THE CHEMIST'S COMPANION

A Handbook of Practical Data, Techniques, and References

ARNOLD J. GORDON

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PREFACE

It is impossible for the chemist to remember or even to catalog handily more than a small portion of the information he regularly needs. Naturally, numerous textbooks, monographs, handbooks, data collections, and similar sources are available wherein specific data are sought. Nevertheless, our own experience has been that whether preparing a lecture, solving a problem, or working in the laboratory, there is a continuous and often immediate demand for certain information that seemingly should be, but usually is not, conveniently available. In addition to frequently called for physicochemical properties, there is an ever-present need for answers to such practical questions on how-to-do-it, what-is-it, what-do-I-use-and-when, and where-do-I-find-it-or-buy-it. An almost endless collection of workaday facts and figures are required, which cannot be found in any one place and often are not accessible at all.

The aim of this book is to provide, in an easily usable form, as much helpful information of this sort as possible. We have canvassed chemistry students and professionals for their pet needs, and have incorporated what we consider to be the most useful and often needed materials for a broad cross section of chemists. We cover almost all the properties mentioned in a 1965 survey of Americal Chemical Society members that asked, among other questions, "What physical, chemical, and mechanical properties of substances and systems do you seek most often in the literature?" [H. M. Wiseman, J. Chem. Doc., 7, 9 (1967)]. To our knowledge, the most reliable and recent data are used throughout. The art and methods of chemical synthesis are generally not discussed; this broad, separate area is, of course, the subject of many other books.

The choice and manner of presentation of some of the material included in this book reflect our interests and experience in organic chemistry. However, most of the information is applicable to nearly all chemical disciplines, and material of special interest to physical and inorganic chemists, as well as biochemists, is included. Topics discussed include properties of atoms and molecules, spectroscopy, photochemistry, chromatography, kinetics and thermodynamics, various experimental techniques, mathematical and numerical information, and a variety of hard-to-classify but frequently sought information. In addition to vital properties, we include important hints, definitions, and other material associated with the "art" as well as the state of the art of a particular subject. We have tried to incorporate as much useful information as possible – the sort that individuals keep tacked to the laboratory or office wall or in file-card collections. Many sections, in fact, are written as mini-reviews, containing the essence of a topic along with the most recent pertinent literature references. To some extent, finally, the book is meant to serve as a glossary of practical chemical lore.

In addition to a Subject Index, there is a Suppliers Index, which lists all suppliers and manufacturers mentioned in the book and cites the page on which an address appears. For pertinent topics, directions are given for obtaining special booklets or other material, many at no cost. A list of publishers' addresses can be found in the last chapter. We apologize in advance to any authors or suppliers we may have overlooked; we have tried to provide a representative collection, with coverage through July 1972.

Wherever possible, standard (IUPAC) chemical nomenclature is used; however, in the interests of clarity and custom, common names are used

whenever deemed appropriate. The definitions and values for the newly adopted International System of Units are described (SI units, see p. 456), along with recommended rules of usage. We have knowingly violated two of those rules: those that prescribe the writing of a large number as (1 245.843 2) and the omission of a degree sign for degrees Kelvin. To our knowledge these are not yet in common usage, and we have retained the traditional practice (1,245.8432 and °K). We have also chosen to use mm Hg for pressure, although the equivalent unit torr is gaining wide acceptance. However, certain other recommendations have been adopted in this book. The micron ($1\mu = 10^{-6}$ m) is no longer considered to be a unit and is replaced by micrometer (μm), which is used, for example, for infrared wavelengths. Another change is the abolishment of the millimicron (mμ), formerly used for ultraviolet or visible spectra wavelengths; the official unit is now the nanometer (nm).

Although the book is purposely organized into separate, individualized sections, there is extensive cross referencing throughout. For example, in the section "Properties of Solvents and Common Liquids" each solvent is given a number; in many other sections of the book when a solvent is mentioned, this number is cited for easy reference to the more extensive data in the master table. The reader will notice in examining many of the tables that entries are missing; this is due to either the unavailability of the information or, in our judgment, its unreliability. It is hoped that readers will be able to fill in the missing data when they become available and that they will inform the authors of such additions.

We believe that this book can serve daily not only the professional chemist but also the student and the beginning practitioner. We welcome criticisms, corrections, and suggestions that will help to make future revisions of this book even more useful and accurate.

