SOLUBILITIES

OF

INORGANIC AND ORGANIC SUBSTANCES

A HANDBOOK OF THE MOST RELIABLE QUANTITATIVE SOLUBILITY DETERMINATIONS

RECALCULATED AND COMPILED BY

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PREFACE

During the years which have elapsed since Professor Arthur M. Comey's admirable "Dictionary of Chemical Solubilities" went to press (March, 1894), the literature upon solubilities has grown to such an extent that it has appeared desirable to make a new compilation of it. Soon after beginning work upon this volume the author realized that it would not be possible to prepare a compilation of solubility results which would fulfill completely the various requirements of theoretical, technical, analytical, and other classes of chemists, and he has therefore endeavored to meet some of the needs of all chemists rather than provide information especially arranged for any particular class.

The following features have been considered of chief importance in preparing the present compilation: completeness of the data, reliability of the determinations, uniformity in expression of results, convenience of arrangement of material, and the indexing of the cross-references to tables.

The material has been collected almost entirely from the original sources, and not from text-books or works of reference. The plan followed has been to search diligently the tables of contents or indices of twenty-five of the principal chemical journals issued since 1875, and to consult all articles in these as well as in other journals to which references could be obtained. In this connection, however, it should be stated that indexed references to work on solubility usually appear under the name of the substance employed, and not under the heading "solubility." Furthermore, solubility determinations are often incidental to other investigations, and consequently are not indicated in the title of the article or included in the index of the journal. Considering these difficulties there can be little hope of making such a compilation complete in every detail, and in the present case the best that can be said is that an earnest effort has been made to omit nothing of importance. This has been done not only for the author's personal satisfaction in perfecting the work, but also to give the reader a reasonable assurance that the absence from these pages of results upon a particular substance is good evidence that such determinations of satisfactory reliability are not readily obtainable from the usually accessible chemical journals.

Although at the time Professor Comey compiled his book it appeared inadvisable to attempt, in the majority of cases, to select the most reliable determinations of the solubility of the same substance reported by different investigators, the present author believes that this can now be done with advantage. The selections have been made in all cases by calculating the available determinations to a common basis and drawing curves through the points plotted on cross-section paper. A comparison of the curves, together with a study of the details of the methods by which the determinations were made in the several cases, has usually furnished clear evidence for a reliable selection. For some substances, however, this plan could not be followed, and it has therefore been necessary to present two or more sets of disagreeing results.

In many instances the calculations and study necessary to ascertain the most reliable figures have required much labor, and perhaps in some cases the author has not succeeded in selecting the ones nearest the truth; but it is believed that the economy of space required to present the material, and the saving of the time of the reader in making the necessary selections himself, will far overbalance the disadvantage resulting from the accidental inaccuracies introduced through extended computations.

An additional advantage resulting from the recalculation of different determinations to a common basis is the increased uniformity in the expression of results throughout the volume. On this account it has been possible to give the solubility of most substances for regular intervals of temperature and in terms of weight of dissolved substance per given weight of solvent or of solution.

Quantitative results alone have been included in this compilation, since it is assumed that qualitative determinations, if desired, can be readily made by simple tests in the laboratory, and therefore the effort necessary to collect such observations from the literature is out of proportion to the value of the information obtained.

In regard to the names and formulas of the compounds included, the author wishes to say that they are, for the most part, given as found in the original papers from which they were taken; and in some cases a lack of uniformity in the manner of their expression will be noted. This is especially true of the molecules of water of crystallization in the formulas given in connection with the guide names placed in heavy type at the head of the tables for all substances considered. As is well known, many compounds, besides gaining or losing water in air, also crystallize with different numbers of molecules of water even at the ordinary temperature, and it was therefore thought best to include such information at the proper place in the tables under the heading "Solid Phase" rather than to select in doubtful cases the number of molecules of water which the particular substance was considered to carry under ordinary conditions.

Although the arrangement of the material is alphabetical according to the customary English names, an index has been added which also provides for those cases where there appears a doubt as to which name is preferable, and furnishes cross-references to those tables which contain results upon more than one substance.

A glance through the pages of this book will show the incompleteness of the data for many of the most common chemical compounds. Furthermore many of the results given are of doubtful accuracy, although the best available. It is hoped, therefore, that a realization of the present incomplete state of our information concerning solubilities as evidenced in these pages will stimulate investigations of many of those substances which have hitherto been studied incompletely or not at ail.

This volume went to press January 1st, 1907, and the subject matter is brought up to November, 1906.

In conclusion, the author begs all indulgence for errors and omissions, and will thank any one for calling them to his attention or making suggestions such as would improve a possible future edition of this "Handbook."

A. S.

WASHINGTON, D.C., *Feb. 22, 1907.*

ABBREVIATIONS

Abs. — Absolute.
Abs. Coef. — Absorption Coefficient.
Aq. or aq. — Aqueous.
At. — Atmosphere.
b. pt. — Boiling Point.
cc. — Cubic Centimeter.
conc. — Concentrated.
d. — Dextro.
$\mathbf{d}_t$. — Density.
f. pt. — Freezing Point.
G., g., or gm. — Gram.
Gms. or gms. — Grams.
G.M. or Gm. Mol. — Gram Molecule.
l. — Laevo.
m. — Meta.
Mg. or mg. — Milligram.
Mgs. or mgs. — Milligrams.
Mg. Mol. — Milligram Molecule.
Millimols. — Milligram Molecules.
Mol. — Molecule.
m. pt. — Melting Point.
N. or n. — Normal.
o. — Ortho.
ord. — Ordinary.
p. — Para.
ppt. — Precipitate.
pptd. — Precipitated.
pt. — Part.
sat. — Saturated.
sol. — Solution.
Sp. Gr. — Specific Gravity.
t°. — Temperature in degrees C.
temp. — Temperature.
vol. — Volume.
wt. — Weight.

ABBREVIATIONS OF TITLES OF JOURNALS

Am. Ch. J. The American Chemical Journal, Baltimore.
Am. J. Sci. American Journal of Science and Arts, New Haven.
Analyst. The Analyst, London.
Ann. See Liebig's Ann.
Ann. chim. anal. appl. Annales de chimie analytique appliquée, Paris.
Ann. chim. phys. Annales de chimie et de physique, Paris.
Ann. Physik. Annalen der Physik und Chemie, Leipzig. See also Pogg. Ann. and Wied. Ann.
Apoth.-Ztg. Apotheker Zeitung, Berlin.
Arch. Pharm. Archiv der Pharmacie, Halle.
Ber. Berichte der deutschen chemischen Gesellschaft, Berlin.
Biedermann's Centr. Biedermann's Centralblatt für Agrikulturchemie, u. s. w., Leipzig.
Bull. soc. chim. Bulletin de la société chimique de Paris.
Chem. Centralbl. Chemisches Centralblatt, Berlin.
Chem. Ind. Die Chemische Industrie, Berlin.
Chem. News. The Chemical News, London.
Chem.-Ztg. Chemiker Zeitung, Cöthen.
Compt. rend. Comptes rendus hebdomadaires des Seances de l'Academie des Sciences, Paris.
Dingler pol. J. Dingler's polytechnisches Journal, Stuttgart.
Gazz. chim. ital. Gazzeta chimica italiana, Palermo.
Jahresber. Chem. Jahresbericht über die Fortschritte der Chemie, Giessen.
J. Am. Chem. Soc. Journal of the American Chemical Society, Easton.
J. Anal. Chem. The Journal of Analytical and Applied Chemistry, Easton.
J. Chem. Soc. Journal of the Chemical Society of London.
J. pharm. chim. Journal de pharmacie et de chimie, Paris.
J. Physic. Chem. Journal of Physical Chemistry, Cornell.
J. pr. Chem. Journal für praktische chemie, Leipzig.
J. russ. phys. chem. Ges. Journal of the Russian Chemical Society, St. Petersburg.
J. Soc. Chem. Ind. Journal of the Society of Chemical Industry, London.
Landw. Vers-Stat. Landwirthschaftlichen Versuchs-Stationen, Berlin.
Liebig's Annalen. Justus Liebig's Annalen der Chemie, Leipzig.
Monatsh. Ch. Monatshefte für Chemie, u. s. w., Vienna.
Mon. Sci. Le Moniteur Scientifique, Paris.
Mulder. Scheikundige Verhandelingen en Onderzoekingen, Vol. 3, Pt. 3. Bijdragen tot de Geschiedenis van Het Scheikungig Gebonden Water by G. J. Mulder, Rotterdam, 1864.
Pharm. J. Pharmaceutical Journal and Transactions, London.
Phil. Mag. The Philosophical Magazine, London.
Physic. Rev. Physical Review, Cornell.
Pogg. Ann. Annalen der Physik und Chemie, edited by Poggendorf. See also Ann. Physik and Wied. Ann.
Proc. Am. Acad. Proceedings of the American Academy of Arts and Sciences, Boston.
Proc. Roy. Soc. Proceedings of the Royal Society of London.
Rec. trav. chim. Recueil des travaux chimiques des Pays-Bas, Leiden.
Sitzber. Akad. Wiss. Berlin. Sitzungsberichte der königlichen preussischen Akademie der Wissenschaften zu Berlin.
Sitzber. Akad. Wiss. Wien. Sitzungsberichte der mathematische naturwissenschaftlichen classe der kaiserlichen Akademie der Wissenschaften zu Wien.
U. S. P. Pharmacopœia of the United States, 8th Revision, 1900.

Wied. Ann. Annalen der Physik und Chemie, edited by Wiederman. See also Pogg. Ann. and Ann. Physik.
Wiss. Abh. p. t. Reichanstalt. Wissenschaftlichen Abhandlung der physikalische technische Reichstalt, Charlottenburg.
Z. anal. Chem. Zeitschrift für analytische Chemie, Wiesbaden.
Z. angew. Chem. Zeitschrift für angewandte Chemie, Berlin.
Z. anorg. Chem. Zeitschrift für anorganische Chemie, Hamburg and Leipzig.
Z. Elektrochem. Zeitschrift für Elektrochemie, Halle.
Z. Krystallogr. Zeitschrift für Krystallographie und Mineralogie, Leipzig.
Z. physik. Chem. Zeitschrift für physikalische Chemie, Leipzig.
Z. Ver. Zuckerind. Zeitschrift für Rubenzucker-Industrie, Berlin.

The above abbreviations with a few necessary exceptions are taken from the list adopted by the editor of the *Journal of the American Chemical Society* for the new abstract journal, "Chemical Abstracts," and will in general be familiar to many of those who use this volume. In a large number of instances Chem. has been contracted to Ch., but with this exception, and possibly a few inaccuracies which have slipped in, the abbreviations of journal titles used in this book conform to the above list.

ACENAPHTHENE $C_{12}H_{10}$.

Solubility in Several Organic Solvents.

(Speyers — *Am. J. Sci.* [4] 14, 294, 1902.)

Note. — In the original paper the results are given in terms of gram molecules of acenaphthene, acetamide, acetanilide, etc., per 100 gram molecules of solvent, at temperatures which varied with each solvent and with each weighing of the solutions. The tabulated results here given were obtained by recalculating and reading the figures from curves plotted on cross section paper.

t°.	In Methyl Alcohol.			In Ethyl Alcohol.			In Propyl Alcohol.		
	(a)*	(b)*	(c)*	(a)	(b)	(c)	(a)	(b)	(c)
0	81.33	1.80	0.39	81.1	1.9	0.57	82.3	2.26	0.88
10	80.40	1.70	0.38	80.3	2.8	0.84	81.8	2.40	1.00
20	79.60	2.25	0.48	79.6	4.0	1.20	81.4	3.40	1.35
30	79.00	3.50	0.72	79.1	5.6	1.70	80.9	4.75	1.90
40	78.45	6.00	1.20	78.7	8.4	2.60	80.6	7.10	2.90
50	78.15	9.00	1.77	78.8	13.2	3.90	80.7	11.10	4.40
60	78.30	11.70	2.35	79.4	23.2	7.00	81.5	19.60	8.20
70	78.60	14.30	2.90	80.75	40.5	12.50	83.9	37.00	16.20

t°.	In Chloroform.			In Toluene.		
	(a)	(b)	(c)	(a)	(b)	(c)
0	143.8	16.4	12.7	90.7	13.18	7.9
10	140.1	20.6	16.0	90.8	18.0	10.7
20	136.3	27.0	19.5	91.0	24.5	14.5
30	132.4	34.0	25.0	91.8	33.5	20.5
40	128.0	42.5	32.0	92.7	47.0	28.0
50	123.4	51.5	40.0	94.0	60.5	35.7
60	119.3	62.5	50.0	95.5	74.0	43.5
70	...	...	...	97.2	89.0	52.5

ACETAMIDE $CH_3CO.NH_2$.

Solubility in Water and in Alcohol.

(Speyers.)

t°.	In Water.			In Ethyl Alcohol.		
	(a)	(b)	(c)	(a)	(b)	(c)
0	105.5	70.8	29.6	85.62	17.3	18.5
10	104.9	81.0	34.0	86.2	24.0	26.0
20	104.3	97.5	40.8	87.3	31.5	33.8
30	103.7	114.0	47.7	88.8	40.5	43.0
40	103.0	133.0	55.5	90.7	50.0	53.5
50	102.3	154.0	64.0	93.0	61.0	64.5
60	101.6	177.5	74.0	95.5	72.0	76.5

ACETANILIDE $C_6H_5NH.COCH_3$.

100 grams H_2O dissolve 0.55 gram at 25°, and 5.55 grams at b. pt.

* (a) Weight of 100 cc. solution in grams. * (b) Grams dissolved substance per 100 grams solvent.
* (c) Gram molecules of dissolved substance per 100 gram molecules of solvent.

Solubility of Acetanilide in Organic Solvents.

(Speyers.)

t°.	In Methyl Alcohol. (a)	(b)	(c)	In Ethyl Alcohol. (a)	(b)	(c)	In Chloroform. (a)	(b)	(c)
0	86.0	22.7	5.4	84.2	14.7	5.0	150.3	3.66	3.24
10	86.4	30.0	7.0	84.4	20.0	6.6	147.5	7.80	7.00
20	87.5	41.0	9.8	85.0	27.0	9.0	144.0	12.00	10.50
30	89.2	54.0	13.2	86.0	36.0	12.2	139.8	17.0	15.0
40	91.1	75.5	18.0	87.4	49.0	16.2	135.4	23.0	20.4
50	93.2	107.0	25.2	89.5	65.0	22.0	131.4	31.0	27.6
60	95.7	145.0	34.0	92.0	87.0	30.0	127.2	41.0	36.0

Solubility in Mixtures of Ethyl Alcohol and Water at 25°.

(Holleman and Antusch — Rec. trav. chim 13, 293, 1894.)

Vol. % Alcohol.	Gms. C_8H_9NO per 100 Gms. Solvent.	Sp. Gr.	Vol. % Alcohol.	Gms. C_8H_9NO per 100 Gms. Solvent.	Sp. Gr.
100	32.93	0.8512	55	13.13	0.9335
95	36.65	0.8737	50	9.74	0.9396
93	38.04	0.8813	45	7.25	0.9449
90	38.20	0.8896	40	5.10	0.9508
87	37.80	0.8959	35	3.58	0.9567
85	36.83	0.8996	31	2.56	0.9617
80	33.62	0.9072	25	1.73	0.9683
75	29.25	0.9133	20	1.30	0.9736
70	24.73	0.9185	15	1.03	0.9795
65	20.42	0.9185	10	0.94	0.9845
60	16.51	0.9287	0	0.54	0.9970

ACETIC ACID CH_3COOH.

Solubility in Water.

(Dahms — Ann. Phys. [4] 60, 122, '97.)

t°.	Gms. CH_3COOH per 100 Gms. Solution.	Solid Phase.	t°.	Gms. CH_3COOH per 100 Gms. Solution.	Solid Phase.
−5	15.1	Ice	−20	66.3	CH_3COOH
−10	28.2	"	−10	76.7	"
−15	39.5	"	−0	87.0	"
−20	49.5	"	+10	90.8	"
−25	57.0	"	16.5	100.0 tr. pt.	"
−26.6	58.9	Ice + CH_3COOH			

Distribution of Acetic Acid between:

Water and Amyl Alcohol at 20°.

(Herz and Fischer — Ber. 37, 4747, '04)

Gms. CH_3COOH per 100 cc. H_2O Layer.	Gms. CH_3COOH per 100 cc. Alcoholic Layer.	G. M. CH_3COOH per 100 cc. H_2O Layer.	G. M. CH_3COOH per 100 cc. Alcoholic Layer.
1	0.923	0.01	0.0095
2	1.847	0.03	0.0280
3	2.741	0.05	0.0460
4	3.694	0.07	0.0645
5	4.587	0.09	0.0830
6	5.475	0.11	0.1010
7	6.434	0.13	0.1190
8	7.328	...	...

Water and Benzene at 25°.

(H. and F. — Ber. 38, 1140, '05.)

Gms. CH_3COOH per 100 cc. H_2O Layer.	Gms. CH_3COOH per 100 cc. C_6H_6 Layer.	G. M. CH_3COOH per 100 cc. H_2O Layer.	G. M. CH_3COOH per 100 cc. C_6H_6 Layer.
5	0.130	0.05	0.0014
10	0.417	0.10	0.0005
20	1.55	0.20	0.0030
30	3.03	0.30	0.0290
40	4.95	0.50	0.051
..	...	0.70	0.090

Distribution of Acetic Acid between Water and Benzene.

(Waddell — J. Phys. Ch. 2, 237, 1898.)

Results in terms of grams per 100 grams solution.

t°.	Upper Layer. CH₃COOH.	C₆H₆.	H₂O.	Lower Layer. CH₃COOH.	C₆H₆.	H₂O.
25	0.46	99.52	0.02	9.4	0.18	90.42
25	3.10	96.75	0.15	28.2	0.53	71.27
25	5.20	94.55	0.25	37.7	0.84	61.46
25	8.7	90.88	0.42	48.3	1.82	49.88
25	16.3	82.91	0.79	61.4	6.1	32.5
25	30.5	67.37	2.13	66.0	13.8	20.2
25	52.5	39.60	7.60	52.8	39.6	7.6
35	1.2	98.68	0.08	16.4	0.62	89.98
35	5.7	93.97	0.33	36.8	1.42	62.78
35	9.0	90.42	0.58	49.0	2.10	48.90
35	45.0	49.00	6.0	61.3	25.5	13.2
35	52.2	39.4	8.4	52.2	39.4	8.4

Distribution of Acetic Acid between Water and Chloroform:

At Room Temperature.

(Wright, Thomson and Leon — Proc. Roy. Soc. 49, 185, 1891.)

Results in parts per 100 parts of solution.

Upper Layer. CH₃COOH.	CHCl₃.	H₂O.	Lower Layer. CH₃COOH.	CHCl₃.	H₂O.
0	0.84	99.16	0	99.01	0.99
6.46	0.92	92.62	1.04	98.24	0.72
17.69	0.79	81.52	3.83	94.98	1.19
25.10	1.21	73.69	6.77	91.85	1.38
33.71	2.97	63.32	11.05	87.82	1.13
44.12	7.30	48.58	17.72	80.00	2.28
50.18	15.11	34.71	25.75	70.13	4.12

At 25°.

(Herz and Lewy; Rothmund and Wilsmore.)

Gms. CH₃COOH per 100 cc. H₂O Layer.	CHCl₃ Layer.	G. M. CH₃COOH per 100 cc. H₂O Layer.	CHCl₃ Layer.
2	0.089	0.05	0.0032
4	0.313	0.075	0.0062
6	0.596	0.100	0.0100
8	0.974	0.150	0.0198
10	1.430	0.175	0.0260
12	1.982	0.200	0.0325
20	5.10	0.30	0.070
30	10.2	0.50	0.170
40	15.3	0.70	0.275
50	21.9	0.80	0.335
52.3	39.54	0.87	0.659

The figures in the table for 25° were read from the curve plotted from the results of H. and L., Z. electro. Ch. 11, 818, 1905, and of R. and W., Z. phys. Ch. 40, 623, 1902.

The influence of electrolytes upon the distribution of acetic acid between the aqueous and chloroform layers was investigated by Rothmund and Wilsmore, and the following results expressed in gram molecules per liter at 25° were obtained:

Electrolyte.	Conc. of Electrolyte Aq. Layer.	Conc. of CH₃COOH in Aq. Layer.	in CHCl₃ Layer.	Conc.* CH₃COOH H₂O Layer.
HCl	0.463	0.876	0.0907	0.946
"	0.463	1.538	0.2435	1.680
"	0.926	0.813	0.0938	0.966
"	0.926	1.586	0.2902	1.858
HNO_3	0.316	0.936	0.0927	0.958
"	0.316	1.694	0.2537	1.720
"	0.633	0.965	0.0981	0.988
"	0.633	1.631	0.2486	1.702
½ H_2SO_4	0.514	1.099	0.1315	1.168
"	1.029	1.555	0.2714	1.787
NH_4NO_3	1.0	1.136	0.1313	1.168
"	1.0	1.991	0.3481	2.053
$LiNO_3$	1.0	0.892	0.1005	1.000
"	1.0	1.513	0.2581	1.737

* Calculated from table above.

Distribution of Acetic Acid at 25° between:

Water and Carbon Bisulphide.

(Herz and Lewy.)

Gms. CH_3COOH per 100 cc. H_2O Layer.	Gms. CH_3COOH per 100 cc. CS_2 Layer.	G. M. CH_3COOH per 100 cc. H_2O Layer.	G. M. CH_3COOH per 100 cc. CS_2 Layer.
65	2.64	1.1	0.45
70	3.0	1.2	0.55
75	3.3	1.2	0.80
80	5.4	1.35	0.97
85	6.4	1.4	1.3

Water and Carbon Tetrachloride.

(Herz and Lewy.)

Gms. CH_3COOH per 100 cc. H_2O Layer.	Gms. CH_3COOH per 100 cc. CCl_4 Layer.	G. M. CH_3COOH per 100 cc. H_2O Layer.	G. M. CH_3COOH per 100 cc. CCl_4 Layer.
30	1.8	0.5	0.03
40	3.0	0.7	0.055
50	4.8	0.9	0.095
60	5.8	1.1	0.155
70	12.0	1.2	0.235
76.2	25.2	1.27	0.420

Distribution of Acetic Acid at 25° between:

Water and Bromoform.

(H. and L. — Z. electro. Ch. 11, 818, '05.)

Gms. CH_3COOH per 100 cc. H_2O Layer.	Gms. CH_3COOH per 100 cc. $CHBr_3$ Layer.	G. M. CH_3COOH per 100 cc. H_2O Layer.	G. M. CH_3COOH per 100 cc. $CHBr_3$ Layer.
20	1.5	0.4	0.035
30	3.0	0.6	0.070
40	4.8	0.8	0.120
50	7.8	1.0	0.20
60	12.0	1.1	0.28
65	15.6	1.15	0.395
70	27.0	...	...

Water and Toluene.

(H. and F. — Ber. 38, 1140, '05.)

Gms. CH_3COOH per 100 cc. H_2O Layer.	Gms. CH_3COOH per 100 cc. $C_6H_5CH_3$ Layer.	G. M. CH_3COOH per 100 cc. H_2O Layer.	G. M. CH_3COOH per 100 cc. $C_6H_5CH_3$ Layer.
5	0.119	0.1	0.0025
10	0.328	0.2	0.0075
20	1.132	0.4	0.0260
30	2.265	0.6	0.0530
40	3.725	0.8	0.090
50	5.841	1.0	0.140
60	8.344	...	...

Distribution of Acetic Acid at 25° between:

Water and *o* or *p* Xylene.

(Herz and Fischer.)

Gms. CH_3COOH per 100 cc. H_2O Layer.	Gms. CH_3COOH per 100 cc. *o* or *p* Xylene Layer.	G. M. CH_3COOH per 100 cc. H_2O Layer.	G. M. CH_3COOH per 100 cc. *o* or *p* Xylene Layer.
5	0.24	0.1	0.004
10	0.48	0.2	0.010
20	1.13	0.4	0.025
30	2.15	0.6	0.047
40	3.40	0.8	0.079
50	5.10	1.0	0.122
60	7.27	1.2	0.230
70	12.52	...	...

Water and *m* Xylene.

(Herz and Fischer.)

Gms. CH_3COOH per 100 cc. H_2O Layer.	Gms. CH_3COOH per 100 cc. *m* Xylene Layer.	G. M. CH_3COOH per 100 cc. H_2O Layer.	G. M. CH_3COOH per 100 cc. *m* Xylene Layer.
5	0.06	0.1	0.0015
10	0.30	0.2	0.007
20	0.95	0.4	0.022
30	1.91	0.6	0.042
40	3.04	0.8	0.072
50	4.65	1.0	0.111
60	6.65	1.2	...

NOTE. — The distribution results as presented in the original papers to which references are given in the above tables, are reported in millimolecules per 10 cc. portions of each layer in the several cases. To obtain the figures given in the above tables, the original results before and after calculating to gram quantities were plotted on cross-section paper, and from the curves thus obtained, readings for regular intervals of concentration of acetic acid in the aqueous layer were selected.

Chlor **ACETIC ACID** $CH_2ClCOOH$.

DISTRIBUTION OF CHLORACETIC ACID BETWEEN:

(Herz and Fischer.)

Water and Benzene at 25°.

Gms. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	Gms. $CH_2ClCOOH$ per 100 cc. C_6H_6 Layer.	G. M. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	G. M. $CH_2ClCOOH$ per 100 cc. C_6H_6 Layer.
0.25*	8.69	0.0025	0.090
0.5	15.59	0.005	0.155
1.0	27.87	0.010	0.28
1.5	41.10	0.015	0.415
2.0	52.90	0.02	0.54
3.0	68.01	0.03	0.70
4.0	76.52	0.04	0.79

Water and Toluene at 25°.

Gms. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	Gms. $CH_2ClCOOH$ per 100 cc. $C_6H_5CH_3$ Layer.	G. M. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	G. M. $CH_2ClCOOH$ per 100 cc. $C_6H_5CH_3$ Layer.
0.1*	5.22	0.001	0.055
0.5	20.31	0.005	0.20
1.0	34.87	0.010	0.36
1.5	49.14	0.015	0.50
2.0	60.46	0.02	0.62
3.0	72.28	0.03	0.77
4.0	81.72	0.04	0.85
5.0	86.94	0.05	0.90

DISTRIBUTION OF CHLORACETIC ACID BETWEEN:

(Herz and Lewy.)

Water and Chloroform at 25°.

Gms. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	Gms. $CH_2ClCOOH$ per 100 cc. $CHCl_3$ Layer.	G. M. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	G. M. $CH_2ClCOOH$ per 100 cc. $CHCl_3$ Layer.
5*	0.283	0.05	0.0025
10	0.614	0.10	0.0060
20	1.088	0.20	0.0135
40	2.948	0.40	0.029
50	3.684	0.60	0.045
60	4.440	0.70	0.061
70	7.086	0.75	0.077

Water and Bromoform at 25°.

Gms. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	Gms. $CH_2ClCOOH$ per 100 cc. $CHBr_3$ Layer.	G. M. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	G. M. $CH_2ClCOOH$ per 100 cc. $CHBr_3$ Layer.
40*	0.850	0.45	0.011
50	1.889	0.50	0.0165
60	2.994	0.60	0.028
70	4.241	0.70	0.040
80	5.620	0.80	0.053
90	7.560	0.90	0.067
91.6	11.340	0.97	0.120

DISTRIBUTION OF CHLORACETIC ACID BETWEEN:

(Herz and Lewy.)

Water and Carbon Bisulphide at 25°.

Gms. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	Gms. $CH_2ClCOOH$ per 100 cc. CS_2 Layer.	G. M. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	G. M. $CH_2ClCOOH$ per 100 cc. CS_2 Layer.
60*	0.426	0.6	0.0042
80	0.691	0.8	0.007
90	0.803	1.0	0.009
100	1.040	1.05	0.0105
105	1.464	1.10	0.015
106.7	1.890	1.13	0.020

Water and Carbon Tetrachloride at 25°.

Gms. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	Gms. $CH_2ClCOOH$ per 100 cc. CCl_4 Layer.	G. M. $CH_2ClCOOH$ per 100 cc. H_2O Layer.	G. M. $CH_2ClCOOH$ per 100 cc. CCl_4 Layer.
90*	1.417	0.95	0.0150
95	2.031	1.00	0.0195
100	2.645	1.05	0.0270
105	4.26	1.10	0.0415
106.7	5.19	1.13	0.0550

* See Note, page 4.

Solubility of Monochlor, Dichlor, and of Trichloracetic Ester in Aqueous Alcohol at Room Temperature.

(Bancroft — Phys. Rev. 3, 193, 1895–96, from results of Pfeiffer, Z. physik. chem. 9, 469, '92.)

cc. Ethyl Alcohol in Mixtures.	cc. H_2O added to cause separation of a second phase in mixtures of the given amts. of Alcohol and 3 cc. of: $CH_2ClCOOC_2H_5$.	$CHCl_2COOC_2H_5$	$CCl_3COOC_2H_5$.
3	1.32	0.90	0.65
6	4.01	2.45	1.80
9	7.30	4.33	3.02
12	10.78	6.60	4.50
15	16.16	9.20	6.50
18	22.16	...	...
21	28.74	...	...

α ACETNAPHTHALIDE $C_2H_3ONH(C_{10}H_7)$.

Solubility in Mixtures of Alcohol and Water at 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 289, 1894.)

Vol. % Alcohol.	Gms. per 100 Gms. Solvent.	Sp. Gr. of Solutions.	Vol. % Alcohol.	Gms. per 100 Gms. Solvent.	Sp. Gr. of Solutions.
100	4.02	0.7916	65	1.78	0.8977
95	4.31	0.8150	60	1.44	0.9091
90	4.11	0.8344	55	1.02	0.9201
85	3.69	0.8485	50	0.71	0.9290
80	3.18	0.8624	35	0.25	0.9537
75	2.73	0.8761	20	0.09	0.9717
70	2.31	0.8798	10	0.04	0.9841

ACETONE $(CH_3)_2CO$.

Solubility of Acetone at 25° in Aqueous Solutions of: Electrolytes. Non-Electrolytes.

(Bell — J. Phys. Ch. 9, 544, 1905; Linebarger — Am. Ch. J. 14, 380, 1892.)

Gms. Electrolyte per 100 Gms. Aq. Solution.	Gms. $(CH_3)_2CO$ per 100 Gms. Solvent in Solutions of: K_2CO_3	Na_2CO_3	$(NH_4)_2CO_3$	$MgCO_3$	Gms. Non-Electrolyte per 100 Gms. Aq. Solution.	Gms. $(CH_3)_2CO$ per 100 Gms Solvent in Solutions of: $C_{10}H_8$*	Anethol.*	$(C_6H_5)_2CO$.
1.25	...	...	...	83.5	5	92.5	103.0	90.0
2.50	...	51.0	110.0	65.0	10	117.0	123.0	108.5
5.00	65.0	38.0	73.5	47.0	20	137.0	144.5	126.0
7.5	46.5	27.5	57.0	38.0	30	148.5	155.0	133.0
10.0	34.5	19.5	44.5	29.0	40	155.5	162.0	136.0
12.5	25.5	14.0	35.0	...	50	159.5	166.0	135.5
15.0	18.0	9.0	28.0	...	60	160.2	165.0	131.5
20.0	8.0	2.7	...	...	70	155.0	158.0	123.0
25.0	3.7	...	...	...	80	...	...	108.5
30.0	1.6	...	...	...	90	...	...	82.0

* Anethol = *p* Propenylanisol $CH_3.CH:CH[4]C_6H_4OCH_3$. Naphthalene results at 35°.

Note. — The original results were recalculated and plotted on cross-section paper. From the curves so obtained the above table was constructed. See also Note, page 7.

Solubility of Acetone in Aqueous Solutions of Carbohydrates.

(Krug and McElroy — J. Anal. Ch. 6, 184, '92; Bell — J. Phys. Ch. 9, 547, '05.)

In Aqueous Solutions of Cane Sugar.

Per cent Sugar.	Gms. $(CH_3)_2CO$ per 100 Gms. Sugar Solution at:					
	15°.	20°.	25°.	30°.	35°.	40°.
10	597.2	...	581.8	...	574.8	...
20	272.5	...	250.0	...	251.8	...
30	172.4	...	150.0	...	150.6	...
35	...	...	...	...	...	110
40	...	96.4	92.8	89.8	...	85
45	...	71.9	68.8	65.7	...	62
50	...	50.8	48.1	45.9	...	42
55	...	35.8	33.8	32.5	...	29
60	...	25.2	24.2	23.4	...	...
65	...	18.3	17.7	17.0	...	...
70	...	13.2	12.8	12.5	...	...

In Aqueous Dextrose Solutions.

Per cent Dextrose.	Gms. $(CH_3)_2CO$ per 100 Gms. Solvent at:		
	15°.	25°.	35°.
10	736.7	747.9	761.5
20	255.3	247.7	240.8
30	157.5	149.8	142.5
40	86.9	79.6	74.0
50	36.2	33.0	31.2

In Aqueous Maltose Solutions.

Per cent Maltose.	Gms. $(CH_3)_2CO$ per 100 Gms. Solvent at:		
	15°.	25°.	35°.
10	353.6	348.1	342.0
20	185.4	181.2	176.9
30	119.9	116.0	112.4
40	78.4	74.7	70.5
50	46.2	42.9	39.8

Note. — The above determinations were made by adding successive small quantities of acetone to mixtures of known amounts of water and the carbohydrate, and noting the point at which a clouding due to the separation of a second phase occurred. This method was also used for the solubility of acetone in the aqueous electrolyte solutions (see previous page). In the case of the aqueous non-electrolyte solutions, however, successive small amounts of water were added to mixtures of known amounts of acetone and the non-electrolyte.

Distribution of Acetone between Water and Benzene at 25°.

(Herz and Fischer — Ber. 38, 1142, '05.)

Gms. $(CH_3)_2CO$ per 100 cc. Aq. Layer.	Gms. $(CH_3)_2CO$ per 100 cc. C_6H_6 Layer.	G. M. $(CH_3)_2CO$ per 100 cc. Aq. Layer.	G. M. $(CH_3)_2CO$ per 100 cc. C_6H_6 Layer.
1*	1.20	0.025*	0.025
5	4.17	0.05	0.047
10	10.15	0.10	0.975
15	15.59	0.15	0.150
20	22.50	0.20	0.215
		0.25	0.275

* See Note, page 4.

ACET-PHENETIDINE *p* (PHENACETINE) $C_6H_4(OC_2H_5)NHCH_3CO$.

SOLUBILITY IN WATER, ALCOHOL, ETC.

(U. S. P.)

t°.	Gms. $C_6H_4(OC_2H_5)NHCH_3CO$ per 100 Gms. H_2O.	C_2H_5OH.	$(CH_3)_2O$.	$CHCl_3$.
25	0.108	8.33	1.59	5.00
b. pt.	1.43	50.0	...	...

ACET-TOLUIDE *p* $CH_3.C_6H_4NH.C_2H_3O$.

SOLUBILITY IN MIXTURES OF ALCOHOL AND WATER AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 288, '94.)

Vol. % Alcohol.	Gms. per 100 Gms. Solvent.	Sp. Gr. of Solutions.	Vol. % Alcohol.	Gms. per 100 Gms. Solvent.	Sp. Gr. of Solutions.
100	10.18	0.8074	50	1.92	0.9306
95	10.79	0.8276	45	1.41	0.9380
90	10.62	0.8440	40	0.96	0.9460
85	9.62	0.8576	35	0.66	0.9544
80	8.43	0.8685	25	0.31	0.9668
75	7.04	0.8803	20	0.23	0.9725
70	5.81	0.8904	15	0.16	0.9780
65	4.39	0.9021	5	0.13	0.9903
60	3.59	0.9115	0	0.12	0.9979
55	2.69	0.9207			

ACETYLENE C_2H_2.

SOLUBILITY IN WATER.

(Winkler; see Landolt and Börnstein's Tabellen, 3d ed. p. 604, '05.)

t°.	α.	q.
0	1.73	0.20
5	1.49	0.17
10	1.31	0.15
15	1.15	0.13
20	1.03	0.12
25	0.93	0.11
30	0.84	0.09

α, "Absorption Coefficient," = the volume of gas (reduced to 0° and 760 mm. pressure) taken up by one volume of the liquid at the given temperature when the partial pressure of the gas equals 760 mm. mercury.

q, "Solubility," = the amount of gas in grams which is taken up by 100 grams of the pure solvent at the given temperature if the total pressure, *i.e.*, the partial pressure of the gas plus the vapor pressure of the liquid at the absorption temperature is 760 mm.

ACETYLACETONE $CH_3COCH_2COCH_3$.

SOLUBILITY IN WATER.

(Rothmund — Z. phys. Ch. 26, 475, '98.)

t°.	Gms. $CH_3COCH_2COCH_3$ per 100 Gms. H₂O Layer.	Gms. $CH_3COCH_2COCH_3$ per 100 Gms. Acetyl Acetone Layer.
30	15.46	95.02
40	17.58	93.68
50	20.22	91.90
60	23.23	89.41
70	27.10	85.77
80	33.92	78.82
87.7 (crit. temp.)	56.8	

NOTE. — Weighed amounts of water and acetylacetone were placed in small glass tubes, which were then sealed and slowly heated until the contained mixtures became homogeneous. The temperature was then allowed to fall very gradually and the point noted at which cloudiness appeared. This point was accurately established for each tube by repeated trials. The curve plotted from these determinations shows two percentage amounts of acetylacetone which cause cloudiness at each temperature below the critical point. Of these two points, for each temperature, one represents the aqueous layer, *i.e.*, the solubility of acetylacetone in water; and the other represents the acetylacetone layer, *i.e.*, the solubility of water in acetylacetone. This method is known as the "Synthetic Method," and yields results in harmony with those obtained by the analytical method, *i.e.*, by analyzing each layer after complete separation occurs.

ACONITINE (Amorphous) $C_{34}H_{47}NO_{11}$.

SOLUBILITY IN SEVERAL SOLVENTS.

(At 25° U.S.P.; at 18°–22°, Müller — Apoth.-Ztg. 18, 2, '03.)

Solvent.	Gms. $C_{34}H_{47}NO_1$ per 100 Gms. Solvent at: 18°–22°.	25°.
Water	0.054	0.031
Alcohol	...	4.54
Ether	1.44	2.27

Solvent.	Gms. $C_{34}H_{47}NO_{11}$ per 100 Gms. Solvent at: 18°–22°.	25°.
Benzene	..	17.85
Carbon Tetrachloride	1.99	...
Petroleum Ether	0.023	0.028

ADIPIC ACID (Normal) $(CH_2)_4(COOH)_2$.

100 grams H_2O dissolve 1.44 grams adipic acid at 15°.

(Henry — Compt. rend. 99, 1157, '84; Lamouroux — *Ibid.* 128, 998, '99.)

AIR

SOLUBILITY IN WATER.

(Winkler — Ber. 34, 1409, '01; see also Peterson and Sondern — Ber. 22, 1439, '89.)

t°.	B.	B'.	cc.* of atmospheric O and N per liter of: Dist. H_2O (at 760 mm.). Oxygen.	Dist. H_2O Nitrogen.	Sea Water (at 760 mm.). Oxygen.	Sea Water Nitrogen.
0	0.02881	0.02864	10.19	18.45	7.77	14.85
5	.02543	.02521	8.91	16.30	6.93	13.32
10	.02264	.02237	7.87	14.50	6.29	12.06
15	.02045	.02011	7.04	13.07	5.70	11.05
20	.01869	.01826	6.35	11.91	...	10.25
25	.01724	.01671	5.75	10.96	...	9.62
30	.01606	.01539	5.24	10.15		
40	.01418	.01315	4.48	8.67		
50	.01297	.01140	3.85	7.55		
60	.01216	.00978	3.25	6.50		
80	.01126	.00600	1.97	4.03		
100	.01105	.00000	0.00	0.00		

B = "Coefficient of Absorption," *i.e.*, the amount of gas dissolved by the liquid when the pressure of the gas itself without the tension of the liquid amounts to 760 mm.

B' = "Solubility," *i.e.*, the amount of gas, reduced to 0° and 760 mm., which is absorbed by one volume of the liquid when the barometer indicates 760 mm. pressure.

* Reduced to 0° and 760 mm.

SOLUBILITY OF AIR IN AQUEOUS SULPHURIC ACID AT 18° AND 760 MM.

(Tower — Z. anorg. Ch. 50, 382, '06.)

Wt. % H_2SO_4	98	90	80	70	60	50
Solubility Coef.	0.0173	0.0107	0.0069	0.0055	0.0059	0.0076

SOLUBILITY OF AIR IN ALCOHOL, ETC.

(Robinet — Compt. rend. 58, 608, '64.)

Solvent.	Vols. Air per 100 Vols. Solvent.	Solvent.	Vols. Air per 100 Vols. Solvent.
Alcohol (95.1%)	14.1	Oil of Lavender	6.9
Petroleum	6.8	Oil of Turpentine	24.2
Benzene	14.0		

ALANINE (α Aminopropionic Acid) $CH_3CH(NH_2)COOH$.

SOLUBILITY IN MIXTURES OF ALCOHOL AND WATER AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 297, '94.)

Vol. % Alcohol.	Gms. per 100 Gms. Solvent.	Sp. Gr. of Solutions.	Vol. % Alcohol.	Gms. per 100 Gms. Solvent.	Sp. Gr. of Solutions.
0	16.47	1.0421	35	4.91	0.9670
5	14.37	1.0311	40	3.89	0.9577
10	12.43	1.0200	50	2.38	0.9355
15	10.49	1.0101	60	1.57	0.9102
20	8.48	0.9984	70	0.85	0.8836
25	7.11	0.9886	80	0.37	0 8556
31	5.53	0.9761			

ALDEHYDE.

SOLUBILITY OF *p* FORMALDEHYDE (TRIOXYMETHYLENE) IN AQUEOUS SODIUM SULPHITE SOLUTIONS AT 20°.

(Lumière and Seyewetz — Bull. soc. chim. [3] 27, 1213, '02.)

Grams Sodium Sulphite per 100 cc. H_2O	5	10	20	28
Gms. Trioxymethylene per 100 cc. solution	22	24	26	27

100 gms. H_2O dissolve 12.5 paraldehyde at 25°, and 6.6 gms. at b. pt.

ALCOHOLS.

SOLUBILITY OF AMYL ALCOHOL IN WATER AT 22°.

(Herz — Ber. 31, 2671, '98.)

100 cc. water dissolve 3.284 cc. amyl alcohol. Sp. Gr. of solution = 0.9949, Volume = 102.99 cc.

100 cc. amyl alcohol dissolve 2.214 cc. water. Sp. Gr. of solution = 0.8248, Volume = 101.28 cc.

Sp. Gr. of H_2O at 22° = 0.9980; Sp. Gr. of amyl alcohol at 22° = 0.8133.

SOLUBILITY OF AMYL ALCOHOL IN WATER AT DIFFERENT TEMPERATURES, "SYNTHETIC METHOD" (see Note, page 9).

(Alexejew — Ann. phys. Chem. 28, 305, '86.)

t°.	Gms. $C_5H_{11}OH$ per 100 Gms. Aqueous Layer.	Alcoholic Layer.	t°.	Gms. $C_5H_{11}OH$ per 100 Gms. Aqueous Layer.	Alcoholic Layer.
0	8	97	100	2.0	80
20	6	94	120	4.0	77
40	4	90	140	7.0	73
60	2	87	150	9.0	72
80	1.5	83			

SOLUBILITY OF AMYL ALCOHOL IN AQ. ETHYL ALCOHOL SOLUTIONS.

(Bancroft — Phys. Rev. 3, 193, '95–96.)

cc. Ethyl Alcohol in Mixture.	cc. H_2O added to cause Separation of a Second Phase in Mixtures of the given Amounts of Ethyl Alcohol and 3 cc. Portions of Amyl Alcohol at: 9.1°.	19.2°.
3	13.21	3.50
6	10.35	10.80
9	18.34	19.10
12	27.47	29.15
15	41.25	43.15

NOTE. — The effect of various amounts of a large number of salts upon the temperature (39.8°) at which a mixture of 20 cc. of amyl alcohol + 20 cc. of ethyl alcohol + 32.9 cc. of water becomes homogeneous has been investigated by Pfeiffer (Z. phys. Ch. 9, 444, '92). The results are no doubt of interest from a solubility standpoint, but their recalculation to terms suitable for presentation in the present compilation has not been attempted.

SOLUBILITY OF ISOAMYL ALCOHOL IN WATER.

t°.	Gms. Iso Amyl Alcohol per 100 Gms. H_2O Layer.	Alcoholic Layer.	Observer.
13.7	2.0	...	Balbrano — Ber. 9, 1437, '76
16.5	2.5	92.9	Wittstein — Jahrb. 408, '62
22	2.61	97.36	Herz — Ber. 31, 2669, '98

Solubility of Butyl Alcohols in Water, "Synthetic Method" (see Note, page 9).

(Alexejew — Ann. phys. Chem. 28, 305, '86.)

t°.	Secondary Butyl Alcohol and Water. Gms. Secondary Butyl Alcohol per 100 Gms. Aqueous Layer.	Alcoholic Layer.	Iso Butyl Alcohol and Water. Gms. Iso Butyl Alcohol per 100 Gms. Aqueous Layer.	Alcoholic Layer.
−20	27	66	...	...
−10	28	60	...	...
0	27.5	56	13	85
10	26.0	57	...	...
20	22.5	60	9	84
30	18	63.5	...	...
40	16	65.5	7.5	83
60	13	67	7	82
80	15	63	7	77.5
100	20	52	8	72
107 crit. temp.	33		...	...
120			16	62
130			28	50
133 crit. temp.			40	

Distribution of Ethyl Alcohol between Water and Benzene at 25°.

(Taylor — J. Phys. Ch. 1, 468, '97.)

Composition of 10 cc. of Upper Layer. C_6H_6.	H_2O.	C_2H_5OH.	Composition of 10 cc. Lower Layer. C_6H_6.	H_2O.	C_2H_5OH.
5.92	0.60	3.48	4.37	1.07	4.56
6.43	0.48	3.09	3.54	1.41	5.05
7.40	0.29	2.31	2.04	2.27	5.69
8.13	0.17	1.70	1.08	3.22	8.70
8.65	0.10	1.25	0.59	4.06	5.35
9.05	0.06	0.89	0.28	4.99	4.73

ALUMINIUM CHLORIDE $AlCl_3 \cdot 6H_2O$.

Solubility in Water.

(Gerlach — Z. anal. Ch. 8, 250, '69.)

100 gms. saturated solution contain 41.13 gms. $AlCl_3$ at 15°, Sp. Gr. of solution = 1.354.

ALUMINIUM SULPHATE $Al_2(SO_4)_3 \cdot 18H_2O$.

Solubility in Water.

(Poggiale — Ann. chim. phys. [3] 8, 467, '43.)

t°.	Gms. $Al_2(SO_4)_3$ per 100 Gms. Water.	Solution.	t°.	Gms. $Al_2(SO_4)_3$ per 100 Gms. Water.	Solution.
0	31.3	23.8	60	59.1	37.2
10	33.5	25.1	70	66.2	39.8
20	36.1	26.7	80	73.1	42.2
30	40.4	28.8	90	80.8	44.7
40	45.7	31.4	100	89.1	47.1
50	52.1	34.3			

100 gms. of a saturated solution of aluminium sulphate in glycol contain 14.4 gms. $Al_2(SO_4)_3$. (de Coninck — Bull. acad. roy. Belgique, 359, '05.)

ALUMS.

SOLUBILITY OF AMMONIUM ALUM AND OF POTASSIUM ALUM IN WATER.

(Mulder; Poggiale — Ann. chim. phys. [3] 8, 467, '43; Locke — Am. Ch. J. 26, 174, '01; Marino — Gazz. chim. ital. 35, II, 351, '05; Berkeley — Trans. Roy. Soc. 203 A, 214, '04.)

t°.	Ammonium Alum.			Potassium Alum.		
	Gms. $(NH_4)_2Al_2(SO_4)_4$ per 100 g. H_2O.	Gms. $(NH_4)_2Al_2(SO_4)_4 24H_2O$ per 100 g. H_2O.	G.M. $(NH_4)_2Al_2(SO_4)_4$ per 100 g. H_2O.	Gms. $K_2Al_2(SO_4)_4$ per 100 g. H_2O.	Gms. $K_2Al_2(SO_4)_4 24H_2O$ per 100 g. H_2O.	G. M. $K_2Al_2(SO_4)_4$ per 100 g. H_2O.
0	2.10	3.90	0.0044	3.0	5.65	0.0058
5	3.50	6.91	0.0074	3.5	6.62	0.0068
10	4.99	9.52	0.0105	4.0	7.60	0.0077
15	6.25	12.66	0.0132	5.0	9.59	0.0097
20	7.74	15.13	0.0163	5.9	11.40	0.0114
25	9.19	19.19	0.0194	7.23	14.14	0.0140
30	10.94	22.01	0.0231	8.39	16.58	0.0162
40	14.88	30.92	0.0314	11.70	23.83	0.0227
50	20.10	44.10	0.0424	17.00	36.40	0.0329
60	26.70	66.65	0.0569	24.75	57.35	0.0479
70	...	...	...	40.0	110.5	0.0774
80	...	...	...	71.0	321.3	0.1374
90	...	...	...	109.0	2275.0	0.2110
92.5	...	...	...	119.0	∞	0.2313
95	109.7	∞	0.2312	...	...	...

NOTE. — The potassium alum figures in the preceding table were taken from a curve plotted from the closely agreeing determinations of Mulder, Locke, Berkeley, and Marino. For the higher temperatures (above 60°), however, the results of Marino are lower than those of the other investigators, and are omitted from the average curve.

Locke called attention in his paper to the fact that Poggiale's results upon ammonium and potassium alum had evidently become interchanged through some mistake. This explanation is entirely substantiated, not only by Locke's determinations, but also by those of Mulder and Berkeley. The ammonium alum figures given above were therefore read from Poggiale's potassium alum curve, with which Locke's determination of the solubility of ammonium alum at 25° is in entire harmony.

SOLUBILITY OF AMMONIUM ALUM IN PRESENCE OF AMMONIUM SULPHATE AND IN PRESENCE OF ALUMINIUM SULPHATE IN WATER.

(Rüdorff — Ber. 18, 1160, '85.)

Mixture Used.	100 Gms. Saturated Solution Contain:	
	Grams $(NH_4)_2SO_4$	+ Grams $Al_2(SO_4)_3$.
Saturated Ammonium Alum at 18.5°	1.42	3.69
20 cc. above sol. + 6 gms. cryst. $Al_2(SO_4)_3$	0.45	16.09
20 cc. above sol. + 4 gms. cryst. $(NH_4)_2SO_4$	20.81	0.29

Solubility of Mixtures of Potassium Alum and Aluminium Sulphate and of Potassium Alum and Potassium Sulphate in Water.

(Marino — Gazz. chim. ital. 35, II, 351, '05.)

t°.	Gms. per 1000 Gms. H_2O. $Al_2(SO_4)_3.18H_2O$.	Gms. per 1000 Gms. H_2O. K_2SO_4.	Gm. Mols. per 1000 Mols. H_2O. $Al_2(SO_4)_3.18H_2O$.	Gm. Mols. per 1000 Mols. H_2O. K_2SO_4.	Solid Phase.
0	243.73	23.45	6.1	2.3	$K_2Al_2(SO_4)_2.24H_2O$ + $Al_2(SO_4)_3$
20	824.25	30.85	15.1	3.1	"
35	911.02	35.29	24.1	3.6	"
50	1243.21	59.55	33.5	6.1	"
65	1598.00	119.43	43.1	12.6	"
77	1872.11	183.80	50.5	18.9	"
0	5.06	75.83	0.1	7.8	$K_2Al_2(SO_4)_2.24H_2O$ + K_2SO_4
0.5	8.66	75.18	0.2	7.7	"
5.	16.07	85.78	0.4	8.8	"
10	18.52	96.50	0.5	9.9	"
15	20.56	109.30	0.55	11.2	"
30	39.60	147.8	1.0	15.2	"
40	73.88	163.1	1.9	16.8	"
50	126.0	195.4	3.4	20.1	"
60	249.7	238.8	6.7	24.6	"
70	529.0	323.7	14.2	32.6	"
80	1044.0	517.27	28.1	53.4	"

Solubility of Mixtures of Potassium Alum and of Thallium Alum in Water at 25°.

(Fock — Z. Kryst. Min. 28, 397, '97.)

$$K_2Al_2(SO_4)_4.24H_2O;\ Tl_2Al_2(SO_4)_4.24H_2O.$$

Composition of Solution. $KAl(SO_4)_2$ per Liter. Grams.	$KAl(SO_4)_2$ per Liter. Mg. Mols.	$TlAl(SO_4)_2$ per Liter. Grams.	$TlAl(SO_4)_2$ per Liter. Mg. Mols.	Mol. % $KAl(SO_4)_2$.	Sp. Gr. of Solutions.	Solid Phase Mol. % of Potassium Alum.
69.90	270.5	0.00	0.00	100	1.0591	100.0
74.56	288.2	0.48	1.13	99.61	1.0601	99.32
67.90	262.8	1.72	4.07	98.48	1.0598	96.84
65.30	252.7	4.52	10.67	95.95	1.0603	90.84
64.95	251.4	9.60	22.67	91.73	1.0605	82.94
53.23	205.9	18.44	43.56	82.54	1.0609	68.24
45.32	175.4	24.60	58.10	75.12	1.0609	58.23
38.02	147.2	32.48	76.75	65.73	1.0611	46.72
34.54	133.6	35.59	84.10	61.36	1.0611	44.23
28.35	109.7	42.99	101.60	51.93	1.0623	32.07
10.94	42.4	66.12	156.2	21.34	1.0654	7.94
0.00	0.0	75.46	178.3	0.00	1.0674	0.00

Solubility of Sodium Alum in Water.

100 gms. H_2O dissolve 51.0 gms. (?anhy.) $Al_2Na_2(SO_4)_4.24H_2O$ at 16°.

(Auge — Compt. rend. 110, 1139, '90.)

100 gms. H_2O dissolve 110.0 gms. $Al_2Na_2(SO_4)_4.24H_2O$ at 0°.

(Tilden — J. Ch. Soc. (Lond.) 45, 269, '84.)

Solubility of Caesium Alum, Rubidium Alum, and of Thallium Alum in Water.

(Setterburg — Liebig's Annalen, 211, 104, '82; Locke — Am. Ch. J. 26, 183, '01; Berkeley — Trans. Roy. Soc. 203 A, 215, '04.)

t°.	Caesium Alum. Gms. per 100 Gms. H_2O.		Rubidium Alum. Gms. per 100 Gms. H_2O.		Thallium Alum. Gms. per 100 Gms. H_2O.	
	$Al_2Cs_2(SO_4)_4$.	$Al_2Cs_2(SO_4)_4.24H_2O$.	$Al_2Rb_2(SO_4)_4$.	$Al_2Rb_2(SO_4)_4.24H_2O$.	$Al_2Tl_2(SO_4)_4$.	$Al_2Tl_2(SO_4)_4.24H_2O$.
0	0.21	0.34	0.72	1.21	3.15	4.84
5	0.25	0.40	0.86	1.48	3.80	5.86
10	0.30	0.49	1.05	1.81	4.60	7.12
20	0.40	0.65	1.50	2.59	6.40	10.00
25	0.50	0.81	1.80	3.12	7.60	11.95
30	0.60	0.97	2.20	3.82	9.38	14.89
40	0.85	1.38	3.25	5.69	14.40	23.57
50	1.30	2.11	4.80	8.50	22.50	38.41
60	2.00	3.27	7.40	13.36	35.36	65.19
70	3.20	5.27	12.40	23.25	...	...
80	5.40	9.01	21.60	43.25	...	...
90	10.50	18.11	...	...	...	...
100	22.70	42.54	...	...	...	...

Note. — Curves were plotted from the closely agreeing determinations recorded by the above named investigators and the table constructed from the curves.

AMINES.

Methyl Amine and Tri Methyl Amine, Distribution between:

Water and Amyl Alcohol.

(Herz and Fischer — Ber. 37, 4751, '04.)

Gms. $NH_2(CH_3)$ per 100 cc. Aq. Layer.	Gms. $NH_2(CH_3)$ per 100 cc. Alcoholic Layer.	Millimols $NH_2(CH_3)$ per 10 cc. Aq. Layer.	Millimols $NH_2(CH_3)$ per 10 cc. Alcoholic Layer.
0.37	0.12	1.155	0.3804
0.94	0.33	3.036	1.070
1.57	0.54	5.054	1.759
1.89	0.69	6.083	2.219
2.00	0.72	6.429	2.315
2.53	0.92	8.126	2.981
3.30	1.24	10.613	3.974

Water and Benzene.

(Herz and Fischer — Ber. 38, 1143, '05.)

Gms. $N(CH_3)_3$ per 100 cc. Aq. Layer.	Gms. $N(CH_3)_3$ per 100 cc. C_6H_6 Layer.	Millimols $N(CH_3)_3$ per 10 cc. Aq. Layer.	Millimols $N(CH_3)_3$ per 10 cc. C_6H_6 Layer.
0.345	0.174	0.584	0.295
0.812	0.396	1.377	0.670
1.075	0.545	1.819	0.921
1.462	0.731	2.474	1.237
2.139	1.077	3.619	1.823
2.757	1.376	4.663	2.328
3.292	1.683	5.568	2.847
3.996	2.053	6.760	3.474
6.582	3.465	11.135	5.861

Solubilities of Di Ethyl Amine and Water.*

(Lattey — Phil. Mag. [6] 10, 398, '05.)

t°.	Gms. $NH(C_2H_5)_2$ per 100 Gms. Aqueous Layer.	Amine Layer.
155	21.7	59.0
150	23.6	55.5
148	24.8	53.5
146	26.3	51.0
145	28.0	49.0
144	31.0	45.0
143.5 (crit. t.)	37.4	

Distribution of Tri Ethyl Amine between Water and Amyl Alcohol at 25°.

(Herz and Fischer — Ber. 37, 4751, '04.)

Gms. $N(C_2H_5)_3$ per 100 cc.		Millimols $N(C_2H_5)_3$ per 10 cc.	
Aqueous Layer.	Alcoholic Layer.	Aqueous Layer.	Alcoholic Layer.
0.0885	2.299	0.0875	2.273
0.1683	4.457	0.1664	4.408
0.1866	4.922	0.1846	4.868
0.2502	6.491	0.2474	6.418

Tri Ethyl **AMINE** $N(C_2H_5)_3$.

Solubility in Water.

(Rothmund — Z. phys. Ch. 26, 433, '98.)

t°.	Gms. $N(C_2H_5)_3$ per 100 Gms. Aq. Layer.	Amine Layer.	t°.	Gms. $N(C_2H_5)_3$ per 100 Gms. Aq. Layer.	Amine Layer.
18.6 (crit. temp.)	51.9		40	3.65	96.48
20	14.24	72.0	50	2.87	96.4
25	7.30	95.18	55	2.57	96.3
30	5.80	96.60	60	2.23	96.3
35	4.58	96.5	65	1.97	96.3

Solubility of Tri Ethyl Amine in Mixtures of Water and Ethyl Alcohol at Different Temperatures.*

(Meerburg — Z. phys. Ch. 40, 647, '02.)

0% Alcohol. t°.	G. $N(C_2H_5)_3$ per 100 g. sol.	13.33% Alcohol. t°.	G. $N(C_2H_5)_3$ per 100 g. sol.	28.98% Alcohol. t°.	G. $N(C_2H_5)_3$ per 100 g. sol.	38.84% Alcohol. t°.	G. $N(C_2H_5)_3$ per 100 g. sol.	60.16% Alcohol t°.	G. $N(C_2H_5)_3$ per 100 g. sol.
69.2	1.7	38.3	8.2	54.5	22.8	73.4	31.2	76–77	71.2
30.8	5.6	31.7	13.9	45.0	29.8	65.4	33.3	74–75	75.0
23.1	8.5	28.0	21.6	33.4	51.1	51.6	40.6	72–73	80.0
18.7	25.8	26.4	30.6	31.4	63.7	42.1	50.6		
18.7	37.2	24.9	40.5	30.3	68.5	40.9	54.7		
19.5	51.8	24.2	49.8	28.5	82.2	34.2	70.6		
20.5	68.6	24.1	60.7	35.0	91.8	33.0	77.5		
20.5	84.0	24.0	69.7			34.7	88.0		
20.5	89.7	23.5	73.6			40.5	91.3		
21.4	92.4	24.0	81.5						
25.8	95.5	24.2	87.4						
26.5	96.1	25.0	92.0						

Note. — Results for Tri Ethyl Amine, Water and Ethyl Ether, and for Tri Ethyl Amine, Water and Phenol are also given by Meerburg.

100 gms. abs. methyl alcohol dissolve 57.5 grams $NH(C_6H_5)_2$ at 19.5°.
100 gms. abs. ethyl alcohol dissolve 56.0 grams $NH(C_6H_5)_2$ at 19.5°.

(de Bruyn — Z. phys. Ch. 10, 784, 1892.)

* Determinations made by "Synthetic Method," see Note, page 9.

Solubility of Di Phenyl Amine and also of Tri Phenyl Amine in Carbon Bisulphide.

(Arctowski — Compt. rend. 121, 123, '95.)

$NH(C_6H_5)_2$ in CS_2.		$N(C_6H_5)_3$ in CS_2.	
t°.	Gms. per 100 Gms. Solution.	t°.	Gms per 100 Gms. Solution.
−88½	0.87	−83	1.91
−117	0.37	−91	1.56
		−102	1.24
		−113½	0.98

Solubility of Di Phenyl Amine in Hexane and in Carbon Bisulphide.

(Etard — Ann. chim. phys. [7] 2, 570, '94.)

t°.	Gms. $NH(C_6H_5)_2$ per 100 Gms. Sol. in:		t°.	Gms. $NH(C_6H_5)_2$ per 100 Gms. Sol. in:	
	Hexane.	CS_2.		Hexane.	CS_2.
−60	...	1.3	0	2.6	33.7
−50	...	2.2	+10	3.8	46.8
−40	...	3.8	20	6.7	60.9
−30	0.5	7.2	30	13.8	76.0
−20	0.8	12.5	40	47.0	...
−10	1.4	21.6	50	94.0	...

AMMONIA NH_3.

Solubility of Ammonia in Water.

(Roscoe and Dittmar — Liebig's Annalen, 112, 334, '59; Raoult — Ann. chim. [5] 1, 262, '74; Mallet — Am. Ch. J. 19, 807, '97.)

t°.	At 760 mm. Pressure.		t°.	At 760 mm. Pressure.	
	G. NH_3 per 100 g. H_2O.	Vol. NH_3 per 1 g. H_2O.		G. NH_3 per 100 g. H_2O.	Vol. NH_3 per 1 g. H_2O.
−40	294.6	...	20	52.6	710
−30	278.1	...	25	46.0	635
−20	176.8	...	30	40.3	595 (28°)
−10	111.5	...	35	35.5	...
0	87.5	1299	40	30.7	...
5	77.5	1019	45	27.0	...
10	67.9	910	50	22.9	...
15	60.0	802	56	18.5	...

Solubility of Ammonia in Aqueous Salt Solutions.

(Raoult.)

t°.	In Calcium Nitrate Solutions Gms. NH_3 per 100 Gms. Solvent in:		In Potassium Hydroxide Solutions Gms. NH_3 per 100 Gms. Solvent in:	
	28.38% $Ca(NO_3)_2$.	In 59.03% $Ca(NO_3)_2$.	11.25% KOH.	25.25% KOH.
0	96.25	104.5	72.0	49.5
8	78.50	84.75	57.0	37.5
16	65.00	70.5	46.0	28.5
24	...	...	37.3	21.8

Mutual Solubility of Aqueous Ammonia and Potassium Carbonate Solutions.

(Newth — J. Chem. Soc. 77, 776, 1900.)

The solutions used were: Potassium Carbonate saturated at 15° (contained 57.2 grams K_2CO_3 per 100 cc.). Aqueous Ammonia of 0.885 Sp. Gr. (contained about 33 per cent ammonia). The determinations were made by adding successive small quantities of one of the solutions to a measured volume of the other, and observing the point at which opalescence appeared.

t°.	Saturated K_2CO_3 in Aq. Ammonia.		Aq. Ammonia in Saturated K_2CO_3.	
	cc. K_2CO_3 per 100 cc. Ammonia.	% K_2CO_3 Solution in Mixture.	cc. Ammonia in 100 cc. K_2CO_3.	% K_2CO_3 Solution in Mixture.
1	2.0	2.0	37.5	72.7
6	3.0	3.0	47.5	67.6
11	5.0	4.7	52.5	65.0
16	6.5	6.1	60.0	63.0
21	8.5	8.0	77.5	56.3
26	10.5	9.5	105.0	49.0
31	12.5	11.1	152.5	39.0
38	20.0	16.6	195.0	33.0
39	21.0	17.0	220.0	31.0
42	25.0	20.0	250.0	28.5
43	35.0	26.0	285.0	26.5

Above 43° the solutions are completely miscible. If 10 per cent of water is added to each solution the temperature of complete miscibility is lowered to 25°. The mutual solubilities are:

t°.	Per cent K_2CO_3 Solution in:	
	Ammonia Layer.	K_2CO_3 Sol. Layer.
0	8	62
10	11	52
20	15	38
25 (crit. pt.)	25	

With the addition of 12.9 per cent of water to each solution the temperature of complete miscibility (crit. pt.) is lowered to 10°. With the addition of 18.1 per cent water this temperature becomes 0°.

Solubility of Ammonia in Absolute Ethyl Alcohol.

(Delepine — J. pharm. chim. [5] 25, 496, 1892; de Bruyn — Rec. trav. chim. 11, 112, '92.)

t°.	Density.	Gms. NH_3 per 100 cc. Solution.	Gms. NH_3 per 100 Gms. Solution.		Gms. NH_3 per 100 Gms. Alcohol	
			(Delepine.)	(de Bruyn.)	(Delepine.)	(de Bruyn.)
0	0.782	13.05	20.95	19.7	26.5	24.5
5	0.784	12.00	19.00	17.5	23.0	21.2
10	0.787	10.85	16.43	15.0	19.6	17.8
15	0.789	9.20	13.00	13.2	15.0	15.2
20	0.791	7.50	10.66	11.5	11.9	13.2
25	0.794	6.00	10.0	10.0	11.0	11.2
30	0.798	5.15	9.7	8.8	10.7	9.5

Solubility of Ammonia in Aqueous Ethyl Alcohol.

(Delepine.)

t°.	In 96% Alcohol. Sp. Gr. Solution.	In 96% Alcohol. G. NH_3 per 100 Gms. Sol.	In 90% Alcohol. Sp. Gr. Solution.	In 90% Alcohol. G. NH_3 per 100 Gms. Sol.	In 80% Alcohol. Sp. Gr. Solution.	In 80% Alcohol. G. NH_3 per 100 Gms. Sol.
0	0.783	24.5	0.800	30.25	0.808	39.0
10	0.803	18.6	0.794	28.8	0.800	28.8
20	0.788	14.8	0.795	15.8	0.821	19.1
30	0.791	10.7	0.796	11.4	0.826	12.2

t°.	In 60% Alcohol. Sp. Gr. Solution.	In 60% Alcohol. G. NH_3 per 100 Gms. Sol.	In 50% Alcohol. Sp. Gr. Solution.	In 50% Alcohol. G. NH_3 per 100 Gms. Sol.
0	0.830	50.45	0.835	69.77
10	0.831	37.3	0.850	43.86
20	0.842	26.1	0.869	33.8
30	0.846	21.2	0.883	25.2

Solubility of Ammonia in Absolute Methyl Alcohol.

(de Bruyn — Rec. trav. chim. 11, 112, '92.)

t°.	G. NH_3 per 100 Grams. Solution.	G. NH_3 per 100 Grams. Alcohol.	t°.	G. NH_3 per 100 Grams. Solution.	G. NH_3 per 100 Grams. Alcohol.
0	29.3	41.5	20	19.2	23.8
5	26.5	36.4	25	16.5	20.0
10	24.2	31.8	30	14.0	16.0
15	21.6	27.8			

Distribution of Ammonia between:

Water and Amyl Alcohol at 20°.

(Herz and Fischer — Ber. 37, 4747, '04.)

Gms. NH_3 per 100 cc. Aq. Layer.	Gms. NH_3 per 100 cc. Alcoholic Layer.	G.M. NH_3 per 100 cc. Aq. Layer.	G.M. NH_3 per 100 cc. Alcoholic Layer.
0.5	0.072	0.25	0.0035
1.0	0.147	0.50	0.0073
2.0	0.272	1.00	0.0148
3.0	0.438	2.00	0.0295
4.0	0.595	3.00	0.0460
5.0	0.756		

Water and Chloroform at 20°.

(Dawson and McCrae — J. Ch. Soc. 79, 496, '01; see also Hantsch and Sebaldt — Z. phys. Ch. 30, 258, '99.)

Gms. NH_3 per 100 cc. Aq. Layer.	Gms. NH_3 per 100 cc. $CHCl_3$ Layer.	G. M. NH_3 per 100 cc. Aq. Layer.	G. M. NH_3 per 100 cc. $CHCl_3$ Layer.
0.2	0.007	0.01	0.00038
0.4	0.015	0.02	0.00073
0.6	0.023	0.03	0.00114
0.8	0.031	0.04	0.00152
1.0	0.039	0.05	0.00193
1.2	0.046	0.06	0.00232
1.4	0.055	0.08	0.00311
1.6	0.063	0.10	0.00396

Note. — The influence of a large number of electrolytes upon the distribution of ammonia between water and chloroform was also investigated. For calculations of above distribution results, see Note, page 4.

SOLUBILITY OF AMMONIUM CALCIUM ARSENATE AND AMMONIUM MAGNESIUM ARSENATE IN WATER, ETC.

(Field — J. Ch. Soc. 11, 6, '73.)

Solvent.	Grams per 100 Grams Solvent. $NH_4CaAsO_4\frac{1}{2}H_2O$.	$NH_4MgAsO_4\frac{1}{2}H_2O$.
Water	0.02	0.014
Aq. Ammonia 10% (Sp. Gr. 0.88)	0.001	0.007
Aq. NH_4Cl 5%	0.415	...
Aq. NH_4Cl 10%	...	0.095

AMMONIUM BENZOATE $NH_4C_7H_5O_2$.

SOLUBILITY IN WATER AND IN ALCOHOL.

t°.	Gms. $NH_4C_7H_5O_2$ per 100 Gms. Solvent in: Water.	Alcohol.
25	9.52	4.0
b. pt.	83.33	13.2

AMMONIUM BROMO PLATINATE $(NH_4)_2PtBr_6$.

100 gms. sat. aq. solution contain 0.59 gm. $(NH_4)_2PtBr_6$ at 20°.

(Halberstadt — Ber. 17, 2965, '84.)

AMMONIUM BROMIDE NH_4Br.

SOLUBILITY IN WATER.

(Eder — Abh. K. Akad. Wiss. (Berlin) 82 ii, 1284, '80.)

t°.	Gms. NH_4Br per 100 Grams. Solution.	Water.	t°.	Gms. NH_4Br per 100 Grams. Solution.	Water.
10	39.8	66.2	50	48.5	94.3
20	42.5	74.0	60	50.2	101.0
30	44.8	81.3	80	53.5	115.0
40	46.7	87.5	100	56.1	128.2

SOLUBILITY OF AMMONIUM BROMIDE IN ABSOLUTE ETHYL ALCOHOL, METHYL ALCOHOL, AND IN ETHER.

(Eder; de Bruyn — Z. phys. Ch. 10, 783, '92.)

t°.	In Ethyl Alcohol. Gms. NH_4Br per 100 Grams. Solution.	Alcohol.	In Methyl Alcohol. Gms. NH_4Br per 100 Grams. Solution.	Alcohol.	In Ether (0.729 Sp. Gr.). Gms. NH_4Br per 100 Grams. Ether.
15	2.97	3.06	....	....	0.123
19	3.12	3.22	11.1	12.5	....
78	9.50	10.50	....	....	....

Solubility of Tetra Ethyl **AMMONIUM BROMIDE** $N(C_2H_5)_4Br$, and of Tetra Methyl Ammonium Bromide $N(CH_3)_4Br$ in Acetonitril.

(Walden — Z. phys. Ch. 55, 712, '06.)

100 cc. sat. solution in CH_3CN contain 9.59 gms. $N(C_2H_5)_4Br$ at 25°.
100 cc. sat. solution in CH_3CN contain 0.17 gm. $N(CH_3)_4Br$ at 25°.

AMMONIUM CADMIUM BROMIDE $NH_4Br.CdBr_2.\frac{1}{2}H_2O$.

100 parts of water dissolve 137.0 parts $NH_4Br.CdBr_2.\frac{1}{2}H_2O$.
100 parts of alcohol dissolve 18.8 parts $NH_4Br.CdBr_2.\frac{1}{2}H_2O$.
100 parts of ether dissolve 0.36 part $NH_4Br.CdBr_2.\frac{1}{2}H_2O$.

(Eder — Dingler polyt. J. 221, 89, '76.)

AMMONIUM CARBONATE $(NH_4)_2CO_3$.

100 grams H_2O dissolve 100 grams $(NH_4)_2CO_3H_2O$ at 15°.
100 grams glycerine dissolve 20 grams $(NH_4)_2CO_3$ at 15°.

(Divers — J. Ch. Soc. 23, 171, '70.)

AMMONIUM BICARBONATE NH_4HCO_3.

Solubility in Water.

(Dibbits — J. pr. Ch. [2] 10, 417, '74.)

t°.	Gms. NH_4HCO_3 per 100 Grams. Solution.	Water.	t°.	Grams NH_4NCO_3 per 100 Grams. Solution.	Water.
0	10.6	11.9	20	17.4	21.0
5	12.1	13.7	25	19.3	23.9
10	13.7	15.8	30	21.3	27.0
15	15.5	18.3			

Solubility of Ammonium Bicarbonate in Aqueous Solutions of Ammonium Chloride Saturated with CO_2.

(Fedotieff — Z. phys. Ch. 49, 168, '04.)

t°.	Wt. of 1 cc. Sol.	Per 1000 cc. Solution. G. M. NH_4Cl.	G. M. NH_4HCO_3.	Gms. NH_4Cl.	Gms. NH_4HCO_3.	Per 1000 Grams H_2O. G. M. NH_4Cl.	G. M. NH_4HCO_3.	Gms. NH_4Cl.	Gms. NH_4HCO_3.
0	...	...	...	...	...	0.0	1.22	0.0	119.0
0	1.077	4.41	0.37	235.9	29.2	5.42	0.46	290.8	36.0
15	1.064	0.0	2.12	0.0	167.2	0.0	2.36	0.0	186.4
15	1.063	0.5	1.84	26.8	145.2	0.56	2.06	29.9	162.9
15	1.062	1.0	1.59	53.5	125.5	1.13	1.80	60.6	142.2
15	1.062	1.41	1.42	75.4	112.2	1.59	1.60	85.1	126.9
15	1.065	1.89	4.28	100.8	101.1	2.18	1.48	116.8	116.8
15	1.069	2.87	0.99	153.3	78.2	3.42	1.18	183.0	93.3
15	1.076	3.84	0.79	205.2	62.5	5.03	0.98	269.3	77.3
15	1.085	4.82	0.65	257.9	51.4	6.21	0.84	332.5	66.4
15	1.085	4.95	0.62	264.8	48.9	6.40	0.81	343.5	64.2
30	...	...	...	...	...	0.0	3.42	0.0	270.0
30	...	...	...	...	...	7.4	1.15	397.0	91.0

Solubility of Ammonium Bicarbonate in Aqueous Solutions of Sodium Bicarbonate Saturated with CO_2.

(Fedotieff.)

t°.	Wt. of 1 cc. Sol.	Per 1000 cc. Solution. G. M. $NaHCO_3$.	G. M. NH_4HCO_3.	Gms. $NaHCO_3$.	Gms. NH_4HCO_3.	Per 1000 Grams H_2O. G. M. $NaHCO_3$.	G. M. NH_4HCO_3.	Gms. $NaHCO_3$.	Gms. NH_4HCO_3
0	...	...	...	...	...	0.0	1.51	0.0	119.0
0	1.072	0.53	1.28	44.6	101.4	0.58	1.39	48.2	109.4
15	1.064	0.0	2.12	0.0	167.2	0.0	2.36	0.0	186.4
15	1.090	0.63	1.92	52.5	151.3	0.71	2.16	59.2	170.6
30	...	...	...	...	...	0.0	3.42	0.0	270.0
30	...	...	...	...	...	0.83	2.91	70.0	230.0

SOLUBILITY OF MIXTURES OF AMMONIUM BICARBONATE, SODIUM BICARBONATE, AND AMMONIUM CHLORIDE IN WATER SATURATED WITH CO_2.

(Fedotieff.)

t°.	Wt. of 1 cc. Sol.	Gram Mols. per 1000 Gms. H_2O.			Gms. per 1000 Gms. H_2O.			Solid Phase.
		$NaHCO_3$.	NaCl.	NH_4Cl.	$NaHCO_3$.	NaCl.	NH_4Cl.	
0	1.114	0.59	0.96	4.92	49.61	56.16	263.4	a + b + c
0	1.187	0.12	4.83	2.74	10.09	282.6	146.7	"
15	1.116	0.93	0.51	6.28	78.18	29.84	336.2	"
15	1.178	0.18	4.44	3.73	15.13	259.8	199.6	"
15	1.151	0.30	3.09	4.56	25.22	180.8	244.1	a + c
15	1.128	0.51	1.68	5.45	42.87	98.28	291.7	"
15	1.112	0.99	0.35	5.65	83.22	20.47	302.4	a + b
15	1.108	1.07	0.20	5.21	89.95	11.70	278.9	"
15	1.106	1.12	0.11	4.92	94.14	6.44	263.4	"
15	1.101	1.16	0.14	4.00	97.52	8.19	214.1	"
15	1.090	0.93	0.95	2.03	78.18	55.58	108.6	"

a = $NaHCO_3$, b = NH_4HCO_3, c = NH_4Cl.

AMMONIUM URANYL CARBONATE $2(NH_4)_2CO_3UO_2CO_3$.

(Ebelmen.)

100 grams H_2O dissolve 5 grams of the salt at 15°.

AMMONIUM LEAD COBALTICYANIDE $NH_4PbCo(CN)_6.3H_2O$.

(Schuler — Sitz. Ber. K. Akad. W. (Berlin) 79, 302.)

100 grams H_2O dissolve 12.0 grams of the salt at 18°.

AMMONIUM CHLORIDE NH_4Cl.

SOLUBILITY IN WATER.

(Mulder; below 0°, Meerburg — Z. anorg. Ch. 37, 203, 1903.)

t°.	Gms. NH_4Cl per 100 Gms. Solution.	Gms. NH_4Cl per 100 Gms. Water.	t°.	Gms. NH_4Cl per 100 Gms. Solution.	Gms. NH_4Cl per 100 Gms. Water.
−15	19.7	24.5	40	31.4	45.8
−10.9	20.3	25.5	50	33.5	50.4
−5.7	21.7	27.7	60	35.6	55.2
0	22.7	29.4	70	37.6	60.2
+5	23.8	31.2	80	39.6	65.6
10	24.9	33.3	90	41.6	71.3
15	26.0	35.2	100	43.6	77.3
20	27.1	37.2	110	45.6	83.8
25	28.2	39.3	115.6	46.6	87.3
30	29.3	41.4			

Density of saturated solution at 0° = 1.088, at 15° = 1.077, at 19° = 1.075.

Solubility of Ammonium Chloride in Aqueous Ammonium Bicarbonate Solutions Saturated with CO_2.

(Fedotieff — Z. phys. Ch. 49, 169, 1904.)

t°.	Wt. of 1 cc. Sol.	Per 1000 cc. Solution. G. M. NH_4HCO_3.	G. M. NH_4Cl.	Gms. NH_4HCO_3.	Gms. NH_4Cl.	Per 1000 Gms. H_2O. G. M. NH_4HCO_3.	G. M. NH_4Cl.	Gms. NH_4HCl.	Gms. NH_4Cl.
0	1.069	0.0	4.60	0.0	246.1	0.0	5.57	0.0	298.0
0	1.077	0.37	4.41	29.2	235.9	0.46	5.42	36.0	290.8
15	1.077	0.0	5.29	0.0	283.1	0.0	6.64	0.0	355.0
15	1.085	0.62	4.95	48.9	264.8	0.81	6.40	64.2	343.5
30	...	...	...	...	...	0.0	7.78	0.0	416.4
30	...	...	...	...	...	1.15	7.40	91.0	397.0

Solubility of Ammonium Chloride in Aqueous Solutions of Sodium Chloride Saturated with CO_2.

(Fedotieff.)

t°.	Wt. of 1 cc. Sol.	Per 1000 cc. Solution. G. M. NaCl.	G. M. NH_4Cl.	Gms. NaCl.	Gms. NH_4Cl.	Per 1000 Gms. H_2O. G. M. NaCl.	G. M. NH_4Cl.	Gms. NaCl.	Gms. NH_4Cl.
0	1.069	0.0	4.60	0.0	246.1	0.0	5.57	0.0	298.0
0	1.085	4.04	2.26	236.5	121.0	4.89	2.73	286.4	146.1
15	1.077	0.0	5.29	0.0	283.1	0.0	6.64	0.0	355.0
15	1.097	0.81	4.71	47.5	252.1	1.02	5.91	59.8	316.4
15	1.120	1.68	4.13	98.0	221.7	2.09	5.18	122.4	277.0
15	1.153	2.87	3.38	168.0	180.7	3.57	4.20	208.9	224.7
15	1.175	3.65	2.98	213.5	159.4	4.55	3.72	266.8	198.8
30	...	...	...	...	...	0.0	7.78	0.0	416.4
30	1.166	3.30	3.70	193.0	198.0	4.26	4.77	249.0	255.4
45	...	...	...	...	...	0.0	9.03	0.0	483.7
45	...	...	...	...	...	4.0	6.02	233.9	322.1

Solubility of Ammonium Chloride in Aqueous Solutions of Hydrochloric Acid at 0°.

(Engel — Ann. chim. phys. [6] 13, 379, '88.)

Sp. Gr. of Solutions.	Milligram Molecules per 10 cc. Solution. HCl.	NH_4Cl.	Grams per 100 cc. Solution. HCl.	NH_4Cl.
1.076	0.0	46.12	0.0	24.61
1.069	2.9	43.6	1.05	23.16
1.070	5.5	41.0	1.99	21.78
1.071	7.85	39.15	2.84	20.79
1.073	10.85	36.45	3.93	19.36
1.078	21.4	27.37	7.74	14.54
1.106	53.0	10.87	19.18	5.78
1.114	61.0	8.8	22.07	4.67

Sat. HCl at 12° 3.7 at 17°

Solubility in Aqueous Ammonia Solutions at 0°.

(Engel — Bull. soc. chim. [3] 6, 17, 1891.)

Sp. Gr. of Solutions.	Milligram Molecules per 10 cc. Solution.		Grams per 100 cc. Solution.	
	NH_3.	NH_4Cl.	NH_4OH.	NH_4Cl.
1.067	5.37	45.8	0.92	24.52
1.054	12.02	45.5	2.05	24.35
1.031	38.0	44.5	6.48	23.82
1.025	47.0	44.0	8.02	23.56
1.017	54.5	43.63	9.30	23.35
0.993	80.0	43.12	13.66	23.09
0.992	90.0	44.0	15.36	23.56
0.983	95.5	44.37	16.29	23.75
0.953	130.0	49.75	22.18	26.63
0.931	169.75	60.0	28.97	32.14

Solubilities of Mixtures of Ammonium Chloride and Other Salts in Water.

(Rüdorff, Karsten, Mulder.)

Both salts present in solid phase.

t°.	Grams per 100 Grams H_2O.		t°.	Grams per 100 Grams H_2O.	
19.5	29.2 NH_4Cl + 174.0 NH_4NO_3	R	b. pt.	67.7 NH_4Cl + 21.9 KCl	M
21.5	26.8 " + 46.5 $(NH_4)_2SO_4$	R	14.8	38.8 " + 34.2 KNO_3	K
20.0	33.8 " + 11.6 $BaCl_2$	R	18.5	39.8 " + 38.6 KNO_3	K
18.5	39.2 " + 17.0 $Ba(NO_3)_2$	K	14.0	36.8 " + 14.1 K_2SO_4	R
15.0	28.9 " + 16.9 KCl	R	18.7	37.9 " + 13.3 K_2SO_4	K
22.0	30.4 " + 19.1 KCl	R	18.7	22.9 " + 23.9 NaCl	R

Solubility of Ammonium Chloride in Absolute Ethyl and Methyl Alcohol at 19° and in Aqueous Ethyl Alcohol Solutions.

100 grams absolute ethyl alcohol dissolve 0.62 grams NH_4Cl.
100 grams absolute methyl alcohol dissolve 3.35 grams NH_4Cl.

(de Bruyn — Rec. trav. chim. 11, 156, '92.)

In Aqueous Alcohol at 30°.

(Bathrick — J. Physic. Chem. 1, 159, '96.)

Wt. per cent Alcohol.	G. NH_4Cl per 100 g. Alcohol.	Wt. per cent Alcohol.	G. NH_4Cl per 100 g. Alcohol.
0	40.4	45.9	17.0
8.3	35.3	54.3	14.0
16.9	31.8	65.0	9.6
25.9	27.5	75.6	6.4
34.4	21.7	87.9	2.9

In Aq. Alcohol of 45 Wt. %.

(Gerardin — Ann. chim. phys. [4] 5, 147, '65.)

t°.	G. NH_4Cl per 100 g. Alcohol.
4	11.2
8	12.6
27	19.4
38	23.6
56	30.1

SOLUBILITY OF AMMONIUM CHLORIDE IN AQUEOUS GLYCERINE SOLUTIONS AND IN AQUEOUS ACETONE SOLUTIONS AT 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 263, 267, '05.)

In Aqueous Glycerine.

(Sp. Gr. of Glycerine 1.255, Impurity about 1.5%.)

Wt. % Glycerine.	NH_4Cl per 100 cc. Solution. Millimols.	Grams.	Sp. Gr. at $\frac{25°}{4°}$.
0.	585.1	31.32	1.0793
13.28	544.6	29.16	1.0947
25.98	502.9	26.93	1.1127
45.36	434.4	23.26	1.1452
54.23	403.5	21.60	1.1606
83.84	291.4	15.60	1.2225
100.00	228.4	12.23	1.2617

In Aqueous Acetone.

Vol. % Acetone.		NH_4Cl per 100 cc. Solution. Millimols.	Grams.	Sp. Gr. at $\frac{25°}{4°}$.
0		585.1	31.32	1.0793
10		534.1	28.59	1.0618
20		464.6	24.87	1.0451
30		396.7	21.23	1.0263
40		328.5	17.59	0.9998
*46.5	L	283.7	15.19	0.9800
*85.7	U	18.9	1.01	0.8390
90		9.4	0.50	0.8274

* Between these two concentrations of acetone, the solution separates into two layers. L indicates lower layer, U indicates upper layer.

Solubility of Tetra Ethyl **AMMONIUM CHLORIDE** $N(C_2H_5)_4Cl$, and also of Tetra Methyl Ammonium Chloride $N(CH_3)_4Cl$ in Acetonitril.

100 cc. sat. solution in CH_3CN contain 29.31 gms. $N(C_2H_5)_4Cl$ at 25°.
100 cc. sat. solution in CH_3CN contain 0.265 gms. $N(CH_3)_4Cl$ at 25°.

(Walden — Z. physik. Chem. 55, 712, '06.)

AMMONIUM CHROMATES.

SOLUBILITY IN WATER AT 30°.

(Schreinemaker — Z. physic. Chem. 55, 89, '06.)

Composition in Wt. per cent of: The Solution. % CrO_3.	% NH_3.	The Residue. % CrO_3.	% NH_3.	Solid Phase.
6.933	22.23	...	...	$(NH_4)_2CrO_4$
9.966	16.53	47.59	20.44	"
16.973	8.20	...	...	"
22.53	6.37	38.03	12.15	"
27.09	6.87	48.02	12.01	$(NH_4)_2CrO_4 + (NH_4)_2Cr_2O_7$
26.19	5.70	47.38	8.81	$(NH_4)_2Cr_2O_7$
25.99	5.10	41.56	7.58	"
30.16	3.50	...	...	"
38.89	3.10	61.08	8.80	"
42.44	3.15	59.72	6.75	$(NH_4)_2Cr_2O_7 + (NH_4)_2Cr_3O_{10}$
44.08	2.27	54.90	4.14	$(NH_4)_2Cr_3O_{10}$
52.91	1.11	60.88	3.09	"
54.56	1.03	63.07	3.09	$(NH_4)_2Cr_3O_{10} + (NH_4)_2Cr_4O_{13}$
56.57	0.97	65.70	2.95	$(NH_4)_2Cr_4O_3$
58.87	0.65	69.74	3.24	"
62.48	0.46	71.93	3.10	"
63.60	0.40	73.68	1.18	$(NH_4)_2Cr_4O_{13} + CrO_3$
63.66	0.41	71.47	2.07	"
62.94	0.21	...	...	CrO_3
62.28	0.0	...	...	CrO_3

100 gms. of the sat. aq. solution contain 28.80 gms. $(NH_4)_2CrO_4$ at 30°.
100 gms. of the sat. aq. solution contain 32.05 gms. $(NH_4)_2Cr_2O_7$ at 30°.

AMMONIUM FLUOBORIDE NH_43BF_3.

100 parts of water dissolve 25 parts salt at 16°, and about 97 parts at b. pt.

(Stolba — Chem. Techn. Cent. Anz. 7, 459.)

AMMONIUM FORMATE $HCOONH_4$, and also Ammonium Acid Formate.

SOLUBILITY IN WATER.
(Groschuff — Ber. 36, 4351, '03.)

t°.	Gms. HCOONH₄ per 100 Gms. Solution.	Gms. HCOONH₄ per 100 Gms. Water.	Solid Phase.	t°.	Gms. per 100 Gms. Solution. HCOONH₂	Gms. per 100 Gms. Solution. + HCOOH.	Solid Phase.
−20	41.9	72	$HCOONH_4$	− 6.5	46.7	34.1	$HCOONH_4.HCOOH$
0	50.5	102	"	+ 1.5	49.6	36.2	"
20	58.9	143	"	6.0	51.3	37.4	"
40	67.1	204	"	8.5	52.1	38.0	"
60	75.7	311	"	− 7	49.6	36.2	$HCOONH_4$ labil.
80	84.2	531	"	+13	53.0	38.6	" stabil.
116 f. pt.				29	55.8	40.7	" "
				39	57.8	42.2	H_2O free solution.

SOLUBILITY OF AMMONIUM FORMATE IN FORMIC ACID SOLUTIONS.
(Groschuff.)

30 grams of $HCOONH_4$ dissolved in weighed amounts of formic acid and cooled to the point at which a solid phase separated.

t°.	Gms. HCOONH₄ per 100 Gms. Solution.	G. M. HCOONH₄ per 100 G. M. HCOOH.	Solid Phase.	t°.	Gms. HCOONH₄ per 100 Gms. Solution.	G. M. HCOONH₄ per 100 G. M. HCOOH.	Solid Phase.
− 3	35.3	39.9	$HCOONH_4$. HCOOH	11	50.0	73.0	$HCOONH_4$ labil.
+ 8.5	40.6	49.9	"	39	57.8	100.0	" stabil.
21.5	50.0	73.0	"	78	73.1	199.0	" "
				116 m.pt.	100.0	∞	" "

AMMONIUM IODATE NH_4IO_3.

100 parts H_2O dissolve 2.6 parts salt at 15° and 14.5 parts at 100°.

(Rammelsberg — Pogg. Ann. 44, 555, 1838.)

Tetra Methyl **AMMONIUM IODIDE** $N(CH_3)_4I$.

SOLUBILITY IN SEVERAL SOLVENTS.
(Walden — Z. physik. Chem. 55, 708, '06.)

Solvent.	Formula.	t°.	Sp. Gr. of Solution.	Gms. N(CH₃)₄ I per 100. cc. Solution.	Gms. N(CH₃)₄ I per 100. Gms. Solution.
Water	H_2O	0	1.0188	2.01	1.97
Water	H_2O	25	1.0155	5.31–5.89	5.22
Methyl Alcohol	CH_3OH	0	0.8025	0.18–0.22	0.22
Methyl Alcohol	CH_3OH	25	0.7920	0.38–0.42	0.48
Ethyl Alcohol	C_2H_5OH	25	0.7894	0.09	...
Glycol	$(CH_2OH)_2$	0	...	1.014	...
Glycol	$(CH_2OH)_2$	25	1.0678	0.240	0.224
Acetonitril	CH_3CN	25	...	0.650	...
Nitro Methane	CH_3NO_2	0	1.1387	0.25–0.32	0.22
Nitro Methane	CH_3NO_2	25	1.1285	0.34–0.38	0.21
Acetone	$(CH_3)_2CO$	0	...	0.118	...
Acetone	$(CH_3)_2CO$	25	...	0.187	...
Salicyl Aldehyde	$C_6H_4.OH.COH$	0	1.1492	0.302	0.263
Salicyl Aldehyde	$C_6H_4.OH.COH$	25	1.1379	0.510	0.484

Tetra Ethyl **AMMONIUM IODIDE** $N(C_2H_5)_4I$.

SOLUBILITY IN SEVERAL SOLVENTS.

(Walden — Z. physik. Chem. 55, 698, '06.)

Solvent.	Formula.	t°.	Sp. Gr. of Solution.	Gms. $N(C_2H_5)_4I$ per 100. cc. Solution.	Gms. Solution.
Water	H_2O	0	1.0470	16.31	15.58
Water	H_2O	25	1.1021	36.33(35.5)	13.44
Methyl Alcohol	CH_3OH	0	0.8326	3.7–4.3	4.44
Methyl Alcohol	CH_3OH	25	0.8463	10.5 (10.7)	12.29
Ethyl Alcohol	C_2H_5OH	0	0.7928	0.348	0.439
Ethyl Alcohol	C_2H_5OH	25	0.7844	0.98 (0.88)	1.249
Glycol	$(CH_2OH)_2$	0	1.1039	3.27	2.97
Glycol	$(CH_2OH)_2$	25	1.0904	7.63 (7.55)	7.00
Acetonitril	CH_3CN	0	0.8163	2.24	2.74
Acetonitril	CH_3CN	25	0.7929	3.04 (3.54)	3.83
Propionitril	CH_3CH_2CN	0	0.8059	0.618	0.767
Propionitril	CH_3CH_2CN	25	0.7830	0.81–1.01	1.29
Benzonitril	C_6H_5CN	25	...	0.467	...
Methyl Sulphocyanide	CH_3SCN	25	1.0828	4.40	4.06
Ethyl Sulphocyanide	C_2H_5SCN	25	1.0012	0.475	0.47
Nitro Methane	CH_3NO_2	0	1.1658	3.59	3.004
Nitro Methane	CH_3NO_2	25	1.1476	5.61–6.27	5.61
Nitroso Dimethylin	$(CH_3)_2N.NO$	25	1.0059	2.67	2.66
Acetyl Acetone	$CH_3COCH_2COOCH_3$	25	...	0.268	...
Furfurol	$C_4H_3O.COH$	0	1.1738	3.91	3.33
Furfurol	$C_4H_3O.COH$	25	1.1692	5.33	4.55
Benzaldehyde	C_6H_5COH	25	...	0.43	...
Salicylaldehyde	$C_6H_4.OH.COH$	25	...	changeable–17.7	...
Anisaldehyde	$C_6H_4.OCH_3.COH$	25	...	0.59	...
Acetone	$(CH_3)_2CO$	0	0.7991	0.174	0.218
Acetone	$(CH_3)_2CO$	25	...	0.249	0.218
Ethyl Acetate	$CH_3COOC_2H_5$	25	...	0.00039	...
Ethyl Nitrate	$C_2H_5ONO_2$	25	1.0984	0.062	0.056
Benzoyl Ethyl Acetate	$C_6H_5COCH_2COOC_2H_5$	25	1.1303	0.321	0.284
Di-Methyl Malonate	$CH_2(COOCH_3)_2$	25	1.1335	0.040	0.035
Methyl Cyan Acetate	$CH_2CNCOOCH_3$	0	1.1341	1.82	1.605
Methyl Cyan Acetate	$CH_2CNCOOCH_3$	25	...	2.83	...
Ethyl Cyan Acetate	$CH_2CNCOOC_2H_5$	0	1.0760	1.057	0.981
Ethyl Cyan Acetate	$CH_2CNCOOC_2H_5$	25	1.0607	1.71	1.41

Tetra Propyl **AMMONIUM IODIDE** $N(C_3H_7)_4I$.

SOLUBILITY IN SEVERAL SOLVENTS.

(Walden — Z. physik. Chem. 55, 709, '06.)

Solvent.	Formula.	t°.	Sp. Gr. of Solution.	Gms. $N(C_3H_7)_4I$ per 100. cc. Solution.	Gms. $N(C_3H_7)_4I$ per 100. Gms. Solution.
Methyl Alcohol	CH_3OH	0	0.9756	40.92	41.94
Methyl Alcohol	CH_3OH	25	1.0187	56.42	55.37
Ethyl Alcohol	C_2H_5OH	0	0.8349	6.5–6.8	8.14
Ethyl Alcohol	C_2H_5OH	25	0.8716	19.88-20.29	23.28
Acetonitril	CH_3CN	0	0.8553	13.03	15.24
Acetonitril	CH_3CN	25	0.8584	18.69	21.77
Propionitril	C_2H_5CN	0	0.8280	6.37	7.66
Propionitril	C_2H_5CN	25	0.8191	9.65	11.76
Benzonitril	C_6H_5CN	25	1.0199	8.44	8.35
Nitro Methane	CH_3NO_2	0	1.181	14.79	12.52
Nitro Methane	CH_3NO_2	25	1.158	22.24	19.21
Nitro Benzol	$C_6H_5NO_2$	25	1.193	5.71	4.79
Benzaldehyde	C_6H_5COH	0	1.0581	7.06	6.67
Benzaldehyde	C_6H_5COH	25	1.0549	9.87	9.35
Anisaldehyde	$C_6H_5.OCH_3.COH$	0	1.1114	5.60	5.04
Anisaldehyde	$C_6H_5.OCH_3.COH$	25	1.1004	6.75	6.14
Salicylaldehyde	$C_6H_5.OH.COH$	52	...	39.28	...
Ethylnitrite	$C_6H_5ONO_2$	0	1.1207	0.522	0.466
Ethylnitrite	$C_6H_5ONO_2$	25	1.1025	0.653	0.592
Di-Methyl Malonate	$CH_2(COOCH_3)_2$	0	1.1532	0.298	0.259
Di-Methyl Malonate	$CH_2(COOCH_3)_2$	25	1.1345	0.320	0.282
Acetone	$(CH_3)_2C$	0	0.8259	2.692	3.26
Acetone	$(CH_3)_2CO$	25	0.8049	3.944	4.90
Ethyl Acetate	$CH_3COOC_2H_5$	25	0.8975	0.0063	0.007

AMMONIUM NITRATE NH_4NO_3.

SOLUBILITY IN WATER.

(Schwarz — Ostwald's Lehrbuch, 2d ed. p. 425; Muller and Kaufmann — Z. physik. Chem. 42, 497, '01–'02.)

t°.	Sp. Gr. Solution.	G. Mols. NH_4NO_3 per 100 Mols. H_2O.	Gms. NH_4NO_3 per 100 Gms. Solution.	Gms. NH_4NO_3 per 100 Gms. Water.	Solid Phase.
0	...	26.63	54.19	118.3	NH_4NO_3 rhomb. β
12.2	1.2945	34.50	60.53	153.4	"
20.2	1.3116	43.30	65.80	192.4	"
25.0	1.3197	48.19	68.17	214.2	"
30.0	1.3299	54.40	70.73	241.8	"
32.1	1.3344	57.60	71.97	256.9	NH_4NO_3 rhomb. β + rhomb. α
35.0	1.3394	59.80	72.64	265.8	NH_4NO_3 rhomb. α
40.0	1.3464	66.80	74.82	297.0	"
50.0	...	77.41	77.49	344.0	"
60.0	...	94.73	80.81	421.0	"
70.0	...	112.30	83.32	499.0	"
80.0	...	130.50	85.25	580.0	"
90.0	...	166.50	88.08	740.0	NH_4NO_3 rhombohedral?
100.0	...	196.00	89.71	871.0	"

Solubilities of Mixtures of Ammonium Nitrate and Other Salts.

(Rüdorff — Mulder.)

100 gms. H_2O dissolve 162.9 gms. NH_4NO_3 + 77.1 gms. $NaNO_3$ at 16° R.

100 gms. H_2O dissolve 88.8 gms. NH_4NO_3 + 40.6 gms. KNO_3 at 9° M.

100 gms. H_2O dissolve 101.3 gms. NH_4NO_3 + 6.2 gms. $Ba(NO_3)_2$ at 9° M.

Solubility of Ammonium Nitrate in Ammonia.

(Kuriloff — Z. physik. Chem. 25, 109, '98.)

t°.	Gms. NH_4NO_3.	Gms. NH_3.	Mols. NH_4NO_3 per 100 Mols. NH_4NO_3 + NH_3.	t°.	Gms. NH_4NO_3.	Gms. NH_3.	Mols. NH_4NO_3 per 100 Mols. NH_4NO_3 + NH_3.
−80	0	100	0.0	33.3	0.9358	0.2352	45.9
−60	1.3918	4.4327	6.25	35.9	0.7746	0.1857	47.0
−44.5	0.9526	1.2457	13.9	68.8	4.2615	0.7747	53.8
−30	0.8308	0.3700	32.3	94.0	0.6439	0.0665	67.3
−10.5	0.9675	0.3515	36.9	190.8	0.7578	0.0588	74.2
0	0.7600	0.2607	38.3	168.0	...	...	100.0

t° = temperature of equilibrium between solution and solid phase.

Solubility of Ammonium Nitrate in Nitric Acid.

(Groschuff — Ber. 37, 1488, '04.)

Determinations by the "Synthetic Method," see Note, page 9.

t°.	Gms. NH_4NO_3 per 100 Gms. Sol.	Mols. NH_4NO_3 per 100 Mols. HNO_3.	Solid Phase.	t°.	Gms. NH_4NO_3 per 100 Gms. Sol.	Mols. NH_4NO_3 per 100 Mols. HNO_3.	Solid Phase.
8	21.1	21.1	$NH_4NO_3.2HNO_3$	11.0	51.7	84.3	$NH_4NO_3.HNO_3$
23	28.7	31.6	" *a*	12.0	54.7	95.1	" labil.
29.5 m.pt.	38.8	50.0	"	11.5	57.6	108.0	" *b*
27.5	44.6	63.4	" *b*	11.5	54.0	92.4	NH_4NO_3 labil.
23.5	49.4	76.8	"	17.0	54.7	95.1	" stabil.
17.5	54.0	92.4	"	27.0	56.2	101.0	"
16.5	54.3	93.5	"	49.0	60.4	120.0	"
4.0	45.8	66.7	$NH_4NO_3.HNO_3$ labil	79.0	68.1	168.0	"

a = solution in HNO_3, *b* = solution in NH_4NO_3.

Solubility of Ammonium Tri-Nitrate in Water.

(Groschuff.)

t°.	Gms. NH_4NO_3 per 100 Gms. Solution.	Gms. HNO_3 per 100 Gms. Solution.	Mols. NH_4NO_3* per 100 Mols. H_2O.	Mols. NH_4NO_3 per 100 total Mols. Solution.	Solid Phase.
−8	34.2	53.9	64.3	22.0	$NH_4NO_3.2HNO_3$
−2.5	34.8	54.8	75.1	23.1	"
+3.0	35.4	55.8	90.0	24.3	"
8.5	36.6	56.9	113.0	25.7	"
19.5	37.4	58.9	225.0	29.0	"
25.0	38.1	60.0	450.0	31.0	"
29.5 m. pt.	38.8	61.2	0.0	∞	"

* or $NH_4NO_3.2HNO_3$.

SOLUBILITY OF AMMONIUM NITRATE IN AQUEOUS ETHYL ALCOHOL.

(Fleckenstein — Physic. Z. 6, 419, '05.)

t°.	Grams of NH_4NO_3 Dissolved per 100 Grams Aq. Alcohol of (Wt. %).					
	100%.	86.77%.	76.12%.	51.65%.	25.81%.	0%.
20	2.5	11.0	23.0	70.0	140	195
30	4.0	14.0	32.0	90.0	165	230
40	5.0	18.0	43.0	115.0	196	277
50	6.0	24.0	55.0	144.0	244	365
60	7.5	30.0	70.0	183.0	320	...
70	9.0	41.0	93.0	230.0	...	...
80	10.5	56.0	...	...	...	...

NOTE. — The figures in the preceding table were read from curves shown in the abridged report of the work, and are therefore only approximately correct. Determinations of the solubility in methyl alcohol solutions were also made but not quoted in the abstract. The "Synthetic Method" (see Note, page 9) was used.

100 grams absolute ethyl alcohol dissolve 4.6 grams NH_4NO_3 at 14° and 3.8 grams at 20.5°.

100 grams absolute methyl alcohol dissolve 14.6 grams NH_4NO_3 at 14° and 17.1 grams at 20.5°.

(Schiff and Monsacchi — Z. physik. Chem. 21, 277, '96; at 20.5° de Bruyn — *Ibid.*, 10, 783, '92.)

AMMONIUM MAGNESIUM NITRATE $2NH_4NO_3.Mg(NO_3)_2$.

100 parts water dissolve 10 parts salt at 12.5°.

(Foucroy.)

AMMONIUM MANGANIC MOLYBDATE $5(NH_4)_2MoO_4.Mn_2(Mo_2O_7)_3.12H_2O$.

100 parts water dissolve 0.98 parts salt at 17°.

(Struve — J. pr. Chem. 61, 460, '54.)

AMMONIUM OXALATE $(NH_4)_2C_2O_4$.

100 grams H_2O dissolve 2.215 grams $(NH_4)_2C_2O_4$ at 0° Sp. Gr. of solution = 1.0105.

(Engel — Ann. chim. phys. [6] 13, 359, '88.)

SOLUBILITY OF NEUTRAL AMMONIUM OXALATE IN AQUEOUS SOLUTIONS OF ACID AMMONIUM OXALATE.

(Engel.)

½ Milligram Mols. per 10 cc. Solution.		Grams per 100 cc. Solution.	
$(NH_4)_2C_2O_4$	$NH_4HC_2O_4$	$(NH_4)_2C_2O_4$	$NH_4HC_2O_4$.
3.54	0.0	2.19	0.0
2.65	1.45	1.63	0.77
2.475	2.525	1.52	1.34
2.38	2.90	1.47	1.54*

* Both salts present in solid phase

Solubility of Ammonium Oxalate and Oxalic Acid in Water at 25°.

(Walden — Am. Ch. J. 34, 149, '05.)

Mixtures of the two substances were dissolved in warm water and the solutions allowed to cool in a thermostadt held at 25°.

Composition of Solution. Grams per 100 Gms. Solution.		Mols. per 100 Mols. H_2O.		Solid Phase.
$(NH_4)_2C_2O_4$.	$H_2C_2O_4$.	$(NH_4)_2C_2O_4$.	$H_2C_2O_4$.	
0.28	10.20	0.045	2.281	$H_2C_2O_4.2H_2O$ and $(NH_4)_2C_2O_4.3H_2C_2O_4.4H_2O$
0.46	7.24	0.072	1.570	Double salt, $(NH_4)_2C_2O_4.3H_2C_2O_4.4H_2O$
2.44	2.59	0.372	0.546	"
3.65	2.80	0.566	0.599	"
4.99	3.41	0.791	0.745	"
5.20	3.55	0.824	0.781	$(NH_4)_2C_2O_4.3H_2C_2O_4.4H_2O$ and $(NH_4)_2C_2O_4.H_2C_2O_4.H_2O$
5.36	3.38	0.853	0.741	Double salt, $(NH_4)_2.C_2O_4.H_2C_2O_4.H_2O$
6.27	3.04	1.00	0.671	"
7.03	2.90	1.13	0.645	"
7.08	2.70	1.14	0.599	$(NH_4)_2C_2O_4.H_2C_2O_4.H_2O$ and $(NH_4)_2C_2O_4$
6.92	...	0.775	...	$(NH_4)_2C_2O_4$

AMMONIUM HYDROGEN PHOSPHITE $(NH_4H)HPO_3$.

100 grams water dissolve 171 grams $(NH_4H)HPO_3$ at 0°, 190 grams at 14.5° and 260 grams at 31°.

(Amat. — Compt. rend. 105, 809, '87.)

AMMONIUM PERMANGANATE NH_4MnO_4.

100 parts water dissolve approximately 8 parts of NH_4MnO_4 at 15°.

(Aschoff.)

AMMONIUM FLUO SILICATE $(NH_4)_2SiF_6$.

100 parts water dissolve 18.5 parts $(NH_4)_2SiF_6$ at 17.5°, Sp. Gr. 1.096.

(Stolba — Chem. Centr. 418, 1877.)

AMMONIUM SALICYLATE $C_6H_4(OH)COONH_4$.

100 parts H_2O dissolve 111.1 parts $C_6H_4(OH)COONH_4$ at 25°; 100 parts alcohol dissolve 43.5 parts at 25° and 100 parts at the b. pt. (U. S. P.)

AMMONIUM SULPHATE $(NH_4)_2SO_4$.

Solubility in Water.

(Mulder.)

t°	Grams $(NH_4)_2SO_4$ per 100 Grams. Water.	Solution.	t°.	Grams $(NH_4)_2SO_4$ per 100 Grams. Water.	Solution.
0	70.6	41.4	30	78.0	43.8
5	71.8	41.8	40	81.0	44.8
10	73.0	42.2	60	88.0	46.8
15	74.2	42.6	80	95.3	48.8
20	75.4	43.0	100	103.3	50 8
25	76.7	43.4	108.9	107.5	51.8

Sp. Gr. of saturated solution at 15° = 1.248; at 19° = 1.241.

Solubility of Mixtures of Ammonium Sulphate and Copper Sulphate at 16°, and of Ammonium Sulphate and Potassium Sulphate at 19.1°.

(Rüdorff — Ber. 6, 482, '73.)

