The Surface Tension of Pure Liquid Compounds

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The surface tension tables presented herein are the result of a literature survey, evaluation, and compilation of data of some 2200 pure liquid compounds, 226 of which were reported for a single temperature. These are arranged with related compounds in the increasing order of their molecular weights. As far as possible the method of measurement, nature of atmosphere to which the liquid was exposed during measurements, and the estimated accuracy are given for each liquid. The tabulated values were calculated from the derived results of directly measured quantities reported in the literature of many countries from about 1874 to 1969. Preliminary plots of the experimentally measured quantities indicated that the surface tensions of the liquid compounds are linear functions of the temperature over the reported operational range. The principle of least squares was applied to experimental surface tension values to establish the regression curves and their equations. The constants of the equations (slope and intercept), together with the standard deviations are given for each compound. The selection factors establishing criteria of quality of surface tension data are discussed. These include (a) method of measurement, (b) purity of compound, (c) quality of apparatus and assembly, (d) experimental procedure (experimentation), (e) reliability of measurements (most probable values), (f) experience of investigator, and (g) availability of data. There are 274 references listed alphabetically.

Key words: Surface tension; liquids: thermodynamics of liquids: evaluated data.

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Comparison of Recommended Values for Surface Tension as a Function of Temperature with Selected Measurements.

1. Introduction

The following tables present, in the opinion of the writer, the best values of the surface tensions presently available for the compounds listed. The compounds which were studied are those which are liquid in the general vicinity of room temperature and below; the cryogenic fluids are also included. The writer has tried his best to be comprehensive in coverage within this range. References run from the 19th century through 1969.

In addition to compiling the data available in the literature the writer has evaluated these data and estimated their reliability. A discussion of the methods used in evaluating the data and determining their reliability is given below.

1.1. Contents of the Tables

The tables have been arranged, as far as possible, with related compounds in the order of their increasing molecular weights. With one exception the tables present values of the surface tension at integral values of the temperature in degrees Celsius. The exception is the final table which contains data for those compounds that have been studied at only one temperature.

The range of temperatures covered in the tables for a given compound reflects the range covered by the set or sets of measurements selected as most reliable. For the large majority of the compounds the dependence of the surface tension (given in dyn/cm)[1] on the temperature can be given as

$$\gamma = a - bt$$

where a and b are constants and t is the temperature in degrees Celsius. The values of a and b obtained by least-squares fitting of the experimental values are given in the tables and can be used to interpolate within the operational range. The numbers, σ_γ, given in the tables are standard deviations of the residuals resulting from the fit and give a measure of the scatter of the experimental measurements about the line. For a few compounds, for which measurements were available over a rather large temperature range, the van der Waals-Guggenheim equation [ref. 82] was applied. In these cases the equation used is included in the table.

An estimate of the reliability of the data is given in each table and will be found in the space above the columns of numbers or in footnotes. Where one investigator reported an extended series of measurements in one table and used the same apparatus and procedures throughout, the same reliability value was assumed to apply to all entries in the table.

Whenever the information is available, the method of measurement is given, together with the nature of the atmosphere to which the liquid was exposed during the measurement. Air is designated as A; nitrogen, N_2; hydrogen, H_2; helium, He; etc. In the case of measurements made within a closed system, the liquid was in equilibrium with its own vapor. This situation is indicated by the letter, V.

1.2. The Figures

For a number of liquids, for which several sets of measurements over a temperature range exist, plots were made comparing the values selected by the writer with those measured experimentally or selected by other workers. These deviation plots are shown in figures 1–56. The 56 liquids represent those liquids for which the most data are available, with the exception of water. A plot was not given for water since the surface tension of water is known with sufficient precision that a plot of the recommended values against the principal measurements, as listed in table 86, would show no deviations on a scale comparable with that of the other figures. Also Gittens [72 aa] has recently made a fine-grained analysis of the data for water and his recommended values differ negligibly from those recommended here.

1.3. Finding a Given Compound and the Index

The presentation of the data involved formidable problems in nomenclature. Since the measurements cited cover a time span of nearly 100 years, many of the names supplied in the original papers had to be changed to make them conform to modern usage and hence make them intelligible to as large a body of readers as possible. An attempt was made to follow the practices of *Chemical*

[1] 1 dyn/cm = 10^{-3} N/m.

Abstracts in the text and in indexing. Trivial names, or names from other systems of nomenclature which are widely used are usually cross referenced in the Index. Further details are provided at the start of the Index.

The compounds are grouped in the tables according to chemical type, and this is reflected in the naming and numbering of the tables. Usually, the proper table for a given compound can be found by looking at the List of Tables. However, compounds for which data are available only at a single temperature are grouped together. Furthermore, an author making systematic measurements on a class of compounds would occasionally include some compounds of another class which provided interesting comparisons because of structural relationships: for example, an author studying esters of a given acid might include measurements on the acid itself. Because the interest provided by the comparisons may still exist for many readers and because the estimate of error tends to remain constant within a given series of this type, such tables were included as they were initially presented. In any event all compounds in the tables can be located in the Index.

1.4. The Selection of the Recommended Data and the Estimation of Reliability

The selection of data to be recommended and the estimation of their reliability involve several factors, the most important of which are (a) amount of data available, (b) method of measurement, (c) purity of compound, (d) quality of apparatus and assembly, (e) experimental procedure, (f) experience of the investigator. The interplay of these factors in the case of each compound or set of measurements will not be described in detail. However, in what follows the principles used by the writer in the selection of the data and the estimation of their reliability will be given.

a. Amount of Data Available

A review of the literature from 1880 to the present time reveals that surface tension measurements for a large number of liquids have been reported but once. Since it was deemed desirable to make the present compilation as comprehensive as possible, these were included regardless of their probable degree of accuracy. It should be clear that there is no direct check on the accuracy of the measurements on these compounds, and that the accuracy is estimated indirectly from the other factors listed above.

b. Methods of Measurement

The surface tension data tabulated in the tables which follow were measured by one or more of the static methods [see ref. 108a]. These methods are concerned with liquid systems whose surfaces are relatively stationary and have existed long enough to permit the contiguous phases to attain a state of equilibrium with them.

The method which is truly static involves the spontaneous rise of a liquid in a capillary tube. It is the simplest and most accurate and can be used over a wide temperature range. The experimental conditions are so clearly defined and the mathematical theory so simple that the accuracy of the measurements is limited largely to the design of the capillarimeter and any procedural errors introduced by the operator.

The capillary-rise apparatus has numerous variants. Many novel designs have appeared in the literature: some, to meet special experimental conditions; others, to obtain precise results with a minimum of liquid; and still others, to circumvent the time-consuming effort involved in the selection and testing of component parts of the capillarimeter. Although the capillary-rise method is accepted as the ultimate standard for the determination of liquid surface-tensions, the fact remains that high precision is obtained only by rigorously conforming to certain structural and dimensional specifications in designing the capillarimeter. Three directly measurable components only are involved in the capillary-rise equation. Thus, the determinate and indeterminate errors are relatively few and, therefore, the accuracy is very high.

For liquids which form an appreciable glass-liquid contact angle, alternative methods, such as the maximum bubble-pressure or drop-weight, are generally used. The experimental procedures for these are somewhat more complex, but in the hands of an experienced and expert operator the results are very reliable.

c. Purity of Compound

One fundamental requisite, probably the most important in determining the accuracy of surface tension data, is the purity of the compounds involved. Although compounds of very high purity are now readily available, this was decidedly not the case even a few years ago, when most investigators had to prepare their own compounds. Therefore, in the evaluation of surface tension data careful attention must be paid to the efforts investigators have made to obtain their compounds in pure form and to document their purity.

Other things being equal, surface tension measurements made in recent years on a given compound are probably more accurate than those reported previously. The probable purity of the compound played an important role in the decision of the writer in selecting a given set of data for the tables. This selection was frequently guided by advice from authorities in chemical preparative methods who reviewed the various reports on the compounds involved.

d. Quality of Apparatus and Assembly

It has been pointed out that a given method for measuring the liquid surface tension may have many variants. These manifest themselves in variations of design of the principal apparatus and in the organization of the various essential parts of the total assembly. The writer has observed that equally experienced operators using different variants of the same technique on the same compound can obtain differing results. In comparing different measurements,

other things being equal, the writer has a preference for the simpler apparatus.

e. Experimental Procedure

The writer attached greater weight to those papers in which the experimenter either gave replicate measurements that allowed a measure of random errors to be derived or derived such a measure himself.

f. Experience of the Investigator

Some investigators conducted extensive series of measurements over a period of years. When this occurred it was usually possible to compare their results in some cases with results of other workers of recognized capability, and thus obtain an estimate of their reliability. When discrepancies occurred the writer gave greater weight to the results of an investigator with a proven record of reliability.

g. Estimation of Reliability

The factors listed above were not only used in selection from among competing data sets but also in determining the reliability of a given data set. In addition the writer utilized the following sources in estimating reliability: reliability estimates made by the author of the compiled values which appear in the *International Critical Tables*, estimates made by the investigator in reporting his measurements, calculations of the magnitude of random errors, and estimates based on comparisons with data of known reliability.

2. Acknowledgments

In bringing this compilation to a close, the writer wishes to acknowledge with gratitude the help and cooperation which he received in its preparation. His thanks and appreciation, accordingly, are directed to the following who assisted in making the project a success.

1. The American Philosophical Society whose financial assistance through a grant-in-aid helped very materially in the successful completion of the project.

2. Professor Calvin L. Stevens, Chairman, Department of Chemistry, Wayne State University, who furnished an office and supplied services for the writer.

3. Dr. J. Russell Bright, Director of the Office for Research Administration of Wayne State University, whose encouragement and financial arrangements played a major role in the successful completion of this surface tension compilation.

4. Dr. T. Fraser Young of the Argonne National Laboratories, Argonne, Illinois, who, from the wealth of his experience, furnished much invaluable advice on many aspects of the compilation-in-progress.

5. Drs. Norman L. Allinger and Carl R. Johnson, who advised the writer on the apparent quality of numerous organic compounds from the literature descriptions.

6. Miss Marta Nakoneczny, who spent many hours translating numerous articles from the Russian literature for the writer.

7. Miss Mary Ann Richter who devoted many hours for many months, typing and carefully proofreading the numerous tables, and making the tracings for the surface tension vs temperature curves presented herein.

8. Dr. Robert S. Tipson, Miss Bettijoyce Breen, Mrs. Gertrude B. Sherwood and Miss Elizabeth M. Wilson of NBS who assisted in developing a consistent nomenclature and in the indexing.

3. Tables of Surface Tensions

TABLE 1. Acetals [242]

(Capillary Rise Method-A)

Compound	Surface tension (±0.10)									Least squares constants		σ_y
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Dimethoxymethane	21.79	21.19	19.99	------	------	------	------	------	------	23.59	0.1199	±0.06
Diethoxymethane	21.93	20.29	20.00	18.71	17.41	16.12	------	------	------	23.87	0.1291	±0.21
Dipropoxymethane	23.74	23.26	22.31	21.36	20.40	19.45	18.50	17.55	16.59	25.17	0.0953	±0.05
Dibutoxymethane	25.00	24.57	23.69	22.81	21.93	21.06	20.18	19.30	18.43	26.32	0.0877	±0.06
Diisobutoxymethane	------	22.63	21.76	20.89	20.01	19.14	18.27	17.40	16.53	24.37	0.0871	±0.04
Dipentyloxymethane	26.43	25.97	25.03	24.10	23.17	22.24	21.31	20.37	19.44	27.83	0.0932	±0.04
Dihexyloxymethane	27.44	27.02	26.17	25.33	24.48	23.63	22.79	21.94	21.10	28.71	0.0846	±0.04
Diisopropoxymethane	------	20.97	20.08	19.20	18.32	17.44	16.56	15.67	14.79	22.73	0.0882	±0.04
1,1-Dimethoxyethane	22.16	21.58	20.42	19.26	18.10	16.95	------	------	------	23.90	0.1159	±0.02
1,1-Diethoxyethane	21.91	21.40	20.37	19.34	18.31	17.28	16.25	15.22	14.19	23.46	0.1030	±0.10
1,1-Dipropoxyethane	23.57	23.09	22.11	21.14	20.17	19.20	18.23	17.25	16.28	25.03	0.0972	±0.09
1,1-Dibutoxyethane	24.90	24.44	23.51	22.59	21.67	20.75	19.83	18.90	17.98	26.28	0.0922	±0.06
1,1-Diisobutoxyethane	22.85	22.40	21.52	20.63	19.74	18.85	17.97	17.08	16.19	24.18	0.08877	±0.02

TABLE 2.1. Acetylenes [80]

(Maximum Bubble Pressure-A)

Compound	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
1-Hexyne	20.98	-------	-------	-------	-------	-------
1-Heptyne	22.68	20.59	18.51	-------	24.76	0.1042
1-Octyne	23.86	21.78	19.70	-------	25.94	0.1040
1-Nonyne	25.01	23.03	21.05	18.58	26.99	0.09893
1-Decyne	25.93	24.01	22.08	19.67	27.86	0.09637
1-Undecyne	26.59	24.71	22.82	20.47	28.47	0.094124
1-Dodecyne	27.27	25.36	23.44	21.05	29.19	0.09581
1-Tridecyne	27.56	25.68	23.80	21.46	29.44	0.09395
3-Cyclohexylpropyne	29.81	27.85	25.90	23.46	31.76	0.09764

TABLE 2.2. Diesters of 2-butyne-1,4-diol [80]

(Maximum Bubble Pressure-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Formate	-------	45.64	42.75	39.15	51.42	0.1444
Acetate	-------	38.20	35.77	32.72	43.08	0.1219
Propionate	36.16	34.07	31.98	29.37	38.25	0.1045
Butyrate	33.15	31.41	29.69	27.51	34.88	0.0867
Valerate	32.03	30.41	28.79	26.76	33.65	0.08107
Hexanoate	31.50	29.86	28.21	26.16	33.14	0.0821
Heptanoate	31.23	29.79	28.34	26.53	32.68	0.0724

TABLE 2.3. 2-Propyn-1-ol and its esters [80]

(Maximum Bubble Pressure-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Formate	35.00	32.17	29.34	-------	37.83	0.1415
Acetate	32.82	30.20	27.57	-------	35.45	0.1313
Propionate	31.25	28.85	26.44	23.44	33.65	0.1201
Butyrate	30.04	27.84	25.65	22.90	32.24	0.1099
Valerate	29.80	27.70	25.60	22.97	31.90	0.1050
Hexanoate	29.46	27.50	25.53	23.07	31.43	0.09837
Heptanoate	29.68	27.78	25.89	23.52	31.58	0.09488
2-Propyn-1-ol	36.05	33.50	30.97	-------	38.59	0.1270

TABLE 3. Acetylenic esters [115]

(Differential Capillary Rise-A)

Compound	Surface tension (±0.1)									Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Methyl 3-butynoate	33.57	32.94	31.68	30.42	29.16	27.90	26.64	25.38	24.12	35.46	0.1260	±0.07
Ethyl 3-butynoate	31.00	30.43	29.28	28.13	26.97	25.82	24.67	23.52	22.37	32.73	0.1151	±0.07
Propyl 3-butynoate	30.43	29.88	28.78	27.69	26.59	25.49	24.40	23.30	22.21	32.07	0.1096	±0.07
Butyl 3-butynoate	------	29.42	28.41	27.41	26.40	25.40	24.39	23.39	22.38	21.43	0.1005	±0.06
Methyl 9-decynoate	33.61	33.10	32.06	31.02	29.98	28.95	27.91	26.87	25.84	35.17	0.1037	±0.03
Ethyl 9-decynoate	32.48	31.97	30.94	29.91	28.88	27.86	26.83	25.80	24.78	34.02	0.1027	±0.08
Propyl 9-decynoate	------	31.74	30.78	29.83	28.87	27.92	26.96	26.01	25.05	33.65	0.0955	±0.03
Ethyl undecanoate[a,b]	28.78	28.34	27.44	26.54	25.64	24.75	23.85	22.95	22.06	30.13	0.0897	±0.07
Dimethyl acetylenedicarboxylate	38.52	37.91	36.70	35.48	34.27	33.06	31.84	30.63	29.41	40.34	0.1214	±0.09
Diethyl acetylenedicarboxylate	33.82	33.31	32.27	31.24	30.21	29.18	28.15	27.11	26.08	35.37	0.1032	±0.06
Dipropyl acetylenedicarboxylate	------	32.18	31.23	30.27	29.31	28.35	27.39	26.44	25.48	34.10	0.0958	±0.10
Diisopropyl acetylenedicarboxylate	------	30.67	29.75	28.82	27.89	26.96	26.03	25.11	24.18	32.53	0.0928	±0.08
Dibutyl acetylenedicarboxylate	32.17	31.72	30.82	29.92	29.02	28.12	27.22	26.32	25.42	33.52	0.0900	±0.05
Dipentyl acetylenedicarboxylate	31.84	31.42	30.58	29.73	28.89	28.05	27.20	26.36	25.51	33.11	0.0844	±0.10
Diisopentyl acetylenedicarboxylate	------	30.68	29.84	28.99	28.15	27.31	26.46	25.62	24.77	32.37	0.0844	±0.02
Propyl phenylpropiolate	37.58	37.07	36.05	35.04	34.02	33.01	31.99	30.98	29.96	39.10	0.1015	±0.08
Butyl phenylpropiolate	------	36.21	35.29	34.36	33.43	32.50	31.57	30.65	29.72	38.07	0.0928	±0.04
Isobutyl phenylpropiolate[b]	35.50	35.05	34.14	33.22	32.31	31.40	30.49	29.58	28.67	36.87	0.09116	±0.01

[a] Not acetylenic.

[b] Ref. [255] (Cap. Rise-A) (±0.3).

TABLE 4. Tertiary alcohols [162, 173]

(Maximum Bubble Pressure Method-A)

Compound	Surface tension (±0.1)					Least squares constants	
	25°	35°	45°	55°	65 °C	a	b
3-Methyl-3-hexanol	24.44	23.53	22.62	21.73	20.80	26.72	0.0910
3-Ethyl-3-hexanol	25.55	24.66	23.77	22.88	21.99	27.77	0.0880
4-Methyl-4-heptanol	24.68	23.70	22.73	21.75	20.78	27.12	0.0976
4-Ethyl-4-heptanol	25.22	24.41	23.61	22.80	22.00	27.24	0.08075
4-Propyl-4-heptanol	25.05	24.25	23.45	22.65	21.85	27.05	0.0800
2-Methyl-2-hexanol	23.74	22.86	21.87	21.09	20.20	25.96	0.0886
3-Ethyl-3-pentanol	25.25	24.36	23.47	22.57	21.68	27.49	0.0894
2-Methyl-2-octanol	25.41	24.56	23.72	22.89	22.03	27.52	0.08455
3-Methyl-3-nonanol	26.12	25.27	24.41	23.55	22.69	28.27	0.08585
4-Methyl-4-decanol	26.05	25.22	24.38	23.55	22.72	28.14	0.08345
5-Methyl-5-undecanol	26.13	25.32	24.50	23.69	22.87	28.17	0.0815
6-Methyl-6-dodecanol	26.07	25.46	24.84	24.22	23.60	27.62	0.0618
tert-Butyl alcohol	19.96	19.06	18.16	17.26	16.36	22.21	0.0900
3-Methyl-3-heptanol	25.21	24.27	23.34	22.40	.....	27.54	0.09339
4-Methyl-4-octanol	25.61	24.63	23.64	22.66	.....	28.07	0.09841
5-Methyl-5-nonanol	26.20	25.21	24.23	23.24	.....	28.66	0.09854
2-Methyl-2-heptanol	24.76	23.81	22.86	21.91	.....	27.14	0.0951
3-Methyl-3-octanol	26.05	25.12	24.18	23.24	.....	28.40	0.09382
4-Methyl-4-nonanol	25.72	24.87	24.02	23.17	.....	27.84	0.08483
5-Ethyl-5-decanol	26.58	25.70	24.81	23.94	.....	28.79	0.08836
5-Propyl-5-decanol	26.28	25.45	24.62	23.79	.....	28.35	0.0829
5-Butyl-5-decanol	26.84	25.95	25.05	24.16	.....	29.08	0.08954

TABLE 5.1. Aldehydes

Compound	Surface tension										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Acetaldehyde[a]	22.54	21.18	19.82	18.46	17.10	.....	.....	.....	.....	.....	23.90	0.1360	±0.08
Paraldehyde[b]	27.22	26.16	25.09	24.03	22.97	21.91	20.85	19.78	18.72	17.60	28.28	0.1062	.....
Butyraldehyde[c]	25.74	24.82	23.89	22.97	22.04	21.12	20.19	.....	.....	.....	26.67	0.0925	.....
Valeraldehyde[c]	26.95	25.94	24.93	23.92	22.91	21.90	20.89	.....	.....	.....	27.96	0.1010	.....
Isovaleraldehyde[d]	24.70	23.69	22.67	21.66	20.65	19.64	18.63	17.61	16.60	.....	25.71	0.1012	.....
Heptanal[c]	27.72	26.84	25.84	24.96	24.08	23.19	22.20	.....	.....	.....	28.64	0.0920	.....
Benzaldehyde[b]	39.63	38.54	37.45	36.36	35.7	34.18	33.09	32.00	30.91	29.82	40.72	0.1090	.....
Cumaldehyde[d]	34.91	34.03	33.14	32.26	31.37	30.48	29.60	28.71	27.83	26.94	35.80	0.08861	.....
Salicylaldehyde[f]	.....	42.90	41.65	40.41	39.17	37.93	36.69	35.44	34.20	32.96	45.38	0.1242	±0.06
2-Furaldehyde[d]	45.08	43.76	42.39	41.10	39.78	38.45	37.12	35.79	34.47	33.14	46.11	0.1327	.....
Trichloroacetaldehyde[g]	26.46	25.27	24.07	22.87	21.67	20.48	19.28	18.08	.....	.....	27.66	0.1197	.....

[a] Ref. [142] (Capillary Rise Method-A).
[b] Ref. [134] (Drop Weight-A) (±0.50).
[c] Ref. [126] (Maximum Bubble Pressure-A) (±0.10).
[d] Ref. [192] (Capillary Rise Method-A) (±0.70).
[e] Ref. [87] (Drop Weight-A) (±0.30).
[f] Ref. [27] (Maximum Bubble Pressure-A) (±0.20).
[g] Ref. [177] (Capillary Rise Method-A) (±0.10).
[h] Ref. [193] (Capillary Rise Method-A) (±0.4).

TABLE 5.2. Aldehydes (higher melting)

Compound	Surface tension											Least squares constants		σ_γ
	60°	70°	80°	90°	100°	110°	120°	140°	160°	180°	200 °C	a	b	
m-Hydroxybenzaldehyde[a]						41.96	41.10	39.36	37.62	35.89	34.15	51.51	0.08679	±0.24
p-Hydroxybenzaldehyde[a]	48.09	47.34	46.59	45.84	45.09	44.34	43.59	42.08				52.59	0.07504	±0.25
4-Hydroxy-3-methoxybenzaldehyde[b]			41.08	39.85	38.62	37.39	36.16	33.70	31.23	28.77	26.31	50.93	0.1231	

[a] Ref. [27] (Max. Bubble Pressure-A) (±0.20).
[b] Ref. [200] (Max. Bubble Pressure-A) (±0.20).

TABLE 6. Aliphatic haloesters

(Capillary Rise-A)

Compound	Surface tension									Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Methyl chloroacetate[a]	36.60	35.29	33.99	32.68	31.38	30.08	28.77	27.47	26.16	37.90	0.1304	±0.14
Methyl dichloroacetate[b]	35.78	34.56	33.34	32.12	30.90	29.69	28.47	27.25	26.03	37.00	0.1219	±0.03
Methyl trichloroacetate[b]	34.32	33.13	31.95	30.76	29.58	28.40	27.21	26.03	24.84	35.50	0.1184	±0.05
Ethyl chloroacetate[a]	33.00	31.83	30.65	29.47	28.29	27.12	25.94	24.76	23.59	34.18	0.1177	±0.08
Ethyl dichloroacetate[b]	33.73	32.57	31.42	30.26	29.10	27.94	26.78	25.63	24.47	34.89	0.1158	±0.12
Ethyl trichloroacetate[b]	31.90	30.82	29.75	28.68	27.60	26.53	25.46	24.39	23.31	32.97	0.1073	±0.10
Ethyl chloroformate[c]	27.80	26.70	25.70	24.60	23.50	22.40	21.30	20.20	19.10	28.90	0.1084	±0.09
Propyl chloroacetate[a]	31.83	30.74	29.66	28.58	27.49	26.41	25.33	24.25	23.16	32.91	0.1083	±0.10
Propyl dichloroacetate[b]	31.81	30.74	29.67	28.60	27.52	26.45	25.38	24.31	23.24	32.88	0.1071	±0.07
Propyl trichloroacetate[b]	31.50	30.43	29.37	28.31	27.24	26.18	25.12	24.06	22.99	32.56	0.1063	±0.08
Propyl bromoacetate[a]	33.02	31.96	30.91	29.85	28.79	27.73	26.67	25.62	24.56	34.08	0.1058	±0.09
Propyl iodoacetate[a]	35.51	34.44	33.37	32.30	31.23	30.17	29.10	28.03	26.96	36.58	0.1069	±0.17
Butyl chloroacetate[a]	31.20	30.22	29.23	28.25	27.26	26.28	25.29	24.31	23.32	32.19	0.0985	±0.07
Butyl dichloroacetate[b]	31.48	30.49	29.49	28.50	27.50	26.50	25.51	24.51	23.52	32.48	0.0996	±0.09
Butyl trichloroacetate[b]	31.14	30.18	29.21	28.25	27.29	26.33	25.37	24.40	23.44	32.10	0.0962	±0.09
Butyl bromoacetate[a]	32.86	31.87	30.88	29.89	28.90	27.91	26.92	25.93	24.94	33.85	0.0990	±0.05
Butyl iodoacetate[a]	34.05	33.09	32.14	31.18	30.23	29.28	28.32	27.37	26.41	35.00	0.054	±0.14
3-Methylbutyl trichloroacetate[d]	29.49	28.56	27.63	26.69	25.76	24.83	23.90	22.97	22.04	30.42	0.09313	±0.12
Ethyl 2-bromopropionate[e]	31.43	30.36	29.29	28.23	27.16	26.10	25.03	23.97	22.90	32.49	0.1065	±0.04
levo-2-Pentyl 2-bromobutyrate[e]	29.25	28.35	27.45	26.55	25.65	24.75	23.85	22.95	22.05	30.15	0.09003	±0.02

[a] Ref. [244] (±0.10).
[b] Ref. [250] (±0.10).
[c] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).
[d] Ref. [132] (Drop Weight-A) (±0.2).
[e] Ref. [256] (±0.3).