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Riverside, Connecticut
Washington, D.C.
August 1972

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Finally, we thank Francesca Gordon and Kathy Ford for their continued patience, encouragement, and assistance throughout all stages of the book's preparation; particular gratitude is owed to Francesca for help in the exhausting and seemingly endless task of proofreading nearly the entire final copy.

CONTENTS

PROPERTIES OF MOLECULAR SYSTEMS

I. PROPERTIES OF SOLVENTS AND COMMON LIQUIDS

Extensive data on organic solvents can be found in the definitive monograph, J. A. Riddick and W. B. Bunger, Organic Solvents, Volume II of Techniques of Chemistry (successor to the Technique of Organic Chemistry and the Technique of Inorganic Chemistry series), Wiley-Interscience, New York, 1971 (1041 pp; more than 5000 literature citations). Some of the discussion below was taken from this source.

Commercially available solvents come in a variety of purity grades, which are defined as follows:

ACS Reagent Grade. Meets standards established in Reagent Chemicals, ACS, Washington, D.C. 1960.

USP Grade and NF Grade. Meets standards established by the U.S. Pharmacopoeia (USP) or the National Formulary (NF) for exceptional purity of chemicals in drugs or in general pharmacological applications.

Spectrophotometric Grade. Spectrally "pure" in the uv, visible, near-ir, and mid-ir regions. For details, see page 167.

Gas Chromatographic Grade. Homogeneous by high-sensitivity gas liquid chromatography.

Electronic Grade. Extremely low amounts of metallic impurities and very low specific conductance; used in transistor industry and electronic circuitry.

Research Grade. High-Purity research and reference standards. (Bulletin 522, Chemical Department, Phillips Petroleum Co., Bartlesville, Okla.)

Pesticide Grade. Also known as "Nanograde" solvents. Used for pesticide residue analysis; meets ACS Reagent grade standards and has less than 10 ng/liter of chlorinated pesticide or other similar impurity.

Nonaqueous Titration Solvent Grade. Used for high-precision titration; very low in water and in acidic and basic substances. (Write for Titrants, Indicators, Solvents for Non-Aqueous Titrimetry, Eastman Organic Chemicals.)

The Burdick and Jackson Laboratories, Muskegon, Michigan 49442, sell some exceptionally high-purity solvents. Further discussion of purity and directions for custom purification of many common solvents appear on page 429.

This section contains tables of general constants and properties; alphabetical, mp, bp, dielectric constant, and azeotrope indexes to the entries; vapor pressure data for very common solvents (see also p. 30); a section on synonyms, structures, and properties of common name solvents and special liquids; and a section on empirical solvent parameters (Z-values, et al.). To determine if a given solvent forms a binary azeotrope, refer to the azeotrope index.

A. General Constants

Entries are arranged in the order employed by Chemical Abstracts: alphabetically for noncarbon-containing compounds, in the order of increasing number of carbons and hydrogens for carbon compounds, and then alphabetically for other elements. Compounds whose names are followed by a Z are those for which values of that empirical solvent parameter are given in the table on page 23.

The bp and mp are in °C at 760 mm Hg unless followed by another pressure in parentheses. Density (ρ) in g/cc is at 20°C, and dielectric constant (ε) is at 25°C for the pure liquid unless followed by another temperature in parentheses. Refractive index (n_D) is at 20°C unless followed by another temperature in parentheses. Dipole moments (μ) in debyes are for the gas phase unless followed by ℓ for neat liquid or by the solvent for solution measurement (B = benzene, D = 1,4-dioxane). Solubility in water at or near room temperature (S) is expressed as m = miscible, i = immiscible (insoluble), p = partly soluble (<10-15 g/100 g H_2O), v = very soluble (>25 g/100 g H_2O), and d = decomposes. Viscosity (η) is in millipoise (at 25° unless indicated otherwise).