$(NH_4)_2SO_4 + CuSO_4$.			$(NH_4)_2SO_4 + K_2SO_4$.		
Preparation of Solution.	G. per 100 g. Solution.		Preparation of Solution.	G. per 100 g. Solution	
	$CuSO_4$	$(NH_4)_2SO_4$.		K_2SO_4.	$(NH_4)_2SO_4$.
Both salts in excess	8.55	7.12	Both salts in excess	39.3	37.97
15 cc. sat. sol. + 3 gms. $(NH_4)_2SO_4$	1.77	18.16	15 cc. sat. sol. + 4 g. K_2SO_4	4.94	33.26
15 cc. sat. sol. + 3 gms. $CuSO_4.5H_2O$	15.85	5.65	15 cc. sat. sol. + 4 g. $(NH_4)_2SO_4$	2.05	40.80

Solubility of Ammonium Sulphate in Aqueous Ethyl Alcohol Solutions.

(Traube and Neuberg — Z. physik. Chem. 1, 510, '87; Bodländer — *Ibid.* 7, 318, '91; Schreinemaker — *Ibid.* 23, 657, '97; de Bruyn — *Ibid.* 32, 68, '00; Linebarger — Am. Ch. J. 14, 380, '92.)

Upper Layer Results. Grams per 100 Gms. Solution at 10°–40°.		Lower Layer Results.			
		Gms. C_2H_5OH per 100 Gms. Solution.	Gms. $(NH_4)_2SO_4$ per 100 g. Solution at:		
C_2H_5OH.	$(NH_4)_2SO_4$.		6.5°.	15°.	33°.
100	0.0	0	42.0	42.6	44
80	0.1	2.5	39.0	40.2	?
70	0.3	5.0	36.2	37.2	?
60	1.4	7.5	33.2	34.5	42
50	3.2	10.0	30.0	31.0	35
45	4.8	12.5	27.2	28.0	?
40	6.6	15.0	24.6	25.2	?
35	9.2	17.5	22.0	22.4	?
30	12.2	20.0	20.0	20.0	?
25	14.6				

Note. — When ammonium sulphate is added to aqueous solutions of alcohol, it is found that for certain concentrations and temperatures the solutions separate into two liquid layers, the upper of which contains the larger percentage of alcohol.

Most of the determinations which have been made upon this system, as contained in the papers referred to above, are given in terms of grams of ammonium sulphate, of alcohol and of water per 100 grams of these three components taken together. Those results which are given in other terms can be readily calculated to this basis, and it is therefore possible to make a comparison of the several sets of determinations by plotting on cross-section paper and drawing curves through the points. In the present case the grams of alcohol per 100 grams of solution were taken as ordinates, and the grams of ammonium sulphate in the same quantity of each solution taken as abscissæ. It was found that a single curve could be drawn through practically all the points representing the upper layer solutions at the several temperatures, but the points for the solutions containing the larger amounts of water gave curves which diverged with increase of temperature. The results given for 33° in the above table are not to be accepted as correct until further work has been done.

SOLUBILITY OF AMMONIUM SULPHATE IN AQUEOUS PROPYL ALCOHOL SOLUTIONS AT 20°.

(Linebarger — Am. Ch. J. 14, 380, '92.)

Gms. per 100 Gms. Solution.		Gms. per 100 Gms. Solution.	
C_3H_7OH.	$(NH_4)_2SO_4$.	C_3H_7OH.	$(NH_4)_2SO_4$.
70	0.4	40	3.2
60	1.0	30	4.8
50	2.0	20	6.7

AMMONIUM CADMIUM SULPHATE $(NH_4)_2Cd(SO_4)_26H_2O$.

100 cc. H_2O dissolve 72.3 grams $(NH_4)_2Cd(SO_4)_2$ at 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

AMMONIUM CHROMIUM SULPHATE (Alum) $(NH_4)_2Cr_2(SO_4)_4.24H_2O$.

100 cc. H_2O dissolve 10.78 grams anhydrous or 21.21 grams hydrated salt at 25°.

(Locke — Am. Ch. J. 26, 174, '01.)

AMMONIUM COBALT SULPHATE $(NH_4)_2Co(SO_4)_2.6H_2O$.

SOLUBILITY IN WATER.

(Tobler — Liebig's Annalen 95, 193, '55; v. Hauer — J. pr. Chem. 74, 433, '58; at 25°, Locke — Am. Ch. J. 27, 459, '01.)

t°.	Gms. $(NH_4)_2Co(SO_4)_2$ per 100 Gms.		t°.	Gms. $(NH_4)_2Co(SO_4)_2$ per 100 Gms.	
	Water.	Solution.		Water.	Solution.
0	6.0	5.7	40	22.0	18.0
10	9.5	8.7	50	27.0	21.3
20	13.0	11.5	60	33.5	25.1
25	14.72	12.8	70	40.0	28.6
30	17.0	14.5	80	49.0	32.9

NOTE. — The determinations reported by the above named investigators were plotted on cross-section paper and although considerable variations were noted, an average curve which probably represents very nearly the true conditions was drawn through them, and the above table made from this curve.

AMMONIUM COPPER SULPHATE $(NH_4)_2Cu(SO_4)_2.6H_2O$.

100 grams H_2O dissolve 26.6 grams salt at 19°, Sp. Gr. of sol. = 1.1336

(Schiff — Liebig's Ann. 109, 326, '59.)

AMMONIUM IRON SULPHATE (Alum) $(NH_4)_2Fe_2(SO_4)_4.24H_2O$.

100 cc. H_2O dissolve 44.15 gms. anhydrous or 124.40 gms. hydrated salt at 25°. Sp. Gr. of saturated solution at 15° = 1.203.

(Locke — Am. Ch. J. 26, 174, '01.)

AMMONIUM IRON SULPHATE (ferrous) $(NH_4)_2Fe(SO_4)_2.6H_2O$.

SOLUBILITY IN WATER.

(Tobler; at 25°, Locke — Am. Ch. J. 27, 459, '01.)

t°.	G. $(NH_4)_2Fe(SO_4)_2$ per 100 g. H_2O.	t°.	G. $(NH_4)_2Fe(SO_4)_2$ per 100 g. H_2O.	t°.	G. $(NH_4)_2Fe(SO_4)_2$ per 100 g. H_2O.
0	12.5	25	25.0 (T)	50	40
15	20.0	25	35.1 (L)	70	52
		40	33.0		

AMMONIUM INDIUM SULPHATE $(NH_4)_2In_2(SO_4)_4.24H_2O$.

100 g. H_2O dissolve 200 gms. salt at 16° and 400 gms. at 30°.

(Rössler — J. pr. Chem. [2] 7, 14, '73.)

AMMONIUM MAGNESIUM SULPHATE $(NH_4)_2Mg(SO_4)_2.6H_2O$.

SOLUBILITY IN WATER.

(Average curve, from results of Mulder, Tobler, Locke, at 25°.)

t°.	G. $(NH_4)_2Mg(SO_4)_2$ per 100 Gms. Water.	Solution.	t°.	G. $(NH_4)_2Mg(SO_4)_2$ per 100 Gms. Water.	Solution.
0	9.0	8.8	40	27.0	21.3
10	13.0	11.5	50	32.0	24.4
20	18.0	15.3	60	37.0	27.0
25	19.9	16.6	70	42.0	29.6
30	22.0	18.0	80	47.0	32.0

AMMONIUM MANGANESE SULPHATE $(NH_4)_2Mn(SO_4)_2.6H_2O$.

100 cc. water dissolve 37.2 gms. $(NH_4)_2Mn(SO_4)_2$ at 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

AMMONIUM NICKEL SULPHATE $(NH_4)_2Ni(SO_4)_2.6H_2O$.

SOLUBILITY IN WATER.

(Average curve from Tobler, Locke, at 25°.)

t°.	G. $(NH_4)_2Ni(SO_4)_2$ per 100 Gms. Water.	Solution.	t°.	G. $(NH_4)_2Ni(SO_4)_2$ per 100 Gms. Water.	Solution.
0	1.0	0.99	40	12.0	10.72
10	4.0	3.85	50	14.5	12.96
20	6.5	6.10	60	17.0	14.53
25	7.57	7.04	70	20.0	16.66
30	9.0	8.45			

AMMONIUM SODIUM SULPHATE $NH_4NaSO_4.2H_2O$.

100 gms. water dissolve 46.6 gms. $NH_4.NaSO_4.2H_2O$ at 15°, Sp. Gr. Sol. = 1.1749.

AMMONIUM VANADIUM SULPHATE (Alum) $(NH_4)_2V_2(SO_4)_4.24H_2O$.

100 cc. H_2O dissolve 31.69 gms. anhydrous or 78.50 gms. hydrated salt at 25°. (Locke.)

AMMONIUM ZINC SULPHATE $(NH_4)_2Zn(SO_4)_2.6H_2O$.

SOLUBILITY IN WATER.

(Average curve, see Note, p. 33, Tobler, Locke, at 25°.)

t°.	G. $(NH_4)_2Zn(SO_4)_2$ per 100 Gms. Solution.	Water.	t°.	G. $(NH_4)_2Zn(SO_4)_2$ per 100 Gms. Solution.	Water.
0	6.54	7.0	40	16.66	20
10	8.67	9.5	50	20.0	25
20	11.11	12.5	60	23.1	30
25	12.36	14.1	70	25.9	35
30	13.79	16.0	80	29.6	42

AMMONIUM PERSULPHATE $(NH_4)_2S_2O_8$.

100 parts H_2O dissolve 58.2 parts $(NH_4)_2S_2O_8$ at 0°.

(Marshall — J. Chem. Soc. 59, 771, '91.)

AMMONIUM SODIUM HYDROGEN SULPHITE $(NH_4)Na_2H(SO_3)_2$ $4H_2O$.

100 gms. H_2O dissolve 42.3 gms. salt at 12.4° and 48.5° gms. at 15°.

(Schwincker — Ber. 22, 1732, '89.)

AMMONIUM SULPHOCYANIDE NH_4SCN.

100 parts water dissolve 128.1 parts NH_4SCN at 0° and 162.2 parts at 20°.

(Clowes — Z. Ch. 190, 1866.)

AMYL ACETATE BUTYRATE, FORMATE, etc.

SOLUBILITY IN WATER AND IN AQUEOUS ALCOHOL AT 20°.

(Bancroft — Phys. Rev. 3, 131, 196, 205, '95–'96; Traube. — Ber. 17, 2304, '84.)

Ester.	cc. Ester per 100 cc. H_2O.	Sp. Gr. of Ester.	Ester.	cc. Ester per 100 cc. H_2O.	Sp. Gr. of Ester.
Amyl acetate	0.2	0.88	Amyl propionate	0.1	0.88
Iso amyl acetate	0.2 (1.2?)	...	Iso amyl formate	0.3 (gms. at 22°)	
Amyl butyrate	0.06	0.85			

Solubility of Iso Amyl Acetate in Aq. Alcohol Mixtures.

Per 5 cc. C_2H_5OH.	
cc. H_2O.	cc. Iso Amyl acetate.
7	0.41
6	0.7
5	1.31
3.61	3.0
3.01	4.0
2.60	5.0

Solubility of Amyl Acetate and Amyl Formate in Aq. Alcohol Mixtures.

cc. C_2H_5OH in Mixture.	cc. H_2O added to cause separation of second phase in mixtures of the given amounts of alcohol and 3 cc. portions of:	
	Amyl Formate.	Amyl Acetate.
3	1.80	1.76
9	8.77	9.03
15	17.01	17.52
21	27.06	26.99
27	38.31	37.23
33	50.71	48.41
39	65.21	...
45	85.10	...
48	94.20	...

ANETHOL (p Propylanisol) $CH_3CHCH[4]C_6H_4OCH_3$.

SOLUBILITY IN AQ. ALCOHOL AT 20°.

(Schimmel and Co. Reports, Oct 1895, p. 6.)

Vol. per cent alcohol =	20	25	30	40	50
Gm. Anethol per liter aq. alcohol =	0.12	0.20	0.32	0.86	2.30

ANILINE $C_6H_5(NH_2)$.

SOLUBILITY IN WATER AT 22°.

(Herz — Ber. **31**, 2671, '98; see also Vaubel — J. pr. Chem. [2] **52**, 72, '95; Aignan and Dugas — Compt. rend. **129**, 643, 99.)

100 cc. H_2O dissolve 3.481 cc. $C_6H_5(NH_2)$ — Vol. of Sol. = 103.48, Sp. Gr. = 0.9986.

100 cc. $C_6H_5(NH_2)$ dissolve 5.22 cc. H_2O — Vol. of Sol. = 104.96, Sp. Gr. = 1.0175.

SOLUBILITY OF ANILINE IN WATER AT DIFFERENT TEMPERATURES.

(Alexejew — Ann. Physik. Chem. **28**, 305, '86; calc. by Rothmund — Z. physic. Chem. **26**, 475, '98.)

Determinations by "Synthetic Method" see Note, p. 9. Figures read from curve.

t°.	Gms. $C_6H_5(NH_2)$ per 100 Grams.		t°.	Gms. $C_6H_5NH_2$ per 100 Grams.	
	Aq. Layer.	Aniline Layer.		Aq. Layer.	Aniline Layer.
20	3.2	95.5	140	13.0	83.5
40	3.5	95.0	150	18.0	79.0
60	3.8	94.7	160	27.5	71.0
80	4.5	93.5	165	36.0	63.0
100	6.0	92.0	167.5 (crit. temp.)	48.6	
120	8.5	88.5			

SOLUBILITY OF ANILINE IN AQUEOUS SALT SOLUTIONS AT 18°.

(Euler — Z. physik. Chem. **49**, 307, '04.)

Aq. Solution.	Gms. Salt per liter.	Gms. $C_6H_5(NH_2)$ per 100 g. solvent.	Aq. Solution.	Gms. Salt per liter.	Gms. $C_6H_5(NH_2)$ per 100 g. solvent.
H_2O alone	0	3.61	N NaOH	40.06	1.90
½N KCl	37.3	3.15	N LiCl	42.48	2.80
N KCl	74.6	2.68	N $CuCl_2$	67.25	3.00
N NaCl	58.5	2.55			

SOLUBILITY OF ANILINE IN AQUEOUS ANILINE HYDROCHLORIDE SOLUTIONS AT 18°.

(Lidow — J. russ. phys. chem. Ges. **15**, 420, '83; Ber. **16**, 2297, '83.)

Per cent $C_6H_5NH_2HCl$ in Solvent.	Gms. $C_6N_5NH_2$ per 100 g. Solvent.	Per cent $C_6H_5NH_2.HCl$ in Solvent.	Gms. $C_6H_5NH_2$ per 100 g. Solvent.
5	3.8	30	39.2
12	5.3	35	50.4
25	18.3		

DISTRIBUTION OF ANILINE BETWEEN:

(Vaubel — J. pr. Chem. [2] **67**, 477, '03.)

Water and Ether.

Composition of Solutions.		Gms. $C_6H_5NH_2$ in:	
G. $C_6H_5NH_2$ Used.	Solvent.	Aq. Layer.	Ether Layer.
1.2478	50 cc. H_2O + 20 cc. Ether	0.1671	1.0807
1.2478	50 cc. H_2O + 50 cc. Ether	0.0835	1.1643
1.2478	50 cc. H_2O + 100 cc. Ether	0.0594	1.1884

Water and Carbon Tetrachloride.

Composition of Solutions.		Gms. $C_6H_5NH_2$ in:	
G. $C_6H_5NH_2$ Used.	Solvent.	Aq. Layer.	CCl_4 Layer.
0.3478	50 cc. H_2O + 20 cc. CCl_4	0.3358	0.012
1.2478	50 cc. H_2O + 50 cc. CCl_4	0.2767	1.971
1.2478	50 cc. H_2O + 100 cc. CCl_4	0.1845	1.063

SOLUBILITY OF ANILINE IN SULPHUR.

(Alexejew — Ann. Physik. Chem. **28**, 305, '86.)

t°.	Gms. $C_6H_5NH_2$ per 100 g.		t°.	Gms. $C_6H_5NH_2$ per 100 g.	
	S. Layer.	Anilin Layer.		S. Layer.	Anilin Layer.
100	4	75	130	15	58
110	6	70	135	17.5	47
120	10	64	138 (crit. temp.)	23	..

Distribution of Aniline between Water and Toluene and between Aqueous Salt Solutions and Toluene at 25°

(Riedel — Z. physik. Chem. 56, 243, '06.)

Note. — Mixtures of Aniline and Toluene were shaken with water or with aqueous salt solutions, and after separation of the two layers the Sp. Gr. of the A : T mixture (layer) was determined and also the amount of Aniline in each layer.

Solution Shaken with A : T Mixture.	Vol. per cent Aniline : Toluene in Mixtures Used.	Sp. Gr. of A : T Mixture after Separation.	Gms. $C_6H_5NH_2$ in 100 cc. of: A : T Layer.	Aq. Layer.
H_2O	50:50	0.9257	41.5	2.14
"	25:75	0.8928	20.7	1.5
"	12.5:87.5	0.8737	8.62	0.86
"	5.5:94.5	0.8661	3.87	0.45
"	2.5:97.5	0.8627	1.68	0.21
0.1N $\frac{K_2SO_4}{2}$	50:50	0.9297	44.0	2.09
"	25:75	0.8901	19.03	1.38
"	12.5:87.5	0.8739	8.77	0.81
"	5.5:94.5	0.8663	3.94	0.42
"	2.5:97.5	0.8629	1.81	0.21
0.1N KBO_2	50:50	0.9257	41.61	2.11
"	25:75	0.8870	17.08	1.34
"	12.5:87.5	0.8748	9.34	0.92
"	5.5:94.5	0.8661	3.85	0.44
"	2.5:97.5	0.8627	1.72	0.21
0.01094N $\frac{Ba(OH)_2}{2}$	50:50	0.9334	46.52	2.10
"	25:75	0.8929	20.78	1.46
"	12.5:87.5	0.8749	9.41	0.88
"	5.5:94.5	0.8663	3.96	0.43
"	2.5:97.5	0.8628	1.72	0.20
0.104N $\frac{Sr(OH)_2}{2}$	50:50	0.9333	46.45	2.13
"	25:75	0.8929	20.78	1.46
0.1044N $\frac{Sr(OH)_2}{2}$	12.5:87.5	0.8750	9.46	0.88
"	5.5:94.5	0.8662	3.96	0.43
0.1063N $\frac{Sr(OH)_2}{2}$	2.5:97.5	0.8628	1.75	0.20
0.04N $\frac{Ca(OH)_2}{2}$	50:50	0.9333	46.18	2.20
"	25:75	0.8925	20.59	1.51
"	12.5:87.5	0.8749	9.43	0.91
"	5.5:94.5	0.8662	3.89	0.44
"	2.5:97.5	0.8627	1.70	0.21

100 cc. aqueous solution contain 3.607 gms. Aniline at 25°.

Solubility of Aniline, Phenol Mixtures in Water.

(Schreinemaker — Z. physik. Chem. **29**, 584; **30**, 460, '99.)

t°.	Mixture used = 25.4 Mols. Aniline + 74.6 Mols. Phenol Gms. of Mixture per 100 Gms.		t°.	Mixture used = 50 Mols. Aniline + 50 Mols. Phenol Gms. of Mixture per 100 Gms.	
	Aq. Layer.	A. + P. Layer.		Aq. Layer.	A. + P. Layer.
40	5.0	86.0	40	4.0	91.5
60	5.5	82.0	80	5.5	85.5
80	8.0	77.0	100	8.0	82.0
100	12.5	67.0	120	13.5	73.5
110	19.0	56.5	130	19.0	66.0
104 (crit. temp.)	33	...	135	23.5	58.0
			140 (crit. temp.)	35	...

Determinations in above table by "Synthetic Method," see Note, p. 9. Schreinemaker gives results for several other mixtures of Aniline and Phenol which yield curves entirely similar to those for the two mixtures here shown.

Nitr**ANILINES** $C_6H_4NH_2NO_2$. *o*, *m*, and *p*.

Solubility in Water.

(Carnelly and Thomson — J. Chem. Soc. **53**, 768, '88; Vaubel — J. pr. Chem. [2] **52**, 73, '95; above 20°, Löwenherz — Z. physik. Chem. **25**, 407, '98.)

t°.	Grams Nitraniline per Liter of Solution.		
	Ortho Nitraniline.	Meta Nitraniline.	Para Nitraniline.
20	...	1.14–1.67	0.77–0.80
24.2	1.25 (25°)	1.205	...
27.3	...	1.422	...

Solubility of Ortho and of Meta Nitraniline in Hydrochloric Acid.

(Lowenherz.)

Ortho Nitraniline at 25°.

G. Mols. per Liter.		Grams per Liter.	
HCl	$C_6H_5NH_2.NO_2(o)$	HCl	$C_6H_5NH_2.NO_2(o)$
0.0	0.0091	0.0	1.25
0.63	0.0143	22.97	1.97
0.95	0.0174	34.63	2.40
1.26	0.0215	45.94	2.97

Meta Nitraniline.

	G. Mols. per Liter.		Grams per Liter.	
	HCl	$C_6H_5NH_2.NO_2(m)$	HCl	$C_6H_5NH_2.NO_2(m)$
(25°)	0.0	0.0091	0.0	1.20
(26.5°)	0.0125	0.0183	0.46	2.53
(23.3°)	0.0247	0.0274	0.90	3.85

Solubility of Meta and of Para Nitraniline in Organic Solvents at 20°.

(Carnelly and Thomson.)

Solvent.	Gms. per Liter. Meta.	Para.	Solvent.	Gms. per Liter. Meta.	Para.
Methyl Alcohol	110.6	95.9	Benzene	24.5	19.8
Ethyl Alcohol	70.5	58.4	Toluene	17.1	13.1
Propyl Alcohol	56.5	43.5	Cumene	11.5	9.0
Iso Butyl Alcohol	26.4	19.1	Chloroform	30.1	23.1
Iso Amyl Alcohol	85.1	62.9	Carbon Tetra Chloride	2.1	1.7
Ethyl Ether	78.9	61.0	Carbon Bisulphide	3.3	2.6

ANISIC ACID (p-Methoxybenzoic acid) $CH_3O.C_6H_4.COOH$. See also p. 61.

100 cc. sat. aq. solution contain 0.2263 gm. Anisic acid at 25°.

(Paul — Z. physik. Chem. **14**, 111, '94.)

ANTHRACENE $C_{14}H_{10}$.

Solubility in Liquid Sulphur Dioxide in the Critical Region.

(Centnerswer and Teletow — Z. Electrochem. 9, 799, '03.)

Weighed amounts of anthracene and liquid SO_2 were placed in glass tubes which were then sealed, rotated at a gradually increasing temperature and the point at which the solid disappeared, observed.

t°.	Gms. $C_{14}H_{10}$ per 100 g. Solution.	t°.	Gms. $C_{14}H_{10}$ per 100 g. Solution.	t°.	Gms. $C_{14}H_{10}$ per 100 g. Solution.
40.1	2.11	65.0	4.0	98.0	9.36
45.8	2.48	78.2	5.66	99.1	9.95
47.9	2.65	88.0	7.14	106.5	12.78

Solubility of Anthracene in Absolute Ethyl and Methyl Alcohols.

(v. Becchi; at 19.5°, de Bruyn — Z. physik. Chem. 10, 784, '92.)

	Grams $C_{14}H_{10}$ per 100 Grams Alcohol at;		
	16°.	19.5°.	b. pt.
In Ethyl Alcohol	0.076	1.90	0.83
In Methyl Alcohol	...	1.80	...

Solubility of Anthracene in Benzene.

(Findlay — J. Chem. Soc. 81, 1221, '02.)

t°.	Gms. $C_{14}H_{10}$ per 100 Gms. C_6H_6.	Mols. $C_{14}H_{10}$ per 100 Mols. C_6H_6.	t°.	Gms. $C_{14}H_{10}$ per 100 Gms. C_6H_6.	Mols. $C_{14}H_{10}$ per 100 Mols. C_6H_6.
5	0.979	0.429	38.4	2.773	1.213
10	1.118	0.491	40.0	2.987	1.312
15	1.296	0.567	44.6	3.368	1.473
20	1.532	0.673	50	3.928	1.727
25	1.830	0.803	60	4.941	2.164
26.5	1.951	0.856	70	6.041	2.649
30	2.175	0.954	80	7.175	3.143

100 parts of toluene dissolve 0.92 parts anthracene at 16.5° and 12.94 parts at 100° (v. Becchi).

Solubility of Anthracene in Alcoholic Picric Acid Solutions at 25°.

(Behrend — Z. physik. Chem. 15, 187, '94.)

Grams per 100 Grams Solution.		Solid Phase.	Grams per 100 Gms. Solution.		Solid Phase.
Picric Acid.	Anthracene.		Picric Acid.	Anthracene.	
0	0.176	Anthracene	3.999	0.202	Anthracene Picrate
1.017	0.190	"	5.087	0.180	"
2.071	0.206	"	5.843	0.162	"
2.673	0.215	"	6.727	0.151	"
3.233	0.228	"	7.511	0.149	Anthracene Picrate + Picric Acid
3.469	0.236	Anthracene and Anthracene Picrate	7.452	0	Picric Acid

ANTHRAQUINONE $(C_6H_4)_2(CO)_2$.

Solubility in Liquid Sulphur Dioxide in the Critical Region.

(Centnerswer and Teletow — Z. Electrochem. 9, 799, '08.) (See Anthracene, page 39).

t°.	Gms. $C_{14}H_8O_2$ per 100 g. Solution.	t°.	Gms. $C_{14}H_8O_2$ per 100 g. Solution.	t°.	Gms. $C_{14}H_8O_2$ per 100 g. Solution.
39.6	0.64	92.1	2.81	118.5	5.60
51.5	0.88	101.4	3.67	141.6	7.53
67.9	1.73	106.3	4.23	160.0	9.60
82.4	2.24	108.7	4.40	179.0	12.70
				183.7	18.30

100 parts of absolute ethyl alcohol dissolve 0.05 part anthroquinone at 18° and 2.249 parts at b. pt. (v. Becchi).

Solubility of Anthraquinone in Ether.

(Smits — Z. Electrochem. 9, 663, '03.)

Weighed amounts of ether and anthraquinone were placed in glass tubes which were then sealed. The temperature noted at which the anthraquinone disappeared and also at which the liquid phase disappeared (critical temp.). The two curves cross at 195° and again at 241°. Between these two temperatures the critical curve lies below the solubility curve, hence for this range of temperature no solubility curve is shown. The following figures were read from the curves, and are therefore only approximately correct.

t°.	Gms. $C_{14}H_8O_2$ per 100 g. Solution.	t°.	Gms. $C_{14}H_8O_2$ per 100 g. Solution.	t°.	Gms. $C_{14}H_8O_2$ per 100 g. Solution.
130	3	241	30	260	80
150	4	245	40	270	90
170	4.5	247	50	275	100
195	5.0	250	60		

100 parts of toluene dissolve 0.19 part anthraquinone at 15° and 5.56 parts at 100° (v. Becchi).

ANTIMONY TRICHLORIDE $SbCl_3$.

Solubility in Water. Solid Phase $SbCl_3$.

(Meerburg — Z. anorg. Chem. 33, 299, 1903.)

t°.	Mols. $SbCl_3$ per 100 Mols. H_2O.	Gms. $SbCl_3$ per 100 g. H_2O.	t°.	Mols. $SbCl_3$ per 100 Mols. H_2O.	Gms. $SbCl_3$ per 100 g. H_2O.
0	47.9	601.6	35	91.6	1152.0
15	64.9	815.8	40	108.8	1368.0
20	72.4	910.1	50	152.5	1917.0
20	74.1	931.5	60	360.4	4531.0
25	78.6	988.1	72	∞	∞
30	84.9	1068.0			

SOLUBILITY OF ANTIMONY TRICHLORIDE IN AQUEOUS HYDROCHLORIC ACID. SOLID PHASE $SbCl_3$. TEMP. 20°.

(Meerburg.)

Mols. per 100 Mols. H_2O.		Gms. per 100 g. H_2O.		Mols. per 100 Mols. H_2O.		Gms. per 100 g. H_2O.	
HCl.	$SbCl_3$.	HCl.	$SbCl_3$.	HCl.	$SbCl_3$.	HCl.	$SbCl_3$.
0	72.4	0.0	910.1	9.1	68.9	18.41	866.4
2.4	71.2	4.86	895.4	11.7	68.1	23.68	856.3
6.1	69.9	12.34	879.0	28.7	62.8	58.08	789.8
8.3	68.2	16.80	857.6				

100 grams absolute acetone dissolve 537.6 grams $SbCl_3$ at 18°.

(Naumann — Ber. 37, 4332, '04.)

ANTIMONY TRI IODIDE SbI_3.

SOLUBILITY IN METHYLENE IODIDE AT 12°.

(Retgers — Z. anorg. Ch. 3, 344, '93.)

100 parts CH_2I_2 dissolve 11.3 parts SbI_3. Sp. Gr. of solution = 3.453.

ANTIMONY POTASSIUM TARTRATE $K(SbO)C_4H_4O_6.\frac{1}{2}H_2O$.

100 grams glycerine dissolve 5.5 grams of the tartrate at 15.5°.

ARGON, A.

SOLUBILITY IN WATER.

(Estreicher — Z. physik. Chem. 31, 184, '99.)

t°.	Cor. Bar. Pressure.	Vol. H_2O.	Vol. Absorbed Argon.	Absorption Coefficients.* a.	Absorption Coefficients.* l.	Solubility. q.
0	...	...	...	...	0.0578	0.0102
1	764.9	77.40	4.34	0.0561	0.0561	0.0099
5	765.0	77.39	3.92	0.0507	0.0508	0.0090
10	765.3	77.41	3.49	0.0450	0.0453	0.0079
15	762.4	77.46	3.13	0.0404	0.0410	0.0072
20	757.6	77.53	2.86	0.0369	0.0379	0.0066
25	766.7	77.62	2.64	0.0339	0.0347	0.0060
30	760.6	77.73	2.43	0.0312	0.0326	0.0056
35	757.1	77.86	2.24	0.0288	0.0305	0.0052
40	758.3	77.99	2.07	0.0265	0.0286	0.0048
45	756.4	78.15	1.92	0.0246	0.0273	0.0045
50	747.6	78.31	1.73	0.0221	0.0257	0.0041

a = under barometric pressure minus tension of H_2O vapor.
l = under 760 mm. pressure.
q = grams argon per 100 g. H_2O when total pressure is equal to 760 mm.

* See Acetylene, page 8.

ARSENIC PENTOXIDE As_2O_5.

100 parts H_2O dissolve 244.8 parts As_2O_4 = 302.3 parts H_3AsO_4 at 12.5°. Sp. Gr. of solution = 2.18 at 15°.

(Vogel.)

ARSENIC IODIDE AsI_3.

SOLUBILITY IN METHYLENE IODIDE AT 12°.

(Retgers — Z. anorg. Chem. 3, 344, 1893.)

100 grams CH_2I_2 dissolve 17.4 gms. AsI_3. Sp. Gr. of solution = 3.449.

ARSENIC TRIOXIDE As_2O_3.

SOLUBILITY OF THE:

Crystallized Modification.

In Water.

t°.	Gms. As_2O_3 per 100 cc. Sat. Solution.
2	1.201
15	1.657
25	2.038
39.8	2.930
b. pt.	6.+

(Bruner and St. Tolloczko — Z. anorg. Chem. 37, 456, '03; Chodounsky — Listy. Chem. 13, 114, '88.)

Amorphous Modification.

In Water.

t°.	Gms. As_2O_3 per 100 cc. H_2O.
ord. temp.	3.7
b. pt.	11.86

In Alcohol, Ether and CS_2.

	G. As_2O_3 per 100 g. Solvent.
Alcohol	0.446
Ether	0.454
CS_2	0.001

(Winkler — J. pr. Chem. [2] 31, 347, '85.)

ASPARAGINE $C_4H_8N_2O_3.H_2O$.

SOLUBILITY β-l-ASPARAGINE $C_4H_8N_2O_3.H_2O$ AND OF β-l-ASPARAGINIC ACID $C_4H_7NO_4$ IN WATER.

Determined by "Synthetic Method," see Note, page 9.

(Bresler — Z. physik. Chem. 47, 613, '04.)

β-l-Asparagine.				β-l-Asparaginic Acid.			
t°.	Gms. $C_4H_8N_2O_3.H_2O$ per 100 g. H_2O.	t°.	Gms. $C_4H_8N_2O_3.H_2O$ per 100 g. H_2O.	t°.	Gms. $C_4H_7NO_4$ per 100 g. H_2O.	t°.	Gms. $C_4H_7NO_4$ per 100 g. H_2O.
0.7	0.9546	55.5	10.650	0.2	0.2674	51.0	1.2746
7.9	1.4260	71.7	19.838	9.5	0.4042	63.5	1.8147
17.5	2.1400	87.0	36.564	16.4	0.5176	70.0	2.3500
28.0	3.1710	98.0	52.475	31.5	0.7514	80.5	3.2106
41.4	5.6500			40.0	0.9258	97.4	5.3746

ATROPINE $C_{17}H_{23}NO_3$.

SOLUBILITY OF ATROPINE $C_{17}H_{23}NO_3$ AND OF ATROPINE SULPHATE $(C_{17}H_{23}NO_3)_2.SO_2(OH)_2$ IN WATER AND OTHER SOLVENTS.

(U. S. P.; Müller — Apoth.-Ztg. 18, 244, '03.)

Solvent.	t°.	Grams Atropine per 100 Grams. Solution.	Solvent. (U. S. P.)	Grams Atropine Sulphate per 100 Grams Solvent. (U. S. P.)
Water	25	1.782 (20°)	0.222	263.1
Water	80	...	1.15	454.5
Alcohol	25	...	68.44	27.0
Alcohol	60	...	111.11	52.6
Ether	25	2.21 (20°)	6.02	0.047
Chloroform	25	68.03 (20°)	64.10	0.161
Benzene	20	3.99	...	...
Carbon Tetrachloride	20	0.661	1.136* (17°)	...
Ethyl Acetate	20	3.88	...	...
Petroleum Ether	20	0.83	...	...
Glycerine	15	...	3.0	33.0

* Schnidelmeiser — Chem. Ztg. 25, 129, '01.

AZELAIC ACID $C_7H_{14}(COOH)_2$.

SOLUBILITY IN WATER.

(Lamouroux — Compt. rend. 128, 998, '99.)

t° =	0	15	20	35	50	65
Gms. $C_7H_{14}(COOH)_2$ per 100 cc. solution =	0.10	0.15	0.24	0.45	0.82	2.20

AZOPHENETOL (*p*) $C_6H_5N_2.C_6H_4.OC_2H_5$.

SOLUBILITY IN 100 PER CENT ACETIC ACID.

(Dreyer and Rotarski — Chem. Centr. 76, II, 1016, '05.)

t° =	89.2	91	93	95.6	97.2	99.6
Mols. per liter.	0.153	0.176	0.185	0.209	0.232	0.252

A knick at 94.7° corresponds to the transition temperature of the α modification into the β modification.

BARIUM ACETATE $Ba(CH_3COO)_2$.

SOLUBILITY IN WATER.

(Walker and Fyffe — J. Ch. Soc. 83, 179, '03; Krasnicki — Monatsh. Chem. 8, 597, '87.)

t°.	Gms. $Ba(CH_3COO)_2$ per 100 Gms. Water.	Gms. $Ba(CH_3COO)_2$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $Ba(CH_3COO)_2$ per 100 Gms. Water.	Gms. $Ba(CH_3COO)_2$ per 100 Gms. Solution.	Solid Phase.
0.3	58.8	37.0	$Ba(C_2H_3O_2)_2.3H_2O$	40.5	79.0	44.1	$Ba(C_2H_3O_2)_2$
7.9	61.6	38.1	"	41.5	78.7	44.0	"
17.5	69.2	40.9	"	44.5	77.9	43.8	"
21.6	72.8	42.1	"	51.8	76.5	43.4	"
24.1	78.1	43.9	"	63.0	74.6	42.7	"
26.2	76.4	43.3	$Ba(C_2H_3O_2)_2.H_2O$	73.0	73.5	42.4	"
30.6	75.1	42.9	"	84.0	74.0	42.5	"
35.0	75.8	43.1	"	99.2	74.8	42.8	"
39.6	77.9	43.8	"				

Transition temperatures 24.7° and 41°.

BARIUM ARSENATE $Ba_3(AsO_4)_2$.

100 gms. H_2O dissolve 0.055 gm. $Ba_3(AsO_4)_2$; 100 gms. 5% NH_4Cl dissolve 0.195 gm., and 100 gms. 10% NH_4OH dissolve 0.003 gm. $Ba_3(AsO_4)_2$

(Field — J. Ch. Soc. 11 6, 1859.)

BARIUM BROMATE $Ba(BrO_3)_2.H_2O$.

SOLUBILITY IN WATER.

(Trantz and Anschütz — Z. physik. Chem. 56, 238, '06; Rammelsberg — Pogg. Ann. 52, 81, '41.)

t°.	Gms. $Ba(BrO_3)_2$ per 100 Gms. Solution.	t°.	Gms. $Ba(BrO_3)_2$ per 100 Gms. Solution.	t°.	Gms. $Ba(BrO_3)_2$ per 100 Gms. Solution.
− 0.034	0.28	30	0.95	70	2.922
0	0.286	40	1.31	80	3.521
+10	0.439	50	1.72	90	4.26
20	0.652	60	2.271	98.7	5.256
25	0.788			99.65	5.39

BARIUM BROMIDE $BaBr_2.2H_2O$.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 99, 47, '56; Etard — Ann. chim. phys. [7] 2, 540, '94.)

t°.	Gms. $BaBr_2$ per 100 Grams. Water. (Kremers.)	Solution. (Kremers.)	Solution. (Etard.)	t°.	Gms. $BaBr_2$ per 100 Grams. Water. (Kremers.)	Solution. (Kremers.)	Solution. (Etard.)
−20	...	...	45.6	40	114	53.2	51.5
0	98	49.5	47.5	50	118	54.1	52.5
10	101	50.2	48.5	60	123	55.1	53.5
20	104	51.0	49.5	70	128	56.1	54.5
25	106	51.4	50.0	80	135	57.4	55.5
30	109	52.1	50.6	100	149	60.0	57.8
				140	...	...	59.4

Sp. Gr. of saturated solution at 19.5° = 1.710.

The results of Kremers and Etard are both given, since it is uncertain which is the more correct.

SOLUBILITY OF MIXTURES OF BARIUM BROMIDE AND BARIUM IODIDE IN WATER AT DIFFERENT TEMPERATURES.

(Etard.)

t°.	Grams per 100 Gms. Solution. $BaBr_2$.	BaI_2.	t°.	Grams per 100 Gms. Solution. $BaBr_2$.	BaI_2.
−16	4.8	58.4	170	11.0	67.4
+60	5.5	66.0	210	14.9	67.7
135	9.2	67.2	Both salts present in solid phase.		

SOLUBILITY OF BARIUM BROMIDE IN METHYL AND ETHYL ALCOHOLS.

(de Bruyn — Z. physik. Chem. 10, 783, '92; Richards — Z. anorg. Chem. 3, 455, '93; Rohland — *Ibid.* 15 412, '97.)

t°.	Parts $BaBr_2$ per 100 parts Aq. C_2H_5OH of: 100%.	97%.	87%.	Parts $BaBr_2.2H_2O$ per 100 parts of Aq. CH_3OH of: 100%.	93.5%.	50%.
15.0	..	0.48 ($BaBr_2.2H_2O$)	..	45.9	27.3	4.0
22.5	3	...	6	56.1	...	...

BARIUM BUTYRATE $Ba(C_4H_7O_2)_2.2H_2O$.

SOLUBILITY IN WATER.

(Deszathy — Monatsh. Chem. 14, 249, '93.)

t°.	Gms. $Ba(C_4H_7O_2)_2$ per 100 Gms. Water.	Solution.	t°.	Gms. $Ba(C_4H_7O_2)_2$ per 100 Gms. Water.	Solution.
0	37.42	27.24	50	36.44	26.77
10	36.65	26.82	60	37.68	27.36
20	36.12	26.55	70	39.58	28.36
30	35.85	26.38	80	42.13	29.64
40	35.82	26.37			

BARIUM CAPROATE AND BARIUM ISO CAPROATE.

Solubility in Water.

(Kulisch — Monatsh. Chem. 14, 567, '93.) (König — Monatsh. Chem. 15, 23, '94.)

	Barium Caproate (Methyl 3 Pentan.) $Ba(CH_3.CH_2CH(CH_3)CH_2COO)_2$.			Barium Iso Caproate (Methyl 2 Pentan.) $Ba(CH_3CH(CH_3)CH_2.CH_2COO)_2$.		
t°.	Gms. $Ba(C_6H_{11}O_2)_2$ per 100 Gms. Water.	Gms. $Ba(C_6H_{11}O_2)_2$ per 100 Gms. Solution.	Solid Phase.	Gms. $Ba(C_6H_{11}O_2)_2$ per 100 Gms. Water.	Gms. $Ba(C_6H_{11}O_2)_2$ per 100 Gms. Solution.	Solid Phase.
0	11.71	10.49	$Ba(C_6H_{11}O_2)_2.3\frac{1}{2}H_2O$	14.34	12.54	$Ba(C_6H_{11}O_2)_2.4H_2O$
10	8.38	7.73	"	13.33	11.77	"
20	6.89	6.45	"	12.67	11.26	"
30	5.87	5.55	"	12.37	11.01	"
40	5.79	5.47	"	12.42	11.05	"
50	6.63	6.21	"	12.83	11.38	"
60	8.39	7.74	"	13.63	11.99	"
70	11.09	9.98	"	14.68	12.80	"
80	14.71	12.82	"	16.24	13.97	"
90	19.28	16.16	"	17.95	15.23	"

BARIUM CARBONATE $BaCO_3$.

Solubility in Water.

(Holleman, Kohlrausch and Rose — Z. physik. Chem. 12, 129, 241, '93.)

Electrolytic conductivity method used.

1 liter H_2O dissolves 0.016 g. $BaCO_3$ at 8.8°, 0.022 g. at 18°, and 0.024 g. at 24.2°.

Solubility of Barium Carbonate in Water containing CO_2.

The average of several determinations at about 10°, by Bineau, Lassaigne, Foucroy and Bergmann is 1.10 gms. $BaCO_3$ per liter water. Wagner (Z. anal. Ch. 6, 167, '67) gives 7.25 gms. $BaCO_3$ per liter of water saturated with CO_2 at 4–6 atmospheres pressure.

BARIUM CHLORATE $Ba(ClO_3)_2H_2O$.

Solubility in Water.

(Trantz and Anschütz — Z. physik. Chem 56, 238, '06; Kremers — Pogg. Ann. 99, 43, '56; Tilden and Shenstone — Trans. Roy. Soc. 34, '84.)

t°.	Gms. $Ba(ClO_3)_2$ per 100 Gms. Solution.	t°.	Gms. $Ba(ClO_3)_2$ per 100 Gms. Solution	t°.	Gms. $Ba(ClO_3)_2$ per 100 Gms. Solution.
−2.75	15.28	30	29 43	90	48.70
0	16.90	40	33.16	99.1	51.17
+10	21.23	50	36.69	105	52.62
20	25.26	60	40.05	116	66.0
25	27.53	70	43.04	146	78.0
		80	45.90		

BARIUM CHLORIDE $BaCl_2.2H_2O$.

Solubility in Water.

(Mulder; Engel — Ann. chim. phys. [6] 13, 372, '88; Etard — *Ibid.* [7] 2, 535, '94.)

t°.	Gms. $BaCl_2$ per 100 Gms. Water.	Gms. $BaCl_2$ per 100 Gms. Solution.	t°.	Gms. $BaCl_2$ per 100 Gms. Water.	Gms. $BaCl_2$ per 100 Gms. Solution.
0	31.6	24.0	60	46.4	31.3
10	33.3	25.0	70	49.4	33.1
20	35.7	26.3	80	52.4	34.4
25	37.0	27.0	100	58.8	37.0
30	38.2	27.7	130	59.5	37.3
40	40.7	28.9	160	63.6	38.9
50	43.6	30.4	215	75.9	43.1

Sp. Gr. of solution saturated at 0° = 1.25; at 20° = 1.27.

Solubility of Mixtures of Barium Chloride and Barium Nitrate in Water.

Both salts present in solid phase.

(Etard.)

t°.	Grams per 100 Gms. Solution. $BaCl_2$.	Grams per 100 Gms. Solution. $Ba(NO_3)_2$.	t°.	Grams per 100 Gms. Solution. $BaCl_2$.	Grams per 100 Gms. Solution. $Ba(NO_3)_2$.
0	22.5	4.3	100	31	14
20	24.5	6.0	140	32	20
40	26.5	7.5	180	33	26
60	28.5	9.5	210	32	32

Solubility of Mixtures of Barium Chloride and Mercuric Chloride in Water.

(Foote and Bristol — Am. Ch. J. 32, 248, '04.)

t°.	Gms. per 100 Gms. Solution. $BaCl_2$.	Gms. per 100 Gms. Solution. $HgCl_2$.	Solid Phase.
10.4	23.58	50.54	$BaCl_2 2H_2O + HgCl_2$.
10.4	23.44	50.74	Double Salt $BaCl_2.3HgCl_2.6H_2O$.
10.4	22.58	51.23	"
10.4	22.48	51.41	"
10.4	22.10	51.66	Double Salt $BaCl_2.3HgCl_2.6H_2O$.
10.4	21.64	51.74	$BaCl_2.2H_2O + HgCl_2$.
25	23.02	54.83	"

Solubility of Mixtures of Barium Chloride and Potassium Chloride in Water.

(Foote — Am. Ch. J. 32, 253, '04.)

100 grams saturated solution contain 13.83 grams $BaCl_2$ + 18.97 grams KCl at 25°.

Solubility of Mixtures of Barium Chloride and Sodium Chloride in Water.

(Precht and Wittgen — Ber. 14, 1667, '81; Rüdorff — Ber. 18, 1161, '85.)

t°.	Gms. per 100 Gms. H_2O. $BaCl_2$.	Gms. per 100 Gms. H_2O. NaCl.	Gms. per 100 Gms. Solution. $BaCl_2$.	Gms. per 100 Gms. Solution. NaCl.
20	4.1	33.8	2.9	25.0
40	6.3	33.6	4.5	23.0
60	9.7	33.5	6.8	23.4
80	13.9	33.6	9.4	22.8
100	17.9	33.6	11.8	22.2

Solubility of Barium Chloride in Aqueous Solutions of Hydrochloric Acid at 0°.

(Engel — Ann. chim. phys. [6] 13, 371, '88.)

Sp. Gr. of Solutions.	Milligram Mols. per 10 cc. Sol.		Gms. per 100 cc. Sol.		Gms. per 100 g. Sol.	
	HCl.	$\frac{1}{2}BaCl_2$.	HCl.	$BaCl_2$.	HCl.	$BaCl_2$.
1.250	0	28.90	0	30.10	0	24.07
1.242	1.1	27.80	0.40	28.95	0.32	23.31
1.228	2.8	26.07	1.02	27.15	0.83	22.11
1.210	5.0	23.40	1.82	24.36	1.51	20.14
1.143	14.4	14.00	5.24	14.57	4.58	12.76
1.118	18.8	10.20	6.84	10.47	6.13	9.37
1.099	22.7	6.67	8.99	6.95	7.55	6.33
1.079	32.0	2.74	11.66	2.85	10.81	2.64
1.088	50.5	0.29	18.41	0.30	16.92	0.28

Less than 1 part of $BaCl_2$ is soluble in 20,000 parts of concentrated HCl and in 120,000 parts of conc. HCl containing $\frac{1}{6}$ volume of ether.

(Mar — Am. J. Sci. [3] 43, 521, '92.)

Solubility of Barium Chloride in Absolute Methyl Alcohol and in Glycerine.

(In Alcohol, de Bruyn — Z. physik. Chem. 10, 783, '92.)

100 parts of CH_3OH dissolve 2.18 parts $BaCl_2$ at 15.5°, and 7.3 parts $BaCl_2.2H_2O$ at 6°.

100 parts by weight of glycerine dissolve 10 parts of $BaCl_2$ at 15.5°.

Solubility of Barium Chloride in Aqueous Ethyl Alcohol at 15°.

(Schiff — Liebig's Ann. 118, 365, '61; Rohland — Z. anorg. Ch. 15, 412, '97.)

Wt. per cent alcohol	10	20	30	40	60	80	97
Gms. $BaCl_2.2H_2O$ per 100 g. aq. alcohol	31.1	21.9	14.7	10.2	3.5	0.5	0.014

BARIUM CHROMATE $BaCrO_4$.

Solubility in Water and in Salt Solutions.

t°.	Solvent.	Gms. $BaCrO_4$ per Liter Solution.	Observer.
18	Water	0.0038	(Kohlrausch & Rose — Z. physic. Ch. 12, 241, '93.)
ord. temp.	"	0.0062 (ignited $BaCrO_4$)	(Schweitzer — Z. anal. Ch. 29, 414, '90.)
ord. temp.	"	0.0100 (not ignited)	
b. pt.	"	0.043	(Mescherzerski — Z. anal. Ch. 21, 399, '82.)
ord. temp.	1.5% Am. Acetate	0.020	(Fresenius — Z. anal. Ch. 29, 418, '90.)
ord. temp.	0.5% Am. Nitrate	0.022	

BARIUM CITRATE $Ba_3(C_6H_5O_7)_2.7H_2O$.

Solubility in Water and in Alcohol.

100 grams water dissolve 0.0406 gram $Ba_3(C_6H_5O_7)_2.7H_2O$ at 18°, and 0.0572 gm. at 25°.

100 grams 95% alcohol dissolve 0.0044 gram $Ba_3(C_6H_5O_7)_2.7H_2O$ at 18°, and 0.0058 gm. at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

BARIUM CYANIDE $Ba(CN)_2$.

SOLUBILITY IN WATER AND IN ALCOHOL AT 14°.
(Joannis — Ann. chim. phys. [5] 26, 489, '82.)

100 parts water dissolve 80 parts $Ba(CN)_2$.
100 parts 70% alcohol dissolve 18 parts $Ba(CN)_2$.

BARIUM FERROCYANIDE AND BARIUM POTASSIUM FERRO-CYANIDE.

(Wyrouboff — Ann. chim. phys. [4] 16, 292, '69.)

100 parts water dissolve 0.1 part $Ba_2Fe(CN)_6.6H_2O$ at 15°, and 1.0 part at 75°.

100 parts water dissolve 0.33 part $BaK_2Fe(CN)_6.5H_2O$ at ord. temp.

BARIUM FLUORIDE BaF_2.

(Kohlrausch — Z. physik. Chem. 50, 365, '04–'05.)

1 liter of water dissolves 1.63 gms. BaF_2 at 18°. Electrolytic conductivity method.

BARIUM FORMATE $Ba(HCOO)_2.2H_2O$.

SOLUBILITY IN WATER.
(Krasnicki — Monatsh. Chem. 8, 597, '87.)

t°.	Gms. $Ba(HCOO)_2$ per 100 Gms. Water.	Gms. $Ba(HCOO)_2$ per 100 Gms. Solution.	t°.	Gms. $Ba(HCOO)_2$ per 100 Gms. Water.	Gms. $Ba(HCOO)_2$ per 100 Gms. Solution.
0	27.76	21.72	40	34.81	25.82
10	28.46	21.15	50	37.14	27.10
20	30.11	23.15	60	38.97	28.03
25	31.20	23.80	70	39.95	28.54
30	32.34	24.45	80	39.71	28.42

BARIUM HYDROXIDE $Ba(OH)_2$.

SOLUBILITY IN WATER. SOLID PHASE $Ba(OH)_2.8H_2O$.
(Rosenthiel and Rühlmann — Jahresber. Chem. 314, '70.)

t°.	Gms. $Ba(OH)_2$ per 100 Gms. Water.	Gms. $Ba(OH)_2$ per 100 Gms. Solution.	t°.	Gms. $Ba(OH)_2$ per 100 Gms. Water.	Gms. $Ba(OH)_2$ per 100 Gms. Solution.
0	1.67	1.65	30	5.59	5.29
5	1.95	1.92	40	8.22	7.60
10	2.48	2.42	50	13.12	11.61
15	3.23	3.13	60	20.94	17.32
20	3.89	3.74	75	63.51	38.85
25	4.68	4.47	80	101.40	50.35

SOLUBILITY OF BARIUM HYDROXIDE IN AQUEOUS ACETONE AT 25°.
(Herz and Knoch — Z. anorg. Chem. 41, 321, '04.)

Sp. Gr. of Solutions.	Vol. % Acetone.	$Ba(OH)_2$ per 100 cc. Sat. Solution. Millimols.	$Ba(OH)_2$ per 100 cc. Sat. Solution. Grams.	Gms. $Ba(OH)_2$ per 100 Gms. Solution.
1.0479	0	55.08	4.722	4.506
1.0168	10	31.84	2.730	2.686
0.9927	20	17.79	1.525	1.536
0.9763	30	9.10	0.779	0.798
0.9561	40	4.75	0.407	0.426
0.9398	50	1.54	0.132	0.141
0.9179	60	0.48	0.041	0.045
0.8956	70	0.08	0.007	0.018

BARIUM IODATE $Ba(IO_3)_2.H_2O$.

SOLUBILITY IN WATER.

(Trantz and Anschütz — Z. physik. Chem. 56, 238, '06.)

t°.	Gms. $Ba(IO_3)_2$ per 100 Gms. Solution.	t°.	Gms. $Ba(IO_3)$ per 100 Gms. Solution.	t°.	Gms. $Ba(IO_3)_2$ per 100 Gms. Solution
− 0.046	0.008	30	0.031	70	0.093
+ 10	0.014	40	0.041	80	0.115
20	0.022	50	0.056	90	0.141
25	0.028	60	0.074	100	0.197

BARIUM IODIDE BaI_2.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 103, 66, 1858; Etard — Ann. chim. phys. [7] 2, 544, '94.)

t°	Gms. BaI_2 per 100 Gms. Water.	Gms. BaI_2 per 100 Gms. Solution.	Solid Phase.	t°.	Gms. BaI_2 per 100 Gms. Water.	Gms. BaI_2 per 100 Gms. Solution.	Solid Phase.
−20	143.9	59.0	$BaI_2.6H_2O$	40	231.9	69.8	$BaI_2.2H_2O$
0	170.2	63.0	"	60	247.3	71.2	"
+10	185.7	65.0	"	80	261.0	72.3	"
20	203.1	67.0	"	100	271.7	73.1	"
25	212.5	68.0	"	120	281.7	73.8	"
30	219.6	68.7	"	160	294.8	74.6	"

Sp. Gr. of saturated solution at 19°.5 = 2.24.

For method of interpolating above results, see Note, page 33.

100 grams 97% Ethyl Alcohol dissolve 1.07 g. $BaI_2.2H_2O$ at 15°.

(Rohland — Z. anorg. Chem. 15, 417, 1897.)

BARIUM MALATE $BaC_4H_4O_5$.

SOLUBILITY IN WATER.

(Cantoni and Basadonna — Bull. soc. chim. [3] 35, 731, '06.)

t°.	Gms. $BaC_4H_4O_5$ per 100 cc. Sol.	t°.	Gms. $BaC_4H_4O_5$ per 100 cc. Sol.	t°.	Gms. $BaC_4H_4O_5$ per 100 cc. Sol.
20	0.883	35	0.895	60	1.011
25	0.901	40	0.896	70	1.041
30	0.903	50	0.942	80	1.044

SOLUBILITY IN WATER AND IN ALCOHOL.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

100 grams water dissolve 1.24 gms. $BaC_4H_4O_5$ at 18°, and 1.3631 gms. at 25°.

100 grams 95% alcohol dissolve 0.0038 gms. $BaC_4H_4O_5$ at 18°, and 0.0039 gm. at 25°.

BARIUM MALONATE $BaC_3H_2O_4.N_2O$.

SOLUBILITY IN WATER.

(Miczynski — Monatsh. Chem. 7, 263, '86.)

t°.	Gms. $BaC_3H_2O_4$ per 100 Gms. Water.	Gms. $BaC_3H_2O_4$ per 100 Gms. Solution.	t°.	Gms. $BaC_3H_2O_4$ per 100 Gms. Water.	Gms. $BaC_3H_2O_4$ per 100 Gms. Solution.
0	0.143	0.143	50	0.287	0.285
10	0.179	0.179	60	0.304	0.303
20	0.212	0.211	70	0.317	0.316
30	0.241	0.240	80	0.326	0.325
40	0.266	0.265			

BARIUM MOLYBDATE $BaMoO_4$.

100 parts water dissolve 0.0058 part $BaMoO_4$ at 23°.

(Smith and Bradbury — Ber. 24, 2930, '91.)

BARIUM NITRATE $Ba(NO_3)_2$.

SOLUBILITY IN WATER.

(Mulder; Gay Lussac; Etard — Ann. chim. phys. [7] 2, 528, 94; Euler — Z. physik. Chem. 49, 315, '04.)

t°.	Gms. $Ba(NO_3)_2$ per 100 Gms. Water.	Gms. $Ba(NO_3)_2$ per 100 Gms. Solution.	t°.	Gms. $Ba(NO_3)_2$ per 100 Gms. Water.	Gms. $Ba(NO_3)_2$ per 100 Gms. Solution.
0	5.0	4.8	80	27.0	21.3
10	7.0	6.5	100	34.2	25.5
20	9.2	8.4	120	42.0	29.6
25	10.4	9.4	140	50.0	33.3
30	11.6	10.6	160	58.0	36.7
40	14.2	12.4	180	67.0	40.1
50	17.1	14.6	200	76.0	43.2
60	20.3	16.9	215	84.5	45.8

Sp. Gr. of saturated solution at 19.5° = 1.072.

SOLUBILITY OF MIXTURES OF BARIUM NITRATE AND LEAD NITRATE IN WATER AT 25°.

(Fock. — Z. Kryst. Min. 28, 365, '97; at 17°, Euler — Z. phyisk. Chem. 49, 315, '04.)

Sp. Gr. of Solution.	In Solution. Gms. per Liter. $Ba(NO_3)_2$.	Gms. per Liter. $Pb(NO_3)_2$.	Mg. Mols. per Liter. $Ba(NO_3)_2$.	Mg. Mols. per Liter. $Pb(NO_3)_2$	Mol. % $Ba(NO_3)_2$.	In Solid Phase Mol. % $Ba(NO_3)_2$
1.079	102.2	0	391.0	0	100	100
1.088	54.9	17.63	210.1	53.3	79.78	98.30
1.108	86.5	49.80	330.7	150.7	68.70	96.74
1.119	79.7	68.10	304.9	205.7	59.69	94.80
1.140	77.0	97.20	294.4	293.6	50.09	93.62
1.163	69.8	130.7	266.8	395.0	40.31	92.49
1.198	66.0	177.3	252.5	535.6	32.03	90.07
1.252	57.5	247.7	222.6	748.5	22.91	83.47
1.294	25.9	334.3	99.2	1010.3	8.11	75.44
1.376	28.8	429.7	110.3	1298.0	7.77	35.11
1.459	...	553.8	0.0	1673.0	0.0	0.0

Tables of results are also given for 15°, 30°, and 47°.

SOLUBILITY OF MIXTURES OF BARIUM NITRATE AND POTASSIUM NITRATE IN WATER AT 25°.

(Foote — Am. Ch. J. 32, 252, '04.)

Per 100 Grams Solution. Gms. KNO_3.	Grams $Ba(NO_3)_2$.	Solid Phase.
14.89	6.62	$Ba(NO_3)_2$ and $2\,KNO_3.Ba(NO_3)_2$
16.30	5.49	Double salt, $2\,KNO_3.Ba(NO_3)_2$
21.99	3.04	Double salt, $2\,KNO_3.Ba(NO_3)_2$
27.76	2.04	KNO_3 and $2\,KNO_3.Ba(NO_3)_2$

Solubility of Barium Nitrate in Aqueous Phenol Solutions at 25°.

(Rothmund and Wilsmore — Z. physik. Chem. 40, 620, '02.)

G. Mols. per Liter.		Gms. per Liter.		G. Mols. per Liter.		Gms. per Liter.	
C_6H_5OH	$Ba(NO_3)_2$.	C_6H_5OH.	$Ba(NO_3)_2$.	C_6H_5OH.	$Ba(NO_3)_2$.	C_6H_5OH.	$Ba(NO_3)_2$
0.000	0.3835	0.0	100.2	0.310	0.3492	29.12	91.31
0.045	0.3785	4.23	98.97	0.401	0.3400	37.73	88.90
0.082	0.3746	7.71	97.95	0.501	0.3299	47.11	86.26
0.146	0.3664	13.73	95.81	0.728 (sat.)	0.3098	68.45	81.00

BARIUM NITRITE $Ba(NO_2)_2.H_2O$.

Solubility in Water.

(Vogel — Z. anorg. Chem. 35, 389, '03.)

t°.	0°	20°	25°	30°	35°
Gms. $Ba(NO_2)_2$ per 100 gms. H_2O	58	63	71	82	97

BARIUM OXALATE BaC_2O_4.

Solubility of the Three Hydrates in Water.

(Groschuff — Ber. 34, 3318, '01.)

t°.	$BaC_2O_4 3\frac{1}{2}H_2O$.		$BaC_2O_4.2H_2O$.		$BaC_2O_4.\frac{1}{2}H_2O$.	
	Gms. BaC_2O_4 per 1000 g. Sol.	G. M. BaC_2O_4 per 100 Mol. H_2O.	Gms. BaC_2O_4 per 1000 g. Sol.	G. M. BaC_2O_4 per 100 G. M. H_2O.	Gms. BaC_2O_4 per 1000 g. Sol.	G. M. BaC_2O_4 per 100 Mol. H_2O.
0	0.058	0.00046	0.053	0.00042	0.089	0.00070
9.5	0.082	0.00066	...	...	...	...
18	0.112	0.00090	0.089	0.00071	0.124	0.00099
30	0.170	0.00136	0.121	0.00097	0.140	0.00112
40	...	...	0.152	0.00122	0.151	0.00121
45	...	...	0.169	0.00135	...	...
50	...	...	...	...	0.164	0.00131
55	...	...	0.212	0.00170	...	...
60	...	...	...	...	0.175	0.00140
65	...	...	0.250	0.00200	...	...
73	...	...	0.285	0.00228	...	...
75	...	...	...	...	0.188	0.00151
90	...	...	...	...	0.200	0.00160
100	...	...	...	...	0.211	0.00169

Solubility of Barium Oxalate ($BaC_2O_4.\frac{1}{2}H_2O$) in Aqueous Acetic Acid at 26°–27°.

(Herz and Muhs. — Ber. 36, 3715, '03.)

Normality of Acetic Acid.	G. Residue* per 50.05 cc. Sol.	Gms. per 100 cc. Solution.		Normality of Acetic Acid.	G. Residue* per 50 cc. Sol.	Gms. per 100 cc. Solution	
		CH_3COOH.	Ba Oxalate.			CH_3COOH.	Ba Oxalate
0	0.0077	0.00	0.0154	3.85	0.0564	23.12	0.1127
0.565	0.0423	3.39	0.0845	5.79	0.0511	34.76	0.1021
1.425	0.0520	8.55	0.1039	17.30	0.0048	103.90	0.0096
2.85	0.0556	17.11	0.1111	...	...	...	...

* Dried at 70°.

BARIUM ACID OXALATE $BaC_2O_4.H_2C_2O_4.2H_2O$.

SOLUBILITY IN WATER.

(Groschuff.)

t°.	Gms. per 100 Gms. Solution. $H_2C_2O_4$.	Gms. per 100 Gms. Solution. BaC_2O_4.	Mols. per 100 Mols. H_2O. $H_2C_2O_4$.	Mols. per 100 Mols. H_2O. BaC_2O_4.	Mols. $H_2C_2O_4$ per 1 Mol. BaC_2O_4.
0	0.27	0.030	0.054	0.0024	22
18	0.66	0.070	0.130	0.0056	24
20.5	0.76	0.076	0.15	0.0061	25
38	1.61	0.16	0.33	0.013	25
41	1.82	0.18	0.37	0.015	25
53	2.92	0.31	0.60	0.026	24
60	3.60	0.40	0.75	0.033	22.5
80	6.21	0.81	1.34	0.070	19
90	7.96	1.11	1.75	0.098	18
99	10.50	1.55	2.39	0.141	17

BARIUM PROPIONATE $Ba(C_3H_5O_2)_2.H_2O$. also $6H_2O$.

SOLUBILITY IN WATER.

(Krasnicki — Monatsh. Chem. 8, 597, '87.)

t°.	Gms. $Ba(C_3H_5O_2)_2$ per 100 Gms. Water.	Gms. $Ba(C_3H_5O_2)_2$ per 100 Gms. Solution.	t°.	Gms. $Ba(C_3H_5O_2)_2$ per 100 Gms. Water.	Gms. $Ba(C_3H_5O_2)_2$ per 100 Gms. Solution.
0	47.98	32.41	50	62.74	38.57
10	51.56	34.02	60	64.76	39.31
20	54.82	35.42	70	66.46	39.93
30	57.77	36.65	80	67.85	40.42
40	60.41	37.66	..	...	...

BARIUM SULPHATE $BaSO_4$.

SOLUBILITY IN WATER.

Electrolytic Conductivity Method.

(Holleman; Kohlrausch and Rose — Z. physik. Chem. 12, 131, 241, '93.)

t°	2°	10°	19°	26°	34°	37.7°
Gm. $BaSO_4$ per liter	0.0017	0.0020	0.0023	0.0026	0.0029	0.0031

SOLUBILITY OF BARIUM SULPHATE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC AND OF NITRIC ACIDS.

(Banthisch — J. pr. Chem. 29, 54, 1884.)

In Hydrochloric Acid.				In Nitric Acid.			
cc. containing 1 Mg. Equiv. of HCl.	Mgs. $BaSO_4$ per 1 Mg. Equiv. of HCl.	Gms. per 100 cc. Solution. HCl.	Gms. per 100 cc. Solution. $BaSO_4$.	cc. containing 1 Mg. Equiv. of HNO_3.	Mgs. $BaSO_4$ per 1 Mg. Equiv. of HNO_3.	Gms. per 100 cc. Solution. HNO_3.	Gms. per 100 cc. Solution. $BaSO_4$.
2.0	0.133	1.82	0.0067	2.0	0.140	3.15	0.0070
1.0	0.089	3.65	0.0089	1.0	0.107	6.31	0.0107
0.5	0.056	7.29	0.0101	0.5	0.085	12.61	0.0170
0.2	0.017	18.23	0.0086	0.2	0.048	31.52	0.0241

100 cc. HBr dissolve 0.04 gms. $BaSO_4$; 100 cc. HI dissolve 0.0016 gms. $BaSO_4$ at the boiling point.

(Haslam — Chem. News 53, 87, '86.)

SOLUBILITY OF BARIUM SULPHATE IN AQUEOUS SOLUTIONS OF IRON, ALUMINUM AND MAGNESIUM CHLORIDES AT 20° — 25°.

(Fraps. — Am. Ch. J. 27, 290, '01.)

Gms. Chloride per Liter.	Milligrams $BaSO_4$ per Liter in: Aq. $FeCl_3$.	Aq. $AlCl_3$.	Aq. $MgCl_2$.	Gms. Chloride per Liter.	Mgs. $BaSO_4$ per Liter in: Aq. $FeCl_3$.	Aq. $AlCl_3$.	Aq. $MgCl_2$.
1	58	33	30	25	150	116	50
2½	72	43	30	50	160	170	50
5	115	60	33	100	170	175	50
10	123	94	33	...	...	...	..

BARIUM PerSULPHATE $BaS_2O_8.4H_2O$.

100 parts water dissolve 39.1 parts BaS_2O_8 or 52.2 parts $BaS_2O_8.4H_2O$ at 0°.

(Marshall — J. Ch. Soc. 59, 771, '91.

BARIUM SULPHITE $BaSO_3$.

SOLUBILITY IN WATER AND IN AQUEOUS SUGAR SOLUTIONS.

(Rogowicz — Z. Ver Zuckerind. 938, 1905.)

Conc. of Sugar Sol.	Gm. $BaSO_4$ per 100 cc. Sol. at 20°.	at 80°.	Conc. of Sugar Sol.	Gm. $BaSO_4$ per 100 cc. Sol. at 20°.	at 80°.
0° Bx	0.0197	0.00177	40° Bx	0.0048	0.00158
10° "	0.0104	0.00335	50° "	0.0030	0.00149
20° "	0.0097	0.00289	60° " (sat.)	0.0022	0.00112
30° "	0.0078	0.00223	...	...	...

BARIUM SUCCINATE AND **BARIUM ISO SUCCINATE**

$Ba.CH_2CH_2(COO)_2$. $Ba.CH_3CH_2(COO)_2$.

SOLUBILITY OF EACH IN WATER.

(Miczynski — Monatsh. Chem. 7, 263, 1886.)

t°.	Gms. Ba. Succinate per 100 Gms. Water.	Solution.	Gms. Ba. Iso Succinate per 100 Gms. Water.	Solution.
0	0.421	0.420	1.884	1.849
10	0.432	0.430	2.852	2.774
20	0.418	0.417	3.618	3.493
30	0.393	0.392	4.181	4.014
40	0.366	0.365	4.542	4.346
50	0.337	0.336	4.700	4.594
60	0.306	0.305	4.656	4.450
70	0.273	0.272	4.410	4.224
80	0.237	0.237	3.962	3.810

100 gms. H_2O dissolve 0.396 gms. Ba Succinate at 18° and 0.410 gms. at 25°.

100 gms. 95% alcohol dissolve 0.0015 gms. Ba Succinate at 18° and 0.0016 gms. at 25°. (Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

BARIUM TARTRATE $Ba(C_2H_2O_3)_2$.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 751, '05; see also Partheil and Hübner.)

t°.	Gms. $Ba(C_2H_2O_3)_2$ per 100 cc. Solution.	t°.	Gms. $Ba(C_2H_2O_3)_2$ per 100 cc. Solution.	t°.	Gms. $Ba(C_2H_2O_3)_2$ per 100 cc. Solution.
0	0.0205	30	0.0315	70	0.0480
10	0.0242	40	0.0352	80	0.0527
20	0.0279	50	0.0389	90	0.0541
25	0.0297	60	0.0440	..	...

SOLUBILITY OF BARIUM TARTRATE IN AQUEOUS ACETIC ACID SOLUTIONS at 26°–27°.

(Herz and Muhs — Ber. 36, 3715, '03.)

Normality of Acetic Acid.	Gms. residue* per 50 cc. Sol.	Gms. per 100 cc. Solution.		Normality. of Acetic Acid.	Gms. residue* per 50 cc. Sol.	Gms. per 100 cc. Solution	
		CH_3COOH.	Ba tartrate.			CH_3COOH.	Ba tartrate
0	0.0328	0.0	0.0655	3.77	0.1866	22.62	0.3728
0.565	0.1151	3.39	0.2300	5.65	0.1865	33.90	0.3726
1.425	0.1559	8.55	0.3115	16.85	0.0218	101.10	0.0436
2.85	0.1739	17.11	0.3475	...	...	...	...

* Dried at 70°.

100 grams 95% alcohol dissolve 0.032 gm. Ba tartrate at 18° and 0.0356 gm. at 25°. (Partheil and Hübner.)

BENZALDEHYDE C_6H_5COH.

100 gms. H_2O dissolve 0.3 gm. benzaldehyde at room temperature.

(Fluckiger — Arch. Pharm. [3] 7, 103, '75.)

BENZAMIDE $C_6H_5CONH_2$.

SOLUBILITY IN ETHYL ALCOHOL.

(Speyers — Am. J. Sci. [4] 14, 295, '02.)

t°.	Sp. Gr. of Solutions.	G. M. $C_6H_5CONH_2$ per 100 G.M. C_2H_5OH.	Gms. $C_6H_5CONH_2$ per 100 Gms. C_2H_5OH.	t°.	Sp. Gr. of Solutions.	G. M. $C_6H_5CONH_2$ per 100 G.M. C_2H_5OH.	Gms. $C_6H_5CONH_2$ per 100 Gms. C_2H_5OH.
0	0.833	3.1	8.15	40	0.848	11.0	28.92
10	0.832	4.2	11.04	50	0.862	14.2	37.34
20	0.833	5.9	15.52	60	0.881	17.2	45.22
25	0.835	6.8	17.87	70	0.913	20.4	53.63
30	0.838	8.2	21.56	..	...	...	...

SOLUBILITY OF BENZAMIDE IN MIXTURES OF ALCOHOL AND WATER AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 294, '94.)

Vol. % Alcohol.	Gms. $C_6H_5CONH_2$ per 100 Gms. Solvent.	Sp. Gr. of Solutions.	Vol. % Alcohol.	Gms. $C_6H_5CONH_2$ per 100 Gms. Solvent.	Sp. Gr. of Solutions.
100	17.03	0.830	70	23.87	0.925
95	21.12	0.856	60	18.98	0.939
90	24.50	0.878	50	13.74	0.949
85	26.15	0.895	40	8.62	0.958
83	26.63	0.900	31	5.33	0.967
80	26.43	0.907	15	2.28	0.912
75	25.41	0.917	0	1.35	0.999

BENZENE C_6H_6.

SOLUBILITY IN WATER AT 22°.

(Herz — Ber. 31, 2671, '98.)

100 cc. water dissolve 0.082 cc. C_6H_6, Vol. of Sol. = 100.082, Sp. Gr. = 0.9979.

100 cc. C_6H_6 dissolve 0.211 cc. H_2O, Vol. of sol. = 100.135, Sp. Gr. = 0.8768.

Benzene, Acetic Acid, Water Mixtures.

(Lincoln — J. Physic. Chem. 8, 251, '04.)

Note. — To mixtures of known amounts of acetic acid and benzene, water was gradually added until clouding occurred. The same degree of clouding did not represent the end point in all cases, as was assumed by Waddel. (J. Physic. Chem. 4, 161, '00.)

At 25°.			At 35°.		
cc. CH_3COOH.	cc. C_6H_6.	cc. H_2O.	cc. CH_3COOH.	cc. C_6H_6.	cc. H_2O.
5	10.06	0.45	100	18.10	1.14
5	8.04	0.55	100	16.09	1.22
5	6.03	0.64	100	10.06	1.55
5	3.02	0.98	100	6.03	2.17
5	2.01	1.28	100	4.02	2.77
5	1.01	1.89	100	3.01	3.26
5	0.60	2.80	100	1.00	7.01
5	0.35	4.54	100	0.65	10.10
5	0.17	9.53	100	0.47	13.64

Benzene, Aq. Alcohol Mixtures; Benzene, Aq. Acetone Mixtures at 20°.

H_2O added to mixtures of known amounts of the other two and appearance of clouding noted.

(Bancroft — Phys. Rev. 3, 31, 1895-96.)

C_6H_6, C_2H_5OH and H_2O		C_6H_6, CH_3OH and H_2O		$C_6H_5, (CH_3)_2CO$ and H_2O	
Per 5 cc. C_2H_5OH.		Per 5 cc. CH_3OH.		Per 5 cc. $(CH_3)_2CO$.	
cc. H_2O.	cc. C_6H_6.	cc. H_2O.	cc. C_6H_6.	cc. H_2O.	cc. C_6H_6.
20	0.03	5.0	0.15	8.0	0.10
8	0.13	3.0	0.215	3.0	0.395
4	0.39	2.0	0.59	2.0	0.69
2	1.17	1.4	1.0	1.3	1.0
1.5	1.87	1.0	1.9	0.51	2.0
1.0	3.57	0.8	3.0	0.295	3.0
0.605	8.0	0.69	4.0	0.2	4.0
0.34	20.0	0.49	8.0	0.15	5.0

Mutual Solubility of Benzene and β Naphthalene Picrate $C_6H_2(NO_2)_3OH.C_{10}H_7OH$.

"Synthetic Method" used — see Note, p. 9.

(Kuriloff — Z. physik. Chem. 24, 442, '97.)

t°.	Gms. Picrate.	Gms. Benzene	a	t°.	Gms. Picrate.	Gms. Benzene.	a
157	100.0	...	100.0	111.6	1.173	1.037	19.2
148.4	2.128	0.115	79.3	102.0	1.087	1.780	11.2
137.4	1.274	0.170	61.1	29.5	0.390	8.430	0.95
134.2	1.384	0.297	49.3	4.6	1.329	21.80	0.48
126.8	1.019	0.343	38.3	5.02	...	100.0	...

a = Mols. β Naphthalene Picrate per 100 Mols. of β Napthalene Picrate plus Benzene.

Determinations for a large number of isothermes are also given.

Solubility of Benzene in Sulphur.

By "Synthetic Method," see Note, p. 9.

(Alexejew — Ann. Physik. Chem. 28, 305, '86.)

t°.	Gms. C_6H_6 per 100 Gms. S Layer.	C_6H_6 Layer.	t°.	Gms. C_6H_6 per 100 Gms. S Layer.	C_6H_6 Layer.
100	6	75	140	16	61
110	8	72.5	150	19	55
120	10	70	160	25	45
130	12	66	164 (crit. temp.)	35	

Di Brom **BENZENE** (*p*) $C_6H_4Br_2$.

Solubility in Ethyl, Propyl, Iso Butyl Alcohols, etc.

(Schröder — Z. physik. Chem. 11, 456, '93.)

Determinations by "Synthetic Method" see Note, p. 9.

t°.	Grams $C_6H_4Br_2$ (*p*) per 100 Grams Sat. Solution in: C_2H_5OH.	C_3H_7OH.	$(CH_3)CH.CH_2OH$.	$(C_2H_5)_2O$.	CS_2.	C_6H_6.	C_6H_5Br.
0	...	..	...	..	27	..	..
10	...	..	...	30	34	34	22
20	...	..	...	38	43	43	29
30	14	..	15	47	53	53	36
40	19	..	20	57	62	62	45
50	26	27	30	67	72	71	54
60	38	40	44	77	81	80	67
70	57.6	67	65	87	90	88	79
75	80.5	85	77	..	..	..	84
80	94.4	95	94.6	..	..	..	90

Chlor **BENZENE** C_6H_5Cl.

Solubility of Chlor Benzene in Sulphur.

"Synthetic Method," see page 9.

(Alexejew.)

t°.	Grams C_6H_5Cl per 100 Grams. Sulphur Layer.	Chlor Benzene Layer.
90	13	70
100	18.5	63
110	27	53
116 (crit. temp.)	38	

For the solubility of Mixtures of di Chlor Benzene and di Brom Benzene in aqueous Ethyl Alcohol solutions see Thiel.

(Z. physik. Chem. 43, 656, 1903.)

Di Nitro **BENZENE** (*m*) $C_6H_4(NO_2)_2$.

Solubility in Benzene, Brom Benzene and in Chloroform.

"Synthetic Method."

(Schröder.)

t°.	Gms. $C_6H_4(NO_2)_2$ per 100 Gms. Sol. in: C_6H_6.	C_6H_5Br.	$CHCl_3$.	t°.	Gms. $C_6H_4(NO_2)_2$ per 100 Gms. Sol. in: C_6H_6.	C_6H_5Br.	$CHCl_3$.
15	17.5	...	22.2	40	52.0	38.0	42.0
20	26.0	18.5	25.0	50	62.5	47.5	52.5
25	33.0	23.7	29.0	60	71.0	57.0	65.0
30	40.0	28.7	33.0	..	...	...	...

Solubilities of Di-Nitro **BENZENES** and of Tri-Nitro **BENZENES** in Several Solvents.

(de Bruyn — Rec. trav. chim. 13, 116, 150, '94.)

Solvent.	t°.	Grams per 100 Grams Solvent. $(o)C_6H_4.(NO_2)_2$.	$(m)C_6H_4.(NO_2)_2$.	$(p)C_6H_4.(NO_2)_2$.	$(s)C_6H_3.(NO_2)_3$.	$(as)C_6H_3(NO_2)_3$.
Methyl Alcohol	20.5	3.30	6.75	0.69	4.9 (16°)	16.2 (15.5°)
Ethyl Alcohol	20.5	1.9	3.5	0.4	1.9 (16°)	5.45 (15.5°)
Propyl Alcohol	20.5	1.09	2.4	0.298	...	...
Carbon Bi-Sulphide	17.6	0.236	1.35	0.148	0.25	...
Chloroform	17.6	27.1	32.4	1.82	6.1	...
Benzene	18.2	5.66	39.45	2.56	6.2 (16°)	...
Ether	17.5	...	...	...	1.5	...
Ethyl Acetate	18.2	12.96	36.27	3.56	...	...
Toluene	16.2	3.62	30.66	2.36	...	...
Carbon Tetra Chloride	16.2	0.143	1.18	0.12	...	...
Water	(ord.)	0.014	0.0525	0.008	...	...

Symmetrical Tri-Nitro **BENZENE.**

SOLUBILITY IN AQUEOUS ALCOHOL AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 296, '94.)

Vol. % Alcohol.	G. $C_6H_3(NO_3)_3(s)$ per 100 g. Solvent.	Sp. Gr. of Solutions.	Vol. % Alcohol.	G. $C_6H_3(NO_3)_3(s)$ per 100 g. Solvent.	Sp. Gr. of Solutions.
100	2.34	0.7957	80	0.57	0.8582
95	1.57	0.8131	75	0.47	0.8708
90	1.12	0.8288	70	0.37	0.8808
85	0.79	0.8436	60	0.23	0.9064

BENZOYL PHENYL HYDRAZINE $C_6H_5.NH.NH.C_7H_5O$.

SOLUBILITY IN AQUEOUS ALCOHOL.

(Holleman and Antusch — Rec. trav. chim. 13, 291, '94.)

Vol. % Alcohol.	Gms. Hydrazine per 100 g. Solvent.	Sp. Gr. Solutions.	Vol. % Alcohol.	Gms. Hydrazine per 100 g. Solvent.	Sp. Gr. Solutions.
100	2.39	0.793	80	1 59	0.859
95	2.43	0.814	70	1.08	0.884
93	3.00	0.822	55	0.51	0.917
90	2.26	0.831	40	0.16	0.946

BENZO SULPHONIC ACIDS.

SOLUBILITY IN WATER.

(Bahlman — Liebig's Ann. 186, 309, '77.)

Name of Acid.	Gms. Sulphonic Acid per 100 Gms. Solution at:	
o-Amido benzo sulphonic acid.	11° = 1.301	15° = 1.436
Amido brom benzo sulphonic acid.	8° = 0.737	16° = 1.131*
Mono brom amido benzo sulphonic acid.	12° = 0.431	15° = 0.463
Barium di-brom benzo sulphonic acid.	14° = 1.713	9° = 1.098
Barium nitro brom benzo sulphonic acid (hydrated).	16° = 0.527	30° = 0.914
Barium nitro brom benzo sulphonic acid (anhydrous).	8° = 0.156	

* At 18° = 1.201.

BENZINE (Petroleum) $C_5H_{12}C_6H_{14}$.

100 parts of alcohol dissolve about 16 parts benzine of 0.638 — 0.660 Sp. Gr., at 25°.

BENZOIC ACID C_6H_5COOH.

SOLUBILITY IN WATER.

(Bourgoin — Ann. chim. phys. [5] 15, 171, '78.)

t°.	Grams. C_6H_5COOH per 100 Gms. Water.	Grams. C_6H_5COOH per 100 Gms. Solution.	t°.	Grams. C_6H_5COOH per 100 Gms. Water.	Grams. C_6H_5COOH per 100 Gms. Solution.
0	0.170	0.170	40	0.555	0.551
10	0.210	0.209	50	0.775	0.768
20	0.290	0.289	60	1.155	1.142
25	0.345	0.343	80	2.715	2.643
30	0.410	0.408	100	5.875	5.549

100 grams saturated aqueous solution contains 0.340 gram C_6H_5COOH at 25°; 0.353 gram at 26.4°; 0.667 gram at 45°.

(Paul — Z. physik. Ch. 14, 111, '94; Noyes and Chapin — *Ibid.* 27, 443, '98; Hoffman and Langbeck — *Ibid.* 51, 393, '05; Philip — J. Ch. Soc. 87, 992, '05; see also Alexejew — Ann. Phys. Ch. 28, 305, '86; Ost — J. pr. Ch. [2] 17, 232, '78; Vaubel — *Ibid.* [2] 52, 73, '95.)

SOLUBILITY OF MIXTURES OF LIQUID BENZOIC ACID AND WATER.

(Alexejew.)

Determinations by "Synthetic Method," see Note, p. 9. Figures read from curve.

t°.	Gms. C_6H_5COOH per 100 Gms. Aq. Layer.	Gms. C_6H_5COOH per 100 Gms. Benzoic Ac. Layer.	t°.	Gms. C_6H_5COOH per 100 Gms. Aq. Layer.	Gms. C_6H_5COOH per 100 Gms. Benzoic Ac. Layer.
70	6	83	100	12.0	69.0
80	7.5	79.5	110	18.0	59.0
90	8.5	76	116 (crit. temp.)	35	

SOLUBILITY OF BENZOIC ACID IN AQUEOUS SOLUTIONS OF:

(Hoffman and Langbeck.)

Potassium Chloride at 25°.

Normality of Aq. KCl.	Gms. KCl. per Liter.	Dissolved C_6H_5COOH. Mol. Conc.	Dissolved C_6H_5COOH. Wt. per cent.
0.02	1.49	$5.0254-10^{-4}$	0.339
0.05	3.73	4.9801 "	0.333
0.20	14.92	4.7639 "	0.322
0.50	37.30	4.3632 "	0.295

Potassium Nitrate at 25°.

Normality of Aq. KNO_3	Gms. KNO_3 per Liter.	Dissolved C_6H_5COOH. Mol. Conc.	Dissolved C_6H_5COOH. Wt. per cent.
0.02	2.02	$5.0326-10^{-4}$	0.340
0.05	5.06	5.0421 "	0.341
0.20	20.24	5.0297 "	0.340
0.50	50.59	4.9400 "	0.334
1.00	101.19	4.7646 "	0.322

SOLUBILITY OF BENZOIC ACID IN AQUEOUS SOLUTIONS OF:

(Hoffmann and Langbeck.)

Sodium Chloride.

Normality of Aq. NaCl.	Gms. NaCl per Liter.	Gms. C_6H_5COOH per 100 Gms. Sol. at 25°.	Gms. C_6H_5COOH per 100 Gms. Sol. at 45°.
0.00	0.00	0.340	0.667
0.02	1.17	0.339	0.663
0.05	2.93	0.335	0.654
0.20	11.70	0.336	0.617
0.50	29.25	0.282	0.546
1.00	58.50	...	0.449

Sodium Nitrate.

Normality of Aq. $NaNO_3$.	Gms. $NaNO_3$ per Liter.	Gms. C_6H_5COOH per 100 Gms. Sol. at 25°.	Gms. C_6H_5COOH per 100 Gms. Sol. at 45°.
0.02	1.70	0.340	0.666
0.05	8.51	0.339	0.663
0.20	17.02	0.333	0.647
0.50	42.54	0.319	0.613
1.00	85.09	0.294	...

Solubility of Benzoic Acid in Aqueous Solutions of Sodium Acetate, Formate, Butyrate, and Salicylate.

(Noyes and Chapin — Z. physik. Chem. 27, 443, '98; Philip — J. Ch. Soc. 87, 992, '05.)

Grams Sodium Salt per Liter.	Grams C_6H_5COOH per Liter of Solution in:					
	CH_3COONa.		$HCOONa$.		C_3H_7COONa.	$C_6H_4OH.COONa$.
	At 25°.	At 26.4°.	At 25°.	At 26.4°.	At 26.4°.	At 26.4°.
0	3.41	3.53	3.41	3.53	3.53	3.53
1	4.65	4.75	4.25	4.35	4.50	3.62
2	5.70	5.85	4.75	4.85	5.40	3.70
3	6.70	6.90	5.20	5.30	6.15	3.80
4	7.60	7.85	5.60	5.70	6.90	3.87
6	...	...	...	...	8.40	4.00
8	...	...	...	...	...	4.10

Gram. Mols. Sodium Salt per Liter.	Gram Molecules C_6H_5COOH per Liter of Solution in:					
	CH_3COONa.		$HCOONa$.		C_3H_7COONa.	$C_6H_4OH.COONa$
	At 25°.	At 26.4°.	At 25°.	At 26.4°.	At 26.4°.	At 26.4°.
0.00	0.0279	0.0289	0.0279	0.0289	0.0289	0.0289
0.01	0.0362	0.0370	0.0330	0.0336	0.0376	0.0300
0.02	0.0440	0.0448	0.0364	0.0372	0.0455	0.0312
0.03	0.0508	0.0518	0.0392	0.0398	0.0525	0.0321
0.04	0.0572	0.0586	0.0416	0.0423	0.0596	0.0328
0.06	...	...	0.0460	0.0466	...	0.0342

Solubility of Benzoic Acid in Absolute Alcohols.

(Timofeiew — Compt. rend. 112, 1137, '91; at 15°, Bourgoin — Ann. chim. phys., [5] 13, 406, '78.)

t°.	In Methyl Alcohol. G. C_6H_5COOH per 100 Gms.		In Ethyl Alcohol. G. C_6H_5COOH per 100 Gms.		In Propyl Alcohol. G. C_6H_5COOH per 100 Gms.	
	CH_3OH.	Solution.	C_2H_5OH.	Solution.	C_3H_7OH.	Solution.
3	50.16	33.39	40.16	28.65	29.88	23.00
15	...	...	46.70	31.80	...	...
21	69.29	40.93	54.09	35.10	40.64	28.90

Solubility of Benzoic Acid in 90% Alcohol, in Ether and in Chloroform.

(Bourgoin.)

Solvent.	t°.	Gms. C_6H_5COOH per 100 Grams.	
		Solvent.	Solution.
90% Alcohol	15	41.62	29.39
Ether	15	31.35	23.86
Chloroform	25	14.30	12.50

Solubility of Benzoic Acid in Aqueous Solutions of Dextrose.

(Hoffman and Langbeck.)

Normality of Aq. Dextrose.	Gms. $C_6H_{12}O_6$ per Liter.	Dissolved C_6H_5COOH at 25°.		Dissolved C_6H_5COOH at 45°.	
		Mol. Conc.	Weight Per Cent.	Mol. Conc.	Weight Per Cent.
0.02	3.67	$5.0322 \cdot 10^{-4}$	0.34	$9.9088 \cdot 10^{-4}$	0.674
0.05	9.00	5.0403 "	0.34	9.9328 "	0.669
0.204	36.73	5.0303 "	0.34	9.9323 "	0.669
0.533	96.15	5.0321 "	0.34	10.0101 "	0.674
1.068	192.30	5.0443 "	0.341	10.0369 "	0.676

Solubility of Benzoic Acid in Aqueous Solutions of Urea and of Thio Urea.

(Hoffman and Langbeck.)

	Normality of Solution.	Gms. per Liter.	C_6H_5COOH Dissolved at 25°. Mol. Conc.	Wt. per cent.
In Aqueous Urea	0.10	6.01 $CO(NH_2)_2$	$5.1876 \cdot 10^{-4}$	0.350
In Aqueous Thio Urea	0.20	15.23 $CS(NH_2)_2$	5.4994 "	0.372

Amido **BENZOIC ACIDS** $C_6H_4.NH_2.COOH$ (*m*).

Solubility in Water and in other Solvents.

(de Coninck — Compt. rend. 116, 758, '93.)

In Water.

t°.	Gms. $C_6H_4.NH_2.COOH$(*m*) per 100 cc. H_2O.
0	0.43
10	0.52
20	0.67
30	0.87
40	1.15
50	1.50
60	2.15
70	3.15

In Organic Solvents.

Solvent.	t°.	Gms. $C_6H_4.NH_2.COOH$(*m*) per 100 cc. Solvent.
Ethyl Alcohol (95%)	12.5	2.92
Methyl Alcohol (pure)	10.5	4.05
Acetone	11.3	6.22
Methyl Iodide	10.0	0.04
Ethyl Iodide	0.0	0.02
Chloroform	12.0	0.07
Bromoform	8.0	trace

Solubility of the Three Isomeric Amido Nitro Benzoic Acids.

In Ether.

t°.	Gms. $C_6H_3.NO_3.NH_2.COOH$ per 100 cc. Ether. Ortho.	Meta.	Para.
2.7	10.84	1.70	6.41
5.8	16.05 (6.8°)	1.81	8.21

In Ethyl Alcohol (90%).

t°.	Gms. $C_6H_3NO_3.NH_2.COOH$ per 100 cc. Alcohol. Ortho.	Meta.	Para.
3	8.13	1.79	8.4
9.6	10.70	2.20	11.3

Solubility in Water of the Three Isomeric:

(Vaubel — J. pr. Chem. [2] 52, 72, '95.)

Amido Benzo Sulphonic Acids.

t°.	G. $C_6H_4.NH_2.SO_2H$ per 100 g. Aq. Sol. Ortho.	Meta.	Para.
7	1.06	1.276	0.592 (6°)

Amido Phenols.

t°.	G. $C_6H_4(OH).NH_2$ per 100 g. Aq. Sol. Ortho.	Meta.	Para.
0	1.7	2.6 (20°)	1.1

Brom, Chlor, and Iodo **BENZOIC ACIDS.**

Solubility in Water at 25°.

(Paul — Z. hysik. Chem. 14, 111, '94; Löwenherz — *Ibid.* 25, 401, '98; Vaubel.)

Compound.	Formula.	Per 1000 cc. Aqueous Solution. Grams.	Gram Mol.
Brom benzoic acid.	$C_6H_4Br.COOH$ (ortho).	1.856	0.00924
Brom benzoic acid.	$C_6H_4Br.COOH$ (meta).	0.402	0.00200
Brom benzoic acid.	$C_6H_4Br.COOH$ (para).	0.056	0.00028
Chlor benzoic acid.	$C_6H_4Cl.COOH$ (ortho).	2.087	0.01333
Iodo benzoic acid.	$C_6H_4I.COOH$ (ortho).	0.95	...
Iodo benzoic acid.	$C_6H_4I.COOH$ (meta).	0.12	...

SOLUBILITY OF ORTHO HYDROXY BENZOIC ACID (SALICYLIC ACID), META HYDROXY BENZOIC ACID, AND PARA HYDROXY BENZOIC ACID (ANISIC ACID) IN WATER, BENZENE, ETC. (See also pp. 38 and 274.)

(Walker and Wood — J. Ch. Soc. 73, 622, '98; Vaubel — J. pr. Chem. [2] 52, 73, '95.)

100 gms. aq. solution contain 0.225 gm. $C_6H_4.OH.COOH$ (*o*) at 15° (Vaubel).

100 gms. aq. solution contains 0.794 gm. $C_6H_4.OH.COOH$ (*p*) at 15° (Vaubel).

t°.	Gms. C H_4.OH.COOH per 100 Gms. H_2O. Meta.	Para.	Gms. C_6H_4.OH.COOH per 100 Gms. C_6H_6. Meta.	Para.
10	0.55	0.25	...	0.0018
20	0.90	0.50	0.008	0.0027
25	1.08	0.65	0.010	0.0035
30	1.34	0.81	0.012	0.0045
35	1.64	1.01	0.015	0.0060
40	2.10	1.24	0.017	0.0082
50	3.10	2.12	0.028	0.0162
60	...	...	0.047	0.028
80	...	...	...	0.066

In Acetone.

t°.	G. C_6H_4.OH.COOH per 100 cc. Sol. Meta.	Para.
23	26.0	22.7

In Ether.

t°.	G. C_6H_4.OH.COOH per 100 cc. Sol. Meta.	Para.
17	9.73	9.43

Methyl BENZOIC ACIDS $C_6H_4COOH.CH_3$. *o*, *m*, and *p*.

SOLUBILITY IN WATER.

(Vaubel.)

t°.	Gms. $C_6H_4COOH.CH_3$ per 1000 Gms. Sat. Solution. Ortho.	Meta.	Para.
25°	1.18	0.98	0.35

Nitro BENZOIC ACIDS $C_6H_4.NO_2.COOH$. *o*, *m*, and *p*.

SOLUBILITY IN SEVERAL SOLVENTS.

(de Coninck — Compt. rend. 118, 471, '94; for solubility in H_2O, see also Paul, Vaubel, Löwenherz, and Goldschmidt — Z. physik. Chem. 25, 95, '96.)

Solvent.	t°.	Gms. $C_6H_4.NO_2$.COOH per 100 cc. Solvent. Ortho.	Meta.	Para.
Water	20	0.682 (0.654G.)	0.315	0.039
Water	25	0.743–0.779	0.341	0.028
Water	30	0.922	...	...
Methyl Alcohol	10	42.72	47.34	9.6
Ethyl Alcohol	10	28.2	33.1 (11.7°)	0.9
Ethyl " (33 Vol.%)	15	0.64 (11.8°)	0.52	0.055
Acetone	10	41.5	41.5	4.54
Benzene	10	0.294	0.795	0.017(12.5°)
Carbon Bi-Sulphide	10	0.012	0.10 (8.5°)	0.007
Chloroform	10	0.455 (11.°)	5.678	0.066
Ether	10	21.58	25.175	2.26
Ligröin	10	trace	0.013	0.00

Solubility of Para Nitro Benzoic Acid in Aqueous Solutions of Anilin and of Para Toluidin at 25°.

(Löwenherz — Z. physik. Chem. 25, 395, '98.)

In Anilin.				In *p*-Toluidin.			
G. Mols. per Liter.		Gms. per Liter.		G. Mols. per Liter.		Gms. per Liter.	
$C_6H_5NH_2$.	$C_6H_4.NO_2.COOH$.	$C_6H_5NH_2$.	$C_6H_4NO_2.COOH$.	$C_6H_4NH_2.CH_3$.	$C_6H_4NO_2.COOH$.	$C_6H_4NH_2.CH_3$.	$C_6H_4NO_2.COOH$.
0.0	0.00164	0.0	0.274	0.0	0.00164	0.0	0.274
0.01	0.00841	0.91	1.406	0.01	0.0100	1.071	1.671
0.02	0.01379	1.82	2.304	0.02	0.0174	2.142	2.902
0.04	0.02172	3.64	3.629	0.03	0.0245	3.213	4.097
0.08	0.0347	7.29	5.798				

Solubility of Ortho Nitro Benzoic Acid in Aqueous Solutions of Sodium Butyrate, Acetate, Formate, and Salicylate at 26.4°.

(Philip — J. Chem. Soc. 87, 992, '05.)

Original results in terms of $\frac{\text{Mols.}}{100}$ per liter.

Gms. Na Salt per Liter.	Gms. Ortho $C_6H_4COOH.NO_2$ per Liter of Solution in:			
	C_3H_7COONa.	CH_3COONa.	$HCOONa$.	$C_6H_4.OH.COONa$.
0	7.85	7.85	7.85	7.85
0.5	8.35	8.50	8.60	8.35
1.0	8.90	9.15	9.50	8.70
2	10.0	10.80	11.5	9.4
3	11.2	12.55	13.5	11.0
4	12.4	14.5	15.6	11.5
6	15.2	...	...	...

Solubility of Ortho Nitro Benzoic Acid in Aqueous Solutions of Dextrose, Sodium Chloride, and of Sodium Nitrate.

Original results in molecular quantities.

(Hoffman and Langbeck — Z. physik. Chem. 51, 412, '05.)

In Dextrose.			In NaCl.			In $NaNO_3$.		
G. $C_6H_{12}O_6$ per 100 cc. Solution.	G. $(o)C_6H_4NO_2.COOH$ per 100 g. Solvent.		G. NaCl. per 100 cc. Solution.	G. $(o)C_6H_4NO_2.COOH$ per 100 g. Solvent.		G. $NaNO_3$ per 100 cc. Solution.	G. $(o)C_6H_4NO_2.COOH$ per 100 g. Solvent.	
	At 25°.	At 35°.		At 25°.	At 35°.		At 25°.	At 35°.
0.0	0.736	1.063	0.117	0.743	1.072	0.170	0.746	1.074
0.36	0.736	1.064	0.195	0.746	1.075	0.284	0.754	1.080
1.80	0.732	1.061	0.585	0.749	1.070	0.851	0.767	1.096
9.50	0.722	1.051	2.425	0.688	0.967	4.255	0.774	1.097
20.00	0.703	1.030	5.80	0.597	0.831	8.510	0.748	1.047

BENZOIC SULPHINIDE (Saccharine) $C_6H_4<^{SO_2}_{CO}>NH$.

100 parts water dissolve 0.4 part at 25° and 4.17 parts at 100°.
100 parts alcohol dissolve 4 parts at 25° (U. S. P.).

BENZOPHENONE $(C_6H_5)_2CO$.

SOLUBILITY IN AQUEOUS ALCOHOL AND IN OTHER SOLVENTS.

(Derrien — Compt. rend. 130, 722, '00; Bell — J. Physic. Chem. 9, 550, '05.)

In Aqueous Alcohol at 40°.

(Bell.)

Wt. % Alcohol in Solvent.	Gms. $(C_6H_5)_2CO$ per 100 Gms. Solvent.	Gms. $(C_6H_5)_2CO$ per 100 Gms. Solution.	Wt. % Alcohol in Solvent.	Gms. $(C_6H_5)_2CO$ per 100 Gms. Solvent.	Gms. $(C_6H_5)_2CO$ per 100 Gms. Solution.
40	2	1.9	67.5	39	28.1
45	5	4.8	70	56	35.9
50	8	8.3	71	67	39.2
55	11	9.9	72	90	47.4
60	16	13.8	72.5	105	51.2
65	28	22.6	73	156	61.0

In Aqueous Alcohol and other Solvents.

(Derrien.)

Solvent.	t°.	Gms. $(C_6H_5)_2CO$ per 100 g. Solvent.	Solvent.	t°.	Gms. $(C_6H_5)_2CO$ per 100 g. Solvent.
97% Ethyl Alcohol	17	13.5	Benzene	17	76.9
85 cc. 97% Alcohol + 15 cc. H_2O	"	3.8	Xylene	17.6	38.4
80 " " + 20 "	"	2.2	Nitro Benzene	15.8	58.8
75 " " + 26 "	"	1.3	Chloroform (com.)	16.5	55.5
Methyl Alcohol (pure)	9.8	11.0	Bromoform	17.3	33.3
" " "	15.0	14.3	Toluene	17.2	55.5
Acetic Ether (pure)	9.6	19.2	Ligröine	14.6	6.7
Carbon Bisulphide	16.1	66.6			

BERYLLIUM HYDROXIDE $Be(OH)_2$ (See also Glucinium, page 140).

SOLUBILITY IN AQUEOUS SOLUTIONS OF SODIUM HYDROXIDE.

(Rubenbauer — Z. anorg. Chem. 30 334, '02.)

Moist $Be(OH)_2$ used, solutions shaken 5 hours, temperature probabiy about 20°.

Per 20 cc. Solution. Gms. Na.	Per 20 cc. Solution. Gms. Be.	Molecular Dilution of the NaOH.	Gms. per 100 cc. Solution. NaOH.	Gms. per 100 cc. Solution. $Be(OH)_2$.
0.3358	0.0358	1.37	2.917	0.850
0.6716	0.0882	0.68	5.840	2.094
0.8725	0.1175	0.53	7.585	2.789
1.7346	0.2847	0.27	18.310	6.760

BERYLLIUM SULPHATE $BeSO_4$.

SOLUBILITY IN WATER.

(Levi, Malvano — Z. anorg. Chem. 48, 446, '06.)

t°.	Mols. H_2O per 1 Mol. $BeSO_4$.	Gms. $BeSO_4$ per 100 Gms. Water.	Gms. $BeSO_4$ per 100 Gms. Solution.	Solid Phase.	t°.	Mols. H_2O per 1 Mol. $BeSO_4$.	Gms. $BeSO_4$ per 100 Gms. Water.	Gms. $BeSO_4$ per 100 Gms. Solution.	Solid Phase.
31	11.18	52.23	34.32	$BeSO_4.6H_2O$	95.4	6.44	90.63	47.55	$BeSO_4.4H_2O$
50	9.62	60.67	37.77	"	107.2	5.06	115.3	53.58	"
72.2	7.79	74.94	42.85	"	111	4.55	128.3	56.19	"
77.4	7.13	81.87	45.01	"	80	6.89	84.76	45.87	$BeSO_4.2H_2O$
30	13.33	43.78	30.45	$BeSO_4.4H_2O$	91.4	5.97	97.77	49.42	"
40	12.49	46.74	31.85	"	105	4.93	118.4	54.21	"
68	9.42	61.95	38.27	"	119	3.91	149.3	59.88	"
85	7.65	76.30	43.28	"					

BISMUTH Bi.

Mutual Solubility of Bismuth and Zinc.

(Spring and Romanoff — Z. anorg. Chem. 13, 34, '96.)

t°.	Upper Layer. %Bi.	Upper Layer. %Zn.	Lower Layer. %Bi.	Lower Layer. %Zn.
266	86	14	..	..
419	..	..	3	97
475	84	16	5	95
584	80	20	10	90
650	77	23	15	85
750	70	30	27	73
810–820 (crit. temp.)				

BISMUTH CHLORIDE $BiCl_3$.

100 grams absolute acetone dissolve 17.9 grams $BiCl_3$ at 18°.

(Naumann — Ber. 37, 4332, 1904.)

BISMUTH IODIDE BiI_3.

100 grams absolute alcohol dissolve 3.5 grams BiI_3 at 20°.

(Gott and Muir — J. Chem. Soc. 57, 138, '90.)

100 grams methylene iodide CH_2I_2 dissolve 0.15 gram BiI_3 at 12°.

(Retgers — Z. anorg. Chem. 3, 343, '93.)

BISMUTH NITRATE $Bi(NO_3)_3.5H_2O$.

100 grams acetone dissolve 48.66 grams $Bi(NO_3)_3.5H_2O$ at 0°, and 41.7 grams at 19°.

(von Laszczynski — Ber. 27, 2285, '94.)

BISMUTH OXIDE Bi_2O_3.

Solubility of Bismuth Oxide in Aqueous Nitric Acid at 20°.

(Rutten and van Bemmelen — Z. anorg. Chem. 30, 386, '02.)

Present in Shaker Flask. Per 1 part $Bi_2O_3.3N_2O_5.10H_2O$.	Gms. per 100 Gms. Solution. Bi_2O_3	Gms. per 100 Gms. Solution. N_2O_5	Mols. per 100 Mols. H_2O. Bi_2O_3	Mols. per 100 Mols. H_2O. N_2O_5	Ratio $Bi_2O_3 : N_2O_5$.	Solid Phase.
24.4 parts H_2O	0.321	0.963	0 126	1.61	1:12.8	$Bi_2O_3.N_2O_5.2H_2O$
3.2 parts H_2O	6.37	7.17	2.844	13.82	1: 4.8	"
Dilute HNO_3	18.74	15.9	10.50	38.65	1: 3.6	$Bi_2O_3.N_2O_5.H_2O$
Dilute HNO_3	31.48	23.7	27.2	83.8	1: 3.0	"
Dilute HNO_3 = 6.13% N_2O_5	32.93	24.83	30.15	97.97	1: 3.2	$Bi_2O_3.N_2O_5.H_2O$ and $Bi_2O_3.3N_2O_5.10H_2O$
6.816% N_2O_5	32.67	24.70	29.70	96.57	1: 3.2	$Bi_2O_3.3N_2O_5.10H_2O$
24.0% N_2O_5	24.16	28.25	19.65	98.76	1: 5.0	"
51.0% N_2O_5	11.66	46.62	10.81	186.23	1:17.2	"
70.0% N_2O_5	20.76	53.75	33.51	355.87	1:10.6	"
	27.85	51.02	51.0	403.0	1: 7.9	$Bi_2O_3.3N_2O_5.10H_2O$ and $Bi_2O_3.3N_2O_5.3H_2O$
Anhydrous HNO_3	8.56	68.28	14.35	492.0	1:34.3	$Bi_2O_3.3N_2O_5.3H_2O$
Bi_2O_3+ "	4.05	74.90	7.45	592.9	1:79.5	"

Results are also given for 9°, 30°, and 65°.

BORIC ACID (Ortho) H_3BO_3.

SOLUBILITY IN WATER.

(Ditte — Compt. rend. 85, 1069, 77; Herz and Knoch — Z. anorg. Chem. 41, 319, '04.)

t°.	Gms. H_3BO_3 per 100 Gms. Water.	Gms. H_3BO_3 per 100 Gms. Solution.	Gms. B_2O_3 per 100 Gms. H_2O.	t°.	Gms. H_3BO_3 per 100 Gms. Water.	Gms. H_3BO_3 per 100 Gms. Solution.	Gms. B_2O_3 per 100 Gms. H_2O.
0	1.95	1.91	1.1	40	7.0	6.54	3.95
10	2.70	2.63	1.5	50	8.8	8.09	5.08
20	4.0	3.85	2.25	60	11.0	9.91	6.2
25	4.7	4.49	2.65	80	16.8	14.38	9.5
30	5.4	5.12	3.05	100	27.5	21.57	15.52

The above results of Ditte are probably low.

Herz and Knoch find for 13°, 3.845 grams H_3BO_3 per 100 cc. solution, for 20°, 4.909, 25°, 5.593, and 26°, 5.637.

Bogdan finds 5.753 grams H_3BO_3 per 100 grams H_2O at 25°.

SOLUBILITY OF BORIC ACID IN AQUEOUS SOLUTIONS OF HYDROCHLORIC, SULPHURIC, AND NITRIC ACIDS AT 26°.

(Herz — Z. anorg. Chem. 33, 355, 34, 205, '03.)

Normality of the H_2SO_4, HCl or HNO_3.	Normality of Dissolved $B(OH)_3$.	Gms. Strong Acid per 100 cc. Solution.	Gms. $B(OH)_3$ per 100 cc. Solution. In HCl.	In H_2SO_4.	In HNO_3.
0	0.91	0	5.64	5.64	5.64
0.5	0.78	5	4.0	4.25	4.50
1.0	0.71	10	3.2	3.6	3.9
2.0	0.58	15	2.45	3.0	3.35
3.0	0.49	20	1.8	2.5	2.9
4.0	0.41	25	...	2.0	2.55
5.0	0.35	30	...	1.55	2.1
6.0	0.26	35	...	...	1.75

The determinations given in the original tables in terms of normal solutions when plotted together lay close to an average curve drawn through them. The figures in the tables here shown were read (and calculated) from the average curve.

SOLUBILITY OF BORIC ACID IN AQUEOUS SOLUTIONS OF ELECTROLYTES AT 25°.

(Bogdan — Ann. Scient. Univ. Jassy, 2, 47, '02–'03.)

