

**CRC Handbook of tables for
Organic Compound Identification**



CRC HANDBOOK
of tables for
**ORGANIC
COMPOUND
IDENTIFICATION**

Third Edition

Compiled by
ZVI RAPPOPORT, Ph.D.
Hebrew University of Jerusalem, Israel



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Tables for Identification of Organic Compounds

Compiled by
Max Frankel, Ph.D.
Saul Patai, Ph.D.

Assisted by
Albert Zikha, Ph.D.
Robert Farkas—Kadmon

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Second Edition
Tables for Identification of Organic Compounds

Compiled by
Max Frankel, Ph.D.
Saul Patai, Ph.D.

Assisted by
Albert Zilkha, Ph.D.
Zvi Rappoport, Ph.D.
Robert Farkas—Kadmon

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PREFACE

The present volume is a revised and enlarged third edition of the book formerly titled TABLES FOR IDENTIFICATION OF ORGANIC COMPOUNDS. Four new classes of compounds, i.e., sulfonyl chlorides, sulfonamides, thiols and thioethers were added, bringing the number of classes included in the book to twenty-six. The tables of alkanes, alkenes, alkynes, aromatic hydrocarbons, phenols, nitriles and sulfonic acids were all thoroughly revised and considerably enlarged. In all, the addition of 2400 compounds to the third edition, raised the total number of parent compounds in the book to over 8150.

Three tables containing the dissociation constants of more than 1050 phenols, organic acids and organic bases were added. Correlation charts for I.R., Far I.R. and N.M.R. were also included.

Explanatory sections entitled "Explanations and References" precede the tables. In these sections the formulas of the derivatives and the full reaction equations for their preparation by the most important methods, together with some essential details and references to their preparations, are given.

An index covering both the names and synonyms of the compounds was added at the end of the book. An index listing the names of all tables and major subjects was also added.

The main objective of this book is to assist chemists in the identification of organic compounds. The organization of the compounds in classes according to increasing boiling points should also assist in the search for standard vapor phase chromatography work.

For further information of techniques of organic analysis one or more of the following books should be consulted:

- N. D. Cheronis, J. B. Entrikin and E. M. Hodnett, *Semimicro Qualitative Organic Analysis*, 3rd Ed., Interscience Publishers, New York, 1965.
- L. Meites, *Handbook of Analytical Chemistry*, McGraw Hill Book Co., 1963.
- F. Feigl, *Spot Tests in Organic Analysis*, 6th Ed., Elsevier Publishing Co., 1960.
- A. I. Vogel, *A Textbook of Practical Organic Chemistry*, 3rd Ed., Longmans Green and Co., London, 1957.
- R. L. Shriner, R. C. Fuson and D. Y. Curtin, *The Systematic Identification of Organic Compounds*, 4th Ed., John Wiley and Sons, New York, 1956.
- F. Wild, *Characterization of Organic Compounds*, 2nd Ed., Cambridge University Press, 1958.

The publication of the third edition would not have been possible without the work of those involved in the preparation of the earlier editions. The editor is thankful for the part in the earlier work contributed by Professors M. Frankel, S. Patai and A. Zilkha, and the late Mr. R. Farkas-Kadmon. Thanks are due also to Mrs. E. Shohamy and Mr. A. Glazer for assisting in collection of new data, to Mrs. Y. Elmaleh for typing the index, and especially to Prof. S. Patai, who as consulting editor, read all the new material and gave many helpful suggestions. The cooperation of Dr. Robert C. Weast and Mrs. F. Thomas in the publication of the book is gratefully acknowledged.

Z. R.

Jerusalem
January 1967

LIST OF ABBREVIATIONS USED

$[\alpha]_D^{25}$	specific rotation	fum	fuming	pr	prisms
a	acid	glac	glacial	purp	purple
abs	absolute	glit	glistening	pyr	pyridine
abt	about	glyc	glycerol	rac	racemic (or racemate)
ac a	acetic acid	gran	granular	rect	rectangular
ac anh	acetic anhydride	grn	green	recr	recrystallization
acet	acetone	h	hot	redsh	reddish
add	addition	htng	heating	rhomb	rhombic
al	alcohol	hyd	hydrate or hydrolyses	r	rapid
alk	alkali	hyg, hydr	hygroscopic	r h	rapid heating
amor	amorphous	i	inactive	s	soluble
anh	anhydrous	i	insoluble	sec	secondary
arom	aromatic	ign	ignites	scar	scarcely
aqu	aqueous	insol	insoluble	s h	slow heating
asym, as	asymmetric	l, L	levorotatory (or L-configuration)	sh	short
bl	blue	leaf, lf	leaflets	sl	slightly
blk	black	lg	large	slid	solid
boil	boiling	lgr	ligroin	slend	slender
b p, B P	boiling point	liq	liquid	sm	small
br	brown	lng	long	soft	softens
bz	benzene	lt	light	sol, soln	solution(s)
brt	bright	lvs	leaves	solv	solvent(s)
brnsh	brownish	m-	meta	st	steel
c	cold	me, meth	methyl	stab	stable
ca	about	micr	microscopic	subl	sublimes
caust	caustic	mixt	mixture	sym	symmetrical
chl	chloroform	ml	milliliter	tab, tabl	tablet(s), tables
cl -bz	chlorobenzene	mod	modification	tert	tertiary
col	colorless	monohyd	monohydrate	tetr	tetragonal
comp	compound	monocl	monoclinic	tol	toluene
conc	concentrated	m p, M P	melting point	trans	transparent
cor	corrected	need, nd	needles	thk	thick
cr, cryst	crystals	o-	ortho	tricl	trichinic
d	decomposes	ol	olive	trim	trimeric
d, D	dextrorotatory (or D-configuration)	ord	orange	uns	unsymmetrical
deriv	derivative	org	ordinary	unst	unstable
deliq	deliquescent	orth	organic	vac	vacuum, in vacuo
dil	dilute	oxid	orthorhombic	v	very
dist	distillate	p-	oxidation	var	variable
dk	dark	pa	para	vic-	vicinal
dl, d.l, D,L	racemic	part	pale	visc	viscous
efflor	efflorescent	pet	partly	volat	volatile or volatilizes
et	ethyl	pet eth	petroleum	vlt	violet
et ac	ethyl acetate	ph	petroleum ether	w	water
eth	ether	ph hydraz	phenyl	wh	white
exp	explodes	PhNO ₂	phenyl hydrazine	yel	yellow
f	from	pl	nitrobenzene	yelsh, ylsh	yellowish
fl	flakes	powd	plates	>	above, greater than
fluores	fluorescent		powder	<	below, smaller than
f p	freezing point			∞	miscible
frz	freezes			xyl	xylene

EXPLANATIONS AND REFERENCES TO THE TABLES

The following section gives explanations and references for the preparation of the derivatives appearing in the Tables. Formulas of the derivatives as well as the main methods for their preparation are given. Usually, only the reagents and the solvents required for the preparation of a derivative are mentioned without specific details for the reaction conditions and the exact procedure. The aim of these notes is mainly to enable the worker to choose the method preferable in the conditions and the reagents available to him in his laboratory for the derivatization of his specific compound. However, THIS IS ONLY A REFERENCE SECTION AND NOT AN INSTRUCTION MANUAL AND THE QUOTED REFERENCES SHOULD BE CONSULTED FOR THE ACTUAL PREPARATION OF DERIVATIVES, ESPECIALLY REGARDING SAFETY HAZARDS INVOLVED IN THE WORK.

References are usually given for the preparation of all the derivatives having separate columns in the Tables, as well as for important ones listed in the "miscellaneous" section of the Tables. References to five different popular analytical textbooks are given, assuming that at least one of them, or another equivalent publication, would be available to the worker. These are:

N. D. Cheronis, J. B. Entrikin and E. M. Hodnett, *Semimicro Qualitative Organic Analysis*, 3rd edition, Interscience, New York, 1965, quoted in the text as "Cheronis".

R. P. Linstead and B. C. L. Weedon, *A Guide to Qualitative Organic Chemical Analysis*, Butterworth Scientific Publication, London, 1956, quoted in the text as "Linstead".

R. L. Shriner, R. C. Fuson and D. Y. Curtin, *The Systematic Identification of Organic Compounds*, 4th edition, John Wiley and Sons, New York, 1956, quoted in the text as "Shriner".

A. I. Vogel, *A Textbook of Practical Organic Chemistry*, 3rd edition, Longmans, Green and Co., London, 1957, quoted in the text as "Vogel".

F. Wild, *Characterization of Organic Compounds*, 2nd edition, Cambridge University Press, Cambridge, 1958, quoted in the text as "Wild".

In addition, leading references from the original literature are also given. Although the literature coverage is not complete (especially for the common derivatives) it was attempted to describe different methods, and to give as many references as possible to less common derivatives having limited scope. More references can be found in the textbooks mentioned above.

Derivatives appear either in a separate column or in the "miscellaneous" section in the Tables, where separate columns are usually given for derivatives which should be tried first, and for which enough data are available. Derivatives which should be tried as a second choice, or preferred derivatives for which not enough data are available appear in the "miscellaneous" section. The explanations and the references for the different derivatives are arranged usually in the same order as in the Tables. Occasionally, this order is changed in the explanatory notes in order to describe the derivatives in a logical order (e.g., in Table 17 the phenylurethane appears in a separate column, while the phenylhydantoin appears in the "miscellaneous" section in the "explanations and references" section the phenylhydantoin appears directly after the phenylurethane).

Derivatives which are followed by an asterisk are those recommended for first trial. Other derivatives should be tried after these.

Although "Ar" usually stands for monovalent aromatic group, we used it a few times in the following sections as a polyvalent aromatic residue. This was done only for demonstration purposes.

EXPLANATIONS AND REFERENCES TO TABLE I

As a result of their inertness no general suitable derivative exists for alkanes and cycloalkanes. Characterization is based only on the physical constants given in the Table: melting and boiling points, index of refraction and density. Any laboratory text-book will give adequate directions for the determination of these constants.

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE I. ALKANES AND CYCLOALKANES
a) Gases and Liquids (Listed in order of increasing b.p.)***

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}
1	Methane	-161.49	-182.48 ^T		
2	Ethane	-88.63	-183.27 ^T		
3	Propane	-42.07	-187.69 ^T		0.5005 ^S
4	Cyclopropane	-32.86	-127.42		0.720-79
5	2-Methylpropane (Isobutane)	-11.73	-159.6		0.5572 ^S
6	<i>n</i> -Butane	-0.50	-138.35	1.3326 ^S	0.5788 ^S
7	2,2-Dimethylpropane (Neopentane)	9.503	-16.55	1.342 ^S	0.5910 ^S
8	Cyclobutane	13.08 ⁷⁴¹ , 12.5	-80	1.37520 ⁰	0.7038 ⁰
9	1,1-Dimethylcyclopropane	20.63	-108.96	1.3668	0.6589
10	2-Methylbutane	27.852	-159.9	1.35373	0.61967
11	<i>trans</i> -1,2-Dimethylcyclopropane	29		1.3713	0.6769
12	Ethylcyclopropane	35.94	-149.41	1.3786	0.6839
13	<i>n</i> -Pentane	36.074	-129.721	1.35748	0.62624
14	Methylcyclobutane	36.3		1.3830	0.6933
15	<i>cis</i> -1,2-Dimethylcyclopropane	37	-140.9	1.3822	0.6928
16	Spiropentane	38.977	-107.06	1.41200	0.755
17	Cyclopentane	49.262	-93.879	1.40645	0.74538
18	2,2-Dimethylbutane	49.741	-99.87	1.36876	0.64916
19	1,1,2-Trimethylcyclopropane	56.7 ⁷⁵⁰		1.3848 ^{19 S}	0.6822 ^{19 S}
20	2,3-Dimethylbutane	57.988	-128.538	1.37495	0.66164
21	2-Methylpentane	60.271	-153.67	1.37145	0.65315
22	3-Methylpentane	63.282		1.37652	0.66431
23	1,2,3-Trimethylcyclopropane	65.7 ⁷⁵⁵		1.3945 ¹⁸	0.6946 ¹⁸
24	<i>n</i> -Hexane	68.74	-95.348	1.37486	0.65937
25	Ethylcyclobutane	70.64	-142.85	1.4020	0.7280
26	Methylcyclopentane	71.812	-142.455	1.4097	0.74864
27	2,2-Dimethylpentane	79.197	-123.811	1.38215	0.67385
28	2,4-Dimethylpentane	80.5	-119.242	1.38145	0.67270
29	Cyclohexane	80.738	6.554	1.42623	0.77855
30	2,2,3-Trimethylbutane	80.882	-24.912	1.38944	0.69011
31	3,3-Dimethylpentane	86.064	-134.46	1.39092	0.69327
32	1,1-Dimethylcyclopentane	87.846	-69.795	1.41356	0.75448
33	2,3-Dimethylpentane	89.784		1.39196	0.69508
34	2-Methylhexane	90.052	-118.276	1.38485	0.67859
35	<i>trans</i> -1,3-Dimethylcyclopentane	90.773	-133.702	1.40894	0.74479
36	<i>cis</i> -1,3-Dimethylcyclopentane	91.725	-133.975	1.41074	0.74880
37	3-Methylhexane	91.850		1.38864	0.68713
38	<i>trans</i> -1,2-Dimethylcyclopentane	91.869	-117.58	1.41200	0.75144
39	3-Ethylpentane	93.475	-118.604	1.39339	0.69816
40	Quadricyclane (Quadricyclo [2,2,1,0 ² ,0 ³ ,0 ⁵] heptane)	98		1.4804	
41	<i>n</i> -Heptane	98.427	-90.61	1.38764	0.68376
42	2,2,4-Trimethylpentane	99.238	-107.38	1.39145	0.69192
43	<i>cis</i> -1,2-Dimethylcyclopentane	99.532	-53.892	1.42217	0.77262
44	Methylcyclohexane	100.934	-126.593	1.42312	0.76939
45	Ethylcyclopentane	103.466	-138.446	1.41981	0.76647
46	1,1,3-Trimethylcyclopentane	104.893	-142.44	1.41119	0.74825
47	2,2-Dimethylhexane	106.84	-121.18	1.39349	0.69528
48	2,5-Dimethylhexane	109.103	-91.20	1.39246	0.69354
49	1, <i>trans</i> -2, <i>cis</i> -4-Trimethylcyclopentane	109.29	-130.78	1.41060	0.74727
50	2,4-Dimethylhexane	109.429		1.39534	0.70036
51	2,2,3-Trimethylpentane	109.841	-112.27	1.40295	0.71602
52	1, <i>trans</i> -2, <i>cis</i> -3-Trimethylcyclopentane	110.2	-112.705	1.4138	0.7535
53	3,3-Dimethylhexane	111.969	-126.1	1.40009	0.7100
54	2,3,4-Trimethylpentane	113.467	-109.21	1.40422	0.71906
55	1,1,2-Trimethylcyclopentane	113.729	-21.64	1.42298	0.77252
56	2,3,3-Trimethylpentane	114.76	-100.70	1.40750	0.72619
57	2,3-Dimethylhexane	115.607		1.40113	0.71214
58	3-Ethyl-2-methylpentane	115.65	-114.96	1.40401	0.71932

*Derivative data given in order m p, crystal color, solvent from which crystallized

**T = triple point, S = at saturation pressure

TABLE I. ALKANES AND CYCLOALKANES
a) Gases and Liquids (Listed in order of increasing b.p.*) (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰
59	1, <i>cis</i> -2, <i>trans</i> -4-Trimethylcyclopentane	116 731	-132 55	1 41855	0 76345
60	1, <i>cis</i> -2, <i>trans</i> -3-Trimethylcyclopentane	117 5	-112	1 4218	0 7704
61	2-Methylheptane	117 647	-109 04	1 39494	0 69792
62	4-Methylheptane	117 709	-120 955	1 39792	0 70463
63	3,4-Dimethylhexane	117 725		1 40406	0 71923
64	1, <i>cis</i> -2, <i>cis</i> -4-Trimethylcyclopentane	118		1 422	0 766
65	3-Ethyl-3-methylpentane	118 259	-90 87	1 40775	0 72742
66	3-Ethylhexane	118 534		1 40162	0 71358
67	3-Methylheptane	118 925	-120 5	1 39848	0 70582
68	Cycloheptane (Suberane)	118 20	-7 98	1 4449	0 8275°
69	<i>trans</i> -1,4-Dimethylcyclohexane	119 351	-36 962	1 42090	0 76255
70	1,1-Dimethylcyclohexane	119 543	-33 495	1 42900	0 78094
71	<i>cis</i> -1,3-Dimethylcyclohexane	120 088	-75 573	1 42294	0 76603
72	<i>trans</i> -1-Ethyl-3-methylcyclopentane	120 8	-108	1 4186	0 7619
73	<i>trans</i> -1-Ethyl-2-methylcyclopentane	121 2		1 4219	0 7690
74	<i>cis</i> -1-Ethyl-3-methylcyclopentane	121 4		1 4203	0 7724
75	1-Ethyl-1-methylcyclopentane	121 522	-143 80	1 42718	0 78093
76	2,2,4,4-Tetramethylpentane	122 284	-66 54	1 40694	0 71947
77	1, <i>cis</i> -2, <i>cis</i> -3-Trimethylcyclopentane	123 0	-116 43	1 4262	0 7792
78	<i>trans</i> -1,2-Dimethylcyclohexane	123 419	-88 194	1 42695	0 77601
79	2,2,5-Trimethylhexane	124 084	-105 78	1 39972	0 70721
80	<i>cis</i> -1,4-Dimethylcyclohexane	124 321	-87 436	1 42966	0 78285
81	<i>trans</i> -1,3-Dimethylcyclohexane	124 45	-90 108	1 43085	0 78472
82	<i>n</i> -Octane	125 665	-56 795	1 39743	0 70252
83	Isopropylcyclopentane	126 419	-111 375	1 42582	0 77653
84	2,2,4-Trimethylhexane	126 54	-120	1 4033	0 7156
85	<i>cis</i> -1-Ethyl-2-methylcyclopentane	128 050	-105 95	1 42933	0 78522
86	<i>cis</i> -1,2-Dimethylcyclohexane	129 728	-50 023	1 43596	0 79627
87	2,4,4-Trimethylhexane	130 38	-113 38	1 40745	0 72381
88	<i>n</i> -Propylcyclopentane	130 8	-118 7	1 4266	0 7761
89	2,3,5-Trimethylhexane	131 34	-127 8	1 4061	0 7219
90	Ethylcyclohexane	131 783	-111 323	1 43304	0 78792
91	2,2-Dimethylheptane	132 69	-113 0	1 4016	0 7105
92	2,2,3,4-Tetramethylpentane	133 016	-121 09	1 41472	0 73895
93	2,4-Dimethylheptane	133 5		1 4033	0 716
94	Methylcycloheptane	133 5		1 4410	0 8052
95	2,2,3-Trimethylhexane	133 6		1 4105	0 7292
96	4-Ethyl-2-methylhexane	133 8		1 4068	0 723
97	3-Ethyl-2,2-dimethylpentane	133 83	-99 2	1 4123	0 7348
98	4,4-Dimethylheptane	135 2		1 4076	0 725
99	2,6-Dimethylheptane	135 21	-102 9	1 4007	0 7089
100	2,5-Dimethylheptane	136 0		1 4038	0 715
101	3,5-Dimethylheptane	136 0		1 4067	0 723
102	Bicyclo[4.2.0]octane	136 0		1 4613	0 8573
103	<i>cis</i> -Bicyclo[3.3.0]octane	136-6 5		1 4595 ²⁵	0 8638 ²⁵
104	2,4-Dimethyl-3-ethylpentane	136 73	-122 2	1 4137	0 7379
105	1,1,3-Trimethylcyclohexane	137-8		1 4362	0 7868 ²⁵
106	3,3-Dimethylheptane	137 3		1 4085	0 725
107	2,2,5,5-Tetramethylhexane	137 5		1 40550	0 71875
108	2,3,3-Trimethylhexane	137 68	-116 80	1 4141	0 738
109	3-Ethyl-2-methylhexane	138		1 4120	0 731
110	<i>trans</i> -1,3,5-Trimethylcyclohexane	138 5-9 ⁷⁵⁴		1 42740 _H	0 7720
111	2,3,4-Trimethylhexane	139 0		1 4144	0 7392
112	<i>cis</i> -1,3,5-Trimethylcyclohexane	140-0 5 ⁷⁵²		1 43010 _H	0 7773
113	<i>trans</i> -1,2,4-Trimethylcyclohexane	140-1		1 43121 _{He}	0 7813
114	2,2,3,3-Tetramethylpentane	140 274	-9 9	1 42360	0 75666
115	4-Ethyl-3-methylhexane	140 4		1 416	0 742
116	3,3,4-Trimethylhexane	140 46	-101 2	1 4178	0 7454
117	2,3-Dimethylheptane	140 5		1 4085	0 7260

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE I. ALKANES AND CYCLOALKANES
a) Gases and Liquids (Listed in order of increasing b.p. *) (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}
118	3,4-Dimethylheptane	140.6		1.4111	0.7314
119	3-Ethyl-3-methylhexane	140.6		1.4142	0.741
120	4-Ethylheptane	141.2		1.4096	0.730
121	2,3,3,4-Tetramethylpentane	141.551	-102.123	1.42222	0.75473
122	2,3-Dimethyl-3-ethylpentane	142		1.419	0.754
123	<i>trans</i> -1,2,3-Trimethylcyclohexane	142.35 ⁷⁸²		1.43582 _{He}	0.7914
124	1-Isopropyl-3-methylcyclopentane (Pulegan)	142.4		1.4236	0.7730 ²²
125	4-Methyloctane	142.48	-113.2	1.4061	0.7199
126	1-Isopropyl-2-methylcyclopentane	142.5 ⁷⁵⁹		1.4279	0.7792
127	3-Ethylheptane	143.0		1.4093	0.727
128	2-Methyloctane	143.26	-80.4	1.4031	0.7134
129	<i>cis</i> -1,2,3-Trimethylcyclohexane	144-6 ⁷⁵³		1.43682 _{He}	0.7930
130	3-Methyloctane	144.18	-107.6	1.4062	0.7207
131	2,4,6-Trimethylheptane	144.8		1.4071	0.7225
132	<i>cis</i> -1,2,4-Trimethylcyclohexane	146		1.43209	0.786
133	3,3-Diethylpentane	146.168	-33.11	1.42051	0.75359
134	2,2-Dimethyl-4-ethylhexane	147		1.4131	0.733
135	2,2,4-Trimethylheptane	147.7		1.4092	0.7275
136	2,2,4,5-Tetramethylhexane	147.8		1.41318	0.73546
137	2,2,5-Trimethylheptane	148		1.409	0.726
138	2,2,6-Trimethylheptane	148.2		1.4059	0.7195
139	2,2,3,5-Tetramethylhexane	148.4		1.4142	0.7378
140	Nopinane (7,7-Dimethylbicyclo[3.1.1]heptane)	149 ⁷⁴⁷		1.4641	0.8611 ²²
141	<i>trans</i> -1-Ethyl-4-methylcyclohexane	149.05-15	-80.8	1.4304	0.7798
142	Cyclooctane	150 ⁷⁵⁰	14(4.3)	1.4586	0.8349
143	1-Ethyl-2-methylcyclohexane	150.2		1.432	0.784
144	<i>n</i> -Nonane	150.81	-53.519	1.40542	0.71763
145	1,3,3-Trimethylbicyclo[2.2.1]heptane (Fenchane)	151.2		1.44714	0.8345
146	<i>trans</i> -1-Ethyl-4-methylcyclohexane	151.69		1.4382	0.7972
147	<i>cis</i> -1,1,3,5-Tetramethylcyclohexane	152.4-5		1.4319	0.7813
148	<i>cis</i> -1-Ethyl-4-methylcyclohexane	152.55-60		1.4374	0.7969
149	2,5,5-Trimethylheptane	152.8		1.4136	0.7368
150	2,4,4-Trimethylheptane	153		1.412	0.733
151	2,3,3,5-Tetramethylhexane	153		1.4196	0.746
152	2,2,4,4-Tetramethylhexane	153.3		1.4208	0.7470
153	Isopropylcyclohexane	154.5	-89.8	1.44095	0.80232
154	1,1,3,3-Tetramethylcyclohexane	154.8-5.0		1.4374	0.7936
155	2,2,3,4-Tetramethylhexane	154.9		1.4226	0.7548
156	2,2-Dimethyloctane	155		1.4082	0.7245
157	3-Ethyl-2,2,4-trimethylpentane	155.3		1.4223	0.7571
158	3,3,5-Trimethylheptane	155.6		1.4170	0.7428
159	2,3,6-Trimethylheptane	155.7		1.4125	0.7345
160	2,4-Dimethyloctane	155.8-6.0		1.4090	0.7259 ²⁰
161	<i>d,l-cis</i> -1-Ethyl-3-methylcyclohexane	155.97		1.4432	0.8094
162	<i>d,l</i> -2,5-Dimethyloctane	156-8		1.4160	0.7370
163	1,1,3,5-Tetramethylcyclohexane	156.4-5		1.4370	0.7929
164	<i>n</i> -Butylcyclopentane	156.56	-107.985	1.4316	0.7846
165	<i>n</i> -Propylcyclohexane	156.724	-94.90	1.43705	0.79360
166	2,3,5-Trimethylheptane	157		1.416	0.741
167	2,5-Dimethyl-3-ethylhexane	157		1.416	0.741
168	2,4,5-Trimethylheptane	157		1.4160	0.741
169	2,4-Dimethyl-3-isopropylpentane	157		1.42463	0.75830
170	2,2,3-Trimethylheptane	158		1.417	0.7420
171	2,4-Dimethyl-4-ethylhexane	158		1.419	0.747
172	2,2-Dimethyl-3-ethylhexane	159		1.420	0.749
173	2,2,3,4,4-Pentamethylpentane	159.3		1.43069	0.76703
174	1,1,3,4-Tetramethylcyclohexane	159.5-6.1		1.4380	0.7976
175	5-Ethyl-2-methylheptane	159.7		1.4134	0.736
176	2,7-Dimethyloctane	159.9		1.4086	0.7242

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE I. ALKANES AND CYCLOALKANES
a) Gases and Liquids (Listed in order of increasing b.p.*) (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}
177	3,6-Dimethyloctane	160		1.4145 ¹⁸	0.7363
178	3,5-Dimethyloctane	160		1.413	0.736
179	4-Isopropylheptane	160		1.417	0.741
180	2,3,3-Trimethylheptane	160		1.4202	0.7488
181	4-Ethyl-2-methylheptane	160		1.413	0.736
182	2,6-Dimethyloctane	160-0.5		1.4113	0.7285
183	2,2,3,3-Tetramethylhexane	160.3		1.42818	0.76446
184	<i>trans</i> -1-Isopropyl-4-methylcyclohexane (<i>p</i> -Menthane)	161		1.4393	0.792
185	4,4-Dimethyloctane	161		1.4144	0.7347
186	2,3,4,5-Tetramethylhexane	161		1.424	0.757
187	5-Ethyl-3-methylheptane	161		1.414	0.737
188	3,3-Dimethyloctane	161.2		1.4165	0.7390
189	4,5-Dimethyloctane	162		1.4173	0.7458
190	3,4-Diethylhexane	162		1.420	0.754
191	4-Propylheptane	162		1.4150	0.7364
192	1,1,4-Trimethylcycloheptane (Eucarvane)	162.3 ⁷²⁰		1.4420	0.8011
193	<i>trans</i> -1,2,3,5-Tetramethylcyclohexane	162.4		1.4465 ^{7He}	0.8140
194	2,3,4,4-Tetramethylhexane	162.2		1.4270	0.7639
195	2,3,4-Trimethylheptane	163		1.421	0.751
196	3-Isopropyl-2-methylhexane	163		1.421	0.751
197	2,2,7-Trimethylbicyclo[2.2.1]heptane (α -Fenchane)	163.5.4.5 ⁷⁵³		1.4590	0.8579
198	3-Ethyl-3-methylheptane	163.8		1.4208	0.7501
199	2,4-Dimethyl-3-ethylhexane	164		1.424	0.759
200	3,4,4-Trimethylheptane	164		1.424	0.757
201	3,3,4-Trimethylheptane	164		1.424	0.757
202	3,4,5-Trimethylheptane	164		1.424	0.759
203	2,3-Dimethyl-4-ethylhexane	164		1.424	0.759
204	1-Methyl-3-propylcyclohexane	164-5 (171.3)		1.4377	0.7895 ²¹
205	2,3-Dimethyloctane	164.4.4.6 ⁷⁶⁴		1.4152	0.7377
206	<i>d,l</i> -Pinane	164.5.5.0		1.4609	0.8551
207	2,3,3,4-Tetramethylhexane	164.6		1.4297	0.7694
208	3,3-Dimethyl-4-ethylhexane	165		1.427	0.764
209	5-Methylnonane	165.1	-87.7	1.4122	0.7326
210	4-Methylnonane	165.7	-98.7	1.4123	0.7323
211	3-Ethyl-2-methylheptane	166		1.418	0.746
212	3,4-Dimethyloctane	166		1.4182	0.746
213	<i>d</i> - α -Pinane	166.6.5 ⁷⁶²		1.4630	0.8560
214	<i>d,l</i> -1-Isopropyl-3-methylcyclohexane (<i>d,l-m</i> -Menthane)	166.7		1.44 ²⁴	0.7965 ²⁴
215	2,2,3,3,4-Pentamethylpentane	166.1		1.43606	0.78009
216	<i>trans</i> -1,2,4,5-Tetramethylcyclohexane	166.2-8.0		1.44446 ^{He}	0.8100
217	3,3-Diethylhexane	166.3		1.428	0.767
218	2-Methylnonane	166.8	-74.5	1.4099	0.7281
219	<i>d</i> -1-Isopropyl-3-methylcyclohexane (<i>d-m</i> -Menthane)	167		1.446 ²³	0.8116 ²³
220	3-Ethyl-4-methylheptane	167		1.422	0.753
221	4-Ethyl-3-methylheptane	167		1.422	0.753
222	4-Ethyl-4-methylheptane	167		1.421	0.752
223	<i>l</i> - β -Pinane	167.5-8 ⁷⁴⁸		1.4605	0.8567
224	3-Methylnonane	167.8	-84.8	1.4125	0.7334
225	3-Ethylheptane	168		1.416	0.740
226	4-Ethylheptane	168		1.416	0.740
227	3-Ethyl-2,2,3-trimethylpentane	168		1.436	0.781
228	<i>l</i> -1-Isopropyl-3-methylcyclohexane (<i>l-m</i> -Menthane)	168		1.4358	0.7938
229	<i>cis</i> -1-Isopropyl-4-methylcyclohexane (<i>cis-p</i> -Menthane ^e)	168.5		1.4515	0.816
230	<i>cis</i> -1,2,3,5-Tetramethylcyclohexane	168-70 ⁷⁶²		1.44847 ^{He}	0.8166
231	2,3-Dimethyl-3-ethylhexane	169		1.427	0.765

*Derivative data given in order m p, crystal color solvent from which crystallized

TABLE I. ALKANES AND CYCLOALKANES
a) Gases and Liquids (Listed in order of increasing b.p.*) (Continued)

No	Name		Boiling point, °C	n _D ²⁰	D ₄ ²⁰
232	1-Isopropyl-4-methylcyclohexane (<i>p</i> -Menthane)	169 70		1 4375 ²¹	0 7929
233	3,4-Dimethyl-3-ethylhexane	170		1 431	0 772
234	3,3,4,4-Tetramethylhexane	170		1 4368	0 7824
235	Cyclononane	170-2	9 7	1 4328 ¹⁶	0 8534 ^{15,2}
236	1-Isopropyl-2-methylcyclohexane (<i>o</i> -Menthane)	171		1 447 ²¹	0 8135 ²¹
237	<i>cis</i> -1,2,4,5-Tetramethylcyclohexane	171 ⁷⁵⁵		1 44647 _{He}	0 8122
238	1-Methyl-1-propylcyclohexane	172		1 4440	0 8101
239	<i>n</i> -Decane	174 123	-29 661	1 41189	0 73005
240	1-Methyl-4-propylcyclohexane	174 3-7 1		1 4393	0 798
241	1-Methyl-2-propylcyclohexane	175 5 6 0 ^{7 6}		1 4468 ¹⁹	0 8130 ¹⁹
242	<i>n</i> -Pentylcyclopentane	180 60 ¹⁰	-83	1 4358	0 7912
243	<i>n</i> -Butylcyclohexane	180 947	-74 725	1 44075	0 79918
244	<i>trans</i> -Decahydronaphthalene (<i>trans</i> -Decalin)	187 25	-30 40	1 4695	0 8699
245	Isoamylcyclohexane	193		1 4423	0 8023
246	<i>cis</i> -Decahydronaphthalene (<i>cis</i> -Decalin)	195 69	-43 01	1 4810	0 8965
247	<i>n</i> -Undecane (<i>n</i> Hendecane)	195 89	-25 594	1 41716	0 74017
248	Cyclodecane	201	9 6	1 4692	0 8577 ^{20,4}
249	<i>n</i> -Pentylcyclohexane	202 8	-57 5	1 4437	0 8037
250	<i>n</i> -Hexylcyclopentane	203		1 4392	0 7965
251	9-Methyl- <i>trans</i> -decahydronaphthalene	205, 77 ¹⁰		1 4631	0 8620
252	1,10-Dimethyl- <i>trans</i> -decahydronaphthalene	213 83 ¹⁰		1 4659	0 8633
253	9-Methyl- <i>cis</i> -decahydronaphthalene	215 85 ¹⁰		1 4804	0 8910
254	<i>n</i> -Dodecane	216 278, 51 84 ¹	-9 587 (-12)	1 42160	0 74869
255	1,10-Dimethyl- <i>cis</i> -decahydronaphthalene	220, 88 99 ¹⁰		1 4812	0 8896
256	<i>n</i> -Hexylcyclohexane	224 0, 92 0 ¹⁰	-43	1 4462	0 8076
257	<i>n</i> -Heptylcyclopentane	224		1 4421	0 8010
258	9-Ethyl- <i>trans</i> -decahydronaphthalene	225 93 06 ¹⁰		1 466	0 8610
259	9-Ethyl- <i>cis</i> -decahydronaphthalene	233 99 ¹⁰		1 480	0 8860
260	1-Methyl- <i>trans</i> -decahydronaphthalene	235, 101 ¹⁰		1 4270	
261	<i>n</i> -Tridecane	235 44 66 35 ¹	-5 392	1 4256	0 7564
262	Bicyclohexyl	236 5 7 5, 100 ¹⁰	3 5-4 0	1 4795	0 8848
263	<i>n</i> -Octylcyclopentane	243		1 4446	0 8048
264	<i>n</i> -Heptylcyclohexane	244		1 4484	0 8109
265	<i>n</i> -Tetradecane	235 57, 80 13 ¹	5 863	1 4289	0 7628
266	<i>n</i> -Nonylcyclopentane	262		1 4467	0 8081
267	<i>n</i> -Octylcyclohexane	264		1 4503	0 8138
268	<i>n</i> -Pentadecane	270 63, 93 26 ¹	9 926	1 4319	0 7685
269	<i>n</i> -Decylcyclopentane	279 3		1 44862	0 81097
270	<i>n</i> -Nonylcyclohexane	282		1 4519	0 8163
271	<i>n</i> -Undecylcyclopentane (<i>n</i> -Hendecylcyclopentane)	296		1 4503	0 8135
272	<i>n</i> -Decylcyclohexane	299		1 45338	0 81858
273	2-Methylheptadecane	311, 178 5 ¹⁵		1 4394 ¹⁴	0 7838 ¹⁵
274	<i>n</i> -Dodecylcyclopentane	312		1 4518	0 8158
275	<i>n</i> -Undecylcyclohexane (<i>n</i> -Hendecylcyclohexane)	316	5 8	1 4547	0 8206
276	<i>n</i> -Tridecylcyclopentane	327	5	1 4531	0 8178
277	<i>n</i> -Dodecylcyclohexane	331	12 5	1 4559	0 8223
278	<i>n</i> -Tetradecylcyclopentane	341	9	1 4543	0 8196

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE I. ALKANES AND CYCLOALKANES
b) Solids (Listed in order of increasing m.p.)***

No.	Name	Melting point, °C	Boiling point, °C	n_D	D_4
1	Pentadecylcyclopentane	17	355	1.4554 ²⁰	0.8213 ²⁰
2	<i>n</i> -Hexadecane (Cetane)	18.165	286.793; 105.20 ¹	1.43453 ²⁰	0.7734 ²⁰
3	Tridecylcyclohexane	18.5	346	1.4570 ²⁰	0.8239 ²⁰
4	Hexadecylcyclopentane	21		1.4543 ²⁵	0.8194 ²⁵
5	<i>n</i> -Heptadecane	21.98	301.82; 117.26 ¹	1.4348 ²⁵ ; 1.4369 ²⁰ _U	0.7745 ²⁵ ; 0.7780 ²⁰ _U
6	Tetradecylcyclohexane	24		1.4559 ²⁵	0.8221 ²⁵
7	Heptadecylcyclopentane	27		1.4532 ³⁰	0.8173 ³⁰
8	<i>n</i> -Octadecane	28.18	316.12; 128.28 ¹	1.4191 ⁷⁰ ; 1.4390 ²⁰ _U	0.7751 ³⁰ ; 0.7819 ²⁰ _U
9	Pentadecylcyclohexane	29		1.4545 ³⁰	0.8201 ³⁰
10	Octadecylcyclopentane	30		1.4541 ³⁰	0.8186 ³⁰
11	<i>n</i> -Nonadecane	32.1	329.7; 138.8 ¹	1.4211 ⁷⁰ ; 1.4409 ²⁰ _U	0.7787 ³⁰ ; 0.7855 ²⁰ _U
12	Hexadecylcyclohexane	33.6		1.4596 ²⁰	0.8279 ²⁰
13	Nonadecylcyclopentane	35		1.4588 ²⁰	0.8266 ²⁰
14	<i>n</i> -Eicosane	36.8	342.7; 148.9 ¹	1.4230 ⁷⁰ ; 1.4426 ²⁰ _U	0.7550 ⁷⁰ ; 0.7887 ²⁰ _U
15	Heptadecylcyclohexane	37.8		1.4603 ²⁰	0.8290 ²⁰
16	Eicosylcyclopentane	38		1.4595 ²⁰	0.8276 ²⁰
17	<i>n</i> -Heneicosane	40.5	356.5; 152.94 ¹	1.4247 ⁷⁰ ; 1.4441 ²⁰ _U	0.7583 ⁷⁰ ; 0.7917 ²⁰ _U
18	Octadecylcyclohexane	41.6		1.4610 ²⁰	0.8300 ²⁰
19	Heneicosylcyclopentane	42		1.4602 ²⁰	0.8286 ²⁰
20	<i>n</i> -Docosane	44.4 (47)	368.6; 161.88 ¹	1.4260 ⁷⁰ ; 1.4455 ²⁰ _U	0.7631 ⁷⁰ ; 0.8295 ²⁰ _U
21	Docosylcyclopentane	45		1.4608 ²⁰	0.8295 ²⁰
22	Nonadecylcyclohexane	45.2		1.4616 ²⁰	0.8310 ²⁰
23	<i>n</i> -Tricosane	47.6	380.2; 170.48 ¹	1.4276 ⁷⁰ ; 1.4468 ²⁰ _U	0.7641 ⁷⁰ ; 0.7969 ²⁰ _U
24	Eicosylcyclohexane	48.5		1.4622 ²⁰	0.8318 ²⁰
25	Tricosylcyclopentane	49		1.4614 ²⁰	0.8304 ²⁰
26	<i>n</i> -Tetracosane	50.9	391.3; 178.7 ¹	1.4286 ⁷⁰ ; 1.4480 ²⁰ _U	0.7657 ⁷⁰ ; 0.7991 ²⁰ _U
27	Tetracosylcyclopentane	51		1.4619 ²⁰	0.8312 ²⁰
28	Heneicosylcyclohexane	51.5		1.4627 ²⁰	0.8326 ²⁰
29	<i>n</i> -Pentacosane	53.7	401.9; 186.55 ¹	1.4302 ⁷⁰ ; 1.4491 ²⁰ _U	0.7693 ⁷⁰ ; 0.8012 ²⁰ _U
30	Pentacosylcyclopentane	54		1.4624 ²⁰	0.8319 ²⁰
31	Docosylcyclohexane	54.4		1.4632 ²⁰	0.8334 ²⁰
32	Hexacosylcyclopentane	56		1.4628 ²⁰	0.8326 ²⁰
33	Nortricyclene (Tricyclo[2.2.1.0 ^{2,6}]heptane)	56	106-7		
34	<i>n</i> -Hexacosane	56.4	412.2; 194.18 ¹	1.4310 ⁷⁰ ; 1.4501 ²⁰	0.7704 ⁷⁰ ; 0.8032 ²⁰
35	Cyclohexadecane	57	93-8 ^{0,8}		
36	Tricosylcyclohexane	57		1.4637 ²⁰	0.8341 ²⁰
37	Heptacosylcyclopentane	59		1.4633 ²⁰	0.8333 ²⁰
38	<i>n</i> -Heptacosane	59.0	422.1; 201.54 ¹	1.4321 ⁷⁰ ; 1.4511 ²⁰ _U	0.7732 ⁷⁰ ; 0.8050 ²⁰ _U
39	Tetracosylcyclohexane	59.5		1.4641 ²⁰	0.8347 ²⁰
40	Cyclopentadecane	60-1		1.4592 ^{61,5}	0.8634 ^{61,5}
41	Octacosylcyclopentane	61		1.4637 ²⁰	0.8339 ²⁰
42	<i>n</i> -Octacosane	61.4	431.6; 208.58 ¹	1.4330 ⁷⁰ ; 1.4520 ²⁰ _U	0.7750 ⁷⁰ ; 0.8067 ²⁰ _U
43	Pentacosylcyclohexane	61.9		1.4645 ²⁰	0.8353 ²⁰
44	Nonacosylcyclopentane	63		1.4640 ²⁰	0.8345 ²⁰
45	<i>n</i> -Nonacosane	63.7	440.8; 172.36 ^{0,1}	0.7797 ⁶⁵ ; 1.4529 ²⁰ _U	1.4361 ⁶⁵ ; 0.8083 ²⁰ _U

*Derivative data given in order: m.p., crystal color, solvent from which crystallized.

**U = undercooled liquid.

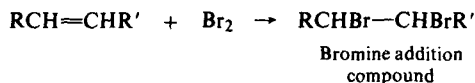
TABLE I. ALKANES AND CYCLOALKANES
b) Solids (Listed in order of increasing m.p.) (Continued)**

No	Name	Melting point, °C	Boiling point, °C	n _D	D ₄
46	Hexacosylcyclohexane	64		1 4649 ²⁰	0 8359 ²⁰
47	Triacosylcyclopentane	65		1 4644 ²⁰	0 8350 ²⁰
48	<i>d,l</i> -Isobornane (2,2,3-Trimethylbicyclo[2 2 1]heptane)	65-7		1 44186 ⁶⁷	0 82757 ⁶⁷
49	<i>n</i> -Triacontane	65 8	449 7, 222 00 ¹	1 4348 ⁷⁰ , 1 4536 ²⁰	0 7797 ⁷⁰ , 0 8097 ²⁰
50	Heptacosylcyclohexane	66 1		1 4653 ²⁰	0 8365 ²⁰
51	Hentriacontylcyclopentane	67		1 4648 ²⁰	0 8356 ²⁰
52	<i>n</i> -Hentriacontane	67 9	458, 184 17 ^{0 1}	1 4543 ²⁰	0 8111 ²⁰
53	Octacosylcyclohexane	68		1 4656 ²⁰	0 8370 ²⁰
54	Dotriacontylcyclopentane	69		1 4651 ²⁰	0 8360 ²⁰
55	<i>n</i> -Dotriacontane (Bicetyl)	69 7	467, 234 8 ¹	1 4550 ²⁰	0 7791 ⁷⁵ , 0 8124 ²⁰
56	Nonacosylcyclohexane	69 9		1 4659 ²⁰	0 8374 ²⁰
57	Trtriacontylcyclopentane	70		1 4654 ²⁰	0 8365 ²⁰
58	Trtriacontane	71 4		1 4557 ²⁰	0 8136 ²⁰
59	Triacosylcyclohexane	71 6		1 4662 ²⁰	0 8379 ²⁰
60	Tetatriacontylcyclopentane	72		1 4657 ²⁰	0 8370 ²⁰
61	Tetatriacontane	72 6, 73 1	285 4 ³	1 4296 ⁹⁰ , 1 4563 ²⁰	0 7728 ⁹⁰ , 0 8148 ²⁰
62	28-Methylnonacosane	73 4	222 ^{0 3}		
63	Hentriacontylcyclohexane	73 3		1 4665 ²⁰	0 8383 ²⁰
64	Pentatriacontylcyclopentane	74		1 4660 ²⁰	0 8374 ²⁰
65	Pentatriacontane	74 7	331	1 4568 ²⁰	0 8157 ²⁰
66	Dotriacontylcyclohexane	74 8		1 4668 ²⁰	0 8388 ²⁰
67	Hexatriacontylcyclopentane	75		1 4662 ²⁰	0 8378 ²⁰
68	Hexatriacontane	76 2		1 4573 ²⁰	0 8169 ²⁰
69	Trtriacontylcyclohexane	76 3		1 4670 ²⁰	0 8391 ²⁰
70	Heptatriacontane	77 7		1 4578 ²⁰	0 8179 ²⁰
71	Tettriacontylcyclohexane	77 7		1 4673 ²⁰	0 8395 ²⁰
72	Octatriacontane	79		1 4583 ²⁰	0 8188 ²⁰
73	Pentatriacontylcyclohexane	79 1		1 4675 ²⁰	0 8399 ²⁰
74	Nonatriacontane	80 3		1 4588 ²⁰	0 8197 ²⁰
75	Hexatriacontylcyclohexane	80 4		1 4678 ²⁰	0 8402 ²⁰
76	Tetracontane	81 5		1 4593 ²⁰	0 8205 ²⁰
77	Norbornane (Bicyclo[2 2 1]heptane)	86-7, subl			
78	2,2,3,3-Tetramethylbutane	100 69	106 47	1 4695 ²⁰	0 8242 ²³ solid
79	Bornane (Camphane)	158 9, subl			
80	Adamantane	268 (252 3)		1 568	1 07 ^{solid}

*Derivative data given in order m p , crystal color, solvent from which crystallized

**U = undercooled liquid

EXPLANATIONS AND REFERENCES TO TABLE II

*Bromine addition compound.**

From the alkene and bromine in carbon tetrachloride.

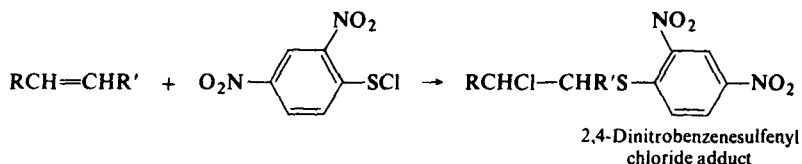
For directions and examples see: Cheronis, p. 576; Shriner, p. 106.

From the alkene and bromine in water.

See: Vogel, p. 241.

From the alkene and bromine in chloroform.

See: C. G. Schmitt and C. E. Boord, *J. Amer. Chem. Soc.*, **54**, 751 (1932).

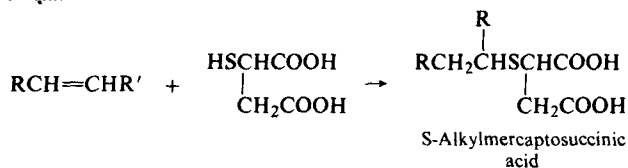
*2,4-Dinitrobenzenesulfonyl chloride addition compound.**

From the alkene and 2,4-dinitrobenzenesulfonyl chloride in glacial acetic acid.

For directions and examples see: Cheronis, p. 577; N. Kharasch and C. M. Buess, *J. Amer. Chem. Soc.*, **71**, 2724 (1949); D. J. Cram, *J. Amer. Chem. Soc.*, **71**, 3883 (1949); N. Kharasch, C. M. Buess and S. I. Strashun, *J. Amer. Chem. Soc.*, **74**, 3422 (1952).

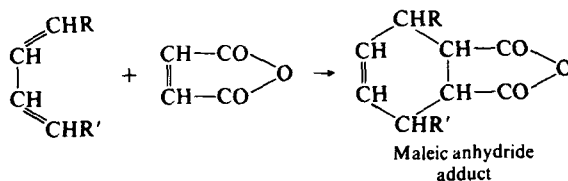
From the alkene and 2,4-dinitrobenzenesulfonyl chloride in benzene or in carbon tetrachloride.

See: N. Kharasch and C. M. Buess, *J. Amer. Chem. Soc.*, **71**, 2724 (1949).

*S-Alkylmercaptosuccinic acid.**

From the alkene, mercaptosuccinic acid and benzoyl peroxide in methanol.

For directions and examples see: J. G. Hendrickson and L. F. Hatch, *J. Org. Chem.*, **25**, 1747 (1960).

Maleic anhydride adduct (from dienes).

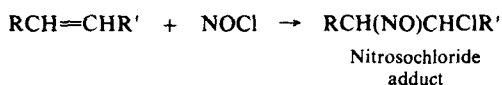
From the diene and maleic anhydride in benzene.

For directions and examples see: Linstead, p. 51; Vogel, p. 943.

From the diene and maleic anhydride in xylene.

See: Linstead, p. 51.

For general references see: M. C. Kloetzel in *Organic Reactions*, Vol. 4 (Ed. R. Adams), John Wiley and Sons, New York, 1948, p. 1; H. L. Holmes in *Organic Reactions*, Vol. 4, (Ed. R. Adams), John Wiley and Sons, New York, 1948, p. 60; O. Diels and K. Alder, *Chem. Ber.*, **62**, 2081 (1929).

Nitrosochloride addition compound.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE II (Continued)

From the alkene and nitrosyl chloride (prepared from sodium nitrite in concentrated hydrochloric acid) in ether-acetic acid mixture.

For directions and examples see: Linstead, p. 52; R. Perrot, *Compt. Rend.*, **203**, 329 (1936).

From the alkene and nitrosyl chloride (prepared from thionyl chloride and nitrogen trioxide) in ether.
See: M. Tuot, *Compt. Rend.*, **204**, 697 (1937).

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)***

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						x-Bromo-	B P, °C	M P, °C	n _D ²⁰	D ₄ ²⁰	
1	Ethene (Ethylene)	-103.71	-169.15 ^T		0.384 ⁰	di-	131.36	9.85	1.53868	2.1792	
2	Propene (Propylene)	-47.70	-185.25 ^T		0.5139	di-	141.99	-55.5	1.52004	1.93268	
3	Cyclopropene	-36 ¹¹¹									
4	Allene	-34.5	-136					10.7	1.6200	2.703	
5	2-Methylpropene	-6.90	-140.35	1.3467	0.5942 ^S	di-	149		1.5080	1.7595	2,4-Dinitrophenyl-sulfonyl chloride, 86.7
6	1-Butene	-6.26	-185.35	1.3465	0.5951	di-	166.3		1.5150	1.7951	2,4-Dinitrophenyl-sulfonyl chloride, 77.5-8.5
7	1,3-Butadiene	-4.41	-108.92	1.4292 ² 0.650 ¹	0.6255 ¹	tetra-		118 lgr			
8	trans-2-Butene	0.88	-105.55		0.6042 ^S	di-	161.0		1.5110	1.7852	
9	Cyclobutene	2.4			0.733 ⁰						
10	cis-2-Butene	3.72	-138.91		0.6306 ¹	di-	161.0		1.5110	1.7852	
11	1,2-Butadiene (Methylallene)	10.85	-136.19	1.4208 ¹	0.652 ^S	tetra-	97.5	-2	1.6070	2.5085	
12	3-Methyl-1-butene	20.06	-168.49	1.3643	0.6272	di-	61.2 ¹²		1.50932	1.6776	
13	1,4-Pentadiene	25.97	-148.28	1.38876	0.66706	tetra-		85.5-6.0, eth			
14	1-Pentene	29.97	-165.22	1.37148	0.64050	di-	68 ¹²		1.5012 ¹²	1.592 ¹⁹	Mercaptosuccinic acid adduct, 107.3-6
15	2-Methyl-1-butene	31.16	-137.56	1.3778	0.6504	di-	47.4-48 ⁹		1.5088	1.6711	Mercaptosuccinic acid adduct, 122.3-6
16	3-Methylcyclobutene	32		1.4005							
17	2-Methyl-1,3-butadiene (Isoprene)	34.07	-145.95	1.42194	0.68095	di- tetra-	90-6 ¹² 155 60 ¹²				Maleic anhyd adduct, 63-4, lgr
18	trans-2-Pentene	36.35	-140.24	1.3793	0.6482	di-	91.0 ⁵⁰		1.5096	1.6809	
19	cis-2-Pentene	36.94	-151.39	1.3830	0.6556	di-	92.4 ⁵⁰		1.5096	1.6817	
20	1-Methyl-1-cyclobutene	37.1		1.4088	0.7244						
21	2-Methyl-2-butene	38.57	-133.77	1.3874	0.6623						Nitroschloride, 74, Mercaptosuccinic acid adduct, 153.7-4.0
22	3-Methyl-1,2-butadiene (1,1-Dimethylallene)	40		1.410	0.680	tetra-	150.2 ¹		1.594 ¹⁷	2.305 ¹⁷	
23	Cyclopentadiene	40.83 ²	-85	1.4398 ^{19,5}	0.7983 ¹⁹						Dimer 32, Maleic anhyd adduct, 164.5 Benzoquinone adduct, 75.6
24	1,3-Pentadiene (Piperylene)	41.1	-88.9	1.4309	0.6803	tetra-		114.5, al			Maleic anhyd adduct, 61, pet eth, Oxid by KMnO ₄ → HCOOH + CH ₃ COOH
25	3,3-Dimethyl-1-butene	41.24	-115.2	1.3760	0.6529	di-	95.3 5.6 ¹⁰		1.5109	1.5615	
26	1, trans-3-Pentadiene	42.03	-87.47	1.43008	0.67603	tetra-	131 ²	115, al			
27	1, cis-3-Pentadiene	44.07	-140.82	1.43634	0.69102	tetra-	131 ²	115, al			

*Derivative data given in order m.p., crystal color, solvent from which crystallized

**T = triple point, S = at saturation pressure

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						x Bromo-	B P °C	M P °C	n _D ²⁰	D ₄ ²⁰	
28	Cyclopentene	44.24	-135.08	1.42246	0.77199	di-	71.5 ¹²		1.5510 ¹¹	1.8713 ¹¹	Mercaptosuccinic acid adduct 142.8.3.1 Pseudonitrosite 69.70 Perbenzoic acid oxid → epoxy-cyclopentane b.p. 102.3
29	1,2-Pentadiene (Ethylallene)	44.86	-137.26	1.42091	0.69257	tetra-	94.6 ⁹			2.3469 ¹²	
30	2,3-Pentadiene (1,3-Dimethylallene)	48.27	-125.26	1.42842	0.69502						
31	4-Methyl-1-pentene	53.88	-153.63	1.3828	0.6642	di	87 ²¹		1.4980	1.5689	Mercaptosuccinic acid adduct 102.6.9
32	3-Methyl-1-pentene	54.14	-153.0	1.3842	0.6675	di	99 ¹⁰		1.5060	1.6016	
33	3-Methyl-1,4-pentadiene	55		1.405	0.695						
34	2,3-Dimethyl-1-butene	55.67	-157.27	1.3904	0.6779	di-	80 ¹		1.5105	1.6033	
35	2-Methyl-1,4-pentadiene	56		1.405	0.694						
36	4-Methyl-cis-2-pentene	56.3	-134.43	1.3880	0.6690	di	72.3 ¹⁸		1.5060	1.5983	
37	4-Methyl-trans-2-pentene	58.55	-140.81	1.3889	0.6686	di-	78 ²²		1.5070	1.5996	
38	1,5-Hexadiene (Biallyl)	59.46	-140.8	1.4042	0.6923	tetra-		52			Dil HNO ₃ → succinic ac 185
39	2-Methyl-1-pentene	60.7	-135.72	1.3920	0.6817	di	87.8 ²⁰		1.5015	1.5581	
40	1-Hexene	63.49	-139.82	1.38788	0.67317	di-	89.90 ¹⁸		1.5024	1.5774	2,4-Dinitrophenyl-sulfonyl chloride 61.2 Mercaptosuccinic acid adduct, 94.5.5.7
41	2-Ethyl-1-butene	64.6	-131.53	1.3969	0.6894	di-	87 ²¹		1.5112	1.6045	
42	trans-1,3-Hexadiene	64.5.5.5		1.4060 ¹⁹	0.6925 ¹⁹	tetra-		19			
43	3-Methylcyclopentene	65.0		1.4207	0.7622						
44	cis-3-Hexene	66.44	-137.82	1.3947	0.6796	di	80.1 ¹³		1.5045	1.6027	
45	3-Hexene (cis-trans mixture)	66.6-67		1.3942	0.6816	di-	80.1 ¹³		1.5045	1.6027	
46	trans-3-Hexene	67.08	-113.43	1.3943	0.6772	di-	80.1 ¹³		1.5045	1.6027	
47	2-Methyl-2-pentene	67.29	-135.7	1.4004	0.6863	di-	71-2 ¹⁸		1.5063	1.5849	Mercaptosuccinic acid adduct, 152.1.6
48	3-Methyl-trans-2-pentene	67.63	-134.84	1.4016	0.6942	di-	72.4 ¹⁵		1.5085		
49	trans-2-Hexene	67.87	-132.97	1.3935	0.6784	di-	90 ¹⁶		1.5025	1.5812	
50	2-Hexene (cis-trans mixture)	67.9.8.1		1.3928	0.6813	di-	90 ¹⁶		1.5025	1.5812	
51	2,3-Hexadiene	68		1.395	0.680						
52	2,3-Dimethyl-1,3-butadiene	68.78	-76.01	1.4394	0.7267	di-		47, lgr 138, bz			Maleic anhyd adduct, 78-9
53	cis-2-Hexene	68.84	-141.14	1.3977	0.6869	di-	90 ¹⁶		1.5025	1.5812	
54	4-Methyl-1,2-pentadiene (1-Isopropylallene)	70		1.424	0.708						
55	3-Methyl-cis-2-pentene	70.45	-138.45	1.4045	0.6986	di-	72-4 ¹⁵		1.5085		

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous	
						<i>α</i> -Bromo-	B P, °C	M P, °C	n _D ²⁰	D ₄ ²⁰		
56	2-Methyl-2,3-pentadiene (Trimethyl allene)	72		1.425	0.711							
57	1,4-Hexadiene	72.3-2.5		1.4402 ¹⁹	0.7057 ¹⁹	tetra- 2 forms		a) 63-4 b) fp < -50				
58	4,4-Dimethyl-1-pentene	72.49	-136.6	1.3918	0.6827	di	77-8 ⁹		1.4970	1.5129		Mercaptosuccinic acid adduct, 119.05
59	1, (cis and/or trans)-3-hexadiene	73		1.438	0.705							
60	2,3-Dimethyl-2-butene	73.21	-74.28	1.4122	0.7080	di		173-4-121				
61	2-Ethyl-1,3-butadiene	75		1.445	0.717							
62	4-Methylcyclopentene	75.2		1.4306	0.7796							
63	1-Methylcyclopentene	75.8	-127	1.4330	0.7802							
64	2-Methyl-1, (cis and/or trans)-3-pentadiene	76		1.446	0.719							
65	1,2-Hexadiene (n-Propylallene)	76		1.4282	0.7149	tetra-	130 ³		1.5850	2.1873		
66	2-Methyl-1, (cis and/or trans)-3-pentadiene	76		1.446	0.719							
67	4-Methyl-1,3-pentadiene	76.3		1.451	0.719							
68	4,4-Dimethyl-trans-2-pentene	76.75	-115.24	1.3982	0.6889	di-	92.8-93 ¹⁴		1.5080	1.5538		
69	3,3-Dimethyl-1-pentene	77.54	-134.3	1.3984	0.6974	di-	95.3-6 ¹⁰		1.5109	1.5615		
70	2,3,3-Trimethyl-1-butene	77.87	-109.85	1.4029	0.7050	di-	98-9 ¹⁴	38-9				
71	3-Methyl-1,3-pentadiene	78.0-3		1.4494	0.7499							
72	trans-1,3,5-Hexatriene	78.5, 77.8-5		1.4884 ¹³⁻⁵	0.74229 ¹⁵	hexa-		78				
73	cis-1,3,5-Hexatriene	78.5		1.4577	0.7179							
74	3-Methyl-1,2-pentadiene	79.70		1.425	0.715							
75	2,4-Hexadiene	79.4-81.6 ⁷⁶⁵	-79	1.4493	0.7152	2,5-di-tetra-	85 ¹¹	182	1.534 ¹⁰	1.622 ¹⁰		Maleic anhyd adduct, 95.6, 1gr, SO ₂ adduct, 43-3.5
76	3-Methyl-1,5-hexadiene	80-1		1.4116	0.7103							
77	4,4-Dimethyl-1,2-pentadiene (tert-Butylallene)	80-3			0.7184							
78	1,3-Cyclohexadiene	80.31 ⁷⁵⁷	-104.8	1.4740	0.8413	di- tetra- 2 forms		68, isomerizes → m 108 1, trans-2, cis-3, trans-4, 92, 1, cis-2, trans-3, trans-4, 156				Maleic anhyd adduct, 145-6, heptane, Benzoquinone adduct, 196.7, 1gr
79	4,4-Dimethyl-cis-2-pentene	80.42	-135.46	1.4024	0.6996	di-	92.8-3.0 ¹⁴		1.5080	1.5538		

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Bromine addition product					Miscellaneous	
						x-Bromo	B P °C	M P °C	n_D^{20}	D_4^{20}		
80	3,4-Dimethyl-1-pentene	81		1.3995	0.701							
81	Cyclohexene	82.97	-103.51	1.44654	0.81096	di-	101.3 ¹³		1.5445 ¹⁹	1.7759 ¹⁹		Mercaptosuccinic acid adduct, 150.5; 1.5, KMnO ₄ oxid → adipic acid, 154, 2,4-Dinitrophenylsulfenyl chloride, 117.8; HBr → cyclohexyl bromide, b.p. 165
82	2,4-Dimethyl-2-pentene	83-4	-127.7	1.40165 ²²	0.6958 ²²	di-	88 ¹⁷		1.50920 ^{22.5}	1.5431 ^{22.5}		
83	3-Methyl-1-hexene	84.0		1.397	0.695	di-	84.0-2 ⁶		1.5028	1.5248		
84	2,3-Dimethyl-1-pentene	84.26	-134.8	1.4033	0.7051	di-	72.5-3.0 ³		1.5028	1.5245		
85	3-Ethyl-1-pentene	85.13	-127.4	1.3980	0.6962	di-	93.5 ¹⁵		1.5006	1.5251		
86	5-Methyl-1-hexene	85.31		1.3966	0.6920	di-	142.6-3.6 ¹⁰¹		1.4970	1.5072		
87	5-Methyl-trans-2-hexene	86.0		1.400	0.700	di-	87.8 ¹⁰		1.4960	1.5027		
88	2-Methyl-3-hexene	86.0		1.399	0.694	di-	96 ¹⁹		1.5060	1.5310		
89	2,4-Dimethyl-2,3-pentadiene (Tetramethylallene)	86.5		1.40039	0.7006							
90	4-Methyl-1-hexene	86.73	-141.45	1.4000	0.6985	di-	94.7-5.7 ¹¹		1.4980	1.5027		
91	3,4-Dimethyl-2-pentene	87.0		1.407	0.713	di-	65.5-6.0		1.5104	1.5400		
92	4-Methyl-cis-2-hexene	87.37		1.4024	0.6996	di-	91.2 ¹¹		1.5045	1.5382		
93	4-Methyl-trans-2-hexene	87.6	-126.5	1.4023	0.6975	di-	91.2 ¹¹		1.5045	1.5382		
94	3,3-Dimethylcyclopentene	88		1.423	0.771							
95	2-Ethyl-3-methyl-1-butene	89		1.410	0.715	di-	72.5-3.5 ⁴		1.5062	1.5261		
96	5-Methyl-cis-2-hexene	91		1.400	0.700	di-	89.90 ¹¹		1.4990	1.5152		
97	5-Methyl-1,4-hexadiene	91-2.5		1.4390	0.7258	1,2-di-	101.4 ¹⁸		1.5233 ¹⁶	1.566 ¹⁶		
98	2-Methyl-1-hexene	92.0	-102.84	1.4034	0.7030	di-	100.5-1.5 ²³		1.5000	1.5066		
99	1,3-Dimethylcyclopentene	92		1.428	0.766							
100	2-Methyl-1,5-hexadiene	92.5 ⁷⁶⁹		1.423/6 ^{17.3}	0.7289 ^{18.5}							Nitrosochloride, 75.6
101	2,4-Dimethyl-1,3-pentadiene	93	-114	1.4412	0.7368							
102	1,4-Dimethylcyclopentene	93.2		1.4283	0.779							
103	3-Methyl-trans-3-hexene	93.5		1.4107	0.7099							
104	1-Heptene	93.64	-119.03	1.39980	0.69698	di-	106.2 ¹³		1.4990	1.5208		Mercaptosuccinic acid adduct 103.4-9

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						x Bromo	B P, °C	M P, °C	n _D ²⁰	D ₄ ²⁰	
105	3-Methyl- <i>trans</i> -2-hexene	94 0		1 410	0 7120	<i>di</i> -	65 0 5 1 ²		1 5040	1 5240	
106	2-Ethyl-1-pentene	94		1 405	0 708	<i>di</i> -	77 8 ⁴		1 4990	1 4929	
107	3-Methyl- <i>cis</i> -3-hexene	95 35		1 4123	0 7132						
108	2-Methyl-2-hexene	95 41	-130 35	1 4106	0 7082	<i>di</i> -	73 0 1 ⁸		1 4990	1 5116	
109	<i>trans</i> -3-Heptene	95 67	-136 63	1 4043	0 6981	<i>di</i> -	105 5 6 5 ²¹		1 5010	1 5153	
110	<i>cis</i> -3-Heptene	95 75		1 4059	0 7030	<i>di</i> -	105 5- 6 5 ²³		1 5010	1 5153	
111	5-Methyl-1,2-hexadiene (Isobutylallene)	96		1 4282 ¹⁹	0 7225 ¹⁹						
112	3-Ethyl-2-pentene	96 01		1 4148	0 7204	<i>di</i> -	76 0- 4 ³		1 5090	1 5426	
113	2,3-Dimethyl-2-pentene	97 5	-118 3	1 4208	0 7277	<i>di</i> -	97 9 ¹⁵		1 517 ²²	1 547 ²²	
114	<i>trans</i> -2-Heptene	97 95	-109 48	1 4045	0 7012	<i>di</i> -	96 2 ¹²		1 5000	1 5129	
115	3-Ethylcyclopentene	98 1		1 4319	0 7830						
116	<i>cis</i> -2-Heptene	98 5		1 406	0 708	<i>di</i> -	96 2 ¹²		1 5000	1 5129	
117	5-Methyl-1,3-cyclohexadiene	100 5 1 5 ⁷⁰²		1 4662 ^{22 5}	0 8252						
118	2,2-Dimethyl- <i>trans</i> -3-hexene	100 9		1 4063	0 7039	<i>di</i> -	96 5- 7 0 ⁸		1 5032	1 4856	
119	1,4-Heptadiene	101		1 4202	0 7106	<i>di</i> -			1 5734	2 091	
120	2,4,4-Trimethyl-1-pentene	101 44	-93 48	1 4086	0 7150						
121	3,3-Dimethyl-1,5-hexadiene	101 6		1 4160	0 7249						
122	3,4-Dimethyl-1,5-hexadiene	101 8		1 4211	0 7304						
123	2,5-Dimethyl-3-hexene	102		1 406	0 710	<i>di</i> -	109 ¹⁹		1 5058	1 5034	
124	5,5-Dimethyl-1-hexene	102 5		1 4049	0 709						
125	4-Methylcyclohexene	102 74	-115 5	1 4414	0 7947	<i>di</i> -	130 ⁴⁰			1 650 ¹³	
126	3-Methylcyclohexene	104 0		1 4444	0 8010						
127	2-Isopropyl-3-methyl-1-butene	104		1 4085	0 722						
128	3,4,4-Trimethyl-1-pentene	104		1 412	0 719						
129	3,5-Dimethyl-1-hexene	104		1 404	0 708						
130	3,3-Dimethyl-1-hexene	104		1 4070	0 7140						
31	5,5-Dimethyl- <i>trans</i> -2-hexene	104 1		1 4055	0 7066						
32	2,4,4-Trimethyl-2-pentene	104 91	-106 33	1 4160	0 7218						
33	3,3,4-Trimethyl-1-pentene	105		1 4144	0 729						
34	2,2-Dimethyl- <i>cis</i> -3-hexene	105 4	-137 4	1 4099	0 7128						
35	1,2-Heptadiene (<i>n</i> -Butylallene)	105 5 6 0		1 432 ¹⁸	0 7306 ¹⁸	2,3- <i>di</i> - <i>tetra</i> -	108- 10 ¹² , 140 ⁹		1 5200 ¹⁸	1 5595 ¹⁸	
36	1,2-Dimethylcyclopentene	105 8	-90 4	1 4448	0 7976				1 5718	2 0675	
37	4-Ethylcyclopentene	106		1 440	0 798						
38	4,4-Dimethyl-2-hexene	106		1 413	0 722	<i>di</i> -	92 3 ⁴		1 5113	1 5148	
39	1-Ethylcyclopentene	106 3	-118 4	1 4410	0 7982						
40	5,5-Dimethyl- <i>cis</i> -2-hexene	106 9		1 4113	0 7169						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						<i>α</i> -Bromo-	B P °C	M P °C	n _D ²⁰	D ₄ ²⁰	
141	2-Methyl-2,4-hexadiene	107		1.4266 ²⁴	0.7439						
142	2-Methyl-1,3-cyclohexadiene	107.8		1.4662 ¹⁸	0.8272 ¹⁸						
143	3-Methyl-2,4-hexadiene	107.8		1.46146 ¹⁵	0.7625 ¹⁵						
144	4,4-Dimethyl-1-hexene	107.2		1.4102	0.7198	<i>di</i> -	224.5		1.5003	1.4689	
145	3-Ethyl-4-methyl-1-pentene	107.5		1.4097	0.7200						
146	2,4-Heptadiene	107.5-8.0		1.4578	0.7384						
147	2,4-Dimethyl- <i>trans</i> -3-hexene	107.6		1.4126	0.7145						
148	Quadricyclene (Quadricyclo [2,2,1,0 ^{2,6} ,0 ^{3,5}] heptane)	108 ⁷⁴⁰ sl d		1.4804							
149	2,3,4-Trimethyl-1-pentene	108		1.415	0.729						
150	4-Methyl-1,3-hexadiene	108-10		1.4523	0.7558						
151	2,3,3-Trimethyl-1-pentene	108.3	-69	1.4174	0.7352						
152	4,5-Dimethyl-1-hexene	109		1.414	0.728						
153	1,5,5-Trimethylcyclopentene (Isolaurolene)	109 ⁷⁵⁴		1.4324	0.7824						Reduces Tollen's reagent on warming
154	2,4-Dimethyl- <i>cis</i> -3-hexene	109		1.4140	0.7178						
155	3,3-Dimethyl-2-ethyl-1-butene	110		1.4159	0.728						
156	3-Ethyl-2-methyl-1-pentene	110		1.415	0.730						
157	4,5-Dimethyl-2-hexene	110		1.413	0.725						
158	1-Methylcyclohexene	110.0	-121	1.4503	0.8102	<i>di</i> -	100.2 ¹²				2,4-Dinitrophenylsulfenyl chloride, 139-40
159	2-Ethyl-4-methyl-1-pentene	110.3		1.4105	0.7195						
160	3-Ethyl-1-hexene	110.3		1.407	0.715						
161	2,3-Dimethyl-1-hexene	110.5		1.4113	0.7214						
162	2,4-Dimethyl-2-hexene	110.6		1.4118	0.7213						
163	3-Methyl-1-heptene	111		1.406	0.711						
164	2,4-Dimethyl-1-hexene	111.2		1.4110	0.720						
165	2,5-Dimethyl-1-hexene	111.6		1.4105	0.7172						
166	3-Ethyl-3-methyl-1-pentene	112		1.418	0.7305						
167	3,4-Dimethyl-1-hexene	112		1.413	0.724						
168	3,4,4-Trimethyl-2-pentene	112		1.4232	0.7395						
169	3,5-Dimethyl-2-hexene	112		1.416	0.725						
170	2-Methyl-3-heptene	112		1.402	0.706						
171	5-Methyl-3-heptene	112		1.410	0.713						
172	2,5-Dimethyl-2-hexene	112.2		1.4140	0.720	<i>di</i> -	88 ¹³		1.4740	1.3980	
173	3-Methyl-1,5-heptadiene	112.5		1.4230 ^{22,5}							
174	2-Ethyl-3-methyl-1-pentene	112.5		1.4142	0.729						

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						α-Bromo-	B P, °C	M P °C	n _D ²⁰	D ₄ ²⁰	
175	4-Methyl-1-heptene	112.8		1.410	0.717						
176	6-Methyl-3-heptene	113 ⁷³⁴		1.4114	0.7256	di-		97			
177	4-Ethyl-1-hexene	113		1.412	0.726						
178	4-Ethyl-2-hexene	113		1.412	0.725						
179	2-Isopropyl-1-pentene	113		1.414	0.725						
180	5-Methyl-1-heptene	113.3		1.4094	0.7164						
181	4-Methyl-2-heptene	113.5-4.1		1.4096	0.7154						
182	2,3-Dimethyl-3-hexene	114		1.416	0.728						
183	4-Methyl-2-octene	114		1.4100 ²⁵	0.7188 ²⁵						
184	2,4-Dimethyl-2,4-hexadiene	114-5		1.4545 ^{16.5}	0.7635 ^{16.5}						
185	6-Methyl-2,4-heptadiene	114.6		1.4397 ²⁵	0.7041 ²⁵						
186	3-Ethyl-4-methyl-trans-2-pentene	114.3		1.4210	0.7350						
187	Cycloheptene (Suberene)	114.38	-56	1.4580	0.8254	di-	unstable				Nitroschloride, 118 Oxid → pimelic ac., 105
188	1-Methyl-1,4-cyclohexadiene	114.5-4.8	< -70	1.4703	0.848	tetra-		171			
189	3-Ethyl-4-methyl-cis-2-pentene	115		1.424	0.739						
191	1,3,5-Cycloheptatriene (Tropilidene)	115.5	-79.49	1.5243							Maleic anhyd adduct, 104.2-5.0, CCl ₄
192	3,4-Dimethyl-2-hexene	116		1.418	0.737						
193	3-Ethyl-3-hexene	116		1.418	0.729						
194	6-Methyl-1,3-heptadiene	116.8			0.741 ²²						
195	2,5-Dimethyl-1,3-hexadiene	116.8	> -80	1.45024	0.7412						
196	2,3,4-Trimethyl-2-pentene	116.3	-113.3	1.4275	0.7434						
197	4,4-Dimethylcyclohexene	116.98	-80.5	1.4420	0.7996						
198	6-Methyl-2-heptene	117		1.412	0.718						
199	2-n-Propyl-1-pentene	117.7		1.4136	0.7240						
200	5-Methyl-2-heptene	118		1.414	0.723						
201	3,3-Dimethylcyclohexene	119		1.445	0.804						
202	2-Methyl-1-heptene	119.22	-87.38	1.41195	0.72025						
203	2,5-Dimethyl-1,5-hexadiene	119.23	solid at -80, liq at -23	1.45054	0.7637						
204	2-Ethyl-1-hexene	120		1.4157	0.7270						Mercaptosuccinic acid adduct, 101.9-2.7
205	d,l-1,2,3-Trimethylcyclopentene (Laurolene)	120.1 ⁷⁵²		1.4421	0.7950						
206	4-Methyl-3-heptene	120.4		1.41712 ²⁵	0.7411 ²⁵						
207	3-Ethyl-2-hexene	121		1.424	0.737						
208	3-Methyl-3-heptene	121		1.418	0.728						
209	1-Octene	121.28	-101.76	1.40870	0.71492	di-	240.2, 118.5 ¹⁵		1.4970	1.4580	Mercaptosuccinic acid adduct, 96.1-6

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous		
						x Bromo	B P C	M P C	n _D ²⁰	D ₄ ²⁰			
210	<i>trans</i> -4-Octene	121 4 ⁷³⁹	f p -94	1 41157	0 71467	<i>di</i> (<i>meso</i>)	103 ⁸			1 4967 ²⁴	1 4525	H ₂ → Cyclo heptane b p 118 20	
211	1,3-Cycloheptadiene (Hydrotropilidene)	121 52	-110 42		0 8929 ⁰								
212	3-Methyl-2-heptene	121 6		1 4183	0 7296								
213	<i>cis</i> -4-Octene	121 7 ⁷³⁹	f p -118	1 41361	0 72048	<i>di</i> (<i>d l</i>)	84 0 8 4 ^{1 3}			1 4981	1 4569		
214	2,3-Dimethyl-2-hexene	121 8	-115 1	1 4268	0 7408								
215	3,4-Dimethyl- <i>trans</i> -3-hexene	122		1 430	0 747	<i>di</i>	85 7 ⁵			1 5060	1 387		
216	6-Methyl-1-heptene	122 4 113 5		1 4070	0 7125								
217	<i>cis</i> -3-Octene	122 3 ⁷⁴¹	f p -126	1 41246	0 71888								
218	<i>trans</i> -3-Octene	122 4 ⁷⁴¹	f p -110 4	1 41241	0 71630								
219	2-Methyl-2-heptene	123 5		1 4138	0 7241								
220	<i>trans</i> -2-Octene	125 0	-87 7	1 4132	0 7199								Mercaptosuccinic acid adduct 142 9 3 5
221	<i>cis</i> -2-Octene	125 64	-100 2	1 4150	0 7243								
222	2-Methyl-1,3-heptadiene	127 8 4		1 4432	0 7432								
223	1,4-Dimethylcyclohexene	128		1 446	0 802								Nitrosochloride 83 4
224	1,5-Dimethylcyclohexene	128		1 448	0 8051								Nitrosochloride 118 9
225	2,6-Dimethyl 2-heptene	128 9		1 412	0 722								
226	4-Vinylcyclohexene	129 5 30 5 36 ⁴³		1 4623	0 8320	$\alpha \beta$ <i>di</i>		69 5 70 eth					
227	4-Methyl-2,4-heptadiene	131 2		1 4621	0 7551								
228	3,4-Dimethyl-2,4-hexadiene	132 4 71 3		1 4410	0 7832								
229	3-Methyl-2,4-heptadiene	132 5		1 4649	0 7667								HBr → Dihydro bromide b p 109 11 °
230	Bicyclo[4,2,0]oct-7-ene	132 5		1 4761		<i>di</i>	74 ⁰						
231	4-Ethylcyclohexene	133		1 449	0 810								
232	1,6-Dimethylcyclohexene	133		1 454	0 815								
233	3,5-Dimethyl-2,4-heptadiene	133 44 1		1 4487	0 7728								
234	2,4-Octadiene	133 5 4 0		1 4542 ²	0 7427 ²								
235	2,5-Dimethyl-2,4-hexadiene	133 6 28 ¹	14 6 8	1 4796 ¹¹	0 7646 ⁸	<i>tetra</i>			101			Oxid in air → polymeric peroxide 59	
236	3-Ethylcyclohexene	134		1 451	0 814								
237	1,2,3,3-Tetramethylcyclopentene (Campholene)	134 5		1 44406	0 8035								
238	1-Ethylcyclohexene	136		1 4575	0 823								
239	1,2-Dimethylcyclohexene	137		1 4588	0 8250	<i>di</i>		142 3 acet				Nitrosochloride 58 60	
240	1,3-Dimethylcyclohexene	137		1 445	0 802								
241	Bicyclo[4,2,0]oct-2-ene	137 9		1 4810 ³⁰	0 8948								

*Derivative data given in order m p crystal color solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						x Bromo	B P °C	M P °C	n _D ²⁰	D ₄ ²⁰	
243	1-Methylcycloheptene	137.5-8.5		1.4581	0.8243 ²²						Nitroschloride, 106, Nitrosate, 97.8
244	2-Methyl-4-octene	138 ⁷¹¹		1.4181	0.7392						
245	δ-Fenchene (1,5,5-Trimethylbicyclo[2,2,1]hept-2-ene)	139-40		1.44862	0.8433						Nitroschloride, 131
246	1,5,5-Trimethylcyclohexene (α-Cyclogeraniolene)	139-41 ⁷¹¹		1.44612 ²¹	0.7981 ²¹						Nitroschloride, 100.20, aq. me., al Nitrosate, 102.4
247	2,6-Dimethyl-2,4-heptadiene	139-43 ⁷²		1.4587 ⁴⁴	0.74820						
248	1,4,4-Trimethylcyclohexene (Pulene)	139.5-40.5		1.444 ²⁴	0.8032 ^{15, 22}	di-	120.05 ¹⁰⁰		1.5247 ¹¹	1.5324 ¹¹	Nitroschloride, 118.22, et. ac
249	1,5,6-Trimethylcyclohexene	140		1.4572	0.831 ²⁵						
250	2,3-Dimethyl-2-norbornene (Santene 2,3-Dimethylbicyclo[2,2,1]hept-2-ene)	140-1, 35 ¹		1.46699	0.8640						Dichloride 88.9, Nitrosate, 216d, Nitroschloride, 109.10 Nitrosite, 3 forms a) 122.4, b) 127-8, grn, c) 104, col
251	2,6-Dimethyl-1,3-heptadiene (Isogeraniolene)	140-2, 31		1.4606 ²²	0.7923 ²²						
252	Cyclooctatetraene	140.56, 142.3, 42.25 ¹	-4.68, -7	1.5290	0.9206						Maleic anhyd adduct, 167.8 Benzquinone adduct, 141, al Acrylic acid adduct 112.3, lgr AgNO ₃ adduct, 173.4
253	7-Methyl-3-octene	141 ^{71b}		1.4168	0.7278						
254	2,6-Dimethyl-1,5-heptadiene (Geraniolene)	141-2, 165.70	-70	1.44361 ²²	0.7626 ²²						
255	1,8-Nonadiene *	141-4		1.4302	0.7511						
256	1,3,5-Trimethylcyclohexene (Tetrahydro-mesitylene)	142.5-3.5		1.449 ^{13, 5}	0.8025 ^{14, 3}						Nitroschloride, 134
257	3-Methyl-2-octene	143-5 ^{73a}		1.4247	0.7409 ²⁵						
258	Cyclooctene	143.8-4.5 ^{77a}		1.4693							Br ₂ → Bromocyclooctene, b p 7-8 ²³ , n _D ²⁰ 1.5182, Dichloride, b p 130.4-0.6 ²⁵ , m p -5, n _D ²⁰ 1.5061, D ₄ ²⁰ 1.1620
259	3,6-Dimethyl-2,4-heptadiene	144-6		1.46335 ¹⁴	0.7853 ⁰						
260	4-Nonene	144-6, 44.6 ¹²		1.4212 ¹⁸	0.732 ¹⁸	di-	119.20 ¹²		1.4988 ¹⁷	1.410 ¹⁷	
261	1,4,5-Trimethylcyclohexene	144-6		1.4482	0.805						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						x-Bromo-	B P, °C	M P, °C	n _D ²⁰	D ₄ ²⁰	
262	1-Vinylcyclohexene	145, 63 5 ^{5a}		1 4950 ¹⁹							50% H ₂ SO ₄ → dimer, b p 118-9 ⁵
263	cis-1,4-Cyclooctadiene	145 1 ^{75b}	-53		0 8754	tetra-		139			
264	1,3,5-Cyclooctatriene	145 6, 76 ⁹⁰		1 5035 ²⁵	0 8971 ²⁵						Maleic anhyd adduct, 144-5, AgNO ₃ adduct, 125-6, al
265	4,4-Dimethyl-1,7-octadiene	145 8		1 4330	0 7647						
266	ξ-Fenchene (2,7,7-Trimethylbicyclo[2,2,1]hept-2-ene)	146 2 6 8 ⁷⁵²		1 4865	0 8626						[α] _D ²⁰ -24 l
267	1,6,6-Trimethylcyclohexene	146 2-7 2 ⁷⁶⁷ , 144 6		1 456 ^{20 4}	0 8217 ^{20 3}						Nitroschloride, 133 4, et ac
268	1-Nonene	146 87	-81 37	1 41572		di-	141 5 ²⁰		1 4942	1 3980	
269	3-Nonene	147 4 ⁷⁵⁰		1 4173	0 7294						
270	1,5-Cyclooctadiene	148 9		1 4905	0 8818 ²⁴						N-Bromosuccinimide → bromocyclooctadiene, b p 64 ^{1 9} , n _D ²⁵ 1 5410, D ₄ ²⁵ 1 3420
271	4-Methyl-3,5-octadiene	148 51		1 46285 ²⁵	0 7640 ²⁵						
272	7-Methyl-2,4-octadiene	149		1 4543 ¹⁸	0 7521 ¹⁸	tetra-	184 ¹⁸				
273	1-Ethyl-4-methylcyclohexene	149, 153 4		1 453 ¹⁶	0 8169 ¹⁶						Nitroschloride, 2 forms a) 103-4, pr, eth, b) 98 9, cr, eth
274	1-Ethyl-3-methylcyclohexene	149 51		1 454	0 8296						
275	2-Nonene	149 4 9 9		1 420 ²¹	0 738 ²¹						
276	1,2,3-Trimethylcyclohexene	149 6 150 ⁷⁴⁹		1 463 ¹²	0 8347 ¹²						
277	1-Ethyl-5-methylcyclohexene	150		1 4527 ²⁵	0 812 ²⁵						
278	β-Fenchene (2,2-Dimethyl-5-methylenebicyclo[2,2,1]heptane)	150 5 3 5		1 46511	0 8599	di-		81-2			[α] _D ²⁵ +62 5, Nitroschloride, 120
279	2,6-Dimethyl-2,5-heptadiene	150 6 1 0		1 4490							
280	2,7-Nonadiene	150 6	-72 5	1 4358	0 7499						
281	Allylcyclohexane (3-Cyclohexylpropene)	151		1 4536 ¹³	0 8196 ¹³	di-	143 4 ¹⁶			1 537 ⁰	
282	1-Ethylidene-4-methylcyclohexane	152-3		1 4571 ²¹	0 81 ²¹						Nitroschloride, 2 forms a) 117-8, least soluble, b) 113-4, more soluble
283	4,5-Dimethyl-2,6-octadiene	152 9-3 8		1 4375 ²⁵	0 7611 ²⁵						
284	1-Ethylidene-3-methylcyclohexane	153		1 458 ⁴	0 8135 ¹⁹						Nitroschloride, 114, acet
285	3,6-Dimethyl-2,6-octadiene	153-5		1 44453	0 7767						
286	2,6-Dimethyl-2,7-octadiene	155 6 ⁷²⁰		1 4385 ¹⁸	0 7605 ¹⁸						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES,
DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						x Bromo	B P, °C	M P, °C	n _D ²⁰	D ₄ ²⁰	
287	α-Pinene	156 0-6 3	-50	1 4560	0 8600	<i>di-</i>		169 70, al			Nitroschloride, 109, Hydrobromide, 89, Nitrosobromide, 91 2d, Acid KMnO ₄ → pinonic ac, 103-5
288	1-Ethylidene-2-methylcyclohexane	158		1 47	0 823 ⁰						
289	2,4-Dimethyl-2,4-octadiene	161 3 ⁷⁴⁶		1 4558 ^{9 8}	0 7802 ^{9 8}						
290	1,4,4-Trimethylcycloheptene (Eucarvene)	161-5 ⁷²⁰		1 4561	0 8185						
291	β-Pinene (Nopinene, Pseudopinene)	163-4		1 4782	0 8694						[α] _D -22
292	2,7-Dimethyl-2,6-octadiene	163 5 4 5		1 44814	0 7849	<i>tetra-</i>		124-7			
293	3,7-Dimethyl-2,4-octadiene	164-7, 58 ¹²		1 456	0 7933						
294	1-4-Carene (3,7,7-Trimethylbicyclo[2,2,1]hept-2-ene)	165 5 7 0 ⁷⁰⁷		1 474 ³⁰	0 8552 ³⁰						[α] _B ³⁰ +62 2
295	Myrcene (2-Methyl-6-methylene-2,7-octadiene)	166		1 4722	0 7982						Maleic anh adduct, 33-4, 1,4-Naphthoquinone adduct, 81 Methodide, 130d
296	2,6-Dimethyl-2,6-octadiene	168, 56 ¹⁴		1 45245 ¹⁵	0 775 ²¹						
297	1-3-Carene (3,7,7-Trimethylbicyclo[2,2,1]hept-3-ene)	168 9 ⁷⁰⁵ , 123 4 ²⁰⁰		1 469 ³⁰	0 8586 ³⁰						[α] _B ³⁰ +7 69, Nitroschloride, 100-1
298	3,8-o-Menthadiene (cis-3-Isopropenyl-4-methylcyclohexene)	169-70		1 4749	0 8507						
299	5-Decene	170 ⁷⁵⁰	-112 to -111	1 4260	0 7474	<i>di-</i>	119 ⁹		1 4912	1 3484	
300	p-8-Menthene (1-Isopropenyl-4-methylcyclohexane)	170		1 4523	0 8142						
301	d-m-8-Menthene (1-Isopropenyl-3-methylcyclohexane)	170		1 4546	0 8179						[α] _D +9 73
302	l-m-8-Menthene (1-Isopropenyl-3-methylcyclohexane)	170-1		1 4574	0 8189						[α] _D -8 06
303	6,8-o-Menthadiene (3-Isopropenyl-2-methylcyclohexene)	170 1		1 4758	0 8481						
304	5,8-o-Menthadiene (4-Isopropenyl-3-methylcyclohexene)	170-1		1 4778	0 8490 ¹⁷						
305	1-Decene	170 57	-66 31	1 42146	0 74081	<i>di-</i>	145 160 ¹⁸		1 4891 ²⁴	1 324 ²⁸	Mercaptosuccinic acid adduct, 93 5- 8
306	4-Decene	170 6		1 4243	0 7404						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						α-Bromo-	B P., °C	M P., °C	n _D ²⁰	D ₄ ²⁰	
307	<i>p</i> -Menthene (1-Isopropylidene-4-methylcyclohexane)	172-4		1 4568	0 819 ²¹						Nitroschloride, 101-3
308	1-Isopropenyl-1,4-cyclohexadiene	172-6		1 5216	0 9068	tetra-		113			
309	<i>o</i> -Menthene (1-Isopropylidene-2-methylcyclohexane)	173, 160-2		1 467	0 8345						
310	<i>m</i> -Menthene (1-Isopropylidene-3-methylcyclohexane)	173-5		1 4670	0 8214						
311	α-Terpinene (1-Isopropyl-4-methyl-1,3-cyclohexadiene)	173 5 4 8 ⁷⁵⁵		1 477	0 8375						Dihydrochloride, 53-4, me al, Dihydrobromide, 58 9, me al, Dihydroiodide, 76, me al, Nitrosite, 155, Maleic anh adduct, 62, 66-7
312	2,4- <i>p</i> -Menthadiene (2-Isopropyl-5-methyl-1,3-cyclohexadiene)	174 6		1 4845 ²⁷	0 8441 ³²						
313	<i>l</i> -5-Isopropyl-2-methyl-1,3-cyclohexadiene	174-7		1 4732	0 8425						[α] _D ²⁰ -112 76, Nitrosite, α 120-1, β 105 6
314	1,5- <i>p</i> -Menthadiene (5-Isopropyl-2-methyl-1,3-cyclohexadiene)	175 6		1 4777	0 8463 ²⁵						[α] _D +49 1, Nitrosite, α 113-4, β 105 Maleic anh adduct, 126-7, pet eth
315	<i>d</i> -Silvestrene	175 8		1 4760	0 8479	tetra-		135			Dihydrochloride, 72, Nitroschloride, 106-7
316	<i>d</i> -Limonene	176 6 4		1 4743	0 8411	tetra-		104			Nitroschloride, 100-4, 2,4-Dinitrophenylsulfenyl chloride, 195-6
317	Isocarvestrene (5-Isopropenyl-1-methylcyclohexene)	176 7 ⁶⁵		1 4804	0 8496	tetra-		137-8, me al -chl			Dihydrochloride, 71 5, me al
318	<i>l</i> -3-Isopropenyl-1-methylcyclohexene	176-8	.....	1 4761 ¹⁸	0 848 ¹⁹						[α] _D ²⁰ -68 2, Dihydrochloride, 72
319	Dipentene (<i>d l</i> -Limonene)	177 6-8 0		1 4727 ²⁰	0 8402 ²⁰	tetra-		125, eth			Dihydrochloride, 50-1, al
320	3,8- <i>m</i> -Menthadiene (1-Isopropenyl-5-methylcyclohexene)	179 ³⁰		1 4972							[α] _D +17 5
321	Menogerene (5-Isopropylidene-2-methyl-1,3-cyclohexadiene)	180 1 ⁶⁰		1 5005	0 8672	di-		115			
322	γ-Terpinene (1-Isopropyl-4-methyl-1,4-cyclohexadiene)	183		1 4765 ^{14 5}	0 849	tetra-		129-30, pet eth			[α] _D ²⁰ +36, Nitroschloride, 111, Nitrosate, 116d, ac a-me al
323	<i>d l</i> -2,8- <i>m</i> -Menthadiene (1-Isopropenyl-3-methylcyclohexene)	184 7		1 503	0 864 ²⁰						

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES,
DIENES AND POLYENES

a) Liquids 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Bromine addition product					Miscellaneous	
						α -Bromo	B P °C	M P °C	n_D^{20}	D_4^{20}		
324	Menogene (3-Iso-propylidene-6-methylcyclohexene)	184 6 ⁷⁶⁴ 5		1 5026	0 8624							Nitrosite, 155, me al or chl, Maleic anh adduct, 205 8 Maleic anh adduct, 182
325	Terpinolene (4-Iso-propylidene-1-methylcyclohexene)	186		1 4883	0 8633 $\frac{1}{3}$	<i>di-tetra-2 forms</i>		69 70 a) 119, ac a, b) 122				
326	2-Undecene (2-Hendecene)	192 3, 78 5 ¹⁴		1 43325	0 7735 $\frac{1}{3}$	<i>di-</i>	145 6 ⁹					
327	5-Undecene (5-Hendecene)	192 2		1 4289	0 7511							
328	1-Undecene (1-Undecene)	192 67	-49 19	1 42609	0 75032	<i>di-</i>	186 ¹³		1 4916	1 3122		
329	<i>cis</i> -Cyclodecene	194 5 ⁷⁴⁰		1 4854	0 8770	<i>di-</i>		121				O ₃ → Sebacic acid, 134 5
330	1-Dodecene	213 36 88 7 ¹⁰	-35 23	1 43002	0 75836	<i>di-</i>		-15				
331	1-Tridecene	232 78 104 5 ¹⁰	-23 07	1 4336	0 7653							
332	1-Tetradecene	251 1, 119 0 ¹⁰	-12 85	1 43631	0 7713	<i>di-</i>		0				Mercaptosuccinic acid adduct, 104 0 8
333	Cedrene	262-3, 124 6 ¹²		1 5001 ¹⁹	0 9359 $\frac{1}{3}$							
334	1-Pentadecene	268 17, 133 7 ¹⁰	-3 73	1 4389	0 77641	<i>di-</i>	204-5 ¹⁷		1 4897	1 2235		
335	1-Hexadecene	284 4 103 9 ¹	4 12	1 44120	0 78112	<i>di-</i>	225 7 ¹⁵	13 5, al				1% Hot KMnO ₄ → <i>n</i> pentadecylic ac, 52 3, Mercaptosuccinic acid adduct, 105 0 8
336	1-Heptadecene	299 7, 116 ¹	11 2	1 4432	0 7852							
337	2-Methyl-2-heptadecene	314, 277 ¹⁰⁰	-2 5		0 7953	<i>di-</i>	267-8 ²⁸					
338	1-Octadecene	314 2, 128 ¹	17 6	1 4449	0 7888	<i>di-</i>		24, al				

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES, DIENES AND POLYENES

a) Liquids 2) (B.p. at reduced pressure only. Listed alphabetically)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Miscellaneous
1	Bicyclo[12,2,2]octadeca-14,16,18-triene	163.5 ⁴ 5 ⁵		1.5204 ²⁵		Maleic anhydride adduct, 143.4
2	Bicyclo[4,2,0]oct-3-ene	81 ¹⁴⁰		1.4832		
3	Butylcyclooctatetraene	98 ²⁰		1.5083 ²⁵	0.8876 ²⁵	
4	trans-Cyclodecene	68-70 ¹⁰		1.4822	0.8672	O ₃ → Sebacic acid, 134.5
5	1,5,9,13-Cyclohexadecatetraene	93.8 ⁰ 8 ⁸		1.5472		
6	trans-Cyclononene	73.4 ³⁰		1.4799	0.8615	Phenylazide adduct, 97.8.8.2
7	1,3-Cyclooctadecadiene	115 ³		1.4899	0.8814	
8	1,3-Cyclooctadiene	48 ²⁵	-57 to -55	1.4940 ²⁵	0.8699 ²⁵	
9	1,3,6-Cyclooctatriene	68 ⁶⁰	-62 to -56		0.8940 ²⁵	
10	1,3-Cyclotetradecadiene	106-8 ³		1.4982	0.8723 ²⁵	Nitroschloride, 109-10, Nitrosate, 210d
11	1,2-Dimethylcyclooctatetraene	107 ⁹⁶		1.5219 ²⁵	0.8950 ²⁵	Maleic anhydride adduct, 184.5-5.5, benzylidene, AgNO ₃ adduct, 142.5.4.5, al
12	2,6-Dimethyl-2,5-octadiene	59.0-5 ¹²		1.4500	0.733	
13	Ethylcyclooctatetraene	81 ³⁷		1.5187 ²⁵	0.8996 ²⁵	Maleic anhydride adduct, 97.8.5, benzylidene-cyclohexane, AgNO ₃ adduct, 124-5.5, al
14	5-Methylcycloheptene	69.70 ³⁸		1.42016 ³¹	0.76061 ³¹	
15	Methylcyclooctatetraene	84.5 ⁶⁷		1.5249 ²⁵	0.8978 ²⁵	
16	7-Pentadecene	114 ³²		1.4420	0.7765	
17	Propylcyclooctatetraene	73 ⁹		1.5131 ²⁵	0.8870 ²⁵	

*Derivative data given in order m, p, crystal color, solvent from which crystallized

TABLE II. ORGANIC DERIVATIVES OF ALKENES, CYCLOALKENES,
DIENES AND POLYENES

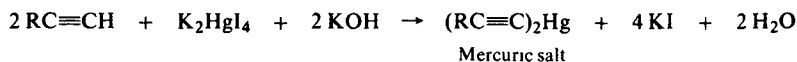
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	n _D ²⁰	D ₄ ²⁰	Bromine addition product					Miscellaneous
						x Bromo	B p, °C	M p °C	n _D ²⁰	D ₄ ²⁰	
1	1-Nonadecene	23.4	328.0, 138.8 ¹	1.4445	0.7886						
2	Eicosene	28.6	341.2	1.4439 ³⁰	0.7882 ³⁰						
3	Bicyclo[4,7]pentadiene (<i>endo</i> -4,7-Methylene-4,7,8,9-tetrahydroindene)	32	170	1.5070 ³⁵	0.9766 ³³						Phenylazide adduct, 128
4	1-Heneicosene	33.3	355	1.4494 ^S	0.7977 ^S						
5	1-Docosene	37.8		1.4505 ^S	0.8002 ^S						
6	1-Tricosene	41.6	379	1.4516 ^S	0.8023 ^S						
7	1-Tetracosene	45.3	390	1.4527 ^S	0.8045 ^S						
8	1-Pentacosene	48.7	401	1.4536 ^S	0.8063 ^S						
9	<i>cis cis cis</i> 1,4,7-Cyclononatriene	49.5-50									AgNO ₃ adduct, 243d
10	<i>d,l</i> -Camphene (2,2-Dimethyl-3-methylenebicyclo[2,2,1]heptene)	50	159-60			<i>di</i> -	91-2	153.5 ¹⁵			
11	<i>l</i> -Camphene	51.3	159-60								2,4-Dinitrophenyl-sulfonyl chloride, 121.2, Hydrochloride, 125-7
12	1-Heptacosene	54.7	421	1.4552 ^S	0.8097 ^S						
13	1-Triacontene	62.4	448	1.4573 ^S	0.8141 ^S						
14	1-Hentriacontene	64.6	457	1.4580 ^S	0.8153 ^S						
15	1-Dotriacontene	66.7	465	1.4585 ^S	0.8165 ^S						
16	1-Tritriacontene	68.7	473	1.4591 ^S	0.8176 ^S						
17	1-Tetraatriacontene	70.5	481	1.4596 ^S	0.8186 ^S						
18	1-Pentatriacontene	72.3	489	1.4601 ^S	0.8196 ^S						
19	1-Hexatriacontene	73.9	496	1.4605 ^S	0.8205 ^S						
20	1-Heptatriacontene	75.5	503	1.4610 ^S	0.8214 ^S						
21	1-Octatriacontene	77	510	1.4614 ^S	0.8223 ^S						
22	1-Nonatriacontene	78.4	517	1.4618 ^S	0.8231 ^S						
23	1-Tetracontene	79.8	523	1.4622 ^S	0.8238 ^S						
24	Bicyclo(2,2,2)-oct-2-ene	111.2	128.34			2,3- <i>trans</i> - <i>di</i> -		55.0-5.5			

*Derivative data given in order m p, crystal color, solvent from which crystallized

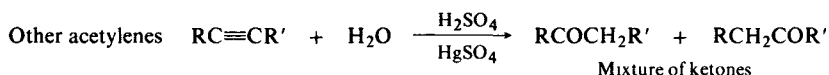
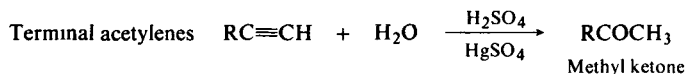
S = Supercooled liquid at 20°

EXPLANATIONS AND REFERENCES TO TABLE III

*Hg salt (Mercuric acetylide) **

From the terminal alkyne and K_2HgI_4 (prepared from mercuric chloride, potassium iodide and potassium hydroxide)

For directions and examples see Linstead, p 52, J R Johnson and W L McEwen, *J Amer Chem Soc*, **48**, 469 (1926)

Hydration to form carbonyl compound

From the alkyne in methanol and a catalyst composed of boron trifluoride etherate, red mercuric oxide and trichloroacetic acid

For directions and examples see J G Sharefkin and E M Boghosian, *Anal Chem*, **33**, 640 (1961)

From the alkyne, mercuric sulfate and sulfuric acid in 70% methanol, in 70% acetone or in 60% acetic acid

See Cheronis, p 576, H Erdmann and F Kother, *Z Anorg Chem*, **18**, 48 (1898), R J Thomas, K N Campbell and G F Hennion, *J Amer Chem Soc*, **60**, 718 (1938)

From the alkyne, mercuric oxide and sulfuric acid in alcohol

See J R Johnson, A M Schwartz and T L Jacobs, *J Amer Chem Soc*, **60**, 1882 (1938)

NOTE For directions and examples for the preparation of the semicarbazones and the 2,4-dinitrophenylhydrazones of the formed carbonyl compounds see explanations and references to Table IX and X, p 141, 142, 143

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE III. ORGANIC DERIVATIVES OF ALKYNES (ACETYLENES)

a) Liquids (Listed in order of increasing b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Hydration product (RC≡CR' → RCOCH ₂ R) and its derivatives				Hg salt	Miscellaneous
						Ketone	B p, °C	2,4-Dinitrophenylhydrazone of ketone	Semicarbazone of ketone		
1	Ethyne (Acetylene)	-84.0 (sat press)	-80.8, subl		0.6179 ⁸⁴	(Acetaldehyde)	(20.2)	(168)	(162-3)		
2	Propyne (Methyl acetylene)	-23.22	-102.7		0.6174 ²³	Acetone	56	128	190	204	
3	1-Butyne (Ethyl acetylene)	8.09, 8.3	-125.72	1.3962	0.6682 ⁸	2-Butanone	82	116-7	135.6	162.3, al	
4	1,3-Butadiyne (Diacyetylene)	10.3	-35 to -36	1.4120	0.7249					161.5, 2.0	KOBr → 1,4-Dibromo deriv, 49.50, bz
5	3-Methyl-1-butyne (Isopropyl acetylene)	26.35, 28	-89.7	1.3723	0.666						Tetrabromo deriv, b p 275
6	2-Butyne (Dimethyl acetylene)	27.2, 6	-32.26	1.3921	0.6901	2-Butanone	82	116.7	135.6		Tetrabromo deriv, 243, eth, 2,4-Dinitrophenylsulfenyl chloride, 65.6
7	3-Methyl-3-buten-1-yne (Isopropenyl acetylene)	33		1.4158	0.6801 ¹¹						3,4-Dibromo deriv, b p 50.0-1.5 ¹⁰
8	3,3-Dimethyl-1-butyne (tert-Butyl acetylene)	38.9	-81.20	1.37725 ¹⁵	0.6737 ¹⁵					92.5-3.0	Cu salt, 140, red
9	1-Pentyne (Propyl acetylene)	40.18	-105.7	1.3852	0.6901	2-Pentanone	102.3	145	112, 106	118.4	Tetrabromo deriv, b p 275
10	1-Penten-4-yne (Allyl acetylene)	42-3		1.4125 ¹⁶	0.738 ¹⁶	Allyl methyl ketone	111.2	160			1,2-Dibromo deriv, b p 79.5, 80.5 ¹⁰ , 4,4,5,5-Tetrabromo deriv, b p 132.6 ¹⁰
11	cis-3-Penten-1-yne (cis-Propenyl acetylene)	44.6		1.4330						48	
12	trans-3-penten-1-yne (trans Propenyl acetylene)	52.2		1.4377	0.7270					155-7	1,2-Dibromo deriv, b p, 60-2 ¹⁰ , 3,4-Dibromo deriv, 66-76 ¹⁰
13	2-Pentyne (Ethyl methyl acetylene)	56.07	-109.3	1.4039	0.7107	2-Pentanone + 3-Pentanone	102.3, 102	145, 156	112, 106, 138-9		KMnO ₄ → formic ac + propionic ac
14	1-Penten-3-yne (Methyl vinyl acetylene)	59.2, 60.1		1.4496	0.7401						
15	4-Methyl-1-pentyne (Isobutyl acetylene)	61.1, 2, 99	-105.1	1.3936 ¹⁵	0.7092 ¹⁵					100.0-5	
16	3-Methyl-1-pentyne (sec-Butyl acetylene)	65.70 ⁷⁰ , 57.7		1.3916	0.7037					74-5	
17	1-Hexyne (Butyl acetylene)	71.33	-131.9	1.3989	0.7155	2-Hexanone	128	106.7	125	96.2, 4	
18	4-Methyl-2-pentyne (Isopropyl methyl acetylene)	72.0, 5	-110.37	1.4078 ¹⁹	0.716 ¹⁹						
19	4,4-Dimethyl-1-pentyne	73.5		1.4028	0.7154					125.6, 5	
20	1,3-Pentadiyne	75.0-5, 55-6	-45 to -35	1.4431 ²¹	0.7375 ²¹						
21	1,4-Hexadiyne	78-83			0.825 ⁹						
22	3-Hexyne (Diethyl acetylene)	81.57 ⁴⁴	-51	1.4112 ²⁵	0.7263 ²⁵	3-Hexanone	125	130	112		2,4-Dinitrophenylsulfenyl chloride, 65.6

* Derivative data given in order: m.p., crystal color, solvent from which crystallized

TABLE III. ORGANIC DERIVATIVES OF ALKYNES (ACETYLENES)

a) Liquids (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Hydration product (RC≡CR → RCOCH ₂ R) and its derivatives				Hg salt	Miscellaneous
						Ketone	B p °C	2,4-Di-nitro-phenyl-hydrazone of ketone	Semicarbazone of ketone		
23	4,4-Dimethyl-2-pentyne (tert Butyl methyl acetylene)	82.9-3.0		1.4071	0.7176						
24	2-Hexyne (Methyl propyl acetylene)	83.7-4.0	-92	1.4135	0.7317	2-Hexanone + 3-Hexanone	128 125	106.7 130	125 112		
25	1-Hexen-3-yne (Ethyl vinyl acetylene)	85 ^{75b}		1.4522	0.7492						1,2-Dibromo deriv b p 87.0 ⁵¹ 3,3,4,4-Tetra-bromo deriv b p 140.50 ¹⁰
26	1,5-Hexadien-3-yne (Divinyl acetylene)	85.0	-87.83	1.5045	0.7857						
27	1-Hexen-4-yne	87 ⁵³		1.446 ¹⁴	0.767 ¹⁴						1,2-Dibromo deriv b p 93.0 ⁵¹ 1,2,4,5-Tetra-bromo deriv b p 154.5-50 ¹⁰
28	3-Ethyl-1-pentyne	87.0-8.5		1.4102	0.7246						
29	1,5-Hexadiyne (Dipropargyl)	87.5 85 ⁵⁸ 20 ⁴⁶	-4.266	1.4381 ²³	0.79943						
30	2-Hexen-4-yne	88.9		1.4918	0.7710	Allyl ethyl ketone	74.5-6.5 ⁹⁰	95-106			
31	2-Methyl-3-hexyne	95.2	-116.7	1.4114	0.7263						
32	4-Methyl-2-hexyne	95.94	f p -107.63	1.4170	0.73855						
33	3-Ethyl-3-penten-1-yne	96.5		1.4338 ²³	0.7886 ²⁵						
34	5-Methyl-3-heptyne	98-100 ¹⁵		1.4102	0.7360						
35	1-Heptyne (n-Pentyl acetylene)	99.74	-80.9	1.4087	0.7328	2-Heptanone	151.2	89	123-127	61 me al	
36	5-Methyl-2-hexyne	102.46	-92.91	1.41762	0.73776						
37	8-Methyl-4-nonyne	104.5		1.4311	0.7681						
38	3-Heptyne (Ethyl propyl acetylene)	105.6		1.415	0.7337	4-Heptanone	144	75	132		
39	2-Heptyne (n-Butyl methyl acetylene)	111.5-2.5		1.4230	0.748	2-Heptanone + 3-Heptanone	151.2 148	89	123-127 101		
40	2,2,5,5-Tetramethyl-3-hexyne (Di-tert-butyl acetylene)	111.9 ^{74b}	19.4	1.4055	0.7120						
41	1,6-Heptadiyne	112-30 ²⁶	-85	1.451 ¹	0.8164 ¹⁷						
42	1-Octyne (n-Hexyl acetylene)	126.2	-79.3	1.4159	0.7461	2-Octanone	173	64.5-58	124.5	80.4-7 me al	
43	4-Octyne (Dipropyl acetylene)	130.4-6 ^{74c}		1.4226	0.7484						
44	3-Octyne (Butyl ethyl acetylene)	131.0-5		1.4261	0.748						
45	2-Octyne (Hexyl methyl acetylene)	138.0-4		1.4285	0.761	2-Octanone + 3-Octanone	173 169 70 ^{73b}	64.5-58 64.5	124.5 117.0-5		
46	4-Nonyne (n-Butyl propyl acetylene)	150.4 ^{75d}		1.4296 ²⁵	0.757 ²⁵	4-Nonanone + 5-Nonanone	187.8 188.4	57.8	73.4 90		

*Derivative data given in order m p, crystal color solvent from which crystallized

TABLE III. ORGANIC DERIVATIVES OF ALKYNES (ACETYLENES)
a) Liquids (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Hydration product (RC≡CR' → RCOCH ₂ R') and its derivatives				Hg salt	Miscellaneous
						Ketone	B p, °C	2,4-Dinitrophenylhydrazone of ketone	Semcarbazone of ketone		
47	1-Nonyne (Heptyl acetylene)	150.8	-50	1.4217	0.7568	2-Nonanone	195.3	55-6	118.20	67.8-85.5 me al	
48	3-Nonyne (Methyl pentyl acetylene)	153.5 ⁷⁴⁵ , 92 ²⁷		1.4299	0.7616	3-Nonanone + 4-Nonanone	187 ⁷⁵¹ , 187-8	55-6, 57-8	111-2, 73.4		
49	Cyclooctyne	157.5-80 ⁷⁴⁰		1.4850	0.868						
50	2-Nonyne (Methyl hexyl acetylene)	161		1.4331	0.769	3-Nonanone + 2-Nonanone	187 ⁷⁵¹ , 195.3	55-6, 55-6	111.2, 118.20		
51	1,8-Nonadiyne	162, 55.0-5 ¹³	-27.28	1.4490	0.8158						
52	1-Decyne (<i>n</i> -Octyl acetylene)	174.0	-44	1.4265	0.7655	2-Decanone	215.5	124	63, 81	80.0-7	
53	3-Decyne (Ethyl hexyl acetylene)	175-6		1.433 ²¹	0.7765 ²¹	3-Decanone + 4-Decanone	211, 206.7		100.1, 51.2		
54	5-Decyne (Dibutyl acetylene)	177, 100 ⁸⁰	-73	1.4332	0.7688	5-Decanone		60.15	57.5-8.0		NaNH ₂ at 210° → 1-Decyne, b p 174
55	Cyclononyne	177.8 ⁷⁴⁰	-36.4	1.4890	0.8972	Cyclononanone	m p 34	146	184.5		
56	2,7-Nonadiyne	180	4.30	1.4674	0.8332						
57	1-Undecyne (1-Hendecyne, Nonyl acetylene)	195, 96.4 ³³⁰	-25	1.4306	0.7728	2-Undecanone	228	63	122.0-5	79	
58	Cyclododecane	203.4 ⁷⁴⁰ , 78.5 ¹²		1.4950	0.8975	Cyclodecanone	100.2 ¹²		203-5		Ozonolysis → sebacic acid, 134.5 NaNH ₂ → 1-Dodecane, b p 215
59	6-Dodecane (Dipentyl acetylene)	209 ⁷⁴⁵ , 90 ⁸		1.4380 ²⁵	0.7816 ²⁵						
60	1-Dodecane (Decyl acetylene)	215, 89.09 ¹⁰	19	1.4340	0.7788					84.2-8	
61	1-Tridecane (<i>n</i> -Undecyl acetylene)	234, 102.95 ¹⁰	-5	1.4371	0.7842						
62	1-Tetradecane (Dodecyl acetylene)	252, 118.31 ¹⁰	0	1.4396	0.7888						
63	1-Pentadecane (Tridecyl acetylene)	268, 129.79 ¹⁰	10	1.4419	0.7928						
64	1-Hexadecane (Tetradecyl acetylene)	284, 103.3 ¹	15	1.4440	0.7965						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE III. ORGANIC DERIVATIVES OF ALKYNES (ACETYLENES)

b) Solids (Listed in order of increasing m.p.)*

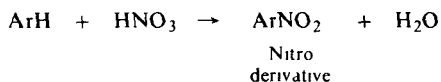
No	Name	Melting point °C	Boiling point °C	n_D^{20}	D_4^{20}	Miscellaneous
1	1-Heptadecyne	22	299	1.4437 ²⁵	0.7961 ²⁵	
2	2,6-Octadiyne	27	62 ¹⁹	1.453 ²¹	0.828 ²⁰	
3	1-Octadecyne	27	313	1.4474	0.8025	
4	2-Octadecyne	30	184 ¹⁵		0.8016	
5	1-Nonadecyne	33	327	1.4488 ^S	0.8050 ^S	Hg salt, 96-7 <i>n</i> -BuOH
6	1-Eicosyne	35	340	1.4501 ^S	0.8073 ^S	
7	2-Heneicosyne	35-6	180 ²	1.4499 ⁴⁰		
8	1-Heneicosyne	41		1.4513 ^S	0.8094 ^S	
9	1-Docosyne	45	363	1.4524 ^S	0.8114 ^S	
10	1-Tricosyne	49	374	1.4534 ^S	0.8131 ^S	
11	1-Tetracosyne	52	385	1.4544 ^S	0.8148 ^S	
12	1-Pentacosyne	55	395	1.4552 ^S	0.8163 ^S	
13	1-Hexacosyne	57	405	1.456 ^S	0.8177 ^S	
14	1-Heptacosyne	60	415	1.4568 ^S	0.8190 ^S	
15	1-Octacosyne	62	426	1.4575 ^S	0.8202 ^S	
16	1-Nonacosyne	65	432	1.4581 ^S	0.8213 ^S	
17	1-Triacontyne	67	441	1.4587 ^S	0.8224 ^S	
18	1-Hentriacontyne	69	449	1.4593 ^S	0.8234 ^S	
19	1-Dotriacontyne	71	457	1.4598 ^S	0.8243 ^S	
20	1-Tritriacontyne	73	464	1.4603 ^S	0.825 ^S	
21	1-Tetratriacontyne	74	472	1.4608 ^S	0.8260 ^S	
22	1-Pentatriacontyne	76	479	1.4612 ^S	0.8268 ^S	
23	1-Hexatriacontyne	77	486	1.4617 ^S	0.8275 ^S	
24	1-Heptatriacontyne	79	493	1.4621 ^S	0.8282 ^S	
25	1-Octatriacontyne	80	499	1.4625 ^S	0.8289 ^S	
26	1-Nonatriacontyne	82	505	1.4628 ^S	0.8295 ^S	
27	1-Tetracontyne	83	512	1.4632 ^S	0.8301 ^S	

Derivative data given in order m.p. crystal color solvent from which crystallized

S = supercooled liquid at 20°

EXPLANATIONS AND REFERENCES TO TABLE IV

Nitro derivative *



From the aromatic hydrocarbon with concentrated nitric and sulfuric acids

For directions and examples see Cheronis, p 578 80, Linstead, p 48, 49, Shriner, p 249, Vogel, p 520, Wild, p 24

From the aromatic hydrocarbon with fuming and concentrated nitric acids

See Shriner, p 249, Wild, p 24

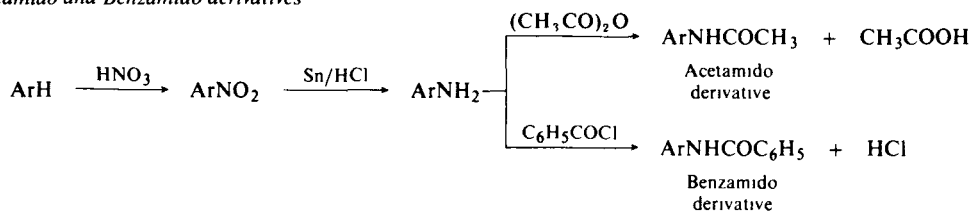
From the aromatic hydrocarbon with fuming nitric acid in acetic acid

See Vogel, p 520

From the aromatic hydrocarbon with nitric and sulfuric acids in chloroform

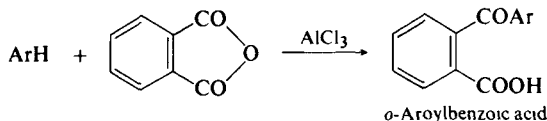
See Vogel, p 580

Acetamido and Benzamido derivatives *



Nitration of the aromatic hydrocarbon is followed by reduction with tin and hydrochloric acid. The resulting amine is acetylated with acetic anhydride or benzoylated with benzoyl chloride.

For directions and examples see Cheronis, p 581, V L Ipatieff and L A Schmerling, *J Amer Chem Soc*, **59**, 1056 (1937), **60**, 1476 (1938), **65**, 2470 (1943)

o-Aroylbenzoic acid (product with phthalic anhydride)

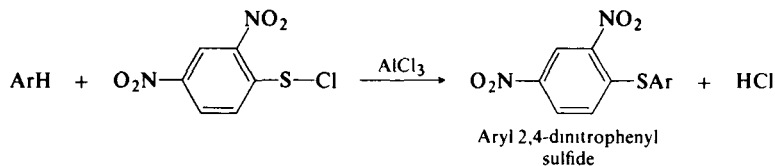
From the aromatic hydrocarbon, phthalic anhydride and aluminum chloride in carbon disulfide

For directions and examples see Cheronis, p 548, Shriner, p 250, Vogel, p 519, Wild, p 28, H W Underwood and W L Walsh, *J Amer Chem Soc*, **57**, 940 (1935)

From the aromatic hydrocarbon, phthalic anhydride and aluminum chloride without solvent

See G F Lewenz and K T Serijan, *J Amer Chem Soc*, **75**, 4087 (1953)

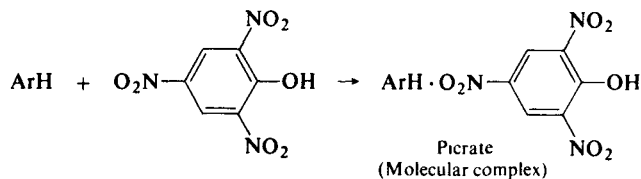
2,4-Dinitrobenzenesulfonyl chloride derivative (Aryl 2,4-dinitrophenyl sulfide)



From the aromatic hydrocarbon, 2,4-dinitrobenzenesulfonyl chloride and aluminum chloride in 1,2-dichloroethane

For directions and explanations see Cheronis, p 585, C M Buess and N Kharasch, *J Amer Chem Soc*, **72**, 3529 (1950)

Picrate



*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE IV (Continued)

From the aromatic hydrocarbon and picric acid in alcohol

For directions and examples see Linstead, p 50 Vogel, p 518, Wild, pp 29 30

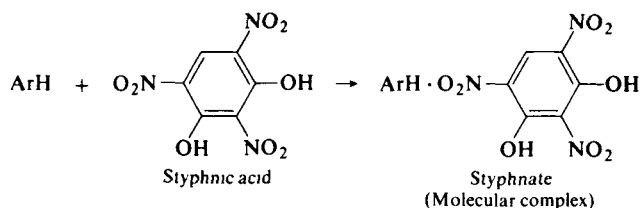
From excess of liquid aromatic hydrocarbon and picric acid without solvent

See Wild, pp 28 9 Baril and Hauber, *J Amer Chem Soc*, **53**, 1087 (1931)

From the aromatic hydrocarbon in methanol or in dry benzene

See Cheronis, pp 582 3

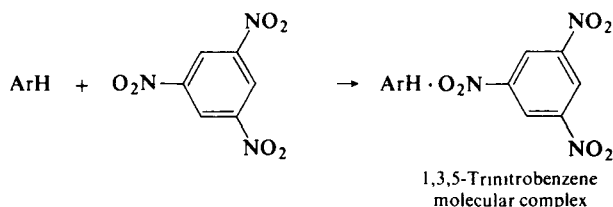
Styphnate



From the aromatic hydrocarbon and styphnic acid (2,4,6-trinitroresorcinol) in acetic acid

For directions and examples see Vogel, p 519, W J Hickinbottom, *Reactions of Organic Compounds*, 2nd ed, Longmans, Green and Co, London, 1948, p 76

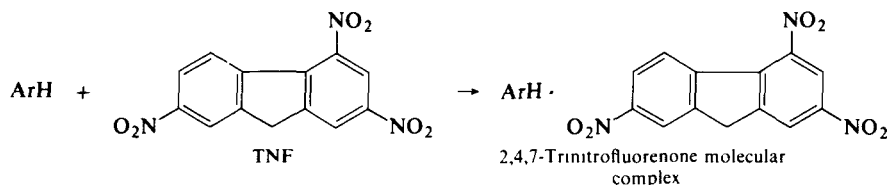
1,3,5-Trinitrobenzene derivative



From the aromatic hydrocarbon and 1,3,5-trinitrobenzene in alcohol, acetic acid, or benzene

For directions and examples see Vogel, p 519

2,4,7-Trinitrofluorenone (TNF) derivative *



From the aromatic hydrocarbon and 2,4,7-trinitrofluorenone in methanol-benzene and ethanol-benzene mixtures

For directions and examples see Cheronis, pp 582 3, M Orchin, *J Amer Chem Soc*, **68**, 1727 (1946), M Orchin, L Reggel and E O Woolfolk, *J Amer Chem Soc*, **69**, 1225 (1947)

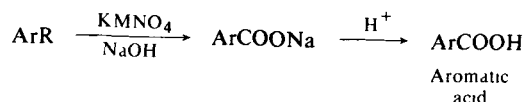
From the aromatic hydrocarbon and 2,4,7-trinitrofluorenone in glacial acetic acid

See M C Kloetzel and H E Mertel, *J Amer Chem Soc*, **72**, 4786 (1950), M D Soffer and R A Stewart, *J Amer Chem Soc*, **74**, 567 (1952)

From the aromatic hydrocarbon and 2,4,7-trinitrofluorenone without solvent

See D E Laskowski and W C McCrone, *Anal Chem*, **30**, 542 (1958)

Acids from side-chain oxidation



*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE IV (Continued)

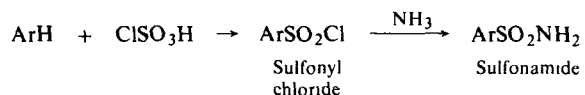
From the alkyl-substituted aromatic hydrocarbon with potassium permanganate in sodium hydroxide or sodium carbonate solution

For directions and examples see Cheronis, p 585, 627, Linstead, p 50, Shriner, p 250, Vogel, p 520, Wild, p 26

From the alkyl-substituted aromatic hydrocarbon with sodium bichromate and sulfuric acid

See Cheronis, p 627, Shriner, p 250, Wild, p 26

Sulfonamide *



From the aromatic hydrocarbon and chlorosulfonic acid in chloroform, followed by aqueous ammonia

For directions and examples see Linstead, p 49, Wild, p 27, E H Huntress and F H Carten, *J Amer Chem Soc*, **62**, 511 (1940), E H Huntress and J S Autenrieth, *J Amer Chem Soc*, **63**, 3446 (1941)

From the aromatic hydrocarbon with chlorosulfonic acid without solvent, followed by ammonolysis with dry ammonium carbonate

See Wild, p 27

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Picrate	1,3,5-Trinitro benzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfonyl chloride derivative	Miscellaneous
1	Benzene	80.1	5.5	1.5011	0.87901	84		1,3-di 89, 1,3,5 tri 122		127	120	Sulfonamide, 156
2	Toluene	110.6	-95	1.49613	0.86694	88 2, pa yel		2,4-di 70	2,4-di 221	137	102.3	Oxid → benzoic acid, 121, Sulfonamide, 137
3	Ethylbenzene	136.2	-93.9	1.49594	0.86690	96 6, pa yel		2,4,6-tri 37	2,4-di 223	122, 128	97	Oxid → benzoic acid, 121, Sulfonamide, 109
4	1,4-Xylene	138.3	13.26	1.49581	0.86105	90		2,3,5-tri 139		132, 148	134-5	Oxid → terephthalic acid, > 300, subl, Sulfonamide, 147
5	1,3-Xylene	139.1	-47.89	1.49722	0.86417	91		2,4,6-tri 183		126, 142		Oxid → isophthalic acid, 348, h w, Sulfonamide, 137
6	1,2-Xylene	144.4	-25.18	1.50545	0.88020	88		4,5-di 118		178		Oxid → phthalic acid, 206.8, Sulfonamide, 144
7	Isopropylbenzene (Cumene)	152.4	-96.04	1.49146	0.86179			2,4,6-tri 109	4-mono 106, 2,4-di 216	133		Oxid → benzoic acid, 121 Sulfonamide, 106
8	n-Propylbenzene	159.2	-99.59	1.49202	0.86204	103		2,4-di b p 150 ¹	4-mono 96, 2,4-di 208	125		Oxid → benzoic
9	1-Ethyl-3-methylbenzene (m-Ethyltoluene)	161.3	-96.55	1.49661	0.86455							Oxid → isophthalic acid, 348, h w
10	1-Ethyl-4-methylbenzene (p-Ethyltoluene)	162.1	-62.35	1.49500	0.86118							Oxid → terephthalic acid, > 300, subl
11	1,3,5-Trimethylbenzene (Mesitylene)	164.7	-44.72	1.49937	0.86518	97		2,4-di 86, 2,4,6- tri 235		212		Oxid → trimesic acid, 380, Sulfonamide, 141
12	1-Ethyl-2-methylbenzene (o-Ethyltoluene)	165.2	-80.83	1.50456	0.88069							Oxid → phthalic acid, 206.8
13	tert-Butylbenzene	169.1	-58.34	1.49266	0.86650			2,4-di 62, 2,4,6- tri 124	4-mono 170, 2,4-di 210		130.1	Oxid → benzoic acid, 121
14	1,2,4-Trimethylbenzene (Pseudocumene)	169.4	-43.91	1.50484	0.87582	97		3,5,6-tri 185				Oxid → trimellitic acid, 225.35 d
15	Isobutylbenzene	172.8	-51.53	1.48646	0.85321				4-mono 127.0 7.5		99.100	Oxid → benzoic acid, 121
16	sec-Butylbenzene	173.3	-75.57	1.49020	0.86207			2,4-di b p 161.2 ⁵	4-mono 126, 2,6-di 192		88-9	Oxid → benzoic
17	3-Isopropyl-1-methylbenzene (3-Isopropyltoluene, m-Cymene)	175.1	-63.75	1.4930	0.8610							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS
a) Liquids. (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Picrate	1,3,5-Trinitrobenzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Di-nitro-phenyl sulfenyl chloride derivative	Miscellaneous
18	1,2,3-Trimethylbenzene (Hemimellitene)	176.08	-25.41	1.51393	0.89438	90.5						Oxid → hemimel- litic acid, 190.7 d
19	<i>trans</i> -Propenylbenzene	176.5 7.5	-27.1 to -25.9	1.5463 ²⁵	0.902							
20	Indane	177	-51.4	1.5381	0.9645							
21	4-Isopropyl-1-methylbenzene (4-Isopropyltoluene, 4-Cymene)	177.1	-67.94	1.4909	0.8537			2,6- <i>di</i> 54, 2,3,6 <i>tri</i> 118		123.4		Sulfonamide, 115
22	2-Isopropyl-1-methylbenzene (2-Isopropyltoluene 2-Cymene)	178.35	-71.71	1.5006	0.8766							Br ₂ → Tetrabromo, 59.5-60.5
23	1,3-Diethylbenzene	181.1		1.49552	0.86394			2,4,6- <i>tri</i> 62		114		
24	1-Methyl-3-propylbenzene (<i>m</i> -Propyltoluene)	181.8		1.4936	0.8610							
25	Indene	182.4	-2	1.5764	0.9915	98, yel						Acid → polymer
26	<i>n</i> -Butylbenzene	183.27	-88.15	1.48979	0.86013				4- <i>mono</i> 105 2,4- <i>di</i> 214	97	72.3	
27	1-Methyl-4-propylbenzene (<i>p</i> -Propyltoluene)	183.3		1.4919	0.8584							
28	1,2-Diethylbenzene	183.4		1.50346	0.87996							
29	1,4-Diethylbenzene	183.8		1.49483	0.86196							
30	1,3-Dimethyl-5-ethylbenzene	183.8	-84.4	1.4981	0.8648			2,4,6- <i>tri</i> 117.0 7.6				Br ₂ → Tribromo, 89
31	1-Methyl-2-propylbenzene (<i>o</i> -Propyltoluene)	184.8	-60.2	1.4998	0.8744							
32	2,2-Dimethyl-1-phenylpropane (Neopentylbenzene)	186		1.4880	0.858							
33	1,4-Dimethyl-2-ethylbenzene	186.9		1.5043	0.8772			3,5,6- <i>tri</i> 127.8, al	4- <i>mono</i> 142, 2,4- <i>di</i> 181			Sulfonamide, 107-8
34	2-Methylindane	187.0		1.5070	0.9034							
35	3-Methyl-2-phenylbutane	188		1.486	0.8701				4- <i>mono</i> 147.8, 2,4- <i>di</i> 193			4-Benzamido deriv, 141.2
36	1-Methylindane	188.90		1.5274	0.939							Heat with Pt at 310-350 → Naph- thalene, 80.3
37	1,3-Dimethyl-4-ethylbenzene	188.4	-63.0	1.5038	0.8763			2,5,6- <i>tri</i> 127.5 9.0				Br ₂ → 2,5,6-Tri- bromo, 94.5, 81.2
38	3-<i>tert</i>-Butyl-1-methylbenzene (3- <i>tert</i> -Butyltoluene)	189.3	-41.39	1.4944	0.8657							
39	1,2-Dimethyl-4-ethylbenzene	189.55	-67.1	1.5031	0.8745							Oxid → trimel- litic acid, 225.35 d
40	1,3-Dimethyl-2-ethylbenzene	190		1.5107	0.8904							Oxid → hemimel- litic acid, 190-7 d

*Derivative data given in order m, p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Picrate	1,3,5-Trinitrobenzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Dinitrophenylsulfenyl chloride derivative	Miscellaneous
41	3-Phenylpentane	191		1.4877	0.8649				4-mono 145.6 2,4-di 199.200			4-Benzamido deriv., 154
42	1-Ethyl-3-isopropylbenzene	192		1.4955	0.859							
43	2-Methyl-2-phenylbutane	192.38		1.4934	0.8737				4-mono 142 2,4-di 181			4-Benzamido deriv. 112.3
44	4-tert-Butyl-1-methylbenzene (4-tert-Butyltoluene)	192.8	-52.49	1.4918	0.8612			2,6-di 96				
45	1-Ethyl-2-isopropylbenzene	193		1.5080	0.888							
46	2-Phenylpentane	193		1.4876	0.8576				4-mono 107 2,4-di 181.2			4-Benzamido 127.8
47	1,2-Dimethyl-3-ethylbenzene	193.9	-49.5	1.5117	0.8921							Oxid → hemimellitic acid 190.7 d
48	3-sec-Butyl-1-methylbenzene (3-sec-Butyltoluene)	194		1.490	0.858							
49	3-Isobutyl-1-methylbenzene (3-Isobutyltoluene)	194		1.4888	0.8536							
50	d-2-Methyl-1-phenylbutane	194		1.4880	0.8617							
51	1,3-Dimethyl-5-isopropylbenzene	194.5 191		1.4955	0.8591							Oxid → trimelic acid, 380
52	2-Phenyl-cis-2-butene	194.5		1.5402 ²³	0.9191 ²						81.2	
53	4-Isobutyl-1-methylbenzene (p-Isobutyltoluene)	196		1.4874	0.8517							
54	2-sec-Butyl-1-methylbenzene (2-sec-Butyltoluene)	196		1.497	0.873							
55	2-Isobutyl-1-methylbenzene (o-Isobutyltoluene)	196		1.4935	0.8649							
56	1,4-Dimethyl-2-isopropylbenzene	196.2		1.5010	0.8738							
57	1-Ethyl-4-isopropylbenzene	196.6		1.4923	0.8585							
58	d,l-2-Methyl-1-phenylbutane	197		1.486	0.859				4-mono 115.6 2,4-di 193.4			4-Benzamido 126
59	1,2,3,5-Tetramethylbenzene (Isodurene)	197.9		1.5125	0.8899			4,6-di 181.157		213		
60	3-Methyl-1-phenylbutane (Isopentylbenzene)	198.9 196		1.4847	0.8558				4-mono 114 2,4-di 215.6			
61	1,3-Dimethyl-2-isopropylbenzene	199		1.509	0.890							
62	1,3-Dimethyl-4-isopropylbenzene	199.1 195		1.5018	0.869							
63	3-Methylindene	199.2 200 198.5		1.55907 ²⁷	0.9640	76.8, or - yel., al						
64	4-sec-Butyl-1-methylbenzene (p-sec-Butyltoluene)	200		1.4932	0.8650							

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Picrate	1,3,5-Trinitrobenzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Di-nitrophenyl sulfonyl chloride derivative	Miscellaneous
65	2- <i>tert</i> -Butyl-1-methylbenzene (2- <i>tert</i> -Butyltoluene)	200.5		1.5076	0.8897							
66	3,5-Diethyl-1-methylbenzene (3,5-Diethyltoluene)	200.7	-74.12	1.4969	0.8630			2,4,6- <i>tri</i> 106.65				
67	2-Butyl-1-methylbenzene (2-Butyltoluene)	201.208		1.4958	0.8721							
68	1-Ethyl-3-propylbenzene	201		1.4930	0.8607							
69	1,2-Dimethyl-4-isopropylbenzene	201.8		1.4993	0.8699							
71	1,2-Dimethyl-3-isopropylbenzene	202.6		1.508	0.888							
72	1-Ethyl-2-propylbenzene	203		1.4992	0.8744							
73	1,3-Di-isopropylbenzene	203.2	-63.1	1.4883	0.85593			4,6- <i>di</i> 76.972, 2-ProH				
74	1,2-Diethyl-4-methylbenzene	203.6		1.5039	0.8762							
75	1,2-Di-isopropylbenzene	203.8		1.4960	0.8771							
76	1,4-Dimethyl-2-propylbenzene	204.3		1.4999	0.8717							
77	1,2,3,4-Tetramethylbenzene (Prehnitene)	205.0	-6.3	1.5201	0.9053	92-5		5,6- <i>di</i> 176				
78	1-Ethyl-4-propylbenzene	205		1.4921	0.8594							
79	3-Butyl-1-methylbenzene (<i>m</i> -Butyltoluene)	205		1.491	0.859							
80	2,4-Diethyl-1-methylbenzene (2,4-Diethyltoluene)	205		1.5027	0.8748							
81	<i>n</i> -Pentylbenzene	205.4	-75	1.4878	0.8585				4- <i>mono</i> 101-2, 2,4- <i>di</i> 202			4-Benzamido, 128.9
82	3-Methyl-3-phenylpentane	206		1.4958	0.8755							
83	1,3-Dimethyl-5- <i>tert</i> -butylbenzene	206-6.5	-21.5	1.4958	0.8645			2,4,6- <i>tri</i> 107 (one form), 114 (another form)				
84	1,3-Dimethyl-4-propylbenzene	206.6		1.4998	0.8723							
85	1,2-Diethyl-3-methylbenzene	206.6		1.5105	0.8910							
86	4-Butyl-1-methylbenzene (4-Butyltoluene)	207		1.490	0.857							
87	2,5-Diethyl-1-methylbenzene (2,5-Diethyltoluene)	207.1		1.5034	0.8758							
88	1,2,3,4-Tetrahydronaphthalene (Tetralin)	207.6	-35.79	1.54135	0.9702			5,7- <i>di</i> 95		153.5		Cl ₂ * 5,6,7,8-Tetrachloro, 172
89	1,3-Diethyl-2-propylbenzene	207.6		1.5063	0.8856							
90	2,6-Diethyl-1-methylbenzene (2,6-Diethyltoluene)	208.8		1.5106	0.8907							
91	1,2-Dimethyl-4-propylbenzene	208.9		1.5000	0.8715							
92	1,3-Dimethyl-5-propylbenzene	209		1.4933	0.8610							
93	2-Methyl-3-phenylpentane	209		1.4912	0.8678							
94	4- <i>tert</i> -Butyl-1,3-dimethylbenzene	210-4		1.5030 ³⁷	0.9372 ³⁸			2,5,6- <i>tri</i> 112, al				
95	1,4-Di-isopropylbenzene	210.4	-17.1	1.48983	0.85676							
96	1,2-Dimethyl-3-propylbenzene	210.7		1.5075	0.8864							

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Picrate	1,3,5-Trinitrobenzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfenyl chloride derivative	Miscellaneous
97	1- <i>tert</i> -Butyl-4-ethylbenzene	211		1.4950	0.8635			2,6- <i>di</i> 94 5, al				
98	<i>d,l</i> -3-Phenylhexane	211 208.3		1.4867	0.8596				2,4- <i>di</i> 207 8			
99	2-Ethyl-1,3,5-trimethylbenzene	212.4	-12.2	1.5074	0.883			4,6- <i>di</i> 111, al				
100	3-Ethyl-4-isopropyl-1-methylbenzene	213		1.5006	0.8722							
101	5-Ethyl-1,2,4-trimethylbenzene	213	-13.5	1.5075	0.833			3,6- <i>di</i> 87 8, al				3,6-Dibromo, 60-1, acet
102	6-Ethyl-1,2,4-trimethylbenzene	213		1.5118	0.8897							
103	2-Phenylhexane	214		1.4882	0.8600				2,4- <i>di</i> 178			
104	2-Methyl-1-phenylpentane	215		1.4847	0.8624							
105	4-Isopropyl-1-propylbenzene	215		1.4972	0.8614							
106	1,3-Dipropylbenzene	215.8		1.5155 ¹¹	0.9137 ¹							
107	5-Ethyl-1,2,3-trimethylbenzene	215.8		1.5101	0.8863							
108	3-Ethyl-1,2,4-trimethylbenzene	216.6		1.5133	0.895			5,6- <i>di</i> 79 80, al				
109	1,2,4-Triethylbenzene	217.7		1.4982	0.8791							
110	1,3,5-Triethylbenzene	218 211.2		1.4965	0.8568 ²⁵			2,4,6- <i>tri</i> 112 4 2 6		129		2,4,6-Tribromo, 105
111	2-Methyl-1,2,3,4-tetrahydronaphthalene (2-Methyltetralin)	218		1.5311	0.952							
112	1-Methyl-1,2,3,4-tetrahydronaphthalene (1-Methyltetralin)	219		1.5357	0.9580							
113	4-Ethyl-1,2,3-trimethylbenzene	220.4		1.5180	0.9019							
114	1,4-Dipropylbenzene	221		1.4914	0.8564							
115	3-Methyl-1-phenylpentane	221		1.4876	0.8605							
116	2-Propyl-1,3,5-trimethylbenzene	221		1.5033	0.8782							
117	1,1-Dimethyl-1,2,3,4-tetrahydronaphthalene (1,1-Dimethyltetralin)	221		1.5292	0.950			<i>Ar-x, x-di</i> 64 5				
118	3- <i>tert</i> -Butyl-1-isopropylbenzene	222		1.4832	0.8512							
119	1-Methyl-3-pentylbenzene (3-Pentyltoluene)	223		1.4911	0.8593							
120	4- <i>tert</i> -Butyl-1-isopropylbenzene	224		1.4872	0.8665							
121	2-Methyl-2-phenylhexane	225		1.4943	0.8737							
122	2,4-Di-isopropyl-1-methylbenzene (2,4-Di-isopropyltoluene)	225		1.4990	0.8664							
123	3-Methyl-3-phenylhexane	226		1.4980	0.8776							
124	<i>n</i> -Hexylbenzene	226.1	-61.2	1.4864	0.8575				2,4- <i>di</i> 205 6			
125	3-Phenylheptane	227		1.4862	0.8607							
126	2,6-Di-isopropyl-1-methylbenzene (2,6-Di-isopropyltoluene)	228		1.5032	0.8768							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n_D^{20}	D_4^{20}	Picrate	1,3,5 Trinitro benzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4 Di nitro phenyl sulfenyl chloride derivative	Miscellaneous
127	5-Propyl-1,2,4-trimethylbenzene	228		1.5095	0.887							
128	6-Methyl-1,2,3,4-tetrahydronaphthalene (6-Methyltetralin)	229		1.5357	0.9537							
129	2,2-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,2-Dimethyltetralin)	230		1.5200	0.935							
130	2-Phenylheptane	231		1.4863	0.8610							
131	5-Methyl-1,2,3,4-tetrahydronaphthalene (5-Methyltetralin)	234.4		1.54395	0.9720							
132	2-Ethyl-1,2,3,4-tetrahydronaphthalene (2-Ethyltetralin)	235		1.523	0.938							
133	Cyclohexylbenzene	235-6	7-8	1.5329	0.9502							
134	1-Ethyl-1,2,3,4-tetrahydronaphthalene (1-Ethyltetralin)	236		1.5321	0.9535							
135	2,5-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,5-Dimethyltetralin)	236		1.526	0.946							
136	2,8-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,8-Dimethyltetralin)	236		1.526	0.941							
137	2,7-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,7-Dimethyltetralin)	237.8		1.526	0.941							
138	2,6-Dimethyl-1,2,3,4-tetrahydronaphthalene (2,6-Dimethyltetralin)	238		1.526	0.941							Oxid → trimellitic acid 225-35 d
139	1,4-Di-sec-butylbenzene	239		1.4892	0.8590							
140	1,5-Dimethyl-1,2,3,4-tetrahydronaphthalene (1,5-Dimethyltetralin)	239		1.526	0.9410							
141	3-Ethyl-3-phenylhexane	239		1.4943	0.875							
142	6-Ethyl-1,2,3,4-tetrahydronaphthalene (6-Ethyltetralin)	241		1.5331	0.9568							
143	2-Methyl-1-phenyl-1-butene	241.2		1.528 ¹⁸								Nitrosit, 129-30
144	5-Ethyl-1,2,3,4-tetrahydronaphthalene (5-Ethyltetralin)	242		1.540	0.973							
145	n-Heptylbenzene	244		1.4875	0.8595							
146	1-Methylnaphthalene	244.8	-30.57	1.6174	1.02025	142, or red, al	153.5, 4.5, al	4-mono 71, 4,5-di 143		68		Styphnate, 135, al
147	5,6-Dimethyl-1,2,3,4-tetrahydronaphthalene (5,6-Dimethyltetralin)	252		1.552	0.975							Oxid → melo phanic acid, 238-42
148	6,7-Dimethyl-1,2,3,4-tetrahydronaphthalene (6,7-Dimethyltetralin)	252	10	1.5360	0.954			5,8 di 203				
149	5,7-Dimethyl-1,2,3,4-tetrahydronaphthalene (5,7-Dimethyltetralin)	253.1	-6	1.5405	0.9583							Heating with S at 320° → 1,3-Dimethylnaphthalene, b p 263

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Picrate	1,3,5-Trinitrobenzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfonyl chloride derivative	Miscellaneous
150	5,8-Dimethyl-1,2,3,4-tetrahydronaphthalene (5,8-Dimethyltetralin)	254		1.547	0.967							Heating with S at 230° → 1,4-Dimethylnaphthalene, b.p. 268
151	2-Ethynaphthalene	257.9	-7.5	1.59761	0.9922	77.0	88.9, 2-					Styphnate, 88.90
152	1-Ethynaphthalene	258.67	-13.88	1.6062	1.00816	98.5	111.5, 12, al					Styphnate, 111.3, al
153	1,7-Dimethylnaphthalene	263	-13	1.60831	1.0115	121	137					Styphnate, 143
154	1,6-Dimethylnaphthalene	263	-14	1.6072	1.003	114.5	139, or, al, yel					Styphnate, 122
155	1,3-Dimethylnaphthalene	263	-4.0	1.6078	1.0063	118	135, yel, al					Styphnate, 117.8, w-me al, 2,4,7-Trinitrofluorenone deriv., 142.5, or
156	<i>n</i> -Octylbenzene (1-Phenyl-octane)	264.5	-36	1.4845	0.8562			2,4-di 2				
157	1-Allylnaphthalene	265.7		1.6140	1.0228	69						
158	1-Isopropylnaphthalene	267.9	-16	1.5950	0.99565	85.6						Dimer, 198.5, 9.5
159	1,4-Dimethylnaphthalene	268, 262-4	7.66	1.6127	1.0166	144, or, me al	165.6, yel, me al					Tetrabromo, 141.2 Styphnate, 126-7 or me al
160	1,1-Diphenylethane	268-70		1.5761	1.0033							Oxid → benzophenone, 49
161	2-Isopropylnaphthalene	a) 268.2 b) 262		1.5772 1.5861	0.9795	93.5, 91.3						
162	2-Propylnaphthalene	273.5, 277.9		1.5872	0.9770	93.4, or al	99					
163	1-Propylnaphthalene	277, 272.5	-10	1.5952	0.9918	91.2	86.7, al					
164	1,3,7-Trimethylnaphthalene	280	13.5	1.5759	1.007	144, or, al						Styphnate, 151.5 or me al
165	1-Isopropyl-7-methylnaphthalene (Apocadale)	282		1.5884	0.9833	102, or, al						Styphnate, 166 (163-4), yel, al
166	<i>n</i> -Nonylbenzene (1-Phenyl-nonane)	282	-24	1.4838	0.8558							4-Sulfonamide, 94.5-5.0 Maleic anhydride → 3-(4-Nonylbenzoyl) acrylic acid, 82.3
167	2-Butylnaphthalene	283-5, 292	-8.1	1.57774	0.9673	71.3, or-yel, al						
168	2- <i>tert</i> -Butylnaphthalene	285-90	-4	1.5768	0.9687	102.3						
169	1- <i>tert</i> -Butylnaphthalene	287.9		1.5726	0.9629	96, yel						
170	1-Butylnaphthalene	289.34	-19.76	1.5819	0.97673	104.5, or-yel						

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

a) Liquids. (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Picrate	1,3,5-Trinitrobenzene derivative	Nitro derivative	Acetamido derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfonyl chloride derivative	Miscellaneous
171	4,5-Benzindane (1,2-Cyclopentanonaphthalene)	294.5		1.6290	1.066	110	119.20					2,4,7-Trinitrofluorenone deriv., 133
172	<i>n</i> -Decylbenzene (1-Phenyldecane)	300	-14.38	1.48319	0.85553							
173	1-Pentyl-naphthalene	307	-22	1.5725	0.9656		75, yel					
174	2-Pentyl-naphthalene	310	-21	1.5694	0.9561		74, yel					
175	<i>n</i> -Undecylbenzene (<i>n</i> -Hendecylbenzene, 1-Phenylundecane)	316	-5	1.4828	0.8553							4-Sulfonamide, 95.7.6.2
176	1-Hexyl-naphthalene	322	-17.7	1.5647	0.9566		69.74					
177	2-Hexyl-naphthalene	324	-5.6	1.620	0.9479		67-8, yel					
178	<i>n</i> -Dodecylbenzene (1-Phenyl-dodecane)	331	3	1.4824	0.8551							4-Sulfonamide, 97.5
179	1-Heptyl-naphthalene	340		1.5582	0.9491							
180	2-Heptyl-naphthalene	341	1	1.5556	0.9410							
181	Tridecylbenzene (1-Phenyl-tridecane)	346	10	1.4821	0.8550							
182	1-Octyl-naphthalene	356	-2.0	1.5532	0.9427							
183	2-Octyl-naphthalene	357	2 forms stable -0.5, meta-stable 13	1.5501	0.9356							
184	1-Nonyl-naphthalene	372		1.5477	0.9371							
185	2-Nonyl-naphthalene	372	12	1.5454	0.9298							
186	1-Decyl-naphthalene	387		1.5435	0.9322							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS
b) Solids. (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	Picrate	Styphnate	sym-Tri-nitro-benzene derivative	2,4,7-Tri-nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4-Di-nitrophenyl sulfonyl chloride derivative	Miscellaneous
1	1,2,6-Trimethylnaphthalene	14	146 ¹⁰	122-3, al	150-1, al						n _D ²⁰ 1 6010
2	Diphenylmethane	26 7	264 7, 261 2, 120 ¹⁰					2,4,2',4'-tetra 172			n _D ²⁰ 1 5770, D ₂₀ ²⁵ 1 0056, CrO ₃ → Benzophenone, 49 n _D ²⁵ 1 5725
3	1,2,3-Trimethylnaphthalene	27 8, al	125-30 ¹²	143, or , al	143 5, yel 148-9, or , me al	154 6, al					
4	1,6,7-Trimethylnaphthalene	28, me al	285, 138 ¹²	125 6, or , me al		142-3, yel , me al					
5	2-Isopropylazulene	31, bl - vlt				dt 113 4					
6	1,4-Dimethyl-7-isopropylazulene (δ-Guaiazulene)	31 5, bl - vlt , al	167-8 ¹²	122 2 5, bl , al	105-6, bl , me al	151-1 5					D ₄ ¹⁹ 0 9728 (super-cooled) 2,4,6-Tri-nitrotoluene deriv , 89
7	2,6-Dimethylphenanthrene	33-4, me al		135 6, yel , al	148 50, yel , me al						
8	1,2,5-Trimethylnaphthalene	33 5, 31-2, al	147 8 ¹¹	138 40, al	131, al	159-60, al					n _D ²⁰ 1 6110, D ₂₀ ²⁵ 1 0103, 2,4,6-Tri-nitrotoluene deriv , 90 0 5
9	1-Propylphenanthrene	34 5, me al		100-1, yel , me al							
10	5-Isopropylazulene	34 5				134, 122 3					
11	2-Propylphenanthrene	35-6, al	170 ^{10,2}	91 2, al							
12	2-Methylnaphthalene	37-8, 34 4	240-2, 110-2 ¹⁶	116, al		123, yel	125 6, al	1-mono 81			CrO ₃ → β-Naphthoic acid, 182
13	1-Ethyl-5-methylnaphthalene	40, al	133 ¹⁰	97, or , al							
14	9-Isopropylphenanthrene	41-2		109-10							
15	6-Isopropylazulene	43				124					
16	2-Ethyl-6-methylnaphthalene	44 5	145 50 ¹¹	109, or	119, yel	116-7, yel					2,4,6-Trinitrotoluene deriv , 62, yel
17	2-Isopropylphenanthrene	44-5, al		108, yel , me al							
18	6-Isopropyl-1-methylphenanthrene	45-6		143, or							
19	2-Ethylazulene	45 5, 44-5, bl		110 1		107					
20	2,5-Dimethylphenanthrene	46 7, al	204-5 ¹⁵	127-9, yel , al	132-3, or , al						
21	1,3,5-Trimethylnaphthalene	47, me al	139 5 ¹⁰	141-2, me al	138, yel						
22	3-Ethyl-6-methylphenanthrene	47-8		156-6 5, or							
23	2-Methylazulene	47-8		130-1, bl , al		140-1, dk red, al					
24	1,3,8-Trimethylnaphthalene	48, me al		127 5, or , al	140 5, al						
25	4-Methylphenanthrene	49 50, 95% al		140-1, al	135, or , al						

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

b) Solids. (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Picrate	Styphnate	sym Tri-nitro-benzene derivative	2,4,7-Tri-nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfenyl chloride derivative	Miscellaneous
26	1,4-Dimethylphenanthrene	50 1 (cor), me al		143 5, or -yel	135 5 6 5, or						
27	Bibenzyl (1,2-Diphenylethane)	53	284			102		4,4-di 180, 2,2',4,4-tetra 169		132 3	D ₃₀ ^m 0 9782, CrO ₃ → Benzoic acid, 121
28	Methylenefluorene (Biphenylencethylene)	53		152 3							
29	3,5-Dimethylphenanthrene	53 4, me al		139, or , me al	124 5 or -yel						
30	1,3-Dimethylazulene	54		164 6		164 6, al					
31	7-Methyl-3,4-benzphenanthrene	54 0 4 5, al		134 0 4 5, red, al			178 5 8 8				
32	Pentamethylbenzene	54 3, 51	231 8	131		121		6-mono 154			
33	1,2,4-Trimethylnaphthalene	55-6 50, me al	146 ¹²	148 8 5, or me al	123 5, yel , me al	165 6 5, me al					
34	3,3'-Dimethylstilbene (sym-Di-m-tolyethylene)	55 6		97							
35	1,4,5,7-Tetramethylnaphthalene	56	162 5 ¹¹	153			152 8 3 4				
36	1,2,4,8-Tetramethylnaphthalene	56 7	150 ¹⁰	145 5		167, red, me al					2,4,6-Trinitrotoluene deriv , 88 yel
37	2,9-Dimethylphenanthrene	56 7, al		138, yel , al							
38	1,5-Dimethylphenanthrene	57 8, me al		134 5, or , me al							
39	2-Benzyl-naphthalene	58	350	93 4, yel , al			124 3 5 4				D ^m 1 176
40	1-Benzyl-naphthalene	58 9	350	103-4, yel							D ¹ 1 166
41	1,2-Dimethylazulene	58 9, bl , al		129 30, blk , al		166 7 br -blk , al					
42	9-Propylphenanthrene	59	265 70 ²²	99, yel , al							
43	1,7-Dimethyl-4-isopropyl-naphthalene	60, al -w		92, or -red, al	120, yel						
44	3-Methylphenanthrene	62-3	140 50 ⁶	137-8, yel , al							
45	3,4-Dimethylphenanthrene	62 3, me al		129-30, or -red, al	142 3, or -red, al						
46	1-Ethylphenanthrene	62 5, al		108-9, or , al	144, yel , al						
47	sym-Diphenylacetylene (Tolane)	62 5, al		111, yel		96, yel					
48	9-Ethylphenanthrene	62 5 3 0, 66, bz -pet eth	198 200	123-4, or -red, al							D ₄ ^m 1 0603 n _D ^m 1 6582

* Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS
b) Solids. (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Picrate	Styphnate	<i>sym</i> -Tri-nitro benzene derivative	2,4,7 Tri-nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4 Dinitrophenyl sulfonyl chloride derivative	Miscellaneous
49	1,4,5-Trimethylnaphthalene	63	145 ¹²	144 5, red, al	129 30						
50	4-Methylfluorene	63, al									In H ₂ SO ₄ sol → grn
51	1,4,6,7-Tetramethylnaphthalene	63 4, al		148 9			172 4 3 4				
52	1,2,3-Trimethylphenanthrene	63 8 4 8		187 8, or		200 7 1 5, yel, bz -al					
53	1,8-Dimethylnaphthalene	65 63	140 ¹⁸	156 148	160						
54	8-Methyl-3,4-benzphenanthrene	65 6, al		107 8, red, al							
55	2-Ethylphenanthrene	67 8, me al 64 5		95 5 6 0, yel, al, 92 3			180 7 0 9				
56	3,4-Benzphenanthrene	68, al		120 8-8 5, red, al			170 8 1 1				
57	1,3,7-Trimethylphenanthrene	68 9 me al		163 4 al	160 1						
58	4-Isopropyl-1-methylphenanthrene	68 8 5 me al		113 6 4 or, al							
59	4,8-Dimethylazulene	69 70, bl, al		157-8, blk al		179 80 red-br, al					
60	Biphenyl	69 2 71	254 5 145 ²²					4 4'-di 237 229, 2,2',4,4'-tetra 150	225	142 3	n _D ²⁰ 1 475 D ₄ ²⁰ 0 866
61	2-Methyl-3,4-benzphenanthrene	70 4-1 0 al		141 8 3 2, red, bz -al		145 bz pet eth	158 8 5, or red, aq al				
62	3-Methylpyrene	71 2, al		211-2, br -red, bz							Conc H ₂ SO ₄ sol → yel with grn fluorescence on heating → olive grn with vlt fluorescence
63	1,4,7-Trimethylphenanthrene	72 3		141 2, me al	129 30						
64	1,4-Dimethylantracene	74, al		140							
66	4,9-Dimethyl-1,2-benzanthracene	75 me al		116, br, me al		124-5, red, me al					
67	Benzalfluorene (ω-Phenyl-dibenzfulvene)	76, al		115 6							Dibromide, 116 d
68	1,3-Dimethylphenanthrene	76 7, ac a		153 5, or, al	165 6						
69	1-Methyl-3,4-benzphenanthrene	77 8	210 ^{0 4}	112-3, red, al			171 8 2 2				
70	3-Isopropyl-1-methylphenanthrene	79	180 ^{1 5}	150	155						

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

b) Solids. (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Picrate	Styphnate	sym Tri-nitro-benzene derivative	2,4,7-Tri-nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4-Di-nitrophenyl sulfenyl chloride derivative	Miscellaneous
71	1,2'-Binaphthyl	79 80, 76		127 0-7 5 (cor), or			145 0 6 9				
72	2,3-Dimethylphenanthrene	79 80		146 7, or -red, al	147 8, or , al						
73	1,2,4,5-Tetramethylbenzene (Durene)	79 2, 80	196 8					3,6-di 205	263		
74	1-Ethyl-2-methylphenanthrene	80, me al		134 5, me al		152 5-3 0					
75	1,5-Dimethylnaphthalene	80 0 0 5, 85% al		140							
76	6-Methyl-3,4-benzphenanthrene	80-1, al	206-8 ²	118 0-8 5, red, me al			144 2-4 5				
77	Naphthalene	80 3	218	149		153	153 4	1-mono 61, 57	172	173 4	
78	1,3,6,8-Tetramethylnaphthalene	81	115-6 ²	151-2		175-6					
79	1-Ethyl-7-methylphenanthrene (Homopimanthrene)	81, al		115-6, yel , me al							Quinoxaline deriv , 154, ac a
80	9-Methylanthracene	81 5	196-7 ¹²	137 d , red-br							D ₁ ¹⁰ 1 065, n _D ²⁰ 1 6959, Irradiation in acetone → dimer, 228 0-8 5 Photo-oxide, ca 80, exp
81	1-Isopropyl-7-methylphenanthrene	82 3	170 ¹	119 20, or	148 9, yel	163 4, yel					
82	6-Methylazulene	83, bl -vlt		137, 125		141					
83	1,3-Dimethylanthracene	83		136							bl fluorescence
84	2,2'-Dimethylstilbene (sym-Di-o-tolyethylene)	83	176 80 ¹⁰	102							
85	1-Methylanthracene	85 6, me al	199 200	115 6 6 2, red, me al	176 4 7 0, red, me al		219 0-9 8, red, bz				D ₁ ¹⁰ 1 0471 n _D ²⁰ 1 6802, Irradiation → dimer, 246
86	1,7-Dimethylphenanthrene	86		132, me al	159, me al						
87	1,6-Diphenylnaphthalene	86 7		106-8							
88	1,6-Dimethylphenanthrene	87-8, me al		134, yel , al							
89	1,9-Dimethylphenanthrene	88, al		163 5, or -yel , me al	181						
90	9-Methylphenanthrene	90 1, aq al		152 3, al							
91	1,2,10-Trimethylanthracene	90 6 1 4, yel		138 5 9 5, al		169 6-170 2, al					
92	7-Ethyl-1-methylphenanthrene	91 0 1 5, 84 5			141-2	135-6					
93	Triphenylmethane	92	358					4,4',4''-tri 206			Br ₂ → bromo deriv , 152
95	5-Isopropyl-naphthanthracene	92, ac, a		157							

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS
b) Solids. (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Picrate	Styphnate	sym Tri-nitro benzene derivative	2,4,7-Tri-nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4-Di-nitro phenyl sulfonyl chloride derivative	Miscellaneous
96	3,9-Dimethyl-1,2-benzanthracene	93		137-8, red, al		145, red, bz-lgr					
97	5,6-Benzindane (2,3-Cyclopentenonaphthalene)	94		120-1							
98	12-Isopropyl-naphthanthracene	94.5, al		157.8							
99	Acenaphthene	96.2, al	278	162, or-red, al		168, yellow, al	175.6	5-mono 101	198	187.9, d	n_D^{20} 1.6066, D_4^{20} 1.0242, 1,2-Di-bromide, 121.3
100	2,7-Dimethylnaphthalene	96.7, al	262	136.0-6.5, yellow, me al	158.0-9.5, yellow, me al						
101	7-Isopropyl-1-methylfluorene	96.5-7.0, al						di ca 245			
102	Azulene	98.5-99	270 d, 115, 35 ¹⁰	120 d		167					Heat at 270° → Naphthalene, 80.3, 2,4,6-Trinitrotoluene deriv., 95.5-100, D 1.035
103	Retene (7-Isopropyl-1-methylphenanthrene)	100.5-101, al	390, 158.6, 5 ^{9,2}	124-5	141.2	139					
104	Phenanthrene	101, al, 96.3	340, 332	144, 132.8		158, 145	197			250.1	n_D 1.5973, D 1.182
105	2,7-Dimethylphenanthrene	101.2, me al		152.3, or, al							
106	2,3,6-Trimethylnaphthalene	102, 92.3	286, 146-8 ¹⁴	130, yellow, me al	165, yellow, me al						
107	2-Phenylnaphthalene	102-3					169.5, 70.5, 182.4				
108	1,2,3,4-Tetrahydroanthracene	103-5									
109	2,3-Dimethylnaphthalene (Guarene)	104.0-4.5 (subl), al	265-6	123.4							D_4^{20} 1.008
110	Ethylidene fluorene	104, al		155.6							Dibromide, 93.5
111	1,7-Dimethylfluorene (Gibberene)	107.0-7.5		85-6, or-red		98, yellow, al					In H ₂ SO ₄ sol → bl
112	1,1'-Dinaphthylmethane	110, al	>360, 270 ¹⁴	142		141.5	216				
113	Fluoranthrene	110		185.6			216				
114	2,6-Dimethylnaphthalene	111	261-2	143			156				
115	2,4-Dimethylphenanthrene	111, al		138-9, 142, me al							
116	Fluorene	113.5, 116-7	293-5	87, 77		105	179	2-mono 156, 2,7-di 199	228		CrO ₃ → Fluorenone, 84
117	4,10-Dimethyl-1,2-benzanthracene	114, pale yellow, me al		162, blk							
118	4H-Cyclopenta(def)phenanthrene (Phenanthridene)	116, al	353	166							Benzylidene deriv., 108
119	1,3,8-Trimethylphenanthrene	116		174-5		188	199				
120	11-Methylnaphthanthracene	117-8		159-60, dk red		170, or	238.2, 8.6				

*Derivative data given in order: m.p., crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

b) Solids. (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Picrate	Styphnate	<i>sym</i> -Tri nitrobenzene derivative	2,4,7-Tri nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfonyl chloride derivative	Miscellaneous
121	5-Methylchrysene	117 2 7 8, bz - al		142 6 3 0, or - red, al		172 6 3 6, bz - al					
122	1,2,5,6-Tetramethylnaphthalene	118	150 60 ¹⁰	156 7 red	166, bz	180 0 0 5, bz					
123	Cyclohept(fg)acenaphthene (Accepleiadene)	118 20 (subl), red, al		150 d							Maleic anh add comp, 248-50, bz
124	1,2,7-Trimethylphenanthrene	120 1, al		148 9	169 70						
125	1',10-Dimethyl-1,2-dibenzanthracene	122 3, al		147 8, red, al							In H ₂ SO ₄ sol → red
126	9,10-Dimethyl-1,2-benzanthracene	122 3		112 3, blk, al <i>di</i> 102 6, red, al							Highly carcinogenic
127	Benz(bc)aceanthrylene	122-3, al		141 5 2 0, dk red, al		162 5 3 0 or, al					
128	1-Methylphenanthrene	123, aq al		139, yel, al	152 3, yel						
129	1,6,7-Trimethylphenanthrene	123 4 al		165 6, or <i>di</i> 270, red	111 2						
130	1,1'-Diacenaphthene	(a) 124, al, (b) 169, pet eth									
131	<i>trans</i> -Stilbene	124, al	305 ⁷²⁰	94 5		115 20					
132	3,4-Benzfluorene	124 5, al		130 1, red, al			191 8				
133	9-Isopropylanthracene	125, al		152							
134	6-Methylnaphthanthracene	126 2 7 2, al		149 50, red-br, al			221 4 1 8 163-4, al				
135	5,8-Dimethyl-1,2-benzanthracene	131, bz - al		175, red, al							
136	8-Isopropylanthracene	132 3		118							
137	1,4,5,8-Tetramethylnaphthalene	132 3		154 6 5 4	143 4 4 2		158-9 234 5 5 0, 209 5 9 7, red, al				
138	12-Methylnaphthanthracene	138, yel		115 6, red							
139	2-Methyl-1',2'-benzpyrene	138 9, pa yel, me al, after fusing, 140 0 0 2		184 5, br, bz - lgr		211 5- 2 0, red, bz -lgr					
140	1,5-Dimethylantracene	139 40, pa yel		166 7, scar, al							
141	7-Methylnaphthanthracene	140		174, dk red			236 1- 6 5				

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

b) Solids. (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Picrate	Styphnate	sym-Tri-nitro-benzene derivative	2,4,7-Tri-nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4-Di-nitro-phenyl sulfinyl chloride derivative	Miscellaneous
142	3,6-Dimethylphenanthrene	141, al		172 3, or -yel, me al							
143	5-Methyl-3,4-benzphenanthrene	141 4 1 9					130 6 1 4, red				
144	1,4-Dimethylchrysene	142		141, red, al							
145	1,2-Dimethylphenanthrene	142 3, al		148, or, al	153, yel, al						
146	8,10-Dimethyl-1,2-benzanthracene	146, bz - al		166, red, al							
147	1,2,8-Trimethylphenanthrene	146 7, al	210 20 ¹¹	164 5, or, al		193 0 3 5 al					
148	3-Methyl-1',2'-benzpyrene	146 7 8 1, yel, al -eth		179 5 80 0, br -red, bz -lgr		210 5 11 0, bz -lgr					
149	9-Methyl-1',2'-benzpyrene	146 8 8 0, yel, hexane				218 5 9 5, red, bz -lgr					
150	9-Phenylfluorene	147 8, al						<i>di ca</i> 240 <i>tetra</i> <i>ca</i> 235 <i>d</i>			Bromide, <i>di</i> 181 2, <i>tri</i> 167 71
151	2-Methylnaphthanthracene	149 50, al		180			218 7 9 2				
152	Pyrene	149 50, pa yel	335	222, red, al 220, 227			242 3				
153	9-Methylnaphthanthracene	150 5 1 5, al		157 8			225 1 5 4				
154	4-Methylchrysene	151 0 1 5, bz - al		two forms 135 0 5 5, red, bz -lgr, 137 5 8 0, or, bz -lgr							
155	<i>trans-trans</i> -1,4-Diphenyl-1,3-butadiene (<i>trans-trans</i> -Distyryl)	152 5	350	152 3							Maleic anh add comp, 198-200
156	Cinnamalfuorene	155, pa yel, ac a		<i>di</i> 178 9							Tetrabromide, ca 160 d
157	5-Methylnaphthanthracene	155 9 6 9, bz - pet eth		153			235 4 5 6				
158	1,2-Benzanthracene	159-60		133			160				
159	8-Methylnaphthanthracene	160 0-0 6		166			243 2 3 6				
160	1,1'-Binaphthyl	160 5	240 4 ¹²	145							
161	Di-1-naphthastilbene (<i>sym</i> -Di-1-naphthylethylene)	161, pa yel, al		<i>tri</i> 210							

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS

b) Solids. (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Picrate	Styphnate	sym Tri-nitrobenzene derivative	2,4,7-Tri-nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4-Dinitrophenyl sulfenyl chloride derivative	Miscellaneous
162	6-Methylchrysene	161 0 14, et ac-al		170 0 0 6, or, bz-al		189 8 190 6, yel, bz-al					
163	3-Methylnaphthanthracene	163 0 3 9, al		146 0 6 8			239 0 9 6				
164	2,6-Dimethyl-1,2-benzanthracene	164, ac a		199 200							
165	Cyclopentadienophenanthrene	164 5		146 7		172 3					In H ₂ SO ₄ sol → bl
166	10,11-Benzfluoranthene	165, 166,		194 5		220 0 0 5					
167	Hexamethylbenzene	165	264	170		174					
168	3-Methylchrysene	170 0 0 5, bz - pet-eth		164 0 4 5, grn, al							
169	Cholanthrene	170-1, 173 (subl), pa yel, bz-al		167 8, vlt-blk, bz			245 6				
170	6-Methyl-1',2'-benzpyrene	171 0 1 5, yel, bz-lgr		181 5 2 5 br bz-lgr	209 10, red bz lgr						
171	6,7-Dimethyl-1,2-benzanthracene	174, et ac		170							
172	1,2-Benzpyrene	176 5 7 5, pa yel, bz - me al	310 2 ¹⁰	197 8, vlt-blk							
173	5,10-Dimethyl-1,2-benzanthracene	177, bz - al		174, red- blk, bz							
174	4,5-Benzpyrene	178-9, bz		229 30, red, bz							
175	9,10-Dimethylantracene	180 1, al		176-7 d							
176	10-Methylnaphthanthracene	183 0- 3 6, yel, al		159 0 9 4							2,4,6-Trinitrotoluene deriv., 224 8 5 0
177	5,6-Dimethyl-1,2-benzanthracene	187 8, al		191 3, red, al							
178	2,2'-Binaphthyl	188, 181	452	184			171				Lt bl fluorescence, KMnO ₄ → Phthalic acid, 206 8
179	1,2-Benzfluorene (Chrysofluorene)	189-90, ac a, 183-4	413, 398 400	di 127 5, 124 6		144-5	213 5 5 5				
180	1,8-Dimethylphenanthrene	191-2, bz		151 2, yel			193 4				
181	8-Methyl-1',2'-benzpyrene	192-3, yel, bz		205, dk br, bz		233 d, red, bz					
182	Bifluorenylidene (Dibiphenyleneethylene)	194 5 (cor), red		177 8				two di- forms 171, dk red, 170, or red			Dibromide, 312, red, bz
183	1,2,7,8-Dibenzanthracene	196, bz		212, brt red							Bl-grn fluorescence in sol

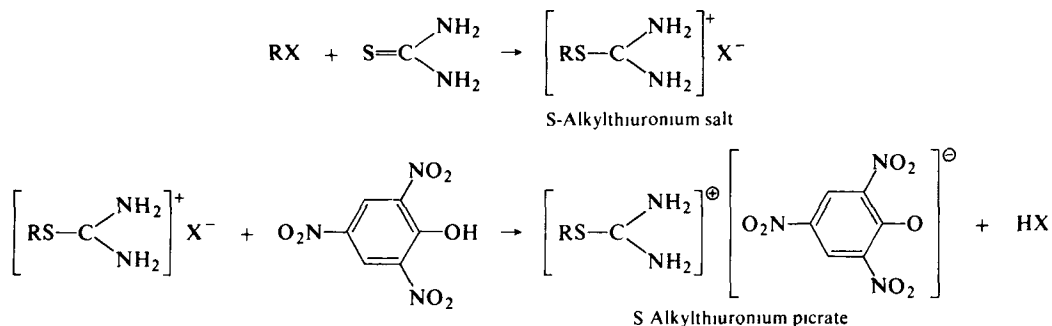
*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IV. ORGANIC DERIVATIVES OF AROMATIC HYDROCARBONS
b) Solids. (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Picrate	Styphnate	sym-Tri-nitrobenzene derivative	2,4,7-Tri-nitrofluorenone derivative	Nitro derivative	Phthalic anhydride derivative	2,4-Di-nitro-phenyl sulfenyl chloride derivative	Miscellaneous
184	4-Methylnaphthanthracene	197 4-8 0, al		139 40, lt red			228 2-8 8				
185	1,2,3,4-Dibenzanthracene	200 2, pa yel, ac a		207, red							In conc H ₂ SO ₄ sol → pa vlt-red
186	Di-2-fluorenylmethane	201 2, al						di 256 7			Na ₂ Cr ₂ O ₇ → Di-2-fluorenyl ketone, 297-8, yel, ac a
187	2,3-Benzfluorene	208 9					221 2-2 0				
188	5-Methyl-1',2'-benzpyrene	215 7-6 2, yel, eth-al		207 8, vlt-blk, bz-lgr		230 1, red, bz-lgr					
189	Anthracene	216 2	340 (cor), 226 5 ⁵³	138		164	194				D ₂ ⁷ 1 25, Di-bromide, 122, CrO ₃ → Anthraquinone, 273
190	11,12-Benzfluoranthene	217	480	170 1		182	236 7				
191	4-Methyl-1',2'-benzpyrene	217 5 8 0, yel		203 4, vlt-br, bz							
192	2,8-Dimethylchrysene	218, bz		171 2, bz	204, or, bz	195, yel, bz					
193	2-Methylchrysene	224 5 5 5, bz-al		143 6, yel, al							
194	6,12-Dimethylchrysene	237			207 d, bz	222					
195	1,2-Benzphenanthrene (Chrysene)	254, bz	448	273		186	248 9		214		Dibromide, 275
196	Di-2-naphthastilbene (sym-Di-2-naphthylethylene)	254 5, bz		215							
197	1-Methylchrysene	254 5 (cor), (vacuum), bz				174-6, yel, bz					
198	2,3,6,7-Dibenzphenanthrene	257, grn-yel		184, or-red							Bl fluorescence in sol, intense yel-grn in u v
199	2,3,5,6-Dibenzphenanthrene	261, grn-yel, ac a		di 213, or-red							Bl fluorescence in bz sol, grn fluorescence in u v
200	1,2,5,6-Dibenzanthracene	262, met, ac a		di 214, or							
201	Perylene	273 4					270-1 257 8				
202	Picene (1,2,7,8-Dibenzphenanthrene)	365 6, xyl	518 20								Dibromide, 295, 2,7-Dianthraquinone add comp, 299-300
203	1,2,3,4,5,6,7,8-Tetrabenzanthracene	428 9					318-9, red				
204	Coronene (Hexabenzobenzene)	438-40 (cor), yel, bz	525	>250 d, red, bz		>280 d, or, bz					

* Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE V

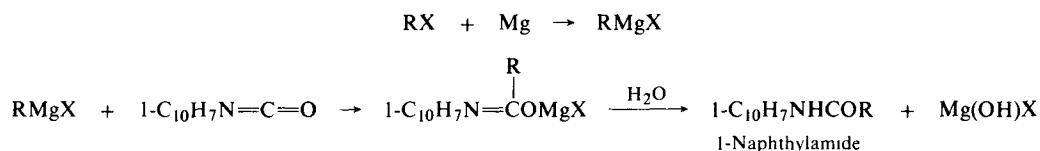
S-Alkylthiuronium picrate (*S*-Alkylisothiourea picrate)*

From the alkyl halide with thiourea in 95% ethanol, followed by addition of picric acid in ethanol

For directions and examples see Linstead, pp 82-3, Shriner, p 245, Vogel, pp 291-2, Wild, p 43, E L Brown and N Campbell, *J Chem Soc*, 1699 (1937), W J Levy and N Campbell, *J Chem Soc*, 1442 (1939)

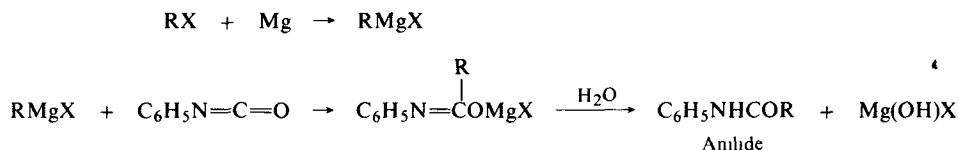
From the alkyl halide with thiourea in ethylene glycol, followed by addition of picric acid in ethanol

See Cheronis, p 550, H M Crosby and J B Entrikin, *J Chem Ed*, **41**, 360 (1964)

1-Naphthylamide (α -Naphthalide)*

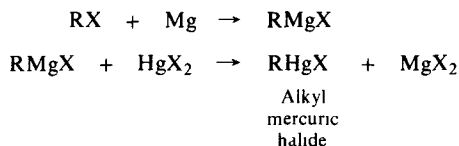
From the Grignard reagent (prepared from the alkyl halide and magnesium in dry ether) with 1-naphthylisocyanate in ether

For directions and examples see Cheronis, pp 551, 553 Linstead, p 83 Shriner, p 244, Vogel, pp 290-1, Wild, pp 35-37 H Gilman and M Furry, *J Amer Chem Soc*, **50**, 1214 (1928), H W Underwood and J C Gale, *J Amer Chem Soc*, **56**, 2117 (1934)

*Anilide**

From the Grignard reagent (prepared from the alkyl halide and magnesium in dry ether) with phenylisocyanate in ether

For directions and examples see Cheronis, pp 551, 554, Linstead, p 83, Shriner, p 244, Vogel, pp 290-1, Wild, pp 35-7, A M Schwartz and J R Johnson, *J Amer Chem Soc*, **53**, 1063 (1931), H W Underwood and J C Gale, *J Amer Chem Soc*, **56**, 2117 (1934)

*Alkylmercuric halide**

From the Grignard reagent (prepared from the alkyl halide and magnesium in dry ether) with the mercuric salt of the same halogen in ether

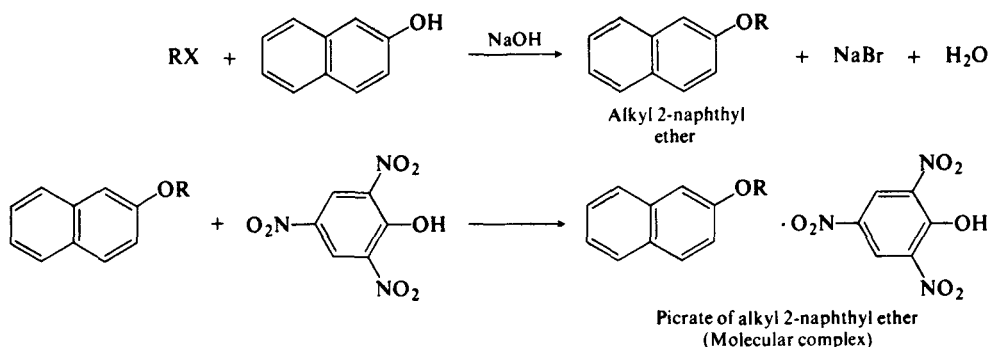
For directions and examples see Cheronis, pp 551, 554, Shriner, p 244, Vogel, p 291, Wild, p 38, C S Marvel, C Gaukerke and E L Hill, *J Amer Chem Soc*, **47**, 3009 (1925), E L Hill, *J Amer Chem Soc*, **50**, 167 (1928), K H Slotta and K R Jacobi, *J prakt Chem*, **120**, 249 (1929)

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE V (Continued)

*Picrate of alkyl 2-naphthyl ether (Molecular complex).**



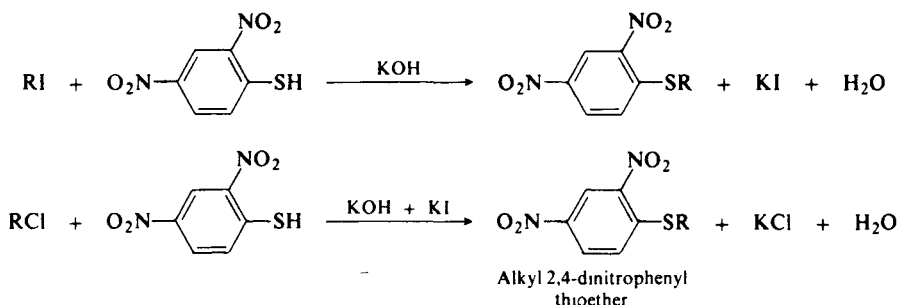
The alkyl 2-naphthyl ether is obtained from the alkyl halide with 2-naphthol in ethanolic sodium or potassium hydroxide.

For directions and examples see: Cheronis, p. 551; Linstead, p. 83; Shriner, p. 244; Vogel, p. 292; Wild, p. 44.

The picrate is obtained from the alkyl 2-naphthyl ether and picric acid in chloroform or ethanol.

See: Cheronis, p. 551; Linstead, p. 83; Vogel, p. 292; Wild, p. 44; O. L. Baril and G. A. Megrđichian, *J. Amer. Chem. Soc.*, **58**, 1415 (1936); V. H. Dermer and O. C. Dermer, *J. Org. Chem.*, **3**, 289 (1938).

Alkyl 2,4-dinitrophenyl thioether (Alkyl 2,4-dinitrophenyl sulfide).



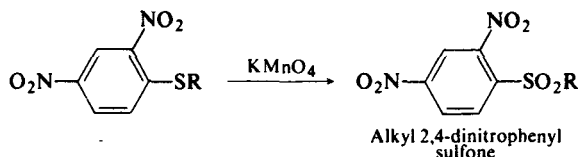
From the alkyl bromide or iodide with 2,4-dinitrothiophenol in butyl carbitol (2-(2-butoxyethoxy)ethanol) and aqueous potassium hydroxide.

For directions and examples see: Cheronis, p. 557; R. W. Bost, P. K. Starnes and E. L. Wood, *J. Amer. Chem. Soc.*, **73**, 1968 (1951).

From the alkyl chloride with 2,4-dinitrothiophenol in butyl carbitol (2-(2-butoxyethoxy)ethanol) with potassium iodide and aqueous potassium hydroxide.

See: Cheronis, p. 557; R. W. Bost, P. K. Starnes and E. L. Wood, *J. Amer. Chem. Soc.*, **73**, 1968 (1951).

Alkyl 2,4-dinitrophenyl sulfone.



From the alkyl 2,4-dinitrophenyl thioether (prepared from the alkyl halide as above) in glacial acetic acid, with aqueous potassium permanganate.

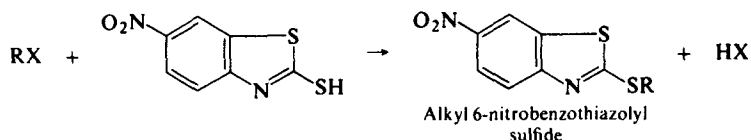
For directions and examples see: R. W. Bost, J. O. Turner and R. D. Norton, *J. Amer. Chem. Soc.*, **54**, 1985 (1932).

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE V (Continued)

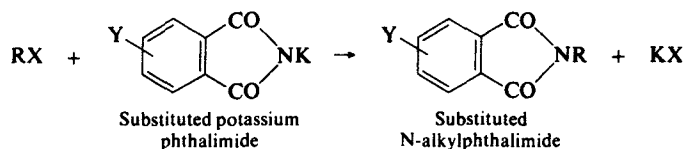
6-Nitro-2-mercaptobenzothiazole derivative.



From the alkyl halide (especially a dihalide) and 6-nitro-2-mercaptobenzothiazole in butyl carbitol (2-(2-butoxyethoxy)ethanol) and aqueous sodium hydroxide.

For directions and examples see: Cheronis, p. 557; H. B. Cutter and H. R. Golden, *J. Amer. Chem. Soc.*, **69**, 831 (1947); H. B. Cutter and A. Kreuchunas, *Anal. Chem.*, **25**, 198 (1953).

Substituted N-alkylphthalimides.



From the alkyl halide with the potassium salt of the substituted phthalimide.

For directions and examples see: Wild, p. 41.

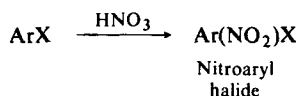
From the alkyl halide with the potassium salt of the substituted phthalimide or with the substituted phthalimide and potassium carbonate in dimethylformamide.

See: J. H. Billman and R. V. Cash, *J. Amer. Chem. Soc.*, **75**, 2499 (1953).

From the alkyl halide with the substituted phthalimide and potassium hydroxide in methanol-dioxane mixture.

See: C. H. Allen and R. V. V. Nicholls, *J. Amer. Chem. Soc.*, **56**, 1409 (1934).

Nitro derivative.*



From the aromatic halide with fuming and concentrated nitric acids.

For directions and examples see: Wild, p. 450.

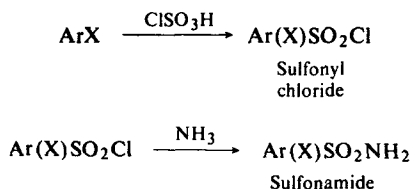
From the aromatic halide with 100% nitric acid.

See: Cheronis, pp. 559-561, 563.

From the aromatic halide with nitric and sulfuric acids.

See: Cheronis, pp. 560, 563; Vogel, p. 543.

Sulfonamide.*



The sulfonyl chloride is prepared from the aromatic halide and chlorosulfonic acid in chloroform or without solvent. The sulfonamide is obtained from the sulfonyl chloride with concentrated ammonia or dry ammonium carbonate.

For directions and examples see: Cheronis, pp. 564, 638, 639; E. H. Huntress and F. H. Carten, *J. Amer. Chem. Soc.*, **62**, 511 (1940).

NOTE: For additional information regarding directions and examples for the derivatization of aromatic halides (through the above reactions or additional ones, e.g., side-chain oxidation) see explanations and references to Table IV, pp. 32, 33, 34.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE V. ORGANIC DERIVATIVES OF HALIDES
A) Alkyl and cycloalkyl halides 1. Chlorides
a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	n_D^{20}	D_4^{20}	S-Alkyl thiuronium picrate	1 Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2-naphthyl ether	2,4-Dinitrophenyl thioether	2,4-Dinitrophenyl sulfone	Miscellaneous
1	Methyl chloride	-24			224	160	114	167		128	185, 189	Methyl-2-naphthyl ether, 70
2	Vinyl chloride	-14			104							Polymerizes to solid on irradiation
3	Ethyl chloride	13		0.917 ₈	188	126	104	192	104	115	156, 160	
4	Isopropyl chloride	36.5	1.378	0.859	196, 148		103		95			
5	1-Chloropropene	37					114					
6	Allyl chloride	44.5	1.416	0.940	155		114		99			3-Nitrophthalimide deriv., 100-1
7	<i>n</i> -Propyl chloride	46.5	1.388	0.889	181, 176	121	92	147	81	84	126	
8	<i>tert</i> -Butyl chloride	51	1.386	0.846	160-1	147	128	122-3				Heating with maleic anhydride and boiling the adduct in water → 4-chloro-1,2,3,6-tetrahydrophthalic acid, 173-5
9	Chloroprene	59	1.458	0.9583								
10	<i>sec</i> -Butyl chloride	68	1.397	0.874	190, 166	129	108	30.5	86	66	120	
11	Isobutyl chloride	69	1.398	0.881	174	125	109		85	76	105	
12	Methallyl chloride (3-Chloro-2-methyl-1-propene)	72	1.4340	0.9475								Phthalimide deriv., 89-90
13	<i>n</i> -Butyl chloride	78	1.402	0.886	180, 177	112	63	128	67	66	92	
14	Neopentyl chloride	85		0.879			130-1	117-8				
15	<i>tert</i> -Amyl chloride	86	1.405	0.865		138	92					
16	3-Chloro-1-pentene	93-4	1.4254	0.8978								Phthalimide deriv., 78-9
17	DL-3-Chloro-2-methyl-1-butene	94	1.4304	0.9088								Br ₂ → dibromo deriv., 197-8
18	Trimethylvinyl chloride (3-Chloro-2-methyl-2-butene)	94	1.4320	0.925 (0.905)								Br ₂ in ether → dibromo deriv., 197
19	DL-2-Chloropentane	97	1.4079	0.8695		102.3	94.6					
20	3-Pentyl chloride (3-Chloropentane)	97	1.4082	0.8723		117-8	127, 122					
21	Isoamyl chloride	100	1.409	0.872	179, 173	111	108	86	94	80	124	
22	<i>n</i> -Amyl chloride (<i>n</i> -Pentyl chloride)	106	1.412	0.882	154	112	96	110	67	80	83	
23	1-Chloro-2-pentene	109-10	1.435 ²¹	0.908 ^{21.5}								Phthalimide deriv., 69-70
24	2-Chloro-2-methylpentane	110.3	1.4126	0.863		116-8	71-4					
25	3-Chloro-2,2-dimethylbutane (Pinacolyl chloride)	112	1.4181	0.8767				89-90				
26	Cyclopentyl chloride	114-5	1.4510	1.005				108				
27	4-Chloro-2,2-dimethylbutane	115	1.4160	0.8670			138-9	133				
28	3-Chloro-3-methylpentane	115-7	1.421	0.89			87-8					
29	2-Chloro-2,3-dimethylbutane	117-9		0.8769 ²²								Carbonation of Grignard and conversion of acid to amide, 125-7. Br ₂ → 2,3-dibromo deriv., 166-8 (173-4)
30	3-Hexyl chloride (3-Chlorohexane)	123	1.4163	0.870 ₂₀								Grignard reagent + O ₂ → 3-hexanol → 3-hexanone, 2,4-Dinitrophenylhydrazone, 147.8 Semicarbazone, 110.11

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

A) Alkyl and cycloalkyl halides 1. Chlorides

a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	n_D^{20}	D_4^{20}	S Alkyl thuronium picrate	1 Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2 naphthyl ether	2,4-Di-nitro-phenyl thio ether	2,4-Di-nitro-phenyl sulfone	Miscellaneous
31	2-Hexyl chloride (2-Chlorohexane)	123.4	1.4142 ²¹	0.8694 ²¹			91-2					
32	1-Chloro-2-ethylbutane	125-7	1.4230	0.8914			81.2 83-4					
33	3-Chloro-2,2,3-trimethylbutane	133										Carbonation of Grignard → acid, 80
34	n-Hexyl chloride	133	1.420	0.878	157	106	69	125		74	97	
35	Cyclohexyl chloride	143	1.462	0.989		188	146					6-Nitro-2-mercaptobenzo-thiazole deriv 100-1.2 sulfone, 189
36	5-Chloro-2,3-dimethylpentane	152	1.4299	0.8825			80.1					
37	n-Heptyl chloride	159	1.426	0.877	142	95	57	120		82	101	
38	Benzyl chloride	179	1.539	1.100	188	166	117	104	123	130	178, 182	Quaternary salt with dimethyl aniline, 110
39	n-Octyl chloride	180, 184	1.431	0.875	134	91	57	115		78	98	
40	β-Phenylethyl chloride	190					97		84			
41	4-Methylbenzyl chloride	192	1.5380	1.0512								Phthalimide, 120. 117 Carbonation of Grignard → 4-tolylacetic acid, 92
42	α-Phenylethyl chloride	195					133					
43	3-Methylbenzyl chloride	195-6	1.5327 ²⁵	1.064 ²⁰								Phthalimide deriv., 117-8, Carbonation of Grignard → 3-tolylacetic acid, 61
44	2-Methylbenzyl chloride	197.9										Phthalimide deriv., 148-9, Heating with pyridine → alkyl pyridinium chloride 183
45	β-Chlorostyrene	197-9	1.571 ²⁵	1.109								Br ₂ in chl → dibromo deriv., 32, Oxid → benzoic acid, 122
46	n-Nonyl chloride	202	1.434	0.870	131					86	92	
47	2-Chlorobenzyl chloride	213-4										5-Nitro deriv. 66 Carbonation of Grignard → 2-chlorophenylacetic acid, 94-5
48	4-Chlorobenzyl chloride	214, 222					166					Oxid → 4-chlorobenzoic acid, 242
49	3-Chlorobenzyl chloride	216		1.2695 ¹⁵								Oxid → 3-chlorobenzoic acid, 158, 155, Heating with 2,4-dichlorophenol in toluene → 2-(3-chlorobenzyl)-4,6-dichlorophenol, 59-60
50	n-Decyl chloride	223	1.437	0.868	137							
51	4-Isopropylbenzyl chloride	226-9										Carbonation of Grignard → acid, 52
52	n-Undecyl chloride (n-Hendecyl chloride)	241	1.440	0.868	139							
53	n-Dodecyl chloride (Lauryl chloride)	243-4	1.4425	0.8673				114				Refluxed with pyridine → alkyl pyridinium chloride, 92
54	Cetyl chloride (Hexadecyl chloride)	286 d			155			102				3-Nitrophthalimide deriv., 101, Alkyl saccharin deriv., 98

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

A) Alkyl and cycloalkyl halides 1. Chlorides

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	S-Alkyl thuronium picrate	1-Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2-naphthyl-ether	2,4-Di-nitro-phenyl thio-ether	2,4-Di-nitro-phenyl sulfone	Miscellaneous
1	1,3-Bis(chloromethyl)benzene (<i>m</i> -Xylylene dichloride)	32-4	250-5								Diphthalimide deriv , 237
2	4-Bromobenzyl chloride	36-8, 50	236	219							Oxid → 4-bromobenzoic acid, 251
3	2,4,6-Trimethylbenzyl chloride	37	130 ²²								Hydrolysis → 2,4,6-trimethylbenzyl alcohol, 88-9, Phthalimide deriv , 209-10
4	2,6-Dichlorobenzyl chloride	39-40									Carbonation of Grignard → 2,6-dichlorophenylacetic acid, 157 8
5	1-Chloro-2,2,3,3-tetramethylbutane	52-3					170-1				Grignard treated with O ₂ at -5 → carbinol, 149-50
6	1,2-Bis(chloromethyl)benzene (<i>o</i> -Xylylene dichloride)	54-5	239-41								Oxid → phthalic acid, 200-6
7	4-Nitrobenzyl chloride	71									Oxid → 4-nitrobenzoic acid, 241
8	1,4-Bis(chloromethyl)benzene (<i>p</i> -Xylylene dichloride)	98-100	240-5								Heating with benzyl alcohol + KOH → dibenzyl ether, 67, Boiling with Pb(NO ₃) ₂ → terephthaldehyde, 115
9	Triphenylmethyl chloride (Trityl chloride)	113									Boiling with H ₂ O → triphenyl carbinol, 162

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

A) Alkyl and cycloalkyl halides 2. Bromides

a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	n_D^{20}	D_4^{20}	S-Alkyl thiuronium picrate	1-Naphthyl amide	Amide	Alkyl mercuric halide	Picrate of 2-naphthyl ether	2,4-Dinitrophenyl thioether	2,4-Dinitrophenyl sulfone	Miscellaneous
1	Methyl bromide	3.5			224	160	114	172, 160		128	185, 189	
2	Vinyl bromide	16					104					
3	Ethyl bromide	38	1.425	1.460	188	126	104	193, 198	104	115	156, 160	
4	1-Bromopropene	60	1.452	1.4133			114					
5	Isopropyl bromide	60	1.425	1.314	196, 148		103	93	92	95	140	
6	Allyl bromide	71	1.46545	1.398	155		114		99	71		
7	<i>n</i> -Propyl bromide	71	1.4341	1.353	181, 177	121	92	138	75	84	126	
8	<i>tert</i> -Butyl bromide	72.3		1.211		147	128					
9	Isobutyl bromide	91	1.435	1.253	174, 167	125	109	55	84	76	105	
10	<i>sec</i> -Butyl bromide	91	1.437	1.256	190, 166	129	108	39	85	66	120	
11	<i>n</i> -Butyl bromide	101	1.440	1.274	180, 177	112	63	136, 129	67	66	92	
12	<i>tert</i> -Amyl bromide	108	1.442	1.198 ¹⁸		138	92					
13	Neopentyl bromide	109		1.225			126					
14	DL-2-Pentyl bromide	117, 113	1.442	1.212		102.3	93					
15	3-Pentyl bromide	118	1.443	1.211			124					
16	Isoamyl bromide	120-1	1.442	1.213	179, 173	111	108	80	94	80	124	
17	<i>n</i> -Amyl bromide (<i>n</i> -Pentyl bromide)	129	1.445	1.219	154	112	96	127, 122	67	80	83	
18	Cyclopentyl bromide	137	1.489	1.387								
19	2-Hexyl bromide (2-Bromohexane)	146	1.4832 ²⁵	1.1658			91-2					
20	<i>n</i> -Hexyl bromide	155, 157	1.448	1.175	157	106	69	127, 119		74	97	
21	Cyclohexyl bromide	165	1.495	1.336		188	146	153				
22	<i>n</i> -Heptyl bromide	180, 174	1.451	1.140	142	95	57	118		82	101	
23	Benzyl bromide	198		1.438	188	166	117	119	123	130	178, 182	
24	<i>n</i> -Octyl bromide	201, 204	1.453	1.112	134	91	57	109		78	98	
25	α -Phenylethyl bromide	205					133					
26	β -Phenylethyl bromide	218	1.556	1.359			97	169	84			
27	<i>n</i> -Nonyl bromide	220	1.454	1.090	131			109		86	92	
28	β -Bromostyrene	221				217	115	91				
29	<i>n</i> -Dodecyl bromide (Lauryl bromide)	130 ⁶	1.458	1.038				108				
30	<i>n</i> -Tetradecyl bromide	179 ²⁰	1.460	1.017						94	104	m p 5

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

A) Alkyl and cycloalkyl halides 2. Bromides

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	S-Alkyl thiuronum picrate	1-Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2-naphthyl ether	2,4-Di nitro-phenyl thio-ether	2,4-Di-nitro-phenyl sulfone	Miscellaneous
1	<i>n</i> -Hexadecyl bromide (Cetyl bromide)	14	201 ^a	155, 137			101 2		95	105	n_D^{20} 1.462, D_4^{20} 1.001
2	2-Bromobenzyl bromide	31		222							CrO ₃ → 2-bromobenzoic acid, 150
3	3-Bromobenzyl bromide	41		205							CrO ₃ → 3-bromobenzoic acid, 155
4	2-Nitrobenzyl bromide	46-7									Oxid → 2-nitrobenzoic acid, 146-8
5	4-Chlorobenzyl bromide	51		194							CrO ₃ → 4-chlorobenzoic acid, 242
6	3-Nitrobenzyl bromide	58-9									Oxid → 3-nitrobenzoic acid, 141
7	4-Bromobenzyl bromide	62		219							CrO ₃ → 4-bromobenzoic acid, 251
8	4-Nitrobenzyl bromide	99									Oxid → 4-nitrobenzoic acid, 240

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

A) Alkyl and cycloalkyl halides 3. Iodides

a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	n_D^{20}	D_4^{20}	S-Alkyl thuronium picrate	1-Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2-naphthyl ether	2,4-Dinitrophenyl thioether	2,4-Dinitrophenyl sulfone	Miscellaneous
1	Methyl iodide	43	1.532	2.282	224	160	114	152, 145	117	128	185, 189	
2	Vinyl iodide	56					104					
3	Ethyl iodide	72	1.514	1.940	188	126	104	186, 182	104	115	156, 160	
4	Isopropyl iodide	90	1.499	1.703	196, 148		103		92	95	140	
5	<i>n</i> -Propyl iodide	102-3	1.505	1.743	181, 176	121	92	113	75	84	126	
6	Allyl iodide	103	1.578	1.777	155	121	114	112	99			
7	<i>tert</i> -Butyl iodide	103, 98			188	147	128					
8	<i>sec</i> -Butyl iodide	120	1.499	1.592	190, 166	129	108		85	66	120	
9	Isobutyl iodide	120	1.496	1.602	174, 167	125	109	72	84	76	105	
10	<i>tert</i> -Amyl iodide	128		1.479		138	92					
11	<i>n</i> -Butyl iodide	130	1.499	1.616	180, 177	112, 110	63	117	67	66	92	
12	2-Pentyl iodide	142	1.496	1.510			93					
13	3-Pentyl iodide	142	1.497	1.511			124					
14	Isoamyl iodide	148	1.493	1.503	179, 173	111	108	122	94	80	124	
15	<i>n</i> -Amyl iodide (<i>n</i> -Pentyl iodide)	155	1.496	1.512	154	112	96	110	67	80	83	
16	Cyclopentyl iodide	166-7	1.5447	1.7096								
17	Cyclohexyl iodide	179, sl d		1.626 $\frac{1}{3}$		188	146					
18	<i>n</i> -Hexyl iodide	179	1.493	1.437	157	106	69	110		74	97	
19	<i>n</i> -Heptyl iodide	204	1.490	1.373	142	95	57	103		82	101	
20	<i>n</i> -Nonyl iodide	220			131					86	92	
21	<i>n</i> -Octyl iodide	225-6	1.489	1.330	134					78	98	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

A) Alkyl and cycloalkyl halides 3. Iodides
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	S-Alkyl thiuronum picrate	1-Naphthyl amide	Anilide	Alkyl mercuric halide	Picrate of 2-naphthyl ether	2,4-Dinitrophenyl thioether	2,4-Dinitrophenyl sulfone	Miscellaneous
1	<i>n</i> -Hexadecyl iodide (Cetyl iodide)	22		155, 137			82		95	105	
2	Benzyl iodide	24		188	166	117		123	130	178, 182	

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

B) Dihalides and polyhalides (non-aromatic)

1. Fluorides (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point °C	n_D^{20}	D_4^{20}	Miscellaneous
1	Perfluorocyclopentane	22		1.648 ₄ ²⁵	m p 10
2	1,3-Difluoropropane	41.2	1.3190 ²⁶	1.0057 ₄ ²⁵	
3	Perfluorocyclohexane	50			m p 49
4	Perfluoro- <i>n</i> -hexane	57	1.2515 ²²	1.6995 ₄ ²⁵	
5	Perfluoro-2-methylpentane	58	1.2564 ²²	1.7326	
6	Perfluoro- <i>n</i> -heptane	84	1.2770	1.801 ₄ ²⁵	
7	Perfluoro- <i>n</i> -nonane	127	1.2865 ²⁵	1.860 ₄ ²⁵	
8	Perfluoro- <i>n</i> -decane	150	1.2890 ²⁵	1.873 ₄ ²⁵	m p 36
9	Perfluoro- <i>n</i> -undecane (Perfluoro- <i>n</i> -hendecane)	161	1.2960 ²⁵	1.919 ₄ ²⁵	m p 57

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

B) Dihalides and polyhalides (non-aromatic)

2. Chlorides a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	n_D^{20}	D_4^{20}	Miscellaneous
1	Dichloromethane (Methylene chloride)	41	1.4237	1.336	6-Nitro-2-mercaptobenzothiazole deriv., 232-3. Di-(2-naphthyl) ether, 133 S-Alkyl bis-(thiuronium picrate), 267
2	<i>trans</i> -1,2-Dichloroethylene	48	1.452	1.2569	Br ₂ → dibromo deriv., 190-5
3	1,1-Dichloroethane	57	1.4164	1.175	1,1-Di-(1-naphthyl) ether, 117
4	<i>cis</i> -1,2-Dichloroethylene	60	1.4428 ⁴⁵	1.282	Br ₂ → dibromo deriv., 190-5
5	Chloroform	61	1.446	1.489	Gives carbylamine test with primary amines
6	2,2-Dichloropropane	70	1.4117	1.093	
7	1,1,1-Trichloroethane	74	1.4380	1.349	
8	Carbon tetrachloride	77	1.4630	1.595	
9	Ethylene dichloride (1,2-Dichloroethane)	84	1.4443	1.256	1,2-Di-(2-naphthyl) ether, 217
10	1,1,2-Trichloroethylene	87	1.4773	1.464	HgO + NaOEt + KCN in al shaken 1 hr at 40-60 → mercury bis-(trichloroethylene), Hg(-CCl=CCl ₂) ₂ , 83, eth
11	1,2-Dichloropropane	96	1.4388	1.155	1,2-Di-(2-naphthyl) ether, 152. 1,2-Diphenyl ether, 32
12	1-Bromo-2-chloroethane	106-7			6-Nitro-2-mercaptobenzothiazole deriv., 202-3. Di-(2-naphthyl) ether, 217
13	1,1,2-Trichloroethane	114	1.4707	1.443	
14	1,1,2,2-Tetrachloroethylene (Perchloroethylene)	121	1.5055	1.623	With paraformaldehyde + conc H ₂ SO ₄ → α,α-dichloro-β-hydroxypropionic acid, 88-9
15	1,2-Dichlorobutane	123-4	1.440		6-Nitro-2-mercaptobenzothiazole deriv., 164-5
16	1,3-Dichloropropane	125	1.449	1.189 ¹⁸ 1.177 ²⁷	1,3-Di-(1-naphthyl) ether, 103-4. 1,3-Di-(2-naphthyl) ether, 148-9. 1,3-Diphenyl ether, 60
17	1,3-Dichloro-2-methylpropane	135-6	1.4627 ¹⁹	1.131 ²⁰	
18	1-Bromo-3-chloropropane	143-4	1.4861	1.594	1,3-Di-(1-naphthyl) ether, 103-4. 1,3-Di-(2-naphthyl) ether, 148-9. 1,3-Diphenyl ether, 60
19	1,1,2,2-Tetrachloroethane	146	1.4942	1.600	
20	1,2,3-Trichloropropane	158	1.4585	1.417	
21	Pentachloroethane	161	1.504	1.681	
22	Benzalchloride	207, 214	1.5515	1.295 ¹⁶	Oxid → benzoic acid, 122. Hydrolysis → benzaldehyde, 2,4-Dinitrophenylhydrazone, 237. Semicarbazone, 222
23	Benzotrichloride	221		1.374 ¹⁷ 1.399 ¹⁵	Hydrolysis → benzoic acid, 122
24	2-Chlorobenzalchloride (2-Chlorobenzylidene chloride)	228-9	1.5670 ¹⁶	1.399 ¹⁵	Oxid → 2-chlorobenzoic acid, 141. Hydrolysis → 2-chlorobenzaldehyde, 2,4-dinitrophenylhydrazone, 213-209
25	3-Chlorobenzalchloride (3-Chlorobenzylidene chloride)	237-40			Oxid → 3-chlorobenzoic acid, 158. Hydrolysis → 3-chlorobenzaldehyde, 2,4-dinitrophenylhydrazone, 256-248
26	4-Chlorobenzalchloride (4-Chlorobenzylidene chloride)	237			Oxid → 4-chlorobenzoic acid, 240. Hydrolysis → 4-chlorobenzaldehyde, 47. 2,4-dinitrophenylhydrazone, 265

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
B) Dihalides and polyhalides (non-aromatic) 2. Chlorides
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point °C	Boiling point, °C	Miscellaneous
1	3,4-Dichlorobenzotrichloride	26		Hydrolysis → 3,4-Dichlorobenzoic acid, 202
2	DDT (2,2-Bis-(4-chlorophenyl)-1,1,1-trichloroethane)	108	260	Heating with Cl ₂ + trace PCl ₃ in CCl ₄ → 1,1,1,2-tetrachloro deriv , 91-2, Nitration → nitro deriv , 148, AlCl ₃ + benzene → 1,1,2,2-tetraphenylethane, 211
3	γ-Benzene hexachloride (Gammexane, 666)	112		
4	α-Benzene hexachloride	157	288	Heat above m p → HCl + 1,2,4-trichlorobenzene, 17, b p 213, mononitro deriv , 56, dinitro, 103
5	Hexachloroethane	187 subl	185	
6	β-Benzene hexachloride	310		Unreactive to boiling pyridine, Unattacked by boiling HNO ₃ or H ₂ SO ₄

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
B) Dihalides and polyhalides (non-aromatic)
3. Bromides a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	n_D^{20}	D_4^{20}	Miscellaneous
1	Dibromomethane (Methylene bromide)	98-9	1.538	2.496	6-Nitro-2-mercaptobenzothiazole deriv , 232 3, S-Alkyl bis-(thiuronium picrate), 267
2	1,1-Dibromoethane	112	1.5128	2.055	6-Nitro-2-mercaptobenzothiazole deriv , 145 6 1,1-Di-(1-naphthyl) ether, 117
3	1,2-Dibromoethane	132	1.5379	2.179	m p 10, 6-Nitro-2-mercaptobenzothiazole deriv 201 2 1,2-Di-(2-naphthyl) ether 217
4	DL-1,2-Dibromopropane	141-2	1.5203	1.933	6-Nitro-2-mercaptobenzothiazole, 194 5, 1,2-Di-(2-naphthyl) ether, 152, 1,2-Diphenyl ether, 32
5	1,2-Dibromo-2-methylpropane	149	1.512	1.783	
6	1,2-Dibromo-1-butene	150		1.887	
7	Bromoform	150-1	1.598	2.890 ^o	m p 8
8	1,3-Dibromopropene	156	1.538 ²⁵	2.097 ^o	
9	1,1-Dibromo-2-methylpropene	156 7	1.530	1.866 ²⁵	
10	2,3-Dibromobutane	157	1.515	1.792	
11	1,2-Dibromobutane	166		1.820	6-Nitro-2-mercaptobenzothiazole deriv , 164 5
12	1,3-Dibromopropane	167 8	1.523	1.982	1,3-Di-(1-naphthyl) ether, 103-4 1,3-Di-(2-naphthyl) ether 148 9 1,3-Diphenyl ether, 60
13	1,3-Dibromo-2-butene	168-9	1.548	1.877	
14	1,3-Dibromobutane	174	1.507	1.820 ^o	
15	1,1,2-Tribromoethane	189	1.5933	2.6211	
16	1,4-Dibromobutane	197-8		1.847 ^o	<i>p</i> -toluidine (3 moles) $\xrightarrow{\text{heat}}$ N-4 tolylpyrrolidine, 42 dil al
17	1,2,3-Tribromopropane	220	1.582	2.402	
18	1,5-Dibromopentane	221	1.514 ¹⁵	1.694 ²⁵	6-Nitro-2-mercaptobenzothiazole deriv , 132 3 S-Alkyl bis-(thiuronium picrate) 247
19	1,1,2,2-Tetrabromoethane	243-4	1.638	2.967	
20	1,8-Dibromooctane	270-2	1.501 ¹⁵	1.468 ¹⁵	m p 15-6, S-Alkyl bis-(thiuronium picrate), 214
21	1,9-Dibromononane	285-8		1.415 ¹⁵	m p -2 5, S-Alkyl bis-(thiuronium picrate), 193

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES**B) Dihalides and polyhalides (non-aromatic)****3. Bromides b) Solids (Listed in order of increasing m.p.)***

No	Name	Melting point °C	Boiling point °C	Miscellaneous
1	1,7-Dibromoheptane	42	263	S-Alkyl bis-(thiuronium picrate), 208
2	Carbon tetrabromide	92	190	

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

B) Dihalides and polyhalides (non-aromatic)

4. Iodides a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	n_D^{20}	D_4^{20}	Miscellaneous
1	Di-iodomethane (Methylene iodide)	181	1.7425	3.325	6-Nitro-2-mercaptobenzothiazole deriv., 232-3, Di-(2-naphthyl) ether, 133, S-Alkyl bis-(thiuronium picrate), 267
2	1,3-Di-iodopropane	224	1.6423	2.5755	1,3-Di-(1-naphthyl) ether, 103-4, 1,3-Di-(2-naphthyl) ether, 148-9, 1,3-Diphenyl ether, 60

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

B) Dihalides and polyhalides (non-aromatic)

4. Iodides b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point °C	Boiling point, °C	Miscellaneous
1	1,2-Di-iodoethane	81		6-Nitro-2-mercaptobenzothiazole deriv , 202 3, 1,2-Di-(2-naphthyl) ether, 217
2	Iodoform	119		Comp with quinoline, 65

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
C) Aryl halides 1. Fluorides (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Nitro derivative		Sulfonamide		Miscellaneous
						M P	Position of nitro groups	M P	Position of sulfonamide group	
1	1,3-Difluorobenzene	82		1.4404 ¹⁸	1.1473 ₄ ²⁵	74	1 3			Boiling with NaOH → 4-fluorophenol, 48, b p 186-8, n _D ²⁰ 1.5010, D ₄ ²⁰ 1.1889 Oxid → 2-fluorobenzoic acid, 127 Oxid → 3-fluorobenzoic acid, 124 Oxid → 4-fluorobenzoic acid, 182 Picrate, 113 Picrate, 101
2	Fluorobenzene	87		1.466	1.024			125	4	
3	1,4-Difluorobenzene	88		1.4423 ¹⁸	1.1632 ₄ ²⁵					
4	1,2-Difluorobenzene	92	-34	1.4451 ¹⁸	1.1496 ₄ ²⁵					
5	2-Fluorotoluene	114						105	5	
6	3-Fluorotoluene	116						174	6	
7	4-Fluorotoluene	117		1.496	0.998			141	2	
8	1-Fluoronaphthalene	214		1.594	1.134					
9	2-Fluoronaphthalene		60							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES

* C) Aryl halides 2. Chlorides a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Nitro derivative		Sulfonamide		Miscellaneous
						M P	Position of nitro groups	M P	Position of sulfonamide group	
1	Chlorobenzene	132		1.525	1.107	52	2,4	144	4	2,4-Dinitrobenzenesulfonyl chloride adduct, 123-4
2	2-Chlorotoluene	159		1.524	1.082	63	3,5	128	5	Oxid → 2-chlorobenzoic acid, 141
3	3-Chlorotoluene	162		1.521	1.072	91	4,6	185	6	Oxid → 3-chlorobenzoic acid, 158
4	4-Chlorotoluene	162	7	1.521	1.071	38	2	143	2	Oxid → 4-chlorobenzoic acid, 240
5	1,3-Dichlorobenzene	173		1.546	1.288	103	4,6	182	6	
6	1-Chloro-2-ethylbenzene	178, 180		1.5218	1.057					Oxid → 2-chlorobenzoic acid, 141
7	1,2-Dichlorobenzene	179		1.552	1.305	110	4,5	135, 140	4	
8	1-Chloro-3-ethylbenzene	184		1.5199	1.053					Oxid → 3-chlorobenzoic acid, 158
9	1-Chloro-4-ethylbenzene	184, 180-1		1.5175	1.045					Oxid → 4-chlorobenzoic acid, 240
10	2-Chloro-1,4-dimethylbenzene	184-5	2		1.0598 ²⁰	77, 101	5, 5,6	155	5	Sulfonyl chloride, 50
11	1-Chloro-2-vinylbenzene (o-Chlorostyrene)	189		1.5649	1.100					Polymerizes on heating with benzoyl peroxide
12	1-Chloro-2,3-dimethylbenzene	190								Oxid → 3-chloro-2-methylbenzoic acid, 159
13	1-Chloro-2-isopropylbenzene	191		1.5168	1.0341					Oxid → 2-chlorobenzoic acid, 141
14	1-Chloro-2,4-dimethylbenzene	192, 187		1.5230 ²⁵	1.0598 ²⁰	42	6	195	6	Oxid $\xrightarrow{\text{CrO}_3/\text{H}_2\text{SO}_4}$ 4-chloro-3-methylbenzoic acid, 209-10. Oxid $\xrightarrow{\text{aq KMnO}_4}$ 4-chloroisophthalic acid, 294-5
15	1-Chloro-4-vinylbenzene (p-Chlorostyrene)	192		1.5660	1.0868					Polymerizes on heating with peroxide
16	1-Chloro-3,4-dimethylbenzene	194-5	-6		1.0691 ¹⁵	63	5	207	5	Cl ₂ $\xrightarrow{\text{Fe}}$ 1,2-dichloro-4,5-dimethylbenzene, 76
17	1-Chloro-4-isopropylbenzene (p-Chlorocumene)	198		1.5117	1.0208			91		Oxid → 4-chlorobenzoic acid, 240
18	2,6-Dichlorotoluene	199		1.5510	1.2686	50, 121	3, 3,5			Chlorosulfonic acid in chl → 3-sulfonyl chloride 54, 6, 60. Oxid → 2,6-dichlorobenzoic acid, 139
19	2,5-Dichlorotoluene	199	4-5		1.2535 ²⁰	50, 100-1	4, 4,6			Oxid $\xrightarrow{\text{dil HNO}_3}$ 2,5-dichlorobenzoic acid, 154
20	2,4-Dichlorotoluene	200		1.549	1.249	104	3,5			Oxid → 2,4-dichlorobenzoic acid, 164
21	3,5-Dichlorotoluene	201				61, 99-100	2, 2,6	168, 9	2	Oxid → 3,5-dichlorobenzoic acid, 188
22	2-Chloro-1,3,5-trimethylbenzene	204-6		1.5212 ³⁰	1.0337 ³⁰	178	4,6	165-6		Oxid $\xrightarrow{\text{aq KMnO}_4}$ 2-chlorobenzene tricarboxylic acid, 285 (anh), 278 (hyd)
23	2,3-Dichlorotoluene	207		1.5511		51, 71-2	4, 4,6			Oxid $\xrightarrow{\text{alk KMnO}_4}$ 2,3-dichlorobenzoic acid, 163
24	3,4-Dichlorotoluene	209		1.5471	1.2526	63, 91-2	6, 2,6			Oxid → 3,4-dichlorobenzoic acid, 206
25	1,2,4-Trichlorobenzene	213	17			56, 103	5, 3,5	>200		Sulfonyl chloride, 31-4
26	2-Chloro-4-isopropyl-1-methylbenzene (2-Chloro-p-cymene)	217		1.5178 ¹⁷	1.0151 ¹⁷	109-10	5,6			Boiling with dil HNO ₃ → 3-chloro-4-methylbenzoic acid, 196
27	3-Chloro-4-isopropyl-1-methylbenzene (3-Chloro-p-cymene)	217		1.5179 ¹⁸	1.0181 ¹⁸	102-3, 106	2,6			
28	1-Chloronaphthalene	259		1.633	1.191	180	4,5			Picrate, 137
29	3-Chlorobiphenyl	284-5	16			202-3	4,4'			Oxid → 3-chlorobenzoic acid, 158, 155

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
C) Aryl halides 2. Chlorides b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	Nitro derivative		Sulfonamide		Miscellaneous
				M P	Position of nitro groups	M P	Position of sulfonamide group	
1	2-Chlorobenzotrichloride	29	283					Hydrolysis → 2-chlorobenzoic acid, 142
2	2,4,6-Trichlorotoluene	33 4, 38		54 50 178 80	3, 3 5			Oxid → 2,4,6-trichlorobenzoic acid, 160-1
3	2-Chlorobiphenyl	34	273					Oxid → 2-chlorobenzoic acid, 141
4	1,2-Dichloronaphthalene	35	296	169	<i>di</i>			n_D^{20} 1.6337, D_4^{25} 1.3147 Oxid → $CrO_3/ac a$ → 5,6-dichloro-1,4-naphthoquinone, 181
5	2,3,4-Trichlorotoluene	41	231 ⁷⁶¹	60, 140-1	5 or 6, 5,6			Oxid → 2,3,4-trichlorobenzoic acid, 186-7
6	1,2,3,4-Tetrachlorobenzene	44-5	254	63 5, 151	5, 5,6			
7	3,4,5-Trichlorotoluene	44-5	245 ⁷⁶⁸	81 2, 163-4	2, 2,6			Oxid → 3,4,5-trichlorobenzoic acid, 203, $Cl_2 \xrightarrow{Al/Hg}$ 2,3,4,5-tetrachlorotoluene, 97-8
8	2,3,5-Trichlorotoluene	45-6	232	58 9, 149-50	4 or 6, 4,6			Oxid $\xrightarrow{dil HNO_3}$ 2,3,5-trichlorobenzoic acid, 162
9	1,6-Dichloronaphthalene	48		119	4	216	4	
10	1,2,3,5-Tetrachlorobenzene	50-1	246	40-1, 161-2	4, 4,6			
11	1,2,3-Trichlorobenzene	52 3	218-9	56, 92-3	4, 4,6	226-30	4	Sulfonyl chloride, 65
12	1,4-Dichlorobenzene	53	173	54	2	180 186	2	
13	4,4'-Dichlorodiphenylmethane	55	337	198-9	3,3'			Oxid $\xrightarrow{CrO_3/ac a}$ 4,4'-dichlorobenzophenone, 145 Picrate, 81
14	2-Chloronaphthalene	56, 61	265	175	1,8	126		
15	2,2'-Dichlorobiphenyl	60		203-5	5,5'			
16	1,3-Dichloronaphthalene	61	291 ⁷⁷⁵	150 and 158	<i>di</i>			Oxid $\xrightarrow{dil HNO_3}$ phthalic acid, 200-6
17	1,3,5-Trichlorobenzene	63	208	68	2	210 2		Sulfonyl chloride, 35-40
18	1,7-Dichloronaphthalene	63-4	286	138-9		226	4	Sulfonyl chloride, 118
19	1-Bromo-4-chlorobenzene	67	197	72	2			
20	1,4-Dichloronaphthalene	68	286 ⁷⁴⁰	92	8	244	6	Oxid $\xrightarrow{CrO_3/ac a}$ 5,8-dichloro-1,4-naphthoquinone, 173 4 Boiling $HNO_3(D = 1.3) \rightarrow$ 3 6-dichlorophthalic acid, 194 185
21	2,5-Dichloro-1,4-dimethylbenzene (2,5-Dichloro <i>p</i> -xylene)	68	224					Oxid → 2,5-dichloroterephthalic acid, 306
22	4-Chlorobiphenyl	77	293					Oxid → 4-chlorobenzoic acid, 240
23	2,4,5-Trichlorotoluene	82	230 ⁷¹⁵	89-90, 226 7	3, 3,6			Oxid → 2,4,5-trichlorobenzoic acid, 168
24	Pentachlorobenzene	86, 84	276	143, 146	6			
25	1,8-Dichloronaphthalene	89				228	4	Sulfonyl chloride, 141
26	1,5-Dichloronaphthalene	107		142	8	204	3	Oxid $\xrightarrow{CrO_3/ac a}$ 3-chlorophthalic acid, 185 7 Picrate, 87
27	2,7-Dichloronaphthalene	114 5		141 2	<i>mono</i>	218	3	Oxid $\xrightarrow{dil HNO_3}$ 4-chlorophthalic acid, 157
28	2,6-Dichloronaphthalene	135-6	285			269	4	Sulfonyl chloride, 136, Cl_2 in chl → 1,2,6-trichloronaphthalene, 92 Oxid $\xrightarrow{CrO_3/ac a}$ 1 4-naphthoquinone deriv 148 9
29	1,2,4,5-Tetrachlorobenzene	140	245	99, 232	3, 3,6			Chlorosulfonic acid → hexachlorobenzene, 229
30	4,4'-Dichlorobiphenyl	149						Oxid → 4-chlorobenzoic acid, 240

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
C) Aryl halides 2. Chlorides b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Nitro derivative		Sulfonamide		Miscellaneous
				M P	Position of nitro groups	M P	Position of sulfonamide group	
31	5,6,7,8-Tetrachlorotetralin	174	180 ²⁶					Br ₂ in CS ₂ → 1,2-dibromo-5,6,7,8-tetrachloronaphthalene, 142
32	1,2,3,4-Tetrachlorotetralin	182, 187						Oxid $\xrightarrow{\text{CrO}_3/\text{ac a}}$ 2,4-dichloro-1-naphthol, 106-7 Boiling HNO ₃ → phthalic acid, 200-6
33	Octachloronaphthalene	198, 200	442					Oxid $\xrightarrow{\text{fuming HNO}_3}$ hexachloro-1,4-naphthoquinone, 222 SbCl ₅ in CCl ₄ → cherry-red color
34	9,10-Dichloroanthracene (meso-Di-chloroanthracene)	209-10, yel				279	2	Sulfonyl chloride, 221-5, Oxid → 9,10-anthraquinone, 286. Maleic anhydride, 258-9
35	Hexachlorobenzene	229, subl, 226	309					Boiling with fuming HNO ₃ + conc H ₂ SO ₄ → tetrachloro-1,4-benzoquinone (chloroanil), 290

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
C) Aryl halides 3. Bromides a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Nitro derivative		Sulfonamide		Miscellaneous
						M P	Position of nitro groups	M P	Position of sulfonamide group	
1	Bromobenzene	156		1 560	1 494	70-2	2,4	166 161	4	1-Naphthylamide, 161, 2,4-Dinitrobenzenesulfonyl chloride adduct 140-1
2	2-Bromotoluene	182			1 425	82	3,5	146	5	Oxid → 2-bromobenzoic acid, 150
3	3-Bromotoluene	184			1 410	103	4,6	168	6	Oxid → 3-bromobenzoic acid, 155
4	1-Bromo-2-ethylbenzene	199		1 5486	1 355					Oxid → 2-bromobenzoic acid, 150
5	1-Bromo-4-ethylbenzene	205		1 5448	1 342					Oxid → 4-bromobenzoic acid, 251
6	1-Bromo-2-vinylbenzene (<i>o</i> -Bromostyrene)	210		1 5927	1 4160					Polymerizes on heating with benzoyl peroxide
7	1-Bromo-2-isopropylbenzene	210		1 5408	1 3020					Oxid → 2-bromobenzoic acid, 150
8	1-Bromo-4-vinylbenzene (<i>p</i> -Bromostyrene)	212		1 5947	1 398					Polymerizes on heating with benzoyl peroxide, Oxid → 4-bromobenzoic acid, 251
9	1-Bromo-2,3-dimethylbenzene	217								Oxid → 3-bromophthalic acid, 188
10	1,3-Dibromobenzene	219		1 606	1 952	61	4	190	6	
11	1-Bromo-4-isopropylbenzene	219		1 5361	1 2854					Oxid → 4-bromobenzoic acid, 251
12	1,2-Dibromobenzene	219		1 609	1 956	114	4,5	176	4	
13	2-Bromocumene	234			1 267	97				Amide, 143
14	2,5-Dibromotoluene	236			1 811					Oxid → 2,5-dibromobenzoic acid, 157
15	3,4-Dibromotoluene	240			1 81					Oxid → 3,4-dibromobenzoic acid 235
16	1-Bromonaphthalene	281		1 658	1 484	85	4	191 3	4	Picrate, 134, Carbonation of Grignard → 1-naphthoic acid, 162
17	2-Bromobiphenyl	297								Oxid → 2-bromobenzoic acid, 150

* Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
C) Aryl halides 3. Bromides b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	Nitro derivative		Sulfonamide		Miscellaneous
				M P	Position of nitro groups	M P	Position of sulfonamide group	
1	4-Bromotoluene	28-9	184					Oxid → 4-bromobenzoic acid, 251
2	2-Bromonaphthalene	59	281			208	8	Picrate, 86, 79, 2,4,7-Trinitrofluorenone adduct, 138-40
3	1,2-Dibromonaphthalene	67						Oxid → 3,4-dibromophthalic acid, 196
4	1,4-Dibromonaphthalene	82						Oxid → 3,6-dibromophthalic acid, 135
5	1,4-Dibromobenzene	89	219	84	2,5	195	2	
6	4-Bromobiphenyl	89	310					Oxid → 4-bromobenzoic acid, 251
7	1,3,5-Tribromobenzene	120	271			222	2	
8	4,4'-Dibromobiphenyl	164						Oxid → 4-bromobenzoic acid, 251
9	1,2,4,5-Tetrabromobenzene	180		168	3			

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
C) Aryl halides 4. Iodides a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Nitro derivative		Sulfonamide		Miscellaneous
						M P	Position of nitro groups	M P	Position of sulfonamide group	
1	Iodobenzene	188-7		1.620	1.831	171	4			Br ₂ → 1-Bromo-4 iodobenzene 91 Oxid → 3-iodobenzoic acid, 187 Oxid → 2-iodobenzoic acid, 162 Cl ₂ in chl → dichloride (ArCl ₂) 110 Picrate, 128
2	3-Iodotoluene	204			1.698	108	4,6			
3	2-Iodotoluene	211			1.698	103	6			
4	1-Iodo-4-isopropylbenzene	236-8								
5	1-Iodonaphthalene	305								

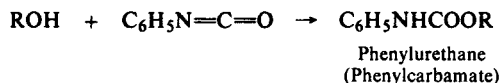
*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE V. ORGANIC DERIVATIVES OF HALIDES
C) Aryl halides 4. Iodides b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	Nitro derivative		Sulfonamide		Miscellaneous
				M P	Position of nitro groups	M P	Position of sulfonamide group	
1	4-Iodotoluene	35	211					HNO ₃ at 200° → 4-iodobenzoic acid, 270 Cl ₂ in chl → dichloride (ArICl ₂), 66 Picrate, 95 Cl ₂ in chl → dichloride (ArICl ₂), 102
2	1-Iodo-2,4,5-trimethylbenzene	37	256-8					
3	1,3-Di-iodobenzene	40	285					
4	2-Iodonaphthalene	55	309					
5	4-Iodobiphenyl	114	320 d					
6	1,4-Di-iodobenzene	129	289	171	2,5			

*Derivative data given in order m p , crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE VI

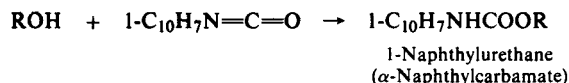
Phenylurethane.

From the dry alcohol with phenylisocyanate without solvent.

For directions and examples see: Linstead, pp. 34-35; Shriner, p. 211; Vogel, p. 264; B. T. Dewey and N. F. Witt, *Ind. Eng. Chem., Anal. Ed.*, **12**, 459 (1940); **14**, 648 (1942).

From the dry alcohol with phenylisocyanate in petrol ether.

See: Wild, pp. 55-57.

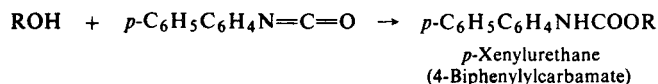
*1-Naphthylurethane (α-Naphthylcarbamate).**

From the dry alcohol with 1-naphthylisocyanate without solvent.

For directions and examples see: Cheronis, pp. 475-479; Linstead, pp. 34-35; Shriner, p. 211; Vogel, p. 264; V. T. Bickel and H. E. French, *J. Amer. Chem. Soc.*, **48**, 747 (1926); H. E. French and A. F. Wirtel, *J. Amer. Chem. Soc.*, **48**, 1736 (1926).

From the dry alcohol with 1-naphthylisocyanate in petrol ether.

See: Cheronis, pp. 476-477; Wild, pp. 55-57.

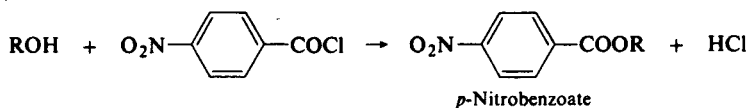
p-Xenylurethane (4-Biphenylurethane).

From the alcohol with *p*-xenylisocyanate in toluene.

For directions and examples see: G. T. Morgan and A. E. J. Pettet, *J. Chem. Soc.*, 1124 (1931); B. Witten and E. E. Reid, *J. Amer. Chem. Soc.*, **69**, 2470 (1947).

From the alcohol with *p*-xenylisocyanate in a benzene—petrol ether mixture.

See: M. J. van Gelderen, *Rec. Trav. chim.*, **52**, 969 (1933).

*p-Nitrobenzoate.**

From the alcohol in excess and *p*-nitrobenzoyl chloride.

For directions and examples see: Cheronis, pp. 467-469, 471; Shriner, p. 212; Vogel, p. 263; Wild, p. 52; M. D. Armstrong and J. E. Copenhaver, *J. Amer. Chem. Soc.*, **65**, 2252 (1943).

From an aqueous solution of the alcohol with *p*-nitrobenzoyl chloride in a ligroin-benzene mixture.

See: Cheronis, pp. 468-469, 472.

From the alcohol with *p*-nitrobenzoyl chloride in pyridine.

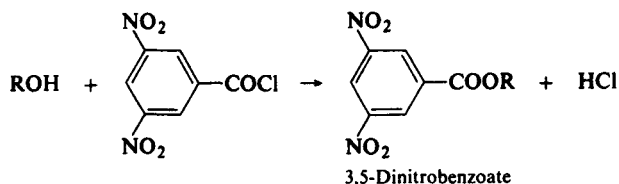
See: Shriner, p. 212; Wild, p. 52; L. F. King, *J. Amer. Chem. Soc.*, **61**, 2383 (1939).

From the alcohol with *p*-nitrobenzoyl chloride in aqueous sodium hydroxide.

See: Wild, p. 52.

From the alcohol with *p*-nitrobenzoyl chloride in an aqueous solution of sodium acetate and potassium hydroxide at low temperature.

See: Wild, p. 53; F. A. Menalda, *Rec. Trav. chim.*, **49**, 967 (1930); H. Henstock, *J. Chem. Soc.*, 216 (1933).

*3,5-Dinitrobenzoate.**

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE VI (Continued)

From the alcohol in excess with 3,5-dinitrobenzoyl chloride.

For directions and examples see: Cheronis, pp. 467-470; Shriner, pp. 212-213; Vogel, p. 262; G. B. Malone and E. E. Reid, *J. Amer. Chem. Soc.*, **51**, 3424 (1929).

From an aqueous solution of the alcohol with 3,5-dinitrobenzoyl chloride in a ligroin-benzene mixture.

See: Cheronis, pp. 468-469, 472.

From the alcohol with 3,5-dinitrobenzoyl chloride and pyridine in benzene.

See: Linstead, p. 34; Wild, p. 53; T. Reichstein, *Helv. chim. Acta*, **9**, 799 (1926); W. M. D. Bryant, *J. Amer. Chem. Soc.*, **54**, 3758 (1932).

From the alcohol with 3,5-dinitrobenzoyl chloride and a catalytic amount of pyridine in isopropyl or *n*-butyl ether.

See: Cheronis, pp. 469, 471.

From the alcohol with 3,5-dinitrobenzoyl chloride in pyridine.

See: Cheronis, p. 469; Shriner, pp. 212-213; Vogel, pp. 262-263.

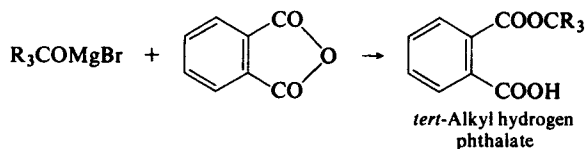
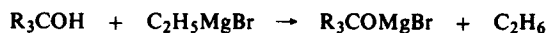
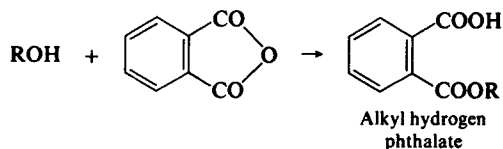
From the alcohol with 3,5-dinitrobenzoyl chloride in aqueous potassium hydroxide.

See: Linstead, p. 34.

From the alcohol in aqueous sodium hydroxide and potassium acetate with 3,5-dinitrobenzoyl chloride in a benzene-ligroin mixture.

See: Wild, pp. 53-54; W. N. Lipscomb and R. H. Baker, *J. Amer. Chem. Soc.*, **64**, 179 (1942).

Hydrogen phthalate.*



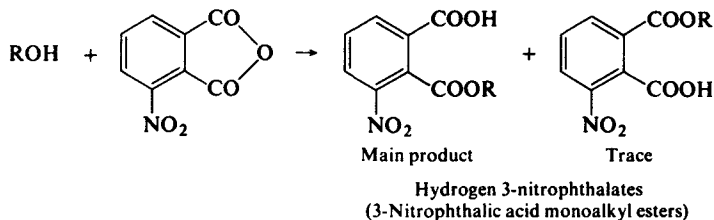
From the alcohol with phthalic anhydride.

For directions and examples see: E. E. Reid, *J. Amer. Chem. Soc.*, **39**, 1250 (1917); J. F. Goggans and J. E. Copenhaver, *J. Amer. Chem. Soc.*, **61**, 2909 (1939).

From the alkoxy magnesium halide derived from a tertiary alcohol (prepared from the alcohol with ethylmagnesium bromide) with phthalic anhydride in ether or an ether-dioxan mixture.

See: W. A. Fessler and R. L. Shriner, *J. Amer. Chem. Soc.*, **58**, 1384 (1936).

Hydrogen 3-nitrophthalate.*



From the alcohol with 3-nitrophthalic anhydride.

For directions and examples see: Cheronis, pp. 473-474; Linstead, p. 35; Shriner, p. 213; Vogel, p. 265; Wild, p. 59; G. M. Dickinson, L. H. Crosson and J. E. Copenhaver, *J. Amer. Chem. Soc.*, **59**, 1094 (1937); B. H. Nicolet and J. Sacks, *J. Amer. Chem. Soc.*, **47**, 2348 (1925); A. J. Veraguth and H. Diehl, *J. Amer. Chem. Soc.*, **62**, 233 (1940).

From a high boiling alcohol with 3-nitrophthalic anhydride in toluene.

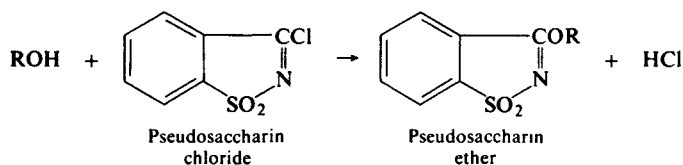
See: Linstead, p. 35; Shriner, p. 213; Vogel, p. 265; Wild, p. 59; G. M. Dickinson, L. H. Crosson and J. E. Copenhaver, *J. Amer. Chem. Soc.*, **59**, 1094 (1937).

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE VI (Continued)

Pseudosaccharin ether (Pseudosaccharin derivative).



From the alcohol with pseudosaccharin chloride without solvent.

For directions and examples see: Vogel, p. 266; Wild, pp. 60-61; J. R. Meadoc and E. E. Reid, *J. Amer. Chem. Soc.*, **65**, 457 (1943).

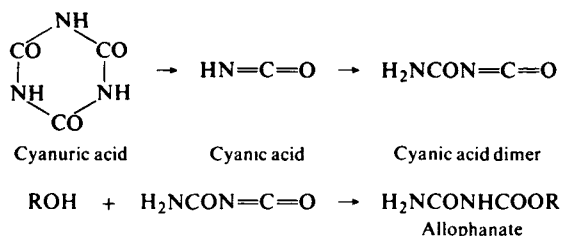
From the alcohol with pseudosaccharin chloride in chloroform.

See: H. Bohme and H. Opper, *Z. Anal. Chem.*, **139**, 255 (1953).

From the alcohol with pseudosaccharin chloride and a catalytic amount of pyridine in chloroform.

See: Cheronis, p. 482; H. Bohme and H. Opper, *Z. Anal. Chem.*, **139**, 255 (1953).

Allophanate



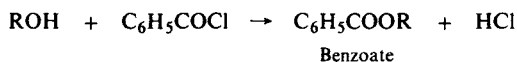
From the alcohol with cyanic acid (prepared from the depolymerization of cyanuric acid).

For directions and examples see: Linstead, p. 36; A. Behal, *Compt. rend.*, **168**, 945 (1919); M. A. Spielman, J. D. Barnes and W. J. Close, *J. Amer. Chem. Soc.*, **72**, 2520 (1950); H. W. Blohm and E. I. Becker, *J. Amer. Chem. Soc.*, **72**, 5342 (1950); *Chem. Revs.*, **51**, 471 (1952).

From the alcohol with sodium cyanate and dry hydrochloric acid in dioxane.

See: E. S. Lane, *J. Chem. Soc.*, 2764 (1951).

*Benzoate.**



Especially for polyhydric alcohols.

From the alcohol with benzoyl chloride.

For directions and examples see: Shriner, p. 212.

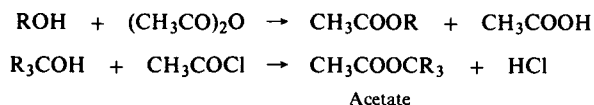
From the alcohol with benzoyl chloride in anhydrous pyridine.

See: Cheronis, pp. 481-482; Shriner, p. 212; Vogel, pp. 243, 447.

From the alcohol with benzoyl chloride in aqueous sodium hydroxide.

See: Vogel, p. 447.

Acetate.



Especially for polyhydric alcohols.

From the alcohol with acetic anhydride and sodium acetate.

For directions and examples see: Linstead, pp. 35, 39; Shriner, p. 212.

From the alcohol with acetic anhydride in pyridine.

See: Shriner, p. 212.

From the alcohol (especially a tertiary alcohol) with acetyl chloride in the presence of magnesium.

See: A. Spassow, *Chem. Ber.*, **70B**, 1926 (1937).