Data for these tables were gathered principally from the following sources: L. Scheflan and M. B. Jacobs, The Handbook of Solvents, D. Van Nostrand, New York, 1953; J. J. Lagowski, Ed., The Chemistry of Non-Aqueous Solvents, Vols. 1, 2, and 3, Academic Press, New York, 1966, 1967 and 1970; T. C. Waddington, Non-Aqueous Solvent Systems, Academic Press, New York, 1965; I. Mellan, Handbook of Solvents, Vol. 1, Reinhold Publishing Corp., New York, 1957; Handbook of Chemistry and Physics, 50th ed., CRC, Cleveland, 1969; Organic Solvents, 2nd ed., Volume VII of Technique of Organic Chemistry, Interscience, New York, 1955; R. Nelson, Jr., D. Lide, Jr., and A. Maryott, Selected Values of Electric Dipole Moments for Molecules in the Gas Phase, NSRDS-NBS 10, U.S. Government Printing Office, Washington, D.C., 1967; A. L. McClellan, Tables of Experimental Dipole Moments, W. H. Freeman, San Francisco, 1963; A. Maryott and E. Smith, Table of Dielectric Constants of Pure Liquids, NBS Circular 514, U.S. Government Printing Office, Washington, D.C., 1951.

Compound	Mw	Bp	Mp
1. $AsBr_3$ (arsenic tribromide)	314.65	220	35
2. $AsCl_3$ (arsenic trichloride)	181.28	130	-13
3. AsF_3 (arsenic trifluoride)	131.92	63	-6
4. Br_2 (bromine)	159.81	59	-7
5. Br_3P (phosphorus tribromide)	270.70	173	-40
6. CCl_3F (trichlorofluoromethane)	70.01	24	-111
7. CCl_4 (carbon tetrachloride)	153.82	76.5	-23
8. $CClFHBr$ (bromochlorofluoromethane)	147.38	36	-115
9. CCl_2HBr (bromodichloromethane)	163.83	90	-57
10. $CClHBr_2$ (dibromochloromethane)	208.29	119(748)	
11. $CHBr_3$ (bromoform)	252.75	150	8.3
12. CCl_3H (chloroform Z)	119.38	61.7	-63.5
13. CHN (hydrocyanic acid)	27.03	26	-14
14. $CClH_2Br$ (bromochloromethane)	129.39	68.1	-86
15. CH_2Br_2 (dibromomethane)	173.85	97	-52.6
16. CCl_2H_2 (dichloromethane Z)	84.93	40	-95.1
17. CH_2O (formaldehyde)	30.03	-21	-92
18. CH_2O_2 (formic acid)	46.03	101	8.4
19. CH_3Br (bromomethane)	94.94	3.6	-94
20. CH_3I (iodomethane)	141.94	42.4	-66.4
21. CH_3NO (formamide Z)	45.04	193	2.6
22. CH_3NO_2 (nitromethane)	61.04	101	-28.5
23. CH_4O (methanol Z)	32.04	64.5	-97.5
24. CH_5N (methylamine)	31.06	-6.3	-93.5
25. CS_2 (carbon disulfide)	76.14	46.2	-111.5
26. $C_2Cl_2O_2$ (oxalyl chloride)	126.93	63	-16
27. C_2Cl_4 (tetrachloroethylene)	165.83	121	-19
28. C_2Cl_3H (trichloroethylene)	131.39	87	-73
29. $C_2Cl_3HO_2$ (trichloroacetic acid)	163.39	198	58(α)
30. $C_2F_3HO_2$ (trifluoroacetic acid)	114.02	72.4	-15
31. $C_2Cl_4H_2$ (1,1,2,2-tetrachloroethane)	167.85	146	-36
32. $C_2H_2O_2$ (glyoxal)	58.04	50.4	15
33. C_2H_3Br (bromoethylene)	106.96	15.8	-140
34. C_2H_3OBr (acetyl bromide)	122.96	76	-96
35. C_2ClH_3 (chloroethylene)	62.50	-13.4	-154
36. C_2ClH_3O (acetyl chloride)	78.50	51	-112
37. $C_2Cl_3H_3$ (1,1,1-trichloroethane)	133.41	74.1	-30
38. $C_2Cl_3H_3$ (1,1,2-trichloroethane)	133.41	113.8	-36
39. $C_2F_3H_3O$ (2,2,2-trifluoroethanol)	100.04	73.5	
40. C_2H_3N (acetonitrile Z)	41.05	81.6	-45.7
41. $C_2H_4Br_2$ (1,2-dibromoethane)	187.87	131	9.8
42. $C_2Cl_2H_4$ (1,1-dichloroethane)	98.96	57.3	-97
43. $C_2Cl_2H_4$ (1,2-dichloroethane)	98.96	83.5	-35
44. $C_2H_4I_2$ (1,2-diiodoethane)	281.86	200	83
45. C_2H_4O (acetaldehyde)	44.05	20.8	-121
46. C_2H_4O (ethylene oxide)	44.05	13.5(746)	-111
47. $C_2H_4O_2$ (acetic acid Z)	60.05	118	16.6
48. C_2H_5Br (bromoethane)	108.97	38	-119