TABLE 7.1. Acetic anhydride [225]

(Capillary Rise Method-A)

Surface tension (±0.20)											Least squares constants	
−20°	−10°	10°	20°	30°	40°	50°	60°	80°	100°	110 °C	a	b
38.39	36.96	34.08	32.65	31.21	29.78	28.34	26.90	24.03	21.16	19.72	35.52	0.1436

TABLE 7.2. Aliphatic acids [246]

(Capillary Rise Method-A)

Acid	Surface tension (±0.10)									Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Formic[a]	38.22	37.67	36.58	35.48	34.38	33.28	32.18	31.09	29.99	39.87	0.1098	±0.54
Acetic	-------	27.59	26.60	25.60	24.61	23.62	22.62	21.63	20.63	29.58	0.0994	±0.09
Propionic	27.19	26.69	25.70	24.71	23.71	22.72	21.73	20.74	19.74	28.68	0.0993	±0.05
Butyric	-------	26.51	25.59	24.67	23.75	22.83	21.91	20.99	20.07	28.35	0.0920	±0.02
Isobutyric	25.50	25.04	24.12	23.20	22.28	21.36	20.44	19.52	18.60	26.88	0.0920	±0.10
Valeric	-------	27.13	26.24	25.35	24.46	23.58	22.69	21.80	20.92	28.90	0.0887	±0.08
Isovaleric	-------	25.51	24.62	23.74	22.85	21.96	21.08	20.19	19.31	27.28	0.0886	±0.07
Myristic[b]	-------	-------	-------	-------	-------	28.30	27.50	26.50	25.50	33.90	0.0932	±0.01
Levulinic[c]	-------	-------	-------	38.64	37.87	37.11	36.35	35.59	34.82	41.69	0.0763	±0.03
4-Methylvaleric[d]	27.00	26.60	25.81	25.02	24.23	23.45	22.66	21.87	21.08	28.18	0.0789	±0.07
Heptanoic[e]	28.61	28.18	27.34	26.49	25.64	24.79	23.94	-------	-------	29.88	0.0848	±0.04

[a] Ref. [125] (±0.5).
[b] Ref. [79] (Ring Pull) (±0.10).
[c] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).
[d] Ref. [177] (±1.0).
[e] Ref. [86] (Drop Weight) (±0.2).

TABLE 8. Aliphatic alcohols [246]

(Capillary Rise Method-A)

Alcohol	Surface tension (±0.10)										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Methyl	23.28	22.50	21.73	20.96	20.18	19.41	------	------	------	------	24.00	0.0773	±0.02
Ethyl	23.22	22.39	21.55	20.72	19.89	19.06	18.23	------	------	------	24.05	0.0832	±0.06
Propyl	24.48	23.71	22.93	22.15	21.37	20.60	19.82	19.04	18.27	------	25.26	0.0777	±0.03
Isopropyl	22.11	21.32	20.53	19.74	18.95	18.17	17.38	16.59	------	------	22.90	0.0789	±0.14
Butyl	26.28	25.39	24.50	23.61	22.71	21.82	20.93	20.04	19.14	18.20	27.18	0.08983	±0.04
Isobutyl	23.73	22.94	22.14	21.35	20.55	19.76	18.96	18.17	17.32	16.58	24.53	0.0795	±0.05
Pentanol	26.67	25.79	24.92	24.04	23.17	22.30	21.42	20.55	19.67	18.80	27.54	0.0874	±0.02
3-Methyl-1-butanol	24.94	24.12	23.30	22.48	21.66	20.84	20.02	19.20	18.38	17.56	25.76	0.0820	±0.04
2-Pentanol[a]	24.96	23.95	22.95	21.94	20.94	19.94	18.93	17.93	16.92	15.92	25.96	0.1004	±0.02
2-Methyl-2-butanol[b]	23.43	22.68	21.94	21.19	20.44	19.69	18.94	18.20	17.45	------	24.18	0.0748	------
Allyl	26.63	25.73	24.82	23.92	23.02	22.12	21.22	20.31	19.41	------	27.53	0.0902	±0.02
2-Methoxyethanol	32.32	31.33	30.35	29.36	28.38	27.40	26.41	25.43	24.44	23.46	33.30	0.0984	±0.01
2-Ethoxyethanol	------	28.80	27.90	27.00	26.10	25.21	24.31	23.41	22.52	21.62	30.59	0.0897	±0.12
2-Butoxyethanol	27.86	26.55	25.73	24.92	24.10	23.28	22.47	21.65	20.84	20.02	28.18	0.0816	±0.13
1-Octanol[c]	28.30	27.50	26.70	25.91	25.11	24.32	23.52	------	------	------	29.09	0.0795	±0.04
2-Octanol[c]	27.14	26.32	25.50	24.68	23.86	23.04	22.22	------	------	------	27.96	0.08197	±0.04
1-Nonanol[d]	29.03	28.27	27.51	26.75	26.00	25.24	24.48	23.72	22.96	22.20	29.79	0.07589	±0.16
1-Decanol[c]	29.61	28.88	28.14	27.41	26.68	25.95	25.21	24.48	23.75	23.02	30.34	0.07324	±0.04
Myricyl alcohol[e]	------	------	------	------	------	------	------	27.09	26.39	25.69	32.72	0.07033	±0.06

[a] Ref. [224] (±0.10).
[b] Ref. [193] (±0.4).
[c] Ref. [87] (Drop Weight-A) (±0.2).
[d] Ref. [48] (±0.2).
[e] Ref. [191].

TABLE 9. Aliphatic and related carboxylic esters [243]

(Differential Capillary Rise-A)

Compound	Surface tension (±0.10)										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Methyl myristate[a]	.....	29.40	28.60	27.80	27.00	26.20	25.40	24.60	23.80	23.00	31.00	0.0800	±0.15
Methyl palmitate[a]	.....	29.95	29.17	28.40	27.62	26.85	26.07	25.30	24.52	23.75	31.50	0.0775	±0.15
Ethyl palmitate[b]	.....	.....	30.28	29.42	28.56	27.71	26.85	25.99	25.13	24.27	32.86	0.0859	±0.14
Methyl stearate[a]	.....	30.65	29.87	29.10	28.32	27.55	26.77	26.00	25.22	24.45	32.20	0.0775	±0.15
Methyl acetate	26.66	25.87	24.08	22.79	21.50	20.22	.....	.....	.....	.....	27.95	0.1289	±0.08
Ethyl acetate[c]	25.13	23.97	22.81	21.65	20.48	19.32	18.16	17.00	15.84	14.68	26.29	0.1161	±0.10
Propyl acetate	25.48	24.36	23.24	22.12	21.00	19.88	18.76	17.64	16.52	15.40	26.60	0.1120	±0.05
Isopropyl acetate	23.37	22.30	21.22	20.05	19.08	18.01	16.94	15.86	.....	.....	24.44	0.1072	±0.05
Butyl acetate	26.48	25.41	24.35	23.28	22.21	21.14	20.07	19.01	17.94	16.87	27.55	0.1068	±0.08
Isobutyl acetate	24.07	23.56	22.55	21.54	20.52	19.51	18.50	17.49	16.47	15.46	25.59	0.1013	±0.03
sec-Butyl acetate	24.67	23.61	22.56	21.50	20.45	19.40	18.34	17.29	16.23	15.18	25.72	0.1054	±0.07
tert-Butyl acetate	23.59	22.49	21.38	20.28	19.18	18.08	16.98	15.87	.....	.....	24.69	0.1102	±0.01
Isobutyl ricinoleate[d]	32.31	31.54	30.77	29.99	29.22	28.45	27.68	26.91	26.14	25.37	33.08	0.07714	±0.01
1-Pentyl acetate	26.67	25.16	24.68	23.68	22.69	21.69	20.70	19.71	18.71	17.72	27.66	0.09943	±0.05
3-Methylbutyl acetate	25.76	24.77	23.78	22.79	21.80	20.82	19.83	18.84	17.85	16.86	26.75	0.0989	±0.06
Hexyl acetate	27.47	26.50	25.53	24.56	23.59	22.62	21.65	20.68	19.71	18.74	28.44	0.0970	±0.07
Methyl formate[e]	26.72	25.15	23.57	22.00	20.43	18.86	17.29	15.71	14.14	12.57	28.29	0.1572	±0.20
Ethyl formate	24.50	23.84	22.52	21.21	.....	.....	.....	.....	.....	.....	26.47	0.1315	±0.08
Propyl formate	25.65	24.53	23.41	22.29	21.17	20.06	18.94	.....	.....	.....	26.77	0.1119	±0.06
Isopropyl formate	22.84	22.27	21.12	19.97	18.82	.....	.....	.....	.....	.....	24.56	0.1147	±0.02
Butyl formate	26.05	25.03	24.00	22.98	21.95	20.92	19.90	18.87	17.85	16.82	27.08	0.1026	±0.02
Isobutyl formate	24.46	23.90	22.77	21.65	20.53	19.41	18.29	17.16	.....	.....	26.14	0.1122	±0.05
1-Pentyl formate	27.07	26.04	25.02	24.00	22.97	21.95	20.93	19.91	18.88	17.86	28.09	0.1023	±0.03
Isopentyl formate	25.70	24.89	23.87	22.85	21.83	20.82	19.80	18.78	17.77	16.75	26.92	0.1017	±0.04
Hexyl formate	27.82	26.85	25.89	24.92	23.96	23.00	22.03	21.07	20.10	19.14	28.78	0.0964	±0.07
Methyl propionate	26.32	25.06	23.81	22.55	21.29	20.03	18.77	.....	.....	.....	27.58	0.1258	±0.06
Ethyl propionate	25.55	24.38	23.22	22.05	20.88	19.71	18.54	17.38	.....	.....	26.72	0.1168	±0.05
Propyl propionate	25.80	24.74	23.68	22.62	21.56	20.51	19.45	18.39	17.33	16.27	26.86	0.1059	±0.04
Butyl propionate	26.38	25.36	24.39	23.40	22.40	21.41	20.42	19.43	18.43	17.44	27.37	0.0993	±0.06
Methyl butyrate	26.33	25.19	24.04	22.90	21.75	20.61	19.46	18.32	17.17	16.03	27.18	0.1115	±0.06
Methyl isobutyrate	24.86	23.73	22.60	21.47	20.33	19.20	18.07	16.94	15.81	14.68	25.99	0.1131	±0.02
Ethyl butyrate	25.50	24.46	23.41	22.37	21.32	20.28	19.23	18.19	17.14	16.10	26.55	0.1045	±0.03
Propyl butyrate	26.06	25.06	24.06	23.06	22.06	21.06	20.06	19.06	18.06	16.06	27.06	0.1000	±0.04
Butyl butyrate	26.68	25.72	24.75	23.79	22.82	21.86	20.89	19.93	18.96	18.00	27.65	0.0965	+0.06
Isobutyl butyrate[f]	23.63	22.78	21.94	21.10	20.25	19.41	18.57	17.63	16.88	16.04	24.47	0.0843	±0.03
1-Pentyl butyrate	27.02	26.11	25.20	24.29	23.38	22.48	21.57	20.66	19.75	18.84	27.93	0.0909	±0.08
Isopentyl butyrate	26.40	25.48	24.57	23.65	22.73	21.81	20.89	19.98	19.06	18.14	27.32	0.0918	±0.04
Ethyl isobutyrate	24.28	23.24	22.19	21.15	20.10	19.05	18.01	16.96	15.92	14.87	25.33	0.1046	±0.07
Propyl isobutyrate	24.83	23.80	22.78	21.77	20.75	19.74	18.72	17.71	16.69	15.68	25.83	0.1015	±0.09
Butyl isobutyrate	25.47	24.49	23.50	22.51	21.52	20.54	19.55	18.56	17.58	16.59	26.46	0.0987	±0.04
Methyl valerate	26.81	25.76	24.72	23.67	22.63	21.59	20.54	19.50	18.45	17.41	27.85	0.1044	±0.01
Methyl isovalerate	25.28	24.24	23.20	22.16	21.12	20.08	19.09	18.00	16.96	15.92	26.32	0.1040	±0.04
Ethyl valerate	26.19	25.15	24.14	23.15	22.15	21.16	20.16	19.16	18.16	17.16	27.15	0.0999	±0.02
Ethyl isovalerate	24.78	23.78	22.77	21.77	20.76	19.75	18.75	17.74	16.74	15.73	25.79	0.1006	±0.10
Propyl valerate	26.76	25.77	24.79	23.80	22.82	21.84	20.85	19.87	18.88	17.90	27.74	0.0984	±0.05
Propyl isovalerate	25.48	24.53	23.75	22.62	21.67	20.72	19.77	18.81	17.86	16.91	26.43	0.0952	±0.08
Butyl valerate	27.22	26.22	25.22	24.22	23.21	22.21	21.21	20.21	19.21	18.21	28.22	0.1001	±0.07
Butyl isovalerate	26.11	25.16	24.22	23.27	22.33	21.39	20.44	19.50	18.55	17.61	27.05	0.0944	±0.13
Isobutyl valerate[g]	24.24	23.40	22.57	21.73	20.90	20.07	19.23	18.40	17.56	16.73	25.07	0.0834	±0.05
Methyl hexanoate	27.42	26.38	25.33	24.29	23.24	22.20	21.15	20.11	19.06	18.02	28.47	0.1045	±0.10
Ethyl hexanoate	26.77	25.81	24.83	23.89	22.93	21.97	21.01	20.05	19.09	18.13	27.73	0.0960	±0.03
Methyl heptanoate	27.96	26.98	25.99	25.00	24.01	23.03	22.04	21.05	20.07	19.08	28.95	0.0987	±0.08
Ethyl heptanoate	27.38	26.44	25.50	24.56	23.62	22.69	21.75	20.89	19.87	18.93	28.32	0.0939	±0.03
Methyl octanoate	28.93	27.93	26.92	25.92	24.92	23.92	22.92	21.91	20.91	19.91	29.93	0.1002	±0.08
Ethyl octanoate	28.41	27.44	26.47	25.49	24.52	23.55	22.58	21.61	20.64	19.66	29.38	0.09716	±0.16
Methyl decanoate	29.42	28.51	27.59	26.68	25.77	24.86	23.95	23.03	22.12	21.21	30.33	0.0912	±0.04
Ethyl decanoate	29.07	28.15	27.23	26.31	25.38	24.46	23.54	22.62	21.70	20.78	29.99	0.0921	±0.06

TABLE 9. Aliphatic and related carboxylic esters [243]—Continued

Compound	Surface tension (±0.10)										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Propyl decanoate	29.16	28.29	27.41	26.54	25.66	24.78	23.91	23.03	22.16	21.28	30.04	0.0876	±0.10
Butyl decanoate	29.41	28.53	27.66	26.78	25.90	25.02	24.14	23.27	22.39	21.51	30.29	0.0878	±0.04
Methyl dodecanoate	30.40	29.50	28.69	27.80	26.91	26.01	25.12	24.23	23.34	22.44	31.37	0.08927	±0.04
Ethyl dodecanoate	29.19	28.32	27.46	26.60	25.74	24.87	24.01	23.15	22.28	21.42	30.05	0.08628	±0.05
Propyl dodecanoate	29.65	28.81	27.97	27.13	26.29	25.45	24.61	23.77	22.93	22.09	30.49	0.0840	±0.10
Butyl dodecanoate	30.02	29.15	28.27	27.40	26.52	25.64	24.77	23.89	23.02	22.14	30.90	0.0876	±0.11
Ethyl lactate [f]	------	28.75	27.77	26.79	25.80	24.82	23.84	22.86	21.87	20.89	30.72	0.0983	±0.04
1-Pentyl stearate [f]	------	------	28.35	27.61	26.87	26.13	25.39	24.65	23.91	23.16	30.57	0.07395	±0.11
Methyl acetoacetate [i]	34.04	33.09	32.15	31.20	30.26	29.32	28.37	27.43	26.48	25.54	34.98	0.0944	±0.17
Ethyl acetoacetate [i]	33.40	32.39	31.37	30.36	29.34	28.33	27.31	26.30	25.28	24.27	34.42	0.1015	±0.08
Ethyl 2-acetylvalerate [i]	30.78	29.86	28.93	28.00	27.08	26.15	25.22	24.29	23.37	22.44	31.71	0.09269	±0.38
Ethyl 2-allylaceto-acetate [i]	31.24	30.30	29.36	28.41	27.47	26.53	25.59	24.65	23.71	22.77	32.18	0.09413	±0.03
Ethyl 2,2-dimethyl-acetoacetate [i]	------	------	28.55	27.48	26.41	25.34	------	------	------	------	31.75	0.1068	±0.40
Ethyl 2-ethylaceto-acetate [h]	------	------	28.90	27.94	26.98	26.02	25.06	24.10	23.14	22.18	31.78	0.09598	±0.06
Ethyl 2,2-diethyl-acetoacetate [i]	------	------	27.23	26.29	25.36	24.43	------	------	------	------	30.03	0.0934	±0.40
Methyl levulinate [k]	------	------	31.45	30.38	29.31	28.25	27.18	26.11	25.05	23.98	34.65	0.1067	±0.15
Ethyl 2-isopentylaceto-acetate [k]	------	------	27.28	26.43	25.59	24.75	23.91	23.07	22.23	21.38	29.80	0.08415	±0.10
Methyl 2-methylaceto-acetate [i]	36.82	36.03	34.88	33.73	32.57	31.42	30.27	29.12	27.97	26.82	38.33	0.1151	±0.90
Triethyl aconitate [d]	35.57	34.56	33.54	32.52	31.50	30.49	29.47	28.45	27.44	26.42	36.59	0.1017	±0.03
Isobutyl propionate [l]	27.80	26.64	25.47	24.31	23.14	21.97	20.81	19.64	18.48	17.31	28.97	0.1166	------
Isobutyl isobutyrate [l]	29.65	28.38	27.11	25.84	24.57	23.30	22.03	20.76	19.49	18.22	30.92	0.1270	------
Isopentyl propionate [l]	26.01	25.10	24.20	23.29	22.39	21.49	20.58	19.68	18.77	17.87	26.91	0.09039	------

[a] Ref. [159] (Capillary Pressure-A) (±0.1).
[b] Ref. [49] (Maximum Bubble Pressure-A) (±0.2).
[c] Ref. [125] (V) (±0.3).
[d] Ref. [254] (A) (±0.3).
[e] Ref. [214, 82] (Calc. $\gamma = 0.03849 - (487.1 - T)^{1.25}$).
[f] Ref. [95] (A) (±0.3).
[g] Ref. [132] (Drop Weight-A) (±0.3).
[h] Ref. [216] (Maximum Bubble Pressure-A) (±0.4).
[i] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).
[j] Ref. [133] (Drop Weight-A) (±0.4).
[k] Ref. [262] (A) (±0.4).
[l] Ref. [193] (Cap. Rise-A) (±0.6).

TABLE 10. Aliphatic thiols and sulfides [248]

(Cap. Rise-A)

Compound	Surface tension (±0.1)									Least squares constants		σ_2
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Methanethiol[a]	25.55	24.70	23.00	21.31						28.09	0.1696	±0.02
Ethanethiol	23.87	23.47	22.68							25.06	0.0793	±0.10
1-Propanethiol	25.47	24.84	23.56	22.29	21.02	19.75				27.38	0.1272	±0.05
2-Propanethiol	22.50	21.91	20.74	19.56	18.39					24.26	0.1174	±0.00
1-Butanethiol	26.36	25.79	24.64	23.50	22.36	21.22	20.08	18.93		28.07	0.1142	±0.04
2-Methyl-1-propanethiol	24.52	24.01	22.99	21.96	20.94	19.92	18.89	17.87		26.06	0.1024	±0.16
2-Methyl-2-propanethiol	21.05	20.51	19.43	18.34	17.26					22.68	0.1084	±0.00
1-Pentanethiol	26.83	26.35	25.37	24.39	23.41	22.44	21.46	20.84	19.51	28.30	0.0977	±0.03
3-Methyl-1-butanethiol	26.10	25.60	24.60	23.60	22.60	21.60	20.60	19.60	18.60	27.60	0.1000	±0.21
1-Hexanethiol	27.98	27.50	26.53	25.56	24.59	23.63	22.66	21.69	20.73	29.43	0.0967	±0.03
1-Heptanethiol	27.69	27.26	26.42	25.57	24.72	23.87	23.02	22.18	21.33	28.96	0.0848	±0.25
1-Octanethiol	28.18	27.77	26.95	26.14	25.32	24.51	23.69	22.88	22.06	29.40	0.0815	±0.03
Benzenethiol	39.61	39.01	37.80	36.60	35.40	34.20	33.00	31.79	30.59	41.41	0.1202	±0.09
Methyl phenyl sulfide	40.95	40.33	39.10	37.86	36.62	35.38	34.14	32.91	31.67	42.81	0.1238	±0.03
Ethyl phenyl sulfide	37.60	37.04	35.91	34.78	33.64	32.51	31.38	30.25	29.12	39.50	0.1131	±0.12
Phenyl propyl sulfide	35.89	35.37	34.32	33.28	32.23	31.18	30.14	29.09	28.05	37.46	0.1046	±0.08
Isopropyl phenyl sulfide	33.99	33.46	32.40	31.35	30.29	29.24	28.18	27.13	26.07	35.57	0.1055	±0.09
Butyl phenyl sulfide	34.99	34.50	33.52	32.55	31.57	30.59	29.62	28.64	27.67	36.45	0.0976	±0.07
1-Pentyl phenyl sulfide	34.63	34.16	33.26	32.25	31.30	30.35	29.40	28.44	27.49	36.06	0.0952	±0.13
Hexyl phenyl sulfide	44.67	44.07	42.87	41.68	40.48	39.28	38.09	36.89	35.70	46.46	0.1196	±0.05

[a] Ref. [13] (Capillary Rise Method) (±1.5).

TABLE II. Alicyclic hydrocarbons and derivatives [236]

(Differential Capillary Rise-A)

Compound	Surface tension (±0.1)											Least squares constants		σ_Y
	5°	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Cyclohexane[a]	27.13	26.43	25.24	24.06	22.87	21.68	20.49	19.30				27.62	0.1138	±0.01
Cyclohexene[a]	28.62	28.01	26.78	25.56	24.34	23.11	21.89	20.67				29.23	0.1223	±0.01
Cyclopentane[a]	24.80	23.34	22.61	21.14	19.68	18.22						25.53	0.1462	±0.01
Cyclopentene[a]	25.19	24.44	22.95	21.45								25.94	0.1495	±0.01
Cyclo-octane[f]			29.84	28.75	27.66	26.57	25.48	24.39	23.30	22.21	21.12	32.02	0.1090	±0.05
Cyclopentanol[a]			33.02	32.01	31.00	29.98	28.97	27.96	26.95	25.94	24.93	35.04	0.1011	±0.01
Cyclohexanol[a]			33.40	32.43	31.47	30.50	29.53	28.57	27.60	26.64	25.67	35.33	0.0966	±0.01
Cycloheptanol	35.16	34.70	33.17	32.25	31.33	30.40	29.48	28.56	27.64	26.71	25.79	35.02	0.0923	±0.18
Cyclopentanone	35.00	34.45	33.35	32.25	31.15	30.05	28.95	27.85	26.75	25.65	24.55	35.55	0.1100	±0.05
Cyclohexanone	37.05	36.43	35.19	33.94	32.70	31.46	30.22	28.98	27.73	26.49	25.25	37.67	0.1242	±0.25
Cycloheptanone	36.23	35.71	34.66	33.61	32.56	31.50	30.45	29.40	28.35	27.30	26.25	36.76	0.1051	±0.11
Methylcyclopentane		23.47	22.30	21.11	19.98	18.81	17.65					24.63	0.1163	±0.12
1-Methylcyclopentene[b]	21.20	20.64	19.52									21.76	0.1120	±0.05
Methylcyclohexane[c]	25.54	24.98	23.85	22.72	21.59	20.46	19.33					26.11	0.1130	±0.02
Ethylcyclopentane[c]	25.41	24.90	23.88	22.86	21.84	20.82	19.80					25.92	0.1020	±0.01
Propylcyclopentane[b]	26.42	25.83	24.95	23.97	22.99	22.01	21.03					26.91	0.09795	±0.01
Isopropylcyclopentane[b]	25.85	25.36	24.38	23.40	22.42	21.44	20.46					26.34	0.09795	±0.01
Butylcyclopentane[b]	27.31	26.83	25.87	24.91	23.95	22.99	22.03					27.79	0.0960	±0.01
Isobutylcyclopentane[b]	26.13	25.67	24.75	23.84	22.91	21.99	21.08					26.59	0.0919	±0.01
Propylcyclohexane[b]	27.86	27.35	26.33	25.31	24.29	23.27	22.25					28.37	0.1020	±0.02
Isopropylcyclohexane[b]	27.98	27.48	26.48	25.50	24.49	23.50	22.51					28.48	0.0995	±0.08
Butylcyclohexane[b]	28.48	27.99	27.03	26.02	25.09	24.11	23.14					28.96	0.09697	±0.02
Isobutylcyclohexane[b]	27.39	26.80	25.84	24.87	23.91	22.94	21.98					27.77	0.0965	±0.01
sec-Butylcyclohexane[b]	28.88	28.41	27.46	26.52	25.56	24.61	23.66					29.36	0.0950	±0.01
tert-Butylcyclohexane[b]	28.10	27.62	26.66	25.71	24.74	23.78	22.82					28.58	0.09598	±0.01
Cyclo-octanone[f]					34.03	33.02	32.02	31.02	30.02	29.01	28.01	38.04	0.1003	±0.01
1-Methylcyclohexene[c]		27.70	26.60	25.49	24.38	23.27	22.17	21.06	19.95	18.85	17.74	28.81	0.1107	±0.09
Methylenecyclopentane		25.42	24.35	23.29	22.23							26.48	0.1063	±0.01
3-Methylcyclopentene	24.48	23.88	22.68	21.48								25.08	0.1200	±0.01
1,1-Dimethylcyclohexane[a]	25.59	25.11	24.13	23.16	22.18	21.21	20.24					26.08	0.0974	±0.05
cis-1,2-Dimethylcyclohexane[a]	27.31	26.79	25.73	24.68	23.62	22.56	21.50					27.85	0.1058	±0.02
trans-1,2-Dimethylcyclohexane[a]	25.45	24.98	24.04	23.10	22.16	21.21	20.27					25.92	0.0941	±0.05
cis-1,3-Dimethylcyclohexane[a]	24.56	24.08	22.63	22.15	21.19	20.23	19.27					25.04	0.0962	±0.02
trans-1,3-Dimethylcyclohexane[a]	26.20	25.69	24.67	23.66	22.64	21.62	20.60					26.71	0.1018	±0.01
cis-1,4-Dimethylcyclohexane[a]	25.87	25.39	24.43	23.47	22.51	21.54	20.58					26.35	0.0961	±0.02
trans-1,4-Dimethylcyclohexane[a]	24.47	23.98	23.01	22.03	21.06	20.08	19.10					24.96	0.0976	±0.02
trans-Hexahydro-2-indanone	36.43	35.96	35.03	34.10	33.17	32.24	31.32	30.39	29.46	28.53	27.60	36.89	0.0929	±0.08
trans-Decahydro-2-methylenenaphthalene			30.84	29.91	28.99	28.07	27.15	26.23	25.30	24.40	23.46	32.68	0.0922	±0.03
trans-Hexahydro-2-methylenindan			28.85	27.93	27.02	26.10	25.18	24.27	23.35	22.44	21.52	30.68	0.0916	±0.05