NOTE: For additional information regarding directions and examples for the preparation of derivatives of polyhydric alcohols see explanations and references to Table XIX, p. 326.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS

a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Phenyl-urethane	1 Naphthyl-urethane	4 Nitro-benzoate	3,5-Dinitro-benzoate	Hydrogen 3-nitro-phthalate	Hydrogen phthalate	Miscellaneous
1	Methanol (Methyl alcohol)	64.65	f.p. -97	1.3306 ¹⁵	0.7915	47, al	124, lgr	96, dil al	108 (cor), al	153 (cor)	82.5 (cor)	Pseudosaccharin ether, 182 (cor)
2	Ethanol (Ethyl alcohol)	78.32	f.p. -117.3	1.3610	0.7894	52	79, lgr	57, al	93, al	158 (cor), w	48	Pseudosaccharin ether, 219 (cor)
3	2-Propanol (Isopropyl alcohol)	82.4	-89.5	1.37927	0.78507	75-6, lt pet	106	110.5, lt pet	108	123, pet eth	154 (cor), w	Pseudosaccharin ether, 137 (cor)
4	<i>d,l</i> -3-Buten-2-ol (Methyl vinyl carbinol)	94-6									43-4	Allophanate, 152, Constant boil mixt with 21.76% w, b.p. 80
5	2-Propen-1-ol (Allyl alcohol)	97.1		1.41345	0.8540	70	108	28	49-50	124		
6	1-Propanol (<i>n</i> -Propyl alcohol)	97.1		1.38499	0.80359	57, pet	80, 76	35, pet	74, pet eth	145.5 (cor), w	54.1-4 (cor), pet eth-bz (9.1)	Pseudosaccharin ether, 124.5 (cor)
7	2-Butanol (<i>d,l</i> - <i>sec</i> -Butyl alcohol, Ethyl methyl carbinol)	99.5		1.39495 ²⁵	0.80692	64.5, pet	97	25-6, dil al	76	131 (cor)	59-60	Pseudosaccharin ether, 65.5 (cor)
8	2-Methyl-2-butanol (<i>tert</i> -Amyl alcohol)	102.3	-8.55	1.4052	0.80889	42, pet eth	72	85	116, 117-8			
9	2-Fluoroethanol	105		1.3633 ²⁵			128					
10	2-Methyl-1-propanol (Isobutyl alcohol)	108.1		1.3939 ²⁵	0.80196	86, lgr	104	69	87	180.5 (cor)	65, pet eth	Pseudosaccharin ether, 100 (cor)
11	3-Buten-1-ol	122.5-3.5 ²⁵				23.4-4.5						
12	<i>d,l</i> -3-Methyl-2-butanol (<i>sec</i> -Isoamyl alcohol, <i>d,l</i> -Isopropyl methyl carbinol)	114, <i>d</i> 110-2		1.3973	0.8180	68	109			127	39, <i>d</i> 34, <i>l</i> 34	<i>d</i> $[\alpha]_D^{20} + 5.34$, in al
13	3-Pentanol (<i>sym-sec</i> -Amyl alcohol, Diethyl carbinol)	116.1		1.4103	0.82037	48-9	95, lgr	17	101, 99, 97	121		
14	1-Butanol (<i>n</i> -Butyl alcohol)	117.6, 116	-90.2	1.3974 ²⁵	0.80960	61	71	70, 64 35-6	64, 62.5	147 (cor)	73.1-5 (cor)	Pseudosaccharin ether, 96 (cor)
15	<i>d,l</i> -2-Pentanol (<i>sec</i> -Amyl alcohol)	119.85		1.4060	0.80919		74.5, 76, <i>d</i> 88-91	17	62	102-3	60-1, <i>d</i> 34, <i>l</i> 34	Pseudosaccharin ether, 38 (cor)
16	3,3-Dimethyl-2-butanol (<i>d,l</i> -Pinacolyl alcohol, <i>tert</i> -Butyl methyl carbinol)	120.4	5.3	1.4148	0.8185	77-8, pet eth			107, yel-wh, pet eth		85-6, lt pet	
17	2,3-Dimethyl-2-butanol (Dimethyl isopropyl carbinol)	120.5	-14	1.4140	0.8208	65-6, pet eth	101		111, yel, bz-pet eth			
18	3-Methyl-3-pentanol	123	-22	1.4166 ²⁵	0.82334 ²⁵	43.5	83.5		96.5, yel, pet eth, 62.5			Allophanate, 152 (cor)

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n_D^{20}	D_4^{20}	Phenyl urethane	1-Naphthyl urethane	4 Nitro benzoate	3,5-Dinitrobenzoate	Hydrogen 3-nitrophthalate	Hydrogen phthalate	Miscellaneous
19	2-Methyl-2-pentanol (Dimethyl <i>n</i> -propyl carbinol)	123, 121	-103, -108	1.4113	0.81341				72			Benzoate, 182.3, al., Allophanate, 128
20	2-Methoxyethanol (Methyl cellosolve, Ethylene glycol mono-methyl ether)	124.5		1.40238	0.9647		112.5, 3.0	50.5, dil al		129, dil al		Diphenyl urethane, 51
21	2-Methyl-3-pentanol (Ethyl isopropyl carbinol)	127.5		1.4168	0.82487	50			85, yellow, petroleum	150.7	70.69, 71, racemic	
22	1-Chloro-2-propanol	127							77			
23	2-Methyl-1-butanol (Active amyl alcohol, <i>d</i> - <i>sec</i> -Butyl carbinol)	128.9		1.4107	0.8193	31	82, lgr		70	157.8, w		$[\alpha]_D^{20} -5.756$
24	2-Chloroethanol (Ethylene chlorohydrin)	131				51	101			98		
25	<i>d,l</i>-4-Methyl-2-pentanol (Isobutyl methyl carbinol)	132		1.4011	0.80713	143, et ac	88	26	65, yellow, petroleum			
26	3-Methyl-1-butanol (<i>prim</i> -Isoamyl alcohol)	132	-117	1.40851 ¹⁵	0.80918	56-7, lgr	68	21	61	166.3 (cor), 30% al	165-6, w	Pseudosaccharin ether, 64 (cor)
27	<i>d,l</i>-2-Chloro-1-propanol	133.4		1.436	1.103				76			Alkali + heat → propylene oxide b.p. 35
28	3-Methyl-2-pentanol (<i>sec</i> -Butyl methyl carbinol)	134.2 ⁷⁴⁹					72		43.5, yellow, petroleum, 41			
29	2-Ethoxyethanol (Ethylene glycol monoethyl ether)	135		1.40797	0.9297		67.3-5		75, al	118.86 (anh), 94.24 (monohyd) w-al		Diphenyl urethane, 43
30	3-Hexanol (Ethyl <i>n</i> -propyl carbinol)	136		1.4159	0.81851				97, yellow-white, petroleum		76-7, petroleum	
31	2,2-Dimethyl-1-butanol (<i>tert</i> -Amyl carbinol)	136.7		1.4208	0.82834	65-6	80-1, lgr			51, yellow, petroleum		Pseudosaccharin ether, 68-9 lit petroleum
32	1-Pentanol (<i>n</i> -Amyl alcohol)	138 (cor)	-78.5	1.40994	0.81479	46	68	11	46.4	136 (cor)	75.5	Pseudosaccharin ether, 62 (cor)
33	<i>d,l</i>-2-Hexanol (<i>n</i> -Butyl methyl carbinol)	138.9 ⁷⁴⁵		1.4126 ²⁵	0.80977 ²⁵		60.5	40	38.5		<i>d</i> 29	3,5-Dinitrophenyl urethane, 40
34	2,4-Dimethyl-3-pentanol	140		1.42259	0.8288	95, eth-petroleum, 96-9	95, 99	155		150-1		Camphor-like odor
35	Cyclopentanol	140.85		1.4530	0.94688	132.5, al	118					
36	2-Isopropoxyethanol (Ethylene glycol mono-isopropyl ether)	141.5 ⁷³⁶		1.40954	0.9030							Triphenylmethyl ether, 71.0-5, me al

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS.
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Phenyl-urethane	1 Naphthyl-urethane	4 Nitrobenzoate	3,5-Dinitrobenzoate	Hydrogen 3-nitro phthalate	Hydrogen phthalate	Miscellaneous
37	3-Ethyl-3-pentanol (Triethyl carbinol)	142		1.4305	0.83889							Camphor-like odor, Allophanate, 152 (cor)
38	2,3-Dimethyl-1-butanol	145		1.4195	0.8297 ²⁰ ₅	28.9			51.5, pale, pet eth			
39	3-Hydroxy-2-butanone (<i>d,l</i> -Acetoin, Acetyl methyl carbinol)	145	-72	1.4178	0.9861 ²⁰ ₄							Semicarbazone, 185, al, 202, 2,4-Dinitrophenylhydrazone, 318, or, PhNO ₂ -tol
40	1-Hydroxy-2-propanone (Acetol, Acetyl carbinol)	146	-17	1.4295	1.0824 ²⁰ ₂₀							Semicarbazone, 196, al, 2,4-Dinitrophenylhydrazone, 128.5 (cor), or, al
41	2-Methyl-1-pentanol (2-Methyl- <i>n</i> -amyl alcohol)	148.0		1.4190	0.8208		75.6		50.5, yellow, pet eth	145, 141, bz		
42	2-Ethylbutanol	148.9		1.4224	0.83345				51.5, pet eth			
43	2-Bromoethanol (Ethylene bromohydrin)	149d					86					
44	2-<i>n</i>-Propoxyethanol (Ethylene glycol mono- <i>n</i> -propyl ether)	150.0 ⁷³⁶		1.41328	0.9112							
45	Trichloroethanol	151	19			87	120	71, al	142.3			Urethane 64.5
46	3-Methyl-1-pentanol	151-2 153.7 4.1		1.4188	0.8242		58 <i>d,l</i> 40-1, <i>d</i> 38- 40 137.8		38, yellow, pet eth			
47	4-Methyl-1-pentanol (Isoamyl carbinol, Isohexyl alcohol)	152.3		1.4153	0.8131	48 (cor)			72, pet eth 69.8 (cor)	138.5 40, bz-pet eth		
48	<i>d,l</i>-4-Heptanol (Di- <i>n</i> -propyl carbinol)	156	-41.5	1.4205	0.8183		78.80	35	64		60	
49	1-Hexanol (<i>n</i> -Hexyl alcohol)	157.5	-51.6 -46.1	1.41778	0.81893	42	59.62	5	58.4 (cor), 60.1	124 (cor), 123	25	Pseudosaccharin ether 60 (cor)
50	<i>d,l</i>-2-Heptanol (<i>n</i> -Amyl methyl carbinol, <i>sec</i> -Heptyl alcohol)	158.7		1.4210	0.8167		54		49.4		57.5 <i>d,l</i> 76.5	
51	2-Isobutoxyethanol (Ethylene glycol mono-isobutyl ether)	159.3 ⁷⁴⁶		1.41428	0.8900							
52	2-<i>sec</i>-Butoxyethanol (Ethylene glycol mono- <i>sec</i> -butyl ether)	159.3 ⁷⁴⁶		1.41606	0.8966							
53	2,4-Dimethyl-1-pentanol	159.8		1.427	0.793					154-5, bz-pet eth		<i>p</i> -Xenylurethane, 74-5, pet

*Derivative data given in order: m.p., crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Phenylurethane	1-Naphthylurethane	4-Nitrobenzoate	3,5-Dinitrobenzoate	Hydrogen 3-nitrophthalate	Hydrogen phthalate	Miscellaneous
54	3-Chloro-1-propanol (3-Chloropropyl alcohol)	161.2				38	76		77			
55	2-Methyl-1-hexanol	164.5		1.4250	0.8270					131.2, wh, pet		<i>p</i> -Xenylurethane, 88.0-5, pet
56	2-Ethyl-1-pentanol (2-Ethyl- <i>n</i> -amyl alcohol)	164.6								127.8, bz-pet		<i>p</i> -Xenylurethane, 77-77.5, pet
57	<i>d,l</i>-4-Methyl-1-hexanol	165.173		1.4219	0.8239		50			149		Odor of Amyl alcohol
58	<i>d,l</i>-<i>cis</i>-2-Methylcyclohexanol (<i>cis</i> -Hexahydro- <i>o</i> -cresol)	165.3	-9.3	1.4640	0.9340	90.1, 93.4		51.2, 55.6	98.9		103.4, 104.5	
59	4-Hydroxy-4-methyl-2-pentanone (Diacetone alcohol)	166			0.9306 ²⁵			48	55			Oxime, 57.5-8.5 lgr-eth
60	<i>d,l</i>-<i>trans</i>-2-Methylcyclohexanol (<i>trans</i> -Hexahydro- <i>o</i> -cresol)	167.4	21	1.4611	0.9235	105, mixt <i>cis</i> + <i>trans</i> , 90, 105		65, mixt <i>cis</i> + <i>trans</i> , 35-6	114.5, mixt <i>cis</i> + <i>trans</i> , 85, 90		124.5, mixt <i>cis</i> + <i>trans</i> , 95, 6	
61	2-<i>n</i>-Butoxyethanol (Ethylene glycol mono- <i>n</i> -butyl ether)	170-6 ^{74,8}		1.4177 ²⁶	0.9188	62				120.0, 6		4-Nitrophenylurethane, 58.7, 9.1, CCl ₄ , N-1-Naphthylurea, 186 (cor), Picrate, 160
62	2-Aminoethyl alcohol (Ethanolamine)	171										<i>p</i> -Xenylurethane, 118 Allophanate, 156
63	2,6-Dimethyl-4-heptanol (Di-isobutyl carbinol)	171.4, 3.4		1.4242	0.8129 ²⁰	61.2, lgr-al					118	
64	Furfuryl alcohol (2-Furyl carbinol)	172, 170		1.4863	1.1351 ²⁰	45	129.30, lgr, 133	76	80.1		85	Urethane, 50, Pseudosaccharin ether 55
65	<i>d,l</i>-<i>cis</i>-3-Methylcyclohexanol (<i>cis</i> -Hexahydro- <i>m</i> -cresol)	173.4		1.4572	0.919	87.8	128.9	65	91.2		82-3	
66	<i>d,l</i>-<i>cis</i>-4-Methylcyclohexanol (<i>cis</i> -Hexahydro- <i>p</i> -cresol)	173.4 ⁷⁰		1.4549	0.914	118.9		94	134		72.3	
67	<i>d,l</i>-<i>trans</i>-4-Methylcyclohexanol (<i>trans</i> -Hexahydro- <i>p</i> -cresol)	173.4, 5 ⁷⁴		1.4534	0.913	124.5, mixt <i>cis</i> + <i>trans</i> , 112.5		67	139.40, mixt <i>cis</i> + <i>trans</i> , 125.30		119-25, ac a	
68	<i>d,l</i>-<i>trans</i>-3-Methylcyclohexanol (<i>trans</i> -Hexahydro- <i>m</i> -cresol)	174.5		1.4550	0.9145	93.4, mixt <i>cis</i> + <i>trans</i> , 75.85	122	58	97.8, mixt <i>cis</i> + <i>trans</i> , 80.5		93.4	
69	2,6-Dimethylcyclohexanol	174-5 ^{74,8}		1.4619	0.9115, 0.9235	158						
70	<i>cis</i>-2,5-Dimethylcyclohexanol	175		1.4522 ¹¹	0.9096 ¹¹							Allophanate, 157.8
71	<i>trans</i>-2,4-Dimethylcyclohexanol	175		1.4560	0.900	96						Acetate, b p 198 ⁷¹
72	1,3-Dichloro-2-propanol	176				73	115					

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Phenyl urethane	1 Naphthyl urethane	4 Nitro benzoate	3,5 Dinitro benzoate	Hydrogen 3 nitro phthalate	Hydrogen phthalate	Miscellaneous
73	3-Bromo-1-propanol (Triethylene bromohydrin)	176d					73					
74	cis-2,4-Dimethylcyclohexanol	176		1 4582	0 907							
75	1-Heptanol (<i>n</i> -Heptyl alcohol)	176 8	-34 6 -33 8	1 4245	0 82242	60 65	62	10	46 47	127 (cor)	16 5-17 5	Pseudosaccharin ether, 55 (cor) Allophanate, 125
76	trans-2,5-Dimethylcyclohexanol	177		1 4545 ¹⁷	0 9079 ¹⁷							
77	2,2-Dimethylcyclohexanol	177	8	1 4648	0 9225	85						
78	Tetrahydrofurfuryl alcohol	177-8 ⁴³		1 45167	1 0544	61, pet eth bis		46-8	83-4			Diphenylurethane, 81, me al
79	2-Methyl-1,2-propanediol (Isobutylene glycol)	178		1 4358 ¹⁷	0 999 ¹⁴	140 5						
80	d,l-2-Octanol	179		1 4265	0 8205	oil	63-4, 62 5	28	32		55, d,l 75	
81	2,2-Dibromoethanol	179-81										Urethane 90-1
82	1,3,5-Trimethylcyclohexanol	181		1 454 ^{16 3}	0 8876 ^{18 8}							
83	2,3-Butanediol (2,3-Butylene glycol)	meso 181 7 ⁴² , d,l 176 7 ⁴²	meso 34 4, d,l 7 6	meso 1 43637	meso 1 0433	meso bis 201						Dibenzoate d,l 53 4, meso 75 5-6 2
84	Cyclohexyl carbinol (Hexahydrobenzyl alcohol)	182		1 4649	0 9280							Acetate, b p 199-201 ⁷⁴⁰
85	2,3-Dichloropropanol	182				73	93	37-8				2-Naphthylurethane, 99
86	4-Methyl-1-heptanol	182 7								133		Pseudosaccharin ether, 34 (cor)
87	2-Ethyl-1-hexanol	184 6		1 4328	0 8328	33-4	60 1			108		<i>p</i> -Xenylurethane, 80, pet, Pseudosaccharin ether, 53 5 (cor)
88	3,3-Dimethylcyclohexanol	185 ⁷⁵⁴	11 2	1 4606 ¹⁵	0 9128 ¹⁴			83				Acetate, b p 194-5 ⁷⁵⁰ , <i>o</i> -Nitrobenzoate, 62
89	cis-3,5-Dimethylcyclohexanol	187		1 454 ²¹	0 9109 ²¹							Acetate, b p 201-2
90	trans-3,5-Dimethylcyclohexanol	d,l 187		1 4579	d 0 9146, l 0 9166							Acetate, d,l, b p, 196 d, [α] _D ²⁰ +4 55, l, [α] _D ¹⁷ -7 74
91	d,l-1,2-Propanediol (α -Propylene glycol)	187 4		1 43162 ²⁵	1 0354 ²³	bis 153, 143-4						Monostearate, 59 5, Distearate, 72 3
92	3,4-Dimethylcyclohexanol	189		1 458 ¹⁶	0 9073 ¹⁶	119						
93	2,4,5-Trimethylcyclohexanol	cis 191-3, trans 196				cis 83 5, al, trans 95, al					81-3 5, eth-lgr	
94	1,3,3-Trimethylcyclohexen-6-ol	193 (cor)			0 9310 ¹³							Acetate, b p 206 7
95	2,3,6-Trimethylcyclohexanol	193-5 ⁷⁴⁷			0 9119 ¹⁷							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point, °C	n_D^{20}	D_4^{20}	Phenyl-urethane	1 Naphthyl urethane	4 Nitro benzoate	3,5-Dinitro benzoate	Hydrogen 3-nitro phthalate	Hydrogen phthalate	Miscellaneous
96	2-(2-Methoxyethoxy)-ethanol (Diethylene glycol monomethyl ether)	194		1.4244	1.035 ₂₀ ²⁰			92		91.4, 2.2 (anh.), 87.90 (monohyd) w-al		4-Nitrophenylurethane, 73.5, 76
97	5-Nonanol	194 ⁷⁴³		1.4289 ^{1K}							45	Allophanate, 158
98	1-Octanol (<i>n</i> -Octyl alcohol)	195	-16, -16.7	1.4274 ²⁵	0.8249	74.72	67	12	61.2	128 (cor)	22	Pseudosaccharin ether 46 (cor)
99	2-Methyl-2,4-pentanediol	196, 198		1.42976 ^{16,7}	0.9240 ¹⁷							Odor of pinacol, Heating with 2% HBr → diene, b p 75.5-76.0
100	2-(2-Ethoxyethoxy)-ethanol (Diethylene glycol monoethyl ether)	196 ⁷⁶³		1.4298	1.023 ₂₀ ²⁰			oil	oil	oil		4 Nitrophenylurethane, 65.8, 63
101	Glycol (1,2-Ethanediol)	197.85	-12.6	1.43192	1.11361	<i>di</i> 157	<i>di</i> 176	140, 141	<i>di</i> 169			<i>bis</i> -4-Nitrophenylurethane, 135.5
102	<i>d,l</i> -2-Nonanol	198.2		1.4290 ²⁵	0.81910 ₄ ²⁵		55.5, <i>lt</i> pet		42.8 (cor)		42.4, <i>d,l</i> 58-9	
103	<i>l</i> -Linalool (<i>l</i> -Linalyl alcohol)	199		1.46238	0.8622	65.6	53	70				[α] _D -3 to -17
104	Benzyl alcohol	205.5	-15.3	1.53955	1.04540	77, 75.5, 76, <i>pet eth</i>	134	85	113	176	106, 104	Pseudosaccharin ether, 130 (cor)
105	<i>d,l</i> -1,3-Butanediol (<i>d,l</i> -1,3-Butylene glycol)	207.5, 204		1.44252 ^{19,5}	1.0053	122-3, <i>d</i> 115-6	184					Diphenylurethane / 127.8
106	<i>d,l</i> -2-Decanol (Methyl <i>n</i> -octyl carbinol)	211		<i>d</i> 1.4344	<i>d</i> 0.8250		69, <i>lt pet</i>				48.9, <i>d</i> 38.9	
107	1-Nonanol (<i>n</i> -Nonyl alcohol)	213.5		1.43105	0.8271	60, 69, 62-4	65.5	60, 66	52.2	125 (cor)	42.5	Pseudosaccharin ether, 49 (cor)
108	1,3-Propanediol (Trimethylene glycol)	214.7, 210-2	-30	1.43983	1.0538	<i>di</i> 137	<i>di</i> 164	<i>di</i> 119	<i>di</i> 178			Dibenzoate, 57, 59
109	3-Methylbenzyl alcohol (3-Tolyl carbinol)	217			0.9157 ¹⁷		116					
110	α -4-Dimethylbenzyl alcohol (α -Methyl-4-tolyl carbinol)	219			0.9668 ₁₅ ^{15,5}	96, <i>pet eth</i>						
111	1-Phenyl-<i>n</i>-propyl alcohol (<i>d,l</i> -Phenylethyl carbinol)	219		1.5257	1.0056 ₂₀ ²⁰		102	59-60, 56.5, 7.8				
112	2,3-Dibromo-1-propanol	219d				84		59-60				3,5-Dinitrophenylurethane, 71
113	2-Phenethyl alcohol (2-Phenylethanol)	219.8	-25.8	1.5240	1.0235 ₂₅ ²⁵	78, 79-80, <i>al</i>	119	61.5-2 (cor), 62-3, <i>al</i>	108	123	188-9	
114	<i>d,l</i> - α -Terpineol	221	35, <i>d,l</i> 37-8	1.4834	0.9337	112.3, <i>me al</i> , <i>d,l</i> 110	152, 147	139, <i>me al</i>	78-9, <i>lgr</i>		117-8, <i>ac a</i>	Commercial liquid, lilac-like odor

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Phenyl urethane	1 Naphthyl urethane	4 Nitro benzoate	3,5 Dinitro benzoate	Hydrogen 3 nitro phthalate	Hydrogen phthalate	Miscellaneous
115	Citronellol	222 118 ¹⁷										Oxid → Adipic acid, 89, Rose-like odor
116	α -Isopropylbenzyl alcohol (<i>d,l</i> -Isopropyl phenyl carbinol)	222.4		1.51932 ¹⁸	0.9790 ²⁰		116.7					Oxid → Isopropylphenyl ketone, b p 222
117	<i>d,l</i> -2-Undecanol (<i>d,l</i> -2-Hendecanol Methyl <i>n</i> -nonyl carbinol)	228-9			0.8263 ¹⁸						49.50	
118	2-(2- <i>n</i> -Butoxyethoxy)-ethanol (Diethylene glycol mono- <i>n</i> -butyl ether)	228-30		1.4341	0.957 ²⁰							4-Nitrophenyl-urethane 54.5-5.3
119	1,4-Butanediol (Tetra-methylene glycol)	230, 235	19.0, 5	1.4467	1.0171	<i>di</i> 183 3.5 chl 180	<i>di</i> 199, xyl	<i>di</i> 175 ac a				Dibenzoate, 81.2, eth
120	Geraniol	230		1.4766	0.8894		47.8	35	62.3	117	47, lgr	
121	1-Decanol (<i>n</i> -Decyl alcohol)	231	5.99, 6.4	1.43682	0.8292	59.6, bz, then al	73	30.2, al	57.7	122.8 (cor)	38 (cor)	Pseudosaccharin ether, 47.5 (cor)
122	2-Phenoxyethanol (Ethylene glycol monophenyl ether)	237, 245		1.534	1.102 ²²					112.3		Benzoate 64 4-Toluene-sulfonate 80, al
123	3-Phenylpropanol (Hydrocinnamyl alcohol)	237.4, 235		1.53565	1.0079	45 47-8, al		45.6, 47	92	117		4 Nitrophenyl urethane 104 pet eth
124	1,5-Pentanediol (Pentamethylene glycol)	238-9		1.4499	0.9939 ²⁰	<i>di</i> 174-5 (cor) abs al	<i>di</i> 147	<i>di</i> 104-5, bz-al				
125	1-Undecanol (1-Hendecanol <i>n</i> -Undecyl alcohol)	243	15.85, 14.3			62, al, 52		99.5, al	55	123.3 (cor)	43.8, 4.1	Allophanate 156 Pseudosaccharin ether 58.5 (cor)
126	Diethylene glycol (β,β' -Dihydroxydiethyl ether)	244.5	f p -10.45	1.4475	1.1212 ¹⁵		149	151 (cor), 149, ac a				
127	2-Methoxybenzyl alcohol (Saligenin-2-methyl ether)	247		1.549 ¹⁷	1.0495 ¹⁵		135-6					Allophanate, 180, Benzoate, 59, lgr
128	2-Benzyloxyethanol (Ethylene glycol monobenzyl ether)	265.0		1.5225	1.0700 ²⁰							Triphenylmethyl ether, 76.7, eth
129	<i>n</i> -Hexyl phenyl carbinol	275		1.501	0.946	75						
130	Triethylene glycol (Ethylene glycol di-(β -hydroxyethyl) ether)	285, 165 ¹⁴	-9.4	1.4578 ¹⁵	1.1274 ¹⁵							<i>bis</i> -Triphenylmethyl ether, 142.2.5, acet
131	Glycerol (1,2,3-Trihydroxypropane)	290d	17.9	1.4729	1.26134	<i>tri</i> 180	<i>tri</i> 191- 2, al	<i>tri</i> 188				4-Nitrophenyl urethane, 216 Tribenzoate, 71.2, 75.6
132	3,4-Dimethoxybenzyl alcohol (Veratryl alcohol)	296-7 ³²		1.555 ¹⁷	1.179 ¹⁷	118						Acetate, b p 170 ¹² , n_D^{17} 1.5245, Benzoate, 36.7

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Phenyl urethane	1 Naphthyl urethane	4 Nitro benzoate	3,5 Dinitro benzoate	Hydrogen 3 nitro phthalate	Hydrogen phthalate	Miscellaneous
133	4-Methoxyphenyl methyl carbinol (4 Anisyl methyl carbinol)	310d (cor)		1.557	1.0864 ⁶	82.3						Odor of anise Oxid → 4 Methoxy acetophenone 38
134	<i>cis</i> -Octa-9-decen-1-ol (Oleyl alcohol <i>cis</i> -Octadecenyl alcohol)	333.5		1.4607	0.8489	oil	β 44.5 al					Allphante 135 chl 129 chl 4 Nitrophenyl urethane 85.91

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	1 Naphthyl urethane	4 Nitro benzoate	3,5 Di nitro benzoate	Hydrogen 3 nitro phthalate	Hydrogen phthalate	Pseudo saccharine ether	Miscellaneous
1	1-Phenylethyl alcohol (<i>d l</i> Methyl phenyl carbinol)	20, 20.1	202	92, 91-2, lgr	106	43 (cor), al	95 93		108 ac a		n_D^{20} 1.5275, D_4^{20} 0.0129
2	<i>trans</i> -2-Methylcyclohexanol	21	167.4	<i>d l</i> 105	<i>d l</i> 155		<i>d l</i> 115				Oxalate <i>d l</i> 61
3	1-Dodecanol (π -Dodecyl alcohol, Lauryl alcohol)	24, 26	259	74	80	45, 42	60	124 (cor)	50.3 (cor)	54 (cor)	
4	1,1-Dimethyl-2-phenylethanol (Benzyl dimethyl carbinol)	24	216								n_D^{15} 1.5174
5	4-Methoxybenzyl alcohol (4 Anisyl carbinol)	24-5	259	92 (cor)							Benzoate, 38, Meth, b p 225-6, n_D^{15} 1.5422, D_4^{15} 0.1129
6	Cyclohexanol	25.1	161.1	82	129	50	112.3, al	160	99		n_D^{15} 1.46477, D_4^{30} 0.94155
7	<i>tert</i> -Butyl alcohol (Trimethyl carbinol)	25.5	82.5	136, eth	101	116, al	142, pet eth				n_D^{20} 1.38779, D_4^{20} 0.78670
8	3-Nitrobenzyl alcohol	27	175-80 ³								Benzoate, 71.2 Ox → 3-nitro benzoic acid 140
9	2,3,3-Trimethylcyclohexanol	28	197								
10	Diethanolamine (β, β' -Dihydroxy-diethylamine)	28	270, 217-8 ¹⁵⁰								Picrate, 109-10
11	2,4-Hexadien-1-ol	30.5-1.5	76 ¹²	78-9			85				
12	1-Tridecanol	α 30.6, β 28.3	155.6 ¹⁵			37.4 (cor)		124 (cor)	52.5	66 (cor)	D_4^{21} 0.8223
13	Cinnamyl alcohol	33	257	90.0-1.5	114	78, 76.5	121				
14	2-Methylbenzyl alcohol (2 Toly carbinol)	36, 35	219	79 (cor)							
15	<i>trans</i> -Octa-9-decen-1-ol (Elaidyl alcohol)	36.7, 35, 34	333, 216 ¹⁸	56-7	71						
16	<i>d,l</i> -Fenchyl alcohol	38-9, <i>d</i> α 45, <i>l</i> α 47, <i>l</i> β 3-4	201.5, 201-2	104, <i>d</i> α 82, <i>l</i> α 82	149	109, α 108.9 β 94-5, <i>l</i> α 109, <i>l</i> β 83	104	95	169, <i>d</i> α 145, <i>l</i> α 146, <i>l</i> β 153		
17	1-Tetradecanol (Myristyl alcohol)	39, 37.7	170-3 ²⁰	74, 71	82	51.2 (cor)	67	123.5 (cor)	60 (cor)	62 (cor)	
18	1,2,2-Trimethylcyclohexanol	41 (+ $\frac{1}{2}$ H ₂ O)	81.4-8 ²⁰								$n_D^{18.4}$ 1.469, $D_4^{18.4}$ 0.9274
19	Pnacol (Tetramethylethylene glycol)	43, 45-6	172								Diacetate, 65, Hydrate, 46
20	<i>l</i> -Menthol	44, 42.5, 35, 33, 31, <i>d</i> 38-40, <i>d,l</i> 34	216	111-2, al, <i>d l</i> 103-4	119, 126	61-2	153		112, 129-31, ac a		Allophanate, 215
21	1-Pentadecanol	α 44, β 38.9		72, bz	72	45.8 (cor)		122.5 (cor)	60.4	72 (cor)	
22	1,3,5-Trimethyl-1-cyclohexen-3-ol	46	87-90 ¹⁷								$n_D^{19.3}$ 1.4735, $D_4^{20.2}$ 0.9132
23	<i>d,l</i> - α -Propylbenzyl alcohol	<i>d</i> 49, <i>l</i> 49	168-70 ¹⁰⁰		99	58			91, 53-4		
24	1,1,1-Trichloroisopropanol	50-1	161.8 ⁷⁷³								Camphor-like odor
25	1-Hexadecanol (Cetyl alcohol)	50, 49.27	190 ¹⁸	73	82	58.4 (cor), 52	66	122 (cor)	66.8	69.5 (cor)	
26	2,2,6-Trimethylcyclohexanol	51, al	186-7 ⁷⁵³								n_D^{20} 1.4600, D_4^{20} 0.9128

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Phenyl urethane	1 Naphthyl urethane	4 Nitro benzoate	3,5 Di nitro benzoate	Hydrogen 3 nitro phthalate	Hydrogen-phthalate	Pseudo saccharine ether	Miscellaneous
27	3,3,5-Trimethylcyclohexanol	<i>trans</i> 52, 37	<i>cis</i> 201-37 ⁵⁰ , <i>trans</i> 196.5 ⁷⁰								Acetate, <i>cis</i> b p 209-10, <i>trans</i> b p 209-10
28	2,2-Dimethyl-1-propanol (<i>tert</i> -Butyl carbinol, Neopentyl alcohol)	52-3	113	144, lgr	100				71		
29	4-Methylbenzhydrol (Phenyl 4-tolyl carbinol)	53, 58, 42									Ox → Phenyl 4-tolyl ketone, 60
30	1-Heptadecanol	α 54	310		88.5	53.8 (cor)	121.5 (cor)	121.0-8	66.6-7 (cor)	76 (cor)	
31	Piperonyl alcohol	58		102.5							Benzoate, 66, Allophanate, 176.5
32	4-Methylbenzyl alcohol (4-Tolyl carbinol)	59-60	217	79			117.8				
33	1-Octadecanol (Stearyl alcohol)	59.5	210.5 ¹⁵	79-80		64.3 (cor)	66	119 (cor)	72.5 (cor)	74.5 (cor)	
34	1-Nonadecanol	62				58.9			71	80.5	Acetate, 40
35	Eicosanol	65	220 ³			69.4			77		
36	1-(1-Naphthyl) ethanol (<i>d,l</i> -Methyl 1-naphthyl carbinol)	66							131-2, bz		
37	1,2-Diphenylethanol (<i>d,l</i> -Benzyl phenyl carbinol)	67	167 ¹⁰						131 (cor), eth-lt pet		
38	4,4'-Dimethylbenzhydrol (Di-4-tolyl carbinol)	68, al									Carbinyl bromide 48.5-9 lgr
39	Benzhydrol (Diphenyl carbinol)	68, lgr	288, 180 ²⁰	139.40, bz	135.6, 139	131-2	141		164.5		Acetate 41.2 Benzoate 88-9, al Conc H ₂ SO ₄ → pa red Tetraacetate, 53
40	1-Glyceryl phenyl ether	69, eth									
41	Erythritol (<i>d,l</i> -1,2,3,4 Tetrahydroxybutane)	72									
42	Dihydroxyacetone (1,3-Dihydroxy-2-propanone)	72									Diacetate, 48, Di-benzoate, 120.5, 2,4-Dinitrophenyl-hydrazone, 277-8
43	2-Nitrobenzyl alcohol	74	270-165 ²⁰								Benzoate, 101-2
44	1,10-Decanediol (Decamethylene glycol)	75.5, 72									1,10-Dibromide, 27.4 b p 162.5 ⁵⁰ Urethane, 86-7
45	2,2,2-Tribromoethanol	80	92-3 ¹⁰								
46	10-Nonadecanol (Myrcyl alcohol)	85		96	54						
47	Phenacyl alcohol (α -Hydroxyacetophenone, Benzoyl carbinol)	86	118-20 ¹¹			128.6					Benzoate, 118.5, 3-Nitrobenzoate, 104.5
48	<i>n</i>-Triacontanol (1-Hydroxytriacontane)	86.5, bz									Acetate, 69, pet eth
49	2-Hydroxybenzyl alcohol (Saligenin)	86-7									2-Benzoate, 66
50	<i>d</i>-Sorbitol	89-93, 112 (anh)									Hexaacetate, 99, Hexabenzoate, 216-7, et ac
51	3-Nitrophenacyl alcohol (3-Nitrobenzoyl carbinol)	92.5-30, pa yel									Acetate, 53, eth-lgr, Semicarbazone, 214, al

*Derivative data given in order m p, crystal color, solvent from which crystallized

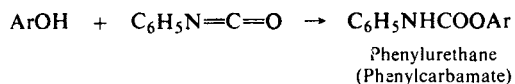
119 53 9
 C₁₄H₁₂O₂


TABLE VI. ORGANIC DERIVATIVES OF ALCOHOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl-urethane	1 Naphthyl urethane	4-Nitrobenzoate	3,5-Dinitrobenzoate	Hydrogen 3-nitrophthalate	Hydrogen-phthalate	Pseudo saccharine ether	Miscellaneous
52	4-Nitrobenzyl alcohol	93	185 ¹²								Acetate, 78, Benzoate, 94 5
53	4,4',4''-Trimethyltriphenyl carbinol (Tris-<i>p</i>-tolyl carbinol)	96									Et eth 111 pet eth H ₂ SO ₄ → gr-red
54	meso-Erythritol	121, 120 (cor)	330								Tetraacetate 85 89 Dibenzyldene, 201-2
55	4-Nitrophenacyl alcohol (4-Nitrobenzoyl carbinol)	121									Acetate, 124, et ac-igr, Phenylhydrazone, 178, bz
56	<i>d</i>-l-Benzoin (Benzoyl phenyl carbinol)	137, 133	344	165	140	123					4 Nitrophenylurethane 183 Acetate, 83
57	Cinchol (β-Sitosterol)	137					202 4				Acetate, 134, Benzoate, 145
58	Furoin (Furoyl furyl carbinol)	138 9 (cor), 135									Acetate, 76-7 Benzoate, 92-3
59	Cholesterol (anh) (<i>l</i>-Cholesterol)	148 5	360d	168	176	185 190 3			161		4-Nitrophenylurethane, 205 Benzoate, 151-2 Acetate, 87 8
60	Triphenylmethanol (Triphenyl carbinol)	161 2, bz	380								
61	Ergosterol	165		185	202		202, chl				Acetate, 176, 180, eth, Benzoate, 168
62	<i>d</i>-Mannitol	166, <i>l</i> 163-4, <i>dl</i> - α 168		303							Hexaacetate, 126, eth, Benzoate, 149-50, 147-8, al
63	1,1,1-Tribromo-<i>tert</i>-butyl alcohol (Brometone)	167-76, w-al									Acetate, 43 4, al, Benzoate, 27, al
64	Dulcitol (1,2,3,4,5,6-Hexanehexol)	188 5									Hexaacetate, 171, 168 9, abs al, Hexabenzoate, 189-91, eth -chl
65	4,4',4''-Triaminotriphenyl carbinol (Parosaniline base)	205									4 4,4'' Triacetyl, 192 acet-eth Me eth 105, eth, 135, bz
66	<i>d</i>-Borneol ("Borneo camphor")	208, 205, <i>dl</i> 210 5	212	138-9	132, <i>iso</i> 130, 127	153, <i>dl</i> 134, 137	154 5		161 4, ac a, 165 (cor)		
67	meso-Inositol (1,2,3,4,5,6-Hexahydroxycyclohexane)	225 (cor), 218					86, al				Hexaacetate, 212, subl, tol, Hexabenzoate, 258, al
68	<i>d</i>-Quercitol (Pentahydrocyclohexane)	232, 234									Pentabenzoate, 155
69	Pentaerythritol (2,2-Bishydroxymethyl-1,3-propanediol)	262 253									Tetraacetate, 84, wh, al, Tetraacetate, 99-101, al

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE VII

Phenylurethane

From the phenol with phenylisocyanate without solvent

For directions and examples see Linstead, pp 34-35, J B McKinley, J E Nickels and S S Sidue, *Ind Eng Chem, Anal Ed*, **16**, 304 (1944)

From the phenol with phenylisocyanate in kerosene

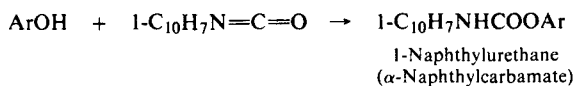
See Cheronis, p 489

From the phenol with phenylisocyanate and a catalytic amount of pyridine

See Shriner, p 265

From the phenol with phenylisocyanate in toluene

See O L Brady and J Harris, *J Chem Soc*, **127**, 2175 (1925)

*1-Naphthylurethane (α -Naphthylcarbamate) **

From the phenol with 1-naphthylisocyanate without solvent

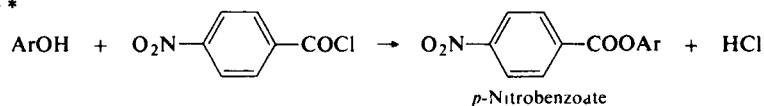
For directions and examples see Cheronis, p 488, Linstead, pp 34-35, Vogel, p 683, Wild, p 68

From the phenol with 1-naphthylisocyanate and a catalytic amount of pyridine, triethylamine or trimethylamine in ether

See Shriner, p 211, Vogel, p 683, Wild, p 68, H E French and A F Wirtel, *J Amer Chem Soc*, **48**, 1736 (1926)

From the phenol with 1-naphthylisocyanate and a catalytic amount of a tertiary aliphatic amine in petrol ether

See Cheronis, p 488, Vogel, p 684

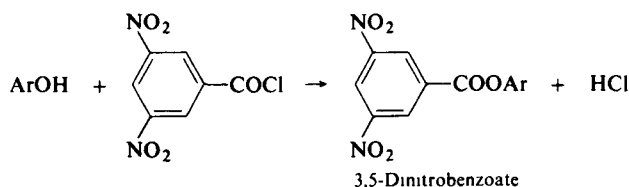
*p-Nitrobenzoate **

From the phenol with *p*-nitrobenzoyl chloride in pyridine

For directions and examples see Vogel, p 682, Wild, p 52

From the phenol with *p*-nitrobenzoyl chloride without solvent

See Wild, p 52

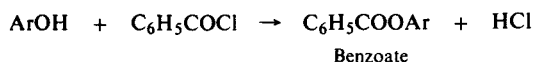
*3,5-Dinitrobenzoate **

From the phenol with 3,5-dinitrobenzoyl chloride in pyridine

For directions and examples see Cheronis, p 486, Vogel, p 682, Wild, p 65, R C Brown and R E. Kremers, *J Amer Pharm Ass*, **11**, 607 (1922), M Phillips and G L Keenan, *J Amer Chem Soc*, **53**, 1924 (1931)

From the phenol with 3,5-dinitrobenzoyl chloride without solvent

See Shriner, pp 212-213

Benzoate

From the phenol with benzoyl chloride in aqueous sodium hydroxide

For directions and examples see Cheronis, pp 481-482, 487, Linstead, p 20, Wild, p 65

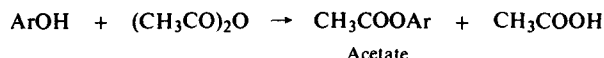
*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE VII (Continued)

From the phenol with benzoyl chloride in pyridine
 See Linstead, p 19

Acetate



From the phenol with acetic anhydride in aqueous sodium hydroxide

For directions and examples see Linstead, p 21, Vogel, p 682, Wild, p 64, F D Chattaway, *J Chem Soc*, 2495 (1931)

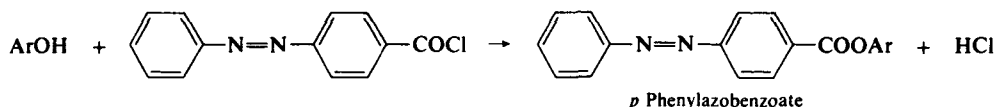
From the phenol with acetic anhydride and sodium acetate

See Linstead, p 21, Wild, p 64

From the phenol with acetic anhydride and a catalytic amount of sulfuric acid

See Cheronis, p 487

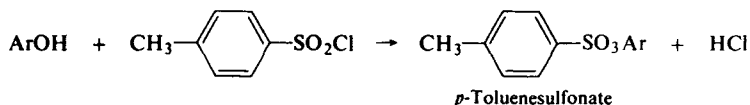
p-Phenylazobenzoate



From the phenol with *p*-phenylazobenzoyl chloride in pyridine

For directions and examples see Cheronis, p 486, E O Woolfolk and J M Taylor, *J Org Chem*, 22, 827 (1957)

p-Toluenesulfonate



From the phenol with *p*-toluenesulfonyl chloride in pyridine

For directions and examples see Linstead, p 20, Vogel, p 684, Wild, p 66

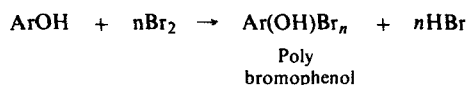
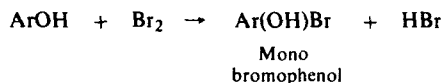
From the phenol with *p*-toluenesulfonyl chloride in aqueous sodium hydroxide

See Linstead, p 20

From the phenol with *p*-toluenesulfonyl chloride and sodium hydroxide in aqueous acetone

See Wild, p 66

Bromo derivative *



From the phenol in aqueous methanol, in ethanol, in acetone or in dioxane with bromine in aqueous potassium bromide

For directions and examples see Cheronis, p 490, Shriner, p 264

From the phenol in aqueous hydrochloric acid with bromine in water

See Linstead, p 19

From the phenol in glacial acetic acid and bromine

See Wild, p 73

From the phenol with bromine in carbon disulfide

See Vogel, p 679

For a discussion on the effect of solvents in the bromination of phenols

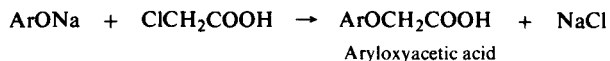
See N D Cheronis, *Micro and Semimicro Methods (Technique of Organic Chemistry)*, Vol 6, Interscience, New York, 1954, pp 286-287

*Derivatives recommended for first trial

WARNING This is not an instruction manual References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE VII (Continued)

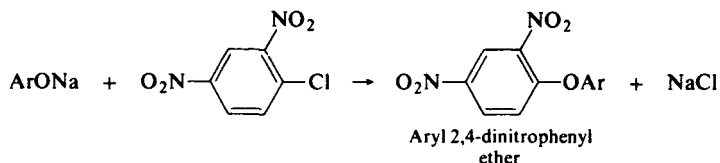
*Aryloxyacetic acid.**



From the phenol in aqueous sodium hydroxide with aqueous chloroacetic acid.

For directions and examples see: Cheronis, pp. 489-490; Linstead, p. 20; Shriner, p. 264; Vogel, p. 683; Wild, p. 72; C. F. Koelsch, *J. Amer. Chem. Soc.*, **53**, 304 (1931); N. V. Hayes and G. E. K. Branch, *J. Amer. Chem. Soc.*, **65**, 1555 (1943).

Aryl 2,4-dinitrophenyl ether.



From the phenol in aqueous sodium hydroxide with 2,4-dinitrochlorobenzene in alcohol.

For directions and examples see: Cheronis, pp. 490-491; Vogel, p. 684; Wild, p. 71; R. W. Bost and F. Nicholson, *J. Amer. Chem. Soc.*, **57**, 2368 (1935).

From the phenol with 2,4-dinitrochlorobenzene and aqueous potassium hydroxide.

See: Linstead, pp. 20-21.

NOTE: For additional information regarding directions and examples for the preparation of derivatives of phenols which are similar to those of alcohols (e.g., 1-naphthylurethanes, 3,5-dinitrobenzoates, etc.) see explanations and references to Table VI, p. 77, 78, 79.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
a) Liquids. (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point °C	Melting point, °C	n_D^{20}	D_4^{20}	Phenyl-urethane	α -Naphthyl-urethane	p -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	p -Toluene sulfonate	Miscellaneous
1	2-Chlorophenol	175.6	7	1.5473 ¹⁰	1.2410 ¹⁵	121	120	115	143	<i>mono</i> 48.9, <i>di</i> 76	74	Aryloxyacetic acid, 145, 2,4-Dinitrophenyl ether, 99, 4,6-Bis(dimethylamino-methyl) deriv., 62, 3-, p -Phenylazobenzoate, 120-1
2	2-Bromophenol	195	5		1.4924		129			95	78	p -Phenylazobenzoate, 126-7
3	2-Chloro-4-methylphenol (2-Chloro- p -cresol)	195.6		1.5200 ⁷	1.1785 ²⁷							Benzoate, 71, 2-, Aryloxyacetic acid, 108, Acetate, b p 238
4	2-Hydroxybenzaldehyde (Salicylaldehyde)	197 (cor)	1.6	1.574	1.1690 ²⁰	133		128			63, 4	Aryloxyacetic acid, 132, Acetate, 39
5	3-Methylphenol (m -Cresol)	203	12	1.540	1.03401	125, 121, 2, al -lgr	127.8	90	165.4 (cor), al	<i>tri</i> 84	51	Aryloxyacetic acid, 103, 2,4-Dinitrophenyl ether, 74, Benzoate, 55
6	2-Ethylphenol	207			1.0371 ⁰	143.4, 141		56.7	108			Aryloxyacetic acid, 141, Benzoate, 38-9, al
7	2-Isopropylphenol	212	16	1.5315	1.012							Aryloxyacetic acid, 132, 3-, Methylurethane, 96, 7, 4,6-Dinitro deriv., 53
8	2-Bromo-4-ethylphenol	213.4									121	
9	3-Ethylphenol	217	-4		1.0250 ⁹	137, 138.8		68				Aryloxyacetic acid, 77, Benzoate, 52, 95% al
10	2-Allylphenol	220	-6	1.5181	1.0255 ¹⁵	116, 106.0 6.5				<i>6-mono</i> 50		Aryloxyacetic acid, 148.5-50
11	2-Chloro-4,6-dimethylphenol	221.3						94-5				
12	Methyl salicylate (Methyl 2-hydroxybenzoate)	224	-8	1.5369	1.184	117, bz		128				Acetate, 52, Benzoate, 92, al
13	2-Propylphenol	224.6- 6.6, 220.0- 0.5		1.5280	1.000 ¹⁵	111, formic a			96			Aryloxyacetic acid, 99-100
14	2-sec-Butylphenol	227-8, 116 ²¹	12-3	1.5288	0.9876	86, lgr						Aryloxyacetic acid, 109.5-110
15	4-Allylphenol	230-1 ⁷⁵⁰	16	1.5441 ¹⁸	1.033 ¹⁸				103.0- 3.5			Urethane, 122, 3-, Acetate, b p 238-9
16	Ethyl salicylate (Ethyl 2-hydroxybenzoate)	234	1.3	1.5226	1.131	98, 100		107-8, yel, bz				Benzoate, 79-80, 87, al, 3,5-Dinitro deriv., 92-3
17	2-n-Butylphenol	234-7 113 5 ¹⁴		1.5180 ^{25.5}	0.975				97			Aryloxyacetic acid, 104-5, Acetate, 105.5
18	4-Isobutylphenol	236, 235-9		1.5319 ²⁵	0.9796 ²⁰							Aryloxyacetic acid, 124-5
19	Carvacrol (5-Isopropyl-2-methylphenol)	237.8	1	1.524	0.9760	134.5, 138	116, lgr	51	83, 76-7	46		Aryloxyacetic acid, 151, p -Xenylurethane, 116, al
20	Isopropyl salicylate (Isopropyl 2-hydroxybenzoate)	240-2		1.50650	1.0729							3,5-Dinitro deriv., 101.2, al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
a) Liquids. (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Phenyl-urethane	α -Naphthyl-urethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Miscellaneous
21	3-Methoxyphenol (Resorcinol monomethyl ether)	243-244	-17.5				128.9			<i>tri</i> 104		Aryloxyacetic acid, 118, 111-3, w, 2,4-Dinitrophenyl ether, 87-8
22	2-Allyl-6-methoxyphenol	250-1115 ⁹		1.5393				96.7				
23	4-Allyl-2-methoxyphenol (Eugenol)	254.8, 127 ¹⁵	-9.1, 16.9	1.5410	1.0664	95.5	122, lgr	81	130.8 (cor), al	<i>tetra</i> 118	85	Acetate, 29, al, Benzoate, 70, al, Aryloxyacetic acid, 81, 100, 2,4-Dinitrophenyl ether, 115, N,N-Diphenylurethane, 108
24	Isobutyl salicylate (Isobutyl 2-hydroxybenzoate)	260.2		1.50872	1.0639							3,5-Dinitro deriv, 72.3, al
25	<i>d,l</i>-1,2,3,4-Tetrahydro-2-naphthol	264 ⁷¹⁶		1.5523 ¹⁷	1.0715 ¹⁷	99						Acetate, b p 169 ³⁴ , Benzoate, b p 254.5 ⁴⁰
26	2-Methoxy-4-propenylphenol (Isoeugenol)	267.5		<i>cis</i> 1.5700, <i>trans</i> 1.5782	<i>cis</i> 1.0851, <i>trans</i> 1.0852	<i>cis</i> 118, <i>trans</i> 152	149.50, lgr	109	154.8 (cor), <i>n</i> -BuOH			Acetate, 79-80, bz-lgr, Benzoate, <i>cis</i> , 68, <i>trans</i> , 103.4, al, Aryloxyacetic acid, 116 (94), 2,4-Dinitrophenyl ether, 128
27	<i>n</i>-Butyl salicylate (<i>n</i> -Butyl 2-hydroxybenzoate)	270-2, 259-60	-5.9	1.51148	1.0728							3,5-Dinitro deriv, 60.1, al, <i>p</i> -Nitrobenzyl ether, 92
28	Isoamyl salicylate (Isopentyl salicylate)	276.8		1.50799	1.0535							3,5-Dinitro deriv, 61-2, al
29	3-Acetoxyphenol (Resorcinol monoacetate)	283		1.5328								Saponification → resorcinol, 110 + ac a, Diacetate, b p 130.1 ⁷

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
1	2-Benzylphenol (2-Hydroxydiphenylmethane) (Labile form)	21, stable 52, 54	312	117-8								Me eth, 30, Urethane, 110-1
2	4- <i>n</i> -Propylphenol	22	232	129			123			b p 245 6 ⁷⁴⁵	38	n _D ²⁰ 1 5220
3	4- <i>n</i> -Butylphenol	22	248, 138-9 ¹⁸	115, al		67-8, yel al	92			b p 138- 41 ¹⁵	27	n _D ²⁰ 1 5165, D ₄ ²⁰ 0 978, Aryloxyacetic acid, 81
4	4- <i>n</i> -Amylphenol (4- <i>n</i> -Pentylphenol)	23	248-53								51 0 0 5, al	n _D ²⁰ 1 5272, D ₄ ²⁰ 0 9621, Aryloxyacetic acid, 90
5	3- <i>n</i> -Propylphenol	26	228				75 (117-8)					n _D ²⁰ 1 5223, D ₄ ²⁰ 0 9887, Aryloxyacetic acid, 96-7, lgr
6	2-Chloro-3,4-dimethylphenol	27, pet eth									87, aq al	
7	2,4-Dichloro-3-methylphenol (2,4-Dichloro- <i>m</i> -cresol)	27	240 5- 2 5						92 0 2 5, al		90 5	Benzenesulfonate, 70, al
8	2,4-Dimethylphenol (<i>m</i> -4-Xylenol)	27 8	211 5 (cor)	103, 112, CCl ₄	135	102, 105	164 6 (cor), 95% al				37 8, ac a	n _D ²⁰ 1 5420, D ₄ ²⁰ 1 0276, <i>p</i> -Xenylurethane, 184, Aryloxyacetic acid, 141, <i>p</i> -Phenylazobenzoate, 110-3 2 4-Dinitrophenyl ether, 102-3
9	2-Ethoxyphenol	28	217								31	Allophanate, 212
10	2-Acetylphenol (2-Hydroxyacetophenone)	28	215							89, al	87 8, al	n _D ²⁰ 1 5590, D ₄ ²⁰ 1 131, Semicarbazone, 210, Oxime, 118, Phenylhydrazone, 110
11	2-Methylphenol (<i>o</i> -Cresol)	31	191-2	141, 143	141 2, lgr	94	138 4 (cor), al	<i>di</i> 56	54 5, pyr			Aryloxyacetic acid, 152, <i>p</i> -Phenylazobenzoate, 110- 11 5, 2,4-Dinitrophenyl ether, 90, N,N-Diphenylurethane, 73
12	2-Methoxyphenol (Guaiacol)	32, 28 2	205	136, al	118	93	141 2 (cor), al	4,5,6- <i>tri</i> 116, al	85, lgr		57 8	n _D ²⁰ 1 5441, D ₄ ²⁰ 1 1287, Aryloxyacetic acid, 116, 2,4-Dinitrophenyl ether, 97
13	5-Fluoro-2-nitrophenol	32, lgr									110 11	Me eth, 52, lgr
14	3-Bromophenol	33	236		108				52 4	b p 149 ⁴⁰	86	Aryloxyacetic acid, 108, <i>p</i> -Phenylazobenzoate, 125-6
15	3-Chlorophenol	33	214		158	99	156				71	Aryloxyacetic acid, 110, 2,4-Dinitrophenyl ether, 75, <i>p</i> -Phenylazobenzoate, 127-8
16	2-Bromo-4-chlorophenol	33-4	123 ¹⁰								99-100	Aryloxyacetic acid, 139-40

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
17	4-Methylphenol (<i>p</i> -Cresol)	36	202	115	146	98	188.6 (cor), al	<i>di</i> 49, <i>tetra</i> 198-9, al	69-70, al		70	<i>p</i> -Phenylazobenzoate, 134.5-6.5, N,N-Diphenylurethane, 94, <i>p</i> -Xenylurethane, 198
18	2,4-Dibromophenol	36, 40	238-9			183.5		<i>6-mono</i> 95-6	120	36	97.5	Aryloxyacetic acid, 153, 2,4-Dinitrophenyl ether, 135, Me eth, 61.3, <i>b p</i> 272, Et eth, 53.5
19	4-Methyl-2-nitrophenol (2-Nitro- <i>p</i> -cresol)	36.5, yel, w-al	125 ²²				192				100-1	Me eth, 8.5, <i>pa yel</i> , <i>b p</i> 274, Et eth, <i>b p</i> 275.85 d
20	4-Chlorophenol	37, 43	217	148.5	166	171	186	<i>2-mono</i> 33.4, <i>2,6-di</i> 90	71	7.8	88	Aryloxyacetic acid, 156, 2,4-Dinitrophenyl ether, 126, <i>p</i> -Phenylazobenzoate, 153-4, N,N-Diphenylurethane, 97
21	2,4-Diethylphenol	37-8	219	170.1								Aryloxyacetic acid, 67-8
22	3-Fluoro-2-nitrophenol	39, lgr									114	Me eth, 43.5, lgr
23	2,6-Dichloro-4-methylphenol (2,6-Dichloro- <i>p</i> -cresol)	39, 42	120-5 ¹¹							48	9	NH ₄ salt, 125, Me eth, <i>b p</i> 234
24	3-Ethoxyphenol (Resorcinol monoethyl ether)	40	246-7, <i>pa yel</i> , 254-8			183.5					97.5	2,4-Dinitrophenyl ether, 114-5, Picrate, 105-6, red, chl
25	3-Iodophenol	40		138		133	183		60-1	38, pet eth	72-3, pet eth	Aryloxyacetic acid, 115
26	2-Benzoylphenol (2-Hydroxybenzophenone)	41				124						<i>p</i> -Nitrobenzyl ether, 124.5, acet, Phenylhydrazone, 155, Semicarbazone, 250-1, Oxime, 141.3
27	3-Methyl-2-nitrophenol (2-Nitro- <i>m</i> -cresol)	41, yel, pet eth								59, al	79, al	Me eth, 54, yel, al
28	Phenol	41.8, 42	182, 183	126, bz	132.3, lgr	127, bz	145.8 (cor), al	<i>tri</i> 95	95.6, al		69	Aryloxybenzoic acid, 99, <i>p</i> -Phenylazobenzoate, 148-50, <i>p</i> -Xenylurethane, 173, N,N-Diphenylurethane, 105
29	3-Fluoro-4-nitrophenol	42, w or lgr	173 ¹²								118	Me eth, 56.5
30	Phenyl salicylate (Salol, Phenyl 2-hydroxybenzoate)	42, 38.8, 28.5 (three forms)		111-2, bz, 242		111				99.5	81	N,N-Diphenylurethane, 144

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
31	2-Iodophenol	43	186-7 ¹⁶⁰	122						98 101	34, pet eth	D ⁸⁰ 1 8757 Aryloxyacetic acid, 135 <i>p</i> -Phenylazobenzoate 126 8 2,4 Dinitrophenyl ether, 95
32	5-Bromo-2-nitrophenol	44 yel								74 5		Me eth, 85 5 Et eth, 79 5 80 5, al
33	2,4-Dichlorophenol	45	210				142-3	68	125		97	Aryloxyacetic acid, 141, 135, β -Naphthylurethane, 166, 2,4-Dinitrophenyl ether, 119
34	2-Nitrophenol	45, yel, al	216		113	141	155	<i>di</i> 117	83	40 1, lgr	59	D ¹⁰ 1 2942, Aryloxyacetic acid, 158, 2,4-Dinitrophenyl ether, 142, N,N-Diphenylurethane, 114, <i>p</i> -Phenylazobenzoate, 136 5 7 0
35	5-Chloro-2-hydroxybiphenyl	46									88	
36	2-Chloro-5-methylphenol (6-Chloro- <i>m</i> -cresol)	46	196						96	<i>b p</i> 122-3 ¹¹	31 40	Benzenesulfonate, 99
37	4-Bromo-5-isopropyl-2-methylphenol	46, lgr				53 4						Me eth, <i>b p</i> 147 50 ¹⁵
38	2-tert-Butyl-5-methylphenol (6- <i>tert</i> -Butyl- <i>m</i> -cresol)	46-7	127 ¹¹							<i>b p</i> 139 ¹⁷		Me eth, 22, <i>b p</i> 225 7
39	3-Chlorocatechol (3-Chloro-1,2-dihydroxybenzene)	46-8, 48 50	110 11 ¹¹								110-11	2-Me eth, 31 5 3 0
40	4-Ethylphenol (4-Hydroxyethylbenzene)	47	219	120	128	80 1	132-3				59 60, al	n ²⁵ 1 5239, D ²⁰ 1 0123 Aryloxyacetic acid, 97, <i>p</i> -Phenylazobenzoate, 117-8
41	3-Methyl-2,4,6-trichlorophenol (2,4,6-Trichloro- <i>m</i> -cresol)	47, w	265						92 3	35, 32, eth	53	
42	4-Chloro-2-methylphenol (4-Chloro- <i>o</i> -cresol)	48	222-5								71	Aryloxyacetic acid, 115 7, Me eth, <i>b p</i> 213 5
43	2,6-Dibromo-4-methylphenol (2,6-Dibromo- <i>p</i> -cresol)	49, 54				141 2				67	94 5	
44	Thymol (2-Isopropyl-5-methylphenol)	49 7, 51 5, acet	233 5	107, aq al	160, lgr	70	103 2, al	55	71	<i>b p</i> 242 3	33	Aryloxyacetic acid, 149, 2,4-Dinitrophenyl ether, 67, <i>p</i> -Xenylurethane, 194, <i>p</i> -Phenylazobenzoate, 85 6

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
45	2-Hydroxy-4-methoxyacetophenone (Peonol)	52-3, al								46-5		n ²⁰ _D 1.54322, D ²⁰ _D 1.310, <i>m</i> -Nitrobenzoate, 109, <i>p</i> -Nitrophenylhydrazone, 238-9, ac a
46	2-Benzylphenol (2-Hydroxydiphenylmethane) (stable form)	52-54, labile 21-2	312	117-5-80, lgr								Benzyl eth, 38, me al
47	2-Chloro-3-methylphenol (2-Chloro-<i>m</i>-cresol)	55-6-49-50	194						96		55-6	Benzenesulfonate, 58
48	4-Methoxyphenol (Hydroquinone monomethyl ether)	56-55	243-4							32	87, al	Aryloxyacetic acid, 110-2
49	3-Methyl-6-nitrophenol (6-Nitro-<i>m</i>-cresol)	56, yel, bz								48, al	77	Me eth, 62, Et eth, 55, pet eth, 50-1
50	3-Bromo-4-methylphenol (3-Bromo-<i>p</i>-cresol)	56	245								75	Me eth, b p 103-5 ¹⁰
51	2-Phenylphenol (2-Hydroxybiphenyl)	56, 67-5 (cor)	275						64-6, dil al	62-5-3 pet eth	75-6	<i>p</i> Phenylazobenzoate, 141-4, 2,4-Dinitrophenyl ether, 113-4
52	2,6-Dibromophenol	56-7	162 ²¹					93-3		46	68	Me eth, 13, b p 143-5 ³⁴ , Et eth, 40-6
53	4-<i>n</i>-Caproylresorcinol	56-7, tol-pet eth	343-5 d			89-91 pa yel, al						
54	2-Bromo-4-methylphenol (2-Bromo-<i>p</i>-cresol)	56-7	213-4, 102-4 ²⁰						121	b p 120 ⁴		D ²⁰ _D 1.547
55	5-Bromo-3-methylphenol (5-Bromo-<i>m</i>-cresol)	56-7, 54								83		Me eth, b p 139-40 ²⁰ , Picrate, 130
56	2-Cyclohexylphenol	56-7										4,6-Dinitro deriv, 106, al, 2,4-Dinitrophenyl ether 76-7
57	2,3-Dichlorophenol	56-7	206					di 90				Me eth, 31
58	4,6-Dibromo-2-methylphenol (4,6-Dibromo-<i>o</i>-cresol)	57				136-7					62	
59	3-Hydroxy-6-nitrobiphenyl	57-8, bz				135	171					2,4-Dinitrophenyl ether, 131-4-Nitro deriv, 176-8
60	2,3,6-Trichlorophenol	58, pet eth									90, al	
61	2,6-Dichloro-3-methylphenol (2,6-Dichloro-<i>m</i>-cresol)	58	234						100-1, al		78-0, 8-5, al	
62	2,5-Dichlorophenol	58-9, pet eth	212								69	
63	4-Propylcatechol (1,2-Dihydroxy-4-propylbenzene)	60, bz	175-80 ³⁰									3-Me eth, b p 240-2, Di-me eth, b p 247
64	1,2-Dihydroxynaphthalene (1,2-Naphthalenediol)	60 (hyd), 103-4 (anh)									di 106	
65	4-Isopropylphenol	61	223-5								71-2	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous	
66	5,6,7,8-Tetrahydro-2-naphthol	61.5-2.5	275 ⁷⁰⁵			113, 106.5				b p 158 ¹⁴	96	N,N-Diphenylurethane, 114, Cinnamate, 77.5	
67	2,3,5-Trichlorophenol	62 (hyg.)									103, lgr	Me eth, 84, al	
68	2-Methyl-3,5,6-trichlorophenol (3,5,6-Trichloro- <i>o</i> -cresol)	62, ac a									110, al		
69	3,4-Dimethylphenol (<i>o</i> -4-Xylenol)	62.5, w	225 ⁷⁵⁷	120, dil al	141.2, lgr		181.6 (cor), al	<i>tri</i> 171		22	58.5	Aryloxyacetic acid, 162.5. 2,4-Dinitrophenyl ether 105-6. <i>p</i> -Xenylurethane, 183, al. Picrate, 83.8, yel. Me eth, 204.5. <i>p</i> -Phenylazobenzoate, 104-7.	
70	2,6-Dinitrophenol	63-4									135	Picrate, 122, Me eth, 118.	
71	4-Bromo-3-methylphenol (4-Bromo- <i>m</i> -cresol)	63.5, pet eth	118-23 ⁷								84.5	83.5. Benzenesulfonate, 79-80, Me eth, b p 108.5 ¹² .	
72	4-Bromo-2-methylphenol (4-Bromo- <i>o</i> -cresol)	64	235 (subl.)							b p 132 ¹²	67.8	Et eth, b p 238-40.	
73	1-Acetyl-2-naphthol	64, lgr									85.6, pyr		
74	4-Bromophenol	64, 66.4	238	140	169	180	191	<i>tri</i> 171		22	58.5	Aryloxyacetic acid, 157, 2,4-Dinitrophenyl ether, 141, N,N-Diphenylurethane, 99, <i>p</i> -Phenylazobenzoate, 167.5-8.5.	
75	2-Methyl-1-naphthol	64-5									81.2	94-5. Picrate, 133-4.	
76	4-Methylcatechol (3,4-Dihydroxytoluene)	65, bz	252	<i>di</i> 166							<i>di</i> b p 260-4	58. Diaryloxyacetic acid, 58, <i>Di</i> - <i>p</i> -xenylurethane, 193.	
77	3-Bromo-2-nitrophenol	65-7, pet eth (anh), 35 (hyd), w									136.5-7.5, al	133. Me eth, 73.	
78	4-Chloro-3-methylphenol (4-Chloro- <i>m</i> -cresol)	66, 55	235			153-4					98	86. 2,4-Dinitrophenyl ether, 112, Benzenesulfonate, 66.	
79	4-Hydroxy-3-nitrobiphenyl	66									85-6, lgr	111. Me eth, 91-2.	
80	4-Methyl-2,3,5-trichlorophenol (2,3,5-Trichloro- <i>p</i> -cresol)	66-7, ac a									37-8, w-ac a	89, w-al.	
81	2,6-Dichlorophenol	67	219-20, 80-5 ⁴									74.0-4.5	Me eth, b p 105-6 ²⁰ .
82	3,5-Dimethylphenol (<i>m</i> -5-Xylenol)	68	219.5 (subl.)	148, 151		109	195.4 (cor), al	<i>tri</i> 166	83, ac a	b p 130 ²⁶	24	Aryloxyacetic acid, 111, 81, 2,4-Dinitrophenyl ether, 100, <i>p</i> -Phenylazobenzoate, 104.5-6.5, <i>p</i> -Xenylurethane, 150.	
83	2-Bromo-6-nitrophenol	68, yel									39.5-40	Me eth, 67.	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	α Naphthyl urethane	<i>p</i> -Nitro benzoate	3,5 Di-nitro benzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous	
84	3-Methylcatechol (2,3-Dihydroxytoluene)	68, bz										2-Me eth, 39, b p 204, Di-Me eth, b p 202-3	
85	3,5-Dichlorophenol	68	233					<i>tri</i> 189	116	38	55	Me eth, 35, ac a, Et eth, 41-2, ac a	
86	2,6-Di-iodophenol	68								107, ac a			
87	2,4,5-Trichlorophenol	68, pet eth									92 3, al	Aryloxyacetic acid, 157, Me eth, 77-5, al	
88	5,6,7,8-Tetrahydro-1-naphthol	68 5-9 0, 74-5	264 5-5 0							73 5	46	Me eth, b p 124 ¹⁰ , Et eth, b p 259 ⁷⁰⁵	
89	2-Bromo-4,6-dichlorophenol	68 9	268 d						82-3			2,4-Dinitrophenyl ether, 140-1	
90	2-Bromo-4-methyl-6-nitrophenol (2-Bromo-6-nitro- <i>p</i> -cresol)	69, yel							128	110-11			
91	2,4,6-Trichlorophenol	69 5, ac a, 68	245			105 6					b p 261-2	75 5, al	Aryloxyacetic acid, 182 6, 2,4-Dinitrophenyl ether, 136, N,N-Diphenylurethane, 143, Me eth, 61-2, al, Et eth, 43-4
92	2,4,6-Trimethylphenol	70, 69	220	141-2 lgr				<i>di</i> 158				62, pet eth	Aryloxyacetic acid, 142
93	2,3,4,6-Tetrachlorophenol	70	150 ¹⁵							65 6		108	Me eth, 64-5, Et eth, 55, Benzene-sulfonate, 127
94	1-Chloro-2-naphthol	70, lgr, 72									42 3	99 100	Me eth, 70-1, Et eth, 58
95	Methyl 3-hydroxybenzoate	70	280	115-6, bz									
96	2-Methyl-6-nitrophenol (6-Nitro- <i>o</i> -cresol)	70, w -al							66, al			42, al	Me eth, 30, pet eth, Et eth, b p 249 50, yel
97	3-Propylcatechol (1,2-Dihydroxy-3-propylbenzene)	70-2, pet eth											3-Me eth, b p 144-6 ²⁵ , Di-Me eth, b p 134-7 ²²
98	2,4,5-Trimethylphenol (Pseudocumenol)	71	232	110				35		34 0-4 5, pet eth	63, al		Aryloxyacetic acid, 132, <i>p</i> -Xenylurethane, 196
99	4,6-Dichloro-3-methylphenol (4,6-Dichloro- <i>m</i> -cresol)	72	235-6, 110 ¹⁸						104-5, al			57 5, al	n ^o 1 5722, Benzenesulfonate, 86, al
100	2,4-Di-iodophenol	72, w							165-7 (cor)	70-1, w -al		98	Me eth, 68, w -al, Et eth, 46, me al, 51
101	2-Chloro-4,5-dimethylphenol	72										43	
102	3,5-Dimethylcatechol (4,5-Dihydroxy- <i>m</i> -xylene)	73-4, w								<i>di</i> 161, ac a			4-Me eth, b p 227-8

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenylurethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5 Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
103	5-Chloro-2-methylphenol (5-Chloro- <i>o</i> -cresol)	73.4	225					tri 190	110		53.4	Me eth, b p 206-8, Et eth, b p 210.20
104	2,5-Dibromophenol	73.4							110			
105	3-Iodo-2-nitrophenol	73.5, w								102.5		Me eth, 83-4
106	Ethyl 3-hydroxybenzoate	73.8, bz	295.282							35	58, al	
107	1,3-Dibromo-2-naphthol	75								102		
108	2,5-Dimethylphenol (<i>p</i> -2-Xylenol)	75, al -eth	212	160.1, bz, 162, 166	172.3 lgr	87	137.2 (cor)	tri 178			61	Aryloxyacetic acid, 118 <i>p</i> -Xenylurethane, 162, <i>p</i> -Phenylazobenzoate, 95.5-7.5, Picrate, 81-2, or, al
109	2,3-Dimethylphenol (<i>o</i> -3-Xylenol)	75, w -al		193.5								Aryloxyacetic acid, 187, <i>p</i> -Phenylazobenzoate, 134.6, Me eth, 29, b p 199, Et eth, 10, b p 212.5
110	8-Hydroxyquinoline (Oxine)	75.6, dil al	266.6 ⁷⁵²			174.5			115	b p 280	118.20, al	Picrate, 203.4, Methodide, 143 d (hyd)
111	4-(Dimethylamino)phenol	76							130	78		
112	3-Chloro-4-hydroxybiphenyl	76.7, 80									110.11, 95.7	2,4-Dinitrophenyl ether, 109-11
113	3-Bromo-2,6-dichlorophenol	76.5, lgr	264-70 ⁷⁵¹								102	Me eth, b p 260.5 ⁵⁰ Me eth 51.5, al
114	2-Methyl-4,5,6-trichlorophenol (4,5,6 Trichloro- <i>o</i> -cresol)	77, pet eth								45, w -me al		
115	2-Bromo-4-methyl-3-nitrophenol (2-Bromo-3-nitro- <i>p</i> -cresol)	77, yel, w								81		Me eth, 74
116	3-(Diethylamino)phenol	78	276.80								22.3	Methylurethane, 85.6, Methodide, 140.3
117	3-Phenylphenol (3-Hydroxybiphenyl)	78, 75	>300						52.5		60.1, al	Et eth, 34
118	4-Bromo-2,6-dinitrophenol	78, yel							136, al	110.5, bz	154, al	Me eth, 88, Et eth, 66
119	4-Chloro-2-iodophenol	78		128						57	88, 84	
120	2,4-Diaminophenol (4-Hydroxy- <i>m</i> -phenylenediamine)	78.80 unstable										Me eth, 68, Et eth, 67.8, 4, N-Acetyl, 249, N, N'-Diacetyl, 220-2, O, N, N'-Triacetyl, 180.2, N, N'-Dibenzoyl, 253-4, Picrate, 120 d, yel
121	4-Methyl-3-nitrophenol (3-Nitro- <i>p</i> -cresol)	79, yel, eth							91			Me eth, 17, b p 266.7
122	2,3,4,6-Tetramethylphenol (Isodurenenol)	79.81	230.50	178.9, wh, w -al							71-2, wh, w -al	
123	2-Bromo-4,5-dimethylphenol	80, pet eth									51	Me eth, b p 86 ³ , <i>o</i> -Nitrobenzoate, 151-2

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Phenyl urethane	α Naphthyl urethane	<i>p</i> -Nitrobenzoate	3,5-Di nitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
124	5-Bromo-2-methylphenol (5-Bromo- <i>o</i> -cresol)	80									41	
125	4-Iodo-2-nitrophenol	80 1									102 3	Me eth , 98, Et eth , 80
126	4-Hydroxy-3-methoxybenzaldehyde (Vanillin)	81	285	116 7					115	102	78	Aryloxyacetic acid, 187 2,4-Dinitrophenyl ether, 131, 2,4-Dinitrophenylhydrazone, 271 d
127	3,5-Dibromophenol	81								53	77	Me eth , 140
128	4-Chloro-2,6-dinitrophenol	81								110 11		Me eth , 66 Et eth , 54 5
129	4-Methyl-2-naphthol	81 2								117 8		
130	5-Chloro-2,3-dimethylphenol	81 2									88, al	
131	3-Methyl-2,4,6-tribromophenol (2,4,6-Tribromo- <i>m</i> -cresol)	81 5-2 0, al							113 4, al	68, al	84 5 al	<i>p</i> -Phenylazobenzoate, 130-2
132	2-Hydroxy-1-naphthaldehyde	82	192 ²							87, al <i>tri</i> 124, al		Me eth , 84 Et eth , 115, Oxime 157, Picrate, 120
133	3,4-Di-iodophenol	83									123	
134	2-Hydroxazobenzene (2-Benzeneazophenol)	83								-20	93 pet eth	Me eth , 41, Et eth , 44 Cu deriv , 225 6, al
135	5-Propylresorcinol (1,3-Dihydroxy-5-propylbenzene, Divaninol)	83 4, bz , (anh), 51, w								<i>di</i> 12-5		Di-Me eth , b p 147 ²⁹
136	2,3,4-Trichlorophenol	83 5, lgr									141, al	Me eth , 69 5, al
137	4-Benzylphenol (4-Hydroxydiphenylmethane)	84	321, 308								<i>mono</i> 87, pet	2,4-Dinitrophenyl ether, 75 6, Benzyl eth , 49 5, al
138	4-Chloro-2,3-dimethylphenol	84									102	
139	2,4-Dimethyl-1-naphthol	84 5	169 70 ¹⁰	174 5								Me eth , b p 150-1 ¹² , Picrate 143 4, dk red
140	4-Methyl-1-naphthol	84 5									81	
141	1-Bromo-2-naphthol	85							56			Me eth , 85
142	3-Bromo-2-naphthol	85							94			Me eth , 77-8
143	2-Nitroresorcinol (1,3-Dihydroxy-2-nitrobenzene)	85, or -red, w -al							<i>di</i> 63			Di-Me eth , 131, yel , al Di-Et eth , 106 7
144	3-(Dimethylamino)phenol (3-Hydroxydimethyl aniline)	85	265-8, 138 ¹⁰						36 5, b p 160 ⁵		94	Picrate, 162, Methylurethane, 87, Ethylurethane, 150, 99 100, Me eth , b p 237, Et eth , b p 247
145	3-Hydroxy-2-nitrobiphenyl	85-6, bz , 81 2, yel , al								61 5 2 5	131 0 2 5	Benzenesulfonate, 130-1, 4-Nitro deriv , 126 7, 6-Nitro deriv , 214, 4,6-Dinitro deriv , 168 70
146	2-Hydroxybenzyl alcohol (Saligenin)	86 7, w									<i>di</i> 51, 70% al	Aryloxyacetic acid, 120, w

* Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
147	4,6-Dinitro-2-methylphenol (4,6-Dinitro- <i>o</i> -cresol)	86.5								95-6	135, 132	
148	3-Nitrocatechol (1,2-Dihydroxy-3-nitrobenzene)	86.5, yel, pet eth								<i>di</i> b p 103-4 ¹	2-mono 66	1-Me eth, 62, yel, 2-Me eth, 102-3, Di-Me eth, 64-5, al
149	4-Chloro-2-nitrophenol	86-7								47.8		Me eth, 98 Et eth, 61-2
150	2,4,5-Tribromophenol	87, CH ₂ Cl ₂ , pet eth									99	Me eth, 105, <i>o</i> -Br- <i>p</i> -toluenesulfonate, 107.8, al
151	4-Bromocatechol (4-Bromo-1,2-dihydroxybenzene)	87									<i>di</i> 111	1-Me eth, 65
152	4-(Methylamino)phenol	87, bz							135, bz - lgr	43, pet eth	173-4, 50% al	Aryloxyacetic acid, 213.4, Me eth, 37
153	2-Methyl-3,4,5-tribromophenol (3,4,5-Tribromo- <i>o</i> -cresol)	89, pet										
154	2-Amino-6-methylphenol (6-Amino- <i>o</i> -cresol)	89, w							89, 90	78-9		N-Acetyl, 100.1
155	N-Benzylidene-2-aminophenol	89								93-6		Et eth, b p 215-6 ²⁰
156	3-Nitro-2,4,6-tribromophenol	89-90, lgr							146-7, al			Me eth, 82, al, Et eth, 79, eth
157	2-Amino-6-chloro-4-methylphenol (2-Amino-6-chloro- <i>p</i> -cresol)	89-90										N,O-Diacetyl, 162.3
158	1,3-Dimethyl-2-naphthol	89-90		197					85.6			Picrate, 132-3
159	2-Propylhydroquinone (1,4-Dihydroxy-2-propylbenzene)	90, bz										Di-Me eth, b p 240-6
160	4-Chlorocatechol (4-Chloro-1,2-dihydroxybenzene)	90-1	136 ^{8,5}							<i>di</i> b p 145-7 ⁷	<i>di</i> 96-7, eth	Di-Me eth, b p 242.4
161	3-Chloro-4,6-dimethylphenol	90-1										
162	2-Methyl-3,4,6-tribromophenol (3,4,6-Tribromo- <i>o</i> -cresol)	91, pet								76-7, ac a	85, 133, bz	Me eth, 71, al
163	5-Chloro-2,4-dinitrophenol	92								69		Me eth, 105, Et eth, 112, 6-Nitro deriv, 113.5
164	4-Chloro-2,6-dibromophenol	92							107-8			2,4-Dinitrophenyl ether, 145-6 Me eth, 74
165	4-Bromo-2-nitrophenol	92, 89								75		Me eth, 88 Et eth, 47, Benzene-sulfonate, 83-4
166	4- <i>tert</i> -Amylphenol	92-3	260-5	108					55		61	
167	4-Hydroxyphenylethyl alcohol (Tyrosol)	93, chl	310, 156 ¹⁵							β -mono 59, eth - lgr <i>di</i> b p 187 ¹⁸	<i>di</i> 111, al	4-Et eth, 40

*Derivative data given in order: m.p., crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
168	4-Iodophenol	93 4, w		148, bz					99, me al	32	119	Aryloxyacetic acid 156, N,N-Di-phenylurethane 127, 2,4-Dinitrophenyl ether, 156
169	1-Naphthol (α -Naphthol)	94	278-80	177-8, al	152, lgr	143, 140	217 4 (cor), yel, al	2,4-di 105	89	48-9, al	56, al	Aryloxyacetic acid, 193 5, <i>p</i> -Xenylurethane, 190 2,4-Dinitrophenyl ether, 128, <i>p</i> -Phenylazo-benzoate, 118-9
170	2-Iodo-4-nitrophenol	94, 86-7								68		Me eth, 97, Et eth, 96
171	2,4,6-Tribromophenol (Bromol)	95, HCOOH 94, ac a (+1 ac a)			153	153	174	tetra 120	113, al	82.87 ac a	81, al	Aryloxyacetic acid, 200, N,N-Di-phenylurethane, 153, 2,4-Dinitrophenyl ether, 137 8 <i>p</i> -Phenylazo-benzoate, 116-9
172	2,2'-Stilbenediol (2,2'-Dihydroxystilbene)	α 95, al, β 197, al										α di 107-8
173	6-Chloro-1-naphthol	95								47		Picrate, 165
174	3-Bromo-4-hydroxybiphenyl	95								74 5	93 4	Benzenesulfonate 102 3
175	1,3,6-Trihydroxynaphthalene (1,3,6-Naphthalenetriol)	95								iri 112-3		Me eth, 103-4
176	2,3,4-Tribromophenol	95, w - HCOOH										Me eth, 106
177	2,3,5-Trimethylphenol	95 6	233	174, pet eth						241	50, pet eth	
178	2-Naphthyl salicylate (Betol)	95 5, stable, 93 5, labile		268, yel, ac a						136, al		
179	3-Amino-2,4,6-trichlorophenol	95 5-6 0, lgr										N-Acetyl, 185 0
180	3-Acetylphenol (3-Hydroxyacetophenone)	96	296, 153 ^b							44 0-4 5	52-3	6 5, tol D ¹⁰⁰ 1 099, n _D ²⁰ 1 5348 Me eth b p 240, Semicarbazone, 194-6
181	5-Iodo-2-nitrophenol	96, yel, pet eth								95	122	Me eth, 92, Et eth, 86-7
182	2-Methoxy-5-propenylphenol	96, 92	147 ¹⁹							101		Et eth, 49 50
183	2-Methyl-4-nitrophenol (4-Nitro- <i>o</i> -cresol)	96, yel, bz, 30-40 (+1 H ₂ O), w	186 90						107, al		128	Me eth, 64, al, Et eth, 71, w -al
184	2-(Methylamino)phenol	96-7, 86 7, pet eth									157 9	N-Benzoyl, 160 1, Me eth, 33 0-3 5
185	3-Nitrophenol	97	194 ⁷⁰	129	167	174	159	di 91	112 3	55-6	95	D ¹⁰⁰ 1 2797, Aryloxybenzoic acid, 156, 2,4-Dinitrophenyl ether 136, <i>p</i> -Phenylazo-benzoate, 160 5-2 5

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Phenylurethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	Toluene sulfonate	Acetate	Benzoate	Miscellaneous
186	2,3-Dibromo-5,6-dimethylphenol	97, aq al								78, pet eth	153, al	
187	5-Methyl-1-naphthol	97-8									77 8	
188	3-Acetylcatechol (2,3-Dihydroxyacetophenone)	97-8, yel, w								di 109, bz		1-Me eth, 152 3 Di-Me eth, 48, Oxime 96 7 Semicarbazone, 166 7
189	2-Cyanophenol	98									106, pet eth 42, al	D ₁ ⁹⁹ 6 1 1052 n _α ⁹⁹ 6 1 53716
190	3-Chloro-4,5-dimethylphenol	98										
191	2,5-Di-iodophenol	99, pet eth								70, ac a		
192	4- <i>tert</i> -Butylphenol	100	237	148 5	110			50 di 64 7	109 10		81-2	Aryloxyacetic acid, 86 5, 2,4-Dinitrophenyl ether 108 10 Benzene-sulfonate 70 1
193	3,4,5-Trichlorophenol	101, lgr, 91	271 7 ⁷⁴⁶								120, al	Me eth, 130, b p 256 61, <i>m</i> -Nitrobenzenesulfonate, 176
194	3,5-Dibromo-2-methylphenol (3,5-Dibromo- <i>o</i> -cresol)	101 98 101									91-3	
195	4,6-Dinitro-3-methylphenol (4,6-Dinitro- <i>m</i> -cresol)	101 73 4							110 11		95	Me eth, 115 Et eth, 97
196	2-Acetyl-1-naphthol	102, pa grn, al, 98, br yel, bz	325, sl d							107 5, al	128, al	
197	2-Methyl-3,4,5-trinitrophenol (3,4,5-Trinitro- <i>o</i> -cresol)	102, or yel, acet										Me eth, 111 2, w-al
198	4-Methyl-2,3,6-tribromophenol (2,3,6-Tribromo- <i>p</i> -cresol)	102, pet								77, lgr		
199	1-Nitro-2-naphthol	103, yel, al								61, pet eth		<i>m</i> -Nitrobenzenesulfonate, 176, ac a, Et eth, 104-5, yel, al
200	3,3'-Dihydroxydiphenylmethane	103, yel, al								di 57 5 8 5, lgr		
201	4-Chloro-2-naphthol	104								56		
202	3,5-Di-iodophenol	104, w								79, me al	93	Me eth, 85, pet eth, Et eth, 30, me al
203	2-Bromo-4-methyl-5-nitrophenol (2-Bromo-5-nitro- <i>p</i> -cresol)	104, yel								121		Me eth, 94, yel, eth
204	3-Hydroxybenzaldehyde (3-Formylphenol)	104, 108 (cor)	240	158-60						b p 203	38, 48 5-9 0	Aryloxyacetic acid, 148, 2,4-Dinitrophenylhydrazone, 257 d, Semicarbazone, 198
205	5-Methyl-2-naphthol	104 5									107 8	Picrate, 156 7

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	α -Naphthyl urethane	p -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	p -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
206	3-Hydroxy-4-nitrobiphenyl	104 5, al				157	199					
207	Catechol (Pyrocatechol, 1,2-Dihydroxybenzene)	105	245 6	<i>di</i> 169	175	<i>mono</i> 159 <i>di</i> 169, al	<i>di</i> 152	<i>tetra</i> 192 3, wh - vlt	<i>mono</i> 57 8, <i>di</i> 65		<i>mono</i> 181, 131 <i>di</i> 84, al - eth	Aryloxyacetic acid 136 8 Monobenzenesulfonate monoacetate, 86 me al Dibenzene-sulfonate, 155-6, acet Me eth, 54-5, al <i>sym</i> -TNB add comp, 97, Picrate, 97, yel
208	2,4-Dibromo-1-naphthol	105, 111								92-3		Me eth, 54-5, al <i>sym</i> -TNB add comp, 97, Picrate, 97, yel
209	2,4-Dichloro-5-nitrophenol	105 6									111 2	<i>m</i> -Nitrobenzoate, 154, <i>o</i> -Nitro- <i>p</i> -toluenesulfonate, 143
210	Chlorohydroquinone	106							<i>mono</i> 62, <i>di</i> 72, 99			
211	4,6-Dinitro-2-iodophenol	106 7, w							149			
212	1,6-Dibromo-2-naphthol	106-7 (+1 ac a, 84)								113		Me eth, 102, Et eth, 94
213	2-Amino-5-chloro-4-methylphenol (2-Amino-5-chloro- <i>p</i> -cresol)	106-7								125		N-Acetyl, 115, aq al, Me eth, 106, lgr
214	4-Chlororesorcinol (4-Chloro-1,3-dihydroxybenzene)	106-7 89	259, 147 ¹⁸						<i>di</i> 46 7	<i>di</i> 66		3-Me eth, 79-80 Di-Me eth, b p 135 7 ¹⁷
215	2-Hydroxypyridine (α -Pyridone)	106 7, bz	280 1			120			158-9, 53	b p 150-60 ⁹ 99	42	Picrate, 176 7, Benzyleth, 42
216	2-Phenoxyphenol (2-Hydroxydiphenyl ether)	106 7	151 5 ¹¹							b p 358-60	48 5	Me eth, 79, lgr
217	5-Methylresorcinol (Orcinol, 3,5-Dihydroxytoluene)	106 5 8, 56 8 (+1 H ₂ O)	287-90	154	160, lgr	214	190	<i>tri</i> 104		<i>di</i> 25	<i>di</i> 88, al	Aryloxyacetic acid 217 <i>p</i> -Xenylurethane, 196 2,4-Dinitrophenyl ether, 153 4
218	6-Amino-4-chloro-2-methylphenol (6-Amino-4-chloro- <i>o</i> -cresol)	107								2,3- <i>di</i> 196		
219	2,4-Dichloro-1-naphthol	107-8								74-6		Me eth, 58
220	1,2-Dihydroxynaphthalene (1,2-Naphthalenediol, β -Naphthohydroquinone)	108, 105 5								<i>di</i> 104-6, 109, ac a	<i>di</i> 106	Diaryloxyacetic acid, 104 6, 1-Me eth, 90 5, Di-Me eth, 31
221	1,2,3,4-Tetrahydroanthranol	108, lgr								109, al	142	Me eth, b p 197 ¹⁴
222	4-Methyl-5,6,7,8-tetrahydro-2-naphthol	108				114 6					89	
223	4-Acetylphenol (4-Hydroxyacetophenone)	109								54		Semicarbazone, 199, 2,4-Dinitrophenylhydrazon 261 5 (cor), br, al
224	3-Methyl-2,4,6-trinitrophenol (2,4,6-Trinitro- <i>m</i> -cresol)	109 10, yel, al								135, pa yel, bz	140	Di-Me eth, 155, al, Di-Et eth, 36 7, w - al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α -Naphthyl urethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous	
225	2-Iodo-6-nitrophenol	109-10								96-7		Me eth, 96-7	
226	Resorcinol (1,3-Dihydroxybenzene)	110 (stable), 108.85 (labile)	280.8 (cor), 275.9	<i>di</i> 164, chl		<i>di</i> 182, 175	<i>di</i> 201	<i>tri</i> 112	<i>di</i> 80-1, acet-dil al	57-8, dil al	<i>mono</i> 135-6, <i>di</i> 117, dil al	Aryloxyacetic acid, 175, 195, 2,4-Dinitrophenyl ether, 194, N,N-Diphenylurethane, 194, Me eth, 43-4, me al	
227	2,2-Biphenol (2,2-Dihydroxybiphenyl)	110-109, tol	326	<i>di</i> 145, dil al				<i>di</i> 188	190	<i>di</i> 95, xyl	<i>di</i> 101, al	Di-Me eth, 155, al, Di-Et eth, 36-7, w-al	
228	Bromohydroquinone	110						<i>di</i> 186		<i>di</i> 72			
229	4-Hydroxy-2'-nitro-biphenyl	110, 1, 116								122	156-7	Aryloxyacetic acid, 160-1, Benzene-sulfonate, 106, yel, al, Me eth, 60-0.5, Et eth, 51, 5-nitro deriv, 151-2	
230	7-Methyl-1-naphthol	110-11								39-41		Picrate, 164-5	
231	1-Methyl-2-naphthol	111								66	116-7	Picrate, 163-4	
232	2-Chloro-4-nitrophenol	111, w								63		Me eth, 98, Et eth, 82, 142	
233	2-Amino-6-nitrophenol	111-2 aq al									2- <i>mono</i> 102-3 (hyd), 122 (anh)	Me eth, 198	
234	2,4,6-Tribromoresorcinol (1,3-Dihydroxy-2,4,6-tribromobenzene)	112, w									<i>mono</i> 114, CS ₂ , <i>di</i> 108	<i>mono</i> 120, chl-pet-eth	Me eth, 104, Di-Me eth, 68-9, w-al
235	4',5-Dimethyl-2-hydroxyazobenzene (2- <i>p</i> -Toluene-azo- <i>p</i> -cresol)	112-3, tol								91, yel, ac a	95, yel, al	Et eth, 43, ac a, Propionate, 62, lgr	
236	4-Hydroxyphenanthrene (4-Phenanthrol)	112-3.5, pet eth								58-9, al		Me eth, 68, me al	
237	2,2'-Dihydroxy-3,3'-dimethylbiphenyl	113, pet eth									<i>di</i> 147, me al		
238	2,6-Dinitro-4-iodophenol	113, w							138		175		
239	2-Chloro-4,6-dinitrophenol	113, 110							155				
240	4,4'-Dihydroxy-2,2'-dimethylbiphenyl	114								<i>di</i> 75	<i>di</i> 127		
241	2-Bromo-4-nitrophenol	114								62, 86	131-2	Me eth, 106, Et eth, 98, yel	
242	4-Nitrophenol	114		156	150-1	159	186, 188 (+1 ac a)	2,6- <i>di</i> 142	97	81-2, w-al	142-5	Aryloxyacetic acid, 187, 2,4-Dinitrophenyl ether, 120, N,N-Diphenylurethane, 112, <i>p</i> -Phenylazobenzoate, 203-6	
243	2,4-Dinitrophenol	114				139		6- <i>mono</i> 118	121	72	132	2,4-Dinitrophenyl ether, 248	
244	2,3,5-Tri-iodophenol	114, bz-lgr								123		Et eth, 121	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Di nitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
245	4-Hydroxy-3-methoxybenzyl alcohol	115								4-mono 51, di 48, bz lgr 130-1, aq al	4-mono 90, et ac-al, di 121 128-9	4-Et eth, 56 7
246	1-Hydroxyfluorenone	115, yel										Me eth, 141 5 2 5 Oxime, 169-70, Phenylhydrazone, 173-4
247	Ethyl 4-hydroxybenzoate	115, 116	297-8								94, eth	
248	4-Chloro-3,5-dimethylphenol	115-6								47 8		
249	3,5-Dimethyl-2,4-dinitrophenol	115-6, 106							171	148	156	
250	4-Bromo-1,5-dihydroxynaphthalene (4-Bromo-1,5-naphthalenediol)	116								di 138		Di-Me eth, 115
251	3-Benzoylphenol (3-Hy)	116 al										Oxime <i>anti</i> 76 bz <i>syn</i> 126 (on heating <i>anti</i>)
252	4-Hydroxybenzaldehyde	116-7									90	Aryloxyacetic acid 198, 2,4-Dinitrophenylhydrazone 270 1 Naphthalene add comp, 100
253	3-Bromo-1,2-dihydroxynaphthalene (3-Bromo-1,2-naphthalenediol)	117								di 160		
255	Phloroglucinol (1,3,5-Trihydroxybenzene)	117 (+2H ₂ O), 217-9 (anh)				283		tri 151		tri 104	tri 185	Picrate, 101-3
256	2,4'-Dihydroxydiphenylmethane	117-8, w-al								di 70, ac a	di 108	Di-Me eth, 26 Di-Et eth, 60, w-al
257	2,3,5,6-Tetramethylphenol (Durenol)	118, wh, pet	249					4-mono 118, or, di al				
258	4-Amino-2-methyl-6-nitrophenol (4-Amino-6-nitro- <i>o</i> -cresol)	118, al								4-mono 217, yel, al		
259	2,4-Dibromo-6-nitrophenol	118, ac a							140	89		Me eth, 76-7, yel, Et eth, 46
260	2-Methyl-5-nitrophenol (5-Nitro- <i>o</i> -cresol)	118, yel, lgr							123-4, al	74		Me eth, 74, al, Et eth, 61, al
261	2-Bromo-4,6-dinitrophenol	118-9, yel							157	104 5	94, aq al	Me eth, 48, yel
262	2-Bromo-5-nitrophenol	118 5-21, pet eth							131 5-2 5, al			Me eth, 104, al
263	2-Amino-4-methyl-6-nitrophenol (2-Amino-6-nitro- <i>p</i> -cresol)	119, 110, br, al										N-Acetyl, 143, yel al
264	3-Amino-2,4,6-tribromophenol	119, pet eth								146-7, al		O,N,N-Triacetyl, 136

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
265	2-Methylresorcinol (1,3-Dihydroxy-2-methylbenzene, 2,6-Dihydroxytoluene)	119 20, bz	271 (cor)								<i>di</i> 105-6, me al	Di-Me eth, 39
266	4-Acetylcatechol (3,4-Dihydroxyacetophenone)	119 2 7 116							<i>di</i> 144-5, et ac	4- <i>mono</i> 58, <i>di</i> 91, 88	<i>di</i> 118, al	Oxime, 184 d, et ac, 1-Me eth, 91, 2-Me eth, 115, Di-Me eth, 51
267	2-Chloro-5-nitrophenol	119 5, w								82	127-8	Me eth, 83, Et eth, 64 5, al
268	5-Methyl-1,2,3-trihydroxybenzene (3,4,5-Trihydroxytoluene, 5-Methylpyrogallol)	120 (subl), bz								<i>tri</i> 99		3,5-Di-Me eth, 36, al
269	9-Hydroxyanthracene (9-Anthrol, Anthranol)	120, yel								126 31	286 8	
270	6-Bromo-2-methyl-4-nitrophenol (6-Bromo-4-nitro- <i>o</i> -cresol)	120 d, yel, lgr								137		
271	2,2'-Dihydroxy-4,4'-dimethylbiphenyl	120									<i>di</i> 148, al-acet	
272	4-Nitro-2-naphthol	120, yel, pet eth							122, pa yel, al			<i>m</i> -Nitrobenzenesulfonate, 149, ac a, Me eth, 100-3, br, bz-al
273	4-Chloro-1-naphthol	120 1, 116 7, al or chl								44		Picrate, 171, Carbonate, 228
274	2-Chloro-3-nitrophenol	120 5, w								51 5	94	Me eth, 94, Et eth, 51, me al
275	4-Chloro-3,5-dibromophenol	121									132	Me eth, 82 5
276	3,4-Dimethyl-1-naphthol	121 5 3 0, lgr	205 10 ¹⁵				222 4			89 5 91		Turns red in air, Picrate, 168
277	3-Aminophenol (3-Hydroxyaniline)	122				143	179					N-Acetyl, 148, N- <i>p</i> -Toluenesulfonyl, 157, N-Phenylthiourea, 156
278	2-Amino-3-chlorophenol	122										N-Acetyl, 123, N-Benzoyl, 123, HNO ₃ salt, 137
279	4-Bromo-2-naphthol	122								61		Me eth, 64
280	4-Nitroresorcinol (1,3-Dihydroxy-4-nitrobenzene)	122, yel, CCl ₄	178-9 ¹¹							<i>di</i> 90-1, al	1- <i>mono</i> 124, ac a, 3- <i>mono</i> 189, ac a, <i>di</i> 110	Di-Et eth, 85
281	2,4,6-Trinitrophenol (Picric acid)	122 (subl on slow htng, exp on rapid htng)								76		Naphthalene add comp, 149-51

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α -Naphthyl urethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
282	3-Hydroxyphenanthrene (3-Phenanthrol)	122 3, al								114 5, aq al		Me eth , 63, me al , Et eth , 46, me al , Picrate, 124-5, red, al
283	2,4-Dichloro-6-nitrophenol	122 3								77		3-Nitrobenzoate, 149-50
284	2-Naphthol (β -Naphthol)	123	286	155-6, al	156 7, lgr	169	210 2 (cor), al	84	125, al	71 2 70	106-7	Aryloxyacetic acid, 95, 2,4-Dinitrophenyl ether, 95, N,N-Diphenylurethane, 141, <i>p</i> -Phenylazobenzoate, 190 3
285	2,3,4,5-Tetrabromophenol	123, aq al						225 6		110 5, aq ac a	133, al	
286	2,4-Dimethyl-2-methoxyphenol	123							137 8	114		Et eth , 91
287	2-Nitro-4,5,6-tribromophenol	123, yel , bz										Me eth , 109, al , Et eth , 74
288	1,4-Dichloro-2-naphthol	123 4								90 1		
289	4-Butyl-2-methylphenol (4-Butyl- <i>o</i> -cresol)	124	127 9 ¹⁵							268 70		
290	3,3'-Biphenol (3,3'-Dihydroxybiphenyl)	124, w								<i>di</i> 82 5, <i>dil</i> al	<i>di</i> 92	Di-Me eth , 36, w - al , b p 328
291	1,3-Dihydroxynaphthalene (1,3-Naphthalenediol)	124, w								<i>di</i> 56, w -ac a		<i>sym</i> -Trinitrobenzene add comp , 174 5, red
292	3-Iodo-4-nitrophenol	124, yel , pet eth								73 7	119	Me eth , 69-70
293	2-Methylhydroquinone (2,5-Dihydroxytoluene)	124 5, bz						84	125	<i>mono</i> 92, pet eth , <i>di</i> 49, 45, w	<i>di</i> 119-20	Aryloxyacetic acid, 153, Di-Et eth , 24 5, b p 247-9
294	4-Hydroxybenzyl alcohol (α ,4-Dihydroxytoluene)	124 5 5 5								α - <i>mono</i> 84, <i>di</i> 75	α - <i>mono</i> 88 9	
295	4,6-Dimethylresorcinol (4,6-Dihydroxy- <i>m</i> -xylene)	124 5-5 0, w (+1 w)	276 9							<i>di</i> 45, al , b p 285-7		Di-Me eth , 76, Di-Et eth , 75, al
296	4-Benzyl-1-naphthol	125-6								87-8	103	
297	Pentamethylphenol	126	267	215						273	127	Me eth , 163 4
298	3,5-Dinitrophenol	126, 122								126 7		Me eth , 105-6, Et eth , 97
299	7-Chloro-2-naphthol	126 5								104 5		
300	4-Chloro-3-nitrophenol	126 5 w								83 5	96-7	Me eth , 98, al , Et eth , 47 5, al
301	2-Nitro-3,4,6-tribromophenol	127, pa yel , w - HCOOH								118		Me eth , 72, w - HCOOH
302	2-Nitro-1-naphthol	127-8, yel , al								118		Me eth , 80, Et eth , 84, yel , lgr
303	1,3-Dibromo-2,4-dihydroxynaphthalene (1,3-Dibromo-2,4-naphthalenediol)	128 9, ac a						186, CS ₂		4- <i>mono</i> 148, <i>di</i> 125, al		

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α Naphthyl urethane	<i>p</i> Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
304	4-Iodo-2-naphthol	128.5								59		Me eth, 67
305	4-Bromo-1-naphthol	129								51		
306	3-Methyl-4-nitrophenol (4-Nitro- <i>m</i> -cresol)	129, w								34, al	74	Me eth, 55, lgr, Et eth, 45, al
307	3-Hydroxypyridine (β -Pyridone)	129								b p 210, 92°	50-0 0.5	Hydrochloride, 105-7, Picrate, 200-1
308	4-Hydroxy-3-nitroazobenzene	129, lgr								120.5, ac a	132, bz	Me eth, 107
309	3-Amino-2-methylphenol (3-Amino- <i>o</i> -cresol)	129, w								108		Turns br in air
310	6-Bromo-2-naphthol	129.30								103		Me eth, 108
311	8-Nitro-1-naphthol	130										<i>m</i> -Nitrobenzenesulfonate, 166, ac a
312	4-Amino-2-nitrophenol	131, dk red										Me eth, 243, Et eth, 170, N-Acetyl, 157-8, yel
313	Methyl 4-hydroxybenzoate	131		134-5, bz						85	135	
314	5-Methyl-1,2,4-trihydroxybenzene (2,4,5-Trihydroxytoluene)	131.2, bz								<i>tri</i> 114.5, al		4-Me eth, 124, w, 4-Et eth, 131 (subl), bz, Trimethyl, 55, w-me al
315	5-Chloro-1-naphthol	131.2, w or CS ₂								53		Picrate, 160
316	4-Cyclohexylphenol	132		145.5		137, al	168 (cor)			35	118.5, me al	
317	Pyrogallol (1,2,3-Trihydroxybenzene)	133	309	<i>tri</i> 173		<i>tri</i> 230	<i>tri</i> 205	<i>di</i> 158		<i>di</i> 110-11, <i>tri</i> 165, 173	<i>mono</i> 140, <i>di</i> 108, <i>tri</i> 90, al	Tris-N,N-Diphenylurethane, 212
318	2-Amino-4,6-dimethylphenol	134-5, al										N-Acetyl, 96, aq al, O,N-Dibenzoyl, 153.5 Me eth, b p 239-40
319	4-Amino-5-isopropyl-2-methyl-6-nitrophenol (4-Amino-5-isopropyl-6-nitro- <i>o</i> -cresol)	134.5 yel, al									1- <i>mono</i> 280-3, <i>di</i> 222.5, bz	
320	4,6-Dibromo-2-naphthol	134-5								128	128.9	Me eth, 103, Et eth, 98
321	2,3-Dichloro-1,4-dihydroxynaphthalene	135, 155-6, aq al								<i>di</i> 239-40	<i>di</i> 252	Di-Me eth, 107-8, Dipropionate, 166-7, Dibutyrate, 128
322	4-Benzoylphenol (4-Hydroxybenzophenone)	135								81, me al	115, 94-5	2,4-Dinitrophenylhydrazone, 242.4 (cor), Semicarbazone, 194

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α Naphthyl urethane	<i>p</i> -Nitro benzoate	3,5 Di nitro benzoate	Bromo derivative	<i>p</i> Toluene sul fonate	Acetate	Benzoate	Miscellaneous
323	2-Amino-4-methylphenol (2-Amino <i>p</i> -cresol)	135, w										N-Benzoyl, 191, al . O,N-Dibenzoyl, 190-1, al . O,N-Diacetyl, 128-9, Me eth , 93-4, pet eth
324	3-Amino-4,6-dichlorophenol	135-6 w							113-4			N-Acetyl, 233-6, Me eth , 51
325	2,6-Dinitrohydroquinone	135 6 (anh)								4-mono 95-6, di 135-6 77-8	4-mono 150 1	4-Me eth , 102, Di-Me eth , 95-6 112
326	1,4-Dimethyl-2-naphthol	135 6										
327	Trichlorohydroquinone	136, w								di 153 (subl)		Di-Et eth , 68 5, al
328	5-Iodo-3-nitrophenol	136, w								110	100 5	Me eth , 84
329	Trichlorophloroglucinol	136, al								tri 167 8, ac a		Di-Me eth , 93-5 Tri-Me eth , 130-1, al
330	1,6-Dihydroxynaphthalene (1,6-Naphthalenediol)	137-8, bz								di 73, al	di 103-4	Di-Me eth , 60-1 pet eth , Di-Et eth , 83, lgr , 2-Naphthylamine add comp , 110 5
331	2,4-Dinitro-1-naphthol	138									174	Me eth , 97, Et eth , 92
332	4-Amino-2,6-dimethylphenol	138 d , bz										N-Acetyl, 136-7, aq al , O,N-Diacetyl, 160, Me eth , 66, w
333	2-Amino-3-bromophenol	138							120-1, al			Me eth , 65, Hydrochloride, 225
334	2-Amino-4-chlorophenol	138 (unstable)							115	73-4		N-Acetyl, 185, O,N-Dibenzoyl, 157-8, Me eth , 82-3
335	1,4,6-Trihydroxynaphthalene (1,4,6-Naphthalenetriol)	138-40								94 5		
336	2,6-Dibromo-3,4,5-trihydroxybenzoic acid (Dibromogallic acid)	139 d (+1H ₂ O)								tri 168	tri 95-6	Triacetate of Me eth , 150-2
337	2-Hydroxy-2'-nitro-biphenyl	139-40				116	180	3,5-di 149	100		116	3-Nitrobenzenesulfonate, 161, 4-Nitrobenzenesulfonate, 147, 2,4-Dinitrophenyl ether, 118, Me eth , 82, 3,5-Dinitro deriv , 123
338	4-Phenyl-1-naphthol	140									73-4	
339	1,3-Dihydroxy-2-methylnaphthalene (2-Methyl-1,3-naphthalenediol)	140								118		
340	1,2,4-Trihydroxybenzene	140-5, eth								tri 96-7, wh , abs al	tri 120, al	Tri-Et eth , 34, al , Picrate, 96
341	2-Amino-5-iodophenol	141										N- <i>p</i> -Toluenesulfonyl, 175-6

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	α -Naphthyl urethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
342	4-Hydroxy-2-nitro-biphenyl	141-3								169	105.6	Me eth, 72
343	1,8-Dihydroxynaphthalene (1,8-Naphthalenediol)	142, ac a, 140, w								<i>di</i> 155 ac anh	<i>di</i> 174.5	Di-Me eth, 50, pet eth Picrate, 135.7. 2-Naphthylamine add comp, 124
344	2-Amino-4-nitrophenol	142.3 (anh), 80-90 (hyd)				122			122, yel, al			N-Acetyl, 279, N-Benzoyl, ca 200 d, Me eth 124.5 Et eth, 97.8
345	3,4-Dihydroxyphenanthrene (Morphol)	143, pet eth								<i>di</i> 159, eth		Me eth, 62.3, Di-Me eth, 45, me al
346	3-Chloro-1-naphthol	143, 134.5, lgr								69, lgr	118.9	Me eth, b p 162-4 ¹⁸
347	2-Isopropyl-5-methylhydroquinone (Thymoquinol)	143, 139.5	290	232.3, al	147.8, al					<i>di</i> 73.5	141.2, al	
348	2,6-Dibromo-4-nitrophenol	144							128.9	181		
349	3,4,5-Tribromocatechol	144 (+1H ₂ O)								<i>di</i> 120		Di-Me eth, 86-7
350	3-Amino-4-methylphenol (3-Amino- <i>p</i> -cresol)	144										N-Acetyl, 178. O,N-Diacetyl, 128.9 N-Benzenesulfonyl, 183, Me eth, 47, w
351	8-Nitro-2-naphthol	144-5, yel								101-2, w-al		<i>m</i> -Nitrobenzenesulfonate, 144-6, ac a, Me eth, 69, Et eth, 72-3, yel, pet eth
352	4-Benzoylresorcinol (2,4-Dihydroxybenzophenone)	144.6								<i>di</i> 78		
353	1-Hydroxyacenaphthene (1-Acenaphthenol)	144.5-5.5 (cor), 148		137						b p 166-8 ⁵		
354	4-Amino-2,3,6-trinitrophenol	145 d, ac a										N-Acetyl, 178-9, N-Benzoyl, 205, ac a, Me eth, 138-9, al
355	4-Benzoylcatechol (3,4-Dihydroxybenzophenone)	145, 134									<i>di</i> 95	Me eth, 131-2, Di-Me eth, 103.4
356	3-Bromo-5-nitrophenol	145								99		Me eth, 88
357	3,4-Dihydroxybiphenyl (4-Phenylcatechol)	145								<i>di</i> 77.5 80		
358	2,4,6-Tri-iodoresorcinol	145, CS ₂								<i>di</i> 170		
359	2,4'-Dihydroxychalcone	145								<i>di</i> 94.5	<i>di</i> 120	4'-Me eth, 148 d, al
360	2,6-Diamino-4-methylphenol (4-Hydroxy-3,5-toluenediamine)	146										N,N'-Diacetyl, 225-7, dil al, 1,2,6-Triacetyl, 128, al
361	5-Aminoresorcinol (3,5-Dihydroxyaniline)	146-52										N-Benzoyl, 139, Di-Me eth, 46, Picrate, 167-70 d, yel, aq al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
362	4-Acetylresorcinol (Resacetophenone, 2,4-Dihydroxyacetophenone)	147								3-mono 119 20, 4-mono 74, di 38	3-mono 67, 4-mono 106 7	Semicarbazone, 216, 2,4-Dinitrophenylhydrazone, 218, Oxime, 199, Phenylhydrazone, 159
363	3-Chloro-5-nitrophenol	147								84	78	Me eth, 101, Et eth, 47, al
364	5-Nitro-2-naphthol	147, yel, w										<i>m</i> -Nitrobenzenesulfonate, 106, ac a, Et eth, 115, yel, al
365	2-Methyl-3-nitrophenol (3-Nitro- <i>o</i> -cresol)	147, yel, w							94, al			Me eth, 52 3, w-me al
366	2-Chloro-4-hydroxybenzaldehyde	147 8								52	97	Semicarbazone, 214, Oxime, 194, <i>p</i> -Nitrophenylhydrazone, 288 d
367	1,5-Dibromo-4,8-dihydroxynaphthalene	147 5									di 131	
368	5-Acetylresorcinol (3,5-Dihydroxyacetophenone)	148									di 91 2	Semicarbazone, 205 6 <i>p</i> -Nitrophenylhydrazone, 236 7
369	2,4-Dinitroresorcinol	148							mono 126-7	di 119 20	di 182 4	Aryloxyacetic acid, 155, Me eth, 108, Di-Et eth, 57
370	4-Propionylphenol (4-Hydroxypropiophenone)	148								62, lgr	107 5	2,4-Dinitrophenylhydrazone, 229
371	9,10-Dihydroxyphenanthrene (9,10-Phenanthrenediol)	148								mono 168 70, di 202	di 216 7	
372	3,4,5-Trihydroxyphenanthrene (3,4,5-Phenanthrenetriol)	148, w								tri 138, bz - pet eth		Tri-me eth, 90, me al
373	4-Hydroxypyridine (γ -Pyridone)	148 5 (anh), 65 (+1 H ₂ O)	>350							140 50	81	Picrate, 240, Methiodide, 108 9
374	3-Nitrosalicylic acid	148 5-9 0										Amide, 155, 145
375	3-Acetamidophenol (3-Hydroxyacetamide)	148 9, w								99 5 100 5		
376	2-Amino-3,6-dimethylphenol	149 50, bz										N-Benzoyl, 210-11, O,N-Dibenzoyl, 178-9
377	2,6-Dimethylhydroquinone	149-51, xyl										4-Me eth, 77, pet eth
378	2,4'-Dihydroxybenzophenone	150								84 5		
379	5-Amino-2-bromophenol	150 d							135 6			
380	2-Amino-5-bromophenol	150										O,N-Dibenzoyl, 133 4, H ₂ SO ₄ salt, 239 40
381	1-Hydroxyanthracene (1-Anthrol)	150-3, br, al								128-30		Me eth, 70, Et eth, 69
382	2-Amino-4-chloro-6-nitrophenol	152										N-Acetyl, 150 60, yel

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	α Naphthylurethane	p -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	p Toluene sulfonate	Acetate	Benzoate	Miscellaneous
383	4-Hydroxyazobenzene (4-Benzeneazophenol)	152, al								89, 84 5, yel, al	136-8, yel, al	Hydrochloride, 169 HNO ₃ → 2,4-Dinitrophenol, 113 Propionate, 75, red
384	Tribromophloroglucinol	152.3 (anh), w								mono 169, bz-pet eth, tri 181.3, al		Me eth, 123, bz Tri-Me eth 145, al Di-Et eth, 63.5, w-ac a, Tri-Et eth, 102.4, ac a
385	4-Amino-2-chlorophenol	153							116-7, aq al			N-Acetyl, 144 O,N-Diacetyl, 124 Me eth, 62
386	2,2'-Dihydroxy-5,5'-dimethylbiphenyl	153-4, w								di 88		Di-formate, 61, 70% al
387	2-Amino-5-chlorophenol	154, aq al										O,N-Dibenzoyl, 140, al Me eth, 46, Hydrochloride 226 d
388	1,2,4-Trihydroxynaphthalene (1,2,4-Naphthalenetriol)	154								tri 134.5		
389	6-Hydroxybiphenyl-2-carboxylic acid	154 (anh)							177, ac a	88-9, al	121, 150	Benzenesulfonate, 104-5 Butyrate, 59-60
390	4-Amino-3-nitrophenol	154, dk red							134, al	185		N-Acetyl, 218, yel, w O,N-Diacetyl, 146, O-m-nitrobenzenesulfonate, 184
391	2-Azoxyphenol (2,2'-Dihydroxyazoxybenzene)	154.5								di 150, bz al	di 108 al	Di-Me eth 81 Di-Et eth, 102
392	3,5-Stilbenediol (3,5-Dihydroxystilbene, Pinosylvyn)	155.5-6.0, ac a								di 100-i me al	di 150.1 ac a me al	Me eth, 122-3, ac a Di-Me eth, 56.7 me al
393	1-Hydroxyphenanthrene (1-Phenanthrol)	156, eth								135-6, al		Me eth, 105, me al, Picrate 182, or -red, me al
394	4-Iodo-3-nitrophenol	156, yel, al								107.5		Me eth, 62, Et eth, 63.5
395	1,4,5-Trichloro-2-naphthol	157-8, ac a								129		
396	9-Hydroxyphenanthrene (9-Phenanthrol)	158, bz, 153								77-8, al	99-100	Me eth, 95-6, me al, Picrate, 185, red, Propionate, 95, ac a
397	5-Nitroresorcinol	158, w								di 105		Me eth, 141-2, yel, Di-Me eth, 89, eth-et ac, Et eth, 80, w
398	4,4'-Dihydroxydiphenylmethane	158, w								di 69-70, al	di 156, al	Di-Me eth, 52, Di-Et eth, 38-9
399	2,4,6-Tri-iodophenol	158-9, w - al					181			156, bz	137	Me eth, 98-9, bz Et eth, 83, eth

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
400	Salicylic acid (2-Hydroxybenzoic acid)	158.3	211 ²⁰			205, me al				135, wh	132	Aryloxyacetic acid, 191, Amide, 142, Anilide, 136, <i>p</i> -Toluidide, 156
401	4-Amino-2,3,6-trichlorophenol	159, al								153, yel		N-2,4-Dinitrophenyl, 211, or-red
402	4-Amino-3-chlorophenol	160										N-Acetyl, 121
403	6-Amino-2,4-dinitro-3-methylphenol (6-Amino-2,4-dinitro- <i>m</i> -cresol)	160, al										N-Acetyl, 225, yel
404	2,2'-Dihydroxychalcone	160-1								<i>di</i> 85.5-60	<i>di</i> 114	2-Me eth, 112, al 2-Et eth, 61, al
405	4-Amino-6-nitroresorcinol	160-1 d, eth-lgr										N-Acetyl, 261, yel, ac a, Di-Me eth 136.7, red aq al
406	4,4'-Dihydroxy-3,3'-dimethylbiphenyl	160-1								<i>di</i> 131, al, 135.5	185, ac a	
407	2,3-Dihydroxynaphthalene (2,3-Naphthalenediol)	160.1, w									<i>di</i> 235	Me eth, 108, Di-Me eth, 116.5, lgr, Et eth, 109-10, Di-Et eth, 96-7, 2-Naphthylamine add comp 168
408	1,2-Dihydroxyanthracene (1,2-Anthracenediol)	160-2								<i>di</i> 157.0-75, al-ac a		
409	6-Retenol (6-Hydroxyretene)	161, xyl							110.5-11	134-5		Picrate, 152-2.5, red, al
410	5-Amino-2-methylphenol (5-Amino- <i>o</i> -cresol)	161, w							111-2, aq al			N-Acetyl, 225, N,N-Diacetyl, 132-3, O,N-Dibenzoyl, 162, Me eth, 58
411	4,4'-Dihydroxytriphenylmethane	161, w-al								<i>di</i> 109-10		Di-Me eth, 100.1, chl-me al
412	3-Hydroxyphthalic acid	161 d								114-6	148	
413	1,2,3,4-Tetrahydroxybenzene (Apionol, Phenetrol)	161, pink, et ac								<i>tetra</i> 142	<i>tetra</i> 191.2	1,4-Di-Me eth, 106, Tetra-Me eth, 89
414	5-Amino-2-nitrophenol	162, or-yel, w										N-Acetyl, 221, yel, ac a, O,N-Diacetyl, 149, w
415	1,3,4-Trichloro-2-naphthol	162								133.5-40, ac a		
416	2-Amino-5-methylphenol (6-Amino- <i>m</i> -cresol)	162 d										N-Benzoyl, 169, acet-pet eth, O,N-Dibenzoyl, 162.3, me al, Me eth, 171, 50% al O,O,N-Triacetyl, 155-6, bz
417	1-Amino-2,4-dihydroxynaphthalene	162 (at 130 → vlt)										

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
418	2,4'-Biphenol (2,4'-Dihydroxybiphenyl)	162 3	342							<i>di</i> 94, <i>al</i>		Di-Me eth, 70
419	2,5-Dimethylresorcinol (2,6-Dihydroxy- <i>p</i> -xylene)	163, bz	277 80							<i>di</i> 69, <i>al</i>		Me eth, 118-21, bz
420	2-Amino-3,5-dimethylphenol	163, bz								186 7		O,N-Diacetyl, 87-8, N-Benzoyl, 211 2, <i>al</i> O,N-Dibenzoyl, 148-9, <i>me al</i> , Hydrochloride, 270 80, <i>dil</i> HCl
421	4-Nitro-1-naphthol	164, w										<i>m</i> -Nitrobenzenesulfonate, 135, Me eth, 81, <i>yel</i> , bz 85-6, Et eth, 120, <i>al</i> , 116 7
422	3,5-Dinitrocatechol (1,2-Dihydroxy-3,5-dinitrobenzene)	164								120, <i>di</i> 112 4, 124, <i>al</i>		1-Me eth, 123, 2-Me eth, 80 Di-Me eth, 102, <i>al</i> , 1-Et eth, 155, <i>al</i> , Di-Et eth, 78 94 5
423	2,2'-Dihydroxy-6,6'-dimethylbiphenyl	164								<i>di</i> 87, <i>al</i>	<i>di</i> 136, <i>al</i>	
424	2-Amino-3,4-dihydroxynaphthalene	164								<i>di</i> >200 <i>d</i>		N-Acetyl, 170 <i>d</i> , 3-O,N-Diacetyl, 195 <i>d</i> , <i>acet</i>
425	2,6-Dibromohydroquinone	164								<i>di</i> 117		
426	2-Benzoylphloroglucinol (2,4,6-Trihydroxybenzophenone)	165									<i>tri</i> 125-6	2,4-Di-Me eth, 83, 2,6-Di-Me eth, 178-9
427	5-Amino-3-nitrophenol	165, <i>yel</i>										N-Acetyl, 260-70, <i>et ac</i>
428	2-Methoxy-4-nitrophenol	165 <i>d</i> , <i>yel</i> , <i>chl</i>								156-8	188, <i>yel</i> , <i>al</i>	Me eth, 105 6
429	3-Amino-4,5-dimethylphenol	165, <i>eth</i> , <i>br</i> , (173-5, <i>subl</i>)										N-Acetyl, 191 (<i>sinters</i> , 184), O,N-Diacetyl, 157, <i>al</i> , O,N,N-Triacetyl, 100-1, <i>al</i> , N-Benzoyl, 195-6
430	1,2,3,5-Tetrahydroxybenzene	165									<i>tri</i> 74	1,3-Di-Me eth, 159, 83, 1,2,3-Tri-Et eth, 105
431	4-Phenylphenol (4-Hydroxybiphenyl)	165	305 8	167 5					177, <i>ac a</i> , 179, <i>al</i> - <i>acet</i>	88-9, 87-8, <i>al</i>	150-1, <i>al</i>	<i>p</i> -Phenylazobenzoate, 213 5-4 0, 2,4-Dinitrophenyl ether, 118
432	4-Amino-2-bromophenol	165, 155										N-Benzoyl, 145, O,N-Dibenzoyl, 192
433	Benzeneazocatechol (3,4-Dihydroxyazobenzene)	165 <i>d</i> , <i>dk</i> <i>red</i> , <i>al</i>										3-Me eth, 70-1, <i>red</i> , <i>lgr</i> , Di-Me eth, 53-4, <i>red</i> , <i>lgr</i> , 44-5
434	4-Amino-2-chloro-3-nitrophenol	165 5 <i>d</i> , <i>bz</i>										N-Acetyl, 184-5, Et eth, 74, or

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α -Naphthyl urethane	<i>p</i> -Nitro benzoate	3,5-Di nitro-benzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
435	4-Amino-2,5-dinitrophenol	166-7, al										N-Acetyl, 144-5, Me eth, 153, bz - lgr, red, Et eth, 139
436	4-Amino-2,6-dinitro-3-methylphenol (4-Amino-2,6-dinitro- <i>m</i> -cresol)	167, red, 50% al										N-Acetyl, 231 d, ac a, Et eth, 96 7, Hydrochloride, 200 d, dil, HCl
437	2-Benzamidophenol (2-Hydroxybenzanilide)	167 d							109-10, al	134 40, al		Me eth, 60
439	2,3,4-Trichloro-1-naphthol	168, lgr								123-4		
440	2-Hydroxyphenanthrene (2-Phenanthrol)	168, al								142-3	139-40, al	Et eth, 112, al, Picrate, 156, red
441	1,5-Di-(2-hydroxyphenyl)-1,4-pentadiene-3-one	168								<i>di</i> 128, al	135, al	al, Di-Et eth, 89, al
442	3,5-Diaminophenol	168-70										3,5-Diacetyl, 195
443	4-Acetamidophenol (4-Hydroxyacetanilide)	169								150-1		
444	2-Amino-4,6-dinitrophenol (Picramic acid)	169, dk red, al										N-Acetyl, 201, N-Benzoyl, 230, 220, N- <i>p</i> -Toluene-sulfonyl, 191
445	4-Amino-2-chloro-5-nitrophenol	169 5 d										N-Acetyl, 166, yel, Et eth, 128 5, or
446	3,3'-Dihydroxybenzophenone	170								89-90	101-2	
447	1,4-Dihydroxy-2-methylnaphthalene (2-Methyl-1,4-naphthohydroquinone)	α 170, β 60, ac a								<i>di</i> 113, al	181	
448	4-Amino-2,6-dinitrophenol (Isopicramic acid)	170, br, w										N-Acetyl, 182, N-Benzoyl, 263, 250, Me eth, 212, Et eth, 172
449	Benzeneazoresorcinol (2,4-Dihydroxyazobenzene)	170, dk red								<i>di</i> 104, or-red, al		Di-Me eth, 92, red, al, Di-Et eth, 70 yel-red, al
450	3,4-Diaminophenol	170 2, 167 8, unstable										N,N'-Diacetyl, 205-7, 3,4-Dibenzoyl, 203 5, 1,3,4-Tribenzoyl, 225, Et eth, 71 2 b p 294-6
451	5-Nitro-1-naphthol	171, dk yel-red, w								114, w-al	109, me al	Me eth, 96-7, yel pet eth
452	Hydroquinone (1,4-Dihydroxybenzene)	171, 172	286	<i>di</i> 224, 205 7	<i>di</i> 258, al	<i>di</i> 317	<i>di</i> 186	<i>mono</i> 98-9, bz, <i>di</i> 159, 25% al	<i>di</i> 123, w	<i>di</i> 199, 204 (cor), tol		Aryloxyacetic acid, 250, 2,4-Dinitrophenyl ether, 243-6, N,N-Diphenylurethane, 250

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α Naphthyl urethane	<i>p</i> -Nitrobenzoate	3,5-Di nitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
453	2-Azophenol (2,2'-Dihydroxyazobenzene)	172, yel, bz								<i>di</i> 150, or -red		Di-Me eth, 153, or, Di-Et eth, 131, red
454	2,3,4-Trihydroxyacetophenone (Gallacetophenone)	173 192 0-2 5								2,4- <i>di</i> 107-8, 3,4- <i>di</i> 78-81, <i>tri</i> 85		Semicarbazone, 225 d, Oxime, 162-3, Picrate, 133
455	3,5-Dinitrosalicylic acid	173-4 (anh)									163	Amide, 181, Anilide, 180 (subl), 194
456	2-Aminophenol (2-Hydroxyaniline)	174									175	N-Acetyl, 209, 201, N-Benzenesulfonyl, 141, N- <i>p</i> -Toluenesulfonyl, 146
457	3-Benzamidophenol (3-Hydroxybenzamide)	174, tol									153	Et eth, 103
458	4-Amino-2-methylphenol (4-Amino <i>o</i> -cresol)	175, bz							109-10, bz - lgr			N-Acetyl, 179, O,N-Dibenzoyl, 194, ac a, Me eth, 59 0-9 5, 92-3, aq al
459	1,6,7-Trihydroxynaphthalene (1,6,7-Naphthalenetriol)	175								<i>tri</i> 143 4		
460	4-Nitrocatechol	176, yel, w								<i>di</i> 98	<i>di</i> 156, al	Di-Me eth, 96, w-al, Di-Et eth, 73 5, pa yel
461	1,4-Dihydroxynaphthalene (1,4-Naphthalenediol, 1,4-Naphthohydroquinone)	176, 192								<i>di</i> 128 30, al	<i>di</i> 169, ac a	Me eth, 131, Di-Me eth, 85, CS ₂
462	1,7-Dihydroxynaphthalene (1,7-Naphthalenediol)	178, bz		203 4		182-3				<i>di</i> 108, bz	<i>di</i> 101 5, 113-5	Di-Et eth, 67
463	1,2-Dihydroxyphenanthrene (1,2-Phenanthrenediol)	178, w -al								<i>di</i> 147, me al		Di-Me eth, 100 2, lgr
464	4-Amino-6-isopropyl-3-methylphenol (4-Amino-6-isopropyl- <i>m</i> -cresol)	178-9, bz										N-Benzoyl, 178-9, O,N-Dibenzoyl, 166-7, aq al, Hydrochloride, 255
465	1,8,9-Trihydroxyanthracene (1,8,9-Anthracenetriol, Anthralin)	178 80, 176 7								<i>tri</i> 209 10		
466	4-Amino-3-methylphenol (4-Amino- <i>m</i> -cresol)	179, 50% al									92, pet eth	N-Acetyl, 138, Hydrochloride, 215, Me eth, 29-30
467	2,5-Dihydroxyphenanthrene (2,5-Phenanthrenediol)	180, xyl								<i>di</i> 144, w -ac a		Di-Me eth, 117, ac a
468	9,10-Dihydroxyanthracene (9,10-Anthradiol)	180, yel								<i>di</i> 260, ac a	<i>di</i> 292, yel xyl - chl	Di-Me eth, 202, bz, Di-Et eth, 148, bl fluor, al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
469	1,2,5,8-Tetrahydroxynaphthalene (1,2,5,8-Naphthalenetetrol)	180 d								<i>tetra</i> 202		
470	4-Hydroxy-3-iodo-5-methoxybenzaldehyde (5-Iodovanillin)	180								105-6	135 5-6 5	Oxime, 178 9 Semicarbazone, 187 8 d
471	6-Nitro-1-naphthol	181 2								121		
472	4-Amino-3,5-dimethylphenol	181 2, chl										N-Acetyl, 178 80 N-Benzyl, 104 5, Me eth, 43, pet eth
473	2-Amino-4-nitroresorcinol	182, br, aq al										N-Acetyl, 213, yel
474	3-Azoxyphenol (3,3'-Dihydroxyazoxybenzene)	183								<i>di</i> 102, 50% al	<i>di</i> 75, ac a 144	Di-Me eth, 49 50, 47 6
475	N-Benzylidene-4-aminophenol	183								92		Me eth, 62, Et eth, 76 (71), Hydrochloride, 167-77
476	4-Aminophenol (4-Hydroxyaniline)	184 (subl)				178 5 (cor)				168		O,N-Diacetyl, 150, 2,4-Dinitrobenzoyl, 204 5 (cor), N- <i>p</i> -Toluenesulfonyl, 253
477	1,9-Dihydroxyphenanthrene (1,9-Phenanthrene-diol)	184 5, bz								<i>di</i> 154-5, w-al		9-Me eth, 131 2, bz-pet eth Di-Me eth, 113 4, me al
478	4,6-Diacetylresorcinol (Resodiacetophenone)	185, al								<i>di</i> 120	<i>mono</i> 214-5, <i>di</i> 118	Di-Me eth, 171 5, Dioxime, 242, Phenylhydrazone, 233
479	4-Amino-2-naphthol	185							137			O,N-Dibenzoyl, 309
480	7-Hydroxy-4-methylcoumarin (4-Methylumbelliferone)	185 6, al		155-6	143					150, al	159-60, al	Me eth, 159, <i>m</i> -Nitrobenzoate, 210-11, Picrate, 108
481	3-Amino-4-nitrophenol	185-6, or, w										N-Benzoyl, 166, Me eth, 131, Et eth, 105-6
482	1,2,6-Trihydroxynaphthalene (1,2,6-Naphthalenetriol)	188								<i>tri</i> 262		
483	α,2,4-Trihydroxyacetophenone (ω -Hydroxyresacetophenone)	189								<i>tr.</i> 129	α - <i>mono</i> 200	α -Me eth, 136, <i>p</i> -Nitrophenylhydrazone, 205 d, Oxime, 105-7
484	2,7-Dihydroxynaphthalene (2,7-Naphthalenediol)	190, 185-6, w							150, chl	<i>mono</i> 171-2, me al, <i>di</i> 136, w	<i>mono</i> 199, me al, <i>di</i> 139, al	Aryloxyacetic acid, 149, N,N-Diphenylurethane, 176, Me eth, 117 Di-Me eth, 139, Di-Et eth, 104, al
485	1,4,5,8-Tetrahydroxynaphthalene (1,4,5,8-Naphthalenetetrol)	190								<i>tetra</i> 277 9		

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α Naphthyl urethane	<i>p</i> -Nitro benzoate	3,5-Di nitro benzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
486	1,5-Diacetyl-2,3,4-tri-hydroxybenzene (4,6-Diacetylpyrogallol Gallodiacetophenone)	190 l, w								<i>mono</i> 207.9	<i>tri</i> 189	Tri-Me eth, 73-4
487	3,9-Dihydroxyacridine	190.2 lt br → dk in air al										9-Me-3-Et eth, 144, yel, w In al → grn fluor
488	Pentachlorophenol	190.2							145	149-50	164-5, 159	Aryloxyacetic acid, 196
489	5-Amino-2-naphthol	191										O,N-Diacetyl, 187, O,N-Dibenzoyl, 223
490	1,4-Dihydroxynaphthalene (1,4-Naphthalenediol)	192								<i>di</i> 128-30	<i>di</i> 169	
491	5-Amino-1-naphthol	192										O,N-Dibenzoyl, 276
492	Tetrabromocatechol	192-3								<i>di</i> 215-6	<i>di</i> 197-8, bz-lgr	Me eth, 151-2, 118-20
493	6-Hydroxyquinoline	193, al							98	36.8	230-1, ac a	Methodide, 236 d, Picrate, 235.6
494	3-Methyl-2,4,5,6-tetra-bromophenol (2,4,5,6-Tetrabromo- <i>m</i> -cresol)	194, ac a								165.6	153-4	Me eth, 145.6, al, Et eth, 108, eth
495	1,5-Dichloro-4,8-dihydroxynaphthalene	194, ac a								<i>4-mono</i> 148-60, ac a <i>di</i> 154, 143, acet	<i>4-mono</i> 157-8, ac a, <i>di</i> 179, acet	
496	1,6-Dinitro-2-naphthol	195 d							181			Me eth, 204, 198, Et eth, 144, yel, Alc NH ₃ at 160° → 1,6-dinitro-2-naphthylamine, 248, Oxid → 4-nitrophthalic acid, 165
497	5,6-Dihydroxyacenaphthene (5,6-Acenaphthenediol)	196-9, bz								<i>di</i> 194-5		
498	1,2,7-Trihydroxynaphthalene (1,2,7-Naphthalenetriol)	197								181-2		
499	4-Methyl-2,3,5,6-tetra-bromophenol (2,3,5,6-Tetrabromo- <i>p</i> -cresol)	199								156		
500	2-Hydroxyquinoline	199										2-Ph eth, 69
501	2-Amino-4-methyl-5-nitrophenol (2-Amino-5-nitro- <i>p</i> -cresol)	199-200 d										N-Acetyl, 242, ac a, Me eth, 132, yel
502	6-Amino-1-naphthol	199.5										O,N-Diacetyl, 130, N-Benzoyl, 203, O,N-Dibenzoyl, 230
503	Hexahydroxybenzene	200 d								<i>hexa</i> 203	<i>hexa</i> 313	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
504	Methylenedi-2-naphthol (2,2'-Dihydroxy-1,1'-dinaphthylmethane)	200, ac a										Di-Me eth , 144-7, al , Picrate, 178 9, red-br Aryloxyacetic acid, 206, Amide, 170, <i>p</i> -Bromophenacyl ester, 176
505	3-Hydroxybenzoic acid	200								<i>di</i> 214, al		
506	Methyl gallate (Methyl 3,4,5-trihydroxybenzoate)	200-1								<i>tri</i> 120, 120 2, al	<i>tri</i> 139, al	
507	3-Hydroxyquinoline	200-1, bz							90			Picrate, 240 5 N-Acetyl, 232, O,N-Diacetyl, 156, N-Benzoyl, 243-6, O,N-Dibenzoyl, 181 O,N-Diacetyl, 127 8
508	7-Amino-2-naphthol	201, 208									177	
509	4-Amino-3-methyl-2-nitrophenol (4-Amino-2-nitro- <i>m</i> -cresol)	201, al										
511	2-Acetamidophenol (2-Hydroxyacetanilide)	201 3, 209, aq al								122	140	O,N-Diacetyl, 77
512	2-Acetylhydroquinone (2,5-Dihydroxyacetophenone)	202								<i>di</i> 68	<i>di</i> 113	<i>p</i> -Nitrophenylhydrazone, 215-6, Oxime, 149-50
513	2,8-Dihydroxyphenanthrene (2,8-Phenanthrenediol)	202, w -al								<i>di</i> 125, al		
514	4-Hydroxy-4'-nitrobiphenyl	203, 200-1							159, bz	138 9, lgr	208-10, ac a	Me eth , 111, yel., al , 3,5-Dinitro deriv , 197-8
515	3,5-Dimethoxy-4-hydroxybenzoic acid	205								191	229-32	
516	4-Hydroxycoumarin (Benzotetronic acid)	206, 232 3								103		Me eth , 124, w
517	2,3,5-Trihydroxyacetophenone	206-7, yel , ac a								<i>tri</i> 106-7, lgr	<i>tri</i> 106-7	<i>p</i> -Nitrophenylhydrazone, 241-2 d , w -al
518	2,4,5-Trihydroxyacetophenone	206-7, red								2,4- <i>di</i> 165-6, bz		
519	6-Chloro-3-hydroxy-4-methylbenzoic acid	206-8									146	Amide, 239-40, Anilide, 222 O,N-Diacetyl, 178, O,N-Dibenzoyl, 208
520	8-Amino-2-naphthol	207 d										
521	3-Azophenol (3,3'-Dihydroxyazobenzene)	207, yel								<i>di</i> 144, yel , al	<i>di</i> 188, w -al	Di-Me eth , 73-4, Di-Et eth , 91, yel
522	2-Amino-5-nitrophenol	207-8, or , 201-2, w							188, yel , al			N-Acetyl, 271-2, O,N-Diacetyl, 187, Me eth , 139
523	2-Methyl-3,4,5,6-tetrabromophenol (3,4,5,6-Tetrabromo- <i>o</i> -cresol)	208								154		
524	2,6-Dichloro-3,4,5-tribromophenol	209									202	Me eth , 143-4

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α Naphthyl urethane	<i>p</i> Nitro benzoate	3,5-Di nitro benzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
525	4-Hydroxy-3-methoxybenzoic acid (Vanillic acid)	210 (subl)				140 l d				110, w	178, aq al	Hydrazide, 207, Phenylhydrazide, 150 2 5
526	4,4'-Dihydroxybenzophenone	210									156, 152	Me eth, 151-2, Di-Me eth, 146, 2,4-Dinitrophenylhydrazone, 190-2
527	<i>cis</i> -1,2-Dihydroxyacenaphthene (<i>cis</i> -Acenaphthylene glycol)	212 3, w								<i>mono</i> 122-3, al, <i>di</i> 130, me al		
528	4-Hydroxy-4'-nitroazobenzene	212 3 219 0-9 5								147, or	195, or	Me eth, 157 5 8 0
529	6-Amino-2-naphthol	213 d										O,N-Diacetyl, 220
530	2,4-Dihydroxybenzoic acid	213, 216 d										Amide, 222, Anilide, 126-7, <i>p</i> -Nitrophenyl ester, 189
531	Methylphloroglucinol (2,4,6-Trihydroxytoluene)	214-6, et ac								<i>tri</i> 76, lgr		2-Me eth, 91 (+H ₂ O), 117 9 (anh), 4-Me eth, 124, Tri-Me eth, 10 13, b p 140-2 ¹⁸
532	4-Hydroxybenzoic acid	215, 210								187	221-3	Aryloxyacetic acid, 278, Anilide, 198, <i>p</i> -Toluidide, 204
533	4,6-Dinitroresorcinol	215, yel				<i>di</i> 178			<i>mono</i> 135	<i>di</i> 139	<i>di</i> 343-4	Me eth, 113, Di-Me eth 157, Et eth, 77, Di-Et eth, 133
534	4-Chloro-2,3,5,6-tetrabromophenol	215									203	Me eth, 161
535	2,6-Dihydroxynaphthalene (2,6-Naphthalenediol)	215, 218								<i>di</i> 175	<i>di</i> 215	Di-Me eth, 50, bz, Di-Et eth, 162, al
536	1,2,4,5-Tetrahydroxybenzene	215-20								<i>tetra</i> 226-7		2-Me eth, triacetyl, 142, Tetra-Me eth, 103
537	4-Azophenol (4,4'-Dihydroxyazobenzene)	α 216, grn (anh), β 216, dk red (anh)								<i>di</i> 198-9, yel, ac a	<i>di</i> 210 5 1 5, 249-51, red-yel, bz	Di-Me eth, 160 5 2 5, me al, Di-Et eth, 157-9, yel, al, 160
538	2-Amino-3-nitrophenol	216 7, red							136			N-Acetyl, 172, Me eth, 75-6
539	4-Benzamidophenol (4-Hydroxybenzanilide)	216 7, 227								171	235	Me eth, 153-4, al, Et eth, 173, aq al, Benzyl eth, 226-7
540	2,5-Dimethylhydroquinone (Hydrophlorone)	217								<i>mono</i> 117, <i>di</i> 135	<i>mono</i> 162-3, pet eth, <i>di</i> 159, me al	Me eth, 90, lgr

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
541	Phloroglucinol (1,3,5 Trihydroxybenzene)	217 9, rapid htng . 200 9, slow htng		<i>tri</i> 190 1		283	<i>tri</i> 162	<i>tri</i> 151		<i>tri</i> 104 6, al	<i>tri</i> 173 4, al	Monobenzenesulfonate, 163 4 (anh) Monobenzenesulfonate, diacetate, 95 6, bz Dibenzenesulfonate, 120-1, bz, Dibenzenesulfonate monoacetate, 81 me al
542	2-Amino-3,5-dinitrophenol	218, yel, al							186			O,N-Di <i>p</i> -Toluene sulfonyl, 188 N Acetyl, 171 Me eth, 181
543	2,2'-Dihydroxy-1,1'-binaphthyl	218								<i>di</i> 109, al	<i>mono</i> 204, <i>di</i> 160	Dipicrate, 175 6, Di-Me eth, 190, Di-Et eth, 90
544	7-Hydroxybenzo [a]pyrene	218 9, yel								194 5, yel	191 2, yel	Me eth, 183 4, pyr <i>p</i> -Nitrobenzyl eth, 252-3
545	Acetylphloroglucinol (2,4,6-Trihydroxyacetophenone, Phloracetophenone)	219, w, 222								<i>tri</i> 103	2- <i>mono</i> 168, 4 <i>mono</i> 210-11, <i>tri</i> 117 8	2-Me eth, 205 7, 4-Me eth, 139 40, Tri-Me eth, 103 Tri-Et eth, 75, aq al
546	1,1'-Dihydroxy-2,2'-binaphthyl	220								<i>di</i> 169		Di-Me eth, 122, lgr
547	3,5-Dihydroxypyrene	220 d, ac a								<i>di</i> 155		Di-Me eth, 177-8
548	3,6-Dihydroxyphenanthrene (3,6-Phenanthrenediol)	221, w-al								<i>di</i> 124 5, al		3-Me eth, 135 6 w-me al Di-Me eth, 104-5, w-me al
549	2,3-Dimethylhydroquinone (3,6-Dihydroxy- <i>o</i> -xylene)	221, sl d, w								<i>mono</i> 174 5, acet-pet eth, <i>di</i> 182, acet-pet eth	184-6	Di-Et eth, 68 9
550	3-Hydroxy-2-naphthoic acid	222										Amide, 218, Anilide, 244 <i>p</i> -Toluidide, 222
551	4-Amino-6-chloro-3-methylphenol (4-Amino-6-chloro- <i>m</i> -cresol)	223-5 d										O,N-Diacetyl, 162 O,N-Dibenzoyl, 220
552	4-Azoxyphenol (4,4'-Dihydroxyazoxybenzene)	224 d								<i>di</i> 163, or, al	<i>mono</i> 200, al, 212, bz, <i>di</i> 187-90	Di-Me eth, 118-9 yel, Di-Et eth, 137-8

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> Toluene sulfonate	Acetate	Benzoate	Miscellaneous
553	5-Hydroxyquinoline	224							85			Hydrochloride, 240, Methiodide, 224, Picrate, 187
554	2-Amino-4-chloro-5-nitrophenol	225 d, yel										N-Acetyl 193 Me eth, 132
555	1,2,3,4-Tetrahydroxynaphthalene (1,2,3,4-Naphthalenetetrol)	225								<i>tetra</i> 220		
556	1,8-Dihydroxyanthracene (1,8-Anthracenediol, Chrysazol)	225, yel, al -w								<i>di</i> 184, et ac		Di-Me eth, 198, al, Di-Et eth, 139, al
557	4-Amino-6-nitrocatechol	228, yel										O,O,N-Triacetyl, 207, ac a
558	5-Hydroxycoumarin	229								88 9, 84		Me eth, 85 7
559	2-Hydroxy-5-nitrobenzoic acid	229 30										Amide, 225, Anilide, 224
560	Pentabromophenol	229 5, 225 6								197, 171		Me eth, 173 4, Et eth, 136
561	2,6-Dihydroxyphenanthrene (2,6-Phenanthrenediol)	234, w -al								<i>di</i> 122-3, al	<i>di</i> 252 3	Di-Me eth, 87, me al
562	3-Amino-2-naphthol	235										O,N-Diacetyl, 188, O,N-Dibenzoyl, 184
563	5-Hydroxy-1-naphthoic acid	235								202	241	
564	2,3-Dihydroxyacridine (2,3-Acridinediol)	235 d										Di-Me eth, 107, yel -wh, al
565	Tetrachlorohydroquinone	236 7								<i>di</i> 245	<i>di</i> 233	
566	7-Hydroxyquinoline	238-40, al, (br at 200)							116		88-9, al	Methiodide, 251 d, al, Picrate, 244-5
567	1,7-Dihydroxyanthrone (Euxanthone)	240								7-mono 160, al, <i>di</i> 185, bz	<i>di</i> 221 2, 214	7-Me eth, 130-5
568	1,6-Dihydroxypyrene (1,6-Pyrenediol)	240 d, sinters at 175										Sol red with grn fluor In alkali red soln with bl fluor, Zn dust → pyrene, 149-50
569	4-Amino-2,5-dimethylphenol	242 d, al										N-Acetyl, 177 9, al, Et eth, 69 5
570	3,8-Dihydroxyphenanthrene (3,8-Phenanthrenediol)	247, lt red, w -al								<i>di</i> 184, al		Di-Me eth, 117, me al
571	3-Hydroxy-1-naphthoic acid	248								169 70	222-3	Amide, 209-11, Anilide, 112-3
572	2,5-Dihydroxypyridine (2,5-Pyridinediol)	248								5-mono 156		Hydrochloride, 106 (hyd), 154 (anh)
573	1,4-Dihydroxyisoquinoline (1,4-Isoquinolinediol)	>250, ac a turns red at 200								4-mono 207-8		4-Me eth, 171, acet -pet eth
574	2,3-Dihydroxyquinoline (3-Hydroxycarbostyryl, 2,3-Quinolinediol)	257 8, >300								3-mono 211	3-mono 286 7, <i>di</i> 45 6, pet eth	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VII. ORGANIC DERIVATIVES OF PHENOLS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Phenyl urethane	α -Naphthylurethane	<i>p</i> -Nitrobenzoate	3,5-Dinitrobenzoate	Bromo derivative	<i>p</i> -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
575	1,5-Dihydroxynaphthalene (1,5-Naphthalenediol)	265, 258								<i>di</i> 159-61, dil al	<i>di</i> 235, 242, pyr	Di-Me eth, 183 4, Di-Et eth, 130, w-al, 2 Naphthylamine add comp, 229 5
576	2,7-Dihydroxyphenanthrene (2,7-Phenanthrenediol)	265, w-al								<i>di</i> 181 5, al		Di-Me eth, 169-70, me al
577	Phenolphthalein	265 (cor), 261		<i>di</i> 135, bz						<i>di</i> 143, al	<i>di</i> 169, bz-lgr	
578	1,5-Dihydroxyanthracene (Rufol, 1,5-Anthracenediol)	265 d, yel								<i>di</i> 198, et ac		Di-Me eth, 224, me al, Di-Et eth, 179, al
579	4,4'-Biphenol (4,4'-Dihydroxybiphenyl)	274 5, al						<i>di</i> 189 90, bz	<i>di</i> 161, dil al, 164 (cor)	<i>di</i> 241, ac a		Aryloxyacetic acid, 274, Di-Me eth, 173 (subl), Di-Et eth, 176
580	1-Amino-2-naphthol	276 d										O,N-Diacetyl, 206, O,N-Dibenzoyl, 235
581	2,7-Dihydroxyanthracene (2,7-Anthracenediol)	280-5 d, bz, turns dk at 250								282		Di-Me eth, 216 7, ac a, Di-Et eth, 192-3
582	2,3-Dihydroxyanthracene (2,3-Anthracenediol)	282 d, yel								<i>di</i> 175		Di-Me eth, 204, al
583	4,4'-Dihydroxystilbene (4,4'-Stilbenediol)	284, ac a								<i>di</i> 213		Di-Me eth, 214-5, Di-Et eth, 208
584	3,5'-Dimethoxy-5,7,4'-trihydroxyflavonol (Syringetin)	288 9, pa yel, ac a								<i>tetra</i> 224-6		4'-Benzyl eth, 240 1
585	2,7-Dihydroxy-4-methylquinoline	290-300, w-al (+ 1H ₂ O), turns br at 280								<i>7-mono</i> 250-4, al	<i>7-mono</i> 288, al	
586	2,6-Dihydroxyanthracene (Flavol 2,6-Anthracenediol)	295-300 d, al, turns dk at 270								<i>di</i> 260 1, ac a		Di-Me eth, 255-6, ac a, Di-Et eth, 230-1
587	Bi-α-naphthol (4,4'-Dihydroxy-1,1'-binaphthyl)	300, 250								<i>di</i> 217		Di-Me eth, 252, Di-Et eth, 211
588	2,8-Dihydroxyacridine (2,8-Acridinediol)	> 300, turns red at 275										Di-Me eth, 138-9, Di-Et eth, 142 3
589	2,6-Dibromo-1,5-dihydroxynaphthalene	> 300, 224 d turns dk at 200								<i>1-mono</i> 273, <i>di</i> 228	<i>di</i> 262, pyr	<i>1</i> -Acetate, 5-benzoate, 164, Di-Me eth, 161, Di-Et eth, 148
590	3,7-Dihydroxyacridine (3,7-Acridinediol)	324, pa yel, w-al										In al sol \rightarrow grn fluor
591	3,8-Dihydroxypyrene (3,8-Pyrenediol)	330, Tri-cl-bz-ph hydraz, turns dk at 280								<i>di</i> 224, ac a		Di-Me eth, 244, cl-bz

*Derivative data given in order m.p., crystal color, solvent from which crystallized

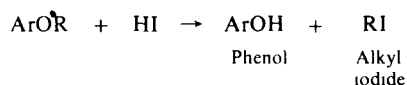
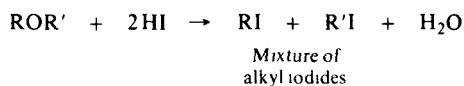
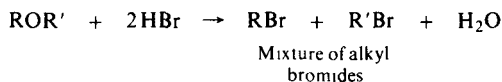
TABLE VII. ORGANIC DERIVATIVES OF PHENOLS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Phenyl urethane	α -Naphthyl urethane	p Nitro benzoate	3,5-Di nitro benzoate	Bromo derivative	p -Toluene sulfonate	Acetate	Benzoate	Miscellaneous
592	1,3-Dihydroxyacridone	370								<i>mono</i> 200, yel	<i>mono</i> 295.7	Me eth (i) 203, dk br, (ii) 252, yel. Di-Me eth, 286-7 d, Anil, 269-70, Zn dust \rightarrow acridine, 111

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE VIII

Cleavage to alkyl bromide or alkyl iodide

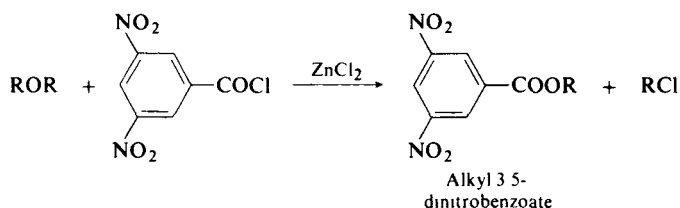


From the ether with concentrated hydrochloric acid

For directions and examples see Cheronis, p 543, Linstead, pp 46-7, Shriner, p 116, Vogel, p 316

NOTE For directions and examples for preparation of derivatives of alkyl iodides and alkyl bromides formed on cleavage of ethers see explanations and references to Table V, pp 52, 53, 54

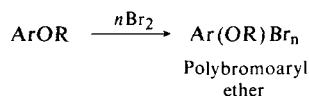
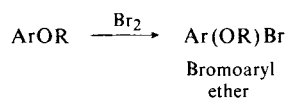
*Alkyl 3,5-dinitrobenzoate **



From a symmetrical aliphatic ether with freshly fused zinc chloride and 3,5-dinitrobenzoyl chloride

For directions and examples see Cheronis, pp 542, 543, Linstead, p 46, Shriner, p 239, Vogel, p 316, Wild, p 96 H W Underwood, O L Baril and G C Toone, *J Amer Chem Soc*, **52**, 4087 (1930)

Bromo derivative



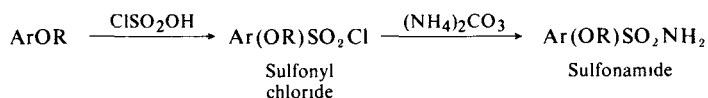
From alkyl aryl or diaryl ether with bromine in glacial acetic acid or chloroform

For directions and examples see Cheronis, p 545, Shriner, p 240

From the aromatic ether with bromine in alcohol, acetic acid, ether, chloroform or petrol ether

See Wild, pp 98-9, 101, H W Underwood, O L Baril and G C Toone, *J Amer Chem Soc*, **52**, 4087 (1930)

*Sulfonamide **



The sulfonyl chloride is prepared from the aromatic ether with chlorosulfonic acid in chloroform or without solvent. The sulfonamide is obtained from the sulfonyl chloride with ammonium carbonate and/or aqueous ammonia.

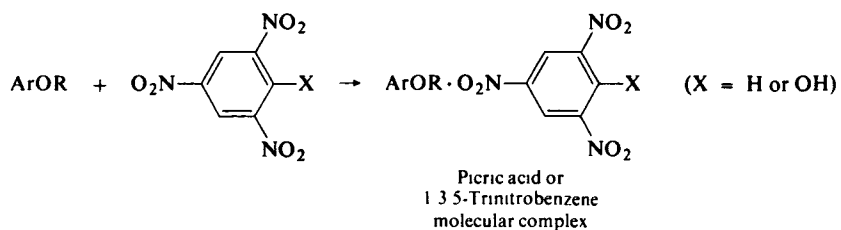
For directions and examples see Cheronis, pp 545, 546, Linstead, pp 47, 50, Shriner, p 241, Vogel, p 672, Wild, pp 27, 101, E H Huntress and F H Carten, *J Amer Chem Soc*, **62**, 511, 603 (1940)

***Derivatives recommended for first trial**

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE VIII (Continued)

Picric acid and 1,3,5-trinitrobenzene addition complexes



From the aromatic ether with the aromatic polynitro compound in chloroform

For directions and examples see Cheronis, pp 545, 547, Linstead, pp 47, 50, Shriner, p 241, Vogel, p 672, Wild, p 100, O L Baril and G A Megrichian, *J Amer Chem Soc*, 58, 1415 (1936), E K Andersen, *Acta Chem Scand*, 8, 157 (1954)

From the aromatic ether with picric acid in ethanol

See V H Dermer and O C Dermer, *J Org Chem*, 3, 289 (1938)

NOTE For additional information regarding directions and examples for the derivatization of aromatic ethers (nitration, side-chain oxidation, etc.) see explanations and references to Table IV, pp 32, 33, 34

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS
a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point °C	n_D^{20}	D_4^{20}	Picrate	Sulfon amide	Nitro derivative	Bromo derivative	1,3,5-Tri-nitro-benzene addition compound	3,5-Dinitro benzoate	Miscellaneous
1	Ethylene oxide (Epoxyethane)	10.7	-111.7	1.3614 ⁴	0.89713 ⁹							HBr → Ethylene bromohydrin, b p 149
2	Ethyl methyl ether	10.8, 10			0.7260 ⁰							Maleic anhydride → 3,6-Endoxo- Δ^4 -tetrahydrophthalic anhydride, 125d, 118d, abs eth Iodide, b p 72
3	Furan	31.27	-85.6	1.42157	0.9366						93	
4	Diethyl ether (Ethyl ether)	34.60	-116.3, stab, -123.3, unst	1.3526	0.71352							Heating with dil H_2SO_4 → <i>d</i> -propylene glycol, b p 187.4
5	Propylene oxide (1,2-Epoxypropane)	35		1.466	0.830							Dil acid → al + acetaldehyde
6	Ethyl vinyl ether	35.75	-115.8	1.3768	0.7589							
7	Methyl <i>n</i> -propyl ether	39		1.3579	0.7356 ⁴							
8	Allyl methyl ether	46							β, γ -di b p 185, D_4^{20} 1.8329			
9	Ethyl isopropyl ether	53.4			0.7211 (0.745 ⁰)							Heating with 1% H_2SO_4 (sealed tube) → al + isopropyl alcohol
10	<i>tert</i> -Butyl methyl ether	55.2		1.3689	0.7405							Constant boil mixt with w, b p 52.6, with 4% w
11	2,3-Epoxybutane	<i>cis</i> 58 9 ⁷⁴⁵ <i>trans</i> 53-4 ⁷⁴¹			<i>cis</i> 0.8226 ²⁵ , <i>trans</i> 0.8010 ²⁵							Normal crude mixt is 65% <i>trans</i> + 35% <i>cis</i>
12	Chloromethyl methyl ether	59		1.3974	1.015	163						
13	α -Butylene oxide (1,2-Epoxybutane)	61-2		1.385 ¹⁷	0.837 ¹⁷							
14	Ethyl <i>n</i> -propyl ether	63.6	< -79	1.36948	0.7386							Constant boil mixt with al, b p 61.2, with 25% al
15	2-Methylfuran (Sylvan)	64		1.434	0.913							
16	Tetrahydrofuran	65		1.407	0.889							
17	Allyl ethyl ether	66-7 ⁷⁴²		1.3881	0.7651				β, γ -di b p 193-5			Heating with 2% H_2SO_4 → al + allyl alcohol
18	Di-isopropyl ether (Isopropyl ether)	67.5	-60	1.3688	0.726						123, 120-1, CCl_4	

*Derivative data given in order: m p, crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Picrate	Sulfonamide	Nitro derivative	Bromo derivative	1,3,5-Tri-nitro-benzene addition compound	3,5-Dinitro benzoate	Miscellaneous
19	<i>n</i> -Butyl methyl ether	70	-115.5	1.3728, 1.3736	0.7455, 0.7474							Oxid by alkaline KMnO ₄ at 35-40° → ac a + methoxyacetic acid
20	<i>tert</i> -Butyl ethyl ether	73.1 (cor)		1.3760	0.7404							Constant boil mixt with w, b p 65.2, with 6% w
21	Tetrahydrofuran	79		1.407	0.855							
22	Chloromethyl ethyl ether	80, 83d		1.40398	1.014							
23	Ethyl isobutyl ether	81.1 (cor)		1.3739 ²⁵	0.7323 ²⁵							
24	<i>sec</i> -Butyl ethyl ether	81.2 (cor)		1.3802	0.7503							
25	Isopropyl <i>n</i> -propyl ether	83		1.376	0.7370							
26	Ethylene glycol dimethyl ether	84.7		1.37965	0.8665							
27	Dihdropyran	86		1.440	0.923							
28	<i>tert</i> -Amyl methyl ether	86.3		1.3885	0.7703							Constant boil mixt with w, b p 73.8, with 9% w. Constant boil mixt with me al, b p 62.3, with 50% me al
29	Tetrahydropyran	88		1.421	0.881							
30	Di- <i>n</i> -propyl ether (<i>n</i> -Propyl ether)	90.1	-122	1.38829	0.74698						74	Constant boil mixt with w, b p 75.4, Constant boil mixt with <i>n</i> -propyl alcohol, b p 85.8
31	<i>n</i> -Butyl ethyl ether	92.3 (cor)	-124	1.3820	0.7505							
32	2,5-Dimethylfuran	94		1.4363 ^{21,6}	0.888 ^{20,1}				<i>penta</i> 180, chl			Maleic anhydride → 3,6-Endoxo-3,6-dimethyl- Δ^4 -tetrahydrophthalic anhydride, 78, eth
33	α -Chloroethyl ethyl ether	98		1.404	0.966							
34	<i>n</i> -Amyl methyl ether	99-100		1.3873	0.761							
35	<i>tert</i> -Amyl ethyl ether	101		1.3912	0.7657							Constant boil mixt with 13% w, b p 81.2
36	1,4-Dioxane	101.4	11.8	1.4232	1.03361					65-6		Iodine derivative, 84.5, Constant boil mixt with 48 mole% dioxane, b p 82.8

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Picrate	Sulfonamide	Nitro derivative	Bromo derivative	1,3,5 Tri nitro benzene addition compound	3,5 Dinitro benzoate	Miscellaneous
37	Ethylene glycol monoethyl monomethyl ether (1-Ethoxy-2-methoxyethane)	102		1.38677	0.8529							
38	Cyclopentyl methyl ether	105		1.4206	0.862							
39	β -Chloroethyl ethyl ether	107		1.411	0.989							
40	<i>n</i> -Butyl isopropyl ether	108 ⁷³⁸		1.3889 ₄₆₁ ⁴¹	0.7594 ¹⁵							Boil HI → <i>n</i> -butyl iodide + isopropyl iodide
41	α -Epichlorohydrin	115.7		1.438	1.181							
42	α, α' -Dichloroethyl ether	116, 114		1.4183 ²⁴	1.138 ₁ ²							
43	<i>n</i> -Amyl ethyl ether	118		1.3927	0.762							
44	Di- <i>sec</i> -butyl ether	121		1.3928 ²⁷	0.760					b p 90.1 n_D^{25} 1.250	75.5	
45	Cyclopentyl ethyl ether	122		1.423	0.853							
46	Di-isobutyl ether (Isobutyl ether)	123			0.7616 ₁₅						87, 84.5, 5.5	
47	Ethylene glycol mono-methyl mono- <i>n</i> -propyl ether (1-Methoxy 2- <i>n</i> propoxyethane)	124.5		1.39467	0.8472							
48	<i>n</i> -Hexyl methyl ether	126		1.3972	0.772							
49	2-Methoxy-1-propanol	130 ⁷⁵⁸									97	α -Naphthylurethane, 60
50	Cyclohexyl methyl ether	134		1.435	0.875							
51	Ethylene glycol monoethyl ether ("Cello-solve", 2-Ethoxy-ethanol)	134.8, 135.1		1.40797	0.9297, 0.9311						75	Miscible with w, with al and with eth, Diphenylurethane, 43, Xanthate, 202.5 (cor), acet abs eth Phenylurethane, 226
52	3-Ethoxy-2-methyl-2-butanol	141										
53	<i>n</i> -Hexyl ethyl ether	142		1.4008	0.772							
54	Di- <i>n</i> -butyl ether (Butyl ether)	142.4, 144	-98	1.3989	0.76829						62.3, 64	
55	Cyclohexyl ethyl ether	149		1.435	0.864							
56	Anisole (Methoxybenzene, Methyl phenyl ether)	153.8, 155 (43 ¹⁰)	-37.5	1.52211	0.99393	79.81, unst in air	113, 110.1, al	2,4-di 86.9, al, 95.5	2,4-di 61, al		87	
57	3-Methoxy-2-methyl-1-propanol	155		1.4140 ²⁷							64	
58	Diethylene glycol dimethyl ether	162.0	-75	1.4099	0.9440 ₃₀							

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n_D^{20}	D_4^{20}	Picrate	Sulfon amide	Nitro derivative	Bromo derivative	1,3,5-Trinitrobenzene addition compound	3,5-Dinitrobenzoate	Miscellaneous
59	Furfuryl alcohol (2-Furancarbinol)	170		1.4868	1.1351						80-1, pyr	<i>p</i> -Nitrobenzoate, 76, N-Phenylurethane, 45
60	Ethylene glycol mono- <i>n</i> -butyl ether (<i>n</i> -Butyl "cellosolve")	171 ⁷⁴³		1.4177	0.9188						oil	3-Nitrophthalate, 120
61	Benzyl methyl ether	170-1 (cor)		1.5008	0.9649	115.6						
62	2-Methoxytoluene (2-Methyl anisole, Methyl 2-tolyl ether, 2-Cresyl methyl ether)	171		1.505	0.9853	116, 113.4, pale yellow	137, al	3,5-di 69, pale yellow, me al	5-mono 63-4, al			Oxid → <i>o</i> -Methoxybenzoic acid, 101
63	Phenyl ethyl ether (Phenetole)	172	-33	1.5080, 1.5074	0.9666	92	150	<i>p</i> -mono 58				
64	Di-isoamyl ether (Isoamyl ether)	172.5		1.409	0.778						60.1	Constant boil mixt with w, b p 97.2
65	4-Methoxytoluene (4-Methylanisole, Methyl 4-tolyl ether, 4-Cresyl methyl ether)	173, 176		1.512	0.970	88-9, yellow-orange	182, al					Oxid → <i>p</i> -Anisic acid, 184-6, 184, w
66	3-Methoxytoluene (3-Methylanisole, Methyl 3-tolyl ether, 3-Cresyl methyl ether)	173, 177 (cor)		1.513	0.972	113.4, yellow-orange	129.30, al	2-mono 54-5, petroleum, 2,4,6-tri 92, al				Oxid → <i>m</i> -Methoxybenzoic acid, 110
67	Tetrahydrofurfuryl alcohol	117		1.45167	1.0544						83-4	<i>p</i> -Nitrobenzoate, 46-8, N-Phenylurethane, 61, petroleum conc H ₂ SO ₄ + ac a → <i>o</i> -Isopropylphenol, b p 213-4, m p 130
68	Phenyl isopropyl ether	178		1.4992	0.975							
69	β, β' -Dichloroethyl ether	178		1.4568	1.220							
70	2-Ethoxytoluene (2-Cresyl ethyl ether, Ethyl 2-tolyl ether)	184		1.505	0.953	117.5, 85, pale yellow	148-9, al	<i>di</i> 51				Oxid → <i>o</i> -Ethoxybenzoic acid, 25, 190-5, well dried
71	Benzyl ethyl ether (Homophenetole)	184-6 (cor)		1.4958	0.9478							Refluxed in benz + P ₂ O ₅ → Ethylene + Diphenylmethane, 25.1
72	Di- <i>n</i> -amyl ether (<i>n</i> -Amyl ether)	187.5	-69.3	1.416	0.78298						42.3	
73	Diethylene glycol diethyl ether	188		1.411	0.906							
74	Phenyl <i>n</i> -propyl ether (<i>n</i> -Propoxybenzene)	188, 189.3 (cor)		1.5014, 1.5011	0.9494 ⁸⁸		116.7, al					

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point, °C	n_D^{20}	D_4^{20}	Picrate	Sulfonamide	Nitro derivative	Bromo derivative	1,3,5-Tri-nitrobenzene addition compound	3,5-Dinitrobenzoate	Miscellaneous
75	4-Ethoxytoluene (4-Cresyl ethyl ether Ethyl 4-tolyl ether)	190.5		1.505	0.949	110.1, or yel	138.05, al					Oxid → <i>p</i> -Ethoxybenzoic acid, 198, 195.0-5, al
76	3-Ethoxytoluene (3-Cresyl ethyl ether Ethyl 3-tolyl ether)	190.5		1.506	0.949	114.5 or -yel	110.1 al					Oxid → <i>m</i> -Ethoxybenzoic acid, 137
77	Diethylene glycol monomethyl ether	194		1.4244	1.035 ₄ ²⁰							<i>p</i> -Nitrophenylurethane, 73.5
78	3-Chloroanisole	194					131					
79	2-Chloroanisole	195		1.5433 ²⁵	1.1865 ₄ ¹⁵			95				
80	Diethylene glycol monoethyl ether	196		1.4298	1.023 ₄ ²⁰						oil	<i>p</i> -Nitrophenylurethane, 66
81	4-Chloroanisole	200			1.1851 ₄ ²⁰ *		151	2-mono 95				
82	<i>n</i> -Butyl phenyl ether (<i>n</i> -Butoxybenzene)	206		1.5049		110-2, pa yel chl	103.4, al					
83	2-Chlorophenetole	208	17				133	82				
84	2-Bromoanisole	210					140	106				
85	Benzyl isobutyl ether (cor)	210.2		1.4826	0.9233							
86	<i>p</i> -Bromoanisole	215, 216			1.494 ₄ ⁰		148	88				
87	Methyl thymyl ether	216			0.954 ₄ ⁰			<i>tri</i> 92				
88	Triethylene glycol dimethyl ether	216	-47	1.4233	0.9871 ₄ ²⁰							
89	1,3-Dimethoxybenzene (Resorcinol dimethyl ether)	217 (cor)	-58, -52	1.4233	1.0552 ₄ ²⁵	56.8, or -yel, unst in air	166-7, al	2,4- <i>di</i> 72, pa yel, al, 4,6- <i>di</i> 157 al, 2,4,6- <i>tri</i> 123-4, pa red, al	4,6- <i>di</i> 140, al			
90	2-Bromophenetole	218					135	98				
91	Benzyl <i>n</i> -butyl ether (cor)	219-21		1.4833	0.9227							
92	Creosol (4-Methylcatechol 2-methyl ether)	221	5.5	1.5353 ²⁵	1.0919 ₄ ²⁵	112, yel						
93	<i>n</i> -Butyl 2-tolyl ether (2-Butoxytoluene)	223			0.9437 ₆ ⁰		95-6, al					
94	2-Methoxyaniline (2-Anisidine)	225	5		1.0978 ₁₅ ¹⁵							N-Formyl, 83.5, N-Acetyl, 87-8
95	Di- <i>n</i> -hexyl ether (<i>n</i> -Hexyl ether)	228-9 ⁷⁶¹			0.7936						54.5-5.5	
96	Safrole (4-Allyl-1,2-methylenedioxybenzene)	233	11	1.5383	1.100	104.05.5, or -red			<i>tri</i> 108, <i>penta</i> 169-70, bz	51		
97	4-Bromophenetole	233, 229	12				145	47				

* Derivative data given in order *m p*, crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS
a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Picrate	Sulfonamide	Nitro derivative	Bromo derivative	1,3,5-Tri nitro benzene addition compound	3,5-Dinitro benzoate	Miscellaneous
98	Resorcinol diethyl ether	235	12.4			109	184		<i>tri</i> 69			
99	Eugenol methyl ether (4-Allyl-1,2-dimethoxybenzene)	244		1.5360	1.0336	114.5, red-br, chl	7		<i>tri</i> 78, abs al			
100	2-Iodophenetole	246			1.800	84			<i>tri</i> 110			
101	trans(β)-Isosafrole (1,2-Methylene-dioxy-4-propylbenzene)	248	6.8	1.5782	1.122	74.5, dk red, chl			<i>di</i> 52-3, eth, <i>tri</i> 109, 10, pet eth	85.6, brt scar		
102	3-Methoxyaniline (3-Anisidine)	251				169d, yel						N-Formyl, 57, N-Acetyl, 81, N-p-Toluenesulfonyl, 68
103	Di-n-heptyl ether (n-Heptyl ether)	263, 260		1.427	0.8056 ₃₀						47	
104	Isoeugenol methyl ether	264	16-7	1.5692	1.0528	42.5, dk red, chl			<i>di</i> 101.0, 5, abs eth	69-70, brt scar		Oxid → Veratric acid, 181
105	Tetraethylene glycol dimethyl ether	266, 275		1.432	1.009							
106	Methyl 1-naphthyl ether (1-Methoxynaphthalene)	271 (cor)	< -10	1.6940 ²⁵	1.09159	129.5, 30.5, yel-or, chl	156.7, al	2-mono 80,4 mono 85, yel, al	4-mono b p 181-2, 5-mono 67.5, 80, x-mono 46, al, 2,4-di 54.5, al	139.40, 137.8, yel		
107	2-Nitroanisole	277	10	1.562	1.254							Reduct → o-anisidine, b p 225
108	Ethyl 1-naphthyl ether (1-Ethoxynaphthalene)	280.5 (cor)	5.5	1.5973 ²⁵	1.074	118.5, 9.0 (cor)	164-5, al	2-mono 84,4-mono 116-7, al	4-mono 48, al	125.5, yel		
109	Dibenzyl ether (Benzyl ether)	290, 300d	3.6		1.0428	77.8, or-yel, chl			<i>di</i> 107-8, al		112	
110	Isoamyl 1-naphthyl ether	317.5 (cor)	< -10	1.57049 ^{14,2}	1.00689 ^{14,2}	96.0-7.0						

*Derivative data given in order: m p, crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	n_D^{20}	D_4^{20}	Picrate	Sulfonamide	Nitro derivative	Bromo derivative	1,3,5-Tri-nitrobenzene addition compound	3,5-Dinitrobenzoate	Miscellaneous
1	4-Chlorophenetole (1-Chloro-4-ethoxybenzene)	21	212	1 5227 ¹⁹	1 1231 ²⁰		134		2,6 <i>di</i> 54			
2	Veratrole (1,2-Dimethoxybenzene)	22 5	207, 205	1 5287 ²¹	1 080	56 7, red	135 6, al	95	4,5- <i>di</i> 92-3			
3	Anethole (1-Methoxy-4-propenylbenzene)	22 5, al	235	1 558	0 989 ²²	69 70d, or-red, al			<i>di</i> 67, eth, 65, 62 4, <i>tri</i> 108, pet eth			
4	4-Methoxybenzyl alcohol (Anisyl alcohol)	24	151 ²⁷ , 138 ¹⁴									Phenylurethane, 93 <i>p</i> -Nitrobenzoate, 94
5	<i>n</i> -Amyl 2-naphthyl ether	24 5	327 5 (cor)	1 5587 ³⁰		66 5 7 0, or, h al	159	<i>di</i> 135	<i>di</i> 58			
6	4-Iodophenetole (1-Ethoxy-4-iodobenzene)	27	252					96				
7	Diphenyl ether (Phenyl ether)	28	259	1 5826 ²⁴	1 073	110	<i>di</i> 159, al	4,4'- <i>di</i> 144 4, al, 2,4,2',4'- <i>tetra</i> 195 7, pa yel, ac a	4,4'- <i>di</i> 54 5, al			
8	Isoamyl 2-naphthyl ether	28 0 5	321 0 (cor)			93 5-4 0, al						
9	2-Methoxyphenol (Guaiacol, Catechol monomethyl ether)	28 2	205	1 5441	1 1287 ^{20,4} _{vac}	86 7			4,5,6- <i>tri</i> 116, al		141 2 (cor), al	
10	2-Methoxybiphenyl (2-Biphenyl methyl ether)	29, pet eth	274					5- <i>mono</i> 95 6, pa yel, me al				
11	β -Bromoethyl phenyl ether	32							56			
12	Isobutyl 2-naphthyl ether	33	304			84 5						
13	Didodecyl ether (Dilauryl ether)	33, 28-30	190-5 ¹									
14	2-Ethoxybiphenyl (2-Biphenyl ethyl ether)	34	132 ⁶									
15	<i>sec</i> -Butyl 2-naphthyl ether	34	298 5 (cor)			86						
16	3-Ethoxybiphenyl (3-Biphenyl ethyl ether)	35	158 ⁸									
17	3-Nitrophenetole	35	284									Reduct \rightarrow <i>m</i> -Phenetidine, (Picrate, 158)
18	<i>n</i> -Butyl 2-naphthyl ether	35 5	309 (cor)			67						
19	Ethyl 2-naphthyl ether (Neonerolin)	36, 37	282 (cor)	1 5932 ²⁷	1 064	101	161-3, al		1- <i>mono</i> 66, pet eth, 1,6- <i>di</i> 94, pet eth			
20	3-Aminodiphenyl ether	37, lgr	315									N-Hydrochloride, 141, 139, N-Acetyl, 83, lgr

*Derivative data given in order *m p*, crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	n_D^{20}	D_4^{20}	Picrate	Sulfonamide	Nitro-derivative	Bromo-derivative	1,3,5-Tri nitro benzene addition compound	3,5 Dinitro benzoate	Miscellaneous
21	3-Nitroanisole	39	258		1.373 ¹⁸							Reduct → <i>m</i> -Anisidine, (Picrate, 169d)
22	Isopropyl 2-naphthyl ether	40	285			95						
23	2-Naphthyl <i>n</i> -propyl ether	40	297			81						
24	Catechol diethyl ether (1,2-Diethoxybenzene)	43, dil al	217			69-71, red-br, unst in air	3,4- <i>di</i> 162 3, al	<i>tri</i> 122				
25	bz-Tetrahydro-6-methoxyquinoline	43	130	1.5718 ⁵⁰								
26	2,4,6-Trichlorophenetole	44	246					<i>di</i> 100				
27	8-Methoxyquinoline	45	175 ²⁹			162						
28	2-Aminodiphenyl ether	47	173 ¹⁴									Acetate, 81
29	Pyrogallol trimethyl ether (1,2,3-Trimethoxybenzene)	47, dil al	241			78 5-80 0, yel	2,3,4- <i>tri</i> 123 4	5- <i>mono</i> 106, ac a	<i>mono</i> oil, <i>di</i> oil, 4,5,6- <i>tri</i> 73 4	81, pa yel		
30	4-Iodoanisole	52	139									
31	Phloroglucinol trimethyl ether (1,3,5-Trimethoxybenzene)	52 3, al	255 5 (cor)						2 <i>mono</i> 96 7, dil al, 2,4- <i>di</i> 129-30, al, 2, 4,6- <i>tri</i> 145, al			
32	Hydroquinone monomethyl ether	52 5	244 ^{754 2}									
33	4-Nitroanisole	54	274	1.5707 ⁶⁰	1.233 ²⁰							Reduct → <i>p</i> -Anisidine, 57
34	Hydroquinone dimethyl ether (1,4-Dimethoxybenzene)	56, 75% al	213 (cor)			47-8, or red, unst in air	148, al	2- <i>mono</i> 72, yel, 2,3- <i>di</i> 177, 2,5- <i>di</i> 202	<i>di</i> 142, ac a	<i>di</i> 86 5, red		
35	4-Methoxyaniline (4-Anisidine)	57	246		1.071 ²⁵							N-Formyl, 81, N-Acetyl, 130-2, w, N-Benzoyl, 216 7
36	4-Cyclohexylphenyl methyl ether	59	116 ⁴									
37	2,4,6-Trichloroanisole	60						<i>di</i> 95				
38	1,3-Diphenoxypropane (Trimethylene glycol diphenyl ether)	61, al	338-40 (cor)				4,4'- <i>di</i> 245 55, al					
39	Catechol dibenzyl ether (1,2-Dibenzoyloxybenzene)	63 4, wh, me al						4- <i>mono</i> 98, pa yel, al				
40	1-Phenyl-2-phenoxy-methanol	64										<i>p</i> -Nitrobenzoate, 84
41	α -Glyceryl phenyl ether	70	187 ¹⁵									
42	2,4,6-Tribromophenetole	72						79				

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	n_D^{20}	D_4^{20}	Picrate	Sulfon amide	Nitro derivative	Bromo derivative	1,3,5-Tri-nitro-benzene addition compound	3,5-Dinitro-benzoate	Miscellaneous
43	Hydroquinone diethyl ether (1,4-Diethoxybenzene)	72						<i>mono</i> 49, yel, 2,3- <i>di</i> 130, yel, al, 2,5- <i>di</i> 176, yel, al		86.5		
44	Methyl 2-naphthyl ether (Nerolin)	73 (cor), eth	273			116.5-70, dk yel, 113.0-3.5	150.1, al	1- <i>mono</i> 128, 1,6,8- <i>tri</i> 215d	<i>x-mono</i> 62.3, pet eth, 1- <i>mono</i> 83-4, 3- <i>mono</i> 77.8, 6- <i>mono</i> 108	93.5, yel		
45	2,4,5-Tribromophenetol	73						79				
46	4-Ethoxybiphenyl (4-Biphenyl ethyl ether)	76, 74	188 ¹³									
47	Benzyl 1-naphthyl ether	77 (cor)	200 ¹²			85-100 (cor)						
48	2-Phenyl-2-phenoxy-ethanol	81										<i>p</i> -Nitrobenzoate, 87
49	4-Aminodiphenyl ether	83.5, 84, w	189 ¹⁴									N-Acetyl, 127, N-HCl, 122
50	Biphenylene oxide (Dibenzofuran)	86, wh, al	288 (cor)			94		3- <i>mono</i> 181-2, <i>di</i> 245, ac a		96, yel		
51	4-Methoxybiphenyl (4-Biphenyl methyl ether, 4-Phenylanisole)	90, 89					3- <i>mono</i> 91.2, al, 3,5- <i>di</i> 137-8, yel, al, 3,4'- <i>di</i> 171	3- <i>mono</i> 79, 4'- <i>mono</i> 144, pet, 3,4'- <i>di</i> 134, 3,5- <i>di</i> 87, pet				
52	1,2-Diphenoxyethane (Ethylene glycol diphenyl ether)	98, al					4,4'- <i>di</i> 228-9, al	2',4'- <i>di</i> 215.2 (cor), pa yel, acet	<i>di-p</i> 134-5, al			
53	Benzyl 2-naphthyl ether (2-Benzyloxynaphthalene)	101.5 (cor), al	d			123.0 (cor)						
54	Anisoin (4,4-Dimethoxybenzoin)	113										Methyl ether, 52-3, yel, CCl ₄ , Ethyl ether, 103-4, al-w
55	Hydroquinone dibenzyl ether (1,4-Dibenzyloxybenzene)	128-9, al						83				

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE VIII. ORGANIC DERIVATIVES OF ETHERS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	n_D^{20}	D_4^{20}	Picrate	Sulfonamide	Nitro derivative	Bromo derivative	1,3,5-Tri-nitrobenzene addition compound	3,5-Dinitrobenzoate	Miscellaneous
56	Ansil (4,4'-Dimethoxybenzil)	133, yel										Monoxime, 133, <i>syn</i> -Dioxime, 217, <i>anti</i> -Dioxime, 195, bz, Disemicarbazone, 254 5, dilac a, Dihydrazone, 118
57	Antiarol (5-Hydroxy-1,2,3-trimethoxybenzene)	148, w										Acetyl, 74, al, Methyl ether, 47, b p 271
58	Anhalamine (6,7-Dimethoxy-8-hydroxy-1,2,3,4-tetrahydroisoquinoline)	187-8, al				234-6						Dibenzoyl, 128-9, N-Benzoyl, 167 8
59	7-Methoxyquinoline	210	287 ⁷⁵⁸			229						

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLES IX AND X (Continued)

From the carbonyl compound in ethanol with 2,4-dinitrophenylhydrazine in 85% phosphoric acid

See Vogel, p 344, G D Johnson, *J Amer Chem Soc*, **73**, 5888 (1951), **75**, 2720 (1953)

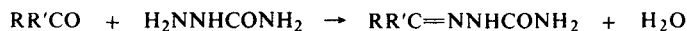
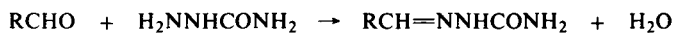
From the carbonyl compound with 2,4-dinitrophenylhydrazine and sulfuric acid in isopropyl alcohol

See N R Campbell, *Analyst*, **61**, 391 (1936)

From the carbonyl compound with 2,4-dinitrophenylhydrazine in pyridine

See E A Braude and C J Timmons, *J Chem Soc*, 3131 (1953)

Semicarbazone *



Semicarbazone

From the carbonyl compound with aqueous semicarbazide hydrochloride and sodium acetate

For directions and examples see Cheronis, pp 503-504, 512, Shriner, p 218, Vogel, p 344, Wild, p 121, A Michael, *J Amer Chem Soc*, **41**, 417 (1919)

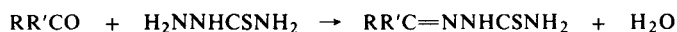
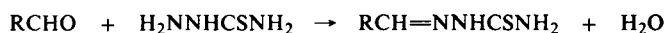
From the carbonyl compound in ethanol with aqueous semicarbazide hydrochloride and sodium acetate

See Linstead, p 27, Shriner, p 218, Wild, p 122, R L Shriner and T A Turner, *J Amer Chem Soc*, **52**, 1267 (1930)

From the carbonyl compound and acetone semicarbazone in acetic acid

See B Angla, *Ann Chim Anal Chim Appl*, **22**, 10 (1940)

Thiosemicarbazone *

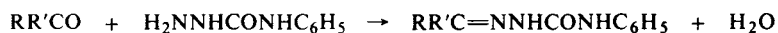
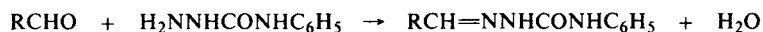


Thiosemicarbazone

From the carbonyl compound with thiosemicarbazide and sodium acetate in water, alcohol or acetic acid

For directions and examples see Cheronis, pp 503, 512, Wild, p 128, F J Wilson and R Burns, *J Chem Soc*, **121**, 873 (1922), W Baird, R Burns and F J Wilson, *J Chem Soc*, 2527 (1927), M Busch, *J prakt Chem*, **124**, 301 (1930), P P T Sah and T C Daniels, *Rec Trav Chim*, **69**, 1545 (1950)

Phenylsemicarbazone *

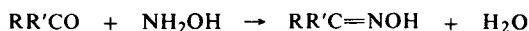
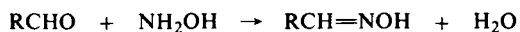


Phenylsemicarbazone

From the carbonyl compound with phenylsemicarbazide in alcohol or acetic acid

For directions and examples see P P T Sah and T -S Ma, *J Chinese Chem Soc*, **2**, 32 (1934), *CA*, **28**, 3713 (1934)

Oxime *



Oxime

From the carbonyl compound with hydroxylamine hydrochloride and pyridine in ethanol or without solvent

For directions and examples see Cheronis, p 513, Shriner, p 254, Vogel, p 345, J B Buck and W S Ide, *J Amer Chem Soc*, **53**, 1536 (1931), W E Bachmann and C H Boatner, *J Amer Chem Soc*, **58**, 2097 (1936), W E Bachmann and M X Barton, *J Org Chem*, **3**, 300 (1938)

For a modification of the above method in aqueous alcohol

See W M D Bryant and D M Smith, *J Amer Chem Soc*, **57**, 57 (1935)

From the carbonyl compound with hydroxylamine hydrochloride and sodium hydroxide in methanol or aqueous ethanol

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLES IX AND X (Continued)

See: Cheronis, p. 513; Shriner, p. 255; Vogel, p. 721; Wild, p. 121.

From the carbonyl compound with hydroxylamine hydrochloride and potassium hydroxide in 95% ethanol.

See: Shriner, p. 255.

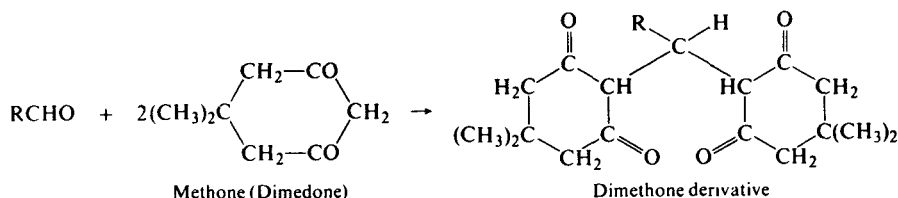
From the carbonyl compound with hydroxylamine hydrochloride and sodium or potassium acetate in water or aqueous ethanol.

See: Linstead, p. 27; Vogel, pp. 343, 345; J. S. Buck and W. S. Ide, *J. Amer. Chem. Soc.*, **53**, 1536 (1931).

From the carbonyl compound with hydroxylamine hydrochloride and sodium carbonate or bicarbonate in water or aqueous ethanol.

See: Wild, p. 120.

*Dimethone derivative (Methone derivative).**



This derivative is specific for aldehydes only.

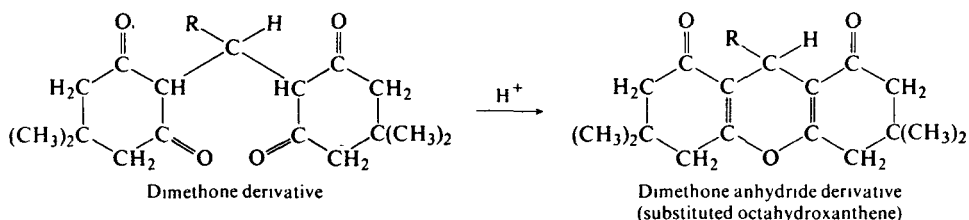
From the aldehyde and methone (dimedone; 5,5-dimethyl-1,3-cyclohexanedione; dimethyl dihydroresorcinol) in aqueous ethanol or methanol.

For directions and examples see: Cheronis, p. 505; Linstead, p. 27; Shriner, p. 220; Vogel, p. 333; Wild, pp. 136-7; D. Vorlander, *Z. Anal. Chem.*, **77**, 241 (1929); *Z. Angew. Chem.*, **42**, 46 (1929); W. Weinberger, *Ind. Eng. Chem., Anal. Ed.*, **3**, 365 (1931).

From the aldehyde with methone and a catalytic amount of piperidine in aqueous ethanol.

See: E. C. Horning and M. G. Horning, *J. Org. Chem.*, **11**, 95 (1946).

*Anhydride of dimethone derivative (substituted octahydroxanthene).**



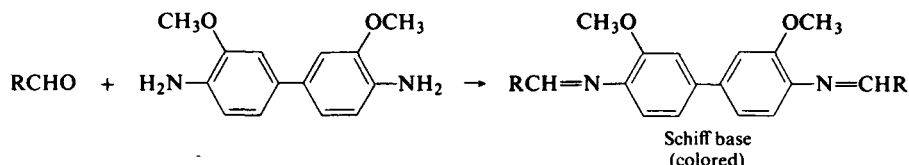
From the dimethone derivative with acetic anhydride.

For directions and examples see: Cheronis, p. 505; Vogel, p. 333.

From the dimethone derivative and a catalytic amount of hydrochloric acid in water or in ethanol.

See: Cheronis, p. 505; Linstead, p. 27; Shriner, p. 220; Vogel, p. 333; Wild, p. 137; E. C. Horning and M. G. Horning, *J. Org. Chem.*, **11**, 95 (1946).

o-Dianisidine spot test.



This test is usually applicable to aldehydes only.

From the aldehyde and a saturated solution of *o*-dianisidine (4,4'-diamino-3,3'-dimethoxybiphenyl) in glacial acetic acid.

For directions and examples see: F. Feigl, *Spot Tests in Organic Analysis*, 6th Ed., Elsevier Publishing Co., New York, 1960, p. 225; R. Wasicky and O. Frehden, *Mikrochim. Acta*, **1**, 55 (1927).

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 1) Listed in order of increasing atmospheric b.p.*

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	Semi-carbonyl	2,4-Dinitrophenylhydrazone	p-Nitrophenylhydrazone	Phenylhydrazone	Oxime	Dimethylone deriv (Dimedone deriv)	Dimethylone anhydride	Miscellaneous	o-Dianisidine spot test		
													Cold	Hot	Limit γ
1	Formaldehyde (Methanal)	-21	-91		169	167, yel al	181 2, yel, bz	145	oil	189, al, 191 4			pa yel	or br	50
2	Trifluoroacetaldehyde	-20				151									
3	Acetaldehyde (Ethanal)	20 2	-123 5	1 3392 ¹⁸ , 1 3316	162 3	stable 168, al unstable 157, mixture 148	128 5	57, 99	47	139, al	175-6, al	Thio-semicarbazone, 146	or	dk br	30
4	Propionaldehyde (Propanal)	48 9	-81	1 364	89, bz-lgr, 154, w	148, or, 150, red, 155	125, yel, 50% al	oil	40	154 6, al	143	Picrate, 156-7	dk ol gn	red	20
5	Glyoxal	50	15		270	328	311	180	178	mono 186, di 228	mono 224	Phenyl-osazone, 169-70			
6	Acrolein (Acraldehyde)	52 4	-87 7	1 4025	171, w	165	150-1	50 1, hot lgr, pyrazoline		192, 50% al	163, al		red br	vlt br	0 1
7	Propynal (Propargyl aldehyde)	55										Cu deriv, 160			
8	2,2,2-Trifluoropropionaldehyde	56 ⁷⁴⁵				151									
9	Isobutyraldehyde	64	-65 9	1 3730	125 6	187, or-yel, al, 182	130 1, or-yel, al	oil	oil	154	144				
10	2-Methyl-2-propenal (Methacrolein)	73 5		1 4191	198	206		74, pyrazoline							
11	n-Butyraldehyde (Butanal)	74 7	-97 1	1 38433	95 5, lgr, 106	123, al	87, yel, al, 93 5, red	93 5	b p 152 ⁷¹⁵	134, 142	141				
12	Trimethylacetaldehyde (Pivaldehyde)	75	3, 6	1 3791	190	210, yel			41						
13	Chloroacetaldehyde	85-6				134-5d, 148, al			oil						
14	2-Chloropropionaldehyde	86		1 431 ¹⁷								Hydrate, b p 80 5-81			
15	Dichloroacetaldehyde	89 5-90 5				155-6, using only 1 equivalent of reagent			b p 67-9 ¹⁷ , using only 1 equivalent of reagent						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES

a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	Semi-carbazone	2,4-Di-nitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Dimeth-one deriv (Dime done deriv)	Dimeth one anhy dride	Miscel-laneous	o-Dianisidine spot test				
													Cold	Hot	Limit, γ		
16	Methoxyacetaldehyde	92		1.3950		124.5	115										
17	3-Methylbutanal (Isovaleraldehyde)	92.5	-51	1.39225	107	123, yel - or, al	110.1, al	oil	48.5	154-5, al	173 (cor)	Thio-semicarbazone, 52.3					
18	2-Methyl-1-butanal (α-Methylbutyraldehyde)	92-3	20, tri-	1.3942	103.5, bz - pet eth	120											
19	Trichloroethanal (Chloral, Trichloroacetaldehyde)	98	-57.5	1.45572	90d	131	131, yel		56			Hydrate, 51.7					
20	Pentanal (Valeraldehyde)	103.4	-91.5	1.3947		98, yel, al, 107			52, pet eth	104.5	113	Thio-semicarbazone, 65					
21	tert-Butylacetaldehyde	103		1.4150		147											
22	2-Butenal (Crotonaldehyde)	104	-69	1.4362 ^{20.5}	199	190, crim, bz - lt pet	184.5	56	119	183	163, sint, 167	Phenyl-semicarbazone, 126-7	dk red	dk br - red		2	
23	Dimethylethylacetaldehyde	104															
24	Ethoxyacetaldehyde	106		1.3956		116.7, me al	113.4, al										
25	2-Isopropylacrolein	107.9		1.4223		165											
26	2-Butynal	105		1.446 ¹⁹		136											
27	Methylisopropylacetaldehyde	114		1.3998 ²⁵		124											
28	2-Bromoisobutyraldehyde	115		1.4518 ²⁵									Decomposes in w				
29	Diethylacetaldehyde (2-Ethylbutyraldehyde)	116-117		1.4025	99, bz - lt pet	95, pa - or, lt pet, 129, 30, al				102, me al							
30	Methyl-n-propylacetaldehyde	116 ⁷³⁷			102	103											
31	2-Methyl-2-butenal	116.9			216												
32	n-Propoxyacetaldehyde	119 ⁷⁴⁸				86											
33	Isobutylacetaldehyde (Isocaproaldehyde)	121 ⁷⁴³			127	99			b p 103 ³⁵								
34	Paraldehyde (Acetaldehyde trimer)	124.4 ⁷⁵²	12.6	1.4049								Dilute acid → Acetaldehyde, b p 20.2	dk ol grn	dk red br		4	
35	2-Pentenal	125			180		123										
36	3-Methoxyisobutyraldehyde	129		1.4030 ²⁷		102											

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	Semi carba zone	2,4-Di nitro phenyl hydra zone	p Nitro phenyl hydra zone	Phenyl hydra zone	Oxime	Dimeth one deriv (Dime done deriv)	Dimeth one anhy dride	Miscel laneous	o-Dianisidine spot test		
													Cold	Hot	Limit γ
37	3-Chloropropion-aldehyde	130-1		1 475 ¹⁵								Trimer 35 5, dil HCl-abs al b p 170 5 ¹²⁻⁵			
38	Hexanal (Capro-aldehyde)	131		1 4068	106, bz - pet eth	104, or - yel			51, pet eth me al	108 5, dil al		Phenyl-semicar-bazone, 135-6			
39	Ethylisopropylacet-aldehyde	133 5		1 4086 ²⁵		121									
40	3,3-Dimethyl-pentanal	134		1 4292		102									
41	3-Methyl-2-butenal (3-Methylcroton-aldehyde)	135		1 4526	223	182									
42	Cyclopentanecar-boxaldehyde	136			124										
43	2-Methylpenten-2-al-1 (3-Ethyl-2-methylacrolein)	136 8		1 4488	207	159, red al		58-60	48-48 8						
44	Tetrahydrofurfural	142-3 ⁷⁹		1 4473 1 43658	166	134						Conc HCl → brt red col α Benzyl-α phenyl hydra zone 67 me al			
45	5-Methylhexanal	144 ⁷⁵⁰		1 4114	117	117									
46	3-Furaldehyde	144 ⁷³²		1 4945	211			149 5							
47	1-Cyclopentenyl-formaldehyde	146		1 4828 ²¹	208			188							
49	2-Chloro-2-butenal (2-Chlorocroton-aldehyde)	147-50		1 478 ²³								Cyano-hydrin b p 137 8 ²⁶ , n _D ²⁰ 1 4762			
50	2-Hexenal	150		1 4470 ¹³	176			139							
51	3-Hexenal	150			147										
52	Heptanal (Enanth-aldehyde)	155	-45	1 4125	109, al	108, yel, al	73		57	135	112		red-br	red	9
53	Ethylisobutylacet-aldehyde	155			98										
54	Di-n-propylacetal-dehyde	161		1 4142 ¹⁵	101				b p 126 ⁴⁷						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	Semi-carbazon	2,4-Dinitrophenylhydrazone	p Nitrophenylhydrazone	Phenylhydrazone	Oxime	Dimeth one deriv (Dime done deriv)	Dimeth one anhydride	Miscellaneous	o-Dianisidine spot test		
													Cold	Hot	Limit, γ
55	2-Furancarboxaldehyde (Furfural)	161.7	-36.5	1.52608	202	212.4, yel, 230 (cor), red, mixture 185	54	97	α 75-6, pet eth, β 91.2, al	160d	162.5	Phenylsemicarbazone, 180.1	dk red-vlt	dk bl-vlt	0.02
56	Hexahydrobenzaldehyde	162		1.4495 ¹⁹	173, 176, w	172			90-1, pet eth			Oxime-HCl, 107-8d			
57	2-Ethylhexanal-1 (n-Butylethylacetaldehyde)	163		1.4150	254d	114.5, dil al, 120.1, yel, al									
58	2,2,3-Trichloro-n-butyraldehyde (n-Butylchloral, Crotonchloral)	164.5 5.5		1.47554					65			NH ₃ → Butylchloral ammonia, 62			
59	Butanedial (Succinaldehyde)	169-70d		1.4254		280			di 172			Polymer, 65			
60	Octanal (n-Octaldehyde Caprylaldehyde)	171		1.42167	98, dil me al 101	106, yel, al, 96	80, brt yel		60, me al	90, dil al	101	Thiosemicarbazone, 94-94.5			
61	2-Ethyl-3-n-propylacrolein	173		1.4518 ²²	150.1, 153	124.5, 122									
62	3-Fluorobenzaldehyde	173					202	114	63						
63	2,2,2-Tribromoethanal (Bromal)	174, yel							115			Monohydrate, 53.5	no reac	dk grn	40
64	4-Fluorobenzaldehyde	174.5 ⁵²					212	147	syn 116.7, anti 86						
65	2-Fluorobenzaldehyde	175	-44.5				205	90	63						
66	Benzaldehyde	179	-26, fp -55.6	1.5446	222, 233-5, r htng	237, or, al	190, red, al 234, 6, 262	158, 154.5	α 35 (stable) β 130, eth 64, pet eth	193	200	Phenylsemicarbazone, 180.1	or	red-or	3
67	Nonanal (Pelargonaldehyde)	185		1.4273	100.84, me al	100 (cor), yel, al						Phenylsemicarbazone, 131.2			
68	5-Methylfurfural	187		1.5147 ²⁵	211*	212 (cor)	130, red	147-8	syn 112, anti 51-2						
69	Glutaraldehyde	187-9d		1.4330 ²⁵			169		di 175, 178, w						
70	Phenylethanal (Phenylacetaldehyde)	194	33	1.53191	153, dil al, 156	121, grn-yel, al, 110		58, lgr, 62-3	97-8, eth, 100	165	126		dk br-red	dk br	polym

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES

a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	Semi carb zone	2,4-Di nitro phenyl hydrazone	p Nitro phenyl hydrazone	Phenyl hydrazone	Oxime	Dimeth-one deriv (Dime done deriv)	Dimeth one anhy dride	Miscel-laneous	o-Dianisidine spot test		
													Cold	Hot	Limit, γ
71	2-Hydroxybenzaldehyde (Salicylaldehyde)	197 (cor)	-7, f p 16	1.574	231	248, red, abs al 252d, lt red, ac a 242	227, red-br, al	142	57.63		208, 70% al	p-Nitrobenzoate, 128	or	or	5
72	2-Thiophenecarboxaldehyde	198		1.5950 ¹⁶				119 139							
73	3-Methylbenzaldehyde (3-Tolu-aldehyde)	199		1.5413 ²¹	204 223 4	212, 194	157	91, lgr, 84	60, lgr	172	206		dk or-red	ch red	5
74	2-Methylbenzaldehyde (2-Tolu-aldehyde)	200		1.5481	209 al, 212, 218	193 4, red, ac a	222, red, al	101, 105 6, 111	49	167	215		dk or-red	ch red	5
75	4-Methylbenzaldehyde (4-Tolu-aldehyde)	204 5		1.5454	234, al, 215	232 5 4 5 (cor) or-yel al PhNO ₂	200 5 (cor), dk red, ac a	112-3, al, 121	79-80, 110				dk or-red	ch red	5
76	d-Citronellal (d-Rhodinal)	207		1.4485	83-4, chl, ppt by lgr 91 2	78, yel, al			oil	77 9, dil al	173		dk grn	brt red	10
77	Decanal (Capraldehyde)	207-9		1.4287	102	104, yel			69, dil me al	91 7, dil al		Thio-semicarbazone, 99-100	pa ol	dk br	200
78	2-Chlorobenzaldehyde	213-4	11	1.56708	146, yel, 225, pyr, 229-30, me al	213 6 (cor), 209, or red, xyl	237 8, red, al, 241, br-red, 249, or	86	α 75-6, al, β 101 3	205d, al	224 6 (cor), al				
79	Phenoxyethanal (Phenoxyacetaldehyde, Glycolaldehyde phenyl ether)	215d		1.5380 ²¹	145			86, pa yel, al	95, pet eth						
80	3,5-Dimethylbenzaldehyde	220-2	9	1.5385	201 2							Oxid → acid, 170, al			
81	3-Phenylpropionaldehyde (Hydrocinnamaldehyde)	224			127, al	149, yel, al	122 3, yel, dil al		93-4 5, dil al 97 (cor)						
82	Citral a. (Geranial)	228d		1.48752	164, me al	108-10, red-or al, 116			143 5				dk red	red blk	0 1
83	Citral b. (Neral)	228d		1.4900	HCl 171, mixture 132, NaOAc	96, red-or, al							dk red	red blk	0 1

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 1) Listed in order of increasing atmospheric b.p.* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	Semi carbazone	2,4-Di-nitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Dimeth-one deriv (Dime-done deriv)	Dimeth-one anhy dride	Miscel-laneous	o-Dianisidine spot test				
													Cold	Hot	Limit γ		
84	2,6-Dimethylbenzaldehyde	228 ^{7,12}	11		158												
85	3-Methoxybenzaldehyde (3-Anisaldehyde)	230	3-4	1.5538	233d		171	76	39-40 pet eth. 112			Phenylthio-semicarbazone, 153	dk or	red br	0.4		
86	3-Bromobenzaldehyde	234-6			205		220	141	72								
87	4-Isopropylbenzaldehyde (Cumaldehyde)	236		1.5301	211, me al	241, red bz., 243, red, ac a., 244.5, al -chl	190, al	129, al	α 52, al β 111	170-1, al	172-3		dk red	ol yel	3		
88	3-Ethoxybenzaldehyde	245-5		1.5408													
89	4-Methoxybenzaldehyde (4-Anisaldehyde)	248	2-5	1.5731	210, 203	253-4d, red, ac a., 250, red, xyl	160, red-vlt	120-1, wh, dil al	α' 64-5, bz α 4-5 (from α' on fusion) β 133, bz	144-5 (cor), al	243 (cor), al		dk or	red br	0.4		
90	3-Phenylpropenal (Cinnamaldehyde)	252d	-7-5	1.61949	215-6 w	255d, red, ac a	195, red, al	168, yel, dil al	α 64-5, lgr, β 138-5, bz	213 (cor), al	175, al		dk ch red	ch red	0.05		
91	4-Ethoxybenzaldehyde	255, 249	13-4		202d, al, 208				syn 157 anti 118								
92	3,4-Diethoxybenzaldehyde (Protocatechualdehyde diethyl ether)	277-80							98			Oxid → acid, 165					
93	Diphenylacetaldehyde	315-6d			162				α 120, β 106			Oxid → Benzophenone 48					

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 2) Reduced pressure b.p. only (listed in order of increasing semicarbazone m.p.)*

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	Semi carba zone	2,4-Di nitro phenyl hydra zone	p Nitro phenyl hydra zone	Phenyl hydra zone	Oxime	Di meth one deriv (Dime done deriv)	Di meth one anhy dride	Miscellaneous	o-Dianisidine spot test				
													Cold	Hot	Limit γ		
1	7-Methyloctanal	94 ¹²⁰			80	100											
2	3-(2-Furyl)propionaldehyde	70 ¹⁴		1.4470	80												
3	2-Methyloctanal	83 ²⁰			80												
4	2,3-Dichloro-n-butyr-aldehyde	58 60 ²⁰		1.4618 ²¹	96.7				oil								
5	Octanal (n Octaldehyde)	81 ³²		1.4217	98.101	106 yel	80		59.60	89.8							
6	Undecanal (Hendecanal)	120 ²⁰	-4	1.4324 ²³	103 me al	104 yel			72 wh me al			Timer 47.8					
7	Tridecanal (n Tridecylaldehyde)	136 ⁸	15		106 al	108			80.5 dil al			Trimer 61.5 eth					
8	2-Hydroxypropionaldehyde	114 ⁹			114 w		127										
9	2-n-Amylcinnamaldehyde (2-n-Pentylcinnamaldehyde Jasminaldehyde)	161 3 ¹⁷		1.5381	118	164 red al			74 al w								
10	2-Methyl-3-phenylpropionaldehyde	90 ⁹			123												
11	2-Hydroxy-2-methylhexanal (n-Butylmethylglycolaldehyde)	87.8 ⁵			143												
12	Phenoxyacetaldehyde	83		1.5360	146	138			95								
13	2-Ethyl-2-hexenal	73 ²⁰			152	125											
14	2-Ethyl-3-hexenal	84 ³²			156												
15	Cyclohexylacetaldehyde	58 ¹⁰		1.4509 ²⁵	159	125											
16	2-Nonenal	126 ²¹		1.4426	165	126	113										
17	2-Heptenal	85 ¹⁴		1.4314	169		116										
18	2,3,6-Trimethylbenzaldehyde	114 ¹⁰			169				126								
19	3,5-Dimethylhexahydrobenzaldehyde	71 ¹¹			171												
20	2-Hydroxy-2-phenylpropionaldehyde (Methylphenylglycolaldehyde)	101 ⁴			182.3												
21	2,4,6-Trimethylbenzaldehyde	98 ⁶ 128 ¹⁵		1.5524	188												
22	2-Hydroxy-2-phenylbutyraldehyde (Ethylphenylglycolaldehyde)	110 11			188												
23	2-Hydroxybutyraldehyde (Aldol)	83 ⁷			194		109.11 red yel dil al		syn 112 anti 51.2	146.8 30 ⁹ me al	126	4-Bromo phenylhydrazone 127.8					
24	1,2,3,4-Tetrahydro-2-naphthaldehyde	92 ¹			197												
25	2-(1-Naphthyl)propionaldehyde	132 ²			204												

* Derivative data given in order: m.p. crystal color solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES

a) Liquids 2) Reduced pressure b.p. only (listed in order of increasing semicarbazone m.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	Semi carba zone	2,4 Di nitro phenyl hydra zone	p Nitro phenyl hydrazone	Phenyl hydra zone	Oxime	Di meth one deriv (Dime done deriv)	Di meth one anhy dride	Miscellaneous	o Dianisidine spot test			
													Cold	Hot	Limit γ	
26	1,6-Hexanedial (Adipic dialdehyde)	94 ¹² , 70 ^d		1.4350	di 206				di 185.6 w							
27	2-Methylcinnamaldehyde	124 ¹⁴		1.6057 ¹⁷	208, al - w											
28	Phenylglyoxal	108 ¹⁵			mono 208 9d yel al bis 229d		309					91 (mono hyd)w 2 Thio semicarba zone, 170 yel al				
30	Cyclohexenecarboxaldehyde	70 ¹¹		1.4921 ¹	213				99							
31	2-Phenoxybenzaldehyde	153 ¹			215											

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
a) Liquids 3) Miscellaneous; reduced pressure b.p. only (listed alphabetically)*

No	Name	Boiling point °C	Melting point, °C	n _D ²⁰	Semi carba zone	2,4 Di nitro phenyl-hydra-zone	p-Nitro-phenyl hydra-zone	Phenyl-hydra-zone	Oxime	Di meth one deriv (Dime done deriv)	Di meth-one anhy-dride	Miscellaneous	o Diamisidine spot test		
													Cold	Hot	Limit γ
1	2-Chloroacrolein	29 31 ¹⁷		1 463								Diethylacetal, b p 158 60			
2	4-Chloro- <i>n</i> -butyraldehyde	50 1 ¹¹		1 44662 ^{8 5}		134 5	110		74 5						
3	<i>d,l</i> -2,3-Dichloropropion-aldehyde	48 ¹⁴		1 4762								Dimethylacetal, b p 78-82 ¹³ , n _D ¹⁸ 1 144			
4	2-Heptynal	54 ¹³		1 4521 ¹⁷		74									
5	2,4-Hexadienal (Sorbalde-hyde)	65 ¹¹		1 5372 ²²				102	160						
6	4-Hydroxy- <i>n</i> -butyr-aldehyde	68 ⁸		1 4403		118									
7	3-Hydroxy-2-isopropyl-propionaldehyde	84 ¹⁰				126									
8	3-Hydroxy-3-methyl- <i>n</i> -butyraldehyde	67 ¹³					142								
9	4-Methoxy-2-methyl- <i>n</i> -butyraldehyde	66 ⁵⁵		1 4280 ²⁵		88									
10	5-Methyl-2-thiophene-carboxaldehyde	114 ²⁵		1 5782 ²⁹				126							
11	3-Methyl-2-thiophene-carboxyaldehyde	114 ²⁵		1 5833 ²⁵				149							
12	4-Octenal	84 ¹³		1 4463 ²⁵		108									
13	Phenylpropargyl alde-hyde	116 7 ¹⁷		1 6032 ²⁵					108, lgr						
14	2-Phenylpropionaldehyde	76 ⁴				135									
15	3-Pyridinecarboxaldehyde (Nicotinaldehyde)	99 ²⁶						158							
16	2,2,4-Trichloro- <i>n</i> -butyr-aldehyde		f p -78									HNO ₃ → acid, 73 5			
17	2,4,6-Trihydroxybenzal-dehyde (Phloroglucinalde-hyde)		d						195d, (hyd), w			2,4,6 Triacetate 156 7, al 2- Benzoate 198 200, chl			
18	4-Vinylbenzaldehyde (4-Formylstyrene)	93 ¹⁴		1 5960 ²⁵				131							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point °C	Boiling point °C	Semi carbazone	2,4-Di-nitro phenyl hydrazone	p Nitro phenyl-hydrazone	Phenyl hydrazone	Oxime	Dimeth one deriv (Dime done deriv)	Di meth one anhy dride	Miscellaneous	o Diamisidine spot test		
												Cold	Hot	Limit γ
1	3-Chlorobenzaldehyde	17 8	213 4	228, pyr 230, me al	248, dk red, xyl, 256, or-yel	216, dil al	134 5, abs al	<i>α</i> , <i>anti</i> 70 1, al <i>β</i> , <i>syn</i> 118 125			n_D^{20} 1 55908			
2	2,3,5,6-Tetramethylbenzaldehyde	20	135 ¹¹	270d										
3	2-Ethoxybenzaldehyde (Salicylaldehyde ethyl ether)	20 2 6-7	247 9	219, al				57 9, pet eth			Diacetate 88 9, ac anh			
4	Tetradecanal (Myristaldehyde)	23 3 5	166 ²⁴	106 5, dil al	108	95 brt yel		82 5 3 5, dil al			Trimer, 65			
5	Pentadecanal	24 5	160 ¹⁴	106 5, al	106 7, yel, pyr-al	94 5, yel, al		86, dil al			Trimer, 69 70			
6	Hexadecanal (Palmitaldehyde)	34		107, dil al, 108-9	108	96 5, yel, eth		88, yel			Trimer, 73 Thiosemicarbazone, 106 9			
7	1-Naphthaldehyde	34	292 162 ¹⁸	221		224	80	98 90						
8	Phenylacetaldehyde	34	195	156, 163	121	151	<i>mono</i> 63, 58, <i>di</i> 101-2 113	99, 103	165					
9	4-Methoxy-1-naphthaldehyde	34, wh	200 ¹¹								Azine 185, yel, al			
10	(5-Hydroxymethyl) furfural	35 6	115 20 ⁹	195d al, recr tol -lgr	184 red	185 dk red, al	140 1, tol	77 8, 108						
11	Heptadecanal (Margarin aldehyde)	35-6, 63						89 5, et ac			Trimer, 77-8, lt pet			
12	3,4-Methylenedioxybenzaldehyde (Piperonal)	37	263	230, 234, 237	265d, xyl, 266d, red, ac a	199 200, red	102 3, yel, al, 99, 106 79	146, me al, <i>anti</i> 112, w 108 89	177 8, 193, yel, al	220 (cor)		brt red	dk red	4
13	2-Iodobenzaldehyde	37	129 ¹⁴	206										
14	Octadecanal (Stearaldehyde)	38		108-9	101, 110	101, yel, me al					Thiosemicarbazone, 111			
15	2-Methoxybenzaldehyde (<i>o</i> -Anisaldehyde, Salicylaldehyde methyl ether)	38-9	243-6 (cor)	215d, al	253 5 (cor), red, xyl	204-5, br red		92, dil al			n_D^{20} 1 5598			
16	2-Aminobenzaldehyde	40				220	221	135						
17	4-Diethylaminobenzaldehyde	41	172 ⁷	241d, al			103, yel-br	93						
18	Dodecanal (Lauraldehyde)	2 forms a) 42-3 b) 11	238	103, 106	106, yel	96		76-7, eth, 77-8, me al			Thiosemicarbazone, 100			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Semi-carbazone	2,4-Dinitrophenylhydrazone	p-Nitrophenylhydrazone	Phenylhydrazone	Oxime	Dimethone deriv (Dime done deriv)	Dimethone anhydride	Miscellaneous	o-Dianisidine spot test			
												Cold	Hot	Limit, γ	
19	3,4-Dichlorobenzaldehyde	43.4	247.8			276.7, or		syn 120 al, on fusing → anti 114.5 118-9							
20	3-Phenylcinnamaldehyde	44	210 ¹⁴	214.5	196		173, yel								
21	2,4,5-Trimethylbenzaldehyde	44	120 ¹⁰	243			127								
22	2-Nitrobenzaldehyde	44		256	265	263	156	anti 102 syn 154, bz				grn br	red br	5	
23	3,4-Dimethoxybenzaldehyde (Veratraldehyde)	44, 58	285	177	261.3 (cor), or, PhNO ₂ 264.5		121, al	94.5, lgr	173						
24	4-Chlorobenzaldehyde	48	214.5 6.5	230, pyr 233, me al	254 (cor), or	237, dk br, al	127 7.5, lt yel, dil al	α 110, β 146							
25	2-Pyrrolicarboxaldehyde	50	217.9	183.5, w		182.3, red, xyl	139, lgr	164, bz			n ^b 15939				
26	Benzylglycolaldehyde	52	121 ⁴	137							Benzoate, 70				
27	Furfural diacetate	52, eth	220												
28	4-Chloro-2-hydroxybenzaldehyde	52.5		212 pa yel, ac a		257, or, ac a		155, col, al							
29	Quinoline-4-carboxaldehyde	51.3, tol (anh), 84.4.5 (monohyd)	123 ⁴			261.2 yel al		181.2 me al			Picrate, 179				
30	2-Ethyl-4-hydroxybenzaldehyde	53	145 ¹												
31	2-(2-Furyl)acrolein	54, lgr	95 ⁹	219.5			132, pet eth	110.1							
32	2,3-Dimethoxybenzaldehyde (o-Veratraldehyde)	54	137 ¹²	231d			138	99, al-w							
33	9-Hydroxynonanal	54	120 ^{0.1}												
34	2,3-Diphenylpropionaldehyde	54	170 ¹¹	125											
35	3-Benzoyloxybenzaldehyde	54	218 ²⁰												

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Semi-carbazon	2,4-Dinitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Dimeth one deriv (Dime-done deriv)	Di meth-one anhy-dride	Miscellaneous	o-Dianisidine spot test		
												Cold	Hot	Limit, γ
36	3-Chloro-2-hydroxy-benzaldehyde (3-Chlorosalicylaldehyde)	54.5		240-3, 50% ac a				167-8, dil al			5 Nitro deriv, 129, yel, dil al			
37	Octatrienal	55												
38	Isoquinoline-1-carboxaldehyde	55.5		197			171.2							
39	Phthalaldehyde	56					di 191					brt yel ppt	brt yel ppt	
40	2,3,5-Trichlorobenzaldehyde	56 col, dil al									Oxid $\xrightarrow{\text{KMnO}_4}$ acid, 162.3 Diacetate, 94, al			
41	2-Hydroxy-5-methylbenzaldehyde (5-Methylsalicylaldehyde)	56 dil al	217.8				149 yel, al	105, w						
42	3-Iodobenzaldehyde	57		226		212	155	62						
43	4-Bromobenzaldehyde	57		228, 229	128, 257	207.8	113	syn 157, anti 111						
44	3-Nitrobenzaldehyde	58		246	293d	247	120, 124	120, 122						
45	2,5-Dichlorobenzaldehyde	58	231-3				104-5, al	127.5-8, dil al						
46	2,4,6-Trichlorobenzaldehyde	58-9												
47	2-Phenanthraldehyde	59, 59.5		282				175						
48	Paraisobutyraldehyde (2,4,6-Tri-isopropyl-1,3,5-trioxan)	59, 60	195 (cor), sl depolym								See Isobutyraldehyde b p 64			
49	1-Hydroxy-2-naphthaldehyde	59, 60, gm - yel, al - w						145, bz						
50	2-Naphthaldehyde	60, w	150 ¹⁵	245, al	270	230	205.6, 217.8	156, dil al						
51	4-Phenylbenzaldehyde	60		243d, al	239d, scar, xyl		189d	149-50						
52	3-Methoxy-1-naphthaldehyde	60, pet eth		200, al - w		197, red, ac a		102, al - w						
53	4-Ethoxy-3-methoxybenzaldehyde	64												
54	3,5-Dichlorobenzaldehyde	65	235 40 ⁷⁴⁸				106.5, yel, pet eth	112						
55	2,3-Dichlorobenzaldehyde	65.7												
56	5-Methoxy-1-naphthaldehyde	66, yel, pet eth		246, ac a - w		246, red, ac a - w		104, w						

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi-carbazone	2,4-Dinitrophenylhydrazone	p-Nitrophenylhydrazone	Phenylhydrazone	Oxime	Dimethone deriv (Dime-done deriv)	Dimethone anhydride	Miscellaneous	o-Diamidine spot test				
												Cold	Hot	Limit, γ		
57	Dibenzofuran-2-carboxaldehyde	68					162									
58	2,6-Dichlorobenzaldehyde	70-1									o-Nitrophenylhydrazone, 154, p-Bromophenylhydrazone, 142					
59	2,4-Dimethoxybenzaldehyde (β-Resorcyaldehyde dimethyl ether)	71, dil al, 69	165 ¹⁰					106, w			5-Nitro deriv 188 9, me al					
60	Quinoline-2-carboxaldehyde	71, pet eth (anh), 51 (monohyd), w				250, yel, 225, subl	204, yel, al	188								
61	4-Ethoxy-1-naphthaldehyde	72									Hydrazone, 160 182, dk red, Azine, 209, yel, PhNO ₂					
62	4-Aminobenzaldehyde	72		153				124				or br	red br		0.4	
63	2,4-Dichlorobenzaldehyde	72, 74 5						136 7			Oxime HCl, 133 5					
64	4-Dimethylaminobenzaldehyde	74		222	325	182	148	185								
65	4-Methylthiazole-5-carboxaldehyde	75, 72 5	118 ²¹					159, 161								
66	Quinoline-6-carboxaldehyde	75 6 (anh), 55 (hyd)		239, yel, al				185, red, al	191, yel, al		Methiodide, 218, yel, al					
67	3,4,5-Trimethoxybenzaldehyde (Gallaldehyde trimethyl ether)	78, 75	163-5 ¹⁰	219-20		201-2		83 4								
68	4-Iodobenzaldehyde	78		224	257	201	121									
69	3-Phenanthraldehyde	80		275				145								
70	4-Hydroxy-3-methoxybenzaldehyde (Vanillin)	80 1, w	285d	230, 240d.	271d (cor), red, ac ac, 268	227, ac a, 223	105, bz	117, w, 122	196-8 (cor), al	228	2,4-Dinitrophenyl ether, 131	brt or red	ch red		3	
71	2-Hydroxy-1-naphthaldehyde	82, al	192 ²⁷	240, yel, me al				157			Picrate, 120	or	brk red		10	
72	Stilbene-2-carboxaldehyde	83														
73	2-Methoxy-1-naphthaldehyde	84, al	200-1 ¹¹								Azine, 255-6, yel, PhNO ₂					

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Semi-carba-zone	2,4-Di-nitro-phenyl-hydra-zone	<i>p</i> -Nitro-phenyl-hydrazone	Phenyl-hydra-zone	Oxime	Dimeth-one deriv (Dime-done deriv)	Di meth-one anhy-dride	Miscellaneous	<i>o</i> -Dianisidine spot test		
												Cold	Hot	Limit, γ
74	2,3,6-Trichlorobenzaldehyde	86.7									Ac anhyd + ac a + NaOAc → 2,3,6-trichlorocinnamic acid, 189. ac a			
75	Isophthalaldehyde	89					242	180						
76	3,4,5-Trichlorobenzaldehyde	90.1, al		252-4, al		342d, or, PhNO ₂	147				2-Nitro deriv, 118.5. 9.0 Oxid alk KMnO ₄ → 3,4,5-trichlorobenzoic acid, 210			
77	Phenylglyoxal hydrate	91		α 217d		309	di 152	α 129, di 168						
78	2,3,4-Trichlorobenzaldehyde	91									Ac anhyd + ac a + NaOAc → 2,3,4-trichlorocinnamic acid, 185			
79	Quinoline-8-carboxaldehyde	94.5, dil al		238.9, bz			176, yel, al	115, dil al						
80	2-Phenylcinnamaldehyde	94, al, 95	195, 200 ¹	188-9, al, 195			125.6, yel, ac a, 141	165-6, al						
81	3,5-Dichloro-2-hydroxybenzaldehyde (3,5-Dichlorosalicylaldehyde)	95.6		227d, ac a			153, pa yel, al	195-6, al-w (4.1)			Ac anhyd + ac a + NaOAc → dichlorocoumarin, 160, bz			
82	Hydroxyacetaldehyde (Glycolaldehyde)	96.7					162				Phenylosazone, 178.9, yel, eth, <i>p</i> -Nitrophenylosazone, 311			
83	3-Chloro- <i>n</i> -butyraldehyde (Trimer)	96.7	28-33 ¹³											
84	2,2-Dimethyl-3-hydroxypropionaldehyde	97	85 ¹⁵											
85	2,3,4,6-Tetrachlorobenzaldehyde	97.8												
86	Benzaldehyde-2-carboxylic acid (2-Formylbenzoic acid, Phthalaldehydic acid)	98.9 (hyd), 240-50 (anh)		202				120, w						
87	3-Hydroxy-2-naphthaldehyde	99-100		>270, me al			246-8	207d						

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Semi carbazone	2,4-Di-nitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Dimeth-one deriv (Dime-done deriv)	Di meth one anhy dride	Miscellaneous	o-Dianisidine spot test			
												Cold	Hot	Limit, γ	
88	5-Chloro-2-hydroxy-benzaldehyde	99 100	105 ¹²	286-7, ac a			150 2	128 w 123 4							
89	9-Phenanthraldehyde	101		223		265		157							
90	3-Hydroxybenzaldehyde	104 108 (cor.), w	240	198, 199	259, scar, xyl 260d, red, al	221 2, dil ac a	130 1 5, tol, 147, recr bz	90, 88				dk br red	dk ch red	4	
91	9-Anthraldehyde	105		219, yel, al			207, or, al	187							
92	4-Nitrobenzaldehyde	106		221, 211	320	249	159, 153	anti 133, 129, syn 182 4				or br	red br	1	
93	2,3,4,5-Tetrachloro-benzaldehyde	106 6 5													
94	2,3-Dihydroxybenzaldehyde	108		226d			167								
95	2-Chloro-5-hydroxy-benzaldehyde	110 5-1 5, ac a		236, pa yel			250 1, red, dil al		146 7, abs al						
96	1-Phenanthraldehyde	111 5						189							
98	2,4,5-Trichlorobenzaldehyde	112-3, al									Ac anh + ac a + NaOAc → 2,4,5-trichlorocinnamic acid, 200 1				
99	3-Hydroxy-2,4,6-trichlorobenzaldehyde	113-6 5, 50% ac a				272-3d, yel or		170-2, dil al							
100	2-Ethoxy-1-naphthaldehyde	115, al		214-5, yel, al			91				Azine, 184, yel, PhNO ₂ -al Dil a → acetaldehyde, b p 20 2				
101	Metalddehyde	115, 246, (polymers)													
102	4-Hydroxybenzaldehyde	116-7, w		224, 280d	280d, purp, ac a, 260 (mono-hyd), red, w	266	177 8, al, 184, slow htng	72, 112 (anh)	188-90 (cor), 184	246		dk or red	ch red	5	
103	Terephthalaldehyde	116, 118	245			di 281	di 278d, 154	di 200							
104	2,4,6-Trimethoxybenzaldehyde	118						201-3, me al							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Semi carba zone	2,4-Di-nitro phenyl hydra zone	p Nitro phenyl hydrazone	Phenyl hydra zone	Oxime	Dimeth one deriv (Dime done deriv)	Di meth one anhy dride	Miscellaneous	o Diansidine spot test		
												Cold	Hot	Limit γ
105	1-Bromo-2-naphthaldehyde	118									Oxid → acid 186			
106	4-Chloro-3-hydroxybenzaldehyde	121		238 9, pa yel		226 7 vit red dil al		126 (anh) 106 10d (monohyd)						
107	Pyrene-3-carboxaldehyde	126												
108	1,2,3,4-Tetrahydrophenanthrene-9-carboxaldehyde	129												
109	4,6-Dichloro-3-hydroxybenzaldehyde	129 30									2 Nitro deriv 157			
110	2,4-Dihydroxybenzaldehyde (β-Resorcyaldehyde)	135-6, yel, w		260d	286d brt red AmOH		156 60d	191, w						
111	3-Chloro-4-hydroxybenzaldehyde	139 (cor)		210d, yel, v dil ac a				144 5, w						
112	2-Chloro-3-hydroxybenzaldehyde	139 9 5		236 7, pa yel		244 5 or red, al		149 dil al						
113	2,6-Dichloro-3-hydroxybenzaldehyde	140 2						174 5 dil al						
114	2,4-Dichloro-3-hydroxybenzaldehyde	141, ac a				277 8, or red		188, al						
115	d,l-Glyceraldehyde (dimer)	142, 40°, me al		160d	166 7 (cor), 50°, me al			117 8	197 (cor) 50°, al 203	172 50°, al				
116	2-Chloro-4-hydroxybenzaldehyde	147 8 w		214, yel al		284d dk red al		194 al						
117	3,4-Dihydroxybenzaldehyde (Protocatechualdehyde)	153 4, w		230d	275d, dk red, me al		175 6d, w 121 8	157, xyl	145d, al		Dibenzoate 96 7, al			
118	3,5-Dihydroxybenzaldehyde (α-Resorcylic aldehyde)	156 7		223 4										
119	3,5-Dichloro-4-hydroxybenzaldehyde	158 9 (cor), 156, dil al		236 7d (cor), grn - yel, ac a				185, dil al						
120	Hydroxypyruvic aldehyde	160						135						
121	Diphenylglycolaldehyde	163		242				124						
122	Benzaldehyde-3-carboxylic acid (3-Formylbenzoic acid)	175, w		265			164	188d						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE IX. ORGANIC DERIVATIVES OF ALDEHYDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi carba zone	2,4-Di nitro-phenyl-hydrazone	p Nitro phenyl-hydrazone	Phenyl-hydrazone	Oxime	Dimeth one deriv (Dime-done deriv)	Di-meth one anhy dride	Miscellaneous	o-Dianisidine spot test		
												Cold	Hot	Limit γ
123	2-Hydroxybenzaldehyde-3-carboxylic acid (3-Formyl-salicylic acid)	179					188, al	193, yel, w						
124	4-Hydroxy-1-naphthaldehyde	181, yel, w		224							Hydrazone, 220-36, dk red Azine, 236, yel, PhNO ₂			
125	Indole-3-carboxaldehyde	195, 198					198							
126	Pentachlorobenzaldehyde	202.5					152.5 (cor), yel, al	201 (cor), bz						
127	3,4-Benzopyrene-5-carboxaldehyde	203												
128	3,4,5-Trihydroxybenzaldehyde (Gallaldehyde)	212d, (mono-hyd)				226, 234-6d		195-200d						
129	4-Hydroxybenzaldehyde-3-carboxylic acid (5-Formyl-salicylic acid)	248-9					219, al	179						
130	Benzaldehyde-4-carboxylic acid (4-Formylbenzoic acid)	256, w, subl					226	208-10						

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLES IX AND X (Continued)

From the carbonyl compound in ethanol with 2,4-dinitrophenylhydrazine in 85% phosphoric acid

See Vogel, p 344, G D Johnson, *J Amer Chem Soc*, **73**, 5888 (1951), **75**, 2720 (1953)

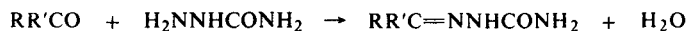
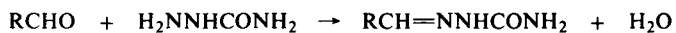
From the carbonyl compound with 2,4-dinitrophenylhydrazine and sulfuric acid in isopropyl alcohol

See N R Campbell, *Analyst*, **61**, 391 (1936)

From the carbonyl compound with 2,4-dinitrophenylhydrazine in pyridine

See E A Braude and C J Timmons, *J Chem Soc*, 3131 (1953)

Semicarbazone *



Semicarbazone

From the carbonyl compound with aqueous semicarbazide hydrochloride and sodium acetate

For directions and examples see Cheronis, pp 503-504, 512, Shriner, p 218, Vogel, p 344, Wild, p 121, A Michael, *J Amer Chem Soc*, **41**, 417 (1919)

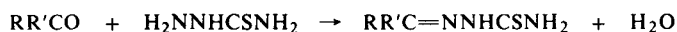
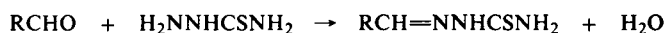
From the carbonyl compound in ethanol with aqueous semicarbazide hydrochloride and sodium acetate

See Linstead, p 27, Shriner, p 218, Wild, p 122, R L Shriner and T A Turner, *J Amer Chem Soc*, **52**, 1267 (1930)

From the carbonyl compound and acetone semicarbazone in acetic acid

See B Angla, *Ann Chim Anal Chim Appl*, **22**, 10 (1940)

Thiosemicarbazone *

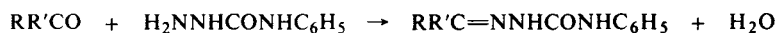
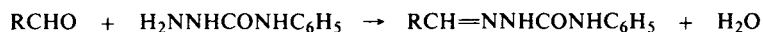


Thiosemicarbazone

From the carbonyl compound with thiosemicarbazide and sodium acetate in water, alcohol or acetic acid

For directions and examples see Cheronis, pp 503, 512, Wild, p 128, F J Wilson and R Burns, *J Chem Soc*, **121**, 873 (1922), W Baird, R Burns and F J Wilson, *J Chem Soc*, 2527 (1927), M Busch, *J prakt Chem*, **124**, 301 (1930), P P T Sah and T C Daniels, *Rec Trav Chim*, **69**, 1545 (1950)

Phenylsemicarbazone *

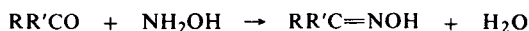
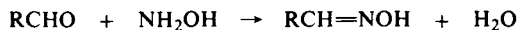


Phenylsemicarbazone

From the carbonyl compound with phenylsemicarbazide in alcohol or acetic acid

For directions and examples see P P T Sah and T -S Ma, *J Chinese Chem Soc*, **2**, 32 (1934), *CA*, **28**, 3713 (1934)

Oxime *



Oxime

From the carbonyl compound with hydroxylamine hydrochloride and pyridine in ethanol or without solvent

For directions and examples see Cheronis, p 513, Shriner, p 254, Vogel, p 345, J B Buck and W S Ide, *J Amer Chem Soc*, **53**, 1536 (1931), W E Bachmann and C H Boatner, *J Amer Chem Soc*, **58**, 2097 (1936), W E Bachmann and M X Barton, *J Org Chem*, **3**, 300 (1938)

For a modification of the above method in aqueous alcohol

See W M D Bryant and D M Smith, *J Amer Chem Soc*, **57**, 57 (1935)

From the carbonyl compound with hydroxylamine hydrochloride and sodium hydroxide in methanol or aqueous ethanol

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLES IX AND X (Continued)

See: Cheronis, p. 513; Shriner, p. 255; Vogel, p. 721; Wild, p. 121.

From the carbonyl compound with hydroxylamine hydrochloride and potassium hydroxide in 95% ethanol.

See: Shriner, p. 255.

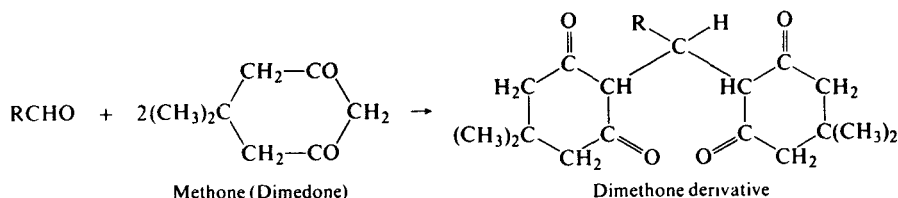
From the carbonyl compound with hydroxylamine hydrochloride and sodium or potassium acetate in water or aqueous ethanol.

See: Linstead, p. 27; Vogel, pp. 343, 345; J. S. Buck and W. S. Ide, *J. Amer. Chem. Soc.*, **53**, 1536 (1931).

From the carbonyl compound with hydroxylamine hydrochloride and sodium carbonate or bicarbonate in water or aqueous ethanol.

See: Wild, p. 120.

*Dimethone derivative (Methone derivative).**



This derivative is specific for aldehydes only.

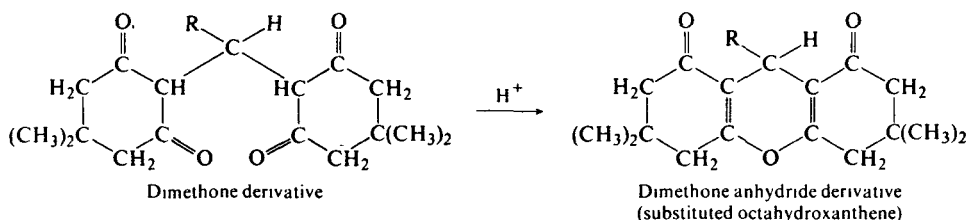
From the aldehyde and methone (dimedone; 5,5-dimethyl-1,3-cyclohexanedione; dimethyl dihydroresorcinol) in aqueous ethanol or methanol.

For directions and examples see: Cheronis, p. 505; Linstead, p. 27; Shriner, p. 220; Vogel, p. 333; Wild, pp. 136-7; D. Vorlander, *Z. Anal. Chem.*, **77**, 241 (1929); *Z. Angew. Chem.*, **42**, 46 (1929); W. Weinberger, *Ind. Eng. Chem., Anal. Ed.*, **3**, 365 (1931).

From the aldehyde with methone and a catalytic amount of piperidine in aqueous ethanol.

See: E. C. Horning and M. G. Horning, *J. Org. Chem.*, **11**, 95 (1946).

*Anhydride of dimethone derivative (substituted octahydroxanthene).**



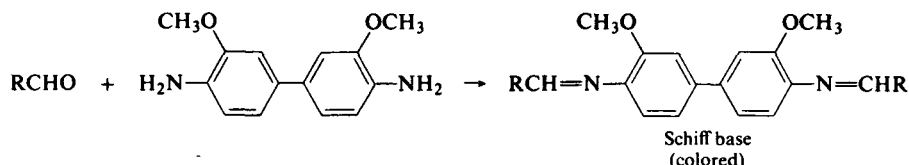
From the dimethone derivative with acetic anhydride.

For directions and examples see: Cheronis, p. 505; Vogel, p. 333.

From the dimethone derivative and a catalytic amount of hydrochloric acid in water or in ethanol.

See: Cheronis, p. 505; Linstead, p. 27; Shriner, p. 220; Vogel, p. 333; Wild, p. 137; E. C. Horning and M. G. Horning, *J. Org. Chem.*, **11**, 95 (1946).

o-Dianisidine spot test.



This test is usually applicable to aldehydes only.

From the aldehyde and a saturated solution of *o*-dianisidine (4,4'-diamino-3,3'-dimethoxybiphenyl) in glacial acetic acid.

For directions and examples see: F. Feigl, *Spot Tests in Organic Analysis*, 6th Ed., Elsevier Publishing Co., New York, 1960, p. 225; R. Wasicky and O. Frehden, *Mikrochim. Acta*, **1**, 55 (1927).

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

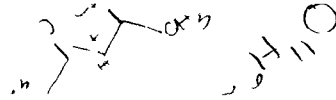


TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Semi carbazone	2,4-Dinitrophenyl hydrazone	<i>p</i> -Nitrophenyl hydrazone	Phenyl hydrazone	Oxime	Miscellaneous
1	Acetone (2-Propanone)	56	-95	1.3592		190 w	126 128 yel al	148 9 yel al	42	59	Thiosemicarbazone 179
2	3-Buten-2-one (Methyl vinyl ketone)	81		1.4095 ²		141 140					
3	2-Butanone (Ethyl methyl ketone)	80 82	86.4	1.3791	0.804	146	116 7 115 yel al	128 9 yel w al	oil	b p 152	Phenylsemicarbazone 168
4	3-Butyn-2-one (Ethyne methyl ketone)	86					181	143			
5	2,3-Butanedione (Biacetyl)	88 gr yel	f p 2.4	1.3927		mono 235 (cor) w di 278 9 c a	di 314 (cor) red or PhNO	mono 230 or yel	mono 134 yel dil il di 243d yel bz	mono 76 di 245 6 (cor) 234 5 subl dil al	
6	2-Methyl-3-butanone (Isopropyl methyl ketone)	94 3		1.3879	0.8046	113 4 112 3 dil	120 117 or yel al chl	108 9 or yel al	oil	oil	
7	2-Methyl-1-buten-3-one (Isopropenyl methyl ketone)	97 ¹		1.4232 1.4235		173	181				
8	Cyclobutanone	100		1.4189			146				
9	3-Pentanone (Diethyl ketone)	102	39.8	1.3922		138 9	156 p or al	144 or yel 50 dil	oil	b p 165	
10	2-Pentanone (Methyl <i>n</i> -propyl ketone)	107 3		1.3902 1.39012	0.80639	112 106	143 4 yel or al	117	oil	b p 167	
11	1-Penten-3-one (Ethyl vinyl ketone)	107 ¹		1.4192			129				
12	3,3-Dimethyl-2-butanone (<i>tert</i> -Butyl methyl ketone Pinacolone)	106	49.8	1.3960 1.3956	0.8114	157 8	125 or yel al fusion 131		oil	75 79	
13	1-Methoxy-2-propanone (Methoxymethyl methyl ketone)	115		1.3981			163 159	111 109			
14	1-Methoxy-3-butanone (1-Methoxyethyl methyl ketone)	116		1.3936		141					
15	4-Methyl-2-pentanone (Isobutyl methyl ketone)	116 8		1.3956	0.8008	132 135	95 or red al			b p 176	
16	3-Methyl-2-pentanone (<i>sec</i> -Butyl methyl ketone)	118		1.3990		94 5 pet cth	71 2			oil b p 89 ²⁶	
17	1-Chloro-2-propanone (Chloroacetone)	119				150 164d	125			b p 171 ²⁷	
18	2-Methyl-1-penten-3-one (Ethyl isopropenyl ketone)	119		1.4270 ¹		161					
19	1,1-Dichloro-2-propanone (1,1-Dichloroacetone)	120			1.305 ²	163					
20	2,4-Dimethyl-3-pentanone (Diisopropyl ketone)	124		1.4001	0.8108	160 (cor) 149	88 85 6 or 94 8				
21	Methyl neopentyl ketone	125 122		1.4018 ²⁵			100				
22	3-Hexanone (Ethyl <i>n</i> -propyl ketone)	125		1.4007	0.81491 ¹	113	130			b p 86 ¹⁷	
23	2,2-Dimethyl-3-pentanone (<i>tert</i> -Butyl ethyl ketone)	125 ²³		1.4052			144				
24	2-Hexanone (<i>n</i> -Butyl methyl ketone)	128		1.40069	0.81127	125 (cor) 121 rapid htne	106 red or al 110	88	oil	49	Thiosemicarbazone 110

* Derivative data given in order: m p, crystal color, solvent from which crystallized.

TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n_D^{20}	D_4^{20}	Semi carbazone	2,4-Di-nitrophenyl hydrazone	<i>p</i> -Nitrophenyl hydrazone	Phenyl hydrazone	Oxime	Miscellaneous
25	4-Methyl-3-penten-2-one (Isopropylideneacetone Mesityl oxide)	130		1 44397	0 86532	α 164 β 133 4, bz	200, red, al, 203, red, ac a 112	132 4, or -yel, al	142	β 48-9, me al	
26	3,3-Dimethyl-2-pentanone (<i>tert</i> -Amyl methyl ketone)	130 ⁷³³		1 4100							
27	Cyclopentanone	130 7	-51 3	1 4366 1 4370	0 94869	210 203, 216-7, rapid htng	146, or ac a, 142, or -yel, al	154	55, lt pet	56 5, pet eth	
28	5-Hexen-2-one (Allylacetone)	132		1 4174 ²⁵		102	108				
29	1-Methoxy-2-butanone (Ethyl methoxymethyl ketone)	133 ⁷⁵⁷		1 4063			198				
30	2,2,4-Trimethyl-3-pentanone (<i>tert</i> -Butyl isopropyl ketone)	135		1 4065		132				144	
31	5-Methyl-3-hexanone (Ethyl isobutyl ketone)	135 ⁷³⁵		1 407		152					
32	2-Methyl-1-penten-4-one	135 45d				192					
33	1-Bromo-2-propanone (Bromoacetone)	136				135d				36	
34	2-Methyl-3-hexanone (Isopropyl <i>n</i> -propyl ketone)	136		1 4075		119					
35	4-Methyl-3-hexanone (<i>sec</i> -Butyl ethyl ketone)	136		1 402		137	78				
36	2-Methoxy-3-pentanone (Ethyl 1-methoxyethyl ketone)	136 ⁷⁵⁰		1 4019		120					
37	Cyclobutyl methyl ketone	136		1 4283 ²⁸		149					
38	3-Methyl-2-hexanone	137				70					
39	3-Methyl-1-hexen-5-one	138		1 4197 ²⁵		112					
40	1-Chloro-2-butanone (Chloromethyl ethyl ketone)	138		1 4372							
41	3-Methyl-1-penten-4-one	138				201				75 6	
42	3,4-Dimethyl-2-pentanone	138		1 4094		113					
43	4-Hexen-3-one	139		1 4388		157					
44	2,4-Pentanedione (Acetylacetone)	139	-30	1 4465 ^{25 6}	0 976	<i>mono</i> 122, <i>di</i> 209	209, yel, al			<i>di</i> 149, al b p 103 ²²	
45	2-Methylcyclopentanone	139		1 4364		184, 182					
46	3-Ethyl-2-pentanone	139 ⁷⁴⁶		1 4073		99					
47	3-Hydroxy-3-methyl-2-butanone (Acetyl diethyl carbinol)	140				165				87	
48	4-Methyl-2-hexanone	142, 139		1 4057 ²⁵		120, 128					
49	1-Propoxy-2-propanone (Isopropoxymethyl methyl ketone)	142		1 4004			142 144				
50	<i>d</i>-3-Methylcyclopentanone	143		1 4340 ¹⁹		184 5				α 91-2, β 67-9	$[\alpha]_D^{25} + 132 9$
51	3,4-Dimethyl-4-penten-2-one	144				114					
52	4-Heptanone (Di- <i>n</i> -propyl ketone)	144	-34 0	1 4069	0 8175	132, pet eth	75, yel - or, al 71			b p 193	
53	2,4-Dimethyl-3-hexanone (<i>sec</i> -Butyl isopropyl ketone)	145		1 4059, 1 4080							
54	3-Hydroxy-2-butanone (<i>d l</i> -Acetoin)	145, 148	-72, 15	1 4178	0 9861 ³⁰	185, al, 202	<i>di</i> 318, or, PhNO ₂ tol				Phenylosazone, 243d, yel, bz
55	<i>d l</i>-3-Methylcyclopentanone	145 ⁷⁵⁵		1 4329		185					
56	1-Methoxy-3-methyl-2-butanone (Isopropyl methoxymethyl ketone)	145 ⁷⁴⁸		1 4078			163				

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point, °C	n_D^{20}	D_4^{20}	Semi-carbazone	2,4-Dinitrophenyl hydrazone	<i>p</i> -Nitrophenyl hydrazone	Phenylhydrazone	Oxime	Miscellaneous
57	2,2-Dimethyl-3-hexanone (<i>tert</i> -Butyl <i>n</i> -propyl ketone)	145 ⁷³⁸		1.4107			124, 116				
58	1-Hydroxy-2-propanone (Acetol)	146	-17	1.4295		196, al	128.5 (cor), or, al	173			
59	4-Chloro-3-methyl-2-butanone (α -Chloroisopropyl methyl ketone)	146		1.4390			116				
60	1-Hepten-4-one	146.7				110, w-al				b.p.	92.3 ¹³
61	3,4-Dimethyl-3-penten-2-one	147		1.4506 ¹⁴		200					
62	1-Ethoxy-2-butanone (Ethoxymethyl ethyl ketone)	147 ⁷⁵²		1.4068							
63	2,5-Dimethyl-3,4-hexanedione (Di-isobutyryl)	148		1.42057						<i>mono</i>	125, <i>di</i> 172
64	3-Heptanone (<i>n</i> -Butyl ethyl ketone)	148		1.4092		101, 103, 152					
65	5-Methyl-4-hexen-3-one	148		1.4496 ¹⁵		163					
66	5-Methyl-5-hexen-2-one (Methylallylacetone)	149		1.4285 ²⁵		137					
67	2-Methyl-4-heptanone (Isobutyl <i>n</i> -propyl ketone)	150 ⁷⁵⁰				124					
68	4,4-Dimethyl-3-hexanone (<i>tert</i> -Amyl ethyl ketone)	150.2				98					
69	2-Heptanone (<i>n</i> -Amyl methyl ketone)	151.2	-35.5	1.40069		123, al, 127	89, yel or, al 74		207		
70	3-Ethyl-5-hexen-2-one	152		1.4260 ²⁵			53				
71	5-Hepten-2-one (Crotylacetone)	153		1.4280 ²⁵	0.8446	105, 97					
72	1-Methoxy-2-pentanone (Methoxymethyl <i>n</i> -propyl ketone)	153 ⁷⁴⁵		1.4119							
73	3,3-Dimethylcyclopentanone	153 ⁷⁴⁸				178					
74	2,2,4,4-Tetramethyl-3-pentanone (Di- <i>tert</i> -butyl ketone)	154		1.4392, 1.4194							
75	1-Bromo-2-butanone (Bromomethyl ethyl ketone)	155, 50 ¹²		1.4670							
76	Cyclopentyl methyl ketone	155				143					
77	2,2,5,5-Tetramethylcyclopentanone	155		1.4280							
78	1-Methoxy-3-hexanone (1-Methoxyethyl <i>n</i> -propyl ketone)	155 ⁷⁴⁶		1.4091		169, 170					
79	Cyclohexanone	156	-16.4	1.4507		166-7	160, 162, yel al 80	146.7, 90% al	81.2, 50% al	91, lgr	
80	4-Methyl-6-hepten-3-one	156									
81	2-Hepten-4-one	156.7				147, w-me al					
82	2,3-Hexanedione	158									<i>di</i> 175
83	3,4-Dimethyl-2-hexanone	158, 155				120, 118, 126					
84	3,4-Dimethyl-3-hexen-2-one	158		1.4476 ¹⁵		142					
85	2,2,4-Trimethyl-3-hexanone (<i>tert</i> -Butyl isobutyl ketone)	158				145					
86	2-Ethyl-1-hexen-3-one	158 ⁷⁴²		1.4408 ¹⁸		119					
87	3,3-Dimethyl-1-methoxy-2-butanone (<i>tert</i> -Butyl methoxymethyl ketone)	159 ⁷⁴⁴		1.4193							
88	1-Isopropoxy-3-methyl-2-butanone	160					88				
89	2-Methyl-3-cyclopentanone	161		1.4771		220				127	

* Derivative data given in order: m.p., crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Semi carbazone	2,4-Di-nitrophenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Miscellaneous
90	1-Ethylcyclopentanone	161 ⁷⁵⁵				189					
91	3-Methyl-2-heptanone	162		1.415		82					
92	4,5-Dimethyl-5-hexen-3-one	162 ⁷⁵⁰				110					
93	3,5-Dimethyl-4-heptanone (Di-sec-butyl ketone)	162, 170-3				83-4					
94	6-Methyl-3-heptanone (Ethyl isoamyl ketone)	163, 160				132					
95	2-Methoxy-3-methyl-2-pentanone (sec-Butyl methoxymethyl ketone)	164 ⁷⁵⁷		1.4162							
96	1-Methoxy-4-methyl-2-pentanone (Isobutyl methoxymethyl ketone)	164 ⁷⁵¹		1.4140							
97	2-Methylcyclohexanone	165.1, 166	-14.0	1.4885	0.92500	191, 197d, al, rapid htng	135.5, 70.1, 137 (cor), 202.3	132	b.p. 220 ¹⁵⁻¹⁷	43, eth	
98	4-Hydroxy-4-methyl-2-pentanone (Diacetone alcohol)	166, 164								58	3,5-Dinitrobenzoate, 55
99	4,5-Dimethyl-4-hexen-3-one	166 ⁷⁵⁰				209					
100	2,2-Dimethyl-3-heptanone (n-Butyl tert-butyl ketone)	166 ⁷⁴⁵		1.4167		145					
101	2,6-Dimethyl-4-heptanone (Di-isobutyl ketone, Isovalerone)	168.0		1.4173 ²⁵		122, 126	66, or -red 92				
102	2-Methyl-4-octanone (n-Butyl isobutyl ketone)	168				132					
103	2,5-Dimethyl-4-heptanone (sec-Butyl isobutyl ketone)	169, 167				133					
104	d-3-Methylcyclohexanone	169		1.4456 ²¹		180, me al				43	$[\alpha]_D^{20} +13.38$
105	d-l-3-Methylcyclohexanone	168, 169.6	-73.5	1.4430, 1.4463	0.91535	179, me al, 191.4d, rapid htng	155, yel	119	94, w-al		
106	1-Methoxy-2-hexanone (n-Butyl methoxymethyl ketone)	169 ⁷⁴⁴		1.4173							
107	4-Octanone (n-Butyl n-propyl ketone)	170				96					
108	Methyl acetoacetate	170	-40.6	1.41964	1.0765	152					
109	2,2-Dimethylcyclohexanone	170, 171		1.4482		201, 193	140-2				
110	6-Methyl-2-heptanone (Isohexyl methyl ketone)	171		1.4146		154	77				
111	trans-2,4-Dimethylcyclohexanone	171		1.4429 ¹⁶		136					
112	4-Methylcyclohexanone	171.25	-40.6	1.4445	0.91562	199, me al, 203.5d, rapid htng		128.5, yel, al	109.10, al	37.9	
113	d,l-2,5-Dimethylcyclohexanone	171-3		1.4446		α 122, β 173				111, al	
114	2-Octanone (Hexyl methyl ketone)	173	-21.5	1.41518, 1.4154	0.81853	122.3 (cor), pet eth-al	58, or, al	92.3, yel, al			
115	5-Ethyl-3-heptanone	173				134					
116	d-2,5-Dimethylcyclohexanone	173-4				176.7				97.8	$[\alpha]_D^{20} +11.6$
117	3-Ethyl-2-methylcyclopentanone	174				170, al					

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Semi-carbazone	2,4-Di-nitrophenyl-hydrazone	<i>p</i> -Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Miscellaneous
118	2,6-Dimethylcyclohexanone	174		1 4500, 1 4470							
119	2-Isopropylcyclopentanone	174		1 4395 ²⁹		202					
120	Acetoxyacetone	174-5, 74 ¹⁸		1 4150	1 0749	145 me al		144, yel, bz	60d, eth	b p 144 ²⁰	
121	2,4-Heptanedione (<i>n</i> -Butyryl-acetone)	174.5									Cu salt, 165 161, pa bl
122	3-Methyl-3-hepten-2-one	175				164					
123	<i>cis</i> -2,4-Dimethylcyclohexanone	176		1 4430 ²⁵		200, 190				98.9	
124	4-Ethyl-4-hydroxy-3-hexanone	178 ⁷⁴²				177					
125	2,3-Dimethylcyclohexanone	178-9		1 4505		203-4					
126	2,2,6-Trimethylcyclohexanone	179 ⁷⁶⁷		1 4480		209	141				
127	3,3-Dimethylcyclohexanone	179 ⁷⁴⁸		1 4482 ¹⁷		219					
128	5-Ethyl-4-hepten-3-one	179 ⁷⁴⁰				105					
129	3-Ethyl-4-methylcyclopentanone	180				208-9 w-al				oil, b p 117 ¹¹	
130	Cyclohexyl methyl ketone	180		1 4514		177		154		60	
131	<i>trans</i> -3,5-Dimethylcyclohexanone	<i>d l</i> 180.1		1 4475 ²¹	<i>d l</i> 0 897 <i>d</i> 0 9083 <i>l</i> 0 9074	<i>d l</i> 193-4, <i>d</i> 193-4, <i>l</i> 189				<i>d l</i> oil, b p 116-8 ¹⁴	<i>d</i> $[\alpha]_D^{20} +4.65$ <i>l</i> $[\alpha]_D^{20} -7.91$
132	5-Hydroxy-4-octanone (Butyrolin)	180-90					99				
133	Ethyl acetoacetate	181				133, 129d	93				
134	Cycloheptanone	181, 182				163	148	137		23	
136	<i>cis</i> -3,5-Dimethylcyclohexanone	182-3		1 4407	0 890	202.3				74	
137	2-Propylcyclopentanone	183		1 4429		214d, al				oil, b p 109-11 ⁹	
138	2,2,6,6-Tetramethylcyclohexanone	184 ⁷⁷²	15	1 4473							
139	3-Methyl-2,4-hexanedione	184 183									Cu salt, 177
140	5-Nonanone (D1- <i>n</i> -butyl ketone)	186-7	f p -5.9	1 421 ¹⁵	0 8222	90, al					
141	3,4-Dimethylcyclohexanone	187		1 4520 1 4507	0 906	189					
142	3-Nonanone (Ethyl <i>n</i> -hexyl ketone)	187 ⁷⁵¹				112					
143	2,5-Dimethylcyclohexen-3-one	189.90		1 4753 ²²		165, me al				92.3, me al 169, al 121	
144	Methyl 2-pyridyl ketone (2-Acetyl-pyridine)	190									
145	3-Propylcyclopentanone	190-1		1 4456 ¹²		178.9, me al				oil, b p 121.2 ¹²	
146	3-Ethylcyclohexanone	192		1 4537, 1 4511		182, 175					
147	1,5-Dimethylcyclohexen-4-one	192-3, 194								102	
148	2,5-Hexanedione (Acetonyl-acetone)	194	-9	1 428, 1 449	0 97370	<i>mono</i> 185d, <i>di</i> 224	<i>di</i> 257 pyr	<i>di</i> 210.2 red al	<i>di</i> 120, <i>dil</i> al	<i>mono</i> b p 130 ¹¹ , <i>di</i> 137	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Semi-carbazone	2,4-Dinitrophenylhydrazone	<i>p</i> -Nitrophenylhydrazone	Phenylhydrazone	Oxime	Miscellaneous
149	<i>d</i> -Fenchone	195-6		1.46355 ¹⁸	0.947 ¹⁹	184, 172	140		b p 202-3 ¹⁸	<i>d</i> or <i>l</i> α + 165 β + 123, <i>d l</i> α + 159 β + 129	Hydrazone 56 7
150	2-Nonanone (<i>n</i> -Heptyl methyl ketone)	195 3	-8	1.42072	0.82133 0.82217	118 9 al					
151	1-Acetyl-4-methylcyclohexanone	195-7		1.4509 ¹⁸		α 159, me al β 175				57 9	
152	Methyl levulinate	196 0		1.42333	1.04945	143	142, al		96 105, al		
153	4-Fluoroacetophenone	196		1.5081 ²⁵		219					
154	<i>d l</i> -2-Ethyl-5-methylcyclohexanone	197		1.4485		178-81				80, w -al	
155	1-Acetyl-2-methylcyclohexanone	197 200				172 3					
156	2- <i>n</i> -Propylcyclohexanone	198-9 ^{74*}		1.4558 ¹³		133d, w -al				67 8	
157	1-Acetylcyclohexene	200		1.4892		220				59	
158	3-(Trifluoromethyl)acetophenone	202									
159	β-Thujone	202, 76 ¹⁰				174	114				
160	Acetophenone (Methyl phenyl ketone)	205, 202	20	1.541 1.5339	1.02810	198-9 (cor), 50% al, 203	238-40, al, 249- 50, or - red, ac a	184-5, or -red	105, wh, al, → dk	60	
161	2-Ethyl-4-methylcyclohexanone	205 ^{74*}		1.4452							
162	Ethyl levulinate	206		1.42288	1.01114	148	102		104		
163	4-Decanone	206 7				51 2					
164	1,5-Dimethylcyclohexen-3-one	208-9		1.4819 ²²		179-80, yel, al, 168 71			76 8		Thiosemicarbazone, 195d
165	<i>l</i> -Menthone	209, 207	-6 6	1.4505		189, 187, 184	146, or, al		53	59, eth	
166	2-Decanone (Methyl <i>n</i> -octyl ketone)	211, 215 5	14, f p 3 1	1.42523	0.82370	124, 126, pet eth					
167	Methyl 4-pyridyl ketone	212								142	
168	4- <i>n</i> -Propylcyclohexanone	212 ⁷⁴⁰		1.4514 ²⁵		180					
169	2-Acetylthiophene (Methyl 2-thienyl ketone)	213	10 5	1.5666		190, bz		181	96	81	
170	2-Methylacetophenone (Methyl 2-tolyl ketone)	214, 216		1.5320		205, al, 210	159, yel, al 161			61	
171	6-Bromo-2-hexanone	214 ⁷²⁰		1.4713			81				
172	1,5,5-Trimethylcyclohexen-3-one (Isophorone)	215		1.4789 ^{21 5}	0.9255 ^{20 5}	199 5d, al, 191			68, dil al	79 5, pet eth, 76	
173	<i>n</i> -Propyl 2-pyridyl ketone	217-8							82		Picrate, 75
174	Propiophenone (Ethyl phenyl ketone)	218, 220	20, 18 6	1.5270	1.0105	173 4 (cor), al, 182, rapid htng	190 1, red, bz, 189			54, 53, pet eth	
175	Methyl 3-pyridyl ketone	220, 218							137	113	
176	3-Methylacetophenone (Methyl 3-tolyl ketone)	220		1.5306	1.007	198, 203	207			55, 57, al	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point, °C	n_D^{20}	D_4^{20}	Semi-carbazone	2,4-Di-nitrophenyl-hydrazone	<i>p</i> -Nitrophenyl-hydrazone	Phenyl hydrazone	Oxime	Miscellaneous
177	Isobutyrophenone (Isopropyl phenyl ketone)	222 217		1.5190	0.9863 ^{16,17}	181, al	163, or -red, dil ac a		73	94, lt pet	
178	Acetyl benzoyl ketone	222, yel		1.537 ¹⁰		<i>di</i> 229 32		<i>di</i> 256	α 143	α , <i>mono</i> 166, β , <i>mono</i> 114 <i>di</i> 240	
179	5-Ethyl-1-methylcyclohexene-3-one	223.7				162.8d, al					Thiosemicarbazone, 150.1
180	4[8]- <i>p</i> -Menthen-3-one (Pulegone)	224, 221.2		1.48705 ¹⁸		174.175.6	142			119	
181	Pivalophenone (<i>tert</i> Butyl phenyl ketone)	224 ^{7M}		1.5082 1.5102		150	194.5			167	
182	1-Phenyl-2-butanone (Benzyl ethyl ketone)	226				135.146					
183	6-Undecanone (6-Hendecanone Di- <i>n</i> -amyl ketone)	228 (cor)	15	1.42875	0.82471	oil				oil	
184	3-Chloroacetophenone	228				232		176		88	
185	Ethyl 1-thienyl ketone	228				167				55-6	
186	2-Undecanone (2-Hendecanone Methyl <i>n</i> -nonyl ketone)	228	12.1 12.7	1.42899	0.82564	122.0.5	63, al	90.1, yel, al		44.5	
187	2,4-Dimethylacetophenone	228 234.5		1.5381 1.5340		185.7				63.4, pet eth	
188	2-Chloroacetophenone	229		1.685 ²⁵		160				113	
189	1-Phenoxy-2-propanone (Phenoxyacetone)	229 30 120 ¹⁴		1.5228	1.0903	173, 176 (cor), 50% al					
190	<i>n</i> -Propyl 4-pyridyl ketone	229.31									Picrate, 96
191	<i>n</i> -Butyrophenone (Phenyl <i>n</i> -propyl ketone)	230, 218 21	11.5 13.0	1.5196 1.5203		187.8, al, 191	190, or -red, dil ac a			50, abs eth	
192	<i>d</i> -Carvone	230		1.49952	0.9608	162-3, 142.3, <i>d</i> 154.6	191, red, ac a	174.5, red-br		<i>d</i> α 72-3, al <i>d</i> , β 56-7, <i>l</i> , α , (-) 72, <i>l</i> , β , (+) 57-8, <i>d</i> , <i>l</i> 93-4	$[\alpha]_D^{20} +62.9$
193	2,5-Dimethylacetophenone	230		1.5291 1.5306		168.9					
194	4-Chloroacetophenone	232 236	12			204 160, 146	231	239	114	95	
196	4-Phenyl-2-butanone (Methyl- β -phenylethyl ketone)	235				142				87	
197	Isovalerophenone (Isobutyl phenyl ketone)	236				210				76, 64.5	
198	3,5-Dimethylacetophenone	236.7		1.5276 ²⁵				179.80, yel, ac a		114, me al	
199	2-Methoxyacetophenone (2-Acetylanisole)	239, 245		1.5395	1.089	183			114, al	83, 96.0 5, pet	
200	3-Methoxyacetophenone (3-Acetylanisole)	240, 252		1.5583 ^{15,4}	1.0993 ^{15,4}	196					
201	5-Phenyl-3-pentanone	244		1.5125		80					
202	5-Isopropyl-2-methylacetophenone (2-Acetyl- <i>p</i> -cymene)	245		1.51849	0.9654 ²⁰	147	140.2, clearing at 160			91-2.5	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Semi carbazone	2,4-Di nitrophenyl-hydrazone	<i>p</i> -Nitro phenyl hydrazone	Phenyl hydrazone	Oxime	Miscellaneous
203	<i>α</i> -Bromopropiophenone	245.50		1.5686 ²⁵							
204	3,4-Dimethylacetophenone	246.7, 251		1.5400		233.4				85	
205	2,4,5-Trimethylacetophenone	246.7				204				85.6	
206	<i>n</i> -Propyl 3-pyridyl ketone	246.52		1.5128		169.70			182		Picrate, 104
207	<i>n</i> -Valerophenone (<i>n</i> -Butyl phenyl ketone)	248.5, 242		1.5150	0.988 ₂₀ ²⁰	160, w-al	166, brt red, ac a	161.5, 2.5, or-red, al	162	52.0-5, pet eth	
208	2-Aminoacetophenone	250, 2d	20			290d, al			108, al	109, subl, w	
209	2,5-Dichloroacetophenone	251	14							130	
210	4-Isopropylacetophenone	252.4									
211	1,1,1-Tribromoacetone	255d									
212	Ethyl benzoylacetate	265				125					
213	<i>n</i> -Enanthophenone (<i>n</i> -Hexyl phenyl ketone)	283.3	16.4	1.5076 _{He}	0.95155	119, dil al		127.8		55	
214	3-Phenylcyclohexanone	287, 8 ^{7.46}				167, al				128.9, al	
215	1-Acetylnaphthalene (Methyl 1-naphthyl ketone)	302		1.629		288.5-9.5, 232-3			146	140, 137.5	
216	Ethyl 1-naphthyl ketone	305.7		1.6109						58	Picrate, 77-8, al, 79
217	2-Benzoylpyridine (Phenyl 2-pyridyl ketone)	317		1.6056			199		136, yel, al	150, 165	Picrate, 130, al
218	2,4,5-Trimethylbenzophenone	328			1.0332 ¹⁸						
219	2,4,4'-Trimethylbenzophenone	340									
220	<i>α</i> -Methylstyryl phenyl ketone (Dypnone)	340.5, sl d			1.108 ₂₀ ²⁰	151, bz				132, al	<i>syn</i> 134, al, <i>anti</i> 78
221	1,5-Diphenyl-3-pentanone (Di-benzylacetone)	352, 348	13.4							95.6	

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
a) Liquids 2) (Reduced pressure b.p. only) (Listed in order of increasing semicarbazone m.p.)*

No	Name	Semi-carbazone	Boiling point, °C	n_D^{20}	D_4^{20}	Miscellaneous
1	1-Chloro-2-methyl-3-pentanone	70	64 ⁹			
2	4-Methyl-2-octanone	70	94 ⁴⁰			
3	1-Hepten-5-one	82 3, w al	46 7 ¹²	1 4254 ^{18 5}	0 8487 ^{18 5}	
4	3-Dodecanone	89 w -al	134 ¹⁸			m p 19
5	1,3-Diethoxy-2-propanone (<i>sym</i> -Diethoxyacetone)	91	105 ³⁵	1 4202		
6	1-Ethoxy-2-propanone (Ethoxyacetone)	96	36 ²⁸	1 4000		
7	3-Cyclopentyl-2-butanone (α -Cyclopentyl- α -methylacetone)	98	79 ¹⁷	1 4470		
8	7-Methyl-1-octen-5-one	101 2	62 3 ¹⁴	1 4288 ^{12 5}		
9	Cyclohexyl methoxymethyl ketone	102	111 ²¹	1 4552 ²⁵		
10	1-Phenoxy-2-butanone (Ethyl phenoxymethyl ketone)	102	100 ⁵	1 5201		
11	1-Naphthoxyacetone	103	205 8 ¹⁴			
12	1-Hepten-6-one	108 w - al	41 3 ¹⁰	1 4350 ¹⁸	0 8673 ¹⁸	
13	1-Phenoxy-2-pentanone (Phenoxymethyl <i>n</i> -propyl ketone)	108	112 ⁴	1 5148		
14	3-Octyn-2-one	109	76 ¹⁵	1 4446 ²⁵		2,4-Dinitrophenylhydrazone 88
15	3-Hepten-6-one	109 10 wh	61 2 ²⁰	1 4290 ²¹	0 8618 ²¹	
16	3-Methyl-4-phenyl-2-butanone	112 114	130 ¹⁷	1 5090 ¹⁹		
17	3-Methyl-3-hepten-5-one	114	82 6 ⁴²	1 4488 ²⁵		
18	1-Chloro-2-ethyl-3-hexanone	115	92 ¹²			
19	1,3-Dimethoxy-2-propanone (<i>sym</i> -Dimethoxyacetone)	120	78 ¹⁸	1 4174		
21	<i>trans</i> -3-Hepten-2-one	125 128	60 ¹⁶	1 4421 1 4430	0 8445	
22	5-Hydroxy-5-methyl-3-heptanone	125	86 ¹⁴	1 4386 ¹⁴		
23	α -Ethoxyacetophenone	128	122 ¹⁵	1 5250		
24	3-Propylpropiofenone (Ethyl 3-propylphenyl ketone)	128	145 ²⁰			
25	α -Methoxyacetophenone	129	126 ¹⁹			
26	1-Phenyl-4-hexen-1-one	130	97 ¹	1 5270 ²⁵		
27	5-Phenyl-2-pentanone	130	122 ⁶			
28	2-Methyl-3-octen-6-one	131 2	73 7 ¹⁴	1 44533		
29	1-Phenyl-1-hexen-5-one	132 et ac	153 5 ¹⁰	1 5458 ²⁵		
30	3-Phenyl-1-hexen-5-one	132	153 5 ¹⁰	1 5193 ²⁵		2,4-Dinitrophenylhydrazone, 103
31	4-Phenyl-2-pentanone	137	115 ¹³	1 5124		
32	3-Propyl-3-hexen-2-one	142	72 ⁹			
33	3-Acetyl furan	150	84 ²¹			
34	3-Hydroxy-3-methyl-2-pentanone	150	73 ⁵⁰	1 4200		
35	1-Cyclopentyl-2-propanone (1-Cyclopentylacetone)	150	67 ¹²			
37	<i>cis</i> -3-Hepten-2-one	152	70 ¹⁵	1 4505 ²²	0 8555 ²²	
38	3-Hydroxy-3-methyl-2-heptanone	152	84 ¹⁹			
39	<i>d</i> -2-Ethyl-5-methylcyclohexanone	152 4	83 4 ¹⁸		0 9016 ¹⁵	$[\alpha]_D + 8.5$
40	5-Hydroxy-2-pentanone	155	86 ¹⁰	1 4350 ²⁵		
41	3-Phenyl-2-butanone	158	107 ²²	1 5092		
42	3-Phenyl-3-hexen-5-one	158	138 ¹⁴			
43	Dicyclopentyl ketone	162	112 ¹²			
44	2-Ethylcyclohexanone	162 163	76 ²⁰	1 4522		2,4-Dinitrophenylhydrazone 162
45	2,3-Dimethyl-2-hepten-6-one	163	76 ¹³			
46	3- <i>n</i> -Propylcyclohexanone	169	42 ^{0 7}	1 4530		
48	2-Cyclohexenone	172, 168	68 ²²	1 4879		2,4-Dinitrophenylhydrazone, 163 117
49	2-Chloropropiofenone (2-Chlorophenyl ethyl ketone)	173	106 ¹²			
50	<i>d,l</i> -1-Acetyl-3-methylcyclohexanone	174-5	99 100 ³⁸			
51	3- <i>n</i> -Propyl-2-cyclohexenone	175	60 ^{0 4}	1 4876 ²⁵		2,4-Dinitrophenylhydrazone, 156
52	2-Bromoacetophenone	177	112 ¹⁰			2,4-Dinitrophenylhydrazone, 189

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES

a) Liquids 2) (Reduced pressure b.p. only) (Listed in order of increasing semicarbazone m.p.)* (Continued)

No	Name	Semi-carbazone	Boiling point °C	n _D ²⁰	D ₄ ²⁰	Miscellaneous
53	2-Methyl-3-butenyl phenyl ketone	177	100 ^{2 1}	1 5223 ²⁵		
54	4-Methoxycyclohexanone	178	85 ¹⁴	1 4560		2,4-Dinitrophenylhydrazone, 150
55	5,5-Dimethyl-3-hexen-2-one	178	79 ⁴⁰	1 4430		
56	Ethyl 2-methylstyryl ketone	178	152 ¹⁴			
57	2-Bromopropiophenone (2-Bromophenyl ethyl ketone)	179	118 ¹¹			
58	3-Isopropyl-2-cyclohexenone	179	60 ^{0 3}	1 4842		2,4 Dinitrophenylhydrazone, 155
59	2-Ethylacetophenone	180	118 ²⁹	1 5249		
60	3-Pyridylacetone	185	123 ¹			
61	1-6-Isopropyl-3-cyclohexenone	185	98 100 ¹⁰	1 484		[α] _D ¹⁸ -64.5 2,4-Dinitrophenylhydrazone, 137-8 <i>p</i> -Nitrophenylhydrazone, 168-9
62	4- <i>n</i> -Butylacetophenone	185	141 ¹⁴			
63	3-Phenyl-2-hexen-5-one	185	138 ¹⁴			
64	3-Ethyl-2-cyclohexenone	186	57 ^{0 9}	1 4913		
65	3-Methyl-3-phenyl-2-butanone	186	77 ¹⁵	1 5083		
66	2-Methyl-3-octen-5-one	187-8	68 78 ²⁴	1 4748		
67	4-Isopropylcyclohexanone	188, 188-9	91 ¹³	1 4560		<i>p</i> -Nitrophenylhydrazone, 123-4
68	4,4,6-Trimethyl-2-cyclohexen-1-one	188, 185-7	73-5 ¹³			
69	2-Acetyl-5-methylfuran	191	73 ⁸			
71	3-Phenyl-2-pentanone		110 ¹⁸	1 5051		
72	4-Phenylhexahydroacetophenone (Methyl 4-phenylcyclohexyl ketone)	191	121 ^{1 2}			
73	2,6,6-Trimethylcycloheptanone	191-2	85 5 ¹²	1 4568 ¹⁸	0 9095 ¹⁸	2,4-Dinitrophenylhydrazone, 170
74	Acetyl phenyl carbinol	194	137			126 Oxime 113 <i>m p</i> 18, Oxime, 88
75	2-Tetralone	194	131 ¹¹	1 5555 ²⁵		Oxime, 78
76	3-Isopropylcyclohexanone	195	51 ¹	1 4540		H ₂ SO ₄ → red → vlt → col
77	1-Propionylcyclohexene	195, 189	102 ¹⁴			
78	α-Thienylacetone (1-(α-Thienyl)-2-propanone)	195	106 ¹²	1 5366 ¹⁴		
79	5,5-Dimethyl cyclohexen-3-one	195	88 5 ³²			
80	2-Acetylbiphenyl	197	105 ¹			
81	3-Methyl-2-cyclohexen-1-one	199, 201	78 ¹⁴	1 4945		2,4-Dinitrophenylhydrazone, 176 178
82	1-Acetyl-2,2-dimethylcyclohexene	201	118 ⁴⁹	1 4810 ²⁵		
83	1,1-Dimethyl-2-tetralone	204	96 ^{0 5}	1 538		
84	2-Methyl-1-tetralone	205, 195	138 ¹⁶	1 5447		
85	6-Propionyltetralin	209	163 ¹¹	1 5508 ²⁹		
86	3-Methyl-2- <i>n</i> -propylcyclopentanone	210	58 ²	1 4778		
87	4-Methyl-1-tetralone	211	111 ¹			
88	1-Acetylcyclopentene	211	74 ¹²			
89	2-Acetyl-5-methylthiophene	217	83 ²	1 5622		
90	1-Tetralone	217, yel, al	170 ⁴⁹			Oxime, 102, prisms, 88 9, needles, me al Oxime, 114
91	Neopentyl phenyl ketone	218	116 ¹¹	1 5078		
92	3-Methyl-2,5-hexanedione	220	71 ¹⁰	1 4260		
93	<i>cis</i> -1-Decalone	220d	116 ¹⁸	1 4939		
94	3-Acetylbiphenyl	223	138 ¹	1 6140 ²⁵		
95	1,2-Dimethyl cyclohexen-3-one	225d	118-9 ¹²			
96	3-Chloroacetophenone	232	113 ¹¹	1 5494		
97	3-Bromoacetophenone	233	132 ¹⁷	1 5755		
99	6-Acetyltetralin	234	156 ¹⁰	1 5591 ²⁵		
100	2,3-Dimethyl-2-cyclopentenone	250	92 ²⁵	1 4830		

*Derivative data given in order *m p*, crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES

a) Liquids 2) (Reduced pressure b.p. only) (Listed in order of increasing semicarbazone m.p.)* (Continued)

No	Name	Semi carbazone	Boiling point °C	n_D^{20}	D_4^{20}	Miscellaneous
101	1-Ethyl-2-methyl-3-cyclohexenone	250	105 ¹⁹			
102	3-Acetylthianaphthene	250	137 ³			
103	2-Oxopropionaldehyde (Methylglyoxal, Pyruvic aldehyde)	<i>di</i> 254	52 ¹²			<i>bis</i> -2,4-Dinitrophenylhydrazone 299-300, red, PhNO ₂ , Dioxime 157, al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point °C	Semi-carbazone	2,4 Di-nitrophenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl hydrazone	Oxime	Miscellaneous
1	2-Aminoacetophenone	20	250 2d	290d , al			108, al	109, subl , w	
2	2-Dodecanone (<i>n</i> -Decyl methyl ketone)	20 5	246 7	122 3 dil al					n_D^{20} 1 42855, D_4^{20} 0 81982
3	<i>n</i>-Amyl phenyl ketone (<i>n</i> -Pentyl phenyl ketone)	24 7	265 2	131 5, 50% al 133 (cor)	168 (cor), ac a				n_D^{25} 1 50272
4	3,5-Dichloroacetophenone	26	134 6 ¹⁷					138	
5	Benzyl methyl ketone (Phenyl-acetone)	27	216 5 (cor)	199 9 5, al , 188	156	145	86 7 lgr 83	68 70	n_D^{20} 1 5168
6	4-Methylacetophenone	28	226	204 5, al , 197	260 4 (cor), scar , ac a	198	97, al	87-8, pet eth	n_D^{20} 1 5348, D_4^{20} 1 003
7	2-Hydroxyacetophenone	28	215	210	210 12 212 3		110	118	
8	Phorone (Di-isopropylidene-acetone)	28, yel -gr	198	221, w 186	118			48	Tetrabromide, 88 9, al
9	2-Tridecanone (Methyl <i>n</i> -undecyl ketone <i>n</i> -Hendecyl methyl ketone)	28	263	123, al , 126, 117	69, or -yel	101-2		56 7, al -pet eth	n_D^{20} 1 43175
10	Furfuralacetophenone	29, yel -red	317d		169, scar				
11	Ethyl 2-furyl ketone	30, 28	183	189					
12	4-Cyclohexylcyclohexanone	30 31 29 2	100 ⁹ 1	216	137			101 2, 104 5 78	
13	2-(1'-Hydroxycyclopentyl)-cyclopentanone	31	99 ³						
14	7-Tridecanone (Di- <i>n</i> -hexyl ketone)	31 2	255, 264			96			
15	2-Acetyl furan (2-Furyl methyl ketone)	32, 33	169-73	150, me al , 148	220	185 6, red, w -al	86, yel , w -al	104, eth -pet eth , 92	n_D^{20} 1 5017, D^{20} 1 098
16	Levulinic acid (3-Acetyl propionic acid)	33	245 6		206 (cor), or -yel , ac a	174 5	108, bz	45-6	
17	2-Tetradecanone (<i>n</i> -Dodecyl methyl ketone)	33-4, dil al		115 6, al					
18	Methyl 1-naphthyl ketone (1 Acetylnaphthalene)	34	302	222 5 4			146	136	n_D^{20} 1 6257, Picrate, 116, yel
19	1,3-Diphenyl-2-propanone (1 3 Diphenylacetone Dibenzyl ketone)	34, 35, 30	330	145 6, abs al , 125-6, dil al	100		121, al , 128 9	125, 123	
20	2,2,6,6-Tetramethyl-4-piperidone	34 9, red, dry eth , 58 (monohyd), eth	205-6	219 20, al				153 al	
21	4-Chloropropiophenone	36 35	118 ²	177, 175 6				62-3	
22	2-Phenylcyclopentanone	37	126-7 ¹⁰	218d					
23	Furfuralacetone	38, 39	116 ¹⁰		241 (cor)		131-2, al		
24	4-Methoxyacetophenone	38, 37	258	197 8, dil al	220 (cor), red, 231 8 (cor)	195-5 5, or , al	142, yel , al	86-7, wh , pet eth	
25	1-Phenyl-1-hepten-3-one (<i>n</i> -Butyl styryl ketone)	38 9, 40	159-67 ¹¹				98, yel		Dimer, 175-6

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi-carbazone	2,4-Di nitrophenyl-hydrazone	p Nitro phenyl-hydrazone	Phenyl-hydrazone	Oxime	Miscellaneous
26	4,4-Dimethylcyclohexanone	38 41	73 ¹⁴	204			106 7		n _D ²⁰ 1 4537 D ₄ ²⁰ 0 932
27	3,4-Methylenedioxypropio-phenone (Propiopiperone)	39		187 8			97	104	
28	2-Hydroxybenzophenone	39, w -al 153	250 ⁵⁶⁰				155, al	<i>syn</i> 141, <i>bz anti</i> 143, <i>bz</i> 145 8, <i>dil</i> <i>al fu</i> <i>sion</i> → 130	
29	2-Methoxybenzophenone (2-Anisyl phenyl ketone)	39							
30	3-Bromopropiophenone	40		183					
31	Benzalacetone	41	212	187	227, 223	166	157	115	Thiosemicarbazone, 148
32	1-Indanone (α-Hydrindone)	42, 38	241 2 ⁷³⁰	233 239	258	234 5, ac a	130 1 134 5 <i>me al</i> 124 8	146 144 <i>bz pet</i> <i>eth</i>	
33	2,4-Dichloroacetophenone	42	235 40	208				152	n _D ²⁰ 1 5640
34	3-Aminopropiophenone	42, <i>yel</i>	168 9 ¹⁵	196 7				112 112 3	N- <i>p</i> Toluenesulfonyl deriv 97 al
35	2-Bromobenzophenone	42	345					133	
36	8-Pentadecanone (Di- <i>n</i> -heptyl ketone)	42	178					120	
37	4-Phenyl-3-buten-2-one (Methyl styryl ketone)	42	262	186, al , 198, 142	227, red, ac a 223, or - red, al	165 7, red, al	156 7 <i>yel , al ,</i> 159	115 6, 60° al 87	H ₂ SO ₄ → or -red
38	3-Chlorobenzyl phenyl ketone	43						102	
39	8-Acetylguanine	43 5	116°		253				
40	2-Benzoylfuran (2-Furyl phenyl ketone)	44	150 ³					122	
41	1,3-Dichloro-2-propanone (1,3-Dichloroacetone)	45	175, 173						n _D ²⁰ 1 47144, D ₄ ²⁰ 1 3826
42	2-Acetylquinoline	46					54		
43	3-Chloropropiophenone	46		179-80					
44	4-Bromopropiophenone	46	140 ²	171				90 1	
45	Phenyl <i>n</i> -undecyl ketone (<i>n</i> -Hendecyl phenyl ketone Lauropenone)	47, 44		94 5 95				63 63 5	
46	2-Aminopropiophenone	47, <i>pet eth</i>		190d , al				88 9, w	Hydrochloride, 184 5 N-Acetyl 70 1
47	Benzophenone	48, 49	306 (cor)	164-5, al , 167	238 9, or - <i>yel , ac</i> <i>a , 229</i>	154 5, <i>yel , al ,</i> 144, red, al	137 8, al	142 3, <i>me</i> <i>al , 144</i> 140	D ₂₀ ²⁰ 1 0976
48	2,4,6-Heptanetrione (Diacyl-acetone)	49	121 ¹⁰	<i>mono</i> 203			<i>di</i> 142	2,6- <i>di</i> 68 5	n _D ²⁰ 1 4930, D ₄ ²⁰ 1 0681
49	5-Phenoxy-2-pentanone (Methyl 3-phenoxypropyl ketone)	50	121 ²	108 10	110				
50	9-Heptadecanone (Di- <i>n</i> -octyl ketone)	50-50 5	250-3			54		111 2	
51	Phenacyl bromide (ω-Bromo-acetophenone)	50, 51		146	212-3, <i>yel , or</i>			89 5, 97	
52	4-Bromoacetophenone	51, 50 5	225	208	230, 237 (cor)		126	128, 129	
53	3-Bromophenacyl bromide	51, <i>lgr</i>	174 ¹⁴	163-4d , al					
54	Ethynyl phenyl ketone	51			214				

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi-carbazone	2,4-Dinitrophenylhydrazone	p-Nitrophenylhydrazone	Phenylhydrazone	Oxime	Miscellaneous
55	3,4-Dimethoxyacetophenone (Acetoveratrone)	51, w -al	286-8	218, w al	206-7	227	131	140, w -al	
56	Diphenylacetoin	52		169					4-Nitrobenzoate 84
57	Methyl 2-naphthyl ketone (2-Acetylnaphthalene)	53 4, al , 56	301	234 5 237	262d , red, ac a		176-7, 171	149, 145 6	Picrate, 82
58	Chloromethyl 2-phenylethyl ketone	54	244 5	156	147, 146			89	
59	2-Furyl-2-thenoylmethane	55 5	195 ⁶						Cu salt, 274
60	Phenyl 2-thienyl ketone (2-Benzoylthiophene)	56	300	195-7				93	
61	2-Nonadecanone (<i>n</i> -Heptadecyl methyl ketone)	56		124-5 125 5 6				77	
62	4-<i>n</i>-Caproylresorcinol (2,4-Dihydroxy- <i>n</i> -caproylbenzene)	56 7	243 5d					190-1d , 50% al	
63	2,2 -Dichlorobenzoin	57							
64	3-Propionylphenanthrene	57						53 6 4 7	Picrate, 113
65	9-Propionylphenanthrene	57							Picrate, 107
66	Benzalacetophenone (Phenyl styryl ketone Chalcone)	58, pa yel al 57 8	345	α 168, β 170, yel , γ 179-80d	244d , or - red, ac a , 245 (cor)		120	140 68	Picrate, 93 7, Dimers, 124, 178, 195, 225 6
67	2-Indanone	58 58 9		218, 212- 15 (dec)		232 (dec)		155	
68	Phenacyl chloride (ω -Chloroacetophenone)	59	244	156, 149	213 4d 214 5d			89	
69	3-Phenyl-2,4-pentanedione	60	134 ²⁰						Cu salt, 224
70	Mesitylacetone	60	130 ¹⁰	205, 197					
71	Ethyl 2-naphthyl ketone	60	312 4	202				133, w -al	
72	Difurfuralacetone	60, yel					121-2		
73	Desoxybenzoin (Benzyl phenyl ketone)	60, al	321 (cor)	148, dil al	204 (cor) or	163, red- br , 160	116, yel , al	98, al	
74	4-Methylbenzophenone (Phenyl 4-tolyl ketone)	60, 55	326 (cor)	121-2, al	202 4 (cor) 199-200, or		109, wh , ac a	154, less soluble in w -ac a , 115, more soluble in w -ac a	
75	1-Phenyl-1,3-butanedione (Benzoylacetone Methyl phenacyl ketone)	61	261-2		151, pa yel , al	100-1, me al	150-3		
76	1,1-Diphenylacetone	61, al		170			131, bz	165	
77	2,4'-Dibromobenzophenone	62, pet eth	381-4 sl d					141-2	
78	5-Isopropyl-1,3-cyclohexanedione	62							
79	Benzyl 3-chlorophenyl ketone	62						120	
80	4-Methoxybenzophenone (4-Anisyl phenyl ketone)	62 4 al	354		180, dk or	198-9, al	132, 90	α 140 1, 137-8, β 115 6	
81	2-Phenylcyclohexanone	63, al , 60	160 ¹⁵	190	139			169	
82	4-Methoxybenzil	63						124	
83	1-Acetyl-2-hydroxynaphthalene	64							Benzoate, 85 6, pyr
84	11-Heneicosanone (D1- <i>n</i> -decyl ketone)	64, w -al						27 5	
85	Benzoylformic acid (Phenylglyoxylic acid)	66	147 51 ¹²		196 7d (cor) yel			α 127, eth , β 145d , w	Thiosemicarbazone, 188 9 (cor) , yel
86	2,2 -Dimethylbenzophenone (D1-2-tolyl ketone)	67			190			105	

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi-carbazone	2,4-Di-nitrophenyl-hydrazone	p-Nitro-phenyl hydrazone	Phenyl hydrazone	Oxime	Miscellaneous
87	1,5-Diphenyl-1,5-pentanedione (1,3-Dibenzoylpropane)	67.5, 62-3						<i>di</i> 165 6d	
88	3,5-Dibromoacetophenone	68, al, 65	198 ¹⁵	268d, w - ac a			109-10, yel., al		
89	Cinnamalacetone	68, eth		186, yel., al	222.3, vlt -red, ac a, 218-20, br -red, chl -me al		180, yel., al	153, al, 152	
90	Benzoyl-2-furoylmethane	68	169 ³						Cu salt, 248
91	12-Tricosanone (Di-n-undecyl ketone Di-n-hendecyl ketone, Laurone)	69.5		179				39.40, al	
92	Diphenyl triketone	70, 69, yel., lgr							Heating with excess phenylhydrazine → 4 Benzene-azo-1,3,5 tri-phenylpyrazole, 156.7 yel -red, al
93	2-Chlorobenzyl phenyl ketone	71						86	
94	Dihydroxyacetone	72			277.8	160		84	Diacetate, 48 Dibenzoate, 120.5, Dimer 78.81 Picrate, 125.6
95	3-Acetylphenanthrene	72		230				193.4	
96	4-Methoxybenzalacetone (Anisal-acetone)	73, me al			229 (cor), red, ac a			119.20	
97	Benzylacetophenone	73		144				87	
98	Phenoxyethyl phenyl ketone (α Phenoxyacetophenone)	74	187 ⁸	187					
99	9-Acetylphenanthrene	74	170 ¹	201				154-5	Picrate, 107.8
100	1-Naphthyl phenyl ketone	75.5-6.0	225 ¹⁵	385	α 246.7, red, β 243.4, or, mixt 220			161	
101	9-Acetylfluorene	75.5					139		
102	2-Benzofuryl methyl ketone	76, 72	136 ¹¹	207			154		
103	Benzyl 4-methoxyphenyl ketone	77						118	
104	4-Methoxybenzalacetophenone (Anisalacetophenone 4-Methoxychalcone)	77, yel., al		α 168, al, β 190, al					Picrate, 87, or
105	2-Naphthoxyacetone	78, 77		203			154	123	
106	4-Phenylcyclohexanone	78		212, 229d, al				110	
107	Benzoyl-2-thenoylmethane	78	201 ⁴						Cu salt, 278
108	4-Chlorobenzophenone	78			185		106	β 105-6	
109	1,4-Cyclohexanedione	79	132 ²⁰	<i>mono</i> 221.2, <i>di</i> 231	240			188	
110	Di-n-tridecyl ketone (Myristone)	79						57	
111	Phenacyl phenyl ketone (Di-benzoylmethane, ω-Benzoyl-acetophenone)	keto 81, enol 78, al		205			<i>mono</i> 105	<i>mono</i> 165	Dibromo deriv., 94-5, eth
112	3-Nitroacetophenone	81		257	228		128, 135	132	
113	4-Bromobenzophenone	82		350	230		126	α 116-7, β 110-1	
114	1-Benzoylpropionic acid	82-3d					100-4, br., bz		

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi carbazone	2,4-Dinitrophenylhydrazone	p-Nitrophenylhydrazone	Phenylhydrazone	Oxime	Miscellaneous
115	Fluorenone	83, yel, bz	341.5		283.4	269	151.2, yel, al	195.6 (cor)	
116	4-Iodoacetophenone	85, eth	153 ¹⁸						
117	Di-n-Heptadecyl ketone	88.5, lgr, 89						67.62.3	
118	4,4'-Dimethylbenzophenone (Di 4-tolyl ketone)	95, al	335	143.4	218.9		100, yel, al	163, al	Hydrazone, 108.10
119	Benzil (Dibenzoyl)	95, yel	347	mono 174-5 d, di 243.4 d, al	di 189, yel, al, 185	mono 192.3, dk or, ac a, di 290, yel, pyr-eth	mono 134, yel, al, di 235, chl rapid htng	α mono 137.8, 140, bz, di 237	
120	β,β -Diphenylpropiophenone	96-92						133	
121	3-Hydroxyacetophenone	96, 95	296	189.91	261				
122	4-Chlorophenacyl bromide	96-8							Acetate, 72
123	2,3-Dihydroxyacetophenone (3-Acetylcatechol)	97.8, dk yel, bz-lgr		166.7				96.7	Diacetate 109, bz Di-Me eth, b p 143.4 ¹⁴ 143.4 ¹⁴
124	2-Naphthylglyoxal	98, (hyd), w 109	183 ²⁰						Diacetate, 150, bz-pet eth osazone 184
125	3-Aminoacetophenone	98-9, pa yel, al		196d, w				192.4, w-al	Hydrazone, 98, al
126	2-Benzoylacrylic acid	99 (anh) 64 (mono hyd)		190			197	168d	Hydrazone, 185.6, al
127	Di-2-thenylmethane	100							Cu salt, 263
128	Di-1-naphthyl ketone	100						200	Picrate 121.5.2.0
129	1,3-Dibenzoylbenzene	101.2, al						mono 201, di 70-3	
130	2-Acetyl-1-hydroxynaphthalene	102, gr-yel, al, 98, yel, bz	325 sl d	245.50, pa yel			136.7, wh, dil al	168.9	Acetate, 107.5, Benzoate, 128, al
131	Cinnamacetophenone	102, yel, al			222, red, ac a, 218.9d	α 135, al			
132	1,3-Cyclohexanedione	104						156	
133	4-Tolil (4,4'-Dimethylbenzil)	104.5						225	
134	2-Propionylphenanthrene	105, 104							Picrate, 107
135	2-Aminobenzophenone	105-6, pa yel, al						156, alk-stab, 127, a-stab	
136	Benzoylnitromethane	106					105.5.5, yel, al	96, w	
137	4-Aminoacetophenone	106, w	294	250, yel al	266.7, 263			147.8, al	4 Toluensulfonamide, 203
138	Benzalacenaphthenone	107, yel, w-al						48	
139	Benzyl 4-chlorophenyl ketone	108						123	
140	4-Bromophenacyl bromide	108.9						115	Acetate, 72
141	4-Hydroxyacetophenone (4-Acetylphenol)	109		199	210, br, al		151, wh \rightarrow yel	145, 143.4, bz	Acetate, 54, Benzoate, 134.5, al
142	trans-1,2-Dibenzoylethylene	110						211	
143	Piperonalacetone	110-1, pa yel		α 217, al, β 168, bz			163	186, al	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi-carbazone	2,4-Dinitrophenylhydrazone	p-Nitrophenylhydrazone	Phenylhydrazone	Oxime	Miscellaneous
144	2-Acetyldibenzothiophene	112		235					
145	1,5-Diphenyl-3-pentadienone (Dibenzalacetone)	112, 111		187-90, al	180, red, ac a	173, yel, bz	152 3, 147 8, yel, al	142 4	Picrate, 114
146	4,4'-Dimethoxybenzoin (Anisoin)	113, dil al		185 (cor), w-al					Acetate, 94-5, al -pet eth
147	1,4-Diacetylbenzene	114	130 ^a					240	
148	3,4-Dihydroxyacetophenone (4-Acetylcatechol)	116, w	127 33 ¹¹					184d, et ac	3 4-Diacetate, 91
149	3-Hydroxybenzophenone	116, al						syn 76, anti 126, bz	
150	α-Hydroxyacetophenone (Phenyl alcohol, Benzoyl carbinol)	117 8	118 ¹¹	146 6 5, al			112, lgr-eth	70	Acetate, 49, eth, Benzoate, 118, dil al
151	7-Acenaphthenone	121 (cor), al					90, dk, al	175, al, 183 4, bz, di 222d	Picrate, 113
152	4-Phenylacetophenone (4-Acetyl-biphenyl, Methyl 4-xenyl ketone)	121, al	325-7		241 5-2, red-or			186-7, al	
153	Piperonalacetophenone (3,4-Methylenedioxychalcone)	122, yel, al		α 203-5, abs al					Dibromide, 152, bz -lgr (l l), Picrate, 126-8
154	9-Hydroxyxanthene (Xanthidrol)	122-4d							Heat → Dixanthyl ether, 219, Dixanthyl, 204, lgr
155	4-Aminobenzophenone	124, w-al						168, al, 127, w-al	Hydrazone, 139-40, yel, al
156	4-Phenylphenacyl bromide	124 5							Acetate, 111
157	2-Naphthoin	126, .						172	
158	4-Phenylphenacyl chloride	126-7							Acetate, 111
159	Vanillalacetone (4-Hydroxy-3-methoxystyryl methyl ketone)	129, yel, al			230 (cor), red		127-8, yel		
160	Dianisalacetone	129, yel, bz -pet eth			82-3			147 8	
161	4,4'-Dimethoxybenzil (Anisil)	133, yel		di 254 5, dil ac a				mono 133, syn di 217, anti, di 195, bz	Dihydrazone, 118
162	d,l-Benzoin	133, al, 129	344	α 205-6, w	245, yel, al, 234		α 158-9, bz -lgr, β 106	α 151 2, bz, β 99	Acetate, 83, al, Benzoate, 124 5, 75% al
163	cis-1,2-Dibenzoyl ethylene	134						di 210 ld	
164	3,4,5-Tribromoacetophenone	134 5, al		265d, ac a			129-34d, yel, pet eth		
165	4-Hydroxybenzophenone (4-Benzoylphenol)	134 5, w		194, bz	242 4 (cor), or		144, pet eth	81, Heat → 152	Acetate, 81, al Benzoate, 94 5, 115
166	1-Furoin	135, 138-9 (cor)			216 7, or-red, al		79-81, lgr-bz	α 161, al, β 102, pa yel, eth	Acetate, 76-7, Benzoate, 92 3
167	Mesityl phenyl ketone	137			232				
168	4-Chlorobenzyl phenyl ketone	138						96	

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Semi carbazone	2,4-Di-nitrophenyl-hydrazone	p-Nitro-phenyl hydrazone	Phenyl-hydrazone	Oxime	Miscellaneous
169	α -Anisal- α' -cinnamalacetone	139, red, al					Pyrazo- line, 155 6, yel, al		Dibromide, 139-40, CS ₂ , Tetrabromide, 155 6, CS ₂
170	4-Aminopropiophenone	140, w						153, al	N-Acetyl deriv 161, w
171	3,3'-Dibromobenzophenone	141						181 2d	
172	2-Acetylphenanthrene	143		260			187 8		
173	Dicinnamalacetone	144, yel, abs al			195 7 (cor), dk red di 265		166, yel, al		Light → d
174	1,2-Dibenzoylthane	147					mono 116, di 179	204	
175	2,4-Dihydroxyacetophenone (Resacetophenone)	147, 144		218, 214 20d	206 8		156 8	202 3	2,4-Diacetate, 38 2,4 Dibenzoate, 81
176	3,5-Dihydroxyacetophenone	147 8, w		205 6, al		236 7, red, w - ac a			3,5-Diacetate, 91-2, lgr
177	4,4'-Dichlorobenzophenone	147-8			238-40			135	
178	1,2-Dibenzoylbenzene	148						mono 150	
179	9-Benzoylanthracene (9-Anthra-phenone)	148, yel, bz							H ₂ SO ₄ → brief blue color
180	4-Hydroxypropiophenone	148			229				
181	5,5-Dimethyl-1,3-cyclohexanedione (Methone Dimedone)	148 9						mono 115 di 176	
182	2,3,4,2'-Tetrahydroxybenzo-phenone	149 (anh), 100 (hyd), yel, w							2,3,4,2'-Tetraacetate, 118, al
183	Anthrone	154, ac a							Al sol → bl fluorescence
184	1,4-Dibenzoylbenzene	161, al						mono 212-3, di 235	
185	Furil (2,2'-Bifuroyl)	165, yel, bz					mono 82 3, yel, di 184, yel, lgr	α , mono 106, β , mono 97-8, α , di 100, 166, β , di 188 90	
186	Benzanthrone	170, yel, al							H ₂ SO ₄ → or -red sol, gr fluorescence
187	Quinhydrone	171, dk gr, subl					152	161	
188	2,3,4-Trihydroxyacetophenone (Gallacetophenone)	172, w		225, rapid htng				162 3	2,3,4-Triacetate, 85 Picrate, 133
189	Xanthone (Diphenylene ketone oxide)	174	350				152	161	
190	4,4'-Bis(dimethylamino)benzo-phenone	174					174 5	233	Hydrazone, 150, Picrate, 156
191	4,4'-Dibromobenzophenone	177	395					150-2	Hydrazone, 92-4
192	d,l-Camphor	di 178, d 179	209, 205	247-8d (cor), 236-7, al	d, l 164, d 177, or, al >320, red, PhNO ₂	217	233	d 118 9	d [α] _D ²⁰ + 44, Hydrazone, 55
193	3-Acetylidazole	182, yel, ac a						222, bz - al	N-Acetyl deriv, 123, ac a
194	3,4,5-Trihydroxyacetophenone	187-8, w		216-7, al		260d, red, w-ac a			3,4,5-Triacetate, 111-2, lgr

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE X. ORGANIC DERIVATIVES OF KETONES
b) Solids (Listed in order of increasing m.p.)* (Continued)

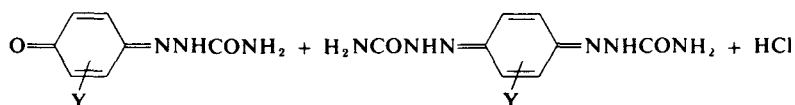
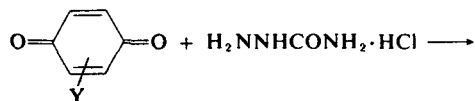
No	Name	Melting point °C	Boiling point, °C	Semi carbazone	2,4-Di nitrophenyl hydrazone	p Nitro phenyl hydrazone	Phenyl-hydrazone	Oxime	Miscellaneous
195	3-Acetyllindole	190 l, bz						144 7, w	N-Acetyl deriv , 151, subl , pet eth -bz , Picrate, 183, yel , pet eth Diacetyl deriv , 165 6, bz
196	2,5,2',6'-Tetrahydroxybenzo-phenone	200 2d w							2,5,2',6'-Tetraacetate, 118 9, al
197	2,5-Dihydroxyacetophenone (Quinacetophenone)	202, yel gr , w				215 6		149 50, tol	2 5-Diacetate, 68, ac a
198	2,4,5-Trihydroxyacetophenone	206 7 red							2 4 5-Triacetate 165 6, bz
199	2,3,5-Trihydroxyacetophenone	206-7, yel , ac a				241 2d , w -al			2 3 5-Triacetate, 106 7, lgr
200	2,4,6-Trihydroxyacetophenone (Phloracetophenone)	219, anh , w							2,4 6-Triacetate, 103, 2,4,6- Tribenzoate, 117 8
201	2,3-(3',4',5'-Triphenylcyclo-pentadieno)-indone	222					246-7		
202	3,4,3'4'-Tetrahydroxybenzo-phenone	227 8, w						145, al	
203	Ninhydrin (Triketohydrindene hydrate)	243, 241d					di 207 8, or -red, al	201	Warm aqueous sol of α-amino acids → intense bl , vlt , etc At 125-30, loses w , turns red
204	Phenacridone	304 5, yel , ac a							N-Benzyl deriv , 188 9, yel , al

*Derivative data given in order m p , crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XI

The derivatives of quinones are usually similar to those of ketones. Therefore, for directions and examples for their preparation see explanations and references to Tables 9 and 10, pages 141, 142, 143

The derivatives listed as *phenylhydrazones*, *p-nitrophenylhydrazones* and *2,4-dinitrophenylhydrazones* of quinones in most cases are not real substituted phenylhydrazones, but either addition compounds or hydroxy derivatives of variously substituted aromatic azo compounds

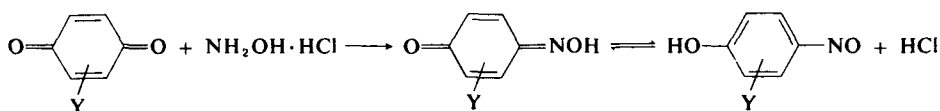
Semicarbazone *

Monosemicarbazone

Disemicarbazone

From the quinone with semicarbazide hydrochloride in water

For directions and examples see Linstead, p 30, Vogel, p 749

Oxime *

Monooxime

Substituted *p*-nitrosophenol

From the quinone with hydroxylamine hydrochloride in water

For directions and examples see Linstead, p 30

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE XI. ORGANIC DERIVATIVES OF QUINONES
(Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	Semi carbazone	2,4 Di nitrophenyl hydrazone	p-Nitro-phenyl-hydrazone	Phenyl hydrazone	Oxime	Miscellaneous
1	2,3,5-Trimethyl-1,4-benzoquinone	32, yel, eth		252 3 d, yel				1-mono 181 2, yel, al 4-mono 134, yel	
2	2-Isopropyl-5-methyl-1,4-benzoquinone (Thymoquinone)	45 5, or - yel	232	mono 201 2d, yel, al, di 237, yel	mono 179 80, dk red, al		93	1-mono 160 2, pa yel chl	
3	2,3-Dimethyl-1,4-benzoquinone (o-Xylo-p quinone)	55 (subl), yel						mono 166, yel	
4	2-Bromo-1,4-benzoquinone	56						1-mono 184, or 4-mono 196	
5	2-Chloro-1,4-benzoquinone	57, yel - red		4-mono 185d				1-mono 184, pa grn -yel, 4-mono 148d	
6	2-Methyl-1,4-benzoquinone (p-Toluquinone)	67 6 68 4		4-mono 178 9, yel, al di 240d, or -red	di 269, PhNO ₂		130	mono 134 5d w, di 220d, yel -wh	
7	2,6-Dimethyl-1,4-benzoquinone (m-Xylo-p-quinone)	68 71, yel						1-mono 175, yel, al -w 4 mono 170 1, yel bz di 128, br	
8	4-Chloro-1,2-benzoquinone	78 pa yel -red, hexane							
9	2,5-Dimethyl-1,4-naphthoquinone	94 yel me al					mono 226, red, ac a		
10	Dunnione	98 9, or - red, w		mono 232 3, w -me al	266 8, or				[α] _D ²⁰ +310° in chl
11	2-Methyl-1,4-naphthoquinone	106, yel, me al			4-mono 299d			mono 160, di 166-8	Benzoyl chloride + Zn dust → 1,4-dibenzyloxy-2-methylnaphthalene, 180 0-0 5, col, al
12	Quinone (1,4-Benzoquinone)	116, yel 113		mono 166, yel, 165-6d, red, 178, di 243d, red	mono 185 6, br, al, di 231		152	240	Picrate, 79, Quinhydrone, 171
13	2-Chloro-1,4-naphthoquinone	117, yel, w						4-mono 200d 198, pa yel, bz	
14	1,4-Naphthoquinone (α-Naphthoquinone)	117 8, yel, al		mono 247, grn -yel, ac a	mono 278, yel, pyr	mono 277 9, or -red, PhNO ₂	mono 205-6d, dk vlt, bz		

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XI. ORGANIC DERIVATIVES OF QUINONES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Semi-carbazone	2,4 Dinitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl hydrazone	Oxime	Miscellaneous
15	2,5-Dimethyl-1,4-benzoquinone (<i>p</i> -Xylo- <i>p</i> -quinone)	125, yel, al					122 4, yel, 154 5, or	<i>mono</i> 168, yel, w, <i>di</i> 272, yel, al, 254	Monobenzoylphenyl-hydrazone, 122 4, yel, lgr
16	2,6-Dibromo-1,4-benzoquinone	131, yel, al		<i>4-mono</i> 225d, yel, al				<i>4-mono</i> 170d, br	
17	2,6-Diphenyl-1,4-benzoquinone	137 8, red						242-4d	
18	2,5-Dihydroxy-3-<i>n</i>-dodecyl-1,4-benzoquinone (Embelin)	143, or -red, eth -bz		<i>di</i> 236			<i>di</i> 189 90	<i>tetra</i> 175	Diacetate, 54 Dibenzoate, 97-8
19	1,2-Naphthoquinone (β -Naphthoquinone)	145 7d, red, eth, 120		<i>1-mono</i> 184d, yel, al		<i>1-mono</i> 250 1, <i>2-mono</i> 236, dk red, ac a	<i>2-mono</i> 138, dk red, al	<i>1-mono</i> 109 5, <i>2-mono</i> 162-4d, <i>di</i> 169, yel, al	
20	3,7-Dimethyl-1,2-naphthoquinone	151 2, red, al						<i>2-mono</i> 222d, or	
21	5-Hydroxy-1,4-naphthoquinone (Juglone)	153 4, or, bz						<i>mono</i> 167 0, 7 5, red, ac a, <i>di</i> 225 (exp), dk br, ac a	Acetate, 154-5
22	3-Chloro-1,2-naphthoquinone	172, red, chl						<i>1-mono</i> 167 8, or	
23	1,8-Dihydroxy-2-methyl-9,10-anthraquinone (2-Methylchrysazin)	175							Diacetate, 205
24	2-Methyl-9,10-anthraquinone	177 9, 177, pa yel							Diacetate, 217, pa yel, ac a
25	3,5-Dihydroxy-2-methyl-1,4-naphthoquinone (Droserone)	181, pa yel, al						<i>di</i> 151	Diacetate, 119, me al
26	2,3,4-Trihydroxy-9,10-phenanthraquinone	185d, br -red		<i>mono</i> 270d, br -red, al					Phenazine, 255d, br, al
27	6-Bromo-1,4-dihydroxy-9,10-anthraquinone (6-Bromoquinizarin)	185 5, red-br, bz							Di Me eth, 176 5, or -yel, al, Diacetate, 220 5, yel, al
28	1,2-Anthraquinone	185 90d, or -br						<i>1-mono</i> 188d, or -br, <i>2-mono</i> 200d, or -br	
29	4-Chloro-1,2-naphthoquinone	188, red br, bz						<i>2-mono</i> 157, pa yel	
30	7-Isopropyl-1-methyl-9,10-phenanthraquinone (Retenequinone)	197, or, al		<i>mono</i> 200, yel, pyr		<i>mono</i> 222 3, red, ac a	<i>mono</i> 160, or, bz -al	<i>mono</i> 128 5, 130 1 (cor), yel, al	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XI. ORGANIC DERIVATIVES OF QUINONES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi-carbazone	2,4-Dinitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Miscellaneous
31	Camphorquinone	199, yel, dil al		3 mono (α) 236d, al	mono 36, di 190	239	183 90, pa yel, al, 170	mono α 153 β 114 5, di (four forms) α 201d, β 248d, γ 136 δ 194d	3-p-Bromophenylhydrazone, 215 6, ac a, Hydrazone, 182
32	1-Hydroxy-9,10-anthraquinone	200, or -red, al, 193	subl						Acetate, 176 9, yel, al
33	1,4-Dihydroxy-9,10-anthraquinone (Quinizarin)	200 2 (cor), red, ac a, 195							Diacetate, 207 8, yel, pyr, 200-1, yel, ac anh
34	9,10-Phenanthraquinone	206 7 5, or -yel, 208, or	>360, subl → or -red	mono 220d	mono 312-3d, dk red	mono 245, red, xyl	mono 165, dk red, al	mono 158, grn -yel, al, di 202d 233 br, turns dark at 205	Conc H ₂ SO ₄ → dull grn
35	1,4-Anthraquinone	218d, yel, turns dark at 200 10							
36	4-Chloro-1,2,3-trihydroxy-9,10-anthraquinone	233, yel							Triacetate, 187, yel, Conc H ₂ SO ₄ → red
37	2-Bromo-9,10-phenanthraquinone	233 4, red-yel, ac a						mono 163 4, or	
38	1-Bromo-9,10-phenanthraquinone	233-4, yel						mono 213d	
39	Chrysoquinone (Chrysenquinone)	239 5, red						mono 161, or	Conc H ₂ SO ₄ → bl
40	1,2,8-Trihydroxy-9,10-anthraquinone (2-Hydroxychrysoquinone)	239 40, red, ac a							Triacetate, 224, yel 2-Me eth, 220 or, chl-me al, 2,8-Di-Me eth, 193, br -yel, chl-me al, 1,2,8-Tri-Me eth, 157, yel, me al
41	1-Amino-9,10-anthraquinone	251, or -red							N-Acetyl, 218, or -red, N-Benzoyl, 255, grn, N-p-Toluenesulfonyl, 228 9
42	3-Amino-9,10-phenanthraquinone	254, dk red-br, al						mono 247d, red-br	
43	1,2,4-Trihydroxy-9,10-anthraquinone	259, dk red, abs al							2-Me eth 232 3, red, bz, 2,4-Di-Me eth 186-9, or, 2-Acetate, 179 80, or, al Triacetate, 198-200 (sinters 193), pa yel
44	Acenaphthenequinone	261 (cor), yel, ac a		mono 192-3, ac a, di 271, al		mono 247, or -red, ac a	mono 179, or -red, al, di 219, dk yel, al	mono 230, dil al, 220d	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XI. ORGANIC DERIVATIVES OF QUINONES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Semi-carbazone	2,4-Dinitro-phenyl-hydrazone	p-Nitro-phenyl-hydrazone	Phenyl-hydrazone	Oxime	Miscellaneous
45	1,3-Dihydroxy-4-methyl-9,10-anthraquinone (4-Methylpurpuroxanthin)	265 6, or , bz							Di-Me eth , 162, yel , chl , Diacetate, 181-2, yel , ac a
46	2-Bromo-1,4-dihydroxy-9,10-anthraquinone (2-Bromoquinizarin)	265 8, br - red							Diacetate, 226-9, yel
47	3-Bromo-9,10-phenanthraquinone	268 dk - yel , ac a		<i>mono</i> 242d			<i>mono</i> 177, red	<i>mono</i> 198, <i>di</i> 212d , grn	
48	Aceanthrenequinone (3,4-Benzacenaphthenequinone)	270, red, bz					<i>mono</i> 203, or , bz	<i>mono</i> 251d , yel , ac a	subl
49	1,2,5-Trihydroxy-9,10-anthraquinone (Hydroxyanthrarufin)	273 4, red, ac a							2-Me eth , 229, yel , al , 1,2-Di-Me eth , 231, or , al , 1,2,5-Tri-Me eth , 203 4, yel , al , Triacetate, 228 9, yel al
50	1,5-Dihydroxy-9,10-anthraquinone (Anthrarufin)	280 (subl) , pa yel	379-81						Diacetate, 245d , pa yel , ac a
51	Chloranilic acid (2,5-Dichloro-3,6-dihydroxy-1,4-benzoquinone)	283 4, red, w (+2H ₂ O)							Di-Me eth , 141 2, red, Di-Et eth , 107, red, Diacetate, 182 5, yel
52	9,10-Anthraquinone	286	382, 376 8 (cor)					<i>mono</i> 224, pa yel , (rapid htng)	Diacetate, 260, col , ac a
53	Chloranil (2,3,5,6-Tetrachloro-1,4-benzoquinone)	290, yel , ac a , (slow htng , sealed tube)	subl						SO ₂ —Tetrachlorohydroquinone, In w-alkali sol → alkali salts of chloranilic acid
54	Alizarin (1,2-Dihydroxy-9,10-anthraquinone)	290, or , al	430						2-Benzoate, 214 6, al , 2-p-Bromobenzoate, 195, yel , Diacetate, 184, yel , al , Di-Me eth , 215
55	2-Amino-9,10-phenanthraquinone	>300, dk vlt , w , sinters at 205-10							N-Acetyl, 324, dk red-vlt , PhNO ₂ , N-Benzoyl, 297-8, br -red, PhNO ₂
56	3-Aminoalizarin (3-Amino-1,2-dihydroxy-9,10-anthraquinone)	>300, dk red, ac a							N-Acetyl, 238-40, yel -br , Monobenzoyl, 275, dk yel , Dibenzoyl, 252, yel
57	1,4-Diamino-5,8-dihydroxy-9,10-anthraquinone (5,8-Diaminoquinizarin)	>300, br -vlt , PhNO ₂							N,N'-Dibenzoyl, 284-5, br -vlt , xyl , N,N'-Diphenyl, 258-60, dk bl , bz -lgr , 1,4-Di-Me eth , 250d , vlt -blk , ac a
58	Dianthraquinone (9,9'-Di-anthranil-10,10'-quinone)	>300, yel							Conc H ₂ SO ₄ → vlt -red, CrO ₃ → Anthraquinone, Zn dust + ac a → di-anthranol, 230 (enol), 250 (keto)

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XI. ORGANIC DERIVATIVES OF QUINONES
(Listed in order of increasing m.p.)* (Continued)

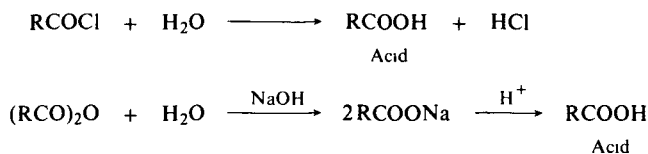
No	Name	Melting point, °C	Boiling point, °C	Semi carbazone	2,4-Dinitrophenylhydrazone	p-Nitrophenylhydrazone	Phenylhydrazone	Oxime	Miscellaneous
59	2-Amino-9,10-anthraquinone	306, 303.6, red, al							N-Acetyl, 262, yel, N,N-Diacetyl, 258, yel, ac a N-Benzoyl, 227.8, yel, ac a
60	2-Hydroxy-9,10-anthraquinone	305, yel, al	306						Acetate, 159.60, al, Benzoate, 202.4, ac a
61	1,2,3-Trihydroxy-9,10-anthraquinone (Anthragallol)	313.4d, br-or (290, subl)							Triacetate, 181.2, yel, al 188.9, pyr 2,3-Di-p-toluenesulfonate 196.8, yel, pyr, Tri-Me eth, 167.9, grn-yel, bz-pet, Triacetate, 181-2, yel, ac a, Tribenzoate, 213.5, pa yel, al bz
62	1,2,6-Trihydroxy-9,10-anthraquinone (Flavopurpurin)	>330, (>160, subl)							2,6-Di-Me eth, 239, yel, 1,2,6-Tri-Me eth, 225-6, yel Diacetate 238 Triacetate 202.3
63	1,2,7-Trihydroxy-9,10-anthraquinone (Anthrapurpurin)	369, or, al							2-Acetate, 296-8 yel, al, 2,7-Diacetate, 192.3, yel, al-ac a Triacetate, 223, pa yel, ac a Tri-Me eth, 201, yel, al

*Derivative data given in order m.p., crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV

The derivatives of three classes of compounds (carboxylic acids, acyl halides and acid anhydrides) are essentially the same as those of carboxylic acids, and are prepared either directly from the acid or *via* the acyl halide. All of them appear therefore under the same title.

Hydrolysis of acid halide or acid anhydride to the corresponding carboxylic acid



From the acyl halide in water

For directions and examples see Wild, p 180

From the acyl halide with aqueous sodium hydroxide

See Vogel, p 369, Wild, p 180

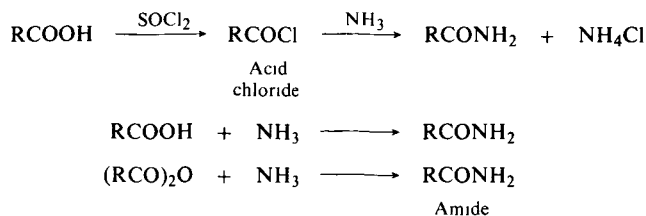
From the acid anhydride with water

See Vogel, p 376, Wild, p 184, A. C. D. Rivett and N. V. Sidgwick, *J. Chem. Soc.*, **97**, 1677 (1910)

From the acid anhydride with aqueous sodium hydroxide

See Linstead, pp 16-7, Wild, p 184

*Amide **



Acid chloride is prepared from the acid and thionyl chloride. Amide is formed on addition of aqueous ammonia.

For directions and examples see Cheronis, p 440, Shriner, p 200, Vogel, p 361, Wild, p 181

From the acid chloride in benzene with aqueous ammonia

See D. Swern, J. M. Stutzman and E. T. Roe, *J. Amer. Chem. Soc.*, **71**, 3017 (1942)

By passing gaseous ammonia through a benzene or ether solution of the acyl chloride

See Linstead, p 14, Wild, p 182

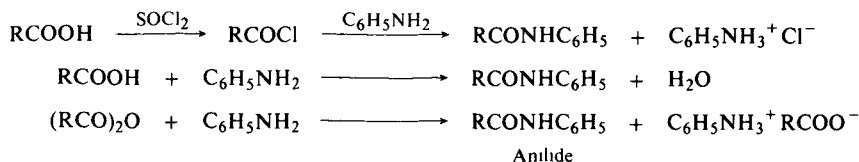
From the neat acid with gaseous ammonia

See J. A. Mitchell and E. E. Reid, *J. Amer. Chem. Soc.*, **53**, 1879 (1931)

From the acid anhydride with aqueous ammonia

See Wild, p 184, 185

*Anilide **



From the acid chloride (prepared from the acid and thionyl chloride) and aniline in benzene or in ether

For directions and examples see Cheronis, p 445, Linstead, p 14, Shriner, pp 98, 200-1, Vogel, pp 361, 369, 458, Wild, p 182, P. W. Robertson, *J. Chem. Soc.*, **115**, 1210 (1919)

From the acid chloride with aniline in aqueous sodium hydroxide

See Wild, pp 181, 219

From the acid and aniline at high temperatures

See Vogel, p 362

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

From the sodium salt of the acid with aniline and concentrated hydrochloric acid

See Shriner, p 201, Wild, p 154

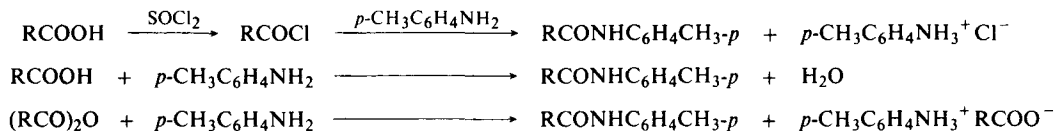
From the acid anhydride with aniline without solvent

See Linstead, p 17, Vogel, p 377, Wild, p 185

From the acid anhydride with aniline in benzene

See Linstead, p 15, Wild, p 185

p-Toluidide *



From the acid chloride with *p*-toluidine in ether or benzene

For directions and examples see Cheronis, pp 441, 444, 458, Linstead, p 14, Shriner, pp 200-1, Vogel, p 361

From the acid and *p*-toluidine at high temperatures

See Cheronis, pp 441, 442-3, Vogel, p 362

From the sodium salt of the acid, *p*-toluidine and concentrated hydrochloric acid

See Shriner, p 201, Wild, p 154

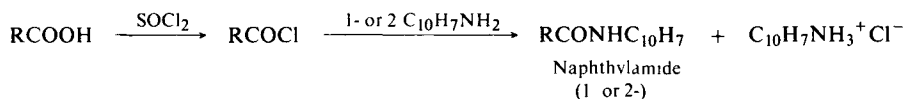
From the acid anhydride with *p*-toluidine without solvent

See Cheronis, p 459, Linstead, p 17

From the acid anhydride with *p*-toluidine in benzene

See Wild, p 185

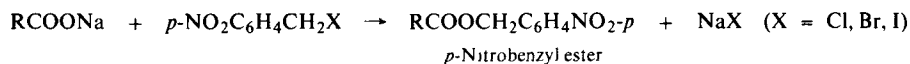
1- and 2-Naphthylamide *



From the acid chloride with the naphthylamine

For directions and examples see Cheronis, p 446, P W Robertson, *J Chem Soc*, 115, 1210 (1919)

p-Nitrobenzyl ester *



From an aqueous solution of the sodium salt of the acid, with the *p*-nitrobenzyl halide in ethanol

For directions and examples see Cheronis, pp 447, 448, Shriner, p 200, Vogel, p 362, Wild, pp 144 5

From an aqueous solution of the sodium salt of the acid with *p*-nitrobenzyl bromide in acetone

See F F Blicke and F D Smith, *J Amer Chem Soc*, 51, 1947 (1929)

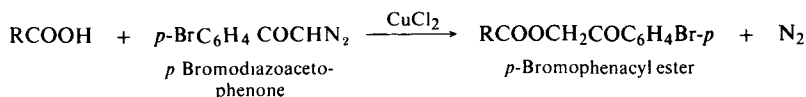
From the sodium or the potassium salt of the acid and *p*-nitrobenzyl bromide in 1 2 water-ethanol

See E E Reid, *J Amer Chem Soc*, 39, 124 (1917)

From the sodium or the potassium salt of the acid and *p*-nitrobenzyl chloride or iodide in 1 2 water-ethanol

See J A Lyman and E E Reid, *J Amer Chem Soc*, 39, 701 (1917)

p-Bromophenacyl ester *



From the sodium salt of the acid and *p*-bromophenacyl bromide in aqueous ethanol

*Derivatives recommended for first trial

WARNING This is not an instruction manual References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

For directions and examples see Cheronis, pp 447, 448, Linstead, p 14, Shriner, p 200, Vogel, p 362, Wild, p 146

From the sodium salt of the acid (neutralization with sodium carbonate) with *p*-bromophenacyl halide in 1:2 water-ethanol

See W L Judefind and E E Reid, *J Amer Chem Soc*, **41**, 1043 (1920)

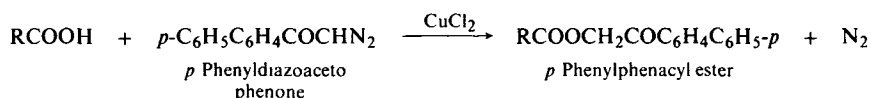
From the sodium salt of the acid (neutralization with sodium hydroxide) with *p*-bromophenacyl bromide in 95% ethanol

See R M Hann, E E Reid and G S Jamieson, *J Amer Chem Soc*, **52**, 818 (1930), C G Moses and E E Reid, *J Amer Chem Soc*, **54**, 2101 (1930)

From the acid and *p*-bromodiazoacetophenone in dioxane in the presence of catalytic amounts of cupric chloride

See J L E Erickson, J M Dechary and M R Kesling, *J Amer Chem Soc*, **73**, 5301 (1951)

p-Phenylphenacyl ester *



From the sodium salt of the acid (neutralization with sodium carbonate) and *p*-phenylphenacyl bromide in aqueous alcohol

For directions and examples see Linstead, p 14, Vogel, p 363, N L Drake and J Bronitsky, *J Amer Chem Soc*, **52**, 3715 (1930)

From the sodium salt of the acid (neutralization with sodium hydroxide) and *p*-phenylphenacyl bromide in aqueous alcohol

See Shriner, p 200, N L Drake and J P Sweeney, *J Amer Chem Soc*, **54**, 2059 (1932)

For dibasic acids from the acid, ethylamine and *p*-phenylphenacyl bromide in aqueous ethanol

See Wild, p 147, N L Drake and J P Sweeney, *J Amer Chem Soc*, **54**, 2059 (1932)

From the acid and *p*-phenyldiazoacetophenone in dioxane in the presence of catalytic amounts of cupric chloride

See J L E Erickson, J M Dechary and M R Kesling, *J Amer Chem Soc*, **73**, 5301 (1951)

Methyl ester



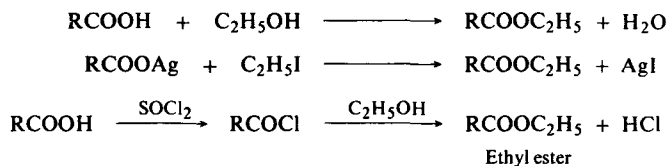
From the acid with methanol and a catalytic amount of sulfuric acid

For directions and examples see Linstead, p 16, Vogel, p 383

From the acid and diazomethane in ether

See B Eistert, in *Newer Methods of Preparative Organic Chemistry*, Interscience, New York, 1948, p 513

Ethyl ester



From the acid and ethanol in the presence of a catalytic amount of sulfuric acid

For directions and examples see Vogel, pp 383, 385, 386, 387

From the silver salt of the acid with ethyl iodide

See Vogel, p 388

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

From the acid chloride and ethanol.

See: Vogel, p. 389.

NOTE: The same methods can be used for the formation of other esters.

S-Benzylthiuronium salt.*



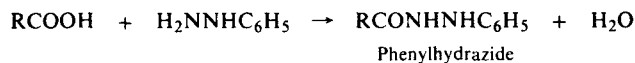
From the sodium or the potassium salt of the acid and *S*-benzylthiuronium chloride in water.

For directions and examples see: Linstead, p. 15; Vogel, p. 36; Wild, p. 149; S. Veibel and H. Lillelund, *Bull. Soc. Chim.* [5], 5, 1153 (1938), S. Veibel and K. Ottung, *Bull. Soc. Chim.* 6, 1434 (1939).

From the sodium or the potassium salt of the acid in water or in aqueous ethanol with an ethanolic solution of *S*-benzylthiuronium chloride.

See: Cheronis, p. 449; Shriner, p. 202; J. J. Donleavy, *J. Amer. Chem. Soc.*, 58, 1004 (1936).

Phenylhydrazide.



From the acid with phenylhydrazine without solvent.

For directions and examples see: Shriner, p. 201; Wild, p. 152; G. H. Stempel and G. S. Schaffel, *J. Amer. Chem. Soc.*, 64, 470 (1942).

From the acid with phenylhydrazine in benzene.

See: Shriner, p. 201; Wild, p. 152.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS

a) Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	<i>p</i> -Toluidide	Anilide	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
1	Thioacetic acid	93			1.074 ₄ ¹⁰	130	76		108			
2	Formic acid	100.7	8.4	1.37137	1.22026	53	50	140-135				<i>p</i> -Nitrobenzyl ester, 31
3	Acetic acid (Ethanoic acid)	118.2	16.6	1.36976 1.3721	1.04926	153 147	114	86.0	82			<i>p</i> -Nitrobenzyl ester, 78
4	Difluoroacetic acid	134.5							52			
5	Acrylic acid	141, 140	13	1.4224	1.0621 ₄ ⁸	141	104.5, w		84-5, pet eth			
6	Propionic acid (Propanoic acid)	141	-20.8	1.3868	0.99336	126, 123	106	63.4	81			<i>p</i> -Nitrobenzyl ester 31
7	Propiolic acid	144d	18		1.139 ₁ ¹⁵		87		61.2			
8	Isobutyric acid (Isobutanoic acid)	154.7	-46.1	1.3920	0.94791	108.5 9.5	105	76.8	128 129			
9	Methacrylic acid	161	16	1.429	1.015				102.6			<i>p</i> -Bromoanilide, 116
10	<i>n</i> -Butyric acid (<i>n</i> -Butanoic acid)	162.5 164	-5.5 -8	1.3983 1.3979	0.95790	75	96.97	63	115.6			<i>p</i> -Nitrobenzyl ester, 35
11	Pyruvic acid (α -Oxopropionic acid)	165d 80 ²⁷	13.6	1.4138	1.2668 ₁ ⁷	109 130	104, subl		124.5, 145			2,4-Dinitrophenylhydrazone 218, yellow
12	Vinylacetic acid (3-Butenoic acid)	169-163	-35	1.4221	1.0094		58		73			
13	Isocrotonic acid (<i>cis</i> - β -Crotonic acid <i>cis</i> -2-Butenoic acid)	169	15	1.4456	1.0265	132	101.2	81	101.2			
14	<i>d</i> -2-Methylbutanoic acid (Ethylmethylacetic acid)	176.7 174		1.4052	0.938 ₈ ²⁰	92.5 3.0	110	55	112			
15	Isovaleric acid (3-Methylbutanoic acid)	176.5	-30.0	1.4043	0.92623	106.7	109.5 (cor)	68.0	135 137			
16	<i>n</i> -Amylpropionic acid (1-Heptyne-1-carboxylic acid)	180 220d	f p 2.5			68, bz			91			Nitrile, b p 194 6 <i>o</i> -Toluidide, 60, pet eth
17	3,3-Dimethylbutanoic acid (<i>tert</i> -Butylacetic acid)	184, 96 ²⁶	6.7	1.4096	0.9124	134	132, et ac-pet eth		132	b p 126		
18	<i>d</i> -1- α -Chloropropionic acid	186				124			80			
19	Cyclopropanecarboxylic acid	186, 182.4	17, 18-9	1.43901	1.0885				125		b p 134, n_D^{20} 1.41902, D_4^{15} 0.96078	
20	<i>n</i> -Pentanoic acid (<i>n</i> -Valeric acid)	186.4	-34.5	1.4086	0.93922	74	63	75	106			
21	2,2-Dimethylbutanoic acid (Dimethylethylacetic acid)	187, 190	-15.0	1.4141, 1.4145	0.9276	83.0	59.2, 90-1		103			<i>p</i> -Phenylphenacyl ester, 86
22	Allylacetic acid (4-Pentenoic acid)	188.9		1.4341 1.4283	0.9843 ₁ ¹⁸				94, b p 230	b p 144.6		
23	Cyclopropylacetic acid	190 ⁷⁵⁰		1.4320 ²⁵								<i>p</i> -Phenylphenacyl ester, 83
24	<i>d</i> -1-2,3-Dimethylbutanoic acid (Isopropylmethylacetic acid)	191.7	-1.5	1.4146	0.9275	112.6	78.4		132			<i>p</i> -Phenylphenacyl ester, 74
25	Dichloroacetic acid	194	5-6	1.4659	1.5634	153	118	99	98, subl			

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS

a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	<i>p</i> -Toluidide	Anilide	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
26	Cyclobutanecarboxylic acid	195	1 4403 ²⁵	1 0599					152 3	b p 136 0 - 5	b p 159 62	
27	2-Ethylbutanoic acid (Diethylacetic acid)	195	-31 8	1 4132	0 9239	116 2	127 5		112 107			
28	<i>d</i> 1-2-Methylpentanoic acid (Methyl- <i>n</i> -propylacetic acid)	195 6		1 4136	0 9230	81	95		79 6			
29	<i>d</i> , <i>l</i> -3-Methylpentanoic acid	197 5	-41 6	1 4159	0 9262	74 8	87, 88		124 9			
30	4-Methylpentanoic acid (Isocaproic acid, Isobutylacetic acid)	199 1 ⁷⁵²	-33	1 4144	0 9225	63 0	112 0, 110 5 111 5	77 3	120 1			
31	Methoxyacetic acid (Glycolic acid methyl ether)	204, 203		1 41677	1 1768		58, pet eth		96 5 7 0, 92-4 78			
32	2-Ethyl-2-methylbutanoic acid (Diethylmethylacetic acid)	204		1 4256								
33	Hexanoic acid (<i>n</i> -Caproic acid)	205 35	-3 9, f p -1 5- -2	1 41635	0 93568	74 5	94 5	72 0	100, 101		b p 166-7	
34	Ethoxyacetic acid (Glycolic acid ethyl ether)	206 7		1 41937	1 1021	32, eth	95 92	104 8	80-2			
35	5-Methylhexanoic acid	207 ⁷⁵²		1 4220			75		103			
36	2-Ethylpentanoic acid (Ethyl- <i>n</i> -propylacetic acid)	209				129	94		104 5			
37	2-Methylhexanoic acid (<i>n</i> -Butylmethylacetic acid)	209 6		1 4189 ²⁵		85	98		73 70- 2 5			
38	α -Chloroisovaleric acid	20-2									b p 178 9	Nitrile b p 154 5 Chloride, b p 149
39	α -Bromobutanoic acid	217d				92	98		112, 108			
40	4-Methylhexanoic acid	217 8 ⁷⁵⁴		1 4211	0 9194		76 5		98			
41	2,2-Dimethylhexanoic acid	218							89			
42	4-Ethyl-4-methylbutanoic acid (<i>active</i> -Amylacetic acid)	221			0 9149					b p 158 64	b p 173 9	$[\alpha]_D^{25}$ +7 6 in me al
43	2-Chloro- <i>n</i> -valeric acid (2-Chloropentanoic acid)	222								b p 160	b p 185-6	Nitrile, b p 160
44	<i>n</i> -Heptanoic acid (<i>n</i> -Heptoic acid)	223 0	-7 46	1 4234	0 91808	81	70, 65	72 0	96, 96 5			
45	2-Ethylhexanoic acid (α -Ethylcaproic acid)	228							102			<i>p</i> -Phenylphenacyl ester, 53 4, 49 5 50
46	Cyclohexylacetic acid	237							172			
47	<i>n</i> -Caprylic acid (<i>n</i> -Octanoic acid)	237, 239 3	16 3	1 4268	0 90884	70	57	67 4	110, 106		b p 207 8 ⁷⁵⁴	
48	Pelargonic acid (<i>n</i> -Nonanoic acid)	254 4	12 3	1 43446 ¹⁵ yel	0 90552	84	57	68 5	99			
49	<i>d</i> -Citronellic acid (2,6-Dimethyl-1-octene-8-carboxylic acid)	257			0 9308				84 5		b p 113 5 ¹² , $[\alpha]_D^{25}$ +0 3	$[\alpha]_D$ +21, Nitrile, b p 230, D^{20} 0 8645
50	2-Phenylpropionic acid	265							92			
51	4-Acetylbutanoic acid (γ -Acetobutyric acid)	275d, 195- 200 ⁸⁵	13-4			123, w			114, chl			Semicarba- zone 175d (+1 H ₂ O), w, Oxime, 104 5 bz

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS

a) Liquids 2) (Reduced pressure b.p. only) (Listed in order of increasing amide m.p.)*

No	Name	Amide	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	<i>p</i> -Toluidide	Anilide	<i>p</i> -Bromophenacyl ester	Methyl ester	Ethyl ester	Miscellaneous
1	3-Ethoxypropionic acid	51	120 ¹⁷		1.4216							
2	3-Heptynoic acid	67	102 ²	14	1.4635 ²⁵							
3	2-Heptynoic acid	68 9, al	135 ²⁰		1.4619	0.978				b p 91-3 ¹⁹ , n_D^{20} 1.4455, D_4^{20} 0.937		
4	<i>trans</i> -Oleic acid	75-6	216 ⁵ , 250 (superheated steam)	α 13.36, β 16.25	1.4597		42.5	41	40, 46			
5	2-Fluoropropionic acid	76	60 ⁸									
6	2-Azidoisovaleric acid (2-Triazoisovaleric acid)	78 9, bz	82 ^{0 1}			1.0638 ³³					b p 82 ¹⁶ , D_{20}^{20} 1.0295	
7	<i>d,l</i> -Lactic acid	78 5 9 0 (cor), bz -al (3 1)	122 ¹⁵	18			107	58.5-9.0, w	112.8	144.8	154	
8	<i>d,l</i> -2-Azidopropionic acid (<i>d,l</i> -2-Triazopropionic acid)	80, bz	121.5 ²⁰								b p 70 ¹⁶ , n_D^{25} 1.428.57, D_{23}^{23} 1.065	Explodes on heating
9	2-Ethyl-3-Hexenoic acid	80	132 ¹⁹									
10	4-Phenoxybutanoic acid	80	197 ¹⁸									
11	2-Methoxypropionic acid	81	89 ¹⁰									
12	<i>l</i> -Citronelic acid (2,6-Dimethyl-1-octen-8-carboxylic acid)	84-5	117.9 ^{0 6}		1.4563 ²⁴	0.9274 ²⁵	93-4	76		b p 86 ^{1 1}		$[\alpha]_D^{25}$ -6.6
13	2-Ethyl-4-methylpentanoic acid (Ethylisobutylacetic acid)	89	115 ²⁰									
14	2-Octynoic acid	90	133 ¹⁰		1.4595			60				
15	6-Methyloctanoic acid	91	149 ²³		1.4337							
17	3-Methylhexanoic acid	98	112 ¹⁶		1.4222							
18	2,3-Dimethylpentanoic acid	102	92 ¹⁵									
19	2-Cyanopropionic acid	105, 81	142-5 ¹¹								b p 192-3	
20	7-Methyloctanoic acid	106	105 ²									
21	1-Chlorocyclohexane carboxylic acid	110, me al -w	138-40 ¹³									Ethylamide, 53
22	2-Cyanobutanoic acid	113	153-5 ¹⁵								b p 207-9	
23	Methylnopentylacetic acid	123	108 ¹⁴									
24	2-Isopropylbutanoic acid (2-Ethyl-3-methylbutanoic acid)	135	105 ¹⁵									
25	5-Cyclopentylpentanoic acid	136	123 ^{4 5}									
26	2-Methylcyclopentane-carboxylic acid	148	107 ⁹		1.4504 ²²							
27	3,4,4-Trimethylpentanoic acid	167	98 ⁴		1.4320 ²¹							
28	<i>cis</i> -4-Methylcyclohexane-carboxylic acid	175	130 ¹³									
29	Cyclopentanecarboxylic acid	179	123 ²⁷									

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point °C	<i>p</i> -Toluidide	Amide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
1	<i>β</i> -Bromobutyric acid (<i>β</i> -Bromobutanoic acid)	20	122 ¹⁶					92 3		b p 183 4	
2	<i>trans</i> - <i>β</i> -Ethyl- <i>α</i> -methylacrylic acid	24	112 ¹² <i>cis</i> 94 ¹⁰				91, <i>cis</i> 46	80			<i>n</i> _D ²⁰ 1 4578 <i>cis</i> <i>n</i> _D ²⁰ 1 4485
3	<i>d l</i> - <i>α</i> -Azidobutyric acid (<i>d l</i> - <i>α</i> -Triazobutyric acid)	24	81 ^{0 2}					38 9, bz - pet eth		b p 64 ⁷ , D ₂₀ ²⁰ 1 038	
4	Undecylenic acid (10-Undecen-1-oic acid 10-Hendecen-1-oic acid)	24 5	275					87			Cu salt, 232-4, Pb salt, 80
5	2-Ethoxybenzoic acid (Salicylic acid ethyl ether)	24 5 5 5	300d					132			
6	<i>d l</i> - <i>α</i> -Bromopropionic acid	25 7	203 5	125	99, 100			123	b p 145- 50	b p 159- 60d	
7	<i>n</i> -Undecylic acid (<i>n</i> -Undecanoic acid, <i>n</i> -Hendecanoic acid)	28 5, <i>α</i> 13 4, <i>β</i> 16 3	280, 284	80	71		68 2	103			
8	<i>α</i> -Chloroisobutyric acid (<i>α</i> -Chloroisobutanoic acid)	31	118 ⁵⁰		69 70, al				b p 133 5	b p 148 9	
9	<i>α</i> -Azidoisobutyric acid (<i>α</i> -Azidoisobutanoic acid <i>α</i> -Triazoisobutyric acid)	31	75 ^{0 2}					93-4		b p 71 ¹⁶ , D ₂₀ ²⁰ 1 0344	D ₃₃ ³³ 1 1433
10	Cyclohexanecarboxylic acid (Hexahydrobenzoic acid)	31, 30 1	233		146 (cor)			185 6			
11	<i>α</i> -Ketobutyric acid (2 Oxo-butanoic acid)	31	78 ²⁵					117			<i>n</i> _D ²⁰ 1 3975, <i>p</i> - Nitrophenyl- hydrazone, 194
12	Fluoroacetic acid	31-2	167-9					108			
13	Capric acid (<i>n</i> -Decanoic acid)	31 5	268 70	78	70		67, al, 66	108, 100 l, 98, 99	b p 224	b p 243-5	<i>n</i> _D ²⁰ 1 42855
14	Bromochloroacetic acid	31 5	215 sl d					126, 117		b p 174d	Phenyl ester, 46 5, b p 266
15	2-Hexenoic acid	32	-		110						
16	<i>n</i> -Butylmethylglycolic acid	33						58			
17	<i>cis</i> -13-Docosenoic acid (Erucic acid)	33-4	264 ¹⁵	75-8	55		62 5, 61 0	84			D 0 860 ⁵⁵
18	Levulinic acid (<i>γ</i> -Ketovaleric acid, <i>β</i> -Acetylpropionic acid)	33-5 deliq	245-6	108 9, w	102, w	61	84	107-8d			Oxime, 96
19	Pivalic acid (Trimethylacetic acid)	35 5	163-4	119-20	132-3, 128 (cor)		75 6	155 7, 153-4, et ac -pet eth			
20	<i>d, l</i> - <i>α</i> -Methylhydrocinnamic acid (<i>α</i> -Benzylpropionic acid)	36 5	272	130, <i>d</i> 115-6				107 8, <i>d</i> 113-4			
21	1-Cyclohexenylcarboxylic acid	38	107 ³					128			
22	<i>n</i> -Hexylmethylglycolic acid	40						59			
23	5-Acetyl- <i>n</i> -valeric acid (<i>δ</i> -Acetylpentanoic acid)	40 2, 31-2	250 3 ²⁸⁰								Semicarbazone, 144-6, ac a
24	<i>d, l</i> - <i>α</i> -Campholytic acid (1,5,5-Trimethylcyclopenten-4-carboxylic acid)	40 5	162-5 ⁴⁵ , 1 240- 3					103, w	b p 200		Nitrile, b p 200-5
25	<i>β</i> -Chloropropionic acid	41, w, 39, lgr	204						b p 155- 7, D ⁰ 1 198	b p 162, D ₂₀ ²⁰ 1 1086, <i>n</i> _D ²⁰ 1 42537	Nitrile, b p 175- 6, D ^{18 5} 1 1443
26	<i>d, l</i> - <i>α</i> -Ethylphenylacetic acid (<i>d, l</i> - <i>α</i> -Phenylbutanoic acid)	42	270					85-7, 83			

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	<i>p</i> Toluidide	Anilide	<i>p</i> Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
27	<i>α</i> -Ethylpimelic acid	43	223 ¹⁷		145						
28	Tridecyclic acid (<i>n</i> -Tridecanoic acid)	43, 41 6	312, 177 ¹⁰	88	80		75 0	100			
29	Lauric acid (<i>n</i> -Dodecanoic acid)	44, 42	299	87	78		76	100, 99			
30	<i>d,l</i> - <i>α</i> -Bromoisovaleric acid	44	230d	124	116			133, bz	b p 174	b p 186	
31	Elaidic acid (<i>trans</i> -Oleic acid)	44 5, 51	234 ¹⁵				65	93-4, 89 90			<i>p</i> -Phenylphenacyl ester, 73 5, <i>p</i> -Chlorophenacyl ester, 56
32	4-Cyanobutanoic acid (<i>γ</i> -Cyanobutyric acid)	45						69 70, sealed tube		b p 245	
33	Dimethylneopentylacetic acid	45	230 ⁷³²					71			
34	<i>trans</i> -2-Methyl-2-butenic acid (Angelc acid)	45 6	185 (cor)		126, bz			127-8			Isobutyl ester, b p 177 2-Naphthylamide, 135, bz, Heating 2 hours in sealed tube → tlglic acid, 64-5
35	Dibromoacetic acid	48	232-5					156			
36	<i>α</i> -Bromoisobutyric acid (<i>α</i> -Bromoisobutanoic acid)	48 9	198 200	92 5, al	83, al - w			148			<i>o</i> -Toluidide, 63
37	<i>tert</i> -Butylpropionic acid	48-9	110 ¹⁰						b p 66 ¹³ , D ⁰ 0 9209	b p 75 ¹⁵ , D ⁰ 0 9209	
38	Hydrocinnamic acid (<i>β</i> -Phenylpropionic acid)	48 7, 40	279-80 (cor)	135	98, 96	36 3	104	105, 82			<i>p</i> -Phenylphenacyl ester, 95
39	<i>β</i> -Cyanopropionic acid	48-50						97, sealed tube	b p 215, n _D ²⁰ 1 42427, D ²⁰ 1 0792	b p 220 ⁷⁵⁴ , D ²⁰ 1 0353	..
40	Benzylpyruvic acid	49 50 (+ $\frac{1}{2}$ H ₂ O), w						180			Semicarbazone, 175d, Oxime, 65, Phenylhydrazone, 144-5
41	Bromoacetic acid	50	208		131	88		91	b p 144d	b p 168-9	
42	2-Pentynoic acid (Ethylpropionic acid)	50	100 ¹⁰					146			
43	<i>γ</i> -Phenylbutyric acid	52	290					84			
44	<i>n</i> -Pentadecylic acid (<i>n</i> -Pentadecanoic acid)	52 3	212 ¹⁶		78	39 5-40 (cor)	77 2	102 5			
45	<i>β</i> -Campholenic acid	53 5	245					86		222 5	Nitrile, 225, D ²⁰ 0 9093
46	Myristic acid (Tetradecanoic acid)	53 9	202 ¹⁶	93	84		81	103			
47	Trichloroacetic acid	57 8	197 5	113	97, 94	80		141	b p 153 8	b p 168	Phenylhydrazide, 123
48	<i>α</i> -Acetoxypropionic acid (O-Acetylactic acid)	57 60, 39-40	167-70 ⁷⁸								Nitrile, b p 172-3
49	<i>β</i> -Acetylglutaric acid	58						<i>mono</i> 141-2, al -eth	89		
50	<i>sec-n</i> -Amylmalonic acid (2-Ethylbutane-1,1-dicarboxylic acid, <i>sec-n</i> -Pentylmalonic acid)	58, bz			<i>di</i> 219-20					<i>di</i> b p 243 5	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	<i>p</i> -Toluidide	Anilide	<i>p</i> Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
51	<i>trans</i> -Brassicic acid	59.7	256 ¹⁰		78		94.2	94			
52	5-Phenylpentanoic acid	60			90			109			
53	β -Cyclohexylacrylic acid	60	154 ¹¹					159			
54	β -Chloroisocrotonic acid	61	195 (subl.)		108			110	b p 142	b p 161	
55	Margaric acid (<i>n</i> -Heptadecanoic acid)	61.2	231 ¹⁶			48.5 9.0 (cor.)	82.6	108, 106			
56	Chloroacetic acid	α 61.3, β 56.2 γ 52.5	189	162	136.7		104	121	b p 130	b p 145.6	
57	β -Bromopropionic acid	62.5						111	b p 80 ²⁷ , D ¹⁷ 1.4897	b p 70 ¹² , D ¹⁵ 1.2609	2-Naphthylamide, 174
58	Palmitic acid (Hexadecanoic acid)	62.7	222 ¹⁶	98	90.6, al	42.5	86, 82	106.7, 105.3, al			
59	<i>cis</i> -2-Methyl-2-butenoic acid (Tiglic acid)	64.5-5.0	198.5 (cor.)	70.0-1.5	77, pet eth	64	68	75.6, bz			
60	Cyanoacetic acid	66			198-9			119-20	b p 200	b p 207	Nitrile, 29-30, b p 218.9
61	Benzoylformic acid	66						91			Nitrile, 32-3, b p 206-8, 2,4-Dinitrophenylhydrazone, 196-7d (cor.), Phenylhydrazone, 64
62	Acetoxyacetic acid	66-8, bz	145 ¹²		89-90, w					b p 179, D ¹⁷ 1.0993	
63	2,3-Dibromopropionic acid	67, stab, 51, unst	160 ²⁰					130			
64	3,3-Dimethylacrylic acid	67	106 ²⁰					108			
65	2-Furylacetic acid	67			85						
66	3,3,4,4-Tetramethylpentanoic acid	67						138			
67	4-Ketocyclohexanecarboxylic acid (4-Oxocyclohexanecarboxylic acid)	67-8, bz - pet eth							b p 140 ²⁰	b p 158 ⁴⁰	Semicarbazone, 200d, Oxime, 147, eth
68	<i>d,l</i> -2-Phenyllactic acid	68 (+ $\frac{1}{2}$ H ₂ O), w 94 (anh), <i>d</i> 116-7, w, <i>l</i> 115.6, bz						101.2, di- chloro- ethylene, <i>l</i> 62.5 3.5, bz			<i>d,l</i> -Et eth, 60-2, lgr, <i>d</i> - Quinine salt, 216d, al, <i>l</i> - Menthyl ester, 55.5-6.0
69	<i>d</i> -Chaulmoogric acid (<i>d</i> - ω -Cyclopentyltridecanoic acid)	68.5	247-8 ²⁰	100	89			106, al	22	b p 230 ²⁰ , D ¹⁵ 0.9064	[α] _D +62 in chl
70	Stearic acid (Octadecanoic acid)	70-1, 69.6		102	95.5, al		92	109, 108.4, al			
71	<i>trans</i> -Crotonic acid (<i>trans</i> -2-Butenoic acid)	72, w	189 (cor.)	132, bz	118, w, 115	67.4	95.6	159-60, bz	b p 121	b p 138, D ²⁰ 0.9175, n _D ²⁰ 1.42524	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
72	γ-Bromocrotonic acid	74, igr						101	b p 87 ¹⁵ , D ₄ ¹⁹ 1 490	b p 97- 8 ¹⁵ , D ₄ ¹⁶ 1 402, n _D ¹⁶ 1 498	
73	Caproylacetic acid	74d						100	b p 118 ¹⁹ , D ₄ ² 0 9916	b p 127 ¹⁹ , D ⁰ 0 9721 b p 138 ¹⁸	Nitrile, b p 127- 8 ¹⁴ , D ¹⁵ 0 9914
74	3-Ketocyclohexanecarboxylic acid (3-Oxocyclohexanecarboxylic acid)	75 6, bz	195-7 ²⁰								Semicarbazone, 183-4, al, Oxime, 170d, w, Phenylhydra- zone, 125, yel
75	2-Thienylacetic acid	76						148			
76	sec-Butylmalonic acid (Isopentane-1,1-dicarboxylic acid)	76						<i>di</i> 242	<i>di</i> b p 217 8 ⁷⁴⁸	<i>di</i> b p 245-50 ⁷⁶²	
77	Phenylacetic acid	76 5, subl	256 5 (cor)	135-6	117-8	65	89	156			
78	Eicosanoic acid (Arachidic acid)	77, 75	204 ¹	96	92		89	108 9			
79	Glycolic acid (Hydroxyacetic acid)	78 9, 80		143, w	97, w	106 8	138	120, al - et ac			On prolonged heating at 100° → anh, 128 30
80	α-Hydroxyisobutyric acid (2-Hydroxyisobutanoic acid Dimethylglycolic acid)	79	212	132-3, w	136, w	80 5	98, acet				
81	α-Methylcinnamic acid	81, 74						128			
82	2-Ketocyclohexanecarboxylic acid (2-Oxocyclohexanecarboxylic acid)	81-2, eth								b p 107- 8 ¹² , 159-60 ¹⁰⁰	Alcoholic sol + FeCl ₃ → blue color
83	<i>n</i>-Docosanoic acid (Behenic acid)	81-2			101 2			111	54	50	
84	β-Iodopropionic acid	82, 85						101 142			
85	α-Benzoylpropionic acid	82-3, bz - pet eth			137-8, al			145-6			Phenylhydrazone, 100 4, br, bz
86	Iodoacetic acid	83						95			
87	γ-Chlorocrotonic acid	83	117 8 ¹³					130-2, w		b p 191-3 ⁷⁵⁰	Nitrile, b p 73 ¹⁵ , D ⁰ 1 1495 <i>p</i> -Chlorophenacyl ester, 100
88	Lignoceric acid (Tetracosanoic acid)	84					91				
89	β-Methyladipic acid	85, 91	223 ¹⁸		200						
90	α-Benzoylbutyric acid (α-Benzoylbutanoic acid)	85-7						148-9		b p 168- 71 ¹⁰	Nitrile, b p 134-5 ³
91	<i>d,l</i>-α-Bromophenylacetic acid	86, 84						148, 144			Nitrile, 29, b p 242d
92	(4-Methoxyphenyl)acetic acid	87, 84						189			
93	Dineopentylacetic acid	88						140			
94	Dibenzylacetic acid	89		175, abs al	155, abs al			128-9, bz			
95	(2-Tolyl)acetic acid	90, 88						161			
96	α-Thienylglyoxylic acid	91						88			
97	Δ⁵-Campholytic acid (4,5,5-Trimethylcyclopentene-1-carboxylic acid)	91						90, igr			
98	Citraconic acid (Methylmaleic acid)	92d, 92-3, 91d, eth -lgr		<i>mono</i> 170-1, yel, eth	<i>mono</i> 153, <i>di</i> 175 5, al	<i>di</i> 70 6		<i>di</i> 185- 7d	<i>di</i> b p 210-1	<i>di</i> b p 231	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
99	2-Bromobenzoylformic acid	93-101						136-7, w			Nitrile, 62-4, yel, Oxime, 162-4d
100	β -Chlorocrotonic acid	94	206-11 sl d		123-4			100 1	b p 64 7 ¹⁴ , D ₄ ²² 1 555, n _D ²⁰ 1 463	b p 180, 184, D ₄ ²⁰ 1 1062, n _D ²⁰ 1 459	1-Naphthylamide, 169-70
101	Phenyl- <i>n</i> -propylglycolic acid	94						132			
102	(2-Chlorophenyl)acetic acid	95, w		170	138 5			175, w			Nitrile, 25, b p 251, <i>o</i> -Toluidide, 174
103	(4-Tolyl)acetic acid	95, 91	159 ¹⁵					185			
104	<i>o</i> -Chlorohydrocinnamic acid	96 5, w						119, bz	b p 255		Nitrile, b p 267-8
105	2-Hydroxy-3-phenylpropionic acid	97, 96						112			
106	1,2,3,4-Tetrahydro-2-naphthoic acid	97						139			
107	Glutaric acid (1,3-Propanedicarboxylic acid)	98	302 4	<i>di</i> 218	<i>di</i> 223 4	<i>di</i> 69	<i>di</i> 136 8	<i>di</i> 175-6			
108	3-Phenoxypropionic acid	98						119			
109	α -Crotonic acid	99	212					112	161	176	Nitrile, b p 136
110	Phenoxyacetic acid	98-9, 99 100	285d		99, al		148 5	101 5			
111	2-Benzofurylacetic acid	99						164			
112	1-Naphthylglycolic acid	99 124-5						135			
113	Citric acid	100 (+1 H ₂ O), 153 (anh)		<i>tri</i> 189, al	<i>tri</i> 192	<i>tri</i> 102	<i>tri</i> 148	<i>tri</i> 210-5d, w			
114	2-Methoxybenzoic acid (<i>o</i> -Anisic acid Salicylic acid methyl ether)	100 1	200				113	129			
115	<i>l</i> -Malic acid (Hydroxysuccinic acid)	100-1		<i>di</i> 206-7	<i>di</i> 197	<i>mono</i> 87 2, <i>di</i> 124 5	<i>di</i> 179	<i>di</i> 156-7, <i>d,l</i> 162 3			
116	Oxalic acid	101 (+2 H ₂ O) (rapid htng), 189 5 (anh) subl at 150-60		<i>mono</i> 169, <i>di</i> 268	<i>mono</i> 148 9, <i>di</i> 254, 246, bz	<i>di</i> 204		<i>mono</i> 219, <i>di</i> 419d			
117	Acetylpyruvic acid (2,4-Diketone-valeric acid, 2,4-Dioxopentanoic acid)	101, bz						131-2d, al	63-4		
118	<i>n</i> -Butylmalonic acid (Pentane-1,1-dicarboxylic acid)	101			<i>di</i> 193			<i>di</i> 200		<i>di</i> b p 235-40	Mononitrile, 122 5-6 5, w, subl
119	α -Cyanohydrocinnamic acid (Benzylcyanoacetic acid)	101-2						130		b p 176-85 ²¹	
120	2-Chloro-6-methylbenzoic acid	102, w						167			Nitrile, 82-3, pet eth
121	Aleuritic acid (9,10,16-Trihydroxypalmitic acid)	102, w							63-4		Hydrazide, 139-40, Azide, 50d, al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
122	(2-Bromophenyl)acetic acid	103.4, 109						186.7			Nitrile, b p 145.7 ¹⁴
123	Benzylacetic acid	103.4d			107.8			113			Nitrile, 80.1, 1-Menthyl ester, 41
124	Pimelic acid	104-5, subl	223 ¹⁵	<i>di</i> 206, al	<i>mono</i> 108.9 <i>di</i> 155.6, me al-w		<i>di</i> 136.6	<i>di</i> 175			
125	2-Toluic acid (2-Methylbenzoic acid)	104.5, 107.8	259 ⁷⁵¹	144	125	90.7	57	142.8 (cor)			
126	Allylmalonic acid	105, eth				46, al				<i>di</i> b p 222-3	Mononitrile, b p 223, Dinitrile, b p 217.8
127	(4-Chlorophenyl)acetic acid	105-6, 104		190	164.5, al			175, al		32, b p 260	<i>o</i> -Toluidide, 190, bz Nitrile, 30, b p 265-7
128	Δ^2 -Cyclogeranic acid (1,5,5-Trimethylcyclohexene-6-carboxylic acid)	106, lgr	138 ¹¹					120.1, bz-pet eth		b p 101.2 ¹⁰	
129	<i>d</i> -Campholic acid (<i>d</i> -1,2,2,3-Tetramethylcyclopentane-1-carboxylic acid)	106, <i>dl</i> 109	255		91			80, <i>dl</i> 90	b p 208	b p 220	Nitrile, 73, Anhydride, 56, <i>dl</i> 66
130	Atropic acid (1-Phenylacrylic acid)	106-7, w			134			121.2, w		b p 124 ¹⁶ , n _B ¹⁶ 152605	
131	<i>l</i> -Campholic acid	106-7	250					78-9	b p 211	b p 228	Anhydride, 57.8
132	Azelaic acid (Heptane-1,7-dicarboxylic acid)	106.5	>360 sl d, 237 ¹⁵	<i>di</i> 201.2	<i>mono</i> 107-8, <i>di</i> al, <i>di</i> 186.7	<i>di</i> 43.8	<i>di</i> 130.6	<i>mono</i> 93-5, <i>di</i> 175			
133	Methylneopentylglycolic acid	109						116			
134	<i>trans</i> -4-Methylcyclohexane-carboxylic acid	111						226			
135	<i>cis</i> - α -Chloroalloccinnamic acid	111			138.9, al-w			134, bz	b p 153.4 ²⁸	b p 157.8 ¹⁰ , D ₂ ²⁵ 1569, n _B ²⁵ 15525	
136	Ethylmalonic acid	111			150	75		<i>di</i> 214			
137	3-Toluic acid (3-Methylbenzoic acid)	111.3, 110-1	263, subl	118	126	86.6	108	94, 97			
138	<i>O</i> -Benzoyllactic acid (Lactic acid benzoate)	112						124		b p 288	Nitrile, b p 269-70, 1-Naphthylamide, 155, 2-Naphthylamide, 177
139	2,4,6-Triethylbenzoic acid	113						156			
140	2-Phenylbenzoic acid	113						177			
141	(1-Naphthyl)glyoxylic acid	113						151			
142	Bromomalonic acid	113d		<i>di</i> 217, ac a				<i>di</i> 181, al	<i>di</i> b p 215-25	<i>di</i> b p 233-5d 30	Dinitrile, 65-6
143	(4-Bromophenyl)acetic acid	114, subl						192.4			Nitrile, 46.7
144	2-Acetylbenzoic acid (Acetophenone- <i>o</i> -carboxylic acid)	114-5						116.5, w			Oxime, 159, 2,4-Dinitrophenylhydrazone, 186

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
145	Pyrotartaric acid (Methylsuccinic acid)	115		164	<i>mono</i> 159, et ac 123, chl <i>di</i> 200			<i>di</i> 225			
146	2-Phenoxypropionic acid	115-6, 112-3		115	117 118 9			132 3, 130			
147	3-Benzoylpropionic acid	116			150, 145			145-6, w		18 9	Semicarbazone, 181d Dinitrile, 91, 79
148	Benzylmalonic acid	117d, 121			<i>di</i> 217	<i>di</i> 119 5		<i>di</i> 225			
149	<i>d l</i> -Tropic acid (3 Hydroxy-2 phenylpropionic acid)	117 8 <i>d</i> 130						169			
150	Cuminic acid (4 Isopropyl benzoic acid)	117-8, al						133		b p 263 4	Nitrile, b p 243-4 ⁷³⁴
151	<i>d l</i> -Mandelic acid (α -Hydroxyphenylacetic acid)	118, <i>d</i> 133 <i>l</i> 134		172, al	151 2, al	123 4		133 4 (cor)			
152	<i>l</i> -Arabonic acid	118 9, al		200	204			136, me al			<i>o</i> -Toluidide, 172
153	α -Chlorodiphenylacetic acid	118-9d, bz -lgr			88			115		43 4	Anhydride, 219
154	<i>d l</i> -Citramalic acid (<i>d l</i> -2-Hydroxy-2-methylsuccinic acid)	119						<i>mono</i> 140 1	<i>di</i> b p 112 ¹⁵		Me eth, 90 2 Et eth, 81 3
155	Anilinomalonic acid	119d, al - lgr			<i>mono</i> 157d, w <i>di</i> 162, 246 7, ac a			<i>di</i> 156	<i>di</i> 68	<i>di</i> 45, al	
156	4-Chloromandelic acid	119 22, 112 3						122 3			Nitrile, 43 Me eth 85-8, bz pet eth
157	(3-Nitrophenyl)acetic acid	120						110			
158	<i>cis</i> -2-Bromoallicinnamic acid	120						129	b p 111 ^{0 6} , D ₄ ²⁰ 1 4726	b p 173 4 ³⁰ , D ₄ ²⁵ 1 3713	
159	3-Furoic acid (3 Furancarboxylic acid)	121						169			
160	1-Cyclopentenylcarboxylic acid	121		122	126						
161	Cetylmalonic acid (Heptadecane-1,1-dicarboxylic acid)	121 5 2 0, ac a						<i>mono</i> 130 50d, lgr -al 226	<i>di</i> 44, eth	<i>di</i> 22	
162	<i>cis</i> -1,3-Cyclopentanedicarboxylic acid	122 <i>trans</i> 161									
163	<i>d l</i> - <i>trans</i> -Camphenic acid (<i>d l</i> - <i>trans</i> -Camphenecamphoric acid)	122 3, ac a			<i>di</i> 165, ac a			<i>di</i> 231 2, ac a			
164	Benzoic acid	122.4, at 100, subl	249	158	160, boil 50% al 164	89	119 0	130	b p 199 6	b p 212 6	
165	3,3,3-Trichlorolactic acid	124						96			
166	3-Nitrosahelic acid	125 (hyd)						145			
167	Diethylmalonic acid	125				<i>di</i> 91		<i>mono</i> 146, <i>di</i> 224			
168	1,14-Tetradecanedicarboxylic acid	126			163						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	<i>p</i> -Toluidide	Amide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
169	2,4-Dimethylbenzoic acid	127 (anh) 90 (hyd)			141			179-81			
170	<i>cis</i> -2-Chloroallicinnamic acid	127						112			
171	2-Benzoylbenzoic acid (Benzophenone-2-carboxylic acid)	128, 91 (+1 H ₂ O), w			195	100.4		165 (cor)	52		
172	1,10-Decanedicarboxylic acid	128						185			
173	2-Thenoic acid (2-Thiophenecarboxylic acid)	129						180			
174	4-Bromopyromucic acid (4-Bromofuran-2-carboxylic acid)	129						155-6		29 b p 235.6	
175	Maleic acid (<i>cis</i> -Butenedioic acid)	130 (+30% Fumaric a), 137 (pure)		<i>di</i> 142, eth	<i>mono</i> 198, 187, yel, al, <i>di</i> 187, al	<i>di</i> 91 (cor)	168.70, 190	<i>mono</i> 172.3, w 153 sl d, <i>di</i> 260, 181, me al			Heated at 160 → anh, 60, b p 202
176	Tribromoacetic acid	131, 135	245d					122			
177	(1-Naphthyl)acetic acid (1-Naphthaleneacetic acid)	131, 135			155, al, 159.6			180.1, al			
178	<i>trans</i> - α -Bromocinnamic acid	131-2						119	23	b p 294-6	
179	2,5-Dimethylbenzoic acid	132			140			186			
180	<i>cis</i> - β -Chloroallicinnamic acid	132		142	134.5			76	34	b p 265 sl d	
181	<i>trans</i> -Cinnamic acid	133	300	168	153, 109	116.8	145.6	147.8			Nitrile, 20-1, b p 255.6
182	Chloromalonic acid	133			<i>di</i> 118, w			<i>di</i> 170	<i>di</i> b p 206-8 ⁷⁷²	<i>di</i> b p 222	Di- <i>p</i> -bromoanilide 239
183	Sebacic acid (Decanedioic acid, Octane-1,8-dicarboxylic acid)	33, subl	243 ¹⁵	<i>di</i> 201	<i>mono</i> 122.3, <i>di</i> 201.2	<i>di</i> 73.5, 72.6	<i>di</i> 147	<i>mono</i> 170, <i>di</i> 210, 208			Phenylhydrazide, 194
184	2-Furoic acid (2-Furancarboxylic acid, Pyromucic acid)	133-4, 132	230-2	170.5, al	123.5, al	133.5	138.5	142.3		34, b p 195	
185	Malonic acid (Propanedioic acid)	134.8-9		<i>mono</i> 156d, <i>di</i> 252-3, al	<i>mono</i> 132, <i>di</i> 230, 227-8, al	<i>di</i> 85.5		<i>mono</i> 106.10, <i>di</i> 170, w-al		<i>di</i> b p 199	Phenylhydrazide, 194
186	O-Acetylsalicylic acid (Aspirin)	135, rapid htng	140d		136	90.5		138			Phenacyl ester, 105
187	β-Campholytic acid (1,5,5-Trimethylcyclopentene-2-carboxylic acid)	135	247-9, 255-6	114	104, al-w			130	b p 203.4	b p 214	
188	2-Anilinoisovaleric acid	135, w						102.3		b p 275-80	
189	Acetone-1,3-dicarboxylic acid	135d, et ac			<i>di</i> 155, al						Oxime, 53.4 w Acids or alkalis → acetone b p 56 + CO ₂
190	<i>d l cis</i> -Camphenic acid (<i>d l cis</i> -Camphenecamphoric acid)	135-7			<i>di</i> 212			<i>di</i> 225			
191	Phenylpropionic acid	136-7, subl		142	128, 126, 125	83		99-100, 109			Melts under w at 80

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
192	<i>trans</i> -Glutaconic acid	136-8			<i>mono</i> 167, <i>di</i> 228						Acetic anhydride → anh 88
193	3-Ethoxybenzoic acid	137						139 0-5			
194	Methylmalonic acid	137, 138d		<i>mono</i> 145d, <i>di</i> 228, 214				217, 206			
195	<i>trans</i> - α -Chlorocinnamic acid	137-8		116, al	118, al			121 2	33	<i>b p</i> 209 ⁷⁵ , D ₄ ²⁵ 1 1719, n _D ²⁵ 1 5705	
196	3-Thenoic acid (3-Thiophenecarboxylic acid)	138					130	180			
197	<i>cis</i> -Cyclobutane-1,2-dicarboxylic acid	138						<i>di</i> 228, w	<i>di b p</i> 225	<i>di b p</i> 238-42 ⁷²⁰	Anhydride, 75 71-3
198	2-Pyridinecarboxylic acid (Picolinic acid)	138						107			
199	(3-Chloromethyl)benzoic acid	138, w						124		<i>b p</i> 168 9 ²⁵	Nitrile 67 al <i>b p</i> 258 60
200	5-Chloro-2-nitrobenzoic acid	139, w			164, eth			154, eth	48 5, me al		Methylamide, 134, al -w, Dimethylamide, 104 5
201	Anhydrocamphoronic acid	139			202 3				α 138, β 45		
202	Butane-1,1,4-tricarboxylic acid	139 40, bz -et ac			<i>mono</i> 177					<i>tri b p</i> 175 6 ¹⁸ , D ¹⁵ 1 0726	
203	<i>meso</i> -Tartaric acid	140			<i>mono</i> 193-4, pa yel, w	93		<i>di</i> 187, 189 90, dil me al			Diphenylhydrazide 245
204	3-Nitrobenzoic acid	140		162	154	141	132	143	78 5, 70	47, 40-1	
205	3-Bromo-4-toluic acid (2-Bromo-4-methylbenzoic acid)	140						137, subl			Nitrile, 47
206	2-Chloro-4-nitrobenzoic acid	140-2			168			172, al	73-5		
207	(2-Nitrophenyl)acetic acid	141, 138						161			
208	Furanacrylic acid (β -(2-Furyl)acrylic acid)	141	286					168 9			
209	2-Anilinobutyric acid	141			92, al			123, w		26, <i>b p</i> 278	Nitrile, 39
210	(2-Naphthyl)acetic acid (2-Naphthaleneacetic acid)	141-2, 143						200, 205			
211	4-Chloro-2-nitrobenzoic acid	142, w						172, al	41 3		Nitrile, 98
212	<i>trans</i> - β -Chlorocinnamic acid	142		122-5	128			118	29	<i>b p</i> 293	
213	2-Chlorobenzoic acid	142, 140		131	114, 118, pet eth	106	106	142, 202	<i>b p</i> 234	<i>b p</i> 243	
214	(2-Bromophenoxy)acetic acid	142 5, al						151, al		<i>b p</i> 160 70 ¹⁶	

* Derivative data given in order m p, crystal color, solvent from which crystallized

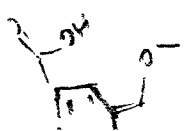


TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
215	Suberic acid (Octanedioic acid, Hexane-1,6-dicarboxylic acid)	144, 139 41		<i>di</i> 218, 219	<i>mono</i> 128 9, <i>di</i> 186-7	<i>di</i> 85	<i>di</i> 144 2	<i>mono</i> 125 7, <i>di</i> 216-7		<i>di</i> b p 282 6	
216	Asaronic acid (2,4,5-Tri-methoxybenzoic acid)	144, bz - pet eth	<i>ca</i> 300		154 5			184 5	97 5, yel	72, yel	Nitrile, 112-4, al
217	(2-Chlorophenoxy)acetic acid	145 6, w			121			149 5	b p 186 8	32	
218	2-Nitrobenzoic acid	146			155	112	107	176	b p 275, 269, D ₄ ¹⁰ 1 286	30, b p 148 50 ¹⁰	
219	Phthalonic acid	146			<i>mono</i> 176 <i>di</i> 208			α 179d β 155d			Phenylhydrazone, 171 2
220	(2-Hydroxyphenyl)acetic acid	147 149, 141						118			
221	2-Anilinovaleric acid (2-Anilino-pentanoic acid)	147-8, al -w						99, eth - pet eth			Nitrile, 51, pet eth
222	Diphenylacetic acid	148		172 3	180			167 5 8 0			
223	Diglycolic acid	148, 142		<i>mono</i> 148, w	<i>mono</i> 118, <i>di</i> 152, eth al (2 1) <i>di</i> 154			<i>mono</i> 135			
224	Oxanilic acid	148 9						228			
225	(4-Hydroxyphenyl)acetic acid	148 50, 148, w						175			Benzoate of amide, 167 9
226	2-Bromobenzoic acid	150			141	110	102	155	b p 243 4	b p 254-5	
227	Benzilic acid (α -Hydroxy-diphenylacetic acid)	150		189-90	174 5	99 5	152	153, chl, 154 5	74-5	34	Acetate, 98, ac a
228	Citric acid (2-Hydroxypropane-1,2,3-tricarboxylic acid)	153 (slow htng)		<i>tri</i> 189 al	<i>tri</i> 192, al -w	<i>tri</i> 102	<i>tri</i> 148	<i>tri</i> 210 5d			Triphenyl ester, 124
229	(4-Nitrophenyl)acetic acid	153			198		207	198			
230	2,5-Dichlorobenzoic acid	153						155			
231	Phenylmalonic acid	153						233			
232	Adipic acid (Butane 1,4-dicarboxylic acid)	153 4 (cor)	216 ¹⁵	241	<i>mono</i> 151 3 w <i>di</i> 240 1 al	106	154 5, 152 6	<i>mono</i> 125 30, w, <i>di</i> 220	3, b p 162 ¹⁰	<i>di</i> 8, b p 112 ¹⁰ , f p 0	Diphenyl ester, 105-6, al -w
233	(4-Bromophenoxy)acetic acid	153-4 al								54, al	Phenyl ester, 73, al Oxime, 159
234	Phenylpyruvic acid	154									
235	3-Bromobenzoic acid	155			136	105	120	155	31 2	b p 254-5	
236	2,4,6-Trimethylbenzoic acid	155, 153						188			
237	2-Chloro-4-methylbenzoic acid	155-6						182			Nitrile, 61-2, subl
238	(4-Chlorophenoxy)acetic acid	155 6, w, 158			125		136	133	b p 177 80	49	
239	3-(1-Naphthyl)propionic acid	156						104			
240	Tartronic acid (Hydroxy-malonic acid)	156 8d						<i>di</i> 198, dil al, 195-6d			
241	Benzoylpyruvic acid	156 8d (+1 H ₂ O), al -w						138d	59, 62	46	1-Oxime, 98- 100d (+1 H ₂ O)

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
242	Cyclobutane-1,1-dicarboxylic acid	157, w 158			<i>di</i> 214 5			<i>di</i> 275 7		b p 218 ¹² <i>di</i> b p 222 6	Dihydrazide 109 10 al-w
243	3-Chlorobenzoic acid	158 155			122 5 al	107	116	134	21 b p 231	b p 245	
244	Salicylic acid (2 Hydroxybenzoic acid)	158 3, subl at 76		156	136	97 8	140	142 139	-8 6 b p 223 3	1 3 b p 234 231 5	
245	1-Naphthoic acid	161 2 (cor)			162 3 164		135 5	202 205			
246	2-Iodobenzoic acid	162			141	111	143	110	184		
247	2-Anilino propionic acid	162, w			127, al			144		b p 272	Nitrile, 92, al N-Acetyl, 143, w
248	4-Dibenzothienylacetic acid	162						206			
249	Alloxanic acid	162 3d, eth						191, w	171, et ac	115, acet - chl	Phenylamide 99, eth
250	5-Chloro-3-nitrosalicylic acid (5-Chloro-2-hydroxy-3-nitrobenzoic acid)	163						199		91, al	
251	2-Benzofurylacetic acid	163						210			
252	Cholanic acid	164, ac a						175		93-4, 80% al	[α] _D ²⁰ +21 74 in chl, Propyl ester 56-7, Butyl ester, 53
253	4-Nitrophthalic acid	165		<i>mono</i> 172	192			200d			
254	Itaconic acid (Methylene-succinic acid)	165			<i>mono</i> 151 5, eth	<i>di</i> 90 6	<i>di</i> 117 4	<i>di</i> 191 2 8, al			
255	5-Bromosalicylic acid (5-Bromo-2-hydroxybenzoic acid)	165			222			232	61, b p 264 6	50	
256	6-Chloro-3-nitrobenzoic acid	165, w						178, w 130	73, me al	28 9	Nitrile, 105-6
257	3,4-Dimethylbenzoic acid	166, 164			104, 108						
258	Tricarballic acid (Propane-1,2,3-tricarboxylic acid)	166			<i>tri</i> 252, PhNO ₂		<i>tri</i> 138 2	<i>tri</i> 205 7d 133			
259	Mesitylenic acid (3,5-Dimethylbenzoic acid)	166									
260	<i>d,l</i> -Phenylsuccinic acid	167-8, 84 (anh), <i>d/l</i> 173 4		<i>mono</i> (α) 175, <i>mono</i> (β) 168-9	<i>mono</i> (α) 175, <i>mono</i> (β) 171, <i>di</i> 222			<i>mono</i> (α) 158 9 <i>mono</i> (β) 145, <i>di</i> 211			
261	Mesitylacetic acid	168						210			
262	3-Chloro-4-hydroxybenzoic acid	169 70, w, 164-5						180 2	106 7	77 8	Nitrile, 155
263	<i>d</i> -Tartaric acid	169 71			<i>mono</i> 180d, 194 (cor), ac a, <i>di</i> 263 4d, al	<i>di</i> 163	<i>di</i> 204	<i>mono</i> 171-2, <i>di</i> 196d, al			Phenylhydrazide, 240

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
264	Azobenzene-3-carboxylic acid	170 l, or, al						198-9, or, al	58, me al		
265	2,2-Diphenylpropionic acid	171 175						149			
266	8-Chloro-1-naphthoic acid	171 2, al-w						207 5, red, al		50	
267	4-Bromo-2,5-dimethylbenzoic acid	171 5 2 5, lgr						209-10			Nitrile, 103-4
268	5-Chlorosalicylic acid (5-Chloro-2-hydroxybenzoic acid)	172 w						226-7	50, b p 249d	25	Nitrile, 165-7, Phenyl ester, 81-3, Me eth, 81-2, Et ester, 118
269	4-Chloro-2-methylbenzoic acid	172						183		b p 258	Nitrile, 67
270	2,4-Dibromobenzoic acid	174						198			
271	3-Aldehydebenzoic acid (3-Formylbenzoic acid)	175						190d	53	b p 278	Nitrile, 79-81, eth, Semicarbazone, 265, Phenylhydrazone, 164
272	3-Thianaphthenecarboxylic acid	175			173			198			
273	Apiolic acid (2,5-Dimethoxy 3,4-methylenedioxybenzoic acid)	175, w							71-2, w		Nitrile, 135 5, al-w
274	Allomucic acid (2,3 4,5-Tetrahydroadipic acid)	176d, w						175 6, w, di 209d, w		di 139-41 al	Polyphenylhydrazide, 218d, al
275	8-Bromo-1-naphthoic acid	178, bz			151, al			179-80	33, pet eth	52, pet eth	
276	3-Phenanthrylacetic acid	178						176			
277	Acetylenedicarboxylic acid	179						di 294d			
278	4-Toluic acid (4-Methylbenzoic acid)	179 80, subl 182	275 (cor)	160, 165	144 5, 148, 140	104 5	153	160, 158			
279	6-Bromo-3-nitrobenzoic acid	180			166, al			197-8	82	66	Nitrile, 117, subl
280	5-Bromo-2,4-dimethylbenzoic acid	180 l						197 5-8 5			Nitrile, 88-9
281	Veratric acid (3 4 Di methoxybenzoic acid)	181 (anh)			154			164			
282	<i>N</i>-Benzoylanthranic acid (2-Benzamidobenzoic acid)	181			279			218-9	100	98	Nitrile, 156
283	4-Chloro-3-nitrobenzoic acid	181-2			131			156, al	83, me al	59, yel	Nitrile, 100-1
284	3,5-Dinitrosalicylic acid (3,5-Dinitro-2-hydroxybenzoic acid)	182 (anh) 174 (+1H ₂ O)						181			
285	4-Fluorobenzoic acid	182 182 6						154, 154 5			Nitrile, 35
286	4-Chloropicolinic acid (4-Chloropyridine-2-carboxylic acid)	182d						158, 152-4	57-8		Phenyl ester, 68, pet eth
287	2,4-Dinitrobenzoic acid	183				142	158	203			
288	2-Naphthoic acid	184, 185 5		192, al	171, bz, 173			192-3, al, 195			
289	3-Bromosalicylic acid (3-Bromo-2-hydroxybenzoic acid)	184						165			Nitrile, 49-50
290	2-Anilinoisobutyric acid (2-Anilinoisobutanoic acid)	184 5, w			155, al			136			Nitrile, 93-4, al
291	4-Anisic acid (4-Methoxybenzoic acid)	184 6, 184 2 (cor)	275-80	186	169-71	132	152	167, 162-3, w			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
292	(2-Carboxyphenyl)acetic acid (Homophthalic acid)	185, 180						228			
293	Acetylanthranilic acid	185, ac a			167 8, al			177, al			Nitrile, 133, w, <i>N</i> -Methylamide, 172 al
294	Succinic acid (Butanedioic acid, Ethane-1,2-dicarboxylic acid)	185, 182 8	235d	<i>mono</i> 179 80, <i>di</i> 254 5-5 5, 260	<i>mono</i> 148 5, <i>di</i> 230, al	<i>di</i> 88	<i>di</i> 211 0	<i>mono</i> 157 <i>di</i> 260d, w			
295	5-Bromopyromucic acid (5-Bromofuran-2-carboxylic acid)	186, w						144 5		b p 234	Hydrazide 135 5 6 0, Azide, 66 7
296	Hippuric acid	187			208	136	151	183			
297	3-Iodobenzoic acid	187				121	128	186			
298	5-Bromo-2-toluic acid (4-Bromo-2-methylbenzoic acid)	187, subl						180			Nitrile, 70
299	2-Cyanobenzoic acid (Phthalic acid mononitrile)	187, 192						173	151	70	
300	3-Nitroanisic acid (4-Methoxy-3-nitrobenzoic acid)	187			163						
301	Fluorene-2-acetic acid	187						266			
302	Coumarin-3-carboxylic acid	187d, w			250			236	116-7	94	Nitrile, 182
303	<i>d</i> -Camphoric acid (1,2,2-Trimethylcyclopentane-1,3-dicarboxylic acid)	187 5-8 0, <i>l</i> 187, <i>d,l</i> 202, 208		(α) 212-4, (β) 190-6	<i>mono</i> (α) 204, (β) 209 10, <i>mono</i> (β) 196, <i>di</i> 226, <i>di</i> , <i>l</i> 226	65 5		<i>mono</i> (α -amide- β -acid) <i>di</i> b p 176, <i>mono</i> (β -amide- α -acid) 182-3, <i>di</i> 192-3	(α) 77 (β) 86 <i>di</i> b p 263 4	(α) 47 8 (β) 57 <i>di</i> b p 285 6	
304	3-Bromophthalic acid	188								<i>mono</i> 127 8	Anhydride, 132-4
305	4-Bromo-3,5-dinitrobenzoic acid	188, al						188, pa yel, al - w	125 me al - w	118, al - w	
306	Butane-1,2,3,4-tetracarboxylic acid (low melting form)	189, w			187 (rapid htng), al - w			<i>di</i> 181d, <i>dil</i> H ₂ SO ₄ <i>tetra</i> 310d, w	<i>tetra</i> 75-6, w	<i>di</i> 168 w	Heating \rightarrow monoanh of high melting form
307	Anthroxanic acid	190, 196d						211-2, w	70	64-5	
308	α -Chrysenic acid (<i>o</i> -2-Naphthylbenzoic acid)	190						169 70	63		
309	<i>l</i> -Ascorbic acid	190d, <i>d,l</i> 168-9									[α] _D ²⁰ +48 in me al, Diphenylhydrazone, 178d, red, Di- <i>p</i> -nitrophenyl hydrazone 262d al Di 2 4 dinitro phenylhydrazone, 282d, br -red

* Derivative data given in order m p., crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	<i>p</i> -Toluidide	Amide	<i>p</i> -Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
310	Chlorofumaric acid	191 2, ac a			186, al	<i>di</i> 138 5			<i>di</i> b p 224	<i>di</i> b p 250 sl d	Ethyl ester amide, 102
311	<i>N</i> -Methylacetylthranilic acid	192 3					155				<i>N</i> -Methylamide, 171 2 <i>N</i> -Ethylamide, 140
312	Coumarilic acid (Coumarone-2-carboxylic acid)	192 3, w	310 5 sl d		159			159		27	Nitrile, 36, Phenyl ester, 101
313	Dimethylmalonic acid	193, subl				83 6		<i>di</i> 269			
314	<i>trans</i> -Aconitic acid	194 5d (cor), <i>cis</i> 125 → <i>trans</i> on heating			<i>di</i> 189, <i>cis</i> , <i>mono</i> 170d, al		<i>tri</i> 186	<i>tri</i> 250 → br, 260 → sinters			Heat → Itaconic acid, 165
315	Benzylidenemalonic acid	195 6d						<i>di</i> 189 90	<i>di</i> 44	85, <i>di</i> 32	Mononitrile, 183 Dinitrile, 87
316	4-Ethoxybenzoic acid	198 195 6			169, 170 172			202			
317	<i>trans</i> -3-Nitrocinnamic acid	199 <i>cis</i> 138				174	178, 173	196			
318	Chrysodiphenic acid (2-Phenyl-naphthalene-1,2'-dicarboxylic acid)	199						1- <i>mono</i> 275, 2'- <i>mono</i> 220	1- <i>mono</i> 171 5, me al, 2'- <i>mono</i> 124, <i>di</i> 90		
319	3,4-Dihydroxybenzoic acid (Protocatechuic acid)	199-200d			166	188		212	134 5 w		
320	3-Hydroxybenzoic acid	200, subl		163 dil al	156 7, w 155	106 8	176, 176 1-4	170 167 w			
321	Phthalic acid (Benzene-1,2-dicarboxylic acid)	200 6, 191 (sealed tube), 230 (rapid htng)		<i>mono</i> 150 (slow htng), 160 5 (rapid htng), <i>di</i> 201	<i>mono</i> 170 <i>di</i> 253-5	<i>di</i> 155 5	<i>di</i> 152 8	<i>mono</i> 149, <i>di</i> 220			
322	3,4-Dichlorobenzoic acid	201 2, 208 9						133			
323	(4-Chloromethyl)benzoic acid	203						173			Nitrile, 79 80, al, b p 263
324	5-Bromo-2-nitro-4-toluic acid (2-Bromo-4-methyl-5 nitro-benzoic acid)	203, 200						191		61	Nitrile, 132
325	4-Bromo-3-nitrobenzoic acid	203 4			156, or -yel, al			156	104	74	Nitrile, 120
326	<i>d,l</i> -Tartaric acid	203-4 (+1 H ₂ O) 205 6 (anh)			<i>di</i> 235-6	<i>di</i> 147 6		<i>di</i> 226, w-me al			
327	<i>cis</i> -Apocamphoric acid	204, w, <i>trans</i> 190-1, w			<i>mono</i> 212						Anhydride, 178, al
328	3,5-Dinitrobenzoic acid	204-5			234	157	159	183			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
329	Mesaconic acid (Methylfumaric acid)	204.5 (cor), subl		<i>mono</i> (α) 196, <i>di</i> 212, al	<i>mono</i> (α) 202, <i>mono</i> (β) 163, <i>di</i> 185.7	<i>di</i> 134 (cor)		<i>mono</i> (α) 222, <i>mono</i> (β) 174, <i>di</i> 176.5			
330	5-Bromo-3-nitro-4-toluic acid (6-Bromo-4-methyl-2-nitrobenzoic acid)	206						171			Nitrile, 130, subl
331	Anthracene-9-carboxylic acid (<i>meso</i> -Anthroic acid)	207, pa yel, al							111, yel		Nitrile, 170-2, lgr
332	Vanillic acid	207, 210				140d				44, b p 293	
333	<i>trans</i> -2-Coumaric acid (<i>trans</i> -2-Hydroxycinnamic acid)	207.8d, subl, w				152.5		209d			Acetate, 154.5, 146, bz
334	Oxamic acid	210			148-9			419d			
335	Pentamethylbenzoic acid	210						206			
336	4-Coumaric acid (4-Hydroxycinnamic acid)	210.3, 206 (anh)						194	137, 126		Acetate, 200.5
337	<i>trans</i> -2-Chlorocinnamic acid	212, yel, al			176			168	10.5, b p 278-9	b p 162 ¹²	Nitrile, 40
338	2,4-Dihydroxybenzoic acid (β-Resorcylic acid)	213d (rapid htng), 216d, 217			126-7	188.9		222			Loses H ₂ O of crystallization at 100. Easy loss of CO, gives m p varying from 194 to 236
339	2-Bromo-3,5-dinitrobenzoic acid	213						216, pa yel, al-w	109, me al-w	74, al	
340	4-Dibenzofurylacetic acid	214						212			
341	Mucic acid	214d (varies with htng rate) 223, 255				310	225	<i>mono</i> 192d, <i>di</i> 220			
342	3-Chloroanisic acid (3-Chloro-4-methoxybenzoic acid)	214.5						193	94.5		
343	4-Hydroxybenzoic acid	215, 213-4, 210		203-4, al	196.7, yel, w	180.2	191.5 (cor), 184	162 (+1 H ₂ O), w			
344	Piperic acid	216				145					
345	3-Chloro-2-naphthoic acid	216.7, me al-w						237	58, me al	50	
346	3-Nitrophthalic acid	218		<i>di</i> 226	<i>di</i> 234	189		<i>di</i> 201d			
347	Acenaphthene-5-carboxylic acid	219, bz						198			Nitrile, 110-1
348	4-Cyanobenzoic acid (Terephthalic acid mononitrile)	219, 214			179	189		223	62	54	
349	4-Phenylbenzoic acid	221						223			
350	3-Hydroxy-2-naphthoic acid	222.3 (cor)		221-3	243-4, ac a, 249 (cor)			217.8 (cor), yel, al			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	<i>p</i> Toluidide	Anilide	<i>p</i> Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
351	4-Hydroxy-2-naphthoic acid	225 6		206				217 8			
352	5-Bromo-3-nitro-2-toluic acid (4-Bromo-2-methyl 6 nitro-benzoic acid)	226						235			Nitrile, 106-7, subl
353	9-Fluorenicarboxylic acid	227 230, 225						251			
354	Biphenyl-2,2'-dicarboxylic acid (2 2 Diphenic acid)	227 233 229			mono 176, di 229-30, al	di 187, 182 6		mono 193, 190 1, di 212, w			
355	Methylmniodiacetic acid	227d						mono 169, di 169			
356	2,4,6-Trinitrobenzoic acid	228						264d			
357	Piperonylic acid	229, 228						169, al			
358	5-Nitrosalicyclic acid	229 30			224			225			
359	4-Chloro-3-hydroxy-2-naphthoic acid	231, yel						225	116, yel		
360	1-Phenanthroic acid	232						284			
361	3-Pyridylacrylic acid	233						148			
362	4-Bromo-3-hydroxy-2-naphthoic acid	233-5d, yel, al - ac a			161-2						Acetate, 183
363	4-Chloro-1-hydroxy-2-naphthoic acid	234, al		143-4	180-1				120-1	92-3	<i>o</i> -Toluidide, 148-9, <i>m</i> -Toluidide, 188-9
364	3-Chloro-2-nitrobenzoic acid	235 w			186						
365	Benzophenone-2,4-dicarboxylic acid	235, w						di >288	di 107		
366	5-Bromo-2-hydroxy-3-toluic acid (5 Bromo-2-hydroxy 3-methylbenzoic acid)	236			125, al -w			75-8	109	75	
367	2-Thianaphthenecarboxylic acid	236						177			
368	Butane-1,2,3,4-tetracarboxylic acid (high melting form)	236-7 (slow htng)			di 168, acet (slow htng)			di 169d	tetra 63-4, lgr		Di-imide, 320d, w
369	7-Bromo-1-naphthoic acid	237 (cor), 60% al			202, al -w			247, 50% al	55 (cor), 60% me al	46	
370	3-Pyridinecarboxylic acid	237 8 235, 232		150	85, 132, bz - lgr, 265, w			128, 122			
371	<i>trans</i> -2-Nitrocinnamic acid	240, <i>cis</i> 146-7				132	141	185			
372	2-Chloroquinoline-3-carboxylic acid	240						200-1			
373	4-Nitrobenzoic acid	241		204, 192	211, 204	168	137	201, 198	96	57	
374	Azobenzene-4-carboxylic acid	241, red, al						224-5, red	123-4, or, me al	86-7, or - red, al	Nitrile, 120-1, br, bz, Propyl ester, 64, red, lgr
375	4-Chlorobenzoic acid	243, 240			194, al	129 5, al	126	179, 170	44	b p 238	
376	7-Chloro-1-naphthoic acid	243, 60% al			185, al -w			237, 50% al	54, 60% al		
377	3-Chlorocinchonic acid (2-Chloroquinoline-4-carboxylic acid)	244, al			202, al			334-5, al -w, 276-8 (after fusion)	89-90, acet	64 5	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
378	5-Chloro-1-naphthoic acid	245, 241-2 subl						239		42	Nitrile, 145
379	Azobenzene-2,2'-dicarboxylic acid	245, dk yel, al						<i>mono</i> 215d, red-br, et ac, <i>di</i> 294d, red-br, ac a	<i>di</i> 101, red, me al	<i>di</i> 85, pa red, al	
380	Anthracene-1-carboxylic acid (α -Anthroic acid)	245, yel, al, 252						260, al	108, ac a		Nitrile, 126, yel, Phenyl ester, 207-9, yel
381	2-Amino-9,10-anthraquinone-1-carboxylic acid	250 2, or - red						300, or, PhNO ₂			
382	4-Bromobenzoic acid	251-3			197	180		189-90, w			<i>p</i> -Phenylphenacyl ester, 193
383	9-Phenanthroic acid	251, 253						233			
384	4-Bromocinnamic acid	251 3			183				80		
385	Cinchonic acid (Quinoline-4-carboxylic acid)	253 4 (+1 or 2H ₂ O)						181	24	13, b p 173 ¹⁵	Nitrile, 102
386	Gallic acid (3,4,5-Trihydroxybenzoic acid)	253-4d, 222-40d			207	141	134	189			
387	1-Acenaphthoic acid	256						228			
388	2-Phenanthroic acid	260						243			
389	Cinchomeric acid (Pyridine-3,4-dicarboxylic acid)	260d, w			<i>di</i> 199-206			3- <i>mono</i> 200d, 4- <i>mono</i> 170d, w, <i>di</i> 163-5d	3- <i>mono</i> 182 4- <i>mono</i> 154-72, <i>di</i> 141	4- <i>mono</i> 131-3, bz, <i>di</i> b p 172 ²¹	Imide, 229-30, subl
390	5-Bromo-1-naphthoic acid	261, 256						241		48-9	Nitrile, 147, subl
391	Chelidonic acid (γ -Pyrone-2,6-dicarboxylic acid)	262						245	<i>di</i> 122 5	227, <i>di</i> 63	<i>p</i> -Phenylphenacyl ester, 195-8d
392	4-Iodobenzoic acid	270, 265			210	141	146	217			
393	5-Chloro-2-naphthoic acid	270, al			202 5			186-7	81	45	Nitrile, 144
394	3-Phenanthroic acid	270						234			
395	Quinoline-3-carboxylic acid	272						198			
396	1-Chloroanthraquinone-2-carboxylic acid	272, pa yel, al			248 9, pa yel, bz - ac a			317, yel	161 5, yel, acet, 155	142, yel, al	Benzyl ester, 135-6, yel, al
397	Anthracene-2-carboxylic acid (β -Anthroic acid)	281, yel, al						293-5, yel, al		134-5	
398	<i>trans</i> -4-Nitrocinnamic acid	285				186	191	204, 217			
399	Fumaric acid (<i>trans</i> -Butanedioic acid)	286-7, (sealed tube), >200, subl, 293-5			<i>mono</i> 233 0-4 5, <i>di</i> 313 4, ac a	150 8		270, 300 2 subl, <i>di</i> 266d	<i>di</i> 102, b p 192	<i>mono</i> 66, <i>di</i> b p 218	At 230 \rightarrow maleic anh 56
400	Muconic acid	289d (slow htng), 306 (rapid htng)						<i>di</i> 240d			<i>trans-trans</i> 296-8, <i>cis-cis</i> 195

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XII. ORGANIC DERIVATIVES OF CARBOXYLIC ACIDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

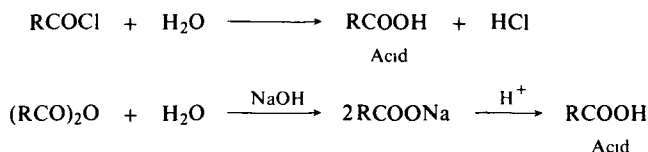
No	Name	Melting point °C	Boiling point °C	<i>p</i> -Toluidide	Anilide	<i>p</i> -Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	Amide	Methyl ester	Ethyl ester	Miscellaneous
401	9,10-Anthraquinone-2-carboxylic acid	290-2, yel, ac a			258 60			280, ac a -bz	170	147	
402	9,10-Anthraquinone-1-carboxylic acid	293 4, pa yel, ac a			288 9, pa yel, PhNO ₂			280 pa yel, al	189, pa yel, me al	169, yel, al	Nitrile, 247, yel, ac a
403	Bromoterephthalic acid (2-Bromobenzene-1,4-dicarboxylic acid)	299						<i>di</i> 270	1- <i>mono</i> 145, 4- <i>mono</i> 164 <i>di</i> 54		
404	Terephthalic acid (Benzene-1,4-dicarboxylic acid)	300, subl without melting >300, w			<i>di</i> 334 7, PhNO ₂	<i>di</i> 263 5	<i>di</i> 225	<i>di</i> >225			
405	Chloroterephthalic acid (2-Chlorobenzene-1,4-dicarboxylic acid)							<i>di</i> >300	<i>di</i> 60		
406	4-Pyridinecarboxylic acid (isonicotinic acid)	324						156			
407	9,10-Anthraquinone-2,3-dicarboxylic acid	240-2, yel, ac a						<i>mono</i> >340, <i>br</i> , ac a			Anhydride, 290
408	Isophthalic acid (Benzene-1,3-dicarboxylic acid)	348, subl				202 5	179 1	<i>mono</i> 280, <i>di</i> 280			Ba salt (+6 H ₂ O) very soluble—differentiates from Terephthalic acid Dinitrile, 204-5
409	Benzophenone-4,4'-dicarboxylic acid	subl <360						<i>di</i> >300	<i>di</i> 224 231		
410	Trimesic acid (Benzene-1,3,5-tricarboxylic acid)	380 (cor)			<i>tri</i> 118-20d, ac a		<i>tri</i> 197 (sealed tube)	365d (cor)	<i>tri</i> 143-4, me al	<i>tri</i> 132 3, al 133 after sintering at 127	

* Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV

The derivatives of three classes of compounds (carboxylic acids, acyl halides and acid anhydrides) are essentially the same as those of carboxylic acids, and are prepared either directly from the acid or *via* the acyl halide. All of them appear therefore under the same title.

Hydrolysis of acid halide or acid anhydride to the corresponding carboxylic acid



From the acyl halide in water

For directions and examples see Wild, p 180

From the acyl halide with aqueous sodium hydroxide

See Vogel, p 369, Wild, p 180

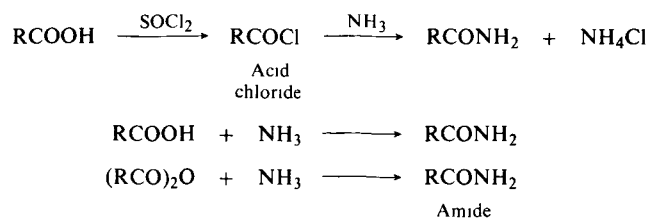
From the acid anhydride with water

See Vogel, p 376, Wild, p 184, A C D Rivett and N V Sidgwick, *J Chem Soc*, **97**, 1677 (1910)

From the acid anhydride with aqueous sodium hydroxide

See Linstead, pp 16-7 Wild, p 184

*Amide **



Acid chloride is prepared from the acid and thionyl chloride. Amide is formed on addition of aqueous ammonia.

For directions and examples see Cheronis, p 440, Shriner, p 200, Vogel, p 361, Wild, p 181

From the acid chloride in benzene with aqueous ammonia

See D Swern, J M Stutzman and E T Roe, *J Amer Chem Soc*, **71**, 3017 (1942)

By passing gaseous ammonia through a benzene or ether solution of the acyl chloride

See Linstead, p 14, Wild, p 182

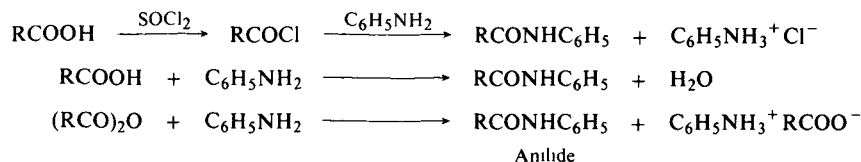
From the neat acid with gaseous ammonia

See J A Mitchell and E E Reid, *J Amer Chem Soc*, **53**, 1879 (1931)

From the acid anhydride with aqueous ammonia

See Wild, p 184, 185

*Anilide **



From the acid chloride (prepared from the acid and thionyl chloride) and aniline in benzene or in ether

For directions and examples see Cheronis, p 445, Linstead, p 14, Shriner, pp 98, 200-1, Vogel, pp 361, 369, 458, Wild, p 182, P W Robertson, *J Chem Soc*, **115**, 1210 (1919)

From the acid chloride with aniline in aqueous sodium hydroxide

See Wild, pp 181, 219

From the acid and aniline at high temperatures

See Vogel, p 362

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

From the sodium salt of the acid with aniline and concentrated hydrochloric acid

See Shriner, p 201, Wild, p 154

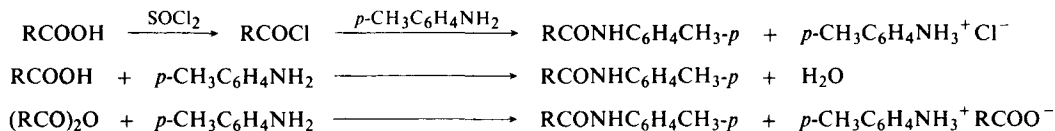
From the acid anhydride with aniline without solvent

See Linstead, p 17, Vogel, p 377, Wild, p 185

From the acid anhydride with aniline in benzene

See Linstead, p 15, Wild, p 185

p-Toluidide *



From the acid chloride with *p*-toluidine in ether or benzene

For directions and examples see Cheronis, pp 441, 444, 458, Linstead, p 14, Shriner, pp 200-1, Vogel, p 361

From the acid and *p*-toluidine at high temperatures

See Cheronis, pp 441, 442-3, Vogel, p 362

From the sodium salt of the acid, *p*-toluidine and concentrated hydrochloric acid

See Shriner, p 201, Wild, p 154

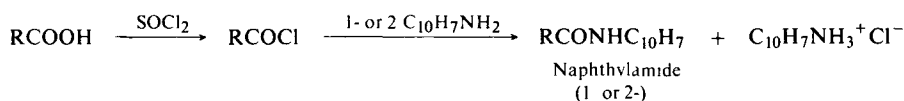
From the acid anhydride with *p*-toluidine without solvent

See Cheronis, p 459, Linstead, p 17

From the acid anhydride with *p*-toluidine in benzene

See Wild, p 185

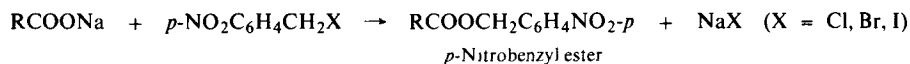
1- and 2-Naphthylamide *



From the acid chloride with the naphthylamine

For directions and examples see Cheronis, p 446, P W Robertson, *J Chem Soc*, 115, 1210 (1919)

p-Nitrobenzyl ester *



From an aqueous solution of the sodium salt of the acid, with the *p*-nitrobenzyl halide in ethanol

For directions and examples see Cheronis, pp 447, 448, Shriner, p 200, Vogel, p 362, Wild, pp 144 5

From an aqueous solution of the sodium salt of the acid with *p*-nitrobenzyl bromide in acetone

See F F Blicke and F D Smith, *J Amer Chem Soc*, 51, 1947 (1929)

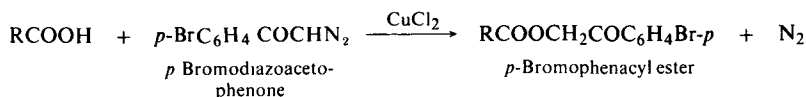
From the sodium or the potassium salt of the acid and *p*-nitrobenzyl bromide in 1 2 water-ethanol

See E E Reid, *J Amer Chem Soc*, 39, 124 (1917)

From the sodium or the potassium salt of the acid and *p*-nitrobenzyl chloride or iodide in 1 2 water-ethanol

See J A Lyman and E E Reid, *J Amer Chem Soc*, 39, 701 (1917)

p-Bromophenacyl ester *



From the sodium salt of the acid and *p*-bromophenacyl bromide in aqueous ethanol

*Derivatives recommended for first trial

WARNING This is not an instruction manual References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

For directions and examples see Cheronis, pp 447, 448, Linstead, p 14, Shriner, p 200, Vogel, p 362, Wild, p 146

From the sodium salt of the acid (neutralization with sodium carbonate) with *p*-bromophenacyl halide in 1:2 water-ethanol

See W L Judefind and E E Reid, *J Amer Chem Soc*, **41**, 1043 (1920)

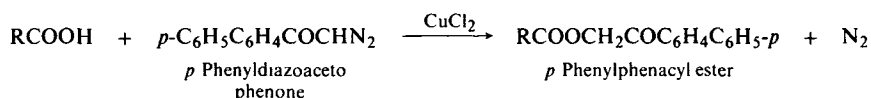
From the sodium salt of the acid (neutralization with sodium hydroxide) with *p*-bromophenacyl bromide in 95% ethanol

See R M Hann, E E Reid and G S Jamieson, *J Amer Chem Soc*, **52**, 818 (1930), C G Moses and E E Reid, *J Amer Chem Soc*, **54**, 2101 (1930)

From the acid and *p*-bromodiazoacetophenone in dioxane in the presence of catalytic amounts of cupric chloride

See J L E Erickson, J M Dechary and M R Kesling, *J Amer Chem Soc*, **73**, 5301 (1951)

p-Phenylphenacyl ester *



From the sodium salt of the acid (neutralization with sodium carbonate) and *p*-phenylphenacyl bromide in aqueous alcohol

For directions and examples see Linstead, p 14, Vogel, p 363, N L Drake and J Bronitsky, *J Amer Chem Soc*, **52**, 3715 (1930)

From the sodium salt of the acid (neutralization with sodium hydroxide) and *p*-phenylphenacyl bromide in aqueous alcohol

See Shriner, p 200, N L Drake and J P Sweeney, *J Amer Chem Soc*, **54**, 2059 (1932)

For dibasic acids from the acid, ethylamine and *p*-phenylphenacyl bromide in aqueous ethanol

See Wild, p 147, N L Drake and J P Sweeney, *J Amer Chem Soc*, **54**, 2059 (1932)

From the acid and *p*-phenyldiazoacetophenone in dioxane in the presence of catalytic amounts of cupric chloride

See J L E Erickson, J M Dechary and M R Kesling, *J Amer Chem Soc*, **73**, 5301 (1951)

Methyl ester



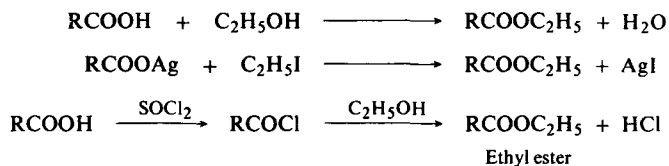
From the acid with methanol and a catalytic amount of sulfuric acid

For directions and examples see Linstead, p 16, Vogel, p 383

From the acid and diazomethane in ether

See B Eistert, in *Newer Methods of Preparative Organic Chemistry*, Interscience, New York, 1948, p 513

Ethyl ester



From the acid and ethanol in the presence of a catalytic amount of sulfuric acid

For directions and examples see Vogel, pp 383, 385, 386, 387

From the silver salt of the acid with ethyl iodide

See Vogel, p 388

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

From the acid chloride and ethanol.

See: Vogel, p. 389.

NOTE: The same methods can be used for the formation of other esters.

S-Benzylthiuronium salt.*



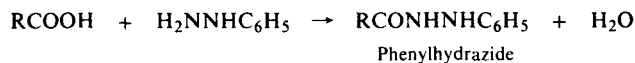
From the sodium or the potassium salt of the acid and *S*-benzylthiuronium chloride in water.

For directions and examples see: Linstead, p. 15; Vogel, p. 36; Wild, p. 149; S. Veibel and H. Lillelund, *Bull. Soc. Chim.* [5], 5, 1153 (1938), S. Veibel and K. Ottung, *Bull. Soc. Chim.* 6, 1434 (1939).

From the sodium or the potassium salt of the acid in water or in aqueous ethanol with an ethanolic solution of *S*-benzylthiuronium chloride.

See: Cheronis, p. 449; Shriner, p. 202; J. J. Donleavy, *J. Amer. Chem. Soc.*, 58, 1004 (1936).

Phenylhydrazide.



From the acid with phenylhydrazine without solvent.

For directions and examples see: Shriner, p. 201; Wild, p. 152; G. H. Stempel and G. S. Schaffel, *J. Amer. Chem. Soc.*, 64, 470 (1942).

From the acid with phenylhydrazine in benzene.

See: Shriner, p. 201; Wild, p. 152.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES

I. Acyl Fluorides (Listed in order of increasing b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	<i>p</i> -Toluidide	2-Naphthyl amide	Miscellaneous
						B p, °C	M p, °C					
1	Acetyl fluoride	20-1			1.002 ¹⁵	118		82	114	147	134	
2	Propionyl fluoride	44.6				141		81	106	126		
3	Fluoroacetyl fluoride	50.5-51				167.9	31-2	108				
4	Trichloroacetyl fluoride	66.8				197	57.8	141	97	113		
5	<i>n</i> -Butyryl fluoride	67				162.5		115	96	75	125	
6	Chloroacetyl fluoride	73.5					63	120	137	162	117.8	
7	Phthaloyl difluoride	224.6	42-3				206	220(<i>dt</i>)	253(<i>dt</i>)	201(<i>dt</i>)		
8	Phenylacetyl fluoride	88-9 ¹⁷	.				76	156	118	136	159	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES
II. Acyl Chlorides a) Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point °C	n _D	Density g/ml	Acid		Amide	Anilide	p-Toluidide	2-Naphthyl amide	Miscellaneous
						B p., °C	M p., °C					
1	Acetyl chloride	51-2		1 3897 ²⁰	1 105 ²⁰ ₄	118		82	114	147	134	
2	Oxalyl chloride	64	-12	1 434 ¹³	1 488 ¹³ ₄		101 (dihyd)	419d	246	268		
3	Fluoroacetyl chloride	72-3				167 9	31-2	108				
4	Acrylyl chloride	76		1 4343 ²⁰	1 114 ²⁰ ₄	140		85	105	141		
5	Propionyl chloride	80		1 4051 ²⁰	1 065 ²⁰	141		81	106	126		
6	Isobutyryl chloride	92		1 4079 ²⁰	1 017 ²⁰ ₄	154 5		128	105	107		
7	Methacrylyl chloride	95-6		1 4435		160 5	15-6	102-6				
8	Vinylacetyl chloride	98				163		72-3	58			
9	n-Butyryl chloride	101-2		1 4121 ²⁰	1 028 ²⁰ ₄	162 5		115	96	75		
10	Pivalyl chloride	105-6					35	154	129	120		
11	Dichloroacetyl chloride	108				194		98	118	153		
12	Chloroacetyl chloride	108-10		1 454 ²⁰	1 3997 ¹⁸ ₄	189	63	120	137	162		
13	DL-α-Chloropropionyl chloride	110-11		1 440 ²⁰	1 285 ²⁰ ₄	185-6		80	92	124		
14	Methoxyacetyl chloride	113				204		97	58			
15	DL-Ethylmethacetyl chloride	115-6				176		112	110	93		
16	Isovaleryl chloride	115		1 4136 ²⁴ ₃	0 985 ²⁴ ₄	176		135	109 10	107	138 5	
17	Acetylglycyl chloride	115-8					206	137				Hydrazide 115 Me ester 58 9
18	Trichloroacetyl chloride	118		1 470 ²⁰	1 620 ²⁰ ₄	197	57 8	141	97	113		
19	Cyclopropane carbonyl chloride	120			1 152 ²⁰ ₀	186	18	125				
20	Ethoxyacetyl chloride	123-4				207		80 2				
21	trans-Crotonyl chloride	126		1 46 ¹⁸	1 08 ²⁰ ₄		72	161	118	132		
22	n-Pentanoyl chloride (n-Valeryl chloride)	126		1 420 ²⁰	1 0004 ²⁰ ₀	186		106	63	74	112	
23	Allylacetyl chloride	128			1 074 ¹⁶	188 9		94				
24	Bromoacetyl chloride	133-5			1 908 ⁰	208	50	91	131		134	
25	Cyclobutane carbonyl chloride	137 142 3				195		153				
26	β-Methoxypropionyl chloride	138		1 424		107 ¹⁰		50 5				
27	Diethylacetyl chloride	140		1 4234		190		107				
28	β-Chloropropionyl chloride	144		1 455	1 331 ¹³		42		119	121		
29	Isocaproyl chloride (4-Methylpentanoyl chloride)	147			0 9725 ²⁰ ₄	199		121	112	63		
30	α-Acetoxypromionyl chloride (O-Acetyl lactoyl chloride)	150 part d		1 4241 ¹⁷	1 192		57 60, 40					
31	DL-α-Bromobutyryl chloride	150-2				217d	-4	112	98	92		
32	n-Hexanoyl chloride (n-Caproyl chloride)	153		1 426 ²⁰	0 975 ²⁰ ₄	205		100	95	75	107	
34	Furoyl chloride	173 4					133-4	142-3	124	107		
35	n-Heptanoyl chloride (Enanthoyl chloride)	175		1 4345 ¹⁵	0 963 ²⁰ ₀	223		96	70 (65)	81	101	
36	Hexahydrobenzoyl chloride (Cyclohexane carboxylic acid chloride)	183 4		1 4766 ¹⁵ 1 4711 ²⁰	1 096 ¹⁵ ₄		29 30	185	143 4			
37	3-Fluorobenzoyl chloride	189, 204					124	130				
38	Succinyl dichloride	190d	20	1 473 ¹⁵	1 395 ¹⁵ ₄		186	260 (di)	230 (di)	255 (di)		
39	4-Fluorobenzoyl chloride	193	9				183	154 5				

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES
II. Acyl Chlorides a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	p-Toluidide	2-Naphthyl amide	Miscellaneous
						B p, °C	M p, °C					
40	<i>n</i> -Octanoyl chloride (<i>n</i> -Capryloyl chloride)	196			0.949 ²⁰	239	16	110, 106	57	70	103	
41	Benzoyl chloride	197	-1	1.558 ¹⁵	1.212 ²⁰		122	130	163	158		
42	Diethyl malonyl dichloride	197		1.5537 ²⁰	1.2187 ¹⁵		125	224 (<i>di</i>)				
43	2-Fluorobenzoyl chloride	206	4				126.5	116				
44	Phenylacetyl chloride	210		1.533 ²⁰	1.1685 ²⁰		76	156	118	136	159	
45	<i>n</i> -Nonanoyl chloride (Pelargonyl chloride)	215			0.946 ¹⁵	255	12	99	57	84	103	
46	Glutaryl dichloride	218		1.473 ²⁰	1.324 ²⁰	302	97.8	175.6 (<i>di</i>)	224			
47	4-Chlorobenzoyl chloride	222	16	1.579 ²⁰	1.362 ²⁰		240	179, 170	194			
48	Hydrocinnamoyl chloride (β -Phenylpropionyl chloride)	225 d			1.135 ²¹		48	105	98, pet eth	135		
49	3-Chlorobenzoyl chloride	225					158	134	122			
50	Phenoxyacetyl chloride	225-6					98-9	101.5	101			
51	4-Methylbenzoyl chloride (4-Toluyyl chloride)	225.6	-3.9	1.545 ²⁰	1.1686 ²⁰		179-80	160	145	160		
52	<i>n</i> -Decanoyl chloride	232				268.70	31	108.98	70	78	104	
53	2-Chlorobenzoyl chloride	233					142	142	118	131		
54	3-Methoxybenzoyl chloride	242.4					110, 105					Benzylamine salt of acid, 112 Hydrazide, 151
55	3-Bromobenzoyl chloride	243, 239					155	155	136			
56	2-Bromobenzoyl chloride	245	11				150	155.6	141			Hydrazide, 153
57	2-Methoxybenzoyl chloride	254						129	131			Phenyl ester, 59
58	4-Methoxybenzoyl chloride (Anisoyl chloride)	262.3 sl d	22	1.58 ²⁰	1.261 ²⁰		184	162.3	169, 163	186		Aniside, 202
59	Phthaloyl dichloride	276	15.6	1.569 ²⁰	1.406 ²⁰		200.6	220 (<i>di</i>)	253.5 (<i>di</i>)	201 (<i>di</i>)		
60	3-Nitrobenzoyl chloride	278	35				140	143	154	162		
61	1-Naphthoyl chloride	297.5	20				161	202				Piperide, 85.7

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES

II. Acyl Chlorides a) Liquids

2) (Reduced pressure b.p. only) (Listed in order of increasing m.p. of the corresponding amides)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	p-Toluidide	2-Naphthyl amide	Miscellaneous
						B p °C	M p, °C					
1	<i>β</i> -Ethoxypropionyl chloride	78 ⁵²				120 ¹⁷		51				
2	Azidoacetyl chloride	50 ²⁰					16	58				
3	Oleyl chloride	163 ²					16	75.6	41	42.5		
4	<i>γ</i> -Phenoxybutyryl chloride	155 ²⁰					64-5	80				
5	<i>γ</i> -Phenylbutyryl chloride	140-2 ¹²				290	60	84.5				
6	<i>ω</i> -Undecenoyl chloride (<i>ω</i> -Undecenyl chloride, <i>ω</i> -Hendecenoyl chloride)	128 ¹⁴				275	52	87				
7	Benzoylformyl chloride	125 ⁹					64-6	91				2,4-Dinitrophenyl-hydrazone of acid, 196.7, yel
8	Iodoacetyl chloride	49-52 ¹⁵			2.25 ²⁵		83	95	143-4			
9	<i>β</i> -Iodopropionyl chloride	81 ¹⁵					82, 85	101, 142				
10	Palmitoyl chloride	194 ¹⁷	11-2				63	106-7	90	98	109	
11	Myristoyl chloride	174 ¹⁶	1-3				54, 58	107	84	93	108	
12	Phenylpropionyl chloride	115-6 ¹⁷					136-7	108-9, 99, 100	126	142		
13	Dodecanoyl chloride (Lauroyl chloride)	145 ¹⁸	-17	1.446 ²⁰		299	44	110, 102	78	87	106	
14	<i>α</i> -Phenoxybutyryl chloride	128-31 ³⁸				258	82.3	111, 123	93-4			Phenyl ester, 48-9
15	Cyanoacetyl chloride	57 ^{0.5}					99	119, 20	198-9			
16	Nicotinyl chloride	90 ¹⁵					66	122	85			
17	Dibenzylacetyl chloride	202 ¹⁸					235	129	155			
18	<i>α</i> -Phenoxypropionyl chloride	115 ²⁰					89	129	117	115	117	
19	DL- <i>α</i> -Bromoisovaleryl chloride	59 ¹⁵					115.6	132	117			
20	3-Ethoxybenzoyl chloride	135-40 ¹⁶	27.8				112.3	133	116	124	145	
21	<i>α</i> -Bromoisobutyryl chloride	52 ³⁰		1.475 ²³			44	133	116	124	145	
22	4-Isopropylbenzoyl chloride	121 ¹⁰					137	139				
23	Benzilic acid chloride (<i>α</i> -Hydroxydiphenylacetyl chloride)	193.5 ²⁷					137	139				
24	1-Naphthoxyacetyl chloride	194 ¹⁰					48.9	148	83	92.5	135	
25	Hexahydrophenylacetyl chloride (Cyclohexylacetyl chloride)	98, 100 ²³				244-6	256-8	153				
26	Azelayl dichloride	166 ¹⁴ , 140 ¹⁴					150	154.5	175	190		Me ester 74-5
27	2-Nitrobenzoyl chloride	148 ⁹	20				190	155	144			4-Phenetidine, 145.6
28	Mesaconyl dichloride (Methylfumaryl di-chloride)	64-5 ¹⁴					190	155	144			
29	1-Naphthylacetyl chloride	188 ²³					244-6	33	171-2			
30	2,4,6-Trimethylbenzoyl chloride	155-6 ¹⁸		1.5263 ²⁵	1.0967 ²⁵		106.5	175 (dt)	186-7 (dt)	191 (dt)		
31	3-Formylbenzoyl chloride	130 ²⁰					146	176	155			
32	4-Ethoxybenzoyl chloride	160 ²⁰					240.5	177 (dt)	186 (dt)	212		
33	Sebacoyl dichloride	182 ¹⁶		1.4684	1.1212 ²⁰		131	180.1				
							154	188				
							175	190				Me ester, 53, Semicarbazone of acid, 265
							198	202	170			
							134.5	210 (dt)	198 (dt)			

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES

H. Acyl Chlorides a) Liquids

2) (Reduced pressure b.p. only) (Listed in order of increasing m.p. of the corresponding amides)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	p-Toluidide	2-Naphthyl amide	Miscellaneous
						B p., °C	M p., °C					
34	Adipyl dichloride	130-2 ¹⁸					153	220 (di)	240-1	241		Di-N-methyl-amide, 152-3
35	Benzylmalonyl dichloride	141 ¹⁵					117d	225 (di)	217 (di)			Di-Me ester, 51
36	Phenylmalonyl dichloride	122 ¹⁵					152-3	233				
37	trans-Aconityl trichloride (1,2,3-Propylenetricarboxylic acid trichloride)	155-7 ²⁰					194-5	260 (tri) (sinters)				
38	Fumaryl dichloride	63 ¹³		1 5004 ¹⁸	1 408 ²⁰		300-2	266 (di)	314 (di)			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES

II. Acyl Chlorides b) Solids (Listed in order of increasing m.p.)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Amide	p-Toluidide	2-Naphthyl amide	Miscellaneous
						B p, °C	M p °C					
1	Salicyloyl chloride	92 ¹⁵	19-20				158	142	136	156	189	
2	Stearoyl chloride	202-3 ⁶	23				70 1	109	95	102	112	
3	2-Iodobenzoyl chloride		35-40, 30-1				162	184				
4	trans-Cinnamoyl chloride	258	35 6	1 6202 ³⁷	1 1632 ³⁷		133	147 8	151	168		
5	4-Bromobenzoyl chloride	245-7	42				251 3	189-90	197			Hydrazide, 164
6	Isophthaloyl dichloride	276	43-4	1 570 ⁴⁷	1 388 ⁴⁷		345-7	280 (di)				Di-Me ester, 68 Dihydrazide, 220
7	2-Naphthoyl chloride	304-6	43				184-5	192				Piperidine, 88-90
8	2,4-Dinitrobenzoyl chloride		46				183	203				Me ester, 70
9	4-Formylbenzoyl chloride	258	48				256					Me ester, 63, Phenylhydrazone of acid, 226
10	4-Nitrophenylacetyl chloride		48				153	198	198			
11	2-Naphthoxyacetyl chloride		54				156	147	145			4-Phenetidine, 164-5, Et ester, 48-9
12	Diphenylacetyl chloride		56-7				148	168	180	173	191 2	
13	trans-2-Nitrocinnamoyl chloride		64 5				240	185				Me ester, 73
14	3,5-Dinitrobenzoyl chloride		68 9, 74				204 5	183	234			Me ester, 108, Et ester, 93
15	4-Nitrobenzoyl chloride	150-2 ¹⁵	75				241	201	211	204		
16	3-Nitrophthaloyl dichloride		77				218	201 (di)	234 (di)	226 (di)		
17	Benzylidene malonyl dichloride		77				195-6	189 (di)				Di Me ester 45
18	Fluorene-9-carboxylic acid chloride		77				230-2	251				Me ester, 63
19	Terephthaloyl dichloride		83-4					>250 (di)	334-7 (di)			Di-l-naphthylamide, 334
20	4-Iodobenzoyl chloride		83 77-8				270 265	218	210			
21	Diphenylcarbonyl chloride (Diphenylaminoformyl chloride)		86					189				Me ester, 86, Et ester, 72, 1gr
22	2,2'-Diphenic acid dichloride		94				228 9	212				
23	α,α-Diphenylpropionyl chloride		95-6				173-4	149				Benzyl ester, 71 2
24	Phenanthrene-2-carboxylic acid chloride		101				259 60	242 3	217-8			
25	Phenanthrene-9-carboxylic acid chloride		102				252	232 226	218			
26	Diphenyl-4-carbonyl chloride (4-Phenylbenzoyl chloride)		114-5				228	223				Me ester, 117-8, Et ester, 46
27	Phenanthrene-3-carboxylic acid chloride		116-7				269	233 227	216-7			
28	trans-4-Nitrocinnamoyl chloride		124				286	217				Me ester, 161
29	Fluorenone-4-carboxylic acid chloride		128, yel				227, yel	230, 225				Oxime of acid, 263, Me ester, 132, Et ester, 103
30	Fluorenone-1-carboxylic acid chloride		140, yel					229-30				Oxime of acid 230 Me ester, 86 9, Et ester, 84 6

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES
II. Acyl Chlorides b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	<i>p</i> -Toluidide	2-Naphthyl amide	Miscellaneous	
						B p, °C	M p, °C						
31	Azobenzene-4,4'-dicarboxylic acid dichloride		144-5, red				330d						
32	9, 10-Anthraquinone-2-carboxylic acid chloride		147				290, yel	280	258-60				Di-Me ester, 242. Di-Et ester, 146 Me ester, 170
33	Di-(1-naphthyl) acetyl chloride		167-9				228 5						
34	9, 10-Anthraquinone-2,6-dicarboxylic acid dichloride		197-8				>400	>370					
35	9,10-Anthraquinone-1,4-dicarboxylic acid dichloride		203-5				>300						
36	9,10-Anthraquinone-1,5-dicarboxylic acid dichloride		260-3				>390						Di-Me ester, 236, Di-Et ester, 155, yel

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES
III. Acyl Bromides a) Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point °C	Melting point °C	n _D	Density g/ml	Acid		Amide	Anilide	p-Toluidide	2-Naphthylamide	Miscellaneous
						B p, °C	M p °C					
1	Oxalyl dibromide	64					101 (hyd)	419d (dt)	254 (dt)	268 (dt)		
2	Acetyl bromide	81		1.4538 ¹⁸	1.6625 ¹⁶	118		82	114	147	132	
3	Propionyl bromide	103				141		81	106	126		
4	Chloroacetyl bromide	127					63	120	137	162	117-8	
5	n-Butyryl bromide	128				162.5		115	96	75	125	
6	Isovaleryl bromide	138-40				176		135		107	138.5	
7	Trichloroacetyl bromide	143			1.90 ¹³	197	57-8	162.5	95-7	113		4-Nitroanilide, 146-7
8	Bromoacetyl bromide	150			2.425	208	50	91	131		134	
9	DL-α-Bromopropionyl bromide	154-5			2.061 ¹⁶	204	25.7	123	99, 110			
10	α-Bromoisobutyryl bromide	162-4				198-200	48.9	148	83	92.5	135	
11	DL-α-Bromobutyryl bromide	172.4				127 ²⁵	-4	112, 108				
12	n-Hexanoyl bromide (n-Caproyl bromide)	175-6				205		100	95	75	107	
13	DL-α-Bromoisovaleryl bromide	184-94					44	133	116	124	145	
14	Benzoyl bromide	218-9			1.570 ¹⁵		122	130	163	158		

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES

III. Acyl Bromides a) Liquids

2) (Reduced pressure b.p. only) (Listed in order of increasing m.p. of the corresponding amides)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	p-Toluidide	2-Naphthyl amide	Miscellaneous
						B p, °C	M p, °C					
1	3-Methylbenzoyl bromide	137 ⁵²					111	94 97	126	118		
2	n-Pentanoyl bromide (n-Valeryl bromide)	64 ⁶⁶				186 5		106	63	74		
3	3-Chlorobenzoyl bromide	145 ⁴⁰					158, 155	134	122			
4	2-Chlorobenzoyl bromide	144 ³⁷					140	142	114, 118	131		
5	2-Methylbenzoyl bromide	135 ³⁷					104 5	143	125	144		
6	2-Bromobenzoyl bromide	167 ¹⁸					150	155	141			
7	Phenylacetyl bromide	150-5 ⁵⁰					76	156	117-8	135-6	159	
8	4-Methylbenzoyl bromide	147 ⁴²					179-80	160	145 148	160, 165		
9	4-Methoxybenzoyl bromide	185 ²⁷					184-6	167, 163	169-71	186		
10	4-Chlorobenzoyl bromide	142 ²⁷					240	179, 170	194			
11	4-Bromobenzoyl bromide	136 ¹⁸					251	189	197			
12	Succinyl dibromide	105-6 ¹³					186	260 (dt)	230 (dt)	255 (dt)		

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES
III. Acyl Bromides b) Solids (Listed in order of increasing m.p.)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	p-Toluidide	2-Naphthyl amide	Miscellaneous
						B p, °C	M p, °C					
1	3-Nitrobenzoyl bromide		43				140	143	154	162		
2	<i>trans</i> -Cinnamoyl bromide		48				133	148	151, 153	168		
3	4-Iodobenzoyl bromide		55				270, 265	217	210			
4	3,5-Dinitrobenzoyl bromide		60				204-5	183	234			
5	4-Nitrobenzoyl bromide		64				241	201, 198	211	203		
6	Phthaloyl dibromide		80				206	220 (<i>di</i>)	253 (<i>di</i>)	201 (<i>di</i>)		

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES
IV. Acyl Iodides. Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	<i>p</i> -Toluidide	2-Naphthyl amide	Miscellaneous
						B p, °C	M p, °C					
1	Acetyl iodide	108			1.98 ¹⁷	118		82	114	147	134	
2	Propionyl iodide	127				141		81	106 103	126		
3	<i>n</i> -Butyryl iodide	146-8				162.5		115	96	75	125	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIII. ORGANIC DERIVATIVES OF ACYL HALIDES

IV. Acyl Iodides. Liquids

2) (Reduced pressure b.p. only) (Listed in order of increasing m.p. of the corresponding amides)*

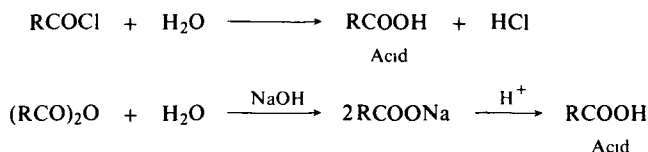
No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	<i>p</i> -Toluidide	2-Naphthyl amide	Miscellaneous
						B p, °C	M p, °C					
1	Dichloroacetyl iodide	55 ¹⁵		1.5754		194		98	118	153		
2	Chloroacetyl iodide	37 ⁴		1.5903			63	120	137, 134	162	117-8	
3	Benzoyl iodide	109 ¹⁰					122	130	163	158		
4	Trichloroacetyl iodide	74 ³⁰		1.5711		197	57-8	141	97-94	113		

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV

The derivatives of three classes of compounds (carboxylic acids, acyl halides and acid anhydrides) are essentially the same as those of carboxylic acids, and are prepared either directly from the acid or *via* the acyl halide. All of them appear therefore under the same title.

Hydrolysis of acid halide or acid anhydride to the corresponding carboxylic acid



From the acyl halide in water

For directions and examples see Wild, p 180

From the acyl halide with aqueous sodium hydroxide

See Vogel, p 369, Wild, p 180

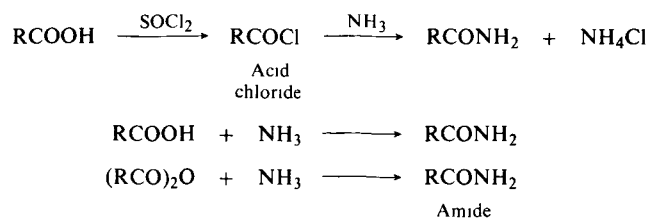
From the acid anhydride with water

See Vogel, p 376, Wild, p 184, A C D Rivett and N V Sidgwick, *J Chem Soc*, **97**, 1677 (1910)

From the acid anhydride with aqueous sodium hydroxide

See Linstead, pp 16-7 Wild, p 184

*Amide **



Acid chloride is prepared from the acid and thionyl chloride. Amide is formed on addition of aqueous ammonia.

For directions and examples see Cheronis, p 440, Shriner, p 200, Vogel, p 361, Wild, p 181

From the acid chloride in benzene with aqueous ammonia

See D Swern, J M Stutzman and E T Roe, *J Amer Chem Soc*, **71**, 3017 (1942)

By passing gaseous ammonia through a benzene or ether solution of the acyl chloride

See Linstead, p 14, Wild, p 182

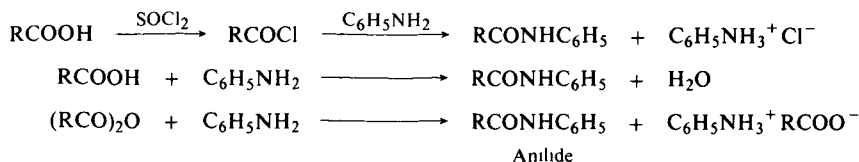
From the neat acid with gaseous ammonia

See J A Mitchell and E E Reid, *J Amer Chem Soc*, **53**, 1879 (1931)

From the acid anhydride with aqueous ammonia

See Wild, p 184, 185

*Anilide **



From the acid chloride (prepared from the acid and thionyl chloride) and aniline in benzene or in ether

For directions and examples see Cheronis, p 445, Linstead, p 14, Shriner, pp 98, 200-1, Vogel, pp 361, 369, 458, Wild, p 182, P W Robertson, *J Chem Soc*, **115**, 1210 (1919)

From the acid chloride with aniline in aqueous sodium hydroxide

See Wild, pp 181, 219

From the acid and aniline at high temperatures

See Vogel, p 362

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

From the sodium salt of the acid with aniline and concentrated hydrochloric acid

See Shriner, p 201, Wild, p 154

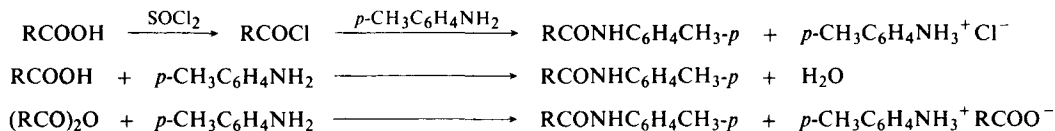
From the acid anhydride with aniline without solvent

See Linstead, p 17, Vogel, p 377, Wild, p 185

From the acid anhydride with aniline in benzene

See Linstead, p 15, Wild, p 185

p-Toluidide *



From the acid chloride with *p*-toluidine in ether or benzene

For directions and examples see Cheronis, pp 441, 444, 458, Linstead, p 14, Shriner, pp 200-1, Vogel, p 361

From the acid and *p*-toluidine at high temperatures

See Cheronis, pp 441, 442-3, Vogel, p 362

From the sodium salt of the acid, *p*-toluidine and concentrated hydrochloric acid

See Shriner, p 201, Wild, p 154

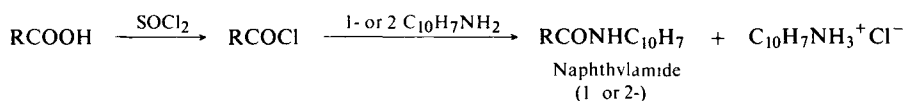
From the acid anhydride with *p*-toluidine without solvent

See Cheronis, p 459, Linstead, p 17

From the acid anhydride with *p*-toluidine in benzene

See Wild, p 185

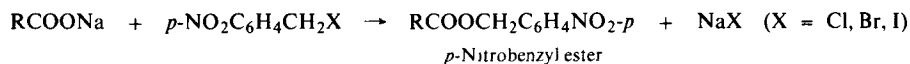
1- and 2-Naphthylamide *



From the acid chloride with the naphthylamine

For directions and examples see Cheronis, p 446, P W Robertson, *J Chem Soc*, 115, 1210 (1919)

p-Nitrobenzyl ester *



From an aqueous solution of the sodium salt of the acid, with the *p*-nitrobenzyl halide in ethanol

For directions and examples see Cheronis, pp 447, 448, Shriner, p 200, Vogel, p 362, Wild, pp 144 5

From an aqueous solution of the sodium salt of the acid with *p*-nitrobenzyl bromide in acetone

See F F Blicke and F D Smith, *J Amer Chem Soc*, 51, 1947 (1929)

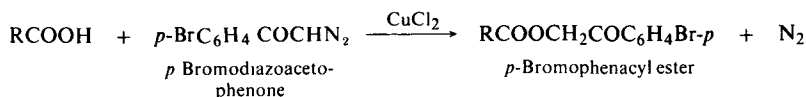
From the sodium or the potassium salt of the acid and *p*-nitrobenzyl bromide in 1 2 water-ethanol

See E E Reid, *J Amer Chem Soc*, 39, 124 (1917)

From the sodium or the potassium salt of the acid and *p*-nitrobenzyl chloride or iodide in 1 2 water-ethanol

See J A Lyman and E E Reid, *J Amer Chem Soc*, 39, 701 (1917)

p-Bromophenacyl ester *



From the sodium salt of the acid and *p*-bromophenacyl bromide in aqueous ethanol

*Derivatives recommended for first trial

WARNING This is not an instruction manual References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

For directions and examples see Cheronis, pp 447, 448, Linstead, p 14, Shriner, p 200, Vogel, p 362, Wild, p 146

From the sodium salt of the acid (neutralization with sodium carbonate) with *p*-bromophenacyl halide in 1:2 water-ethanol

See W L Judefind and E E Reid, *J Amer Chem Soc*, **41**, 1043 (1920)

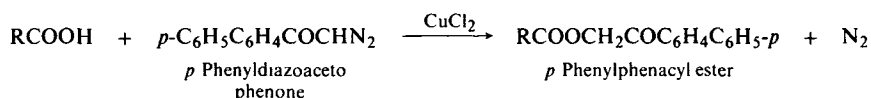
From the sodium salt of the acid (neutralization with sodium hydroxide) with *p*-bromophenacyl bromide in 95% ethanol

See R M Hann, E E Reid and G S Jamieson, *J Amer Chem Soc*, **52**, 818 (1930), C G Moses and E E Reid, *J Amer Chem Soc*, **54**, 2101 (1930)

From the acid and *p*-bromodiazoacetophenone in dioxane in the presence of catalytic amounts of cupric chloride

See J L E Erickson, J M Dechary and M R Kesling, *J Amer Chem Soc*, **73**, 5301 (1951)

p-Phenylphenacyl ester *



From the sodium salt of the acid (neutralization with sodium carbonate) and *p*-phenylphenacyl bromide in aqueous alcohol

For directions and examples see Linstead, p 14, Vogel, p 363, N L Drake and J Bronitsky, *J Amer Chem Soc*, **52**, 3715 (1930)

From the sodium salt of the acid (neutralization with sodium hydroxide) and *p*-phenylphenacyl bromide in aqueous alcohol

See Shriner, p 200, N L Drake and J P Sweeney, *J Amer Chem Soc*, **54**, 2059 (1932)

For dibasic acids from the acid, ethylamine and *p*-phenylphenacyl bromide in aqueous ethanol

See Wild, p 147, N L Drake and J P Sweeney, *J Amer Chem Soc*, **54**, 2059 (1932)

From the acid and *p*-phenyl diazoacetophenone in dioxane in the presence of catalytic amounts of cupric chloride

See J L E Erickson, J M Dechary and M R Kesling, *J Amer Chem Soc*, **73**, 5301 (1951)

Methyl ester



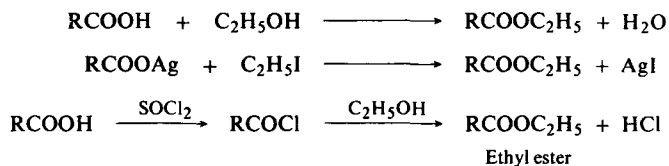
From the acid with methanol and a catalytic amount of sulfuric acid

For directions and examples see Linstead, p 16, Vogel, p 383

From the acid and diazomethane in ether

See B Eistert, in *Newer Methods of Preparative Organic Chemistry*, Interscience, New York, 1948, p 513

Ethyl ester



From the acid and ethanol in the presence of a catalytic amount of sulfuric acid

For directions and examples see Vogel, pp 383, 385, 386, 387

From the silver salt of the acid with ethyl iodide

See Vogel, p 388

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLES XII, XIII AND XIV (Continued)

From the acid chloride and ethanol.

See: Vogel, p. 389.

NOTE: The same methods can be used for the formation of other esters.

S-Benzylthiuronium salt.*



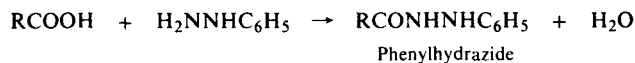
From the sodium or the potassium salt of the acid and S-benzylthiuronium chloride in water.

For directions and examples see: Linstead, p. 15; Vogel, p. 36; Wild, p. 149; S. Veibel and H. Lillelund, *Bull. Soc. Chim.* [5], 5, 1153 (1938), S. Veibel and K. Ottung, *Bull. Soc. Chim.* 6, 1434 (1939).

From the sodium or the potassium salt of the acid in water or in aqueous ethanol with an ethanolic solution of S-benzylthiuronium chloride.

See: Cheronis, p. 449; Shriner, p. 202; J. J. Donleavy, *J. Amer. Chem. Soc.*, 58, 1004 (1936).

Phenylhydrazide.



From the acid with phenylhydrazine without solvent.

For directions and examples see: Shriner, p. 201; Wild, p. 152; G. H. Stempel and G. S. Schaffel, *J. Amer. Chem. Soc.*, 64, 470 (1942).

From the acid with phenylhydrazine in benzene.

See: Shriner, p. 201; Wild, p. 152.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE XIV. ORGANIC DERIVATIVES OF ACID ANHYDRIDES

a) 'Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Acid anhydride	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anide	p-Toluidide	2-Naphthylamide	Miscellaneous
						B P	M P					
1	Trifluoroacetic	39		1.269 ²⁵	1.490 ²⁵	72		75	88			
2	Perfluoropropionic	72		1.273 ²⁵	1.571 ²⁵	96		95				
3	Perfluoro-n-butyric	108		1.285 ²⁰	1.665 ²⁰	120		105	93			
4	Acetic	140	-73	1.3904 ²⁰	1.0811 ²⁰	118	16	82	114	153		
5	n-Propionic	167	-45	1.404 ²⁰	1.017 ¹⁵	141		81	106	126 (124)		
6	Perfluoro-n-caproic (Perfluoro-n-hexanoic)	176		1.295 ²⁰	1.769 ²⁵	157		117				
7	Isobutyric	182			0.957 ¹⁷	154		128	105	107		
8	Pivalic (Trimethylacetic)	190				164	35	154	129	120		
9	n-Butyric	198			0.978 ¹⁵	162		115	96	75 (73)	125	
10	Citraconic (Methylmaleic)	214	7-8	1.471 ^{21.5}	1.238 ²⁵		92d	185-7 (di)	175 (di)			
11	Isovaleric	215				176		135 (137)		107	138	
12	Dichloroacetic	216d				194		98	118	153		
13	Valeric (Pentanoic)	218			0.922 ¹⁷	186		106	63	74	112	
14	Crotonic	248		1.4745 ²⁰	1.0397 ²⁰	189	72	161 (158)	118 (115)	132		
15	Caproic (n-Hexanoic)	254-7 (245)		1.4297 ²⁰	0.92 ²⁰	205		100	95 (92)	75 (73)	107	
16	n-Heptanoic	258		1.4335 ¹⁵	0.9175 ²⁰	223		96	70 (65)	81	101	
17	α-Methylglutaric	272-5					79		175 6 (di) mono (2 forms) 114 or 100	174 5 (di) mono (2 forms) 126 or 98-9	227-8 (di), 115-9 (mono)	
18	Caprylic (n-Octanoic)	280-5	-1	1.436 ¹⁷	0.9065 ¹⁷	239	16	110 (106)	57 (55)	70	103	
19	cis-Hexahydroisophthalic	304					187 9		298-9 (di)			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIV. ORGANIC DERIVATIVES OF ACID ANHYDRIDES

a) Liquids 2) (Reduced pressure b.p. only) (Listed in order of increasing m.p. of the corresponding amide derivative)*

No.	Acid anhydride	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acid		Amide	Anilide	p-Toluidide	2-Naphthylamide	Miscellaneous
						B.P.	M.P.					
1	DL-α-Bromobutyric	148–52 ¹⁰	.....	.....	.....	127 ²⁵	–4	112	.....	.....	.....	4-Nitrophenyl ester, 48–9; 2-Naphthyl ester, 54
2	DL-α-Bromopropionic	120 ⁵ (123–4 ¹⁰)	.....	.....	.....	204	26	123	.....	.....	.....

* Derivative data given in order: m.p., crystal color, solvent from which crystallized.

TABLE XIV. ORGANIC DERIVATIVES OF ACID ANHYDRIDES

b) Solids (Listed in order of increasing m.p.)*

No	Acid anhydride	Melting point, °C	Boiling point, °C	Acid		Amide	Anilide	p-Toluidide	2 Naphthylamide	Miscellaneous
				B P	M P					
1	Oleic	22			16	76	41	43	169	
2	Capric (n-Decanoic)	24		268 70	31	108, 98	70	78	104	D _B ⁰ 0 8596, n _D ²⁰ 1 4234
3	β-Ethyl-β-methylglutaric	25	185 ²⁰		87		105 (mono)			1-Naphthylamide, 126
4	Hexahydrobenzoic	25	280-3	232	29-30	185-6				
5	α,α-Dimethylsuccinic (unsym - Dimethylsuccinic)	29	220		141					α-Me ester, 41 β Me ester, 52, Anil, 87
6	cis-Hexahydrophthalic	32	145 ¹⁸		192					Conc HCl at 180 → trans form, 221
7	DL-Methylsuccinic	37	244-8		115 (112)	225 (di)	123, chl (mono), 159 et, ac, (mono)	164 (mono)	155 (mono)	Anil, 109-10
8	n-Undecanoic (n-Hendecanoic)	37		284	30	103, 99	71	80		
9	2-Methylbenzoic (o-Toluic)	39			104 5	143	125	144		
10	β-Methylglutaric	41	276-8		87		200 (di) 121 (117) (mono)	mono 135	143 (mono)	
11	Bromoacetic	41-2		208	50	91	131		134	
12	Lauric (n-Dodecanoic)	42		299	44 (42)	110, 100	78	87	106	
13	Benzoic	42	360		122	130	163	158		
14	trans-α,β-Dimethylsuccinic	43			198 (208)	238 (di) 165 7 (mono)				Imide, 78
15	Iodoacetic	46			83	95	143 4			
16	Chloroacetic	46		189	63	121	134	162	117-8	
17	n-Tridecanoic	50		312	44	100	80	88		
18	DL-Phenylsuccinic	54	204-6 ²²		168	209 10 (di) 158-9 (α) 144 5 (β-)	222 (di) 175 (α-) 170-1 (β-)	175 (α-) 168 9 (β-)		Imide, 90
19	Myristic (n-Tetradecanoic)	54		202 ¹⁶	54	107, 103	84	93	108	D _B ⁰ 0 8502, n _D ²⁰ 1 4335
20	Glutaric	56		200 ²⁰	97	di 175 6	224	218		
21	Maleic	56, 52-4	198		130	181 (172) (mono) 266 (di)	173-5 (mono) 187 (di)	di 142		
22	Suberic (dimer) (Octanedioic)	56-7			144 (141)	127 (mono) 217 (di)	128 (mono) 186 (di)	di 218		
23	α-Bromoisobutyric	63-5		198-200	48-9	148	83	92	135	1-Naphthylamide, 116
24	Palmitic (n-Hexadecanoic)	64		222 ¹⁶	63	106 7	90	98	109	D _B ⁰ 0 847, n _D ²⁰ 1 4357
25	Margaric (n-Heptadecanoic)	67		231 ¹⁶	61	108				
26	Itaconic (Methylenesuccinic)	67-8			165	di 192	190, 185			
27	Sebacic (dimer) (Decanedioic)	68		243 ¹⁵	133	210 (di) 170 (mono)	201 (di), 122 (mono)	201		
28	Stearic (n-Octadecanoic)	70			70	109	95	102	112	
29	3-Methylbenzoic (m-Toluic)	71			111 3	94	126	118		Hydrazide, 97
30	Phenylacetic	72			76-7	156	118	136	159	
31	2-Bromobenzoic	75-6			150	155 6				Hydrazide, 153
32	Arachidic (n-Eicosanoic)	77-8			77	108-9	92	96	112	
33	2-Chlorobenzoic	79			142, 140	142	114, 118	131		
34	cis-α-Methylglutaconic	85			118		148 (mono)			
35	cis-β-Methylglutaconic	86			147-9		143 (mono)			Mono-Et ester, 73
36	cis-α,β-Dimethylsuccinic	87			129, 122	148 9 (mono) 244 (di)	222 (di)			Imide, 111, 101, Anil, 146
37	3,5-Dichlorophthalic	89			164					Imide, 208, N-Phenylamide, 150
38	4-Methylphthalic	92	295		152	188 (di)				Imide, 196
39	3-Chlorobenzoic	95			158, 155	134	122			
40	4-Methylbenzoic (p-Toluic)	95			179 80	160	145	160		
41	Diphenylacetic	98			148	167-8	180			Me ester, 60

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIV. ORGANIC DERIVATIVES OF ACID ANHYDRIDES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Acid anhydride	Melting point, °C	Boiling point, °C	Acid		Amide	Anhydride	p-Toluidide	2-Naphthylamide	Miscellaneous
				B P	M P					
42	4-Chlorophthalic	99			157					Imide, 210-11, Di-Me ester, 37, Anil, 174
43	Anisic (4-Methoxybenzoic)	99			184-6	167, 163	169 71	186		
44	DL-Benzylsuccinic	102			161					Imide, 97 8, Dihydrazide, 146
45	β -Phenylglutaric	105			140		171 (168) (mono)	154 (mono)		Imide, 174, Di-Me ester, 86-7
46	4-Ethoxybenzoic	108			198	202	170			Hydrazide, 124
47	α -Benzylcinnamic	108-9			158					Me ester, b p 278, Et ester, 38-9
48	3,5-Dinitrobenzoic	109			204-5	183	234			
49	4-Bromophthalic	113			173-5,					Di-Me ester, 40
		109			166					
50	3-Methylphthalic	114-5,			157					Imide, 189-90
		110								
51	4-Nitrophthalic	119			165	200d	192	mono 172		
52	Succinic	120	261		186	157 (mono), 260 (di)	148 (mono) 230 (di)	180 (mono) 255 (di)		
53	Nicotinic (3-Pyridine-carboxylic)	123			237 8	128	85	150		
54	3-Chlorophthalic	124 5			186					Imide, 118 20 (sealed tube)
55	4-Iodophthalic	125-6			182, 185					Imide, 224-4
56	3,4-Dimethylphthalic	126			201					Imide, 240-1, Methylimide, 98 9
57	3-Bromophthalic	132-4			188, 178					Mono-Et ester, 127 8
58	Phthalic	132			206, 200	149 (mono) 220 (di)	170 (mono) 253-5 (di)	mono 160		
59	3-Iodobenzoic	134			187	187				Me ester, 54-5
60	2-Naphthoic (β -Naphthoic)	135			184	192-3	171-2	192		
61	2-Nitrobenzoic	135			146	176	155			
62	Cinnamic	136			133	148	151, 153	168		
63	trans-DL-Hexahydrophthalic acid	140			221	mono 196				Mono-Me ester, 96, Di-Me ester, 33
64	Homophthalic (2-Carboxy-phenylacetic)	141			180-1	230 (2-), 185 (α -)	231			α -Me ester 96 8 2-Me ester, 143 5, α -Et ester, 107 8, Imide, 233
65	1-Naphthoic (α -Naphthoic)	146			162	202	163			Piperidine, 85-7
66	3-Bromobenzoic	148-9			155	155				Hydrazide, 151
67	3-Iodophthalic	159 61			206					Di-Me, ester, 89, Di-Et ester, 70, Imide, 238
68	2,4-Dinitrobenzoic	160			183	203				
69	3-Nitrobenzoic	160, 163			140	143	154	162		
70	3-Nitrophthalic	162			218	201 (di)	234 (di)	226 (di)		
71	3,5-Dinitrophthalic	163-4, 161			226					Et ester, 187, Di-Et ester, 73
72	4,5-Dichlorophthalic	188	313		200, 188					Mono-Et ester, 133 4
73	4-Nitrobenzoic	189			241	201, 198	211, 204	204, 192		
74	4-Chlorobenzoic	194			240	179, 170	194			
75	3,6-Dichlorophthalic	194-5	339		194-5					Mono-Et ester, 130 1 Di-Et ester, 60, Imide, 242, Anil, 191
76	3,4-Di-iodophthalic	198			212-3					Anil, 270
77	β -Phenylglutaconic	206			154-5	138 (mono)	174 (mono)	184 (mono)		Mono-Et ester, 78, Imide, 256-7
78	4,5-Dimethylphthalic	208			123, 196					Methylimide, 150, Ethylimide, 89

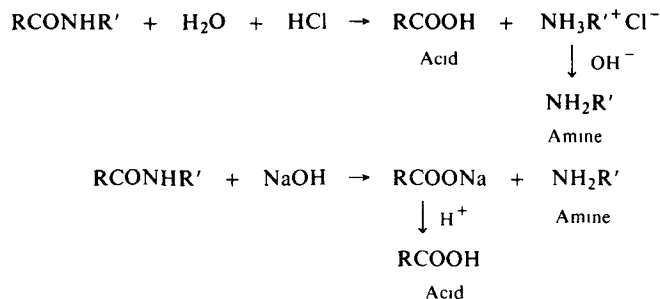
* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIV. ORGANIC DERIVATIVES OF ACID ANHYDRIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Acid anhydride	Melting point, °C	Boiling point, °C	Acid		Amide	Anilide	p-Toluidide	2-Naphthylamide	Miscellaneous
				B P	M P					
79	2,2'-Diphenic	217			229	191 (mono) 212 (di)	176 (mono) 230 (di)			H ₂ SO ₄ at 100-120 → Fluorenone-4-carboxylic acid, 227
80	4-Bromobenzoic	218			251	189	197			
81	D-Camphoric	221			188	177 (mono) 193 (di)	209 (204) (mono), 226 (di)	α 212-4, β 190-6		
82	4-Iodobenzoic	228			270, 267	217 8				Me ester, 114
83	Tetrachlorophthalic	256, 249			250 d					Mono-Me ester, 142, Mono-Et ester, 94 5, Imide, 338-9, 2-Naphthylimide, 287, Anil, 268-9
84	1,8-Naphthalenedicarboxylic	274			274		250 82 (di)			Heat with aq NH ₃ → 1,8-Naphthalimide, 300 N-Phenylimide, 202 Di-Me ester, 102 3
85	Tetrabromophthalic	280			266					Mono-Me ester, 267, Imide, > 380, yel, Anil, 279-80, p-Tolil, 280, 2-Naphthylimide, 306-8
86	Tetraiodophthalic	318, 325, yel			324 7					Mono-Me ester, 298

* Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XV

*Hydrolysis of amide or imide to the corresponding carboxylic acid and amine **

From the amide with aqueous hydrochloric acid

For directions and examples see Cheronis, pp 607, 608, Vogel, pp 404, 808

From the amide with 85% or 100% phosphoric acid

See Cheronis, p 609, G Berger and S C J Olivier, *Rec Trav chim*, **46**, 600 (1927), W M Dehn and K E Jackson, *J Amer Chem Soc*, **55**, 4284 (1933)

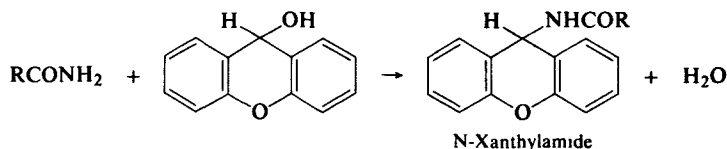
From the amide with 70% sulfuric acid

See Wild, p 193

From the amide with aqueous sodium hydroxide

See Cheronis, p 609, Vogel, pp 404, 799, Wild, p 193*NOTE* For directions and examples for preparation of derivatives of carboxylic acids formed on hydrolysis of amides and imides see explanations and references to Tables XII, XIII and XIV, p 186, 187, 188, 189

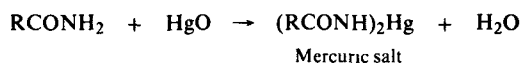
For directions and examples for preparation of derivatives of amines formed on hydrolysis of amides and imides see explanations and references to Table XVIII, p 291, 292, 293, 294

*N-Xanthylamides **

From the amide with xanthhydrol in glacial acetic acid

For directions and examples see Cheronis, p 610, Linstead, p 66, Shriner, p 222, Vogel, p 405, Wild, p 195, R F Phillips and B M Pitt, *J Amer Chem Soc*, **65**, 1355 (1943), W Andriani, *Rec Trav chim*, **35**, 180 (1916)

From the amide with xanthhydrol in ethanol-water-acetic acid mixture

See Shriner, p 222, Wild, p 195, R F Phillips and B M Pitt, *J Amer Chem Soc*, **65**, 1355 (1943)*Hg salt (Hg derivative) **

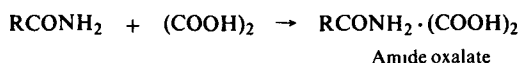
From the amide with mercuric oxide in methanol or ethanol

For directions and examples see Cheronis, pp 610, 611, Wild, p 197, J W Williams, W T Rainey and R S Leopold, *J Amer Chem Soc*, **64**, 1738 (1942)

From the amide with mercuric oxide in water

See Vogel, p 405

From the amide with yellow mercuric oxide without solvent

See Cheronis, p 611, Wild, p 196, J W Williams, W T Rainey and R S Leopold, *J Amer Chem Soc*, **64**, 1738 (1942)*Oxalate*

From the amide with anhydrous oxalic acid in the presence of ethyl acetate

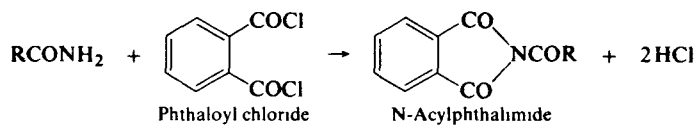
*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE XV (Continued)

For directions and examples see: Cheronis, p. 611; Wild, p. 196; C. A. MacKenzie and W. T. Rawles, *Ind. Eng. Chem., Anal. Ed.*, **12**, 737 (1940).

N-Acylphthalimide (Phthalimide derivative).



From the amide with phthaloyl chloride in toluene or without solvent.

For directions and examples see: Cheronis, p. 611; T. W. Evans and W. M. Dehn, *J. Amer. Chem. Soc.*, **51**, 3651 (1929).

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
a) Liquids (Listed in order of increasing b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Derived acid				Derived amine				Miscellaneous
						M P, °C	B P, °C	p-Nitro benzyl ester	p-Bromo-phenacyl ester	M P, °C	B P, °C	Acet-amide	Benz-amide	
1	N,N-Dimethylformamide	153, 76 ⁴⁹	-61	1.42938 ^{22,4}	0.9484 ^{22,4}	8.4	100.7	31	140, 135		7		41	Xanthyl deriv., 184, Oxalate, 107.4, 7.7
2	N,N-Diethylformamide	176-8, 68 ¹⁵			0.908 ¹⁶	8.4	100.7	31	140, 135		56		42	
3	N-Methylformamide	180-5, 131 ⁹⁰	-3.8, -5.4	1.4310 ²⁵	1.011 ¹⁹	8.4	100.7	31	140, 135		-6	28	80	
4	Formamide	193, 195d	2.55			8.4	100.7	31	140, 135		NH ₃			
5	N-Ethylformamide	197.9			0.952 ²¹	8.4	100.7	31	140, 135		16.5, 19		71	
6	N-Formylpiperidine (Form-N-piperidide)	222				8.4	100.7	31	140, 135		106		48	
7	N-Acetyl piperidine (Aceto-N-piperidide)	226				166	118.2	78	86.0		106		48	
8	N-Methylformanilide	243-4, 249-51, 128-9 ¹⁵	12.5		1.0928 ²³	8.4	100.7	31	140, 135		196	102	63	
9	N-Ethylformanilide	258 ⁷²⁸ , 123 ¹¹			1.0549	8.4	100.7	31	140, 135		205	54	60	
10	N-Propylformanilide	267 ⁷³¹ (cor)			1.044 ¹⁶	8.4	100.7	31	140, 135		222	47		
11	N-Isobutylformanilide	274 ⁷³¹ (cor)				8.4	100.7	31	140, 135		227			
12	N-Isoamylformanilide	285-6 ⁷²⁸			1.004 ¹⁶	8.4	100.7	31	140, 135		254.5 (cor)			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point °C	Xan thyl amide	Derived acid				Derived amine				Miscellaneous
				M P °C	B P °C	p Nitro benzyl ester	p Bromo phenacyl ester	M P, °C	B P °C	Acet amide	Benz amide	
1	<i>n</i> -Butyranilide	35		-5.5 -8	162.5/164		63		184	114	160	
2	Oleanilide	41		α 13.36 β 16.25	250 (super heated steam) 216 ^s		40/46		184	114	160	
3	N-Benzpiperidide (<i>N</i> -Benzoyl piperidine)	48		122.4	249	89	119.0		106		48	
4	Ethyl urethane (Ethyl carbamate)	49/48	169						NH ₃			
5	Formanilide	50/47		8.4	100.7	31	140/135		184	114	160	B p 271 Benzyl chloride → benzyl form anilide 48
6	Malonic acid monoamide (Malonamic acid)	50		134.8/9		<i>di</i> 85.5			NH ₃			
7	N-Propylacetanilide	50		16.6	118.2	78	86.0			47		
8	Difluoroacetamide	52			134.5				NH ₃			
9	N-Benzyl- <i>n</i> -caproamide	53		-3.9	203.35		72		184.5	60	105	
10	Phenyl urethane (Phenyl carbamate)	53							184	114	160	
11	Methyl urethane (Methyl carbamate)	54/52	193						NH ₃			
12	N-Ethylacetanilide	54		16.6	118.2	78	86.0		205	54	60	B p 249
13	<i>n</i> Butyl urethane (<i>n</i> Butyl carbamate)	54							NH ₃			
14	N-Benzylisovaleramide	54		-30	176.5	68.0	135/137		184.5	60	105	
15	Acetoacetamide	54							NH ₃			
16	Isobutyl urethane (Isobutyl carbamate)	55	148						NH ₃			
17	N-Methyl-2-acetotoluidide	56		16.6	118.2	78	86.0		208	56	66	
18	Carpnylanilide	57/55		16.3	237 239.3		67.4		184	114	160	
19	Pelargonanilide	57		12.3	254.4		68.5		184	114	160	
20	N-Benzylacetanilide	58		16.6	118.2	78	86.0	37	298	58	107	
21	Methoxyacetanilide	58			204/203				184	114	160	
22	<i>d</i> L-Lactanilide	59		18	122 ¹⁵		112.8		184	114	160	
23	N-Ethylbenzanilide	60		122.4	249	89	119.0		205	54	60	
24	<i>n</i> -Propyl urethane (<i>n</i> Propyl carbamate)	60							NH ₃			
25	N-Benzylformamide	60		8.4	100.7	31	140/135		184.5	60	105	
26	N-Benzylacetamide	61		16.6	118.2	78	86.0		184.5	60	105	
27	Propiolamide	61-2		18	144d				NH ₃			
28	<i>n</i> -Valeranilide (<i>n</i> -Pentanilide)	63		-34.5	186.4		75		184	114	160	
29	Isoamyl urethane (Isoamyl carbamate)	64	145						NH ₃			
30	Erucanilide	65, 55		33.4	264 ¹⁵		62.5		184	114	160	
31	3-Acetotoluidide (<i>N</i> Acetyl- <i>m</i> toluidine)	66/65		16.6	118.2	78	86.0		203	65	125	
32	N-Methyl-3-acetotoluidide	66		16.6	118.2	78	86.0		206.7	66	125	
33	Ethyl oxanilate	66/7							184	114	160	
34	Benzindole	68		122.4	249	89	119	52	253	157.8	68	
35	Heptananilide	70, 65		-7.46	223		72		184	114	160	
36	Capranilide (<i>n</i> -Decananilide)	70		31.3	268.7		60		184	114	160	
37	<i>n</i> -Undecanilide (<i>n</i> Hendecananilide)	71		28.5 α 13.4 β 16.3	280, 284		68.2		184	114	160	

*Derivative data given in order m p, crystal color solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No.	Name	Melting point, °C	Xanthylamide	Derived acid				Derived amine				Miscellaneous	
				M.P., °C	B.P., °C	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	M.P., °C	B.P., °C	Acetamide	Benzamide		
38	2-Methylhexanamide	72			209.6				NH ₃				
39	<i>N,N</i> -Diphenylformamide	73		8.4	100.7	31	140; 135	53-4		101	180		
40	Vinylacetanilide	73		-35	169; 163				184	114	160		
41	Oleamide	76		α : 13.36 β : 16.25	250 (superheated steam); 216 ⁵		40-6		NH ₃				
42	Thioacetanilide	76			93				184	114	150		
43	Tiglamide	76		64.5-5.0	198.5 (cor.)	64	68		NH ₃				
44	Tiglanilide	77		64.5-5.0	198.5 (cor.)	64	68		184	114	160		
45	4-Methylhexananilide	77			217-8 ²⁵⁴				184	114	160		
46	Lauranilide (Dodecananilide)	78		44; 42	299		76		184	114	160		
47	<i>d,l</i> -2,3-Dimethylbutananilide	78		-1.5	191.7				184	114	160		
48	Pentadecananilide	78		52.3	212 ¹⁶	39.5-40 (cor.)	77.2		184	114	160		
49	<i>d,l</i> -Lactamide	78.5- 9.0; 76		18	122 ¹⁵		112.8		NH ₃				
50	Transbrassidanilide	79		59.7	256 ¹⁰		94.2		184	114	160		
51	2-Acetophenetidide (<i>N</i> -Acetyl- <i>o</i> -phenetidine)	79		16.6	118.2	78	86.0		229	79	104		
52	<i>d,l</i> -2-Methylpentanamide	79.6; 80			195-6				NH ₃				
53	Tridecananilide	80		43; 41.6	312; 177 ¹⁰		75.0		184	114	160		
54	<i>d,l</i> - α -Chloropropionamide	80			186				NH ₃				
55	Propionamide	81; 77	214; 211	-20.8	141	31	63.4		NH ₃				Mercury deriv., 201; Oxalate, 80.8-1.0
56	Acetamide	82	245; 238- 40	16.6	118.2	78	86.0		NH ₃				Mercury deriv., 196-7; Oxalate; 127.3; Phthalimide, 135-6
57	Ethoxyacetamide	82			206-7		104.8		NH ₃				
58	<i>N</i> -Methyl-4-acetotoluidide	83		16.6	118.2	78	86.0		210	83			
59	α -Bromoisobutyranilide	83		48-9	198-200				184	114	160		
60	γ -Phenylbutyramide	84		52	290				NH ₃				
61	Myristanilide	84		53.9	212 ¹⁶		81		184	114	160		
62	Acrylamide	85		13	141; 140				NH ₃				
63	Allylurea	85							58				
64	Acetoacetanilide	85							184	114	160		
65	<i>d,l</i> - α -Ethylphenylacetamide (α -Phenylbutyramide)	86; 83		42	270				NH ₃				
66	4- <i>n</i> -Propylacetanilide	87		16.6	118.2	78	86.0		225	87	115		
67	α -Undecylenamide (α -Hendecylenamide)	87		24.5	275				NH ₃				
68	Propiolanilide	87		18	144d.				184	114	160		
69	3-Bromoacetanilide	87		16.6	118.2	78	86.0	18	251	87	120; 136		
70	<i>d,l</i> -3-Methylpentananilide	87		-41.6	197.5				184	114	160		
71	<i>n</i> -Butyl oxamate	88		189.5 (anh.); 101(+ H ₂ O)		<i>di</i> : 204			NH ₃				
72	2-Chloroacetanilide	88		16.6	118.2	78	86.0		209; 207	87	99		
73	D-Chaulmoogranilide	89		68.5	247-8 ²⁰				184	114	160		
74	Palmitanilide	90		62.7	222 ¹⁶	42.5	86; 82		184	114	160		
75	<i>N</i> -Phenylmaleimide	91		130		<i>di</i> : 91 (cor.)	168-70; 190		184	114	160		

*Derivative data given in order: m.p., crystal color, solvent from which crystallized.

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Xanthyl amide	Derived acid				Derived amine				Miscellaneous	
				M P °C	B P °C	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	M P °C	B P °C	Acet amide	Benz amide		
76	Bromoacetamide	91		50	208	88			NH ₃				
77	<i>α</i> -Phenylpropionamide	92	158		265				NH ₃				
78	Isopropyl urethane (Isopropyl carbamate)	92							33				
79	Arachidamide	92		77 75	204 ¹		89		184	114	160		
80	<i>d l α</i> Chloropropionamide	92			186				184	114	160		
81	2,2-Dimethylbutanamide	92		-15 0	187 190				184	114	160		
82	2-Nitroacetamide	92 94		16 6	118 2	78	86 0	71		92 94	98 110		
83	Maleimide	93		130		<i>di</i> 91 (cor)	168 70 190		NH ₃				
84	Elaidamide	93 4		44 5 51	234 ¹⁵		65		NH ₃				
85	Transbrassicamide	94		59 7	256 ¹⁰		94 2		NH ₃				
86	2-Ethylpentanamide	94			209				184	114	160		
87	<i>N</i> -Methyl- <i>N</i> -(1-naphthyl)acetamide	94		16 6	118 2	78	86 0		294	94 5	121		
88	<i>n</i> -Caproamide (<i>n</i> Hexanamide)	95 92		-3 9	205 35		72		184	114	160		
89	<i>N</i> -Butyranilide	95		-5 5 -8	162 5 164	35	63		184	114	160		
90	<i>N</i> -Benzylpalmitamide	95		62 7	222 ¹⁶	42 5	86 82		184 5	60	105		
91	Azelaic acid monoamide	95		106 5	>360 sl <i>d</i> 237 ¹⁵	<i>di</i> 43 8	<i>di</i> 130 6		NH ₃				
92	<i>d l</i> -2-Methylpentanamide	95			195 6				184	114	160		
93	Iodoacetamide	95		83					NH ₃				
94	Stearanilide	95		70 1 69 6			92		184	114	160		
95	Heptanamide	96	154 5	-7 46	223 0		72		NH ₃				
96	Trichlorolactamide	96		124					NH ₃				
97	Semcarbamide	96						1 4	113 5	<i>mono</i> 67 <i>di</i> (<i>sym</i>) 138	<i>mono</i> 172 5 <i>di</i> (<i>sym</i>) 241 (cor)		Gives semicarbazones with aldehydes and ketones
98	3-Toluamide	97, 94		111 3, 110 1	236, subl	86 6	108						Mercury deriv., 200
99	Trichloroacetanilide	97, 94		57 8	197 5	80			184	114	160		
100	3-Acetophenetidine	97		16 6	118 2	78	86 0		248	37	103		
101	<i>N</i> -Benzylstearamide	97		70 1 69 6			92		184 5	60	105		
102	Glycollanilide	97		78 9 80		106 8	138		184	114	160		
103	Methoxyacetamide	97			204 203				NH ₃				
104	Hydrocinnamamide (<i>β</i> Phenylpropionamide)	98, 96		48 7, 40	279 80 (cor)	36 3	104		184	114	160		
105	<i>α</i> -Hydroxyisobutyramide	98		79	212	80 5	98		NH ₃				
106	Dichloroacetamide	98, subl		5-6	194		99		NH ₃				
107	2-Methylhexanamide	98			209 6				184	114	160		
108	4-Methylhexanamide	98			217 8 ⁷⁴⁵				NH ₃				
109	4-Methyl-2-nitroacetamide	99, 94		16 6	118 2	78	86 0	117		99	148		
110	Capramide (<i>n</i> -Decanamide)	99	148	31 3	268 7		67 0		NH ₃				
111	2-Bromoacetamide	99		16 6	118	78	86 0	32	250	99	116		
112	Phenoxyacetamide	99		98 9, 99 100	285d		148 5		184	114	160		
113	Pelargonamide	99	147 5 8 5	12 3	254 4		68 5		NH ₃				
114	<i>α</i> -Bromopropionamide	99, 110		25 7	203 5				184	114	160		
115	<i>n</i> -Caproamide (<i>n</i> -Hexaneamide)	100, 101	160	-3 9	203 35		72		NH ₃				Oxalate, 71 1- 3
116	Tridecanamide	100		43, 41 6	312, 177 ¹⁰		75		NH ₃				
117	Phenylpropiolamide	100, 109		136-7, subl		83			NH ₃				

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No.	Name	Melting point, °C	Xanthylamide	Derived acid				Derived amine				Miscellaneous
				M.P., °C	B.P., °C	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	M.P., °C	B.P., °C	Acetamide	Benzamide	
118	N,N-Diphenylacetamide	101	.....	16.6	118.2	78	86.0	53-4	.....	101	180	.....
119	β -Iodopropionamide	101	.....	82; 85	.....	.....	.....	NH ₃	.....	.....	.....	.....
120	N,N'-Diacetyltrimethylenediamine	101	.....	16.6	118.2	78	86.0	.....	136	mono: 126; di: 101	mono: 140; di: 147	.....
121	Methylurea	101	230	.....	.....	.....	.....	.....	-6	28	80	Picrate, 127d.
122	Phenoxyacetamide	101	.....	98-9; 99-100	285d.	.....	148.5	.....	NH ₃	.....	.....	.....
123	N-Methylacetanilide	102	.....	16.6	118.2	78	86.0	.....	196	102	63	B.p. 237; Conc. HNO ₃ + H ₂ SO ₄ → <i>p</i> -Nitro deriv., 153
124	Levulinanilide	102	.....	33-5, deliq.	245-6	61	84	.....	184	114	160	.....
125	Pentadecanamide	102	.....	52.3	212 ¹⁶	39.5-40 (cor.)	77.2	.....	NH ₃	.....	.....	.....
126	Isocrotonamide	102	.....	15	169	.....	81	.....	NH ₃	.....	.....	.....
127	Isocrotonanilide	102	.....	15	169	.....	81	.....	184	114	160	.....
128	<i>n</i> -Undecanamide (<i>n</i> -Hendecanamide)	103; 99	.....	28.5; α :13.4; β :16.3	280-4	.....	68.2	.....	NH ₃	.....	.....	.....
129	3-Benzophenetidine (N-Benzoyl- <i>m</i> -phenetidine)	103	.....	122.4	249	89	119	.....	248	97	103	.....
130	N,N-Dicyclohexylacetamide	103	.....	16.6	118.2	78	86.0	20	225 sl. d.	103	153	.....
131	3,4-Dimethylbenzanilide	104	.....	166; 164	.....	.....	.....	.....	184	114	160	.....
132	2-Benzophenetidine (N-Benzoyl- <i>o</i> -phenetidine)	104	.....	122.4	249	89	119	.....	229	79	104	.....
133	Pyruvanilide	104, subl.	.....	13.6	165d; 80 ²⁵	.....	.....	.....	184	114	160	.....
134	N-Cyclohexylacetamide	104	.....	16.6	118.2	78	86.0	.....	134	104	149	.....
135	2- <i>n</i> -Propylacetanilide	104-5	.....	16.6	118.2	78	86.0	.....	222-4	104-5	119	.....
136	2-Ethylpentanamide	105; 103	.....	.....	209	.....	.....	.....	NH ₃	.....	.....	.....
137	Isobutyranilide	105	.....	-46.1	154.7	.....	76.8	.....	184	114	160	.....
138	4- <i>n</i> -Butylacetanilide	105	.....	16.6	118.2	78	86.0	.....	261	105	126	.....
139	Acrylanilide	105	.....	13	141; 140	.....	.....	.....	184	114	160	.....
140	β -Phenylpropionamide (Hydrocinnamamide)	105	189	48.7; 40	279-80 (cor.)	36.3	104	.....	NH ₃	.....	.....	.....
141	Propionanilide	106; 103	.....	-20.8	141	31	63.4	.....	184	114	160	Conc. HNO ₃ + H ₂ SO ₄ → <i>p</i> -Nitro deriv., 182
142	Palmitamide	106	142	62.7	222 ¹⁶	42.5	86; 82	.....	NH ₃	.....	.....	.....
143	N-Benzylbenzamide	106	.....	122.4	249	89	119	.....	184-5	60	105	.....
144	D-Chaulmoogramide	106	.....	68.5	247-8 ²⁰	.....	.....	.....	NH ₃	.....	.....	.....
145	<i>sym</i> -Dimethylurea	106	.....	.....	.....	.....	.....	.....	-6	28	80	.....
146	<i>n</i> -Valeramide (<i>n</i> -Pentanamide)	106	167	-34.5	186.4	.....	75	.....	NH ₃	.....	.....	Oxalate, 61.1-4
147	Myristamide	107; 103	.....	53.9	212 ¹⁶	.....	81	.....	NH ₃	.....	.....	.....
148	N-Benzylbenzanilide	107	.....	122.4	249	89	119	37	298	58	107	.....
149	Margaramide (Heptadecanamide)	108	.....	61.2	231 ¹⁶	48.5-9.0 (cor.)	82.6	.....	NH ₃	.....	.....	.....
150	Thioacetamide	108	.....	93	.....	.....	.....	.....	NH ₃	.....	.....	.....
151	Fluoroacetamide	108	.....	31-2	167-9	.....	.....	.....	NH ₃	.....	.....	.....
152	Levulinamide	108d.	.....	33-5, deliq.	245-6	61	84	.....	NH ₃	.....	.....	.....
153	Azelaic acid monoanilide	108	.....	106.5	> 360 sl. d.; 237 ¹⁵	di: 143.8	di: 130.6	.....	184	114	160	.....
154	Arachidamide	108-9	.....	77; 75	204 ¹	.....	89	.....	NH ₃	.....	.....	.....

*Derivative data given in order: m.p., crystal color, solvent from which crystallized.

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Xanthylamide	Derived acid				Derived amine				Miscellaneous	
				M P, °C	B P, °C	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	M P, °C	B P, °C	Acetamide	Benzamide		
155	Anthranilamide	109		147d					NH ₃				
156	2-Iodoacetanilide	109		16 6	118 2	78	86	61, 58		109	139		
157	Pimelic acid monoanilide	109		104-5, subl	223 ¹⁵		<i>di</i> 136 6		184	114	160		
158	Stearamide	109	139 41	70 1, 69 6			92		NH ₃				
159	α -Methylhydrocinnamamide	109							NH ₃				
160	Lauramide (Dodecanamide)	170, 102		44, 42	299		76		NH ₃				
161	<i>n</i> -Caprylamide (<i>n</i> -Octanamide)	110, 108	148	16 3	237, 239 3		67 4		NH ₃				
162	Isovaleranilide	110		-30 0	176 5		68 0		184	114	160		
163	<i>d,l</i> -2-Methylbutanilide	110			176-7, 174		55		184	114	160		
164	3-Nitrophenylacetamide	110		120					NH ₃				
165	2-Ethylacetanilide	111		16 6	118 2	78	86 0		210-1	111	147		
166	β -Bromopropionamide	111		62 5					NH ₃				
167	3-Aminobenzamide	111		174d					NH ₃				
168	2-Ethylbutanamide	112, 107		-31 8	195				NH ₃				
169	4-Methylpentananilide (Isocaproanilide)	112, 110		-33	199 1 ⁷⁵²		77 3		184	174	160		
170	<i>d,l</i> -2-Methylbutanamide	112			176-7, 174		55		NH ₃				
171	2-Acetotoluidide	112		16 6	118 2	78	86 0	200		110 1 ¹	146		KMnO ₄ → Acetylanthranilic acid, 185
172	<i>d</i> -Hydnocarpamide (α -Cyclopentylundecylamide)	112-3		60 5					NH ₃				
173	4-Aminobenzamide	114		118d					NH ₃				
174	Acetanilide	114 (cor)		16 6	118 2	78	86 0		184	114	160		B p 304, Conc HNO ₃ + H ₂ SO ₄ → <i>p</i> -nitro deriv., 210
175	<i>N</i> -Benzylcrotonamide	114		72	189 (cor)	67 4	95-6		184-5	60	105		
176	Ethyl oxamate	114		189 5 (anh), 101(+2H ₂ O) (rapid htng)		<i>di</i> 204			16 5, 19		71		
177	2-Chlorobenzanilide	114, 118		142, 140		106	106		184	114	160		
178	Dihydroacetic acid monoanilide	115		109	270				184	114	160		
179	<i>n</i> -Butyramide	115	185-7	-5 5, -8	162 5, 164		63		NH ₃				Mercury deriv., 222-4, Oxalate, 65 9 6 2
180	Methacrylamide	116		16	161				NH ₃				
181	α -Bromoisovaleranilide	116		44	230d				184	114	160		
182	<i>trans</i> - α -Crotonanilide	118, 115		72, w	189 (cor)	67 4	95-6		184	114	160		
183	Phenylacetanilide	118		76 5, subl	256 5 (cor)	65	89		184	114	160		Conc HNO ₃ → 2,4-dinitrophenylacetic acid, 189
184	Dichloroacetanilide	118		5-6	194		99		184	114	160		
185	<i>N</i> -Ethyl-4-nitroacetanilide	118		16 6	118 2	78	86 0	96		119	98		
186	Trimesic acid trianilide	118-20d		380 (cor)			<i>tri</i> 197 (sealed tube)		184	114	160		
187	3-Iodoacetanilide	119		16 6	118 2	78	86 0	33, 27		119	157		
188	Cyanoacetamide	120	222-3	66					NH ₃				

*Derivative data given in order m p crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES

b) Solids (Listed in order of increasing m. p.)* (Continued)

No	Name	Melting point °C	Xan thyl amide	Derived acid				Derived amine				Miscellaneous	
				M P °C	B P °C	p-Nitro benzyl ester	p-Bromo phenacyl ester	M P, °C	B P °C	Acet amide	Benz amide		
189	Glycolamide	120		78 9, 80		106 8	138		NH ₃				
190	Isocaproamide (Isohexanamide)	120 1	159-60	-33	199 1 ^{75a}		77 3		NH ₃				
191	Chloroacetamide	121	208 9	α 61 3 β 56 2, γ 52 5	189		104						
192	2-Chlorophenoxyacetanilide	121		145 6, w					184	114	160		
193	Tribromoacetamide	122		131, 135	245d				NH ₃				
194	Sebacic acid monoanilide	122		33, subl	243 ¹⁵	dt 73 5, 72 6	dt 147		184	114	160		
195	3-Chlorobenzanilide	122 5		158 155		107	116		184	114	160		
196	α-Bromopropionamide	125		25 7	203 5				NH ₃				
197	Furanilide	123 5		133 4 132	230-2	133 5	138 5		184	114	160		
198	Pyruvamide	124		13 6	165d 80 ²⁵				NH ₃				
199	3-Methylpentanamide	125		-41 6	197 5				NH ₃				
200	4-Chlorophenoxyacetanilide	125		155 6 w 158			136		184	114	160		
201	3-Benzotoluidide (N Benzoyl m toluidine)	125		122 4	249	89	119 0		203	65	125		
202	2-Toluanilide	125		104-5, 107 8	259 ⁷⁰¹	90 7	57		184	114	160		
203	Acetyl-β-phenylhydrazine	125 6		16 6	118 2	78	86 0	19, 23	243	128, dt 107	168, dt 177		
204	Adipic acid monoamide	125-30		153 4 (cor)	216 ¹⁵	106	154 5, 152 6		NH ₃				
205	Succinimide	126	245-7	185, 182 8	235d	dt 88	dt 211		NH ₃				
206	3-Toluanilide	126		111-3, 110 1	263, subl	86 6	108		184	114	160		
207	Angelanilide	126		45-6	185 (cor)				184	114	160		
208	β-Resorcylianilide (2,4-Dihydroxybenzanilide)	126 7		213d (rapid htng) 216, 217		188-9			184	114	160		
209	2-Ethylbutanilide	127, 127 5		-31 8	195				184	114	160		
210	Suberic acid monoamide	127		144 139 41		dt 85	dt 144 2		NH ₃				
211	4-Methoxyacetanilide	127		16 6	118 2	78	86 0	58	240	130 127	154, 157		
212	Angelanilide	127 8		45 6	185 (cor)				NH ₃				
213	Phenylpropiolanilide	128, 126		136 7, subl		83			184	114	160		
214	Nicotinamide	128, 129, 129 31		237-8 subl					NH ₃				B p 150 60 ^{s 10-4} Chloroaurate, 205, N-Ethyl, 188-9, N isopropyl, 184 6
215	Pivalanilide	128 (cor), 132-3		35 5	163 4		75-6		184	114	160		
216	Suberic acid monoanilide	128-9		144, 139-41		dt 85	dt 144 2		184	114	160		
217	Isobutyramide	129, 127	210-1	-46 1	154 7		76 8		NH ₃				
218	2-Methoxybenzamide	129		100-1	200		113		NH ₃				Mercury deriv, 241
219	2-Bromo-4-nitroacetanilide	129		16 6	118 2	78	86 0	105		129	160		
220	Benzamide	130, 129	222 5- 3 5, 224	122 4	249	89	119		NH ₃				Mercury deriv, 222, Phthali- mide, 168

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Xanthylamide	Derived acid				Derived amine				Miscellaneous	
				M P, °C	B P, °C	p-Nitro benzyl ester	p Bromo-phenacyl ester	M P °C	B P °C	Acet amide	Benz amide		
221	3,4-Dimethylbenzamide	130		166, 164					NH ₃				
222	α,β-Dibromopropionamide	130, 133		67 (stab), 50 (unstab)	160 ²⁰				NH ₃				
223	Anthranilanilide	131		147					184	114	160		
224	Bromoacetanilide	131		50	208	88			184	114	160		
225	2-Methoxybenzanilide	131		100-1	200		113		184	114	160		
226	Nicotnanilide	132, bz, 85 (+ 2H ₂ O), w, 265 (anh)		237 8, subl					184	114	160		
227	2,2-Dimethylbutanamide	132, 103		-15 0	187, 190				184	114	160		
228	d,l-2,3-Dimethylbutanamide	132		-1 5	191 7				NH ₃				
229	3,3-Dimethylbutananilide	132		6 7	184, 96 ²⁶				184	114	160		
230	3,3-Dimethylbutanamide	132		6 7	184, 96 ²⁶				NH ₃				
231	2,5-Dichloroacetanilide	132		16 6	118 2	78	86 0	50		132	120		
232	Malonic acid monoanilide	132		134 8 9		dt 85 5			184	114	160		
233	Urea (Carbamide)	132 8	265, 274						NH ₃				Phthalimide, 188-90, Picrate, 148
234	2,4-Dimethylacetanilide	133, 130		16 6	118 2	78	86 0		217	133, 130	192		
235	Mesityleneamide (3,5-Dimethylbenzamide)	133		16 6					NH ₃				
236	4-Isopropylbenzamide	133		177, al					NH ₃				
237	α-Bromoisovaleramide	133		44	230d				NH ₃				
238	4-Chlorophenoxyacetamide	133		155-6, w, 158			136		NH ₃				
239	d,l-Mandelamide	133 4 (cor)		118		123-4			NH ₃				
240	N-(2-Naphthyl)acetamide	134		16 6	118 2	78	86 0	112		132	162		Br ₂ → 1-Bromo deriv, 140
241	3-Chlorobenzamide	134		158, 155		107	116		NH ₃				Mercury deriv, 245
242	Phenacetin (4-Aceto-phenetidine)	134		16 6	118 2	78	86 0	2 3	248 254	137	173		10% HNO ₃ → 3-Nitro deriv, 103
243	Chloroacetanilide	134, 136-7		α 61 3, β 56 2, γ 52 5	189		104		184	114	160		
244	2,3-Dimethylacetanilide	135		16 6	118 2	78	86 0		221-2	135	189		
245	Isovaleramide	135, 136	182-3	-30 0	176 5		68 0		NH ₃				
246	Acetyl salicylanilide	136		135 (rapid htng)	140d	90 5			184	114	160		
247	3-Bromobenzanilide	136		155		105	120		184	114	160		
248	Salicylanilide	136		158 3 (subl at 76)		97-8	140		184	114	160		
249	α-Hydroxyisobutyramide	136		79	212	80 5	98		184	114	160		
250	N,N-Diacetyltetramethylenediamine	137		16 6	118 2	78	86 0	27	159	dt 137	dt 177		
251	Benzo-2-iodonanilide (N-Benzoyl-α-iodoaniline)	139		122 4 (subl at 100)	249	89	119	61, 58		109	139		
252	3-Ethoxybenzamide	139		137					NH ₃				
253	2,5-Dimethylacetanilide	139		16 6	118 2	78	86 0	15 5	213-5	139	140		
254	3-Aminobenzanilide	140		174d					184	114	160		

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Xanthylamide	Derived acid				Derived amine				Miscellaneous
				M P, °C	B P, °C	p-Nitrobenzyl ester	p-Bromophenacyl ester	M P, °C	B P, °C	Acetamide	Benzamide	
255	2-Toluamide	140, 143	199	104-5,	259 ⁷⁵¹	90 7	57	NH ₃				Mercury deriv., 196
256	Trichloroacetamide	141	200 5	107 8				NH ₃				
257	2-Iodobenzanilide	141		57-8	197 5	80		NH ₃	184	114	160	
258	2-Bromobenzanilide	141		162		111	143	NH ₃	184	114	160	
259	3-Tolylurea	142		150		110	102	NH ₃	203	65	125	
260	2-Chlorobenzamide	142		142, 140		106	106	NH ₃				
261	Salicylamide	142		158 3 (subl at 76)		97-8	140	NH ₃				Mercury deriv., 190
262	Furamide	142-3	210	133 4, 132	230-2	133 5	138 5	NH ₃				
263	3-Nitrobenzamide	143, 142		140		141	132	NH ₃				
264	Iodoacetanilide	143-4		83				NH ₃	184	114	160	
265	3,5-Dimethylacetanilide	144, 140		16 6	118 2	78	86	NH ₃	220	144, 140	136	
266	2-Benzotoluidide (N-Benzoyl-o-toluidine)	144		122 4	249	89	119	NH ₃	200	110-11	146	KMnO ₄ → Benzoylanthranic acid, 177
267	3-Nitrosalicylamide	145 (hyd)		125				NH ₃				
268	2,4-Dichloroacetanilide	145		16 6	118 2	78	86 0	NH ₃	63	145	177	
269	α-d l-Phenylsuccinamide (β form)	145		167-8, 84 (anh)				NH ₃				
270	4-Toluamide	145, 148		179 80, 182 subl	275 (cor)	104 5	153	NH ₃	184	114	160	
271	Diethylmalonic acid monoamide	146		125		di 91		NH ₃				
272	Cyclohexancarboxanilide (Hexahydrobenzanilide)	146, 131		30-1	233			NH ₃	184	114	160	
273	Phenylurea	147	225					NH ₃	184	114	160	
274	N,N'-Dibenzoyltrimethylenediamine	147		122 4	249	89	119	NH ₃	136	mono 126, di 101	mono 140, di 147	
275	Benzo-2-ethylanilide (N-Benzoyl-o-ethylaniline)	147		122 4	249	89	119	NH ₃	210-11	111	147	
276	2,4,6-Trichloroacetanilide	148		16 6	118 2	78	86 0	NH ₃	78	148	172	
277	α-Bromoisobutyramide	148		48-9	198-200			NH ₃				
278	Cinnamamide	148, 142		133	300	116 8	145 6	NH ₃				
279	Succinic acid monoanilide	148 5		185, 182 8	235 d	di 88	di 211	NH ₃	184	114	160	
280	N-Cyclohexylbenzamide	149		122 4	249	89	119	NH ₃	134	104	149	
281	Benzylurea	149						NH ₃	184-5	60	105	
282	Phthalic acid monoamide (Phthalamic acid)	149		200-6, 197 (sealed tube), 230 (rapid htng)		di 155 5	di 152 8	NH ₃				
283	β-Benzoylpropionanilide	150, 145		116				NH ₃	184	114	160	
284	Ethylmalonic acid monoanilide	150		111		75		NH ₃	184	114	160	
285	2-Chlorophenoxyacetamide	150		145-6, w				NH ₃				
286	Adipic acid monoanilide	151 3		153-4 (cor)	216 ¹⁵	106	154 5, 152 6	NH ₃	184	114	160	
287	Cinnamanilide	151, 153		133	300	116 8	145 6	NH ₃	184	114	160	Acid KMnO ₄ → Benzoic acid, 122 4

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Xanthyl amide	Derived acid				Derived amine				Miscellaneous
				M P, °C	B P, °C	<i>p</i> Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	M P, °C	B P, °C	Acetamide	Benzamide	
288	4-Fluoroacetanilide	152		16 6	118 2	78	86 0	- 1	186	152	185	
289	<i>d l</i> -Mandelanilide	152		118		123 4			184	114	160	
290	4-Acetotoluidide (N-Acetyl- <i>p</i> -toluidine)	153, 147		16 6	118 2	78	86 0	45	200	147	158	KMnO ₄ → 4-Acetamido-benzoic acid, 256, Br ₂ → 3-Bromo deriv, 117
291	N-Methyl-4-nitroacetanilide	153		16 6	118 2	78	86 0	152		153	112	
292	Veratranilide	154		181					184	114	160	
293	4-Fluorobenzamide	154		182, 182 6					NH ₃			
294	3-Nitrobenzanilide	154		140		141	132		184	114	160	
295	Benzilamide	154-5, 155		150		99 5	152		NH ₃			
296	3-Nitrosalicylamide	155, 145		125 (+ H ₂ O)					NH ₃			
297	2,5-Dichlorobenzamide	155		153					NH ₃			
298	2-Bromobenzamide	155		150		110	102		NH ₃			Mercury deriv, 242
299	Dibenzylacetanilide	155		89					184	114	160	
300	2-Nitrobenzanilide	155		146		112	107		184	114	160	
301	3-Bromobenzamide	155		155		105	120		NH ₃			Mercury deriv, 235
302	N-(1-Naphthyl) acetanilide	155, 159 6		131, 135					184	114	160	
303	Phthalonamide (<i>β</i> form)	155d		146					NH ₃			
304	3-Nitroacetanilide	155		16 6	118 2	78	86 0		114	<i>mono</i> 155, <i>di</i> 76	<i>mono</i> 155, <i>di</i> 150	
305	Pimelic acid dianilide	155-6		104-5, <i>subl</i>	223 ¹⁵		<i>di</i> 136 6		184	114	160	
306	Pivalamide	155-7, 153-4		35 5	163-4		75-6		NH ₃			
307	N-Phenylsuccinimide	156		185, 182 8	235d	<i>di</i> 88	<i>di</i> 211		184	114	160	
308	Dibromoacetamide	156		48	232-5				NH ₃			
309	L-Malamide	156 5-8 0		100-1		<i>mono</i> 87 2, <i>di</i> 124 5	<i>di</i> 179		NH ₃			
310	Phenylacetamide	156, 157	196	76 5, <i>subl</i>	256 5 (cor)	65	89		NH ₃			
311	3-Hydroxybenzanilide	157, 155		200, <i>subl</i>		106-8	176, 176 1 4		184	114	160	
312	Succinic acid monoamide (Succinamic acid)	157		185, 182 8	235d	<i>di</i> 88	<i>di</i> 211		NH ₃			
313	N-Acetylidole	157-8		16 6	118 2	78	86	52	253	157-8	68	
314	<i>d l</i> -Phenylsuccinamide (<i>α</i> form)	158		167-8					NH ₃			
315	4-Benzotoluidide (N-Benzoyl- <i>p</i> -toluidine)	158		122 4	249	89	119	45	200	147	158	CrO ₃ → 4-Benzamido benzoic acid, 278
316	N-(1-Naphthyl) acetamide	159		16 6	118 2	78	86 0	50		159	160	Br ₂ → 4-Bromo deriv, 193, Fuming HNO ₃ → dinitro deriv, 250

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Xanthyl amide	Derived acid				Derived amine				Miscellaneous	
				M P, °C	B P, °C	p-Nitro benzyl ester	p Bromo phenacyl ester	M P, °C	B P, °C	Acet amide	Benz- amide		
317	4-Toluamide	159, 160	224-5	179-80, 182, subl	275 (cor)	104.5	153	NH ₃					Mercury deriv, 260
318	Crotonamide	161, 158		72, w	189 (cor)	67.4	95.6	NH ₃					
319	N-(1-Naphthyl) benzamide	161		122.4	249	89	119	50		159	160		
320	N-(2-Naphthyl) benzamide	162		122.4	249	89	119	112		132	162		
321	4-Aminoacetanilide	162		16.6	118.2		86.0	140, 147	267	mono 162.3, di 304	mono 128, di 300		Azo-β-naphthol deriv, 261
322	4-Hydroxybenzamide	162 (hyd)		215, 213.4, 210		180-2	191.5 (cor) 184	NH ₃					
323	Benzanilide	163, 160		122.4	249	89	119		184	114	160		Br ₂ →4-Bromo deriv, 204
324	1-Naphthanilide	163, 164		161.2 (cor)			135.5		184	114	160		
325	Trichlorolactanilide	164		124					184	114	160		
326	Veratramide	164		181				NH ₃					
327	2-Benzoylbenzamide	165		128, 91 (hyd)		100.4		NH ₃					
328	L-Glutamide	165		211 (rapid htng), 197 (slow htng)				NH ₃					
329	Protocatechuanilide	166		199-200d			188		184	114	160		
330	4-Ansamide	167, 163		184.6, 184.2 (cor)	275-80	132	152	NH ₃					Mercury deriv, 222
331	4-Bromoacetanilide	167, 168		16.6	118.2	78	86.0	66	245	168	204		
332	Acetylanthranililide	167		185 ac a					184	114	160		
333	Diphenylacetamide	168		148				NH ₃					
334	α-Benzoyl-β-phenylhydrazine	168		122.4	249	89	119	19.23	243	128	168		
335	2-Furanacrylamide (β-(2-Furyl)-acrylic acid)	168-9		141	286			NH ₃					
336	Piperonylamide	169		229, 228				NH ₃					
337	d l-Tropamide	169		117-8				NH ₃					
338	Methyliminodiacetic acid monoamide	169		227d				NH ₃					
339	Methyliminodiacetic acid diamide	169		227d				NH ₃					
340	4-Hydroxyacetanilide	169		16.6	118.2	78	86.0	184, 186		mono 168, di 150	N-mono 216-7, N,O-di 234		
341	4-Ansamilide	169-71		184.6, 184.2 (cor)	275-80	132	152		184	114	160		
342	3-Hydroxybenzamide	170, 167		200 subl		106.8	176, 176.7-4	NH ₃					
343	Sebacic acid monoamide	170		33, subl	243 ¹⁵	di 73.5, 72.6	di 147	NH ₃					
344	cis-Aconitanilide	170d		125			tri 186		184	114	160		

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No.	Name	Melting point, °C	Xanthylamide	Derived acid				Derived amine				Miscellaneous	
				M.P., °C	B.P., °C	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	M.P., °C	B.P., °C	Acetamide	Benzamide		
345	Malonic acid diamide (Malondiamide)	170	270	134.8-9		<i>di</i> : 85.5			NH ₃				
346	D,L-Phenylsuccinic acid monoanilide (β form)	170		167-8; 84 (anh.)					184	114	160		
347	4-Ethoxybenzanilide	170; 172		198; 195-6					184	114	160		
348	2-Naphthylanilide	171; 173		184; 185.5					184	114	160		
349	N,N'-Diacetylenediamine	172		16.6	118.2	78	86.0	8.5	116	<i>di</i> : 172	<i>di</i> : 244		
350	Benzo-2,4,6-trichloroanilide (N-Benzoyl-2,4,6-trichloroaniline)	172		122.4	249	89	119	78		148	172		
351	Azelaic acid diamide	172		106.5	> 360 sl. d.; 237 ¹⁵	<i>di</i> : 43.8	<i>di</i> : 130.6		NH ₃				
352	Maleic acid monoamide (Maleamic acid)	172-3; 153 sl.d.		137-8; 130 (+ 3% fumaric acid)		<i>di</i> : 91 (cor.)	168-70; 190		NH ₃				
353	4-Phenetylurea (Dulcin)	173						2-3	248; 254	137	173		
354	4-Benzophenetidine (N-Benzoyl- <i>p</i> -phenetidine)	173		122.4	249	89	119	2-3	248; 254	137	173		
355	Benzylanilide	174-5		150		99.5	152		184	114	160		
356	Pimelic acid diamide	175		104-5, subl.	223 ¹⁵		<i>di</i> : 136.6		NH ₃				
357	<i>d,l</i> -Phenylsuccinic acid monoanilide (α form)	175		167-8; 84 (anh.)					184	114	160		
358	4-Hydroxyphenylacetamide	175		148-50; 148, w.					NH ₃				
359	Citraconic acid dianilide	175.5		92-3; 22d.		70.6			184	114	160		
360	Glutaric acid diamide	175-6		98	302-4	<i>di</i> : 69	<i>di</i> : 139.8		NH ₃				
361	2-(4-Toluy) benzamide	175-6		139-140					NH ₃				
362	2-Nitrobenzamide	176; 175		146		112	107		NH ₃				
363	Phthalonic acid monoanilide	176		146					184	114	160		
364	N,N-Dibenzoyltetramethylenediamine	177		122.4	249	89	119	27	159	<i>di</i> : 137	<i>di</i> : 177		
365	Acetylanthranilamide	177		185, ac. a.					NH ₃				
366	2,6-Dimethylacetanilide	177		16.6	118.2	78	86.0		215; 218	177	168		
367	D-Camphoric acid monoamide	177		187.5-8.0		65.5			NH ₃				
368	Mesaconic acid diamide	177		204.5 (cor.), subl.		<i>di</i> : 134 (cor.)			NH ₃				
370	4-Cyanobenzanilide	179		219; 214		189			184	114	160		
371	N-Benzylphthalamide	179		200-6; 191 (sealed tube); 230 rapid htng.)		<i>di</i> : 155.5	<i>di</i> : 152.8		184-5	60	105		
372	4-Chloroacetanilide	179		16.6	118.2	78	86.0	72		179	192		
373	α -Phthalonamide	179d.		146					NH ₃				

* Derivative data given in order: m.p., crystal color, solvent from which crystallized.

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Xanthylamide	Derived acid				Derived amine				Miscellaneous	
				M P, °C	B P, °C	<i>p</i> Nitrobenzyl ester	<i>p</i> Bromophenacyl ester	M P, °C	B P, °C	Acetamide	Benzamide		
374	2,4-Dimethylbenzamide	179-81		127, 90 (+ H ₂ O)					NH ₃				
375	D-Tartaric acid monoanilide	180d		169-71		<i>dt</i> 163	<i>dt</i> 204		184	114	160		
376	α -Acetyl- β -methylurea	180		16-6	118-2	78	86-0		-6	28	80		
377	Diphenylacetanilide	180		148					184	114	160		
378	3,5-Dinitrosalicylamide	181		182					NH ₃				
379	1-Naphthylacetamide	181		131, 135					NH ₃				
380	Maleic acid diamide	181, 180		137		<i>dt</i> 91 (cor)	168-70, 190		NH ₃				
381	<i>unsym</i> -Dimethyl urea	182	225						7		41		
382	Thiourea	182							NH ₃				
383	Hippuramide	183		187		136	151		NH ₃				
384	4-Tolylurea	183						45	200	147	158		
385	3,5-Dinitrobenzamide	183		204-5		157	159		NH ₃				
386	2-Iodobenzamide	184		162		111	143		NH ₃				
387	4-Iodoacetanilide	184		16-6	118-2	78	86-0	67-8		184	222		
388	Benzo-4-fluoroanilide (N-Benzoyl- <i>p</i> -fluoroaniline)	185		122-4	249	89	119	-1	186	152	185		
389	N,N'-Diacetyl- <i>o</i> -phenylenediamine	185		16-6	118-2	78	86-0	102		<i>dt</i> 185	<i>dt</i> 301		
390	2-Nitrocinnamamide	185		240		132	141		NH ₃				
391	Mesaconic acid dianilide	185-7		204-5 (cor)		<i>dt</i> 134 (cor)			184	114	160		
392	Citraconic acid diamide	185-7		92-3, 92d		<i>dt</i> 70-6			NH ₃				
393	Chlorofumaranylde	186		191-2		<i>dt</i> 138-5			184	114	160		
394	3-Iodobenzamide	186		187		121	128		NH ₃				
395	Suberic acid dianilide	186-7		144, 139- 41		<i>dt</i> 85	<i>dt</i> 144-2		184	114	160		
396	Maleic acid dianilide	187		137		<i>dt</i> 91 (cor)	168-70, 190		184	114	160		
397	Maleic acid monoanilide	187		137		<i>dt</i> 91 (cor)	168-70, 190		184	114	160		
398	Hippuric acid	187-5		122-4	249	89	119	Glycine 228 30, 262d 53-4		206	187-5	Acetamide, 136, Benzamide, 151	
399	<i>unsym</i> -Diphenylurea	189	180							101	180		
400	Aconitic acid dianilide	189		194-5d (cor)			<i>tri</i> 186		184	114	160		
401	<i>meso</i> -Tartaric acid diamide	189-90, 187		140		93			NH ₃				
402	4-Bromobenzamide	189-90		251-3		180			NH ₃				Mercury deriv., 266
403	Itaconic acid dianilide	190, 185		165		<i>dt</i> 90-6	<i>dt</i> 117-4		184	114	160		
404	Picramide	190		122-5					NH ₂				Acetamide, 230, Benzamide, 196
405	N,N'-Diacetyl- <i>m</i> -phenylenediamine	191		16-6	118-2	78	86-0	63		<i>mono</i> 87-9, <i>dt</i> 191	<i>mono</i> 125 <i>dt</i> 240		
406	Itaconic acid diamide	191-2- 8		165		<i>dt</i> 90-6	<i>dt</i> 117-4		NH ₃				
407	Mucic acid monoamide	192d		214d, varies with htng rate, 223- 255		310	225		NH ₃				

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Xanthyl amide	Derived acid				Derived amine				Miscellaneous
				M P °C	B P °C	<i>p</i> -Nitro benzyl ester	<i>p</i> -Bromo phenacyl ester	M P °C	B P °C	Acet amide	Benz- amide	
408	4-Nitrophthalimide	192	228	165					184	114	160	
409	2-Tolylurea	192							200	110-11	146	
410	Benzo-4-chloroaniline (N Benzoyl <i>p</i> -chloroaniline)	192		122 4	249	89	119		72	179, 172	192	
411	Buret	192d							NH ₃			
412	2-Naphthamide	192 195		184					NH ₃			
413	D-Camphoric acid diamide	193		185 5					NH ₃			
414	4-Chlorobenzamide	194		187 5 8 0			65 5		NH ₃			
415	4-Coumaramide	194		243, 240			129 5	126	184	114	160	
				210 3					NH ₃			
416	2-Benzoylbenzamide	195		206 (anh)								
			128 91			100 4		184	114	160		
			(+1 H ₂ O)									
417	3-Nitrocinnamamide	196	199			174	178, 173	NH ₃				
418	D-Tartaric acid diamide	196d	169 71			<i>di</i> 163	<i>di</i> 204	NH ₃				
419	2-Methyl-4-nitroacetanilide	196 202	16 6	118 2		78	86 0	130	202			
420	L-Malanilide (Hydroxysuccin anilide)	197	100 1			<i>mono</i> 87 2 <i>di</i> 124 5	<i>di</i> 179		184	114	160	
421	4-Hydroxybenzamide	198	215			180 2	191 5		184	114	160	
		196 7	213 4				(cor)					
422	4-Nitrophenylacetamide	198	153				207	NH ₃				
423	4-Nitrophenylacetanilide	198	153				207	147 8		215	<i>di</i> 193, 203	
424	Cyanoacetanilide	198-9	66						184	114	160	
425	Citric acid trianilide	199 192	100 153 (anh)			<i>tri</i> 102	<i>tri</i> 148		184	114	160	
			(+1 H ₂ O)									
426	4-Nitrophthalamide	200d	165					NH ₃				
427	<i>cis</i> -Aconitic acid dianilide	200	125				<i>tri</i> 186		184	114	160	
428	Methylsuccinic acid dianilide	200	115						184	114	160	
429	4-Nitrobenzamide	200	241			168	137	NH ₃				
430	2-Naphthylacetamide	200 205	141 2 143					NH ₃				
431	Isatin	200 1									Acetamide, 147	
432	3-Nitrophthalic acid diamide	201d	218			189		NH ₃				
433	Sebacic acid dianilide	201	33, subl	243 ¹⁵		<i>di</i> 73 5 72 6	<i>di</i> 147		184	114		160
434	1-Naphthoamide	202	161 2 (cor)				135 5	NH ₃				
435	4-Ethoxybenzamide	202	198 195-6					NH ₃				
436	2,4-Dinitrobenzamide	203	183			142	158	NH ₃				
437	D-Camphoric acid monoanilide	204	187 5 8 0			65 5			184	114		160
438	Benzo-4-bromoanilide (N Benzoyl- <i>p</i> bromoaniline)	204	122 4	249		89	119	66	245	168		204
439	4-Nitrocinnamamide	204, 217	285			186	191	NH ₃				
440	N-Phenylphthalimide	205	200 6 191 (sealed tube), 230 (rapid htng)			<i>di</i> 155 5	<i>di</i> 152 8		184	114		160

*Derivative data given in order m p, crystal color solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Xanthyl amide	Derived acid				Derived amine				Miscellaneous	
				M P °C	B P °C	p-Nitro benzyl ester	p-Bromo phenacyl ester	M P °C	B P °C	Acet amide	Benz amide		
441	Carballylic acid triamide	207d 205 7d		166			tri 138 2		NH ₃				
442	Gallantide	207		253 4d 222 40d		141	134		184	114	160		
443	Phthalonic acid diamide	208		146					184	114	160		
444	Hippuranilide	208		187		136	151		184	114	160		
445	2-Coumaramide	209d		207 8, subl		152 5			NH ₃				
446	Sebacic acid diamide	210 208		133, subl	243 ¹⁵	di 73 5 72 6	di 147		NH ₃				
447	4-Iodobenzanilide	210		270, 265		141	146		184	114	160		
448	Citric acid triamide	210-5		153 (slow htng)		tri 102	tri 148		NH ₃				
449	4-Nitrobenzanilide	211 204		241		168	137		184	114	160		
450	d,l-Phenylsuccinic acid diamide	211		167 8 84 (anh)					NH ₃				
451	Protocatechuamide	212		199 200d		188			NH ₃				
452	2,2'-Diphenic acid diamide	212		227 233		di 187 182 6			NH ₃				
453	4-Nitroacetanilide	213 4		16 6	118 2	78	86 0	147 8		215	di 199 208		
454	Ethylmalonic acid diamide	214		111		75			NH ₃				
455	3-Nitrophthalimide	216		218		189			NH ₃				
456	Suberic acid diamide	216 7		144 139 41		di 85	di 144 2		NH ₃				
457	Methylmalonic acid diamide	217 206		137 138d					NH ₃				
458	4-Iodobenzamide	217		270 265		141	146		NH ₃				
459	Benzylmalonic acid diamide	217		117d 121		di 119 5			184	114	160		
460	4-Hydroxy-2-naphthamide	217 8		225 6					NH ₃				
461	Acetylurea	218		16 6	118 2	78	86 0		NH ₃				
462	3-Hydroxy-2-naphthamide	218		222 3 (cor)					NH ₃				
463	sym -Di-3-tolylurea	218							203	65	125		
464	Phthalic acid diamide	220		200-6, 191 (sealed tube) 230 (rapid htng)		di 155 5	di 152 8		NH ₃				
465	Mucic acid diamide	220		214d, varies with htng rate, 223-255		310	225		NH ₃				
466	Saccharin	220	198 9	206					NH ₃				
467	Adipic acid diamide	220, 229		153-4 (cor)	216 ¹⁵	106	152 6 154 5		NH ₃				
468	d,l-Phenylsuccinic acid diamide	222		167-8, 84 (anh)					184	114	160		

*Derivative data given in order m p , crystal color solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Xanthyl amide	Derived acid				Derived amine				Miscellaneous	
				M P °C	B P °C	<i>p</i> Nitro benzyl ester	<i>p</i> Bromo phenacyl ester	M P °C	B P °C	Acet amide	Benz amide		
469	β -Resorcyamide	222		213d (rapid htng) 216d 217		188 9			NH ₃				
470	4-Cyanobenzamide	223		219 214		189			NH ₃				
471	Diethylmalonic acid diamide	224		125	302 4	<i>dt</i> 91			NH ₃				
472	Glutaric acid dianilide	224		98		<i>dt</i> 69	<i>dt</i> 139 8		184	114	160		
473	5-Nitrosalicylanilide	224		229 30					184	114	160		
474	5-Nitrosalicylamide	225		229 30					NH ₃				
475	Benzylmalonic acid diamide	225		117d 121		<i>dt</i> 119 5			NH ₃				
476	Methylsuccinic acid diamide	225		115					NH ₃				
477	Malonic acid dianilide	225 227, 230		134 8- 9		<i>dt</i> 85 5			184	114	160		
478	<i>d l</i> -Tartaric acid monoamide	226		203 4 (+1 H ₂ O) 205 6 (anh)		<i>dt</i> 147 6			NH ₃				
479	D-Camphoric acid dianilide	226		187 5 8 0		65 5			184	114	160		
480	Succinic acid dianilide	230, 226		185 182 8	235d	<i>dt</i> 88	<i>dt</i> 211		184	114	160		Heat above m p → succinamil, 155 6 + aniline, b p 184
481	2,2 -Diphenanilide	230		227 229 233		<i>dt</i> 187 182 6			184	114	160		
482	Phthalimide	233 5 (cor) 238	176 7	200 6 191 (sealed tube) 230 (rapid htng)	249	89	119	122 119		232	198, 204		
483	3,5-Dinitrobenzanilide	234		204 5		157	159		184	114	160		
484	3-Nitrophthalic acid dianilide	234		218		189			184	114	160		
485	Terephthalic acid monoanilide	234 7		300, subl with out melting		<i>dt</i> 263 5	<i>dt</i> 225		184	114	160		
486	<i>d l</i> -Tartaric acid monoanilide	236		203 4 (+1 H ₂ O) 205 6 (anh)					184	114	160		
487	N-Benzylacrylamide	237		13	141, 140				184 5	60	105		
488	Carbanilide (<i>sym</i> -Diphenyl urea)	238, 240							184	114	160		
489	Muconic acid diamide	240d		289d (slow htng) 306 (rapid htng)					NH ₃				
490	Adipic acid dianilide	241		153-4 (cor)	216 ¹⁵	106	152 6, 154 5		184	114	160		

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Xanthyl amide	Derived acid				Derived amine				Miscellaneous
				M P, °C	B P, °C	<i>p</i> -Nitrobenzyl ester	<i>p</i> -Bromophenacyl ester	M P, °C	B P, °C	Acetamide	Benzamide	
491	<i>N,N'</i> -Dibenzoyl ethylenediamine	244		122.4	249	89	119	8.5	116	<i>di</i> 172	<i>di</i> 244	
492	Gallamide	245		253-4d, 222, 40d		141	134		NH ₃			
493	3-Hydroxy-2-naphthanilide	249 (cor), 244		222-3 (cor)					184	114	160	
494	<i>sym</i> -Di-2-tolylurea	250							200	110.1	146	
495	Carballylic acid trianilide	252		166			<i>tri</i> 138.2		184	114	160	
496	Phthalic acid dianilide	253.5		200.6, 191 (sealed tube), 230 (rapid htng)		<i>di</i> 155.5	<i>di</i> 152.8		184	114	160	
497	Oxalic acid dianilide	254		189.5 (anh), 101 (+2 H ₂ O) (rapid htng)		<i>di</i> 204			184	114	160	
498	Succinic acid diamide	255, 260d	275	185, 182.8	235d	<i>di</i> 88	<i>di</i> 211		NH ₃			
499	2,4,6-Trinitrobenzamide	264d		228					NH ₃			
500	D-Tartaric acid dianilide	264d		169-71		<i>di</i> 163	<i>di</i> 204		184	114	160	
501	Fumaric acid diamide	266d		293.5, 286-7 (sealed tube), 200, subl		150.8			NH ₃			
502	<i>sym</i> -Di-4-tolylurea	268						45	200	147	158	
503	Isophthalic acid monoamide	280		348, subl		202.5	179.1		NH ₃			
504	Isophthalic acid diamide	280		348, subl		202.5	179.1		NH ₃			
505	Acetylenedicarboxylic acid diamide	294d		179					NH ₃			
506	Mucic acid monoanilide	310		214, varies with htng rate, 223-255		310	225		184	114	160	
507	<i>N,N'</i> -Diacetyl <i>p</i> -phenylenediamine	310		16.6	118.2	78	86.0	140, 147	267	<i>mono</i> 162-3, <i>di</i> 304	<i>mono</i> 128, <i>di</i> 300	
508	Fumaric acid dianilide	314		286.7 (sealed tube), 293-5, 200, subl		150.8			184	114	160	
509	<i>N,N'</i> -Diacetylbenzidine	317		16.6	118.2	78	86.0	127		<i>mono</i> 199, <i>di</i> 317	<i>mono</i> 203-5, <i>di</i> 352	

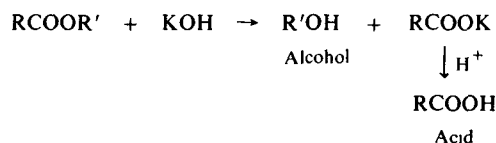
*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XV. ORGANIC DERIVATIVES OF AMIDES AND IMIDES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Xanthyl amide	Derived acid				Derived amine				Miscellaneous	
				M P, °C	B P °C	<i>p</i> Nitro benzyl ester	<i>p</i> -Bromo-phenacyl ester	M P, °C	B P, °C	Acet-amide	Benz-amide		
510	Terephthalic acid dianilide	334.7		300, subl without melting		<i>di</i> 263.5	<i>di</i> 225						
511	N,N'-Dibenzoylbenzidine	352		122.4	249	89	119	127		<i>mono</i> 199 <i>di</i> 317	<i>mono</i> 203.5 <i>di</i> 352		
512	Trimesic acid triamide	365d		380 (cor.)			<i>tri</i> 197 (sealed tube)		NH ₃				
513	Oxalic acid diamide	419d (sealed tube)		189.5 (anh.), 101 (+2 H ₂ O), (rapid htng)		<i>di</i> 204			NH ₃				

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XVI

*Hydrolysis to the corresponding acid and alcohol **

From the ester with aqueous sodium or potassium hydroxide

For directions and examples see Cheronis, p 539, Linstead, p 42, Vogel, pp 390, 391, 786, Wild, p 187

From the ester and potassium hydroxide in anhydrous or aqueous diethylene glycol

See Cheronis, p 538, C E Redemann and H J Lucas, *Ind Eng Chem, Anal Ed*, **9**, 514 (1937)

From the ester with sodium methoxide in methanol or with sodium ethoxide in ethanol

See Linstead, p 40, Vogel, p 391

From an α -hydroxy ester in water without catalyst

See A Findlay and E M H Hickmans, *J Chem Soc*, **95**, 1004 (1909)

Saponification equivalent

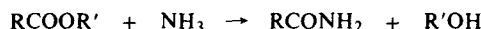
The saponification equivalent (S E) measures the number of equivalents of base required for complete hydrolysis of an ester. It is defined as

$$\text{S E} = \frac{\text{Milligrams ester taken for hydrolysis}}{\text{Milliequivalents of KOH required for complete hydrolysis}}$$

For directions and examples see Cheronis, pp 975-6, Shriner, p 235, Vogel, p 392

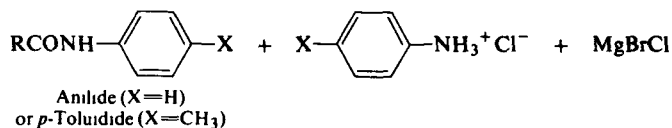
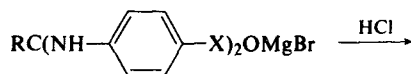
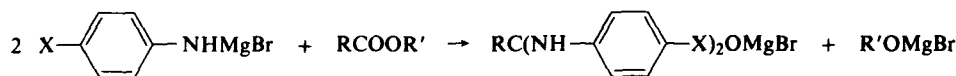
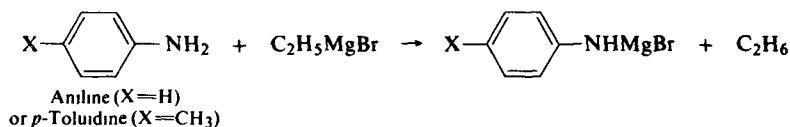
NOTE For directions and examples for preparation of derivatives of the carboxylic acids formed on hydrolysis of esters see explanations and references to Tables XII, XIII and XIV, pp 186, 187, 188, 189

For directions and examples for preparation of derivatives of alcohols formed on hydrolysis of esters see explanations and references to Table VI, pp 77, 78, 79

Amide

From the ester with aqueous or alcoholic ammonia

For directions and examples see Linstead, p 42, Wild, p 188

Anilide and p-Toluidide

From the ester and the N-magnesium bromide derivative of aniline or *p*-toluidide (prepared from the amine and ethylmagnesium bromide) in anhydrous ether

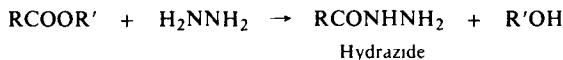
For directions and examples see Cheronis, p 537, Linstead, pp 42-3, Vogel, p 394, Wild, p 190, C F Koelsch and D Tenenbaum, *J Amer Chem Soc*, **55**, 3049 (1933), D V N Hardy, *J Chem Soc*, 398 (1936)

***Derivatives recommended for first trial**

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE XVI (Continued)

Hydrazide



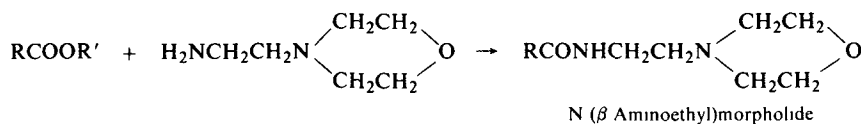
From the ester and 90% hydrazine hydrate

For directions and examples see Linstead, p 42, Wild, p 191

From the ester and 85% hydrazine hydrate in alcohol

See Cheronis, p 535, Shriner, p 237, Vogel, p 395, P P T Sah, *Rec Trav chim*, 59, 1036 (1940)

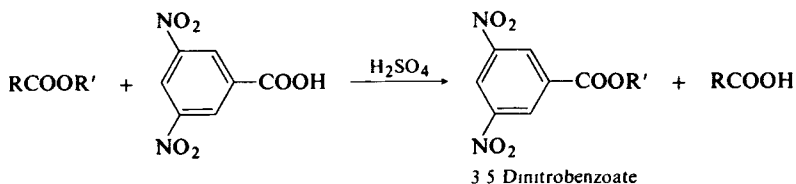
N-(β-Aminoethyl)morpholide *



From the ester and *N*-(β-aminoethyl)morpholine in ethylene glycol or without solvent

For directions and examples see Cheronis, p 536, R W Bost and L V Mullen, *J Amer Chem Soc*, 73, 1967 (1951)

3,5-Dinitrobenzoate *



From the ester with 3,5-dinitrobenzoic acid with a catalytic amount of sulfuric acid

For directions and examples see Linstead, p 43, Shriner, p 238, Vogel, p 393, W B Renfrow and A Chaney, *J Amer Chem Soc*, 68, 150 (1946)

From the ester with 3,5-dinitrobenzoyl chloride and pyridine

See Cheronis, p 538

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids
a) Liquids. 1) (Listed in order of increasing b.p.).*

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	ρ Toluene	3,5-Di-nitrobenzoate	Miscellaneous	
						Equiv. valent	Acid		Alcohol					
							M.P., °C	B.P., °C	M.P., °C					B.P., °C
1	Ethyl nitrite	17			0.900 ¹⁵	75			-117.3	78.32				
2	Methyl formate	31.50	-99	1.34648 ¹⁵ He (yel)	0.97421	60	8.4	100.7	-97	64.65	2.55	53	93, al 108 (cor), al	
3	Ethyl formate	54.15	-79.4	1.35975	0.92247	74	8.4	100.7	-117.3	78.32	2.55	53	93, al	
4	Methyl acetate	57.1	-98.7	1.36170 1.3639	0.9274 0.93347	74	16.6	118.2	-97	64.65	82	153 147	108 (cor), al	
5	Ethyl trifluoroacetate	60.5		1.3093 ¹⁵		142	-15.25	72.4	-117.3	78.32			93, al	
6	Methyl nitrate	65			1.217 ¹⁵	77			-97	64.65			108 (cor), al	
7	Isopropyl formate	71, 68			0.8728	88	8.4	100.7	-89.5	82.4	2.55	53	123, pet eth	
8	Butyl nitrite	75			0.911	103			-90.2	117.6 116			64, 62.5	
9	Methyl chloroformate	75		1.38675	1.2231	94.5			-97	64.65			108 (cor), al	
10	Ethyl acetate	77.15	-83.6	1.372	0.90055	88	16.6	118.2	-117.3	78.32	82	153 147	93, al	
11	Methyl propionate	79.65	-87.5	1.3779	0.9151	88	-20.8	141	-97	64.65	81.813, 79	126 123	108 (cor), al	
12	Methyl acrylate	80.3		1.3984	0.961 ^{19,2}	86	13	140, 141	-97	64.65	84-5, pet eth	141	108 (cor), al Polymerizes on standing	
13	n-Propyl formate	80.85, 81	-92.9	1.37789	0.9071, 0.918	88	8.4	100.7		97.1	2.55	53	74, pet eth	
14	tert-Butyl formate	83				102	8.4	100.7	25.5	82.5	2.55	53	142, pet eth	
15	Allyl formate	83.6			0.946	86	8.4	100.7		97.1	2.55	53	49-50	
16	Ethyl nitrate	87	-112		1.106	91			-117.3	78.32			93, al	
17	Isopropyl acetate	88.9, 91	-73.4	1.3740 ²⁵	0.872	102	16.6	118.2	-89.5	82.4	82	153, 147	123, pet eth	
18	Dimethyl carbonate (Methyl carbonate)	90.5		1.3687	1.0702 1.0694	90			-97	64.65			108 (cor), al	
19	Methyl isobutyrate	92.6, 92.26	-87.7, -84.7	1.3840	0.8906	102	-46.1	154.7	-97	64.65	128, 129	108.5- 9.5	108 (cor), al	
20	Ethyl chloroformate	93		1.3974	1.13519	108.5			-117.3	78.32			93, al	
21	sec-Butyl formate	97		1.384	0.884	102	8.4	100.7		99.5	2.55	53	76	
22	tert-Butyl acetate	97.8		1.386	0.867	116	16.6	118.2	25.5	82.5	82	153, 147	142, pet eth	
23	Isobutyl formate	98.4	-95.8	1.38568	0.88535, 0.8755	102	8.4	100.7		108.1	2.55	53	87	
24	Isoamyl nitrite	99		1.38708 ²¹	0.880 ¹⁵	117			-117	132			61	
25	Ethyl difluoroacetate	99		1.3463		124		134.5	-117.3	78.32	52		93, al	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p Toluene	3,5-Dinitrobenzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M.P., °C	B.P., °C	M.P., °C					B.P., °C
26	Methyl methacrylate	99, 100 1	-50	1.413	0.936	100	16	161	-97	64.65	102.6		108 (cor) al	Polymerizes on standing or heating.
27	Ethyl propionate	99.1	-73.85	1.3853	0.8889	102	-20.8	141	-117.3	78.32	81, 81.3, 79	126, 123	93, al	N-(β-Aminoethyl)morpholide, 85
28	Ethyl acrylate	101		1.4059 ^{19,4}	0.9136 ¹⁵	100	13	141	-117.3	78.32	84-5, pet eth	141	93, al	Polymerizes on standing or heating
29	Methyl pivalate (Methyl trimethylacetate)	101		1.4228	0.891 ⁰	116	35.5	163-4	-97	64.65	155.7, 153.4, et ac-pet eth	119.20	108 (cor), al	
30	n-Propyl acetate	101.55	-95	1.38468	0.8834	102	16.6	118.2		97.1	82	153, 147	74, pet eth	
31	Methyl n-butyrate	102.3	-84.8	1.3879	0.8982	102	-5.5-8	162.5, 164	-97	64.65	115.6	75	108 (cor), al	
32	Allyl acetate	104		1.40488	0.9276	100	16.6	118.2		97.1	82	153, 147	49.50	
33	Trimethyl orthoformate (Methyl orthoformate)	105, 102		1.3793	0.9676	106	8.4	100.7	-97	64.65	2.55	53	108 (cor), al	
34	Methyl isocrotonate	106.2, 108.2 (cor)				100	15	169	-97	64.65	101.2	132	108 (cor), al	
35	n-Butyl formate	106.6	-91.9	1.38940	0.8885	102	8.4	100.7	-90.2	117.6, 116	2.55	53	64, 62.5	
36	Ethyl isobutyrate	109.8, 111	-88.2	1.3903	0.86930	116	-46.1	154.7	-117.3	78.32	128, 129	108.5-9.5	93, al	Hydrazide, 104, eth-al
37	n-Propyl nitrate	110		1.3979	1.063	105				97.1			74, pet eth	
38	Chloromethyl acetate	111			1.094 ¹⁵	108.5	16.6	118.2			82	153, 147		
39	Isopropyl propionate	111.3			0.8931 ⁰	116	-20.8	141	-89.5	82.4	81, 81.3, 79	126, 123	123, pet eth	
40	sec-Butyl acetate	112.0		1.3865 ²⁵	0.872, 0.8648 ²⁵	116	16.6	118.2		99.5	82	153, 147	76	
41	n-Propyl chloroformate	113, 115		1.40350	1.0901	122.5				97.1			74, pet eth	
42	Methyl isovalerate	116.7		1.3900 ²⁵	0.8808	116	-30.0	176.5	-97	64.65	135, 137	106.7	108 (cor), al	
43	Isobutyl acetate	117.2, 118		1.39008	0.8747	116	16.6	118.2		108.1	82	153, 147	87	
44	Ethyl pivalate (Ethyl trimethylacetate)	118, 115		1.39061	0.85467	130	35.5	163-4	-117.3	78.32	155.7, 153-4, et ac-pet eth	119.20	93, al	
45	Ethyl methacrylate	118.5 ¹¹		1.41472	0.91063	114	16	161	-117.3	78.32	102.6		93, al	Polymerizes on heating.