S	ρ	n_D	ε	μ	$10^3\eta$	
d	3.33(50)		8.8(35)		54.1(35)	1.
d	2.16	1.621(14)	12.6(17)	1.59	12.25(20)	2.
d	2.67(0)		5.7(<-6)	2.59		3.
p	3.12	1.661	3.1(20)	0		4.
d	2.85(15)	1.697(27)	3.9(20)	1.7(D)		5.
i	1.46(30)		2.28(29)	0.45		6.
i	1.59	1.4601	2.23	0	9.69(20)	7.
i	1.98(0)	1.4144(25)				8.
i	1.98	1.4964				9.
i	2.45	1.5482				10.
p	2.89	1.5976	4.39(20)	0.99	21.5(15)	11.
i	1.48	1.4459	4.70	1.87	5.42	12.
m	0.7(22)	1.2675(10)	114	2.98	2.0(20)	13.
i	1.934	1.4838				14.
p	2.50	1.5420	6.7(40)	1.43		15.
i	1.33	1.4242	8.9	1.60	3.9(30)	16.
v	0.82(-20)			2.33		17.
m	1.220	1.3714	58(16)	1.41	19.66	18.
i	1.68	1.4218	9.82(0)	1.81	3.79	19.
i	2.28	1.5380	7	1.62	5.18(15)	20.
m	1.129(25)	1.44754	110	3.7	33.0	21.
p	1.137	1.3817	38.6	3.46	6.08	22.
m	0.791	1.3288	32.6	1.70	5.45	23.
v	0.66		9.4	1.31		24.
i	1.263	1.6319	2.64	0	3.76(20)	25.
d	1.478	1.4316	3.47	0.93(B)		26.
i	1.623	1.5053	2.5	0	9.32(15)	27.
i	1.464	1.4773	3.4(16)	0.77(ℓ)	5.32	28.
v	1.6	1.4603(61)	4.6(60)			29.
p	1.54(0)		39(20)	2.28	5.78	30.
i	1.595	1.4940	8.2(20)	1.32	18.4(15)	31.
m	1.14	1.3826				32.
i	1.49(ℓ)	1.4410		1.42		33.
d	1.66(16)	1.4538(16)	16.2(20)			34.
i	0.91	1.3700		1.45		35.
d	1.105	1.3898	15	2.72		36.
i	1.339	1.4379	7.5(20)	1.78		37.
i	1.44	1.4714		1.25(<70°)		38.
p	1.384(25)	<1.3	26.5			39.
m	0.777(25)	1.3441	36.2	3.92	3.45	40.
p	2.18	1.5387	4.78	1.01(35°)	18.8(15)	41.
i	1.176	1.4164	10(18)	2.06	5.05	42.
i	1.235	1.4448	10.4	1.44(35°)	8.0(20)	43.
i	3.325	1.871				44.
v	0.783	1.3316	21(20)	2.69		45.
v	0.88(10)	1.3597(7)	22(10)	1.89		46.
m	1.049	1.3716	6.19	1.74	11.6	47.
i	1.46	1.4239	9.39(20)	2.03		48.