Gms. Electrolyte per 100 Gms. H_2O.	Grams H_3BO_3 per 100 Gms. H_2O in Aq. Solutions of: NaCl.	KCl.	$NaNO_3$.	KNO_3.	Na_2SO_4.	K_2SO_4.
0	5.75	5.75	5.75	5.75	5.75	5.75
10	5.75	5.80	5.78	5.81	5.88	5.92
20	5.74	5.86	5.81	5.88	6.00	6.10
40	5.72	5.98	5.87	6.04	6.33	6.50
60	5.72	6.12	5.95	6.20	6.70	6.92
80	5.71	6.29	6.02	6.37	7.10	7.40

Interpolated from the original.

100 parts alcohol dissolve 6.5 parts H_3BO_3 at 25° and 23 parts at b. pt. (U. S. P.).

Solubility of Boric Acid in Aqueous Solutions of Urea, Acetone, and of Propyl Alcohol at 25°.

(Bogdan.)

Grams of $CO(NH_2)_2$, $(CH_3)_2CO$ or of C_3H_7OH per 100 Gms. H_2O.	Gms. H_3BO_3 per 100 g. H_2O in Aq. Solutions of: $CO(NH_2)_2$	$(CH_3)_2CO$.	C_3H_7OH.
0	5.75	5.75	5.75
10	5.84	5.84	5.80
20	5.93	5.93	5.85
40	6.13	6.12	5.94
60	6.31	6.29	6.03

Solubility of Boric Acid in Aqueous Solutions of:

Acetic Acid at 26°.

(Herz — Z. anorg. Chem. 34, 205, '03.)

Normality of Solutions. CH_3COOH.	$B(OH)_3$.	Gms. per 100 cc. Solution. CH_3COOH.	$B(OH)_3$.
0	0.91	0	5.64
1	0.82	5	4.7
2	0.65	10	4.2
4	0.42	20	3.0
6	0.25	30	2.0

Acetone at 20°.

(Herz and Knoch — *Ibid.* 41, 319, '04.)

cc. Acetone per 100 cc. Solvent.	$B(OH)_3$ per 100 cc. Solution. Millimols.	Grams.
0	79.15	4.91
20	81.71	5.07
30	83.35	5.17
40	82.72	5.13
50	81.62	5.06
60	76.40	4.74
70	67.62	4.19
80	55.05	3.41
100	8.06	0.50

Solubility of Boric Acid in:

Pure Glycerine (Sp.Gr. = 1.260 at 15.5°).

(Hooper — Pharm. J. Trans. [3] 13, 258, '82.)

t°.	Gms. B_2O_3.-$3H_2O$ per 100 cc. Glycerine	Gms. $B(OH)_3$ per 100 Gms. Glycerine.	Solution.
0	20	15.87	13.17
10	24	19.04	16.00
20	28	22.22	18.21
30	33	26.19	20.75
40	38	30.16	23.17
50	44	34.92	25.95
60	50	39.68	28.41
70	56	44.65	30.72
80	61	48.41	32.61
90	67	53.18	34.70
100	72	57.14	36.36

Aq. Solutions of Glycerine at 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 268, '05.)

Wt. % Glycerine in Solvent.	Millimols $B(OH)_3$ per 100 cc. Sol.	Sp. Gr. at $\frac{25°}{4°}$.	Gms. $B(OH)_3$ per 100 cc. Solution.	Gms. Solution.
0	90.1	1.017	5.59	5.50
7.15	90.1	1.038	5.59	5.38
20.44	90.6	1.063	5.62	5.28
31.55	92.9	1.090	5.76	5.29
40.95	97.0	1.113	6.02	5.41
48.7	103.0	1.133	6.39	5.64
69.2	140.2	1.187	8.69	7.32
100.0	390.3	1.272	24.20	19.02

Distribution of Boric Acid between Water and Amyl Alcohol at 25°.

(Fox — Z. anorg. Chem. 35, 130, '03.)

Millimols $B(OH)_3$ in		Gms. $B(OH)_3$ in 100 cc.		Millimols $B(OH)_3$ in		Gms. $B(OH)_3$ in 100 cc	
Aq. Layer.	Alcoholic Layer.	Aq. Layer.	Alcoholic Layer.	Aq. Layer.	Alcoholic Layer.	Aq. Layer.	Alcoholic Layer.
265.8	76.6	1.648	0.475	87.9	33.2	0.545	0.206
196.5	59.5	1.219	0.369	75.2	22.7	0.466	0.141
159.6	47.5	0.990	0.294	64.6	19.76	0.400	0.123
126.0	37.1	0.781	0.230				

BORIC ACID (Tetra) $H_2B_4O_7$.

100 grams water dissolve 2.69 grams $H_2B_4O_7$ at 15°, Sp. Gr. = 1.015.

(Gerlach — Z. anal. Chem. 28, 473, '89.)

BORON TRI-FLUORIDE BF_3.

1 cc. H_2O absorbs 1.057 cc. BF_3 at 0° and 762 mm., 1 cc. conc. H_2SO_4 (Sp. Gr. 1.85) absorbs 50 cc. BF_3.

BROMINE Br.

Solubility in Water.

(Winkler — Chem. Ztg. 23, 687, '99; Roozeboom — Rec. trav. chim. 3, 29, 59, 73, 84, '84; Dancer — J. Chem. Soc. 15, 477, '62; at 15°, Dietze — Pharm. Ztg. 43, 290, '98.)

t°.	Grams Bromine per 100 Grams.				"Absorption Coefficient." *	"Solubility." *
	Water.		Solution.			
	(W.)	(R. D. & D.)	(W.)	(R. D. & D.)	a.	q.
0	4.17	4.22	3.98	4.05	60.5	43.1
5	3.92	3.7	3.77	3.57	45.8	32.4
10	3.74	3.4	3.61	3.29	35.1	24.8
15	3.65	3.25	3.52	3.15	27.0	19.0
20	3.58	3.20	3.46	3.10	21.3	14.8
25	3.48	3.17	3.36	3.07	17.0	11.7
30	3.44	3.13	3.32	3.03	13.8	9.4
40	3.45	...	3.33	...	9.4	6.2
50	3.52	...	3.40	...	6.5	4.0
60	...	...	...	...	4.9	2.8
80	...	...	...	...	3.0	1.1

* For "Absorption Coefficient" a and "Solubility" q, of Bromine Vapor in water, see Acetylene, page 9.

Solubility of Bromine in Aqueous Solutions of Potassium Sulphate, Sodium Sulphate, and of Sodium Nitrate at 25°.

(Jakowkin — Z. physik. Chem. 20, 38, '96.)

Normality of Salt Solution.	In K_2SO_4 Gms. per Liter.		In Na_2SO_4 Gms. per Liter.		In $NaNO_3$ Gms. per Liter.	
	K_2SO_4.	Br.	Na_2SO_4.	Br.	$NaNO_3$.	Br.
1/1	91.18	25.14	63.55	25.07	85.09	28.80
1/2	45.59	29.44	31.77	29.20	42.54	31.35
1/4	22.79	31.46	15.88	31.33	21.27	32.62
1/8	11.39	32.70	7.94	32.94	10.63	33.33
1/16	5.69	33.10	3.97	32.26	5.31	33.74

Solubility of Bromine in Normal Aqueous Salt Solutions at 25°.

(McLauchlan — Z. physik. Chem. 44, 617, '03.)

Salt.	Gms. Salt per Liter.	Normality of Dissolved Br.	Gms. Br. per Liter.	Salt.	Gms. Salt per Liter.	Normality of Dissolved Br.	Gms. Br. per Liter.
Water	0.0	0.424	33.95	NH_4NO_3	80.11	0.688	55.15
Na_2SO_4	63.55	0.286	23.9	NaCl	58.50	0.701	55.90
K_2SO_4	91.18	0.310	24.8	KCl	74.60	0.718	57.40
$(NH_4)_2SO_4$	70.04	0.971	77.7	NH_4Cl	53.52	1.028	82.2
$NaNO_3$	85.09	0.3495	28.0	CH_3COONH_4	77.09	4.26	340.5
KNO_3	101.19	0.362	28.95	H_2SO_4*	49.03	0.366	29.26

* Wildeman.

Solubility of Bromine in Aqueous Potassium Bromide Solutions.

(Worley — J. Chem. Soc. 87, 1107, '05; see also Wildeman — Z. physik. Chem. 11, 421, '93.)

Gram Mols. KBr per Liter.	Gms. KBr per Liter.	Br. per Liter Dissolved at 26.5°.		Br. per Liter Dissolved at 18.5°.	
		G. Mols.	Grams.	G. Mols.	Grams.
0.00	0.00	0.4282	34.23	0.4448	35.56
0.02	2.18	0.4671	37.35	0.4823	38.56
0.04	4.38	0.5101	40.79	0.5243	41.91
0.06	6.55	0.5530	44.21	0.5668	45.31
0.08	8.76	0.5920	47.33	0.6059	48.44
0.10	10.91	0.6488	51.87	0.6533	52.23
0.20	21.82	0.8591	68.69	0.8718	69.69
0.40	43.82	1.2704	101.60	1.3124	104.90
0.60	65.46	1.6717	133.70	1.7712	141.60
0.80	87.64	2.1029	168.10	2.2354	178.70
0.90	98.19	2.3349	186.20	2.4851	198.70

100 grams saturated solution of Bromine in Carbon Bisulphide contain 45.4 grams Br at − 95°, 39.0 grams at − 110.5°, and 36.9 grams at − 116°.

(Arctowski — Z. anorg. Chem. 11, 274, '95–'96.)

DISTRIBUTION OF BROMINE AT 25° BETWEEN WATER AND:

(Jakowkin — Z. physik. Chem. 18, 588, '95.)

Carbon Bisulphide.		Bromoform.		Carbon Tetra Chloride.	
Gms. Br. per Liter of:		Gms. Br. per Liter of:		Gms. Br. per Liter of:	
Aq. Layer.	CS_2 Layer.	Aq. Layer.	$CHBr_3$ Layer.	Aq. Layer.	CCl_4 Layer.
0.5	36	0.5	33	0.5	15
1	80	1	66	1	28
2	163	2	136	2	60
3	240	3	206	3	90
4	330	4	276	4	123
5	420	5	346	5	156
6	515	6	415	6	190
7	620	...	...	8	260
				10	340
				12	430
				14	520

BRUCINE $C_{21}H_{20}(OCH_3)_2N_2O_2.4H_2O$.

SOLUBILITY IN SEVERAL SOLVENTS AT 18°–22°.

(Müller — Apoth. Ztg. 18, 232, '03.)

Solvent.	Gms. Brucine per 100 Gms. Solution.	Solvent.	Gms. Brucine per 100 Gms. Solution.
Water	0.0563	Petroleum Ether	0.088
Ether	0.749	Carbon Tetra Chloride	0.078
Acetic Ether	4.255	Carbon Tetra Chloride*	1.937
Benzene	1.11	Glycerine	2.2

* Schindelmeiser — Chem. Ztg. 25, 129, '01.

BUTANE C_4H_{10}.

SOLUBILITY IN WATER AT t°. AND 760 MM.

t°.	0°	4°	10°	15°	20°
Vols. C_4H_{10} per 100 vols. H_2O	3.147	2.77	2.355	2.147	2.065

Iso **BUTYL ACETATE**, etc.

SOLUBILITY IN WATER.

(Traube — Ber. 17, 2304, '84; at 20°, Vaubel — J. pr. Chem. 59, 30, '99.)

t°.	Compound.	Grams Compound per 100 Grams H_2O.
22	Iso Butyl Acetate	0.5
22	Iso Butyl Formate	1.0
20	Normal Butyric Aldehyde	3.6
20	Iso Butyric Aldehyde	10.0

SOLUBILITY OF BUTYL ACETATE AND OF BUTYL FORMATE IN MIXTURES OF ALCOHOL AND WATER.

(Bancroft — Calc. from Pfeiffer — Phys. Rev. 3, 205, '95–'96.)

cc. Alcohol in Mixture.	cc. H_2O added to cause separation of a second phase in mixtures of the given quantity of alcohol and 3 cc. portions of:	
	Butyl Formate.	Butyl Acetate.
3	3.45	2.08
6	8.83	6.08
9	14.75	10.46
12	21.45	15.37
15	29.65	20.42
18	39.0	25.60
21	51.8	31.49
24	∞	37.48
27		43.75
30		50.74
33		59.97

100 cc. H_2O dissolve 0.7 cc. iso butyl acetate at 25° (Bancroft)

Iso **BUTYRIC ACID** $(CH_3)_2CH.COOH$.

SOLUBILITY IN WATER.

(Rothmund — Z. physik. Chem. 26, 475, '98.)

Synthetic Method used, see Note, p. 9.

t°.	Gms. Iso Butyric Acid per 100 Gms.	
	Aq. Layer.	Iso Butyric Ac. Layer.
5	16.4	73.4
10	17.5	68.5
15	19.4	62.5
20	22.6	53.9
22	25.8	49.6
24.7	(crit. temp.)	36.3

CADMIUM BROMIDE $CdBr_2$.

SOLUBILITY IN WATER.

(Dietz — Ber. 32, 95, '99; Z. anorg. Chem. 20, 260, '99; Wiss. Abh. p.t. Reichanstalt, 3, 433, '00; see also Eder — Dingler polyt. J. 221, 189, '76; Etard — Ann. chim. phys. [7] 2, 536, '94.)

t°.	Gms. $CdBr_2$ per 100 Gms. Solution.	Mols. $CdBr_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $CdBr_2$ per 100 Gms. Solution.	Mols. $CdBr_2$ per 100 Mols. H_2O.	Solid Phase.
0	37.92	4.04	$CdBr_2.4H_2O$	40	60.65	10.20	$CdBr_2.H_2O$
18	48.90	6.21	"	45	60.75	10.24	"
30	56.90	8.73	"	60	61.10	10.39	"
38	61.84	10.73	"	80	62.29	10.48	"
35	60.29	10.05	$CdBr_2.H_2O$	100	61.63	10.63	"

Density of saturated solution at 18° = 1.683.

Solubility of Cadmium Bromide in Alcohol, Ether, and in Acetone.

100 gms. sat. solution of $CdBr_2.4H_2O$ in abs. alcohol contain 20.93 gms. $CdBr_2$ at 15° (Eder).

100 gms. sat. solution of $CdBr_2.4H_2O$ in abs. ether contain 0.4 gm. $CdBr_2$ at 15° (Eder).

100 gms. absolute acetone dissolve 1.559 gms. $CdBr_2$ at 18°.

(Naumann — Ber. 37, 4332, '04.)

CADMIUM (Mono) AMMONIUM BROMIDE $CdBr_2.NH_4Br$.

Solubility in Water.

(Rimbach — Ber. 38, 1553, '05; Eder.)

t°.	100 Grams Solution contain Gms.			Atomic Relation.			G. $CdBr_2.NH_4Br$ per 100 Gms. Solution.
	Cd.	Br.	NH_4.	Cd	Br	NH_4.	
1.0	16.33	34.87	2.63	1	3	1	53.82
14.8	17.40	37.15	2.80	1	3	1	58.01
52.2	19.79	42.38	3.21	1	3	1	65.31
110.1	22.99	49.17	3.72	1	3	1	75.98

100 gms. sat. solution of $CdBr_2.NH_4Br$ in abs. alcohol contain 15.8 gms. double salt at 15° (Eder).

100 gms. sat. solution of $CdBr_2.NH_4Br$ in abs. ether contain 0.36 gm. double salt at 15° (Eder).

CADMIUM (Tetra) AMMONIUM BROMIDE $CdBr_2.4NH_4Br$.

Solubility in Water.

(Rimbach.)

The double salt is decomposed by water at temperatures below 160°.

t°.	100 Gms. Solution contain Gms.			Atomic Relation in Sol.			Atomic Relation in Solid.		
	Cd.	Br.	NH_4.	Cd	Br	NH_4.	Cd	Br	NH_4.
0.8	14.72	50.46	6.67	1	4.82	2.82	1	10.02	8.02
13.0	14.95	51.48	6.85	1	4.85	2.85	1	11.57	9.57
44.0	15.01	53.85	7.35	1	5.04	3.04	1	6.84	4.84
76.4	14.6	54.28	7.80	1	5.32	3.32	1	6.63	4.63
123.5	15.5	59.50	8.45	1	5.38	3.38	1	7.40	5.40
160.0	14.7	62.67	9.43	1	5.99	3.99	1	6.03	4.03

CADMIUM (Mono) POTASSIUM BROMIDE $CdBr_2.KBr.H_2O$.

Solubility in Water.

(Rimbach; see also Eder.)

t°.	100 Gms. Solution contain Gms.			Atomic Relation in Sol.			Gms. $CdBr_2.KBr$ per 100 Gms. Solution.
	Cd.	Br.	K.	Cd	Br	K.	
0.4	15.41	33.0	5.42	1	3	1	53.63
15.8	16.85	35.96	5.86	1	3	1	58.61
50.0	19.58	41.86	6.85	1	3	1	67.87
112.5	22.24	48.28	8.14	0.98	3	1.03	78.11

CADMIUM Tetra **POTASSIUM BROMIDE** is decomposed by water at ordinary temperatures.

CADMIUM (Mono) RHUBIDIUM BROMIDE $CdBr_2.RbBr$.

SOLUBILITY IN WATER.

(Rimbach.)

t°.	100 Gms. Solution contain Gms. Cd.	Br.	Rb.	Atomic Relation in Sol. Cd	: Br	Rb.	Gms. $CdBr_2.RbBr$ per 100 Gms. Solution.
0.4	8.37	17.93	6.43	1	3	1.01	32.65
14.5	10.72	23.02	8.30	0.99	3	1.01	41.87
49.2	15.01	32.13	11.51	1	3	1	58.54
107.5	19.65	41.12	14.06	1.02	3	0.96	75.77

CADMIUM (Tetra) RHUBIDIUM BROMIDE $CdBr_2.4RbBr$.

SOLUBILITY IN WATER.

(Rimbach.)

t°.	100 Gms. Solution contain Gms. Cd	Br	Rb.	Atomic Relation in Sol. Cd	: Br	: Rb.	Gms. $CdBr_2.4RbBr$ per 100 Gms. Solution.
0.5	5.70	24.94	17.97	0.98	6	4.05	47.95
13.5	6.55	28.74	20.74	0.97	6	4.05	55.17
51.5	8.25	35.51	25.39	0.99	6	4.02	68.82
114.5	9.50	40.67	29.00	1.00	6	4.0	79.04

CADMIUM (Mono) SODIUM BROMIDE $CdBr_2.NaBr2\frac{1}{2}H_2O$.

SOLUBILITY IN WATER, ETC., AT 15°.

(Eder — Ding. polyt. J. 221, 189, '76.)

Solvent.	Gms. $CdBr_2.NaBr$ per 100 Gms. Solution.	Solvent.	Solid Phase.
Water	49.0	96.1	$CdBr_2.NaBr.2\frac{1}{2}H_2O$
Absolute Alcohol	21.2	27.0	"
Absolute Ether	0.52	0.53	"

CADMIUM CHLORATE $Cd(ClO_3)_2.2H_2O$.

SOLUBILITY IN WATER.

(Meusser — Ber. 35, 1422, '02.)

t°.	Gms. $Cd(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Cd(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Cd(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Cd(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−20	72.18	22.47	$Cd(ClO_3)_2.2H_2O$	18	76.36	27.98	$Cd(ClO_3)_2.2H_2O$
−15	72.53	22.87	"	49	80.08	34.82	"
0	74.95	25.92	"	65	82.95	42.14	"

Density of the saturated solution at 18° = 2.284.

Solubility in Water.

(Dietz — W. Abh. p. t. Reichanstalt 3, 433, '00; above 100°, Etard — Ann. chim. phys. [7] 2, 536, '94.)

t °.	G. $CdCl_2$ per 100 Gms. Solution.	Mols. $CdCl_2$ per 100 Mols. H_2O.	Solid Phase.
−9	43.58	7.5	$CdCl_2.4H_2O$
0	49.39	9.6	$CdCl_2.4H_2O$
+10	55.58	12.3	$CdCl_2.4H_2O$
15	59.12	14.2	$CdCl_2.4H_2O$
−10	44.35	7.8	$CdCl_2.2\frac{1}{2}H_2O$ (monoclinic)
0	47.37	9.0	$CdCl_2.2\frac{1}{2}H_2O$ (monoclinic)
+18	52.53	10.9	$CdCl_2.2\frac{1}{2}H_2O$ (monoclinic)
30	56.91	12.8	$CdCl_2.2\frac{1}{2}H_2O$ (monoclinic)
36	57.91	13.5	$CdCl_2.2\frac{1}{2}H_2O$ (monoclinic)
+10	57.47	13.3	$CdCl_2.H_2O$
20	57.35	13.2	$CdCl_2.H_2O$
40	57.51	13.3	$CdCl_2.H_2O$
60	57.71	13.4	$CdCl_2.H_2O$
80	58.41	13.8	$CdCl_2.H_2O$
100	59.52	14.4	$CdCl_2.H_2O$
150	64.8		
200	72.0		
270	77.7		

Density of saturated solution at 18° = 1.741.

100 gms. abs. ethyl alcohol dissolve 1.52 gms. $CdCl_2$ at 15°.5.
100 gms. abs. methyl alcohol dissolve 1.71 gms. $CdCl_2$ at 15°.5.

(de Bruyn — Z. physik. Chem. 10, 783, '92.)

CADMIUM AMMONIUM CHLORIDE $CdCl_2.NH_4Cl$.

Solubility in Water.

(Rimbach — Ber. 30, 3075, 1897.)

t °.	100 Gms. Solution contain Gms.			Gms. $CdCl_2.NH_4Cl$ per 100 Gms.	
	Cd.	Cl.	NH_4.	Solution.	Water.
2.4	14.26	13.44	2.24	29.94	42.74
16.0	15.82	15.07	2.56	33.45	50.26
41.2	18.61	17.46	2.89	38.96	63.83
63.8	20.92	19.73	3.34	43.99	78.54
105.9	24.70	23.52	4.01	52.23	109.33

CADMIUM (Tetra) AMMONIUM CHLORIDE $CdCl_2.4NH_4Cl$.

In Contact with Water.

The salt is decomposed in aqueous solution.

(Rimbach.)

t °.	100 Gms. Solution contain Gms.			Atomic Relation in Solution.		
	Cd.	Cl.	NH_4.	Cd	: Cl	: NH_4.
3.9	5.75	18.17	7.37	1	9.96	7.96
16.1	6.96	20.26	7.97	1	9.20	7.13
40.2	9.91	23.84	8.92	1	7.61	5.61
58.5	12.50	26.53	9.35	1	6.71	4.66
112.9	16.66	31.79	10.78	1	6.02	4.02
113.9	16.51	32.71	11.30	1	6.26	4.26

Solubility of Mixtures of Cadmium Tetra Ammonium Chloride and Cadmium Ammonium Chloride in Water.

(Rimbach — Ber. 35, 1300, '02.)

t°.	100 Gms. Solution contain Gms.			Atomic Relation.			Solid Phase, Mol. per cent of:	
	Cd.	Cl.	NH_4.	Cd	: Cl	: NH_4.	$CdCl_2.NH_4Cl$.	$CdCl_2.4NH_4Cl$.
1.1	5.34	17.62	7.27	1	10.47	8.50	49.6	50.4
14.0	7.12	19.86	7.84	1	8.84	6.87	47.0	53.0
40.7	10.24	23.82	8.85	1	7.37	5.37	77.0	23.0
58.5	12.50	26.53	9.35	1	6.71	4.66	...	...

Solubility of Mixtures of Cadmium Tetra Ammonium Chloride and Ammonium Chloride in Water.

(Rimbach.)

t°.	100 Gms. Solution contain Gms.			Atomic Relation.			Solid Phase, Mol. per cent of:	
	Cd.	Cl.	NH.	Cd	: Cl	: NH_4.	NH_4Cl.	$CdCl_2.4NH_4Cl$.
1.0	2.82	17.11	7.82	1	19.21	17.28	59.0	41.0
13.2	2.76	18.84	8.71	1	21.62	19.62	74.0	26.0
40.1	3.16	22.56	10.49	1	22.65	20.74	71.0	29.0
58.2	3.51	25.21	11.72	1	22.79	20.89	69.0	31.0

CADMIUM BARIUM CHLORIDE $2(CdCl_2).BaCl_2.5H_2O$.

Solubility in Water.

(Rimbach — Ber. 30, 3083, '97.)

t°.	100 Gms. Solution contain Gms.			Gms. $2(CdCl_2).BaCl_2$ per 100 Gms.	
	Cd.	Cl.	Ba.	Solution.	Water.
22.6	17.71	16.89	11.0	45.60	83.82
41.3	19.22	18.15	11.77	49.14	96.62
53.9	19.85	18.75	12.41	51.04	104.25
62.2	20.59	19.66	12.83	53.08	113.13
69.5	21.20	20.18	13.09	54.47	119.64
107.2	24.25	23.23	14.90	62.38	165.85

CADMIUM BARIUM CHLORIDE $CdCl_2.BaCl_2.4H_2O$.

Solubility in Water.

(Rimbach.)

t°.	100 Gms. Solution contain Gms.			Gms. $CdCl_2.BaCl_2$ per 100 Gms.	
	Cd.	Cl.	Ba.	Solution.	Water.
22.5	11.98	15.19	14.71	41.88	72.06
32.9	12.40	16.18	16.09	44.67	80.73
41.4	13.05	16.95	16.81	46.81	88.01
53.4	13.96	18.21	18.13	50.30	101.21
62.0	14.73	18.81	18.74	52.28	109.56
97.8	17.57	22.48	22.00	62.05	163.50
108.3	18.53	23.51	22.79	64.83	184.33
109.2	18.67	23.69	29.95	65.31	188.27

CADMIUM MAGNESIUM CHLORIDE $2(CdCl_2)MgCl_2.12H_2O$.

Solubility in Water.

(Rimbach.)

t°.	100 Gms. Solution contain Gms.			Gms. $2(CdCl_2).MgCl_2$ per 100 Gms.	
	Cd.	Cl.	Mg.	Solution.	Water.
2.4	22.14	21.06	2.41	45.61	83.86
20.8	24.30	22.80	2.55	49.69	98.77
45.5	26.24	24.55	2.72	53.51	115.10
67.2	28.45	26.71	2.98	58.14	138.90
121.8	31.84	30.20	3.44	65.48	189.69

CADMIUM (Mono) RHUBIDIUM CHLORIDE $CdCl_2.RbCl$.

Solubility of Cadmium Mono Rhubidium Chloride in Water.

(Rimbach — Ber. 35, 1303, '02.)

t°.	100 Gms. Solution ontain Gms.			Gms. $CdCl_2.RbCl$ per 100 Gms.	
	Cd.	Cl.	Rb.	Solution.	Water.
1.2	4.80	4.53	3.63	12.97	14.90
14.5	6.20	5.88	4.75	16.80	20.19
41.4	9.34	8.86	7.14	25.31	33.89
57.6	11.40	10.78	8.63	30.83	44.58
103.9	17.14	16.37	13.39	46.62	87.36

CADMIUM (Tetra) RHUBIDIUM CHLORIDE $CdCl_2.4RbCl$.

In Contact with Water.

(Rimbach.)

The double salt decomposes to $CdCl_2.RbCl$ and RbCl.

t°.	100 Gms. Solution contain Gms.			Atomic Relation.			Solid Phase, Mol. per cent of:	
	Cd.	Cl.	Rb.	Cd	: Cl	: Rb.	$CdCl_2.RbCl$.	$CdCl_2.4RbCl$.
0.7	0.65	6.52	14.73	1	31.88	29.88	30	70
8.8	1.07	7.37	16.13	1	21.89	19.89	24	76
13.8	1.32	7.86	16.93	1	18.88	16.83	16	84
42.4	3.21	11.35	22.45	1	11.21	9.21	14	86
59.0	4.61	13.41	25.31	1	9.23	7.23	33	67
108.4	8.94	18.57	31.15	1	6.57	4.59	..	..

Solubility of Mixtures of $CdCl_2.4RbCl$ and RbCl in Water.

(Rimbach.)

t°.	100 Gms. Solution contain Gms.			Atomic Relation.			Solid Phase, Mol. per cent of:	
	Cd.	Cl.	Rb.	Cd	: Cl :	Rb.	$CdCl_2.4RbCl$	RbCl.
0.4	..	12.86	30.97	..	1	1	55	45
14.8	..	13.62	32.81	..	1	1	67	33
17.9	..	14.0	33.71	..	1	1	80	20

The Effect of the Presence of HCl, $CaCl_2$ and of LiCl upon the Decomposition of Cadmium Tetra Rhubidium Chloride by Water at 16°.

(Rimbach — Ber. 38, 1570, '05.)

100 Gms. Solution contain Gms.					Mols. per 100 Mols. H_2O.			Molecular Ratio.	
Total Cl.	Cl.	HCl.	Cd.	Rb.	$CdCl_2$.	RbCl.	HCl.	$CdCl_2$:	RbCl.
36.44	0.84	36.61	0.41	1.39	0.109	0.483	29.76	1	4.43
28.45	0.80	28.44	0.35	1.38	0.082	0.422	20.35	1	5.15
12.09	3.24	9.11	0.69	6.74	0.139	1.772	5.60	1	12.75
	Ca.	$CaCl_2$.					$CaCl_2$.		
14.98	7.56	20.91	0.73	2.80	0.159	0.799	4.59	1	5.04
12.70	5.77	15.96	0.77	4.87	0.163	1.353	3.41	1	8.31
10.85	3.78	14.47	1.00	8.51	0.211	2.365	2.24	1	11.22
9.08	1.84	5.10	1.24	12.14	0.262	3.385	1.09	1	12.92
	Li.	LiCl.					LiCl.		
26.49	4.87	29.40	0.56	3.871	0.139	1.271	19.40	1	9.13
20.37	3.33	20.11	0.52	7.84	0.122	2.433	12.54	1	19.88

See Note on next page.

CADMIUM (Mono) POTASSIUM CHLORIDE $CdCl_2.KCl.H_2O$.

SOLUBILITY IN WATER.

(Rimbach — Ber. 30, 3079, '97; see also Croft — Phil. Mag. [3] 21, 356, '42.)

t°.	100 Gms. Solution contain Gms.			Gms. $CdCl_2.KCl$ per 100 Gms.	
	Cd.	Cl.	K.	Solution.	Water.
2.6	9.53	9.03	3.31	21.87	27.99
15.9	11.63	10.98	3.99	26.60	36.24
41.5	15.47	14.73	5.45	35.66	55.34
60.6	17.68	16.80	6.20	40.67	68.55
105.1	22.46	21.34	7.87	51.67	106.91

CADMIUM (Tetra) POTASSIUM CHLORIDE $CdCl_2.4KCl$.

IN CONTACT WITH WATER.

(Rimbach.)

The double salt is decomposed when dissolved in water at ordinary temperature.

t°.	100 Grams Solution contain Gms.		
	Cd.	Cl.	K.
4	3.64	9.84	8.31
23.6	5.66	14.02	11.52
50.2	9.10	18.09	13.60
108.9	11.94	23.11	17.16

NOTE. — The effect of the presence of certain chlorides upon the decomposition of cadmium tetra potassium chloride by water at 16° was investigated by Rimbach in a manner similar to that used in the case of cadmium tetra rhubidium chloride (see preceding page). The results, which show the extent to which increasing amounts of the several chlorides force back the decomposition of the double salt, were plotted on cross-section paper, and the points at which the decomposition was prevented, were determined by interpolation. These values which show the minimum amount of the added chlorides which must be present to insure the crystallization of the pure double salt are shown in the following table.

Added Chloride.	Mols. per 100 Mols. H_2O.			Density of Solutions.	Mols. per Liter of Solution.		
	$CdCl_2$.	KCl.	Added Chloride.		$CdCl_2$.	KCl.	Added Chloride.
HCl	0.074	0.296	19.80	1.1403	0.033	0.132	8.828
LiCl	0.344	1.376	9.30	1.1380	0.166	0.663	4.483
$CaCl_2$	0.544	2.176	3.80	1.2333	0.270	1.808	1.887
KCl	1.034	6.514*	2.378	1.214	0.507	3.195*	1.167

* Total.

CADMIUM CYANIDE $Cd(CN)_2$.

100 gms. H_2O dissolve 1.7 gms. $Cd(CN)_2$ at 15°.

(Joannis — Ann. chim. phys. [5] 26, 489, '82.)

CADMIUM FLUORIDE CdF_2.

SOLUBILITY IN WATER.

100 cc. saturated aqueous solution contain 4.36 gms. CdF_2 at 25°.

(Jager — Z. anorg. Chem. **27**, 34, '01.)

CADMIUM HYDROXIDE $Cd(OH)_2$.

SOLUBILITY IN WATER.

1 liter of aqueous solution contains 0.0026 gm. $Cd(OH)_2$ at 25°.

(Bodländer — Z. physik. Chem. **27**, 66, '98.)

CADMIUM IODIDE CdI_2.

SOLUBILITY IN WATER.

(Dietz — W. Abh. p. t. Reichanstalt **3**, 433, '00; see also Kremers — Pogg. Ann. **103**, 57, '58; Eder — Dingl. polyt. J. **221**, 189, '76; Etard — Ann. chim. phys. [7] **2**, 536, '94.)

t°.	Gms. CdI_2 per 100 Gms. Solution.	Gms. CdI_2 per 100 Gms. Water.	Mols. CdI_2 per 100 Mols. H_2O.	t°.	Gms. CdI_2 per 100 Gms. Solution.	Gms. CdI_2 per 100 Gms. Water.	Mols. CdI_2 per 100 Mols. H_2O.
0	44.4	79.8	3.9	30	47.3	89.7	4.43
10	45.4	83.2	4.1	40	48.4	93.8	4.6
15	45.8	84.5	4.17	50	49.35	97.4	4.8
18	46.02	85.2	4.2	75	52.65	111.2	5.4
20	46.3	86.2	4.26	100	56.08	127.6	6.3
25	46.8	87.9	4.34				

Density of saturated solution at 18° = 1.590.

SOLUBILITY OF CADMIUM IODIDE IN ORGANIC SOLVENTS.

Solvent.	t°.	Gms. CdI_2 per 100 Gms. Solution.	Gms. CdI_2 per 100 Gms. Solvent.	Observer.
Absolute Alcohol	15	50.5	102.0	(Eder.)
Ethyl Alcohol	20	42.6	74.27	(Timofeiew — Compt. rend. **112**, 1224, '91.)
Methyl Alcohol	20	59.0	143.7	(Timofeiew — Compt. rend. **112**, 1224, '91.)
Propyl Alcohol	20	28.9	40.67	(Timofeiew — Compt. rend. **112**, 1224, '91.)
Absolute Ether	15	21.7	27.7	(Eder.)
Absolute Acetone	18	20.0	25.0	(Naumann — Ber. **37**, 4332, '04.)

CADMIUM AMMONIUM IODIDES (Mono and Di).

SOLUBILITY IN WATER, ETC.

(Rimbach — Ber. **38**, 1557, '05; at 15° Eder — Dingl. polyt. J. **221**, 189, '76.)

Solvent.	Cd. Mono Ammonium Iodide. t°.	Gms. $CdI_2.NH_4I$ per 100 Gms. Solution.	Gms. $CdI_2.NH_4I$ per 100 Gms. Solvent.	Cd. Di Ammonium Iodide. t°.	Gms. $CdI_2.2NH_4I$ per 100 Gms. Solution.	Gms. $CdI_2.2NH_4I$ per 100 Gms. Solvent.
Water	15	52.6	111.0	14.5	85.97	611.6
Abs. Alcohol	15	53.	113	15	59	143
Abs. Ether	15	29.4	41.7	15	10	11

CADMIUM POTASSIUM IODIDES, Mono = $CdI_2.KI.H_2O$, Di = $CdI_2.2KI.2H_2O$.

CADMIUM Di SODIUM IODIDE $CdI_2.2NaI.6H_2O$.

SOLUBILITY IN WATER, ETC., AT 15°.

(Eder.)

Solvent.	Gms. $CdI_2.KI$ per 100 Gms. Solution.	Gms. $CdI_2.KI$ per 100 Gms. Solvent.	Gms. $CdI_2.2KI$ per 100 Gms. Solution.	Gms. $CdI_2.2KI$ per 100 Gms. Solvent.	Gms. $CdI_2.2NaI$ per 100 Gms. Solution.	Gms. $CdI_2.2NaI$ per 100 Gms. Solvent.
Water	51.5	106	57.8	137	61.3	158.8
Abs. Alcohol	...	...	41.7	71	53.7	116.2
Abs. Ether	...	...	3.9	4.1	9.0	9.9

CADMIUM NITRATE $Cd(NO_3)_2$.

SOLUBILITY IN WATER.

(Funk — Wiss. Abh. p. t. Reichanstalt 3 440, '00.)

t°.	Gms. $Cd(NO_3)_2$ per 100 Gms. Solution.	Gms. $Cd(NO_3)_2$ per 100 Gms. Water.	Mols. $Cd(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−13	37.37	59.67	4.55	$Cd(NO_3)_2.9H_2O$
− 1	47.33	89.86	6.85	"
+ 1	52.73	111.5	8.50	"
0	52.37	109.7	8.37	$Cd(NO_3)_2.4H_2O$
+18	55.9	126.8	9.61	"
30	58.4	140.4	10.7	"
40	61.42	159.2	12.1	"
59.5	76.54	326.3	25.0	"

Density of saturated solution at 18° = 1.776.

CADMIUM OXALATE $CdC_2O_4.3H_2O$.

1 liter of sat. aqueous solution contains 0.033 gm. CdC_2O_4 at 18°.

(Kohlrausch — Z. physik. Chem. 44, 197, '03.)

CADMIUM SULPHATE $CdSO_4$.

SOLUBILITY IN WATER.

(Mylius and Funk — W. Abh. p. t. Reichanstalt 3, 444, '00; see also Kohnstamm and Cohn — Wied Ann. 65, 344, '98; Steinwehr — Ann. der Phys. (Drude) [4] 9, 1050, '02; Etard — Ann. chim. phys [7] 2 536, '94.)

t°.	Gms. $CdSO_4$ per 100 Gms. Solution.	Gms. $CdSO_4$ per 100 Gms. Water.	Solid Phase.	t°.	Gms. $CdSO_4$ per 100 Gms. Solution.	Gms. $CdSO_4$ per 100 Gms. Water.	Solid Phase.
−17	44.5	80.2	$CdSO_4.7H_2O$	40	43.99	78.54	$CdSO_4.\frac{8}{3}H_2O$.
−10	46.1	85.5	"	60	44.99	83.68	"
− 5	48.5	94.2	"	73.5	46.6	87.28	"
−18	43.35	76.52	$CdSO_4.\frac{8}{3}H_2O$	74.5	46.7	87.62	$CdSO_4.H_2O$
−10	43.27	76.28	"	77	42.2	73.02	"
0	43.01	76.48	"	85	39.6	65.57	"
+10	43.18	76.00	"	90	38.7	63.13	"
20	43.37	76.60	"	100	37.8	60.77	"

Solubility of Cadmium Sulphate in Aqueous Solutions of Sulphuric Acid at 0°.

(Engel — Compt. rend. 104, 507, '87.)

Equivalents per 10 Gms. H_2O.		Density of Solutions.	Grams per 100 Grams H_2O.	
H_2SO_4.	$CdSO_4$.		H_2SO_4.	$CdSO_4$.
0.	71.6	1.609	0.00	74.61
3.87	70.9	1.591	1.90	73.87
12.6	62.4	1.545	6.18	65.03
28.1	50.6	1.476	13.78	52.73
43.3	40.8	1.435	21.23	42.52
47.6	37.0	1.421	23.34	38.56
53.8	32.7	1.407	26.38	34.07
71.5	23.0	1.379	35.06	23.96

Solubility of Mixed Crystals of Cadmium Sulphate and Ferrous Sulphate in Water at 25°.

(Stortenbecker — Z. physik. Chem. 34, 109, '00.)

Composition of Solution.					Mol. per cent Cd in Crystals of Solid Phase.
Gms. per 100 Gms. H_2O.		Mols. per 100 Mols. H_2O.		Mol. % Cd. in Sol.	
$CdSO_4$.	$FeSO_4$.	Cd.	Fe.		
Crystals with $2\frac{2}{3}$ Mols. H_2O.					
76.02	0.0	6.57	0.0	100	100
57.61	10.63	4.98	1.26	79.8	99.0
Crystals with 7 Mols. H_2O.					
57.61	10.63	4.98	1.26	79.8	36.6
...	...	...	...	78.5	34.6
...	...	...	...	44.6	11.1
...	...	...	...	24.4	4.8
0.0	26.69	0.0	3.165	0.0	0.0

CADMIUM POTASSIUM SULPHATE $CdK_2(SO_4)_2$.

Solubility in Water.

(Wyrouboff — Bull. soc. chim. [3] 25, 121, '01.)

t°.	G. $CdK_2(SO_4)_2$ per 100 Gms. H_2O.	Solid Phase.	t°.	G. $CdK_2(SO_4)_2$ per 100 Gms. H_2O.	Solid Phase.
16	42.89	$CdK_2(SO_4)_2.2H_2O$	26	42.50	$CdK_2(SO_4)_2.1\frac{1}{2}H_2O$
31	46.82	"	31	42.80	"
40	47.40	"	40	43.45	"
			64	44.90	"

CADMIUM SODIUM SULPHATE $CdNa_2(SO_4)_2.2H_2O$.

SOLUBILITY IN WATER, ALSO WITH THE ADDITION OF CADMIUM SULPHATE AND OF SODIUM SULPHATE.

(Koppel, Gumpery — Z. physik. Chem. 52, 413, '05.)

t°.	Gms. per 100 Gms. Solution.		Gms. per 100 Gms. H_2O.		Mols. per 100 Mols. H_2O.		Solid Phase.
	$CdSO_4$.	Na_2SO_4.	$CdSO_4$.	Na_2SO_4.	$CdSO_4$.	Na_2SO_4.	
24	22.25	15.07	35.49	24.04	3.07	3.05	$CdNa_2(SO_4)_2.2H_2O$
30	22.55	15.29	36.28	24.60	3.14	3.12	"
40	22.89	15.65	37.24	25.45	3.22	3.28	"
0	40.32	4.85	73.54	8.85	6.36	1.12	$CdNa_2(SO_4)_2.2H_2O + CdSO_4.\frac{8}{3}H_2O$
10	39.91	5.24	72.77	9.55	6.30	1.21	"
20	40.26	5.16	73.81	9.45	6.39	1.20	"
40	39.89	7.18	75.38	13.56	6.52	1.72	"
−14.8	40.18	4.60	72.68	8.32	6.29	1.05	
0	37.30	6.53	66.32	11.62	5.74	1.47	$CdNa_2(SO_4)_2.2H_2O + Na_2SO_4.10H_2O$
10	32.53	8.69	55.34	14.78	4.79	1.84	"
20	22.69	14.71	36.25	23.52	3.14	2.98	"
25	16.33	19.82	25.60	31.06	2.21	3.94	"
30	9.21	27.80	14.62	44.14	1.26	4.59	$CdNa_2(SO_4)_2.2H_2O + Na_2SO_4$
35	8.26	29.35	13.26	47.06	1.15	5.96	"
40	9.98	28.27	16.24	46.27	1.41	5.86	"

CAESIUM ALUMS

SOLUBILITY OF CAESIUM CHROMIUM ALUM, CAESIUM IRON ALUM, CAESIUM INDIUM ALUM, AND OF CAESIUM VANADIUM ALUM IN WATER.

(Locke — Am. Ch. J. 27, 174, '01.)

Formula of Alum.	t°.	Gms. per 100 cc. H_2O. Anhydrous Salt.	Gms. per 100 cc. H_2O. Hydrated Salt.	Gram Mols. Salt per 100 cc. H_2O.
$Cs_2Cr_2(SO_4)_4.24H_2O$	25	0.57	0.94	0.00151
"	30	0.96	1.52	0.0025
"	35	1.206	1.91	0.0032
"	40	1.53	2.43	0.00405
$Cs_2Fe_2(SO_4)_4.24H_2O$	25	1.71	2.72	0.0045
"	30	2.52	4.01	0.0066
"	35	3.75	6.01	0.0099
"	40	6.04	9.80	0.0156
$Cs_2In_2(SO_4)_4.24H_2O$	25	7.57	11.73	0.0172
$Cs_2V_2(SO_4)_2.24H_2O$	25	0.771	1.31	0.00204

CAESIUM CHLORAURATE $CsAuCl_4$.

SOLUBILITY IN WATER.

(Rosenbladt — Ber. 19, 2537, '86.)

t°.	Gms. $CsAuCl_4$ per 100 Gms. Solution.	t°.	Gms. $CsAuCl_4$ per 100 Gms. Solution.	t°.	Gms. $CsAuCl_4$ per 100 Gms. Solution.
10	0.5	40	3.2	80	16.3
20	0.8	50	5.4	90	21.7
30	1.7	60	8.2	100	27.5
		70	12.0		

CAESIUM FLUOBORIDE $CsBFl_4$.

100 grams water dissolve 0.92 gram $CsBFl_4$ at 20°, and 0.04 gram at 100°.

(Godeffroy — Ber. 9, 1367, '76.)

CAESIUM MERCURIC BROMIDE $CsBr.2HgBr_2$.

100 grams saturated aqueous solution contain 0.807 gram $CsBr.2HgBr_2$ at 16°.

(Wells — Am. J. Sci. [3] 44, 221, '92.)

CAESIUM CARBONATE Cs_2CO_3.

100 grams absolute alcohol dissolve 11.1 grams Cs_2CO_3 at 19°, and 20.1 grams at b. pt.

(Bunsen.)

CAESIUM CHLORIDE CsCl.

SOLUBILITY IN WATER.

(Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 208, '04; see also Hinrichsen and Sachsel — Z. physik. Chem. 50, 99, '04–'05; at 25°, Foote.)

t°.	G. CsCl per 100 Gms. Solution.	G. CsCl per 100 Gms. Water.	G. Mol. CsCl per Liter.	t°.	G. CsCl per 100 Gms. Solution.	G. CsCl per 100 Gms. Water.	G. Mol. CsCl per Liter.
0	61.7	161.4	6.74	60	69.7	229.7	8.28
10	63.6	174.7	7.11	70	70.6	239.5	8.46
20	65.1	186.5	7.38	80	71.4	250.0	8.64
30	66.4	197.3	7.63	90	72.2	260.1	8.80
40	67.5	208.0	7.86	100	73.0	270.5	8.96
50	68.6	218.5	8.07	119.4	74.4	290.0	9.22

SOLUBILITY OF MIXTURES OF CAESIUM CHLORIDE AND MERCURIC CHLORIDE IN WATER AT 25°.

(Foote — Am. Ch. J. 30, 340, '03.)

Gms. per 100 Gms. Solution. $CsCl_2$.	Gms. per 100 Gms. Solution. $HgCl_2$.	Solid Phase.
65.61	0.0	CsCl
65.78	0.215	$CsCl + Cs_3HgCl_5$
62.36	0.32	Double Salt $Cs_3HgCl_5 = 65.1\%$ CsCl
57.01	0.64	"
52.35	1.23	"
51.08	1.44	$Cs_3HgCl_5 + Cs_2HgCl_4$
49.30	1.49	Double Salt $Cs_2HgCl_4 = 55.4\%$CsCl
45.95	1.69	"
45.23	1.73	$Cs_2HgCl_4 + CsHgCl_3$
38.63	1.32	Double Salt $CsHgCl_3 = 38.3\%$ CsCl
17.03	0.51	"
1.53	0.42	"
0.61	2.64	CsHg $+ CsHg_2Cl_5$
0.49	2.91	Double Salt $CsHg_2Cl_5 = 23.7\%$ CsCl
0.40	3.78	"
0.44	4.63	$CsHg_2Cl_5 + CsHg_5Cl_{11}$
0.41	4.68	Double Salt $CsHg_5Cl_{11} = 11.1\% C_5Cl$
0.25	5.65	"
0.18	7.09	$CsHg_5Cl_{11} + HgCl_2$
0.0	6.90	$HgCl_2$

CAESIUM CHLORTELLURATE $CsTeCl_6$.

SOLUBILITY IN AQUEOUS HYDROCHLORIC ACID.
(Wheeler — Am. J. Sci. [3] 45, 267, '93.)

100 parts HCl (Sp. Gr. 1.2) dissolve 0.05 part $CsTeCl_6$ at 22°.
100 parts HCl (Sp. Gr. 1.05) dissolve 0.78 part $CsTeCl_6$ at 22°.

CAESIUM THALLIC CHLORIDE $3CsCl.TlCl_3.2H_2O$.

100 parts H_2O dissolve 2.76 parts $3CsCl.TlCl_3.2H_2O$ at 17°, and 33.3 parts at 100°. (Godeffroy — Z. Österr. Apoth. Ver. No. 9, 1886).

CAESIUM IODATE $CsIO_3$.

100 parts H_2O dissolve 2.6 parts $CsIO_3$ at 24°, and 2.5 parts $2CsIO_3.I_2O_5$ at 21°. (Wheeler — Am. J. Sci. [3] 44, 123, '92.)

CAESIUM IODIDE CsI.

SOLUBILITY OF MIXTURES OF CAESIUM IODIDE AND IODINE IN WATER.
(Foote — Am. Ch. J. 29, 210, '03.)

t°.	Gms. per 100 Gms. Solution. CsI.	I.	t°.	Gms. per 100 Gms. Solution. CsI.	I.	Solid Phase at both Temps.
−4	27.68	0.0	35.6	51.48	0.0	CsI
−4	27.52	0.09	35.6	51.66	0.71	CsI and CsI_3
−4	3.18	0.31	35.6	10.72	1.78	CsI_3 and CsI_5
−0.2	0.85	0.34	35.6	3.74	1.60	CsI_5 and I

t°.	Gms. per 100 Gms. Solution. CsI.	I.	In Separated Heavy Solution Gms. per 100 Gms. Solution. CsI.	I.	Solid Phase.
52.2	16.75	4.52	...	...	CsI_3 and CsI_5
52.2	6.69	3.36	...	...	CsI_5 and I
52.2	6.72	3.32	22.94	73.72	CsI_5
52.2	6.65	3.45	22.80	74.63	I
73	26.98	15.07	...	...	CsI_3 and CsI_5
73	16.66	10.50	27.56	68.40	CsI_5
73	6.27	4.08	17.68	80.02	I

CAESIUM (Tri) IODIDE CsI_3.

100 cc. saturated aqueous caesium iodide (about 17 per cent CsI) solution contain 0.97 gram CsI_3 at 20°, density of solution = 1.154. (Wells — Am. J. Sci. [3] 44, 221, '92.)

CAESIUM NITRATE $CsNO_3$.

SOLUBILITY IN WATER.
(Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 213, '04.)

t°.	Gms. $CsNO_3$ per 100 Gms. Solution.	Water.	G. Mols. $CsNO_3$ per Liter.	t°.	Gms. $CsNO_3$ per 100 Gms. Solution.	Water.	G. Mols $CsNO_3$ per Liter.
0	8.54	9.33	0.476	60	45.6	83.8	3.41
10	12.97	14.9	0.725	70	51.7	107.0	4.10
20	18.7	23.0	1.11	80	57.3	134.0	4.81
30	25.3	33.9	1.58	90	62.0	163.0	5.50
40	32.1	47.2	2.12	100	66.3	197.0	6.19
50	39.2	64.4	2.73	106.2	68.8	220.3	6.58

CAESIUM OXALATE $Cs_2C_2O_4.H_2O$.

SOLUBILITY OF MIXTURES OF CAESIUM OXALATE AND OXALIC ACID IN WATER AT 25°.

(Foote and Andrew — Am. Ch. J. 34 156, '05.)

Varying amounts of the two substances were dissolved in hot watei and the solutions allowed to cool in a thermostadt held at 25°.

Gms. per 100 Gms. Solution.		G. Mols. per 100 G. Mols. H_2O.		Solid Phase.
$H_2C_2O_4$.	$Cs_2C_2O_4$.	$H_2C_2O_4$.	$Cs_2C_2O_4$.	
10.20	...	2.274	...	$H_2C_2O_4.2H_2O$
10.29	0.61	2.314	0.035	$H_2C_2O_4.2H_2O + H_3Cs(C_2O_4)_2.2H_2O$
7.90	9.92	1.924	0.614	Double Salt.
4.11	25.12	1.162	1.81	$H_3Cs(C_2O_4)_2.2H_2O$
4.32	27.55	1.279	2.06	$H_3Cs(C_2O_4)_2 2H_2O + H_4Cs_2(C_2O_4)_3$
4.27	28.30	1.267	2.14	Double Salt.
4.40	35.90	1.476	3.07	$H_4Cs_2(C_2O_4)_3$
4.82	40.10	1.752	3.71	$H_4Cs_2(C_2O_4)_3 + HCsC_2O_4$
4.45	42.32	1.672	4.05	Double Salt.
3.05	48.80	1.268	5.16	$HCsC_2O_4$
1.04	68.69	0.688	11.56	
0.91	71.24	0.648	13.06	$HCsC_2O_4 + H_6Cs_8(C_2O_4)_7$
0.77	73.45	0.598	14.51	Double Salt.
0.75	74.04	0.596	14.96	$H_6Cs_8(C_2O_4)_7$
0.74	75.20	0.625	15.93	$H_6Cs_8(C_2O_4)_7 + Cs_2C_2O_4.H_2O$
0.0	75.82	0.0	15.97	$Cs_2C_2O_4.H_2O$

CAESIUM PERMANGANATE $CsMnO_4$.

100 cc. sat. aqueous solution contain 0.097 gm. $CsMnO_4$ at 1°, 0.23 gm. at 19°, and 1.25 gms. at 59°. (Patterson — J. Am. Chem. Soc. 28, 1735, '06.)

CAESIUM SELENATE Cs_2SeO_4.

100 grams H_2O dissolve 245 grams Cs_2SeO_4 at 12°.

(Tutton — J. Chem. Soc. 71, 850, '97.)

CAESIUM SULPHATE Cs_2SO_4.

SOLUBILITY IN WATER.

(Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 210, '04.)

t°.	Gms. Cs_2SO_4 per 100 Gms.		G. Mols. Cs_2SO_4 per Liter.	t°.	Gms. Cs_2SO_4 per 100 Gms.		G. Mols. Cs_2SO_4 per Liter.
	Solution.	Water.			Solution.	Water.	
0	62.6	167.1	3.42	60	66.7	199.9	3.78
10	63.4	173.1	3.49	70	67.2	205.0	3.83
20	64.1	178.7	3.56	80	67.8	210.3	3.88
30	64.8	184.1	3.62	90	68.3	214.9	3.92
40	65.5	189.9	3.68	100	68.8	220.3	3.97
50	66.1	194.9	3.73	108.6	69.2	224.5	4.00

SOLUBILITY OF CAESIUM DOUBLE SULPHATES IN WATER AT 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

Name.	Formula.	Gms. Anhydrous Salt per 100 Gms. Solution.	Gms. Anhydrous Salt per 100 Gms. Water.	Gm. Mols. Salt per 100 Gms. H_2O.
Caesium Cadmium Sulphate	$Cs_2Cd(SO_4)_2.6H_2O$	58.16	139.9	0.2455
Caesium Cobalt Sulphate	$Cs_2Co(SO_4)_2.6H_2O$	29.52	41.9	0.081
Caesium Copper Sulphate	$Cs_2Cu(SO_4)_2.6H_2O$	31.49	46.0	0.0882
Caesium Iron Sulphate	$Cs_2Fe(SO_4)_2.6H_2O$	50.29	101.1	0.1967
Caesium Magnesium Sulphate	$Cs_2Mg(SO_4)_2.6H_2O$	34.77	53.3	0.1106
Caesium Manganese Sulphate	$Cs_2Mn(SO_4)_2.6H_2O$	44.58	80.4	0.157
Caesium Nickel Sulphate	$Cs_2Ni(SO_4)_2.6H_2O$	20.37	25.6	0.0495
Caesium Zinc Sulphate	$Cs_2Zn(SO_4)_2.6H_2O$	27.87	38.6	0.0738

CAFFEINE $C_5H(CH_3)_3N_4O_2.H_2O$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Göckel — J. Chem. Soc. 74, 327, '98; Commaille — Compt. rend. 81, 819, '75.)

Solvent.	Grams Caffeine per 100 Grams Solvent at: U.S.P. 25°.	U.S.P. 80°.	Göckel. 18°.	Göckel. b. pt.	Commaille. 15.17°	Commaille. b. pt.
Water	2.19	19.23	...	...	1.31‡	45.51‡
Alcohol	1.88	5.85*	...	...	0.61‡§	3.12‡§
Ether	0.267	...	0.119	0.295	0.044‡§	0.36‡§
Chloroform	12.5	...	11.77	15.63	12.97‡	19.02‡
Benzene	...	...	0.911	5.29	...	...
Carbon Tetra Chloride	...	...	0.089	0.702	...	...
Carbon Bisulphide	...	...	...	...	0.0585‡	0.454‡

* 60°. † 65°. ‡ Gms. anhydrous caffeine. § Abs. alcohol and abs. ether.

CALCIUM ACETATE $Ca(CH_3COO)_2.2H_2O$.

SOLUBILITY IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02, Krasnicki — Monatsh. Chem. 8, 597, '87.)

t°.	Gms. $Ca(CH_3COO)_2$ per 100 Gms. Solution.	Gms. $Ca(CH_3COO)_2$ per 100 Gms. Water.	Solid Phase.	t°.	Gms. $Ca(CH_3COO)_2$ per 100 Gms. Solution.	Gms. $Ca(CH_3COO)_2$ per 100 Gms. Water.	Solid Phase.
0	27.2	37.4	$Ca(CH_3COO)_2.2H_2O$	60	24.6	32.7	$Ca(CH_3COO)_2.2H_2O$
10	26.5	36.0	$Ca(CH_3COO)_2.2H_2O$	80	25.1	33.5	$Ca(CH_3COO)_2.2H_2O$
20	25.8	34.7	$Ca(CH_3COO)_2.2H_2O$	84	25.3	33.8	$Ca(CH_3COO)_2.2H_2O$
25	25.5	34.2	$Ca(CH_3COO)_2.2H_2O$	85	24.7	32.9	$Ca(CH_3COO)_2.H_2O$
30	25.3	33.8	$Ca(CH_3COO)_2.2H_2O$	90	23.7	31.1	$Ca(CH_3COO)_2.H_2O$
40	24.9	33.2	$Ca(CH_3COO)_2.2H_2O$	100	22.9	29.7	$Ca(CH_3COO)_2.H_2O$

SOLUBILITY OF CALCIUM ACETATE IN AN AQUEOUS SATURATED SOLUTION OF SUGAR AT 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 gms. solution contain 8.29 gms. $Ca(CH_3COO)_2$ + 60.12 gms. sugar.
100 gms. water dissolve 26.3 gms. $Ca(CH_3COO)_2$ + 190.3 gms sugar.

CALCIUM (Tri) Methyl **ACETATE** $Ca[(CH_3)_3CCOO]_2$.

CALCIUM (Di) Ethyl **ACETATE** $Ca[(C_2H_5)_2CHCOO]_2$.

CALCIUM Methyl Ethyl **ACETATE** $Ca[CH_3(C_2H_5).CHCOO]_2$.

SOLUBILITY OF EACH IN WATER.

(Landau — Monatsh. Chem. **14**, 717, '93; Keppish — *Ibid.* **9**, 600, '88; Sedlitzki — *Ibid.* **8**, 573, '87.)

t °.	Ca. Tri Methyl Acetate. Gms. $Ca(C_5H_9O_2)_2$ per 100 Gms.		Ca. Di Ethyl Acetate. Gms. $Ca(C_6H_{11}O_2)_2$ per 100 Gms.		Ca. Methyl Ethyl. Acetate. Gms. $Ca(C_5H_9O_2)_2$ per 100 Gms.	
	Water.	Solution.	Water.	Solution.	Water.	Solution.
0	7.30	6.81	30.3	23.22	28.78	22.35
10	6.84	6.40	27.8	21.75	31.71	24.07
20	6.54	6.14	25.6	20.38	33.76	25.23
30	6.40	6.01	23.7	19.16	34.92	25.89
40	6.44	6.05	22.1	18.10	35.20	26.04
50	6.64	6.22	20.8	17.22	34.60	25.71
60	6.86	6.42	19.9	16.60	33.11	24.89
70	7.11	6.64	19.2	16.11	30.74	23.41
80	7.38	6.87	...	...	27.49	21.56

CALCIUM Methyl Propyl **ACETATE** $Ca[CH_3(C_3H_7).CHCOO]_2$.

CALCIUM (Di) Propyl **ACETATE** $Ca[(C_3H_7)_2CHCOO]_2$.

CALCIUM (Iso) Butyl **ACETATE** $Ca[(CH_3)_2CH(CH_2)_2COO]_2$.

SOLUBILITY OF EACH IN WATER.

(Stiassny — Monatsh. Chem. **12**, 596, '91; Furth — *Ibid.* **9**, 313, '88; König — *Ibid.* **15**, 22, '94.)

t °.	Ca. Methyl Propyl Acetate. Gms. $Ca(C_6H_{11}O_2)_2$ per 100 Gms.		Ca. Di Propyl Acetate. Gms. $Ca(C_8H_{15}O_2)_2$ per 100 Gms.		Ca. Iso Butyl Acetate. Gms. $Ca(C_6H_{11}O_2)_2$ per 100 Gms.	
	Water.	Solution.	Water.	Solution.	Water.	Solution.
0	16.58	14.22	9.57	8.73	7.48	6.96
10	15.80	13.65	8.35	7.71	6.38	5.99
20	15.14	13.15	7.19	6.71	5.66	5.36
30	14.61	12.75	6.11	5.77	5.31	5.04
40	14.21	12.45	5.09	4.84	5.31	5.04
50	13.94	12.24	4.14	3.98	5.68	5.37
60	13.79	12.13	3.25	3.15	6.41	6.02
70	13.78	12.12	2.44	2.38	7.51	6.98
80	13.89	12.20	1.65	1.62	8.97	8.23
90	...	...	...	...	10.79	9.74

CALCIUM BROMIDE $CaBr_2$.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. **103**, 65, '58; Etard — Ann. chim. phys. [7] **2**, 532, '94, gives results which yield an irregular curve and are evidently less accurate than those of Kremers.)

t °.	Gms. $CaBr_2$ per 100 Gms. Water.	Solution.	t °.	Gms. $CaBr_2$ per 100 Gms. Water.	Solution.
−22	101	50.5	34.2	185	65
0	125	55.5	40	213	68.1
10	132	57.0	60	278	73.5
20	143	58.8	80	295	74.7
25	153	60.5	105	312	75.7

Density of saturated solution at 20° = 1.82.

CALCIUM (Normal) **BUTYRATE** $Ca[CH_3(CH_2)_2COO]_2.H_2O$.

CALCIUM (Iso) **BUTYRATE** $Ca[(CH_3)_2CH.COO]_2.5H_2O$.

SOLUBILITY OF EACH IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; see also Chancel and Parmentier — Compt. rend. 104, 474, '87; Deszathy — Monatsh. Chem. 14, 251, '93, and also Hecht — Liebig's Annalen 213, 72, '82, give results for the normal salt which are somewhat below those of Lumsden for the lower temperatures. Sedlitzki — Monatsh. Chem. 8, 566, '87, gives slightly different results for the iso salt.)

Calcium Normal Butyrate.

t°.	Gms. $Ca(C_4H_7O_2)_2$ per 100 Gms. Water.	Gms. $Ca(C_4H_7O_2)_2$ per 100 Gms. Solution.
0	20.31	16.89
10	19.15	16.08
20	18.20	15.39
25	17.72	15.05
30	17.25	14.71
40	16.40	14.09
60	15.15	13.16
80	14.95	13.01
100	15.85	13.69

Calcium Iso Butyrate.

t°.	Gms. $Ca(C_4H_7O_2)_2$ per 100 Gms. Water.	Gms. $Ca(C_4H_7O_2)_2$ per 100 Gms. Solution.	Solid Phase.
0	20.10	16.78	$Ca(C_4H_7O_2)_2.5H_2O$
20	22.40	18.30	"
30	23.80	19.23	"
40	25.28	20.65	"
60	28.40	22.12	"
62	28.70	22.30	"
65	28.25	22.03	$Ca(C_4H_7O_3)_2.H_2O$
80	27.00	21.26	"
100	26.10	20.69	"

CALCIUM CAPROATE $Ca[CH_3(CH_2)_4COO]_2.H_2O$.

CALCIUM 3 Methyl **PENTANATE** $Ca[CH_3.CH_2.CH(CH_3)CH_2.COO]_2.3H_2O$.

CALCIUM CAPRYLATE $Ca[CH_3(CH_2)_6COO]_2.H_2O$.

SOLUBILITY OF EACH IN WATER.

(Lumsden; the Pentanate, Kulish — Monatsh. Chem. 14, 566, '93; see also Keppish — *Ibid.* 9, 594, '88, and Altschul — *Ibid.* 17, 571, '96, for results on the Caproate.)

t°.	Ca. Caproate. Gms. $Ca(C_6H_{11}O_2)_2$ per 100 Gms. H_2O.	Ca. 3 Methyl Pentanate. Gms. $Ca(C_6H_{11}O_2)_2$ per 100 Gms. Water.	Ca. 3 Methyl Pentanate. Gms. $Ca(C_6H_{11}O_2)_2$ per 100 Gms. Solution.	Ca. Caprylate. Gms. $Ca(C_8H_{15}O_2)_2$ per 100 Gms. H_2O.
0	2.23	12.33	10.98	0.33
20	2.18	17.18	14.66	0.31
40	2.15	18.99	15.97	0.28
50	2.10	18.73	15.78	0.26
60	2.15	17.71	15.04	0.24
80	2.30	13.37	11.80	0.32
100	2.57	9.94	9.04	0.50

CALCIUM CARBONATE $CaCO_3$.

SOLUBILITY IN WATER, AS DETERMINED BY THE ELECTROLYTIC CONDUCTIVITY METHOD.

(Holleman, Kohlrausch, and Rose — Z. physik. Chem. 12, 129, 241, '93.)

1 liter solution contains 0.01 gram $CaCO_3$ at 8.7°, and 0.012 gram at 20°.

CALCIUM BICARBONATE $Ca(HCO_3)_2$.

Solubility in Water at 15°.

Calcium carbonate in presence of water, free from and containing carbon dioxide, dissolves as the hydrogen carbonate.

(Among the investigators who have reported results upon the solubility of calcium bicarbonate may be mentioned, Cossa — Z. anal. Chem. **8**, 145, '69; Schloesing — Compt. rend. **74**, 1522, '72; Caro — Arch. Pharm. [3] **4**, 145, '74; Reid — Proc. Roy. Soc. (Edin.) **15**, 151, '87–'88; Irving and Young — J. Chem. Soc. **56**, 344, '88; Anderson — Proc. Roy. Soc. (Edin.) **16**, 319, '88–'89; Engel — Ann. chim. phys. [6] **13**, 348, '88; Lubavin — J. russ. phys. chem. Ges. **24**, 389, '92; Pollacci — L'Orosi **19**, 217, '96, etc. The results, however, which appear of most interest and reliability are the following by Treadwell and Reuter — Z. anorg. Chem. **67**, 185, '96.)

cc. CO_2 per 100 cc. Gaseous Phase (0° and 760 mm.).	Partial Pressure of CO_2 in mm. Hg.	Gms. per 100 cc. Saturated Solution.		
		Free CO_2.	$Ca(HCO_3)_2$.	Ca.
8.94	67.9	0.1574	0.1872	0.0462
6.04	45.9	0.0863	0.1755	0.0433
5.45	41.4	0.0528	0.1597	0.0394
2.18	16.6	0.0485	0.1540	0.0380
1.89	14.4	0.0347	0.1492	0.0368
1.72	13.1	0.0243	0.1331	0.0329
0.79	6.0	0.0145	0.1249	0.0308
0.41	3.1	0.0047	0.0821	0.0203
0.25	1.9	0.0029	0.0595	0.0147
0.08	0.6	...	0.0402	0.0099
...	...	...	0.0385	0.0095

Therefore 1 liter sat. solution at 15° and 0 partial pressure of CO_2 contains 0.385 gram $Ca(HCO_3)_2$.

Solubility of Calcium Bicarbonate in Aqueous Sodium Chloride Solution at 15°.

(Treadwell and Reuter.)

The NaCl solution contained about 5 grams per liter, and was therefore approximately $\frac{1}{10}$ normal.

cc. CO_2 per 100 cc. Gaseous Phase (0° and 760 mm.).	Partial Pressure of CO_2 in mm. Hg.	Grams per 100 cc. Saturated Solution.		
		Free CO_2.	$Ca(HCO_3)_2$.	Ca.
16.95	128.8	0.1325	0.2184	0.0539
11.47	87.2	0.1101	0.2143	0.0529
6.07	46.1	0.0235	0.1492	0.0368
3.16	24.0	0.0135	0.1183	0.0292
0.50	3.8	0.0027	0.0739	0.0182
.41	3.4	0.0003	0.0490	0.0121
	...	...	0.0349	0.0086
	...	...	0.0332	0.0082

SOLUBILITY OF CALCIUM BICARBONATE IN AQUEOUS SOLUTIONS OF AMMONIUM NITRATE, SODIUM CHLORIDE AND OF SODIUM SULPHATE.

(Cameron and Seidell — J. Physic. Chem. 6, 50, '02; Berju and Kosminiko — Landw. Vers. Stat. 60, 422, '04.)

In NH_4NO_3 Solutions at 18°. Grams per Liter Solution.		In NaCl Solutions at 25°. Grams per Liter Solution.		In Na_2SO_4 Solutions at 24°. Grams per Liter Solution.		
NH_4NO_3.	$Ca(HCO_3)_2$.	NaCl.	$Ca(HCO_3)_2$.	Na_2SO_4.	$Ca(HCO_3)_2$ total.	$Ca(HCO_3)_2$.
0	0.210	0	0.1046	0	0.092	0.092
5	0.340	5	0.150	5	0.175	0.175
10	0.415	10	0.180	10	0.232	0.220
20	0.547	20	0.210	20	0.277	0.262
40	0.744	40	0.225	40	0.332	0.307
80	0.940	80	0.220	80	0.400	0.347
		100	0.215	100	0.432	0.355
		150	0.192	150	0.510	0.382
		200	0.170	200	0.600	0.400
		250	0.137	250	0.725	0.435

CALCIUM CHLORATE $Ca(ClO_3)_2.2H_2O$.

100 grams saturated aqueous solution contain 64.0 grams $Ca(ClO_3)_2$ at 18°. Density of solution is 1.729.

(Mylius and Funk — Ber. 30, 1718, '97.)

CALCIUM CHLORIDE $CaCl_2$.

SOLUBILITY IN WATER.

(Roozeboom — Z. physik. Chem. 4, 42, '89; see also Mulder; Ditte — Compt. rend. 92, 242, '81; Engel — Ann. chim. physic. [6]13, 381, '88; Etard — *Ibid.* [7] 2, 532, '94.)

t°.	Gms. $CaCl_2$ per 100 Gms. Water.	Gms. $CaCl_2$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $CaCl_2$ per 100 Gms. Water.	Gms. $CaCl_2$ per 100 Gms. Solution.	Solid Phase.
−55	42.5	29.8	Ice + $CaCl_2.6H_2O$	60	136.8	57.8	$CaCl_2.2H_2O$
−25	50.0	33.3	$CaCl_2.6H_2O$	70	141.7	58.6	$CaCl_2.2H_2O$
0	59.5	37.3	$CaCl_2.6H_2O$	80	147.0	59.5	$CaCl_2.2H_2O$
10	65.0	39.4	$CaCl_2.6H_2O$	90	152.7	60.6	$CaCl_2.2H_2O$
20	74.5	42.7	$CaCl_2.6H_2O$	100	159.0	61.4	$CaCl_2.2H_2O$
30.2	102.7	50.7	$CaCl_2.6H_2O$	120	173.0	63.4	$CaCl_2.2H_2O$
20	91.0	47.6	$CaCl_2.4H_2O\alpha$	140	191.0	65.6	$CaCl_2.2H_2O$
29.8	100.6	50.1	$.4H_2O\ \alpha + .6H_2O$	160	222.5	69.0	$CaCl_2.2H_2O$
40	115.3	53.4	$.4H_2O\ \alpha$	170	255.0	71.8	$CaCl_2.2H_2O$
20	104.5	51.1	$CaCl_2.4H_2O\ \beta$	175.5	297.0	74.8	$CaCl_2.2H_2O$ + $CaCl_2.H_2O$
29.2	112.8	53.0	$.4H_2O\ \beta + .6H_2O$	180	300.0	75.0	$CaCl_2.H_2O$
35	122.5	55.0	$.4H_2O\ \beta$	200	311.0	75.7	$CaCl_2.H_2O$
38.4	127.5	56.0	$.4H_2O\ \beta + CaCl_2.2H_2O$	235	332.0	76.8	$CaCl_2.H_2O$
45.3	130.2	56.6	$.4H_2O\ \alpha + CaCl_2.2H_2O$	260	347.0	77.6	$CaCl_2.H_2O$

Density of saturated solution at 0° = 1.367, at 15° = 1.399, at 18° = 1.417.

Solubility of Calcium Chloride in Aqueous Solutions of Hydrochloric Acid at 0°.

(Engel — Compt. rend. 104, 434, '87.)

G. Mols. in Mgs. per 10 cc. Solution.		Density of Solutions.	Grams per 100 cc. Solution.	
$\frac{1}{2}CaCl_2$.	HCl.		$CaCl_2$.	HCl.
92.7	0.0	1.367	51.45	0.0
83.7	9.1	1.344	46.45	3.32
77.1	16.0	1.326	42.80	5.83
66.25	29.25	1.310	36.77	10.66
53.75	43.45	1.283	29.84	15.84
36.25	63.5	1.250	20.12	23.15
20.3	95.0	1.238	11.29	34.62

Solubility of Mixtures of Calcium Chloride and Alkali Chlorides.

(Mulder; Rüdorff.)

100 grams H_2O dissolve 63.5 grams $CaCl_2$ + 4.9 grams KCl at 7° (M)
100 grams H_2O dissolve 57.6 grams $CaCl_2$ + 2.4 grams NaCl at 4° (M)
100 grams H_2O dissolve 59.5 grams $CaCl_2$ + 4.6 grams NaCl at 7° (M)
100 grams H_2O dissolve 72.6 grams $CaCl_2$ + 16.0 grams NaCl at 15° (R)

Solubility of Calcium Chloride in Aqueous Alcohol at Room Temperature.

(Bödtker — Z. physik. Chem. 22, 570, '97.)

Solution Used.	Vol. per cent Alcohol.	Gms. $CaCl_2$ per 5 cc. Sol.
15 Gms. $CaCl_2.6H_2O$ + 20 cc. alcohol	92.3	1.430
15 Gms. $CaCl_2.6H_2O$ + 20 cc. alcohol	97.3	1.409
15 Gms. $CaCl_2.6H_2O$ + 20 cc. alcohol	99.3	1.429
15 Gms. $CaCl_2.6H_2O$ + 1 Gm. $CaCl_2$	99.3	1.529
15 Gms. $CaCl_2.6H_2O$ + 20 cc.: alcohol + 2 Gms. $CaCl_2$	99.3	1.561
" + 3 " "	"	1.590
" + 4 " "	"	1.641
" + 5 " "	"	1.709

Solubility of Calcium Chloride in a Saturated Solution of Sugar at 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 grams saturated solution contain 42.84 grams sugar + 25.25 grams $CaCl_2$, or 100 grams water dissolve 135.1 grams sugar + 79.9 grams $CaCl_2$.

CALCIUM CITRATE $Ca_3(C_6H_5O_7)_2.4H_2O$.

Solubility in Water and in Alcohol at 18° and at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

Solvent.	Grams $Ca_3(C_6H_5O_7)_2.4H_2O$ per 100 Gms. Solvent at:	
	18°.	25°.
Water	0.08496	0.0959
Alcohol (Sp. Gr. 0.8092=95%)	0.0065	0.0089

CALCIUM CHROMATE $CaCrO_4$.

SOLUBILITY OF THE SEVERAL HYDRATES IN WATER.

(Mylius and Wrochem — Wiss. Abh. p. t. Reichanstalt 3, 462, '00.)

t°.	Gms. $CaCrO_4$ per 100 Gms. Water.	Gms. $CaCrO_4$ per 100 Gms. Solution.	Mols. $CaCrO_4$ per 100 Mols. H_2O.
Solid Phase, α $CaCrO_4.2H_2O$. (Monoclinic.)			
0	17.3	14.75	2.0
18	16.68	14.3	1.93
20	16.6	14.22	1.93
30	16.5	13.89	1.85
45	14.3	12.53	1.65
Solid Phase, β $CaCrO_4.2H_2O$ (Rhombic.)			
0	10.9	9.8	1.25
18	11.5	10.3	1.33
40	11.6	10.4	1.34
Solid Phase, $CaCrO_4.H_2O$.			
0	13.0	11.5	1.50
18	10.6	9.6	1.22
25	10.0	9.1	1.15
40	8.5	7.8	0.98
60	6.1	5.7	0.70
75	4.8	4.6	0.56
100	3.2	3.1	0.37

t°.	Gms. $CaCrO_4$ per 100 Gms. Water.	Gms. $CaCrO_4$ per 100 Gms. Solution.	Mols. $CaCrO_4$ per 100 Mols. H_2O.
Solid Phase, $CaCrO_4.\frac{1}{2}H_2O$.			
0	7.3	6.8	0.84
18	4.8	4.4	0.51
31	3.84	3.7	0.44
38.5	2.67	2.6	0.31
50	1.63	1.6	0.19
60	1.13	1.1	0.13
100	0.81	0.8	0.09
Solid Phase, $CaCrO_4$.			
0	4.5	4.3	0.52
18	2.32	2.27	0.27
31	2.92	1.89	0.22
50	1.12	1.11	0.13
60	0.83	0.82	0.11
70	0.80	0.79	0.09
100	0.42	0.42	0.05

Densities of the saturated solutions of the above several hydrates at 18° are: α $CaCrO_4.2H_2O$, 1.149; β $CaCrO_4.2H_2O$, 1.105; $CaCrO_4.H_2O$, 1.096; $CaCrO_4.\frac{1}{2}H_2O$, 1.044; $CaCrO_4$, 1.023.

100 cc. 29% alcohol dissolve 1.206 grams $CaCrO_4$.
100 cc. 53% alcohol dissolve 0.88 gram $CaCrO_4$.

(Fresenius — Z. anal. Chem. 30, 672, '91.)

CALCIUM POTASSIUM FERROCYANIDE $CaK_2Fe(CN)_6.3H_2O$.

100 parts H_2O dissolve 0.125 part salt at 15°, and 0.69 part at b. pt.

(Kunheim and Zimmerman — Dingt. polyt. J. 252, 478, '84.)

CALCIUM FLUORIDE CaF_2.

1 liter of saturated aqueous solution contains 0.016 gram CaF_2 at 18°. Determined by the electrolytic method.

(Kohlrausch — Z. physik. Chem. 44, 197, '03.)

CALCIUM FORMATE $Ca(HCOO)_2$.

SOLUBILITY IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; see also Krasnicki — Monatsh. Chem. 8, 597, '87.)

t°.	Gms. $Ca(HCOO)_2$ per 100 Gms. Water.	Gms. $Ca(HCOO)_2$ per 100 Gms. Solution.	t°.	Gms. $Ca(HCOO)_2$ per 100 Gms. Water.	Gms. $Ca(HCOO)_2$ per 100 Gms. Solution.
0	16.15	13.90	60	17.50	14.89
20	16.60	14.22	80	17.95	15.22
40	17.05	14.56	100	18.40	15.53

CALCIUM HEPTOATE (Oenanthate) $Ca[CH_3(CH_2)_5COO]_2.H_2O$.

Solubility in Water.

(Lumsden — J. Chem. Soc. 81, 355, '02; see also Landau — Monatsh. Chem. 14, 712, '93; Altschul — *Ibid.* 17, 575, '96.)

t°.	0°.	20°.	40°.	60°.	80°.	100°.
G. $Ca(C_7H_{13}O_2)_2$ per 100 gms. solution	0.94	0.85	0.81	0.81	0.97	1.24

CALCIUM HYDROXIDE $Ca(OH)_2$.

Solubility in Water.

(Average curve from the results of Lamy — Ann. chim. phys. [5] 14, 145, '78; Mahen — Pharm. J. Trans [3] 14, 505, '83–84; Herzfeld — Z. Ver Zuckerind. 34, 820, '97, and Guthrie — J. Soc. Chem. Ind. 20, 224, '01.)

t°.	Grams per 100 Grams H_2O.		t°.	Grams. per 100 Grams H_2O.	
	$Ca(OH)_2$.	CaO.		$Ca(OH)_2$.	CaO.
0	0.185	0.140	50	0.128	0.097
10	0.176	0.133	60	0.116	0.088
20	0.165	0.125	70	0.106	0.080
25	0.159	0.120	80	0.094	0.071
30	0.153	0.116	90	0.085	0.064
40	0.141	0.107	100	0.077	0.058

Solubility of Calcium Hydroxide in Aqueous Solutions of Ammonium Chloride at 25°.

(Noyes and Chapin — Z. physik. Chem. 28, 520, '99.)

Millimols per Liter.		Grams per Liter of Saturated Solution.		
NH_4Cl.	$Ca(OH)_2$.	NH_4Cl.	$Ca(OH)_2$ =	CaO.
0.00	20.22	0.00	1.50	1.13
21.76	29.08	1.165	2.16	1.63
43.52	39.23	2.330	2.91	2.20
83.07	59.68	4.447	4.42	3.45

Solubility of Calcium Hydroxide in Aqueous Solutions of Calcium Chloride.

(Zahorsky — Z. anorg. Chem. 3, 41, '93; Lunge — J. Soc. Chem. Ind. 11, 882, '92.)

Concentration of $CaCl_2$ Solutions, Wt. %.	Grams CaO Dissolved per 100 cc. Solvent at:				
	20°.	40°.	60°.	80°.	100°.
0	0.1374	0.1162	0.1026	0.0845	0.0664
5	0.1370	0.1160	0.1020	0.0936	0.0906
10	0.1661	0.1419	0.1313	0.1328	0.1389
15	0.1993	0.1781	0.1706	0.1736	0.1842
20	0.1857*	0.2249	0.2204	0.2295	0.2325
25	0.1661*	0.3020*	0.2989	0.3261	0.3710
30	0.1630*	0.3680*	0.3664	0.4122	0.4922

* Indicates cases in which a precipitate of calcium oxychloride separated and thus removed some of the $CaCl_2$ from solution.

The results in 0% $CaCl_2$ solutions, *i.e.*, in pure water, are high when compared with the average results given above.

Solubility of Calcium Hydroxide in Aqueous Solutions of Potassium Chloride and of Sodium Chloride.

(Cabot — J. Soc. Chem. Ind. **16**, 417, '97.)

Gms. of the Chloride per Liter.	In KCl Solutions. Gms. CaO per Liter at: 0°.	15°.	99°.	In NaCl Solutions. Gms. CaO per Liter at: 0°.	15°.	99°.
0	1.36	1.31	0.635	1.36	1.31	0.635
30	1.701	1.658	0.788	1.813	1.703	0.969
60	1.725	1.674	0.876	...	1.824	1.004
120	1.718	1.606	0.894	1.86	1.722	1.015
240	1.248	1.199	0.617	1.37	1.274	0.771
320	...	...	...	1.054	0.929	0.583

Solubility of Lime in Aqueous Solutions of Sodium Chloride alone and containing Sodium Hydroxide.

(Margiet — Bull. soc. chim. [3] **33**, 631, '05.)

G. NaCl per Liter.	Gms. CaO per Liter of Solution. Without NaOH.	0.89.NaOH per Liter.	4.09.NaOH per Liter.	G. NaCl. per Liter.	Gms. CaO per Liter of Solution. Without NaOH.	0.89.NaOH per Liter.	4.09.NaOH per Liter.
0	1.3	0.8	0.22	150	1.65	1.25	0.44
5	1.4	0.9	...	175	1.6	1.2	...
10	1.6	1.0	...	182	1.6	1.2	...
25	1.7	1.1	...	225	1.4	1.0	...
50	1.8	1.25	...	250	1.3	0.9	...
75	1.9	1.4	0.55	300	1.1	0.7	0.22
100	1.85	1.4	...	...	...	...	...

Solubility of Calcium Hydroxide in Aqueous Solutions of Sodium Hydroxide.

(d'Anselme — Bull. soc. chim. [3] **29**, 938, '03.)

Concentration of NaOH: Normality.	Gms. per Liter	Grams CaO per Liter Sat. Solution at: 20°.	50°.	70°.	100°.
0	0	1.170	0.880	0.75	0.54
N/100	0.4	0.94	0.65	0.53	0.35
N/25	1.6	0.57	0.35	0.225	0.14
N/15	2.66	0.39	0.20	0.11	0.05
N/8	5.00	0.18	0.06	0.04	0.01
N/5	8.00	0.11	0.02	0.01	trace
N/2	20.00	0.02	trace	0.00	0.00

For results upon mixtures of calcium hydroxide and alkali carbonates and hydroxides, see Bodländer — Z. angew. Chem. **18**, 1138, '05.

Solubility of Calcium Hydroxide in Aqueous Solutions of Glycerine at 25°.

(Herz and Knoch — Z. anorg. Chem. **46**, 193, '05; for older determinations, see Berthelot — Ann. chim. phys. [3] **46**, 176; and Carles — Arch. Pharm. [3] **4**, 558, '74.)

Density of Solutions	Wt. per cent Glycerine in Solution.	Millimols $\frac{1}{2}Ca(OH)_2$ per 100 cc. Solution.	Gms. per 100 cc. Solution. $Ca(OH)_2$	= CaO.
1.0003	0.0	4.3	0.1593	0.1206
1.0244	7.15	8.13	0.3013	0.2281
1.0537	20.44	14.9	0.5522	0.4180
1.0842	31.55	22.5	0.8339	0.6313
1.1137	40.95	40.1	1.486	1.125
1.1356	48.7	44.0	1.631	1.234
1.2072	69.2	95.8	3.550	2.687

Solubility of Lime in Aqueous Solutions of Sugar.

(Weisberg — Bull. soc. chim. [3] **21**, 775, '99.)

The original results were plotted on cross-section paper and the following table constructed from the curves.

1st series, t° = 16′–17°. Gms. per 100 Gms. Solution. Sugar.	CaO.	G. CaO per 100 Gms. Sugar in Sol.	2d, series t° = 15°. Gms. per 100 Gms. Solution. Sugar.	CaO.	G. CaO per 100 Gms. Sugar in Sol.
1	0.30	35.0	1	0.50	62.5
2	0.56	28.7	2	0.75	36.0
3	0.85	28.0	3	1.02	32.5
4	1.12	27.7	4	1.22	30.2
5	1.40	27.5	5	1.45	28.5
6	1.65	27.5	6	1.67	27.7
8	2.22	27.5	8	2.22	27.5
10	2.77	27.5	10	2.77	27.5
12	3.27	27.5	12	3.27	27.5
14	3.85	27.5	14	3.85	27.5

In the second series a very much larger excess of lime was used than in the first series. The author gives results in a subsequent paper, — Bull. soc. chim. [3] **23**, 740, '00, — which show that the solubility is also affected by the condition of the calcium compound used, *i.e.*, whether the oxide, hydrate, or milk of lime is added to the sugar solutions.

CALCIUM IODATE $Ca(IO_3)_2.6H_2O$.

SOLUBILITY IN WATER.

(Mylius and Funk — Ber. 30, 1724, '97; W. Abh. p. t. Reichanstalt 3, 448, '00.)

t°.	Gms. $Ca(IO_3)_2$ per 100 Gms. Sol.	Mols. $Ca(IO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Ca(IO_3)_2$ per 100 Gms. Sol.	Mols. $Ca(IO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
0	0.10	0.0044	$Ca(IO_3)_2.6H_2O$	21	0.37	0.016	$Ca(IO_3)_2.H_2O$
10	0.17	0.0075	"	35	0.48	0.021	"
18	0.25	0.011	"	40	0.52	0.023	"
30	0.42	0.019	"	45	0.54	0.024	"
40	0.61	0.027	"	50	0.59	0.026	"
50	0.89	0.040	"	60	0.65	0.029	"
54	1.04	0.046	"	80	0.79	0.034	"
60	1.36	0.063	"	100	0.94	0.042	"

Density of solution saturated at 18° = 1.00.

CALCIUM IODIDE CaI_2.

SOLUBILITY IN WATER.

(Average curve from the results of Kremers — Pogg. Ann. 103, 65, '58; Etard — Ann. chim. phys. [7] 2, 532, '94.)

t°.	Gms. CaI_2 per 100 Gms. Solution.	t°.	Gms. CaI_2 per 100 Gms. Solution.	t°.	Gms. CaI_2 per 100 Gms. Solution.
0	64.6	30	69	80	78
10	66.0	40	70.8	100	81
20	67.6	60	74		

Density of solution saturated at 20° = 2.125.

CALCIUM (Neutral) MALATE $Ca(C_4H_4O_5).3H_2O$.
CALCIUM (Acid) MALATE $Ca(C_4H_5O_5)_2.6H_2O$.
CALCIUM MALONATE $Ca(C_3H_2O_4).4H_2O$.

SOLUBILITY OF EACH IN WATER.

(Iwig and Hecht — Liebig's Ann. 233, 167, '86; Cantoni and Basadonna — Bull. soc. chim. [3] 35, 731, '06; the malonate, Miczynski — Monatsh. Chem. 7, 261, '86.)

t°.	Ca. Neutral Malate. Gms. $Ca(C_4H_4O_5)$ per 100. Gms. H_2O.	Gms. Sol.	cc. Sol. (C and B).	Ca. Acid Malate. Gms. $Ca(C_4H_5O_5)_2$ per 100 Gms. Water.	Solution.	Ca. Malonate. Gms. $Ca(C_3H_2O_4)$ per 100 Gms. H_2O.
0	...	...	...	...	...	0.290
10	0.85	0.84	...	1.8	1.77	0.330
20	0.82	0.81	0.907	1.5	1.48	0.365
30	0.78	0.77	0.835	2.0	1.96	0.396
40	0.74	0.73	0.816	5.2	4.94	0.422
50	0.66	0.65	0.809	15.0	13.09	0.443
57	0.57	0.56	...	32.24	24.29	...
60	0.58	0.58	0.804	26.0	20.64	0.460
70	0.63	0.63	0.795	11.0	9.91	0.472
80	0.71	0.70	0.754	6.8	6.37	0.479
90	...	...	0.740	...	...	

SOLUBILITY OF CALCIUM MALATE IN WATER AND IN ALCOHOL.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

100 grams H_2O dissolve 0.9214 gram $CaC_4H_4O_5.H_2O$ at 18°, and 0.8552 gram at 25°.

100 grams 95% alcohol dissolve 0.0049 gram $CaC_4H_4O_5.H_2O$ at 18°, and 0.00586 gram at 25°.

CALCIUM NITRATE $Ca(NO_3)_2.2H_2O$.

SOLUBILITY IN WATER AT 18°.

(Mylius and Funk — Ber. 30, 1718, '97.)

100 grams saturated solution contain 54.8 grams $Ca(NO_3)_2$. Density of solution, 1.548.

CALCIUM OXALATE $Ca(COO)_2.H_2O$.

SOLUBILITY IN WATER, BY ELECTROLYTIC CONDUCTIVITY METHOD.

(Holleman, Kohlrausch, and Rose — Z. physik. Chem. 12, 129, 241, '93; Richards, McCaffrey, and Bisbee — Z. anorg. Chem. 28, 85, '01.)

t°.	Gms. CaC_2O_4 per Liter of Solution.	t°.	Gms. CaC_2O_4 per Liter of Solution.
13	0.0067 (H)	25	0.0068 (R, McC and B)
18	0.0056 (K and R)	50	0.0095 "
24	0.0080 (H)	95	0.0140 "

SOLUBILITY OF CALCIUM OXALATE IN AQUEOUS SOLUTIONS OF ACETIC ACID AT 26°–27°.

(Herz and Muhs — Ber. 36, 3715, '03.)

Normality of Acetic Acid.	G. CH_3COOH per 100 cc. Sol.	Residue from 50.052 cc. Solution.
0	0.00	0.0017
0.58	3.48	0.0048
2.89	17.34	0.0058
5.79	34.74	0.0064

The residues were dried at 70° C.

CALCIUM OXIDE. See Calcium Hydroxide, p. 91.

CALCIUM PHOSPHATE (Tribasic) $Ca_3(PO_4)_2$.

SOLUBILITY IN WATER.

The determinations of the solubility of this salt in water, as stated in the literature, are found to vary within rather wide limits, due, no doubt, to the fact that so-called tribasic calcium phosphate is apparently a solid solution of the dibasic salt and calcium oxide, and therefore analyses of individual samples may show an excess of either lime or phosphoric acid. When placed in contact with water, more PO_4 ions enter solution than Ca ions, the resulting solution being acid in reaction and the solid phase richer in lime than it was, previous to being added to the water. For material having a composition approximating closely that represented by the formula $Ca_3(PO_4)_2$ the amount which is dissolved by CO_2 free water at the ordinary temperature, as calculated from the calcium determination, is 0.01 to 0.10 gram per liter, depending upon the conditions of the experiment. Water saturated with CO_2 dissolves 0.15 to 0.30 gram per liter.

A list of references to papers on this subject is given by Cameron and Hurst — J. Am. Chem. Soc. **26**, 903, '04; see also Cameron and Bell, *Ibid.* **27**, 1512, '05.

CALCIUM PHOSPHATE (Dibasic) $CaHPO_4.2H_2O$.

SOLUBILITY IN WATER.

(Cameron and Seidell — J. Am. Chem. Soc. 26, 1460, '04; see also Rindell — Compt. rend. 134, 112, '02; Magnanini — Gazz. chim. ital. 31, II, 544, '01.)

1 liter of CO_2 free water dissolves 0.136 gram $CaHPO_4$ at 25°.
1 liter of water sat. with CO_2 dissolves 0.561 gram $CaHPO_4$ at 25°.

SOLUBILITY OF DI CALCIUM PHOSPHATE AND OF MONO CALCIUM PHOSPHATE IN AQUEOUS SOLUTIONS OF PHOSPHORIC ACID AT 25°.

(Cameron and Seidell — J. Am. Chem. Soc. 27, 1508, '05; Causse — Compt. rend. 114, 414, '92.)

Grams per Liter of Solution.		Gms. per Liter		P_2O_5 per Liter in Excess of that combined with Ca.	Solid Phase.
CaO.	P_2O_5.	Calc. from CaO	Found.		
1.71	4.69	4.15	$CaHPO_4$	2.53	$CaHPO_4.2H_2O$
11.57	36.14	28.05	"	21.5	"
23.31	75.95	56.53	"	46.45	"
39.81	139.6	97.01	"	89.0	"
49.76	191.0	120.7	"	128.0	"
59.40	234.6	144.1	"	159.4	"
70.31	279.7	170.6	"	190.7	"
77.00	317.0	174.2	$CaHPO_4$ or	226.0	$CaHPO_4.2H_2O+$
		321.3	$CaH_4(PO_4)_2$	122.2	$CaH_4(PO_4)_2.H_2O$
72.30	351.9	301.6	$CaH_4(PO_4)_2$	169.0	$CaH_4(PO_4)_2.H_2O$
69.33	361.1	289.3	"	186.1	"
59.98	419.7	250.2	"	267.9	"
53.59	451.7	223.7	"	316.1	"
44.52	505.8	185.8	"	393.1	"
39.89	538.3	166.4	"	437.4	"

Density of the solution in contact with both salts at 25° = 1.29.

SOLUBILITY OF DI CALCIUM PHOSPHATE IN AQUEOUS N/200 SOLUTION OF ACID POTASSIUM TARTRATE AT 25°.

(Magnanini.)

1 liter of the solution contains 0.08 gram Ca = 0.235 gram $CaHPO_4$.

CALCIUM PHOSPHATE (Monobasic) $CaH_4(PO_4)_2.H_2O$.

SOLUBILITY IN WATER.

This salt is stable in contact with the aqueous solution only when there is present free phosphoric acid to the extent indicated by the above table.

CALCIUM PELARGONATE (Nonate) $Ca[CH_3(CH_2)_7COO]_2.H_2O$.
CALCIUM PROPIONATE $Ca(CH_3.CH_2COO)_2.H_2O$.

SOLUBILITY OF EACH IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; Krasnicki — Monatsh. Chem. 8, 597, '87.)

	Calcium Pelargonate.	Calcium Propionate.	
t°.	Grams $Ca[CH_3(CH_2)_7COO]_2$ per 100 Grams H_2O.	Grams $Ca(CH_3.CH_2COO)_2$ per 100 Grams. Water.	Solution.
0	0.16	42.80	29.97
20	0.14	39.85	28.48
40	0.13	38.45	27.76
60	0.12	38.25	27.67
80	0.15	39.85	28.48
90	0.18	42.15	29.66
100	0.26	48.44	32.63

CALCIUM SELENATE $CaSeO_4$.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 532, '94.)

t°.	−1°.	+5°.	20°.	37°.	67°.
Gms. per 100 gms. sol.	7.4	7.3	7.6	6.8	5.1

The accuracy of these results appears questionable.

CALCIUM SILICATE $CaSiO_3$.

SOLUBILITY IN WATER AND IN AQUEOUS SUGAR SOLUTIONS AT 17°.

(Weisberg — Bull. soc. chim. [3] 15, 1097, '96.)

The sample of calcium silicate was air dried.

Solvent.	Grams per 100 cc. Saturated Solution. At 17°.		After Boiling and Filtering Hot.	
	CaO(det.)	$CaSiO_3$(calc.)	CaO(det.)	$CaSiO_3$(calc.)
Water	0.0046	0.0095	...	...
10% sugar sol.	0.0065	0.0135	0.0094	0.0195
20% sugar sol.	0.0076	0.0157	0.0120	0.0249

CALCIUM SUCCINATE $Ca(C_2H_2O_2)_2$.

CALCIUM (Iso) SUCCINATE $CaCH_3.CHC_2O_4.H_2O$.

SOLUBILITY OF EACH IN WATER.

(Miczynski — Monatsh. Chem. 7, 261, '86.)

Calcium Succinate. t°.	Gms. $Ca(C_2H_2O_2)_2$ per 100 Gms. H_2O.	t°.	Gms. $Ca(C_2H_2O_2)_2$ per 100 Gms. H_2O.	Calcium Iso Succinate. t°.	Gms. $Ca(C_2H_2O_2)_2$ per 100 Gms. H_2O	t°.	Gms. $Ca(C_2H_2O_2)_2$ per 100 Gms. H_2O.
0	1.127	50	1.029	0	0.522	50	0.440
10	1.220	60	0.894	10	0.524	60	0.396
20	1.276	70	0.770	20	0.517	70	0.342
40	1.177	80	0.657	40	0.475	80	0.279

100 cc. H_2O dissolve 1.424 grams succinate ($CaC_4H_4O_4.H_2O$) at 18°, and 1.436 grams at 25°.

100 cc. 95% alcohol dissolve 0.00136 gram succinate ($CaC_4H_4O_4.H_2O$) at 18°, and 0.00136 gram at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

CALCIUM SULPHATE $CaSO_4.2H_2O$.

SOLUBILITY IN WATER.

(Hulett and Allen — J. Am. Chem. Soc. 24, 674, '02; for references to other determinations see Hulett and Allen, also Euler—Z. physik. Chem. 49, 313, '04. Determinations by the electrolytic conductivity method Holleman, Kohlrausch and Rose — Z. physik. Chem. 12, 129, 241, '93.)

t°.	Gms. $CaSO_4$ per 100 cc. Solution.	Millimols. per Liter.	Density of Solutions.	t°.	Gms. $CaSO_4$ per 100 cc. Solution.	Millimols per Liter.	Density of Solutions.
0	0.1759	12.926	1.00197	40	0.2097	15.413	0.99439
10	0.1928	14.177	1.00173	55	0.2009	14.765	0.98796
18	0.2016	14.817	1.00059	65.3	0.1932	14.200	0.98256
25	0.2080	15.295	0.99911	75	0.1847	13.575	0.97772
30	0.2090	15.361	0.99789	100	0.1619	11.900	...
35	0.2096	15.405	0.99789	107	...	11.390	..

Solubility of Calcium Sulphate in Aqueous Solutions of Hydrochloric, Nitric, Chlor Acetic, and Formic Acids.

(Banthisch — J. pr. Chem. 29, 52, '84; Lunge — J. Soc. Chem. Ind. 4, 32, '85.)

	In Hydrochloric.		In Nitric.	In Chlor Acetic.	In Formic.
Grams Acid per 100 cc. Solution.	Grams $CaSO_4$ per 100 cc. Sol. at 25°.	at 102°.	Gms. $CaSO_4$ per 100 cc. Solution at 25°.	Gms. $CaSO_4$ per 100 cc. Sol. at 25°.	Gms. $CaSO_4$ per 100 cc. Sol. at 25°.
0	0.208	0.160	0.208	0.208	0.208
1	0.72	1.38	0.56	...	...
2	1.02	2.38	0.82	...	...
3	1.25	3.20	1.02	...	...
4	1.42	3.64	1.20	0.22	0.24
6	1.65	4.65	1.48	...	...
8	1.74	...	1.70	...	...
10	...	...	1.84	0.25	...
12	...	...	1.98	...	...

Solubility of Calcium Sulphate in Aqueous Solutions of Phosphoric Acid at 25°.

(Taber — page 61, Bull. 33, Bureau of Soils — U. S. Dept. Agr., 1906.)

Gms. per Liter. P_2O_4.	Gms. per Liter. $CaSO_4$.	Sp. Gr. of Solutions at $\frac{25}{25}$.	Gms. per Liter. P_2O_5.	Gms. per Liter. $CaSO_4$.	Sp. Gr. of Solutions at $\frac{25}{25}$.
0.0	2.126	0.9991	145.1	7.920	1.106
5.0	3.143	1.002	205.0	8.383	1.145
10.5	3.734	1.007	311.5	7.965	1.221
21.4	4.456	1.016	395.8	6.848	1.280
46.3	5.760	1.035	494.6	5.572	1.344
105.3	7.318	1.075			

Solubility of Calcium Sulphate in Aqueous Solutions of Sulphuric Acid.

(Cameron and Breazeale — J. Physic. Chem. 7, 574, '03.)

Grams H_2SO_4 per Liter of Solution.	Results at 25°. Gms. $CaSO_4$ per Liter.	Results at 25°. Wt. of 1 cc. Sol.	Results at 35°. Gms. $CaSO_4$ per Liter.	Results at 43°. Gms. $CaSO_4$ per Liter.
0.00	2.126	0.9991 grams	...	2.145
0.48	2.128	1.0025 "	2.209	2.236
4.87	2.144	1.0026 "	2.451	2.456
8.11	2.203	1.0051 "	...	2.760
16.22	2.382	1.0098 "	...	3.116
48.67	2.727	1.0302 "	3.397	3.843
75.00	2.841	1.0435 "	...	4.146
97.35	2.779	1.0756 "	3.606	...
146.01	2.571	... "	3.150	4.139
194.70	2.313	1.1134 "		3.551
243.35	1.901	1.1418 "		2.959
292.02	1.541	1.1681 "	...	2.481

Solubility of Calcium Sulphate in Aqueous Solutions of Ammonium Salts.

(In NH_4Cl and NH_4NO_3, Cameron and Brown — J. Physic. Chem. **9**, 210, '05; In $(NH_4)_2SO_4$ at 25°, Sullivan — J. Am. Chem. Soc. **27**, 529, '05; In $(NH_4)_2SO_4$ at 50°, Bell and Tabor — J. Physic. Chem. **10**, 119, '06.)

Gms. Ammonium Salt per Liter.	In NH_4Cl at 25°. G. $CaSO_4$ Dissolved per Liter.	In NH_4NO_3 at 25°. G. $CaSO_4$ Dissolved per Liter.	Gms. Ammonium Salt per Liter.	In NH_4Cl at 25°. G. $CaSO_4$ Dissolved per Liter.	In NH_4NO_3 at 25°. G. $CaSO_4$ Dissolved per Liter.
0	2.08	2.08	300	10.10	10.80
20	5.00	3.70	375	7.40	...
40	7.00	5.10	400	...	11.40
60	8.00	6.05	600	...	12.15
80	8.50	7.00	800	...	12.10
100	9.10	7.65	1000	...	11.81
150	10.30	8.88	1400	...	10.02
200	10.85	9.85	sat.	...	7.55

In $(NH_4)_2SO_4$ at 25°. Grams per Liter Sol.			In $(NH_4)_2SO_4$ at 50°. Grams per Liter Sol.		
$(NH_4)_2SO_4$.	$CaSO_4$.	Wt. of 100 cc. Sat. Sol.	$(NH_4)_2SO_4$.	$CaSO_4$.	Sp. Gr. of Solutions.
0.00	0.208	99.91	0.00	2.168	...
0.129	0.204	99.91	15.65	1.609	1.0026
0.258	0.199	99.92	30.67	1.750	1.0113
0.821	0.181	99.95	91.6	2.542	1.0440
1.643	0.166	99.99	160.4	3.402	1.0819
3.287	0.154	100.10	221.6	4.068	1.1108
6.575	0.144	100.34	340.6	5.084	1.1653
13.15	0.146	100.82	416.5	5.354	1.1964
26.30	0.162	101.76	428.4	4.632	1.2043
84.9	0.233	105.34	530.8	2.152	1.2437
169.8	0.333	110.32	566.0	1.08	1.2508
339.6	0.450	119.15	566.7	0.00	1.2510

Solubility of Calcium Sulphate in Aqueous Solutions of Calcium Salts at 25°.

(Cameron and Seidell — J. Physic. Chem. **5**, 643, '01; Seidell and Smith — *Ibid.* **8**, 493, '04; Cameron and Bell — J. Am. Chem. Soc. **28**, 1220, '06.)

In Calcium Chloride. Grams per Liter Sol.		In Calcium Nitrate. Gms. per Liter Sol.			In Calcium Hydroxide and *vice versa*. Gms. per Liter Sol.		
$CaCl_2$.	$CaSO_4$.	$Ca(NO_3)_2$.	$CaSO_4$.	Wt. of 1 cc. Sol.	CaO.	$CaSO_4$.	Solid Phase.
0.00	2.06	0.0	2.08	0.998	0.0	2.126	$CaSO_4.2H_2O$
7.49	1.24	25	1.24	1.014	0.062	2.030	"
11.96	1.18	50	1.20	1.032	0.176	1.918	"
25.77	1.10	100	1.13	1.067	0.349	1.853	"
32.05	1.08	200	0.93	1.137	0.61	1.722	"
51.53	1.02	300	0.76	1.204	0.939	1.634	"
97.02	0.84	400	0.57	1.265	1.222	1.588	$CaSO_4.2H_2O + Ca(OH)_2$
192.71	0.47	500	0.40	1.328	1.242	1.214	$Ca(OH)_2$
280.30	0.20	544	0.35	1.352	1.150	0.666	"
367.85	0.03	...	...	...	1.166	0.00	"

Solubility of Calcium Sulphate in Aqueous Solutions of Magnesium Chloride and of Magnesium Nitrate at 25°.

(Cameron, Seidell, and Smith.)

In Magnesium Chloride.

Grams per Liter of Sat. Solution.		
$MgCl_2$.	$CaSO_4$.	H_2O.
0.0	2.08	997.9
8.50	4.26	996.5
19.18	5.69	994.5
46.64	7.59	989.1
121.38	8.62	972.2
206.98	6.57	949.9
337.0	2.77	908.7
441.1	1.39	878.6

In Magnesium Nitrate.

Gms. per Liter Sol.		Wt. of 1 cc. Solution.
$Mg(NO_3)_2$.	$CaSO_4$.	
0.0	2.08	0.9981
25	5.77	1.0205
50	7.88	1.0398
100	9.92	1.0786
200	13.34	1.1498
300	14.00	1.2190
400	14.68	1.2821
514	15.04	1.3553

Solubility of Calcium Sulphate in Aqueous Solutions of Magnesium Sulphate at 25°.

(Cameron and Bell — J. Physic. Chem. 10, 210, '06.)

Grams per Liter Solution.		Sp. Gr. of Solutions at $\frac{25}{25}$°.	Grams per Liter Solution.		Sp. Gr. of Solutions at $\frac{25}{25}$°.
$MgSO_4$.	$CaSO_4$.		$MgSO_4$.	$CaSO_4$.	
0.0	2.046	1.0032	149.67	1.597	1.1377
3.20	1.620	1.0055	165.7	1.549	1.1479
6.39	1.507	1.0090	171.2	1.474	1.1537
10.64	1.471	1.0118	198.8	1.422	1.1813
21.36	1.478	1.0226	232.1	1.254	1.2095
42.68	1.558	1.0419	265.6	1.070	1.2382
64.14	1.608	1.0626	298.0	0.860	1.2624
85.67	1.617	1.0833	330.6	0.647	1.2877
128.28	1.627	1.1190	355.0	0.501	1.3023

Solubility of Calcium Sulphate in Aqueous Solutions of Potassium Chloride, Bromide, and Iodide at 21°.

(Ditte — Ann. chim. phys. [7] 14, 294, '98.)

Grams of the Potassium Salt per Liter.	In KCl Solutions. Gms. $CaSO_4$ per Liter.	In KBr Solutions. Gms. $CaSO_4$ per Liter.	In KI Solutions. Gms. $CaSO_4$ per Liter.
0	2.05	2.05	2.05
10	3.6	3.1	2.8
20	4.5	3.6	3.2
40	5.8	4.5	3.9
60	6.6	5.2	4.5
80	7.2	5.9	4.85
100	7.5	6.3	5.1
125	double salt	6.7	5.45
150	...	7.0	5.8
200	...	7.3	5.95
250	...	double salt	6.00
300	...	...	double salt

Solubility of Calcium Sulphate in Aqueous Solutions of Potassium Nitrate and of Potassium Sulphate at 25°.

(Seidell and Smith — J. Physic. Chem. **8**, 493, '04; Cameron and Breazeale — *Ibid.* **8**, 335, '04.)

In Potassium Nitrate.

Gms. per Liter Solution. KNO_3.	Gms. per Liter Solution. $CaSO_4$.	Wt. of 1 cc. Solution.
0.0	2.08	0.9981
12.5	3.28	1.0081
25.0	4.08	1.0154
50.0	5.26	1.0321
100.0	6.86	1.0625
150	7.91	1.0924
200	8.69	1.1224
260	syngenite	1.1539

In Potassium Sulphate.