1,1-Dimethylcyclopentane[a]	23.27	22.76	21.75	20.73	19.72	18.70	17.68					23.78	0.1016	±0.02
2-Methylcyclohexanone[c]	33.55	33.03	32.01	30.98	29.95	28.92	27.90	26.87	25.48	24.82	23.79	34.06	0.1027	±0.03
3-Methylcyclohexanone[c]	32.60	32.13	31.21	30.28	29.36	28.43	27.51	26.58	25.66	24.73	23.81	33.06	0.0925	±0.16
4-Methylcyclohexanone[c]	32.36	31.89	30.96	30.02	29.09	28.15	27.22	26.28	25.35	24.41	23.48	32.83	0.0935	±0.02
3-Methylcyclopentanone	31.18	30.69	29.72	28.75	27.78	26.81	25.85	24.88	23.91	22.94	21.97	31.66	0.0969	±0.03
Bromocycloheptane		35.30	34.42	33.53	32.64	31.75	30.87	29.98	29.09	28.21	27.32	36.19	0.0887	±0.20
1-Methylcyclopentanol[b]			29.75	28.76	27.77	26.77	25.44	24.74	24.04	23.34	22.64	31.75	0.0993	+0.04
3-Methylcyclopentanol	29.29	28.94	28.24	27.54	26.84	26.14	25.44	24.74	24.04	23.34	22.64	29.64	0.0700	+0.01
2-Methylcyclohexanol	32.06	31.68	30.91	30.14	29.37	28.60	27.83	27.06	26.29	25.52	24.75	32.45	0.0770	±0.23
3-Methylcyclohexanol	28.77	28.45	27.82	27.19	26.56	25.93	25.31	24.68	24.05	23.42	22.79	29.08	0.0629	±0.01
4-Methylcyclohexanol	28.72	28.38	27.69	27.00	26.31	25.62	24.93	24.24	23.55	22.86	22.17	29.07	0.0690	±0.09
Decylcyclopentane[d]	30.67	30.22	29.34	28.45	27.57	26.68	25.80	24.91	24.02	23.14	22.25	31.11	0.08862	±0.01
Decylcyclohexane[d]	31.06	30.63	29.77	28.92	28.06	27.20	26.34	25.49	24.63	23.77	22.91	31.49	0.08579	±0.01
Methylenecyclohexane		26.76	25.69	24.61	23.53	22.45	21.38					27.84	0.1077	±0.02
1-Methyl-3-methylenecyclohexane		25.68	24.70	23.73	22.75	21.77	20.79					26.66	0.0978	±0.01
1-Methyl-4-methylenecyclohexane	26.20	25.70	24.72	23.73	22.75	21.76	20.78	19.79	18.81	17.82		26.69	0.0985	±0.01
2-Cyclopentylcyclopentanol		38.11	36.18	35.25	34.32	33.39	32.47	31.54	30.61	29.68	28.75	38.04	0.0929	±0.04
Ethylcyclohexane[a]	27.25	26.73	25.67	24.62	23.56	22.51	21.46					27.78	0.1054	±0.04
trans-Octahydro-2(1H)-naphthalenone	37.52	37.05	36.12	35.18	34.25	33.31	32.37	31.44	30.50	29.57	28.53	37.99	0.0936	±0.07
Methyl 2-methyl-1, 1-cyclohexanediacetate			33.68	34.70	33.72	32.73	31.75	30.77	29.79	28.81	27.83	37.62	0.0981	±0.03
Ethyl 2-methyl-1, 1-cyclohexanediacetate			33.26	32.37	31.48	30.58	29.69	28.80	27.91	27.02	26.13	35.04	0.0891	±0.01
Methylcyclopentadecane[f]			32.03	31.19	30.35	29.51	28.67	27.83	26.99	26.15	25.31	33.71	0.0840	±0.09
3-Methylcyclopentadecanone[f]			34.59	33.72	32.84	31.97	31.10	30.22	29.35	28.47	27.60	36.34	0.0874	±0.03
9-Cycloheptadecen-1-one[f]							32.83	31.94	31.05	30.17	29.28	38.15	0.08871	±0.05
1,1,3-Trimethylcyclohexane[b]	24.87	24.41	23.50	22.58	21.67	20.75	19.84					25.38	0.0915	±0.01

[a] Ref. [105] (Maximum Bubble Pressure-A).
[b] Ref. [226] (A) (±0.10).
[c] Ref. [33] (A) (±0.10).
[d] Ref. [112] (N_2) (±0.01).
[e] Ref. [27] (A).
[f] Ref. [187] (A).
[g] Ref. [1] (A).
[h] Ref. [182] (Maximum Bubble Pressure-A) (±0.03).

TABLE 12. Alkyl halides [237]

(Diff. Cap. Rise-A)

Compound	Surface tension (±0.10)										Least squares constants		σ_r
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Chloromethane[a]	17.6	16.2	14.6								19.5	0.1650	
Iodomethane	32.85	31.00	29.72	28.48							33.42	0.1234	
Bromoethane	25.36	24.20	23.00								26.52	0.1159	±0.02
Iodoethane	30.38	29.10	27.81	26.53	25.24	23.95	22.67				31.67	0.1286	±0.13
1-Chloropropane	23.16	21.92	20.67	19.43							24.41	0.1246	±0.07
2-Chloropropane	20.49	19.60	18.72	17.84							21.37	0.0883	±0.05
1-Bromopropane[b]	27.08	25.86	24.65	23.43	22.21	20.99					28.30	0.1218	±0.60
2-Bromopropane[b]	25.03	23.84	22.66	21.48	20.29						26.21	0.1183	±0.50
1-Iodopropane[b]	30.50	29.37	28.23	27.10	25.96	24.82	23.69	22.55	21.42	20.28	31.61	0.1136	±0.60
2-Iodopropane[b]	28.24	27.14	26.03	24.92	23.81	22.71	21.60	20.49			29.35	0.1107	±0.50
1-Chlorobutane	24.85	23.74	22.62	21.50	20.38	19.27	18.15				25.97	0.1117	±0.08
1-Chloro-2-methylpropane	23.30	22.20	21.10	20.00	18.90	17.81					24.40	0.1099	±0.07
2-Chlorobutane	23.28	22.16	21.05	19.93	18.81	17.69					24.40	0.1118	±0.06
1-Bromobutane	27.58	26.46	25.33	24.21	23.08	21.95	20.83	19.70	18.58	17.45	28.71	0.1126	±0.05
1-Bromo-2-methylpropane	25.90	24.84	23.78	22.72	21.66	20.61	19.55	18.49			26.96	0.1059	±0.03
2-Bromobutane	26.37	25.27	24.16	23.05	21.94	20.84	19.73	18.62	17.52		27.48	0.1107	±0.03
1-Iodobutane	29.79	28.76	27.73	26.70	25.66	24.63	23.60	22.57	21.54	20.51	30.82	0.1031	±0.07
1-Iodo-2-methylpropane	29.19	28.12	27.04	25.97	24.90	23.83	22.76	21.68	20.61	19.54	30.26	0.1072	±0.10
2-Iodobutane	29.26	28.21	27.15	26.10	25.04	23.99	22.93	21.87	20.82	19.76	30.32	0.1056	±0.08
1-Fluoropentane[c]	21.49	20.18	18.86	17.55	16.23	14.92					22.61	0.1315	±0.15
1-Chloropentane	26.01	24.94	23.86	22.79	21.71	20.63	19.56	18.48	17.41	16.33	27.09	0.1076	±0.08
1-Chloro-3-methylbutane	24.43	23.36	22.28	21.21	20.13	19.05	17.98	16.90	15.83		25.52	0.1076	±0.02
1-Bromopentane	28.46	27.41	26.36	25.31	24.26	23.22	22.17	21.12	20.07	19.02	29.51	0.1049	±0.02
1-Bromo-3-methylbutane[b]	27.10	26.11	25.11	24.12	23.12	22.12	21.13	20.13	19.14	18.14	28.10	0.09959	±0.06
1-Iodopentane	30.40	29.58	28.37	27.35	26.34	25.33	24.31	23.30	22.28	21.27	31.41	0.1014	±0.04
1-Iodo-3-methylbutane	29.46	28.54	27.63	26.71	25.80	24.88	23.97	23.05	22.14	21.22	30.37	0.09145	±0.03
1-Fluorohexane[c]	22.41	21.41	20.41	19.41	18.40	17.40	16.40				23.41	0.1001	±0.05
1-Chlorohexane	27.28	26.24	25.21	24.17	23.13	22.09	21.05	20.02	18.98	17.94	28.32	0.1038	±0.06
1-Bromohexane		27.88	26.91	25.94	24.98	24.01	23.04	22.07	21.11	20.14	29.81	0.09669	±0.10
1-Iodohexane[c]		29.94	29.09	28.25	27.40	26.56	25.71	24.87	24.02	23.18	31.68	0.08454	±0.01
1-Fluoroheptane[c]	23.85	22.82	21.80	20.77	19.74	18.71	17.69	16.66	15.63	14.60	24.88	0.1028	±0.04
1-Chloroheptane	27.98	27.02	26.06	25.10	24.13	23.17	22.21	21.25	20.29	19.33	28.94	0.0961	±0.05
1-Bromoheptane	29.76	28.78	27.79	26.81	25.83	24.85	23.87	22.88	22.40	20.92	30.74	0.0982	±0.08
1-Iodoheptane[d]		30.41	29.52	28.63	27.75	26.86	25.97	25.09	24.20	23.31	32.18	0.08865	±0.03
1-Fluoro-octane[c]	24.97	24.03	23.10	22.16	21.22	20.28	19.34	18.41	17.47	16.53	25.91	0.0938	±0.08
1-Chloro-octane	28.68	27.72	26.76	25.80	24.83	23.87	22.91	21.95	20.99	20.03	29.64	0.0961	±0.08
2-Chloro-octane[c]	27.40	26.40	25.40	24.40	23.40	22.40					28.40	0.1000	±0.10
1-Bromo-octane	30.07	29.14	28.22	27.29	26.36	25.43	24.50	23.58	22.65	21.72	31.00	0.0928	±0.04
1-Iodo-octane	31.60	30.68	29.77	28.85	27.94	27.02	26.11	25.19	24.28		32.51	0.09146	±0.07
1-Chlorononane	29.29	28.34	27.38	26.43	25.48	24.53	23.58	22.62	21.67	20.72	30.24	0.0952	±0.10
1-Bromononane	30.47	29.57	28.68	27.78	26.89	26.00	25.10	24.23	23.31	22.42	31.36	0.0894	±0.07
1-Chlorodecane	29.82	28.89	27.95	27.02	26.08	25.14	24.21	23.27	22.34	21.40	30.76	0.0936	±0.01
1-Bromodecane		29.55	28.69	27.84	26.98	26.13	25.28	24.41			32.26	0.0856	±0.07
1-Chloroundecane		29.30	28.40	27.50	26.60	25.71	24.81	23.91	23.02	22.12	31.09	0.0897	±0.03
1-Bromoundecane		30.22	29.36	28.50	27.63	26.77	25.91	25.05	24.19	23.33	31.94	0.0861	±0.05
1-Bromododecane		30.83	29.94	29.06	28.18	27.30	26.42	25.53	24.65	23.77	32.59	0.08819	±0.05
1-Bromotetradecane[c]	32.05	31.17	30.30	29.42	28.54	27.66	26.78	25.91	25.03	24.15	32.93	0.0878	±0.08
1-Chlorohexadecane[c]	32.10	31.10	30.10	29.10							33.10	0.1000	±0.10

TABLE 12. Alkyl halides [237]—Continued

Compound	Surface tension (±0.10)										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
1-Bromohexadecane [c]	32.15	31.65	30.79	29.93	29.06	28.20	27.34	26.48	25.62	24.76	33.37	0.0861	±0.05
1-Bromo-2-ethoxy-ethane [c]	30.85	29.72	28.59	27.46	26.33	25.21	24.08	22.95	21.82	.....	31.98	0.1129	±0.05
1-Iodohexadecane [f]	.....	32.73	31.85	30.97	30.09	29.21	28.33	27.45	26.57	25.69	34.49	0.0880	±0.04

[a] Ref. [232] (V).
[b] Ref. [192] (A).
[c] Ref. [243] (A).
[d] Ref. [91] (A).
[e] Ref. [157] (A).
[f] Ref. [42] (A) (±0.15).

TABLE 13. Polyaloalkanes

(Differential Capillary Rise-A)

Compound	Surface tension										Least squares constants		σ_γ
	15°	25°	35°	45°	55°	65°	75°	85°	95°	105 °C	a	b	
1,1,2,2-Tetrachloro-ethane [b]	36.85	35.58	34.41	33.04	31.78	30.51	29.24	27.97	26.70	25.44	38.75	0.1268	±0.12
1,1,2,2-Tetrabromo-ethane [b]	50.18	48.71	47.25	45.79	44.32	42.86	41.40	39.93	38.47	.....	52.37	0.1463	±0.05
1,1,1-Trichloroethane [a]	26.40	25.14	23.89	22.64	21.38	20.13	.....	.....	.....	.....	28.28	0.1242	±0.05
1,2,3-Tribromopro-pane [b]	.....	44.82	43.56	42.29	41.02	39.75	38.49	37.22	35.95	34.69	47.99	0.1267	±0.12
Bromodichloromethane [b]	33.17	31.87	30.58	29.29	27.99	26.70	25.40	24.11	.....	.....	35.11	0.1294	±0.05
Chloroform [c]	27.97	26.67	25.38	24.08	22.79	21.49	20.20	.....	.....	.....	29.91	0.1295	±0.07
Bromoform [a]	46.18	44.87	43.56	42.25	40.95	39.64	38.33	37.02	35.71	.....	48.14	0.1308	±0.27
Carbon tetrachloride [c]	27.65	26.43	25.21	23.98	22.76	21.53	20.31	19.09	17.86	16.64	29.19	0.1224	±0.20
Pentachloroethane [d]	35.32	34.14	32.97	31.79	30.61	29.43	28.25	27.08	.....	.....	37.09	0.1178	±0.02
1,1,2-Trichloroethane [e]	35.37	34.02	32.67	31.32	29.97	28.62	27.27	25.92	24.57	23.21	37.40	0.1351	±0.70

[a] Ref. [250] (±0.10).
[b] Ref. [256] (±0.3).
[c] Ref. calculated [230] (V), [82].
[d] Ref. [91] (±0.2).
[e] Ref. [192] (±0.7).

TABLE 13.1. Dialkyl oxalates [126]

(Maximum Bubble Pressure-A)

Ester	Surface tension (±0.10)				Least squares constants		σ_γ
	20°	40°	60°	85 °C	a	b	
Dihexyl	30.45	28.74	27.02	24.88	32.16	0.0856	±0.01
Diheptyl	31.29	29.51	27.54	24.87	33.26	0.0987	±0.03

TABLE 14.2. Alkyl isonicotinates [126]

(Maximum Bubble Pressure-A)

Ester	Surface tension (±0.10)				Least squares constants		σ_γ
	20°	40°	60°	85 °C	a	b	
Methyl	40.83	38.49	36.12	33.18	43.19	0.1178	±0.01
Ethyl	37.15	35.02	32.89	30.23	39.26	0.1065	±0.01
Propyl	35.22	33.23	31.23	28.73	37.22	0.09984	±0.01
Butyl	34.77	32.88	30.99	28.63	36.66	0.09444	±0.01
Pentyl	33.92	32.24	30.55	28.45	35.60	0.0841	±0.02
Hexyl	33.46	31.73	29.99	27.83	35.20	0.08676	±0.01
Heptyl	33.81	32.00	30.20	27.94	35.62	0.0904	±0.06

TABLE 14.3. Methyl pyridyl ketones [126]

(Maximum Bubble Pressure-A)

Ketone	Surface tension (±0.10)				Least squares constants		σ_γ
	20°	40°	60°	85 °C	a	b	
2-Pyridyl	39.65	37.30	34.95	32.01	42.00	0.1175	±0.02
3-Pyridyl	44.66	42.26	39.86	36.86	47.06	0.1200	±0.02
4-Pyridyl	44.01	41.51	39.00	35.88	46.51	0.1251	±0.02

TABLE 14.4. Alkyl picolinates [126]

(Maximum Bubble Pressure-A)

Ester	Surface tension (±0.10)				Least squares constants		σ_γ
	20°	40°	60°	85 °C	a	b	
Methyl	43.48	41.31	39.15	36.43	45.64	0.1082	±0.01
Ethyl	39.72	37.57	35.43	32.75	41.86	0.1072	±0.01
Propyl	36.98	35.04	33.10	30.67	38.92	0.09697	±0.05
Butyl	35.86	33.95	32.05	29.66	37.77	0.0954	±0.01
Pentyl	34.62	32.90	31.17	29.03	36.34	0.0861	±0.01
Hexyl	34.12	32.33	30.53	28.29	35.91	0.0896	±0.01
Heptyl	33.35	31.65	29.96	27.84	35.04	0.0847	±0.03

TABLE 14.5. Alkyl nicotinates [126]

(Maximum Bubble Pressure-A)

Ester	Surface tension (±0.10)				Least squares constants		σ_γ
	20°	40°	60°	85 °C	a	b	
Methyl		39.03	36.66	33.72	43.77	0.1184	±0.00
Ethyl	37.80	35.56	33.32	30.52	40.04	0.1120	±0.02
Propyl	36.11	34.16	32.20	29.76	38.07	0.0978	±0.02
Isopropyl	33.82	31.61	29.39	26.62	36.04	0.1108	±0.04
Butyl	35.22	33.34	31.47	29.13	37.09	0.0936	±0.01
sec-Butyl	34.42	32.00	29.58	26.56	36.83	0.1208	±0.40
tert-Butyl	33.94	32.27	30.61	28.53	35.60	0.0832	±0.40
Pentyl	34.23	32.57	30.91	28.83	35.89	0.0830	±0.06
Hexyl	33.71	31.96	30.20	28.01	35.46	0.0876	±0.01
Heptyl	33.28	31.59	29.88	27.77	34.98	0.0848	±0.00

TABLE 14.6. Pyridine and alkylpyridines [126]

(Maximum Bubble Pressure-A)

Compound	Surface tension (±0.10)				Least squares constants		σ_γ
	20°	40°	60°	85 °C	a	b	
Pyridine	37.21	34.60	31.98	28.72	39.82	0.1306	±0.80
2-Methyl-	33.62	31.14	28.65	25.54	36.11	0.1243	±0.04
2-Ethyl-	32.01	29.72	27.44	24.58	34.29	0.1142	±0.07
2-Propyl-	31.36	29.21	27.07	24.38	33.51	0.1074	±0.11
2-Butyl-	31.02	29.03	27.05	24.56	33.01	0.0994	±0.01
2-Pentyl-	30.98	29.02	27.06	24.61	32.94	0.0980	±0.01
2-Hexyl-	30.62	28.86	27.09	24.89	32.38	0.0881	±0.02
2-Heptyl-	30.84	29.14	27.44	25.30	32.55	0.0853	±0.03
3-Methyl-	35.04	32.74	30.43	27.55	37.35	0.1153	±0.02
3-Ethyl-	33.77	31.57	29.38	26.63	35.97	0.1099	±0.02
3-Propyl-	32.48	30.46	28.45	25.92	34.50	0.1009	±0.04
3-Butyl-	31.90	29.97	28.03	25.62	33.83	0.0966	±0.06
3-Pentyl-	31.61	29.78	27.96	25.68	33.43	0.0912	±0.01
3-Hexyl	31.11	29.46	27.81	25.75	32.76	0.0825	±0.02
3-Heptyl-	31.25	29.57	27.89	25.79	32.93	0.0840	±0.01
4-Methyl-	35.43	33.15	30.86	28.01	37.71	0.1141	±0.02
4-Ethyl-	33.72	31.52	29.33	26.58	35.92	0.1099	±0.01
4-Propyl-	32.08	30.05	28.01	25.47	34.12	0.1018	±0.05
4-Isopropyl-	33.69	31.57	29.44	26.78	35.82	0.1063	±0.06
4-Butyl-	32.37	30.47	28.56	26.19	34.27	0.0951	±0.01
4-*sec*-Butyl-	34.71	32.76	30.80	28.36	36.66	0.0976	±0.01
4-*tert*-Butyl-	33.58	31.68	29.77	27.40	35.48	0.0951	±0.005
4-Pentyl-	32.41	30.45	28.48	26.03	34.37	0.0981	±0.05
4-(1-Ethylpropyl)-	33.22	31.09	28.95	26.29	35.35	0.1066	±0.000
4-Hexyl-	31.66	30.07	28.49	26.51	33.24	0.0792	±0.01
4-Heptyl-	32.18	30.47	28.75	26.61	33.90	0.08575	±0.015
4-(1-Propylbutyl)-	31.46	29.68	27.90	25.67	33.24	0.0890	±0.008
4-(1-Hexylheptyl)-	31.27	29.54	27.82	25.67	32.99	0.0861	±0.000
2,3- Dimethyl-	33.24	31.10	28.97	26.29	35.38	0.1069	±0.02
2,4- Dimethyl-	33.16	30.76	28.37	25.38	35.55	0.1197	±0.04
2,5 Dimethyl-	32.31	30.05	27.78	24.96	34.57	0.1131	±0.02
2,6-Dimethyl-	31.59	29.27	26.96	24.06	33.91	0.1159	±0.11
3,5-Dimethyl-	33.82	31.66	29.49	26.79	35.98	0.1081	±0.03
4-Ethyl-3-methyl-	36.02	33.70	31.39	28.49	38.34	0.1159	±0.03

TABLE 14.7. Alkyl orthogermanates [19]

(Capillary Rise Method-A)

Ester	Surface tension (±0.15)					Least squares constants	
	20°	25°	30°	35°	40 °C	*a*	*b*
Tetramethyl	22.89	22.49	22.08	21.68	21.27	24.51	0.0810
Tetraethyl	23.67	23.23	22.79	22.35	21.91	25.43	0.0880
Tetrapropyl	24.06	23.61	23.16	22.72	22.27	25.85	0.0895
Tetraisopropyl	21.17	20.76	20.35	19.95	19.54	22.80	0.0815
Tetrabutyl	24.45	24.00	23.54	23.09	22.64	26.26	0.0905
Tetraisobutyl	23.68	23.25	22.81	22.38	21.95	25.41	0.0865
Tetra-*sec*-butyl	23.95	23.47	23.00	22.53	22.07	25.79	0.0930
Tetra-*tert*-butyl	23.14	22.74	22.34	21.94	21.54	24.74	0.0800
Tetrapentyl	24.65	24.20	23.76	23.31	22.87	26.43	0.0890
Tetrakis(2,2-dimethylpropyl)	23.86	23.39	22.93	22.44	21.96	25.75	0.0950

TABLE 15.1. 3-Methoxypropionates [2]

(Maximum Bubble Pressure Method-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Methyl	30.83	28.49	26.15	23.22	33.17	0.1170
Ethyl	29.26	27.22	25.19	22.65	31.29	0.1017
Propyl	28.42	26.43	24.43	21.94	30.42	0.0998
Butyl	28.48	26.58	24.67	22.30	30.38	0.0951
Pentyl	28.59	26.75	24.90	22.59	30.44	0.0924
Hexyl	28.76	27.00	25.25	23.05	30.52	0.0879
Heptyl	28.86	27.24	25.61	23.59	30.48	0.0811

TABLE 15.2. 3-Ethoxypropionates [2]

(Maximum Bubble Pressure Method-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Methyl	28.71	26.73	24.74	22.27	30.70	0.0993
Ethyl	27.84	25.89	23.93	21.49	29.79	0.0976
Propyl	27.25	25.38	23.50	21.16	29.12	0.0936
Butyl	26.78	25.10	23.43	21.33	28.46	0.0839
Pentyl	27.23	25.57	23.91	21.83	28.89	0.0832
Hexyl	27.63	26.00	24.36	22.32	29.26	0.0816
Heptyl	28.26	26.54	24.81	22.65	29.99	0.0863

TABLE 15.3. 3-Propoxypropionates [2]

(Maximum Bubble Pressure Method-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Methyl	28.26	26.37	24.47	22.09	30.16	0.0949
Ethyl	27.33	25.42	23.52	21.13	29.24	0.0954
Propyl	26.99	25.23	23.46	21.26	28.75	0.0831
Butyl	26.79	25.14	23.50	21.44	28.43	0.0822
Pentyl	27.10	25.51	23.93	21.95	28.68	0.0792
Hexyl	27.32	25.82	24.30	22.44	28.82	0.0751
Heptyl	27.88	26.29	24.71	22.72	29.47	0.0794

TABLE 15.4. 3-Butoxypropionates [2]

(Maximum Bubble Pressure Method-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Methyl	28.27	26.44	24.60	22.31	30.10	0.0916
Ethyl	27.23	25.44	23.64	21.40	29.03	0.0898
Propyl	27.11	25.39	23.66	21.51	28.83	0.0861
Butyl	26.76	25.19	23.63	21.67	28.33	0.0784
Pentyl	27.41	25.70	24.00	21.86	29.12	0.0854
Hexyl	27.74	26.16	24.55	22.56	29.34	0.0798
Heptyl	28.17	26.59	25.00	23.02	29.76	0.0793

TABLE 15.5. 3-Pentyloxypropionates [2]

(Maximum Bubble Pressure Method-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Methyl	28.37	26.59	24.82	22.60	30.14	0.0887
Ethyl	27.36	25.71	24.05	21.98	29.02	0.0828
Propyl	27.00	25.50	23.99	22.10	28.51	0.0754
Butyl	27.35	25.81	24.26	22.33	28.90	0.0773
Pentyl	27.68	26.10	24.51	22.54	29.26	0.0791
Hexyl	27.94	26.41	24.90	22.98	29.47	0.0763
Heptyl	28.34	26.77	25.21	23.25	29.90	0.0782

TABLE 15.6. 3-Hexyloxypropionates [2]

(Maximum Bubble Pressure Method-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Methyl	28.54	26.83	25.14	23.01	30.23	0.0849
Ethyl	27.63	25.99	24.34	22.28	29.28	0.0823
Propyl	27.59	25.98	24.36	22.34	29.21	0.0808
Butyl	27.84	26.18	24.51	22.44	29.50	0.0831
Pentyl	28.20	26.55	24.90	22.84	29.85	0.0825
Hexyl	28.35	26.78	25.22	23.26	29.91	0.0782
Heptyl	28.41	27.03	25.66	23.93	29.79	0.0689

TABLE 15.7. 3-Heptyloxypropionates [2]

(Maximum Bubble Pressure Method-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Methyl	28.33	26.68	25.03	22.98	29.98	0.0824
Ethyl	27.57	26.00	24.42	22.45	29.15	0.0788
Propyl	27.87	26.19	24.52	22.42	29.55	0.0839
Butyl	28.01	26.44	24.86	22.90	29.59	0.0788
Pentyl	28.32	26.89	25.47	23.68	29.75	0.0714
Hexyl	28.71	27.13	25.55	23.57	30.29	0.0790
Heptyl	28.77	27.44	26.11	24.45	30.10	0.0665

TABLE 15.8. Butoxyacetates [2]

(Maximum Bubble Pressure Method-A)