Compound	Mw	Bp	Mp
49. C_2ClH_5 (chloroethane)	64.52	13.1	-139
50. C_2ClH_5O (2-chloroethanol)	80.52	128	-68
51. C_2FH_5O (2-fluoroethanol)	64.06	104	-26
52. C_2H_5NO (N-methylformamide)	59.07	180-5	
53. $C_2H_5NO_2$ (nitroethane)	75.07	115	-50
54. $C_2H_5NO_3$ (2-nitroethanol)	91.07	193	-80
55. C_2H_6O (ethanol Z)	46.07	78.3	-114.5
56. C_2H_6OS (dimethyl sulfoxide Z)	78.13	189(d)	18.4
57. $C_2H_6O_2$ (ethylene glycol Z)	62.07	198	-11.5
58. $C_2H_6O_4S$ (dimethyl sulfate)	126.13	189(d)	-32
59. C_2H_7N (dimethylamine)	45.09	7	-96
60. C_2H_7N (ethylamine)	45.09	16.6	-81
61. C_2H_7NO (2-aminoethanol)	61.09	170	10.3
62. $C_2H_8N_2$ (ethylenediamine)	60.11	116.5	8.5
63. C_3Cl_6O (hexachloroacetone)	264.75	203	-2
64. C_3F_6O (hexafluoroacetone)	166.02	-27.4	-125
65. $C_3F_6H_2O$ (hexafluoroacetone·H_2O)	184.04	55(80)	40
66. $C_3H_4O_3$ (ethylene carbonate)	88.06	248	39
67. C_3H_5N (propionitrile)	55.08	97.4	-93
68. C_3H_6O (acetone Z)	58.08	56.2	-95.4
69. C_3H_6O (oxetane)	58.08	46	
70. $C_3H_6O_2$ (ethyl formate)	74.08	54.5	-81
71. $C_3H_6O_2$ (methyl acetate)	74.08	57	-98
72. $C_3H_6O_3$ (dimethyl carbonate)	90.08	90	3
73. C_3ClH_7 (1-chloropropane)	78.54	46.6	-123
74. C_3ClH_7 (2-chloropropane)	78.54	35.7	-117
75. C_3H_7NO (N,N-dimethylformamide Z)	73.10	152	-61
76. C_3H_7NO (N-methylacetamide Z)	73.10	206	29.5
77. C_3H_8O (1-propanol Z)	60.11	97.4	-127
78. C_3H_8O (2-propanol Z)	60.11	82.4	-89.5
79. $C_3H_8O_2$ (2-methoxyethanol)	76.11	124	-85
80. $C_3H_8O_2$ (dimethoxymethane)	76.11	42	-105
81.[a] $C_3H_9O_3B$ (trimethyl borate)	103.91	68	-29
82. C_3H_9N (1-aminopropane)	59.11	47.8	-83
83. C_3H_9N (2-aminopropane)	59.11	32.4	-95
84. C_4H_4S (thiophene)	84.14	84.2	-38
85. C_4H_5N (pyrrole)	67.09	130	-15
86. $C_4H_6O_3$ (acetic anhydride)	102.09	139.6	-73
87. $C_4H_6O_3$ (propylene carbonate)	102.09	240	-70
88. C_4H_8 (cyclobutane)	56.12	12	-50
C_4H_4O (furan); see 225			
89. C_4H_8O (ethyl methyl ketone)	72.12	79.6	-86
90. C_4H_8O (tetrahydrofuran)	72.12	66	-65
91. $C_4H_8O_2$ (1,3-dioxane)	88.12	107	-42
92. $C_4H_8O_2$ (1,4-dioxane)	88.12	102	11.8
93. $C_4H_8O_2$ (ethyl acetate)	88.12	77.1	-83.6
94. $C_4H_8O_2S$ (sulfolane Z)	120.16	283	28.9
95. C_4H_9Br (1-bromobutane)	137.03	102	-112
96. C_4H_9Br (dl-2-bromobutane)	137.03	91.2	-112

[a] For $C_3H_8O_3$ (glycerol), see 226.