Gms. per Liter Solution. K_2SO_4.	Gms. per Liter Solution. $CaSO_4$.	Wt. of 1 cc. Solution.
0.0	2.08	0.9981
4.88	1.60	1.0036
5.09	1.56	1.0038
9.85	1.45	1.0075
19.57	1.49	1.0151
28.35	1.55	1.0229
30.66	1.57	1.0236
32.47	1.58*	...

* Solid phase syngenite. Results for the solubility of syngenite in solutions of potassium sulphate are also given in the original paper.

Solubility of Calcium Sulphate in Aqueous Solutions of Sodium Chloride at 26°.

(Cameron — J. Physic. Chem. **5**, 556, '01; see this paper for references to other work, also Orloff — J. russ. phys. chem. Ges. **37**, 949, '02; Cloez — Bull. soc. chim. [3] **29**, 167, '03; d'Anselme — *Ibid.* [3] **29**, 372, '03.)

Grams per 100 cc. Solution. NaCl.	Grams per 100 cc. Solution. $CaSO_4$.	Wt. of 1 cc. Solution.	Grams per 100 cc. Solution. NaCl.	Grams per 100 cc. Solution. $CaSO_4$.	Wt. of 1 cc. Solution.
0.00	0.2121	0.9998	17.650	0.712	1.1196
9.115	0.666	1.0644	22.876	0.679	1.1488
14.399	0.718	1.0981	26.417	0.650	1.1707
14.834	0.716	1.1012	32.049	0.572	1.2034

Solubility of Mixtures of Calcium Sulphate and Calcium Carbonate in Aqueous Solutions of Sodium Chloride at 23°.

(Cameron and Seidell — J. Physic. Chem. **5**, 643, '01.)

Grams per Liter Solution. NaCl.	Grams per Liter Solution. $Ca(HCO_3)_2$.	Grams per Liter Solution. $CaSO_4$.	Grams per Liter Solution. NaCl.	Grams per Liter Solution. $Ca(HCO_3)_2$.	Grams per Liter Solution. $CaSO_4$.
0.00	0.060	1.930	79.52	0.060	6.424
3.63	0.072	2.720	121.90	0.056	5.272
11.49	0.089	3.446	193.80	0.048	4.786
39.62	0.101	5.156	267.60	0.040	4.462

Solubility of Mixtures of Calcium Sulphate and Silver Sulphate in Water.

(Euler — Z. physik. Chem. **49**, 313, '04.)

t°.		Per Liter of Solution. Gms. Salt.	Per Liter of Solution. Gms. Equiv. Salt.	Total Salt per 100 Gms. Solution.	Sp. Gr. of Solutions.
17°	$CaSO_4$	2.31	0.034	0.9473	1.0083
	Ag_2SO_4	7.235	0.0464		
25°	$CaSO_4$	2.61	0.0383	1.062	1.010
	Ag_2SO_4	8.11	0.0520		

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SOLUTIONS OF SODIUM NITRATE AND OF SODIUM SULPHATE AT 25°.

(Seidell, Smith, Cameron, Breazeale.)

In Sodium Nitrate. Grams per Liter Solution. $NaNO_3$.	$CaSO_4$.	Wt. of 1 cc. Solution.	In Sodium Sulphate. Grams per Liter Solution. Na_2SO_4.	$CaSO_4$.	Wt. of 1 cc. Solution.
0	2.08	0.9981	2.39	1.65	1.0013
25	4.25	1.0163	9.54	1.45	1.0076
50	5.50	1.0340	14.13	1.39	1.0115
100	7.10	1.0684	24.37	1.47	1.0205
200	8.79	1.1336	46.15	1.65	1.0391
300	9.28	1.1916	115.08	2.10	1.0965
600	7.89	1.3639	146.61	2.23	1.1427
655	7.24	1.3904	257.10	2.65	1.2120

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS AND ALCOHOLIC MONO POTASSIUM TARTRATE SOLUTIONS AT 20°.

(Magnanini — Gazz. chim. ital. 31, II, 544, '01.)

Solvent.	Gms. $CaSO_4$ per 100 Gms. Solution.	Solvent.	Gms. $CaSO_4$ per 100 Gms. Solution
Water	0.2238	10% alcoholic N/200 $KHC_2H_4O_6$	0.0866
Aq. N/200 $KHC_4H_4O_6$	0.2323	Aq. N/200 $KHC_2H_4O_6$ + 5% tartaric ac.	0.2566
10 per cent alcohol	0.0970	10% alc. N/400 $KHC_2H_4O_6$ + 5% tartaric ac.	0.1086

SOLUBILITY OF CALCIUM SULPHATE IN AQUEOUS SUGAR SOLUTIONS.

(Stolle — Z. Ver. Zuckerind. 50, 331, '00.)

Per cent Concentration of Sugar Solutions.	Grams $CaSO_4$ Dissolved by 1 Liter of the Sugar Solutions at: 30°.	40°.	50°.	60°.	70°.	80°.
0	...	2.157	1.730	1.730	1.652	1.710
10	2.041	1.730	1.730	1.574	1.574	1.613
20	1.808	1.652	1.419	1.380	1.419	1.263
27	1.550	1.438	1.361	1.283	1.283	0.972
35	1.263	1.050	1.088	1.108	0.914	...
42	1.030	...	0.777	0.816	0.855	0.729
49	...	0.564	0.739	0.564	0.603	0.486
55	...	0.486	0.505	0.486	0.369	0.330

CALCIUM SULPHIDE CaS.

SOLUBILITY IN AQUEOUS SUGAR SOLUTIONS.

(Stolle.)

Per cent Concentration of Sugar Solutions.	Grams CaS Dissolved per Liter of the Sugar Solutions at: 30°.	40°.	50°.	60°.	70°.	80°.	90°.
0	1.982	2.123	1.235	1.390	1.696	2.032	2.496
10	1.866	1.316	1.441	1.673	1.560	1.634	1.544
20	2.187	1.696	1.802	1.905	1.879	1.892	1.930
27	2.522	2.097	2.059	2.226	2.342	2.304	2.357
35	2.689	2.265	2.304	2.406	2.342	2.857	2.947
42	2.342	2.136	2.226	2.522	2.574	2.509	2.689
49	2.445	2.290	2.458	2.638	2.728	2.818	3.063
55	2.509	2.226	2.340	2.882	2.766	2.972	3.616

CALCIUM SULPHITE $CaSO_3$.

SOLUBILITY IN WATER AND IN AQUEOUS SUGAR SOLUTIONS AT 18°.

(Weisberg — Bull. soc. chim. [3] 15, 1097, '96.)

Solvent.	Grams $CaSO_3$ per 100 cc. Solution. At 18°.	After Boiling Solution 2 Hours.
Water	0.0043	...
10 Per cent Sugar	0.0083	0.0066
30 Per cent Sugar	0.0080	0.0069

CALCIUM TARTRATE $CaC_4H_4O_6.4H_2O$.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 747, '05.)

t°.	Gms. $CaC_4H_4O_6.4H_2O$ per 100 cc. Sol.	t°.	Gms. $CaC_4H_4O_6.4H_2O$ per 100 cc. Sol.	t°.	Gms. $CaC_4H_4O_6.4H_2O$ per 100 cc. Sol.
0	0.0365	30	0.0631	70	0.1430
10	0.0401	40	0.0875	80	0.1798
20	0.0475	50	0.1100	85	0.2190
25	0.0525	60	0.1262		

100 gms. aq. Ca. tartrate solution contain 0.0185 g. $CaC_4H_4O_6.4H_2O$ at 18°, and 0.029489 at 25°.

100 gms. 95% alcohol solution contain 0.0187 g. $CaC_4H_4O_6.4H_2O$ at 18°, and 0.02352 at 25°. (Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

100 gms. aq. Ca. tartrate solution contain 0.0364 g. $CaC_4H_4O_6$ at 20°.

100 gms. 10% alcohol solution contain 0.0160 g. $CaC_4H_4O_6$ at 20°.

100 gms. 10% alcohol + 5% tartaric acid solution contain 0.1632 g. $CaC_4H_4O_6$ at 20°. (Magnanini — Gazz. chim. ital. 31, II, 544, '01.)

SOLUBILITY OF CALCIUM TARTRATE IN AQUEOUS ACETIC ACID SOLUTIONS AT 26°–27°.

(Herz and Muhs — Ber. 36, 3715, '03; see also Enell — Pharm. Centrallh. 38, 181; Z. anal. Chem. 38, 368, '99.)

Normality of Acetic Acid.	Gms. CH_3COOH per 100 cc. Sol.	Residue from 50.052 cc. Sol.	Normality of Acetic Acid.	Gms. CH_3COOH per 100 cc. Sol.	Residue from 50.052 cc. Sol.
0	0	0.0217	3.80	22.80	0.2042
0.57	3.42	0.1082	5.70	34.20	0.1844
1.425	8.55	0.1635	10.09	60.54	0.1160
2.85	17.10	0.1970	16.505	93.03	0.0337

The residue was dried at 70° C.

CALCIUM BITARTRATE $CaH_2(C_4H_4O_6)_2$.

SOLUBILITY IN WATER AND IN AQUEOUS SOLUTIONS OF ACIDS AND OF SALTS.

(Warington — J. Chem. Soc. 28, 946, '75.)

In Hydrochloric Acid.

Conc. of HCl Gms. per 100 Gms. Sol.	Gms. $CaH_2(C_4H_4O_6)_2$ per 100 Gms. Solvent. At 22°.	At 80°.
0	0.600	4.027
0.68	3.01	5.35
2.15	6.88	11.35
4.26	11.19	20.23
8.36	22.75	40.93
16.13	48.31	80.12

100 gms. H_2O dissolve 0.422 gms. bitartrate at 14°

In other Acids and in Salt Solutions at 14°.

Acid or Salt.	Gms. Acid or Salt per 100 cc. Sol.	Gms. $CaH_2(C_4H_4O_6)_2$ per 100 cc. Sol.
Acetic Acid	0.81	0.422
Tartaric Acid	1.03	0.322
Citric Acid	0.84	0.546
Sulphuric Acid	0.685	1.701
Hydrochloric Acid	0.504	1.947
Nitric Acid	0.845	1.969
Potassium Acetate	1.387	0.744
Potassium Citrate	1.397	0.843

CALCIUM VALERATE $Ca[CH_3(CH_2)_3COO]_2.H_2O$.
CALCIUM (Iso) **VALERATE** $Ca[(CH_3)_2.CH.CH_2.COO]_2.3H_2O$.

SOLUBILITY OF EACH IN WATER.

(Lumsden — J. Chem. Soc. 81, 355, '02; see also Furth — Monatsh. Chem. 9, 313, '88; Sedlitzky — *Ibid*, 8, 566, '87.)

Calcium Valerate.			Calcium Iso Valerate.			
t°.	Gms. $Ca(C_5H_9O_2)_2$ per 100 Gms. Water.	Gms. $Ca(C_5H_9O_2)_2$ per 100 Gms. Solution.	t°.	Gms. $Ca(C_5H_9O_2)_2$ per 100 Gms. Water.	Gms. $Ca(C_5H_9O_2)_2$ per 100 Gms. Solution.	Solid Phase.
0	9.82	8.94	0	26.05	20.66	$Ca(C_5H_9O_2)_2.5H_2O$
10	9.25	8.47	10	22.70	18.50	"
20	8.80	8.09	20	21.80	17.90	"
30	8.40	7.75	30	21.68	17.82	"
40	8.05	7.45	40	22.00	18.18	"
50	7.85	7.28	45.5	22.35	18.42	"
57	7.75	7.19	50	19.95	16.63	$Ca(C_5H_9O_2)_2.H_2O$
60	7.78	7.22	60	18.38	15.52	"
70	7.80	7.24	70	17.40	14.82	"
80	7.95	7.36	80	16.88	14.44	"
90	8.20	7.58	90	16.65	14.28	"
100	8.78	8.07	100	16.55	14.20	"

CAOUTCHOUC.

SOLUBILITY IN ORGANIC SOLVENTS.

(Hanausek — J. pharm. chim. [5] 15, 509, '87.)

Solvent.	Grams. Caoutchouc Dissolved per 100 Gms. Solvent. Ceara.	Tete Noire.	Sierra Leone.
Ether	2.5	3.6	4.5
Turpentine	4.5	5.0	4.6
Chloroform	3.0	3.7	3.0
Petroleum	1.5	4.5	4.0
Benzene	4.4	5.0	4.7
Carbon Bisulphide	0.4	0.0	0.0

CAMPHORIC ACID $C_8H_{14}(COOH)_2$.

100 grams of water dissolve 0.8 gram $C_8H_{14}(COOH)_2$ at 25°, and 10 grams at the b. pt. (U.S.P.)

CARBAZOLE (Di Phenylene imid) $(C_6H_4)_2NH$.

100 grams abs. alcohol dissolve 0.92 gms. $(C_6H_4)_2NH$ at 14°, and 3.88 grams at b. pt.

100 grams toluene dissolve 0.55 gm. $(C_6H_4)_2NH$ at 16.5°, and 5.46 grams at b. pt.

CARBAMIDES.

SOLUBILITY IN SEVERAL SOLVENTS.

as Methyl Phenyl Carbamide (m. pt. 82°), Benzyl Carbamide (m. pt. 149°). *o* Tolyl Carbamide (m. pt. 185°) and *p* Tolyl Carbamide (m. pt. 173°).

(Walker and Wood — J. Chem. Soc. 73, 626, '98.)

Solvent.	t°.	Grams Carbamide per 100 cc. Sat. Solution. *as* Methyl Phenyl.	Benzyl.	*p* Tolyl.	*o* Tolyl.
Water	45	74	1.71	0.307	0.251
Acetone	23	29.4	3.10	2.66	0.462
Ether	22.5	2.28	0.053	0.062	0.0162
Benzene	44.2	12.4	0.0597	0.043	0.0155

CARBON DIOXIDE CO_2.

Solubility in Water and in Aqueous Sodium Chloride Solutions.

(Bohr — Wied. Ann. Physik. [3] 68, 503, '99; Geffcken — Z. physik. Chem. 49, 271, '04; Just — *Ibid.* 37, 354, '01.)

t°.	Solubility in Water.			In 6.53% NaCl.	In 17.62% NaCl.
	q.	β.	l.	β.	β.
0	0.335	1.713	...	1.234	0.678
5	0.277	1.424	...	1.024	0.577
10	0.231	1.194	...	0.875	0.503
15	0.197	1.019	1.070	0.755	0.442
20	0.169	0.878	...	0.664	0.393
25	0.145	0.759	0.826	0.583	0.352
30	0.126	0.665	...	0.517	0.319
40	0.097	0.530	...	0.414	0.263
50	0.076	0.436	...	0.370	0.235
60	0.058	0.359	...	0.305	0.183

q = wt. of gas dissolved by 100 grams of solvent at a total pressure of 760 mm.

β = the **Bunsen Absorption Coefficient** which signifies the volume (v) of the gas (reduced to 0° and 760 mm.) taken up by unit volume (V) of the liquid when the pressure of the gas itself minus the vapor tension of the solvent is 760 mm.

$$\beta = \frac{v}{V(1 + 0.00367\,t)}.$$

l = the **Ostwald Solubility Expression** which represents the ratio of the volume (v) of gas absorbed at any pressure and temperature, to the volume (V) of the absorbing liquid, i.e. $l = \frac{v}{V}$. This expression differs from the Bunsen Absorption Coefficient, β, in that the volume (v) of the dissolved gas is not reduced to 0° and 760 mm. The solubility l is therefore the volume of gas dissolved by unit volume of the solvent at the temperature of the experiment. The two expressions are related thus:

$$l = \beta\,(1 + 0.00367\,t), \quad \beta = \frac{l}{(1 + 0.00367\,t)}.$$

Solubility in Water at Pressures Above One Atmosphere.

(Wroblewski — Compt. rend. 94, 1335, '82.)

Pressure in Atmospheres.	Coefficient of Saturation * at: 0°.	12.4°.	Pressure in Atmospheres.	Coefficient of Saturation * at: 0°.	12.4°.
1	1.797	1.086	20	21.65	17.11
5	8.65	5.15	25	30.55	20.31
10	16.03	9.65	30	33.74	23.25

* Coefficient of Absorption is no doubt intended.

Solubility of CO_2 in Aqueous Solutions of Acids and Salts

(Geffcken.)

Aq. Solvent.	Gms. Acid per Liter.	CO_2 Dissolved, l at: 15°.	25°.	Aq. Solvent.	Gms. Salt per Liter.	CO_2 Dissolved, l at: 15°.	25°.
HCl	18.23	1.043	0.806	CsCl	84.17	1.006	0.781
"	36.46	1.028	0.799	KCl	37.30	0.976	0.759
"	72.92	1.000	0.795	KCl	74.60	0.897	0.700
HNO_3	31.52	1.078	0.840	KI	83.06	0.992	0.775
"	63.05	1.086	0.853	KI	166.12	0.923	0.727
"	126.10	1.100	0.877	KBr	59.55	0.986	0.768
H_2SO_4	24.52	1.018	0.794	KBr	119.11	0.914	0.713
"	49.04	0.978	0.770	KNO_3	50.59	1.005	0.784
"	98.08	0.917	0.730	KNO_3	101.19	0.946	0.749
"	147.11	0.870	0.698	RbCl	60.47	0.989	0.769
"	196.15	0.828	0.667	RbCl	120.95	0.921	0.788

Solubility in Aqueous Solutions of Salts.

(Mackenzie — Wied. Ann. Physik. [2] 1, 450, '77.)

Salt in Solution.	Gms. Salt per 100 Gms. Solution.	Density of Solution 15°.	Absorption Coefficient α at: 8°.		15°.	22°.
KCl	6.05	1.021	0.988		0.777	0.670
"	8.646	1.053	0.918		0.777	0.649
"	11.974	1.080	0.864		0.720	0.597
"	22.506	1.549	0.688		0.571	0.480
NaCl	7.062	1.038	0.899 (6.4°)		0.735	...
"	12.995	1.080	0.633 (6.4°)		0.557	0.482
"	17.42	1.123	0.518 (6.4°)		0.431	0.389
"	26.00	1.195	0.347 (6.4°)		0.297	0.263
NH_4Cl	6.465	1.021	1.023		0.825	0.718
"	8.723	1.047	1.000		0.791	0.702
"	12.727	1.053	0.922		0.798	0.684
"	24.233	1.072	0.813 (10°)		0.738	0.600
			8°.	16.5°.	22°.	30°.
$BaCl_2$	7.316	1.068	0.969	0.744	0.680	0.566
"	9.753	1.092	1.021	0.645	0.607	0.543
"	14.030	1.137	...	0.618	0.524	0.467
"	25.215	1.273	0.495	0.618	0.383	0.315
$SrCl_2$	9.511	1.087	0.779	0.663	0.581	0.508
"	12.325	1.1159	0.737	0.586	0.507	0.539
"	17.713	1.173	0.606	0.473	0.444	0.367
"	31.194	1.343	0.285	0.245	0.247	0.223
$CaCl_2$	4.365	1.036	0.942	0.759	0.673	0.596
"	5.739	1.049	0.855	0.726	0.616	0.527
"	8.045	1.068	0.838	0.674	0.581	0.500
"	15.793	1.139	0.632	0.520	0.471	0.400

Solubility of Carbon Dioxide in Alcohol.

(Bohr — Wied. Ann. Physik [4] 1, 247, '00.)

t°.	In 99 per cent Alcohol. cc. CO_2 (at 0° and 760 mm.) per 1 cc. Alcohol.	Sat. Solution.	In 98.7 per cent Alcohol. cc. CO_2 (at 0° and 760 mm.) per 1 cc. Alcohol.	Sat. Solution.
−65	38.41	35.93	39.89	37.22
−20	7.51	7.41	7.25	7.16
−10	5.75	5.69	5.43	5.38
0	4.44	4.40	4.35	4.31
+10	3.57	3.55	...	...
20	2.98	2.96	...	...
25	2.76	2.74	...	...
30	2.57	2.56	...	...
40	2.20	2.19	...	...
45	2.01	2.00	...	...

Solubility in Aqueous Alcohol at 20°.

(Müller — Wied. Ann. Physik. [2] **37**, 39, '89; Lubarsch — *Ibid.* [2] **37**, 525, '89.)

Density of Alcohol.	Per cent Alcohol By Wt.	Abs. Coef. of CO_2, α.	Density of Alcohol.	Per cent Alcohol By Wt.	Abs. Coef. of CO_2, α.
0.998	1.07	0.861	0.922	49.0	0.982
0.969	22.76	0.841	0.870 (18.8°)	71.1	1.293
0.960 (22.4°)	28.46	0.792	0.835 (16°)	85.3	1.974
0.956	31.17	0.801	0.795 (19°)	99.7	2.719
0.935 (17°)	42.15	0.877			

Solubility of Carbon Dioxide in Organic Solvents.

(Just — Z. physik. Chem. **37**, 354, '01.)

Solvent.	Sol. of CO_2, Ostwald Expression.*			Solvent.	Sol. of CO_2, Ostwald Expression.*		
	l_{25}.	l_{20}.	l_{15}.		l_{25}.	l_{20}.	l_{15}.
CS_2	0.870	0.889	0.945	C_3H_7OH	2.498	...	...
$C_6H_5NH_2$	1.324	1.434	1.531	C_2H_5OH(95%)	2.706	2.923	3.130
$C_5H_{11}OH$	1.831	1.941	2.058	C_6H_5COH	2.841	3.057	3.304
C_6H_5Br	1.842	1.964	2.092	$CHCl_3$	3.430	3.681	3.958
CCl_4	2.294	2.502	2.603	CH_3OH	3.837	4.205	4.606
$C_6H_5CH_3$	2.305	2.426	2.557	CH_3COOH	4.691	5.129	5.614
C_6H_6	2.425	2.540	2.716	$(CH_3CO)_2O$	5.206	5.720	6.18
$C_6H_5NO_2$	2.456	2.655	2.845	$(CH_3)_2CO$	6.295	6.921	...

* See p. 105.

Determinations are also given for the solubility in glycerine, iod benzene, *o* and *m* toluidine, eugenol, benzene tri chloride, cumol, carvene, di chlor hydrine, iso butyl alcohol, benzyl chloride, meta xylol, ethylene bromide, chlor benzene, propylene bromide, amyl bromide, carvol, amyl chloride, iso butyl chloride, butyric acid, ethylene chloride, pyridine, amyl formate, propionic acid, amyl acetate, iso butyl acetate, and in methyl acetate.

See Woukoloff — Compt. rend. **108**, 674; **109**, 62, '89, for the solubility of CO_2 in CS_2 and $CHCl_3$ at different pressures.

CARBON MONOXIDE CO.

Solubility in Water.

(Winkler — Ber. **34**, 1416, '01.)

t°.	β, "Absorp. Coef."	β', "Solubility."	q.	t°.	β, "Absorp. Coef."	β', "Solubility."	q.
0	0.03537	0.03516	0.0044	40	0.01775	0.01647	0.0021
5	0.03149	0.03122	0.0039	50	0.01615	0.01420	0.0018
10	0.02816	0.02782	0.0035	60	0.01488	0.01197	0.0015
15	0.02543	0.02501	0.0031	70	0.01440	0.00998	0.0013
20	0.02319	0.02266	0.0028	80	0.01430	0.00762	0.0010
25	0.02142	0.02076	0.0026	90	0.01420	0.00438	0.0006
30	0.01998	0.01915	0.0024	100	0.01410	0.00000	0.0000

β = vol. of CO absorbed by 1 volume of the liquid at a partial pressure of 760 mm. See page 105.

β' = vol. of CO (reduced to 0° and 760 mm.) absorbed by 1 volume of the liquid under a total pressure of 760 mm.

q = grams of CO dissolved by 100 grams H_2O at a total pressure of 760 mm.

Solubility of Carbon Monoxide in Aqueous Alcohol Solutions at 20° and 760 mm. Pressure.

(Lubarsch — Wied. Annalen Physik. [2] 37, 525, '89.)

Wt. % Alcohol.	Vol. % Absorbed CO.	Wt. % Alcohol.	Vol. % Absorbed CO.
0.00	2.41	28.57	1.50
9.09	1.87	33.33	1.94
16.67	1.75	50.00	3.20
23.08	1.68		

Solubility of Carbon Monoxide in Organic Solvents.

(Just — Z. physik. Chem. 37, 361, '01.)

Results in terms of the Ostwald Solubility Expression, see p. 105.

Solvent.	l_{25}.	l_{20}.	Solvent.	l_{25}.	l_{20}.
Water	0.02404	0.02586	Toluene	0.1808	0.1742
Anilin	0.05358	0.05055	Ethyl Alcohol	0.1921	0.1901
Carbon Disulphide	0.08314	0.08112	Chloroform	0.1954	0.1897
Nitro Benzene	0.09366	0.09105	Methyl Alcohol	0.1955	0.1830
Benzene	0.1707	0.1645	Amylacetate	0.2140	0.2108
Acetic Acid	0.1714	0.1689	Acetone	0.2225	0.2128
Amyl Alcohol	0.1714	0.1706	Iso Butyl Acetate	0.2365	0.2314
Xylene	0.1781	0.1744	Ethyl Acetate	0.2516	0.2419

100 volumes of petroleum absorb 12.3 vols. CO at 20°, and 13.4 vols. at 10°.

(Guiewasz and Walfisz — Z. physik. Chem. 1, 70, '87.)

Solubility of Carbon Monoxide in Mixtures of Acetic Acid and Other Solvents at 25°.

(Skirrow — Z. physik. Chem. 41, 148, '02.)

Results in terms of the Ostwald Solubility Expression, see p. 105.

Mixture of Acetic Ac. and:	% CH_3COOH in Mixture. By Wt.	% CH_3COOH in Mixture. By Vol.	CO. l_{25}.	Mixture of Acetic Ac. and:	% CH_3COOH in Mixture. By Wt.	% CH_3COOH in Mixture. By Vol.	CO. l_{25}.
Anilin	100.0	100.0	0.173	Chloroform	56.4	64.5	0.196
"	86.5	90.8	0.110	"	0.0	0.0	0.206
"	58.3	68.5	0.070	Nitro Benzene	88.4	84.8	0.156
"	13.8	25.1	0.058	"	49.0	66.3	0.130
"	0.0	0.0	0.053	"	0.0	0.0	0.093
Benzene	67.5	63.4	0.199	Toluene	74.7	71.0	0.191
"	33.6	29.6	0.198	"	56.9	52.6	0.195
"	19.2	16.5	0.190	"	20.5	17.8	0.190
"	0.0	0.0	0.174	"	0.0	0.0	0.182

Solubility of Carbon Monoxide in Mixtures of Acetone and Other Solvents at 25°.

(Skirrow.)

Mixture of Acetone and:	% $(CH_3)_2CO$ in Mixture. By Wt.	By Vol.	CO. l_{25}.	Mixture of Acetone and:	% $(CH_3)_2CO$ in Mixture. By Wt.	By Vol.	CO. l_{25}.
Anilin	100.0	100.0	0.238	Chloroform	66.6	78.9	0.226
"	79.2	85.9	0.179	"	26.5	40.4	0.212
"	44.9	56.7	0.110	"	0.0	0.0	0.207
"	0.0	0.0	0.053	β Naphthol	86.0	93.9	0.190
Carbon Bisulphide	82.0	83.8	0.236	"	73.1	87.1	0.169
"	50.5	61.8	0.227	Nitro Benzene	78.4	88.5	0.207
"	26.0	35.7	0.187	"	46.8	69.5	0.157
"	14.5	21.2	0.144	"	0.0	0.0	0.090
"	0.0	0.0	0.096	Phenanthrene	87.2	95.4	0.205
Naphthalene	86.7	93.5	0.199	"	75.0	90.2	0.183
"	72.6	85.4	0.187				

Solubility of Carbon Monoxide in Mixtures of Benzene and Other Solvents at 25°.

(Skirrow — Z. physik. Chem. 41, 144, '02.)

The solubility of the CO given in terms of the Ostwald Expression, see p. 105.

Mixture of Benzene and:	% C_6H_6 in Mixture. By Wt.	By Vol.	CO. l_{25}.	Mixture of Benzene and:	% C_6H_6 in Mixture. By Wt.	By Vol.	CO. l_{25}.
Naphthalene	100.0	100.0	0.174	Anilin	87.3	89.1	0.156
"	88.5	92.6	0.164	"	71.7	75.2	0.131
"	66.2	76.3	0.141	"	42.6	47.0	0.095
Phenanthrene	89.2	95.1	0.144	"	21.2	24.3	0.068
"	72.6	85.8	0.127	"	0.0	0.0	0.053
α Naphthalene	96.5	98.1	0.149	Nitro Benzene	71.8	80.1	0.152
"	87.9	93.1	0.139	"	45.1	56.4	0.127
Ethyl Alcohol	47.7	44.9	0.181	"	0.0	0.0	0.093
"	0.0	0.0	0.192				

Solubility of Carbon Monoxide in Mixtures of Toluene and Other Solvents at 25°.

(Skirrow.)

Mixture of Toluene and:	% $C_6H_5CH_3$ in Mixture. By Wt.	By Vol.	CO. l_{25}.	Mixture of Toluene and:	% $C_6H_5CH_3$ in Mixture. By Wt.	By Vol.	CO. l_{25}.
Anilin	100.0	100.0	0.182	α Naphthol	95.5	97.1	0.171
"	94.4	93.5	0.169	"	91.2	94.2	0.162
"	80.1	80.3	0.148	Nitro Benzene	81.7	85.7	0.160
"	55.4	55.6	0.115	"	50.8	58.1	0.131
"	25.4	25.6	0.077	"	23.7	29.3	0.108
"	0.0	0.0	0.053	"	0.0	0.0	0.093
Naphthalene	92.9	94.8	0.169	Phenanthrene	94.4	97.0	0.170
"	84.9	88.7	0.161	"	88.8	93.9	0.161
"	77.3	82.5	0.153	"	78.4	87.5	0.147

SOLUBILITY OF CARBON MONOXIDE IN MIXTURES OF ORGANIC SOLVENTS AT 25°.

(Skirrow.)

Mixture Composed of:	% of Latter in Mixture. By Wt.	By Vol.	CO. l_{25}.
Chloroform and Methyl Alcohol	0.0		0.207
" "	13.0		0.202
" "	100		0.196
Carbon Bisulphide and Ethyl Di Chloride		100	0.147
" "		75	0.157
" "		51	0.160
" "		18.4	0.140
" "		0.0	0.083
Methyl Alcohol and Glycerine	0.0	0.0	0.196
" "	39.6	30.1	0.096
" "	60.5	50.1	0.052
" "	77.1	68.9	0.025
" "	100.0	100.0	very small

NOTE. — From the results shown in the preceding five tables, it is concluded that the solubility of carbon monoxide in various mixtures of organic solvents is, in general, an additive function.

CARBON BISULPHIDE CS_2.

SOLUBILITY IN WATER.

(Chancel and Parmentier — Compt. rend. 100, 773, 85; Rex — Z. physik. Chem. 55, 355, '06.)

t°.	Grams CS_2 per 100 cc. Solution.	Grams CS_2 per 100 Gms. H_2O (Rex).	t°.	Grams CS_2 per 100 cc. Solution.	Grams CS_2 per 100 Gms. H_2O (Rex).
0	0.204	0.258	30	0.155	0.195
5	0.199	...	35	0.137	...
10	0.194	0.239	40	0.111	...
15	0.187	...	45	0.070	...
20	0.179	0.101	49	0.014	...
25	0.169	...			

100 cc. H_2O dissolve 0.174 cc. CS_2 at 22°; Vol. of solution = 100.208, Sp. Gr. = 0.9981.

100 cc. CS_2 dissolve 0.961 cc. H_2O at 22°; Vol. of solution = 100.961, Sp. Gr. = 1.253. (Herz — Ber. 31, 2670, '98.)

SOLUBILITY OF CARBON BISULPHIDE IN:

Aq. Solutions of Ethyl Alcohol at 17°.

(Tuchschmidt and Folleuins — Ber. 4, 583, '71.)

Wt. per cent Alcohol.	Gms. CS_2 per 100 cc. Solvent.	Wt. per cent Alcohol.	Gms. CS_2 per 100 cc. Solvent.
100	∞	91.37	50
98.5	182	84.12	30
98.15	132	76.02	20
96.95	100	48.40	2
93.54	70	47.90	0

Methyl Alcohol.

(Rothmund — Z. physik. Chem. 26, 475, '98.)

t°.	Wt. per cent CS_2 in: CH_3OH Layer.	CS_2 Layer.
10	45.1	98.3
20	50.8	97.2
25	54.2	96.4
30	58.4	95.5
35	64.0	93.5
40.5 (crit. temp.)	80.5	

Solubility of Carbon Oxysulphide in Water.

(Winkler; see Landolt and Börnstein's Tabellen, 3d ed. p. 602, 1906.)

t°.	β.	q.	t°.	β.	q.
0	1.333	0.356	20	0.561	0.147
5	1.056	0.281	25	0.468	0.122
10	0.835	0.221	30	0.403	0.104
15	0.677	0.179			

For β and q see Carbon Dioxide, page 105.

CARBON TETRACHLORIDE. See p. 201.

CARVOXIME $C_{10}H_4$:NOH.

Solubility in r Limonene.

(Goldschmidt and Cooper — Z. physik. Chem. 26, 714, '98.)

t°.	Gms. $C_{10}H_4$:NOH per 100 Gms. r Limonene.	Solid Phase.	t°.	Gms. $C_{10}H_4$:NOH per 100 Gms. r Limonene.	Solid Phase.
24.6	44.6	*l* Carvoxime	48	198.7	*l* Carvoxime
30.0	59.2	*l* Carvoxime	49.4	199.7	*r* Carvoxime
30.3	63.3	*r* Carvoxime	55.4	325.1	*l* Carvoxime
38.4	104.3	*l* Carvoxime	55.9	346.6	*r* Carvoxime
39.4	103.1	*r* Carvoxime	58.8	560.0	*r* Carvoxime
43.1	130.8	*l* Carvoxime	63.2	126.93	*r* Carvoxime

CERIUM ACETATE, BUTYRATE, FORMATE, etc.

Solubility in Water.

(Wolff — Z. anorg. Chem. 45, 102, '05.)

Salt.	Formula.	Grams Anhydrous Salt per 100 Gms. Solution at: 11°.	15°.	76°.
Acetate	$Ce(C_2H_3O_2)_3 \cdot 1\frac{1}{2}H_2O$	...	19.61	12.97
Butyrate	$Ce(C_4H_7O_2)_3$, and $3H_2O$	3.544	3.406	1.984
Iso Butyrate	$Ce(C_4H_7O_2)_3 \cdot 3H_2O$	...	6.603 (20.4°)	3.39
Formate	$Ce(CHO_2)_3$	...	0.398 (13°)	0.374 (75.3°)
Propionate	$Ce(C_3H_5O_2)_3 \cdot H_2O$, and $3H_2O$	...	18.99	15.93

CERIUM AMMONIUM NITRATE (Ceri) $Ce(NO_3)_4 \cdot 2NH_4NO_3$.

Solubility in Water.

(Wolff.)

t°.	Gms. per 100 Gms. Solution. NH_4.	Ce.	Atomic Relation. NH_4 : Ce.	Gms. $Ce(NO_3)_4 \cdot 2NH_4NO_3$ per 100 Gms. Solution.	Water.
25	4.065	15.16	2.08 : 1	58.49	140.9
35.2	4.273	16.10	2.06 : 1	61.79	161.7
45.3	4.489	16.69	2.08 : 1	64.51	174.9
64.5	4.625	17.40 Ce	2.06 : 1 Ce		
		15.03 Ce IV	2.39 : 1 Ce IV	66.84	201.6
85.6	4.778	18.16 Ce	2.04 : 1 Ce		
		15.79 Ce IV	2.34 : 1 Ce IV	69.40	226.8
112	6.117	22.82 Ce	2.08 : 1 Ce		
		16.22 Ce IV	2.95 : 1 Ce IV	88.03	735.4

CERIUM AMMONIUM NITRATE (Cero) $Ce(NO_3)_3.2NH_4NO_3.4H_2O$.

SOLUBILITY IN WATER.

(Wolff.)

t°.	Gms. per 100 Gms. Solution.		Atomic Relation.	Gms. $Ce(NO_3)_3.2NH_4NO_3$ per 100 Gms.	
	NH_4.	Ce.	NH_4 : Ce.	Solution.	Water.
8.75	4.787	18.56	1.999 : 1	70.2	235.5
25.0	5.09	19.80	1.995 : 1	74.8	296.8
45.0	5.53	21.06	2.037 : 1	80.4	410.2
60.0	6.01	22.77	2.054 : 1	87.2	681.2
65.06	6.11	23.42	2.022 : 1	89.1	817.4

CERIUM AMMONIUM SULPHATE $Ce_2(SO_4)_3.(NH_4)_2SO_4.8H_2O$.

SOLUBILITY IN WATER.

(Wolff.)

t°.	Gms. $Ce_2(SO_4)_3.(NH_4)_2SO_4$ per 100 Gms. Solution.	Water.	Solid Phase.	t°.	Gms. $Ce_2(SO_4)_3.(NH_4)_2SO_4$ per 100 Gms. Solution.	Water.	Solid Phase.
22.3	5.06	5.33	$.8H_2O$	45.0	2.91	2.99	Anhydride
35.1	4.93	5.18	"	55.25	2.16	2.21	"
45.2	4.76	4.99	"	75.4	1.46	1.48	"
				85.2	1.17	1.18	"

CERIUM SULPHATE $Ce_2(SO_4)_3$.

SOLUBILITY OF THE SEVERAL HYDRATES IN WATER.

(Koppel — Z. anorg. Chem. **41**, 377, '04; the previous determinations by Muthman and Rolig — Z. anorg. Chem. **16**, 455, '98, and by Wyrouboff — Bull. soc. chim. [3] **25**, 121, '01, are shown by Koppel to be inaccurate.)

t°.	Gms. $Ce_2(SO_4)_3$ per 100 Gms. Solution.	Mols. $Ce_2(SO_4)_3$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Ce_2(SO_4)_3$ per 100 Gms. Solution.	Mols. $Ce_2(SO_4)_3$ per 100 Mols. H_2O.	Solid Phase.
0	14.20	0.525	$Ce_2(SO_4)_3.12H_2O$	20.5	8.69	0.302	$Ce_2(SO_4)_3.8H_2O$
18.8	14.91	0.555	"	40	5.613	0.188	"
19.2	15.04	0.561	"	60	3.88	0.129	"
0	17.35	0.665	$Ce_2(SO_4)_3.9H_2O$	45	8.116	0.280	$Ce_2(SO_4)_3.5H_2O$
15	10.61	0.376	"	60	3.145	0.103	"
21	8.863	0.308	"	80	1.19	0.0382	"
31.6	6.686	0.227	"	100.5	0.46	0.0149	"
45.6	4.910	0.164	"	35	7.8	0.27	$Ce_2(SO_4)_3.4H_2O$
50	4.465	0.148	"	40	5.71	0.19	"
60	3.73	0.123	"	50	3.31	0.11	"
65	3.47	0.114	"	65	1.85	0.06	"
0	15.95	0.605	$Ce_2(SO_4)_3.8H_2O$	82	0.98	0.032	"
15	9.95	0.350	"	100.5	0.42	0.014	"

CHLORAL HYDRATE $C_2HCl_3O.H_2O$.

Solubility in Water, Ethyl Alcohol, Chloroform, and in Toluene.

(Speyers — Am. J. Sci. [4] 14, 294, '02.)

Calculated from the original results, which are given in terms of gram molecules of chloral hydrate per 100 gram mols. of solvent.

t°.	In Water. W.	In Water. S.	In Alcohol. W.	In Alcohol. S.	In Chloroform. W.	In Chloroform. S.	In Toluene. W.	In Toluene. S.
0	1.433	189.7	1.11	123.3	1.530	3.7	0.898	3.2
5	1.460	233.0	1.16	130.0	1.515	4.0	0.900	4.0
10	1.485	275.0	1.23	140.0	1.510	5.0	0.910	7.0
15	1.510	330.0	1.30	160.0	1.505	9.0	0.915	11.0
20	1.535	383.0	1.36	185.0	1.510	19.0	0.94	21.0
25	1.555	433.0	1.42	215.0	1.520	34.0	0.97	36.0
30	1.580	480.0	1.49	245.0	1.540	56.0	1.02	56.0
35	1.59	516.0	1.55	280.0	1.570	80.0	1.13	80.0
40	1.605	...	1.60	320.0	1.590	110.0	1.40	110.0
45	1.620	...	...	...	...	...	...	...

W = wt. of 1 cc. saturated solution, S = Gms. $C_2HCl_3.H_2O$ per 100 grams solvent.

CHLORINE Cl.

Solubility in Water.

(Winkler — Landolt and Börnstein's Tabellen, 3d ed. p. 532, 601, '06; Roozeboom — Rec. trav. chim. 3, 59, '84; 4, 69, '85; Z. physik. Chem. 2, 452, '88.)

t°.	β′.	q.
0	4.610	1.46
3	3.947	1.25
6	3.411	1.08
9	3.031	0.96
9.6	2.980	0.94
12.0	2.778	0.88
10	3.095	0.997
15	2.635	0.849
20	2.260	0.729
25	1.985	0.641
30	1.769	0.572
40	1.414	0.459
50	1.204	0.393
60	1.006	0.329
70	0.848	0.279
80	0.672	0.223
90	0.380	0.127
100	0.000	0.000

t°.	Gms. Cl per 100 Gms. H_2O.	Solid Phase.
−0.24	0.492	Ice+Cl.8 aq.
0	0.507–0.560	Cl.8 aq.
2	0.644	"
4	0.732	"
6	0.823	"
8	0.917	"
9	0.965–0.908	"
20	1.85	"
28.7	3.69	"

β′ = vol. of Cl (red. to 0° and 760 mm.) absorbed by 1 vol. H_2O at total pressure of 760 mm.

q = Gms. Cl per 100 gms. H_2O at a total pressure of 760 mm.

Solubility in Water.

(Goodwin — Ber. 15, 3039, '82.)

The saturated aqueous solution of the chlorine was cooled until chlorhydrate separated; the temperature was then gradually raised and portions withdrawn for analysis at intervals. Slightly different results were obtained for solutions in contact with much, little, or no chlorhydrate. The following results are taken from an average curve.

t°.	Solubility Coefficient.	t°.	Solubility Coefficient.	t°.	Solubility Coefficient.
2.5	1.76	11	3.0	25	2.06
5.0	2.00	12.5	2.75	30	1.8
7.5	2.25	15	2.6	40	1.35
10	2.7	20	2.3	50	1.0

Solubility of Chlorine in Aqueous Solutions of Hydrochloric Acid and of Potassium Chloride.

(Goodwin.)

t°.	Coefficient of Solubility in: HCl (1.046 Sp. Gr.).	HCl (1.08 Sp. Gr.).	HCl (1.125 Sp. Gr.).	KCl (20 g. per 100 cc.).
0	4.1	6.4	7.3	1.5
5	5.1	5.2	6.7	2.0
10	4.1	4.5	6.1	2.2
15	3.5	3.9	5.5	1.6
20	3.0	3.4	4.7	1.2
25	2.5	3.0	4.0	1.0
30	2.0	2.4	...	0.9
40	1.25	1.6	...	...

Goodwin also gives results for solutions of NaCl, $CaCl_2$, $MgCl_2$, $SrCl_2$, Fe_2Cl_2, $CoCl_2$, $NiCl_2$, $MnCl_2$, $CdCl_2$, LiCl, and in mixtures of some of these, but the concentrations of the salt solutions are not stated.

Solubility of Chlorine in Aqueous Solutions of Sodium Chloride.

(Kumpf — Wied. Ann. Beibl. 6, 276, '82; Kohn and O'Brien — J. Soc. Chem. Ind. 17, 100, '98.)

t°.	Coefficient of Solubility in: 9.97% NaCl.	16.01% NaCl.	19.66% NaCl.	26.39% NaCl.
0	2.3	1.9	1.7	0.5
5	2.0	1.6	1.4	0.44
10	1.7	1.3	1.15	0.4
15	1.4	1.06	0.95	0.36
20	1.2	0.9	0.8	0.34
25	0.94	0.75	0.65	0.3
50	...	...	...	0.2
80	...	...	...	0.05

100 cc. of 6.2 per cent $CaCl_2$ solution dissolve 0.245 gram Cl at 12°.
100 cc. of 6.2 per cent $MgCl_2$ solution dissolve 0.233 gram Cl at 12°.
100 cc. of 6.2 per cent $MnCl_2$ solution dissolve 0.200 gram Cl at 12°.

For coefficient of solubility see page 105.

CHLORINE MONOXIDE Cl_2O.

100 volumes of water at 0° absorb 200 volumes of Cl_2O gas.

CHLORINE TRIOXIDE Cl_2O_3.

SOLUBILITY IN WATER AT APPROX. 760 MM. PRESSURE.

(Brandan — Liebig's Ann. **151**, 340, '69.)

t°.	8.5°.	14.0°.	21°.	93°.
Gms. Cl_2O_3 per 100 gms. H_2O	4.765	5.012	5.445	5.651

Garzarolli and Thurnbalk — Liebig's Ann. **209**, 184, '81, say that Cl_2O_3 does not exist, and above figures are for mixtures of Cl_2O and Cl.

CHLOROFORM $CHCl_3$.

SOLUBILITY IN WATER.

(Chancel and Parmentier — Compt. rend. **100**, 473, 85; Rex — Z. physik. Chem. **55**, 355, '06.)

t°.	Gms. $CHCl_3$ per Liter of Solution.	Density of Solutions.	t°.	Gms. $CHCl_3$ per 100 Gms. H_2O (Rex).
0	9.87	1.00378		
3.2	8.90	...	0	1.062
17.4	7.12	1.00284	10	0.895
29.4	7.05	1.00280	20	0.822
41.6	7.12	1.00284	30	0.776
54.9	7.75	1.00309		

100 cc. H_2O dissolve 0.42 cc. $CHCl_3$ at 22°; Vol. of sol. = 100.39 cc., Sp. Gr. = 1.0002.

100 cc. $CHCl_3$ dissolve 0.152 cc. H_2O at 22°; Vol. of sol. = 99.62 cc., Sp. Gr. = 1.4831.

(Herz — Ber. **31**, 2670, '98.)

SOLUBILITY OF CHLOROFORM IN AQUEOUS ETHYL ALCOHOL, METHYL ALCOHOL, AND ACETONE MIXTURES AT 20°.

(Bancroft — Phys. Rev. **3**, 29, '95, '96.)

In Ethyl Alcohol.		In Methyl Alcohol.		In Acetone.	
Per 5 cc. C_2H_5OH.		Per 5 cc. CH_3OH.		Per 5 cc. $(CH_3)_2CO$	
cc. H_2O.	cc. $CHCl_3$.	cc. H_2O.	cc. $CHCl_3$.	cc. H_2O.	cc. $CHCl_3$.
10	0.20	10	0.10	5.0	0.16
8	0.3	5	0.48	4.0	0.22
6	0.515	4	0.80	3.0	0.33
4	1.13	2	4.0	2.0	0.58
2	2.51	1.49	7.0	1.0	0.955
1	4.60	1.35	8.0	0.79	1.12
0.91	5.0	1.12	10.0	0.505	1.60
0.76	6.0			0.30	2.50
0.55	8.0			0.21	3.50
0.425	10.0			0.19	4.0
0.20	20.0			0.16	5.0
0.125	30.24			0.12	10.0

Solubility of Chromium Alums in Water at 25°.

(Locke — Am. Ch. J. 26, 174, '01.)

Alum.	Formula.	Per 100 cc. Water. Grams Anhdyrous.	Grams Hydrated.	Gram Mols.
Potassium Chromium Alum	$K_2Cr_2(SO_4)_4.24H_2O$	12.51	24.39	0.0441
Tellurium Chromium Alum	$Te_2Cr_2(SO_4)_4.24H_2O$	10.41	16.38	0.0212

CHROMIUM CHLORIDE (ic) $CrCl_3.6\frac{1}{2}H_2O$.

100 grams H_2O dissolve 130 grams (green modification) at 15°.

(Recoura — Compt. rend. 102, 518, '86.)

CHROMIUM DOUBLE SALTS.

Solubility in Water.

(Jörgensen — J. pr. Chem. [2] 20, 105, '79; [2] 30, 1, '84; [2] 42, 208, '90; Struve — *Ibid.* [2] 61, 457, '99.)

Name of Salt.	Formula.	t°.	Gms. per 100 Gms. H_2O.
Chloro Tetra Amine Chromium Chloride	$CrCl(NH_3)_4(OH_2)Cl_2$	15	6.3
Chloro Purpureo Chromium Chloride	$CrCl(NH_3)_5Cl_2$	16	0.65
Luteo Chromium Nitrate	$Cr(NH_3)_6(NO_3)_3$	?	2.6
Chloro Purpureo Chromium Nitrate	$CrCl(NH_3)_5(NO_3)_2$	17.5	1.4
Chromic Potassium Molybdate	$3K_2O.Cr_2O_3.12MoO_3.20H_2O$	17	2.5

CHROMIUM TRIOXIDE CrO_3.

Solubility in Water.

(Mylius and Funk — Wiss. Abh. p. t. Reichanstalt, 3, 451, '00.)

t°.	Gms. CrO_3 per 100 g. Solution.	Mols. CrO_3 per 100 Mols. H_2O.	Solid Phase.
0	62.08	29.4	CrO_3
15	62.38	29.8	"
18	62.45	29.91	"
50	64.55	32.7	"
99	67.39	37.1	"

Density of solution saturated at 18° = 1.705.

CHROMIUM SULPHATES (ous and ic).

Solubility in Water (ous at 0°).

Salt.	Gms. per 100 Gms. H_2O.	Solid Phase.	Authority.
Chromous	12.35	$CrSO_4.7H_2O$	(Moissan — Bull. soc. chim. [2] 37, 296, '82)
Chromic	120.0	$Cr_2(SO_4)_3.18H_2O$	(Etard — Compt. rend. 84, 1090, '77.)

CHRYSAROBIN $C_{30}H_{26}O_7$.

Solubility in Several Solvents.

(U. S. P.)

Solvent.	Gms. per 100 Gms. Solvent at: 25°.	80°.
Water	0.021	0.046
Alcohol	0.324	0.363 (60°)
Benzene	4.0	...

Solvent.	Gms. per 100 Gms. Solvent at 25°.
Chloroform	5.55
Ether	0.873
Amyl Alcohol	3.33
Carbon Disulphide	0.43

CHRYSEN $C_{18}H_{12}$.

SOLUBILITY IN TOLUENE AND IN ABS. ALCOHOL.

(v. Becchi.)

100 gms. toluene dissolve 0.24 gm. $C_{18}H_{12}$ at 18°, and 5.39 gms. at 100°.

100 gms. abs. alcohol dissolve 0.097 gm. $C_{18}H_{12}$ at 16°, and 0.170 gm. at b. pt.

CINCHONA ALKALOIDS. (See also Quinine, p. 269.)

SOLUBILITY OF CINCHONINE, CINCHONIDINE, QUININE, AND QUINIDINE IN SEVERAL SOLVENTS AT 18°–22°.

(Müller — Apoth.-Ztg. **18**, 233, '03; see also Prunier — J. pharm. chim. [4] **29**, 136, '79.)

Solvent.	Grams of the Alkaloid per 100 Grams Solution.				
	Cinchonine $C_{19}H_{22}N_2O$.	Cinchonidine $C_{19}H_{22}N_2O$.	Quinine $C_{20}H_{24}N_2O_2$.		Quinidine $C_{20}H_{24}N_2O_2$.
			Hydrate.	Anhydride.	
Ether	0.10	0.211	1.619	0.876	0.776
Ether sat. with H_2O	0.123	0.523	5.618	2.794	1.629
H_2O sat. with Ether	0.025	0.0306	0.0667	0.0847	0.031
Benzene	0.0545	0.099	0.2054	1.700	2.451
Chloroform	0.6979	9.301	100+	100+	100+
Acetic Ether	0.0719	0.3003	4.65	2.469	1.761
Petroleum Ether	0.0335	0.0475	0.0103	0.0211	0.0241
Carbon Tetra Chloride	0.0361	0.0508	0.203	0.529	0.565
Water	0.0239	0.0255	0.574	0.0506	0.0202
Glycerine (15.5°)	0.50	...	0.50	...	...

100 grams chloroform dissolve 0.565 gm. cinchonine at 50°.
100 grams abs. ether dissolve 0.264 gm. cinchonidine at 32°.

(Köhler — Z. anal. Ch. **18**, 242, '79.)

SOLUBILITY OF CINCHONINE AND CINCHOTINE SULPHATE, TARTRATE, BITARTRATE, OXALATE, AND HYDROCHLORIDE IN WATER.

(Forst and Böhringer — Ber. **14**, 1266, '81.)

Cinchonine Salts. Formula.	t°.	Gms. per 100 Gms. H_2O.	Cinchotine Salts. Formula.	t°.	Gms. per 100 Gms. H_2O.
$2(C_{19}H_{22}N_2O)SO_4H_2.2H_2O$	13	1.52	$2(C_{19}H_{24}N_2O)SO_4H_2.2H_2O$	13	3.28
$2(C_{19}H_{22}N_2O)C_4H_6O_6.2H_2O$	16	3.0	$2(C_{19}H_{24}N_2O)C_4H_6O_6.2H_2O$	16	1.76
$C_{19}H_{22}N_2O.C_4H_6O_6.4H_2O$	16	0.99	$C_{19}H_{24}N_2O.C_4H_6O_6.4H_2O$	16	1.28
$2(C_{19}H_{22}N_2O).C_2H_4O_4.H_2O$	20	0.96	$2(C_{19}H_{24}N_2O).C_2H_2O_4.H_2O$	10	1.16
$C_{19}H_{22}N_2O.HCl.2H_2O$	10	4.16	$C_{19}H_{24}N_2O.HCl.2H_2O$	10	2.12

SOLUBILITY OF CINCHONINE SULPHATE AND OF CINCHONIDINE SULPHATE IN SEVERAL SOLVENTS.

(U. S. P.)

Solvent.	Gms. $(C_{19}H_{22}N_2O_2)_2H_2SO_4.2H_2O$ per 100 Gms. Solvent.		Gms. $(C_{19}H_{22}N_2O)_2.H_2SO_4.3H_2O$ per 100 Gms. Solvent.	
	At 25°.	At 80°.	At 25°.	At 80°.
Water	1.72	3.1	1.60	4.80
Alcohol	10.0	19.2 (60°)	1.4	3.1 (60°)
Ether	0.04	...	0.02	...
Chloroform	1.45	...	0.11	...
Glycerine	6.7 (15°)	...	...	...

CINNAMIC ACID $C_6H_5CH{:}CH.COOH$.

Solubility of Cinnamic Acid in Aqueous Solutions of Sodium Acetate, Butyrate, Formate, and Salicylate at 26.4°.

(Philip — J. Chem. Soc. 87, 992, '05.)

Calculated from the original results, which are given in terms of molecular quantities per liter.

Gms. Na Salt per Liter.	Gms. $C_6H_5CH{:}CH.COOH$ per Liter in Solutions of: CH_3COONa.	C_3H_7COONa.	$HCOONa$.	$C_6H_4.OH.COONa$.
0	0.56	0.56	0.56	0.56
1	1.50	1.30	0.92	0.62
2	2.12	1.85	1.12	0.70
3	2.52	2.25	1.27	0.73
4	2.85	2.60	1.40	0.77
5	3.05	2.90	1.47	0.80
8	...	...	...	0.90

1 liter of aqueous solution contains 0.491 gm. $C_6H_5CH{:}CH.COOH$ at 25° (Paul).

Solubility of Cinnamic Acid in Aqueous Solutions of Anilin and of Para Toluidin at 25°.

(Lowenherz — Z. physik. Chem. 25, 394, '98.)

Original results in terms of molecular quantities per liter.

In Aqueous Anilin.

Grams per Liter. $C_6H_5NH_2$.	$C_6H_5CH:CHCOOH$.
0	0.49
1	1.20
2	1.65
3	2.02
4	2.35
6	2.92

In Aqueous *p* Toluidin.

Grams per Liter. $C_6H_4CH_3NH_2$.	$C_6H_5CH:CHCOOH$.
0	0.49
1	1.52
2	2.20
3	2.83
4	3.35
5	3.80

Solubility of Cinnamic Acid in Methyl, Ethyl, and Propyl Alcohols.

(Timofeiew — Compt. rend. 112, 1137, '91.)

t°.	Grams $C_6H_5CH{:}CH.COOH$ per 100 Grams of: CH_3OH.	C_2H_5OH.	C_3H_7OH.
0	20.65	15.61	10.63
19.5	28.91	22.03	15.41

Solubility of Brom Cinnamic Acids.

α Brom and β Brom Cinnamic Acid in Water at 25°.

(Paul — Z. physik. Chem. 14, 111, '94.)

Acid.	Per 1000 cc. Solution. Grams.	Millimols.
α, $C_6H_5CH{:}CBrCOOH$	3.9325	17.32
β, $C_6H_5CBr{:}CHCOOH$	0.5255	2.315

α Brom Cinnamic Acid in Aq. Solutions of Oxalic Acid at 25°.

(Noyes — Z. physik. Chem. 6, 245, '90.)

Normality of Solutions. $(COOH)_2$.	$C_6H_5CH{:}CBr{:}COOH$.	Grams per Liter. $(COOH)_2$.	$C_6H_5CH{:}CBrCOOH$.
0	0.0176	0.0	3.995
0.0275	0.0140	2.448	3.178
0.0524	0.0129	4.716	2.928

CITRIC ACID $C_3H_4(OH)(COOH)_3.H_2O$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Bourgoin — Ann. chim. phys. [5] 13, 406, '78.)

Solvent.	t°.	Gms. $C_3H_4(OH)(COOH)_3.H_2O$ per 100 Gms. Solution.	Solvent.
Water	25	64.8	185
Water	b. pt.	70.3	250
Alcohol (90%)	25	34.6	75.9
Alcohol (U.S.P.)	"	39.2	64.5
Alcohol (Abs.)	"	43.2	52.8
Ether	"	2.21	2.26
Ether (U.S.P.)	"	5.2	5.55

COBALT BROMIDE $CoBr_2$.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 537, '94.)

t°.	59°.	75°.	97°.
Gms. $CoBr_2$ per 100 gms. solution	66.7	66.8	68.1 (blue)

COBALT DOUBLE SALTS.

SOLUBILITY IN WATER.

(Jörgensen — J.pr.Chem. [2] 18, 205, '78; 19, 49, '79; Kurnakoff — J. russ. phys. chem. Ges. 24, 629, '92.)

Name.	Formula.	t°.	Gms. Salt per 100 Gms. H_2O.
Chloro purpureo cobaltic bromide	$CoCl(NH_3)_5Br_2$	14.3	0.467
Bromo purpureo cobaltic bromide	$CoBr(NH_3)_5Br_2$	16	0.19
Chloro tetra amine cobaltic chloride	$CoCl(NH_3)_4(OH_2)Cl_2$		2.50
Chloro purpureo cobaltic chloride	$CoCl(NH_3)_5Cl_2$	0	0.232
Chloro purpureo cobaltic chloride	$CoCl(NH_3)_5Cl_2$	15.5	0.41
Chloro purpureo cobaltic chloride	$CoCl(NH_3)_5Cl_2$	46 6	1.03
Luteo cobaltic chloride	$Co(NH_3)_6Cl_3$	0	4.26
Luteo cobaltic chloride	$Co(NH_3)_6Cl_3$	46.6	12.74
Roseo cobaltic chloride	$Co(NH_3)_5(OH_2)Cl_3$	0	16.12
Roseo cobaltic chloride	$Co(NH_3)_5(OH_2)Cl_3$	16.2	24.87
Chloro purpureo cobaltic iodide	$CoCl(NH_3)_5I_2$	19.2	2.0
Chloro purpureo cobaltic nitrate	$CoCl(NH_3)_5(NO_3)_2$	15	1.25
Chloro purpureo cobaltic sulphate	$CoCl(NH_3)_5SO_4.2H_2O$	17.3	0.75
Nitrato purpureo cobaltic nitrate	$Co(NO_3)(NH_3)(NO_3)_2$	16	0.36

COBALT CHLORATE $Co(ClO_3)_2$.

SOLUBILITY IN WATER.

(Meusser — Ber. 35, 1419, '02.)

t°.	Gms. $Co(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Co(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Co(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Co(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−12	29.97	3.41	Ice	18	64.19	14.28	$Co(ClO_3)_2.4H_2O$.
−21	53.30	9.08	$Co(ClO_3)_2.6H_2O$.	21	64.39	14.51	"
−19	53.61	9.20	"	35	67.09	16.10	"
0	57.45	10.75	"	47	69.66	18.29	"
10.5	61.83	12.90	"	61	76.12	25.39	"

Density of solution saturated at 18° = 1.861.

COBALT CHLORIDE $CoCl_2$.

Solubility in Water.

(Etard — Compt. rend. 113, 699, '91; Ann. chim. phys. [7] 2, 537, '94.)

t°.	Gms. $CoCl_2$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $CoCl_2$ per 100 Gms. Solution.	Solid Phase.
−10	27.0	$CoCl_2.6H_2O$ (red)	35	38.0	$CoCl_2.H_2O$ (violet)
0	29.5	"	40	41.0	"
+10	31.5	"	50	47.0	"
20	33.5	"	60	47.5	$CoCl_2.H_2O$ (blue)
25	34.5	"	80	49.5	"
30	35.5	"	100	51.0	"

Solubility of Cobalt Ammonium Chlorides in Water.

(Kurnakoff — J. russ. phys. chem. Ges. 24, 629, '93; J. Chem. Soc. 64, ii, 509, '93.)

Salt.	Grams per 100 Grams H_2O at: 0°.	16.9°.	46.6°.
$CoCl_3.5NH_3$	0.232	...	1.031
$CoCl_3.5NH_3.H_2O$	16.12	24.87	...
$CoCl_3.6NH_3$	4.26	...	12.74

Solubility of Cobalt Chloride in Aqueous Hydrochloric Acid Solutions at 0°.

(Engel — Ann. chim. phys. [6] 7, 355, '89.)

Milligram Mols. per 10 cc. Sol.		Sp. Gr. of Solutions.	Gms. per 100 Gms. Solution.		Gms. per 100 cc. Solution.	
½$CoCl_2$.	HCl.		$CoCl_2$.	HCl.	$CoCl_2$.	HCl.
62.4	0	1.343	30.17	0.00	40.5	0
58.52	3.7	1.328	28.62	0.102	38.0	0.135
50.8	11.45	1.299	25.39	0.321	33.0	0.417
37.25	25.2	1.248	19.43	0.738	24.2	0.919
12.85	55.0	1.167	7.15	1.718	8.34	2.00
4.75	74.75	1.150	2.68	2.369	3.08	2.72
12.0	104.5	1.229	6.34	3.099	7.79	3.81
25.0	139.0	1.323	12.27	3.829	16.24	5.07

Solubility of Cobalt Chloride in Aqueous Alcohol at 11.5°.

(Bödtker — Z. physik. Chem. 22, 509, '97.)

10 gms. of $CoCl_2.6H_2O$ were added to 20 cc. of alcohol and in addition the amounts of $CoCl_2$ shown in the second column. The solutions were shaken 2 hours, 5 cc. withdrawn, and the amount of dissolved $CoCl_2$ determined by evaporation and weighing.

Vol. % Alcohol.	Gms. $CoCl_2$ Added.	Gms. per 5 cc. Solution. H_2O.	$CoCl_2$.	Vol. % Alcohol.	Gms. $CoCl_2$ Added.	Gms. per 5 cc. Sol. H_2O.	$CoCl_2$.
91.3	0.0	1.325	1.168	99.3	0.612	0.764	1.459
98.3	0.0	1.134	1.214	99.3	0.813	0.688	1.568
98.3	0.0	1.068	1.181	99.3	1.022	0.634	1.713
99.3	0.0	1.045	1.199	99.3	1.240	0.553	1.831
99.3	0.194	0.899	1.204	99.3	1.446	0.483	1.943
99.3	0.400	0.829	1.325	99.3	1.650	0.500	2.183

100 gms. sat. solution in alcohol (0.792 Sp. Gr.) contain 23.66 gms. $CoCl_2$, Sp. Gr. = 1.0107. (Winkler — J. pr. Chem. 91, 207, '64.)

Solubility of Cobalt Chloride in Organic Solvents.

Solvent.	t°.	Gms. per 100 Gms. Solvent. $CoCl_2$.	$CoCl_2.2H_2O$.	Authority.
Acetone	0	9.11	17.16	(St. von Laszczynski — Ber. 27, 2285, '94.)
"	22.5	9.28	17.06	(St. von Laszczynski — Ber. 27, 2285, '94.)
"	25	8.62	...	(Krug and McElroy — J. Anal. Ch. 6, 184, '92.)
"	18	2.75	...	(Naumann — Ber. 37, 4332, '04.)
Ethyl Acetate	14	0.08	...	(St. von Lasczczynski.)
"	79	0.26	...	"
Ether	...	0.021	0.0291	(Bödtker — Z. physik. Chem. 22, 509, '97.)
Glycol	...	10.7 (per 100 g. sol.)		(de Coninck—Bull. acad. roy. Belgique, 359, '05.)

COBALT IODATE $Co(IO_3)_2$.

Solubility in Water.

(Meusser — Ber. 34, 2435, '01.)

t°.	Solid Phase: $Co(IO_3)_2.4H_2O$. G.	M.	$Co(IO_3)_2.2H_2O$. G.	M.	$Co(IO_3)_2$. G.	M.
0	0.54	0.028	0.32	0.014	...	...
18	0.83	0.038	0.45	0.020	1.03	0.046
30	1.03	0.046	0.52	0.023	0.89	0.040
50	1.46	0.065	0.67	0.030	0.85	0.030
60	1.86	0.084	...	...	...	...
65	2.17	0.098	...	...	...	...
75	...	...	0.84	0.038	0.75	0.033
100	...	...	1.02	0.045	0.69	0.031

G = Gms. $Co(IO_3)_2$ per 100 gms. solution. M = Mols. $Co(IO_3)_2$ per 100 Mols. H_2O.

COBALT IODIDE CoI_2.

Solubility in Water.

(Etard — Compt. rend. 113, 699, '91; Ann. chim. phys. [7] 2, 537, '94.)

The accuracy of these results is doubtful.

t°.	Gms. CoI_2 per 100 Gms. Solution.	Solid Phase.	t°.	Gms. CoI_2 per 100 Gms. Solution.	Solid Phase.
−10	55.5	$CoI_2.H_2O$ (green)	25	67.5	$CoI_2.H_2O$ (olive)
0	58.0	"	30	70.0	"
10	61.5	"	40	75.0	$CoI_2.H_2O$ (yellow)
15	63.2	"	50	79.0	"
20	65.2	"	80	80.0	"
25	67	"	110	81.0	"

COBALT NITRATE $Co(NO_3)_2$.

Solubility in Water.

(Funk — Wiss. Abh. p. t. Reichanstalt 3, 439, '00.)

t°	Gms. $Co(NO_3)_2$ per 100 Gms. Solution.	Mols. $Co(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Co(NO_3)_2$ per 100 Gms. Solution.	Mols. $Co(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−26	39.45	6.40	$Co(NO_3)_2.9H_2O$	41	55.96	12.5	$Co(NO_3)_2.6H_2O$
−20.5	42.77	7.35	"	56	62.88	16.7	"
−21	41.55	6.98	$Co(NO_3)_2.6H_2O$	55	61.74	15.8	$Co(NO_3)_2.3H_2O$
−10	43.69	7.64	"	62	62.88	16.7	"
− 4	44.85	7.99	"	70	64.89	18.2	"
0	45.66	8.26	"	84	68.84	21.7	"
+18	49.73	9.71		91	77.21	33.3	"

Density of solution saturated at 18° = 1.575.

Solubility of Cobalt Nitrate in Glycol.

(de Coninck — Bull. acad. roy. Belgique, 359, '05.)

100 grams saturated solution contain 80 gms. Cobalt Nitrate.

COBALT RUBIDIUM NITRITE $Rb_3Co(NO_2)_6.H_2O$.

100 grams H_2O dissolve 0.005 gram of the salt.

(Rosenbladt — Ber. 19, 2531, '86.)

COBALT SULPHATE $CoSO_4.7H_2O$.

Solubility in Water.

(Mulder; Tobler — Liebig's Ann. 95, 193, '55; Koppel — Wetzel — Z. physik. Chem. 52, 395, '05.)

t°.	Gms. $CoSO_4$ per 100 Gms. Solution.	Gms. $CoSO_4$ per 100 Gms. Water.	Mols. $CoSO_4$ per 100 Mols. H_2O.	t°.	Gms. $CoSO_4$ per 100 Gms. Solution.	Gms. $CoSO_4$ per 100 Gms. Water.	Mols. $CoSO_4$ per 100 Mols. H_2O.
0	20.35	25.55	2.958	35	31.40	45.80	5.31
5	21.90	28.03	3.251	40	32.81	48.85	5.664
10	23.40	30.55	3.540	50	35.56	55.2	...
15	24.83	33.05	3.831	60	37.65	60.4	...
20	26.58	36.21	4.199	70	39.66	65.7	...
25	28.24	39.37	4.560	80	41.18	70.0	...
30	29.70	42.26	4.903	100	45.35	83.0	...

Solubility of Mixtures of $CoSO_4.7H_2O$ and $Na_2SO_4.10H_2O$ in Water.

(Koppel; Wetzel.)

t°.	Gms. per 100 Gms. Solution.		Gms. per 100 Gms. H_2O.		Mols. per 100 Mols. H_2O.		Solid Phase.
	$CoSO_4$.	Na_2SO_4.	$CoSO_4$.	Na_2SO_4.	$CoSO_4$.	Na_2SO_4.	
0	16.56	7.63	21.85	10.07	2.54	1.27	$CoSO_4.7H_2O$ + $Na_2SO_4.10H_2O$
5	17.46	9.59	23.94	13.15	2.77	1.67	"
10	17.90	11.73	25.41	16.67	2.94	2.11	"
20	17.59	16.43	26.65	24.91	3.09	3.15	$CoNa_2(SO_4)_2.4H_2O$
25	17.06	15.70	25.36	23.32	2.95	2.97	"
30	15.94	14.93	23.15	21.61	2.70	2.74	"
35	15.73	14.52	22.54	20.85	2.62	2.64	"
40	14.87	14.22	20.98	20.05	2.46	2.53	"
18.5	18.75	15.61	28.61	23.82	3.32	3.02	$CoNa_2(SO_4)_2.4H_2O$ + $CoSO_4.7H_2O$
20	19.30	15.10	29.42	23.01	3.41	2.92	"
25	20.30	13.60	30.74	20.58	3.56	2.61	"
30	21.67	12.05	32.70	18.17	3.79	2.30	"
35	22.76	10.43	34.06	15.61	3.95	1.98	"
40	24.05	9.16	35.01	13.72	4.81	1.74	"
18.5	16.87	16.97	25.50	25.65	2.96	3.25	$CoNa_2(SO_4)_2.4H_2O$ + $Na_2SO_4.10H_2O$
20	15.41	18.12	23.18	27.26	2.69	3.45	"
25	10.63	23.26	16.07	35.17	1.86	4.46	"
30	6.01	28.67	9.20	43.74	1.07	5.54	"
35	4.56	32.14	7.19	50.79	0.835	6.44	$CoNa_2(SO_4)_2.4H_2O$ + Na_2SO_4
40	4.72	31.78	7.45	50.10	0.864	6.34	"

SOLUBILITY OF COBALT SULPHATE IN METHYL AND ETHYL ALCOHOL AND IN GLYCOL.

Solvent.	t°.	Gms. per 100 Gms. Solvent. $CoSO_4$.	$CoSO_4.7H_2O$.	Observer.
Methyl Alcohol (abs.)	3	...	42.8	(de Bruyn—Z. physik. Ch. 10, 784, '92.)
" "	15	...	50.9	"
" "	18	1.04	54.5	"
" (93.5%)	3	...	13.3	"
" (50%)	3	...	1.8	"
Ethyl Alcohol (abs.)	3	...	2.5	"
Glycol	..	(per 100 gms. solution)	3.1	(de Coninck—Bull. acad. roy. Belgique, 359, '05.)

COCAINE $C_{17}H_{21}NO_4$.

COCAINE HYDROCHLORIDE $C_{17}H_{21}NO_4.HCl$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; at 18°–22°; Müller — Apoth.-Ztg. 18, 248, '03.)

Solvent.	t°.	Gms. per 100 Gms. Solvent. $C_{17}H_{21}NO_4$.	$C_{17}H_{21}NO_4.HCl$.	Solvent.	t°.	Gms. $C_{17}H_{21}NO_4$. per 100 Gms. Solvent.
Water	25	0.17	250	Ether + H_2O	18–22	34.0
Water	80	0.38	1000	H_2O + Ether	18–22	0.254
Alcohol	25	20.0	38	Benzene	18–22	100
Ether (U.S.P.)	25	26.3	...	CCl_4	17	18.5
Ether	18–22	11.6	...	Acetic Ether	18–22	58.99
Chloroform	18–22	100+	...	Petroleum Ether	18–22	2.37

CODEINE $C_{18}H_{21}NO_3.H_2O$, also the Phosphate and Sulphate.

COLCHICINE $C_{22}H_{25}NO_6$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; at 18°–22°, Müller.)

Solvent.	t°.	Grams. per 100 Grams Solvent. $C_{18}H_{21}NO_3 H_2O$.	Codeine $H_3PO_4.2$ Aq.	Codeine $H_2SO_4.5$ Aq.	$C_{22}H_{25}NO_6$.
Water	18–22	...	...	..	9.616
Water	25	1.13	44.9	3.3	4.5
Water	80	1.70	217.0	16.0	5.0
Alcohol	25	62.5	0.383	0.096	...
Alcohol	60	108.7	1.03	0.27	...
Ether	25	8.0	0.075	...	0.64
Ether	18–22	...	...	...	0.126
Ether sat. with H_2O	18–22	...	...	...	0.18
H_2O sat. with Ether	18–22	...	...	...	12.05
Benzene	18–22	...	...	...	0.939
Benzene	25	...	...	...	1.15
Chloroform	25	151.5	0.015	...	100+
Carbon Tetra Chloride	17	1.328	...	...	0.121
Acetic Ether	18–22	...		.	1.342
Petroleum Ether	18–22	...	...	..	0.058

COLLIDINE (2, 4, 6, Tri Methyl Pyridine) $C_5H_2N(CH_3)_3$.

SOLUBILITY IN WATER.
(Rothmund — Z. physik. Chem. 26, 433, '98.)

t°.	Gms. Collidin per 100 Gms. Aq. Layer.	Gms. Collidin per 100 Gms. Collidin Layer.	t°.	Gms. Collidin per 100 Gms. Aq. Layer.	Gms. Collidin per 100 Gms. Collidin Layer.
5.7 (crit. t.)	17.20				
10	7.82	41.66	80	1.73	86.12
20	3.42	54.92	100	1.78	88.07
30	2.51	62.80	120	1.82	88.98
40	1.93	70.03	140	2.19	89.10
60	1.76	80.19	160	2.93	87.2
			180	3.67	...

COPPER ACETATE $Cu(C_2H_3O_2)_2.H_2O$.

100 grams of glycerine dissolve 10 grams of copper acetate at 15.5°.

COPPER BROMIDE (ous) Cu_2Br_2.

SOLUBILITY OF CUPROUS BROMIDE IN AQUEOUS SOLUTIONS OF POTASSIUM BROMIDE AT 18°–20°.
(Bodländer and Storbeck — Z. anorg. Chem. 31, 460, '02.)

Millimols per Liter. KBr.	Total Cu.	Total Br.	Cu (ic).	Cu (ous).	Grams. per Liter. KBr.	Total Cu.	Cu (ic).	Cu (ous).
0	0.3157	0.4320	0.2096	0.1061	0	0.0201	0.0133	0.0067
25	0.119	...	0.012	0.107	2.98	0.0076	0.0007	0.0068
40	0.200	...	0.013	0.187	4.76	0.0127	0.0007	0.0119
60	0.310	...	0.025	0.285	7.15	0.0197	0.0015	0.0181
80	0.423	...	0.012	0.411	9.53	0.0266	0.0007	0.0261
100	0.584	...	...	0.584	11.91	0.0371	...	0.0371
120	0.693	...	...	0.693	14.29	0.0441	...	0.0441
500	8.719	...	...	8.719	59.55	0.5540	...	0.5540

COPPER CHLORATE (ic) $Cu(ClO_3)_2.4H_2O$.

SOLUBILITY IN WATER.
(Meusser — Ber. 35, 1420, '02.)

t°.	Gms. $Cu(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Cu(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°	Gms. $Cu(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Cu(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−12	30.53	3.43	Ice	18	62.17	12.84	$Cu(ClO_3)_2.4H_2O$
−31	54.59	9.39	$Cu(ClO_3)_2.4H_2O$	45	66.17	15.28	"
−21	57.12	10.41	"	59.6	69.42	17.73	"
+0.8	58.51	11.02	"	71	76.9	25.57	"

Density of solution saturated at 18° = 1.695.

COPPER CHLORIDE (ic) $CuCl_2$.

SOLUBILITY IN WATER.
(Reicher and Deventer — Z. physik. Chem. 5, 560, '90; see also Etard — Ann. chim. phys. [7] 2, 528, '94.)

t°.	Gms. $CuCl_2$ per 100 Gms. Solution.	t°.	Gms. $CuCl_2$ per 100 Gms. Solution.	t°.	Gms. $CuCl_2$ per 100 Gms. Solution.
0	41.4	25	44.0	50	46.65
10	42.45	30	44.55	60	47.7
20	43.5	40	45.6	80	49.8
				100	51.9

Density of solution saturated at 0° = 1.511, at 17.5° = 1.579.

Solubility of Cupric Chloride in Aqueous Solutions of Hydrochloric Acid at 0°.

(Engel — Ann. chim. phys. [6] 17, 351, '89.)

Milligram Mols. per 10 cc. Sol.		Sp Gr. of Solutions.	Gms. per 100 cc. Sol.		Gms. per 100 Gms. Sol.	
$\frac{1}{2}CuCl_2$.	HCl.		$CuCl_2$.	HCl.	$CuCl_2$.	HCl.
91.75	0	1.49	61.70	0.0	41.41	0.0
86.8	4.5	1.475	58.37	1.64	39.58	1.11
83.2	7.8	1.458	55.95	2.84	38.37	1.95
79.35	10.5	1.435	53.37	3.83	37.19	2.67
68.4	20.25	1.389	46.01	7.38	33.11	5.31
50.0	37.5	1.319	33.62	13.67	25.50	10.37
22.8	70.25	1.231	15.33	25.61	12.46	20.80
23.5	102.5	1.288	15.81	37.36	12.27	29.00
26.7	128.0	1.323	17.96	46.66	13.57	35.26
			29.0	Sat. HCl		

Solubility of Cuprous Chloride in Aqueous Solutions of Hydrochloric Acid.

(Engel — *Ibid.* [6] 17, 372, '89; Compt. rend. 121, 529, '95.)

Milligram Mols. per 10 cc. Sol.		Sp. Gr. of Solutions.	Gms. per 100 cc. Sol.		Gms. per 100 Gms. Sol	
$\frac{1}{2}Cu_2Cl_2$.	HCl.		Cu_2Cl_2.	HCl.	Cu_2Cl_2.	HCl.
Results at 0°.						
0.475	8.975	1.05	0.471	0.327	0.448	0.312
1.5	17.5	1.049	1.486	0.638	1.418	0.608
2.9	26.0	1.065	2.872	0.948	2.697	0.932
4.5	34.5	1.080	4.457	1.257	4.127	1.164
8.25	47.8	1.135	8.172	1.743	7.199	1.535
15.5	68.5	1.261	15.7	2.497	12.46	1.980
33.0	104.0	1.345	32.68	3.827	24.30	2.845
Results at 15°–16°.						
7.4	54.4	1.19	7.33	1.983	6.159	1.666
10.8	68.9	1.27	10.69	2.511	8.422	1.977
12.8	75.0	1.29	12.68	2.734	9.826	2.119
16 0	92.0	1.38	15.84	3.346	11.48	2.424

Copper Chloride, Ammonium Chloride Mixtures in Aqueous Solution at 30°.

(Meerburg — Z. anorg. Chem. 45, 3, '05.)

Grams per 100 Gms. Sat. Solution.		Grams per 100 Gms. Solid Phase.		Solid Phase.
$CuCl_2$.	NH_4Cl.	$CuCl_2$.	NH_4Cl.	
0	29.5	...	...	NH_4Cl
1.9	28.6	6.0	48.2	$NH_4Cl + CuCl_2.2NH_4Cl.2H_2O$
3.6	25.9	37.0	34.9	$CuCl_2.2NH_4Cl.2H_2O$
10.5	16.5	21.7	23.1	"
19.9	9.4	28.5	18.4	"
29.4	4.9	35.1	15.3	"
41.4	2.1	43.1	13.3	"
43.2	2.0	51.9	6.6	$CuCl_2.2NH_4Cl.2H_2O + CuCl_2.2H_2O$
43.9	0	...	...	$CuCl_2.2H_2O$

COPPER AMMONIUM CHLORIDE $CuCl_2.2NH_4Cl.2H_2O$.

SOLUBILITY IN WATER.

(Meerburg.)

t°.	Gms. $CuCl_2.2NH_4Cl$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $CuCl_2.2NH_4Cl$ per 100 Gms. Solution.	Solid Phase.
−10.5	3.87	Ice	30	27.70	$CuCl_2.2NH_4Cl.2H_2O$
−10.8	20.12	Ice	40	30.47	"
−11	20.3	Ice + $CuCl_2.2NH_4Cl.2H_2O$	50	33.24	"
−10	20.46	$CuCl_2.2NH_4Cl.2H_2O$	60	36.13	"
0	22.02	"	70	39.35	"
12	24.26	"	80	43.36	"
20	25.95	"			

SOLUBILITY OF CUPROUS CHLORIDE IN AQUEOUS SOLUTIONS OF CUPRIC SULPHATE AT ABOUT 20°.

(Bodländer and Storbeck — Z. anorg. Chem. 31, 22, '02.)

Millimols per Liter.					Grams per Liter.				
$CuSO_4$.	Total Cu.	Total Cl.	Cu(ic).	Cu(ous).	$CuSO_4$.	Total Cu.	Total Cl.	Cu(ic).	Cu(ous).
0	2.880	5.312	2.258	0.622	0.0	0.183	0.188	0.143	0.040
0.987	3.602	4.908	3.145	0.457	0.158	0.229	0.174	0.200	0.029
1.975	4.553	4.687	4.131	0.422	0.315	0.290	0.166	0.263	0.027
2.962	5.193	4.256	4.625	0.509	0.473	0.330	0.151	0.292	0.032
4.937	7.276	4.329	6.546	0.730	0.788	0.463	0.154	0.416	0.046

SOLUBILITY OF CUPROUS CHLORIDE IN AQUEOUS SOLUTIONS OF POTASSIUM CHLORIDE AT 18°–20° EXCEPT DETERMINATIONS IN 3RD, 7TH, 8TH, AND LAST LINE, WHICH ARE AT 16°.

(Bodländer and Storbeck.)

Millimols per Liter.					Grams per Liter.				
KCl.	Total Cu.	Total Cl.	Cu(ic).	Cu(ous).	KCl.	Total Cu.	Total Cl.	Cu(ic).	Cu(ous)
0	2.851	5.436	2.222	0.629	0.0	0.181	0.193	0.141	0.040
2.5	1.955	6.015	1.421	0.534	0.186	0.124	0.213	0.090	0.034
5	1.522	7.525	1.008	0.514	0.373	0.097	0.267	0.069	0.033
10	1.236	11.735	0.475	0.761	0.746	0.079	0.416	0.030	0.048
20	1.446	21.356	0.324	1.122	1.492	0.092	0.759	0.021	0.071
50	2.411	not det.	0.1088	2.302	3.730	0.153	not det.	0.007	0.146
100	4.702	"	0.000	4.702	7.460	0.299	"	0.000	0.299
200	9.485	"	0.000	9.485	14.920	0.603	"	0.000	0.603
1000	97.0	"	0.000	97.0	74.60	6.170	"	0.000	6.170
2000	384.0	"	0.000	384.0	149.2	24.42	"	0.000	24.420

SOLUBILITY OF COPPER CHLORIDE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE.

(Hunt — Am. J. Sci. [2] 49, 154, '70.)

t°.	Grams $CuCl_2$ per 100 cc. Solution of:		
	Sat. NaCl.	15% NaCl.	5% NaCl.
11	8.9	3.6	...
40	11.9	6.0	1.1
90	16.9	10.3	2.6

Solubility of Copper Chloride and Potassium Chloride Double Salts and Mixtures in Water.

(Meyerhoffer — Z. physik. Chem. 5, 102, '90.)

t°.	Cl per 1 Gram Solution. Present as $CuCl_2$.	Present as KCl.	Mols. per 100 Mols. H_2O. $CuCl_2$.	KCl.	Solid Phase.
39.4	0.120	0.107	5.56	9.93	$CuCl_2.2KCl.2H_2O + KCl$
49.9	0.129	0.115	6.39	11.4	"
60.4	0.142	0.125	7.71	13.6	"
79.1	0.168	0.142	11.1	18.8	"
90.5	0.188	0.154	14.9	24.4	"
93.7	0.194	0.156	16.2	26.0	$CuCl_2.KCl + KCl$
98.8	0.197	0.162	17.5	28.7	"
0	0.214	0.021	9.84	1.94	$CuCl_2.2KCl.2H_2O + CuCl_2.2H_2O$
39.6	0.232	0.049	12.9	5.44	"
50.1	0.233	0.059	13.7	6.90	"
52.9	0.241	0.062	14.8	7.63	"
60.2	0.246	0.066	15.8	8.49	$CuCl_2.KCl + CuCl_2.2H_2O$
72.6	0.255	0.063	16.8	8.35	"
64.2	...	...	14.9	11.6	$CuCl_2.2KCl.2H_2O + CuCl_2.KCl$
72.5	...	...	14.8	15.0	$CuCl_2.KCl$

Solubility of Cupric Chloride in Several Solvents.

(Etard — Ann. chim. phys. [7] 2, 564, '94; de Bruyn — Z. physik. Chem. 10, 783, '92; de Coninck — Compt. rend. 131, 59, '00; St. von Laszczynski — Ber. 27, 2285, '94.)

Solvent.	Grams $CuCl_2$ per 100 Grams Sat. Solution at: 0°.	15°.	20°.	40°.	80°.
Methyl Alcohol	36	40.5 (de B.)	36.5	37.0	...
Ethyl Alcohol	32	35.0 (de B.)	35.7	39.0	...
Propyl Alcohol	29	...	30.5	30.5	...
Iso Propyl Alcohol	...	...	...	16.0	30.0
n Butyl Alcohol	15	...	15.3	16.0	16.5
Allyl Alcohol	23	...	23.0	...	...
Ethyl Formate	10	...	9.0	8.0	...
Ethyl Acetate	...	...	3.0	2.5	1.3 (72°)
Acetone (abs.)	8.86*	8.92†	2.88 (18°)	...	1.40 (56°)
Acetone (80%)	...	...	18.9‡	...	...
Ether	...	0.043 (11°)	0.11	...	...

* ($CuCl_2$.2 Aq.) † ($CuCl_2$.2 Aq.) ‡ (23° $CuCl_2$.2 Aq.)

For the solubility of cupric chloride in mixtures of a number of organic solvents, see de Coninck.

Solubility of Cupric Chloride in Aqueous Alcohol at 11.5°.

(Bödtker — Z. physik. Chem. 22, 507, '97.)

10 gms. of $CuCl_2 2H_2O$ and the indicated amounts of $CuCl_2$ were added to 20 cc. portions of alcohol. The solutions shaken two hours, 5 cc. portions withdrawn.

Vol. % Alcohol.	Gms. $CuCl_2$ Added.	Gms. per 5 cc. Solution.		Vol. % Alcohol.	Gms. $CuCl_2$ Added.	Gms. per 5 cc. Solution.	
		H_2O.	$CuCl_2$.			H_2O.	$CuCl_2$.
89.3	0.0	0.794	1.137	99.3	0.223	0.330	1.295
92.0	0.0	0.648	1.090	99.3	0.887	0.247	1.639
96.3	0.0	0.478	1.116	99.3	1.540	0.191	2.086
99.3	0.0	0.369	1.208	99.3	1.957	0.164	2.400

COPPER NITRATE (ic) $Cu(NO_3)_2$.

Solubility in Water.

(Funk — Wiss. Abh. p. t. Reichanstalt, 3, 440, '00.)

t°.	Gms. $Cu(NO_3)_2$ per 100 Gms. Solution.	Mols. $Cu(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Cu(NO_3)_2$ per 100 Gms. Solution.	Mols. $Cu(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−23	36.08	5.42	$Cu(NO_3)_2.9H_2O$	20	55.58	12.0	$Cu(NO_3)_2.6H_2O$
−20	40.92	6.65	"	26.4	63.39	16.7	"
−21	39.52	6.27	$Cu(NO_3)_2.6H_2O$	25	60.01	14.4	$Cu(NO_3)_2.3H_2O$
0	45.00	7.87	"	40	61.51	15.2	"
+10	48.79	9.15	"	60	64.17	17.2	"
18	53.86	11.20	"	80	67.51	20.0	"
				114.5	77.59	33.3	"

Density of solution saturated at 18° = 1.681.

COPPER SULPHATE $CuSO_4.5H_2O$.

Solubility in Water.

(Etard — Ann. chim. phys. [7] 2, 528, '94; Patrick and Aubert — Trans. Kansas Acad. Sci. 19, '74; at 15°, Cohen — Z. Electrochem. 9, 433, '03; at 25°, Trevor — Z. physik. Chem. 7, 470, '91.)

t°.	Gms. $CuSO_4$ per 100 Gms.		t°.	Gms. $CuSO_4$ per 100 Gms.	
	Solution.	Water.		Solution.	Water.
0	12.5	14.3	60	28.5	40.0
10	14.8	17.4	80	35.5	55.0
20	17.2	20.7	100	43.0	75.4
25	18.5	22.7	120	44.0	78.6
30	20.0	25.0	140	44.5	80.2
40	22.5	28.5	160	44.0	78.6
50	25.0	33.3	180	43.0	75.4

Solubility of Copper Sulphate in Aqueous Solutions of Sulphuric Acid at 0°.

(Engel — Compt. rend. 104, 507, '87.)

Milligram Equiv. per 10 Gms. H_2O.		Sp. Gr. of Solutions.	Grams per 100 Grams H_2O.	
H_2SO_4.	$CuSO_4$.		H_2SO_4.	$CuSO_4$.
0.0	18.6	1.144	0.00	14.85
4.14	17.9	1.143	2.03	14.29
14.6	19.6	1.158	7.16	15.65
31.0	12.4	1.170	15.20	9.90
54.2	8.06	1.195	26.57	6.43
56.25	7.75	1.211	27.57	6.19
71.8	5.0	1.224	35.2	3.99

Solubility of Copper Sulphate in Aqueous Solutions of Ammonium Sulphate at 0°.

(Engel — Compt. rend. 102, 114, '86.)

Milligram Equiv. per 10 cc. Solution.		Sp. Gr. of Solutions.	Grams per 100 cc. Solution.	
$(NH_4)_2SO_4$.	$CuSO_4$.		$(NH_4)_2SO_4$.	$CuSO_4$.
0.0	18.52	1.144	0.0	14.79
5.45	20.15	1.190	3.61	16.09
7.0	10.5	1.108	4.63	8.38
7.4	9.1	1.099	4.90	7.26
8.45	6.425	1.0815	5.59	5.13
11.35	3.7	1.071	7.51	2.95
18.6	1.178	1.082	12.31	0.94
31.2	1.0	1.116	20.65	0.80

Mixtures of Copper Ammonium Sulphate and Nickel Ammonium Sulphate in Water at 13°–14°.

(Fock — Z. Kryst. Min. 28, 394, '97.)

$CuSO_4.(NH_4)_2SO_4.6H_2O$ — $NiSO_4.(NH_4)_2SO_4.6H_2O$.

Mol. % in Solution.		Mols. per 100 Mols. H_2O.		Mol. % in Solid Phase.	
Cu. Salt.	Ni Salt.	Cu Salt.	Ni Salt.	Cu. Salt.	Ni Salt.
0.00	100.00	0.00	0.521	0.00	100.00
33.34	66.66	0.1476	0.295	10.29	89.71
56.05	43.95	0.2664	0.2089	30.59	69.41
73.89	26.20	0.4165	0.1449	52.23	47.77
79.92	20.08	0.4785	0.1202	78.80	21.20
100.00	0.00	1.0350	0.00	100.0	0.00

Mixtures of Copper Ammonium Sulphate and Zinc Ammonium Sulphate in Water at 13°–14°.

(Fock.)

$CuSO_4.(NH_4)_2SO_4.6H_2O$ — $ZnSO_4.(NH_4)_2SO_4.6H_2O$.

Mol. % in Solution.		Mols. per 100 Mols. H_2O.		Mol. % in Solid Phase.	
Cu. Salt.	Zn Salt.	Cu Salt.	Zn Salt.	Cu. Salt.	Zn Salt.
4.97	95.03	0.0422	0.8069	2.39	97.61
10.65	89.35	0.0666	0.5638	4.52	95.48
19.24	80.76	0.1218	0.5115	9.03	90.97
30.19	69.81	0.2130	0.4924	14.67	85.33
44.44	55.56	0.3216	0.4022	22.62	77.38
100.00	0.00	1.035	0.000	100	0.000

Solubility of Copper Sulphate in Aqueous Solutions of Magnesium Sulphate at 0°.

(Diacon — Jahresber. Chem. 61, '66.)

Grams per 100 Gms. H_2O.		Solid Phase.	Grams per 100 Gms. H_2O.		Solid Phase.
$CuSO_4$.	$MgSO_4$.		$CuSO_4$.	$MgSO_4$.	
0	26.37	$MgSO_4.6H_2O$	12.03	15.67	$CuSO_4.5H_2O$
2.64	25.91	"	13.61	8.64	"
4.75	25.30	"	14.99	0.00	"
9.01	23.30	$MgSO_4.6H_2O + CuSO_4.5H_2O$			

Copper Sulphate, Manganese Sulphate, Mixed Crystals at 25°.

(Stortenbecker — Z. physik. Chem. 34, 112, '00.)

Gms. per 100 Gms. H_2O. CuSO$_4$.	MnSO$_4$.	Mols. per 100 Mols. H_2O. Cu.	Mn.	Mol. % Cu in Solution.	Mol. % Cu in Crystals.
Triclinic Crystals with $5H_2O$.					
20.2	0	2.282	0	100	100
				90.5	99.3
19.76	3.69	2.23	0.44	83.5	...
				74.1	97.3
				57.7	95.1
				31.0	81.3
13.65	31.52	1.54	3.76	29.0	...
				26.1	70.4
11.61	39.41	1.31	4.70	21.8	...
				21.2	42.6
				20.0	34.4
9.39	46.77	1.06	5.59	15.9	22.9
				13.45*	15.2*
6.47	53.39	0.73	6.37	10.27	10.5
				5.0	4.9
3.01	58.93	0.34	7.03	4.6	...
				2.31	2.15
0.0	61.83	0.0	7.375	0.0	100.0
Monoclinic Crystals with $7H_2O$.					
				20.0	28.2
9.39	46.77	1.06	5.58	15.9	23.5
				13.45	20.8
6.47	53.39	0.73	6.37	10.27	16.0
				4.6*	5.8*
0.0	67.07±	0.0	8±*	0.0	100

* Indicates points of labil equilibrium.

Copper Sulphate, Zinc Sulphate, Mixed Crystals in Water.

(Stortenbecker — Z. physik. Chem. 22, 62, '97.)

Mols. per 100 Mols. H_2O. Cu.	Zn.	Mol. % Cu in Solution.	Mol. % Cu in Crystals.	
2.28	0	100	100	Triclinic Crystals with $5H_2O$.
1.83	2.08	46.8	94.9	
1.41	3.60	28.1	86.4	
1.19	5.01	19.2	77.9	
1.86	3.36	36.2	40.4	Monoclinic Crystals with $7H_2O$.
1.22	4.45	21.5	29.5–31.9	
1.01	4.72	17.6	24.1–28.	
0.82	5.03	14.0	19.0–22.	
0.51	5.59	8.36	12.4–14.9	
0.30	5.56	4.87	7.02	
0.0	6.42	0.0	0	
1.19	5.01	19.2	5.01	Rhombic Crystals with $7H_2O$.
0.51	5.59	8.36	1.97	
0.267	5.77	4.42	1.15	
0.0	5.94	0.0	0.00	

Solubility of Copper Sulphate, Sodium Sulphate Mixtures in Water.

(Koppel — Z. physik. Chem. 42, 8, '01–'02; Massol and Maldes — Compt. rend. 133, 287, '01.)

t°.	Gms. per 100 Gms. Solution.		Mols. per 100 Mols. H_2O.		Solid Phase.
	$CuSO_4$.	Na_2SO_4.	$CuSO_4$.	Na_2SO_4.	
0	13.40	6.23	1.88	0.98	$CuSO_4.5H_2O + Na_2SO_4.10H_2O$
10	14.90	9.46	2.23	1.56	"
15	15.18	11.64	2.23	2.02	"
17.7	14.34	13.34	2.24	2.34	$CuSO_4.Na_2SO_4.6H_2O$
23.0	14.36	12.76	2.23	2.21	"
40.15	13.73	12.26	2.10	2.10	"
17.7	14.99	13.48	2.37	2.39	$CuSO_4.Na_2SO_4.6H_2O + CuSO_4.5H_2O$
23	16.41	11.35	2.57	1.99	"
40.15	20.56	8.0	3.25	1.47	"
18	13.53	13.84	2.10	2.41	$CuSO_4.Na_2SO_4.6H_2O + Na_2SO_4.10H_2O$
20	11.34	15.70	1.76	2.73	"
25	6.28	21.20	0.98	3.70	"
30	2.607	28.38	0.43	5.21	"
33.9	1.475	32.30	0.25	6.18	"
37.2	1.494	31.96	0.25	6.08	"
30	5.38	22.17			$CuSO_4.Na_2SO_4.6H_2O$ + increasing amts. of $Na_2SO_4.10H_2O$
30.1	3.69	25.37			
30	1.57	32.09			

Solubility of Copper Potassium Sulphate $CuK_2(SO_4)_2.6H_2O$ in Water at 25°.

100 gms. H_2O dissolve 11.14 gms. $CuK_2(SO_4)_2$.

(Trevor — Z. physik. Chem. 7, 470, '91.

Solubility of Copper Sulphate in Methyl and Ethyl Alcohol, etc.

(de Bruyn — Z. physik. Chem. 10, 786, '92; de Coninck — Bull. acad. roy. Belgique, 257, '05.)

Solvent.	t°.	Gms. per 100 Gms. Solvent.	
		$CuSO_4$.	$CuSO_4.5H_2O$.
Methyl Alcohol Abs.	18	1.05	15.6
" 93.5%	18	...	0.93
" 50%	18	...	0.40
" Abs.	3	...	13.4
Ethyl Alcohol Abs.	3	...	1.1
Glycol	14.6	...	7.6*
Glycerine	15.5	...	30.0

* Per 100 g. sol.

Solubility in Aqueous Alcohol at 15°.

(Schiff — Liebig's Ann. 118, 365, '61.)

Wt. % Alcohol.	Gms. $CuSO_4.5H_2O$ per 100 g. Solvent.
10	15.3
20	3.2
40	0.25

COPPER SULPHIDE CuS.

Solubility in Aqueous Sugar Solutions.

(Stolle — Z. Ver. Zuckerind. 50, 340, '00.)

% Sugar in Solvent.	Gms. CuS per Liter of Aq. Sugar Solution at:		
	17.5°.	45°.	75°.
10	0.5672	0.3659	1.1345
30	0.8632	0.7220	1.2033
50	0.9076	1.0589	1.2809

COPPER TARTRATE $CuC_4O_6H_4.3H_2O$.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 751, '05.)

t°.	Gms. $CuC_4O_6H_4.3H_2O$ per 100 cc. Solution.	t°.	Gms. $CuC_4O_6H_4.3H_2O$ per 100 cc. Solution.	t°.	Gms. $CuC_4O_6H_4.3H_2O$ per 100 cc. Solution.
15	0.0197	40	0.1420	65	0.1767
20	0.0420	45	0.1708	70	0.1640
25	0.0690	50	0.1920	75	0.1566
30	0.0890	55	0.2124	80	0.1440
35	0.1205	60	0.1970	85	0.1370

CRESOL $C_6H_4(OH).CH_3$ *o*, *m* and *p*.

SOLUBILITY IN WATER AT 20°.

(Vaubel — J. pr. Chem. [2] 52, 72, '95.)

100 grams of the saturated aqueous solution contain:

2.45 grams *o* cresol, 2.18 grams *m* cresol, 1.94 grams *p* cresol.

DISTRIBUTION OF CRESOL BETWEEN WATER AND ETHER.

(Vaubel — J. pr. Chem. [2] 67, 472, '03.)

Composition of Solvent.	Gms. Cresol in H_2O Layer.	In Ether Layer.
200 cc. H_2O + 100 cc. Ether	0.0570	1.0760
200 cc. H_2O + 200 c.c. Ether	0.0190	1.1144

CUMINIC ACID $C_3H_7C_6H_4.COOH$ (*p* Iso Propyl Benzoic Acid).

SOLUBILITY IN WATER AT 25°.

(Paul — Z. physik. Chem. 14, 111, '94.)

1000 cc. sat. solution contain 0.1519 gm. or 0.926 millimol Cuminic Acid.

PseudoCUMIDINE $(CH_3)_3.C_6H_2.NH_2$ (*sym.* 5 Amino, 1, 2, 4, Trimethyl benzene).

SOLUBILITY IN WATER.

(Lowenherz — Z. physik. Ch. 25, 412, '98.)

t°.	19.4°.	23.7°.	28.7°.
Gms. ψ Cumidine per liter H_2O	1.198	1.330	1.498

CYANOGEN CN.

SOLUBILITY IN SEVERAL SOLVENTS AT 20°.

(Gay Lussac.)

Solvent.	Vols. CN per 1 Vol. Solvent.
Water	4.5
Alcohol	23.0
Ether	5.0
Oil of Turpentine	5.0

DIDYMIUM SULPHATE $Di_2(SO_4)_3$.

SOLUBILITY IN WATER.

(Marignac — Ann. chim. phys. [3] 38, 170, '53.)

t°.	Gms. $Di_2(SO_4)_3$ per 100 Gms. H_2O.	Solid Phase.	t°.	Gms. $Di_2(SO_4)_3$ per 100 Gms. H_2O.	Solid Phase.
12	43.1	$Di_2(SO_4)_3$	?	34.0	$Di_2(SO_4)_3.6H_2O$
18	25.8	"	19	11.7	$Di_2(SO_4)_3.8H_2O$
25	20.6	"	40	8.8	"
38	13.0	"	50	6.5	"
50	11.0	"	100	1.8	"

DIDYMIUM POTASSIUM SULPHATE $K_2SO_4.Di_2(SO_4)_3.2H_2O$.

(Marignac.)

100 gms. H_2O dissolve 1.6 grams double salt at 18°.

ERBIUM SULPHATE $Er_2(SO_4)_3$.

SOLUBILITY IN WATER.

(Hoglund.)

100 gms. H_2O dissolve 43.0 gms. $Er_2(SO_4)_3$ at 0°.
100 gms. H_2O dissolve 23.0 gms. $Er_2(SO_4)_3.8H_2O$ at 20°.

ERYTHRITE $CH_2OH(CHOH)_2CH_2OH$.

100 grams saturated solution in pyridine contain 250 gms. at 26°.

(Holty — J. Physic. Chem. 9, 764, '05.)

ETHANE C_2H_6.

SOLUBILITY IN WATER.

(Winkler — Ber. 34, 1421, '01.)

t°.	β.	β'.	q.	t°.	β.	β'.	q.
0	0.0987	0.0982	0.0132	40	0.0292	0.0271	0.0037
5	0.0803	0.0796	0.0107	50	0.0246	0.0216	0.0029
10	0.0656	0.0648	0.0087	60	0.0218	0.0175	0.0024
15	0.0550	0.0541	0.0073	70	0.0195	0.0135	0.0018
20	0.0472	0.0462	0.0062	80	0.0183	0.0097	0.0013
25	0.0410	0.0398	0.0054	90	0.0176	0.0054	0.0007
30	0.0362	0.0347	0.0049	100	0.0172	0.0000	0.0000

β = Absorption coefficient, *i.e.*, the volume of gas (reduced to 0° and 760 mm.) absorbed by 1 volume of the liquid when the pressure of the gas itself without the tension of the liquid amounts to 760 mm.

β' = Solubility, *i.e.*, the volume of gas (reduced to 0° and 760 mm.) which is absorbed by one volume of the liquid when the barometer indicates 760 mm. pressure.

q = the weight of gas in grams which is taken up by 100 grams of the pure solvent at the indicated temperature and a total pressure (that is, the partial pressure of the gas plus the vapor pressure of the liquid at the absorption temperature) of 760 mm.

ETHER $(C_2H_5)_2O$.

Reciprocal Solubility of Ether and Water.

(Klobbie — Z. physik. Chem. **24**, 619, '97; Schuncke — *Ibid.* **14**, 334, '94; St. Tolloczko — *Ibid.* **20**, 407, '96.)

t°.	Solubility of Ether in Water. Lower Layer — Aqueous. Gms. $(C_2H_5)_2O$ per 100 Gms. Water.	Solution.	Solubility of Water in Ether. Upper Layer — Ethereal. Gms. H_2O per 100 Gms. Ether.	Solution.
0	13.12	11.6	1.01	1.0
5	11.4	10.2	1.06	1.05
10	9.5	8.7	1.12	1.12 (2.6, S.)
15	8.2	7.6	1.16	1.15
20	6.95	6.5	1.20	1.20 (2.65, S.)
25	6.05	5.7	1.26	1.26
30	5.4	5.1	1.33	1.32
*40	4.7	4.5	1.52	1.50
*50	4.3	4.1	1.73	1.7
*60	3.8	3.7	1.83	1.8
*70	3.3	3.2	2.04	2.0
*80	2.9	2.8	2.25	2.2

* Indicates determinations made by Synthetic Method, for which see page 9.

100 cc. H_2O dissolve 8.11 cc. ether at 22°; Vol. of solution 107.145 cc., Sp. Gr. 0.9853.

100 cc. ether dissolve 2.93 cc. H_2O at 22°; Vol. of solution 103.282, Sp. Gr. 0.7164. (Herz — Ber. **31**, 2671, '98.)

For recent determinations of the density of ether, see Christomanos — Z. anorg. Chem. **45**, 136, '05.

Solubility of Ether in Aqueous Solutions of Hydrochloric Acid.

(Schuncke — Z. physik. Chem. **14**, 334, '94; in 38.52% HCl, Draper — Chem. News, **35**, 87, '77.)

t°.	In 38.52 % HCl. cc. Ether per 100 cc. Solvent.	In 31.61 % HCl. cc. Ether per 100 cc. Solvent.	Gms. per 1 Gram H_2O. HCl.	$(C_2H_5)_2O$.	In 20 % HCl. cc. Ether per 100 cc. Solvent.	Gms. per 1 g. H_2O. HCl.	$(C_2H_5)_2O$.
−6	181	149	0.4622	1.387	67.2	0.253	0.5637
0	177.5	142	0.4622	1.308	58.3	0.253	0.4863
+6	172.5	131.5	0.4622	1.2075	51.1	0.253	0.4231
15	163	121.7 (14°)	0.4622	1.1075	40.5	0.253	0.3299
20	158	116.9 (20.8°)	0.4622	1.0005	33.1	0.253	0.2688
26	135	104.2	0.4622	0.9360	27.5	0.253	0.2221

t°.	In 12.58 % HCl. cc. Ether per 100 cc. Solvent.	Gms. per 1 Gram H_2O. HCl.	$(C_2H_5)_2O$.	In 3.65 % HCl. cc. Ether per 100 cc. Solvent.	Gms. per 1 Gram H_2O. HCl.	$(C_2H_5)_2O$.
−6	26.45	0.144	0.2106	19.23	0.0308	0.1454
0	22.19	0.144	0.1748	...	...	...
+6	19.18	0.144	0.1503	14.31	0.0308	0.1070
15	15.61	0.144	0.1210	11.83	0.0308	0.0868
20	13.76	0.144	0.1059	10.52	0.0308	0.0769
26	12.70	0.144	0.0970	9.24	0.0308	0.0673

Solubility of Ether in Aqueous Salt, etc., Solutions at 18°.

(Euler — Z. physik. Chem. 49, 306, '04.)

Aq. Solution of:	Gms. per Liter Added Salt.	Gms. $(C_2H_5)_2O$ per 100 cc. Solvent.	Aq. Solution of:	Gms. per Liter Added Salt.	Gms. $(C_2H_5)_2O$ per 100 cc. Solvent.
Water	0.0	7.8	Na_2SO_4	59.54	3.7
KNO_3	101.19	5.4	Mannite	91.06	6.7
KCl	73.6	4.7	H_2SO_4	49.0	6.6
LiCl	42.48	5.2	"	122.5	5.65
NaCl	58.5	4.5	"	245.0	4.55

Solubility of Ether in Aqueous Ethyl Alcohol and in Aqueous Methyl Alcohol Mixtures at 20°.

(Bancroft — Phys. Rev. 3, 122, '95–'96.)

In Ethyl Alcohol.				In Methyl Alcohol.			
Per 5 cc. Alcohol.		Per 5 cc. Alcohol.		Per 1 cc. CH_3OH.		Per 1 cc CH_3OH.	
cc. H_2O.*	cc. $(C_2H_5)_2O$.†	cc. H_2O.*	cc. $(C_2H_5)_2O$.†	cc. H_2O.	cc. $(C_2H_5)_2O$.	cc. H_2O.	cc. $(C_2H_5)_2O$.
50	1.30	4.45	7.0	10	1.13	0.83	1.80
25	1.70	4.0	7.8	7	0.85	0.64	3.00
10	2.41	3.87	8.0	4	0.60	0.52	5.0
8	3.35	3.10	10.0	2.5	0.56	0.44	10.0
6	5.10	2.08	15.0	1.8	0.63	0.45	15.0
5.21	6.00	1.77	17.5	1.0	1.23		

* Saturated with ether. † Saturated with water.