Ester	Surface tension (±0.15)				Least squares constants	
	20°	40°	60°	85 °C	*a*	*b*
Methyl	28.12	26.13	24.15	21.66	30.11	0.0994
Ethyl	27.39	25.55	23.72	21.42	29.23	0.0919
Propyl	27.40	25.63	23.87	21.66	29.16	0.0882
Butyl	27.13	25.48	23.83	21.77	28.78	0.0825
Pentyl	27.41	25.76	24.12	22.06	29.06	0.0824
Hexyl	27.59	25.98	24.38	22.37	29.19	0.0802
Heptyl	27.75	26.16	24.56	22.57	29.34	0.0796

TABLE 16. Alkanesulfonyl chlorides [176]

(Capillary Rise Method-A)

Sulfonyl chloride	Surface tension (±0.1)							Least squares constants	
	20°	25°	30°	35°	40°	45°	50 °C	*a*	*b*
Ethane-	41.1	40.5	39.9	39.3	38.7	38.1	37.5	43.43	0.1177
1-Propane-	38.0	37.5	36.9	36.4	35.8	35.3	34.8	40.14	0.1074
1-Butane-	35.4	34.9	34.4	33.9	33.4	32.9	32.4	37.33	0.0977
1-Pentane-	33.1	32.6	32.2	31.7	31.3	30.8	30.4	34.90	0.0909
1-Hexane-	31.1	30.7	30.3	29.8	29.4	29.0	28.6	32.80	0.0849

TABLE 17.1. Alkanesulfonic acids [14]

(Capillary Rise Method-V)

Compound	Surface tension (±1.5)							Least squares constants	
	18°	25°	35°	45°	55°	65°	75 °C	a	b
Methanesulfonic acid	----	50.05	49.15	48.26	47.37	46.48	45.58	52.28	0.0893
Ethanesulfonic acid	44.26	43.68	42.86	42.03	41.21	40.38	39.56	45.74	0.08239

TABLE 17.2. Alkyl thiosulfites [227]

(Max. Bubble Pressure-A)

Thiosulfite	Surface tension (±0.10)					Least squares constants	
	18°	20°	22°	24°	26 °C	a	b
Methyl	32.88	32.76	32.64	32.52	32.39	33.99	0.0614
Ethyl	30.56	30.27	29.97	29.68	29.39	33.21	0.1471
Propyl	29.78	29.60	29.42	29.34	29.07	31.37	0.0886
Butyl	29.47	29.28	29.10	28.91	28.72	31.14	0.0929

TABLE 17.3. Alkyl sulfates [237]

(Capillary Rise Method-A)

Sulfate	Surface tension (±0.10)										Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90°	100°	120 °C	a	b	
Methyl	39.52	38.93	37.76	36.61	35.44	34.28	33.12	31.96	30.79	----	----	41.26	0.1163	±0.08
Ethyl	34.01	33.52	32.54	31.57	30.59	29.61	28.64	27.66	26.69	25.71	23.76	35.47	0.0976	±0.04
Propyl	32.49	32.03	31.11	30.19	29.27	28.35	27.43	26.51	25.59	24.67	22.83	33.87	0.0920	±0.09
Butyl	31.59	31.15	30.27	29.40	28.52	27.64	26.77	25.89	25.02	24.14	22.39	32.90	0.0876	±0.11

TABLE 17.4. Alkyl sulfides [237]

(Capillary Rise Method-A)

Sulfide	Surface tension (±0.10)													Least squares constants		σ_γ
	5°	10°	15°	20°	30°	40°	50°	60°	70°	80°	90°	100°	120 °C	a	b	
Methyl		25.26	24.86	24.46										26.07	0.0805	±0.07
Ethyl		26.22	25.67	25.12	24.01	22.91	21.80	20.69						27.33	0.1106	±0.01
Propyl			26.81	26.29	25.25	24.22	23.18	22.15	21.11	20.08	19.04			28.36	0.1035	±0.11
Isopropyl		24.16	23.67	23.18	22.21	21.23	20.26	19.29	18.31	17.34	16.36			25.13	0.0974	±0.11
Butyl			27.69	27.23	26.30	25.38	24.45	23.53	22.60	21.68	20.75			29.08	0.0925	±0.02
Isobutyl			25.36	24.91	24.01	23.11	22.21	21.32	20.42	19.52	18.62			26.71	0.0899	±0.08
sec-Butyl		26.77	26.29	25.81	24.84	23.88	22.92	21.96	21.00	20.03	19.07			27.73	0.0962	±0.08
1-Pentyl			28.24	27.80	26.92	26.05	25.17	24.29	23.42	22.55	21.67			29.55	0.0876	±0.04
Isopentyl			26.38	25.97	25.15	24.32	23.50	22.68	21.85	21.03	20.20	19.38	17.74	27.62	0.0824	±0.09
Hexyl				28.41	27.57	26.73	25.89	25.05	24.21	23.37	22.53			30.09	0.0840	±0.03
Heptyl				29.32	28.51	27.70	26.88	26.07	25.26	24.45	23.64			30.94	0.0811	±0.02
Octyl				30.25	29.32	28.38	27.44	26.50	25.56	24.63	23.69			32.13	0.0938	±0.26
Ethyl methyl	26.99	26.34	25.70	25.06	23.77	22.49								27.63	0.1286	±0.12
Butyl methyl				26.23	25.19	24.15	23.11	22.07	21.03	19.99	18.95			28.31	0.1040	±0.03
Isobutyl methyl				25.07	24.06	23.05	22.04	21.03	20.02	19.01	18.00			27.09	0.1010	±0.02
tert-Butyl methyl			24.00	23.48	22.44	21.41	20.37	19.34						25.55	0.1035	±0.00
Butyl ethyl			26.97	26.47	25.46	24.45	23.44	22.43						28.49	0.1010	±0.03
tert-Butyl ethyl				23.54	22.58	21.63	20.67	19.72	18.76	17.81	16.85			25.45	0.0955	±0.04

TABLE 17.4. Alkyl sulfides [237]—Continued

Compound	Surface tension (±0.1)			Least squares constants	
	20°	25°	30 °C	a	b
Dipropyl sulfide[a]	26.1	25.6	25.0	28.2	0.1050
Dibutyl sulfide[a]	27.1	26.7	26.2	28.8	0.0850

[a] Max. Bubble Pressure-A. Ref. [153].

TABLE 17.5. Alkyl disulfides [237]

(Capillary Rise Method-A)

Disulfide	Surface tension (±0.10)											Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90°	100°	120 °C	a	b	
Methyl	34.74	34.06	32.72	31.38	30.03	28.69						36.75	0.1343	±0.02
Ethyl	31.43	30.91	29.87	28.83	27.79	26.76	25.72	24.68	23.64			32.99	0.1039	±0.06
Propyl	31.03	30.53	29.53	28.53	27.53	26.54	25.54	24.54	23.54			32.53	0.0999	±0.09
Isopropyl	28.84	28.37	27.42	26.48	25.53	24.58	23.64	22.69	21.75			30.26	0.0946	±0.15
Butyl	31.02	30.55	29.62	28.68	27.75	26.82	25.88	24.95	24.01			32.42	0.0934	±0.07
Isobutyl	28.41	27.97	27.10	26.22	25.35	24.48	23.60	22.73	21.85			29.72	0.0874	±0.06
tert-Butyl	28.01	27.51	26.50	25.50	24.50	23.50	22.50	21.49	20.49			29.51	0.1002	±0.35
1-Pentyl	30.01	29.61	28.80	27.99	27.18	26.37	25.56	24.75	23.94	23.13	21.51	31.23	0.0810	±0.09
Isopentyl	28.87	28.46	27.64	26.83	26.01	25.19	24.38	23.56	22.75	21.93	20.30	30.09	0.0816	±0.10

TABLE 17.6. Alkyl sulfites [237]

(Capillary Rise Method-A)

Sulfite	Surface tension (±0.10)											Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90°	100°	120 °C	a	b	
Methyl	34.60	33.97	32.72	31.47	30.21	28.96	27.71	26.46	25.20			36.48	0.1253	±0.05
Ethyl		29.58	28.50	27.42	26.33	25.25	24.17	23.09	22.00			31.75	0.1083	±0.06
Propyl	29.16	28.69	27.77	26.84	25.91	24.98	24.05	23.13	22.20	21.27	19.41	30.55	0.0928	±0.07
Isopropyl	26.59	26.14	25.24	24.34	23.44	22.55	21.65	20.75	19.85	18.95	17.15	27.94	0.0899	±0.10
Butyl	29.26	28.81	27.91	27.01	26.11	25.22	24.32	23.42	22.52			30.61	0.0899	±0.06
Isobutyl	27.53	27.10	26.22	25.34	24.46	23.59	22.71	21.83	20.96	20.08	18.33	28.85	0.0877	±0.07
1-Pentyl	29.34	28.92	28.09	27.25	26.41	25.57	24.73	23.90	23.06	22.22	20.54	30.60	0.0838	±0.10
Isopentyl	28.29	27.86	26.99	26.13	25.27	24.41	23.55	22.68	21.82			29.58	0.0862	±0.06

TABLE 17.7. Methyl sulfoxide [34]

(Maximum Bubble Pressure-A)

Surface tension (±0.20)							Least squares constants	
20°	25°	30°	35°	40°	50°	60 °C	a	b
43.54	42.86	42.41	41.73	41.17	40.05	38.94	45.78	0.1145

TABLE 18. Amides [228]

(Diff. Cap. Rise)

Compound	Surface tension (±0.5)							Least squares constants		σ_γ
	25°	45°	65°	85°	100°	110°	120° C	a	b	
Formamide[a]	57.02	55.34	53.66	51.97	50.71	49.87	49.03	59.13	0.0842	±0.05
Acetamide				38.98	37.45	36.43	35.41	47.66	0.1021	±0.02
Propionamide				31.32	29.96	29.05	28.14	39.05	0.0909	±0.01
Lactamide				43.73	42.52	41.72	40.92	50.56	0.08035	±0.01

Compound	Surface tension (±0.5)						Least squares constants		σ_γ
	130°	140°	150°	160°	170°	180 °C	a	b	
Benzamide	38.09	37.39	36.69	35.98	35.27	34.57	47.26	0.0705	±0.10
o-Hydroxybenzamide		40.81	40.02	39.23	38.44	37.65	51.87	0.0790	±0.04
2-Phenylacetamide				33.65	32.86	32.08	46.26	0.0788	±0.02

[a] Ref. [157] (A) (±0.2).

TABLE 19.1. Isopropylamine [108]

(Maximum Bubble Pressure-N_2)

Surface tension (±2.0)										Least squares constants		σ_γ
−70°	−60°	−50°	−40°	−30°	−20°	−10°	10°	20°	30 °C	a	b	
26.71	25.74	24.77	23.80	22.83	21.85	20.88	18.94	17.97	16.99	19.91	0.09719	±0.80

TABLE 19.2. Primary, secondary, and tertiary amines [249]

(Diff. Cap. Rise-A)

Compound	Surface tension (±0.10)									Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Methylamine[b]	20.64	19.89	18.41	16.92						22.87	0.1488	±0.15
Dimethylamine[a]	27.61	26.97	25.70	24.44						29.50	0.1265	±0.15
Trimethylamine[a]	14.55	13.97	12.84	11.71						16.24	0.1133	±0.15
Ethylamine[a]	20.57	19.89	18.51	17.14						22.63	0.1372	±0.15
Diethylamine	21.00	20.42	19.28	18.14						22.71	0.1143	±0.09
Triethylamine		20.72	19.72	18.73	17.74	16.75				22.70	0.0992	±0.03
Propylamine	23.00	22.37	21.13	19.89						24.86	0.1243	±0.15
Dipropylamine	23.33	22.82	21.79	20.77	19.75	18.73	17.71	16.68	15.66	24.86	0.1022	±0.07
Diisopropylamine	20.21	19.68	18.60	17.52	16.44	15.37				21.83	0.1077	±0.07
Tripropylamine		22.82	21.95	21.07	20.19	19.31	18.43	17.56	16.68	24.58	0.0878	±0.04
Butylamine	24.56	24.00	22.87	21.75	20.63	19.51				26.24	0.1122	±0.05
Isobutylamine		22.30	21.20	20.11	19.02	17.93				24.48	0.1092	±0.06
sec-Butylamine		21.64	20.58	19.52						23.75	0.1057	±0.04
tert-Butylamine[c]	17.90	17.38	16.36	15.33						19.44	0.1028	±0.02
Dibutylamine	25.07	24.60	23.64	22.69	21.74	20.79	19.84	18.88	17.93	26.50	0.0952	±0.03
Diisobutylamine	22.63	22.18	21.26	20.35	19.44	18.53	17.62	16.70	15.79	24.00	0.0912	±0.06
Di-*sec*-butylamine	23.20	22.70	21.70	20.70	19.70	18.70				24.70	0.0999	±0.04
Tributylamine		24.81	23.98	23.15	22.31	21.48	20.65	19.82	18.99	26.47	0.0831	±0.04
Triisobutylamine[e]	22.61	22.30	21.68	21.06	20.44	19.83	19.21	18.59	17.97	23.54	0.0619	±0.09
Pentylamine		25.20	24.18	23.16	22.13	21.11	20.09	19.07	18.04	27.25	0.1023	±0.03
Isopentylamine		23.81	22.81	21.81	20.80	19.80	18.80	17.79	16.79	25.81	0.1002	±0.06
tert-Pentylamine[c]	20.78	20.34	19.48	18.61	17.74	16.87	16.01			22.08	0.08676	±0.34
Dipentylamine	26.59	26.15	25.26	24.38	23.50	22.62	21.74	20.85	19.97	27.91	0.0882	±0.11
Diisopentylamine	24.75	24.32	23.47	22.61	21.75	20.89	20.04	19.18	18.32	26.04	0.08575	±0.10
Tripentylamine	26.67	26.24	25.39	24.54	23.69	22.85	22.00	21.15	20.30	27.94	0.0849	±0.06
Triisopentylamine	24.75	24.34	23.52	22.70	21.88	21.07	20.25	19.43	18.61	25.98	0.0819	±0.07
Allylamine		24.92	23.63	22.34						27.49	0.1287	±0.06
Hexylamine	26.76	26.26	25.24	24.22	23.20	22.19	21.17	20.15	19.14	28.29	0.1017	±0.05
Isohexylamine[c]	23.77	23.39	22.64	21.89	21.14	20.38	19.63	18.88	18.13	24.90	0.07527	±0.10
Dihexylamine[i]		27.45	26.55	25.66	24.76	23.87	22.97	22.07	21.18	29.24	0.08957	±0.10
Heptylamine	24.79	24.39	23.61	22.93	22.05	21.26	20.48	19.70	18.91	25.96	0.07828	±0.13
Ethylenediamine		41.97	40.58	39.18	37.78	36.38	34.98	33.59	32.19	44.77	0.1398	±0.02
Cyclohexylamine	32.41	31.81	30.63	29.44	28.25	27.06	25.87	24.69	23.50	34.19	0.1188	±0.07
Dicyclohexylamine	34.23	33.74	32.77	31.80	30.82	29.85	28.88	27.91	26.93	35.69	0.0973	±0.05
Benzylamine		39.90	38.69	37.48	36.26	35.05	33.84	32.63	31.41	42.33	0.1213	±0.05
Dibenzylamine[d]	41.64	41.10	40.01	38.93	37.84	36.75	35.67	34.58	33.50	43.27	0.1086	±0.08
Ethyl methylcarbamate		32.48	31.47	30.48	29.47	28.47	27.47	26.46	25.46	34.48	0.1002	±0.90
N-Nitrosodimethylamine[c]	38.98	38.36	37.12	35.88	34.64	33.41	32.17	30.93	29.69	40.84	0.1239	±0.07
N-Nitrosodiethylamine[c]	33.58	33.07	32.05	31.03	30.00	28.98	27.96	26.94	25.92	35.11	0.1021	±0.07
N-Nitrosodipropylamine[c]		31.64	30.67	29.70	28.72	27.75	26.78	25.81	24.83	33.59	0.0973	±0.05
N-Nitrosodibutylamine[c]	30.79	30.36	29.49	28.62	27.75	26.89	26.02	25.15	24.29	32.09	0.0867	±0.01
N-Nitrosodipentylamine[j]	30.66	30.24	29.41	28.58	27.74	26.91	26.08	25.24	24.41	31.91	0.08332	±0.08
N-Nitrosodihexylamine[i]	30.47	30.07	29.22	28.40	27.57	26.74	25.91	25.08	24.25	31.71	0.08287	±0.04
N,*N*-Diethylbenzylamine	30.26	29.79	28.87	27.95	27.02	26.10	25.18	24.26	23.33	31.64	0.0923	±0.13
Aniline[b, f, h, i]	43.21	42.67	41.56	40.50	39.41	38.33	37.24	36.15	35.06	44.83	0.1085	
o-Toluidine[f]	41.23	40.68	39.59	38.49	37.40	36.31	35.21	34.12	33.02	42.87	0.1094	±0.07
m-Toluidine[f]		38.37	37.39	36.41	35.43	34.46	33.48	32.50	31.52	40.33	0.0979	±0.11
p-Toluidine[f]					34.79	33.84	32.88	31.92	30.97	39.58	0.0957	±0.08
N-Methylaniline[e]	37.87	37.38	36.41	35.44	34.47	33.50	32.53	31.56	30.59	39.32	0.09698	±0.17
N-Ethylaniline		36.86	35.79	34.72	33.65	32.58	31.51	30.44	29.37	39.00	0.1070	±0.06
N-Propylaniline		34.79	33.84	32.89	31.94	31.00	30.05	29.10	28.15	36.69	0.0949	±0.05
N-Butylaniline		33.91	33.04	32.17	31.29	30.42	29.55	28.68	27.81	35.65	0.0871	±0.07
N,*N*-Dimethylaniline		36.04	34.99	33.94	32.89	31.85	30.80	29.75	28.70	38.14	0.1049	±0.07
N,*N*-Diethylaniline		34.51	33.47	32.43	31.39	30.35	29.31	28.27	27.23	36.59	0.1040	±0.01
N,*N*-Dipropylaniline		32.92	31.95	30.98	30.01	29.04	28.07	27.10	26.13	34.86	0.0970	±0.09
N,*N*-Dibutylaniline	32.77	32.30	31.36	30.43	29.49	28.55	27.62	26.68	25.75	34.17	0.0936	±0.07

TABLE 19.2. Primary, secondary, and tertiary amines [249]—Continued

Compound	Surface tension (±0.10)									Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
N,*N*-Diisobutylaniline [e]	31.18	30.75	29.89	29.03	28.16	27.30	26.44	25.58	24.72	32.47	0.0861	±0.40
Phenylhydrazine [d]	------	45.56	44.26	42.97	41.68	40.39	39.10	37.80	36.51	48.14	0.1292	±0.04
o-Chloroaniline [e]	42.05	41.60	40.70	39.79	38.89	37.99	37.08	36 18	35.27	43.41	0.0904	±0.50
N-Methyl-*N*-nitrosoaniline [b]	45.70	45.12	43.96	42.80	41.63	40.47	39.31	38.15	36.99	47.44	0.1161	±0.06
N-Ethyl-*N*-nitrosoaniline	41.71	41.20	40.16	39.13	38.10	37.07	36.04	35.00	33 97	43.26	0.1032	±0.21
N-Nitrosobenzylamine [c]	45 55	44 94	43.74	42.54	41.33	40.13	38.93	37.73	36 52	47.35	0.1203	±0.02
2,4-Xylidine [f]	37.85	37.35	36.35	35.36	34.36	33.37	32.37	31.37	30.38	39.34	0.09957	±0.07
Ethyl nitrilotriacetate	35.18	34.67	33.64	32.61	31.58	30.55	29.52	28.49	27.46	36.73	0.1030	±0.10

(High Melting)

Compound	Surface tension											Least squares constants		σ_γ
	50°	60°	75°	85°	95°	100°	120°	140°	160°	180°	200 °C	a	b	
Diphenylamine [d]	------	39.26	37.73	36.72	35.70	35.19	33.16	31.12	29.09	27.05	25.02	45.36	0.1017	±0.03
Tribenzylamine [d]	------	------	------	------	33.35	32.88	30.97	29.06	27.16	25.25	23.34	42.41	0.09534	------
p-Chloroaniline [b]	------	------	40.45	39.35	38.25	37.70	35.50	33.30	31.11	28.91	26.71	48.69	0.1099	±0.08
N,*N*-Dimethyl-*o*-nitroaniline [g]	38.11	37.26	35.98	35.12	34.27	33.84	32.14	30.43	28.70	------	------	42.38	0.08536	±0.10
N,*N*-Dimethyl-*m*-nitroaniline [g]	------	------	37.60	36.60	35.60	35.10	33.10	31.10	29.10	------	------	45.10	0.1000	±0.10

[a] Ref. [223] (V) calc.
[b] Ref. [215] (Maximum Bubble Pressure-A) (±1.0).
[c] Ref. [250] (±0.1).
[d] Ref. [228] (±0.5).
[e] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).
[f] Ref. [26] (Maximum Bubble Pressure-A) (±0.2).
[g] Ref. [139] (Maximum Bubble Pressure-A) (±0.15).
[h] Ref. [179] (Capillary Rise-A) (±0.3).
[i] Ref. [125] (Capillary Rise-A) (±0.4).
[j] Ref. [25] (Maximum Bubble Pressure-A) (±0.15).

TABLE 19.3. Aminoalcohols [195]

(Cap. Rise-A)

Compound	Surface tension (±0.10)								Least squares constants		σ_γ
	15°	25°	35°	45°	55°	65°	75°	85 °C	a	b	
2-Aminoethanol [a]	49.45	48.30	47.20	46.08	44.97	43.85	42 73	41 62	51.11	0.1117	±0.02
3-Amino-1-propanol	45.5	44.7	44.0	43.2	42.5	41.7	41.0	40.2	46.6	0.0750	±0.10
N-Methyl-2,2′-iminodiethanol	40.5	39.8	39.1	38.4	37.7	37.0	36.3	35.6	41.6	0.0700	±0.10
2-Isopropylaminoethanol	41.6	40.7	39.8	38.9	38.0	37.1	36.2	35.3	43.0	0.0900	±0.10
2,2′,2″-Nitrilotriethanol	------	47.2	46.4	45.6	44.8	44.0	43.2	42.4	49.2	0.0800	±0.10

[a] Ref. [178] (±0.15).

TABLE 20. Anilides and urethans [228]

(Diff. Cap. Rise-A)

Compound	Surface tension (±0.5)								Least squares constants		σ_γ
	60°	70°	80°	90°	100°	120°	140°	150 °C	a	b	
Formanilide	39.05	38.17	37.30	36.42	35.55	33.80	------	------	44.30	0.0875	±0.03
Acetanilide	------	------	------	------	------	35.27	33.44	32.53	46.21	0.0912	±0.03
N-Methylacetanilide	------	------	------	------	------	30.66	28.73	27.77	42.20	0.0962	±0.01
N-Ethylacetanilide	34.77	33.51	32.24	30.98	29.72	27.20	24.67	------	42.34	0.1262	±0.37
Methyl carbamate[a]	38.34	37.16	35.98	34.81	33.63	31.28	28.92	27.74	45.40	0.1177	±0.07
Ethyl ethylcarbamate	31.93	30.75	29.57	28.39	27.21	24.85	22.49	21.30	39.02	0.1181	±0.34
Ethyl propylcarbamate[a]	29.13	28.28	27.43	26.59	25.74	24.05	22.35	21.50	34.21	0.0847	±0.11
Ethyl carbanilate	36.53	35.35	34.18	33.00	31.83	29.48	27.13	25.95	43.58	0.1175	±0.34

[a] Ref. [83] (A) (±0.30).

TABLE 21. Aromatic alcohols

Compound	Surface tension										Least squares constants		σ_γ
	70°	80°	90°	100°	120°	140°	160°	180°	200°	220 °C	a	b	
Phenethyl alcohol[a]	35.61	34.58	33.54	32.50	30.42	28.35	26.27	24.20	22.12	------	42.88	0.1038	±0.04
Tetrahydrofurfuryl alcohol[a]	32.90	31.90	30.89	29.88	27.86	25.85	23.83	------	------	------	39.96	0.1008	±0.02
p-Methylbenzyl alcohol[b]	33.98	33.12	32.27	31.42	29.72	28.02	26.32	------	------	------	39.93	0.08507	±0.25
1-Naphthalene-methanol[b]	------	41.38	40.21	39.04	36.70	34.36	32.02	------	------	------	50.74	0.1170	±0.50
Benzyl alcohol[c]	28.58	27.20	25.82	24.44	21.68	18.92	16.15	13.39	------	------	38.25	0.1381	±0.03
Triphenylmethanol[d]	------	------	------	------	------	------	------	28.24	25.24	22.24	55.28	0.1502	------

Compound	Surface tension										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
dextro-4-Phenyl-2-butanol[e]	36.48	35.61	34.74	33.87	32.99	32.12	31.25	30.38	29.51	28.64	37.35	0.08711	------
levo-4-Phenyl-2-butanol[e]	36.66	35.73	34.79	33.85	32.91	31.98	31.04	30.10	29.16	28.23	37.60	0.09373	±0.03
DL-4-Phenyl-2-butanol[e]	36.64	35.67	34.70	33.73	32.76	31.79	30.82	29.85	28.88	27.91	37.61	0.09703	------
levo-1-Phenyl-1-propanol[e]	34.89	33.95	33.02	32.08	31.15	30.22	29.28	28.35	27.41	26.48	35.82	0.0934	±0.02
DL-1-Phenyl-1-propanol[e]	34.92	34.00	33.07	32.15	31.23	30.31	29.38	28.46	27.54	26.62	35.84	0.09222	------

[a] Ref. [247] (Capillary Rise-A) (±0.10).
[b] Ref. [106] (Maximum Bubble Pressure-A) (±0.15).
[c] Ref. [224] (Capillary Rise-A) (±0.10).
[d] Ref. [92] (Capillary Rise-A) (±0.4).
[e] Ref. [207] (Capillary Rise-A).