S	ρ	n_D	ε	μ	$10^3\eta$	
i	0.903(15)	1.3676	6.3(170)	2.05	2.79(10)	49.
m	1.200	1.4419	26	1.78	39.1(15)	50.
m	1.104	1.3639				51.
p	1.01	1.4319	182	3.83	16.5	52.
p	1.04(25)	1.3917	28.1(30)	3.6	6.61	53.
m	1.270	1.4434				54.
m	0.785(25)	1.3611	24.3	1.69	10.8	55.
m	1.101	1.4770	49	3.96	19.8	56.
m	1.109	1.4318	37.7	2.28	136(30)	57.
v	1.328	1.3874	42.6(20)			58.
v	0.68(0)		5.26	1.03		59.
m	0.683	1.3663	6.94(10)	1.22		60.
m	1.018	1.4541		2.6(D)		61.
m	0.9	1.4568	14.2(20)	1.99	15.4	62.
p	1.74(12)	1.5112	3.82(30)			63.
(m)	1.33(25ℓ)		1.96(-35)			64.
(m)		1.3179				65.
	1.32(39)	1.4158(50)		4.5		66.
	0.782	1.3655	27(20)	4.02	4.54(15)	67.
m	0.790	1.3588	20.7	2.88	3.16	68.
m		1.3961		1.93		69.
p	0.917	1.3598	7.2	1.93	3.58(30)	70.
v	0.933	1.3593	6.7	1.72	3.62	71.
i	1.069	1.3687		0.9		72.
i	0.891	1.3879	7.7	2.05	3.18(30)	73.
i	0.862	1.3777		2.17	2.86(30)	74.
m	0.945(25)	1.4303	36.7	3.86	7.96	75.
v	0.957(25)	1.4301	179(30)	3.73	38.9(30)	76.
m	0.804	1.3850	20.1	1.68	20.0	77.
m	0.786	1.3776	18.3	1.66	17.7(30)	78.
m	0.965	1.4024	16(30)	2.2(B)		79.
v	0.847(30)	1.3530	2.7(20)	0.74(35°)	32.5(30)	80.
d	0.915	1.3568	8.0(20)			81.
v	0.717	1.3870		1.17		82.
m	0.889	1.3742	5.5(20)			83.
i	1.065	1.5289	2.76(16)	0.55	6.21	84.
i	0.969	1.5085	7.48(18)	1.84		85.
v	1.082	1.3901	21(19)	2.8	78.3(30)	86.
	1.204	1.4189	65.1	4.98(B)	25.3	87.
i	0.72(5)	1.4260				88.
v	0.805	1.3788	18.5(20)	2.5(B)	36.5(30)	89.
m	0.889	1.4050	7.32	1.63		90.
m	1.034	1.4165		2.13(B)		91.
m	1.034	1.4224	2.21	0	10.87(30)	92.
p	0.900	1.3723	6.02	1.78	4.41	93.
v	1.262(30)		44(30)	4.7	98.7(30)	94.
i	1.276	1.4401	7.1(20)	2.08		95.
i	1.259	1.4366	8.64	2.23		96.

Compound	Mw	Bp	Mp
97. C_4H_9N (pyrrolidine)	71.12	89	
98. C_4H_9NO (N,N-dimethylacetamide Z)	87.12	165	-20
99. C_4H_9NO (morpholine)	87.12	128	-4.8
100. $C_4H_{10}O$ (1-butanol Z)	74.12	117	-90
101. $C_4H_{10}O$ (diethyl ether)	74.12	34.5	-116
102. $C_4H_{10}O$ (dl-2-butanol)	74.12	99.5	-115
103. $C_4H_{10}O$ (i-butyl alcohol)	74.12	108	-108
104. $C_4H_{10}O$ (t-butyl alcohol Z)	74.12	82	25.5
105. $C_4H_{10}O_2$ (1,1-dimethoxyethane)	90.12	64.5	-113
106. $C_4H_{10}O_2$ (2-ethoxyethanol)	90.12	135	
107. $C_4H_{10}O_2$ (ethylene glycol dimethyl ether Z)	90.12	83	-58
108. $C_4H_{10}O_3$ (diethylene glycol)	106.12	245	-10
109. $C_4H_{11}N$ (diethylamine)	73.14	56	-50
110. $C_4H_{12}Si$ (tetramethylsilane)	88.23	26.5	-102(α)
111. C_5H_5N (pyridine Z)	79.10	115.6	-41.8
112. C_5H_6O (γ-pyran)	81.09	80	
113. C_5H_8O (2,3-dihydro-γ-pyran)	84.13	86	
114. C_5H_{10} (cyclopentane)	70.14	49.3	-93.9
115. $C_5H_{10}O$ (tetrahydropyran)	86.14	88	
116. $C_5H_{10}O_3$ (diethyl carbonate)	118.13	126	-43
117. $C_5H_{11}N$ (piperidine)	85.15	106	-10.5
118. $C_5H_{11}NO$ (N,N-dimethylpropionamide)	101.15	175	-45
119. $C_5H_{12}N_2O$ (tetramethylurea)	116.16	167	-1
120. C_5H_{12} (neopentane)	72.15	9.5	-16.6
121. C_5H_{12} (pentane)	72.15	36.1	-130
122. $C_5H_{12}O$ (1-pentanol)	88.15	137	-79
123. $C_5H_{12}O$ (dl-2-pentanol)	88.15	119	
124. $C_5H_{12}O$ (3-pentanol)	88.15	116.1	<-75
125. $C_5H_{12}O$ (i-pentyl alcohol)	88.15	132	-117
126. $C_5H_{12}O$ (neo-pentyl alcohol)	88.15	113	52
127. $C_5H_{12}O$ (t-pentyl alcohol)	88.15	102	-8.4
128. $C_5H_{12}O_3$ (diethylene glycol monomethyl ether)	120.15	193	
129. C_6F_6 (hexafluorobenzene)	186.05	81(743)	∿5
130. $C_6Cl_3H_3$ (1,2,4-trichlorobenzene)	181.45	213.5	17
131. $C_6Cl_2H_4$ (o-dichlorobenzene)	147.01	180.5	-17
132. C_6H_5Br (bromobenzene)	157.02	156	-30.8
133. C_6ClH_5 (chlorobenzene)	112.56	132	-45.6
134. C_6FH_5 (fluorobenzene)	96.11	85.1	-41
135. C_6H_5I (iodobenzene)	204.01	188	-31.3
136. $C_6H_5NO_2$ (nitrobenzene)	123.05	211	5.8
137. C_6H_6 (benzene Z)	78.12	80.1	5.5
138. C_6H_6O (phenol)	94.11	181.8	43
139. C_6H_7N (aniline)	93.13	184	-6.3
140. C_6H_7N (2-picoline)	93.13	129	-70
141. C_6H_7N (3-picoline)	93.13	144	-18
142. C_6H_7N (4-picoline)	93.13	145	3.6
143. C_6H_{12} (cyclohexane)	84.16	80.7	6.55