ETHYL ACETATE $CH_3COOC_2H_5$.

Solubility in Water and in Aqueous Salt Solutions at 28°.

(Euler — Z. physik. Chem. 31, 365, '99; 49, 306, '04.)

Solvent.	Conc. of Salt Solution. Normality.	Gms. per Liter.	$CH_3COOC_2H_5$ per Liter. Gram Mols.	Grams.	Solvent.	Conc. of Salt Solution. Normality.	Gms. per Liter.	$CH_3COOC_2H_5$ per Liter. Gram Mols.	Grams.
Water	0	0	0.825	75.02	NaCl(at 18°)	¼	14.62	0.76	67.0
KNO_3	½	50.59	0.77	67.81	" "	½	29.25	0.67	59.0
"	1	101.19	0.72	63.40	" "	1	58.5	0.51	45.0
"	2	202.38	0.625	55.04	Na_2SO_4	1	71.08	0.465	40.96
KCl	¼	18.4	0.747	65.79	" (at 18°)	½	35.54	0.61	54.0
"	½	36.8	0.685	65.33	" "	1	71.08	0.42	37.0
"	1	73.6	0.575	50.64	$MgSO_4$	¼	16.30	0.733	64.55
"	2	147.2	0.41	36.11	"	½	32.6	0.655	57.68
NaCl	¼	14.62	0.745	65.61	"	1	65.21	0.505	44.47
"	½	29.25	0.677	59.62	$ZnSO_4$	¼	20.18	0.733	64.55
"	1	58.5	0.545	47.99	"	½	40.36	0.653	57.50
"	2	117.0	0.315	27.74	"	1	80.73	0.500	44.03

SOLUBILITY OF ETHYL ACETATE IN AQUEOUS ETHYL ALCOHOL, METHYL ALCOHOL, AND ACETONE MIXTURES AT 20°.

(Bancroft — Phys. Rev. 3, 122, 131, '95–'96.)

In Ethyl Alcohol. Per 1 cc. C_2H_5OH.		In Methyl Alcohol. Per 1 cc. CH_3OH.		In Acetone. Per 1 cc. $(CH_3)_2CO$.	
cc. H_2O.*	cc. $CH_3COOC_2H_5$.†	cc. H_2O.	cc. $CH_3COOC_2H_5$.	cc. H_2O.	cc. $CH_3COOC_2H_5$.
10	0.25	10	1.08	10	1.01
8	0.27	3	0.68	5	0.60
4	0.35	1.5	1.69	2	0.43
2	1.02	1.29	2.50	1.5	0.47
1.06	2.50	1.0	4.9	1.0	0.63
0.65	5.0	0.98	7.0	0.8	0.74
0.54	7.0	1.0	8.0	0.51	1.00
0.44	10.0	1.03	10.0	0.25	2.00
				0.29	5.00

* Saturated with ethyl acetate. † Saturated with water.

100 cc. H_2O dissolve 7.26 g. ethyl acetate at 28°.

(Euler — Z. physik. Chem. 31, 360, '99.)

100 cc. H_2O dissolve 9.26 cc. ethyl acetate at 20°.
100 cc. ethyl acetate dissolve 2.94 cc. water at 20°.

ETHYL BUTYRATE $C_3H_7COOC_2H_5$.

SOLUBILITY IN WATER AND IN AQUEOUS ETHYL ALCOHOL MIXTURES AT 20°.

100 g. H_2O dissolve 0.5 g. ethyl butyrate at 22°.

(Traube — Ber. 17, 2304, '84.)

100 cc. H_2O dissolve 0.8 cc. ethyl butyrate at 20°. (Bancroft.)
100 cc. ethyl butyrate dissolve 0.4 – 0.5 cc. H_2O at 20°.

Per 5 cc. Ethyl Alcohol						
	cc. H_2O	10	6	4	2.96	2.10
	cc. $C_3H_7COOC_2H_5$	0.34	0.96	2.47	4.00	6.0

ETHYL FORMATE $HCOOC_2H_5$.

100 grams water dissolve 10 grams ethyl formate at 22°. (Traube.)

ETHYL PROPIONATE $C_2H_5COOC_2H_5$.

SOLUBILITY IN WATER AND IN AQUEOUS ETHYL ALCOHOL MIXTURES.

(Bancroft.)

100 grams H_2O dissolve 1.7 grams ethyl propionate at 22°. (Traube.)

cc. Alcohol in Mixture.	cc. H_2O to cause separation of a second phase in ixtures of the given amounts of Alcohol and 3 cc. portions of Ethyl Propionate.
3	2.32
6	6.87
9	12.35
12	19.17
15	27.12
18	36.84
21	50.42
24	∞

ETHYL VALERATE $C_4H_9COOC_2H_5$.

ETHYL (Iso) **VALERATE** $(CH_3)_2.CH.CH_2COOC_2H_5$.

SOLUBILITY OF EACH IN WATER AND IN AQUEOUS ALCOHOL MIXTURES AT 20°.

(Bancroft.)

100 cc. water dissolve 0.3 cc. ethyl valerate at 25°.
100 cc. water dissolve 0.2 cc. ethyl iso valerate at 20°.
100 cc. ethyl iso valerate dissolve 0.4+ cc. water at 20°.

Mixtures of Ethyl Alcohol, Ethyl Valerate and Water.

cc. Alcohol.*	cc. H_2O.†	cc. Alcohol.*	cc. H_2O.†
3	1.42	39	53.13
9	7.18	45	63.60
15	14.13	57	90.53
21	22.40	72	131.0
27	31.62	81	180.0
33	41.62		

Mixtures of Ethyl Alcohol, Ethyl Iso Valerate and Water.

Per 5 cc. Ethyl Alcohol.	
cc. H_2O.	cc. Ethyl Iso Valerate.
10	0.15
8	0.23
6	0.46
5	0.72
4	1.23

* cc. Alcohol in mixture.
† cc. H_2O added to cause the separation of a second phase in mixtures of the given amounts of alcohol and 3 cc. portions of ethyl valerate.

Di **ETHYL KETONE** (3 Pentanon) $(C_2H_5)_2CO$.

SOLUBILITY IN WATER.

(Rothmund — Z. physik. Ch. 26, 433, '98)

Determinations made by Synthetic Method, see page 9.

t°.	Gms. Di Ethyl Ketone per 100 Gms. Aq. Layer.	Gms. Di Ethyl Ketone per 100 Gms. Ketone Layer.	t°.	Gms. Di Ethyl Ketone per 100 Gms. Aq. Layer.	Gms. Di Ethyl Ketone per 100 Gms. Ketone Layer.
20	4.60	...	100	3.68	93.10
40	3.43	97.42	120	4.05	90.18
60	3.08	96.18	140	4.76	87.01
80	3.20	94.92	160	6.10	83.33

ETHYL BROMIDE C_2H_5Br.

SOLUBILITY IN ETHER.

(Parmentier — Compt. rend. 114, 1002, '92.)

t°.	−13°.	0.	12.	22.5.	32.
G. C_2H_5Br per 100 gms. Ether	632	561	462	302	253

SOLUBILITY OF ETHYL BROMIDE, ETC., IN WATER.

(Rex — Z. physik. Chem. 55, 355, '06.)

Dissolved Substance.	Grams per 100 Grams H_2O at: 0°.	10°.	20°.	30°.
Ethyl Bromide	1.067	0.965	0.914	0.896
Ethyl Iodide	0.441	0.414	0.403	0.415
Ethylene Chloride	0.922	0.885	0.869	0.894
Ethylidene Chloride	0.656	0.595	0.550	0.540

ETHYL CARBAMATE $CO(OC_2H_5)NH_2$. (See also Urethane, p. 347.)

SOLUBILITY IN SEVERAL SOLVENTS AT 25°.
(U. S. P.)

Solvent.	Water.	Alcohol.	Ether.	Chloroform.	Glycerine.
Gms. $CO(OC_2H_5)NH_2$ per 100 gms. solvent	100+	166	100	77	33

ETHYLENE C_2H_4.

SOLUBILITY IN WATER AND IN ALCOHOL.
(Bunsen and Carius; Winkler — Landolt and Börnstein, Tabellen, 3d ed. p. 604, '06.)

t°.	β.	q.
0	0.226	0.0281
5	0.191	0.0237
10	0.162	0.0200
15	0.139	0.0171
20	0.122	0.0150
25	0.108	0.0131
30	0.098	0.0118

Solubility in Alcohol.

t°.	Vols. C_2H_4 per 100 Vols. Alcohol.
0	359.5
4	337.5
10	308.6
15	288.2
20	271.3

For β and q see Ethane, page 133.

SOLUBILITY OF ETHYLENE IN METHYL ALCOHOL AND IN ACETONE.
(Levi — Gazz. chim. ital. 31, II, 513, '01.)

Results in terms of the Ostwald Solubility Expression l. See p. 105.

t°.	In Methyl Alcohol.	In Acetone.	t°.	In Methyl Alcohol.	In Acetone.
0	3.3924	4.0652	30	1.8585	1.8680
10	2.8831	3.3580	40	1.3432	1.0852
20	2.3718	2.6278	50	0.8259	0.2772
25	2.1154	2.2500	60	0.3506	...

The formulas from which the above figures were calculated are:

In Methyl Alcohol, $l = 3.3924 - 0.05083\,t - 0.00001\,t^2$.
In Acetone, $l = 4.0652 - 0.06946\,t - 0.000126\,t^2$.

FATS.

SOLUBILITY OF THE FATTY ACIDS OBTAINED FROM SEVERAL SOURCES IN ALCOHOL AND IN BENZENE.
(Dubois and Pade — Bull. soc. chim. [2] 44, '85.)

Crude Fatty Acid of:	Gms. Fat per 100 Gms. Abs. Alcohol at: 0°.	10°.	26°.	Gms. Fats per 100 Gms. Benzene at 12°.
Mutton	2.48	5.02	67.96	14.70
Beef	2.51	6.05	82.23	15.89
Veal	5.00	13.78	137.10	26.08
Pork	5.63	11.23	118.98	27.30
Butter	10.61	24.81	158.2	69.61
Margarine	2.37	4.94	47.06	13.53

FUMARIC ACID COOH.CH:CH.COOH.

MALËIC ACID $(CH)_2(COOH)_2$.

SOLUBILITY IN WATER.

(Vaubel — J. pr. Chem. [2] **59**, 30, '99.)

100 gms. water dissolve 0.672 gram fumaric acid at 165°.
100 gms. water dissolve 50.0 grams malëic acid at 100°.

FURFUROL C_4H_3OCHO.

SOLUBILITY IN WATER.

(Rothmund — Z. physik. Chem. **26**, 475, '98.)

Determinations by Synthetic Method, for which see page 9.

t°.	Gms. C_4H_3OCHO per 100 Gms.	
	Aq. Layer.	Furfurol Layer.
40	8.2	93.7
50	8.6	93.0
60	9.2	92.0
70	10.8	90.7
80	13.0	89.0
90	15.5	86.6
100	18.9	83.5
110	24.0	78.5
115	28.0	74.6
120	34.4	68.1
122.7 (crit. t.)	51.0	

GADOLINIUM SULPHATE $Gd_2(SO_4)_3.8H_2O$.

SOLUBILITY IN WATER.

(Benedicks — Z. anorg. Chem. **22**, 409, '00.)

t°.	Gms. $Gd_2(SO_4)_3$ per 100 Gms H_2O.	Solid Phase.
0	3.98	$Gd_2(SO_4)_3.8H_2O$
10	3.3	"
14	2.8	"
25	2.4	"
34.4	2.26	"

GALACTOSE $C_6H_{12}O_6$.

100 grams saturated solution in pyridine contain 5.45 grams $C_6H_{12}O_6$ at 26°, density of solution 1.0065.

(Holty — J. Physic. Chem. **9**, 764, '05)

GALLIC ACID $C_6H_2(OH_3)$ (3, 4, 5) COOH + H_2O.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Bourgoin — Ann. chim. phys. [5] **13**, 406, '78.)

Solvent.	t°.	Gms. $C_7H_6O_5.H_2O$ per 100 Gms.	
		Solvent.	Solution.
Water	25	1.20	1.18
Water	100	33.3	25.0
Alcohol (Abs.)	...	23.3	18.1
Alcohol (U.S.P.)	25	24.1	19.3
Alcohol 90%	...	38.8	18.9
Ether	25	2.56	2.50
Glycerine	25	8.3	7.66

GERMANIUM DIOXIDE GeO_2.

100 gms. H_2O dissolve 0.405 gm. GeO_2 at 20°, and 1.07 gms. at 100°.

(Winkler — J. pr. Chem. [2] 34, 177, '86; 36, 177, '87.)

GERMANIUM (Mono) **SULPHIDE** GeS and **GERMANIUM** (Di) **SULPHIDE** GeS_2.

100 gms. H_2O dissolve 0.24 GeS and 0.45 gm. GeS_2.

(Winkler.)

GLASS.

For data on the solubility of glass in water and other solvents, see:

(Cowper — J. Chem. Soc. 41, 254, '82; Emmerling — Liebig's Annalen, 150, 257, '69; Böhling — Z. anal Chem. 23, 518, '84; Kreusler and Herzhold — Ber. 17, 34, '84; Kohlrausch — Ber. 24, 3561, '91; Wied Ann. 44, 577, '91; Förster — Ber. 25, '92; Mylius and Förster — Ber. 22, 1100, '89; Ber. 25, 70, '92; Wartha — Z. anal. Chem. 24, 220, '85, etc.)

GLYCOLIC ACID $CH_2OH.COOH$.

SOLUBILITY IN WATER.
(Emich — Monatsh. Chem. 3, 336, '84.)

t°.	20°.	60°.	80°.	100°.
Gms. $CH_2OH(COOH)$ per 100 gms. H_2O	0.033	0.102	0.235	0.850

GLUCINIUM SALTS. (See also Beryllium p. 63).

SOLUBILITY IN WATER AND IN ACETIC ACID SOLUTIONS.
(Marignac; Sestini — Gazz. chim. ital. 20, 313, '90.)

Salt.	Formula.	Solvent.	Gms. Anhydrous Salt per 100 Gms. Solvent. At 20°.	At 100°.
Glucinium potassium fluoride	$GlF_2.KF$	Water	2.0	5.2
" sodium "	$GlF_2.NaF$	"	1.4	2.8
Glucinium hydroxide	$Gl(OH)_2$	Water + CO_2 sat.	0.0185 (GlO)	...
" phosphate	$Gl_3(PO_4)_2.6H_2O$	2% CH_3COOH	0.055	...
" "	"	10% "	0.1725	...

GLUTARIC ACID (Pyrotartaric) $(CH_2)_3(COOH)_2$.

SOLUBILITY IN WATER.
(Lamouroux — Compt. rend. 128, 998, '99.)

t°.	0°.	15°.	20°.	35°.	50°.	65°.
Gms. $(CH_2)_3(COOH)_2$ per 100 cc. solution	42.9	58.7	63.9	79.7	95.7	111.8

GOLD Au.

SOLUBILITY OF GOLD IN POTASSIUM CYANIDE SOLUTIONS.
(Maclaurin — J. Chem. Soc. 63, 729, '93.)

Gold disks placed in Nestler tubes with KCN solutions.

Per cent KCN.	Grams Au Dissolved in 24 Hours in Nessler Tubes: Full.	½ Full.	Oxygen Passed in.	Oxygen + Agitation.
0.1	0.00195	0.00331	...	...
1.0	0.00162	0.00418	0.00845	0.0187
5.0	0.0032	0.0046	0.01355	0.0472
20.0	0.0012	0.00305	0.0115	0.0314
50.0	0.00043	0.00026	0.00505	0.0108

GOLD CHLORIDE (Auric) $AuCl_3$.

SOLUBILITY IN WATER, ETC.

100 gms. H_2O dissolve 68 grams $AuCl_3$.

$AsCl_3$ and $SbCl_3$ each dissolve about 2.5% $AuCl_3$ at 15°, and 22% at 160°.

$SnCl_4$ dissolves about 4% $AuCl_3$ at 160°, and a trace at 0°.

(Lindet — Bull. soc. chim. [2] 45, 149, '86.)

GOLD PHOSPHORUS TRI CHLORIDE (Aurous) $AuClPCl_3$.

100 gms. PCl_3 dissolve 1 gram at 15°, and about 12.5 grams at 120°.

(Lindet — Compt. rend. 101, 1492, '85.)

GOLD ALKALI DOUBLE CHLORIDES.

SOLUBILITY OF SODIUM GOLD CHLORIDE, LITHIUM GOLD CHLORIDE, POTASSIUM GOLD CHLORIDE, RHUBIDIUM GOLD CHLORIDE, AND CAESIUM GOLD CHLORIDE IN WATER.

(Rosenbladt — Ber. 19, 2537, '86.)

t°.	Grams Anhydrous Salt per 100 Grams Solution.				
	$NaAuCl_4$.	$LiAuCl_4$.	$KAuCl_4$.	$RbAuCl_4$.	$CsAuCl_4$.
10	58.2	53.1	27.7	4.6	0.5
20	60.2	57.7	38.2	9.0	0.8
30	64.0	62.5	48.7	13.4	1.7
40	69.4	67.3	59.2	17.7	3.2
50	77.5	72.0	70.0	22.2	5.4
60	90.0	76.4	80.2	26.6	8.2
70	...	81.0	...	31.0	12.0
80	...	85.7	...	35.3	16.3
90	...	...	...	39.7	21.7
100	...	...	...	44.2	27.5

GUAIACOL $C_6H_4(OH)OCH_3$ 1:2. **GUAIACOL CARBONATE** $C_6H_4(OCH_3)O_2.CO$.

SOLUBILITY IN WATER, ALCOHOL, ETC.

(U. S. P.)

Solvent.	t°.	Gms. per 100 Gms. Solvent.	
		Guaiacol.	Guaiacol Carbonate.
Water	25	1.89	...
Alcohol	25	...	2.08
Chloroform	25	...	66.6
Ether	25	...	7.69
Glycerine	25	100	...

a Tri Phenyl **GUANIDINE** $C_6H_5N{:}C(NHC_6H_5)_2$.

SOLUBILITY IN MIXTURES OF ALCOHOL AND WATER AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 292, '94.)

Vol. % Alcohol.	Gms. $C_6H_5N{:}C(NHC_6H_5)_2$ per 100 Gms. Solvent.	Density of Solutions.	Vol. % Alcohol.	Gms. $C_6H_5N{:}C(NHC_6H_5)_2$ per 100 Gms. Solvent.	Density of Solutions.
100	6.23	0.8021	80	1.06	0.8572
95	3.75	0.8158	75	0.67	0.8704
90	2.38	0.8309	70	0.48	0.8828
85	1.58	0.8433	60	0.22	0.9048

HELIUM He.

Solubility in Water.

(Estreicher — Z. physik. Chem. 31, 184, '99.)

t°.	Cor. Barometic Pressure.	Vol. of Water.	Vol. of He.	q.	Absorption Coefficient. At Bar. Pressure Minus H_2O Vapor Tension.	At 760 mm. Pressure.
0	...	...	...	0.000270	...	0.0150
0.5	764.0	73.584	1.093	...	0.0149	0.0149
5	758.0	73.578	1.062	0.000260	0.0144	0.0146
10	758.0	73.597	1.046	0.000255	0.0142	0.0144
15	757.8	73.641	1.008	0.000246	0.0137	0.0140
20	758.4	73.707	0.996	0.000242	0.0135	0.0139
25	762.3	73.793	0.983	0.000238	0.0133	0.0137
30	764.4	73.897	0.985	0.000238	0.0133	0.0138
35	764.5	74.0167	0.972	0.000234	0.0131	0.0138
40	762.0	74.147	0.957	0.000232	0.0129	0.0139
45	761.7	74.294	0.947	0.000229	0.0127	0.0140
50	760.9	74.461	0.920	0.000223	0.0124	0.0140

For *q* and also Absorption Coefficient, see Ethane, page 133.

HEXANE C_6H_{14}.

Solubility in Methyl Alcohol.

(Rothmund — Z. physik. Chem. 26, 475, '98.)

Determined by Synthetic Method, see page 9.

t°.	Gms. Hexane per 100 Gms. Alcoholic Layer.	Hexane Layer.	t°.	Gms. Hexane per 100 Gms. Alcoholic Layer.	Hexane Layer.
10	26.5	96.8	35	43.6	91.2
20	31.6	95.9	40	52.7	85.5
30	38.3	93.7	42.6 (crit. t.)	68.9	

HIPPURIC ACID $C_6H_5CONH.CH_2COOH$.

Solubility in Aq. Potassium Hippurate Solutions at 20°.

(Hoitsema — Z. physik. Chem. 27, 317, '98.)

Density of Solutions.	Gram Mols. per Liter Sol. $C_9H_9NO_3$.	$KC_9H_8NO_3$.	Grams per Liter Solution. $C_9H_9NO_3$.	$KC_9H_8NO_3$.	Solid Phase.
1.002	0.0182	0	3.276	0.0	$C_9H_9NO_3$
1.003	0.0163	0.011	2.919	2.39	"
1.008	0.0183	0.071	3.278	15.43	"
1.022	0.0234	0.254	4.191	55.18	"
1.114	0.064	1.36	11.47	295.4	"
1.182	0.131	2.21	23.46	480.1	"
1.192	0.147	2.32	26.32	504.1	$C_9H_9NO_3$ + $C_9H_9NO_3.KC_9H_8NO_3.H_2O$
1.195	0.153	2.40	27.40	521.4	
1.201	0.133	2.50	23.82	543.1	$C_9H_9NO_3.KC_9H_8NO_3.H_2O$
1.239	0.084	3.01	15.04	654.0	"
1.282	0.068	3.57	12.18	775.7	$C_9H_9NO_3.KC_9H_8NO_3.H_2O$ + $KC_9H_8NO_3$
1.282	0.065	3.58	11.60	777.8	
1.276	0.031	3.56	5.55	773.4	$KC_9H_8NO_3$
1.277	0.011	3.55	1.917	771.3	"
1.277	0.00	3.56	...	773.4	"

HOMATROPINE HYDROBROMIDE $C_{16}H_{21}NO_3.HBr$.

SOLUBILITY IN WATER, ETC.
(U. S. P.)

100 grams water dissolve 17.5 grams salt at 25°.
100 grams alcohol dissolve 3.08 grams salt at 25°, and 11.5 grams at 60°.
100 grams chloroform dissolve 0.16 gram salt at 25°.

HYDRASTINE $C_{21}H_{21}NO_6$. **HYDRASTINE HYDROCHLORIDE** $C_{11}H_{11}NO_2.HCl$.

SOLUBILITY IN SEVERAL SOLVENTS.
(U. S. P.; Müller — Apoth.-Ztg. 18, 249, '03.)

Solvent.	Gms. $C_{21}H_{21}NO_6$ per 100 Gms. Solution. At 18°-22°.	At 80°.	Solvent.	Gms. per 100 Gms. Solution at 18°-22°. $C_{21}H_{21}NO_6$.	$C_{11}H_{11}NO_2.HCl$.
Water	0.0033	0.025	Ether	0.51	0.078 (25°)
Alcohol	0.74 (25°)	5.9 (60°)	Ether + H_2O	0.80	...
Benzene	8.89	...	Chloroform	100+	0.35 (25°)
Acetic Ether	4.05	...	CCl_4	0.123	...
Petroleum Ether	0.073	...			

HYDRAZINE SULPHATE $N_2H_4.H_2SO_4$.

100 grams water dissolve 3.055 grams $N_2H_4.H_2SO_4$ at 22°.
(Curtius and Jay — J. pr. Chem. [2] 39, 39, '89.)

HYDROBROMIC ACID HBr.

SOLUBILITY IN WATER.
(Roozeboom — Z. physik. Chem. 2, 454, '88; Rec. trav. chim. 4, 107, '85; 5, 358, '86; see also Pickering — Phil. Mag. [5] 36, 119, '93.)

t°.	Gms. HBr Dissolved (at 760-765 mm.) per 100 Gms. Water.	Solution.	β.	Gms. HBr Dissolved at Lower Pressures per 100 Gms. H_2O.
− 2.5	255.0	71.83	...	175.0 (10 mm.)
−15	239.0	70.50	...	...
0	221.2	68.85	611.6	...
+10	210.3	67.76	581.4	108.5 (5 mm.)
15	204.0	67.10	...	...
25	193.0	65.88	532.1	...
50	171.5	63.16	468.6	...
75	150.5	60.08	406.7	...
100	130.0	56.52	344.6	...

For β see Ethane, page 133.

HYDROCHLORIC ACID HCl.

Solubility in Water at Different Temperatures and Pressures.

(Deicke; Roscoe and Dittmar — Liebig's Ann. 112, 334, '59; below o°, Roozeboom — Rec. trav. chim. 3, 104, '84.)

t°.	At Different Temperatures and 760 mm. Pressure.				At Different Pressures and 0°.	
	cc. HCl per 100 cc. H_2O.	Density.	Gms. HCl per 100 g. Sol.	Gms. HCl per 100 g. H_2O.	Pressures.*	Gms. HCl per 100 g. H_2O.
0	525.2	1.2257	45.15	82.31	60	61.3
4	497.7	1.2265	44.36	79.73	100	65.7
8	480.3	1.2185	43.83	78.03	150	68.6
12	471.3	1.2148	43.28	76.30	200	70.7
14	462.4	1.2074	42.83	74.92	300	73.8
18	451.2	1.2064	42.34	73.41	400	76.3
23	435.0	1.2014	41.54	71.03	500	78.2
30	...	...	40.23	67.3	600	80.0
40	...	...	38.68	63.3	750	82.4
50	...	...	37.34	59.6	1000	85.6
60	...	...	35.94	56.1	1300	89.5

* Pressures in mm. Hg minus tension of H_2O vapor.

Solubility in Water at Temperatures Below o°:

At a pressure of 760 mm.				At pressures below and above 760 mm.		
t°.	q.	t°.	q.	t°.	mm. Pressure.	q.
−24	101.2	−15	93.3	−23.8	...	84.2
−21	98.3	−10	89.8	−21	334	86.8
−18.3	96.0	− 5	86.8	−19	580	92.6
−18	95.7	0	84.2	−18	900	98.4
				−17.7	1073	101.4

For value of *q*, see Ethane, page 133.

Solubility of Hydrochloric Acid Gas in Methyl Alcohol, Ethyl Alcohol, and in Ether at 760 mm. Pressure.

(de Bruyn — Rec. trav. chim. 11, 129, '92; Schuncke — Z. physik. Chem. 14, 336, '94.)

t°.	Grams HCl gas per 100 Grams Solution in:		
	CH_3OH.	C_2H_5OH.	$(C_2H_5)_2O$.
−10	54.6	...	37.51 (−9.2°)
− 5	...	...	37.0
0	51.3	45.4	35.6
+ 5	...	44.2 (6.5°)	33.1
10	...	42.7 (11.5°)	30.35
15	...	...	27.62
20	47.0 (18°)	41.0	24.9
25	...	40.2 (23.5°)	22.18
30	43.0 (31.7°)	38.1 (32°)	19.47

HYDROFLUORIC ACID HF.

100 grams H_2O dissolve 111 grams HF at 35°.

(Metzner — Compt. rend. 119, 683, '94.)

HYDRIODIC ACID HI. **IODIC ACID** HIO_3.

For determinations of the freezing points of aqueous solutions of HI, and isolation of the several hydrates at temperatures below 0°, see Pickering — Ber. **26**, 2307, '93.

SOLUBILITY OF IODIC ACID AND ITS MODIFICATIONS IN WATER.

(Groschuff — Z. anorg. Chem. 47, 343, '05.)

t°.	Grams per 100 Gms. Solution.		Gram Mols. I_2O_5 per 100 Gm. Mols.		Solid Phase.
	HIO_3.	I_2O_5.	H_2O.	Solution.	
−14	72.8	69.1	12.1	10.8	Ice + HIO_3
0	74.1	70.3	12.8	11.3	HIO_3
16	75.1	71.7	13.7	12.0	"
40	77.7	73.7	15.1	13.2	"
60	80.0	75.9	17.0	14.5	"
80	82.5	78.3	19.4	16.3	"
85	83.0	78.7	20.0	16.7	"
101	85.2	80.8	22.8	18.6	"
110	86.5	82.1	24.7	19.8	HIO_3 + HI_3O_8
125	87.2	82.7	25.9	20.6	HI_3O_8
140	88.3	83.8	27.9	21.8	"
160	90.5	85.9	32.8	24.7	"

SOLUBILITY OF IODIC ACID IN NITRIC ACID.

(Groschuff.)

t°.	Grams HIO_3 per 100 Grams.		
	Aq. Solution.	27.73% HNO_3 Solution.	40.88% HNO_3 Solution.
0	74.1	18.0	9.0
20	75.8	21.0	10.0
40	77.7	27.0	14.0
60	80.0	38.0	18.0

HYDROGEN H.

SOLUBILITY IN WATER.

(Winkler — Ber. 24, 99, '91; Bohr and Bock — Wied. Ann. 44, 318, '91; Timofejew — Z. physik. Chem. 6, 147, '90.)

t°.	β′.	l.		β.	q.
0	0.0214	...	...	0.0214	0.000193
5	0.0203	0.0209 —	0.0241	0.0204	0.000184
10	0.0193	0.0204 —	0.0229	0.0195	0.000176
15	0.0185	0.0200 —	0.0217	0.0188	0.000169
20	0.0178	0.0196 —	0.0205	0.0182	0.000162
25	0.0171	0.0193 —	0.0191	0.0175	0.000156
30	0.0163	...	...	0.0170	0.000147
40	0.0153	...	...	0.0164	0.000139
50	0.0141	...	...	0.0161	0.000129
60	0.0129	...	...	0.0160	0.000119
80	0.0085	...	...	0.0160	0.000079
100	0.0000	...	...	0.0160	0.000000

l = Ostwald Solubility Expression, see page 105. For β′, β, and *q*, see Ethane, page 133.

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF ACIDS AND BASES AT 25°.

(Geffcken — Z. physik. Chem. 49, 268, '04.)

Gram Equiv. Acids and Bases per Liter.	Solubility of H (l_{25} = Ostwald Expression) in Solutions of:						
	HCl.	HNO_3.	$\frac{1}{2}H_2SO_4$.	CH_3COOH.	$CH_2ClCOOH$.	KOH.	NaOH.
0.0	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193
0.5	0.0186	0.0188	0.0185	0.0192	0.0189	0.0167	0.0165
1.0	0.0179	0.0183	0.0177	0.0191	0.0186	0.0142	0.0139
2.0	0.0168	0.0174	0.0163	0.0188	0.0180	...	0.0097
3.0	0.0159	0.0167	0.0150	0.0186	...	...	0.0072
4.0	...	0.0160	0.0141	0.0186	...	...	0.0055

The above figures for the concentrations of acids and bases were calculated to grams per liter, and these values with the corresponding l_{25} values for the solubility of hydrogen plotted on cross-section paper. From the resulting curves the following table was read.

Grams Acids and Bases per Liter.	Solubility of H (l_{25} = Ostwald Expression) in Solutions of:						
	HCl.	HNO_3.	$\frac{1}{2}H_2SO_4$.	CH_3COOH.	$CH_2ClCOOH$.	KOH.	NaOH.
0	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193	0.0193
20	0.0185	0.0189	0.0186	0.0192	0.0191	0.0172	0.0165
40	0.0179	0.0186	0.0180	0.0191	0.0190	0.0153	0.0140
60	0.0173	0.0183	0.0174	0.0190	0.0188	0.0135	0.0117
80	0.0167	0.0180	0.0168	0.0189	0.0187	...	0.0097
100	0.0160	0.0179	0.0162	0.0189	0.0185	...	0.0082
150	...	0.0171	0.0148	0.0188	0.0182	...	0.0058
200	...	0.0165	0.0140	0.0186	0.0179	...	...
250	...	0.0160	...	0.0184	...	...	...

For Ostwald Solubility Expression, see page 105.

SOLUBILITY OF HYDROGEN IN AQUEOUS SOLUTIONS OF AMMONIUM NITRATE AT 20°.

(Knopp — Z. physik. Chem. 43, 103, '04.)

p.	Normality (per 1000 Gms.) H_2O.	Molecular Concentration.	Absorption Coefficient of Hydrogen.	Density of Solutions.
0.00	0.00	0.00	0.0188	...
1.037	0.1308	0.002352	0.01872	1.0027
2.167	0.2765	0.004956	0.01845	1.0072
3.378	0.4363	0.007799	0.01823	1.0122
4.823	0.6333	0.011280	0.01773	1.0182
6.773	0.9069	0.016447	0.01744	1.0262
11.550	1.6308	0.028525	0.01647	1.04652

Solubility of Hydrogen in Aqueous Solutions of Barium Chloride.

(Braun — Z. physik. Chem. 33, 735, '00.)

Gms. $BaCl_2$ per 100 Gms. Solution.	Coefficient of Absorption of Hydrogen at: 5°.	10°.	15°.	20°.	25°.
0.00	0.0237	0.0221	0.0206	0.0191	0.0175
3.29	0.0211	0.0198	0.0185	0.0172	0.0157
3.6	0.0209	0.0197	0.0184	0.0170	0.0156
6.45	0.0196	0.0186	0.0173	0.0161	0.0147
7.00	0.0194	0.0183	0.0172	0.0159	0.0146

Solubility of Hydrogen in Aqueous Solutions of Calcium Chloride, Magnesium Sulphate, and Lithium Chloride at 15°.

(Gordon — Z. physik. Chem. 18, 14, '95.)

Coefficient of Absorption of hydrogen in water at 15° = 0.01883.

In Calcium Chloride. Gms. $CaCl_2$ per 100 g. Sol.	G. M. $CaCl_2$ per Liter.	Absorption Coefficient of H.	In Magnesium Sulphate. Gms. $MgSO_4$ per 100 g. Sol.	G. M. $MgSO_4$ per Liter.	Absorption Coefficient of H.	In Lithium Chloride. Gms. LiCl per 100 g. Sol.	G. M. LiCl per Liter.	Absorption Coefficient of H.
3.47	0.321	0.01619	4.97	0.433	0.01501	3.48	0.835	0.01619
6.10	0.578	0.01450	10.19	0.936	0.01159	7.34	1.800	0.01370
11.33	1.122	0.01138	23.76	2.501	0.00499	14.63	3.734	0.0099
17.52	1.1827	0.00839						
26.34	2.962	0.00519						

For definition of Coefficient of Absorption, see page 105.

Solubility of Hydrogen in Aqueous Solutions of Potassium Carbonate, Chloride, and Nitrate at 15°.

(Gordon.)

In Potassium Carbonate. Gms. K_2CO_3 per 100 g. Sol.	G. M. K_2CO_3 per Liter.	Absorption Coefficient of H.	In Potassium Chloride. Gms. KCl per 100 g. Sol.	G. M. KCl per Liter.	Absorption Coefficient of H.	In Potassium Nitrate. Gms. KNO_3 per 100 g. Sol.	G. M. KNO_3 per Liter.	Absorption Coefficient of H.
2.82	0.209	0.01628	3.83	0.526	0.01667	4.73	0.482	0.01683
8.83	0.690	0.01183	7.48	1.051	0.01489	8.44	0.879	0.01559
16.47	1.376	0.00761	12.13	1.755	0.01279	16.59	1.820	0.01311
24.13	2.156	0.00462	19.21	2.909	0.01012	21.46	2.430	0.01180
41.81	4.352	0.00160	22.92	3.554	0.00892			

Solubility of Hydrogen in Aqueous Solutions of Potassium Chloride and Nitrate at 20°.

(Knopp — Z. physik. Chem. 43, 103, '04.)

In Potassium Chloride. *p*.	Normality (per 1000 g. H_2O).	Absorption Coefficient.	Density of Solutions.	In Potassium Nitrate. *p*.	Normality (per 1000 g. H_2O).	Absorption Coefficient.	Density of Solutions.
1.089	0.1475	0.01823	1.0052	1.224	0.1245	0.01835	1.0059
2.123	0.2907	0.01757	1.0118	2.094	0.2114	0.01818	1.0113
4.070	0.5687	0.01661	1.0243	4.010	0.4127	0.01785	1.0236
6.375	0.9127	0.01531	1.0394	5.925	0.6225	0.01743	1.0359
7.380	1.0682	0.01472	1.0460	7.742	0.8293	0.01667	1.0477
13.612	2.1222	0.01255	1.0875	13.510	1.5436	0.01436	1.0865

Solubility of Hydrogen in Aqueous Sodium Carbonate and Sulphate Solutions at 15°.

(Gordon.)

In Sodium Carbonate.			In Sodium Sulphate.		
Gms. Na_2CO_3 per 100 Gms. Solution.	G. M. Na_2CO_3 per Liter.	Absorption Coefficient of H.	Gms. Na_2SO_4 per 100 Gms. Solution.	G. M. Na_2SO_4 per Liter.	Absorption Coefficient of H.
2.15	0.207	0.01639	4.58	0.335	0.01519
8.64	0.438	0.01385	8.42	0.638	0.0154
11.53	1.218	0.00839	16.69	1.364	0.00775

Solubility of Hydrogen in Aqueous Solutions of Sodium Chloride.

(Braun; Gordon.)

Gms. NaCl per 100 Gms. Solution.	Coefficient of Absorption of Hydrogen at:				
	5°.	10°.	15°.	20°.	25°.
1.25	0.0218	0.0205	0.0191	0.0177	0.0162
3.80	0.0198	0.0188	0.0176	0.0162	0.0148
4.48	0.0192	0.0182	0.0171	0.0159	0.0143
6.00	0.0184	0.0175	0.0164	0.0153	0.0138
14.78	...	...	0.0093	...	...
23.84	...	...	0.00595	...	...

Solubility of Hydrogen in Aqueous Solutions of Sodium Nitrate.

In Sodium Nitrate at 20°. (Knopp.)				In Sodium Nitrate at 15°. (Gordon.)		
p.	Normality (per 1000 Gms. H_2O).	Absorption Coefficient of H.	Density of Solutions.	Gms. $NaNO_3$ per 100 Gms. Solution.	G. M. $NaNO_3$ per Liter.	Absorption Coefficient of H.
1.041	0.1236	0.01839	1.0052	5.57	0.679	0.01603
2.192	0.2634	0.01774	1.0130	11.16	1.413	0.0137
4.405	0.5416	0.01694	1.0282	19.77	2.656	0.01052
6.702	0.8442	0.01518	1.04411	37.43	5.711	0.00578
12.637	1.7354	0.0130	1.08667			

Solubility of Hydrogen in Alcohol.

(Timofejew — Z. physik. Chem. 6, 147, '90.)

t°.	Coefficient of Abs. in 98.8% Alcohol.	t°.	Coefficient of Abs. in 99.7% Alcohol.
0	0.0676	4	0.0749
6.2	0.0693	18.8	0.0740
13.4	0.0705		
18.8	0.0740		

Solubility in Aqueous Alcohol Solutions at 20° and 760 mm. Pressure.

(Lubarsch — Wied. Ann. [2] 37, 525, '89.)

Wt. % Alcohol.	Vol. % Absorbed H.	Wt. % Alcohol.	Vol. % Absorbed H.
0.00	1.93	28.57	1.04
9.09	1.43	33.33	1.17
16.67	1.29	50.0	2.02
23.08	1.17	66.67	2.55

Solubility of Hydrogen in Aqueous Sugar Solutions at 15°.

(Gordon — Z. physik. Chem. 18, 14, '95.)

Gms. Sugar per 100 Gms. Solution.	Gm. Mols. Sugar per Liter.	Absorption Coefficient of H.
16.67	0.520	0.01561
30.08	0.993	0.01284
47.65	1.699	0.00892

Solubility of Hydrogen in Water and in Organic Solvents.

Results in terms of the Ostwald Expression, see page 105.

(Just — Z. physik. Chem. 37, 359, '01.)

Solvent.	l_{25}.	l_{20}.	Solvent.	l_{25}.	l_{20}.
Water	0.0199	0.0200	Amyl Acetate	0.0774	0.0743
Anilin	0.0285	0.0303	Xylene	0.0819	0.0783
Amyl Alcohol	0.0301	0.0353	Ethyl Acetate	0.0852	0.0788
Nitro Benzene	0.0371	0.0353	Toluene	0.0874	0.0838
Carbon Disulphide	0.0375	0.0336	Ethyl Alcohol (98.8%)	0.0894	0.0862
Acetic Acid	0.0633	0.0617	Methyl Alcohol	0.0945	0.0902
Benzene	0.0756	0.0707	Iso Butyl Alcohol	0.0976	0.0929
Acetone	0.0764	0.0703			

Solubility of Hydrogen in Chloral Hydrate Solutions at 20°.

(Knopp.)

p.	Normality (per 1000 Gms. H_2O).	Molecular Concentration.	Absorption Coefficient of H.	Density of Solutions.
4.91	0.310	0.005594	0.01839	1.0202
7.69	0.504	0.008992	0.01802	1.0320
14.56	1.030	0.018223	0.01712	1.0669
29.50	2.530	0.043601	0.01542	1.1466
38.42	3.770	0.063647	0.01440	1.1982
49.79	6.000	0.097493	0.01353	1.2724
63.90	10.700	0.161660	0.01307	1.3743

Solubility of Hydrogen in Propionic Acid Solutions.

(Braun.)

G. C_2H_5COOH per 100 Gms. Solution.	Coefficient of Absorption of Hydrogen at:				
	5°.	10°.	15°.	20°.	25°.
2.63	0.02245	0.0214	0.0200	0.0188	0.0172
3.37	0.0222	0.0212	0.0199	0.0187	0.0171
5.27	0.0224	0.0212	0.0198	0.0184	0.0171
6.50	0.0218	0.0209	0.0193	0.0183	0.0169
9.91	0.0213	0.0203	0.0191	0.0178	0.0160

Solubility of Hydrogen in Petroleum.

(Griewasz and Walfisz — Z. physik. Chem. 1, 70, '87.)

Coefficient of absorption at 20° = 0.0582, at 10° = 0.0652.

HYDROGEN SULPHIDE H_2S.

SOLUBILITY IN WATER AND IN ALCOHOL AT t° AND 760 MM. PRESSURE.

(Bunsen and Carius; Fauser — Math. u Natur. W. Ber. (Ungarn.) 6, 154, '88.)

	In Water.				In Alcohol.
t°.	1 Vol. H_2O Absorbs		β.	q.	1 Vol. Alcohol Absorbs
0	4.37	Vols. H_2S (at 0° and 760 mm.)	4.686	0.710	17.89 Vols. H_2S (at 0° and 760 mm.)
5	3.97	"	4.063	0.615	14.78 "
10	3.59	"	3.520	0.530	11.99 "
15	3.23	"	3.056	0.458	9.54 "
20	2.91	"	2.672	0.398	7.42
25	2.61	"	...	...	5.96 (24°)
30	2.33	"	...	...	...
35	2.08	"	...	...	...
40	1.86	"	...	...	...

For β and q see Ethane, page 133.

SOLUBILITY OF HYDROGEN SULPHIDE IN AQUEOUS SALT SOLUTIONS AT 25°.

(McLauchlan — Z. physik. Chem. 44 615, '03.)

NOTE. — The original results are given in terms of $\frac{l}{l_0}$ which is the iodine titer (l) of the H_2S dissolved in the salt solution divided by the titer (l_0) of the H_2S dissolved in pure water. These figures were multiplied by 2.61 (see 25° results in preceding table) and the products recorded in the following table as volumes of H_2S absorbed by 1 vol. of aqueous solution.

Solution.	Grams Salt per Liter.	$\frac{l}{l_0}$.	Vols. H_2S per 1 Vol. Sol.	Solution.	Gms. Salt per Liter.	$\frac{l}{l_0}$.	Vols. H_2S per 1 Vol. Sol
n NH_4Br	98.0	1.00	2.61	n KBr	119.0	0.945	2.47
n NH_4Cl	53.4	0.96	2.40	n KCl	74.5	0.853	2.22
n NH_4NO_3	80.0	0.99	2.58	n KNO_3	101.0	0.913	2.38
½n $(NH_4)_2SO_4$	33.0	0.82	2.14	½n K_2SO_4	43.5	0.78	2.04
¼n $(NH_4)_2SO_4$	16.5	0.91	2.37	¼n K_2SO_4	21.7	0.89	2.32
n $NH_4C_2H_3O_2$	77.1	1.09	2.84	n KI	166.0	0.98	2.56
n $(NH_2)_2CO$	60.1	1.02	2.66	n NaBr	103.0	0.935	2.44
½n HCl	18.22	0.975	2.54	n NaCl	58.5	0.847	2.21
½n H_2SO_4	24.52	0.905	2.36	½n NaCl	29.2	0.93	2.42
n $C_4H_6O_6$	150.0	0.944	2.46	n $NaNO_3$	85.0	0.893	2.32
3n $C_4H_6O_6$	450.0	0.858	2.24	½n Na_2SO_4	35.5	0.73	1.90
Pure $C_3H_5(OH)_3$	1000.0	0.863	2.26	¼n Na_2SO_4	17.8	0.89	2.32

HYDROQUINONE $C_6H_4(OH)_2$ 1:4, also Resorcin $C_6H_4(OH)_2$ 1:3 and Pyrocatechin $C_6H_4(OH)_2$ 1:2.

SOLUBILITY IN WATER.

(Vaubel — J. pr. Chem. [2] 59, 30, '99.)

100 grams solution contain 6.7 grams hydroquinone at 20°. Sp. Gr. of sol. = 1.012.

100 grams solution contain 63.7 grams resorcin at 20°.

100 grams solution contain 31.1 grams pyrocatechin at 20°.

SOLUBILITY OF HYDROQUINONE IN SULPHUR DIOXIDE IN THE CRITICAL VICINITY.

(Centnerswer and Teletow — Z. Electrochem. **9**, 799, '03.)

Determinations made by the Synthetic Method, for which see Note, page 9.

t°.	Gms. Hydroquinone per 100 Gms. Sol.	t°.	Gms. Hydroquinone per 100 Gms. Sol.	t°.	Gms. Hydroquinone per 100 Gms. Solution.
63	0.89	117.6	4.46	136.7	10.31
73.5	1.22	123.3	5.66	141.4	13.3
89.2	2.18	134.2	8.31	145.0	14.9

HYDROXYLAMINE $NH_2(OH)$. **HYDROXYLAMINE HYDROCHLORIDE** $NH_2(OH).HCl$.

SOLUBILITY IN SEVERAL SOLVENTS.

(de Bruyn — Rec. trav. chim. **11**, 18, '92; Z. physik. Chem. **10**, 783, '92.)

Solvent.	t°.	Grams NH_2OH per 100 Gms. Solution.	t°.	Grams $NH_2(OH).HCl$ per 100 Gms. Solvent.
Methyl Alcohol (abs.)	5°	35.0	19.75	16.4
Ethyl Alcohol (abs.)	15°	15.0	19.75	4.43
Ether (dry)	(b. pt.)	1.2	...	...
Ethyl Acetate	(b. pt.)	1.6	...	...

For densities of $NH_2(OH).HCl$ solutions, see Schiff and Monsacchi — Z. physik. Ch. **21**, 277, '96.

HYOSCYAMINE $C_{17}H_{21}NO_3$.

SOLUBILITY IN SEVERAL SOLVENTS AT 18°–22°.

(Müller — Apoth.-Ztg. **18**, 249, '03.)

Solvent.	Gms. $C_{17}H_{21}NO_3$ per 100 Gms. Solution.	Solvent.	Gms. $C_{17}H_{21}NO_3$ per 100 Gms. Solution.
Water	0.355	Chloroform	100+
Ether	2.02	Acetic Ether	4.903
Ether sat. with H_2O	3.913	Petroleum Ether	0.098
Water sat. with Ether	3.125	Carbon Tetra Chloride	0.059
Benzene	0.769		

HYOSCINE HYDROBROMIDE, etc.

SOLUBILITY IN SEVERAL SOLVENTS AT 25°.

(U. S. P.)

Solvent.	Grams per 100 Grams Solvent.		
	Hyoscine Hydrobromide $C_{17}H_{21}NO_4.HBr.3H_2O$.	Hyoscyamine Hydrobromide $C_{17}H_{23}NO_3.HBr$.	Hyoscyamine Sulphate $(C_{17}H_{23}NO_3)_2.H_2SO_4$.
Water	66.6	very soluble	very soluble
Alcohol	6.2	50	15.6
Ether	...	0.062	0.04
Chloroform	0.133	40.0	0.043

IODINE I.

Solubility in Water.

t°.	Gms. I per Liter Solution.	Authority.
15	0.272–0.283	(Dietz — Pharm. Ztg. 43, 290, '98.)
25	0.279	(McLauchlan — Z. physik. Chem. 44, 617, '03.)
25	0.304	(Herz and Knoch— Z. anorg. Chem. 45, 269, '05.)
25	0.339	(Jakowkin — Z. physik. Chem. 18, 590, '95.)
25	0.340	(Noyes and Seidensticker — Z. physik. Chem. 27, 359, '98.)
30	0.457	(Dietz.)

Solubility of Iodine in Aqueous Potassium Iodide Solutions at 25°.

(Noyes and Seidensticker; Bruner — Z. physik. Chem. 26, 147, '98.)

Millimols per Liter.		Gms. per Liter.		Results by Bruner.	
KI.	(I_2).	KI.	I.	Gms. KI per 1000 g. Sol.	Gms. I per Liter.
0.000	1.342	0.00	0.340	10	0.78*
0.830	1.814	1.37	0.461	20	1.60
1.661	2.235	2.75	0.568	40	3.25
3.322	3.052	5.51	0.775	60	5.04
6.643	4.667	11.03	1.185	80	6.94
13.29	8.003	22.07	2.032	100	8.96
26.57	14.68	44.15	3.728		
53.15	28.03	88.3	7.119		
106.3	55.28	176.6	14.04		

* There is some uncertainty in regard to the position of the decimal point in this column. By calculation from the original it should be one place further to the right.

Solubility of Iodine in Aqueous Salt Solutions at 25°.

(McLauchlan.)

Salt.	Gms. Salt per Liter.	Gms. Dissolved I per Liter.	Salt.	Gms. Salt per Liter.	Gms. Dissolved I per Liter.
Na_2SO_4	29.77	0.160	NH_4Cl	53.4	0.735
K_2SO_4	43.5	0.238	NaBr	103.0	3.29
$(NH_4)_2SO_4$	33.0	0.246	KBr	119.0	3.801
$NaNO_3$	85.0	0.257	NH_4Br	98.0	4.003
KNO_3	101.2	0.266	$NH_4C_2H_3O_2$	77.1	0.440
NH_4NO_3	80.0	0.375	$(NH_4)_2C_2H_4$	86.9	0.980
NaCl	58.5	0.575	H_3BO_3	55.8	0.300
KCl	73.6	0.658			

Solubility of Iodine in Arsenic Tri Chloride.

(Sloan and Mallet — Chem. News, 46, 194, '82.)

t°.	0°.	15°.	96°.
Gms. I per 100 gms. $AsCl_3$	8.42	11.88	36.89

Solubility of Iodine in Aqueous Ethyl and Normal Propyl Alcohol Solutions at 15°.

(Bruner — Z. physik. Chem. 26, 147, '98.)

In Aq. Ethyl Alcohol.				In Aq. Propyl Alcohol.			
Gms. C_2H_5OH per 100 Gms. Solvent.	Gms. I per 100 cc. Solution.	Gms. C_2H_5OH per 100 Gms. Solvent.	Gms. I per 100 cc. Sol.	Gms. C_3H_7OH per 100 Gms. Solvent.	Gms. I per 100 cc. Sol.	Gms. C_3H_7OH per 100 Gms. Solvent.	Gms. I per 100 cc. Sol.
10	0.05	60	1.14	10	0.05	60	2.71
20	0.06	70	2.33	20	0.11	70	4.10
30	0.10	80	4.20	30	0.40	80	6.05
40	0.26	90	7.47	40	0.94	90	9.17
50	0.88	100	15.67	50	1.64	100	14.93

Solubility of Iodine in Benzene, Chloroform, and in Ether.

(Arctowski — Z. anorg. Chem. 11, 276, '95–'96.)

In Benzene.		In Chloroform.		In Ether.	
t°.	Gms. I per 100 Gms. Solution.	t°.	Gms. I per 100 Gms. Solution.	t°.	Gms. I per 100 Gms. Solution.
4.7	8.08	−49	0.188	−83	15.39
6.6	8.63	−55½	0.144	−90	14.58
10.5	9.60	−60	0.129	−108	15.09
13.7	10.44	−69½	0.089		
16.3	11.23	−73½	0.080		
		+10	1.76 per 100 gms. $CHCl_3$		

(Duncan — Pharm. J. Trans. 22, 544, '91–'92.)

Solubility of Iodine in Bromoform, Carbon Tetra Chloride, and in Carbon Bisulphide at 25°.

(Jakowkin — Z. physik. Chem. 18, 590, '95.)

1 liter of saturated solution in $CHBr_3$ contains 189.55 gms. I.
1 liter of saturated solution in CCl_4 contains 30.33 gms. I.
1 liter of saturated solution in CS_2 contains 230.0 gms. I.

Solubility of Iodine in Carbon Bisulphide Solutions.

(Arctowski — Z. anorg. Chem. 6, 404, '94.)

t°.	Gms. I per 100 Gms. Solution.	t°.	Gms. I per 100 Gms. Solution.	t°.	Gms. I per 100 Gms. Solution.
−100	0.32	0	7.89	30	19.26
−80	0.51	10	10.51	36	22.67
−63	1.26	15	12.35	40	25.22
−20	4.14	20	14.62	42	26.75
−10	5.52	25	16.92		

Solubility of Iodine in Mixtures of Chloroform and Ethyl Alcohol, Chloroform and Normal Propyl Alcohol, Chloroform and Benzene, and Chloroform and Carbon Bisulphide at 15°.

(Bruner.)

Gms. $CHCl_3$ per 100 Gms. of Mixtures.	Grams I Dissolved per 100 cc. of Mixtures of:			
	$CHCl_3 + C_2H_5OH$.	$CH_3Cl + C_3H_7OH$.	$CH_3Cl + C_6H_6$.	$CH_3Cl + CS_2$.
0	15.67	14.93	10.40	17.63
10	9.43	13.16	9.84	15.93
20	8.69	11.20	8.78	14.20
30	7.80	8.98	7.74	12.16
40	7.09	8.09	6.96	10.20
50	6.62	7.82	6.20	9.08
60	6.24	7.09	5.34	7.72
70	5.77	6.42	4.89	6.42
80	5.06	5.54	4.53	5.27
90	4.34	4.52	4.07	4.32
100	3.62	3.62	3.62	3.62

Solubility of Iodine in Mixtures of Carbon Tetra Chloride and Benzene and in Mixtures of Carbon Tetra Chloride and Carbon Bisulphide at 15°.

(Bruner.)

Gms. CCl_4 per 100 Gms. of Mixtures.	Gms. I per 100 cc. of Mixture of:		Gms. CCl_4 per 100 Gms. of Mixtures.	Gms. I per 100 cc. of Mixture	
	$CCl_4 + C_6H_6$.	$CCl_4 + CS_2$.		$CCl_4 + C_6H_6$.	$CCl_4 + CS_2$.
0	10.40	17.6	60	4.90	5.55
10	9.44	14.44	70	4.09	4.50
20	8.53	12.33	80	3.41	3.37
30	7.77	10.34	90	2.74	2.60
40	6.63	8.60	100	2.06	2.06
50	5.70	6.83			

Solubility of Iodine in Aqueous Glycerine Solutions at 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 269, '05.)

Density of glycerine at 25°/4° = 1.2555; impurities about 1.5%.

Wt.% Glycerine in Solvent.	Millimols I per 100 cc. Solution.	Grams I per 100 cc. Solution.	Density of Solutions at 25°/4°.
0	0.24	0.0304	0.9979
7.15	0.27	0.0342	1.0198
20.44	0.38	0.0482	1.0471
31.55	0.49	0.0621	1.0750
40.95	0.69	0.0875	1.0995
48.7	1.07	0.135	1.1207
69.2	2.20	0.278	1.1765
100.0	9.70	1.223	1.2646

Distribution of Iodine between Carbon Bisulphide and Aq. Potassium Oxalate.

(Dawson — Z. physik. Chem. 56, 610, '06; Dawson and McRae — J. Chem. Soc. 81, 1086, '02.)

Concentration of Aq. $K_2C_2O_4$.	Gms. I per Liter of Aq. Layer.	Gms. I per Liter of CS_2 Layer.	Vol. of Solution which Contains 1 Mol. I.	Fraction of I Uncombined in Solution.
1.0 Equiv.	2.408	10.82	105.3	0.005495
1.0 "	3.555	16.32	71.37	0.00561
1.0 "	5.766	27.91	43.99	0.005915
1.0 "	6.861	34.01	36.98	0.006055
1.2 "	3.525	17.07	71.97	0.005645

Distribution of Iodine between Amyl Alcohol and Water and between Amyl Alcohol and Aqueous Potassium Iodide Solutions at 25°.

(Herz and Fischer — Ber. 37, 4752, '04.)

The original results were plotted on cross-section paper, and the following tables made from the curves.

Millimols I per 10 cc. Amyl Alcohol Layer in Each Case.	Millimols I per 10 cc. of H_2O and of Aq. KI Layers. H_2O.	$\frac{N}{10}$ KI.	$\frac{2N}{10}$ KI.	$\frac{3N}{10}$ KI.	$\frac{4N}{10}$ KI.	$\frac{10N}{10}$ KI.
2.5	0.012	0.135	0.160	0.170	0.170	...
3.0	0.014	0.150	0.185	0.200	0.200	0.160
4.0	0.018	0.180	0.235	0.255	0.270	0.240
5	0.021	0.210	0.280	0.315	0.340	0.315
6	0.025	0.230	0.330	0.375	0.410	0.390
7	0.029	0.250	0.375	0.430	0.480	0.470
8	...	0.260	0.420	0.490	0.550	0.555
9	...	0.270	0.450	0.550	0.620	0.640
10	...	0.280	0.470	0.605	0.690	0.720
12	...	...	0.490	0.700	0.830	0.900
14	...	...	0.510	0.790	0.980	1.200
20	...	...	0.575	...	...	...

Gms. I per 100 cc. Amyl Alcohol Layer in Each Case.	Gms. I per 100 cc. of H_2O and of KI Layers. H_2O.	$\frac{N}{10}$ KI.	$\frac{2N}{10}$ KI.	$\frac{3N}{10}$ KI.	$\frac{4N}{10}$ KI.	$\frac{10N}{10}$ KI.
3	0.014	0.164	0.20	0.21	0.21	...
4	0.016	0.196	0.24	0.26	0.26	0.21
6	0.026	0.252	0.34	0.38	0.40	0.37
8	0.033	0.297	0.43	0.49	0.54	0.51
10	0.040	0.328	0.51	0.61	0.67	0.69
12	...	0.341	0.58	0.73	0.81	0.84
14	...	...	0.60	0.83	0.95	1.00
16	...	...	0.63	0.91	1.09	1.20
18	...	...	0.64	...	...	...
25	...	...	0.71	...	...	...

The original figures for 5N/10 and 10N/10 KI solutions give practically identical curves.

Results for the distribution of Iodine between N/10 KI solutions on the one hand, and mixtures in various proportions of $C_6H_6 + CS_2$, $C_6H_5CH_3 + CS_2$, $C_6H_6 + C_6H_5CH_3$, C_6H_6 + light petroleum, CS_2 + light petroleum, $CS_2 + CHCl_3$, $CHCl_3 + C_6H_6$, $CCl_4 + CS_2$ and $CCl_4 + C_6H_5CH_3$ on the other hand, are given by Dawson — J. Chem. Soc., **81**, 1086, '02.

Distribution of Iodine between Water and Bromoform, Water and Carbon Bisulphide, and Water and Carbon Tetra Chloride at 25°.

(Jakowkin — Z. physik. Chem. 18, 590, '95.)

Original results plotted on cross-section paper and table made from curves. Jakowkin points out that the results of Berthelot and Jungfleisch — Ann. chim. phys. [4] 26, 400, '72, are incorrect on account of the presence of HI.

Grams I per Liter of H_2O Layer in Each Case.	Grams I per Liter of: $CHBr_3$ Layer.	CS_2 Layer.	CCl_4 Layer.
0.05	20	30	4.0
0.10	45	60	8.5
0.15	71	91	13.0
0.20	100	126	17.5
0.25	130	160	22.0

IODOFORM CHI_3, IODOL C_4I_4NH (Tetra Iodo Pyrrol).

Solubility in Several Solvents.

(U. S. P.; Vulpius — Pharm. Centrh. 34, 117, '93.)

Solvent.	t°.	Grams per 100 Grams Solvent. CH_3I.	C_4I_4NH.
Water	25	0.0106	0.0204
Alcohol	25	2.14 (1.43 gms. (V.))	11.1
Alcohol	b. pt.	(10.0 gms. (V.))	...
Ether	25	19.2 (16.6 gms. (V.))	66.6
Chloroform	25	...	0.95

IRIDIUM DOUBLE SALTS.

Solubility in Water.

(Palmaer — Ber. 23, 3817; 24, 2090, '91.)

Double Salt.	Formula.	t°.	Gms. per 100 Gms. H_2O.
Irido Pentamine Bromide	$Ir(NH_3)_5Br_3$	12.5	0.284
" " Bromonitrate	$Ir(NH_3)_5Br(NO_3)_2$	18	5.58
" " Tri Chloride	$Ir(NH_3)_5Cl_3$	15.1	6.53
" " Chloro Bromide	$Ir(NH_3)_5ClBr_2$	15	0.47
" " Chloro Iodide	$Ir(NH_3)_5ClI_2$	15	0.95
" " Chloro Nitrate	$Ir(NH_3)_5Cl(NO_3)_2$	15.4	1.94
" " Chloro Sulphate	$Ir(NH_3)_5ClSO_4.2H_2O$	15.0	0.74
" " Nitrate	$Ir(NH_3)_5(NO_3)_3$	16	0.28
" Aquo Pentamine Bromide	$Ir(NH_3)_5(OH_2)Br_3$	ord. temp.	25.0
" " " Chloride	$Ir(NH_3)_5(OH_2)Cl_3$	ord. temp.	74.7
" " " Nitrate	$Ir(NH_3)_5(OH_2)(NO_3)_3$	17	10.0

IRON BROMIDE (Ferrous) $FeBr_2.6H_2O$.

Solubility in Water.

(Etard — Ann. chim. phys. [7] 2, 537, '94.)

t°.	Gms. $FeBr_2$ per 100 Gms. Sol.	t°.	Gms. $FeBr_2$ per 100 Gms. Sol.	t°.	Gms. $FeBr_2$ per 100 Gms. Sol.
−20	47.0	30	55.0	60	59.0
0	50.5	40	56.2	80	61.5
20	53.5			100	64.0

IRON CARBONATE (Ferrous) $FeCO_3$.

100 gms. H_2O saturated with CO_2 at 6–8 atmospheres dissolve 0.073 gram $FeCO_3$. (Wagner — Jahresber. Chem. 135, '67.)

IRON CHLORIDE (Ferrous) $FeCl_2.4H_2O$. SOLUBILITY IN WATER.

(Etard.)

t°.	Gms. $FeCl_2$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $FeCl_2$ per 100 Gms. Solution.	Solid Phase.
10	39.2	$FeCl_2.4H_2O$	60	47.0	$FeCl_2.4H_2O$
15	40.0	"	80	50.0	"
25	41.5	"	87	51.2	$FeCl_2.4H_2O+FeCl_2$
30	42.2	"	90	51.3	$FeCl_2$
40	43.6	"	100	51.4	"
50	45.2	"	120	51.8	"

SOLUBILITY OF IRON CHLORIDE (FERRIC) Fe_2Cl_6 IN WATER.

(Roozeboom — Z. physik. Chem. 10, 477, '92.)

t°.	Mols. Fe_2Cl_6 per 100 Mols. H_2O.	Gms. $FeCl_3$ per 100 Gms. H_2O.	Gms. $FeCl_3$ per 100 Gms. Solution.
Solid Phase, $Fe_2Cl_6.12H_2O$.			
−55	2.75	49.52	33.12
−27	2.98	53.60	34.93
0	4.13	74.39	42.66
+20	5.10	91.85	47.88
30	5.93	106.8	51.64
37	8.33	150.0	60.01
30	11.20	201.7	66.85
20	12.83	231.1	69.79
8	13.7	246.7	71.15
Solid Phase, $Fe_2Cl_6.7H_2O$.			
20	11.35	204.4	67.14
32	13.55	244.0	70.92
30	15.12	272.4	73.13
25	15.54	280.0	73.69
Solid Phase, $Fe_2Cl_6.5H_2O$.			
12	12.87	231.8	69.87
27	14.85	267.5	72.78
Solid Phase, $Fe_2Cl_6.5H_2O$ (con.).			
35	15.64	281.6	73.79
50	17.50	315.2	75.91
55	19.15	344.8	77.52
55	20.32	365.9	78.54
Solid Phase, $Fe_2Cl_6.4H_2O$.			
50	19.96	359.3	78.23
55	20.32	365.9	78.54
60	20.70	372.8	78.86
69	21.53	387.7	79.50
73.5	25.0	450.2	81.81
70	27.9	502.4	83.41
66	29.2	525.9	84.03
Solid Phase, Fe_2Cl_6.			
66	29.2	525.9	84.03
75	28.42	511.4	83.66
80	29.20	525.9	84.03
100	29.75	535.8	84.26

SOLUBILITY OF FERRIC CHLORIDE IN AQUEOUS SOLUTIONS OF AMMONIUM CHLORIDE AT 25°, 35°, AND 45°.

(Mohr — Z. physik. Chem. 27, 197, '98.)

Results at 25°. Mols. per 100 Mols. H_2O. NH_4Cl.	Fe_2Cl_6.	Results at 35°. Mols. per 100 Mols. H_2O. NH_4Cl.	Fe_2Cl_6.	Results at 45°. Mols. per 100 Mols. H_2O. NH_4Cl.	Fe_2Cl_6.	Solid Phase in Each Case.
0	10.98	0	13.36	0.0	33.4	$Fe_2Cl_6.12H_2O$ ($5.H_2O$ at 45°)
1.57	10.74	1.41	13.05	...	...	Hydrate + Double Salt
2.48	9.02	3.08	9.28	4.08	9.58	Double Salt
5.28	7.73	6.98	7.64	...	...	"
9.59	6.77	10.76	6.70	13.09	6.31	"
9.83	6.70	11.60	6.52	13.54	6.28	Double Salt + Mixed Crystals
9.65	6.07	12.28	6.08	12.91	5.49	Mixed Crystals
9.93	5.23	11.57	3.98	13.49	4.84	"
9.92	3.97	11.89	3.38	13.46	4.99	"
10.31	2.05	13.23	1.38	...	...	"
13.30	0.0	14.79	0.0	16.28	0.0	NH_4Cl

Solubility of Ferric Chloride in Aqueous Solutions of Ammonium Chloride at 15°.

(Roozeboom — Z. physik. Ch. 10, 148, '92.)

Mols. per 100 Mols. H_2O.		Grams per 100 Gms. H_2O.		Solid Phase.
NH_4Cl.	$FeCl_3$.	NH_4Cl.	$FeCl_3$.	
0.0	9.30	0.0	83.88	$Fe_2Cl_6.12H_2O$
1.09	9.57	3.24	86.32	"
1.36	9.93	4.03	91.61	$Fe_2Cl_6.12H_2O$ + Double Salt
2.00	9.27	5.92	83.64	Double Salt
2.79	8.71	8.31	78.77	"
4.05	8.09	12.08	73.20	"
6.41	7.18	19.12	64.83	"
10.78	6.21	32.04	56.00	"
7.82	6.75	23.21	60.83	Mixed Crystals containing 7.29% $FeCl_3$
7.62	5.94	22.63	53.47	" " 5.55 "
7.70	5.03	22.90	45.42	" " 4.4 "
7.81	4.34	23.23	39.13	" " 3.8 "
8.52	2.82	25.33	25.43	" " 1.64 "
10.95	0.68	32.55	6.15	" " 0.31 "
11.88	0.0	35.30	0.0	NH_4Cl

Solubility of Ferric Chloride in Aqueous Hydrochloric Acid Solutions at Different Temperatures.

(Roozeboom and Schreinemaker — Z. physik. Chem. 15, 633, '94.)

Mols. per 100 Mols. H_2O.		Gms. per 100 Gms. H_2O.		Solid Phase.
HCl.	$FeCl_3$.	HCl.	$FeCl_3$.	
Results at 0°.				
0	8.25	0	74.30	$Fe_2Cl_6.12H_2O$
7.52	6.51	15.22	58.62	
13.37	6.33	27.06	57.01	
16.80	8.70	33.99	78.34	
18.45	10.23	37.34	92.10	
20.40	15.40	41.28	138.7	
20.10	16.00	40.67	144.1	
19.95	17.70	40.37	159.4	
19.00	22.75	38.45	204.8	
18.05	23.41	36.53	210.8	
18.05	23.40	36.53	210.8	$Fe_2Cl_6.7H_2O$
19.50	25.93	39.55	233.5	
24.12	30.04	48.81	270.5	$Fe_2Cl_6.5H_2O$
26.00	32.16	52.60	289.6	
26.00	32.16	52.60	289.6	$Fe_2Cl_6.4H_2O$
34.60	38.11	70.01	343.2	
37.27	36.60	75.41	329.6	$Fe_2Cl_6.2HCl + 4H_2O$
34.60	38.11	70.01	343.2	
Results at 25°.				
0.0	10.90	0.0	98.15	$Fe_2Cl_6.12H_2O$
2.33	23.72	4.715	213.6	
0.0	24.5	0.0	220.7	
0.0	23.5	0.0	211.6	$Fe_2Cl_6.7H_2O$
2.33	23.72	4.715	213.4	
7.50	29.75	15.18	267.9	
0.0	31.50	0.0	283.6	

Mols. per 100 Mols. H_2O.		Gms. per 100 Gms. H_2O.		Solid Phase.
HCl.	$FeCl_3$.	HCl.	$FeCl_3$.	
Results at 25° (con.).				
0.0	29.00	0.0	261.1	$Fe_2Cl_6.5H_2O$
7.5	29.75	15.18	267.9	
19.5	35.25	39.46	317.4	
19.5	35.25	39.46	317.4	$Fe_2Cl_6.4H_2O$
20.6	35.34	41.68	318.3	
31.34	41.58	63.42	374.4	
33.00	43.00	66.77	387.3	
34.65	44.80	70.11	403.4	
40.41	40.25	81.77	362.4	$Fe_2Cl_6.2HCl + 4H_2O$
39.03	41.38	78.98	372.7	
35.74	45.24	72.33	407.4	
Results at 40°.				
0	32.4	0.0	291.7	$Fe_2Cl_6.5H_2O$
13.4	37.45	27.11	337.3	
13.4	37.45	27.11	337.3	$Fe_2Cl_6.4H_2O$
27.0	50.80	54.64	457.5	
0	58.0	0.0	522.3	Fe_2Cl_6
27	50.8	54.64	457.5	
42.01	48.64	85.00	438.0	
42.50	47.52	86.72	428.0	$Fe_2Cl_6.2HCl + 4H_2O$
42.01	48.64	85.00	438.0	

Results for other temperatures are also given in the original paper.

SOLUBILITY OF THE SALT PAIR $FeCl_3.NaCl$ IN WATER AT 21°.

(Hinrichsen and Sachsel — Z. physik. Chem. 50, 94, '04-'05.)

Grams Used.		Gms. per 100 Gms. Solution.		G. Mols. per 100 Mols. H_2O.		Solid Phase.
$FeCl_3$.	NaCl.	$FeCl_3$.	NaCl.	$FeCl_3$.	NaCl.	
0	3.6	0	36.10	0	11.2	NaCl
1.8	3.0	24.27	9.10	2.69	2.8	Mix Crystals
3.6	2.5	25.40	8.45	2.81	2.6	"
5.5	2.0	26.40	5.25	2.93	2.54	"
7.2	1.5	38.15	3.90	4.23	1.22	"
9.0	1.0	45.38	2.45	5.03	0.75	"
10.8	0.5	46.75	2.11	5.18	0.65	"
10.8	0.0	83.39	0.0	9.3	0.0	$FeCl_3$

SOLUBILITY OF THE SALT PAIR $FeCl_3.KCl$ IN WATER AT 21°.

(H. and S.)

Grams Used.		Gms. per 100 Gms. Solution.		Gm. Mols. per 100 Mols. H_2O.		Solid Phase.
$FeCl_3$.	KCl.	$FeCl_3$.	KCl.	$FeCl_3$.	KCl.	
0	35	0	34.97	0	8.45	KCl
13	28	13.44	24.45	1.49	5.90	Mix Crystals
18	21	23.18	16.54	2.57	3.99	"
23	18.5	28.05	11.69	3.11	2.82	"
28	16	35.72	11.68	3.96	2.82	"
31	10.5	36.62	11.19	4.06	2.70	Double Salt
36.2	9	37.35	13.67	4.14	3.30	"
46.5	6	51.69	7.54	5.73	1.82	"
15.5	0	83.89	0.0	9.3	0.0	$FeCl_3$

SOLUBILITY OF THE SALT PAIR $FeCl_3.CsCl$ IN WATER AT 21°.

(H. and S.)

Grams Used.		Gms. per 100 Gms. Solution.		Gm. Mols. per 100 Mols. H_2O.		Solid Phase.
$FeCl_3$.	CsCl.	$FeCl_3$.	CsCl.	$FeCl_3$.	CsCl.	
0	65	0.0	65.0	0.0	6.95	CsCl
0.6	11.6	0.45	55.18	0.05	5.9	$FeCl_3.CsCl.H_2O$
1.4	10.2	2.1	52.38	0.23	5.6	"
2.2	8.8	5.24	51.44	0.57	5.5	"
2.0	7.4	7.8	47.70	0.86	5.1	$FeCl_3.2CsCl.H_2O$
3.8	6.0	8.93	41.15	0.99	4.4	"
4.6	4.6	15.34	25.25	1.70	2.7	"
5.4	2.8	21.65	14.96	2.40	1.6	"
6.2	1.4	27.96	8.42	3.10	0.9	"
35.0	0.2	48.71	0.94	5.40	0.1	"
35.0	0.0	83.89	0.0	9.3	0.0	$FeCl_3$

100 gms. abs. acetone dissolve 62.9 gms. $FeCl_3$ at 18°.

(Naumann — Ber. 37, 4332, '04.)

IRON NITRATE (Ferrous) $Fe(NO_3)_2$.

Solubility in Water.

(Funk — Wiss. Abh. p. t. Reichanstalt 3, 438, '00.)

t°.	Gms. $Fe(NO_3)_2$ per 100 Gms. Sol.	Mols. $Fe(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Fe(NO_3)_2$ per 100 Gms. Sol.	Mols. $Fe(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−27	35.66	5.54	$Fe(NO_3)_2.9H_2O$	−9	39.68	6.57	$Fe(NO_3)_2.6H_2O$
−21.5	36.10	5.64	"	0	41.53	7.10	"
−19	36.56	5.76	"	18	45.14	8.23	"
−15.5	37.17	5.91	"	24	46.51	8.70	"
				60.5	62.50	16.67	"

Density of solution saturated at 18° = 1.497.

IRON OXIDES, HYDROXIDE and SULPHIDE.

Solubility in Aqueous Sugar Solutions.

(Stolle — Z. Ver Zuckerind. 50, 340, '00.)

One Liter of Sugar Solutions Dissolves Milligrams of:

% Sugar in Solvent.	$Fe_2(OH)_6$ at: 17.4°.	45°.	75°.	Fe_2O_3 at: 17.5°.	45°.	Fe_3O_4 at: 17.5°.	45°.	75°.	FeS at: 17.5°.	45°.	75°.
10	3.4	3.4	6.1	1.4	2.0	10.3	10.3	12.4	3.8	3.8	5.3
30	2.3	2.7	3.8	1.4	...	12.4	10.3	12.4	7.1	9.1	7.2
50	2.3	1.9	3.4	0.8	1.1	14.5	10.3	14.5	9.9	19.8	9.1

IRON PHOSPHATE $Fe_2(PO_4)_3$.

The Action of Water and of Aqueous Salt Solutions upon Ferric Phosphate.

(Lachowicz — Monatsh. Chem. 13, 357, '92; Cameron and Hurst — J. Am. Chem. Soc. 26, 888, '04.)

The experiments show that the ordinary precipitation methods for the production of ferric phosphate give products which do not conform to the formula $Fe_2(PO_4)_3$. By digesting such samples with water very little is dissolved, but the material is decomposed to an extent depending upon the relative amounts of solid and solvent used. The amount of PO_4 dissolved per gram of $Fe_2(PO_4)_3$ varies from about 0.0026 gram removed by 5 cc. H_2O to 0.0182 gram removed by 800 cc. H_2O at the ordinary temperature.

IRON SULPHATE (Ferrous) $FeSO_4.7H_2O$.

Solubility in Water.

(Fränckel — Heidelberg '05, Landolt and Börnstein's Tabellen, 3d ed. p. 537, '06.)

t°.	Gms. $FeSO_4$ per 100 Gms. H_2O.	Solid Phase.	t°.	Gms. $FeSO_4$ per 100 Gms. H_2O.	Solid Phase.
−1.82	14.98	Ice+$FeSO_4.7H_2O$	56.6	54.58	$FeSO_4.7H_2O + FeSO_4.4H_2O$
0	15.62	$FeSO_4.7H_2O$	60	55.02	$FeSO_4.4H_2O$
10	20.85	"	70	56.04	"
20	26.42	"	75.8	56.8	$FeSO_4.4H_2O + FeSO_4.H_2O$
30	33.00	"	80	50.6	$FeSO_4.H_2O$
40	40.20	"	90	43.0	"
50	48.55	"			

100 grams sat. solution in Glycol contain 6.0 grams $FeSO_4$ at ordinary temperature. (de Coninck.)

IRON POTASSIUM SULPHATE (Ferrous) $FeSO_4.K_2SO_4.6H_2O$.

Solubility in Water.

(Tobler — Liebig's Ann. 95, 193, '55.)

t°.	Gms. $K_2Fe(SO_4)_2$ per 100 Grams H_2O.	t°.	Gms. $K_2Fe(SO_4)_2$ per 100 Grams H_2O.
0	19.6	35	41.0
10	24.5	40	45.0
14.5	29.1	55	56.0
16	30.9	65	57.3
25	36.5	70	64.2

Solubility of Mixtures of Ferrous Sulphate $FeSO_4.7H_2O$ and Sodium Sulphate $Na_2SO_4.10H_2O$ in Water.

(Koppel — Z. physik. Chem. 52, 405, '05.)

t°.	Gms. per 100 Gms. Solution.		Gms. per 100 Gms. H_2O.		Solid Phase.
	$FeSO_4$.	Na_2SO_4.	$FeSO_4$.	Na_2SO_4.	
0	14.54	4.93	18.06	6.11	$FeSO_4.7H_2O + Na_2SO_4.10H_2O$
15.5	17.76	11.32	25.05	15.97	" "
21.8	16.57	15.32	24.34	22.51	$FeNa_2(SO_4)_2.4H_2O$
24.92	16.21	15.13	23.62	22.04	"
35	16.35	14.98	23.91	21.83	"
40	16.37	15.42	24.01	22.62	"
18.8	18.13	13.8	26.63	20.28	$FeNa_2(SO_4)_2.4H_2O + FeSO_4.7H_2O$
23	19.58	12.5	28.82	18.4	" "
27	20.97	11.3	30.95	16.64	" "
31	22.91	9.71	33.99	14.41	" "
35	23.85	9.26	35.61	13.85	" "
40	26.32	7.85	39.98	11.92	" "
18.8	18.23	14.83	27.23	22.16	$FeNa_2(SO_4)_2.4H_2O + Na_2SO_4.10H_2O$
23	13.83	18.04	20.31	26.48	" "
28	7.66	24.41	11.28	35.94	" "
31	4.58	29.50	6.95	44.75	" "
35	4.04	30.49	6.16	46.58	$FeNa_2SO_4.4H_2O + Na_2SO_4$
40	4.10	30.60	6.27	46.99	" "

LANTHANUM BROMATE $La(BrO_3)_3.9H_2O$.

100 gms. H_2O dissolve 28.5 gms. lanthanum bromate at 15°.

(Marignac.)

LANTHANUM SULPHATE $La_2(SO_4)_3$. + 9H2O

SOLUBILITY IN WATER.

(Muthmann and Rölig — Ber. 31, 1723, '98.)

t°.	Gms. $La_2(SO_4)_3$ per 100 Gms. Solution.	Gms. $La_2(SO_4)_3$ per 100 Gms. Water.	t°.	Gms. $La_2(SO_4)_3$ per 100 Gms. Solution.	Gms. $La_2(SO_4)_3$ per 100 Gms. Water.
0	2.91	3.0	50	1.47	1.5
14	2.53	2.6	75	0.95	0.96
30	1.86	1.9	100	0.68	0.69

LEAD Pb.

MUTUAL SOLUBILITY OF LEAD AND ZINC.

(Spring and Romanoff — Z. anorg. Chem. 13, 34, '96.)

t°.	Upper Layer. %Pb.	Upper Layer. %Zn.	Lower Layer. %Pb.	Lower Layer. %Zn.	t°.	Upper Layer. %Pb.	Upper Layer. %Zn.	Lower Layer. %Pb.	Lower Layer. %Zn.
334	98.8	1.2	...	...	650	83.0	17.0	7.0	93.0
419	...	...	1.5	98.5	740	79.0	21.0	10.0	90.0
450	92.0	8.0	...	...	800	75.0	25.0	14.0	86.0
475	91.0	9.0	2.0	98.0	900	59.0	41.0	25.5	74.5
584	86.0	14.0	5.0	95.0	910–920 (crit. temp.)				

LEAD ACETATE $Pb(C_2H_3O_2)_2.3H_2O$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.)

Solvent.	Grams $Pb(C_2H_3O_2)_2$ per 100 Grams Solvent at: 25°.	b. pt.
Water	50	200
Alcohol	3.3	100
Alcohol (0.941 Sp. Gr.)	12.5 (per 100 cc. at 15.5°)	
Glycerine	20.0 (15°)	

LEAD BENZOATE $Pb(C_7H_5O_2)_2.H_2O$.

SOLUBILITY IN WATER.

(Paietta — Gazz. chim. ital. 36, II, 67, '06.)

t°.	18°.	40.6°.	49.5°.
Gms. $Pb(C_7H_5O_2)_2.H_2O$ per 100 gms. sat. solution	0.149	0.249	0.310

LEAD BROMATE $Pb(BrO_3)_2.H_2O$.

100 gms. cold water dissolve 1.33 gms. lead bromate.

(Rammelsberg — Pogg. Annalen. 52, 96, '41; Böttger — Z. physik. Chem. 46, 602, '03.)

LEAD BROMIDE $PbBr_2$.

Solubility in Water.

(Lichty — J. Am. Chem. Soc. 25, 474, '03.)

t°.	Density of Solutions, H_2O at 0°.	Gms. $PbBr_2$ per 100 cc. Solution.	Gms. $PbBr_2$ per 100 Gms. H_2O.	Milligram Mols. $PbBr_2$ per 100 cc. Solution.	Milligram Mols. $PbBr_2$ per 100 Gms. H_2O.
0	1.0043	0.4554	0.4554	1.242	1.242
15	1.0053	0.7285	0.7305	1.987	1.989
25	1.0061	0.9701	0.9744	2.646	2.655
35	1.0060	1.3124	1.3220	3.577	3.603
45	1.0059	1.7259	1.7457	4.705	4.760
55	1.0046	2.1024	2.1376	5.731	5.827
65	1.0028	2.516	2.574	6.859	7.016
80	1.0000	3.235	3.343	8.819	9.113
95	0.9995	4.1767	4.3613	11.386	11.890
100	...	4.550	4.751	12.40	12.94

Solubility of Lead Bromide in Aqueous Hydrobromic Acid at 10°.

100 grams H_2O containing 72.0 grams HBr dissolve 55.0 grams $PbBr_2$ per 100 gms. solvent, and solution has Sp. Gr. 2.06.

(Ditte — Compt. rend. 92, 719, '81.)

LEAD CARBONATE $PbCO_3$.

Solubility in Water by Electrical Conductivity Method.

(Kohlrausch and Rose — Z. physik. Chem. 12, 241, '93; Böttger — *Ibid.* 46, 602, '03.)

1 liter of water dissolves 0.0011 – 0.0017 gram $PbCO_3$ at 20°.

LEAD CHLORATE $Pb(ClO_3)_2$.

100 grams H_2O dissolve 151.3 grams $Pb(ClO_3)_2$, or 100 grams sat. solution contain 60.2 gms. $Pb(ClO_3)_2$ at 18°. Density of solution, 1.947.

(Mylius and Funk — Ber. 30, 1718, '97.)

LEAD CHLORIDE $PbCl_2$.

Solubility in Water.

(Lichty; see also Formanek — Chem. Centrb. 18, 270, '87; Bell — Chem. News, 16, 69, '67; Ditte — Compt. rend. 92, 718, '81.)

t°.	Density of Solutions, H_2O at 0°.	Gms. $PbCl_2$ per 100 cc. Solution.	Gms. $PbCl_2$ per 100 Gms. H_2O.	Milligram Mols. $PbCl_2$ per 100 cc. Solution.	Milligram Mols. $PbCl_2$ per 100 Grams H_2O.
0	1.0066	0.6728	0.6728	2.421	2.421
15	1.0069	0.9070	0.9090	3.265	3.272
25	1.0072	1.0786	1.0842	3.882	3.903
35	1.0060	1.3150	1.3244	4.733	4.767
45	1.0042	1.5498	1.5673	5.579	5.644
55	1.0020	1.8019	1.8263	6.486	6.573
65	0.9993	2.0810	2.1265	7.490	7.651
80	0.9947	2.5420	2.6224	9.150	9.439
95	0.9894	3.0358	3.1654	10.926	11.394
100	...	3.208	3.342	11.52	12.01

Solubility of Lead Chloride in Aqueous Solutions of Hydrochloric Acid.

(At 0°, Engel — Ann. chim. phys. [6] 17, 359, '89; at 25°, Noyes — Z. physik. Chem. 9, 623, '92; at different temperatures, Ditte — Compt. rend. 92, 718, '81; see also Bell — J. Chem. Soc. 21, 350, '68.)

Gms. HCl per Liter.	Gms. $PbCl_2$ per Liter at: 0°.	25°.
0	5.83	10.79
0.5	4.5	9.0
1.0	3.6	7.6
2.0	2.2	6.0
3.0	1.6	5.0
6	1.4	3.1
10	1.2	1.8
100	1.2	...
200	5.2	...
250	10.5	...
300	17.5	...
400	40.0	...

Gms. HCl per 100 Gms. H_2O.	Gms. $PbCl_2$ per 100 Gms. Solution at: 0°.	20°.	40°.	55°.	80°.
0	8.0	11.8	17.0	21.0	31.0
100	1.2	1.4	3.2	5.5	12.0
150	1.5	2.0	5.0	7.5	16.0
200	3.5	5.0	8.2	11.7	21.5
250	6.5	8.0	13.0	16.2	28.5
300	10.7	12.5	17.5	22.0	35.0
400	21.5	24.0	...	...	...

Solubility of Lead Chloride in Aqueous Salt Solutions at 25°.

(Noyes; in $HgCl_2$ solutions at 20°, Formanek — Chem. Centralb. 270, '87.)

In Aqueous Solutions of:

HCl, KCl, $MgCl_2$, $CaCl_2$, $MnCl_2$ and $ZnCl_2$ Gram Equivalents per Liter of: Salt.	$PbCl_2$.	In $CaCl_2$ Gram Equiv. per Liter. $CdCl_2$.	$PbCl_2$.	In $HgCl_2$ Gram Equiv. per Liter. $HgCl_2$.	$PbCl_2$.	In $Pb(NO_3)_2$ Gram Equiv. per Liter. $Pb(NO_3)_2$.	$PbCl_2$.
0.0	0.0777	0.00	0.0777	0.0	0.0777	0.0	0.0777
0.05	0.050	0.05	0.0601	0.1	0.0992	0.2	0.0832
0.10	0.035	0.10	0.0481				
0.20	0.021	0.20	0.0355				

The above results were calculated to grams per liter plotted on cross-section paper, and the figures in the following table read from the curves.

Gms. Salt per Liter.	Grams $PbCl_2$ per Liter in Aqueous Solutions of: HCl.	KCl.	$MgCl_2$.	$CaCl_2$.	$MnCl_2$.	$ZnCl_2$.	$CdCl_2$.	$HgCl_2$.		$Pb(NO_3)_2$
0	10.79	10.79	10.79	10.79	10.79	10.79	10.79	10.79(N)	9.71(F)	10.79
1	8.5	9.3	7.7	8.7	9.5	...	10.2	11.0	9.8	10.8
2	6.5	8.2	6.5	7.6	8.3	...	9.7	11.4	10.0	10.85
3	5.2	7.2	5.7	6.7	7.3	...	9.2	11.7	10.3	10.87
4	4.3	6.5	5.2	6.0	6.3	...	8.6	12.0	10.5	10.90
6	3.2	5.3	4.4	4.8	5.0	...	7.7	12.7	11.0	10.95
8	2.5	4.5	...	3.9	4.1	...	7.0	13.3	11.6	11.00
10	2.1	3.9	...	3.3	3.5	...	6.3	14.0	12.2	11.05
14	...	3.1	...	...	2.8	3.0	5.4	...	13.2	11.15
20	...	...	...	...	...	...	4.7	...	14.8	11.20
40	...	...	...	...	...	...	...	...	19.0	11.70

Solubility of Lead Chloride in Glycerine.

(Presse — Ber. 7, 599, '74.)

1 part glycerine + 7 parts H_2O dissolve 0.91 per cent $PbCl_2$.
1 part glycerine + 3 parts H_2O dissolve 1.04 per cent $PbCl_2$.
1 part glycerine + 1 part H_2O dissolves 1.32 per cent $PbCl_2$.
Pure glycerine dissolves 2.00 per cent $PbCl_2$.

LEAD CHROMATE $PbCrO_4$.

One liter of water dissolves 0.0002 gram $PbCrO_4$ at 18° (conductivity method). (Kohlrausch — Z. physik. Chem. 50, 365, '04–'05.)

Solubility of Lead Chromate in Aqueous Potassium Hydroxide Solutions.

(Lacland and Lepierre — Bull. soc. chim. [3] 6, 230, '91.)

t°.	Grams KOH per 100 cc.	Grams $PbCrO_4$ per 100 cc.
15	2.308	1.19
60	2.308	1.62
80	2.308	2.61
102	2.308	3.85

LEAD CITRATE $Pb(C_6H_5O_7)_2.H_2O$.

Solubility in Water and in Alcohol.

100 gms. H_2O dissolve 0.04201 gm. $Pb(C_6H_5O_7)_2.H_2O$ at 18°, and 0.05344 gm. at 25°.

100 gms. alcohol (95%) dissolve 0.0156 gm. $Pb(C_6H_5O_7)_2.H_2O$ at 18°, and 0.0167 gm. at 25°. (Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

LEAD DOUBLE CYANIDES.

Solubility in Water.

(Schuler — Sitzber. Akad. Wiss. Wien, 79, 302, '79.)

Double Salt.	Formula.	t°.	Gms. per 100 Gms. H_2O.
Lead Cobalticyanide	$Pb_3[Co(CN)_6]_2.7H_2O$	18	56.5
Lead Cobalticyanide	$Pb_3[Co(CN)_6]_2.7H_2O$	19	61.3
Lead Potassium Cobalticyanide	$PbKCo(CN)_6.3H_2O$	18	14.8
Lead Cobalticyanide Nitrate	$Pb_3[Co(CN)_6]_2.Pb(NO_3)_2.12H_2O$	18	5.9
Lead Ferricyanide Nitrate	$Pb_3[Fe(CN)_6]_2.Pb(NO_3)_2.12H_2O$	16	7.5
Lead Potassium Ferricyanide	$PbKFe(CN)_6.3H_2O$	16	21.0

LEAD FLUORIDE PbF_2.

One liter of water dissolves 0.64 gram PbF_2 at 18° (conductivity method). (Kohlrausch — Z. physik. Chem. 50, 365, '04–'05.)

LEAD FORMATE $Pb(HCOO)_2$.

Solubility of Lead Formate in Aqueous Solutions of Barium Formate at 25°.

(Fock — Z. Kryst. Min. 28, 383, '97.)

Mol. % in Solution.		Grams per Liter.		Sp. Gr. of Solutions.	In Solid Phase Mol. % of	
$Pb(HCO_2)_2$.	$Ba(HCO_2)_2$.	$Pb(HCO_2)_2$.	$Ba(HCO_2)_2$.		$Pb(HCO_2)_2$.	$Ba(HCO_2)_2$.
0.00	100.0	...	28.54	1.2204	0.0	100
0.29	99.71	1.104	28.65	1.2213	1.72	98.28
0.74	99.26	2.803	28.90	1.2251	5.29	94.71
1.24	98.76	5.309	32.24	1.2529	11.94	88.06
2.91	97.09	11.42	29.29	1.2341	24.81	75.19
5.92	94.08	23.11	28.13	1.2355	56.54	43.46
100.00	0.0	28.35	...	1.0911	100.0	0.0

LEAD HYDROXIDE $Pb(OH)_2$.

SOLUBILITY OF LEAD HYDROXIDE IN AQUEOUS SOLUTIONS OF SODIUM HYDROXIDE. (Moist Lead Hydroxide used, temperature not given.)

(Rubenbauer — Z. anorg. Chem. 30, 336, '02.)

Amt. of Na in 20 cc.	Amt. of Pb. in 20 cc.	Mol. Dilution of NaOH.	Grams per 100 cc. Solution. NaOH.	Grams per 100 cc. Solution. $Pb(OH)_2$.
0.2024	0.1012	2.27	1.759	0.590
0.3196	0.1736	1.44	2.778	1.010
0.5866	0.3532	0.785	5.10	2.056
0.9476	0.4071	0.485	8.235	2.370
1.7802	0.5170	0.258	15.470	3.010

LEAD IODATE $Pb(IO_3)_2$.

One liter of water dissolves 0.019 gm. $Pb(IO_3)_2$ at 18°.

(Kohlrausch; Böttger.)

LEAD IODIDE PbI_2.

SOLUBILITY IN WATER.

(Lichty — J. Am. Chem. Soc. 25, 471, '03.)

t°.	Density. (H_2O at 0°.)	Grams PbI_2 per 100 cc. Solution.	Grams PbI_2 per 100 Grams H_2O.	Millimols PbI_2 per 100 cc. Solution.	Millimols PbI_2 per 100 Grams H_2O.
0	1.0006	0.0442	0.0442	0.096	0.096
15	0.9998	0.0613	0.0613	0.133	0.133
25	0.9980	0.0762	0.0764	0.165	0.166
35	0.9951	0.1035	0.1042	0.224	0.226
45	0.9915	0.1440	0.1453	0.312	0.315
55	0.9872	0.1726	0.1755	0.374	0.381
65	0.9827	0.2140	0.2183	0.464	0.473
80	0.9745	0.2937	0.3023	0.637	0.656
95	0.9671	0.3814	0.3960	0.828	0.859
100	...	0.420	0.436	0.895	0.927

SOLUBILITY OF LEAD IODIDE IN ACETONE, ANILIN AND AMYL ALCOHOL.

(von Laszczynski — Ber. 27, 2285, '94.)

Solvent.	t°.	Grams PbI_2 per 100 Grams Solvent.
$(CH_3)_2CO$	59	0.02
$C_6H_5NH_2$	13	0.50
$C_6H_5NH_2$	184	1.10
C_5H_7OH	133.5	0.02

Solubility of Mixtures of Lead Iodide and Potassium Iodide in Water.

(Ditte — Ann. chim. phys. [5] **24**, 226, '81; Schreinemaker — Z. physik. Chem. **9**, 65, '92.)

t°.	Grams per 1000 Gms. H_2O.		Mols. per 1000 Mols. H_2O.		Solid Phase.
	PbI_2.	KI.	PbI_2.	K_2I_2.	
5	...	163	...	8.8	Double Salt + PbI_2
20	9	260	0.3	14.1	" "
28	25	325	0.9	17.6	" "
39	45	449	1.8	24.3	" "
67	255	751	9.9	40.7	" "
80	731	1186	28.5	64.3	" "
80	519.9	976.4	22.2	52.9	" "
104.5	1411	1521	55.1	82.5	" "
120	2151	1812	83.9	98.2	"
137	2874	2097	112.2	113.8	" "
175	5603	2947	218.7	159.9	" "
189	...	3339	...	181.0	" "
9	96.6	1352	3.77	73.3	Double Salt + KI
13	114.3	1384	4.46	75.05	" "
23	186.3	1510	7.27	81.08	" "
50	526.7	1906	20.56	103.3	" "
64	789.3	2161	30.8	117.2	" "
83.5	1108.6	2434	43.2	131.9	" "
92	1273	2566	49.7	139.3	" "
137	2382	3278	93.0	117.7	" "
165	4187	4227	163.4	229.1	" "
218	10303	...	402.3	...	" "
241	12803	7998	499.9	433.6	" "
242	12749	...	497.8	...	" "
250	15264	...	596.0	...	" "

t°.	Gms. $PbI_2.2KI$ per 1000 Gms. H_2O.	Mols. $PbI_2.2KI$ per 1000 Mols. H_2O.	Solid Phase.
157	5218	141.07	$PbI_2.2KI.2\frac{1}{2}H_2O$
172	6489	175.5	"
186	7903	213.7	"
194	9266	250.6	"
201	11320	306.0	"

LEAD MALATE $Pb.C_4H_4O_5.3H_2O$.

Solubility in Water and Alcohol.

(Partheil and Hübner — Archiv. Pharm. **241**, 413, '03.)

100 gms. H_2O dissolve 0.0288 gm. $PbC_4H_4O_5.3H_2O$ at 18°, and 0.06504 gm. at 25°.

100 gms. 95% alcohol dissolve 0.0048 gm. $PbC_4H_4O_5.3H_2O$ at 18°-25°.

Density of alcohol employed = 0.8092.

LEAD NITRATE $Pb(NO_3)_2$.

Solubility in Water.

(Mulder; Kremers — Pogg. Ann. 92, 497, '54; at 15°, Michel and Kraft — Ann. chim. phys. [3] 41, 471, '54; at 17°, Euler — Z. physik. Chem. 49, 314, '04.)

t°.	Grams $Pb(NO_3)_2$ per 100 Gms. Water.		Solution.	t°.	Grams $Pb(NO_3)_2$ per 100 Gms. Water.		Solution.
0	36.5(1)	38.8(2)	27.33(3)	40	69.4	75.0	41.9
10	44.4	48.3	31.6	50	78.7	85.0	45.0
17	50.0	54.0	34.2	60	88.0	95.0	47.8
20	52.3	56.5	35.2	80	107.6	115.0	52.7
25	56.4	60.6	36.9	100	127.0	138.8	57.1
30	60.7	66.0	38.8	17°	52.76*		34.54*

* Euler.

(1) Mulder, (2) Kremers, (3) Average of M and K.
Density of saturated solution at 17° = 1.405. (Euler.)

Solubility of Lead Nitrate in Ethyl and Methyl Alcohol.

Solvent.	Gms. $Pb(NO_3)_2$ per 100 Grams Solvent at: 4°.	8°.	22°.	40°.	50°.	
Aq. C_2H_5OH (Sp. Gr. .9282)	4.96	5.82	8.77	12.8	14.9	(G)
Abs. C_2H_5OH	...	...	0.04 (20.5°)	...	...	(de B)
Abs. CH_3OH	...	...	1.37 "	...	...	"

(Gerardin — Ann. chim. phys. [4] 5, 129, '65; de Bruyn — Z. physik. Chem. 10, 783, '92.)

Solubility of Mixed Crystals of Lead Nitrate and Strontium Nitrate in Water at 25°.

(Fock — Z. Kryst. Min. 28, 372, '97.)

Mol. per cent in Solution. $Pb(NO_3)_2$.	$Sr(NO_3)_2$.	Gms. per 100 cc. Solution. $Pb(NO_3)_2$.	$Sr(NO_3)_2$.	Sp. Gr. of Solutions.	Mol. per cent in Solid Phase. $Pb(NO_3)_2$.	$Sr(NO_3)_2$.
100	0.0	46.31	0.0	1.4472	100	0.0
87.41	12.39	50.47	4.56	1.4336	99.05	0.95
78.68	21.32	53.92	8.14	1.4288	98.11	1.89
56.39	43.61	45.34	17.81	1.4263	97.02	2.98
60.29	39.71	44.48	18.74	1.4245	96.06	3.94
33.70	66.30	25.23	35.03	1.4468	83.84	16.16
24.58	75.42	19.13	37.54	1.4867	32.88	67.12
0.0	100.0	0.0	71.04	1.5141	0.0	100.00

LEAD OXALATE PbC_2O_4.

One liter of water dissolves 0.0015 gm. PbC_2O_4 at 18° (conductivity method). (Böttger — Z. physik. Chem. 46, 602, '03; Kohlrausch — *Ibid* 50, 356, '04–'05.)

LEAD OXIDES.

Solubility in Water.

(Böttger; Ruer — Z. anorg. Chem. 50, 273, '06.)

No.	Description of Oxide.	Gm. Equiv. per Liter.	Gms. per Liter.
1.	Yellow Oxide, by boiling Pb hydroxide with 10% NaOH	1.03×10^{-4}	0.023
2.	Red Oxide, by boiling Pb hydroxide with conc. NaOH	0.56×10^{-4}	0.012
3.	Yellow Oxide, by heating No. 1 to 630°	1.05×10^{-4}	0.023
4.	Yellow Oxide, by heating No. 2 to 740°	1.00×10^{-4}	0.022
5.	Yellow Oxide, by heating com. yellow brown oxide to 620°	1.09×10^{-4}	0.024
6.	Yellow Brown Oxide commercially pure	1.10×10^{-4}	0.024
7.	Yellow Brown Oxide, by long rubbing of No. 5.	1.12×10^{-4}	0.025

Böttger gives for three samples of lead oxide, 0.017, 0.021, and 0.013 gm. per liter respectively.

LEAD PALMITATE, LEAD STEARATE.

100 cc. absolute ether dissolve 0.0138 gm. palmitate and 0.0148 gm. stearate.

(Lidoff — Bull. soc. chim. [3] 10, 356, '93.)

LEAD PHOSPHATE (Ortho) $Pb_3(PO_4)_2$.

One liter of 4.97 per cent aqueous acetic acid solution dissolves 1.27 gms. $Pb_3(PO_4)_2$.

(Bertrand — Monit. Scient. [3] 10, 477, '68.)

LEAD SUCCINATE $PbC_4H_4O_4$.

SOLUBILITY IN WATER AND IN ALCOHOL.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

100 gms. H_2O dissolve 0.0253 gm. $PbC_4H_4O_4$ at 18°, and 0.0285 gm. at 25°.

100 gms. 95% alcohol dissolve 0.00275 gm. $PbC_4H_4O_4$ at 18°, and 0.003 gm. at 25°.

Density of alcohol used = 0.8092.

LEAD SULPHATE $PbSO_4$.

One liter of water dissolves 0.041 gm. $PbSO_4$, by conductivity method.

(Kohlrausch; Böttger. Dibbits — Z. anal. Chem. 13, 139, '74, finds 0.038 gram by gravimetric method.)

SOLUBILITY OF LEAD SULPHATE IN AQUEOUS SOLUTIONS OF STRONG ACIDS.

(Schultz — Pogg. Ann. 113, 137, '61; Rodwell — J. Chem. Soc. 15, 59, '62.)

In Aq. H_2SO_4. (a).	(b).	(c).	In Aq. HCl. (a).	(b).	(c).	In Aq. HNO_3. (a).	(b).	(c).
1.540	63.4	0.003	1.05	10.6	0.14	1.08	11.6	0.33
1.793	85.7	0.011	1.08	16.3	0.35	1.12	17.5	0.59
1.841	97.0	0.039	1.11	22.0	0.95	1.25	34.0	0.78
			1.14	27.5	2.11	1.42	60.0	1.01
			1.16	31.6	2.86			

(a) Sp. Gr. of Aq. Acid. (b) Gms. Acid per 100 Gms. Solution. (c) Gms. $PbSO_4$ per 100 Gms. Solvent.

SOLUBILITY OF LEAD SULPHATE IN AQUEOUS SOLUTIONS OF AMMONIUM ACETATE AND OF SODIUM ACETATE.

(Noyes and Whitcomb — J. Am. Chem. Soc. 27, 756, '05; Dunnington and Long — Am. Ch. J. 22, 217, '99; Dibbits — Z. anal. Chem. 13, 139, '74.)

In Ammonium Acetate. At 25° (N. and W.). Millimols per Liter. $NH_4C_2H_3O_2$.	$PbSO_4$.	Grams per Liter. $NH_4C_2H_3O_2$.	$PbSO_4$.	At 100° (D. and L.). G. $NH_4C_2H_3O_2$ per 100 cc. Solution.	G. $PbSO_4$ per 100 g. Solution.	In Sodium Acetate. (D.). Gms. per 100 Gms. H_2O. $NaC_2H_3O_2$.	$PbSO_4$.
0.0	0.134	0.0	0.041	28	7.12	2.05	0.054
103.5	2.10	7.98	0.636	32	9.88	8.2	0.853
207.1	4.55	15.96	1.38	37	10.58	41.0	11.23
414.1	10.10	31.92	3.02	45	11.10		

SOLUBILITY OF MIXTURES OF LEAD HYPOSULPHATE AND STRONTIUM HYPOSULPHATE AT 25°.

(Fock — Z. Kryst. Min. 28, 389, '97.)

Mol. per cent in Solution.		Grams per Liter.		Sp. Gr. of Solutions.	Mol. per cent in Solid Phase.	
$PbS_2O_6.4H_2O$.	$SrS_2O_6.4H_2O$.	PbS_2O_6.	SrS_2O_6.		$PbS_2O_6.4H_2O$.	$SrS_2O_6.4H_2O$.
0.0	100.0	0.0	145.6	1.1126	0.0	100.0
1.05	98.95	2.97	151.2	1.1184	0.30	99.7
15.31	84.69	40.82	152.5	1.1503	3.87	96.13
46.80	53.20	149.2	114.5	1.2147	9.84	90.16
62.30	37.70	256.1	85.0	1.2889	19.26	80.74
75.75	24.25	310.3	67.0	1.3252	23.73	76.27
78.09	21.91	373.7	70.8	1.3726	32.24	67.76
88.29	11.71	509.5	45.6	1.4671	49.97	50.13
100.0	0.00	374.3	0.0	1.6817	0.00	0.00

LEAD TARTRATE $PbC_4O_6H_4$.

SOLUBILITY IN WATER.

(Cantoni and Zachoder — Bull. soc. chim. [3] 33, 751, '05; Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

t°.	Gms. $PbC_4O_6H_4$ per 100 cc. Solution.	t°.	Gms. $PbC_4O_6H_4$ per 100 cc. Solution.	t°.	Gms. $PbC_4O_6H_4$ per 100 cc. Solution.
18	0.010 (P. and H.)	50	0.00225	70	0.0032
25	0.0108 "	55	0.00295	75	0.0033
35	0.00105	60	0.00305	80	0.0038
40	0.0015	65	0.00315	85	0.0054

NOTE. — The positions of the decimal points here shown are just as given in the original communications.

100 gms. alcohol of 0.8092 Sp. Gr. (about 95%) dissolve 0.0028 gm. $PbC_4O_6H_4$ at 18°, and 0.00315 gm. at 25°. (P. and H.)

LEVULOSE $C_6H_{12}O_6$.

100 gms. saturated solution in pyridine contain 18.49 gms. $C_6H_{12}O_6$ at 26°, Sp. Gr. 1.0521. (Holty — J. Physic. Chem. 9, 764, '05.)

LIGRÖIN.

100 cc. H_2O dissolve 0.341 cc. ligröin at 22° Vol. of solution = 100.34, Sp. Gr. 0.9969.

100 cc. ligröin dissolve 0.335 cc. H_2O at 22° Vol. of solution = 100.60, Sp. Gr. 0.6640. (Herz — Ber. 31, 2671, '98.)

LITHIUM BENZOATE C_6H_5COOLi.

100 gms. H_2O dissolve 33.3 gms. at 25°, and 40.0 gms. at b. pt.

100 gms. alcohol dissolve 7.7 gms. at 25°, and 10.0 gms. at b. pt.

(U. S. P.)

LITHIUM BORATE $Li_2OB_2O_3$.

SOLUBILITY IN WATER.

t°	0	10	20	30	40	45
Gms. $Li_2OB_2O_3$ per 100 Gms. H_2O	0.7	1.4	2.6	4.9	11.12	20

(Le Chatelier — Compt. rend. 124, 1094, '97.)

LITHIUM BROMATE $LiBrO_3$.

100 gms. H_2O dissolve 153.7 gms. $LiBrO_3$ at 18°, or 100 gms. saturated solution contain 60.4 gms. Sp. Gr. of sol. = 1.833.

(Mylius and Funk — Ber. 30, 1718, '97.)

LITHIUM BROMIDE LiBr.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 104, 133, '58.)

t°.	Gms. LiBr per 100 Gms. Water.	Gms. LiBr per 100 Gms. Solution.	t°.	Gms. LiBr per 100 Gms. Water.	Gms. LiBr per 100 Gms. Solution.
0	143	58.8	40	202	66.9
10	161	61.7	50	214	68.2
20	177	63.9	60	224	69.1
25	184	64.8	80	245	71.0
30	190	65.5	100	266	72.7

100 gms. saturated solution in glycol, $C_2H_4(OH)_2.H_2O$, contain 37.5 gms. LiBr at 14.7°.

(de Coninck — Chem. Centr. 76, II, 883, '05.)

LITHIUM CARBONATE Li_2CO_3.

SOLUBILITY IN WATER.

(Bevade — J. russ. phys. chem. Ges. 16, 591, 84; Bull. soc. chim. [2] 43, 123, '85; Flückiger — Arch. Pharm. [3] 25, 542, '87; Draper — Chem. News, 55, 169, '87.)

An average curve was constructed from the available results and the following table read from it.

t°.	Gms. Li_2CO_3 per 100 Gms. Water.	Gms. Li_2CO_3 per 100 Gms. Solution.	t°.	Gms. Li_2CO_3 per 100 Gms. Water.	Gms. Li_2CO_3 per 100 Gms. Solution.
0	1.54	1.52	40	1.17	1.16
10	1.43	1.41	50	1.08	1.07
20	1.33	1.31	60	1.01	1.00
25	1.29	1.28	80	0.85	0.84
30	1.25	1.24	100	0.72	0.71

Density of saturated solution at 0° = 1.017; at 15° = 1.014.