TABLE 22. Aromatic esters

Compound	Surface tension												Least squares constants		σ_γ
	10°	20°	40°	60°	80°	100°	120°	140°	160°	170°	190°	200 °C	a	b	
Methyl salicylate[a]	40.98	39.80	37.45	35.11	32.76	30.40	28.06	25.71	23.37	22.19	------	------	42.15	0.1174	±0.26
Methyl *m*-hydroxybenzoate[a]	------	------	------	------	39.63	37.82	36.01	34.20	32.39	31.48	29.67	28.77	46.87	0.0905	±0.13
Methyl *p*-hydroxybenzoate[a]	------	------	------	------	------	------	------	35.77	33.75	32.73	30.70	29.69	49.97	0.1014	±0.16
Benzyl benzoate[d]	------	45.95	43.81	41.68	39.55	37.42	35.29	33.16	31.03	29.96	27.83	26.77	48.07	0.1065	±1.9
Ethyl salicylate[e]	39.91	38.82	36.64	34.45	32.27	30.09	27.91	25.73	23.54	22.45	20.27	19.18	41.00	0.1091	±0.51
Ethyl *m*-hydroxybenzoate[e]	------	------	------	------	------	34.42	32.52	30.63	28.73	------	------	------	43.92	0.09495	±0.03
Ethyl *p*-hydroxybenzoate[e]	------	------	------	------	------	------	33.68	31.84	30.01	29.09	27.25	26.33	44.69	0.09173	±0.02
Diethyl phthalate[f]	37.51	36.54	34.62	32.69	30.77	28.84	------	------	------	------	------	------	38.47	0.0963	±0.07
Dipentyl phthalate[f]	31.82	31.08	29.60	28.13	26.65	25.17	23.69	22.21	------	------	------	------	32.56	0.0739	±0.09
Ethyl α-campholanate[d]	28.46	27.64	26.02	24.39	22.76	21.13	19.51	17.88	16.25	15.44	14.81	13.00	29.27	0.08137	±0.03
Methyl *p*-toluenesulfonate[e]	------	------	41.26	39.42	37.59	35.76	33.93	32.09	------	------	------	------	44.92	0.09162	±0.14
Ethyl ethanesulfonate[f]	37.05	36.04	34.01	31.98	29.95	27.92	------	------	------	------	------	------	38.07	0.1015	±0.03
Ethyl phenylpropiolate[f]	40.22	39.18	37.11	35.03	32.96	30.88	28.80	------	------	------	------	------	41.26	0.1038	±0.04
Ethyl 3-hydroxyatropic acid[g]	------	37.67	35.57	33.48	31.38	29.29	27.20	------	------	------	------	------	39.75	0.1047	±0.06
Ethyl 2-*O*-benzoyl-*DL*-lactate[h]	36.62	35.61	33.58	31.56	29.53	27.51	25.49	------	------	------	------	------	37.63	0.1012	±0.16
Methyl *DL*-3-phenylhydracrylate[h]	39.88	38.91	36.97	35.03	33.09	31.15	------	------	------	------	------	------	40.85	0.09696	±0.05

[a] Ref. [27] (Maximum Bubble Pressure-A) (±0.3).
[b] Ref. [207] (Capillary Rise Method-A) (±0.20).
[c] Ref. [125] (Capillary Rise Method-A) (±0.3).
[d] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).
[e] Ref. [93] (Capillary Rise Method-A) (±0.40).
[f] Ref. [255] (Capillary Rise Method-A) (±0.20).
[g] Ref. [260] (Capillary Rise Method-A) (±0.40).
[h] Ref. [95] (Capillary Rise Method-A) (±0.30).

TABLE 23. Benzene and its alkyl derivatives [44]

(Maximum Bubble Pressure Method-A)

Compound	Surface tension (±0.10)										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Benzene[a]	30.21	28.88	27.56	26.25	24.96	23.67	22.40	21.20					
Toluene	29.72	28.52	27.33	26.15	24.95	23.77	22.58	21.39	20.20	19.01	30.90	0.1189	±0.01
Ethylbenzene[c]	30.39	29.29	28.20	27.10	26.01	24.92	23.82	22.73	21.63	20.54	31.48	0.1094	±0.04
Propylbenzene[c]	30.05	28.98	27.90	26.83	25.75	24.68	23.60	22.53	21.45	20.38	31.13	0.1075	±0.01
Cumene[c]	29.27	28.21	27.16	26.09	25.05	24.00	22.94	21.89	20.83	19.78	30.32	0.1054	±0.01
Butylbenzene	30.25	29.23	28.20	27.18	26.15	25.13	24.10	23.08	22.05	21.03	31.28	0.1025	±0.01
Isobutylbenzene	28.43	27.47	26.51	25.55	24.58	23.62	22.66	21.70	20.74	19.78	29.39	0.0961	±0.01
sec-Butylbenzene	29.50	28.52	27.54	26.57	25.59	24.61	23.63	22.65	21.67	20.69	30.48	0.0979	±0.01
tert-Butylbenzene	29.11	28.13	27.14	26.16	25.17	24.19	23.20	22.22	21.23	20.25	30.10	0.0985	±0.01
Pentylbenzene[a]	30.38	29.45	28.52	27.59	26.65	25.72	24.79	23.86	22.93	22.00	31.31	0.0931	±0.04
1-Phenylhexane[a]	30.96	30.01	29.15	28.10	27.15	26.20	25.25	24.29	23.34	22.39	31.91	0.0952	±0.04
o-Xylene[c]	31.41	30.31	29.21	28.11	27.00	25.90	24.80	23.70	22.60	21.50	32.51	0.1101	±0.03
m-Xylene[c]	30.13	29.02	27.92	26.81	25.71	24.61	23.50	22.40	21.29	20.19	31.23	0.1104	±0.02
p-Xylene[c]		28.55	27.47	26.39	25.32	24.25	23.17	22.10	21.02	19.95	30.69	0.1074	±0.05
o-Ethyltoluene	31.27	30.21	29.15	28.09	27.03	25.97	24.91	23.85	22.79	21.73	32.33	0.1060	±0.01
m-Ethyltoluene	30.18	29.08	27.97	26.87	25.76	24.66	23.55	22.45	21.34	20.24	31.29	0.1105	±0.01
p-Ethyltoluene	29.90	28.83	27.75	26.68	25.60	24.53	23.45	22.38	21.30	20.23	30.98	0.1075	±0.01
o-Diethylbenzene	31.32	30.29	29.26	28.24	27.20	26.18	25.15	24.12	23.09	22.06	32.35	0.1029	±0.01
m-Diethylbenzene	30.21	29.17	28.12	27.08	26.04	24.99	23.94	22.90	21.85	20.81	31.26	0.1045	±0.01
p-Diethylbenzene	30.03	29.00	27.97	26.94	25.91	24.88	23.85	22.82	21.79	20.76	31.06	0.1030	±0.01
1,2,4-Trimethylbenzene[c]	30.73	29.71	28.68	27.66	26.63	25.61	24.58	23.56	22.53	21.51	31.76	0.1025	±0.02
1,2,3-Trimethylbenzene[c]	29.87	28.83	27.79	26.75	25.71	24.67	23.63	22.59	21.55	20.51	30.91	0.1040	±0.01
1-Phenyldecane[d]	31.85	30.97	30.08	29.21	28.32	27.44	26.55	25.67	24.79	23.91	32.73	0.08822	±0.01
Mesitylene[c]	28.89	28.00	27.10	26.20	25.31	24.41	23.51	22.62	21.72	20.82	29.79	0.08966	±0.16
Cymene[b]	27.95	27.08	26.20	25.32	24.44	23.57	22.69	21.81	20.94	20.06	28.83	0.0877	±0.14

[a] Ref. [1].
[b] Ref. [179] (Capillary Rise Method-A) (±0.2).
[c] Ref. [181] (Capillary Rise Method-A) (±0.10).
[d] Ref. [112] (Capillary Rise Method-N_2) (±0.10).
[e] Ref. [108] (N_2) (±2.0).

TABLE 24.1. *N*-methylacetanilide—boron trifluoride [260]

(Capillary Rise Method-A)

Surface tension (±0.06)								Least squares constants	
115°	120°	125°	130°	135°	140°	145°	150 °C	a	b
38.39	37.90	37.41	36.92	36.43	35.94	35.45	34.95	49.67	0.0981

TABLE 24.2. Boron tribromide [229]

(Maximum Bubble Pressure-A)

Surface tension									Least squares constants	
22°	25°	30°	40°	50°	60°	70°	80°	84 °C	a	b
29.1	28.7	28.1	26.8	25.5	24.2	22.9	21.7	21.2	31.90	0.1280

TABLE 24.3. Tributylboroxin [146]

(Maximum Bubble Pressure-H_2)

Surface tension (±0.15)						Least squares constants		σ_γ
5°	10°	15°	20°	25°	30 °C	a	b	
27.37	26.88	26.39	25.89	25.40	24.91	27.86	0.0983	±0.13

TABLE 24.4. Boron trifluoride addition compounds [260]

(Capillary Rise Method-V)

Compound	Surface tension (±0.2)									Least squares constants	
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b
Methyl formate—boron trifluoride			39.47	38.53	37.59	36.65				42.28	0.09383
Ethyl formate—boron trifluoride	35.91	35.33	34.16	32.99	31.84	30.66				37.66	0.11672
Methyl acetate—boron trifluoride						32.42	31.12	29.82	28.52	40.22	0.1300
Ethyl acetate—boron trifluoride				31.59	30.72	29.86	29.00			35.04	0.08633
Dimethyl ether—boron trifluoride		33.18	32.01	30.84	29.66	28.49				35.53	0.1173
Diethyl ether—boron trifluoride	30.29	29.84	28.95	28.06	27.17	26.27				31.63	0.08927

TABLE 24.5. Boroxin [47]

(Capillary Rise Method-V)

Surface tension (±0.10)										Least squares constants	
240°	250°	260°	265°	270°	275°	280°	285°	290°	295 K	a	b
27.5	26.2	25.0	24.3	23.7	23.0	22.4	21.7	21.1	20.5	58.31	0.1283

TABLE 24.6. Dimethylaminoboron dichloride [24]

(Capillary Rise Method-V)

Surface tension (±0.10)															Least squares constants		σ_γ
40°	−35°	−30°	−25°	−20°	−15°	−10°	−5°	5°	10°	15°	20°	25°	30°	35 °C	a	b	
33.39	33.23	32.95	32.70	32.13	30.85	30.56	29.77	28.82	28.25	27.40	27.09	26.07	25.06	24.90	29.24	0.1238	±0.02

TABLE 25. Bromine [31]

(Capillary Rise Method-V)

Surface tension (±0.6)										Least squares constants	
5°	10°	15°	20°	25°	30°	35°	40°	45°	50 °C	a	b
44.7	43.6	42.9	41.8	40.9	40.0	39.2	38.3	37.3	36.4	45.5	0.1820

TABLE 26.1. Halides of phosphorus [249]

(Capillary Rise Method-A)

Compound	Surface tension (±0.10)								Least squares constants		σ_γ
	15°	25°	35°	45°	55°	65°	75°	85 °C	a	b	
Phosphorus trichloride	29.24	27.97	26.71	25.44	24.18	22.91	------	------	31.14	0.1266	±0.06
Phosphoryl chloride	33.31	32.03	30.76	29.48	28.21	26.93	25.66	24.38	35.22	0.1275	±0.07
Phosphorus tribromide	43.42	42.13	40.85	39.57	38.28	37.00	------	------	45.34	0.1283	±0.10
Phosphorus triiodide [a]	------	------	------	------	------	57.26	56.58	55.90	61.66	0.06771	±0.11
Thiophosphoryl chloride [b]	35.09	33.82	32.55	31.28	30.00	28.73	27.46	26.19	37.00	0.1272	------

[a] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0). [b] Ref. [192] (Capillary Rise Method-A) (±0.7).

TABLE 26.2. Stannic chloride [169]

(Maximum Bubble Pressure-A)

Surface tension (±0.15)										Least squares constants		σ_γ
10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
28.79	27.65	26.52	25.38	24.25	23.12	21.98	20.85	19.71	18.58	29.92	0.1134	±0.05

TABLE 26.3. Antimony trichloride [219]

(Maximum Bubble Pressure-A)

Surface tension (±1.0)								Least squares constants		σ_γ
80°	90°	100°	120°	140°	160°	180°	200 °C	a	b	
47.97	46.73	45.49	43.01	40.54	38.06	35.59	33.11	47.87	0.1238	±0.17

TABLE 26.4. Silicon tetrachloride [177]

(Capillary Rise Method-A)

Surface tension (±1.0)								Least squares constants	
5°	10°	15°	20°	25°	30°	40°	50 °C	a	b
20.28	19.78	19.29	18.79	18.29	17.79	16.80	15.80	20.78	0.099624

TABLE 26.5. Arsenious chloride [108]

(Maximum Bubble Pressure-N_2)

Surface tension (±2.0)										Least squares constants		σ_γ
−10°	10°	20°	30°	40°	50°	60°	80°	100°	110 °C	a	b	
42.65	40.69	39.71	38.74	37.76	36.78	35.80	33.85	31.89	30.91	41.67	0.09781	±0.12

TABLE 26.6. Arsenious bromide [108]

(Maximum Bubble Pressure-N_2)

Surface tension (±2.0)										Least squares constants		σ_γ
40°	50°	60°	70°	80°	100°	120°	140°	160°	180 °C	a	b	
50.24	49.19	48.15	47.11	46.07	43.98	41.89	39.81	37.72	35.64	54.41	0.1043	±0.56

TABLE 26.7. Phosphorus trioxide [190]

(Capillary Rise Method)

Surface tension									Least squares constants		σ_γ
30°	40°	50°	60°	70°	80°	100°	120°	140 °C	a	b	
36.97	35.81	34.65	33.49	32.33	31.18	28.86	26.54	24.23	40.44	0.1158	±0.15

TABLE 27. Campholenic and campholanic acid [108]

(Maximum Bubble Pressure-N_2)

Compound	Surface tension (±2.0)										Least squares constants		σ_γ
	20°	40°	60°	80°	100°	120°	140°	160°	180°	200 °C	a	b	
α-Campholenic acid	35.12	33.40	31.67	29.95	28.23	26.51	24.79	23.06	21.34	19.62	36.84	0.0861	±0.26
α-Campholanic acid	32.21	30.63	29.06	27.48	25.91	24.34	22.76	21.19	19.61	18.04	33.78	0.0787	±0.71

TABLE 28. Chelated co-ordination compounds and related compounds [221]

(Max. Bubble Pressure-A)

Compound	Surface tension (±0.20)										Least squares constants		σ_y
	10°	15°	20°	30°	40°	50°	60°	70°	80°	100 °C	a	b	
Tetraethyllead	29.53	29.05	28.56	27.59	26.62	25.65	24.69	23.72	22.75	------	30.50	0.0969	±0.17
2,4-Hexanedionoberyllium	------	------	------	------	------	32.33	31.78	30.73	29.68	27.58	38.08	0.1050	±0.04
2,4-Pentanedione	32.14	31.56	30.99	29.85	28.70	27.56	26.42	25.27	24.13	------	33.28	0.1144	±0.17
2,4-Hexanedione	------	30.72	30.22	29.21	28.21	27.21	26.21	------	------	------	32.22	0.1002	±0.01
1-Phenyl-1,3-butanedione	------	------	------	------	------	39.35	38.83	38.31	37.79	36.74	41.96	0.05215	±0.60
2,4-Pentanedionoboron difluoride	------	------	------	------	------	37.08	36.09	35.10	34.11	32.13	42.04	0.0991	±0.09
Thallous ethoxide	------	38.69	38.26	37.39	36.52	35.64	34.77	------	------	------	40.00	0.0871	±0.15

Compound	Surface tension (±0.20)										Least squares constants		σ_y
	110°	120°	130°	140°	160°	180°	200°	220°	240°	260°	280 °C	a	b	
Dimethyl-(1-phenyl-1,3-butanediono)thallium	------	33.35	32.38	31.40	29.55	------	------	------	------	------	------	45.07	0.09756	±0.06
Thallous formate	81.19	77.30	73.42	69.54	------	------	------	------	------	------	------	123.90	0.3883	±0.50
Thallous acetate	------	------	29.83	28.49	25.82	23.14	20.47	------	------	------	------	47.21	0.01337	±0.05
Thallous nitrate	------	------	------	------	------	------	113.41	111.64	109.86	108.08	------	131.18	0.08884	±0.20
Diphenylmercury	------	36.63	35.80	34.97	33.30	31.64	------	------	------	------	------	46.60	0.0831	±0.14
2,4-Pentanedionoberyllium	28.41	27.47	26.52	25.57	23.68	21.79	------	------	------	------	------	38.83	0.09469	±0.06
Basic beryllium propionate	------	------	------	20.55	18.81	17.08	15.34	------	------	------	------	32.70	0.0868	±0.07
2,4-Pentanedionostannic difluoride	------	------	------	------	------	------	29.18	27.21	25.23	------	------	48.95	0.09884	±0.04
2,4-Pentanedionoaluminum	------	------	------	------	------	------	19.13	17.63	16.12	14.62	13.12	34.16	0.07515	±0.10
Aluminum bromide	24.93	24.23	23.52	22.82	21.41	------	------	------	------	------	------	32.69	0.0705	±0.10

TABLE 29. Cryogenic and low boiling fluids

	Surface tension							Least squares constants		σ_γ
	78°	80°	82°	84°	86°	88°	90 K	a	b	
Nitrogen	8.75	8.30	7.85	7.39	6.94	6.49	6.03	26.42	0.2265	±0.05

Ref. [210] (Capillary Rise Method-V).

	Surface tension ($\gamma = 37.78(1 - T/150.72)^{1.277}$)					Least squares constants		σ_γ
	84°	86°	88°	90°	92 K	a	b	
Argon	13.34	12.84	12.34	11.84	11.34	34.28	0.2493	±0.02

Ref. [210] (Capillary Rise Method-V).

	Surface tension					Least squares constants		σ_γ
	115°	118°	120°	122°	124 K	a	b	
Krypton	8.341	6.474	5.896	5.318	4.740	40.576	0.2890	±0.048

Ref. [67] (Capillary Rise Method-V).

	Surface tension ($\gamma = 0.03703(289.74 - T)^{1.257}$)										σ_γ
	165°	175°	185°	195°	205°	215°	225°	245°	265°	285 K	
Xenon	18.46	16.58	14.74	12.96	11.23	9.55	7.94	4.94	2.30	0.28	±0.10

Ref. [206] (Capillary Rise Method-V).

	Surface tension ($\gamma = 0.352 - 6.9 \times 10^{-3} T^{7/3}$)							
	0.50°	0.75°	1.00°	1.25°	1.50°	1.75°	2.00°	2.1 K
Helium II	0.351	0.347	0.345	0.340	0.334	0.327	0.317	0.313

Ref. [6] (Capillary Rise Method-V).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension[a]									
	0.361°	0.500°	0.574°	0.647°	0.820°	0.910°	1.132°	1.639°	2.328°	2.992 K
Helium III	0.151	0.150	0.151	0.152	0.149	0.147	0.131	0.111	0.069	0.028

[a] Measured from a greatly enlarged copy of the γ vs $T°$ curve.
Ref. [237] (Capillary Rise Method-V).

	Surface tension ($\gamma = 0.3729 - 0.0081 T^{2.5}$)							
	0.35°	0.50°	0.65°	0.80°	0.95°	1.10°	1.25°	1.40 K
Helium IV	0.373	0.372	0.370	0.368	0.366	0.360	0.359	0.354

Ref. [7] (Capillary Rise Method-V).

	Surface tension ($\gamma = 0.1124(33.19 - t)^{1.112}$)($\pm 0.003$)					
	−258°	−257°	−256°	−255°	−254°	−253 °C
Hydrogen	2.80	2.63	2.41	2.29	2.12	1.95

Ref. [210] (Calculated from Guggenheim-Ferguson equation).

	Surface tension						Least squares constants	
	15°	16°	17°	18°	19°	20 K	a	b
Deuterium hydride	3.713	3.524	3.336	3.148	2.959	2.771	6.537	0.1883

Ref. [77] (Capillary Rise Method-V).

	Surface tension (± 0.2)										Least squares constants		σ_γ
	−202°	−200°	−198°	−196°	−194°	−192°	−190°	−188°	−186°	−184 °C	a	b	
Oxygen	18.01	17.50	16.99	16.48	15.96	15.45	14.94	14.43	13.91	13.40	−33.72	0.2561	±0.02

Ref. [9] (Capillary Rise Method-V).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension (±0.2)								Least squares constants		σ_γ
	−202°	−200°	−198°	−196°	−194°	−192°	−190°	−188 °C	a	b	
Fluorine	17.15	16.82	16.49	16.16	15.83	15.50	15.17	14.84	−16.10	0.1646	±0.50

Ref. [259] (Capillary Rise Method-V).

	Surface tension (±0.2)						Least squares constants		σ_γ
	−80°	−70°	−60°	−50°	−40°	−30 °C	a	b	
Chlorine	35.05	33.15	31.25	29.36	27.46	25.56	19.87	0.1897	±0.06

Ref. [118] (Capillary Rise Method-V).

	Surface tension (±0.20)										Least squares constants	
	−80°	−70°	−60°	−50°	−40°	−30°	−20°	−10°	10°	20 °C	a	b
Hydrogen fluoride	16.70	15.92	15.13	14.34	13.56	12.77	11.98	11.20	9.62	8.84	10.41	0.07867

Ref. [203] (Maximum Bubble Pressure-N_2).

	Surface tension						Least squares constants		σ_γ
	−192°	−190°	−188°	−186°	−184°	−182 °C	a	b	
Carbon monoxide	9.60	9.19	8.77	8.36	7.94	7.53	−30.20	0.2073	±0.04

Ref. [210] (Capillary Rise Method-V).

	Surface tension (±0.5) ($\gamma = 0.05902(304.26 - t)^{1.25}$)								
	−30°	−20°	−10°	0°	10°	15°	20°	25°	30 °C
Carbon dioxide	10.08	8.06	6.14	4.34	2.67	1.90	1.19	0.57	0.07

Ref. [230, 231] (Capillary Rise Method-V).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension (±0.2)						Least squares constants	
	−120°	−110°	−100°	−90°	−80°	−70 °C	a	b
Nitryl fluoride	30.51	28.65	26.80	24.95	23.09	21.24	8.26	0.1854

Ref. [92] (Capillary Rise Method-V).

	Surface tension (±0.2)						Least squares constants	
	−100°	−90°	−80°	−75°	−70°	−60 °C	a	b
Nitrogen oxyfluoride	25.65	24.49	23.32	22.74	22.16	20.99	14.00	0.1165

Ref. [94] (Capillary Rise Method-V).

	Surface tension (±0.5)								Least squares constants	
	−75°	−70°	−65°	−60°	−55°	−50°	−45°	−40 °C	a	b
Perchloryl fluoride	24.1	23.3	22.5	21.7	20.9	20.1	19.3	18.5	12.24	0.1576

Ref. [202] (Capillary Rise Method-V).

	Surface tension (±0.2)						Least squares constants		σ_γ
	−90°	−80°	−70°	−60°	−50°	−40 °C	a	b	
Sulfur tetrafluoride	28.47	26.74	25.01	23.27	21.54	19.81	12.87	0.1734	±0.16

Ref. [25] (Capillary Rise Method-V).

	Surface tension (±0.3)				Least squares constants		σ_γ
	−65°	−50°	−40°	−20 °C	a	b	
Sulfur hexafluoride	13.40	11.61	10.42	8.04	5.66	0.1190	±0.01

Ref. [167] (Capillary Rise Method-V).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension (±0.2)						Least squares constants	
	−80°	−75°	−70°	−65°	−60°	−50 °C	*a*	*b*
Nitrosyl peroxide fluoride	23.36	22.78	22.19	21.61	21.03	19.86	14.03	0.1166

Ref. [94] (Capillary Rise Method-V).

	Surface tension (±0.02)							Least squares constants	
	−60°	−50°	−40°	−30°	−20°	−10°	10 °C	*a*	*b*
Hydrogen disulfide	59.50	57.74	55.98	54.22	52.47	50.71	47.19	48.95	0.1758

Ref. [29] (Capillary Rise Method-V).

	Surface tension (±0.3)							Least squares constants	
	−30°	−25°	−20°	−15°	−10°	−5°	5 °C	*a*	*b*
Hydrogen selenide	26.77	26.03	25.28	24.54	23.80	23.06	21.58	22.32	0.1482

Ref. [183] (Capillary Rise Method-V).

	Surface tension (±0.14)						Least squares constants	
	−30°	−25°	−20°	−15°	−10°	−5 °C	*a*	*b*
Hydrogen telluride	36.89	35.58	34.27	32.96	31.65	30.34	29.03	0.2619

Ref. [183] (Capillary Rise Method-V).

	Surface tension (±0.2)						Least squares constants		σ_7
	−75°	−70°	−65°	−60°	−55°	−50 °C	*a*	*b*	
Hydrogen bromide	28.69	27.65	26.61	25.57	24.53	23.50	13.10	0.2079	±0.02

Ref. [168] (Capillary Rise Method-V).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension (±1.0)						Least squares constants		σ_γ
	−45°	−40°	−35°	−30°	−20°	−10 °C	a	b	
Nitrosyl chloride	36.21	35.46	34.72	33.97	32.48	30.98	29.49	0.1493	±0.07

Ref. [22] (Capillary Rise Method-A).

	Surface tension ($\gamma = 38.618 - 0.1873T - 0.0003567T^2$)						σ_γ
	90°	95°	100°	105°	110°	115 K	
Methane	18.877	17.611	16.328	15.026	13.707	12.371	0.025

Ref. [67] (Capillary Rise Method-V).

	Surface tension						Least squares constants		σ_γ
	−140°	−130°	−120°	−110°	−100°	−90 °C	a	b	
Ethane	24.48	22.82	21.16	19.50	17.84	16.18	1.24	0.1660	±0.07

Ref. [130] (Capillary Rise Method-V) (±0.12).

	Surface tension						Least squares constants		σ_γ
	−90°	−70°	−50°	−30°	−10°	10 °C	a	b	
Propane	17.09	15.34	13.59	11.84	10.09	8.35	9.22	0.0874	±0.14

Ref. [122] (Capillary Rise Method-V).

	Surface tension									Least squares constants		σ_γ
	−70°	−60°	−50°	−40°	−30°	−20°	−10°	10°	20 °C	a	b	
Butane	23.31	22.50	20.90	19.69	18.49	17.28	16.08	13.66	12.46	14.87	0.1206	±0.04
2-Methylpropane	21.46	20.25	19.15	17.88	16.54	15.30	14.09	11.57	10.30	12.83	0.1236	±0.09
1-Butene	24.45	23.12	21.81	20.48	19.16	17.84	16.51	13.87	12.54	15.19	0.1323	±0.03
2-Butene	25.13	23.84	22.56	21.24	19.98	18.69	17.40	14.82	13.53	16.11	0.1289	±0.03
2-Methylpropene	------	------	21.68	19.98	18.70	17.41	16.13	13.56	12.27	14.84	0.1319	±0.13

Ref. [37] (Capillary Rise Method-V).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension						Least squares constants		σ_γ
	−90°	−80°	−70°	−60°	−50°	−40 °C	a	b	
Propyne	27.85	26.37	24.88	23.40	21.92	20.44	14.51	0.1482	±0.16

Ref. [142] (Capillary Rise Method-V).

	Surface tension					Least squares constants		σ_γ
	−90°	−80°	−70°	−60°	−50 °C	a	b	
Acetylene	20.84	18.90	16.97	15.03	13.10	3.42	0.1935	±0.05

Ref. [142] (Capillary Rise Method-V).

	Surface tension						Least squares constants		σ_γ
	−160°	−150°	−140°	−130°	−120°	−110 °C	a	b	
Ethylene	27.93	25.08	23.23	21.37	19.52	17.66	−2.73	0.1854	±0.05

Ref. [142] (Capillary Rise Method-V) (±0.14).

	Surface tension						Least squares constants		σ_γ
	−80°	−70°	−60°	−50°	−40°	−30 °C	a	b	
Propylene	21.41	19.98	18.55	17.13	15.70	14.27	9.99	0.1427	±0.07

Ref. [142] (Capillary Rise Method-V).