*Derivative data given in order: m.p., crystal color, solvent from which crystallized.

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5-Di- nitro- benzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M P, °C	B P, °C	M P, °C					B P, °C
46	Methyl crotonate	118 8- 119 3			0 9806 ⁴	100	72	189 (cor)	-97	64 65	118, w, 115	132, bz	108 (cor), al	
47	Isopropyl iso- butyrate	120 76			0 84708 ^{21 3}	130	-46 1	154 7		82 4	128, 129	108 5- 9 5	123, pet eth	Hydrazide, 104, eth -al
48	Ethyl n-butyrate	121 6	-100 8	1 40002	0 87917	116	-5 5, -8	162 5, 164	-117 3	78 32	115-6	75	93, al	
49	n-Propyl pro- pionate	122 2, 123 4	-75 9	1 39325	0 8809	116	-20 8	141		97 1	81, 81 3, 79	126 123	74, pet eth	
50	tert-Amyl acetate (Dimethylethyl- carbinyl acetate)	124		1 392	0 8738 ¹⁹	130	16 6	118 2	-8 55	102 3	82	153, 147	116, 117-8	
51	Allyl propionate	124				114	-20 8	141		97 1	81, 81 3, 79	126 123	49 50	
52	Isoamyl formate	124 2	-93 5	1 39756	0 8820	116	8 4	100 7	-117	132	2 55	53	61	
53	Ethyl isocrotonate	125 5- 126 ⁷⁴⁹		1 42423	0 91820	114	15	169	-117 3	78 32	101 2	132	93, al	
54	n-Butyl acetate	126 1	-73 5	1 39614	0 881	116	16 6	118 2	-90 2	117 6, 116	82	153, 147	64, 62 5	
55	Diethyl carbonate (Ethyl carbon- ate)	126 5	-43 0	1 3852	0 9752	118			-117 3	78 32			93, al	
56	tert-Butyl iso- butyrate	126 7		1 3921		144	-46 1	154 7	25 5	82 5	128, 129	108 5- 9 5	142, pet eth	Hydrazide, 104, eth -al
57	Methyl n-valerate (Methyl n- pentanoate)	127 7	-91 0	1 397	0 885	116	-34 5	186 35	-97	64 65	106	74	108 (cor), al	
58	Isopropyl n- butyrate	128			0 8652 ¹³	130	-5 5, -8	162 5, 164	-89 5	82 4	115-6	75	123, pet eth	
59	Isobutyl chloro- formate	130, 128 8		1 40711 ^{17 9}		136 5				108 1			87	
60	Methyl methoxy- acetate	130		1 39636	1 0511	104		203	-97	64 65	96 5- 7 0, 92 4		108 (cor), al	
61	Methyl chloro- acetate	130, 132		1 4221	1 238	108 5	α 61 3, β 56 2, γ 52 5	189	-97	64 65	121	162	108 (cor), al	
62	Ethyl methoxy- acetate	132			1 0118 ¹⁵	118		203	-117 3	78 32	96 5 7 0, 92-4		93, al	
63	n-Amyl formate	132 1, 130	-73 5	1 39916	0 8853	116	8 4	100 7	-78 5	138 (cor)	2 55	53	46 4	
64	sec-Amyl(3) acetate (Diethyl- carbinyl acetate)	133			1 4005	130	16 6	118 2		116 1	82	153, 147	101, 99, 97	
65	sec-Amyl(2) acetate (Methyl n-propylcarbinyl acetate)	133 5		1 3960	0 8692 ¹⁸	130	16 6	118 2		119 85	82	153, 147	62	
66	Allyl isobutyrate	134				128	-46 1	154 7		97 1	128, 129	108 5 9 5	49-50	Hydrazide, 104, eth -al
67	Ethyl isovalerate	134 7	-99 3	1 4009	0 86565	130	-30 0	176 5	-117 3	78 32	135, 137	106-7	93, al	
68	n-Propyl iso- butyrate	135		1 3959	0 8843 ⁰	130	-46 1	154 7		97 1	128, 129	108 5 9 5	74, pet eth	Hydrazide, 104, eth -al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5-Di- nitro benzoate	Miscellaneous			
						Equiv alent	Acid		Alcohol							
							M P, °C	B P °C	M P °C					B P °C		
69	<i>n</i> -Butyl nitrate	136			1 048 ⁰	119			-90 2	117 6						
70	Methyl pyruvate	136 8 138, 134-7			1 154 ⁰	102	13 6	165d	-97	116 64 65	124 5 145	109 130	64, 62 5 108 (cor), al	2,4-Dinitro- phenylhyd- razone, 186 5 7 5 (cor), yel, diox-me al		
71	Methyl α-hy- droxyisobutyrate	137				118	79	212	-97	64 65		132 3, w	108 (cor), al			
72	Isobutyl pro- pionate	138, 137	-71 4	1 3975	0 8876 ⁰	130	-20 8	141		108 1	81, 81 3, 79	123-6	87			
73	Ethyl crotonate	138, 136 7 ⁷⁴⁹		1 42524	0 91752	114	72, w	189 (cor)	-117 3	78 32	159 60, bz	132, bz	93, al			
74	Allyl <i>n</i> -butyrate	142				128	-5 5 -8	162 5, 164		97 1	115-6	75	49 50			
75	Isoamyl acetate (3-Methylbutyl acetate)	142		1 40034	0 8674	130	16 6	118 2	-117	132	82	153, 147	61			
76	Isopropyl iso- valerate	142		1 3938 ²⁵	0 8538 ¹⁷	144	-30	176 5	-89 5	82 4	135 137	106 7	123, pet eth			
77	<i>n</i> -Propyl <i>n</i> -buty- rate	143 8	-95 2	1 4005	0 872	130	-5 5 -8	162 5 164		97 1	115 6	75	74, pet eth			
78	β-Methoxyethyl acetate (Ethylene glycol mono- methyl ether acetate, Methyl cellosolve acetate)	144			1 088	118	16 6	118 2		124 5	82	153 147				
79	Methyl bromo- acetate	144d			1 657	153	50	208	-97	64 65	91		108 (cor), al			
80	<i>n</i> -Butyl chloro- formate	145, 139		1 417 ^{* 4}	1 079	136 5			-90 2	117 6, 116			64, 62 5			
81	β-Chloroethyl acetate	145		1 4234	1 178	122 5	16 6	118 2		131	82	153, 147				
82	Methyl <i>d</i> - lactate	145 144 8		1 4144	1 0931	104	16 8, 18	122 ¹⁵	-97	64 65	78 5-9 0 (cor), bz-al (3 1)	107	108 (cor), al			
83	Ethyl chloro- acetate	145	-26	1 42274	1 158	122 5	α 61 3, β 56 2, γ 52 5	189	-117 3	78 32	121	162	93, al			
84	<i>tert</i> -Butyl <i>n</i> - butyrate	145-6 6		1 4001 ^{17 5}		144	-5 5, -8	162 5, 164	25 5	82 5	115-6	75	142, pet eth			
85	Triethyl ortho- formate (Ethyl- orthoformate)	145 5		1 3922	0 8909	148	8 4	100 7	-117 3	78 32	2 55	53	93, al			
86	Ethyl <i>n</i> -valerate (Ethyl <i>n</i> - pentanoate)	145 5	-91 2	1 40094	0 8739	130	-34 5	186 35	-117 3	78 32	106	74	93, al			
87	Ethyl α-chloro- propionate	146			1 087	136 5		186	-117 3	78 32	80	124	93, al	Phenylhydra- zide, 95		

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5-Di- nitro- benzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M P °C	B P °C	M P °C					B P °C
88	<i>n</i> -Butyl propionate	146.8	-89.6	1.4038 ¹⁵	1.401	130	-20.8	141	-90.2	117.6, 116	81, 81.3, 79	126, 123	64, 62.5	
89	Benzyl chloroacetate	147		1.5246 ¹⁸	1.2223 ¹	170.5	α 61.3, β 56.2, γ 52.5	189	-15.3	205.5	121	162	113	
90	Di-isopropyl carbonate (Isopropyl carbonate)	147.2 (cor)		1.3932	0.9162	146			-89.5	82.4			123, pet eth	
91	Methyl isobutylcarbinyl acetate	148			0.8805 ⁰	130	16.6	118.2	-97	64.65	82	153, 147	108 (cor), al	
92	Methyl ethoxyacetate	148			1.0112 ¹	118		206.7	-97	64.65	80.2	32, eth	108 (cor), al	
93	Isobutyl isobutyrate	148.6	-80.65	1.3999	0.87496 ⁰	144	-46.1	154.7		108.1	128, 129	108.5, 9.5	87	Hydrazide, 104, eth-al
94	<i>n</i> -Amyl acetate (<i>n</i> -Pentyl acetate)	149.25	-70.8	1.4031	0.8756	130	16.6	118.2	-78.5	138 (cor)	82	153, 147	46.4	
95	Ethyl α-hydroxyisobutyrate	150				132	79	212	-117.3	78.32		132.3, w	93, al	
96	Methyl glycolate	151.2			1.1677 ¹⁸	90	78.9, 80		-97	64.65	120 al- et ac	143, w	108 (cor), al	
97	Methyl <i>n</i> -caproate (Methyl <i>n</i> -hexanoate)	151.25	-71.0	1.405	0.88464	130	-3.9	205.35	-97	64.65	100.1	74.5	123, pet eth	
98	Isopropyl <i>n</i> -valerate (Isopropyl <i>n</i> -pentanoate)	153.5		1.4009	0.8579	144	-34.5	186.35	-89.5	82.4	106	74	61	
99	Isoamyl chloroformate	154		1.41916 ¹⁶	1.032 ¹⁵	150.5			-117	132			93, al	
100	Ethyl <i>d,l</i> -lactate	154.5		1.410	1.030	118	16.8, 18	122 ¹⁵	-117.3	78.32	78.5, 9.0 (cor), bz-al, (3.1)	107	93, al	
101	Ethyl pyruvate	155		0.0596 ^{15, 6}	1.408 ^{15, 6}	116	13.6	165d	-117.3	78.32	124.5, 145	109, 130	93, al	Phenylhydrazone, 118, dil al 4-Nitrophenylhydrazone, 185-7, 2,4-Dinitrophenylhydrazone, 154.5, 155 (cor), diox-al
102	<i>n</i> -Propyl isovalerate	155.5		1.40413 ^{17, 8}	0.8643 ^{17, 8}	144	-30	176.5		97.1	135, 137	106-7	74, pet eth	
103	<i>n</i> -Hexyl formate	155.51	-62.65	1.40898 ¹⁵	0.88133	130	8.4	100.7	-51.6, -46.1	157.5	2.55	53	58.4 (cor)	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Toluidide	3,5-Dinitrobenzoate	Miscellaneous	
						Equivalent	Acid		Alcohol					
							M P °C	B P °C	M P °C					B P °C
104	<i>β</i> -Ethoxyethyl acetate (Ethylene glycol monoethyl ether acetate, Ethyl cellosolve acetate)	156.2, 158		1.40292	0.9701	132	16.6	118.2		135	82	153, 147	75, al	
105	Isobutyl <i>n</i> -butyrate	157		1.40295 ^{18,4}	0.8620	144	-5.5 -8	162.5 164		108.1	115.6	75	87	
106	Ethyl dichloroacetate	158		1.43860	1.2821	157	5.6	194	-117.3	78.32	98 (subl)	153	93, al	
107	Ethyl bromoacetate	159		1.451	1.506	167	50	208	-117.3	78.32	91		93, al	
108	Ethyl glycolate	160			1.0869 ¹⁵	104	78.9 80		-117.3	78.32	120, al- et ac	143, w	93, al	
109	Isoamyl propionate	160.2		1.4065	0.870	144	-20.8	141	-117	132	81, 81.3 79	126 123	61	
110	Ethyl α -bromopropionate	162			1.524	181	25.7	203.5	-117.3	78.32	123	125	93, al	
111	Cyclohexyl formate	162.5 ⁷⁵⁰		1.443	1.010	128	8.4	100.7	25.1	161.1	2.55	53	112-3, al	
112	<i>β</i> -Bromoethyl acetate	163			1.524	167	16.6	118.2		149d	82	153, 147		
113	Tetraethyl silicate (Ethyl orthosilicate)	165.5, 168.5		1.38619	0.93975	52			-117.3	78.32			93, al	Gives SiO ₂ on hydrolysis
114	<i>n</i> -Propyl <i>n</i> -valerate (<i>n</i> -Propyl <i>n</i> -pentanoate)	166.2, 167	-70.7	1.4065	0.8699	144	-34.5	186.35		97.1	106	74	74, pet eth	
115	<i>n</i> -Butyl <i>n</i> -butyrate	166.6	-91.5	1.406	0.869	144	-5.5 -8	162.5, 164	-90.2	117.6 116	115.6	75	64, 62.5	
116	Ethyl <i>n</i> -caproate (Ethyl <i>n</i> -hexanoate)	167.7	-67.5	1.40727	0.8710	144	-3.9	205.35	-117.3	78.32	100.1	74.5	93, al	
117	Ethyl trichloroacetate	168		1.450	1.380	191.5	57.8	197.5	-117.3	78.32	141	113	93, al	Phenylhydrazide, 123
118	Isopropyl <i>d,l</i> -lactate	168, 166.8		1.4082 ²⁵	0.998	132	16.8, 18	122 ¹⁵	-89.5	82.4	78.5, 90 (cor), bz-al (3.1)	107	123, pet eth	
119	Di- <i>n</i> -propyl carbonate (<i>n</i> -Propyl carbonate)	168.5 (cor)		1.4014	0.9411	146				97.1			74, pet eth	
120	<i>n</i> -Amyl propionate (<i>n</i> -Pentyl propionate)	168.7	-73.1	1.4096 ¹⁵	0.8761 ¹⁵	144	-20.8	141	-78.5	138 (cor)	81, 81.3, 79	126, 123	46.4	
121	Ethylidene diacetate	169			1.061 ¹²	73	16.6	118.2	-12.6	197.85	82	153, 147	169	
122	Isoamyl isobutyrate	169			0.8760 ⁰	158	-46.1	154.7	-117	132	128, 129	108.5- 9.5	61	Hydrazide, 104, eth-al
123	Methyl acetoacetate	170		1.41964	1.0765 ⁰	116			-97	64.65			108 (cor), al	Semicarbazone, 152.5, me al
124	Isobutyl isovalerate	171		1.40569	0.8534	158	-30	176.5		108.1	135, 137	106.7	87	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Toluidide	3,5-Dinitrobenzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M P, °C	B P, °C	M P, °C					B P, °C
125	Methyl enanthate (Methyl <i>n</i> -heptanoate)	173.8	-55.8	1.412	0.88011	144	-74.7	223	-97	64.65	96.965	81	108 (cor), al	
126	Ethylene glycol diformate	174			1.193 ⁰	59	8.4	100.7	-78.5	138 (cor)	2.55	53	46.4	
127	sec-Butyl <i>n</i> -valerate (sec-Butyl <i>n</i> -pentanoate)	174.5		1.4081	0.8605 ²⁰	158	-34.5	108.35		99.5	106	74	76	
128	Cyclohexyl acetate	175		1.442	0.970	142	16.6	118.2	25.1	161.1	82	153, 147	112.3, al	
129	<i>n</i> -Butyl chloroacetate	175			1.081	150.5	α 61.3, β 56.2, γ 52.5	189	-90.2	117.6, 116	121	162	64, 62.5	
130	Furfuryl acetate	175.7		1.4627	1.118	140	16.6	118.2		172, 170	82	153, 147	80.1	
131	Methyl methylacetoacetate	177.4		1.418	1.030	130			-97	64.65			108 (cor), al	Semicarbazone, 138, al
132	<i>n</i> -Heptyl formate	178.12		1.41505 ¹⁵ He (yel)	0.87841	144	8.4	100.7	-34.6, -33.8	176.8	2.55	53	46.47	
133	<i>n</i> -Hexyl acetate	178.1	-80.9, -60.9	1.41122 ¹⁵ He (yel)	0.87336	144	16.6	118.2	-51.6, -46.1	157.5	82	153, 147	58.4 (cor)	
134	Isoamyl <i>n</i> -butyrate	178.6		1.411	0.864	158	-5.5, -8	162.5, 164	-117	132	115.6	75	61	
135	Ethyl β-bromopropionate	179			1.425	181	62.5		-117.3	78.32	111		93, al	2-Naphthylamide, 174
136	Ethyl acetyl-glycolate	179			1.0993 ¹⁷	73			-117.3	78.32			93, al	Hydrolysis → glycolic a + ac a + al
137	Isobutyl <i>n</i> -valerate (Isobutyl <i>n</i> -pentanoate)	179		1.4099	0.8625	158	-34.5	186.35		108.1	106	74	87	
138	β-Hydroxyethyl formate (Ethylene glycol monoformate)	180			1.1989 ¹⁵	90	8.4	100.7	-78.5	138 (cor)	2.55	53	46.4	
139	Ethyl methylacetoacetate	180.8 (cor), 187		1.419	1.0191	144			-117.3	78.32	73, eth		93, al	Anilide, 138-40, Semicarbazone, 194, 2,4-Dinitrophenyl hydrazone, 56-7
140	Ethyl acetoacetate	181		1.41976	1.025	130			-117.3	78.32			93, al	Semicarbazone, 129, 133, eth
141	Methyl pyromucate (Methyl 2-furoate)	181.3		1.4860	1.180	126	133.4, 132	230-2	-97	64.65	142-3	170.5, al	108 (cor), al	2,4-Dinitrophenylhydrazone, 93, 96, yel, al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Toluide	3,5-Di-nitrobenzoate	Miscellaneous	
						Equiv. alent	Acid		Alcohol					
							M P °C	B P °C	M P °C					B P °C
142	Dimethyl malonate (Methyl malonate)	181.5	-62	1.41398	1.1539	66	134.8	9	-97	64.65	mono 106 110 di- 170 w-al	mono 156d 252 3, al	108 (cor) al	Phenylhydrazide, 194
143	Ethyl β-methoxyethyl carbonate	182.6		1.4036 ²⁵	1.0424 ²⁵	148			-117.3	78.32			93 al	
144	Methyl cyclohexanecarboxylate (Methyl hexahydrobenzoate)	183		1.45372 ¹⁵	0.9954 ¹⁵	142	30.1	233	-97	64.65	185.6		108 (cor) al	
145	Diethyl oxalate (Ethyl oxalate)	185.19	-41.5, -40.6	1.41043	1.0785	73	189.5 (anh) 101 (+ 2H ₂ O)		-117.3	78.32	mono 219 di 419d	mono 169 di 268	93, al	N-(β-Aminoethyl)morpholide 170
146	n-Amyl n-butyrate (n-Pentyl n-butyrate)	186.4	-72.3	1.412	0.866	158	-5.5, -8	162.5 164	-78.5	138 (cor)	115-6	75	46.4	
147	n-Butyl n-valerate (n-Butyl n-pentanoate)	186.9	-92.8	1.4123	0.8678	158	-34.5	186.35	-90.2	117.6 116	106	74	64 62.5	
148	β-Hydroxyethyl acetate (Ethylene glycol monoacetate)	187-9				104	16.6	118.2	-78.5	138 (cor)	82	153 147	46.4	
149	n-Propyl n-caproate (n-Propyl n-hexanoate)	187.15 186	-74.0	1.417	0.86719	158	-3.9	205.35		97.1	100.1	74.5	74, pet eth	
150	Dimethyl sulfate (Methyl sulfate)	188	-27	1.3874	1.3348 ¹⁵	63			-97	64.65			108 (cor) al	
151	n-Butyl lactate	188	-43	1.4216	0.984 ²⁰ ₂₀	146	16.8, 18	122 ¹⁵	-90.2	117.6 116	78.5-9.0 (cor), bz-al (3.1)	107	64 62.5	
152	Ethyl enanthate (Ethyl n-heptanoate)	188.6	-66.3	1.413	0.86856	158	-7.47	223	-117.3	78.32	96, 96.5	81	93, al	
153	Methyl ethylacetate (cor)	189.7 (cor)			0.989	144			-97	64.65	95.6, bz		108 (cor) al	
154	Di-isobutyl carbonate (Isobutyl carbonate)	189.8 (cor)		1.4072	0.9138	174				108.1			87	
155	n-Hexyl propionate	190	-57.5	1.41621 ¹⁵ He (yel)	0.86980	158	-20.8	141	-51.6 -46.1	157.5	81, 81.3, 79	126 123	58.4 (cor)	
156	Ethylene glycol diacetate	190.2	-31	1.4150	1.1040	73	16.6	118.2	-78.5	138 (cor)	82	153, 147	46.4	
157	Isoamyl iso-valerate	190.4		1.41300 ^{18.7}	0.870	172	-30	176.5	-117	132	135, 137	106.7	61	
158	n-Heptyl acetate	192.45		1.41653 ¹⁵ He (yel)	0.87070 ¹⁵	158	16.6	118.2	-34.6, -33.8	176.8	82	153, 147	46, 47	
159	Cyclohexyl propionate	193 ⁷⁵⁰			0.9718 ⁹	156	-20.8	141	25.1	161.1	81, 81.3, 79	126, 123	112.3, al	

*Derivative data given in order m, p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5 Di- nitro- benzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M P, °C	B P, °C	M P, °C					B P, °C
160	Di-isopropyl oxalate (Iso-propyl oxalate)	193.4		1.4100	1.0097	87	189.5 (anh.), 101 (+ 2H ₂ O)		-89.5	82.4	mono 219, di 419d	mono 169, di 268	123, pet eth	
161	Ethyl β-ethoxyethyl carbonate	194.5		1.5064 ²⁵	1.0115 ²⁵	162			-117.3	78.32			93, al	
162	sec-Octyl acetate	194.5		1.4141	0.8606 ¹⁹	172	16.6	118.2		179	82	153, 147	32	
163	Methyl n-caprylate (Methyl n-octanoate)	194.6	-41	1.417	0.878	158	16.3	237, 239.3	-97	64.65	57	70	108 (cor), al	
164	α-Tetrahydrofurfuryl acetate	195, 194		1.4350	1.0624 ²⁵	144	16.6	118.2		177-8 ⁷⁴³	82	153, 147	83-4	
165	Methyl levulinate	196, 191		1.42333	1.04945	130	33.5	245-6	-97	64.65	107-8, al	108.9, w	108 (cor), al	Semicarbazone, 142-3, Phenylhydrazone, 94-6, 2,4-Dinitrophenylhydrazone, 141.5-2.5 (cor), diox-al, Oxime, 96
166	Ethyl cyclohexanecarboxylate (Ethyl hexahydrobenzoate)	196		1.45012 ¹⁵	0.9672 ¹⁵	156	30.1	233	-117.3	78.32	185.6		93, al	
167	Diethyl methylmalonate	196			1.019 ¹⁵	87	137, 138d		-117.3	78.32	217, 206	mono 145d, di 228, 214	93, al	
168	Phenyl acetate	196.7		1.503	1.078	136	16.6	118.2	41.8, 42	182	82	153, 147	145.8 (cor), al	
169	Ethyl ethylacetacetate	198		1.422	0.9856	158			-117.3	78.32	95.6, bz		93, al	Ketone cleavage → 2-pentanone, b p 102
170	n-Octyl formate	198.8	-39.1	1.42082 ¹⁵	0.87435	158	8.4	100.7	-16, -16.7	195	2.55	53	61-2	
171	2-Ethyl-1-hexyl acetate	199			0.8733 ³⁰	172	16.6	118.2		184.6	82	153, 147		
172	Methyl benzoate	199.2	-12.4	1.5164	1.0888	136	122.4	249	-97	64.65	130	158	108 (cor), al	
173	Diethyl malonate (Ethyl malonate) ...	199.3	-51.5	1.41618	1.05513	80	134.8.9		-117.3	78.32	mono 106, di 170, w-al	mono 156d, di 252-3, al	93, al	Phenylhydrazide, 194
174	Methyl cyanoacetate	200	-22.5		1.0962 ²⁵	99	66		-97	64.65	119.20		108 (cor), al	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Toluidide	3,5-Dinitrobenzoate	Miscellaneous	
						Equiv. valent	Acid		Alcohol					
							M P, °C	B P °C	M P °C					B P, °C
175	Dimethyl mesaconate	203		1.45119	1.0914	79	204.5 (cor)		-97	64.65	mono (α) 222 (β) 174, dt 176.5	mono (α) 196, dt 212, al	108 (cor), al	Dihydrazide, 215d, dil al
176	Benzyl formate	203		1.516	1.080	136	8.4	100.7	-15.3	205.5	2.55	53	113	
177	Vinyl benzoate	203		1.065	1.065	148	122.4	249			130	158		
178	Cyclohexyl isobutyrate	204 ⁷⁵⁰		0.9489 ⁰		170	-46.1	154.7	25.1	161.1	128.129	108.5	112-3, al	Hydrazide, 104, al-eth
179	Dimethyl maleate	204.4	7.6	1.44156	1.14513 ¹⁵	72	137		-97	64.65	mono 172.3, w, 153, sl d, dt 181, me al	dt, 142, eth	108 (cor), al	
180	α-Tetrahydrofurfuryl propionate	204-7			1.044	158	-20.8	141		177.8 ⁷⁴³	81.81379	126.123	83.4	
181	Ethyl levulinate	205.8		1.42288	1.01114	144	33.5	245-6	-117.3	78.32	107-8d	108-9, w	93, al	Semicarbazone, 147.8, Phenylhydrazone, 103-4, 2,4-Dinitrophenylhydrazone, 101.2, diox-al, Oxime, 96
182	Ethyl allylacetoacetate	206 sl d, 211-2 sl d		1.4317 ⁶	0.9898	170			-117.3	78.32			93, al	Semicarbazone, 125, w
183	n-Amyl n-valerate (n-Pentyl n-pentanoate)	207.4		1.4181 ¹⁵	0.8825 ⁰	172	-34.5	186.35	-78.5	138 (cor)	106	74	46.4	
184	Di-n-butyl carbonate (n-Butyl carbonate)	207.5 (cor)		1.4117	0.9238	174			-90.2	117.6, 116			64, 62.5	
185	n-Butyl n-caproate (n-Butyl n-hexanoate)	207.74	-63.1, -64.3	1.41877 ¹⁵ He (yel)	0.86530	172	-3.9	205.35	-90.2	117.6, 116	100-1	74.5	64, 62.5	
186	n-Hexyl n-butyrate	207.88	-78	1.41875 ¹⁵ He (yel)	0.86519	172	-5.5, -8	162.5, 164	-51.6, -46.1	157.5	115-6	75	58.4 (cor)	
187	2-Tolyl acetate ("o-Cresyl acetate")	208		1.048	1.048	150	16.6	118.2	31	191.2	82	153, 147	134.8 (cor), al	
188	Diethyl sulfate (Ethyl sulfate)	208		1.4010 ¹⁸	1.172 ²⁵	77			-117.3	78.32			93, al	
189	n-Propyl n-enanthate (n-Propyl n-heptanoate)	208	-64.8	1.41835 ¹⁵	0.86556	172	-7.47	223		97.1	96, 96.5	81	74, pet eth	
190	Ethyl n-caprylate (Ethyl n-octanoate)	208.35	α -43.1, β -59.2	1.41775	0.8667	172	16.3	237, 239.3	-117.3	78.32	110, 106	70	93, al	N-(β-Aminoethyl) morpholide, 59

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5-Di- nitro- benzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M P, °C	B P, °C	M P °C					B P °C
191	Isobutyl enanthate (Isobutyl <i>n</i> -heptanoate)	209			0.8593	186	-7.47	223		108.1	96.96.5	81	87	
192	Isopropyl levulinate	209.3		1.42088	0.98724	158	33.5	245.6		82.4	107.8d	108-9, w	123, pet eth	Semicarbazone, 141-2, Phenylhydrazone, 108.9, 2,4-Dinitrophenylhydrazone, 88-9 (cor.), 90.9
193	Trimethylene glycol diacetate (1,3-Diacetoxypropane)	210			1.069	80	16.6	118.2	-30	214.7 210.2	82	153 147	178	
194	<i>n</i> -Octyl acetate	210			0.8847 ^o	172	16.6	118.2	-16	195	82	153 147	61.2	
195	<i>n</i> -Heptyl propionate	210	-50.9	1.42605 ^{1,7} He (yel)	0.86786	172	-20.8	141	-34.6 -33.8	176.8	81.81.3 79	126 123	46.47	
196	Dimethyl citraconate	210.5		1.44856	1.11531	79	92.91d eth lgr	206	-97	64.65	100.1		108 (cor.), al	Dihydrazide, 177, w, 1-Naphthylamide, 169-70
197	<i>n</i> -Propyl pyromucate (<i>n</i> -Propyl 2-furoate)	211		1.4737 ^{25.9}	1.0745 ^{25.9}	154	133-4, 132	230.2		97.1	142.3	170.5, al	74, pet eth	
198	Ethylene glycol dipropionate	211			1.0544 ^{1,5}	87	-20.8	141	-78.5	138 (cor) 79	81, 81.3, 126	126 123	46.4	
199	Cyclohexyl <i>n</i> -butyrate	212 ⁷⁵⁰			0.9572 ^o	170	-5.5, -8	162.5, 164	25.1	161.1	115.6	75	112-3, al	
200	3-Tolyl acetate ("m-Cresyl acetate")	212	12	1.4978	1.049	150	16.6	118.2	11.95	202.7	82	153, 147	164.5 (cor), al	
201	Ethyl aceto-pyruvate	213.5		1.4757 ¹⁷	1.1251	158	101, bz		-117.3	78.32	131.2d, al		93, al	
202	Ethyl benzoate	212.4 213.2	-34.7	1.50570	1.04684	150	122.4	249	-117.3	78.32	130	158	93, al	N-(β-Aminoethyl) morpholide, 123.4
203	4-Tolyl acetate ("p-Cresyl acetate")	212.5		1.500	1.051	150	16.6	118.2	36	202	82	153 147	188.6 (cor), al	
204	Di- <i>n</i> -propyl oxalate (<i>n</i> -Propyl oxalate)	213.9	-51.7	1.4168	1.0169	87	189.5 (anh), 101 (+2 H ₂ O)			97.1	mono 219, di 419d	mono 169, di 268	74, pet eth	NH ₂ , OH → Di- <i>n</i> -propyl oxamate, 90-2, me al
205	Methyl pel-argonate	214, 213-4			0.892	172	12.3	254.4	-97	64.65	99	84	108 (cor), al	
206	Dimethyl glutarate	214 ⁷⁶¹	-34.7	1.42415	1.0874	80	98	302.4	-97	64.65	di 175	di 218	108 (cor), al	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5-Di- nitro- benzoate	Miscellaneous	
						Equiv alent	Acid		Alcohol					
							M P, °C	B P, °C	M P, °C					B P, °C
207	2,6-Dimethyl-phenyl acetate (vic-m-Xylenyl acetate)	214-6				164	16 6	118 2	49	203	82	153, 147	158 8 (cor), al	
208	Methyl 2-toluate (Methyl 2-methylbenzoate)	215			1 068	150	104-5, 107 8	259 ⁷⁵¹	-97	64 65	142 8 (cor)	144	108 (cor), al	
209	Benzyl acetate	217		1 5200	1 055	150	16 6	118 2	-15 3	205 5	82	153, 147	113 N-(β-Aminoethyl) morpholide, 95 2	
210	Diethyl succinate	217 25	-20 8	1 41975	1 0398	87	185 182 8	235d	-117 3	78 32	mono 157, di 260d, w	mono 179 80, di 254 5-5 5, 260	93, al	N-(β-Aminoethyl) morpholide, 174
211	Diethylene glycol monoethyl ether acetate	218			1 013	176	16 6	118 2		198	82	153, 147	oil	
212	Diethyl fumarate	218 4, 213-4	0 55	1 44103	1 052	86	286 7 (sealed tube), 233-5, 200, subl		-117 3	78 32	mono 270, 300-2, subl, di 266d	mono 233 0-4 5, di 313 4, ac a	93, al	
213	Isopropyl benzoate	218 5		1 4890 ²⁵	1 013	164	122 4	249	-89 5	82 4	130	158	123, pet eth	
214	Methyl phenylacetate	220		1 507	1 068	150	76 5, subl	256 5 (cor)	-97	64 65	156	135-6	108 (cor), al	
215	l-Linalyl acetate	220		1 4460	0 8951	196	16 6	118 2		199	82	153, 147	[α] _D -3 to -17, 4-Nitrobenzoate, 70	
216	Methyl 3-toluate (Methyl 3-methylbenzoate)	221, 215			1 061	150	111 3, 110-1	263, subl	-97	64 65	94, 97	118	108 (cor), al	
217	n-Propyl levulinate	221 2		1 42576	0 98955	158	33-5	245 6		97 1	107-8d	108-9, w	74, pet eth	Semicarbazone, 129-30, Hydrazone, 88-90, Phenylhydrazone, 67-8 (cor), al, Oxime, 96
218	Diethyl d,l-tartronate	222-5d			1 152 ¹⁵	88	156-8d		-117 3	78 32	di 198, dil al, 195-6d		93, al	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p Toluide	3,5-Di nitro benzoate	Miscellaneous	
						Equiv alent	Acid		Alcohol					
							M P °C	B P °C	M P °C					B P °C
219	Diethyl maleate	222.7	-17	1.44156	1.066	86	137		-117.3	78.32	mono 172.3, w 152.3 sl d di 181, me al	di 142, eth	93, al	
220	Methyl salicylate	224		1.5369	1.184	152	158.3		-97	64.65	142, 139	156	108 (cor), al 93, al	
221	Ethyl <i>n</i> -butoxyethyl carbonate	224		1.4143 ²	0.9756 ²⁵	190			-117.3	78.32			93, al	
222	sec-Butyl levulinat	225.8		1.42495	0.96698	172	33.5	245.6		99.5	107.8d	108.9, w 75	76	Oxime, 96
223	<i>n</i> -Heptyl <i>n</i> -butyrate	225.87	-57.5	1.42279 ¹⁵ He (yel)	0.86371	186	-5.5 -8	162.5, 164	34.6 -33.8	176.8	115.6	75	46.47	
224	2,4-Dimethylphenyl acetate (unsym- <i>m</i> -Xylenyl acetate)	226 (cor)		1.4990 ¹⁵	1.0298 ^{15, 5}	164	16.6	118.2	27	211.5 (cor)	82	153, 147	164.6 (cor), 95°, al 108 (cor), al 46.4	
225	Methyl <i>n</i> -caprate (Methyl <i>n</i> -decanoate)	226		1.426	0.873	186	31.5	268.70	-97	64.65	108, 100.1	78	108 (cor), al 64.5	
226	<i>n</i> -Amyl <i>n</i> -caproate (<i>n</i> -Pentyl <i>n</i> -hexanoate)	226.16	-50, -47	1.42280 ¹⁵ He (yel)	0.86349	186	-3.9	205.35	-78.5	138 (cor)	100.1	74.5	46.4	
227	<i>n</i> -Butyl <i>n</i> -enanthate (<i>n</i> -Butyl <i>n</i> -heptanoate)	226.2		1.42280 ¹⁵	0.86382	186	-7.47	223	-90.2	117.6, 116	96.96.5	81	64.5	
228	<i>n</i> -Hexyl <i>n</i> -valerate (<i>n</i> -Hexyl <i>n</i> -pentanoate)	226.3	-63.1	1.42286 ¹⁵	0.86345	186	-34.5	186.35	-51.6 -46.1	157.5	106	74	58.4 (cor)	
229	<i>n</i> -Propyl <i>n</i> -caprylate (<i>n</i> -Propyl <i>n</i> -octanoate)	226.43	-46.2	1.42351 ¹⁵ He (yel)	0.86591	186	16.3	237 239.3		97.1	110.106	57	74, pet eth	
230	Ethyl 2-toluate (Ethyl 2-methyl benzoate)	227		1.507 ^{21, 6}	1.0325 ^{21, 5}	164	104-5, 107.8	259 ⁷⁵¹	-117.3	78.32	142.8 (cor)	144	93, al	
231	Ethyl pelargonate	227	α -55.0, β -36.7	1.42200	0.8657	186	12.3	254.4	-117.3	78.32	99	84	93, al	N-(β-Aminoethyl) morpholide, 61.3
232	<i>l</i> -Menthyl acetate	227			0.9185	198	16.6	118.2	43	216	82	153, 147	153	
233	Ethyl phenylacetate	227.5		1.49921 ^{18, 6}	1.0333	164	76.5, subl	256.5 (cor)	-117.3	78.32	156	135-6	93, al	N-(β-Aminoethyl) morpholide, 88.9
234	<i>n</i> -Octyl propionate	227.9	-41.6	1.42185 ¹⁷ He (yel)	0.86633	186	-20.8	141	-16, -16.7	195	81, 81.3, 79	126, 123	61-2	
235	Diethyl itaconate	228		1.4377	1.0467	93	165		-117.3	78.32	di 191.2-8, al		93, al	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5-Di- nitro- benzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M.P., °C	B.P., °C	M.P., °C					B.P., °C
236	Diethyl mesa- conate	229		1.4488	1.0453	93	204.5 (cor), subl		-117.3	78.32	mono (α) 222 (β) 174 di 176.5	mono (α) 196 di 212, al	93, al	
237	Di-isobutyl oxalate (Isobutyl oxalate)	229		1.4180	0.97373	101	189.5 (anh), 101 (+2 H ₂ O)			108.1	mono 219 di 419d	mono 169 di 268	87	
238	Allyl benzoate	230		1.0674	1.0578 ¹⁵	162	122.4	249		97.1	130	158	49, 50	
239	Isobutyl levulinate	230.9		1.42677	0.96770	172	33.5	245.6		108.1	107.8d	108.9, w	87	Semicarba- zone, 112, 3, Phenylhyd- razone, 84, 6, 2,4-Dinitro- phenylhyd- drazone, 55, 6, Oxime, 96
240	n-Propyl benzoate	231		1.500	1.023	164	122.4	249		97.1	130	158	74, pet eth	
241	Diethyl citra- conate	231		1.4442	1.0491	93	92d, eth lgr	206.11 sl d	-117.3	78.32	100.1		93, al	1-Naphthyl- amide, 169- 70
242	Methyl 3-chloro- benzoate	231				170.5	158, 155		-97	64.65	134		108 (cor), al	
243	β-Phenylethyl acetate	232, 224		1.5108	1.057 ^{22, 5}	164	16.6	118.2	-25.8	219.8	82	153 147	108	
244	Ethyl β-(2-furyl) acrylate	232	14	1.5286	1.0891 ¹⁵	166	141	286	-117.3	78.32	168.9, w		93, al	
245	Di-(β-methoxy- ethyl) carbonate	232		1.4193 ²⁰	1.0936 ²⁵	178				124.5				
246	Di-isoamyl car- bonate	233 (cor)		1.4174	0.9067	202			-117	132			61	
247	Diethyl glutarate	233.66	-23.8	1.02229	1.42395	94	98	302-4	-117.3	78.32	di 175-6	di 218	93, al	N-(β-Amino- ethyl) mor- pholide, 152, 7
248	Ethyl 3-toluate	234		1.505 ^{21, 4}	1.0265 ^{21, 4}	164	111.3, 110.1	263, subl	-117.3	78.32	94, 97	118	93, al	
249	Ethyl salicylate	234		1.52542	1.1396	166	158.3, subl at 76		-117.3	78.32	142, 139	156	93, al	
250	Methyl 2-chloro- benzoate	234				170.5	142, 144		-97	64.65	142, 202	131	108, (cor), al	
251	Ethyl 4-toluate	234.5		1.5089 ^{18, 2}	1.0269 ^{18, 2}	164	179.80, subl	275 (cor)	-117.3	78.32	160, 158	160, 165	93, al	
252	Diethyl bromo- malonate	235		1.4261 ₂		239	113d		-117.3	78.32	di 181, al	di 217, ac a	93, al	

* Derivative data given in order: m.p., crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Toluide	3,5-Di-nitrobenzoate	Miscellaneous	
						Equivalent	Acid		Alcohol					
							M.P., °C	B.P., °C	M.P., °C					B.P., °C
253	Ethylene glycol di-n-butylate	235-77 ¹⁰		1.42619 ^{He}	1.0005	101	-5.5, -8	162.5, 164	-78.5	138 (cor)	115.6	75	46.4	
254	Diethyl butylmalonate	235-40			1.425	101			-117.3	78.32	di 200		93, al	
255	2,4,6-Trimethylphenyl acetate (Mesityl acetate)	236				178	16.6	118.2	70, 69	220	82	153, 147		
256	2,5-Dimethylphenyl acetate (p-Xylenyl acetate)	237 ⁶⁸			1.0264 ¹⁵	164	16.6	118.2	74.5	212	82	153, 147	137.2 (cor), al	
257	n-Butyl levulinate	237.8		1.42905	0.97353	172	33.5	245-6	-90.2	117.6, 116	107.8d	108-9, w	64, 62.5	Semicarbazone, 102-3, Phenylhydrazone, 79.81, 2,4-Dinitrophenylhydrazone, 65.8, Oxime, 96
258	Benzyl n-butyrate	238-40			1.033 ¹⁶	178	-5.5, -8	162.5, 164	-15.3	205.5	115-6	75	113	
259	Methyl hydrocinnamate (Methyl β-phenylpropionate)	239			1.0455 ⁹	164	48.7, 40	279-80 (cor)	-97	64.65	105, 82	135	108 (cor), al	
260	n-Propyl salicylate	239, 249-51		1.51610	1.0979	180	158.3			97.1	142, 139	156	74, pet eth	
261	Guaiacol acetate (2-Methoxyphenyl acetate)	240		1.5101 ²⁵	1.1285 ²⁵	166	16.6	118.2	32, 28.2	205	82	153, 147	141.2 (cor), al	
262	Isopropyl salicylate	240-2, 237		1.50650	1.0729	180	158.3, subl at 76		-89.5	82.4	142, 139	156	123, pet eth	
263	Dimethyl l-malate	242		1.4425	1.2334	81	100-1		-97	64.65	di 156-7	di 206-7	108 (cor), al	[α] _D ²⁰ -6.85
264	Geranyl acetate	242		1.4660	0.9174 ¹⁵	196	16.6	118.2		230	82	153, 147	62-3	
265	Isobutyl benzoate	242.2 (cor)			0.999	178	122.4	249		108.1	130	158	87	
266	Di-n-butyl oxalate (n-Butyl oxalate)	243, 245.5	-29.6	1.4240	0.98732	101	189.5 (anh), 101 (+ 2H ₂ O)		-90.2	117.6, 116	mono 219, di 419d	mono 169, di 268	64, 62.5	
267	Methyl 2-bromobenzoate	244				215	150		-97	64.65	155		108 (cor), al	
268	n-Octyl n-butyrate	244.1	-55.6	1.42674 ¹⁵ He (yel)	0.86288	200	-5.5, -8	162.5, 164	-16, -16.7	195	115.6	75	61.2	
269	Ethyl n-caprate (Ethyl n-decanoate)	244.9	β -20, γ -30.6	1.42575	0.8650	200	31.5	268.70	-117.3	78.32	108, 100.1	78	93, al	N-(β-Aminoethyl) morpholide, 60.1

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Toluene	3,5-Dinitrobenzoate	Miscellaneous	
						Equiv. valent	Acid		Alcohol					
							M.P. °C	B.P. °C	M.P. °C					B.P. °C
270	Diethyl adipate	245, 133.8 ¹⁵	-21	1.42765	1.0090	101	153-4 (cor)	216 ¹⁵	-117.3	78.32	mono 125, 30, w, di 220	241	93, al	N-(β-Aminoethyl) morpholide 165
271	Methyl phenoxyacetate	245			1.1501 ^{7, 5}	166	98.9	285d	-97	64.65	101.5		108 (cor), al	
272	Thymyl acetate	245			1.009 ⁰	192	16.6	118.2	51.5	233.5	82	153, 147	103.2 (cor), al	
273	Carvacryl acetate	245 (cor)		1.49128 ²⁸	0.98959 ²⁵	192	16.6	118.2	1	237.5	82	153, 147	83	
274	Diethylene glycol diacetate (β,β'-Diacetoxy diethyl ether)	245.51, 148 ²⁶		1.4348	1.10781 ⁵	95	16.6	118.2	-10.45	244.5	82	153, 147	149 ac a	
275	n-Butyl n-caprylate (n-Butyl n-octanoate)	245.02	-41.9, -43	1.42647 ¹³	0.86278	200	16.3	237	-90.2	117.6, 116	110, 106	70	64, 62.5	
276	n-Heptyl n-valerate (n-Heptyl n-pentanoate)	245.2	-46.4	1.42536 ¹⁵	0.86225	200	-34.5	186.35	-34.6, -33.8	176.8	106	74	46, 47	
277	n-Amyl n-enanthate (n-Pentyl n-heptanoate)	245.4	-49.5	1.42627 ¹³	0.86232	200	-7.47	223	-78.5	138 (cor)	96, 96.5	81	46.4	
278	n-Hexyl n-caproate (n-Hexyl n-decanoate)	245.4	-55.25	1.42637 ¹³	0.86216	200	-3.9	205.35	-51.6, -46.1	157.5	100.1	74.5	58.4 (cor)	
279	Di-(β-ethoxyethyl) carbonate	245.5		1.4239 ²⁵	1.0635 ²⁵	206				135			75, al	
280	Diethylene glycol monobutyl ether acetate	246			0.983	204	16.6	118.2		228-30	82	153, 147		
281	Isobutyl phenylacetate	247			0.999 ¹⁸	192	76.5 (cor)	256.5 (cor)		108.1	156	135-6	87	
282	Ethyl hydrocinnamate (Ethyl β-phenylpropionate)	247.2			1.0147	178	40, 48.7	279-80 (cor)	-117.3	78.32	105, 82	135	93, al	
283	Di-n-propyl succinate	248, 246	-10.4	1.4252	1.011	101	185, 182.8	235d		97.1	mono 157, di 260d, w	mono 179, 80, di 254.5, 55, 260	74, pet eth	
284	Methyl 2-methoxybenzoate	248		1.534 ^{19, 5}	1.1571 ¹⁹	166	100.1	200	-97	64.65	129		108 (cor), al	
285	Methyl undecylenate (Methyl hendecylenate)	248	-27.5	1.43928	0.889 ¹⁵	198	24.5	275	-97	64.65	87		108 (cor), al	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu-dide	3,5-Di-nitro-benzoate	Miscellaneous	
						Equiv-alent	Acid		Alcohol					
							M P, °C	B P °C	M P °C					B P °C
286	Isoamyl levulinate	248.8		1.43102	0.96136	186	33.5	245.6	-117	132	107.8d	108.9, w	61	Semicarba- zone, 91-2, Phenylhyd- razone, 70.2, 2,4-Dinitro- phenylhyd- razone, 50.5 Oxime, 96
287	Diethyl acetone-dicarboxylate	250d			1.113	101	135		-117.3	78.32			93, al	Dianilide, 155, bz, Semicarba- zone, 94.5, Cu(OAc) ₂ → Cu enolate, 142.3, grn bz
288	n-Butyl benzoate	250.3	-22.4		1.000	178	122.4	249	-90.2	117.6, 116	130	158	64 62.5	
289	Ethyl phenoxy-acetate	251			1.104 ^{17.5}	180	98-9	285d	-117.3	78.32	101.5		93, al	
290	Methyl 3-methoxybenzoate	252		1.52236	1.131	166	109-10		-97	64.65			108 (cor), al	α-Phenyl- ethylamide, 128.6, 9.0, Benzyl- amide, 111.8, 2.8
291	Diethyl l-malate	253		1.4362	1.1290	95	100-1		-117.3	78.32	dl 156.7	dl 206.7	93, al	[α] _D ²⁰ -10.18
292	n-Amyl levulinate (n-Pentyl levulinate)	253.4		1.43192	0.96136	186	33.5	245.6	-78.5	138 (cor)	107.8d	108.9, w	46.4	2,4-Dinitro- phenylhyd- razone, 84.2, Oxime, 96
293	n-Butyl phenyl-acetate	254		1.489	0.994	192	76.5, subl 122.4	256.5 (cor) 249	-90.2	117.6, 116	156	135.6	64, 62.5	
294	β-Methoxyethyl benzoate (Methyl "cellosolve" benzoate)	255		1.5040 ²⁵	1.0891 ²⁵	180				124.5	130	158		4-Nitro- benzoate, 50.5, dil al
296	Diethyl pimelate	255	-23.8	1.42985	0.9929	108	105	223 ¹⁵	-117.3	78.32	dl 175	dl 206, al	93, al	N-(β-Amino- ethyl) mor- pholide, 137.9
297	Ethyl benzoyl-formate	256-7		1.5190 ²⁵	1.222 ²⁵	178	66		-117.3	78.32	91		93, al	Phenylhyd- razone, 64, 2,4-Di- nitro- phenylhyd- razone, 196.7d (cor)

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	ρ Toluide	3,5-Di-nitrobenzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M P °C	B P °C	M P °C					B P °C
298	Glyceryl triacetate	258			1.161 ¹⁵	72.7	16.6	118.2	17.9	290d	82	153 147	Tris-4-nitrobenzoate, 188	
299	Ethyl 3-methoxybenzoate	260		1.5161	1.0993	180	109.10		-117.3	78.32		93, al	Benzylamide, 111.8 2,8,α-Phenylethylamide, 128.6-9.0	
300	β-Ethoxyethyl benzoate ("Cello-solve" benzoate)	260-173 ⁵		1.4969 ²⁵	1.0585 ²⁵	194	122.4	249		135	130	158	75, al	
301	Isobutyl salicylate	260.2		1.50872	1.0639	194	158.3, subl at 76			108.1	142, 139	156	87	
302	n-Amyl n-caprylate (n-Pentyl n-octanoate)	260.21	-34.8	1.43019 ¹⁵ He (yel)	0.86132	214	16.3	237 239.3	-78.5	138 (cor)	110, 106	70	46.4	
303	n-Hexyl n-enanthate (n-Hexyl n-heptanoate)	260.9	-47.9	1.42939 ¹ He (yel)	0.86114	214	-7.47	223	-51.6, -46.1	157.5	96.96.5	81	58.4 (cor)	
304	n-Heptyl n-caproate (n-Heptyl n-hexanoate)	260.97	-34.4	1.42934 ¹⁵ He (yel)	0.86115	214	-3.9	205.35	-34.6, -33.8	176.8	100.1	74.5	46.47	
305	Ethyl 2-methoxybenzoate	261		1.5224	1.1124	261	100.1	200	-117.3	78.32	129		93, al	
306	n-Octyl n-valerate (n-Octyl n-pentanoate)	261.1	-42.5	1.42743 ¹⁵ He (yel)	0.86148	214	-34.5	186.35	-16 -16.7	195	106	74	61.2	
307	Isoamyl benzoate	262.3		1.4950	1.004	192	122.4	249	-117	132	130	158	61	
308	Dimethyl d-camphorate	263		1.46334 ^{16.9}	1.0747	114	187.5 8.0		-97	64.65	mono (α-amide β-acid), 176, (β-amide- α-acid), 182.3, di 192-3	α 212.4, β 190-6	108 (cor), al	
309	Ethyl undecylenate (Ethyl hendecylenate)	264		1.4449 ²³	0.88271 ¹⁵	212	24.5	275	-117.3	78.32	87		93, al	
310	Isobutyl succinate	265		1.427	0.974	115	185, 182.8	235d		108.1	mono 157, di 260d, w	mono 179 80, di 254.5 5.5, 260	87	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5-Di- nitro- benzoate	Miscellaneous		
						Equiv- alent	Acid		Alcohol						
							M P, °C	B P °C	M P °C					B P, °C	
311	Ethyl benzoyl- acetate	265 sl d, 270 d		1.5498	1.116	192			-117.3	78.32			93, al	Ketone cleavage → aceto- phenone, m p 19.65, b p 202	
312	Di-isoamyl oxa- late (Isoamyl oxalate)	267.8, 262		1.427	0.961	115	189.5 (anh) 101 (+ 2H ₂ O)		-117	132	mono 219, di 419d	mono 169, di 268	61		
313	Dimethyl suberate	268	-5	1.43326	1.0198	101	144, 139-41		-97	64.65	mono 125.7, di 216.7	di 218, 219	108 (cor), al		
314	Methyl laurate	268		1.432	0.870	214	44, 42	299	-97	64.65	100, 99	87	108 (cor), al	β-Naphthol → β- naphthyl methyl ether, 72	
315	Ethyl 4-methoxy- benzoate (Ethyl anisate)	269	7	1.5254	1.1038	180	184.6, 184.2 (cor)	275.80	-117.3	78.32	167, 162.3, w	186	93, al	N-(β-Amino- ethyl) mor- pholide, 130.6	
316	Ethyl laurate	269	-1.7	1.4321	0.8671 ₁₈	228	44, 42	299	-117.3	78.32	100, 99	87	93, al		
317	Trimethyl aconitate	270				72	194-5 (cor) d		-97	64.65	tri turns br at 250, sinters at 260		108 (cor), al		
318	n-Butyl salicylate	270-2, 268		1.51148	1.0728	194	158.3, subl at 76		-90.2	117.6, 116	142, 139	156	64, 62.5		
319	Ethyl cinnamate	271	6.70	1.55982	1.0490	176	133	300	-117.3	78.32	147-8	168	93, al	N-(β-Amino- ethyl) mor- pholide, 121.9	
320	Di-n-butyl suc- cinate	274.5	-29.3	1.4298	0.9760	115	185, 182.8	235d	-90.2	117.6, 116	mono 157, di 260d, w	mono 179 80, di 254.5 -5.5, 260	64, 62.5		
321	Ethyl 2-nitro- benzoate	275	30			195	146		-117.3	78.32	176		93, al		
322	Triethyl aconitate	275d		1.45562	1.1064	86	194-5 (cor)		-117.3	78.32	tri turns br at 250, sinters at 260		93, al		
323	Di-isopropyl d- tartarate	275			1.1274	117	169.71		-89.5	82.4	mono 171-2, di 196d, al		123, pet eth	[α] _D ²⁰ +14.886, Phenylhyd- razide, 240	
324	Ethyl 4-ethoxy- benzoate	275			1.076 ²¹	194	198, 195-6		-117.3	78.32	202		93, al	Hydrazide, 126-7, al	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p Toluide	3,5-Di-nitrobenzoate	Miscellaneous	
						Equiv alent	Acid		Alcohol					
							M P °C	B P °C	M P °C					B P °C
325	<i>n</i> -Octyl <i>n</i> -caproate (<i>n</i> Octyl <i>n</i> hexanoate)	275.2	-28.4	1.43256 ¹⁵ He (yel)	0.86032	228	-3.9	205.35	-16 -16.7	195	100.1	74.5	61.2	
326	Isoamyl salicylate	276.8		1.50799	1.0535	208	158.3 subl at 76		-117	132	142.139	156	61	
327	<i>n</i> -Heptyl <i>n</i> -enan- thate (<i>n</i> Heptyl <i>n</i> heptanoate)	277.2	-33.3	1.43183 He (yel)	0.86039	228	-7.47	223.0	-34.6 -33.8	176.8	96.965	81	46.47	
328	<i>n</i> -Hexyl <i>n</i> - caprylate (<i>n</i> Hexyl <i>n</i> octanoate)	277.44	-30.6	1.43230 ¹ He (yel)	0.86033	228	16.3	237 239.3	-51.6 -46.1	157.5	110.106	70	58.4 (cor)	
329	Resorcinol di- acetate	278 sl d			1.179	97	16.6	118.2	110 (stab) 108 8.5 (labile)	280.8 (cor)	82	153 147	di 201	
330	Diethyl suberate	282	5.9	1.43236	1.9807	115	144 139.41		-117.3	78.32	mono 125.7 di 216-7	di 218-9	93 al	N-(β-Amino-ethyl) mor- pholide, 157.2
331	Resorcinol mono- acetate	283				152	16.6	118.2	110 (stab) 108- 8.5 (labile)	280.8 (cor)	82	153 147	di 201	
332	Dimethyl phthalate (Methyl phthal- ate)	283.8		1.5138	1.191	97	200.6 191 (sealed tube)		-97	64.65	mono 149 di 220	mono 150 (slow htng) 160.5 (rapid htng)	108 (cor) al	
333	Diethyl iso- phthalate	286 ⁷³³	11.5			111	348 (subl)		-117.3	78.32	mono 280 di 280		93 al	
334	Diethyl <i>d</i> -cam- phorate	286		1.45354 ^{26 2}	1.0298	128	187.5- 8.0		-117.3	78.32	mono (α amide β- acid) 176 (β amide- α- acid) 182.3, di 192.3	α 212- 4 β 190-6	93, al	
335	Glyceryl tri- propionate	289			1.083 ¹⁹	86.7	-20.8	141	17.9	290d	81.813, 79	126 123		Tris-4-nitro- benzoate, 188

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Toluidide	3,5-Dinitrobenzoate	Miscellaneous	
						Equiv. valent	Acid		Alcohol					
							M P °C	B P °C	M P °C					B P °C
336	Diethyl phthalate (Ethyl phthalate)	289.5, 298		1.5019	1.1175	111	200.6, 191 (sealed tube)		-117.3	78.32	mono 149, di 220	mono 150 (slow htng), 160.5 (rapid htng)	93, al	
337	n-Heptyl n-caprylate (n-Heptyl n-octanoate)	290.6	-10.2	1.43492 ¹ He (yel)	0.85958	242	16.3	237, 239.3	-34.6, -33.8	176.8	110, 106	70	46, 47	
338	n-Octyl n-enanthate (n-Octyl n-heptanoate)	290.8	-21.5	1.43488 ¹ He (yel)	0.85961	242	-7.47	223.0	-16, -16.7	195	96, 96.5	81	61.2	
339	Diethyl azelate	291	-18.5	1.43509	0.97294	122	106.5	>360 sl d 237 ¹⁵	-117.3	78.32	mono 93.5, di 175	di 201-2	93, al	N-(β-Aminoethyl) morpholide, 141.3
340	Triethyl citrate	294		1.44554	1.1369	92	153 (anh) 100 (+1 H ₂ O)		-117.3	78.32	tri 210 Sd, w	tri 189, al	93, al	
341	Ethyl myristate	295	α 11.9 β 12.3	1.4362	0.8573 ²⁵	256	53.9	202 ¹⁶	-117.3	78.32	103	93	93, al	N-(β-Aminoethyl) morpholide, 76
342	Di-n-propyl d-tartarate	297			1.1390	117	169.71			97.1	mono 171-2, di 196d, al		74, pet eth	[α] _D ²⁰ +12.00, Phenylhydrazide, 240
343	Isoamyl succinate	297		1.434	0.958	129	185, 182.8	235d	-117	132	mono 157, di 260d, w	mono 179-80, di 254.5, 5.5, 260	61	
344	Di-(β-n-butoxyethyl) carbonate	297.8		1.4279 ²⁵	0.9766 ⁶⁵	262					170.6 ⁷⁴³			
345	Diethyl benzylmalonate	300			1.077 ¹⁵	125	117d		-117.3	78.32	225		93, al	
346	α-Tetrahydrofurfuryl benzoate	300.2 ⁵⁰			1.137 ²⁰	206	122.4	249		177.8 ⁷⁴³	130	158	83-4	
347	Di-isopropyl phthalate (Iso-propyl phthalate)	302			1.065 ¹⁹	115	200.6, 191 (sealed tube)		-89.5	82.4	mono 149, di 220	mono 150 (slow htng), 160-5 (rapid htng)	123, pet eth	
348	n-Octyl n-caprylate (n-Octyl n-octanoate)	306.8	-15.1	1.43698 ¹⁵ He (yel)	0.85919	256	16.3	237, 239.3			110, 106	70	61.2	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

Including esters of inorganic acids

a) Liquids. 1) (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D ²⁰	D ₄ ²⁰	Equiv- alent	Saponification				Amide	p-Tolui- dide	3,5-Di nitro- benzoate	Miscellaneous
							Acid		Alcohol					
							M P, °C	B P °C	M P, °C	B P °C				
349	Diethyl sebacate	307	1 3	1 43657	0 9631	129	33, subl	243 ¹⁵	-117 3	78 32	mono 170 di 210, 208	di 201	93, al	
350	2-Tolyl benzoate ("o-Cresyl" benzoate)	307			1 114 ¹⁹	212	122 4	249	31	191 2	130	158	138 4 (cor), al	
351	Ethyl 1-naph- thoate	309			1 1274 ¹³	200	161 2 (cor)		-117 3	78 32	202 205		93, al	
352	Glyceryl tri- butyrate	318			1 033 ¹	100 7	-5 5 -8	162 5, 164	17 9	290d	115 6	75		Tris-4-nitro- benzoate, 188
353	Di-n-butyl d,l- tartarate (Di-n- butyl racemate)	320			1 0879 ¹⁸	131	205 6 (anh), 203-4 (+1 H ₂ O)		-90 2	117 6, 116	di 226, w-me al		64, 62 5	Dianilide, 235-6
354	Benzyl salicylate	320				228	158 3, subl at 76		-15 3	205 5	142, 139	156	113	
355	Di-n-butyl phthalate (n Butyl phthalate)	340 7		1 4900	1 047 ²⁰	139	200 6, 191 (sealed tube)		-90 2	117 6, 116	mono 149, di 220	mono 150 (slow htng), 160 5 (rapid htng)	64, 62 5	N-(β-Amino- ethyl) mor- pholide, 124
356	Di-n-butyl sebacate	345			0 9329 ¹⁵	157	133, subl	243 ¹⁵	-90 2	117 6, 119	mono 126 5, di 210, 208	di 201	64, 62 5	Phenylhyd- razide, 194
357	Di-isoamyl phthal- ate (Isoamyl phthalate)	349			1 024 ¹⁷	153	200-6, 191 (sealed tube)		-117	132	mono 149, di 220	mono 150 (slow htng), 160-5 (rapid htng)	61	
358	Tricresyl phos- phate	400d, 275 80 ²⁰	-30	1 5568	1 197 ²⁵	122 7			36	202 32			188 6 (cor), al	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
 Reduced pressure b.p. only
 a) Liquids. 2) (Listed in order of increasing m.p. of the corresponding amide)*

No	Name	Boiling point °C	Melting point, °C	n _D ²⁰	D ₄ ²⁰	Saponification				Amide	p-Tolu- dide	3,5-Di- nitro- benzoate	Miscellaneous	
						Equiv- alent	Acid		Alcohol					
							M P, °C	B P °C	M P, °C					B P, °C
1	3,5-Dimethylphenyl acetate (<i>Sym-m-Xylenyl</i> acetate)	130 ²⁶ , 120 ¹¹				164	16.6	118.2	63.2 68	220.2	82	153, 147	195.4, al	
2	Dimethyl azelate	156 ²⁰ , 146.2 ¹⁰		1.43607	1.0069	108	106	>360 sl d	-97	64.65	<i>mono</i> 93.5, <i>di</i> 172	<i>di</i> 201.2, 198	108 (cor), al	
3	Dimethyl adipate	107.6 ¹¹	8.5	1.4277	1.0625	87	153.4 (cor)	216 ¹⁵	-97	64.65	<i>mono</i> 125 30, w, <i>di</i> 220	241	108 (cor), al	
4	<i>β-n</i> -Butoxyethyl benzoate (Butyl "cellosolve" benzoate)	156.5 70 ¹⁴ , 131.6 26 ³⁰		1.4925 ²⁵	1.0277 ²⁵	222	122.4	249		170 6 ¹¹	130	158		4-Nitro- phenylure- thane, 58.7 9.1, CCl ₄
5	Ethyl fuoylacetate	170 ²⁰ 143 ¹⁰		1.5055 ¹⁶	1.165 ¹⁷				-117.3	78.32	159, al		93, al	Oxime, 131.2, dl, al
6	Methyl fuoylacetate	144.5 ²⁰ , 96-8 ¹							-97	64.65	159, al		108 (cor), al	Semicarba- zone, 141- 2, bz-al (3.1), Oxime, 124.5, bz
7	Di- <i>n</i> -propyl adipate	155 ¹⁶	-20	1.4314	0.9790	115	153.4			97.1	<i>mono</i> 161 <i>di</i> 220	<i>di</i> 241	74, pet eth	
8	Dimethyl pimelate	119.3 9.6 ¹⁰	-20.6	1.42888	1.0383	94	105		-97	64.65	<i>di</i> 175	<i>di</i> 206, al	108 (cor), al	
9	Di- <i>n</i> -propyl maleate	114-7 ⁶		1.444 ^{14.3}	1.026	100	137			97.1	<i>di</i> 181, me al	<i>mono</i> 195d, chl, <i>di</i> 142, eth	74, pet eth	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	Saponification				Amide	<i>p</i> -Toluidide	3,5-Dinitrobenzoate	Miscellaneous		
				Equiv alent	Acid		Alcohol						
					M P, °C	B P, °C	M P °C					B P °C	
1	Dimethyl succinate	18.2	196	73	185, 182.8	235d	-97	64.65	64.65	<i>mono</i> 157, <i>di</i> 260d	<i>mono</i> 179.80, <i>di</i> 254.5, 5.5, 260	108 (cor), al	n_D^{20} 1.41965, D_4^{20} 1.1192
2	Methyl myristate	18.5	323	242	53.9	202 ¹⁶	-97	64.65	103		93	108 (cor), al	n_D^{20} 1.428
3	Ethyl piperonylate	18.5	286	194		228, 229	-117.3	78.32	169, al			93, al	
4	Diethyl <i>d</i> -tartarate	18.6	280	103	169.71		-117.3	78.32	<i>mono</i> 171-2, <i>di</i> 196d, al			93, al	n_D^{20} 1.44677, D_4^{20} 1.2028 [α] D_4^{20} (grn) + 7.87, Phenylhydrazide, 204
5	Phenyl propionate	20	211	150	-20.8	141	41.8, 42	182, 183	81	123, 126	145.8 (cor), al	113	D_4^{20} 1.0467, Tri-bromo, 95
6	Ethyl margarate	20.6 (β)		298	61.2	231 ¹⁶	-117.3	78.32	108, 106		93, al		
7	Methyl 3-chlorobenzoate	21	231	170.5	158, 155		-97	64.65	134		108 (cor), al		
8	Benzyl benzoate	21	323-4 (cor)	212	122.4		-15.3	205.5	130	158	113		n_D^{20} 1.5681, D^{19} 1.1224
9	Di- <i>n</i> -butyl <i>d</i> -tartarate	22		131	169.71		-90.2	117.6, 116	<i>mono</i> 171-2, <i>di</i> 196d, al			64, 62.5	D_4^{20} 1.0886, [α] D_4^{20} + 10.09, Phenylhydrazide, 240
10	3,4-Dimethylphenyl acetate	22	235	164	16.6	118.2	62.5	225	82	153, 147	181.6, rods, al	87	
11	Isobutyl stearate	(a) 22.5, (b) 28.9, (two forms)		340	70.1			108.1	109, 108.4, al	102			
12	Isoamyl stearate	23		354	70-1		-117	132	109, 108.4, al	102	61		
13	Cetyl acetate (<i>n</i> -Hexadecyl acetate)	α 18.5, β 24.2, 22		284	16.6	118.2	49.27	190 ¹⁸	82	153, 147	66		
14	Ethyl palmitate	α 19.4, β 24.2	185	284	62.7	222 ¹⁶	-117.3	78.32	106-7, 105.3, al	98	93, al		
15	Methyl anthranilate (Methyl 2-aminobenzoate)	24.4	299.8	151	146		-117.3	78.32	109	151	93, al		N-(β -Aminoethyl) morpholide, 126, Picrate, 106
16	Di- <i>n</i> -propyl <i>d,l</i> -tartarate	25	286 ⁷⁶⁵	117	203-4 (+1 H ₂ O), 205-6 (anh)			97.1	226, w-me al		74, pet eth		D_4^{20} 1.1256
17	Dimethyl sebacate	26.6, 27-8		115	133, subl	243 ¹⁵	-97	64.65	<i>mono</i> 170, <i>di</i> 210, 208	<i>di</i> 201	108 (cor), al		n_D^{20} 1.43549, D_4^{20} 0.98818, Phenylhydrazide, 194

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Saponification				Amide	<i>p</i> -Toluidide	3,5-Dinitrobenzoate	Miscellaneous	
				Equiv- alent	Acid		Alcohol					
					M P, °C	B P, °C	M P, °C					B P, °C
18	Methyl β-(2-furyl) acrylate	27	227	152	141	286	-97	64 65	168 9		108 (cor), al	
19	<i>n</i> -Butyl stearate	27 5, 28		340	70 1		-90 2	117 6, 116	109 108 4, al	102	64 62 5	
21	<i>d</i> -Bornyl acetate	29	226, 221	196	16 6	118 2	204 5 5 5	212	82	153, 147	154	n_D^{22} 1 4633, D_4^{15} 0 991 (undercooled)
22	Methyl margarate	29		284	61 2	231 ¹⁶	-97	64 65	108, 106		108 (cor), al	
23	Eugenyl acetate	30	282	206	16 6	118 2	-9 1	253	82	153, 147	130 8 (cor), 95% al	n_D^{20} 1 52069 D_4^{15} 1 087
24	Methyl palmitate	30	184 ¹²	270	62 7	222 ¹⁶	-97	64 65	106 7 105 3, al	98	108 (cor), al	n_D^{25} 1 4317
25	<i>n</i> -Amyl stearate (<i>n</i> -Pentyl stearate)	30		354	70 1		-78 5	138 (cor)	109, 108 4, al	102	136 (cor)	
26	Ethyl 2-nitrobenzoate	30	275	195	146		-177 3	78 32	176		93, al	
27	<i>n</i> -Octadecyl acetate	α 29 97, β 31 95		312	16 6	118 2	α 57 95, 59 5	210 5 ¹⁵	82	153, 147	66	β -Form exist below 0°, α -Form seeding with crys or cooling soln of the compound
28	Ethyl 2-naphthoate	32	304	200	184, 185 5		-117 3	78 32	192-3, 195, al	192, al	93, al	n_D^{20} 1 596, D_4^{20} 1 117
29	Methyl-3-bromo-benzoate	32		229	155		-97	64 65	155		108 (cor), al	
30	Methyl 4-toluate	33	222 5, 217	150	179-80, subl	275 (cor)	-97	64 65	160, 158	160, 165	108 (cor), al	
31	Thymyl benzoate	33		255	122 4		51 5	233 5	130	158	103 2, al	
32	Di-(β-ethoxyethyl) phthalate	33		155	200 6, 191 (sealed tube)			134 8	<i>mono</i> 149, <i>di</i> 220	<i>mono</i> 150 (slow htng), 160-5 (rapid htng) <i>di</i> 201	75, al	
33	Ethyl stearate	α 30 9, β 33 5	199 ¹⁰	312	70-1		-117 3	78 32	109, 108 4, al	102	93, al	$\alpha \rightarrow \beta$ Slowly on rubbing, N-(β-Aminoethyl) morpholide, 58
34	Di-isopropyl <i>d,l</i> -tartarate	34	275 ⁷⁶⁵	117	203 4 (+ 1H ₂ O), 205-6 (anh)		-89 5	82 4	226, w-me, al		123, pet eth	D_4^{20} 1 1166
35	Ethyl pyromucate (Ethyl furoate)	34	197	140	133 4, 132	230-2	-117 3	78 32	142-3	170 5, al	93, al	n_D 1 4797, D_4^{20} 1 1174 (undercooled)
36	Diethyl 4-nitrophthalate	34		133 5	165		-117 3	78 32	200 d	<i>mono</i> 172	93, al	
37	Ethyl benzilate	34		256	150		-117 3	78 32	153, chl	189-90	93, al	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Saponification				Amide	<i>p</i> -Toluidide	3,5-Di-nitro benzoate	Miscellaneous	
				Equiv alent	Acid		Alcohol					
					M P °C	B P °C	M P °C					B P °C
38	2,4,5-Trimethylphenyl acetate (Pseudocumenyl acetate)	34-45	245.6	178	16.6	118.2	71	232	82	153, 147		
39	Methyl cinnamate	36	261	162	133	300	-97	64.65	147.8	168	108 (cor), al	
40	Ethyl <i>d,l</i> -mandelate	37	254	180	118		-117.3	78.32	133.4	172, al	93, al	
41	Dimethyl itaconate	38	208	79	165		-97	64.65	<i>di</i> 191.28, al		108 (cor), al	
42	Methyl sebacate	38	288d	216	133, subl	243 ¹⁵	-97	64.65	<i>mono</i> 170, <i>di</i> 210, 208	<i>di</i> 201	108 (cor), al	
43	Methyl stearate	38.8	214-5 ¹⁵	298	70-1		-97	64.65	109, 108.4, al	102	108 (cor), al	
44	Benzyl cinnamate	39		238	133	300	-15.3	205.5	147	168	113	
45	Methyl dibenzylacetate	41		254	89		-97	64.65	128.9, bz	175, abs al	108 (cor), al	
46	Phenyl salicylate (Salol)	42		214	158.3, subl at 76		41.8, 42	182, 183	142.139	156	145.8 (cor), al	
47	Benzyl succinate	42		208	185, 182.8	235d	-15.3	205.5	<i>mono</i> 157, <i>di</i> 260d	<i>mono</i> 179.80, <i>di</i> 254.5, 5.5, 260	113	
48	Dibenzyl phthalate	43		173	200.6, 191 (sealed tube)				<i>mono</i> 149, <i>di</i> 220	<i>mono</i> 150 (slow htng), 160.5 (rapid htng), <i>di</i> 201	113	
49	Diethyl terephthalate	44	302	111	300, subl without melting		-117.3	78.32	>225		93, al	
50	Cinnamyl cinnamate	44		264	133	300	33	257	147-8	168	121	
51	Ethyl 2-nitrocinnamate	44		221	240		-117.3	78.32	185		93, al	
52	Methyl 2-chlorocinnamate	44		196.5	212, yel, al		-97	64.65	168		108 (cor), al	
53	Diethyl 3-nitrophthalate	46		133.5	218		-117.3	78.32	<i>di</i> 201d	<i>di</i> 226	93, al	
54	Ethyl 3-nitrobenzoate	47	296	195	140		-117.3	78.32	<i>di</i> 187, 189.90, dil me al		93, al	
55	Dicyclohexyl oxalate	47, 42		127	189.5 (anh), 101 (+ 2H ₂ O)		25.15	161.1	<i>mono</i> 219, <i>di</i> 419d	<i>mono</i> 168, <i>di</i> 268	112-3, al	
56	2-Phenylethyl cinnamate	47.8		252	133	300	-25.8	219.8	147.8	168	108	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Saponification				Amide	<i>p</i> -Toluidide	3,5-Di-nitrobenzoate	Miscellaneous	
				Equivalent	Acid		Alcohol					
					M P °C	B P °C	M P °C					B P °C
58	1-Naphthyl acetate	48-49		186	16-6	118-2	94	278-80	82	153, 147	217-4, yellow al	
59	Methyl 4-methoxybenzoate (Methyl anisate)	49, 45	255	166	184-6	275-80	-97	64-65	167, 162-5, w	186	108 (cor), al	
60	Phenacyl acetate (Benzoylcarbonyl acetate, ω-Acetoxyacetophenone)	49		178	16-6	118-2	86	118-20 ¹¹	82	153, 147		
61	Di-3-tolyl carbonate (Di-" <i>m</i> -cresyl" carbonate)	49		242				12	203		165-4 (cor), al	
62	Triphenyl phosphate	49	260 ²⁰	108-7			41-8, 42	182, 183			145-8 (cor), al	D ₂ ⁰ 185, Tri-bromo deriv of phenol, 95
63	Dibenzyl <i>d</i> -tartarate	50		165	169-71		-15-3	205-5	<i>mono</i> 171-2, <i>di</i> 196d, al		113	Phenylhydrazide, 240
64	Dibenzyl succinate	51-2		149	185, 182-8	235d	-15-3	205-5	<i>mono</i> 157, <i>di</i> 260d	<i>mono</i> 179-80, <i>di</i> 254-5, 5-5, 260	113	
65	Methyl piperonylate	51-2	270-1 ⁷⁷⁷	180	229, 228		-97	64-65	169, al		108 (cor), al	
66	Cetyl palmitate (<i>n</i> -Hexadecyl palmitate)	51-6		480	62-7	222 ¹⁶	49-27	190 ¹⁸	106-7, 105-3, al	98	66	
68	Furfuryl diacetate	52	220	99	16-6	118-2			82	153-147		Hydrolysis → furfural, b p, 161-7, Semicarbazone, 202
69	Ethylene glycol dilaurate	52		213	44, 42	299	-12-6	197-85	100, 99	87	169	
70	Phenyl stearate	52		360	70-1		41-8, 42	182, 183	109, 108-4, al	102	145-8 (cor), al	Tri-bromo deriv of phenol, 95
71	Methyl <i>d</i> / <i>l</i> -mandelate	53-3	250 sl d	166	118		-97	64-65	133-4	172, al	108 (cor), al	
72	Dimethyl tartronate	53-4		74	156-8d		-97	64-65	<i>di</i> 198, <i>dil</i> al		108 (cor), al	
73	Dimethyl oxalate	54	163-5 ²⁶²	59	189-5 (anh), 101 (+ 2H ₂ O)		-97	64-65	<i>mono</i> 219, <i>di</i> 419d	<i>mono</i> 168, <i>di</i> 268	108 (cor), al	
74	Tetraethyl pyromellitate	54		91-5	275		-117-3	78-32			93, al	
75	Diethyl <i>meso</i> -tartrate	55		103	140		-117-3	78-32	<i>di</i> 187, 189-90, <i>dil</i> me al		93, al	Bis-phenylhydrazide, 245

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Saponification				Amide	<i>p</i> -Toluidide	3,5-Dinitrobenzoate	Miscellaneous		
				Equiv alent	Acid		Alcohol						
					M P, °C	B P, °C	M P °C					B P °C	
76	3-Tolyl benzoate ("m-Cresyl" benzoate)	55	314	212	122.4	249	12	203	130	158	165.4 (cor), al	N-(β-Aminoethyl)morpholide, 186.3	
77	Ethyl 4-nitrobenzoate	56	186.3	195	241		-117.3	78.32	201, 198	204, 192	93, al		
78	1-Naphthyl benzoate	56		248	122.4	249	94	278-80	130	158	217.4, yellow, al		
79	Cetyl stearate (<i>n</i> -Hexadecyl stearate)	56.6		508	70-1		49.27	190 ¹⁸	109, 108.4, al	102	66		
80	Di-isobutyl <i>d,l</i> -tartarate	58	311	131	203.4 (+ 1H ₂ O), 205.6 (anh)			108.1	<i>di</i> 226, <i>w-me</i> al		87		
81	Ethyl diphenylacetate	58		240	148		-117.3	78.32	167.5, 80	172.3	93, al		
82	Ethyl 2-benzoylbenzoate	58		254	128 (anh) 91 (+ 1H ₂ O), <i>w</i>		-117.3	78.32	165 (cor), 162		93, al		N-(β-Aminoethyl)morpholide, 150.2
83	Diethyl naphthalate	58-60		136	274		-117.3	78.32			93, al		
84	Methyl diphenylacetate	60		226	148		-97	64.65	167.5, 80	172.3	108 (cor), al		
85	Di-2-tolyl carbonate (Di-" <i>o</i> -cresyl" carbonate)	60		242			30.75	190.8			138.4 (cor), al		
86	Methyl 2-(4-tolyl)-benzoate	61		254	139-46		-97	64.65	175.6, al		108 (cor), al		
87	Dimethyl <i>d</i> -tartarate	61.5		89	169.71		-97	64.65	<i>mono</i> 171.2, <i>di</i> 196d, al		108 (cor), al	Two other forms, m p 48 and 50, Phenylhydrazide, 240	
88	Ethylene glycol dimyristate	63.0		241	53.9	202 ¹⁶	-12.6	197.85	103	93	169		
89	Dimethyl 4-nitrophthalate	66		119.5	165		-97	64.65	200d	<i>mono</i> 172	108 (cor), al		
90	Dicyclohexyl phthalate	66		165	200-6 191 (sealed tube)		25.15	161.1	<i>mono</i> 149, <i>di</i> 220	<i>mono</i> 150 (slow htng), 160-5 (rapid htng), <i>di</i> 201	112-3, al	<i>n</i> _D ²⁰ 1.451, <i>D</i> ₄ ²⁰ 1.383	
92	Ethyl oxanilate	66-7		193	148.9		-117.3	78.32	228		93, al		
93	Dimethyl isophthalate	67.8		97	348, subl		-97	64.65	<i>mono</i> 280, <i>di</i> 280		108 (cor), al		
94	Ethyl 2-(4-tolyl)benzoate	68, 69	314, 299	268	139-40		-117.3	78.32	175.6, <i>w</i>		93, al		
95	Phenyl benzoate	69, 71	314	198	122.4	249	41.8, 42	182, 183	130	158	145.8 (cor), al	AICl ₃ → 4-Hydroxy benzophenone, Tribromo deriv of phenol, 95	

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Saponification				Amide	<i>p</i> -Toluidide	3,5-Di-nitrobenzoate	Miscellaneous	
				Equiv- alent	Acid		Alcohol					
					M P °C	B P °C	M P °C					B P °C
96	Dimethyl 3-nitro-phthalate	69		133.5	218		-97	64.65	<i>di</i> 201d	<i>di</i> 226	108 (cor), al	
97	Methyl 3-hydroxy-benzoate	70		152	200, subl		-97	64.65	170.167	163, dil al	108 (cor), al	
98	Ethylene glycol di-palmitate	70.5-69		269	62.7	222 ¹⁶	-12.6	197.85	106.7, 105.3, al	98	169	
99	2-Naphthyl acetate	71		186	16.6	118.2	123	285.6	82	153.147	210.2 al	
100	Glyceryl tristearate	71		297	70.1		17.9	290d	109, 108.4 al	102		n ²⁰ 1.4399 D ₄ ²⁰ 0.862
101	4-Tolyl benzoate ("p-Cresyl" benzoate)	71	316	212	122.4	249	36	202	130	158	188.6 (cor), al	
102	Glyceryl tribenzoate	72, lgr, 76, al		135	122.4	249	17.9	290d	130	158		
103	Phenyl cinnamate	72		238	133	300	41.8-42	182, 183	147.8	168	145.8 (cor), al	Tribromo deriv of phenol, 95
104	Ethylene glycol dibenzoate	73		135	122.4	249	-12.6	197.85	130	158	<i>di</i> 169	
105	Methyl 2-nitro-cinnamate	73		207	240		-97	64.65	185		108 (cor), al	
106	Di-isobutyl <i>d</i> -tartarate	73-4, 70		131	169.71			108.1	<i>mono</i> 171.2, <i>di</i> 169d, al		87	Phenylhydrazide, 240
107	Ethyl 3-hydroxy-benzoate	73.8	282	166	200, subl		-117.3	78.32	170, 167	163, dil al	93 al	
108	Diphenyl phthalate (Phenyl phthalate)	74-5, 70		159	200.6, 191 (sealed tube)		41.8, 42	182, 183	<i>mono</i> 149, <i>di</i> 220	<i>mono</i> 150 (slow htng), 160.5 (rapid htng), <i>di</i> 201	145.8 (cor), al	Tribromo deriv of phenol, 95
109	Methyl 3-hydroxy-2-naphthoate	75		202	222-3 (cor)		-97	64.65	217.8 (cor), yel, al	221-3	108 (cor), al	
110	Methyl benzilate	75		242	150		-97	64.65	154.5, chl	189.90	108 (cor), al	
111	Ethylene glycol di- <i>n</i> -stearate	76, 73		297	70, 69.6		-12.6	197.85	109, 108.4, al	102	169	
112	Trimethyl citrate	76, 78.9	283.7d	78	100, 153 (anh)		-97	64.65	<i>tri</i> 210-5d, w	<i>tri</i> 189, al	108 (cor), al	
113	Methyl 2-naphthoate	77	290	186	184, 185.5		-97	64.65	192-3, al	192, al	108 (cor), al	
114	Methyl α -phenyl- <i>n</i> -butyrate	77-8		178	42	270	-97	64.65	85-7		108 (cor), al	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Saponification				Amide	<i>P</i> -Toluidide	3,5-Dinitrobenzoate	Miscellaneous	
				Equiv- alent	Acid		Alcohol					
					M P, °C	B P, °C	M P, °C					B P, °C
115	Diphenyl carbonate	78	306	214			41 8, 42 182 183			145 8 (cor), al	Phenylhydrazine → N,N'-diphenylcar- bazide, Tribromo deriv of phenol, 95	
116	Methyl 3-nitrobenzoate	78	279	181	140		-97 64 65	143	162	108 (cor), al		
117	Ethyl 3-nitrocinnamate	79		221	199		-117 3 78 32	196		93, al	Dibromide, 132-3	
118	Isoeugenyl acetate	79	283	206	16 6	118 2	267 5	82	153, 147	158 4 (cor), BuOH		
119	Methyl 2-benzoylbenzoate	79-80, 52	352	240	128 (anh), 91 (+1 H ₂ O), w		-97 64 65	165 (cor), 162		108 (cor), al		
120	Benzyl oxalate	80		135	189 5 (anh) 101 (+2 H ₂ O)		-15 3 205 5	<i>mono</i> 219, <i>di</i> 419d	<i>mono</i> 169 <i>di</i> 268	113		
121	Methyl 4-bromobenzoate	81		215	251 3		-97 64 65	189 90, w		108 (cor), al		
122	Benzoin acetate	83		254	16 6	118 2	133	344	82	153, 147		
123	Pentaerythritol tetraacetate	84		76	16 6	118 2	262 253		82	153, 147		
124	Pyrocatechol dibenzoate (Catechol dibenzoate)	84		159	122 4	249	105	245 6	130	158	<i>di</i> 152	
125	Ethyl 3-hydroxy-2-naphthoate	85	291	216	222 3 (cor)		-117 3 78 32	217 8 (cor), yel, al	221-3	93, al		
126	Diguaiacol carbonate (Di-(2-methoxyphenyl) carbonate, "Guaiacol carbonate")	87		274			32	205		141 2 (cor), al	Monobromo deriv, 178	
127	Dimethyl <i>d,l</i> -tartarate	90 (stab), 84 (meta- stab)	282	89	203 4 (+1 H ₂ O), 205 6 (anh)		-97 64 65	226, w - me al		108 (cor), al		
128	Di-2-tolyl oxalate (Di-" <i>o</i> -cresyl" oxalate)	91		135	189 5 (anh), 101 (+2 H ₂ O)		30 75 190 8	<i>mono</i> 219 <i>di</i> 419d	<i>mono</i> 169, <i>di</i> 268	138 4 (cor), al		
129	Ethyl 3,5-dinitrobenzoate	94, 93		240	204-5		-117 3 78 32	183		93, al	N-(β-Aminoethyl) morpholide, 189 5	
130	2-Naphthyl salicylate	95 5, 93 5		264	158 3 subl at 76		123 285-6	142, 139	156	210 2, al		
131	Methyl 4-nitrobenzoate	96		181	241		-97 64 65	201, 198	204, 192	108 (cor), al		
132	<i>n</i> -Propyl 4-hydroxybenzoate	96		180	215, 210		97 1	162 (+1 H ₂ O), w	203-4, al	123, pet eth		
133	1,2,4-Triacetoxybenzene ("Hydroquinone triacetate")	96-7		76	16 6	118 2	140 5	82	153, 147			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Saponification				Amide	<i>p</i> -Toluidide	3,5-Dinitrobenzoate	Miscellaneous		
				Equiv. alent	Acid		Alcohol						
					M P °C	B P, °C	M P, °C					B P °C	
134	Ethyl 3,5-dinitrosalicylate	99		256	182, 173 (+1 H ₂ O)		-117 3	78 32	181		93, al		
135	Dimethyl fumarate	101 7	193 25	72	286 7 (sealed tube), subl 200		-97	64 65	<i>mono</i> 270, 300 2 <i>di</i> 266d		108 (cor), al	<i>n</i> _D ^{10.5} 1 40625, D ^{110.5} 1 0397	
136	Ethyl 5-nitrosalicylate	102		211	229 30		-117 3	78 32	225		93, al		
137	Dimethyl naphthalate	104		122	274		-97	64 65			108 (cor), al		
138	Di-3-tolyl oxalate (Di- <i>m</i> -cresyl" oxalate)	105		135	189 5 (anh), 101 (+2 H ₂ O)		12	203	<i>mono</i> 219, <i>di</i> 419d	<i>mono</i> 169 <i>di</i> 268	164 5 (cor), al		
139	Phloroglucinol triacetate (1,3,5-Triacetoxybenzene)	105-6		76	16 6	118 2	200 9 (slow htng), 217 9 (rapid htng)		82		153, 147	<i>tri</i> 162	
140	Diphenyl adipate	106		149	153-4 (cor)	216 ¹⁵			<i>mono</i> 125-30, <i>w, di</i> 220	241	145 8 (cor), al	Tribromo deriv of phenol, 95	
141	Acetylsalicylaldehyde diacetate ("Salicylaldehyde triacetate")	107, 103		89	16 6	118 2			82	153, 147		Hydrolysis → salicylaldehyde, b p 197 (cor)	
142	2-Naphthyl benzoate	107		248	122 4	249	123	285-6	130	158	210 2, al		
143	Methyl 3,5-dinitrobenzoate	108		226	204 5		-97	64 65	183		108 (cor), al		
144	Dimethyl mesotartarate	111		89	140		-97	64 65	<i>di</i> 187, 189 90, <i>dil me</i> al		108 (cor), al	Bis-phenylhydrazide, 245	
145	Di-4-tolyl carbonate (Di- <i>p</i> -cresyl" carbonate)	114		242			36	202			188 6 (cor), al		
146	Ethyl oxamate	114 5		117	210		-117 3	78 32	419d		93, al		
147	Cholesteryl acetate	114		416	16 6	118 2	148 5		82	153, 147			
148	Ethyl 4-hydroxybenzoate	116		166	215, 210		-117 3	78 32	162 (+1 H ₂ O), <i>w</i>	203-4, al	93, al	N-(β-Aminoethyl) morpholide, 184	
149	Resorcinol dibenzoate	117		159	122 4	249	110 (stab), 108 8 5 (labile)	280 8 (cor)	130	158	<i>bis</i> 201		
150	Ethyl 3-nitrosalicylate	118		211	125 (+1 H ₂ O)		-117 3	78 32	145		93, al		
151	Methyl 5-nitrosalicylate	119		197	229 30		-97	64 65	225		108 (cor), al		

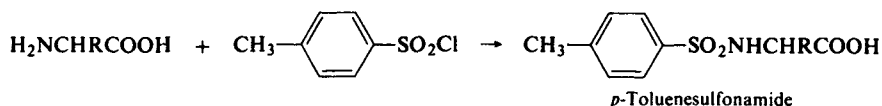
*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVI. ORGANIC DERIVATIVES OF ESTERS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Saponification				Amide	<i>p</i> -Toluidide	3,5-Di-nitro benzoate	Miscellaneous	
				Equiv- alent	Acid		Alcohol					
					M P °C	B P °C	M P, °C					B P °C
152	Diphenyl succinate	121		135	185 182.8	235d	41.8, 42	182, 183	<i>mono</i> 157, <i>di</i> 260d	<i>mono</i> 179.80, <i>di</i> 254.5 5.5, 260	148.5 (cor), al	Tribromo deriv of phenol, 95
153	Di-4-tolyl succinate (Di- "p-cresyl" succinate)	121		149	185 182.8	235d	36	202	<i>mono</i> 157, <i>di</i> 260d	<i>mono</i> 179.80, <i>di</i> 254.5- 5.5, 260	188.6 (cor), al	
154	Hydroquinone diacetate	124		97	16.6	118.2	171	286	82	153, 147	<i>bis</i> 317	
155	Methyl 3-nitro-cinnamate	124		207	199		-97	64.65	196		108 (cor), al	
156	Methyl 3,5-dinitro-salicylate	127		242	182		-97	64.65	181, 173 (+1 H ₂ O)		108 (cor), al	
157	Methyl 4-hydroxy-benzoate	131		152	215, 210		-97	64.65	162 (+1 H ₂ O), w	203-4, al	108 (cor), al	
158	Methyl 3-nitro-salicylate	132		197	125 (+1 H ₂ O)		-97	64.65	145		108 (cor), al	
159	Triethyl trimesate	133		98	380 (cor)		-117.3	78.32	<i>tri</i> 365d (cor)		93, al	
160	Ethyl 4-nitro-cinnamate	137, 142		221	285		-117.3	78.32	204, 217		93, al	
161	Dimethyl terephthalate	141		97	300 (subl without melting)		-97	64.65	<i>di</i> >225		108 (cor), al	
162	Tetramethyl pyromellitate	142		77.5	275		-97	64.65			108 (cor), al	
163	Trimethyl trimesate	144		84	380 (cor)		-97	64.65	<i>tri</i> 365d (cor)		108 (cor), al	
164	Di-4-tolyl oxalate (Di- "p-cresyl" oxalate)	148-9		135	189.5 (anh), 101 (+2 H ₂ O)		36	202	<i>mono</i> 219, <i>di</i> 419d	<i>mono</i> 169, <i>di</i> 268	188.6 (cor), al	
165	Methyl 4-nitro-cinnamate	161		207	285		-97	64.65	204, 217		108 (cor), al	
166	Diethyl mucate	163-4		133	214d, 223-55		-117.3	78.32	<i>mono</i> 192d, <i>di</i> 220		93, al	
167	Pyrogallol triacetate	165, 172		84	16.6	118.2	133	309	82	153, 147	<i>tri</i> 205	
168	Dimethyl mucate	165.7d		119	214d, 223-55		-97	64.65	<i>mono</i> 192d, <i>di</i> 220		108 (cor), al	
169	Methyl gallate	200-1		184	253-4d, 222 40d		-97	64.65	189		108 (cor), al	
170	Hydroquinone di-benzoate	204 (cor), 199		159	122.4	249	171, 172	286	130	158	<i>bis</i> 317	

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XVII

p-Toluenesulfonamide (*p*-Toluenesulfonyl derivative).*

From the amino acid in aqueous sodium hydroxide with *p*-toluenesulfonyl chloride in ether.

For directions and examples see: Cheronis, pp. 453-454; Linstead, pp. 77-78; Shriner, p. 231; Vogel, p. 437; Wild, pp. 169-170; E. Fischer and P. Bergell, *Chem. Ber.*, **35**, 3779, 3784 (1902); E. W. McChesney and W. K. Swann, *J. Amer. Chem. Soc.*, **59**, 1116 (1937).

From the amino acid in aqueous sodium hydroxide with *p*-toluenesulfonyl chloride.

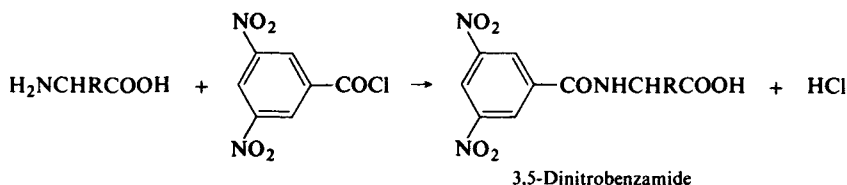
See: J. I. Harris and T. S. Work, *Biochem. J.*, **46**, 582 (1950).

From the amino acid with *p*-toluenesulfonyl chloride and triethylamine in aqueous tetrahydrofuran.

See: D. Theodoropoulos and L. C. Craig, *J. Org. Chem.*, **21**, 1376 (1956).

For an extensive list of references for the preparation of the *p*-toluenesulfonyl derivatives of amino acids *see:* J. P. Greenstein and M. Winitz, *Chemistry of the Amino Acids*, Vol. 2, John Wiley and Sons, New York, 1961, pp. 886-889.

3,5-Dinitrobenzamide (3,5-Dinitrobenzoyl derivative).*



From the amino acid in aqueous sodium hydroxide with 3,5-dinitrobenzoyl chloride.

For directions and examples see: Cheronis, p. 453; Vogel, p. 436; Wild, p. 168; B. C. Saunders, *Biochem. J.*, **28**, 580 (1934); *J. Chem. Soc.*, 1397 (1938); B. C. Saunders, G. J. Stacey and I. G. E. Wilding, *Biochem. J.*, **36**, 368 (1942); B. W. Town, *Biochem. J.*, **35**, 578 (1941).

Benzamide (Benzoyl derivative).



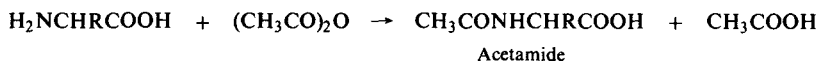
From the amino acid in aqueous sodium carbonate or bicarbonate and benzoyl chloride.

For directions and examples see: Linstead, p. 77; Vogel, p. 436; Wild, p. 167.

From the amino acid in aqueous sodium hydroxide with benzoyl chloride.

See: Cheronis, p. 453; E. Fischer and P. Bergell, *Chem. Ber.*, **35**, 3779, 3784 (1902); **39**, 597 (1906).

Acetamide (Acetyl derivative).



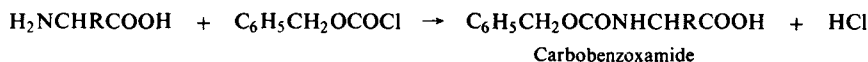
From the amino acid with acetic anhydride in water.

For directions and examples see: Linstead, p. 77; Shriner, p. 226; Wild, p. 167; R. M. Herbst and D. Shemin in *Organic Syntheses*, Coll. Vol. 2, (Ed. A. H. Blatt), John Wiley and Sons, New York, 1943, p. 11.

From the amino acid in aqueous sodium hydroxide with acetic anhydride.

See: Cheronis, p. 454; M. Bergmann and L. Zervas, *Biochem. Z.*, **203**, 288 (1928).

Carbobenzoxamide (Carbobenzoxy derivative; Benzylloxycarbonyl derivative).



From the amino acid in aqueous sodium hydroxide with carbobenzoxy chloride (benzyl chloroformate).

For directions and examples see: M. Bergmann and L. Zervas, *Chem. Ber.*, **65**, 1192 (1932); M. Winitz, L. Bloch-Frankenthal, N. Izumiya, S. M. Birnbaum, C. G. Baker and J. P. Greenstein, *J. Amer. Chem. Soc.*, **78**, 2423 (1956).

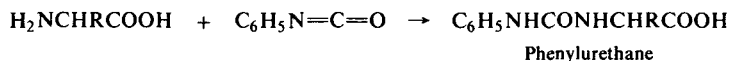
*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE XVII (Continued)

For an extensive list of references for the preparation of the carbobenzoxy derivatives of amino acids see: J. P. Greenstein and M. Winitz, *Chemistry of the Amino Acids*, Vol. 2, John Wiley and Sons, New York, 1961, pp. 887-895.

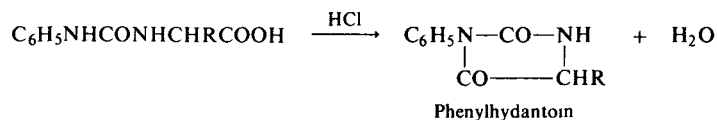
*Phenylurethane (Phenylurea derivative).**



From the amino acid with aqueous potassium hydroxide and phenylisocyanate.

For directions and examples see: Linstead, p. 78; Shriner, p. 211; Wild, p. 171.

*Phenylhydantoin.**



From the phenylurethane (obtained as described above) in aqueous hydrochloric acid.

For directions and examples see: Cheronis, p. 456.

Rf Values.

For the determination of the *Rf* values of amino acids in aqueous phenol, in collidine-lutidine and in butanol-acetic acid mixtures see: R. J. Block, R. LeStrange and G. Zweig, *Paper Chromatography*, Academic Press, New York, 1952, pp. 51-66; E. Lederer and M. Lederer, *Chromatography*, Elsevier Publishing Co., New York, 1957, pp. 306-311.

NOTE: For additional information regarding directions and examples for the preparation of derivatives of amino acids which are similar to those of amines (e.g., phenylurethane, acetamide, etc.) see explanations and references to Table XVIII, p. 291, 292, 293, 294.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE XVII. ORGANIC DERIVATIVES OF AMINO ACIDS
(Listed in order of increasing decomposition temperatures)* **

No	Name	Decomp temp °C	Specific rotation			Rf values***			<i>p</i> Toluene-sulfonyl	Phenyl urea	Benzoyl	3,5 Dinitro benzoyl	Picrate	Miscellaneous
			[α] _D	T, °C	Conc (C) and solvent	Aqueous phenol	Collidine-Lutidine	Butanol-Ac acid						
1	3-Aminohydrocinnamic acid	84-5												Acetyl, 162, Hydrochloride, 191
2	N-Methyl-β-alanine	99-100												Hydrochloride, 105, aq al
3	Aminomalonic acid	109								61, pet eth				Formyl, 48, Heat → glycine decom temp 228-30-262
4	2-Aminophenylacetic acid	119								179, al				Acetyl, 158, Formyl, 110
5	2-Amino-1-Naphthoic acid	126												N-Acetyl, 195-6, al
6	N-Phenylglycine	127							195	63				Acetyl 124
7	4-Aminohydrocinnamic acid	132									194-5			Acetyl 143 (anh) 124 (hyd)
8	L-Ornithine	140	11.5	25	c = 6.5	0.79	0.11	0.15	190	240 (mono), 189 (di)			208	α,β-Dicarbobenzyloxy, 112-4
9	Anthranilic acid (2-Amino benzoic acid)	147				0.85			217	181	182	278	104	
10	3-Aminophenylacetic acid	151												Amide, 164-6, al Chloroacetyl 187-8, al
11	5-Aminopentanoic acid (ω-Amino-n-valeric acid)	157									105-94			
12	2-Aminocinnamic acid	158, yel									191-3, al			Monoacetyl, 250-1, al, Diacetyl 158, lgr
13	DL-β-Amino-n-valeric acid DL-3-Aminopentanoic acid	160-5									145-6			N-β-Naphthalenesulfonyl 134
14	2-Amino-4-toluic acid	165												Acetyl, 279-81
15	3-Aminobenzoic acid	174				0.86			270-264	248	270			
16	trans-4-Aminocinnamic acid	175-6								274				Acetyl, 259-60
17	ω-Aminotridecyllic acid	177								111-105				Benzenesulfonyl, 120, al
18	3-Amino-4-toluic acid (Homoanthranilic acid)	177												Amide, 146, Acetyl, 184, Formyl, 186, al

* Derivative data given in order m p, crystal color, solvent from which crystallized

** Decomposition points of amino acids are only a first doubtful identification as they depend on velocity of heating and other conditions

*** Aqueous phenol 80°, w/w for basic amino acids 3 vol —^o, of a conc aq NH₃ has to be present (in a separate vessel) in the chamber, otherwise low values are obtained. Collidine-lutidine mixture 2,6-lutidine (100 ml), 2,4,6-collidine (100 ml), water (100 ml), diethylamine (3 ml), Butanol-acetic acid-water 40 ml 10 ml 10 ml

TABLE XVII. ORGANIC DERIVATIVES OF AMINO ACIDS
(Listed in order of increasing decomposition temperatures)* ** (Continued)

No	Name	Decomp temp °C	Specific rotation			Rf values***			<i>p</i> -Toluene-sulfonyl	Phenyl urea	Benzoyl	3,5-Dinitro benzoyl	Picrate	Miscellaneous
			[α] _D	T °C	Conc (C) and solvent	Aqueous phenol	Collidine-Lutidine	Butanol-Ac acid						
19	4-Amino-1-naphthoic acid	177												Acetyl, 189, Amide, 175
20	<i>trans</i> -3-Aminocinnamic acid	181, yel								229				Acetyl, 237, al
21	3-Amino-1-naphthoic acid	181												Acetyl, 254 5
22	N-Ethylglycine	182												Hydrochloride, ca 180
23	L-Canavanine	184	7.9	20		0.51				<i>tri</i> 186			163 4	
24	L-Glutamine	185				0.6								Carbo-benzyloxy, 137
25	Hippuric acid	187												4 Nitrobenzyl ester 136 4-Bromo phenacyl ester, 151
26	4-Aminobenzoic acid	188				0.81				300	278	290		
27	DL-Canaline	190-5									158 60 (<i>di</i>)			γ-Carbobenzyloxy, 208-10
28	Betaine (Tri-methyl-glycine)	193						0.43						Formyl, 183
29	DL-β-Aminobutyric acid	194				0.78					154			
30	DL-Glutamic acid	199				0.31	0.20	0.3	117		153 155			Acetyl, 187
31	4-Aminophenylacetic acid	199 200									205-6, al			Acetyl, 168 70, Chloroacetyl, 158-60
32	β-Alanine	200				0.66	0.22	0.37		168	120	202		Carbobenzyloxy, 106
33	L-Isoserine	200				0.39					107-9			
34	ω-Amino- <i>n</i> -caproic acid (6-Amino-hexanoic acid)	202									45-7			
35	γ-Aminobutyric acid	203				0.75								Hydrochloride, 135 Heat → pyrrolidone, 24, pet eth
36	DL-Proline	203 (mono-hyd) 191				0.88	0.28	0.43		170		217	135-7	
37	γ-Amino- <i>n</i> -caproic acid (4-Amino-hexanoic acid)	205-7									150 2			Hydrochloride, 120 1
38	6-Amino-1-naphthoic acid	205-6												Acetyl, 170 2, 252-3
39	1-Amino-2-naphthoic acid	205 r h												Heating with conc HCl → 1-naphthylamine, 50

*Derivative data given in order m p, crystal color, solvent from which crystallized

**Decomposition points of amino acids are only a first doubtful identification as they depend on velocity of heating and other conditions

***Aqueous phenol 80% w/w, for basic amino acids 3 vol --% of a conc aq NH₃ has to be present (in a separate vessel) in the chamber, otherwise low values are obtained, Collidine-lutidine mixture 2,6-lutidine (100 ml), 2,4,6-collidine (100 ml), water (100 ml), diethylamine (3 ml), Butanol-acetic acid-water 40 ml 10 ml 10 ml

TABLE XVII. ORGANIC DERIVATIVES OF AMINO ACIDS
(Listed in order of increasing decomposition temperatures)* ** (Continued)

No	Name	Decomp temp °C	Specific rotation			Rf values***			<i>p</i> -Toluene sulfonyl	Phenyl urea	Benzoyl	3,5-Dinitro benzoyl	Picrate	Miscellaneous
			[α] _D	T °C	Conc (C) and solvent	Aqueous phenol	Collidine-Lutidine	Butanol-Ac acid						
40	L-Arginine	207	11.8	20	c = 0.87 in 0.5 N-NaOH	0.89	0.17	0.2			298 (mono), 235 (di)	150	217 (mono), 190 (di)	Monocarbo-benzyloxy, 175
41	L-Glutamic acid	211 r h, 197 s h	31.2	22.4	c = 3.48 in water	0.31	0.2	0.3	131					Acetyl, 199, Carboben-zyloxy, 120
42	5-Amino-1-naphthoic acid	212		18	c = 1.0 in 6N-HCl									Acetyl, 296, al
43	Sarcosine	212				0.78				102	104	153		Acetyl, 135
44	L-3,5-Di-iodo-tyrosine	213	2.9	20	c = 5.08 in 1.1 N-HCl	0.61	0.55							
45	L-α-Asparagine	213-5				0.47								Carboben-zyloxy, 164
46	DL-γ-Amino- <i>n</i> -valeric acid (DL-4-Amino-pentanoic acid)	214 (cor)									132			
47	L-Canaline	214				0.77					99 (di)		192.3	
48	β-Aminoiso-valeric acid	217												Hydrochloride, 120
49	β-Hydroxy-valine	218								182	153 (mono)			2-Naphthalene-sulfonyl, 261
50	L-Proline	220.2	-93.0	20	c = 2.42 in 0.6 N-KOH	0.88	0.28	0.43	130-3				154	Phenylhy-dantoin, 144
			-52.6	20	c = 0.57 in 0.5 N-HCl									
51	L-Citrulline	222	3.7	20	c = 2 in water	0.63	0.23	0.25					206	
52	7-Amino-1-naphthoic acid	223-4												Acetyl, 229
53	L-Lysine	224	14.6	20	c = 6.5 in water	0.81	0.11	0.14		184	235 (mono), 149 (di)		266	Monohydro-chloride 235
			25.9	22.9	c = 2.0 in 6 N-HCl									Dihydrochloride, 193 α,ε-Dicarboben-zyloxy, 150
54	β-L-Asparagine	227				0.40	0.21	0.19	175	164	189	196	180	Carboben-zyloxy, 165
55	3,5-Diamino-benzoic acid	228												3,5-Diacetyl, 184, Et ester, 84
56	L-Serine	228	14.45	25	c = 9.34 in 1 N-HCl	0.36	0.28	0.27						Carboben-zyloxy, 121
			-6.83	20	c = 10.4 in water									
57	Glycine	228.30, 262				0.41	0.24	0.26	147	197	187.5	179	202	Carboben-zyloxy, 120
58	DL-Thyroxine	230 s h, 250 r h				0.86	0.76				210.5			N-Chloro-acetyl, 201, Me ester 156
59	DL-β-Hydroxy-norvaline	230								156	170			Phenylhy-dantoin, 154.5

* Derivative data given in order m p, crystal color, solvent from which crystallized

** Decomposition points of amino acids are only a first doubtful identification as they depend on velocity of heating and other conditions

*** Aqueous phenol 80% w/w, for basic amino acids 3 vol —% of a conc aq NH₃ has to be present (in a separate vessel) in the chamber, otherwise low values are obtained, Collidine-lutidine mixture 2,6-lutidine (100 ml), 2,4,6-collidine (100 ml), water (100 ml), diethylamine (3 ml), Butanol-acetic acid-water 40 ml 10 ml 10 ml

TABLE XVII. ORGANIC DERIVATIVES OF AMINO ACIDS
(Listed in order of increasing decomposition temperatures)* ** (Continued)

No	Name	Decomp temp, °C	Specific rotation			Rf values***			<i>p</i> -Toluene sulfonyl	Phenyl urea	Benzoyl	3,5-Dinitrobenzoyl	Picrate	Miscellaneous
			[α] _D	T, °C	Conc (C) and solvent	Aqueous phenol	Collidine-Lutidine	Butanol-Ac acid						
60	DL-β-Amino-hydrocinnamic acid	231								194 6			Hydrochloride, 218, Formyl, 128-9, Acetyl, 161, al Amide, 266	
61	DL-Homo-aspartic acid (α-Amino-α-methyl succinic acid)	232												
62	D-β-Amino-hydrocinnamic acid	234-5	7 0	20	water								N-Formyl, 142-3	
63	L-β-Amino-hydrocinnamic acid	234-5	-7 5	25	water								N-Formyl, 142 3	
64	3-Amino-salicylic acid	235								189			Acetyl, 215, N-Benzenesulfonyl, 194	
65	DL-Allo-threonine	237				0 50	0 34				176 (mono), 174 (di)			
66	DL-Arginine	238				0 89	0 17	0 2			230 (di, anh), 176 (di, hyd)	200 (mono), 196 (di)		
67	4-Dimethyl-aminobenzoic acid	242											Amide, 206, Anilide, 182 3	
68	β-Amino-β-phenyliso-butyric acid	243									205			
69	DL-Isoserine	246				0 39				184	151		Phenylurethane, 183-4	
70	DL-Serine	246				0 36	0 28	0 27	213	169	149-50		Carbobenzoyloxy, 125	
71	4-Hydroxy-phenylglycine	248									117		Monoacetyl, 203, Diacetyl, 174 5, Amide, 135	
72	Isoaspartic acid (α-Amino-α-methylmalonic acid)	250											Diamide, 200 1 Heat → alanine, 295 d	
73	DL-Threonine	251				0 50	0 34	0 35			177 8	145	Phenylhydantoin, 164	
74	DL-α-Amino-phenylacetic acid	256 (subl)									175, al		Acetyl, 198 5, Formyl, 180	
75	L-Cystine	260	-214 4 -70 0	24 4 18 5	c = 1 0 in 1 02 N-HCl c = 0 4 in 0 2 N-NaOH			0 1	204 5	160	181 (di)	180	Dicarbobenzoyloxy, 123	
76	DL-α-Amino-hydratropic acid (DL-α-Phenyl-alanine)	260 (subl)											N-Carboethoxy, 191, al	

* Derivative data given in order m p, crystal color, solvent from which crystallized

** Decomposition points of amino acids are only a first doubtful identification as they depend on velocity of heating and other conditions

***Aqueous phenol 80%, w/w for basic amino acids 3 vol —% of a conc aq NH₃ has to be present (in a separate vessel) in the chamber, otherwise low values are obtained. Collidine-lutidine mixture 2,6-lutidine (100 ml), 2,4,6-collidine (100 ml), water (100 ml), diethylamine (3 ml), Butanol-acetic acid-water 40 ml 10 ml 10 ml

TABLE XVII. ORGANIC DERIVATIVES OF AMINO ACIDS
(Listed in order of increasing decomposition temperatures)* ** (Continued)

No	Name	Decomp temp. °C	Specific rotation			Rf values***			<i>p</i> -Toluene-sulfonyl	Phenyl urea	Benzoyl	3,5 Dinitro benzoyl	Picrate	Miscellaneous
			[α] _D	T °C	Conc (C) and solvent	Aqueous phenol	Collidine-Lutidine	Butanol Ac acid						
77	Glycylglycine	260				0.39		0.22	178	176	208	210		Carboben-zyloxy, 178
78	DL-β-Phenylalanine	264				0.85	0.48	0.68	134.5	182	188		173	Carboben-zyloxy, 103
79	DL-Aspartic acid	270 (>300)				0.19	0.21	0.24			119 (hyd), 176 (anh)			Carboben-zyloxy, 116
80	DL-α-Amino-octanoic acid	270				0.89	0.55				128			
81	L-Aspartic acid	270	24.6	24	c = 2.0 in 6 N HCl	0.19	0.21	0.24	140	162	185			Carboben-zyloxy, 116
82	DL-α-Amino-nonanoic acid	273									128			
83	L-Hydroxy-proline	274	-47.3 -75.2	20 22.5	c = 1.31 in 1 N-HCl c = 1.0 in water	0.63	0.28		153	175	100 (mono), 92 (di)			
84	DL-Trypto-phane	275				0.75	0.50	0.50	176			240		N-Benzene-sul-fonyl 185 Carboben-zyloxy, 169-70 1-Naphthyl-urea, 198
85	α-Aminoiso-butyric acid	280				0.74	0.32				198			
86	DL-α-Amino-heptanoic acid	281									135			
87	DL-Methionine	281				0.81	0.42	0.55	105		145			Acetyl, 114, Formyl, 100, Carboben-zyloxy, 112
88	5-Aminosalic-lic acid	283									252			Monoacetyl, 218 Diacetyl, 184
89	DL-Lanthionine	283				0.26	0.11				195.8 (di)			
90	L-Methionine	283	-8.11	25	c = 0.8 in water	0.81	0.42	0.55				94.5 (hyd), 150 (anh)		Acetyl, 98.9 1-Naphthyl-urea, 188
91	L-(+)-Iso-leucine		40.6 11.29	20 20	c = 5.1 in 6.1 N-HCl c = 3.1 in water	0.84	0.45	0.72	130-2	121	117			Formyl, 156
92	L-Phenylala-nine	283 320	-35.1	20	c = 1.94 in water	0.85	0.48	0.68	164	181	146	93		Carboben-zyloxy, 126.8
93	L-Hexahydro-tyrosine	285												N-4-Nitro-benzoyl, 225
94	D(-)-Iso-leucine	285	-40.86	20	c = 4.53 in 6.1 N-HCl	0.84	0.45	0.72	130.2	121	117			Formyl, 156
95	L-Histidine	288, 253	13.0 -39.0	22.7 25	c = 1.5 in 6 N-HCl c = 1.13 in water	0.69	0.27	0.2	202.4		230 (mono)	189	86	Carboben-zyloxy, 209
96	L-Cysteic acid	289 260	8.66	20	c = 1.85 g in 25 ml water									Diphenylacyl ester, 203

* Derivative data given in order m p, crystal color, solvent from which crystallized

** Decomposition points of amino acids are only a first doubtful identification as they depend on velocity of heating and other conditions

*** Aqueous phenol 80%, w/w for basic amino acids 3 vol —% of a conc aq NH₃ has to be present (in a separate vessel) in the chamber, otherwise low values are obtained. Collidine-lutidine mixture: 2,6-lutidine (100 ml), 2,4,6-collidine (100 ml), water (100 ml), diethylamine (3 ml). Butanol-acetic acid-water: 40 ml 10 ml 10 ml

TABLE XVII. ORGANIC DERIVATIVES OF AMINO ACIDS
(Listed in order of increasing decomposition temperatures)* ** (Continued)

No	Name	Decomp temp., °C	Specific rotation			Rf values***			<i>p</i> -Toluene sulfonyl	Phenyl urea	Benzoyl	3,5-Dinitrobenzoyl	Picrate	Miscellaneous
			[α] _D	T, °C	Conc (C) and solvent	Aqueous phenol	Collidine-Lutidine	Butanol Ac acid						
97	L-Tryptophane	290 252	-31.5 6.17	22.7 20	c = 1.0 in water c = 2.42 in 0.5 N-NaOH	0.75	0.50	0.5	176	166	183	233		Carbobenzoyloxy, 126
98	DL-N-Methyl-α-alanine	292												Methylamide, 43, Hydrochloride, 110
99	DL-Isoleucine	292, 275 s h				0.84	0.45	0.72	141	120	118			Formyl, 121
100	L-(+)-α-Aminobutyric acid	292, 303 s h	18.65	19	c = 4.8 in 6 N-HCl	0.71	0.31	0.45			121			Formyl, 126, 1-Naphthylurea, 195
101	DL-Leucine	293, s h 332				0.84	0.45	0.73		165	137.41	187		
102	DL-α-Amino-α-methylvaleric acid (DL-α-Amino-α-methylpentanoic acid)	295, s h												1-Naphthylurea, 196
103	DL-Alanine	295				0.60	0.28	0.38	139		166	177		Carbobenzoyloxy, 114.5 Formyl, 194.5
104	D-α-Amino-hydratropic acid	295 (subl.)	70.0	18	water									
105	L-Alanine	297	14.7 2.7	15 22	c = 5.8 in 0.97 N-HCl c = 10.3 in water	0.60	0.28	0.38	133		151			Carbobenzoyloxy, 84 1-Naphthylurea, 220.2 Formyl, 114
106	DL-Norleucine	297 327				0.84	0.45	0.74	124					
107	DL-Valine	298, s h 282				0.78	0.36	0.6	110	164	132	158		
108	L-Djenkotic acid	300-50	-60.5 -47.5	20.5 25	1% in 1N-HCl 2% in 1N-HCl water	0.40	0.13				166 (mono), 88 (di)			
109	D-N-Methyl-α-alanine	300	5.6	20	water									Hydrochloride, 165.6
110	Taurine	300-5				0.42								N-Me, 241, N-Et, 147
111	L-(+)-Norleucine	301	21.3 6.26	20 20	c = 4.25 in 6 N-HCl c = 0.7 in water	0.84	0.45	0.74			53			Formyl, 115-6, 2-Naphthalenesulfonyl, 149
112	DL-Norvaline	303, s h				0.80	0.39	0.65		117				Formyl, 132, Phenylhydantoin, 103 Diacetyl, 165
113	Creatine (α-Methylguanidoacetic acid)	303											218.20	
114	4-Aminocyclohexanecarboxylic acid	303-4												Heat → lactam, 191-2

*Derivative data given in order m p, crystal color, solvent from which crystallized

**Decomposition points of amino acids are only a first doubtful identification as they depend on velocity of heating and other conditions

***Aqueous phenol 80% w/w for basic amino acids 3 vol —% of a conc aq NH₃ has to be present (in a separate vessel) in the chamber, otherwise low values are obtained. Collidine-lutidine mixture 2,6-lutidine (100 ml), 2,4,6-collidine (100 ml), water (100 ml), diethylamine (3 ml) Butanol-acetic acid-water 40 ml 10 ml 10 ml

TABLE XVII. ORGANIC DERIVATIVES OF AMINO ACIDS
(Listed in order of increasing decomposition temperatures)* ** (Continued)

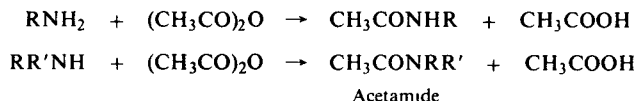
No	Name	Decomp temp °C	Specific rotation			Rf values***			<i>p</i> Toluene sulfonyl	Phenyl urea	Benzoyl	3,5 Dinitro benzoyl	Picrate	Miscellaneous
			[α] _D	T °C	Conc (C) and solvent	Aqueous phenol	Collidine-Lutidine	Butanol Ac acid						
115	DL-α-Aminobutyric acid	304				0.71	0.31	0.45		170	147			1-Naphthylurea, 194, Phthalyl, 96
116	meso-Lanthionine	304				0.26	0.11				198-200			Dicarbo-benzyloxy, 139-40
117	Creatinine	305, 260											220	
118	L-α-Aminophenylacetic acid	305, 10	-111.0, -157	20, 20	water dil HCl									Acetyl 191, Formyl 190
119	meso-2,3-Diaminosuccinic acid	306									(di) 212 hyd			Diacetyl, 235
120	L-(+)-Norvaline	307	23.0	20	c = 10 in 10% HCl	0.80	0.39				64			Acetyl, 137
121	L-Tyrosine	314-8 r h, 290.5 s h	-8.64, -13.2	20, 18	c = 4.4 in 6.3 N HCl, c = 0.91 in 3 N-NaOH	0.51	0.51	0.45	N- 188	104	N- 166, 7, 211, 2 (di)			N-Acetyl, 148, Diacetyl, 172, N-Carbobenzyloxy, 101
122	L-(+)-Valine	315	28.8	20	c = 3.4 in 6 N-HCl	0.78	0.36	0.60	147		127	157.8		Carbobenzyloxy, 64-5
123	L-Leucine	337	15.1, -10.8	25.9, 24.7	c = 2.0 in 6 N-HCl, c = 2.0 in water	0.84	0.45	0.73	124	115	118	187		
124	DL-Tyrosine	340 r h, 295 s h, 350, 320 s h				0.51	0.51	0.45	224.6		N- 197	252.4 (di)		
125	1-Aminocyclohexanecarboxylic acid	350, 320 s h											209-10	Hydrochloride, 310
126	DL-2,3-Diaminosuccinic acid										164 (di) hyd			Diacetyl, 235
127	DL-Ornithine					0.79	0.11	0.15	188 (mono)	192	4 N, 285-8, 188 (di)		208 (di)	
128	L-(+)-Alloisoleucine		38.1	20	c = 3.97 in 6 N-HCl					151				Formyl, 126, 1-Naphthylurea, 166, Benzene-sulfonyl, 147
129	DL-Lysine					0.81	0.11	0.14		196	249 (mono), 146 (di)		225 (mono)	Monohydrochloride, 260.3, Dihydrochloride, 187-9
130	L-Cysteine					0.57								S-Benzyl, 216, Oxid → L-cystine, 260 d Hydrochloride, 175-8, [α] _D ²⁵ 9.5 (c = 2 in water)

*Derivative data given in order m p, crystal color, solvent from which crystallized

**Decomposition points of amino acids are only a first doubtful identification as they depend on velocity of heating and other conditions

***Aqueous phenol 80°, w/w for basic amino acids 3 vol —°, of a conc aq NH₃ has to be present (in a separate vessel) in the chamber otherwise low values are obtained. Collidine-lutidine mixture 2.6-lutidine (100 ml) 2.4-collidine (100 ml), water (100 ml) diethylamine (3 ml) Butanol-acetic acid-water 40 ml 10 ml 10 ml

EXPLANATIONS AND REFERENCES TO TABLE XVIII

*Acetamide (Acetyl derivative) ***For primary and secondary amines only*

From the amine with acetic anhydride without solvent

For directions and examples see Cheronis, pp 591-593, Linstead, p 60, Vogel, p 652, Wild, p 218, J J Sudborough, *J Chem Soc*, **79**, 533 (1901), L C Raiford, R Taft and H P Lankelma, *J Amer Chem Soc*, **46**, 2051 (1924)

From the amine with acetic anhydride in aqueous sodium hydroxide

See F D Chattaway, *J Chem Soc*, 2495 (1931)

From the amine with acetic anhydride in pyridine

See Cheronis, pp 590, 592-593

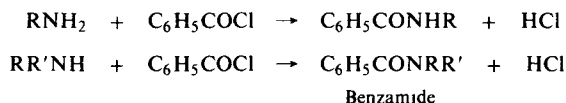
From the amine hydrochloride with acetic anhydride in aqueous sodium acetate

See Linstead, p 60, Vogel, p 652

From the amine with acetic anhydride in water

See Shriner, p 226

From the amine with acetic anhydride in acetic acid

See Wild, p 218*Benzamide (Benzoyl derivative) ***For primary and secondary amines only*

From the amine with benzoyl chloride in aqueous sodium hydroxide

For directions and examples see Cheronis, pp 591, 593-594, Linstead, p 60, Vogel, p 652, Wild, p 219

From the amine with benzoyl chloride in a pyridine-benzene mixture

See Shriner, p 226

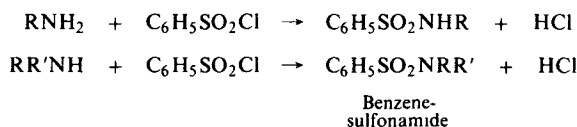
From the amine with benzoyl chloride in benzene

See Shriner, p 227

From the amine with benzoyl chloride in an aqueous sodium hydroxide-chloroform mixture

See Shriner, p 226

From the amine with benzoyl chloride

See Vogel, p 653*Benzenesulfonamide (Benzenesulfonyl chloride derivative) ***For primary and secondary amines only*

From the amine with benzenesulfonyl chloride in aqueous sodium hydroxide

For directions and examples see Cheronis, pp 595-596, Shriner, pp 103-104, Vogel, p 653, O Hinsberg, *Chem Ber*, **23**, 2962 (1890), **38**, 906 (1905)

From the amine in aqueous sodium hydroxide with benzenesulfonyl chloride in methanol

See Cheronis, p 596

From the amine with benzenesulfonyl chloride in benzene

See Wild, p 221

From the amine in aqueous sodium hydroxide with benzenesulfonyl chloride in acetone

See Wild, p 221

From the amine with benzenesulfonyl chloride in aqueous pyridine

See Wild, p 221

From the amine with benzenesulfonyl chloride in pyridine

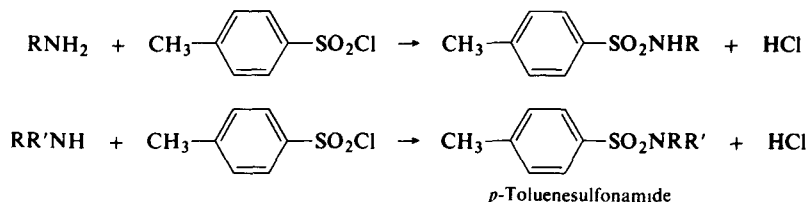
See Vogel, p 653***Derivatives recommended for first trial****WARNING** This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE XVIII (Continued)

From the amine with benzenesulfonyl chloride in aqueous sodium hydroxide

See Wild, p 221

p-Toluenesulfonamide (*p*-Toluenesulfonyl chloride derivative) *



For primary and secondary amines only

From the amine with *p*-toluenesulfonyl chloride in aqueous sodium hydroxide

For directions and examples see Cheronis, p 595, Linstead, p 60, Shriner, pp 103 104, Vogel, p 653

From the amine with *p*-toluenesulfonyl chloride in benzene

See Wild, p 221

From the amine with *p*-toluenesulfonyl chloride in acetone

See Wild, p 221

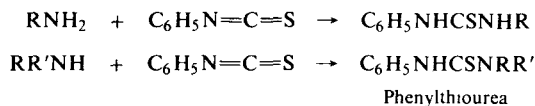
From the amine with *p*-toluenesulfonyl chloride in pyridine

See F Bell, *J Chem Soc*, 2787 (1929)

From the amine with *p*-toluenesulfonyl chloride in aqueous pyridine

See Wild, p 221

Phenylthiourea *



For primary and secondary amines only

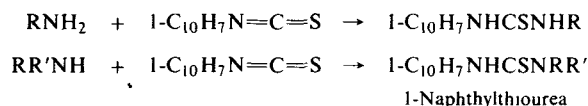
From the amine with phenylisothiocyanate in alcohol

For directions and examples see Cheronis, pp 599-600, Shriner, p 227, Vogel, p 422, Wild, p 227, T Otterbacher and F C Whitmore, *J Amer Chem Soc*, 51, 1909 (1929)

From the amine with phenylisothiocyanate without solvent

See Vogel, p 422, Wild, p 227, N A Lange, H L Ebert and L K Youse, *J Amer Chem Soc*, 51, 1911 (1929)

1-Naphthylthiourea *



For primary and secondary amines only

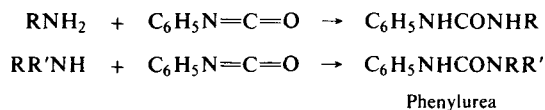
From the amine with 1-naphthylisothiocyanate in ethanol

For directions and examples see Cheronis, pp 600-601, Vogel, p 422, Wild, p 227, C M Suter and E W Moffet, *J Amer Chem Soc*, 55, 2497 (1933)

From the amine with 1-naphthylisothiocyanate without solvent

See Vogel, p 422, Wild, p 227, C M Suter and E W Moffet, *J Amer Chem Soc*, 55, 2497 (1933)

Phenylurea



For primary and secondary amines only

From the amine with phenylisocyanate in petrol ether

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

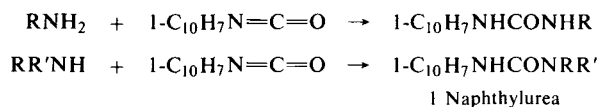
EXPLANATIONS AND REFERENCES TO TABLE XVIII (Continued)

For directions and examples see Linstead, p 61, Wild, pp 223 224

From the amine with phenylisocyanate without solvent

See N A Lange, H L Ebert and L K Youse, *J Amer Chem Soc*, **51**, 1911 (1929)

1-Naphthylurea *



For primary and secondary amines only

From the amine with 1-naphthylisocyanate without solvent

For directions and examples see Cheronis, p 599, H E French and A F Wirtel, *J Amer Chem Soc*, **48**, 1736 (1926)

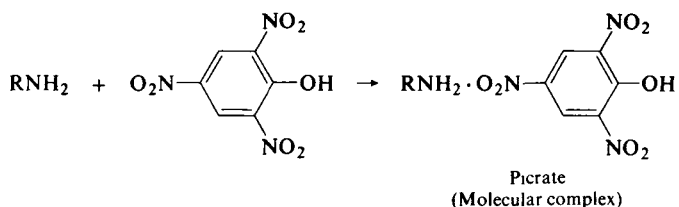
From the amine with 1-naphthylisocyanate in petrol ether

See Linstead, p 61, Wild, pp 223 224

From the amine with 1-naphthylisocyanate with water

See Wild, p 224

Picrate *



For primary, secondary and tertiary amines

From the amine with picric acid in methanol or in ethanol

For directions and examples see Cheronis, pp 603 604, Linstead, p 50, 61, Shriner, p 229, Vogel, pp 422-423, Wild, p 212

From the amine with picric acid in water

See Vogel, p 422

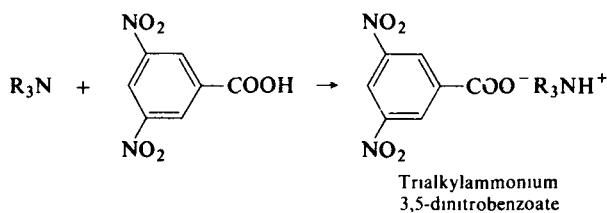
From the amine with picric acid in acetone or benzene

See Wild, p 212

From the amine with picric acid

See Shriner, p 229

3,5-Dinitrobenzoic acid salt *

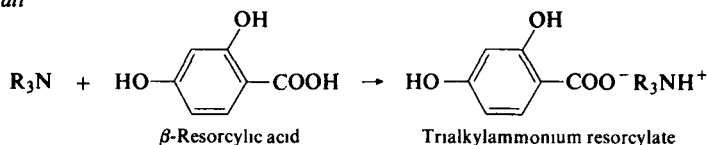


Especially for tertiary amines

From the amine with 3,5-dinitrobenzoic acid in methanol or ethanol

For directions and examples see Cheronis, pp 602 603, Wild, p 215, C A Buehler, E J Currier and R Lawrence, *Ind Eng Chem, Anal Ed*, **5**, 277 (1933), C A Buehler and J D Calfree, *Ind Eng Chem, Anal Ed*, **6**, 351 (1934)

β -Resorcylic acid salt



*Derivatives recommended for first trial

WARNING This is not an instruction manual References should be consulted for the preparation of derivatives

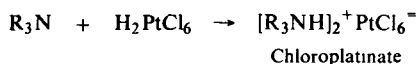
EXPLANATIONS AND REFERENCES TO TABLE XVIII (Continued)

Especially for tertiary amines.

From the amine with β -resorcylic acid in ether.

For directions and examples see: Cheronis, p. 603; K. W. Wilson, F. E. Anderson and R. W. Donohoe, *Anal. Chem.*, **23**, 1032 (1951).

*Chloroplatinic acid salt.**

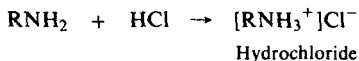


Especially for tertiary amines.

From the amine in aqueous hydrochloric acid with aqueous chloroplatinic acid.

For directions and examples see: Shriner, p. 230; Wild, p. 213.

Hydrochloride.



For primary, secondary and tertiary amines.

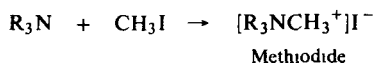
From the amine with gaseous hydrogen chloride in ether, benzene or chloroform.

For directions and examples see: Cheronis, p. 601; Shriner, p. 224; Wild, p. 211.

From the amine with dilute aqueous hydrochloric acid.

See: Wild, p. 211.

*Methiodide.**



Especially for tertiary amines.

From the amine with methyl iodide without solvent.

For directions and examples see: Linstead, p. 61; Shriner, p. 228; Vogel, p. 660; Wild, p. 232.

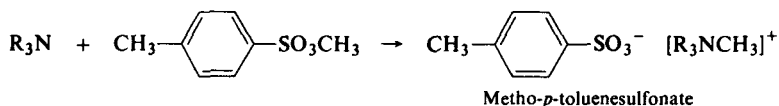
From the amine with methyl iodide in isopropyl ether.

See: Cheronis, p. 604.

From the amine with methyl iodide in ether or benzene.

See: Vogel, p. 660.

*Metho-*p*-toluenesulfonate (Methyl *p*-toluenesulfonate).**



Especially for tertiary amines.

From the amine with methyl *p*-toluenesulfonate in isopropyl ether.

For directions and examples see: Cheronis, p. 604.

From the amine with methyl *p*-toluenesulfonate in benzene.

See: Linstead, p. 62; Shriner, p. 229; Vogel, p. 660; Wild, p. 233; C. S. Marvell, E. W. Scott and K. L. Amstutz, *J. Amer. Chem. Soc.*, **51**, 3638 (1929).

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n_D	Density g/ml	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
1	Methylamine	-6			0.699 ₄ ¹¹	28	80	30	75	113	207, 215	
2	Dimethylamine	7			0.680 ₄ ⁹		41	47	79	135	158	
3	Ethylamine	16.5			0.705 ₇ ⁴		71	58	63	106	165	
4	Isopropylamine	19 33		1.377 ¹⁵	0.691 ₄ ⁸			26		135 101		1-Naphthylurea, 200, 1-Naphthylthiourea, 143
5	Ethyl methyl amine	36									196	Chloroplatinate, 207, Hydrochloride, 126-30
6	<i>tert</i> -Butylamine	46		1.379 ₄ ¹⁸	0.700 ₄ ¹⁵	101.2	134			120	198	Hydrochloride, 270-80
7	<i>n</i> -Propylamine	49		1.390 ₁ ¹⁷	0.714 ₂ ²⁵		84	36	52	63	135	1-Naphthylurea, 196
8	Isopropyl methyl amine	50			0.702 ₆ ¹⁹					120	135	Phenylurea, 131
9	Cyclopropylamine	50		1.421 ²⁰	0.824 ₂ ²⁰		99	120 (<i>dt</i>)			149	Hydrochloride, 100
10	Ethyleneimine	56			0.832 ²⁴				52		142	Oxalate, 115
11	Diethylamine	56		1.387 ₃ ¹⁸	0.710 ₈ ¹⁸		42	42	60	34	155	1-Naphthylthiourea, 108
12	Allylamine	58		1.419 ₄ ²²	0.743 ₆ ²⁰			39	64	98	140	
13	DL- <i>sec</i> - <i>n</i> -Butylamine (2-Aminobutane)	63		1.395 ¹⁷	0.718 ²⁰		76	70	55	101	139.40	
14	<i>unsym</i> -Dimethylhydrazine	63		1.407 ₅ ²²	0.791 ₄ ²²							Hydrochloride, 81-2, Oxalate, 142, Sulfate, 105
15	Trimethyleneimine (Azetidene)	63		1.428 ₇ ²⁴	0.843 ₆ ²⁰						166-7	Chloroplatinate, 203, Chloroaurate, 192
16	Isobutylamine	69		1.398 ₈ ¹⁷	0.724 ₂ ²⁵		57	53	78	82	150	
17	<i>n</i> -Butylamine	77		1.401	0.740 ₁ ²⁰					65	151	1-Naphthylurea, 149, 1-Naphthylthiourea, 108-9, Hydrochloride, 195
18	2-Amino-2-methylbutane	78			0.756 ₀ ⁹						183	
19	DL- <i>sec</i> -Butyl methyl amine	78.9			0.740 ¹⁵						78	Chloroplatinate, 151
20	Ethyl propyl amine	80.1		1.3966	0.773 ²⁴							Hydrochloride, 225, Chloroplatinate, 198, Chloroaurate, 86
21	<i>Sym</i> -Dimethylhydrazine	81		1.420 ₉ ²⁰	0.827 ₄ ²⁰						147.50	Oxalate, 119, Hydrochloride, 168
22	Cyclobutylamine	82		1.436 ₃ ¹⁹	0.832 ₈ ²⁰							Chloroplatinate, 210.5
23	Di-isopropylamine	84			0.722 ²²						140	N-Nitroso, 48, Chloroplatinate, 186.9, Hydrochloride, 216-7
24	Pyrrolidine	89		1.427 ₀ ¹⁵	0.852 ²²				123		112, yel., 163-4, red	
25	<i>n</i> -Butyl methyl amine	90-1		1.401 ₈ ¹⁸	0.736 ₇ ¹⁵						111	Hydrochloride, 170, Chloroplatinate, 205
26	5-Amino-1-pentene	91-4										Chloroplatinate, 166, Chloroaurate, 195
27	DL-2-Amino- <i>n</i> -pentane (<i>sec</i> - <i>n</i> -Amylamine)	92			0.738 ₄ ²⁰							Hydrochloride, 168, Oxalate, 226, 131
28	Isoamylamine	96		1.409 ₆ ¹⁸	0.751 ¹⁸					102	138	Chloroaurate, 82-3 1-Naphthylurea, 132

*Derivative data given in order m.p., crystal color, solvent from which crystallized.

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES

1. Primary and secondary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point, °C	n_D	Density g/ml	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
29	D-2-Methyl- <i>n</i> -butylamine (active-Amylamine)	96			0.7505 ₄ ²⁵							$[\alpha]_D^{25} - 5.86$, Hydrochloride, 176, Chloroplatinate, 240
30	2-Methylpyrrolidine	97.8			0.84 ₂₀ ²⁰						88.5, 9.5	Oxalate, 178.9, Chloroplatinate, 172.3 (anh.), 206-7, rapid htng Picrate of <i>N</i> -methyl deriv., 235
31	3-Methylpyrrolidine	103.5		1.4480 ²⁰	0.8654 ₄ ⁰						106	Chloroplatinate, 194
32	<i>n</i> -Amylamine	104			0.7614 ₂₀ ²⁰					69	139	2-Naphthylthiourea, 114
33	2-(Methylamino)- <i>n</i> -pentane	105			0.947 ²⁰						77.8	Chloroplatinate, 138
34	Piperidine	106		1.4530 ²⁰	0.8606 ₄ ²⁰	48		93.4	96	101	152	
35	2-Aminodiethylether	108.9		1.4101 ²⁰	0.8512 ₄ ²⁰						122	Picronate, 204
36	Di- <i>n</i> -propylamine	109.10		1.4046 ²⁰	0.7384 ₂₀ ²⁰			51		69	75	1-Naphthylurea, 93
37	2,5-Dimethylpyrrolidine	110.3		1.4357 ¹⁵	0.8185 ₄ ¹⁴						117.8	Hydrochloride, 188.90, Chloroplatinate, 225
38	2,4-Dimethylpyrrolidine	115.7		1.4325 ²⁰	0.8297 ₄ ²⁰						116.7	Chloroplatinate, 210
39	1,2-Ethylenediamine	116	8.5	1.454 ²⁶	0.898 ₄ ²⁵	172 (di)	244 (di)	168 (di)	360 (di)	102	233 (di)	
40	L-2-Methylpiperidine	117	50.1								116.7	Hydrochloride, 190, Chloroplatinate, 194
41	DL-2-Methylpiperidine	118-9		1.4464 ²⁴	0.8436 ₄ ²⁴		45		55		164	Hydrochloride, 207, Oxalate, 125
42	DL-1,2-Diaminopropane	119-20			0.878 ¹⁵	139 (di)	192 (di)				135 (di)	
43	Isohexylamine	125			0.758 ₄ ²⁵						123.5	Hydrochloride, 220, Oxalate, 166, Chloroplatinate, 200
44	DL-3-Methylpiperidine	126		1.446 ²⁴	0.845 ₄ ²⁴						138 (di)	Hydrochloride, 172, N-2,4-Dinitrophenyl deriv., 67
45	2,6-Dimethylpiperidine	127-8		1.4366 ²⁵	0.816 ₄ ²⁵		111	50			162.4	Chloroplatinate, 212
46	<i>n</i> -Hexylamine	130	-19		0.763 ₄ ²⁵		40	96		77	126	
47	3-Amino- <i>n</i> -hexane	130										Hydrochloride, 227, Chloroplatinate, 190.200
48	Morpholine	130					75	118	147	136	146	
49	Cyclohexylamine	134		1.4372 ²⁰	0.8191 ₄ ²⁰	101	149	89		148		
50	Trimethylenediamine (1,3-Diaminopropane, 1,3-Propylenediamine)	136			0.884 ₄ ²⁵	1.3-di, 126, 107	1.3-di, 140, 147	96	148		250	Chloroplatinate, 240
51	2,2,6-Trimethylpiperidine	138.9									195.6	Hydrochloride, 236, Chloroaurate, 128
52	Di-isobutylamine	139	-77	1.4093 ²⁰	0.745 ₄ ²⁰	86		55, 57		113	121	
53	4-Amino- <i>n</i> -heptane	139.40			0.767 ₄ ²⁰							Hydrochloride, 246-7, Chloroplatinate, 235
54	1,3-Diaminobutane	141.2									240-5	Hydrochloride, 171.2
55	2-Amino- <i>n</i> -heptane	142		1.4199 ¹⁹	0.7665 ₄ ¹⁹							Hydrochloride, 133, Oxalate, 204-5, Chloroaurate, 63.4
56	unsym-Diethylethylenediamine	145			0.827 ₁₉ ¹⁹					115 (mono), 211 (di)		Chloroaurate, 63.4, Chloroplatinate, 211
57	Furfurylamine (α -Furylmethylamine)	145.6									150	Oxalate, 145, With CO ₂ from air \rightarrow comp., 75, Hydrochloride, 110

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES

1. Primary and secondary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D	Density g/ml	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
58	Cyclohexyl methyl amine	145.7					85-6				170	Hydrochloride, 193
59	2-Ethylpiperidine (α -Ethylpiperidine)	146.7			0.8651 ₀			64-5			133	Hydrochloride, 181, Chloroplatinate, 202
60	2,2,4-Trimethylpiperidine	148			0.832 ¹⁵							Chloroplatinate, 215, Methiodide, 266
61	Sym-Diethylethylenediamine	149.50										Hydrochloride, 260, Chloroplatinate, 223, Chloraurate, 220
62	4-Ethylpiperidine (γ -Ethylpiperidine)	151		1.4503 ²⁵	0.876 ⁰			74-5				Chloroplatinate, 173, Chloraurate, 105
63	3-Ethylpiperidine (β -Ethylpiperidine)	153			0.871 ₄ ¹⁶						63	Hydrochloride, 141, Chloroplatinate, 183
64	<i>n</i> -Heptylamine	155	-23	1.41954 ²⁶ _{α}	0.777 ²⁰					75	121	1-Naphthylthiourea, 68.9
65	Di- <i>n</i> -butylamine	159								86	59	1-Naphthylthiourea, 123
66	Tetramethylenediamine (1,4-Diaminobutane, Putrescine)	159	27		0.877 ₄ ²⁵	137 (di)	177 (di)		224 (di)		249-50 (di)	
67	DL-2-Hydroxy- <i>n</i> -propylamine (Isopropanolamine)	163			0.973 ¹⁸						142	Chloroplatinate, 195, Hydrochloride, 73
68	Hexahydrobenzylamine	163.5		1.4646 ¹⁸	0.87 ₄ ²⁰		98, 107				184.6	Hydrochloride, 254
69	Cyclohexyl ethyl amine	164			0.868 ₀						133	Hydrochloride, 184
70	2-Ethylcyclohexylamine	170.1		1.4682 ²⁰	0.8744 ₄ ²⁰			121-2			190	Chloroplatinate, 239
71	2-Aminoethyl alcohol (Ethanolamine)	171		1.4539 ²⁰	1.022 ₄ ²⁰						160	1-Naphthylurea, 186
72	3-Amino-2-hydroxypentane	172			0.906 ¹⁸							N-Chloroacetyl deriv., 52.60, Monooxalate, 166, Dioxalate, 204
73	2-Aminopropyl alcohol	173-6										Hydrochloride, 86, Chloroplatinate, 198.9
74	2-Amino-3-hydroxypentane	174		1.4458	0.9289 ²⁴							Chloroplatinate, 154, Picronate, 215
75	2-Fluoroaniline	176	-35 -29			80	113					Picrate of N,N-dimethyl deriv., 131
76	Pentamethylenediamine (1,5-Diaminopentane, Cadaverine)	178.80			0.9174 ₀		135 (di)	119		148	237	
77	<i>n</i> -Octylamine	180			0.777 ²⁰							1-Naphthylthiourea, 72
78	5-Methyl-2-pyrazoline	180					156				126	Phenylurea, 127
79	Benzyl methyl amine	181			0.945 ₁₅ ¹⁸				95		117-8	Chloroplatinate, 197
80	Aniline	184		1.5863 ²⁰	1.022 ₄ ²⁰	114	160	112	103	54	180	
81	Benzylamine	184-5		1.5401	0.9826 ₄ ¹⁹	65	105	88	116, 185	156	194	
82	4-Fluoroaniline	186	-1	1.5195 ²⁰	1.1725 ₀ ²⁰	152	185					N-4-Nitrobenzoyl deriv., 181
83	DL- α -Phenylethylamine (α -Aminoethylbenzene)	187, 185			0.9395 ¹⁵	57	120					Hydrochloride, 158
84	1,2-Diaminocyclohexane	187				260 (di)					210.5 (di)	Hydrochloride, 280
85	3-Fluoroaniline	187-8, yel			1.160 ¹⁶	84						
86	Di-isoamylamine	187-8	-44	1.4229 ²¹	0.7672 ₄ ¹					72	94.5	1-Naphthylurea, 95, Methiodide, 221
87	3-Aminopropyl alcohol	188		1.457 ²⁶	0.982 ₄ ²⁶						222	Chloroplatinate, 199

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D	Density g/ml	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenylthiourea	Picrate	Miscellaneous
88	1,2,3-Triaminopropane	190				200-2 (<i>tri</i>)	217-8 (<i>tri</i>)				>269	
89	4-Amino-2,6-dimethylpiperidine	195									220	Chloroplatinate, >250
90	N-Methylaniline	196		1.573 ¹⁶	0.989 ²⁰ ₄	102	63	79	94	87	145	
91	1-Phenylisopropylamine	196-7		1.5181 ²⁵	0.9424 ²⁰ ₀		159					Oxalate, 131, Hydrochloride, 236
92	β -Phenylethylamine (β -Aminoethylbenzene)	198			0.958 ²⁴ ₇	51	116	69		135	174, 167	
93	Benzyl ethyl amine	199			0.935 ¹⁷ ₁₅				50		118	Hydrochloride, 184
94	2-Methylaniline (<i>o</i> -Toluidine)	200		1.5688 ²⁰	1.0053 ²⁰ ₀	110-1	146	124	185.6	136	213	
95	<i>n</i> -Nonylamine	201				34-5	49				111	
96	3-Methylaniline (<i>m</i> -Toluidine)	203		1.5686 ²⁰	0.990 ²⁵ ₂₅	65	125	95	171-2		200	
97	Di- <i>n</i> -amylamine	205								72		2-Naphthylthiourea 126, Hydrochloride, 275
98	DL-2-Phenylisopropylamine	205				64 initially, 93 on standing					143	Hydrochloride 145-7
99	N-Ethylaniline	205		1.5559 ²⁰	0.9625 ²⁰ ₀	54	60		87	89	132, 138	
100	4-Methylpyrazole	207		1.4920 ²⁰ _{He}	1.015 ²⁰						142	1- <i>o</i> -Nitrobenzoyl deriv., 107
101	3-Methylbenzylamine (<i>m</i> -Xylylamine)	207			0.9654 ²⁰ ₀	235-40	150				198, 156	Hydrochloride, 208 Chloroplatinate, 214
102	2-Chloroaniline	209-207		1.5895 ²⁰	1.2125 ²⁰ ₀	87	99	129	193, 105	156	134	
103	N,2-Dimethylaniline (N-Methyl- <i>o</i> -toluidine)	208			0.973 ¹⁵	56	66				90	
104	2-Methylbenzylamine (<i>o</i> -Xylylamine)	208	-20	1.5436 ¹⁹	0.977 ¹⁹ ₀	69	88				215	Chloroplatinate, 220-3
105	4-Methylbenzylamine (<i>p</i> -Xylylamine)	208	13	1.5364 ²⁰	0.952 ²⁰ ₀	107-8	137				204	
106	3-Methylpyrazole	208		1.497 ¹⁶ _{He}	1.020 ¹⁶ ₀	29-30					144	N- <i>o</i> -Nitrobenzoyl deriv., 120
107	1-Phenylpropylamine	208		1.5173 ²⁵	0.9347 ²⁵ ₅		115-6	81				Hydrochloride, 190
108	2-Phenylpropylamine	210					85				182	Hydrochloride, 123-4
109	N,4-Dimethylaniline (N-Methyl <i>p</i> -toluidine)	210				83		67			131	N-Nitroso deriv., 52, Hydrochloride, 119-5
110	2-Ethylaniline	210-11	46-6	1.5584 ²²	0.9810 ²⁰	111	147				194-5	
111	L-Menthylamine	212, 207				145	156			135	215	$[\alpha]_D^{25} -34.2$
112	2,5-Dimethylaniline (<i>p</i> -2-Xylydine)	213-5, pale yellow	14-2	1.5591 ²¹	0.9735 ²⁰	139	140	138	232-3, 119	148	171	
113	1-Phenylisobutylamine	214		1.5123 ²⁰	0.920 ²⁰ ₀						166-8	Oxalate, 120-2, Hydrochloride, 275-7
114	3-Methylpyridazine	215			1.0486 ²⁰ ₀						143-4	
115	2,6-Dimethylaniline (<i>m</i> -2-Xylydine)	215, 218	11-2	1.5610 ²⁰	0.9842 ²⁰	177	168		212	204	180	
116	4-Ethylaniline	216, 214	-6	1.5550 ²⁰	0.9690 ²⁰	94	151		104			
117	2,4-Dimethylaniline (<i>m</i> -4-Xylydine)	217		1.561 ²⁰	0.9783 ²⁰ ₀	133, 130	192	130	181	152	209	
118	2-Chloro-N-methylaniline	218			1.1735 ¹¹						133	
119	2,4-Dimethylbenzylamine	218-9									223	Hydrochloride, 212, Chloroplatinate, 226

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES

1. Primary and secondary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D	Density g/ml	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenylthiourea	Picrate	Miscellaneous
120	2-Amino-N,N-dimethylaniline	219				72	51				138 40	
121	3,5-Dimethylaniline (<i>m</i> -5-Xylidine)	220	9 8	1 5581 ²⁰	0 9706 ²⁰	144, 140	144-5			153	200	N-Formyl deriv , 76
122	N-Ethyl-3-methylaniline (N-Ethyl- <i>m</i> -toluidine)	221, 215					72					Hydrochloride, 159, Chloroplatinate, 182
123	3,5-Dimethylbenzylamine	221		1 5305 ²⁰	0 9508 ²⁰						225	Hydrochloride, 245, Chloroplatinate, 204
124	2,3-Dimethylaniline (<i>o</i> -3-Xylidine)	221-2	3 5	1 5684 ²⁰	0 9931 ²⁰	135	189				221	Hydrochloride, 254, N-Formyl deriv , 102
125	1-Aminoindane (1-Hydrindamine)	222					142 3				207	
126	3-Phenylpropylamine	222			0 9763 ²⁵		57 8				152 3	Hydrochloride, 218
127	2-Methyl-4,5,6,7-tetrahydroindole	222			0 9871 ¹⁰			86-91			141	Methiodide 195, Chloroplatinate, 187
128	N- <i>n</i> -Propylaniline	222			0 9491 ¹⁸	47		54		104		
129	2- <i>n</i> -Propylaniline	222-4				104-5	119				151	Hydrochloride, 173
130	2-Chloro-4-methylaniline	223				113	137					
131	α -Amino- <i>n</i> -butylbenzene	223			0 9367 ²⁰		128					Chloroplatinate, 184, Hydrochloride, 288
132	<i>trans</i> -9-Aminodecalin	223	-25	1 4922 ²⁰ _{He}	0 9393 ²⁰	183	148 9					N-Formyl deriv , 172
133	γ -Amino- <i>n</i> -butylbenzene	223		1 5152 ²⁰	0 9289 ¹⁵		108, lgr					Hydrochloride, 144, Chloroplatinate, 220
134	2-Methoxyaniline (<i>o</i> -Anisidine)	225	5-6			85, 88	60, 84	89	127	136	200	N-Formyl deriv , 84
135	4-Isopropylaniline (<i>p</i> -Cumidine)	225			0 9533 ²⁰	102	162					
136	4- <i>n</i> -Propylaniline	225				93-4	115					Hydrochloride, 203 4
137	N-Isobutylaniline	227			0 9401 ¹⁸				122 3			
138	α -Methyl- α -phenylhydrazine	227		1 5824 ²⁰		92	153	132				
139	4- <i>tert</i> -Butylaniline	228	17			173	140		179-80			N-Formyl deriv , 59 Hydrochloride, 270-4
140	<i>cis</i> -9-Aminodecalin	228	-13 5	1 4982 ²⁰ _{He}	0 9511 ²¹	127	147					N-Formyl deriv , 165-6
141	2-Ethoxyaniline (<i>o</i> -Phenetidine)	229				79	104	102	164	137		
142	2,4,6-Trimethylaniline (Mesidine)	229, 232				216	204	137	167	193	189-91	
143	2-Aminoindane (2-Hydrindamine)	230				127	155				239	Hydrochloride, 241
144	3-Chloroaniline	230, 236		1 5931 ²⁰	1 2225 ¹⁵	72, 78	119-20	121	138, 210	124, 116	177	
145	2,2'-Diaminodiethylsulfide	231 3									212	Dihydrochloride, 131
146	1,2,3,4-Tetrahydroisoquinoline	233		1 5798 ²³	1 0643 ²³	46	129	154			200, 195	
147	2- <i>tert</i> -Butylaniline	233-5		1 5453 ²⁰	0 9771 ¹⁵	159-61						
148	3-Amino-4-(dimethylamino)toluene	234									151	Hydrochloride, 192 3
149	4-Isobutylaniline	235, pale				127			136-7			
150	4-Aminoindane (4-Hydrindamine)	236	-3			126	136					
151	2-Aminoundecane (2-Aminohendecane, <i>sec</i> - <i>n</i> -Undecylamine)	237				58					111	Hydrochloride, 84
152	<i>unsym</i> -Ethylphenylhydrazine	237			1 0181 ¹⁵							Hydrochloride, 137, Reduces warm Fehling

* Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES

1. Primary and secondary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D	Density g/ml	Acetamide	Benzamide	Benzene sulfonamide	p-Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
153	<i>sym</i> -Ethylphenylhydrazine	238.9		1.55 ¹⁵	1.004 ¹⁵		100					Hydrochloride, 164, Oxalate, 167
154	2-Bromo-4-methylaniline (3-Bromo- <i>p</i> -toluidine)	240	26		1.51 ²⁰	118	149					Hydrochloride, 221
155	1-Aminoundecane (1-Aminohendecane, <i>n</i> -Undecylamine, <i>n</i> -Hendecylamine)	240	15-6			48	60					Hydrochloride, 190
156	4-Chloro- <i>N</i> -methylaniline	240			1.169 ^{11.5}	92-4					153	Nitrosamine, 51
157	4-Chloro-2-methylaniline (5-Chloro- <i>o</i> -toluidine)	241	29			140						
158	2-Amino- <i>p</i> -cymene (<i>p</i> -Cymidine)	241		1.543 ¹⁹	0.994 ²⁰	71	102					Hydrochloride, 207
159	<i>N</i> -Butylaniline	241		1.5381 ²⁰	0.9358 ²⁰		56		56			
160	Phenylhydrazine	243	19-23	1.6081 ²⁰	1.0978 ²⁰	128	168, 177 (<i>di</i>)	148	151	172		
✓ 161	α, α' -Diamino- <i>m</i> -xylene (<i>m</i> -Xylylenediamine)	245.8				<i>di</i> 134.5, <i>bz</i> 123	<i>N, N'</i> - <i>di</i> 172				185-90	Dihydrobromide, 266
162	2-Chloro-6-methoxyaniline (3-Chloro- <i>o</i> -anisidine)	246 sl d					135					
163	3-Ethoxyaniline (<i>m</i> -Phenetidine)	248				97	103		157	138	158	
164	4-Ethoxyaniline (<i>p</i> -Phenetidine)	248, 254	2-3		1.065 ¹⁶	137	173	143	106	136	69	
165	1,2,3,4-Tetrahydroquinoline	250	20	1.593 ²⁴	1.054 ²⁴		75	67				
166	2-Aminoacetophenone	250.2d	20			76.7	98		148			Semicarbazone, 290, Oxime, 109, Hydrochloride, 168 d
167	3-Bromoaniline	251	18	1.626 ²⁰	1.579 ²⁰	87	120-136			143	180	
168	3-Methoxyaniline (<i>m</i> -Anisidine)	251				81			68		169	Hydrochloride, 167.8
169	3-Bromo-2-methylaniline (6-Bromo- <i>o</i> -toluidine)	254				163	176-7					
✓ 170	4-Amino-1,2,3,5-tetramethylbenzene (Isoduridine)	255	23-4			215-7					200	
✓ 171	Dicyclohexylamine	255 sl d	abt 20	1.488 ¹⁸	0.925 ¹⁸	103	153				173	
172	6-Methyl-1,2,3,4-tetrahydroisoquinoline	256			1.0235 ⁴						205	Hydrochloride, 195-7, Methiodide, 144.5, <i>N</i> -Nitroso deriv., 98
✓ 173	4-Amino- <i>N, N</i> -diethylaniline	261				104	172					
✓ 174	4- <i>n</i> -Butylaniline	261			0.945 ²⁰	105	126					Chloroplatinate, 200-2
175	1-Amino-5,6,7,8-tetrahydronaphthalene	261.3		1.5896 ²³	1.0625 ¹⁶	158						Hydrochloride, 259.61
176	7-Methyl-1,2,3,4-tetrahydroquinoline	264					70-2				153-4	Hydrochloride, 175
177	4-Methylindole	267	5		1.062 ²⁰						194.5	
178	2-Amino-4-chloro- <i>N, N</i> -dimethylaniline	267.8				90					191	
179	DL-3-Aminopropylenglycol (2,3-Dihydroxypropylamine)	268 part d		1.49 ¹⁰	1.175 ²⁰		<i>O, N</i> - <i>di</i> 109 <i>O, O, N</i> - <i>tri</i> 113					Chloroplatinate, 185, Picrolonate, 220, <i>O, N</i> - <i>di</i> -4-Nitrobenzoyl deriv., 139

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES

1. Primary and secondary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n_D	Density g/ml	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
180	Diethanolamine (Di-(2-hydroxyethyl)-amine)	270	28	1.4776 ⁴⁰	1.0966 ⁴⁰						110	Nitrate, 69, Chloroplatinate, 160
181	3-(Dimethylamino) aniline	272			0.995 ⁴⁵	87.69 (<i>di</i>)	163.4				187	N-Chloroacetyl deriv., 102
182	1-(N,N-Diethylamino) naphthalene	290		1.5961 ⁴⁰	1.015 ⁴⁰						152.4	1,3,5-Trinitrobenzene add comp., 95, scar
183	1-(Methylamino) naphthalene	294				94.5	121		164			
184	Dibenzylamine	300		1.5743 ⁴²	1.0256 ⁴²		112	68	159			Hydrochloride, 256
185	α -Aminodiphenylmethane (Benzhydrylamine)	303-4		1.5963 ^{41, 5}	1.0635 ^{41, 5}	146.7	172.167				205.6	N-Formyl deriv., 132
186	1,2-Diphenylethylamine	313			1.031 ⁴⁵						212.3	Oxalate, 158, Chloroplatinate, 188
187	2,3-Diphenylpropylamine	315.7				85 (<i>di</i>)						Hydrochloride, 188 90, Chloroaurate, 144.5
188	2-(Methylamino) naphthalene	317, 309				51	84	107	78		145	Hydrochloride, 182.3
189	2-(N,N-Diethylamino) naphthalene	320.2										1,3,5-Trinitrobenzene add comp., 116, blk. Hydrochloride, 177, Chloroplatinate, 95

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines a) Liquids 2) (b.p. at reduced pressure only)
(Listed in order of increasing m.p. of the corresponding acetyl derivative)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
1	3-Aminostyrene	112 5 ¹²			1 0216 ²⁰ ₂₀	74 5						Polymerizes readily
2	2-Bromo-4-ethoxyaniline (3-Bromo- <i>p</i> -phenetidine)	160 ²³				97						
3	3-Aminothiophenol	180-90 ¹⁶				<i>N,S-di</i> 97 <i>di</i>)						Hydrochloride, 232
4	2- <i>n</i> -Butylaniline	122 5 ¹²			0 953 ²⁰ ₂₀	100	116 7					Hydrochloride, 137
5	2-(2-Aminophenyl)ethyl alcohol	147 8 ^{3 5}		1 5849 ¹⁹		103 5						Hydrochloride, 126
6	6-Amino-3,4'-dimethylbiphenyl	165 7 ⁴				104						Hydrochloride, 216-26
7	2,2-Diphenylpropylamine	179-82 ²²			1 027 ¹⁸	106 7	82-3					Hydrochloride, 261
8	2-Chloro-4-methoxyaniline (3-Chloro- <i>p</i> -anisidine)	156 ³¹				114						Hydrochloride, 228
9	2-Aminostyrene	97 8 ⁸		1 6130 ²¹	1 015 ²¹ ₂₁	129						Polymerizes readily
10	2-Aminothiophene	77 9 ¹¹				161 2	172-3					Oxidizes rapidly, N-2-toluenesulfonyl deriv, 183 4
11	4,4'-Diamino-2,3'-dimethylbiphenyl	244 ¹²				<i>N,N'-di</i> 253, <i>tetra</i> 191	<i>N,N'-di</i> 245					

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenylthiourea	Picrate	Miscellaneous
1	Di- <i>n</i> -heptylamine	1	271						117-20	
2	4-Aminostyrene	23.5	98 ^a	142	160-1					D ₂₁ ²¹ 1 012 n _D ²⁰ 1 625
3	3-Bromo-4-methylaniline (2-Bromo- <i>p</i> -toluidine)	25-6	254-7	117-8	132					
4	2-Amino-3-methylpyridine (2-Amino- β -picoline)	26	224	64	220				229	
5	2-Aminothiophenol	26	234	135 (<i>N,S-di</i>)	154 (<i>N,S-di</i>)					
6	<i>n</i> -Dodecylamine	27-8	247-9				73			Hydrochloride, 98, Chloroplatinate, 215 Hydrochloride, 180 3
7	DL-2,6-Dimethyl-1,2,3,4-tetrahydroquinoline	31-2	267		103-5					
8	5-Bromo-2-methylaniline (4-Bromo- <i>o</i> -toluidine)	32	253 part d	165						
9	1-Amino-2-methylnaphthalene (2-Methyl-1-naphthylamine)	32		188	180					
10	2-Bromoaniline	32	250	99	116			146 161	129	
11	4,4'-Dimethyldibenzylamine (<i>p</i> -Dixylamine)	32.5	220 ³⁰						153	Nitrosamine, 52, Hydrochloride, 272
12	2-Aminodibenzyl	33	173-83 ¹¹	117	166				167-8	Hydrochloride, 198
13	3-Iodoaniline	33.27	145.6 ¹⁵	119	157		128			
14	unsym-Diphenylhydrazine	34	220 ⁴⁰⁻⁵⁰	184	192					
15	α,α -Diamino-1,4-dimethylbenzene (<i>p</i> -Xylylenediamine)	35		194 (<i>tetra</i>)	193 (<i>N,N'-di</i>)				232	
16	3-Bromo-5-methylaniline (5-Bromo- <i>m</i> -toluidine)	36	255.60	171.2						
17	4-Amino- <i>N</i> -methylaniline	36	258	63	165				206	
18	Pentadecylamine	36, 33	300	72						Hydrochloride, 199
19	<i>N</i> -Benzylaniline	37	298	58	107	119	148-9	103	48	
20	3-Iodo-4-methylaniline (2-Iodo- <i>p</i> -toluidine)	37-8		130						Oxalate, 103
21	5-Aminoindane (5-Hydrindamine)	37-8	247-9 ⁷⁴⁵	106	137					
22	2-Amino-5,6,7,8-tetrahydronaphthalene (5,6,7,8-Tetrahydro-2-naphthylamine)	38	275-7 ¹¹²	107	167				204	
23	2-Amino-5-bromonaphthalene (5-Bromo-2-naphthylamine)	38	207.10 ¹⁶	165	109				216	<i>N</i> -Benzal, 63
24	2,2-Diphenylethylamine	38	180 ³³	88	144.5				212.3	Phenylurethane 191.2, Hydrochloride, 256-7
25	2,3-Dimethyl-1,2,3,4-tetrahydroquinoline	38-9			92				178	
26	2-Iodo-4-methylaniline (3-Iodo- <i>p</i> -toluidine)	40		133	161					Oxalate, 120, Hydrochloride, 188
27	2-Chloro-4,6-dimethylaniline (5-Chloro- <i>m</i> -4-xylidine)	40		205-6	148					2-Naphthylthiourea 154
28	2-Amino-6-methylpyridine (6-Amino- α -picoline)	41	208-9	90	90				202	Hydrochloride, 155, Chloroplatinate, 218
29	4-Amino- <i>N,N</i> -dimethylaniline	41, 53	262	132-3	228				188	
30	1,6-Diaminohexane (Hexamethylenediamine)	42	204-5	125-7 (<i>di</i>)	155 (<i>di</i>)	154 (<i>di</i>)			220	
31	1,3-Diaminoisopropyl alcohol	42	235						230	Hydrochloride, 185, Chloroplatinate, 240
32	4-Amino-3-methylbiphenyl	43	190 ¹⁵	165, 158	189					<i>N</i> -Benzal, 108
33	2,4'-Diaminobiphenyl	45	363	202 (<i>di</i>)	278 (<i>di</i>)					
34	4-Methylaniline (<i>p</i> -Toluidine)	45	200	147	158	120	118	141	182	
35	4-Aminothiophenol	46	140-5 ¹⁶	154 (<i>N</i> -), 144 (132) (<i>N,S-di</i>)	180 (<i>N</i> -)					Oxidized readily \rightarrow 4,4-diaminodiphenyl sulfide, 104.5

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
36	4-Aminobenzyl cyanide	46		97 (<i>mono</i>) 152-3 (<i>di</i>)	176-7				185	N-Formyl, 135
37	2-Aminopropiophenone	47	93 ^o *	71	130					Oxime, 88-9, Semicarbazone, 190, N-Propionyl, 51
38	3-Bromo-4-ethoxyaniline (2-Bromo- <i>p</i> -phenetidine)	47	189 ²⁰	114					178 9	
39	4-Amino-2-thiocresol	47		95 (N-), 125 (N,S- <i>di</i>)						S-Me, 47
40	2-Iodo-5-methylaniline (4-Iodo- <i>m</i> -toluidine)	48, 38		151, 146						N-Formyl, 129
41	1-Amino-4-fluoronaphthalene (4 Fluoro-1 naphthylamine)	48	162 ¹⁶		197					Hydrochloride, 280
42	4-Aminodibenzyl	48			170 1					Hydrochloride, 210, Chloroplatinate, 286-9
43	3,4-Dimethylaniline (<i>o</i> -4-Xylidine, 4-Amino- <i>o</i> -xyiene)	49	224	99		118				N-Formyl, 52, Hydrochloride, 256
44	2-Ethoxy-6-nitroaniline	49, yel		64						N-Me, 59
45	Heptadecylamine	49	335-40	62	91					
46	2-Aminobiphenyl	49	299	121	102					N-Formyl, 75, N-Propionyl, 65
47	4-Amino-2-methyldiphenylamine	49 50	196 ⁴	139 40						Hydrochloride, 185 7
48	2-Bromo-4,6-dimethylaniline (5-Bromo- <i>m</i> -4-xylidine)	49 50		196 7	186				122	
49	2,5-Dichloroaniline	50	251	132	120				86	Hydrochloride, 191 2
50	1-Aminooxindole	50		186-7	189					
51	1-Aminonaphthalene (α -naphthylamine)	50		159	160	167	157, 147	165	163 181	
52	1-Amino-1,2,3-triazole	51			151				130	Hydrochloride, 114
53	2-Amino-1-methylnaphthalene (1-Methyl-2-naphthylamine)	51		188 9	222					
54	1-Amino-3-methylnaphthalene (3 Methyl-1 naphthylamine)	51-2		175 6	188 9					
55	1-Amino-4-methylnaphthalene (4 Methyl-1-naphthylamine)	51-2	176 ¹²	166 7	238-9					Hydrochloride, 233-4
56	4-Chloro-2-methoxyaniline (5-Chloro- <i>o</i> -anisidine)	52, 46	260	150					200	N-Formyl, 177 8, Hydrochloride, 238
57	Indole	52	253	157 8	68	254				N-Nitroso, 171
58	2-Aminodiphenylmethane	52	190 ²²	135	116					Hydrochloride, 137
59	2,2'-Ditolylamine (Di- <i>o</i> -tolylamine)	52 3	318		114-5					
60	4-Aminobiphenyl	53	302	171, 120 (<i>di</i>)	230		255 160			N-Formyl, 172
61	1,4-Bis-(methylamino)benzene (3,3'-Dimethyl- <i>p</i> -phenylenediamine)	53	150 ¹⁷						186	N,N'-Dinitroso, 148
62	Diphenylamine	53-4		101	180	124	141	152	182	
63	DL- α -Aminobenzyl cyanide	55			159 60				160-1	
64	4-Methoxy-3-nitroaniline (2-Nitro- <i>p</i> -anisidine)	57, or		153						N-Chloroacetyl, 150, N,N-Di-Me, 46, red
65	5-Bromo-2-ethoxyaniline (4-Bromo- <i>o</i> -phenetidine)	57 53		133					135 7	
66	2-Amino-5-bromobiphenyl	57		130	162					
67	4-Methoxyaniline (<i>p</i> -Anisidine)	58	240	130, 127	154, 157	95	114	157, 171		
68	1-Amino-7-methylnaphthalene (7-Methyl-1-naphthylamine)	58-9	162 ¹⁰	182-3	204					
69	4-Bromo-2-methylaniline (5-Bromo- <i>o</i> -toluidine)	59	240	156-7	115					

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point C	Boiling point C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
70	2-Amino-1 chloronaphthalene (1 Chloro 2 naphthylamine)	59		147	98	131				N Formyl 136
71	2 Aminoazobenzene	59		126	122					
72	1-Amino 2-chloronaphthalene (2 Chloro 1 naphthylamine)	59 60		191 (<i>mono</i>) 88 (<i>di</i>)						
73	5-Methylindole	60	267						151	
74	2-Aminopyridine	60 58	204	71	165 (<i>di</i>)				216 7	
75	3-(3 Indolyl)-propylamine	60 4							146 9	Hydrochloride 170
76	2-Methylindole	61	271 2						156 139	1 3 5 Trinitrobenzene add comp 152 N Formyl 75 Hydrochloride 153 4
77	2-Iodoaniline	61 58		109	139				112	
78	1 Naphthyl phenyl amine (N Phenyl 1 naphthylamine)	62	226 ⁺	115	157					
79	3-Chloro-4 methoxyaniline (2 Chloro <i>p</i> anisidine)	62		94					186	
80	1-Amino-3 chloronaphthalene (3 Chloro 1 naphthylamine)	62		197	162					Hydrochloride 219
81	2-Amino-4,4 -dimethylbiphenyl	62 3		118 9	95 6					
82	8-Amino-6-methylquinoline	62 4		91 2						1 3 5 Trinitrobenzene add comp 139 N Propionyl 139 N Benzal 93 4 1 3 5 Trinitrobenzene add comp 192
83	2-Amino-1 bromonaphthalene (1 Bromo 2 naphthylamine)	63		<i>mono</i> 140 <i>di</i> 105						
84	1,3-Diaminobenzene (<i>m</i> Phenylene diamine)	63	282 4	191 (<i>di</i>) 87 9 (<i>mono</i>)	240 (<i>di</i>) 125 (<i>mono</i>)	194	172		184	
85	2,4-Dichloroaniline	63	245	145	117	128	126		106	
86	2-Amino 5 methyl naphthalene (5 Methyl 2 naphthylamine)	63 4		123 4	155 6					
87	3-Bromo-4-methoxyaniline (2 Bromo <i>p</i> anisidine)	64		111						Hydrochloride 255
88	2,5-Diaminotoluene	64	273 4	220 (<i>di</i>)	307	2 <i>mono</i> 147	2 <i>mono</i> 150			
89	3-Aminopyridine	64	250 2	<i>mono</i> 133 <i>di</i> 88	119					
90	9-Amino fluorene	64		262	260 1					Hydrochloride 255
91	4-Methylphenylhydrazine (<i>p</i> Tolyhydrazine)	65	240 4d	121	1 N <i>mono</i> 68 70 2 N <i>mono</i> 146					
92	4-Aminobenzyl alcohol	65		188 (O N <i>di</i>)	4 <i>mono</i> 150					Hydrochloride 217
93	2-Bromo-6-methoxyaniline (3 Bromo <i>o</i> anisidine)	65			90					Hydrochloride 225
94	1,3-Diamino-2,6-dimethylbenzene (2 4 Diamino <i>m</i> xylene)	65 6		> 260 (<i>di</i>)	232 (227) (<i>di</i>)					N N Di formyl 220
95	Aminoacetamide (Glycineamide)	65 7								Hydrochloride 186 9 Chloroaurate 197 8 Hot H ₂ O → glycine + NH ₃ Hydrochloride 175 N Phenyl 150
96	2-Aminocyclohexanol	66	219							
97	2-Amino-5-methylbenzophenone	66 yel		159	118				145	
98	4-Bromoaniline	66	245	168	204	134		148	180	
99	1,8-Diaminonaphthalene	66		311 2 (<i>di</i>)			207 (<i>di</i>)			

*Derivative data given in order m p crystal color solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
100	3-Amino-5-bromopyridine	66-7	150 ¹²	76-8 (hyd) 127 (anh)					212-3	Chloroaurate, 185 7
101	1-Amino-8-methylnaphthalene (8-Methyl-1-naphthylamine)	67 8		183-4	195-6					
102	4-Iodoaniline	67-8		184	222			153		N 4-Nitrobenzoyl, 269 N-Benzal, 86
103	1-Amino-2,4,5-trimethylbenzene (Pseudocumidin)	68		162	167	136				
104	2,2'-Diaminodibenzyl	68		249 (<i>di</i>)	255 (<i>di</i>)				225 30	
105	2-Amino-4-methylnaphthalene (4-Methyl-2-naphthylamine)	68		172 3	194-5					
106	3-Nitro-N-methylaniline	68		95	105	83				
107	1-Amino-3-bromonaphthalene (3-Bromo-1-naphthylamine)	70		174	166					Hydrochloride, 247
108	1-Amino-5-methyl-1,2,3-triazole	70			158, 138 (<i>di</i>)					N-Benzal, 67 8, Hydrochloride, 138 Hydrochloride, 208 9
109	8-Aminoquinoline	70, 65, yel		103	98		154-6			
110	2-Nitroaniline	71, golden-yel		92, 94	98, 110	104	142		73	
111	3,4-Diaminotriphenylmethane	71 2		226 (<i>di</i>)	243 (<i>di</i>)					
112	4-Chloroaniline	72		179, 172	192	122	95, 119	152		
113	8-Amino-6-Chloroquinoline	73								Hydrochloride 208 Chloroplatinate, 212, Methiodide, 178 Hydrochloride, 242
114	4-Aminophenylurethane (N-carbethoxy-1,4-diaminobenzene)	73-4		202, 181	230					
115	4-Aminodiphenylamine	75 (anh)		158	203					
116	3,5-Dimethylindole	75	278						180	
117	Duridine (3-Amino-1,2,4,5-tetramethylbenzene)	75	261	207						Hydrochloride, 260
118	1-Amino-3,4,5-trimethylbenzene	75	240	163 4						N-Formyl, 98
119	2-Amino-1,4-dimethylnaphthalene (1,4-Dimethyl-2-naphthylamine)	75	333	219-20						
120	4-Nitromesidine (2-Amino-4-nitromesitylene)	75		191	169	163				
121	2-Methoxy-6-nitroaniline (3-Nitro- <i>o</i> -anisidine)	76, yel		158-9						N-Me, 58, red
122	2-Bromo-1,4-diaminobenzene (2-Bromo- <i>p</i> -phenylenediamine)	76		200(<i>di</i>)	235(<i>di</i>)					
123	4,6-Dimethyl-2-nitroaniline (5-Nitro- <i>m</i> -4-xylidine)	76, 70		176, 173	185					
124	1-Amino-5-methylnaphthalene (5-Methyl-1-naphthylamine)	77-8		194-5	173-4				210 d	
125	2,4,6-Trichloroaniline	78	263	204, 206	174	152-4			83	
126	4-Methyl-3-nitroaniline (2-Nitro- <i>p</i> -toluidine)	78		148	172	160	164	171		
127	2,4-Dibromoaniline	79		146	134		134		124	
128	1-Naphthyl 4-tolyl amine	79		124	140					
129	2-Aminodiphenylamine	79-80		121 (2-N-)	136 (2-N-)					
130	2,4-Diaminophenol (4-Hydroxy- <i>m</i> -phenylenediamine)	79-80		220-2 (2,4-N-) 180-2 (<i>tri</i>)	253 (<i>di</i>)				120	
131	4-Aminopyrazole	80-2			173 (<i>di</i>)				193-4	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES

1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	p-Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
132	4-Bromo-3-methylaniline (6-Bromo- <i>m</i> -toluidine)	81	240	103-4						N,N-Di-Me, 55
133	2,2'-Diaminodibenzyl sulfide	81		209 (<i>di</i>)					203 4	N,N'-Di-formyl, 163
134	2,2'-Diaminobiphenyl	81	162 ^a	<i>mono</i> 89, <i>di</i> 161	159 (2-N-) 190 (<i>di</i>)					N,N'-Di-formyl, 137
135	3-Aminoacenaphthene	81		192 3, al	209, al				221	N-Formyl, 151, Alc, FeCl ₃ → bl -vlt col
136	2-Aminobenzyl alcohol	82	270 80 part d	N- <i>mono</i> 114	O- 198-9				110	Hydrochloride, 108
137	1-Amino-1,3,4-triazole	82 3							194-5	Hydrochloride, 153, N-Formyl, 117, Chloro- platinate, 230
138	4-Chloro-3-methylaniline (6 Chloro- <i>m</i> -toluidine)	83		91	119					2-Naphthylthiourea, 158
139	2,6-Dibromoaniline	83-4	262-4	210					123-4	
140	5-Chloro-2-methoxyaniline (4-Chloro- <i>o</i> -anisidine)	84		104	77 8				194	
141	4-Aminotriphenylmethane	84, bz	248 ¹²	168	198					N,N-Di-Me, 132
142	1-Amino-3-iodonaphthalene (3-Iodo-1-naphthylamine)	84		207	174					
143	4-Aminobutyrophenone	84		142						Hydrochloride, 178
144	4,4'-Diaminodiphenyl disulfide	85, yel, 106		205 (<i>di</i>)						N,N'-Dicarbethoxy, 136-7
145	7-Methylindole	85	266		84				176	
146	2-Amino-4-bromobenzaldehyde	85								Oxime, 194, Phenylhydra- zone, 215
147	2,2'-Diaminodiphenyl sulfide	85 6		160 (<i>di</i>)	162 3 (<i>di</i>)					
148	4-Aminoveratrol (3,4-Dimethoxy- aniline)	85 6	174 6	133	177					Chloroplatinate, 227
149	2-Aminophenanthrene	85, pa yel		225	216					
150	4-Aminobenzonitrile	86		205	170				150	N-Formyl, 188-9, N-Propionyl, 169
151	4-Iodo-2-methylaniline (5-Iodo- <i>o</i> - toluidine)	87 92		170, 162	184				189	N-Benzal, 55, Phenyl- urethane, 232
152	4-Aminoacenaphthene	87		175 6	196				190- 200	
153	3-Aminoacetanilide	87 9		191			241			
154	3-Aminophenanthrene	87 5		200-1	213					
155	4-Amino-3-methyl-1-phenylpyrazole	88	312	94 5 (hyd), 120(anh)	181				138	N-Formyl, 112 (anh), 81 (hyd), Chloroplatinate, 226
156	2-Hydroxy-3-methylaniline (3-Amino- <i>o</i> -cresol)	89		N- <i>mono</i> 78-9						N-Acetyl of Me eth, 100
157	3,4-Diaminotoluene	89 90	265	210 (<i>di</i>), 95 (3-N), 131 (4-N)	263-4 (<i>di</i>)	178-9 (<i>di</i>)	4- <i>mono</i> 140			
158	2-Nitrophenylhydrazine	90, red		140 1, <i>di</i> 57 8	166					N-Formyl, 177
159	2,2'-Diaminodibenzyl disulfide	90-1		202-5 (<i>di</i>)						N,N'-Dipropionyl, 190-1
160	4-Chloro-1,3-diaminobenzene	91		242 (<i>di</i>)	178 (<i>di</i>)		215			
161	1-Amino-2,6-dimethylnaphthalene (2,6-Dimethyl-1-naphthylamine)	91		211	219-20					
162	1-Amino-4-mercaptanaphthalene (4-Amino-1-thionaphthol)	91 3		N- <i>mono</i> 173						S-Me, 54
163	2-Methyl-3-nitroaniline (6-Nitro- <i>o</i> -toluidine)	92 97		158	168					
164	2-Methyl-6-nitroaniline (3-Nitro- <i>o</i> -toluidine)	92	305d	158	167					1-Naphthylthiourea, 171

*Derivative data given in order m p, crystal color, solvent from which crystallized

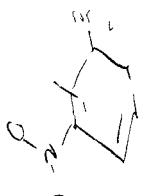


TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
165	3-Bromo-2-hydroxy-5-methylaniline (3-Amino-5-bromo- <i>p</i> -cresol)	93		<i>N</i> -mono 129 <i>dt</i> 169	<i>N</i> -mono 185 <i>dt</i> 166	<i>N</i> -mono 157 <i>dt</i> 230				
166	4-Chloro-2,6-dibromoaniline	93		226	194					
167	2,2'-Diaminodiphenyl disulfide	93		156 (<i>dt</i>)					141 (<i>dt</i>)	
168	1,18-Diaminooctadecane	93			150 (<i>dt</i>)					Hydrochloride >225 N,N-Dibenzal, 130
169	4,4'-Diaminodiphenylmethane	93	232 ^a	236 (<i>dt</i>) (228)						
170	3-Nitrophenylhydrazine	93, yel		145 150 (<i>dt</i>)	151 153 (<i>dt</i>)					
171	7-Aminoquinoline	93 4 (anh), 73 (hyd)		167	189					Chloroplatinate, 225
172	2-Aminodibenzofuran	94		178 83 (<i>dt</i>)	201					
173	3-Aminoquinoline	94 84		172 167					210	
174	7-Amino-2,4-dimethylquinoline	94 100	> 300	212					215 7	
175	Skatole (3 Methylindole)	95	267	68					170 1	Hydrochloride, 167 8, N-Propionyl, 45
176	2-Chloro-4,6-dibromoaniline	95		227	192					
177	4-Hydroxybenzylamine	95								Hydrochloride, 195, N-Acetyl of Me ether, 96
178	1-Amino-4,5-dimethyl-1,2,3-triazole	95							124 5	Hydrochloride 131, Chloroplatinate, 215
179	1-Amino-8-hydroxynaphthalene (8 Hydroxy-1-naphthylamine 8 Amino-1-naphthol)	95-7		<i>N</i> -mono 181 N O <i>dt</i> 118	<i>N</i> -mono 193, N,O- <i>dt</i> 206		<i>N</i> mono 189		163 4	N-Formyl, 140 50
180	5-Amino-2-methylpyridine (5 Amino- α -picoline)	96		126	111				201	Dihydrochloride, 215 8
181	4,4'-Diamino-3,3'-dimethyl-diphenyl sulfide	96		<i>dt</i> 220	<i>dt</i> 233				186 (<i>dt</i>)	Dihydrochloride, 248-9
182	6,6'-Diamino-3,3'-dimethyl-diphenylmethane	96		226 (<i>dt</i>) 152 (<i>tetra</i>)					199	Dihydrochloride, 248 9
183	<i>N</i> -Ethyl-4-nitroaniline	96		119	98		107			
184	2,4-Di-iodoaniline	96		141 171	181					
185	1-Amino-8-nitronaphthalene (8-Nitro-1-naphthylamine)	97, red		191		194				
186	3-Aminobenzyl alcohol	97		<i>N</i> mono 106-7	<i>N</i> -mono 115 N,O- <i>dt</i> 113 4					
187	5-Bromo-2-methoxyaniline (4-Bromo- <i>o</i> -anisidine)	97-8		160	108					
188	2-Amino-4-methylpyridine (2-Amino- γ -picoline)	98		102-3	114, 182 3 (<i>dt</i>)				227	
189	2-Aminophenacyl alcohol	98		<i>N</i> -mono 141	N,O- <i>dt</i> 167					Phenylhydrazone, 198
190	1-Amino-4-chloronaphthalene (4-Chloro-1-naphthylamine)	98		186						
191	1,2-Diaminonaphthalene	98		234 (<i>dt</i>)	291 (<i>dt</i>)	1-mono 215				
192	4-Amino-4'-methylbiphenyl	99	190 ¹⁸	221						Hydrochloride, 280 3
193	3-Aminoacetophenone	99		128-9			130			Semicarbazone, 196
194	2,4-Diaminotoluene	99		N,N'- <i>dt</i> 224	224 (<i>dt</i>)	2-mono 138, 2,4- <i>dt</i> 192	4-mono 160, 2,4- <i>dt</i> 192-3			

*Derivative data given in order, m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
 1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
195	4-Amino-3,2'-dimethylazobenzene	100, yel		185 (<i>mono</i>), 65 (75) (<i>di</i>), 1gr						N-Chloroacetyl, 171-2
196	1,2-Diaminobenzene (<i>o</i> -Phenylene-diamine)	102	256-8	185 (<i>di</i>)	301 (<i>di</i>)	185	260 (<i>di</i>)		208	
197	1-Amino-4-bromonaphthalene (4-Bromo-1-naphthylamine)	102, 95		193						N-Formyl, 172, 1,3,5-Tri-nitrobenzene add comp, 196
198	2-Naphthyl 4-tolyl amine	103		85	139					
199	3,4-Diaminobiphenyl	103		3- <i>mono</i> 211 4- <i>mono</i> 155, 3,4- <i>di</i> 163 165 (<i>di</i>)	3- <i>mono</i> 186, 4- <i>mono</i> 221, 3,4- <i>di</i> 248 185 (<i>di</i>)					
200	6,6'-Diamino-3,3'-dimethyl-diphenyl sulfide	103-4							179 (<i>di</i>)	
201	2-Amino-8-nitronaphthalene (8-Nitro-2-naphthylamine)	104, red		196	162					
202	Piperazine	104	140	<i>mono</i> 52, <i>di</i> 144	<i>mono</i> 75, <i>di</i> 196	282 (<i>di</i>)	173		280	
203	4,4'-Diaminodibenzyl sulfide	104-5		188 (<i>di</i>)	224 (<i>di</i>)					
204	3-Amino-4,4'-dimethylbiphenyl	104-5		156-7	160 1					Hydrochloride, abt 230
205	1,3-Diamino-4,6-dimethylbenzene (4,6-Diamino- <i>m</i> -xylene)	105		1- <i>mono</i> 165, <i>di</i> 295	258 9 (<i>di</i>)		221 (<i>di</i>)			N,N-Diformyl 182 3
206	2-Bromo-4-nitroaniline	105, yel		129	160					N-Me, 118
207	Triphenylmethylamine	105		207-8	160-2					N-Benzyl, 110
208	4-Aminophenanthrene	105		190	224				216	
209	2-Aminobenzophenone	105-6, pa yel		72, 89	80					Oxime (alkali-stable), 156, (acid stable), 127; N Propionyl, 78
210	3-Amino-6-phenylpyridine	105-6		148-9	201					
211	3-Amino-4-methylpyridine (3-Amino- γ -picoline)	106	260	84	81				179 80	Chloroplatinate, 227, Hydrochloride, 180
212	4-Bromophenylhydrazine	106								Acetophenone deriv, 112
213	4-Aminoacetophenone	106	294	167	205	128	203			Semicarbazone, 250, Oxime, 148 Chloroplatinate, 224
214	2,4-Diaminopyridine	107			191-2 (<i>di</i>)					N-Benzal, 104
215	9-Phenanthrylmethylamine	107		182-5	167				241	N-Formyl, 178 9, N-4-Nitrobenzoyl, 214
216	2-Methyl-5-nitroaniline (4-Nitro- <i>o</i> -toluidine)	107		151		172				
217	2,5-Diaminopyridine	107-10		290 (<i>di</i>)	230 (<i>di</i>)					
218	2-Naphthyl phenyl amine	108		93	148, 136					
219	2-(4-Aminophenyl) ethyl alcohol	108		105	O- <i>mono</i> 59-60, N,O- <i>di</i> 136	93				Hydrochloride, 171
220	5-Aminoacenaphthene	108		238 (<i>mono</i>), 122 (<i>di</i>)	210, 199				190 200	N-Formyl, 172, FeCl ₃ → bl col
221	4,4'-Diamino-2,2'-dimethylbiphenyl (<i>m</i> -Tolidine)	108 9		281 (275) (<i>di</i>)					225	N,N'-Dibenzal, 172-3
222	4-Aminoantipyrine (4-Amino-2,3-dimethyl-1-phenylpyrazolone-5)	109, yel		199					144	
223	3-Amino-4-methylbenzophenone	109		108						Hydrobromide, 130, dil HBr
224	2-Aminobenzamide	109-11		177	214-5					
225	1,4-Diamino-2-iodobenzene (2-Iodo- <i>p</i> -phenylenediamine)	110 5		211	254					

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
I. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
226	5-Aminoquinoline	110	310	178			203 4			
227	4-Amino-2-nitrostilbene	110 1, dk red		192 3						Hydrochloride, 223
228	3-Aminocamphor	110 5		121	141				191	Oxime, 145, N-Formyl, 87
229	4-Bromo-2-nitroaniline	111, or		104	137-8					N-Me, 102, N-Et, 91
230	3'-Amino-4-methylbenzophenone	111		139						Oxime, 146, Hydrochloride, 198
231	4-Amino-3-methylbenzophenone	112, pale yel		175	158					N-Propionyl, 128
232	2-Aminonaphthalene (β-Naphthylamine)	112		132	162	102	133	129	195	
233	β-Aminopropiophenone (1-Aminoethyl phenyl ketone)	112 4 (unst)		90-1	104-5				164 5	Hydrochloride, 187, Chloroplatinate, 205
234	2-Hydroxybenzylaniline	113		93						Hydrochloride, 131, Chloroplatinate, 184
235	4-Ethoxy-2-nitroaniline (3-Nitro <i>p</i>-phenetidine)	113, 108, red		104		72	94			
236	5-Bromo-2-hydroxy-3-methylaniline	113		<i>N</i> -mono 119 <i>dt</i> 200	<i>N</i> -mono 195					
237	3-Nitroaniline	114		<i>mono</i> 155, <i>di</i> 76	155, 150 (<i>dt</i>) 169	136	138	160	143	
238	6-Aminoquinoline	114 (anh)		<i>mono</i> 138, <i>di</i> 75			193			Methodide, 199
239	<i>cis</i> -2,5-Dimethylpiperazine	114	162		152 (<i>dt</i>)		146-7 (<i>dt</i>)			N,N'-Dinitroso, 95
240	3-Amino-2-phenylquinoline	115 6	223 ³	<i>mono</i> 124, <i>di</i> 173	179 80				194 5	Methodide, 238, Ethoxide, 202
241	5-Amino-3-methyl-1-phenylpyrazole	116	333	110					160 2	Hydrochloride, 199 200
242	4-Aminotriphenylcarbinol	116		176						N,N-Dimethyl, 92-3
243	5-Bromo-2-hydroxy-4-methylaniline	116		<i>N</i> -mono 199, <i>di</i> 188	<i>N</i> -mono 223					
244	4-Chloro-2-nitroaniline	116-7, yel		104			110			
245	4-Methyl-2-nitroaniline (3-Nitro-<i>p</i>-toluidine)	117		99	148	102	146			Hydrochloride, 170 1
246	5-Amino-2-methylquinoline (5-Aminoquinaldine)	117 8 (anh), grnsh		205						N-Cinnamoyl, 257
247	<i>trans</i> -2,5-Dimethylpiperazine	118	162		228 9 (<i>dt</i>)		225 (<i>dt</i>)			N,N'-Dinitroso, 174
248	2,3,4,6-Tetrabromoaniline	118		228-9						1,3,5-Trinitrobenzene add comp, 108
249	2-Methoxy-5-nitroaniline (4-Nitro-<i>o</i>-anisidine)	118, or -red		175 6	160-1		128			N-Me, 87
250	4-Hydroxypyrazole	118			109 (<i>dt</i>)				129	
251	2-Amino-5,4'-dimethylazobenzene	118-9, or -red		157	135					N-Carboxy, 94
252	1-Amino-5-nitronaphthalene (5-Nitro-1-naphthylamine)	119, red		220		183				N-Formyl, 199
253	5-Hydroxy-2,4,6-tribromoaniline	119		O,N,N- <i>tri</i> 136			146 7			
254	1,4-Diaminonaphthalene	120		303 (<i>dt</i>)	<i>mono</i> 186, <i>di</i> 280		<i>mono</i> 187 8			
255	1,9-Diaminofluorene	120		293 (<i>dt</i>)	abt 310 (<i>dt</i>)				205	
256	2-(ω-Aminoethyl)-indole (2-(2-Indolyl)-ethylamine)	120			173 4					N-Benzal, 122
257	2,2'-Diamino-4,4'-dimethylbiphenyl	120		189 (<i>dt</i>)	170 (<i>dt</i>)					N,N'-Di-formyl, 185

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
 1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
258	2,6-Diaminopyridine	121		203 (di)	176 (di)				240	
259	<i>cis</i> -4,4'-Diaminostilbene	121, pale yel		172 (di)	253 (di)					
260	4-Aminobenzhydrol	121			145					Hydrochloride, 270 3
261	3-Amino-6-hydroxyacetophenone	121 110 yel		<i>N</i> -mono 165 di 174 192						Oxime, 201 Et eth, 60
262	2-Aminotriphenylcarbinol	121							122 3	
263	3-Hydroxyaniline (3-Aminophenol)	122		<i>mono</i> 148 di 101	<i>N</i> -mono 174 198 204		157	156		
264	2,4,6-Tribromoaniline	122 119		232						<i>N</i> -Formyl 222
265	4-Amino-2-hydroxyacetophenone	122 3		<i>N</i> -mono 91						<i>N,N</i> -Di Me 120
266	1-Aminoisoquinoline	122 3							290 1	Hydrochloride, 233 Chloroplatinate, >300
267	3,4,5-Tribromoaniline	123		255 6	210					
268	4,4'-Diamino-2,2'-dimethyldiphenylmethane	123		228 (di)					216	
269	<i>cis</i> -2,2'-Diaminostilbene	123, 107, red		214-5 (di)					155-6	Hydrochloride 230
270	2,4-Dimethyl-5-nitroaniline	123		159	200	149	192			
271	2-Amino-4-nitrobenzaldehyde	124								Oxime, 193 Semicarbazone, 390 Anil, 147, red <i>N</i> -Propionyl 139
272	4-Aminobenzophenone	124		153	152					
273	7-Amino-8-hydroxyquinoline	124, br		<i>N</i> -mono 177					205	
274	2-Amino-5-nitrobiphenyl	125, yel		133			169			
275	3-Hydroxy-4-methoxyaniline (4-Aminoguaiacol)	125 7		<i>N</i> -mono 116 9	<i>N,O</i> -di 162 4					
276	2-Amino-1-nitronaphthalene (1-Nitro-2-naphthylamine)	126, or - yel		123	168	156	160			
277	4-Aminoazobenzene	126		146	211					<i>N</i> -propionyl, 170
278	Hydrazobenzene	126 7		<i>mono</i> 159, di 105	<i>mono</i> 126, bz di 162					
279	5-Chloro-2-nitroaniline	126 5 gold-yel		121						<i>N</i> -Me, 107 <i>N,N</i> -Di-Me, 49
280	Benzidine	127		317 (di) 199 (<i>mono</i>)	352 (di) 203 5 (<i>mono</i>)	232 (di)	243 (di)			
281	2-Aminopyrimidine	127 8							237-8	Chloroplatinate, 216 Hydrochloride, 196
282	2-Amino-6-bromonaphthalene (6-Bromo-2-naphthylamine)	128		192	218					
283	5-Bromo-2-hydroxyaniline (2-Amino-4-bromophenol)	128, 88		177 9						Me eth, 97 8
284	5-Aminoisoquinoline	128							>200	Methiodide, 228 Ethiodide, 216
285	2-Aminovanillin (2-Amino-4-hydroxy-3-methoxybenzaldehyde)	128 9		97						Oxime, 151 2, Phenylhydrazone, 165
286	2-Amino-3,7-dimethylnaphthalene (3,7-Dimethyl-2-naphthylamine)	129, 134		231						Hydrochloride, 275
287	4-Methoxy-2-nitroaniline (3-Nitro- <i>p</i> -anisidine)	129, 123, dk red		117, yel	140					<i>N</i> -4-Nitrobenzoyl, 204
288	2-Aminotriphenylmethane	129		154 5						<i>N</i> -Me, 130-2

*Derivative data given in order m p crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
289	2-Aminoquinoline	129							255-6	Methodide, 247, Ethio- dide, 232, 1,3,5-Trinitro- benzene add comp, 186, red
290	4,4'-Diamino-3,3'-dimethyl- biphenyl (<i>o</i> -Tolidine)	129		<i>mono</i> 103 (hyd), <i>di</i> 315 <i>tetra</i> 211	198 (<i>mono</i>), 265 (<i>di</i>)					N,N'-Di-formyl, 254 1 Naphthylthiourea, 167, 3-Nitrophthalimide, 185
291	2,4-Diaminodiphenylamine	130		188 (<i>di</i>)	2- <i>mono</i> 213					
292	3-Aminocoumarin	130, yel		201 2	173					1-Naphthylthiourea 165
293	2-Methyl-4-nitroaniline (5-Nitro- <i>o</i> -toluidine)	130		202		158	174			
294	2-Amino-4-chloropyridine	130 1		115-6	<i>mono</i> 120; <i>di</i> 165				243	
295	4-Hydroxy-3-nitroaniline	131, 127, red		<i>N-mono</i> 157 8						N-Me, 113 Et eth, 40
296	4-Bromo-3-nitroaniline	131 2		146						N,N -Di-Me, 72
297	2-Aminobenzothiazole	132, 129		186	186				256	
298	2-Amino-4-methylquinoline	133	320						abt 250 164	N-Phenyl, 129, Chloro- platinate, 230
299	2,2'-Diaminobenzophenone	133, pa yel		168 (154) (<i>di</i>)						
300	2,2'-Diaminoazobenzene	134, red		271 (<i>di</i>)						
301	3,5-Dimethyl-2-hydroxyaniline	134-5		<i>N-mono</i> 96	154 (O,N- <i>di</i>)					N-Formyl, 68
302	2-Hydroxy-5-methylaniline (4-Hydroxy- <i>m</i> -toluidine)	135		<i>N-mono</i> 160, N,O- <i>di</i> 145	191, N,O- <i>di</i> 190					N-Propionyl, 95 6, N,O-Dipropionyl, 91 2
303	3-Methyl-4-nitroaniline (6-Nitro- <i>m</i> -toluidine)	135		102						2-Naphthylthiourea, 159
304	2-Amino-3-methylnaphthalene (3-Methyl-2-naphthylamine)	135		181-2	190					
305	2-Aminoacenaphthene	135							260, yel, eth	Hydrochloride, 270
306	DL-2,2'-Diamino-6,6'-dimethyl- biphenyl	136		205 (<i>di</i>)	182 (<i>di</i>)		162 3 (<i>di</i>)			
307	1,4-Diamino-2-nitrobenzene (2-Nitro- <i>p</i> -phenylenediamine)	137, blk		1- <i>mono</i> 162, 4- <i>mono</i> 189, <i>di</i> 186	4- <i>mono</i> 236					1,4-Di-4-nitrobenzoyl, >305
308	9-Aminophenanthrene	137 8, 104		207 8	199				190	
309	4,4'-Diamino-3,3'-dimethoxy- biphenyl (Dianisidine)	137-8		242 (<i>di</i>)	236 (<i>di</i>)				225 (<i>di</i>)	
310	3,5-Dimethyl-4-hydroxyaniline (5-Amino-2-hydroxy- <i>m</i> -xylene)	137-8		160 (<i>di</i>)						Me eth, 66
311	2,6-Dinitroaniline	138		197						
312	2-(4-Aminophenyl)-quinoline	138		<i>mono</i> 189, <i>di</i> 154	234					Methodide, 220, N-Me, 82, N-Formyl, 160 Hydrochloride, 283
313	2-Amino-3,6-dimethylnaphthalene (3,6-Dimethyl-2-naphthylamine)	139		207						
314	2-Methoxy-4-nitroaniline (5-Nitro- <i>o</i> -anisidine)	139-40, pa yel		153-4	150	181	175, 170			
315	4-Aminopropiophenone	140		161	190					Oxime, 153
316	4-Amino-3-nitrobenzophenone	140, 135, yel			154 5					N,N-Di-Me, 116, N-Et, 100

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
317	2-Amino-4-methyldiphenylamine	140			161					Hydrochloride, 200
318	1,4-Diaminobenzene (<i>p</i> -Phenylenediamine)	140, 147	267	<i>mono</i> 162 3 <i>di</i> 304	<i>mono</i> 128 <i>di</i> 300	247 (<i>di</i>)	266 (<i>di</i>)			3,5 Dinitrobenzoate, 178
319	2-Hydroxy-5-nitroaniline	142 3 (anh) 80-90 (hyd), or		220	>200		122 (O-)			Me eth 118 Et eth, 99
320	2-Amino-4-nitrostilbene	142 3, red		<i>N-mono</i> 220 yel, al						Hydrochloride, 219
321	5-Amino-8-hydroxyquinoline	143		<i>N-mono</i> 221 2, al, N,O- <i>di</i> 206 7, al	205 (O, N- <i>di</i>)					Me eth, 156, yel
322	1-Amino-2-nitronaphthalene (2-Nitro-1-naphthylamine)	144, red- yel		199	175					N-Et, 77, red
323	2-Amino-5-nitronaphthalene (5-Nitro-2-naphthylamine)	144, red		186	182					
324	5-Hydroxy-2-methylaniline (4-Hydroxy- <i>o</i> -toluidine)	144		<i>N-mono</i> 178 N,O- <i>di</i> 128		183 (N-)				
325	2,5-Dimethyl-4-nitroaniline (5-Nitro- <i>p</i> -2-xylidine)	144-5		168-9		162	185			
326	4-Amino-4'-bromobiphenyl	145		247			174			
327	1-Aminophenanthrene	146		220					204	
328	3,5-Dihydroxyaniline (5-Amino-resorcinol)	146-52		119 21 (<i>tri</i>)						Di Me eth, 46 Picrate of Di-Me eth, 167-70 N,N'-Di-Me, 82, N-Et, 101
329	4-Amino-2-chlorobenzaldehyde	147, yel		152						
330	4-Nitroaniline	147 8, yel		215	199, 203 (<i>di</i>)	139	191		100	1-Naphthylthiourea, 187
331	5-Amino-3-methyl-1,2,4-triazole	148		>270	285 90				225	
332	2,2'-Dihydroxyhydrazobenzene	148			186 (<i>di</i>)					Di-Me eth, 102
333	7-Amino-2-methylquinoline (anh)	148			172 3				213-4	
334	4,4'-Diamino-2,2'-dimethyl azoxybenzene	148, gold- yel		281 (<i>di</i>)	290					
335	4-Bromo-3-hydroxyaniline	150		210-2			135-6 (O-)			
336	3-Amino-1-phenyl-1,2,4-triazole	150		<i>3-mono</i> 168, 3,3- <i>di</i> 118					220	Hydrochloride, 187
337	4-Aminochalcone (4-Aminobenzalacetophenone)	151, golden		179						Oxime, 139
338	4-Aminopyrimidine	151-2		202					226	N-Me, 74-5, N-Phenyl, 142-3 N-Formyl, 217, N-Me, 60, N,N-Di-Me, 53-4
339	Pentamethylaniline	151-2	277-8	213						
340	N-Methyl-4-nitroaniline	152		153	112	121				
341	5-Bromo-2-nitroaniline	152, red- yel		139						N-Me, 115, N-Et, 90
342	3-Chloro-4-hydroxyaniline	153		<i>N-mono</i> 144, <i>di</i> 124			116-7 (O-)			Me eth, 62

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
343	4-Chloro-2-hydroxyaniline	154		140 (<i>di</i>)						Hydrochloride, 226 7, Benzyl eth, 46 7 Me eth, 52
344	4-Aminoquinoline (γ-Aminoquinoline)	154 (anh)		178					274	Methiodide, 224, Ethiodide, 232
345	3-Aminobenzopyrazole	154		177 8 (<i>di</i>)	182 (<i>di</i>)					
346	2,5-Dihydroxy-4-nitroaniline (2-Amino-5 nitrohydroquinone)	154, red		<i>mono</i> 226 <i>di</i> 183 4						Di Me eth, 158
347	4-Hydroxy-2-nitroaniline	154, red		<i>N-mono</i> 218 <i>N O-di</i> 146						Me eth, 129 123
348	3-Aminotriphenylcarbinol	155		164						O,N,N-Trimethyl, 81
349	1-2,2'-Diamino-6,6-dimethylbiphenyl	156		205 (<i>di</i>)	172 (<i>di</i>)					
350	3,3'-Diaminoazobenzene	156 140, or -yel		272 (<i>di</i>)	286 (<i>di</i>)					
351	5-Amino-1-phenyl-1,2,4-triazole	157							175	Chloroplatinate, 197
352	4-Nitrophenylhydrazine	157, or -red		205	193				119 20	
353	4-Aminopyridine (γ-Aminopyridine)	158		150 (anh)	202					215 6
354	4,4'-Diamino-3,3'-dimethyldiphenylmethane	158 9		224 (<i>di</i>) 119 (<i>tetra</i>)	215 (<i>di</i>)					192-3
355	2-Amino-8-nitroquinoline	159		211	166				257	
356	3-Amino-1,2,4-triazole	159							231	Hydrochloride, 153
357	2-Amino-4'-nitrobiphenyl	159, or -red		199			163			
358	3-Amino-2-methylquinoline	159 60	270	165	161				235	N-Formyl, 163
359	1-Amino-4-hydroxy-3-nitronaphthalene (4-Hydroxy-3-nitro-1-naphthylamine)	160, maroon		250, 238	330					
360	2,4-Dihydroxy-5-nitroaniline	160-1, red		<i>N-mono</i> 261 <i>tri</i> 176						Di-Me eth, 136 7
361	1,3-Diamino-4-nitrobenzene (4-Nitro- <i>m</i> -phenylenediamine)	161 157, yel red		<i>l-mono</i> 200 1,3- <i>di</i> 246	222 (<i>di</i>)		169 (<i>di</i>)			N,N,N',N'-Tetramethyl, 81
362	3-Hydroxy-4-methylaniline (2-Hydroxy- <i>p</i> -toluidine)	161		<i>N-mono</i> 225 <i>di</i> 132 3			111-2 (O-)			N-Chloroacetyl, 154 5
363	2-Hydroxy-4-methylaniline (3-Hydroxy- <i>p</i> -toluidine)	162		<i>N-mono</i> 171	<i>N-mono</i> 169, <i>N,O-di</i> 162					
364	4-Aminoacetanilide	162		304						
365	3-Hydroxy-4-nitroaniline	162, 158, or -yel		<i>N-mono</i> 221, <i>N,O-di</i> 149						Me eth, 169, 161
366	2,4-Dimethyl-6-hydroxyaniline	163		<i>mono</i> 186 7, <i>di</i> 87 8	<i>N-mono</i> 211, <i>N,O-di</i> 148 9					Me eth, 150
367	2-Aminofluorenone	163, vlt -red		227						Hydrazone, 209, N-Car-bethoxy, 167 8
368	1-(2-Aminoethyl)-4-hydroxybenzene (4-(2-Aminoethyl)phenol, Tyramine)	164			<i>N-mono</i> 162, <i>di</i> 172				206	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
369	4-Aminophenacyl alcohol	165, yel		<i>N</i> -mono 176 7, <i>O</i> - <i>mono</i> 130 <i>N,O</i> - <i>di</i> 162	188 (<i>O</i> -)					Phenylhydrazone, 199
370	3-Bromo-4-hydroxyaniline	165 155, pa br		<i>N</i> -mono 157	<i>N</i> -mono 184 5, <i>di</i> 192					
371	2,7-Diaminonaphthalene	166		261 (<i>di</i>)	267 (<i>di</i>)				210 (<i>di</i>)	
372	4-Amino-4'-iodobiphenyl	166-7, 159 yel								<i>N</i> -Benzal, 209, <i>N</i> -Piperonyldine, 150 1, Hydrochloride, 295 <i>N</i> -Me, 112
373	4-Amino-3-nitrobiphenyl	167, red		132	143					
374	1,2-Diamino-4-hydroxybenzene (3,4-Diaminophenol)	167-8		1,2- <i>di</i> 205 7	1,2- <i>di</i> 203 <i>tri</i> 225					
375	4,4'-Diaminotriphenylcarbinol	168 s h, 175 r h		4,4'- <i>di</i> 267						Me eth, 162
376	4-Amino-2-phenylquinoline	168		108, 117 (<i>di</i>)	182					Methodide, 274, Ethio- dide, 244, <i>N</i> -Formyl, 275
377	2,6-Dinitro-4-methylaniline	168, 172		195	186					
378	4-Amino-2-methylquinoline	168	333						197 9	<i>N</i> -Phenyl, 150, Chloro- platinate, 223 <i>N</i> -Formyl, 175-6
379	6-Aminocoumarin	168-70, yel		216-7	173	159				
380	Picramic acid (3,5-Dinitro-2- hydroxyaniline)	169, red		<i>N</i> -mono 201, <i>O</i> - 193	<i>N</i> -mono 300 <i>O</i> - 218		191			
381	3,3-Diaminobenzophenone	173, yel		226-7 (<i>di</i>)						Oxime, 177-8
382	4,5-Dimethyl-2-hydroxyaniline	173 5		<i>N</i> -mono 191, <i>N,O</i> - <i>di</i> 157	<i>N</i> -mono 195 6, <i>N,O</i> - <i>di</i> 152 3					
383	2-Hydroxyaniline	174		<i>mono</i> 209 201, <i>di</i> 124	<i>N</i> -mono 165 <i>O</i> - 185	141	146			
384	4-Hydroxy-3-methylaniline	175		<i>N</i> -mono 179	<i>N,O</i> - <i>di</i> 194		109-10 (<i>O</i> -)			
385	6-Amino-5,7-dimethylquinoline	175	> 300	212					182	
386	4,4'-Diaminodiphenyl sulfone	175-6		286 (<i>di</i>)						<i>N,N'</i> -Di-Me, 179-80, <i>N,N</i> -Tetramethyl, 260
387	<i>trans</i> -2,2'-Diaminostilbene	176, 168, gold- yel		304 (<i>di</i>)					209	Hydrochloride, 267
388	6-Amino-5-nitroquinoline	178, 174, yel					168		270	
389	6-Aminothymol	178 9		<i>N</i> -mono 74, <i>tri</i> 91	<i>N</i> -mono 178-9, <i>N,O</i> - <i>di</i> 166 7					Oxid → thymoquinone, 45 5
390	4-Hydroxy-2-methylaniline (5-Hydroxy- <i>o</i> -toluidine)	179		<i>N</i> -mono 130	92 (<i>O</i> -)					Hydrochloride, 215
391	2,4-Dinitroaniline	180, 188		120	202, 220		219			
392	1-Amino-4-chloroanthraquinone	180, red		203-4						<i>N,N</i> -Di-Me, 172
393	2,6-Dimethyl-4-hydroxyaniline	181		178-80						<i>N</i> -Benzal, 104-5, <i>N</i> -Me, 43, <i>N</i> -Et, 161-2
394	4-Amino-2,6-dimethylpyrimidine	183							214	<i>N</i> -Phenyl, 104
395	4-Aminobenzamide	183, yel		275						<i>N</i> -Chloroacetyl, 241 3

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
396	4-Hydroxyaniline (4-Aminophenol)	184, 186		150 (<i>di</i>), 168 (<i>mono</i>)	<i>N</i> - <i>mono</i> 216-7, <i>N,O</i> - <i>di</i> 234	125	<i>N</i> - <i>mono</i> 252-4, <i>O</i> -142	150		3,5-Dinitrobenzoate, 178
397	1-Amino-3-hydroxynaphthalene (3-Hydroxy-1-naphthylamine)	185		<i>N</i> - <i>mono</i> 179	309 (<i>O,N</i> - <i>di</i>)		137 (<i>O</i> -)			
398	5-Hydroxy-2-nitroaniline	185 6, or		<i>N</i> - <i>mono</i> 266						Me eth, 131, br, Et eth, 105, yel
399	6,6'-Diamino-3,3'-dimethyltriphenylmethane	185-6	430, part d	217 (<i>di</i>)	196 (<i>di</i>)					
400	4-Amino-2,6-dimethylpyridine	186	246	113					194 5	Chloroplatinate, 250
401	4-Amino-4'-hydroxyazobenzene	186		<i>N</i> - <i>mono</i> 203 <i>di</i> 236 7						<i>N,N</i> - <i>Di</i> -Me, 203
402	4-Amino-4'-methylbenzophenone	186 7		155						Phenylhydrazone, 163
403	6-Amino-2-methylquinoline	187-8		168 9						<i>N</i> -Cinnamoyl, 257
404	4-Amino-2,6-diethyl-5-methylpyrimidine (Cyanethine)	189	280 d	59						
405	2,4,6-Trinitroaniline (Picramide)	190		230	196	211				
406	1-Amino-6-hydroxynaphthalene (6-Hydroxy-1-naphthylamine)	190 185		<i>N</i> - <i>mono</i> 218, <i>N,O</i> - <i>di</i> 187	<i>N</i> - <i>mono</i> 152 <i>N,O</i> - <i>di</i> 223				170	
407	4,4'-Diaminoazoxybenzene	190, yel		275						Sn + HCl → 1,4-Diaminobenzene, 147
408	4-Amino-3-nitrobenzaldehyde	191, yel		155						Phenylhydrazone, 202, Oxime, 207 4-Nitrophenylhydrazone, 270-2
409	2-Amino-1,5-dinitronaphthalene (1,5-Dinitro-2 naphthylamine)	191		201			182			
410	DL-2,2'-Diamino-1,1'-dinaphthyl	193		235 6 (<i>di</i>)	235 (<i>di</i>)				185	
411	8-Amino-6-nitroquinoline	194, red		224						Chloroplatinate, 180, Methodide, 176
412	1-Amino-4-nitronaphthalene (4-Nitro-1-naphthylamine)	195		190	224	173, 158	185			
413	2-Amino-4,6-dimethylpyrimidine	197							230	Hydrochloride, 181, Chloroplatinate, 225, <i>N</i> -Me, 98
414	4,6-Diamino-2-methylquinoline	197		6- <i>mono</i> 250						6- <i>N</i> -Cinnamoyl, 253-4, 4- <i>N</i> -Et, 195, 6- <i>N</i> -Et, 232 <i>N,N'</i> - <i>Di</i> -Me, 172
415	1,2-Diamino-4-nitrobenzene (4-Nitro- <i>o</i> -phenylenediamine)	198, red		1 <i>mono</i> 205 2 <i>mono</i> 195	235 (<i>di</i>)					
416	2,4-Dinitrophenylhydrazine	199 200		197 8	206-7					
417	2-Hydroxy-5-methyl-4-nitroaniline	200, yel		<i>N</i> - <i>mono</i> 242						Me eth, 132, <i>N</i> -Acetyl of Me eth, 156
418	4-Amino-3-nitropyridine	200, yel							197 8	Hydrochloride, 258-9, Chloroplatinate, 256
419	4-Amino-4'-nitrobiphenyl	200, red		264, 240, yel		174, yel				
420	2-Amino-5-nitrobenzaldehyde	200, yel		160-1			181-2			Oxime, 203 <i>N,N</i> - <i>Di</i> -Me 105, yel
421	2-Amino-7-hydroxynaphthalene (7-Hydroxy-2-naphthylamine)	201		<i>N</i> - <i>mono</i> 232, <i>N,O</i> - <i>di</i> 156	<i>N</i> - <i>mono</i> 243 6, <i>N,O</i> - <i>di</i> 181					
422	2-Amino-1-bromo-3-methylanthraquinone	202, 204			<i>di</i> 243 4, pa yel, al					

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TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Acetamide	Benzamide	Benzene sulfonamide	p-Toluene sulfonamide	Phenylthiourea	Picrate	Miscellaneous
423	4,4'-Diamino-1,1'-dinaphthyl	202		363 (<i>di</i>)	320 (<i>di</i>)				147	
424	4,4',4''-Triaminotriphenylmethane	203		201 (<i>tri</i>)						1,3,5-Trinitrobenzene add comp, 140, blk
425	Isatin	204		141						Oxime, 201 2
426	3-Amino-5-phenylacridine	204		256	246					
427	2-Amino-1,4-naphthoquinone	204 5, or -red		202						N-Phenyl, 191
428	1-Amino-2-methylantraquinone	205, red		<i>mono</i> 176 7, <i>di</i> 203-6			218			
429	4,4',4''-Triaminotriphenylcarbinol (Pararosaniline)	205		192 (<i>tri</i>)						Me eth, 135
430	1-Amino-7-hydroxynaphthalene (7-Hydroxy-1-naphthylamine)	205 7		N- <i>mono</i> 165	N- <i>mono</i> 208-9, N,O- <i>di</i> 208					
431	4,6-Diaminoisophthalaldehyde	208		270 (<i>mono</i>), 280 (<i>di</i>)						Dioxime, 220, Diphenylhydrazone, 337
432	N-4-Hydroxybenzylaniline	208								Me eth, 65, Et eth, 65
433	6-Aminobenzopyrazole	210		248 (6-N-), 184-5 (<i>di</i>)						Dihydrochloride, 230
434	4,4'-Diamino-2,5,2',5'-tetramethyltriphenylmethane	210		217 (<i>di</i>)	250 (<i>di</i>)					
435	3-Indolylpyruvic acid	211, grey								4-Nitrophenylhydrazone, 153-4, Oxime, abt 175
436	2-Amino-6-hydroxynaphthalene (6-Hydroxy-2-naphthylamine)	212 3			N,O- <i>di</i> 228 30					Me eth, 78 Et eth, 91
437	5-Amino-1,4-dihydroxyanthraquinone (5-Aminoquinizarin)	212 3, br red								N-Phenyl, 223, Di-Me eth, 242-3
438	2-Amino-4,5-dimethylpyrimidine	214 5							250	Chloroplatinate, 227
439	5-Bromo-4-hydroxy-2-methylaniline	215, 205		171 2 (<i>di</i>)	229 (<i>di</i>)					
440	4-Amino-4'-nitroazobenzene	216 205		245						N-Me, 206 7, bl
441	2-Hydroxy-6-nitroaniline	216, red		N- <i>mono</i> 172			136 (O-)			Me eth, 76
442	3,4-Diaminopyridine	218 9			222 3 (<i>di</i>)					
443	1-Amino-5-chloroanthraquinone	219, red		219	218					Chloroplatinate, 231
444	3,6-Dimethylcarbazole	219		129					192	N-Nitroso, 106
445	3-Aminothioxanthone	221-2, yel-br		236 7						Hydrochloride, 230
446	2-Amino-10-hydroxyphenanthrene	221		182 (O, N- <i>di</i>)	225 (O, N- <i>di</i>)					
447	5-Amino-4-nitroacenaphthene	222, red		252	233					N-Formyl, 227
448	5-Chloro-4-hydroxy-2-methylaniline	223 5, 204 5		162 (<i>di</i>)	220 (<i>di</i>)					
449	2,6-Dimethylcarbazole	224							162	N-Nitroso, 113
450	2-Amino-1,8-dinitronaphthalene (1,8-Dinitro-2-naphthylamine)	226		238			221			
451	<i>trans</i> -4,4'-Diaminostilbene	231, yel		353 (<i>di</i>)	352 (<i>di</i>)					
452	2-Amino-3-hydroxynaphthalene (3-Hydroxy-2-naphthylamine)	234		188 (O,N- <i>di</i>)	N- <i>mono</i> 233-5					
453	1-Amino-2,4-dinitronaphthalene (2,4-Dinitro-1-naphthylamine)	242		259	252		166			
454	2,5-Dimethyl-4-hydroxyaniline	242		177-9						Et eth, 69 70
455	1-Amino-3-bromoanthraquinone	243, red		214			227			
456	4,4'-Diaminobenzophenone	244		237 (<i>di</i>)						Phenylhydrazone, 240
457	Carbazole	246		69	98				185	
458	1-Amino-2-hydroxyanthraquinone	250, br		N- <i>mono</i> 170						Et eth, 182, red

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
1. Primary and secondary amines c) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Acetamide	Benzamide	Benzene sulfonamide	<i>p</i> -Toluene sulfonamide	Phenyl thiourea	Picrate	Miscellaneous
459	1-Aminoanthraquinone	252, 243		218	255		228 9			
460	3-Aminocarbazole	254		3-mono 217, <i>di</i> 200, <i>tri</i> 175	3-mono 250					
461	2,7-Diaminocarbazole	260		320 (<i>di</i>)						N,N'-Dibenzal, 290
462	1,8-Diaminoanthraquinone	262, red		284 (<i>di</i>)	324 (<i>di</i>)					
463	1,4-Diaminoanthraquinone	268, vlt		271 (<i>di</i>)	284 (<i>di</i>), 280 (<i>mono</i>)					
464	2-Amino-3-nitrofluorenone	269, vlt		245 6						N-Carboxy, 204
465	1,1'-Diamino-2,2'-dinaphthyl	281		230 (<i>di</i>)	278 (<i>di</i>)					
466	1,7-Diaminoanthraquinone	290, red		283 (<i>di</i>)	325 (<i>di</i>)					
467	2,7-Diaminofluorenone	290, vlt		222 (<i>di</i>)					230 (<i>di</i>)	Oxime, 255, Phenylhydrazone, 230, 4-Nitrophenylhydrazone, 280
468	1,6-Diaminoanthraquinone	292, red		295 (<i>di</i>)	275 (<i>di</i>)					
469	1-Amino-5-nitroanthraquinone	293, red		275	237					N-Me, 250 2, vlt- blk. N-Et, 238 N-Me, 250
470	1-Amino-4-nitroanthraquinone	296, yel - red		256 8						
471	5,8-Diaminoquinizarin (1,4-Diamino-5,8-dihydroxyanthraquinone)	>300, br -vlt		5,8- <i>di</i> 284		5,8- <i>di</i> 275				
472	2-Aminoanthraquinone	305 8, 302		<i>mono</i> 262, <i>di</i> 258	228	271	304			
473	2-Amino-3-bromoanthraquinone	307, or -yel		259 217	279					N-Benzal, 174
474	2-Aminoquinizarin (2-Amino-1,4-dihydroxyanthraquinone)	313 4, grn -yel								N-Phenyl, 255 6, N-4-Tolyl, 220
475	1,5-Diaminoanthraquinone	319, red		317 (<i>di</i>)	>350 (<i>di</i>)					
476	2,7-Diaminoanthraquinone	>330, or		>350	300 (<i>di</i>)					
477	2,5-Dianilino-1,4-benzoquinone	345, red-br								Anil, 203. Diamil, 240, red
478	2,8-Diaminoacridone	>350		>350 (<i>di</i>)	>250 (<i>di</i>)					N,N'-Dibenzal, 370

*Derivative data given in order m p crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
2. Tertiary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point °C	Melting point, °C	n_D	Density g/ml	Methyl <i>p</i> -toluene sulfonate	Methiodide	Picrate	Chloro platinate	Miscellaneous
1	Trimethylamine	3			0.6709 ⁰		230	216, 225		<i>p</i> -Toluenesulfonate salt, 162
2	Dimethyl ethyl amine	37.5						193		Hydrochloride, 221
3	N-Methylpyrrolidine	78-80						221	233	
4	Triethylamine	89		1.400 ²⁰	0.7255 ⁴⁵			173		2,4-Dinitrobenzoate salt, 81
5	1,2-Dimethylpyrrolidine	96		1.4252 ²⁰	0.7994 ²⁰			235	223	3, β -Resorcylic acid salt, 120
6	1,3-Dimethylpyrrolidine	96-7			0.7921 ⁵			dimorphous, 181 or 110-5	58.9	HgCl ₂ add comp., 200
7	Pyridine	116		1.5092 ²¹	0.9782 ²⁵	139	117	167	241, 262.4	<i>p</i> -Toluenesulfonate salt, 160, Ethiodide, 91
8	1,2,5-Trimethylpyrrolidine	116		1.4335 ^{9, 2}	0.815 ⁴		310	163		
9	2-Dimethylaminoethyl ether	121		1.406 ²⁰	0.806 ²⁰		160.5	119-21		
10	Dimethylaminoacetone	123							176, s. h	Oxime, 99
11	1-Methylpyrazole	127		1.4787 ¹⁴ _{He}	0.9931 ¹⁴		190	148	196.8	
12	N-Ethylpiperidine	128		1.4416 ²⁰ _α	0.8237 ²⁰			167.5	202	
13	2-Methylpyridine (α -Picoline)	129		1.503 ¹⁷	0.9497 ¹⁵	150	230	169	216, 195	<i>p</i> -Toluenesulfonate salt, 161, Ethiodide, 123
14	β -Dimethylaminoethyl alcohol (2-Dimethylaminoethyl alcohol)	135		1.43 ²⁰	0.8866 ²⁰			96.7		
15	1,3-Dimethylpyrazole	136		1.467 ¹⁵ _α	0.9628 ¹⁵		256	138		
16	2-Methylpyrazine	136-7			1.029 ²⁰		129.30	133		
17	4-Methylpyrimidine	141.2			1.031 ¹⁸			131.4		HgCl ₂ double salt, 198
18	2,6-Dimethylpyridine (2,6-Lutidine)	142.3					233	168	208	
19	3-Methylpyridine (β -Picoline)	143		1.504 ²⁴	0.9515 ²⁵			150	202	Styphnate, 154, Oxid → nicotinic acid, 228
20	4-Methylpyridine (γ -Picoline)	143		1.506 ¹⁹	0.957 ¹⁵			167	231	β -Resorcylic acid salt, 125
21	4-Chloropyridine	147.8							202	
22	2-Ethylpyridine	149			0.9371 ¹⁷			187.9	165.7	
23	3-Chloropyridine	149						135	168	
24	Tri- <i>n</i> -propylamine	156.5		1.4176 ²⁰	0.753 ²⁰		207.8	116		Ethiodide, 238
25	2,4-Dimethylpyridine (2,4-Lutidine)	157, 159		1.503 ¹⁴	0.9273 ²⁵			183	216	β -Resorcylic acid salt, 143
26	2,5-Dimethylpyridine (2,5-Lutidine)	160						169	192.4	
27	1,3,4-Trimethylpyrazole	160		1.4866 ¹⁸ _{He}	0.956 ¹⁸			164		
28	3-Ethylpyridine	162-4			0.954 ⁰			128-30	208-9, 196	
29	β -Diethylaminoethyl alcohol (2-Diethylaminoethyl alcohol)	163		1.440 ²⁵	0.8601 ²⁵ _{SS}					4-Nitrophenylurethane, 60
30	Tropidine (2-Tropene)	163		1.4884 ¹⁹ _α	0.953 ²⁰		abt 300	285	217	
31	2,3-Dimethylpyridine (2,3-Lutidine)	164						188	195	
32	3,4-Dimethylpyridine (3,4-Lutidine)	164						163	205	
33	4-Ethylpyridine	164-5			0.9417 ²⁰			168	213	
34	2,4,5-Triethylpyridine (2,4,5-Collidine)	165-8						128-31	205	
35	1,4-Bis-dimethylaminobutane	167						199		
36	Tropane	167			0.931 ²⁰		> 300	281	230	
37	1-Diethylaminoisopropyl alcohol	167.72			0.8511 ²⁰			89		
38	2-Chloropyridine	170, 166			1.205 ¹⁵	120				
39	3-Bromopyridine	170		1.5694 ²⁰	1.645 ⁹	156	165		175	
40	3,5-Dimethylpyridine (3,5-Lutidine)	170-1						245	255	

*Derivative data given in order. m. p., crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
2. Tertiary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Methyl <i>p</i> -toluene sulfonate	Methiodide	Picrate	Chloro platinate	Miscellaneous
41	2,4,6-Trimethylpyridine (2,4,6-Collidine)	172			0.917 ²⁰			156	223	
42	1,4,5-Triethylpyrazole	176-7		1.4848 ¹⁸ _{He}	0.9685 ¹⁸			175.6		
43	2,3,6-Trimethylpyridine (2,3,6-Collidine)	176.8						146	250.2	
44	Benzyl dimethyl amine	181						93	192	Picrolonate, 151
45	2,3,5-Trimethylpyridine (2,3,5-Collidine)	184						183, 179	227.8	
46	N,N,2-Trimethylaniline (N,N-Dimethyl <i>o</i> -toluidine)	185		1.515 ²⁰	0.9286 ²⁰			122, 116		1,3,5-Trinitrobenzene add comp., 113
47	2,6-Dimethyl-4-ethylpyridine	186			0.916 ¹⁴			119-20	210	
48	2,4-Diethylpyridine	187-8			0.9338 ⁰			98.100	170-1	
49	3-Diethylaminopropyl alcohol	190					175			
50	Methyl 2-pyridyl ketone	192					161	131	220	Oxime, 121 Phenylhydrazone, 155, Ethiodide, 205
51	2,3,4-Trimethylpyridine (2,3,4-Collidine)	192-3			0.912 ¹⁵			163.4	259	
52	N,N-Dimethylaniline	193	2.2.5	1.5582 ²⁰	0.9557 ²⁰	161	228, 220	163	173	<i>p</i> -Toluenesulfonate salt, 133, 3,5-Dinitrobenzoate salt, 115
53	2-Bromopyridine	194			1.657 ¹⁵	127				
54	3-Ethyl-4-methylpyridine	195.6			0.9656 ⁰			148.50	234, 205	
55	3,5-Dimethyl-2-ethylpyridine	198						152	189	
56	N,N,2,6-Tetramethylaniline (N,N-Dimethyl- <i>m</i> -2-xylylidine 2-Dimethylamino- <i>m</i> -xylene)	199-200		1.513 ²⁰	0.912 ²⁰					1,3,5-Trinitrobenzene add comp., 108
57	N-Ethyl-N-methylaniline	201			0.919 ⁵⁵		125	134.5		Hydrochloride, 114
58	N,N,2,5-Tetramethylaniline (N,N-Dimethyl- <i>p</i> -2-xylylidine, 2-Dimethylamino- <i>p</i> -xylene)	204						158	196	
59	N,N,2,4-Tetramethylaniline (N,N-Dimethyl- <i>m</i> -4-xylylidine, 4-Dimethylamino- <i>m</i> -xylene)	205		1.5201 ²⁰	0.9164 ²⁰			123.4	219	1,3,5-Trinitrobenzene add comp., 114
60	N,N-Diethyl-2-methylaniline (N,N-Diethyl- <i>o</i> -toluidine)	206, 210					224	180		
61	2-Chloro-N,N-dimethylaniline	207					152	132		
62	N,N,4-Trimethylaniline (N,N-Dimethyl- <i>p</i> -toluidine)	210		1.536 ²⁰	0.929 ²⁰	85	219	129		1,3,5-Trinitrobenzene add comp., 124, vlt
63	3,4-Diethylpyridine	211						139	221	
64	Tri- <i>n</i> -butylamine	211, 216			0.778 ²⁰ ₂₀		180	106		β -Resorcylic acid salt, 121
65	N,N,3-Trimethylaniline (N,N-Dimethyl- <i>m</i> -toluidine)	212		1.5492 ²⁰	0.941 ²⁰		177			
66	Methyl 4-pyridyl ketone	212-4						130	205	Oxime, 142, Phenylhydrazone, 150, HgCl ₂ double salt, 183-4
67	N,N-Diethylaniline	218, 216			0.9351 ²⁰		102	142		
68	Methyl 3-pyridyl ketone	220								Oxime, 133, Phenylhydrazone, 137, HgCl ₂ double salt, 158
69	N,N-Diethyl-4-methylaniline (N,N-Diethyl- <i>p</i> -toluidine)	229			0.924 ¹⁶		184			
70	2,3,4,5-Tetramethylpyridine	232.4						170.2	210	
71	Quinoline	239	-15.6	1.6268 ²⁰	1.0929 ²⁰	126	133	203	227, 218	<i>p</i> -Toluenesulfonate salt, 155, Ethiodide, 159, Styphnate, 207.8
72	Isoquinoline	243	26, 24	1.615 ²⁰ , 1.622 ²⁵	1.0986 ²⁰	163	159	222	263	Ethiodide, 148

*Derivative data given in order m, p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
2. Tertiary amines a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D	Density g/ml	Methyl <i>p</i> -toluene sulfonate	Methiodide	Picrate	Chloro platinate	Miscellaneous
73	DL-Nicotine (DL-1-Methyl-2-(3-pyridyl)-pyrrolidine)	243			1 008 ₄ ²⁰		219	218	abt 280	
74	2-Dimethylaminobenzaldehyde	244, yel					164		205 6	Oxime, 87, <i>p</i> -Nitrophenylhydrazone, 191
75	Tri-isoamylamine	245, 237			0 786 ₄ ²⁰			125		
76	N,N-Dipropylaniline	245			0 9104 ²⁰		156	261		
77	2-Ethylquinoline (α -Ethylquinoline)	245-6		1 598 ²³	1 050 ¹⁷		180	148	188	
78	2-Methylquinoxaline	245-7						215	>250	
79	1-Methylindole	247, 239			1 0707 ⁰			150		
80	2-Methylquinoline (Quinaldine)	247		1 6126 ²⁰	1 0585 ₂ ²⁰	161, 134	195	191, 195	228	β -Resorcylic acid salt, 145 Ethiodide, 233
81	8-Methylquinoline	248		1 616 ²⁰	1 072 ₁ ²¹			200		
82	L-Nicotine (L-1-Methyl-2-(3-pyridyl)-pyrrolidine)	248		1 528 ²⁰	1 0097 ₄ ²⁰			218	275	$[\alpha]_D^{20}$ - 167-8
83	1-Ethylisoquinoline	250						207 10	200	
84	2,4-Dimethyl-5,6,7,8-tetrahydroquinoline	250	20	1 5415 ²⁰	1 0043 ₄ ²⁰		157	144		Hydrochloride, 195
86	N-Methyl-2-pyridone	255						145	141	Styphnate, 162
87	4,6-Dimethylquinoline	255 6, 280						236-7	238	
88	3-Ethylisoquinoline	257						171 2	180	
89	Tri-<i>n</i>-amylamine (Tri- <i>n</i> -pentylamine)	257, 245				80				
90	3-Methylquinoline (β -Methylquinoline)	257 9	16 7	1 6171 ²⁰	1 0673 ₃ ²⁰		221	187	249	Ethiodide 220
91	6-Methylquinoline	258		1 6157 ²⁰	1 0654 ₄ ²⁰	154	219, 216	229		
92	3-Chloroquinoline (β -Chloroquinoline)	258 60					276 subl	182	>300	
93	3-Bromo-N,N-dimethylaniline	259	11					135		
94	5-Methylquinoline	260					105	210 3		
95	4-Methylquinoline (γ -Methylquinoline)	261-3			1 0862 ²⁰		173 4	210-1	226 30	Ethiodide, 141 3
96	2,4-Dimethylquinoline	264-5			1 061 ¹⁵		263 5	193-4	229	Ethiodide, 214
97	2-Phenylpyridine	268-9						175	204	
98	6,8-Dimethylquinoline	269			1 066 ⁴			288-9	235	
99	N,N-Di-<i>n</i>-butylaniline	271				180		125		
100	4-Ethylquinoline (γ -Ethylquinoline)	272-4					149	178-80	204	
101	N,N-Dimethyl-1-aminonaphthalene (N,N-Dimethyl- α -naphthylamine)	273		1 624 ¹⁵	1 0446 ₁₃ ¹⁵			145		1,3,5-Trinitrobenzene add comp, 105 7
102	5,8-Dimethylquinoline	273 5	4 5		1 072 ²¹			198	234	
103	3-Bromoquinoline (β -Bromoquinoline)	274 6	12					190		Oxalate, 107
104	3,5-Dimethyl-1-phenylpyrazole	275					190	103	186	
105	6-Bromoquinoline	278	19, 24				278	217		
106	2,4,7-Trimethylquinoline	280-1		1 5973 ²⁴	1 0337 ²⁰		322	232	272	
107	4,7-Dimethylquinoline	283						224	227	
108	3,4-Dimethyl-1-phenylpyrazole	285		1 5724 ²⁰	1 0574 ₄ ²⁰			122 5	180	
109	8-Chloroquinoline	288					165		235	
110	2,3'-Bipyridyl	289, 298						150, <i>dt</i> 165-8		
111	8-Bromoquinoline	302-4					281		230	
112	6-Methoxyquinoline	305d	20, 28				236	305		
113	N-Benzyl-N-methylaniline	306		1 601 ³⁰	1 0422 ₂₆ ²⁶		164	127		

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
2. Tertiary amines a) Liquids (b.p. at reduced pressure only)
2) (Listed in order of increasing m.p. of the corresponding picrate derivative)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Methyl <i>p</i> -toluene sulfonate	Metho dide	Picrate	Chloro-platinate	Miscellaneous
1	N,N-Dimethyl-2-nitroaniline	151 3 ³⁰⁻³ , or -yel		1 6102				102 3		Hydrochloride, 174, 1,3,5-Trinitrobenzene add comp, 112
2	2,6-Diethylpyridine	71 3 ¹⁷					142	115	211 2	
3	2-Iodopyridine (α-Iodopyridine)	93 ¹³		1 6366 ²⁰	1 9735 ²⁰		207	120	210	
4	1,3-Dimethyl-1,2,3,4-tetrahydroquinoline	130 2 ¹⁷					204	131		
5	β,β-Diethylphenylhydrazine	110 2 ¹⁴						131		Reduces Fehling's and Tollen's reagent Zn + AcOH → aniline, b p 184 + diethylamine b p 56
6	3-Dimethylaminobenzaldehyde	138°, yel					185 6	147	168 r h	Oxime, 75-6, Semicarbazone, 229 <i>p</i> -Nitrophenylhydrazone, 188
7	4-Methyl-5,6,7,8-tetrahydroquinoline	122 ¹¹					183	170		Hydrochloride, 203
8	3-Methyl-5,6,7,8-tetrahydroquinoline	126 7 ¹⁷					162	171	219	
9	3-Ethylquinoline (β-Ethylquinoline)	135 8 ¹²		1 603 ¹⁸	1 0508 ²⁰		191	197		Hydrochloride, 173
10	4-Bromopyridine (γ-Bromopyridine)	27 5 30 ^{0 3-0 5}	0-1	1 5679 ²⁰				223		Decomposes to yel -br solid on standing

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
2. Tertiary amines b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Methyl <i>p</i> -toluene sulfonate	Methiodide	Picrate	Chloro platinate	Miscellaneous
1	Pyrimidine	21	123 4			156		Chloraurate, 226
2	4,6-Dimethylpyrimidine	25	160			12 34	103 4	
3	2,8-Dimethylquinoline	27	252		221	180		n _D 1 6022, Ethiodide, 229
4	4-Bromoquinoline (γ-Bromoquinoline)	29 30, 25	270d		265 70			
5	Quinoxaline (Benzopyrazine)	30	230		176			D ₄ ^s 1 1334, n _D ^s 1 6231, Oxalate, 169, Ethiodide, 146
6	5-Methylpyrimidine	30 5	154			141		HgCl ₂ double salt, 246, Chloraurate, 209
7	4-Chloroquinoline (γ-Chloroquinoline)	31	263			212	278	
8	7-Chloroquinoline	31-2	267-8		250		253	
9	8-Iodoquinoline	36			200		251	
10	1,3,5-Trimethylpyrazole	37	170			147	187 91	n _D ^s 1 4589
11	2-Chloroquinoline (α-Chloroquinoline)	38	267			122		
12	2,3-Dimethyl-5,6,7,8-tetrahydroquinoline	38	125 ¹⁴		117	169		
13	7-Methylquinoline	39	252			237	223-4	
14	4-Bromoisquinoline	40	280 5		233			
15	6-Chloroquinoline	41	262	143	248			Ethiodide, 168 9
16	4-(Diethylamino)benzaldehyde	41, yel						Oxime, 93, Semicarbazone, 214 Phenylhydrazone, 103, Anil, 108-9 Hydrochloride, 154
17	3-Nitropyridine	41	216				254	
18	2,4,8-Trimethylquinoline	42	270		229	193		
19	4-Chloro-2-methylquinoline (4-Chloroquinaldine)	42 3			212	178		
20	5-Chloroquinoline	45	256		231, 172		255	
21	2,6,8-Trimethylquinoline	46	264 5			187-9	206-7	Hydrochloride, 207
22	2-(Dimethylamino)naphthalene (N,N-Dimethyl-β-naphthylamine)	47	305			206		
23	2,4,5,8-Tetramethylquinoline	48, pa yel	168-72 ¹²			161		Hydrochloride, 254
24	5-Bromoquinoline	48, 52	280		205			Hydrochloride, 225
25	2-Bromoquinoline (α-Bromoquinoline)	49			210			
26	8-Methoxyquinoline	50	283		160	143		
27	7-Bromoquinoline	52, 34	290		240, yel			Hydrochloride, 213
28	2-Iodoquinoline (α-Iodoquinoline)	52-3			211-2			Ethiodide, 220
29	3-Iodopyridine (β-Iodopyridine)	53, 50					211	Chl ₂ cold CHCl ₃ → chloride, 128 30, yel
30	4,8-Dimethylquinoline	54 5	258 9			216 7	226	
31	2,3,8-Trimethylquinoline	55-6	281			242 5		Hydrochloride, 260
32	2,6-Dimethylquinoline	60	266	175	236-7	186, 178		Styphnate, 200
33	N,N-Dimethyl-3-nitroaniline	60, red			205	119		
34	3,4'-Bipyridyl	62	297			215		
35	2,4,6-Trimethylquinoline	65 5 (anh), 39 5 (hyd)	281 2		245-7, 225	200-1		Hydrochloride, 268-72
36	3,3'-Bipyridyl (β,β-Bipyridyl)	68	291-2			232		
37	2,3-Dimethylquinoline	68 9	263		218	230 1	230	
38	2,2'-Bipyridyl (α,α'-Bipyridyl)	69				158		
39	5-Nitroquinoline	72 (anh)			215			Hydrochloride, 214
40	N,N-Dibenzylaniline	72, 70			135	131		
41	2,2'-Bis-(dimethylamino)-biphenyl	72-3			190-2			Hydroiodide, 256-7
42	3,4-Dimethylquinoline	73-4, 65	293		191	215, 205		Hydrochloride, 290
43	8-Hydroxy-2-methylquinoline (8-Hydroxyquinaldine)	74	266					Me eth, 125, b p 282
44	4-Dimethylaminobenzaldehyde	74						Semicarbazone, 222, <i>p</i> -Nitrophenylhydrazone, 182, 2,4-Dinitrophenylhydrazone, 325, Anil, 100, grn -yel
45	8-Hydroxyquinoline	75			143	204		Benzoate, 120, 1,3,5-Trinitrobenzene add comp, 124
46	N,N-Dimethyl-4-aminophenol (N,N-Dimethyl-4-hydroxyaniline)	76						Acetate, 78, Me eth, 49, <i>p</i> -Toluenesulfonyl, 130
47	8-Bromoisquinoline	80 5			274			Nitrate, 193