SOLUBILITY OF LITHIUM CARBONATE IN AQUEOUS SOLUTIONS OF ALKALI SALTS AT 25°.

(Geffcken — Z. anorg. Chem. 43, 197, '05.)

The original results were calculated to gram quantities and plotted on cross-section paper. The figures in the following table were read from the curves.

Gms. Salt per Liter.	Grams Li_2CO_3 per Liter in Aqueous Solutions of: $KClO_3$.	KNO_3.	KCl.	NaCl.	K_2SO_4.	Na_2SO_4.	NH_4Cl.	$(NH_4)_2SO_4$.
0	12.63	12.63	12.63	12.63	12.63	12.63	12.63	12.63
10	12.95	13.05	13.10	13.4	13.9	14.0	16.0	20.7
20	13.10	13.3	13.5	13.9	14.7	15.0	19.2	25.0
30	13.25	13.6	13.8	14.3	15.4	16.0	21.5	28.2
40	13.40	13.8	14.0	14.6	16.0	16.6	23.3	30.8
60	...	13.8	14.2	14.5	16.9	17.8	26.0	35.2
80	...	13.6	14.0	14.4	17.7	18.6	27.6	38.5
100	...	13.5	13.9	14.2	18.2	19.4	28.4	41.0
120	...	13.3	13.7	14.0	...	19.9	28.7	42.6
140	...	13.0	13.3	...	...	20.4	28.8	43.5
170	...	12.6	...	...	...	...	28.9	...
200	...	12.2	...	...	...	...	29.0	...

100 gms. aq. alcohol of 0.941 Sp. Gr. dissolve 0.056 gm. Li_2CO_3 at 15.5°.

LITHIUM (Bi) CARBONATE $LiHCO_3$.

100 grams H_2O dissolve 5.501 grams $LiHCO_3$ at 13°.

(Bevade — Ber. 17, R 406, '84.)

LITHIUM CHLORATE $LiClO_3$.

100 grams H_2O dissolve 213.5 grams $LiClO_3$ at 18°, or 100 grams sat. solution contain 75.8 grams. Sp. Gr. of sol. = 1.815.

(Mylius and Funk — Ber. 30, 1718, '97.)

LITHIUM CHLORAURATE $LiAuCl_4$.

SOLUBILITY IN WATER.

(Rosenbladt — Ber. 19, 2538, '86.)

t°.	Gms. $LiAuCl_4$ per 100 Gms. Solution.	t°.	Gms. $LiAuCl_4$ per 100 Gms. Solution.	t°.	Gms. $LiAuCl_4$ per 100 Gms. Solution.
10	53.1	40	67.3	60	76.4
20	57.7	50	72.0	70	81.0
30	62.5			80	85.7

LITHIUM CHLORIDE LiCl.

SOLUBILITY IN WATER.

(Average curve from results of Gerlach — Z. anal. Chem. 8, 281, '69.)

t°.	Gms. LiCl per 100 Gms. Water.	Gms. LiCl per 100 Gms. Solution.	t°.	Gms. LiCl per 100 Gms. Water.	Gms. LiCl per 100 Gms. Solution.
0	67	40.1	40	90.5	47.5
10	72	41.9	50	97.0	49.2
20	78.5	44.0	60	103.0	51.9
25	81.5	49.9	80	115.0	53.5
30	84.5	45.8	100	127.5	56.0

Density of saturated solution at 0°, 1.255; at 15°, 1.275.

SOLUBILITY OF LITHIUM CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORIC ACID AT 0°.

(Engel — Ann. chim. phys. [6] 13, 385, '88.)

Milligram Mols. per 10 cc. Solution. LiCl.	Milligram Mols. per 10 cc. Solution. HCl.	Gms. per 10 cc. Solution. LiCl.	Gms. per 10 cc. Solution. HCl.	Sp. Gr. of Solutions.
120	0.0	51.0	0.0	1.255
97.5	22.5	41.4	8.2	1.243
67.0	66.0	28.5	24.1	1.249
58.0	81.0	24.6	29.5	1.251

SOLUBILITY OF LITHIUM CHLORIDE IN SEVERAL SOLVENTS.

(von Laszczynski — Ber. 27, 2285, '94; de Coninck — Chem. Centrb. 76, II, 883, '05.)

In Acetone. (von L.)

t°.	Gms. LiCl per 100 Gms. $(CH_3)_2CO$.	t°.	Gms. LiCl per 100 Gms. $(CH_3)_2CO$.
0	4.60	46	3.76
12	4.41	53	3.12
25	4.11	58	2.14

In Pyridine. (von L.)

t°.	Gms. LiCl per 100 Gms. C_5H_5N.
15°	7.78
100	14.26

In Glycol. (de C.)

t°.	Gms. LiCl per 100 Gms. Sat. Sol.
15°	11.0

LITHIUM CHROMATE $Li_2CrO_4.2H_2O$.

LITHIUM BICHROMATE $Li_2Cr_2O_7.2H_2O$.

Solubility in Water at 30°.

(Schreinemaker — Z. physik. Chem. 55, 79, '06; at 18°, Mylius and Funk — Ber. 30, 1718, '97.)

Composition in Weight per cent: Of Solution. %CrO_3.	%Li_2O.	Of Residue. %CrO_3.	%Li_2O.	Solid Phase.
0.0	7.09	...	...	$LiOH.H_2O$
6.986	7.744	4.322	18.538	"
16.564	8.888	10.089	19.556	"
25.811	10.611	15.479	21.106	"
33.618	12.886	24.365	19.398	"
37.411	14.306	44.555	17.411	$LiOH.H_2O + Li_2CrO_4.2H_2O$
37.588	14.381	36.331	18.552	" "
37.495	13.311	51.075	16.384	$Li_2CrO_4.2H_2O$
40.280	10.858	...	...	"
43.404	11.809	53.793	14.070	$Li_2Cr_2O_4.2H_2O + Li_2Cr_2O_7.2H_2O$
45.130	9.515	56.085	10.190	$Li_2Cr_2O_7.2H_2O$
47.945	7.951	58.029	9.238	"
57.031	6.432	65.560	8.733	"
67.731	5.713	71.687	8.513	$Li_2Cr_2O_7.2H_2O + CrO_3$
67.814	5.689	80.452	3.780	" "
65.200	4.661	...	...	CrO_3
63.257	2.141	85.914	0.758	"
62.28	...	...	...	"

A saturated aqueous solution contains:

49.985 per cent Li_2CrO_4, or 100 grams H_2O dissolve 99.94 grams Li_2CrO_4 at 30° (S.).

56.6 per cent $Li_2Cr_2O_7$, or 100 grams H_2O dissolve 130.4 grams $Li_2Cr_2O_7$ at 30° (S.).

52.6 per cent Li_2CrO_4, or 100 grams H_2O dissolve 110.9 grams $LiCrO_4$ at 18° (M. and F.).

Sp. Gr. of sat. solution at 18° = 1.574.

LITHIUM CITRATE $C_3H_4(OH)(COOLi)_3$.

100 gms. H_2O dissolve 50 gms. citrate at 25°, and 66.6 gms. at b. pt.
100 gms. alcohol of 0.941 Sp. Gr. dissolve 4 gms. citrate at 15.5°.

(U. S. P.)

LITHIUM FLUORIDE LiF.

100 grams H_2O dissolve 0.27 gram LiF at 18°. Sp. Gr. of sol. = 1.003.

(Mylius and Funk.)

LITHIUM FORMATE HCOOLi.

Solubility in Water.

(Groschuff — Ber. 36, 179, '03.)

t°.	Gms. HCOOLi per 100 Gms. Solution.	Mols. HCOOLi per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. HCOOLi per 100 Gms. H_2O.	Mols. HCOOLi per 100 Mols. H_2O.	Solid Phase.
−20	21.14	9.28	$HCOOLi.H_2O$	91	54.16	40.90	$HCOOLi.H_2O$
0	24.42	11.18	"	98	57.05	45.99	HCOOLi
18	27.85	13.36	"	104	57.04	47.11	"
49.5	35.60	19.14	"	120	59.63	51.13	"
74	44.91	28.22	"				

Sp. Gr. sat. sol. at 18° = 1.142.

Solubility of Neutral Lithium Formate in Anhydrous Formic Acid.

t°.	Gms. per 100 Gms. Solution.		Mols. per 100 Mols. H_2O.		Solid Phase.
	HCOOLi.	HCOOH.	HCOOLi.	HCOOH.	
0	25.4	47.02	11.80	39.27	HCOOLi
18	25.9	46.92	12.11	39.11	"
39	26.4	46.92	12.42	39.13	"
60	26.9	46.94	12.74	39.13	"
79	27.8	47.02	13.36	39.26	"

LITHIUM HYDROXIDE LiOH.

Solubility in Water.

(Dittmar — J. Soc. Ch. Ind. 7, 730, '88; Pickering — J. Chem. Soc. 63, 909, '93.)

t°	Gms. per 100 Gms. Solution.		Gms. LiOH per 100 Gms. H_2O.	t°.	Gms. per 100 Gms. Solution.		Gms. LiOH. per 100 Gms H_2O.
	Li_2O.	LiOH.			Li_2O.	LiOH.	
0	6.67	10.64	12.7	40	7.29	11.68	13.0
10	6.74	10.80	12.7	50	7.56	12.12	13.3
20	6.86	10.99	12.8	60	7.96	12.76	13.8
25	6.95	11.14	12.9	80	8.87	14.21	15.3
30	7.05	11.27	12.9	100	10.02	16.05	17.5

LITHIUM IODATE $Li(IO_3)$.

100 grams H_2O dissolve 80.3 grams $LiIO_3$ at 18°, or 100 grams solution contain 44.6 grams. Sp. Gr. of sol. = 1.568.

(Mylius and Funk — Ber. 30, 1718, '97.)

LITHIUM IODIDE LiI.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 104, 133, '58; 111, 60, '60.)

t°.	Gms. LiI per 100 Gms. Water.	Gms. LiI per 100 Gms. Solution.	t°.	Grams LiI per 100 Gms. Water.	Grams LiI per 100 Gms. Solution.
0	151	60.2	40	179	64.2
10	157	61.1	50	187	65.2
20	165	62.2	60	202	66.9
25	167	62.6	70	230	69.7
30	171	63.1	75	263	72.5

100 grams sat. solution in Glycol ($C_2H_4(OH)_2.H_2O$) contain 28.0 grams LiI at 15.3°. (de Coninck — Chem. Centrb. 76, II, 883, '05.)

100 cc. saturated solution in Furfurol ($C_4H_3O.COH$) contain 45.86 gms. LiI at 25°.

100 cc. saturated solution in Nitro Methane (CH_3NO_2) contain 1.219 gms. LiI at 0°, and 2.519 gms. at 25°.

(Walden — Z. physik. Ch. 55, 713, 718, '06.)

LITHIUM NITRATE $LiNO_3$.

SOLUBILITY IN WATER.

(Donnan and Burt — J. Chem. Soc. 83, 335, '03.)

t°.	Gms. $LiNO_3$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $LiNO_3$ per 100 Gms. Solution.	Solid Phase.
0.1	34.8	$LiNO_3.3H_2O$	29.87	56.42	$LiNO_3.3H_2O$
10.5	37.9	"	29.86	56.68	"
12.1	38.2	"	29.64	57.48	"
13.75	39.3	"	29.55	58.03	"
19.05	40.4	"	43.6	60.8	$LiNO_3.\frac{1}{2}H_2O$
21.1	42.9	"	50.5	61.3	"
27.55	47.3	"	55.0	63.0	"
29.47	53.67	"	60.0	63.6	"
29.78	55.09	"	64.2	64.9	$LiNO_3$
			70.9	66.1	"

Cryohydrate point of the trihydrate, 17.8°. Transition points, 29.6° and 61.1°.

LITHIUM OXALATE $Li_2C_2O_4$.

SOLUBILITY OF MIXTURES OF LITHIUM OXALATE AND OXALIC ACID IN WATER AT 25°.

(Foote and Andrew — Am. Ch. J. 34, 153, '05.)

Mixtures of the two substances were dissolved in water, and the solutions cooled in a thermostadt to 25°.

Gms. per 100 Gms. Solution. $H_2C_2O_4$.	Gms. per 100 Gms. Solution. $Li_2C_2O_4$.	Mols. per 100 Mols. H_2O. $H_2C_2O_4$.	Mols. per 100 Mols. H_2O. $Li_2C_2O_4$.	Solid Phase.
10.20	...	2.274	...	$H_2C_2O_4.2H_2O$
10.66	2.96	2.457	0.622	$H_2C_2O_4.H_2O$ and $HLiC_2O_4.H_2O$
10.55	3.11			
8.08	3.18	1.823	0.633	Double Salt
2.60	5.03	0.563	0.962	$HLiC_2O_4.4H_2O$ $= 39.2 H_2C_2O_4$ and $44.7\ Li_2C_2O_2$
2.16	6.54	0.469	1.273	$HLiC_2O_4.H_2O$ and $Li_2C_2O_4$
2.12	1.61			
...	5.87	...	1.901	$Li_2C_2O_4$

LITHIUM PHOSPHATE Li_3PO_4.

100 grams H_2O dissolve 0.04 gram Li_3PO_4. (Mayer — Liebig's Ann. **98**, 193, '56.)

LITHIUM (Hypo) **PHOSPHATE** $Li_4P_2O_6.7H_2O$.

100 grams H_2O dissolve 0.83 gram hypophosphate at ord. temp.

(Rammelsberg — J. pr. Ch. [2] **45**, 153, '92.)

LITHIUM PERMANGANATE $LiMnO_4.3H_2O$.

100 grams water dissolve 71.4 grams permanganate at 16°.

(Ashoff.)

LITHIUM SALTS of Fatty Acids.

SOLUBILITY IN WATER AND IN ALCOHOL OF 0.797 SP. GR. AT 18° AND AT 25°.

(Partheil and Ferie — Archiv. Pharm. **241**, 554, '03.)

Salt.	Formula.	Grams Salt per 100 cc. Sat. Solution in: Water at 18°.	Water at 25°.	Alcohol at 18°.	Alcohol at 25°.
Stearate	$C_{17}H_{35}COOLi$	0.010	0.011	0.041	0.0532
Palmitate	$C_{15}H_{31}COOLi$	0.011	0.018	0.0796	0.0956
Myristate	$C_{13}H_{27}COOLi$	0.0232	0.0234	0.184	0.2100
Laurinate	$C_{11}H_{23}COOLi$	0.158	0.1726	0.418	0.4424
Oleate	$C_{17}H_{33}COOLi$	0.0674	0.1320	0.9084	1.010

LITHIUM SULPHATE Li_2SO_4.

SOLUBILITY IN WATER.

(Average curve from Kremers — Pogg. Ann. **95**, 468, '55; Etard — Ann. chim. phys. [7] **2**, 547, '94.)

t°.	Gms. Li_2SO_4 per 100 Gms. Solution.	t°.	Gms. Li_2SO_4 per 100 Gms. Solution.	t°.	Gms. Li_2SO_4 per 100 Gms. Solution.
−20	18.4	20	25.5	50	24.5
−10	24.2	25	25.3	60	24.2
0	26.1	30	25.1	80	23.5
10	25.9	40	24.7	100	23.0

NOTE. — For equilibrium between lithium sulphate ammonia and water, see Schreinemaker and Cochert — Chem. Weekblad. **2**, 771; **3**, 157, '06.

EQUILIBRIUM BETWEEN LITHIUM SULPHATE, ALUMINUM SULPHATE, AND WATER AT 30°.

(Schreinemaker and De Waal — Chem. Weekblad. **3**, 539, '06.)

Composition in Weight per cent: Of Solution. % Li_2SO_4.	Of Solution. % $Al_2(SO_4)_3$.	Of Residue. % Li_2SO_4.	Of Residue. % $Al_2(SO_4)_3$.	Solid Phase.
25.1	0	...	...	$Li_2SO_4.H_2O$
21.93	5.34	...	...	"
16.10	14.89	63.70	4.02	"
13.63	20.76	14.72	31.17	$Li_2SO_4.H_2O + Al_2(SO_4)_3.18H_2O$
13.24	21.71	61.24	7.22	$Li_2SO_4.4H_2O$
11.73	22.08	6.92	33.54	$Al_2(SO_4)_3.18H_2O$
6.75	24.34	3.77	37.06	"
3.44	26.12	...	...	"
0.0	28.0	...	...	"

NOTE. — For solubility of lithium sulphate in mixtures of alcohol and water at 30°, see Schreinemaker and Van Dorp, Jr. — Chem. Weekblad. **3**, 557, '06.

MAGNESIUM BROMATE $Mg(BrO_3)_2.6H_2O$.

100 cc. sat. solution contain 42 grams $Mg(BrO_3)_2$, or 0.15 gram mols. at 18°.

(Kohlrausch — Sitzb. K. Akad. Wiss. (Berlin), i, 90, '97.)

MAGNESIUM BROMIDE $MgBr_2.6H_2O$.

SOLUBILITY IN WATER.

(Menschutkin — Chem. Centrb. 77, I, 646, '06; at 18°, Mylius and Funk — Ber. 30, 1718, '97.)

t°.	Grams $MgBr_2$ per 100 Gms. Solution.	Grams $MgBr_2$ per 100 Gms. Water.	t°.	Grams $MgBr_2$ per 100 Grams. Solution.	Grams $MgBr_2$ per 100 Grams. Water.
−10	47.2	89.4	40	50.4	101.6
0	47.9	91.9	50	51.0	104.1
10	48.6	94.5	60	51.8	107.5
18	49.0	96.1	80	53.2	113.7
18	50.8	103.4 (M. and F.)	100	54.6	120.2
20	49.1	96.5	120	56.0	127.5
25	49.4	97.6	140	58.0	138.1
30	49.8	99.2	160	62.0	163.1

Density of saturated solution at 18° = 1.655 (M. and F.)

Etard — Ann. chim. phys. [7] 2, 541, '94, gives solubility results which are evidently too high.

SOLUBILITY OF MAGNESIUM BROMIDE ALCOHOL COMPOUNDS IN THE CORRESPONDING ALCOHOLS.

(Menschutkin — Chem. Centrb. 77, I, 334, 647, '06.)

In the Corresponding Alcohols.

t°.	Results Expressed in Mols. per cent. $MgBr_2.6CH_3OH$ in CH_3OH.	Results Expressed in Mols. per cent. $MgBr_2.6C_2H_5OH$ in C_2H_5OH.
0	6.0	2.0
20	6.4	4.6
40	6.9	8.4
50	7.2	10.9
60	7.5	14.1
80	8.25	22.1
100	9.6	38.6
150	16.7	100.0 (108.5°)
190	100.0	

Determinations are also given for the solubility of $MgBr_2.6C_3H_7OH$ in C_3H_7OH, of $MgBr_2.6(CH_3)_2C_2H_3OH$ in $(CH_3)_2C_2H_3.OH$, and of $MgBr_2.6(CH_3)_2C_2H_3OH$ in $(CH_3)_2C_2H_3OH$, also of $MgBr_2.4(CH_3)_2.CHOH$ in iso propyl alcohol and in tri methyl carbinol.

For the solubility magnesium bromide mono etherate ($MgBr_2.(C_2H_5)_2O$) in ethyl ether, see Menschutkin — Chem. Centrb. **77**, I, 1868, '06; also Z. anorg. Ch. **49**, 208, '06. For magnesium bromide di etherate ($MgBr_2.2C_4H_{10}O$) in ethyl ether, see Menschutkin — Z. anorg. Ch. **49**, 35, '06. For magnesium bromide hexa formic acid and magnesium bromide hexa acetic acid compounds in anhydrous solutions of the corresponding acids, see Iswietja d. Petersburger, Polytechn. Inst. **5**, 293, '06; Chem. Centrb. **77**, II, 1482, '06.

MAGNESIUM CARBONATE $MgCO_3$.

Solubility in Water in Presence of Carbon Dioxide at 15°.

(Treadwell and Reuter — Z. anorg. Ch. 17, 200, '98.)

cc. CO_2 per 100 cc. Gas Phase (at 0° and 760 mm.).	Partial Pressure of CO_2 in mm. Hg.	Grams per 100 cc. Solution.			
		Free CO_2.	$MgCO_3$.	$Mg(HCO_3)_2$.	Total Mg.
18.86	143.3	0.1190	...	1.2105	0.2016
5.47	41.6	0.0866	...	1.2105	0.2016
4.47	33.8	0.0035	...	1.2105	0.2016
1.54	11.7	...	0.0773	1.0766	0.2016
1.35	10.3	...	0.0765	0.7629	0.1492
1.07	8.2	...	0.0807	0.5952	0.1224
0.62	4.7	...	0.0701	0.3663	0.0865
0.60	4.6	...	0.0758	0.3417	0.0788
0.33	2.5	...	0.0748	0.2632	0.0655
0.21	1.6	...	0.0771	0.2229	0.0594
0.14	1.1	...	0.0710	0.2169	0.0566
0.03	0.3	...	0.0711	0.2036	0.0545
...	...	...	0.0685	0.2033	0.0536
...	...	...	0.0702	0.1960	0.0529
...	...	...	0.0625	0.2036	0.0520
...	...	...	0.0616	0.1954	0.0511
...	...	...	0.0641	0.1954	0.0518

Therefore at 0 partial pressure of CO_2 and at 15° and mean barometric pressure, one liter of saturated aqueous solution contains 0.641 gram of $MgCO_3$ plus 1.954 grams $Mg(HCO_3)_2$.

Solubility of Magnesium Carbonate in Water Charged with Carbon Dioxide at Pressures Greater than One Atmosphere.

(Engel and Ville — Compt. rend. 93, 340, '81; Engel — Ann. chim. phys. [6] 13, 349, '88.)

Pressure of CO_2 in Atmospheres.	G. $MgCO_3$* per Liter. At 12°.	At 19°.	Pressure of CO_2 in Atmospheres.	G. $MgCO_3$* per Liter. At 12°.	At 19°.
0.5	20.5	...	4.0	42.8	...
1.0	26.5	25.8	4.7	...	43.5
2.0	34.2	33.1 (2.1 At.)	6.0	50.6	48.5 (6.2 At.)
3.0	39.0	37.2 (3.2 At.)	9.0	...	56.6

Solubility in Water Saturated with CO_2 at One Atmosphere.

(Engel.)

t°.	Gms. $MgCO_3$* per Liter.	t°.	Gms. $MgCO_3$* per Liter.	t°.	Gms. $MgCO_3$* per Liter.
5	36	30	21	60	11
10	31	40	17	80	5
20	26			100	0

* Dissolved as $Mg(HCO_3)_2$.

Solubility of Magnesium Carbonate in Aqueous Solutions of Sodium Carbonate at 25°. The solutions being in equilibrium with an atmosphere free from CO_2.

(Cameron and Seidell — J. Physic. Ch. 7, 588, '03.)

Wt. of 1 Liter of Solution.	Grams per Liter.		Reacting Weights per Liter.	
	Na_2CO_3.	$MgCO_3$.	Na_2CO_3.	$MgCO_3$.
996.8	0.00	0.223	0.000	0.00266
1019.9	23.12	0.288	0.220	0.00344
1047.7	50.75	0.510	0.482	0.00620
1082.5	86.42	0.879	0.820	0.01027
1118.9	127.3	1.314	1.209	0.01570
1147.7	160.8	1.636	1.526	0.01955
1166.1	181.9	1.972	1.727	0.02357
1189.4	213.2	2.317	2.024	0.02770

Solubility of Magnesium Bi Carbonate and of Magnesium Carbonate in Aqueous Solutions of Sodium Chloride at 23°. The solutions being in equilibrium with an atmosphere of CO_2 in the one case, and in equilibrium with air free from CO_2 in the other.

(C. and S.)

In Presence of CO_2 as Gas Phase.		Wt. of 1 Liter.	In Presence of Air Free from CO_2.	
Gms. NaCl per Liter.	Gms. $Mg(HCO_3)_2$ per Liter.		Gms. NaCl per Liter.	Gms. $MgCO_3$ per Liter.
7.0	30.64	996.9	0.0	0.176
56.5	30.18	1016.8	28.0	0.418
119.7	27.88	1041.1	59.5	0.527
163.9	24.96	1070.5	106.3	0.585
224.8	20.78	1094.5	147.4	0.544
306.6	10.75	1142.5	231.1	0.460
		1170.1	272.9	0.393
		1199.3	331.4	0.293

Solubility of Magnesium Carbonate in Aqueous Solutions of Sodium Sulphate at 24° and at 35.5°. The solutions being in equilibrium with an atmosphere free from CO_2.

(Cameron and Seidell.)

Results at 24°.			Results at 35.5.°		
Wt. of 1 Liter.	Gms. Na_2SO_4 per Liter.	Gms. $MgCO_3$ per Liter.	Wt. of 1 Liter.	Gms. Na_2SO_4 per Liter.	Gms. $MgCO_3$ per Liter.
997.5	0.00	0.216	995.1	0.32	0.131
1021.2	25.12	0.586	1032.9	41.84	0.577
1047.6	54.76	0.828	1067.2	81.84	0.753
1080.9	95.68	1.020	1094.8	116.56	0.904
1133.8	160.8	1.230	1120.4	148.56	0.962
1157.3	191.9	1.280	1151.7	186.7	1.047
1206.0	254.6	1.338	1179.8	224.0	1.088
1242.0	305.1	1.388	1236.5	299.2	1.130

MAGNESIUM CHLORATE $Mg(ClO_3)_2$.

Solubility in Water.

(Meusser — Ber. 35, 1416, '02.)

t°.	Gms. $Mg(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Mg(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Mg(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Mg(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−18	51.64	10.05	$Mg(ClO_3)_2.6H_2O$	42	63.82	16.16	$Mg(ClO_3)_2.4H_2O$
0	53.27	10.73	"	65.5	69.12	20.08	"
18	56.50	12.22	"	39.5	65.37	17.76	$Mg(ClO_3)_2.2H_2O$
29	60.23	14.25	"	61.0	69.46	21.40	"
35	63.65	16.48	"	68	70.69	22.69	"
				93	(73.71)	(26.38)	"

Sp. Gr. of saturated sol. at + 18° = 1.564.

MAGNESIUM CHLORIDE $MgCl_2$.

Solubility in Water.

(van 't Hoff and Meyerhoffer — Z. physik. Chem. 27, 75, '98; Engel; Lowenherz. Results quoted from Landolt and Börnstein — Tabellen, 3d, ed. p. 549, '06.)

t°.	Gms. $MgCl_2$ per 100 Gms Solution.	Gms. $MgCl_2$ per 100 Gms Water.	Solid Phase.	t°.	Gms. $MgCl_2$ per 100 Gms Solution.	Gms. $MgCl_2$ per 100 Gms Water.	Solid Phase.
−10	11.1	12.5	Ice	0	34.5	52.8	$MgCl_2.6H_2O$
−20	16.0	19.0	"	10	34.9	53.5	"
−30	19.4	24.0	"	20	35.3	54.5	"
−33.6	20.6	26.0	Ice + $MgCl_2.12H_2O$	22	35.6	55.2	"
−12	26.7	36.5	$MgCl_2.12H_2O$	25	36.2	56.7	"
−16.4	30.6	44.04 f.pt.	"	40	36.5	57.5	"
−16.8	31.6	46.2	$MgCl_2.12H_2O$ + $MgCl_2.8H_2O$ α	60	37.9	61.0	"
−17.4	32.3	47.6	$MgCl_2.12H_2O$ + $MgCl_2.8H_2O$ β	80	39.8	66.0	"
−19.4	33.3	49.9	$MgCl_2.12H_2O$ + $MgCl_2.6H_2O$	100	42.2	73.0	"
−9.6	33.9	51.3	$MgCl_2.8H_2O$ β + $MgCl_2.6H_2O$	116.7	46.2	85.5	$MgCl_2.6H_2O$ + $MgCl_2.4H_2O$
−3.4	34.4	52.3	$MgCl_2.8H_2O$ α + $MgCl_2.6H_2O$	152.6	49.1	96.4	$MgCl_2.4H_2O$
				about 181.5	55.8	126.0	$MgCl_2.4H_2O$ + $MgCl_2.2H_2O$
				186	56.1	128.0	$MgCl_2.2H_2O$

Solubility of Magnesium Chloride in Aqueous Solutions of Hydrochloric Acid at 0°.

(Engel — Compt. rend. 104, 433, '87.)

Milligram Mols. per 10 cc. Solution. HCl.	Milligram Mols. per 10 cc. Solution. ½$MgCl_2$.	Sp. Gr. of Solutions.	Grams per Liter of Solution. HCl.	Grams per Liter of Solution. $MgCl_2$.
0.0	99.55	1.362	0.0	474.2
4.095	95.5	1.354	14.93	454.8
9.5	90.0	1.344	34.63	428.6
17.0	82.5	1.300	61.97	393.0
20.5	79.0	1.297	74.74	376.2
28.5	71.0	1.281	103.9	338.3
42.0	60.125	...	153.1	286.4
58.75	46.25	...	214.2	220.3
76.0	32.0	...	277.1	152.0
			sat. HCl (Ditte)	6.5

SOLUBILITY OF MIXTURES OF MAGNESIUM CHLORIDE AND OTHER SALTS IN WATER AT 25°.

(Löwenherz — Z. physik. Chem. 13, 479, '94.)

Mixture.	Gram Mols. per 1000 Mols. H_2O.	Gms. per Liter of Solution.
$MgCl_2.6H_2O + MgSO_4.6H_2O$	104 $MgCl_2$ + 14 $MgSO_4$	25.0 Cl + 4.4 SO_4
$MgCl_2.7H_2O + MgSO_4.6H_2O$	73 " + 15 "	19.5 " + 5.3 "
$MgCl_2.6H_2O + MgCl_2.KCl.6H_2O$	106 Cl + 1 K_2 + 105 Mg	26.9 Cl + 0.3 K + 45.7 SO_4

Results for the remaining possible combinations of magnesium sulphate and potassium chloride are also given.

MAGNESIUM CHROMATE $MgCrO_4.7H_2O$.

100 grams H_2O dissolve 72.3 grams $MgCrO_4$ at 18°, or 100 grams solution contain 42.0 grams. Sp. Gr. = 1.422.

(Mylius and Funk — Ber. 30, 1718, '97.)

MAGNESIUM POTASSIUM CHROMATE $MgCrO_4.K_2CrO_4.2H_2O$.

100 grams H_2O dissolve 28.2 grams at 20°, and 34.3 grams at 60°.

(Schweitzer.)

MAGNESIUM PLATINIC CYANIDE $MgPt(CN)_4$.

SOLUBILITY IN WATER.

(Buxhoevden and Tamman — Z. anorg. Ch. 15, 319, '97.)

t°.	Gms. $MgPt(CN)_4$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $MgPt(CN)_4$ per 100 Gms. Solution.	Solid Phase.
−4.12	24.90	$MgPt(CN)_4.6.8\text{–}8.1H_2O$	48.7	40.89	$MgPt(CN)_4.4H_2O$
0.5	26.9	" (Red)	55	41.33	"
5.5	28.65	"	58.1	42.15	"
18.0	32.46	"	69.0	43.49	"
36.6	39.53	"	77.8	44.90	"
45.0	41.33	"	87.4	45.52	"
46.2	42.0	"	90.0	45.65	"
42.2	40.21	$MgPt(CN)_4.4H_2O$	93.0	45.04	"
46.3	39.85	" (Bright Green)	96.4	44.33	$MgPt(CN)_4.2H_2O$
			100.0	44.0	" (White)

MAGNESIUM FLUORIDE MgF_2.

One liter of water dissolves 0.076 gram MgF_2 at 18° by conductivity method.

(Kohlrausch — Z. physik. Ch. 50, 356, '04–'05.

MAGNESIUM HYDROXIDE $Mg(OH)_2$.

One liter of water dissolves 0.008 – 0.009 gm. $Mg(OH)_2$ at 18° by conductivity method.

(Dupre and Brutus — Z. angew. Ch. 16, 55, '03.)

SOLUBILITY OF MAGNESIUM OXIDE IN AQUEOUS SOLUTIONS CONTAINING SODIUM CHLORIDE AND SODIUM HYDROXIDE.

(Maigret — Bull. soc. chim. 33, 631, '05.)

Gms. NaCl per Liter.	Grams MgO per Liter Solution with Added: 0.8 g. NaOH per Liter.	4.0 g. NaOH per Liter.
125	0.07	0.03
140	0.045	...
160	none	none

SOLUBILITY OF MAGNESIUM HYDROXIDE IN AQUEOUS SOLUTIONS OF AMMONIUM CHLORIDE AND OF AMMONIUM NITRATE AT 29°.

(Herz and Muhs — Z. anorg. Ch. 38, 140, '04.)

NOTE. — Pure $Mg(OH)_2$ was prepared and an excess shaken with solutions of ammonium chloride and of ammonium nitrate of different concentrations.

Concentration of NH_4Cl or of NH_4NO_3. (Normal.)		Acid Required for Liberated NH_4OH in 25 cc. (Normal.)	Normality of: $Mg(OH)_2$.	Normality of: NH_4Cl.		Grams per Liter. $Mg(OH)_2$.	Grams per Liter. NH_4Cl.	
.7	(NH_4Cl)	0.09835	0.156	0.388		4.55	20.86	
0.466	"	0.1108	0.108	0.250		3.15	13.39	
0.35	"	0.09835	0.089	0.172		2.60	9.21	
0.233	"	0.1108	0.0638	0.106		1.86	5.67	
0.175	"	0.1108	0.049	0.0771		1.43	4.13	
0.35	(NH_4NO_3)	0.1108	0.0833	0.1834	(NH_4NO_3)	2.43	14.69	(NH_4NO_3)
0.175	"	0.1108	0.0495	0.076	"	1.45	6.09	"

MAGNESIUM IODATE $Mg(IO_3)_2$.

SOLUBILITY IN WATER.

(Mylius and Funk — Ber. 30, 1722, '97; Wiss. Abh. p. t. Reichanstalt 3, 446, '00.)

t°.	Gms. $Mg(IO_3)_2$ per 100 Gms. Solution.	Mols. $Mg(IO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Mg(IO_3)_2$ per 100 Gms. Solution.	Mols. $Mg(IO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
0	3.1	0.15	$Mg(IO_3)_2.10H_2O$	0	6.8	0.34	$Mg(IO_3)_2.4H_2O$
20	10.2	0.55	"	10	6.4	0.30	"
30	17.4	1.01	"	18	7.6	0.40	"
35	21.9	1.35	"	20	7.7	0.40	"
50	67.5	10.0	"	35	8.9	0.47	"
				63	12.6	0.69	"
				100	19.3	1.13	"

Sp. Gr. of solution sat. at 18° = 1.078.

MAGNESIUM IODIDE MgI_2.

SOLUBILITY IN WATER.

(Menschutkin — Chem. Centrb. 77, I, 646, '06; at 18°, Mylius and Funk — Ber. 30, 1718, '97.)

t°.	Gms. MgI_2 per 100 Grams Solution.	Solid Phase.	t°.	Grams MgI_2 per 100 Grams Solution.	Solid Phase.
0	50.0	$MgI_2.8H_2O$	50	61.6	$MgI_2.6H_2O$
10	51.65	"	70	61.85	"
18	53.0 (59.7 M. and F.)	"	90	62.1	"
20	53.4	"	110	62.25	"
25	54.4	"	140	62.5	"
30	55.4	"	160	63.0	"
40	57.8	"	200	64.1	"
45	59.9	"			

Density of saturated solution at 18° = 1.909. (M. and F.)

Solubility of Magnesium Iodide Alcohol Compounds in the Corresponding Alcohols.

(Menschutkin — Chem. Centrb. 77, I, 335, '06.)

Results expressed in molecular per cent.

t°.	$MgI_2.6CH_3OH$ in CH_3OH.	$MgI_2.6C_2H_5OH$ in C_2H_5OH.	t°.	$MgI_2.6CH_3OH$ in CH_3OH.	$MgI_2.6C_2H_5OH$ in C_2H_5OH.
0	6.3	2.3	100	10.5	19.7
10	6.6	3.1	120	11.8	28.2
20	7.0	4.0	140	13.4	53.6
40	7.8	6.2	160	15.7	80.3 (145°)
60	8.6	9.3	180	18.7	100.0 (146.5°)
80	9.5	13.5	200	23.1	...

Solubility of Magnesium Iodide Di Etherate ($MgI_2.2C_4H_{10}O$) in Ethyl Ether.

(Menschutkin — Z. anorg. Ch. 49, 46, '06.)

Synthetic Method used, see page 9.

t°.	Grams per 100 Gms. Solution.	
	MgI_2.	$MgI_2.2C_4H_{10}O$.
5.4	1.45	2.2
11.8	2.43	3.7
15.6	3.46	5.3
18.1	5.4	8.3
20.4	7.55	11.6
22.2	11.28	17.3

Results in the Critical Vicinity.

t°.	Gms. per 100 Gms. Solution.	
	MgI_2.	$MgI_2.2C_4H_{10}O$.
37.3	19.4	29.3
38.5	22.45	34.4
38.5	26.07	39.9
38.5	29.8	45.7
38	32.8	50.3

Two liquid phases appear near the melting point of the magnesium iodide di etherate. The lower may be considered as a solution of ether in di etherate, and the upper as a solution of the lower layer in ether. The critical temperature is 38.5°.

Lower Layer.

t°.	Gms. per 100 Gms. Solution.	
	MgI_2.	$MgI_2.2C_4H_{10}O$.
14.8	35.5	54.4
20.0	35.8	54.8
28.4	35.5	54.4
33	35.7	54.7
35	35.3	54.1

Upper Layer.

t°.	Gms. per 100 Gms. Solution	
	MgI_2.	$MgI_2.2C_4H_{10}O$.
18.6	13.57	20.8
23.2	14.4	22.1
24.4	14.6	22.4
32.4	15.82	24.2

The solubility of double compounds of magnesium iodide and alkyl esters in the corresponding acetates is given by Menschutkin — Chem. Centrb. **77**, I, 647, '06. For the solubility of magnesium iodide hexa acetic acid compound in anhydrous acetic acid solutions, see Chem. Centrb. **77**, II, 1482, '06.

MAGNESIUM NITRATE $Mg(NO_3)_2$.

SOLUBILITY IN WATER.

(Funk — Wiss. Abh. p. t. Reichanstalt 3, 437, '00.)

t°.	Gms. $Mg(NO_3)_2$ per 100 Gms. Solution.	Mols. $Mg(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Mg(NO_3)_2$ per 100 Gms. Solution.	Mols. $Mg(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−23	35.44	6.6	$Mg(NO_3)_2.9H_2O$	40	45.87	10.3	$Mg(NO_3)_2.6H_2O$
−20	36.19	7.0	"	80	53.69	14.6	"
−18	38.03	7.4	"	90	57.81	16.7	"
−18	38.03	7.37	$Mg(NO_3)_2.6H_2O$	89	63.14	20.9	*
− 4.5	39.50	7.92	"	77.5	65.67	23.2	*
0	39.96	8.08	"	67	67.55	25.1	*
+18	42.33	8.9	"				

* Reverse curve.

Sp. Gr. of solution saturated at 18° = 1.384.

MAGNESIUM OXALATE $Mg.C_2O_4.2H_2O$.

One liter of water dissolves 0.3 gram MgC_2O_4 at 18° (conductivity method). (Kohlrausch — Z. physik. Ch. 50, 356, '05.)

MAGNESIUM (Hypo) PHOSPHATE $Mg_2P_2O_6.12H_2O$.

One liter of water dissolves 0.066 gram hypophosphate. (Salzer — Liebig's Ann. 232, 114, '86.)

One liter of water dissolves 5.0 grams magnesium hydrogen hypophosphate $MgH_2P_2O_6.4H_2O$. (Salzer.)

MAGNESIUM SALICYLATE $Mg(C_7H_5O_3)_2.4H_2O$.

One liter of saturated solution contains 8.015 grams of the salt. (Barthe — Bull. soc. chim. [3] 11, 519, '94.)

MAGNESIUM FLUOSILICATE $MgSiF_6.6H_2O$.

One liter of water dissolves 652 grams of the salt at 17.5°. Sp. Gr. of solution = 1.235. (Stolba — Chem. Centrb. 578, '77.)

MAGNESIUM SULPHATE $MgSO_4$.

SOLUBILITY IN WATER.

(Mulder; Tilden — J. Ch. Soc. 45, 409, '84; Etard — Compt. rend. 106, 741, '88.)

Etard's results for the lower temperatures are somewhat low. Mulder's and Tilden's results agree very well.

t°.	Gms. $MgSO_4$ per 100 Gms. Solution.	Gms. $MgSO_4$ per 100 Gms. Water.	Solid Phase.	t°.	Gms. $MgSO_4$ per 100 Gms. Solution.	Gms. $MgSO_4$ per 100 Gms. Water.	Solid Phase.
0	21.2	26.9	$MgSO_4.7H_2O$	50	33.5	50.3	$MgSO_4.6H_2O$
10	24.0	31.5	"	60	35.5	55.0	"
20	26.5	36.2	"	70	37.5	59.6	"
25	28.2	38.5	"	80	39.1	64.2	"
30	29.0	40.9	"	90	40.7	68.9	"
40	31.2	45.6	"	100	42.5	73.8	"
				110	45.5	83.6	"

For temperatures between 123° and 190°, grams $MgSO_4$ per 100 grams solution = 48.5 − 0.4403 t. (Etard).

For densities of aqueous solutions of $MgSO_4$, see Barnes and Scott— J. Physic. Ch. 2, 542, '98.

Solubility of Magnesium Sulphate in Methyl and Ethyl Alcohols.

(de Bruyn — Rec. trav. chim. 11, 112, '92.)

Solvent.	t°.	Per 100 Gms. Solvent.	Solvent.	t°.	Per 100 Gms. Solvent.
Abs. CH_3OH	18	1.18 gms. $MgSO_4$	93% Methyl Alc.	17	9.7 gms. $MgSO_4.7H_2O$
"	17	41.0 " $MgSO_4.7H_2O$	50% " "	3-4	4.1 " "
"	3-4	29.0 " "	Abs. C_2H_5OH	3	1.3 " "

Solubility in Aqueous Ethyl Alcohol.

(Schiff — Liebig's Ann. 118, 365, '61.)

Wt. per cent Alcohol	10	20	40
G. $MgSO_4.7H_2O$ per 100 gms. solvent	64.7	27.1	1.65

Solubility of Magnesium Sulphate in Saturated Sugar Solution at 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 grams saturated aqueous solution contain 46.52 grams sugar + 14.0 grams $MgSO_4$.

100 grams water dissolve 119.6 grams sugar + 36.0 grams $MgSO_4$.

MAGNESIUM POTASSIUM SULPHATE $MgK_2(SO_4)_2.6H_2O$.

Solubility in Water.

(Tobler — Liebig's Ann. 95, 193, '55.)

t°. =	0°	20°	30°	45°	60°	75°
Gms. $MgK_2(SO_4)_2$ per 100 gms. H_2O	14.1	25.0	30.4	40.5	50.2	59.8

MAGNESIUM SULPHITE $MgSO_3.6H_2O$.

100 grams cold water dissolve 1.25 grams sulphite; 100 grams boiling water dissolve 0.83 gram.

(Hager — Chem. Centrb. 135, '75.)

MALONIC ACID $CH_2(COOH)_2$.

Solubility in Water.

(Klobbie — Z. physik. Chem. 24, 622, '97; Miczynski — Monatsh. Ch. 7, 259, '86; Henry — Compt. rend. 99, 1157, '84; Lamouroux — *Ibid.* 128, '998, '99.)

t°.	Grams $CH_2(COOH)_2$ per 100 Gms. Solution.*	Grams $CH_2(COOH)_2$ per 100 cc. Solution (L.).	t°.	Grams $CH_2(COOH)_2$ per 100 Gms. Solution.*	Grams $CH_2(COOH)_2$ per 100 cc. Solution (L.).
0	52.0	61.0	50	71.0	93.0
10	56.5	67.0	60	74.5	100.0
20	60.5	73.0	70	...	106.0
25	62.2	76.3	80	82.0	...
30	64.0	80.0	100	89.0	...
40	68.0	86.5	132 (m. pt.)	100.0	...

* Average curve from results of K., M., and H.

Solubility of Malonic Acid in Ether.

(Klobbie.)

t°.	Gms. $CH_2(COOH)_2$ per 100 Gms. Solution.	t°.	Gms. $CH_2(COOH)_2$ per 100 Gms. Solution.	t°.	Gms. $CH_2(COOH)_2$ per 100 Gms. Solution.
0	6.25	30	10.5	100	46.0
10	7.74	80	33.0	110	56.0
20	9.00	90	39.0	120	70.0
25	9.7			132 (m. pt.)	100.0

100 grams saturated solution of malonic acid in pyridine contain 14.6 grams at 26°.

(Holty — J. Physic. Ch. 9, 764, '05.)

Solubility of Substituted Malonic Acids in Water.

(Lamouroux.)

t°.	Grams per 100 cc. Saturated Aqueous Solution.					
	Malonic Acid.	Methyl Malonic Acid.	Ethyl Malonic Acid.	*n* Propyl Malonic Acid.	*n* Butyl Malonic Acid.	Iso Amyl Malonic Acid.
0	61.1	44.3	52.8	45.6	11.6	38.5
15	70.2	58.5	63.6	60.1	30.4	51.8
25	76.3	67.9	71.2	70.0	43.8	79.3
30	92.6	91.5	90.8	94.4	79.3	83.4

MANGANESE BORATE $MnH_4(BO_3)_2H_2O$.

Solubility in Water and in Aqueous Salt Solutions.

(Hartley and Ramage — J. Ch. Soc. 63, 137, '93.)

t°.	Grams $MnH_4(BO_3)_2$ per Liter in Solutions of:				
	H_2O + trace Na_2SO_4.	Na_2SO_4 (0.2 Gms. per Liter).	Na_2SO_4 (20 Gms. per Liter).	NaCl (20 Gms. per Liter).	$CaCl_2$ (20 Gms. per Liter).
14	0.94	1.7	...	...	...
18	...	...	0.77	1.31	2.91
40	0.50	0.69 (52°)	0.65	...	2.44
60	...	...	0.36	0.60	2.25
80	0.08	...	0.12	0.29	1.35

MANGANESE BROMIDE $MnBr_2.4H_2O$.

Solubility in Water.

(Etard — Ann. chim. phys. [7] 2, 537, '94.)

t°.	Gms. $MnBr_2$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $MnBr_2$ per 100 Gms. Solution.	Solid Phase.
−20	52.3	$MnBr_2.4H_2O$	40	62.8	$MnBr_2.4H_2O$
−10	54.2	"	50	64.5	"
0	56.0	"	60	66.3	"
10	57.6	"	70	68.0	"
20	59.5	"	80	69.2	$MnBr.2H_2O$
25	60.2	"	90	69.3	"
30	61.1	"	100	69.5	"

MANGANESE CHLORIDE $MnCl_2.4H_2O$.

SOLUBILITY IN WATER.

(Etard; Dawson and Williams — Z. physik. Chem. 31, 63, '99.)

t°.	Sp. Gr. of Solutions.	Grams $MnCl_2$ per 100 Grams Water.	Grams $MnCl_2$ per 100 Grams Solution.	Mols. $MnCl_2$ per 100 Mols. H_2O.	Solid Phase.
−20	...	53.8	35.0	...	$MnCl_2.4H_2O\alpha$
−10	...	58.7	37.0	...	"
0	...	63.4	38.8	...	"
+10	...	68.1	40.5	...	"
20	...	73.9	42.5	...	"
25	1.4991	77.18	43.55	11.08	"
30	1.5049	80.71	44.68	11.55	"
40	1.5348	88.59	46.96	12.69	"
50	1.5744	98.15	49.53	14.05	"
57.65	1.6097	105.4	51.33	15.10	"
60	1.6108	108.6	52.06	15.55	$MnCl_2.2H_2O$
70	1.6134	110.6	52.52	15.85	"
80	...	112.7	52.98	16.14	"
90	...	114.1	53.2	...	"
100	...	115.3	53.5	...	"
120	...	118.8	54.3	...	"
140	...	119.5	55.0	...	"

One liter of water dissolves 87.0 grams $MnCl_2$. One liter of sat. HCl dissolves 19.0 grams $MnCl_2$ at 12°. (Ditte — Compt. rend. 92, 242, '81.)

MANGANESE FLUO SILICATE $MnSiF_6.6H_2O$.

100 grams H_2O dissolve 140 grams salt at 17.5°. Sp. Gr. of solution = 1.448. (Stolba — Chem. Centrb. 292, '83.)

MANGANESE NITRATE $Mn(NO_3)_2.6H_2O$.

SOLUBILITY IN WATER.

(Funk — Wiss. Abh. p. t. Reichanstalt 3, 438, '00.)

t°.	Gms. $Mn(NO_3)_2$ per 100 Gms. Sol.	Mols. $Mn(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Mn(NO_3)_2$ per 100 Gms. Sol.	Mols. $Mn(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−29	42.29	7.37	$Mn(NO_3)_2.6H_2O$.	18	57.33	13.5	$Mn(NO_3)_2.6H_2O$.
−26	43.15	7.63	"	25	62.37	16.7	"
−21	44.30	8.0	"	27	65.66	19.2	$Mn(NO_3)_2.3H_2O$.
−16	45.52	8.4	"	29	66.99	20.4	"
− 5	48.88	9.61	"	30	67.38	20.7	"
0	50.49	10.2	"	34	71.31	24.9	"
+11	54.50	12.0	"	35.5	76.82	33.3	"

Sp. Gr. of solution saturated at 18° = 1.624.

MANGANESE (Hypo) PHOSPHITE $Mn(PH_2O_2)_2H_2O$.

100 grams H_2O dissolve 15.15 grams salt at 25°, and 16.6 grams at b. pt.

MANGANESE SULPHATE $MnSO_4.5H_2O$.

Solubility in Water.

(Cottrell — J. Physic. Ch. 4, 651, '01; Richards and Fraprie — Am. Ch. J. 26, 77, '01. The results of Linebarger — Am. Ch. J. 15, 225, '93, were shown to be incorrect by Cottrell, and this conclusion was confirmed by R. and F.)

t°.	Grams $MnSO_4$ per 100 Gms. Water.	Grams $MnSO_4$ per 100 Gms. Solution.	Solid Phase.	t°.	Grams $MnSO_4$ per 100 Gms. Water.	Grams $MnSO_4$ per 100 Gms. Solution.	Solid Phase.
−10	47.96	32.40	$MnSO_4.7H_2O$	16	63.94	38.99	$MnSO_4.4H_2O$
0	53.23	34.73	"	18.5	64.19	39.10	"
5	56.24	35.99	"	25	65.32	39.53	"
9	59.33	37.24	"	30	66.44	39.93	"
12	61.77	38.19	"	39.9	68.81	40.77	"
14.3	63.93	39.00	"	49.9	72.63	42.08	"
5	58.06	36.69	$MnSO_4.5H_2O$	41.4	60.87	37.84	$MnSO_4.H_2O$
9	59.19	37.18	"	50	58.17	36.76	"
15	61.08	37.91	"	60	55.0	35.49	"
25	64.78	39.31	"	70	52.0	34.22	"
30	67.76	40.38	"	80	48.0	32.43	"
35.5	71.61	41.74	"	90	42.5	29.83	"
				100	32.0	24.24	"

Solubility of Manganese Sulphate, Copper Sulphate Mixed Crystals in Water at 18°.

(Stortenbecker — Z. physik. Chem. 34, 112, '00.)

Mols. per 100 Mols. H_2O. Cu.	Mn.	Mol. per cent Cu in: Solution.	Crystals.	Mols. per 100 Mols. H_2O. Cu.	Mn.	Mol. per cent Cu in: Solution.	Crystals.
Solid Phase, $CuMnSO_4.5H_2O$, Triclinic.				Solid Phase, $CuMnSO_4.5H_2O$. Triclinic.			
2.282	0	100	100	[0.73	6.37	10.27	10.5]
...	...	90.5	...	...	...	5.0	4.9
2.23	0.44	83.5	...	0.34	7.03	4.60	...
...	...	74.1	97.3	...	...	2.31	2.15
...	...	57.7	95.1	...	7.375	0.0	0.0
...	...	31.0	81.3	Solid Phase. $CuMnSO_4$. Monoclinic. $7H_2O$.			
1.54	3.76	29.0	...	...	...	20.4	28.2*
...	...	26.1	70.4	[1.06	5.58	15.9	23.5]
1.31	4.70	21.8	...	...	...	12.45	20.8
...	...	21.2	42.6	[0.73	6.37	10.27	16.0]
...	...	20.0	34.4	...	...	4.60	5.8*
[1.06	5.58	15.9	22.9]	...	±8	0.0	0.0
...	...	13.9	15.2*				

* Indicates meta stabil points.

$CuMnSO_4.5H_2O$ = 100–90.8 and 2.11–0 mol. per cent Cu.
$CuMnSO_4.7H_2O$ = 37.8–4.92 mol. per cent Cu.

Solubility of Manganese Sulphate in Glycol.

100 grams saturated solution contain 0.5 gram $MnSO_4$.

(de Coninck — Bul. acad. roy. Belgique, 359, '05.)

Solubility of Manganese Sulphate in Aqueous Ethyl and Propyl Alcohol Solutions at 20°.

(Linebarger — Am. Ch. J. 14, 380, '92; Snell — J. Physic. Ch. 2, 474, '98.)

Conc. of Alcohol in Wt. per cent.	Gms. $MnSO_4$ per 100 Gms. Aq. Ethyl Alc.	Propyl Alc.	Conc. of Alcohol in Wt. per cent.	Gms. $MnSO_4$ per 100 Gms. Aq. Ethyl Alc.	Propyl Alc.
34	9.5	6.0	44	3.3	1.9
36	7.2	4.6	48	2.2	1.4
38	5.8	3.5	52	1.4	1.1
40	4.7	2.8			

MANGANESE POTASSIUM VANADATE $MnKV_5O_{14}.8H_2O$.

100 grams H_2O dissolve 1.7 grams salt at 18°.

(Radan — Liebig's Ann. 251, 129, '89.)

MANNITE $C_6H_8(OH)_6$.

Solubility in Water.

(Campetti — Abs. in Z. physik. Chem. 41, 109, '02.)

t°.	Grams $C_6H_8(OH)_6$ per 100 Grams. Water.	Solution.
10	13.94	12.78
15	16.18	14.63
20	18.98	16.86

100 grams of saturated solution of mannite in Pyridine contain 0.47 gram $C_6H_8(OH)_6$ at 26°. (Holty — J. Physic. Ch. 9, 764, '05.)

MANNITOL $C_6H_8(OH)_6$.

Solubility in Water.

(Findlay — J. Ch. Soc. 81, 1219, '02.)

t°.	Wt. of 1 cc. in Grams.	Gms. Mannitol per 100 Gms. H_2O.	G. M. Mannitol per 100 G.M. H_2O.	t°.	Wt. of 1 cc. in Grams.	Gms. Mannitol per 100 Gms. H_2O.	G. M. Mannitol per 100 G.M. H_2O.
0	1.044	7.59	0.75	50	1.099 (47.7°)	47.01	4.65
10	...	11.63	1.15	60	...	60.01	5.94
15	1.05	14.38	1.42	70	1.148 (68°)	74.50	7.35
20	...	17.71	1.75	80	...	91.5	9.04
25	...	21.39	2.11	90	1.207 (85.9°)	110.8	10.96
30	1.076(31.1°)	25.40	2.51	100	...	133.1	13.17
40	...	35.40	3.50				

Note. — In the original paper the author writes, "grams of substance in 100 grams of solvent (percentage solubility)" and "moles of substance in 100 mols of solvent (percentage molar solubility)," thus implying equivalence of the terms and giving rise to uncertainty as to which is really intended.

MERCURY BROMIDE (ic) $HgBr_2$. Solubility in Water.

t°.	Gms. $HgBr_2$ per 100 Gms. H_2O.	Authority.
9	1.06	(Lassaigne — J. chim. med. 12, 177, '76.)
25	0.61	(Sherrill — Z. physik. Ch. 43, 727, '03.)
100	20–25	(Lassaigne.)

Solubility of Mercuric Bromide Organic Solvents.

In Carbon Bisulphide.

(Arctowski — Z. anorg. Ch. **6**, 267, '94.)

t°.	Gms. $HgBr_2$ per 100 Gms. Solution.	t°.	Gms. $HgBr_2$ per 100 Gms. Solution.
−10	0.049	15	0.140
− 5	0.068	20	0.187
0	0.087	25	0.232
+ 5	0.105	30	0.274
10	0.122		

In Other Solvents at 18°–20°.

(Sulc. — *Ibid.* **25**, 401, '00.)

Solvent.	Formula.	Gms. $HgBr_2$ per 100 Gms. Solvent.
Chloroform	$CHCl_3$	0.126
Bromoform	$CHBr_3$	0.679
Tetra Chlor Methane	CCl_4	0.003
Ethyl Bromide	C_2H_5Br	2.31
Ethylene Di Bromide	$C_2H_4Br_2$	2.34

Mercurous bromide Hg_2Br_2. One liter of saturated aqueous solution contains 0.000039 gram Hg_2Br_2 at 25°. (Sherrill)

MERCURY CHLORIDE (ic) $HgCl_2$.

Solubility in Water.

(Etard — Ann. chim. phys. [7] **2**, 563, '94; at 25°, Foote and Levy — Am. Ch. J. **35**, 238, '06; at room temp. Rohland — Z. anorg. Ch. **18**, 328' '98; see also Poggiale — Ann. chim. phys. [3] **8**, 468, '43.)

t°.	Gms. $HgCl_2$ per 100 Gms. Solution.	t°.	Gms. $HgCl_2$ per 100 Gms. Solution.	t°.	Gms. $HgCl_2$ per 100 Gms. Solution.
0	3.5	30	7.2	100	38.0
10	4.5	40	9.3	120	59.0
20	5.4 (6.88,R.	60	14.0	140	77.0
25	6.9 (F. and L.)	80	23.1	150	78.5

Solubility of Mercuric Chloride in Aqueous Solutions of Sodium Chloride.

(Homeyer and Ritsert — Pharm. Ztg. **33**, 738, '88.)

Per cent Concentration of NaCl Solutions.	Gms. $HgCl_2$ per 100 Gms. NaCl Solution at: 15°	65°	100°
0.5	10	13	44
1.0	14	18	48
5.0	30	36	64
10.0	58	68	110
25.0	120	142	196
26.0 (saturated)	128	152	208

Solubility of Mercuric Chloride in Aqueous Solutions of Hydrochloric Acid at:

0°.

(Engel — Ann. chim. phys. [6] **17**, 362, '89.)

Mg. Mols. per 100 cc. Sol. HCl.	Mg. Mols. per 100 cc. Sol. ½HgCl.	Gms. per 100 cc. Sol. HCl.	Gms. per 100 cc. Sol. $HgCl_2$.	Sp. Gr. of Solutions.
4.3	9.7	1.57	13.11	1.117
9.9	19.8	3.61	18.04	1.238
17.8	35.5	6.49	32.44	1.427
26.9	55.6	9.81	49.04	1.665
32.25	68.9	11.76	58.80	1.811
34.25	72.4	12.48	62.40	1.874
41.5	85 5	15.13	75.65	2.023
48.1	88 6	17.54	87.70	2.066
70.9	95.7	25.84	129.20	2.198

20–25° (?).

(Ditte — *Ibid.* [5] **22**, 551, '81.)

Parts HCl per 100 Parts H_2O.	Parts $HgCl_2$ per 100 Parts Solution.
0.0	6.8
5.6	46.8
10.1	73.7
13.8	87.8
21.1	127.4
31.0	141.9
50.0	148.0
68.0	154.0

Solubility of Mixtures of Sodium and Mercuric Chloride in Water at 25°.

(Foote and Levy — Am. Ch. J. 35, 239, '06.)

Gms. per 100 Gms. Solution.		Gms. per 100 Gms. Undissolved Residue.			Solid Phase.
$NaCl$.	$HgCl_2$.	$NaCl$.	$HgCl_2$.	H_2O.	
26.5	none	100	none	none	$NaCl$
18.66	51.35	...	16.39	...	$NaCl$ and $NaCl.HgCl_2.2H_2O$
18.71	51.32	...	21.98	...	
18.64	51.42	...	65.42	...	
18.87	51.26	...	71.25	...	
14.97	57.74	16.38	74.18	9.44	Double Salt $NaCl.HgCl_2.2H_2O$ Calc. Comp. = 16.01% $NaCl$ 74.14% $HgCl$.9.85% H_2O
14.03	59.69	16.36	74.21	9.43	
13.25	62.16	16.16	74.70	9.14	
13.17	62.59	15.96	74.76	9.28	
12.97	62.50	...	78.20	...	$NaCl.HgCl_2.2H_2O$ and $HgCl_2$
13.14	62.48	...	88.64	...	
13.15	62.55	...	90.83	...	
Two determinations made at 10.3° gave:					
19.46	46.49	67.46	29.19	3.35	
19.48	46.50	22.83	68.85	8.32	

Solubility of Mixtures of Potassium and Mercuric Chlorides in Water at 25°.

(Foote and Levy.)

Composition of Solution. Grams per 100 Grams Solution.		Percentage Composition of Undissolved Residue			Solid Phase.
KCl.	$HgCl_2$.	KCl.	$HgCl_2$.	H_2O.	
26.46	none	100	none	...	KCl
26.24	15.04	...	3.63	...	KCl and $2KCl.HgCl_3.H_2O$
26.43	15.02	...	26.15	...	
26.33	15.02	...	52.01	...	
26.33	14.92	...	61.04	...	
23.74	18.91	34.61	61.66	3.73	$2KCl.HgCl_2.H_2O$ Calc. Composition 34.05% KCl, 61.84% $HgCl_2$, 4.11% H_2O
22.36	21.39	34.77	62.02	3.21	
21.39	23.88	34.05	61.84	3.35	
20.32	27.62	...	65.24	...	$2KCl.HgCl_2.H_2O$ and $KCl.HgCl_2.H_2O$
20.26	27.38	...	73.98	...	
17.85	25.34	21.89	75.10	3.01	$KCl.HgCl_2.H_2O$ Calc. Composition 20.52% KCl, 74.53% $HgCl_2$, 5.47% H_2O
9.26	18.95	21.02	73.36	5.62	
7.80	19.56	20.76	73.06	6.18	
6.84	22.81	20.75	74.54	4.71	
6.66	24.32	20.54	73.99	5.47	
6.52	25.13	...	76.46	...	$KCl.HgCl_2.H_2O$ and $KCl.2HgCl_2.2H_2O$
6.64	25.16	...	80.60	...	
6.27	25.11	12.09	83.20	4.71	$KCl.2HgCl_2.2H_2O$ Calc. Composition 11.43% KCl, 83.05% $HgCl_2$.5.52% H_2O
5.77	24.73	11.87	83.18	4.95	
4.68	24.75	...	84.46	...	$KCl.2HgCl_2.2H_2O$ and $HgCl_2$
4.66	25.17	...	93.68	...	
4.69	24.82	...	98.50	...	
none	6.90	none	100.00	none	$HgCl_2$

Solubility of Mixtures of Rubidium and Mercuric Chlorides in Water at 25°.

(Foote and Levy.)

Composition of Solution. Grams per 100 Grams. Solution.		Percentage Composition of Undissolved Residue.			Solid Phase.
RbCl.	$HgCl_2$.	RbCl.	$HgCl_2$.	H_2O.	
48.57	none	100.0	none	none	RbCl
46.76	9.18	88.04	11.24	0.72	RbCl and $2RbCl.HgCl_2.H_2O$
47.54	9.49	60.33	37.51	2.16	
47.55	9.39	56.59	40.75	2.66	
47.3	9.47	46.73	49.38	3.88	
47.65	10.35	46.50	50.92	2.58	$2RbCl.HgCl_2.H_2O$ Calc. Composition 45.55% RbCl, 51.05% $HgCl_2$. 3.4% H_2O
35.16	19.58	45.98	50.80	3.22	
34.77	19.94	43.07	52.44	4.49	$2RbCl.HgCl_2.H_2O$ and $3RbCl.2HgCl_2.2H_2O$
34.76	20.10	41.10	55.36	3.54	
30.27	20.17	39.07	57.34	3.59	$3RbCl.2HgCl_2.2H_2O$ Calc. Composition 38.55% RbCl, 57.62% $HgCl_2$. 3.82% H_2O
29.20	20.55	39.10	57.47	3.43	
27.38	20.63	38.67	57.40	3.93	$3RbCl.2HgCl_2.2H_2O$ and $RbCl.HgCl_2.H_2O$
26.83	20.87	38.48	57.36	4.16	
27.09	20.97	31.40	64.35	4.25	
26.15	20.58	30.34	65.48	4.18	
23.81	18.71	30.87	65.10	4.03	$RbCl.HgCl_2.H_2O$ Calc. Composition 29.49% RbCl, 66.11% $HgCl_2$, 4.40% H_2O
18.10	14.25	29.87	65.28	4.85	
10.87	10.42	29.33	66.15	4.52	
10.68	10.56	28.59	67.99	3.42	$RbCl.HgCl_2.H_2O$ and $3RbCl.4HgCl_2.H_2O$
10.06	10.05	26.22	72.20	1.58	
10.06	9.86	25.28	73.38	0.84	$3RbCl.4HgCl_2.H_2O$ Calc. Composition 24.76% RbCl, 74.01% $HgCl_2$, 1.23% H_2O
8.48	8.71	25.30	73.15	1.55	
8.46	8.80	25.44	73.67	0.89	
5.68	8.70	25.09	73.46	1.45	
5.10	8.33	24.92	73.93	1.15	
3.43	8.25	22.79	75.72	1.49	$3RbCl.4HgCl_2.H_2O$ and $RbCl.5HgCl_2$
3.38	8.00	12.68	86.74	0.58	
2.98	7.71	8.40	91.24	...	$RbCl.5HgCl_2$ Calc. Composition 8.20% RbCl, 91.8% $HgCl_2$
1.89	7.64	8.38	91.78	...	
1.50	7.55	8.30	91.81	...	
1.10	7.21	8.07	91.58	...	
0.79	7.16	6.91	93.15	...	$RbCl.5HgCl_2$ and $HgCl_2$
0.84	7.42	2.27	97.09	...	
none	6.90	none	100.0	...	$HgCl_2$

Solubility of Mercuric Chloride in Methyl, Ethyl Propyl, *n* Butyl, Iso Butyl and Allyl Alcohols.

(Etard — Ann. chim. phys. [7] 2, 563, '94.)

Note. — For the solubility in Me, Et, and propyl alcohols at room temperature, see Rohland — Z. anorg. Ch. **18**, 328, '98; at 8.5°, 20° and 38.2°, see Timofejew — Compt. rend. **112**, 1224, '91; in Me and Et alcohols at 25°, see de Bruyn — Z. physik. Ch. **10**, 783, '92. The determinations of these investigators agree well with those of Etard, which are given below.

t °.	Grams $HgCl_2$ per 100 Grams Saturated Solution in:					
	CH_3OH.	C_2H_5OH.	C_3H_7OH.	$CH_3(CH_2)_3OH$.	$(CH_3)_2CHCH_2OH$.	$CH_2.CH.CH_2OH$.
−30	...	14.5	15.0	...	...	...
−20	...	20.1	15.7	13.5	...	21.0
−10	15.2	26.5	16.5	13.7	...	25.5
0	20.1	29.8	17.4	14.0	5.2	30.0
+10	26.3	30.6	18.0	14.3	6.0	37.5
20	34.0	32.0	18.8	14.6	6.8	46.5
25	40.0	32.5	19.5	15.5	7.2	...
30	44.4	33.7	20.0	16.5	7.5	...
40	58.6	35.6	23.0	19.6	9.7	...
60	62.5	41.2	29.8	26.5	17.0	...
80	66.0	47.5	36.8	33.0	24.9	...
100	70.1	54.3	43.8	...	31.7	...
120	73.5	61.5	50.6	...	39.2	...
150	78.5	...	...	...	...	...

Solubility of Mercuric Chloride in Acetic Acid.

(Etard.)

t °.	Gms. $HgCl_2$ per 100 Gms. Solution.	t °.	Gms. $HgCl_2$ per 100 Gms. Solution.	t °.	Gms. $HgCl_2$ per 100 Gms. Solution.
20	2.5	70	8.5	110	13.6
30	3.5	80	9.7	120	16.5
40	4.7	90	11.0	130	20.7
50	6.0	100	12.4	140	25.2
60	7.2			160	34.8

Solubility of Mercuric Chloride and Sodium Chloride in Ethyl Acetate at 40°.

(Linebarger — Am. Ch. J. 16, 214, '94.)

Mols. per 100 Mols. Acetate.		Gms. per 100 Gms. Acetate.		Gms. per 100 Gms. Solution.		Solid Phase.
NaCl.	$HgCl_2$.	NaCl.	$HgCl_2$.	NaCl.	$HgCl_2$.	
0.8	12.9	0.53	39.7	0.53	28.4	$HgCl_2$
2.3	12.4	1.53	38.15	1.51	27.61	"
4.3	16.4	2.85	50.44	2.78	33.54	"
9.1	22.85	6.05	86.14	5.60	46.28	"
18.5	34.9	12.29	107.4	10.95	51.76	"
20.0	40.0	13.29	123.0	11.73	55.18	$HgCl_2$ + NaCl

The double salt $(HgCl_2)_2.NaCl$ is formed under proper conditions.

SOLUBILITY OF MERCURIC CHLORIDE IN ETHYL ACETATE AND IN ACETONE.

(Etard; von Laszczynski — Ber. 27, 2285, '94; Krug and McElroy — J. Anal. Ch. 6, 186, '92; Linebarger — Am. Ch. J. 16, 214, 94; Aten — Z. physik. Ch. 54, 121, '05.)

NOTE. — The results obtained by the above named investigators were calculated to a common basis and plotted on cross-section paper. The variations which were noted could not be satisfactorily harmonized, and therefore all the results are included in the following table.

SOLUBILITY.

t°.	In Ethyl Acetate. Grams $HgCl_2$ per 100 Grams Solution.				In Acetone. Gms. $HgCl_2$ per 100 Gms. Solution.			
	Laszczynski.	Aten.	Linebarger.	Etard.	K and McE.	Laszczynski.	Aten.	Etard.
−10	...	23.0	...	40	...	...	44.0 *	57.0
0	22.0	23.2	32.0	40	...	49.7	43.0 *	61.7
+10	22.2	23.5	32.5	40	...	52.0	51.0 *–58.9 †	61.7
20	22.5	23.4	32.7	40	...	54	58.5 †	61.7
25	22.7	23.5	33.0	40	37.4	55.2	58.2 †	61.7
30	23.0	...	33.2	40	...	...	...	61.7
40	23.5	...	33.5	40	...	...	...	61.7
50	24.0	...	33.5	41	...	...	...	61.7
60	24.7	...	...	42.5	...	...	...	61.7
80	26.0	...	...	45.2	...	...	...	61.7
100	...	...	...	48.0	...	...	...	...
120	...	...	...	50.8	...	...	...	...
150	...	...	...	55.0	...	...	...	...

(*) Solid phase $HgCl_2(CH_3)_2CO$. (†) Solid Phase $HgCl_2$.

100 grams absolute acetone dissolve 143 grams $HgCl_2$ at 18°.

(Naumann — Ber. 37, 4332, '04.)

SOLUBILITY OF MERCURIC CHLORIDE IN SEVERAL SOLVENTS.

(Arctowski — Z. anorg. Ch. 6, 267, '94; von Laszcynski; Sulc. — Z. anorg. Ch. 25, 401, '00.)

In Carbon Bisulphide (A.).

t°.	Gms. $HgCl_2$ per 100 Gms. Solution.
−10	0.010
0	0.018
10	0.026
15	0.032
20	0.042
25	0.053
30	0.063

In Benzene (von L.).

t°.	Gms. $HgCl_2$ per 100 Gms. Solution.
15	0.537
41	0.616
55	0.843
84	1.769

In Several Solvents at 18–20° (S.).

Solvent.	Gms. $HgCl_2$ per 100 Gms. Solvent.
$CHBr_3$	0.486
$CHCl_3$	0.106
CCl_4	0.002
C_2H_5Br	2.010
$C_2H_4Br_2$	1.530

SOLUBILITY OF MERCURIC CHLORIDE IN ABSOLUTE ETHYL ETHER.

(Etard; Laszczynski; Köhler — Z. anal. Ch. 18, 242, '79.)

t°.	Gms. $HgCl_2$ per 100 Gms. Solution.	t°.	Gms. $HgCl_2$ per 100 Gms. Solution.	t°.	Gms. $HgCl_2$ per 100 Gms. Solution.
−20	6.0	60	6.0	90	7.5
0	6.0	70	6.4	100	8.0
20	6.0	80	7.0	110	8.5

SOLUBILITY OF MERCURIC CHLORIDE AND OF DOUBLE MERCURIC AND TETRA METHYL AMINE CHLORIDE $(CH_3)_4NCl.6HgCl_2$ IN AQ. ETHER AT 17°.

(Strömholm — J. pr. Ch. [2] 66, 443, '02; Z. physik. Chem. 44, 64, '03.)

Molecular Concentration per Liter.			Grams per Liter of Solution.		
H_2O.	$HgCl_2$ (*).	$HgCl_2$ (†).	H_2O.	$HgCl_2$ (*).	$HgCl_2$ (†).
0.0	0.1515	0.0342	0	41.16	9.26
0.0656	0.1795	0.0428	1.18	48.64	11.60
0.1311	0.2069	0.0516	2.36	56.08	14.00
0.1956	0.2339	0.0603	3.52	63.38	16.34
0.2611	0.2489	0.0690	4.70	70.16	18.70
0.3267	0.2849	0.0779	5.88	77.20	21.10
0.3922	0.3100	0.0866	7.06	84.02	23.48

(*) Results in this column are for solutions in contact with the Solid Phase $HgCl_2$. (†) Results in this column are for solutions in contact with the Solid Phase $(CH_3)_4NCl.6HgCl_2$.

SOLUBILITY OF MERCURIC CHLORIDE AND OF DOUBLE MERCURIC AND TETRA METHYL AMINE CHLORIDE IN ALCOHOL–ETHER SOLUTIONS AT 17°.

(Strömholm.)

Grams C_2H_5OH per Liter.	Grams $HgCl_2$ (*) per Liter.	Grams $HgCl_2$ (†) per Liter.
0.0	41.16	9.26
4.58	50.00	11.87
9.16	58.76	14.38
13.74	66.96	16.90

SOLUBILITY OF DOUBLE MERCURIC CHLORIDES IN AQUEOUS AND PURE ETHER AT 16.6°.

(Strömholm.)

Mol. Conc. of $HgCl_2$ per Liter of:				Gms. $HgCl_2$ per Liter of:				Solid Phase.
Pure Ether.	Aq. Ether (1).	Aq. Ether (2).	Aq. Ether (3).	Pure Ether.	Aq. Ether (4).	Aq. Ether (5).	Aq. Ether (6).	
0.1515	0.2387	0.2647	0.3196	41.04	64.69	71.71	86.58	$HgCl_2$
0.0673	0.0673	0.1293	0.1617	18.23	18.23	35.05	43.79	$(CH_3.CH_3C_2H_4)_2SCl.6HgCl_2$
0.0404	0.0720	0.0835	0.1034	10.95	19.51	22.61	28.01	$(CH_3.C_2H_5CH_3C_2H_4)_2SCl.6HgCl_2$
0.0342	...	0.0706	...	9.26	...	19.10	...	$(CH_3)_4NCl.6HgCl_2$
0.0264	...	0.0568	...	7.14	...	15.39	...	$(C_2H_5)_3SCl.6HgCl_2$
0.0209	0.0400	0.0460	0.0594	5.66	10.83	12.48	16.10	$(CH_3.C_2H_5)_2SCl.6HgCl_2$
0.0063	...	0.0144	...	1.70	...	3.90	...	$(CH_3)_2.H_2NCl.2HgCl_2$

(1) containing 0.21055 mol. H_2O per liter. (2) 0.2756 mol. H_2O per liter. (3) 0.421 mol. H_2O per liter (4) containing 3.79 gms. H_2O per liter. (5) 4.97 gms. H_2O per liter. (6) 7.59 gms. H_2O per liter.

Distribution of Mercuric Chloride between Water and Toluene at 24°.

(Brown — J. Physic. Ch. 2, 50, '98.)

Gms. $HgCl_2$ per 100 cc.		Gms. $HgCl_2$ per 100 cc.	
H_2O Layer.	$C_6H_5CH_3$ Layer.	H_2O Layer.	$C_6H_5CH_3$ Layer.
0.442	0.0270	1.816	0.130
0.732	0.0488	3.766	0.292
0.780	0.0542	3.754	0.298
1.192	0.0812	6.688*	0.528*

* This solution saturated.

MERCUROUS CHLORIDE HgCl.

One liter water dissolves 0.002 gram HgCl at 18°, by conductivity method.

(Kohlrausch — Z. physik. Ch. 50, 356, '04–'05.)

Solubility of Mercurous Chloride (Calomel) in Aqueous Solutions of Sodium Chloride, Barium Chloride, Calcium Chloride and of Hydrochloric Acid at 25°.

(Richards and Archibald — Proc. Am. Acad. 37, 345, '01–'02.)

Solid phase in each case. Calomel + about 0.1 gram of mercury.

In Aqueous NaCl.

Sp. Gr. of Solutions.	Grams per Liter. NaCl.	Grams per Liter. $HgCl_2$.
...	5.85	0.0041
1.040	58.50	0.041
1.078	119.00	0.129
1.093	148.25	0.194
1.142	222.3	0.380
1.188	292.5	0.643

In Aqueous $BaCl_2$.

Sp. Gr. of Solutions.	Grams per Liter. $BaCl_2$.	Grams per Liter. $HgCl_2$.
1.088	104.15	0.044
1.134	156.22	0.088
1.174	208.30	0.107
1.263	312.45	0.231

In Aqueous $CaCl_2$

Sp. Gr. of Solutions.	Grams per Liter. $CaCl_2$.	Grams per Liter. $HgCl_2$.
...	39.96	0.022
...	55.5	0.033
1.064	111.0	0.081
1.105	138.75	0.118
1.151	195.36	0.231
1.205	257.52	0.322
1.243	324.67	0.430
1.315	432.9	0.518
1.358	499.5	0.510

In Aqueous HCl.

Sp. Gr. of Solutions.	Grams per Liter. HCl.	Grams per Liter. $HgCl_2$.
...	31.69	0.034
...	36.46	0.048
1.042	95.43	0.207
1.069	158.4	0.399
1.091	209.2	0.548
1.114	267.3	0.654
1.119	278.7	0.675
1.132	317.3	0.670
1.153	364.6	0.673

100 grams bromoform, $CHBr_3$, dissolve 0.055 gram HgCl at 18°–20°.

(Sulc. — Z. anorg. Ch. 25, 401, '00.)

MERCURIC CYANIDE $Hg(CN)_2$.

SOLUBILITY IN SEVERAL SOLVENTS.

Solvent.	t°.	Gms. $Hg(CN)_2$ per 100 Gms. Solvent.	Observer.
Water	−0.45	about 11.0	(Guthrie — Phil. Mag. [5] 6, 40, '78.)
"	15.2	8.0	(Wittstein.)
"	101.1	53.85	(Griffiths.)
Abs. Ethyl Alcohol	19.5	10.1	(de Bruyn — Z. physik. Ch. 10, 784, '92.)
Abs. Methyl Alcohol	19.5	44.2	" "
Glycerine	15.5	27.0	

SOLUBILITIES OF MERCURIC CYANIDE DOUBLE SALTS IN WATER AND IN ALCOHOL.

Double Salt.	t°.	Gms. per 100 Grams. Water.	Gms. per 100 Grams. Alcohol.		Observer.
$Hg(CN)_2.2KCN$	cold	22.7	...		
$Hg(CN)_2.2TlCN$	1°	12.6	...		(Fromuller — Ber. 11, 92, '78.)
$Hg(CN)_2.2TlCN$	10°	9.7	...		" "
$2Hg(CN)_2.CaBr_2.5H_2O$	cold	100.0	50.0		(Custer.)
$2Hg(CN)_2.CaBr_2.5H_2O$	boiling	400.0	100.0		"
$Hg(CN)_2.KCl.H_2O$	18°	14.81	...		(Brett.)
$Hg(CN)_2.KBr.2H_2O$	18°	7.49	...		"
$Hg(CN)_2.KBr.2H_2O$	boiling	100.0+	...		"
$Hg(CN)_2.BaI_2.4H_2O$	cold	6.42	4.42		(Custer.)
$Hg(CN)_2.BaI_2.4H_2O$	boiling	250.0	62.5	(90% Alc.)	"
$Hg(CN)_2.KI$	cold	6.2	1.04	(34° B Alc.)	(Caillot.)
$Hg(CN)_2.NaI.2H_2O$	18°	22.2	15.4	(90% Alc.)	(Custer.)
$Hg(CN)_2.SrI_2.6H_2O$	18°	14.3	25.0	(90% Alc.)	"

SOLUBILITY OF MERCURIC CYANIDE IN ORGANIC SOLVENTS AT 18°–20°.

(Sulc — Z. anorg. Ch. 25, 401, '00.)

Solvent.	Formula.	G. $Hg(CN)_2$ per 100 Gms. Solvent.
Bromoform	$CHBr_3$	0.005
Carbon Tetra Chloride	CCl_4	0.001
Ethyl Bromide	C_2H_5Br	0.013
Ethylene Di Bromide	$C_2H_4Br_2$	0.001

MERCURY FULMINATE $C_2HgN_2O_2$.

One liter of water dissolves 1.738 – 1.784 grams $C_2HgN_2O_2$ at 12°.

(Holleman — Rec. trav. chim. 15, 159, '96.)

MERCURIC IODIDE HgI_2.

SOLUBILITY IN WATER.

t°.	Grams HgI_2 per Liter.	Observer.
18	0.0004 (conductivity method)	(Kohlrausch — Z. physik. Ch. 50, 356, '04–'05.)
17.5	0.040	(Bourgoin — Bull. soc. chim. [2] 42, '84.)
22	0.054	(Rohland — Z. anorg. Ch. 18, 328, '98.)

Solubility of Mercuric Iodide in Alcohols.

Alcohol.	Formula.	t°.	Sp. Gr. of Solution.	G. HgI_2 per 100 Gms. Alcohol.	Observer.
Methyl	CH_3OH	15–20	0.799	3.24	(Rohland.)
"	"	19.5	...	3.16	(de Bruyn.)
"	"	66 (b. pt.)	...	6.512	(Sulc.)
Ethyl	C_2H_5OH	15–20	0.810	1.42	(Rohland.)
"	"	18	...	1.48	(Bourgoin.)
"	"	19.5	...	2.09	(de Bruyn.)
"	"	25	0.803	2.19	(Herz and Knoch.)
"	"	78 (b. pt.)	...	4.325	(Sulc.)
Propyl	C_3H_7OH	15–20	0.816	0.826	(Rohland.)
Amyl	$C_5H_{11}OH$	13	...	0.66	(Laszcynski.)
"	"	71	...	3.66	"
"	"	100	...	5.30	"
"	"	133.5	...	9.57	"
Iso Propyl	$(CH_3)_2CH.OH$	81 (b. pt.)	...	2.266	(Sulc.)
Iso Butyl	$(CH_3)_2CHCH_2OH$	105–107 (b. pt.)	...	2.433	"

Solubility of Mercuric Iodide in Aqueous Ethyl Alcohol:

At 18°.
(Bourgoin.)

Solvent.	Gms. HgI_2 per Liter.
Abs. Alcohol	11.86
H_2O+80% 90° Alc.	2.857
H_2O+10% 90° Alc.	0.086

At 25°.
(Herz and Knoch — Z. anorg. Ch. **45**, 266, '05.)

Wt. % Alcohol in Solvent.	HgI_2 per 100 cc. Solution. Millimols.	Grams.	Sp. Gr. of Solutions 25°/4°
100	3.86	1.754	0.8033
95.82	2.56	1.162	0.8095
92.44	1.92	0.873	0.8154
86.74	1.38	0.623	0.8300
78.75	0.935	0.425	0.8465
67.63	0.45	0.204	0.8721

Solubility of Mercuric Iodide in Acetone in Ethyl Acetate and in Benzene.

(Sulc; Krug and McElroy — J. Anal. Ch. **6**, 186, '92; Laszcynski — Ber. **27**, 2285, '94.)

In Acetone.

t°.	Gms. HgI_2 per 100 Gms. $(CH_3)_2CO$.
− 1	2.83
18	3.36
25	2.09 (K. and McE.)
40	4.73
58	6.07
56 (b.pt.)	3.249 (Sulc.)

In Ethyl Acetate.

t°.	Gms. HgI_2 per 100 Gms. $CH_3COOC_2H_5$.
−20	1.49
+17.5	1.56
21	1.64
40	2.53
55	3.19
76	4.31
74–78 (b.pt.)	4.20 (Sulc.)

In Benzene.

t°.	Gms. HgI_2 per 100 Gms. C_6H_6
15	0.22
60	0.88
65	0.95
84	1.24
80 (b.pt.)	0.825 (Sulc.)

Solubility of Mercuric Iodide in Carbon Bisulphide.

(Linebarger — Am. Ch. J. 16, 214, '94; Arctowski — Z. anorg. Ch. 6, 267, '94; 11, 274, '95.)

t°.	Gms. HgI_2 per 100 Gms. Solution.	t°.	Gms. HgI_2 per 100 Gms. Solution.	t°.	Gms. HgI_2 per 100 Gms. Solution.
−116	0.017	− 5	0.141	15	0.271
− 93	0.023	0	0.173	20	0.320
− 86.5	0.024	+ 5	0.207	25	0.382
− 10	0.107	10	0.239	30	0.445

Solubility of Mercuric Iodide in Several Organic Solvents.

(Sulc — Z. anorg. Ch. 25, 401, '00.)

Solvent.	Formula.	t°.	Gms. HgI_2 per 100 Gms. Solvent.
Chloroform	$CHCl_3$	18–20	0.040
Chloroform	$CHCl_3$	61 (b. pt.)	0.163
Bromoform	$CHBr_3$	18–20	0.486
Tetra Chlor Methane	CCl_4	18–20	0.006
Tetra Chlor Methane	CCl_4	75 (b. pt.)	0.094
Ethyl Bromide	C_2H_5Br	18–20	0.643
Ethyl Bromide	C_2H_5Br	38° (b. pt.)	0.773
Ethylene Di Bromide	$C_2H_4Br_2$	18–20	0.748
Ethyl Iodide	C_2H_5I	18–20	2.041
Ethylene Di Chloride	$C_2H_4Cl_2$	85.5° (b. pt.)	1.200
Iso Butyl Chloride	$(CH_3)_2.CHCH_2Cl$	69 "	0.328
Methyl Formate	$HCOOCH_3$	36–38 "	1.166
Ethyl Formate	$HCOOC_2H_5$	52–55 "	2.150
Methyl Acetate	CH_3COOCH_3	56–59 "	2.500
Acetal	$CH_3CH(OC_2H_5)_2$	105 "	2.000
Epi Chlor Hydrine	$CH_2.O.CH.CH_2Cl$	117 "	6.113
Hexane	C_6H_{14}	67 ...	0.072

Solubility of Mercuric Iodide in Ether and in Methylene Iodide.

In Ether.

(Sulc; Laszczynski.)

t°.	Gms. HgI_2 per 100 Gms. $(C_2H_5)_2O$.
0	0.62
36	0.97
35 (b. pt.)	0.47 (Sulc)

In Methylene Iodide.

(Retgers — Z. anorg. Ch. 3, 253, '93.)

t°.	Gms. HgI_2 per 100 Gms. CH_2I_2.
15	2.5
100	16.6
180	58.0

Solubility of Mercuric Iodide in Fatty Bodies.

(Mehu — J. pharm. chim. [5] 12, 249, '85.)

Solvent.	t°.	Gms. HgI_2 per 100 Gms. Solvent.	Solvent.	t°.	Gms. HgI_2 per 100 Gms. Solvent.
Bitter Almond Oil	25	0.5	Vaseline	25	0.025
Bitter Almond Oil	100	1.3	Vaseline	100	0.20
Castor Oil	25	4.0	Poppy Oil	25	1.0
Castor Oil	100	20.0	Olive Oil	25	0.4
Nut Oil	100	1.3	Carbolic Acid	100	2.0

100 grams oil of bitter almonds dissolve 5.0 grams $HgI_2.KI$ at 25°. (Mehu.)

MERCURY OXIDE HgO.

Solubility in Water.

(Schick — Z. physik. Ch. 42, 163, '01–'02.)

t°.	Grams per 1000 cc. Solution.	
25	0.0518 yellow HgO	0.0513 red HgO
100	0.410 yellow HgO	0.379 red HgO

Equilibrium in the System, Mercury Oxide, Sulphur Trioxide, Water.

(Hoitsema — Z. physik. Chem. 17, 651, '95.)

Results expressed in molecules per sum of 100 molecules of the three components of the system.

Results at 25°.

Liquid Phase. H_2O.	SO_3.	HgO.	Solid Phase.
98.5	1.24	0.33	$3HgO.SO_3$
96.6	2.49	0.92	"
94.4	3.93	1.65	"
93.9	4.24	1.85	$3HgO.SO_3$ and $3HgO.2SO_3.2H_2O$
94.4	4.52	2.12	
93.4	4.65	1.94	$3HgO.2SO_3.2H_2O$
92.9*	4.81	2.29	$3HgO.SO_3$
92.9	5.11	1.98	$3HgO.2SO_3.2H_2O$
92.3*	5.20	2.54	$3HgO.SO_3$
92.3	5.58	2.09	$3HgO.2SO_3.2H_2O$
92.1	5.81	2.08	"
91.9	5.97	2.90	$3HgO.SO_3$
91.9	6.15	2.05	$3HgO.2SO_3.2H_2O$
91.3	6.54	2.13	"
91.2	6.77	2.02	$HgO.SO_3.H_2O$
91.3	6.90	1.80	"
91.3	7.67	1.01	"
91.3	7.84	0.89	$HgO.SO_3.H_2O$ and $HgO.SO_3$
91.0	8.36	0.69	
90.5	8.95	0.53	$HgO.SO_3$
89.2	10.6	0.22	"
75.8	24.2	trace	"
39.2	60.7	trace	"

Results at 50°.

Liquid Phase. H_2O.	SO_3.	HgO.	Solid Phase.
98.9	0.96	0.17	$3HgO.SO_3$
96.0	3.05	0.93	"
93.2	4.92	1.90	"
92.8	5.10	2.09	"
92.8	5.16	2.06	"
92.5	5.34	2.12	"
92.2	5.57	2.20	$3HgO.SO_3$ and $3HgO.2SO_3.2H_2O$
92.1	5.75	2.11	$3HgO.2SO_3.2H_2O$
92.0	5.80	2.16	"
91.2*	6.27	2.56	$3HgO.SO_3$ and $HgO.SO_3$
91.5	6.34	2.19	$3HgO.2SO_3.2H_2O$ and $HgO.SO_3$
91.3*	6.37	2.30	$HgO.SO_3$
91.6	6.69	1.75	"
91.1	8.32	0.57	"
89.6	10.2	0.23	"
31.6	68.4	0.03	"

* Indicates unstable equilibrium.

MERCUROUS SULPHATE Hg_2SO_4.

Solubility in Water, in Sulphuric Acid and in Potassium Sulphate at 25°.

(Drucker — Z. anorg. Ch. 28, 362, '01; Wright and Thomson — Phil. Mag. [5] 17, 288; 19, 1, '84–'85; Wilsmore — Z. physik. Ch. 35, 305, '00.)

Solvent.	Hg_2SO_4 per Liter. Gram Mols.	Grams.
Water	11.71×10^{-4}	0.058 (0.047 W. and T., 0.039 W.)
Aq. H_2SO_4 (1.96 gms. per liter)	8.31 "	0.041
Aq. H_2SO_4 (4.90 gms. per liter)	8.78 "	0.044
Aq. H_2SO_4 (9.80 gms. per liter)	8.04 "	0.040
Aq. K_2SO_4 (34.87 gms. per liter)	9.05 "	0.045

METHANE CH_4.

Solubility in Water.

(Winkler — Ber. 34, 1418, '01.)

t°.	β.	β'.	q.	t°.	β.	β'.	q.
0	0.05563	0.05530	0.00396	40	0.02369	0.02198	0.00159
5	0.04805	0.04764	0.00341	50	0.02134	0.01876	0.00136
10	0.04177	0.04127	0.00296	60	0.01954	0.01571	0.00115
15	0.03690	0.03628	0.00260	70	0.01825	0.01265	0.00093
20	0.03308	0.03233	0.00232	80	0.01770	0.00944	0.00070
25	0.03006	0.02913	0.00209	90	0.01735	0.00535	0.00040
30	0.02762	0.02648	0.00191	100	0.01700	0.00000	0.00000

For the values of β, β' and q see Ethane, page 133.

Solubility of Methane in Methyl Alcohol and in Acetone.

(Levi — Gazz. chim. ital. II, 513, '01; abs. in Z. physik. Ch. 41, 110, '02.)

In methyl alcohol l (Ostwald expression, see page 105) $= 0.5644 - 0.0046\,t - 0.00004\,t^2$.

In acetone l (Ostwald expression) $= 0.5906 - 0.00613t - 0.0000146t^2$.

From which is calculated the following values:

In Methyl Alcohol.				In Acetone.			
t°.	l.	t°.	l.	t°.	l.	t°.	l.
0	0.5644	40	0.3164	0	0.5906	40	0.3220
10	0.5144	50	0.2344	10	0.5278	50	0.2476
20	0.4564	60	0.1444	20	0.4622	60	0.1702
30	0.3904	70	0.0464	30	0.3936	70	0.0900

Tetra Chlor METHANE CCl_4 (Carbon Tetra Chloride).

Solubility in Water.

(Rex — Z. physik. Chem. 55, 355, '06.)

t°.	0°.	10°.	20°.	30°.
Grams CCl_4 per 100 gms. H_2O	1.097	0.083	0.080	0.085

Tri Phenyl METHANE $CH(C_6H_5)_3$.

Solubility in Anilin.

(Hartley and Thomas — J. Ch. Soc. 89, 1026, '06.)

By synthetic method, see page 9.

t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.	Mol. per cent $CH(C_6H_5)_3$.	Solid Phase.	t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.	Mol. per cent $CH(C_6H_5)_3$.	Solid Phase.
23.0	5.4	1.85	$CH(C_6H_5)_3.C_6H_5NH_2$ rhombs	71.3	67.9	44.6	$CH(C_6H_5)_3.C_6H_5NH_2$ rhombs
35.3	9.5	3.8	"	71.6	71.7	49.1	"
43.0	13.5	5.6	"	71.2	76.3	55.1	"
52.1	21.9	9.7	"	70.6	78.3	57.9	"
61.4	36.5	17.8	"	71.6	82.1	63.5	$CH(C_6H_5)_3$ monoclinic
66.0	47.2	25.4	"	74.3	84.9	68.2	"
68.7	54.8	31.6	"	82.1	91.7	80.9	"
70.1	64.6	40.9	"	87.3	96.1	90.2	"

Solubility of Tri Phenyl Methane in Benzene.

(Linebarger — Am. Ch. J. 15, 45, '93.) (Hartley and Thomas.)

t°.	Gms. $CH(C_6H_5)_3$ per 100 Grams C_6H_6.	Solid Phase.	t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.	Mol. per cent $CH(C_6H_5)_3$.	Solid Phase.
3.9	3.90	$C_6H_6 + CH(C_6H_5)_3.C_6H_6$	33	12.6	4.4	$CH(C_6H_5)_3.C_6H_6$ rhombs
4.0	4.06	$CH(C_6H_5)_3.C_6H_6$	49.4	24.0	8.8	"
12.5	5.18	"	65.6	38.9	17.2	"
16.1	6.83	"	73.8	57.5	30.2	"
19.4	7.24	"	77.1	67.4	39.7	"
23.1	8.95	"	77.9	76.3	50.7	"
37.5	10.48	$(C_6H_5)_3CH.C_6H_6 + CH(C_6H_5)_3$	77.5	80.2	56.4	"
42.0	19.61	$CH(C_6H_5)_3$	76.2	84.1	62.8	"
44.6	22.64	"	74.6	87.5	69.1	$CH(C_6H_5)_3$ monoclinic
50.1	30.64	"	76.0	89.0	72.2	"
55.5	40.51	"	78.8	90.5	75.3	"
71.0	140.00	"	82.3	93.1	81.3	"
76.2	319.67	"	86.6	95.7	87.8	"

NOTE.—Hartley and Thomas call attention to the inaccuracy of Linebarger's results and the correctness of Kuriloff's determinations (Z. physik. Chem. 22, 547, '97).

Solubility of Tri Phenyl Methane in Carbon Bisulphide.

(Etard — Ann. chim. phys. [7] 2, 570, '94; below −80°, Arctowski — Z. anorg. Ch. 11, 273, '95.)

t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.	t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.	t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.
−113.5	0.98	−40	7.5	40	63.7
−102	1.24	−20	13.7	50	72.4
−91	1.56	0	25.8	60	78.6
−83	1.91	+10	38.7	70	85.6
−60	3.4	20	43.2	80	92.2
		30	52.9		

Solubility of Tri Phenyl Methane in Hexane and in Chloroform.

(Etard.)

t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution in: Hexane.	Chloroform.	t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution in: Hexane.	Chloroform.
−50	...	10.5	30	12.5	48.8
−30	1.2	15.2	40	20.0	56.1
−20	1.6	19.0	50	25.8	63.8
−10	2.2	23.5	60	45.7	71.7
0	3.5	28.9	70	62.0	79.8
+10	5.6	35.0	80	78.5	87.2
20	8.3	41.5	90	97.0	...

Solubility of Tri Phenyl Methane in Pyridine.

(Hartley and Thomas — J. Ch. Soc. 89, 1028, '06.)

Synthetic method used, see note, page 9.

t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.	Mol. per cent $CH(C_6H_5)_3$.	Solid Phase.	t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.	Mol. per cent. $CH(C_6H_5)_3$.	Solid Phase.
22.8	46.2	22.0	$CH(C_6H_5)_3$ monoclinic	59.3	75.6	50.3	$CH(C_6H_5)_3$
31.7	53.3	27.2	"	67.8	81.9	59.7	"
37.9	57.6	30.7	"	72.8	85.7	66.4	"
48.7	66.6	39.5	"	80.6	91.5	77.2	"
53.1	70.1	43.5	"	86.8	95.8	88.1	"

Solubility of Tri Phenyl Methane in:

(Hartley and Thomas.)

Pyrrole.				Thiophene.			
t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Sol.	Mol. per cent $CH(C_6H_5)_3$.	Solid Phase.	t°.	Gms. $CH(C_6H_5)_3$ per 100 Gms. Solution.	Mol. per cent $CH(C_6H_5)_3$.	Solid Phase.
24.6	24.3	8.1	$CH(C_6H_5)_3.C_4H_4NH$ rhombs	25.7	26.0	10.8	$CH(C_6H_5)_3.C_4H_4S$ rhombs
29.0	29.8	10.4	"	33.5	31.1	13.5	"
31.5	33.4	12.1	"	44.0	43.6	21.1	"
36.8	40.6	15.8	$CH(C_6H_5)_3$ monoclinic	47.6	48.4	24.4	"
42.7	49.1	20.9	"	53.5	58.7	32.9	"
46.9	56.0	25.9	"	57.4	70.2	44.7	"
53.2	63.9	32.8	"	57.6	74.8	50.6	"
60.0	72.3	41.8	"	62.7	78.7	56.0	$CH(C_6H_5)_3$ monoclinic
63.9	76.7	47.4	"	67.0	81.9	60.8	"
68.5	81.9	55.6	"	67.2	82.1	61.3	"
71.1	84.4	59.8	"	74.2	87.4	70.5	"
80.0	91.5	74.8	"	79.0	90.3	76.3	"
89.2	97.6	91.8	"	87.2	96.2	89.9	"

METHYL ACETATE, Butyrate and Propionate.

Solubility in Water at 22°.

(Traube — Ber. 17, 2304, '84.)

100 grams H_2O dissolve 25.0 grams CH_3COOCH_3; 1.7 grams $C_3H_7COOCH_3$; 5.0 grams $C_2H_5COOCH_3$.

METHYL IODIDE, Methylene Chloride and Methylene Bromide.

Solubility of Each in Water.

(Rex — Z. physik. Chem. 55, 355, '06.)

t°.	Grams per 100 Grams H_2O.		
	CH_3I.	CH_2Cl_2.	CH_2Br_2.
0	1.565	2.363	1.173
10	1.446	2.122	1.146
20	1.419	2.000	1.148
30	1.429	1.969	1.176

METHYL BUTYRATE, METHYL VALERATE.

SOLUBILITY OF EACH IN AQUEOUS ALCOHOL MIXTURES.

(Bancroft — Phys. Rev. 3, 193, '95.)

100 cc. H_2O dissolve 1.15 cc. methyl butyrate at 20°.

cc. Alcohol in Mixture.	cc. H_2O Added.* Butyrate.	cc. H_2O Added.* Valerate.	cc. Alcohol in Mixture.	cc. H_2O Added.* Valerate.
3	2.34	1.66	27	41.15
6	6.96	5.06	30	52.37
9	12.62	9.03	33	62.25
12	19.45	13.40	36	74.15
15	28.13	18.41	39	91.45
18	33.80	24.00	42	∞
21	55.64	30.09		
24	∞	36.72		

* cc. H_2O added to cause the separation of a second phase in mixtures of the given amounts of ethyl alcohol and 3 cc. portions of methyl butyrate and of methyl valerate respectively.

METHYL ETHYL KETONE $CH_3.CO.C_2H_5$.

SOLUBILITY IN WATER.

(Rothmund — Z. physik. Chem. 26, 475, '98.)

By synthetic method, see Note, page 9.

t°.	Gms. Ketone per 100 Gms. Aq. Layer.	Gms. Ketone per 100 Gms. Ketone Layer.	t°.	Gms. Ketone per 100 Gms. Aq. Layer.	Gms. Ketone per 100 Gms. Ketone Layer.
−10	34.5	89.7	90	16.1	84.8
+10	26.1	90.0	110	17.7	80.0
30	21.9	89.9	130	21.8	71.9
50	17.5	89.0	140	26.0	64.0
70	16.2	85.7	151.8 (crit. temp.)	44.2	

MOLYBDENUM TRIOXIDE MoO_3.

100 gms. cold H_2O dissolve 0.187 gm. MoO_3.
(Dumas; Buchlolz.)

100 gms. hot H_2O dissolve 0.104 gm. MoO_3.
(Hatchett.)

MORPHINE $C_{17}H_{19}NO_3.H_2O$.

SOLUBILITY IN SEVERAL SOLVENTS.

(U. S. P.; Müller — Apoth.-Ztg. 18, 257, '03.)

Solvent.	Gms. Morphine per 100 Gms. Solution. At 18°–22°.	At 25°.	At 80°.
Water	0.0283	0.030	0.0961
Alcohol	...	0.600	1.31 (60°)
Ether	0.0131	0.0224	...
Ether sat. with H_2O	0.0094	...	...
H_2O sat. with Ether	0.0447	...	...
Benzene	0.0625	...	...

Solvent.	Gms. Morphine per 100 Gms. Solution. At 18°–22°.	At 25°.
Chloroform	0.0655	0.0555
Amyl Alcohol	...	0.8810
Ethyl Acetate	0.1861	0.1905
Petroleum Ether	0.0854	...
Carbon Tetra Chloride	0.0156	0.032 (17°)
Glycerine	0.45 (15.5°)	...

Solubility of Morphine in Aqueous Solutions of Salts and Bases at Room Temperature, Shaken Eight Days.

(Dieterich — Pharm. Centrh. 31, 395, '90.)

Aq. Salt or Base.	In N/10 Salt or Base. Grams per Liter. Salt or Base.	Morphine.	In N/1 Salt or Base. Grams per Liter. Salt or Base.	Morphine.
NH_4OH	3.51	0.20	35.08	0.505
$(NH_4)_2CO_3$	4.80	0.031	48.03	0.040
KOH	4.62	2.78	46.16	...
K_2CO_3	6.92	0.20	69.15	0.379
$KHCO_3$	10.02	0.024	100.16	0.040
NaOH	4.00	3.33	40.05	...
Na_2CO_3	5.30	0.09	53.03	0.14
$NaHCO_3$	8.41	0.032	84.06	0.044
$Ca(OH)_2$ (sat.)	...	1.00 (25°)	...	...

MORPHINE ACETATE $CH_3COOH.C_{17}H_{19}NO_3.3H_2O$, Morphine Hydrochloride $HCl.C_{17}H_{19}NO_3.3H_2O$, Morphine Sulphate $H_2SO_4.(C_{17}H_{19}NO_3)_2.5H_2O$, and Apo Morphine Hydrochloride $HCl.C_{17}H_{17}NO_2$.

Solubility in Several Solvents.

(U. S. P.)

Grams per 100 Grams of Solvent.

Solvent.	Acetate. 25°.	Acetate. 80°.	Hydrochloride. 25°.	Hydrochloride. 80°.	Sulphate. 25°.	Sulphate. 80°.	Apo M. Hydrochloride. 25°.	Apo M. Hydrochloride. 80°.
Water	44.9	50.0	5.81	200.0	6.53	166.6	2.53	6.25
Alcohol	4.6	40.0*	2.4	2.8*	0.22	0.53*	2.62	3.33
Chloroform	0.21	...	...	...	...	...	0.026	...
Ether	...	...	...	...	...	...	0.053	...
Glycerine	19.2	...	20.0†	...	...	...	...	...

* 60°. † 15.5°.

100 gms. H_2O dissolve 1.69 gms. apo morphine hydrochloride at 15.5°, and 2.04 gms. at 25°.

100 gms. 90% alcohol dissolve 1.96 gms. apo morphine hydro chlorde at 25°. (Dolt — Pharm. J. [4] 22, 345, '75.)

100 gms. H_2O dissolve 4.17 gms. morphine sulphate at 15°. (Power — Am. J. Pharm. March, '82.)

MUSTARD OIL Allyl Isosulphocyanic Ester $CS:NC_3H_5$

Solubility in Sulphur by Synthetic Method. See Note, p. 9.

(Alexejew—Ann. Physik. Chem. 28, 305, '86.)

t°.	Grams Mustard Oil per 100 grams. Sulphur Layer.	Mustard Oil Layer.
90	10	72
100	12	67
110	15	62
120	23	51
124 (crit. temp.)	35	

α NAPHTHYLAMINE *p* Sulphonic Acid (Naphtion Acid), 1 : 4 α $C_{10}H_6NH_2.SO_2H$ and α Naphthalamine *o* Sulphonic Acid, 1 : 2 α $C_{10}H_6NH_2.SO_2H$.

Solubility of Each in Water.

(Dolinski — Ber. 38, 1836, '05.)

t °.	Gms. per 100 Gms. H_2O. *p* Sulphonic Ac.	Gms. per 100 Gms. H_2O. *o* Sulphonic Ac.	t °.	Gms. per 100 Gms. H_2O. *p* Sulphonic Ac.	Gms. per 100 Gms. H_2O. *o* Sulphonic Ac.
0	0.027	0.24	50	0.059	0.81
10	0.029	0.32	60	0.075	1.01
20	0.031	0.41	70	0.097	1.37
30	0.037	0.52	80	0.130	1.80
40	0.048	0.65	90	0.175	2.40
			100	0.228	3.19

NAPHTHALENE $C_{10}H_8$.

Solubility in Methyl, Ethyl, and Propyl Alcohols.

(Speyers — Am. J. Sci. [4] 14, 294, '02; at 19.5°, de Bruyn — Z. physik. Chem. 10, 784, '92; at 11°, Timofeiew — Compt. rend. 112, 1137, '91.)

The original results were calculated to a common basis, plotted on cross-section paper, and the following table read from the curves.

t °.	In Methyl Alcohol. Wt. of 1 cc. Solution.	In Methyl Alcohol. Gms. $C_{10}H_8$ per 100 Gms. CH_3OH.	In Ethyl Alcohol. Wt. of 1 cc. Solution.	In Ethyl Alcohol. Gms. $C_{10}H_8$ per 100 Gms. C_2H_5OH.	In Propyl Alcohol. Wt. of 1 cc. Solution.	In Propyl Alcohol. Gms. $C_{10}H_8$ per 100 Gms. C_3H_7OH.
0	0.8194	3.48	0.8175	5.0	0.8285	4.45
10	0.812	5.6	0.814	7.0	0.824	5.6
20	0.807	8.2	0.810	9.8	0.821	8.2
25	0.805	9.6	0.809	11.3	0.820	9.6
30	0.804	11.2	0.809	13.4	0.820	11.4
40	0.805	16.2	0.812	19.5	0.823	16.4
50	0.813	26.0	0.822	35.0	0.837	26.0
60	0.837	50.0	0.855	67.0	0.867	50.0
65	0.870	...	0.890	96.0	0.897	80.0
70	0.9023 (68°)	...	0.930	179.0	0.933	134.1 (68.5°)

Solubility of Naphthalene in Aqueous Acetone.

(Cady — J. Physic. Ch. 2, 168, '98.)

t °.	Grams per 100 Grams Solution. Acetone.	Grams per 100 Grams Solution. Water.	Grams per 100 Grams Solution. Naphthalene.
65.5	10.0	89.92	0.05
55.3	19.91	80.0	0.09
45	29.92	69.67	0.41
38	40.81	58.22	0.97
32.2	48.67	48.68	2.65
28.5	57.43	36.64	5.93
28.2	60.43	25.75	13.82

The isotherms for intervals of 10° lie so close together that they are practically indistinguishable for the greater part of their length.