	Surface tension						Least squares constants		σ_γ
	−50°	−40°	−30°	−20°	10°	20 °C	a	b	
Ethylene oxide	35.98	34.32	32.65	29.99	26.00	24.33	27.66	0.1664	±0.10

Ref. [221] (Maximum Bubble Pressure-A).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension ($\gamma = 23.41 - 0.3371t - 0.000943t^2$)								σ_γ
	−75°	−70°	−65°	−60°	−55°	−50°	−45°	−40 °C	
Ammonia	43.39	42.39	41.34	40.25	39.10	37.91	36.67	35.38	±0.15

Ref. [210] (Maximum Bubble Pressure-H_2).

	Surface tension (±0.1)								Least squares constants		σ_γ
	−70°	−60°	−50°	−45°	−40°	−35°	−30°	−25 °C	a	b	
Dimethyl ether	25.32	23.84	22.36	21.62	20.88	20.14	19.40	18.67	14.97	0.1478	±0.06

Ref. [142] (Capillary Rise Method-V).

	Surface tension (±0.10)									Least squares constants		σ_γ
	−95°	−85°	−75°	−65°	−55°	−45°	−30°	−20°	−10°	5 °C	a	b	
Carbonyl sulfide	29.02	27.24	25.46	23.68	21.90	20.13	17.46	15.68	13.90	11.22	12.12	0.1779	±0.33

Ref. [164] (Capillary Rise Method-V).

	Surface tension						Least squares constants		σ_γ
	−50°	−40°	−30°	−20°	−10°	10 °C	a	b	
Sulfur dioxide	36.32	34.37	32.42	30.48	28.53	24.63	26.58	0.1948	±0.15

Ref. [212] (Capillary Rise Method-V).

	Surface tension						Least squares constants		σ_γ
	−100°	−80°	−60°	−40°	−20°	−10 °C	a	b	
Nitrous oxide	25.41	21.35	17.28	13.22	9.15	7.12	5.09	0.2032	±0.60

Ref. [175] (Capillary Rise Method-V).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension					Least squares constants		σ_γ
	−160°	−158°	−156°	−154°	−152 °C	a	b	
Nitric oxide	26.17	25.00	23.83	22.66	21.49	−67.48	0.5853	±0.22

Ref. [32] (Capillary Rise Method-V).

	Surface tension (±0.06)							Least squares constants	
	−116°	−112°	−108°	−104°	−100°	−96°	−92 °C	a	b
Boron trifluoride	20.71	19.82	19.00	18.19	17.38	16.57	15.76	−2.92	0.2030

Ref. [259] (Capillary Rise Method-V).

	Surface tension (±0.06)						Least squares constants	
	−30°	−25°	−20°	−15°	−10°	−5 °C	a	b
Boron trifluoride ether	36.14	35.55	34.96	34.36	33.77	33.17	32.58	0.1188

Ref. [259] (Capillary Rise Method-V).

	Surface tension (±0.10)						Least squares constants		σ_γ
	−150°	−140°	−130°	−120°	−110°	−100 °C	a	b	
Diborane	23.62	21.83	20.05	18.27	16.48	14.70	−3.13	0.1783	±0.03

Ref. [128] (Maximum Bubble Pressure).

	Surface tension (±0.3)								Least squares constants		σ_γ
	−100°	−80°	−60°	−40°	−20°	−10°	−5°	5 °C	a	b	
Carbonyl chloride	37.15	34.24	31.33	28.41	25.50	24.05	23.32	21.86	22.59	0.1456	±0.04

Ref. [165] (Drop Weight-V).

TABLE 29. Cryogenic and low boiling fluids—Continued

	Surface tension											Least squares constants		σ_γ
	−70°	−60°	−50°	−40°	−30°	−20°	−10°	10°	20°	25°	30 °C	a	b	
2-Methyl-2-butene														
(a)	28.60	27.33	26.06	24.78	23.51	22.24	20.97					19.70	0.1271	±0.15
(b)								18.61	17.64	17.15	16.67	19.58	0.09715	

(a) Ref. [198] (Capillary Rise Method-V).
(b) Ref. [1].

TABLE 30.1. Nitriles

(Cap. Rise-A)

Compound	Surface tension (±0.1)									Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Acetonitrile [a]		29.29	28.03	26.77	25.50	24.24				31.82	0.1263	±0.03
Propionitrile [a]		27.32	26.17	25.02	23.86	22.71				29.63	0.1153	±0.09
Butyronitrile [a]		27.44	26.40	25.36	24.32	23.29	22.25	21.21	20.18	29.51	0.1037	±0.08
Valeronitrile [a]		27.41	26.47	25.53	24.60	23.66	22.72	21.78	20.85	29.28	0.0937	±0.09
Isovaleronitrile [c]	26.34	25.93	25.10	24.27	23.44	22.62	21.79	20.96	20.14	27.58	0.0827	±0.16
Hexanenitrile [a]		27.83	26.92	26.01	25.10	24.20	23.29	22.38	21.48	29.64	0.0907	±0.04
4-Methylvaleronitrile [a]		27.06	26.14	25.22	24.30	23.39	22.47	21.55	20.64	28.89	0.0917	±0.14
Heptanenitrile [b]	28.18	27.75	26.89	26.03	25.17	24.31	23.45	22.59	21.73	29.47	0.0860	±0.16
Octanenitrile [b]	28.41	28.01	27.20	26.40	25.60	24.80	24.00	23.19	22.39	29.61	0.0802	±0.06
Nonanenitrile [b]	29.91	28.50	27.68	26.87	26.05	25.32	24.42	23.60	22.79	30.13	0.0816	±0.06
3-Butenenitrile [a]	29.77	29.23	28.14	27.06	25.97	24.89	23.80	22.72	21.63	31.40	0.1085	±0.04
Decanenitrile [c]	29.89	29.36	28.30	27.24	26.17	25.11	24.05	22.99	21.93	31.48	0.1061	±0.01
Succinonitrile [d]						46.79	45.71	44.63	43.55	53.26	0.1079	±0.01
Lactonitrile [e]	36.87	36.39	35.43	34.47	33.51	32.55	31.59	30.63	29.67	38.31	0.0960	±0.01
Phenylacetonitrile [a]	42.84	42.26	41.10	39.95	38.79	37.64	36.48	35.33	34.17	44.57	0.1155	±0.12
Benzonitrile [a]	39.95	39.37	38.21	37.05	35.89	34.74	33.58	32.42	31.26	41.69	0.1159	±0.07
DL-Mandelonitrile [e]	44.43	43.94	42.97	41.99	41.01	40.03	39.05	38.08	37.90	45.90	0.0978	±0.02
o-Tolunitrile [c]	38.44	37.86	36.70	35.53	34.37	33.21	32.04	30.88	29.71	40.19	0.1164	±0.03
m-Tolunitrile [c]	37.33	36.82	35.81	34.80	33.78	32.77	31.76	30.75	29.73	38.85	0.1013	±0.03
p-Tolunitrile [c]			36.49	35.39	34.29	33.19	32.09	30.99	29.89	39.79	0.1100	±0.02

TABLE 30.1. Nitriles—Continued

Compound	Surface tension										Least squares constants		σ_γ
	15°	20°	25°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
3-(Ethylamino)-propionitrile[b]	33.30	32.83	32.35	31.88	30.93	29.97	29.03	28.07	27.13	26.18	34.73	0.0951	±0.08
3-(Propylamino)-propionitrile[b]	31.81	31.37	30.93	30.48	29.61	28.72	27.84	26.96	26.07	.....	33.13	0.0882	±0.08
3-(Butylamino)-propionitrile[b]	31.21	30.80	30.38	29.97	29.15	28.33	27.51	26.69	25.86	25.04	32.44	0.0822	±0.06
3-(1-Pentylamino)-propionitrile[b]	30.98	29.51	29.13	28.75	27.99	27.28	26.48	25.72	24.96	24.21	31.02	0.0757	±0.09
3-(Hexylamino)-propionitrile[b]	30.20	29.93	29.46	29.09	28.35	27.61	26.88	26.14	25.40	24.66	31.31	0.0739	±0.05
3-(Diethylamino)-propionitrile[b]	31.65	30.18	29.70	29.22	28.27	27.32	26.37	25.42	24.47	.....	32.08	0.0952	±0.05
3-(Dipropylamino)-propionitrile[b]	29.41	28.99	28.57	28.15	27.31	26.46	25.62	24.78	23.94	23.10	30.67	0.0841	±0.04
3-(Dibutylamino)-propionitrile[b]	29.60	29.19	28.77	28.35	27.51	26.67	25.84	25.00	24.16	23.33	30.86	0.0837	±0.03
3-(Di-1-pentylamino)-propionitrile[b]	29.10	28.73	28.35	27.98	27.23	26.48	25.74	24.99	24.24	23.50	30.22	0.0747	±0.01
3-Methoxypropionitrile[b]	36.47	35.88	35.28	34.69	33.51	32.33	31.15	29.97	28.78	27.60	38.24	0.1182	±0.14
3-Ethoxypropionitrile[b]	32.01	31.52	31.02	30.53	29.54	28.55	27.56	26.57	25.58	24.59	33.50	0.0990	±0.06
3-Propoxypropionitrile[b]	30.11	29.75	29.39	29.02	28.30	27.57	26.85	26.12	25.40	24.67	31.20	0.0725	±0.45
3-Butoxypropionitrile[b]	30.33	29.90	29.47	29.04	28.19	27.33	26.47	25.62	24.76	23.91	31.61	0.0856	±0.08
3-Pentyloxypropionitrile[b]	30.78	30.36	29.93	29.51	28.66	27.81	26.96	26.11	25.26	24.41	32.06	0.0850	±0.05
3-Hexyloxypropionitrile[b]	30.74	30.33	29.92	29.52	28.70	27.89	27.08	26.26	25.45	24.63	31.96	0.0814	±0.01
Acrylonitrile[b]	27.81	27.22	26.63	26.05	24.87	23.69	22.51	.....	.....	.....	29.58	0.1178	±0.04
3-Heptyloxy-propionitrile[f]	.....	29.38	29.01	28.63	27.89	27.14	26.40	25.65	24.91	.....	30.87	0.0745	±0.05

[a] Ref. [115] (A) (±0.1).
[b] Ref. [251] (A) (±0.1).
[c] Ref. [91] (A) (±0.2).
[d] Ref. [225] (A) (±0.2).
[e] Ref. [228] (±0.5).
[f] Ref. [2] (±0.1).

TABLE 30.2. Hydrogen cyanide [35]

(Maximum Bubble Pressure-A)

Surface tension ($\gamma = 20.62 - 0.1155t - 7\times10^{-5}t^2$) (±0.2)

−13.3°	−10.0°	−5.0°	5.0°	10.0°	15.0°	18.0°	20.0°	22.0°	25.0 °C
22.16	21.78	21.20	20.02	19.45	18.89	18.56	18.33	18.12	17.78

TABLE 31. Saturated and unsaturated cyano-esters [39]

(Cap. Rise-A)

Compound	Surface tension (±0.10)								Least squares constants		σ_γ
	15°	25°	50°	75°	100°	120°	135°	150 °C	a	b	
Methyl cyanoacetate[a]	39.71	38.63	35.95	33.26	30.58	28.43	26.82	25.21	41.32	0.1074	±0.05
Ethyl cyanoacetate	37.16	36.07	33.34	30.61	27.88	25.70	.....	.....	38.80	0.1092	±0.08
Propyl cyanoacetate[b]	34.28	33.37	31.12	28.86	26.61	24.81	23.45	22.10	35.63	0.0902	±0.10
Butyl cyanoacetate[b]	32.39	31.61	29.65	27.69	25.73	24.16	22.99	21.81	33.57	0.0784	±0.07
Isobutyl cyanoacetate[b]	31.04	30.27	28.35	26.42	24.50	22.96	21.80	20.65	32.20	0.0770	±0.04
Pentyl cyanoacetate[b]	30.10	29.43	27.76	26.08	24.41	23.07	22.06	21.06	31.11	0.0670	±0.10
Ethyl 2-cyano-3-methylbutyrate	30.92	30.01	27.73	25.45	23.17	21.35	.....	.....	32.29	0.0912	±0.01
Ethyl 2-cyano-3-methylvalerate	31.26	30.36	28.10	25.84	23.58	21.77	.....	.....	32.62	0.0904	±0.07
Ethyl 2-cyano-3-ethylvalerate	31.42	30.50	28.20	25.90	23.60	21.76	.....	.....	32.80	0.0920	±0.03
Ethyl 2-cyano-3-methylhexanoate	30.54	29.67	27.50	25.32	23.15	21.41	.....	.....	31.85	0.0870	±0.01
Ethyl 2-cyano-3-ethylhexanoate	30.90	30.03	27.85	25.68	23.50	21.76	.....	.....	32.21	0.0871	±0.06
Ethyl 2-cyano-3-propylhexanoate	30.53	29.67	27.51	25.35	23.19	21.46	.....	.....	31.83	0.0864	±0.08
Ethyl 2-cyano-3-methyl-2-pentenoate	34.87	33.86	31.33	28.81	26.28	24.26	.....	.....	36.39	0.1011	±0.12
Ethyl 2-cyano-3,3-diethylacrylate	34.00	33.02	30.58	28.15	25.71	23.76	.....	.....	35.46	0.0975	±0.02
Ethyl 2-cyano-3-propylcrotonate	33.67	32.74	30.41	28.09	25.77	23.91	.....	.....	35.06	0.0929	±0.01
Ethyl 2-cyano-3-propyl-2-pentenoate	32.23	31.30	28.97	26.65	24.32	22.46	.....	.....	33.63	0.0931	±0.08
Ethyl 2-cyano-3,3-dipropylacrylate	32.91	31.94	29.49	27.05	24.61	22.66	.....	.....	34.38	0.0977	±0.06

[a] Ref. [255] (±0.20).

[b] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).

TABLE 32. Cyclopentane and cyclohexane derivatives [246]

(Differential Capillary Rise-A)

Compound	Surface tension (±0.10)								Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Cyclopentyl methyl ether	27.00	26.43	25.29	24.16	23.02	21.89	.....	.....	.....	28.70	0.1135	±0.03
Cyclopentyl ethyl ether	26.65	26.12	25.06	23.99	22.93	21.87	20.80	19.74	18.67	28.25	0.1064	±0.05
Cyclopentyl formate	32.37	31.79	30.63	29.48	28.32	27.16	26.01	24.85	23.70	34.10	0.1156	±0.07
Cyclopentyl acetate	.....	30.62	29.48	28.34	27.19	26.05	24.91	23.77	22.62	32.91	0.1143	±0.08
Chlorocyclopentane	30.99	30.40	29.22	28.05	26.87	25.69	24.52	23.34	22.17	32.75	0.1176	±0.07
Bromocyclopentane	33.90	33.31	32.14	30.97	29.79	28.62	27.45	26.28	25.10	35.66	0.1173	±0.09
Iodocyclopentane	36.76	36.19	35.06	33.92	32.78	31.64	30.50	29.37	28.23	38.47	0.1138	±0.03
Bicyclohexyl	33.21	32.74	31.79	30.84	29.88	28.93	27.98	27.03	26.08	34.64	0.0951	±0.09
Cyclohexyl methyl ether	28.77	28.21	27.11	26.01	24.90	23.80	22.70	21.60	20.49	30.42	0.1103	±0.04
Cyclohexyl ethyl ether	27.80	27.29	26.26	25.24	24.22	23.20	22.18	21.15	20.13	29.33	0.1022	±0.07
Cyclohexyl formate	32.78	32.22	31.11	30.00	28.88	27.77	26.66	25.54	24.43	34.45	0.11132	±0.09
Cyclohexyl acetate	.....	31.27	30.16	29.05	27.93	26.82	25.71	24.60	23.48	33.50	0.1113	±0.07
Chlorocyclohexane	32.25	31.70	30.60	29.50	28.39	27.29	26.19	25.09	23.99	33.90	0.1101	±0.10
Bromocyclohexane	.....	33.90	32.78	31.66	30.54	29.43	28.31	27.19	26.08	36.13	0.1117	±0.02
Iodocyclohexane	36.81	36.25	35.13	34.02	32.90	31.79	30.67	29.56	28.44	38.48	0.1115	±0.30

TABLE 33. Cyclopropane- and cyclobutane-carboxylic acids and some carboxylates

(Capillary Rise-A)

Compound	Surface tension										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Cyclopropanecarboxylic acid [c]		34.48	33.43	32.38	31.33	30.29	29.24	28.19	27.14	26.09	36.58	0.1049	±0.07
Cyclobutanecarboxylic acid [c]		33.62	32.59	31.57	30.54	29.52	28.49	27.47	26.44	25.42	35.67	0.1025	±0.09
Methyl 1,1-cyclopropanedicarboxylate [a]	37.59	36.41	35.23	34.05	32.87	31.69	30.51	28.74	28.15	26.97	38.77	0.1180	±0.02
Ethyl 1,1-cyclopropanedicarboxylate [b]	32.46	31.50	30.53	29.56	28.59	27.63	26.66	25.69	24.72	23.76	33.43	0.09673	±0.20
Diethyl 1,1-cyclopropanedicarboxylate [c]	32.83	31.76	30.69	29.63	28.56	27.50	26.43	25.37	24.30	23.24	33.89	0.1065	±0.11
Dipropyl 1,1-cyclopropanedicarboxylate [c]	31.99	30.99	29.99	28.99	27.99	26.99	25.99	24.99	23.99	22.99	32.99	0.1000	±0.20
Ethyl cyclobutanecarboxylate [b]	31.02	29.86	28.70	27.54	26.38	25.22	24.06	22.90	21.74	20.58	32.18	0.1160	±0.05
Methyl 1,1-cyclobutanedicarboxylate [a]	36.23	35.11	33.99	32.87	31.74	30.62	29.50	27.82	27.26	26.14	37.35	0.1121	±0.17
Dimethyl 1,1-cyclobutanedicarboxylate [c]	36.17	35.04	33.91	32.78	31.65	30.52	29.39	28.26	27.13	26.00	37.30	0.1130	±0.10
Ethyl 1,1-cyclobutanedicarboxylate [b]	33.04	31.94	30.84	29.74	28.63	27.53	26.43	25.33	24.23	23.13	34.14	0.1101	±0.03
Diethyl 1,1-cyclobutanedicarboxylate [c]	32.59	31.54	30.49	29.44	28.38	27.33	26.28	25.23	24.18	23.13	33.64	0.1051	±0.06
Dipropyl 1,1-cyclobutanedicarboxylate [c]	31.64	30.67	29.71	28.74	27.78	26.82	25.85	24.89	23.92	22.96	32.60	0.0964	±0.04
Dibutyl 1,1-cyclobutanedicarboxylate [c]	31.20	30.28	29.35	28.42	27.49	26.57	25.64	24.71	23.79	22.86	32.13	0.0927	±0.16
Methyl 1,1-cyclopentanedicarboxylate [a]	36.34	35.21	34.09	32.96	31.83	30.70	29.57	27.88	27.32	26.19	37.47	0.1128	±0.03
Methyl 1,1-cyclohexanedicarboxylate [a]	36.54	35.47	34.41	33.34	32.28	31.22	30.15	28.56	28.02	26.96	37.70	0.1064	±0.11
Ethyl 1,1-cyclopropanedicarboxylate [b]	33.57	32.53	31.48	30.44	29.39	28.35	27.30	26.26	25.21	24.17	34.62	0.1045	±0.06
Ethyl *trans*-3,3-dimethyl-1,2-cyclopropanedicarboxylate [b]	31.68	30.65	29.61	28.58	27.55	26.52	25.49	24.45	23.42	22.39	32.71	0.1032	±0.08
Ethyl 1,1,2,2-cyclopropanetetracarboxylate [b]					31.51	30.57	29.63	28.69	27.75	26.81	36.21	0.09398	±0.01
Methyl 3-methyl-2-cyclopropene-1,2-dicarboxylate [b]					34.51	33.29	32.07	30.86	29.64	28.42	40.60	0.1218	±0.04
Ethyl 3-methyl-2-cyclopropene-1,2-dicarboxylate [b]				31.55	30.46	29.38	28.30	27.22	26.14	25.06	35.87	0.1081	±0.04
Labile Ethyl 3-methyl-2-cyclopropene-1,2-dicarboxylate [b]			33.50	32.32	31.15	29.98	28.80	27.63	26.45	25.28	37.02	0.1174	±0.01
Ethyl 1-cyano-1-cyclobutanecarboxylate [b]							29.44	28.36	27.29	26.22	36.94	0.1072	±0.13

[a] Ref. [234] (A) (±0.10).
[b] Ref. [220] (Maximum Bubble Pressure-A) (±0.10).
[c] Ref. [115] (A) (±0.10).

TABLE 34. Dialkyl carbonates [194]

(Maximum Bubble Pressure-A)

Compound	Surface tension (±0.15)										Least squares constants		σ_γ
	15°	20°	25°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Ethyl propyl carbonate	27.11	26.60	26.10	25.60	24.59	23.58	22.57	21.56	20.56	19.55	28.62	0.1008	±0.05
Butyl ethyl carbonate	27.17	26.59	26.22	25.75	24.81	23.86	22.92	21.98	21.04	20.07	28.58	0.0943	±0.08
Ethyl pentyl carbonate	27.51	27.03	26.56	26.09	25.15	24.20	23.26	22.32	21.38	20.43	28.92	0.0943	±0.02
Ethyl hexyl carbonate	28.14	27.66	27.18	26.70	25.74	24.78	23.83	22.87	21.91	20.95	29.58	0.0959	±0.08
Butyl propyl carbonate	27.41	26.93	26.46	25.99	25.05	24.10	23.16	22.22	21.28	19.33	28.82	0.0943	±0.05
Dipentyl carbonate	27.88	27.47	27.06	26.64	25.82	24.99	24.16	23.34	22.51	21.69	29.12	0.0826	±0.22
Dihexyl carbonate	28.48	28.06	27.63	27.21	26.36	25.50	24.65	23.80	22.95	22.10	29.76	0.0851	±0.03
Dimethyl carbonate[a]	29.93	29.25	------	27.91	26.57	25.22	23.88	------	------	------	31.94	0.1343	±0.00
Diethyl carbonate[a]	26.97	26.42	------	25.32	24.22	23.12	22.02	20.92	19.82	18.72	28.62	0.1100	±0.09
Dipropyl carbonate[a]	27.42	26.91	------	25.89	24.88	23.86	22.85	21.83	20.82	19.80	28.94	0.1015	±0.07
Dibutyl carbonate[a]	27.66	27.19	------	26.25	25.31	24.37	23.43	22.49	21.55	20.61	29.07	0.0940	±0.05
Diisobutyl carbonate[a]	25.78	25.31	------	24.39	23.96	22.53	21.60	20.67	19.75	18.82	27.17	0.0928	±0.02

[a] Ref. [250].

TABLE 35. Alkyl alkylxanthates [250]

(Capillary Rise Method-A)

Compound	Surface tension (±0.10)								Least squares constants		σ_γ
	15°	25°	35°	45°	55°	65°	75°	85 °C	a	b	
Ethyl ethylxanthate	34.78	33.72	32.66	31.61	30.55	29.50	28.44	27.38	36.36	0.1056	±0.11
Propyl propylxanthate	33.34	32.37	31.40	30.43	29.45	28.48	27.51	26.54	34.80	0.0972	±0.01
Butyl ethylxanthate	33.25	32.31	31.38	30.45	29.51	28.58	27.64	26.71	34.65	0.0934	±0.06
Ethyl butylxanthate	33.38	32.41	31.45	30.48	29.52	28.55	27.58	26.62	34.83	0.0966	±0.18
Butyl butylxanthate	32.34	31.43	30.53	29.62	28.72	27.81	26.90	26.00	35.70	0.09063	±0.09

TABLE 36. Dodecanols [69]

(Maximum Bubble Pressure-A)

Compound	Surface tension (±0.20)								Least squares constants	
	20°	25°	30°	40°	50°	60°	70°	80 °C	a	b
Dodecyl alcohol	------	29.41	28.96	28.29	27.51	26.75	26.02	25.27	31.25	0.0748
2-Dodecanol	29.16	------	28.24	27.46	26.57	25.83	25.13	24.33	30.66	0.0798
3-Dodecanol	28.60	------	27.65	26.92	26.06	25.35	24.49	23.75	30.12	0.0801
4-Dodecanol	27.83	------	26.94	26.17	25.41	24.53	23.83	23.02	29.34	0.0796
5-Dodecanol	27.45	------	26.54	25.80	25.03	24.17	23.34	22.60	29.02	0.0806
6-Dodecanol	------	------	26.29	25.34	24.57	23.83	23.02	22.21	28.63	0.0803

TABLE 37. Esters of normal dibasic acids and of substituted malonic acids [243]

(Differential Capillary Rise-A)