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
2. Tertiary amines b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Methyl <i>p</i> -toluene sulfonate	Methiodide	Picrate	Chloroplatinate	Miscellaneous
48	3,4'-Biquinolyl	83-4				244		Diethiodide, 198
49	2,2'-Dipyridylamine	84, 95 after resolution	307-8			227-8	160	
50	N,N-Dimethyl-4-nitrosoaniline (4-Nitroso-N,N-dimethylaniline)	85				140		Hydrochloride, 177
51	N,N-Dimethyl-3-aminophenol (N,N-Dimethyl-3-hydroxyaniline)	85						Benzoate, 95, Me urethane, 87
52	2,3,6-Trimethylquinoline	86-7	285			212		
53	6,6'-Dimethyl-2,2'-bipyridyl	89-90				170 1		HgCl ₂ add comp, 238
54	4,4'-Bis-(dimethylamino)-diphenylmethane	91	390		214 (di)	185 (mono), 178 (di)		1,3,5-Trinitrobenzene add comp, 114, vlt
55	6-Iodoquinoline	91			>300		265	Hydrochloride, 210
56	Tribenzylamine	91			184	190		Ethiodide, 190, β-Resorcyclic acid salt, 141
57	2,3,4-Trimethylquinoline	92	285		260	216	215	Hydrochloride, 274
58	4-Dimethylaminobenzophenone	92			188-90			Anil, 151, Phenylhydrazone, 105
59	N-Methyl-4-pyridone	92-4 hyg					176 (anh)	HgCl ₂ double salt, 177-80
60	1,5-Dimethylbenzimidazole	95	300			255		Hydrochloride, 215
61	1-Phenylisoquinoline	95-6	300			165	242	Hydrochloride, 235
62	6-Bromo-2-methylquinoline (6-Bromoquinaldine)	96 7			237			Ethiodide, 218
63	4-Iodoquinoline (γ-Iodoquinoline)	97			251		185	
64	4,4'-Bis-(dimethylamino)-benzhydrol	98, 102, grn			195 (di)			Me eth, 71 2, 1,3,5-Trinitrobenzene add comp, 76
65	5-Iodoquinoline	100			245		263	
66	4,4'-Bis-(dimethylamino)-triphenylmethane (Leuco-malachite green)	102, bz, 93, al			231 (220) (di)			1,3,5-Trinitrobenzene add comp, 89
67	2,2'-Biquinolylmethane	103			205	239, 210 (di)		
68	2-Hydroxypyridine (α-Hydroxypyridine, α-Pyridone)	106-7	280-1					Benzoate, 42, HgCl ₂ comp with Me eth, 200, HgCl ₂ comp with Et eth, 141-2
69	Acridine	111			224	208		
70	3,5-Dibromopyridine	112	222	219	274			
71	1,2-Dimethylbenzimidazole	112 (anh), 65(hyd)	290		254	238		
72	Antipyrine (2,3-Dimethyl-1-phenyl-5-pyrazolone)	113	319			188		Salicylate, 92
73	4,4'-Bipyridyl	114 (anh), 73 (hyd)				257		Nitrate, 256
74	4-Dimethylaminoazobenzene	117, yel			174, al			Methochloride, 194
75	Triphenylamine	127	365					Hydrochloride, 214, Fuming HNO ₃ in ac a → trinitro deriv, 280
76	3-Hydroxypyridine (β-Hydroxypyridine)	129						Oxalate, 177, Chloroplatinate of Et eth, 192
77	Methyleneaminoacetonitrile	129	210			127		Acid hydrolysis → glycine
78	7-Nitroquinoline	132 3			231-2			Ethiodide, 220
79	6,8'-Biquinolyl	148			126 (mono)	268		
80	4-Hydroxypyridine (γ-Hydroxypyridine)	149 (anh)						Acetate, 140 50, Benzoate, 81, Zn → pyridine, b p 116
81	6-Nitroquinoline	154, 149			245			Styphnate, 190, Hydrobromide, 245
82	Quinuclidine	158 (sealed tube)				275-6	238-40	Ethiodide, 270-1
83	2,7'-Biquinolyl	160			263	240		

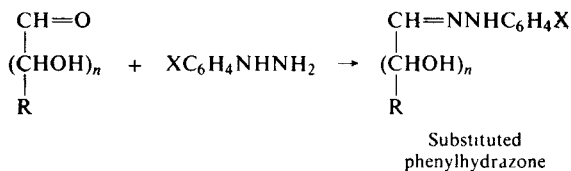
*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XVIII. ORGANIC DERIVATIVES OF AMINES
2. Tertiary amines b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Methyl <i>p</i> -toluene sulfonate	Methiodide	Picrate	Chloroplatinate	Miscellaneous
84	2,2'-Biquinolyl ketone	164				179		Oxime, 201, Phenylhydrazone, 199
85	6-Hydroxypyrimidine	164-5				190		Acetyl, 180, 215-20 after re-solidification
86	7,7'-Biquinolyl	171-2			310 (<i>mono</i>)	300		
87	4,4'-Bis-(dimethylamino) benzophenone (Michler's ketone)	174			105	156		Oxime, 233
88	5,5'-Biquinolyl	175			272	>300		Hydrochloride, 292
89	2,3'-Biquinolyl	176			286		278	
90	6,6'-Biquinolyl	181			>290 (<i>di</i>)			Diethiodide, 270
91	6-Hydroxyquinoline	193				236		1,3,5-Trinitrobenzene add comp, 193-5
92	2,2'-Biquinolyl (α,α' -Biquinolyl)	196				210, 215		
93	3-Hydroxyquinoline (β -Hydroxyquinoline)	198				240-5		
94	1,2-Di(2-pyrrolyl)ethanedione (2,2'-Bipyrryl)	200, pa yel						α -Phenylenediamine \rightarrow di-pyrrolylquinoxaline, 158, Monoxime, 147, Diphenylhydrazone, 146
95	4-Hydroxyquinoline (γ -Hydroxyquinoline)	201 (anh)						Hydrochloride, 187 (anh), $\text{KMnO}_4 \rightarrow$ kynuric acid, 200 (anh)
96	6-Hydroxy-2-methylquinoline (6-Hydroxyquinaldine)	213						Et eth, 71, Picrate of Et eth, 192, Ethiodide of Et eth, 182
97	5-Hydroxyquinoline	224			224		230	Hydrochloride, 240
98	4-Hydroxy-2-methylquinoline (4-Hydroxyquinaldine)	232 (anh)			201 (anh)	200	215	Me eth, 82
99	7-Hydroxyquinoline	235			251	244-5		Benzoate, 88-9
100	5-Hydroxy-2-methylquinoline (5-Hydroxyquinaldine)	246, 232-4						Picrate of Me eth, 217, Picrate of Et eth, 213, 206
101	4,4'-Dipyridylamine	273-5				235, 174	>280	Hydrochloride, >300
102	Hexamethylene tetramine	280		205	190	179		Dil acid \rightarrow formaldehyde, semicarbazone, 169

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XIX

*Substituted phenylhydrazones **

From the carbohydrate and one equivalent of phenylhydrazine in aqueous acetic acid

For directions and examples see Cheronis, p 520, Wild, p 77

From the carbohydrate, phenylhydrazine hydrochloride and sodium acetate in water

See Wild, p 77

From the carbohydrate with *p*-nitrophenylhydrazine hydrochloride and sodium acetate in methanol

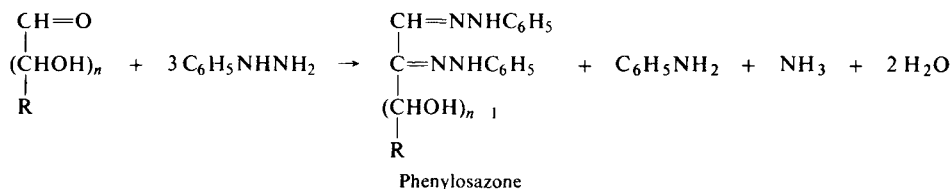
See Cheronis, p 523

From the carbohydrate and *p*-nitrophenylhydrazine in alcohol

See Vogel, p 456

From the carbohydrate and benzylphenylhydrazine in aqueous alcohol

See Shriner, p 77

*Phenylosazone **

From the carbohydrate and excess of phenylhydrazine in glacial acetic acid

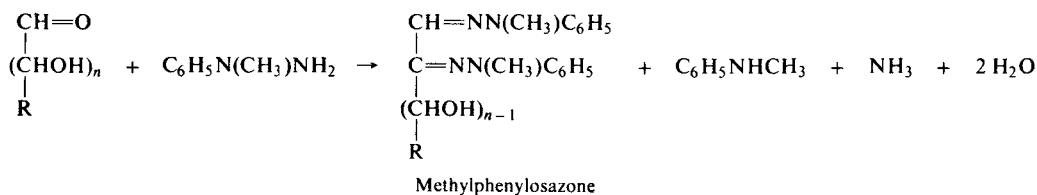
For directions and examples see Cheronis, pp 523, 524

From the carbohydrate, excess of phenylhydrazine hydrochloride and sodium acetate in aqueous acetic acid

See Cheronis, pp 524, 525 Linstead p 38 Shriner, p 132 Vogel, p 455

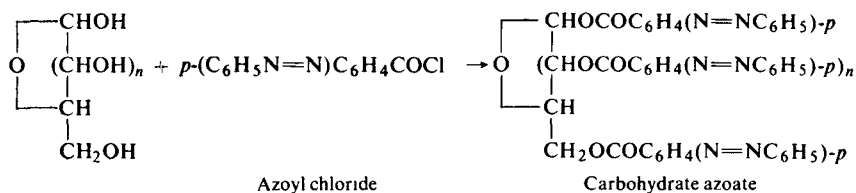
From the carbohydrate and excess of phenylhydrazine in methyl cellosolve-glacial acetic acid mixture

See W T Haskins, R M Hann and C S Hudson, *J Amer Chem Soc*, **68**, 1766 (1946)

Methylphenylosazone

From the carbohydrate and *as*-methylphenylhydrazine in aqueous alcohol

For directions and examples see Vogel, p 456

p-Phenylazobenzoate (azoate) *

From the carbohydrate and azoyl chloride (*p*-phenylazobenzoyl chloride) in anhydrous pyridine

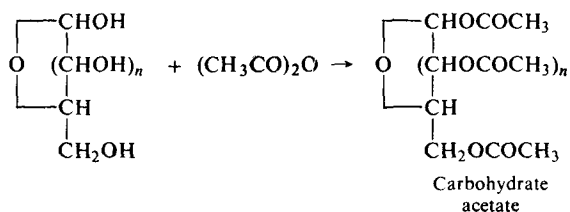
For directions and examples see Cheronis, p 526, G H Coleman, A G Farnham and A Miller, *J Amer Chem Soc*, **64**, 1501 (1942), G H Coleman and C M McClosky, *J Amer Chem Soc*, **65**, 1588 (1943)

***Derivatives recommended for first trial**

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE XIX (Continued)

Acetate



From the carbohydrate, acetic anhydride and sodium acetate

For directions and examples see Linstead, p 39, Shriner, p 212, Vogel, p 451, Wild, p 78

Specific rotation

Specific rotation can be used as means for identification

For directions and examples see Cheronis, p 578, Wild, p 78

General references

C A Browne and F W Zerban, *Physical and Chemical Methods of Sugar Analysis*, 3rd edition, John Wiley and Sons, New York, 1941, J Stanek, M Carny, J Kocourek and J Pacak, *The Monosaccharides*, Academic Press, New York, 1963, pp 865 955, G R Pigman in *The Carbohydrates*, (Ed W Pigman), Academic Press, New York, 1957, pp 602 640

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE XIX. ORGANIC DERIVATIVES OF CARBOHYDRATES
a) Liquids (Listed in order of increasing m.p. of the corresponding phenylosazone derivatives)*

No	Name	Melting point, °C	Specific rotation			Rf-Values in <i>n</i> -butanol-acetic acid-water (4:1:5)	Phenylosazone		Azoate (<i>p</i> -Phenylazobenzoate)		<i>p</i> -Nitrophenylhydrazone	<i>p</i> -Bromophenylhydrazone	Miscellaneous
			$[\alpha]_D$	T, °C	Conc., Solvent		M P	$[\alpha]_D^T$ Solvent	M P	$[\alpha]_{589}^{25}$ chl			
1	DL-Methyltetrose						140-2						Phenylbenzylhydrazone, 99 100
2	Apiose		+3 8,	20	c = 3 4,		156						<i>p</i> -Bromophenylosazone, 210 2
3	DL-Gulose		+5 6	15	water		157 9						Phenylhydrazone, 143, <i>p</i> -Bromophenylosazone, 183
4	L-Erythrose		+11 5 → +15 2 → +30 5	24	c = 3, water		164						Benzylphenylhydrazone, 105, $[\alpha]_D^{20}$ +32 8, c = 5, 95% al, Triacetyl, 134
5	D-Erythrose		-14 5	20	c = 11, water		164, 166	0 5, pyr-al					Benzylphenylhydrazone, 105 6 $[\alpha]_D^{20}$ +32 8, c = 5, 95% al, <i>p</i> -Bromophenylosazone, 195 Phenylhydrazone, 116
6	DL-Erythrose						164, 166 8						Benzylphenylhydrazone, 83
7	DL-Erythrulose						164						Methylphenylosazone, 158 9
8	L-Erythrulose		+12	20	water		164						<i>p</i> -Bromophenylosazone, 195
9	L-Idose		+52 7	20	c = 6 2, water		168, 160						
10	D-Gulose		-20 4 → +61 6	20	water		168, 160	+6, c = 0 4, me al					Phenylhydrazone, 143 <i>p</i> -Bromophenylosazone, 186 Benzylphenylhydrazone, 124, $[\alpha]_D$ -24, c = 0 5, me al
11	β -Methylglycer-aldehyde						171						Benzylphenylhydrazone, 116
12	L-Methyltetrose		-30 5 → -16 5	20	c = 9 47, 96% al		172-3						Benzylphenylhydrazone, 96 7 Diethyl mercaptal, 109
13	D-Rhamnose (6-Desoxy-D-mannose)		-8 25	16 5	c = 10, water		185, 191	-95 2, pyr					<i>p</i> -Bromophenylosazone, 225, 222-3
14	3-Amino-3-desoxy-D-glucose		-61 → -78	18	water		207						N-Benzoyl, 128 30
15	DL-Xylulose (DL-Xyloketose)						210 5						Methylphenylosazone, 173

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIX. ORGANIC DERIVATIVES OF CARBOHYDRATES

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Specific rotation			Rf-Values in <i>n</i> -butanol-acetic acid-water (4:1:5)	Phenylosazone		Azoate (<i>p</i> -Phenylazobenzozate)		<i>p</i> -Nitrophenylhydrazone	<i>p</i> -Bromophenylhydrazone	Miscellaneous
			$[\alpha]_D$	T, °C	Conc, Solvent		M P	$[\alpha]_D^T$ Solvent	M P	$[\alpha]_{435}^{25}$, chl			
1	1,3-Dihydroxyacetone	65-71 (monomer), 80 (dimer)					132				156, 160		Phenylhydrazone, 115, Me phenylosazone, 127 130 Diacetate, 46 7 Dbenzoate, 120, Di- <i>p</i> -nitrobenzoate, 198, Oxime, 84
2	β -Melibiose dihydrate (6- α -D-Galactosido)-D-glucose)	82-5	+111.7 \rightarrow +129.5	20	c = 4, water		176-8	+43.2, pyr	280	+172			<i>p</i> -Bromophenyl- osazone, 181 2, Phenylhydrazone, 145 160 Oxime, 186, Octaacetate, 177 5, $[\alpha]_D^{20}$ +102.5
3	D-Ribose	87, 95	-21.5, -23.7	20	c = 4, water	0.31	164 160				170, ($[\alpha]_D^{20}$ -5.7, al)		<i>p</i> -Bromophenyl- osazone, 180 5, β -Me glucoside, 83 4, $[\alpha]_D^{20}$ -113.6
4	L-Ribose	87	+20.3 \rightarrow +20.7	20	c = 4, water		166				164 5		Phenylhydrazone, 154 5
5	2-Desoxy-D-ribose	90	+2.88 \rightarrow +2.13	23	water								Benzylphenylhydra- zone, 127 9
6	Glycollic aldehyde (Glycoaldehyde)	95 7					179						<i>p</i> -Nitrophenylosazone, 311, Diphenyl- osazone, 207, Benzyl- phenylosazone, 198, Monoacetate, 157 8, Phenylhydrazone, 162
7	D-Fructose	102 4	-132.2 \rightarrow -92.4	20	c = 4, water	0.23	210		125	-440	176, ($[\alpha]_D^{20}$ +16, pyr-al)		<i>o</i> -Nitrophenylhydra- zone, 156 7 α -Me phenylosazone, 161 2, Pentaacetate α - form, 70, $[\alpha]_D^{20}$ +34.7, chl β -form, 108-9, $[\alpha]_D^{20}$ -120.5, chl
8	Lactic aldehyde (Lactaldehyde)	105					154, 145				128 9		Phenylhydrazone, 93
9	α -L-Rhamnose (6-Desoxy-L-mannose)	105, 93-4 (hyd)	-8.6 \rightarrow +8.2	20	c = 4, water	0.37	222, 182	+94, pyr			186 191		<i>p</i> -Nitrophenylosa- zone, 208, 2-Naph- thylhydrazone, 170, $[\alpha]_D^{20}$ +8.4, me al, Semicarbazone, 183, $[\alpha]_D^{20}$ +75 \rightarrow +57, w
10	L-Altrose	105, 107-9	-32.3	20	water		165 178						Benzylphenylhydra- zone, 148
11	D-Altrose	105	+32.6	20	c = 7.6, water		178						Benzylphenylhydra- zone, 148-50
12	2-Amino-2-desoxy-D-glucose (Glucosamine)	105-10	+48, +44		water		210						Phenylurea, 210, N- Acetyl, 190, Oxime, 127, Semicarbazone, 165
13	α -D-Lyxose	106-7, 101	+5.5 \rightarrow -14.0		c = 8, water		164				172	162, 156 7	Benzylphenylhydra- zone, 116, 128, $[\alpha]_D^{20}$ +26.4, c = 4.9, abs al

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XIX. ORGANIC DERIVATIVES OF CARBOHYDRATES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Specific rotation			Rf Values in <i>n</i> -butanol-acetic acid-water (4:1:5)	Phenylosazone		Azoate (<i>p</i> -Phenyl azobenzoate)		<i>p</i> Nitro phenyl-hydrazone	<i>p</i> -Bromo phenyl-hydrazone	Miscellaneous
			$[\alpha]_D$	T °C	Conc Solvent		M P	$[\alpha]_D^T$ Solvent	M P	$[\alpha]_{25}^{20}$ chl			
14	Raffinose (2-[6-(α -D Galactosido)- α -D-glucoside] β -D-fructose)	118.9, (anh) 80 (hyd)	+123, +105.2	20	water c = 4, water	0.05			145	+146			Tritrityl, 130, α -Methylphenylhydrazone, 190, Emulsin \rightarrow sucrose + galactose
15	β -L-Rhamnose	122.6	+9.1	20	water		222, 185	+94 pyr			190.1, ($[\alpha]_D^{20}$ +21.4)		α -Methylphenylhydrazone, 124, <i>p</i> -Bromophenylosazone, 222
16	D-Tagatose	124	+1.0	22	c = 1, water		196.7, 201						Diacetone deriv, 65.6, ($[\alpha]_D^{20}$ +71.8), w
17	D-Threose	126.32	+29 \rightarrow +19.6	22	water		164						Benzylphenylhydrazone, 194, bz, Acetone deriv, 84, Triacetate, 113.4, ($[\alpha]_D^{20}$ +35.5), chl
18	D-1-Amino-fructose	127.8					210						
19	β -D-Allose	128	+0.58 \rightarrow +14.41	20	c = 5, water		178, 174					145, ($[\alpha]_D^{20}$ -6.7, al)	
20	β -L-Allose	128.9	-1.9	20	water		165					141.5, ($[\alpha]_D^{20}$ +6.4, al)	
21	D-Talose	128.30	+30 \rightarrow +20.6	21	water		201, 197					205	Phenylhydrazone, 178, Benzylphenylhydrazone, 199
22	DL-Xylose	129.31					210.5						
23	α -D-Mannose	133	+29.3 \rightarrow +14.2	20	c = 4, water	0.20	210				194.5, ($[\alpha]_D^{20}$ +56, pyr -al (1.1))	208.10	Phenylhydrazone, 199.200, ($[\alpha]_D^{20}$ +26.3 \rightarrow +33.8, pyr, α -Methylphenylhydrazone, 178, ($[\alpha]_D$ +8.6, c = 0.5, me al, Benzylphenylhydrazone, 165
24	β -D-Mannose	132	-17.0 \rightarrow +14.2	20	c = 4, water		210				194.5	208.10	Phenylhydrazone, 199.200, α -Methylphenylhydrazone, 178, CaCl ₂ add comp, 101.2
25	L-Mannose	132	+14.0 \rightarrow -14.0		water		208						Phenylhydrazone, 195, ($[\alpha]_D$ +1.2, HCl
26	DL-Mannose	132.3					217.9						Phenylhydrazone, 195
27	α -D-Mannoheptose	134.5	+85.05 \rightarrow +68.64	20	c = 11, water		200					207-8	Phenylhydrazone, 197, Hexaacetate, 106, 50% al, 139.40, eth
28	DL-Glyceraldehyde (dimer)	139, 142					132						<i>p</i> -Bromophenylosazone, 168, Dibenzoate, 231, Di- <i>p</i> -nitrobenzoate, 247, Semicarbazone, 160, 2,4-Dinitrophenylhydrazone, 166-7
29	D-Isorhamnose (6-Desoxy-D-glucose)	139-40	+72.3 \rightarrow 29.7	20	c = 10, water		185, 187.9						

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XIX. ORGANIC DERIVATIVES OF CARBOHYDRATES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Specific rotation			Rf-Values in <i>n</i> -butanol-acetic acid water (4:1:5)	Phenylosazone		Azoate (<i>p</i> -Phenylazobenzoate)		<i>p</i> -Nitrophenylhydrazone	<i>p</i> Bromophenylhydrazone	Miscellaneous
			[α] _D	T, °C	Conc. Solvent		M P	[α] _D ^T Solvent	M P	[α] _D ²⁵ chl			
30	α-L-Glucose	141.3	-95.5 → -51.4	20	c = 4, water		208						Diphenylhydrazone, 162
31	L-Xylose	144, 141.3	-79.3 → -18.6	20	c = 9.94, water		159.61						Tetraacetate, 126 (β-form)
32	α-D-Xylose	145, 143	+93.6 → +18.8	20	c = 4, water	0.28	164 155	-40.9, al	157	+244	155	128	Me phenylhydrazone, 108, Benzylphenylhydrazone, 95, [α] _D -33, c = 0.57, al 2-Naphthylhydrazone, 124, [α] _D +18.6, me al Methylphenylosazone, 181, Oxime, 188.9, [α] _D +13.2, w
33	D-Fucose (6-Desoxy-D-galactose, D-Rhodoose)	145	+89.3 → +75.7	22	water		177						
34	L-Fucose (6-Desoxy-L-galactose, L-Rhodoose)	145	-152.6 → -75.9	20	c = 4 water	0.27	178				210.1	181.4	Phenylhydrazone, 170, α-Methylphenylhydrazone, 174, [α] _D ¹⁷ -17.0, pyr Oxime, 188.9, α-Me glucoside, 158, [α] _D ²⁰ -197.5, w β-Me glucoside, 119, [α] _D ²⁰ +16.04, w
35	α-D-Glucose	146 (anh), 83 (hyd)	+112.2 → +52.7	20	c = 4, water	0.18	210	-1.5, c = 2, pyr-al (1.1)	266	+223	88, 196 ([α] _D +21.5, me al)	164.6, ([α] _D -43.6 +18.9 c = 4, pyr)	2-Naphthylhydrazone, 178 <i>p</i> -Nitrophenylosazone, 257, 2,4-Dinitrophenylosazone, 256.7, α-Pentaacetate, 112
36	2-Desoxy-D-glucose	148	+46.6	18	water								Benzylphenylhydrazone, 158.9
37	β-D-Glucose	148.50	+18.7 → +52.7	20	c = 4, water		210						<i>p</i> -Nitrophenylosazone, 257, 2,4-Dinitrophenylosazone, 256.7 β-Pentaacetate, 132
38	Melezitose (2-[3-(α-D-Glucosido)-D-fructosido]-α-D-glucose)	153-4 (+2 H ₂ O)	+88.2	20	c = 4, water				130 (sin- teres)	+188			
39	Turanose (3-[α-D-Glucosido]-D-fructose)	157 (anh), 60.5 (hyd)	+27.3 → +75.8	20	c = 4, water		215.20						Heptaacetate, 140.1, eth, [α] _D ²⁰ +37, chl
40	β-D-Arabinose	158-9	-175 → -105		c = 9.45, water	0.21	162.3, 160						Oxime, 136, Benzylphenylhydrazone, 173
41	β-L-Arabinose	160	+190.6 → +104.5	20	water		166		262	+755	186	155	Benzylphenylhydrazone, 174, Me phenylhydrazone, 165, Oxime, 139, Tetraacetate, α-form 94.6, eth, β-form 86, w, Tetrabenzoate, 160.1, 173, Semicarbazone, 190, 163

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XIX. ORGANIC DERIVATIVES OF CARBOHYDRATES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Specific rotation			Rf Values in <i>n</i> -butanol-acetic acid-water (4:1:5)	Phenylosazone		Azoate (<i>p</i> -Phenylazobenzoate)		<i>p</i> -Nitrophenylhydrazone	<i>p</i> -Bromophenylhydrazone	Miscellaneous
			$[\alpha]_D$	T, °C	Conc., Solvent		M P	$[\alpha]_D^T$ Solvent	M P	$[\alpha]_{25}^{25}$, chl			
42	β -D-Galacturonic acid	160	(+55.3)	20	water							151 ($[\alpha]_D$ +11.5, me al)	Phenylhydrazone, 140, Brucine salt, 180
43	β -Maltose (4- $[\alpha$ -D-Glucosido]- β -D-glucose)	160.5, 102.3 (+1 H ₂ O)	+111.7 → +130.4	20	c = 4, water	0.11	205-6		275	+2			Phenylhydrazone, 130, <i>p</i> -Nitrophenylosazone, 261, <i>p</i> -Bromophenylosazone, 198, 2-Naphthylhydrazone, 176, Octaacetate, 160.1, $[\alpha]_D^{20}$ +62.59, chl
44	DL-Fucose (6-Desoxy-DL-galactose, DL-Rhodoose)	161					187						Diacetone deriv., 41
45	DL-Sorbose	162.3				0.20	169-70						
46	L-Galactose	162-3	-120 → -73.6		c = 10, water		192.5						Phenylhydrazone, 158.60, $[\alpha]_D$ +21.6, w
47	DL-Galactose	163, 144					206						Phenylhydrazone, 158.60, α -Methylphenylhydrazone, 183
48	β -D-Glucuronic acid	163	+36.3	20	water						225		Semicarbazone, 188, Cinchonine salt, 204, $[\alpha]_D^{20}$ +139.9, w
49	DL-Arabinose	164					169					160	Diphenylhydrazone, 204, <i>p</i> -Bromophenylosazone, 200-2
50	L-Sorbose	165, 159.61	-43.7 → -43.4	20	c = 12, water	0.20	156, 168	-6, me al					<i>p</i> -Bromophenylosazone, 181 <i>o</i> -Nitrophenylosazone, 211
51	D-Sorbose	165	+42.9	20	c = 1, water		168, 160						2, β -Me glucoside, 120-2, $[\alpha]_D^{20}$ -88.5, w, Pentaacetate, 97, $[\alpha]_D$ +2.9, chl
52	3-(β -D-Galactosido)-D-arabinose	166-8	-50.3 → +63.1	19	water		242						β -Me glucoside, 119, $[\alpha]_D$ +88.5, w
53	α -D-Galactose	167	+150.7 → +80.2	20	c = 5, water	0.16	196, 201		276	+436	154, 197	168	Benzylphenylhydrazone, 223-5
54	Stachyose (α -Galactosyl) ^{1-6'} α -galactosyl ^{1'-4} α -glucosyl ^{1-2'} β -fructoside)	167-70	+148	20	water								α -Methylphenylhydrazone, 190-1, Benzylphenylhydrazone, 157, Diphenylhydrazone, 157, α -Pentaacetate, 95
55	Sucrose (2- $[\alpha$ -D-Glucosido]- β -D-fructose)	169.70, me al, 185, w-al	+66.53	20	c = 26, water	0.14			125	+35			Tetradecaacetate, 95-6, $[\alpha]_D^{20}$ +120, al, Tetradeca- <i>p</i> -nitrobenzoate, 166
													Nonreducing, Octaacetate, 72, 69, $[\alpha]_D^{20}$ +59.6, chl, Tritrityl, 128

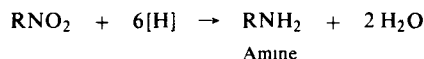
*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XIX. ORGANIC DERIVATIVES OF CARBOHYDRATES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Specific rotation			Rf Values in <i>n</i> -butanol-acetic acid-water (4:1:5)	Phenylosazone		Azoate (<i>p</i> -Phenylazobenzoate)		<i>p</i> -Nitrophenylhydrazone	<i>p</i> -Bromophenylhydrazone	Miscellaneous
			$[\alpha]_D$	T, °C	Conc. Solvent		M P	$[\alpha]_D^T$ Solvent	M P	$[\alpha]_{589}^{25}$, chl			
56	D-Glucoheptulose	171	+67.4	20	water		209-10						Hexaacetate, 112, $[\alpha]_D^{20}$ +87.0, α -Me glucoside, 138.40, $[\alpha]_D^{25}$ +108.5 w
57	4- β -D-Glucosido- β -D-mannose	176 (anh), 139.40 (hyd)	+15.1 \rightarrow +10.7	16	water		198						
58	α -L-Rhamnohexose	180.1	-80 \rightarrow -61.4	20	c = 9.67, water		200						Benzylphenylhydrazone, 183.4
59	L-Ascorbic acid	190, 187	+49	18	me al	0.38					262 (dl)	170 (dl)	Diphenylhydrazone, 187. Di-2,4 dinitrophenylhydrazone, 282
60	Gentiobiose (6- β -D-Glucosido) D-glucose	190-5 (anh), 86 (hyd)	+21.4 \rightarrow +8.7	20	c = 5, water		163.4, 170, 179	-42.9 ²⁰ , 95° al					Octaacetate (α) 188.9, $[\alpha]_D^{20}$ +52.3, chl, (β) 192.3, $[\alpha]_D^{20}$ -5.3, chl
61	α -D-Glucoheptose	193	-20	20	water		194-5						β -Me glucoheptoside, 169, $[\alpha]_D$ -75, w, Hexaacetate, 164 (α form), 135 (β -form)
62	α,α -Trehalose (1- $[\alpha$ -D-Glucosido]- α -D-glucose)	210, 203 (anh), 97 (+2 H ₂ O)	+178.3	20	c = 7, water				134.5	+210			Nonreducing Octanitate, 124. Octaacetate, 100.2, $[\alpha]_D^{20}$ +162, chl. Hexaacetate, 93-6, $[\alpha]_D^{19}$ +158.3, chl
63	Primeverose (6- β -D-Xylosido) D-glucose	210, 208	+24.1 \rightarrow -3.3		c = 2.5, water		220						β -Heptaacetate, 216, $[\alpha]_D^{20}$ -23.5, chl
64	Lactose (4- β -D-Galactosido) D-glucose	α -form, 223 (anh), 201 (hyd), β -form, 252 (anh)	+90 \rightarrow +55.3 (+52.3), +35 \rightarrow +55.3 (+52.3)	20	c = 4, water	0.09	200, 210-2						<i>p</i> -Nitrophenylosazone, 258, Octaacetate, 100. Benzylphenylhydrazone, 128, 2-Naphthylhydrazone, 203
65	β -Cellobiose (4- $[\alpha$ -D-Glucosido]- β -D-glucose)	225	+14.2 \rightarrow +34.6	20	c = 8, water		208, 10, 198	-6.5 ²⁰ , pyr-al (1:1)	273	+105			Phenylhydrazone, 90, Octaacetate, (α) 229.30, $[\alpha]_D^{20}$ +42, chl, Semicarbazone, 183.5, Octaacetate (β), 192, 202, $[\alpha]_D^{20}$ -14.5, chl, Oxime, 123.5
66	6- β -Cellobiosido- α -D-glucose	247-52 (anh), 200 (hyd)	+15.0 \rightarrow +8.4		water		224						
67	6- β -Lactosido- α -D-glucose	257	+34.7 \rightarrow +22.6	24	water		233						

*Derivative data given in order m.p., crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XX

*Formation of amine by reduction **

From the nitro compound and tin in hydrochloric acid

For directions and examples see Cheronis, p 625, Linstead, p 69, Shriner, p 262, Vogel, p 529, Wild, p 247

From catalytic hydrogenation (Raney nickel, platinum oxide and palladium on charcoal) of the nitro compound in ethanol, methanol or dioxane

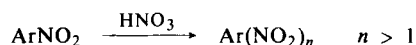
See Cheronis, p 626, Linstead, p 70, N D Cheronis and M Koeck, *J Chem Ed*, **20**, 488 (1943), K Johnson and E F Degering, *J Amer Chem Soc*, **61**, 3194 (1939), S V Voris and P E Spoerri, *J Amer Chem Soc*, **60**, 935 (1938), E R Blout and D C Silverman, *J Amer Chem Soc*, **66**, 1442 (1944)

From the nitro compound and lithium aluminum hydride in ethers

See N G Gaylord, *Reduction with Complex Metal Hydrides*, Interscience, New York, 1956, pp 762-773

For partial reduction of polynitro compounds with sodium or ammonium polysulfide *see* Linstead, p 71, Vogel, p 551

NOTE For directions and examples for the preparation of the derivatives of the amine formed on reduction of the nitro compounds see explanations and references to Table XVIII, p 291, 292, 293, 294

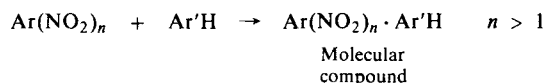
*Polynitro derivative **

From the aromatic nitro compound with concentrated or fuming nitric acid and sulfuric acid

For directions and examples see Cheronis, pp 580, 627, Shriner, p 249, Vogel, pp 526, 527

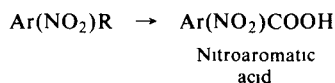
From fuming nitric acid in acetic acid or acetic anhydride

See Wild, pp 24, 247, 248, J Reilly and W J Hickinbottom, *J Chem Soc*, **117**, 135 (1920), O L Brady and W H Gibson, *J Chem Soc*, **119**, 102 (1921)

Molecular compounds of aromatic polynitro compounds with aromatic hydrocarbons

Molecular addition compounds are formed from the aromatic polynitro compound and aromatic hydrocarbons

For directions and examples see Table IV, p 32, 33, 34 Wild, p 248, T Asahina and C Shinomiya, *J Chem Soc Japan*, **59**, 341 (1938), O C Dermer and R B Smith, *J Amer Chem Soc*, **61**, 748 (1939)

Nitroaromatic acids from side-chain oxidation

From the alkylaromatic nitro compound and basic aqueous potassium permanganate

For directions and examples see Cheronis, p 627, Vogel, p 629

From the alkylaromatic nitro compound and sodium bichromate and sulfuric acid in water

See Cheronis, p 628, Vogel, p 629

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS
a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point °C	n _D	Density g/ml	Data for the corresponding amine obtained on reduction of all nitro groups						Nitration product		Miscellaneous
						Amine		Acet amide	Benz amide	Benzene sulfon amide	Picrate	Melting point, °C	Position of nitro groups	
						Boiling point, °C	Melting point, °C							
1	Nitroethylene	98.9			1.073 ¹⁴	16.5			71	58	165			Polymerizes readily on contact with base
2	Nitromethane	101	-17	1.3797 ²³	1.1297 ²⁴	-6		28	80	30	207 215			
3	Nitroethane	114		1.392 ²⁰	1.0497 ²⁰	16.5			71	58	165			Phenylthiourea deriv of amine, 101, 1-Naphthylurea deriv of amine, 200
4	2-Nitropropane	120		1.394	1.024 ⁹	33			26					
5	3-Nitropropylene (3 Nitropropene)	125.30			1.051 ²¹	58				39	140			p Toluenesulfonamide deriv of amine, 78
6	1-Nitropropane	132		1.4002 ²⁴	1.008 ²¹	49			84	36	135			
7	DL-2-Nitrobutane	140		1.4013	0.9877 ⁹	63			76	70	139-40			p Toluenesulfonamide deriv of amine, 78
8	2-Methyl-1-nitropropane	140.1			0.987 ⁷	69			57	53	150			
9	2-Methyl-2-nitrobutane	150				78					183			Hydrochloride of amine, 168, Oxalate, 226-131 Chloroaurate, 82-3
10	DL-2-Nitropentane	152.4				92								
11	1-Nitrobutane	153		1.4103 ²⁰	0.9710 ²⁰	77					151			Phenylthiourea deriv of amine, 65, 1-Naphthylurea deriv of amine, 149
12	1-Nitroisobutylene (1-Nitroisobutene)	154-8			1.052 ⁹	69			57	53	150			
13	3-Methyl-1-nitrobutane	164				96					138			Phenylthiourea deriv of amine, 102, 1-Naphthylurea deriv of amine, 132
14	1-Nitropentane	173		1.4175	0.9525 ²⁰	104					139			
15	2-Nitrohexane	176			0.9357 ²⁰	116-8								Phenylthiourea deriv of amine, 75
16	1-Nitrohexane	193		1.4234	0.9396 ²⁰	130			40	96	126			
17	1-Nitroheptane	193.5			0.9476 ¹⁷	155					121			Hydrochloride of amine, 133 Oxalate, 204-5, Chloroaurate, 63-4
18	2-Nitroheptane	194.8			0.9466 ⁹	142								
19	Nitrocyclohexane	205.6	-34	1.4612 ¹⁹	1.068 ¹⁹	134		104	147					SnCl ₂ + HCl → Cyclohexanone oxime 89-90
20	1-Nitrooctane	206.10 part d			0.9346 ²⁰	180					112			
21	Nitrobenzene	210.1		1.553 ²⁰	1.2031 ²⁰	184		114	160	112	90	1,3		1 Naphthylthiourea deriv of amine, 72
22	2-Nitrotoluene	222		1.5474 ²⁰	1.1622 ¹⁹	200		110-11	146, 143	124	213	70-1	2,4	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS

a) Liquids (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Data for the corresponding amine obtained on reduction of all nitro groups					Nitration product		Miscellaneous	
						Amine		Acet-amide	Benz-amide	Benzene sulfon-amide	Picrate	Melting point, °C		Position of nitro groups
						Boiling point, °C	Melting point, °C							
23	1-Ethyl-2-nitrobenzene	224		1.5407 ¹⁹	1.126 ²⁴	210-11		111-2	147		194-5			
24	1,3-Dimethyl-2-nitrobenzene (2-Nitro- <i>m</i> -xylene)	226	13		1.112 ¹⁵	215-218		177	168		180	182	1,3,5	<i>p</i> -Toluenesulfonamide deriv of amine, 212
25	Phenylnitromethane	226d		1.5323 ²⁰	1.1598 ²⁰	184-5		60	105	88	194			
26	3-Nitrotoluene	233	16	1.5470 ²¹	1.1571 ²⁰	203		65	125	95	200			Oxid → 3-nitrobenzoic acid, 140
27	1,4-Dimethyl-2-nitrobenzene (2-Nitro- <i>p</i> -xylene)	241-2			1.132 ¹⁵	213-5		139	140	138	171	139	1,2,4	
28	1-Ethyl-4-nitrobenzene	241		1.5458 ¹⁹	1.124 ²⁵	216-214		94	151			37	2,4,6	<i>p</i> -Toluenesulfonamide deriv of amine, 104
29	1,3-Dimethyl-4-nitrobenzene (4-Nitro- <i>m</i> -xylene)	246	2		1.126 ^{17,5}	217		133-130	192	129-30	209	182	1,3,5	
30	1,2-Dimethyl-3-nitrobenzene (3-Nitro- <i>o</i> -xylene)	250	15			221-2		135	189		221	82	1,2	
31	2-Nitro- <i>p</i> -cymene	264		1.5309 ²⁰	1.0744 ²⁰	241		71	102			54	2,6	
32	2-Nitroanisole	265	10	1.5620 ²⁰	1.2540 ²⁰	225	5-6	85-88	60-84	89	200	68	2,4,6	
33	1- <i>tert</i> -Butyl-4-nitrobenzene	267				230	17	169-70	134-6					Dil HNO ₃ → 4-nitrobenzoic acid, 240
34	2-Nitrophenetole	268	5-6	1.5425 ²⁰	1.1903 ¹⁵	229		79	104	102		86	2,4	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS

b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point, °C	Data for the corresponding amine obtained on reduction of all nitro groups						Nitration product		Miscellaneous
				Amine		Acet-amide	Benz-amide	Benzene sulfon-amide	Picrate	Melting point °C	Position of nitro groups	
				Boiling point, °C	Melting point, °C							
1	2-Methyl-2-nitropropane (<i>tert</i> -Nitrobutane)	25-6	127	46			134		198			Phenylthiourea deriv of amine, 120
2	4-Fluoro-1-nitrobenzene	25-7		184-6		152	185					N- <i>p</i> -Nitrobenzamide deriv of amine, 181
3	1-Nitro-2,3,6-trimethylbenzene	30		235		186						
4	3,4-Dimethyl-1-nitrobenzene (4-Nitro- <i>o</i> -xylene)	30		226	51, 47-8	99				82	1,2	N-Formyl deriv of amine, 52 N-Chloroacetyl, 109
5	2-Chloro-1-nitrobenzene	32		209		87	99	129	134	50-52	2,4	
6	2,4-Dichloro-1-nitrobenzene	33	258		63	143-6	115	128	106			N-Formyl deriv of amine, 154
7	4-Bromo-3-nitrotoluene	33		136 ¹⁶		121, 114						
8	3-Nitrophenetole (3-Ethoxy-1-nitrobenzene)	34		248		97	103			158		<i>p</i> -Toluenesulfonamide deriv of amine, 157
9	2-Nitrobiphenyl	37, 33			49-50	121	102					N-Formyl deriv of amine, 75
10	6-Chloro-2-nitrotoluene	37	238		245	157-9	173					Oxid → 6-chloro-2-nitrobenzoic acid, 161
11	3-Iodo-1-nitrobenzene	38, 35			33, 27	119	157					<i>p</i> -Toluenesulfonamide deriv of amine, 128
12	3-Nitroanisole (3-Methoxy-1-nitrobenzene)	38	258	251		81			169	106	3,5	<i>p</i> -Toluenesulfonamide deriv of amine, 68
13	4-Chloro-2-nitrotoluene	38	240		21-2	139-40, 131						Oxid → 4-chloro-2-nitrobenzoic acid, 142
14	5-Nitroindane	40, yel	152 ¹⁴	250	37-8	106	137					
15	2-Bromo-1-nitrobenzene	43		250	32	99	116		129	72	1,3	
16	4-Nitroindane	44	139 ¹⁰	236	-3	126	136					
17	Nitromesitylene	44		232-3		216-7	204		189-91	86	<i>di</i>	<i>p</i> -Toluenesulfonamide deriv of amine, 167
18	3-Chloro-1-nitrobenzene	45		230		72, 78	119-20	121	177			
19	2-Nitroazoxybenzene	49, yel			98	156						
20	2-Iodo-1-nitrobenzene	49			61, 58	109	139		112			
21	4-Nitrotoluene	52	234	200	45	147	158	120	182	70	2,4	
22	4-Chloro-1,3-dinitrobenzene (1-Chloro-2,4-dinitrobenzene)	52			91	142 (<i>di</i>)	178 (<i>di</i>)			183	2,4,6	NaOH → 2,4-Dinitrophenol, 114, Hydrazine → 2,4-dinitrophenylhydrazine, 199
23	4-Nitroanisole (4-Methoxy-1-nitrobenzene)	53		240	58	130, 127	154	95		89	2,4	
24	2,5-Dichloro-1-nitrobenzene	54			50, lgr	132	120			104	1,3	
25	4-Iodo-3-nitrotoluene	55			48, 38	151, 136						N-Formyl deriv of amine, 129, NaOH → 3-Nitro- <i>p</i> -cresol, 36-7
26	3-Bromo-1-nitrobenzene	56		251	18	87	120, 136		180	59	1,2	
27	1-Nitronaphthalene	57, 60			50	159	160	167	163, 181			
28	β -Nitrostyrene	58, yel	250-60d									Irradiation → dimer, 180-7
29	1-Methyl-2-nitronaphthalene	58-9, yel			51	188-9	222					

*Derivative data given in order m.p., crystal color, solvent from which crystallized.

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Data for the corresponding amine obtained on reduction of all nitro groups						Nitration product		Miscellaneous
				Amine		Acetamide	Benzamide	Benzene sulfonamide	Picrate	Melting point, °C	Position of nitro groups	
				Boiling point, °C	Melting point, °C							
30	4-Nitrophenetole (1-Ethoxy-4-nitrobenzene)	60-58		248 254	3-4	137	173	143	69	86	2,4	
31	3,4-Dinitrotoluene	61		265	89-90	4 mono 131-2, di 210	3-mono 193-4 di 263-4	178-9 (di)				Oxid → 3,4-dinitrobenzoic acid, 165, 161
32	3-Nitrobiphenyl	61, 59			30	148						
33	2,3-Dinitrotoluene	63		255	63-4							(NH ₄) ₂ S → 2-Nitro- <i>m</i> -toluidine, 108, red HNO ₃ → 2,3-Dinitrobenzoic acid, 201
34	1-Methyl-8-nitronaphthalene	63-4			67-8	183-4	195-6					
35	2,6-Dinitrotoluene	66			105	202-3				80, 82	2,4,6	Oxid → 2,6-Dinitrobenzoic acid, 202-3 Naphthalene adduct, 69-70, NH ₃ in al → picramide, 188
36	2,4,6-Trinitroanisole (1-Methoxy-2,4,6-trinitrobenzene)	68										
37	2,4-Dinitrotoluene	70, 72		292	99	224 (di)	224 (di)	2 mono 138 di 191		80, 82	2,4,6	Naphthalene adduct, 60. Oxid → 2,4-dinitrobenzoic acid 182-3 SnCl ₂ + HCl → 4-Nitro- <i>o</i> -toluidine, 107 vel
38	2-Nitroazobenzene	71, or-red			59	126	122					
39	1-Methyl-4-nitronaphthalene	71-2, pa yel			51-2	166-7	238-9					Dil HNO ₃ → 4-nitro-1-naphthoic acid, 220-1
40	4-Bromo-1,3-dinitrobenzene (1-Bromo-2,4-dinitrobenzene)	75, 72										NaOH → 2,4-Dinitrophenol, 114 Al NH ₃ → 2,4-dinitroaniline, 180-188, yel Sn + HCl → 1,3-Diaminobenzene 63, Hydrazine → 2,4-dinitrophenylhydrazine, 199
41	3,5-Dimethyl-1-nitrobenzene	75	273	220-1		144, 140						N-Formyl deriv of amine, 76-7
42	4,5-Dimethyl-1,3-dinitrobenzene	76										(NH ₄) ₂ S → 1-Amino-3,4-dimethyl-5-nitrobenzene, 75 Acetyl deriv of this, 209-10, Benzoyl deriv of this, 223-4
43	5-Methyl-2-nitronaphthalene	76-7			63-4	123-4	155-6					
44	2-Nitronaphthalene	78			112	132	162	102	195			
45	2,4,6-Trinitrophenetole (1-Ethoxy-2,4,6-trinitrobenzene)	78										Naphthalene adduct, 39, NH ₃ in al → picramide, 188
46	2,4,6-Trinitrotoluene (T N T)	80, 82										Naphthalene adduct, 97; CrO ₃ /conc H ₂ SO ₄ → 2,4,6-trinitrobenzoic acid, 220
47	2-Methyl-1-nitronaphthalene	81, yel			32, pet eth	188	180					
48	4-Nitrophenanthrene	81			105	190	224					
49	3,4-Dimethyl-1,2-dinitrobenzene	82										Reduct → 1-amino-3,4-dimethyl-2-nitrobenzene, 66, red, Acetyl deriv of this, 115-6, Benzoyl deriv of this, 199-200

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Data for the corresponding amine obtained on reduction of all nitro groups						Nitration product		Miscellaneous
				Amine		Acet-amide	Benz-amide	Benzene sulfon-amide	Picrate	Melting point °C	Position of nitro groups	
				Boiling point, °C	Melting point, °C							
50	5-Methyl-1-nitro-naphthalene	82-3			77-8	194-5	173-4					
51	Picryl chloride	83				208 (tri)		211				NaOH → Picric acid, 122 NH ₃ → 2,4,6-Trinitroaniline, 188-192-5 NaOH → 4-Nitrophenol, 114
52	4-Chloro-1-nitrobenzene	84			72	179-172	192	122				2,5-Dibromo- <i>p</i> -nitroaniline, 175, yel Reduct → 1-amino-2,4-dimethyl-3-nitrobenzene 84 N,N-Diformyl, 219-20 Reduct → 2-amino-4-nitro-mesitylene, 75 Acetyl deriv of this, 191 Benzoyl deriv of this, 169 Benzenesulfonyl deriv of this, 163
53	2,5-Dibromo-1,4-dinitrobenzene	127										
54	2,4-Dimethyl-1,3-dinitrobenzene	84-82			65-6, lgr	>260 (di)	232 (227) (di)					
55	2,4-Dinitromesitylene	85								232	2,4,6	
56	2,5-Dibromo-1-nitrobenzene	85			51-2	171-2						
57	4-Bromo-1-nitro-naphthalene	85			102	193						N-Formyl deriv of amine, 172
58	2,4-Dinitrophenetole 1,3-Dinitro-4-ethoxybenzene	86			67-8	193 (di)				78	2,4,6	Reduct → 2-nitro- <i>p</i> -phenetidine, 40
59	4-Chloro-1-nitro-naphthalene	87-85			98	186						
60	1,3-Dinitrobenzene	90			63	191 (di), 87-9 (mono)	240 (di), 125 (mono)	194	184			(NH ₃) ₂ S → 3-Nitroaniline, 114 Naphthalene adduct, 52
61	2,3-Dimethyl-1,4-dinitrobenzene	90			116	275-6 (di)						1-amino-2,3-dimethyl-4-nitrobenzene, 114
62	3,5-Dinitrotoluene	92		283-5		235-6 (di)						Oxid → 3,5-dinitro-benzoic acid 204-5 (NH ₃) ₂ S → 5-Nitro- <i>m</i> -toluidine 98 Oxid → 2,3-dinitro- <i>p</i> -toluic acid, 249
63	3,6-Dimethyl-1,2-dinitrobenzene	93			75							N,N'-Diformyl deriv of amine, 182-3
64	4,6-Dimethyl-1,3-dinitrobenzene	93			105	1-mono 165 di 295	258-9 (di)			125	4,5,6	
65	2,4'-Dinitrobiphenyl	93		363	45	202 (di)	276-8 (di)					
66	8-Chloro-1-nitro-naphthalene	94			88-9 96	137						
67	2,4-Dinitroanisole 1,3-Dinitro-4-methoxybenzene	95										2,4-Dinitrophenol, 114, Naphthalene adduct, 50 Reduct → 2-amino-4-nitroanisole, 118, or -red. Acetyl deriv of this, 175-6
68	3-Nitroazobenzene	96, or			56-7	130-1						
69	4-Chloro-2-nitroanisole (5-Chloro-2-methoxy-1-nitrobenzene)	98			84	104	77-8		194			
70	2-Nitrophenanthrene	99, pa yel			85, pa yel	225	216					CrO ₃ → 2-Nitrophenanthraquinone, 260, golden yel
71	8-Bromo-1-nitro-naphthalene	99-100			90	138-9						

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Data for the corresponding amine obtained on reduction of <i>all</i> nitro groups						Nitration product		Miscellaneous
				Amine		Acetamide	Benzamide	Benzene sulfonamide	Picrate	Melting point, °C	Position of nitro groups	
				Boiling point, °C	Melting point, °C							
72	3,5-Dimethyl-1,4-dinitrobenzene	101			104							Reduct → 1-amino-2,6-dimethyl-4-nitrobenzene, 158
73	1,2-Dinitronaphthalene	102-3, br			98	234 (<i>dt</i>)	291 (<i>dt</i>)	1- <i>mono</i> 215				
74	5-Nitroacenaphthene	106, 101, yel			108	238	210, 199		190 200			
75	2,β-Dinitrostyrene	106-7, yel										Alk KMnO ₄ → 2-nitrobenzoic acid, 146-8
76	5-Chloro-1-nitronaphthalene	111			85	128						
77	3-Nitrodurene (3-Nitro-1,2,4,5-tetramethylbenzene)	112-3		261-2	75	207						
78	4-Nitrobiphenyl	114		302	53	171	230					N-Formyl deriv of amine, 172 Picrate, 78-9
79	9-Nitrophenanthrene	116-7			137-8, 104	207-8	199		190			
80	1,2-Dinitrobenzene	118			102	185 (<i>dt</i>)	301 (<i>dt</i>)	185				(NH ₄) ₂ S → 2-Nitroaniline, 71, Hot aq NaOH → 2-nitrophenol, 45 Oxid → 2,4'-dinitrobenzophenone, 197
81	2,4'-Dinitrodiphenylmethane	118, yel			88-9	224-5 (210) (<i>dt</i>)						
82	4,5-Dimethyl-1,2-dinitrobenzene	118, 115			126	227-8 (<i>dt</i>)						
84	3-Methyl-2-nitro-1,4-naphthoquinone	121-2, 125, yel										Dil KMnO ₄ → phthalic acid, 200-6, Na ₂ SO ₃ Reduct or Fe + ac a → 2-amino-3-methyl-1,4-naphthoquinone, 167, red Anthracene adduct, 164, Naphthalene adduct, 156, Fluorene adduct, 105
85	1,3,5-Trinitrobenzene	122										
86	5-Bromo-1-nitronaphthalene	122			69, 63-4	215						
87	Picric acid	122										Naphthalene adduct, 149, Fluorene adduct, 84, Anthracene adduct, 138, <i>n</i> -Butylammonium picrate, 151 Reduct → 1-amino-2,5-dimethyl-3-nitrobenzene, 98 Formyl deriv of amine, 222
88	2,5-Dimethyl-1,3-dinitrobenzene	123-4			102-3							
89	1-Nitro-2,4,6-tribromobenzene	125			122	232	198					
90	4-Bromo-1-nitrobenzene	126			66	168	204	134	180			NaOH → 4-Nitrophenol, 114 N,N'-Di-formyl deriv of amine, 137
91	2,2'-Dinitrobiphenyl	124, 128			81	<i>mono</i> 89-90, <i>dt</i> 161	<i>mono</i> 158- 60, <i>dt</i> 190-1					
92	1,4-Dinitronaphthalene	131-2, yel			120, yel	303-4 (<i>dt</i>)	280 (<i>dt</i>)					
93	3,5-Dimethyl-1,2-dinitrobenzene	132			78							Reduct → 1-amino-2,4--dimethyl-6-nitrobenzene, 76
94	4-Nitrozobenzene	135, or		> 360	126	144-6	211, 205					

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Data for the corresponding amine obtained on reduction of all nitro groups						Nitration product		Miscellaneous
				Amine		Acet amide	Benz-amide	Benzene sulfon amide	Picrate	Melting point, °C	Position of nitro groups	
				Boiling point °C	Melting point °C							
95	4-Chloro-1,5-dinitro-naphthalene	138										NaOH → 4,8-Dinitro-1-naphthol, 235 Sn + HCl → 1,5-Diaminonaphthalene, 190, PCl ₅ → 1,4,5-Trichloronaphthalene, 131
96	2-Nitroindene	141										Zn + Ac a → 2-indanone oxime, 155
97	4-Bromo-1,5-dinitro-naphthalene	143										NaOH → 4,8 Dinitro-1-naphthol, 235, HNO ₃ At 180 → 3-nitrophthalic acid, 218
98	2,4-Dinitrostilbene	143 5, yel		119 20, pa yel								
99	1,3-Dinitronaphthalene	144 5, yel		96	263 5 (di)							
100	9-Nitroanthracene	146, yel		145 50	273 4							CrO ₃ Oxid of amine → anthraquinone 273 286, yel
101	4-Chloro-1,3-dinitro-naphthalene	146 7										Warm dil NaOH → 2,4 dinitro 1 naphthol, 140
102	2,5-Dimethyl-1,4-dinitrobenzene	147, 142		150								Reduct → 1 amino 2 5 dimethyl-4-nitrobenzene, 144 5
103	3-Nitroacenaphthene	151-2, yel		81 2	192 3	209 10			221			
104	4-Nitroazoxybenzene	153, pa yel		138	151 172							
105	3,8-Dinitroacenaphthene	155-6, br -yel		167 8, yel								
106	2-Nitrofluorene	156, 154		129	191							
107	3-Nitro-1,2-naphthoquinone	156, red										SnCl ₂ + HCl → 3-Amino 1,2-naphthohydroquinone, 164 Dil HNO ₃ → phthalic acid, 200 6
108	2,2'-Dinitrodiphenylmethane	159		160								Oxid → 2,2'-dinitrobenzophenone, 188 9
109	1,6-Dinitronaphthalene	161 2, 166, pa yel		85-6, 77	257 (263) (di)	265 (di)						
110	1,8-Dinitronaphthalene	170, 173		66		311 2 (di)				218	1,3,8	
111	4-Bromo-1,8-dinitro-naphthalene	170, yel										NaOH → 4,5-Dinitro 1 naphthol, 235, HNO ₃ At 180 → 3-nitrophthalic acid, 218, Al NH ₃ → 4-amino-1,8-dinitro-naphthalene, 246, red, Acetyl deriv of this, 245
112	3-Nitrophenanthrene	170-1		87 8	200 1	213						
113	4-Iodo-1-nitrobenzene	173		67 8	184	222						
114	1,4-Dinitrobenzene	173, 171		140, 147	304 (di), 162 3 (mono)	300 (di), 128 (mono)	247 (di)					Aq NaOH → 4-nitrophenol, 114
115	3,3'-Dinitrodiphenylmethane	175		53-4	193 (di)							Oxid → 3,3'-dinitrobenzophenone, 155

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Data for the corresponding amine obtained on reduction of all nitro groups						Nitration product		Miscellaneous
				Amine		Acet amide	Benz amide	Benzene sulfon amide	Picrate	Melting point °C	Position of nitro groups	
				Boiling point °C	Melting point °C							
116	4-Nitrophenanthrenequinone	179-80, pa yel										CrO ₃ → 6-Nitrodiphenic acid, 248-50, <i>o</i> -Phenylene diamine → quinoxaline deriv., 217-8, Monoxime, 169-70, Dioxime, 210, Monosemicarbazone, 210-11
117	4-Chloro-1,8-dinitronaphthalene	180, pa yel										NaOH → 4,5-Dinitro-1-naphthol, 235, PCl ₅ → 1,4,5-Trichloronaphthalene, 131
118	9-Nitrofluorene	181-2		64-47		262	260-1					
119	4,4'-Dinitrodiphenylmethane	183		93		236-7 (di)						Oxid → 4,4'-dinitrobenzophenone, 189
120	4-Chloro-3-nitro-1,2-naphthoquinone	184, red										Aniline → 2-amino-3-nitro-1,4-naphthoquinone-4-anil, 250
121	2-Nitroanthraquinone	185		303-6		262	227-8					
122	2,2'-Dinitrostilbene	196, yel		176, golden yel		304 (di)			209			
123	4,β-Dinitrostyrene	199, yel										Acid K ₂ Cr ₂ O ₇ → 4-nitrobenzoic acid, 240
124	3,3'-Dinitrobiphenyl	200, yel		94		257-8 (di)						
125	2,5-Dinitrofluorene	207, yel		175		289 (di)						
126	2,2'-Dinitroazobenzene	209-10, 194-5 yel		134, red		271 (di), or						
127	1,5-Dinitronaphthalene	214		190		360 (di)				154	1,4,5	
128	4,4'-Dinitroazobenzene	222-3, 216, or -red		250-1		212 (mono)						
129	2,5-Dinitrophenanthrenequinone	228, yel - red										Monoxime, 190-1, <i>o</i> -Phenylenediamine → quinoxaline deriv., 262-4
130	1-Nitroanthraquinone	230		252, 243		218	255					
131	2,7-Dinitronaphthalene	234, yel		166, 159		261 (di)	267 (di)			210 (di)		
132	4,4'-Dinitrobiphenyl	237, 240		128		317 (di), 199 (mono)	352 (di), 203-5 (mono)					
133	1,3-Dinitroanthraquinone	240, yel		290			>300					
134	1,6-Dinitroanthraquinone	255-7, yel		262, red		295 (di)	275 (di)					
135	2-Nitrophenanthrenequinone	258-60, yel		205-10, dk vlt								CrO ₃ → 4-Nitrodiphenic acid, 217, Monoxime, 213, Monothiosemicarbazone, 234-5
136	3-Nitrophenanthrenequinone	279-80, or										CrO ₃ → 5-Nitrodiphenic acid, 268, Monoxime, 240, Dioxime, 200, Monosemicarbazone, 254, red
137	2,7-Dinitroanthraquinone (Fritzsche's reagent)	280, 262, pa yel		>330		>350 (di)	300 (di)					

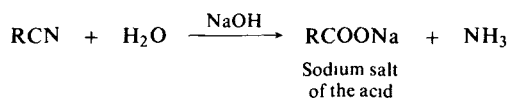
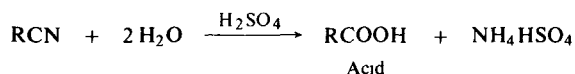
*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XX. ORGANIC DERIVATIVES OF NITRO COMPOUNDS
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Data for the corresponding amine obtained on reduction of all nitro groups						Nitration product		Miscellaneous
				Amine		Acet amide	Benz amide	Benzene sulfon amide	Picrate	Melting point °C	Position of nitro groups	
				Boiling point °C	Melting point °C							
138	<i>trans</i> -4,4'-Dinitrostilbene	288, yel			231, yel	353 (<i>dt</i>)	352 (<i>dt</i>)					
139	9,10-Dinitroanthracene	294 263 yel										Oxid → anthraquinone, 273 286 yel
140	1,7-Dinitroanthraquinone	295			290, red	283 (<i>dt</i>)	325 (<i>dt</i>)					
141	2,7-Dinitrophenanthrenequinone	301 3, pa yel			> 360, dk vlt							CrO ₃ → 4,4'-Dinitrodiphenic acid, 257 8, Monoxime, 246-8, <i>o</i> -Phenylenediamine → quinoxaline deriv, 356, Fluorene adduct, 270, red -yel
142	1,8-Dinitroanthraquinone	311 2			262, red	284 (<i>dt</i>)	324 (<i>dt</i>)					
143	1,5-Dinitroanthraquinone	384-5, pa yel			319, red	317 (<i>dt</i>)	> 350 (<i>dt</i>)					Monoxime, 253

* Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XXI

*Hydrolysis to the corresponding acid **

From the nitrile and 75% sulfuric acid, or 4 l phosphoric acid-sulfuric acid

For directions and examples see Cheronis, pp 618, 619, Linstead, p 65, Shriner, p 258, Vogel, p 410, Wild, p 250

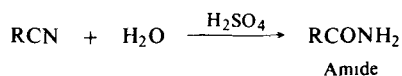
From the nitrile and potassium hydroxide in aqueous methanol, ethanol or benzyl alcohol

See Linstead, p 65, Vogel, pp 410, 805, Wild, p 250, L Palfray, S Sabetai and S Rovira, *Compt Rend*, 209, 483 (1939)

From the nitrile and potassium hydroxide in ethylene glycol or glycerol

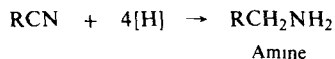
See Cheronis, pp 618, 620, S Rovira and L Palfray, *Compt Rend*, 211, 396 (1940)

NOTE For the directions and examples for the preparation of the derivatives of the carboxylic acid formed on hydrolysis see the explanations and references to Tables XII, XIII and XIV, pp 186, 187, 188, 189

*Partial Hydrolysis to the corresponding amide **

From the nitrile with sulfuric acid

For directions and examples see Cheronis, pp 619, 620 Vogel, p 411

*Reduction to the corresponding amine **

From the nitrile and sodium in absolute ethanol

For directions and examples see Cheronis, p 621, Shriner, p 259, Vogel, p 411, Wild, p 254, H B Cutter and M Taras, *Ind Eng Chem, Anal Ed*, 13, 830 (1941)

From the nitrile and lithium aluminum hydride in ether

See W G Brown in *Organic Reactions*, Vol 6 (Ed R Adams), John Wiley and Sons, New York, 1951, p 469, N G Gaylord, *Reduction with Complex Metal Hydrides*, Interscience, New York, 1956, pp 731-750

For summary of reduction methods see V Migrdichian, *Organic Cyanogen Compounds*, Reinhold Publishing Corp, New York, 1947, pp 151-172

NOTE For directions and examples for the preparation of the derivatives of the amine formed on reduction of the nitrile see explanations and references to Table XVIII, pp 291, 292, 293, 294

*Derivatives recommended for first trial

WARNING This is not an instruction manual References should be consulted for the preparation of derivatives

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES

a) Liquids 1) (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point, °C	Melting point °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous	
						Acid		Amide	Anilide	S-Benzyl thiuronium chloride						
						B.P. °C	M.P. °C				Amine B.P. °C	Benzamide	Benzene sulfonamide	Phenyl thiourea		Picrate
1	Cyanoacetylene	42.5	5	1.38699 ¹	0.8159 ¹	144d, 83, 4 ¹	18	61.2	87							HgNO ₃ → Wh precipitate. Dimer, 64.5-5.0
2	Cyanoacetaldehyde	71.2			0.881 ¹						45.6 ¹					HNO ₃ → Cyanoacetic acid, 66, 2,4-Di nitro phenylhydrazine, 170.1, aq. al., p-Nitrophenylhydrazine, 153-4
3	Acrylonitrile	77.8		1.393 ²⁰	0.7974 ²⁰	140	13	85	105							Gives solid polymer on addition of conc NaOMe sol
4	Fluoroacetonitrile	80				165	33	77								
5	Acetonitrile (Cyanomethane)	81-2		1.3442 ²⁰	0.7828 ²⁰	118		82	114	135	16.5	71	58	106, 135	165	
6	Trichloroacetonitrile	86, 83.4			1.439 ¹²	196.7	58	141	95-7							
7	Methacrylonitrile (α-Methylacrylonitrile)	90.1		1.399 ²⁵	0.7991 ¹⁸	160	15.6	102.6								Gives solid polymer on heating with benzoyl peroxide
8	Propionitrile (Cyanoethane)	97, 103.5		1.3659 ²⁵	0.7774	141		79	106	151	49	84	36	63	135	
9	Isobutyronitrile	104, 107.8			0.773	154.3	-47	129	109, 10	143	69	57	53	82	150	
10	Trimethylacetonitrile (tert-Butylcyanide)	106	15-6	1.3792			35	153.4	127-9							
11	2-Ethylacrylonitrile	111		1.4132		180		84, bz								
12	Dichloroacetonitrile	113			1.374 ^{11, 5}	194	5.6	98								Me ester of acid, 143-4
13	α-Chloroisobutyronitrile	116		1.4045 ²⁵ , 1.435 ¹⁴	1.064 ¹⁴		31		69.70							
14	n-Butyronitrile (1-Cyano-propane)	117		1.3812 ²⁴	0.796 ¹	162		116	96	146	77			65	151	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous	
						Acid		Amide	Anilide	S-Benzylthiuronium chloride	Amine B.P., °C	Benzamide	Benzene sulfonamide	Phenylthiourea		Picrate
						B.P., °C	M.P., °C									
15	<i>trans</i> -Crotonitrile	119		1.4217		189	72	158	115		83-4			109.5-105	131.5-2.5	n _D ²⁰ of amine 1.4263, 1-Naphthylthiourea of amine, 129.30
16	Allylcyanide	119		1.4060 ²⁰	0.835 ¹⁵	169.63		73	58	75.7				123.7-56.7	136.8-7.4	n _D ²⁵ of amine 1.4191, Al KOH → crotonic ac., 72.1-Naphthylthiourea of amine, 109.10
17	Methoxyacetonitrile	120		1.380 ²⁸	0.9373 ²⁸	203-4		96	58							
18	2-Hydroxyisobutyronitrile (Acetone cyanohydrin)	120d	-19	1.3996 ²⁰	0.934 ²⁰		79	98	136							
19	3-Hydroxy-4-methoxybenzonitrile	124 131.5-2.0					255.7									Acetate, 116, Acetate of acid, 206-7, Me ester of acid, 83.4, 66-7
20	2-Methylbutyronitrile	125.6		1.380 ²⁵	0.8061 ²⁰	177		112	110		95.5-6.0					HCl salt of amine, 176, H ₂ PtCl ₆ salt of amine, 240
21	Chloroacetonitrile	127			1.193 ²⁰	189	63	120	137						142-3	Addition comp with AlCl ₃ , 38, HCl salt of amine, 144
22	Isovaleronitrile	130			0.7884 ²⁰	176		136	113, 109, 10	153	96		102	138		3-Nitrohydrogen phthalate of amine, 108
23	2,4-Pentadienitrile	135-8		1.4880	0.8444		72	124								Me ester of acid, 50.2 ²⁰

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH					Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous
						Acid		Amide	Anilide	S-Benzyl thiuronium chloride	Amine B P, °C	Benzamide	Benzene sulfonamide	Phenyl thiourea	Picrate	
						B P, °C	M P, °C									
24	2-Chlorocrotonitrile	136				212, 85, 95 ¹⁰	99	212				128, 31			191	Me ester of acid, 161, HCl salt of amine, 220
25	Ethoxyacetonitrile	136, 7 ²⁵³				156, 7 ¹⁶		80, 2				108 ⁷⁵⁰			121, 3	n _D ²⁵ of amine 1, 4108, Et ester of acid, b p 152, p-Toluidide of acid, 70, 5-1, 5
26	2-Methylcrotonitrile	138		1, 4319	0, 8313	198, 5	64	75, 6	77							
27	2-Bromoisobutyronitrile	139-40		1, 445 ²⁵				48-9	148	83						
28	4-Pentenitrile	140		1, 4213 ¹⁴	0, 848 ¹⁵	188-9		94			91, 4, 98					H ₂ PtCl ₆ salt of amine, 166, Thiourea deriv of amine, 43, 5-4, 0, Di-Me ester of acid, 32, 3
29	Thiophene-2,3-dicarbonitrile (2,3-Dicyanothiophene)	140						272-4	di 228							
30	3,3-Dimethylacrylonitrile	140, 2			0, 8292 ¹⁴	199	70	107-8, 65, 6	126, 7			105, 8		105, 0, 5, 5	139-40d	HCl salt of amine, 193-4
31	Valeronitrile (1-Cyanobutane)	141		1, 3991 ¹⁵	0, 8035 ¹⁵	186		106	63			104		69	139	
32	2-Chlorobutyronitrile	143				189 ⁹²⁷		75, 5, 6, 0	74, 5						142, 124, 168-9	
33	Diethylacetonitrile	145				190		107				71, 5				
34	2-Furanecarbonitrile (α-Furanitrile, 2-Cyanofuran)	147		1, 4798 ²⁰	1, 0822 ²⁰		133, 4	142	124	211		145, 6			150	
35	2-Methylacetacetoneitrile	147, 145, 6		1, 4239 ²⁰	0, 9794 ²⁰	224 ³⁴	73	138-40								Semicarbazone, 153, p-Nitrophenylhydrazone, 147
36	Cyclobutane-carbonitrile (Cyanocyclobutane)	150				195		152-3, 155	112, 5-3, 0			110 ⁷⁵³				HCl salt of amine, 235, 5

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous		
						Acid		Amide	Anilide	S-Benzyl thiuronium chloride	Amine B P, °C	Benz amide	Benz sulfonamide	Phenyl thiourea		Picrate	
						B P, °C	M P, °C										
37	2-Chloro-3-methylbutyronitrile	154-5			0.9922 ¹²	210-2, 126 ³²	37.9									137-8, 160	Et ester of acid, b p 178-9, HCl salt of amine, 190d, H ₂ PtCl ₆ salt of amine, 193.5
38	Isocapro-nitrile (4-Methyl-pentano-nitrile)	155		1.4085 ¹⁴	0.8071 ⁴	199.4	-33	119, 121	111-2		125					123.5	
39	2,2-Dimethyl-acetoaceto-nitrile	163.4		1.008 ¹¹		103 ¹		121									Oxime, 99-100
40	2-Methyl-hexanonitrile	165		1.4070	0.7985	210		72	98		45-54 ¹⁵						
41	3-Methoxy-propionitrile	165		1.4032	0.9367 ⁴⁵	107 ¹⁰		50			120						
42	n-Capronitrile (n-Hexano-nitrile)	165	-80.31	1.4115 ²⁰	0.8093 ²⁰	205		100	95		130	40	96	77	126		HCl salt of amine 219
43	(Ethylamino) acetone-nitrile (N-Ethylglycino-nitrile)	166.7, 81.3 ²⁹						180-2			126-9	di 117-8			di 194.5		HCl salt, 141.2
44	d,l-3-Methyl-hexanonitrile	171-2 ⁷⁴⁹		1.4143	0.8109	212.3 ⁵⁵		99.100			148.9 ⁷⁵⁶						p-Toluidide of acid, 73.4, n _D ²⁰ of amine, 0.7787
45	Chlorofumaronitrile	172.64 ¹⁰		1.49571 ²⁰	1.2499 ²⁰			191.2	di 186								Di-Me ester of acid, b p 113.4 ¹
46	2-Acetoxy-propionitrile (O-Acetyl lactonitrile)	172.3				167.70 ⁷⁸	57.60										H ₂ PtCl ₆ salt of amine, 207.9
47	3-Ethoxypropionitrile	173		1.4068	0.9189 ⁴⁵	119 ¹⁹		50			138						n _D ²⁰ of amine, 1.4242, D ₄ ²⁰ of amine, 0.8697
48	3-Chlorobutyronitrile	176			1.0772 ⁹	101 ¹⁴	43.4.5		89.90							147	H ₂ PtCl ₆ salt of amine, 212
49	3-Chloropropionitrile	178			1.1443 ¹⁸	204	41		119, w								p-Toluidide of acid, 121 HCl salt of amine, 146-8

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous	
						Acid		Amide	Anilide	S Benzyl thionium chloride	Amine B P °C	Benz amide	Benzene sulfonamide	Phenyl thiourea		Picrate
						B P °C	M P °C									
50	Indole-3-carbonitrile (3-Cyanoindole)	178 rose				208 10										N Acetyl deriv 202 Et ester of acid 82 M p of amine 84 Me ester of acid, b p 166 7
51	5-Methylhexanonitrile	178 80				216		104 75	149 5							
52	Thiophene-3-carbonitrile (3-Cyanothiophene)	179 203 5		1 5565 ²¹	1 1956 ²⁰		138 180									
53	d/l-4-Methylhexanonitrile	180		1 4144	0 8141	217 8	98			152 3 ³⁰						n _D ²⁰ of amine, 1 4238, D ₄ ²⁰ of amine, 0 7802
54	d/l-Lactonitrile (Acetaldehyde cyanohydrin)	182 4		1 4058 ¹⁴	0 9877 ²⁰	122 ¹ 18	79 75 6	59	153	161 2					142	
55	Glycolonitrile (Formaldehyde cyanohydrin)	183 sl d				80	120	97	141 146 7	171					160	Benzoyl deriv 195 6
56	Heptanonitrile	183 187			0 8107 ²⁰	223		95 71		155			75	121		
57	4-Cyanoheptane	183-4				221 2		123 4		167						Et ester of acid b p 183 H ₂ PtCl ₆ salt of amine, 211 d
58	Benzonitrile	190	-13	1 5289 ²⁰	1 0102 ¹³	122	129	162	167	184 5	105	88	156	194		
59	Thiophene-2-carbonitrile (2-Cyanothiophene)	192		1 5641 ¹³	1 1800 ¹⁵	129 30 192	180	140		58 ⁵				181 2		HCl salt of amine, 193 4
60	2-Octynonitrile	194 6				148 9 ¹⁹	f p 2 5	91	44							
61	4-Chlorobutyronitrile	196 7			1 162 ¹⁰	196 ²²	16	88 9	60 70, bz - pet eth							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point, °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH					Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous	
						Acid		Amide	Anilide	S-Benzyl thio-ronium chloride	Amine	Benzamide	Benzene sulfonamide	Phenyl thiourea	Picrate		
						B P, °C	M P, °C				B P, °C						
62	Methyl cyanoacetate	200, 115 ³⁶	-22.5	1.4170 ²⁵	1.0962 ²⁵							58 ¹⁵					Hydrolysis → malonic acid, 135, HCl salt of amine, 102.5, H ₂ PtCl ₆ salt of amine, 192, NH ₃ → Cyanoacetamide, 118
63	Dibenzyl acetonitrile	200, 15					89	128.9	155								
64	2-Tolunitrile (2-Methylbenzonitrile)	205	-13	1.5272 ⁴⁵	0.9912 ⁴⁵		104	140	125	146		208	88			215	Acetyl deriv. of amine, 69
65	2,3,3-Trimethyl-1-cyclopentene-1-carbonitrile (β-Campholitylonitrile)	205, 225			0.9127 ¹⁵	255-6	135	130, al	104, aq al			205.5, 6.5				178	Et ester of acid, 222.5, HCl salt of amine, 175-6
66	Caprylonitrile (Octanonitrile)	206, 199		1.4224 ¹⁶	0.8172 ¹⁷	239	16	110	57			180				112	
67	1,1-Dicyanopropane (Ethyl malononitrile)	206 ^{75b} , 90-1 ²⁰			0.9515 ¹¹		111.5	di 216									Dihydrazide of acid, 168, al
68	Ethyl cyanoacetate	207		1.4179 ²⁰	1.0564 ²⁷					198.9							NH ₃ → Cyanoacetamide, 118
69	1,1-Dicyanobutane (Propyl malononitrile)	210 ⁷⁵⁰			0.9224 ¹⁸		96	di 184	di 198								
70	3-Tolunitrile (3-Methylbenzonitrile)	212	-23		1.0316 ²⁰		113, 110	95	126	140		207				198, 156	Acetyl deriv. of amine, 150
71	Cyclohexylacetonitrile	215		1.457 ¹⁸	0.913 ¹⁸	244.6	33	171-2				188-9	79-81			155.6	HCl salt of amine, 252-3, n _D ²⁰ of amine, 1.4625
72	4,4-Dicyano-1-butene (Allyl malononitrile)	217-8	f p -12				105, eth										Di-Et ester of acid, b p 222.3, p-Nitrobenzyl ester of acid, 46, al

*Derivative data given in order: m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH					Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous	
						Acid		Amide	Anilide	S-Benzylthuronium chloride	Amine B P, °C	Benzamide	Benzene sulfonamide	Phenyl thiourea	Picrate		
						B P °C	M P °C										
73	3-Isopropylidene-1-methylcyclopentane-1-carbonitrile (β-Fencholone nitrile)	217.9			0.9203 ¹	259	72.3	86.5 7.5								Me ester of acid, 97.9	
74	3-Hydroxypropionitrile	220			1.059 ^u	d	syrup					188				222	Sodium salt of acid, 143. P ₂ O ₅ → acrylonitrile, b p 77
75	1,1-Dicyano-3-methylbutane (Isobutyl malonitrile)	222					108, bz	dt 195.6, al									
76	Nonanonitrile	224	-34.2	1.42522	0.8221 ¹	255	15	99	57		201	49				111	Acetyl deriv of amine, 34.5
77	2-Phenylacetone nitrile	224.6		1.5555	1.013		136	98.9									
78	Ethylenecyanohydrin	229.7 220			1.059 ^u						107.8 ^{ph}					130, 222	Me ester of acid, b p 177.84. H ₂ PtCl ₆ salt of amine, 199
79	2-Phenylpropionitrile	232				265.8		97.5		210						182	Me ester of acid, 221. M p of amine, 85. HCl salt of amine, 123.4. H ₂ PtCl ₆ salt of amine, 229d
80	Phenylacetone nitrile (Benzyl cyanide)	234		1.5211 ¹	1.0214 ¹		76.7	157	118	163	198	116	69	135	174, 167		
81	Phenoxyacetone nitrile	239.40			1.09 ¹	285	98.9	101.5			228.9 ¹				167.8		HCl salt of amine, 215. HBr salt of amine, 192-3

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH					Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous	
						Acid		Amide	Anilide	S-Benzylthiourom chloride	Amine B P, °C	Benzamide	Benzene sulfonamide	Phenylthiourea	Picrate		
						B P °C	M P, °C										
82	4-Hydroxybutyronitrile	240			1.029 ^a	204						205.6					Acid forms readily butyrolactone, b p 204, CrO ₃ + butyrolactone → succinic acid, 186
83	(3-Tolyl)acetonitrile (<i>m</i> -Xylylcyanide)	240.1			1.0022 ²²	120-3 ^{2b}	61	141				214.5 ⁴⁴				176	Et ester of acid, b p 237.8, HCl salt of amine, 159
84	(4-Tolyl)acetonitrile (<i>p</i> -Xylylcyanide)	242.3	18	1.5153 ²	0.9922 ²²	265-7	94	185				214.5	95.6			155	Et ester of acid, b p 240, HCl salt of amine, 216-7
85	4-Isopropylbenzonitrile	243-4 ⁴⁴					117.8, al	153, 133				227 ⁴⁴					Et ester of acid, b p 263.4 HCl salt of amine, 239-40
86	(2-Tolyl)acetonitrile (<i>o</i> -Xylylcyanide)	244			1.0156 ²²		88.9	161				215.5	7.0			177	HCl salt of amine, 227-8
87	Decanonitrile	245		1.4320 ^{He}	0.8294 ¹	269	31	100, 108	70								
88	3-Methyl-2-phenylbutyronitrile	245.9 ¹		1.5038 ²	0.967 ¹	159.60 ¹⁴	61.2	111.2	132.3			155-6 ²⁴					HCl salt of amine, 128
89	1,2-Dicyanopropane (Methyl succinonitrile)	252.4	12				115	<i>di</i> 225	<i>di</i> 200			172.3	154				HCl salt of diamine, 144.5
90	1-Undecanonitrile (1-Hendecanonitrile)	253.4				164 ¹	28.2	6	98.0	7.71							Hydrazide of acid, 101-2, Phenylhydrazide of acid, 110
91	2-Phenylvaleronitrile	254-5 ³⁰		1.5000	0.960 ¹⁷	280	58	83.5				90 ³					
92	10-Undecanonitrile (10-Hendecanonitrile)	257.129-30 ¹⁴		1.4442 ²⁰	0.8443 ²⁰	274	24.5	87									

*Derivative data given in order: m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous	
						Acid		Amide	Anilide	S-Benzyl thiuronium chloride	Amine B P °C	Benz amide	Benzene sulfonamide	Phenyl thiourea		Picrate
						B P °C	M P °C									
93	3-Phenylpropionitrile	261			1.0014 ¹⁸	280 ⁷⁵⁴	48.5	105	98		221.5 ⁷⁵	57.8			152-3	HCl salt of amine, 218, H ₂ PtCl ₆ salt of amine, 233
94	2-Cyanobenzal chloride (α,α-Dichloro- <i>o</i> -tolunitrile)	261					155, bz	117								
95	N-Methylaminonitrile (N-Cyano-N-methylaniline)	266	13				95, 100	163								Picrate, 195
96	3-(2-Chlorophenyl)propionitrile	267.8		1.5390	1.1390 ²⁰		96.5, w	119, bz								Me ester of acid, 255 HCl salt of amine, 167
97	1,3-Dicyano-2-methylpropane (2-Methylglutaronitrile)	269.71				205.8 ¹²	79	<i>di</i> 175.6			78 ¹¹					Di- <i>p</i> -toluene diacid, 174.5, n _D ²⁰ of amine, 1.4585
98	O-Benzoyl lactonitrile (Lactonitrile benzoate)	269-70					112	124								Di- <i>p</i> -nitrobenzyl ester of acid, 119.5
99	3-Cyanobenzal chloride (α,α-Dichloro- <i>m</i> -tolunitrile)	272.5					132									
100	4-Cyanobenzal chloride (α,α-Dichloro- <i>p</i> -tolunitrile)	273.6 ⁷⁷⁰					151.8									Et ester of acid, 45.6
101	Dodecanonitrile (Lauronitrile)	276.7	4	1.43595	0.8273 ¹⁵	225	44	110, 102, aq. al.	78	141	247.9					M p of amine, 28.3 Acetyl deriv of amine, 68.5, 9.5, bz, <i>p</i> -Toluene-sulfonyl deriv of amine, 73
102	1,3-Dicyanopropane (Glutaronitrile)	286		1.4365 ²³	0.9951 ⁵		97	175	224		178.80	<i>di</i> 135	119	148	237	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
a) Liquids 1) (Listed in order of increasing atmospheric b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous	
						Acid		Amide	Anilide	S-Benzyl thiuronium chloride	Amine B P °C	Benz amide	Benzene sulfon amide	Phenyl thiourea		Picrate
						B P °C	M P °C									
103	4-Methoxyhydrocinnamonnitrile (3-(4-Methoxyphenyl)propionitrile)	290-300					104-5	125			118 20 ²					Me ester of acid, 38, M p of amine, 65.7-63, HCl salt of amine, 220.5
104	1,4-Dicyanobutane (Adiponitrile)	295	0-1	1.4597 ²⁰	0.951 ¹⁹		153, 150	220	239		204.5	<i>di</i> 155	<i>di</i> 154		220	M p of amine, 42

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES

a) Liquids 2) (b.p. at reduced pressure only) (Listed in order of increasing m.p. of the corresponding acid)*

No	Name	Boiling point, °C	Melting point, °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscellaneous		
						Acid		Amide	Amide	S-Benzyl thiuronium chloride	Amine	Benzamide	Benzene sulfonamide	Phenylthiourea		Picrate	
						B.P., °C	M.P., °C										B.P., °C
1	1,2,2,3-Tetramethyl-3-cyclopentene-1-acetonitrile (5-Methyl- α -campholenitrile)	115-9 ¹⁸		1.4722 ¹⁸	0.9217 ¹⁸	150-15 ¹²	35.6-7.0	99-100, lgr									
2	1-Cyano-cyclohexene	81 ¹²		1.4818 ²⁵	0.954 ²⁵	238-40 ^{63K}	38	127.8			55-7 ¹²					181	
3	2-Hydroxybutyronitrile (Propanal cyanohydrin)	102-3 ²³		1.4150	0.9621	225-60d	43.4		89-90		172 ^{75S}	112.1-3.1					N,O-Di- <i>p</i> -nitrobenzoyl deriv of amine, 119.2, Acetate, 43, CS ₂
4	Hydnocarbonitrile	155-6 ²⁻³		1.4559 ²⁵	0.8580 ²⁵		59-60	108.5d									
5	α -Chloro- α -phenylacetonitrile	131-5 ¹³					60.1	116									
6	Butyl cyanoacetate	115 ¹⁵		1.4243 ²⁵	0.998 ²⁵		66	119-20	198-9								
7	3-Bromopropionitrile	69 ⁷		1.4789 ²⁵			62								154, yel		Nitrile + alkali → acrylic acid, <i>p</i> -toluidide of which, 141
8	2,4-Diphenylbutyronitrile	152-6 ¹				190 ¹	72.3-76	96									
9	Thiophene-2-acetonitrile	115-20 ²²		1.5399 ²⁵	1.153 ²⁵		76-63-4	146.7			72-4 ³	61, bz-lgr		109.5-10			HCl salt of amine, 202.4, N-Acetyl deriv of amine, 45.5-6.5
10	<i>trans</i> -4-Chlorocrotonitrile	61-14 ¹¹		1.4705	1.1207	117-8 ¹³	83	130-2									
11	2-Cyanopentanoic acid	125-30 ⁹²					96	<i>di</i> 184	<i>di</i> 198								Amide of nitrile, 124.5, Amide of nitrile, 88-9, M p of amine, 37
12	Azelaonitrile (1,7-Dicyanoheptane)	183 ¹¹ , 160 ³		1.4426 ²⁵			106	<i>di</i> 175	<i>di</i> 186-7		258-9						
13	3-Chloro-2-hydroxy-2-methylpropionitrile (Chloroacetone cyanohydrin)	110 ²²		1.4520	1.2027 ¹⁵	230-5	110										
14	1,11-Dicyanoundecane (1,11-Dicyanohendecane)	189-90 ⁷					111-2	<i>di</i> 175.6	<i>mono</i> 112.5-3.0, <i>di</i> 160.1								M p of amine, 58 HCl salt of amine, 254.5, al

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES

a) Liquids 2) (b.p. at reduced pressure only) (Listed in order of increasing m.p. of the corresponding acid)* (Continued)

No	Name	Boil ing point °C	Melt ing point °C	n _D	Density g/ml	Derivatives of the corresponding acid RCN → RCOOH					Derivatives of the corresponding amine RCN → RCH ₂ NH ₂					Miscel- laneous	
						Acid		Amide	Anilide	S-Benzyl thiuronium chloride	Amine	Benz amide	Ben zene sulfon amide	Phenyl thiourea	Picrate		
						B P °C	M P °C				B P °C						
15	2-Cyanobutyric acid	153 ¹⁵					111.5	212.4									Hydrazide of acid, 95.6, Amide, 113
16	2-Cyanobiphenyl	172 ¹⁵					114	177									Acid + conc H ₂ SO ₄ → fluorenone, 83
17	1,12-Dicyanododecane (α,ω-Dodecane dicyanide)	225.8 ¹⁷					129, w	di 189	di 191, 170.1								Di- <i>p</i> -tolu- lide of acid 165 M p of amine, 61.5 HCl salt of diamine, 309.10
18	1-Cyano-4-isopro- penylcyclohexene	116.8 ¹¹		1.4978	0.9439	164-5 ¹⁰	132.3	164.5									
19	Sebaconitrile (1,8-Dicyanooctane)	201.3 ¹⁶					134	di 210	di 198								M p of amine 60
20	Suberonitrile (1,6-Dicyanohexane)	180 ¹²		1.4448 ²²			141	di 216.7	di 186.7	240.1	di 121.2				di 180		M p of amine, 52
21	3-Cyanoindene (Indene-3-car- bonitrile)	140.2 ¹³					161, 156-7	180	158								Hydrazide of acid, 186
22	Aminoacetonitrile (Glycinonitrile)	58 ¹⁵ , part d					262 d	65-6	62 (+2 H ₂ O)	116.5	di 244	di 168		di 233.5			HCl salt, 165.5 6.5, M p of amine, 8.5

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point C	Boiling point C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN + RCH ₂ NH ₂				Miscellaneous		
				Acid		Amide	Anilide	S Benzyl thiuronium chloride	Amine B P C	Benz amide	Benzene sulfonamide		Picrate	
				B P C	M P °C									
1	2-Cyanodiphenylmethane	19	313.4		117	163								
2	N-Piperidinoacetonitrile	19	210		215.7				182.3 58 61				di 225 220.1	Methiodide 192.3 HCl salt of acid 215.6 Phenylthiourea deriv of amine 92.3
3	3-Chloro-2-tolunitrile	19	107 ²⁶		159.154									
4	Tetradecanonitrile	19-20			54	103	82							M p of amine 37
5	Cinnamonitrile	20	255.6		133	153 109	147	175 179					181 yel aq al	HCl salt of amine 235
6	Trichloroacrylonitrile	20			76	97.8 87	98							n _D ²⁰ 1.5100
7	DL-Mandelonitrile (Benzaldehyde cyanohydrin)	22			118.9	133.4	151.2 146		116.7	148.9			153.4 al	M p of amine 56.5-8.0 O-Benzoyl deriv 63.4 3-Nitrobenzoyl deriv 83.4 p-Toluidide of acid 174 HCl salt of amine 208.19 acet
8	Pentadecanonitrile	23	322		52	102	78		299 301					M p of amine 34.0-6.5 HCl salt of amine 199 N-Acetyl deriv of amine 72
9	2-Methoxybenzonitrile	24.5	255.6		00.1	129	131		226.8					H-PtCl ₆ salt of amine 187
10	(2-Chlorophenyl) acetonitrile (2-Chlorobenzyl cyanide)	25	251		95	175 w	138.9		105.8 ²				187 bz	
11	1,1-Dicyanoethane (Methylmalononitrile)	26			135 138 d	di 217	di 182						di 252 d	Di p-toluidide of acid 227.8 Di-HCl salt of amine 201
12	2-Cyanopyridine (2-Pyridinecarbonitrile Picolinonitrile)	26	212.5		136.7	106.7	76		95.8 ²				159 60 d	HAuCl ₄ salt 190 N-Acetyl deriv of amine 59.60 bz-pet eth Oxalate salt of amine 166.7 d
13	4-Tolunitrile (4-Methylbenzonitrile)	27-29	217		179.80	155.165	147.8		208	137			205 15 d	D ¹ 0.9805 M p of amine 13 N-Acetyl deriv of amine 107.8
14	D-Mandelonitrile	28.9	170 d		133	123								[α] _D ²⁰ +46.9 in bz
15	d,l-(2-Bromophenyl) acetonitrile (2-Bromobenzyl cyanide)	29	242 d		84	143.4 144.8							150.1	Et ester of acid b p 150.2 ³ M p of amine 163.4 HBr salt of amine 163.4
16	(4-Chlorophenyl) acetonitrile (4-Chlorobenzyl cyanide)	30	265.7		105	175	164.5		114.6 ¹⁹				212	HCl salt of amine 218.0-8.5 p-Toluene sulfonate deriv of amine 235
17	Malononitrile (Methylene cyanide)	30	218.9		135	170			136	140	96	250		n _D ²⁰ 1.4146 N-Acetyl deriv of amine 126
18	Hexadecanonitrile	31			63	106.7	90							D ¹ 0.8224
19	Maleonitrile (cis-1,2-Dicyanoethylene)	31			130	181	187	163 173	163.70	di 178.5 9.5	di 155 ab	di 250 d		
20	2,2-Dicyanopropane (Dimethylmalononitrile)	31.2	169.5 subl		192.3 subl part d >130	di 269	203.4	159.60	153	di 152				Di-Me ester of acid b p 177 ²⁵ HCl salt of amine 256.7

* Derivative data given in order: m.p. crystal color solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous	
				Acid		Amide	Anilide	S-Benzyl thiuronium chloride	Amine	Benzamide	Benzene sulfonamide		Picrate
				B P, °C	M P °C								
21	<i>tert</i> -Butylacetonitrile (Neopentyl cyanide)	32-3	138	186 8		132	131						HCl salt of amine, 158 60, subl
22	1-Naphthylacetonitrile	33			131	154, 180							
23	4,4-Dicyanoheptane (Dipropylmalononitrile)	33 4 (anh) 49 50 (hyd)	223-4, 135-40 ^{o 2}		161	<i>di</i> 214	<i>di</i> 168 0 5, me al		132 ²⁵	<i>di</i> 154			
24	Heptadecanonitrile	34			61	106			335-40	91			M p of amine, 49, N-Acetyl deriv of amine, 62
25	1-Naphthonitrile (1-Cyanonaphthalene)	34, 37	299		162	202			155 ¹²		148	223	N-Acetyl deriv of amine, 134, lgr Methiodide deriv of amine, 213, al
26	2-Cyanopropionic acid	35	142 5 ¹¹		135, 120	<i>di</i> 206	<i>di</i> 182, 214						Amide, 105 81 Mono- <i>p</i> -toluidide of acid, 145 d Di- <i>p</i> -toluidide of acid, 227 8 245
27	4-Fluorobenzonitrile	35	189-90		183	154-5			183			203	Et ester of acid, 27 Ph ester of acid, 101
28	Coumarilonitrile (Coumarin-2-carbonitrile)	36		310-5, sl d	192-3, w	159	159						
29	Indole-3-acetonitrile	36 0 5	157 ^{o 2}		164-5 199	150 1	149 5 50			137 8		247 d	Me ester of acid, 135 M p of amine, 116 7, 146 HCl salt of amine, 248 9 N-Acetyl deriv of amine, 77, pet eth
30	3-Bromobenzonitrile	38	225		155	155			244-5	135 6		205	Et ester of acid, 26 b p 278
31	2-(N-Anilino)-butyronitrile	39			141	123, w	92, al						Me ester of acid, b p 278 9
32	<i>trans</i> - <i>o</i> -Chlorocinnamonitrile	40			212, yell, al	168	176						
33	Octadecanonitrile	41 43			70	109	95 88						
34	3-Chlorobenzonitrile	41			158, 155	134	122-5		110-2 ¹⁷	214		203	
35	2-Chlorobenzonitrile	43	232		141	142	118		103-4 ¹¹	116 7		217	N-Acetyl deriv of amine, 79-80 O-Benzoyl deriv, 57-8 Me ester of acid, 85 8, bz-pet eth
36	4-Chloromandelonitrile	43			119-22, 112-3	122-3							Me ester of acid, 39 5 40
37	Nonadecanonitrile	43			69	109 5 8	95 5-6 5						
38	2-Bromo-4-tolunitrile	44			204								
39	3,3-Dicyanopentane (Diethylmalononitrile)	44-5	195, 92 ²⁴		125, w	<i>mono</i> 146, <i>di</i> 224							
40	4-Cyanobutyric acid	45			97 8	182-3	<i>di</i> 221 2			105			Amide, 69 70 Et ester of acid, b p 245 M p of amine, 157 8, HCl salt of amine, 92-4 HAuCl, salt of amine, 86 7, 106
41	5-Chloro-2-tolunitrile	45-6			169								Me ester of acid, 30-1
42	(4-Aminophenyl)acetonitrile (4-Aminobenzyl cyanide)	46	312		199	161 2							N-Benzoyl deriv, 176-7, Picrate, 185
43	<i>meso</i> -2,3-Dimethylsuccinonitrile	46			209, 198 d	<i>di</i> 310-3	<i>di</i> 235						Di-Me ester of acid, b p 198 9

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous	
				Acid		Amide	Anilide	S-Benzyl thiuronium chloride	Amine B P, °C	Benzamide	Benzene sulfonamide		Picrate
				B P, °C	M P, °C								
44	3-Bromo-4-tolunitrile	47			140	137							
45	(4-Bromophenyl)acetonitrile (4-Bromobenzyl cyanide)	47			114, subl	192.4							Et ester of acid, 30, HCl salt of amine, 240-3
46	N-Anilinoacetonitrile	48 lgr			127.8	136	113						
47	3-Cyanopropionic acid	48-50			235	185	mono 157, di 269 d	mono 148.5, di 230		79-80			Amide, 97, Me ester of acid, b p 215, Di- <i>p</i> -toluidide of acid, 256, M p of amine, 193-203 d, HCl salt of amine, 135-6, 95-6 Me ester of acid, 28
48	3-Chloro-4-tolunitrile	48-50			200.2								
49	3,3-Diphenylacrylonitrile (β -Phenyl cinnamonitrile)	49			162, 167		130.1						
50	3-Bromo-2-hydroxybenzonitrile	49-50			184	165							
51	4,4-Dicyanoheptane (Dipropylmalononitrile)	49-50 (hyd), 33.4 (anh)			161	di 214	di 168.0-5, me al		132 ²⁵	di 154			
52	<i>trans</i> -2,3-Diphenylacrylonitrile	49-51	213-4 ⁴³		172	127, acet	141, al						
53	Eicosanonitrile	49-5			77, 75.2	108.9	92		196.2 ⁴⁰				M p of amine, 57.8, n _D ²⁰ of amine, 1.4341
54	3-Cyanopyridine (Nicotinonitrile)	50	240-5		232	122	85, w, 132, bz-lgr		88-90 ²	132		tri 206.8	HAuCl ₄ salt of amine, 196-8, Di-HCl salt of amine, 224
55	(4-Iodophenyl)acetonitrile (4-Iodobenzyl cyanide)	50-1			135								HCl salt of amine, 294.6 d
56	4-Cyanodiphenylmethane	51			157.8								Acid $\xrightarrow{\text{CrO}_3}$ 4-Benzoylbenzoic acid, 197-200, al
57	2-(N-Anilino)-valeronitrile	51, pet eth			147-8, al	99, eth-pet eth							
58	2-Aminobenzonitrile (Anthranilonitrile)	51, yel, CS ₂	267.8 ⁷⁷⁷		147	109-11	130-1			167			Et ester of acid, b p, 266-8, <i>p</i> -Toluidide of acid, 151
59	2-Bromobenzonitrile	53	253		150	155-6			118 ⁸				HCl salt of amine, 241, 208
60	5-Cyanothiazole	53			218	186							Me ester of acid, 68-9, N-Acetyl deriv of amine, 159-60
61	3-Aminobenzonitrile	53-4, aq al	288-90		174	78.9	114						N-Acetyl deriv, 248, Me ester of acid, 36-8, Et ester of acid, b p 294, Fe/AcOH → Benzonitrile, b p 190 + NH ₃
62	2-Quinolinoacetonitrile	53.4	140 ¹		274-5				138-40 ⁷			di 202	Picrate, 176-7 d, Me ester of acid, 72, lgr
63	2-Iodobenzonitrile	55			162	184				154			HCl salt of amine, 248-50, N-Acetyl deriv of amine, 134-5

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous		
				Acid		Amide	Anilide	S Benzyl thiuronium chloride	Amine B P °C	Benzamide	Benzene sulfonamide		Picrate	
				B P °C	M P °C									
64	2,4,6-Trimethylbenzotrile	55, bz	225 30		155, lgr	187 8				98 5 100 ^b	153 4			Me ester of acid, b p 241 2 ¹⁸
65	α-Aminobenzyl cyanide	55			256	130 2, al				135 ¹⁹	<i>di</i> 223 5			N-Acetyl deriv, 130-8, et ac pet eth N Benzoyl deriv, 151 Picrate, 160-1, yel NH ₄ salt, 183
66	Cyanoform (Tricyano methane)	55 6 pet eth												
67	Succinonitrile	56 6	265 7		186 8	260	230	149	159	177		250 5		M p of amine, 27 N-Acetyl deriv of amine 137
68	2-Iodo-4-tolunitrile (2-Iodo-4-methylbenzotrile)	57-8			205 6	167								
69	2,6-Dinitrobenzotrile	58 (145)			202 3									Me ester of acid, 147 M p of amine, 88, HCl salt of amine, 185, H ₂ PtCl ₆ salt of amine, 193
70	<i>d,l</i> -2,3-Dimethylsuccinonitrile	58 9	.....		135	<i>mono</i> 148 9, <i>di</i> 244	<i>di</i> 222							Di-Me ester of acid, b p 200
71	2-Chloro-4-tolunitrile	61 2			155 6	182								
72	4-Methoxybenzotrile	61 2	256 7		184 6	162 3	169	177 184 5	236 7					N-Acetyl deriv of amine, 96, H ₂ PtCl ₆ salt of amine, 210
73	2,4-Dichlorobenzotrile	61-2			164 160	194			140 ¹²²					Me ester of acid, b p 132 ¹⁵ , n _D ²⁵ of amine 1 5738, HCl salt of amine, 281 2 4 3
74	4-Methoxycinnamotrile	64			170	186								Me ester of acid, 90 Et ester of acid, 49 50
75	3,5-Dichlorobenzotrile	65, subl			188				254 ⁹			241		Me ester of acid, 58, n _D ²⁵ of amine 1 5690, HCl salt of amine, 300
76	<i>cis</i> -1,4-Dicyanocyclohexane	65			168 9									Acid + conc HCl at 180 → <i>trans</i> isomer, 300
77	Bromomalononitrile	65 6			113d	181								Di- <i>p</i> -toluidide of acid, 217
78	2-Naphthonitrile (2-Cyanonaphthalene)	66 62	305		184	192, 195						226		M p of amine, 60 N Acetyl deriv of amine, 126, Methiodide deriv of amine, 168, al
79	Cyanoacetic acid	66			135 6	170	226 7			120 w				Amide, 119 20, Anilide, 198 9, Warming with benzaldehyde → α-cyanocinnamic ac, 180, M p of amine, 200, HCl salt of amine, 123
80	2-Cyano-2-ethylbutyric acid (Diethylcyanoacetic acid)	66 57	240 5, 164 ^a		125, w	<i>mono</i> 146, <i>di</i> 224								NH ₃ → Diethylcyanoacetamide, 121

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Derivatives of the corresponding acid RCN → RCOOH					Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous	
				Acid		Amide	Anilide	S-Benzyl thionium chloride	Amine B P, °C	Benzamide	Benzene sulfonamide	Picrate		
				B P, °C	M P °C									
81	2,4-Diphenylglutaronitrile	66, 70 1	220-7 ⁵		2 forms (a) 164-5, w, (b) 185-6, chl - pet eth									Di-HCl salt of amine, 319 20, iso-PrOH
82	α-Chloro-3-tolunitrile	67, al	258 60		132, w	124							173	HCl salt of amine, 169, H ₂ PtCl ₆ salt of amine, 219
83	4-Chloro-2-tolunitrile	67			172	183								
84	1-Cyanoacenaphthene (Acenaphthene 1-carbonitrile)	68			161									
85	Phenylmalonitrile (α-Cyanobenzyl cyanide)	69			152 3	233								
86	6-Nitro-2-tolunitrile	69 70			184	163								
87	(4-Hydroxyphenyl) acetoneitrile (4-Hydroxybenzyl cyanide)	69 70, w	330		148-50	175							200	Me ester of acid, 66 Acetate, 49 50 M p of amine, 160 1
88	5-Bromo-2-tolunitrile	70			187	180								
89	α-Bromo-2-tolunitrile (2-Cyanobenzyl bromide)	71 2	124 ⁴		147									Me ester of acid, 32 0-5
90	2,2-Diphenylglutaronitrile	71 2 5			195-7, 183	1-mono 142-4								Anhydride of acid, 134, Imide of acid, 158 9
91	(2-Aminophenyl) acetoneitrile (2-Aminobenzyl cyanide)	72			119	93								N-Acetyl deriv, 120, Benzamide, 175-9, N-Acetyl deriv of acid, 158
92	3,4-Dichlorobenzonitrile	72			208 9	133			139 40 ¹⁷				228	Me ester of acid, 46 5 7 5, HCl salt of amine 240 2
93	1,2,2,3-Tetramethylcyclopentene-1-carbonitrile (Campholonic nitrile)	73	217 9	255	106	80	91, al		210	98				
94	Dicyanodimethyl amine (Bis(cyanomethyl) amine)	75, 77			247 5, 225d	dt 143	dt 140 5		208	tri 166, chl		tri 212d		N-Nitroso deriv, 43, N-Benzoyl deriv, 131 2, Tri-HCl salt of amine, 233
95	Diphenylacetoneitrile (α-Phenylbenzyl cyanide)	75			148	168	180	145	134 ²	144-5		211 2 d		M p of amine, 42 3 5, HBr salt of amine, 205 7
96	4-Cyano-N,N-dimethylaniline	75 6	318		242 5-3 5	206	182-3							Me ester of acid, 102, HCl salt of amine, 212
97	1-Cyanoisoquinoline	78, 93			161									
98	4-Cyanopyridine	78, 83			315	155-6			120 5 ¹²			179-80, al		HCl salt, 199, HAuCl ₄ salt, 208 10
99	α-Chloro-4-tolunitrile (4-Cyanobenzyl chloride)	78-80, al	263		203	173						185		H ₂ PtCl ₆ salt of amine, 226
100	2,5-Diphenylvaleronitrile	79			80-1, lgr									
101	3-Cyanobenzaldehyde (3-Formylbenzonitrile)	79-81			175, w	190d								Oxime, 99-101, w, Semicarbazone of acid, 265, Phenylhydrazone of acid, 164

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point °C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous		
				Acid		Amide	Anilide	S-Benzylthiuronium chloride	Amine	Benzamide	Benzene sulfonamide		Picrate	
				B P, °C	M P, °C									
102	6-Nitro-3-tolunitrile	80			219	151								Me ester of acid, 81-2, Et ester of acid, 55, al
103	Benzoylacetoneitrile	81			103-4d	113	108							Carbazone of acid, 125, HCl salt of amine, 128
104	6-Chloro-2-tolunitrile	82 3			102	167								Me ester of acid, 104
105	8-Cyanoquinoline	84, 50% al			187	171-3, w								Et ester of acid, 38 b p 175-7 ⁷
106	2-Nitro-3-tolunitrile	84			223	192								Me ester of acid, 74, me al
107	2,3,4,5-Tetrachlorobenzonitrile	84			194 5	207 8, acet - al	197, al							M p of amine 90 1
108	4-Cyanobiphenyl	85 6			228	223				195-200 ¹⁵				Me ester of acid, 117 8, M p of amine, 128 HCl salt of amine, 308 10 282
109	2-Naphthylacetoneitrile	86, 81			142	200								
110	cis-2,3-Diphenylacrylonitrile	86	228 30 ²³		137-8	167-8, chl - lgr	179, chl - pet eth							
111	4-Aminobenzonitrile (4-Cyanoaniline)	86			188	182 9				268 70				N-Acetyl deriv , 205, N-Benzoyl deriv , 170 Picrate, 150
112	1-Cyano-2-phenylacrylonitrile (Benzalmalononitrile)	87			195-6d	di 189-90								Di-Me ester of acid, 44 Di-Et ester of acid, 32
113	5-Bromo-2,4-dimethylbenzonitrile	88 90			180-1	197 5-8 5								
114	2-Cyanotriphenylmethane	89	270-85 ²⁰⁻³⁰		162									Me ester of acid, 98, me al
115	5-Cyanoquinoline	89 (anh), 70 (+1 5 H ₂ O)			342									Picrate, 241, Styphnate, 241d , yel HCl salt 248, yel , Me ester of acid, b p 128-32 ^{0 2}
116	2,6-Dimethylbenzonitrile	90 1			116	138 5-9 0, 120-5				96-8				Me ester of acid, b p 94 ⁹
117	Phenylcyanoacetic acid	92												Amide, 147, Anilide, 136
118	2-(N-Anilino)propionitrile	92, al			162, w	144	127, al							Et ester of acid, b p 272
119	2,4-Dibromobenzonitrile	92			174	198								Me ester of acid, 33
120	β-(2-Nitrophenyl)acrylonitrile	92, w	194-67-8		146-7, yel , trans 240	185								Et ester of acid, 60
121	5-Chloro-2-nitro-4-tolunitrile	93			180-1									
122	α-Bromo-3-tolunitrile (3-Cyanobenzyl bromide)	93, al			155-6									
123	4-Nitro-3-tolunitrile	93-4			134	176-7								Me ester of acid, 78 9, me al
124	2-(N-Anilino)-isobutyronitrile	93-4, al			184-5, w	136	155, al							
125	2-Cyanoquinoline	94			157	133, 123								

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Boiling point, °C	Derivatives of the corresponding acid RCN → RCOOH					Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous	
				Acid		Amide	Anilide	S-Benzyl thiuronium chloride	Amine B P, °C	Benzamide	Benzene sulfonamide	Picrate		
				B P, °C	M P, °C									
126	4-Cyanovaleric acid (2-Methylglutaromononitrile)	95.6, w		205-8 ¹²	79	<i>dt</i> 175.6								Di- <i>p</i> -toluidide of acid, 74.5; H ₂ PtCl ₆ salt of amine 202.3
127	Fumaronitrile	96			295, 300	266	313-4	178, 182						
128	4-Chlorobenzonitrile	96, 94.6	223, 95 ⁵		240	179, 170	194		217	140			210	
129	9-Phenanthrylacetonitrile	96.5-7.0			224.5	250-2								
130	3,5-Dibromobenzonitrile	97, subl			219.20	187								Me ester of acid, 63
131	2-Chloro-3-nitrobenzonitrile	97-101, pa yel			185									Me ester of acid, 70. Et ester of acid, b p 314d
132	2-Hydroxybenzonitrile (2-Cyanophenol)	98		211 ²⁰	159	133	135							D ₄ ⁹⁹ 1.1052, n _D ²⁰ 1.53716. O-Benzoyl deriv., 106, pet eth., M p of amine, 125, 129, H ₂ PtCl ₆ salt of amine 197d. HI salt of amine, 184
133	4-Chloro-2-nitrobenzonitrile	98			142	172								Me ester of acid, 42-3
134	4-Cyanotriphenylmethane	100, me al			165, ac a		196, ac a							
135	4-Chloro-3-nitrobenzonitrile	100.1			181-2	156	131						210d	Me ester of acid, 83. HCl salt of amine, 227.8
136	3-Nitro-4-tolunitrile	101			164.5	153								Amide, 130, Di-Me ester of acid, 35.6
137	2-Cyano-3-phenylpropionic acid	101.2, 75			120-1	225								
138	3-Cyanophenanthrene	102			269	233.4, 227-8	216.7							
139	2,3,3-Triphenylpropionitrile	102, me al			222-3, al	213								Me ester of acid, 162. HCl salt of amine, 269.72
140	4-Cyanoquinoline	102			253.4	181								Methodide, 216. H ₂ AuCl ₄ salt, 232. Di-HCl salt of amine, 255d. Me ester of acid, 42
141	4-Bromo-1-naphthonitrile (1-Bromo-4-cyanonaphthalene)	102-3			212, 220									
142	4-Bromo-2,5-dimethylbenzonitrile	103-4			171.5-2.5	209-10								
143	5-Nitro-3-tolunitrile	104.5			174	164-5								Me ester of acid, 84-5
144	2,4-Dinitrobenzonitrile	104.5, al			182-3	203-4								Me ester of acid, 70. Hydrazide of acid, 231.3
145	4-Nitro-2-tolunitrile	105			179	173.4								Me ester of acid, 69
146	6-Chloro-3-nitrobenzonitrile	105-6			165	178								Me ester of acid, 73.
147	5-Bromo-3-nitro-2-tolunitrile	106-7			226	235								
148	2-Nitro-4-tolunitrile	107, pa yel			190	166								
149	9-Cyanophenanthrene	107, 111.0-3			256.5-7.0	232-3, 226	218			167			241	M p of amine, 108.5. HCl salt of amine, 294. N-Acetyl deriv of amine, 182.3. Picrate of acid, 217-8
150	3-Cyanoquinoline	108			275	198-9, 195								

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous	
				Acid		Amide	Anilide	S Benzyl thiuronium chloride	Amine B P , °C	Benzamide	Benzene sulfonamide		Picrate
				B P , °C	M P °C								
151	2-Cyanophenanthrene	109			259 60	242 3	217 8						
152	3-Nitro-2-tolunitrile	109 10			151 2 pa yel	158							Me ester of acid, 50
153	2-Nitrobenzonitrile	110			146	174 6	155						HCl salt of amine, 248 50
154	4-Chloro-1-naphtho-nitrile (1-Chloro-4-cyanonaphthalene)	110			223-4, 210	235 6							
155	5-Cyanoacenaphthene (Acenaphthene-5-carbonitrile)	110 1			219, bz	198				182-4	148-9		
156	4-Bromobenzonitrile	112	235 7		251	189 90			250	143		221	M p of amine, 20 N-Acetyl deriv of amine 113
157	2,4,5-Trimethoxybenzo-nitrile	112 4. al		ca 300	144, bz - pet eth	184 5	154 5						Me ester of acid, 97 5 Et ester of acid, 72
158	4-Hydroxybenzonitrile (4-Cyanophenol)	113			213-4	162 (+1 H ₂ O)	196 7						M p of amine, 109 (anh), 95 (+1H ₂ O) HCl salt of amine 195 HI salt of amine 198 200
159	2,3-Diphenylvaleronitrile (2 forms)	(a) 115 al	(a) 235 40 ²⁰ (b) 210 2 ²⁰		(a) 152- 3 (b) 178 lgr								
160	α-Bromo-4-tolunitrile (4-Cyanobenzyl bromide)	115 6 al			229 30								Me ester of acid, 54 Et ester of acid, 35 6
161	(4-Nitrophenyl)aceto-nitrile (4-Nitrobenzyl cyanide)	116			153	197 8 191	198						
162	6-Bromo-3-nitrobenzo-nitrile	117			180	197 8	166						
163	(2-Hydroxyphenyl) acetoneitrile (2-Hydroxybenzyl cyanide)	117 9		240 3	147 9	116 8, al		163					O-Benzoyl deriv 50, lgr HCl salt of amine, 155
164	3-Nitrobenzonitrile	118			140	141-3	153 4						HCl salt of amine 224
165	4-Bromo-3-nitrobenzo-nitrile	120			203 4	156							
166	4-Cyanoazobenzene	120 1, br , bz			241, red, al	224-5, red							Me ester of acid, 123 4, or , me al , Et ester of acid, 86-7, red, al
167	Dipicolonitrile (2,6-Dicyanopyridine)	123 113			252d 228	di 302							Di-Me ester of acid, 124 5 Di-Et ester of acid, 41 2
168	2-Cyanohehexanoic acid	123-6 5			101	di 200	di 193						
169	Dibromomalomonitrile (Bromodicyano-methane)	124			147d 136- 7d	di 200, 206d							Di-Me ester, 67
170	1-Cyanoanthracene	126			245, yel , al	260							Me ester of acid, 108, yel , ac a
171	2,2,3-Triphenylpropio-nitrile	126			162 132	111, al							Me ester of acid, 127
172	1-Cyanophenanthrene	128			232-3	284	245						

* Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous	
				Acid		Amide	Anilide	S-Benzylthiuronium chloride	Amine	Benzamide	Benzene sulfonamide		Picrate
				B.P. °C	M.P. °C								
195	5-Iodo-2-naphthonitrile (2-Cyano 5 iodo-naphthalene)	148.5			264, al	196	203						M p of amine, 120 HCl salt of amine, 251.3 N-Acetyl deriv amine 135-6
196	3-Cyano-3-phenylpropionic acid	150	215.8 ¹⁰		166-7								Di-Me ester of acid, 55, al, Imide of acid, 88-90, M p of amine, 209 HCl salt of amine, 203, N-Acetyl deriv of amine, 65
197	2-Cyano-2-propylvaleramide (Dipropylcyanoacetamide)	153			161	di 214	di 168.85, me al						
198	2,6-Dibromobenzonitrile	155, subl	308.9		157	208.5							Me ester of acid, 83 Hydrazide of acid, 204
199	3-Chloro-4-hydroxybenzonitrile	155			169-70, w, 164.5	180-2							Me ester of acid, 106.7, Et ester of acid, 77-8
200	5-Chloro-2,4-dinitrobenzonitrile	156			182.3	212	226						
201	4-Benzamidobenzonitrile (N-Benzoylanthranilonitrile)	156			181	218.9	279						Me ester of acid, 100 Et ester of acid 98
202	5-Bromo-2-hydroxybenzonitrile	158-9			165	232	222						O-Acetyl deriv of acid, 60
203	d l-2,3-Diphenylsuccinonitrile	160			183 (+ l H ₂ O)		mono 173.5, al						
204	Isophthalonitrile (m-Dicyanobenzene)	161.5, 2.0			345.7	di 280							
205	2-Hydroxy-4-nitrobenzonitrile (2-Cyano-5-nitrophenol)	160.1, yel			235, 226, w	192.4							Benzoate, 122, yel, al, Et ester of acid, 84-5
206	d l-4-Cyano-3,4-diphenylbutyric acid (d l-2,3-Diphenylglutaromononitrile)	162.3, bz			208-10 (cor), aq ac a	mono 200-5, d, al	mono 201-2, 50% al						Et ester, 99-100, al, Imide of acid, 225-9, aq al
207	d-3-Carboxy-2,2,3-trimethylcyclopentylacetonitrile	164				233, PhNO ₂							[α] _D +64.41, Me ester, 77, Et ester, 58
208	5-Chloro-2-hydroxybenzonitrile (4-Chloro-2-cyanophenol)	165-7			172, 167.5	226							Me ester of acid, 84
209	2,3-Diphenylcinnamonitrile (Cyanotriphenylethylene)	166.7, 162-3			213	223							
210	1,7-Dicyanonaphthalene	167, al			294-6								
211	4,4'-Dicyanodiphenylmethane	169			334, 290								Di-Me ester of acid, 81.2
212	2,2'-Diphenic acid mononitrile (2-Carboxy-2'-cyanobiphenyl)	170.2, bz			233.5	mono 193, di 212	mono 181-3						Di-Me ester of acid, 74, Me ester, 110, Et ester, 91-2
213	5-Nitro-2-naphthonitrile (2-Cyano-5-nitro-naphthalene)	172-3			295, yel	261-3, br -yel							Me ester of acid, 112, yel

* Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXI. ORGANIC DERIVATIVES OF NITRILES

b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous	
				Acid		Amide	Anilide	S-Benzylthio ronium chloride	Amine B P °C	Benz amide	Ben zene sulfon amide		Picrate
				B P °C	M P °C								
214	9-Cyanoanthracene (9-Anthracenecarbonitrile)	175, 170-2			207, pale								Me ester of acid, 111, M p of amine, 90
215	2,3-Dicyanopyridine	175.6			228.9	2-mono 168.5 d, di 165							
216	1,3-Dicyanonaphthalene	179, ac a			267.8								
217	3-Cyanocoumarin	182			187 d	236	250						Me ester of acid, 116.7 Et ester of acid, 64
218	2-Cyanocinnamic acid	183, al			195.6 d	di 189-90							NH ₃ → 2-Cyanocinnamamide, 123 Me ester of nitrile 89 Di-Me ester of acid, 44.5
219	2-Cyanobenzoic acid	187, 192			200.6	di 219	di 253	di 151, 157		di 184		170	NH ₃ → 2-Cyanobenzamide, 173 Me ester 51 Et ester, 70.65
220	1,2-Dicyanonaphthalene	190, bz			175	di 265							p-Nitrobenzoyl ester of acid, 115
221	2-Hydroxy-5-nitrobenzotrile (2-Cyano-4-nitrophenol)	194-6, yel, w			229-30, 227	225, al							
222	Tetracyanoethylene	198, 200, subl	223										ng ⁵ 1.560 D' 1.348 N,N-Dimethylaniline → N,N-dimethyl 4-tricyanovinylaniline 173.5, ac a Anthracene → adduct, 268.70, acet Me ester of acid, 109-10, Et ester of acid, 93
223	5-Nitro-1-naphthonitrile (1-Cyano-5-nitro-naphthalene)	205			241.2, 239	235.6							Di-Me ester of acid, 67 Di-Et ester of acid, 64
224	1,4-Dicyanonaphthalene	208, ac a			309, 288								Di-Me ester of acid, 99
225	1,6-Dicyanonaphthalene	208-10			310								Di-Me ester of acid, 114.5 Di-Et ester of acid, 123-4
226	1,5-Dicyanonaphthalene	211, 266-7			310, ac a								NH ₃ → 3-Cyanobenzamide, >300 Me ester, 65, Et ester, 56
227	3-Cyanobenzoic acid	217			345	280							NH ₃ → 4-Cyanobenzamide, 223, Me ester, 62, Et ester, 54
228	4-Cyanobenzoic acid	219			ca 300, subl	di >250	di 334-7					232 d	N,N'-Diacyetyl deriv of diamine, 225
229	Terephthalonitrile (p-Dicyanobenzene)	222			ca 300, subl	di >250	di 334-7					232 d	Di-Me ester of acid, 102.3, Di-Et ester of acid, 58.60
230	1,8-Dicyanonaphthalene	232			260	di 250-82 d							Di-Me ester of acid, 214 224, Di-Et ester of acid, 112, Heating acid with lime → biphenyl, 71
231	4,4'-Dicyanobiphenyl	233.4											Imide of acid, 196.8, ac a
232	l-2,3-Diphenylsuccinonitrile	239.40			176-7, 190, w								

*Derivative data given in order m p, crystal color, solvent from which crystallized

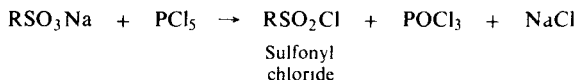
TABLE XXI. ORGANIC DERIVATIVES OF NITRILES
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	Derivatives of the corresponding acid RCN → RCOOH				Derivatives of the corresponding amine RCN → RCH ₂ NH ₂				Miscellaneous	
				Acid		Amide	Anilide	S Benzyl thiuronium chloride	Amine	Benzamide	Benzene sulfonamide		Picrate
				B P °C	M P °C				B P °C				
233	1-Cyano-9,10-anthraquinone	247, yel, ac a		293 4, pa yel, ac a	280, pa yel, al	288-9, pa yel, PhNO ₂						Me ester of acid, 189, yel, Et ester of acid, 169, yel	
234	2,3-Dicyanonaphthalene	251, al		239-41								Imide of diacid, 275	
235	2,7-Dicyanonaphthalene	267 8, ac a		>320	<i>dt</i> 297-8							Di-Me ester of acid 135-6	
236	2,6-Dicyanonaphthalene	293, al		>300 d	<i>dt</i> >320							Di-Me ester of acid, 191	

*Derivative data given in order m p , crystal color, solvent from which crystallized

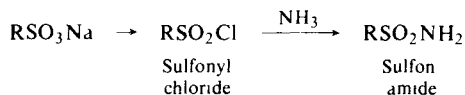
EXPLANATIONS AND REFERENCES TO TABLES XXII AND XXIII

The main derivatives of the sulfonic acids are obtained by converting them to the corresponding sulfonyl chlorides. Hence sulfonic acids and sulfonyl chlorides are often identified through the same derivatives.

Sulfonyl chloride

From the sulfonic acid or its sodium or potassium salt with phosphorus pentachloride without solvent

For directions and examples see Cheronis, p 638, Linstead, p 89, Shriner, pp 268, 270, Vogel, p 553, Wild, p 161

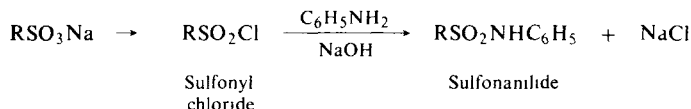
*Sulfonamide **

From the sulfonyl chloride (prepared from the acid or its salt) and concentrated aqueous ammonia solution

For directions and examples see Linstead, p 49, Shriner, pp 268, 270, Vogel, p 553, Wild, p 161

From the sulfonyl chloride, aqueous ammonia and ammonium carbonate

See Cheronis, p 639

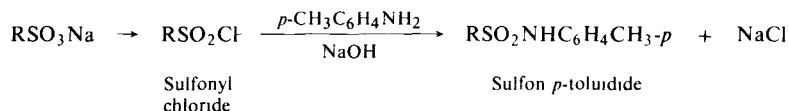
*Sulfonanilide **

From the sulfonyl chloride (prepared from the acid), aniline, and sodium hydroxide

For directions and examples see Linstead, p 89, Wild, p 161

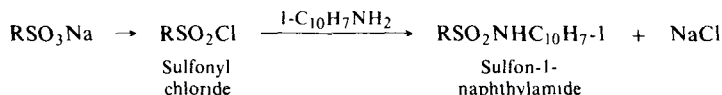
From the sulfonyl chloride and aniline

See Vogel, p 553

*Sulfon-p-toluidide **

From the sulfonyl chloride, *p*-toluidine and aqueous sodium hydroxide

For directions and examples see Vogel, p 553

*Sulfon-1-naphthylamide **

From the sulfonyl chloride (prepared from the acid) and 1-naphthylamine in benzene

For directions and examples see Cheronis, p 639

*S-Benzylthiuronium salt **

From the sodium, potassium or ammonium salt of the sulfonic acid and S-benzylthiuronium chloride in water

For directions and examples see Cheronis, pp 635, 636, Linstead, pp 15, 89, Shriner, p 269, Wild, pp 149, 159, E. Chambers and G. W. Watt, *J Org Chem*, **6**, 376 (1941), E. Campaigne and C. M. Suter, *J Amer Chem Soc*, **64**, 3040 (1942), S. Veibel, *J Amer Chem Soc*, **67**, 1867 (1945)

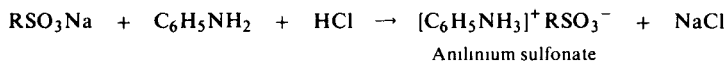
***Derivatives recommended for first trial**

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE XXII AND XXIII (Continued)

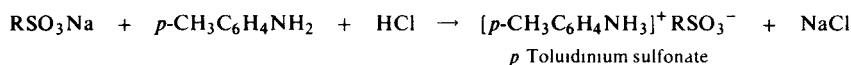
From sodium or potassium sulfonate and S-benzylthiuronium chloride in alcohol
See J J Donleavy, *J Amer Chem Soc*, **58**, 1004 (1936)

Anilinium salt *



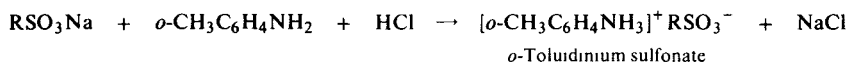
From the sodium or potassium salt of the acid, aniline and hydrochloric acid in water
For directions and examples see Cheronis, p 637, O C Dermer and V H Dermer, *J Org Chem*, **7**, 581 (1942)

p-Toluidinium salt *



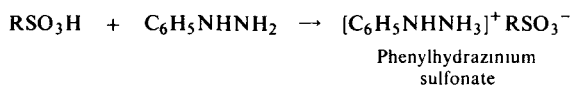
From the sulfonic acid and *p*-toluidine
For directions and examples see Shriner, p 269
From the sodium, potassium or ammonium salt with *p*-toluidine or *p*-toluidine hydrochloride in water
See Shriner, p 269, Vogel, p 555, O C Dermer and V H Dermer, *J Org Chem*, **7**, 581 (1942), A D Barton and L Young, *J Amer Chem Soc*, **65**, 294 (1943)
From the sodium, potassium, ferric or barium salt (after boiling with sulfuric acid) with *p*-toluidine and hydrochloric acid
See Cheronis, p 637, Fieser, *J Amer Chem Soc*, **51**, 2460 (1929)

o-Toluidinium salt *



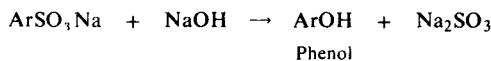
From the sodium or the potassium salt of the sulfonic acid with *o*-toluidine and hydrochloric acid in water
For directions and examples see Cheronis, p 637, O C Dermer and V H Dermer, *J Org Chem*, **7**, 581 (1942)

Phenylhydrazinium salt *



From the sulfonic acid with phenylhydrazine in water-alcohol
For directions and examples see Wild, p 159, P H Latimer and R W Bost, *J Amer Chem Soc*, **59**, 2500 (1937)

Phenols by KOH fusion



By fusion of the sodium arylsulfonate and sodium hydroxide in a nickel crucible
For directions and examples see Vogel, p 552
By fusion of the sodium arylsulfonate, potassium hydroxide and zinc dust
See Linstead, p 89

*Derivatives recommended for first trial

WARNING This is not an instruction manual References should be consulted for the preparation of derivatives

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS

a) Listed in order of increasing m.p. of the corresponding sulfonamide*

No	Name	Melting point °C	S-Benzylthiuronium salt	p-Toluidinium salt	Anilinium salt	o-Toluidinium salt	Sulfonyl chloride	Sulfonamide	Sulfonanilide	Sulfon-1-naphthylamide	Miscellaneous
1	Propane-1-sulfonic acid			67-8			b p 180	52, eth		84	Phenylhydrazine salt, 204 5
2	Ethane sulfonic acid		115				b p 171	60, eth		66	Phenylhydrazine salt, 182 8
3	Propane-2-sulfonic acid	-37					b p 79 ¹⁸	60, eth - pet eth		134	B p 159 ¹¹ , D ₄ ²⁵ = 1 1877, n _D ²⁰ = 1 4332, m-T uide, 109
4	Heptane-1-sulfonic acid						16	75			Phenylhydrazine salt, 100 0 5
5	2,4,5-Trimethoxybenzene sulfonic acid						130	76	170		
6	Methane sulfonic acid	20					b p 60 ²¹	90	100	125-6	Phenylhydrazine salt, 193 5-4d
7	Hexadecane-1-sulfonic acid (Cetyl sulfonic acid)	54					54	97			
8	10-Bromocamphor-3-sulfonic acid						97	100 2			
9	Benzyl sulfonic acid			113, al	102	83	92 3, eth, bz	105, w, al	102, al	166 (146), yel, al	Diethylamide, 29, Ethylamide, 65-6, Hydrazide, 131-2, Methylamide, 109-10, Phenylhydrazine salt, 173
10	3-Toluene sulfonic acid (3-Methylbenzene sulfonic acid)	oil		106		108	12	108, al		96, al	
11	3-Hydroxynaphthalene-2-sulfonic acid				241 2		112	110			
12	Pyridine-3-sulfonic acid	357					Hydrochloride, 141-4 d	110 1		145	Diethylamide, 49-50, Hydrazide, 94, me al
13	2,6-Dimethylbenzene sulfonic acid	98					39	113 (96)			
14	2-(N-Methylamino)benzene sulfonic acid	182 d						114 5 5 5			N-4-Toluene sulfonyl, 193
15	Indane-4-sulfonic acid						53 3 5	118-9, w			
16	2-Phenylethane-1-sulfonic acid	91					33	122		77	
17	4-Formylbenzene sulfonic acid (Benzaldehyde-4-sulfonic acid)							122-4			Amide oxime, 185, Dimethylamide, 134-7, Di-O-acetate, 86-7 5, Chloride diacetate, 111-3
18	2-Methylnaphthalene-1-sulfonic acid						83-5	124			
19	4-Fluorobenzene sulfonic acid						36 (30)	125 (123), w			
20	4-Chloro-3-methylbenzene sulfonic acid						65	128		92	Sulfonyl bromide, 67 5
21	3-Chloro-4-methoxybenzene sulfonic acid						82	131			
22	3-Ethoxybenzene sulfonic acid						38	131			
23	D-Camphor-10-sulfonic acid	193					67	132		121	
24	2-Fluoronaphthalene-6-sulfonic acid	105					97, chl	133		129	
25	DL-Camphor-8-sulfonic acid	56 8					106	133-5, w			
26	3-Methyl-4-nitrobenzene sulfonic acid						50	133 5			
27	3-Chloro-4-methylbenzene sulfonic acid						38	134		96	
28	3,5-Dimethylbenzene sulfonic acid			121-2, al			94 (90), bz	135, al		119, al	

*Derivative data given in order m p . crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS

a) Listed in order of increasing m.p. of the corresponding sulfonamide* (Continued)

No	Name	Melting point °C	S-Benzylthiuronium salt	p Tolu-dinium salt	Anilinium salt	o Tolu-dinium salt	Sulfonyl chloride	Sulfonamide	Sulfonamide	Sulfonamide	Miscellaneous
29	Indane-5-sulfonic acid	92					46-7, eth	135 5 6, al	129, al		
30	D-Camphor-8-sulfonic acid						138, ([α] _D ²⁰ + 128 7 in chl)	137, ([α] _D ²⁰ + 93 6 in al)			
31	4-Toluene sulfonic acid (4-Methylbenzene sulfonic acid)	104 5 (92)	181-2	198	238	190	71, eth	anh 138 5 9, dhyd 105	103, eth -al	157, al	Phenylhydrazide, 155, al, o-Toluidide, 110, aq ac a, Triethylammonium salt, 65
32	2,4-Dimethylbenzene sulfonic acid	62 (hvd)	146				34	139 (137)	110		
33	4-Vinylbenzene sulfonic acid (4-Styrene sulfonic acid)			182 3				139 40			Dimethylamide, 62 3
34	3,4-Dichlorobenzene sulfonic acid						22 4 (19)	140 (135)			
35	2-Bromonaphthalene-1-sulfonic acid						97	140			
36	2,4,6-Trimethylbenzene sulfonic acid	77					56	142	109		
37	3-Aminobenzene sulfonic acid (Metanilic acid)		148					142			
38	D-Camphor-2-sulfonic acid			196 7			88	143	124		Me ester 77, ([α] _D ²⁰ + 98 6 in chl)
39	4-Methylnaphthalene-2-sulfonic acid						124-5, eth	143 4, al			
40	3,4-Dimethylbenzene sulfonic acid	64	208				52	144			
41	4-Chlorobenzene sulfonic acid	93	175	208 10	222 3	163 4	53	144	104	190	
42	4-Methyl-3-nitrobenzene sulfonic acid	92 hyg		130	109	128	36	144 5		153	
43	3-Bromocamphor-8-sulfonic acid	195 6 (anh)					136 7	145			
44	5-Chloro-2-methylbenzene sulfonic acid						24 (21)	145, aq al			
45	4-Bromo-3-methylbenzene sulfonic acid						50	146			
46	4-Methoxy-3-nitrobenzene sulfonic acid						66	146 3			
47	3-Chlorobenzene sulfonic acid			199 200	206 7			148			
48	2,5-Dimethylbenzene sulfonic acid		184				24 6	148			
49	Naphthalene-1-sulfonic acid	90	137	181	183	237	68 (66)	150	112 (152)		
50	4-Ethoxybenzene sulfonic acid						39	150			
51	4,6-Dichloro-2,5-dimethylbenzene sulfonic acid						81	150	175		
52	3-Bromo-4-methylbenzene sulfonic acid						60	151			
53	Benzene sulfonic acid	66	148	205	240	176	14 5	153 (156)	112 (110)	170 1	N-Xanthylsulfonamide, 200 N-Benzoyl deriv of amide, 198, Hydrochloride, 201
54	2-Aminobenzene sulfonic acid (Orthanilic acid)		132					153			
55	2-Iodonaphthalene-1-sulfonic acid						110	154			
56	2,6-Dichloro-4-methylbenzene sulfonic acid						56	154-5			
57	2-Chloro-5-methylbenzene sulfonic acid						56	156	229 30 5		
58	2-Toluene sulfonic acid (2-Methylbenzene sulfonic acid)	57	170	203 4	218		10	156 3	136, aq al		Sulfonyl bromide, b p 138 ¹⁰ , N-Xanthylsulfonamide, 182 3 5

*Derivative data given in order m p crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS

a) Listed in order of increasing m. p. of the corresponding sulfonamide* (Continued)

No	Name	Melting point, °C	S Benzyl thiuronium salt	p-Toluidinium salt	Anilinium salt	o-Toluidinium salt	Sulfonyl chloride	Sulfonamide	Sulfon anhydride	Sulfon 1 naphthylamide	Miscellaneous
59	3-Bromocamphor-10-sulfonic acid	47.5					65	156.5			
60	2,4-Dinitrobenzene sulfonic acid	106.8 (<i>hyd</i>)					102	157 (154)			Hydrazide, 110
61	2-Methyl-4-nitrobenzene sulfonic acid	130 (<i>anh</i>)				177	106	157			
62	Benzophenone-3,3'-disulfonic acid						<i>di</i> 137.8	<i>di</i> 157	<i>di</i> 177.8		Methylamide, 106.7, Dimethylamide, 118.9
63	3-Nitrobenzyl sulfonic acid	74					100, bz	159, w			
64	4,6-Dimethyl-2-hydroxy-1,3-benzene disulfonic acid						<i>di</i> 89.91	<i>di</i> 160.1			
65	2-Nitrodiphenylamine-4-sulfonic acid	220 d					157	162			
66	2-Ethoxybenzene sulfonic acid						65.6	163	158		Phenylhydrazide, 132.3
67	3-Methyl-2-nitrobenzene sulfonic acid						58.5	163.5			
68	3-Amino-6-methylbenzene sulfonic acid							164	146.7		Chloride of N-acetyl deriv., 124. Chloride of N-chloroacetyl deriv., 87. Amide of N-acetyl deriv., 242.
69	4-Chloro-2-nitrobenzene sulfonic acid						75	164	138		Anhydride, 114.5, Phenylhydrazide, 151, Ph ester, 82
70	4-Aminobenzene sulfonic acid (Sulfanilic acid)		185	109		132		165	200	196	N-Acetyl, 214, Me ester, 92
71	3,6-Dichloro-2,5-dimethylbenzene sulfonic acid						71	165	171		
72	6-Aminonaphthalene-1-sulfonic acid		172.4					165			Benzoylguanidine salt, 210.11
73	4-Bromobenzene sulfonic acid	102.3 (88.9)	170	215.6	237.8	182.3	76, eth	166 (161)	119	183.4	
74	5-Bromo-2-methylbenzene sulfonic acid						33.5	167			
75	2,3-Dimethylbenzene sulfonic acid						47	167			
76	5-Chloro-2-methyl-3-nitrobenzene sulfonic acid						60	167			
77	3-Nitrobenzene sulfonic acid	48	146	222	222	193	64	167	126	166.7	
79	4,6-Dichloro-2-methylbenzene sulfonic acid						43	168			
80	4-Chloronaphthalene-2-sulfonic acid						106	168			Et ester, 76.9
81	4-Bromo-2-methylbenzene sulfonic acid						50	168			
82	Propane-1,3-disulfonic acid	92, d without melting					<i>di</i> 45	<i>di</i> 169, w	<i>di</i> 129		B p 157.1, Di-m-toluidide, 222, Dihydrazide, 105
83	Propane-1,1-disulfonic acid							<i>di</i> 169.70	151.2, al		Di-(N-ethyl)anilide, 128.9, al
84	3-Carboxybenzene sulfonic acid (3-Sulfobenzoic acid)	98 (<i>hyd</i>)	163		224.6		<i>di</i> 20	<i>di</i> 170			
85	4-Methyl-2-nitrobenzene sulfonic acid	141 (<i>anh</i>)					98.9	170			o-Anisidide, 135
86	2,4-Dimethyl-3-nitrobenzene sulfonic acid	144 (<i>anh</i>)					96	172			

*Derivative data given in order m. p., crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS
a) Listed in order of increasing m.p. of the corresponding sulfonamide* (Continued)

No	Name	Melting point, °C	S-Benzylthiuronium salt	p-Toluidinium salt	Anilinium salt	o-Toluidinium salt	Sulfonyl chloride	Sulfonamide	Sulfonamide	Sulfonamide	Sulfonamide	Miscellaneous
87	2,5-Dimethyl-3-nitrobenzene sulfonic acid	128		135-6		126 5-7 5	60 1	172 3	143 4			
88	4-Nitrodiphenylamine-2-sulfonic acid						102-4	173	164			
90	3,4-Dibromobenzene sulfonic acid	66 5 7 5 (anh)					34	175				
91	4-Chloro-3-nitrobenzene sulfonic acid						40 1	175-6, yel, al	176			
92	3-Amino-4-methylbenzene sulfonic acid											N-Acetyl of chloride, 144, N-Benzoyl of Chloride, 196, N-Benzoyl, 203 Me ester, 89, Et ester, 65
93	7-Chloronaphthalene-2-sulfonic acid	118 (anh), 68 (tetrahyd)					86 5	176				
94	4-Bromo-3-nitrobenzene sulfonic acid						55 7	176 7				
95	4-Hydroxybenzene sulfonic acid		169	202	170	192		176-7	141			
96	5-Methylnaphthalene-1-sulfonic acid	115						176-8				
97	4-Methylnaphthalene-1-sulfonic acid						81	177	158			
98	4-Nitrobenzene sulfonic acid	95 (109 11), hyg		179 80			80, lgr	180, 50% al	136 (171), al			
99	3-Chloro-2-methylbenzene sulfonic acid	60 72, 72 (anh)					72, pet eth	180, w				
100	2,5-Dichlorobenzene sulfonic acid	93 7 (> 100)	170	247-8	262 3	250-1	38	181 (186)	160	160		
101	2,4,5-Trimethylbenzene sulfonic acid	112					61 2	181				
102	8-Aminonaphthalene-2-sulfonic acid							181	146 7			N-Acetyl deriv of amide, 213, Benzoylguanidine salt, 214-6
103	5-Chloro-4-methyl-2-nitrobenzene sulfonic acid	128					99	181				
104	2,4-Dichlorobenzene sulfonic acid	86		204-6		170-2	55	182				
105	4-Iodobenzene sulfonic acid						85	183	143			
106	Quinoline-8-sulfonic acid	312					124	183 4				Picrate of Na salt, 226 7, Me ester, 96, Et ester, 73 Me ester, 89, Et ester, 79, Sulfonyl bromide, 124
107	6-Chloronaphthalene-2-sulfonic acid						110 5	183-4				
108	5-Nitronaphthalene-2-sulfonic acid	118-9, yel			260		125	184, yel				
109	4-Chloro-2-methylbenzene sulfonic acid						54	185				
110	4-Chloro-2,5-dimethylbenzene sulfonic acid	100					50	185	155			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS

a) Listed in order of increasing m.p. of the corresponding sulfonamide* (Continued)

No	Name	Melting point, °C	S-Benzylthiuronium salt	p Tolu-dinium salt	Am-inium salt	o Tolu-dinium salt	Sulfonyl chloride	Sulfon-amide	Sulfon-anilide	Sulfon-1-naph-thylamide	Miscellaneous
111	2-Carboxy-5-methylbenzene sulfonic acid	190 (158), (anh)					dt 59	185			Nitrile of the sulfonyl chloride, 67, lgr, NH ₄ salt of 2-amide, 186 (monohyd)
112	8-Chloronaphthalene-2-sulfonic acid						94	185-6			Et ester, 92
113	2-Chloro-5-nitrobenzene sulfonic acid	168-9 d (hyd)					89-90, w	185 6, w			
114	2-Bromobenzene sulfonic acid						51, eth	186, w			
115	2,3-Dichloro-6-methylbenzene sulfonic acid						49	186			
116	2-Methyl-5-nitrobenzene sulfonic acid	133 5 (di-hyd)		256 7		256-8	46 7	186	148		
117	2-Chloro-4-methylbenzene sulfonic acid						46 (52)	186			
118	3,5-Dichloro-2-methylbenzene sulfonic acid						54	186			
119	6-Chloro-3-nitrobenzene sulfonic acid	168 9					90, eth	186, w			
120	2,4-Dimethyl-5-nitrobenzene sulfonic acid	132 (122), dil HNO ₃					98	187 (179)			Sulfonyl fluoride, 109-10
121	2-Methyl-5-nitrobenzene sulfonic acid	131					46 7 (44), eth -pet eth	187	148		
122	4-Chloronaphthalene-1-sulfonic acid	130 3 d			145-6	151	95	187	145-6	162	Me ester, 83, Et ester, 104
123	8-Iodonaphthalene-1-sulfonic acid						115	187	140		
124	2,4-Diaminobenzene-1,5-disulfonic acid						275	187	236		
125	2,6-Dichloro-3-methylbenzene sulfonic acid						19 5	188			
126	4-Nitronaphthalene-1-sulfonic acid						99	188			
127	2-Chlorobenzene sulfonic acid						28 5, eth	188			
128	5-Methylnaphthalene-2-sulfonic acid						120-2	188 9	248-50		
129	Phenanthrene-3-sulfonic acid	175 6 (anh), 120-1 (monohyd), 88-9 (di-hyd)		222			110-1 (108)	190			Me ester, 119-20, al, Et ester, 107 8
130	2,4-Dibromobenzene sulfonic acid	110 (anh)					79, eth	190			
131	8-Nitronaphthalene-1-sulfonic acid	115 (tri-hyd)					165 d	190 5-1 5	178-8 5		
132	4-Methylbenzene-2,4-disulfonic acid	oil		277 d	di 189	170-1	54 (56), eth	di 190 5-1	189		
133	3,5-Dichloro-4-methylbenzene sulfonic acid						69	191			
134	2,5-Dimethyl-6-nitrobenzene sulfonic acid	145 (anh)		158 5-9, al		143-5, 50% al	110, eth -pet -eth	192, 50% al	182, bl, al		

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS

a) Listed in order of increasing m.p. of the corresponding sulfonamide* (Continued)

No	Name	Melting point, °C	S-Benzylthiuronium salt	p-Toluidinium salt	Anilinium salt	o-Toluidinium salt	Sulfonyl chloride	Sulfonamide	Sulfonamide	Sulfonamide	Miscellaneous
135	Quinoline-6-sulfonic acid	> 260					91	192			
136	3,4-Dicarboxybenzene sulfonic acid (4-sulphthalic acid)	138-40 (<i>monohyd</i>)					167-70 d, eth	192-200 d, w			
137	2-Nitrobenzene sulfonic acid	70 (85)					69	193	115		
138	Phenanthrene-9-sulfonic acid	174 (<i>anh</i>) 134 (<i>hyd</i>)		235			127	193 4, al			Me ester, 106, me al, Et ester, 108, al
139	2-Carboxybenzene sulfonic acid (2-Sulfobenzoic acid)	68 9 (<i>hyd</i>), 134 (<i>anh</i>)	206	197 (200)	165	127-8	79, pet eth, 40, eth	C 193-4 (<i>anh</i>), S 153 4, sl htng 195	194 5		
140	4-Bromonaphthalene-1-sulfonic acid						87				
141	2,5-Dibromobenzene sulfonic acid	128 (<i>anh</i>)					71, pet eth-eth	195, al			
142	7-Methylnaphthalene-1-sulfonic acid						96	195-6	162 4		
143	5-Fluoronaphthalene-1-sulfonic acid	105 6					122-3	196-7			Me ester, 118, eth
144	Acenaphthene-3-sulfonic acid				284 6		113-4	196-9			Me ester, 122-3, Et ester, 137-9, lgr
145	2,5-Dimethyl-4-nitrobenzene sulfonic acid	140		143 5 4 5		143 5 4 5	75	197-8	131		
146	8-Chloronaphthalene-1-sulfonic acid						101 (96 8)	197 6			Me ester, 70, Et ester, 67-8
147	4-Chloro-3-methyl-5-nitrobenzene sulfonic acid						52	201			
148	5-Amino-2-hydroxybenzene sulfonic acid (4-Aminophenol-2-sulfonic acid)	100 (<i>anh</i>)						202	159		Pyridine salt of O,N-diacetyl deriv, 143-4
149	4-Nitrobenzyl sulfonic acid	71					90	204	220		
150	Anthracene-1-sulfonic acid						90	205			
151	6-Methylnaphthalene-2-sulfonic acid						97 8	205 6			
152	4-Iodonaphthalene-1-sulfonic acid						124 (121)	206 (204)	136		
153	4-Fluoronaphthalene-1-sulfonic acid	100					86, chl	206	144		Et ester, 93
154	4-Aminonaphthalene-1-sulfonic acid (Naphthionic acid)		195					206			N-Acetyl deriv of amide, 241 N-Acetyl deriv of anilide, 231
155	4-Amino-2-nitrobenzene sulfonic acid						59-60	206 7			
156	Retene-6-sulfonic acid	121-3					146-7 5	206 7 5			Me ester, 117 9, Et ester, 114 5
157	2,6-Dimethyl-4-hydroxybenzene-1,3-disulfonic acid						119	208	207		
158	4-(N-methylamino)benzene sulfonic acid	244 5 d						210-1			N-4-Toluenesulfonyl, benzidine salt, 255
159	6-Chloronaphthalene-1-sulfonic acid						70	214			Et ester, 114-5
160	1-Nitronaphthalene-2-sulfonic acid	105, grn			(202)		120-1, pink, bz-pet eth	214, 50% al	202		
161	2,5-Dichlorobenzene-1,3-disulfonic acid						114	215-7			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS
a) Listed in order of increasing m.p. of the corresponding sulfonamide* (Continued)

No	Name	Melting point, °C	S-Benzylthiuronium salt	p-Toluidinium salt	Anilinium salt	o-Toluidinium salt	Sulfonyl chloride	Sulfonamide	Sulfonamide	Sulfonamide	Sulfonamide	Miscellaneous
162	5-Methylbenzene-1,3-disulfonic acid						94, eth	216, w	153, al			
163	Naphthalene-2-sulfonic acid	91, hyg	190 1	221	269	213	76 (79)	217 (213)	132			
164	4-Acetamidobenzene-1-sulfonic acid							218		215		
165	5-Aminonaphthalene-2-sulfonic acid		191					218 9 d	127-8			N-Acetyl, 238-9
166	8-Nitronaphthalene-2-sulfonic acid	135-6 (hyd)					169	223, 228	172-3			
167	5-Chlorobenzene-1,3-disulfonic acid						106	224				
168	2-Methylbenzene-1,4-disulfonic acid						98, bz - pet eth	di 224	di 178			
169	4-Carboxy-3-nitrobenzene sulfonic acid	111 (+ 2½-H ₂ O)					di 160	di 226, mono-S	192			
170	5-Chloronaphthalene-1-sulfonic acid						95	226	138			Me ester, 89, Et ester, 46 Sulfonyl bromide, 110
171	3,4-Di-iodobenzene sulfonic acid	122 5, after drying at 100					82, bz - pet eth	227, aq al				Me ester, 93, al, Et ester, 82 5, al
172	2,4,6-Tribromobenzene sulfonic acid	64					64	228	220-2			
173	4'-Nitrobiphenyl-4-sulfonic acid						178	228				
174	3,4-Dichloro-2-methylbenzene sulfonic acid						52	228				
175	Benzene-1,3-disulfonic acid		214				63	229	148 50	245		Alkali fusion → resorcinol, 110
176	Biphenyl-4-sulfonic acid						115	230	125			
177	2,4-Di-iodobenzene sulfonic acid	162 (anh)					77 8	230				Me ester, 78, al, Et ester, 57, al
178	1-Ethoxybenzene-2,5-disulfonic acid						di 106-8	di 233				
179	Methane disulfonic acid (Methionic acid)						8, b p 133 ¹⁰	di 233	di 192-3			B p 220-70 ¹⁰⁻¹⁵ d
180	3,5-Dinitrobenzene sulfonic acid						99, chl - lgr	235, w, al				
181	4-Aminobenzene-1,3-disulfonic acid (Aniline-2,4-disulfonic acid)	120 d						di 235				
182	5-Iodonaphthalene-1-sulfonic acid						114	236 (239)				
183	5-Nitronaphthalene-1-sulfonic acid				265		113	236	123			Me ester, 117 8, chl
184	4-Carboxybenzene sulfonic acid (4-Sulfobenzoic acid)	94 (hyd), 260 (anh)	213					di 57	di 236	di 252		
185	2,3-Dichloro-4-methylbenzene sulfonic acid						41	237				
186	6-Hydroxynaphthalene-2-sulfonic acid	167 (anh), 129 (hyd)	217 (207)	248	264	208		237	161			
188	4-Methylbenzene-1,2-disulfonic acid						109-11, bz - pet eth	237 9	190, al			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS
a) Listed in order of increasing m.p. of the corresponding sulfonamide* (Continued)

No	Name	Melting point °C	S-Benzylthiuronium salt	<i>o</i> -Toluidinium salt	Anilinium salt	<i>p</i> -Toluidinium salt	Sulfonyl chloride	Sulfonamide	Sulfonamide	Sulfon-1 naphthylamide	Miscellaneous
189	4,5-Dimethylbenzene-1,3-disulfonic acid						79, yel, al	239	200, al		
190	4-Hydroxybenzene-1,3-disulfonic acid (Phenol-2,4-disulfonic acid)	> 100 d					<i>di</i> 89	<i>di</i> 239	<i>di</i> 205		
191	4-Methoxybenzene-1,3-disulfonic acid						86	240	209		
192	4-Acetamidonaphthalene-1-sulfonic acid (Acetylnaphthionic acid)			232-3	231-2			241	231		
193	Naphthalene-2,7-disulfonic acid		212	299	251-2	238	158 (162), bz	242			
194	5-Nitrobenzene-1,3-disulfonic acid						<i>di</i> 97-8	<i>di</i> 242			
195	2,4,6-Trimethylbenzene-1,3-disulfonic acid (Mesitylene disulfonic acid)						<i>di</i> 125	<i>di</i> 244	<i>di</i> 150-1		
196	2,3,4,6-Tetrabromobenzene sulfonic acid						96-5	<i>ca</i> 245 d			
197	4,6-Dimethylbenzene-1,3-disulfonic acid						130, pet eth	249, w	196, 50° al		
198	1-Chloronaphthalene-2-sulfonic acid	130-3 d (anh)					84-5	250	171-2		Et ester, 104
199	Azobenzene-4,4'-disulfonic acid	169 d (anh)					<i>di</i> 222 (170)	<i>di</i> 250 d			
200	Phenanthrene-2-sulfonic acid	150		291			156, ac a	253-4, al	157-8		Me ester, 101-2 (96-8), Et ester, 89, yel br, al Imide, 186
201	Benzene-1,2-disulfonic acid		206				143	254	241		
202	2-Amino-5-methylbenzene-1,4-disulfonic acid	d at 290					<i>di</i> 156, chl	<i>di</i> 257, w	<i>di</i> 196-7, aq al		
203	5-Aminonaphthalene-1-sulfonic acid (Laurent's acid)		179					259-60	171		N-Acetyl deriv of aniline salt, 344
204	2-Methylbenzene-1,3-disulfonic acid						88, bz	> 260	162, al		
205	Anthracene-2-sulfonic acid						122, yel, tol	261	201		Me ester, 157, yel, Et ester, 160, Phenylhydrazide, 210
206	Anthraquinone-2-sulfonic acid		211	308	309		197, pa yel, bz	261, yel, ac a	193, yel-br		Me ester, 123, Et ester, 125
207	7-Nitronaphthalene-1-sulfonic acid						169-70	261-2			
208	Azoxybenzene-3,3'-disulfonic acid	126					138	273			
209	Naphthalene-1,4-disulfonic acid						160 (166)	273, w, al	179		
210	4,6-Dichlorobenzene-1,3-disulfonic acid						123	276			
211	Benzidine-2,2'-disulfonic acid						Hydrochloride, 205	278			
212	9,10-Dichloroanthracene-2-sulfonic acid						221	279	248		
213	4-Nitronaphthalene-2,7-disulfonic acid						<i>di</i> 140-1	<i>di</i> 286-7			
214	Benzene-1,4-disulfonic acid						131 (139)	288	249		
215	Azobenzene-3,4'-disulfonic acid						<i>di</i> 123-5	<i>di</i> 288			
216	Naphthalene-1,3-disulfonic acid						<i>di</i> 137-5	<i>di</i> 292-3			
217	2,5-Dimethylbenzene-1,3-disulfonic acid						81, lgr	295, al	174, al		
218	Naphthalene-1,6-disulfonic acid	125 (anh)	81	314-5	298-9	323-4	129, bz	297-8			

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS
a) Listed in order of increasing m.p. of the corresponding sulfonamide* (Continued)

No	Name	Melting point °C	S-Benzyl thiuronium salt	<i>p</i> Toluendinium salt	Anilinium salt	<i>o</i> Toluendinium salt	Sulfonyl chloride	Sulfonamide	Sulfonamide	Sulfonamide	Miscellaneous
219	Naphthalene-1,7-disulfonic acid						<i>di</i> 123	<i>di</i> 298 300			
220	Biphenyl-4,4'-disulfonic acid	72	171	330			203	300			
221	Naphthalene-2,6-disulfonic acid		256				225, bz	305			
222	Azobenzene-3,3'-disulfonic acid						166	305			
223	Naphthalene-1,5-disulfonic acid	240.5 (<i>anh</i>)	257 (251)				<i>di</i> 183	<i>di</i> 310 (>340)	<i>di</i> 249		Di-Me ester, 205, chl Tri-Et ester, 147, bz
224	Benzene-1,3,5-trisulfonic acid	>100					<i>tri</i> 187	<i>tri</i> 310.5	<i>tri</i> 237		
225	Anthracene-1,5-disulfonic acid						<i>di</i> 249, pa yel	<i>di</i> >330, yel	<i>di</i> 293		
226	Anthracene-1,8-disulfonic acid						225 yel, bz	333	224		
227	Anthraquinone-1,8-disulfonic acid	293.4					222.3, yel	>340	237.8, yel	PhNO ₂	
228	Anthraquinone-1,5-disulfonic acid	310-1 (<i>hyd</i>), yel					265-70, yel, PhNO ₂	>350	269.70, red-yel, PhNO ₂		

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXII. ORGANIC DERIVATIVES OF SULFONIC ACIDS

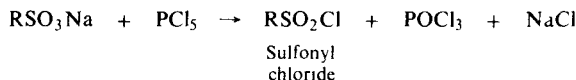
b) M.p. of the amide deriv. not available; listed in order of increasing m.p. of the corresponding anilide deriv.*

No	Name	Melting point, °C	S-Benzylthiuronium salt	p-Toluidinium salt	Anilinium salt	o-Toluidinium salt	Sulfonyl chloride	Sulfonamide	Sulfon anilide	Sulfon-1-naphthylamide	Miscellaneous
1	Ethane-1,2-disulfonic acid	104	201 2	270 d	270, w		dt 95		69		m-Toluidide, 230, Di-Et ester, 77, eth
2	Vinylsulfonic acid (Ethylene-sulfonic acid)		145 6, w				b p 118 20 ²⁵⁰		71, b p 174 ¹		B p 135 ² , n _D ²⁰ 1 4505
3	Phenol-O-sulfonic acid	145 (hyd)		124-5	165				126 5-7 5		
4	8-Aminonaphthalene-1-sulfonic acid (Peri acid)		300						139 40		Anilinium salt of N-acetyl deriv, 273
5	3,5-Dimethyl-2-hydroxybenzene sulfonic acid	121 5 d							142 3		Chloride of O-acetyl deriv, 62, pet eth, Methylanilide, 111 2
6	Benzophenone-2-sulfonic acid						96-7		143 5		
7	7-Hydroxynaphthalene-1,3,6-trisulfonic acid						196		152-5		
8	1-Hydroxynaphthalene-2-sulfonic acid	> 250	169						O-acetyl deriv, 157-8		O-acetyl deriv of p-toluidide, 135-6
9	2-Hydroxynaphthalene-1,6-disulfonic acid						dt 111		dt 191		
10	Anthraquinone-2,7-disulfonic acid						dt 186, chl		dt 192		
12	7-Hydroxynaphthalene-1,3-disulfonic acid (G-Acid)		228	294		271	eth 161-2		195		
13	7-Hydroxynaphthalene-1-sulfonic acid (Bayer Acid)		218	232	240	242			195		
14	4-Hydroxynaphthalene-1-sulfonic acid (NW-Acid)	170, r h	103	196	186 7	203-4			199-200		2-Naphthylamide, 204
15	5-Hydroxynaphthalene-1-sulfonic acid	110-2 d							201		Chloride of O-acetyl deriv, 129
16	2-Hydroxynaphthalene-3,6-disulfonic acid (R-Acid)		233	250	254	257			202		
17	Anthraquinone-1-sulfonic acid	218	191		284		216 8, yel, PhNO ₂ 197 8, yel, PhNO ₂		214, gold-yel 227 8, yel, cl-bz		NH ₃ → 1-Aminoanthraquinone, 252 (243)
18	Anthraquinone-1,6-disulfonic acid	215 7, gold, ac a					dt 177		dt 231		
19	2-Hydroxynaphthalene-1,5-disulfonic acid										
20	2-Hydroxynaphthalene-1,7-disulfonic acid			219			169		233		
21	Anthraquinone-1,7-disulfonic acid	120 (hyd)					231-2, br-yel, PhNO ₂		237 8, yel, cl-bz		
22	Anthraquinone-2,6-disulfonic acid						dt 250, yel, cl-bz		dt 321		

*Derivative data given in order m p, crystal color, solvent from which crystallized

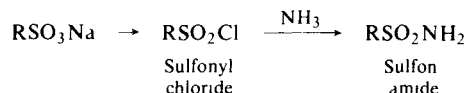
EXPLANATIONS AND REFERENCES TO TABLES XXII AND XXIII

The main derivatives of the sulfonic acids are obtained by converting them to the corresponding sulfonyl chlorides. Hence sulfonic acids and sulfonyl chlorides are often identified through the same derivatives.

Sulfonyl chloride

From the sulfonic acid or its sodium or potassium salt with phosphorus pentachloride without solvent.

For directions and examples see Cheronis, p 638, Linstead, p 89, Shriner, pp 268, 270, Vogel, p 553, Wild, p 161

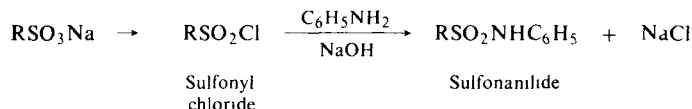
*Sulfonamide **

From the sulfonyl chloride (prepared from the acid or its salt) and concentrated aqueous ammonia solution.

For directions and examples see Linstead, p 49, Shriner, pp 268, 270, Vogel, p 553, Wild, p 161

From the sulfonyl chloride, aqueous ammonia and ammonium carbonate.

See Cheronis, p 639

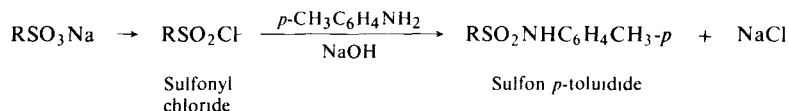
*Sulfonanilide **

From the sulfonyl chloride (prepared from the acid), aniline, and sodium hydroxide.

For directions and examples see Linstead, p 89, Wild, p 161

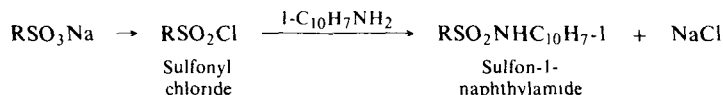
From the sulfonyl chloride and aniline.

See Vogel, p 553

*Sulfon-p-toluidide **

From the sulfonyl chloride, *p*-toluidine and aqueous sodium hydroxide.

For directions and examples see Vogel, p 553

*Sulfon-1-naphthylamide **

From the sulfonyl chloride (prepared from the acid) and 1-naphthylamine in benzene.

For directions and examples see Cheronis, p 639

*S-Benzylthiuronium salt **

From the sodium, potassium or ammonium salt of the sulfonic acid and S-benzylthiuronium chloride in water.

For directions and examples see Cheronis, pp 635, 636, Linstead, pp 15, 89, Shriner, p 269, Wild, pp 149, 159, E. Chambers and G. W. Watt, *J Org Chem*, **6**, 376 (1941), E. Campaigne and C. M. Suter, *J Amer Chem Soc*, **64**, 3040 (1942), S. Veibel, *J Amer Chem Soc*, **67**, 1867 (1945)

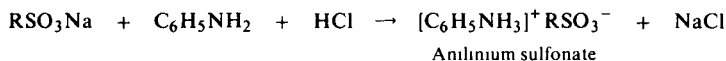
***Derivatives recommended for first trial**

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE XXII AND XXIII (Continued)

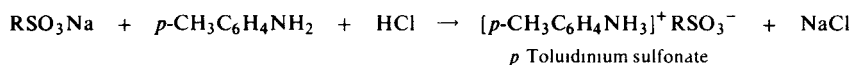
From sodium or potassium sulfonate and S-benzylthiuronium chloride in alcohol
See J J Donleavy, *J Amer Chem Soc*, **58**, 1004 (1936)

Anilinium salt *



From the sodium or potassium salt of the acid, aniline and hydrochloric acid in water
For directions and examples see Cheronis, p 637, O C Dermer and V H Dermer, *J Org Chem*, **7**, 581 (1942)

p-Toluidinium salt *



From the sulfonic acid and *p*-toluidine

For directions and examples see Shriner, p 269

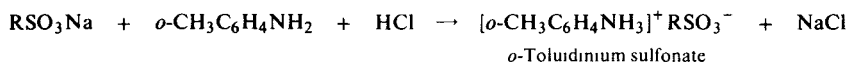
From the sodium, potassium or ammonium salt with *p*-toluidine or *p*-toluidine hydrochloride in water

See Shriner, p 269, Vogel, p 555, O C Dermer and V H Dermer, *J Org Chem*, **7**, 581 (1942), A D Barton and L Young, *J Amer Chem Soc*, **65**, 294 (1943)

From the sodium, potassium, ferric or barium salt (after boiling with sulfuric acid) with *p*-toluidine and hydrochloric acid

See Cheronis, p 637, Fieser, *J Amer Chem Soc*, **51**, 2460 (1929)

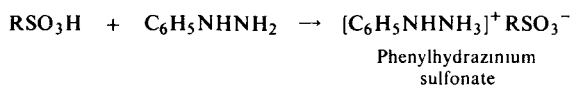
o-Toluidinium salt *



From the sodium or the potassium salt of the sulfonic acid with *o*-toluidine and hydrochloric acid in water

For directions and examples see Cheronis, p 637, O C Dermer and V H Dermer, *J Org Chem*, **7**, 581 (1942)

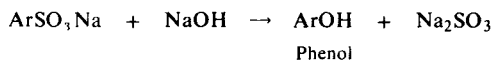
Phenylhydrazinium salt *



From the sulfonic acid with phenylhydrazine in water-alcohol

For directions and examples see Wild, p 159, P H Latimer and R W Bost, *J Amer Chem Soc*, **59**, 2500 (1937)

Phenols by KOH fusion



By fusion of the sodium arylsulfonate and sodium hydroxide in a nickel crucible

For directions and examples see Vogel, p 552

By fusion of the sodium arylsulfonate, potassium hydroxide and zinc dust

See Linstead, p 89

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)*

No	Name	Melting point °C	Sulfonic acid	Amide	Anilide	1 Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S Benzylthiuronium	p-Toluidine	Aniline	o-Toluidine	
1	Methanedisulfonyl chloride	8	b p 220 70 ¹⁵ 20 ^d	233	192-3						B p 133 ¹⁰
2	2-Ethylbenzenesulfonyl chloride	11 7		100							
3	3-Methylbenzenesulfonyl chloride (Toluene-3-sulfonyl chloride)	12		108, al	96						
4	4-Ethylbenzenesulfonyl chloride	12		110							N-Xanthylsulfonamide 196
5	Benzenesulfonyl chloride	14 5	43 4 (mono-hyd) 66 (anh)	156, 153		170 1	148	205	240	176	N-Xanthylsulfonamide, 200
6	Heptane-1-sulfonyl chloride	16		75							
7	2,6-Dichloro-3-methylbenzenesulfonyl chloride	19 5		188							
8	3-Carboxybenzenesulfonyl chloride	20	98 (hyd), 148 (anh)	di 170			163	224 6			The m p is that of the 1,3-dichloride
9	3,4-Dichlorobenzenesulfonyl chloride	22 4 19		140 135							
10	5-Chloro-2-methylbenzenesulfonyl chloride	24		145, aq al							
11	2,5-Dimethylbenzenesulfonyl chloride	24 6	48 (anh) 86 (hyd)	148			184				N-Xanthylsulfonamide, 176
12	2-Chlorobenzenesulfonyl chloride	28 5		188							
13	2-Phenylethane-1-sulfonyl chloride	33	91	122	77						
14	5-Bromo-2-methylbenzenesulfonyl chloride	33 5		166 7							
15	2,4-Dimethylbenzenesulfonyl chloride	34	62 (hyd)	110							
16	3,4-Dibromobenzenesulfonyl chloride	34	66 5 7 5 (anh)	175							
17	2,4,6-Trichlorobenzenesulfonyl chloride	35 40		210 2d							
18	4-Methyl-3-nitrobenzenesulfonyl chloride	36	92, hyg	144 5	109	153		130-1		28	
19	4-Fluorobenzenesulfonyl chloride	36, 30		125							
20	3-Ethoxybenzenesulfonyl chloride	38		131							
21	3-Chloro-4-methylbenzenesulfonyl chloride	38		134	96						
22	2,5-Dichlorobenzenesulfonyl chloride	38	93-7	181	160	160	170	247-8	262 3	250 1	
23	2,6-Dimethylbenzenesulfonyl chloride	39	98	113 96							
24	4-Ethoxybenzenesulfonyl chloride	39		150							
25	4-Chloro-3-nitrobenzenesulfonyl chloride	40 1 60-2		175 6 yel al							
26	2,3-Dichloro-4-methylbenzenesulfonyl chloride	41		237							
27	4,6-Dichloro-2-methylbenzenesulfonyl chloride	43		168							
28	3,3-Dimethylbutane-1-sulfonyl chloride	43 4		96 7							
29	Propane-1,3-disulfonyl chloride	45	92d	169, w 186	di 125						Di-m-toluidide 222
30	2-Chloro-4-methylbenzenesulfonyl chloride	46, 52									
31	Indane-5-sulfonyl chloride	46-7, eth	92	135 5-6, al	129, al						
32	2-Methyl-5-nitrobenzenesulfonyl chloride	46-7	133 5 (+2H ₂ O)	186	148			256-7		256-8	B p 183 5 ¹⁰
33	2,3-Dimethylbenzenesulfonyl chloride	47		167							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Amide	Anilide	1-Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S Benzylthuronium	p-Toluene	Aniline	o-Toluene	
34	4-Bromo-3-methylbenzenesulfonyl chloride	50		146							
35	3-Methyl-4-nitrobenzenesulfonyl chloride	50		133 5							
36	4-Bromo-2-methylbenzenesulfonyl chloride	50		168							
37	4-Chloro-2,5-dimethylbenzenesulfonyl chloride	50	100	185	155						
38	2-Bromobenzenesulfonyl chloride	51, eth		186 w							
39	3,4-Dichloro-2-methylbenzenesulfonyl chloride	51 2		228							
40	3,4-Dimethylbenzenesulfonyl chloride	52	64 55	144			208				
41	4-Chloro-3-methyl-5-nitrobenzenesulfonyl chloride	52		201							
42	4-Chlorobenzenesulfonyl chloride	53	69 93	144	104	190	175	208-10	222 3	163 4	
43	Indane-4-sulfonyl chloride	53 3 5		118 9, w							B p 140 l
44	4-Methylbenzene-1,3-disulfonyl chloride (Toluene-2,4-disulfonyl chloride)	54 46		di 186 7 191	189						
45	4-Chloro-2-methylbenzenesulfonyl chloride	54		185							
46	3,5-Dichloro-2-methylbenzenesulfonyl chloride	54		186							
47	Hexadecane-1-sulfonyl chloride	54	54	97							
48	2,4-Dichlorobenzenesulfonyl chloride	55	86	182				204 6		170-2	
49	4-Bromo-3-nitrobenzenesulfonyl chloride	55 7		176 7							
50	2,4,6-Trimethylbenzenesulfonyl chloride	56	78	142	109						
51	2-Chloro-5-methylbenzenesulfonyl chloride	56		156	229 30 5						
52	2,6-Dichloro-4-methylbenzenesulfonyl chloride	56		154 5							
53	4-Carboxybenzenesulfonyl chloride	57	94 (hyd), 260 (anh)	di 236	di 252						The m p is that of the 1,4-dichloride
54	Tetralin-6-sulfonyl chloride	58		135	155 6						
55	3-Methyl-2-nitrobenzenesulfonyl chloride	58 5		163 5							
56	5-Carboxy-2-methylbenzenesulfonyl chloride (4-Toluic acid-2-sulfonyl chloride)	59	190, 158 (anh)	185							The m p is that of the 1,5-dichloride
57	4-Amino-3-nitrobenzenesulfonyl chloride (2-Nitroaniline-4-sulfonyl chloride)	59-60		206-7							
58	5-Chloro-2-methyl-3-nitrobenzenesulfonyl chloride	60		167							
59	3-Bromo-4-methylbenzenesulfonyl chloride	60		151							
60	2,5-Dimethyl-3-nitrobenzenesulfonyl chloride	61	128, 200	173	143 4			136			
61	2,4,5-Trimethylbenzenesulfonyl chloride	61	112	181							
62	Benzene-1,3-disulfonyl chloride	63		229	148 50	245	214				N-Xanthylsulfonamide, 170 Alk fusion → resorcinol, 110
63	4-Chloro-3-methylbenzenesulfonyl chloride	63		128	92						

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Amide	Anilide	1 Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S-Benzylthiuronium	p-Toluidine	Aniline	o-Toluidine	
64	7-Methylnaphthalene-2-sulfonyl chloride	63-4		163-4							
65	2,4,6-Tribromobenzenesulfonyl chloride	64	64	228	220-2d						
66	3-Nitrobenzenesulfonyl chloride	64	48	167	126	166-5	146	222	126-5-75	193	
67	2,3,4-Trichlorobenzenesulfonyl chloride	64-5		227-30							
68	3-Bromocamphor-10-sulfonyl chloride	65	47-5	156							
70	2-Ethoxybenzenesulfonyl chloride	65-6		163	158						
71	4-Methoxy-3-nitrobenzenesulfonyl chloride	66		146-3							
72	D-Camphor-10-sulfonyl chloride	67	193	132	121-88						
73	2-Methylbenzenesulfonyl chloride (Toluene-2-sulfonyl chloride)	68	57	156-3	136		170	203-4	218		N-Xanthylsulfonamide, 182-3-5
74	Naphthalene-1-sulfonyl chloride	68, 66	90	150	112-152		137	181	183	237	
75	4-Methylbenzenesulfonyl chloride (Toluene-4-sulfonyl chloride)	69	104-5	138-5-9 (anh), 105 (+2H ₂ O)	103	157	181-2	198	238	190	
76	2-Nitrobenzenesulfonyl chloride	69	70-85	193	115						
77	3,5-Dichloro-4-methylbenzenesulfonyl chloride	69		191							
78	2,4-Dimethoxybenzenesulfonyl chloride	70		167							
79	6-Chloronaphthalene-1-sulfonyl chloride	70		214							
80	3,4-Dimethyl-5-nitrobenzenesulfonyl chloride	70		180							
81	2,5-Dibromobenzenesulfonyl chloride	71	128 (anh)	195							
82	3,6-Dichloro-2,5-dimethylbenzenesulfonyl chloride	71		165	171						
83	3-Chloro-2-methylbenzenesulfonyl chloride	72, pet eth	60-72	180, w							
84	4-Methoxynaphthalene-2-sulfonyl chloride	75		157	145						
85	2-Chloronaphthalene-1-sulfonyl chloride	75		153							
86	4-Chloro-2-nitrobenzenesulfonyl chloride	75	82	164, 237	138						Phenylhydrazide 151, Ph ester, 82
87	2,5-Dimethyl-4-nitrobenzenesulfonyl chloride	75	140	197-8	131			143-5 4-5		143-5 4-5	
88	4-Bromobenzenesulfonyl chloride	76, eth	88-90	166, 161	119	183-5	170	215-6	237-8	182-3	
89	Naphthalene-2-sulfonyl chloride	76, 79	91, hyg, 122	217, 213	132		190-1	221	269	213	
90	6-Bromonaphthalene-1-sulfonyl chloride	77		217							
91	2,4-Diiodobenzenesulfonyl chloride	77-8	167 (anh)	230							Me ester, 78, al, Et ester, 57, al
92	2-Carboxybenzenesulfonyl chloride	79, pet eth	68-9 (hyd), 134 (anh)		194-5		206	196 200	165	127-8	The m p is that of the 1,2-dichloride
93	2,4-Dibromobenzenesulfonyl chloride	79, eth	110 (anh)	190							
94	4,5-Dimethylbenzene-1,3-disulfonyl chloride	79, yel		239	200, al						

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Amide	Anilide	1-Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S Benzylthiuronium	p-Toluidine	Aniline	o-Toluidine	
95	4-Nitrobenzenesulfonyl chloride	80 lgr	109 11 95 hyg	180, 50% al	171 136 d			179 80			
96	6-Methoxynaphthalene-1-sulfonyl chloride	80 5		149 5	177 5						
97	2,5-Dimethylbenzene-1,3-disulfonyl chloride	81, lgr		295 al	174 al						
98	4,6-Dichloro-2,5-dimethylbenzenesulfonyl chloride	81		150	175						
99	4-Methylnaphthalene-1-sulfonyl chloride	81, eth		174 177 al	158						
100	3,4-Di-iodobenzenesulfonyl chloride	82, bz pet eth	122 5	227, aq al							
101	3-Chloro-4-methoxybenzenesulfonyl chloride	82		131							
102	7-Methoxynaphthalene-2-sulfonyl chloride	83		220	121						
103	2-Methylnaphthalene-1-sulfonyl chloride	83 5		124							
104	1-Chloronaphthalene-2-sulfonyl chloride	84 5	130 3d (anh)	250	171 2						
105	4-Iodobenzenesulfonyl chloride	85		183	143						
106	4-Ethoxynaphthalene-2-sulfonyl chloride	85		183	143 5						
107	4,5-Dichloro-3-methylbenzenesulfonyl chloride	85 8		183 5							
108	4-Methoxybenzene-1,3-disulfonyl chloride	86		240	209						
109	4-Fluoronaphthalene-1-sulfonyl chloride	86	100 (hyd)	206	144						Et ester, 93
110	7-Chloronaphthalene-2-sulfonyl chloride	87	68 (tetra- hyd) 118 (anh)	76							Me ester, 89, Et ester, 65
111	4-Bromonaphthalene-1-sulfonyl chloride	87		195							
112	D-Camphor-3-sulfonyl chloride	88	77	143	124			196 7			Me ester, 77
113	2-Methylbenzene-1,3-disulfonyl chloride	88		260	162						
114	8-Methylnaphthalene-2-sulfonyl chloride	88		116							
115	4-Hydroxybenzene-1,3-disulfonyl chloride (Phenol-2,4 disulfonyl chloride)	89	>100d	239							
116	3,5-Dimethyl-2-hydroxybenzene-1,3-disulfonyl chloride	89 91		160 1							
117	Anthracene-1-sulfonyl chloride	90		205							
118	2-Chloro-5-nitrobenzenesulfonyl chloride	90, w	168 9d (hyd)	185 6							
119	Quinoline-6-sulfonyl chloride	91	>260	192							
120	Benzylsulfonyl chloride	92 3, eth, lgr		105, w, al	102	166 146		113, al	102	83	Hydrazide, 131 2, Phenylhydrazide, 173
121	6-Iodonaphthalene-1-sulfonyl chloride	92 5		213							
122	6-Methoxynaphthalene-2-sulfonyl chloride	93		189	120						
123	5-Chloro-2-nitrobenzenesulfonyl chloride	93		159							
124	1-Bromonaphthalene-2-sulfonyl chloride	93		271							

*Derivative data given in order m p, crystal color solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Amide	Anilide	1-Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S-Benzylthiuronium	p-Toluidine	Aniline	o-Toluidine	
125	5-Methylbenzene-1,3-disulfonyl chloride	94, eth		216, w	153, al						
126	3,5-Dimethylbenzenesulfonyl chloride	94, 90, bz		135, al	129, al			121 2, al			
127	8-Chloronaphthalene-2-sulfonyl chloride	94		185							
128	1-Iodonaphthalene-2-sulfonyl chloride	94		247							
129	4-Chloronaphthalene-1-sulfonyl chloride	94 5	130 3d	187		162				151	<i>o</i> -Toluidide 145 6 Me ester 83 Et ester, 104 Di-Et ester 77 eth <i>m</i> -Toluidide 230
130	Ethane-1,2-disulfonyl chloride	95		69			201 2	270d	270, w		
131	5-Bromonaphthalene-1-sulfonyl chloride	95		232 3							
132	5-Chloronaphthalene-1-sulfonyl chloride	95		226	138						Sulfonyl bromide, 110, Me ester, 89, Et ester, 46
133	7-Methylnaphthalene-1-sulfonyl chloride	96		195 6	162 4						
134	2,4-Dimethyl-3-nitrobenzenesulfonyl chloride	96	144 (anh)	172							
135	5-Bromonaphthalene-2-sulfonyl chloride	96		220							
136	2-Benzoylbenzenesulfonyl chloride (Benzophenone 2-sulfonyl chloride)	96 7			143 5						
137	2,3,4,6-Tetrabromobenzenesulfonyl chloride	96 5		245d							
138	10-Bromocamphor-3-sulfonyl chloride	97		100 2							
139	6-Fluoronaphthalene-2-sulfonyl chloride	97 chl	105 (hyd)	133	129		190 1	221	269	213	
140	2-Bromonaphthalene-1-sulfonyl chloride	97		140							
141	6-Methylnaphthalene-2-sulfonyl chloride	97 8		205 6							
142	5-Nitrobenzene-1,3-disulfonyl chloride	97 8		242							
143	2,4-Dimethyl-5-nitrobenzenesulfonyl chloride	98	132 122 dil HNO ₃	187 179							Sulfonyl fluoride, 109 10
144	2-Methylbenzene-1,4-disulfonyl chloride	98		224	<i>dt</i> 178						
145	4-Methyl-3-nitrobenzenesulfonyl chloride	98 9		170							<i>o</i> -Aniside, 135
146	4-Methoxynaphthalene-1-sulfonyl chloride	98 5		226	147 5						
147	5-Chloro-4-methyl-2-nitrobenzenesulfonyl chloride	99	128	181							
148	3,5-Dinitrobenzenesulfonyl chloride	99, chl , lgr		235							
149	4-Nitronaphthalene-1-sulfonyl chloride	99		188							
150	7-Iodonaphthalene-2-sulfonyl chloride	100		210							
151	7-Bromonaphthalene-2-sulfonyl chloride	100		218							

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Amide	Anilide	1-Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S Benzylthiuronium	p Tolu-dine	Aniline	o-Tolu-dine	
152	3-Nitrobenzylsulfonyl chloride	100, bz	74 (hyd)	159 d , w							Me amide 106 7 Dimethylamide 118 9
153	8-Chloronaphthalene-1-sulfonyl chloride	101		197							
154	2,4-Dinitrobenzenesulfonyl chloride	102	106 8 (hyd) 130 (anh)	157 154							Hydrazide, 110
155	4-Nitrodiphenylamine-2-sulfonyl chloride	102 4		173	164						
156	4-Ethoxynaphthalene-1-sulfonyl chloride	103		170	180						
157	7-Ethoxynaphthalene-2-sulfonyl chloride	103		142	153						
158	3,7-Diethylnaphthalene-1-sulfonyl chloride	105 7		207							
159	5,6-Dichloronaphthalene-1-sulfonyl chloride	106		223							
160	4-Chloronaphthalene-2-sulfonyl chloride	106		168							Et ester 76 9
161	2-Methyl-4-nitrobenzenesulfonyl chloride	106		157							
162	DL-Camphor-8-sulfonyl chloride	106	56 8	133 5, w							
163	5-Chlorobenzene-1,3-disulfonyl chloride	106		224							
164	3-Ethoxybenzene-1,4-disulfonyl chloride	106 8		di 233							
165	6-Ethoxynaphthalene-2-sulfonyl chloride	107 5		183	153						
166	4-Methylbenzene-1,2-disulfonyl chloride	109 11		237 9	190						
167	2,5-Dimethyl-6-nitrobenzenesulfonyl chloride	110	145 (anh)	192	182			158 5 9		143 5 50% al	
168	2-Iodonaphthalene-1-sulfonyl chloride	110		154							
169	Phenanthrene-3-sulfonyl chloride	110-1	175 6 (anh) 120 1 (+1 H ₂ O) 88d (+2H ₂ O)	190			222				Me ester 119 20, al Et ester 107 8
170	6-Chloronaphthalene-2-sulfonyl chloride	110 5		184							
171	2-Hydroxynaphthalene-1,6-disulfonyl chloride	111			di 191						
172	Acenaphthene-5-sulfonyl chloride	111		223	178						
173	3-Hydroxynaphthalene-2-sulfonyl chloride	112		110					241 2		
174	5-Nitronaphthalene-1-sulfonyl chloride	113		236	123						
175	Acenaphthene-3-sulfonyl chloride	113 4	87 9	199	284 6						Me ester, 122 3, Et ester, 137 9, lgr
176	2,5-Dichlorobenzene-1,3-disulfonyl chloride	114		215 7							
177	5-Chloronaphthalene-2-sulfonyl chloride	115		216							
178	Biphenyl-4-sulfonyl chloride (4-Phenylbenzenesulfonyl chloride)	115		230	125						

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Amide	Anilide	1-Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S-Benzylthiuronium	p-Toluidine	Aniline	o-Toluidine	
179	2-Ethoxynaphthalene-1-sulfonyl chloride	116		158	187						
180	4,5-Dichloronaphthalene-1-sulfonyl chloride	117		229							
181	2,6-Dimethyl-4-hydroxybenzene-1,3-disulfonyl chloride	117.8		206-8	205.7						
182	6-Ethoxynaphthalene-1-sulfonyl chloride	118		154	194.5						
183	4,6-Dichloronaphthalene-1-sulfonyl chloride	119		226							
184	5-Methoxynaphthalene-1-sulfonyl chloride	119.5		194.5	157						
185	5-Methylnaphthalene-2-sulfonyl chloride	120.2		188.9	248-50, 133-4						
186	8-Bromonaphthalene-2-sulfonyl chloride	121		187							
187	5-Ethoxynaphthalene-1-sulfonyl chloride	121		182.5	130						
188	2-Methoxynaphthalene-1-sulfonyl chloride	121		159	196.5						
189	1-Nitronaphthalene-2-sulfonyl chloride	121, pink, bz-pet eth	105, lgr	214	202						
190	6,8-Dichloronaphthalene-2-sulfonyl chloride	121		228							
191	2-Chloro-5-methyl-6-nitrobenzene sulfonyl chloride	122		177							
192	Anthracene-2-sulfonyl chloride	122		261	201						Me ester, 157, Et ester, 160 Me ester, 118, eth
193	5-Fluoronaphthalene-1-sulfonyl chloride	122-3	105 (hyd)	196.7							
194	4,6-Dichlorobenzene-1,3-disulfonyl chloride	123		276							
195	Azobenzene-3,4'-disulfonyl chloride	123.5		di 288							
196	7,8-Dichloronaphthalene-2-sulfonyl chloride	124		227							
197	4-Iodonaphthalene-1-sulfonyl chloride	124, 121		206, 204	136						
198	6-Bromonaphthalene-2-sulfonyl chloride	124		127							
199	Quinoline-8-sulfonyl chloride	124	312	183-4							Me ester, 96, Et ester, 73
200	4-Methylnaphthalene-2-sulfonyl chloride	124.5		143-4							
201	1,5-Dichloronaphthalene-1-sulfonyl chloride	125		282							
202	2,4,6-Trimethylbenzene-1,3-disulfonyl chloride	125		di 244	di 150.1						
203	5-Nitronaphthalene-2-sulfonyl chloride	125	118-9, yel	184							
204	6-Nitronaphthalene-1-sulfonyl chloride	127		223-4							
205	Phenanthrene-9-sulfonyl chloride	127	174 (anh)	193-4				235			Me ester, 106, me al, Et ester, 108 al
206	Naphthalene-1,6-disulfonyl chloride	129	125 (anh)	298			81, 235	314-5	298-9	323-4	
207	7-Chloronaphthalene-1-sulfonyl chloride	129		235							

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Amide	Anilide	1 Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S-Benzylthiuronium	p-Toluidine	Aniline	o-Toluidine	
208	4,6-Dichloronaphthalene-2-sulfonyl chloride	130		218							
209	2,4,5-Trimethoxybenzenesulfonyl chloride	130		76	170						
210	4,6-Dimethylbenzene-1,3-disulfonyl chloride	130, pet eth		249, w	196, 50% al						
211	5,6,7-Trichloronaphthalene-1-sulfonyl chloride	131		249							
212	Benzene-1,4-disulfonyl chloride	131 139		288	249						
213	5,8-Dichloronaphthalene-2-sulfonyl chloride	134		244							
214	3,7-Dichloronaphthalene-1-sulfonyl chloride	136		269							
215	3-Bromocamphor-8-sulfonyl chloride	136 7									
216	8-Chloro-7-methoxynaphthalene-1-sulfonyl chloride	137		153	196						
217	Benzophenone-3,3'-disulfonyl chloride	137 8		di 157	di 177 8						N-Xanthylsulfonamide, 197
218	Naphthalene-1,3-disulfonyl chloride	137 5		di 292 3							
219	7,8-Dichloronaphthalene-1-sulfonyl chloride	138		221							
220	Azoxybenzene-3,3'-disulfonyl chloride	138	126	di 273							
221	D-Camphor-8-sulfonyl chloride	138		137							
222	3-Methoxynaphthalene-2-sulfonyl chloride	138		113	174						
223	8-Cyanonaphthalene-1-sulfonyl chloride	139		333 4							
224	4-Nitronaphthalene-2-sulfonyl chloride	139 5		225							
225	6-Iodonaphthalene-2-sulfonyl chloride	140		222							
226	8-Iodonaphthalene-1-sulfonyl chloride	140	115	187							
227	4-Nitronaphthalene-2,7-disulfonyl chloride	140 1		286-7							
228	4-Hydroxybenzenesulfonyl chloride	141		176-7			169	202	170	192	
229	4,8-Dichloronaphthalene-2-sulfonyl chloride	141		205							
230	5-Iodonaphthalene-1-sulfonyl chloride	141		239							
231	Pyridine-3-sulfonyl chloride	Hydrochloride, 141 4	357	110 1	145						Hydrazide, 94
232	6,7-Dichloronaphthalene-1-sulfonyl chloride	142		268							
233	Benzene-1,2-disulfonyl chloride	143		254	241						
234	6-Ethoxy-1-nitronaphthalene-2-sulfonyl chloride	146		218							
235	Retene-6-sulfonyl chloride	146 7 5, yel -br	121 3	206 7 5							
236	7-Bromonaphthalene-1-sulfonyl chloride	147		209							
237	4-Acetamidobenzenesulfonyl chloride	149		219	214	215					
238	5,7-Dichloronaphthalene-1-sulfonyl chloride	149		272							

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Amide	Anilide	1 Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S-Benzylthuronium	p-Toluidine	Aniline	o-Toluidine	
239	4,5-Dibenzyl-naphthalene-1-sulfonyl chloride	151		168							
240	4,7-Dichloronaphthalene-1-sulfonyl chloride	151		217							
241	7-Ethoxy-8-nitronaphthalene-1-sulfonyl chloride	155		173-4							
242	2-Amino-5-methylbenzene-1,3-disulfonyl chloride	156, chl		di 257, w	di 196-7, aq al						
243	Phenanthrene-2-sulfonyl chloride	156	150	253-4	157-8			291			Me ester, 101-2, Et ester, 89, yel-br
244	4,7-Dichloronaphthalene-2-sulfonyl chloride	156		196							
245	6,7,8-Trichloronaphthalene-2-sulfonyl chloride	157		245							
246	4,5-Dichloronaphthalene-2-sulfonyl chloride	158		197							
247	5,6,8-Trichloronaphthalene-2-sulfonyl chloride	158		235							
248	Naphthalene-2,7-disulfonyl chloride	158, 162		242			212	299	251-2	238	
249	Naphthalene-1,4-disulfonyl chloride	160-166		273, w, or al	179						
250	4-Carboxy-3-nitrobenzenesulfonyl chloride	di 160	111 (+2½ H ₂ O)	192							The m.p. is that of the 1,4-dichloride, Diamide, 226
251	7-Hydroxynaphthalene-1,3-disulfonyl chloride	161-2			195		228	294		271	
252	Fluorene-2-sulfonyl chloride	164	155 (hyd)	213d							
253	2,5-Dimethylbenzene-1,4-disulfonyl chloride	164		310	223						
254	8-Nitronaphthalene-1-sulfonyl chloride	165 d	115 d (+3H ₂ O)	191	178-8-5						
255	7-Iodonaphthalene-1-sulfonyl chloride	165		240							
256	Azobenzene-3,3'-disulfonyl chloride	166		di 305							
257	3,6-Dichloronaphthalene-2-sulfonyl chloride	166		218							
258	5,6-Dichloronaphthalene-2-sulfonyl chloride	167		192							
259	Phthalic acid-4-sulfonyl chloride (3,4-Dicarboxybenzenesulfonyl chloride)	167-70, d eth	138-40 (+1H ₂ O)	192-200 d, w							
260	8-Nitronaphthalene-2-sulfonyl chloride	169	135-6 (+1½ H ₂ O)	223	172-3						
261	4-Amino-2-hydroxybenzenesulfonyl chloride	169		155							
262	2-Hydroxynaphthalene-1,7-disulfonyl chloride	169		233							
263	7-Nitronaphthalene-1-sulfonyl chloride	169-70		261-2							
264	4,6,7,8-Tetrachloronaphthalene-2-sulfonyl chloride	176		235							
265	4'-Nitrobiphenyl-4-sulfonyl chloride	178		228							
266	Naphthalene-1,5-disulfonyl chloride	183	245 (anh)	310, 340	249		257, 251 d	332			Di-Me ester, 205, chl
267	Anthraquinone-2,7-disulfonyl chloride	186, chl			di 192						

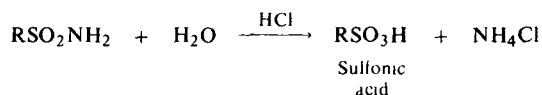
*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXIII. ORGANIC DERIVATIVES OF SULFONYL CHLORIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Amide	Anilide	1 Naphthyl amide	Salts of the corresponding acid				Miscellaneous
							S Benzylthiuronium	p-Toluene	Aniline	p-Toluene	
268	Benzene-1,3,5-trisulfonyl chloride	187		tri 310 5	tri 237						Tri-Et ester, 147, bz
269	7-Hydroxynaphthalene-1,3,6-trisulfonyl chloride	196			152 5						
270	Anthraquinone-2-sulfonyl chloride	197		261	193		211	308	309		Me ester, 123, Et ester, 125
271	Anthraquinone-1,6-disulfonyl chloride	197 8, yel, PhNO ₂	215 7, gold		227 8, yel						
272	Biphenyl-4,4'-disulfonyl chloride	203		300			171	330 d			
273	Benzidine-2,2'-disulfonyl chloride	Hydrochloride, 205		di 278							
274	Anthraquinone-1-sulfonyl chloride	216 8, yel, PhNO ₂	218		214		191		284		NH ₃ → 1-Amino-anthraquinone, 252, 243
275	9,10-Dichloroanthracene-2-sulfonyl chloride	221		279	248						
276	Azobenzene-4,4'-disulfonyl chloride	222	169d (anh)	250 d							Et ester, 104
277	Anthraquinone-1,8-disulfonyl chloride	222 3, yel, PhNO ₂	293-4	>340	237-8, yel, PhNO ₂						
278	Anthracene-1,8-disulfonyl chloride	225		333	224						
279	Naphthalene-2,6-disulfonyl chloride	225		305			256		360		
280	2-Hydroxynaphthalene-1,5-disulfonyl chloride	231			231						
281	Anthracene-1,5-disulfonyl chloride	240		di 330	di 293						
282	Anthraquinone-2,6-disulfonyl chloride	250, yel cl bz			di 321						
283	Anthraquinone-1,3-disulfonyl chloride	265 70, yel	310 1 (hyd)	>350	269 70, yel-red						
284	2,4-Diaminobenzene-1,5-disulfonyl chloride	275		187	236						
285	Anthraquinone-1,7-disulfonyl chloride	301 2, br yel, PhNO ₂	120 (hyd)		237-8, yel cl bz						

*Derivative data given in order m p, crystal color, solvent from which crystallized

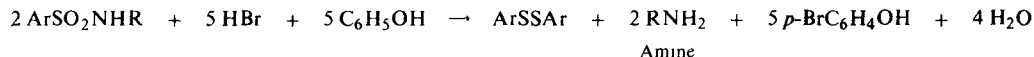
EXPLANATIONS AND REFERENCES TO TABLE XXIV

*Formation of sulfonic acid by hydrolysis **

From hydrolysis of the sulfonamide by 25% hydrochloric acid.

For directions and examples see Cheronis, p. 631, Shriner, pp. 104, 267, R. S. Schreiber and R. L. Shriner, *J Amer Chem Soc*, **56**, 1618 (1934).

From hydrolysis of the sulfonamide in a mixture of concentrated sulfuric acid and 85% phosphoric acid
See Cheronis, p. 633.

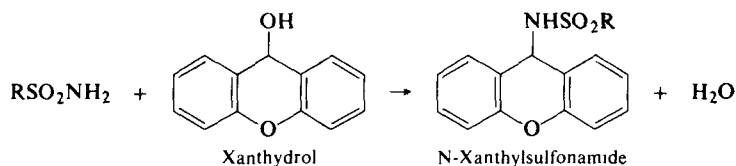
Formation of the amine by hydrolysis

From hydrolysis of the sulfonamide in 48% hydrobromic acid and phenol.

For directions and examples see Shriner, pp. 105, 267, H. R. Snyder and R. E. Heckert, *J Amer Chem Soc*, **74**, 2006 (1952); H. R. Snyder and H. C. Geller, *J Amer Chem Soc*, **74**, 4864 (1952).

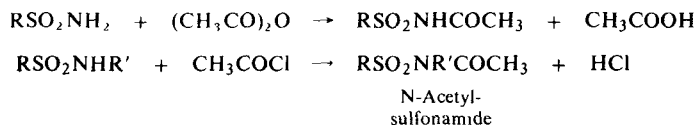
NOTE For directions and explanations for the preparation of derivatives of the sulfonic acid formed by the hydrolysis of the sulfonamide see explanations and references to Table XXII, pp. 369, 370.

For directions and explanations for the preparation of the amine formed by the hydrolysis of the sulfonamide see explanations and references to Table XVIII, pp. 291, 292, 293

*N-Xanthylsulfonamide **

From the sulfonamide and xanthylol in glacial acetic acid.

For directions and examples see Cheronis, p. 634, Linstead, p. 95; Shriner, p. 267; R. F. Phillips and V. S. Frank, *J Org Chem*, **9**, 9 (1944).

N-Acetylsulfonamide.

From the sulfonamide and acetic anhydride.

For directions and examples see Cheronis, p. 634.

From the sulfonamide and acetyl chloride in acetic acid.

See Linstead, p. 95; Vogel, p. 555.

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1-Naphthylamide	S Benzylthiourom	p-Toluidinum	Anilinum	o-Toluidinum		
1	2-Methylpropane-1-sulfonamide	14-6		b p 80 ¹³		38	107						
2	N,N-Diethylbenzylsulfonamide	29		92	105, w, al	102	166 (146)		113, al	102	83		
3	2-Methylpropane-1-sulfonanilide	38		b p 80 ¹³	14-6		107						
4	3-Methylbutane-1-sulfonanilide	42		b p 98 ¹³	3		90 1						
5	Butane-1-sulfonamide	45	-15	b p 75 ¹⁰		10 5	60 5						Phenylhydrazinium salt, 114 5
6	Propane-1-sulfonamide	52, eth	7 5	b p 78 ¹⁵		10	84		67-8				Phenylhydrazinium salt, 204 5d
7	Ethane sulfonamide	58, eth	-17	b p 178		58	66	115					Phenylhydrazinium salt, 182 8
8	Ethane sulfonanilide	58	-17	b p 178	58		66	115					Phenylhydrazinium salt, 182 8
9	N,N-Diethyltoluene-4-sulfonamide	60	104-5	69	105 (dihyd), 138 5 9 (anh)	103	157	181-2	198	238	190		m-Toluidide, 109
10	Propane-2-sulfonamide	60, eth - pet eth	-37	b p 61 ⁹		84	134						
11	N-Ethyltoluene-4-sulfonamide	64	104-5	69	105 (dihyd), 138 5-9 (anh)	103	157	181 2	198	238	190		
12	N-Ethylbenzyl sulfonamide	65-6, eth, lgr		92	105, w, al	102	166 (146)		113, al	102	83		
13	N-(1-Naphthyl)ethane sulfonamide	66	-17	b p 178	58	58		115					
14	Ethane-1,2-disulfonanilide	69		di 95, eth				201 2	d at 270	270, w			Di Et ester, 77, eth, m-Toluidide, 230
15	N-Methyltoluene-2-sulfonamide	74-5	57	68		136		170	203 4	218			
16	Heptane-1-sulfonamide	75		16									
17	2,4,5-Trimethoxybenzene sulfonamide	76		130		170							
18	2-Phenylethane-1-sulfonanilide	77	91	33	122								
19	N-Methyltoluene-4-sulfonamide	78 9	104-5	69	105 (dihyd), 138 5-9 (anh)	103	157	181 2	198	238	190		
20	Propane-2-sulfonanilide	84		b p 61 ⁹	60		134						
21	N-(1-Naphthyl)propane-1-sulfonamide	84	7 5	b p 78 ¹⁵	52	10			67 8				
22	N,N-Dimethyltoluene-4-sulfonamide	86-7	104-5	69	105 (dihyd), 138 5 9 (anh)	103	157	181 2	198	238	190		
23	Methane sulfonamide	90	20	b p 60 ²¹		100 5	125 5						Phenylhydrazinium salt, 193 5-4d
24	N-(1-Naphthyl)-3-methylbutane-1-sulfonamide	90-1		b p 98 ¹³	3	42							
25	4-Chloro-3-methylbenzene sulfonanilide	92		63	128								
26	Toluene-3-sulfonanilide	96		12	108				106				

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Amilide	1-Naphthyl amide	S-Benzylthiuronium	p-Toluidinum	Anilinum	o-Toluidinum		
27	3-Chloro-4-methylbenzene sulfonanilide	96		38	134								
28	3,3-Dimethylbutane sulfonamide	96-7		43 4									
29	Hexadecane-1-sulfonamide	97	54	54									
30	2-Ethylbenzene sulfonamide	100		11 7									
31	10-Bromocamphor-3-sulfonamide	100-2		97									
32	Methane sulfonanilide	100 5	20	b p 60 ²¹	90		125 5						Phenylhydrazinium salt, 193 5-4d
33	N,N-Dimethylbenzyl sulfonamide	101		92-3, eth. lgr	105, w, al	102, al	166 (146)		113, al	102	83		Hydrazide, 131 2, Phenylhydrazide, 173
34	Benzyl sulfonanilide (Toluene- α -sulfonanilide)	102, al		92	105, w, al		166 (146)		113, al	102	83		Hydrazide, 131 2, Phenylhydrazide, 173
35	Toluene-4-sulfonanilide	103	92 (104 5)	69	137			181 2	198	238	190		N-Xanthylsulfonamide, 197
36	4-Chlorobenzene sulfonanilide	104	69 (93)	53	144		190	175	208 10	222 3	163 4		
37	Benzyl sulfonamide (Toluene- α -sulfonamide)	105, w, al		92-3, eth. lgr		102, al	166 (146)		113, al	102	83		Hydrazide, 131 2, Phenylhydrazide, 173
38	N-(1-Naphthyl)-2-methylpropane sulfonamide	107		b p 80 ¹³	14-6	38							
39	Toluene-3-sulfonamide	108, al		12		96			106		108		
40	2,4-Dimethyl-6-nitrobenzene sulfonamide	108	97										
41	2,4,6-Trimethylbenzene sulfonanilide	109	78	56	142								N-Xanthylsulfonamide, 203
42	N-Methylbenzyl sulfonamide	109-10		92-3, eth. bz	105, w, al	102, al	166 (146)		113, al	102	83		N-Xanthylsulfonamide, 188, Hydrazide, 131 2, Phenylhydrazide, 173
43	2,4-Dimethylbenzene sulfonanilide	110	62 (hyd)	34									
44	4-Ethylbenzene sulfonamide	110		12									N-Xanthylsulfonamide, 196
45	3-Hydroxynaphthalene-2-sulfonamide	110		112						241 2			
46	Pyridine-3-sulfonamide	110-1	357	Hydrochloride, 141-4 d		145							Hydrazide, 94
47	Naphthalene-1-sulfonanilide	112 (152)	90	68, 66	150			137	181	183	237		
48	Benzene sulfonanilide	112	66 (anh)	14 5	156		170 1	148	205	240	176		N-Xanthylsulfonamide, 200
49	3-Methoxynaphthalene-2-sulfonamide	113		138		174							
50	2,6-Dimethylbenzene sulfonamide	113 (96)	98	39									
51	2-(N-Methylamino)benzene sulfonamide	114 5 5 5	182 d										2-N-p-Toluene-sulfonyl deriv of sulfonamide, 193

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid
				Chloride	Amide	Anilide	1-Naphthyl amide	S Benzylthuronium	p-Toluidinum	Anilinium	o-Toluidinum	
52	2-Nitrobenzene sulfonanilide	115	70 (85)	69	193							
53	N-Benzyltoluene-4-sulfonamide	115 6	92	69	137			181-2	198	238	190	N-Xanthylsulfonamide, 197
54	8-Methylnaphthalene-2-sulfonamide	116		88								
55	Indane-4-sulfonamide	118 9, w		53-3 5, b p 140-1 ⁴								
56	4-Bromobenzene sulfonanilide	119	88 90	76, eth	166, 161		183 5	170	215 6	237 8	182 3	
57	3,5-Dimethylbenzene sulfonanilide	119		94 90	135				121 2 d			
58	6-Methoxynaphthalene-2-sulfonanilide	120		93	189							
59	D-Camphor-10-sulfonanilide	121	193	67	132							
60	7-Methoxynaphthalene-2-sulfonanilide	121		83	220							
61	2-Phenylethane-1-sulfonamide	122	91	33		77						
62	4-Formylbenzene sulfonamide	122 4										Oxime, 158, O,O-Diacetate of sulfonamide, 86-7 5
63	5-Nitronaphthalene-1-sulfonanilide	123		113	236							Me ester, 117 8, chl
64	2-Methylnaphthalene-1-sulfonamide	124		83 5								
65	D-Camphor-3-sulfonanilide	124	77	88	143				196 7			Me ester, 77, [α] _D +98 6 in chl
66	Biphenyl-4-sulfonanilide	125		115	230							
67	4-Fluorobenzene sulfonamide	125		36 30								
68	N-(1-Naphthyl)methane sulfonamide	125 5	20	b p 60 ²¹	90	100 5						
69	3-Nitrobenzene sulfonanilide	126	48	64	167		166 5	146	222	222	193	
70	Phenol-O-sulfonanilide	126 5 7 5	145 (monohyd)						124 5	126 5 7 5		
71	5-Aminonaphthalene-2-sulfonanilide	127 8			219			191				5-N-Acetyl deriv of sulfonamide, 247
73	4-Chloro-3-methylbenzene sulfonamide	128		63		92						Sulfonyl bromide, 67 5
74	6-Fluoronaphthalene-2-sulfonanilide	129	105 (hyd)	97	133							
75	5-Ethoxynaphthalene-1-sulfonanilide	130		121	182 5							
76	3-Chloro-4-methoxybenzene sulfonamide	131		82								
77	4-Aminonaphthalene-2-sulfonamide	131 (hyd)										4-N-Acetyl deriv of sulfonamide, 220
78	2,5-Dimethyl-4-nitrobenzene sulfonanilide	131	140	75	197-8				143 5 4 5		143 5 4 5	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid
				Chloride	Amide	Anilide	1 Naphthylamide	S Benzylthionium	p-Toluidinium	Anilinium	o-Toluidinium	
79	3-Ethoxybenzene sulfonamide	131		38								
80	D-Camphor-10-sulfonamide	132	193	67		121 (88)						
81	Naphthalene-2-sulfonanilide	132	91 (hyg)	76 79	217 213							
82	6-Fluoronaphthalene-2-sulfonamide	133	105 (hyd)	97, chl		129		190 1	221	269	213	
83	DL-Camphor-8-sulfonamide	133 5 w	56 8	106								
84	3-Methyl-4-nitrobenzene sulfonamide	133 5		50								
85	3-Chloro-4-methylbenzene sulfonamide	134		38		96						
86	N-(1-Naphthyl)propane-2-sulfonamide	134	-37	b p 61 ^a	60	84						m-Toluidide, 109
87	3,5-Dimethylbenzene sulfonamide	135, al		94, 90, bz		129, al			121 2 al			
88	Tetraline-6-sulfonamide	135		58		155 6						
89	Indane-5-sulfonamide	135 5 6, al	92	46-7, eth b p 148 9 ^a		129, al						
90	Toluene-2-sulfonanilide	136	57	68	156			170	203 4	218		N-Xanthylsulfonamide, 183
91	4-Iodonaphthalene-1-sulfonanilide	136		124 121	206 204							
92	D-Camphor-8-sulfonamide	137		138								[α] _D ²⁰ +93 6, in al
93	4-Chloro-2-nitrobenzene sulfonanilide	138	82	75	237							
94	2,4-Dimethylbenzene sulfonamide	138	62 (hyd)	34		110		146				N-Xanthylsulfonamide, 188
95	Toluene-4-sulfonamide	138 5 9 0 (anh) 105 (dihyd)	104 5	69		103	157	181 2	198	238	190	N-Xanthylsulfonamide, 197
96	8-Aminonaphthalene-1-sulfonanilide	139 40						300				
97	4-Vinylbenzene sulfonamide	139 40							182 3			Dimethylamide, 62 3
98	2-Bromonaphthalene-1-sulfonamide	140		97								
99	3,4-Dichlorobenzene sulfonamide	140, 135		22 4, 19								
100	2,4,6-Trimethylbenzene sulfonamide	142	78	56		109						N-Xanthylsulfonamide, 203
101	7-Ethoxynaphthalene-2-sulfonamide	142		103		153						
102	3-Aminobenzene sulfonamide	142						148				
103	3,5-Dimethyl-2-hydroxybenzene sulfonanilide	142 3	121 5									2-O-Acetyl deriv of sulfonyl chloride, 62, pet eth
104	D-Camphor-3-sulfonamide	143	77	88		124			196 7			N-Methylanilide, 111 2, Me ester, 77, [α] _D ²⁰ +98 6 in chl
105	5-Chloro-2-methylbenzene sulfonamide	143	21, 24									

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1 Naphthylamide	S Benzylthionium	p-Toluidinium	Anilinium	o-Toluidinium		
106	4-Iodobenzene sulfonanilide	143		85	183								
107	2,5-Dimethyl-3-nitrobenzene sulfonanilide	143 4	128 (200)	61	173				135-6			126 5-7 5	
108	4-Methylnaphthalene-2-sulfonamide	143 4		124 5									
109	Benzophenone-2-sulfonanilide	143 5		96 7									
110	4-Ethoxynaphthalene-2-sulfonanilide	143 5		85	183								
111	3,4-Dimethylbenzene sulfonamide	144	64 (55)	52				208					
112	4-Fluoronaphthalene-1-sulfonanilide	144	100 (hyd)	86	206								Et ester, 93
113	4-Chlorobenzene sulfonamide	144	69 (93)	53		104	190	175	208-10	222 3	163 4		
114	4-Methyl-3-nitrobenzene sulfonamide	144 5	92 (hyg)	36		109	153		130 1		28		
115	3-Chloro-6-methylbenzene sulfonamide	145, aq al		24									
116	Pyridine-3-sulfonanilide	145			110 1								
117	3-Bromocamphor-8-sulfonamide	145	195 6 (anh)	136 7									
118	4-Chloronaphthalene-1-sulfonanilide	145 6	130 3	94 5	187		162			145 6	151		Me ester, 83 Et ester, 104
119	4-Bromo-3-methylbenzene sulfonamide	146		50									
120	4-Methoxy-3-nitrobenzene sulfonamide	146 3		66									
121	1-Aminonaphthalene-7-sulfonanilide	147			181 (hyd)								Benzoylguanidine salt, 214 6
122	4-Methoxynaphthalene-2-sulfonanilide	147 5		98 5	226								
123	3-Chlorobenzene sulfonamide	148							199-200	206 7			
124	2-Methyl-5-nitrobenzene sulfonanilide	148	133 5	46-7	186				256 7		256 8		
125	2,5-Dimethylbenzene sulfonamide	148	48 (anhyd) 86 (hyd)	24 6				184					N-Xanthylsulfonamide, 176
126	Benzene-1,3-disulfonanilide	148 50		63	229		245	214					N-Xanthylsulfonamide, 170
127	6-Methoxynaphthalene-1-sulfonamide	149 5		80 5		177 5							
128	Naphthalene-1-sulfonamide	150	90	68, 66		112 (152)		137	181	183	237		
129	4-Ethoxybenzene sulfonamide	150		39									
130	4,6-Dichloro-2,5-dimethylbenzene sulfonamide	150		81		175							
131	3-Bromo-4-methylbenzene sulfonamide	151		60									
132	2-Hydroxynaphthalene-3,6,8-trisulfonanilide	152-5		<i>m</i> 196									
133	7-Ethoxynaphthalene-2-sulfonanilide	153		103	142								
134	2-Chloronaphthalene-1-sulfonamide	153		75									

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1-Naphthylamide	S Benzylthuronium	p Toluene	Anilinium	o Toluene		
135	8-Chloro-7-methoxynaphthalene-1-sulfonamide	153		137		196							
136	2-Aminobenzene sulfonamide	153						132					2-N Benzoyl deriv of sulfonamide 198, Hydrochloride, 201
137	5-Methylbenzene-1,3-disulfonanilide	153, al		94, eth	216, w								
138	6-Ethoxynaphthalene-2-sulfonanilide	153		107 5	183								
139	2-Iodonaphthalene-1-sulfonamide	154		110									
140	6-Ethoxynaphthalene-1-sulfonamide	154		118		194 5							
141	2,6-Dichloro-4-methylbenzene sulfonamide	154-5		56									
142	4-Chloro-2,5-dimethylbenzene sulfonanilide	155	100	50	185								
143	4-Amino-2-hydroxybenzene sulfonamide	155		169									
144	Tetraline-6-sulfonanilide	155 6		58	135								
145	Benzene sulfonamide	156 (153)	43 4 (mono-hyd), 66 (anh)	14 5			170 1	148	205	240	176		N Xanthylsulfonamide, 200
146	2-Chloro-5-methylbenzene sulfonamide	156		56		229-30 5							
147	D-3-Bromocamphor-10-sulfonamide	156	47 5	65									
148	Toluene-2-sulfonamide	156 3	57	68		136		170	203 4	218			N Xanthylsulfonamide, 182-3,5
149	4-Methoxynaphthalene-2-sulfonamide	157		75 5	145								
150	5-Methoxynaphthalene-1-sulfonanilide	157		119 5	194 5								
151	N-(1-Naphthyl)toluene-4-sulfonamide	157	104-5	69	105 (dihyd), 138 5 9 (anh)	103		181 2	198	238	190		
152	Benzophenone-3,3'-disulfonamide	157		di 137-8			di 177 8						N-Xanthylsulfonamide, 197
153	2,4-Dinitrobenzene sulfonamide	157, 154	106 8 (hyd), 130 (anh)	102									Hydrazide 110
154	2-Methyl-4-nitrobenzene sulfonamide	157		106									
155	2-Nitrodiphenylamine-4-sulfonanilide	157	220d		162								
156	Phenanthrene-2-sulfonanilide	157 8	150	156	253-4				291				Me ester, 101 2, Et ester, 89, yel-br
157	4-Methylnaphthalene-1-sulfonanilide	158		81	174, 177								
158	2-Ethoxynaphthalene-1-sulfonamide	158		116		187							
159	4-Methoxynaphthalene-1-sulfonanilide	158		81	177								

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1 Naphthyl amide	S Benzyl thiuronium	p-Toluidinium	Anilinium	o-Toluidinium		
160	2-Ethoxybenzene sulfonanilide	158		65 6	163								Phenylhydrazide, 132 3
161	2-Methoxynaphthalene-1-sulfonamide	159		121		196 5							
162	3-Nitrobenzylsulfonamide (3-Nitrotoluene- α -sulfonamide)	159d, w	74 (hyd)	100 bz									Me amide, 106 7 Dimethylamide, 118 9
163	5-Amino-2-hydroxybenzene sulfonanilide	159 (98)	100 (anh)		202 d								
164	5-Chloro-2-nitrobenzene sulfonamide	159		93									
165	2,5-Dichlorobenzene sulfonanilide	160	93 7	38	181			170					
166	3,5-Dimethyl-2-hydroxybenzene-1,4-disulfonamide	160 1		dt 89 91									
167	6-Hydroxynaphthalene-2-sulfonanilide	161	129 (hyd) 167 (anhyd)		238			217 (207)	247	264	208		
168	2-Methylbenzene-1,3-disulfonanilide	162		88	260								
169	N-(1-Naphthyl)-4-chloronaphthalene-1-sulfonamide	162	130 3	94 5	187	145 6				145 6	151		Me ester, 83 Et ester, 104
170	2-Nitrodiphenylamine-4-sulfonamide	162	220 d			157							
171	7-Methylnaphthalene-1-sulfonanilide	162 4		96	197								
172	2-Ethoxybenzene sulfonamide	163		65 6		158							Phenylhydrazide, 132 3
173	7-Methylnaphthalene-2-sulfonamide	163 4		63 4									
174	3-Methyl-2-nitrobenzene sulfonamide	163 5		58 5									
175	5-Amino-2-methylbenzene sulfonamide	164				146 7							5-N-Acetyl deriv of sulfonamide, 242
176	4-Chloro-2-nitrobenzene sulfonamide	164		75		138							Phenylhydrazide, 151, Ph ester, 82
177	4-Nitrodiphenylamine-2-sulfonanilide	164		102 4	174								
178	4-Aminobenzene sulfonamide	165				200	196	185					
179	3,6-Dichloro-2,5-dimethylbenzene sulfonamide	165		71		171							
180	6-Aminonaphthalene-1-sulfonamide	165						172 4					Benzoylguanidine salt, 210 1
181	N-(1-Naphthyl)benzyl sulfonamide	166 (146)		92 3, eth, bz	105, w, al	102, al			113, al	102	83		Hydrazide, 131 2, Phenylhydrazide, 173
182	4-Bromobenzene sulfonamide	166, 161	88-90	76, eth		119	183 5	170	215-6	237-8	182-3		
183	5-Bromo-2-methylbenzene sulfonamide	166 7		33-5									
184	N-(1-Naphthyl)-3-nitrobenzene sulfonamide	166 5	48	64	167	126		146	222	126 5-7 5	193		
185	3-Nitrobenzene sulfonamide	167	48	64		126	166 5	146	222	126 5-7 5	193		

* Derivative data given in order m p crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid
				Chloride	Amide	Anilide	1 Naphthylamide	S-Benzylthiuronium	p-Toluidinium	Anilinium	o-Toluidinium	
186	2,4-Dimethoxybenzene sulfonamide	167		70								
187	5-Chloro-2-methyl-3-nitrobenzene sulfonamide	167		60								
188	4-Hydroxynaphthalene-1-sulfonamide	167				199-200						
189	2,3-Dimethylbenzene sulfonamide	167		47								
190	4,6-Dichloro-2-methylbenzene sulfonamide	168		43								
191	4-Chloronaphthalene-2-sulfonamide	168		106								Et ester, 76 9
192	4,5-Dibenzyl-naphthalene-1-sulfonamide	168		151								
193	4-Bromo-2-methylbenzene sulfonamide	168		50								
194	Propane-1,3-disulfonamide	169, w	92 d	di 45		di 125						Di-m-toluidide, 222, Di-hydrazide, 105
195	Propane-1,1-disulfonamide	169 70				151-2, al						
196	2,4,5-Trimethoxybenzene sulfonanilide	170		130	76							
197	4-Acetamidonaphthalene-1-sulfonanilide	170			241							
198	4-Ethoxynaphthalene-1-sulfonamide	170		103		180						
199	3-Carboxybenzene sulfonamide	di 170	98 (hyd), 148 (anh)	di 20			163	224-6				
200	4-Methyl-2-nitrobenzene sulfonamide	170		98 9								o-Anisidide, 135
201	N-(1-Naphthyl)benzene sulfonamide	170-1	43-4 (mono-hyd), 66 (anh)	14 5	156	112	148	205	240	176		Me ester, b p 150 ¹⁵ , N-Xanthylsulfonamide, 200
202	3,6-Dichloro-2,5-dimethylbenzene sulfonanilide	171		71	165							
203	5-Aminonaphthalene-1-sulfonanilide	171			260		179					
204	4-Nitrobenzene sulfonanilide	171 (136)	109 11 (95)	80, lgr	180			179-80				
205	2,4-Dimethyl-3-nitrobenzene sulfonamide	172	144 (anh)	96								
206	8-Nitronaphthalene-2-sulfonanilide	172-3	135 6 (hyd)	169	223							
207	2,5-Dimethyl-3-nitrobenzene sulfonamide	173	128 (200)	61		143 4		136				
208	4-Nitrodiphenylamine-2-sulfonamide	173		102 4		164						
209	7-Ethoxy-8-nitronaphthalene-1-sulfonamide	173 4		155								
210	2,5-Dimethylbenzene-1,3-disulfonanilide	174, al		81, lgr	295, al							
211	3-Methoxynaphthalene-2-sulfonanilide	174		138	113							
212	3,4-Dibromobenzene sulfonamide	175	66 5-7 5 (anhyd)	34								

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1-Naphthylamide	S-Benzylthiuronium	p-Toluidinium	Anilinium	o-Toluidinium		
213	4,6-Dichloro-2,5-dimethylbenzene sulfonanilide	175		81	150								
214	4-Chloro-3-nitrobenzene sulfonamide	175 6, yel. al		40 1 (60 2)									
215	7-Chloronaphthalene-2-sulfonamide	176	68 (tetrahyd) 118 (anhyd)	87									Me ester, 89, Et ester, 65
216	3-Amino-4-methylbenzene sulfonamide	176											3-N-Benzoyl deriv of sulfonamide, 203, 3-N-Acetyl deriv of sulfonyl chloride, 144, 3-N-Benzoyl deriv of sulfonyl chloride, 196
217	4-Bromo-3-nitrobenzene sulfonamide	176-7		55 7									
218	4-Hydroxybenzene sulfonamide	176 7		141				169	202	170	192		
219	5-Methylnaphthalene-1-sulfonamide	176 8	115										
220	4-Methylnaphthalene-1-sulfonamide	177 d 174		81, lgr		158							
221	2-Chloro-5-methyl-6-nitrobenzene sulfonamide	177		122									
222	Benzophenone-3,3-disulfonanilide	177 8		di 137 8	di 157								
223	6-Methoxynaphthalene-1-sulfonanilide	177 5		80 5	149 5								
224	Acenaphthene-5-sulfonanilide	178		111	223								
225	2-Methylbenzene-1,4-disulfonanilide	di 178		98	224								
226	8-Nitronaphthalene-1-sulfonanilide	178 8 5	115 (trihyd)	165 d	190 5 1 5								
227	Naphthalene-1,4-disulfonanilide	179		160 (166)	273, w, al								
228	4-Nitrobenzene sulfonamide	180, 50° al	109 11 (95) (hyg)	80, lgr		171 (136) d			179 80				
229	4-Ethoxynaphthalene-1-sulfonanilide	180		103	170								
230	3,4-Dimethyl-5-nitrobenzene sulfonamide	180		70									
231	3-Chloro-2-methylbenzene sulfonamide	180 w	60-72	72, pet eth									
232	2-Aminonaphthalene-8-sulfonamide	181 (hyd)				147							1-N-Acetyl deriv of sulfonamide, 213, Benzoylguanidine salt, 214-6
233	2,5-Dichlorobenzene sulfonamide	181	93 7 (>1 00)	38		160	160	170	247-8	262-3	250-1		
234	2,4,5-Trimethylbenzene sulfonamide	181	112	61									

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1-Naphthylamide	S-Benzylthiuronium	p-Toluidinum	Anilinum	o-Toluidinum		
235	5-Chloro-4-methyl-2-nitrobenzene sulfonamide	181	128	99									
236	2,4-Dichlorobenzene sulfonamide	182	86	55					204 6			170 2	
237	2,5-Dimethyl-6-nitrobenzene sulfonanilide	182	145 (anh)	110	192				158 5 9, al			143 5, 50°, al	
238	5-Ethoxynaphthalene-1-sulfonamide	182 5		121		130							
239	6-Ethoxynaphthalene-2-sulfonamide	183		107 5		153							
240	4-Iodobenzene sulfonamide	183		85		143							
241	4-Ethoxynaphthalene-2-sulfonamide	183		85		143 5							
242	Quinoline-8-sulfonamide	183-4	312	124									Me ester, 96, Et ester, 73, Picrate of Na salt, 226-7
243	4,5-Dichloro-3-methylbenzene sulfonamide	183-5		85 8									
244	N-(1-Naphthyl)-4-bromobenzene sulfonamide	183 5	88 90	76, eth	166 161	119		170	215 6	237-8		182 3	
245	6-Chloronaphthalene-2-sulfonamide	184		110 5									
246	5-Nitronaphthalene-2-sulfonamide	184	118 9, yel	125						260 d			
247	8-Chloronaphthalene-2-sulfonamide	185		94									
248	4-Chloro-2-methylbenzene sulfonamide	185		54									
249	4-Chloro-2,5-dimethylbenzene sulfonamide	185	100	50		155							
250	2-Carboxy-5-methylbenzene sulfonamide (4-Toluic acid-2-sulfonamide)	185	190 (158) (anh)	di 59									
251	2-Chloro-5-nitrobenzene sulfonamide	185-6	168-9 d (hyd)	90, w									
252	2-Bromobenzene sulfonamide	186, w		51, eth									
253	3,5-Dichloro-2-methylbenzene sulfonamide	186		54									
254	2-Methyl-5-nitrobenzene sulfonamide	186	133 5 (dihyd)	46-7, b p 183-5 ¹⁰		148			256-7			256-8	
255	2-Chloro-4-methylbenzene sulfonamide	186		46, 52									
256	4-Methylbenzene-1,3-disulfonamide (Toluene-2,4-disulfonamide)	186-7 (191)		54, 46		189			277 d	di 189	di 170-1		Di-m-toluidide, 138
257	2-Ethoxynaphthalene-1-sulfonamide	187		116	158								
258	4-Chloronaphthalene-1-sulfonamide	187	130 3 d	94-5		145-6	162			145-6	151		Me ester, 83, Et ester, 104
259	8-Iodonaphthalene-1-sulfonamide	187	115	140									

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid
				Chloride	Amide	Anilide	1 Naphthyl amide	S-Benzylthionium	p-Toluidinium	Anilinium	o-Toluidinium	
260	2,4-Dimethyl-5-nitrobenzene sulfonamide	187 (179)	132 (122) dil HNO ₃	98								Sulfonyl chloride, 109 10
261	2,4-Diaminobenzene-1,5-disulfonamide	187		275		236						
262	8-Bromonaphthalene-2-sulfonamide	187		121								
263	2-Chlorobenzene sulfonamide	188		28 5								
264	4-Nitronaphthalene-1-sulfonamide	188		99								
265	2,6-Dichloro-3-methylbenzene sulfonamide	188		19 5								
266	5-Methylnaphthalene-2-sulfonamide	188 9		120 2		248 50 (133 4)						
267	4-Methylbenzene-1,3-disulfonanilide	189		54, 46	186-7							
268	6-Methoxynaphthalene-2-sulfonamide	189		93		120						
269	Sulfanylguanidine (Sulfaguanidine)	189 90 (anh), 143 (hyd)										4-N-Acetyl deriv of sulfonamide, 262 6 (248 51) Hydrochloride, 205 6
270	N-(1-Naphthyl)-4-chlorobenzene sulfonamide	190	69 (93)	53	144	104		175	208-10	222 3	163 4	
271	2,4-Dibromobenzene sulfonamide	190	110 (anh)	79, eth								
272	4-Methylbenzene-1,2-disulfonanilide (Toluene-3,4-disulfonanilide)	190		109 11	237 9							
273	Phenanthrene-3-sulfonamide	190	175-6 (anh), 120-1 (monohyd) 88 d (dihyd)	110 1				222				Me ester, 119 20, al Et ester, 107-8
274	4-Aminonaphthalene-1-sulfonanilide	190										4-N-Acetyl deriv of sulfonamide, 247
275	8-Nitronaphthalene-1-sulfonamide	191	115 d (trihyd)	165 d		178-8 5						
276	2-Hydroxynaphthalene-1,6-disulfonanilide	191		di 111								
277	3,5-Dichloro-4-methylbenzene sulfonamide	191		69								
278	Sulfapyridine	191-2										4-N-Acetyl deriv of sulfonamide, 226 7, acet
279	Antraquinone-2,7-disulfonanilide	192		di 186 chl								
280	4-Carboxy-3-nitrobenzene sulfonamide (2-Nitrobenzoic acid-4-sulfonamide)	192	111 (+2½ H ₂ O)	di 160								Diamide, 226
281	Quinoline-6-sulfonamide	192	>260	91								
282	5,6-Dichloronaphthalene-2-sulfonamide	192		167								

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1-Naphthyl amide	S Benzyl thiuronium	p-Toluidinium	Anilinium	o-Toluidinium		
283	Anthraquinone-2,7-disulfonamide	192		186									
284	2,5-Dimethyl-6-nitrobenzene sulfonamide	192	145 (anh)	110		182			158.5 9			143.5, 50% al	
285	2-Amino-5-methylbenzene-1,3-disulfonanilide	192		156	257								
286	Methane disulfonanilide	192.3	220.7 ¹⁵ d	8 b p 133 ¹⁰⁰	dt 233								
287	3,4-Dicarboxybenzene sulfonamide (Phthalic acid-4 sulfonamide)	192.200 d w	138.40 (mono-hyd)	167.70 d eth									
288	2-Nitrobenzene sulfonamide	193	70 (85)	69		115							
289	Anthraquinone-2-sulfonanilide	193		197	261			211	308	309			Me ester, 123 Et ester, 125
290	Phenanthrene-9-sulfonamide	193.4	174 (anh)	127					235				Me ester, 106, me al Et ester, 108, al
291	2-Carboxybenzene sulfonanilide	194.5	68.9 (hyd) 134 (anh)	79, pet eth				206	196 (200)	165	127.8		
292	5-Methoxynaphthalene-1-sulfonamide	194.5		119.5		157							
293	6-Ethoxynaphthalene-1-sulfonanilide	194.5		118	154								
294	7-Hydroxynaphthalene-1,3-disulfonanilide	195		161.2				228	294		271		
295	4-Bromonaphthalene-1-sulfonamide	195		87									
296	7-Hydroxynaphthalene-1-sulfonanilide	195						218	232	240	242		
297	2,5-Dibromobenzene sulfonamide	195	128 (anh)	71									
298	7-Methylnaphthalene-1-sulfonamide	195.6		96		162.4							
299	4,6-Dimethylbenzene-1,3-disulfonanilide	196, 50% al		130, pet eth	249, w								
300	4,7-Dichloronaphthalene-2-sulfonamide	196		156									
301	N-(1-Naphthyl)-4-aminobenzene sulfonamide	196			165	200		185					
302	8-Chloro-7-methoxynaphthalene-1-sulfonanilide	196		137	153								
303	5-Fluoronaphthalene-1-sulfonamide	196.7	105 (hyd)	122.3									Me ester, 118, eth
304	2-Methoxynaphthalene-1-sulfonanilide	196.5		121	159								
305	8-Chloronaphthalene-1-sulfonamide	197		101									
306	4,5-Dichloronaphthalene-2-sulfonamide	197		158									
307	2,5-Dimethyl-4-nitrobenzene sulfonamide	197.8	140	75		131			143.5 4.5		143.5 4.5		

*Derivative data given in order m p crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1-Naphthylamide	S-Benzylthionium	p-Toluidinium	Anilinium	o-Toluidinium		
308	Sulfamethazine (Sulfadimethylpyrimidine)	198 9 (+½ H ₂ O), pa yel											4-N-Acetyl deriv of sulfonamide, 249 50
309	Acenaphthene-3-sulfonamide	199	87 9	113 4		284 6							Me ester, 122 3, Et ester, 137 9, lgr
310	4-Hydroxynaphthalene-1-sulfonamide	199 200	170		167			103	196	186-7	203 4		2-Naphthyl sulfonamide, 204
311	4-Aminobenzene sulfonamide	200			165		196	185	109		132		4-N-Acetyl deriv of sulfonamide, 214, Me ester, 92
312	4,5-Dimethylbenzene-1,3-disulfonamide	200, al		79, yel	239								
313	4-Chloro-3-methyl-5-nitrobenzene sulfonamide	201		52									
314	Anthracene-2-sulfonamide	201		122	261								Phenylhydrazide, 210, Me ester, 157, Et ester, 160
315	5-Hydroxynaphthalene-1-sulfonamide	201	110 2 d										O-Acetyl deriv of sulfonyl chloride, 129
316	2-Hydroxynaphthalene-3,6-disulfonamide	202						233	250	254	257		
317	5-Amino-2-hydroxybenzene sulfonamide	202 d	100 (anh)			159 (98)							
318	1-Nitronaphthalene-2-sulfonamide	202	105, grn	121, bz - pet eth	214								
319	Sulfathiazole	202 5											4-N-Acetyl deriv of sulfonamide, 256 7
320	4-Nitrobenzyl sulfonamide (4-Nitrotoluene-α-sulfonamide)	204	71	90	220 d								
321	Anthracene-1-sulfonamide	205		90									
322	4,8-Dichloronaphthalene-2-sulfonamide	205		141									
323	3-Amino-4-hydroxybenzene sulfonamide	205 (170)	155-6 d										
324	4-Hydroxybenzene-1,3-disulfonamide (Phenol-2,4-disulfonamide)	205	> 100 d	89	239								
325	6-Methylnaphthalene-2-sulfonamide	205-6		97 8									
326	2,6-Dimethyl-4-hydroxybenzene-1,3-disulfonamide	205-7		117-8	206-8								
327	4-Iodonaphthalene-1-sulfonamide	206, 204		124, 121		136							
328	4-Fluoronaphthalene-1-sulfonamide	206	100 (hyd)	86		144							Et ester, 93
330	4-Amino-3-nitrobenzene sulfonamide	206 7		59-60									

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1-Naphthylamide	S Benzylthiuronium	p-Toluidinum	Anilinium	o-Toluidinum		
331	Retene-6-sulfonamide	206 7 5	121 3	146 7 5, yel -br 117-8									Me ester, 117 9, Et ester, 114-5
332	2,6-Dimethyl-4-hydroxybenzene-1,3-disulfonamide	206 8				205 7							
333	3,7-Diethylnaphthalene-1-sulfonamide	207		105 7									
334	6-Bromonaphthalene-2-sulfonamide	207		124									
335	7-Bromonaphthalene-1-sulfonamide	209		147									
336	4-Methoxybenzene-1,3-disulfonanilide	209		86	240								
337	7-Iodonaphthalene-2-sulfonamide	210		100									
338	4-(N-Methylamino)benzene sulfonamide	210 11	244 5 d										p-Toluenesulfonate, benzidine salt, 255
339	2,4,6-Trichlorobenzene sulfonamide	210-2 d		35 40									
340	4-Aminonaphthalene-1-sulfonamide	212				190							
341	6-Iodonaphthalene-1-sulfonamide	213		92 5									
342	Fluorene-2-sulfonamide	213 d	155 (hyd)	164									
343	Anthraquinone-1-sulfonanilide	214	218	216-8, yel, PhNO ₂				191		284			NH ₃ → 1-Aminoanthraquinone, 252 (243)
344	1-Nitronaphthalene-2-sulfonamide	214	105, grn	121, pink, bz -pet eth		202							
345	4-Acetamidobenzene sulfonanilide	214		149	219		215						
346	6-Chloronaphthalene-1-sulfonamide	214		70									Et ester, 114-5
347	N-(1-Naphthyl)-4-acetamidobenzene sulfonamide	215		149	219	214							
348	2,5-Dichlorobenzene-1,3-disulfonamide	215 7		114									
349	5-Methylbenzene-1,3-disulfonamide	216, w		94, eth		153, al							
350	5-Chloronaphthalene-2-sulfonamide	216		115									
351	Naphthalene-2-sulfonamide	217, 213	91 (hyg.), (122)	76, 79		132		190 1	221	269	213		
352	4,7-Dichloronaphthalene-1-sulfonamide	217		151									
353	6-Bromonaphthalene-1-sulfonamide	217		77									
354	4,6-Dichloronaphthalene-2-sulfonamide	218		136									
355	7-Bromonaphthalene-2-sulfonamide	218		100									
356	3,6-Dichloronaphthalene-2-sulfonamide	218		166									

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Anilide	1-Naphthyl amide	S-Benzylthiuronium	p-Toluidinium	Anilinium	o-Toluidinium		
157	6-Ethoxy-1-nitro-naphthalene-2-sulfonamide	218		146									
158	5-Aminonaphthalene-2-sulfonamide	218 9 d				127 8							1-N-Acetyl deriv of sulfonamide, 238 9
59	4-Acetamidobenzene sulfonamide	219		149		214	215						
60	5-Bromonaphthalene-2-sulfonamide	220		96									
61	4-Nitrobenzyl sulfon-anilide (4-Nitrotoluene- α -sulfonanilide)	220 d	71	90	204								
62	7-Methoxynaphthalene-2-sulfonamide	220		83		121							
163	2,4,6-Tribromobenzene sulfonanilide	220 2 d	64	64	228								
364	7,8-Dichloronaphthalene-1-sulfonamide	221		138									
365	8-Hydroxynaphthalene-1-sulfonamide	222 d	107 (hyg)										
366	6-Iodonaphthalene-2-sulfonamide	222		140									
367	2,5-Dimethylbenzene-1,4-disulfonanilide	223		164	310								
368	5,6-Dichloronaphthalene-1-sulfonamide	223		106									
369	Acenaphthene-5-sulfonamide	223		111		178							
370	6-Nitronaphthalene-1-sulfonamide	223-4		127									
371	2-Methylbenzene-1,4-disulfonamide	224		98		di 178							
372	5-Chlorobenzene-1,3-disulfonamide	224		106									
373	Anthracene-1,8-disulfonanilide	224		225	333								
374	4-Nitronaphthalene-2-sulfonamide	225		139 5									
375	4,6-Dichloronaphthalene-1-sulfonamide	226		119									
376	4-Carboxamido-3-nitrobenzene sulfonamide (2-Nitrobenzamide-4-sulfonamide)	226	111 (+2.5 H ₂ O)	di 160	192								
377	5-Chloronaphthalene-1-sulfonamide	226		95		138							Sulfonyl bromide, 110, Me ester, 89, Et ester, 46
378	4-Methoxynaphthalene-1-sulfonamide	226		98 5		147 5							
379	3,4-Di-iodobenzene sulfonamide	227, aq al	122 5	82, bz - pet eth									
380	7,8-Dichloronaphthalene-2-sulfonamide	227		124									
381	Anthraquinone-1,6-disulfonanilide	227 8, yel	215 7, gold	197-8, yel, PhNO ₂									
382	2,3,4-Trichlorobenzene sulfonamide	227-30		64 5									

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid	
				Chloride	Amide	Amide	1 Naphthyl amide	S-Benzylthiuronium	p-Toluidinium	Anilinium	o-Toluidinium		
383	3,4-Dichloro-2-methylbenzene sulfonamide	228		51 2									
384	4'-Nitrobiphenyl-4-sulfonamide	228		178									
385	2,4,6-Tribromobenzene sulfonamide	228	64	64		220 2 d							
386	8-Nitronaphthalene-2-sulfonamide	228 223	135 6 (+15 H ₂ O)	169		172 3							
387	6,8-Dichloronaphthalene-2-sulfonamide	228		121									
388	Benzene-1,3-disulfonamide	229		63		148-50	245	214					N-Xanthylsulfonamide, 170, Alk fusion → resorcinol, 110
389	4,5-Dichloronaphthalene-1-sulfonamide	229		117									
390	Biphenyl-4-sulfonamide	230		115		125							
391	2,4-Di-iodobenzene sulfonanilide	230	167 (anh)	77 8									Me ester, 78, al, Et ester, 52, al
392	2-Hydroxynaphthalene-1,5-disulfonanilide	231		di 231									
393	5-Bromonaphthalene-1-sulfonamide	232-3		95									
394	2-Hydroxynaphthalene-1,7-disulfonanilide	233		169									
395	Methane disulfonamide	233	b p 220 70 ¹⁵⁻²⁰ d	di 8, b p 133 ¹⁰		di 192-3							
396	2-Ethoxybenzene-1,4-disulfonamide	233		di 106 8									
397	3,5-Dinitrobenzene sulfonamide	235		99, chl, lgr									
398	4-Aminobenzene-1,3-disulfonamide (Aniline-2,4-disulfonamide)	235, w	120 d										
399	7-Chloronaphthalene-1-sulfonamide	235		129									
400	5,6,8-Trichloronaphthalene-2-sulfonamide	235		158									
401	4,6,7,8-Tetrachloronaphthalene-2-sulfonamide	235		176									
402	5-Nitronaphthalene-1-sulfonamide	236		113		123							
403	4-Carboxamidobenzene sulfonamide	236	94 (hyd) 260 (anh)	di 57		di 252							
404	2,4-Diaminobenzene-1,5-disulfonanilide	236		275	187								
405	2,3-Dichloro-4-methylbenzene sulfonamide	237		41									
406	Benzene-1,3,5-trisulfonanilide	tri 237	> 100	tri 187	tri 310 5								Tri-Et ester, 147, bz
408	Anthraquinone-1,7-disulfonanilide	237-8, yel, cl bz	120 (hyd)	321-2, br -yel, PhNO ₂									
409	Anthraquinone-1,8-disulfonanilide	237-8, yel, PhNO ₂	293-4	222 3	> 340								
410	4-Methylbenzene-1,2-disulfonamide	237 9		109-11		190							

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid
				Chloride	Amide	Anilide	1 Naphthyl amide	S-Benzylthiuronium	p-Toluidinium	Ammonium	o-Toluidinium	
411	6-Hydroxynaphthalene-2-sulfonamide	238	129 (hyd) 167 (anh)			161		217 (207)	248	264	208	
412	4-Hydroxybenzene-1,3-disulfonamide (Phenol-2,4-disulfonamide)	239	> 100 d	89		205						
413	5-Iodonaphthalene-1-sulfonamide	239		141								
414	4,5-Dimethylbenzene-1,3-disulfonamide	239		79, yel		200, al						
415	7-Iodonaphthalene-1-sulfonamide	240		165								
416	4-Methoxybenzene-1,3-disulfonamide	240		86		209						
417	4-Acetamidonaphthalene-1-sulfonamide	241				170						
418	Benzene-1,2-disulfonanilide	241		143	254			206				
419	5-Nitrobenzene-1,3-disulfonamide	242		di 97 8								
420	Naphthalene-2,7-disulfonamide	242		158 162				212	299	251-2	238	
421	2,4,6-Trimethylbenzene-1,3-disulfonamide	244		di 125		di 150 1						
422	5,8-Dichloronaphthalene-2-sulfonamide	244		134								
423	2,3,4,6-Tetrabromobenzene sulfonamide	245 d		96 5								
424	6,7,8-Trichloronaphthalene-2-sulfonamide	245		157								
425	N,N'-Di(1-naphthyl)benzene-1,3-disulfonamide	245		63	229	148 50		214				Alk fusion → resorcinol, 110, N-Xanthy sulfonamide, 170
426	Anthraquinone-1,5-disulfonamide	246 (350)	310 d	265-70		270 d						
427	1-Iodonaphthalene-2-sulfonamide	247		94								
428	9,10-Dichloroanthracene-2-sulfonanilide	248		221	279							
430	5-Methylnaphthalene-2-sulfonanilide	248-50		120-2	188 9							
431	4,6-Dimethylbenzene-1,3-disulfonamide	249, w		130, pet eth		196, 50% al						
432	Benzene-1,4-disulfonanilide	249		131 (139)	288							
433	5,6,7-Trichloronaphthalene-1-sulfonamide	249		131								
434	Naphthalene-1,5-disulfonanilide	249	245 (anh)	di 183	310 (340)			257 25td	332			Di-Me ester, 205, chl
435	1-Chloronaphthalene-2-sulfonamide	250	130 3d (anh)	84 5		171 2						
436	Azobenzene-4,4'-disulfonamide	250 d	169d (anh)	di 222								Et ester, 104
437	4-Carboxanilidobenzene sulfonanilide	252	94 (hyd), 260 (anh)	di 57	di 236							

* Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid
				Chloride	Amide	Anilide	1-Naphthyl amide	S-Benzylthionium	p-Toluidinium	Anilinium	o-Toluidinium	
438	Phenanthrene-2-sulfonamide	253.4	150	156		157.8			291			Me ester, 101-2, Et ester, 89, yel-br
439	Benzene-1,2-disulfonamide	254		143		241		206				
440	2-Amino-5-methylbenzene-1,3-disulfonamide	257		156		192						
441	2-Amino-5-methylbenzene-1,4-disulfonamide	257, w	290	dt 156, chl		dt 196-7, aq al						
442	5-Aminonaphthalene-1-sulfonamide	260				171		179				5-N-Acetyl deriv of sulfonamide, 231-2
443	2-Methylbenzene-1,3-disulfonamide	260		88		162						
444	Anthracene-2-sulfonamide	261		122		201						Me ester, 157, Et ester, 160
445	Anthraquinone-2-sulfonamide	261		197		193		211	308	309		Me ester, 123, Et ester, 125
446	7-Nitronaphthalene-1-sulfonamide	261-2		169.70								
447	6,7-Dichloronaphthalene-1-sulfonamide	268		142								
448	3,7-Dichloronaphthalene-1-sulfonamide	269		136								
449	Anthraquinone-2,6-disulfonamide	269-70	310.11 (hyd)	265.70, yel	>350							
450	Anthraquinone-1,5-disulfonamide	270 d	310 d	265-70	246 (350)							
451	1-Bromonaphthalene-2-sulfonamide	271		93								
452	5,7-Dichloronaphthalene-1-sulfonamide	272		149								
453	Naphthalene-1,4-disulfonamide	273, w, al		160 (166)		179						
454	Azoxybenzene-3,3'-disulfonamide	273	126	dt 138								
455	4,6-Dichlorobenzene-1,3-disulfonamide	276		123								
456	Benzidine-2,2'-disulfonamide	278		Hydrochloride, 205								
457	9,10-Dichloroanthracene-2-sulfonamide	279		221		248						
458	1,5-Dichloronaphthalene-2-sulfonamide	282		125								
459	4-Nitronaphthalene-2,7-disulfonamide	286-7		140.1								
460	Azobenzene-3,4'-disulfonamide	288		123.5								
461	Benzene-1,4-disulfonamide	288		131 (139)		249						
462	Naphthalene-1,3-disulfonamide	292.3		dt 137.5								
463	Anthracene-1,5-disulfonamide	293		dt 240	dt >330							
464	2,5-Dimethylbenzene-1,3-disulfonamide	295, al		81, lgr		174, al						

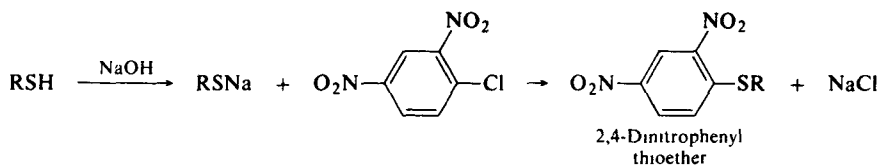
*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXIV. ORGANIC DERIVATIVES OF SULFONAMIDES AND SULFONANILIDES
(Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point, °C	Sulfonic acid	Derivatives of the corresponding acid				Salts of the corresponding acid				Miscellaneous derivatives of the acid
				Chloride	Amide	Anilide	1-Naphthylamide	S-Benzylthionium	p-Toluidinium	Anilinium	o-Toluidinium	
465	Naphthalene-1,6-disulfonamide	298	125 (anh)	129				81 (235)	314-5	298-9	323-4	
466	Naphthalene-1,7-disulfonamide	298 300	123									
467	Biphenyl-4,4'-disulfonamide	300	72	203				171	330 d			
468	Naphthalene-2,6-disulfonamide	305		225				256		360		
469	Azobenzene-3,3'-disulfonamide	305		<i>di</i> 166								
470	2,5-Dimethylbenzene-1,4-disulfonamide	310		164		223						
471	Naphthalene-1,5-disulfonamide	310 (340)	245 (anh)	183		249		257, 251 d	332			Di-Me ester, 205, chl
472	Benzene-1,3,5-trisulfonamide	310 5	>100	<i>tri</i> 187		<i>tri</i> 237						Tri-Et ester, 147, bz
473	Anthraquinone-2,6-disulfonamide	321		<i>di</i> 250, yel, chl bz								
474	Anthracene-1,5-disulfonamide	330		<i>di</i> 240		<i>di</i> 293						
475	Anthracene-1,8-disulfonamide	333		225		224						
476	8-Cyanonaphthalene-1-sulfonamide	333-4		139								
477	Anthraquinone-1,8-disulfonamide	>340	293 4	222 3, yel, PhNO ₂		237-8, yel, PhNO ₂						
478	Anthraquinone-1,3-disulfonamide	>350	310 11 (hyd)	265 70, yel		269-70, red-yel						

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XXV

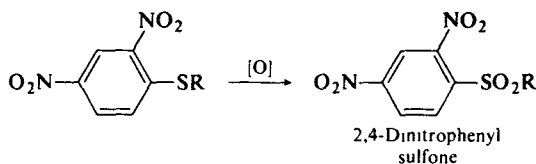
*2,4-Dinitrophenyl thioether (2,4-Dinitrophenyl sulfide).**

From the sodium thiolate (prepared from the thiol and sodium hydroxide) and 2,4-dinitrochlorobenzene in methanol.

For directions and examples see: Cheronis, p. 642.

From the sodium thiolate and 2,4-dinitrochlorobenzene in aqueous or absolute alcohol.

See: Linstead, p. 86; Shriner, p. 255; Vogel, p. 500; Wild, p. 91; R. W. Bost, J. O. Turner and R. D. Norton, *J. Amer. Chem. Soc.*, **54**, 1985 (1932); R. W. Bost, J. O. Turner and M. W. Conn, *J. Amer. Chem. Soc.*, **55**, 4956 (1933).

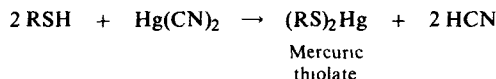
*2,4-Dinitrophenyl sulfone.**

From the thioether (prepared from the thiol and 2,4-dinitrochlorobenzene) and potassium permanganate in aqueous or glacial acetic acid.

For directions and examples see: Cheronis, p. 641; Linstead, p. 87; Vogel, p. 501; Wild, pp. 91-2.

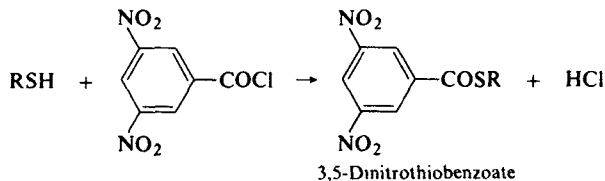
From the thioether with hydrogen peroxide, ammonium molybdate and perchloric acid in water.

See: Cheronis, p. 642.

Hg salt.

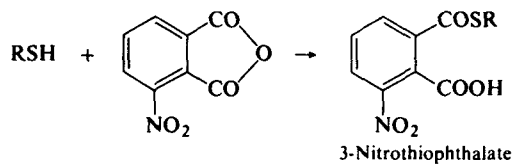
From the thiol and aqueous mercuric cyanide in ethanol.

For directions and examples see: Linstead, p. 86; Wild, pp. 90-91; E. Wertheim, *J. Amer. Chem. Soc.*, **51**, 3661 (1929).

*3,5-Dinitrothiobenzoate.**

From the thiol, 3,5-dinitrobenzoyl chloride and pyridine.

For directions and examples see: Cheronis, p. 643; Shriner, p. 255; Vogel, p. 501; Wild, p. 92; E. Wertheim, *J. Amer. Chem. Soc.*, **51**, 3661 (1929).

*3-Nitrothiophthalate.**

From 3-Nitrophthalic anhydride and the thiol.

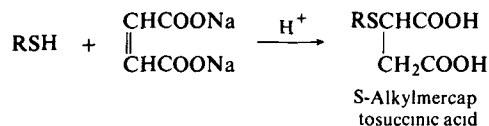
For directions and examples see: Wild, p. 93; E. Wertheim, *J. Amer. Chem. Soc.*, **51**, 3661 (1929).