SOLUBILITY OF NAPHTHALENE IN:

t°.	Chloroform. (Speyers; Etard.) Wt. of 1 cc. Solution.	Chloroform. Gms. $C_{10}H_8$ per 100 Grams $CHCl_3$.	Carbon Tetra Chloride. (Schröder — Z. physik. Ch. 11, 457, '93.) Gms. $C_{10}H_8$ per 100 Gms. Sat. Solution.	Carbon Di Sulphide. (Arctowski — Compt. rend, 121, 123, '95; Etard.) Gms. $C_{10}H_8$ per 100 Gms. Sat. Solution.
−108	...	...	...	0.62
− 82	...	...	...	1.38
− 50	...	...	...	2.3
− 30	...	8.8	...	6.6
− 10	...	15.6	...	14.1
0	1.393	19.5	9.0	19.9
+ 10	1.355	25.5	14.0	27.5
20	1.300	31.8	20.0	36.3
25	1.280	35.5	23.0	41.0
30	1.255	40.1	26.5	46.0
40	1.205	49.5	35.5	57.2
50	1.150	60.3	47.5	67.6
60	1.090	73.1	62.5	79.2
70	1.040	87.2	80.0	90.3

NOTE. — Speyers' results upon the solubility of $C_{10}H_8$ in $CHCl_3$, when calculated to grams per 100 grams of solvent, agree quite well with Etard's (Ann. chim. phys. [7] **2** 570, '94 figures, reported on the basis of grams $C_{10}H_8$ per 100 grams saturated solution.

SOLUBILITY OF NAPHTHALENE IN:

(Schröder; Etard; Speyers.)

t°.	Benzene. Gms. $C_{10}H_8$ per 100 Gms. Solution.	Chlor Benzene. Gms. $C_{10}H_8$ per 100 Gms. Solution.	Hexane. Gms. $C_{10}H_8$ per 100 Gms. Solution.	Toluene. Wt. of 1 cc. Solution.	Toluene. Gms. $C_{10}H_8$ per 100 Gms. $C_6H_5.CH_3$.
−50	...	...	0.3	...	...
−20	...	...	1.9	...	...
0	...	...	5.5	0.9124	...
+10	27.5	24.0	9.0	0.9126	15.0
20	36.0	31.0	14.0	0.9135	28.0
25	40.5	35.0	17.5	0.9155	36.0
30	45.5	39.0	21.0	0.9180	42.0
40	54.0	48.0	30.8	0.9250	56.0
50	65.0	57.5	43.7	0.9350	69.5
60	77.5	70.5	60.6	0.9475	83.0
70	88.0	85.0	78.8	0.9640	97.5
80	...	...	...	0.9770	111.0

β NAPHTHOIC ACID $C_{10}H_7COOH$.

One liter of aqueous solution contains 0.058 gram $C_{10}H_7COOH$ at 25°.

(Paul — Z. physik. Ch. 14, 111, '94.)

β NAPHTHOL $C_{10}H_7OH$.

100 grams H_2O dissolve 0.105 gram at 25°, and 1.33 grams at b. pt.; 100 grams alcohol dissolve 164.0 grams at 25°.

NARCEINE.

100 grams pure carbon tetra chloride dissolve 0.011 gram narceine at 17°. (Schindelmeiser — Chem.-Ztg. 25, 129, '01.)

NEODYMIUM CHLORIDE $NdCl_3$.

100 grams H_2O dissolve 98.7 grams $NdCl_3$ at 13°, and 140.4 grams at 100°. (Matignon — Compt. rend. 133, 289, '01.)

NEODYMIUM SULPHATE $Nd_2(SO_4)_3$.

SOLUBILITY IN WATER.

(Muthmann and Rolig — Ber. 31, 1728, '98.)

t°.	Gms. $Nd_2(SO_4)_3$ per 100 Gms. Solution.	Gms. $Nd_2(SO_4)_3$ per 100 Gms. Water.	t°.	Gms. $Nd_2(SO_4)_3$ per 100 Gms. Solution.	Gms. $Nd_2(SO_4)_3$ per 100 Gms. Water.
0	8.7	9.5	50	3.5	3.7
16	6.6	7.1	80	2.6	2.7
30	4.7	5.0	108	2.2	2.3

NICKEL BROMATE $Ni(BrO_3)_2.6H_2O$.

100 grams cold water dissolve 27.6 grams nickel bromate.

NICKEL BROMIDE $NiBr_2$.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 539, '94.)

t°.	Gms. $NiBr_2$ per 100 Gms. Solution.	t°.	Gms. $NiBr_2$ per 100 Gms. Solution.	t°.	Gms. $NiBr_2$ per 100 Gms. Solution.
−20	47.7	25	57.3	80	60.6
−10	50.5	30	58.0	100	60.8
0	53.0	40	59.1	120	60.9
+10	55.0	50	60.0	140	61.0
20	56.7	60	60.4		

NICKEL CHLORATE $Ni(ClO_3)_2$.

SOLUBILITY IN WATER.

(Meusser — Ber. 35, 1419, '02.)

t°.	Gms. $Ni(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Ni(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Ni(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Ni(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−18	49.55	7.84	$Ni(ClO_3)_2.6H_2O$	48	67.60	16.65	$Ni(ClO_3)_2.4H_2O$
− 8	51.52	8.49	"	55	68.78	17.59	"
0	52.66	8.88	"	65	69.05	18.01	"
+18	56.74	10.47	"	79.5	75.50	24.68	"
40	64.47	15.35	"	−13.5	31.85	3.73	Ice
				− 9	26.62	2.90	"

Sp. Gr. of solution saturated at + 18 = 1.661.

NICKEL CHLORIDE $NiCl_2$.

SOLUBILITY IN WATER.

(Etard; at 12°, Ditte — Compt. rend. 92, 242, '81.)

t°.	Gms. $NiCl_2$ per 100 Gms. Solution.	t°.	Gms. $NiCl_2$ per 100 Gms. Solution.	t°.	Gms. $NiCl_2$ per 100 Gms. Solution.
−17	29.7	25	40.0	60	45.1
0	35.0	30	40.8	70	46.0
+10	37.3	40	42.3	78	46.6
20	39.1	50	43.9	100	46.7

1000 cc. sat. HCl solution dissolve 4.0 grams $NiCl_2$ at 12°.

100 grams abs. alcohol dissolve 53.71 grams $NiCl_2.6H_2O$ at room temperature.

100 grams abs. alcohol dissolve 10.05 grams $NiCl_2$ at room temperature.

(Bödtker — Z. physik. Chem. 22, 511, '97.)

100 grams abs. alcohol dissolve 2.16 grams $NiCl_2.7H_2O$ at 17°, and 1.4 grams at 3°. (de Bruyn — Rec. trav. chim. 11, 156, '92.)

100 grams saturated solution in glycol contain 16.2 grams $NiCl_2$ at room temperature. (de Coninck — Bul. acad. roy. Belgique, 359, '05.)

NICKEL IODATE $Ni(IO_3)_2$.

SOLUBILITY IN WATER.

(Meusser — Ber. 34, 2440, '01.)

t°.	Gms. $Ni(IO_3)_2$ per 100 Gms. Solution.	Mols. $Ni(IO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Ni(IO_3)_2$ per 100 Gms. Solution.	Mols. $Ni(IO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
0	0.73	0.033	$Ni(IO_3)_2.4H_2O$	18	0.55	0.0245	$Ni(IO_3)_2.2H_2O$ (2)
18	1.01	0.045	"	50	0.81	0.035	"
30	1.41	0.063	"	75	1.03	0.045	"
0	0.53	0.023	$Ni(IO_3)_2.2H_2O$ (1)	80	1.12	0.049	"
18	0.68	0.030	"	30	1.135	0.050	$Ni(IO_3)_2$
30	0.86	0.039	"	50	1.07	0.046	"
50	1.78	0.080	"	75	1.02	0.045	"
8	0.52	0.023	$Ni(IO_3)_2.2H_2O$ (2)	90	0.988	0.044	"

(1) α Dihydrate. (2) β Dihydrate.

NICKEL IODIDE NiI_2.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 546, '94.)

t°.	Gms. NiI_2 per 100 Gms. Solution.	t°.	Gms. NiI_2 per 100 Gms. Solution.	t°.	Gms. NiI_2 per 100 Gms. Solution.
−20	52.0	25	60.7	60	64.8
0	55.4	30	61.7	70	65.0
10	57.5	40	63.5	80	65.2
20	59.7	50	64.7	90	65.3

NICKEL NITRATE $Ni(NO_3)_2$.

Solubility in Water.

(Funk — Wiss. Abh. p. t. Reichanstalt, 3, 439, '00.)

t°.	Gms. $Ni(NO_3)_2$ per 100 Gms. Solution.	Mols. $Ni(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Ni(NO_3)_2$ per 100 Gms. Solution.	Mols. $Ni(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−23	39.02	6.31	$Ni(NO_3)_2.9H_2O$	20	49.06	9.49	$Ni(NO_3)_2.6H_2O$
−21	39.48	6.43	"	41	55.22	12.1	"
−10.5	44.13	7.79	"	56.7	62.76	16.7	"
−21	39.94	6.55	$Ni(NO_3)_2.6H_2O$	58	61.61	15.9	$Ni(NO_3)_3.3H_2O$
−12.5	41.59	7.01	"	60	61.99	16.0	"
−10	42.11	7.16	"	64	62.76	16.6	"
− 6	43.00	7.44	"	70	63.95	17.6	"
0	44.32	7.86	"	90	70.16	23.1	"
+18	48.59	9.3	"	95	77.12	33.3	"

100 grams sat. solution in glycol contain 7.5 grams $Ni(NO_3)$ at room temperature. (de Coninck.)

NICKEL SULPHATE $NiSO_4$.

Solubility in Water.

(Steele and Johnson — J. Ch. Soc. 85, 116, '04; see also Etard and Mulder.)

t°.	Grams $NiSO_4$ per 100 Gms. Solution.	Grams $NiSO_4$ per 100 Gms. Water.	Solid Phase.	t°.	Grams $NiSO_4$ per 100 Gms. Solution.	Grams $NiSO_4$ per 100 Gms. Water.	Solid Phase.
5	20.47	25.74	$NiSO_4.7H_2O$	33.0	30.25	43.35	$NiSO_4.6H_2O$
0	21.40	27.22	"	35.6	30.45	43.79	" (blue)
9	23.99	31.55	"	44.7	32.45	48.05	"
22.6	27.48	37.90	"	50.0	33.39	50.15	"
30	29.99	42.46	"	53.0	34.38	52.34	"
32.3	30.57	44.02	"	54.5	34.43	52.50	$NiSO_4.6H_2O$
33	31.38	45.74	"	57.0	34.81	53.40	" (green)
34	31.20	45.5	"	60	35.43	54.80	"
32.3	30.35	43.57	$NiSO_4.6H_2O$	70	37.29	59.44	"
33.0	30.25	43.35	" (blue)	80	38.71	63.17	"
34.0	30.49	43.83	"	99	43.42	76.71	"

Transition points, hepta hydrate ⇄ hexa hydrate = 31.5°.
Hexa hydrate (blue) ⇄ hexa hydrate (green) = 53.3°.

Solubility of Mixtures of Nickel Sulphate and Copper Sulphate.

(Fock — Z. Kryst. Min. 28, 387, '97.)

Results at 35°.

Gms. per 100 Gms. H_2O.		Mol. per cent in Solution.		Mol. per cent in Solid Phase.		Crystal Form.
$CuSO_4$.	$NiSO_4$.	$CuSO_4$.	$NiSO_4$.	$CuSO_4$.	$NiSO_4$.	
9.62	583.9	1.57	98.43	0.35	99.65	Rhombic
41.66	484.4	7.69	92.31	2.12	97.88	"
75.39	553.5	11.66	88.34	4.77	95.23	Tetragonal
106.40	506.5	16.92	83.08	6.52	93.48	"
172.0	483.8	25.63	74.37	13.88	86.17	"
186.9	468.0	27.90	72.10	18.77	81.23	Tetragonal
				94.91	5.09	Triclinic

Results at 67°.

Gms. per 100 Gms. H_2O.		Mol. per cent in Solution.		Mol. per cent in Solid Phase.		Crystal Form.
$CuSO_4$.	$NiSO_4$.	$CuSO_4$.	$NiSO_4$.	$CuSO_4$.	$NiSO_4$.	
20.04	729.3	2.65	97.35	0.93	99.07	Monoclinic
66.01	706.2	8.31	91.69	2.86	97.14	"
88.08	501.6	13.55	86.45	3.92	96.08	"
47.94	675.0	16.39	83.61	6.66	93.34	"
249.9	747.8	24.46	75.54	22.32	77.68	Monoclinic Triclinic

Solubility of Mixtures of Nickel Sulphate and Sodium Sulphate, etc.

(Koppel; Wetzel — Z. physik. Chem. 52, 401, '05.)

t°.	Gms. per 100 Gms. Solution.		Gms. per 100 Gms. H_2O.		Mols. per 100 Mols. H_2O.		Solid Phase.
	$NiSO_4$.	Na_2SO_4.	$NiSO_4$.	Na_2SO_4.	$NiSO_4$.	Na_2SO_4.	
0	16.94	7.61	22.46	10.09	2.61	1.28	$NiSO_4.7H_2O$ + $Na_2SO_4.10H_2O$
5	17.99	10.85	25.28	15.24	2.94	1.93	
10	18.97	13.85	28.26	20.64	3.29	2.61	
20	18.76	17.21	29.31	26.87	3.410	3.404	$NiNa_2(SO_4)_2.4H_2O$
25	17.85	16.54	27.33	25.33	3.181	3.208	"
30	16.74	15.34	24.64	22.58	2.868	2.861	"
35	16.28	14.91	23.66	21.67	2.753	2.744	"
40	15.35	14.49	21.88	20.65	2.546	2.616	"
18.5	19.61	16.49	30.70	25.80	3.56	3.27	$NiNa_2(SO_4)_2.4H_2O$ + $NiSO_4.7H_2O$
20	20.13	16.15	31.59	25.35	3.67	3.21	
25	21.20	14.77	33.11	23.06	3.85	2.92	
30	22.60	12.80	34.98	19.82	4.07	2.59	
35	23.62	10.78	36.01	16.43	4.19	2.08	
40	24.92	9.39	37.93	14.29	4.41	1.81	
18.5	16.80	18.93	26.14	29.45	3.04	3.72	$NiNa_2(SO_4)_2.4H_2O$ + $Na_2SO_4.10H_2O$
20	15.48	20.18	24.06	31.37	2.80	3.97	
25	10.92	24.12	16.81	37.13	1.96	4.70	
30	6.40	28.71	9.87	44.25	1.15	5.60	
35	4.54	31.65	7.13	49.59	0.838	6.28	$NiNa_2(SO_4)_2.4H_2O$ + Na_2SO_4
40	4.63	31.37	7.24	49.03	0.843	6.21	

Solubility of Nickel Potassium Sulphate $NiK_2(SO_4)_2.6H_2O$ in Water.

(Tobler — Liebig's Ann. 95, 193, '55; v. Hauer — J. pr. Ch. 74, 433, '58.)

t°.	Grams $NiK_2(SO_4)_2$ per 100 Gms. H_2O. (Tobler.)	(v. Hauer.)	t°.	Grams $NiK_2(SO_4)_2$ per 100 Gms. H_2O. (Tobler.)	(v. Hauer.)
0	5.3	...	50	30	...
10	8.9	...	60	35.4	20.47
20	13.8	9.53	70	42.0	...
30	18.6	...	80	46.0	28.2
40	24.0	14.03			

Solubility of Nickel Sulphate in Methyl and Ethyl Alcohols.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

100 grams abs. ethyl alcohol dissolve 1.3 grams $NiSO_4.7H_2O$ at 17°.

100 grams abs. methyl alcohol dissolve 46.0 grams $NiSO_4.7H_2O$ at 17°, and 24.7 grams at 4°.

100 grams abs. methyl alcohol dissolve 0.5 gram $NiSO_4$ at 18°.

100 grams abs. methyl alcohol dissolve 31.6 grams $NiSO_4.6H_2O$ at 17°.

100 grams 93.5% methyl alcohol dissolve 10.1 grams $NiSO_4.7H_2O$ at 4°, and 7.8 grams $NiSO_4.6H_2O$ at 18°.

100 grams 50.0% methyl alcohol dissolve 2.0 grams $NiSO_4.7H_2O$ at 4°, and 1.9 grams $NiSO_4.6H_2O$ at 18°.

100 grams sat. solution in glycol contain 9.7 grams $NiSO_4$ at room temperature.

(de Coninck — Bull. acad. roy. Belgique 359, '05.)

NICOTINE $C_{10}H_{14}N_2$.

Solubility in Water.

(Hudson — Z. physik. Chem. 47, 114, '04.)

Determinations made by Synthetic Method, for which see Note, page 9. Below 60° and above 210° both liquids are miscible in all proportions; likewise with percentages of nicotine less than 6.8 and above 82 per cent the liquid does not show two layers at any temperature. Below 94° the upper layer is water. Above 94° the upper layer is nicotine. The curve plotted from the following results makes a complete circle.

Percentage of Nicotine in the Mixture.	Temp. of Appearance of Two Layers. Degrees C.	Temperature of Homogeneity. Degrees C.
6.8	94	95
7.8	89	155
10.0	75	...
14.8	65	200
32.2	61	210
49.0	64	205
66.8	72	190
80.2	87	170
82.0	129	130

NITROGEN N.

Solubility in Water.

(Winkler — Ber. 24, 3606, '91; Braun — Z. physik. Chem. 33, 732, '00; Bohr and Bock — Wied. Ann. 44, 318, '91.)

t°.	"Coefficient of Absorption" β.			"Solubility" B'.	q.
0	0.0235*	0.0239†	...‡	0.0233*	0.00239*
5	0.0208	0.0215	0.0217	0.0206	0.00259
10	0.0186	0.0196	0.0200	0.0183	0.00230
15	0.0168	0.0179	0.0179	0.0165	0.00208
20	0.0154	0.0164	0.0162	0.0151	0.00189
25	0.0143	0.0150	0.0143	0.0139	0.00174
30	0.0134	0.0138	...	0.0128	0.00161
35	0.0125	0.0127	...	0.0118	0.00148
40	0.0118	0.0118	...	0.0110	0.00139
50	0.0109	0.0106	...	0.0096	0.00121
60	0.0102	0.0100	...	0.0082	0.00105
80	0.0096	...	...	0.0051	0.00069
100	0.0095	0.0100	...	0.0000	0.00000

* W. † B. and B. ‡ B.

For values of β, β', and q, see Ethane, page 133.

Solubility of Nitrogen in Aqueous Salt Solutions.

(Braun.)

t°.	Coefficient of Absorption of N in Barium Chloride Solutions of: 13.83 per cent.	11.92 per cent.	6.90 per cent.	3.87 per cent.	3.33 per cent.
5	0.0127	0.0137	0.0160	0.0180	0.0183
10	0.0117	0.0125	0.0147	0.0166	0.0168
15	0.0104	0.0114	0.0132	0.0148	0.0150
20	0.0092	0.0098	0.0118	0.0132	0.0135
25	0.0078	0.0086	0.0104	0.0114	0.0119

t°.	Coefficient of Absorption of N in Sodium Chloride Solutions of: 11.73 per cent.	8.14 per cent.	6.4 per cent.	2.12 per cent.	0.67 per cent.
5	0.0102	0.0127	0.0138	0.0179	0.0200
10	0.0093	0.0113	0.0126	0.0164	0.0185
15	0.0081	0.0101	0.0113	0.0147	0.0164
20	0.0066	0.0087	0.0098	0.0131	0.0148
25	0.0047	0.0075	0.0083	0.0113	0.0130

Solubility of Nitrogen in Alcohol.

(Bunsen.)

t°	0°	5°	10°	15°	20°	24°
Vols. N * dissolved by 1 Vol. Alcohol.	0.1263	0.1244	0.1228	0.1214	0.1204	0.1198

* At 0° and 760 mm.

Solubility of Nitrogen in Mixtures of Alcohol and Water at 25°.

(Just — Z. physik. Ch. 37, 361, '01.)

Results in terms of the Ostwald solubility expression, see page 105.

Vol. H_2O in Mixture.	Vol. Alcohol in Mixture.	Dissolved N (l_{25}).
100	0	0.01634
80	20	0.01536
67	33	0.01719
0	100 (99.8% Alcohol)	0.1432

Solubility of Nitrogen in Several Solvents at 20° and 25°.

(Just.)

Solvent.	l_{25}.	l_{20}.	Solvent.	l_{25}.	l_{20}.
Water	0.01634	0.01705	Toluene	0.1235	0.1186
Aniline	0.03074	0.02992	Chloroform	0.1348	0.1282
Sulphur Dioxide	0.05860	0.05290	Methyl Alcohol	0.1415	0.1348
Nitro Benzene	0.06255	0.06082	Ethyl Alcohol (99.8%)	0.1432	0.1400
Benzene	0.1159	0.1114	Acetone	0.1460	0.1383
Acetic Acid	0.1190	0.1172	Amyl Acetate	0.1542	0.1512
Xylene	0.1217	0.1185	Ethyl Acetate	0.1727	0.1678
Amyl Alcohol	0.1225	0.1208	Iso Butyl Acetate	0.1734	0.1701

Solubility of Nitrogen in Petroleum. Coefficient of Absorption at 10° = 0.135, at 20° = 0.117.

(Gniewasz and Walfisz — Z. physik. Ch. 1, 70, '87.)

Solubility of Nitrogen in Aqueous Propionic Acid and Urea Solutions.

(Braun.)

t°.	Coefficient of Absorption of N in C_2H_5COOH Solutions of:				
	11.22 per cent.	9.54 per cent.	6.07 per cent.	4.08 per cent.	3.82 per cent.
5	0.0195	0.0204	0.0208	0.0210	0.0209
10	0.0178	0.0182	0.0186	0.0192	0.0191
15	0.0159	0.0163	0.0164	0.0169	0.0167
20	0.0146	0.0147	0.0148	0.0154	0.0155
25	0.0130	0.0134	0.0134	0.0137	0.0137

t°.	Coefficient of Absorption of N in $CO(NH_2)_2$ Solutions of:					
	15.65 per cent.	11.9 per cent.	9.42 per cent.	6.90 per cent.	5.15 per cent.	2.28 per cent.
5	0.0175	0.0179	0.0190	0.0198	0.0197	0.0199
10	0.0162	0.0167	0.0176	0.0183	0.0182	0.0184
15	0.0150	0.0149	0.0158	0.0165	0.0165	0.0171
20	0.0140	0.0139	0.0146	0.0151	0.0151	0.0155
25	0.0130	0.0130	0.0133	0.0137	0.0135	0.0139

NITROUS OXIDE N_2O.

Solubility in Water.

(Bunsen; Gordon — Z. physik. Ch. 18, 9, '95; Roth — *Ibid.* 24, 123, '97; Knopp — *Ibid.* 48, 106, '04 Geffcken — *Ibid.* 49, 276, '04.)

t°.	Coefficient of Absorption β. (B.)	(G.)	(R.)	(K.)	q	Solubility in terms of Ostwald Expression (l).* (R.)	(K.)	(G.)
5	1.0950	1.0955	1.1403	...	0.205	1.161	...	1.067
10	0.9196	0.9200	0.9479	...	0.171	0.9815	...	0.9101
15	0.7778	0.7787	0.7896	...	0.143	0.8315	...	0.7784
20	0.6700	0.6700	0.6654	0.6270	0.121	0 7131	0.6739	0.6756
25	0.5961	...	0.5752	...	0.104	0.6281	...	0.5992

* Calculated by Geffcken.

Note. — Knopp and also Geffcken call attention to the fact that Roth in making his determinations used a rubber tube between the gas burette and the shaking flask, and give this as an explanation of the high results which he obtained.

Solubility of Nitrous Oxide in Aqueous Sulphuric Acid.

(Lunge — Ber. 14, 2188, '81; see also Geffcken's results.)

Sp. Gr. of H_2SO_4	1.84	1.80	1.705	1.45	1.25
Vols. N_2O dissolved by 100 vols. H_2SO_4	75.7	66.0	39.1	41.6	33.0

100 vols. of KOH solution of 1.12 Sp. Gr. absorb 18.7 vols. N_2O.
100 vols. of NaOH solution of 1.10 Sp. Gr. absorb 23.1 vols. N_2O.

Solubility of Nitrous Oxide in Aqueous Solutions of Acids.

(Geffcken.)

Results in terms of the Ostwald Solubility Expression (l). See p. 105.

In Hydrochloric Acid. Gms. HCl per Liter.	N_2O Dissolved l_{15}.	l_{25}.	In Nitric Acid. Gms. HNO_3 per Liter.	N_2O Dissolved l_{15}.	l_{25}.	In Sulphuric Acid. Gms. H_2SO_4 per Liter.	N_2O Dissolved l_{15}.	l_{25}.
18.22	0.755	0.577	36.52	0.777	0.597	24.52	0.734	0.566
36.45	0.738	0.568	63.05	0.777	0.602	49.04	0.699	0.543
72.90	0.716	0.557	126.10	0.775	0.611	98.08	0.645	0.509
						147.12	0.602	0.482
						196.16	0.562	0.463

Solubility of Nitrous Oxide in Aqueous Solutions of:

(Roth.)

t°	Phosphoric Acid. Coefficient of Abs. in H_3PO_4 Solutions of: 3.38%.	4.72%.	8.84%.	9.89%.	13.35%.	Oxalic Acid. Coefficient of Abs. in $(COOH)_2$ Solutions of: 0.812%.	3.70%.
5	1.057	1.0365	0.9883	0.9635	0.9171	1.1450	1.1094
10	0.8827	0.8665	0.8296	0.8101	0.7711	0.9526	0.9264
15	0.7388	0.7258	0.6977	0.6826	0.6505	0.7940	0.7745
20	0.6253	0.6147	0.5926	0.5810	0.5555	0.6694	0.6538
25	0.5427	0.5329	0.5143	0.5054	0.4860	0.5784	0.5643

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SOLUTIONS OF PROPIONIC ACID AT 20°.

(Knopp.)

Gms. C_2H_5COOH per liter	15.15	60.42	158.4	176.6	344.0
Coef. of Absorption of N_2O	0.6323	0.6369	0.6504	0.6534	0.7219

SOLUBILITY OF NITROUS OXIDE IN AQUEOUS SALT SOLUTIONS.

Results by Geffcken in terms of the Ostwald expression (l). See page 105.

Salt.	Formula.	Conc. of Salt per Liter.		Solubility of N_2O.	
		Gram Equiv.	Grams.	l_{15}.	l_{25}.
Ammonium Chloride	NH_4Cl	0.5	26.76	0.730	0.557
Ammonium Chloride	NH_4Cl	1.0	53.52	0.691	0.529
Caesium Chloride	CsCl	0.5	84.17	0.710	0.544
Lithium Chloride	LiCl	0.5	21.24	0.697	0.535
Lithium Chloride	LiCl	1.0	42.48	0.623	0.483
Potassium Bromide	KBr	0.5	59.55	0.697	0.536
Potassium Bromide	KBr	1.0	119.11	0.627	0.485
Potassium Chloride	KCl	0.5	37.3	0.686	0.527
Potassium Chloride	KCl	1.0	74.6	0.616	0.475
Potassium Iodide	KI	0.5	83.06	0.702	0.541
Potassium Iodide	KI	1.0	166.12	0.633	0.492
Potassium Hydroxide	KOH	0.5	28.08	0.668	0.514
Potassium Hydroxide	KOH	1.0	56.16	0.559	0.436
Rubidium Chloride	RbCl	0.5	60.47	0.695	0.533
Rubidium Chloride	RbCl	1.0	120.95	0.625	0.483

Results by Knopp, in terms of the coefficient of absorption. See page 105.

Salt.	Formula.	Conc. of Salt per Liter.		Coef. of Absorption of N_2O at 20°.
		Normality.	Grams.	
Potassium Nitrate	KNO_3	0.1061	10.74	0.6173
"	"	0.2764	27.94	0.6002
"	"	0.5630	56.97	0.5713
"	"	1.1683	118.2	0.5196
Sodium Nitrate	$NaNO_3$	0.1336	11.37	0.6089
"	"	0.3052	25.97	0.5876
"	"	0.6286	53.50	0.5465
"	"	1.1200	95.30	0.4926

Results by Roth, in terms of the coefficient of absorption.

Grams NaCl per 100 Grams Solution.	Coefficient of Absorption of N_2O at:				
	5°.	10°.	15°.	20°.	25°.
0.99	1.0609	0.8812	0.7339	0.6191	0.5363
1.808	1.0032	0.8383	0.7026	0.5962	0.5190
3.886	0.9131	0.7699	0.6495	0.5520	0.4475
5.865	0.8428	0.7090	0.5976	0.5088	0.4224

Solubility of Nitrous Oxide in Aqueous Salt Solutions.

Results by Gordon in terms of coefficient of absorption. See p. 105.

Salt.	Concentration of Salt. Grams per 100 Grams Solution.	Gram Mols. per Liter.	Coefficient of Absorption of N_2O at: 5°.	10°.	15°.	20°.
Calcium Chloride	5.79	0.547	0.819	0.697	0.591	0.500
"	9.86	0.964	0.668	0.586	0.509	0.435
"	13.99	1.416	0.510	0.441	0.380	0.328
Lithium Chloride	1.35	0.319	0.986	0.831	0.700	0.594
"	3.85	0.928	0.878	0.743	0.629	0.536
"	11.48	2.883	0.606	0.512	0.437	0.382
Lithium Sulphate	2.37	0.219	0.934	0.792	0.670	0.569
"	5.46	0.521	0.795	0.665	0.557	0.474
"	8.56	0.836	0.646	0.555	0.477	0.415
Magnesium Sulphate	5.90	0.521	0.766	0.664	0.561	0.471
"	7.66	0.687	0.708	0.586	0.488	0.414
"	10.78	0.997	0.569	0.491	0.417	0.346
Potassium Chloride	4.90	0.676	0.879	0.751	0.643	0.555
"	7.64	1.037	0.799	0.693	0.591	0.494
"	14.58	2.147	0.654	0.574	0.500	0.430
"	22.08	3.414	0.544	0.459	0.390	0.339
Potassium Sulphate	2.62	0.154	0.986	0.831	0.701	0.605
"	4.78	0.285	0.918	0.763	0.637	0.542
Sodium Chloride	6.20	1.107	0.800	0.682	0.585	0.509
"	8.88	1.614	0.713	0.603	0.510	0.434
"	12.78	2.391	0.634	0.532	0.449	0.386
Sodium Sulphate	5.76	0.427	0.808	0.677	0.584	0.495
"	8.53	0.646	0.692	0.574	0.482	0.416
"	12.44	0.974	0.559	0.486	0.417	0.354
Strontium Chloride	3.31	0.215	0.928	0.788	0.671	0.578
"	5.73	0.380	0.848	0.709	0.610	0.550
"	13.24	0.939	0.644	0.547	0.463	0.390

Solubility of Nitrous Oxide in Alcohol and in Aqueous Chloral Hydrate Solutions at 20°.

(Bunsen; Knopp — Z. physik. Ch. 48, 106, '04.)

t°.	In Alcohol (B.). Vols. N_2O (at 0° and 760 mm.) per 1 Vol. Alcohol.	In Aq. Chloral Hydrate (K.). Normality of $C_2HCl_3O.H_2O$.	Gms. $C_2HCl_3O.H_2O$ per Liter.	Coef. of Abs. of N_2O.
0	4.178	0.184	30.43	0.618
5	3.844	0.445	73.60	0.613
10	3.541	0.942	155.8	0.596
15	3.268	1.165	192.7	0.589
20	3.025	1.474	243.8	0.579
24	2.853	1.911	316.4	0.567

Solubility of Nitrous Oxide in Petroleum. Coefficient of Absorption at 10° = 2.49, at 20° = 2.11.

(Gniewasz and Walfisz — Z. physik. Ch. 1, 70, '87.)

Solubility of Nitrous Oxide in Aqueous Solutions of Glycerine and of Urea.

(Roth.)

t°.	Coefficient of Absorption of N_2O in Glycerine Solutions of: 3.46 per cent.	6.73 per cent.	12.12 per cent.	16.24 per cent.
5	1.097	1.055	0.999	0.959
10	0.917	0.887	0.841	0.810
15	0.767	0.745	0.710	0.686
20	0.647	0.630	0.605	0.585
25	0.556	0.542	0.527	0.508

t°.	Coefficient of Absorption of N_2O in Urea Solutions of: 3.31 per cent.	4.97 per cent.	6.37 per cent.	7.30 per cent.	9.97 per cent.
5	1.104	1.096	1.088	1.101	1.069
10	0.921	0.920	0.909	0.921	0.901
15	0.771	0.773	0.761	0.772	0.761
20	0.653	0.656	0.644	0.655	0.651
25	0.569	0.567	0.559	0.570	0.569

NITRIC OXIDE NO.

Solubility in Water.

(Winkler — Ber. 34, 1414, '01.)

t°.	β.	β'.	q.	t°.	β.	β'.	q.
0	0.0738	0.0734	0.00984	40	0.0351	0.0325	0.00440
5	0.0646	0.0641	0.00860	50	0.0315	0.0277	0.00376
10	0.0571	0.0564	0.00757	60	0.0295	0.0237	0.00324
15	0.0515	0.0506	0.00680	70	0.0281	0.0195	0.00267
20	0.0471	0.0460	0.00618	80	0.0270	0.0144	0.00199
25	0.0430	0.0419	0.00564	90	0.0265	0.0082	0.00114
30	0.0400	0.0384	0.00517	100	0.0263	0.0000	0.00000

For values of β, β' and q, see Ethane, page 133.

Solubility of Nitric Oxide in Aqueous Sulphuric Acid Solutions at 18°.

(Lunge — Ber. 18, 1391, '85; Tower — Z. anorg. Ch. 50, 382, '06.)

Wt. per cent H_2SO_4 in Solution.	Sp. Gr. at 15°.	Tension of H_2O Vapor.	Solubility Coefficient * of NO at 18°.	
98	1.84	...	0.0227	(0.035, L.)
90	1.82	0.1 mm.	0.0193	
80	1.733	0.4 "	0.0117	
70	1.616	1.5 "	0.0113	
60	1.503	3.1 "	0.0118	(0.017, L.
50	1.399	6.2 "	0.0120	

* Volume of NO (at 760 mm.) per 1 volume of aqueous H_2SO_4.

Solubility of Nitric Oxide in Alcohol.

(Bunsen.)

t°	0°	5°	10°	15°	20°	24°
Vols. NO* absorbed by 1 vol. Alc.	0.316	0.300	0.286	0.275	0.266	0.261

* At 0° and 760 mm.

OXALIC ACID $(COOH)_2.2H_2O$.

Solubility in Water.

(Average curve from results of Alluard; Miczynski — Monatsh. Ch. 7, 258, '86; Henry — Compt. rend. 99, 1157, '84; Lamouroux — *Ibid.* 128, 998, '99; at 25°, Foote and Andrew — Am. Ch. J. 34, 154, '05.)

t°.	Grams $(COOH)_2$ per 100 Grams H_2O.	Grams $(COOH)_2$ per 100 Grams Solution.	t°.	Grams $(COOH)_2$ per 100 Grams H_2O.	Grams $(COOH)_2$ per 100 Grams Solution.
0	3.45	3.33	40	21.15	17.46
10	5.55	5.26	50	31.53	23.97
20	8.78	8.07	60	45.55	31.37
25	11.36	10.21	70	63.82	38.95
30	13.77	11.91			

Solubility of Oxalic Acid in Alcohols.

(Timofeiew — Compt. rend. 112, 1137, '91; Bourgoin — Ann. chim. phys. [5] 13, 406, '78).

t°.	Grams $(COOH)_2$ per 100 Grams of: Methyl Alcohol.	Ethyl Alcohol.	Propyl Alcohol.
− 1	36.26	20.25	9.73
+20	47.24	26.23	15.14

Solubility of Oxalic Acid in Absolute and in Aq. Ether at 25°.

(Bödtker — Z. physik. Ch. 22, 512, '97; Bourgoin.)

100 grams absolute ether dissolve 1.47 grams $(COOH)_2.2H_2O$.
100 grams absolute ether dissolve 23.59 grams $(COOH)_2$.

In Aqueous Ether Solutions.

Gms. Solid Acid Added per 100 cc. Ether Solution. $(COOH)_2.2H_2O$.	$(COOH)_2$.	Grams per 100 cc. Ether Solution. H_2O.	$(COOH)_2$.
(1) 5.0	0.0	1.250	0.742
(2) 5.0	0.0	0.788	0.720
5.0	0.0	0.418	1.044
5.0	2.44	0.360	3.388
5.0	4.82	0.484	6.038
5.0	7.14	0.558	8.538
5.0	9.42	0.632	10.996
5.0	11.63	0.676	13.316
5.0	13.79	0.761	15.684
5.0	18.18	0.816	17.818
5.0	22.73	0.816	17.818

(1) Ether saturated with water. (2) Ether containing 0.694 per cent water.

100 grams glycerine dissolve 15 grams oxalic acid at 15.5°.

Distribution of Oxalic Acid between Water and Amyl Alcohol at 20°.

(Herz and Fischer — Ber. 37, 4748, '04.)

Millimols $\frac{1}{2}(COOH)_2$ per 10 cc. Aq. Layer.	Alcoholic Layer.	Grams $(COOH)_2$ per 100 cc. Aq. Layer.	Alcoholic Layer.
0.6806	0.1451	0.306	0.0653
2.364	0.7233	1.064	0.320
6.699	2.550	3.015	1.148
10.029	4.300	4.511	1.934

OXYGEN O. Solubility in Water.

(Winkler — Ber. 24, 3609, '91; Bohr and Bock — Wied. Ann. [2] 44, 318, '91.)

t°.	Coef. of Absorption β.		q.	cc. O per Liter H_2O.	t°.	Coef. of Absorption β.		q.
0	0.0489*	0.0496†	0.00695	10.187	40	0.0231*	0.0233†	0.00308
5	0.0429	0.0439	0.00607	8.907	50	0.0209	0.0207	0.00266
10	0.0380	0.0390	0.00537	7.873	60	0.0195	0.0189	0.00227
15	0.0342	0.0350	0.00480	7.038	70	0.0183	0.0178	0.00186
20	0.0310	0.0317	0.00434	6.356	80	0.0176	0.0172	0.00138
25	0.0283	0.0290	0.00393	5.776	90	0.0172	0.0169	0.00079
30	0.0261	0.0268	0.00359	5.255	100	0.0170	0.0168	0.00000

* W. † B. and B.

For values of β and q see Ethane, page 133.

Solubility of the Oxygen of Air in Water.

t°.	5.2°	5.65°	14.78°	24.8°
Solubility *	8.856	8.744	7.08	5.762

* cc. Oxygen per 1000 cc. H_2O saturated with air at 760 mm.

Solubility of Oxygen in Water and in Aqueous Solutions of Acids, Bases and Salts.

(Geffcken — Z. physik. Ch. 49, 269, '04.)

Aq. Solution of:	Concentration per Liter. Gram Equiv.	Grams.	Solubility of Oxygen.* $l_{15°}$.	l_{25}.
Water alone	...	...	0.0363	0.0308
Hydrochloric Acid	0.5	18.22	0.0344	0.0296
"	1.0	36.45	0.0327	0.0287
"	2.0	72.90	0.0299	0.0267
Nitric Acid	0.5	36.52	0.0348	0.0302
"	1.0	63.05	0.0336	0.0295
"	2.0	126.10	0.0315	0.0284
Sulphuric Acid	0.5	24.52	0.0338	0.0288
"	1.0	49.04	0.0319	0.0275
"	2.0	98.08	0.0335	0.0251
"	3.0	147.12	0.0256	0.0229
"	4.0	196.16	0.0233	0.0209
"	5.0	245.20	0.0231	0.0194
Potassium Hydroxide	0.5	28.08	0.0291	0.0252
"	1.0	56.16	0.0234	0.0206
Sodium Hydroxide	0.5	20.03	0.0288	0.0250
"	1.0	40.06	0.0231	0.0204
"	2.0	80.12	0.0152	0.0133
Potassium Sulphate	0.5	43.59	0.0294	0.0253
"	1.0	87.18	0.0237	0.0207
Sodium Chloride	0.5	29.25	0.0308	0.0262
"	1.0	58.5	0.0260	0.0223
"	2.0	119.0	0.0182	0.0158

* In terms of the Ostwald Solubility Expressions. See page 105.

Solubility of Oxygen in Aq. Potassium Cyanide Solutions at 20°.

(Maclaurin — J. Ch. Soc. 63, 737, '93.)

Gms. KCN per 100 gms. sol.	1	10	20	30	50
Coefficient of absorption of O	0.029	0.018	0.013	0.008	0.003

Solubility of Oxygen in Ethyl Alcohol, Methyl Alcohol and in Acetone.

(Timofejew — Z. physik. Ch. 6, 151, '90; Levi — Gazz. chim. ital. 31, II, 513, '01.)

t°.	In Ethyl Alcohol of 99.7% (T.). β.	β'.	In Methyl Alcohol (L.) l =	In Acetone (L.) l =
0	0.2337	0.2297	0.31864	0.2997
5	0.2301	0.2247	0.30506	0.2835
10	0.2266	0.2194	0.29005	0.2667
15	0.2232	0.2137	0.27361	0.2493
20	0.2201	0.2073	0.25574	0.2313
25	0.2177 (24°)	0.2017 (24°)	0.23642	0.2127
30	...	...	0.21569	0.1935
40	...	...	0.16990	0.1533
50	...	...	0.11840	0.1057

For values of β and β', see Ethane, page 133. l = Ostwald Solubility Expression. See page 105.

The formulae expressing the solubility of oxygen in methyl alcohol and in acetone as shown in the above table are as follows:

In Methyl Alcohol $l = 0.31864 - 0.002572\,t - 0.00002866\,t^2$.
In Acetone $l = 0.2997 - 0.00318\,t - 0.000012\,t^2$.

Solubility of Oxygen in Aqueous Alcohol at 20° and 760 mm.

(Lubarsch — Wied. Ann. [2] 37, 525, '89.)

Wt. per cent Alcohol.	Vol. per cent Absorbed O.	Wt. per cent Alcohol.	Vol. per cent Absorbed O.	Wt. per cent Alcohol.	Vol. per cent Absorbed O.
0.00	2.98	23.08	2.52	50.0	3.50
9.09	2.78	28.57	2.49	66.67	4.95
16.67	2.63	33.33	2.67	80.0	5.66

Solubility of Oxygen in Petroleum. Coefficient of Absorption at 10° = 0.229, at 20° = 0.202.

(Gniewasz and Walfisz — Z. physik. Ch. 1, 70, '87.)

OZONE O_3.

Solubility in Water.

(von Mailfert — Compt. rend. 119, 951, '94; Carius; Schöne — Ber. 6, 1224, '73.)

t°.	W.	G.	R.	t°.	W.	G.	R.
0	39.4	61.5	0.641	27	13.9	51.4	0.270
6	34.3	61.0	0.562	33	7.7	39.5	0.195
11.8	29.9	59.6	0.500	40	4.2	37.6	0.112
13.0	28.0	58.1	0.482	47	2.4	31.2	0.077
15.0	25.9	56.8	0.456	55	0.6	19.3	0.031
19.0	21.0	55.2	0.381	60	0.0	12.3	0.000

W = Milligrams Ozone dissolved per liter water. *G* = Milligrams Ozone in one liter of the gas phase above the solutions. *R* = Ratio of the dissolved to undissolved Ozone (W ÷ G).

SOLUBILITY OF OZOKERITE PARAFFINE OF MELTING POINT 64°–65° AND SP. GR. AT 20° = 0.917 IN SEVERAL SOLVENTS AT 20°.

(Pawlewski and Filemonowicz — Ber. 21, 2973, '88.)

Solvent.	Gms. Paraffine per 100 Gms. Solvent.	Gms. Paraffine per 100 cc. Solvent.	Solvent.	Gms. Paraffine per 100 Gms. Solvent.	Gms. Paraffine per 100 cc. Solvent.
Carbon Bisulphide	12.99	...	Acetone	0.262	0.209
Benzine, boiling below 75°	11.73	8.48	Ethyl Acetate	0.238	...
Turpentine, b.pt. 158°–166°	6.06	5.21	" Alcohol	0.219	...
Cumol, com. b.pt. 160°	4.26	3.72	Amyl Alcohol	0.202	0.164
" frac. 150°–160°	3.99	3.39	Propionic Acid	0.165	...
Xylene, com. b.pt. 135°–143°	3.95	3.43	Propyl Alcohol	0.141	...
" frac. 135°–138°	4.39	3.77	Methyl Alcohol	0.071	0.056
Toluene, com. b.pt. 108°–110°	3.88	3.34	Methyl Formate	0.060	...
" frac. 108°–109°	3.92	3.41	Acetic Acid	0.060	0.063
Chloroform	2.42	3.61	" Anhydride	0.025	...
Benzene	1.99	1.75	Formic Acid	0.013	0.015
Ethyl Ether	1.95	...	Ethyl Alcohol 75%	0.0003	...
Iso Butyl Alcohol, com.	0.285	0.228			

PAPAVERINE $C_{20}H_{21}NO_4$.

100 grams pure carbon tetra chloride dissolve 0.203 gram at 17°.

(Schindelmeiser — Chem.-Ztg. 25, 129, '01.)

PHENANTHRENE $C_{14}H_{10}$.

SOLUBILITY IN ALCOHOL AND IN TOLUENE.*

(Speyers — Am. J. Sci. [4] 14, 295, '02.)

t°.	In Alcohol. Gms. $C_{14}H_{10}$ per 100 Grams C_2H_5OH.	In Alcohol. Sp. Gr. of Solutions (H_2O at 4°.)	In Toluene. Gms. $C_{14}H_{10}$ per 100 Grams $C_6H_5.CH_3$	In Toluene. Sp. Gr. of Solutions (H_2O at 4°.)
0	3.65	0.814	23.0	0.925
10	3.80	0.807	30.0	0.929
20	4.6	0.801	42.0	0.934
25	5.5	0.799	50.0	0.939
30	6.4	0.797	58.0	0.943
40	8.2	0.795	76.0	0.955
50	10.6	0.794	95.0	0.971
60	15.6	0.797	115.0	0.989
70	33.0	0.815	135.0	1.007
80	...	0.865 (76.4°)	155.0	1.027

* Calculated from the original results which are given in terms of gram molecules of Phenanthrene per 100 gram molecules of solvent, and for irregular intervals of temperature.

Behrend — Z. physik. Ch. **10**, 265, '92, finds 2.77 grams phenanthrene per 100 grams alcohol at 12.3°, and 3.09 grams at 14.8°.

Solubility of Phenanthrene Picrate in Absolute Alcohol.

(Behrend — Z. physik. Ch. 10, 205, '92.)

t°.	Grams per 100 Grams Saturated Solution. Picric Acid +	Phenanthrene =	Phenanthrene Picrate.
12.3	0.91	0.71	1.62
14.3	1.00	0.78	1.78
17.5	1.05	0.82	1.87

Solubility of Phenanthrene Picrate in Alcoholic Solutions Containing Picric Acid and also Phenanthrene.

(Behrend.)

t°.	Grams Added to 62 cc. Abs. Alcohol.			Gms. per 100 Gms. Sat. Solution.		
	P. Picrate +	Picric Ac. +	Phenanthrene.	Picric Ac. +	Phenanthrene =	P. Picrate.
12.3	1.4	0	0.5	0.534	1.413	1.947
12.3	1.4	0	0.9	0.409	2.141	2.550
12.3	0.8	0	2.1	0.354	2.77	3.124
12.3	0.8	0	4.0	0.139	5.626	5.765
17.5	1.4	0.1	0	1.159	0.75	1.91
17.5	1.4	0.2	0	1.285	0.68	1.97
17.5	1.4	1.0	0	2.45	0.37	2.82
17.5	1.4	4.0	0	6.15	0.195	6.345
17.5	1.4	0.0	2.2	0.423	3.276	3.699

PHENOL C_6H_5OH.

Solubility in Water.

(Alexejew — Wied. Ann. 28, 305, '86; Schreinemaker — Z. physik. Ch. 33, 79, '00; Rothmund — *Ibid* 26, 474. '98.)

Determinations were made by the "Synthetic Method," for which see Note, page 9.

t°.	Grams Phenol per 100 Grams Aqueous Layer.	Phenol Layer.
10	7.5	75.0
20	8.3	72.1
30	8.8	69.8
40	9.6	66.9
50	12.0	62.7
55	14.1	59.5
60	16.7	55.4
65	21.9	49.2
68.3 (crit. temp.)	33.4	

Vaubel — J. pr. Ch. [2] 52, 73, '95, states that 100 grams sat. aqueous solution contain 6.1 grams phenol at 20°. Sp. Gr. of solution = 1.0057.

Solubility of Phenic Acid (Phenol, C_6H_5OH) in Paraffine and in Benzene.

(Schweissinger — Pharm. Ztg. '84–'85.)

Solvent.	Grams C_6H_5OH per 100 Grams Solvent at: 16°.	21°.	25°.	43°.
Paraffine	1.66	...	...	5.0
Benzene	2.5	8.33	10.0	100.0

Solubility of Phenol in Aqueous Acetone Solutions.

(Schreinemaker.)

t°.	In 4.24 % Acetone. Grams Phenol per 100 Gms. Aq. Acetone Layer.	Phenol Layer.	In 12.2% Acetone. Gms. Phenol per 100 Gms. Aq. Acetone Layer.	Phenol Layer.	In 24.4% Acetone. Gms. Phenol per 100 Gms. Aq. Acetone Layer.	Phenol Layer.	In 59.9% Acetone. Gms. Phenol per 100 Gms. Aq. Acetone Layer.	Phenol Layer
20	...	...	...	...	...	...	26.0	60.5
30	5.0	74.0	4.0	71.0	6.0	69.5	28.5	57.0
40	5.5	70.0	...	...	...	...	32.0	52.0
50	5.7	67.0	5.0	67.0	8.0	64.0	34.5§	49.0§
60	6.5	61.0	...	...	...	...	36.5‖	46.5‖
70	9.0	51.0	7.5	57.5	19.0	57.0	(49.5°) 41.5	
80	14.0	34.0	10.5	49.5	14.0	52.5		
	(84°) 22.5		20.4*	30.5*	23.0†	47.0†		
			(90.3°) 25.0		26.5‡	44.0‡		
					(90.5°) 35.0			

*90° †85° ‡87°.5 §45° ‖47°.5

The figures in the above table were read from curves plotted from the original results.

Solubility of Phenol in Aqueous Solutions *d* Tartaric Acid.

(Schreinemaker.)

t°.	In 5.093% Acid. Gms. Phenol per 100 Gms. Aq. Acid Layer.	Phenol Layer.	t°.	In 19.34% Acid. Gms. Phenol per 100 Gms. Aq. Acid Layer.	Phenol Layer.	t°.	In 40.9% Acid. Gms. Phenol per 100 Gms. Aq. Acid Layer.	Phenol Layer.
30	7.5	72.5	50	10.0	77.0	70	13.0	...
50	10.5	65.5	60	12.5	72.0	80	16.5	77.0
60	14.5	58.0	70	19.0	64.0	85	20.0	74.0
65	19.5	53.0	75	29.0	56.0	90	26.5	71.0
67.5	25.0	48.5	77	47.0		95	39.0	63.5
69	47.5					97	54.0	

Distribution of Phenol between:

Amyl Alcohol and Water at 25°.

(Herz and Fischer — Ber. 37, 4747, '04.)

Millimols Phenol per 10 cc. Alcoholic Layer.	Aqueous Layer.	Gms. Phenol per 100 cc. Alcoholic Layer.	Aqueous Layer.
0.75	0.047	0.705	0.0441
0.9	0.05	0.846	0.047
1.1	0.07	1.035	0.066
2.6	0.16	2.445	0.150
54.1	3.83	50.88	3.601
56.3	3.9	52.93	3.667

Benzene and Water at 20°.

(Vaubel — J. pr. Ch. [2] 67, 476, '03.)

Volumes of Solvents used per 1 Gm. Phenol	Gms. Phenol in: H_2O Layer.	C_6H_6 Layer
50 cc. H_2O + 50 cc. C_6H_6	0.286	0.714
" + 100 cc. "	0.1188	0.8212
" + 150 cc. "	0.0893	0.9107
" + 200 cc. "	0.0893	0.9107

DISTRIBUTION OF PHENOL BETWEEN WATER AND BENZENE AND BETWEEN AQUEOUS K_2SO_4 SOLUTIONS AND BENZENE AT 25°.

(Rothmund and Wilsmore — Z. physik. Ch. 40, 623, '02.)

NOTE. — The original results, which are given in terms of gram mols. per liter, were calculated to grams per liter, and plotted on cross-section paper. The following figures were read from the curves obtained.

Between H_2O and C_6H_6. Grams C_6H_5OH per Liter of: H_2O Layer.	C_6H_6 Layer.	Effect of K_2SO_4 upon the Distribution. Gms. K_2SO_4 per Liter Aq. Solution.	(1) Gms. C_6H_5OH per Liter of: Aq. Layer.	C_6H_6 Layer.	(2) Gms. C_6H_5OH per Liter of: Aq. Layer.	C_6H_6 Layer.
5	10	1.36	17.08	59.96	9.52	26.28
10	28	2.72	16.92	60.63	9.50	26.38
15	52	5.44	16.85	60.92	9.46	26.55
20	84	10.89	16.44	62.73	9.35	27.06
25	128	21.79	15.89	65.19	9.09	28.27
30	200	43.59	14.85	69.71	8.68	30.21
35	300	87.18	12.92	78.00	7.79	34.38
40	410					
45	520					
50	610					

(1) First series. (2) Second series.

DISTRIBUTION OF PHENOL AT 25° BETWEEN:

(Herz and Fischer — Ber. 38, 1143, '05.)

Water and Toluene. Millimols C_6H_5OH per 10 cc. $C_6H_5CH_3$ Layer.	H_2O Layer.	Grams C_6H_5OH per 100 cc. $C_6H_5CH_3$ Layer.	H_2O Layer.	Water and *m* Xylene. Millimols C_6H_5OH per 10 cc. $mC_6H_4(CH_3)_2$ Layer.	H_2O Layer.	Grams C_6H_5OH per 100 cc. $mC_6H_4(CH_3)_2$ Layer.	H_2O Layer.
1.244	0.724	1.169	0.681	1.610	1.071	1.514	1.007
3.047	1.469	2.865	1.381	4.787	2.726	4.501	2.563
4.667	2.200	4.389	2.068	12.210	5.168	11.22	4.860
6.446	2.861	6.061	2.691	22.718	6.994	21.36	6.577
14.960	4.750	14.07	4.467	34.827	8.124	32.75	7.640
17.725	5.346	16.69	5.027	51.352	9.123	48.28	8.578
47.003	7.706	44.20	7.246	77.703	10.050	73.07	9.450
53.783	8.087	50.58	7.604				
90.287	9.651	84.89	9.074				

DISTRIBUTION OF PHENOL BETWEEN WATER AND CARBON TETRA CHLORIDE AT 20°.

(Vaubel — J. pr. Ch. [2] 67, 476, '03.)

Gms. Phenol Used.	Volumes of Solvents.	Grams Phenol in: H_2O Layer.	CCl_4 Layer.
1	50 cc. H_2O + 10 cc. CCl_4	0.8605	0.1285
1	" + 20 cc. "	0.7990	0.1900
1	" + 30 cc. "	0.7275	0.2615
1	" + 50 cc. "	0.6435	0.3455
1	" + 100 cc. "	0.4680	0.5210
1	" + 150 cc. "	0.3645	0.6245
1	" + 200 cc. "	0.3240	0.6650

PHENOLATE of Phenyl Ammonium.

SOLUBILITY IN WATER.

Figures read from Curve. (Alexejew — Wied. Ann. 28, 305, '86.)

By Synthetic Method, See page 9.

t°.	Gms. Phenolate per 100 Gms. Aq. Layer.	Gms. Phenolate per 100 Gms. Phenolate Layer.	t°.	Gms. Phenolate per 100 Gms. Aq. Layer.	Gms. Phenolate per 100 Gms. Phenolate Layer.
10	3	94	110	9	76
30	4	93	120	12	69
50	5	91	130	17.5	60
70	6	87.5	140 (crit. temp.)	40	
90	7	83			

PHENYL (Di) AMINES $C_6H_4(NH_2)_2$.

SOLUBILITY IN WATER AT 20°.

(Vaubel — J. pr. Ch. [2] 52, 73, '95.)

Amine.	Gms. per 100 Gms. Solution.	Sp. Gr. of Solution.
m Phenyl di Amine	23.8	1.0317
p "	3.7	1.0038

Nitro PHENOLS $C_6H_4.OH.NO_2$.

100 grams saturated aqueous solution contain: 0.208 gram ortho, 2.14 grams meta, 1.32 grams para nitro phenol at 20°.

(Vaubel.)

Di Nitro PHENOL $C_6H_3.OH.(NO_2)_2$.

SOLUBILITY IN ALCOHOLS AT 19.5°.

(de Bruyn — Z. physik. Ch. 10, 784, '92.)

100 grams abs. methyl alcohol dissolve 6.3 grams $C_6H_3.OH.(NO_2)_2$.
100 grams abs. ethyl alcohol dissolve 3.9 grams $C_6H_3.OH.(NO_2)_2$.

SOLUBILITY OF MIXTURES OF *s* TRI BROM PHENOL AND *s* TRI CHLOR PHENOL IN METHYL ALCOHOL AT 25°.

(Thiel — Z. physik. Ch. 43, 667, '03; from Wurfel — Dissertation Marburg, '96.)

Molecular per cent $C_6H_2.OH.Br_3$ In Solid.	Molecular per cent $C_6H_2.OH.Br_3$ In Solution.	*n* Solubility of $C_6H_2.OH.Cl_3$.	*n* Solubility of $C_6H_2.OH.Br_3$.	Total.
0	0	0.204	0	0.204
4.49	3.59	0.194	0.007	0.201
10.13	7.58	0.191	0.016	0.206
16.28	12.15	0.172	0.024	0.196
62.44	13.07	0.204	0.031	0.235
69.88	15.86	0.150	0.028	0.178
81.76	19.01	0.096	0.023	0.118
84.66	24.05	0.069	0.022	0.091
87.53	32.46	0.043	0.021	0.063
93.62	47.87	0.021	0.019	0.040
100.0	100.0	0.0	0.019	0.019

PHENYL SALICYLATE (Salol) $C_6H_4(OH).COOC_6H_5$ 1:2.

100 grams H_2O dissolve 0.043 gram salicylate at 25°. 100 grams alcohol dissolve 20.0 grams at 25°.

(U. S. P.)

Di **PHENYL** $C_6H_5.C_6H_5$.

100 grams absolute methyl alcohol dissolve 6.57 grams at 19.5°. 100 grams abs. ethyl alcohol dissolve 9.98 grams at 19.5°.

(de Bruyn — Z. physik. Ch. 10, 784, '92.)

PHOSPHO MOLYBDIC ACID $P_2O_5.20MoO_3.52H_2O$.

SOLUBILITY IN ETHER.

(Parmentier — Compt. rend. 104, 686, '87.)

t°	0°	8.1°	19.3°	27.4°	32.9°
Gms. Acid per 100 gms. Ether	80.6	84.7	96.7	103.9	107.9

PHOSPHORUS P. (yellow)

SOLUBILITY IN BENZENE.

(Christomanos — Z. anorg. Ch. 45, 136, '05.)

t°.	Gms. P per 100 Gms. C_6H_6.	Sp. Gr. of Solution.	t°.	Gms. P per 100 Gms. C_6H_6.	Sp. Gr. of Solution.	t°.	Gms. P per 100 Gms. C_6H_6
0	1.513	...	23	3.399	0.8875	50	6.80
5	1.99	...	25	3.70	0.8861	55	7.32
8	2.31	0.8990	30	4.60	...	60	7.90
10	2.4	0.8985	35	5.17	...	65	8.40
15	2.7	0.894	40	5.75	...	70	8.90
18	3.1	0.892	45	6.11	...	75	9.40
20	3.2	0.890				81	10.03

SOLUBILITY OF PHOSPHORUS IN ETHER.

(Christomanos.)

t°.	Gms. P per 100 Gms. $(C_2H_5)_2O$.	Sp. Gr. of Solutions.	t°.	Gms. P per 100 Gms. $(C_2H_5)_2O$.	Sp. Gr. of Solutions.	t°.	Gms. P per 100 Gms. $(C_2H_5)_2O$.
0	0.434	...	15	0.90	0.723	28	1.60
5	0.62	...	18	1.01	0.719	30	1.75
8	0.79	0.732	20	1.04	0.718	33	1.80
10	0.85	0.729	23	1.12	0.722	35	2.00
			25	1.39	0.728		

100 grams CS_2 dissolve about 1750 grams yellow P at room temperature.

(Vogel — Jahresber. Chem. 149, '68.)

100 grams alcohol of 0.799 Sp. Gr. dissolve 0.312 gram P cold and 0.416 gram hot.

(Buchner)

SOLUBILITY OF YELLOW PHOSPHORUS IN SEVERAL SOLVENTS AT 15°.

(Stich — Pharm. Ztg. 48, 343, '03.)

Solvent.	Gms. P per 100 Gms. Solution.
Almond Oil	1.25
Oleic Acid	1.06
Paraffine	1.45
Water	0.0003
Acetic Acid	0.105

PHTHALIC ACIDS $C_6H_4(COOH)_2$.

SOLUBILITY IN WATER.

(Vaubel — J. pr. Ch. [2] 52, 73, '95; 59, 30, '99.)

Acid.	t°.	Gms. per 100 Gms. Solution.
o Phthalic Acid	14	0.54
Iso Phthalic Acid	25	0.013
Tere Phthalic Acid	..	almost insoluble

SOLUBILITY OF *o* PHTHALIC ACID IN ALCOHOL AND IN ETHER AT 15°.

(Bourgoin — Ann. chim. phys. [5] 13, 406, '78.)

Solvent.	Grams $C_6H_4(COOH)_2$ *o* per 100 Grams Solution.	Solvent.
Absolute Alcohol	9.156	11.70
90 per cent Alcohol	10.478	10.08
Ether	0.679	0.684

PHTHALIC ANHYDRIDE $C_6H_4<\genfrac{}{}{0pt}{}{CO}{CO}>O$.

SOLUBILITY IN WATER.

(van der Stadt — Z. physik. Ch. 41, 358, '02.)

All determinations, except first three, made by the Synthetic Method. See page 9.

t°.	Grams $C_8H_4O_3$ per 100 Gms. Water.	Solution.	Mol. per cent $C_8H_4O_3$.	t°.	Grams $C_8H_4O_3$ per 100 Gms. Water.	Solution.	Mol. per cent $C_8H_4O_3$
0	0.00295	0.00295	0.00036	189.5	1076	91.66	56.73
25	0.6194	0.6150	0.0754	188.8	1265	92.68	60.63
50	1.630	1.604	0.198	187.1	1474	93.65	64.22
135.9	94.3	48.54	10.30	181.8	2332	95.88	73.95
165.4	210.0	67.75	20.36	176.2	3334	97.07	80.23
179.4	319.3	76.13	27.98	169.4	5745	98.28	87.49
186.2	449.6	81.81	35.37	130.9	37570	99.72	97.89
189.6	546.1	84.50	39.93	131.0	83010	99.86	99.02
191.0	821.5	89.19	50.00	131.2	∞	100.00	100.00
190.4	863.4	89.62	51.24				

On page 362 of the original paper the solubility of $C_8H_4O_3$ at 0° is given as 0.2722 gram per 100 grams of solution.

Solubility of Phthalic Anhydride in Carbon Bisulphide.

(Arctowski — Compt. rend. **121,** 123, '95; Etard — Ann. chim. phys. [7] **2,** 570, '94.)

t°.	Gms. $C_8H_4O_3$ per 100 Gms. Solution.	t°.	Gms. $C_8H_4O_3$ per 100 Gms. Solution.	t°.	Gms. $C_8H_4O_3$ per 100 Gms. Solution.
−112.5	0.013	+10	0.3	70	2.3
− 93	0.013	20	0.7	90	3.7
− 77.5	0.016	30	0.8	100	5.0
− 40	0.03	40	1.2	120	8.0
− 20	0.06	50	1.3	140	13.3
− 10	0.10	60	1.7	160	20.7
0	0.20			180	30.2

PHYSOSTIGMINE SALICYLATE $C_6H_4(OH)COOH.C_{15}H_{21}N_3O_2$ and Physostigmine Sulphate $H_2SO_4(C_{15}H_{21}N_3O_2)_2$.

Solubility in Water, Alcohol, etc.

(U. S. P.)

Solvent.	t°.	Gms. per 100 Gms. Solvent. Salicylate.	Sulphate.
Water	25	1.38	very soluble
Water	80	6.66	"
Alcohol	25	7.87	"
Alcohol	60	25.00	"
Chloroform	25	11.6	"
Ether	25	0.57	0.083

PICRIC ACID $C_6H_2.OH.(NO_2)_3$.

Solubility in Water.

(Dolinski — Ber. **38,** 1836, '05; Findlay — J. Ch. Soc. **81,** 1219, '02.)

t°.	Gms. $C_6H_3N_3O_7$ per 100 Grams Solution.	Water.		t°.	Gms. $C_6H_3N_3O_7$ per 100 Grams Solution.	Water.	
0	0.67 (D.)	0.68 (D.)	1.05 (F.)	60	2.77 (D.)	2.81 (D.)	3.17 (F.)
10	.80	0.81	1.10	70	3.35	3.47	3.89
20	1.10	1.11	1.22	80	4.22	4.41	4.66
30	1.38	1.40	1.55	90	5.44	5.72	5.49
40	1.75	1.78	1.98	100	6.75	7.24	6.33
50	2.15	2.19	2.53				

Dolinski does not refer to the previous determinations of Findlay.

Solubility of Picric Acid in Water and in Aqueous Salt Solutions at 25°.

(Levin — Z. physik. Ch. 55, 520, '06.)

One liter of aqueous solution contains 0.05328 gram mols. = 12.20 grams $C_6H_2.OH(NO_2)_3$ at 25°.

Gm. Mols. Salt per Liter.	Gram Mols. Picric Acid per Liter in Aq. Solutions of: NaCl.	NaNO₃.	Na₂SO₄.	LiCl.	Li₂SO₄.	NH₄Cl.
0.01	0.05524	0.05529	0.05604	0.05480	0.05661	0.05487
0.02	0.05559	0.05872	0.05872	0.05558	0.06053	0.05540
0.05	0.05729	0.06632	0.06632	0.05703	0.06691	0.05771
0.07	0.05862	0.07093	0.07093	0.05878	0.07013	0.05865
0.10	0.05902	0.07670	0.07670	0.06132	0.07437	...
0.50	0.0790	...	...	...	0.123	...
1.00	0.1180	...	...	...	0.149	...

Gm. Mols. Salt per Liter.	Grams Picric Acid per Liter in Aq. Solutions of: NaCl.	NaNO₃.	Na₂SO₄.	LiCl.	Li₂SO₄.	NH₄Cl.
0.01	12.66	12.67	12.83	12.55	12.97	12.57
0.02	12.74	13.45	13.45	12.74	13.87	12.69
0.05	13.12	15.19	15.19	13.06	15.33	13.22
0.07	13.43	16.25	16.25	13.47	16.06	13.44
0.10	13.52	17.57	17.57	14.05	17.04	...
0.50	18.09	...	...	...	28.18	...
1.00	26.98	...	...	...	34.14	...

Solubility in Aq. Cane Sugar.

Gm. Mols. Sugar per Liter.	Picric Ac. per Liter Solution. Gm. Mols.	Gms.	Sp. Gr. Solution.
0.10	0.05202	11.92	1.0122
0.25	0.04978	11.40	1.0319
0.50	0.0482	11.04	1.0654
1.00	0.0443	10.15	1.1294

Solubility in Aq. Grape Sugar.

Gm. Mols. Grape Sugar per Liter.	Picric Acid per Liter Sol. G. Mols.	Gms.
0.10	0.0530	12.14
0.25	0.0521	11.93
0.50	0.0509	11.66
1.00	0.0474	10.86

Solubility of Picric Acid in Absolute Alcohol.

(Behrend — Z. physik. Ch. 10, 265, '92.)

100 gms. sat. solution contain 5.53 grams $C_6H_3N_3O_7$ at 12.3°, and 5.92 grams at 14.8°. Sp. Gr. of the latter solution = 0.8255.

Solubility of Picric Acid in Benzene.

(Findlay.)

t°.	Gms. $C_6H_3N_3O_7$ per 100 Gms. C_6H_6.	Mols. $C_6H_3N_3O_7$ per 100 Mols. C_6H_6.	t°	Gms. $C_6H_3N_3O_7$ per 100 Gms. C_6H_6.	Mols. $C_6H_3N_3O_7$ per 100 Mols. C_6H_6.
5	3.70	1.26	38.4	26.15	8.88
10	5.37	1.83	45	33.57	11.40
15	7.29	2.48	55	50.65	17.21
20	9.56	3.25	58.7	58.42	19.83
25	12.66	4.30	65	71.31	24.20
26.5	13.51	4.60	75	96.77	32.92
35	21.38	7.26			

Solubility of Picric Acid in Ether.

(Bougault — J. pharm. chim. [6] 18, 116, '03; — Apoth.-Ztg. 21, 74, '06.)

Solvent.	t °.	Gms. $C_6H_3N_3O_7$ per Liter.	
Ether of Sp. Gr. 0.721	13	10.8	(B.)
Ether of Sp. Gr. 0.725 (0.8 pt. H_2O per 100)	13	36.8	"
Ether of Sp. Gr. 0.726 (1.0 pt. H_2O per 100)	13	40.0	"
Ether saturated with H_2O	15	51.2	
H_2O saturated with Ether	15	13.8	

Distribution of Picric Acid at 25° between:

Water and Amyl Alcohol.

(Herz and Fischer — Ber. 37, 4747, '04.)

Millimols $C_6H_3N_3O_7$ per 10 cc.		Gms. $C_6H_3N_3O_7$ per 100 cc.	
Aq. Layer.	Alcohol Layer.	Aq. Layer.	Alcohol Layer.
0.0553	0.0930	0.127	0.213
0.0920	0.1850	0.211	0.424
0.1613	0.4127	0.369	0.946
0.1869	0.5182	0.428	1.188
0.3161	1.079	0.724	2.473
0.4471	1.638	1.024	3.753
0.5624	2.189	1.288	5.017
0.6423	2.549	1.472	5.839

Water and Toluene.

(H. and F. — Ber. 38, 1142, '05.)

Millimols $C_6H_3N_3O_7$ per 10 cc.		Gms. $C_6H_3N_3O_7$ per 100 cc.	
Aq. Layer.	Toluene Layer.	Aq. Layer.	Toluene Layer.
0.075	0.126	0.172	0.289
0.109	0.230	0.250	0.527
0.163	0.482	0.374	1.104
0.244	1.026	0.559	2.351
0.389	2.347	0.891	5.380
0.496	3.747	1.137	8.586
0.583	5.135	1.336	11.770

Distribution of Picric Acid at 25° between:

Water and Bromoform.

(Herz and Lewy — Z. Electrochem. 11, 820, '05.)

Millimols $C_6H_3N_3O_7$ per 10 cc.		Gms. $C_6H_3N_3O_7$ per 100 cc.	
Aq. Layer.	Bromoform Layer.	Aq. Layer.	Bromoform Layer.
0.321	0.365	0.736	0.836
0.401	0.515	0.919	1.180
0.475	0.655	1.088	1.501
0.575	0.871	1.317	1.995
0.674	1.14	1.545	2.612

Water and Chloroform.

(H. and L.)

Millimols $C_6H_3N_3O_7$ per 10 cc.		Gms. $C_6H_3N_3O_7$ per 100 cc.	
Aq. Layer.	Chloroform Layer.	Aq. Layer.	Chloroform Layer.
0.207	0.254	0.474	0.582
0.329	0.547	0.754	1.253
0.488	1.09	1.118	2.498
0.561	1.41	1.285	3.230
0.588	1.53	1.348	3.505

PILOCARPINE HYDROCHLORIDE $C_{11}H_{16}N_2O_2.HCl$, Pilocarpine Nitrate $C_{11}H_{16}N_2O_2.HNO_3$, and Piperine $C_{17}H_{19}NO_3$ in Several Solvents.

(U. S. P.)

Solvent.	t °.	Grams per 100 Grams Solvent.		
		$C_{11}H_{16}N_2O_2.HCl$.	$C_{11}H_{16}N_2O_2.HNO_3$.	$C_{17}H_{19}NO_3$.
Water	25	333	25	insoluble
Alcohol	25	4.35	1.66	6.66
Alcohol	60	9.09	6.2	22.7
Chloroform	25	0.18	...	58.8
Ether	25	...	...	2.8

Solubility of Platinum Alloys in Nitric Acid.

(Winkler — Z. anal. Ch. 13, 369, '74.)

Alloy.	Approx. per cent Pt in Alloy.	Grams Alloy Dissolved per 100 Grams HNO_3 Solution of 1.398 Sp. Gr.	1.298 Sp. Gr.	1.190 Sp. Gr.	1.298 Sp. Gr.
Pt and Silver	10	57	44	69	37
"	5	69	57	51	35
"	2.5	62	61	69	..
"	1	75	70	76	..
Pt and Copper	10	46	27	11	51
"	5	36	34	14	41
"	2.5	51	40	30	..
"	1	52	41	37	..
Pt and Lead	10	7	9	8	..
"	5	8	9	10	..
"	2.5	22	17	11	..
"	1+	21	18	23	..
Pt and Bismuth	10	14	19	4	3
"	5	21	20	6	18
"	2.5	25	42	8	..
"	1	49	64	10	..
Pt and Zinc	10	10	11	19	5
"	5	16	12	6	11
"	2.5	16	24	19	..
"	1	20	32	37	..

PLATINUM BROMIDE $PtBr_4$.

100 grams sat. aqueous solution contain 0.41 gram PtBr4 at 20°.

(Halberstadt — Ber. 17, 2962, '84.)

PLATINIC POTASSIUM BROMIDE K_2PtBr_6.

100 grams sat. aqueous solution contain 2.02 grams K_2PtBr_6 at 20°.

(Halberstadt.)

PLATINIC DOUBLE CHLORIDES of Ammonium, Caesium, Potassium, Rubidium and Thallium.

Solubility in Water.

(Crookes — Chem. News 9, 37, 205, '64; Bunsen — Pogg. Ann. 113, 337, '61.)

t°.	Grams per 100 Grams Water. $(NH_4)_2PtCl_6$.	Cs_2PtCl_6.	K_2PtCl_6.	Rb_2PtCl_6.	Tl_2PtCl_6.
0	...	0.024	0.74	0.184	...
10	0.666 (15°)	0.050	0.90	0.154	0.0064 (15°)
20	...	0.079	1.12	0.141	...
25	...	0.095	1.26	0.143	...
30	...	0.110	1.41	0.145	...
40	...	0.142	1.76	0.166	...
50	...	0.177	2.17	0.203	...
60	...	0.213	2.64	0.253	...
70	...	0.251	3.19	0.329	...
80	...	0.291	3.79	0.417	...
90	...	0.332	4.45	0.521	...
100	1.25	0.377	5.18	0.634	0.050

SOLUBILITY OF AMMONIUM PLATINIC CHLORIDE AND OF POTASSIUM PLATINIC CHLORIDE IN ALCOHOL AT 15°–20°.

(Fresenius; Peligot — Z. anal. Ch. 36, 322, '97.)

Solvent.	Gms. per Liter Solution. $(NH_4)_2PtCl_6$.	K_2PtCl_6.	Solvent.	Gms. per Liter Solution. $(NH_4)_2PtCl_6$.	K_2PtCl_6.
55% Alcohol	0.150	...	95% Alcohol	0.0037	0.030
76 "	0.067	0.026	Abs. "	...	0.0082–0.0023
85 "	...	0.180	80 Vol.% Alcohol + 20 Vol. % Ether	...	0.027
90 "	...	0.100	Abs. Methyl Alcohol	...	0.072

PLATINO AMINES.

SOLUBILITY IN WATER.

(Cleve.)

Amine.	Formula.	Gms. per 100 Gms. H_2O.	
Platino Semi Di Amine Chloride	$Pt<^{(NH_3)_2.Cl}_{Cl}$	0.26 at 0°	3.4 at 100°
Chloro Platin Amine Chloride	$Cl_2Pt<^{NH_3Cl}_{NH_3Cl}$	0.14 "	3.0 "
Chloro Platin Semi Diamine Chloride	$Cl_3Pt(NH_3)_2Cl$	0.33 "	1.54 "

POTASSIUM ACETATE CH_3COOK.

SOLUBILITY IN WATER.

100 gms. sat. aq. solution contain 73.65 gms. CH_3COOK, or 100 gms. H_2O dissolve 286.3 gms. at 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 gms. H_2O dissolve 188 gms. CH_3COOK at 5°, 229 gms. at 13.9°, 492 gms. at 62°.

(Osann.)

100 gms. 99 per cent ethyl alcohol dissolve 33.3 gms. CH_3COOK at 15°, and 50.0 gms. at 80°.

POTASSIUM (Di Hydrogen) ARSENATE KH_2AsO_4.

100 gms. sat. aq. solution contain 15.9 gms. KH_2AsO_4, or 100 gms. H_2O dissolve 18.86 gms. at 6°. Sp. Gr. of solution = 1.1134.

(Field — J. Ch. Soc. 11, 6, '59.)

POTASSIUM BENZOATE $KC_7H_5O_2.3H_2O$.

SOLUBILITY IN WATER.

(Paietta — Gazz. chim. ital. 36, II, 67, '06.)

t°.	17.5°	25°	33.3°	50°
Gms. $KC_7H_5O_2$ per 100 Gms. Solution.	41.4	42.4	44.0	46.6

Solubility of Potassium Borates in Water at 30°.

(Dukelski — Z. anorg. Chem. 50, 42, '06, complete references given.)

Gms. per 100 Gms. Solution.		Gms. per 100 Gms. Residue.		Solid Phase.
K_2O.	B_2O_3.	K_2O.	B_2O_3.	
47.50	...	...	...	$KOH.2H_2O$
46.36	0.91	46.13	9.02	$K_2O.B_2O_3.2\frac{1}{2}H_2O$
40.51	1.25	41.62	9.71	"
36.82	1.80	39.90	13.19	"
32.74	3.51	37.22	14.58	"
29.63	6.98	35.05	17.92	"
24.84	17.63	30.02	21.70	"
23.30	18.19	26.84	31.49	$K_2O.2B_2O_3.4H_2O$
16.21	13.10	25.12	33.18	"
11.78	9.82	20.57	26.43	"
9.18	8.00	22.38	31.30	"
6.22	9.13	20.87	31.06	"
7.73	13.37	22.21	36.24	$K_2O.2B_2O_3.4H_2O + K_2O.5B_2O_3.8H_2O$
7.81	13.28	17.50	34.18	"
7.71	13.21	11.49	34.81	$K_2O.5B_2O_3.8H_2O$
7.63	13.28	12.51	40.52	"
3.42	7.59	10.77	37.35	"
1.80	4.15	5.88	20.00	"
0.51	3.19	10.81	40.89	"
0.33	4.58	7.72	34.21	$K_2O.5B_2O_3.8H_2O + B(OH)_3$
0.31	4.46	3.91	30.68	"
...	3.54	...	...	"

POTASSIUM (Fluo) BORIDE KBF_4.

100 gms. H_2O dissolve 0.44 gm. KBF_4 at 20°, and 6.27 gms. at 100°
(Stolba — Chem. techn. Centr. Anz. 7, 459, '89.)

POTASSIUM BROMATE $KBrO_3$.

Solubility in Water.

(Kremers — Pogg. Ann. 97, 5, '56; Rammelsberg — *Ibid.* 55, 79, '42; Pohl — Sitzber. Akad. Wiss Wien. 6, 595, '51.)

t°.	Gms. $KBrO_3$ per 100 Gms. Water.	Gms. $KBrO_3$ per 100 Gms. Solution.	t°.	Gms. $KBrO_3$ per 100 Gms. Water.	Gms. $KBrO_3$ per 100 Gms. Solution.
0	3.1	3.0	40	13.2	11.7
10	4.8	4.6	50	17.5	14.9
20	6.9	6.5	60	22.7	18.5
25	8.0	7.4	80	34.0	25.4
30	9.5	8.7	100	50.0	33.3

Sp. Gr. of solution saturated at 19.5° = 1.05.

Solubility of Potassium Bromate in Aqueous Solutions of Sodium Nitrate and of Sodium Chloride.

(Geffcken — Z. physik. Chem. 49, 296, '04.)

In Sodium Nitrate.

Grams per Liter. $NaNO_3$.	Grams per Liter. $KBrO_3$.	Mols. $KBrO_3$ per Liter.
0.0	78.79	0.4715
42.54	96.01	0.5745
85.09	108.6	0.6497
170.18	128.3	0.7680
255.27	150.9	0.9026
340.36	172.3	1.031

In Sodium Chloride.

Grams per Liter. NaCl.	Grams per Liter. $KBrO_3$.	Mols. $KBrO_3$ per Liter.
0.0	78.79	0.4715
29.25	82.24	0.5220
58.50	93.87	0.5616
117.0	100.9	0.6042
175.5	104.3	0.6244
234.0	106.9	0.6400

POTASSIUM BROMIDE KBr.

Solubility in Water.

(Average curve from results of Meusser — Z. anorg. Chem. 44, 79, '05; Etard — Compt. rend. 98, 1432, '84; Ann. chim. phys. [7] 2, 526, '94; de Coppet — *Ibid.* [5] 30, 416, '83; Tilden and Shenstone — Phil. Trans. 175, 23, '84.)

t°.	Grams KBr per 100 Grams Solution.	Grams KBr per 100 Grams Water.	t°.	Grams KBr per 100 Grams Solution.	Grams KBr per 100 Grams Water.
− 6.5	20.0	25.0	30	41.4	70.6
− 8.5	26.5	35.7	40	43.0	75.5
−10.5	29.5	41.8	50	44.5	80.2
−11.5	31.2	45.3	60	46.1	85.5
−10	31.8	46.7	70	47.4	90.0
− 5	33.3	50.0	80	48.7	95.0
0	34.9	53.5	90	49.8	99.2
5	36.1	56.5	100	51.0	104.0
10	37.3	59.5	110	52.3	109.5
15	38.5	62.5	140	54.7	120.9
20	39.5	65.2	181	59.3	145.6
25	40.4	67.7			

Solubility of Mixtures of Potassium Bromide and Ammonium Bromide in Water at 25°.

(Fock — Z. Kryst. Min. 28, 357, '97.)

Grams per Liter Solution. NH_4Br.	Grams per Liter Solution. KBr.	Mol. per cent in Solution. NH_4Br.	Mol. per cent in Solution. KBr.	Sp. Gr. of Solutions.	Mol. per cent in Solid Phase. NH_4Br.	Mol. per cent in Solid Phase. KBr.
0.00	558.1	0.0	100	1.3756	0.00	100
6.4	554.2	1.38	98.62	1.3745	0.26	99.74
24.64	536.5	5.29	94.71	1.3733	1.27	98.73
51.34	516.8	10.77	89.23	1.3721	3.02	96.98
152.9	441.2	29.63	70.37	1.3711	8.42	91.58
262.2	347.3	47.84	52.16	1.3715	17.20	82.80
347.6	262.3	61.69	38.31	1.3753	27.98	72.02
381.4	260.3	64.03	35.97	1.3753	32.53	67.47
417.8	232.2	68.61	31.39	1.3766	39.45	60.55
432.5	222.3	70.27	29.73	1.3777	variable	variable
480.8	179.9	76.47	23.53	1.3766	98.53	1.47
577.3	0.0	100.0	0.0	1.3763	100.0	0.00

Solubility of Potassium Bromide in Aqueous Solutions of Potassium Hydroxide.

(Ditte — Compt. rend. 124, 30, '97.)

Grams per 1000 Grams H_2O. KOH.	KBr.	Grams per 1000 Grams H_2O. KOH.	KBr.
36.4	558.4	277.6	248.1
113.5	433.6	434.7	137.1
177.2	358.1	579.6	64.8
231.1	281.2	806.9	33.4

Solubility of Mixtures of Potassium Bromide and Chloride and of Mixtures of Potassium Bromide and Iodide in Water.

(Etard — Ann. chim. phys. [7] 3, 275, '97.)

t°.	Mixtures of KBr and KCl. Grams per 100 Gms. Solution. KBr.	KCl.	Mixtures of KBr and KI. Grams per 100 Grams Solution. KBr.	KI.
−20	17.5	10.5	9.2	42.5
0	21.5	10.8	9.9	45.3
10	23.2	11.0	10.2	46.6
20	24.8	11.2	10.5	47.5
25	25.5	11.3	10.7	48.0
30	26.3	11.4	10.9	48.6
40	28.0	11.5	11.2	49.6
60	30.6	11.8	11.9	51.3
80	33.4	12.1	12.6	52.7
100	35.7	12.6	13.2	53.8
120	38.0	12.9	14.0	54.8
150	40.6	13.4	14.9	55.5

Solubility of Potassium Bromide in Aqueous Solutions of Potassium Chloride, and of Potassium Chloride in Aqueous Solutions of Potassium Bromide, at 25.2°.

(Touren — Compt. rend. 130, 1252, '00.)

KBr in Aq. KCl Solutions.

Mols. per Liter. KCl.	KBr.	Grams per Liter. KCl.	KBr.
0.0	4.761	0.0	567.0
0.67	4.22	50.0	502.5
0.81	4.15	60.4	494.2
1.35	3.70	100.7	440.7
1.48	3.54	110.4	421.6
1.61	3.42	120.0	407.2
1.70	3.34	126.8	397.7
2.46	2.50	183.5	297.7
3.775	0.525	281.6	625.3

KCl in Aq. KBr Solutions.

Mols. per Liter. KBr.	KCl.	Grams per Liter. KBr.	KCl.
0.0	4.18	0.00	311.8
0.49	3.85	58.4	287.2
0.85	3.58	101.3	267.1
1.31	3.19	156.1	238.0
1.78	2.91	211.9	217.1
2.25	2.58	268.0	192.4
2.69	2.33	320.4	173.8

Solubility of Potassium Bromide in Aqueous Solutions of Potassium Nitrate, and of Potassium Nitrate in Aqueous Solutions of Potassium Bromide, at 14.5° and at 25.2°.

(Touren — Compt. rend. 130, 908, '00.)

KBr in Aqueous KNO_3 Solutions.

Mols. per Liter. KNO_3.	Mols. per Liter. KBr.	Grams per Liter. KNO_3.	Grams per Liter. KBr.
Results at 14.2°.			
0.0	4.332	0.0	515.9
0.362	4.156	36.6	494.9
0.706	4.093	71.4	487.4
1.235	3.939	124.9	469.1
Results at 25.2°.			
0.0	4.761	0.0	566.2
0.131	4.72	13.3	561.0
0.527	4.61	53.3	549.1
0.721	4.54	72.9	540.8
1.09	4.475	110.3	533.0
1.170	4.44	118.4	528.8
1.504	4.375	152.2	521.1

KNO_3 in Aq. KBr Solutions.

Mols. per Liter. KBr.	Mols. per Liter. KNO_3.	Grams per Liter. KBr.	Grams per Liter. KNO_3.
Results at 14.20°.			
0.0	2.228	0.0	225.4
0.356	2.026	42.4	205.0
0.784	1.835	93.4	185.7
1.092	1.730	130.0	175.0
1.577	1.587	187.8	160.6
2.542	1.406	302.7	142.2
3.536	1.308	421.1	132.3
Results at 25.2°.			
0.0	3.217	0.0	325.5
0.38	3.026	45.3	306.2
0.93	2.689	110.8	272.0
1.37	2.492	163.1	252.2
1.208	2.216	143.8	224.3
2.87	1.958	341.8	198.1
3.55	1.807	422.8	182.8

Solubility of Potassium Bromide in Alcohols at 25°.

(de Bruyn — Z. physik. Chem. 10, 783, '92; Rohland — Z. anorg. Chem. 18, 327, '98.)

Alcohol.	Grams KBr Dissolved by 100 Gms. Alcohol at: Room Temp. (R.).	25° (de B.).
Methyl Alcohol	1.92	1.51 Abs. Alcohol
Ethyl Alcohol	0.28 (Sp. Gr. 0.81)	0.13 "
Propyl Alcohol	0.055	...

Solubility of Potassium Bromide in Aqueous Alcohol.

(Taylor — J. Physic. Ch. 1, 724, '96–'97.)

Wt. per cent Alcohol in Solution.	Results at 30°. Gms. KBr per 100 Gms. Sat. Solution.	Results at 30°. Gms. KBr per 100 Gms. Solvent.	Results at 40°. Gms. KBr per 100 Gms. Sat. Solution.	Results at 40°. Gms. KBr per 100 Gms. Solvent.
0	41.62	71.30	43.40	76.65
5	38.98	67.25	40.85	72.70
10	36.33	63.40	38.37	69.00
20	31.09	56.40	33.27	62.30
30	25.98	50.15	28.32	56.45
40	21.24	44.95	23.22	50.46
50	16.27	38.85	18.11	44.25
60	11.50	32.50	13.02	37.40
70	6.90	24.70	7.98	28.90
80	3.09	15.95	3.65	18.95
90	0.87	8.80	1.03	10.45

100 gm. acetone dissolve 0.023 gm. KBr at 25°.

(Krug and McElroy — J. anal. Chem. 6, 184, '92.)

SOLUBILITY OF POTASSIUM BROMIDE AT 25° IN:

(Herz and Knoch — Z. anorg. Chem. 45, 262, '05.)

Aqueous Acetone.

cc. Acetone per 100 cc. Solvent.	Per 100 cc. Sat. Solution. Millimols KBr.	Gms. KBr.	Gms. H_2O.	Sp. Gr. Solutions.
0	481.3	57.3	80.6	1.3793
20	366.7	43.67	69.5	1.2688
30	310.5	36.98	62.97	1.2118
40	259.0	30.85	55.60	1.1558
50	202.9	24.16	47.60	1.0918
60	144.9	17.22	39.15	1.0275
70	95.3	11.35	29.78	0.9591
80	46.5	5.54	20.10	0.8942
90	10.1	1.20	10.15	0.8340

Aqueous Glycerine.

Wt. % Glycerine in Solvent.	KBr per 100 cc. Sol. Millimols.	Gms.	Sp. Gr. Solutions
0	481.3	57.32	1.3793
13.28	444.3	52.91	1.3704
25.98	404.0	48.11	1.3655
45.36	340.5	40.55	1.3594
54.23	310.4	36.98	1.3580
83.84	219.25	26.11	1.3603
100.00	172.65	20.56	1.3691

100 cc. sat. solution of potassium bromide in furfurol ($C_4H_3O.COH$) contain 0.139 gm. KBr at 25°. (Walden — Z. physik. Chem. 55, 713, '06.)

POTASSIUM BUTYRATE C_3H_7COOK.

100 grams water dissolve 296.8 grams C_3H_7COOK, or 100 grams sat. solution contain 74.8 grams at 31.25°.

100 grams of an aq. solution saturated with sugar and C_3H_7COOK contain 49.19 grams sugar + 34.78 grams C_3H_7COOK + 16.03 grams H_2O at 31.25°. (Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

POTASSIUM CARBONATE K_2CO_3.

POTASSIUM (Bi) **CARBONATE** $KHCO_3$.

SOLUBILITY OF EACH IN WATER.

(Mulder; Dibbits — J. pr. Chem. [2] 10, 439, '74.)

t°.	Grams K_2CO_3 per 100 Grams Solution.	Water.	Grams $KHCO_3$ per 100 Grams Solution.	Water.
0	47.2	89.4	18.3	22.4
10	52.2	109.0	21.7	27.7
20	52.8	112.0	24.9	33.2
30	53.3	114.0	28.1	39.0
40	54.0	117.0	31.2	45.3
60	56.0	127.0	37.5	60.0
100	60.9	156.0		

Köhler (loc. cit.) gives for the solubility of K_2CO_3 in water, 48.91 grams K_2CO_3 per 100 grams solution, or 95.9 grams per 100 grams H_2O at 31.25°. In saturated sugar solution at the same temperature he finds 56.0 grams sugar + 22.24 grams K_2CO_3 + 21.76 grams H_2O per 100 grams sat. solution. Engel (Ann. chim. phys. [6] **13**, 366, '88) finds 111.0 grams K_2CO_3 per 100 grams H_2O or 52.6 grams per 100 grams sat. solution at 0°. Sp. Gr. of solution = 1.542. For potassium bi carbonate he finds 23 grams $KHCO_3$ per 100 grams H_2O, or 18.7 grams per 100 grams solution. Sp. Gr. of solution = 1.127.

Solubility of Potassium Bi Carbonate in Aqueous Solutions of Potassium Carbonate at 0°.

(Engel.)

Milligram Mols. per 10 cc. Solution. $\frac{1}{2}K_2CO_3$.	Milligram Mols. per 10 cc. Solution. $KHCO_3$	Sp. Gr. of Solutions.	Grams per 100 cc. Solution. K_2CO_3.	Grams per 100 cc. Solution. $KHCO_3$.
0.0	21.15	1.133	0.0	21.2
17.14	15.28	1.182	11.8	15.3
24.10	12.65	1.203	16.7	12.6
34.50	10.25	1.241	23.8	10.3
49.20	7.55	1.298	34.0	7.6
62.14	5.86	1.350	43.0	5.9
74.60	4.90	1.398	51.6	4.9
87.50	3.75	1.448	60.5	3.8
117.75	0.0	1.542	81.4	0.0

Solubility of Potassium Carbonate in Aqueous Solutions of Ethyl and Propyl Alcohols at 20°.

(Linebarger — Am. Ch. J. 14, 380, '92; de Bruyn — Rec. trav. chim. 18, 87, '99.)

In Aq. Ethyl Alcohol. Wt. per cent C_2H_5OH in Solvent.	Gms. K_2CO_3 per 100 Gms. Sat. Solution.	Wt. per cent C_2H_5OH in Solvent.	Gms. K_2CO_3 per 100 Gms. Sat. Solution.	In Aq. Propyl Alcohol. Wt. per cent C_3H_7OH in Solvent.	Gms. K_2CO_3 per 100 Gms. Sat. Solution.
10	24	50	2.5	40	4.3
20	16	55	1.8	45	3.0
30	10	60	1.1	50	2.0
40	5.6	65	0.8	55	1.3
45	4	69	0.4	60	0.8
				65	0.5

100 grams glycerine of 1.225 Sp. Gr. dissolve 7.4 grams K_2CO_3.

(Vogel — N. Rep. Pharm. 16, 557, '67.)

POTASSIUM SODIUM CARBONATE $KNaCO_3.6H_2O$.

100 gms. H_2O dissolve 184 gms. salt at 15°. Sp. Gr. of sol. = 1366.

(Stolba — J. pr. Chem. 94, 406, '65.)

POTASSIUM URANYL CARBONATE $2K_2CO_3.(UO_2)CO_3$.

100 gms. H_2O dissolve 7.4 gms. salt at 15°.

(Ebelmen — Liebig's Ann. [3] 5, 189, '52.)

POTASSIUM CHLORATE $KClO_3$.

Solubility in Water.

(Gay-Lussac — Ann. chim. phys. 11, 314, 1819; Pawlewski — Ber. 32, 1040, '99; above 100°, Tilden and Shenstone — Proc. Roy. Soc. 35, 345, '81; see also Blarez — Compt. rend. 112, 1213, '91; Etard — Ann. chim. phys. [7] 2, 526, 94; at 99°, Köhler — Z. anal. Chem. 18, 242, '79.)

t°.	Gms. $KClO_3$ per 100 Gms. Solution.	Water.	Water.	t°.	Gms. $KClO_3$ per 100 Gms. Solution.	Water.	Water.
0	3.04	3.14	3.3*	70	22.55	29.16	32.5*
10	4.27	4.45	5.0	80	26.97	36.93	39.6
20	6.76	7.22	7.1	90	31.36	46.11	47.5
25	7.56	8.17	8.6	100	35.83	55.54	56.0
30	8.46	9.26	10.1	120	42.4	73.7	73.7
40	11.75	13.31	14.5	136	49.7	98.5	99.0
50	15.18	17.95	19.7	190	64.6	183.0	183.0
60	18.97	23.42	26.0	330	96.7	2930.00	...

* Gay Lussac.

Solubility of Potassium Chlorate in Aqueous Solutions of Potassium Bromide at 13°.

(Blarez — Compt. rend. 112, 1213, '91.)

Gms. per 100 Gms. Solution.		Gms. per 100 Gms. Solution.		Gms. per 100 Gms. Solution.	
KBr.	$KClO_3$.	KBr.	$KClO_3$.	KBr.	$KClO_3$.
0.20	5.18	1.0	5.04	6.0	3.46
0.60	5.20	2.0	4.60	8.0	2.80
0.8	5.06	3.0	4.2	10.0	2.40
		4.0	4.0		

Solubility of Potassium Chlorate in Aqueous Solutions of Other Potassium Salts at 14°–15°.

(Blarez.)

Salt.	Gms. per 100 Gms. Solution.		Salt.	Gms. per 100 Gms. Solution.	
	K Salt.	$KClO_3$.		K Salt.	$KClO_3$.
KOH	1.43	4.47	KNO_3	2.59	4.51
KCl	1.91	4.45	"	5.18	3.88
"	3.82	3.58	K_2SO_4	2.23	4.71
KBr	3.05	4.49	"	4.46	3.98
"	6.10	3.60	$K_2C_2O_4$	2.42	4.72
KI	4.25	4.59	"	4.85	3.93
"	8.51	3.65			

Solubility of Potassium Chlorate in Aqueous Solutions of Potassium Chloride at 20°.

(Winteler — Z. Electrochem. 7, 360, '00.)

Sp. Gr. of Solutions.	Grams per Liter.		Sp. Gr. of Solutions.	Grams per Liter.	
	KCl.	$KClO_3$.		KCl.	$KClO_3$.
1.050	0	71.1	1.098	120	24.5
1.050	10	58.0	1.108	140	22.5
1.050	20	49.0	1.119	160	21.0
1.054	40	39.5	1.130	180	20.0
1.064	60	34.0	1.140	200	20.0
1.075	80	30.0	1.168	250	20.0
1.086	100	27.0			

Solubility of Potassium Chlorate in Aqueous Solutions of Potassium Nitrate.

(Arrhenius — Z. physik. Chem. 11, 397, '93.)

Results at 19.85°.

Mols. per Liter.		Grams per Liter.	
KNO_3.	$KClO_3$.	KNO_3.	$KClO_3$
0.0	0.570	0.0	69.88
0.125	0.529	12.65	64.86
0.25	0.492	25.29	60.33
1.0	0.374	101.19	45.85
2.0	0.328	202.38	40.22

Results at 23.87°.

Mols. per Liter.		Grams per Liter.	
KNO_3.	$KClO_3$	KNO_3.	$KClO_3$.
0.0	0.645	0.0	79.09
0.5	0.515	50.59	63.14

Solubility of Potassium Chlorate:

(Taylor — J. Physic. Chem. 1, 720, '96–'97; see also Gerardin — Ann. chim. phys. [4] 5, 148, '65.)

Wt. per cent Alcohol or of Acetone in Solvent.	In Aqueous Alcohol. At 30°. Gms. $KClO_3$ per 100 Gms. Solution.	Water.	At 40°. Gms. $KClO_3$ per 100 Gms. Solution.	Water.	In Aqueous Acetone. At 30°. Gms. $KClO_3$ per 100 Gms. Solution.	Water.	At 40°. Gms. $KClO_3$ per 100 Gms. Solution.	Water.
0	9.23	10.17	12.23	13.93	9.23	10.17	11.23	13.93
5	7.72	8.80	10.48	12.33	8.32	9.56	11.10	13.11
10	6.44	7.65	8.84	10.77	7.63*	9.09	10.28*	12.60
20	4.51	5.90	6.40	8.56	6.09	8.10	8.27	11.26
30	3.21	4.74	4.67	7.00	4.93	7.40	6.69	10.24
40	2.35	4.00	3.41	5.88	3.90	6.76	5.36	9.45
50	1.64	3.33	2.41	4.94	2.90	5.98	4.03	8.40
60	1.01	2.53	1.41	3.69	2.03	5.17	2.86	7.35
70	0.54	1.82	0.78	2.63	1.24	4.18	1.68	5.68
80	0.24	1.22	0.34	1.73	0.57	2.88	0.79	3.97
90	0.06	0.62	0.12	1.17	0.18	1.82	0.24	2.45

* Solvent, 9.09 Wt. per cent Acetone.

100 grams glycerine dissolve 3.5 grams $KClO_3$ at 15.5°.
100 grams sat. solution of $KClO_3$ in glycol contain 0.9 gram $KClO_3$.

(de Coninck — Bul. acad. roy. Belgique, 359, '05.)

POTASSIUM (Per) CHLORATE $KClO_4$.

Solubility in Water and in Alcohol.

(Muir — Chem. News, 33, 15, '76; Wenze — Z. angew. Ch. 5, 691, '91.)

In Water. (M.) t°.	Gms. $KClO_4$ per 100 Gms. H_2O.	Sp. Gr. of Solutions.	In Alcohol. (W.) Wt. per cent Alcohol.	Gms. $KClO_4$ per 100 Gms. Alcohol.
6	0.7	1.0005	97.2	0.0156
25	1.9	1.0123	95.8	0.020
50	6.45	1.0181	90.0	0.036
100	20.0	1.0660		

POTASSIUM CHLORIDE KCl.

Solubility in Water.

(Average curve from the results of Meusser — Z. anorg. Chem. 44, 79, '05; at 31.25°, Köhler — Z. Ver. Zuckerind. 47, 447, '97; Andrae — J. pr. Chem. [2] 29, 456, '84; Gerardin — Ann. chim. phys. [4] 5, 137, '65; de Coppet *Ibid.* [5] 30, 411, '83; Etard *Ibid.* [7] 2, 526, '94; Mulder; above 100°, Tilden and Shenstone — Proc. Roy. Soc. (Lond.) 35, 345, '83.)

t°.	Gms. KCl per 100 Gms. Solution.	Water.	t°.	Gms. KCl per 100 Gms. Solution.	Water.	t°.	Gms. KCl per 100 Gms. Solution.	Water.
−9	19.3	23.9	40	28.6	40.0	147	41.5	70.8
−4.5	20.6	25.9	50	29.9	42.6	180	43.7	77.5
0	21.6	27.6	60	31.3	45.5		Solid Phase Ice	
5	22.7	29.3	70	32.6	48.3	−9	19.3	23.9
10	23.7	31.0	80	33.8	51.1	−8.	17.7	21.5
15	24.5	32.4	90	35.1	54.0	−8	16.7	20.0
20	25.4	34.0	100	36.2	56.7	−7	14.9	17.5
25	26.2	35.5	130	39.8	66.0	−6	13.6	15.7
30	27.1	37.0				−5.5	12.5	14.3

Sp. Gr. of solution sat. at o = °1.150; at 15° = 1.172.

Solubility of Mixtures of Potassium Chloride and Ammonium Chloride in Water at 25°.

(Fock — Z. Kryst. Min. 28, 353, '97.)

Grams per Liter Solution.		Mol. per cent in Solution.		Sp. Gr. of Solutions.	Mol. per cent in Solid Phase.	
NH_4Cl.	KCl.	NH_4Cl.	KCl.		NH_4Cl.	KCl.
0.00	311.3	0.00	100.0	1.1807	0.0	100
22.81	293.3	9.41	90.59	1.1716	1.21	98.79
35.39	278.7	15.04	84.96	1.1678	2.11	97.89
89.17	273.2	34.26	65.74	1.1591	6.18	93.82
127.8	234.6	46.59	53.44	1.1493	8.90	91.10
147.2	204.2	51.63	48.37	1.1461	10.53	89.47
197.3	157.7	63.56	36.44	1.1391	17.86	82.14
232.5	116.8	73.49	26.51	1.1326	60.20	39.80
244.5	123.0	73.48	26.52	1.1329	76.88	23.12
261.9	111.0	79.10	20.90	1.1245	97.51	2.49
259.0	102.2	82.14	17.86	1.1212	97.79	2.21
278.6	53.16	87.96	12.04	1.1009	98.85	1.15
320.7	31.24	93.45	6.55	1.0912	99.33	0.67
273.5	0.00	100.00	0.00	1.0768	100.0	0.00

Solubility of Mixtures of Potassium Chloride and Potassium Bromide at 25°.

(Fock.)

Grams per Liter Solution.		Milligram Mols. per Liter.		Mol. per cent KCl in Solution.	Sp. Gr. of Solutions.	Mol. per cent KCl in Solid Phase.
KBr.	KCl.	KBr.	KCl.			
558.1	0.00	4686.2	0.0	0.0	1.3756	0.00
531.5	23.44	4462.7	314.2	6.16	1.3700	0.00
503.6	46.57	4228.5	624.3	12.86	1.3648	8.23
454.6	82.62	3817.8	1108.0	22.49	1.3544	15.68
379.6	136.6	3188.1	1830.7	36.48	1.3320	33.66
324.8	166.9	2727.6	2237.4	45.06	1.3119	63.51
218.0	213.9	1830.2	2868.0	60.30	1.2689	82.29
140.7	250.9	1181.1	3363.9	74.01	1.2455	88.04
47.5	291.7	398.8	3911.4	85.22	1.1977	96.98
0.0	311.3	0.0	4173.1	100.00	1.1756	100.00

Solubility of Potassium Chloride in Aqueous Solutions of Hydrochloric Acid at 0°.

(Jeannel — Compt. rend. 103, 381, '86; Engel — Ann. chim. phys. [6] 13, 377, '88.)

Milligram Mols. per 10 cc.		Grams per 100 cc. Solution.		Sp. Gr. of Solutions.
KCl.	HCl.	KCl.	HCl.	
34.5	0.0	25.73	0.0	1.159
30.41	3.9	22.69	1.42	1.152
27.95	6.6	20.84	2.41	1.150
27.5	7.1	20.51	2.59	1.147
23.75	11.1	17.71	4.05	1.137
16.0	23.0	11.93	8.39	1.111
10.0	34.0	7.46	12.40	1.105
7.5	41.0	5.60	14.95	1.105
2.0	65.5	1.49	23.88	1.121
2.4	148.8 (sat.)	1.52	54.26	1.224

100 cc. saturated HCl solution dissolve 1.9 grams KCl at 17°.

(Ditte — Compt. rend. 92, 242, '86.)

Solubility of Potassium Chloride in Aqueous Potassium Hydroxide Solutions.

(Engel — Bull. soc. chim. [3] 6, 16, '91; Winteler — Z. Electrochem. 7, 360, '00.)

Results at 0°.
(Engel.)

Mg. Mols. per 10 cc. Solution		Sp. Gr. of Solution.	Gms. per 100 cc. Solution.	
KCl.	KOH.		KCl.	KOH.
35.5	0	1.159	26.83	0.0
31.0	2.375	1.146	23.44	1.33
28.3	4.7	1.153	21.39	2.64
23.0	9.9	1.172	17.39	5.56
18.38	15.1	1.195	13.89	8.46
14.43	20.0	1.216	10.91	11.23
11.43	24.63	1.239	8.64	13.83
8.98	29.25	1.261	6.78	16.43
6.28	35.13	1.294	4.74	19.72

Results at 20°.
(Winteler.)

Gms. per 100 cc. Solution.		Sp. Gr. of Solution.
KCl.	KOH.	
29.3	1.0	1.185
21.1	10.0	1.210
14.8	20.0	1.245
10.4	30.0	1.295
6.8	40.0	1.345
4.0	50.0	1.397
2.2	60.0	1.450
1.4	70.0	1.500
1.1	80.0	1.550
0.9	85.0	1.580

Solubility of Mixtures of Potassium Chloride and Potassium Iodide in Water.

(Etard — Ann. chim. phys. [7] 3, 275, '94.)

t°.	Grams per 100 Gms. Solution.		t°.	Grams per 100 Gms. Solution.	
	KCl.	KI.		KCl.	KI.
0	3.7	50.5	100	6.2	61.0
20	4.2	53.0	140	7.3	63.7
40	4.7	55.3	180	8.3	65.5
60	5.2	57.5	220	9.4	66.3
80	5.7	59.4	245	10.0	66.5

Solubility of Potassium Chloride in Aqueous Magnesium Chloride Solutions.

(Precht and Wittgen — Ber. 14, 1667, '81.)

t°.	Grams KCl per 100 Grams Sat. Solution in:				
	11% $MgCl_2$.	15% $MgCl_2$.	21.2% $MgCl_2$.	30% $MgCl_2$.	20% $MgCl_2$.
10	14.3	9.9	5.3	1.9	4.2 KCl+5.7 NaCl
20	15.9	11.3	6.5	2.6	6.0 " +5.9 "
30	17.5	12.7	7.6	3.4	6.9 " +6.0 "
40	19.0	14.2	8.8	4.2	7.9 " +6.1 "
50	20.5	15.6	10.0	5.0	8.9 " +6.3 "
60	21.9	17.0	11.2	5.8	9.9 " +6.4 "
80	24.5	19.5	13.6	7.3	10.9 " +6.6 "
90	25.8	20.8	14.7	8.1	11.9 " +6.7 "
100	27.1	22.1	15.9	8.9	13.0 " +6.9 "

Solubility of Potassium Chloride in Aqueous Solutions of Potassium Nitrate, and of Potassium Nitrate in Aqueous Solutions of Potassium Chloride, at Several Temperatures.

(Touren — Compt. rend. 130, 908, '00; Bodländer — Z. physik. Ch. 7, 360, '91; Nicol — Phil. Mag. (Lond.) 31, 369, '91; Soch — J. Physic. Ch. 2, 46, '98.)

KCl in Aq. KNO_3 Solutions at:

14.5° (T.). Gms. per Liter Solution.		17.5° (B.). Sp. Gr. Solutions.	Gms. per Liter.		25.2° (T.). Gms. per Liter.		20°, etc. (N.). Gms. per 1000 Gms. H_2O.	
KNO_3.	KCl.		KNO_3.	KCl.	KNO_3.	KCl.	KNO_3.	KCl.
0	288.3	1.173	0.0	293.9	0.0	311.8	0.00	345.2
20.64	284.2	1.198	65.8	275.0	13.76	306.6	56.18	342.15
32.18	282.1	1.210	88.3	273.4	32.18	303.6	168.54	334.39
62.23	276.8	1.225	124.8	265.3	91.26	293.2	at 25°	
82.77	273.5	1.236	148.3	259.8	122.7	287.2	225.8	341.3
115.9	270.7	1.239	152.2	259.6	141.4	284.2	at 80°	
119.1	268.3	1.239	154.9	259.5	182.7	276.0		
123.4	267.2	1.241	153.3	262.4			1175.0	402.0

KNO_3 in Aq. KCl Solutions at:

14.5°. Grams per Liter Solution.		25.2°. Grams per Liter Solution.		20°. Grams per 1000 Gms. H_2O.	
KCl.	KNO_3.	KCl.	KNO_3.	KCl.	KNO_3.
0.0	225.4	0.0	325.5	0.0	311.1
13.58	219.8	19.39	312.3	82.9	256.8
31.63	208.2	49.22	288.7	165.8	221.7
65.64	185.2	100.7	254.0	248.7	202.0
132.6	159.5	155.2	224.4	310.8	501.6
164.4	153.3	207.3	203.9		
196.5	144.0	226.8	196.9		
236.9	137.1				

KNO_3 in Aq. KCl at 20.5° (B.).