Ester	Surface tension (±0.1)										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Dimethyl malonate[a]	38.51	37.37	36.10	34.89	33.68	32.47	31.26	30.06	28.85	27.64	39.72	0.1208	±0.14
Diethyl malonate[a]	32.87	31.83	30.78	29.74	28.70	27.66	26.62	25.57	24.53	23.49	33.91	0.1042	±0.05
Dipentyl malonate[b]	28.7	28.3	27.5	26.7	25.9	25.1	24.3	23.5	22.7	21.9	29.9	0.0800	±0.60
Dimethyl succinate	37.81	36.62	35.43	34.24	33.04	31.85	30.66	29.47	28.28	27.09	39.00	0.1191	±0.16
Diethyl succinate	32.93	31.89	30.85	29.81	28.76	27.72	26.68	25.64	24.60	23.56	33.97	0.1041	±0.08
Dipropyl succinate	31.61	30.68	29.75	28.82	27.89	26.97	26.04	25.11	24.18	23.25	32.54	0.0929	±0.20
Diisopropyl succinate	29.17	28.24	27.31	26.38	25.45	24.53	23.60	22.67	21.74	20.81	30.10	0.0929	±0.07
Dibutyl succinate	31.57	30.65	29.72	28.80	27.87	26.94	26.02	25.09	24.17	23.24	32.50	0.0926	±0.03
Diisobutyl succinate	29.30	28.45	27.60	26.75	25.89	25.04	24.19	23.34	22.49	21.64	30.15	0.0851	±0.08
Dipentyl succinate	31.07	30.27	29.47	28.67	27.86	27.06	26.26	25.46	24.66	23.86	31.87	0.0801	±0.09
Diisopentyl succinate	30.78	29.92	29.07	28.21	27.36	26.51	25.65	24.80	23.94	23.09	31.63	0.0854	±0.06
Dimethyl glutarate	-------	36.21	35.03	33.85	32.67	31.50	30.32	29.14	27.96	-------	38.57	0.1179	±0.04
Diethyl glutarate	33.33	32.32	31.31	30.30	29.29	28.28	27.27	26.26	25.25	24.24	34.34	0.1010	±0.03
Diethyl malate[c]	38.76	37.14	35.51	33.88	32.25	30.63	-------	-------	-------	-------	40.39	0.1627	±0.30
Dipentyl malate[c]	29.37	28.63	27.96	27.29	26.62	25.95	-------	-------	-------	-------	29.97	0.0670	±0.30
Dimethyl adipate	37.12	35.98	34.85	33.71	32.57	31.43	30.29	29.16	28.02	26.88	38.26	0.1138	±0.09
Diethyl adipate	33.42	32.38	31.33	30.28	29.23	28.19	27.14	26.09	25.05	24.00	34.47	0.1047	±0.10
Dipropyl adipate	32.81	31.83	30.84	29.86	28.88	27.90	26.92	25.93	24.95	23.97	33.79	0.0982	±0.08
Diisopropyl adipate	30.31	29.33	28.34	27.36	26.37	25.39	24.40	23.42	22.43	21.45	31.30	0.0985	±0.13
Dibutyl adipate	32.26	31.37	30.47	29.58	28.68	27.79	26.89	26.00	25.10	24.21	33.16	0.0895	±0.06
Dipentyl adipate	32.11	31.25	30.38	29.51	28.64	27.78	26.91	26.04	25.18	24.31	32.98	0.0867	±0.05
Diisopentyl adipate	30.95	30.10	29.26	28.41	27.57	26.73	25.88	25.04	24.19	23.35	31.79	0.0844	±0.07
Dimethyl suberate	36.75	35.65	34.54	33.43	32.32	31.22	30.11	29.00	27.90	26.79	37.86	0.1107	±0.14
Diethyl suberate	33.57	32.60	31.62	30.65	29.68	28.71	27.74	26.76	25.79	24.81	34.54	0.0973	±0.03
Dipropyl suberate	32.78	31.87	30.96	30.05	29.14	28.24	27.33	26.42	25.51	24.60	33.69	0.0909	±0.04
Dibutyl suberate	32.59	31.69	30.78	29.88	28.98	28.08	27.18	26.27	25.37	24.47	33.49	0.0902	±0.09
Diethyl sebacate	33.72	32.76	31.80	30.84	29.88	28.93	27.97	27.01	26.05	25.09	34.68	0.0959	±0.09
Dipropyl sebacate	33.32	32.38	31.45	30.52	29.58	28.65	27.72	26.79	25.85	24.92	34.25	0.0933	±0.09
Diisopentyl sebacate[d]	31.91	31.11	30.30	29.50	28.69	27.89	27.08	26.28	25.47	24.67	32.72	0.0805	±0.02
Dimethyl pimelate[a]	36.60	35.57	34.53	33.49	32.45	31.42	30.38	29.34	28.31	-------	37.64	0.1037	±0.06
Dimethyl azelate[a]	36.38	35.32	34.25	33.19	32.12	31.06	29.99	28.93	27.86	-------	37.45	0.1065	±0.07
Diethyl oxalate	33.20	32.08	30.96	29.84	28.72	27.61	26.49	25.37	24.25	23.13	34.32	0.1119	±0.05
Dipropyl oxalate	31.18	30.19	29.20	28.21	27.22	26.23	25.24	24.23	23.26	22.27	32.17	0.09898	±0.09
Diisopropyl oxalate	29.44	28.43	27.42	26.41	25.39	24.38	23.37	22.36	21.35	20.34	30.45	0.1011	±0.14
Dibutyl oxalate	30.54	29.63	28.72	27.81	26.89	25.98	25.07	24.16	23.25	22.34	31.45	0.0911	±0.02
Dipentyl oxalate	30.55	29.67	28.78	27.90	27.02	26.14	25.26	24.37	23.49	22.61	31.43	0.0882	±0.06
Diisopentyl oxalate	28.89	28.09	27.28	26.48	25.67	24.86	24.06	23.25	22.45	21.64	29.70	0.0806	±0.02
Methyl dimethyl-malonate[a]	32.15	31.04	29.92	28.81	27.69	26.58	25.46	24.35	23.23	-------	33.27	0.1115	±0.01
Methyl diethyl-malonate[a]	32.13	31.04	29.95	28.86	27.77	26.69	25.60	24.51	23.42	-------	33.22	0.1089	±0.06
Methyl ethylpropyl-malonate[e]	31.55	30.53	29.51	28.49	27.46	26.44	25.42	24.40	23.38	-------	32.57	0.1021	±0.03
Methyl dipropyl-malonate[a]	30.23	29.34	28.46	27.58	26.69	25.81	24.93	24.05	23.16	-------	31.11	0.0883	±0.14
Dimethyl methyl-malonate	34.71	33.51	32.31	31.11	29.90	28.70	27.50	26.30	25.10	23.90	35.91	0.1201	±0.09
Diethyl methylmalonate	31.00	29.95	28.89	27.83	26.77	25.72	24.66	23.60	22.55	21.49	32.06	0.1057	±0.07
Dipropyl methyl-malonate	30.09	29.11	28.12	27.14	26.16	25.18	24.20	23.21	22.23	21.25	31.07	0.0982	±0.05
Dibutyl methylmalonate	-------	28.81	27.90	26.99	26.08	25.18	24.27	23.36	22.45	21.60	30.63	0.0909	±0.06
Dimethyl ethylmalonate	33.52	32.38	31.25	30.11	28.97	27.83	26.69	25.56	24.42	23.28	34.66	0.1138	±0.06
Diethyl ethylmalonate	30.53	29.51	28.50	27.48	26.46	25.44	24.42	23.41	22.39	21.37	31.55	0.1018	±0.10
Dipropyl ethyl-malonate	29.93	28.99	28.04	27.10	26.15	25.20	24.26	23.31	22.37	21.42	30.88	0.0946	±0.13
Dibutyl ethylmalonate	29.71	28.79	27.88	26.97	26.05	25.14	24.23	23.32	22.40	21.49	30.62	0.0913	±0.09

TABLE 37. Esters of normal dibasic acids and of substituted malonic acids [243]—Continued

Ester	Surface tension (±0.1)										Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100 °C	a	b	
Dimethyl propylmalonate	32.37	31.33	30.28	29.24	28.19	27.14	26.10	25.05	24.01	22.96	33.42	0.1046	±0.07
Diethyl propylmalonate	-------	28.93	27.96	26.98	26.00	25.02	24.04	23.07	22.09	21.10	30.89	0.0979	±0.07
Dipropyl propylmalonate	-------	28.68	27.74	26.81	25.88	24.95	24.02	23.08	22.15	21.22	30.54	0.0932	±0.09
Dibutyl propylmalonate		28.39	27.54	26.68	25.82	24.96	24.10	23.25	22.39	21.53	30.11	0.0858	±0.03
Dimethyl pentylmalonate	31.44	30.50	29.55	28.60	27.65	26.71	25.76	24.81	23.87	22.92	32.39	0.0947	±0.06
Diethyl pentylmalonate	29.38	28.53	27.68	26.83	25.98	25.14	24.29	23.44	22.59	21.74	30.23	0.0849	±0.20
Dipropyl pentylmalonate	29.58	28.69	27.79	26.90	26.01	25.12	24.23	23.33	22.44	21.55	30.47	0.0892	±0.02
Dibutyl pentylmalonate	-------	28.44	27.61	26.77	25.94	25.10	24.27	23.44	22.60	21.77	30.11	0.08342	±0.02
Diethyl bromomalonate [i]	33.82	33.08	32.34	31.60	30.86	30.12	29.38	28.64	27.90	27.16	34.56	0.07403	±0.35
Diethyl benzylmalonate [i]	35.84	35.04	34.24	33.45	32.65	31.85	31.05	30.25	29.45	28.65	36.64	0.07985	±0.33
Diethyl *O*-propionyl-malate	-------	-------	-------	29.18	28.30	27.43	26.55	25.68	24.80	23.93	32.68	0.0875	±0.12
Diethyl *O*-butyryl-*l*-malate [c]	31.71	30.77	29.83	28.89	27.95	27.02	26.08	25.14	24.20	23.26	32.65	0.0939	±0.05
Diethyl *O*-valeryl-*l*-malate [f]	30.65	29.81	28.97	28.13	27.28	26.44	25.60	24.76	23.92	23.08	31.49	0.0841	±0.24
Diethyl *O*-hexanoyl-*l*-malate [g]	30.75	29.85	28.95	28.05	27.15	26.25	25.35	24.45	23.55	22.65	31.65	0.0900	±0.12
Diethyl *O*-heptanoyl-*l*-malate [f]	30.69	29.84	28.99	28.14	27.29	26.44	25.59	24.74	23.89	23.04	31.54	0.08497	±0.13
Diethyl *O*-octanoyl-*l*-malate [f]	30.53	29.70	28.88	28.05	27.22	26.39	25.56	24.73	23.91	23.06	31.36	0.08283	±0.01
Diethyl *O*-nonanoyl-*l*-malate [f]	31.31	30.41	29.51	28.62	27.72	26.82	25.92	25.02	24.12	23.21	32.21	0.08987	±0.45
Diethyl *O*-decanoyl-*l*-malate [f]	30.74	29.91	29.09	28.27	27.45	26.62	25.80	24.98	24.16	23.33	31.56	0.08225	±0.17
Dimethyl *dextro*-tartrate [b]	-------	-------	-------	-------	-------	39.17	28.24	37.31	36.38	35.45	44.75	0.09299	±0.04
Dimethyl *DL*-tartrate [b]	-------	-------	-------	-------	-------	-------	-------	-------	35.15	34.23	43.44	0.0921	±0.03
Diethyl *dextro*-tartrate [i]	-------	37.97	36.97	35.97	34.96	33.96	32.96	31.96	30.95	29.95	39.98	0.1003	±0.14

[a] Ref. [234] (A) (±0.1).
[b] Ref. [133] (A) (Drop Weight-A) (±0.3).
[c] Ref. [132] (A) (Drop Weight-A) (±0.3).
[d] Ref. [256] (A) (±0.3).
[f] Ref. [95] (A) (±0.3).
[g] Ref. [179] (A) (±0.3).
[h] Ref. [157] (A).
[i] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).

TABLE 38.1. Isomeric esters (C_{16}) [171]

(Maximum Bubble Pressure-A)

Compound	Surface tension (±0.1)					Least squares constants	
	25°	35°	45°	55°	65 °C	a	b
Methyl pentadecanoate	29.38	28.56	27.75	25.93	26.11	31.43	0.08186
Ethyl myristate	29.27	28.26	27.24	26.23	25.21	31.81	0.1015
Propyl tridecanoate	28.84	27.92	27.00	26.08	25.16	31.14	0.0920
Butyl dodecanoate[a]	28.33	27.54	26.76	25.98	25.19	30.29	0.07844
Pentyl undecanoate	28.20	27.37	26.54	25.72	24.89	30.26	0.08256
Hexyl decanoate	28.29	27.36	26.43	25.50	24.57	30.61	0.0929
Heptyl nonanoate	28.14	27.29	26.44	25.59	24.74	30.26	0.08492
Octyl octanoate	29.99	27.12	26.29	25.47	24.65	29.99	0.08222
Nonyl heptanoate	28.24	27.46	26.68	25.90	25.12	30.20	0.0782
Decyl hexanoate	28.59	27.66	26.72	25.79	24.85	30.93	0.09353
Undecyl valerate	28.45	27.64	26.83	26.03	25.22	30.46	0.08057
Dodecyl butyrate	28.89	28.03	27.17	26.31	25.45	31.04	0.0860
Tridecyl propionate	29.43	28.61	27.79	26.96	26.14	31.49	0.0823
Tetradecyl acetate	29.81	28.87	27.93	26.98	26.04	32.16	0.0941
Pentadecyl formate	30.42	29.49	28.56	27.62	26.69	32.76	0.09344

[a] For preferred values for butyl dodecanoate see table 9. The values given here are listed to maintain the consistency of treatment of these isomeric esters.

TABLE 38.2. Esters of cyclopropane- and cyclobutane-carboxylic acids [115]

(Capillary Rise Method-A)

Carboxylate	Surface tension (±0.10)									Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Methyl cyclopropane-	------	30.79	29.56	28.33	27.09	25.86	24.63	23.40	22.17	33.25	0.1231	±0.08
Ethyl cyclopropane-	------	29.08	27.94	26.79	25.64	24.49	23.34	22.20	21.05	31.38	0.1148	±0.08
Propyl cyclopropane-	------	29.00	27.89	26.78	25.67	24.57	23.46	22.35	21.25	31.21	0.1107	±0.11
Butyl cyclopropane-	------	28.91	27.89	26.87	25.85	24.84	23.82	22.80	21.79	30.94	0.1017	±0.04
Pentyl cyclopropane-	29.63	29.12	28.09	27.07	26.05	25.03	24.01	22.98	21.96	31.16	0.1022	±0.08
Butyl cyclobutane-	29.83	29.35	28.37	27.39	26.41	25.44	24.46	23.48	22.51	31.30	0.0977	±0.07
Pentyl cyclobutane-	29.82	29.34	28.38	27.42	26.46	25.50	24.54	23.58	22.62	31.26	0.0960	±0.11
Methyl cyclobutane-	------	30.79	29.60	28.41	27.21	26.02	24.83	23.64	22.45	33.17	0.1191	±0.18
Propyl cyclobutane-	29.67	29.15	28.10	27.06	26.01	24.97	23.92	22.88	21.83	31.24	0.1045	±0.05

TABLE 38.3. Esters of orthoformic acid [250]

(Capillary Rise Method-A)

Orthoformate	Surface tension (±0.10)								Least squares constants		σ_γ
	15°	25°	35°	45°	55°	65°	75°	85 °C	a	b	
Ethyl	24.09	23.10	22.11	21.12	20.14	19.15	18.16	17.17	25.57	0.0980	±0.11
Propyl	25.25	24.34	23.42	22.50	21.59	20.67	19.75	18.84	26.63	0.0917	±0.04
Butyl	26.05	25.18	24.32	23.45	22.59	21.72	20.85	19.99	27.35	0.0866	±0.09

TABLE 39. Esters of 3 ,3-disubstituted glutaric acids [235]

(Differential Capillary Rise-A)

Compound	Surface tension (±0.10)								Least squares constants		σ_γ
	15°	25°	35°	45°	55°	65°	75°	85 °C	a	b	
Methyl 3-methylglutarate	-------	33.17	32.12	31.06	30.01	28.95	27.90	26.84	35.81	0.1055	±0.04
Methyl 3 ,3-dimethylglutarate	-------	30.93	29.96	28.99	28.02	27.05	26.08	25.11	33.36	0.0971	±0.02
Methyl 3-ethyl-3-methylglutarate	-------	31.54	30.55	29.56	28.57	27.58	26.59	25.60	34.01	0.0989	±0.12
Methyl 3 ,3-diethylglutarate	-------	31.29	30.40	29.51	28.62	27.73	26.84	25.95	33.52	0.0890	±0.00
Methyl 3-methyl-3-propylglutarate	-------	30.74	29.83	28.91	27.99	27.07	26.15	25.24	33.04	0.0918	±0.00
Methyl 3-ethyl-3-propylglutarate	-------	30.93	30.03	29.13	28.23	27.33	26.43	25.53	33.18	0.0900	±0.03
Methyl 3 ,3-dipropylglutarate	-------	30.04	29.15	28.26	27.37	26.48	25.59	24.70	32.27	0.0891	±0.10
Methyl 1 ,1-cyclopentanediacetate	-------	34.85	33.80	32.74	31.68	30.62	29.56	28.51	37.50	0.1058	±0.04
Methyl 3-methyl-1 ,1-cyclopentane-diacetate	-------	32.12	31.25	30.39	29.52	28.66	27.79	26.93	34.28	0.0865	±0.06
Methyl 1 ,1-cyclohexanediacetate	-------	35.31	34.34	33.37	32.40	31.43	30.46	29.49	37.74	0.0971	±0.06
Methyl 3-methyl-1 ,1-cyclohexane-diacetate	-------	32.94	32.10	31.26	30.43	29.59	28.75	27.91	35.04	0.0839	±0.18
Methyl 4-methyl-1 ,1-cyclohexane-diacetate	33.68	32.89	32.10	31.31	30.51	29.72	28.93	28.14	34.87	0.0792	±0.02
Methyl *trans*-decahydro-2 ,2-naphtha-lenediacetate	36.88	35.93	34.97	34.02	33.07	32.12	31.16	30.21	38.31	0.0953	±0.08
Methyl *trans*-hexahydro-2 ,2-indandi-acetate	-------	35.20	34.27	33.39	32.41	31.48	30.55	29.62	37.53	0.0930	±0.03
Ethyl 3 ,3-dimethylglutarate	30.11	29.18	28.25	27.32	26.39	25.46	24.53	23.60	31.51	0.0930	±0.13
Ethyl 1 ,1-cyclopentanediacetate	33.40	32.41	31.42	30.43	29.43	28.44	27.45	26.46	34.89	0.0992	±0.08
Ethyl 3-methyl-1 ,1-cyclopentanedi-acetate	31.55	30.68	29.81	28.94	28.06	27.19	26.32	25.45	32.86	0.0872	±0.01
Ethyl 1 ,1-cyclohexanediacetate	33.93	32.98	32.04	31.10	30.16	29.22	28.27	27.33	35.34	0.0942	±0.04
Ethyl 3-methyl-1 ,1-cyclohexanedi-acetate	-------	31.26	30.33	29.40	28.48	27.55	26.62	25.69	33.58	0.0928	±0.04
Ethyl 4-methyl-1 ,1-cyclohexanedi-acetate	32.18	31.30	30.42	29.54	28.66	27.78	26.90	26.02	33.50	0.0880	±0.03
Ethyl *trans*-hexahydro-2 ,2-indandi-acetate	-------	33.44	32.51	31.59	30.66	29.74	28.81	27.89	35.75	0.0925	±0.09
Ethyl *trans*-decahydro-2 ,2-naphthalene-diacetate	-------	33.92	32.98	32.04	31.09	30.15	29.21	28.27	36.27	0.0941	±0.12

TABLE 40.1 Ethers [242]

(Capillary Rise Method-A)

Compound	Surface tension (±0.10)									Least squares constants		σ_γ
	15°	25°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Ethyl methyl ether[d]	16.58	15.27	14.61	13.29	11.97	------	------	------	------	18.56	0.1317	±0.04
Ethyl propyl ether[d]	20.34	19.28	18.76	17.70	16.65	15.60	------	------	------	21.92	0.1054	±0.01
Diethyl ether	17.56	16.65	16.20	------	------	------	------	------	------	18.92	0.0908	±0.00
Dipropyl ether	21.03	19.98	19.46	18.41	17.36	16.32	------	------	------	22.60	0.1047	±0.00
Diisopropyl ether	18.32	17.27	16.75	15.70	14.65	13.60	------	------	------	19.89	0.1048	±0.03
Dibutyl ether	23.38	22.44	21.98	21.04	20.11	19.18	18.24	17.31	16.37	24.78	0.0934	±0.08
Dipentyl ether	25.27	24.35	23.88	22.96	22.03	21.11	20.18	19.26	18.22	26.66	0.0925	±0.09
Diisopentyl ether	23.45	22.58	22.15	21.28	20.40	19.53	18.66	17.79	16.92	24.76	0.0871	±0.04
Dihexyl ether	26.21	25.35	24.93	24.07	23.21	22.35	21.50	20.64	19.78	27.50	0.0858	±0.07
Diheptyl ether	27.42	26.56	26.14	25.28	24.43	23.58	22.72	21.87	21.01	28.70	0.0854	±0.03
Dioctyl ether	------	27.31	26.90	26.07	25.24	24.41	23.58	22.75	21.92	29.39	0.0830	±0.04
Butyl methyl ether	20.58	19.53	19.00	17.94	------	------	------	------	------	22.17	0.1057	±0.06
Butyl ethyl ether	21.18	20.13	19.60	18.55	17.50	16.46	------	------	------	22.75	0.1049	±0.02
Methyl pentyl ether	22.43	21.39	20.87	19.83	18.79	17.75	------	------	------	23.99	0.1040	±0.01
Ethyl pentyl ether	22.70	21.71	21.21	20.22	19.23	18.24	17.25	16.25	15.26	24.19	0.0992	±0.18
Hexyl methyl ether	23.71	22.72	22.22	21.23	20.24	19.25	18.26	17.26	16.27	25.20	0.0992	±0.06

Compound	Surface tension (±0.10)										Least squares constants		σ_γ
	15°	20[c]	25°	30°	40[c]	50°	60[c]	70°	80°	90 °C	a	b	
Ethyl hexyl ether	22.46	------	21.70	21.33	20.57	19.82	19.07	18.31	17.56	16.80	23.59	0.0754	±0.40
Bis(2-ethoxyethyl) ether	27.98	------	26.80	26.21	25.04	23.86	22.68	21.51	20.33	19.16	29.74	0.1176	±0.35
Bis[2-(2-methoxyethoxy)-ethyl] ether	34.42	------	33.41	32.90	31.88	30.86	29.85	28.83	27.81	26.80	35.95	0.1017	±0.02
Anisole	36.30	------	35.10	34.50	33.29	32.09	30.89	29.68	28.48	27.27	38.11	0.1204	±0.13
Phenetole	34.51	------	32.41	31.86	30.75	29.65	28.55	27.44	26.34	25.23	35.17	0.1104	±0.12
Phenyl propyl ether	32.69	------	31.63	31.10	30.05	28.99	27.93	26.88	25.82	24.77	34.27	0.1056	±0.03
Isopropyl phenyl ether	31.34	------	30.28	29.76	28.70	27.65	26.60	25.54	24.49	23.43	32.92	0.1054	±0.07
Butyl phenyl ether	31.93	------	30.97	30.48	29.52	28.55	27.59	26.62	25.66	24.69	33.38	0.09653	±0.07
Pentyl phenyl ether	32.19	------	31.25	30.78	29.85	28.91	27.98	27.04	26.11	25.17	33.59	0.0935	±0.01
Hexyl phenyl ether	31.66	------	30.79	30.35	29.48	28.61	27.73	26.86	25.99	25.12	32.97	0.08725	±0.05
Allyl phenyl ether	34.44	------	33.35	32.80	31.71	30.61	29.51	28.43	27.34	26.24	36.08	0.1093	±0.03
p-Methylanisole[b]	34.59	------	33.52	32.99	31.92	30.84	29.77	28.70	27.63	26.56	36.20	0.1071	------
Phenyl ether[c]	27.53	------	26.77	26.36	25.58	24.80	24.02	23.24	------	------	28.70	0.0780	------
Anethol[a]	35.59	35.14	34.69	34.24	33.35	32.45	31.56	30.66	29.77	28.87	36.93	0.0895	±0.30

[a] Ref. [13] (Capillary Rise Method-V) (±1.5).
[b] Ref. [192] (±0.2).
[c] Ref. [43] (Maximum Bubble Pressure-A) (±0.2).
[d] Ref. [179] (Capillary Rise Method-A) (±0.5).

TABLE 40.2. Oximes [251]

(Maximum Bubble Pressure Method-A)

Oxime	Surface tension (±0.15)										Least squares constants		σ_γ
	15°	20°	25°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Acetone *O*-methyloxime	23.38	22.85	22.31	21.78	20.72						24.97	0.1062	±0.00
Acetone *O*-ethyloxime	23.03	22.48	21.93	21.38	20.28	19.18	18.08				24.68	0.1100	±0.01
Acetone *O*-propyloxime	24.19	23.65	23.12	22.59	21.52	20.45	19.38				25.79	0.1068	±0.03
2-Butanone *O*-ethyloxime	24.29	23.75	23.20	22.66	21.58	20.49	19.40	18.32	17.23	16.15	25.92	0.1086	±0.06
2-Butanone *O*-propyloxime	24.47	23.95	23.43	22.93	21.88	20.84	19.81	18.77	17.74	16.70	26.02	0.1035	±0.04
3-Pentanone *O*-ethyloxime	24.28	23.78	23.27	22.77	21.76	20.75	19.75	18.74	17.73	16.73	25.79	0.1007	±0.08
3-Pentanone *O*-propyloxime	25.23	24.73	24.24	23.74	22.75	21.76	20.77	19.78	18.79	17.80	26.71	0.09899	±0.05
2-Pentanone *O*-ethyloxime	24.04	23.56	23.08	22.59	21.63	20.66	19.70	18.73	17.77	16.80	25.49	0.0965	±0.06
2-Pentanone *O*-propyloxime	25.13	24.63	24.13	23.64	22.64	21.64	20.64	19.64	18.65	17.65	26.63	0.0998	±0.14
3-Hexanone *O*-ethyloxime	24.74	24.25	23.76	23.28	22.30	21.32	20.34	19.36	18.39	17.41	26.21	0.0978	±0.04
3-Hexanone *O*-propyloxime	25.49	25.00	24.50	23.98	23.01	22.02	21.03	20.04	19.05	18.05	26.98	0.09918	±0.09
4-Heptanone *O*-ethyloxime	25.26	24.76	24.25	23.75	22.74	21.73	20.73	19.72	18.71	17.71	26.77	0.1007	±0.13
4-Heptanone *O*-propyloxime		24.96	24.50	24.04	23.13	22.21	21.30	20.38	19.47	18.55	26.79	0.0915	±0.12

TABLE 41. Ethylenic compounds [114]

(Capillary Rise-A)

Compound	Surface tension (±0.10)									Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
3-Butenoic acid	29.31	28.82	27.83	26.84	25.84	24.85	23.86	22.87	21.88	30.80	0.0991	±0.07
Methyl 3-butenoate	27.98	27.38	26.18	24.99	23.79	22.60				29.77	0.1195	±0.05
Ethyl 3-butenoate	96.71	96.16	95.05	93.95	92.84	91.73	20.63	19.52	18.42	28.37	0.1106	±0.05
Propyl 3-butenoate	26.81	26.29	25.25	24.22	23.18	22.14	21.11	20.07	19.04	28.36	0.1036	±0.03
Butyl 3-butenoate	27.07	26.58	25.59	24.61	23.62	22.63	21.65	20.66	19.68	28.55	0.0986	±0.03
Pentyl 3-butenoate	27.26	26.78	25.84	24.89	23.94	22.99	22.04	21.10	20.15	28.68	0.0948	±0.03
Methyl undecenoate	30.42	29.95	29.01	28.07	27.13	26.19	25.25	24.31	23.37	31.83	0.0940	±0.04
Ethyl undecenoate	29.69	29.24	28.34	27.45	26.55	25.65	24.76	23.86	22.97	31.03	0.0896	±0.04
Propyl undecenoate	29.95	29.49	28.57	27.64	26.72	25.80	24.87	23.95	23.02	31.34	0.0924	±0.03
Butyl undecenoate	30.05	29.61	28.74	27.86	26.98	26.10	25.22	24.35	23.47	31.37	0.0878	±0.07
2-Pentene	17.66	17.14	16.09							19.23	0.1047	±0.00
Methyl allylmalonate	33.11	32.57	31.49	30.40	29.32	28.24	27.15	26.07	24.98	34.74	0.1084	±0.06
Ethyl allylmalonate	30.15	29.65	28.65	27.65	26.64	25.64	24.64	23.64	22.64	31.65	0.1001	±0.10
Propyl allylmalonate		29.29	28.36	27.44	26.51	25.58	24.66	23.73	22.81	31.14	0.0926	±0.12
Butyl allylmalonate	29.42	28.98	28.10	27.22	26.33	25.45	24.57	23.69	22.81	30.74	0.0881	±0.07
Allyl acetate		26.36	25.17	23.99	22.80	21.61				28.73	0.1186	±0.08