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

EXPLANATIONS AND REFERENCES TO TABLE XXV (Continued)

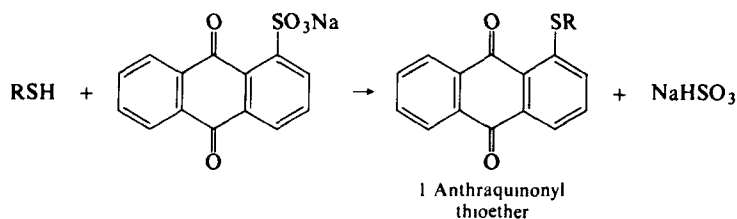
S-Alkylmercaptosuccinic acid (*Alkylthiosuccinic acid*) *



From the thiol and disodium maleate in ethanol

For directions and examples see J G Hendrickson and L F Hatch, *J Org Chem*, **25**, 1747 (1960)

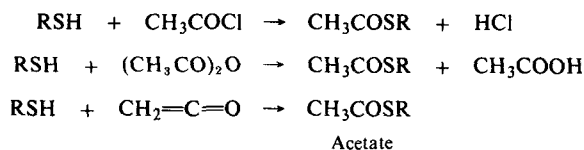
1-Anthraquinonyl thioether



From the thioether with sodium anthraquinone-1-sulfonate and sodium hydroxide in water

For directions and examples see E E Reid, C M MacKall and G E Miller, *J Amer Chem Soc*, **43**, 2104 (1921) W S Hoffman and E E Reid, *J Amer Chem Soc*, **45**, 1831 (1923) L M Ellis and E E Reid, *J Amer Chem Soc*, **54**, 1674 (1932)

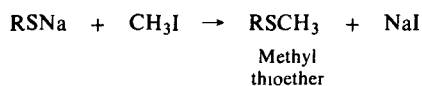
Acetate



From the thiol with acetyl chloride, or from the thiol with acetic anhydride and aqueous sodium hydroxide, or from the thiol with ketene

For directions and examples see A Schoberl and A Wagner in *Methoden der Organischen Chemie (Houben-Weyl)*, Vol 9 (Ed E Muller), Georg Thieme Verlag, Stuttgart, 1955, pp 753-756

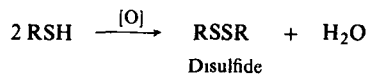
Methyl thioether



From the sodium thiolate with alkyl halide

For directions and examples see E E Reid, *The Chemistry of Bivalent Sulfur*, Vol 2, Chemical Publishing Co, New York, 1960, p 25

Disulfide



From the thiol (or thiophenol) with ferric chloride in aqueous acetic acid

For directions and examples see Linstead, p 87, Wild, p 95, T Zincke and W Frohneberg, *Chem Ber*, **43**, 840 (1910)

From the thiol with chlorine, bromine or iodine in hydrocarbon solvent

See E E Reid, *The Chemistry of Bivalent Sulfur*, Vol 1, Chemical Publishing Co, New York, 1958, p 124

*Derivatives recommended for first trial

WARNING This is not an instruction manual References should be consulted for the preparation of derivatives

TABLE XXV. ORGANIC DERIVATIVES OF THIOLS (MERCAPTANS)

a) Liquids (Listed in order of increasing atmospheric b.p.)*

No	Name	Boiling point °C	Melting point, °C	n_D^{20}	D_4^{20}	2,4-Di-nitro-phenyl thio-ether	2,4-Di-nitro-phenyl sulfone	3,5-Di-nitro-thio-benzoate	3 Nitro-thio-phthalate	1-An-thra-quinonyl thio-ether	Mercury salt	S Alkyl-mer-capto succinic acid	Disulfide	Miscellaneous
1	Methanethiol (Methyl mercaptan)	5.96	-123		0.8599 ²⁵	127.8	189.5			221	176	133	-84.72, b p 116.8	
2	Ethanethiol (Ethyl mercaptan)	36	-144.4	1.4318	0.83147 ²⁵	114.5	160	62	149	184	85	119.5	-101.4, b p 153.5	Acetyl, b p 114
3	2-Propanethiol (sec-Propyl mercaptan)	56	-130.7	1.4256	0.8142	93.55.0	140.5	84	145	134	63		-69 b p 176	
4	2-Methyl-2-propanethiol (tert-Butyl mercaptan)	64.2	1.26	1.4230	0.7999	109.11						164	b p 200.1	Benzoyl, b p 110 ²⁸
5	1-Propanethiol (n-Propyl mercaptan)	67.5	-113.8	1.4348	0.8047	85-6.5	127.5	52	137	151	72	118.9	-85.59 b p 195-6	
6	2-Butanethiol (sec-Butyl mercaptan)	84.5	-165.0	1.4367	0.8294	65.66.0	120				189	135	b p 95.7 ¹⁴	Benzoyl, b p 150 ²⁰
7	2-Methyl-1-propanethiol (Isobutyl mercaptan)	88.72		1.4386	0.8357	74.55.0	105.5	63.4	136	144	95	120.9	b p 220	
8	2-Propene-1-thiol (Allyl mercaptan)	90.67.9		1.4680	0.93044	72	105	52					b p 174d	
9	1-Butanethiol (n-Butyl mercaptan)	98.100	-119 to -115	1.44402	0.8337	66	92	49	144	112.5	86	103.7-4	b p 226	Benzoyl, b p 160 ²³
10	2-Pentanethiol (sec-Amyl mercaptan)	112.9	-169	1.4386 ²⁵	0.82815 ²⁵								b p 122.3 ¹⁰	
11	2-Methoxyethanethiol	113		1.4488 ²⁵		90								Acetyl, b p 110 ¹¹⁰
12	D,L-3-Methylbutanethiol (Isoamyl mercaptan)	117, 118, 20		1.44118	0.83475							115.6-6.0	b p 250	
13	1-Phenylethane-1-thiol	119.20		1.557	1.022		161						58	Acetyl, b p 123-5 ¹³
14	D-2-Methyl-1-butane-thiol	119.21			0.8403 ²⁵	78.9					60	122.3-6	b p 122.3	[α] _D ²⁵ +3.21
15	2-Chloropropanethiol	125		1.4844	1.1062	76.7							b p 113-20 ²⁰	Acetyl, b p 70-1 ⁹
16	2-Chloroethanethiol	125-6		1.5289	1.203	95.7							b p 170.80	Acetyl, b p 51 ⁴
17	2-Ethoxyethanethiol	125.6		1.5795	0.9462	66							b p 150-2 ¹⁵	
18	1-Pentanethiol (n-Amyl mercaptan)	126.64	-75.83	1.44366	0.8390	79.5, 80.5	83	40	132	114	75	107.8	b p 140-5 ¹⁷	PdCl ₂ deriv., 41
19	2-Hexanethiol (sec-Hexyl mercaptan)	142, 138.9	-147.0	1.4426 ²⁵	0.83050 ²⁵									
20	1,2-Ethanedithiol (Ethylene dithio-glycol)	147, 46.7 ¹⁶	-41.0	1.5550	1.1185 ²⁵	248								Di-Me eth., b p 183
21	1-Hexanethiol (n-Hexyl mercaptan)	151.2	-81.03	1.4490	0.8526	73.55.0	97			129	58	96.0-5		
22	2-Hydroxyethanethiol	158, 54 ¹²		1.4443	1.1143	100.2					123		28	Diacetyl, b p 98-9, Dibenzoyl, 39, S-Phenyl-urethane, 59-60, bz

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXV. ORGANIC DERIVATIVES OF THIOLS (MERCAPTANS)
a) Liquids (Listed in order of increasing m.p.)* (Continued)

No	Name	Boiling point °C	Melting point, °C	n_D^{20}	D_4^{20}	2,4-Di-nitro-phenyl thio ether	2,4-Di-nitro-phenyl sulfone	3,5 Di-nitro-thioben-zoate	3 Nitro thio-phthal-ate	1-An-thra-quinonyl thio-ether	Mercury salt	S-Alkyl mer-capto succinic acid	Disulfide	Miscellaneous
23	Cyclohexanethiol (Cyclohexyl mercaptan)	158-60		1.4933	0.9782	148	172				78	150.5-15	b p 288	
24	<i>cis</i> -3-Methyl-1-cyclohexanethiol	165		1.4647 ²⁵	0.916 ²⁵									(α) ₅₄₁ -2.24
25	Thiophenol (Mercaptobenzene)	169.5, 172.5	-14.9	1.5888	1.0780	121	161	149	131				66.5-61	4-Nitro-thio-benzoyl, 115.7-8, Phenyl-urethane, 128
26	<i>trans</i> -3-Methyl-1-cyclohexanethiol	171		1.4663 ²⁵	0.914 ²⁵									(α) ₅₄₆ +5.50
27	2-Thiophenethiol	171.1, 166		1.6021	1.168 ^{19.5}	119	143						56	Acetyl, b p 230.2
28	1,3-Propanedithiol	172.9	-79.0	1.5371 ²⁵	1.0775 ²⁵	194							b p 198 ²⁰	Diben-zoyl, 56.3
29	1-Heptanethiol (<i>n</i> -Heptyl mercaptan)	176.7	-43.4	1.4498 ²⁵	0.83891 ²⁵	81-2	101	53	96	132	77	105.8-6.2	b p 164 ⁶	
30	2-Octanethiol (<i>sec</i> -Octyl mercaptan)	186.4	-79.0	1.4481 ²⁵	0.83293 ²⁵								b p 161-71 ⁶	
31	2-Thiocresol (2-Toluenethiol)	194.3	15			101, 98.9.5	155				170.3			S-4-Nitro-benzoyl, 90-1
32	Phenylmethanethiol (Benzyl mercaptan)	194-5			1.058	130, 128.5-9.5	182.5	120	137			189-90, 192	74, 70	Ph eth, 42
33	3-Thiocresol (3-Toluenethiol)	195.4				100-1.5, 91	145							S-4-Nitro-benzoyl, 95-6, Ag deriv, 126-7
34	1,4-Butanedithiol	195.6	-53.9	1.5265 ²⁵	1.0395 ²⁵									Diben-zoyl, 49.5
35	2-Phenylethanethiol	199		1.5643 ¹⁹	1.0318 ¹⁸	93-4.5	133						b p 168-80 ^{1.5}	Acetyl, b p 134.5 ¹⁴
36	1-Octanethiol (<i>n</i> -Octyl mercaptan)	199.1	-49.2	1.4519 ²⁵	0.83956 ²⁵	78, 76-7.5	98			95	71	96.1-6	b p 178-83 ⁵	
37	2-Chlorothiophenol	205			1.2752 ^{19.5}	138							90	
38	2,5-Dimethylthiophenol (<i>p</i> -Xylene-2-thiol)	211-2												S-Ph eth, b p 172.5 ¹¹ , S-4-Tolyl, eth, b p 188 ¹¹
39	2,4-Dimethylthiophenol (<i>m</i> -Xylene-4-thiol)	214												S-Ph eth, b p 171 ¹¹ , S-Benzyl eth, 35

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXV. ORGANIC DERIVATIVES OF THIOLS (MERCAPTANS)
a) Liquids (Listed in order of increasing m.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	2,4-Di-nitro-phenyl thio ether	2,4-Di-nitro-phenyl sulfone	3,5 Di-nitro thio-ben-zoate	3 Nitro-thio-phthal-ate	1-An-thra-quinonyl thio ether	Mercury salt	S-Alkyl mer-capto-succinic acid	Disulfide	Miscellaneous
40	2-Hydroxythiophenol (Thiocatechol)	216 77 ⁵¹ , 88-90 ⁵	5-6		1.2373 ⁰									O-Me eth, b p 218-9, Di-Me eth, b p 237
41	Bis(2-mercaptoethyl) ether	217	-80	1.5339	1.1648 ²⁵									4-Nitro-benzoyl, 106.5
42	1,5-Pentanedithiol	217.3, 110 ¹⁶	-72.5											Dibenzoyl, 45
43	1-Nonanethiol (<i>n</i> -Nonyl mercaptan)	220.2	-20.1	1.45197	0.83714	86, 84.5	92			117.5		105-6	b p 211-2 ⁶	
44	2-Isopropyl-5-methyl-benzenethiol (Thiothymol)	230-1										78, al		
45	5-Isopropyl-2-methyl-benzenethiol (Thiocarvacrol)	235-6			0.9975 ¹⁷						109			S-Me eth, b p 244
46	1,6-Hexanedithiol	237.1	-21.0	1.5077 ²⁵	0.9886 ²⁵									Dibenzoyl, 57
47	1-Naphthalenethiol (α -Mercapto naphthalene)	285, 114.8 ¹⁰		1.6802	1.1607									Benzyl eth, 78-80, 4-Nitro-benzoyl, 121-30, Acetyl, b p, 200-3 ²⁵

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXV. ORGANIC DERIVATIVES OF THIOLS (MERCAPTANS)
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point, °C	Boiling point °C	2,4-Di-nitro-phenyl thio-ether	2,4 Di-nitro-phenyl sulfone	Acetate	Benzoate	S-Alkyl mer-capto-succinic acid	Disulfide	Methyl thio-ether	Miscellaneous
1	3-Hydroxythiophenol (Thio-resorcinol)	17	168 ¹⁵				<i>di</i> 78		95	15 b p 224 sl d	Di-Me eth , b p 224-5
2	Hexadecanethiol (Cetyl mercaptan)	19	123-80 ⁵	91, 96	105			105 6 5	55 5		
3	1,10-Decanedithiol	20 17 8	297 1				<i>di</i> 57 55				Di ¹⁵ 0 9432 n ₆ ⁵ 1 4940
4	Benzoylmethanethiol (2-Mercapto-acetophenone)	23 4	116 22 ¹						81		Di ¹⁰ 1 1753, Oxime, 70, Phenyl-hydrazone, 90 1
5	2-Aminothiophenol	26	234, 125-7 ⁶	152		<i>di</i> 135			93	b p 234 sl d	
6	3-Phenylenedithiol (Dithio-resorcinol)	27 1	245 123 ¹¹								Trinitrobenzene add comp , 76 7
7	4-Dimethylaminothiophenol	28 5	259 60	176					118		
8	2-Phenylenedithiol (Dithiocatechol)	29	238 9			<i>di</i> 88 5	<i>di</i> 74 5 94-5				
9	4-Hydroxybenzenethiol (Thio-hydroquinone)	30	144 6 ²⁰			S- 85 6, bz -lgr , <i>di</i> 66	75, <i>di</i> 161			84 5	S-Et eth , 39-41
10	<i>threo</i> -Dithiothreitol (<i>threo</i> -2,3-Dihydroxy-1,4 dithiobutane)	42 3	123-5 ²			<i>tetra</i> 73, me al					Oxid → <i>trans</i> -4,5-dihydroxy- <i>o</i> -dithiane, 132, Di-isopropylidene deriv 78, me al
11	4-Thiocresol (4-Toluenethiol)	43-4	195	102 5 4	189 5	<i>di</i> 66	<i>di</i> 161				S-4-Tolyl deriv , 57 S-4-Nitrobenzoyl 114 5 S-Chloro-acetyl, 40
12	4-Chloro-1-naphthalenethiol	43 4, al							122		
13	4-Aminothiophenol	46	140 5 ¹⁶			N-mono 154 163, yel			82	b p 272 3	
14	1,4-(Dimethylthio)-benzene (<i>p</i> -Xylylene dimercaptan)	46-7	156 ¹²				<i>di</i> 135				
15	5-Amino-2-methylthiophenol	47, bz - pet eth				<i>di</i> 125, yel , bz - pet eth				147 lgr	Tri-Me eth , b p 159
16	4-Chlorothiophenol	54	123					163 4	73		
17	2-Hydroxy-1-naphthalenethiol	55, pet eth				O- 120, CCl ₄ , <i>di</i> 57					
18	1,3,5-Benzenetrithiol	57 60				<i>tri</i> 73-4, al				<i>tri</i> 66 8, al 64 5	
19	2-Nitrothiophenol	58 61		131 3					199		
20	1-Amino-2-propanethiol	63 5							Dihydro-chloride, 214		Hydrochloride, 87- 8, al Picrate, 143-4 d
21	4-Bromothiophenol	75	231	142	190	51 2, me al			94 5	38, al	Benzenesulfonate, 75
22	3-Nitrothiophenol	77							84		
23	4-Nitrothiophenol	77		160			123 7, 50 ^o ac a		184	72	
24	4-Nitro-1-naphthalenethiol	77 9		193					189		
25	2-Naphthalenethiol (2-Mercapto-naphthalene)	81	286	145	228	53 5			139		4-Nitrobenzoyl, 183-4, 2-Tolyl eth , b p 229 5 ¹¹

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XXV. ORGANIC DERIVATIVES OF THIOLS (MERCAPTANS)

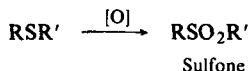
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point °C	2,4-Di-nitro-phenyl thio-ether	2,4-Di-nitro-phenyl sulfone	Acetate	Benzoate	S-Alkyl mercapto succinic acid	Disulfide	Methyl thio-ether	Miscellaneous
26	DL-erythro-Dithiothreitol (<i>erythro</i> -2,3-Dihydroxy-1,4-dithiobutane)	82 3, lt pet eth				<i>tetra</i> 126, bz					Oxid → <i>cis</i> -4,5-dihydroxy- <i>o</i> -dithiane, 132 Di-isopropylidene deriv., 145, pet eth
27	4-Iodothiophenol	85 6, al		140 5					124	45 38	CrO ₃ /AcOH → sulfone, 83
28	4-Amino-1-naphthalenethiol	91 3				<i>N-mono</i> 173			168		
29	2-(3-Aminopropionamido)ethanethiol (Alethene)	93 6, subl 140 ¹⁰ s				<i>di</i> 139 40, et ac					Hydrochloride, 214 7, 95 ⁰ , al. Oxalate, 121 2, al
30	Bis(4-mercaptophenyl) ether	98				<i>di</i> 68					
31	4-Phenylenedithiol (1,4-Dimercaptobenzene)	98, aq al				<i>di</i> 126, pet eth				<i>di</i> 85, me al	Di-Et eth, 81 5, al
32	2-Aminoethanethiol	98 100	130	94 5		<i>di</i> 30			Dihydrochloride, 216		Hydrochloride, 70 2, al. Picrate, 126 S-Acetyl hydrochloride, 137
33	Triphenylmethanethiol	107		190		139-41	185		<i>ca</i> 155		
34	4-Bromo-2-nitrothiophenol	110		142							
35	4-Biphenylthiol	111 2, al		146	170				150	107 8, al	
36	3-Amino-1-propanethiol	112 3							Dihydrochloride, 219		Hydrochloride, 69, dil al
37	1,8-Naphthalenedithiol	113 4, al								<i>di</i> 84	
38	4-Hydroxy-1-naphthalenethiol	114				<i>di</i> 77					
39	Bis(4-thiophenyl) sulfide	114				<i>di</i> 65			190		
40	2,4,6-Trinitrothiophenol	114		217							
41	1,5-Naphthalenedithiol	118 21, yel				<i>di</i> 187-9	<i>di</i> 232			<i>di</i> 250	
42	4-Chloro-2-nitrothiophenol	120 2		141							
43	2,4-Dinitrothiophenol	131 2		193 7	240 1	107	113		280		
44	6-Hydroxy-2-naphthalenethiol	137, al				<i>di</i> 110, 107, al			221		
45	2-Benzothiazolthiol	177 9, aq me al								52, aq al	Et eth, 26 al
46	2,7-Naphthalenedithiol	181, 174, al				<i>di</i> 110	<i>di</i> 152-3				
47	1-Antraquinonethiol	187, yel, ac a							>350	218, yel, al	Et eth, 183, yel, al, Benzyl eth, 241, yel, ac a
48	2-Antraquinonethiol	206, yel, ac a							257	162, yel, ac a	Et eth, 138, yel, al, Benzyl eth, 138, yel, al
49	2-Benzimidazolthiol	298, 296 7, dil al									Benzyl eth, 186 7, 1-N-Me eth, 190-2

*Derivative data given in order m p, crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLE XXVI

Sulfone *



From the thioether in glacial acetic acid with dilute aqueous potassium permanganate

For directions and examples see Cheronis, p 641, Linstead, p 87, G W Fenton and C K Ingold, *J Chem Soc*, 2338 (1929), H Rheinboldt and E Giesbrecht, *J Amer Chem Soc*, 68, 973 (1946)

From the thioether with aqueous hydrogen peroxide in acetone or in acetic acid

See O Hinsberg, *J prakt Chem*, 90, 350 (1914), H Rheinboldt and E Giesbrecht, *J Amer Chem Soc*, 68, 973 (1946), C G Overberger, S P Lighthelm and E A Swire, *J Amer Chem Soc*, 72, 2856 (1950)

From the thioether with hydrogen peroxide and ammonium molybdate in aqueous perchloric acid

See Cheronis, p 641

From the thioether with potassium bichromate and sulfuric acid in water

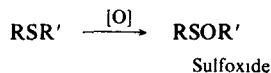
See G Raiziss, L W Clemence, M Severac and J C Moetsch, *J Amer Chem Soc*, 61, 2763 (1939)

From the thioether with chromic anhydride in glacial acetic acid

See C G Overberger, S P Lighthelm and E A Swire, *J Amer Chem Soc*, 72, 2856 (1950)

For extensive lists of references for the oxidation of thioethers to the corresponding sulfones see A Schoberl and A Wagner in *Methoden der Organischen Chemie (Houben-Weyl)*, Vol 9, (Ed E Miller), Georg Thieme Verlag, Stuttgart, 1955, pp 227-231, E E Reid, *Organic Chemistry of Bivalent Sulfur*, Vol 2, Chemical Publishing Co, New York, 1960, pp 64-65

Sulfoxide



From the thioether with hydrogen peroxide in acetic acid, in acetone or in alcohol-acetic acid mixture

For directions and examples see O Hinsberg, *Chem Ber*, 43, 289 (1910), R L Shriner, H C Struck and W V Jorison, *J Amer Chem Soc*, 52, 2060 (1930), P Karrer, N J Antia and R Schwyzer, *Helv chim Acta*, 34, 1392 (1951)

From the thioether with perphthalic acid in ether

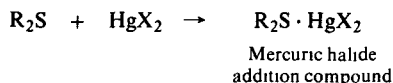
See H Bohme, *Chem Ber*, 70, 378 (1937)

From the thioether with chromic anhydride in aqueous acetic acid

See R Knoll, *J prakt Chem*, 113, 40 (1926)

For additional references for the oxidation of thioethers to the corresponding sulfoxides see A Schoberl and A Wagner in *Modern Methoden der Organischen Chemie (Houben-Weyl)*, Georg Thieme Verlag, Stuttgart, 1955, pp 211-215

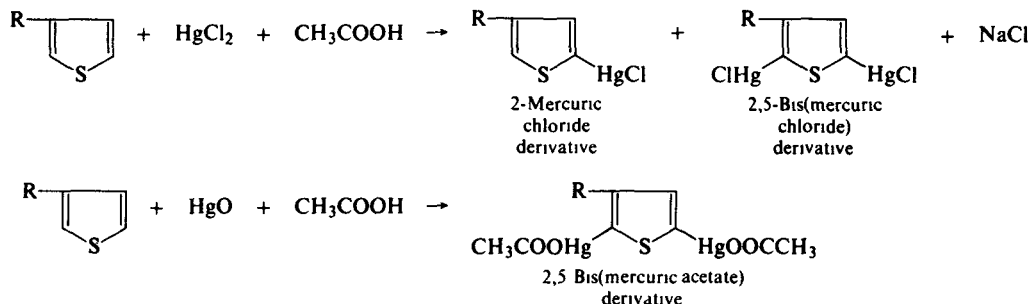
Mercuric halide addition compound



From the thioether with mercuric chloride, bromide or iodide in ethanol, acetone or aqueous solution

For directions and examples see W F Faragher, J C Morrell and S Comay, *J Amer Chem Soc*, 51, 2774 (1929), E E Reid, *Organic Chemistry of Bivalent Sulfur*, Vol 2, Chemical Publishing Co, New York, 1960.

Mercuric halide or mercuric acetate derivative



*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

EXPLANATIONS AND REFERENCES TO TABLE XXVI (Continued)

These derivatives are for substituted thiophenes only.

From the substituted thiophene with the mercuric salt (with or without sodium acetate) in ethanol or in acetic acid.

For directions and examples see: H. D. Hartough, Thiophene and its Derivatives, (The Chemistry of Heterocyclic Compounds, Vol. 3), Interscience, London, 1952, pp. 444-453.

For various additional compounds of thioethers with metal salts see: E. E. Reid, *Organic Chemistry of Bivalent Sulfur*, Vol. 2, Chemical Publishing Co., New York, 1960, pp. 52-60.

*Derivatives recommended for first trial.

WARNING: This is not an instruction manual. References should be consulted for the preparation of derivatives.

TABLE XXVI. ORGANIC DERIVATIVES OF THIOETHERS (SULFIDES)

a) Liquids 1) Noncyclic (Listed in order of increasing b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Sulfone	Sulfoxide	Disulfide	Miscellaneous
1	Dimethyl sulfide (Methyl sulfide)	37.3	-98.27	1.4356	0.8458 ²¹	109 b p 238	18.45 b p 189	109.7	Tri-HgCl ₂ add comp., 158.150.1, rapid htng. HgI ₂ add comp., 75, SnBr ₄ add comp., 85-7, PtCl ₂ add comp., 159. PtBr ₂ add comp., 159. PdCl ₂ add comp., 130. PdBr ₂ add comp., 125. AgNO ₃ add comp., 126.
2	Ethyl methyl sulfide	66.9	-104.8	1.4353	0.8483	36, eth		130	HgCl ₂ add comp., 128. HgI ₂ add comp., 59. PdCl ₂ add comp., 67.
3	Methyl vinyl sulfide	67.3		1.4845	0.9026				
4	Divinyl sulfide (Vinyl sulfide)	84			0.9174				
5	Allyl methyl sulfide	91.3		1.4712	0.8767				
6	Diethyl sulfide (Ethyl sulfide)	92	-102.05	1.44233	0.8368	73.4 b p 248	4.6.15 b p 88 9 ¹⁵	152.6 154	Disulfoxide 123.4 ¹¹ . Mono-HgCl ₂ add comp., 90. Di-HgCl ₂ add comp., 119.5. HgI ₂ add comp., 110. AgNO ₃ add comp., 122. SnCl ₄ add comp., 102. SnBr ₄ add comp., 84. PtCl ₂ add comp., 106. PtBr ₂ add comp., 118. PtI ₂ add comp., 136. PdCl ₂ add comp., 83. PdBr ₂ add comp., 100.
7	Ethyl vinyl sulfide	92		1.4756	0.8756				
8	Isopropyl methyl sulfide	93.5.85	-101.48	1.4392	0.8291				
9	Methyl <i>n</i> -propyl sulfide	95.5	-112.98	1.4442	0.8438				
10	<i>tert</i> -Butyl methyl sulfide	99		1.4402	0.8257				
11	Chloromethyl methyl sulfide	107.1		1.4967					
12	Ethyl isopropyl sulfide	107.3	-122.19	1.4407	0.8246				
13	Isobutyl methyl sulfide	112.5		1.4433	0.8335				
14	Methyl 2-methylallyl sulfide	113.0.2		1.4712					
15	Allyl ethyl sulfide	115.6			0.8676				
16	Ethyl <i>n</i> -propyl sulfide	118.5, 110.2	-117.04	1.4461	0.84448	25, b p 142 ²³		173.7	
17	Di-isopropyl sulfide (Isopropyl sulfide)	120.7	-78.08	1.4381	0.8135	36	68.5	176	PtCl ₂ add comp., 163. PtBr ₂ add comp., 174. PtI ₂ add comp., 176, PtI ₄ add comp., 139. HgCl ₂ add comp., 116.5.
18	<i>n</i> -Butyl methyl sulfide	122.5		1.4477	0.8427				
19	Chloromethyl ethyl sulfide	128				33		b p 78 80 ¹⁶	
20	Isopropyl propyl sulfide	132		1.4440	0.8269				
21	<i>sec</i> -Butyl ethyl sulfide	133.6		1.4477	0.8353				
22	Ethyl isobutyl sulfide	134.2		1.4452	0.8306				
23	Diallyl sulfide (Allyl sulfide)	139 ^{75k} , 35 ⁵⁻⁷	-83	1.4877 ²⁷	0.88765 ²⁷	b p 109 ³	b p 107-97 ⁸	b p 78 80 ¹⁶	HgCl ₂ add comp., 108.
24	Methyl 2-methylbutyl sulfide	139-40			0.8410 ¹⁹				
25	2-Chloroethyl methyl sulfide	140, 44 ²⁰		1.4908	1.1155				
26	Di- <i>n</i> -propyl sulfide (<i>n</i> -Propyl sulfide)	141.2	-101.9	1.4481	0.8358	30	14.5.5.0, b p 82 ¹⁵	194	Mono-HgCl ₂ add comp., 88.9. Di-HgCl ₂ add comp., 122.127.5. Chloroamine-T → sulflimide, 110.1.5.
27	<i>n</i> -Butyl ethyl sulfide	144.2	-95.13	1.4491	0.8376	50		193	
28	Methyl pentyl sulfide (Amyl methyl sulfide)	144.5-5.5		1.448	0.843				HgCl ₂ add comp., 127.
29	Di- <i>tert</i> -butyl sulfide (<i>tert</i> -Butyl sulfide)	150		1.4505				201, b p 88 ²¹	
30	Diacetyl sulfide (Thioacetic anhydride)	155.8d, 63 ²⁰		1.4810 ²¹	1.124				Reduction → acetaldehyde, b p 20.2. 2,4-dinitrophenylhydrazine, 168.
31	Dichloromethyl sulfide (Chloromethyl sulfide)	156.5	-54, -37	1.5313	1.4065	70.5-2.0			
32	2-Chloroethyl ethyl sulfide	157, 63-5 ¹⁷		1.06644	1.4878				

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXVI. ORGANIC DERIVATIVES OF THIOETHERS (SULFIDES)

a) Liquids 1) Noncyclic (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Sulfone	Sulfoxide	Disulfide	Miscellaneous
33	2-Aminoisopropyl methyl sulfide	158				b p 140 ⁴			
34	Ethyl 3-methylbutyl sulfide	160		1.4495	0.8349	13.5			HgCl ₂ add comp, 87
35	4-Chlorophenyl methyl sulfide	170		1.6023 ²⁵	1.1224 ²⁵	57.8			
36	3-Aminopropyl methyl sulfide	170				44, b p 165.8 ⁶	197		Hydrochloride, 136, Picrate, 127, Oxalate, 207d
37	Di-isobutyl sulfide (Isobutyl sulfide)	172.3		1.4463	0.8262	17, b p 265	68.5	215	Mono-HgCl ₂ add comp, 116, Di-HgCl ₂ add comp, 131, PtCl ₂ add comp, (i) 83 (ii) 139, PtBr ₂ add comp, 143.4 PtI ₂ add comp, 187 PtCl ₄ add comp, 162, AuCl ₃ add comp, 87 PdCl ₂ add comp, 95, PdBr ₂ add comp, 140, PdI ₂ add comp, 145
38	Di-2-methylallyl sulfide (2-Methylallyl sulfide)	173							
39	Chloromethyl dichloromethyl sulfide	177.2 ⁷⁵³		1.5395	1.5258				
40	Dicrotyl sulfide (Crotyl sulfide)	186.5, 88.9 ²⁰		1.495 ²⁵	0.9032 ⁰				
41	Di-n-butyl sulfide (n-Butyl sulfide)	188.0, 182.109.15 ¹⁵	-79.7	1.45405	0.8386	44, resolidifies at 32.5	33	231	Di-HgCl ₂ add comp 113.110.5 PtBr ₂ add comp 65 PtI ₂ add comp 67 PdCl ₂ add comp, 32 Pd(NO ₃) ₂ add comp, 166, AgNO ₃ add comp 98
42	4-Aminobutyl methyl sulfide	188.90				42 b p 165 ³			Hydrochloride, 153.4, acet Picrate, 116.8
43	Di-dichloromethyl sulfide (Di-chloromethyl sulfide)	189.62.4 ¹⁰		1.5464	1.6273				
44	Methyl phenyl sulfide	194-6.78-9 ¹³		1.5870	1.0533 ²⁵	88, w			
45	2-Chloroethyl chloromethyl sulfide	194.5.77 ¹⁰		1.5311	1.338				
46	Benzyl methyl sulfide	195.8		1.5550 ²⁵		127, w			
47	Ethyl phenyl sulfide	205, 200-2		1.5701 ¹⁵	1.024 ¹⁵	42, b p 160 ¹²			PdCl ₂ add comp, 140
48	Isopropyl phenyl sulfide	208		1.5468	0.9855				PdCl ₂ add comp, 162
49	Methyl 4-tolyl sulfide	211.2, 104-5 ²⁰		1.57537 ¹⁶	1.0302 ¹⁶	89, bz - pet eth	50-4		
50	Di-(3-methylbutyl)sulfide (Isoamyl sulfide)	215.3		1.4471	0.8285	31, b p 295		250	PdCl ₂ add comp, 95 PdBr ₂ add comp, 133 PdI ₂ add comp, 143, SnCl ₄ add comp, 64, SnBr ₄ add comp, 45.6
51	Allyl phenyl sulfide	215-8, 104-6 ²⁵		1.5760	1.0275				
52	Di-2-chloroethyl sulfide (2-Chloroethyl sulfide, Mustard gas, Yperite)	217	14.4	1.53125	1.2741	56, b p 183 ²⁰	109-11		
53	Phenyl propyl sulfide	219-20		1.5571	0.9995	44			PdCl ₂ add comp, 91
54	Ethyl 4-tolyl sulfide	220.1		1.5568	1.0016 ^{17.5}	55.6			
55	Benzyl ethyl sulfide	222.3, 98.9 ¹³				84			Mono-HgCl ₂ add comp, 84, Di-HgCl ₂ add comp, 142
56	3-Methylbutyl phenyl sulfide	240-2		1.5380	0.9681	36			PdCl ₂ add comp, 97
57	2-Chloroethyl phenyl sulfide	245, 121 ¹⁵		1.5838	1.1799	45			
58	2-Chloroethyl 4-tolyl sulfide	255-7, 150-2 ²⁰				78			
59	2-Hydroxyethyl 4-tolyl sulfide	282-3, 119.20 ¹							
60	Di-(3-tolyl)sulfide (m-Tolyl sulfide)	290, 174 ¹²				94	b p 215 ¹⁵	b p 150 d	

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXVI. ORGANIC DERIVATIVES OF THIOETHERS (SULFIDES)
a) Liquids 1) Noncyclic (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Sulfone	Sulfoxide	Disulfide	Miscellaneous
61	Diphenyl sulfide (Phenyl sulfide)	296, 157-8 ¹⁶ 5	-21 5	1 6312	1 1160	128-9, b p 379	70 5	61	Disulfone of the disulfide, 193-4
62	Di- <i>n</i> -heptyl sulfide (<i>n</i> -Heptyl sulfide)	298				80			
63	4-Chlorophenyl phenyl sulfide	305-15d, 167-8 ¹⁰				34, 90			
64	Phenyl 3-tolyl sulfide	309 5, 164 5 ¹¹	-6 5		1 0937 ¹⁶				
65	Phenyl 2-tolyl sulfide	309 9, 300 5, 160 5 ¹¹			1 1012 ¹⁵	81, al			
66	Phenyl 4-tolyl sulfide	311 5, 167 5 ¹¹	15 7		1 0900 ^{16, 7}	127-8 al			

*Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXVI. ORGANIC DERIVATIVES OF THIOETHERS (SULFIDES)

a) Liquids 2) Cyclic (Listed in order of increasing b.p.)*

No	Name	Boiling point, °C	Melting point, °C	n_D^{20}	D_4^{20}	Sulfone	HgCl ₂ addition compound	Miscellaneous
1	Ethylene sulfide (Thiurane Thiacyclopropane)	55-6		1.4914	1.0046			Polymerizes rapidly
2	2-Methylethylene sulfide (2-Methylthiurane)	76		1.473 ¹⁹	0.946 ¹⁸			
3	Thiophene	84.12	-38.30	1.5287	1.0644			2-HgCl deriv., 182-3; 2-HgBr deriv., 169-70, 2-HgI deriv., 116-7
4	2,2-Dimethylethylene sulfide (2,2-Dimethylthiurane)	87, 84.6		1.4641				
5	Trimethylene sulfide (Thietane Thiacyclobutane)	95	-73.25	1.506 ²³	1.0200	76, w	93.5 d	Methodide, 98.5-9.0
6	2-Ethylethylene sulfide (2-Ethylthiurane)	104		1.475 ¹⁹	0.930 ¹⁸			
7	2-Methyltrimethylene sulfide (2-Methylthietane)	106		1.4831	0.9571	b p 251.5-3.5		
8	2-Methylthiophene	112.4		1.52042	1.02183			5-HgCl deriv., 204, 5-HgBr deriv., 179-80, 5-HgI deriv., 111-2
9	2,4-Dimethyltrimethylene sulfide (2,4-Dimethylthietane)	113.4		1.4502 ^{1*}	0.8710 ¹⁸	b p 255.0-5.5		
10	3-Methylthiophene	115.4		1.52042	1.02183			2-HgCl deriv., 128-9, 2,5-Di-HgOOCCH ₃ deriv., >240d
11	2,2-Dimethyltrimethylenesulfide (2,2-Dimethylthietane)	120		1.4739 ^{1*}		55	118	
12	Tetramethylene sulfide (Thiolane Thiophane Thiacyclopentane)	121.2, 120.2-5	-96.17	1.5047	0.99869	28.36	128	Sulfoxide, 105-7 ¹²
13	2-Methyltetramethylene sulfide (2-Methylthiolane)	132.5 ⁷⁵⁰	-100.71	1.4922	0.9555	b p 279-80 ^{75*}	di 162	
14	2-Ethylthiophene	132.5-4.0		1.5127	0.990 ²⁴			5-HgCl deriv., 147-8, 5-HgI deriv., 96-7
15	3-Ethylthiophene	135.6		1.5146	0.9980			2-HgCl deriv., 67-8, 2,5-Di-HgCl deriv., 295-7d
16	2,5-Dimethylthiophene	135.5-6.0	-62.57	1.5126	0.98587			3-HgCl deriv., 156-7, 3-HgI deriv., 175
17	2,4-Dimethylthiophene	137.8, 140		1.5130	0.9956			5-HgCl deriv., 138-9, 5-HgI deriv., 137-9
18	3-Methyltetramethylene sulfide (3-Methylthiolane)	138.2	-81.10	1.4924	0.9634	1, 0.5	83	
19	2,3-Dimethylthiophene	140.2-1.2	-49.1 to -48.9	1.5188	1.0021			5-HgCl deriv., 218.5-9.5, 5-HgI deriv., 184.0-4.5, 4,5-Di-HgOOCCH ₃ , 237-40
20	trans-2,5-Dimethyltetramethylene sulfide (trans-2,5-Dimethylthiolane)	142	-76.35	1.4766	0.9188	3, b p 278	111	
21	cis-2,5-Dimethyltetramethylene sulfide (cis-2,5-Dimethylthiolane)	142.3		1.4799	0.9222	4, b p 278	di 180	
22	3,4-Dimethylthiophene	144.6		1.5212	1.008 ²¹			2-HgCl deriv., 139-40.5, 2-HgBr deriv., 152, 2-HgI deriv., 142
23	1,4-Thioxane	148.9	-17	1.5070	1.1177	130, 105.5	171	Sulfoxide, 25, 45
24	2-Methylpentamethylene sulfide (2-Methylthiane)	151	-58.14	1.4905	0.9428	68.5	102	
25	2-Isopropylthiophene	152		1.5037	0.9673			
26	3-Isopropylthiophene	155.7, 157		1.5052	0.9733			5-HgCl deriv., 137
27	3-Methylpentamethylene sulfide (3-Methylthiane)	157-8	-60.17	1.4922	0.9473	83	136	
28	2-Ethyltetramethylene sulfide (2-Ethylthiolane)	157.8		1.4896	0.9451		mono 100, di 146-8	
29	2-Propylthiophene	157.5-9.5		1.5048	0.9683			5-HgCl deriv., 155, 5-HgSCN deriv., 169.0-9.5
30	4-Methylpentamethylene sulfide (4-Methylthiane)	158.6	-28.11	1.5049	0.9687	121.5	136	
31	2-Ethyl-5-methylthiophene	159.8-60.4	-68.6	1.5073	0.9663			

* Derivative data given in order m p, crystal color, solvent from which crystallized

TABLE XXVI. ORGANIC DERIVATIVES OF THIOETHERS (SULFIDES)
a) Liquids 2) Cyclic (Listed in order of increasing b.p.)* (Continued)

No	Name	Boiling point °C	Melting point °C	n_D^{20}	D_4^{20}	Sulfone	HgCl ₂ addition compound	Miscellaneous
32	2-Ethyl-3-methylthiophene	160 0 1 5		1 5092 ²²	0 9792 ²²			5 HgCl deriv , 172-3, 5-HgI deriv , 156-7
33	2,6-Dimethyl-1,4-thioxane	160 1		1 4733		105 5		
34	3-Propylthiophene	160 2		1 5057	0 9716			
35	2-Allylthiophene	161, 158 5 9 0		1 5281 ²⁰	1 0175 ²⁰			
36	3,5-Dimethyl-1,4-thioxane	162				102		
37	3-Ethyl-5-methylthiophene	162 4	-60 to -59	1 5098	0 9742			
38	2,3,5-Trimethylthiophene	163 5, 164 5 ⁴⁶		1 5131	0 9753			x-HgCl deriv , 160-1
39	2-tert-Butylthiophene	163 9	-59 2	1 49788	0 9514			
40	3-tert-Butylthiophene	168 9	-54 8	1 50149	0 9574			
41	Hexamethylene sulfide (Thiepane Thiacycloheptane)	170 173 4		1 5125	0 9883	71	149	Methiodide, 141 5-2 0
42	2,3,4-Trimethylthiophene	172 7, 160 3		1 5208	0 995			
43	1,3-Dithiolane(1,3-Dithiacyclopentane)	175		1 5975 ¹³	1 259 ¹	di 205	117, 126	Methiodide, 96, Disulf-oxide, 134
44	2-Methyl-5-propylthiophene	179 5 80 5		1 5026				
45	Cyclohexene sulfide (7-Thiabicycloheptane)	180 71 5-3 5 ²¹		1 5309	0 9274			
46	2-n-Butylthiophene	181-2 ⁷⁴⁰		1 50896	0 9537			
47	2,5-Diethylthiophene	181-2, 63-6 ¹⁴		1 5036	0 962 ¹⁴			
48	3-n-Butylthiophene	181 3		1 51005	0 9570			
49	2,3,4,5-Tetramethylthiophene	182 4, 187 9		1 5196	0 9442 ²¹			
50	3,4-Diethylthiophene	185-7		1 5157 ¹⁷				2-HgCl deriv , 118
51	2-Ethyl-1,3-dithiolane	191 2				124		
52	2,4-Dimethyltetramethylene sulfide (2,4-Dimethylthiolane)	197 8 ¹²		1 4818	0 9265	b p 123 3 ⁵	89	
53	3-Ethyl-2,4,5-trimethylthiophene	204 6 ⁷⁴⁸		1 5132	0 9609			
54	2-n-Octylthiophene	257 9, 106 8 ¹		1 4824	0 920			

*Derivative data given in order m p , crystal color, solvent from which crystallized

TABLE XXVI. ORGANIC DERIVATIVES OF THIOETHERS (SULFIDES)
b) Solids (Listed in order of increasing m.p.)*

No	Name	Melting point °C	Boiling point °C	Sulfone	Sulfoxide	Disulfide	Miscellaneous
1	Ethyl 2-naphthyl sulfide	16	170.5 ¹⁵	43.5			
2	Ethyl hexadecyl sulfide	19		88			
3	Thiane (Pentamethylene sulfide Thiacyclohexane)	19.07, 13	142	98.5, 9.0			D ₄ ¹⁰ 0.9849, n _D ²⁰ 1.5067, HgCl ₂ add comp., 137.5, al., Meth iodide, 192 subl
4	2-Methyl-1,4-dithiane	20		dt 304			
5	Didecyl sulfide (Decyl sulfide)	27	217.8*	206.7			
6	3-Tolyl 4-tolyl sulfide	27.8 al	179 ¹¹	116 ac a	72		
7	Diundecyl sulfide (Undecyl sulfide <i>n</i> -Hendecyl sulfide)	34.8					
8	Di-(2-bromoethyl)sulfide (Bromoethyl sulfide)	35		111.2			
9	4-Iodophenyl phenyl sulfide (4-Iododiphenyl sulfide)	35		141			
10	2-Aminophenyl phenyl sulfide (2-Amino-diphenyl sulfide)	35.6, al	212 ²³	122, dil al			<i>N</i> -Benzenesulfonyl, 225.6
11	4-Bromophenyl methyl sulfide	37.5		56.7			
12	Didodecyl sulfide (<i>n</i> -Dodecyl sulfide)	40.5				34.5	
13	Benzyl phenyl sulfide	41.44.5, al	197 ²	146.6.5, 148, al	123		
14	Di-(4-chlorobenzyl)sulfide (4-Chlorobenzyl sulfide)	41				59	
15	1-Naphthyl phenyl sulfide	41.8, aq al	220.5 ¹¹	99.5, 100.5, al			
16	3-Nitrophenyl phenyl sulfide (3-Nitrodiphenyl sulfide)	42.5		80.5, 81			
17	Ethyl 4-nitrophenyl sulfide	44		138.5			
18	Isopropyl 4-nitrophenyl sulfide	44.5		115.3			
19	Di-(4-methoxyphenyl)sulfide (4-Methoxyphenyl sulfide)	46		130	96	45	Disulfone, 221, r h 210.2, s h
20	Dibenzoyl sulfide (Thiobenzoic anhydride, Benzoyl sulfide)	48, al				133, 128	
21	Dibenzyl sulfide (Benzyl sulfide)	50, chl		151.7, al bz	134.8	73	D ₄ ¹⁰ 1.0712, HgCl ₂ add comp., 131, HgI ₂ add comp., 37.8, FeCl ₃ add comp., 94, PtCl ₄ add comp., 159, PtCl ₂ add comp., 172d, PtBr ₂ add comp., 139, PtI ₂ add comp., 129
22	2,5-Dichlorophenyl methyl sulfide	51		88			
23	Methyl 2-naphthyl sulfide	51.8, 64	226 ¹¹	115.6, al	67.5		Disulfone, 166
24	Bis(phenylthio)methane	52		dt 120-1			
25	Ditetradecyl sulfide (<i>n</i> -Tetradecyl sulfide)	53.8				46	
26	Di-(2-diphenoxyethyl)sulfide	54, al		108, pink, al		97	
27	1,3-Dithiane	54		dt 330, 308			
28	Bis(benzylthio)methane	55		dt 216			
29	4-Nitrophenyl phenyl sulfide (4-Nitrodiphenyl sulfide)	55, yel lgr	240 ²⁵	142, aq al			
30	Di- <i>n</i> -octyl sulfide (<i>n</i> -Octyl sulfide)	57		76		b p 178-83 ⁵	
31	Di-(4-tolyl)sulfide (4-Tolyl sulfide)	57.3	179 ¹¹	158, bz	95, pet eth	48, al	
32	2-Aminophenyl 4-aminophenyl sulfide (2,4'-Diaminodiphenyl sulfide)	61, 62.5, aq al		124-6			Diacetyl, 208
33	Dihexadecyl sulfide (<i>n</i> -Hexadecyl sulfide)	61.3		103.4	99.8		
34	2-Chloroethyl 4-nitrophenyl sulfide	62		128			
35	Di-(2-tolyl)sulfide (2-Tolyl sulfide)	64, al	285, 174 ¹⁵	134.5, al	121, pet eth	38-9, al	
36	Methyl 2-nitrophenyl sulfide	64.5, yel, al		106			D ₄ ¹⁰ 1.2626, n _D ²⁰ 1.62458, AgNO ₃ add comp., 122, yel, al
37	Benzyl 4-bromophenyl sulfide	65		159			

*Derivative data given in order m.p., crystal color, solvent from which crystallized

TABLE XXVI. ORGANIC DERIVATIVES OF THIOETHERS (SULFIDES)
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Sulfone	Sulfoxide	Disulfide	Miscellaneous
38	1,2-Bis(phenylthio)ethane	69-70		di 180			
39	Dioctadecyl sulfide (Octadecyl sulfide)	71, 64-5				62-5	
40	2-Phenyl-1,3-dithiane	71-2		di 265			
41	Methyl 4-nitrophenyl sulfide	72		141			D ₄ ⁸⁰ 1 2391, n _D ⁸⁰ 1 64008
42	Di-(3-phenylpropyl)sulfide (3-Phenylpropyl sulfide)	73		117		b p 165-60 ⁰³	
43	Di-(2-methoxyphenyl)sulfide (2-Anisyl sulfide)	73, al	252-3 ¹⁰	157-8, bz		120	
44	Di-(4-methylbenzyl)sulfide (4-Methylbenzyl sulfide)	76		197			
45	Cinnamyl phenyl sulfide	78		111-2	90-1		
46	4-(Methylthio)benzaldehyde	78, yel, lgr	273, 153 ¹⁷				Phenylhydrazone, 138, Thiosemicarbazone, 177-9, yel
47	4-Nitrobenzyl phenyl sulfide	79		209-5			
48	1,2-Bis(tolylthio)ethane	80-1		di 200-1			
49	2-Nitrophenyl phenyl sulfide (2-Nitrodiphenyl sulfide)	80-2, 77, yel	210 ¹⁵	147-5, al			
50	Di-(2-aminobenzyl) sulfide	81				90-1 lgr et ac	N,N'-Di-formyl, 163 N,N'-Diacetyl, 209 Picrate, 203-4d
51	4-Nitrophenyl 4-tolyl sulfide	81-5, yel		170-1, yel			
52	Di-(2-aminophenyl) sulfide	87		146-7		93, al	N,N'-Diacetyl, 164-5 N,N'-Dibenzoyl, 162-3
53	Di-(2-phenylethyl) sulfide (2-Phenylethyl sulfide)	92-5-90		100-6	69	b p 172-5 ⁰⁸	
54	4-Aminophenyl phenyl sulfide (4-Amino-diphenyl sulfide)	96, lgr	243 ²⁹	176, al	152, w		Hydrochloride, 197-8d N-4-Toluenesulfonyl, 73
55	Di-(4-amino-3-methylphenyl) sulfide	96-25 ⁰ , al					Di-hydrochloride, 248-9 dil HCl N,N'-Diacetyl, 22, al, N,N'-Dibenzoyl, 233, me al, Dipicrate, 186, w
56	Di-(4-chlorophenyl) sulfide (4-Chlorophenyl sulfide)	98-88-90	212 ¹⁸	148-9, subl	143	73	
57	3-Aminophenyl 4-nitrophenyl sulfide (3-Amino-4'-nitrodiphenyl sulfide)	99-100					N-Acetyl, 115-6, N,N-Dimethyl, 83-4
58	Di-(2-amino-5-methylphenyl) sulfide	103-4, al				98	Di-hydrochloride, 100d, al, N,N'-Diacetyl, 165, al, N,N'-Dibenzoyl, 185-6, al, Diurethane, 113, bz -pet eth Dipicrate, 179, bz
59	Di-(4-aminobenzyl) sulfide	104-5				96-8, al	N,N'-Diacetyl, 188, N,N'-Dibenzoyl, 224
60	Di-(4-aminophenyl) sulfide	108-9, w		178, me al	175d, al	85-106, al	N,N'-Diacetyl, 220-1 N,N'-Dibenzoyl, 234
61	Di-(1-naphthyl) sulfide	110, al	290 ¹⁵	187, al	166, al	91	
62	1,4-Dithiane	111-2	199-200	mono 200, di >330			Methodide, 73-4, Sulfoxide-sulfone, 279
63	Di-(4-bromophenyl) sulfide (4-Bromophenyl sulfide)	112, al	243 ²⁰	172	153, al	94-5	
64	2,4-Dinitrophenyl phenyl sulfide (2,4-Dinitrodiphenyl sulfide)	121, 117, bz		161			
65	Di-(2-nitrophenyl) sulfide (2-Nitrophenyl sulfide)	122-3, yel, al-ac a		164		198-9, ac a or bz	
66	Benzyl 4-nitrophenyl sulfide	123		172			
67	Di-(3-hydroxyphenyl) sulfide (3-Hydroxyphenyl sulfide)	130		190-1, 186-7	94-5, pet eth	95	Acetyl, 87
68	1,3-Bis(2-nitrophenylthio)propane	140		di 156-7			
69	Di-(2-hydroxyphenyl) sulfide (2-Hydroxyphenyl sulfide)	142, bz		179, 164-5, bz		b p >200d	Diacetyl, 95-6, al Di-Me eth, 73
70	1-Naphthyl 2-naphthyl sulfide (1,2'-Dinaphthyl sulfide)	151	291-2 ¹⁵	123			
71	Di-(2-naphthyl) sulfide (2-Naphthyl sulfide)	151	296 ¹⁵	177, al	137-5-8-5	139	

*Derivative data given in order m.p., crystal color, solvent from which crystallized

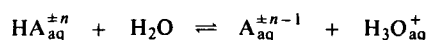
TABLE XXVI. ORGANIC DERIVATIVES OF THIOETHERS (SULFIDES)
b) Solids (Listed in order of increasing m.p.)* (Continued)

No	Name	Melting point °C	Boiling point, °C	Sulfone	Sulfoxide	Disulfide	Miscellaneous
72	Di-(4-hydroxyphenyl)sulfide (4-Hydroxyphenyl sulfide)	151, al		240 l, w	195, acet	150 l	Diacetyl, 94-55, Di-Me eth, 46, Di-Et eth 55
73	Di-(4-nitrobenzyl)sulfide (4-Nitrobenzyl sulfide)	158-9		260-5	212	126-5	
74	Di-(4-nitrophenyl)sulfide (4-Nitrophenyl sulfide)	174-5, 156-7, or, or pale yellow		282, 245-225		182, acet	
75	Di-(3-nitrophenyl)sulfide (3-Nitrophenyl sulfide)	193		201		84, al	
76	Di-(2,4-dinitrophenyl)sulfide (2,4-Dinitrophenyl sulfide)	193-7-193-4, yellow, acet		240 l		280	
77	Di-(2,4,6-trinitrophenyl)sulfide (Dipicryl sulfide)	230-1-226, yellow		307			

* Derivative data given in order m.p., crystal color, solvent from which crystallized

EXPLANATIONS AND REFERENCES TO TABLES XXVII, XXVIII AND XXIX

The dissociation of an organic carboxylic acid, phenol or the conjugate acid of an amine in aqueous solution is expressed by the equation



and the corresponding equilibrium constant K_e is given by

$$K_e = \frac{(a_{\text{A}_{\text{aq}}^{\pm n-1}})(a_{\text{H}_3\text{O}^+})}{(a_{\text{HA}_{\text{aq}}^{\pm n}})(a_{\text{H}_2\text{O}})}$$

where the a 's are the activities of the species. At low electrolyte concentrations $a_{\text{H}_2\text{O}}$ is virtually constant, and a second constant, K_a , the thermodynamic dissociation constant, is defined as

$$K_a = K_e(a_{\text{H}_2\text{O}}) = \frac{(a_{\text{A}_{\text{aq}}^{\pm n-1}})(a_{\text{H}_3\text{O}^+})}{(a_{\text{HA}_{\text{aq}}^{\pm n}})} = \frac{(c_{\text{A}_{\text{aq}}^{\pm n-1}})(c_{\text{H}_3\text{O}^+})}{(c_{\text{HA}_{\text{aq}}^{\pm n}})} \cdot \frac{f_{\pm}^2}{f_{\text{HA}_{\text{aq}}^{\pm n}}}$$

where the c 's are the concentrations and the f 's are the activity coefficients of the species

The dissociation constants in the Tables are given in the more convenient pK_a notation, where

$$pK_a = -\log K_a$$

For Table XXVII, $\text{HA}^{\pm n} = \text{RCOOH}$, and $\text{A}^{\pm n-1} = \text{RCOO}^-$

For Table XXVIII, $\text{HA}^{\pm n} = \text{ArOH}$, and $\text{A}^{\pm n-1} = \text{ArO}^-$

For Table XXIX, $\text{HA}^{\pm n} = \text{RR}'\text{R}''\text{NH}^+$ and $\text{A}^{\pm n-1} = \text{RR}'\text{R}''\text{N}$ (R , R' and R'' may be alkyl or aryl groups or a hydrogen atom)

For monobasic acids $pK_a = pK_1$

For dicarboxylic acids both pK_1 and pK_2 are given, pK_1 is defined above, and pK_2 is the analogous dissociation constant of the monoanion, $\text{A}^{\pm n-1}$, obtained on the first dissociation. For other dibasic acids such as the conjugate acids of amino acids, or diamines, pK_1 is as defined above, and pK_2 is the dissociation constant for the species obtained after the first protonation

For a comprehensive compilation of the dissociation constants of organic acids (including phenols) in aqueous solution, as well as summary of the methods for pK determinations, see G Kortum, W Vogel and K Andrussov, in *Pure and Applied Chemistry*, Vol 1, Butterworths, London, 1961, pp 190-536

For a comprehensive compilation of the dissociation constants of organic bases (especially amines) in aqueous solution see D D Perrin, *Dissociation Constants of Organic Bases in Aqueous Solution*, Butterworths, London, 1965

For general references including methods of determination of pK , and data for both acids and bases see J F King, in *Elucidation of Structures by Physical and Chemical Methods*, Vol 1 (Ed K W Bentley) (*Technique of Organic Chemistry*, Vol 9), Interscience, New York, 1963, Chapter 6, pp 318-401, H C Brown, D H McDaniel and O Hafiger in *Determination of Organic Structures by Physical Methods*, Vol 1 (Ed E A Braude and F C Nachod), Academic Press, New York, 1955, Chapter 14, p 567

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

**TABLE XXVII. ACID DISSOCIATION CONSTANTS OF
ORGANIC ACIDS IN AQUEOUS SOLUTION
(Listed in order of increasing pKa)**

No	Name	T, °C	pK ₁	pK ₂	No	Name	T, °C	pK ₁	pK ₂
1	Heptafluoro- <i>n</i> -butyric acid	25	0.17		51	1,3,5-Benzenetricarboxylic acid	25	2.12	3.89
2	Trifluoroacetic acid	25	0.23						pK ₃ = 4.70
3	Trichloroacetic acid	25	0.63		52	D,L-3,5-Di-iodotyrosine	25	2.12	6.48
4	2,4,6-Trinitrobenzoic acid	25	0.65		53	3-(2-Fluorophenyl)alanine	24	2.12	9.01
5	Tribromoacetic acid	25	0.66		54	3-(4-Fluorophenyl)alanine	24	2.13	9.05
6	3-Chlorophenylglycine	25	1.05	3.93	55	D,L-β-Phenylalanine	25	2.16	9.15
7	2,6-Dinitrobenzoic acid	25	1.14		56	<i>l</i> -Lysine	25	2.16	9.18
8	Trichloroacrylic acid	25	1.15						pK ₃ = 10.79
9	Difluoroacetic acid	25	1.24		57	<i>d</i> -Lysine	25	2.16	9.16
10	Oxalic acid	25	1.27	4.28					pK ₃ = 10.81
11	Dichloroacetic acid	25	1.29		58	Glutamic acid	20	2.16	4.324
12	2-Chloro-6-nitrobenzoic acid	25	1.34						pK ₃ = 9.96
13	2-Bromo-6-nitrobenzoic acid	25	1.37		59	6,6,6-Trifluoronorleucine	25	2.164	9.463
14	Benzenhexacarboxylic acid	25	1.40	2.19	60	3-(3-Chlorophenyl)alanine	25	2.17	8.91
				pK ₃ = 3.31	61	2-Chloro-5-nitrobenzoic acid	25	2.17	
				pK ₄ = 4.78	62	D,L-Serine	25	2.21	4.15
				pK ₅ = 5.89	63	Diethylmalonic acid	25	2.21	7.29
				pK ₆ = 6.96	64	<i>N</i> -Propylalanine	25	2.21	10.19
15	<i>d,l</i> -2,3-Dibromosuccinic acid	20	1.42	3.24	65	<i>N</i> -Ethylalanine	25	2.22	10.22
16	2,4-Dinitrobenzoic acid	25	1.42		66	D,L- <i>N</i> -Methylalanine	25	2.22	10.19
17	<i>erythro</i> -2-Bromo-3-chlorosuccinic acid	19	1.43	2.60	67	2-Nitrobenzoic acid	25	2.22	
18	<i>d,l</i> -2,3-Dichlorosuccinic acid	20	1.46	2.86	68	3-(2-Chlorophenyl)alanine	25	2.23	8.94
19	<i>threo</i> -2-Bromo-3-chlorosuccinic acid	20	1.46	2.77	69	6-Bromo-2-methylolbenzoic acid	20	2.25	
20	<i>meso</i> -2,3-Dibromosuccinic acid	20	1.51	2.71	70	6-Chloro-2-methylolbenzoic acid	20	2.26	
21	<i>meso</i> -2,3-Dichlorosuccinic acid	20	1.52	2.94	71	<i>d,l</i> -Valine	25	2.286	9.744
22	4,4,4-Trifluorovaline	25	1.537	8.098	72	<i>d,l</i> -2-Aminobutyric acid	25	2.29	9.83
23	4,4,4-Trifluorothreonine	25	1.554	7.822	73	2-Benzyl-2-cyanopropionic acid	25	2.29	
24	2-Amino-4,4,4-trifluoro- <i>n</i> -butyric acid	25	1.600	8.169	74	2-Amino- <i>n</i> -pentanoic acid	25	2.318	9.808
25	2,5-Dinitrobenzoic acid	25	1.62		75	(3,4-Dihydroxyphenyl)alanine	25	2.32	8.68
26	Nitroacetic acid	25	1.68						pK ₃ = 9.88
27	Trifluoroacrylic acid	25	1.79		76	2-Chloro-3-hydroxysuccinic acid	25	2.32	
28	Benzenepentacarboxylic acid	25	1.80	2.73	77	3-Hydroxyglutaric acid	25	2.32	4.24
				pK ₃ = 3.97					pK ₃ = 9.56
				pK ₄ = 5.25	78	<i>d,l</i> -Leucine	25	2.32	9.74
				pK ₅ = 6.46	79	<i>d,l</i> -Norleucine	25	2.335	9.83
29	Cyclopropane-1,1-dicarboxylic acid	25	1.82	5.43	80	<i>d,l</i> -Alanine	25	2.34	9.87
30	Hydroxyproline	25	1.82	9.66	81	<i>cis</i> -Caronic acid (<i>cis</i> -1,1-Dimethyl-2,3-cyclopropanedicarboxylic acid)	25	2.34	8.31
31	DL-Histidine	25	1.82	6.04					
				pK ₃ = 9.12	82	<i>N</i> -Ethylglycine	25	2.34	10.23
32	2,3-Dinitrobenzoic acid	25	1.85		83	Glycine	25	2.35	9.78
33	2-Methyl-4-nitrobenzoic acid	25	1.86		84	<i>N</i> -Methylglycine	25	2.35	10.18
34	1,2,4,5-Benzenetetracarboxylic acid	25	1.92	2.87	85	<i>N</i> -Propylglycine	25	2.35	10.19
				pK ₃ = 4.49	86	<i>N-n</i> -Butylglycine	25	2.35	10.25
				pK ₄ = 5.63	87	<i>N</i> -Isobutylglycine	25	2.35	10.12
35	<i>trans</i> -Ethylene oxide-1,2-dicarboxylic acid	19	1.93	3.25	88	2-Aminoisobutyric acid	25	2.36	10.25
36	<i>cis</i> -Ethylene oxide-1,2-dicarboxylic acid	18	1.94	3.92	89	(Methylsulfonyl)acetic acid	25	2.36	
37	Maleic acid	25	1.94	6.23	90	2-Cyano-2-cyclohexylacetic acid	25	2.37	
38	Ornithine	25	1.94	8.65	91	2-Cyanopropionic acid	25	2.37	
39	2-Chloro-4-nitrobenzoic acid	25	1.96		92	D,L-Tryptophane	25	2.38	9.39
40	4-Aminosalicylic acid (4-Amino-2-hydroxybenzoic acid)	25	1.99	3.92	93	1,2,3,5-Benzenetetracarboxylic acid	25	2.38	3.51
41	2-Chloro-3-nitrobenzoic acid	25	2.02						pK ₂ = 4.44
42	Asparagine	25	2.05	3.87					pK ₃ = 5.81
43	Anthranilic acid	25	2.05	4.95	94	4-Aminobenzoic acid	25	2.38	
44	5,5,5-Trifluoroleucine	25	2.05	8.92	95	2-Cyanoisobutyric acid	25	2.42	
45	<i>S</i> -Ethylcysteine	25	2.05	8.60	96	Cyanoacetic acid	25	2.46	
46	1,2,3,4-Benzenetetracarboxylic acid	25	2.06	3.25	97	Pyruvic acid	25	2.49	
				pK ₃ = 4.73	98	<i>O</i> -Acetylcitric acid	25	2.49	
				pK ₄ = 6.21	99	3-Pentenoic acid	25	2.51	
47	Di- <i>n</i> -propylmalonic acid	25	2.07	7.51	100	1,2,4-Benzenetricarboxylic acid	25	2.52	3.84
48	3-(4-Chlorophenyl)alanine	25	2.08	8.96					pK ₃ = 5.20
49	3-(3-Fluorophenyl)alanine	24	2.10	8.98	101	(2-Chlorovinyl)acetic acid	25	2.54	
50	Arginine	25	2.10	9.07	102	Oxaloacetic acid	25	2.55	4.37
					103	Fluoroacetic acid	25	2.58	

TABLE XXVII. ACID DISSOCIATION CONSTANTS OF ORGANIC ACIDS IN AQUEOUS SOLUTION (Listed in order of increasing pK_a) (Continued)

No	Name	T, °C	pK ₁	pK ₂	No	Name	T, °C	pK ₁	pK ₂
104	Phenylmalonic acid	25	2.58	5.03	162	(2,4-Dichloro-6-methylphenoxy)acetic acid	20	3.13	
105	2-Chloro-3-hydroxybutyric acid	25	2.58		163	2-Cyanobenzoic acid	25	3.14	
106	2-Fluoroacrylic acid	25	2.58		164	(3-Methoxyphenoxy)acetic acid	25	3.14	
107	2,4-Dioxo- <i>n</i> -pentanoic acid	25	2.58		165	Ethyl- <i>n</i> -propylmalonic acid	25	3.15	7.43
108	2-Chloro-3-hydroxy-3-phenylpropionic acid	25	2.61		166	4,4,4-Trifluorocrotonic acid	25	3.15	
109	2-Chloro-6-hydroxybenzoic acid	25	2.63		167	(4-Iodophenoxy)acetic acid	25	3.16	
110	2-Butynoic acid (Tetrolic acid)	25	2.65		168	(2-Iodophenoxy)acetic acid	25	3.17	
111	1-Aminocyclohexanecarboxylic acid	25	2.66		169	3,3-Difluoroacrylic acid	25	3.17	
112	Bromosuccinic acid	50	2.69	4.69	170	Dimethylmalonic acid	25	3.17	6.06
113	3-Hydroxy-2-naphthoic acid	25	2.71		171	Phenoxyacetic acid	25	3.17	
114	5-Aminosalicylic acid (5-Amino-2-hydroxybenzoic acid)	25	2.74	5.84	172	Iodoacetic acid	25	3.18	
115	Triethylsuccinic acid	25	2.74		173	3-Iodo-2-methylbenzoic acid	20	3.18	
116	Salicylic acid (2-Hydroxybenzoic acid)	30	2.75, (3.00)	12.38	174	2-Hydroxy-3-chloroisobutyric acid	25	3.20	
117	2,4-Dichlorobenzoic acid	25	2.76		175	(4-Methoxyphenoxy)acetic acid	25	3.21	
118	1,2,3-Benzenetricarboxylic acid	25	2.80	4.20	176	(4-Methylphenoxy)acetic acid	25	3.22	
119	3,4-Dinitrobenzoic acid	25	2.82	pK _s = 5.87	177	<i>meso</i> -Tartaric acid	25	3.22	4.82
120	3,5-Dinitrobenzoic acid	25	2.82		178	2-Chlorocrotonic acid	25	3.22	
121	Guanidinoacetic acid	25	2.82		179	2,4-Dihydroxybenzoic acid	30	3.22	
122	2-Bromobenzoic acid	25	2.85		180	(2-Methoxyphenoxy)acetic acid	25	3.23	
123	Malonic acid	25	2.86	5.65	181	(2-Methylphenoxy)acetic acid	25	3.23	
124	Chloroacetic acid	25	2.86		182	Cyclopentane-1,1-dicarboxylic acid	25	3.23	4.08
125	Ethylmethylmalonic acid	25	2.86	6.43	183	3-Bromomandelic acid	25	3.23	
126	2-Iodobenzoic acid	25	2.86		184	3-Chloromandelic acid	25	3.24	
127	2-Chloropropionic acid	18	2.88		185	2,6-Dimethylbenzoic acid	25	3.25	
128	(4-Nitrophenoxy)acetic acid	25	2.89		186	3-Iodomandelic acid	25	3.26	
129	Bromoacetic acid	25	2.90		187	2-Fluorobenzoic acid	25	3.27	
130	2-Chlorobenzoic acid	25	2.92		188	3-Chloro-2-methylbenzoic acid	25	3.27	
131	(4-Cyanophenoxy)acetic acid	25	2.93		189	(4-Chloro-2-methylphenoxy)acetic acid	25	3.28	
132	Isopropylmalonic acid	25	2.94	5.38	190	3-Bromo-2-methylbenzoic acid	20	3.28	
133	(3-Nitrophenoxy)acetic acid	25	2.95		191	<i>cis</i> -3-Chloroacrylic acid	18	3.32	
134	Phthalic acid	25	2.95	5.41	192	<i>cis</i> -Cyclopropane-1,2-dicarboxylic acid	24	3.33	6.47
135	2-Chloroisobutyric acid	18	2.97		193	(2,6-Dimethylphenoxy)acetic acid	25	3.36	
136	3,5-Dinitro-4-methylbenzoic acid	25	2.97		194	Anthraquinone-1-carboxylic acid	20	3.37	
137	(2-Cyanophenoxy)acetic acid	25	2.97		195	3-Hydroxy-3-phenylpropionic acid	18	3.40	
138	2-Bromopropionic acid	18	2.97		196	<i>d,l</i> -Mandelic acid	25	3.41	
139	Ethylmalonic acid	25	2.99	5.83	197	Anthraquinone-2-carboxylic acid	20	3.42	
140	<i>n</i> -Propylmalonic acid	25	2.996	5.84	198	<i>N</i> -Formylglycine	19	3.43	
141	<i>d</i> -Tartaric acid	25	3.00	4.34	199	2,4,6-Trimethylbenzoic acid	25	3.44	
142	Fumaric acid	25	3.02	4.38	200	3-Nitrobenzoic acid	25	3.44	
143	(3-Cyanophenoxy)acetic acid	25	3.03		201	Cyclohexane-1,1-diacetic acid	25	3.45	7.08
144	Benzilic acid	18	3.05		202	2-Phenylbenzoic acid (Biphenyl-2-carboxylic acid)	25	3.46	
146	Methylmalonic acid	25	3.05	5.76	203	<i>meso</i> -2,3-Diphenylsuccinic acid	25	3.48	
147	(2-Chlorophenoxy)acetic acid	25	3.05		204	(2,4-Dinitrophenyl)acetic acid	25	3.50	
148	3,3,3-Trifluoropropionic acid	25	3.06		205	Tetramethylsuccinic acid	25	3.50	7.28
149	3-Aminobenzoic acid	25	3.07	4.73	206	<i>d,l</i> -2,3-Diethylsuccinic acid	25	3.51	6.60
150	(3-Chlorophenoxy)acetic acid	25	3.07		207	2-Phenoxybenzoic acid	20	3.53	
151	2-Hydroxy-3-chlorobutyric acid	25	3.08		208	2-Hydroxy-2-phenylpropionic acid	18	3.53	
152	(3-Fluorophenoxy)acetic acid	25	3.09		210	Terephthalic acid	25	3.54	4.46
153	(2-Fluorophenoxy)acetic acid	25	3.09		211	2- <i>tert</i> -Butylbenzoic acid	25	3.54	
154	(4-Chlorophenoxy)acetic acid	25	3.10		212	3-Aminopropionic acid	25	3.55	
155	(3-Bromophenoxy)acetic acid	25	3.10		213	4-Cyanobenzoic acid	25	3.55	
156	α -Iodopropionic acid	18	3.11		214	3-(Methylamino)benzoic acid	25	3.55	
157	(2-Bromophenoxy)acetic acid	25	3.12		215	3-Methoxy-2-methylbenzoic acid	20	3.58	
158	3-Chlorolactic acid	25	3.12		216	<i>d,l</i> -2,3-Diphenylsuccinic acid	25	3.58	
159	(4-Bromophenoxy)acetic acid	25	3.13		217	2-Aminocyclohexanecarboxylic acid	25	3.59	10.21
160	(3-Iodophenoxy)acetic acid	25	3.13		218	3-Cyanobenzoic acid	25	3.60	
161	(4-Fluorophenoxy)acetic acid	25	3.13		219	3-Ethoxy-2-methylbenzoic acid	20	3.62	
					220	Isophthalic acid	25	3.62	4.60
					221	3-Ethyl-3-methylglutaric acid	25	3.62	6.70

TABLE XXVII. ACID DISSOCIATION CONSTANTS OF ORGANIC ACIDS IN AQUEOUS SOLUTION (Listed in order of increasing pK_a) (Continued)

No	Name	T °C	pK ₁	pK ₂	No	Name	T °C	pK ₁	pK ₂
222	3,3-Diethylglutaric acid	25	3.62	7.12	279	<i>cis</i> -Tetrahydronaphthalene-2,3-dicarboxylic acid	20	3.98	6.47
223	<i>meso</i> -2,3-Diethylsuccinic acid	25	3.63	6.46	280	4-Chlorobenzoic acid	25	3.98	
224	(2,4-Dichlorophenoxy)acetic acid	20	3.64		281	2,5-Dimethylbenzoic acid	25	3.98	
225	Malonic acid (Malonic acid monoamide)	25	3.64		282	3-Bromopropionic acid	18	3.99	
226	2-Isopropylbenzoic acid	25	3.64		283	2-Hydroxy-2-methylbutyric acid	18	3.99	
227	Decahydronaphthoxyacetic acid	25	3.64		284	3-Cyanopropionic acid	25	3.99	
228	2-Cyclohexyloxypropionic acid	25	3.64		285	3-Chloropropionic acid	25	3.996	
229	<i>trans</i> -3-Chloroacrylic acid	18	3.65		286	<i>trans</i> -Tetrahydronaphthalene-2,3-dicarboxylic acid	20	4.00	5.70
230	9-Anthracenecarboxylic acid	20	3.65		287	(2-Nitrophenyl)acetic acid	25	4.004	
231	Ethoxyacetic acid	18	3.65		288	3-Aminopentanoic acid	25	4.02	10.40
232	<i>trans</i> -Cyclopropane-1,2-dicarboxylic acid	24	3.65	5.13	289	4-Aminobutyric acid	25	4.03	
233	N-Acetylglycine	25	3.67		290	<i>cis</i> -Cyclobutane-1,3-dicarboxylic acid	25	4.03	5.31
234	1-Anthracenecarboxylic acid	20	3.68		291	2-Hydroxyisobutyric acid	18	4.04	
235	2-Benzyl-2-phenylsuccinic acid	20	3.69	6.49	292	(2-Iodophenyl)acetic acid	25	4.04	
236	3,3-Di- <i>n</i> -propylglutaric acid	25	3.69	7.31	293	<i>trans</i> -4-Nitrocinnamic acid	25	4.05	
237	Cyclopentyloxyacetic acid	25	3.70		294	(2-Bromophenyl)acetic acid	25	4.05	
238	3,3-Dimethylglutaric acid	25	3.70	6.29	295	(2-Chlorophenyl)acetic acid	25	4.07	
239	<i>cis</i> -3-Aminocyclohexanecarboxylic acid	15	3.70		296	2-Methoxybenzoic acid	20	4.08	
240	<i>d,l</i> -N-Acetylalanine	25	3.72		297	3-Methoxybenzoic acid	25	4.09	
241	N-Propionylglycine	25	3.72		298	3-Iodopropionic acid	18	4.09	
242	2,3-Dimethylbenzoic acid	25	3.74		299	<i>cis</i> -Cyclohexane-1,3-dicarboxylic acid	16	4.10	5.46
243	Formic acid	25	3.74		300	Ethylsuccinic acid	25	4.00	
244	Phthalamic acid (Phthalic acid monoamide)	25	3.75		301	Iminodipropionic acid	30	4.11	9.61
245	Glutaconic acid	25	3.77	5.08	302	Benzylsuccinic acid	20	4.11	5.65
246	<i>meso</i> -2,3-Dimethylsuccinic acid	25	3.77	5.94	303	<i>trans</i> -3-Nitrocinnamic acid	25	4.12	
247	2-Ethylbenzoic acid	25	3.79		304	4-Fluorobenzoic acid	25	4.14	
248	3-Methylcyclopentyl-1,1-diacetic acid	25	3.79	6.74	305	(3-Chlorophenyl)acetic acid	25	4.14	
249	<i>trans</i> -Cyclobutane-1,2-dicarboxylic acid	20	3.79	5.61	306	4,4,4-Trifluorobutyric acid	25	4.15	
250	Cyclohexyloxyacetic acid	25	3.80		307	<i>trans</i> -2-Nitrocinnamic acid	25	4.15	
251	2-Hydroxybutyric acid	18	3.80		308	3-Isopropoxybenzoic acid	20	4.15	
252	Cyclopentyl-1,1-diacetic acid	25	3.80	6.77	309	2-Naphthoic acid	25	4.16	
253	3-Bromobenzoic acid	25	3.81		310	Succinic acid	25	4.16	5.61
254	3-Chlorobenzoic acid	25	3.82		311	(3-Iodophenyl)acetic acid	25	4.16	
255	<i>trans</i> -Caronic acid (<i>trans</i> -1,1-Dimethyl-2,3-cyclopropanedicarboxylic acid)	25	3.82	5.32	312	3-Ethoxybenzoic acid	20	4.17	
256	2,2-Diethylsuccinic acid	25	3.84		313	2,2-Diphenyladipic acid	20	4.17	5.80
257	<i>trans</i> -3-Aminocyclohexanecarboxylic acid	15	3.85		314	(4-Iodophenyl)acetic acid	25	4.18	
258	3-Iodobenzoic acid	25	3.85		315	2-Anthracenecarboxylic acid	20	4.18	
259	(4-Nitrophenyl)acetic acid	25	3.85		316	<i>trans</i> -Cyclohexane-1,4-dicarboxylic acid	16	4.18	
260	<i>cis</i> -3-Methylcyclohexyloxyacetic acid	25	3.85		317	4,4,5,5,6,6,6-Heptafluorohexanoic acid	25	4.18	
261	Lactic acid	25	3.86		318	2,4-Dimethylbenzoic acid	25	4.18	
262	<i>cis</i> -Cinnamic acid	25	3.88		319	<i>trans</i> -Cyclohexane-1,2-dicarboxylic acid	19	4.18	5.93
263	Hydroxyacetic acid	25	3.89		320	(4-Bromophenyl)acetic acid	25	4.19	
264	1,2,3-Cyclohexanetricarboxylic acid	23	3.89	4.85	321	(4-Chlorophenyl)acetic acid	25	4.19	
				pK ₃ = 8.83	322	Mesaconic acid	18	4.20	
265	<i>cis</i> -Cyclobutane-1,2-dicarboxylic acid	19	3.90	5.89	323	Benzoic acid	25	4.20	
266	2-Methylcyclohexyloxyacetic acid	25	3.90		324	3-Propoxybenzoic acid	20	4.20	
267	3-Fluorobenzoic acid	25	3.90		325	2-Ethoxybenzoic acid	20	4.21	
268	3-Hydroxybenzoic acid	30	3.90	9.78	326	3,4-Diphenyladipic acid	25	4.22	5.19
269	2-Methylbenzoic acid	25	3.91		327	<i>trans</i> -2-Chlorocinnamic acid	25	4.23	
270	2,2-Diphenylglutaric acid	20	3.91	5.38	328	3-Fluoromandelic acid	25	4.24	
271	3-Phenoxybenzoic acid	20	3.91		329	(1-Naphthyl)acetic acid	25	4.24	
272	2-(Bromomethyl)butyric acid	18	3.92		330	(2-Isopropoxy)benzoic acid	20	4.24	
273	Diphenylacetic acid	25	3.94		331	2-Propoxybenzoic acid	20	4.24	
274	2,2-Dibenzylsuccinic acid	20	3.96	6.66	332	3-Butoxybenzoic acid	20	4.25	
275	Triphenylacetic acid	25	3.96		333	(4-Fluorophenyl)acetic acid	25	4.25	
276	<i>trans</i> -Cyclopentane-1,2-dicarboxylic acid	25	3.96	5.85	334	Acrylic acid	25	4.25	
277	4-Bromobenzoic acid	25	3.97		335	3-Methylglutaric acid	25	4.25	5.41
278	(3-Nitrophenyl)acetic acid	25	3.97		336	(2-Naphthyl)acetic acid	25	4.26	
					337	<i>cis</i> -Cyclopentane-1,3-dicarboxylic acid	25	4.26	5.51
					338	5-Aminopentanoic acid	25	4.27	

TABLE XXVII. ACID DISSOCIATION CONSTANTS OF
ORGANIC ACIDS IN AQUEOUS SOLUTION
(Listed in order of increasing pKa) (Continued)

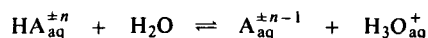
No	Name	T, °C	pK ₁	pK ₂	No	Name	T, °C	pK ₁	pK ₂
339	3-Methylbenzoic acid	25	4.27		401	3-(2-Chlorophenyl)propionic acid	25	4.58	
340	2,2-Diphenylpimelic acid	25	4.28	5.39	402	3-(3-Chlorophenyl)propionic acid	25	4.58	
341	3-Ethylglutaric acid	25	4.29	5.33	403	4-Methyl-3-pentenoic acid	25	4.60	
342	Angellic acid	18	4.29		404	<i>cis</i> -3-Hydroxycyclohexanecarboxylic acid	25	4.60	
343	<i>trans</i> -3-Chlorocinnamic acid	25	4.29		405	2-Hydroxycinnamic acid	25	4.61	
344	3,5-Dimethylbenzoic acid	25	4.30		406	4-Hydroxybenzoic acid	27.8	4.61	9.31
345	3-Isopropylglutaric acid	25	4.30	5.51	407	Levulinic acid	18	4.64	
346	3- <i>n</i> -Propylglutaric acid	25	4.31	5.31	408	2-Methyl-3-hydroxybutyric acid	18	4.65	
347	Phenylacetic acid	25	4.31		409	3-(3-Methoxyphenyl)propionic acid	25	4.65	
348	<i>trans</i> -Cyclohexane-1,3-dicarboxylic acid	19	4.31	5.73	410	4-Acetylbutyric acid	18	4.66	
349	2,2-Diphenylsuberic acid	20	4.31	5.39	411	2-Methylacrylic acid	18	4.66	
350	<i>trans</i> -Cyclopentane-1,3-dicarboxylic acid	25	4.32	5.42	412	3-Phenylpropionic acid	25	4.66	
351	2,2-Diphenylazelaic acid	20	4.33	5.38	413	3-(2-Methylphenyl)propionic acid	25	4.66	
352	(3,4-Dimethoxyphenyl)acetic acid	25	4.33		414	4-Pentenoic acid	25	4.67	
353	3,4,5-Trihydroxybenzoic acid	30	4.33		415	4-Ureidobutyric acid	25	4.68	
354	<i>cis</i> -Cyclohexane-1,2-dicarboxylic acid	20	4.34	6.77	416	3-(3-Methylphenyl)propionic acid	25	4.68	
355	4-Isopropylbenzoic acid	25	4.35		417	3-(4-Methylphenyl)propionic acid	25	4.68	
356	Vinylacetic acid	25	4.35		418	(4-Isopropoxy)benzoic acid	20	4.68	
357	Glutaric acid	25	4.35	5.42	419	<i>trans</i> -2-Hydroxycyclohexanecarboxylic acid	25	4.68	
358	4-Ethylbenzoic acid	25	4.35		420	<i>trans</i> -4-Hydroxycyclohexanecarboxylic acid	25	4.68	
359	(4-Methoxyphenyl)acetic acid	25	4.36		421	3-(4-Methoxyphenyl)propionic acid	25	4.69	
360	4-Methylbenzoic acid	25	4.37		422	2-Pentenoic acid	25	4.69	
361	(4-Methylphenyl)acetic acid	25	4.37		423	<i>trans</i> -Crotonic acid	25	4.69	
362	(4-Ethylphenyl)acetic acid	25	4.37		424	4-Hydroxypentanoic acid	18	4.69	
363	4-Methoxycinnamic acid	25	4.38		425	2-Hexenoic acid	25	4.70	
364	<i>trans</i> -Cyclohexane-1,2-diacetic acid	20	4.38	5.42	426	4-Hexenoic acid	25	4.72	
365	(4-Isopropylphenyl)acetic acid	25	4.39		427	5-Hexenoic acid	25	4.72	
366	<i>trans</i> -4-Aminocyclohexanecarboxylic acid	25	4.39	10.55	428	2-Ethylpentanoic acid	18	4.72	
367	3-Hydroxycinnamic acid	25	4.40		429	2-Ethylbutyric acid	25	4.75	
368	4- <i>tert</i> -Butylbenzoic acid	25	4.40		430	4-Phenylbutyric acid	25	4.76	
369	<i>cis</i> -Crotonic acid	18	4.41		431	Acetic acid	25	4.76	
370	3,4-Dimethylbenzoic acid	25	4.41		432	Isovaleric acid	25	4.78	
371	<i>trans</i> -2-Bromocinnamic acid	25	4.41		433	4-Propoxybenzoic acid	20	4.78	
372	<i>cis</i> -Cyclohexane-1,2-diacetic acid	20	4.42	5.45	434	4,4-Dimethylpentanoic acid	18	4.79	
373	<i>cis</i> -Cyclopentane-1,2-diacetic acid	20	4.42	5.42	435	Cyclobutanecarboxylic acid	25	4.79	
374	(4- <i>tert</i> -Butylphenyl)acetic acid	25	4.42		436	<i>d,l</i> -2-Methylpentanoic acid	18	4.79	
375	<i>trans</i> -Cyclopentane-1,2-diacetic acid	20	4.43	5.43	437	5-Methyl-4-hexenoic acid	25	4.80	
376	<i>trans</i> -4-Chlorocinnamic acid	25	4.43		438	4-Methyl-2-pentenoic acid	25	4.80	
377	Adipic acid	25	4.43	5.42	439	3-(2-Methoxyphenyl)propionic acid	25	4.80	
378	4-Cyanobutyric acid	25	4.44		440	2-Methylbutyric acid	18	4.81	
379	<i>trans</i> -Cinnamic acid	25	4.44		441	<i>n</i> -Butyric acid (<i>n</i> -Butanoic acid)	25	4.82	
380	<i>trans</i> -3-Methylcinnamic acid	25	4.44		442	<i>trans</i> -3-Hydroxycyclohexanecarboxylic acid	25	4.82	
381	3-(Acetylamino)propionic acid	25	4.45		443	Nicotinic acid	25	4.82	11.98
382	2-Ureidoisobutyric acid	25	4.46		444	Cyclopropanecarboxylic acid	25	4.83	
383	4-Methoxybenzoic acid	25	4.47		445	<i>cis</i> -4-Aminocyclohexanecarboxylic acid	25	4.83	10.62
384	3-(4-Nitrophenyl)propionic acid	25	4.47		446	<i>d,l</i> -3-Methylpentanoic acid	18	4.84	
385	Pimelic acid	25	4.48	5.42	447	Isonicotinic acid	20	4.84	12.23
386	3-(1-Naphthoyl)propionic acid	20	4.48		448	<i>cis</i> -4-Hydroxycyclohexanecarboxylic acid	25	4.84	
387	3-Methylcyclohexyl-1,1-diacetic acid	25	4.49	6.08	449	Isocaproic acid	18	4.84	
388	4-Methylcyclohexyl-1,1-diacetic acid	25	4.49	6.10	450	<i>n</i> -Pentanoic acid (<i>n</i> -Valeric acid)	25	4.84	
389	5,5,5-Trifluoropentanoic acid	25	4.49		451	Isobutyric acid	25	4.86	
390	3-Ureidopropionic acid	25	4.49		452	Propionic acid (Propanoic acid)	25	4.87	
391	3-(2-Nitrophenyl)propionic acid	25	4.50		453	4-Hydroxyisocaproic acid	18	4.87	
392	<i>trans</i> -2-Methylcinnamic acid	25	4.50		454	<i>n</i> -Hexanoic acid (<i>n</i> -Caproic acid)	25	4.88	
393	2-Methoxycinnamic acid	25	4.50		455	<i>n</i> -Heptanoic acid	25	4.89	
394	3-Hexenoic acid	25	4.52		456	<i>n</i> -Octanoic acid (<i>n</i> -Caprylic acid)	25	4.89	
395	Suberic acid	25	4.52	5.40	457	Cyclohexylpropionic acid	25	4.91	
396	Azelaic acid	25	4.53	5.40	458	<i>d,l</i> -2,3-Dimethylsuccinic acid	25	4.94	6.20
398	Succinamic acid (Succinic acid monoamide)	25	4.54		459	<i>n</i> -Nonanoic acid (Pelargonic acid)	25	4.94	
399	<i>trans</i> -4-Methylcinnamic acid	20	4.56		460	Cyclohexylbutyric acid	25	4.95	
400	O-Acetylsalicylic acid (Aspirin)	17	4.57						

**TABLE XXVII. ACID DISSOCIATION CONSTANTS OF
ORGANIC ACIDS IN AQUEOUS SOLUTION
(Listed in order of increasing pKa) (Continued)**

No	Name	T °C	pK ₁	pK ₂	No	Name	T °C	pK ₁	pK ₂
461	Tiglic acid	18	4.96		468	<i>cis</i> -3-Methyl-2-pentenoic acid	25	5.15	
462	3-(2-Naphthoyl)propionic acid	20	4.96		469	Itaconic acid	18	5.54	
463	Cyclopentanecarboxylic acid	25	4.99		470	Citraconic acid	18	6.17	
464	2,2-Dimethylbutyric acid	18	5.03		471	Ethylenediamine-N,N,N',N'-tetraacetic acid	25	6.27	10.95
465	Trimethylacetic acid	25	5.05		472	Ethylenediamine-N,N'-diacetic acid	30	6.42	9.46
466	3,3-Dimethylacrylic acid (3-Methylcrotonic acid)	25	5.12		473	Ethylenediamine-N,N'-dipropionic acid	30	6.87	9.60
467	<i>trans</i> -3-Methyl-2-pentenoic acid	25	5.13						

EXPLANATIONS AND REFERENCES TO TABLES XXVII, XXVIII AND XXIX

The dissociation of an organic carboxylic acid, phenol or the conjugate acid of an amine in aqueous solution is expressed by the equation



and the corresponding equilibrium constant K_e is given by

$$K_e = \frac{(a_{\text{A}_{\text{aq}}^{\pm n-1}})(a_{\text{H}_3\text{O}^+})}{(a_{\text{HA}_{\text{aq}}^{\pm n}})(a_{\text{H}_2\text{O}})}$$

where the a 's are the activities of the species. At low electrolyte concentrations $a_{\text{H}_2\text{O}}$ is virtually constant, and a second constant, K_a , the thermodynamic dissociation constant, is defined as

$$K_a = K_e(a_{\text{H}_2\text{O}}) = \frac{(a_{\text{A}_{\text{aq}}^{\pm n-1}})(a_{\text{H}_3\text{O}^+})}{(a_{\text{HA}_{\text{aq}}^{\pm n}})} = \frac{(c_{\text{A}_{\text{aq}}^{\pm n-1}})(c_{\text{H}_3\text{O}^+})}{(c_{\text{HA}_{\text{aq}}^{\pm n}})} \cdot \frac{f_{\pm}^2}{f_{\text{HA}_{\text{aq}}^{\pm n}}}$$

where the c 's are the concentrations and the f 's are the activity coefficients of the species

The dissociation constants in the Tables are given in the more convenient pK_a notation, where

$$pK_a = -\log K_a$$

For Table XXVII, $\text{HA}^{\pm n} = \text{RCOOH}$, and $\text{A}^{\pm n-1} = \text{RCOO}^-$

For Table XXVIII, $\text{HA}^{\pm n} = \text{ArOH}$, and $\text{A}^{\pm n-1} = \text{ArO}^-$

For Table XXIX, $\text{HA}^{\pm n} = \text{RR}'\text{R}''\text{NH}^+$ and $\text{A}^{\pm n-1} = \text{RR}'\text{R}''\text{N}$ (R , R' and R'' may be alkyl or aryl groups or a hydrogen atom)

For monobasic acids $pK_a = pK_1$

For dicarboxylic acids both pK_1 and pK_2 are given, pK_1 is defined above, and pK_2 is the analogous dissociation constant of the monoanion, $\text{A}^{\pm n-1}$, obtained on the first dissociation. For other dibasic acids such as the conjugate acids of amino acids, or diamines, pK_1 is as defined above, and pK_2 is the dissociation constant for the species obtained after the first protonation.

For a comprehensive compilation of the dissociation constants of organic acids (including phenols) in aqueous solution, as well as summary of the methods for pK determinations, see G Kortum, W Vogel and K Andrussov, in *Pure and Applied Chemistry*, Vol 1, Butterworths, London, 1961, pp 190-536

For a comprehensive compilation of the dissociation constants of organic bases (especially amines) in aqueous solution see D D Perrin, *Dissociation Constants of Organic Bases in Aqueous Solution*, Butterworths, London, 1965

For general references including methods of determination of pK , and data for both acids and bases see J F King, in *Elucidation of Structures by Physical and Chemical Methods*, Vol 1 (Ed K W Bentley) (*Technique of Organic Chemistry*, Vol 9), Interscience, New York, 1963, Chapter 6, pp 318-401, H C Brown, D H McDaniel and O Hafiger in *Determination of Organic Structures by Physical Methods*, Vol 1 (Ed E A Braude and F C Nachod), Academic Press, New York, 1955, Chapter 14, p 567

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

**TABLE XXVIII. ACID DISSOCIATION CONSTANTS OF PHENOLS
IN AQUEOUS SOLUTION
(Listed in order of increasing pK_a)**

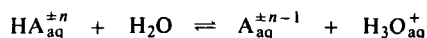
No	Name	T °C	pK ₁	pK ₂	No	Name	T °C	pK ₁	pK ₂
1	Picric acid (2,4,6-Trinitrophenol)	25	0 29 (0 71)		51	2-Hydroxy-3-methoxybenzylamine	25	8 70	10 52
2	4-Hydroxypyrimidine	20	1 85	8 59	52	3-Hydroxypyridine	20	8 72	
3	2-Hydroxypyrimidine	20	2 24	9 17	53	2-Fluorophenol	25	8 82	
4	4-Chloro-2,6-dinitrophenol	25	2 97		54	Isovanillin (5-Formyl-2-methoxyphenol 3-Hydroxy-4-methoxybenzaldehyde)	25	8 889	
5	2,6-Dinitrophenol	25	3 71		55	3-Hydroxy-2-methoxybenzylamine	25	8 89	10 52
6	2,4-Dinitrophenol	25	4 09		56	4-Hydroxy-3-methoxybenzylamine	25	8 94	10 42
7	2,6-Dinitrohydroquinone	21	4 42	9 14	57	3-Nitro-2,4,6-trimethylphenol	25	8 98	
8	8-Hydroxyquinoline	20	5 017	9 813	58	Sodium 4-hydroxybenzenesulfonate	25	9 01	
9	2,5-Dinitrophenol	25	5 04		59	Pyrogallol (1 2 3-Trihydroxybenzene)	25	9 01	11 64
10	3,4-Dinitrophenol	25	5 42		60	2-Methylhydroquinone (Toluhydroquinone)	25	9 05	11 62
11	8-Hydroxyquinaldine	25	5 55	10 31	61	3-Chlorophenol	25	9 08	
12	4-Methyl-8-hydroxyquinoline	25	5 58	10 00					(9 02)
13	3,4-Dimethyl-8-hydroxyquinoline	25	5 80	10 05	62	3-Bromophenol	25	9 11	
14	5-Formyl-2-nitrophenol (3-Hydroxy-4-nitrobenzaldehyde)	25	6 00		63	3-Iodophenol	25	9 17	
15	5-Chloro-2-nitrophenol	25	6 05		64	3-Acetylphenol	25	9 19	
16	5-Carboethoxy-2-nitrophenol (Ethyl 3-hydroxy-4-nitrobenzoate)	25	6 11		65	4-Iodophenol	25	9 20	
17	5-Carbomethoxy-2-nitrophenol (Methyl 3-hydroxy-4-nitrobenzoate)	25	6 15		66	Sodium 3-hydroxybenzenesulfonate	25	9 29	
18	2,4-Dimethyl-8-hydroxyquinoline	25	6 20	10 60	67	1-Naphthol	20 5	9 30	
19	3-Nitrocatechol	25	6 68						(9 85)
20	2-Nitro-5-phenylphenol (3-Hydroxy-4-nitrophenyl)	25	6 74		68	3-(Methylsulfonyl)phenol	25	9 33	
21	2-Formylphenol (Salicylaldehyde)	25	6 79		69	4-Bromophenol	25	9 34	
22	5-Methoxy-2-nitrophenol	25	7 09		70	3-Fluorophenol	25	9 36	
23	4-Nitrophenol	25	7 16						(9 28)
24	2-Nitrophenol	25	7 21		71	1,4-Naphthohydroquinone (1 4 Dihydroxy naphthalene)	26 5	9 37	10 93
25	2,6-Dimethyl-4-nitrophenol	25	7 22		72	4-Chlorophenol	25	9 38	
26	5-Methyl-2-nitrophenol	25	7 25						(9 42)
27	2,6-Dichlorohydroquinone	25	7 30	9 99	73	Sodium 4-hydroxybenzoate	20	9 39	
28	Vanillin (4-Formyl-2-methoxyphenol 4-Hydroxy-3-methoxybenzaldehyde)	25	7 396		74	Resorcinol (1 3 Dihydroxybenzene)	30	9 44	11 32
29	2-Nitrohydroquinone	21	7 63	10 06	75	Catechol (1 2-Dihydroxybenzene)	30	9 48	12 08
30	4-Formylphenol (4-Hydroxybenzaldehyde)	25	7 66		76	4-Phenylphenol (4 Hydroxybiphenyl)	22 5	9 51	
31	4-(Methylsulfonyl)phenol	25	7 83		77	3-(Methylthio)phenol	25	9 53	
33	<i>o</i> -Vanillin (2-Formyl-6-methoxyphenol, 2-Hydroxy-3-methoxybenzaldehyde)	25	7 91		78	4-(Methylthio)phenol	25	9 53	
34	4-Cyanophenol (4-Hydroxybenzonitrile)	25	7 95		79	2,4,6-Trimethylolphenol	25	9 56	
35	3-Formylphenol (3-Hydroxybenzaldehyde)	25	8 00		80	2-Naphthol	19 5	9 57,	
36	4-Acetylphenol	25	8 05						(9 93)
37	3,5-Dimethyl-4-(methylsulfonyl)phenol	25	8 13		81	3-Phenylphenol (3-Hydroxybiphenyl)	22 5	9 64	
38	4-Cyano-3,5-dimethylphenol (2,6-Dimethyl-4-hydroxybenzonitrile)	25	8 21		82	3-Methoxyphenol	25	9 65	
39	3,5-Dimethyl-4-nitrophenol	25	8 25		83	2,6-Dimethylolphenol	25	9 66	
40	4-Cyano-2,6-dimethylphenol (3,5-Dimethyl-4-hydroxybenzonitrile)	25	8 27		84	2-Aminophenol (2-Hydroxyaniline)	28	9 71	
41	2-Carboxamidophenol (Salicylamide)	20	8 37		85	2,4-Dimethylolphenol	25	9 77	
42	3-Nitrophenol	25	8 38		86	4-Methylolphenol	25	9 82	
43	4-Carbobenzyloxyphenol (Benzyl 4-hydroxybenzoate)	25	8 41		87	3-Methylolphenol	25	9 83	
44	2-Bromophenol	25	8 42		88	3-Aminophenol (3-Hydroxyaniline)	21 5	9 87	9 92
45	Phloroglucinol (1,3,5-Trihydroxybenzene)	25	8 45	8 88	89	Sodium 4-hydroxybenzenephosphonate	25	9 90	
			(7 0)		90	3-Ethylphenol	28	9 90	
46	2-Iodophenol	25	8 46		91	2,6-Dimethylol-4-methylphenol	25	9 92	
47	4-Carbobutoxyphenol (<i>n</i> -Butyl 4-hydroxybenzoate)	25	8 47		92	2-Methylolphenol	25	9 92	
48	4-Carbomethoxyphenol (Methyl 4-hydroxybenzoate)	25	8 47		93	4-Fluorophenol	25	9 92	
49	2-Chlorophenol	25	8 48		94	Sodium 3-hydroxybenzoate	20	9 94	
50	4-Carboethoxyphenol (Ethyl 4-hydroxybenzoate)	25	8 50		95	2-Methoxyphenol	25	9 98	
					96	Phenol	25	9 99,	
									(9 95)
					97	Eugenol (4-Allyl-2-methoxyphenol)	25	10 00	
					98	2-Phenylphenol (2-Hydroxybiphenyl)	22 5	10 01	
					99	4-Ethylphenol	28	10 01	
					100	3-Methylphenol (<i>m</i> -Cresol)	25	10 09	
					101	3-Ethyl-5-methylphenol	28	10 10	
					102	3,5-Dimethylphenol	25	10 15	
					103	4-Methyl-2-methylolphenol	25	10 15	
					104	4-Methoxyphenol	25	10 20	
					105	Sodium 3-hydroxybenzenephosphonate	25	10 2	

**TABLE XXVIII. ACID DISSOCIATION CONSTANTS OF PHENOLS
IN AQUEOUS SOLUTION
(Listed in order of increasing pKa)**

No.	Name	T, °C	pK ₁	pK ₂	No.	Name	T, °C	pK ₁	pK ₂
106	2-Ethylphenol	28	10.2		115	2,6-Dimethylphenol	25	10.59	
107	2,5-Dimethylphenol	24	10.22		116	2,4,6-Trimethylphenol	25	10.88, (10.99)	
108	4-Methylphenol (<i>p</i> -Cresol)	25	10.26		117	Hydroquinone (1,4-Dihydroxybenzene)	25	10.85, (9.96)	11.39
109	2-Methylphenol (<i>o</i> -Cresol)	25	10.28		118	4-Hydroxypyridine	20	11.09	
110	4-Indanol	25	10.32		119	Tetramethylhydroquinone (Durohydroquinone)	25	11.51	
111	3,4-Dimethylphenol	25	10.32		120	2-Hydroxypyridine	20	11.62	
112	2,4,5-Trimethylphenol	25	10.45						
113	2,4-Dimethylphenol	25	10.45						
114	2,3-Dimethylphenol	25	10.50						

EXPLANATIONS AND REFERENCES TO TABLES XXVII, XXVIII AND XXIX

The dissociation of an organic carboxylic acid, phenol or the conjugate acid of an amine in aqueous solution is expressed by the equation



and the corresponding equilibrium constant K_e is given by

$$K_e = \frac{(a_{\text{A}_{\text{aq}}^{\pm n-1}})(a_{\text{H}_3\text{O}^+})}{(a_{\text{HA}_{\text{aq}}^{\pm n}})(a_{\text{H}_2\text{O}})}$$

where the a 's are the activities of the species. At low electrolyte concentrations $a_{\text{H}_2\text{O}}$ is virtually constant, and a second constant, K_a , the thermodynamic dissociation constant, is defined as

$$K_a = K_e(a_{\text{H}_2\text{O}}) = \frac{(a_{\text{A}_{\text{aq}}^{\pm n-1}})(a_{\text{H}_3\text{O}^+})}{(a_{\text{HA}_{\text{aq}}^{\pm n}})} = \frac{(c_{\text{A}_{\text{aq}}^{\pm n-1}})(c_{\text{H}_3\text{O}^+})}{(c_{\text{HA}_{\text{aq}}^{\pm n}})} \cdot \frac{f_{\pm}^2}{f_{\text{HA}_{\text{aq}}^{\pm n}}}$$

where the c 's are the concentrations and the f 's are the activity coefficients of the species

The dissociation constants in the Tables are given in the more convenient pK_a notation, where

$$pK_a = -\log K_a$$

For Table XXVII, $\text{HA}^{\pm n} = \text{RCOOH}$, and $\text{A}^{\pm n-1} = \text{RCOO}^-$

For Table XXVIII, $\text{HA}^{\pm n} = \text{ArOH}$, and $\text{A}^{\pm n-1} = \text{ArO}^-$

For Table XXIX, $\text{HA}^{\pm n} = \text{RR}'\text{R}''\text{NH}^+$ and $\text{A}^{\pm n-1} = \text{RR}'\text{R}''\text{N}$ (R , R' and R'' may be alkyl or aryl groups or a hydrogen atom)

For monobasic acids $pK_a = pK_1$

For dicarboxylic acids both pK_1 and pK_2 are given, pK_1 is defined above, and pK_2 is the analogous dissociation constant of the monoanion, $\text{A}^{\pm n-1}$, obtained on the first dissociation. For other dibasic acids such as the conjugate acids of amino acids, or diamines, pK_1 is as defined above, and pK_2 is the dissociation constant for the species obtained after the first protonation.

For a comprehensive compilation of the dissociation constants of organic acids (including phenols) in aqueous solution, as well as summary of the methods for pK determinations, see G Kortum, W Vogel and K Andrussow, in *Pure and Applied Chemistry*, Vol 1, Butterworths, London, 1961, pp 190-536

For a comprehensive compilation of the dissociation constants of organic bases (especially amines) in aqueous solution see D D Perrin, *Dissociation Constants of Organic Bases in Aqueous Solution*, Butterworths, London, 1965

For general references including methods of determination of pK , and data for both acids and bases see J F King, in *Elucidation of Structures by Physical and Chemical Methods*, Vol 1 (Ed K W Bentley) (*Technique of Organic Chemistry*, Vol 9), Interscience, New York, 1963, Chapter 6, pp 318-401, H C Brown, D H McDaniel and O Hafiger in *Determination of Organic Structures by Physical Methods*, Vol 1 (Ed E A Braude and F C Nachod), Academic Press, New York, 1955, Chapter 14, p 567

*Derivatives recommended for first trial

WARNING This is not an instruction manual. References should be consulted for the preparation of derivatives

TABLE XXIX. DISSOCIATION CONSTANTS OF ORGANIC BASES IN AQUEOUS SOLUTION

(Listed in order of increasing pK_a)

(The data relates to the acid dissociation constant (K_a) of the conjugate acid (BH⁺) of the listed base (B))

No	Name	T, °C	pK ₁	pK ₂	No	Name	T, °C	pK ₁	pK ₂
1	2,4,6-Trinitroaniline	25	-9.41		59	2-Amino-6-nitronaphthalene	25	2.62	
2	2,4-Dinitroaniline	25	-4.53		60	N,N-Dimethyl-3-nitroaniline	25	2.63	
3	2,6-Dinitro-4-methylaniline	25	-3.96		61	2-Chloroaniline	25	2.65	
4	2,4-Dichloro-6-nitroaniline	25	-3.61		62	2-Amino-4-cyanonaphthalene	25	2.66	
5	2,6-Dichloro-4-nitroaniline	20	-2.55		63	1-Amino-3-bromonaphthalene	25	2.67	
6	N-Cyanodiethylamine	25	-2.0		64	3-Bromoquinoline	25	2.69	
7	1-Amino-2-nitronaphthalene	25	-1.74		65	1-Amino-3-chloronaphthalene	25	2.69	
8	4-Chloro-2-nitroaniline	25	-1.02		66	5-Nitroquinoline	20	2.69	
9	Dicyanomethyl ethyl amine	25	-0.6		67	6-Nitroquinoline	20	2.72	
10	2-Fluoropyridine	25	-0.44		68	1-Amino-5-nitronaphthalene	25	2.73	
11	Pyrrrole	25	-0.27		69	2-Amino-8-nitronaphthalene	25	2.73	
			(-3.8)		70	3-Cyanoaniline	25	2.748	
12	2-Nitroaniline	25	-0.26		71	1-Amino-8-nitronaphthalene	23	2.79	
13	Bis (cyanomethyl) amine	25	0.2		72	1-Amino-3-iodonaphthalene	25	2.82	
14	2-Chloropyridine	25	0.49,		73	3-Bromopyridine	25	2.84	
			(0.72)		74	3-Chloropyridine	25	2.84	
15	1-Amino-4-nitronaphthalene	20	0.54		75	1-Amino-6-nitronaphthalene	25	2.89	
16	Quinoxaline	20	0.56		76	4-Methyl-3-nitroaniline	25	2.96	
17	N,N-Dimethyl-4-nitroaniline	25	0.607		77	3-Cyano-N,N-dimethylaniline	25	2.969	
18	Pyrazine	27	0.65	-5.78	78	3-Fluoropyridine	25	2.97	
19	Diphenylamine	25	0.79		79	2-Amino-5-nitronaphthalene	25	3.01	
20	3-Nitropyridine	25	0.81		80	2-Methoxypyridine	25	3.06	
21	2-Bromopyridine	25	0.90		81	2-Amino-7-nitronaphthalene	25	3.10	
22	2-Cyanoaniline	25	0.95		82	1,3-Dimethylpyrazole	25	3.11	
23	2,6-Dimethyl-4-nitroaniline	22	0.98		83	2-Methoxyquinoline	20	3.16	
24	4-Nitroaniline	25	1.00		84	3-Acetylpyridine	25	3.18	
25	N-Chlorodiethylamine	25	1.02		85	4-Hydroxypyridine	20	3.20	11 12
26	2-Methyl-4-nitroaniline	24.5	1.04		86	2-Fluoroaniline	25	3.20	
27	2-Bromoquinoline	25	1.05		87	1-Amino-4-bromonaphthalene	25	3.21	
28	Tris (2-cyanoethyl) amine	25	1.1		88	3-Iodopyridine	25	3.25	
29	Pyrimidine	20	1.23		89	1-Amino-3-methoxynaphthalene	25	3.26	
			(1.31)		90	1-Amino-3-hydroxynaphthalene	25	3.30	
30	2-Amino-3-nitronaphthalene	25	1.48		91	1-Amino-5-chloronaphthalene	25	3.34	
31	3-Methyl-4-nitroaniline	25	1.50		92	2-Amino-4-chloronaphthalene	25	3.38	
32	2,5-Dichloroaniline	22	1.57		93	4-Aminofluorene	25	3.39	
33	4-Cyanoaniline	25	1.74		94	2-Amino-4-bromonaphthalene	25	3.40	
34	4-Cyano-N,N-dimethyl aniline	25	1.78		95	2-Amino-4-iodonaphthalene	25	3.41	
35	2-Iodopyridine	25	1.82		96	1-Amino-7-chloronaphthalene	25	3.48	
36	2,3-Dimethyl-4-nitroaniline	25	1.96		97	1-Amino-6-chloronaphthalene	25	3.48	
37	2,4-Dichloroaniline	25	2.00		98	Quinazoline	20	3.49	
38	1-Amino-3-nitronaphthalene	25	2.07		99	3-Chloroaniline	25	3.52	
39	3-Methoxy-5-nitroaniline	25	2.11		100	4-Bromo-2,6-dimethylaniline	25	3.54	
40	4-Aminobenzophenone (4-Benzoylaniline)	25	2.17		101	3-Methylpyrazole	25	3.56	
41	4-Aminoacetophenone (4-Acetylaniline)	25	2.19		102	3-Aminoacetophenone (3-Acetylaniline)	25	3.56	
			(2.75)		103	3-Fluoroaniline	25	3.57	
42	2-Aminoacetophenone (2-Acetylaniline)	25	2.22		104	4-Bromo-2-methylaniline	25	3.58	
43	Pyridazine	20	2.24		105	3-Bromoaniline	25	3.58	
44	1-Amino-3-cyanonaphthalene	25	2.26		106	2-(Methylthio)pyridine	20	3.59	
45	Cinnoline	20	2.27		107	3-Iodoaniline	25	3.61	
46	1,2,4-Triazole	25	2.30		108	5-Bromoquinoline	25	3.62	
47	2,4-Dibromoaniline	15	2.3		109	1-(Methylamino)naphthalene	27	3.67	
48	2,6-Dibromoaniline	25	2.34		110	2-Amino-7-chloronaphthalene	23	3.71	
49	7-Nitroquinoline	20	2.40		111	4-Bromopyridine	20	3.78	
50	2-Amino-4-nitronaphthalene	25	2.43		112	4-Iodoaniline	25	3.78	
51	Thiazole	20	2.44		113	2-Aminobiphenyl	22	3.82	
52	3-Nitroaniline	25	2.466		114	3,5-Dimethoxyaniline	25	3.82	
53	Pyrazole	25	2.48		115	4-Chloropyridine	20	3.84	
54	2-Bromoaniline	25	2.53		116	4-Bromoaniline	25	3.86	
55	1-Amino-7-nitronaphthalene	25	2.55		117	1-Aminofluorene	25	3.87	
56	8-Nitroquinoline	20	2.55		118	1-Amino-6-methoxynaphthalene	25	3.90	
57	3,5-Dimethyl-4-nitroaniline	25	2.59		119	1-Aminonaphthalene	25	3.92	
58	2-Iodoaniline	25	2.60		120	2,6-Dimethylaniline	25	3.95	

TABLE XXIX. DISSOCIATION CONSTANTS OF ORGANIC BASES IN AQUEOUS SOLUTION

(Listed in order of increasing pK_a) (Continued)

(The data relates to the acid dissociation constant (K_a) of the conjugate acid (BH⁺) of the listed base (B))

No	Name	T, °C	pK ₁	pK ₂	No	Name	T °C	pK ₁	pK ₂
121	8-Aminoquinoline	20	3.95		183	8-Methylquinoline	25	4.91	
122	1-Amino-5-hydroxynaphthalene	25	3.96		184	3,5-Dimethylaniline	25	4.91	
123	1-Amino-3-methylnaphthalene	25	3.96		185	3-Aminoquinoline	20	4.91	
124	1-Amino-6-hydroxynaphthalene	25	3.97		186	3-Methoxypyridine	25	4.91	
125	4-Chloroaniline	25	4.00		187	4- <i>tert</i> -Butylaniline	25	4.95	
126	3-(Methylthio)aniline	25	4.00		188	3,5-Di- <i>tert</i> -butylaniline	25	4.97	
127	4-Iodopyridine	20	4.02		189	2-Vinylpyridine	25	4.98	
128	2-Amino-4-methoxynaphthalene	25	4.05		190	1,3-Diaminobenzene (<i>m</i> -Phenylenediamine)	25	4.98	2.41
129	2-Amino-5-hydroxynaphthalene	25	4.07		191	N,3-Dimethylaniline	21	5.00	
130	1-Amino-7-methoxynaphthalene	25	4.07		192	2- <i>tert</i> -Butylaniline	25	5.03	
131	3-Bromo-4-methoxyaniline	23	4.08		193	6-Methoxyquinoline	20	5.03	
132	1-Aminoanthracene	25	4.1		194	N,N-Dimethylaniline	25	5.068	
133	2-Aminonaphthalene	25	4.16		195	4-Methylaniline	25	5.08	
134	N-Allylaniline	25	4.17		196	3-Hydroxypyridine	25	5.10	8.60
135	3-Ethoxyaniline	25	4.17		197	N-Ethylaniline	24	5.12	
136	1-(Ethylamino)naphthalene	25	4.18		198	N- <i>n</i> -Butylaniline	25	5.12	
137	2-Amino-7-methoxynaphthalene	25	4.19		199	3,5,6-Trimethylaniline	20.5	5.12	
138	1-Amino-7-hydroxynaphthalene	25	4.20		200	2-Benzylpyridine	25	5.13	
139	3-Methoxyaniline	25	4.20		201	6-Methylquinoline	25	5.15	
140	4-Aminobiphenyl	29	4.22		202	2-Amino-5,6,7,8-tetrahydronaphthalene	17	5.17	
141	4-Bromo-N,N-dimethylaniline	25	4.232		203	3,4-Dimethylaniline	25	5.17	
142	3-Aminobiphenyl	17	4.25		204	4-Ethoxvaniline	28	5.20	
143	2-Amino-7-hydroxynaphthalene	25	4.25		205	4-Methylquinoline	25	5.20	(5.59)
144	2,3,5,6-Tetramethylaniline	25	4.30		206	Pyridine	25	5.25	
145	2-Bromo-N,N-dimethylaniline	25	4.31		207	Bis(2-cyanoethyl)amine	25	5.26	
146	4-(Methylthio)aniline	25	4.35		208	7-Methylquinoline	25	5.29	
147	2- <i>n</i> -Propylaniline	25	4.36		209	N-Cyclopentylaniline	25	5.30	
148	Tris(2-chloroethyl)amine	25	4.37		210	5-Aminoindane	16	5.31	
149	2-Ethylaniline	25	4.37		211	4-Methoxyaniline	25	5.31	
150	2,4,6-Trimethylaniline	25	4.37		212	Aminoacetonitrile	25	5.34	
151	3,5-Dimethylpyrazole	25	4.38		213	N,N,3-Trimethylaniline	25	5.344	
152	3-(Methylthio)pyridine	20	4.42		214	N,4-Dimethylaniline	23	5.36	
153	2-Isopropylaniline	25	4.42		215	Isoquinoline	20	5.42	
154	N-Isobutylaniline	25	4.43		216	N- <i>n</i> -Hexylaniline	19	5.42	
155	2-Ethoxyaniline	28	4.43		217	5-Aminoquinoline	20	5.42	
156	2-Methylaniline	25	4.44		218	2,2,2-Trichloroethylamine	20	5.47	
157	1-Amino-5,6,7,8-tetrahydronaphthalene	16	4.47		219	Benzimidazole	25	5.53	
158	Phenanthridine	20	4.48		220	1-Methylbenzimidazole	25	5.54	
159	2-Methoxyaniline	25	4.52		221	3-Ethylpyridine	25	5.56	
160	2,5-Dimethylaniline	25	4.53		222	1-Ethylbenzimidazole	25	5.59	
161	1-(Cyanomethyl)pyridine	25	4.55		223	6-Aminoquinoline	20	5.59	
162	(Cyanomethyl) diethyl amine	25	4.55		224	N-Cyclohexylaniline	25	5.60	
163	Bis(2-Cyanoethyl) ethyl amine	25	4.55		225	4-Vinylpyridine	25	5.62	
164	2-(Dimethylamino)naphthalene	25	4.566		226	N,N,4-Trimethylaniline	25	5.628	
165	Aniline	25	4.603		227	3-Methylpyridine	25	5.63	
166	5-Methylquinoline	25	4.62		228	4-Methylbenzimidazole	25	5.65	
167	N,2-Dimethylaniline	23	4.62		229	N,N-Di- <i>n</i> -propylaniline	23	5.68	
168	2-Aminofluorene	25	4.64		230	2-Methylquinoline	25	5.69	
169	2-Amino-6-methoxynaphthalene	25	4.64		231	1-Isopropylbenzimidazole	25	5.71	
170	4-Fluoroaniline	25	4.65		232	3-Isopropylpyridine	25	5.72	
171	3- <i>tert</i> -Butylaniline	25	4.66		233	2- <i>tert</i> -Butylpyridine	25	5.76	
172	3-Isopropylaniline	25	4.67		234	N-Isopropylaniline	25	5.77	
173	2,3-Dimethylaniline	25	4.70		235	5-Methylbenzimidazole	25	5.78	
174	3-Methylaniline	25	4.70		236	3- <i>tert</i> -Butylpyridine	25	5.82	
175	3-Ethylaniline	25	4.70		237	2-Isopropylpyridine	25	5.83	
176	1,2-Diaminobenzene (<i>o</i> -Phenylenediamine)	25	4.74	0.6	238	4-Ethylpyridine	25	5.87	
177	N- <i>n</i> -Propylaniline	25	4.79		239	2-Ethylpyridine	25	5.89	
178	Quinoline	25	4.81		240	2-Methylpyridine	25	5.94	
179	3-Aminofluorene	25	4.82		241	4-(Methylthio)pyridine	20	5.94	
180	1-(Dimethylamino)naphthalene	28	4.83		242	2-Hexylpyridine	25	5.95	
181	N-Methylaniline	25	4.848						
182	2,4-Dimethylaniline	25	4.89						

TABLE XXIX. DISSOCIATION CONSTANTS OF ORGANIC BASES IN AQUEOUS SOLUTION

(Listed in order of increasing pK_a) (Continued)

(The data relates to the acid dissociation constant (K_a) of the conjugate acid (BH⁺) of the listed base (B))

No	Name	T °C	pK ₁	pK ₂	No	Name	T °C	pK ₁	pK ₂
243	2- <i>n</i> -Propylpyridine	25	5.97		305	Bis(2-hydroxyethyl)amine	25	8.88	
244	4- <i>tert</i> -Butylpyridine	25	5.99		306	N,N-Dimethylbenzylamine	25	8.91	
245	2-Pentylpyridine	25	6.00		307	3-Bromopropylamine	21	8.93	
246	4-Isopropylpyridine	25	6.02		308	1,2-Bis(dimethylamino)ethane	30	8.97	5.85
247	4-Methylpyridine	25	6.03		309	1-(Aminoethyl)benzene	25	9.08	
248	3-Aminopyridine	25	6.03		310	2-Acetoxyethylamine	25	9.1	
249	N,N,2-Trimethylaniline	25	6.11		311	4-Aminopyridine	25	9.114	
250	N,2,6-Trimethylaniline	25	6.12		312	4-Aminoquinoline	20	9.13	
					313	(3-Cyanopropyl) diethyl amine	25	9.13	
252	2-Methylbenzimidazole	25	6.19		314	3-Methoxybenzylamine	25	9.15	
253	1,4-Diaminobenzene (<i>p</i> -Phenylenediamine)	25	6.2	2.67	315	2-Methylbenzylamine	25	9.19	
254	2-Isopropylbenzimidazole	25	6.21		316	1-Aminoindane	22.5	9.21	
255	2-Ethylbenzimidazole	25	6.27		317	<i>trans</i> -1-Amino-2-hydroxycyclopentane	25	9.28	
256	N,N-Di- <i>n</i> -butylaniline	19	6.30		318	Diallylamine	25	9.29	
257	2,5-Dimethylpyridine	25	6.40		319	Dimethyl (2-hydroxyethyl) amine	20	9.31	
258	2-Phenylimidazole	25	6.40		320	3-Methylbenzylamine	25	9.33	
259	Bis(2-chloroethyl) methyl amine	25	6.43		321	Benzylamine	25	9.35,	
260	4-Methoxyquinoline	30	6.45					(9.62)	
261	3,4-Dimethylpyridine	25	6.46		322	4-Methylbenzylamine	25	9.36	
262	4-Methoxypyridine	25	6.47		323	3,4-Dimethoxybenzylamine	25	9.39	
263	Bis(2-chloroethyl) ethyl amine	25	6.55		324	2,3-Dimethoxybenzylamine	25	9.41	
264	1,2-Dimethylbenzimidazole	25	6.55		325	2-(Phenethylamino)ethylamine	25	9.44	6.59
265	2,3-Dimethylpyridine	25	6.57		326	N,N-Diethylbenzylamine	25	9.44	
266	2,6-Dimethylpyridine	25	6.60		327	4-Methoxybenzylamine	25	9.47	
267	7-Aminoquinoline	20	6.61		328	2-(Methylthio)ethylamine	20	9.49	
268	N,N-Diethylaniline	22	6.61		329	2-Hydroxyethylamine	25	9.498	
269	4-Ethoxypyridine	20	6.67		330	2-(Dimethylamino)ethylamine	25	9.53	6.63
270	2-Aminopyridine	25	6.71		331	N-Methylbenzylamine	25	9.54	
271	2,4-Dimethylpyridine	25	6.77		332	1,2-Bis(diethylamino)ethane	25	9.55	6.18
272	Imidazole	25	6.95		333	2-Aminoindane	21.5	9.57	
273	N- <i>tert</i> -Butylaniline	25	7.00		334	N-Propylbenzylamine	25	9.58	
274	(2-Cyanoethyl) dimethyl amine	29	7.0		335	1,2,3-Triaminopropane	20	9.59	7.95, pK _a = 3.72
275	2-Benzyl-2-pyrrolone	25	7.06						
276	2-Aminoquinoline	20	7.30		336	2-Methoxyethylamine	20	9.61	
277	N,N-Di-isopropylaniline	25	7.37		337	5-Bromo- <i>n</i> -pentylamine	21	9.62	
278	N-Methylmorpholine	25	7.38		338	<i>trans</i> -1-Amino-2-hydroxycyclohexane	25	9.63	
279	2,4,6-Trimethylpyridine	25	7.43		339	1-Amino-1,2,3,4-tetrahydronaphthalene	20	9.63	
280	4-Methylimidazole	25	7.518		340	N-Ethylbenzylamine	25	9.64	
281	1,3-Triazine	25	7.6		341	3,3,3-Trichloro- <i>n</i> -propylamine	20	9.65	
282	N-Ethylmorpholine	25	7.67		342	1-Allylpiperidine	25	9.65	
283	2-Cyanoethylamine	29	7.7		343	2-Methoxybenzylamine	25	9.70	
284	Tris(2-hydroxyethyl)amine	25	7.762		344	<i>cis</i> -1-Amino-2-hydroxycyclopentane	25	9.70	
285	2-Methylimidazole	25	7.85		345	2-(Furfurylamino)ethylamine	20	9.72	6.20
286	N-Methylaziridine	25	7.86		346	<i>cis</i> -1-Amino-2-hydroxycyclohexane	25	9.72	
287	N- <i>n</i> -Butylaziridine	25	7.86		347	Piperazine	25	9.81	5.55
288	2-Ethyl-2-pyrrolone	25	7.87		348	Trimethylamine	25	9.81	
289	2,3,5,6-Tetramethylpyridine	20	7.90		349	Phenethylamine ((2-Aminoethyl)benzene)	25	9.84	
290	2-Cyclohexyl-2-pyrrolone	25	7.91		350	Diethyl 2-hydroxyethyl amine	20	9.87	
291	N-Ethylaziridine	24	7.93		351	1-Methyl-3-pyrrolone	25	9.88	
292	Aziridine	25	8.01		352	1,2-Diaminoethane (1,2-Ethylenediamine)	25	9.928	6.848
293	N,2-Diethylaziridine	25	8.18		353	<i>cis</i> -1,2-Diaminocyclohexane	20	9.93	6.13
294	2-Ethylaziridine	25	8.29		354	2-Amino-1,2,3,4-tetrahydronaphthalene	17	9.93	
295	Triallylamine	25	8.31		355	Tri- <i>n</i> -butylamine	25	9.93	
296	Morpholine	25	8.33		356	4,4,4-Trichloro- <i>n</i> -butylamine	20	9.93	
297	2,4-Dimethylimidazole	25	8.36		357	<i>trans</i> -1,2-Diaminocyclohexane	20	9.94	6.47
298	2-Bromoethylamine	24	8.49		358	3-Hydroxypropylamine	25	9.96	
299	Bis(2-hydroxyethyl) methyl amine	25	8.52		359	<i>meso</i> -2,3-Diaminobutane	25	9.97	6.92
300	1,2-Bis(furfurylamino)ethane	20	8.61	5.74	360	<i>d,l</i> -2,3-Diaminobutane	25	10.00	6.91
301	2,2-Dimethylaziridine	25	8.64		361	1,2-Diaminopropane	25	10.00	7.13
302	<i>trans</i> -2,3-Dimethylaziridine	24	8.69						
303	<i>cis</i> -2,3-Dimethylaziridine	23	8.72		362	<i>cis</i> -Neobornylamine	25	10.01	
304	(2-Chloroethyl) diethyl amine	25	8.80						

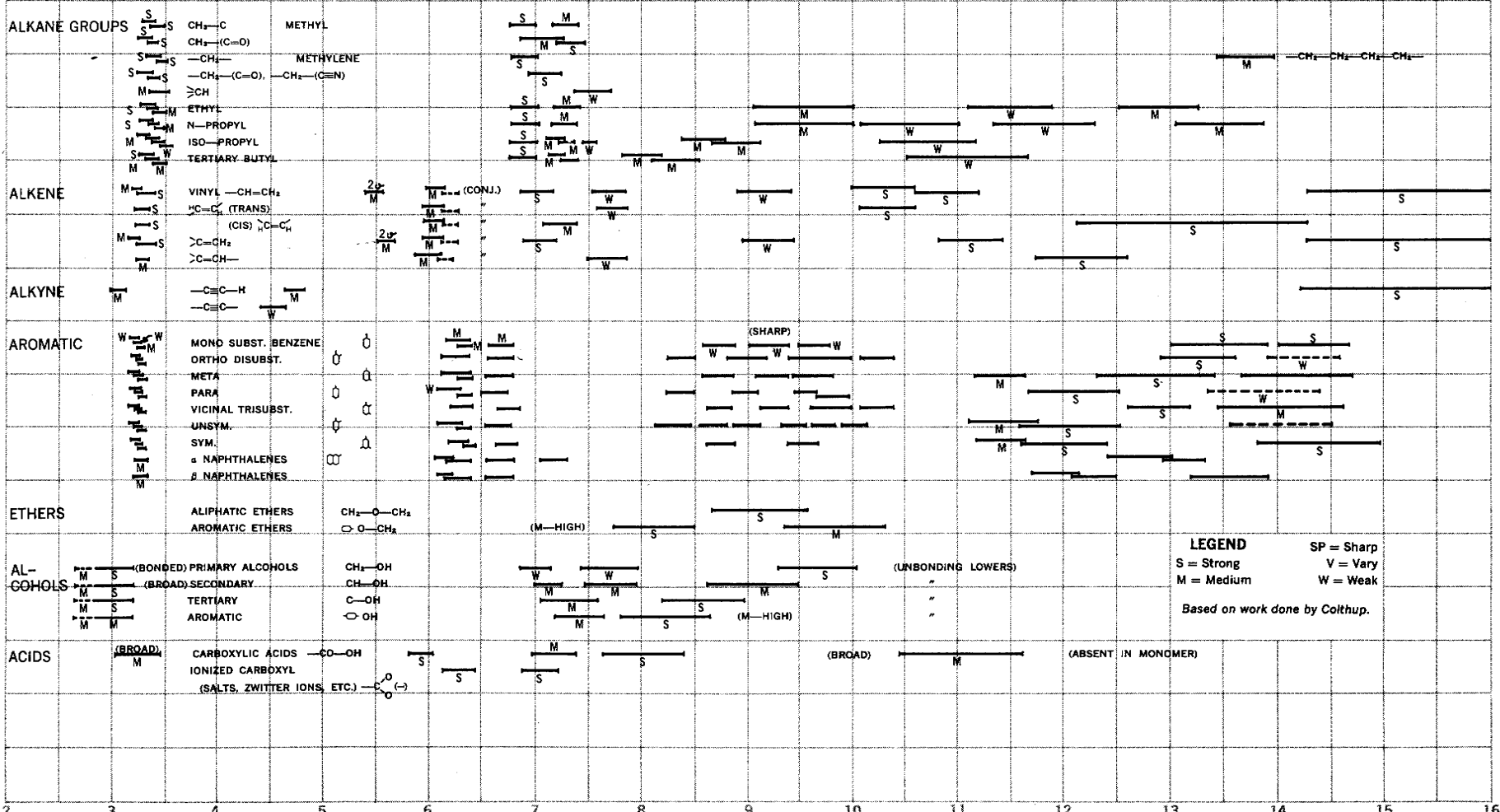
TABLE XXIX. DISSOCIATION CONSTANTS OF ORGANIC BASES IN AQUEOUS SOLUTION

(Listed in order of increasing pKa) (Continued)

(The data relates to the acid dissociation constant (Ka) of the conjugate acid (BH⁺) of the listed base (B))

No	Name	T °C	pK ₁	pK ₂	No	Name	T °C	pK ₁	pK ₂
363	2-(Diethylamino)ethylamine	25	10 02	7 07	417	<i>n</i> -Pentylamine	25	10 63	
364	1-Methylpiperidine	25	10 08		418	<i>n</i> -Undecylamine (<i>n</i> -Hendecylamine)	25	10 63	
365	Dimethyl isobutyl amine	20	10 08		419	<i>n</i> -Nonylamine	25	10 64	
366	5,5,5-Trichloro- <i>n</i> -pentylamine	20	10 12		420	Acridine	25	10 65	
367	2-(Methylamino)ethylamine	20	10 15	6 86	421	<i>n</i> -Octylamine	25	10 65	
368	<i>cis</i> -1,2,6-Trimethylpiperidine	30	10 15		422	Methylamine	25	10 657	
369	2,2-Dimethyl- <i>n</i> -propylamine	25	10 15		423	1-Ethyl-2-methylpiperidine	25	10 66	
370	1,2-Bis(methylamino)ethane	25	10 16	7 40	424	<i>n</i> -Heptylamine	25	10 66	
371	Dimethyl propyl amine	20	10 16		425	2-Aminoheptane	25	10 67	
372	Dimethyl ethyl amine	20	10 16		426	Cyclohexylamine	25	10 68	
373	<i>trans</i> -Bornylamine	25	10 17		427	<i>tert</i> -Butylamine	25	10 68	
374	1,2,2,4-Tetramethylpiperidine	30	10 18		428	<i>tert</i> -Butyl dimethyl amine	20	10 69	
375	<i>n</i> -Butyl dimethyl amine	25	10 19		429	<i>n</i> -Propylamine	25	10 69	
376	1,2-Dimethylpyrrolidine	26	10 20		430	1,2,2,6-Tetramethylpiperidine	30	10 70	
377	1,2-Dimethylpiperidine	25	10 22		431	Ethylamine	25	10 70	
378	1,5-Diaminopentane	25	10 25	9 13	432	Isobutylamine	25	10 72	
379	Tri- <i>n</i> -propylamine	25	10 26		433	3-(Trimethylsilyl)- <i>n</i> -propylamine	25	10 73	
380	1,2-Bis(propylamino)ethane	25	10 27	7 53	434	Dimethylamine	25	10 73	
381	2-(Butylamino)ethylamine	25	10 30	7 53	435	Triethylamine	25	10 75	
382	1,3-Diaminopropane (1,3-Propylenediamine)	25	10 30	8 29	436	2-Cyclohexylpyrrolidine	25	10 76	
383	2-Benzylpyrrolidine	25	10 31		437	1,4-Diaminobutane	20	10 80	9 35
384	Tri-isobutylamine	25	10 32		438	Di-isobutylamine	21	10 91	
385	<i>N</i> -Methylpyrrolidine	25	10 32		439	1,6-Diaminohexane	25	10 93	9 83
386	2-(propylamino)ethylamine	25	10 34	7 54	440	Di-isoamylamine	27 8	10 94	
387	4-Hydroxy- <i>n</i> -butylamine	20	10 35		441	Quinuclidine	25	10 95	
388	1,2-Bis(isopropylamino)ethane	25	10 40	7 59	442	2-Methylpiperidine	25	10 95	
389	1- <i>n</i> -Propylpiperidine	26 5	10 41		443	2-(Trimethylsilyl)ethylamine	25	10 97	
390	3-Aminopentane	25	10 42		444	Di- <i>n</i> -tridecylamine	25	11 00	
391	3-Aminocyclohexane	25	10 42		445	Di- <i>n</i> -octadecylamine	25	11 00	
392	1- <i>n</i> -Butylpiperidine	26	10 43		446	1,8-Diaminooctane	20	11 00	10 1
393	1-Ethylpiperidine	23	10 45		447	Di- <i>n</i> -propylamine	25	11 00	
394	1,2-Bis(ethylamino)ethane	25	10 46	7 70	448	Di- <i>n</i> -dodecylamine	25	11 00	
395	Diethyl methyl amine	20	10 46		449	Di- <i>n</i> -pentadecylamine	25	11 00	
396	5-Hydroxy-1-pentylamine	23	10 46		450	Di- <i>n</i> -hexylamine	25	11 01	
397	Dimethyl isopropyl amine	20	10 47		451	Di- <i>n</i> -octylamine	25	11 01	
398	<i>trans</i> -1-Amino-4-methylcyclohexane	25	10 48		452	2,2,4-Trimethylpiperidine	30	11 04	
399	(Aminomethyl)cyclohexane	25	10 49		453	Cyclohexyl methyl amine	25	11 04	
400	<i>cis</i> -1-Amino-2-methylcyclohexane	25	10 49		454	Diethylamine	25	11 04	
401	2-Aminooctane	25	10 49		455	2,2,6,6-Tetramethylpiperidine	25	11 07	
402	<i>trans</i> -1-Amino-2-methylcyclohexane	25	10 51		456	Azepine	25	11 07	
403	<i>cis</i> -1-Amino-3-methylcyclohexane	25	10 56		457	<i>cis</i> -2,6-Dimethylpiperidine	25	11 07	
404	2-(Ethylamino)ethylamine	25	10 56	7 63	458	3-Methylpiperidine	25	11 07	
405	Dimethyl <i>sec</i> -butyl amine	20	10 57		459	Piperidine	25	11 123	
406	6-Hydroxy- <i>n</i> -hexylamine	21	10 60		460	Di-isopropylamine	21	11 13	
407	6-Bromo- <i>n</i> -hexylamine	21	10 60		461	Di- <i>n</i> -pentylamine	26	11 16	
408	1-Aminoheptadecane	25	10 60		462	2,2,6-Trimethylpiperidine	30	11 21	
409	1-Aminodocosane	25	10 60		463	(<i>tert</i> -Butylamino)cyclohexane	25	11 23	
410	1-Aminooctadecane	25	10 60		464	Di- <i>n</i> -butylamine	25	11 25	
411	1-Aminopentadecane	25	10 61		465	1,2,2,4,4-Pentamethylpiperidine	25	11 25	
412	<i>n</i> -Butylamine	25	10 61		466	Pyrrolidine	25	11 27	
413	1-Aminohexadecane	25	10 61		467	Azetidine	25	11 29	
414	<i>trans</i> -1-Amino-3-methylcyclohexane	25	10 61		468	Isopropylamine	25	11 54, (10 63)	
415	1-Aminotetradecane	25	10 62		469	1,2-Dimethyl-2-pyrrolone	25	11 90	
416	2-(Isopropylamino)ethylamine	25	10 62	7 70	470	Acetamidine (Methylamidine)	25	12 40	

4000 3000 2500 2000 1500 1400 1300 1200 1100 1000 900 800 700 650



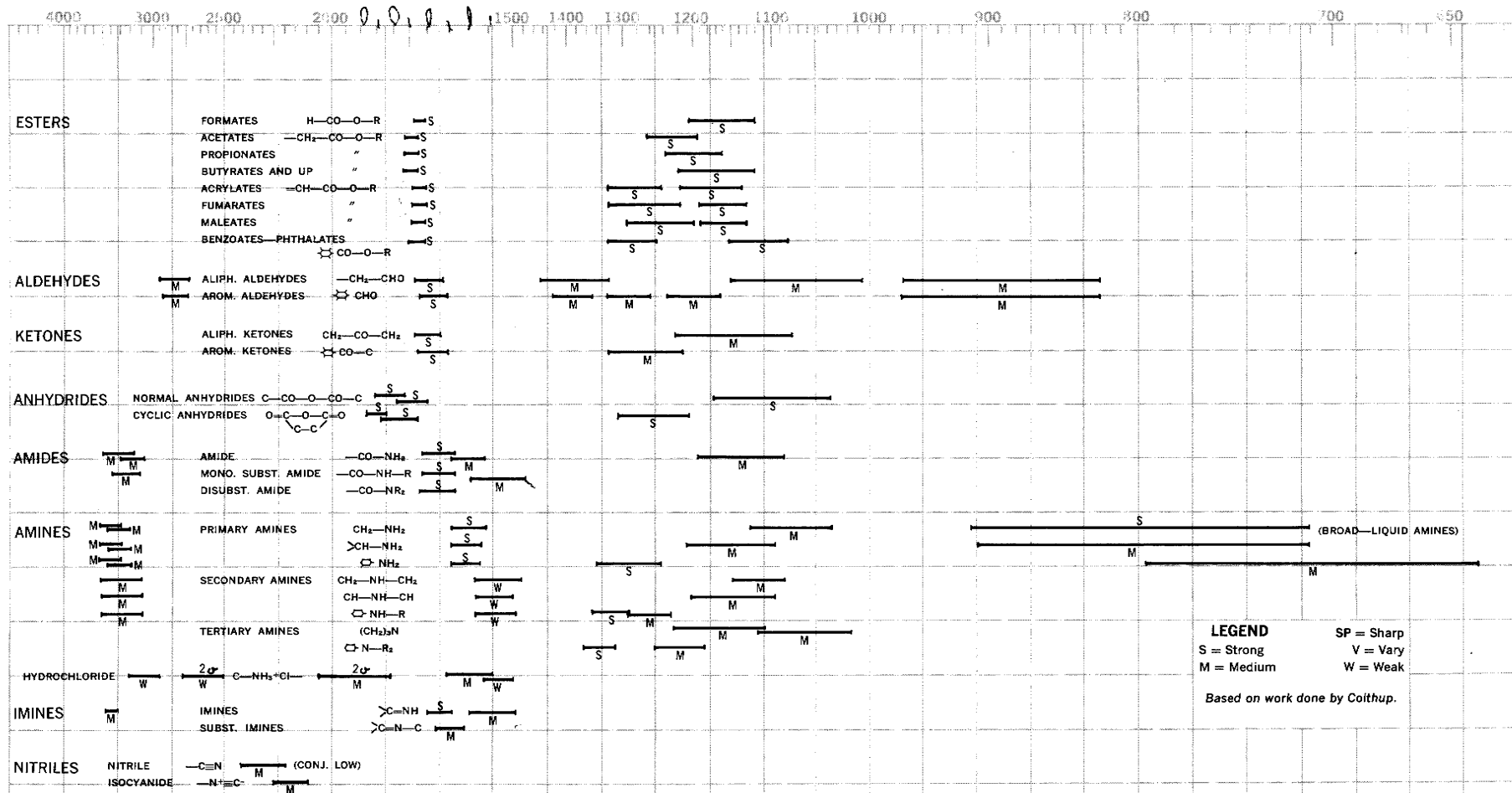
Handbook of tables for Organic Compound Identification, © 1967 CRC

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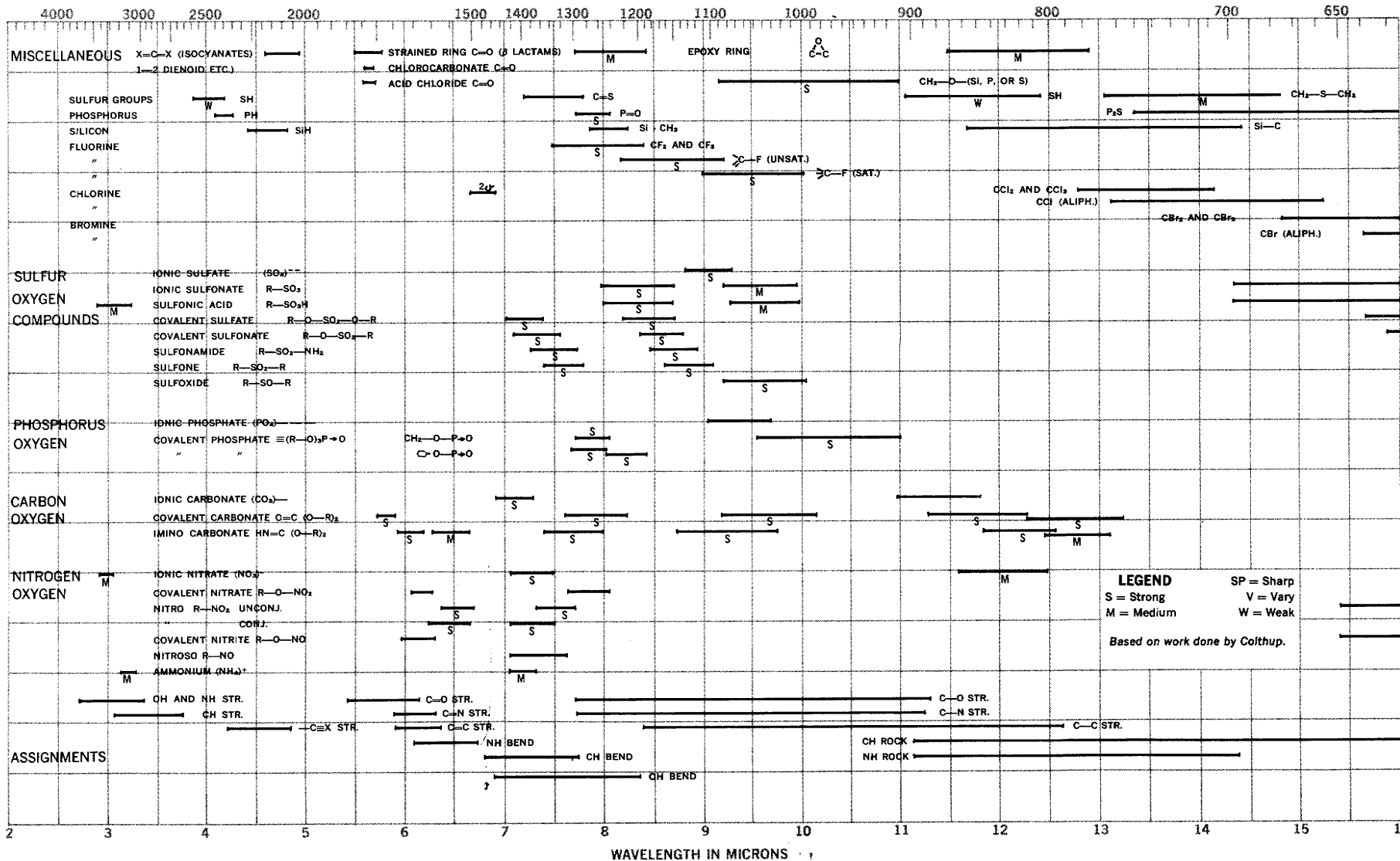
WAVELENGTH IN MICRONS

INFRARED CORRELATION CHART No. 1 (Con't.)

WAV. NUMBERS IN KAYSERS



WAVENUMBERS IN KAYSERS



INFRARED CORRELATION CHART No. 2

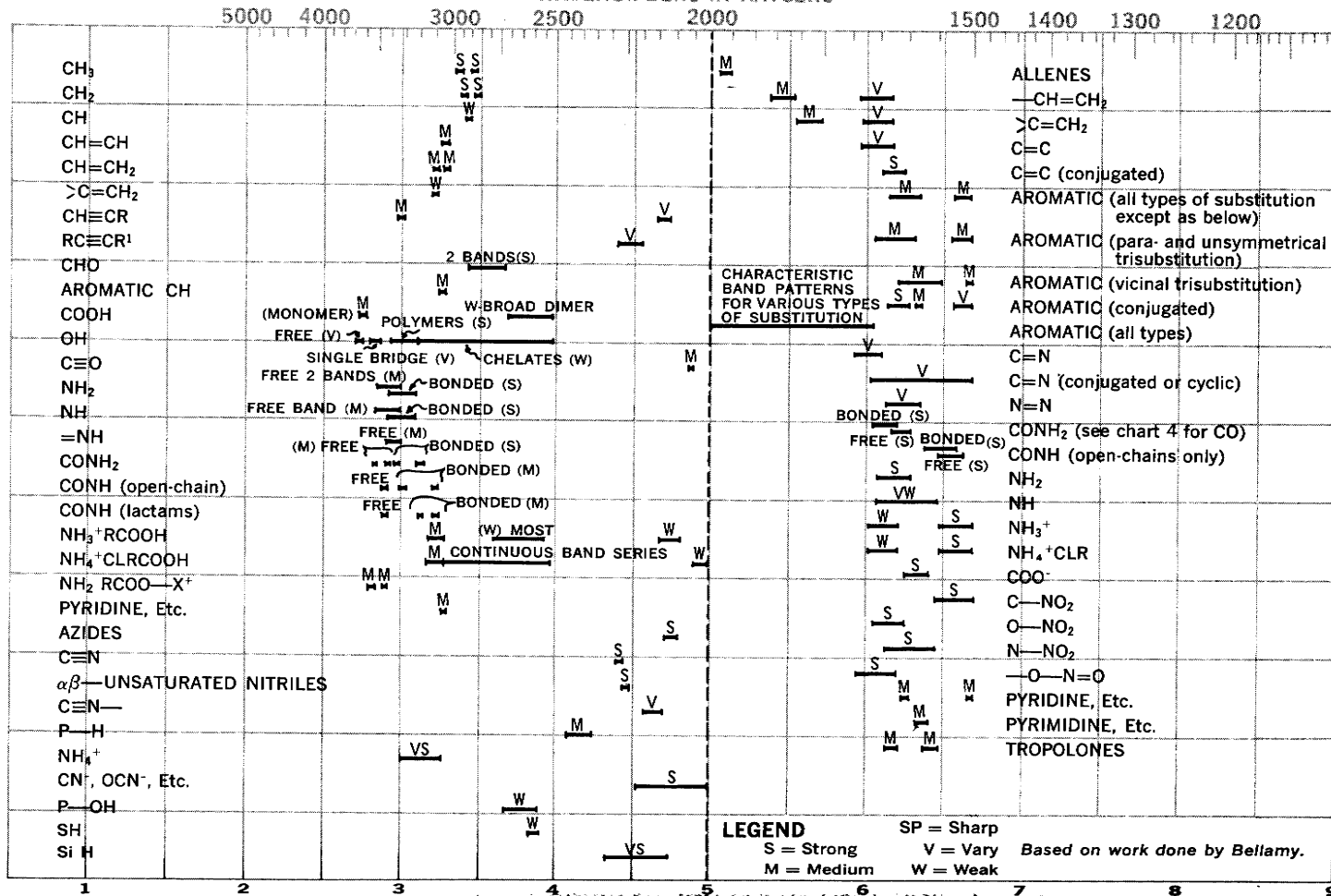
Prepared from information supplied by Beckman Instruments

This chart presents some information regarding structure, double-bond vibrations, hydrogen stretching and triple-bond vibrations.

HYDROGEN STRETCHING AND TRIPLE-BOND VIBRATIONS, 3750-2000 CM^{-1}

DOUBLE-BOND VIBRATIONS, ETC. 2000-1500 CM^{-1}

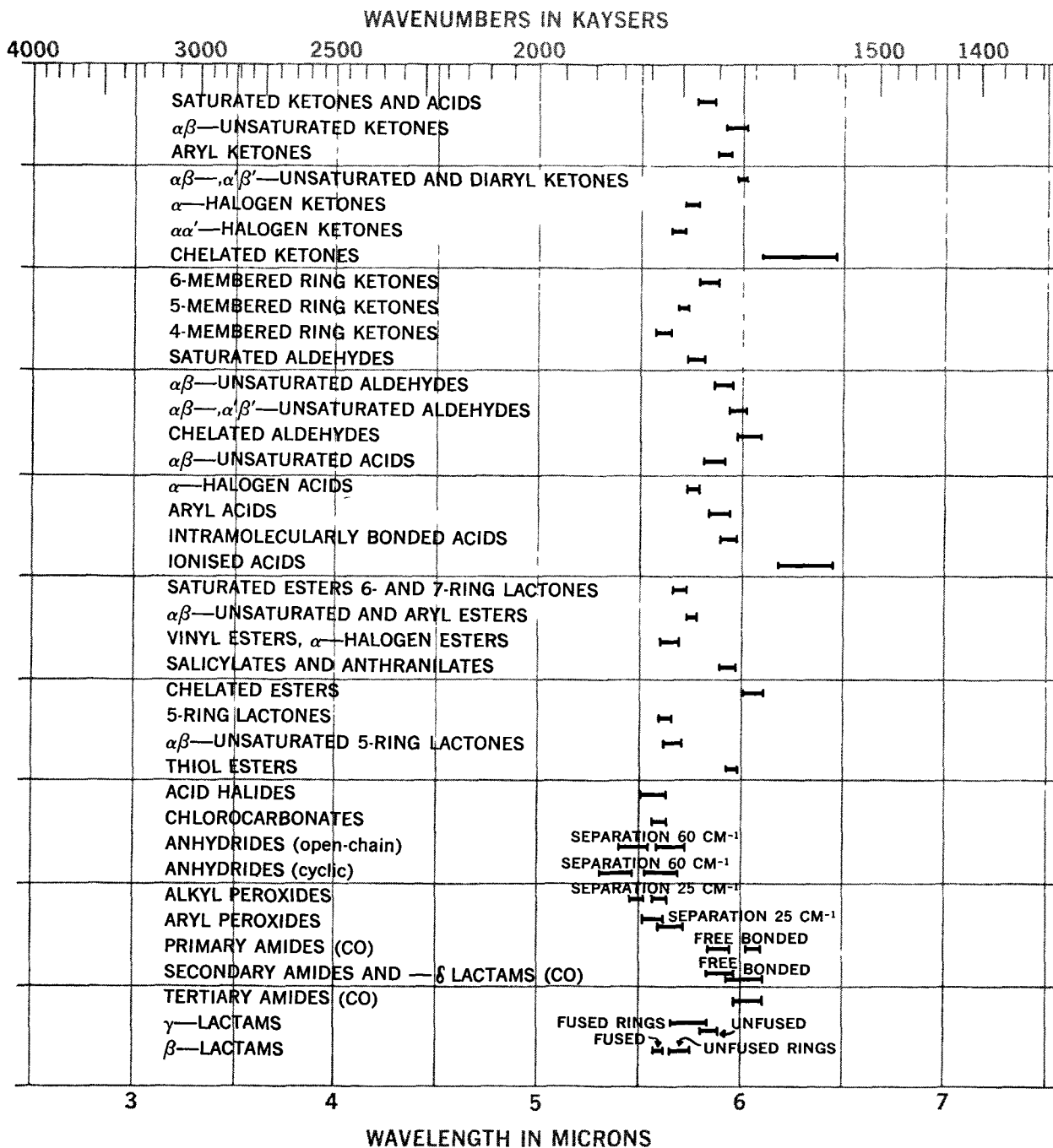
WAVENUMBERS IN KAYERS



INFRARED CORRELATION CHART No. 3

Prepared from information supplied by Beckman Instruments

This chart presents some correlations between structure and the carbonyl vibrations of some classes of organic compounds. In all cases the absorption bands are strong and fall within the range of 1900-1500 cm^{-1} .

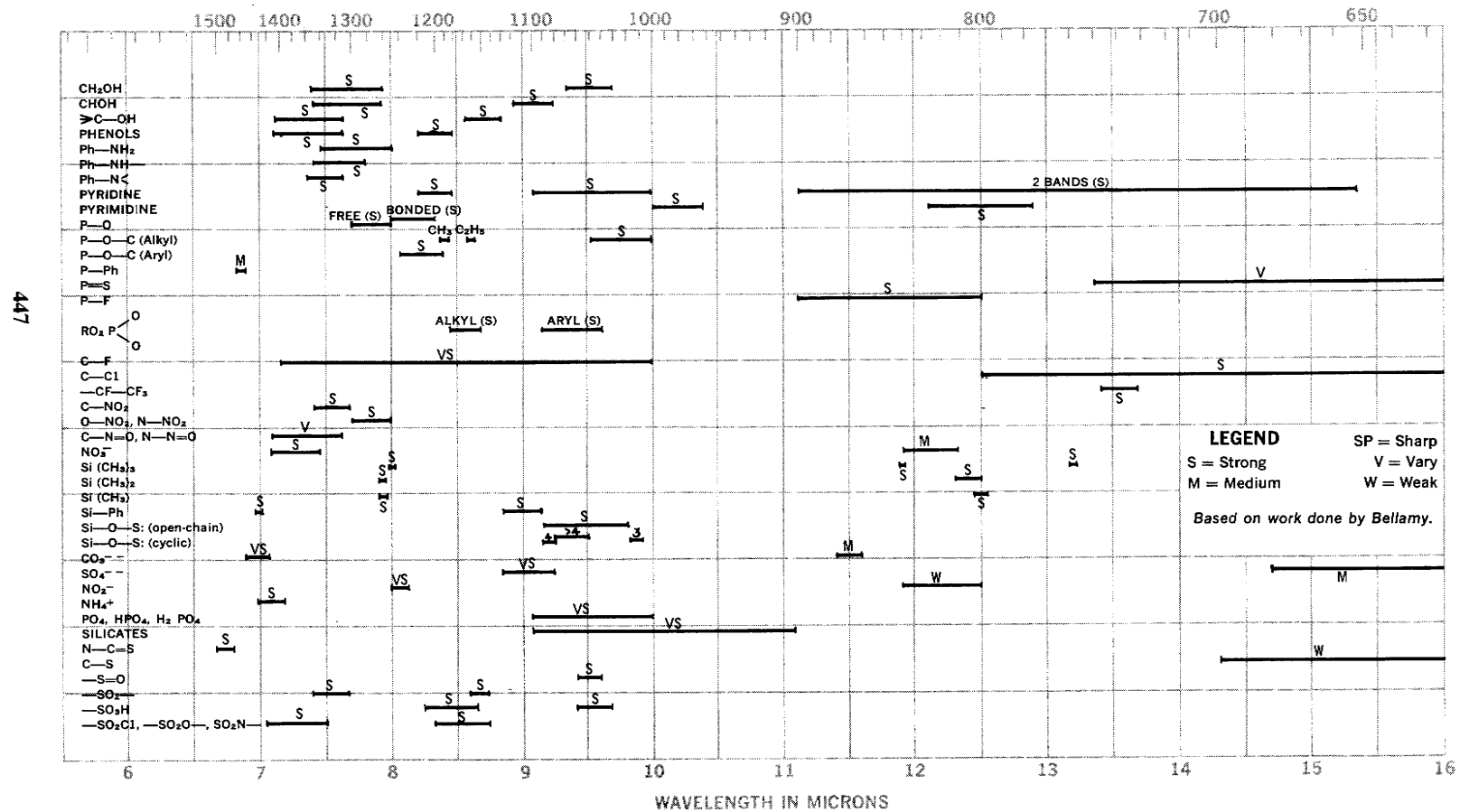


INFRARED CORRELATION CHART No. 4 (Con't.)

Prepared from information supplied by Beckman Instruments

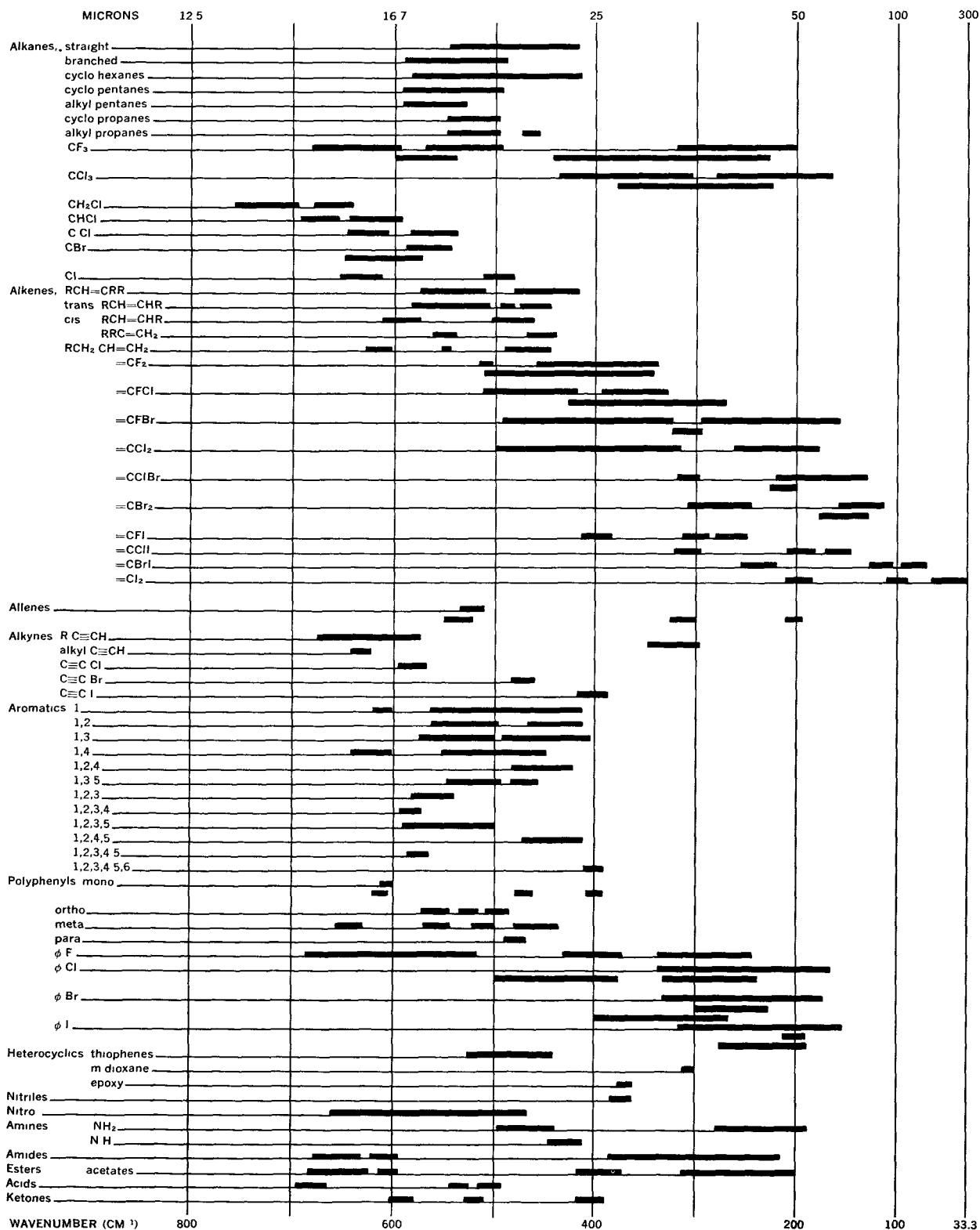
This chart presents some correlations between structure and single-bond vibrations for a number of classes of compounds having absorption between 1500-650 cm^{-1} .

WAVENUMBERS IN KAYSERS

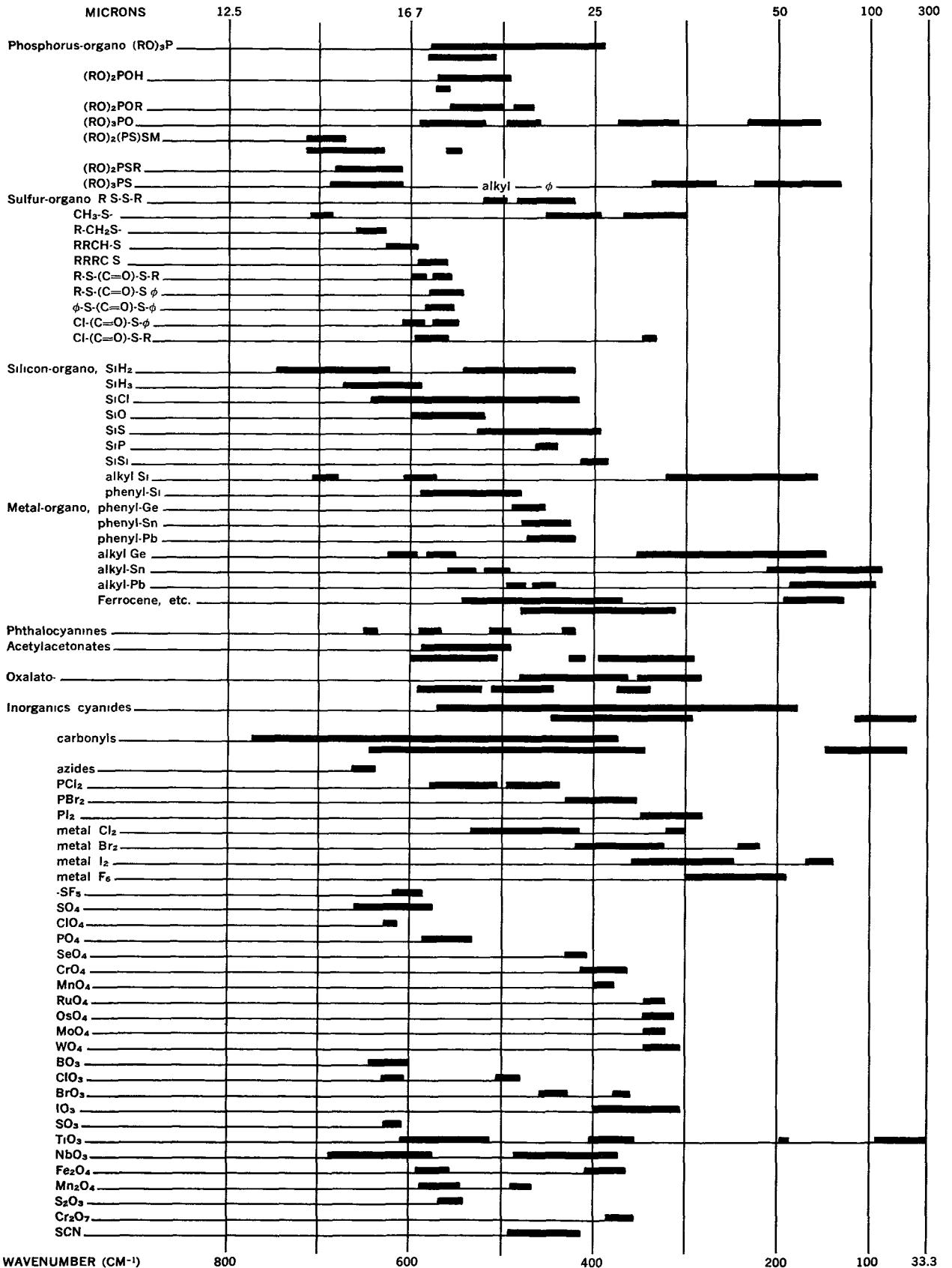


FAR INFRARED VIBRATIONAL FREQUENCY CORRELATION CHART

Based on evidence compiled by James E. Stewart of Beckman Instruments.
This chart shows the vibrational frequency correlation in the far infrared region.
Because research is continuing in the far infrared region, this chart is not all-inclusive.



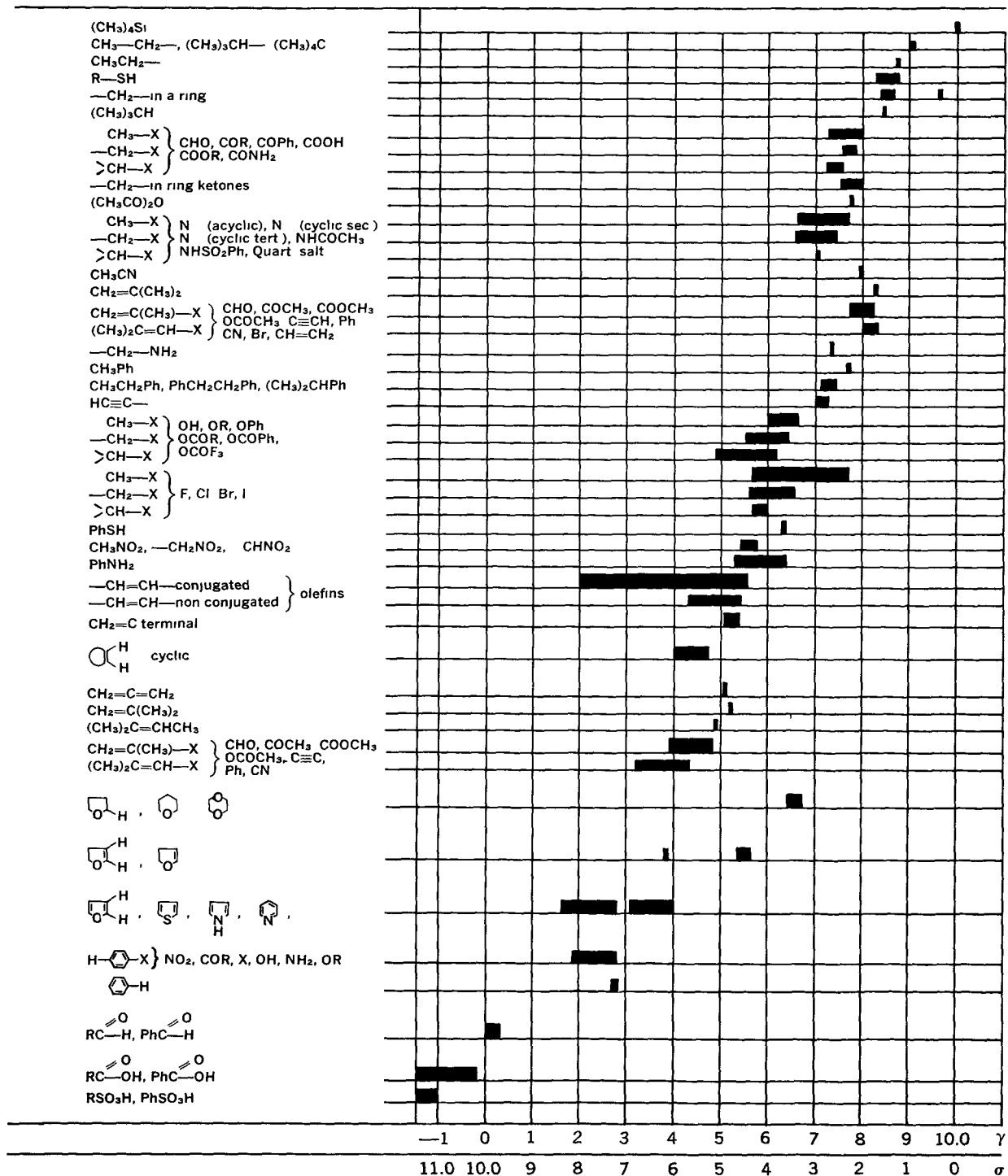
FAR INFRARED VIBRATIONAL FREQUENCY CORRELATION CHART (Con't.)



CHARACTERISTIC NMR SPECTRAL POSITIONS FOR HYDROGEN IN ORGANIC STRUCTURES

By permission from Erno Mohacsí, *J. of Chemical Education*, 41, 38 (1964)

This table is useful for quick qualitative determination of proton spectrum lines by providing a tabulation of line positions obtained using tetramethylsilane as an internal reference. The listing has been kept as simple as possible for this purpose. The proton spectrum lines are arranged according to the chemical shift relative to tetramethylsilane and are given in values of τ and σ . The purpose of this table is to supplement tables available in standard references and to summarize information available in the literature.



MISCIBILITY OF ORGANIC SOLVENT PAIRS

Table A

Doctor J. S. Drury

Industrial and Engineering Chemistry

Vol. 44, No. 11, Nov. 1952

(Reprinted by permission)

The classifications were made by shaking together 5 ml. of each of the solvents listed in a test tube for 1 minute, then allowing the mixture to settle. If no interfacial meniscus was observed, the solvent pair was considered miscible. If such a meniscus was present, the solvent pair was regarded as immiscible. The classification of immiscible is a qualitative one since solvent pairs may exhibit some degree of partial miscibility while existing as separate phases. Solvent pairs possessing a pronounced degree of partial miscibility are designated by the symbol Is.

Compound number	Compounds	Acetone	Acetyl acetone	2-Amino-2-methyl-1-propanol	Aniline	Benzaldehyde	Benzene	Benzin	Benzyl alcohol	Butyl acetate	Butyl alcohol	n-Butyl ether	Capryl alcohol	Carbon tetrachloride	Diacetone alcohol	Diethanolamine	Diethyl cellosolve	Diethyl ether	Dimethylaniline	Ethyl alcohol	Ethyl benzoate	Ethylene glycol	2-Ethylhexanol	Formamide	Furfuryl alcohol	Glycerol	Hydroxyethyl-ethylenediamine	Isoamyl alcohol	Methyl isobutyl ketone	Nitromethane	Dibutoxytetra-ethylene glycol	Pyridine	Triethanolamine	Trimethylene glycol			
1	Acetone	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
2	Acetyl acetone	M	R	M	M	M	M	M	M	M	M	M	M	M	M	R	M	M	M	M	M	M	M	M	M	M	M	R	M	M	M	M	M	M	M	M	
3	Adiponitrile	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
4	2-Amino-2-methyl-1-propanol	M	R	M	M	M	M	M	M	M	M	Is	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
5	Benzaldehyde	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	Is	M	M	M	M	M	M	M	M	M	M	M	M	M	
6	Benzene	M	M	M	M	M	M	M	M	M	M	M	M	M	Is	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
7	Benzin	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
8	Benzonitrile	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
9	Benzothiazole	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
10	Benzyl alcohol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
11	Benzyl mercaptan	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
12	Butyl acetate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
13	Butyl alcohol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
14	n-Butyl ether	M	M	Is	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
15	Capryl alcohol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
16	Carbon tetrachloride	M	M	M	M	M	M	M	M	M	M	M	M	Is	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
17	Diacetone alcohol	M	M	R	M	Is	M	M	M	M	M	M	M	Is	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
18	Diethanolamine	M	R	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
19	Diethyl Cellosolve	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
20	Diethyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
21	Dimethylaniline	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
22	Di-n-propylaniline	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
23	Ethyl alcohol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
24	Ethyl benzoate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
25	Ethyl isothiocyanate	M	M	R	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
26	Ethyl thiocyanate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
27	Ethylene glycol	M	M	M	M	Is	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
28	2-Ethylhexanol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
29	Formamide	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
30	Furfuryl alcohol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
31	Glycerol	I	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
32	Hydroxyethyl-ethylenediamine	M	R	M	M	R	I	Is	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
33	Isoamyl alcohol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
34	Isoamyl sulfide	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
35	Isobutyl mercaptan	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
36	Methyl disulfide	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
37	Methyl isobutyl ketone	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
38	Nitromethane	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
39	Dibutoxytetra-ethylene glycol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
40	Pyridine	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
41	Tri-n-butylamine	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
42	Trimethylene glycol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	

MISCIBILITY OF ORGANIC SOLVENT PAIRS (Continued)

Tables B and C

W. M. Jackson and J. S. Drury

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The classifications were made at 20°C in the following manner. One-milliliter portions of each solvent comprising a pair were shaken together for approximately a minute. If no interfacial meniscus was observed after the contents of the tube were allowed to settle, the solvent pair was considered to be miscible, M. If a meniscus was observed without apparent change in the volume of either solvent, the pair was regarded as immiscible, I. This classification is a qualitative one since solvent pairs may exhibit various degrees of partial miscibility while existing as separate phases. If an obvious change occurred in the volume of each solvent but a meniscus was present, the pair was classified as partially miscible, S. The designation R indicates that the two solvents reacted.

Table B

Compound number	Compounds	Acetone	Isoamyl acetate	n-Amyl cyanide	Benzene	Benzyl ether	2-Bromoethyl acetate	Chloroform	Cinnamaldehyde	Di-n-amylamine	Di-n-butyl carbonate	Diethylacetic acid	Diethylenetriamine	Diethylformamide	Diosobutyl ketone	Diosopropylamine	Di-n-propyl aniline	Ethyl alcohol	Ethyl benzoate	Ethyl ether	Ethyl phenylacetate	Heptadecanol ^a	3-Heptanol	n-Heptyl acetate	n-Hexyl ether	Methyl isopropyl ketone	4-Methyl n-valeric acid	o-Phenetidine	Sulfuric acid (concd)	Tetradecanol ^a	Tri-n-butyl phosphate	Triethylene glycol	Triethylenetetramine	2,6,8-Trimethyl 4-nonanone	Compound number		
1	Acetone	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	1
2	Isoamyl acetate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	2	
3	n-Amyl cyanide	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	3	
4	Benzene	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	4	
5	Benzyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	5	
6	2-Bromoethyl acetate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	6	
7	Chloroform	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	7	
8	Cinnamaldehyde	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	8	
9	Di-n-amylamine	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	9	
10	Di-n-butyl carbonate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	10	
11	Diethylacetic acid	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	11	
12	Diethylenetriamine	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	12	
13	Diethyl formamide	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	13	
14	Diosobutyl ketone	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	14	
15	Diosopropylamine	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	15	
16	Di-n-propylamine	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	16	
17	Ethyl alcohol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	17	
18	Ethyl benzoate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	18	
19	Ethyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	19	
20	Ethyl phenylacetate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	20	
21	Heptadecanol ^a	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	21	
22	3-Heptanol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	22	
23	n-Heptyl acetate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	23	
24	n-Hexyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	24	
25	Methyl isopropyl ketone	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	25	
26	4-Methyl-n-valeric acid	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	26	
27	o-Phenetidine	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	27
28	Sulfuric acid (concd)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	28	
29	Tetradecanol ^a	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	29	
30	Tri-n-butyl phosphate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	30
31	Triethylene glycol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	31
32	Triethylenetetramine	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	32
33	2,6,8-Trimethyl 4-nonanone	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	33

^a Union Carbide name.

**MISCIBILITY OF ORGANIC SOLVENT
PAIRS (Continued)
Table C**

Compound number	Compounds	Acetone	Isosamyl acetate	n-Amyl cyanide	Anisaldehyde	Benzene	Benzyl ether	Chloroform	o-Cresol	Diisobutyl ketone	Diethylacetic acid	Diethyl formamide	Di-n-propyl aniline	Ethyl alcohol	Ethyl ether	β-Heptanol	n-Heptyl acetate	n-Hexyl ether	α-Methylbenzylamine	α-Methylbenzylidethanolamine	α-Methylbenzylidimethylamine	α-Methylbenzylethanolamine	2-Methyl-5-ethylpyridine	Methyl isopropyl ketone	4-Methyl-n-valeric acid	o-Phenetidine	2-Phenylethylamine	Isopropanolamine	Pyridine	Salicylaldehyde	Tetradecanol*	Tri-n-butyl phosphate	Triethylenetetramine	2,6,8-Trimethyl 4-nonanone			
1	1,3-Butylene glycol	M	I	M	I	I	M	M	I	M	M	I	M	M	S	M	I	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	I	
2	2,3-Butylene glycol	M	M	M	M	S	I	M	M	M	M	M	I	M	M	M	M	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	I
3	2-Chloroethanol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	R	M	M	M	R	M	M	M	M	R	R	M	M	M	M	M	M	M	
4	3-Chloro-1,2-propanediol	M	M	M	M	I	M	M	M	M	M	M	I	M	M	M	M	I	R	M	M	M	M	M	M	M	M	R	R	M	M	S	M	R	S	M	
5	Dibutyl hydrogen phosphite	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
6	Diethylene glycol dibutyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	R	M	S	M	M	M	M	M	M	R	R	M	M	M	M	M	R	M	
7	Diethylene glycol diethyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
8	Diethylene glycol monobutyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
9	Diethylene glycol monoethyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
10	Diethylene glycol monomethyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
11	Dipropylene glycol	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
12	Ethylene diacetate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
13	Ethylene glycol	M	I	I	I	I	I	S	M	I	M	M	I	M	I	M	I	I	M	M	M	M	M	I	M	M	M	M	M	M	M	I	I	S	M	I	
14	Ethyl glycol ethylbutyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
15	Ethylene glycol monobutyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
16	Ethylene glycol monoethyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
17	Ethylene glycol monomethyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
18	Ethylene glycol monophenyl ether	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
19	Glycerol	I	I	I	I	I	I	M	I	I	M	I	M	M	I	I	I	I	M	M	I	M	M	I	I	I	I	M	M	M	M	I	I	M	M	I	
20	1,2-Propanediol	M	M	M	M	I	I	M	M	I	M	M	I	M	S	M	I	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
21	1,3-Propanediol	M	I	I	I	I	I	M	M	I	M	M	I	M	I	M	I	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
22	Triethylene glycol	M	I	M	M	S	I	M	M	I	M	M	I	M	I	M	I	I	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	I	S	M	M
23	Triethyl phosphate	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
24	Trimethylene chlorohydrin	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	R	M	M	M	M	R	M	M	M	R	R	M	M	M	M	M	R	M	M	

* Union Carbide name.

EMERGENT STEM CORRECTION FOR LIQUID-IN-GLASS THERMOMETERS

Accurate thermometers are calibrated with the entire stem immersed in the bath which determines the temperature of the thermometer bulb. However, for reasons of convenience it is common practice when using a thermometer to permit its stem to extend out of the apparatus. Under these conditions both the stem and the mercury in the exposed stem are at a temperature different from that of the bulb. This introduces an error into the observed temperature. Since the coefficient of thermal expansion of glass is less than that of mercury, the observed temperature will be less than the true temperature if the bulb is hotter than the stem and greater than the true temperature, providing the thermal gradient is reversed. For exact work the magnitude of this error can only be determined by experiment. However, for most purposes it is sufficiently accurate to apply the following equation which takes into account the difference of the thermal expansion of glass and mercury:

$$T_c = T_o + F \times L(T_o - T_m)$$

Where T_c = corrected temperature

T_o = observed temperature

T_m = mean temperature of exposed stem. The mean temperature of the exposed stem may be determined by fastening the bulb of a second thermometer against the mid-point of the exposed liquid column.

L = the length of the exposed column in degrees above the surface of the substance whose temperature is being determined.

F = correction factor. For approximate work and when the liquid in the thermometer is mercury a value for F of 0.00016 is generally used. For more accurate work with mercury filled thermometers values as given in the following table are used. For thermometers filled with organic liquids it is customary to use 0.001 for the value of F .

Values of F for various glasses					
T_m °C.	Corning 0041	Corning 8800	Corning 8810	Jena 16 III	Jena 59 III
50	0.000157	0.000166	0.000156	0.000158	0.000164
150	0.000159	0.000167	0.000157	0.000158	0.000165
250	0.000163	0.000168	0.000161	0.000161	0.000170
350	0.000168	0.000173	0.000166	.....	0.000177

CORRECTION OF BOILING POINTS TO STANDARD PRESSURE

BY H. B. HASS AND R. F. NEWTON

This correction may be made by using the equation:

$$\Delta t = \frac{(273.1 + t)(2.8808 - \log p)}{\phi + .15(2.8808 - \log p)} \quad (1)$$

where Δt = degrees C to be added to the observed boiling point.

t = the observed boiling point.

$\log p$ = the logarithm of the observed pressure in millimeters of mercury.

ϕ = the entropy of vaporization at 760 mm.

The value of ϕ may be estimated from the graph and the table. Substances not included in the table may be classified by grouping them with compounds which bear a close physical or structural resemblance to them.

Example 1. Benzene boils at 20°C. at 75 mm pressure. What is its normal boiling point? We do not find benzene in the table but we find hydrocarbons in group 2, and a group 2 compound with a boiling point of 20° has a ϕ of 4.6.

Substituting in the equation

$$\Delta t = \frac{(273.1 + 20)(2.8808 - 1.8751)}{4.60 + .15(2.8808 - 1.8751)} = 62^\circ$$

Adding this to 20° gives 82° as a first approximation.

The graph shows that the ϕ for a compound of group 2 boiling at 82° is 4.72 instead of 4.60 which we originally used. Since ϕ is in the denominator, this increase will lower our Δt by the ratio, 4.60/4.72, or the corrected Δt is $62 \times 4.60/4.72 = 60.4$. Adding Δt to t , gives 80.4° as a second approximation.

The formula can best be used in a slightly different form when the reverse calculation is desired, i.e., when one calculates the vapor pressure at a given temperature, lower than the normal boiling point.

$$2.8808 - \log p = \frac{\phi \Delta t}{273.1 + t - .15 \Delta t} \quad (2)$$

Example 2. Alcohol boils at 78.4°C. What is its vapor pressure at 20°C.? Substituting in equation 2:

$$2.8808 - \log p = \frac{6.06 \times 58.4}{293.1 - (.15 \times 58.4)} = 1.245$$

$$\log p = 2.8808 - 1.245 = 1.6358$$

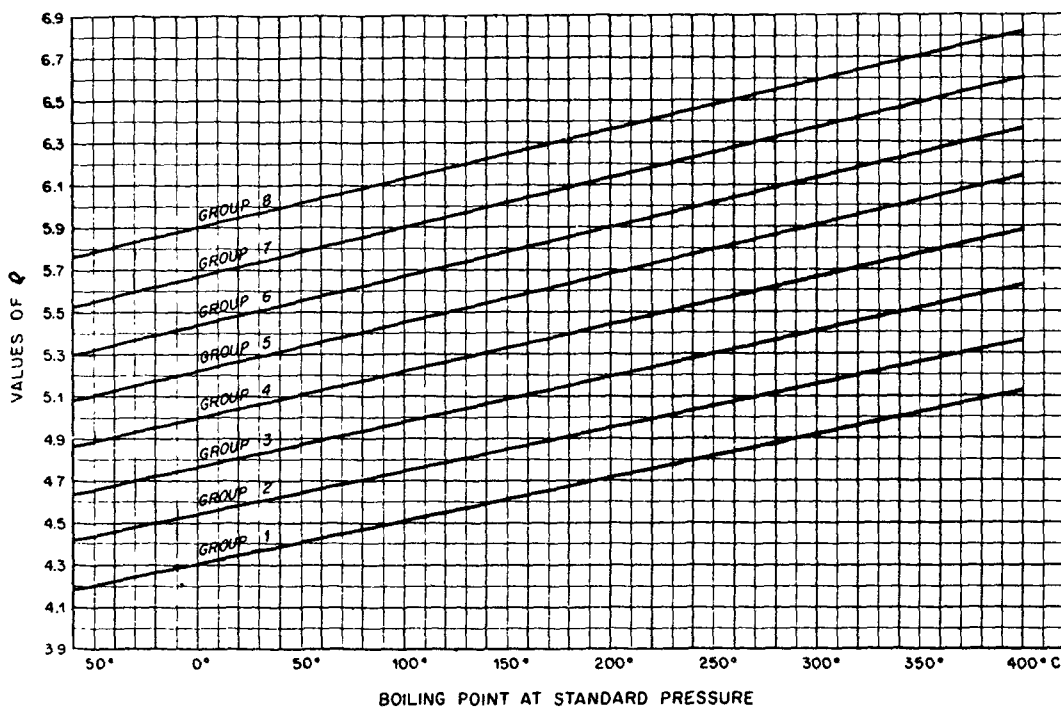
$$p = 43.2 \text{ mm.}$$

Here no second approximation is necessary, since the correct value of ϕ was taken immediately, the normal boiling point having been known.

Compound	Group	Compound	Group
Acetaldehyde	3	Benzyl alcohol	5
Acetic acid	4	Butylethylene	1
Acetic anhydride	6	Butyric acid	7
Acetone	3	Camphor	2
Acetophenone	4	Carbon monoxide	1
Amines	3	Carbon oxysulfide	2
<i>n</i> -Amyl alcohol	8	Carbon suboxide	2
Anthracene	1	Carbon sulfoselenide	2
Anthraquinone	1	<i>m.p.</i> Chloroanilines	3
Benzaldehyde	2	Chlorinated derivatives	Same group as though Cl was H
Benzoic acid	5	<i>o.m.p.</i> Cresols	4
Benzonitrile	2	Cyanogen	4
Benzophenone	2		

CORRECTION OF BOILING POINTS (Continued)

Compound	Group	Compound	Group
Cyanogen chloride.....	3	Methyl benzoate.....	3
Dibenzyl ketone.....	2	Methyl ether.....	3
Dimethyl amine.....	4	Methyl ethyl ether.....	3
Dimethyl oxalate.....	4	Methyl ethyl ketone.....	2
Dimethyl silicane.....	2	Methyl fluoride.....	3
Esters.....	3	Methyl formate.....	4
Ethanol.....	8	Methyl salicylate.....	2
Ethers.....	2	Methyl silicane.....	1
Ethylamine.....	4	α,β Naphthols.....	3
Ethylene glycol.....	7	Nitrobenzene.....	3
Ethylene oxide.....	3	Nitromethane.....	3
Formic acid.....	3	o.m.p. Nitrotoluenes.....	2
Glycol diacetate.....	4	o.m.p. Nitrotoluidines.....	2
Halogen derivatives.....	Same group as though halogen were hydrogen.	Phenanthrene.....	1
Heptylic acid.....	7	Phenol.....	5
Hydrocarbons.....	2	Phosgene.....	2
Hydrogen cyanide.....	3	Phthalic anhydride.....	2
Isoamyl alcohol.....	7	Propionic acid.....	5
Isobutyl alcohol.....	8	<i>n</i> -Propyl alcohol.....	8
Isobutyric acid.....	6	Quinoline.....	2
Isocaproic acid.....	7	Sulfides.....	2
Methane.....	1	Tetranitromethane.....	3
Methanol.....	7	Trichloroethylene.....	1
Methyl amine.....	5	Valeric acid.....	7
		Water.....	6



MOLECULAR ELEVATION OF THE BOILING POINT

(Most values from Hoyt, C.S. and Fink, C.K., Journal of Physical Chemistry, Vol. 41, No. 3., March, 1937.)

Molecular elevation of the boiling point showing the elevation of the boiling point in degrees C due to the addition of one gram molecular weight of the dissolved substance to 1000 grams of any one of the solvents below. The correction in the last column gives the number of degrees to be subtracted for each mm. of difference between the barometric reading and 760 mm.

Solvent	K _B	Barometric Correction per mm.
Acetic acid.....	3.07	0.0008
Acetone.....	1.71	0.0004
Aniline.....	3.52	0.0009
Benzene.....	2.53	0.0007
Bromobenzene.....	6.26	0.0016
Carbon bisulfide.....	2.34	0.0006
Carbon tetrachloride.....	5.03	0.0013
Chloroform.....	3.63	0.0009
Cyclohexane.....	2.79	0.0007
Ethanol (ethyl alcohol).....	1.22	0.0003
Ethyl acetate.....	2.77	0.0007
Ethyl ether.....	2.02	0.0005
<i>n</i> -Hexane.....	2.75	0.0007
Methanol (methyl alcohol).....	0.83	0.0002
Methyl acetate.....	2.15	0.0005
Nitrobenzene.....	5.24	0.0013
<i>n</i> -Octane.....	4.02	0.0010
Phenol.....	3.56	0.0009
Toluene.....	3.33	0.0008
Water.....	0.512	0.0001

MOLECULAR DEPRESSION OF THE FREEZING POINT

Showing the depression of the freezing point due to the addition of one gram molecular weight of solute, for various solvents.

Solvent	Depression for one gram molecular weight dissolved in 1000 grams, °C	Solvent	Depression for one gram molecular weight dissolved in 1000 grams, °C
Acetic acid	3.90	Diphenylamine	8.60
Acetophenone	5.65	Diphenyl ether	8.00
Aniline	5.87	Ethylene dibromide	11.80
Anthracene	14.65	Ethyl ether	11.79
Anthraquinone	14.80	Formic acid	2.77-2.80
Benzene	4.90-5.23	Hexachlorobenzene	20.75
Benzoic acid	7.85-8.79	Menthol	12.4
Benzophenone	9.88	Naphthalene	6.90-7.10
<i>d</i> -Bromocamphor	11.87	β -Naphthol	11.25
Bromoform	14.25	Nitrobenzene	6.89-7.10
<i>tert</i> -Butyl alcohol	12.80	Phenanthrene	12.0
Camphor	49.80	Phenol	7.20-7.50
Carbazole	12.30	Phenylhydrazine	5.86
Carbon disulfide	3.83	Pyridine	4.97
Carbon tetrachloride	29.8-34.8	Stearic acid	4.50
Chloroform	4.67-4.90	Triphenylmethane	12.45
Cyclohexane	20.0-20.30	Urethane	5.00-5.14
Dicyclohexyl	14.50	Water	1.85-1.87
<i>m</i> -Dinitrobenzene	10.60	<i>p</i> -Xylene	4.30
Diphenyl	8.00-8.35		

CARBOHYDRATES

These data for carbohydrates were compiled originally for the Biology Data Book by M L Wolfram, G G Maher and R G Pagnucco (1964) Data are reproduced here by permission of the copyright owners of the above publication, the Federation of American Societies for Experimental Biology, Washington, D C pp 351-359

All data are for crystalline substances, unless otherwise specified Selection of substances was restricted to natural carbohydrates found free (or in chemical combination and released on hydrolysis) and to biological oxidation products of the natural carbohydrates The nomenclature conforms with that of the British-American report as published in the *Journal of Organic Chemistry*, 28 281 (1963) Substances have been arranged alphabetically under the name of the parent sugar within groups formulated according to increasing carbon content (excluding carbon in substituents), with synonymous common names in parentheses **Melting Point:** b p = boiling point, d = decomposes, s = sinters **Specific Rotation** was determined in water at concentrations of 1-5 g per 100 ml of solution and at 20°-25°C, unless otherwise specified, other temperatures or wavelengths are shown in brackets *c* = grams solute per 100 ml of solution

Part I. NATURAL MONOSACCHARIDES: ALDOSES AND KETOSES

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation [α] _D
(A)	(B)	(C)	(D)
Aldoses			
1 D-Glyceraldehyde	C ₃ H ₆ O ₃		+13.5 ± 0.5 (syrup)
2 D-Glyceraldehyde, 3-deoxy-3,3-C-bis-(hydroxymethyl)- (Cordycepose)	C ₅ H ₁₀ O ₄		-26 (c 0.6, C ₂ H ₅ OH)
3 D-Glyceraldehyde, 3,3-bis(C-hydroxymethyl)- (Apiose)	C ₅ H ₁₀ O ₅		+5.6 (c 10) [15°] syrup
4 β-D-Arabinose	C ₅ H ₁₀ O ₅	155	-175 → -103
5 D-Arabinose, 2-O-methyl-	C ₆ H ₁₂ O ₅	Syrup	-102
6 α-L-Arabinose	C ₅ H ₁₀ O ₅	158 amorphous	+55.4 → +105
7 β-L-Arabinose	C ₅ H ₁₀ O ₅	160	+190.6 → +104.5
8 D-L-Arabinose	C ₅ H ₁₀ O ₅	163.5-164.5	None
9 α-L-Lyxose	C ₅ H ₁₀ O ₅	105	+5.8 → +13.5
10 L-Lyxose, 5-deoxy-3-C-formyl- (Streptose)	C ₆ H ₁₀ O ₅		
11 L-Lyxose, 3-C-formyl- (Hydroxystreptose)	C ₆ H ₁₀ O ₆		
12 Pentose, 4,5-anhydro-5-deoxy-D-erythro-	C ₅ H ₈ O ₃		
13 Pentose, 2-deoxy-D-erythro-	C ₅ H ₁₀ O ₄	96-98	-91 → -58
14 D-Ribose	C ₅ H ₁₀ O ₅	87	-23.1 → -23.7
15 D-Ribose, 2-C-hydroxymethyl- (Hamamelose)	C ₆ H ₁₂ O ₆		-7.1 [λ578]
16 α-D-Xylose	C ₅ H ₁₀ O ₅	145	+93.6 → +18.8
17 D-Xylose, 5-deoxy-	C ₅ H ₁₀ O ₄		+16
18 β-D-Xylose, 2-O-methyl-	C ₆ H ₁₂ O ₅	137-138	-21 → +34
19 α-D-Xylose, 3-O-methyl-	C ₆ H ₁₂ O ₅	95	+45 → +19
20 D-Allose, 6-deoxy-	C ₆ H ₁₂ O ₅	140-143 146-148	+1.6 [18°] (c 0.6) -4.7 → 0
21 D-Allose, 6-deoxy-2,3-di-O-methyl- (Mycnose)	C ₈ H ₁₆ O ₅	102-106	-46 → -29
22 Amicetose (a trideoxy hexose)	C ₆ H ₁₂ O ₃	Oil, b p 65-70	+28.6 (CHCl ₃)
23 Antiarose	C ₆ H ₁₂ O ₅		Levo
24 α-D-Galactose	C ₆ H ₁₂ O ₆	167	+150.7 → +80.2
25 β-D-Galactose	C ₆ H ₁₂ O ₆	143-145	+52.8 → +80.2
26 D-Galactose, 3,6-anhydro-	C ₆ H ₁₀ O ₅		+21.3 [10°]
27 α-D-Galactose, 6-deoxy- (D-Fucose, Rhodeose)	C ₆ H ₁₂ O ₅	140-145	+127 → +76.3 (c 10)
28 D-Galactose, 6-deoxy-3-O-methyl- (Digitalose)	C ₇ H ₁₄ O ₅	106 ¹ , 119 ²	+106

CARBOHYDRATES (Continued)

Part I. NATURAL MONOSACCHARIDES: ALDOSES AND KETOSES (Continued)

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation $[\alpha]_D$
(A)	(B)	(C)	(D)
Aldoses (Con t)			
29 D-Galactose, 6-deoxy-4- <i>O</i> -methyl-	C ₇ H ₁₄ O ₅	131-132	+82
30 D-Galactose, 6-deoxy-2,3-di- <i>O</i> -methyl-	C ₈ H ₁₆ O ₅		+73
31 α-D-Galactose, 3- <i>O</i> -methyl-	C ₇ H ₁₄ O ₅	144-147	+150.6 → +108.6
32 α-D-Galactose, 6- <i>O</i> -methyl-	C ₇ H ₁₄ O ₅	122-123	+117 → +77.3
33 L-Galactose	C ₆ H ₁₂ O ₅		See D-Galactose
34 α-L-Galactose, 3,6-anhydro-	C ₆ H ₁₀ O ₃		-39.4 → -25.2
35 α-L-Galactose, 6-deoxy- (<i>L</i> -Fucose)	C ₆ H ₁₂ O ₅	145	-124.1 → -76.4
36 L-Galactose, 6-deoxy-2- <i>O</i> -methyl-	C ₇ H ₁₄ O ₅	149-150	-75 ± 4 (<i>c</i> 0.5)
37 L-Galactose, 6-sulfate	C ₆ H ₁₂ O ₉ S		-47 (<i>c</i> 0.2) (Na salt)
38 DL-Galactose	C ₆ H ₁₂ O ₅	143-144, 163	None (racemic)
39 α-D-Glucose	C ₆ H ₁₂ O ₅	146, 83 (H ₂ O)	+112 → +52.7
40 β-D-Glucose	C ₆ H ₁₂ O ₅	148-150	+18.7 → +52.7
41 D-Glucose, 6-acetate	C ₇ H ₁₄ O ₇	135	+48
42 D-Glucose, 2,3-di- <i>O</i> -methyl-	C ₈ H ₁₆ O ₅	85-86, 121	+50
43 D-Glucose, 6- <i>O</i> -benzoyl- (<i>Vaccinin</i>)	C ₁₃ H ₁₆ O ₇	Amorphous	+48 (C ₂ H ₅ OH)
44 α-D-Glucose, 6-deoxy- (<i>Chinovose</i> , <i>Epirhamnose</i> , <i>Glucomethylose</i> , <i>Isorhamnose</i> , <i>Isorhodeose</i> <i>Quinovo-</i> <i>vose</i>)	C ₆ H ₁₂ O ₅	139-140	+73.3 → +29.7 (<i>c</i> 8)
45 α-D-Glucose, 6-deoxy-3- <i>O</i> -methyl- (<i>D</i> -Thevetose)	C ₇ H ₁₄ O ₅	116	+84 → +33
46 D-Glucose, 6-sulfonic acid, 6-deoxy- (6- <i>Sulfoquinovose</i>)	C ₆ H ₁₂ O ₈ S	173-174	+87 ^a
47 D-Glucose, 3- <i>O</i> -methyl-	C ₇ H ₁₄ O ₅	162-167	+98 → +59.5
48 α-L-Glucose	C ₆ H ₁₂ O ₅	141-143	-95.5 → -51.4
49 L-Glucose, 6-deoxy-3- <i>O</i> -methyl- (<i>L</i> -Thevetose)	C ₇ H ₁₄ O ₅	126-129	-36.9 ± 2
50 D-Gulose, 6-deoxy-	C ₆ H ₁₂ O ₅		
51 Hexose, 2-deoxy-D- <i>arabino</i> - ⁴	C ₆ H ₁₂ O ₅	148	+46.6 [18°]
52 Hexose, 2,6-dideoxy-3- <i>O</i> -methyl-D- <i>arabino</i> - (<i>D</i> - <i>Oleandrose</i>)	C ₇ H ₁₄ O ₄		-11
53 Hexose, 3,6-dideoxy-D- <i>arabino</i> - (<i>Tyvelose</i>)	C ₆ H ₁₂ O ₄		+24 ± 2
54 Hexose, 2,6-dideoxy-3- <i>O</i> -methyl-L- <i>arabino</i> - (<i>L</i> - <i>Oleandrose</i>)	C ₇ H ₁₄ O ₄	62-63	+11.9 ± 2.5
55 Hexose, 3,6-dideoxy-L- <i>arabino</i> - (<i>Ascarylose</i>)	C ₆ H ₁₂ O ₄		-24 ± 2
56 Hexose, 2,6-dideoxy-3- <i>O</i> -methyl-D- <i>lyxo</i> - (<i>Diginose</i>)	C ₇ H ₁₄ O ₄	90-92	+56 ± 4
57 Hexose, 2,6-dideoxy-L- <i>lyxo</i> - (<i>L</i> - <i>Fucose</i> , 2-deoxy-)	C ₆ H ₁₂ O ₄	103-106	-61.6
58 Hexose, 2,6-dideoxy-3- <i>O</i> -methyl-L- <i>lyxo</i> -	C ₇ H ₁₄ O ₄	78-85	-65
59 Hexose, 2,6-dideoxy-D- <i>ribo</i> - (<i>Digi-</i> <i>toxose</i> , <i>D</i> - <i>Altrose</i> , 2,6-dideoxy-)	C ₆ H ₁₂ O ₄	110	+46.4
60 Hexose, 2,6-dideoxy-3- <i>O</i> -methyl-D- <i>ribo</i> - (<i>Cymarose</i>)	C ₇ H ₁₄ O ₄	93	+52
61 Hexose, 3,6-dideoxy-D- <i>ribo</i> - (<i>Paratose</i>)	C ₆ H ₁₂ O ₄		+10 ± 2 (<i>c</i> 0.9)
62 Hexose, 4,6-dideoxy-3- <i>O</i> -methyl-D- <i>ribo</i> - (<i>D</i> - <i>Gulose</i> , 4,6-dideoxy-3- <i>O</i> - methyl-, <i>Chalco-</i>)	C ₇ H ₁₄ O ₄	96-99	+120 → +76
63 Hexose, 2,6-dideoxy-D- <i>xylo</i> - (<i>Boivi-</i> <i>nose</i>)	C ₆ H ₁₂ O ₄	96-98	-3.9 → +3.9

CARBOHYDRATES (Continued)

Part I. NATURAL MONOSACCHARIDES: ALDOSES AND KETOSES (Continued)

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation $[\alpha]_D$
(A)	(B)	(C)	(D)
Aldoses (Con't)			
64 Hexose, 2,6-dideoxy-3-O-methyl-D-xylo- (Sarmentose)	C ₇ H ₁₄ O ₄	78-79	+12 → +15.8
65 Hexose, 3,6-dideoxy-D-xylo- (Abequose)	C ₆ H ₁₂ O ₄		-3.2 ± 0.6
66 Hexose, 2,6-dideoxy-3-C-methyl-L-xylo- (Mycarose)	C ₇ H ₁₄ O ₄	129-129	-31.1
67 Hexose, 2,6-dideoxy-3-C-methyl-3-O-methyl-L-xylo- (Cladinose)	C ₈ H ₁₆ O ₄	oil, b p 120-132 (0.25 mm)	-23.1
68 Hexose, 3,6-dideoxy-L-xylo- (Colitose)	C ₆ H ₁₂ O ₄		+4 (H ₂ O), -51 ± 2 (CH ₃ OH)
69 D-Idose ⁵	C ₆ H ₁₂ O ₆		
70 L-Idose, 1,6-anhydro-	C ₆ H ₁₀ O ₅		
71 α-D-Mannose	C ₆ H ₁₂ O ₆	133	+29.3 → +14.5
72 β-D-Mannose	C ₆ H ₁₂ O ₆	132	-16.3 → +14.5
73 D-Mannose, 6-deoxy- (D-Rhamnose)	C ₆ H ₁₂ O ₅	86-90	-7.0
74 α-L-Mannose, 6-deoxy-monohydrate (L-Rhamnose)	C ₆ H ₁₄ O ₆	93-94	-8.6 → +8.2
75 β-L-Mannose, 6-deoxy-	C ₆ H ₁₂ O ₅	123-125	+38.4 → +8.9
76 L-Mannose, 6-deoxy-2-O-methyl-	C ₇ H ₁₄ O ₅		
77 L-Mannose, 6-deoxy-3-O-methyl- (L-Acofriose)	C ₇ H ₁₄ O ₅	114-115	+30 [18°]
78 L-Mannose, 6-deoxy-2,4-di-O-methyl-	C ₈ H ₁₆ O ₅	82	-19 [16°]
79 L-Mannose, 6-deoxy-5-C-methyl-4-O-methyl- (Noviose)	C ₈ H ₁₆ O ₅	128-130	+19.9 (50% C ₂ H ₅ OH)
80 Rhodiose (a 2,3,6-trideoxyhexose)	C ₆ H ₁₂ O ₃		-11 ± 1.6
81 D-Talose	C ₆ H ₁₂ O ₆	128-132	+16.9
82 D-Talose, 6-deoxy- (D-Talomethylose)	C ₆ H ₁₂ O ₅	129-131	+20.6
83 L-Talose, 6-deoxy- (L-Talomethylose)	C ₆ H ₁₂ O ₅	116-118	-19.5 ± 2 [18°]
84 L-Talose, 6-deoxy-2-O-methyl- (L-Acovenose)	C ₇ H ₁₄ O ₅		-19.4
85 Heptose, D-glycero-D-galacto-	C ₇ H ₁₄ O ₇	139-140	+47 → +64 (c 0.5)
86 Heptose, D-glycero-D-manno-	C ₇ H ₁₄ O ₇		
87 Heptose, D-glycero-L-manno-	C ₇ H ₁₄ O ₇		
Ketoses			
88 Dihydroxyacetone	C ₃ H ₆ O ₃	80 (dimer)	None
89 Tetrulose, L-glycero- ⁸ (L-Erythrulose, Ketoerythritol, L-Threulose)	C ₄ H ₈ O ₄	Syrup	+12
90 Pentulose, D-erythro- (Adonose, D-Ribulose)	C ₅ H ₁₀ O ₅	Syrup	+16.6 [27°]
91 Pentulose, L-erythro- (L-Ribulose)	C ₅ H ₁₀ O ₅		-16.6
92 Pentulose, D-threo- (D-Xylulose)	C ₅ H ₁₀ O ₅		-33
93 Pentulose, 5-deoxy-D-threo-	C ₅ H ₁₀ O ₄		-5 ± 1 (CH ₃ OH)
94 Pentulose, L-threo- (L-Xylulose, L-Lyxulose, Xyloketose)	C ₅ H ₁₀ O ₅	Syrup	+33.1
95 Hexulose, β-D-arabino- (β-D-Fructose, Levulose)	C ₆ H ₁₂ O ₆	102-104 ⁷	-133.5 → -92
96 Hexulose, 6-deoxy-D-arabino- (D-Rhamnulose)	C ₆ H ₁₂ O ₅		-13 ± 2
97 Hexulose, D-lyxo- (D-Tagatose)	C ₆ H ₁₂ O ₆	131-132	+2.7 → -4, -5
98 5-Hexulose, D-lyxo	C ₆ H ₁₂ O ₆	158	-86.6
99 Hexulose, 6-deoxy-L-lyxo- (L-Fuculose)	C ₆ H ₁₂ O ₅		

CARBOHYDRATES (Continued)

Part I. NATURAL MONOSACCHARIDES: ALDOSES AND KETOSES (Continued)

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation $[\alpha]_D$
(A)	(B)	(C)	(D)
Ketoses (Con't)			
100 Hexulose, <i>D-ribo-</i> (<i>D-Psicose</i>)	C ₆ H ₁₂ O ₆	Amorphous	+4.7
101 Hexulose, <i>L-xyl-</i> (<i>L-Sorbose</i>)	C ₆ H ₁₂ O ₆	159-161	-43.1
102 Hexulose, 6-deoxy- <i>L-xyl-</i>	C ₆ H ₁₂ O ₅	88	-25 ± 2 (c 0.7)
103 Heptulose, <i>D-altr-</i> (<i>Sedoheptulose</i> , <i>Sedoheptose</i>)	C ₇ H ₁₄ O ₇	Amorphous	+2.5 (c 10)
104 Heptulose-hemihydrate, <i>L-galacto-</i> (<i>Perseulose</i>)	C ₇ H ₁₄ O ₇ . $\frac{1}{2}$ H ₂ O	110-115	-90 → -80
105 Heptulose, <i>L-gulo-</i>	C ₇ H ₁₄ O ₇		-28
106 Heptulose, <i>D-ido-</i>	C ₇ H ₁₄ O ₇	172	-34 ± 8 (c 0.3)
107 Heptulose, <i>D-manno-</i> (<i>Mannoketohexose</i> , <i>D-Mannotagatoheptose</i>)	C ₇ H ₁₄ O ₇	152	+29.4
108 Heptulose, <i>D-talo-</i>	C ₇ H ₁₄ O ₇		
109 Octulose, <i>D-glycero-L-galacto-</i>	C ₈ H ₁₆ O ₈		-57, -43.4 → -13.4
110 Octulose, <i>D-glycero-D-manno-</i>	C ₈ H ₁₆ O ₈		+20 (CH ₃ OH)

¹ Original melting point. ² Melting point after four-months' storage. ³ As a methyl glycoside cyclohexylamine salt. ⁴ Included because of speculations concerning it in biological processes. ⁵ Either *D*-idose or *L*-altrose is in the polysaccharide varianose. ⁶ Early literature refers to this as *D*-erythrose. ⁷ The $\frac{1}{2}$ H₂O and ·2H₂O forms also exist.

Part II. NATURAL MONOSACCHARIDES: AMINO SUGARS

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation $[\alpha]_D$
(A)	(B)	(C)	(D)
Aldosamines			
1 <i>D</i> -Ribose, 3-amino-3-deoxy-	C ₅ H ₁₁ NO ₄	158-158.5 d.	-24.6 (hydrochloride)
2 <i>D</i> -Galactose, 2-amino-2-deoxy- (<i>Galactosamine</i> ; <i>Chondrosamine</i>)	C ₆ H ₁₃ NO ₅	185	+121 → +80 (hydrochloride)
3 α - <i>L</i> -Galactose, 2-amino-2,6-dideoxy- (<i>L-Fucosamine</i>)	C ₆ H ₁₃ NO ₄	192-193 d.	-119 → -92 [27°] (hydrochloride)
4 α - <i>D</i> -Glucose, 2-amino-2-deoxy- (<i>Glucosamine</i> ; <i>Chitosamine</i>)	C ₆ H ₁₃ NO ₅	88	+100 → +47.5
5 β - <i>D</i> -Glucose, 2-amino-2-deoxy-	C ₆ H ₁₃ NO ₅	110-111	+28 → +47.5
6 <i>D</i> -Glucose, 3-amino-3-deoxy- (<i>Kanosamine</i>)	C ₆ H ₁₃ NO ₅	128 d.	+19 [14°]
7 <i>D</i> -Glucose, 6-amino-6-deoxy-	C ₆ H ₁₃ NO ₅	161-162 d.	+23 → +50.1 (hydrochloride)
8 <i>D</i> -Glucose, 2,6-diamino-2,6-dideoxy- (<i>Neosamine C</i>)	C ₆ H ₁₄ N ₂ O ₄	>230	+61.5 (dihydrochloride)
9 <i>D</i> -Glucose, 3,6-dideoxy-3-dimethylamino- (<i>Mycaminose</i>)	C ₈ H ₁₇ NO ₄	115-116	+31 (hydrochloride)
10 <i>D</i> -Glucose, 4,6-dideoxy-4-dimethylamino-	C ₈ H ₁₇ NO ₄	192-193	+45.5 (hydrochloride)
11 <i>L</i> -Glucose, 2-deoxy-2-methylamino-	C ₇ H ₁₅ NO ₅	130-132	-64
12 <i>D</i> -Gulose, 2-amino-1,6-anhydro-2-deoxy-	C ₆ H ₁₁ NO ₄	250-260 d.	+41 ± 2 (hydrochloride)
13 <i>D</i> -Gulose, 2-amino-2-deoxy-	C ₆ H ₁₁ NO ₅	152-162 d.	+5.6 → -18.7 (hydrochloride)

CARBOHYDRATES (Continued)
Part II. NATURAL MONOSACCHARIDES: AMINO SUGARS (Continued)

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation [α] _D
(A)	(B)	(C)	(D)
Aldosamines (Con't)			
14 Hexose, 3,4,6-trideoxy-3-dimethyl-amino-D-xylo- (Desosamine, Picrocine)	C ₈ H ₁₇ NO ₃	189-191 d	+49.5 (c 10) (hydrochloride)
15 Hexose, a 4-acetamido-2-amino-2,4,6-trideoxy-	C ₈ H ₁₆ N ₂ O ₄	216-219	+115 → +94 [26°] (c 0.05)
16 Hexose, an amino-deoxy-3-O-carboxyethyl-	C ₉ H ₁₇ NO ₇		
17 Hexose, a 2,6-diamino-2,6-dideoxy- (Neosamine B, Paramose)	C ₆ H ₁₄ N ₂ O ₄	135-150 d	+17.5 (c 0.9) (hydrochloride)
18 Hexose, a 3-dimethylamino-2,3,6-trideoxy- (Rhodosamine)	C ₈ H ₁₇ NO ₃		
19 D-Mannose, 2-amino-2-deoxy- (Mannosamine)	C ₆ H ₁₃ NO ₅	142 d	-4.3 (c 9) (hydrochloride)
20 D-Mannose, 3-amino-3,6-dideoxy- (Mycosamine)	C ₆ H ₁₃ NO ₄	162	-11.5 (hydrochloride)
21 D-Talose, 2-amino-2-deoxy- (Talosamine)	C ₆ H ₁₃ NO ₅	151-153	+3.4 → -5.7 (c 0.9) (hydrochloride)
22 L-Talose, 2-amino-2,6-dideoxy- (Pneumosamine)	C ₆ H ₁₃ NO ₄	162-163	+6.9 → +10.4 (hydrochloride)
Ketosamines			
23 Pentulose, 1-(o-carboxyanilino)-1-deoxy-D-erythro-	C ₁₂ H ₁₄ NO ₆		
24 Hexulose, 1-(o-carboxyanilino)-1-deoxy-D-arabino-	C ₁₃ H ₁₆ NO ₇		
25 Hexulose, 5-amino-5-deoxy-L-xylo-	C ₆ H ₁₃ NO ₅	174-176	-62
26 Hexulose, 6-deoxy-6-(N-methylacetamido)-L-xylo-	C ₉ H ₁₇ NO ₆		

Part III. NATURAL ALDITOLS AND INOSITOLS (with Inososes and Inosamines)

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation [α] _D
(A)	(B)	(C)	(D)
Alditols			
1 Glycerol	C ₃ H ₈ O ₃	20	None
2 Glycerol, 1-deoxy- (1,2-Propane-diol) ¹	C ₃ H ₈ O ₂	Oil, b p 188-189	None (racemic)
3 Erythritol	C ₄ H ₁₀ O ₄	118-120	None (meso)
4 Erythritol, 1,4-dideoxy- (2,3-Butylene-glycol)	C ₄ H ₁₀ O ₂	25, 34	None (meso)
5 D-Threitol, 1,4-dideoxy-	C ₄ H ₁₀ O ₂	19	-13.0
6 L-Threitol, 1,4-dideoxy-	C ₄ H ₁₀ O ₂		+10.2
7 DL-Threitol, 1,4-dideoxy-	C ₄ H ₁₀ O ₂	7.6	None (racemic)
8 D-Arabinitol	C ₅ H ₁₂ O ₅	103	+7.82 (c 8, borax solution)
9 L-Arabinitol	C ₅ H ₁₂ O ₅	101-102	-32 (c 0.4, 5% molybdate)
10 Ribitol (Adomitol)	C ₅ H ₁₂ O ₅	102	None (meso)
11 Galactitol (Dulcitol)	C ₆ H ₁₄ O ₆	186-188	None (meso)

CARBOHYDRATES (Continued)
Part III. NATURAL ALDITOLS AND INOSITOLS
(with Inososes and Inosamines) (Continued)

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation $[\alpha]_D$	
(A)	(B)	(C)	(D)	
Alditols (Con't)				
12	D-Glucitol (Sorbitol)	$C_6H_{14}O_6$	112	-1.8 [15°]
13	D-Glucitol, 1,5-anhydro- (Polygalitol)	$C_6H_{12}O_5$	140-141	+42.4
14	L-Iditol	$C_6H_{14}O_6$	73.5	-3.5 (c 10)
15	D-Mannitol	$C_6H_{14}O_6$	166	-0.21
16	D-Mannitol, 1,5-anhydro- (Styracitol)	$C_6H_{12}O_5$	157	-49.9
17	Heptitol, D-glycero-D-galacto- (Heptitol, L-glycero-D-manno-; Perseitol)	$C_7H_{16}O_7$	183-185, 188	-1.1
18	Heptitol, D-glycero-D-gluco- (Heptitol, L-glycero-D-talo-; β -Sedoheptitol)	$C_7H_{16}O_7$	131-132	+46 (5% NH_4 molybdate)
19	Heptitol, D-glycero-D-manno- (Heptitol, D-glycero-D-talo-; Volemitol)	$C_7H_{16}O_7$	153	+2.65
20	Octitol, D-erythro-D-galacto-	$C_8H_{18}O_8$ H_2O	169-170	-11 (5% NH_4 molybdate)
Inositols				
21	Betitol (a dideoxy inositol)	$C_6H_{12}O_4$	224	
22	Bioinosose (<i>scyllo</i> -Inosose; <i>myo</i> -Inosose-2, a deoxy keto inositol)	$C_6H_{10}O_5$	198-200	None (meso)
23	<i>h</i> -Bornesitol (a <i>myo</i> -inositol monomethyl ether)	$C_7H_{14}O_5$	200	+31.6
24	<i>l</i> -Bornesitol (a <i>myo</i> -inositol monomethyl ether)	$C_7H_{14}O_5$	205-206	-32.1
25	Conduritol (a 2,3-dehydro-2,3-dideoxyinositol)	$C_6H_{10}O_4$	142-143	None (meso)
26	Cordycepic acid (a tetrahydroxycyclohexanecarboxylic acid) ²	$C_7H_{12}O_6$		
27	Dambonitol (a <i>myo</i> -inositol dimethyl ether)	$C_8H_{16}O_6$	206	None (meso)
28	DL-Inositol	$C_6H_{12}O_6$	253	None (racemic)
29	<i>d</i> -Inositol	$C_6H_{12}O_6$		+60
30	<i>l</i> -Inositol	$C_6H_{12}O_6$	240	-65
31	Laminitol (a <i>C</i> -methyl <i>myo</i> -inositol)	$C_7H_{14}O_6$	266-269	-3
32	Liriodendritol (a <i>myo</i> -inositol dimethyl ether)	$C_8H_{16}O_6$	224	-25
33	<i>muco</i> -Inositol monomethyl ether	$C_7H_{14}O_6$	322-325	
34	<i>myo</i> -Inositol (<i>meso</i> -Inositol)	$C_6H_{12}O_6$	217-218	None (meso)
35	<i>d</i> - <i>myo</i> -Inosose-1 (a deoxy keto inositol)	$C_6H_{10}O_5$	138-139	+19.6
36	Mytilitol (a <i>C</i> -methyl <i>scyllo</i> -inositol)	$C_7H_{14}O_6$	259	None (meso)
37	<i>neo</i> -Inosamine-2 (a deoxy amino inositol)	$C_6H_{13}O_5N$	239-241 d.	None (meso)
38	<i>d</i> -Ononitol (a <i>myo</i> -inositol monomethyl ether)	$C_7H_{14}O_5$	172	+6.6
39	<i>h</i> -Pinitol (a <i>dextro</i> -inositol monomethyl ether)	$C_7H_{14}O_5$	186	+65.5
40	<i>l</i> -Pinitol (a <i>levo</i> -inositol monomethyl ether)	$C_7H_{14}O_5$	186	-65
41	<i>l</i> -Quebrachitol (a <i>levo</i> -inositol monomethyl ether)	$C_7H_{14}O_5$	190-191	-80.2 [28°]
42	<i>d</i> -Quercitol (a deoxy <i>dextro</i> -inositol)	$C_6H_{12}O_5$	235	+24.2
43	<i>d</i> -Quinic acid (a trideoxy carboxy <i>dextro</i> -inositol)	$C_7H_{12}O_6$	164	+44 (c 10)

CARBOHYDRATES (Continued)
Part III. NATURAL ALDITOLS AND INOSITOLS
(with Inososes and Inosamines) (Continued)

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation [α] _D
(A)	(B)	(C)	(D)
Inositols (Con't)			
44 L-Quinic acid (a trideoxy carboxy <i>levo</i> -inositol)	C ₇ H ₁₂ O ₆	162	-42.1
45 Quinic acid, 5-dehydro-	C ₇ H ₁₀ O ₆	140-142 (138 s.)	-82.4 [28°]
46 Scyllitol (<i>scyllo</i> -Inositol; Cocositol)	C ₆ H ₁₂ O ₆	352-353	None (meso)
47 Sequoyitol (a <i>myo</i> -inositol monomethyl ether)	C ₇ H ₁₄ O ₆	234-235	None (meso)
48 Shikimic acid (a 3,4-anhydro-quinic acid)	C ₇ H ₁₀ O ₅	183-184	-200 [16°]
49 Shikimic acid, 5-dehydro-	C ₇ H ₈ O ₅	150-152	-57.5 [28°] (EtOH)
50 Streptamine (2,4-diaminodideoxy-scyllitol)	C ₈ H ₁₄ O ₄ N ₂	88, 210-250 d.	None (meso)
51 Streptamine, 2-deoxy-	C ₈ H ₁₄ O ₃ N ₂	.....	None (meso)
52 Streptadine (1,3-Dideoxy-1,3-diguani-dino-scyllitol)	C ₈ H ₁₈ N ₆ O ₄	.....	None (meso)
53 Viburnitol (a deoxy <i>levo</i> -inositol) ³	C ₆ H ₁₂ O ₅	174	-73.9

¹ The 1-phosphate ester of this diol is said to occur in brain tissue and sea-urchin eggs. ² Strong evidence that cordycepic acid is really D-mannitol. ³ Not an enantiomorph of *d*-quercitol; other isomeric relationship is involved.

Part IV. NATURAL ALDONIC, URONIC, AND ALDARIC ACIDS

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation [α] _D
(A)	(B)	(C)	(D)
Aldonic Acids			
1 D-Glyceric acid	C ₃ H ₆ O ₄	Gum	Dextro
2 L-Glyceric acid	C ₃ H ₆ O ₄	Gum	Levo
3 D-Arabinonic acid	C ₅ H ₁₀ O ₆	114-116	+10.5 (c 6)
4 L-Arabinonic acid	C ₅ H ₁₀ O ₆	118-119	-9.6 → -41.7 ¹
5 L-Arabinonic-1,4-lactone	C ₅ H ₈ O ₅	97-99	-72
6 D-Ribonic acid	C ₅ H ₁₀ O ₆	112-113	-17.0
7 D-Xylonic acid	C ₅ H ₁₀ O ₆	.....	-2.9 → +20.1 ¹
8 L-Xylonic acid	C ₅ H ₁₀ O ₆	.....	-91.8 ¹
9 D-Altronic acid	C ₆ H ₁₂ O ₇	.....	+11.5 → +24.8 ¹ (Ca salt, N HCl)
10 D-Galactonic acid	C ₆ H ₁₂ O ₇	122	-11.2 → +57.6 ¹
11 D-Gluconic acid	C ₆ H ₁₂ O ₇	130-132 (110-112 s.)	-6.7 → +11.9 ¹
12 L-Gulonic acid	C ₆ H ₁₂ O ₇	Exists only in soln.	[ca. 0°]
13 Hexsonic acid, 2-deoxy-D-arabino-	C ₆ H ₁₂ O ₆	93-95	+68 (lactone)
14 2-Hexulosonic acid, D-arabino-	C ₆ H ₁₀ O ₇	.....	-81.7 (Na salt)
15 2-Hexulosonic acid, 3-deoxy-D-erythro-	C ₆ H ₁₀ O ₆	.....	-29.2 (c 6, Ca salt)
16 2-Hexulosonic acid, D-lyxo-	C ₆ H ₁₀ O ₇	169	-5
17 5-Hexulosonic acid, D-arabino-	C ₆ H ₁₀ O ₇	108-109	.....
18 5-Hexulosonic acid, D-xylo-	C ₆ H ₁₀ O ₇	.....	-14.5
19 D-Mannonic acid	C ₆ H ₁₂ O ₇	.....	-15.6
20 D-Gluconic acid, O-β-D-galactopyrano-syl- (1 → 4)- (Lactobionic acid)	C ₁₂ H ₂₂ O ₁₂	.....	+25.1 (Ca salt)

CARBOHYDRATES (Continued)

Part IV. NATURAL ALDONIC, URONIC, AND ALDARIC ACIDS (Continued)

Substance (Synonym)	Chemical Formula	Melting Point °C	Specific Rotation [α] _D
(A)	(B)	(C)	(D)
Uronic Acids			
21 L-Lyxuronic acid	C ₅ H ₈ O ₆		
22 β-D-Galacturonic acid	C ₆ H ₁₀ O ₇	160	+27 → +55.6
23 α-D-Galacturonic acid·monohydrate	C ₆ H ₁₂ O ₈	159-160 (110-115 s)	+97.9 → +50.9
24 D-Galacturonic acid, 2-amino-2-deoxy-	C ₆ H ₁₁ O ₆ N	160 d.	+84.5 (pH 2 HCl)
25 β-D-Glucuronic acid	C ₆ H ₁₀ O ₇	156	+11.7 → +36.3
26 D-Glucuronic acid, 2-amino-2-deoxy-	C ₆ H ₁₁ O ₆ N	120-172 d.	+55
27 D-Glucuronic acid, 3-O-methyl-	C ₇ H ₁₂ O ₇	Syrup	+6
28 L-Guluronic acid	C ₆ H ₁₀ O ₇		
29 L-Iduronic acid	C ₆ H ₁₀ O ₇		+30
30 β-D-Mannuronic acid	C ₆ H ₁₀ O ₇	165-167	-47.9 → -23.9
31 α-D-Mannuronic acid·monohydrate	C ₆ H ₁₂ O ₈	110 s, 120-130 d.	+16 → -6.1 (c 6.8)
Aldaric Acids			
32 D-Tartaric acid	C ₄ H ₆ O ₆	170	-15
33 L-Tartaric acid	C ₄ H ₆ O ₆	170	+15 [15°]
34 L-Malic acid	C ₄ H ₆ O ₅	100	-2.3 (c 8.4)

¹ Equilibrates with the lactone.

FATS AND OILS

These data for fats and oils were compiled originally for the Biology Data Book by H. J. Harwood, and R. P. Geyer, 1964. Data are reproduced here by permission of the copyright owners of the above publication, the Federation of American Societies for Experimental Biology, Washington, D C. pp. 380-382. Values are typical rather than average, and frequently were derived from specific analyses for particular samples (especially the constituent fatty acids). Extreme variations may occur, depending on a number

	Fat or Oil	Source	Constants				
			Melting (or Solidi- fication) Point, °C	Specific Gravity (or Density)	Refrac- tive Index n_D^{40}	Iodine Value	Saponi- fication Value
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
1	Land Animals Butterfat	<i>Bos taurus</i>	32 2	0 911 ^{10°/15°}	1 4548	36 1	227
2	Depot fat	<i>Homo sapiens</i>	(15)	0 918 ^{15°}	1 4602	67 6	196 2
3	Lard oil	<i>Sus scrofa</i>	(30 5)	0 919 ^{15°}	1 4615	58 6	194 6
4	Neat's-foot oil	<i>B. taurus</i>		0 910 ^{25°}	1 464 ^{25°}	69-76	190-199
5	Tallow, beef	<i>B. taurus</i>				49 5	197
6	Tallow, mutton	<i>Ovis aries</i>	(42 0)	0 945 ^{15°}	1 4565	40	194
7	Marine Animals Cod-liver oil	<i>Gadus morhua</i>		0 925 ^{25°}	1 481 ^{25°}	165	186
8	Herring oil	<i>Clupea harengus</i>		0 900 ^{60°}	1 4610 ^{60°}	140	192
9	Menhaden oil	<i>Brevoortia tyrannus</i>		0 903 ^{60°}	1 4645 ^{60°}	170	191
10	Sardine oil	<i>Sardinops caerulea</i>		0 905 ^{60°}	1 4660 ^{60°}	185	191
11	Sperm oil, body	<i>Physeter macrocephalus</i>				76-88	122-130
12	Sperm oil, head	<i>P. macrocephalus</i>				70	140-144
13	Whale oil	<i>Balaena mysticetus</i>		0 892 ^{60°}	1 460 ^{60°}	120	195
14	Plants Babassu oil	<i>Attalea funifera</i>	22-26	(0 893 ^{60°})	1 443 ^{60°}	15 5	247
15	Castor oil	<i>Ricinus communis</i>	(-18 0)	0 961 ^{15°}	1 4770	85 5	180 3
16	Cocoa butter	<i>Theobroma cacao</i>	34 1	0 964 ^{15°}	1 4568	36 5	193 8
17	Coconut oil	<i>Cocos nucifera</i>	25 1	0 924 ^{15°}	1 4493	10 4	268
18	Corn oil	<i>Zea mays</i>	(-20 0)	0 922 ^{15°}	1 4734	122 6	192 0
19	Cotton seed oil	<i>Gossypium hirsutum</i>	(-1 0)	0 917 ^{25°}	1 4735	105 7	194 3
20	Linseed oil	<i>Linum usitatissimum</i>	(-24 0)	0 938 ^{15°}	1 4782 ^{25°}	178 7	190 3
21	Mustard oil	<i>Brassica hirta</i>		0 9145 ^{15°}	1 475	102	174
22	Neem oil	<i>Melia azadirachta</i>	-3	0 917 ^{15°}	1 4615	71	194 5
23	Niger-seed oil	<i>Guizotia abyssinica</i>		0 925 ^{15°}	1 471	128 5	190
24	Oiticica oil	<i>Licania rigida</i>		0 974 ^{25°}		140-180	
25	Olive oil	<i>Olea europaea sativa</i>	(-6 0)	0 918 ^{15°}	1 4679	81 1	189 7
26	Palm oil	<i>Elaeis guineensis</i>	35 0	0 915 ^{15°}	1 4578	54 2	199 1
27	Palm-kernel oil	<i>E. guineensis</i>	24 1	0 923 ^{15°}	1 4569	37 0	219 9
28	Peanut oil	<i>Arachis hypogaea</i>	(3 0)	0 914 ^{15°}	1 4691	93 4	192 1
29	Perilla oil	<i>Perilla frutescens</i>		(0 935 ^{15°})	1 481 ^{25°}	195	192
30	Poppy-seed oil	<i>Papaver somniferum</i>	(-15)	0 925 ^{15°}	1 4685	135	194
31	Rapeseed oil	<i>Brassica campestris</i>	(-10)	0 915 ^{15°}	1 4706	98 6	174 7
32	Safflower oil	<i>Carthamus tinctorius</i>		(0 900 ^{60°})	1 462 ^{60°}	145	192
33	Sesame oil	<i>Sesamum indicum</i>	(-6 0)	0 919 ^{25°}	1 4646	106 6	187 9
34	Soybean oil	<i>Glycine soja</i>	(-16 0)	0 927 ^{15°}	1 4729	130 0	190 6
35	Sunflower-seed oil	<i>Helianthus annuus</i>	(-17 0)	0 923 ^{15°}	1 4694	125 5	188 7
36	Tung oil	<i>Aleurites fordii</i>	(-2 5)	0 934 ^{15°}	1 5174 ^{25°}	168 2	193 1
37	Wheat-germ oil	<i>Triticum aestivum</i>				125	

¹ Caproic. ² Capryli. ³ Capric. ⁴ Butyric. ⁵ Decenoic. ⁶ C₁₂ monoethenoic. ⁷ C₁₄ monoethenoic. ⁸ Gado-leic plus crucic. ⁹ C₁₂ n-pentadecanoic. ¹⁰ C₁₇ margaric. ¹¹ 12-Methyl tetradecanoic. ¹² C₂₀ polyethenoic.

FATS AND OILS

of variables such as source, treatment, and age of a fat or oil **Specific Gravity** (column D) was calculated at the specified temperature (degrees centigrade) and referred to water at the same temperature, unless otherwise specified **Density**, shown in parentheses (column D), was measured at the specified temperature (degrees centigrade) **Refractive Index** (column E) was measured at 50°C, unless otherwise specified

Constituent Fatty Acids, g/100 g total fatty acids

Saturated						Unsaturated				
Lauric	Myristic	Palmitic	Stearic	Arachidic	Other	Palmitoleic	Oleic	Linoleic	Linolenic	Other
(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)
1	2 5	11 1	29 0	9 2	2 4	2 0 ¹ , 0 5 ² , 2 3 ³	4 6	26 7	3 6	3 6 ⁴ , 0 1 ⁵ , 0 1 ⁶ , 0 9 ⁷ 1 4 ⁸ , 1 0 ⁹ , 1 0 ¹⁰ , 0 4 ¹¹
2		2 7	24 0	8 4			5	46 9	10 2	2 5 ⁸
3		1 3	25 3	11 9			2 7	47 5	6	0 2 ⁷ , 2 1 ⁸
4			17-1 ⁸	2 3				74 76		
5		6 3	27 4	14 1				49 6	2 5	
6		4 6	24 6	30 5				36 0	4 3	
7		5 8	8 4	0 6			20 0	←29 1→		25 4 ¹² , 9 6 ¹³
8		7 3	13 0	Trace			4 9		20 7	30 1 ¹² , 23 2 ¹³
9		5 9	16 3	0 6	0 6		15 5		29 6	19 0 ¹² , 11 7 ¹³ , 0 8 ¹⁴
10		5 1	14 6	3 2			11 8	←17 8→		18 1 ¹² , 14 0 ¹³ , trace ⁷ , 15 4 ¹⁵
11	1	5	6 5				26 5	37	19	1 ¹³ , 4 ⁷ , 19 ¹⁶
12	16	14	8	2	3 5 ³		15	17	6 5	4 ⁶ , 14 ⁷ , 6 5 ¹⁶
13	0 2	9 3	15 6	2 5			14 4	35 2		13 6 ¹² , 5 9 ¹³ , 2 5 ⁷ , 0 2 ¹⁷
14	44 1	15 4	8 5	2 7	0 2	0 2 ¹ , 4 8 ² , 6 6 ³		16 1	1 4	
15	←2 4→							7 4	3 1	87 ¹⁸
16			24 4	35 4				35 1	2 1	
17	45 4	18 0	10 5	2 3	0 4 ¹⁹	0 5 ¹ , 5 4 ² , 8 4 ³	0 4	7 5	Trace	
18		1 4	10 2	3 0			1 5	49 6	34 3	
19		1 4	23 4	1 1	1 3		2 0	22 9	47 8	
20			6 3	2 5	0 5			19 0	24 1	47 4
21		1 3 ²⁰						27 2 ²⁰	16 6 ²⁰	1 8 ²⁰
22		2 6 ²⁰	14 1 ²⁰	24 0 ²⁰	0 8 ²⁰			58 5 ²⁰		0 2 ¹¹
23		3 3 ²⁰	5 2 ²⁰	4 8 ²⁰	0 5 ²⁰			30 3 ²⁰		1 1 ¹¹ , 1 0 ²¹ , 5 1 0 ²²
24	←11 3 ²³ →							6 2		82 5 ²¹
25		Trace	6 9	2 3	0 1			84 4	4 6	
26		1 4	40 1	5 5				42 7	10 3	
27	46 9	14 1	8 8	1 3		2 7 ² , 7 0 ³		18 5	0 7	
28			8 3	3 1	2 4			56 0	26 0	3 1 ¹¹ , 1 1 ²¹
29	←9 6 ²³ →							17 8		17 5
30			4 8 ²⁰	2 9 ²⁰				30 1 ²⁰	62 2 ²⁰	
31			1					32	15	50 ²²
32	←6 8 ²³ →							18 6	70 1	3 4
33			9 1	4 3	0 8			45 4	40 4	
34	0 2	0 1	9 8	2 4	0 9		0 4	28 9	50 7	6 5
35			5 6	2 2	0 9			25 1	66 2	0 1 ⁷
36	←4 6 ²³ →							4 1	0 6	90 7 ²⁰
37	←16 0 ²³ →							28 1	52 3	3 6

¹³ C₂₃ polyethenoic ¹⁴ Behenic ¹⁵ C₁₄ polyethenoic ¹⁶ Gadoleic ¹⁷ C₂₁ polyethenoic. ¹⁸ Ricinoleic. ¹⁹ Includes behenic and lignoceric ²⁰ Percent by weight ²¹ Lignoceric ²² Erucic ²³ Includes behenic ²¹ Licanic ²⁰ Eleostearic

WAXES

These data for waxes were compiled originally for the Biology Data Book by A H Warth Data are reproduced here by permission of the copyright owners of the above publication, the American Societies for Experimental Biology, Washington, D C p 382

Specific Gravity (column C) was calculated at the specified temperature, degrees centigrade, and referred to water at the same temperature **Density**, shown in parentheses (column C), and **Refractive Index** (column D) were measured at the specified temperature, degrees centigrade

	Wax	Melting Point °C	Specific Gravity or (Density)	Refractive Index $n_{\frac{°C}{D}}$	Iodine Value	Acid Value	Saponifi- cation Value
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
1	Bamboo leaf	79-80	(0 961 ^{25°})		7 8 ¹	14 5	43 4
2	Bayberry (myrtle)	46 7-48 8	(0 985 ^{15°})	1 436 ^{80°}	2 9 ² -3 9 ³	3 5	20 5-21 7
3	Beeswax, crude	62-66	(0 927-0 970 ^{15°})	1 439-1 483 ^{40°}	6 8-16 4 ²	16 8-35 8	89 3-149 0
4	Beeswax, white, U S P	61-69	(0 959-0 975 ^{15°})	1 447-1 465 ^{65°}	7-11 ³	17-24	90-96
5	Beeswax, yellow	62-65	(0 960-0 964 ^{15°})	1 443-1 449 ^{65°}	6-11	18-24	90-97
6	Candelilla, refined	67-69	(0 982-0 986 ^{15°})	1 454-1 463 ^{85°}	14 4-20 4	12 7-18 1	35-86
7	Cape berry ⁴	40 5-45 0	(1 004-1 007 ^{15°})	1 450 ^{45°}	0 6-2 4	2 5-3 7	211-215
8	Carandá	79 7-84 5	(0 990 ^{25°})		8 0-8 9	5 0-9 5	64 5-78 5
9	Carnauba	83-86	0 990-1 001 ^{15°}	1 467-1 472 ^{40°}	7 2-13 5	2 9-9 7	78-95
10	Castor oil, hydro- genated	83-88	(0 980-0 990 ^{20°})		2 5-8 5	1 0-5 0	177-181
11	Chinese insect	81 5-84 0	0 950-0 970 ^{15°}	1 457 ^{40°}	1 4	0 2-1 5	73-93
12	Cotton	68-71	0 959 ^{15°}		24 5	32	70 6
13	Cranberry	207-218	(0 970-0 975 ^{15°})		44 2-53 2 ²	42 2-59 1	131-134
14	Douglas-fir bark	59 0-72 8	(1 030 ^{25°})	1 468 ^{80°}	25 8-62 5	58 6-80 7	112-200
15	Esparto	67 5-78 1	0 988 ^{15°}		22-23	22 7-23 9	69 8-79 3
16	Flax	61 5-69 8	0 908-0 985 ^{15°}		21 6-28 8	17 5-48 3	77 5-101 5
17	Ghedda, E Indian beeswax	60 5-66 4	0 956-0 973 ^{15°}	1 440 ^{80°}	5 6-12 6	5 8-7 9	84 5-118 3
18	Indian corn	80-81			4 2 ²	1 9	120 3
19	Japan wax	48-53	0 975-0 993 ^{15°}		4 5-12 5	6-20	206 5-237 5
20	Jojoba	11 2-11 8	0 864-0 899 ^{25°}	1 465 ^{25°}	81 7-88 4 ²	0 2-0 6	92 2-95 0
21	Madagascar	88			3 2-5 3	17 7-28 0	140 0-159 6
22	Microcrystalline, amber	64-91	0 913-0 943 ^{15°}	1 424-1 452 ^{80°}	0	0	0
23	Microcrystalline, white	71-89	0 928-0 941 ^{15°}	1 441 ^{80°}	0	0	0
24	Montan, crude	76-86	(1 010-1 020 ^{25°})		13 9-17 6	22 7-31 0	59 4-92 0
25	Montan, refined	77-84	(1 010-1 030 ^{25°})		10-14	24-43	72-103
26	Orange peel	44 0-46 5	0 985 ^{15°}	1 502 ^{20°}	115 7 ²	48 3	120 9
27	Ouricury, refined	79 0-83 8	1 053 ^{15°}		6 9-7 8 ²	3 4-21 1	61 8-85 8
28	Ozocerite, refined	74 4-75 0	0 907-0 920 ^{15°}		0	0	0
29	Palm	74-86	(0 991-1 045 ^{15°})		8 9-16 9 ²	5 0-10 6	64 5-104 0
30	Paraffin, American	49-63	0 896-0 925 ^{15°}	1 442-1 448 ^{80°}	0	0	0
31	Peat wax, natural	73-76	0 980 ^{15°}		16-40	60 0-73 3	73 9-136 0
32	Rice bran, refined	75 3-79 9		1 469 ^{30°}	11 1-19 4	15-17	56 9-104 4
33	Shellac wax	79-82	0 971-0 980 ^{15°}		6 0-8 8 ³	12 1-24 3	63 8-83 0
34	Sisal hemp	74-81	1 007-1 010 ^{15°}		28-29 ²	16-19 ²	56-58
35	Sorghum grain	77-82			15 7-20 9	10 1-16 2	16-44
36	Spanish moss	79-80			33 0	25 0	120 4
37	Spermaceti	42-50	0 905-0 945 ^{15°}	1 440 ^{70°}	4 8-5 9	2 0-5 2	108-134
38	Sugarcane, crude	52-67	0 988-0 998 ^{25°}		32-84	24-57	128-177
39	Sugarcane, double- refined	77-82	0 961-0 979 ^{25°}	1 510 ^{25°}	13-29	8-23	55-95
40	Wool wax, refined	36-43	0 932-0 945 ^{15°}	1 478-1 482 ^{40°}	15 0-46 9	5 6-22 0	80-127

¹ Wijs test ² Hanus test ³ Hubl test ⁴ *Myrica cordifolia*

DIAMAGNETIC SUSCEPTIBILITIES OF ORGANIC COMPOUNDS

Compiled by George W. Smith

The following table contains values for the molar susceptibility of χ_M , specific susceptibility χ and volumetric susceptibility K . The cgs Gaussian system of units is employed. In the Gaussian units the relation between magnetic induction B and magnetic field strength H is

$$B = H + 4\pi I \quad (1)$$

where I is the magnetization or magnetic moment per unit volume. Actually the quantities involved in equation (1) are all vectors but one may assume that all three are collinear. A reasonable assumption for organic diamagnetic substances in the liquid state. For crystals I may vary with crystal orientation. Equation (1) may be rewritten

$$B = H + 4\pi KH = (1 + 4\pi K)H \quad (2)$$

Here, K is the magnetic susceptibility often called the volumetric susceptibility and is a unitless quantity.

Other susceptibilities of use to chemists and physicists are the specific or mass susceptibility which is defined

$$\chi = K/\rho \quad (3)$$

where ρ is the density of the sample in grams per cc, and the molar susceptibility which is defined as

$$\chi_M = M\chi = MK/\rho \quad (4)$$

where M is the molecular weight of the substance in grams

Temperatures, when listed, are enclosed in parentheses and are listed in degrees C.

Literature references for values contained in this table may be found in General Motors Research Laboratories publication GMR-317.