S	ρ	n_D	ε	μ	$10^3\eta$	
m	0.852	1.4431		1.58(B)		97.
m	0.937(25)	1.4384	37.8	3.81	9.2	98.
m	1.001	1.4548	7.33	1.5(B)		99.
p	0.810	1.3993	17.1	1.66	22.7(30)	100.
p	0.714	1.3526	4.34(20)	1.15	2.22	101.
p	0.806	1.3978	15.8	1.7(B)	42.1(20)	102.
p	0.794(30)	1.3955	17.7	1.64	39.1	103.
m	0.789	1.3878	10.9(30)	1.66(ℓ)	33.2(30)	104.
v	0.850	1.3668	3.49(20)			105.
m	0.930	1.4080		2.08		106.
m	0.863	1.3796			11(20)	107.
m	1.120	1.4472		2.7(D)	300	108.
v	0.71(18)	1.3873(18)	3.6(22)	0.92		109.
i	0.64	1.3587		0		110.
m	0.982	1.5095	12.3	2.19	9.45(20)	111.
		1.4559				112.
p	0.92	1.4399				113.
i	0.746	1.4065	1.97	0(ℓ)	4.16	114.
	0.881	1.4200				115.
i	0.975	1.3845	2.82(20)	1.10	7.48	116.
m	0.861	1.4530	5.8(22)	1.2(B)		117.
						118.
	0.969	1.4507	23.1	3.92(ℓ)		119.
i	0.614	1.3476(6)		0		120.
i	0.626	1.3575	1.84(20)	0	2.15	121.
i	0.814	1.4101	13.9	1.8(ℓ)	33.5	122.
v	0.810	1.4053				123.
p	0.821	1.4104	13.9			124.
p	0.809	1.4075	14.7	1.82(ℓ)	29.6(30)	125.
p	0.812					126.
p	0.806	1.4052	5.82	1.7(B)	28.1(30)	127.
m	1.027	1.4264				128.
i		1.3769				129.
i	1.454	1.5717		1.26(B)		130.
i	1.305	1.5515	9.93	2.50		131.
i	1.495	1.5597	5.40	1.70	9.85(30)	132.
i	1.106	1.5241	5.62	1.69	7.99(20)	133.
i	1.023	1.4684(40)	5.42	1.60		134.
i	1.831	1.6200	4.63(20)	1.70		135.
i	1.204	1.5562	35(30)	4.22	20.3(20)	136.
i	0.879	1.5011	2.28(20)	0	6.03	137.
v	1.072	1.5418(41)	9.78(60)	1.45	34.9(50)	138.
v	1.022	1.5863	6.89(20)	1.76(D)	37.7	139.
v	0.944	1.4957	9.8	1.9(B)		140.
m	0.967	1.5040		2.4(B)		141.
m	0.955	1.5037		2.6(B)		142.
i	0.778	1.4266	2.02(20)	0	8.98	143.