TABLE 41. Ethylenic compounds [114]—Continued

Compound	Surface tension (±0.10)									Least squares constants		σ_γ
	15°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b	
Allyl propionate	26.91	26.35	25.23	24.12	23.00	21.88	20.77	19.65	18.54	28.58	0.1116	±0.04
Allyl butyrate	26.65	26.13	25.09	24.05	23.01	21.98	20.94	19.90	18.86	28.21	0.1039	±0.02
Allyl succinate	------	33.70	32.65	31.60	30.55	29.51	28.46	27.41	26.37	35.79	0.1047	±0.06
3-Chloropropene	24.08	23.61	22.66	------	------	------	------	------	------	25.50	0.0946	±0.06
3-Bromopropene	27.56	26.94	25.68	24.42	23.16	21.91	------	------	------	29.45	0.1257	±0.03
1,5-Hexadiene	19.39	18.87	17.85	16.82	15.79	------	------	------	------	20.93	0.1028	±0.07
Dimethyl maleate	38.90	38.29	37.07	35.85	34.63	33.41	32.19	30.97	29.75	40.73	0.1220	±0.02
Propyl fumarate	31.49	31.01	30.05	29.09	28.12	27.16	26.20	25.24	24.28	32.93	0.0961	±0.09
Diethyl maleate	33.11	32.59	31.55	30.51	29.47	28.44	27.40	26.36	25.32	34.67	0.1039	±0.12
Dipropyl maleate	32.46	31.96	30.96	29.96	28.96	27.96	26.96	25.96	24.96	33.96	0.1000	±0.13
Dibutyl maleate	------	30.73	29.86	29.00	28.13	27.27	26.40	25.54	24.67	32.46	0.0865	±0.13
Diisobutyl maleate	------	28.79	27.94	27.08	26.23	25.38	24.52	23.67	22.81	30.50	0.0854	±0.03
Dipentyl maleate	31.24	30.81	29.95	29.09	28.22	27.36	26.50	25.64	25.08	32.53	0.0861	±0.02
Diisopentyl maleate	28.97	28.60	27.86	27.11	26.37	25.63	24.88	24.14	23.39	30.09	0.0744	±0.09
Ethyl fumarate	32.32	31.79	30.73	29.68	28.62	27.56	26.51	25.45	24.40	33.90	0.1056	±0.11
Butyl fumarate	31.15	30.71	29.82	28.92	28.03	27.14	26.25	25.36	24.47	32.49	0.08916	±0.07
Isobutyl fumarate	------	28.93	28.07	27.22	26.36	25.51	24.65	23.80	22.94	30.64	0.0855	±0.07
Pentyl fumarate	31.11	30.69	29.84	28.99	28.14	27.30	26.45	25.60	24.76	32.38	0.0847	±0.04
Isopentyl fumarate	------	29.33	28.51	27.69	26.87	26.05	25.23	24.41	23.59	30.97	0.0820	±0.06
Methyl citraconate	------	36.34	35.13	33.93	32.72	31.51	30.31	29.10	27.90	38.75	0.1206	±0.08
Ethyl citraconate	------	32.15	31.14	30.13	29.12	28.12	27.11	26.10	25.09	34.17	0.1009	±0.05
Propyl citraconate	------	31.08	30.13	29.18	28.22	27.27	26.32	25.37	24.42	32.98	0.0951	±0.13
Methyl mesaconate	35.86	35.27	34.08	32.90	31.72	30.54	29.36	28.17	26.99	37.63	0.1182	±0.13
Ethyl mesaconate	------	31.54	30.52	29.50	28.48	27.47	26.45	25.43	24.42	33.57	0.1017	±0.13
Propyl mesaconate	31.39	30.91	29.97	29.02	28.07	27.12	26.17	25.23	24.28	32.81	0.0948	±0.05
Methyl pyrotartrate	------	33.21	32.11	31.01	29.90	28.80	27.70	26.60	25.49	35.42	0.1103	±0.08
Ethyl pyrotartrate	------	29.80	28.82	27.85	26.87	25.89	24.92	23.94	22.97	31.75	0.0976	±0.02
Propyl pyrotartrate	------	29.55	28.63	27.71	26.78	25.86	24.94	24.02	23.10	31.39	0.0921	±0.06
Diethyl (bromomethyl)-malonate [c]	31.20	30.77	29.91	29.05	28.18	27.32	26.45	25.59	24.73	32.50	0.08636	±0.08
Methyl crotonate	------	28.62	27.43	26.25	25.07	23.89	22.71	21.52	20.34	30.98	0.1182	±0.08
Ethyl crotonate	------	27.18	26.11	25.05	23.98	22.91	21.85	20.78	19.72	29.31	0.1066	±0.05
Propyl crotonate	28.36	27.83	26.78	25.72	24.67	23.62	22.56	21.51	20.45	29.94	0.1054	±0.06
Butyl crotonate	28.32	27.84	26.88	25.92	24.96	24.01	23.05	22.09	21.13	29.76	0.0959	±0.07
Pentyl crotonate	28.74	28.27	27.32	26.37	25.42	24.47	23.52	22.57	21.62	30.17	0.09505	±0.07
Isopentyl crotonate	------	27.25	26.31	25.38	24.44	23.51	22.57	21.64	20.70	29.12	0.0935	±0.09
Methyl cinnamate [a]	------	------	------	37.65	36.61	35.58	34.55	33.52	32.49	41.77	0.1031	±0.19
Ethyl cinnamate	------	37.90	36.85	35.81	34.76	33.72	32.67	31.63	30.58	39.99	0.1045	±0.07
Propyl cinnamate	------	36.59	35.62	34.65	33.68	32.71	31.74	30.77	29.80	38.53	0.0970	±0.07
Butyl cinnamate	------	35.75	34.81	33.87	32.93	31.99	31.05	30.11	29.17	37.63	0.0940	±0.10
Dimethyl chlorofumarate [b]	------	37.52	36.35	35.19	34.02	32.85	31.69	30.52	29.36	39.85	0.1166	±0.07
Diethyl chlorofumarate [b]	33.76	33.20	32.09	30.98	29.87	28.77	------	------	------	35.42	0.1109	±0.02
Dipentyl chlorofumarate [b]	------	------	29.00	28.20	27.39	26.59	25.78	24.98	24.17	31.42	0.0805	±0.02
Methyl *cis*-cinnamate [a]	------	40.17	38.92	37.66	36.41	35.16	33.90	32.65	------	42.68	0.1254	±0.02
Methyl α-bromocinnamate [a]	------	45.63	44.36	43.09	41.82	40.56	39.29	38.02	36.75	48.17	0.1269	±0.06
Methyl β-bromocinnamate [a]	------	44.36	43.17	41.98	40.79	39.61	38.42	37.23	------	46.74	0.1189	±0.40
Methyl α-bromo-*cis*-cinnamate [a]	------	43.48	42.28	41.09	39.89	38.69	37.50	36.52	------	45.87	0.1196	±0.07
Methyl β-bromo-*cis*-cinnamate [a]	------	------	------	------	------	36.62	35.45	34.27	33.10	43.68	0.1176	±0.09
Propyl hydrocinnamate [b]	34.87	34.37	33.35	32.34	31.33	30.32	29.31	28.29	------	36.39	0.1012	±0.05
Isopropyl hydrocinnamate [b]	33.57	33.09	32.12	31.15	30.18	29.21	28.24	27.27	26.30	35.03	0.0970	±0.02
Dimethyl chloromaleate [b]	38.14	37.54	36.35	35.15	33.95	32.75	31.55	30.36	29.16	39.94	0.1198	±0.06
3-Iodopropene [d]	32.38	31.75	30.48	29.22	27.96	26.70	25.44	24.17	22.91	34.27	0.1262	±0.60
Isopentyl hydrocinnamate [b]	32.19	31.75	30.88	30.01	29.14	28.26	27.39	26.52	25.64	33.50	0.08728	±0.03

[a] Ref. [216] (Maximum Bubble Pressure-A) (±0.5).
[b] Ref. [255] (Capillary Rise Method-A) (±0.3).
[c] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).
[d] Ref. [192] (Capillary Rise Method-A) (±0.7).

TABLE 42.1. Halogenated hydrocarbons

Tetrachlorodifluoroethane [97]

(Capillary Rise Method-A)

Surface tension (±0.09)						Least squares constants	
30.0°	40.0°	50.0°	60.0°	70.0°	80.0 °C	a	b
22.73	21.60	20.46	19.33	18.20	17.07	26.13	0.1133

Trichlorotrifluoroethane [97]

(Capillary Rise Method-A)

Surface tension ($\gamma = 19.85 - 0.9345t + 0.1448t^2 - 0.0045t^3 - 0.1448t^4$)

0°	10°	20°	30°	40 °C
19.85	18.96	17.75	16.56	15.30

Perfluoropentanes [186]

(Capillary Rise Method-A)

Compound	Surface tension (±0.10)					Least squares constants	
	5°	10°	15°	20°	25 °C	a	b
Perfluoropentane	11.28	10.82	10.35	9.89	9.42	11.75	0.0932
Perfluoro-2-methylbutane	11.88	11.41	10.94	10.48	10.01	12.35	0.0937
Perfluorocyclopentane	.....	12.04	11.58	11.12	.....	12.97	0.0927

Perfluorohexane [211]

(Capillary Rise Method)

Surface tension (±0.18)								Least squares constants	
10°	15°	20°	25°	30°	35°	40°	50 °C	a	b
12.84	12.38	11.91	11.44	10.97	10.51	10.04	9.10	13.78	0.0935

TABLE 42.1. Halogenated hydrocarbons—Continued

Perfluoro-2-methylpentane [211]

(Capillary Rise Method)

Surface tension (±0.18)								Least squares constants	
10°	15°	20°	25°	30°	35°	40°	50 °C	*a*	*b*
12.88	12.50	12.12	11.73	11.35	10.97	10.58	9.81	13.65	0.0767

Hexadecafluoroheptane [161]

(Maximum Bubble Pressure-A)

Surface tension (±0.10)					Least squares constants	
15°	20°	25°	30°	35 °C	*a*	*b*
13.60	13.19	12.78	12.37	11.96	14.83	0.0820

Perfluoromethylcyclohexane [78]

(Maximum Bubble Pressure-A)

Surface tension (±0.15)						Least squares constants	
0°	10°	20°	30°	40°	50 °C	*a*	*b*
17.70	16.65	15.70	14.70	13.80	12.90	17.69	0.0973

Fluorotrinitromethane [267]

(Maximum Bubble Pressure Method-A)

Surface tension (±0.1)						Least squares constants	
10°	15°	20°	30°	40°	50 °C	*a*	*b*
26.37	25.76	25.15	23.93	22.71	21.49	27.59	0.1219

TABLE 42.2. Halogen fluorides [185]

(Capillary Rise Method-V)

Compound	Surface tension (±0.6)							Least squares constants	
	10°	15°	20°	25°	35°	40°	45 °C	a	b
Iodine pentafluoride	-------	32.0	30.5	29.9	28.6	27.9	-------	33.16	0.1318
Bromine pentafluoride	24.1	23.6	23.0	22.5	21.4	-------	-------	25.24	0.1098
Bromine trifluoride	37.3	36.8	36.3	35.8	34.8	34.3	33.8	38.30	0.0999

Chlorine trifluoride [10]

(Capillary Rise Method-V)

Surface tension (orthobaric) (±0.2)										Least squares constants	
5°	10°	15°	20°	25°	30°	35°	40°	45°	50 °C	a	b
26.1	25.2	24.4	23.6	22.7	21.9	21.1	20.3	19.4	18.6	26.9	0.1660

TABLE 42.3. Antimony pentafluoride [102]

(Maximum Bubble Pressure Method-A)

Surface tension (±0.30)											Least squares constants	
5°	10°	15°	20°	30°	40°	60°	80°	100°	120°	140 °C	a	b
48.1	47.1	46.2	45.2	43.3	41.3	37.5	33.6	29.7	25.8	22.0	49.07	0.1937

TABLE 42.4. Selenium tetrafluoride [166]

(Maximum Bubble Pressure-A)

Surface tension (±0.18)										Least squares constants	
5°	10°	20°	30°	40°	50°	60°	70°	80°	90 °C	a	b
37.97	37.34	36.07	34.79	33.51	32.24	30.97	29.69	28.42	27.14	38.61	0.1274

TABLE 42.5. Uranium hexafluoride [135]

(Capillary Rise Method-V)

Surface tension (±0.2)				Least squares constants	
70°	80°	90°	100 °C	a	b
16.8	15.6	14.3	13.1	25.5	0.1240

TABLE 43. Gallium trichloride and addition compounds

(Differential Capillary Rise-V)

Compound	Surface tension (±0.2)										Least squares constants		σ_γ
	70°	80°	90°	100°	110°	120°	130°	140°	150°	160 °C	a	b	
Gallium trichloride[a]	28.0	27.0	26.0	25.0	24.0	23.0	22.0	21.0	------	------	35.0	0.1000	±0.3
Gallium trichloride—pyridine[b]	------	------	------	------	------	38.7	37.7	36.8	35.7	34.8	50.3	0.0970	±0.3
Gallium trichloride—piperidine[c]	------	------	------	------	------	35.3	34.5	33.6	32.8	32.3	45.5	0.0847	±0.5
Gallium trichloride—dipiperidine[c]	------	------	------	------	------	------	24.3	22.6	21.0	19.3	46.0	0.1670	±0.2
Gallium trichloride—phosphonyl chloride[d]	------	------	------	------	32.7	32.0	31.2	30.5	29.7	------	41.1	0.0760	±0.1

[a] Ref. [75].
[b] Ref. [76].
[c] Ref. [74].
[d] Ref. [73].

TABLE 44.1. Ditertiary glycols [120]

(Max. Bubble Pressure-A)

Glycol	Surface tension (±0.15)					Least squares constants	
	60°	65°	70°	75°	80 °C	a	b
3,6-Diethyl-3,6-octanediol	------	------	27.13	26.68	26.23	33.43	0.0900
3,11-Diethyl-3,11-tridecanediol	------	29.63	29.27	28.91	28.55	34.31	0.0720
2,11-Dimethyl-2,11-dodecanediol	------	29.79	29.39	28.99	28.59	34.99	0.0800
3,12-Diethyl-3,12-tetradecanediol	------	30.04	29.64	29.23	28.83	35.31	0.0810
4,13-Dipropyl-4,13-hexadecanediol	28.32	27.97	27.62	27.09	26.92	32.51	0.06987

TABLE 44.2. Polyethylene glycols and derivatives [68]

(Capillary Rise Method-V)

Compound	Surface tension (±0.14)							Least squares constants	
	20°	40°	60°	80°	100°	120°	140 °C	a	b
Ethylene glycol	48.43	46.65	44.87	43.09	41.31	39.53	37.75	50.21	0.0890
Diethylene glycol	45.21	43.45	41.69	39.93	38.17	36.41	34.65	46.97	0.0880
Triethylene glycol	45.57	43.81	42.05	40.29	38.53	36.77	35.01	47.33	0.0880
Heptaethylene glycol	48.39	46.61	44.83	43.05	41.27	39.49	37.71	50.17	0.0890
1,3-Propanediol	45.62	43.82	42.01	40.21	38.40	36.59	34.79	47.43	0.0903
2-(2-Chloroethoxy)ethyl-2-(2-hydroxyethoxy)ethyl ether	43.62	41.77	39.92	38.07	36.22	34.37	32.52	45.47	0.0925
Bis(2-chloroethyl) ether	37.96	35.35	32.73	30.12	27.51	.....	.....	40.57	0.1306
p-Dioxane	33.45	30.67	27.88	25.10	22.32	.....	.....	36.23	0.1391
Bis(2-methoxyethyl) ether	30.14	27.81	25.49	23.16	20.83	.....	.....	32.47	0.1164

TABLE 44.3. Epichlorohydrin [220]

(Maximum Bubble Pressure-A)

Surface tension (±0.30)							Least squares constants		σ_γ
10°	20°	30°	40°	60°	80°	100 °C	a	b	
38.40	36.04	35.68	34.32	31.60	28.88	26.16	39.76	0.1360	±0.06

TABLE 45. Synthetic glycerides

Ester of glycerol	Surface tension										Least squares constants		σ_γ
	20°	40°	60°	80°	100°	110°	120°	130°	140°	150 °C	a	b	
Glycerol triformate[a]	47.41	45.27	43.12	40.98	38.84	37.77	36.70	35.63	34.56	33.48	49.55	0.1071	±0.13
Glycerol acetate[d]	41.78	40.04	38.28	36.52	34.77	33.90					43.53	0.08757	±0.05
Glycerol triacetate[a]	36.26	34.64	33.02	31.40	29.78	28.97	28.16	27.35	26.54	25.73	37.88	0.081	±0.38
Glycerol tributyrate[a]	30.85	29.49	28.14	26.78	25.42	24.74	24.06	23.38	22.70	22.02	32.21	0.0679	±0.14
Glycerol trihexanoate[a]	29.93	28.79	27.64	26.50	25.36	24.79	24.22	23.65	23.08	22.50	31.07	0.0571	±0.05
Glycerol trioctanoate[a]	29.21	28.17	27.13	26.08	25.04	24.52	24.00	23.48	22.96	22.44	30.25	0.05208	±0.02
Glycerol tridecanoate[a]		27.64	26.54	25.45	24.36	23.81	23.27	22.72	22.18	21.63	29.82	0.0546	±0.18
Glycerol trilaurate[a]			29.36	28.26	27.17	26.62	26.08	25.53	24.98	24.44	32.64	0.05469	±0.06
Glycerol 1-palmitate[c]				22.12	20.78	20.11	19.45	18.78	18.11		27.46	0.06678	±0.15
Glycerol tripalmitate[b]				26.88	25.54	24.87	24.20	23.52			32.26	0.0672	±0.03
Glycerol 1-stearate[c]					18.64	18.06	17.47	16.88	16.29		24.52	0.05876	±0.15
Glycerol tristearate[b]			28.62	27.25	25.88	25.19	24.51	23.82			32.73	0.06854	±0.05
Glycerol trioleate[a]	34.63	33.23	31.84	30.44	29.04	28.34	27.64	26.94	26.24	25.54	36.03	0.0699	±0.15
Glycerol trielaidate[c]			22.98	21.58	20.18	19.50	18.80	18.10			27.18	0.06986	±0.15
Glycerol trilinoleate[c]	20.28	19.70	19.13	18.56	17.99	17.70	17.41	17.12			20.85	0.02867	±0.15
Glycerol 1,2-diacetate 3-oleate[c]	21.88	20.82	19.75	18.69	17.62	17.09	16.55	16.02			22.95	0.0533	±0.15
Glycerol 1,2-diacetate 3-stearate[c]			26.40	24.53	22.66	21.73	20.79	19.86			32.00	0.09338	±0.15
Glycerol 1,3-dipalmitate[c]				22.15	21.23	20.76	20.30	19.84	19.37		25.85	0.04625	±0.15
Glycerol 1,3-dioleate 2-palmitate[c]	26.49	25.60	24.72	23.83	22.94	22.49	22.05	21.61	21.16		27.38	0.04442	±0.15
Glycerol trinonanoate[c]	24.25	23.12	21.99	20.86	19.73	19.16	18.70	18.03	17.47		25.38	0.0565	±0.15

[a] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).
[b] Ref. [254] (Capillary Rise Method-A) (±0.30).
[c] Ref. [11] (Capillary Pressure-A) (±0.15).
[d] Ref. [255] (Capillary Rise Method-A) (±0.20).

TABLE 46. Glycerol trinitrate [222]

(Capillary Rise-A)

Surface tension (±0.2)						Least squares constants	
10°	15°	20°	25°	30°	35 °C	a	b
53.24	51.98	50.73	49.48	48.23	46.98	55.74	0.2504

TABLE 47. Halogen compounds of benzene and homologs

Compound	Surface tension																Least squares constants		σ_γ
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°	110°	120°	130°	140°	150°	160 °C	a	b	
Fluorobenzene[a]	28.47	27.26	26.06	24.85	23.65	22.45	21.24	20.04									29.67	0.1204	±0.03
Chlorobenzene[c]	34.78	33.59	32.40	31.21	30.01	28.82	27.63	26.44	25.25	24.06	22.87	21.68	20.49				35.97	0.1191	±0.20
Bromobenzene[c]	36.98	35.82	34.66	33.50	32.34	31.18	30.02	28.86	27.70	26.54	25.38	24.22	23.06	21.90	20.74		38.14	0.1160	±0.05
Iodobenzene[a]	40.40	39.27	38.15	37.03	35.90	34.78	33.66	32.54	31.41	30.29	29.17	28.04	26.92	25.80	24.67	23.55	41.52	0.1123	±0.17
p-Fluorotoluene[a]	29.33	28.22	27.11	26.00	24.89	23.75	22.68	21.57	20.46	19.35	18.24						30.44	0.1109	±0.07
m-Fluorotoluene[b]	31.05	29.80	28.54	27.28	26.02	24.77	23.51	22.25	21.00	19.74	18.48						32.31	0.1257	±0.10
p-Chlorotoluene[a]	33.85	32.77	31.68	30.60	29.52	28.44	27.36	26.27	25.19	24.11	23.03	21.95	20.86	19.78	18.70	17.62	34.93	0.1082	±0.10
o-Bromotoluene[b]	35.63	34.63	33.63	32.63	31.63	30.63	29.63	28.64	27.64	26.64	25.64	24.65	23.55	22.65	21.65	20.65	36.62	0.09979	±0.15
p-Bromotoluene[c]			33.41	32.41	31.41	30.42	29.42	28.42	27.43	26.43	25.43	24.44	23.44	22.44	21.44	20.45	36.40	0.0997	±0.14
p-Iodotoluene[c]					34.40	33.44	32.47	31.51	30.54	29.58	28.61	27.65	26.58	25.71	24.75	23.78	39.23	0.09654	±0.18
m-Dichlorobenzene[a]	37.15	36.01	34.86	33.71	32.56	31.42	30.27	29.12	27.98	26.83	25.68	24.54	23.39	22.24	21.09	19.95	38.30	0.1147	±0.10
p-Dichlorobenzene[b]					30.26	29.39	28.51	27.63	26.75	25.87	24.99	24.11	23.23	22.35	21.47	20.60	34.66	0.0879	±0.05
p-Dibromobenzene[b]									32.78	31.77	30.76	29.76	28.75	27.74	26.73	25.73	41.84	0.1007	±0.20
1-Bromo-4-fluoro-benzene[b]	35.71	34.68	33.64	32.61	31.57	30.53	29.50	28.46	27.43	26.39	25.35	24.32	23.28	22.25			36.75	0.1036	±0.13
1-Bromo-4-chloro-benzene[d]							33.02	32.01	31.01	30.01	29.01	28.01	27.00	26.00	25.00	24.00	40.03	0.1002	±0.08
1-Chloro-4-iodo-benzene[e]						37.71	36.69	35.66	34.64	33.62	32.60	31.58	30.55	29.53	28.51	27.49	43.84	0.1022	±0.11
α,α,-Dichloro-toluene[d]	40.22	39.19	38.15	37.12	36.08	35.05	34.01	32.98	31.94	30.91	29.87	28.84	27.80	26.77	25.73	24.70	41.26	0.1035	±0.80
α-Chlorotoluene[d]	38.69	37.47	36.24	35.01	33.78	32.56	31.33	30.10	28.88	27.65	26.42	25.20	23.97	22.74	21.51	20.29	39.92	0.1227	±0.09
α-Bromotoluene[e]	33.66	32.33	30.99	29.66	28.33	27.00	25.67	24.33	23.00	21.67	20.34	19.01	17.67	16.34	15.01	13.68	34.99	0.1332	
Benzoyl chloride[d]	40.26	39.17	38.09	37.00	35.92	34.84	33.75	32.67	31.58	30.50	29.42	28.33	27.25	26.16	25.08	24.00	41.34	0.1084	±0.80
Benzoyl bromide[e]	44.45	43.06	41.66	40.26	38.86	37.47	36.07	34.67	33.28	31.88	30.48	29.09	27.69	26.29	24.89	23.50	45.85	0.1397	
o-Chloroaniline[b]	41.59	40.73	39.86	38.99	38.13	37.26	36.39	35.53	34.66	33.79	32.93	32.06	31.19	30.33	29.46	28.59	42.46	0.08667	±0.50
p-Chloroaniline[a]							40.93	39.85	38.78	37.71	36.64	35.57	34.49	33.42	32.35	31.28	48.43	0.1072	±0.03
(2-Bromoethyl)-benzene[a]	40.02	38.92	37.82	36.72	35.62	34.52	33.42	32.32	31.22	31.12	29.02	27.92	26.82	25.72	24.62	23.52	41.12	0.1100	±0.06
(2-Iodoethyl)-benzene[a]	41.77	40.71	39.64	38.57	37.50	36.44	35.37	34.30	33.24	32.17	31.10	30.04	28.97	27.90	26.83	25.77	42.84	0.1067	±0.17
Benzenesulfonyl fluoride[a]		37.64	36.56	35.48	34.39	33.31	32.23	31.15	30.06	28.98	27.90	26.81	25.73				39.81	0.1083	±0.08
Benzenesulfonyl chloride[a]		43.25	42.13	41.01	39.89	38.78	37.66	36.54	35.43	34.31	33.19	32.08	30.96	29.84			45.48	0.1117	±0.06
p-Toluenesulfonyl chloride[e]							36.09	35.19	34.28	33.38	32.48	31.57	30.67				42.41	0.0903	±0.03
(Bromomethyl)tetra-hydrofuran[a]	38.27	37.11	35.94	34.78	33.61	32.45											39.44	0.1165	±0.03

[a] Ref. [244] (Capillary Rise-A) (±0.10).
[b] Ref. [108] (Maximum Bubble Pressure-N_2) (±2.0).
[c] Ref. [215] (Maximum Bubble Pressure-A) (±1.0).
[d] Ref. [45] (Capillary Rise-A) (±1.0).
[e] Ref. [115] (Capillary Rise-A) (±0.90).
[f] Ref. [26] (Maximum Bubble Pressure-A) (±0.2).

TABLE 48.1. Fluoroacetic acid [111]

(Capillary Rise Method-V)

Surface tension (±0.05)							Least squares constants	
36°	40°	50°	60°	70°	80°	95 °C	a	b
38.21	37.76	36.65	35.54	34.43	33.32	31.64	42.22	0.11145

TABLE 48.2. Trifluoroacetic acid [113]

(Capillary Rise Method-V)

Surface tension (±0.05)												Least squares constants	
24°	26°	28°	30°	35°	40°	45°	50°	55°	60°	65°	68 °C	a	b
13.63	13.44	13.28	13.11	12.68	12.25	11.83	11.42	10.99	10.57	10.15	9.90	15.64	0.08444

TABLE 48.3. Bromoacetic acid [109]

(Capillary Rise Method-V)

Surface tension (±0.06)							Least squares constants	
55°	70°	85°	100°	120°	145°	170 °C	a	b
40.30	38.57	36.96	35.13	33.14	30.40	27.72	46.21	0.1090

TABLE 48.4. Iodoacetic acid [109]

(Capillary Rise Method-V)

Surface tension (±0.06)							Least squares constants	
85°	90°	95°	100°	110°	120°	130 °C	a	b
38.63	38.03	37.35	36.85	35.87	34.54	34.41	48.36	0.1148