Compound	$-\chi_M \times 10^6$	$-\chi \times 10^6$	$-K \times 10^6$	Compound	$-\chi_M \times 10^6$	$-\chi \times 10^6$	$-K \times 10^6$
Acenaphthanthracene	184	73		Amyl iodide	(118.7)	5996 (18°)	(910) (20°)
Acenaphthene	109.3	(709)	(726) (99°)	n-Amyl methyl ketone	80.50	707 ₂	(580) (15°)
Acetal	81.39	688 (32°)	(568) (32°)	Amyl nitrate	(76.4)	574	
Acetaldehyde	22.70	515 ₃	(403) (18°)	iso-Amyl propionate	101.73	705 ₁ (25°)	(609) (25°)
Acetamide	34.1	577	(618) (20°)	n-Amyl valerate	124.55	723 ₉	(638) (0°)
Acetic acid	31.54	525 (32°)	(551) (32°)	Anethole	(96.0)	648	(644) (15°)
Acetic anhydride	(52.8)	517	(562) (15°)	Aniline	62.95	(676)	(691) (20°)
Acetoaminofluorene	(141)	63		Anisidine	(80.5)	654	(72) (20°)
Acetone	33.7 ₅	581 ₁	(460) (20°)	Anisole	72.79	(673)	(672) (15°)
Acetonitrile	28.0	(682)	(534) (20°)	Anthanthrene	204.2	739	
Acetylacetone	62.51	547 ₆	(531) (20°)	Anthanthrone	178.1	581	
Acetophenone	72.05	599 ₈	(615) (20°)	Anthracene	(130)	731	(914) (27°)
Acetophenone oxime	79.9 ₆	592 ₆		Anthracenedimtrile	154.6	(678)	
Acetophenone oxime-O-methyl ether	92.3 ₁	618 ₅		Anthracenonitrile	142.1	(700)	
Acetoxime	44.4 ₁	607 ₆	(480) (20°)	Anthraquinone	(119.6)	575	(825) (20°)
Acetoxime-O-benzyl ether	104.8 ₉	642		Anthrazine	245.7	646	
Acetoxime-O-methyl ether	54.8	629 ₈		Arabinose	85.70	571	(905) (20°)
Acetylacetone	54.88	548 ₁	(535) (20°)	Arbutoside	158.0	(589)	
Acetyl chloride	38.9	496	(548) (20°)	Asarone	131.4	(631)	(735) (18°)
Acetylene	12.5	(480)		Asparagine	69.5	(526)	(812) (15°)
Acetylphenylacetylene	86.9	508		Aspartic acid	64.2 ± 4	(482)	(800) (12°)
Acetylthiophene	71.7	(568)		Aurin	(161.4)	556	
Acridine	(123.3)	688	(757) (20°)	p-Azoanisole	(147.7)	610	
Adonitol	91.30	600		Azobenzene	(106.8)	586	611 (70.5°)
Alanine	50.5	(567)		p-Azophenetole	(171.7)	635	
Allyl acetate	(56.7)	566	(525) (20°)	m-Azotoluene	(127.8)	608	643 (58°)
Allyl alcohol	36.70	632	540 (20°)	Azulene	98.5	768	
1-Allylpyrrole	73.80	685 (20°)		Barbituric acid (Anh.)	53.8	(420)	
Aminoazobenzene	(118.3)	600		Barbituric acid (2H·O)	78.6	(479)	
Aminoazotoluene	(142.2)	631		Benzalazine	(123.7)	594	
o-Aminoazotoluene	(138)	61 ± 02		Benzaldehyde	60.78	(573)	(602) (15°)
α-Aminobutyric acid	62.1	(602)		Benzaldoxime	(60.8)	576	(639) (20°)
Aminomethyl-diethyl-diazine	114.8	(696)		Benzamide	(72.3)	597	(801) (4°)
4-Aminostilbene	122.5	(628)		Benzanthrone	142.9	620	
2-Aminothiazole	56.0	564		Benzene	54.84	702 (32°)	611
n-Amyl acetate	89.06	684 ₅	5979 (20.7°)	Benzidine	110.9	603	(754) (20°)
iso-Amyl acetate	89.40	687	599 (20°)	Benzil	(118.6)	564	616 (100°)
n-Amyl alcohol	(67.5)	766	(624) (20°)	Benzoin acid	70.28	(575)	(728) (15°)
γ-Amyl alcohol	(71.0)	8060	(655) (25°)	Benzoin anhydride	(124.9)	552	(662) (15°)
Inactive Amyl alcohol	69.06	783 ₁ (25°)		Benzonitrile	65.19	(632)	(658) (15°)
iso-Amyl alcohol	68.96	782 ₂ (25°)	(64) (15°)	Benzophenone	109.60	601 ₃	(66) (50°)
sec-Amyl alcohol	69.1	785	(635) (20°)	3,4-Benzopyrene	135.7	538	
tert-Amyl alcohol	(70.9)	804	(654) (15°)	Benzopyrene	194.0	586	(630) (60°)
n-Amylamine	69.4	(796)	(606) (20°)	Benzoyl acetone	(95.0)	539 (20°)	(657) (15°)
iso-Amylamine	71.6	(821)	(616) (20°)	Benzoyl chloride	(75.8)	520	(655) (16°)
n-Amylbenzene	112.55	(759)	(652) (20°)	Benzyl acetate	93.18	(620)	(687) (15°)
iso-Amyl bromide	(88.7)	587	(706) (20°)	Benzyl alcohol	71.83	(664)	(690) (19°)
iso-Amyl-n-butyrate	113.52	717 ₁ (25°)	(616) (25°)	Benzylamine	75.26	(702)	(713) (18°)
iso-Amyl chloride	(79.0)	741	(662) (20°)	Benzyl chloride	81.98	(647)	(646) (20°)
iso-Amyl cyanide	73.4	(755)	(609) (20°)	Benzyl formate	81.43	(598)	
iso-Amylene	53.7	766		Benzylideneaniline	(100.4)	554	
Amylene bromide	(114.5)	498		Benzylidene chloride	(97.9)	608	(763) (14°)
Amylene chloride	(95.2)	675		Benzylidenemethylamine	(73.1)	613	
iso-Amyl ether	(129)	813	(635) (15°)	Benzyl methyl ketone	83.44	621 ₉	(624) (20°)
iso-Amyl formate	78.38	674 ₈	(591) (25°)	Bibenzyl	(126.8)	696	671 (54.5°)
Amylidene chloride	(93.4)	662					

DIAMAGNETIC SUSCEPTIBILITIES OF ORGANIC COMPOUNDS (Continued)

Compound	$-\chi_M \times 10^6$	$-\chi \times 10^6$	$-K \times 10^6$	Compound	$-\chi_M \times 10^6$	$-\chi \times 10^6$	$-K \times 10^6$
3,4-Bis (p-hydroxyphenyl)-2,4-hexadiene	(157)	59		Chlorofumaric acid	67.02	(445)	
m,m'-Bitolyl	(127.4)	6993 (27.4°)	(699) (16°)	p-Chloroiodo benzene	99.42	(417)	(786) (57°)
m,m'-Bitolyl sulfide	(140.0)	6530 (27.4°)		Chloromaleic acid	67.36	(448)	
Borneol	126.0	(817)	(826) (20°)	Chloromethylstilbene	144.8	(633)	
Bromobenzene	78.92	3030 (20°)	(753) (20°)	α -Chloronaphthalene	107.60	661	789 (20°)
Bromobenzene diazocyanide	86.88	(414)		m-Chloronitrobenzene	(74.8)	475	638 (48°)
Bromochloromethane	55.0 \pm 6	(425)	(846) (19°)	o-Chlorophenol	77.4	(602)	(747) (18°)
Bromodichloromethane	66.3 \pm 3	(405)	(812) (15°)	p-Chlorophenol	77.6	(604)	(789) (20°)
Bromoform	82.60	327	948 (20°)	1-(α -Chlorophenylazo) 2 naphthol	161.0	(570)	
Bromonaphthalene	(123.8)	598		1-(p-Chlorophenylazo) 2 naphthol	161.4	(571)	
α -Bromonaphthalene	115.90	560	840 (20°)	Chlorotrifluoroethylene	49.1	422	
m-Bromotoluene	(93.4)	346	(770) (20°)	Chlorotrifluoromethane	45.3 \pm 1.5	(434)	
Bromotrichloromethane	73.1 \pm 7	(389)	(758) (0°)	Cholesterol	(284.2)	735	(784) (20°)
Butane	57.4	(988)		Chrysene	166.67	731	
iso-Butane	51.7	(890)		Chrysoidine	(126.3)	595	
1,4-Butanediol	61.5	(682)	(696) (20°)	Cinnamic acid	78.36	529	(660) (4°)
2-Butene (cis)	42.6	(759)		Cinnamic acid (α trans)	78.2	(528)	
2-Butene (trans)	43.3	(772)		Cinnamic acid (β trans)	79.0	(533)	
1-Butene 3,4-diacetate	95.5	(555)		Cinnamic acid (cis MP 68°)	77.6	(524)	
2-Butene-1,4-diacetate (cis)	95.2	(553)		Cinnamic acid (cis-MP 58°)	77.9	(526)	
2-Butene 1,4-diacetate (trans)	95.1	(552)		Cinnamic acid (cis-MP 42°)	83.2	(562)	
2-Butene 1,4-diol (cis)	54.3	(616)		Cinnamic aldehyde	(74.8)	566	(629) (15°)
2-Butene 1,4-diol (trans)	53.5	(607)		Cinnamyl alcohol	(87.2)	650	(679) (20°)
n-Butyl acetate	77.47	666 ₆ (25°)	(583) (25°)	Cinnamylideneaniline	123.2	(539)	
iso-Butyl acetate	78.52	676 ₆	(584) (25°)	Citral	(98.9)	650	(577) (20°)
n-Butyl alcohol	56.536 (20°)	(7627)	(6176) (20°)	Coronene	(243.3)	810	
iso-Butyl alcohol	57.704 (20°)	(7785)	(624) (20°)	Coumarin	82.5	(565)	(528) (20°)
sec-Butyl alcohol	57.683 (20°)	(7782)	(629) (20°)	o-Cresol	72.90	675	(706) (20°)
tert-Butyl alcohol	57.42	774 (25°)	(611) (20°)	m-Cresol	72.02	667 (26°)	(690) (20°)
n-Butylamine	58.9	(805)	(596) (20°)	p-Cresol	72.1	667 (26°)	(690) (20°)
iso-Butylamine	59.8	(818)	(599) (20°)	o-Cresylmethyl ether	81.94	671 (40°)	(661) (15°)
9-Butyl anthracene	176.0	(751)	(646) (20°)	m-Cresylmethyl ether	77.91	638 (40°)	(583) (15°)
n-Butylbenzene	100.79	(751)	(646) (20°)	p-Cresylmethyl ether	79.13	648 (40°)	(629) (19°)
iso-Butylbenzene	101.81	(759)	(648) (20°)	Cumene	89.53	744 ₉	(642)
tert-Butylbenzene	102.5	(764)	(662) (20°)	Cyamelide	(56.1)	435	490 (15°)
n-Butyl benzoate	116.69	654 ₄	(656) (25°)	Cyameluric acid	101.1 (10°)	(457)	
Butyl bromide	77.14	563 (20°)	(730) (20°)	9-Cyanoanthracene	142.1	(699)	
iso-Butyl bromide	79.88	583 (20°)	(737) (20°)	Cyanogen	(21.6)	415	(359) (liq 17°)
1-n-Butyl chloride	67.10	725	642 (20°)	Cyanuric acid	61.5	476	(842) (10°)
2-n-Butyl chloride	67.40	728	635 (20°)	Cyclobutanecarboxylic acid	58.16	5816 (30°)	(613) (30°)
n-Butyl cyanide	(62.8)	7558 (27.4°)	(606) (20°)	1,3-Cyclohexadiene	48.6	(607)	(510) (20°)
tert-Butyl cyclohexane	115.09	8205	6670 (20°)	1,4-Cyclohexadiene	48.7	(608)	(515) (20°)
1,4-Butyl diacetate	103.4	(594)		Cyclohexane	68.13	8100 (27.5°)	(627) (20°)
n-Butyl ethyl ketone	80.73	707 ₇	(579) (20°)	Cyclohexanecarboxylic acid	83.24	6499 (30°)	(668) (30°)
n-Butyl formate	65.83	644 ₄	(571) (25°)	Cyclohexanol	73.40	732	694 (20°)
iso-Butyl formate	66.79	654 ₉	(574) (25°)	Cyclohexanone	62.0 ₄	632 ₂	(599) (20°)
iso-Butylideneazime	(95.8)	683		Cyclohexanone oxime	71.5 ₅	632 ₁	
Butyl iodide	(93.6)	5086 (18°)	(822) (20°)	Cyclohexanoneoxime O-methyl ether	82.9 ₆	652 ₂	
iso-Butyl methyl ketone	70.05	699 ₅	(561) (20°)	Cyclohexene	57.5	(700)	(567) (20°)
tert-Butyl methyl ketone	69.86	697 ₇	(558) (16°)	Cyclohexenol	64.1	(653)	
n-Butyl perfluor n-butylate	126.7	(469)		Cyclooctane	91.4	(815)	(684) (20°)
p-tert-Butylphenol	108.0	(719)	(653) (114°)	Cyclooctene	84.6	(769)	(654) (20°)
Butyl sulfide	(113.7)	7774 (27.4°)	(652) (16°)	Cyclooctatetraene	(53.9)	518	
Butyl thiocyanate	(79.38)	6891 (27.4°)	(659) (25°)	Cyclopentane	59.18	8439	6290 (20°)
2-Butyne 1,4-diacetate	95.9	(564)		Cyclopentanecarboxylic acid	73.48	6446 (30°)	(677) (30°)
2-Butyne 1,4-dibenzoylate	169.0	(561)		Cyclopentanone	51.63	6141 (30°)	(582) (30°)
2-Butyne-1,4-diol	50.3	(584)		Cyclopropane	39.9	(948)	(683) (-79°)
n-Butylaldehyde	46.08	639 ₄	(522) (20°)	Cyclopropanecarboxylic acid	45.33	5271 (30°)	(569) (30°)
iso-Butylaldehyde	46.38	643 ₃	(511) (20°)	p-Cymene	102.8	766 (20°)	(656) (20°)
iso-Butylaloxime	56.1 ₁	644 ₃	(576) (20°)	Decalin	106.70	7718	6814 (20°)
n-Butyric acid	55.10	625	598 (20°)	cis-Decalin	(107.0)	774	(686) (35°)
iso-Butyric acid	56.06	636 ₃ (25°)	(601) (25°)	trans-Decalin	(107.7)	779	(670) (35°)
Butyronitrile	49.4	(715)	(569) (15°)	n-Decane	119.74	(8416)	(6143) (20°)
Butyl phenylacetylene	(106.4)	618		1-Deuterio pyrrole	48.75	716 (20°)	
(acetyl)	(99.9)	476	(689) (15°)	Deuteriobenzene	60.88	690	(692) (13°)
Carbolic acid	(79.9)	579		Diacetal	(153.8)	668	
Camphor	(103)	68	(67) (25°)	Di-iso-amyllamine	(133.1)	846	(649) (21°)
Camphoric acid	129.0	(644)	(791) (20°)	Diazoacetic ester	57	(50)	(54) (24°)
Camphoric anhydride	(113)	620	(740) (20°)	Dibenzocoronene	289.4	778	
n-Caproic acid	78.55	676 ₆	(624) (25°)	1,2,5,6-Dibenzofluorene	184	69 \pm 03	
(n-Caprylphenyl)acetylene	(130.4)	651		3,4,5,6-Dibenzophenanthrene	(205)	73 \pm 03	
n-Caprylic acid	101.60	7053	(642) (20°)	Dibenzphenanthrone	200.5	716	
Carbanilide	134.05	(6316)	(783) (20°)	Dibenzpyrene	213.6	706	
Carbazole	117.4	(702)		Dibenzpyrenequinone	183.1	551	
Carbon disulfide	42.2	554	699 (22°)	iso-Dibenzpyrenequinone	194.6	586	
Carbon tetrabromide	93.73	2826 (20°)	(966)	Dibenzyl ketone	131.70	626 ₆	
Carbon tetrachloride	66.60	433	691 (20°)	p-Dibromobenzene	(101.4)	430	786 (100°)
Carbon tetratride	(136)	261	1130 (20°)	2,3-Dibromo-2-butene-1,4-diol	94.2	(333)	
Carvacrol	(109.1)	726	(709) (20°)	Dibromodichloromethane	81.1 \pm 4	(884)	(808) (25°)
Carvone	(92.2)	614	(590) (20°)	1,2-Dibromodiodoethylene	(140.1)	320	
Cetyl alcohol	(183.5)	757 (17.5°)	(619) (50°)	1,2-Dibromoethylene	(71.7)	386	(877) (17.5°)
Cetyl mercaptan	390.4	1510		1,2-Dibromo-2-fluoroethane	(78.0)	379	(855) (17°)
Chloral	(67.7)	459	(694) (20°)	Dibromo-4-nitrophenol	(167.5)	564	
Chloranil	(112.6)	458		1,2-Dibromotetrachloroethane	(126.0)	387	(1049)
Chloroacetic acid	48.1	(509)	(804) (20°)	Di-n-butylamine	103.7	(802)	(767) (20°)
Chloroacetone	(50.9)	550	(633) (20°)	Di-iso-butylamine	105.7	(817)	(609) (20°)
Chloroacetylchloride	53.7	(475)	(710) (0°)	Di-sec-butylamine	105.9	(819)	(641) (0°)
p-Cloranisole	89.1	(625)		Di-iso-butyl ketone	104.30	733 ₃	(591) (20°)
Chlorobenzene	69.97	(6216)	(688) (20°)	Di-tert-butyl ketone	104.06	732 ₁	
Chlorobenzene diazocyanide	65.02	(393)		2,6-Di-tert-butyl-4-methyl phenol	165.3	(750)	
Chlorodibromomethane	75.1 \pm 4	(361)	(883) (15°)	2,4-Di-tert-butyl phenol	155.6	(754)	
Chlorodifluoromethane	38.6	446		Dibutyl phthalate	175.1	(629)	(637) (21°)
1-Chloro-2,3-dihydroxypropane	(77.9)	604		Di-iso-butylalacetylene	(125.6)	738	
Chlorodiphenylmethane	131.9	(651)		Dicetyl sulfide	401.7	(832)	
Chloroethylene	35.9	574	(528) (liq, 15°)	Dichloroacetic acid	58.2	(451)	(705) (20°)
Chloroform	59.30	497	740 (20°)	Dichloroacetyl chloride	69.0	(468)	

DIAMAGNETIC SUSCEPTIBILITIES OF ORGANIC COMPOUNDS (Continued)

Compound	$-X_M \times 10^6$	$-X \times 10^6$	$-K \times 10^6$	Compound	$-X_M \times 10^6$	$-X \times 10^6$	$-K \times 10^6$
o-Dichlorobenzene	84 26	5734	(748) (20°)	2,5-Dimethylpyrrole	71 92	756 (20°)	(707) (20°)
m-Dichlorobenzene	83 19	5661	(729) (20°)	o-Dimethyl styrene	(90 7)	686	
p-Dichlorobenzene	82 93	5644	(823) (20 5°)	Dimethyl succinate	81 50	5581	(625) (18°)
1,4-Dichloro-2-butene	74 2	(603)		Dimethyl sulfate	(82 2)	493	(657) (20°)
1,2-Dichloro-1,2-dibromoethane	(108 6)	423		Dimethyl sulfide	(44 9)	723	(612) (21°)
1,1-Dichloro-difluoroethylene	60 0	451		Dimethyltrichloromethylcarbinol	(105)	59	
Dichlorodifluoromethane	52 2	432	(642) (-30°)	N,N-Dimethyl urea	55 1	(625)	(784)
1,1-Dichloroethylene	49 2	508	(635) (15°)	N,N'-Dimethyl urea	56 3	(639)	(730)
cis-1,2-Dichloroethylene	51 0	526	(679) (15°)	o-Dinitrobenzene	65 98	3921	(614) (17°)
trans 1,2-Dichloroethylene	48 9	504	(638) (15°)	m-Dinitrobenzene	70 53	4197	(659) (0°)
1,3-Dichloro-2-hydroxypropane	(80 1)	621		p-Dinitrobenzene	68 30	4064	(660) (30°)
Dicyandiamide	44 55	(530)	(742) (14°)	2,4-Dinitrophenol	(73 1)	397	(668) (24°)
Dicyclohexanol acetylene	(151 6)	682		Dinitroresorcinol	(62 4)	312	
Dicyclohexyl	129 31	7776	6889 (20°)	1,4-Dioxane	52 16	592 (32°)	(606) (32°)
1,1-Dicyclohexylnonane	231 98	7930	7001 (20°)	Diphenyl	103 25	6695	(664) (73°)
Diethanolacetylene	(75 3)	660		1,1-Diphenylallyl-3-chloride	146 1	(639)	
Diethyl acetaldehyde	70 71	7055	(576) (20°)	1,3-Diphenylallyl-3-chloride	140 7	(615)	
Diethylallylacetophenone	146 2	(676)	(663) (16°)	Diphenylamine	(109 7)	648	686 (55 5°)
Diethyl allylmalonate	118 8	(593)	(602) (14°)	Diphenyl-bis-diazo cyanide	85 03	(327)	
Diethylamine	56 8	(777)	(552) (18°)	Diphenylbutadiene	129 6	(629)	
Diethylcyclohexylamine	(124 5)	802	(699) (0°)	Diphenylchloroarsine	(145 5)	550	(871) (40°)
Diethyl ethylmalonate	115 2	(612)	(614) (20°)	Diphenyldecapentaene	180 5	(635)	
Diethyl ketone	58 14	675	(551) (19°)	Diphenyl diacetylene	(134 6)	640	
Diethyl ketoxime	68 31	6754		Diphenyldiazomethane	115	(592)	
Diethyl malonate	(92 6)	5782	(611) (20°)	Diphenyldihydrotetrazine	129 9	(545)	
Diethyl-3-(1-methyl butane) ethyl-malonate	175	(677)		1,1-Diphenylethylene	(118 0)	655	(680) (14°)
Diethyl oxalate	81 71	5595	(603) (15°)	1,6-Diphenylhexane	171 81	7208	6877 (20°)
Diethyl phthalate	127 5	(574)	(645) (25°)	Diphenylhexatriene	146 9	(632)	
Diethyl sebacate	(177 0)	685	(661) (20°)	Diphenylmethane	(115 7)	688	684 (35 5°)
Diethylstilbestrol	172 0	(547)		Diphenylmethanol	119 1	647	
Diethylstilbestrol dipropionate	265 2	720		1,1-Diphenylnonane	206 32	7357	6935 (20°)
Diethyl succinate	105 07	6035	(628) (20°)	Diphenyloctatetraene	164 3	(636)	
Diethyl sulfate	(86 8)	563	(667) (15°)	Diphenylphenoxyarsine	(225 2)	567	
Diethyl sulfide	(67 9)	753	(630) (20°)	N,N-Diphenyl urea	126 3	(595)	(759)
Diethyl tartrate	(113 4)	550	(662) (20°)	N,N'-Diphenyl urea	127 5	(600)	(743) (20°)
Difluoroacetamide	(41 2)	433		Di-n-propyl ketone	80 45	7056	(576) (20°)
1-Difluoro-2-dibromoethane	(85 5)	382	(883) (20°)	Di iso-propyl ketone	81 14	7116	(573) (20°)
1,1-Difluoro-2,2-dichloroethyl amyl ether	129 84	(587)	(694) (20°)	Dipropyl oxalate	105 27	6046	(628) (0°)
1,1-Difluoro-2,2-dichloroethyl butyl ether	119 48	(577)	(703) (20°)	Di iso-propyl oxalate	106 02	6089	
1,1-Difluoro-2,2-dichloroethyl ethyl ether	96 13	(537)	(723) (20°)	Dodecyl alcohol	147 70	7849 (20 7°)	(652) (24°)
1,1-Difluoro-2,2-dichloroethyl methyl ether	80 68	(489)	(696) (20°)	Dulcitol	112 40	617	(905) (15°)
1,1-Difluoro-2,2-dichloroethyl propyl ether	107 19	(555)	(701) (20°)	Fluic acid	204 8	(725)	(619) (79°)
Difluoroethanol	(41 3)	503		Erythritol	73 80	604	(876) (20°)
Di-n-heptylamine	171 5	(805)		Ethane	27 3	(910)	(511) (-100°)
Di-n-hexylamine	148 9	(803)		4-Ethoxy-3-methoxybenzyl acetate	138 5	619	
Dihydronaphthalene	(85 1)	654	(652) (12°)	4-Ethoxy-3-methoxybenzyl benzoate	177 3	620	
o-Dimethoxybenzene	87 39	6329	(686) (25°)	1-Ethoxynaphthalene	119 9	(696)	(738) (20°)
m-Dimethoxybenzene	87 21	6316	(682) (0°)	2-Ethoxynaphthalene	119 2	(692)	(734) (25°)
p-Dimethoxybenzene	86 65	6275	(661) (55°)	Ethyl acetate	54 10	614	554 (20°)
o-(2,5-Dimethoxybenzoyl)-benzoic acid	161 0	(562)		Ethyl acetoacetate	71 67	5506	(565) (20°)
Dimethoxymethane	(47 3)	621	(532)	Ethyl acetophenone	95 5	(644)	(639) (16°)
Dimethylacetophenone	96 8	(653)	(645) (16°)	Ethyl alcohol	33 60	725	575 (20°)
Dimethylallylacetophenone	122 4	(650)	(635) (16°)	Thiallyl acetophenone	122 5	(651)	(634) (16°)
Dimethylaniline	89 66	(740)		Fthyl amylpropionate	(112 7)	670	
2,2-Dimethylbutane	76 24	8848	5744 (20°)	Fthylamine	89 30	(737)	(709)
2,3-Dimethylbutane	76 22	8845	5853 (20°)	9-Ethyl anthracene	153 0	(741)	(771) (99°)
2,3-Dimethyl-2-butene	65 9	(783)	(557)	Ethylbenzene	77 20	7272	6341 (20°)
Dimethylcyclohexanone	(84 8)	672		Ethyl benzoate	93 32	6211	(648) (25°)
1,2 and 1 3 Dimethylcyclopentanes	81 31	8281	6224 (20°)	Fthyl benzoate	(115 3)	600	(673) (20°)
2,5-Dimethyl-2,5-dibromo-3-hexine	(135 6)	506		Fthyl benzoylacetate	(116 3)	578	
Dimethyl diethylketo tetrahydro-furfurane	(116 2)	753		Fthyl benzyldeneacyanoacetate	(154 5)	6172	(663) (20°)
2,5-Dimethyl 1-ethylpyrrole	94 61	768 (20°)		Fthyl benzylmalonate	54 70	502	719 (20°)
2,5-Dimethyl 3-ethylpyrrole	93 87	762 (20°)		Fthyl bromide	(82 8)	496	(747) (20°)
2,5-Dimethylfuran	66 37	687 (20°)	(620) (18°)	Fthyl bromoacetate	(121 4)	652	
Dimethyl furazan	57 27	584		Ethyl butylmalonate	139 3	644	(629) (20°)
2,5-Dimethyl-4-heptene	100 6	(797)		Ethyl n-butyrate	(77 7)	6693	585 (25°)
2,4-Dimethyl-2,4-hexadiene	(78 7)	714		Fthyl n-butyrate	78 32	6743	(583) (25°)
2,3-Dimethylhexane	98 77	8648	6164 (20°)	Ethyl chloroacetate	(72 3)	590	(684) (20°)
2,5-Dimethylhexane	98 15	8593	5969 (20°)	Fthyl cinnamate	(107 5)	610	(640) (20°)
3,4-Dimethylhexane	99 06	8673	6240 (20°)	Fthyl iso-cyanate	(45 6)	642	(582) (16°)
2,6-Dimethyl-4-hexanol	116 9	812		Ethyl cyanoacetate	(67 3)	595	(632) (20°)
2,5-Dimethyl 3 hexine-2,5-diol	(103 0)	734		Fthylcyclohexane	91 09	8118	6324 (20°)
Dimethyl isoxazole	59 7	(615)		Ethyl diallylacetophenone	147 4	(646)	(636) (16°)
Dimethylketo tetrahydrofurfurane	(68 5)	600		Ethyl dibromocinnamate	174 5	519	
Dimethyl malonate	69 69	5277	(609) (20°)	Fthyl dichloroacetate	85 2	(543)	(696) (20°)
1,6-Dimethylnaphthalene	113 3	(725)		Fthyl diethylacetate	(117 9)	6328	(615) (20°)
2,4-Dimethylnonane	134 68	(862)	(636) (20°)	Fthyl diethylmalonate	(140 4)	6492	(641) (20°)
3,4-Dimethylnonane	134 70	(862)	(647) (20°)	Fthyl dithiolacetate	(71 0)	5904 (27 4°)	
4,5-Dimethylnonane	134 52	(861)	(647) (20°)	Fthylene	12 0	(428)	(242) (-102°)
2,6-Dimethyl-2,6,8-nonatriene	(108 8)	724		Ethylene	15 30	546 (32°)	(309) (-102°)
Dimethyl-2,4-nonatriene	(148 8)	990		Ethylene bromide	78 80	419	915 (20°)
2,6-Dimethyloctane	122 54	(861)	(627) (20°)	Ethylene chloride	59 62	602 (32°)	(757) (20°)
3,4-Dimethylloxadiazole	57 17	583		Ethylene diamine	46 26	771 (32°)	(686) (20°)
Dimethyl oxalate	(55 7)	472	(542) (54°)	Ethylene iodide	104 7	371 (32°)	(791) (20°)
Dimethyl oxamide	(63 2)	544		Ethylene oxide	30 7	(697)	(618) (7°)
2,2-Dimethylpentane	86 97	8680	5849 (20°)	Fthyl ether	55 10	743	534 (20°)
2,3-Dimethylpentane	87 51	8733	6070 (20°)	Ethyl ethylacetate	93 9	5937	(582) (20°)
2,4-Dimethylpentane	87 48	8732	5876 (20°)	Ethyl ethylbutylmalonate	(163 3)	6683	(650) (20°)
2,2-Dimethylpropane	63 1	(875)	(536) (0°)	Fthyl ethylpropylmalonate	(152 4)	6619	(648) (20°)
2,5-Dimethyl-3-propyl-pyrrole	106 07	773 (20°)		Ethyl formate	43 00	580	531 (20°)
2,4-Dimethylpyrrole	69 64	732 (20°)	(679) (14°)	Ethyl hexylpropionate	129 9	713	
				Ethyl hydroxylamine	(43 0)	704	
				Ethylidene chloride	(57 4)	580	(681) (20°)
				Ethyl iodide	(69 7)	4470 (17 5°)	(864) (20°)
				Ethyl iodoacetate	(97 6)	456	(829) (13°)
				Ethyl lactate	(72 6)	615	(633) (25°)

DIAMAGNETIC SUSCEPTIBILITIES OF ORGANIC COMPOUNDS (Continued)

Compound	$-\chi_M \times 10^6$	$-\chi \times 10^6$	$-K \times 10^6$	Compound	$-\chi_M \times 10^6$	$-\chi \times 10^6$	$-K \times 10^6$
Ethyl methylacetoacetate	(81.9)	5684	(569) (20°)	Indene (natural)	84.79	(730)	(723) (25°)
Ethyl methyl ketoxime	57.3 ₂	658 ₆	(530) (20°)	Indene (synthetic)	80.89	(696)	(690) (25°)
Ethyl-1-methyl-2-oxocyclohexane-carboxylate	112.1	(608)		Indole	85.0	(726)	
Ethyl methylphenylmalonate	(153.2)	6121	(658) (20°)	Iodobenzene	92.00	451	826 (20°)
Ethyl nitrophenylpropionate	114.6	523		Iodoform (in sol'n)	117.1	2974 (20°)	(1192) (17°)
Ethyl oxamate	62.0	(529)	(427) (19°)	1 Iodo-2 phenylacetylene	(110.1)	483	
Ethyl perfluor-n-butylate	103.5	(427)		o-Iodotoluene	(112.2)	5145 (30°)	(874) (20°)
Ethyl phenylacetate	104.27	(635)	(656) (20°)	m-Iodotoluene	(112.3)	5152 (30°)	(875) (20°)
Ethyl phenylmalonate	(142.2)	6017	(659) (20°)	p-Iodotoluene	101.31	(465)	(780) (40°)
Ethyl phenylpropionate	(104.2)	598	(636) (13°)	Leucine	84.9	(647)	
Ethyl phosphate	(98.2)	539	(576) (25°)	iso-Leucine	84.9	(647)	
Ethyl propionate	(66.5)	6514	(584) (15°)	Maleic acid	49.71	(428)	(681) (20°)
Ethyl propylacetoacetate	(105.7)	6135	(593) (20°)	Maleic anhydride	(35.8)	365	(341) (20°)
Ethyl-n-propyl ketone	69.03	689 ₁	(560) (22°)	Malonic acid	(46.3)	4453	(726) (15°)
Ethyl succinimide	(72.0)	566		Mannitol	111.20	610	(908) (20°)
Ethyl sulfine	(67.0)	631		Mannose	102.90	571	(879)
Ethyl sulfite	(75.4)	546	(604) (0°)	Mesitylene	92.32	7682 (20°)	(665) (20°)
Ethylsulfone ethyl ether	(81.8)	592		Methane	12.2	(765)	
Ethyl thiocyanate	(55.7)	6392 (27.4°)	(637) (25°)	Methone	91.0	(610)	
Ethyl isothiocyanate	(59.0)	6772 (27.4°)	(680) (15°)	p-Methoxyazobenzene	(118.9)	560	
Ethyl thioacetate	(62.7)	6019 (27.4°)	(586) (25°)	o-Methoxybenzaldehyde	76.0	(558)	(632) (20°)
Ethyl thionacetate	(63.5)	6098 (27.4°)	(586) (25°)	p-Methoxybenzaldehyde	78.0	(572)	(642) (20°)
Ethyl tribromoacetate	(119.5)	368	(821) (20°)	o-Methoxybenzyl alcohol	87.9	637	(664) (25°)
Ethyl trichloroacetate	(99.6)	520	(719) (20°)	1-Methoxynaphthalene	107.6	(680)	(741) (14°)
N-Ethyl urea	55.5	(630)	(764) (18°)	2-Methoxynaphthalene	107.6	(680)	
Ethyl iso valerate	(91.1)	700	(607) (20°)	1 (o-Methoxyphenylazo)-2-naphthol	163.6	(588)	
Eucalyptol	(116.3)	754	(699) (20°)	Methoxysalgenin acetate	110.3	613	
Eugenol and iso-eugenol	(102.1)	622	(663) (20°)	Methyl acetate	42.60	575	537 (20°)
Flavanthron	241.0	590		Methyl acetoacetate	59.60	513 ₂	(553) (20°)
Fluorene	110.5	655		Methylacetylacetone	(65.0)	569	
Fluorenone	99.4	552	(623) (100°)	Methyl alcohol	21.40	668	530 (20°)
Fluorobenzene	(58.4)	608	(623) (20°)	Methylallylacetone	111.9	(1330)	
Fluorobromoacetic acid	(59.5)	379		Methylamine	(27.0)	870	(608) (-11°)
Fluorodichloromethane	48.8	474	(676) (0°)	N Methylamine	82.74	(773)	(762) (20°)
p-Fluorophenetole	(88.0)	628		9-Methylanthracene	146.5	762	(812) (99°)
Fluoro trichloroethylene	72.5	485	(742) (25°)	Methyl benzoate	81.59	599 ₂	(651) (25°)
Fluorotrchloromethane	58.7	427	(638) (17°)	Methyl-o-benzoylbenzoate	139.4	(580)	(690) (19°)
Formaldehyde	(18.6)	62	(51) (-20°)	Methyl benzylamine	(132.2)	670	
Formamide	(21.9)	486	(551) (20°)	Methyl bromide	42.8	451	(1044) (0°)
Formic acid	19.90	432	527 (20°)	2-Methylbutane	64.40	8925	5531 (20°)
β -Formylpropionic acid	55.3	(542)		2-Methyl-2-butene	54.14	(772)	(516) (13°)
Fructose	102.60	570		Methyl butyl ketone	(69.1)	690	(563) (15°)
Fulvene (Benzene χ_M measured to be 49)	42.9	(549)	(452) (20°)	Methyl iso-butyl ketone	(69.3)	692	(554) (20°)
Fulvene ($\chi \frac{54.8}{49}$)	48.0	(614)	(505) (20°)	Methyl tert-butyl ketone	(70.4)	703	(562) (16°)
Fumaric acid	49.11	(423)	(692) (20°)	p-Methyl-o-tert butylphenol	120.3	(732)	
Furan	43.09	633 (20°)	(598) (15°)	Methyl butyrate	(66.4)	6498	(588) (16°)
Furfural	47.1	(490)	(568) (20°)	o-Methylcarbamilide	154.0	(681)	
Galactose	103.00	572		Methyl chloride	(32.0)	633	
Gallic acid	90.0	(529)	(896) (4°)	Methyl chloroacetate	58.1	(535)	(661) (20°)
Geraniol formate	(119.9)	658	(610) (20°)	Methylcholanthrene	(182)	68 ± 0.4	
Glucose	102.60	570		3-Methylcholanthrene	194.0	(723)	
D-Glucose	101.5	(563)	(869) (25°)	Methylcyclohexane	78.91	8038	6181 (20°)
Glutamic acid	78.5	(533)		2-Methylcyclohexanone	(74.0)	660	(610) (18°)
Glycerol	57.06	619	779 (20°)	3-Methylcyclohexanone	(74.8)	667	(610) (20°)
Glycine	40.3	(537)	(846) (50°)	4-Methylcyclohexanone	(63.5)	566	(516) (24°)
Glycol	38.80	624	698 (20°)	Methylcyclopentane	70.17	8538	6245 (20°)
Guaiacol	(79.2)	638	(720) (21°)	4-Methyl-2,6-di tert-butylphenol	167.6	(761)	
Helianthron	189.9	497		Methyl dichloroacetate	73.1	(511)	
1,2-Heptadiene	73.5	(764)		Methyldiphenoxyphosphine oxide	(152.9)	616	
2,3-Heptadiene	72.1	(749)		Methyldiphenyltriazine	(155.1)	627	
Heptaldehyde	81.02	709 ₆	(603) (20°)	Methylene bromide	65.10	375	935 (20°)
n-Heptane	85.24	8507	5817 (20°)	Methylene chloride	(46.6)	549	(733) (20°)
4-Heptanol	91.5	789	(647) (20°)	Methylene iodide	93.10	348	1156 (20°)
n-Heptanoic acid	88.60	680	626 (20°)	Methylene succinic acid	57.57	(443)	(723)
n-Heptyl amine	93.1	(808)	(628) (20°)	Methyl ether	26.3	571	
n-Heptyl benzene	134.41	7625	6528 (20°)	Methylethylallylacetophenone	133.3	(659)	(643) (16°)
Heptyl cyclohexane	147.40	8084	6559 (20°)	Methyl ethyl ketone	45.58	632	(509) (20°)
n-Heptylic acid	89.74	6900	(630) (25°)	Methyl formate	(32.0)	5327	(519) (20°)
1-Heptyne	77.0	(801)	(584) (25°)	Methylfumaric acid	56.98	(438)	(642)
2-Heptyne	79.5	(826)	(615) (25°)	3-Methylheptane	97.99	8580	6056 (20°)
Hexabromoethane	(148.0)	294	(1124) (20°)	2-Methyl-4 heptene	88.0	(784)	
Hexachlorobenzene	(147.5)	518	(1059) (24°)	5-Methyl-1,2 hexadiene	73.6	(765)	(553) (19°)
Hexachloroethane	(112.7)	476	(995) (20°)	2-Methylhexane	86.24	8607	5841 (20°)
Hexachlorohexatrone	(145.0)	433		Methyl hexyl ketone	(93.3)	728	(596) (20°)
n-Hexadecane	187.63	8286	6421 (20°)	Methyl-m-hydroxybenzoate	88.4	(581)	
1,5-Hexadiene	(55.1)	671	(462) (20°)	Methyl p-hydroxybenzoate	88.7	(583)	
2,3-Hexadiene	60.9	(741)		Methyl iodide	(57.2)	403	(918) (20°)
n-Hexaldehyde	69.40	692 ₆		Methylmaleic acid	57.84	(446)	(721)
2,2,4,7,9,9-Hexamethyldecane	191.52	8458	6596 (20°)	9-Methyl-10 methoxyanthracene	158.1	(711)	
Hexamethyl disloxane	118.9	7324		Methyl-o-methoxybenzoate	95.6	(575)	(665) (19°)
Hexamethylene glycol	84.30	715		Methyl-p-methoxybenzoate	98.6	(593)	
n-Hexane	(74.6)	8634 (27.4°)	(565)	Methyl- α -methoxy isobutyrate	(81.9)	620	
Hexene	65.7	(781)		1-Methylnaphthalene	102.8	(723)	(741) (14°)
Hexestrol	(165)	61 ± 0.2		2-Methylnaphthalene	102.6	(722)	(743) (20°)
n-Hexyl alcohol	79.20	774	637 (20°)	4-Methylnonane	121.39	(853)	(625) (20°)
n-Hexyl benzene	124.23 (20°)	(767)	(658) (20°)	5-Methyl-5-nonene	111.6	(796)	
n-Hexyl methyl ketone	91.4	713 ₁	(583)	4-Methyloctane	109.63	(855)	(618) (20°)
n-Hexyl methyl ketoxime	102.58	716 ₂	(634) (20°)	Methylol urea	48.3	(493)	
Hexylpropionamide	(103.7)	677		2 Methylpentane	75.26	8734	5705 (20°)
Hydrindene	(78.5)	664	(639) (16°)	3-Methylpentane	75.52	8764	5823 (20°)
Hydroquinone	64.63	587	(797) (20°)	4-Methyl-2-pentanol	80.4	788	(641) (20°)
Hydroxyazobenzene	(99.7)	503		Methyl perfluor-n-butylate	92.5	(406)	
p-Hydroxybenzaldehyde	66.8	(547)	(618) (130°)	Methyl phenylacetate	92.73	(618)	(645) (16°)
4-Hydroxy-2-butanone	48.5	55	(573) (14°)	Methyl phenylpropionate	95.6	597	
				2-Methylpropene	44.4	(791)	
				Methyl propionate	(55.0)	6240	(571) (20°)

DIAMAGNETIC SUSCEPTIBILITIES OF ORGANIC COMPOUNDS (Continued)

Compound	$-X_M \times 10^6$	$-X \times 10^6$	$-K \times 10^6$	Compound	$-X_M \times 10^6$	$-X \times 10^6$	$-K \times 10^6$
Methyl n-propyl ketone	57 41	666i	(541) (15°)	Pentachloroethane	(99 1)	490	(819) (25°)
Methyl-iso-propyl ketone	58 45	679i	(545) (20°)	Pentachlorohexadione	(129 5)	452	
1 Methylpyrrole	58 56	722 (20°)	(664) (10°)	2 3 Pentadiene	49 1	(721)	(501) (20°)
2-Methylpyrrole	60 10	741 (20°)	(700)	n-Pentane	63 05	8739	5472 (20°)
Methyl salicylate	86 30	567	668 (20°)	2 4 Pentanediol	70 4	677	
Methyl silicone	(127 7)	730		Perfluoroacetic acid	43 3	(380)	
α -Methyl styrene	(80 1)	678	(620) (20°)	Perfluoro n-butyric acid	81 0	(378)	
2-Methylthiazole	59 56	601 (20°)		Perfluorobutyric anhydride	149 4	(387)	
2-Methylthiophene	66 35	676 (20°)	(689) (20°)	Perfluorooctane oxide	157 6	(379)	
Methyl trichloroacetate	84 2	(475)	(707) (19°)	Perfluoropropionic acid	61 0	(372)	
N-Methyl urea	44 6	(602)	(725)	Perhydroanthracene	146 01	7592	7178 (20°)
Morpholine	55 0	(631)	(631)	Perylene	166 8	662	
Myleran	169 7	69	(834) (4°)	Phenanthrene	(127 9)	718	(763) (100°)
Myristic acid	176 0	(771)	(661) (60°)	Phenanthrenequinone	104 5	502	(698)
Naphthalaldehydic acid	117 6	(588)		Phenanthrenonitrile	139 0	(685)	
Naphthalene	(91 9)	717	(821) (20°)	o-Phenetidine	(101 7)	741 (25°)	
Naphthalene picrate	185 9	(523)		p-Phenetidine	(96 8)	706 (25°)	(749) (15°)
2-Naphthalenesulfonylamme	127 6	(616)		Phenetole	(84 5)	692	(689) (20°)
2-Naphthalenesulfonyl chloride	121 91	(538)		Phenol	60 21	(640)	(675) (45°)
meso-Naphthodianthrene	214 6	612		Phenoethazine	114 8	(576)	
meso-Naphthodianthrene	221 8	583		Phenylacetaldehyde	72 01	599i	(614) (20°)
1-Naphthol	98 2	681	(834) (4°)	Phenyl acetate	82 04	(603)	(647) (25°)
2-Naphthol	98 25	673	(819) (4°)	Phenylacetic acid	82 72	(608)	(657) (80°)
α -Naphthomtrile	103 3	(682)	(829) (4°)	Phenylacetylene	72 01	(705)	(655) (20°)
β -Naphthomtrile	101 0	(674)	(753) (5°)	1-Phenylazo-2 naphthol	137 6	(554)	
α -Naphthoquinone	73 5	(659)	(721) (60°)	2-Phenylbenzofuran	130 5	(672)	
β -Naphthoquinone	67 9	(429)	(661)	1 Phenyl 4-benzoyl 1,3 butadiene	(140 3)	599	
N-1-Naphthylacetamide	117 8	(636)		Phenylbutadiene	(85 7)	658	
N-2-Naphthylacetamide	117 8	(636)		4 Phenyl 1-butene	93 49	(7077)	(6239) (20°)
1-Naphthylamine	98 8	690	757 (54°)	Phenylbutyl acetate	134 5	653	
2-Naphthylamine	98 00	(684)	(726) (98°)	Phenyl n-butyrate	105 46	(643)	
1-Naphthylamine hydrochloride	(127 6)	710		Phenyl iso-cyanate	(72 7)	610	(699) (20°)
Nicotene	113 328	(699)	(705) (20°)	o-Phenylenediamme	71 98	6662	
o-Nitroaniline	66 47	(481)	(694) (15°)	m-Phenylenediamme	70 53	6529	(723) (58°)
m-Nitroaniline	70 09	(507)	(725) (20°)	p-Phenylenediam me	70 28	6503	
p-Nitroaniline	66 43	(481)	(691) (14°)	Phenyl ether	(108 1)	635	(681) (20°)
o-Nitrobenzaldehyde	68 23	4517		Phenylethyl sulfide	(94 4)	6826 (27 4°)	
m-Nitrobenzaldehyde	68 55	4538		Phenylfluoroform	(77 3)	529	
p-Nitrobenzaldehyde	66 57	4407	(507) (0°)	Phenylhydrazine	67 82	(627)	(688) (23°)
Nitrobenzene	61 80	502	604 (20°)	Phenylhydroxylamine	(68 2)	625	
Nitrobenzene diazo cyanide	59 22	(336)		Phenyl mercaptan	(70 8)	6425 (27 4°)	(693) (20°)
o-Nitrobenzoic acid	76 11	4556	(718) (4°)	1-Phenyl 2 Methylbutane	113 53	(766)	(660) (20°)
m-Nitrobenzoic acid	80 22	4802	(717) (4°)	Phenylmethyl sulfide	(83 2)	6095 (27 4°)	
p-Nitrobenzoic acid	78 81	4718	(731) (32°)	Phenyl isopropylamide	(83 3)	574	
o-Nitrobromobenzene	87 3	(432)	(700) (80°)	Phenyl propionate	93 79	(625)	(654) (25°)
m-Nitrobromobenzene	89 5	(443)	(755) (20°)	Phenylsulfone	(129 0)	591	(740) (20°)
p-Nitrobromobenzene	89 6	(444)	(859) (22°)	Phenyl thiocyanate	(81 5)	6027 (27 4°)	(677) (24°)
m-Nitro carbanilide	148 1	(576)		Phenyl isothiocyanate	(86 0)	6365 (27 4°)	(719) (24°)
Nitroethane	(35 4)	472	(497) (20°)	1-Phenyl 4,6 6-trimethylheptane	173 90	(796)	(682) (20°)
Nitromethane	21 1	3457	(391) (25°)	N-Phenyl urea	82 1	(603)	(785)
1-Nitronaphthalene	98 47	(569)		Phloroglucinol	(73 4)	582	
o-Nitrophenol	73 3	527 (24°)	(696) (62°)	Phthalamide	(91 3)	556	
m-Nitrophenol	70 8	.509 (25°)	(873) (20°)	Phthalic acid	83 61	5035	(802) (20°)
p-Nitrophenol	69 5	500 (22°)	(756)	iso Phthalic acid	84 64	5097	
1-(m-Nitrophenylazo)-2-naphthol	142 0	(484)	(740)	tere-Phthalic acid	83 51	5029	(759)
1-(p-Nitrophenylazo)-2-naphthol	141 7	(483)		Phthalic anhydride	67 31	(454)	(694) (4°)
Nitrophenylfluoroform	(84 1)	440		Phthalimide	(78 4)	533	
2-Nitropropane	45 73	5135	(509) (20°)	Picric acid	84 38	(368)	(649)
Nitrosobenzene	59 1	(552)		Piperazine	56 8	(659)	
N-Nitrosodiethylamine	59 3	(580)	(546) (20°)	Piperidine	64 2	(754)	(650) (20°)
p-Nitrosodiethylaniline	92 6	(520)	(644) (15°)	Propane	40 5	(919)	(538) (-45°)
p-Nitrosodimethylaniline	73 3	(488)		Propene	31 5	(749)	(456) (-47°)
N-Nitrosodiphenylamine	110 7	(558)		Propionaldehyde	34 32	591i	(477) (20°)
1-Nitroso-2-naphthol	83 9	(485)		Propionic acid	43 50	586	582 (20°)
2-Nitroso-1-naphthol	82 7	(478)		Propionitrile	38 5	(699)	(547) (21°)
4-Nitroso-1-naphthol	91 8	(530)		Propionylphenylacetylene	(95 1)	601	
m-Nitrosnitrobenzene	66 0	(433)		Propiophenone	83 73	624i	(631) (20°)
p-Nitrosnitrobenzene	65 8	(433)		n-Propyl acetate	65 91	645i (25°)	(569) (25°)
p-Nitrosophenol	50 7	(412)		iso Propyl acetate	67 04	656i	(566) (25°)
Nitrosopiperidine	(63 4)	555	(590) (20°)	n-Propyl alcohol	45 176 (20°)	(7518)	(6047) (20°)
p-Nitrosotoluene	70 4	(581)		iso-Propyl alcohol	45 794 (20°)	(7621)	(5985) (20°)
o-Nitrotoluene	72 28	5272	(613) (20°)	9-Propylanthracene	164 0	(744)	
m-Nitrotoluene	72 71	5304	(614) (20°)	n-Propylbenzene	89 24	(742)	(640) (20°)
p-Nitrotoluene (in sol'n)	72 06	5257	(614) (20°)	n-Propyl benzoate	105 00	(640)	(646) (25°)
n-Nonane	108 13	8431	(676) (20°)	n-Propyl bromide	(65 6)	533	(721) (20°)
1,2-Octadiene	83 6	(759)	6057 (20°)	iso-Propyl bromide	(65 1)	529	(643) (20°)
n-Octane	96 63	8460	5949 (20°)	Propyl butyrate	(89 4)	6867	(604) (15°)
Octanonoxime	(102 7)	717		propm-Propyl chloride	56 10	715	633 (20°)
Octyl alcohol	102 65	7766 (20°)		iso-Propylcyclohexane	102 65	8131	6528 (20°)
Octyl chloride	(114 9)	773	(640) (20°)	Propylenediamme	(58 1)	784	(688) (15°)
Octylcyclohexane	158 09	8051	(676) (20°)	Propylene oxide	42 5	(732)	(629) (0°)
Octylene	(89 5)	798	(678) (20°)	Propyl formate	(55 0)	6218	(563) (20°)
Octylene bromide	(150 4)	553	(576) (17°)	Propyl iodide	(136 8)	697	
n-Octyl mercaptan	(115 1)	7866 (27 4°)		Propyl isothiocyanate	(84 3)	4958 (30°)	(864) (20°)
Oenanthyldiene chloride	(116 5)	689		Propyl propionate (extrap)	(77 95)	6711	(593) (20°)
Oleic acid	208 5	(738)	(661) (18°)	Propyl sulfide	(92 1)	7787 (27 4°)	(634) (17°)
Opionic acid	111 5	(530)		N-Propyl urea	67 4	(660)	
Ovalene	353 8	888		Pseudocumene	(101 6)	845 (20°)	(740) (20°)
Oxalic acid (anh)	33 8	(375)		Pyramdone	149 0	(645)	
Oxalic acid	60 05	(4763)	(787)	Pyranthrene	266 9	709	
Oxamide	(39 0)	443	(738)	Pyranthrone	250 3	616	(484) (61°)
Palmitic acid	198 6	(775)	(661) (62°)	Pyrazine	37 6	(469)	(933) (0°)
Paraldehyde	(86 2)	652	(648) (20°)	Pyrene	147 9	731	(611) (20°)
Pentabromophenol	(194 0)	397		Pyridine	49 21	(622)	(857) (15°)
Pentacene	(205 4)	738		Pyrocatechol	68 76	6248	(688) (20°)
				Pyrolole	47 6	(709)	

DIAMAGNETIC SUSCEPTIBILITIES OF ORGANIC COMPOUNDS (Continued)

Compound	$-X_M \times 10^6$	$-X \times 10^6$	$-K \times 10^6$	Compound	$-X_M \times 10^6$	$-X \times 10^6$	$-K \times 10^6$
Pyrrolidine	54.8	(771)	(657) (23°)	Triaminophosphine oxide	(201.7)	624	
Quinoline	86.0	(666)	(729) (20°)	1,2,3-Tribromopropane	(117.9)	420	(1023) (23°)
Quinone	38.4	(355)	(468) (20°)	Tri-iso-butylamine	(156.8)	846	(646) (25°)
Quinonoxime	(50.4)	409		Trichloroacetic acid (in sol n)	73.0	(44)	(723) (46°)
Resorcinol	67.26	6112	(785) (15°)	Trichlorobenzene	(106.5)	587	
Rhamnose	99.20	605	(890) (20°)	Trichloro-tert-butyl alcohol (in sol n)	98.01	552	
Safrol and iso-Safrol	(97.5)	601	(66) (20°)	Trichloroethylene	65.8	501	(734) (20°)
Salicylaldehyde	64.4	(527)	(615) (20°)	Trichloronitromethane	(75.3)	458	(756) (20°)
Salicylic acid	72.23	523	(751) (20°)	Triethylamine	81.4	(804)	(586) (20°)
Saligenin	76.9	620	(720) (25°)	Triethyl citrate	(161.9)	586	(666) (20°)
Salol	(123.2)	575	678 (45°)	Triethyl phosphate	(125.3)	688	(735) (20°)
Salvarsan dihydrochloride	(246.1)	518		Triethylphosphine	(90.0)	762	(610) (15°)
Selenophene	66.82	510		Triethylphosphine oxide	(91.6)	683	
iso-Selenophene	110-111	84-85		Triethyl phosphite	(104.8)	631	(611) (20°)
trans-Selenophene	70-77	53 59		Triethyl triazetricarbonate	(164.1)	552	
Sorbitol	107.80	592		Trifluorocresol	(83.8)	517	
Stearic acid	220.8	(776)	(657) (60°)	Tri-n heptylamine	251.3	(806)	
Stilbene	(120.0)	666	(646) (125°)	Tri-n hexylamine	221.7	(823)	
Stilbestrol	(130)	62 63		Trimethylacetophenone	108.2	(667)	(648) (16°)
Styrene	(68.2)	655	(594) (20°)	2,2,3-Trimethylbutane	88.36	8818	6086 (20°)
Succinic acid	(57.9)	4902	(767) (15°)	2,2,3-Trimethylpentane	99.86	8743	6261 (20°)
Succinic anhydride	(47.5)	475	(524)	2,2,4-Trimethylpentane	98.34	8610	5958 (20°)
Succinimide	(47.3)	477	(674) (16°)	2,3,5-Trimethylpyrrole	82.31	754 (20°)	
Sulfamide	44.4	(462)	(832)	1,3,5-Trinitrobenzene	74.55	(350)	(591) (20°)
p-Sulfanilamide	80.15	(465)		Triperfluorobutylamine	253.0	(377)	
Terpineol	111.9	(725)	(678) (room temp)	Triphenoxyarsine	(195.2)	551	
Tetraphenylmonosilane	266.2	(678)		Triphenylarsine	(177.0)	578	
1,1,2,2-Tetrabromoethane	(123.4)	357	(1058) (20°)	Triphenylarsine dihydroxide	(270.5)	795	
Tetrabromoethylene	(114.8)	334		Triphenylarsine oxide	(199.1)	618	
Tetracene	(168.0)	736		Triphenylbismuthine	(196.8)	447	(708) (20°)
1,1,2,2-Tetrachloroethane	(89.8)	535	(856) (20°)	Triphenylbismuthine dinitrate	(254.5)	451	
Tetrachloroethylene	81.6	492	(802) (15°)	Triphenylcarbinol	(175.7)	675	(802) (20°)
Tetrahydroquinoline	(89.0)	668	(715) (4°)	Triphenylmethane	(165.6)	678	686 (100°)
Tetraiodoethylene	(164.3)	309	(922) (20°)	Triphenylphosphine	(166.8)	636	(759)
Tetraiodopyrrole	(188.9)	331		Triphenyl phosphite	(183.7)	592	(701) (18°)
Tetramethylketotetrahydrofuran	(104.7)	736		Triphenylstibine	(182.2)	516	
Tetranitromethane	43.02	2195	(360) (20°)	Triphenylstibine dihydroxide	(238.5)	616	
Tetraphenylbutadiene	228.0	(636)		N,N',N' Triphenyl urea	176.5	(613)	
Tetraphenyldecapentaene	280.8	(643)		Triquinoyl	(133.0)	426	
Tetraphenylhexatriene	246.4	(641)		Topolone	61	50	
Tetraphenyltetratetraene	264.1	(643)		Tryptophan	132.0	(646)	
Tetraphenylrhubene	344.0	(646)		Tyrosine	105.3	(581)	
Tetra-p-tolylmonosilane	276.4	(704)		Undecane	131.84	(8435)	(6247) (20°)
Tetrolic acetal	(97.8)	688		Urea	33.4	(556)	(742) (20°)
Tetrolic acid	(52.5)	525		Urethan	(57)	64	(63) (21°)
Thaoumerin	93.6	577		iso-Valeraldehyde	(57.5)	668	(536) (17°)
Thiazole	50.55	595 (20°)	(714) (17°)	n-Valeric acid	66.85	6548	(617) (20°)
Thioarbuturic acid	72.9	(506)		iso-Valeric acid	(67.7)	663	(621) (15°)
Thiophene	57.38	682 (20°)	(726) (20°)	Valerylphenylacetylene	(119.0)	639	
Tolane	(118.9)	607	(644) (100°)	Valne	74.3	(634)	
Toluene	66.11	7176	6179 (20°)	Violanthrene	273.5	641	
o-Toluidine	76.0	710 (24°)	(709) (20°)	Violanthrone	204.8	449	
m-Toluidine	74.6	697 (25°)	(689) (20°)	iso-Violanthrone	215.9	473	
p-Toluidine	72.1	673 (25°)	(704) (20°)	Water	(13.00)	7218 (20°)	(7205) (20°)
α -Tolunitrile	76.87	(656)	(666) (18°)	Water (value usually used as standard)	(12.97)	720 (20°)	(719) (20°)
1-(o-Tolylazo)-2-naphthol	148.7	(567)		Xanthone	(108.1)	551	
1-(p-Tolylazo)-2-naphthol	157.6	(601)		o-Xylene	77.78	7327	6440 (20°)
Triallylacetophenone	152.5	(634)		m-Xylene	76.56	7212	6235 (20°)
Tri-iso-amyamine	192	845	(647) (25°)	p-Xylene	76.78	7232	6226 (20°)
				Xylose	84.80	565	(862) (20°)

FOUR-PLACE LOGARITHMS

N											Proportional Parts								
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
10	0000	0043	0086	0128	0170	0212	0253	0294	0334	0374	*4	8	12	17	21	25	29	33	37
11	0414	0453	0492	0531	0569	0607	0645	0682	0719	0755	4	8	11	15	19	23	26	30	34
12	0792	0828	0864	0899	0934	0969	1004	1038	1072	1106	3	7	10	14	17	21	24	28	31
13	1139	1173	1206	1239	1271	1303	1335	1367	1399	1430	3	6	10	13	16	19	23	26	29
14	1461	1492	1523	1553	1584	1614	1644	1673	1703	1732	3	6	9	12	15	18	21	24	27
15	1761	1790	1818	1847	1875	1903	1931	1959	1987	2014	*3	6	8	11	14	17	20	22	25
16	2041	2068	2095	2122	2148	2175	2201	2227	2253	2279	3	5	8	11	13	16	18	21	24
17	2304	2330	2355	2380	2405	2430	2455	2480	2504	2529	2	5	7	10	12	15	17	20	22
18	2553	2577	2601	2625	2648	2672	2695	2718	2742	2765	2	5	7	9	12	14	16	19	21
19	2788	2810	2833	2856	2878	2900	2923	2945	2967	2989	2	4	7	9	11	13	16	18	20
20	3010	3032	3054	3075	3096	3118	3139	3160	3181	3201	2	4	6	8	11	13	15	17	19
21	3222	3243	3263	3284	3304	3324	3345	3365	3385	3404	2	4	6	8	10	12	14	16	18
22	3424	3444	3464	3483	3502	3522	3541	3560	3579	3598	2	4	6	8	10	12	14	15	17
23	3617	3636	3655	3674	3692	3711	3729	3747	3766	3784	2	4	6	7	9	11	13	15	17
24	3802	3820	3838	3856	3874	3892	3909	3927	3945	3962	2	4	5	7	9	11	12	14	16
25	3979	3997	4014	4031	4048	4065	4082	4099	4116	4133	2	3	5	7	9	10	12	14	15
26	4150	4166	4183	4200	4216	4232	4249	4265	4281	4298	2	3	5	7	8	10	11	13	15
27	4314	4330	4346	4362	4378	4393	4409	4425	4440	4456	2	3	5	6	8	9	11	13	14
28	4472	4487	4502	4518	4533	4548	4564	4579	4594	4609	2	3	5	6	8	9	11	12	14
29	4624	4639	4654	4669	4683	4698	4713	4728	4742	4757	1	3	4	6	7	9	10	12	13
30	4771	4786	4800	4814	4829	4843	4857	4871	4886	4900	1	3	4	6	7	9	10	11	13
31	4914	4928	4942	4955	4969	4983	4997	5011	5024	5038	1	3	4	6	7	8	10	11	12
32	5051	5065	5079	5092	5105	5119	5132	5145	5159	5172	1	3	4	5	7	8	9	11	12
33	5185	5198	5211	5224	5237	5250	5263	5276	5289	5302	1	3	4	5	6	8	9	10	12
34	5315	5328	5340	5353	5366	5378	5391	5403	5416	5428	1	3	4	5	6	8	9	10	11
35	5441	5453	5465	5478	5490	5502	5514	5527	5539	5551	1	2	4	5	6	7	9	10	11
36	5563	5575	5587	5599	5611	5623	5635	5647	5658	5670	1	2	4	5	6	7	8	10	11
37	5682	5694	5705	5717	5729	5740	5752	5763	5775	5786	1	2	3	5	6	7	8	9	10
38	5798	5809	5821	5832	5843	5855	5866	5877	5888	5899	1	2	3	5	6	7	8	9	10
39	5911	5922	5933	5944	5955	5966	5977	5988	5999	6010	1	2	3	4	5	7	8	9	10
40	6021	6031	6042	6053	6064	6075	6085	6096	6107	6117	1	2	3	4	5	6	8	9	10
41	6128	6138	6149	6160	6170	6180	6191	6201	6212	6222	1	2	3	4	5	6	7	8	9
42	6232	6243	6253	6263	6274	6284	6294	6304	6314	6325	1	2	3	4	5	6	7	8	9
43	6335	6345	6355	6365	6375	6385	6395	6405	6415	6425	1	2	3	4	5	6	7	8	9
44	6435	6444	6454	6464	6474	6484	6493	6503	6513	6522	1	2	3	4	5	6	7	8	9
45	6532	6542	6551	6561	6571	6580	6590	6599	6609	6618	1	2	3	4	5	6	7	8	9
46	6628	6637	6646	6656	6665	6675	6684	6693	6702	6712	1	2	3	4	5	6	7	7	8
47	6721	6730	6739	6749	6758	6767	6776	6785	6794	6803	1	2	3	4	5	5	6	7	8
48	6812	6821	6830	6839	6848	6857	6866	6875	6884	6893	1	2	3	4	4	5	6	7	8
49	6902	6911	6920	6928	6937	6946	6955	6964	6972	6981	1	2	3	4	4	5	6	7	8
50	6990	6998	7007	7016	7024	7033	7042	7050	7059	7067	1	2	3	3	4	5	6	7	8
51	7076	7084	7093	7101	7110	7118	7126	7135	7143	7152	1	2	3	3	4	5	6	7	8
52	7160	7168	7177	7185	7193	7202	7210	7218	7226	7235	1	2	2	3	4	5	6	7	7
53	7243	7251	7259	7267	7275	7284	7292	7300	7308	7316	1	2	2	3	4	5	6	6	7
54	7324	7332	7340	7348	7356	7364	7372	7380	7388	7396	1	2	2	3	4	5	6	6	7
N	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9

* Interpolation in this section of the table is inaccurate.

FOUR-PLACE LOGARITHMS (Continued)

N											Proportional Parts								
	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
55	7404	7412	7419	7427	7435	7443	7451	7459	7466	7474	1	2	2	3	4	5	5	6	7
56	7482	7490	7497	7505	7513	7520	7528	7536	7543	7551	1	2	2	3	4	5	5	6	7
57	7559	7566	7574	7582	7589	7597	7604	7612	7619	7627	1	2	2	3	4	5	5	6	7
58	7634	7642	7649	7657	7664	7672	7679	7686	7694	7701	1	1	2	3	4	4	5	6	7
59	7709	7716	7723	7731	7738	7745	7752	7760	7767	7774	1	1	2	3	4	4	5	6	7
60	7782	7789	7796	7803	7810	7818	7825	7832	7839	7846	1	1	2	3	4	4	5	6	6
61	7853	7860	7868	7875	7882	7889	7896	7903	7910	7917	1	1	2	3	4	4	5	6	6
62	7924	7931	7938	7945	7952	7959	7966	7973	7980	7987	1	1	2	3	3	4	5	6	6
63	7993	8000	8007	8014	8021	8028	8035	8041	8048	8055	1	1	2	3	3	4	5	5	6
64	8062	8069	8075	8082	8089	8096	8102	8109	8116	8122	1	1	2	3	3	4	5	5	6
65	8129	8136	8142	8149	8156	8162	8169	8176	8182	8189	1	1	2	3	3	4	5	5	6
66	8195	8202	8209	8215	8222	8228	8235	8241	8248	8254	1	1	2	3	3	4	5	5	6
67	8261	8267	8274	8280	8287	8293	8299	8306	8312	8319	1	1	2	3	3	4	5	5	6
68	8325	8331	8338	8344	8351	8357	8363	8370	8376	8382	1	1	2	3	3	4	4	5	6
69	8388	8395	8401	8407	8414	8420	8426	8432	8439	8445	1	1	2	2	3	4	4	5	6
70	8451	8457	8463	8470	8476	8482	8488	8494	8500	8506	1	1	2	2	3	4	4	5	6
71	8513	8519	8525	8531	8537	8543	8549	8555	8561	8567	1	1	2	2	3	4	4	5	5
72	8573	8579	8585	8591	8597	8603	8609	8615	8621	8627	1	1	2	2	3	4	4	5	5
73	8633	8639	8645	8651	8657	8663	8669	8675	8681	8686	1	1	2	2	3	4	4	5	5
74	8692	8698	8704	8710	8716	8722	8727	8733	8739	8745	1	1	2	2	3	4	4	5	5
75	8751	8756	8762	8768	8774	8779	8785	8791	8797	8802	1	1	2	2	3	3	4	5	5
76	8808	8814	8820	8825	8831	8837	8842	8848	8854	8859	1	1	2	2	3	3	4	5	5
77	8865	8871	8876	8882	8887	8893	8899	8904	8910	8915	1	1	2	2	3	3	4	4	5
78	8921	8927	8932	8938	8943	8949	8954	8960	8965	8971	1	1	2	2	3	3	4	4	5
79	8976	8982	8987	8993	8998	9004	9009	9015	9020	9025	1	1	2	2	3	3	4	4	5
80	9031	9036	9042	9047	9053	9058	9063	9069	9074	9079	1	1	2	2	3	3	4	4	5
81	9085	9090	9096	9101	9106	9112	9117	9122	9128	9133	1	1	2	2	3	3	4	4	5
82	9138	9143	9149	9154	9159	9165	9170	9175	9180	9186	1	1	2	2	3	3	4	4	5
83	9191	9196	9201	9206	9212	9217	9222	9227	9232	9238	1	1	2	2	3	3	4	4	5
84	9243	9248	9253	9258	9263	9269	9274	9279	9284	9289	1	1	2	2	3	3	4	4	5
85	9294	9299	9304	9309	9315	9320	9325	9330	9335	9340	1	1	2	2	3	3	4	4	5
86	9345	9350	9355	9360	9365	9370	9375	9380	9385	9390	1	1	2	2	3	3	4	4	5
87	9395	9400	9405	9410	9415	9420	9425	9430	9435	9440	0	1	1	2	2	3	3	4	4
88	9445	9450	9455	9460	9465	9469	9474	9479	9484	9489	0	1	1	2	2	3	3	4	4
89	9494	9499	9504	9509	9513	9518	9523	9528	9533	9538	0	1	1	2	2	3	3	4	4
90	9542	9547	9552	9557	9562	9566	9571	9576	9581	9586	0	1	1	2	2	3	3	4	4
91	9590	9595	9600	9605	9609	9614	9619	9624	9628	9633	0	1	1	2	2	3	3	4	4
92	9638	9643	9647	9652	9657	9661	9666	9671	9675	9680	0	1	1	2	2	3	3	4	4
93	9685	9689	9694	9699	9703	9708	9713	9717	9722	9727	0	1	1	2	2	3	3	4	4
94	9731	9736	9741	9745	9750	9754	9759	9763	9768	9773	0	1	1	2	2	3	3	4	4
95	9777	9782	9786	9791	9795	9800	9805	9809	9814	9818	0	1	1	2	2	3	3	4	4
96	9823	9827	9832	9836	9841	9845	9850	9854	9859	9863	0	1	1	2	2	3	3	4	4
97	9868	9872	9877	9881	9886	9890	9894	9899	9903	9908	0	1	1	2	2	3	3	4	4
98	9912	9917	9921	9926	9930	9934	9939	9943	9948	9952	0	1	1	2	2	3	3	4	4
99	9956	9961	9965	9969	9974	9978	9983	9987	9991	9996	0	1	1	2	2	3	3	3	4
N	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9

PERIODIC TABLE OF THE ELEMENTS

1a	2a	3b	4b	5b	6b	7b	8	1b	2b	3a	4a	5a	6a	7a	0	Orbit		
1 H 1.00797 1 +1 -1		Atomic Number → 50 +2 ← Oxidation States Symbol → Sn +4 ← KEY TO CHART Atomic Weight → 118.69 -18-18-4 ← Electron Configuration										2 He 4.0026 2 0	K					
3 Li 6.939 2-1 +1	4 Be 9.0122 2-2 +2									5 B 10.811 2-3 +3	6 C 12.01115 2-4 +2 +4 -4	7 N 14.0067 2-5 +1 +2 +3 +4 +5 -1	8 O 15.9994 2-6 -2	9 F 18.9984 2-7 -1	10 Ne 20.183 2-8 0	K-L		
11 Na 22.9898 2-8-1 +1	12 Mg 24.312 2-8-2 +2	Transition Elements						Transition Elements		13 Al 26.9815 2-8-3 +3	14 Si 28.086 2-8-4 +2 +4 -4	15 P 30.9738 2-8-5 +3 +5 -3	16 S 32.064 2-8-6 +4 +6 -2	17 Cl 35.453 2-8-7 +1 +5 +7 -1	18 Ar 39.948 2-8-8 0	K-L-M		
		Group 8																
19 K 39.102 -8-8-1 +1	20 Ca 40.08 -8-8-2 +2	21 Sc 44.956 -8-9-2 +3	22 Ti 47.90 -8-10-2 +2 +3 +4	23 V 50.942 -8-11-2 +2 +3 +4 +5	24 Cr 51.996 -8-13-1 +2 +3 +6	25 Mn 54.9380 -8-13-2 +2 +3 +4 +7	26 Fe 55.847 -8-14-2 +2 +3	27 Co 58.9332 -8-15-2 +2 +3	28 Ni 58.71 -8-16-2 +2 +3	29 Cu 63.54 -8-18-1 +1 +2	30 Zn 65.37 -8-18-2 +2	31 Ga 69.72 -8-18-3 +3	32 Ge 72.59 -8-18-4 +2 +4	33 As 74.9216 -8-18-5 +3 +5 -3	34 Se 78.96 -8-18-6 +4 +6 -2	35 Br 79.909 -8-18-7 +1 +5 -1	36 Kr 83.80 -8-18-8 0	-L-M-N
37 Rb 85.47 -18-8-1 +1	38 Sr 87.62 -18-8-2 +2	39 Y 88.905 -18-9-2 +3	40 Zr 91.22 -18-10-2 +4	41 Nb 92.906 -18-12-1 +3 +5	42 Mo 95.94 -18-13-1 +6	43 Tc (99) -18-13-2 +4 +7	44 Ru 101.07 -18-15-1 +3	45 Rh 102.905 -18-16-1 +3	46 Pd 106.4 -18-18-0 +2 +4	47 Ag 107.870 -18-18-1 +1	48 Cd 112.40 -18-18-2 +2	49 In 114.82 -18-18-3 +3	50 Sn 118.69 -18-18-4 +2 +4	51 Sb 121.75 -18-18-5 +3 +5 -3	52 Te 127.60 -18-18-6 +4 +6 -2	53 I 126.9044 -18-18-7 +1 +5 +7 -1	54 Xe 131.30 -18-18-8 0	-M-N-O
55 Cs 132.905 -18-8-1 +1	56 Ba 137.34 -18-8-2 +2	57 * La 138.91 -18-9-2 +3	72 Hf 178.49 -32-10-2 +4	73 Ta 180.948 -32-11-2 +5	74 W 183.85 -32-12-2 +6	75 Re 186.2 -32-13-2 +4 +7	76 Os 190.2 -32-14-2 +3 +4	77 Ir 192.2 -32-15-2 +3	78 Pt 195.09 -32-16-2 +2 +4	79 Au 196.967 -32-18-1 +1 +3	80 Hg 200.59 -32-18-2 +1 +2	81 Tl 204.37 -32-18-3 +1 +3	82 Pb 207.19 -32-18-4 +2 +4	83 Bi 208.980 -32-18-5 +3 +5	84 Po (210) -32-18-6 +2 +4	85 At (210) -32-18-7 +1 +5	86 Rn (222) -32-18-8 0	-N-O-P
87 Fr (223) -18-8-1 +1	88 Ra (226) -18-8-2 +2	89 ** Ac (227) -18-9-2 +3															-O-P-Q	

*Lanthanides	58 Ce 140.12 -19-9-2 +3 +4	59 Pr 140.907 -20-9-2 +3	60 Nd 144.24 -22-8-2 +3	61 Pm (145) -23-8-2 +3	62 Sm 150.35 -24-8-2 +2 +3	63 Eu 151.96 -25-8-2 +2 +3	64 Gd 157.25 -25-9-2 +3	65 Tb 158.924 -26-9-2 +3	66 Dy 162.50 -28-8-2 +3	67 Ho 164.930 -29-8-2 +3	68 Er 167.26 -30-8-2 +3	69 Tm 168.934 -31-8-2 +3	70 Yb 173.04 -32-8-2 +2 +3	71 Lu 174.97 -32-9-2 +3	-N-O-P
**Actinides	90 Th 232.038 -19-9-2 +4	91 Pa (231) -20-9-2 +5 +4	92 U 238.03 -21-9-2 +3 +4 +5 +6	93 Np (237) -22-9-2 +3 +4 +5 +6	94 Pu (242) -23-9-2 +3 +4 +5 +6	95 Am (243) -24-9-2 +3 +4 +5 +6	96 Cm (247) -25-9-2 +3 +4 +5 +6	97 Bk (249) -26-9-2 +3 +4	98 Cf (251) -28-8-2 +3	99 Es (254) -29-8-2 +3	100 Fm (252) -30-8-2 +3	101 Md (256) -31-8-2 +3	102 Lw (254) -32-8-2 +3		-O-P-Q

Numbers in parentheses are mass numbers of most stable isotope of that element.

ATOMIC WEIGHTS

For the sake of completeness all known elements are included in the list. Several of those more recently discovered are represented only by the unstable isotopes. The value in parenthesis in the atomic weight column is, in each case, the mass number of the most stable isotope.**

Name	Symbol	At. No.	International atomic weight		Valence	Name	Symbol	At. No.	International atomic weight		Valence
			1961	1959					1961	1959	
Actinium.....	Ac	89	.....	(227)	.....	Neodymium.....	Nd	60	144.24	144.27	3
Aluminum.....	Al	13	26.9815	26.98	3	Neon.....	Ne	10	20.183	20.183	0
Americium.....	Am	95	.....	(243)	3, 4, 5, 6	Neptunium.....	Np	93	.....	(237)	4, 5, 6
Antimony, stibium.....	Sb	51	121.75	121.76	3, 5	Nickel.....	Ni	28	58.71	58.71	2, 3
Argon.....	Ar	18	39.948	39.944	0	Niobium (columbium)..	Nb	41	92.906	92.91	3, 5
Arsenic.....	As	33	74.9216	74.92	3, 5	Nitrogen.....	N	7	14.0067	14.008	3, 5
Astatine.....	At	85	.....	(210)	1, 3, 5, 7	Nobelium.....	No	102	.....	(254)	.....
Barium.....	Ba	56	137.34	137.36	2	Osmium.....	Os	76	190.2	190.2	2, 3, 4, 8
Berkelium.....	Bk	97	.....	(217)	3, 4	Oxygen.....	O	8	15.9994	16.000	2
Beryllium.....	Be	4	9.0122	9.013	2	Palladium.....	Pd	46	106.4	106.4	2, 4, 6
Bismuth.....	Bi	83	208.980	208.99	3, 5	Phosphorus.....	P	15	30.9738	30.975	3, 5
Boron.....	B	5	10.811	10.82	3	Platinum.....	Pt	78	195.09	195.09	2, 4
Bromine.....	Br	35	79.909	79.916	1, 3, 5, 7	Plutonium.....	Pu	94	.....	(244)	3, 4, 5, 6
Cadmium.....	Cd	48	112.40	112.41	2	Polonium.....	Po	84	.....	(209)	.....
Calcium.....	Ca	20	40.08	40.08	2	Potassium, kalium.....	K	19	39.102	39.100	1
Californium.....	Cf	98	.....	(251)	.....	Praseodymium..	Pr	59	140.907	140.92	3
Carbon.....	C	6	12.01115	12.011	2, 4	Promethium.....	Pm	61	.....	(145)	3
Cerium.....	Ce	58	140.12	140.13	3, 4	Protactinium...	Pa	91	.....	(231)	.....
Cesium.....	Cs	55	132.905	132.91	1	Radium.....	Ra	88	.....	(226)	2
Chlorine.....	Cl	17	35.453	35.457	1, 3, 5, 7	Radon.....	Rn	86	.....	(222)	0
Chromium.....	Cr	24	51.996	52.01	2, 3, 6	Rhenium.....	Re	75	186.2	186.22	.....
Cobalt.....	Co	27	58.9332	58.94	2, 3	Rhodium.....	Rh	45	102.905	102.91	3
Columbium, see Niobium.....						Rubidium.....	Rb	37	85.47	85.48	1
Copper.....	Cu	29	63.54	63.54	1, 2	Ruthenium.....	Ru	44	101.07	101.1	3, 4, 6, 8
Curium.....	Cm	96	.....	(247)	3	Samarium.....	Sm	62	150.35	150.35	2, 3
Dysprosium.....	Dy	66	162.50	162.51	3	Scandium.....	Sc	21	44.956	44.96	3
Einsteinium.....	Es	99	.....	(254)	.....	Selenium.....	Se	34	78.96	78.96	2, 4, 6
Erbium.....	Er	68	167.26	167.27	3	Silicon.....	Si	14	28.086	28.09	4
Europium.....	Eu	63	151.96	152.0	2, 3	Silver, argentum.	Ag	47	107.870	107.873	1
Fermium.....	Fm	100	.....	(257)	.....	Sodium, natrium.	Na	11	22.9898	22.991	1
Fluorine.....	F	9	18.9984	19.00	1	Strontium.....	Sr	38	87.62	87.63	2
Francium.....	Fr	87	.....	(223)	1	Sulfur.....	S	16	32.064	32.066*	2, 4, 6
Gadolinium.....	Gd	64	157.25	157.26	3	Tantalum.....	Ta	73	180.948	180.95	5
Gallium.....	Ga	31	69.72	69.72	2, 3	Technetium.....	Tc	43	.....	(97)	6, 7
Germanium.....	Ge	32	72.59	72.60	4	Tellurium.....	Te	52	127.60	127.61	2, 4, 6
Gold, aurum....	Au	79	196.967	197.0	1, 3	Terbium.....	Tb	65	158.924	158.93	3
Hafnium.....	Hf	72	178.49	178.50	4	Thallium.....	Tl	81	204.37	204.39	1, 3
Helium.....	He	2	4.0026	4.003	0	Thorium.....	Th	90	232.038	(232)	4
Holmium.....	Ho	67	164.930	164.94	3	Thulium.....	Tm	69	168.934	168.94	3
Hydrogen.....	H	1	1.00797	1.0080	1	Tin, stannum...	Sn	50	118.69	118.70	2, 4
Indium.....	In	49	114.82	114.82	3	Titanium.....	Ti	22	47.90	47.90	3, 4
Iodine.....	I	53	126.9044	126.91	1, 3, 5, 7	Tungsten (wolfram)....	W	74	183.85	183.86	6
Iridium.....	Ir	77	192.22	192.22	3, 4	Uranium.....	U	92	238.03	238.07	4, 6
Iron, ferrum....	Fe	26	55.847	55.85	2, 3	Vanadium.....	V	23	50.942	50.95	3, 5
Krypton.....	Kr	36	83.80	83.80	0	Xenon.....	Xe	54	131.30	131.30	0
Lanthanum.....	La	57	138.91	138.92	3	Ytterbium.....	Yb	70	173.04	173.04	2, 3
Lead, plumbum..	Pb	82	207.19	207.21	2, 4	Yttrium.....	Y	39	88.905	88.91	3
Lithium.....	Li	3	6.939	6.940	1	Zinc.....	Zn	30	65.37	65.38	2
Lutetium.....	Lu	71	174.97	174.99	3	Zirconium.....	Zr	40	91.22	91.22	4
Magnesium.....	Mg	12	24.312	24.32	2						
Manganese.....	Mn	25	54.9380	54.94	2, 3, 4, 6, 7						
Mendelevium....	Md	101	.....	(256)	.....					
Mercury, hydrargyrum..	Hg	80	200.59	200.61	1, 2						
Molybdenum....	Mo	42	95.94	95.95	3, 4, 6						

* Because of natural variations in the relative abundances of the isotopes of sulfur the atomic weight of this element has a range of ± 0.003 .

** The 1959 atomic weights are based on O = 16.000 whereas those of 1961 are based on the isotope C¹².

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A	Compound No.	Page No.	Compound No.	Page No.
Aceanthrenequinone	48	184	<i>d, l</i> -N-Acetylalanine	240 431
Acenaphthene	99	47	3-(Acetylamino) propionic acid	381 432
Acenaphthene-1-carbonitrile	84	361	2-Acetylaniline	42 436
Acenaphthene-5-carbonitrile	155	364	3-Acetylaniline	102 436
Acenaphthene-5-carboxylic acid	347	207	4-Acetylaniline	41 436
5,6-Acenaphthenediol	497	122	2-Acetylanisole	199 167
Acenaphthenequinone	44	183	3-Acetylanisole	200 167
Acenaphthene-3-sulfonamide	309	404	Acetylanthranilamide	365 241
Acenaphthene-5-sulfonamide	369	406	Acetylanthranilamide	332 240
Acenaphthene-5-sulfonanilide	224	400	Acetylanthranilic acid	293 205
Acenaphthene-3-sulfonic acid	144	376	2-Acetylbenzoic acid	144 198
Acenaphthene-3-sulfonyl chloride	175	386	Acetylbenzoylketone	178 167
Acenaphthene-5-sulfonyl chloride	172	386	2-Acetylbiaryl	80 170
1-Acenaphthenol	353	114	3-Acetylbiaryl	94 170
7-Acenaphthenone	151	177	4-Acetylbiaryl	152 177
1-Acenaphthoic acid	387	209	Acetyl bromide	2 218
<i>cis</i> -Acenaphthylene glycol	527	124	4-Acetylbutyric acid	410 432
Acetleladene	123	48	Acetyl carbinol	40 82
Acetaldehyde	3	144	3-Acetylcatechol	188 106
Acetaldehyde cyanohydrin	54	349	" "	123 176
Acetaldehyde trimer	34	145	4-Acetylcatechol	266 110
Acetamide	56	232	" "	148 177
Acetamidine	470	439	Acetyl chloride	1 212
4-Acetamidobenzene sulfonamide	359	406	0-Acetylcitric acid	98 429
4-Acetamidobenzene sulfonanilide	345	405	1-Acetylcyclohexene	157 166
4-Acetamidobenzene-1-sulfonic acid	164	377	1-Acetylcyclopentene	88 170
4-Acetamidobenzenesulfonyl chloride	237	388	2-Acetyl- <i>p</i> -cymene	202 167
4-Acetamidobenzonitrile	180	365	2-Acetyldibenzothiophene	144 177
4-Acetamidonaphthalene-1-sulfonamide	417	408	Acetyl diethyl carbinol	47 162
4-Acetamidonaphthalene-1-sulfonanilide	197	399	1-Acetyl 2,2-dimethylcyclohexene	82 170
4-Acetamidonaphthalene-1-sulfonic acid	192	378	Acetylene	1 28
2-Acetamidophenol	511	123	Acetylenedicarboxylic acid	277 204
3-Acetamidophenol	375	115	Acetylenedicarboxylic acid diamide	505 246
Acetanilide	174	235	9-Acetylfluorene	101 175
Acetic acid	3	190	Acetyl fluoride	1 211
" "	431	432	2-Acetylfuran	15 172
Acetic anhydride	4	223	3-Acetylfuran	33 169
Acetoacetamide	15	231	β -Acetylglutaric acid	49 194
Acetoacetanilide	64	232	N-Acetyl glycine	233 431
4-Acetobutanoic acid	51	191	Acetyl glycol chloride	17 212
γ -Acetobutyric acid	51	191	8-Acetylguanidine	39 173
<i>d, l</i> -Acetoin	39	82	2-Acetylhydroquinone	512 123
" "	54	162	1-Acetyl-2-hydroxynaphthalene	83 174
Acetol	40	82	2-Acetyl-1-hydroxynaphthalene	130 176
Acetone	1	161	3-Acetylnadazole	193 178
Acetone cyanohydrin	18	346	N-Acetylnadole	313 239
Acetone-1,3-dicarboxylic acid	189	200	3-Acetylnadole	195 179
Acetonitrile	5	345	Acetyl iodide	1 221
Acetylacetone	148	165	0-Acetyllactic acid	48 194
2-Acetophenelidide	51	232	0-Acetyl lactonitrile	46 348
3-Acetophenelidide	100	233	0-Acetyl lactoyl chloride	30 212
4-Acetophenelidide	242	237	Acetyl methyl carbinol	39 82
Acetophenone	160	166	1-Acetyl-2-methylcyclohexanone	155 166
Acetophenone- <i>o</i> -carboxylic acid	144	198	<i>d, l</i> -1-Acetyl-3-methylcyclohexanone	50 169
Aceto-N-piperidide	7	230	1-Acetyl-4-methylcyclohexanone	151 166
Acetopyruvic acid	117	197	2-Acetyl-5-methylfuran	69 170
2-Acetotoluidide	171	235	2-Acetyl-5-methylthiophene	89 170
3-Acetotoluidide	31	231	α -Acetyl- β -methylurea	376 242
4-Acetotoluidide	290	239	1-Acetylnaphthalene	215 168
Acetoveratron	55	174	2-Acetylnaphthalene	57 174
Acetoxyacetic acid	62	195	Acetylnaphthionic acid	192 378
Acetoxyacetone	120	165	1-Acetyl-2-naphthol	73 100
<i>w</i> -Acetoxyacetophenone	60	276	2-Acetyl-1-naphthol	196 106
2-Acetoxyethylamine	310	438	δ -Acetylpentanoic acid	23 193
3-Acetoxyphenol	29	95	2-Acetylphenanthrene	172 178
α -Acetoxypropionic acid	48	194	3-Acetylphenanthrene	95 175
2-Acetoxypropionitrile	46	348	9-Acetylphenanthrene	99 175
α -Acetoxypropionyl chloride	30	212	N-Acetyl- <i>o</i> -phenetidine	51 232
Acetylacetone	44	162	2-Acetylphenol	10 96

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3-Acetylphenol	180	105	Allylacetic acid	22	190
"	64	434	Allylacetone	28	162
4-Acetylphenol	223	107	Allylacetyl chloride	23	212
"	141	176	Allylacetylene	10	28
"	36	434	Allyl alcohol	5	80
Acetyl phenyl carbinol	74	170	Allylamine	12	295
Acetyl β -phenylhydrazine	203	236	N-Allylaniline	134	437
Acetylphloroglucinol	545	125	Allyl benzoate	238	263
N-Acetylpiperidine	7	230	Allyl bromide	6	58
β -Acetylpropionic Acid	16	172	Allyl <i>n</i> -butyrate	74	253
"	18	193	Allyl chloride	6	55
2-Acetylpyridine	144	165	Allyl cyanide	16	346
3-Acetylpyridine	84	436	Allylcyclohexane	281	21
2-Acetylquinoline	42	173	4-Allyl-1,2-dimethoxybenzene	99	136
4-Acetylresorcinol	362	115	Allyl ethyl ether	17	131
5-Acetylresorcinol	368	115	Allyl ethyl sulfide	15	420
Acetylsalicylaldehyde diacetate	141	280	Allyl formate	15	250
Acetyl salicylanilide	246	237	Allyl iodide	6	60
0-Acetylsalicylic acid	186	200	Allyl isobutyrate	66	252
"	400	432	Allylmalonic acid	126	198
6-Acetyltetralin	99	170	Allyl malononitrile	72	350
3-Acetylthianaphthene	102	171	Allyl mercaptan	8	413
2-Acetylthiophene	169	166	2-Allyl-6-methoxyphenol	22	95
N-Acetyl- <i>m</i> -toluidine	31	231	4-Allyl-2-methoxyphenol	23	95
N-Acetyl- <i>p</i> -toluidine	290	239	"	97	434
Acetylurea	461	244	4-Allyl-1,2-methylenedioxybenzene	96	135
5-Acetyl- <i>n</i> -valeric acid	23	193	Allyl methyl ether	8	131
<i>cis</i> -Aconitanilide	344	240	Allyl methyl sulfide	5	420
<i>trans</i> -Aconitic acid	314	206	1-Allylnaphthalene	157	41
Aconitic acid diamilide	400	242	2-Allylphenol	10	94
<i>cis</i> -Aconitic acid diamilide	427	243	4-Allylphenol	15	94
<i>trans</i> -Aconityl trichloride	37	215	Allyl phenyl sulfide	51	421
Acraldehyde	6	144	1-Allylpiperidine	342	438
Acridine	69	324	Allyl propionate	51	252
"	420	439	Allylsulfide	23	420
2,3-Acridinediol	564	126	2-Allylthiophene	35	424
2,8-Acridinediol	588	127	Allylurea	63	232
3,7-Acridinediol	590	127	D-Altrose	11	329
Acrolein	6	144	L-Altrose	10	329
Acrylamide	62	232	2-Aminoacenaphthene	305	312
Acrylanilide	139	234	3-Aminoacenaphthene	135	307
Acrylic acid	5	190	4-Aminoacenaphthene	152	307
"	334	431	5-Aminoacenaphthene	220	309
Acrylonitrile	3	345	Aminoacetamide	95	305
Acrylyl chloride	4	212	3-Aminoacetanilide	153	307
Adamantane	80	9	4-Aminoacetanilide	321	240
Adipic acid	232	202	"	364	314
"	377	432	Aminoacetonitrile	22	356
Adipic acid diamilide	490	245	"	212	437
Adipic acid monoamide	204	236	2-Aminoacetophenone	1	172
Adipic acid monoanilide	286	238	"	166	300
Adipic aldehyde	26	151	"	42	436
Adiponitrile	104	354	3-Aminoacetophenone	125	176
Adipyl dichloride	34	215	"	193	308
β -Alanine	32	285	"	102	436
DL-Alanine	103	289	4-Aminoacetophenone	137	176
"	80	429	"	213	309
L-Alanine	105	289	"	41	436
3-Aldehydobenzoic acid	271	204	3-Aminoalizarin	56	184
Aldol	23	150	1-Aminoanthracene	132	437
Alethene	29	417	1-Amino-9,10-anthraquinone	41	183
Aleuritic acid	121	197	"	459	318
Alizarin	54	184	2-Amino-9,10-anthraquinone	59	185
Allene	4	12	"	472	318
L-(+)-Alloisoleucine	128	290	2-Amino-9,10-anthraquinone-1-carboxylic acid	381	209
Allomucic acid	274	204	4-Aminoantipyrine	222	309
β -D-Allose	19	330	2-Aminoazobenzene	71	305
β -L-Allose	20	330	4-Aminoazobenzene	277	311
DL-Allothreonine	65	287	4-Aminobenzalacetophenone	337	313
Alloxanic acid	249	203	2-Aminobenzaldehyde	16	153
Allyl acetate	32	251	4-Aminobenzaldehyde	62	156

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	Compound No.	Page No.		Compound No.	Page No.
2-Aminobenzamide	224	309	DL- α -Aminobutyric acid	115	290
3-Aminobenzamide	167	235	" " "	72	429
4-Aminobenzamide	173	235	L-(+)- α -Aminobutyric acid	100	289
"	395	315	DL- β -Aminobutyric acid	29	285
3-Aminobenzanilide	254	237	γ -Aminobutyric acid	35	285
4-Aminobenzene-1,3-disulfonamide	398	407	" " "	289	431
4-Aminobenzene-1,3-disulfonic acid	181	377	4-Aminobutyrophenone	143	307
2-Aminobenzene sulfonamide	136	397	3-Aminocamphor	228	310
3-Aminobenzene sulfonamide	102	395	γ -Amino- <i>n</i> -caproic acid	37	285
4-Aminobenzene sulfonamide	178	398	<i>w</i> -Amino- <i>n</i> -caproic acid	34	285
4-Aminobenzene sulfonanilide	311	404	3-Aminocarbazole	460	318
2-Aminobenzene sulfonic acid	54	372	4-Aminochalcone	337	313
3-Aminobenzene sulfonic acid	37	372	1-Amino-4-chloroanthraquinone	392	315
4-Aminobenzene sulfonic acid	70	373	1-Amino-5-chloroanthraquinone	443	317
4-Aminobenzhydrol	260	311	4-Amino-2-chlorobenzaldehyde	329	313
2-Aminobenzoic acid	9	284	2-Amino-5-chloro- <i>p</i> -cresol	213	107
3-Aminobenzoic acid	15	284	2-Amino-6-chloro- <i>p</i> -cresol	157	104
" " "	149	430	4-Amino-6-chloro- <i>m</i> -cresol	551	125
4-Aminobenzoic acid	26	285	6-Amino-4-chloro- <i>o</i> -cresol	218	107
" " "	94	429	2-Amino-4-chloro- <i>N,N</i> -dimethylaniline	178	300
2-Aminobenzonitrile	58	359	2-Amino-5-chloro-4-methylphenol	213	107
3-Aminobenzonitrile	61	359	2-Amino-6-chloro-4-methylphenol	157	104
4-Aminobenzonitrile	150	307	4-Amino-6-chloro-3-methylphenol	551	125
" " "	111	362	6-Amino-4-chloro-2-methylphenol	218	107
2-Aminobenzophenone	135	176	1-Amino-2-chloronaphthalene	72	305
"	209	309	1-Amino-3-chloronaphthalene	80	305
4-Aminobenzophenone	155	177	" " "	65	436
" " "	272	311	1-Amino-4-chloronaphthalene	190	308
" " "	40	436	1-Amino-5-chloronaphthalene	91	436
3-Aminobenzopyrazole	345	314	1-Amino-6-chloronaphthalene	97	436
6-Aminobenzopyrazole	433	317	1-Amino-7-chloronaphthalene	96	436
2-Aminobenzothiazole	297	312	2-Amino-1-chloronaphthalene	70	305
2-Aminobenzyl alcohol	136	307	2-Amino-4-chloronaphthalene	92	436
3-Aminobenzyl alcohol	186	308	2-Amino-7-chloronaphthalene	110	436
4-Aminobenzyl alcohol	92	305	2-Amino-4-chloro-5-nitrophenol	554	126
DL- α -Aminobenzyl cyanide	63	304	2-Amino-4-chloro-6-nitrophenol	382	115
α -Aminobenzyl cyanide	65	360	4-Amino-2-chloro-3-nitrophenol	434	118
2-Aminobenzyl cyanide	91	361	4-Amino-2-chloro-5-nitrophenol	445	119
4-Aminobenzyl cyanide	36	304	2-Amino-3-chlorophenol	278	110
" " "	42	358	2-Amino-4-chlorophenol	334	113
2-Aminobiphenyl	46	304	2-Amino-5-chlorophenol	387	116
" " "	113	436	4-Amino-2-chlorophenol	385	116
3-Aminobiphenyl	142	437	4-Amino-3-chlorophenol	402	117
4-Aminobiphenyl	60	304	2-Amino-4-chloropyridine	294	312
" " "	140	437	8-Amino-6-chloroquinoline	113	306
1-Amino-3-bromoanthraquinone	455	317	<i>trans</i> -2-Aminocinnamic acid	12	284
2-Amino-3-bromoanthraquinone	473	318	<i>trans</i> -3-Aminocinnamic acid	20	285
2-Amino-4-bromobenzaldehyde	146	307	<i>trans</i> -4-Aminocinnamic acid	16	284
2-Amino-5-bromobiphenyl	66	304	3-Aminocoumarin	292	312
4-Amino-4'-bromobiphenyl	326	313	6-Aminocoumarin	379	315
3-Amino-5-bromo- <i>p</i> -cresol	165	308	2-Amino- <i>p</i> -cresol	323	113
2-Amino-1-bromo-3-methylanthraquinone	422	316	3-Amino- <i>o</i> -cresol	309	112
1-Amino-3-bromonaphthalene	107	306	" " "	156	307
" " "	63	436	3-Amino- <i>p</i> -cresol	350	114
1-Amino-4-bromonaphthalene	197	309	4-Amino- <i>m</i> -cresol	466	120
" " "	87	436	4-Amino- <i>o</i> -cresol	458	120
2-Amino-1-bromonaphthalene	83	305	5-Amino- <i>o</i> -cresol	410	117
2-Amino-4-bromonaphthalene	94	436	6-Amino- <i>m</i> -cresol	416	117
2-Amino-5-bromonaphthalene	23	303	6-Amino- <i>o</i> -cresol	154	104
2-Amino-6-bromonaphthalene	282	311	1-Amino-3-cyanonaphthalene	44	436
2-Amino-3-bromophenol	333	113	2-Amino-4-cyanonaphthalene	62	436
2-Amino-4-bromophenol	283	311	1-Aminocyclohexanecarboxylic acid	125	290
2-Amino-5-bromophenol	380	115	" " "	111	430
4-Amino-2-bromophenol	432	118	2-Aminocyclohexanecarboxylic acid	217	430
5-Amino-2-bromophenol	379	115	<i>cis</i> -3-Aminocyclohexanecarboxylic acid	239	431
3-Amino-5-bromopyridine	100	306	<i>trans</i> -3-Aminocyclohexanecarboxylic acid	257	431
2-Aminobutane	13	295	<i>cis</i> -4-Aminocyclohexanecarboxylic acid	445	432
α -Amino- <i>n</i> -butylbenzene	131	299	<i>trans</i> -4-Aminocyclohexanecarboxylic acid	366	432
γ -Amino- <i>n</i> -butylbenzene	133	299	4-Aminocyclohexanecarboxylic acid	114	289
4-Aminobutyl methyl sulfide	42	421	2-Aminocyclohexanol	96	305
			3-Aminocyclohexene	391	439

ORGANIC COMPOUND INDEX

	Compound No.	Page No.		Compound No.	Page No.
2-Amino- <i>p</i> -cymene	158	300	α -Aminoethylbenzene	309	438
<i>cis</i> -9-Aminodecalin	140	299	β -Aminoethylbenzene	93	298
<i>trans</i> -9-Aminodecalin	132	299	"	349	438
2-Amino-2-deoxy-D-glucose	12	329	1-(2-Aminoethyl)-4-hydroxybenzene	368	314
3-Amino-3-deoxy-D-glucose	14	328	2-(<i>w</i> -Aminoethyl)-indole	256	310
2-Aminodibenzofuran	172	308	4-(2-Aminoethyl)-phenol	368	314
2-Aminodibenzyl	12	303	1-Aminoethyl phenyl ketone	233	310
4-Aminodibenzyl	42	304	1-Aminofluorene	117	436
3-Amino-4,6-dichlorophenol	324	113	2-Aminofluorene	168	437
4-Amino-N,N-diethylaniline	173	300	3-Aminofluorene	179	437
2-Aminodiethylether	35	296	4-Aminofluorene	93	436
4-Amino-2,6-dimethyl-5-methylpyrimidine	404	316	9-Aminofluorene	90	305
2-Amino-1,4-dihydroxy-9,10-anthraquinone	474	318	2-Aminofluorenone	367	314
3-Amino-1,2-dihydroxy-9,10-anthraquinone	56	184	1-Amino-4-fluoronaphthalene	41	304
5-Amino-1,4-dihydroxy-9,10-anthraquinone	437	317	D-1-Aminofructose	18	330
1-Amino-2,4-dihydroxynaphthalene	417	117	4-Aminoguaiaicol	275	311
2-Amino-3,4-dihydroxynaphthalene	424	118	1-Aminohendecane	155	300
3-Amino-4-(dimethylamino)toluene	148	299	2-Aminohendecane	151	299
2-Amino-N,N-dimethylaniline	120	299	1-Aminoheptadecane	408	439
4-Amino-N,N-dimethylaniline	29	303	2-Amino- <i>n</i> -heptane	55	296
2-Amino-5,4'-dimethylazobenzene	251	310	"	425	439
4-Amino-3,2'-dimethylazobenzene	195	309	4-Amino- <i>n</i> -heptane	53	296
2-Amino-4,4'-dimethylbiphenyl	81	305	DL- α -Aminoheptanoic acid	86	288
3-Amino-4,4'-dimethylbiphenyl	204	309	1-Amino-hexadecane	413	439
6-Amino-3,4'-dimethylbiphenyl	6	302	3-Amino- <i>n</i> -hexane	47	296
1-Amino-2,6-dimethylnaphthalene	161	307	4-Amino-hexanoic acid	37	285
2-Amino-1,4-dimethylnaphthalene	119	306	6-Amino-hexanoic acid	34	285
2-Amino-3,6-dimethylnaphthalene	313	312	D- α -Aminohydratropic acid	104	289
2-Amino-3,7-dimethylnaphthalene	286	311	DL- α -Aminohydratropic acid	76	287
2-Amino-3,5-dimethylphenol	420	118	1-Aminohydrocinnamic acid	1	284
2-Amino-3,6-dimethylphenol	376	115	4-Aminohydrocinnamic acid	7	284
2-Amino-4,6-dimethylphenol	318	112	D- β -Aminohydrocinnamic acid	62	287
3-Amino-4,5-dimethylphenol	429	118	DL- β -Aminohydrocinnamic acid	60	287
4-Amino-2,5-dimethylphenol	569	126	L- β -Aminohydrocinnamic acid	63	287
4-Amino-2,6-dimethylphenol	332	113	3-Amino-6-hydroxyacetophenone	261	311
4-Amino-3,5-dimethylphenol	472	121	4-Amino-2-hydroxyacetophenone	265	311
4-Amino-2,3-dimethyl-1-phenylpyrazolone-5	222	309	1-Amino-2-hydroxyanthraquinone	458	317
4-Amino-2,6-dimethylpiperidine	89	298	4-Amino-4'-hydroxyazobenzene	401	316
4-Amino-2,6-dimethylpyridine	400	316	3-Amino-4-hydroxybenzenesulfonamide	323	404
2-Amino-4,5-dimethylpyrimidine	438	317	4-Amino-2-hydroxybenzenesulfonamide	143	397
2-Amino-4,6-dimethylpyrimidine	413	316	5-Amino-2-hydroxybenzenesulfonamide	317	404
4-Amino-2,6-dimethylpyrimidine	394	315	5-Amino-2-hydroxybenzenesulfonamide	163	398
6-Amino-5,7-dimethylquinoline	385	315	5-Amino-2-hydroxybenzenesulfonic acid	148	376
7-Amino-2,4-dimethylquinoline	174	308	4-Amino-2-hydroxybenzenesulfonyl chloride	261	389
1-Amino-4,5-dimethyl-1,2,3-triazole	178	308	4-Amino-2-hydroxybenzoic acid	40	429
4-Amino-2,6-dinitro- <i>m</i> -cresol	436	119	5-Amino-2-hydroxybenzoic acid	114	430
6-Amino-2,4-dinitro- <i>m</i> -cresol	403	117	<i>trans</i> -1-Amino-2-hydroxycyclohexane	338	438
4-Amino-2,6-dinitro-3-methylphenol	436	119	<i>cis</i> -1-Amino-2-hydroxycyclohexane	346	438
6-Amino-2,4-dinitro-3-methylphenol	403	117	<i>cis</i> -1-Amino-2-hydroxycyclopentane	344	438
1-Amino-2,4-dinitronaphthalene	453	317	<i>trans</i> -1-Amino-2-hydroxycyclopentane	317	438
2-Amino-1,5-dinitronaphthalene	409	316	2-Amino-4-hydroxy-3-methoxybenzaldehyde	285	311
2-Amino-1,8-dinitronaphthalene	450	317	1-Amino-3-hydroxynaphthalene	397	316
2-Amino-3,5-dinitrophenol	542	125	"	90	436
2-Amino-4,6-dinitrophenol	444	119	1-Amino-5-hydroxynaphthalene	122	437
4-Amino-2,5-dinitrophenol	435	119	1-Amino-6-hydroxynaphthalene	406	316
4-Amino-2,6-dinitrophenol	448	119	"	124	437
2-Aminodiphenylamine	129	306	1-Amino-7-hydroxynaphthalene	430	317
4-Aminodiphenylamine	115	306	"	138	437
2-Aminodiphenyl ether	28	138	1-Amino-8-hydroxynaphthalene	179	308
3-Aminodiphenyl ether	20	137	2-Amino-3-hydroxynaphthalene	452	317
4-Aminodephenyl ether	49	139	2-Amino-5-hydroxynaphthalene	129	437
α -Aminodiphenylmethane	185	301	2-Amino-6-hydroxynaphthalene	436	317
2-Aminodiphenylmethane	58	304	2-Amino-7-hydroxynaphthalene	421	316
2-Aminodiphenyl sulfide	10	425	"	143	437
4-Aminodiphenyl sulfide	54	426	1-Amino-4-hydroxy-3-nitronaphthalene	359	314
1-Aminodocosane	409	439	2-Amino-3-hydroxypentane	74	297
2-Aminoethane thiol	32	417	3-Amino-2-hydroxypentane	72	297
2-Aminoethyl alcohol	62	83	2-Amino-10-hydroxyphenanthrene	446	317
"	71	297	5-Amino-8-hydroxyquinoline	321	313
α -Aminoethylbenzene	83	297	7-Amino-8-hydroxyquinoline	273	311
			5-Amino-2-hydroxy- <i>m</i> -xylene	310	312

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	Compound No.	Page No.		Compound No.	Page No.
1-Aminoindane.....	125	299	4-Amino-2-methyl-6-nitrophenol.....	258	109
".....	316	438	4-Amino-3-methyl-2-nitrophenol.....	509	123
2-Aminoindane.....	143	299	DL- α -Amino- α -methylpentanoic acid.....	102	289
".....	333	438	2-Amino-4-methylphenol.....	323	113
4-Aminoindane.....	150	299	2-Amino-5-methylphenol.....	416	117
5-Aminoindane.....	21	303	2-Amino-6-methylphenol.....	154	104
".....	210	437	3-Amino-2-methylphenol.....	309	112
4-Amino-4'-iodobiphenyl.....	372	315	3-Amino-4-methylphenol.....	350	114
1-Amino-3-iodonaphthalene.....	142	307	4-Amino-2-methylphenol.....	458	120
".....	72	436	4-Amino-3-methylphenol.....	466	120
2-Amino-4-iodonaphthalene.....	95	436	5-Amino-2-methylphenol.....	410	117
2-Amino-5-iodophenol.....	341	113	4-Amino-3-methyl-1-phenylpyrazole.....	155	307
α -Aminoisobutyric acid.....	85	288	5-Amino-3-methyl-1-phenylpyrazole.....	241	310
".....	88	429	2-Amino-3-methylpyridine.....	4	303
4-Amino-6-isopropyl- <i>m</i> -cresol.....	464	120	2-Amino-4-methylpyridine.....	188	308
4-Amino-5-isopropyl-2-methyl-6-nitrophenol.....	319	112	2-Amino-6-methylpyridine.....	28	303
4-Amino-6-isopropyl-3-methylphenol.....	464	120	3-Amino-4-methylpyridine.....	211	309
(2-Aminoisopropyl) methyl sulfide.....	33	421	5-Amino-2-methylpyridine.....	180	308
4-Amino-5-isopropyl-6-nitro- <i>o</i> -cresol.....	319	112	2-Amino-4-methylquinoline.....	298	312
1-Aminoisoquinoline.....	266	311	3-Amino-2-methylquinoline.....	358	314
5-Aminoisoquinoline.....	284	311	4-Amino-2-methylquinoline.....	378	315
β -Aminoisovaleric acid.....	48	286	5-Amino-2-methylquinoline.....	246	310
Aminomalonic acid.....	3	284	6-Amino-2-methylquinoline.....	403	316
1-Amino-4-mercaptanaphthalene.....	162	307	7-Amino-2-methylquinoline.....	333	313
1-Amino-3-methoxynaphthalene.....	89	436	8-Amino-6-methylquinoline.....	82	305
1-Amino-6-methoxynaphthalene.....	118	436	α -Amino- α -methyl-succinic acid.....	61	287
1-Amino-7-methoxynaphthalene.....	130	437	5-Amino-2-methylthiophenol.....	15	416
2-Amino-4-methoxynaphthalene.....	128	437	1-Amino-5-methyl-1,2,3-triazole.....	108	306
2-Amino-6-methoxynaphthalene.....	169	437	5-Amino-3-methyl-1,2,4-triazole.....	331	313
2-Amino-7-methoxynaphthalene.....	137	437	DL- α -Amino- α -methylvaleric acid.....	102	289
4-Amino- <i>N</i> -methylaniline.....	17	303	1-Aminonaphthalene.....	51	304
1-Amino-2-methylanthraquinone.....	428	317	".....	119	436
2-Amino-5-methylbenzene-1,3-disulfonamide.....	285	403	2-Aminonaphthalene.....	232	310
2-Amino-5-methylbenzene-1,3-disulfonamide.....	440	409	".....	133	437
2-Amino-5-methylbenzene-1,4-disulfonamide.....	441	409	2-Aminonaphthalene-8-sulfonamide.....	232	400
2-Amino-5-methylbenzene-1,4-disulfonic acid.....	202	378	4-Aminonaphthalene-1-sulfonamide.....	340	405
2-Amino-5-methylbenzene-1,3-disulfonyl chloride.....	242	389	4-Aminonaphthalene-2-sulfonamide.....	77	394
3-Amino-4-methylbenzenesulfonamide.....	216	400	5-Aminonaphthalene-1-sulfonamide.....	442	409
5-Amino-2-methylbenzenesulfonamide.....	175	398	5-Aminonaphthalene-2-sulfonamide.....	358	406
3-Amino-4-methylbenzenesulfonic acid.....	92	374	6-Aminonaphthalene-1-sulfonamide.....	180	398
3-Amino-6-methylbenzene sulfonic acid.....	68	373	1-Aminonaphthalene-7-sulfonanilide.....	121	396
2-Amino-5-methylbenzophenone.....	97	305	4-Aminonaphthalene-1-sulfonanilide.....	274	402
3-Amino-4-methylbenzophenone.....	223	309	5-Aminonaphthalene-1-sulfonanilide.....	203	399
3'-Amino-4-methylbenzophenone.....	230	310	5-Aminonaphthalene-2-sulfonanilide.....	71	394
4-Amino-3-methylbenzophenone.....	231	310	8-Aminonaphthalene-1-sulfonanilide.....	96	395
4-Amino-4'-methylbenzophenone.....	402	316	4-Aminonaphthalene-1-sulfonic acid.....	154	376
4-Amino-3-methylbiphenyl.....	32	303	5-Aminonaphthalene-1-sulfonic acid.....	203	378
4-Amino-4'-methylbiphenyl.....	192	308	5-Aminonaphthalene-2-sulfonic acid.....	165	377
2-Amino-2-methylbutane.....	18	295	6-Aminonaphthalene-1-sulfonic acid.....	72	373
(Aminomethyl) cyclohexane.....	399	439	8-Aminonaphthalene-1-sulfonic acid.....	4	380
<i>cis</i> -1-Amino-2-methylcyclohexane.....	400	439	8-Aminonaphthalene-2-sulfonic acid.....	102	374
<i>trans</i> -1-Amino-2-methylcyclohexane.....	402	439	4-Amino-1-naphthalenethiol.....	28	417
<i>cis</i> -1-Amino-3-methylcyclohexane.....	403	439	1-Amino-2-naphthoic acid.....	39	285
<i>trans</i> -1-Amino-3-methylcyclohexane.....	414	439	2-Amino-1-naphthoic acid.....	5	284
<i>trans</i> -1-Amino-4-methylcyclohexane.....	398	439	3-Amino-1-naphthoic acid.....	21	285
2-Amino-4-methyldiphenylamine.....	317	313	4-Amino-1-naphthoic acid.....	19	285
4-Amino-2-methyldiphenylamine.....	47	304	5-Amino-1-naphthoic acid.....	42	286
α -Amino- α -methylmalonic acid.....	72	287	6-Amino-1-naphthoic acid.....	38	285
1-Amino-2-methylnaphthalene.....	9	303	7-Amino-1-naphthoic acid.....	52	286
1-Amino-3-methylnaphthalene.....	54	304	1-Amino-2-naphthol.....	580	127
".....	123	437	3-Amino-2-naphthol.....	562	126
1-Amino-4-methylnaphthalene.....	55	304	4-Amino-2-naphthol.....	479	121
1-Amino-5-methylnaphthalene.....	124	306	5-Amino-1-naphthol.....	491	122
1-Amino-7-methylnaphthalene.....	68	304	5-Amino-2-naphthol.....	489	122
1-Amino-8-methylnaphthalene.....	101	306	6-Amino-1-naphthol.....	502	122
2-Amino-1-methylnaphthalene.....	53	304	6-Amino-2-naphthol.....	529	124
2-Amino-3-methylnaphthalene.....	304	312	7-Amino-2-naphthol.....	508	123
2-Amino-4-methylnaphthalene.....	105	306	8-Amino-1-naphthol.....	179	308
2-Amino-5-methylnaphthalene.....	86	305	8-Amino-2-naphthol.....	520	123
2-Amino-4-methyl-5-nitrophenol.....	501	122	2-Amino-1,4-naphthoquinone.....	427	317
2-Amino-4-methyl-6-nitrophenol.....	263	109	5-Amino-4-nitroacenaphthene.....	447	317

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	Compound No.	Page No.		Compound No.	Page No.
1-Amino-4-nitroanthraquinone	470	318	DL-3-Aminopentanoic acid	13	284
1-Amino-5-nitroanthraquinone	469	318	"	288	431
4-Amino-4'-nitroazobenzene	440	317	DL-4-Aminopentanoic acid	46	286
2-Amino-4-nitrobenzaldehyde	271	311	5-Aminopentanoic acid	11	284
2-Amino-5-nitrobenzaldehyde	420	316	"	338	431
4-Amino-3-nitrobenzaldehyde	408	316	5-Amino-1-pentene	26	295
4-Amino-3-nitrobenzenesulfonamide	330	404	2-Aminophenacyl alcohol	189	308
4-Amino-2-nitrobenzenesulfonic acid	155	376	4-Aminophenacyl alcohol	369	315
4-Amino-3-nitrobenzenesulfonyl chloride	57	382	2-Amino-9,10-phenanthraquinone	55	184
4-Amino-3-nitrobenzophenone	316	312	3-Amino-9,10-phenanthraquinone	42	183
2-Amino-4'-nitrobiphenyl	357	314	1-Aminophenanthrene	327	313
2-Amino-5-nitrobiphenyl	274	311	2-Aminophenanthrene	149	307
4-Amino-3-nitrobiphenyl	373	315	3-Aminophenanthrene	154	307
4-Amino-4'-nitrobiphenyl	419	316	4-Aminophenanthrene	208	309
4-Amino-6-nitrocatechol	557	126	9-Aminophenanthrene	308	312
2-Amino-5-nitro- <i>p</i> -cresol	501	122	2-Aminophenol	456	120
2-Amino-6-nitro- <i>p</i> -cresol	263	109	"	84	434
4-Amino-2-nitro- <i>m</i> -cresol	509	123	3-Aminophenol	277	110
4-Amino-6-nitro- <i>o</i> -cresol	258	109	"	263	311
3-Amino-4-nitrodiphenyl sulfide	57	426	"	88	434
2-Amino-3-nitrofluorenone	464	318	4-Aminophenol	476	121
2-Amino-5-nitrohydroquinone	346	314	"	396	316
2-Amino-4-nitromesitylene	120	306	4-Aminophenol-2-sulfonic acid	148	376
1-Amino-2-nitronaphthalene	322	313	(2-Aminophenyl)acetic acid	4	284
"	7	436	DL- α -Aminophenylacetic acid	74	287
1-Amino-3-nitronaphthalene	38	436	L- α -Aminophenylacetic acid	118	290
1-Amino-4-nitronaphthalene	412	316	(3-Aminophenyl)acetic acid	10	284
"	15	436	(4-Aminophenyl)acetic acid	31	285
1-Amino-5-nitronaphthalene	252	310	(2-Aminophenyl)acetoneitrile	91	361
"	68	436	(4-Aminophenyl)acetoneitrile	42	358
1-Amino-6-nitronaphthalene	75	436	3-Amino-5-phenylacridine	426	317
1-Amino-7-nitronaphthalene	55	436	2-Aminophenyl-4-aminophenyl sulfide	32	425
1-Amino-8-nitronaphthalene	185	308	2-(2-Aminophenyl)ethyl alcohol	5	302
"	71	436	2-(4-Aminophenyl)ethyl alcohol	219	309
2-Amino-1-nitronaphthalene	276	311	β -Amino- β -phenylisobutyric acid	68	287
2-Amino-3-nitronaphthalene	30	436	3-Aminophenyl-4-nitrophenyl sulfide	57	426
2-Amino-4-nitronaphthalene	50	436	2-Aminophenyl phenyl sulfide	10	425
2-Amino-5-nitronaphthalene	323	313	4-Aminophenyl phenyl sulfide	54	426
"	79	436	3-Amino-6-phenylpyridine	210	309
2-Amino-6-nitronaphthalene	59	436	2-(4-Aminophenyl)-quinoline	312	312
2-Amino-7-nitronaphthalene	81	436	3-Amino-2-phenylquinoline	240	310
2-Amino-8-nitronaphthalene	201	309	4-Amino-2-phenylquinoline	376	315
"	69	436	3-Amino-1-phenyl-1,2,4-triazole	336	313
2-Amino-3-nitrophenol	538	124	5-Amino-1-phenyl-1,2,4-triazole	351	314
2-Amino-4-nitrophenol	344	114	4-Aminophenylurethane	114	306
2-Amino-5-nitrophenol	522	123	2-Amino- β -picoline	4	303
2-Amino-6-nitrophenol	233	108	2-Amino- γ -picoline	188	308
3-Amino-4-nitrophenol	481	121	3-Amino- γ -picoline	211	309
4-Amino-2-nitrophenol	312	112	5-Amino- α -picoline	180	308
4-Amino-3-nitrophenol	390	116	6-Amino- α -picoline	28	303
5-Amino-2-nitrophenol	414	117	1-Amino-2-propanethiol	20	416
5-Amino-3-nitrophenol	427	118	3-Amino-1-propanethiol	36	417
3-Amino-4'-nitrophenyl sulfide	57	426	2-(3-Aminopropionamido)ethanethiol	29	417
4-Amino-3-nitropyridine	418	316	3-Aminopropionic acid	212	430
2-Amino-8-nitroquinoline	355	314	2-Aminopropiophenone	46	173
6-Amino-5-nitroquinoline	388	315	"	37	304
8-Amino-6-nitroquinoline	411	316	3-Aminopropiophenone	34	173
2-Amino-4-nitrosorcicol	473	121	4-Aminopropiophenone	170	178
4-Amino-6-nitrosorcicol	405	117	"	315	312
2-Amino-4-nitrostilbene	320	313	β -Aminopropiophenone	233	310
4-Amino-2-nitrostilbene	227	310	2-Aminopropyl alcohol	73	297
DL- α -Aminononanoic acid	82	288	3-Aminopropyl alcohol	87	297
1-Aminooctadecane	410	439	DL-3-Aminopropylenglycol	179	300
2-Aminooctane	401	439	3-Aminopropyl methyl sulfide	36	421
DL- α -Aminooctanoic acid	80	288	4-Aminopyrazole	131	306
1-Aminooxindole	50	304	2-Aminopyridine	74	305
DL-2-Amino- <i>n</i> -pentane	27	295	"	270	438
1-Aminopentadecane	411	439	3-Aminopyridine	89	305
3-Aminopentane	390	439	"	248	438
2-Amino- <i>n</i> -pentanoic acid	74	429	4-Aminopyridine	353	314
			"	311	438

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	Compound No.	Page No.		Compound No.	Page No.
γ -Aminopyridine	353	314	<i>w</i> -Amino- <i>n</i> -valeric acid	11	284
2-Aminopyrimidine	281	311	2-Aminovanillin	285	311
4-Aminopyrimidine	338	313	4-Aminoveratrol	148	307
5-Aminoquinoline	246	310	4-Amino- <i>o</i> -xylene	43	304
2-Aminoquinazolin	474	318	<i>n</i> -Amyl acetate	94	254
5-Aminoquinazolin	437	317	<i>sec</i> -Amyl(2) acetate	65	252
γ -Aminoquinoline	344	314	<i>sec</i> -Amyl(3) acetate	64	252
2-Aminoquinoline	289	312	<i>tert</i> -Amyl acetate	50	252
"	276	438	<i>active</i> -Amyl acetic acid	42	191
3-Aminoquinoline	173	308	<i>active</i> -Amyl alcohol	23	81
"	185	437	<i>n</i> -Amyl alcohol	32	81
4-Aminoquinoline	344	314	<i>sec</i> -Amyl alcohol	15	80
"	312	438	<i>sym-sec</i> -Amyl alcohol	13	80
5-Aminoquinoline	226	310	<i>tert</i> -Amyl alcohol	8	80
"	217	437	<i>active</i> -Amylamine	29	296
6-Aminoquinoline	238	310	<i>n</i> -Amylamine	32	296
"	223	437	<i>sec-n</i> -Amylamine	27	295
7-Aminoquinoline	171	308	<i>n</i> -Amyl bromide	17	58
"	267	438	<i>tert</i> -Amyl bromide	12	58
8-Aminoquinoline	109	306	<i>n</i> -Amyl- <i>n</i> -butyrate	146	257
"	121	437	<i>n</i> -Amyl- <i>n</i> -caproate	226	262
5-Aminoresorcinol	361	114	<i>n</i> -Amyl- <i>n</i> -caprylate	302	267
"	328	313	<i>tert</i> -Amyl carbinol	31	81
3-Aminosalicylic acid	64	287	<i>n</i> -Amyl chloride	22	55
4-Aminosalicylic acid	40	429	<i>tert</i> -Amyl chloride	15	55
5-Aminosalicylic acid	88	288	2- <i>n</i> -Amylcinnamaldehyde	9	150
"	114	430	<i>n</i> -Amyl <i>n</i> -enanthatate	277	265
2-Aminostyrene	9	302	<i>n</i> -Amyl ether	72	134
3-Aminostyrene	1	302	<i>n</i> -Amyl ethyl ether	43	133
4-Aminostyrene	2	303	<i>tert</i> -Amyl ethyl ether	35	132
1-Aminotetradecane	415	439	<i>tert</i> -Amyl ethyl ketone	68	163
1-Amino-1,2,3,4-tetrahydronaphthalene	339	438	<i>n</i> -Amyl formate	63	252
2-Amino-1,2,3,4-tetrahydronaphthalene	354	438	<i>n</i> -Amyl iodide	15	60
1-Amino-5,6,7,8-tetrahydronaphthalene	175	300	<i>tert</i> -Amyl iodide	10	60
"	157	437	<i>n</i> -Amyl levulinate	292	266
2-Amino-5,6,7,8-tetrahydronaphthalene	22	303	<i>sec-n</i> -Amylmalonic acid	50	194
"	202	437	<i>n</i> -Amyl mercaptan	18	413
3-Amino-1,2,4,5-tetramethylbenzene	117	306	<i>sec</i> -Amyl mercaptan	10	413
4-Amino-1,2,3,5-tetramethylbenzene	170	300	<i>n</i> -Amyl methyl carbinol	50	82
4-Amino-2-thiocresol	39	304	<i>n</i> -Amyl methyl ether	34	132
4-Amino-1-thionaphthol	162	307	<i>tert</i> -Amyl methyl ether	28	132
2-Aminothiophene	10	302	<i>n</i> -Amyl methyl ketone	69	163
2-Aminothiophenol	5	303	<i>tert</i> -Amyl methyl ketone	26	162
"	5	416	Amyl methyl sulfide	28	420
3-Aminothiophenol	3	302	<i>n</i> -Amyl 2-naphthyl ether	5	137
4-Aminothiophenol	35	303	4- <i>n</i> -Amylphenol	4	96
"	13	416	4- <i>tert</i> -Amylphenol	166	104
3-Aminothioxanthone	445	317	<i>n</i> -Amyl phenyl ketone	3	172
6-Aminothymol	389	315	<i>n</i> -Amylpropionic acid	16	190
2-Amino-4-toluic acid	14	284	<i>n</i> -Amylpropionate	120	255
3-Amino-4-toluic acid	18	284	<i>n</i> -Amyl stearate	25	274
1-Amino-1,2,3-triazole	52	304	<i>n</i> -Amyl <i>n</i> -valerate	183	259
1-Amino-1,3,4-triazole	137	307	Anethole	3	137
3-Amino-1,2,4-triazole	356	314	Angelamide	212	236
3-Amino-2,4,6-tribromophenol	264	109	Angelanilide	207	236
3-Amino-2,4,6-trichlorophenol	179	105	Angelic acid	34	194
4-Amino-2,3,6-trichlorophenol	401	117	"	342	432
<i>w</i> -Aminotridecyclic acid	17	284	Anhalamine	58	140
2-Amino-4,4,4-trifluoro- <i>n</i> -butyric acid	24	429	Anhydrocamphoronic acid	201	201
1-Amino-2,4,5-trimethylbenzene	103	306	Aniline	80	297
1-Amino-3,4,5-trimethylbenzene	118	306	"	165	437
4-Amino-2,3,6-trinitrophenol	354	114	Aniline-2,4-disulfonamide	398	407
2-Aminotriphenyl carbinol	262	311	Aniline-2,4-disulfonic acid	181	377
3-Aminotriphenyl carbinol	348	314	<i>N</i> -Anilinoacetomitrile	46	359
4-Aminotriphenyl carbinol	242	310	2-Anilinobutyric acid	209	201
2-Aminotriphenylmethane	288	311	2-(<i>N</i> -Anilino)-butyronitrile	31	358
4-Aminotriphenylmethane	141	307	2-Anilinoisobutanonic acid	290	204
1-Aminoundecane	155	300	2-Anilinoisobutyric acid	290	204
2-Aminoundecane	151	299	2-(<i>N</i> -Anilino)-isobutyronitrile	124	362
DL- β -Amino- <i>n</i> -valeric acid	13	284	Anilinoisovaleric acid	188	200
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2-Benzofurylacetic acid	251	203	" "	165	177
2-Benzofuryl methyl ketone	102	175	Benzoyl phenyl carbinol	56	90
Benzoic acid	164	199	α -Benzoyl- β -phenylhydrazine	334	240
" "	323	431	2-Benzoylphloroglucinol	426	118
Benzoic anhydride	13	225	N-Benzoylpiperidine	3	231
<i>d,l</i> -Benzoin	56	90	β -Benzoylpropionanilide	283	238
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3-Benzophenetidine	129	234	4-Benzoylresorcinol	352	114
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2-Benzoylbenzoic acid	171	200	Benzyl chloride	38	56
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α -Benzoylbutanoic acid	90	196	Benzyl 4-chlorophenyl ketone	139	176
α -Benzoylbutyric acid	90	196	α -Benzylcinnamic anhydride	47	226
Benzoyl carbinol	47	89	Benzyl cinnamate	44	275
" "	150	177	N-Benzylcrotonamide	175	235
Benzoylcarbinyl acetate	60	276	Benzyl cyanide	80	351
4-Benzoylcatechol	355	114	Benzylcyanoacetic acid	119	197
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N-Benzoyl- <i>o</i> -ethylaniline	275	238	Benzyl dimethyl carbinol	4	88
Benzoylformic acid	85	174	Benzyl ether	109	136
" "	61	195	Benzyl ethyl amine	93	298
Benzoylformyl chloride	7	214	Benzyl ethyl ether	71	134
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Benzyl methyl ether.....	61	134	3-Biphenyl ethyl ether.....	16	137
Benzyl methyl ketone.....	5	172	4-Biphenyl ethyl ether.....	46	139
Benzyl methyl sulfide.....	46	421	2-Biphenyl methyl ether.....	10	137
1-Benzyl naphthalene.....	40	44	4-Biphenyl methyl ether.....	51	139
2-Benzyl naphthalene.....	39	44	Biphenyl-4-sulfonamide.....	390	407
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2-Benzyl-2-pyrroline.....	275	438	6,6'-Biquinolyl.....	90	325
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Benzyl sulfonic acid.....	9	371	Bis(2-chloroethyl)ethylamine.....	263	438
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Bicyclo[4,2,0]oct-2-ene.....	241	19	1,2-Bis(ethylamino)ethane.....	394	439
Bicyclo[4,2,0]oct-3-ene.....	2	25	1,2-Bis(furfurylamino)ethane.....	300	438
Bicyclo[4,2,0]oct-7-ene.....	230	19	Bis(2-hydroxyethyl)amine.....	305	438
Bicyclo[4,7]pentadiene.....	3	26	Bis(2-hydroxyethyl)-methyl amine.....	299	438
Bifluorenylidene.....	182	50	2,2-Bis(hydroxyethyl)-1,3-propanediol.....	69	90
2,2'-Bifuroyl.....	185	178	1,2-Bis(isopropylamino)ethane.....	388	439
Bi- α -naphthol.....	587	127	Bis(2-mercaptoethyl)ether.....	41	415
1,1'-Binaphthyl.....	160	49	Bis(4-mercaptophenyl)ether.....	30	417
1,2'-Binaphthyl.....	71	46	1,2-Bis(methylamino)ethane.....	370	439
2,2'-Binaphthyl.....	178	50	1,4-Bis(methylamino)ethane.....	61	304

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	Compound No.	Page No.		Compound No.	Page No.
1,3-Bis(2-nitrophenylthio)propane	68	426	2-Bromobenzoyl bromide	6	219
1,2-Bis(phenylthio)ethane	38	426	4-Bromobenzoyl bromide	11	219
Bis(phenylthio)methane	24	425	2-Bromobenzoyl chloride	56	213
1,2-Bis(propylamino)ethane	380	439	3-Bromobenzoyl chloride	55	213
Bis(4-thiophenyl)sulfide	39	417	4-Bromobenzoyl chloride	5	216
1,2-Bis(tolylthio)ethane	48	426	2-Bromobenzoylformic acid	99	197
Biuret	411	243	2-Bromobenzyl bromide	2	59
Bornane	79	9	3-Bromobenzyl bromide	3	59
"Borneo camphor"	66	90	4-Bromobenzyl bromide	7	59
α -Borneol	66	90	4-Bromobenzyl chloride	2	57
d -Bornyl acetate	21	274	2-Bromobenzyl cyanide	15	357
<i>trans</i> -Bornylamine	373	439	4-Bromobenzyl cyanide	45	359
<i>trans</i> -Brassicic acid	51	195	2-Bromobiphenyl	17	73
Brometone	63	90	4-Bromobiphenyl	6	74
Bromoacetamide	76	233	α -Bromobutanoic acid	39	191
Bromoacetanilide	224	237	β -Bromobutanoic acid	1	193
2-Bromoacetanilide	111	233	1-Bromo-2-butanone	75	163
3-Bromoacetanilide	69	232	α -Bromobutyric acid	39	191
4-Bromoacetanilide	331	240	β -Bromobutyric acid	1	193
Bromoacetic acid	41	194	DL- α -Bromobutyric anhydride	1	224
"	129	430	DL- α -Bromobutyryl bromide	11	218
Bromoacetic anhydride	11	225	DL- α -Bromobutyryl chloride	31	212
Bromoacetone	33	162	3-Bromocamphor-8-sulfonamide	117	396
2-Bromoacetophenone	52	169	D-3-Bromocamphor-10-sulfonamide	147	397
3-Bromoacetophenone	97	170	10-Bromocamphor-3-sulfonamide	31	393
4-Bromoacetophenone	52	173	3-Bromocamphor-8-sulfonic acid	43	372
<i>w</i> -Bromoacetophenone	51	173	3-Bromocamphor-10-sulfonic acid	59	373
Bromoacetyl bromide	8	218	10-Bromocamphor-3-sulfonic acid	8	371
Bromoacetyl chloride	24	212	3-Bromocamphor-8-sulfonyl chloride	215	388
<i>cis</i> -2-Bromoallocinnamic acid	158	199	3-Bromocamphor-10-sulfonyl chloride	68	383
2-Bromoaniline	10	303	10-Bromocamphor-3-sulfonyl chloride	138	385
"	54	436	4-Bromocatechol	151	104
3-Bromoaniline	167	300	Bromochloroacetic acid	14	193
"	105	436	1-Bromo-4-chlorobenzene	19	71
4-Bromoaniline	98	305	1-Bromo-2-chloroethane	12	63
"	116	436	2-Bromo-4-chlorophenol	16	96
3-Bromo- <i>o</i> -anisidine	93	305	1-Bromo-3-chloropropane	18	63
4-Bromo- <i>o</i> -anisidine	187	308	<i>erythro</i> -2-Bromo-3-chlorosuccinic acid	17	429
2-Bromo- <i>p</i> -anisidine	87	305	<i>threo</i> -2-Bromo-3-chlorosuccinic acid	19	429
2-Bromoanisole	84	135	<i>trans</i> - α -Bromocinnamic acid	178	200
4-Bromoanisole	86	135	<i>trans</i> -2-Bromocinnamic acid	371	432
3-Bromobenzaldehyde	86	149	4-Bromocinnamic acid	384	209
4-Bromobenzaldehyde	43	155	4-Bromo- <i>m</i> -cresol	71	100
2-Bromobenzamide	298	239	5-Bromo- <i>m</i> -cresol	55	99
3-Bromobenzamide	301	239	4-Bromo- <i>o</i> -cresol	72	100
4-Bromobenzamide	402	242	5-Bromo- <i>o</i> -cresol	124	103
2-Bromobenzanilide	258	238	2-Bromo- <i>p</i> -cresol	54	99
3-Bromobenzanilide	247	237	3-Bromo- <i>p</i> -cresol	50	99
Bromobenzene	1	73	γ -Bromocrotonic acid	72	196
2-Bromobenzene-1,4-dicarboxylic acid	403	210	1-Bromo-4-cyanonaphthalene	141	363
2-Bromobenzenesulfonamide	252	401	1-Bromo-5-cyanonaphthalene	194	365
4-Bromobenzenesulfonamide	182	398	2-Bromocymene	13	73
4-Bromobenzenesulfonanilide	56	394	2-Bromo-1,4-diaminobenzene	122	306
2-Bromobenzenesulfonic acid	114	375	2-Bromo-4,6-dichlorophenol	89	101
4-Bromobenzenesulfonic acid	73	373	3-Bromo-2,6-dichlorophenol	113	102
2-Bromobenzenesulfonyl chloride	38	382	Bromodicyanomethane	169	364
4-Bromobenzenesulfonyl chloride	88	383	2-Bromo-1,4-dihydroxy-9,10-anthraquinone	46	184
2-Bromobenzoic acid	226	202	6-Bromo-1,4-dihydroxy-9,10-anthraquinone	27	182
"	122	430	4-Bromo-1,2-dihydroxybenzene	151	104
3-Bromobenzoic acid	235	202	3-Bromo-1,2-dihydroxynaphthalene	253	109
"	253	431	4-Bromo-1,5-dihydroxynaphthalene	250	109
4-Bromobenzoic acid	382	209	2-Bromo-4,6-dimethylaniline	48	304
"	277	431	4-Bromo-2,6-dimethylaniline	100	436
2-Bromobenzoic anhydride	31	225	2-Bromo-N,N-dimethylaniline	145	437
3-Bromobenzoic anhydride	66	226	3-Bromo-N,N-dimethylaniline	93	321
4-Bromobenzoic anhydride	80	227	4-Bromo-N,N-dimethylaniline	141	437
2-Bromobenzonitrile	59	359	1-Bromo-2,3-dimethylbenzene	9	73
3-Bromobenzonitrile	30	358	4-Bromo-2,5-dimethylbenzoic acid	267	204
4-Bromobenzonitrile	156	364	5-Bromo-2,4-dimethylbenzoic acid	280	204
2-Bromobenzophenone	35	173	4-Bromo-2,5-dimethylbenzonitrile	142	363
4-Bromobenzophenone	113	175	5-Bromo-2,4-dimethylbenzonitrile	113	362
2-Bromo-1,4-benzoquinone	4	181	2-Bromo-4,5-dimethylphenol	123	102

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Compound		Page	Compound		Page
No.	No.	No.	No.	No.	No.
1-Bromo-2,4-dinitrobenzene	40	338	3-Bromo-5-methylaniline	16	303
4-Bromo-1,3-dinitrobenzene	40	338	4-Bromo-2-methylaniline	69	304
2-Bromo-3,5-dinitrobenzoic acid	339	207	"	104	436
4-Bromo-3,5-dinitrobenzoic acid	305	205	4-Bromo-3-methylaniline	132	307
4-Bromo-1,5-dinitronaphthalene	97	341	5-Bromo-2-methylaniline	8	303
4-Bromo-1,8-dinitronaphthalene	111	341	3-Bromo-4-methylbenzenesulfonamide	131	396
2-Bromo-4,6-dinitrophenol	261	109	4-Bromo-2-methylbenzenesulfonamide	193	399
4-Bromo-2,6-dinitrophenol	118	102	4-Bromo-3-methylbenzenesulfonamide	119	396
2-Bromoethanol	43	82	5-Bromo-2-methylbenzenesulfonamide	183	398
2-Bromo-4-ethoxyaniline	2	302	3-Bromo-4-methylbenzenesulfonic acid	52	372
3-Bromo-4-ethoxyaniline	38	304	4-Bromo-2-methylbenzenesulfonic acid	81	373
5-Bromo-2-ethoxyaniline	65	304	4-Bromo-3-methylbenzenesulfonic acid	45	372
β -Bromoethyl acetate	112	255	5-Bromo-2-methylbenzenesulfonic acid	74	373
2-Bromoethylamine	298	438	3-Bromo-4-methylbenzenesulfonyl chloride	59	382
1-Bromo-2-ethylbenzene	4	73	4-Bromo-2-methylbenzenesulfonyl chloride	36	382
1-Bromo-4-ethylbenzene	5	73	4-Bromo-3-methylbenzenesulfonyl chloride	34	382
2-Bromo-4-ethylphenol	8	94	5-Bromo-2-methylbenzenesulfonyl chloride	14	381
β -Bromoethyl phenyl ether	11	137	2-Bromo-4-methylbenzoic acid	205	201
Bromoethyl sulfide	8	425	4-Bromo-2-methylbenzoic acid	298	205
Bromoform	7	65	(2-Bromomethyl)butyric acid	272	431
4-Bromofuran-2-carboxylic acid	174	200	Bromomethyl ethyl ketone	75	163
5-Bromofuran-2-carboxylic acid	295	205	2-Bromo-4-methyl-5-nitrobenzoic acid	324	206
2-Bromohexane	19	58	4-Bromo-2-methyl-6-nitrobenzoic acid	352	208
6-Bromo-2-hexanone	171	166	6-Bromo-4-methyl-2-nitrobenzoic acid	330	207
6-Bromo- <i>n</i> -hexylamine	407	439	2-Bromo-4-methyl-3-nitrophenol	115	102
Bromohydroquinone	228	108	2-Bromo-4-methyl-5-nitrophenol	203	106
3-Bromo-4-hydroxyaniline	370	315	2-Bromo-4-methyl-6-nitrophenol	90	101
4-Bromo-3-hydroxyaniline	335	313	6-Bromo-2-methyl-4-nitrophenol	270	110
5-Bromo-2-hydroxyaniline	283	311	3-Bromo-2-methylbenzoic acid	190	430
3-Bromo-2-hydroxybenzoic acid	289	204	6-Bromo-2-methylbenzoic acid	69	429
5-Bromo-2-hydroxybenzoic acid	255	203	2-Bromo-4-methylphenol	54	99
3-Bromo-2-hydroxybenzotrile	50	359	3-Bromo-4-methylphenol	50	99
5-Bromo-2-hydroxybenzotrile	202	366	4-Bromo-2-methylphenol	72	100
3-Bromo-4-hydroxybiphenyl	174	105	4-Bromo-3-methylphenol	71	100
3-Bromo-2-hydroxy-5-methylaniline	165	308	5-Bromo-2-methylphenol	124	103
5-Bromo-2-hydroxy-3-methylaniline	236	310	5-Bromo-3-methylphenol	55	99
5-Bromo-2-hydroxy-4-methylaniline	243	310	6-Bromo-2-methylquinoline	62	324
5-Bromo-4-hydroxy-2-methylaniline	439	317	1-Bromo-2-naphthaldehyde	105	159
5-Bromo-2-hydroxy-3-methylbenzoic acid	366	208	1-Bromonaphthalene	16	73
4-Bromo-3-hydroxy-2-naphthoic acid	362	208	2-Bromonaphthalene	2	74
5-Bromo-2-hydroxy-3-toluic acid	366	208	3-Bromo-1,2-naphthalenediol	253	109
α -Bromoisobutanoic acid	36	194	4-Bromo-1,5-naphthalenediol	250	109
2-Bromoisobutyraldehyde	28	145	1-Bromonaphthalene-2-sulfonamide	451	409
α -Bromoisobutyramide	277	238	2-Bromonaphthalene-1-sulfonamide	98	395
α -Bromoisobutyranilide	59	232	4-Bromonaphthalene-1-sulfonamide	295	403
α -Bromoisobutyric acid	36	194	5-Bromonaphthalene-1-sulfonamide	393	407
α -Bromoisobutyric anhydride	23	225	5-Bromonaphthalene-2-sulfonamide	360	406
2-Bromoisobutyronitrile	27	347	6-Bromonaphthalene-1-sulfonamide	353	405
α -Bromoisobutyryl bromide	10	218	6-Bromonaphthalene-2-sulfonamide	334	405
α -Bromoisobutyryl chloride	21	214	7-Bromonaphthalene-1-sulfonamide	335	405
1-Bromo-2-isopropylbenzene	7	73	7-Bromonaphthalene-2-sulfonamide	355	405
1-Bromo-4-isopropylbenzene	11	73	8-Bromonaphthalene-2-sulfonamide	262	402
4-Bromo-5-isopropyl-2-methylphenol	37	98	2-Bromonaphthalene-1-sulfonic acid	35	372
4-Bromoisoquinoline	14	323	4-Bromonaphthalene-1-sulfonic acid	140	376
8-Bromoisoquinoline	47	323	1-Bromonaphthalene-2-sulfonyl chloride	124	384
α -Bromoisovaleramide	237	237	2-Bromonaphthalene-1-sulfonyl chloride	140	385
α -Bromoisovaleranyl chloride	181	235	4-Bromonaphthalene-1-sulfonyl chloride	111	384
<i>d,l</i> - α -Bromoisovaleric acid	30	194	5-Bromonaphthalene-1-sulfonyl chloride	131	385
DL- α -Bromoisovaleryl bromide	13	218	5-Bromonaphthalene-2-sulfonyl chloride	135	385
DL- α -Bromoisovaleryl chloride	19	214	6-Bromonaphthalene-1-sulfonyl chloride	90	383
Bromol	171	105	6-Bromonaphthalene-2-sulfonyl chloride	198	387
Bromomalonic acid	142	198	7-Bromonaphthalene-1-sulfonyl chloride	236	388
Bromomalonitrile	77	360	7-Bromonaphthalene-2-sulfonyl chloride	151	385
3-Bromomandelic acid	183	430	8-Bromonaphthalene-2-sulfonyl chloride	186	387
2-Bromo-6-methoxyaniline	93	305	5-Bromo-1-naphthoic acid	390	209
3-Bromo-4-methoxyaniline	87	305	7-Bromo-1-naphthoic acid	369	208
"	131	437	8-Bromo-1-naphthoic acid	275	204
5-Bromo-2-methoxyaniline	187	308	1-Bromo-2-naphthol	141	103
2-Bromo-4-methylaniline	154	300	3-Bromo-2-naphthol	142	103
3-Bromo-2-methylaniline	169	300	4-Bromo-1-naphthol	305	112
3-Bromo-4-methylaniline	3	303	4-Bromo-2-naphthol	279	110

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	Compound No.	Page No.		Compound No.	Page No.
2-Bromo- <i>p</i> -toluidine	3	303	<i>n</i> -Butylamine	17	295
3-Bromo- <i>p</i> -toluidine	154	300	" "	412	439
α -Bromo-2-tolunitrile	89	361	Di- <i>n</i> -butylamine	65	297
α -Bromo-3-tolunitrile	122	362	DL- <i>sec-n</i> -Butylamine	13	295
α -Bromo-4-tolunitrile	160	364	<i>tert</i> -Butylamine	6	295
2-Bromo-4-tolunitrile	38	358	" "	427	439
3-Bromo-4-tolunitrile	44	359	(<i>tert</i> -Butylamino)cyclohexane	463	439
5-Bromo-2-tolunitrile	88	361	2-(Butylamino)ethylamine	381	439
1-Bromo-2-vinylbenzene	6	73	<i>N-n</i> -Butylaniline	159	300
1-Bromo-4-vinylbenzene	8	73	" "	198	437
5-Bromo- <i>m</i> -4-xylydine	48	304	2- <i>n</i> -Butylaniline	4	302
1,2-Butadiene	11	12	4- <i>n</i> -Butylaniline	174	300
1,3-Butadiene	7	12	<i>N-tert</i> -Butylaniline	273	438
1,3-Butadiyne	4	28	2- <i>tert</i> -Butylaniline	147	299
Butanal	11	144	" "	192	437
<i>n</i> -Butane	6	3	3- <i>tert</i> -Butylaniline	171	437
Butanedial	59	147	4- <i>tert</i> -Butylaniline	139	299
Butane-1,4-dicarboxylic acid	232	202	" "	187	437
Butanedioic acid	294	205	<i>N-n</i> -Butylaziridine	287	438
<i>d,l</i> -1,3-Butanediol	105	85	<i>n</i> -Butylbenzene	26	36
1,4-Butanediol	119	86	<i>sec</i> -Butylbenzene	16	35
2,3-Butanediol	83	84	<i>tert</i> -Butylbenzene	13	35
2,3-Butanedione	5	161	<i>n</i> -Butyl benzoate	288	266
1,4-Butanedithiol	34	414	2- <i>tert</i> -Butylbenzoic acid	211	430
Butane-1-sulfonamide	5	392	4- <i>tert</i> -Butylbenzoic acid	368	432
Butane-1,2,3,4-tetracarboxylic acid (low melting form)	306	205	<i>n</i> -Butyl bromide	11	58
Butane-1,2,3,4-tetracarboxylic acid (high melting form)	368	208	<i>sec</i> -Butyl bromide	10	58
1-Butanethiol	9	413	<i>tert</i> -Butyl bromide	8	58
2-Butanethiol	6	413	<i>n</i> -Butyl <i>tert</i> -butyl ketone	100	164
Butane-1,1,4-tricarboxylic acid	202	201	<i>n</i> -Butyl <i>n</i> -butyrate	115	255
<i>n</i> -Butanoic acid	10	190	<i>tert</i> -Butyl <i>n</i> -butyrate	84	253
" "	441	432	<i>n</i> -Butyl <i>n</i> -caproate	185	259
1-Butanol	14	80	<i>n</i> -Butyl <i>n</i> -caprylate	275	265
2-Butanol	7	80	<i>n</i> -Butyl carbamate	13	231
2-Butanone	3	161	<i>d-sec</i> -Butyl carbinol	23	81
2-Butenal	22	145	<i>tert</i> -Butyl carbinol	28	89
1-Butene	6	12	<i>n</i> -Butyl carbonate	184	259
<i>cis</i> -2-Butene	10	12	<i>n</i> -Butyl cellosolve	60	134
<i>trans</i> -2-Butene	8	8	Butyl cellosolve benzoate	4	272
<i>cis</i> -Butenedioic acid	175	200	<i>n</i> -Butylchloral	58	147
<i>trans</i> -Butenedioic acid	399	209	<i>n</i> -Butyl chloride	13	55
<i>cis</i> -2-Butenoic acid	13	190	<i>sec</i> -Butyl chloride	10	55
<i>trans</i> -2-Butenoic acid	71	195	<i>tert</i> -Butyl chloride	8	55
3-Butenoic acid	12	190	<i>n</i> -Butyl chloroacetate	129	256
3-Buten-1-ol	11	80	<i>n</i> -Butyl chloroformate	80	253
<i>d,l</i> -3-Buten-2-ol	4	80	4-Butyl- <i>o</i> -cresol	289	111
3-Buten-2-one	2	161	6- <i>tert</i> -Butyl- <i>m</i> -cresol	38	98
<i>n</i> -Butoxybenzene	82	135	<i>tert</i> -Butylcyanide	10	345
2-Butoxybenzoic acid	332	431	Butyl cyanoacetate	6	355
2- <i>n</i> -Butoxyethanol	61	83	<i>n</i> -Butylcyclohexane	243	7
2- <i>sec</i> -Butoxyethanol	52	82	<i>n</i> -Butyl cyclooctatetraene	3	25
2-(2- <i>n</i> -Butoxyethoxy)ethanol	118	86	<i>n</i> -Butylcyclopentane	164	5
β - <i>n</i> -Butoxyethyl benzoate	4	272	<i>n</i> -Butyl dimethyl amine	375	439
2-Butoxytoluene	93	135	<i>tert</i> -Butyl dimethyl amine	428	439
<i>tert</i> -Butylacetaldehyde	21	145	4- <i>tert</i> -Butyl-1,3-dimethylbenzene	94	38
4- <i>n</i> -Butylacetanilide	138	234	<i>n</i> -Butyl <i>n</i> -enanthatate	227	262
<i>n</i> -Butyl acetate	54	252	<i>d,l</i> -1,3-Butylene glycol	105	85
<i>sec</i> -Butyl acetate	40	251	2,3-Butylene glycol	83	84
<i>tert</i> -Butyl acetate	22	250	α -Butylene oxide	13	131
<i>tert</i> -Butylacetic acid	17	190	<i>n</i> -Butyl ether	54	133
<i>tert</i> -Butylacetoneitrile	21	358	Butyl ethyl acetylene	44	29
4- <i>n</i> -Butylacetophenone	62	170	1- <i>tert</i> -Butyl-4-ethylbenzene	97	39
<i>n</i> -Butyl acetylene	17	28	<i>n</i> -Butyl ethyl ether	31	132
<i>sec</i> -Butyl acetylene	16	28	<i>sec</i> -Butyl ethyl ether	24	132
<i>tert</i> -Butyl acetylene	8	28	<i>tert</i> -Butyl ethyl ether	20	132
<i>n</i> -Butyl alcohol	14	80	<i>n</i> -Butyl ethyl ketone	64	163
<i>d,l-sec</i> -Butyl alcohol	7	80	<i>sec</i> -Butyl ethyl ketone	35	162
<i>tert</i> -Butyl alcohol	7	88	<i>tert</i> -Butyl ethyl ketone	23	161
<i>n</i> -Butylallene	135	16	<i>n</i> -Butyl ethyl sulfide	27	420
<i>tert</i> -Butylallene	77	14	<i>sec</i> -Butyl ethyl sulfide	21	420
			<i>n</i> -Butyl formate	35	251
			<i>sec</i> -Butyl formate	21	250

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	Compound No.	Page No.		Compound No.	Page No.
<i>tert</i> -Butyl formate	14	250	4- <i>n</i> -Butylphenol	3	96
<i>N-n</i> -Butylglycine	86	429	2- <i>sec</i> -Butylphenol	14	94
<i>n</i> -Butyl <i>n</i> -heptanoate	227	262	4- <i>tert</i> -Butylphenol	192	106
<i>n</i> -Butyl <i>n</i> -hexanoate	185	259	<i>n</i> -Butyl phenylacetate	293	266
<i>n</i> -Butyl 2-hydroxybenzoate	27	95	(4- <i>tert</i> -Butylphenyl) acetic acid	374	432
<i>n</i> -Butyl 4-hydroxybenzoate	47	434	<i>n</i> -Butyl phenyl ether	82	135
<i>n</i> -Butyl iodide	11	60	<i>n</i> -Butyl phenyl ketone	207	168
<i>sec</i> -Butyl iodide	8	60	<i>tert</i> -Butyl phenyl ketone	181	167
<i>tert</i> -Butyl iodide	7	60	<i>n</i> -Butyl phthalate	355	271
<i>n</i> -Butyl isobutyl ketone	102	164	1- <i>n</i> -Butylpiperidine	392	439
<i>sec</i> -Butyl isobutyl ketone	103	175	<i>tert</i> -Butylpropionic acid	37	194
<i>tert</i> -Butyl isobutyl ketone	85	163	<i>n</i> -Butyl propionate	88	254
<i>tert</i> -Butyl isobutyrate	56	252	<i>n</i> -Butyl propyl acetylene	46	29
3- <i>tert</i> -Butyl-1-isopropylbenzene	118	39	<i>n</i> -Butyl <i>n</i> -propyl ketone	107	164
4- <i>tert</i> -Butyl-1-isopropylbenzene	120	39	<i>tert</i> -Butyl <i>n</i> -propyl ketone	57	163
<i>n</i> -Butyl isopropyl ether	40	133	2- <i>tert</i> -Butylpyridine	233	437
<i>sec</i> -Butyl isopropyl ketone	53	162	3- <i>tert</i> -Butylpyridine	236	437
<i>tert</i> -Butyl isopropyl ketone	30	162	4- <i>tert</i> -Butylpyridine	244	438
<i>n</i> -Butyl lactate	151	257	<i>n</i> -Butyl salicylate	27	95
<i>n</i> -Butyl levulinate	257	264	" "	318	268
<i>sec</i> -Butyl levulinate	222	262	<i>n</i> -Butyl stearate	19	274
<i>n</i> -Butylmalonic acid	118	197	<i>n</i> -Butyl styryl ketone	25	172
<i>sec</i> -Butylmalonic acid	76	196	<i>n</i> -Butyl sulfide	41	421
<i>n</i> -Butyl mercaptan	9	413	<i>tert</i> -Butyl sulfide	29	420
<i>sec</i> -Butyl mercaptan	6	413	2- <i>n</i> -Butylthiophene	46	424
<i>tert</i> -Butyl mercaptan	4	413	3- <i>n</i> -Butylthiophene	48	424
<i>n</i> -Butyl methoxymethyl ketone	106	164	2- <i>tert</i> -Butylthiophene	39	424
<i>sec</i> -Butyl methoxymethyl ketone	95	164	3- <i>tert</i> -Butylthiophene	40	424
<i>tert</i> -Butyl methoxymethyl ketone	87	163	2-Butyltoluene	67	38
<i>n</i> -Butyl methylacetic acid	37	191	3-Butyltoluene	79	38
<i>n</i> -Butyl methyl acetylene	39	29	4-Butyltoluene	86	38
<i>tert</i> -Butyl methyl acetylene	23	29	2- <i>sec</i> -Butyltoluene	54	37
<i>n</i> -Butyl methyl amine	25	295	3- <i>sec</i> -Butyltoluene	48	37
DL- <i>sec</i> -Butyl methyl amine	19	295	4- <i>sec</i> -Butyltoluene	64	37
2-Butyl-1-methylbenzene	67	38	2- <i>tert</i> -Butyltoluene	65	38
3-Butyl-1-methylbenzene	79	38	3- <i>tert</i> -Butyltoluene	38	36
4-Butyl-1-methylbenzene	86	38	4- <i>tert</i> -Butyltoluene	44	37
2- <i>sec</i> -Butyl-1-methylbenzene	54	37	<i>n</i> -Butyl 2-tolyl ether	93	135
3- <i>sec</i> -Butyl-1-methylbenzene	48	37	<i>n</i> -Butyl urethane	13	231
4- <i>sec</i> -Butyl-1-methylbenzene	64	37	<i>n</i> -Butyl <i>n</i> -valerate	147	257
2- <i>tert</i> -Butyl-1-methylbenzene	65	38	<i>sec</i> -Butyl <i>n</i> -valerate	127	256
3- <i>tert</i> -Butyl-1-methylbenzene	38	36	2-Butynal	26	145
4- <i>tert</i> -Butyl-1-methylbenzene	44	37	1-Butyne	3	28
<i>n</i> -Butyl methyl carbinol	33	81	2-Butyne	6	28
<i>sec</i> -Butyl methyl carbinol	28	81	2-Butynoic acid	110	430
<i>tert</i> -Butyl methyl carbinol	16	80	3-Butyn-2-one	4	161
<i>n</i> -Butyl methyl ether	19	132	<i>n</i> -Butyraldehyde	11	144
<i>tert</i> -Butyl methyl ether	10	131	<i>n</i> -Butyramide	179	235
<i>n</i> -Butylmethylglycol aldehyde	11	150	<i>N</i> -Butyranilide	89	233
<i>n</i> -Butyl-methylglucolic acid	16	193	<i>n</i> -Butyric acid	10	190
<i>n</i> -Butyl methyl ketone	24	161	" "	441	432
<i>sec</i> -Butyl methyl ketone	16	161	<i>n</i> -Butyric anhydride	9	223
<i>tert</i> -Butyl methyl ketone	12	161	Butyrolin	132	165
4-Butyl-2-methylphenol	289	111	Butyronitrile	14	345
2- <i>tert</i> -Butyl-5-methylphenol	38	98	<i>n</i> -Butyrophenone	191	167
<i>n</i> -Butyl methyl sulfide	18	420	<i>n</i> -Butyrylacetone	121	165
<i>tert</i> -Butyl methyl sulfide	10	420	<i>n</i> -Butyryl bromide	5	218
1-Butylnaphthalene	167	41	<i>n</i> -Butyryl chloride	9	212
2-Butylnaphthalene	170	41	<i>n</i> -Butyryl fluoride	5	211
1- <i>tert</i> -Butylnaphthalene	169	41	<i>n</i> -Butyryl iodide	3	221
2- <i>tert</i> -Butylnaphthalene	168	41	C		
<i>n</i> -Butyl-2-naphthyl ether	18	137	Cadaverine	76	297
<i>sec</i> -Butyl-2-naphthyl ether	15	137	Camphane	79	9
<i>n</i> -Butyl nitrate	69	253	<i>d,l</i> -Camphene	10	26
Butyl nitrite	8	250	<i>l</i> -Camphene	11	26
1- <i>tert</i> -Butyl-4-nitrobenzene	33	336	<i>d,l-cis</i> -Camphenecamphoric acid	190	200
<i>n</i> -Butyl <i>n</i> -octanoate	275	265	<i>d,l-trans</i> -Camphenecamphoric acid	163	199
<i>n</i> -Butyl oxalate	266	264	<i>d,l-cis</i> -Camphenic acid	190	200
<i>n</i> -Butyl oxamate	71	232	<i>d,l-trans</i> -Camphenic acid	163	199
<i>n</i> -Butyl <i>n</i> -pentanoate	147	257	Campholene	237	19
<i>sec</i> -Butyl <i>n</i> -pentanoate	127	256			
2- <i>n</i> -Butylphenol	17	94			

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	Compound No.	Page No.	Compound No.	Page No.
β -Campholenic acid	45	194	4-Carboxamidobenzen sulfonamide	403 407
<i>d</i> -Campholic acid	129	198	1-Carboxamido-3-nitro-benzenesulfonanilide	376 406
<i>l</i> -Campholic acid	131	198	2-Carboxamidophenol	41 434
Campholic nitrile	93	361	4-Carboxanilidobenzenesulfonanilide	437 408
<i>d,l</i> - α -Campholytic acid	24	193	3-Carboxybenzenesulfonamide	199 399
β -Campholytic acid	187	200	2-Carboxybenzenesulfonanilide	291 403
Δ^2 -Campholytic acid	97	196	2-Carboxybenzenesulfonic acid	139 376
β -Campholytonitrile	65	350	3-Carboxybenzenesulfonic acid	84 373
<i>d,l</i> -Camphor	192	178	4-Carboxybenzenesulfonic acid	184 377
<i>d</i> -Camphoric acid	303	205	2-Carboxybenzenesulfonyl chloride	92 383
<i>D</i> -Camphoric acid diamide	413	243	3-Carboxybenzenesulfonyl chloride	8 381
<i>D</i> -Camphoric acid dianilide	479	245	4-Carboxybenzenesulfonyl chloride	53 382
<i>D</i> -Camphoric acid monoamide	367	241	2-Carboxy-2'-cyanobiphenyl	212 366
<i>D</i> -Camphoric acid monoanilide	437	243	2-Carboxy-5-methylbenzenesulfonamide	250 401
<i>D</i> -Camphoric anhydride	81	227	2-Carboxy-5-methylbenzenesulfonic acid	111 375
Camphorquinone	31	183	5-Carboxy-2-methylbenzenesulfonyl chloride	56 382
<i>D</i> -Camphor-3-sulfonamide	104	395	4-Carboxy-3-nitrobenzenesulfonamide	280 402
<i>D</i> -Camphor-8-sulfonamide	92	395	4-Carboxy-3-nitrobenzenesulfonic acid	169 377
<i>DL</i> -Camphor-8-sulfonamide	83	395	4-Carboxy-3-nitrobenzenesulfonyl chloride	250 389
<i>D</i> -Camphor-10-sulfonamide	80	395	(2-Carboxyphenyl)acetic acid	292 205
<i>D</i> -Camphor-3-sulfonanilide	65	394	(2-Carboxyphenyl)acetic anhydride	64 226
<i>D</i> -Camphor-10-sulfonanilide	59	394	<i>d</i> -3-Carboxy-2,2,3-trimethylcyclopentylaceto-	
<i>D</i> -Camphor-2-sulfonic acid	38	372	nitrile	207 366
<i>D</i> -Camphor-8-sulfonic acid	30	372	<i>l</i> -3-Carene	297 22
<i>DL</i> -Camphor-8-sulfonic acid	25	371	<i>l</i> -4-Carene	294 22
<i>D</i> -Camphor-10-sulfonic acid	23	371	<i>cis</i> -Caronic acid	81 429
<i>D</i> -Camphor-3-sulfonyl chloride	112	384	<i>trans</i> -Caronic acid	255 431
<i>D</i> -Camphor-8-sulfonyl chloride	221	388	Carvacrol	19 94
<i>DL</i> -Camphor-8-sulfonyl chloride	162	386	Carvacryl acetate	273 265
<i>D</i> -Camphor-10-sulfonyl chloride	72	383	<i>d</i> -Carvone	192 167
<i>DL</i> -Canaline	27	285	Catechol	207 107
<i>L</i> -Canaline	47	286	"	75 434
<i>L</i> -Canavanine	23	285	Catechol dibenzoate	124 279
Capramide	110	233	Catechol dibenzyl ether	39 138
Capranilide	36	231	Catechol diethyl ether	24 138
Capric acid	13	193	Catechol monomethyl ether	9 137
Capric anhydride	2	225	Cedrene	333 24
Caproaldehyde	38	146	β -Cellobiose	65 333
<i>n</i> -Caproamide	115	233	6-(β -Cellobiosido)- α -D-glucose	66 333
<i>n</i> -Caproanilide	88	233	Cellosolve	51 133
<i>n</i> -Caproic acid	33	191	Cellosolve benzoate	300 267
"	454	432	Cetane	2 8
Caproic anhydride	15	223	Cetyl acetate	13 273
<i>n</i> -Capronitrile	42	348	Cetyl alcohol	25 88
<i>n</i> -Caprophenone	3	172	Cetyl bromide	1 59
Caproylacetic acid	73	196	Cetyl chloride	54 56
<i>n</i> -Caproyl bromide	12	218	Cetyl iodide	1 61
<i>n</i> -Caproyl chloride	32	212	Cetylmalonic acid	161 199
4- <i>n</i> -Caproylresorcinol	53	99	Cetyl mercaptan	2 416
"	62	174	Cetyl palmitate	66 276
Caprylaldehyde	60	147	Cetyl stearate	79 277
<i>n</i> -Caprylamide	161	235	Cetyl sulfonic acid	7 371
Caprylanilide	18	231	Chalcone	66 174
<i>n</i> -Caprylic acid	47	191	<i>D</i> -Chaulmoogramide	144 234
"	456	432	<i>D</i> -Chaulmoogranilide	73 232
Caprylic anhydride	18	223	<i>d</i> -Chaulmoogric acid	69 195
Caprylonitrile	66	350	Chelidonic acid	391 209
<i>n</i> -Capryloyl chloride	40	213	Chloral	19 145
Carballylic acid triamide	441	244	Chloranil	53 184
Carballylic acid trianilide	495	246	Chloranilic acid	51 184
Carbamide	233	237	Chloroacetaldehyde	13 144
Carbanilide	488	245	Chloroacetamide	191 236
Carbazole	457	317	Chloroacetanilide	243 237
4-Carbenzyloxyphenol	43	434	2-Chloroacetanilide	72 232
<i>N</i> -Carbethoxy-1,4-diaminobenzene	114	306	4-Chloroacetanilide	372 241
5-Carbethoxy-2-nitrophenol	16	434	Chloroacetic acid	56 195
4-Carbethoxyphenol	50	434	"	124 430
4-Carbobutoxyphenol	47	434	Chloroacetic anhydride	16 225
5-Carbomethoxy-2-nitrophenol	17	434	Chloroacetone	17 161
4-Carbomethoxyphenol	48	434	Chloroacetone cyanohydrin	13 355
Carbon tetrabromide	2	66	Chloroacetone nitrile	21 346
Carbon tetrachloride	8	63	2-Chloroacetophenone	188 167

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	Compound No.	Page No.		Compound No.	Page No.
3-Chloroacetophenone	184	167	4-Chlorobenzoyl bromide	10	219
4-Chloroacetophenone	194	167	2-Chlorobenzoyl chloride	53	213
<i>w</i> -Chloroacetophenone	68	174	3-Chlorobenzoyl chloride	49	213
Chloroacetyl bromide	4	218	4-Chlorobenzoyl chloride	47	213
Chloroacetyl chloride	12	212	4-Chlorobenzoyl bromide	5	59
Chloroacetyl fluoride	6	211	2-Chlorobenzyl chloride	47	56
Chloroacetyl iodide	2	222	3-Chlorobenzyl chloride	49	56
2-Chloroacrolein	1	152	4-Chlorobenzyl chloride	48	56
<i>cis</i> -3-Chloroacrylic acid	191	430	2-Chlorobenzyl cyanide	10	357
<i>trans</i> -3-Chloroacrylic acid	229	431	4-Chlorobenzyl cyanide	16	357
<i>cis</i> -2-Chloroallocinnamic acid	170	200	2-Chlorobenzylidene chloride	24	63
<i>cis</i> - α -Chloroallocinnamic acid	135	198	3-Chlorobenzylidene chloride	25	63
<i>cis</i> - β -Chloroallocinnamic acid	180	200	4-Chlorobenzylidene chloride	26	63
2-Chloroaniline	102	298	2-Chlorobenzyl phenyl ketone	93	175
"	61	436	3-Chlorobenzyl phenyl ketone	38	173
3-Chloroaniline	144	299	4-Chlorobenzyl phenyl ketone	168	177
"	99	436	4-Chlorobenzyl sulfide	14	425
4-Chloroaniline	112	306	2-Chlorobiphenyl	3	71
"	125	437	3-Chlorobiphenyl	29	70
3-Chloroanistic acid	342	207	4-Chlorobiphenyl	22	71
2-Chloro- <i>p</i> -anisidine	79	305	1-Chloro-2-butanone	40	162
3-Chloro- <i>o</i> -anisidine	162	300	2-Chloro-2-butanal	49	146
3-Chloro- <i>p</i> -anisidine	8	302	3-Chloro- <i>n</i> -butyraldehyde (trimer)	83	157
4-Chloro- <i>o</i> -anisidine	140	307	4-Chloro- <i>n</i> -butyraldehyde	2	152
5-Chloro- <i>o</i> -anisidine	56	304	2-Chlorobutyronitrile	32	347
2-Chloroanisole	79	135	3-Chlorobutyronitrile	48	348
3-Chloroanisole	78	135	4-Chlorobutyronitrile	61	349
4-Chloroanisole	81	135	3-Chlorocatechol	39	98
1-Chloroanthraquinone-2-carboxylic acid	396	209	4-Chlorocatechol	160	104
2-Chlorobenzal chloride	24	63	3-Chlorocinchonic acid	377	208
3-Chlorobenzal chloride	25	63	<i>trans</i> - α -Chlorocinnamic acid	195	201
4-Chlorobenzal chloride	26	63	<i>trans</i> - β -Chlorocinnamic acid	212	201
2-Chlorobenzaldehyde	78	148	<i>trans</i> -2-Chlorocinnamic acid	337	207
3-Chlorobenzaldehyde	1	153	"	327	431
4-Chlorobenzaldehyde	24	154	<i>trans</i> -3-Chlorocinnamic acid	343	432
2-Chlorobenzamide	260	238	<i>trans</i> -4-Chlorocinnamic acid	376	432
3-Chlorobenzamide	241	237	<i>trans</i> - <i>o</i> -Chlorocinnamionitrile	32	358
2-Chlorobenzanilide	177	235	1-Chlorocyclohexanecarboxylic acid	21	192
3-Chlorobenzanilide	195	236	2-Chloro- <i>m</i> -cresol	47	99
4-Chlorobenzanilide	414	243	2-Chloro- <i>p</i> -cresol	3	94
Chlorobenzene	1	70	4-Chloro- <i>m</i> -cresol	78	100
2-Chlorobenzene-1,4-dicarboxylic acid	405	210	6-Chloro- <i>m</i> -cresol	36	98
5-Chlorobenzene-1,3-disulfonamide	372	406	4-Chloro- <i>o</i> -cresol	42	98
5-Chlorobenzene-1,3-disulfonic acid	167	377	5-Chloro- <i>o</i> -cresol	103	102
5-Chlorobenzene-1,3-disulfonyl chloride	163	386	2-Chlorocrotonaldehyde	49	146
2-Chlorobenzene sulfonamide	263	402	α -Chlorocrotonic acid	178	430
3-Chlorobenzene sulfonamide	123	396	β -Chlorocrotonic acid	100	197
4-Chlorobenzene sulfonamide	113	396	γ -Chlorocrotonic acid	87	196
4-Chlorobenzene sulfonanilide	36	393	2-Chlorocrotononitrile	24	347
2-Chlorobenzene sulfonic acid	127	375	<i>trans</i> -4-Chlorocrotononitrile	10	355
3-Chlorobenzene sulfonic acid	47	372	<i>p</i> -Chlorocumene	17	70
4-Chlorobenzene sulfonic acid	41	372	1-Chloro-4-cyanonaphthalene	154	364
2-Chlorobenzene sulfonyl chloride	12	381	5-Chloro-1-cyanonaphthalene	191	365
4-Chlorobenzene sulfonyl chloride	42	382	5-Chloro-2-cyanonaphthalene	190	365
2-Chlorobenzoic acid	213	201	4-Chloro-2-cyanophenol	208	366
"	130	430	2-Chloro- <i>p</i> -cymene	26	70
3-Chlorobenzoic acid	243	203	3-Chloro- <i>p</i> -cymene	27	70
"	254	431	4-Chloro-1,3-diaminobenzene	160	307
4-Chlorobenzoic acid	375	208	2-Chloro-4,6-dibromoaniline	176	308
"	280	431	4-Chloro-2,6-dibromoaniline	166	308
2-Chlorobenzoic anhydride	33	225	4-Chloro-2,6-dibromophenol	164	104
3-Chlorobenzoic anhydride	39	225	4-Chloro-3,5-dibromophenol	275	110
4-Chlorobenzoic anhydride	74	226	<i>N</i> -Chlorodiethylamine	25	436
2-Chlorobenzonitrile	35	358	3-Chloro-1,2-dihydroxybenzene	39	98
3-Chlorobenzonitrile	34	358	4-Chloro-1,2-dihydroxybenzene	160	104
4-Chlorobenzonitrile	128	363	4-Chloro-1,3-dihydroxybenzene	214	107
4-Chlorobenzophenone	108	175	2-Chloro- <i>N,N</i> -dimethylaniline	61	320
2-Chloro-1,4-benzoquinone	5	181	2-Chloro-4,6-dimethylaniline	27	303
4-Chloro-1,2-benzoquinone	8	181	1-Chloro-2,3-dimethylbenzene	12	70
2-Chlorobenzotrifluoride	1	71	1-Chloro-2,4-dimethylbenzene	14	70
2-Chlorobenzoyl bromide	4	219	1-Chloro-3,4-dimethylbenzene	16	70
3-Chlorobenzoyl bromide	3	219	2-Chloro-1,4-dimethylbenzene	10	70

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Compound No.	Page No.	Compound No.	Page No.		
4-Chloro-2,5-dimethylbenzenesulfonamide	249	401	2-Chloro-2-hydroxybutyric acid	105	430
4-Chloro-2,5-dimethylbenzenesulfonamide	142	397	5-Chloro-4-hydroxy-2-methylaniline	448	317
4-Chloro-2,5-dimethylbenzenesulfonic acid	110	374	6-Chloro-3-hydroxy-4-methylbenzoic acid	519	123
4-Chloro-2,5-dimethylbenzenesulfonyl chloride	37	382	3-Chloro-2-hydroxy-2-methylpropionitrile	13	355
2-Chloro-2,3-dimethylbutane	29	55	4-Chloro-1-hydroxy-2-naphthoic acid	363	208
3-Chloro-2,2-dimethylbutane	25	55	4-Chloro-3-hydroxy-2-naphthoic acid	359	208
4-Chloro-2,2-dimethylbutane	27	55	5-Chloro-2-hydroxy-3-nitrobenzoic acid	250	203
5-Chloro-2,3-dimethylpentane	36	56	2-Chloro-3-hydroxy-3-phenylpropionic acid	108	430
2-Chloro-3,4-dimethylphenol	6	96	2-Chloro-3-hydroxysuccinic acid	76	429
2-Chloro-4,5-dimethylphenol	101	101	4-Chloro-2-iodophenol	119	102
2-Chloro-4,6-dimethylphenol	11	94	α -Chloroisobutanonic acid	8	193
3-Chloro-4,5-dimethylphenol	190	106	α -Chloroisobutyric acid	8	193
3-Chloro-4,6-dimethylphenol	161	104	" "	135	430
4-Chloro-2,3-dimethylphenol	138	103	α -Chloroisobutyronitrile	13	345
4-Chloro-3,5-dimethylphenol	248	109	β -Chloroisocrotonic acid	54	195
5-Chloro-2,3-dimethylphenol	130	103	1-Chloro-2-isopropylbenzene	13	70
1-Chloro-2,4-dinitrobenzene	22	337	1-Chloro-4-isopropylbenzene	17	70
4-Chloro-1,3-dinitrobenzene	22	337	2-Chloro-4-isopropyl-1-methylbenzene	26	70
5-Chloro-2,4-dinitrobenzotrile	200	366	3-Chloro-4-isopropyl-1-methylbenzene	27	70
4-Chloro-1,3-dinitronaphthalene	101	341	α -Chloroisopropyl methyl ketone	59	163
4-Chloro-1,5-dinitronaphthalene	95	341	α -Chloroisovaleric acid	38	191
4-Chloro-1,8-dinitronaphthalene	117	342	3-Chlorolactic acid	158	430
2-Chloro-4,6-dinitrophenol	239	108	Chloromalonic acid	182	200
4-Chloro-2,6-dinitrophenol	128	103	3-Chloromandelic acid	184	430
" "	4	434	4-Chloromandelic acid	156	199
5-Chloro-2,4-dinitrophenol	163	104	4-Chloromandelonitrile	36	358
α -Chlorodiphenylacetic acid	153	199	2-Chloro-4-methoxyaniline	8	302
2-Chloroethanethiol	16	413	2-Chloro-6-methoxyaniline	162	300
2-Chloroethanol	24	81	3-Chloro-4-methoxyaniline	79	305
1-Chloro-4-ethoxybenzene	1	137	4-Chloro-2-methoxyaniline	56	304
β -Chloroethyl acetate	81	253	5-Chloro-2-methoxyaniline	140	307
1-Chloro-2-ethylbenzene	6	70	3-Chloro-4-methoxybenzenesulfonamide	76	394
1-Chloro-3-ethylbenzene	8	70	3-Chloro-4-methoxybenzenesulfonic acid	21	371
1-Chloro-4-ethylbenzene	9	70	3-Chloro-4-methoxybenzenesulfonyl chloride	101	384
1-Chloro-2-ethylbutane	32	56	3-Chloro-4-methoxybenzoic acid	342	207
2-Chloroethyl chloromethyl sulfide	45	421	8-Chloro-7-methoxynaphthalene-1-sulfonamide	135	397
(2-Chloroethyl)diethylamine	304	438	8-Chloro-7-methoxynaphthalene-1-sulfonamide	302	403
α -Chloroethyl ethyl ether	33	132	8-Chloro-7-methoxynaphthalene-1-sulfonyl chloride	216	388
β -Chloroethyl ethyl ether	39	133	5-Chloro-2-methoxy-1-nitrobenzene	69	339
2-Chloroethyl ethyl sulfide	32	420	Chloromethyl acetate	38	251
1-Chloro-2-ethyl-3-hexane	18	169	2-Chloro-N-methylaniline	118	298
2-Chloroethyl methyl sulfide	25	420	4-Chloro-N-methylaniline	156	300
2-Chloroethyl 4-nitrophenyl sulfide	34	425	2-Chloro-4-methylaniline	130	299
2-Chloroethyl phenyl sulfide	57	421	4-Chloro-2-methylaniline	157	300
2-Chloroethyl sulfide	52	421	4-Chloro-3-methylaniline	138	307
2-Chloroethyl 4-tolyl sulfide	58	421	2-Chloro-4-methylbenzenesulfonamide	255	401
Chloroform	5	63	2-Chloro-5-methylbenzenesulfonamide	146	397
Chlorofumaramide	393	242	3-Chloro-2-methylbenzenesulfonamide	231	400
Chlorofumaric acid	310	206	3-Chloro-4-methylbenzenesulfonamide	85	395
Chlorofumaronitrile	45	348	3-Chloro-6-methylbenzenesulfonamide	115	396
2-Chlorohexane	31	56	4-Chloro-2-methylbenzenesulfonamide	248	401
3-Chlorohexane	30	55	4-Chloro-3-methylbenzenesulfonamide	73	394
<i>o</i> -Chlorohydrocinnamic acid	104	197	5-Chloro-2-methylbenzenesulfonamide	105	395
Chlorohydroquinone	210	107	3-Chloro-4-methylbenzenesulfonamide	27	393
3-Chloro-4-hydroxyaniline	342	313	4-Chloro-3-methylbenzenesulfonamide	25	392
4-Chloro-2-hydroxyaniline	343	314	2-Chloro-4-methylbenzenesulfonic acid	117	375
2-Chloro-3-hydroxybenzaldehyde	112	159	2-Chloro-5-methylbenzenesulfonic acid	57	372
2-Chloro-4-hydroxybenzaldehyde	366	115	3-Chloro-2-methylbenzenesulfonic acid	99	374
" " " "	116	159	3-Chloro-4-methylbenzenesulfonic acid	27	371
2-Chloro-5-hydroxybenzaldehyde	95	158	4-Chloro-2-methylbenzenesulfonic acid	109	374
3-Chloro-2-hydroxybenzaldehyde	36	155	4-Chloro-3-methylbenzenesulfonic acid	20	371
3-Chloro-4-hydroxybenzaldehyde	111	159	5-Chloro-2-methylbenzenesulfonic acid	44	372
4-Chloro-2-hydroxybenzaldehyde	28	154	2-Chloro-4-methylbenzenesulfonyl chloride	30	381
4-Chloro-3-hydroxybenzaldehyde	106	159	2-Chloro-5-methylbenzenesulfonyl chloride	51	382
5-Chloro-2-hydroxybenzaldehyde	88	158	3-Chloro-2-methylbenzenesulfonyl chloride	83	383
2-Chloro-6-hydroxybenzoic acid	109	430	3-Chloro-4-methylbenzenesulfonyl chloride	21	381
3-Chloro-4-hydroxybenzoic acid	262	203	4-Chloro-2-methylbenzenesulfonyl chloride	45	382
5-Chloro-2-hydroxybenzoic acid	268	204	4-Chloro-3-methylbenzenesulfonyl chloride	63	382
3-Chloro-4-hydroxybenzotrile	199	366	5-Chloro-2-methylbenzenesulfonyl chloride	10	381
5-Chloro-2-hydroxybenzotrile	208	366	2-Chloro-4-methylbenzoic acid	237	202
3-Chloro-4-hydroxybiphenyl	112	102	2-Chloro-6-methylbenzoic acid	120	197
5-Chloro-2-hydroxybiphenyl	35	98			

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(4-Chloromethyl)benzoic acid.....	323	206	5-Chloronaphthalene-2-sulfonyl chloride.....	177	386
3-Chloro-2-methylbenzoic acid.....	188	430	6-Chloronaphthalene-1-sulfonyl chloride.....	79	383
4-Chloro-2-methylbenzoic acid.....	269	204	6-Chloronaphthalene-2-sulfonyl chloride.....	170	386
6-Chloro-2-methylbenzoic acid.....	70	429	7-Chloronaphthalene-1-sulfonyl chloride.....	207	387
4-Chloro-3-methyl-2-butanone.....	59	163	7-Chloronaphthalene-2-sulfonyl chloride.....	110	384
DL-3-Chloro-2-methyl-1-butene.....	17	55	8-Chloronaphthalene-1-sulfonyl chloride.....	153	386
3-Chloro-2-methyl-2-butene.....	18	55	8-Chloronaphthalene-2-sulfonyl chloride.....	127	385
2-Chloro-3-methylbutyronitrile.....	37	348	4-Chloro-1-naphthalenethiol.....	12	416
Chloromethyl dichloromethyl sulfide.....	39	421	3-Chloro-2-naphthoic acid.....	345	207
Chloromethyl ethyl ether.....	22	132	4-Chloro-1-naphthoic acid.....	378	209
Chloromethyl ethyl ketone.....	40	162	5-Chloro-2-naphthoic acid.....	393	209
Chloromethyl ethyl sulfide.....	19	420	7-Chloro-1-naphthoic acid.....	376	208
Chloromethyl methyl ether.....	12	131	8-Chloro-1-naphthoic acid.....	266	204
Chloromethyl methyl sulfide.....	11	420	1-Chloro-2-naphthol.....	94	101
2-Chloro-5-methyl-6-nitrobenzene sulfonamide.....	221	400	3-Chloro-1-naphthol.....	346	114
4-Chloro-3-methyl-5-nitrobenzene sulfonamide.....	313	404	4-Chloro-1-naphthol.....	273	110
5-Chloro-2-methyl-3-nitrobenzene sulfonamide.....	187	399	4-Chloro-2-naphthol.....	201	106
5-Chloro-4-methyl-2-nitrobenzene sulfonamide.....	235	401	5-Chloro-1-naphthol.....	315	112
4-Chloro-3-methyl-5-nitrobenzenesulfonic acid.....	147	376	6-Chloro-1-naphthol.....	173	105
5-Chloro-2-methyl-3-nitrobenzenesulfonic acid.....	76	373	7-Chloro-2-naphthol.....	299	111
5-Chloro-4-methyl-2-nitrobenzenesulfonic acid.....	103	374	4-Chloro-1-naphthonitrile.....	154	364
2-Chloro-5-methyl-6-nitrobenzenesulfonyl chloride.....	191	387	5-Chloro-1-naphthonitrile.....	191	365
4-Chloro-3-methyl-5-nitrobenzenesulfonyl chloride.....	41	382	5-Chloro-2-naphthonitrile.....	190	365
5-Chloro-2-methyl-3-nitrobenzenesulfonyl chloride.....	58	382	2-Chloro-1,4-naphthoquinone.....	13	181
5-Chloro-4-methyl-2-nitrobenzenesulfonyl chloride.....	147	385	3-Chloro-1,2-naphthoquinone.....	22	182
2-Chloro-2-methylpentane.....	24	55	4-Chloro-1,2-naphthoquinone.....	29	182
3-Chloro-3-methylpentane.....	28	55	1-Chloro-2-naphthylamine.....	70	305
1-Chloro-2-methyl-3-pentanone.....	1	169	2-Chloro-1-naphthylamine.....	72	305
2-Chloro-3-methylphenol.....	47	99	3-Chloro-1-naphthylamine.....	80	305
2-Chloro-5-methylphenol.....	36	98	4-Chloro-1-naphthylamine.....	190	308
3-Chloro-4-methylphenol.....	3	94	4-Chloro-2-nitroaniline.....	244	310
4-Chloro-2-methylphenol.....	42	98	"	8	436
4-Chloro-3-methylphenol.....	78	100	5-Chloro-2-nitroaniline.....	279	311
5-Chloro-2-methylphenol.....	103	102	4-Chloro-2-nitroanisole.....	69	339
(4-Chloro-2-methylphenoxy)acetic acid.....	189	430	2-Chloro-1-nitrobenzene.....	5	337
Chloromethyl 2-phenylethyl ketone.....	58	174	3-Chloro-1-nitrobenzene.....	18	337
3-Chloro-2-methyl-1-propene.....	12	55	4-Chloro-1-nitrobenzene.....	52	339
4-Chloro-2-methylquinoline.....	19	323	2-Chloro-5-nitrobenzenesulfonamide.....	251	401
Chloromethyl sulfide.....	31	420	4-Chloro-2-nitrobenzenesulfonamide.....	176	398
1-Chloronaphthalene.....	28	70	4-Chloro-3-nitrobenzenesulfonamide.....	214	400
2-Chloronaphthalene.....	14	71	4-Chloro-2-nitrobenzenesulfonanilide.....	93	395
1-Chloronaphthalene-2-sulfonamide.....	435	408	5-Chloro-2-nitrobenzenesulfonanilide.....	164	398
2-Chloronaphthalene-1-sulfonamide.....	134	396	2-Chloro-5-nitrobenzenesulfonic acid.....	113	375
4-Chloronaphthalene-1-sulfonamide.....	258	401	4-Chloro-2-nitrobenzenesulfonic acid.....	69	373
4-Chloronaphthalene-2-sulfonamide.....	191	399	4-Chloro-3-nitrobenzenesulfonic acid.....	91	374
5-Chloronaphthalene-1-sulfonamide.....	377	406	6-Chloro-3-nitrobenzenesulfonic acid.....	119	375
5-Chloronaphthalene-2-sulfonamide.....	350	405	2-Chloro-5-nitrobenzenesulfonyl chloride.....	118	384
6-Chloronaphthalene-1-sulfonamide.....	346	405	4-Chloro-2-nitrobenzenesulfonyl chloride.....	86	383
6-Chloronaphthalene-2-sulfonamide.....	245	401	4-Chloro-3-nitrobenzenesulfonyl chloride.....	25	381
7-Chloronaphthalene-1-sulfonamide.....	399	407	5-Chloro-2-nitrobenzenesulfonyl chloride.....	123	384
7-Chloronaphthalene-2-sulfonamide.....	215	400	2-Chloro-3-nitrobenzoic acid.....	41	429
8-Chloronaphthalene-1-sulfonamide.....	305	403	2-Chloro-4-nitrobenzoic acid.....	206	201
8-Chloronaphthalene-2-sulfonamide.....	247	401	"	39	429
4-Chloronaphthalene-1-sulfonanilide.....	118	396	2-Chloro-5-nitrobenzoic acid.....	61	429
1-Chloronaphthalene-2-sulfonic acid.....	198	378	2-Chloro-6-nitrobenzoic acid.....	12	429
4-Chloronaphthalene-1-sulfonic acid.....	122	375	3-Chloro-2-nitrobenzoic acid.....	364	208
4-Chloronaphthalene-2-sulfonic acid.....	80	373	4-Chloro-2-nitrobenzoic acid.....	211	201
5-Chloronaphthalene-1-sulfonic acid.....	170	377	4-Chloro-3-nitrobenzoic acid.....	283	204
6-Chloronaphthalene-1-sulfonic acid.....	159	376	5-Chloro-2-nitrobenzoic acid.....	200	201
6-Chloronaphthalene-2-sulfonic acid.....	107	374	6-Chloro-3-nitrobenzoic acid.....	256	203
7-Chloronaphthalene-2-sulfonic acid.....	93	374	2-Chloro-3-nitrobenzonitrile.....	131	363
8-Chloronaphthalene-1-sulfonic acid.....	146	376	4-Chloro-2-nitrobenzonitrile.....	133	363
8-Chloronaphthalene-2-sulfonic acid.....	112	375	4-Chloro-3-nitrobenzonitrile.....	135	363
1-Chloronaphthalene-2-sulfonyl chloride.....	104	384	6-Chloro-3-nitrobenzonitrile.....	146	363
2-Chloronaphthalene-1-sulfonyl chloride.....	85	383	4-Chloro-1-nitronaphthalene.....	59	339
4-Chloronaphthalene-1-sulfonyl chloride.....	129	385	5-Chloro-1-nitronaphthalene.....	76	340
4-Chloronaphthalene-2-sulfonyl chloride.....	160	386	8-Chloro-1-nitronaphthalene.....	66	339
			4-Chloro-3-nitro-1,2-naphthoquinone.....	120	342
			2-Chloro-3-nitrophenol.....	274	110
			2-Chloro-4-nitrophenol.....	232	108
			2-Chloro-5-nitrophenol.....	267	110

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3-Chloro-5-nitrophenol	363	115	β -Chloropropionyl chloride	28	212
4-Chloro-2-nitrophenol	149	104	2-Chloropropiophenone	49	169
4-Chloro-3-nitrophenol	300	111	3-Chloropropiophenone	43	173
4-Chloro-4-nitrophenol	42	417	4-Chloropropiophenone	21	172
5-Chloro-2-nitrophenol	15	434	3-Chloropropyl alcohol	54	83
5-Chloro-3-nitrosalicylic acid	250	203	2-Chloropyridine	38	319
4-Chloro-2-nitrotoluene	13	337	"	14	436
6-Chloro-2-nitrotoluene	10	337	3-Chloropyridine	23	319
5-Chloro-2-nitro-4-tolunitrile	121	362	"	74	436
DL-2-Chloropentane	19	55	4-Chloropyridine	21	319
3-Chloropentane	20	55	"	115	436
2-Chloropentanoic acid	43	191	4-Chloropyridine-2-carboxylic acid	286	204
1-Chloro-2-pentene	23	55	4-Chloroquinaldine	19	323
3-Chloro-1-pentene	16	55	2-Chloroquinoline-3-carboxylic acid	372	208
4-Chlorophenacyl bromide	122	176	2-Chloroquinoline-4-carboxylic acid	377	208
2-Chlorophenetole	83	135	2-Chloroquinoline	11	323
4-Chlorophenetole	1	137	3-Chloroquinoline	92	321
2-Chlorophenol	1	94	4-Chloroquinoline	7	323
"	49	434	5-Chloroquinoline	20	323
3-Chlorophenol	15	96	6-Chloroquinoline	15	323
"	61	434	7-Chloroquinoline	8	323
4-Chlorophenol	20	97	8-Chloroquinoline	109	321
"	72	434	α -Chloroquinoline	11	323
2-Chlorophenoxyacetamide	285	238	β -Chloroquinoline	92	321
4-Chlorophenoxyacetamide	238	237	γ -Chloroquinoline	7	323
2-Chlorophenoxyacetanilide	192	236	4-Chlororesorcinol	214	107
4-Chlorophenoxyacetanilide	200	236	3-Chlorosalicylaldehyde	36	155
(2-Chlorophenoxy)acetic acid	217	202	5-Chlorosalicylic acid	268	204
"	147	430	β -Chlorostyrene	45	56
(3-Chlorophenoxy)acetic acid	150	430	<i>o</i> -Chlorostyrene	11	70
(4-Chlorophenoxy)acetic acid	238	202	<i>p</i> -Chlorostyrene	15	70
"	154	430	Chloroterephthalic acid	405	210
(2-Chlorophenyl)acetic acid	102	197	4-Chloro-2,3,5,6-Tetrabromophenol	534	124
"	295	431	1-Chloro-2,2,3,3-tetramethylbutane	5	57
(3-Chlorophenyl)acetic acid	305	431	2-Chlorothiophenol	37	414
(4-Chlorophenyl)acetic acid	127	198	4-Chlorothiophenol	16	416
"	321	431	2-Chlorotoluene	2	70
(2-Chlorophenyl)acetoneitrile	10	357	3-Chlorotoluene	3	70
(4-Chlorophenyl)acetoneitrile	16	357	4-Chlorotoluene	4	70
α -Chloro- α -phenylacetoneitrile	5	355	5-Chloro- <i>o</i> -toluidine	157	300
3-(2-Chlorophenyl)alanine	68	429	6-Chloro- <i>m</i> -toluidine	138	307
3-(3-Chlorophenyl)alanine	60	429	2-Chloro-5-tolunitrile	71	360
3-(4-Chlorophenyl)alanine	48	429	3-Chloro-2-tolunitrile	3	357
2-Chlorophenyl ethyl ketone	49	169	3-Chloro-4-tolunitrile	48	359
3-Chlorophenylglycine	6	429	4-Chloro-2-tolunitrile	83	361
4-Chlorophenyl methyl sulfide	35	421	5-Chloro-2-tolunitrile	41	358
4-Chlorophenyl phenyl sulfide	63	422	6-Chloro-2-tolunitrile	104	362
3-(2-Chlorophenyl)propionic acid	401	432	α -Chloro-3-tolunitrile	82	361
3-(3-Chlorophenyl)propionic acid	402	432	α -Chloro-4-tolunitrile	99	361
3-(2-Chlorophenyl)propionitrile	96	353	4-Chloro-1,2,3-trihydroxy-9,10-anthraquinone	36	183
4-Chlorophenyl sulfide	56	426	2-Chloro-1,3,5-trimethylbenzene	22	70
3-Chlorophthalic anhydride	54	226	3-Chloro-2,2,3-trimethylbutane	33	56
4-Chlorophthalic anhydride	42	226	2-Chloro- <i>n</i> -valeric acid	43	191
4-Chloropicolinic acid	286	204	(2-Chlorovinyl)acetic acid	101	429
Chloroprene	9	55	1-Chloro-2-vinylbenzene	11	70
2-Chloropropane thiol	15	413	1-Chloro-4-vinylbenzene	15	70
1-Chloro-2-propanol	22	81	5-Chloro- <i>m</i> -xylylidine	27	303
<i>d,l</i> -2-Chloro-1-propanol	27	81	Cholanic acid	252	203
3-Chloro-1-propanol	54	83	Cholanthrene	169	50
1-Chloro-2-propanone	17	161	Cholesterol	59	90
1-Chloropropene	5	55	Cholesteryl acetate	147	280
2-Chloropropionaldehyde	14	144	Chrysazol	556	126
3-Chloropropionaldehyde	37	146	Chrysene	195	51
<i>d,l</i> - α -Chloropropionamide	54	232	Chrysenequinone	39	183
<i>d,l</i> - α -Chloropropionanilide	80	233	α -Chrysenic acid	308	205
<i>d,l</i> -2-Chloropropionic acid	18	190	Chrysodiphenic acid	318	206
"	127	430	Chrysofluorene	179	50
3-Chloropropionic acid	25	193	Chrysoquinone	39	183
"	285	431	Cinchol	57	90
3-Chloropropionitrile	49	348	Cinchomeronic acid	389	209
DL- α -Chloropropionyl chloride	13	212	Cinchonic acid	385	209
			Cinnamalacetone	89	175

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Cinnamacetophenone	131	176	Crotonchloral	58	147
Cinnamaldehyde	90	149	α -Crotonic acid	109	197
Cinnamalfluorene	156	49	<i>cis</i> -Crotonic acid	13	190
Cinnamamide	278	238	"	369	432
Cinnamanilide	287	238	<i>trans</i> -Crotonic acid	71	195
<i>cis</i> -Cinnamic acid	262	431	"	423	432
<i>trans</i> -Cinnamic acid	181	200	Crotonic anhydride	14	223
" " "	379	432	<i>trans</i> -Crotononitrile	15	346
Cinnamic anhydride	62	226	<i>trans</i> -Crotonyl chloride	21	212
Cinnamonitrile	5	357	Crotylacetone	71	163
<i>trans</i> -Cinnamoyl bromide	2	220	Crotyl sulfide	40	421
Cinnamyl alcohol	13	88	Cumaldehyde	87	149
<i>trans</i> -Cinnamyl chloride	4	216	Cumene	7	35
Cinnamyl cinnamate	50	275	<i>p</i> -Cumidine	135	299
Cinnamyl phenyl sulfide	45	426	Cuminic acid	150	199
Cinnoline	45	436	Cyanethine	404	316
Citraconic acid	98	196	1-Cyanoacenaphthene	84	361
" " "	470	433	5-Cyanoacenaphthene	155	364
Citraconic acid diamide	392	242	Cyanoacetaldehyde	2	345
Citraconic acid dianilide	359	241	Cyanoacetamide	188	235
Citraconic anhydride	10	223	Cyanoacetanilide	424	243
Citral a	82	148	Cyanoacetic acid	60	195
Citral b	83	148	"	79	360
<i>d,l</i> -Citramalic acid	154	199	"	96	429
Citric acid	113	197	Cyanoacetyl chloride	15	214
" " "	228	202	Cyanoacetylene	1	345
Citric acid triamide	448	244	2-Cyanoaniline	22	436
Citric acid trianilide	425	243	3-Cyanoaniline	70	436
<i>d</i> -Citronellal	76	148	4-Cyanoaniline	111	362
<i>d</i> -Citronellic acid	49	191	"	33	436
<i>l</i> -Citronellic acid	12	192	1-Cyanoanthracene	170	364
Citronellol	115	86	9-Cyanoanthracene	214	367
L-Citrulline	51	286	1-Cyano-9,10-anthraquinone	233	368
2,3,4-Collidine	51	320	4-Cyanoazobenzene	166	364
2,3,5-Collidine	45	320	2-Cyanobenzal chloride	94	353
2,3,6-Collidine	43	320	3-Cyanobenzal chloride	99	353
2,4,5-Collidine	34	319	4-Cyanobenzal chloride	100	353
2,4,6-Collidine	41	320	3-Cyanobenzaldehyde	101	361
Coronene	204	51	4-Cyanobenzamide	470	245
2-Coumaramide	445	244	4-Cyanobenzanilide	370	241
4-Coumaramide	415	243	2-Cyanobenzoic acid	299	205
<i>trans</i> -2-Coumaric acid	333	207	"	219	367
<i>p</i> -Coumaric acid	336	207	"	163	430
Coumarilic acid	312	206	3-Cyanobenzoic acid	227	367
Coumarilonitrile	28	358	"	218	430
Coumarin-2-carbonitrile	28	358	4-Cyanobenzoic acid	348	207
Coumarin-3-carboxylic acid	302	205	"	228	367
Coumarone-2-carboxylic acid	312	206	"	213	430
Creatine	113	289	2-Cyanobenzyl bromide	89	361
Creatinine	117	290	3-Cyanobenzyl bromide	122	362
Creosol	92	135	4-Cyanobenzyl bromide	160	364
<i>m</i> -Cresol	5	94	3-Cyanobenzyl chloride	82	361
"	100	434	4-Cyanobenzyl chloride	99	361
<i>o</i> -Cresol	11	96	α -Cyanobenzyl cyanide	85	361
"	109	435	2-Cyanobiphenyl	16	356
<i>p</i> -Cresol	17	97	4-Cyanobiphenyl	108	362
"	108	435	1-Cyanobutane	31	347
<i>m</i> -Cresyl acetate	200	260	2-Cyanobutanoic acid	22	192
<i>o</i> -Cresyl acetate	187	259	4-Cyanobutanoic acid	32	194
<i>p</i> -Cresyl acetate	203	260	2-Cyanobutyric acid	15	356
<i>m</i> -Cresyl benzoate	76	277	4-Cyanobutyric acid	32	194
<i>o</i> -Cresyl benzoate	350	271	"	40	358
<i>p</i> -Cresyl benzoate	101	278	"	378	432
2-Cresyl ethyl ether	70	134	2-Cyanocinnamic acid	218	367
3-Cresyl ethyl ether	76	135	3-Cyanocoumarin	217	367
4-Cresyl ethyl ether	75	135	Cyanocyclobutane	36	347
2-Cresyl methyl ether	62	134	1-Cyanocyclohexane	2	355
3-Cresyl methyl ether	66	134	2-Cyano-2-cyclohexylacetic acid	90	429
4-Cresyl methyl ether	65	134	N-Cyandiethylamine	6	436
Crotonaldehyde	22	145	3-Cyano-N,N-dimethylaniline	77	436
Crotonamide	318	240	4-Cyano-N,N-dimethylaniline	96	361
<i>trans</i> - α -Crotonanilide	182	235	"	34	436

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4-Cyano-2,6-dimethylphenol	40	434	2-Cyanothiophene	59	349
4-Cyano-3,5-dimethylphenol	38	434	3-Cyanothiophene	52	349
<i>d,l</i> -4-Cyano-3,4-diphenylbutyric acid	206	366	Cyanotriphenylethylene	209	366
2-Cyanodiphenylmethane	1	357	2-Cyanotriphenylmethane	114	362
4-Cyanodiphenylmethane	56	359	4-Cyanotriphenylmethane	134	363
Cyanoethane	8	345	4-Cyanovaleric acid	126	363
2-Cyanoethylamine	283	438	Cyclobutane	8	3
2-Cyano-2-ethylbutyric acid	80	360	Cyclobutanecarbonitrile	36	347
(2-Cyanoethyl)dimethylamine	274	438	Cyclobutanecarbonyl chloride	25	212
Cyanoform	66	360	Cyclobutanecarboxylic acid	26	191
2-Cyanofuran	34	347	"	435	432
4-Cyanoheptane	57	349	Cyclobutane-1,1-dicarboxylic acid	242	203
2-Cyanohexanoic acid	168	364	<i>cis</i> -Cyclobutane-1,2-dicarboxylic acid	197	201
α -Cyanohydrocinnamic acid	119	197	"	265	431
3-Cyanoindene	21	356	<i>cis</i> -Cyclobutane-1,3-dicarboxylic acid	290	431
3-Cyanoindole	50	349	<i>trans</i> -Cyclobutane-1,2-dicarboxylic acid	249	431
2-Cyano-5-iodonaphthalene	195	366	Cyclobutanone	8	161
2-Cyanoisobutyric acid	95	429	Cyclobutene	9	12
1-Cyano-4-isopropenylcyclohexane	18	356	Cyclobutylamine	22	295
1-Cyanoisoquinoline	97	361	Cyclobutyl methyl ketone	37	162
Cyanomethane	5	345	Cyclodecane	248	7
N-Cyano-N-methylamine	95	353	<i>cis</i> -Cyclodecene	329	24
(Cyanomethyl)diethylamine	162	437	<i>trans</i> -Cyclodecene	4	25
1-(Cyanomethyl)pyridine	161	437	Cyclodecyne	58	30
1-Cyanonaphthalene	25	358	Δ^2 -Cyclogeranic acid	128	198
2-Cyanonaphthalene	78	360	α -Cyclogeraniolene	246	20
8-Cyanonaphthalene-1-sulfonamide	476	410	Cyclohept(fg)acenaphthene	123	48
8-Cyanonaphthalene-1-sulfonyl chloride	223	388	1,3-Cycloheptadiene	211	19
1-Cyano-4-nitronaphthalene	179	365	Cycloheptane	68	4
1-Cyano-5-nitronaphthalene	223	367	Cycloheptanone	134	165
2-Cyano-1-nitronaphthalene	183	365	1,3,5-Cycloheptatriene	191	18
2-Cyano-5-nitronaphthalene	213	366	Cycloheptene	187	18
2-Cyano-8-nitronaphthalene	189	365	Cyclohexadecane	35	8
2-Cyano-4-nitrophenol	221	367	1,5,9,13-Cyclohexadecatetraene	5	25
2-Cyano-5-nitrophenol	205	366	1,3-Cyclohexadiene	78	14
2-Cyano-6-nitrophenol	178	365	Cyclohexane	29	3
2-Cyanopentanoic acid	11	355	Cyclohexencarboxaldehyde	30	151
1-Cyanophenanthrene	172	364	Cyclohexancarboxanilide	272	238
2-Cyanophenanthrene	151	364	Cyclohexanecarboxylic acid	10	193
3-Cyanophenanthrene	138	363	Cyclohexanecarboxylic acid chloride	36	212
9-Cyanophenanthrene	149	363	Cyclohexane-1,1-diacetic acid	201	430
2-Cyanophenol	189	106	<i>cis</i> -Cyclohexane-1,2-diacetic acid	372	432
"	132	363	<i>trans</i> -Cyclohexane-1,2-diacetic acid	364	432
4-Cyanophenol	158	364	<i>cis</i> -Cyclohexane-1,2-dicarboxylic acid	354	432
"	34	434	<i>trans</i> -Cyclohexane-1,2-dicarboxylic acid	319	431
(2-Cyanophenoxy)acetic acid	137	430	<i>cis</i> -Cyclohexane-1,3-dicarboxylic acid	299	431
(3-Cyanophenoxy)acetic acid	143	430	<i>trans</i> -Cyclohexane-1,3-dicarboxylic acid	348	432
(4-Cyanophenoxy)acetic acid	131	430	<i>trans</i> -Cyclohexane-1,4-dicarboxylic acid	316	431
1-Cyano-2-phenylacrylonitrile	112	362	1,3-Cyclohexanedione	132	176
2-Cyano-3-phenylpropionic acid	137	363	1,4-Cyclohexanedione	109	175
3-Cyano-3-phenylpropionic acid	196	366	Cyclohexanethiol	23	414
4-Cyano-2-phenylquinoline	187	365	Cyclohexane-1,2,3-tricarboxylic acid	264	431
1-Cyanopropane	14	345	Cyclohexanol	6	88
2-Cyanopropionic acid	19	192	Cyclohexanone	79	163
"	26	358	Cyclohexene	81	15
"	91	429	Cyclohexene sulfide	45	424
3-Cyanopropionic acid	39	194	2-Cyclohexenone	48	169
"	47	359	1-Cyclohexenylcarboxylic acid	21	193
"	284	431	Cyclohexylacetaldehyde	15	150
(3-Cyanopropyl) diethyl amine	313	438	N-Cyclohexylacetamide	134	234
2-Cyano-2-propylvaleramide	197	366	Cyclohexyl acetate	128	256
2-Cyanopyridine	12	357	Cyclohexylacetic acid	46	191
3-Cyanopyridine	54	359	Cyclohexylacetonitrile	71	350
4-Cyanopyridine	98	361	Cyclohexylacetyl chloride	25	214
2-Cyanoquinoline	125	362	β -Cyclohexylacrylic acid	53	195
3-Cyanoquinoline	150	363	Cyclohexylamine	49	296
4-Cyanoquinoline	140	363	"	426	439
5-Cyanoquinoline	115	362	N-Cyclohexylaniline	224	437
6-Cyanoquinoline	181	365	N-Cyclohexylbenzamide	280	238
8-Cyanoquinoline	105	362	Cyclohexylbenzene	133	40
5-Cyanothiazole	60	359	Cyclohexyl bromide	21	58

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	Compound No.	Page No.		Compound No.	Page No.
6-Desoxy-L-galactose	34	331	1,4-Diamino-5,8-dihydroxy-9,10-anthraquinone	471	318
2-Desoxy-D-glucose	36	331	4,4'-Diamino-3,3'-dimethoxybiphenyl	309	312
6-Desoxy-D-glucose	29	330	4,4'-Diamino-2,2'-dimethylazoxybenzene	334	313
6-Desoxy-L-mannose	9	329	α,α' -Diamino-1,4-dimethylbenzene	15	303
6-Desoxy-D-mannose	13	328	1,3-Diamino-2,6-dimethylbenzene	94	305
2-Desoxy-D-ribose	5	329	1,3-Diamino-4,6-dimethylbenzene	205	309
1,1-Diacenaphthene	130	48	2,2'-Diamino-4,4'-dimethylbiphenyl	257	310
Diacetone alcohol	59	83	DL-2,2'-Diamino-6,6'-dimethylbiphenyl	306	312
"	98	164	2,2'-Diamino-6,6'-dimethylbiphenyl	349	314
β,β' -Diacetoxydiethyl ether	274	265	4,4'-Diamino-2,2'-dimethylbiphenyl	221	309
1,3-Diacetoxypropane	193	260	4,4'-Diamino-2,3'-dimethylbiphenyl	11	302
Diacetylacetone	48	173	4,4'-Diamino-3,3'-dimethylbiphenyl	290	312
1,4-Diacetylbenzene	147	177	4,4'-Diamino-2,2'-dimethylidiphenylmethane	268	311
N,N'-Diacetylbenzidine	509	246	4,4'-Diamino-3,3'-dimethylidiphenylmethane	354	314
Diacetylene	4	28	6,6'-Diamino-3,3'-dimethylidiphenylmethane	182	308
N,N'-Diacetylthylenediamine	349	241	4,4'-Diamino-3,3'-dimethylidiphenyl sulfide	181	308
N,N'-Diacetyl-m-phenylenediamine	405	242	6,6'-Diamino-3,3'-dimethylidiphenyl sulfide	200	309
N,N'-Diacetyl-o-phenylenediamine	389	242	6,6'-Diamino-3,3'-dimethyltriphenylmethane	399	316
N,N'-Diacetyl-p-phenylenediamine	507	246	1,1'-Diamino-2,2'-dinaphthyl	465	318
4,6-Diacetylpyrogallol	486	122	DL-2,2'-Diamino-1,1'-dinaphthyl	410	316
4,6-Diacetylresorcinol	478	121	4,4'-Diamino-1,1'-dinaphthyl	423	317
Diacetylsulfide	30	420	2,4-Diaminodiphenylamine	291	312
N,N-Diacetyltetramethylenediamine	250	237	2,2'-Diaminodiphenyl sulfide	167	308
1,5-Diacetyl-2,3,4-trihydroxybenzene	486	122	4,4'-Diaminodiphenyl disulfide	144	307
N,N'-Diacetyltrimethylenediamine	120	234	4,4'-Diaminodiphenylmethane	169	308
Diallylamine	318	438	2,2'-Diaminodiphenyl sulfide	147	307
Diallyl sulfide	23	420	2,4'-Diaminodiphenyl sulfide	32	425
2,8-Diaminoacidone	478	318	4,4'-Diaminodiphenyl sulfone	386	315
1,4-Diaminoanthraquinone	463	318	1,2-Diaminoethane	352	438
1,5-Diaminoanthraquinone	475	318	1,9-Diaminofluorene	255	310
1,6-Diaminoanthraquinone	468	318	2,7-Diaminofluorene	467	318
1,7-Diaminoanthraquinone	466	318	1,6-Diaminohexane	30	303
1,8-Diaminoanthraquinone	462	318	"	439	439
2,7-Diaminoanthraquinone	476	318	1,2-Diamino-4-hydroxybenzene	374	315
2,2'-Diaminoazobenzene	300	312	1,4-Diamino-2-iodobenzene	225	309
3,3'-Diaminoazobenzene	350	314	4,6-Diaminoisophthalaldehyde	431	317
4,4'-Diaminoazoxybenzene	407	316	1,3-Diaminoisopropyl alcohol	31	303
1,2-Diaminobenzene	196	309	2,6-Diamino-4-methylphenol	360	114
"	176	437	D1-(2-amino-5-methylphenyl) sulfide	58	426
1,3-Diaminobenzene	84	305	D1-(4-amino-3-methylphenyl) sulfide	55	426
"	190	437	4,6-Diamino-2-methylquinoline	414	316
1,4-Diaminobenzene	318	313	1,2-Diaminonaphthalene	191	308
"	253	438	1,4-Diaminonaphthalene	254	310
2,4-Diaminobenzene-1,5-disulfonamide	261	402	1,8-Diaminonaphthalene	99	305
2,4-Diaminobenzene-1,5-disulfonamide	404	407	2,7-Diaminonaphthalene	371	315
2,4-Diaminobenzene-1,5-disulfonic acid	124	375	1,2-Diamino-4-nitrobenzene	415	316
2,4-Diaminobenzene-1,5-disulfonyl chloride	284	390	1,3-Diamino-4-nitrobenzene	361	314
3,5-Diaminobenzoic acid	55	286	1,4-Diamino-2-nitrobenzene	307	312
2,2'-Diaminobenzophenone	299	312	1,18-Diaminooctadecane	168	308
3,3'-Diaminobenzophenone	381	315	1,8-Diaminooctane	446	439
4,4'-Diaminobenzophenone	456	317	1,5-Diaminopentane	76	297
D1-(2-aminobenzyl)sulfide	50	426	"	378	439
D1-4-aminobenzyl sulfide	59	426	2,4-Diaminophenol	120	102
2,2'-Diaminobiphenyl	134	307	"	130	306
2,4'-Diaminobiphenyl	33	303	3,4-Diaminophenol	450	119
3,4-Diaminobiphenyl	199	309	"	374	315
1,3-Diaminobutane	54	296	3,5-Diaminophenol	442	119
1,4-Diaminobutane	66	297	D1-(2-aminophenyl) sulfide	52	426
"	437	439	D1-(4-aminophenyl) sulfide	60	426
<i>d,l</i> -2,3-Diaminobutane	360	438	1,2-Diaminopropane	361	438
<i>meso</i> -2,3-Diaminobutane	359	438	D,L-1,2-Diaminopropane	42	296
2,7-Diaminocarbazole	461	318	1,3-Diaminopropane	50	296
<i>cis</i> -1,2-Diaminocyclohexane	353	438	"	382	439
<i>trans</i> -1,2-Diaminocyclohexane	357	438	2,4-Diaminopyridine	214	309
1,2-Diaminocyclohexane	84	297	2,5-Diaminopyridine	217	309
2,2'-Diaminodibenzyl	104	306	2,6-Diaminopyridine	258	311
2,2'-Diaminodibenzyl disulfide	159	307	3,4-Diaminopyridine	442	317
2,2'-Diaminodibenzyl sulfide	133	307	5,8-Diaminoquinizarin	57	184
4,4'-Diaminodibenzyl sulfide	203	309	"	471	318
2,2'-Diaminodiethyl sulfide	145	299	<i>cis</i> -2,2'-Diaminostilbene	269	311
1,4-Diamino-5,8-dihydroxy-9,10-anthraquinone	57	184	<i>trans</i> -2,2'-Diaminostilbene	387	315

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	Compound No.	Page No.		Compound No.	Page No.
<i>cis</i> -4,4'-Diaminostilbene	259	311	2,6-Dibromoaniline	139	307
<i>trans</i> -4,4'-Diaminostilbene	451	317	" "	48	136
DL-2,3-Diaminosuccinic acid	126	290	1,2-Dibromobenzene	12	73
<i>meso</i> -2,3-Diaminosuccinic acid	119	290	1,3-Dibromobenzene	10	73
4,4'-Diamino-2,5,2',5'-tetramethyltriphenyl- methane	434	317	1,4-Dibromobenzene	5	74
2,4-Diaminotoluene	194	308	2,4-Dibromobenzenesulfonamide	271	402
2,5-Diaminotoluene	88	305	2,5-Dibromobenzenesulfonamide	297	403
3,4-Diaminotoluene	157	307	3,4-Dibromobenzenesulfonamide	212	399
4,4'-Diaminotriphenylcarbinol	375	315	2,4-Dibromobenzenesulfonic acid	130	375
3,4-Diaminotriphenylmethane	111	306	2,5-Dibromobenzenesulfonic acid	141	376
α,α' -Diamino- <i>m</i> -xylene	161	300	3,4-Dibromobenzenesulfonic acid	90	374
2,4-Diamino- <i>m</i> -xylene	94	305	2,4-Dibromobenzenesulfonyl chloride	93	383
4,6-Diamino- <i>m</i> -xylene	205	309	2,5-Dibromobenzenesulfonyl chloride	81	383
<i>Di-n</i> -amylamine	97	298	3,4-Dibromobenzenesulfonyl chloride	16	381
<i>Di-n</i> -amyl ether	72	134	2,4-Dibromobenzoic acid	270	204
<i>Di-n</i> -amyl ketone	183	167	2,4-Dibromobenzonitrile	119	362
2,5-Dianilino-1,4-benzoquinone	477	318	2,5-Dibromobenzonitrile	176	365
Dianisalacetone	160	177	2,6-Dibromobenzonitrile	198	366
Dianisidine	309	312	3,5-Dibromobenzonitrile	130	363
9,9'-Dianthranyl-10,10'-quinone	58	184	2,4'-Dibromobenzophenone	77	174
Dianthraquinone	58	184	3,3'-Dibromobenzophenone	171	178
Dibenzalacetone	145	177	4,4'-Dibromobenzophenone	191	178
1,2,3,4-Dibenzanthracene	185	51	2,6-Dibromo-1,4-benzoquinone	16	182
1,2,5,6-Dibenzanthracene	200	51	4,4'-Dibromobiphenyl	8	74
1,2,7,8-Dibenzanthracene	183	50	1,2-Dibromobutane	11	65
Dibenzofuran	50	139	1,3-Dibromobutane	14	65
Dibenzofuran-2-carboxaldehyde	57	156	1,4-Dibromobutane	16	65
4-Dibenzofurylacetic acid	340	207	2,3-Dibromobutane	10	65
Dibenzoyl	119	176	1,2-Dibromo-1-butene	6	65
1,2-Dibenzoylbenzene	178	178	1,3-Dibromo-2-butene	13	65
1,3-Dibenzoylbenzene	129	176	3,5-Dibromo- <i>o</i> -cresol	194	106
1,4-Dibenzoylbenzene	184	178	4,6-Dibromo- <i>o</i> -cresol	58	99
N,N'-Dibenzoylbenzidine	511	247	2,6-Dibromo- <i>p</i> -cresol	43	98
1,2-Dibenzoylethane	174	178	1,3-Dibromo-2,4-dihydroxynaphthalene	303	111
<i>cis</i> -1,2-Dibenzoylethylene	163	177	1,5-Dibromo-4,8-dihydroxynaphthalene	367	115
<i>trans</i> -1,2-Dibenzoylethylene	142	176	2,6-Dibromo-1,5-dihydroxynaphthalene	589	127
N,N'-Dibenzoylethylenediamine	491	246	2,3-Dibromo-5,6-dimethylphenol	186	106
Dibenzoylmethane	111	175	2,5-Dibromo-1,4-dinitrobenzene	53	339
1,3-Dibenzoylpropane	87	175	1,1-Dibromoethane	2	65
Dibenzoyl sulfide	20	425	1,2-Dibromoethane	3	65
N,N-Dibenzoyltetramethylenediamine	364	241	2,2-Dibromoethanol	81	84
4-Dibenzothienylacetic acid	248	203	Di-(2-bromoethyl)sulfide	8	425
N,N'-Dibenzoyltrimethylenediamine	274	238	Dibromogallic acid	336	113
1,2,7,8-Dibenzphenanthrene	202	51	1,7-Dibromoheptane	1	66
2,3,5,6-Dibenzphenanthrene	199	51	2,6-Dibromohydroquinone	425	118
2,3,6,7-Dibenzphenanthrene	198	51	Dibromalalonitrile	169	364
Dibenzylacetanilide	299	239	Dibromomethane	1	65
Dibenzylacetic acid	94	196	2,6-Dibromo-4-methylphenol	43	98
Dibenzylacetone	221	168	3,5-Dibromo-2-methylphenol	194	106
Dibenzyl acetonitrile	63	350	4,6-Dibromo-2-methylphenol	58	99
Dibenzylacetyl chloride	17	214	1,2-Dibromo-2-methylpropane	5	65
Dibenzylamine	184	301	1,1-Dibromo-2-methylpropene	9	65
N,N-Dibenzylaniline	40	323	1,2-Dibromonaphthalene	3	74
Dibenzyl ether	109	136	1,4-Dibromonaphthalene	4	74
Dibenzyl ketone	19	172	1,3-Dibromo-2,4-naphthalenediol	303	111
4,5-Dibenzyl-naphthalene-1-sulfonamide	192	399	1,3-Dibromo-2-naphthol	107	102
4,5-Dibenzyl-naphthalene-1-sulfonyl chloride	239	389	1,6-Dibromo-2-naphthol	212	107
1,2-Dibenzyl-oxybenzene	39	138	2,4-Dibromo-1-naphthol	208	107
1,4-Dibenzyl-oxybenzene	55	139	4,6-Dibromo-2-naphthol	320	112
Dibenzyl phthalate	48	275	2,5-Dibromo-1-nitrobenzene	56	339
Dibenzyl succinate	64	276	2,4-Dibromo-6-nitrophenol	259	109
2,2-Dibenzylsuccinic acid	274	431	2,6-Dibromo-4-nitrophenol	348	114
Dibenzyl sulfide	21	425	1,9-Dibromononane	21	65
Dibenzyl <i>d</i> -tartarate	63	276	1,8-Dibromooctane	20	65
Dibiphenyleneethylene	182	50	1,5-Dibromopentane	18	65
Dibromoacetamide	308	239	2,4-Dibromophenol	18	97
3,5-Dibromoacetic acid	35	194	2,5-Dibromophenol	104	102
3,5-Dibromoacetophenone	88	175	2,6-Dibromophenol	52	99
2,4-Dibromoaniline	127	306	3,5-Dibromophenol	127	103
" "	47	436	Di-(4-bromophenyl)sulfide	63	426
			DL-1,2-Dibromopropane	4	65
			1,3-Dibromopropane	12	65

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	Compound No.	Page No.		Compound No.	Page No.
2,3-Dibromo-1-propanol	112	85	1,3-Dichlorobenzene	5	70
1,3-Dibromopropene	8	65	1,4-Dichlorobenzene	12	71
α,β -Dibromopropionamide	222	237	2,5-Dichlorobenzene-1,3-disulfonamide	348	405
2,3-Dibromopropionic acid	63	195	4,6-Dichlorobenzene-1,3-disulfonamide	455	409
3,5-Dibromopyridine	70	324	2,5-Dichlorobenzene-1,3-disulfonic acid	161	376
<i>d,l</i> -2,3-Dibromosuccinic acid	15	429	4,6-Dichlorobenzene-1,3-disulfonic acid	210	378
<i>meso</i> -2,3-Dibromosuccinic acid	20	429	2,5-Dichlorobenzene-1,3-disulfonyl chloride	176	386
2,5-Dibromotoluene	14	73	4,6-Dichlorobenzene-1,3-disulfonyl chloride	194	387
3,4-Dibromotoluene	15	73	2,4-Dichlorobenzene sulfonamide	236	401
2,6-Dibromo-3,4,5-trihydroxybenzoic acid	336	113	2,5-Dichlorobenzene sulfonamide	233	400
Di-(β - <i>n</i> -butoxyethyl)carbonate	344	270	3,4-Dichlorobenzene sulfonamide	99	395
Dibutyl acetylene	54	30	2,5-Dichlorobenzene sulfonanilide	165	398
Di- <i>tert</i> -butyl acetylene	40	29	2,4-Dichlorobenzene sulfonic acid	104	374
Di- <i>n</i> -butylamine	65	297	2,5-Dichlorobenzene sulfonic acid	100	374
"	464	439	3,4-Dichlorobenzene sulfonic acid	34	372
N,N-Di- <i>n</i> -butylaniline	99	321	2,4-Dichlorobenzene sulfonyl chloride	48	382
"	256	438	2,5-Dichlorobenzene sulfonyl chloride	22	381
3,5-Di- <i>tert</i> -butylaniline	188	437	3,4-Dichlorobenzene sulfonyl chloride	9	381
1,4-Di- <i>sec</i> -butylbenzene	139	40	2,4-Dichlorobenzoic acid	117	430
Di- <i>n</i> -butyl carbonate	184	259	2,5-Dichlorobenzoic acid	230	202
Di- <i>n</i> -butyl ether	54	133	3,4-Dichlorobenzoic acid	322	206
Di- <i>sec</i> -butyl ether	44	133	2,2'-Dichlorobenzoin	63	174
Di- <i>n</i> -butyl ketone	140	165	2,4-Dichlorobenzonitrile	73	360
Di- <i>sec</i> -butyl ketone	93	164	2,5-Dichlorobenzonitrile	175	365
Di- <i>tert</i> -butyl ketone	74	163	3,4-Dichlorobenzonitrile	92	361
Di- <i>n</i> -butyl oxalate	266	264	3,5-Dichlorobenzonitrile	75	360
Di- <i>n</i> -butyl phthalate	355	271	4,4'-Dichlorobenzophenone	177	178
Di- <i>n</i> -butyl racemate	353	271	3,4-Dichlorobenzotrichloride	1	64
Di- <i>n</i> -butyl sebacate	356	271	2,6-Dichlorobenzyl chloride	4	57
Di- <i>n</i> -butyl succinate	320	268	Di-(4-chlorobenzyl)sulfide	14	425
Di- <i>n</i> -butyl sulfide	41	421	2,2'-Dichlorobiphenyl	15	71
Di- <i>tert</i> -butyl sulfide	29	420	4,4'-Dichlorobiphenyl	30	71
Di- <i>n</i> -butyl <i>d</i> -tartarate	9	273	1,2-Dichlorobutane	15	63
Di- <i>n</i> -butyl <i>d,l</i> -tartarate	353	271	2,3-Dichloro- <i>n</i> -butyraldehyde	4	150
3,4-Dicarboxybenzenesulfonamide	287	403	2,4-Dichloro- <i>m</i> -cresol	7	96
3,4-Dicarboxybenzenesulfonic acid	136	376	2,6-Dichloro- <i>m</i> -cresol	61	99
3,4-Dicarboxybenzenesulfonyl chloride	259	389	2,6-Dichloro- <i>p</i> -cresol	23	97
Dichloroacetaldehyde	15	144	4,6-Dichloro- <i>m</i> -cresol	99	101
Dichloroacetamide	106	233	2,5-Dichloro-3,6-dihydroxy-1,4-benzoquinone	51	184
Dichloroacetanilide	184	235	1,5-Dichloro-4,8-dihydroxynaphthalene	495	122
2,4-Dichloroacetanilide	268	238	2,3-Dichloro-1,4-dihydroxynaphthalene	321	112
2,5-Dichloroacetanilide	231	237	2,5-Dichloro-1,4-dimethylbenzene	21	71
Dichloroacetic acid	25	190	3,6-Dichloro-2,5-dimethylbenzenesulfonamide	179	398
"	11	429	4,6-Dichloro-2,5-dimethylbenzenesulfonamide	130	396
Dichloroacetic anhydride	12	223	3,6-Dichloro-2,5-dimethylbenzenesulfonanilide	202	399
1,1-Dichloroacetone	19	161	4,6-Dichloro-2,5-dimethylbenzenesulfonanilide	213	400
1,3-Dichloroacetone	41	173	3,6-Dichloro-2,5-dimethylbenzenesulfonic acid	71	373
Dichloroacetone trile	12	345	4,6-Dichloro-2,5-dimethylbenzenesulfonic acid	51	372
2,4-Dichloroacetophenone	33	173	3,6-Dichloro-2,5-dimethylbenzenesulfonyl chloride	82	383
2,5-Dichloroacetophenone	209	168	4,6-Dichloro-2,5-dimethylbenzenesulfonyl chloride	98	384
3,5-Dichloroacetophenone	4	172	4,4'-Dichlorodiphenylmethane	13	71
Dichloroacetyl chloride	11	212	1,1-Dichloroethane	3	63
Dichloroacetyl iodide	1	222	1,2-Dichloroethane	9	63
2,4-Dichloroaniline	85	305	<i>cis</i> -1,2-Dichloroethylene	4	63
"	37	436	<i>trans</i> -1,2-Dichloroethylene	2	63
2,5-Dichloroaniline	49	304	2,2'-Dichloroethyl ether	42	133
"	32	436	β,β' -Dichloroethyl ether	69	134
9,10-Dichloroanthracene	34	72	Di-2-chloroethyl sulfide	52	421
<i>meso</i> -Dichloroanthracene	34	72	2,6-Dichlorohydroquinone	27	434
9,10-Dichloroanthracene-2-sulfonamide	457	409	2,4-Dichloro-3-hydroxybenzaldehyde	114	159
9,10-Dichloroanthracene-2-sulfonanilide	428	408	2,6-Dichloro-3-hydroxybenzaldehyde	113	159
9,10-Dichloroanthracene-2-sulfonic acid	212	378	3,5-Dichloro-2-hydroxybenzaldehyde	81	157
9,10-Dichloroanthracene-2-sulfonyl chloride	275	390	3,5-Dichloro-4-hydroxybenzaldehyde	119	159
2,3-Dichlorobenzaldehyde	55	155	4,6-Dichloro-3-hydroxybenzaldehyde	109	159
2,4-Dichlorobenzaldehyde	63	156	3,5-Dichloro-2-hydroxybenzotrile	184	365
2,5-Dichlorobenzaldehyde	45	155	3,5-Dichloro-4-hydroxybenzotrile	192	365
2,6-Dichlorobenzaldehyde	58	156	Dichloromethane	1	63
3,4-Dichlorobenzaldehyde	19	154	2,3-Dichloro-4-methylbenzenesulfonamide	405	407
3,5-Dichlorobenzaldehyde	54	155	2,6-Dichloro-3-methylbenzenesulfonamide	265	402
2,5-Dichlorobenzamide	297	239			
1,2-Dichlorobenzene	7	70			

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	Compound No.	Page No.		Compound No.	Page No.
2,6-Dichloro-4-methylbenzenesulfonamide	141	397	6,7-Dichloronaphthalene-1-sulfonyl chloride	232	388
3,4-Dichloro-2-methylbenzenesulfonamide	383	407	6,8-Dichloronaphthalene-2-sulfonyl chloride	190	387
3,5-Dichloro-2-methylbenzenesulfonamide	253	401	7,8-Dichloronaphthalene-1-sulfonyl chloride	219	388
3,5-Dichloro-4-methylbenzenesulfonamide	277	402	7,8-Dichloronaphthalene-2-sulfonyl chloride	196	387
4,5-Dichloro-3-methylbenzenesulfonamide	243	401	2,4-Dichloro-1-naphthol	219	107
4,6-Dichloro-2-methylbenzenesulfonamide	190	399	1,4-Dichloro-2-naphthol	288	111
2,3-Dichloro-4-methylbenzenesulfonic acid	185	377	2,4-Dichloro-6-nitroaniline	4	436
2,3-Dichloro-6-methylbenzenesulfonic acid	115	375	2,6-Dichloro-4-nitroaniline	5	436
2,6-Dichloro-3-methylbenzenesulfonic acid	125	375	2,4-Dichloro-1-nitrobenzene	6	337
2,6-Dichloro-4-methylbenzenesulfonic acid	56	372	2,5-Dichloro-1-nitrobenzene	24	337
3,4-Dichloro-2-methylbenzenesulfonic acid	174	377	2,4-Dichloro-5-nitrophenol	209	107
3,5-Dichloro-2-methylbenzenesulfonic acid	118	375	2,4-Dichloro-6-nitrophenol	283	111
3,5-Dichloro-4-methylbenzenesulfonic acid	133	375	2,3-Dichlorophenol	57	99
4,6-Dichloro-2-methylbenzenesulfonic acid	79	373	2,4-Dichlorophenol	33	98
2,3-Dichloro-4-methylbenzenesulfonyl chloride	26	381	"	32	434
2,6-Dichloro-3-methylbenzenesulfonyl chloride	7	381	2,5-Dichlorophenol	62	99
2,6-Dichloro-4-methylbenzenesulfonyl chloride	52	382	2,6-Dichlorophenol	81	100
3,4-Dichloro-2-methylbenzenesulfonyl chloride	39	382	3,5-Dichlorophenol	85	101
3,5-Dichloro-2-methylbenzenesulfonyl chloride	46	382	(2,4-Dichlorophenoxy)acetic acid	224	431
3,5-Dichloro-4-methylbenzenesulfonyl chloride	77	383	2,2-Dichlorophenyl methyl sulfide	22	425
4,5-Dichloro-3-methylbenzenesulfonyl chloride	107	384	Di-(4-chlorophenyl)sulfide	56	426
4,6-Dichloro-2-methylbenzenesulfonyl chloride	27	381	3,5-Dichlorophthalic anhydride	37	225
2,4-Dichloro-3-methylphenol	7	96	3,6-Dichlorophthalic anhydride	75	226
2,6-Dichloro-3-methylphenol	61	99	4,5-Dichlorophthalic anhydride	72	226
2,6-Dichloro-4-methylphenol	23	97	1,2-Dichloropropane	11	63
4,6-Dichloro-3-methylphenol	99	101	1,3-Dichloropropane	16	63
(2,4-Dichloro-6-methylphenoxy)acetic acid	162	430	2,2-Dichloropropane	6	63
1,3-Dichloro-2-methylpropane	17	63	1,3-Dichloro-2-propanol	72	83
Dichloromethyl sulfide	31	420	2,3-Dichloropropanol	85	84
Dichloromethyl sulfide	43	421	1,1-Dichloro-2-propanone	19	161
1,2-Dichloronaphthalene	4	71	1,3-Dichloro-2-propanone	41	173
1,3-Dichloronaphthalene	16	71	<i>d,l</i> -2,3-Dichloropropionaldehyde	3	152
1,4-Dichloronaphthalene	20	71	3,5-Dichlorosalicylaldehyde	81	157
1,5-Dichloronaphthalene	26	71	<i>d,l</i> -2,3-Dichlorosuccinic acid	18	429
1,6-Dichloronaphthalene	9	71	<i>meso</i> -2,3-Dichlorosuccinic acid	21	429
1,7-Dichloronaphthalene	18	71	2,3-Dichlorotoluene	23	70
1,8-Dichloronaphthalene	25	71	2,4-Dichlorotoluene	20	70
2,6-Dichloronaphthalene	28	71	2,5-Dichlorotoluene	19	70
2,7-Dichloronaphthalene	27	71	2,6-Dichlorotoluene	18	70
1,5-Dichloronaphthalene-2-sulfonamide	458	409	3,4-Dichlorotoluene	24	70
3,6-Dichloronaphthalene-2-sulfonamide	356	405	3,5-Dichlorotoluene	21	70
3,7-Dichloronaphthalene-1-sulfonamide	448	409	α,α -Dichloro- <i>m</i> -tolunitrile	99	353
4,5-Dichloronaphthalene-1-sulfonamide	389	407	α,α -Dichloro- <i>o</i> -tolunitrile	94	353
4,5-Dichloronaphthalene-2-sulfonamide	306	403	α,α -Dichloro- <i>p</i> -tolunitrile	100	353
4,6-Dichloronaphthalene-1-sulfonamide	375	406	2,6-Dichloro-3,4,5-tribromophenol	524	123
4,6-Dichloronaphthalene-2-sulfonamide	354	405	2,5-Dichloro- <i>p</i> -xylene	21	71
4,7-Dichloronaphthalene-1-sulfonamide	352	405	Dicinnamylacetone	173	178
4,7-Dichloronaphthalene-2-sulfonamide	300	403	Di- <i>m</i> -cresyl carbonate	61	276
4,8-Dichloronaphthalene-2-sulfonamide	322	404	Di- <i>o</i> -cresyl carbonate	85	277
5,6-Dichloronaphthalene-1-sulfonamide	368	406	Di- <i>p</i> -cresyl carbonate	145	280
5,6-Dichloronaphthalene-2-sulfonamide	282	402	Di- <i>m</i> -cresyl oxalate	138	280
5,7-Dichloronaphthalene-1-sulfonamide	452	409	Di- <i>o</i> -cresyl oxalate	128	279
5,8-Dichloronaphthalene-2-sulfonamide	422	408	Di- <i>p</i> -cresyl oxalate	164	281
6,7-Dichloronaphthalene-1-sulfonamide	447	409	Di- <i>p</i> -cresyl succinate	153	281
6,8-Dichloronaphthalene-2-sulfonamide	387	407	Dicrotyl sulfide	40	421
7,8-Dichloronaphthalene-1-sulfonamide	364	406	<i>m</i> -Dicyanobenzene	204	366
7,8-Dichloronaphthalene-2-sulfonamide	380	406	<i>o</i> -Dicyanobenzene	188	365
1,5-Dichloronaphthalene-1-sulfonyl chloride	201	387	<i>p</i> -Dicyanobenzene	229	367
3,6-Dichloronaphthalene-2-sulfonyl chloride	257	389	4,4'-Dicyanobiphenyl	231	367
3,7-Dichloronaphthalene-1-sulfonyl chloride	214	388	1,1-Dicyanobutane	69	350
4,5-Dichloronaphthalene-1-sulfonyl chloride	180	387	1,4-Dicyanobutane	104	354
4,5-Dichloronaphthalene-2-sulfonyl chloride	246	389	4,4-Dicyano-1-butene	72	350
4,6-Dichloronaphthalene-1-sulfonyl chloride	183	387	<i>cis</i> -1,4-Dicyanocyclohexane	76	360
4,6-Dichloronaphthalene-2-sulfonyl chloride	208	388	<i>trans</i> -1,4-Dicyanocyclohexane	185	365
4,7-Dichloronaphthalene-1-sulfonyl chloride	240	389	Dicyanodimethylamine	94	361
4,7-Dichloronaphthalene-2-sulfonyl chloride	244	389	4,4'-Dicyanodiphenylmethane	211	366
4,8-Dichloronaphthalene-1-sulfonyl chloride	229	388	1,12-Dicyanododecane	17	356
5,6-Dichloronaphthalene-1-sulfonyl chloride	159	386	1,1-Dicyanoethane	11	357
5,6-Dichloronaphthalene-2-sulfonyl chloride	258	389	<i>cis</i> -1,2-Dicyanoethylene	19	357
5,7-Dichloronaphthalene-1-sulfonyl chloride	238	388	1,11-Dicyanohendecane	14	355
5,8-Dichloronaphthalene-2-sulfonyl chloride	213	388	1,7-Dicyanoheptane	12	355

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	Compound No.	Page No.		Compound No.	Page No.
4,4-Dicyanoheptane	23	358	1,2-Diethylbenzene	28	36
"	51	359	1,3-Diethylbenzene	23	36
1,6-Dicyanohexane	20	356	1,4-Diethylbenzene	29	36
1,1-Dicyano-3-methylbutane	75	351	N,N-Diethylbenzylamine	326	438
Dicyanomethyl ethyl amine	9	436	Diethyl benzyl malonate	345	270
1,3-Dicyano-2-methylpropane	97	353	N,N-Diethylbenzylsulfonamide	2	392
1,2-Dicyanonaphthalene	220	367	Diethyl bromomalonate	252	263
1,3-Dicyanonaphthalene	216	367	Diethyl butylmalonate	254	264
1,4-Dicyanonaphthalene	224	367	Diethyl <i>d</i> -camphorate	334	269
1,5-Dicyanonaphthalene	226	367	Diethyl carbinol	13	80
1,6-Dicyanonaphthalene	225	367	Diethylcarbinyl acetate	64	252
1,7-Dicyanonaphthalene	210	366	Diethyl carbonate	55	252
1,8-Dicyanonaphthalene	230	367	Diethyl citraconate	241	263
2,3-Dicyanonaphthalene	234	368	Diethylcyanoacetic acid	80	360
2,6-Dicyanonaphthalene	236	368	Diethylene glycol	126	86
2,7-Dicyanonaphthalene	235	368	Diethylene glycol diacetate	274	265
1,8-Dicyanooctane	19	356	Diethylene glycol diethyl ether	73	134
3,3-Dicyanopentane	39	358	Diethylene glycol dimethyl ether	58	133
1,1-Dicyanopropane	67	350	Diethylene glycol mono- <i>n</i> -butyl ether	118	86
1,2-Dicyanopropane	89	352	Diethylene glycol mono- <i>n</i> -butyl ether acetate	280	265
1,3-Dicyanopropane	102	353	Diethylene glycol monoethyl ether	100	85
2,2-Dicyanopropane	20	357	Diethylene glycol monoethyl ether acetate	211	261
2,3-Dicyanopyridine	215	367	Diethylene glycol monomethyl ether	96	85
2,6-Dicyanopyridine	167	364	"	77	135
2,3-Dicyanothiophene	29	347	Diethyl ether	4	131
1,11-Dicyanoundecane	14	355	<i>sym</i> -Diethylethylenediamine	61	297
N,N-Dicyclohexylacetamide	130	234	<i>unsym</i> -Diethylethylenediamine	56	296
Dicyclohexylamine	171	300	N,N-Diethylformamide	2	230
Dicyclohexyl oxalate	55	275	Diethyl fumarate	212	261
Dicyclohexyl phthalate	90	277	Diethyl glutarate	247	263
Dicyclopentyl ketone	43	169	3,3-Diethylglutaric acid	222	431
Di- <i>n</i> -decyl ketone	84	174	3,3-Diethylhexane	217	6
Didecyl sulfide	5	425	3,4-Diethylhexane	190	6
Di-dichloromethyl sulfide	43	421	Diethyl (2-hydroxyethyl) amine	350	438
Di-(2,4-dinitrophenyl)sulfide	76	427	Diethyl isophthalate	333	269
Di-(2-diphenoxyethyl)sulfide	26	420	Diethyl itaconate	235	262
Di- <i>n</i> -dodecylamine	448	439	Diethyl ketone	9	161
Didodecyl ether	13	137	Diethyl <i>l</i> -malate	291	266
Didodecyl sulfide	12	425	Diethyl maleate	219	262
Diethanolamine	10	88	Diethyl malonate	173	258
"	180	301	Diethylmalonic acid	167	199
<i>sym</i> -Diethoxyacetone	5	169	"	63	429
3,4-Diethoxybenzaldehyde	92	149	Diethylmalonic acid diamide	471	245
1,2-Diethoxybenzene	24	138	Diethylmalonic acid monoamide	271	238
1,4-Diethoxybenzene	43	139	Diethylmalononitrile	39	358
Di-(β -ethoxyethyl) carbonate	279	265	Diethyl malonyl dichloride	42	213
Di-(β -ethoxyethyl)phthalate	32	274	Diethyl mesaconate	236	263
1,3-Diethoxy-2-propanone	5	169	Diethyl <i>meso</i> -tartrate	75	276
Diethylacetaldehyde	29	145	Diethyl methylacetic acid	32	191
Diethylacetic acid	27	191	Diethyl methyl amine	395	439
Diethyl acetonedicarboxylate	287	266	N,N-Diethyl-2-methylaniline	60	320
Diethylacetonitrile	33	347	N,N-Diethyl-4-methylaniline	69	320
Diethylacetyl chloride	27	212	1,2-Diethyl-3-methylbenzene	85	38
Diethylacetylene	22	28	1,2-Diethyl-4-methylbenzene	74	38
Diethyl adipate	270	265	2,4-Diethyl-1-methylbenzene	80	38
Diethylamine	11	295	2,5-Diethyl-1-methylbenzene	87	38
"	454	439	2,6-Diethyl-1-methylbenzene	90	38
4-(Diethylamino)benzaldehyde	17	153	3,5-Diethyl-1-methylbenzene	66	38
"	16	323	Diethyl methylmalonate	167	258
β -Diethylaminoethyl alcohol	29	319	Diethyl mucate	166	281
2-Diethylaminoethyl alcohol	29	319	Diethyl naphthalate	83	277
2-(Diethylamino)ethylamine	363	439	3,7-Diethylnaphthalene-1-sulfonamide	333	405
1-Diethylaminoisopropyl alcohol	37	319	3,7-Diethylnaphthalene-1-sulfonyl chloride	158	386
1-(N,N-Diethylamino)naphthalene	182	301	Diethyl 3-nitrophthalate	53	275
2-(N,N-Diethylamino)naphthalene	189	301	Diethyl 4-nitrophthalate	36	274
3-(Diethylamino)phenol	116	102	Diethyl oxalate	145	257
3-Diethylaminopropyl alcohol	49	320	3,3-Diethylpentane	133	5
N,N-Diethylamine	67	320	2,4-Diethylphenol	21	97
"	268	438	β,β -Diethylphenylhydrazine	5	322
Diethyl azelate	339	270	Diethyl phthalate	336	270
N,2-Diethylaziridine	293	438	Diethyl pimelate	296	266

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Compound		Page		Compound		Page	
	No.		No.		No.		No.
1,3-Diethyl-2-propylbenzene	89	38		1,5-Dihydroxyanthracene	578	127	
2,4-Diethylpyridine	48	320		1,8-Dihydroxyanthracene	556	126	
2,6-Diethylpyridine	2	322		2,3-Dihydroxyanthracene	582	127	
3,4-Diethylpyridine	63	320		2,6-Dihydroxyanthracene	586	127	
Diethyl sebacate	349	271		2,7-Dihydroxyanthracene	581	127	
Diethyl suberate	330	269		9,10-Dihydroxyanthracene	468	120	
Diethyl succinate	210	261		1,2-Dihydroxy-9,10-anthraquinone	54	184	
2,2-Diethylsuccinic acid	256	431		1,4-Dihydroxy-9,10-anthraquinone	33	183	
<i>d,l</i> -2,3-Diethylsuccinic acid	206	430		1,5-Dihydroxy-9,10-anthraquinone	50	184	
<i>meso</i> -2,3-Diethylsuccinic acid	223	431		1,7-Dihydroxyanthrone	567	126	
Diethyl sulfate	188	259		2,2'-Dihydroxyazobenzene	453	120	
Diethyl sulfide	6	420		2,4-Dihydroxyazobenzene	449	119	
Diethyl <i>d</i> -tartarate	4	273		3,3'-Dihydroxyazobenzene	521	123	
Diethyl- <i>d,l</i> -tartronate	218	261		3,4-Dihydroxyazobenzene	433	118	
Diethyl terephthalate	49	275		4,4'-Dihydroxyazobenzene	537	124	
2,5-Diethylthiophene	47	424		2,2'-Dihydroxyazoxybenzene	391	116	
3,4-Diethylthiophene	50	424		3,3'-Dihydroxyazoxybenzene	474	121	
2,4-Diethyltoluene	80	38		4,4'-Dihydroxyazoxybenzene	552	125	
2,5-Diethyltoluene	87	38		2,3-Dihydroxybenzaldehyde	94	158	
2,6-Diethyltoluene	90	38		2,4-Dihydroxybenzaldehyde	110	159	
3,5-Diethyltoluene	66	38		3,4-Dihydroxybenzaldehyde	117	159	
<i>N,N</i> -Diethyltoluene-4-sulfonamide	9	392		3,5-Dihydroxybenzaldehyde	118	159	
<i>N,N</i> -Diethyl- <i>o</i> -toluidine	60	320		2,4-Dihydroxybenzanilide	208	236	
<i>N,N</i> -Diethyl- <i>p</i> -toluidine	69	320		1,2-Dihydroxybenzene	207	107	
<i>Di</i> -2-fluorenylmethane	186	51		"	75	434	
Difluoroacetamide	8	231		1,3-Dihydroxybenzene	226	108	
Difluoroacetic acid	4	190		"	74	434	
"	9	429		1,4-Dihydroxybenzene	452	119	
3,3-Difluoroacrylic acid	169	430		"	117	435	
1,2-Difluorobenzene	4	69		2,4-Dihydroxybenzoic acid	530	124	
1,3-Difluorobenzene	1	69		"	338	207	
1,4-Difluorobenzene	3	69		"	179	430	
1,3-Difluoropropane	2	62		3,4-Dihydroxybenzoic acid	319	206	
Difurfuralacetone	72	174		2,4-Dihydroxybenzophenone	352	114	
Diglycolic acid	223	202		2,4'-Dihydroxybenzophenone	378	115	
Diguaiacol carbonate	126	279		3,3'-Dihydroxybenzophenone	446	119	
<i>Di-n</i> -hendecyl ketone	91	175		3,4-Dihydroxybenzophenone	355	114	
<i>Di-n</i> -heptadecyl ketone	117	176		4,4'-Dihydroxybenzophenone	526	124	
<i>Di-n</i> -heptylamine	1	303		1,1'-Dihydroxy-2,2'-binaphthyl	546	125	
<i>Di-n</i> -heptyl ether	103	136		2,2'-Dihydroxy-1,1'-binaphthyl	543	125	
<i>Di-n</i> -heptyl ketone	36	173		4,4'-Dihydroxy-1,1'-binaphthyl	587	127	
<i>Di-n</i> -heptyl sulfide	62	422		2,2'-Dihydroxybiphenyl	227	108	
Dihexadecyl sulfide	33	425		2,4'-Dihydroxybiphenyl	418	118	
<i>Di-n</i> -hexylamine	450	439		3,3'-Dihydroxybiphenyl	290	111	
<i>Di-n</i> -hexyl ether	95	135		3,4-Dihydroxybiphenyl	357	114	
<i>Di-n</i> -hexyl ketone	114	177		4,4'-Dihydroxybiphenyl	579	127	
Dihydroacetic acid monoanilide	178	235		2,4-Dihydroxy- <i>n</i> -caprylbenzene	62	174	
Dihydropyran	27	132		2,2'-Dihydroxychalcone	404	117	
<i>cis</i> -1,2-Dihydroxyacenaphthene	527	124		2,4'-Dihydroxychalcone	359	114	
5,6-Dihydroxyacenaphthene	497	122		β,β' -Dihydroxydiethylamine	10	88	
1,3-Dihydroxyacetone	42	89		β,β' -Dihydroxydiethyl ether	126	86	
"	94	175		2,2'-Dihydroxy-3,3'-dimethylbiphenyl	237	108	
"	1	329		2,2'-Dihydroxy-4,4'-dimethylbiphenyl	271	110	
2,3-Dihydroxyacetophenone	188	106		2,2'-Dihydroxy-5,5'-dimethylbiphenyl	386	116	
"	123	176		2,2'-Dihydroxy-6,6'-dimethylbiphenyl	423	118	
2,4-Dihydroxyacetophenone	362	115		4,4'-Dihydroxy-2,2'-dimethylbiphenyl	240	108	
"	175	178		4,4'-Dihydroxy-3,3'-dimethylbiphenyl	406	117	
2,5-Dihydroxyacetophenone	512	123		2,2'-Dihydroxy-1,1'-dinaphthylmethane	504	123	
"	197	179		1,2-Dihydroxy-3,5-dinitrobenzene	422	118	
3,4-Dihydroxyacetophenone	266	110		2,4'-Dihydroxydiphenylmethane	256	109	
"	148	177		3,3'-Dihydroxydiphenylmethane	200	106	
3,5-Dihydroxyacetophenone	368	115		4,4'-Dihydroxydiphenylmethane	398	116	
"	176	178		<i>erythro</i> -2,3-Dihydroxy-1,4-dithiobutane	26	417	
2,3-Dihydroxyacridine	564	126		<i>threo</i> -2,3-Dihydroxy-1,4-dithiobutane	10	416	
2,8-Dihydroxyacridine	588	127		2,5-Dihydroxy-3- <i>n</i> -dodecyl-1,4-benzoquinone	18	182	
3,7-Dihydroxyacridine	590	127		<i>Di</i> -(2-hydroxyethyl)amine	180	301	
3,9-Dihydroxyacridine	487	122		2,2'-Dihydroxyhydrazobenzene	332	313	
1,3-Dihydroxyacridone	592	128		1,4-Dihydroxyisoquinoline	573	126	
3,5-Dihydroxyaniline	361	114		1,3-Dihydroxy-4-methyl-9,10-anthraquinone	45	184	
"	328	313		1,8-Dihydroxy-2-methyl-9,10-anthraquinone	23	182	
1,2-Dihydroxyanthracene	408	117		1,3-Dihydroxy-2-methylbenzene	265	110	

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	Compound No.	Page No.		Compound No.	Page No.
1,3-Dihydroxy-2-methylnaphthalene	339	113	Di-iodomethane	1	67
1,4-Dihydroxy-2-methylnaphthalene	447	119	2,4-Di-iodophenol	100	101
3,5-Dihydroxy-2-methyl-1,4-naphthoquinone	25	182	2,5-Di-iodophenol	191	106
2,7-Dihydroxy-4-methylquinoline	585	127	2,6-Di-iodophenol	86	101
1,2-Dihydroxynaphthalene	64	99	3,4-Di-iodophenol	133	103
1,3-Dihydroxynaphthalene	291	111	3,5-Di-iodophenol	202	106
1,4-Dihydroxynaphthalene	461	120	3,4-Di-iodophthalic anhydride	76	226
"	71	434	1,3-Di-iodopropane	2	67
1,5-Dihydroxynaphthalene	575	127	DL-3,5-Di-iodotyrosine	52	429
1,6-Dihydroxynaphthalene	330	113	L-3,5-Di-iodotyrosine	44	286
1,7-Dihydroxynaphthalene	462	120	Di-isoamylamine	86	297
1,8-Dihydroxynaphthalene	343	114	"	440	439
2,3-Dihydroxynaphthalene	407	117	Di-isoamyl carbonate	246	263
2,6-Dihydroxynaphthalene	535	124	Di-isoamyl ether	64	134
2,7-Dihydroxynaphthalene	484	121	Di-isoamyl oxalate	312	268
2,4-Dihydroxy-5-nitroaniline	360	314	Di-isoamyl phthalate	357	271
2,5-Dihydroxy-4-nitroaniline	346	314	Di-isobutylamine	52	296
1,2-Dihydroxy-3-nitrobenzene	148	104	"	438	439
1,3-Dihydroxy-2-nitrobenzene	143	103	Di-isobutyl carbinol	63	83
1,3-Dihydroxy-4-nitrobenzene	280	110	Di-isobutyl carbonate	154	257
1,2-Dihydroxyphenanthrene	463	120	Di-isobutyl ether	46	133
1,9-Dihydroxyphenanthrene	477	121	Di-isobutyl ketone	101	164
2,5-Dihydroxyphenanthrene	467	120	Di-isobutyl oxalate	237	263
2,6-Dihydroxyphenanthrene	561	126	Di-isobutyl sulfide	37	421
2,7-Dihydroxyphenanthrene	576	127	Di-isobutyl <i>d</i> -tartarate	106	278
2,8-Dihydroxyphenanthrene	513	123	Di-isobutyl <i>d,l</i> -tartarate	80	277
3,4-Dihydroxyphenanthrene	345	114	Di-isobutyryl	63	163
3,6-Dihydroxyphenanthrene	548	125	Di-isopropylamine	23	295
3,8-Dihydroxyphenanthrene	570	126	"	460	439
9,10-Dihydroxyphenanthrene	371	115	N,N-Di-isopropylaniline	277	438
(3,4-Dihydroxyphenyl)alanine	75	429	1,2-Di-isopropylbenzene	75	38
1,5-Di-(2-hydroxyphenyl)-1,4-pentadiene-3-one	441	119	1,3-Di-isopropylbenzene	73	38
Di-(2-hydroxyphenyl)sulfide	69	426	1,4-Di-isopropylbenzene	95	38
Di-(3-hydroxyphenyl)sulfide	67	426	Di-isopropyl carbonate	90	254
Di-(4-hydroxyphenyl)sulfide	72	427	Di-isopropyl ether	18	131
1,3-Dihydroxy-2-propanone	42	89	Di-isopropylideneacetone	8	172
2,3-Dihydroxypropylamine	179	300	Di-isopropyl ketone	20	161
1,2-Dihydroxy-3-propylbenzene	97	101	2,4-Di-isopropyl-1-methylbenzene	122	39
1,2-Dihydroxy-4-propylbenzene	63	99	2,6-Di-isopropyl-1-methylbenzene	126	39
1,3-Dihydroxy-5-propylbenzene	135	103	Di-isopropyl oxalate	160	258
1,4-Dihydroxy-2-propylbenzene	159	104	Di-isopropyl phthalate	347	270
1,6-Dihydroxypyrene	568	126	Di-isopropyl sulfide	17	420
3,5-Dihydroxypyrene	547	125	Di-isopropyl <i>d</i> -tartarate	323	268
3,8-Dihydroxypyrene	591	127	Di-isopropyl <i>d,l</i> -tartarate	34	274
2,5-Dihydroxypyridine	572	126	2,4-Di-isopropyltoluene	122	39
2,3-Dihydroxyquinoline	574	126	2,6-Di-isopropyltoluene	126	39
2,2'-Dihydroxystilbene	172	105	2,4-Diketo- <i>n</i> -valeric acid	117	197
3,5-Dihydroxystilbene	392	116	Dilauryl ether	13	137
4,4'-Dihydroxystilbene	583	127	Dimedone	181	178
α ,4-Dihydroxytoluene	294	111	1,4-Dimercaptobenzene	31	417
2,3-Dihydroxytoluene	84	101	<i>sym</i> -Dime thoxyacetone	19	169
2,5-Dihydroxytoluene	293	111	3,4-Dime thoxyacetophenone	55	174
2,6-Dihydroxytoluene	265	110	3,4-Dime thoxyaniline	148	307
3,4-Dihydroxytoluene	76	100	3,5-Dime thoxyaniline	114	436
3,5-Dihydroxytoluene	217	107	2,3-Dime thoxybenzaldehyde	32	154
1,3-Dihydroxy-2,4,6-tribromobenzene	234	108	2,4-Dime thoxybenzaldehyde	59	156
4,4'-Dihydroxytriphenylmethane	411	117	3,4-Dime thoxybenzaldehyde	23	134
2,6-Dihydroxy- <i>p</i> -xylene	419	118	1,2-Dime thoxybenzene	2	137
3,6-Dihydroxy- <i>o</i> -xylene	549	125	1,3-Dime thoxybenzene	89	135
4,5-Dihydroxy- <i>m</i> -xylene	102	101	1,4-Dime thoxybenzene	34	138
4,6-Dihydroxy- <i>m</i> -xylene	295	111	2,4-Dime thoxybenzene sulfonamide	186	399
2,4-Di-iodoaniline	184	308	2,4-Dime thoxybenzene sulfonyl chloride	78	383
1,3-Di-iodobenzene	3	76	4,4'-Dime thoxybenzil	56	140
1,4-Di-iodobenzene	6	76	"	161	177
2,4-Di-iodobenzenesulfonamide	391	407	3,4-Dime thoxybenzoic acid	281	204
3,4-Di-iodobenzenesulfonamide	379	406	4,4'-Dime thoxybenzoic acid	54	139
2,4-Di-iodobenzenesulfonic acid	177	377	"	146	177
3,4-Di-iodobenzenesulfonic acid	171	377	3,4-Dime thoxybenzyl alcohol	132	86
2,4-Di-iodobenzenesulfonyl chloride	91	383	2,3-Dime thoxybenzylamine	324	438
3,4-Di-iodobenzenesulfonyl chloride	100	384	3,4-Dime thoxybenzylamine	323	438
1,2-Di-iodoethane	1	68	Di-(β -methoxyethyl)carbonate	245	263

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	Compound No.	Page No.		Compound No.	Page No.
3,5-Dimethoxy-4-hydroxybenzoic acid	515	123	3,4-Dimethylaniline	43	304
6,7-Dimethoxy-8-hydroxy-1,2,3,4-tetra- hydroisoquinoline	58	140	"	203	437
2,5-Dimethoxy-3,4-methylenedioxybenzoic acid	273	204	3,5-Dimethylaniline	121	299
2,5-Dimethoxy-3,4-methylenedioxybenzotrile	182	365	"	184	437
(3,4-Dimethoxyphenyl)acetic acid	352	432	1,3-Dimethylantracene	83	46
D ₁ -(2-methoxyphenyl)carbonate	126	279	1,4-Dimethylantracene	64	45
D ₁ -(2-methoxyphenyl)sulfide	43	426	1,5-Dimethylantracene	140	48
D ₁ -(4-methoxyphenyl)sulfide	19	425	9,10-Dimethylantracene	175	50
1,3-Dimethoxy-2-propanone	19	169	Dimethyl azelate	2	272
3,5'-Dimethoxy-5,7,4'-trihydroxyflavonol	584	127	2,2-Dimethylaziridine	301	438
Dimethyl ethylacetaldehyde	23	145	<i>cis</i> -2,3-Dimethylaziridine	303	438
2,3-Dimethylacetanilide	244	237	<i>trans</i> -2,3-Dimethylaziridine	302	438
2,4-Dimethylacetanilide	234	237	1,2-Dimethylazulene	41	44
2,5-Dimethylacetanilide	253	237	1,3-Dimethylazulene	30	44
2,6-Dimethylacetanilide	366	241	4,8-Dimethylazulene	59	45
3,5-Dimethylacetanilide	265	238	2,6-Dimethylbenzaldehyde	84	149
2,2-Dimethylacetoacetoneitrile	39	348	3,5-Dimethylbenzaldehyde	80	148
2,4-Dimethylacetophenone	187	167	2,4-Dimethylbenzamide	374	242
2,5-Dimethylacetophenone	193	167	3,4-Dimethylbenzamide	221	237
3,4-Dimethylacetophenone	204	168	3,5-Dimethylbenzamide	235	237
3,5-Dimethylacetophenone	198	167	3,4-Dimethylbenzanilide	131	234
Dimethyl acetylene	6	28	2,6-Dimethyl-1,2-benzanthracene	164	50
3,3-Dimethylacrylic acid	64	195	3,9-Dimethyl-1,2-benzanthracene	96	47
"	466	433	4,9-Dimethyl-1,2-benzanthracene	66	45
3,3-Dimethylacrylonitrile	30	347	4,10-Dimethyl-1,2-benzanthracene	117	47
Dimethyl adipate	3	272	5,6-Dimethyl-1,2-benzanthracene	177	50
1,1-Dimethylallene	22	12	5,8-Dimethyl-1,2-benzanthracene	135	48
1,3-Dimethylallene	31	13	5,10-Dimethyl-1,2-benzanthracene	173	50
D ₁ -2-methylallyl sulfide	38	421	6,7-Dimethyl-1,2-benzanthracene	171	50
Dimethylamine	2	295	8,10-Dimethyl-1,2-benzanthracene	146	49
"	434	439	9,10-Dimethyl-1,2-benzanthracene	126	48
Dimethylaminoacetone	10	319	2,5-Dimethylbenzene-1,3-disulfonamide	464	409
3-(Dimethylamino)aniline	181	301	2,5-Dimethylbenzene-1,4-disulfonamide	470	410
4-Dimethylaminoazobenzene	74	324	4,5-Dimethylbenzene-1,3-disulfonamide	414	408
2-Dimethylaminobenzaldehyde	74	321	4,6-Dimethylbenzene-1,3-disulfonamide	431	408
3-Dimethylaminobenzaldehyde	6	322	2,5-Dimethylbenzene-1,3-disulfonanilide	210	399
4-Dimethylaminobenzaldehyde	64	156	2,5-Dimethylbenzene-1,4-disulfonanilide	367	406
"	44	323	4,5-Dimethylbenzene-1,3-disulfonanilide	312	404
4-Dimethylaminobenzoic acid	67	287	4,6-Dimethylbenzene-1,3-disulfonanilide	299	403
4-Dimethylaminobenzophenone	58	324	2,5-Dimethylbenzene-1,3-disulfonic acid	217	378
2-Dimethylaminoethyl ether	9	319	4,5-Dimethylbenzene-1,3-disulfonic acid	189	378
2-(Dimethylamino)ethylamine	330	438	4,6-Dimethylbenzene-1,3-disulfonic acid	197	378
2-(Dimethylamino)ethyl alcohol	14	319	2,5-Dimethylbenzene-1,3-disulfonyl chloride	97	384
N,N-1-(Dimethylamino)naphthalene	101	321	2,5-Dimethylbenzene-1,4-disulfonyl chloride	253	389
"	180	437	4,5-Dimethylbenzene-1,3-disulfonyl chloride	94	383
"	164	437	4,6-Dimethylbenzene-1,3-disulfonyl chloride	210	388
2-(Dimethylamino)naphthalene	22	323	2,3-Dimethylbenzenesulfonamide	189	399
"	164	437	2,4-Dimethylbenzenesulfonamide	94	395
3-(Dimethylamino)phenol	144	103	2,5-Dimethylbenzenesulfonamide	125	396
N,N-Dimethyl-3-aminophenol	51	324	2,6-Dimethylbenzenesulfonamide	50	393
4-(Dimethylamino)phenol	111	102	3,4-Dimethylbenzenesulfonamide	111	396
N,N-Dimethyl-4-aminophenol	46	323	3,5-Dimethylbenzenesulfonamide	87	395
4-Dimethylaminothiophenol	7	416	2,4-Dimethylbenzenesulfonanilide	43	393
2-Dimethylamino- <i>m</i> -xylene	56	320	3,5-Dimethylbenzenesulfonanilide	57	394
4-Dimethylamino- <i>m</i> -xylene	59	320	2,3-Dimethylbenzene sulfonic acid	75	373
2-Dimethylamino- <i>p</i> -xylene	58	320	2,4-Dimethylbenzene sulfonic acid	32	372
N,N-Dimethylaniline	52	320	2,5-Dimethylbenzene sulfonic acid	48	372
"	194	437	2,6-Dimethylbenzene sulfonic acid	13	371
N,2-Dimethylaniline	103	298	3,4-Dimethylbenzene sulfonic acid	40	372
"	167	437	3,5-Dimethylbenzene sulfonic acid	28	371
N,3-Dimethylaniline	191	437	2,3-Dimethylbenzenesulfonyl chloride	33	381
N,4-Dimethylaniline	109	298	2,4-Dimethylbenzenesulfonyl chloride	15	381
"	214	437	2,5-Dimethylbenzenesulfonyl chloride	11	381
2,3-Dimethylaniline	124	299	2,6-Dimethylbenzenesulfonyl chloride	23	381
"	173	437	3,4-Dimethylbenzenesulfonyl chloride	40	382
2,4-Dimethylaniline	117	298	3,5-Dimethylbenzenesulfonyl chloride	126	385
"	182	437	4,4'-Dimethylbenzhydrol	38	89
2,5-Dimethylaniline	112	298	4,4'-Dimethylbenzil	133	176
"	160	437	1,2-Dimethylbenzimidazole	71	324
2,6-Dimethylaniline	115	298	1,2-Dimethylbenzimidazole	264	438
"	120	436	1,5-Dimethylbenzimidazole	60	324

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	Compound No.	Page No.		Compound No.	Page No.
2,3-Dimethylbenzoic acid	242	431	<i>cis</i> -2,4-Dimethylcyclohexanol	74	84
2,4-Dimethylbenzoic acid	169	200	<i>trans</i> -2,4-Dimethylcyclohexanol	71	83
"	318	431	<i>cis</i> -2,5-Dimethylcyclohexanol	70	83
2,5-Dimethylbenzoic acid	179	200	<i>trans</i> -2,5-Dimethylcyclohexanol	76	84
"	281	431	2,6-Dimethylcyclohexanol	69	83
2,6-Dimethylbenzoic acid	185	430	3,3-Dimethylcyclohexanol	88	84
3,4-Dimethylbenzoic acid	257	203	3,4-Dimethylcyclohexanol	92	84
"	370	432	<i>cis</i> -3,5-Dimethylcyclohexanol	89	84
3,5-Dimethylbenzoic acid	259	203	<i>trans</i> -3,5-Dimethylcyclohexanol	90	84
"	344	432	2,2-Dimethylcyclohexanone	109	164
2,6-Dimethylbenzotrile	116	362	2,3-Dimethylcyclohexanone	125	165
2,2'-Dimethylbenzophenone	86	174	<i>cis</i> -2,4-Dimethylcyclohexanone	123	165
4,4'-Dimethylbenzophenone	118	176	<i>trans</i> -2,4-Dimethylcyclohexanone	111	164
2,3-Dimethyl-1,4-benzoquinone	3	181	<i>d</i> -2,5-Dimethylcyclohexanone	116	164
2,5-Dimethyl-1,4-benzoquinone	15	182	<i>d,l</i> -2,5-Dimethylcyclohexanone	113	164
2,6-Dimethyl-1,4-benzoquinone	7	181	2,6-Dimethylcyclohexanone	118	165
α ,4-Dimethylbenzyl alcohol	110	85	3,3-Dimethylcyclohexanone	127	165
N,N-Dimethylbenzylamine	306	438	3,4-Dimethylcyclohexanone	141	165
2,4-Dimethylbenzylamine	119	298	<i>cis</i> -3,5-Dimethylcyclohexanone	136	165
3,5-Dimethylbenzylamine	123	299	<i>trans</i> -3,5-Dimethylcyclohexanone	131	165
Di-(4-methylbenzyl)sulfide	44	426	4,4-Dimethylcyclohexanone	26	173
N,N-Dimethylbenzyl sulfonamide	33	393	1,2-Dimethylcyclohexene	239	19
7,7-Dimethylbicyclo(3,1,1)heptane	140	5	1,3-Dimethylcyclohexene	240	19
2,3-Dimethylbicyclo(2,1,1)hept-2-ene	250	20	1,4-Dimethylcyclohexene	223	19
6,6'-Dimethyl-2,2'-bipyridyl	53	324	1,5-Dimethylcyclohexene	224	19
2,3-Dimethyl-1,3-butadiene	52	13	1,6-Dimethylcyclohexene	232	19
2,2-Dimethylbutanamide	227	237	3,3-Dimethylcyclohexene	201	18
<i>d,l</i> -2,3-Dimethylbutanamide	228	237	4,4-Dimethylcyclohexene	197	18
3,3-Dimethylbutanamide	230	237	1,2-Dimethylcyclohexen-3-one	95	170
2,2-Dimethylbutananilide	81	233	1,5-Dimethylcyclohexen-3-one	164	166
<i>d,l</i> -2,3-Dimethylbutananilide	47	232	1,5-Dimethylcyclohexen-4-one	147	165
3,3-Dimethylbutananilide	229	237	2,5-Dimethylcyclohexen-3-one	143	165
2,2-Dimethylbutane	18	3	5,5-Dimethylcyclohexen-3-one	79	170
2,3-Dimethylbutane	20	3	1,2-Dimethylcyclooctatetraene	11	25
3,3-Dimethylbutanesulfonamide	28	393	1,1-Dimethylcyclopentane	32	3
3,3-Dimethylbutane-1-sulfonyl chloride	28	381	<i>cis</i> -1,2-Dimethylcyclopentane	43	3
2,2-Dimethylbutanoic acid	21	190	<i>trans</i> -1,2-Dimethylcyclopentane	38	3
<i>d,l</i> -2,3-Dimethylbutanoic acid	24	190	<i>cis</i> -1,3-Dimethylcyclopentane	36	3
3,3-Dimethylbutanoic acid	17	190	<i>trans</i> -1,3-Dimethylcyclopentane	35	3
2,2-Dimethyl-1-butanol	31	81	3,3-Dimethylcyclopentanone	73	163
2,3-Dimethyl-1-butanol	38	82	1,2-Dimethylcyclopentene	136	16
2,3-Dimethyl-2-butanol	17	80	1,3-Dimethylcyclopentene	99	15
3,3-Dimethyl-2-butanol	16	80	1,4-Dimethylcyclopentene	102	15
3,3-Dimethyl-2-butanone	12	161	3,3-Dimethylcyclopentene	94	15
2,3-Dimethyl-1-butene	34	13	2,3-Dimethyl-2-cyclopentenone	100	170
2,3-Dimethyl-2-butene	60	14	1,1-Dimethylcyclopropane	9	3
3,3-Dimethyl-1-butene	25	12	<i>cis</i> -1,2-Dimethylcyclopropane	15	3
Dimethyl <i>sec</i> -butyl amine	405	439	<i>trans</i> -1,2-Dimethylcyclopropane	11	3
1,3-Dimethyl-5- <i>tert</i> -butylbenzene	83	38	<i>cis</i> -1,1-Dimethyl-2,3-cyclopropanedicarboxylic acid	81	429
Di-(3-methylbutyl)sulfide	50	421	<i>trans</i> -1,1-Dimethyl-2,3-cyclopropanedicarboxylic acid	255	431
3,3-Dimethyl-1-butyne	8	28	1,10-Dimethyl- <i>cis</i> -decahydronaphthalene	255	7
2,2-Dimethylbutyric acid	464	433	1,10-Dimethyl- <i>trans</i> -decahydronaphthalene	252	7
Dimethyl <i>d</i> -camphorate	308	267	1',10-Dimethyl-1,2-dibenzanthracene	125	48
2,6-Dimethylcarbazole	449	317	4,4'-Dimethyldiethylamine	11	303
3,6-Dimethylcarbazol	444	317	2,3-Dimethyl-1,4-dinitrobenzene	61	339
Dimethylethylcarbonyl acetate	50	252	2,4-Dimethyl-1,3-dinitrobenzene	54	339
Dimethyl carbonate	18	250	2,5-Dimethyl-1,3-dinitrobenzene	88	340
3,5-Dimethylcatechol	102	101	2,5-Dimethyl-1,4-dinitrobenzene	102	341
1,4-Dimethylchrysene	144	49	3,4-Dimethyl-1,2-dinitrobenzene	49	338
2,8-Dimethylchrysene	192	51	3,5-Dimethyl-1,2-dinitrobenzene	93	340
6,12-Dimethylchrysene	194	51	3,5-Dimethyl-1,4-dinitrobenzene	72	340
Dimethyl citraconate	196	260	3,6-Dimethyl-1,2-dinitrobenzene	63	339
1,1-Dimethylcyclohexane	70	4	4,5-Dimethyl-1,2-dinitrobenzene	82	340
<i>cis</i> -1,2-Dimethylcyclohexane	86	4	4,5-Dimethyl-1,3-dinitrobenzene	42	338
<i>trans</i> -1,2-Dimethylcyclohexane	78	4	4,6-Dimethyl-1,3-dinitrobenzene	64	339
<i>cis</i> -1,3-Dimethylcyclohexane	71	4	3,5-Dimethyl-2,4-dinitrophenol	249	109
<i>trans</i> -1,3-Dimethylcyclohexane	81	4	Dimethylethyl acetic acid	21	190
<i>cis</i> -1,4-Dimethylcyclohexane	80	4	Dimethyl ethyl amine	2	319
<i>trans</i> -1,4-Dimethylcyclohexane	69	4	"	372	439
5,5-Dimethyl-1,3-cyclohexanedione	181	178			
2,2-Dimethylcyclohexanol	77	84			

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	Compound No.	Page No.		Compound No.	Page No.
1,2-Dimethyl-3-ethylbenzene	47	37	2,2-Dimethyl- <i>cis</i> -3-hexene	134	16
1,2-Dimethyl-4-ethylbenzene	39	36	2,2-Dimethyl- <i>trans</i> -3-hexene	118	16
1,3-Dimethyl-2-ethylbenzene	40	36	2,3-Dimethyl-1-hexene	161	17
1,3-Dimethyl-4-ethylbenzene	37	36	2,3-Dimethyl-2-hexene	214	19
1,3-Dimethyl-5-ethylbenzene	30	36	2,3-Dimethyl-3-hexene	182	18
1,4-Dimethyl-2-ethylbenzene	33	33	2,4-Dimethyl-1-hexene	164	17
3,3-Dimethyl-2-ethyl-1-butene	155	17	2,4-Dimethyl-2-hexene	162	17
2,2-Dimethylethylene sulfide	4	423	2,4-Dimethyl- <i>cis</i> -3-hexene	154	17
2,2-Dimethyl-3-ethylhexane	172	5	2,4-Dimethyl- <i>trans</i> -3-hexene	147	17
2,2-Dimethyl-4-ethylhexane	134	5	2,5-Dimethyl-1-hexene	165	17
2,3-Dimethyl-3-ethylhexane	231	6	2,5-Dimethyl-2-hexene	172	17
2,3-Dimethyl-4-ethylhexane	203	6	2,5-Dimethyl-3-hexene	123	16
2,4-Dimethyl-3-ethylhexane	199	6	3,3-Dimethyl-1-hexene	130	16
2,4-Dimethyl-4-ethylhexane	171	5	3,4-Dimethyl-1-hexene	167	17
2,5-Dimethyl-3-ethylhexane	167	5	3,4-Dimethyl-2-hexene	192	18
3,3-Dimethyl-4-ethylhexane	208	6	3,4-Dimethyl- <i>trans</i> -3-hexene	215	19
3,4-Dimethyl-3-ethylhexane	233	7	3,5-Dimethyl-1-hexene	129	16
2,2-Dimethyl-3-ethylpentane	97	4	3,5-Dimethyl-2-hexene	169	17
2,3-Dimethyl-3-ethylpentane	122	5	4,4-Dimethyl-1-hexene	144	17
2,4-Dimethyl-3-ethylpentane	104	4	4,4-Dimethyl-2-hexene	138	16
2,6-Dimethyl-4-ethylpyridine	47	320	4,5-Dimethyl-1-hexene	152	17
3,5-Dimethyl-2-ethylpyridine	55	320	4,5-Dimethyl-2-hexene	157	17
1,7-Dimethylfluorene	111	47	5,5-Dimethyl-1-hexene	124	16
N,N-Dimethylformamide	1	230	5,5-Dimethyl- <i>cis</i> -2-hexene	140	16
Dimethyl fumarate	135	280	5,5-Dimethyl- <i>trans</i> -2-hexene	131	16
2,5-Dimethylfuran	32	132	3,4-Dimethyl-3-hexen-2-one	84	163
Dimethyl glutarate	206	260	4,5-Dimethyl-4-hexen-3-one	99	164
3,3-Dimethylglutaric acid	238	431	4,5-Dimethyl-5-hexen-3-one	92	164
Dimethylglycolic acid	80	196	5,5-Dimethyl-3-hexen-2-one	55	170
2,6-Dimethyl-1,3-heptadiene	251	20	<i>sym</i> -Dimethylhydrazine	21	295
2,6-Dimethyl-1,5-heptadiene	254	20	<i>unsym</i> -Dimethylhydrazine	14	295
2,6-Dimethyl-2,4-heptadiene	247	20	2,3-Dimethylhydroquinone	549	125
2,6-Dimethyl-2,5-heptadiene	279	21	2,5-Dimethylhydroquinone	540	124
3,5-Dimethyl-2,4-heptadiene	233	19	2,6-Dimethylhydroquinone	377	115
3,6-Dimethyl-2,4-heptadiene	259	20	N,N-Dimethyl-3-hydroxyaniline	51	324
2,2-Dimethylheptane	91	4	N,N-Dimethyl-4-hydroxyaniline	46	323
2,3-Dimethylheptane	117	4	2,4-Dimethyl-6-hydroxyaniline	366	314
2,4-Dimethylheptane	93	4	2,5-Dimethyl-4-hydroxyaniline	454	317
2,5-Dimethylheptane	100	4	2,6-Dimethyl-4-hydroxyaniline	393	315
2,6-Dimethylheptane	99	4	3,5-Dimethyl-2-hydroxyaniline	301	312
3,3-Dimethylheptane	106	4	3,5-Dimethyl-4-hydroxyaniline	310	312
3,4-Dimethylheptane	118	5	4,5-Dimethyl-2-hydroxyaniline	382	315
3,5-Dimethylheptane	101	4	4,5'-Dimethyl-2-hydroxyazobenzene	235	108
4,4-Dimethylheptane	98	4	2,6-Dimethyl-4-hydroxybenzene-1,3- disulfonamide	332	405
2,6-Dimethyl-4-heptanol	63	83	3,5-Dimethyl-2-hydroxybenzene-1,4- disulfonamide	166	398
2,2-Dimethyl-3-heptanone	100	164	2,6-Dimethyl-4-hydroxybenzene-1,3- disulfonanilide	326	404
2,5-Dimethyl-4-heptanone	103	164	2,6-Dimethyl-4-hydroxybenzene-1,3- disulfonic acid	157	376
2,6-Dimethyl-4-heptanone	101	164	4,6-Dimethyl-2-hydroxybenzene-1,3-disulfonic acid	64	373
3,5-Dimethyl-4-heptanone	93	164	3,5-Dimethyl-2-hydroxybenzene-1,3-disulfonyl chloride	116	384
2,6-Dimethyl-2-heptene	225	19	3,5-Dimethyl-2-hydroxybenzenesulfonanilide	103	395
2,3-Dimethyl-2-hepten-6-one	45	169	3,5-Dimethyl-2-hydroxybenzenesulfonic acid	5	380
2,4-Dimethyl-2,4-hexadiene	184	18	2,6-Dimethyl-4-hydroxybenzenesulfonyl chloride	181	387
2,5-Dimethyl-1,3-hexadiene	195	18	2,6-Dimethyl-4-hydroxybenzonitrile	38	434
2,5-Dimethyl-1,5-hexadiene	203	18	3,5-Dimethyl-4-hydroxybenzonitrile	40	434
2,5-Dimethyl-2,4-hexadiene	235	19	Dimethyl (2-hydroxyethyl) amine	319	438
3,3-Dimethyl-1,5-hexadiene	121	16	2,2-Dimethyl-3-hydroxypropionaldehyde	84	157
3,4-Dimethyl-1,5-hexadiene	122	16	2,4-Dimethyl-8-hydroxyquinoline	18	434
3,4-Dimethyl-2,4-hexadiene	228	19	3,4-Dimethyl-8-hydroxyquinoline	13	434
3,5-Dimethylhexahydrobenzaldehyde	19	150	2,4-Dimethylimidazole	297	438
2,2-Dimethylhexane	47	3	3,5-Dimethylindole	116	306
2,3-Dimethylhexane	57	3	Dimethyl isobutyl amine	365	439
2,4-Dimethylhexane	50	3	Dimethyl isophthalate	93	277
2,5-Dimethylhexane	48	3	Dimethyl isopropyl amine	397	439
3,3-Dimethylhexane	53	3	1,4-Dimethyl-7-isopropylazulene	6	43
3,4-Dimethylhexane	63	4			
2,5-Dimethyl-3,4-hexanedione	63	163			
2,2-Dimethylhexanoic acid	41	191			
2,2-Dimethyl-3-hexanone	57	163			
2,4-Dimethyl-3-hexanone	53	162			
3,4-Dimethyl-2-hexanone	83	163			
4,4-Dimethyl-3-hexanone	68	163			

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	Compound No.	Page No.		Compound No.	Page No.
1,2-Dimethyl-3-isopropylbenzene	71	38	2,5-Dimethyl-4-nitrobenzenesulfonamide	78	394
1,2-Dimethyl-4-isopropylbenzene	69	38	2,5-Dimethyl-6-nitrobenzenesulfonamide	237	401
1,3-Dimethyl-2-isopropylbenzene	61	37	2,4-Dimethyl-3-nitrobenzenesulfonic acid	86	373
1,3-Dimethyl-4-isopropylbenzene	62	37	2,4-Dimethyl-5-nitrobenzenesulfonic acid	120	375
1,3-Dimethyl-5-isopropylbenzene	51	37	2,5-Dimethyl-3-nitrobenzenesulfonic acid	87	374
1,4-Dimethyl-2-isopropylbenzene	56	37	2,5-Dimethyl-4-nitrobenzenesulfonic acid	145	376
Dimethyl isopropyl carbinol	17	80	2,5-Dimethyl-6-nitrobenzenesulfonic acid	134	375
1,7-Dimethyl-4-isopropyl-naphthalene	43	44	2,4-Dimethyl-3-nitrobenzenesulfonyl chloride	134	385
2,4-Dimethyl-3-isopropylpentane	169	5	2,4-Dimethyl-5-nitrobenzenesulfonyl chloride	143	385
Dimethyl itaconate	41	275	2,5-Dimethyl-3-nitrobenzenesulfonyl chloride	60	382
Dimethyl <i>l</i> -malate	263	264	2,4-Dimethyl-4-nitrobenzenesulfonyl chloride	87	383
Dimethyl maleate	179	259	2,5-Dimethyl-6-nitrobenzenesulfonyl chloride	167	386
Dimethyl malonate	142	257	3,4-Dimethyl-5-nitrobenzenesulfonyl chloride	80	383
Dimethylmalonic acid	313	206	2,6-Dimethyl-4-nitrophenol	25	434
"	170	430	3,5-Dimethyl-4-nitrophenol	39	434
Dimethylmalononitrile	20	357	Dimethyl-3-nitrophthalate	96	278
Dimethyl mesaconate	175	259	Dimethyl-4-nitrophthalate	89	277
Dimethyl mesotartarate	144	280	N,N-Dimethyl-4-nitrosoaniline	50	324
3,3-Dimethyl-1-methoxy-2-butanone	87	163	2,3-Dimethyl-2-norbornene	250	20
2,4-Dimethyl-2-methoxyphenol	286	111	2,4-Dimethyl-2,4-octadiene	289	22
2,2-Dimethyl-3-methylene-bicyclo(2,2,1)heptene	10	26	2,6-Dimethyl-2,5-octadiene	12	25
2,2-Dimethyl-5-methylene-bicyclo(2,2,1)heptane	278	21	2,6-Dimethyl-2,6-octadiene	296	22
3,5-Dimethyl-4-(methylsulfonyl)phenol	37	434	2,6-Dimethyl-2,7-octadiene	286	21
Dimethyl mucate	168	281	2,7-Dimethyl-2,6-octadiene	292	22
Dimethyl naphthalate	137	280	3,6-Dimethyl-2,6-octadiene	285	21
1,3-Dimethylnaphthalene	155	41	3,7-Dimethyl-2,4-octadiene	293	22
1,4-Dimethylnaphthalene	159	41	4,4-Dimethyl-1,7-octadiene	265	21
1,5-Dimethylnaphthalene	75	46	4,5-Dimethyl-2,6-octadiene	283	21
1,6-Dimethylnaphthalene	154	41	2,2-Dimethyloctane	156	5
1,7-Dimethylnaphthalene	153	41	2,3-Dimethyloctane	205	6
1,8-Dimethylnaphthalene	53	45	2,4-Dimethyloctane	160	5
2,3-Dimethylnaphthalene	109	47	<i>a,l</i> -2,5-Dimethyloctane	162	5
2,6-Dimethylnaphthalene	114	47	2,6-Dimethyloctane	182	6
2,7-Dimethylnaphthalene	100	47	2,7-Dimethyloctane	176	5
1,3-Dimethyl-2-naphthol	158	104	3,3-Dimethyloctane	188	6
1,4-Dimethyl-2-naphthol	326	113	3,4-Dimethyloctane	212	6
2,4-Dimethyl-1-naphthol	139	103	3,5-Dimethyloctane	178	6
3,4-Dimethyl-1-naphthol	276	110	3,6-Dimethyloctane	177	6
2,5-Dimethyl-1,4-naphthoquinone	9	181	4,4-Dimethyloctane	185	6
3,7-Dimethyl-1,2-naphthoquinone	20	182	4,5-Dimethyloctane	189	6
1,4-Dimethyl-2-naphthylamine	119	306	2,6-Dimethyl-1-octene-8-carboxylic acid	49	191
N,N-Dimethyl- α -naphthylamine	101	321	2,6-Dimethyl-1-octene-8-carboxylic acid	12	192
N,N-Dimethyl- β -naphthylamine	22	323	2,6-Dimethylol-4-methylphenol	91	434
2,6-Dimethyl-1-naphthylamine	161	307	2,4-Dimethylolphenol	85	434
3,6-Dimethyl-2-naphthylamine	313	312	2,6-Dimethylolphenol	83	434
3,7-Dimethyl-2-naphthylamine	286	311	Dimethyl oxalate	73	276
Dimethylnepentylacetic acid	33	194	2,4-Dimethyl-1,3-pentadiene	101	15
N,N-Dimethyl-2-nitroaniline	1	322	2,4-Dimethyl-2,3-pentadiene	89	15
N,N-Dimethyl-3-nitroaniline	33	323	4,4-Dimethyl-1,2-pentadiene	77	14
"	60	436	3,3-Dimethylpentanal	40	146
N,N-Dimethyl-4-nitroaniline	17	436	2,2-Dimethylpentane	27	3
2,3-Dimethyl-4-nitroaniline	36	436	2,3-Dimethylpentane	33	3
2,4-Dimethyl-5-nitroaniline	270	311	2,4-Dimethylpentane	28	3
2,5-Dimethyl-4-nitroaniline	325	313	3,3-Dimethylpentane	31	3
2,6-Dimethyl-4-nitroaniline	23	436	2,3-Dimethylpentanoic acid	18	192
3,5-Dimethyl-4-nitroaniline	57	436	4,4-Dimethylpentanoic acid	434	432
4,6-Dimethyl-2-nitroaniline	123	306	2,4-Dimethyl-1-pentanol	53	82
1,2-Dimethyl-3-nitrobenzene	30	336	2,4-Dimethyl-3-pentanol	34	81
1,3-Dimethyl-2-nitrobenzene	24	336	3,3-Dimethyl-1-pentanol	40	146
1,3-Dimethyl-4-nitrobenzene	29	336	2,2-Dimethyl-3-pentanone	23	161
1,4-Dimethyl-2-nitrobenzene	27	336	2,4-Dimethyl-3-pentanone	20	161
3,4-Dimethyl-1-nitrobenzene	4	337	3,3-Dimethyl-2-pentanone	26	162
3,5-Dimethyl-1-nitrobenzene	41	338	3,4-Dimethyl-2-pentanone	42	162
2,4-Dimethyl-3-nitrobenzenesulfonamide	205	399	2,3-Dimethyl-1-pentene	84	15
2,4-Dimethyl-5-nitrobenzenesulfonamide	260	402	2,3-Dimethyl-2-pentene	113	16
2,4-Dimethyl-6-nitrobenzenesulfonamide	40	393	2,4-Dimethyl-2-pentene	82	15
2,5-Dimethyl-3-nitrobenzenesulfonamide	207	399	3,3-Dimethyl-1-pentene	69	14
2,5-Dimethyl-4-nitrobenzenesulfonamide	307	403	3,4-Dimethyl-1-pentene	80	15
2,5-Dimethyl-6-nitrobenzenesulfonamide	284	403	3,4-Dimethyl-2-pentene	91	15
3,4-Dimethyl-5-nitrobenzenesulfonamide	230	400	4,4-Dimethyl-1-pentene	58	14
2,5-Dimethyl-3-nitrobenzenesulfonamide	107	396	4,4-Dimethyl- <i>cis</i> -2-pentene	79	14

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	Compound No.	Page No.		Compound No.	Page No.
4,4-Dimethyl- <i>trans</i> -2-pentene	68	14	2,5-Dimethylpyridine	26	319
3,4-Dimethyl-3-penten-2-one	61	163	" "	257	438
3,4-Dimethyl-4-penten-2-one	51	162	2,6-Dimethylpyridine	18	319
4,4-Dimethyl-1-pentyne	19	28	" "	266	438
4,4-Dimethyl-2-pentyne	23	29	3,4-Dimethylpyridine	32	319
1,2-Dimethylphenanthrene	145	49	" "	261	438
1,3-Dimethylphenanthrene	68	45	3,5-Dimethylpyridine	40	319
1,4-Dimethylphenanthrene	26	44	4,6-Dimethylpyrimidine	2	323
1,5-Dimethylphenanthrene	38	44	1,2-Dimethylpyrrolidine	5	319
1,6-Dimethylphenanthrene	88	46	" "	376	439
1,7-Dimethylphenanthrene	86	46	1,3-Dimethylpyrrolidine	6	319
1,8-Dimethylphenanthrene	180	50	2,4-Dimethylpyrrolidine	38	296
1,9-Dimethylphenanthrene	89	46	2,5-Dimethylpyrrolidine	37	296
2,3-Dimethylphenanthrene	72	46	1,2-Dimethyl-2-pyrroline	469	439
2,4-Dimethylphenanthrene	115	47	2,3-Dimethylquinoline	37	323
2,5-Dimethylphenanthrene	20	43	2,4-Dimethylquinoline	96	321
2,6-Dimethylphenanthrene	7	43	2,6-Dimethylquinoline	32	323
2,7-Dimethylphenanthrene	105	47	2,8-Dimethylquinoline	3	323
2,9-Dimethylphenanthrene	37	44	3,4-Dimethylquinoline	42	323
3,4-Dimethylphenanthrene	45	44	4,6-Dimethylquinoline	87	321
3,5-Dimethylphenanthrene	29	44	4,7-Dimethylquinoline	107	321
3,6-Dimethylphenanthrene	142	49	4,8-Dimethylquinoline	30	323
2,3-Dimethylphenol	109	103	5,8-Dimethylquinoline	102	321
" "	114	435	6,8-Dimethylquinoline	98	321
2,4-Dimethylphenol	8	96	2,5-Dimethylresorcinol	419	118
" "	113	435	4,6-Dimethylresorcinol	295	111
2,5-Dimethylphenol	108	102	Dimethyl sebacate	17	273
" "	107	435	2,2'-Dimethylstilbene	84	46
2,6-Dimethylphenol	115	435	3,3'-Dimethylstilbene	34	44
3,4-Dimethylphenol	69	100	Dimethyl suberate	313	268
" "	111	435	Dimethyl succinate	1	273
3,5-Dimethylphenol	82	100	<i>d,l</i> -2,3-Dimethylsuccinic acid	458	432
" "	102	434	<i>meso</i> -2,3-Dimethylsuccinic acid	246	431
(2,6-Dimethylphenoxy)acetic acid	193	430	α,α -Dimethylsuccinic anhydride	5	225
2,4-Dimethylphenyl acetate	224	262	<i>unsym</i> -Dimethylsuccinic anhydride	5	225
2,5-Dimethylphenyl acetate	256	264	<i>cis</i> - α,β -Dimethylsuccinic anhydride	36	225
2,6-Dimethylphenyl acetate	207	261	<i>trans</i> - α,β -Dimethylsuccinic anhydride	14	225
3,4-Dimethylphenyl acetate	10	273	<i>d,l</i> -2,3-Dimethylsuccinonitrile	70	360
3,5-Dimethylphenyl acetate	1	272	<i>meso</i> -2,3-Dimethylsuccinonitrile	43	358
1,1-Dimethyl-2-phenylethanol	4	88	Dimethyl sulfate	150	257
<i>sym</i> -Dimethyl- <i>p</i> -phenylenediamine	61	304	Dimethyl sulfide	1	420
2,2-Dimethyl-1-phenylpropane	32	36	Dimethyl <i>d</i> -tartarate	87	277
3,4-Dimethyl-1-phenylpyrazole	108	321	Dimethyl <i>d,l</i> -tartarate	127	279
3,5-Dimethyl-1-phenylpyrazole	104	321	Dimethyl tartaronate	72	276
2,3-Dimethyl-1-phenyl-5-pyrazolone	72	324	Dimethyl terephthalate	161	281
Dimethyl phthalate	332	269	1,1-Dimethyl-1,2,3,4-tetrahydronaphthalene	117	39
3,4-Dimethylphthalic anhydride	56	226	1,5-Dimethyl-1,2,3,4-tetrahydronaphthalene	140	40
4,5-Dimethylphthalic anhydride	78	226	2,2-Dimethyl-1,2,3,4-tetrahydronaphthalene	129	40
Dimethyl pimelate	9	272	2,5-Dimethyl-1,2,3,4-tetrahydronaphthalene	135	40
<i>cis</i> -2,5-Dimethylpiperazine	239	310	2,6-Dimethyl-1,2,3,4-tetrahydronaphthalene	138	40
<i>trans</i> -2,5-Dimethylpiperazine	247	310	2,7-Dimethyl-1,2,3,4-tetrahydronaphthalene	137	40
1,2-Dimethylpiperidine	377	439	2,8-Dimethyl-1,2,3,4-tetrahydronaphthalene	136	40
<i>cis</i> -2,6-Dimethylpiperidine	457	439	5,6-Dimethyl-1,2,3,4-tetrahydronaphthalene	147	40
2,6-Dimethylpiperidine	45	296	5,7-Dimethyl-1,2,3,4-tetrahydronaphthalene	149	40
2,2-Dimethylpropane	7	3	5,8-Dimethyl-1,2,3,4-tetrahydronaphthalene	150	41
2,2-Dimethyl-1-propanol	28	89	6,7-Dimethyl-1,2,3,4-tetrahydronaphthalene	148	40
Dimethylpropyl amine	371	439	1,3-Dimethyl-1,2,3,4-tetrahydroquinoline	4	322
2,2-Dimethyl- <i>n</i> -propylamine	369	439	2,3-Dimethyl-1,2,3,4-tetrahydroquinoline	25	303
1,2-Dimethyl-3-propylbenzene	96	38	1,3-Dimethyl-5,6,7,8-tetrahydroquinoline	12	323
1,2-Dimethyl-4-propylbenzene	91	38	2,4-Dimethyl-5,6,7,8-tetrahydroquinoline	84	321
1,3-Dimethyl-4-propylbenzene	84	38	DL-2,6-Dimethyl-1,2,3,4-tetrahydroquinoline	7	303
1,3-Dimethyl-5-propylbenzene	92	38	1,1-Dimethyltetralin	117	39
1,4-Dimethyl-2-propylbenzene	76	38	1,5-Dimethyltetralin	140	40
Dimethyl <i>n</i> -propyl carbinol	19	81	2,2-Dimethyltetralin	129	40
1,3-Dimethylpyrazole	15	319	2,5-Dimethyltetralin	135	40
" "	82	436	2,6-Dimethyltetralin	138	40
3,5-Dimethylpyrazole	151	437	2,7-Dimethyltetralin	137	40
2,3-Dimethylpyridine	31	319	2,8-Dimethyltetralin	136	40
" "	265	438	5,6-Dimethyltetralin	147	40
2,4-Dimethylpyridine	25	319	5,7-Dimethyltetralin	149	40
" "	271	438	5,8-Dimethyltetralin	150	41

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	Compound No.	Page No.		Compound No.	Page No.
6,7-Dimethyltetralin	148	40	2,5-Dinitrobenzoic acid	25	429
1,1-Dimethyl-2-tetralone	83	170	2,6-Dinitrobenzoic acid	7	429
2,4-Dimethyltetramethylene sulfide	52	424	3,4-Dinitrobenzoic acid	119	430
<i>cis</i> -2,5-Dimethyltetramethylene sulfide	21	423	3,5-Dinitrobenzoic acid	328	206
<i>trans</i> -2,5-Dimethyltetramethylene-sulfide	20	423		120	430
2,2-Dimethylthietane	11	423	2,4-Dinitrobenzoic anhydride	68	226
2,4-Dimethylthietane	9	423	3,5-Dinitrobenzoic anhydride	48	226
2,2-Dimethylthiirane	4	423	2,4-Dinitrobenzotrile	144	363
1,4-(Dimethylthio)benzene	14	416	2,6-Dinitrobenzotrile	69	360
2,4-Dimethylthiolane	52	424	3,5-Dinitrobenzoyl bromide	4	220
<i>cis</i> -2,5-Dimethylthiolane	21	423	2,4-Dinitrobenzoyl chloride	8	216
<i>trans</i> -2,5-Dimethylthiolane	20	423	3,5-Dinitrobenzoyl chloride	14	216
2,3-Dimethylthiophene	19	423	Di-(4-nitrobenzyl) sulfide	73	427
2,4-Dimethylthiophene	17	423	2,2'-Dinitrobiphenyl	91	340
2,5-Dimethylthiophene	16	423	2,4'-Dinitrobiphenyl	65	339
3,4-Dimethylthiophene	22	423	3,3'-Dinitrobiphenyl	124	342
2,4-Dimethylthiophenol	39	414	4,4'-Dinitrobiphenyl	132	342
2,5-Dimethylthiophenol	38	414	3,5-Dinitrocatechol	422	118
2,6-Dimethyl-1,4-thioxane	33	424	4,6-Dinitro- <i>m</i> -cresol	195	106
3,5-Dimethyl-1,4-thioxane	36	424	4,6-Dinitro- <i>o</i> -cresol	147	104
N,N-Dimethyltoluene-4-sulfonamide	22	392	2,2'-Dinitrodiphenylmethane	108	341
N,N-Dimethyl- <i>m</i> -toluidine	65	320	2,4'-Dinitrodiphenylmethane	81	340
N,N-Dimethyl- <i>o</i> -toluidine	46	320	3,3'-Dinitrodiphenylmethane	115	341
N,N-Dimethyl- <i>p</i> -toluidine	62	320	4,4'-Dinitrodiphenylmethane	119	342
2,2-Dimethyltrimethylene sulfide	11	423	2,4-Dinitrodiphenyl sulfide	64	426
2,4-Dimethyltrimethylene sulfide	9	423	1,3-Dinitro-4-ethoxybenzene	58	339
<i>sym</i> -Dimethylurea	145	234	2,5-Dinitrofluorene	125	342
<i>unsym</i> -Dimethylurea	381	242	2,6-Dinitrohydroquinone	325	113
N,N-Dimethyl- <i>m</i> -2-xylydine	56	320		7	434
N,N-Dimethyl- <i>m</i> -4-xylydine	59	320	3,5-Dinitro-2-hydroxyaniline	380	315
N,N-Dimethyl- <i>p</i> -2-xylydine	58	320	3,5-Dinitro-2-hydroxybenzoic acid	284	204
Di-1-naphthastilbene	161	49	2,6-Dinitro-4-iodophenol	238	108
Di-2-naphthastilbene	196	51	4,6-Dinitro-2-iodophenol	211	107
Di-(1-naphthyl)acetyl chloride	33	217	2,4-Dinitromesitylene	55	339
N,N'-Di-(1-naphthyl)benzene-1,3-di-sulfonamide	425	408	1,3-Dinitro-4-methoxybenzene	67	339
Di-1-naphthylethylene	161	49	2,6-Dinitro-4-methylaniline	377	315
Di-2-naphthylethylene	196	51	"	3	436
Di-1-naphthyl ketone	128	176	3,5-Dinitro-4-methylbenzoic acid	136	430
1,1'-Dinaphthylmethane	112	47	4,6-Dinitro-2-methylphenol	147	104
Di-(1-naphthyl) sulfide	61	426	4,6-Dinitro-3-methylphenol	195	106
1,2'-Dinaphthyl sulfide	70	426	1,2-Dinitronaphthalene	73	340
Di-(2-naphthyl) sulfide	71	426	1,3-Dinitronaphthalene	99	341
Dineopentylacetic acid	93	196	1,4-Dinitronaphthalene	92	340
3,8-Dinitroacenaphthene	105	341	1,5-Dinitronaphthalene	127	342
2,4-Dinitroaniline	391	315	1,6-Dinitronaphthalene	109	341
"	2	436	1,8-Dinitronaphthalene	110	341
2,6-Dinitroaniline	311	312	2,7-Dinitronaphthalene	131	342
2,4-Dinitroanisole	67	339	1,6-Dinitro-2-naphthol	496	122
9,10-Dinitroanthracene	139	343	2,4-Dinitro-1-naphthol	331	113
1,3-Dinitroanthraquinone	133	342	1,5-Dinitro-2-naphthylamine	409	316
1,5-Dinitroanthraquinone	143	343	1,8-Dinitro-2-naphthylamine	450	317
1,6-Dinitroanthraquinone	134	342	2,4-Dinitro-1-naphthylamine	453	317
1,7-Dinitroanthraquinone	140	343	2,5-Dinitrophenanthrenequinone	129	342
1,8-Dinitroanthraquinone	142	343	2,7-Dinitrophenanthrenequinone	141	343
2,7-Dinitroanthraquinone	137	342	2,4-Dinitrophenetole	58	339
2,2'-Dinitroazobenzene	126	342	2,4-Dinitrophenol	243	108
4,4'-Dinitroazobenzene	128	342	"	6	434
2,4-Dinitrobenzamide	436	243	2,5-Dinitrophenol	9	434
3,5-Dinitrobenzamide	385	242	2,6-Dinitrophenol	70	100
3,5-Dinitrobenzamide	483	245	"	5	434
1,2-Dinitrobenzene	80	340	3,4-Dinitrophenol	10	434
1,3-Dinitrobenzene	60	339	3,5-Dinitrophenol	298	111
1,4-Dinitrobenzene	114	341	(2,4-Dinitrophenyl)acetic acid	204	430
2,4-Dinitrobenzenesulfonamide	153	397	2,4-Dinitrophenyl hydrazine	416	316
3,5-Dinitrobenzenesulfonamide	397	407	2,4-Dinitrophenyl phenyl sulfide	64	426
2,4-Dinitrobenzenesulfonic acid	60	373	Di-(2-nitrophenyl) sulfide	65	426
3,5-Dinitrobenzenesulfonic acid	180	377	Di-(3-nitrophenyl) sulfide	75	427
2,4-Dinitrobenzenesulfonyl chloride	154	386	Di-(4-nitrophenyl) sulfide	74	427
3,5-Dinitrobenzenesulfonyl chloride	148	385	2,4-Dinitrophenyl sulfide	76	427
2,3-Dinitrobenzoic acid	32	429	3,5-Dinitrophthalic anhydride	71	226
2,4-Dinitrobenzoic acid	287	204	2,4-Dinitroresorcinol	369	115
"	16	429	4,6-Dinitroresorcinol	533	124

ORGANIC COMPOUND INDEX

	Compound No.	Page No.		Compound No.	Page No.
3,5-Dinitrosalicylamide	378	242	Diphenyl ether	7	137
3,5-Dinitrosalicylic acid	284	204	1,2-Diphenylethylamine	186	301
	455	120	2,2-Diphenylethylamine	24	303
2,2'-Dinitrostilbene	122	342	Di-(2-phenylethyl)sulfide	53	426
2,4-Dinitrostilbene	98	341	N,N-Diphenylformamide	39	232
<i>trans</i> -4,4'-Dinitrostilbene	138	343	2,2-Diphenylglutaric acid	270	431
2,β-Dinitrostyrene	75	340	<i>d,l</i> -2,3-Diphenylglutaromonitrile	206	366
4,β-Dinitrostyrene	123	342	2,2-Diphenylglutaronitrile	90	361
2,4-Dinitrothiophenol	43	417	2,4-Diphenylglutaronitrile	81	361
2,3-Dinitrotoluene	33	338	<i>unsym</i> -Diphenylhydrazine	14	303
2,4-Dinitrotoluene	37	338	Diphenylmethane	2	43
2,6-Dinitrotoluene	35	338	1,6-Diphenylnaphthalene	87	46
3,4-Dinitrotoluene	31	338	1,5-Diphenyl-3-pentadienone	145	177
3,5-Dinitrotoluene	62	339	1,5-Diphenyl-1,5-pentanedione	87	175
Di- <i>n</i> -octadecylamine	445	439	1,5-Diphenyl-3-pentanone	221	168
Di-octadecyl sulfide	39	426	Diphenyl phthalate	108	278
Di- <i>n</i> -octylamine	451	439	2,2-Diphenylpicemic acid	340	432
Di- <i>n</i> -octyl ketone	50	173	1,3-Diphenyl-2-propanone	19	172
Di- <i>n</i> -octyl sulfide	30	425	2,3-Diphenylpropionaldehyde	34	154
1,4-Dioxane	36	132	2,2-Diphenylpropionic acid	265	204
2,4-Dioxopentanoic acid	117	197	α,α-Diphenylpropionyl chloride	23	216
"	107	430	β,β-Diphenylpropionophenone	120	176
Di- <i>n</i> -pentadecylamine	449	439	2,2-Diphenylpropylamine	7	302
Dipentene	319	23	2,3-Diphenylpropylamine	187	301
Dipentylacetylene	59	30	Di-(3-phenylpropyl)sulfide	42	426
Di- <i>n</i> -pentylamine	461	439	2,2-Diphenylsuccinic acid	349	432
2,2'-Diphenanilide	481	245	Diphenyl succinate	152	281
2,2'-Diphenic acid	354	208	<i>d,l</i> -2,3-Diphenylsuccinic acid	216	430
2,2'-Diphenic acid diamide	452	244	<i>meso</i> -2,3-Diphenylsuccinic acid	203	430
2,2'-Diphenic acid dichloride	22	216	<i>d,l</i> -2,3-Diphenylsuccinonitrile	203	366
2,2'-Diphenic acid mononitrile	212	366	<i>l</i> -2,3-Diphenylsuccinonitrile	232	367
2,2'-Diphenic anhydride	79	227	Diphenyl sulfide	61	422
2,4'-Diphenol	418	118	Diphenyl triketone	92	175
1,2-Diphenoxyethane	52	139	<i>sym</i> -Diphenylurea	488	245
1,3-Diphenoxypropane	38	138	<i>unsym</i> -Diphenylurea	399	242
Diphenylacetaldehyde	93	149	2,3-Diphenylvaleronitrile	159	364
Diphenylacetamide	333	240	2,5-Diphenylvaleronitrile	100	361
N,N-Diphenylacetamide	118	234	Dipicolonitrile	167	364
Diphenylacetanilide	377	242	Dipicryl sulfide	77	427
Diphenylacetic acid	222	202	Dipropargyl	29	29
"	273	431	Di- <i>n</i> -propylacetaldehyde	54	146
Diphenylacetic anhydride	41	225	Di- <i>n</i> -propyl acetylene	43	29
Diphenylacetoin	56	174	Di- <i>n</i> -propyl adipate	7	272
1,1-Diphenylacetone	76	174	Di- <i>n</i> -propylamine	36	296
1,3-Diphenylacetone	19	172	"	447	439
Diphenylacetone trile	95	361	"	76	321
Diphenylacetyl chloride	12	216	N,N-Di- <i>n</i> -propylamine	229	437
<i>Sym</i> -Diphenylacetylene	47	44	1,3-Dipropylbenzene	106	39
<i>cis</i> -2,3-Diphenylacrylonitrile	110	362	1,4-Dipropylbenzene	114	39
<i>trans</i> -2,3-Diphenylacrylonitrile	52	359	Di- <i>n</i> -propyl carbinol	48	82
3,3-Diphenylacrylonitrile	49	359	Di- <i>n</i> -propyl carbonate	119	255
Diphenyl adipate	140	280	Dipropylcyanoacetamide	197	366
2,2-Diphenyladipic acid	313	431	Di- <i>n</i> -propyl ether	30	132
3,4-Diphenyladipic acid	326	431	3,3-Di- <i>n</i> -propylglutaric acid	236	431
Diphenylamine	62	304	Di- <i>n</i> -propyl ketone	52	162
"	19	436	Di- <i>n</i> -propyl maleate	10	272
Diphenylaminoformyl chloride	21	216	Di- <i>n</i> -propyl malonic acid	47	429
2,2-Diphenylazelaic acid	351	432	Dipropylmalononitrile	23	358
2,6-Diphenyl-1,4-benzoquinone	17	182	"	51	359
<i>trans-trans</i> -1,4-Diphenyl-1,3-butadiene	155	49	Di- <i>n</i> -propyl oxalate	204	260
2,3-Diphenylbutyronitrile	173	365	Di- <i>n</i> -propyl succinate	283	265
2,4-Diphenylbutyronitrile	8	355	Di- <i>n</i> -propyl sulfide	26	420
Diphenylcarbonyl chloride	21	216	Di- <i>n</i> -propyl <i>d</i> -tartarate	342	270
Diphenyl carbinol	39	89	Di- <i>n</i> -propyl <i>d,l</i> -tartarate	16	273
Diphenyl carbonate	115	279	2,2'-Dipyridylamine	49	324
Diphenyl-4-carbonyl chloride	26	216	4,4'-Dipyridylamine	101	325
2,3-Diphenylcinnamonitrile	209	366	1,2-Di-(2-pyrrolyl)ethanedione	94	325
Diphenylcycloaldehyde	121	159	<i>trans-trans</i> -Distyryl	155	49
Diphenylene ketone oxide	189	178	Di-tetradecyl sulfide	25	425
1,1-Diphenylethane	160	41	Di-2-thenoylmethane	127	176
1,2-Diphenylethane	27	44	1,3-Dithiacyclopentane	43	424
1,2-Diphenylethanol	37	89			

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	Compound No	Page No		Compound No	Page No
Ethoxyacetyl chloride	20	212	6-Ethoxynaphthalene-1-sulfonyl chloride	182	387
2-Ethoxyaniline	141	299	6-Ethoxynaphthalene-2-sulfonyl chloride	165	386
"	155	437	7-Ethoxynaphthalene-2-sulfonyl chloride	157	386
3-Ethoxyaniline	163	300	2-Ethoxy-6-nitroaniline	44	304
"	135	437	4-Ethoxy-2-nitroaniline	235	310
4-Ethoxyaniline	164	300	1-Ethoxy-4-nitrobenzene	30	338
"	204	437	3-Ethoxy-1-nitrobenzene	8	337
2-Ethoxybenzaldehyde	3	153	6-Ethoxy-1-nitronaphthalene-2-sulfonamide	357	406
3-Ethoxybenzaldehyde	88	149	7-Ethoxy-8-nitronaphthalene-1-sulfonamide	209	399
4-Ethoxybenzaldehyde	91	149	6-Ethoxy-1-nitronaphthalene-2-sulfonyl chloride	234	388
3-Ethoxybenzamide	252	237	7-Ethoxy-8-nitronaphthalene-1-sulfonyl chloride	241	389
4-Ethoxybenzamide	435	243	2-Ethoxyphenol	9	96
4-Ethoxybenzanilide	347	241	3-Ethoxyphenol	24	97
2-Ethoxybenzene-2,5-disulfonamide	396	407	1-Ethoxy-2-propanone	6	169
1-Ethoxybenzene-2,5-disulfonic acid	178	377	3-Ethoxypropionic acid	1	192
2-Ethoxybenzene-1,4-disulfonyl chloride	164	386	3-Ethoxypropionitrile	47	348
2-Ethoxybenzene sulfonamide	172	398	β -Ethoxypropionyl chloride	1	214
3-Ethoxybenzenesulfonamide	79	395	4-Ethoxypyridine	269	438
4-Ethoxybenzenesulfonamide	129	396	2-Ethoxytoluene	70	134
2-Ethoxybenzenesulfonanilide	160	398	3-Ethoxytoluene	76	135
2-Ethoxybenzenesulfonic acid	66	373	4-Ethoxytoluene	75	135
3-Ethoxybenzenesulfonic acid	22	371	1-Ethoxy-2,4,6-trinitrobenzene	45	338
4-Ethoxybenzenesulfonic acid	50	372	N-Ethylacetanilide	12	231
2-Ethoxybenzenesulfonyl chloride	70	383	2-Ethylacetanilide	165	235
3-Ethoxybenzenesulfonyl chloride	20	381	Ethyl acetate	10	250
4-Ethoxybenzenesulfonyl chloride	24	381	Ethyl acetoacetate	133	165
2-Ethoxybenzoic acid	5	193	"	140	256
"	325	431	2-Ethylacetophenone	59	170
3-Ethoxybenzoic acid	193	201	Ethyl acetypyruvate	201	260
"	312	431	Ethyl acetylene	3	28
4-Ethoxybenzoic acid	316	206	Ethyl acetylglucolate	136	256
4-Ethoxybenzoic anhydride	46	226	Ethyl acrylate	28	251
3-Ethoxybenzoyl chloride	20	214	2-Ethylacrylonitrile	11	345
4-Ethoxybenzoyl chloride	32	214	N-Ethylalanine	65	429
2-Ethoxybiphenyl	14	137	Ethyl alcohol	2	80
3-Ethoxybiphenyl	16	137	Ethylallene	29	13
4-Ethoxybiphenyl	46	139	Ethyl allylacetate	182	259
1-Ethoxy-2-butanone	62	163	Ethylamine	3	295
2-Ethoxyethanethiol	17	413	"	431	439
2-Ethoxyethanol	29	81	(Ethylamino)acetonitrile	43	348
"	51	133	Ethyl 2-aminobenzoate	15	273
2-(2-Ethoxyethoxy)ethanol	100	85	2-(Ethylamino)ethylamine	404	439
β -Ethoxyethyl acetate	104	255	1-(Ethylamino)naphthalene	136	437
β -Ethoxyethyl benzoate	300	267	Ethyl-n-amyl alcohol	56	83
1-Ethoxy-4-iodobenzene	6	137	N-Ethylaniline	99	298
4-Ethoxy-3-methoxybenzaldehyde	53	155	"	197	437
1-Ethoxy-2-methoxyethane	37	133	2-Ethylaniline	110	298
3-Ethoxy-2-methyl-2-butanol	52	133	"	149	437
Ethoxymethyl ethyl ketone	62	163	3-Ethylaniline	175	437
3-Ethoxy-2-methylolbenzoic acid	219	430	4-Ethylaniline	116	298
2-Ethoxy-1-naphthaldehyde	100	158	Ethyl anisate	315	268
4-Ethoxy-1-naphthaldehyde	61	156	Ethyl anthranilate	15	273
1-Ethoxynaphthalene	108	136	2-Ethylaziridine	294	438
2-Ethoxynaphthalene-1-sulfonamide	158	397	N-Ethylaziridine	291	438
4-Ethoxynaphthalene-1-sulfonamide	198	399	2-Ethylazulene	19	43
4-Ethoxynaphthalene-2-sulfonamide	241	401	N-Ethylbenzanilide	23	231
5-Ethoxynaphthalene-1-sulfonamide	238	401	Ethylbenzene	3	35
6-Ethoxynaphthalene-1-sulfonamide	140	397	2-Ethylbenzenesulfonamide	30	393
6-Ethoxynaphthalene-2-sulfonamide	239	401	4-Ethylbenzenesulfonamide	44	393
7-Ethoxynaphthalene-2-sulfonamide	101	395	2-Ethylbenzenesulfonyl chloride	2	381
2-Ethoxynaphthalene-1-sulfonanilide	257	401	4-Ethylbenzenesulfonyl chloride	4	381
4-Ethoxynaphthalene-1-sulfonanilide	229	400	Ethyl benzilate	37	274
4-Ethoxynaphthalene-2-sulfonanilide	110	396	1-Ethylbenzimidazole	222	437
5-Ethoxynaphthalene-1-sulfonanilide	75	394	2-Ethylbenzimidazole	255	438
6-Ethoxynaphthalene-1-sulfonanilide	293	403	Ethyl benzoate	202	260
6-Ethoxynaphthalene-2-sulfonanilide	138	397	2-Ethylbenzoic acid	247	431
7-Ethoxynaphthalene-2-sulfonanilide	133	396	4-Ethylbenzoic acid	358	432
2-Ethoxynaphthalene-1-sulfonyl chloride	179	387	Ethyl benzoyleacetate	212	168
4-Ethoxynaphthalene-1-sulfonyl chloride	156	386	"	311	268
4-Ethoxynaphthalene-2-sulfonyl chloride	106	384	Ethyl 2-benzoylbenzoate	82	277
5-Ethoxynaphthalene-1-sulfonyl chloride	187	387	Ethyl benzoylformate	297	266

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	Compound No	Page No.		Compound No.	Page No.
N-Ethylbenzylamine	340	438	Ethylene glycol dibenzoate	104	278
N-Ethylbenzylsulfonamide	12	392	Ethylene glycol di- <i>n</i> -butyrate	253	264
Ethyl bromide	3	58	Ethylene glycol diformate	126	256
Ethyl bromoacetate	107	255	Ethylene glycol di-(β -hydroxyethyl)ether	130	86
Ethyl- α -bromopropionate	110	255	Ethylene glycol dilaurate	69	276
Ethyl β -bromopropionate	135	256	Ethylene glycol dimethyl ether	26	132
2-Ethyl-1,3-butadiene	61	14	Ethylene glycol dimyristate	88	277
2-Ethylbutanamide	168	235	Ethylene glycol dipalmitate	98	278
2-Ethylbutananilide	209	236	Ethylene glycol diphenyl ether	52	139
2-Ethylbutane-1,1-dicarboxylic acid	50	194	Ethylene glycol dipropionate	198	260
2-Ethylbutanoic acid	27	194	Ethylene glycol di- <i>n</i> -stearate	111	278
Ethylbutanol	42	82	Ethylene glycol monoacetate	148	257
2-Ethyl-1-butene	41	13	Ethylene glycol monobenzyl ether	128	86
Ethyl <i>n</i> -butoxyethyl carbonate	22	262	Ethylene glycol mono- <i>n</i> -butyl ether	61	83
2-Ethylbutyraldehyde	29	145	" " " "	60	134
Ethyl <i>n</i> -butyrate	48	252	Ethylene glycol mono- <i>sec</i> -butyl ether	52	82
2-Ethylbutyric acid	429	432	Ethylene glycol monoethyl ether	29	81
Ethyl <i>n</i> -caprate	269	264	" " " "	51	133
Ethyl <i>n</i> -caproate	116	255	Ethylene glycol monoethyl ether acetate	104	255
α -Ethylcaproic acid	45	191	Ethylene glycol monoethyl monomethyl ether	37	133
Ethyl <i>n</i> -caprylate	190	259	Ethylene glycol monoformate	138	256
Ethyl carbamate	4	231	Ethylene glycol monoisobutyl ether	51	82
Ethyl carbonate	55	252	Ethylene glycol monoisopropyl ether	36	81
Ethyl cellosolve acetate	104	255	Ethylene glycol monomethyl ether	20	81
Ethyl chloride	3	55	Ethylene glycol monomethyl ether acetate	78	253
Ethyl chloroacetate	83	253	Ethylene glycol monomethyl mono- <i>n</i> -propyl ether	47	133
Ethyl chloroformate	20	250	Ethylene glycol monophenyl ether	122	86
Ethyl α -chloropropionate	87	253	Ethylene glycol mono- <i>n</i> -propyl ether	44	82
Ethyl cinnamate	319	268	Ethyleneimine	10	295
Ethyl crotonate	73	253	Ethylene oxide	1	131
Ethyl cyanoacetate	68	350	<i>cis</i> -Ethylene oxide-1,2-dicarboxylic acid	36	429
Ethylcyclobutane	25	3	<i>trans</i> -Ethylene oxide-1,2-dicarboxylic acid	35	429
Ethylcyclohexane	90	4	Ethylene sulfide	1	423
Ethyl cyclohexanecarboxylate	166	258	Ethylene sulfonic acid	2	380
2-Ethylcyclohexanone	44	169	Ethyl ether	4	131
3-Ethylcyclohexanone	146	165	Ethyl ethoxyacetate	62	252
1-Ethylcyclohexene	238	19	Ethyl 4-ethoxybenzoate	324	268
3-Ethylcyclohexene	236	19	Ethyl β -ethoxyethyl carbonate	161	258
4-Ethylcyclohexene	231	19	Ethyl ethylacetoacetate	169	258
3-Ethyl-2-cyclohexenone	64	170	2-Ethylethylene sulfide	6	423
2-Ethylcyclohexylamine	70	297	N-Ethylformamide	5	230
Ethylcyclooctatetraene	13	25	N-Ethylformanilide	9	230
Ethylcyclopentane	45	3	Ethyl formate	3	250
2-Ethylcyclopentanone	90	164	Ethyl 2-furoate	35	274
1-Ethylcyclopentene	139	16	Ethyl furoylacetate	5	272
3-Ethylcyclopentene	115	16	Ethyl β -(2-furyl)acrylate	244	263
4-Ethylcyclopentene	137	16	Ethyl 2-furyl ketone	11	172
Ethylcyclopropane	12	3	N-Ethylglycine	22	285
S-Ethylcysteine	45	429	" " "	82	429
9-Ethyl- <i>cis</i> -decahydronaphthalene	259	7	N-Ethylglycinonitrile	43	348
9-Ethyl- <i>trans</i> -decahydronaphthalene	258	7	Ethyl glycolate	108	255
Ethyl <i>n</i> -decanoate	269	264	3-Ethylglutaric acid	341	432
Ethyl dichloroacetate	106	255	Ethyl hendecylenate	309	267
Ethyl difluoroacetate	25	250	3-Ethylheptane	127	5
Ethyl 3,5-dinitrobenzoate	129	279	4-Ethylheptane	120	5
Ethyl 3,5-dinitrosalicylate	134	280	Ethyl <i>n</i> -heptanoate	152	257
Ethyl diphenylacetate	81	277	5-Ethyl-3-heptanone	115	164
2-Ethyl-1,3-dithiolane	51	424	5-Ethyl-4-hepten-3-one	128	165
Ethyl enanthate	152	257	Ethyl hexadecyl sulfide	2	425
Ethylene	1	12	Ethyl hexahydrobenzoate	166	258
Ethylene bromohydrin	43	82	2-Ethylhexanal-1	57	147
Ethylene chlorohydrin	24	81	3-Ethylhexane	66	4
Ethylene cyanohydrin	78	351	Ethyl <i>n</i> -hexanoate	116	255
1,2-Ethylenediamine	39	296	2-Ethylhexanoic acid	45	191
" " "	352	438	2-Ethyl-1-hexanol	87	84
Ethylenediamine N,N'-diacetic acid	472	433	2-Ethyl-2-hexenal	13	150
Ethylenediamine-N,N'-dipropionic acid	473	433	2-Ethyl-3-hexenal	14	150
Ethylenediamine-N,N',N'-tetraacetic acid	471	433	2-Ethyl-1-hexene	204	18
Ethylene dichloride	9	63	3-Ethyl-1-hexene	160	17
Ethylene dithioglycol	20	413	3-Ethyl-2-hexene	207	18
Ethylene glycol diacetate	156	257	3-Ethyl-3-hexene	193	18
			4-Ethyl-1-hexene	177	18

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	Compound No.	Page No.		Compound No.	Page No.
2-Ethyl-2-hexene	178	18	<i>trans</i> - β -Ethyl- α -methylacrylic acid	2	193
2-Ethyl-3-hexenoic acid	9	192	Ethyl methyl amine	5	295
2-Ethyl-1-hexen-3-one	86	163	N-Ethyl-N-methylaniline	57	320
3-Ethyl-5-hexen-2-one	70	163	N-Ethyl-3-methylaniline	122	299
2-Ethyl-1-hexylacetate	171	258	1-Ethyl-2-methylbenzene	12	35
Ethyl hexyl acetylene	53	30	1-Ethyl-3-methylbenzene	9	35
Ethyl <i>n</i> -hexyl ketone	142	165	1-Ethyl-4-methylbenzene	10	35
Ethyl hydrocinnamate	282	265	Ethyl 2-methylbenzoate	230	262
2-Ethyl-4-hydroxybenzaldehyde	30	154	2-Ethyl-2-methylbutanoic acid	32	191
Ethyl 2-hydroxybenzoate	16	94	2-Ethyl-3-methylbutanoic acid	24	192
Ethyl 3-hydroxybenzoate	106	102	4-Ethyl-4-methylbutanoic acid	42	191
"	107	278	2-Ethyl-3-methyl-1-butene	95	15
Ethyl 4-hydroxybenzoate	247	109	Ethyl 3-methylbutyl sulfide	34	421
"	148	280	Ethyl methyl carbinol	7	80
"	50	434	1-Ethyl-2-methylcyclohexane	143	5
4-Ethyl-4-hydroxy-3-hexanone	124	165	<i>d,l-cis</i> -1-Ethyl-3-methylcyclohexane	161	5
Ethyl α -hydroxyisobutyrate	95	254	<i>cis</i> -1-Ethyl-4-methylcyclohexane	148	5
Ethyl 3-hydroxy-2-naphthoate	125	279	<i>trans</i> -1-Ethyl-4-methylcyclohexane	146	5
Ethyl 3-hydroxy-4-nitrobenzoate	16	434	1-Ethyl-3-methyl-3-cyclohexenone	101	171
Ethylidene diacetate	121	255	2-Ethyl-4-methylcyclohexanone	161	166
Ethylidenefluorene	110	47	<i>d</i> -2-Ethyl-5-methylcyclohexanone	39	169
1-Ethylidene-2-methylcyclohexane	288	22	<i>d,l</i> -2-Ethyl-5-methylcyclohexanone	154	166
1-Ethylidene-3-methylcyclohexane	284	21	1-Ethyl-3-methylcyclohexene	274	21
1-Ethylidene-4-methylcyclohexane	282	21	1-Ethyl-4-methylcyclohexene	273	21
Ethyl iodide	3	60	1-Ethyl-5-methylcyclohexene	277	21
Ethyl isoamyl ketone	94	164	5-Ethyl-1-methylcyclohexene-3-one	180	167
Ethyl isobutylacetaldehyde	53	146	1-Ethyl-1-methylcyclopentane	75	4
Ethyl isobutylacetic acid	13	192	<i>cis</i> -1-Ethyl-2-methylcyclopentane	85	4
Ethyl isobutyl ether	23	132	<i>trans</i> -1-Ethyl-2-methylcyclopentane	73	4
Ethyl isobutyl ketone	31	162	<i>cis</i> -1-Ethyl-3-methylcyclopentane	74	4
Ethyl isobutyl sulfide	22	420	<i>trans</i> -1-Ethyl-3-methylcyclopentane	72	4
Ethyl isobutyrate	36	251	3-Ethyl-2-methylcyclopentanone	117	164
Ethyl isocrotonate	53	252	3-Ethyl-4-methylcyclopentanone	129	165
Ethyl isopropyl ketone	18	161	Ethyl methyl ether	2	131
Ethyl isopropylacetaldehyde	39	146	3-Ethyl-3-methylglutaric acid	221	430
1-Ethyl-2-isopropylbenzene	45	37	β -Ethyl- β -methylglutaric anhydride	3	225
1-Ethyl-3-isopropylbenzene	42	37	3-Ethyl-2-methylheptane	211	6
1-Ethyl-4-isopropylbenzene	57	37	3-Ethyl-3-methylheptane	198	6
Ethyl isopropyl carbinol	21	81	3-Ethyl-4-methylheptane	220	6
Ethyl isopropyl ether	9	131	4-Ethyl-2-methylheptane	181	6
3-Ethyl-4-isopropyl-1-methylbenzene	100	39	4-Ethyl-3-methylheptane	221	6
Ethyl isopropyl sulfide	12	420	4-Ethyl-4-methylheptane	222	6
1-Ethylisoquinoline	83	321	5-Ethyl-2-methylheptane	175	5
3-Ethylisoquinoline	88	321	5-Ethyl-3-methylheptane	187	6
Ethyl isovalerate	67	252	3-Ethyl-2-methylhexane	109	4
Ethyl <i>d,l</i> -lactate	100	254	3-Ethyl-3-methylhexane	119	5
Ethyl laurate	316	268	4-Ethyl-2-methylhexane	96	4
Ethyl levulinate	162	166	4-Ethyl-3-methylhexane	115	4
"	181	259	Ethyl methyl ketone	3	161
Ethyl malonate	173	258	Ethylmethylmalonic acid	125	430
Ethylmalonic acid	136	198	1-Ethyl-5-methylnaphthalene	13	43
"	139	430	2-Ethyl-6-methylnaphthalene	16	43
Ethyl malonic acid diamide	454	244	3-Ethyl-2-methylpentane	58	3
Ethylmalonic acid monoanilide	284	238	3-Ethyl-3-methylpentane	65	4
Ethyl malononitrile	67	350	2-Ethyl-4-methylpentanoic acid	13	192
<i>d,l</i> -Ethyl mandelate	40	275	2-Ethyl-3-methyl-1-pentene	174	17
Ethyl margarate	6	273	2-Ethyl-4-methyl-1-pentene	159	17
Ethyl mercaptan	2	413	3-Ethyl-2-methyl-1-pentene	156	17
Ethyl methacrylate	45	251	3-Ethyl-3-methyl-1-pentene	166	17
Ethyl methoxyacetate	60	252	3-Ethyl-4-methyl-1-pentene	145	17
Ethyl 2-methoxybenzoate	305	267	3-Ethyl-4-methyl- <i>cis</i> -2-pentene	189	18
Ethyl 3-methoxybenzoate	299	267	3-Ethyl-4-methyl- <i>trans</i> -2-pentene	186	18
Ethyl 4-methoxybenzoate	315	268	1-Ethyl-2-methylphenanthrene	74	46
Ethyl β -methoxyethyl carbonate	143	257	1-Ethyl-7-methylphenanthrene	79	46
Ethyl 1-methoxyethyl ketone	36	162	3-Ethyl-6-methylphenanthrene	22	43
Ethyl methoxymethyl ketone	29	162	7-Ethyl-1-methylphenanthrene	92	46
Ethylmethylacetic acid	14	190	3-Ethyl-5-methylphenol	101	434
Ethyl methylacetoacetate	139	256	1-Ethyl-2-methylpiperidine	423	439
D,L-Ethylmethylacetyl chloride	15	212	3-Ethyl-4-methylpyridine	54	320
Ethyl methyl acetylene	13	28	Ethyl-2-methylstyryl ketone	56	170
3-Ethyl-2-methylacrolein	43	146	Ethyl methyl-sulfide	2	420

ORGANIC COMPOUND INDEX

	Compound No.	Page No.		Compound No.	Page No.
2-Ethyl-3-methylthiophene.....	32	424	Ethylphenylglycolaldehyde.....	22	150
2-Ethyl-5-methylthiophene.....	31	423	3-Ethyl-3-phenylhexane.....	141	40
3-Ethyl-5-methylthiophene.....	37	424	<i>sym</i> -Ethylphenylhydrazine.....	153	300
N-Ethylmorpholine.....	282	438	<i>unsym</i> -Ethylphenylhydrazine.....	152	299
Ethyl myristate.....	341	270	Ethyl- β -phenylpropionate.....	282	265
1-Ethyl-naphthalene.....	152	41	Ethyl phenyl sulfide.....	47	424
2-Ethyl-naphthalene.....	151	41	Ethyl phthalate.....	336	270
Ethyl-1-naphthoate.....	351	271	α -Ethylpimelic acid.....	27	191
Ethyl-2-naphthoate.....	28	274	N-Ethylpiperidine.....	12	319
Ethyl-1-naphthyl ether.....	108	136	".....	393	439
Ethyl-2-naphthyl ether.....	19	137	2-Ethylpiperidine.....	59	297
Ethyl-1-naphthyl ketone.....	216	168	3-Ethylpiperidine.....	63	297
Ethyl-2-naphthyl ketone.....	71	174	4-Ethylpiperidine.....	62	297
Ethyl-2-naphthyl sulfide.....	1	425	α -Ethylpiperidine.....	59	297
Ethyl nitrate.....	16	250	β -Ethylpiperidine.....	63	297
Ethyl nitrite.....	1	250	γ -Ethylpiperidine.....	62	297
N-Ethyl-4-nitroacetanilide.....	185	235	Ethyl piperonylate.....	3	273
N-Ethyl-4-nitroaniline.....	183	308	Ethyl pivalate.....	44	251
1-Ethyl-2-nitrobenzene.....	23	336	Ethylpropionic acid.....	42	194
1-Ethyl-4-nitrobenzene.....	28	336	Ethyl propionate.....	27	251
Ethyl-2-nitrobenzoate.....	26	274	Ethyl- <i>n</i> -propylacetic acid.....	36	191
".....	321	268	Ethyl propyl acetylene.....	38	29
Ethyl-3-nitrobenzoate.....	54	275	2-Ethyl-3- <i>n</i> -propylacrolein.....	61	147
Ethyl-4-nitrobenzoate.....	77	277	Ethyl propyl amine.....	20	295
Ethyl-2-nitrocinnamate.....	51	275	1-Ethyl-2-propylbenzene.....	72	38
Ethyl-3-nitrocinnamate.....	117	279	1-Ethyl-3-propylbenzene.....	68	38
Ethyl-4-nitrocinnamate.....	160	281	1-Ethyl-4-propylbenzene.....	78	38
Ethyl-4-nitrophenyl-sulfide.....	17	425	Ethyl <i>n</i> -propyl carbinol.....	30	81
Ethyl-3-nitrosalicylate.....	150	280	Ethyl- <i>n</i> -propyl ether.....	14	131
Ethyl-5-nitrosalicylate.....	136	280	Ethyl <i>n</i> -propyl ketone.....	22	161
3-Ethyl-octane.....	225	6	Ethyl <i>n</i> -propylmalonic acid.....	165	430
4-Ethyl-octane.....	226	6	Ethyl 3-propylphenyl ketone.....	24	169
Ethyl- <i>n</i> -octanoate.....	190	259	Ethyl <i>n</i> -propylsulfide.....	16	420
Ethyl orthoformate.....	85	253	2-Ethylpyridine.....	22	319
Ethyl orthosilicate.....	113	255	".....	239	437
Ethyl oxalate.....	145	257	3-Ethylpyridine.....	28	319
Ethyl oxamate.....	176	235	".....	221	437
".....	146	280	4-Ethylpyridine.....	33	319
Ethyl oxanilate.....	33	231	".....	238	437
".....	92	277	Ethyl pyromucate.....	35	274
Ethyl palmitate.....	14	273	2-Ethyl-2-pyrrolone.....	288	438
Ethyl pelargonate.....	231	262	Ethyl pyruvate.....	101	254
2-Ethylpentanamide.....	136	234	2-Ethylquinoline.....	77	321
2-Ethylpentananilide.....	86	233	3-Ethylquinoline.....	9	322
3-Ethylpentane.....	39	3	4-Ethylquinoline.....	100	321
Ethyl <i>n</i> -pentanoate.....	86	253	α -Ethylquinoline.....	77	321
2-Ethyl pentanoic acid.....	36	191	γ -Ethylquinoline.....	9	322
".....	428	432	β -Ethylquinoline.....	100	321
2-Ethyl-1-pentanol.....	56	83	Ethyl salicylate.....	249	263
3-Ethyl-3-pentanol.....	37	82	".....	16	94
3-Ethyl-2-pentanone.....	46	162	Ethyl stearate.....	33	274
2-Ethyl-1-pentene.....	106	16	Ethyl succinic acid.....	300	431
3-Ethyl-1-pentene.....	85	15	Ethyl sulfate.....	188	259
3-Ethyl-2-pentene.....	112	16	Ethyl sulfide.....	6	420
3-Ethyl-3-penten-1-yne.....	33	29	1-Ethyl-1,2,3,4-tetrahydronaphthalene.....	134	40
3-Ethyl-1-pentyne.....	28	29	2-Ethyl-1,2,3,4-tetrahydronaphthalene.....	132	40
1-Ethylphenanthrene.....	46	44	5-Ethyl-1,2,3,4-tetrahydronaphthalene.....	144	40
2-Ethylphenanthrene.....	55	45	6-Ethyl-1,2,3,4-tetrahydronaphthalene.....	142	40
9-Ethylphenanthrene.....	48	44	1-Ethyltetralin.....	134	40
2-Ethylphenol.....	6	94	2-Ethyltetralin.....	132	40
".....	106	435	5-Ethyltetralin.....	144	40
3-Ethylphenol.....	9	94	6-Ethyltetralin.....	142	40
".....	90	434	2-Ethyltetramethylene sulfide.....	28	423
4-Ethylphenol.....	40	98	Ethyl α -thienyl ketone.....	185	167
".....	99	434	2-Ethylthiurane.....	6	423
Ethyl phenoxyacetate.....	289	266	2-Ethylthiolane.....	28	423
Ethyl phenoxymethyl ketone.....	10	169	2-Ethylthiophene.....	14	423
<i>d,l</i> - α -Ethylphenylacetamide.....	65	232	3-Ethylthiophene.....	15	423
Ethyl phenylacetate.....	233	262	Ethyl 2-toluate.....	230	262
<i>d,l</i> - α -Ethylphenylacetic acid.....	26	193	Ethyl 3-toluate.....	248	263
(4-Ethylphenyl)acetic acid.....	362	432	Ethyl 4-toluate.....	251	263

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	Compound No.	Page No.		Compound No.	Page No.
<i>m</i> -Ethyltoluene	9	35	2-Fluoroacrylic acid	106	430
<i>o</i> -Ethyltoluene	12	35	2-Fluoroaniline	75	297
<i>p</i> -Ethyltoluene	10	35	"	86	436
<i>N</i> -Ethyltoluene-4-sulfonamide	11	392	3-Fluoroaniline	85	297
<i>N</i> -Ethyl- <i>m</i> -toluidine	122	299	"	103	436
Ethyl 2-(4-toluy) benzoate	94	277	4-Fluoroaniline	82	297
Ethyl 2-tolyl ether	70	134	"	170	437
Ethyl 3-tolyl ether	76	135	2-Fluorobenzaldehyde	65	147
Ethyl 4-tolyl ether	75	135	3-Fluorobenzaldehyde	62	147
Ethyl 4-tolyl sulfide	54	421	4-Fluorobenzaldehyde	64	147
Ethyl trichloroacetate	117	255	4-Fluorobenzamide	293	239
Ethyl trifluoroacetate	5	250	Fluorobenzene	2	69
Ethyl trimethylacetate	44	251	4-Fluorobenzenesulfonamide	67	394
2-Ethyl-1,3,5-trimethylbenzene	99	39	4-Fluorobenzene sulfonic acid	19	371
3-Ethyl-1,2,4-trimethylbenzene	108	39	4-Fluorobenzene sulfonyl chloride	19	381
4-Ethyl-1,2,3-trimethylbenzene	113	39	2-Fluorobenzoic acid	187	430
5-Ethyl-1,2,3-trimethylbenzene	107	39	3-Fluorobenzoic acid	267	431
5-Ethyl-1,2,4-trimethylbenzene	101	39	4-Fluorobenzoic acid	285	204
6-Ethyl-1,2,4-trimethylbenzene	102	39	"	304	431
3-Ethyl-2,2,3-trimethylpentane	227	6	4-Fluorobenzonitrile	27	358
3-Ethyl-2,2,4-trimethylpentane	157	5	2-Fluorobenzoyl chloride	43	213
3-Ethyl-2,4,5-trimethylthiophene	53	424	3-Fluorobenzoyl chloride	37	212
Ethyl undecylenate	309	267	4-Fluorobenzoyl chloride	39	212
Ethylurethane	4	231	2-Fluoroethanol	9	80
Ethyl <i>n</i> -valerate	86	253	3-Fluoromandelic acid	328	431
Ethyl vinyl acetylene	25	29	1-Fluoronaphthalene	8	69
Ethyl vinyl ether	6	131	2-Fluoronaphthalene	9	69
Ethyl vinyl ketone	11	161	4-Fluoronaphthalene-1-sulfonamide	328	404
Ethyl vinyl sulfide	7	420	5-Fluoronaphthalene-1-sulfonamide	303	403
Ethyne	1	28	6-Fluoronaphthalene-2-sulfonamide	82	395
Ethynyl methyl ketone	4	161	4-Fluoronaphthalene-1-sulfonamide	112	396
Ethynyl phenyl ketone	54	173	6-Fluoronaphthalene-2-sulfonamide	74	394
Eucarvane	192	6	2-Fluoronaphthalene-6-sulfonic acid	24	371
Eucarvane	290	22	4-Fluoronaphthalene-1-sulfonic acid	153	376
Eugenol	23	95	5-Fluoronaphthalene-1-sulfonic acid	143	376
"	97	434	4-Fluoronaphthalene-1-sulfonyl chloride	109	384
Eugenol acetate	23	274	5-Fluoronaphthalene-1-sulfonyl chloride	193	387
Eugenol methyl ether	99	136	6-Fluoronaphthalene-2-sulfonyl chloride	139	385
Euxanthone	567	126	4-Fluoro-1-naphthylamine	41	304
			4-Fluoro-1-nitrobenzene	2	337
			3-Fluoro-2-nitrophenol	22	97
			3-Fluoro-4-nitrophenol	29	97
			5-Fluoro-2-nitrophenol	13	96
			2-Fluorophenol	53	434
			3-Fluorophenol	70	434
			4-Fluorophenol	93	434
			(2-Fluorophenoxy) acetic acid	153	430
			(3-Fluorophenoxy) acetic acid	152	430
			(4-Fluorophenoxy) acetic acid	161	430
			(4-Fluorophenyl) acetic acid	333	431
			3-(2-Fluorophenyl) alanine	53	429
			3-(3-Fluorophenyl) alanine	49	429
			3-(4-Fluorophenyl) alanine	54	429
			2-Fluoropropionic acid	5	192
			2-Fluoropyridine	10	436
			3-Fluoropyridine	78	436
			2-Fluorotoluene	5	69
			3-Fluorotoluene	6	69
			4-Fluorotoluene	7	69
			Formaldehyde	1	144
			Formaldehyde cyanohydrine	55	349
			Formamide	4	230
			Formanilide	5	231
			Formic acid	2	190
			"	243	431
			Form- <i>N</i> -piperidine	6	230
			4-Formylbenzenesulfonamide	62	394
			4-Formylbenzenesulfonic acid	17	371
			2-Formylbenzoic acid	86	157
			3-Formylbenzoic acid	122	159
			"	271	204
			4-Formylbenzoic acid	130	160

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	Compound No.	Page No.		Compound No.	Page No.
3-Formylbenzonitrile	101	361	DL-Galactose	47	332
3-Formylbenzoyl chloride	31	214	L-Galactose	46	332
4-Formylbenzoyl chloride	9	216	3-(β-D-Galactosido)-D-arabinose	52	332
N-Formylglycine	198	430	4-(β-D-Galactosido)-D-glucose	64	333
2-Formyl-6-methoxyphenol	33	434	6-(α-D-Galactosido)-D-glucose	2	329
4-Formyl-2-methoxyphenol	28	434	2-[6-(α-D-Galactosido)α-D-glucoside]-β-D-fruc-		
5-Formyl-2-methoxyphenol	54	434	tose	14	330
5-Formyl-2-nitrophenol	14	434	Gallacetophenone	454	120
2-Formylphenol	21	434		188	178
3-Formylphenol	204	106	Gallaldehyde	128	160
"	35	434	Gallaldehyde trimethyl ether	67	156
4-Formylphenol	30	434	Gallamide	492	246
N-Formylpiperidine	6	230	Gallanilide	442	244
3-Formylsalicylic acid	123	160	Gallic acid	386	209
5-Formylsalicylic acid	129	160	Gallodiacetophenone	486	122
4-Formylstyrene	18	152	Gammexane, 666	3	64
Fritzsche's reagent	137	342	Gentriose	60	333
D-Fructose	7	329	Geranial	82	148
D-Fucose	33	331	Geraniol	120	86
DL-Fucose	44	332	Geraniolene	254	20
L-Fucose	34	331	Geranyl acetate	264	264
Fumaric acid	399	209	Gibberene	111	47
"	142	430	α-D-Glucoheptose	61	333
Fumaric acid diamide	501	246	D-Glucoheptulose	56	333
Fumaric acid dianilide	508	246	Glucosamine	12	329
Fumaronitrile	127	363	α-D-Glucose	35	331
Fumaryl dichloride	38	215	α-L-Glucose	30	331
3-Furaldehyde	46	146	β-D-Glucose	37	331
Furamide	262	238	2-(α-D-Glucosido)-β-D-fructose	55	332
Furan	3	131	3-(α-D-Glucosido)-D-fructose	39	331
2-Furanacrylamide	335	240	2-[3-(α-D-Glucosido)-D-fructosido]-α-D-glucose	38	331
Furanacrylic acid	208	201	1-(α-D-Glucosido)-α-D-glucose	62	333
Furancarbinol	59	134	4-(α-D-Glucosido)-β-D-glucose	43	332
2-Furancarboxitrile	34	347	4-(α-D-Glucosido)-β-D-glucose	65	333
2-Furancarboxaldehyde	55	147	6-(β-D-Glucosido)-D-glucose	60	333
2-Furancarboxylic acid	184	200	4-(β-D-Glucosido)-β-D-mannose	57	333
3-Furancarboxylic acid	159	199	β-D-Glucuronic acid	48	332
Furanilide	197	236	trans-Glutaconic acid	192	201
Furfural	55	147	"	245	431
Furfuralacetone	23	172	L-Glutamide	328	240
Furfuralacetophenone	10	172	DL-Glutamic acid	30	285
Furfural diacetate	27	154	"	58	429
Furfuryl acetate	130	256	L-Glutamic acid	41	286
Furfuryl alcohol	64	83	L-Glutamine	24	285
"	59	134	Glutaraldehyde	69	147
Furfurylamine	57	296	Glutaric acid	107	197
2-(Furfurylamino) ethylamine	345	438	"	357	432
Furfuryl diacetate	68	276	Glutaric acid diamide	360	241
Furil	185	178	Glutaric acid dianilide	472	245
2-Furoic acid	184	200	Glutaric anhydride	20	225
3-Furoic acid	159	199	Glutaronitrile	102	353
Furoin	58	90	Glutaryl dichloride	46	213
"	166	177	DL-Glyceraldehyde (dimer)	115	159
α-Furonitrile	34	347	"	28	330
Furoyl chloride	34	212	Glycerol	131	86
Furoyl furyl carbinol	58	90	α-Glyceryl phenyl ether	40	89
2-Furylacetic acid	65	195	"	41	138
2-(2-Furyl)acrolein	31	154	Glyceryl triacetate	298	267
β-(2-Furyl) acrylic acid	208	201	Glyceryl tribenzoate	102	278
"	335	240	Glyceryl tributryrate	352	271
2-Furylcarbinol	64	83	Glyceryl tripropionate	335	269
α-Furylmethylamine	57	296	Glyceryl tristearate	100	278
2-Furyl methyl ketone	15	172	Glycine	57	286
2-Furyl phenyl ketone	40	173	"	83	429
3-(2-Furyl) propionaldehyde	2	150	Glycineamide	95	305
2-Furyl-2-thenoylmethane	59	174	Glycinonitrile	22	356
			Glycol	101	85
			Glycolaldehyde	82	157
			"	6	329
			Glycolaldehyde phenyl ether	79	148
			Glycolanilide	102	233
G-Acid	12	380			
α-D-Galactose	53	332			
β-D-Galacturonic acid	42	332			

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Compound No.	Page No.	Compound No.	Page No.		
<i>n</i> -Heptyl formate	132	256	<i>trans</i> -Hexahydro- <i>p</i> -cresol	67	83
<i>n</i> -Heptyl <i>n</i> -heptanoate	327	269	1,2,3,4,5,6-Hexahydrocyclohexane	67	90
<i>n</i> -Heptyl <i>n</i> -hexanoate	304	267	<i>cis</i> -Hexahydroisophthalic anhydride	19	223
<i>n</i> -Heptyl iodide	19	60	Hexahydrophenylacetyl chloride	25	214
<i>n</i> -Heptyl mercaptan	29	414	<i>cis</i> -Hexahydrophthalic anhydride	6	225
<i>n</i> -Heptyl methyl ketone	150	166	<i>trans</i> -DL-Hexahydrophthalic acid anhydride	63	226
1-Heptylnaphthalene	179	42	L-Hexahydrotyrosine	93	288
2-Heptylnaphthalene	180	42	Hexahydroxybenzene	503	122
<i>n</i> -Heptyl <i>n</i> -octanoate	337	270	Hexamethylbenzene	167	50
<i>n</i> -Heptyl <i>n</i> -pentanoate	276	265	Hexamethylenediamine	30	303
<i>n</i> -Heptyl propionate	195	260	Hexamethylene sulfide	41	424
<i>n</i> -Heptyl sulfide	62	422	Hexamethylene tetramine	102	325
<i>n</i> -Heptyl <i>n</i> -valerate	276	265	Hexanal	38	146
2-Heptynal	4	152	<i>n</i> -Hexanamide	115	233
1-Heptyne	35	29	<i>n</i> -Hexananilide	88	233
2-Heptyne	39	29	<i>n</i> -Hexane	24	3
3-Heptyne	38	29	1,6-Hexanedial	26	151
Heptyne-1-carboxylic acid	16	190	Hexane-1,6-dicarboxylic acid	215	202
2-Heptynoic acid	3	192	2,3-Hexanedione	82	163
3-Heptynoic acid	2	192	2,5-Hexanedione	148	165
Hexabenzobenzene	204	51	1,6-Hexanedithiol	46	415
Hexachlorobenzene	35	72	1,2,3,4,5,6-Hexanehexol	64	90
Hexachloroethane	5	64	1-Hexanethiol	21	413
<i>n</i> -Hexacosane	34	8	2-Hexanethiol	19	413
Hexacosylcyclohexane	46	9	<i>n</i> -Hexanoic acid	33	191
Hexacosylcyclopentane	32	8	" "	454	432
1-Hexacosyne	13	31	<i>n</i> -Hexanoic anhydride	15	223
<i>n</i> -Hexadecanal	6	153	1-Hexanol	49	82
<i>n</i> -Hexadecane	2	8	<i>d, l</i> -2-Hexanol	33	81
Hexadecane-1-sulfonamide	29	393	3-Hexanol	30	81
Hexadecane-1-sulfonic acid	7	371	2-Hexanone	24	161
Hexadecane-1-sulfonyl chloride	47	382	3-Hexanone	22	161
Hexadecanethiol	2	416	<i>n</i> -Hexanonitrile	42	348
<i>n</i> -Hexadecanoic acid	58	195	<i>n</i> -Hexanoyl bromide	12	218
<i>n</i> -Hexadecanoic anhydride	24	225	<i>n</i> -Hexanoyl chloride	32	212
1-Hexadecanol	25	88	Hexatriacontane	68	9
Hexadecanonitrile	18	357	1-Hexatriacontene	19	26
1-Hexadecene	335	24	Hexatriacontylcyclohexane	75	9
<i>n</i> -Hexadecylacetate	13	273	Hexatriacontylcyclopentane	67	9
<i>n</i> -Hexadecyl bromide	1	59	1-Hexatriacontyne	23	31
Hexadecyl chloride	54	56	<i>cis</i> -1,3,5-Hexatriene	73	14
Hexadecylcyclohexane	12	8	<i>trans</i> -1,3,5-Hexatriene	72	14
Hexadecylcyclopentane	4	8	2-Hexenal	50	146
<i>n</i> -Hexadecyl iodide	1	61	3-Hexenal	51	146
<i>n</i> -Hexadecyl palmitate	66	276	1-Hexene	40	13
<i>n</i> -Hexadecyl stearate	79	277	<i>cis</i> -2-Hexene	53	13
<i>n</i> -Hexadecyl sulfide	33	425	<i>trans</i> -2-Hexene	49	13
1-Hexadecyne	64	30	2-Hexene (<i>cis, trans</i> mixture)	50	13
2,4-Hexadienal	5	152	<i>cis</i> -3-Hexene	44	13
1,2-Hexadiene	65	14	<i>trans</i> -3-Hexene	46	13
<i>trans</i> -1,3-Hexadiene	42	13	3-Hexene (<i>cis, trans</i> mixture)	45	13
1, (<i>cis</i> -or <i>trans</i>)-3-Hexadiene	59	14	2-Hexenoic acid	15	193
1,4-Hexadiene	57	14	" "	425	432
1,5-Hexadiene	38	13	3-Hexenoic acid	394	432
2,3-Hexadiene	51	13	4-Hexenoic acid	426	432
2,4-Hexadiene	75	14	5-Hexenoic acid	427	432
2,4-Hexadien-1-ol	11	88	4-Hexen-3-one	43	162
1,5-Hexadien-3-yne	26	29	5-Hexen-2-one	28	162
1,4-Hexadiyne	21	28	1-Hexen-3-yne	25	29
1,5-Hexadiyne	29	29	1-Hexen-4-yne	27	29
Hexahydrobenzaldehyde	56	147	2-Hexen-4-yne	30	29
Hexahydrobenzanilide	272	238	<i>n</i> -Hexyl acetate	133	256
Hexahydrobenzoic acid	10	193	<i>n</i> -Hexyl acetylene	42	29
Hexahydrobenzoic anhydride	4	225	<i>n</i> -Hexyl alcohol	49	82
Hexahydrobenzoyl chloride	36	212	<i>n</i> -Hexylamine	46	296
Hexahydrobenzyl alcohol	84	84	N- <i>n</i> -Hexylaniline	216	437
Hexahydrobenzylamine	68	297	<i>n</i> -Hexylbenzene	124	39
<i>cis</i> -Hexahydro- <i>m</i> -cresol	65	83	<i>n</i> -Hexyl bromide	20	58
<i>trans</i> -Hexahydro- <i>m</i> -cresol	68	83	2-Hexyl bromide	19	58
<i>cis</i> -Hexahydro- <i>o</i> -cresol	58	83	<i>n</i> -Hexyl <i>n</i> -butyrate	186	259
<i>trans</i> -Hexahydro- <i>o</i> -cresol	60	83	<i>n</i> -Hexyl <i>n</i> -caproate	278	265
<i>cis</i> -Hexahydro- <i>p</i> -cresol	66	83	<i>n</i> -Hexyl <i>n</i> -caprylate	328	269

ORGANIC COMPOUND INDEX

	Compound No.	Page No.		Compound No.	Page No.
<i>n</i> -Hexyl chloride	34	56	3-Hydroxyacetanilide	375	115
2-Hexyl chloride	31	56	4'-Hydroxyacetanilide	443	119
3-Hexyl chloride	30	56		340	240
<i>n</i> -Hexylcyclohexane	256	7	Hydroxyacetic acid	79	196
<i>n</i> -Hexylcyclopentane	250	7		263	431
<i>n</i> -Hexyl <i>n</i> -decanoate	278	265	α -Hydroxyacetophenone	47	89
<i>n</i> -Hexyl <i>n</i> -enanthate	303	267		150	177
<i>n</i> -Hexyl ether	95	135	2-Hydroxyacetophenone	10	96
<i>n</i> -Hexyl ethyl ether	53	133	"	7	172
<i>n</i> -Hexyl formate	103	254	3-Hydroxyacetophenone	180	105
<i>n</i> -Hexyl <i>n</i> -heptanoate	303	267	"	121	176
<i>n</i> -Hexyl iodide	18	60	4-Hydroxyacetophenone	223	107
<i>n</i> -Hexyl mercaptan	21	413	"	141	176
<i>sec</i> -Hexyl mercaptan	19	413	2-Hydroxyaniline	456	120
<i>n</i> -Hexyl methyl acetylene	45	29	"	383	315
<i>n</i> -Hexyl methyl ether	48	133	"	88	434
<i>n</i> -Hexylmethylglycolic acid	22	193	3-Hydroxyaniline	277	110
<i>n</i> -Hexyl methyl ketone	114	164	"	263	311
1-Hexylnaphthalene	176	42	"	88	434
2-Hexylnaphthalene	177	42	4-Hydroxyaniline	476	121
<i>n</i> -Hexyl <i>n</i> -octanoate	328	269	"	396	316
<i>n</i> -Hexyl <i>n</i> -pentanoate	228	262	1-Hydroxyanthracene	381	115
<i>n</i> -Hexyl phenyl carbinol	129	86	9-Hydroxyanthracene	269	110
<i>n</i> -Hexyl phenyl ketone	213	168	1-Hydroxy-9,10-anthraquinone	32	183
<i>n</i> -Hexyl propionate	155	257	2-Hydroxy-9,10-anthraquinone	60	185
2-Hexylpyridine	242	437	Hydroxyanthraquinone	49	184
<i>n</i> -Hexyl <i>n</i> -valerate	228	262	2-Hydroxyazobenzene	134	103
1-Hexyne	17	28	4-Hydroxyazobenzene	383	116
2-Hexyne	24	29	2-Hydroxybenzaldehyde	4	94
3-Hexyne	22	28	"	71	148
Hippuramide	383	242	3-Hydroxybenzaldehyde	204	106
Hippuranilide	444	244	"	90	158
Hippuric acid	296	205	"	35	434
"	398	242	4-Hydroxybenzaldehyde	102	158
"	25	285	"	252	109
DL-Histidine	31	429	"	30	434
L-Histidine	95	288	2-Hydroxybenzaldehyde-3-carboxylic acid	123	160
Homoanthranilic acid	18	284	4-Hydroxybenzaldehyde-3-carboxylic acid	129	160
DL-Homoaspartic acid	61	287	3-Hydroxybenzamide	342	240
Homophenetole	71	134	4-Hydroxybenzamide	322	240
Homophthalic acid	292	205	2-Hydroxybenzanilide	437	119
Homophthalic anhydride	64	226	3-Hydroxybenzanilide	457	120
Homopimanthrene	79	46	"	311	239
α -Hydrocarbamide	172	235	4-Hydroxybenzanilide	539	124
Hydrocarbonitrile	4	355	"	421	243
Hydrazobenzene	278	311	4-Hydroxybenzene-1,3-disulfonamide	412	408
1-Hydrindamine	125	299	4-Hydroxybenzene-1,3-disulfonanilide	324	404
2-Hydrindamine	143	299	4-Hydroxybenzene-1,3-disulfonic acid	190	378
4-Hydrindamine	150	299	4-Hydroxybenzene-1,3-disulfonyl chloride	115	384
5-Hydrindamine	21	303	4-Hydroxybenzenesulfonamide	218	400
α -Hydrindone	32	173	4-Hydroxybenzenesulfonic acid	95	374
Hydrocinnamaldehyde	81	148	4-Hydroxybenzenesulfonyl chloride	228	388
Hydrocinnamamide	140	234	4-Hydroxybenzenethiol	9	416
Hydrocinnamanilide	104	233	2-Hydroxybenzoic acid	400	117
Hydrocinnamic acid	38	194	"	244	203
Hydrocinnamoyl chloride	48	213	"	116	430
Hydrocinnamyl alcohol	123	86	3-Hydroxybenzoic acid	505	123
Hydrophlorone	540	124	"	320	206
Hydroquinone	452	119	"	268	431
"	117	435	4-Hydroxybenzoic acid	532	124
Hydroquinone diacetate	154	281	"	343	207
Hydroquinone dibenzoate	170	281	"	406	432
Hydroquinone dibenzyl ether	55	139	2-Hydroxybenzotrile	132	363
Hydroquinone diethyl ether	43	139	4-Hydroxybenzotrile	158	364
Hydroquinone dimethyl ether	34	138	"	34	434
Hydroquinone monomethyl ether	48	99	2-Hydroxybenzophenone	26	97
"	32	138	"	28	173
Hydroquinone triacetate	133	279	3-Hydroxybenzophenone	251	109
Hydrotropilidene	211	19	"	149	177
1-Hydroxyacenaphthene	353	114	4-Hydroxybenzophenone	322	112
Hydroxyacetaldehyde	82	157	"	165	177
2-Hydroxyacetanilide	511	123	7-Hydroxybenzo[a]pyrene	544	125

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	Compound No.	Page No.		Compound No.	Page No.
2-Hydroxybenzyl alcohol	49	89	4-Hydroxy-3-methoxybenzoic acid	525	124
	146	103	3-Hydroxy-4-methoxybenzonitrile	19	346
4-Hydroxybenzyl alcohol	294	111	4-Hydroxy-3-methoxybenzyl alcohol	245	109
4-Hydroxybenzylamine	177	308	2-Hydroxy-3-methoxybenzylamine	51	434
2-Hydroxybenzylamine	234	310	3-Hydroxy-2-methoxybenzylamine	55	434
N-4-Hydroxybenzylamine	432	317	4-Hydroxy-3-methoxybenzylamine	56	434
2-Hydroxybenzyl cyanide	163	364	4-Hydroxy-3-methoxystyryl methyl ketone	159	177
4-Hydroxybenzyl cyanide	87	361	2-Hydroxy-3-methylaniline	156	307
2-Hydroxybiphenyl	51	99	2-Hydroxy-4-methylaniline	363	314
"	98	434	2-Hydroxy-5-methylaniline	302	312
3-Hydroxybiphenyl	117	102	3-Hydroxy-4-methylaniline	362	314
"	81	434	4-Hydroxy-2-methylaniline	390	315
4-Hydroxybiphenyl	431	118	4-Hydroxy-3-methylaniline	384	315
"	76	434	5-Hydroxy-2-methylaniline	324	313
6-Hydroxybiphenyl-2-carboxylic acid	389	116	2-Hydroxy-5-methylbenzaldehyde	41	155
3-Hydroxy-2-butanone	39	82	3-Hydroxy-3-methyl-2-butanone	47	162
"	54	162	3-Hydroxy-3-methylbutyraldehyde	8	152
4-Hydroxy-n-butylamine	387	439	2-Hydroxy-2-methylbutyric acid	283	431
2-Hydroxybutyraldehyde	23	150	7-Hydroxy-4-methylcoumarin	480	121
4-Hydroxybutyraldehyde	6	152	5-Hydroxymethylfurfural	10	153
2-Hydroxybutyric acid	251	431	3-Hydroxy-3-methyl-2-heptanone	38	169
2-Hydroxybutyronitrile	3	355	5-Hydroxy-5-methyl-3-heptanone	22	169
4-Hydroxybutyronitrile	82	352	2-Hydroxy-2-methylhexanal	11	150
3-Hydroxycarbostyryl	574	126	2-Hydroxy-5-methyl-4-nitroaniline	417	316
2-Hydroxy-3-chlorobutyric acid	151	430	3-Hydroxy-3-methyl-2-pentanone	34	169
2-Hydroxy-3-chloroisobutyric acid	174	430	4-Hydroxy-4-methyl-2-pentanone	59	83
2-Hydroxychryzarin	40	183	"	98	164
trans-2-Hydroxycinnamic acid	333	207	4-Hydroxy-2-methylquinoline	98	325
"	405	432	5-Hydroxy-2-methylquinoline	100	325
3-Hydroxycinnamic acid	367	432	6-Hydroxy-2-methylquinoline	96	325
4-Hydroxycinnamic acid	336	207	8-Hydroxy-2-methylquinoline	43	323
4-Hydroxycoumarin	516	123	8-Hydroxy-4-methylquinoline	12	434
5-Hydroxycoumarin	558	126	d,l-2-Hydroxy-2-methylsuccinic acid	154	199
trans-2-Hydroxycyclohexanecarboxylic acid	419	432	1-Hydroxy-2-naphthaldehyde	49	155
cis-3-Hydroxycyclohexanecarboxylic acid	404	432	2-Hydroxy-1-naphthaldehyde	132	103
trans-3-Hydroxycyclohexanecarboxylic acid	442	432	"	71	156
cis-4-Hydroxycyclohexanecarboxylic acid	448	432	3-Hydroxy-2-naphthaldehyde	87	157
trans-4-Hydroxycyclohexanecarboxylic acid	420	432	4-Hydroxy-1-naphthaldehyde	124	160
2-(1'-Hydroxycyclopentyl)cyclopentanone	13	172	7-Hydroxynaphthalene-1,3-disulfonamide	294	403
3-Hydroxydimethylaniline	144	103	2-Hydroxynaphthalene-1,5-disulfonamide	392	407
α-Hydroxydiphenylacetic acid	227	202	2-Hydroxynaphthalene-1,6-disulfonamide	276	402
α-Hydroxydiphenylacetyl chloride	23	214	2-Hydroxynaphthalene-1,7-disulfonamide	394	407
2-Hydroxydiphenyl ether	216	107	2-Hydroxynaphthalene-3,6-disulfonamide	316	404
2-Hydroxydiphenylmethane	46	99	2-Hydroxynaphthalene-1,5-disulfonic acid	19	380
4-Hydroxydiphenylmethane	137	103	2-Hydroxynaphthalene-1,6-disulfonic acid	9	380
2-Hydroxyethanethiol	22	413	2-Hydroxynaphthalene-1,7-disulfonic acid	20	380
β-Hydroxyethyl acetate	148	257	2-Hydroxynaphthalene-3,6-disulfonic acid	16	380
Di-2-Hydroxyethylamine	180	301	7-Hydroxynaphthalene-1,3-disulfonic acid	12	380
2-Hydroxyethylamine	329	438	2-Hydroxynaphthalene-1,5-disulfonyl chloride	280	390
4-Hydroxyethylbenzene	40	98	2-Hydroxynaphthalene-1,6-disulfonyl chloride	171	386
β-Hydroxyethyl formate	138	256	2-Hydroxynaphthalene-1,7-disulfonyl chloride	262	389
2-Hydroxyethyl 4-tolyl sulfide	59	421	7-Hydroxynaphthalene-1,3-disulfonyl chloride	251	389
1-Hydroxyfluorenone	246	109	3-Hydroxynaphthalene-2-sulfonamide	45	393
3-Hydroxyglutaric acid	77	429	4-Hydroxynaphthalene-1-sulfonamide	188	399
6-Hydroxy-n-hexylamine	406	439	6-Hydroxynaphthalene-2-sulfonamide	411	408
4-Hydroxy-3-iodo-5-methoxybenzaldehyde	470	121	8-Hydroxynaphthalene-1-sulfonamide	365	406
2-Hydroxyisobutanoic acid	80	196	4-Hydroxynaphthalene-1-sulfonamide	310	404
α-Hydroxyisobutyramide	105	233	5-Hydroxynaphthalene-1-sulfonamide	315	404
α-Hydroxyisobutyranilide	249	237	6-Hydroxynaphthalene-2-sulfonamide	167	398
α-Hydroxyisobutyric acid	80	196	7-Hydroxynaphthalene-1-sulfonamide	296	403
"	291	431	1-Hydroxynaphthalene-2-sulfonic acid	8	380
2-Hydroxyisobutyronitrile	18	346	3-Hydroxynaphthalene-2-sulfonic acid	11	371
4-Hydroxyisocaproic acid	453	432	4-Hydroxynaphthalene-1-sulfonic acid	14	380
3-Hydroxy-2-isopropylpropionaldehyde	7	152	5-Hydroxynaphthalene-1-sulfonic acid	15	380
Hydroxymalonic acid	240	202	6-Hydroxynaphthalene-2-sulfonic acid	186	377
2-Hydroxy-4-methoxyacetophenone	45	99	7-Hydroxynaphthalene-1-sulfonic acid	13	380
3-Hydroxy-4-methoxyaniline	275	311	3-Hydroxynaphthalene-2-sulfonyl chloride	173	386
2-Hydroxy-3-methoxybenzaldehyde	33	434	2-Hydroxy-1-naphthalenethiol	17	416
3-Hydroxy-4-methoxybenzaldehyde	54	434	4-Hydroxy-1-naphthalenethiol	38	417
4-Hydroxy-3-methoxybenzaldehyde	126	103	6-Hydroxy-2-naphthalenethiol	44	417
"	70	156	2-Hydroxynaphthalene-3,6,8-trisulfonamide	132	396
"	28	434	7-Hydroxynaphthalene-1,3,6-trisulfonic acid	7	380

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	Compound No.	Page No.		Compound No.	Page No.
7-Hydronaphthalene-1,3,6-trisulfonyl chloride	269	390	4-Hydroxyphenyl sulfide	72	427
3-Hydroxy-2-naphthamide	462	244	3-Hydroxyphthalic acid	412	117
4-Hydroxy-2-naphthamide	460	244	DL-Hydroxyproline	30	429
3-Hydroxy-2-naphthamide	493	246	L-Hydroxyproline	83	288
3-Hydroxy-1-naphthoic acid	571	126	2-Hydroxypropane-1,2,3-tricarboxylic acid	228	202
3-Hydroxy-2-naphthoic acid	550	125	1-Hydroxy-2-propanone	40	82
" " "	350	207	" " "	58	163
" " "	113	430	2-Hydroxypropionaldehyde	8	150
4-Hydroxy-2-naphthoic acid	351	208	3-Hydroxypropionitrile	74	351
5-Hydroxy-1-naphthoic acid	563	126	4-Hydroxypropiophenone	370	115
5-Hydroxy-1,4-naphthoquinone	21	182	" " "	180	178
3-Hydroxy-1-naphthylamine	397	316	DL-2-Hydroxy-n-propylamine	67	297
3-Hydroxy-2-naphthylamine	452	317	3-Hydroxypropylamine	358	438
6-Hydroxy-1-naphthylamine	406	316	4-Hydroxypyrazole	250	310
6-Hydroxy-2-naphthylamine	436	317	α -Hydroxypyridine	68	324
7-Hydroxy-1-naphthylamine	430	317	β -Hydroxypyridine	76	324
7-Hydroxy-2-naphthylamine	421	316	γ -Hydroxypyridine	80	324
8-Hydroxy-1-naphthylamine	179	308	2-Hydroxypyridine	215	107
2-Hydroxy-5-nitroaniline	319	313	" " "	68	324
2-Hydroxy-6-nitroaniline	441	317	" " "	120	435
3-Hydroxy-4-nitroaniline	365	314	3-Hydroxypyridine	307	112
4-Hydroxy-2-nitroaniline	347	314	" " "	76	324
4-Hydroxy-3-nitroaniline	295	312	" " "	52	434
5-Hydroxy-2-nitroaniline	398	316	" " "	196	437
4-Hydroxy-4'-nitroazobenzene	528	124	4-Hydroxypyridine	373	115
3-Hydroxy-4-nitrobenzaldehyde	14	434	" " "	80	324
4-Hydroxy-3-nitrobenzene	308	112	" " "	118	435
2-Hydroxy-5-nitrobenzoic acid	559	126	" " "	85	436
2-Hydroxy-3-nitrobenzonitrile	178	365	2-Hydroxypyrimidine	3	434
2-Hydroxy-4-nitrobenzonitrile	205	366	4-Hydroxypyrimidine	2	434
2-Hydroxy-5-nitrobenzonitrile	221	367	6-Hydroxypyrimidine	85	325
2-Hydroxy-2'-nitrobiphenyl	337	113	Hydroxypyruvic aldehyde	120	159
3-Hydroxy-2-nitrobiphenyl	145	103	4-Hydroxyquinaldine	98	325
3-Hydroxy-4-nitrobiphenyl	206	107	5-Hydroxyquinaldine	100	325
3-Hydroxy-6-nitrobiphenyl	59	99	6-Hydroxyquinaldine	96	325
4-Hydroxy-2-nitrobiphenyl	342	114	8-Hydroxyquinaldine	43	323
4-Hydroxy-2'-nitrobiphenyl	229	108	" " "	11	434
4-Hydroxy-3-nitrobiphenyl	79	100	β -Hydroxyquinoline	93	325
4-Hydroxy-4'-nitrobiphenyl	514	123	γ -Hydroxyquinoline	95	325
4-Hydroxy-3-nitro-1-naphthylamine	359	314	2-Hydroxyquinoline	500	122
9-Hydroxynonanal	33	154	3-Hydroxyquinoline	507	123
DL- β -Hydroxy norvaline	59	286	" " "	93	325
5-Hydroxy-4-octanone	132	165	4-Hydroxyquinoline	95	325
4-Hydroxypentanoic acid	424	432	5-Hydroxyquinoline	553	126
5-Hydroxy-2-pentanone	40	169	" " "	97	325
5-Hydroxy-1-pentylamine	396	439	6-Hydroxyquinoline	493	122
1-Hydroxyphenanthrene	393	116	" " "	91	325
2-Hydroxyphenanthrene	440	119	7-Hydroxyquinoline	566	126
3-Hydroxyphenanthrene	282	111	" " "	99	325
4-Hydroxyphenanthrene	236	108	8-Hydroxyquinoline	110	102
9-Hydroxyphenanthrene	396	116	" " "	45	323
4-Hydroxyphenylacetamide	358	241	" " "	8	434
α -Hydroxyphenylacetic acid	151	199	w-Hydroxyreacetopone	483	121
(2-Hydroxyphenyl)acetic acid	220	202	6-Hydroxyretene	409	117
(4-Hydroxyphenyl)acetic acid	225	202	Hydroxysuccinamide	420	243
(2-Hydroxyphenyl)acetoneitrile	163	364	Hydroxysuccinic acid	115	197
(4-Hydroxyphenyl)acetoneitrile	87	361	2-Hydroxythiophenol	40	415
2-Hydroxy-2-phenylbutyraldehyde	22	150	3-Hydroxythiophenol	1	416
4-Hydroxy- <i>m</i> -phenylenediamine	120	102	4-Hydroxy-3,5-toluediamine	360	114
" " "	130	306	2-Hydroxy- <i>p</i> -toluidine	362	314
4-Hydroxyphenylethyl alcohol	167	104	3-Hydroxy- <i>p</i> -toluidine	363	314
4-Hydroxyphenylglycine	71	287	4-Hydroxy- <i>m</i> -toluidine	302	312
3-Hydroxyphenyl methyl sulfide	77	434	4-Hydroxy- <i>o</i> -toluidine	324	313
4-Hydroxyphenyl methyl sulfide	78	434	5-Hydroxy- <i>o</i> -toluidine	390	315
2-Hydroxy-2-phenylpropionaldehyde	20	150	1-Hydroxytriacontane	48	89
2-Hydroxy-2-phenylpropionic acid	208	430	5-Hydroxy-2,4,6-tribromoaniline	253	310
2-Hydroxy-3-phenylpropionic acid	105	197	3-Hydroxy-2,4,6-trichlorobenzaldehyde	99	158
3-Hydroxy-2-phenylpropionic acid	149	199	5-Hydroxy-1,2,3-trimethoxybenzene	57	140
3-Hydroxy-3-phenylpropionic acid	195	430	β -Hydroxyvaline	49	286
2-Hydroxyphenyl sulfide	69	426	9-Hydroxyxanthene	154	177
3-Hydroxyphenyl sulfide	67	426			

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	Compound No.	Page No.	Compound No.	Page No.
I				
L-Diose	9	328	3-Iodomandelic acid	186 430
Imidazole	272	438	2-Iodo-4-methylaniline	26 303
Iminodipropionic acid	301	431	2-Iodo-5-methylaniline	40 304
Indane	20	36	3-Iodo-4-methylaniline	20 303
Indane-4-sulfonamide	55	394	4-Iodo-2-methylaniline	151 307
Indane-5-sulfonamide	89	395	2-Iodo-4-methylbenzonitrile	68 360
Indane-4-sulfonic acid	15	371	3-Iodo-2-methylbenzoic acid	173 430
Indane-5-sulfonic acid	29	372	1-Iodonaphthalene	5 75
Indane-4-sulfonyl chloride	43	382	2-Iodonaphthalene	4 76
Indane-5-sulfonyl chloride	31	381	1-Iodonaphthalene-2-sulfonamide	427 408
4-Indanol	110	435	2-Iodonaphthalene-1-sulfonamide	139 397
1-Indanone	32	173	4-Iodonaphthalene-1-sulfonamide	327 404
2-Indanone	67	174	5-Iodonaphthalene-1-sulfonamide	413 408
Indene	25	36	6-Iodonaphthalene-1-sulfonamide	341 405
Indene-3-carbonitrile	21	356	6-Iodonaphthalene-2-sulfonamide	366 406
Indole	57	304	7-Iodonaphthalene-1-sulfonamide	415 408
Indole-3-acetonitrile	29	358	7-Iodonaphthalene-2-sulfonamide	337 405
Indole-3-carbonitrile	50	349	8-Iodonaphthalene-1-sulfonamide	259 401
Indole-3-carboxaldehyde	125	160	4-Iodonaphthalene-1-sulfonamide	91 395
2-(2-Indolyl)ethylamine	256	310	2-Iodonaphthalene-1-sulfonic acid	55 372
3-(3-Indolyl)propylamine	75	305	4-Iodonaphthalene-1-sulfonic acid	152 376
3-Indolylpyruvic acid	435	317	5-Iodonaphthalene-1-sulfonic acid	182 377
meso-Inositol	67	90	8-Iodonaphthalene-1-sulfonic acid	123 375
Iodoacetamide	93	233	1-Iodonaphthalene-2-sulfonyl chloride	128 385
Iodoacetanilide	264	238	2-Iodonaphthalene-1-sulfonyl chloride	168 386
2-Iodoacetanilide	156	235	4-Iodonaphthalene-1-sulfonyl chloride	197 387
3-Iodoacetanilide	187	235	5-Iodonaphthalene-1-sulfonyl chloride	230 388
4-Iodoacetanilide	387	242	6-Iodonaphthalene-1-sulfonyl chloride	121 384
Iodoacetic acid	86	196	6-Iodonaphthalene-2-sulfonyl chloride	225 388
"	172	430	7-Iodonaphthalene-1-sulfonyl chloride	255 389
Iodoacetic anhydride	15	225	7-Iodonaphthalene-2-sulfonyl chloride	150 385
4-Iodoacetophenone	116	176	8-Iodonaphthalene-1-sulfonyl chloride	226 388
Iodoacetyl chloride	8	214	4-Iodo-2-naphthol	304 112
2-Iodoaniline	77	305	5-Iodo-2-naphthonitrile	195 366
"	58	436	3-Iodo-1-naphthylamine	142 307
3-Iodoaniline	13	303	2-Iodo-1-nitrobenzene	20 337
"	107	436	3-Iodo-1-nitrobenzene	11 337
4-Iodoaniline	102	306	4-Iodo-1-nitrobenzene	113 341
"	112	436	2-Iodo-4-nitrophenol	170 105
4-Iodoanisole	30	138	2-Iodo-6-nitrophenol	225 108
2-Iodobenzaldehyde	13	153	3-Iodo-2-nitrophenol	105 102
3-Iodobenzaldehyde	42	155	3-Iodo-4-nitrophenol	292 111
4-Iodobenzaldehyde	68	156	4-Iodo-2-nitrophenol	125 103
2-Iodobenzamide	386	242	4-Iodo-3-nitrophenol	394 116
3-Iodobenzamide	394	242	5-Iodo-2-nitrophenol	181 105
4-Iodobenzamide	458	244	5-Iodo-3-nitrophenol	328 113
2-Iodobenzanilide	257	238	4-Iodo-3-nitrotoluene	25 337
4-Iodobenzanilide	447	244	2-Iodophenetole	100 136
Iodobenzene	1	75	4-Iodophenetole	6 137
4-Iodobenzenesulfonamide	240	401	2-Iodophenol	31 98
4-Iodobenzenesulfonamide	106	396	"	46 434
4-Iodobenzenesulfonic acid	105	374	3-Iodophenol	25 97
4-Iodobenzenesulfonyl chloride	105	384	"	63 434
2-Iodobenzoic acid	246	203	4-Iodophenol	168 105
"	126	430	"	65 434
3-Iodobenzoic acid	297	205	(2-Iodophenoxy)acetic acid	168 430
"	258	431	(3-Iodophenoxy)acetic acid	160 430
4-Iodobenzoic acid	392	209	(4-Iodophenoxy)acetic acid	167 430
"	126	430	(2-Iodophenyl)acetic acid	292 431
3-Iodobenzoic anhydride	59	226	(3-Iodophenyl)acetic acid	311 431
4-Iodobenzoic anhydride	82	227	(4-Iodophenyl)acetic acid	314 431
2-Iodobenzonitrile	63	359	(4-Iodophenyl)acetoneitrile	55 359
4-Iodobenzoyl bromide	3	220	2-Iodo-p-phenylenediamine	225 309
2-Iodobenzoyl chloride	3	216	4-Iodophenyl phenyl sulfide	9 425
4-Iodobenzoyl chloride	20	216	3-Iodophthalic anhydride	67 226
4-Iodobenzyl cyanide	55	359	4-Iodophthalic anhydride	55 226
4-Iodobiphenyl	5	76	β -Iodopropionamide	119 234
4-Iododiphenyl sulfide	9	425	α -Iodopropionic acid	156 430
Iodoform	2	68	β -Iodopropionic acid	84 196
1-Iodo-4-isopropylbenzene	4	75	"	298 431
			β -Iodopropionyl chloride	9 214

ORGANIC COMPOUND INDEX

	Compound No.	Page No.		Compound No.	Page No.
α -Iodopyridine	3	322	Isobutylamine	16	295
"	35	436	"	432	439
β -Iodopyridine	29	323	N-Isobutylaniline	137	299
"	88	436	"	154	437
2-Iodopyridine	3	322	"	149	299
"	35	436	4-Isobutylaniline	15	35
3-Iodopyridine	29	323	Isobutylbenzene	265	264
"	88	436	Isobutyl benzoate	9	58
4-Iodopyridine	127	437	Isobutyl bromide	105	255
α -Iodoquinoline	28	323	Isobutyl <i>n</i> -butyrate	16	231
γ -Iodoquinoline	63	324	Isobutyl carbamate	154	257
2-Iodoquinoline	28	323	Isobutyl carbonate	11	55
4-Iodoquinoline	63	324	Isobutyl chloride	59	252
5-Iodoquinoline	65	324	Isobutyl chloroformate	191	260
6-Iodoquinoline	55	324	Isobutyl enanthate	79	84
8-Iodoquinoline	9	323	Isobutylene glycol	46	133
4-Iodothiophenol	27	417	Isobutyl ether	11	230
2-Iodotoluene	3	75	N-Isobutylformanilide	23	250
3-Iodotoluene	2	75	Isobutyl formate	87	429
4-Iodotoluene	1	76	N-Isobutylglycine	191	260
4-Iodo- <i>m</i> -toluidine	40	304	Isobutyl <i>n</i> -heptanoate	24	95
5-Iodo- <i>o</i> -toluidine	151	307	Isobutyl 2-hydroxybenzoate	9	60
2-Iodo- <i>p</i> -toluidine	20	303	Isobutyl iodide	93	254
3-Iodo- <i>p</i> -toluidine	26	303	Isobutyl isobutyrate	124	255
2-Iodo-4-tolunitrile	68	360	Isobutyl isovalerate	239	263
1-Iodo-2,4,5-trimethylbenzene	2	76	Isobutyl levulinate	75	351
5-Iodovanillin	470	121	Isobutylmalononitrile	7	413
Isatin	431	243	Isobutyl mercaptan	96	164
"	425	317	Isobutyl methoxymethyl ketone	55	37
Isoamyl acetate	75	253	2-Isobutyl-1-methylbenzene	49	37
<i>prim</i> -Isoamyl alcohol	26	81	3-Isobutyl-1-methylbenzene	53	37
<i>sec</i> -Isoamyl alcohol	12	80	4-Isobutyl-1-methylbenzene	25	81
Isoamylamine	28	295	Isobutyl methyl carbinol	15	161
Isoamylbenzoate	307	267	Isobutyl methyl ketone	13	420
Isoamyl bromide	16	58	Isobutyl methyl sulfide	12	137
Isoamyl <i>n</i> -butyrate	134	256	Isobutyl 2-naphthyl ether	237	263
Isoamyl carbamate	29	231	Isobutyl oxalate	137	256
Isoamyl carbinol	47	82	Isobutyl <i>n</i> -pentanoate	18	94
Isoamyl chloride	21	55	4-Isobutylphenol	281	265
Isoamyl chloroformate	99	254	Isobutyl phenylacetate	195	167
Isoamylcyclohexane	245	7	Isobutyl phenyl ketone	72	253
Isoamyl ether	64	134	Isobutyl propionate	67	163
N-Isoamylformanilide	12	230	Isobutyl <i>n</i> -propyl ketone	301	267
Isoamyl formate	52	252	Isobutyl salicylate	24	429
Isoamyl iodide	14	60	"	11	273
Isoamyl isobutyrate	122	255	Isobutyl stearate	310	267
Isoamyl isovalerate	157	257	Isobutyl succinate	37	421
Isoamyl levulinate	286	266	Isobutyl sulfide	49	37
Isoamyl mercaptan	12	413	<i>m</i> -Isobutyltoluene	53	37
Isoamyl-1-naphthyl ether	110	136	<i>p</i> -Isobutyltoluene	55	37
Isoamyl 2-naphthyl ether	8	137	<i>o</i> -Isobutyltoluene	16	231
Isoamyl nitrate	24	250	Isobutyl urethane	137	256
Isoamyl oxalate	312	268	Isobutyl <i>n</i> -valerate	9	144
Isoamyl phthalate	357	271	Isobutyraldehyde	217	236
Isoamyl propionate	109	255	Isobutyramide	137	234
Isoamyl salicylate	28	95	Isobutyranilide	8	190
"	326	269	Isobutyric acid	451	432
Isoamyl stearate	12	273	"	7	223
Isoamyl succinate	343	270	Isobutyric anhydride	9	345
Isoamyl sulfide	50	421	Isobutyronitrile	177	167
Isoamyl urethane	29	231	Isobutyrophenone	6	212
Isoaspartic acid	72	287	Isobutyryl chloride	33	145
<i>d,l</i> -Isobornane	48	9	Isocaproaldehyde	190	236
Isobutane	5	3	Isocaproamide	169	235
Isobutanoic acid	8	190	Isocaproanilide	30	191
2-Isobutoxyethanol	51	82	"	449	432
Isobutylacetaldehyde	33	145	"	38	348
Isobutyl acetate	43	251	Isocapronitrile	29	212
Isobutylacetic acid	30	191	Isocaproyl chloride	317	23
Isobutyl acetylene	15	28	Isocarvestrene	126	234
Isobutyl alcohol	10	80	Isocrotonamide	127	234
Isobutylallene	111	16	Isocrotonanilide	13	190
			Isocrotonic acid		

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	Compound No.	Page No.		Compound No.	Page No.
Isodurene	59	37	Isopropyl benzoate	213	261
Isodurenol	122	102	2-Isopropylbenzoic acid	226	431
Isoduridine	170	300	4-Isopropylbenzoic acid	150	199
Isoeugenol	26	95	"	355	432
Isoeugenol methyl ether	104	136	4-Isopropylbenzotrile	85	352
Isoeugenyl acetate	118	279	4-Isopropylbenzoyl chloride	22	214
Isogeraniolene	251	20	α -Isopropylbenzyl alcohol	116	86
Isohexanamide	190	236	4-Isopropylbenzyl chloride	51	56
Isohexyl alcohol	47	82	Isopropyl bromide	5	58
Isohexylamine	43	296	2-Isopropylbutanoic acid	24	192
Isohexyl methyl ketone	110	164	Isopropyl <i>n</i> -butyrate	58	252
Isolaurole	153	17	Isopropyl carbamate	78	233
D(-)-Isoleucine	94	288	Isopropyl carbonate	90	254
DL-Isoleucine	99	289	Isopropyl chloride	4	55
L-(+)-Isoleucine	91	288	Isopropylcyclohexane	153	5
Isonicotinic acid	406	210	5-Isopropyl-1,3-cyclohexanedione	78	174
"	447	432	3-Isopropylcyclohexanone	76	170
Isopentane-1,1-dicarboxylic acid	76	196	4-Isopropylcyclohexanone	67	170
Isopentylbenzene	60	37	3-Isopropyl-2-cyclohexenone	58	170
Isopentyl salicylate	28	95	1-6-Isopropyl-3-cyclohexenone	61	170
Isophorone	172	166	Isopropylcyclopentane	83	4
Isophthalaldehyde	75	157	2-Isopropylcyclopentanone	119	165
Isophthalic acid	408	210	Isopropyl ether	18	131
"	220	430	Isopropyl formate	7	250
Isophthalic acid diamide	504	246	3-Isopropylglutaric acid	345	432
Isophthalic acid monoamide	503	246	4-Isopropylheptane	179	6
Isophthalonitrile	204	366	Isopropyl 2-hydroxybenzoate	20	94
Isophthaloyl dichloride	6	216	Isopropylideneacetone	25	162
Isopicramic acid	448	119	5-Isopropylidene-2-methyl-1,3-cyclohexadiene	321	23
Isoprene	17	12	1-Isopropylidene-2-methylcyclohexane	309	23
Isopropenyl acetylene	7	28	1-Isopropylidene-3-methylcyclohexane	310	23
Isopropanolamine	67	297	1-Isopropylidene-4-methylcyclohexane	307	23
1-Isopropenyl-1,4-cyclohexadiene	308	23	4-Isopropylidene-1-methylcyclohexane	325	24
1-5-Isopropyl-2-methyl-1,3-cyclohexadiene	313	23	3-Isopropylidene-6-methylcyclohexane	324	24
<i>d</i> -1-Isopropenyl-3-methylcyclohexane	301	22	3-Isopropylidene-1-methylcyclopentane-1-		
1-1-Isopropenyl-3-methylcyclohexane	302	22	carbonitrile	73	351
1-Isopropenyl-4-methylcyclohexane	300	22	Isopropyl iodide	4	60
<i>cis</i> -3-Isopropenyl-4-methylcyclohexane	298	22	Isopropyl isobutyrate	47	252
1-Isopropenyl-3-methylcyclohexane	323	23	Isopropyl isovalerate	76	253
1-Isopropenyl-5-methylcyclohexane	320	23	Isopropyl <i>d,l</i> -lactate	118	255
1-3-Isopropenyl-1-methylcyclohexane	318	23	Isopropyl levulinate	192	260
3-Isopropenyl-2-methylcyclohexane	303	22	Isopropylmalonic acid	132	430
4-Isopropenyl-3-methylcyclohexane	304	22	Isopropyl methoxymethyl ketone	56	162
5-Isopropenyl-1-methylcyclohexane	317	23	Isopropylmethylacetic acid	24	190
Isopropenyl methyl ketone	7	161	5-Isopropyl-2-methylacetophenone	202	167
(2-Isopropoxy)benzoic acid	330	431	Isopropyl methyl acetylene	18	28
(3-Isopropoxy)benzoic acid	308	431	Isopropyl methylamine	8	295
(4-Isopropoxy)benzoic acid	418	432	2-Isopropyl-1-methylbenzene	22	36
2-Isopropoxyethanol	36	81	3-Isopropyl-1-methylbenzene	17	35
1-Isopropoxy-3-methyl-2-butanone	88	163	4-Isopropyl-1-methylbenzene	21	36
Isopropoxymethyl methyl ketone	49	162	2-Isopropyl-5-methylbenzenethiol	44	415
Isopropyl acetate	17	250	5-Isopropyl-2-methylbenzenethiol	45	415
Isopropyl acetylene	5	28	2-Isopropyl-5-methyl-1,4-benzoquinone	2	181
4-Isopropylacetophenone	210	168	2-Isopropyl-3-methyl-1-butene	127	16
2-Isopropylacrolein	25	145	<i>d,l</i> -Isopropyl methyl carbinol	12	80
Isopropyl alcohol	3	80	1-Isopropyl-4-methyl-1,3-cyclohexadiene	311	23
1-Isopropylallene	54	13	1-Isopropyl-4-methyl-1,4-cyclohexadiene	322	23
Isopropylamine	4	295	2-Isopropyl-5-methyl-1,3-cyclohexadiene	312	23
"	468	439	1-5-Isopropyl-2-methyl-1,3-cyclohexadiene	313	23
2-(Isopropylamino)ethylamine	416	439	5-Isopropyl-2-methyl-1,3-cyclohexadiene	314	23
N-Isopropylaniline	234	437	1-Isopropyl-2-methylcyclohexane	236	7
2-Isopropylaniline	153	437	1-1-Isopropyl-3-methylcyclohexane	228	6
3-Isopropylaniline	172	437	<i>d,l</i> -1-Isopropyl-3-methylcyclohexane	214	6
4-Isopropylaniline	135	299	<i>d</i> -1-Isopropyl-3-methylcyclohexane	219	6
2-Isopropylazulene	5	43	<i>cis</i> -1-Isopropyl-4-methylcyclohexane	229	6
5-Isopropylazulene	10	43	<i>trans</i> -1-Isopropyl-4-methylcyclohexane	232	7
6-Isopropylazulene	15	43	<i>trans</i> -1-Isopropyl-4-methylcyclohexane	184	6
4-Isopropylbenzaldehyde	87	149	1-Isopropyl-2-methylcyclopentane	126	5
4-Isopropylbenzamide	236	237	1-Isopropyl-3-methylcyclopentane	124	5
Isopropylbenzene	7	35	7-Isopropyl-1-methylfluorene	101	47
1-Isopropylbenzimidazole	231	437	3-Isopropyl-2-methylhexane	196	6
2-Isopropylbenzimidazole	254	438	2-Isopropyl-5-methylhydroquinone	347	114

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	Compound No.	Page No.		Compound No.	Page No.
Isopropyl methyl ketone.....	6	161	Itaconic acid diamide.....	406	242
1-Isopropyl-7-methylnaphthalene.....	165	41	Itaconic acid dianilide.....	403	242
7-Isopropyl-1-methyl-9,10-phenanthraquinone.....	30	182	Itaconic anhydride.....	26	225
1-Isopropyl-7-methylphenanthrene.....	81	46			
3-Isopropyl-1-methylphenanthrene.....	70	45	J		
4-Isopropyl-1-methylphenanthrene.....	58	45	Jasminaldehyde.....	9	150
6-Isopropyl-1-methylphenanthrene.....	18	43	Juglone.....	21	182
7-Isopropyl-1-methylphenanthrene.....	103	47			
2-Isopropyl-5-methylphenol.....	44	98	K		
5-Isopropyl-2-methylphenol.....	19	94	α -Ketobutyric acid.....	11	193
Isopropyl methyl sulfide.....	8	420	2-Ketocyclohexanecarboxylic acid.....	82	196
5-Isopropyl-naphthanthracene.....	95	46	3-Ketocyclohexanecarboxylic acid.....	74	196
8-Isopropyl-naphthanthracene.....	136	48	4-Ketocyclohexanecarboxylic acid.....	67	195
9-Isopropyl-naphthanthracene.....	133	48	γ -Ketovaleric acid.....	18	193
12-Isopropyl-naphthanthracene.....	98	47			
1-Isopropyl-naphthalene.....	158	41	L		
2-Isopropyl-naphthalene.....	161	41	Lactaldehyde.....	8	329
Isopropyl 2-naphthyl ether.....	22	138	<i>d,l</i> -Lactamide.....	49	232
Isopropyl 4-nitrophenyl sulfide.....	18	425	<i>d,l</i> -Lactanilide.....	22	231
Isopropyl oxalate.....	160	258	<i>d,l</i> -Lactic acid.....	7	192
Isopropyl <i>n</i> -pentanoate.....	98	254	Lactic acid benzoate.....	138	198
2-Isopropyl-1-pentene.....	179	18	" " ".....	261	431
2-Isopropylphenanthrene.....	17	43	Lactic aldehyde.....	8	329
9-Isopropylphenanthrene.....	14	43	<i>d,l</i> -Lactonitrile.....	54	349
2-Isopropylphenol.....	7	94	Lactonitrile benzoate.....	98	353
4-Isopropylphenol.....	65	99	Lactose.....	64	333
(4-Isopropylphenyl)acetic acid.....	365	432	6- $[\beta$ -Lactosido]- α -D-glucose.....	67	333
<i>d,l</i> -Isopropyl phenyl carbinol.....	116	86	DL-Lanthionine.....	89	288
Isopropyl phenyl ketone.....	177	167	<i>meso</i> -Lanthionine.....	116	290
Isopropyl phenyl sulfide.....	48	421	Lauraldehyde.....	18	153
Isopropyl phthalate.....	347	270	Lauramide.....	160	235
Isopropyl propionate.....	39	251	Lauranilide.....	46	232
4-Isopropyl-1-propylbenzene.....	105	39	Laurent's acid.....	203	378
Isopropyl <i>n</i> -propyl ether.....	25	132	Lauric acid.....	29	194
Isopropyl <i>n</i> -propyl ketone.....	34	162	Lauric anhydride.....	12	225
Isopropyl propyl sulfide.....	20	420	Laurylene.....	205	18
2-Isopropylpyridine.....	237	437	Laurone.....	91	175
3-Isopropylpyridine.....	232	437	Lauronitrile.....	101	353
4-Isopropylpyridine.....	246	438	Lauropenone.....	45	173
Isopropyl salicylate.....	20	94	Lauroyl chloride.....	13	214
" ".....	262	264	Lauryl alcohol.....	3	88
Isopropyl sulfide.....	17	420	Lauryl bromide.....	29	58
2-Isopropylthiophene.....	25	423	Lauryl chloride.....	53	56
3-Isopropylthiophene.....	26	423	DL-Leucine.....	101	289
2-Isopropyltoluene.....	22	36	" ".....	78	429
3-Isopropyltoluene.....	17	35	L-Leucine.....	123	290
4-Isopropyltoluene.....	21	36	Leuco-malachite green.....	66	324
Isopropyl urethane.....	78	233	Levulinamide.....	152	234
Isopropyl <i>n</i> -valerate.....	98	254	Levulinanilide.....	124	234
Isoquinoline.....	72	320	Levulinic acid.....	16	172
" ".....	215	437	" ".....	18	193
1-Isoquinoline-1-carboxaldehyde.....	38	155	" ".....	407	432
1,4-Isoquinolinediol.....	573	126	Lignoceric acid.....	88	196
D-Isorhamnose.....	29	330	<i>d</i> -Limonene.....	316	23
<i>trans</i> (β)-Isosafrole.....	101	136	<i>d,l</i> -Limonene.....	319	23
DL-Isoserine.....	69	287	<i>l</i> -Linalool.....	103	85
L-Isoserine.....	33	285	<i>l</i> -Linalyl acetate.....	215	261
Isovaleraldehyde.....	17	145	<i>l</i> -Linalyl alcohol.....	103	85
Isovaleramide.....	245	237	2,3-Lutidine.....	31	319
Isovaleranilide.....	162	235	2,4-Lutidine.....	25	319
Isovaleric acid.....	15	190	2,5-Lutidine.....	26	319
" ".....	432	432	2,6-Lutidine.....	18	319
Isovaleric anhydride.....	11	223	3,4-Lutidine.....	32	319
Isovalerone.....	101	164	3,5-Lutidine.....	40	319
Isovaleronitrile.....	22	346	D-Lysine.....	57	429
Isovalerophenone.....	197	167			
Isovaleryl bromide.....	6	218			
Isovaleryl chloride.....	16	212			
Isovanilline.....	54	434			
Itaconic acid.....	254	203			
" ".....	469	433			

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	Compound No.	Page No.		Compound No.	Page No.
DL-Lysine	129	290	4(8)- <i>p</i> -Menthen-3-one	180	167
L-Lysine	53	286	<i>l</i> -Menthol	20	88
"	208	429	<i>l</i> -Menthone	165	166
α -D-Lyxose	13	329	<i>l</i> -Menthyl acetate	232	262
M					
L-Malamide	309	239	L-Menthylamine	111	298
L-Malanilide	420	243	2-Mercaptoacetophenone	4	416
<i>l</i> -Malic acid	115	197	Mercaptobenzene	25	414
Maleamic acid	352	241	1-Mercaptonaphthalene	47	415
Maleic acid	175	200	2-Mercaptonaphthalene	25	416
"	37	429	Mesaconic acid	329	207
Maleic acid diamide	380	242	"	322	431
Maleic acid dianilide	396	242	Mesaconic acid diamide	368	241
Maleic acid monoamide	352	241	Mesaconic acid dianilide	391	242
Maleic acid monoanilide	397	242	Mesaconyl dichloride	28	214
Maleic anhydride	21	225	Mesidine	142	299
Maleimide	83	233	Mesityl acetate	255	269
Maleonitrile	19	357	Mesityl acetic acid	261	203
Malonic acid	6	231	Mesitylacetone	70	174
"	225	431	Mesitylene	11	35
Malondiamide	345	241	Mesityleneamide	235	237
Malonic acid	185	200	Mesitylene disulfonic acid	195	378
"	123	430	Mesitylenic acid	259	203
Malonic acid diamide	345	241	Mesityl oxide	25	162
Malonic acid dianilide	477	245	Mesityl phenyl ketone	167	177
Malonic acid monoamide	6	231	Metalddehyde	101	158
"	225	431	Metanilic acid	37	372
Malonic acid monoanilide	232	237	Methacrolein	10	144
Malononitrile	17	357	Methacrylamide	180	235
β -Maltose	43	332	Methacrylic acid	9	190
<i>d,l</i> -Mandelamide	239	237	Methacrylonitrile	7	345
<i>d,l</i> -Mandelanilide	289	239	Methacrylyl chloride	7	212
<i>d,l</i> -Mandelic acid	151	199	Methylacetone	66	163
"	196	430	Methylal chloride	12	55
D-Mandelonitrile	14	357	Methanal	1	144
DL-Mandelonitrile	7	357	Methane	1	3
<i>d</i> -Mannitol	62	90	Methane disulfonamide	395	407
α -D-Mannoheptose	27	330	Methane disulfonanilide	286	403
α -D-Mannose	23	330	Methane disulfonic acid	179	377
β -D-Mannose	24	330	Methane disulfonyl chloride	1	381
DL-Mannose	26	330	Methanesulfonamide	23	392
L-Mannose	25	330	Methanesulfonanilide	32	393
Margaramide	149	234	Methanesulfonic acid	6	371
Margaric acid	55	195	Methanethiol	1	413
Margaric aldehyde	11	153	Methanol	1	80
Margaric anhydride	25	225	Methionine	179	377
Melezitose	38	331	DL-Methionine	87	288
β -Melibiose dihydrate	2	329	L-Methionine	90	288
Menogene	324	24	Methone	181	178
Menogerene	321	23	Methoxyacetaldehyde	16	145
1,5- <i>p</i> -Menthadiene	314	23	Methoxyacetamide	103	233
2,4- <i>p</i> -Menthadiene	312	23	Methoxyacetanilide	21	231
<i>d,l</i> -2,8- <i>m</i> -Menthadiene	323	23	4-Methoxyacetanilide	211	236
3,8- <i>m</i> -Menthadiene	320	23	Methoxyacetic acid	31	191
3,8- <i>o</i> -Menthadiene	298	22	Methoxyacetone	17	346
5,8- <i>o</i> -Menthadiene	304	22	α -Methoxyacetophenone	25	169
6,8- <i>o</i> -Menthadiene	303	22	2-Methoxyacetophenone	199	167
<i>d-m</i> -Menthane	219	6	3-Methoxyacetophenone	200	167
<i>l-m</i> -Menthane	228	6	4-Methoxyacetophenone	24	172
<i>o</i> -Menthane	236	7	Methoxyacetyl chloride	14	212
<i>p</i> -Menthane	232	7	2-Methoxyaniline	94	135
<i>cis-p</i> -Menthane	229	6	"	134	299
<i>trans-p</i> -Menthane	184	6	"	159	437
<i>m</i> -Menthene	310	23	3-Methoxyaniline	102	136
<i>o</i> -Menthene	309	23	"	168	300
<i>p</i> -Menthene	307	23	"	139	437
<i>d-m</i> -8-Menthene	301	22	4-Methoxyaniline	35	138
<i>l-m</i> -8-Menthene	302	22	"	67	304
<i>p</i> -8-Menthene	300	22	"	211	437
			4-Methoxybenzalacetone	96	175
			4-Methoxybenzalacetophenone	104	175
			2-Methoxybenzaldehyde	15	153
			3-Methoxybenzaldehyde	85	149

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	Compound No.	Page No.		Compound No.	Page No.
4-Methoxybenzaldehyde	89	149	2-Methoxynaphthalene-1-sulfonamide	304	403
2-Methoxybenzamide	218	236	3-Methoxynaphthalene-2-sulfonamide	211	399
2-Methoxybenzanilide	225	237	4-Methoxynaphthalene-1-sulfonamide	159	397
Methoxybenzene	56	133	4-Methoxynaphthalene-3-sulfonamide	122	396
4-Methoxybenzene-1,3-disulfonamide	416	408	5-Methoxynaphthalene-1-sulfonamide	150	397
4-Methoxybenzene-1,3-disulfonanilide	336	405	6-Methoxynaphthalene-1-sulfonamide	223	400
4-Methoxybenzene-1,3-disulfonic acid	191	378	6-Methoxynaphthalene-2-sulfonamide	58	394
4-Methoxybenzene-1,3-disulfonyl chloride	108	384	7-Methoxynaphthalene-2-sulfonamide	60	394
4-Methoxybenzyl	82	174	2-Methoxynaphthalene-1-sulfonyl chloride	188	387
2-Methoxybenzoic acid	114	197	3-Methoxynaphthalene-2-sulfonyl chloride	222	388
"	296	431	4-Methoxynaphthalene-1-sulfonyl chloride	146	385
3-Methoxybenzoic acid	297	431	4-Methoxynaphthalene-2-sulfonyl chloride	84	383
4-Methoxybenzoic acid	291	204	5-Methoxynaphthalene-1-sulfonyl chloride	184	387
"	383	432	6-Methoxynaphthalene-1-sulfonyl chloride	96	384
4-Methoxybenzoic anhydride	43	226	6-Methoxynaphthalene-2-sulfonyl chloride	122	384
2-Methoxybenzotrile	9	357	7-Methoxynaphthalene-2-sulfonyl chloride	102	384
4-Methoxybenzotrile	72	360	2-Methoxy-2-nitroaniline	121	306
2-Methoxybenzophenone	29	173	2-Methoxy-4-nitroaniline	314	312
4-Methoxybenzophenone	80	174	2-Methoxy-5-nitroaniline	249	310
4-Methoxybenzoyl bromide	9	219	3-Methoxy-5-nitroaniline	39	436
2-Methoxybenzoyl chloride	57	213	4-Methoxy-2-nitroaniline	287	311
3-Methoxybenzoyl chloride	54	213	4-Methoxy-3-nitroaniline	64	304
4-Methoxybenzoyl chloride	58	213	3-Methoxy-1-nitrobenzene	12	337
2-Methoxybenzyl alcohol	127	86	4-Methoxy-1-nitrobenzene	23	337
4-Methoxybenzyl alcohol	5	88	4-Methoxy-3-nitrobenzenesulfonamide	120	396
"	4	137	4-Methoxy-3-nitrobenzenesulfonic acid	46	372
2-Methoxybenzylamine	343	438	4-Methoxy-3-nitrobenzenesulfonyl chloride	71	383
3-Methoxybenzylamine	314	438	4-Methoxy-3-nitrobenzoic acid	300	205
4-Methoxybenzylamine	327	438	2-Methoxy-4-nitrophenol	428	118
2-Methoxybiphenyl	10	137	5-Methoxy-2-nitrophenol	22	434
4-Methoxybiphenyl	51	139	1-Methoxy-2-pentanone	72	163
1-Methoxy-2-butanone	29	162	2-Methoxy-3-pentanone	36	162
1-Methoxy-3-butanone	14	161	2-Methoxyphenol	12	96
4-Methoxychalcone	104	175	"	9	137
2-Methoxycinnamic acid	393	432	"	95	434
4-Methoxycinnamic acid	363	432	3-Methoxyphenol	21	95
4-Methoxycinnamitrile	74	360	"	82	434
4-Methoxycyclohexanone	54	170	4-Methoxyphenol	48	99
2-Methoxyethanethiol	11	413	"	104	434
2-Methoxyethanol	20	81	(2-Methoxyphenoxy)acetic acid	180	430
2-(2-Methoxyethoxy)ethanol	96	85	(3-Methoxyphenoxy)acetic acid	164	430
β -Methoxyethyl acetate	78	253	(4-Methoxyphenoxy)acetic acid	175	430
2-Methoxyethylamine	336	438	2-Methoxyphenyl acetate	261	264
β -Methoxyethyl benzoate	294	266	(4-Methoxyphenyl)acetic acid	92	196
Methoxyethyl methyl ketone	14	161	"	359	432
1-Methoxyethyl <i>n</i> -propyl ketone	78	163	4-Methoxyphenyl methyl carbinol	133	87
1-Methoxy-2-hexanone	106	164	3-(2-Methoxyphenyl)propionic acid	439	432
1-Methoxy-3-hexanone	78	163	3-(3-Methoxyphenyl)propionic acid	409	432
4-Methoxyhydrocinnamitrile	103	354	3-(4-Methoxyphenyl)propionic acid	421	432
3-Methoxyisobutyraldehyde	36	145	3-(4-Methoxyphenyl)propionitrile	103	354
1-Methoxy-3-methyl-2-butanone	56	162	4-Methoxyphenyl sulfide	19	425
4-Methoxy-2-methyl- <i>n</i> -butyraldehyde	9	152	2-Methoxy-1-propanol	49	133
Methoxymethyl methyl ketone	13	161	1-Methoxy-2-propanone	13	161
3-Methoxy-2-methylolbenzoic acid	215	430	1-Methoxy-4-propenylbenzene	3	137
1-Methoxy-4-methyl-2-pentanone	96	164	2-Methoxy-4-propenylphenol	26	95
2-Methoxy-3-methyl-2-pentanone	95	164	2-Methoxy-5-propenylphenol	182	105
3-Methoxy-2-methyl-1-propanol	57	133	2-Methoxypropionic acid	11	192
Methoxymethyl <i>n</i> -propyl ketone	72	163	3-Methoxypropionitrile	41	348
2-Methoxy-1-naphthaldehyde	73	156	β -Methoxypropionyl chloride	26	212
3-Methoxy-1-naphthaldehyde	52	155	1-Methoxy-2- <i>n</i> -propoxyethane	47	133
4-Methoxy-1-naphthaldehyde	9	153	2-Methoxypyridine	80	436
5-Methoxy-1-naphthaldehyde	56	155	3-Methoxypyridine	186	437
1-Methoxynaphthalene	106	136	4-Methoxypyridine	262	438
2-Methoxynaphthalene-1-sulfonamide	161	398	2-Methoxyquinoline	83	436
3-Methoxynaphthalene-2-sulfonamide	49	393	4-Methoxyquinoline	260	438
4-Methoxynaphthalene-1-sulfonamide	378	406	6-Methoxyquinoline	112	321
4-Methoxynaphthalene-2-sulfonamide	149	397	"	193	437
5-Methoxynaphthalene-1-sulfonamide	292	403	7-Methoxyquinoline	59	140
6-Methoxynaphthalene-1-sulfonamide	127	396	8-Methoxyquinoline	27	138
6-Methoxynaphthalene-2-sulfonamide	268	402	"	26	323
7-Methoxynaphthalene-2-sulfonamide	362	406	2-Methoxytoluene	62	134

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	Compound No.	Page No.		Compound No.	Page No.
3-Methoxytoluene	66	134	4-Methylbenzene-1,3-disulfonamide	256	401
4-Methoxytoluene	65	134	5-Methylbenzene-1,3-disulfonamide	349	405
1-Methoxy-2,4,6-trinitrobenzene	36	338	2-Methylbenzene-1,3-disulfonamide	168	398
N-Methyl acetanilide	123	234	2-Methylbenzene-1,4-disulfonamide	225	400
Methyl acetate	4	250	4-Methylbenzene-1,2-disulfonamide	272	402
Methylacetacetate	108	164	4-Methylbenzene-1,3-disulfonamide	267	402
"	123	255	5-Methylbenzene-1,3-disulfonamide	137	397
2-Methylacetoacetamide	35	347	2-Methylbenzene-1,3-disulfonic acid	204	378
2-Methylacetophenone	170	166	2-Methylbenzene-1,4-disulfonic acid	168	377
3-Methylacetophenone	176	166	4-Methylbenzene-1,2-disulfonic acid	188	377
4-Methylacetophenone	6	172	4-Methylbenzene-2,4-disulfonic acid	132	375
N-Methyl-3-acetotoluidide	17	231	5-Methylbenzene-1,3-disulfonic acid	162	377
N-Methyl-3-acetotoluidide	32	231	2-Methylbenzene-1,3-disulfonyl chloride	113	384
N-Methyl-4-acetotoluidide	58	232	2-Methylbenzene-1,4-disulfonyl chloride	144	385
N-Methylacetylanthranilic acid	311	206	4-Methylbenzene-1,2-disulfonyl chloride	166	386
Methyl acetylene	2	28	4-Methylbenzene-1,3-disulfonyl chloride	44	382
Methyl acrylate	12	250	5-Methylbenzene-1,3-disulfonyl chloride	125	385
2-Methylacrylic acid	411	432	2-Methylbenzenesulfonic acid	58	372
α -Methylacrylonitrile	7	345	3-Methylbenzenesulfonic acid	10	371
β -Methyladipic acid	89	196	4-Methylbenzenesulfonic acid	31	372
D-N-Methyl- α -alanine	109	289	2-Methylbenzenesulfonyl chloride	73	383
DL-N-Methyl- α -alanine	98	289	3-Methylbenzenesulfonyl chloride	3	381
"	66	429	4-Methylbenzenesulfonyl chloride	75	383
N-Methyl- β -alanine	2	284	4-Methylbenzhydrol	29	89
Methyl alcohol	1	80	Methyl benzoate	110	278
Methylallene	11	12	1-Methylbenzimidazole	220	437
2-Methylallyl sulfide	38	421	2-Methylbenzimidazole	252	438
Methylamine	470	439	4-Methylbenzimidazole	228	437
"	1	295	5-Methylbenzimidazole	235	437
"	422	439	Methyl benzoate	172	258
L-Methylamine	111	298	2-Methylbenzoic acid	125	198
2-(N-Methylamino)benzenesulfonamide	51	393	"	269	431
4-(N-Methylamino)benzenesulfonamide	338	405	3-Methylbenzoic acid	137	198
2-(N-Methylamino)benzenesulfonic acid	14	371	"	339	432
4-(N-Methylamino)benzenesulfonic acid	158	376	4-Methylbenzoic acid	278	204
Methyl-2-aminobenzoate	15	273	"	360	432
3-(Methylamino)benzoic acid	214	430	2-Methylbenzoic anhydride	9	225
(2-Methylamino)ethylamine	367	439	3-Methylbenzoic anhydride	29	225
1-(Methylamino)naphthalene	183	301	4-Methylbenzoic anhydride	40	225
"	109	436	2-Methylbenzotriazole	64	350
2-(Methylamino)naphthalene	188	301	3-Methylbenzotriazole	70	350
2-(Methylamino)- <i>n</i> -pentane	33	296	4-Methylbenzotriazole	13	357
2-(Methylamino)phenol	184	105	4-Methylbenzophenone	74	174
4-(Methylamino)phenol	152	104	2-Methyl-1,4-benzoquinone	6	181
Methyl- <i>n</i> -amyl alcohol	41	82	Methyl 2-benzoylbenzoate	119	279
N-Methylaniline	90	298	2-Methylbenzoyl bromide	5	219
"	181	437	3-Methylbenzoyl bromide	1	219
2-Methylaniline	94	298	4-Methylbenzoyl bromide	8	219
"	156	437	4-Methylbenzoyl chloride	51	213
3-Methylaniline	96	298	1-Methyl-3,4-benzphenanthrene	69	45
"	174	437	2-Methyl-3,4-benzphenanthrene	61	45
4-Methylaniline	34	303	5-Methyl-3,4-benzphenanthrene	143	49
"	195	437	6-Methyl-3,4-benzphenanthrene	76	46
N-Methylaminonitrile	95	353	7-Methyl-3,4-benzphenanthrene	31	44
Methyl anisate	59	276	8-Methyl-3,4-benzphenanthrene	54	45
2-Methylanisole	62	134	2-Methyl-1',2'-benzpyrene	139	48
3-Methylanisole	66	134	3-Methyl-1',2'-benzpyrene	148	49
4-Methylanisole	65	134	4-Methyl-1',2'-benzpyrene	191	51
1-Methylanthracene	85	46	5-Methyl-1',2'-benzpyrene	188	51
9-Methylanthracene	80	46	6-Methyl-1',2'-benzpyrene	170	50
Methylanthranilate	15	273	8-Methyl-1',2'-benzpyrene	181	50
2-Methyl-9,10-anthraquinone	24	182	9-Methyl-1',2'-benzpyrene	149	49
N-Methylaziridine	286	438	2-Methylbenzyl alcohol	14	88
2-Methylazulene	23	43	3-Methylbenzyl alcohol	109	85
6-Methylazulene	82	46	4-Methylbenzyl alcohol	32	89
2-Methylbenzaldehyde	74	148	N-Methylbenzylamine	331	438
3-Methylbenzaldehyde	73	148	2-Methylbenzylamine	104	298
4-Methylbenzaldehyde	75	148	"	315	438
2-Methylbenzene-1,3-disulfonamide	443	409	3-Methylbenzylamine	101	298
2-Methylbenzene-1,4-disulfonamide	371	406	"	320	438
4-Methylbenzene-1,2-disulfonamide	410	407			

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	Compound No.	Page		Compound No.	Page
4-Methylbenzylamine	105	298	6-Methylchrysene	162	50
"	322	438	2-Methylcinnamaldehyde	27	151
2-Methylbenzyl chloride	44	56	Methyl cinnamate	39	275
3-Methylbenzyl chloride	43	56	α -Methylcinnamic acid	81	196
4-Methylbenzyl chloride	41	56	<i>trans</i> -2-Methylcinnamic acid	392	432
4-Methylbenzyl sulfide	44	426	<i>trans</i> -3-Methylcinnamic acid	380	432
N-Methylbenzyl sulfonamide	42	393	<i>trans</i> -4-Methylcinnamic acid	399	432
Methyl bromide	1	58	3-Methylcrotonaldehyde	41	146
Methyl bromoacetate	79	253	Methyl crotonate	46	252
Methyl 2-bromobenzoate	267	264	3-Methylcrotonic acid	466	433
Methyl 3-bromobenzoate	29	274	2-Methylcrotononitrile	26	347
Methyl 4-bromobenzoate	121	279	Methyl cyanoacetate	174	258
2-Methyl-1,3-butadiene	17	12	"	62	350
3-Methyl-1,2-butadiene	22	12	Methylcyclobutane	14	3
3-Methylbutanal	17	145	1-Methylcyclobutene	20	12
<i>d,l</i> -2-Methylbutanamide	170	235	3-Methylcyclobutene	16	16
<i>d,l</i> -2-Methylbutananilide	163	235	Methylcycloheptane	94	4
2-Methylbutane	10	3	1-Methylcycloheptene	243	20
D,L-3-Methylbutane-1-sulfonanilide	4	392	5-Methylcycloheptene	14	25
D-2-Methyl-1-butanethiol	14	413	1-Methyl-1,4-cyclohexadiene	188	18
3-Methylbutanethiol	12	413	5-Methyl-1,3-cyclohexadiene	117	16
<i>d,l</i> -2-Methylbutanoic acid	14	190	Methylcyclohexane	44	3
3-Methylbutanoic acid	15	190	Methyl cyclohexane carboxylate	144	257
2-Methyl-1-butanol	23	81	<i>cis</i> -4-Methylcyclohexanecarboxylic acid	28	192
2-Methyl-2-butanol	8	80	<i>trans</i> -4-Methylcyclohexanecarboxylic acid	134	198
3-Methyl-1-butanol	26	81	<i>cis</i> -3-Methyl-1-cyclohexanethiol	24	414
<i>d,l</i> -3-Methyl-2-butanol	12	80	<i>trans</i> -3-Methyl-1-cyclohexanethiol	26	414
2-Methyl-3-butanone	6	161	<i>cis</i> -2-Methylcyclohexanol	58	83
2-Methyl-1-butenal	18	145	<i>trans</i> -2-Methylcyclohexanol	60	83
2-Methyl-2-butenal	31	145	<i>trans</i> -2-Methylcyclohexanol	2	88
3-Methyl-2-butenal	41	146	<i>cis</i> -3-Methylcyclohexanol	65	83
2-Methyl-1-butene	15	12	<i>trans</i> -3-Methylcyclohexanol	68	83
2-Methyl-2-butene	21	12	<i>cis</i> -4-Methylcyclohexanol	66	83
3-Methyl-1-butene	12	12	<i>trans</i> -4-Methylcyclohexanol	67	83
<i>cis</i> -2-Methyl-2-butenic acid	59	195	2-Methylcyclohexanone	97	164
<i>trans</i> -2-Methyl-2-butenic acid	34	194	<i>d</i> -3-Methylcyclohexanone	104	164
2-Methyl-1-buten-3-one	7	161	<i>d,l</i> -3-Methylcyclohexanone	105	164
2-Methyl-3-butenyl phenyl ketone	53	170	4-Methylcyclohexanone	112	164
3-Methyl-3-buten-1-yne	7	28	1-Methylcyclohexene	158	17
3-Methylbutyl acetate	75	253	3-Methylcyclohexene	126	16
D-2-Methyl- <i>n</i> -butylamine	29	296	4-Methylcyclohexene	125	16
3-Methylbutyl phenyl sulfide	56	421	3-Methylcyclohexyl-1,1-diacetic acid	81	170
3-Methyl-1-butyne	5	28	3-Methylcyclohexyl-1,1-diacetic acid	387	432
α -Methylbutyraldehyde	18	145	4-Methylcyclohexyl-1,1-diacetic acid	388	432
Methyl <i>n</i> -butyrate	31	251	2-Methylcyclohexyloxyacetic acid	266	431
2-Methylbutyric acid	440	432	<i>cis</i> -3-Methylcyclohexyloxy acetic acid	260	431
2-Methylbutyronitrile	20	346	Methylcyclooctatetraene	15	25
5-Methyl α -campholenitrile	1	355	Methylcyclopentane	26	3
Methyl <i>n</i> -caprate	225	262	2-Methylcyclopentanecarboxylic acid	26	192
Methyl <i>n</i> -caproate	97	254	2-Methylcyclopentanone	45	162
Methyl <i>n</i> -caprylate	163	258	<i>d</i> -3-Methylcyclopentanone	50	162
Methyl carbamate	11	231	<i>d,l</i> -3-Methylcyclopentanone	55	162
Methyl carbonate	18	250	1-Methylcyclopentene	63	14
3-Methylcatechol	84	101	3-Methylcyclopentene	43	13
4-Methylcatechol	76	100	4-Methylcyclopentene	62	14
2-Methylcatechol 2-methyl ether	92	135	2-Methyl-3-cyclopentenone	90	163
Methyl cellosolve	20	81	3-Methylcyclopentyl-1,1-diacetic acid	248	431
Methyl cellosolve acetate	78	253	1-Methyl- <i>trans</i> -decahydronaphthalene	260	7
Methyl cellosolve benzoate	294	266	9-Methyl- <i>cis</i> -decahydronaphthalene	253	7
Methyl chloride	1	55	9-Methyl- <i>trans</i> -decahydronaphthalene	251	7
Methyl chloroacetate	61	252	Methyl <i>n</i> -decanoate	225	262
Methyl 2-chlorobenzoate	250	263	Methyl dibenzylacetate	45	275
Methyl 3-chlorobenzoate	242	263	Methyl 3,5-dinitrobenzoate	143	280
"	7	273	Methyl 3,5-dinitrosalicylate	156	281
Methyl 2-chlorocinnamate	52	275	Methyl diphenylacetate	84	277
Methyl chloroformate	9	250	2-Methyl-1,4-dithiane	4	425
2-Methylchryszin	23	182	Methyl enanthate	125	256
1-Methylchrysene	197	51	Methyleneaminoacetoneitrile	77	324
2-Methylchrysene	193	51	Methylene bromide	1	65
3-Methylchrysene	168	50	Methylene chloride	1	63
4-Methylchrysene	154	49	Methylene cyanide	17	357
5-Methylchrysene	121	48			

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Methylene-di-2-naphthol.....	504	123	3-Methyl-3-hepten-5-one.....	17	169
3,4-Methylenedioxybenzaldehyde.....	12	153	4-Methyl-6-hepten-3-one.....	80	163
3,4-Methylenedioxychalcone.....	153	177	5-Methyl-3-heptyne.....	34	29
3,4-Methylenedioxypropiofenone.....	27	173	2-Methyl-1,3-hexadiene.....	142	17
1,2-Methylenedioxy-4-propylbenzene.....	101	136	2-Methyl-1,5-hexadiene.....	100	15
Methylenefluorene.....	28	44	2-Methyl-2,4-hexadiene.....	141	17
Methylene iodide.....	1	67	3-Methyl-1,5-hexadiene.....	76	14
Methylenesuccinic acid.....	254	203	3-Methyl-2,4-hexadiene.....	143	17
Methylenesuccinic anhydride.....	26	225	2-Methyl-1,3-hexadiene.....	150	17
endo-4,7-Methylene-4,7,8,9-tetrahydroindene.....	3	26	5-Methyl-1,2-hexadiene.....	111	16
Methyl ethoxyacetate.....	92	254	5-Methyl-1,4-hexadiene.....	97	15
Methyl ethylacetate.....	153	257	Methyl hexahydrobenzoate.....	144	257
2-Methylthylene sulfide.....	2	423	5-Methylhexanal.....	45	146
4-Methylfluorene.....	50	45	2-Methylhexanamide.....	38	232
N-Methylformamide.....	3	230	4-Methylhexanamide.....	108	233
N-Methylformanilide.....	8	230	2-Methylhexananilide.....	107	233
Methyl formate.....	2	250	4-Methylhexananilide.....	45	232
Methylfumaric acid.....	329	207	2-Methylhexane.....	34	3
Methylfumaryl dichloride.....	28	214	3-Methylhexane.....	37	3
2-Methylfuran.....	15	131	3-Methyl-2,4-hexanedione.....	139	165
5-Methylfurfural.....	68	147	3-Methyl-2,5-hexanedione.....	92	170
Methyl furoate.....	141	256	Methyl n-hexanoate.....	97	254
Methyl furoylacetate.....	6	272	2-Methylhexanoic acid.....	37	191
Methyl β-(2-furyl)acrylate.....	18	274	3-Methylhexanoic acid.....	17	192
Methyl gallate.....	506	123	4-Methylhexanoic acid.....	40	191
"	169	281	5-Methylhexanoic acid.....	35	191
cis-α-Methylglutaconic anhydride.....	34	225	2-Methyl-1-hexanol.....	55	83
cis-β-Methylglutaconic anhydride.....	35	225	d,l-4-Methyl-1-hexanol.....	57	83
3-Methylglutaric acid.....	335	431	2-Methyl-3-hexanone.....	34	162
α-Methylglutaric anhydride.....	17	223	3-Methyl-2-hexanone.....	38	162
β-Methylglutaric anhydride.....	10	225	4-Methyl-2-hexanone.....	48	162
2-Methylglutaramononitrile.....	126	363	4-Methyl-3-hexanone.....	35	162
2-Methylglutaronitrile.....	97	353	5-Methyl-3-hexanone.....	31	162
β-Methylglyceraldehyde.....	11	328	2-Methylhexanonitrile.....	40	348
N-Methylglycine.....	84	429	d,l-3-Methylhexanonitrile.....	44	348
Methyl glycolate.....	96	254	d,l-4-Methylhexanonitrile.....	53	349
Methyl glyoxal.....	103	171	5-Methylhexanonitrile.....	51	349
α-Methylguanidoacetic acid.....	113	289	2-Methyl-1-hexene.....	98	15
Methyl hendecylenate.....	285	265	2-Methyl-2-hexene.....	108	16
2-Methylheptadecane.....	273	7	2-Methyl-3-hexene.....	88	15
2-Methyl-2-heptadecene.....	337	24	3-Methyl-1-hexene.....	83	15
2-Methyl-1,3-heptadiene.....	222	19	3-Methyl-trans-2-hexene.....	105	16
3-Methyl-1,5-heptadiene.....	173	17	3-Methyl-cis-3-hexene.....	107	16
3-Methyl-2,4-heptadiene.....	229	19	3-Methyl-trans-3-hexene.....	103	15
4-Methyl-2,4-heptadiene.....	227	19	4-Methyl-1-hexene.....	90	15
6-Methyl-1,3-heptadiene.....	194	18	4-Methyl-cis-2-hexene.....	92	15
6-Methyl-2,4-heptadiene.....	185	18	4-Methyl-trans-2-hexene.....	93	15
2-Methylheptane.....	61	4	5-Methyl-1-hexene.....	86	15
3-Methylheptane.....	67	4	5-Methyl-cis-2-hexene.....	96	15
4-Methylheptane.....	62	4	5-Methyl-trans-2-hexene.....	87	15
Methyl n-heptanoate.....	125	256	5-Methyl-4-hexenoic acid.....	437	432
4-Methyl-1-heptanol.....	86	84	3-Methyl-1-hexen-5-one.....	39	162
2-Methyl-4-heptanone.....	67	163	5-Methyl-4-hexen-3-one.....	65	163
3-Methyl-2-heptanone.....	91	164	5-Methyl-5-hexen-2-one.....	66	163
6-Methyl-2-heptanone.....	110	164	Methyl hexyl acetylene.....	50	30
6-Methyl-3-heptanone.....	94	164	2-Methyl-3-hexyne.....	31	29
2-Methyl-1-heptene.....	202	18	4-Methyl-2-hexyne.....	32	29
2-Methyl-2-heptene.....	219	19	5-Methyl-2-hexyne.....	36	29
2-Methyl-3-heptene.....	170	17	α-Methylhydrocinnamamide.....	159	235
3-Methyl-1-heptene.....	163	17	Methyl hydrocinnamate.....	259	264
3-Methyl-2-heptene.....	212	19	d,l-α-Methylhydrocinnamic acid.....	20	193
3-Methyl-3-heptene.....	208	18	2-Methylhydroquinone.....	293	111
4-Methyl-1-heptene.....	175	18	"	60	434
4-Methyl-2-heptene.....	181	18	Methyl 2-hydroxybenzoate.....	12	94
4-Methyl-3-heptene.....	206	18	Methyl 3-hydroxybenzoate.....	95	101
5-Methyl-1-heptene.....	180	18	"	97	278
5-Methyl-2-heptene.....	200	18	Methyl 4-hydroxybenzoate.....	313	112
5-Methyl-3-heptene.....	171	17	"	157	281
6-Methyl-1-heptene.....	216	19	"	48	434
6-Methyl-2-heptene.....	198	18	2-Methyl-3-hydroxybutyric acid.....	408	432
6-Methyl-3-heptene.....	176	18	Methyl α-hydroxyisobutyrate.....	71	253
3-Methyl-3-hepten-2-one.....	122	165			

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Methyl 3-hydroxy-4-nitrobenzoate	17	434	2-Methylnaphthalene-1-sulfonyl chloride	103	384
4-Methyl-8-hydroxyquinoline	12	434	4-Methylnaphthalene-1-sulfonyl chloride	99	384
2-Methylimidazole	285	438	4-Methylnaphthalene-2-sulfonyl chloride	200	387
4-Methylimidazole	280	438	5-Methylnaphthalene-2-sulfonyl chloride	185	387
Methyliminodiacetic acid	355	208	6-Methylnaphthalene-2-sulfonyl chloride	141	385
Methyliminodiacetic acid diamide	339	240	7-Methylnaphthalene-1-sulfonyl chloride	133	385
Methyliminodiacetic acid monoamide	338	240	7-Methylnaphthalene-2-sulfonyl chloride	64	383
1-Methylindane	36	36	8-Methylnaphthalene-2-sulfonyl chloride	114	384
2-Methylindane	34	36	2-Methylnaphthanthracene	151	49
3-Methylindene	63	37	3-Methylnaphthanthracene	163	50
1-Methylindole	79	321	4-Methylnaphthanthracene	184	51
2-Methylindole	76	305	5-Methylnaphthanthracene	157	49
3-Methylindole	175	308	6-Methylnaphthanthracene	134	48
4-Methylindole	177	300	7-Methylnaphthanthracene	141	48
5-Methylindole	73	305	8-Methylnaphthanthracene	159	49
7-Methylindole	145	307	9-Methylnaphthanthracene	153	49
Methyl iodide	1	60	10-Methylnaphthanthracene	176	50
Methyl isobutylcarbinyl acetate	91	254	11-Methylnaphthanthracene	120	47
Methyl isobutyrate	19	250	12-Methylnaphthanthracene	138	48
Methyl isocrotonate	34	251	Methyl 2-naphthoate	113	278
Methyl isopropylacetaldehyde	27	145	2-Methyl-1,4-naphthohydroquinone	447	119
Methyl isovalerate	42	251	1-Methyl-2-naphthol	231	108
Methyl <i>d,l</i> -lactate	82	253	2-Methyl-1-naphthol	75	100
Methyl laurate	314	268	4-Methyl-1-naphthol	140	103
Methyl levulinate	152	166	4-Methyl-2-naphthol	129	103
"	165	258	5-Methyl-1-naphthol	187	106
Methylmaleic acid	98	196	5-Methyl-2-naphthol	205	106
Methylmaleic anhydride	10	223	7-Methyl-1-naphthol	230	108
Methyl malonate	142	257	2-Methyl-1,4-naphthoquinone	11	181
Methylmalonic acid	194	201	N-Methyl-N-(1-naphthyl)acetamide	87	233
"	146	430	1-Methyl-2-naphthylamine	53	304
Methylmalonic acid diamide	457	244	2-Methyl-1-naphthylamine	9	303
Methylmalonitrile	11	357	3-Methyl-1-naphthylamine	54	304
Methyl <i>d,l</i> -mandelate	71	276	3-Methyl-2-naphthylamine	304	312
Methyl margarate	22	274	4-Methyl-1-naphthylamine	55	304
Methyl mercaptan	1	413	4-Methyl-2-naphthylamine	105	306
Methyl methacrylate	26	251	5-Methyl-1-naphthylamine	124	306
Methyl methoxyacetate	60	252	5-Methyl-2-naphthylamine	86	305
Methyl 2-methoxybenzoate	284	265	7-Methyl-1-naphthylamine	68	304
Methyl 3-methoxybenzoate	290	266	8-Methyl-1-naphthylamine	101	306
Methyl 4-methoxybenzoate	59	276	<i>d,l</i> -Methyl 1-naphthyl carbinol	36	89
Methyl methylacetoacetate	131	256	Methyl-1-naphthyl ether	106	136
Methyl 2-methylallyl sulfide	14	420	Methyl 2-naphthyl ether	44	139
Methyl 2-methylbenzoate	208	261	Methyl 1-naphthyl ketone	215	168
Methyl 3-methylbenzoate	216	261	" " "	18	172
Methyl 2-methylbutyl sulfide	24	420	Methyl 2-naphthyl ketone	57	174
2-Methyl-6-methylene-2,7-octadiene	295	22	Methyl 2-naphthyl sulfide	23	425
4-Methyl-2-methylolphenol	103	434	Methylneopentylacetic acid	23	192
N-Methylmorpholine	278	438	Methylneopentylglycolic acid	133	198
Methyl myristate	2	273	Methyl neopentyl ketone	21	161
1-Methylnaphthalene	146	40	Methyl nitrate	6	250
2-Methylnaphthalene	12	43	N-Methyl-4-nitroacetanilide	291	239
2-Methyl-1,3-naphthalenediol	339	113	2-Methyl-4-nitroacetanilide	419	243
2-Methylnaphthalene-1-sulfonamide	64	394	4-Methyl-2-nitroacetanilide	109	233
4-Methylnaphthalene-1-sulfonamide	220	400	N-Methyl-3-nitroaniline	106	306
4-Methylnaphthalene-2-sulfonamide	108	396	N-Methyl-4-nitroaniline	340	313
5-Methylnaphthalene-1-sulfonamide	219	400	2-Methyl-3-nitroaniline	163	307
5-Methylnaphthalene-2-sulfonamide	266	402	2-Methyl-4-nitroaniline	293	312
6-Methylnaphthalene-2-sulfonamide	325	404	" " "	26	436
7-Methylnaphthalene-1-sulfonamide	298	403	2-Methyl-5-nitroaniline	216	309
7-Methylnaphthalene-2-sulfonamide	173	398	2-Methyl-6-nitroaniline	164	307
8-Methylnaphthalene-2-sulfonamide	54	394	3-Methyl-4-nitroaniline	303	312
4-Methylnaphthalene-1-sulfonamide	157	397	" " "	31	436
5-Methylnaphthalene-2-sulfonamide	430	408	4-Methyl-2-nitroaniline	245	310
7-Methylnaphthalene-1-sulfonamide	171	398	4-Methyl-3-nitroaniline	126	306
2-Methylnaphthalene-1-sulfonic acid	18	371	" " "	76	436
4-Methylnaphthalene-1-sulfonic acid	97	374	5-Methyl-2-nitrobenzene	43	338
4-Methylnaphthalene-2-sulfonic acid	39	372	2-Methyl-4-nitrobenzenesulfonamide	154	397
5-Methylnaphthalene-1-sulfonic acid	96	374	2-Methyl-5-nitrobenzenesulfonamide	254	401
5-Methylnaphthalene-2-sulfonic acid	128	375	3-Methyl-2-nitrobenzenesulfonamide	174	398
6-Methylnaphthalene-2-sulfonic acid	151	376	3-Methyl-4-nitrobenzenesulfonamide	84	395

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4-Methyl-2-nitrobenzenesulfonamide	200	399	2-Methyl-3-octen-6-one	28	169
4-Methyl-3-nitrobenzenesulfonamide	114	396	7-Methyl-1-octen-5-one	8	169
2-Methyl-5-nitrobenzenesulfonamide	124	396	Methyl <i>n</i> -octyl carbinol	106	85
2-Methyl-4-nitrobenzenesulfonic acid	61	373	Methyl <i>n</i> -octyl ketone	166	166
2-Methyl-5-nitrobenzenesulfonic acid	121	375	2-Methylolphenol	92	434
2-Methyl-5-nitrobenzenesulfonic acid	116	375	3-Methylolphenol	87	434
3-Methyl-2-nitrobenzenesulfonic acid	67	373	4-Methylolphenol	86	434
3-Methyl-4-nitrobenzenesulfonic acid	26	371	Methyl orthoformate	33	251
4-Methyl-2-nitrobenzenesulfonic acid	85	373	Methyl palmitate	24	274
4-Methyl-3-nitrobenzenesulfonic acid	42	372	Methyl pelargonate	205	260
2-Methyl-3-nitrobenzenesulfonyl chloride	145	385	2-Methyl-1,3-pentadiene	64	14
2-Methyl-4-nitrobenzenesulfonyl chloride	161	386	2-Methyl-1,3-pentadiene	66	14
2-Methyl-5-nitrobenzenesulfonyl chloride	32	381	2-Methyl-1,4-pentadiene	35	13
3-Methyl-2-nitrobenzenesulfonyl chloride	55	382	2-Methyl-2,3-pentadiene	56	14
3-Methyl-4-nitrobenzenesulfonyl chloride	35	382	3-Methyl-1,2-pentadiene	74	14
4-Methyl-3-nitrobenzenesulfonyl chloride	18	381	3-Methyl-1,3-pentadiene	71	14
Methyl 3-nitrobenzoate	116	279	3-Methyl-1,4-pentadiene	33	13
Methyl 4-nitrobenzoate	131	279	4-Methyl-1,2-pentadiene	54	13
2-Methyl-4-nitrobenzoic acid	33	429	4-Methyl-1,3-pentadiene	67	14
2-Methyl-3-nitrobenzotrile	153	364	2-Methylpentamethylene sulfide	24	423
2-Methyl-2-nitrobutane	9	335	3-Methylpentamethylene sulfide	27	423
3-Methyl-1-nitrobutane	13	335	4-Methylpentamethylene sulfide	30	423
Methyl 2-nitrocinnamate	105	278	<i>d, l</i> -2-Methylpentanamide	52	232
Methyl 3-nitrocinnamate	155	281	3-Methylpentanamide	199	236
Methyl 4-nitrocinnamate	165	281	<i>d, l</i> -2-Methylpentanamide	92	233
1-Methyl-2-nitronaphthalene	29	337	<i>d, l</i> -3-Methylpentanamide	70	232
1-Methyl-4-nitronaphthalene	39	338	4-Methylpentanamide	169	235
1-Methyl-8-nitronaphthalene	34	338	2-Methylpentane	21	3
2-Methyl-1-nitronaphthalene	47	338	3-Methylpentane	22	3
5-Methyl-1-nitronaphthalene	50	339	2-Methyl-2,4-pentadiol	99	85
3-Methyl-2-nitro-1,4-naphthoquinone	84	340	Methyl <i>n</i> -pentanoate	57	252
2-Methyl-3-nitrophenol	365	115	<i>d, l</i> -2-Methylpentanoic acid	28	191
2-Methyl-4-nitrophenol	183	105		436	432
2-Methyl-5-nitrophenol	260	109	<i>d, l</i> -3-Methylpentanoic acid	29	191
2-Methyl-6-nitrophenol	96	101		446	432
3-Methyl-2-nitrophenol	27	97	4-Methylpentanoic acid	30	191
3-Methyl-4-nitrophenol	306	112	2-Methyl-1-pentanol	41	82
3-Methyl-6-nitrophenol	49	99	2-Methyl-2-pentanol	19	81
4-Methyl-2-nitrophenol	19	97	2-Methyl-3-pentanol	21	81
4-Methyl-3-nitrophenol	121	102	3-Methyl-1-pentanol	46	82
5-Methyl-2-nitrophenol	26	434	3-Methyl-2-pentanol	28	81
Methyl 2-nitrophenyl sulfide	36	425	3-Methyl-3-pentanol	18	80
Methyl 4-nitrophenyl sulfide	41	426	4-Methyl-1-pentanol	47	82
2-Methyl-1-nitropropane	8	335	<i>d, l</i> -4-Methyl-2-pentanol	25	81
2-Methyl-2-nitropropane	1	337	3-Methyl-2-pentanone	16	161
Methyl 3-nitrosalicylate	158	281	4-Methyl-2-pentanone	15	161
Methyl 5-nitrosalicylate	151	280	4-Methylpentanonitrile	38	348
28-Methylnonacosane	62	9	4-Methylpentanoyl chloride	29	212
2-Methylnonane	218	6	2-Methyl-2-pentenal-1	43	146
3-Methylnonane	224	6	2-Methyl-1-pentene	39	13
4-Methylnonane	210	6	2-Methyl-2-pentene	47	13
5-Methylnonane	209	6	3-Methyl-1-pentene	32	13
Methyl <i>n</i> -nonyl carbinol	117	86	3-Methyl- <i>cis</i> -2-pentene	55	13
Methyl <i>n</i> -nonyl ketone	186	167	3-Methyl- <i>trans</i> -2-pentene	48	13
8-Methyl-4-nonyne	37	29	4-Methyl-1-pentene	31	13
4-Methyl-3,5-octadiene	271	21	4-Methyl- <i>cis</i> -2-pentene	36	13
7-Methyl-2,4-octadiene	272	21	4-Methyl- <i>trans</i> -2-pentene	37	13
2-Methyloctanal	3	150	<i>cis</i> -3-Methyl-2-pentenoic acid	468	433
7-Methyloctanal	1	150	<i>trans</i> -3-Methyl-2-pentenoic acid	467	433
2-Methyloctane	128	5	4-Methyl-2-pentenoic acid	438	432
3-Methyloctane	130	5	4-Methyl-3-pentenoic acid	403	432
4-Methyloctane	125	5	2-Methyl-1-penten-3-one	18	161
Methyl <i>n</i> -octanoate	163	258	2-Methyl-1-penten-4-one	32	162
6-Methyloctanoic acid	15	192	3-Methyl-1-penten-4-one	41	162
7-Methyloctanoic acid	20	192	4-Methyl-3-penten-2-one	25	162
2-Methyl-4-octanone	102	164	Methyl pentyl acetylene	48	30
4-Methyl-2-octanone	2	169	1-Methyl-3-pentylbenzene	119	39
2-Methyl-4-octene	244	20	Methyl pentyl sulfide	28	420
3-Methyl-2-octene	257	20	3-Methyl-1-pentyne	16	28
4-Methyl-2-octene	183	18	4-Methyl-1-pentyne	15	28
7-Methyl-3-octene	253	20	4-Methyl-2-pentyne	18	28
2-Methyl-3-octen-5-one	66	170	Methyl phenacyl ketone	75	174

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1-Methylphenanthrene	128	48	1-Methyl-3-propylbenzene	24	36
3-Methylphenanthrene	44	44	1-Methyl-4-propylbenzene	27	36
4-Methylphenanthrene	25	43	Methyl <i>n</i> -propylcarbonyl acetate	65	252
9-Methylphenanthrene	90	46	1-Methyl-1-propylcyclohexane	238	7
2-Methylphenol	11	96	1-Methyl-2-propylcyclohexane	241	7
"	109	435	1-Methyl-3-propylcyclohexane	204	6
3-Methylphenol	5	94	1-Methyl-4-propylcyclohexane	240	7
"	100	434	3-Methyl-2- <i>n</i> -propylcyclopentanone	86	170
4-Methylphenol	17	97	Methyl <i>n</i> -propyl ether	7	131
"	108	435	Methyl <i>n</i> -propyl ketone	10	161
Methyl phenoxyacetate	271	265	Methyl <i>n</i> -propyl sulfide	9	420
(2-Methylphenoxy) acetic acid	181	430	2-Methyl-5-propylthiophene	44	424
(4-Methylphenoxy) acetic acid	176	430	4-Methylpurpuroxanthin	45	184
Methyl 3-phenoxypropyl ketone	49	173	2-Methylpyrazine	16	319
Methyl phenylacetate	214	261	1-Methylpyrazole	11	319
(4-Methylphenyl) acetic acid	361	432	3-Methylpyrazole	106	298
<i>d</i> -2-Methyl-1-phenylbutane	50	37	"	101	436
<i>d, l</i> -2-Methyl-1-phenylbutane	58	37	4-Methylpyrazole	100	298
2-Methyl-2-phenylbutane	43	37	5-Methyl-2-pyrazoline	78	297
3-Methyl-1-phenylbutane	60	37	3-Methylpyrene	62	45
3-Methyl-2-phenylbutane	35	36	3-Methylpyridazine	114	298
3-Methyl-3-phenyl-2-butanone	65	170	2-Methylpyridine	13	319
3-Methyl-4-phenyl-2-butanone	16	169	"	240	437
2-Methyl-1-phenyl-1-butene	143	40	3-Methylpyridine	19	319
Methyl α -phenyl <i>n</i> -butyrate	114	278	"	227	437
3-Methyl-2-phenylbutyronitrile	88	352	4-Methylpyridine	20	319
<i>d, l</i> -Methyl phenyl carbinol	1	88	"	247	438
Methyl 4-phenylcyclohexyl ketone	72	170	<i>N</i> -Methyl-2-pyridone	86	321
Methyl phenyl ether	56	133	<i>N</i> -Methyl-4-pyridone	59	324
Methyl β -phenylethyl ketone	196	167	Methyl 2-pyridyl ketone	144	165
Methylphenylglycol aldehyde	20	150	"	50	320
2-Methyl-2-phenylhexane	121	39	Methyl 3-pyridyl ketone	68	320
3-Methyl-3-phenylhexane	123	39	"	175	166
α -Methyl- α -phenylhydrazine	138	299	Methyl-4-pyridyl ketone	167	166
4-Methylphenylhydrazine	91	305	"	66	320
Methyl phenyl ketone	160	166	DL-1-Methyl-2-(3-pyridyl)pyrrolidine	73	321
2-Methyl-1-phenylpentane	104	39	L-1-Methyl-2-(3-pyridyl)pyrrolidine	82	321
2-Methyl-3-phenylpentane	93	38	4-Methylpyrimidine	17	319
3-Methyl-1-phenylpentane	115	39	5-Methylpyrimidine	6	323
3-Methyl-3-phenylpentane	82	38	5-Methylpyrogallol	268	110
2-Methyl-3-phenylpropionaldehyde	10	150	Methyl pyromucate	141	256
Methyl β -phenylpropionate	259	264	<i>N</i> -Methylpyrrolidine	3	319
3-(2-Methylphenyl) propionic acid	413	432	"	385	439
3-(3-Methylphenyl) propionic acid	416	432	2-Methylpyrrolidine	30	296
3-(4-Methylphenyl) propionic acid	417	432	3-Methylpyrrolidine	31	296
Methyl phenyl sulfide	44	423	1-Methyl-3-pyrrolone	351	438
Methylphloroglucinol	531	124	Methyl pyruvate	70	253
Methyl phthalate	332	269	β -Methylquinoline	90	321
3-Methylphthalic anhydride	50	226	γ -Methylquinoline	95	321
4-Methylphthalic anhydride	38	225	2-Methylquinoline	80	321
1-Methylpiperidine	364	439	"	230	437
DL-3-Methylpiperidine	44	296	3-Methylquinoline	90	321
"	458	439	4-Methylquinoline	95	321
DL-2-Methylpiperidine	41	296	"	205	437
"	442	439	5-Methylquinoline	94	321
L-2-Methylpiperidine	40	296	"	166	437
Methyl piperonylate	65	276	6-Methylquinoline	91	321
Methyl pivalate	29	251	"	201	437
2-Methylpropane	5	3	7-Methylquinoline	13	323
2-Methylpropane-1-sulfonamide	1	392	"	208	437
2-Methylpropane-1-sulfonamide	3	392	8-Methylquinoline	81	321
2-Methyl-1,2-epanediol	79	84	"	183	437
2-Methyl-1-propanethiol	7	413	2-Methylquinoxaline	78	321
2-Methyl-2-propanethiol	4	413	2-Methylresorcinol	265	110
2-Methyl-1-propanol	10	80	5-Methylresorcinol	217	107
2-Methyl-2-propenal	10	144	5-Methylsalicylaldehyde	41	155
2-Methylpropene	5	12	Methyl salicylate	12	94
Methylpropionate	11	250	"	220	262
Methyl <i>n</i> -propylacetaldehyde	30	145	Methyl sebacate	42	275
Methyl- <i>n</i> -propylacetic acid	28	191	Methyl stearate	43	275
Methyl propyl acetylene	24	29	Methyl styryl ketone	37	173
1-Methyl-2-propylbenzene	31	36			

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Compound		Page		Compound		Page	
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Naphthalene-1,6-d ₁ sulfonamide	465	410		1-Naphthoxyacetyl chloride	24	214	
Naphthalene-1,7-d ₁ sulfonamide	466	410		2-Naphthoxyacetyl chloride	11	216	
Naphthalene-2,6-d ₁ sulfonamide	468	410		1-Naphthoyl chloride	61	213	
Naphthalene-2,7-d ₁ sulfonamide	420	408		2-Naphthoyl chloride	7	216	
Naphthalene-1,4-d ₁ sulfonanilide	227	400		3-(1-Naphthoyl)propionic acid	386	432	
Naphthalene-1,5-d ₁ sulfonanilide	434	408		3-(2-Naphthoyl)propionic acid	462	433	
Naphthalene-1,3-d ₁ sulfonic acid	216	378		1-Naphthylacetamide	379	242	
Naphthalene-1,4-d ₁ sulfonic acid	209	378		N-(1-Naphthyl)acetamide	316	239	
Naphthalene-1,5-d ₁ sulfonic acid	223	379		2-Naphthylacetamide	430	243	
Naphthalene-1,6-d ₁ sulfonic acid	218	378		N-(2-Naphthyl)acetamide	240	237	
Naphthalene-1,7-d ₁ sulfonic acid	219	379		N-(1-Naphthyl)-4-acetamidobenzene sulfonamide	347	405	
Naphthalene-2,6-d ₁ sulfonic acid	221	379		N-(1-Naphthyl)acetanilide	302	239	
Naphthalene-2,7-d ₁ sulfonic acid	193	378		1-Naphthyl acetate	58	276	
Naphthalene-1,3-d ₁ sulfonyl chloride	218	388		2-Naphthyl acetate	99	278	
Naphthalene-1,4-d ₁ sulfonyl chloride	249	389		(1-Naphthyl)acetic acid	177	200	
Naphthalene-1,5-d ₁ sulfonyl chloride	266	389		"	329	431	
Naphthalene-1,6-d ₁ sulfonyl chloride	206	387		(2-Naphthyl)acetic acid	210	201	
Naphthalene-2,6-d ₁ sulfonyl chloride	279	390		"	336	431	
Naphthalene-2,7-d ₁ sulfonyl chloride	248	389		1-Naphthylacetonitrile	22	358	
1,5-Naphthalenedithiol	41	417		2-Naphthylacetonitrile	109	362	
1,8-Naphthalenedithiol	37	417		1-Naphthylacetyl chloride	29	214	
2,7-Naphthalenedithiol	46	417		1-Naphthylamine	51	304	
Naphthalene-1-sulfonamide	128	396		2-Naphthylamine	232	310	
Naphthalene-2-sulfonamide	351	405		N-(1-Naphthyl)-4-aminobenzene sulfonamide	301	403	
Naphthalene-1-sulfonanilide	47	393		2-Naphthylanilide	348	241	
Naphthalene-2-sulfonanilide	81	395		N-(1-Naphthyl)benzamide	319	240	
Naphthalene-1-sulfonic acid	49	372		N-(2-Naphthyl)benzamide	320	240	
Naphthalene-2-sulfonic acid	163	377		N-(1-Naphthyl)benzenesulfonamide	201	399	
Naphthalene-1-sulfonyl chloride	74	383		1-Naphthyl benzoate	78	277	
Naphthalene-2-sulfonyl chloride	89	383		2-Naphthyl benzoate	142	280	
1,2,3,4-Naphthalenetetrol	555	126		o-2-Naphthylbenzoic acid	308	205	
1,2,5,8-Naphthalenetetrol	469	121		N-(1-Naphthyl)benzylsulfonamide	181	398	
1,4,5,8-Naphthalenetetrol	485	121		N-(1-Naphthyl)-4-bromobenzene sulfonamide	244	401	
1-Naphthalenethiol	47	415		N-(1-Naphthyl)-4-chlorobenzene sulfonamide	270	402	
2-Naphthalenethiol	25	416		N-(1-Naphthyl)-4-chloronaphthalene-1-sulfonamide	169	398	
1,2,4-Naphthalenetriol	388	116		N-(1-Naphthyl)ethane sulfonamide	13	392	
1,2,6-Naphthalenetriol	482	121		1-(1-Naphthyl)ethanol	36	89	
1,2,7-Naphthalenetriol	498	122		(1-Naphthyl)glycolic acid	112	197	
1,3,6-Naphthalenetriol	175	105		2-Naphthylglyoxal	124	176	
1,4,6-Naphthalenetriol	335	113		(1-Naphthyl)glyoxylic acid	141	198	
1,6,7-Naphthalenetriol	459	120		N-(1-Naphthyl)methane sulfonamide	68	394	
2-Naphthamide	412	243		N-(1-Naphthyl)-3-methylbutane-1-sulfonamide	24	392	
1-Naphthanilide	324	240		N-(1-Naphthyl)-2-methylpropane sulfonamide	38	393	
Naphthionic acid	154	376		1-Naphthyl 2-naphthyl sulfide	70	426	
1-Naphthoamide	434	243		N-(1-Naphthyl)-3-nitrobenzene sulfonamide	184	398	
β -Naphthohydroquinone	220	107		1-Naphthyl phenyl amine	78	305	
1,4-Naphthohydroquinone	461	120		2-Naphthyl phenyl amine	218	309	
"	71	434		1-Naphthyl phenyl ketone	100	175	
1-Naphthoic acid	245	203		1-Naphthyl phenyl sulfide	15	425	
2-Naphthoic acid	288	204		N-(1-Naphthyl)propane-1-sulfonamide	21	392	
"	309	431		N-(1-Naphthyl)propane-2-sulfonamide	86	395	
α -Naphthoic anhydride	65	226		2-(1-Naphthyl)propionaldehyde	25	150	
β -Naphthoic anhydride	60	226		3-(1-Naphthyl)propionic acid	239	202	
1-Naphthoic anhydride	65	226		2-Naphthyl <i>n</i> -propyl ether	23	138	
2-Naphthoic anhydride	60	226		2-Naphthyl salicylate	178	105	
2-Naphthoin	157	177		"	130	279	
α -Naphthol	169	105		2-Naphthyl sulfide	71	426	
"	67	434		N-(1-Naphthyl)toluene-4-sulfonamide	151	397	
β -Naphthol	284	411		1-Naphthyl 4-tolyl amine	128	306	
"	80	434		2-Naphthyl 4-tolyl amine	198	309	
1-Naphthol	169	105		<i>cis</i> -Neobornylamine	362	438	
"	67	434		Neonerolin	19	137	
2-Naphthol	284	111		Neopentane	7	3	
"	80	434		Neopentyl alcohol	28	89	
1-Naphthonitrile	25	358		Neopentyl benzene	32	36	
2-Naphthonitrile	78	360		Neopentyl bromide	13	58	
α -Naphthoquinone	14	181		Neopentyl chloride	14	55	
β -Naphthoquinone	19	182		Neopentyl cyanide	21	358	
1,2-Naphthoquinone	19	182		Neopentyl phenyl ketone	91	170	
1,4-Naphthoquinone	14	181		Neral	83	148	
1-Naphthoxyacetone	11	169		Nerolin	44	139	
2-Naphthoxyacetone	105	175					

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	Compound No.	Page No.		Compound No.	Page No.
Nicotinaldehyde	15	152	3-Nitrobenzoic acid	204	201
Nicotinamide	214	236	" "	200	430
Nicotinanilide	226	237	4-Nitrobenzoic acid	373	208
DL-Nicotine	73	321	2-Nitrobenzoic acid-4-sulfonamide	280	402
L-Nicotine	82	321	2-Nitrobenzoic anhydride	61	226
Nicotinic acid	443	432	3-Nitrobenzoic anhydride	69	226
Nicotinic anhydride	53	226	4-Nitrobenzoic anhydride	73	226
Nicotinonitrile	54	359	2-Nitrobenzonitrile	153	364
Nicotinyl chloride	16	214	3-Nitrobenzonitrile	164	364
Ninhydrin	203	179	4-Nitrobenzonitrile	193	365
3-Nitroacenaphthene	103	341	3-Nitrobenzoyl bromide	1	220
5-Nitroacenaphthene	74	340	4-Nitrobenzoyl bromide	5	220
2-Nitroacetanilide	82	233	3-Nitrobenzoyl carbinol	51	89
3-Nitroacetanilide	304	239	4-Nitrobenzoyl carbinol	55	90
4-Nitroacetanilide	453	244	2-Nitrobenzoyl chloride	27	214
Nitroacetic acid	26	429	3-Nitrobenzoyl chloride	60	213
3-Nitroacetophenone	112	175	4-Nitrobenzoyl chloride	15	216
2-Nitroaniline	110	306	2-Nitrobenzyl alcohol	43	89
" "	12	436	3-Nitrobenzyl alcohol	8	88
3-Nitroaniline	237	310	4-Nitrobenzyl alcohol	52	90
" "	52	436	2-Nitrobenzyl bromide	4	59
4-Nitroaniline	330	313	3-Nitrobenzyl bromide	6	59
" "	24	436	4-Nitrobenzyl bromide	8	59
2-Nitroaniline-4-sulfonyl chloride	57	382	4-Nitrobenzyl chloride	7	57
3-Nitroanisic acid	300	205	4-Nitrobenzyl cyanide	161	364
2-Nitro- <i>p</i> -anisidine	64	304	4-Nitrobenzyl phenyl sulfide	47	426
3-Nitro- <i>o</i> -anisidine	121	306	4-Nitrobenzyl sulfide	73	427
3-Nitro- <i>p</i> -anisidine	287	311	3-Nitrobenzylsulfonamide	162	398
4-Nitro- <i>o</i> -anisidine	249	310	4-Nitrobenzylsulfonamide	320	404
5-Nitro- <i>o</i> -anisidine	314	312	4-Nitrobenzylsulfonanilide	361	406
2-Nitroanisole	107	136	3-Nitrobenzylsulfonic acid	63	373
" "	32	336	4-Nitrobenzylsulfonic acid	149	376
3-Nitroanisole	21	138	3-Nitrobenzylsulfonyl chloride	152	386
" "	12	337	2-Nitrobiphenyl	9	337
4-Nitroanisole	34	138	3-Nitrobiphenyl	32	338
" "	23	337	4-Nitrobiphenyl	78	340
9-Nitroanthracene	100	341	4'-Nitrobiphenyl-4-sulfonamide	384	407
1-Nitroanthraquinone	130	342	4'-Nitrobiphenyl-4-sulfonic acid	173	377
2-Nitroanthraquinone	121	342	4'-Nitrobiphenyl-4-sulfonyl chloride	265	389
2-Nitroazobenzene	38	338	1-Nitrobutane	11	335
3-Nitroazobenzene	68	339	DL-2-Nitrobutane	7	335
4-Nitroazobenzene	94	340	<i>tert</i> -Nitrobutane	1	337
2-Nitroazoxybenzene	19	337	3-Nitrocatechol	148	104
4-Nitroazoxybenzene	104	341	" "	19	434
2-Nitrobenzaldehyde	22	154	4-Nitrocatechol	460	120
3-Nitrobenzaldehyde	44	155	2-Nitrocinnamamide	390	242
4-Nitrobenzaldehyde	92	158	3-Nitrocinnamamide	417	243
2-Nitrobenzamide	362	241	4-Nitrocinnamamide	439	243
3-Nitrobenzamide	263	238	<i>trans</i> -2-Nitrocinnamic acid	371	208
4-Nitrobenzamide	429	243	" "	307	431
2-Nitrobenzamide-4-sulfonamide	376	406	<i>trans</i> -3-Nitrocinnamic acid	317	206
2-Nitrobenzanilide	300	239	" "	303	431
3-Nitrobenzanilide	294	239	<i>trans</i> -4-Nitrocinnamic acid	398	209
4-Nitrobenzanilide	449	244	" "	293	431
Nitrobenzene	21	335	<i>trans</i> -2-Nitrocinnamoyl chloride	13	216
5-Nitrobenzene-1,3-disulfonamide	419	408	<i>trans</i> -4-Nitrocinnamoyl chloride	28	216
5-Nitrobenzene-1,3-disulfonic acid	194	378	2-Nitro- <i>m</i> -cresol	27	97
5-Nitrobenzene-1,3-disulfonyl chloride	142	385	2-Nitro- <i>p</i> -cresol	19	97
2-Nitrobenzenesulfonamide	288	403	3-Nitro- <i>o</i> -cresol	365	115
3-Nitrobenzenesulfonamide	185	398	3-Nitro- <i>p</i> -cresol	121	102
4-Nitrobenzenesulfonamide	228	400	4-Nitro- <i>m</i> -cresol	306	112
2-Nitrobenzenesulfonanilide	52	394	4-Nitro- <i>o</i> -cresol	183	105
3-Nitrobenzenesulfonanilide	69	394	5-Nitro- <i>o</i> -cresol	260	109
4-Nitrobenzenesulfonanilide	204	399	6-Nitro- <i>m</i> -cresol	49	99
2-Nitrobenzenesulfonic acid	137	376	6-Nitro- <i>o</i> -cresol	96	101
3-Nitrobenzenesulfonic acid	77	373	Nitrocyclohexane	19	335
4-Nitrobenzenesulfonic acid	98	374	2-Nitro- <i>p</i> -cymene	31	336
2-Nitrobenzenesulfonyl chloride	76	383	2-Nitrodiphenyl sulfide	49	426
3-Nitrobenzenesulfonyl chloride	66	383	3-Nitrodiphenyl sulfide	16	425
4-Nitrobenzenesulfonyl chloride	95	384	4-Nitrodiphenyl sulfide	29	425
2-Nitrobenzoic acid	218	202	2-Nitrodiphenylamine-4-sulfonamide	170	398
" "	67	429	4-Nitrodiphenylamine-2-sulfonamide	208	399

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	Compound No.	Page No.		Compound No.	Page No.
2-Nitrodiphenylamine-4-sulfonamide	155	397	5-Nitro-2-naphthonitrile	213	366
4-Nitrodiphenylamine-2-sulfonamide	177	398	8-Nitro-2-naphthonitrile	189	365
4-Nitrodiphenylamine-2-sulfonic acid	88	374	3-Nitro-1,2-naphthoquinone	107	341
2-Nitrodiphenylamine-4-sulfonic acid	65	373	1-Nitro-2-naphthylamine	276	311
4-Nitrodiphenylamine-2-sulfonyl chloride	155	386	2-Nitro-1-naphthylamine	322	313
3-Nitrodurene	77	340	4-Nitro-1-naphthylamine	412	316
Nitroethane	3	335	5-Nitro-1-naphthylamine	252	310
Nitroethylene	1	335	5-Nitro-2-naphthylamine	323	313
2-Nitrofluorene	106	341	8-Nitro-1-naphthylamine	185	308
9-Nitrofluorene	118	342	8-Nitro-2-naphthylamine	201	309
1-Nitroheptane	17	335	1-Nitrooctane	20	335
2-Nitroheptane	18	335	1-Nitropentane	14	335
1-Nitrohexane	16	335	DL-2-Nitropentane	10	335
2-Nitrohexane	15	335	3-Nitrophenacyl alcohol	51	89
2-Nitrohydroquinone	29	434	4-Nitrophenacyl alcohol	55	90
4-Nitroindane	16	337	2-Nitrophenanthrene	70	339
5-Nitroindane	14	337	3-Nitrophenanthrene	112	341
2-Nitroindane	96	341	4-Nitrophenanthrene	48	338
1-Nitroisobutene	12	335	9-Nitrophenanthrene	79	340
1-Nitroisobutylene	12	335	2-Nitrophenanthrenequinone	135	342
4-Nitromesidine	120	306	3-Nitrophenanthrenequinone	136	342
Nitromesitylene	17	337	4-Nitrophenanthrenequinone	116	342
Nitromethane	2	335	3-Nitro- <i>p</i> -phenetidine	235	310
3-Nitro- <i>N</i> -methylamine	106	306	2-Nitrophenetole	34	336
1-Nitronaphthalene	27	337	3-Nitrophenetole	17	137
2-Nitronaphthalene	44	338		8	337
4-Nitronaphthalene-2,7-disulfonamide	459	409	4-Nitrophenetole	30	338
4-Nitronaphthalene-2,7-disulfonic acid	213	378	2-Nitrophenol	34	98
4-Nitronaphthalene-2,7-disulfonyl chloride	227	388		24	434
1-Nitronaphthalene-2-sulfonamide	344	405	3-Nitrophenol	185	105
4-Nitronaphthalene-1-sulfonamide	264	402		42	434
4-Nitronaphthalene-2-sulfonamide	374	406	4-Nitrophenol	242	108
5-Nitronaphthalene-1-sulfonamide	402	407		23	434
5-Nitronaphthalene-2-sulfonamide	246	401	(3-Nitrophenoxy)acetic acid	133	430
6-Nitronaphthalene-1-sulfonamide	370	406	(4-Nitrophenoxy)acetic acid	128	430
7-Nitronaphthalene-1-sulfonamide	446	409	3-Nitrophenylacetamide	164	235
8-Nitronaphthalene-1-sulfonamide	275	402	4-Nitrophenylacetamide	422	243
8-Nitronaphthalene-2-sulfonamide	386	407	4-Nitrophenylacetanilide	423	243
1-Nitronaphthalene-2-sulfonamide	318	404	(2-Nitrophenyl)acetic acid	207	201
5-Nitronaphthalene-1-sulfonamide	63	394		287	431
8-Nitronaphthalene-1-sulfonamide	226	400	(3-Nitrophenyl)acetic acid	157	199
8-Nitronaphthalene-2-sulfonamide	206	399		278	431
1-Nitronaphthalene-2-sulfonic acid	160	376	(4-Nitrophenyl)acetic acid	229	202
4-Nitronaphthalene-1-sulfonic acid	126	375		259	431
5-Nitronaphthalene-1-sulfonic acid	183	377	(4-Nitrophenyl)acetonitrile	161	364
5-Nitronaphthalene-2-sulfonic acid	108	374	4-Nitrophenylacetyl chloride	10	216
7-Nitronaphthalene-1-sulfonic acid	207	378	β -(2-Nitrophenyl)acrylonitrile	120	362
8-Nitronaphthalene-1-sulfonic acid	131	375	2-Nitro- <i>p</i> -phenylenediamine	307	312
8-Nitronaphthalene-2-sulfonic acid	166	377	4-Nitro- <i>m</i> -phenylenediamine	361	314
1-Nitronaphthalene-2-sulfonyl chloride	189	387	4-Nitro- <i>o</i> -phenylenediamine	415	316
4-Nitronaphthalene-1-sulfonyl chloride	149	385	2-Nitrophenylhydrazine	158	307
4-Nitronaphthalene-2-sulfonyl chloride	224	388	3-Nitrophenylhydrazine	170	308
5-Nitronaphthalene-1-sulfonyl chloride	174	386	4-Nitrophenylhydrazine	352	314
5-Nitronaphthalene-2-sulfonyl chloride	203	387	2-Nitro-5-phenylphenol	20	434
6-Nitronaphthalene-1-sulfonyl chloride	204	387	2-Nitrophenyl phenylsulfide	49	426
7-Nitronaphthalene-1-sulfonyl chloride	263	389	3-Nitrophenyl phenyl sulfide	16	425
8-Nitronaphthalene-1-sulfonyl chloride	254	389	4-Nitrophenyl phenyl sulfide	29	425
8-Nitronaphthalene-2-sulfonyl chloride	260	389	3-(2-Nitrophenyl)propionic acid	391	432
4-Nitro-1-naphthalenethiol	24	416	3-(4-Nitrophenyl)propionic acid	384	432
1-Nitro-2-naphthol	199	106	2-Nitrophenyl sulfide	65	426
2-Nitro-1-naphthol	302	111	3-Nitrophenyl sulfide	75	427
4-Nitro-1-naphthol	421	118	4-Nitrophenyl 4-tolyl sulfide	51	426
4-Nitro-2-naphthol	272	110	4-Nitrophthalamide	426	243
5-Nitro-1-naphthol	451	119	4-Nitrophthalamide	408	243
5-Nitro-2-naphthol	364	115	3-Nitrophthalic acid	346	207
6-Nitro-1-naphthol	471	121	4-Nitrophthalic acid	253	203
8-Nitro-1-naphthol	311	112	3-Nitrophthalic acid diamide	432	243
8-Nitro-2-naphthol	351	114	3-Nitrophthalic acid diamide	484	245
1-Nitro-2-naphthonitrile	183	365	3-Nitrophthalic anhydride	70	226
4-Nitro-1-naphthonitrile	179	365	4-Nitrophthalic anhydride	51	226
5-Nitro-1-naphthonitrile	223	367			

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	Compound No.	Page No.		Compound No.	Page No.
1-Pentadecene	334	24	DL-2-Pentyl bromide	14	58
7-Pentadecene	16	25	3-Pentyl bromide	15	58
Pentadecylamine	18	303	<i>n</i> -Pentyl <i>n</i> -butyrate	146	257
Pentadecylcyclohexane	9	8	3-Pentyl chloride	20	55
Pentadecylcyclopentane	1	8	<i>n</i> -Pentyl chloride	22	55
<i>n</i> -Pentadecylic acid	44	194	2- <i>n</i> -Pentylcinnamaldehyde	9	150
1-Pentadecyne	63	30	<i>n</i> -Pentylcyclohexane	249	7
1,2-Pentadiene	29	13	<i>n</i> -Pentylcyclopentane	242	7
1- <i>cis</i> -3-Pentadiene	27	12	<i>n</i> -Pentyl <i>n</i> -heptanoate	277	265
1- <i>trans</i> -3-Pentadiene	26	12	<i>n</i> -Pentyl <i>n</i> -hexanoate	226	262
1,3-Pentadiene	24	12	<i>n</i> -Pentyl iodide	15	60
1,4-Pentadiene	13	12	2-Pentyl iodide	12	60
2,3-Pentadiene	30	13	3-Pentyl iodide	13	60
2,4-Pentadienonitrile	23	346	<i>sec</i> - <i>n</i> -Pentylmalonic acid	50	194
1,3-Pentadiyne	20	28	1-Pentyl naphthalene	173	42
Pentaerythritol	69	90	2-Pentyl naphthalene	174	42
Pentaerythritol tetraacetate	123	279	<i>n</i> -Pentyl <i>n</i> -octanoate	302	267
Pentahydrocyclohexane	68	90	<i>n</i> -Pentyl <i>n</i> -Pentanoate	183	259
Pentamethylamine	339	313	4- <i>n</i> -Pentylphenol	4	96
Pentamethylbenzene	32	44	<i>n</i> -Pentyl phenyl ketone	3	172
Pentamethylbenzoic acid	335	207	<i>n</i> -Pentyl propionate	120	255
Pentamethylenediamine	76	297	2-Pentylpyridine	245	438
Pentamethyleneglycol	124	86	<i>n</i> -Pentylstearate	25	274
2,2,3,3,4-Pentamethylpentane	215	6	3-Pentyltoluene	119	39
2,2,3,4,4-Pentamethylpentane	173	5	1-Pentyne	9	28
Pentamethylphenol	297	111	2-Pentyne	13	28
1,2,2,4,4-Pentamethylpiperidine	465	439	2-Pentynoic acid	42	194
Pentamethylene sulfide	3	425	Peonol	45	99
Pentanal	20	145	Perchloroethylene	14	63
<i>n</i> -Pentanamide	146	234	Perfluoro- <i>n</i> -butyric anhydride	3	223
<i>n</i> -Pentanamide	28	231	Perfluoro- <i>n</i> -caproic anhydride	6	223
<i>n</i> -Pentane	13	3	Perfluorocyclohexane	3	62
Pentane-1,1-dicarboxylic acid	118	197	Perfluorocyclopentane	1	62
1,5-Pentanediol	124	86	Perfluoro- <i>n</i> -decane	8	62
2,4-Pentanedione	44	162	Perfluoro- <i>n</i> -hendecane	9	62
1,5-Pentanedithiol	42	415	Perfluoro- <i>n</i> -heptane	6	62
1-Pentanethiol	18	413	Perfluoro- <i>n</i> -hexane	4	62
2-Pentanethiol	10	413	Perfluoro- <i>n</i> -hexanoic anhydride	6	223
<i>n</i> -Pentanoic acid	20	190	Perfluoro-2-methylpentane	5	62
" "	450	432	Perfluoro- <i>n</i> -nonane	7	62
<i>n</i> -Pentanoic anhydride	13	223	Perfluoropropionic anhydride	2	223
1-Pentanol	32	81	Perfluoro- <i>n</i> -undecane	9	62
<i>d,l</i> -2-Pentanol	15	80	Peri acid	4	380
3-Pentanol	13	80	Perylene	201	51
2-Pentanone	10	161	Phenacetin	242	237
3-Pentanone	9	161	Phenacridone	204	179
<i>n</i> -Pentanoyl bromide	2	219	Phenacyl acetate	60	276
<i>n</i> -Pentanoyl chloride	22	212	Phenacyl alcohol	47	89
Pentatriacontane	65	9	" "	150	177
1-Pentatriacontene	18	26	Phenacyl bromide	51	173
Pentatriacontylcyclohexane	73	9	Phenacyl chloride	68	174
Pentatriacontylcyclopentane	64	9	Phenacyl phenyl ketone	111	175
1-Pentatriacontyne	22	31	1-Phenanthraldehyde	96	158
2-Pentenal	35	145	2-Phenanthraldehyde	47	155
1-Pentene	14	12	3-Phenanthraldehyde	69	156
<i>cis</i> -2-Pentene	19	12	9-Phenanthraldehyde	89	158
<i>trans</i> -2-Pentene	18	12	9,10-Phenanthraquinone	34	183
2-Pentenoic acid	422	432	Phenanthrene	104	47
3-Pentenoic acid	99	429	Phenanthrene-2-carboxylic acid chloride	24	216
4-Pentenoic acid	22	190	Phenanthrene-3-carboxylic acid chloride	27	216
" "	414	432	Phenanthrene-9-carboxylic acid chloride	25	216
4-Pentenitrile	28	347	1,2-Phenanthrenediol	463	120
1-Penten-3-one	11	161	1,9-Phenanthrenediol	477	121
1-Penten-3-yne	14	28	2,5-Phenanthrenediol	467	120
1-Penten-4-yne	10	28	2,6-Phenanthrenediol	561	126
<i>cis</i> -3-Penten-1-yne	11	28	2,7-Phenanthrenediol	576	127
<i>trans</i> -3-Penten-1-yne	12	28	2,8-Phenanthrenediol	513	123
<i>n</i> -Pentyl acetate	94	254	3,6-Phenanthrenediol	548	125
<i>n</i> -Pentylacetylene	35	29	3,8-Phenanthrenediol	570	126
<i>n</i> -Pentylamine	417	439	9,10-Phenanthrenediol	371	115
<i>n</i> -Pentylbenzene	81	38	Phenanthrene-2-sulfonamide	438	409
<i>n</i> -Pentyl bromide	17	58	Phenanthrene-3-sulfonamide	273	402

ORGANIC COMPOUND INDEX

	Compound No.	Page No.		Compound No.	Page No.
Phenanthrene-9-sulfonamide	290	403	Phenylacetamide	183	235
Phenanthrene-2-sulfonamide	156	397	Phenyl acetate	168	258
Phenanthrene-2-sulfonic acid	200	378	Phenylacetic acid	77	196
Phenanthrene-3-sulfonic acid	129	375		347	432
Phenanthrene-9-sulfonic acid	138	376	Phenylacetic anhydride	30	225
Phenanthrene-2-sulfonyl chloride	243	389	Phenylacetone	5	172
Phenanthrene-3-sulfonyl chloride	169	386	Phenylacetoneitrile	80	351
Phenanthrene-9-sulfonyl chloride	205	387	4-Phenylacetophenone	152	177
3,4,5-Phenanthrenetriol	372	115	Phenylacetyl bromide	7	219
Phenanthridine	158	437	Phenylacetyl chloride	44	213
Phenanthridene	118	47	Phenylacetyl fluoride	8	211
1-Phenanthroic acid	360	208	1-Phenylacrylic acid	130	198
2-Phenanthroic acid	388	209	DL- α -Phenylalanine	76	287
3-Phenanthroic acid	394	209	DL- β -Phenylalanine	78	288
9-Phenanthroic acid	383	209		55	429
1-Phenanthrol	393	116	L-Phenylalanine	92	288
2-Phenanthrol	440	119	4-Phenylanisole	51	139
3-Phenanthrol	282	111	4-Phenylbenzaldehyde	51	155
4-Phenanthrol	236	108	4-Phenylbenzene sulfonyl chloride	178	386
9-Phenanthrol	396	116	Phenyl benzoate	95	277
3-Phenanthrylacetic acid	276	204	2-Phenylbenzoic acid	140	198
9-Phenanthrylacetonitrile	129	363		202	430
9-Phenanthrylmethylamine	215	309	4-Phenylbenzoic acid	349	207
2-Phenethyl alcohol	113	85	4-Phenylbenzoyl chloride	26	216
Phenethylamine	349	438	<i>o</i> -Phenylbenzyl cyanide	95	361
2-(Phenethylamino)ethylamine	325	438	1-Phenyl-1,3 butanedione	75	174
<i>o</i> -Phenetidine	141	299	<i>d,l</i> - α -Phenylbutanoic acid	26	193
<i>m</i> -Phenetidine	163	300	1-Phenyl-2-butanone	182	167
<i>p</i> -Phenetidine	164	300	3-Phenyl-2-butanone	41	169
Phenetole	63	134	4-Phenyl-2-butanone	196	167
Phenetrol	413	117	2-Phenyl- <i>cis</i> -2-butene	52	37
4-Phenetylurea	353	241	4-Phenyl-3-buten-2-one	37	173
Phenol	28	97	α -Phenylbutyramide	65	232
"	96	434	γ -Phenylbutyramide	60	232
Phenol-2,4-di-sulfonamide	412	408	4-Phenylbutyric acid	430	432
Phenol-2,4-di-sulfonamide	324	404	γ -Phenylbutyric acid	43	194
Phenol-2,4-di-sulfonic acid	190	378	γ -Phenylbutyryl chloride	5	214
Phenol-2,4-di-sulfonyl chloride	115	384	Phenyl carbamate	10	231
Phenolphthalein	577	127	4-Phenylcatechol	357	114
Phenol- <i>o</i> -sulfonamide	70	394	2-Phenylcinnamaldehyde	80	157
Phenol- <i>o</i> -sulfonic acid	3	380	3-Phenylcinnamaldehyde	20	154
Phenoxyacetaldehyde	79	148	Phenyl cinnamate	103	278
Phenoxyacetamide	122	234	β -Phenylcinnamonitrile	49	359
Phenoxyacetamide	112	233	2-Phenylcrotononitrile	77	351
Phenoxyacetic acid	110	197	Phenylcyanoacetic acid	117	362
"	171	430	2-Phenylcyclohexanone	81	174
Phenoxyacetone	189	167	3-Phenylcyclohexanone	214	168
Phenoxyacetoneitrile	81	351	4-Phenylcyclohexanone	106	175
α -Phenoxyacetophenone	98	175	2-Phenylcyclopentanone	22	172
Phenoxyacetyl chloride	50	213	1-Phenyldecane	172	42
2-Phenoxybenzaldehyde	31	151	ω -Phenyl dibenzofulvene	67	45
2-Phenoxybenzoic acid	207	430	2-Phenyl-1,3-dithiane	40	426
3-Phenoxybenzoic acid	271	431	1-Phenyl dodecane	178	42
4-Phenoxybutanoic acid	10	192	<i>m</i> -Phenylenediamine	84	305
1-Phenoxy-2-butanone	10	169	"	190	437
α -Phenoxybutyryl chloride	14	214	<i>o</i> -Phenylenediamine	196	309
γ -Phenoxybutyryl chloride	4	214	"	176	437
Phenoxyethanal	79	148	<i>p</i> -Phenylenediamine	318	313
2-Phenoxyethanol	122	86	2-Phenylenedithiol	8	416
Phenoxyethyl phenyl ketone	98	175	3-Phenylenedithiol	6	416
Phenoxyethyl <i>n</i> -propyl ketone	13	169	4-Phenylenedithiol	31	417
1-Phenoxy-2-pentanone	13	169	Phenylethanal	70	147
5-Phenoxy-2-pentanone	49	173	2-Phenylethane-1-sulfonamide	61	394
2-Phenoxyphenol	216	107	2-Phenylethane-1-sulfonamide	18	392
1-Phenoxy-2-propanone	189	167	2-Phenylethane-1-sulfonic acid	16	371
2-Phenoxypropionic acid	146	199	2-Phenylethane-1-sulfonyl chloride	13	381
3-Phenoxypropionic acid	108	197	1-Phenylethanethiol	13	413
α -Phenoxypropionyl chloride	18	214	2-Phenylethanethiol	35	414
Phenylacetaldehyde	70	147	2-Phenylethanol	113	85
"	8	153	Phenyl ether	7	137
Phenylacetamide	310	239	β -Phenylethyl acetate	243	263

ORGANIC COMPOUND INDEX

	Compound No.	Page No.		Compound No.	Page No.
1-Phenylethyl alcohol	1	88	3-Phenylpropanol	123	86
DL- α -Phenylethylamine	83	297	Phenylpropargyl aldehyde	13	152
β -Phenylethylamine	92	298	3-Phenylpropenal	90	149
α -Phenylethyl bromide	25	58	Phenylpropionamide	117	233
β -Phenylethyl bromide	26	58	Phenylpropionic acid	191	200
<i>d,l</i> -Phenylethyl carbinol	111	85	2-Phenylpropionaldehyde	14	152
α -Phenylethyl chloride	42	56	α -Phenylpropionamide	77	233
β -Phenylethyl chloride	40	56	β -Phenylpropionamide	140	234
2-Phenylethyl cinnamate	56	275	Phenylpropionanilide	213	236
Phenyl ethyl ether	63	134	β -Phenylpropionanilide	104	233
2-Phenylethyl sulfide	53	426	Phenyl propionate	5	273
9-Phenylfluorene	150	49	β -Phenylpropionic acid	38	194
β -Phenylglutaconic anhydride	77	226	2-Phenylpropionic acid	50	191
β -Phenylglutaric anhydride	45	226	3-Phenylpropionic acid	412	432
N-Phenylglycine	6	284	2-Phenylpropionitrile	79	351
Phenylglyoxal	28	151	3-Phenylpropionitrile	93	353
Phenylglyoxal hydrate	77	157	Phenylpropionyl chloride	12	214
Phenylglyoxylic acid	85	174	3-Phenylpropionaldehyde	81	148
2-Phenylheptane	130	40	β -Phenylpropionyl chloride	48	213
3-Phenylheptane	125	39	1-Phenyl- <i>n</i> -propyl alcohol	111	85
1-Phenyl-1-hepten-3-one	25	172	1-Phenylpropylamine	107	298
4-Phenylhexahydroacetophenone	72	170	2-Phenylpropylamine	108	298
2-Phenylhexane	103	39	3-Phenylpropylamine	126	299
<i>d,l</i> -3-Phenylhexane	98	39	Phenyl <i>n</i> -propyl ether	74	134
1-Phenyl-1-hexen-5-one	29	169	Phenyl- <i>n</i> -propylglycolic acid	101	197
1-Phenyl-4-hexen-1-one	26	169	Phenyl <i>n</i> -propyl ketone	191	167
3-Phenyl-1-hexen-5-one	30	169	Phenyl propyl sulfide	53	421
3-Phenyl-2-hexen-5-one	63	170	3-Phenylpropyl sulfide	42	426
3-Phenyl-3-hexen-5-one	42	169	2-Phenylpyridine	97	321
Phenylhydrazine	160	300	Phenyl 2-pyridyl ketone	217	168
Phenyl 2-hydroxybenzoate	30	97	Phenylpyruvic acid	234	202
2-Phenylimidazole	258	438	2-Phenyl-4-quinolinonitrile	187	365
1-Phenylisobutylamine	113	298	Phenyl salicylate	30	97
1-Phenylisopropylamine	91	298	"	46	275
DL-2-Phenylisopropylamine	98	298	Phenyl stearate	70	276
Phenyl isopropyl ether	68	134	Phenyl styryl ketone	66	174
1-Phenylisoquinoline	61	324	α - <i>d,l</i> -Phenylsuccinamide	314	239
<i>d,l</i> -2-Phenyllactic acid	68	195	β - <i>d,l</i> -Phenylsuccinamide	269	238
N-Phenylmaleimide	75	232	<i>d,l</i> -Phenylsuccinic acid	260	203
Phenylmalonic acid	231	202	<i>d,l</i> -Phenylsuccinic acid diamide	450	244
"	104	430	<i>d,l</i> -Phenylsuccinic acid dianilide	468	244
Phenylmalononitrile	85	361	α - <i>d,l</i> -Phenylsuccinic acid monoanilide	357	241
Phenylmalonyl dichloride	36	215	β - <i>d,l</i> -Phenylsuccinic acid monoanilide	346	241
Phenylmethanethiol	32	414	DL-Phenylsuccinic anhydride	18	225
2-Phenyl-naphthalene	107	47	N-Phenylsuccinimide	307	239
2-Phenyl-naphthalene-1,2'-dicarboxylic acid	318	206	Phenyl sulfide	61	422
4-Phenyl-1-naphthol	338	113	Phenyl 2-thienyl ketone	60	174
N-Phenyl-1-naphthylamine	78	305	Phenyl 4-tolyl carbinol	29	89
Phenylnitromethane	25	336	Phenyl 4-tolyl ketone	74	174
1-Phenylnonane	166	41	Phenyl 2-tolyl sulfide	65	422
1-Phenyloctane	156	41	Phenyl 3-tolyl sulfide	64	422
2-Phenylpentane	46	37	Phenyl 4-tolyl sulfide	67	422
3-Phenylpentane	41	37	1-Phenyltridecane	181	42
3-Phenyl-2,4-pentanedione	69	174	1-Phenylundecane	175	42
5-Phenylpentanoic acid	52	195	Phenyl <i>n</i> -undecyl ketone	45	173
3-Phenyl-2-pentanone	71	170	Phenylurea	273	238
4-Phenyl-2-pentanone	31	169	Phenyl urethane	10	231
5-Phenyl-2-pentanone	27	169	2-Phenylvaleronitrile	91	352
5-Phenyl-3-pentanone	201	167	Phloracetophenone	200	179
4-Phenylphenacyl bromide	156	177	"	545	125
4-Phenylphenacyl chloride	158	177	Phloroglucinaldehyde	17	152
2-Phenylphenol	51	99	Phloroglucinol	255	109
"	98	434	"	541	125
3-Phenylphenol	117	102	"	45	434
"	81	434	Phloroglucinol triacetate	139	280
4-Phenylphenol	431	118	Phloroglucinol trimethyl ether	31	138
"	76	434	Phorone	8	172
2-Phenyl-2-phenoxyethanol	48	139	Phthalaldehyde	39	155
1-Phenyl-2-phenoxyethanol	40	138	Phthalaldehydic acid	86	157
N-Phenylphthalimide	440	243	Phthalamic acid	282	238
Phenyl phthalate	108	278	"	244	431

ORGANIC COMPOUND INDEX

	Compound No.	Page No.		Compound No.	Page No.
Phthalic acid.....	321	206	DL-Proline.....	36	285
" ".....	134	430	L-Proline.....	50	286
Phthalic acid diamide.....	464	244	Propanal.....	4	144
Phthalic acid dianilide.....	496	246	Propanal cyanohydrin.....	3	355
Phthalic acid monoamide.....	282	238	Propane.....	3	3
" ".....	244	431	1,3-Propanedicarboxylic acid.....	107	197
Phthalic acid mononitrile.....	299	205	Propanedioic acid.....	185	200
Phthalic acid 4-sulfonamide.....	287	403	<i>d,l</i> -1,2-Propanediol.....	91	84
Phthalic acid 4-sulfonyl chloride.....	259	389	1,3-Propanediol.....	108	85
Phthalic anhydride.....	58	226	Propane-1,1-disulfonamide.....	195	399
Phthalimide.....	482	245	Propane-1,3-disulfonamide.....	194	399
α -Phthalonamide.....	373	241	Propane-1,1-disulfonic acid.....	83	373
β -Phthalonamide.....	303	239	Propane-1,3-disulfonic acid.....	82	373
Phthalonic acid.....	219	202	Propane-1,3-disulfonyl chloride.....	29	381
Phthalonic acid dianilide.....	443	244	1,3-Propanedithiol.....	28	414
Phthalonic acid monoanilide.....	363	241	Propane-1-sulfonamide.....	6	392
Phthalonitrile.....	188	365	Propane-2-sulfonamide.....	10	392
Phthaloyl dibromide.....	6	220	Propane-2-sulfonanilide.....	20	392
Phthaloyl dichloride.....	59	213	Propane-1-sulfonic acid.....	1	371
Phthaloyl difluoride.....	7	211	Propane-2-sulfonic acid.....	3	371
Picene.....	202	51	1-Propanethiol.....	5	413
α -Picolene.....	13	319	2-Propanethiol.....	3	413
β -Picolene.....	19	319	Propane-1,2,3-tricarboxylic acid.....	258	203
γ -Picolene.....	20	319	Propanoic acid.....	6	190
Picolinic acid.....	198	201	" ".....	452	432
Picolinonitrile.....	12	357	1-Propanol.....	6	80
Picramic acid.....	444	119	2-Propanol.....	3	80
" ".....	380	315	2-Propanone.....	1	161
Picramide.....	404	242	Propargyl aldehyde.....	7	144
" ".....	405	316	Propene.....	2	12
Picric acid.....	281	110	2-Propene-1-thiol.....	8	413
" ".....	87	340	2-Propen-1-ol.....	5	80
" ".....	1	434	<i>cis</i> -Propenyl acetylene.....	11	28
Picryl chloride.....	51	339	<i>trans</i> -Propenyl acetylene.....	12	28
Pimelic acid.....	124	198	<i>trans</i> -Propenylbenzene.....	19	36
" ".....	385	432	Propiolamide.....	27	231
Pimelic acid diamide.....	356	241	Propiolanilide.....	68	232
Pimelic acid dianilide.....	305	239	Propiolic acid.....	7	190
Pimelic acid monoanilide.....	157	235	Propionaldehyde.....	4	144
Pinacol.....	19	88	Propionamide.....	55	232
Pinacolone.....	12	161	Propionanilide.....	141	234
<i>d,l</i> -Pinacolyl alcohol.....	16	80	Propionic acid.....	6	190
Pinacolyl chloride.....	25	55	" ".....	452	432
<i>d</i> , α -Pinane.....	213	6	<i>n</i> -Propionic anhydride.....	5	223
<i>d,l</i> -Pinane.....	206	6	Propionitrile.....	8	345
<i>l</i> - β -Pinane.....	223	6	Propionyl bromide.....	3	218
α -Pinene.....	287	22	Propionyl chloride.....	5	212
β -Pinene.....	291	22	1-Propionylcyclohexene.....	77	170
Pinosylvin.....	392	116	Propionyl fluoride.....	2	211
Piperazine.....	202	309	<i>N</i> -Propionylglycine.....	241	431
" ".....	347	438	Propionyl iodide.....	2	221
Piperic acid.....	344	207	2-Propionylphenanthrene.....	134	176
Piperidine.....	34	296	3-Propionylphenanthrene.....	64	174
" ".....	459	439	9-Propionylphenanthrene.....	65	174
<i>N</i> -Piperidinoacetoneitrile.....	2	357	4-Propionylphenol.....	370	115
Piperonal.....	12	153	6-Propionyltetralin.....	85	170
Piperonalacetone.....	143	176	Propiophenone.....	174	166
Piperonalacetophenone.....	153	177	Propiopiperone.....	27	173
Piperonyl alcohol.....	31	89	<i>n</i> -Propoxyacetaldehyde.....	32	145
Piperonylamide.....	336	240	<i>n</i> -Propoxybenzene.....	74	134
Piperonylic acid.....	357	208	2-Propoxybenzoic acid.....	331	431
Piperylene.....	24	12	3-Propoxybenzoic acid.....	324	431
Pivalaldehyde.....	12	144	4-Propoxybenzoic acid.....	433	432
Pivalamide.....	306	239	2- <i>n</i> -Propoxyethanol.....	44	82
Pivalanilide.....	215	236	1-Propoxy-2-propanone.....	49	162
Pivalic acid.....	19	193	<i>N</i> -Propylacetanilide.....	7	231
Pivalic anhydride.....	8	223	2- <i>n</i> -Propylacetanilide.....	135	234
Pivalophenone.....	181	167	4- <i>n</i> -Propylacetanilide.....	66	232
Pivalyl chloride.....	10	212	<i>n</i> -Propyl acetate.....	30	251
Prehnitene.....	77	38	Propyl acetylene.....	9	28
Primeverose.....	63	333	<i>N</i> -Propylalanine.....	64	429

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	Compound No.	Page No.		Compound No.	Page No.
<i>n</i> -Propyl alcohol	6	80	3- <i>n</i> -Propylphenol	5	96
<i>n</i> -Propylallene	65	14	4- <i>n</i> -Propylphenol	2	96
<i>n</i> -Propylamine	7	295	1- <i>n</i> -Propylpiperidine	389	439
" "	429	439	<i>n</i> -Propyl propionate	49	252
2-(Propylamino) ethylamine	386	439	3-Propylpropiophenone	24	169
<i>N</i> - <i>n</i> -Propylaniline	128	299	2- <i>n</i> -Propylpyridine	243	438
" "	177	437	<i>n</i> -Propyl 2-pyridyl ketone	173	166
2- <i>n</i> -Propylaniline	129	299	<i>n</i> -Propyl 3-pyridyl ketone	206	168
" "	147	437	<i>n</i> -Propyl 4-pyridyl ketone	190	167
4- <i>n</i> -Propylaniline	136	299	<i>n</i> -Propyl pyromucate	197	260
<i>n</i> -Propylbenzene	8	35	5-Propylresorcinol	135	103
<i>n</i> -Propyl benzoate	240	263	<i>n</i> -Propyl salicylate	260	264
<i>d,l</i> - <i>n</i> -Propylbenzyl alcohol	23	88	<i>n</i> -Propyl sulfide	26	420
<i>N</i> -Propylbenzylamine	334	438	2-Propylthiophene	29	423
<i>n</i> -Propyl bromide	7	58	3-Propylthiophene	34	424
<i>n</i> -Propyl <i>n</i> -butyrate	77	253	<i>m</i> -Propyltoluene	24	36
<i>n</i> -Propyl <i>n</i> -caproate	149	257	<i>o</i> -Propyltoluene	31	36
<i>n</i> -Propyl <i>n</i> -caprylate	229	262	<i>p</i> -Propyltoluene	27	36
<i>n</i> -Propyl carbamate	24	231	2-Propyl-1,3,5-trimethylbenzene	116	39
<i>n</i> -Propyl carbonate	119	255	5-Propyl-1,2,4-trimethylbenzene	40	127
3-Propylcatechol	97	101	<i>n</i> -Propylurethane	24	231
4-Propylcatechol	63	99	<i>n</i> -Propyl <i>n</i> -valerate	114	255
<i>n</i> -Propyl chloride	7	55	Propynal	7	144
<i>n</i> -Propyl chloroformate	41	251	Propyne	2	28
<i>n</i> -Propylcyclohexane	165	5	Protocatechualdehyde	117	159
2- <i>n</i> -Propylcyclohexanone	156	166	Protocatechualdehyde diethyl ether	92	149
3- <i>n</i> -Propylcyclohexanone	46	169	Protocatechuanilide	451	244
4- <i>n</i> -Propylcyclohexanone	168	166	Protocatechuanilide	329	240
3- <i>n</i> -Propyl-2-cyclohexenone	51	169	Protocatechuic acid	319	206
Propylcyclooctatetraene	17	25	Pseudocumene	14	35
<i>n</i> -Propylcyclopentane	88	4	Pseudocumenol	98	101
2-Propylcyclopentanone	137	165	Pseudocumenyl acetate	38	275
3-Propylcyclopentanone	145	165	Pseudocumidine	103	306
<i>n</i> -Propyl <i>n</i> -enantate	189	259	Pseudopinene	291	22
Propylene	2	12	Pulegane	124	5
1,2-Propylenediamine	361	438	Pulegone	180	167
1,3-Propylenediamine	50	296	Pulenene	248	20
" "	382	439	Putrescine	66	297
α -Propylene glycol	91	84	Pyrazine	18	436
Propylene oxide	5	131	Pyrazole	53	436
1,2,3-Propylenetricarboxylic acid trichloride	37	215	Pyrene	152	49
<i>n</i> -Propyl ether	30	132	Pyrene-3-carboxaldehyde	107	159
<i>N</i> -Propylformanilide	10	230	1,6-Pyrenediol	568	126
<i>n</i> -Propyl formate	13	250	3,8-Pyrenediol	591	127
<i>n</i> -Propyl 2-furoate	197	260	Pyridazine	43	436
3- <i>n</i> -Propylglutaric acid	346	432	Pyridine	7	319
<i>N</i> -Propylglycine	85	429	"	206	437
4-Propylheptane	191	6	2-Pyridinecarbonitrile	12	357
<i>n</i> -Propyl <i>n</i> -heptanoate	189	259	3-Pyridinecarboxaldehyde	15	152
<i>n</i> -Propyl <i>n</i> -hexanoate	149	257	2-Pyridinecarboxylic acid	198	201
3-Propyl-3-hexen-2-one	32	169	3-Pyridinecarboxylic acid	370	208
2-Propylhydroquinone	159	104	4-Pyridinecarboxylic acid	406	210
<i>n</i> -Propyl 4-hydroxybenzoate	132	279	3-Pyridinecarboxylic anhydride	53	226
<i>n</i> -Propyl iodide	5	60	Pyridine-3,4-dicarboxylic acid	389	209
<i>n</i> -Propyl isobutyrate	68	252	2, 5-Pyridinediol	572	126
<i>n</i> -Propyl isovalerate	102	254	Pyridine-3-sulfonamide	46	393
<i>n</i> -Propyl levulinate	217	261	Pyridine-3-sulfonanilide	116	396
<i>n</i> -Propylmalonic acid	140	430	Pyridine-3-sulfonic acid	12	371
<i>n</i> -Propylmalononitrile	69	350	Pyridine-3-sulfonyl chloride	231	388
<i>n</i> -Propyl mercaptan	5	413	α -Pyridone	215	107
<i>sec</i> -Propyl mercaptan	3	413	"	68	324
1-Propylnaphthalene	163	41	β -Pyridone	112	307
2-Propylnaphthalene	162	41	γ -Pyridone	115	373
<i>n</i> -Propyl nitrate	37	251	3-Pyridylacetone	60	170
<i>n</i> -Propyl <i>n</i> -octanoate	229	262	3-Pyridylacrylic acid	361	208
<i>n</i> -Propyl oxalate	204	260	Pyrimidine	1	323
<i>n</i> -Propyl <i>n</i> -pentanoate	114	255	"	29	436
2- <i>n</i> -Propyl-1-pentene	199	18	Pyrocatechol	207	107
1-Propyl phenanthrene	9	43	Pyrocatechol dibenzoate	124	279
2-Propyl phenanthrene	11	43	Pyrocatechol monomethyl ether	9	137
9-Propyl phenanthrene	42	44	Pyrogallol	317	112
2- <i>n</i> -Propylphenol	13	94	"	59	434

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	Compound No.	Page No.		Compound No.	Page No.
Pyrogallol triacetate	167	281	Retenequinone	30	182
Pyrogallol trimethyl ether	29	138	Retene-6-sulfonamide	331	405
Pyromucic acid	184	200	Retene-6-sulfonic acid	156	376
γ -Pyrone-2,6-dicarboxylic acid	391	209	Retene-6-sulfonyl chloride	235	388
Pyrotartaric acid	145	199	6-Retenol	409	117
Pyrrole	11	436	α -L-Rhamnohexose	58	333
2-Pyrrolicarboxaldehyde	25	154	D-Rhamnose	13	328
Pyrrolidine	24	295	α -L-Rhamnose	9	329
"	466	439	β -L-Rhamnose	15	330
Pyruvamide	198	236	D-Rhodeose	33	331
Pyruvanilide	133	234	DL-Rhodeose	44	332
Pyruvic acid	11	190	L-Rhodeose	34	331
"	97	429	d-Rhodinal	76	148
Pyruvic aldehyde	103	171	D-Ribose	3	329
			L-Ribose	4	331
			Rufol	578	127
Q			S		
Quadricyclane	40	3	Saccharin	466	244
Quadricyclo (2.2.1.0 ^{2,6} .0 ^{3,5}) heptane	40	3	Salicylaldehyde	4	94
d-Quercitol	68	90	"	71	148
Quinacetophenone	197	179	"	21	434
Quinaldine	80	321	Salicylaldehyde ethyl ether	3	153
Quinazoline	98	436	Salicylaldehyde methyl ether	15	153
Quinhydrone	187	178	Salicylaldehyde triacetate	141	280
Quinizarin	33	183	Salicylamide	261	238
Quinoline	71	320	"	41	434
"	178	437	Salicylanilide	248	237
Quinoline-2-carboxaldehyde	60	156	Salicylic acid	400	117
Quinoline-4-carboxaldehyde	29	154	"	244	203
Quinoline-6-carboxaldehyde	66	156	"	116	430
Quinoline-8-carboxaldehyde	79	157	Salicylic acid ethyl ether	5	193
Quinoline-3-carboxylic acid	395	209	Salicylic acid methyl ether	114	197
Quinoline-4-carboxylic acid	385	209	Salicyloyl chloride	1	216
2,3-Quinolinediol	574	126	Saligenin	49	89
Quinoline-6-sulfonamide	281	402	"	146	103
Quinoline-8-sulfonamide	242	401	Saligenin-2-methyl ether	127	86
Quinoline-6-sulfonic acid	135	376	Salol	30	97
Quinoline-8-sulfonic acid	106	374	"	46	275
Quinoline-6-sulfonyl chloride	119	384	Santene	250	20
Quinoline-8-sulfonyl chloride	199	387	Sarcosine	43	286
2-Quinolinoacetonitrile	62	359	Sebacic acid	183	200
Quinone	12	181	Sebacic acid diamide	446	244
Quinoxaline	5	323	Sebacic acid dianilide	433	243
"	16	436	Sebacic acid monoamide	343	240
Quinuclidine	82	324	Sebacic acid monoanilide	194	236
"	441	439	Sebacic anhydride (dimer)	27	225
			Sebacitrile	19	356
R			Sebacoyl dichloride	33	214
R-Acid	16	380	Semicarbazide	97	233
Rafinose	14	330	DL-Serine	70	287
Resacetophenone	362	115	"	62	429
"	175	178	L-Serine	56	286
Resodiacetophenone	478	121	d-Silversterene	315	23
Resorcinol	226	108	β -Sitosterol	57	90
"	74	434	Skatole	175	308
Resorcinol diacetate	329	269	Sodium 3-hydroxybenzenephosphonate	105	434
Resorcinol dibenzoate	149	280	Sodium 4-hydroxybenzenephosphonate	89	434
Resorcinol diethyl ether	98	136	Sodium 3-hydroxybenzenesulfonate	66	434
Resorcinol dimethyl ether	89	135	Sodium 4-hydroxybenzenesulfonate	58	434
Resorcinol monoacetate	29	95	Sodium 3-hydroxybenzoate	94	434
"	331	269	Sodium 4-hydroxybenzoate	73	434
Resorcinol monoethyl ether	24	97	Sorbalddehyde	5	152
Resorcinol monomethyl ether	21	95	d-Sorbitol	50	89
β -Resorcylaldehyde	110	159	D-Sorbose	51	332
β -Resorcylaldehyde dimethyl ether	59	156	DL-Sorbose	45	332
β -Resorcylamide	469	245	L-Sorbose	50	332
β -Resorcylanilide	208	236	Spiropentane	16	3
β -Resorcyllic acid	338	207	Stachyose	54	332
α -Resorcyllic aldehyde	118	159	Stearaldehyde	14	153
Retene	103	47	Stearamide	158	235

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Stearic acid.....	70	195	Terephthalic acid mononitrile.....	348	207
Stearic anhydride.....	28	225	Terephthalonitrile.....	229	367
Stearoyl chloride.....	2	216	Terephthaloyl dichloride.....	19	216
Stearyl alcohol.....	33	89	α -Terpinene.....	311	23
<i>trans</i> -Stilbene.....	131	48	γ -Terpinene.....	322	23
Stilbene-2-carboxaldehyde.....	72	156	<i>d, l</i> - α -Terpineol.....	114	85
2,2-Stilbenediol.....	172	105	Terpinolene.....	325	24
3,5-Stilbenediol.....	392	116	1,2,3,4,5,6,7,8-Tetrabenzanthracene.....	203	51
4,4' Stilbenediol.....	583	127	2,3,4,6-Tetrabromoaniline.....	248	310
4-Styrenesulfonic acid.....	33	372	1,2,4,5-Tetrabromobenzene.....	9	74
Suberane.....	68	4	2,3,4,6-Tetrabromobenzene sulfonamide.....	423	408
Suberene.....	187	18	2,3,4,6-Tetrabromobenzene sulfonic acid.....	196	378
Suberic acid.....	215	202	2,3,4,6-Tetrabromobenzene sulfonyl chloride.....	137	385
".....	395	432	Tetrabromocatechol.....	492	122
Suberic anhydride (dimer).....	22	225	2,4,5,6-Tetrabromo- <i>m</i> -cresol.....	494	122
Suberic acid diamide.....	456	244	3,4,5,6-Tetrabromo- <i>o</i> -cresol.....	523	123
Suberic acid dianilide.....	395	242	2,3,5,6-Tetrabromo- <i>p</i> -cresol.....	499	122
Suberic acid monoamide.....	210	236	1,1,2,2-Tetrabromoethane.....	19	65
Suberic acid monoanilide.....	216	236	2,3,4,5-Tetrabromophenol.....	285	111
Suberonitrile.....	20	356	Tetrabromophthalic anhydride.....	85	227
Succinaldehyde.....	59	147	2,3,4,5-Tetrachlorobenzaldehyde.....	93	158
Succinamic acid.....	312	239	2,3,4,6-Tetrachlorobenzaldehyde.....	85	157
".....	398	432	1,2,3,4-Tetrachlorobenzene.....	6	71
Succinic acid.....	294	205	1,2,3,5-Tetrachlorobenzene.....	10	71
".....	310	431	1,2,4,5-Tetrachlorobenzene.....	29	71
Succinic acid diamide.....	498	246	2,3,4,5-Tetrachlorobenzonitrile.....	107	362
Succinic acid dianilide.....	480	245	2,3,5,6-Tetrachloro-1,4-benzoquinone.....	53	184
Succinic acid monoamide.....	312	239	1,1,2,2-Tetrachloroethane.....	19	63
".....	398	432	1,1,2,2-Tetrachloroethylene.....	14	63
Succinic acid monoanilide.....	279	238	2,3,5,6-Tetrachlorohydroquinone.....	565	126
Succinic anhydride.....	52	226	4,6,7,8-Tetrachloronaphthalene-2-sulfonamide.....	401	407
Succinimide.....	205	236	4,6,7,8-Tetrachloronaphthalene-2-sulfonyl chloride.....	264	389
Succinonitrile.....	67	360	2,3,4,6-Tetrachlorophenol.....	93	101
Succinyl dibromide.....	12	219	Tetrachlorophthalic anhydride.....	83	227
Succinyl dichloride.....	38	212	1,2,3,4-Tetrachlorotetralin.....	32	72
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Sulfaguanidine.....	269	402	1-Tetracontene.....	23	26
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Sulfanylguanidine.....	269	402	Tetracosanoic acid.....	88	196
Sulfapyridine.....	278	402	1-Tetracosene.....	7	26
Sulfathiazole.....	319	404	Tetracosylcyclohexane.....	39	8
2-Sulfobenzoic acid.....	139	376	Tetracosylcyclopentane.....	27	8
3-Sulfobenzoic acid.....	84	373	1-Tetracosyne.....	11	31
4-Sulfobenzoic acid.....	184	377	Tetracyanoethylene.....	222	367
4-Sulfophthalic acid.....	136	376	Tetradecanal.....	4	153
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			<i>n</i> -Tetradecanoic acid.....	46	194
			<i>n</i> -Tetradecanoic anhydride.....	19	225
			1-Tetradecanol.....	17	88
			2-Tetradecanone.....	17	172
			Tetradecanonitrile.....	4	357
			1-Tetradecene.....	332	24
			<i>n</i> -Tetradecylacetylene.....	64	30
			<i>n</i> -Tetradecyl bromide.....	30	58
			<i>n</i> -Tetradecylcyclohexane.....	6	8
			<i>n</i> -Tetradecylcyclopentane.....	278	7
			<i>n</i> -Tetradecyl sulfide.....	25	425
			1-Tetradecyne.....	62	30
			Tetraethylene glycol dimethyl ether.....	105	136
			Tetraethyl pyromellitate.....	74	276
			Tetraethyl silicate.....	113	255
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			1,2,3,4-Tetrahydroanthranol.....	221	107
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			Tetrahydrofurfural.....	44	146
			α -Tetrahydrofurfuryl acetate.....	164	258

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D-Talose.....	21	330
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Thiophane	12	423	<i>p</i> -Toluic anhydride.....	40	225
Thiophene	3	423	<i>m</i> -Toluidine	96	298
Thiophene-2-acetonitrile	9	355	<i>o</i> -Toluidine	94	298
Thiophene-2-carbonitrile	59	349	<i>p</i> -Toluidine	34	303
Thiophene-3-carbonitrile	52	349	2-Tolunitrile	64	350
2-Thiophenecarboxaldehyde	72	148	3-Tolunitrile	70	350
2-Thiophenecarboxylic acid	173	200	4-Tolunitrile	13	357
3-Thiophenecarboxylic acid	196	201	<i>p</i> -Toluquinone	6	181
Thiophene-2,3-dicarbonitrile.....	29	347	2-(4-Toluyloxy)benzamide.....	361	241
2-Thiophenethiol.....	27	414	4-Toluyloxy chloride.....	51	213
Thiophenol.....	25	414	2-Tolyl acetate.....	187	259
Thioresorcinol.....	1	416	3-Tolyl acetate.....	200	260
Thiothymol.....	44	415	4-Tolyl acetate.....	203	260
Thiourea	382	242	(2-Tolyl)acetic acid.....	95	196
1,4-Thioxane	23	423	(4-Tolyl)acetic acid.....	103	197
DL-Threonine	73	287	(2-Tolyl)acetone.....	86	352
D-Threose	17	330	(3-Tolyl)acetone.....	83	352
B-Thujone	159	166	(4-Tolyl)acetone.....	84	352
Thymol	44	98	2-Tolyl benzoate.....	350	271
Thymoquinol	347	114	3-Tolyl benzoate.....	76	277
Thymoquinone	2	181	4-Tolyl benzoate.....	101	278
Thymyl acetate.....	272	265	2-Tolyl carbinol.....	14	88
Thymyl benzoate.....	31	274	3-Tolyl carbinol.....	109	85
DL-Thyroxine	58	286	4-Tolyl carbinol.....	32	89
Tiglamide.....	43	232	<i>p</i> -Tolylhydrazine.....	91	305
Tiglanilide.....	44	232	2-Tolyl sulfide	35	425
Tiglic acid.....	59	195	3-Tolyl sulfide	60	421
"	461	433	4-Tolyl sulfide	31	425
T.N.T.	46	338	3-Tolyl 4-tolyl sulfide	6	425
Tolane	47	44	2-Tolylurea	409	243
<i>m</i> -Toluidine.....	221	309	3-Tolylurea	259	238
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3-Tolualdehyde	73	148	α, α -Trehalose.....	62	333
4-Tolualdehyde	75	148	1,2,4-Triacetoxybenzene.....	133	279
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3-Toluamide.....	98	233	<i>n</i> -Triacontane	49	3
4-Toluamide.....	317	240	Triacontanol	48	89
2-Toluamylide.....	202	236	1-Triacontene	13	26
3-Toluamylide.....	206	236	Triacontylcyclohexane.....	59	9
4-Toluamylide.....	270	238	Triacontylcyclopentane.....	47	9
Toluene	2	35	1-Triacontyne	17	31
2- <i>p</i> -Tolueneazo- <i>p</i> -cresol	235	108	Triallylamine.....	295	438
Toluene-2,4-di-sulfonamide	256	401	1,2,3-Triaminopropane	88	298
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Toluene- α -sulfonamide	37	393	"	429	317
Toluene-2-sulfonamide	148	397	4,4',4''-Triaminotriphenylmethane.....	424	317
Toluene-3-sulfonamide	39	393	Tri- <i>n</i> -amylamine	89	321
Toluene-4-sulfonamide	95	395	1,3-Triazine.....	281	438
Toluene- α -sulfonamylide	34	393	<i>d,l</i> , α -Triazobutyric acid	3	193
Toluene-2-sulfonamylide	90	395	α -Triazoisobutyric acid.....	9	193
Toluene-3-sulfonamylide	26	392	2-Triazoisovaleric acid.....	6	192
Toluene-4-sulfonamylide	35	393	1,2,4-Triazole	46	436
Toluene-2-sulfonic acid.....	58	372	<i>d,l</i> -2-Triazopropionic acid.....	8	192
Toluene-3-sulfonic acid.....	10	371	Tribenzylamine	56	324
Toluene-4-sulfonic acid.....	31	372	Tribromoacetamide.....	193	236
Toluene-2-sulfonyl chloride	73	383	Tribromoacetic acid.....	176	200
Toluene-3-sulfonyl chloride	3	381	"	5	429
Toluene-4-sulfonyl chloride	75	383	1,1,1-Tribromoacetone	211	168
2-Toluenethiol.....	31	414	3,4,5-Tribromoacetophenone	164	177
3-Toluenethiol.....	33	414	2,4,6-Tribromoaniline.....	264	311
4-Toluenethiol.....	11	416	3,4,5-Tribromoaniline.....	267	311
Toluhydroquinone	60	434	1,3,5-Tribromobenzene.....	7	74
2-Toluic acid.....	125	198	2,4,6-Tribromobenzenesulfonamide	385	407
3-Toluic acid.....	137	198	2,4,6-Tribromobenzenesulfonamylide	363	406
4-Toluic acid.....	278	204	2,4,6-Tribromobenzenesulfonic acid	172	377
4-Toluic acid-2-sulfonamide.....	250	401	2,4,6-Tribromobenzenesulfonyl chloride.....	65	383

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3,4,5-Tribromocatechol	349	114	1,3,4-Trichloro-2-naphthol	415	117
2,3,6-Tribromo- <i>p</i> -cresol	198	106	1,4,5-Trichloro-2-naphthol	395	116
2,4,6-Tribromo- <i>m</i> -cresol	131	103	2,3,4-Trichloro-1-naphthol	439	119
3,4,5-Tribromo- <i>o</i> -cresol	153	104	5,5,5-Trichloro- <i>n</i> -pentylamine	366	439
3,4,6-Tribromo- <i>o</i> -cresol	162	104	2,4,6-Trichlorophenetole	26	138
2,2,2-Tribromoethanal	63	147	2,3,4-Trichlorophenol	136	103
1,1,2-Tribromoethane	15	65	2,3,5-Trichlorophenol	67	100
2,2,2-Tribromoethanol	45	89	2,3,6-Trichlorophenol	60	99
2,4,5-Tribromophenetol	45	139	2,4,5-Trichlorophenol	87	101
2,4,6-Tribromophenetol	42	138	2,4,6-Trichlorophenol	91	101
2,3,4-Tribromophenol	176	105	3,4,5-Trichlorophenol	193	106
2,4,5-Tribromophenol	150	104	Trichlorophloroglucinol	329	113
2,4,6-Tribromophenol	171	105	1,2,3-Trichloropropane	20	63
Tribromophloroglucinol	384	116	3,3,3-Trichloro- <i>n</i> -propylamine	341	438
1,2,3-Tribromopropane	17	65	2,3,4-Trichlorotoluene	5	71
2,4,6-Tribromoresorcinol	234	108	2,3,5-Trichlorotoluene	8	71
Tri- <i>n</i> -butylamine	64	320	2,4,5-Trichlorotoluene	23	71
"	355	438	2,4,6-Trichlorotoluene	2	71
Tricarballic acid	258	203	3,4,5-Trichlorotoluene	7	71
Trichloroacetaldehyde	19	145	<i>n</i> -Tricosane	23	8
Trichloroacetamide	256	238	12-Tricosanone	91	175
Trichloroacetanilide	99	233	1-Tricosene	6	26
2,4,6-Trichloroacetanilide	276	238	Tricosylcyclohexane	36	8
Trichloroacetic acid	47	194	Tricosylcyclopentane	25	8
"	3	429	1-Tricosyne	10	31
Trichloroacetonitrile	6	345	Tricresyl phosphate	358	271
Trichloroacetyl bromide	7	218	Tricyanomethane	66	360
Trichloroacetyl chloride	18	212	Tricyclo(2,2,1,0 ^{2,6})heptane	33	8
Trichloroacetyl fluoride	4	211	Tridecanal	7	150
Trichloroacetyl iodide	4	222	Tridecanamide	116	233
Trichloroacrylic acid	8	429	Tridecanilide	53	232
Trichloroacrylonitrile	6	357	<i>n</i> -Tridecane	261	7
2,4,6-Trichloroaniline	125	306	<i>n</i> -Tridecanonic acid	28	194
2,4,6-Trichloroanisole	37	138	<i>n</i> -Tridecanonic anhydride	17	225
2,3,4-Trichlorobenzaldehyde	78	157	1-Tridecanol	12	88
2,3,5-Trichlorobenzaldehyde	40	155	2-Tridecanone	9	172
2,3,6-Trichlorobenzaldehyde	74	157	7-Tridecanone	14	172
2,4,5-Trichlorobenzaldehyde	98	159	1-Tridecene	331	24
2,4,6-Trichlorobenzaldehyde	46	155	Tridecyl acetylene	63	30
3,4,5-Trichlorobenzaldehyde	76	157	<i>n</i> -Tridecyl aldehyde	7	150
1,2,3-Trichlorobenzene	11	71	Tridecylbenzene	181	42
1,2,4-Trichlorobenzene	25	70	Tridecylcyclohexane	3	8
1,3,5-Trichlorobenzene	17	71	Tridecylcyclopentane	276	7
2,3,4-Trichlorobenzenesulfonamide	382	406	Tridecyclic acid	28	194
2,4,6-Trichlorobenzenesulfonamide	339	405	1-Tridecyne	61	30
2,3,4-Trichlorobenzenesulfonyl chloride	67	381	Triethyl aconitate	322	268
2,4,6-Trichlorobenzenesulfonyl chloride	17	381	Triethylamine	4	319
4,4,4-Trichloro- <i>n</i> -butylamine	356	438	"	435	439
2,2,3-Trichloro- <i>n</i> -butyraldehyde	58	147	1,2,4-Triethylbenzene	109	39
2,2,4-Trichloro- <i>n</i> -butyraldehyde	16	152	1,3,5-Triethylbenzene	110	39
2,3,5-Trichloro- <i>p</i> -cresol	80	100	2,4,6-Triethylbenzoic acid	139	198
2,4,6-Trichloro- <i>m</i> -cresol	41	98	Triethyl carbinol	37	82
3,5,6-Trichloro- <i>o</i> -cresol	68	100	Triethyl citrate	340	270
4,5,6-Trichloro- <i>o</i> -cresol	114	102	Triethylene bromohydrin	73	84
Trichloroethanal	19	145	Triethylene glycol	130	86
1,1,1-Trichloroethane	7	63	Triethylene glycol diacetate	193	260
1,1,2-Trichloroethane	13	63	Triethylene glycol dimethyl ether	88	135
Trichloroethanol	45	82	Triethyl orthoformate	85	253
2,2,2-Trichloroethylamine	218	437	1,4,5-Triethylpyrazole	42	320
1,1,2-Trichloroethylene	10	63	2,4,5-Triethylpyridine	34	319
Trichlorohydroquinone	327	113	Triethylsuccinic acid	115	430
1,1,1-Trichloroisopropanol	24	88	Triethyl trimesate	159	281
3,3,3-Trichlorolactic acid	165	199	Trifluoroacetaldehyde	2	144
Trichlorolactamide	96	233	Trifluoroacetic acid	2	429
Trichlorolactanilide	325	240	Trifluoroacetic anhydride	1	223
5,6,7-Trichloronaphthalene-1-sulfonamide	433	408	Trifluoroacrylic acid	27	429
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