Gms. per 100 Gms. Solution. KCl.	KNO_3.	Sp. Gr. of Solutions.
0.0	27.68	1.1625
4.72	24.39	1.1700
7.74	22.44	1.1765
12.23	20.23	1.1895
15.15	18.96	1.1983
19.61	17.67	1.2150
22.17	17.11	1.2265
24.96	16 79	1.2400

KCl in Aq. KNO_3 at 20.5° (B.).

Gms. per 100 Gms. Solution. KNO_3.	KCl.	Sp. Gr. of Solutions.
0.0	29.39	1.1730
6.58	27.50	1.1980
8.88	27.34	1.2100
12.48	26.53	1.2250
14.83	25.98	1.2360
15.22	25.96	1.2390
15.49	25.95	1.2388
15.33	26.24	1.2410

Solubility of Mixtures of Potassium Chloride and Potassium Sulphate in Water.

t°.	Gms. per 100 Gms. H_2O. KCl.	+ K_2SO_4.	Observer.	t°.	Gms. per 100 Gms. H_2O. KCl	+ K_2SO_4.	Observer.
10	30.9	1.32	(Precht and Wittgen.)	40	38.7	1.68	(P. and W.)
15.8	28.0	2.3	(Kopp.)	50	41.3	1.82	"
20	33.4	1.43	(P. and W.)	60	43.8	1.94	"
25	34.76	2.93	(Van't Hoff and Meyerhoffer.)	80	49.2	2.21	"
30	36.1	1.57	(P. and W.)	100	54.5	2.53	"

Solubility of Mixtures of Potassium Chloride and Sodium Chloride in Water.

((1) Precht and Wittgen — Ber. 14, 1667, '81; at 25° and at 80°, (3) Soch — J. Physic. Ch. 2, 46, '98, (2) Etard — Ann. chim. phys. [7] 3, 275, '97.)

t°.	Grams per 100 Grams H_2O. KCl.		NaCl.		t°.	Grams per 100 Grams H_2O. KCl.		NaCl.	
0	11.2(1)	11.2(2)	30.0(1)	30.0(2)	50	22.0(1)	19.0(2)	27.7(1)	32.3(2)
10	12.5	12.3	29.7	30.5	60	24.6	20.6	27.2	32.8
20	14.7	13.8	29.2	31.0	70	27.3	32.5	26.8	34.1
25	15.8(3)	14.5	29.0(3)	31.3	80	30.0(3)	25.2(3)	26.4(3)	34.0
30	17.2	15.4	28.7	31.5	90	32.9	28.4	26.1	32.3
40	19.5	17.0	28.2	31.9	100	34.7	32.3	25.8	30.6

Note. — Page and Keightly, Rudorff and also Nicol, give single determinations which lie nearer the results of Precht and Wittgen than to those of Etard.

Solubility of Potassium Chloride in Aqueous Solutions of Sodium Chloride, and of Sodium Chloride in Aqueous Solutions of Potassium Chloride, at 20°.

(Nicol — Phil. Mag. (Lond.) 31, 369, '91.)

KCl in Aq. NaCl Solutions. Grams per 100 Grams H_2O. NaCl.	KCl.	NaCl in Aq. KCl Solutions. Grams per 100 Grams H_2O. KCl.	NaCl.
0.0	34.52	0.0	35.91
6.5	29.37	4.14	34.39
13.0	4.71	8.29	32.71
19.5	.42	12.42	31.30

100 gms. 40 per cent by wt. alcohol dissolve 5.87 gms. KCl + 12.25 gms. NaCl at 25°.

100 gms. 40 per cent by wt. alcohol dissolve 5.29 gms. KNO_3 + 10.06 gms. KCl at 25°.
(Soch — J. Physic. Ch. 2, 46, '98.)

100 gms. abs. ethyl alcohol dissolve 0.034 gm. KCl at 18.5°.
100 gms. abs. methyl alcohol dissolve 0.5 gm. KCl at 18.5°.
(de Bruyn — Z. physik. Ch. 10, 783, '92; Rohland — Z. anorg. Ch. 18, 327, '98.)

Solubility of Potassium Chloride in Aqueous Alcohol.

(Gerardin — Ann. chim. phys. [4] 5, 140, '65.)

Interpolated from the original results.

	Grams KCl per 100 Gms. Aq. Alcohol of Sp. Gr.:							
t°.	0.9904 = 5.5 Wt. %.	0.9848 = 9.35 Wt. %.	0.9793 = 13.6 Wt. %.	0.9726 = 19.1 Wt. %.	0.9573 = 30 Wt. %.	0.939 = 40 Wt. %.	0.8967 = 60 Wt. %.	0.8244 = 90 Wt. %.
0	23.4	19.5	15.5	11.5	7.0	4.0	1.7	0.0
5	25.0	21.0	16.8	12.8	8.0	4.8	2.2	0.0
10	26.4	22.5	18.0	14.0	9.0	5.6	2.7	0.0
15	26.8	24.0	19.2	15.2	10.0	6.4	3.1	0.04
20	29.1	25.3	20.3	16.1	10.8	7.2	3.5	0.06
25	30.4	26.8	21.5	17.1	11.6	7.9	3.9	0.08
30	31.7	28.0	22.6	18.2	12.5	8.5	4.2	0.10
40	34.3	30.8	24.8	20.0	14.0	9.9	4.8	0.20
50	37.0	33.5	27.0	21.8	15.5	10.8	5.2	0.30
60	...	...	...	...	16.8	11.8	5.5	0.40

Solubility of Potassium Chloride in Aqueous Alcohol at:

15°.

(Schiff — Liebig's Ann. 118, 365, '61.)

Sp. Gr. of Alcohol.	Wt. per cent Alcohol.	G. KCl per 100 g. Aq. Alcohol.
0.984	10	19.8
0.972	20	14.7
0.958	30	10.7
0.940	40	7.7
0.918	50	5.0
0.896	60	2.8
0.848	80	0.45

Gerardin's results at 15° agree well with the above determinations.

14.5°.

(Bodländer — Z. physik. Ch. 7, 316, '91.)

Sp. Gr. of Sat. Solutions.	Grams per 100 cc. Solution.		
	C_2H_5OH.	H_2O.	KCl.
1.1720	....	88.10	29.10
1.1542	2.79	85.78	26.85
1.1365	4.98	84.00	24.67
1.1075	10.56	79.63	20.56
1.1085	15.57	75.24	17.24
1.0545	20.66	70.52	14.27
1.0455	24.25	67.05	13.25
0.9695	40.42	50.18	6.35
0.9315	48.73	40.60	3.82
0.8448	68.63	15.55	0.30

30° and 40°.

(Bathrick — J. Physic. Chem. 1, 160, '96.)

Wt. per cent Alcohol.	Gms. KCl per 100 Gms. Aq. Alcohol.		Wt. per cent Alcohol.	Gms. KCl per 100 Gms. Aq. Alcohol.	
	At 30°.	At 40°.		At 30°.	At 40°.
0	38.9	41.8	43.1	11.1	13.1
5.28	33.9	35.9	55.9	6.8	8.2
9.43	30.2	33.3	65.9	3.6	4.1
16.9	24.9	27.6	78.1	1.3	1.6
25.1	19.2	21.8	86.2	0.4	0.5
34.1	15.6	17.2			

Solubility of Potassium Chloride in Aqueous Acetone Solutions.

(Snell — J. Physic. Ch. 2, 484, '98; at 20°, Herz and Knoch — Z. anorg. Ch. 41, 317, '04.)

Per cent Acetone in Solvent.	At 20°. KCl per 100 cc. Solution.		At 30°. Gms. per 100 Gms. Solution.		At 40°. Gms. per 100 Gms. Solution.		At 50°. Gms. per 100 Gms. Solution.	
	Millimols.	Grams.	Acetone.	KCl.	Acetone.	KCl.	Acetone.	KCl.
0	410.5	30.62	0. 0	27.27	0.0	28.69	0.0	30.0
9.1	351.7	26.23	6.96	23.42	6.79	25.33	...	...
20	286.6	21.38	16.22	18.90	15.75	21.28	...	...
30	223.7	16.69	25.45	15.06	two layers		25.67	14.42
40	166.5	12.42	35.52	11.31	"		36.03	9.93
50	115.4	8.61	45.98	8.04	"		46.46	7.07
60	71.2	5.31	56.91	5.12	"		57.37	4.38
70	38.5	2.87	68.18	2.60	"		68.56	2.22
80	12.9	0.96	78.43	0.76	79.34	0.58	79.25	0.94
90	2.0	0.15	89.88	0.13	89.84	0.16	81°+sat.sol.	
100	0.0	0.0	100.0	0.00	100.00	0.00		

Note. — For the 20° results the per cent acetone in the solvent is stated in terms of volume per cent, and the concentration of the second solution is 10 per cent instead of 9.1 which is the concentration of the solvent for the corresponding results at the other temperatures.

At the Temperature 40° and for Concentrations of Acetone between 20 and 80 per cent the Saturated Solution separates into Two Layers having the Following Compositions:

Upper Layer. Grams per 100 Grams Solution.			Lower Layer. Grams per 100 Grams Solution.		
H_2O.	$(CH_3)_2CO$.	KCl.	H_2O.	$(CH_3)_2CO$.	KCl.
55.2	31.82	12.99	28.14	69.42	2.44
53.27	35.44	11.29	30.96	65.97	3.07
51.23	48.50	10.27	32.64	63.79	3.56
50.3+	39.88	9.77	34.07	62.01	3.92
48.02	43.18	8.79	37.44	57.67	4.89
46.49	45.34	8.17	38.68	56.17	5.25
58.99	25.24	15.77	23.66	74.91	1.43

100 cc. sat. solution of potassium chloride in furfurol ($C_4H_3O.COH$) contain 0.085 gm. KCl at 25°.

(Walden — Z. physik. Ch. 55, 713,'06.)

Solubility of Potassium Chloride in Aqueous Solutions of Glycerine at 25°.

(Herz and Knoch — Z. anorg. Ch. 45, 267, '05.)

Sp. Gr. of Glycerine at 25°/4° = 1.2555. Impurity about 1.5%.

Wt. per cent Glycerine in Solvent.	KCl per 100 cc. Solution.		Sp. Gr. of Solutions.	Wt. per cent Glycerine in Solvent.	KCl per 100 cc. Solution		Sp. Gr. of Solutions.
	Millimols.	Grams.			Millimols.	Grams.	
0	424.5	31.66	1.180	54.23	238.5	17.79	1.219
13.28	383.4	28.61	1.185	83.84	149.0	11.11	1.259
25.98	339.3	25.31	1.194	100.00	110.6	8.25	1.286
45.36	271.4	20.24	1.211				

100 grams H_2O dissolve 246.5 grams sugar + 44.8 grams KCl at 31.25°, or 100 grams of the sat. solution contain 62.28 grams sugar + 11.33 grams KCl.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

POTASSIUM CHROMATE K_2CrO_4.

POTASSIUM (Di) CHROMATE $K_2Cr_2O_7$.

Solubility of Each in Water.

(Alluard — Compt. rend. 59, 500, '64; Nordenskjold and Lindstrom — Pogg. Ann. 136, 314, '69; Etard — Ann. chim. phys. [7] 2, 527, '94; Kremers — Pogg. Ann. 92, 497, '54; Tilden and Shenstone — Phil. Trans. 23, 1884.)

t°.	Potassium Chromate. Grams per 100 Grams Water.			Potassium Di Chromate. Grams per 100 Grams Water.	
0	58.2*	59.3†	60.2‡	5*	5§
10	60.0	61.2	62.5	7	7
20	61.7	63.2	64.5	12	12
25	62.5	64.2	64.5	16	16
30	63.4	65.2	66.5	20	20
40	65.2	67.0	68.6	26	27
50	66.8	69.0	70.6	34	37
60	68.6	71.0	72.7	43	47
70	70.4	73.0	74.8	52	58
80	72.1	75.0	76.9	61	70
90	73.9	77.0	79.0	70	82
100	75.6	79.0	82.2	80	97
125	79.0	...	...	110	145
150	83.0	...	...	143	205

* Etard. † Alluard. ‡ N. and L. § A., K., T. and S.

SOLUBILITY OF POTASSIUM CHROMATES IN WATER AT 30°.

(Schreinemaker — Z. physik. Ch. 55, 83, '06.)

Composition in Wt. per cent of: The Solution. Per cent CrO_3.	Per cent K_2O.	The Residue. Per cent CrO_3.	Per cent K_2O.	Solid Phase.
0	±47	...	...	$KOH.2H_2O$
0.0	47.16	12.59	47.54	K_2CrO_4
0.1775	34.602	10.93	37.47	"
1.351	26.602	16.482	32.532	"
5.598	20.584	37.131	39.922	"
15.407	19.225	27.966	29.377	"
20.67	19.17	...	...	$K_2CrO_4 + K_2Cr_2O_7$
19.096	17.30	37.64	22.61	$K_2Cr_2O_7$
11.35	7.88	...	...	"
17.93	3.412	25.85	7.82	"
43.51	3.01	49.45	9.91	"
44.46	3.245	53.94	12.40	$K_2Cr_2O_7 + K_2Cr_3O_{10}$
46.368	2.823	60.314	12.935	$K_2Cr_3O_{10}$
49.357	2.353	63.044	11.684	$K_2Cr_3O_{10} + K_2Cr_4O_{13}$
53.215	1.360	62.958	8.002	$K_2Cr_4O_{13}$
62.55	0.796	67.944	6.731	"
62.997	0.621	70.0	4.0	$K_2Cr_4O_{13} + CrO_3$
62.28	0.0	...	...	CrO_3

100 gms. sat. solution in glycol $C_2H_4(OH)_2.H_2O$ contain 1.7 gms. K_2CrO_4 at 15.4°.

100 gms. sat. solution in glycol $C_2H_4(OH)_2.H_2O$ contain 6.0 gms. $K_2Cr_2O_7$ at 14.6°. (de Coninck — Bull. acad. roy. Belgique, 257, '05.)

POTASSIUM CITRATE $C_3H_4(OH)(COOK)_3.H_2O$.

SOLUBILITY IN WATER AND IN SATURATED SUGAR SOLUTION AT 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

100 gms. H_2O dissolve 169.7 gms. $C_6H_5O_7K_3$, or 100 gms. sat. solution contain 61.11 gms.

100 gms. H_2O dissolve 198.3 gms. $C_6H_5O_7K_3$ + 303.9 gms. sugar, or 100 gms. sat. solution contain 32.83 gms. $C_6H_5O_7K_3$ + 50.3 gms. sugar.

POTASSIUM CYANATE KCNO.

SOLUBILITY IN ALCOHOLIC MIXTURES.

(Erdmann — Ber. 26, 2439, '93.)

Solvent.	Grams KCNO per Liter Solvent at b. pt.
80 per cent Alcohol + 20 per cent Water	62
80 per cent Alcohol + 20 per cent Methyl Alcohol	76
80 per cent Alcohol + 10 per cent Acetone	82

POTASSIUM CYANIDE KCN.

100 gms. H_2O dissolve 122.2 gms. KCN, or 100 gms. sat. solution contain 55.0 gms. KCN at 103.3°. (Griffiths.)

100 gms. abs. ethyl alcohol dissolve 0.87 gm. KCN at 19.5°.

100 gms. abs. methyl alcohol dissolve 4.91 gms. KCN at 19.5°.

(de Bruyn — Z. physik, Ch. 10, 783, '92.)

100 gms. glycerine dissolve 32 gms. KCN at 15.5°.

POTASSIUM CHROMOCYANIDE $K_3Cr(CN)_6$.

100 gms. H_2O dissolve 32.33 gms. $K_3Cr(CN)_6$ at 20°.

(Moissan — Ann. chim. phys. [6] 4, 136, '85; Christensen — J. pr. Ch. [2] 31, 166, '85.)

POTASSIUM CHROMISULPHOCYANIDE $K_2Cr(SCN)_6.4H_2O$.

100 gms. H_2O dissolve 139 gms. salt.

(Karsten — Ann. Suppl. 3, 170.)

POTASSIUM CARBONYL FERROCYANIDE $K_3FeCO(CN)_5.3\frac{1}{2}H_2O$.

100 gms. H_2O dissolve 148 gms. salt at 16°.

(Müller — Compt. rend. 104, 992, '87.)

POTASSIUM FERRICYANIDE $K_3Fe(CN)_6$.

POTASSIUM FERROCYANIDE $K_4Fe(CN)_6.3H_2O$.

SOLUBILITY OF EACH IN WATER.

(Wallace — J. Ch. Soc. 7, 80, '85; Etard — Ann. chim. phys. [7] 2, 526, '94; Schiff — Liebig's Ann. 113, 350, '60; Michel and Krafft — Ann. chim. phys. [3] 41, 478, '58; Thomsen.)

NOTE. — The available determinations fall very irregularly when plotted on cross-section paper, and the following figures, which are averages, are therefore hardly more than rough approximations to the true amounts. The figures under $K_4Fe(CN)_6$ show the limits between which the correct values probably lie.

t°.	Grams per 100 Gms. H_2O. $K_3Fe(CN)_6$.	$K_4Fe(CN)_6$.		t°.	Grams per 100 Gms. H_2O. $K_3Fe(CN)_6$.	$K_4Fe(CN)_6$.	
0	31	13	...	40	60	38	70
10	36	20	20	60	66	52	83
20	43	25	40	80	...	66	89
25	46	28	48	100	...	76	91
30	50	32	57	104.4	82.6	...	...

POTASSIUM FLUORIDE $KF.2H_2O$.

100 gms. H_2O dissolve 92.3 gms. KF, or 100 gms. sat. solution contain 48 gms. KF at 18°. Sp. Gr. of solution = 1.502.

(Mylius and Funk — Ber. 30, 1718, '97.)

SOLUBILITY OF POTASSIUM FLUORIDE IN HYDROFLUORIC ACID AT 21°.

(Ditte — Compt. rend. 123, 1282, '96.)

Gms. per 100 Gms. H_2O. HF.	KF.	Gms. per 100 Gms. H_2O. HF.	KF.	Gms. per 100 Gms. H_2O. HF.	KF.
0.0	96.3	9.25	29.9	20.68	38.4
1.21	72.0	11.36	29.6	28.60	46.9
1.61	61.0	12.50	30.5	41.98	61.8
3.73	40.4	13.95	31.4	53.71	74.8
4.03	32.5	15.98	33.4	74.20	105.0
6.05	30.4	17.69	35.62	119.20	169.5

POTASSIUM FORMATE HCOOK.

SOLUBILITY OF POTASSIUM FORMATE AND OF THE ACID SALT IN WATER.

(Groschuff — Ber. 36, 1785, 1903.)

Solid Phase : HCOOK			Solid Phase : HCOOK. HCOOH.					
t°.	Gms. HCOOK per 100 Gms. Solution.	Mols. HCOOK per 100 Mols. H_2O.	t°.	Gms. HCOOK .HCOOH per 100 Gms. Solution.	Gms. HCOOK per 100 Gms. Solution.	t°.	Gms. HCOOK per 100 Gms Solution.	Mols. HCOOH per 1 Mol. HCOOK.
− 20	72.8	57.4	0	60.4	39.0	0	36.3	3.21
+ 18	76.8	71.0	25	69.8	45.1	19.5	38.2	2.96
50	80.7	89.8	50	79.2	51.2	39.3	40.8	2.65
90	86.8	141.0	80	90.7	58.6	60	44.0	2.33
120	92.0	247.0				70	45.9	2.16
140	96.0	511				90	52.1	1.68
157	100.0	∞						

Sp. Gr. of sat. sol. at 18° = 1.573.

NOTE. — Since the acid salt is less soluble at ordinary temperatures than the neutral salt, it can be precipitated from the solution of the neutral salt by addition of aqueous formic acid. Proceeding in this way an impure product is obtained, giving solubility values (expressed in HCOOK) as shown in the last three columns above.

POTASSIUM FLUOGERMANATE K_2GeF_6.

SOLUBILITY IN WATER.

(Winkler; Kruss and Nilson — Ber. 20, 1696, '87.)

100 gms. H_2O dissolve 173.98 gms. K_2GeF_6 at 18°, and 34.07 gms. at 100° (W.).

100 gms. H_2O dissolve 184.61 gms. K_2GeF_6 at 18°, and 38.76 gms. at 100° (K. and N.).

POTASSIUM HYDROXIDE KOH.

SOLUBILITY IN WATER.

(Pickering — J. Ch. Soc. 63, 908, '93; at 15°, Ferchland — Z. anorg. Ch. 30, 133, '02.)

t°.	Gms. KOH per 100 Gms. Water.	Gms. KOH per 100 Gms. Solution.	Solid Phase.	t°.	Gms. KOH per 100 Gms. Water.	Gms. KOH per 100 Gms. Solution.	Solid Phase.
−22	3.7	3.6	Ice	15	107	51.7	$KOH.2H_2O$
−20.7	22.5	18.4	"	20	112	52.8	"
−65.2	44.5	30.8	"	30	126	55.76	"
−36.2	36.2	26.6	$KOH.4H_2O$	32.5	135	57.44	$KOH.2H_2O + KOH.H_2O$
−32.7	77.94	43.8	"	50	140	58.33	$KOH.H_2O$
−33	80	44.4	$KOH.4H_2O + KOH.2H_2O$	100	178	64.03	"
−23.2	85	45.9	$KOH.2H_2O$	125	213	68.06	"
0	97	49.2	"	143	311.7	75.73	
10	103	50.7	"				

Sp. Gr. of sat. solution at 15° = 1.5355.

POTASSIUM IODATE KIO_3.

Solubility in Water.

(Kremers — Pogg. Ann. 97, 5, '56; at 30°, Meerburg — Ch. Weekbl. I, 474, '04.)

t°	0°	20°	30°	40°	60°	80°	100°
Gms. KIO_3 per 100 gms. H_2O	4.73	8.13	11.73	12.8	18.5	24.8	32.2

100 gms. H_2O dissolve 1.3 gms. potassium hydrogen iodate($KH(IO_3)_2$ at 15°, and 5.4 gms. at 17°. (Serullas — Ann. chim. phys. 22, 118.)

100 gms. H_2O dissolve 4.0 gms. potassium di hydrogen iodate $KH_2(IO_3)_2$ at 15°. (Meineke — Liebig's Ann. 261, 360, '91.)

POTASSIUM IODIDE KI.

Solubility in Water.

(Mulder; de Coppet — Ann. chim. phys. [5] 30, 417, '83; Etard — *Ibid.* [7] 2, 526, '94; Meusser — Z. anorg. Ch. 44, 80, '05; see also Tilden and Shenstone — Phil. Trans. 23, '84; Schreinemaker — Z. physik. Chem. 9, 71, '92.)

t°.	Gms. KI per 100 Gms. Water.	Gms. KI per 100 Gms. Solution.
−10	115.1	53.5
− 5	119.8	54.5
− 1	122.2	55.0
0	127.5	56.0
10	136	57.6
20	144	59.0
25	148	59.7
30	152	60.3
40	160	61.5
50	168	62.7
60	176	63.7
70	184	64.8
80	192	65.8
90	200	66.7
100	208	67.5
110	215	68.3
120	223	69.0

Ice Curve

t°.	Gms. KI per 100 Gms. Water.	Gms. KI per 100 Gms. Solution.
− 5	25.7	22.5
− 7	42.6	29.9
− 9.5	51.5	34.0
−11.5	64.7	39.3
−14	75.8	42.7

Solubility of Potassium Iodide in Absolute Alcohols.

(de Bruyn — Z. physik. Ch. 10, 783, '92; Rohland — Z. anorg. Ch. 18, 327, '98.)

100 gms. methyl alcohol dissolve 16.5 gms. KI at 20.5°.
100 gms. ethyl alcohol dissolve 1.75 gms. KI at 20.5°.
100 gms. propyl alcohol dissolve 0.46 gm. KI at 15°–20° (R.).

Solubility of Potassium Iodide in:

Ethyl Alcohol of 0.9496 Sp. Gr.

t°.	Gms. KI per 100 Gms. Alcohol
8	67.4
13	69.2
25	75.1
46	84.7
55	87.5
62	90.2

Aqueous Ethyl Alcohol at 18°.

Sp. Gr. of Alcohol.	Weight per cent Alcohol.	Gms. KI per 100 Gms. Alcohol.	Sp. Gr. of Alcohol.	Weight per cent Alcohol.	Gms. KI per 100 Gms Alcohol.
0.9904	5.2	130.5	0.9390	45	66.4
0.9851	9.8	119.4	0.9088	59	48.2
0.9726	23.0	100.1	0.8464	86	11.4
0.9665	29.0	89.9	0.8322	91	6.2
0.9528	38.0	76.9			

(Gerardin — Ann. chim. phys. [4] 5, 155, '65.)

Solubility of Potassium Iodide in Acetone and in Pyridine.

(von Laszczynski — Ber. 27, 2285, '94; at 25°, Krug and McElroy — J. Anal. Ch. 6, 184, '92.)

Solvent.	Gms. KI per 100 Gms. Solvent at:					
	−2.5°.	10°.	22°.	25°.	56°.	119°.
Acetone	3.08	...	2.38	2.93	1.21	...
Pyridine	...	0.26	...	...	...	0.11

100 gms. glycerine dissolve 40 gms. KI at 15.5°.

Solubility of Potassium Iodide in Several Solvents.

(Walden — Z. physik. Ch. 55, 714, '06.)

Solvent.	Formula.	t°.	Sp. Gr. of Solution.	Gms. KI per 100	
				cc. Solution.	Gms. Solution.
Water	H_2O	0	1.6699	94.05	56.32
Water	H_2O	25	1.7254	102.70	59.54
Methyl Alcohol	CH_3OH	0	0.8964	11.61	12.95
Methyl Alcohol	CH_3OH	25	0.9003	13.5–14.3	14.97
Ethyl Alcohol	C_2H_5OH	0	0.8085	1.197	1.479
Ethyl Alcohol	C_2H_5OH	25	0.7908	1.520	1.922
Glycol	$(CH_2OH)_2$	0	1.3954	43.28	31.03
Glycol	$(CH_2OH)_2$	25	1.3888	47.23	33.01
Acetonitril	CH_3CN	0	0.8198	1.852	2.259
Acetonitril	CH_3CN	25	0.7938	1.57	2.003
Propionitril	C_2H_5CN	0	0.8005	0.34–0.41	0.0429
Propionitril	C_2H_5CN	25	0.7821	0.32–0.36	0.0404
Benzonitril	C_6H_5CN	25	1.0076	0.051	0.0506
Nitro Methane	CH_3NO_2	0	1.1627	0.314–0.366	0.315
Nitro Methane	CH_3NO_2	25	1.1367	0.289–0.349	0.307
Nitro Benzene	$C_6H_5NO_2$	25	...	0.0019	...
Acetone	$(CH_3)_2CO$	0	0.8227	1.732	2.105
Acetone	$(CH_3)_2CO$	25	0.7968	1.038	1.302
Furfurol	$C_4H_3O.COH$	0	...	15.10	...
Furfurol	$C_4H_3O.COH$	25	1.2014	5.93	4.94
Benzaldehyde	C_6H_5COH	25	1.0446	0.343	0.328
Salicyl aldehyde	$C_6H_4.OH.COH$	0	1.1501	1.257	1.093
Salicyl aldehyde	$C_6H_4.OH.COH$	25	1.1373	0.549	0.483
Anis aldehyde	$C_6H_4.OCH_3.COH$	0	1.1223	1.520	1.355
Anis aldehyde	$C_6H_4.OCH_3.COH$	25	1.1180	0.720	0.644
Ethyl Acetate	$CH_3COOC_2H_5$	25	...	0.0013	...
Methyl Cyan Acetate	$CH_2CNCOOCH_3$	0	1.1521	3.256	2.827
Methyl Cyan Acetate	$CH_2CNCOOCH_3$	25	1.1358	2.459	2.165
Ethyl Cyan Acetate	$CH_2CNCOOC_2H_5$	25	1.0628	0.989	0.930

POTASSIUM NITRITE KNO_2.

100 gms. H_2O dissolve about 300 gms. KNO_2 at 15.5°.

(Divers — J. Ch. Soc. **75**, 86, '99.)

POTASSIUM NITRATE KNO_3.

Solubility in Water.

(Mulder; Andrae — J. pr. Ch. [2] **29**, 456, '84; Gerardin — Ann. chim. phys. [4] **5**, 150, '65; Etard — *Ibid.* [7] **2**, 526, '94; Ost — J. pr. Ch. [2] **17**, 233, '78; at 31.25°, Köhler — Z. Ver. Zuckerind. **47**, 447, '97; Euler — Z. physik. Ch. **49**, 315, '04; Tilden and Shenstone — Phil. Trans. 23, '84; Berkeley — Trans. Roy. Soc. **203** A, 213, '04.)

Average Curve.

t°.	Gms. KNO_3 per 100 Gms. Water.	Gms. KNO_3 per 100 Gms. Solution.	t°.	Gms. KNO_3 per 100 Gms. Water.	Gms. KNO_3 per 100 Gms. Solution.
0	13.3	11.7	70	138	58.0
10	20.9	17.3	80	169	62.8
20	31.6	24.0	90	202	66.9
25	37.3	27.2	100	246	71.1
30	45.8	31.4	110	300	75.0
40	63.9	39.0	120	394	79.8
50	85.5	44.0	125	493	83.1
60	110.0	52.0			

Solubility of Mixtures of Potassium Nitrate and Barium Nitrate in Water.

(Euler — Z. physik. Ch. **49**, 313, '04.)

t°.	Sp. Gr. of Sat. Solution.	Grams per 100 Grams H_2O.
17	1.120	13.26 KNO_3 + 6.31 $Ba(NO_3)_2$
21.5	...	17.00 " + 7.58 "
30	1.191	24.04 " + 9.99 "
50	...	49.34 " + 18.09 "

Solubility of Potassium Nitrate in Aqueous Solutions of Nitric Acid at 0°.

(Engel — Compt. rend. **104**, 913, '87.)

Sp. Gr. of Solutions.	Equivalents per 10 cc. Solution.		Grams per 100 cc. Solution.	
1.079	12.5 KNO_3	0 HNO_3	12.65 KNO_3	0.00 HNO_3
...	9.9 "	5.87 "	10.02 "	3.71 "
1.093	8.28 "	13.2 "	8.38 "	8.38 "
1.117	7.4 "	21.55 "	7.49 "	13.58 "
1.144	7.4 "	31.1 "	7.49 "	19.47 "
1.202	7.6 "	48.0 "	7.68 "	30.04 "
1.289	10.3 "	68.0 "	10.42 "	42.86 "
1.498	28.3 "	120.5 "	28.64 "	75.95 "

Solubility of Potassium Nitrate and of Acid Potassium Nitrates in Nitric Acid.

(Groschuff — Ber. 37, 1490, '04.)

Note. — Determinations made by the so-called thermometric method, *i.e.*, by observing the temperature of the disappearance of the separated, finely divided solid from solutions of known concentration.

t°.	Grams per 100 Gms. Solution.		Solid Phase.	t°.	Gms. per 100 Gms. Solution.		Solid Phase.
	KNO_3.	HNO_3.			KNO_3.	HNO_3.	
− 6	24.4	75.41	$KNO_3.2HNO_3$ [1]	22.5	47.2	52.93	$KNO_3.HNO_3$
+14	32.6	67.42	" (stabil)	23.5	47.8	52.11	" (stabil)
17	34.8	65.04	"	25.5	48.6	51.46	"
19.5	37.2	62.90	"	27.0	49.4	50.78	"
22	44.5	55.46	"	29.0	50.1	49.94	$KNO_3.HNO_3$
21.5	47.8	52.11	$KNO_3.2HNO_3$ [2]	30.5	50.9	49.15	" (labil)
21.5	48.6	51.46	" (labil)	21.0	49.4	50.78	KNO_3 (labil)
20	50.9	49.15	"	39.0	50.9	49.15	" (stabil)
− 4	37.2	62.81	$KNO_3.HNO_3$	50	51.7	48.32	"
−16.5	44.5	55.46	" (labil)				

[1] Solution in HNO_3. [2] Solution in KNO_3.

Conduct of Acid Potassium Nitrate Towards Water.

t°.	Gms. per 100 Gms. Solution.		Solid Phase.	t°.	Gms. per 100 Gms. Solution.		Solid Phase.
	KNO_3.	HNO_3.			KNO_3.	HNO_3.	
22	44.5	55.5	$KNO_3.2HNO_3$	50	38.7	48.3	KNO_3
20.5	44.1	55.0	"	61	36.0	44.8	"
18	43.8	54.5	"	63	34.5	43.0	"
12	43.0	53.6	"	60.5	30.9	39.5	"
6	42.3	52.7	"	56	27.6	34.4	"
0	41.6	51.8	"	43	20.8	25.9	"
12	41.3	51.4	KNO_3	17	11.7	16.6	"
22	40.9	51.0	"	−5	5.54	6.91	"
40	39.9	49.8	"				

Solubility of Mixtures of Potassium Nitrate and Potassium Chloride in Water.

(Etard — Ann. chim. phys. [7] 3, 283, '94; at 20°, Rüdorff — Ber. 6, 482, '73; Nicol — Phil. Mag. [5] 31, 385, '91.)

t°.	Gms. per 100 Gms. Solution.		t°.	Gms. per 100 Gms. Solution.		t°.	Gms. per 100 Gms. Solution.	
	KNO_3.	KCl.		KNO_3.	KCl.		KNO_3.	KCl.
0	5.0	20.0	30	16.0	21.2	70	39.5	17.5
10	8.0	20.8	40	21.0	21.0	80	45.5	15.8
20	12.6	21.2	50	27.0	20.0	100	57.5	11.6
25	14.0	21.3	60	33.5	19.0	120	69.0	7.7

Solubility of Potassium Nitrate in Aqueous Solutions of:

(Touren — Compt. rend. 131, 259, '00.)

Potassium Carbonate.

Results at 14.5°.

Mols. per Liter. K_2CO_3.	Mols. per Liter. KNO_3.	Gms. per Liter. K_2CO_3.	Gms. per Liter. KNO_3.
0.0	2.228	0.0	225
0.48	1.85	66.4	188
1.25	1.39	172.9	141
2.58	0.86	356.9	87
3.94	0.64	544.9	65

Results at 25°.

Mols. per Liter. K_2CO_3.	Mols. per Liter. KNO_3.	Gms. per Liter. K_2CO_3.	Gms. per Liter. KNO_3.
0.0	3.217	0.0	326
0.59	2.62	81.6	265
1.35	1.97	186.7	199
2.10	1.46	290.5	148
2.70	1.14	373.6	115
3.58	0.79	495.1	80

Potassium Bi Carbonate.

Results at 14.5°.

Mols. per Liter. $KHCO_3$.	Mols. per Liter. KNO_3.	Grams per Liter. $KHCO_3$.	Grams per Liter. KNO_3.
0.0	2.33	0.0	236
0.39	2.17	39.0	220
0.76	2.03	76.0	205
1.16	1.92	116	194
1.55	1.81	155	183

Results at 25°.

Mols. per Liter. $KHCO_3$.	Mols. per Liter. KNO_3.	Grams per Liter. $KHCO_3$.	Grams per Liter. KNO_3.
0.0	3.28	0.0	332
0.89	2.84	89	287
1.33	2.65	133	268
1.91	2.45	191	249

Solubility of Mixtures of Potassium Nitrate and Potassium Sulphate in Water.

(Euler — Z. physik. Ch. 49, 313, '04.)

t°.	Sp. Gr. of Sat. Solution.	Grams per 100 Grams Water.	
15	1.165	24.12 KNO_3	5.65 K_2SO_4
20	...	30.10 "	5.58 "
25	1.210	36.12 "	5.58 "

Solubility of Mixtures of Potassium Nitrate and Sodium Chloride in Water.

(Etard — Ann. chim. phys. [7] 3, 283, '94; the older determinations of Rüdorff, Karsten, Mulder, etc., agree well with those of Etard.)

t°.	Gms. per 100 Gms. Solution. KNO_3.	Gms. per 100 Gms. Solution. NaCl.	t°.	Gms. per 100 Gms. Solution. KNO_3.	Gms. per 100 Gms. Solution. NaCl.	t°.	Gms. per 100 Gms. Solution. KNO_3.	Gms. per 100 Gms. Solution. NaCl.
0	13	24	40	30.5	19	120	73	8.0
10	16	23	50	36	17	140	77	7.0
20	20	22	60	42.5	15	160	79.5	6.0
25	23	21.5	80	55	12	170	80.5	5.5
30	25	20.5	100	67	9.5			

Solubility of Potassium Nitrate in Aqueous Solutions of Sodium Nitrate and vice versa at 20°.

(Carnelly and Thomson — J. Ch. Soc. 53, 782, '88; Nicol — Phil. Mag. 31, 369, '91.)

KNO_3 in Aq. $NaNO_3$ Solutions.

Grams per 100 Grams H_2O. $NaNO_3$.	Grams per 100 Grams H_2O. KNO_3
0	31.6
10	30.5
20	31.0
40	33.0
60	35.5
80	41.0

$NaNO_3$ in Aq. KNO_3 Solutions.

Grams per 100 Grams H_2O. KNO_3.	Grams per 100 Grams H_2O. $NaNO_3$.
0	88
10	90
20	92
25	93
30	94
35	96

Solubility of Mixtures of Potassium Nitrate and Silver Nitrate in Water.

(Etard — Ann. chim. phys. [7] 3, 283, '94.)

t°.	Gms. per 100 Gms. Sol. KNO_3.	Gms. per 100 Gms. Sol. $AgNO_3$.	t°.	Gms. per 100 Gms. Sol. KNO_3.	Gms. per 100 Gms. Sol. $AgNO_3$.	t°.	Gms. per 100 Gms. Sol. KNO_3.	Gms. per 100 Gms. Sol. $AgNO_3$.
0	13.5	43.0	30	26.8	49.4	80	36.2	55.1
10	19.0	44.7	40	29.6	51.5	100	38.3	55.3
20	23.0	47.0	50	32.0	54.0	120	40.0	55.6
25	25.0	48.0	60	33.5	54.8	140	41.5	55.8

Solubility of Mixed Crystals of Potassium Nitrate and Silver Nitrate in Water at 25°.

(Herz — Inaug. Diss. (Berlin) '05; Calc. by Fock — Z. Kryst. Min. 28, 405, '97.)

Grams per Liter. $AgNO_3$.	Grams per Liter. KNO_3.	Mg. Mols. per Liter. $AgNO_3$.	Mg. Mols. per Liter. KNO_3.	Mol. per cent $AgNO_3$ in Solution.	Mol. per cent $AgNO_3$ in Solid Phase.
45.9	321.8	•270	3180	7.83	0.2896
110.7	322.6	651.3	3184	16.96	0.6006
176.8	333.7	1040	3298	23.97	0.9040
259.6	364.0	1528	3597	29.81	1.054
365.6	456.4	2151	4511	32.28	1.604
507.9	387.2	2988	3816	43.85	2.439
745.9	398.6	4388	3960	52.70	8.294

Solubility of Mixed Crystals of Potassium Nitrate and Thallium Nitrate in Water at 25°.

(Fock.)

Grams per Liter. $TlNO_3$.	Grams per Liter. KNO_3.	Mg. Mols. per Liter. $TlNO_3$.	Mg. Mols. per Liter. KNO_3.	Mol. per cent $TlNO_3$ in Solution.	Sp. Gr. of Solutions.	Mol. per cent $TlNO_3$ in Solid Phase.
0.00	351.0	0.0	3468.2	0.00	1.2632	0.00
2.37	329.0	8.9	3251.5	0.43	1.1903	0.08
6.15	332.4	23.1	3285.1	0.70	1.1956	0.20
17.64	333.7	66.3	3298.1	1.97	1.2050	0.57
49.74	333.3	186.9	3294.4	5.37	1.2196	1.78
63.60	321.0	239.0	3172.4	7.01	1.2436	2.19
86.18	330.5	323.8	3265.8	9.02	1.2617	2.77
123.8	428.3	465.2	4232.6	9.90	1.2950	6.00 27.04
101.3	245.1	380.6	2423.3	13.58	1.2050	93.33
116.1	0.0	463.1	0.0	100.00	1.0964	100.00

Solubility of Potassium Nitrate in Aqueous Alcohol Solutions

(Gerardin — Ann. chim. phys. [4] 5, 151, '65.)

Grams KNO_3 per 100 Grams Aqueous Alcohol of Sp. Gr.:

t°.	0.9904 =5.5 Wt.%.	0.9843 =9.35 Wt.%.	0.9793 =13.6 Wt.%.	0.9726 =19.1 Wt.%.	.09571 =30 Wt.%.	0.939 =40 Wt.%.	0.8967 =60 Wt.%.	0.8429 =90 Wt.%.
10	17	13	10	7	4.5	3	1	0.2
18	22.5	18.5	14.5	10	6.2	4.5	1.6	0.3
20	24	20	16	11	7.0	5	2	0.3
25	29	24.5	20	13.5	9.0	6.5	2.5	0.4
30	36	30	25	17	11.5	8	3.0	0.5
40	52	43	36	27	16.5	11	4	0.6
50	72	61	50	38	23.0	16	6	0.7
60	93	79	69	52	31.0	21	8	1.1

SOLUBILITY OF POTASSIUM NITRATE IN AQUEOUS ALCOHOL AT 18°.

(Bodländer — Z. physik. Ch. 7, 316, '91.)

Sp. Gr. of Solution.	Gms. per 100 cc. Solution.			Sp. Gr. of Solution.	Gms. per 100 cc. Solution.		
	C_2H_5OH.	H_2O.	KNO_3.		C_2H_5OH.	H_2O.	KNO_3.
1.1480	...	89.80	25.0	1.0120	23.33	69.81	8.06
1.1085	3.30	87.44	20.11	0.9935	28.11	64.74	6.50
1.1010	5.24	86.26	18.60	0.9585	37.53	54.21	4.11
1.0805	8.69	83.18	16.18	0.9450	42.98	48.15	3.37
1.0755	9.06	83.10	15.39	0.9050	51.23	27.32	1.95
1.0655	14.08	77.93	14.54	0.8722	61.65	24.74	0.83
1.0490	16.27	76.36	12.27	0.8375	69.60	13.95	0.20
1.0375	19.97	72.93	10.85				

SOLUBILITY OF POTASSIUM NITRATE IN AQUEOUS ALCOHOL AND IN AQUEOUS ACETONE.

(Bathrick — J. Physic. Ch. 1, 160, '96.)

In Aqueous Alcohol.			In Aqueous Acetone at 40°.	
Wt. per cent Alcohol.	Gms. KNO_3 per 100 Gms. Aq. Alcohol.		Wt. per cent Acetone.	Gms. KNO_3 per 100 Gms. Solvent.
	At 30°.	At 40°.		
0	45.6	64.5	0	64.5
8.25	32.3	47.1	8.5	51.3
17.0	22.4	33.3	16.8	38.9
25.7	15.1	24.1	25.2	22.8
35.0	11.4 (34.4°)	16.7	34.3	24.7
44.9	7.0	11.6 (44°)	44.1	17.0
54.3	4.5	7.2 (55°)	53.9	11.9
65.0	2.7	4.4	64.8	7.2
75.6	1.3	2.0 (76.3°)	76.0	3.0
88.0	0.4	0.6 (88.5°)	87.6	0.7

100 grams H_2O saturated with sugar and KNO_3 dissolve 224.7 gms. sugar + 41.9 gms. KNO_3, or 100 gms. of the saturated solution contain 61.36 gms. sugar + 11.45 gms. KNO_3 at 31.25°.

(Köhler — Z. Ver Zuckerind. 47, 447, '97.)

POTASSIUM OXALATE $K_2C_2O_4.4H_2O$.

SOLUBILITY OF MIXTURES OF POTASSIUM OXALATE AND OXALIC ACID IN WATER AT 25°.

(Foote and Andrew — Am. Ch. J. 34, 155, '05.)

Gms. per 100 Gms. Solution.		Mols. per 100 Mols. H_2O.		Solid Phase.
$H_2C_2O_4$.	$K_2C_2O_4$.	$H_2C_2O_4$.	$K_2C_2O_4$.	
10.2	...	2.274	...	$H_2C_2O_4.2H_2O$
10.31	0.04	2.302	0.005	$H_2C_2O_4.2H_2O + H_3K(C_2O_4)_2.2H_2O$
9.26	0.13	2.046	0.016	Double salt $H_3K(C_2O_4)_2.2H_2O$
3.39	0.63	0.707	0.071	Double salt $H_3K(C_2O_4)_2.2H_2O$
2.06	4.26	0.440	0.495	$H_3K(C_2O_4)_2.2H_2O + HKC_2O_4$
1.16	11.50	0.266	1.427	Double salt HKC_2O_4
0.99	16.93	0.240	2.235	Double salt HKC_2O_4
0.85	21.08	0.221	2.928	$HKC_2O_4 + H_2K_4(C_2O_4)_3.2H_2O$
0.82	21.49	0.211	2.998	Double salt $H_2K_4(C_2O_4)_3.2H_2O$
0.64	23.52	0.169	3.361	Double salt $H_2K_4(C_2O_4)_3.2H_2O$
0.57	24.88	0.153	3.617	Double salt $H_2K_4(C_2O_4)_3.2H_2O$
0.43	27.52	0.122	4.14	$H_2K_4(C_2O_4)_3.2H_2O + K_2C_2O_4.H_2O$
...	27.40	...	4.09	$K_2C_2O_4.H_2O$

Solubility of Potassium Oxalate and Acid Potassium Oxalate in Water.

(Alluard; results at 0°, Engel — Ann. chim. phys. [6] 13, 362, '88.)

100 gms. H_2O dissolve 25.24 gms. $K_2C_2O_4$, or 100 gms. of sat. solution contain 20.62 gms. $K_2C_2O_4$ at 0°. Sp. Gr. of solution = 1.161.

Acid Oxalate in Solutions of Neutral Oxalate at 0°.					Acid Oxalate in Water	
n H_2SO_4 Corresponding to K in 10 cc. Sol.	*n* KOH Corresponding to Free Acid in 10 cc.	Sp. Gr. of Solutions.	Gms. per 100 cc. Sol. $K_2C_2O_4$.	Gms. per 100 cc. Sol. $H_2C_2O_4$.	t °.	Gms. KHC_2O_4 per 100 Gms. H_2O.
28.5	0.4	1.164	23.53	0.18	0	2.2
10.8	0.925	...	8.91	0.41	10	3.1
6.8	1.075	1.042	5.61	0.48	20	5.2
4.78	1.25	1.031	3.94	0.56	40	10.5
3.83	1.45	1.025	3.16	0.65	60	20.5
3.35	1.53	1.022	2.76	0.68	80	34.7
2.6 (1)	1.85	1.018	2.15	0.83	100	51.5
2.0 (2)	2.25	1.007	1.65	1.00		
0.45(3)	1.25	1.004	0.37	0.56		

(1) Sat. with acid potassium oxalate. (2) Sat. with both acid oxalate and tetroxalate. (3) Sat. with tetroxalate.

POTASSIUM PERMANGANATE $KMnO_4$.

Solubility in Water.

(Baxter, Boylston, and Hubbard — J. Am. Ch. Soc. 28, 1343, '06; Patterson — *Ibid.* 28, 1735, '06.)

t °.	Grams $KMnO_4$ per 100: Gms. Solution.	Gms. H_2O.	cc. Solution (P).	t °.	Grams $KMnO_4$ per 100: Gms. Solution.	Gms. H_2O.
0	2.75	2.83	2.84	34.8	9.64	10.67
9.8	4.13	4.31	...	40	11.16	12.56
15.0	...	...	5.22	45	12.73	14.58
19.8	5.96	6.34	...	50	14.45	16.89
24.8	7.06	7.59	...	55	16.20	19.33
29.8	8.28	9.03	8.69	65	20.02	25.03

Sp. Gr. of saturated solution at 15° = 1.035.

Solubility of Potassium Permanganate in:

Water. (Voerman — Chem. Centrb. 77, I, 125, '06.)				Aqueous Acetone Solutions at 13°. (Herz and Knoch — Z. anorg. Ch. 41, 317 '04.)		
t °.	Gms. $KMnO_4$ per 100 Gms. Solution.	Water.	Solid Phase.	cc. Acetone per 100 cc. Solvent.	$KMnO_4$ per 100 cc. Solution. Millimols.	Grams.
−0.18	0.58	0.58	Ice	0	148.5	4.70
−0.27	0.99	1.01	"	10	162.2	5.13
−0.48	1.98	2.02	"	20	177.3	5.61
−0.58	2.91	3.00	Ice + $KMnO_4$	30	208.2	6.59
+10.0	4.01	4.22	$KMnO_4$	40	257.4	8.14
15	4.95	5.20	"	50	289.7	9.16
25	7.00	7.53	"	60	316.8	10.02
40	10.40	11.61	"	70	328.0	10.38
50	14.35	16.75	"	80	312.5	9.89
				90	227.0	7.18
				100	67.0	2.14

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM PERMANGANATE AND POTASSIUM PERCHLORATE AT 7°.

(Muthmann and Kuntze — Z. Kryst. Min. **23**, 368, '94; recalculated by Fock — *Ibid.* **28**, 402, '97.)

Milligram Mols. per Liter.		Grams per Liter.		Mol. per cent $KMnO_4$ in Crystals of Solid Phase.
$KMnO_4$.	$KClO_3$.	$KMnO_4$.	$KClO_4$.	
0.0	63.91	0.00	8.86	0.00
29.37	54.48	4.65	7.55	2.84
67.73	42.75	10.71	5.93	9.78
79.04	39.59	12.50	5.49	10.81
99.81	38.63	15.79	5.36	15.96
122.24	34.39	19.34	4.77	23.56
119.21	38.91	18.84	5.39	24.28
128.08	33.77	20.26	4.68	26.40
144.46	33.14	22.86	4.59	34.32
167.81	29.53	26.55	4.09	44.42
183.09	25.19	28.97	3.49	67.33
197.82	20.16	31.30	2.80	77.95
233.75	28.26	36.98	3.92	94.37
264.27	0.00	41.81	0.00	100.00

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM PERMANGANATE AND RUBIDIUM PERMANGANATE AT 7°.

(Muthmann and Kuntze, calc. by Fock.)

Milligram Mols. per Liter.		Grams per Liter.		Mol. per cent $KMnO_4$ in Crystals of Solid Phase.
$KMnO_4$.	$RbMnO_4$.	$KMnO_4$.	$RbMnO_4$.	
27.04	22.69	4.28	4.64	3.50
75.00	22.22	11.84	4.54	13.75
120.26	31.29	19.03	6.40	34.29
188.30	38.98	29.80	7.97	71.45
198.36	41.29	31.39	8.44	92.50
205.76	42.50	32.56	8.69	99.47
225.12	26.00	35.61	5.32	99.32
264.27	0.00	41.81	0.00	100.00

POTASSIUM PHOSPHATE KH_2PO_4 (Monobasic).

One liter aqueous solution contains 249.9 grams at 7°.

(Muthmann and Kuntze.)

POTASSIUM HYPOPHOSPHATE, etc.

SOLUBILITY IN WATER.

(Salzer — Liebig's Ann. 211, 1, 82.)

Salt.	Formula.	Gms. Salt per 100 Gms. H_2O. Cold.	Hot.
Potassium Hypophosphate	$K_4P_2O_6.8H_2O$	400	...
" Hydrogen Hypophosphate	$K_3HP_2O_6.3H_2O$	200	...
" Di Hydrogen Hypophosphate	$K_2H_2P_2O_6.3H_2O$	33	100
" Tri Hydrogen Hypophosphate	$KH_3P_2O_6$	66.6	200
" Penta Hydrogen Hypophosphate	$K_3H_5(P_2O_6)_2.2H_2O$	40	125
" Hydrogen Phosphite	KH_2PO_3	172 (20°)	...
" Hypophosphite	KH_2PO_2	200 (25°)	333
" Hypophosphite	KH_2PO_2*	14.3 (25°)	28

* Solvent alcohol.

POTASSIUM PHOSPHOMOLYBDATE $K_3PO_4.11MoO_3.1\frac{1}{2}H_2O$.

100 gms. H_2O dissolve 0.007 gms. at 30°.
100 gms. aqueous 10 % HNO_3 dissolve 0.204 gms. at 30°.

(Donk — Proc. Assoc. Official Agrl. Chemists — Bull. No. 90, Bureau of Chemistry, U. S. Dept. of Agr., '05.)

POTASSIUM SELINATE K_2SeO_4.

SOLUBILITY IN WATER.

t°.	−20°.	−5°.	+5°.	18°.	97°.
Gms. K_2SeO_4 per 100 gms. solution	51.5	51.7	52.0	52.6	54.9

(Etard — Ann. Chim. phys. [7] 2, 550, '94.)

POTASSIUM STANNATE $K_2SnO_3.3H_2O$.

100 gms. H_2O dissolve 106.6 gms. at 10°, and 110.5 gms. at 20°. Sp. Gr. at 10° = 1.618 at 20° = 1.627.

(Ordway — Am. J. Sci. [2] 40, 173, '65.)

POTASSIUM SULPHATE K_2SO_4.

SOLUBILITY IN WATER.

(Mulder; Andrae — J. pr. Ch. 29, 456, '84; Trevor — Z. physik. Ch. 7, 468, 91; Tilden and Shenstone — Phil. Trans. 31, '84; Berkeley — Trans. Roy. Soc. 203 A, 209, '04; see also Etard — Ann. chim. phys. [7] 2, 549, '94.)

t°.	Gms. K_2SO_4 per 100 Gms. Water.	Gms. K_2SO_4 per 100 Gms. Solution.	t°.	Gms. K_2SO_4 per 100 Gms. Water.	Gms. K_2SO_4 per 100 Gms. Solution.	t°.	Gms. K_2SO_4 per 100 Gms Water.	Gms. K_2SO_4 per 100 Gms Solution.
0	7.35	6.85	40	14.76	12.86	90	22.8	18.57
10	9.22	8.44	50	16.50	14.16	100	24.1	19.42
20	11.11	10.00	60	18.17	15.38	120	26.5	20.94
25	12.04	10.75	70	19.75	16.49	143	28.8	22.36
30	12.97	11.48	80	21.4	17.63	170	32.9	24.76

Sp. Gr. of solution saturated at 18° = 1.083.

SOLUBILITY OF POTASSIUM SULPHATE IN AQUEOUS AMMONIA SOLUTIONS AT 20°.

(Girard — Bull. soc. chim. [2] 43, 552, '85.)

Gms. NH_3 per 100 cc. solution	0	6.086	15.37	24.69	31.02
Gms. K_2SO_4 per 100 cc. solution	10.80	4.10	0.83	0.14	0.04

SOLUBILITY OF MIXED CRYSTALS OF POTASSIUM SULPHATE AND AMMONIUM SULPHATE AT 25°.

(Fock — Z. Kryst. Min. 28, 375, '97.)

Grams per Liter. K_2SO_4.	Grams per Liter. $(NH_4)_2SO_4$.	Milligram Mols. per Liter. K_2SO_4.	Milligram Mols. per Liter. $(NH_4)_2SO_4$.	Mol. per cent K_2SO_4 in Solution.	Sp. Gr. of Solution.	Mol. per cent K_2SO_4 in Solid Phase.
127.9	0.0	734	0.0	100	1.086	100
135.7	115.7	778.5	874.6	47.1	1.149	91.28
84.20	281.1	483	2126	18.5	1.200	80.05
59.28	355.0	340	2685	11.13	1.226	68.63
40.27	482.7	231	3650	5.98	1.246	27.53
0.00	542.3	0.0	4100	0.00	1.245	0.00

Results are also given for 14°, 15°, 16°, 30°, 46°, and 47°.

Solubility of Mixed Crystals of Potassium Copper Sulphate and Ammonium Copper Sulphate in Water.

$CuSO_4.K_2SO_4.6H_2O$ and $CuSO_4(NH_4)_2SO_4.6H_2O$ at 13°–14°.

(Fock.)

Mols. per 100 Mols. H_2O		Mol. per cent K Salt		Mols. per 100 Mols. H_2O		Mol. per cent K Salt	
K. Salt.	NH_4 Salt.	in Solution.	in Solid.	K Salt.	NH_4 Salt.	in Solution.	in Solid.
0.00	1.035	0.00	0.00	0.2946	0.5096	36.63	58.20
0.0897	0.8618	5.06	10.34	0.3339	0.3319	50.15	75.34
0.2269	0.6490	16.76	33.05	0.4560	0.1961	69.93	83.86
0.2570	0.5887	30.40	46.22	0.4374	0.00	100.00	100.00

Solubility of Some Potassium Double Sulphates in Water at 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

Double Salt.	Formula.	Gms. Anhydrous Salt per 100 Gms. H_2O.
Potassium Cobalt Sulphate	$K_2CO(SO_4)_2.6H_2O$	12.88
" Copper "	$K_2Cu(SO_4)_2.6H_2O$	11.69
" Nickel "	$K_2Ni(SO_4)_2.6H_2O$	6.88
" Zinc "	$K_2Zn(SO_4)_2.6H_2O$	13.19

Solubility of Potassium Nickel Sulphate and also of Potassium Zinc Sulphate in Water at Different Temperatures.

t°.	Grams per 100 Gms. H_2O.		t°.	Grams per 100 Grams H_2O.	
	$K_2Ni(SO_4)_2.6H_2O$.	$K_2Zn(SO_4)_2.6H_2O$.		$K_2Ni(SO_4)_2.6H_2O$.	$K_2Zn(SO_4)_2.6HO_2$.
0	6	13	40	23	45
10	9	19	50	28	56
20	14	26	60	35	72
25	16	30	70	43	88
30	18	35			

Solubility of the Three Hydrates of Potassium Ferro Sulphate in Water at Different Temperatures.

(Kuster and Thiel — Z. anorg. Ch. 21, 116, '99.)

t°.	$K_2SO_4.FeSO_4.6H_2O$.		$K_2SO_4.FeSO_4.4H_2O$.		$K_2SO_4.FeSO_4.2H_2O$.	
	cc. N/10 $KMnO_4$ per 2cc. Solution.	Gms. K_2SO_4 .$FeSO_4$ per 100 cc. Sol.	cc. N/10 $KMnO_4$ per 2 cc. Solution.	Gms. K_2SO_4 .$FeSO_4$ per 100 cc. Sol.	cc. N/10 $KMnO_4$ per 2 cc. Solution.	Gms. K_2SO_4 .$FeSO_4$ per 100 cc. Sol.
0.5	12.4	18.36	15.5	22.94	15.4	22.79
17.2	17.0	25.16	18.1	26.79	21.6	31.98
40.1	24.8	36.72	21.9	32.41	27.6	40.86
60	29.0	42.93	24.1	35.68	28.8	42.63
80	30.6	45.29	27.3	40.46	28.6	42.34
90	...	...	29.6	43.82	28.9	42.73
95	...	...	29.8	44.11	27.7	41.01

Solubility of Potassium Sulphate in Aqueous Solutions of Potassium Chloride, Bromide, and Iodide.

(Blarez — Compt. rend. 112, 939, '91.)

Interpolated from the original results.

Grams Halogen Salt per 100 cc. Solution.	Grams K_2SO_4 per 100 cc. in Aq. Solutions of: KCl at 12.5°.	KBr at 14°.	KI at 12.5°.
0	9.9	10.16	9.9
2	8.3	9.1	9.2
4	7.0	8.2	8.4
6	5.7	7.4	7.7
8	4.6	6.6	7.2
10	3.5	6.0	6.6
12	...	5.5	6.0

Solubility of Mixed Crystals of Potassium Sulphate and Potassium Chromate at 25°.

(Fock — Z. Kryst. Min. 28, 379, '97.)

Milligram Mols. per Liter.		Grams per Liter.		Mol. per cent K_2SO_4 in Solution.	Sp. Gr. of Solution.	Mol. per cent K_2SO_4 in Solid Phase.
K_2SO_4.	K_2CrO_4.	K_2SO_4.	K_2CrO_4.			
618.1	0.0	107.7	0.00	100.0	1.083	100.0
608.4	103	106.0	20.02	85.51	1.092	99.65
341.0	691.8	59.46	134.5	33.01	1.141	97.30
174.8	1496.0	30.47	290.5	10.50	1.231	91.97
110.7	2523	19.30	490.5	4.21	1.356	28.43
100.6	2687	17.54	522.3	3.60	1.377	2.41
0.0	2847	0.0	553.5	0.00	1.398	0.00
734.0	0.0	127.9	0.0	100.0	1.0863	100.0
617.0	103.4	107.6	20.1	85.65	1.0934	99.78
463	452.7	80.72	88.0	55.55	1.1235	98.49
279	948.2	48.64	184.4	22.72	1.1700	96.07
153	1469	26.68	285.6	9.41	1.2255	85.77
296	2681	51.61	521.2	21.09	1.3688	25.73
0.0	2715	0.00	527.8	0.00	1.3781	0.00

Solubility of Potassium Sodium Sulphates in Water.

Double Salt.	t°.	Gms. per 100 Gms. H_2O.	Authority.
$3K_2SO_4.Na_2SO_4$	103.5	40.8	(Penny — Phil. Mag. [4] 10, 401, '55.)
$5K_2SO_4.Na_2SO_4$	4.4	9.2	(Gladstone — J. Ch. Soc. 6, 11, '54.)
"	12.7	10.1	"
"	100.0	25.0	"

Solubility of Potassium Sulphate in Aqueous Alcohol.

(Gerardin — Ann. chim. phys. [4] 5, 147, '65; Schiff — Liebig's Ann. 118, 362, '61.)

In Aq. Alcohol of 0.939 Sp. Gr.=40 Wt. %.

t°.	Gms. K_2SO_4 per 100 Gms. Alcohol.
40	0.16
80	0.21
60	0.92

In Alcohol of Different Strengths at 15°.

Weight per cent Alcohol.	Gms. K_2SO_4 per 100 Gms. Sat. Sol.
10	3.90
20	1.46
30	0.56
40	0.21

100 gms. glycerine of 1.255 Sp. Gr. dissolve 1.316 gms. K_2SO_4 at ord. temp.

(Vogel — Neues Report, Pharm. 16, 557 '67.)

Solubility of Potassium Sulphate in Aqueous Acetic Acid and in Aqueous Phenol Solutions at 25°.

(Rothmund and Wilsmore — Z. physik. Ch. 40, 619, '02.)

In Aq. Acetic Acid.

Mols. per Liter.		Grams per Liter.	
CH_3COOH.	K_2SO_4.	CH_3COOH.	K_2SO_4.
0.0	0.6714	0.0	117.0
0.07	0.6619	4.2	115.4
0.137	0.6559	8.22	114.4
0.328	0.6350	19.68	110.8
0.578	0.6097	34.68	106.3
1.151	0.5556	69.06	96.87
2.183	0.4743	128.58	82.70

In Aq. Phenol.

Mols. per Liter.		Grams per Liter.	
C_6H_5OH.	K_2SO_4.	C_6H_5OH.	K_2SO_4.
0.0	0.6714	0.0	117.0
0.032	0.6598	3.01	115.0
0.064	0.6502	6.02	113.3
0.127	0.6310	11.94	110.0
0.236	0.6042	22.19	105.3
0.308	0.5834	28.97	101.7
0.409	0.5572	38.46	97.2
0.464	0.5480	43.63	95.5
0.498 (sat.)	0.5377	46.82	93.8

100 grams water dissolve 10.4 grams K_2SO_4+ 219.0 grams sugar at 31.25°, or 100 grams sat. solution contain 3.18 grams K_2SO_4 + 66.74 grams sugar.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

POTASSIUM ACID SULPHATE $KHSO_4$.

Solubility in Water.

(Kremers — Liebig's Ann. 92, 497, '54.)

t°	0°	20°	40°	100°
Gms. $KHSO_4$ per 100 gms. H_2O	36.3	51.4	67.3	121.6

POTASSIUM PERSULPHATE $K_2S_2O_8$.

100 gms. H_2O dissolve 1.77 gms. $K_2S_2O_8$ at 0°.

(Marshall — J. Ch. Soc. 59, 771, '91.)

POTASSIUM SODIUM THIOSULPHATE $KNaS_2O_3.2H_2O$.

POTASSIUM SODIUM HYDROGEN SULPHITE $KNa_2H(SO_3)_2.4H_2O$.

100 grams H_2O dissolve 213.7 grams $KNaS_2O_3.2H_2O$ (*a*) at 15°.
100 grams H_2O dissolve 205.3 grams $KNaS_2O_3.2H_2O$ (*b*) at 15°.
100 grams H_2O dissolve 69.0 grams $KNa_2H(SO_3)_2.4H_2O$ at 15°.

(Schwicker — Ber. 22, 1731, '89.)

POTASSIUM SULPHOCYANIDE KSCN.

100 grams H_2O dissolve 177.2 grams KSCN at 0°, and 217.0 grams at 20°.

(Rüdorff — Ber. 2, 68, '69.)

SOLUBILITY OF POTASSIUM SULPHOCYANIDE IN ACETONE, AMYL ALCOHOL, ETC.

(von Laszcynski — Ber. 27, 2285, '94.)

In Acetone.		In Amyl Alcohol.		In Ethyl Acetate.		In Pyridine.	
t°.	Gms. KSCN per 100 Gms. $(CH_3)_2CO$.	t°.	Gms. KSCN per 100 Gms. $C_5H_{11}OH$.	t°.	Gms. KSCN per 100 Gms. $CH_3COOC_2H_5$.	t°.	Gms. KSCN per 100 Gms. C_5H_5N.
22	20.75	13	0.18	0	0.44	0	6.75
58	20.40	65	1.34	14	0.40	20	6.15
		100	2.14	79	0.20	58	4.97
		133.5	3.15			97	3.88
						115	3.21

POTASSIUM (Bi) TARTRATE (Mono) $KHC_4H_4O_6$ Cream of Tartar.

SOLUBILITY OF MONO POTASSIUM TARTRATE IN WATER.

(Alluard — Liebig's Ann. 133, 292, '65; Roelofsen — Am. Ch. J. 16, 466, '94; Blarez — Compt. rend. 112, 434, '91; at 20°, Magnanini — Gazz. chim. ital. 31, II, 542, '01; at 25°, Noyes and Clement — Z. physik. Ch. 13, 413, '94.)

t°.	Gms. $KHC_4H_4O_6$ per 100 Gms. Solution.			t°.	Gms. $KHC_4H_4O_6$ per 100 Gms. Solution.		
0	0.30 (R.)	0.32 (A.)	0.35 (B.)	40	0.96	1.3	1.29
10	0.37	0.40	0.42	50	1.25	1.8	1.80
20	0.49	0.53 (M.)	0.60	60	....	2.4	....
25	0.58	0.654 (N. and C.)	0.74	80	....	4.4	....
30	0.69	0.9 (A.)	0.89	100	....	6.5	....

SOLUBILITY OF POTASSIUM ACID TARTRATE ($KHC_4H_4O_6$) IN NORMAL SOLUTIONS OF ACIDS AT 20°.

(Ostwald; Huecke — J. pr. Ch. [2] 29, 49, '84.)

Purified tartrate was added in excess to normal solutions of the acids, and after shaking clear 1 cc. portions of each solution were withdrawn and titrated with approximately N/10 $Ba(OH)_2$ solution; 1 cc. normal acid requiring 10.63 cc. of the $Ba(OH)_2$ solution.

Acid.	Gms. Acid per 100 cc. Solvent.	cc. N/10 $Ba(OH)_2$ per 1 cc. Solution.	Gms. $KHC_4H_4O_6$ per 100 cc. Solution.	Acid.	Gms. Acid per 100 cc. Solvent.	cc. N/10 $Ba(OH)_2$ per 1 cc. Solution.	Gms $KHC_4H_4O_6$ per 100 cc Solution.
HNO_3	6.31	5.77*	10.21	$C_2H_5SO_3H$	11.0	5.01*	8.87
HCl	3.65	5.32	9.42	$HO.(CH_2)_2SO_3H$	12.61	5.33	9.43
HBr	8.10	5.38	9.75	$C_6H_5SO_3H$	15.81	5.25	9.29
HI	12.80	5.43	9.61	HCOOH	4.60	0.45	0.80
H_2SO_4	4.90	3.97	7.03	CH_3COOH	6.00	0.27	0.48
HCH_3SO_4	11.21	5.58	12.44	$CH_2ClCOOH$	9.45	1.01	1.79
$HC_2H_5SO_4$	12.61	5.41	9.58	C_2H_5COOH	7.40	0.24	0.42
$HC_3H_7SO_4$	14.01	5.21	9.22	C_3H_7COOH	8.81	0.23	0.41

* The figures in this column show the amount of the $Ba(OH)_2$ solution in excess of that which would have been required by the normal acid solution alone in each case, viz., 10.63 cc. They, therefore, correspond to the amount of $KHC_4H_4O_6$ dissolved in 1 cc. of each saturated solution, and when multiplied by 1.77 give the grams of $KHC_4H_4O_6$ per 100 cc. solution.

Solubility of Mono Potassium Tartrate ($KHC_4H_4O_6$) in Aqueous Solutions of Electrolytes at 25°.

(Noyes and Clement — Z. physik. Ch. 13, 413, '94; Magnanini — Gazz. chim. ital. 31, II, 542, '01.)

Electrolyte.	Gms. Equiv. per Liter. Electrolyte.	Gms. Equiv. per Liter. $KHC_4H_4O_6$.	Gms. per 100 cc. Electrolyte.	Gms. per 100 cc. $KHC_4H_4O_6$.
KCl	0.025	0.0254	1.86	0.4788
"	0.05	0.0196	3.73	0.3680
"	0.10	0.0133	7.46	0.2509
"	0.20	0.0087	14.92	0.1636
$KClO_3$	0.025	0.0256	3.06	0.4821
"	0.05	0.0197	6.13	0.3716
"	0.10	0.0138	12.26	0.2601
"	0.20	0.0092	24.52	0.1728
KBr	0.05	0.0197	5.95	0.3699
"	0.10	0.0134	11.91	0.2517
"	0.20	0.0087	23.82	0.1629
KI	0.05	0.0196	8.30	0.3687
"	0.10	0.0132	16.61	0.2492
"	0.20	0.0086	33.22	0.1619
KNO_3	0.05	0.0195	5.06	0.3676
"	0.10	0.0136	10.12	0.2551
"	0.20	0.0090	20.24	0.1696
K_2SO_4	0.05	0.0208	4.36	0.3921
"	0.10	0.0147	8.72	0.2769
"	0.20	0.0100	17.44	0.1881

Electrolyte.	Gm. Equiv. per Liter. Electrolyte.	Gm. Equiv. per Liter. $KHC_4H_4O_6$.	Grams per 100 cc. Electrolyte.	Grams per 100 cc. $KHC_4H_4O_6$.
CH_3COOK	0.05	0.0410	4.91	0.7718
"	0.10	0.0504	9.82	0.9486
"	0.20	0.0634	19.63	1.1930
$KHSO_4$ (20°)	0.01	0.0375	1.36	0.706
"	0.02	0.0500	2.72	0.941
"	0.10	0.1597	13.62	3.006
KHC_2O_4* (20°)	0.01	0.0369	1.28	0.694
"	0.02	0.0424	2.56	0.798
"	0.10	0.1132	12.82	2.130
HCl	0.013	0.0367	0.45	0.690
"	0.025	0.0428	0.91	0.806
"	0.050	0.0589	1.82	1.109
NaCl	0.05	0.0376	2.92	0.708
"	0.10	0.0397	5.85	0.748
"	0.20	0.0428	11.70	0.805
$NaClO_3$	0.05	0.0382	5.32	0.718
"	0.10	0.0405	10.65	0.763
"	0.20	0.0446	21.30	0.840

* Acid potassium oxalate.

Solubility of Mono Potassium Tartrate in Aqueous Alcohol Solutions.

(Roelofsen — Am. Ch. J. 16, 466, '94; Wenger — *Ibid.* 14, 624, '92.)

Note. — The original results were plotted on cross-section paper and the following figures read from the curves.

t°.	Milligrams $KHC_4H_4O_6$ per 10 cc. of Aq. Alcohol of: 10 per cent.	20 per cent.	30 per cent.	40 per cent.	60 per cent.	80 per cent.
0	17	11	7	6	6	6
10	22	14	8	7	6	6
20	29	18	11	8	6	6
25	34	21	12	9.5	6.5	5.5
30	40	25	13	11	7	5.5
40	55	36	19	14	7.5	5
50	87	55	29	19	8	5

POTASSIUM FLUO TITANATE $K_2TiF_6.H_2O$.

Solubility in Water.

(Marignac — Ann. chim. phys. [4] 8, 65, '66.)

t°	0°	3°	6°	10°	14°	20°
Gms. K_2TiF_6 per 100 gms. H_2O	0.55	0.67	0.77	0.91	1.04	1.28

POTASSIUM VANADATE $K_3V_5O_{14}.5H_2O$.

100 grams H_2O dissolve 19.2 grams at 17.5°.

(Radan — Liebig's Ann. 251, 120, '89.)

POTASSIUM ZINC VANADATE $KZnV_5O_{14}.8H_2O$.

100 grams H_2O dissolve 0.41 gram of the salt (Radan).

PRASEODYMIUM SULPHATE $Pr_2(SO_4)_3$.

SOLUBILITY IN WATER.

(Muthmann and Rölig — Ber. 31, 1727, '98.)

t°.	Gms. $Pr_2(SO_4)_3$ per 100 Gms. Solution.	Gms. $Pr_2(SO_4)_3$ per 100 Gms. Water.	Solid Phase.	t°.	Gms. $Pr_2(SO_4)_3$ per 100 Gms. Solution.	Gms. $Pr_2(SO_4)_3$ per 100 Gms. Water.	Solid Phase.
0	16.5	19.8	$Pr_2(SO_4)_3.8H_2O$	75	4.0	4.2	$Pr_2(SO_4)_3.8H_2O$
18	12.3	14.1	"	85	1.5	1.55	$Pr_2(SO_4)_3.8H_2O$ + $Pr_2(SO_4)_3.5H_2O$
35	9.4	10.4	"				
55	6.6	7.1	"	95	1.0	1.01	$Pr_2(SO_4)_3.5H_2O$

PROPIONIC ALDEHYDE C_2H_5COH.

100 grams H_2O dissolve 16 grams aldehyde at 20°.

(Vaubel — J. pr. Ch. 59, 30, '99.)

PROPIONITRIL C_2H_5CN.

SOLUBILITY IN WATER.

Synthetic method used. See Note, page 9.

(Rothmund — Z. physik. Ch. 26, 474, '98.)

t°.	Wt. per cent C_2H_5CN in: Aq. Layer.	Wt. per cent C_2H_5CN in: C_2H_5CN Layer.	t°.	Wt. per cent C_2H_5CN in: Aq. Layer.	Wt. per cent C_2H_5CN in: C_2H_5CN Layer.
40	10.7	92.1	95	19.6	78.0
50	11.6	90.5	100	22.4	75.5
60	12.7	88.5	105	26.0	72.1
70	13.2	86.1	110	32.0	66.5
80	14.9	83.4	113.1 (crit. temp.)	48.3	
90	17.6	80.2			

PROPYL ACETATE, Butyrate and Propionate.

SOLUBILITY OF EACH IN AQUEOUS ALCOHOL MIXTURES.

(Bancroft — Phys. Rev. 3, 205, '95, calc. from Pfeiffer.)

cc. Alcohol in Mixture.	cc. H_2O Added to Cause Separation* in: P. Acetate.	P. Butyrate.	P. Propionate.	cc. Alcohol in Mixture.	cc. H_2O Added to cause Separation* in: P. Acetate.	P. Butyrate.	P. Propionate.
3	4.50	1.19	1.58	21	58.71	19.68	27.83
6	10.48	3.55	4.70	24	∞	23.72	33.75
9	17.80	6.13	8.35	30		32.10	47.15
12	26.00	9.05	12.54	36		41.55	63.18
15	35.63	12.31	17.15	42		51.60	83.05
18	47.50	15.90	22.27	48		62.40	107.46
				54		73.85	...

* cc. H_2O added to cause the separation of a second phase in mixtures of the given amounts of alcohol and 3 cc. portions of propyl acetate, butyrate and propionate.

Solubility of Propyl Acetate, Formate, and Propionate in Water.

100 cc. H_2O dissolve 1.7 gms. propyl acetate at 22°.
100 cc. H_2O dissolve 2.1 gms. propyl formate at 22°.
(Traube — Ber. 17, 2304, '84.)
100 cc. H_2O dissolve 0.6 cc. propyl propionate at 25°. (Bancroft.)

PROPYL CHLORIDE, Bromide, etc.

Solubility in Water.

(Rex — Z. physik. Ch. 55, 355, '06.)

Propyl Compound.	Grams P. Compound per 100 Gms. H_2O at: 0°.	10°.	20°.	30°.
$CH_3CH_2CH_2Cl$ (normal)	0.376	0.323	0.272	0.277
$CH_3CH_2CH_2Br$ "	0.298	0.263	0.245	0.247
$CH_3CH_2CH_2I$ "	0.114	0.103	0.107	0.103
$(CH_3)_2CHCl$ (iso)	0.440	0.363	0.305	0.304
$(CH_3)_2CHBr$ "	0.418	0.365	0.318	0.318
$(CH_3)_2CHI$ "	0.167	0.143	0.140	0.134

PROPYLENE C_3H_6. Solubility in Water.

(Than — Liebig's Ann. 123, 187, '62.)

t°.	β.	q.
0	0.4465	0.0834
5	0.3493	0.06504
10	0.2796	0.0519
15	0.2366	0.0437
20	0.2205	0.0405

For values of β and q, see Ethane, page 133.

PYRENE $C_{16}H_{10}$

Solubility in Toluene and in Absolute Alcohol.

100 gms. toluene dissolve 16.54 gms. pyrene at 18°.

100 gms. absolute alcohol dissolve 1.37 gms. pyrene at 10° and 3.08 gms. at b. pt.

PYROGALLOL $C_6H_3(OH)_3$ 1, 2, 3.

Solubility in Water, etc.

(U. S. P.)

100 gms. water dissolve 62.5 gms. $C_6H_3(OH)_3$ at 25°.
100 gms. alcohol dissolve 100.0 gms. $C_6H_3(OH)_3$ at 25°.
100 gms. ether dissolve 90.9 gms. $C_6H_3(OH)_3$ at 25°.

QUININE $C_{20}H_{24}N_2O_2$. (See also Cinchona alkaloids, p. 117.)

Solubility of Quinine and of Quinine Salts in Water and Other Solvents.

(U. S. P.)

Compound.	Water. At 25°.	Water. At 80°.	Alcohol. At 25°.	Ether. At 25°.	Chloroform. At 25.	Glycerine. At 25°.
$C_{20}H_{24}N_2O_2$	0.057	0.123	166.6	22.2	52.6	0.633
$C_{20}H_{24}N_2O_2.3H_2O$	0.065	0.129	166.6	76.9	62.5	0.472
$C_{20}H_{24}N_2O_2HCl.H_2O$	5.55	250.0	166.6	0.417	122.0	12.2
$C_{20}H_{24}.N_2O_2.2C_6H_4(OH).COOH.H_2O$	1.30	2.86	9.09	0.91	2.70	6.25
$(C_{20}H_{24}N_2O_2)_2.H_2SO_4.7H_2O$	0.139	2.22	1.16	....	0.25	2.78
$C_{20}H_{24}N_2O_2.H_2SO_4.7H_2O$	11.77	117.7	5.55	0.056	0.109	5.55
$C_{20}H_{24}N_2O_2.HBr.H_2O$	2.5	33.3	149.2	6.2	...	12.5

Grams. Quinine Compound per 100 Grams Solvent in the columns above.

Solubility of Quinine in Aqueous Solutions of Caustic Alkalies.

(Doumer and Deraux — J. pharm. chim. [6] 1, 50, '95.)

Method. — A one per cent solution of quinine sulphate containing a very small amount of HCl was gradually added to 200 cc. portions of the caustic alkali solutions of the various concentrations stated, and the point noted at which a precipitate of the appearance corresponding to that of 1 cc. of milk in 100 cc. of water, remained undissolved.

In Aq. Ammonia. Gms. NH_3 per 200 cc. Solution.	Gms. Anhydrous Quinine Dissolved.	In Aq. Sodium Hydrate. Gms. NaOH per 200 cc. Solution.	Gms. Anhydrous Quinine Dissolved.	In Aq. Pot. Hydrate. Gms. KOH per 200 cc. Solution.	Gms. Anhydrous Quinine Dissolved.
0.52	0.084	0.007	0.092	0.612	0.088
0.65	0.084	0.012	0.091	1.512	0.082
4.59	0.096	0.740	0.090	3.456	0.068
13.08	0.122	2.160	0.079	10.944	0.039
18.88	0.144	3.188	0.056	44.704	0.006
25.19	0.174	6.172	0.044		
35.79	0.184	8.537	0.021		
		17.074	0.015		

Solubility of Quinine Salts in Water.

(Regnault and Willejean — Chem. Centralb. 18, 252, '87.)

Salt.	t°.	Gms. Salt per 100 Gms. H_2O.	Salt.	t°.	Gms. Salt per 100 Gms. H_2O
Brom Hydrate (basic)	14	2.06	Salicylate (basic)	15	0.114
" (neutral)	12	12.33	Sulphate "	14	0.139
" "	14	13.19	" "	16	0.153
" "	16	14.79	" "	18	0.160
" "	15	14.20	" (neutral)	15	8.50
Chlor Hydrate (basic)	12	3.80	" "	17	8.90
" "	14	4.14	" "	18	9.62
" "	15	4.25	Valerate (basic)	12–16	2.59
Lactate "	15	10.03			
" "	37	16.18			

RESORCINOL $C_6H_4(OH)_2$ 1, 3.

SOLUBILITY IN:

t°.	Water. (Speyers — Am. J. Sci. [4] 14, 294, '02.) Sp. Gr. of Solutions.	Gms. $C_6H_4(OH)_2$ per 100 Gms. Water.	Solution.	Ethyl Alcohol. (Speyers.) Sp. Gr. of Solutions.	Gms. $C_6H_4(OH)_2$ per 100 Gms. Alcohol.	Solution.
0	1.101	60	37.5	1.033	210	67.8
10	1.118	81	44.8	1.036	223	69.0
20	1.134	103	50.7	1.041	236	70.3
25	1.142	117	53.9	1.045	243	70.8
30	1.148	131	56.7	1.048	250	71.4
40	1.157	161	58.9	1.056	266	72.7
50	1.165	198	66.5	1.065	286	74.1
60	1.172	246	71.1	1.075	311	75.7
70	1.176	320	76.2	1.087	341	77.3
80	1.179	487	82.9	1.104	375	78.9

NOTE. — The original results of Speyers are given in terms of mols. per 100 mols. H_2O.

According to Vaubel, 100 gms. H_2O dissolve 175.5 gms. $C_6H_4(OH)_2$, or 100 gms. sat. solution contain 63.7 gms. at 20°. Sp. Gr. of sol. = 1.1335. (J. pr. Ch. [2] 52, 73, '95.)

SOLUBILITY OF RESORCINOL IN BENZENE.

(Rothmund — Z. physik. Ch. 26, 475, '98.)

Synthetic method used. See Note, p. 9.

t°.	Gms. $C_6H_4(OH)_2$ per 100 Gms. C_6H_6 Layer.	$C_6H_4(OH)_2$ Layer.	t°.	Gms. $C_6H_4(OH)_2$ per 100 Gms. C_6H_6 Layer.	$C_6H_4(OH)_2$ Layer
60	4.8	79.4	90	13.0	71.3
70	6.6	77.5	100	19.5	65.7
80	9.2	75.0	105	24.6	60.7
			109.3 (crit. temp.)	42.4	

DISTRIBUTION OF RESORCINOL BETWEEN WATER AND ORGANIC SOLVENTS AT ORDINARY TEMPERATURE.

(Vaubel — J. pr. Ch. [2] 67, 478, '03.)

Gms. $C_6H_4(OH)_2$ Used.	Solvents.	Gms. $C_6H_4(OH)$ in: H_2O Layer.	Organic Solvent Layer.
1.191	60 cc. H_2O + 30 cc. Ether	0.2014	0.9896
1.191	60 cc. H_2O + 60 cc. Ether	0.2475	0.9525
0.800	40 cc. H_2O + 40 cc. Benzene	0.5873	0.2127
0.800	40 cc. H_2O + 80 cc. Benzene	0.5773	0.2227
0.500	50 cc. H_2O + 50 cc. CCl_4	0.4885	0.0115
0.500	50 cc. H_2O + 100 cc. CCl_4	0.4880	0.0120
0.500	50 cc. H_2O + 150 cc. CCl_4	0.4880	0.0120

RHODIUM SALTS. SOLUBILITY IN WATER.

(Jorgensen — J. pr. Ch. [2] 27, 433, '83; 34, 394, '86; 44, 51, '91.)

Salt.	Formula.	t°.	Gms. per 100 Gms. H_2O
Chloro Purpureo Rhodium Chloride	$ClRh(NH_3)_5Cl_2$	17	0.56
Luteo Rhodium Chloride	$Rh(NH_3)_6Cl_3$	8	13.3
Luteo Rhodium Nitrate	$Rh(NH_3)_6(NO_3)_3$	ord. t.	2.1
Luteo Rhodium Sulphate	$[Rh(NH_3)_6]_2(SO_4)_3.5H_2O$	20	2.3

RUBIDIUM ALUMS.

Solubility in Water.

(Locke — Am. Ch. J. 27, 174, '01.)

Alum.	Formula.	t°.	Gms. Alum per 100 Gms. H_2O. Anhydrous.	Hydrated.	G. Mols.
Rb. Aluminum Alum	$RbAl(SO_4)_2.12H_2O$	25	1.81	3.15	0.0059
"	"	30	2.19	...	0.0072
"	"	35	2.66	...	0.0087
"	"	40	3.22	...	0.0106
Rb. Chromium Alum	$RbCr(SO_4)_2.12H_2O$	25	2.57	4.34	0.0079
"	"	30	3.17	...	0.0096
"	"	35	4.11	...	0.0128
"	"	40	5.97	...	0.0181
Rb. Vanadium Alum	$RbV(SO_4)_2.12H_2O$	25	5.79	9.93	0.0177
Rb. Iron Alum	$RbFe(SO_4)_2.12H_2O$	25	9.74	16.98	0.0294
"	"	30	20.24	...	0.0617

Biltz and Wilke (Z. anorg. Ch. **48**, 299, '06) find for the solubility of rubidium iron alum in water, at 6.6°, 4.55 gms. per 100 cc. solution; at 25°, 29.0 gms.; and at 40°, 52.6 gms.

RUBIDIUM FLUOBORIDE $RbBF_4$.

100 gms. H_2O dissolve 0.55 gm. $RbBF_4$ at 20°, and 1.0 gram at 100°.

(Godeffroy — Ber. 9, 1337, '76.)

RUBIDIUM BROMIDE RbBr.

Solubility in Water.

(Rimbach — Ber. 38, 1557, '05.)

t°.	Gms. RbBr per 100 Gms. Water.	Solution.	t°.	Gms. RbBr per 100 Gms. Water.	Solution.
0.5	89.6	47.26	39.7	131.85	56.87
5.0	98.0	49.50	57.5	152.47	60.39
16.0	104.8	51.17	113.5	205.21	67.24

RUBIDIUM CARBONATE Rb_2CO_3.

100 gms. absolute alcohol dissolve 0.74 gm. Rb_2CO_3.

(Bunsen.)

RUBIDIUM CHLORATE $RbClO_3$.

Solubility in Water.

(Reissig — Liebig's Ann. 127, 33, '63.)

t°.	4.7°.	13.0°.	18.2°.	19.0°.
Gms. $RbClO_3$ per 100 grams H_2O	2.8	3.9	4.9	5.1

RUBIDIUM (Per) CHLORATE $RbClO_4$.

100 grams H_2O dissolve 1.08 grams $RbClO_4$ at 21.3°.

(Longuimine — Liebig's Ann. 121, 123, '62.)

RUBIDIUM CHLORIDE RbCl.

SOLUBILITY IN WATER.

(Rimbach — Ber. 35, 1304, '02; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 207, '04.)

t°.	Mols. RbCl per Liter.	Gms. RbCl per 100 Gms. Water.	Gms. RbCl per 100 Gms. Solution.	t°.	Mols. RbCl per Liter.	Gms. RbCl per 100 Gms. Water.	Gms. RbCl per 100 Gms. Solution.
0	5.17	77.0	43.5	60	6.90	115.5	53.6
10	5.55	84.4	45.8	70	7.12	121.4	54.8
20	5.88	91.1	47.7	80	7.33	127.2	56.0
30	6.17	97.6	49.4	90	7.52	133.1	57.1
40	6.43	103.5	50.9	100	7.71	138.9	58.9
50	6.67	109.3	52.2	112.9	7.95	146.6	59.5

RUBIDIUM TELLURIUM CHLORIDE Rb_2TeCl_6.

100 gms. Aq. HCl of 1.2 Sp. Gr. dissolve 0.34 gm. Rb_2TeCl_6 at 23°.
100 gms. Aq. HCl of 1.05 Sp. Gr. dissolve 13.09 gms. Rb_2TeCl_6 at 23°.

(Wheeler — Am. J. Sci. [3] 45, 267, '93.)

RUBIDIUM THALLIUM CHLORIDE $3RbClTlCl_3.2H_2O$.

100 gms. H_2O dissolve 13.3 gms. at 18°, and 62.5 gms. at 100°.

(Godeffroy — Zeit. allgem. Oster. Apoth. No. 9, '80.)

RUBIDIUM CHROMATE (Mono) Rb_2CrO_4.

SOLUBILITY IN WATER.

(Schreinemaker and Filippo — Chem. Centralb. 77, I, 1321, '06.)

t°.	Gms. $RbCrO_4$ per 100 Gms. Solution.	t°.	Gms. $RbCrO_4$ per 100 Gms. Solution.	t°.	Gms. $RbCrO_4$ per 100 Gms. Solution.
−7	36.65	50	47.44	−2.40	15.58
0	38.27	60.4	48.90	−3.25	20.03
10	40.23	Solid Phase, Ice		−4.14	24.28
20	42.42	−0.6	6.95	−5.55	30.15
30	44.11	−1.1	7.22	−6.71	34.31
40	46.13	−1.57	9.87	about −7	36.65

RUBIDIUM (Di) CHROMATE $Rb_2Cr_2O_7$.

100 grams saturated aqueous solution contain 9.47 grams $Rb_2Cr_2O_7$ at 30°.

(Schreinemaker and Filippo.)

RUBIDIUM HYDROXIDE RbOH.

100 grams sat. aqueous solution contain 63.39 grams RbOH at 30°.

(Schreinemaker and Filippo.)

RUBIDIUM IODATE $RbIO_3$.

100 grams H_2O dissolve 2.1 grams $RbIO_3$ at 23°.

(Wheeler — Am. J. Sci. [3] 44, 123, '92.)

RUBIDIUM IODIDE RbI.

100 grams H_2O dissolve 137.5 grams RbI at 6.9°, and 152.0 grams at 17.4°.

(Reissig — Liebig's Ann. 127, 33, '63.)

Solubility of Rubidium Iodide in Organic Solvents.

(Walden — Z. physik. Ch. 55, 713, 718, '06.)

Solvent.	Formula.	Grams RbI per 100 cc. Solution.	
Acetonitril	CH_3CN	1.478 at 0°	1.350 at 25°
Propionitril	C_2H_5CN	0.274 "	0.305 "
Nitromethane	CH_3NO_2	0.567 "	0.518 "
Acetone	$(CH_3)_2CO$	0.960 "	0.674 "
Furfurol	$C_4H_3O.COH$	...	4.930 "

RUBIDIUM BROM IODIDE $RbBr_2I$.

100 gms. sat. aq. solution contain about 44.0 gms. $RbBr_2I$, and the Sp. Gr. of the solution is 3.84.

(Wells and Wheeler — Am. J. Sci. [3] 43, 475, '92.)

RUBIDIUM NITRATE $RbNO_3$. Solubility in Water.

(Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 207, '04.)

t°.	Mols. $RbNO_3$ Per Liter.	Grams $RbNO_3$ per 100 Gms. Water.	Solution.	t°.	Mols. $RbNO_3$ Per Liter.	Gms. $RbNO_3$ per 100 Gms Water.	Solution.
0	1.27	19.5	16.3	60	7.99	200	66.7
10	2.04	33.0	24.8	70	9.02	251	71.5
20	3.10	53.3	34.6	80	9.93	309	75.6
30	4.34	81.3	44.8	90	10.77	375	78.9
40	5.68	116.7	53.9	100	11.54	452	81.9
50	6.88	155.6	60.9	118.3	12.76	617	86.1

RUBIDIUM PERMANGANATE $RbMnO_4$.

One liter of aqueous solution contains 6.03 grams $RbMnO_4$ at 7°.

(Muthmann and Kuntze — Z. Kryst. Min. 23, 377, '94.)

100 cc. sat. aq. solution contain 0.46 gm. $RbMnO_4$ at 2°, 1.06 gms. at 19° and 4.68 gms. at 60°. (Patterson — J. Am. Ch. Soc. 28, 1735, '06.)

RUBIDIUM SELENATE Rb_2SeO_4.

100 grams H_2O dissolve 158.9 grams Rb_2SeO_4 at 12°.

(Tutton — J. Ch. Soc. 71, 850, '97.)

RUBIDIUM FLUO SILICATE Rb_2SiF_6.

100 gms. H_2O dissolve 0.16 gm. Rb_2SiF_6 at 0°, and 1.36 gms. at 100°.

(Stolba — J. pr. Ch. 101, 1, '67.)

RUBIDIUM SILICO TUNGSTATE $Rb_8SiW_{12}O_{42}$.

100 gms. H_2O dissolve 0.65 gm. $Rb_8SiW_{12}O_{42}$ at 20°, and 5.1 gms. at 100°. (Godeffroy — Ber. 9, 1363, '76.)

RUBIDIUM SULPHATE Rb_2SO_4. Solubility in Water.

(Etard — Ann. chim. phys. [7] 2, 550, '94; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 207, '04.)

t°.	Mols. Rb_2SO_4 per Liter.	Gms. Rb_2SO_4 per 100 Gms. Water.	Solution.	t°.	Mols. Rb_2SO_4 per Liter.	Gms. Rb_2SO_4 per 100 Gms. Water.	Solution.
0	1.27	36.4	27.3	60	2.15	67.4	40.3
10	1.46	42.6	29.9	70	2.25	71.4	41.7
20	1.64	48.2	32.5	80	2.34	75.0	42.9
30	1.79	53.5	34.9	90	2.42	78.7	44.0
40	1.92	58.5	36.9	100	2.49	81.8	45.0
50	2.04	63.1	38.7	102.4	2.50	82.6	45.2

Solubility of Rubidium Double Sulphates in Water at 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

Formula.	Per 100 cc. H_2O. Gms. Anh. Salt.	Mols. Salt.	Formula.	Per 100 cc. H_2O. Gms. Anh. Salt.	Mols. Salt.
$Rb_2Cd(SO_4)_2.6H_2O$	76.7	0.1615	$Rb_2Mn(SO_4)_2.6H_2O$	35.7	0.0857
$Rb_2Co(SO_4)_2.6H_2O$	9.28	0.022	$Rb_2Mg(SO_4)_2.6H_2O$	20.2	0.0521
$Rb_2Cu(SO_4)_2.6H_2O$	10.28	0.0241	$Rb_2Ni(SO_4)_2.6H_2O$	5.98	0.0142
$Rb_2Fe(SO_4)_2.6H_2O$	24.28	0.0579	$Rb_2Zn(SO_4)_2.6H_2O$	10.10	0.0236

SALICYLIC ACID $C_6H_4.OH.COOH$ 1:2.

Solubility in Water. (See also p. 61.)

(Average curve from the closely agreeing determinations of Walker and Wood — J. Ch. Soc. 73, 620, '98; at 26.4°, Philip — *Ibid.* 87, 992, '05; at 25°, Paul — Z. physik. Ch. 14, 111, '94; at 20°, Hoitsema — *Ibid.* 27, 315, '98; Hoffmann and Langbeck—*Ibid.* 51, 400, '05. For determinations not in good agreement with the following, see Alexejew — Ann. Physik. Chem. 28, 305, '86; Bourgion — Ann. chim. phys. [5] 15, 165, '78; Ost. — J. pr. Ch. [2] 17, 232, '78.)

t°.	Gms. $C_6H_4OHCOOH$ per Liter Solution.	t°.	Gms. $C_6H_4OH.COOH$ per Liter Solution.	t°.	Gms. $C_6H_4OH.COOH$ per Liter Solution.
0	0.8	25	2.2	60	8.2
10	1.2	30	2.7	70	13.2
20	1.8	40	3.7	80	20.5
		50	5.4		

Solubility of Salicylic Acid (Liquid) in Water.

(Alexejew.)

Determinations by Synthetic Method. See Note, page 9. Figures read from curve.

t°.	Gms. $C_6H_4OHCOOH$ per 100 Gms. Aqueous Layer.	Salicylic Acid Layer.
60	7	68
70	8	64
80	12	58
90	19	49
95 (crit. temp.)	32	

Solubility of Salicylic Acid in Aqueous Salt Solutions at 25° and at 35°.

(Hoffmann and Langbeck — Z. physik. Ch. 51, 407, '05.)

Salt.	Normality of Salt Solution.	Gms. Salt per Liter.	$C_6H_4OHCOOH$ dissolved at 25°. Gms. per 1000 gms. Sat. Sol.	G. Molecular percentage.	$C_6H_4.OH.COOH$ dissolved at 35°. Gms. per 1000 gms. Sat. Sol.	G. Molecular percentage.
	0.0	0.0	2.206	2.8851	3.197	
KCl	0.020	1.49	2.24	$2.9216 \cdot 10^{-4}$	3.23	$4.2206 \cdot 10^{-4}$
"	0.100	7.46	2.25	2.9377 "	3.23	4.2203 "
"	0.492	36.73	2.02	2.6321 "	3.01	3.9268 "
"	1.004	74.92	1.89	2.4759 "	2.68	3.5003 "
KNO_3	0.020	2.02	2.25	3.9351 "	3.25	4.2499 "
"	0.100	10.12	2.30	3.0103 "	3.32	4.3334 "
"	0.504	51.10	2.38	3.1061 "	3.38	4.4123 "
"	1.004	101.60	2.39	3.1249 "	3.36	4.3848 "
NaCl	0.020	1.19	2.23	2.9110 "	3.22	4.2062 "
"	0.100	5.95	2.22	2.9027 "	3.20	4.1806 "
"	0.497	29.50	2.00	2.6128 "	2.85	3.7171 "
"	0.988	58.80	1.72	2.2487 "	2.43	3.1596 "

Solubility of Salicylic Acid in Aqueous Solutions of Sodium Formate, Acetate, and Butyrate at 26.4°.

(Philip — J. Ch. Soc. 87, 992, '05.)

$\frac{\text{Mols.}}{100}$ Na Salt per Liter.	$\frac{\text{Mols.}}{100}$ $C_6H_4.OH.COOH$ per Liter in: HCOONa.	CH_3COONa.	C_3H_7COONa.	Gms. Na Salt per Liter.	Gms. $C_6H_4OHCOOH$ per Liter in: HCOONa.	CH_3COONa.	C_3H_7COONa
0	1.71	1.71	1.71	0	2.36	2.36	2.36
1	2.35	2.47	2.50	1	3.7	3.6	3.3
2	3.05	3.35	3.48	2	5.0	5.2	4.5
3	3.7	4.2	4.35	3	6.2	6.75	5.65
4	4.3	5.1	5.3	4	7.2	8.3	6.85
5	4.8	6.1	6.3	5	...	...	8.1

Solubility of Salicylic Acid in Aqueous Solutions of Sodium Salicylate at 20.1°.

(Hoitsema — Z. physik. Ch. 27, 315, '98.)

Gram Mols. per Liter. C_6H_4OH COOH.	C_6H_4OH COONa.	Sp. Gr. of Solutions.	Grams per Liter. C_6H_4OH COOH.	C_6H_4OH COONa.	Solid Phase.
0.0132	0.0	1.002	1.823	0.0	$C_6H_4OHCOOH$
0.0112	0.017	1.003	1.55	2.705	"
0.0124	0.113	1.009	1.71	17.98	"
0.0143	0.226	1.016	1.97	35.96	"
0.0164	0.344	1.024	2.26	54.74	"
0.0203	0.500	1.034	2.80	79.56	"
0.062	1.70	1.098	8.56	270.5	"
0.095	2.11	1.137	13.11	335.7	$C_6H_4OHCOOH.C_6H_4OHCOONa + C_6H_4OHCOOH$
0.091	2.19	1.144	12.56	348.4	$C_6H_4OHCOOH.C_6H_4OHCOONa$
0.086	3.41	1.215	11.88	542.6	"
0.081	4.23	1.263	11.19	673.0	$C_6H_4OHCOOH.C_6H_4OHCOONa + C_6H_4OHCOONa$
0.048	4.18	1.259	6.63	665.1	$C_6H_4OHCOONa$
0.021	4.12	1.258	2.90	665.5	"
0.00	4.15	1.257	0.0	660.3	"

Solubility of Salicylic Acid in Alcohols in Ether and in Acetone.

(Timofeiew — Compt. rend. 112, 1137, '91; at 15°, Bourgoin — Ann. chim. phys. [5] 13, 405, '78; at 17° and 23°, Walker and Wood — J. Ch. Soc. 73, 620, '98.)

Solvent.	t°.	Gms. $C_6H_4OHCOOH$ per 100 Gms. Solvent.	Solution.	Solvent.	t°.	Gms. $C_6H_4OHCOOH$ per 100 Gms. Solvent.	Solution.
CH_3OH	−3	40.67	28.91	$C_3H_7OH(n)$	−3	26.12	20.71
CH_3OH	+21	62.48	38.46	$C_3H_7OH(n)$	+21	37.69	27.36
C_2H_5OH	−3	36.12	26.29	$(CH_3)_2O$	15	50.47	33.55
C_2H_5OH	+15	49.63	33.17	$(CH_3)_2O$	17		23.4*
C_2H_5OH	21	53.53	34.87	$(CH_3)_2CO$	23		31 3*
C_2H_5OH 90%	15	42.09	29.62				

* Per 100 cc. Sat. Solution.

Solubility of Salicylic Acid in Aqueous Solutions of Ethyl Alcohol, Iso Butyl Alcohol, Dextrose, Cane Sugar, and of Levulose at 25° and at 35°.

(Hoffmann and Langbeck — Z. physik. Ch. 51, 400, '05.)

Aq. Solvent.	Conc. of Solvent.		$C_6H_4OHCOOH$ dissolved at 25°.		$C_6H_4OHCOOH$ dissolved at 35°.	
	Normality.	Gms. per Liter.	Grams molecular percentage.	Grams per 100 gms. sat. solution.	Grams molecular percentage.	Grams per 100 gms. sat. solution.
H_2O	0.0	0.0	2.8851	0.2206	4.1844	0.3197
C_2H_5OH	0.0249	1.146	$2.8966.10^{-4}$	0.222	$4.2044.10^{-4}$	0.322
"	0.0560	2.578	2.9150 "	0.223	4.2348 "	0.324
"	0.1747	8.04	2.9901 "	0.229	...	...
"	0.2399	11.05	...	...	4.4341 "	0.339
"	1.03	47.4	3.5279 "	0.270	5.2816 "	0.404
"	1.638	75.44	3.9253 "	0.300	...	...
C_4H_9OH (iso)	0.020	1.496	2.909 "	0.223	4.229 "	0.324
"	0.051	3.74	2.955 "	0.226	4.289 "	0.329
"	0.100	7.48	3.033 "	0.232	4.435 "	0.339
"	0.521	38.60	3.718 "	0.285	5.624 "	0.431
$C_6H_{12}O_6$	0.02	3.6	2.886 "	0.221	4.184 "	0.321
"	0.10	18.0	2.898 "	0.222	4.202 "	0.322
"	0.50	89.6	2.954 "	0.226	4.263 "	0.326
"	1.00	180.0	3.015 "	0.231	4.360 "	0.334
$C_{12}H_{22}O_{11}$	0.02	6.88	2.885 "	0.221	4.206 "	0.322
"	0.10	34.97	2.964 "	0.227	4.287 "	0.328
"	0.50	172.0	3.239 "	0.248	4.697 "	0.360
"	1.10	376.3	3.633 "	0.278	5.236 "	0.401
$C_6.H_{12}O_6$	0.02	3.6	2.888 "	0.221	...	...
"	0.06	10.8	2.895 "	0.221	...	...
"	0.25	45.0	2.944 "	c.225	...	...

Solubility of Salicylic Acid in Benzene.

(Walker and Wood — J. Ch. Soc. 73, 620, '98.)

t°.	Gms. $C_6H_4OHCOOH$ per 100 Gms. C_6H_6.	t°.	Gms. $C_6H_4OHCOOH$ per 100 Gms. C_6H_6.	t°.	Gms. $C_6H_4OHCOOH$ per 100 Gms. C_6H_6.
11.7	0.460	30.5	0.991	49.4	2.380
18.2	0.579	34.6	1.261	64.2	4.40
		36.6	1.430		

SELENIUM Se.

Solubility in Carbon Bisulphide.

(Marc — Z. anorg. Ch. 48, 425, '06.)

100 cc. CS_2 dissolve 0.065 gm. amorphous Se at room temperature. Se which is heated to 180° for 6–7 hours is insoluble in CS_2. Se crystallized from the melt at 200° is insoluble in CS_2. Se heated once quickly to 140° is very slightly soluble in CS_2.

100 gms. methylene iodide (CH_2I_2) dissolve 1.3 gms. Se at 12°.

(Retgers — Z. anorg. Ch. 3, 346, '93.)

SELENIOUS ACID H_2SeO_3.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 551, '94.)

t°.	Gms. H_2SeO_3 per 100 Gms. Solution.	t°.	Gms. H_2SeO_3 per 100 Gms. Solution.	t°.	Gms. H_2SeO_3 per 100 Gms. Solution.
−10	42.2	25	67.0	60	79.3
0	47.4	30	70.2	70	79.3
+10	55.0	40	77.5	80	79.3
20	62.5	50	79.2	90	79.4

SILICON Si.

SOLUBILITY IN LEAD AND IN ZINC.

(Moissan and Siemens — Ber. 37, 2088, '04.)

In Lead.		In Zinc.	
t°.	Gms. Si per 100 Gms. Solution.	t°.	Gms. Si per 100 Gms. Solution.
1250	0.024	600	0.06
1330	0.070	650	0.15
1400	0.150	730	0.57
1450	0.210	800	0.92
1550	0.780	850	1.62

SILICON IODIDES Si_2I_6, SiI_4.

SOLUBILITY IN CARBON BISULPHIDE.

(Friedel and Lachburg — Bull. soc. chim. [2] 12, 92, '69; Friedel — Liebig's Ann. 149, 96, '69.)

100 gms. CS_2 dissolve 19 gms. Si_2I_6 at 19°.
100 gms. CS_2 dissolve 26 gms. Si_2I_6 at 27°.
100 gms. CS_2 dissolve 2.2 gms. SiI_4 at 27°.

SILICO TUNGSTIC ACID $H_8SiW_{12}O_{42}$.

100 gms. H_2O dissolve 961.5 crystallized silico tungstic acid at 18°, and solution has Sp. Gr. 2.843.

For equilibrium between metallic *Silver* and mercury (Silver amalgam) and mixed aqueous solutions of their nitrates, determined for mixtures of the two metals in all proportions, see Reinders — Z. physik. Ch. **54**, 609, '06.

SILVER ACETATE CH_3COOAg.

SOLUBILITY IN WATER.

(Nernst — Z. physik. Ch. **4**, 379, '89; Arrhenius — *Ibid.* **11**, 396, '93; Goldschmidt — *Ibid.* **25**, 93, '98, Nauman and Rucker — Ber. **38**, 2293, '05; Raupenstrauch — Monatsh. Ch. **6**, 585, '85; Wright and Thompson — Phil. Mag. [5] **17**, 288, '84; **19**, 1, '85.)

t°.	Gms. $Ag(C_2H_3O_2)$ per Liter.	t°.	Gms. $Ag(C_2H_3O_2)$ per Liter.	t°.	Gms. $Ag(C_2H_3O_2)$ per Liter.
0	7.22	25	11.2	50	16.4
10	8.75	30	12.1	60	18.9
15	9.4	40	14.1	70	21.8
20	10.4			80	25.2

SOLUBILITY OF SILVER ACETATE IN AQUEOUS SOLUTIONS OF:

Silver Nitrate.			Sodium Acetate.		
Gms. $AgNO_3$ per Liter.	Gms. CH_3COOAg per Liter at: 16° (Nernst).	19.8° (Arrhenius).	Gms. CH_3COONa per Liter.	Gms. CH_3COOHg per Liter at: 16° (N., N. and R.).	18.6° (A.).
0	10.05	9.85	0	10.05	9.9
5	8.2	7.9	5	6.3	6.6
10	7.0	6.6	10	4.6	4.9
15	6.4	5.5	15	3.8	4.1
20	5.7	4.5	20	3.3	3.5
30	4.4	...	30	...	2.8
40	3.2	...	40	...	2.4

SILVER Mono Chlor **ACETATE** $CH_2ClCOOAg$.

One liter aqueous solution contains 12.97 grams $CH_2ClCOOAg$ at 16.9°.

(Arrhenius.)

SOLUBILITY OF SILVER MONO CHLOR ACETATE AT 16.9° IN AQUEOUS SOLUTIONS OF:

Silver Nitrate.		Sodium Chlor Acetate.	
Gms. $AgNO_3$ per Liter.	Gms. $CH_2ClCOOAg$ per Liter.	Gms. $CH_2ClCOONa$ per Liter.	Gms. $CH_2ClCOOAg$ per Liter.
0.0	12.97	0.0	12.97
9.6	10.05	3.88	10.05
17.0	7.55	7.77	8.16
		15.53	6.02
		31.07	4.19
		58.26	3.26

SILVER Di Propyl **ACETATE** $AgC_8H_{15}O_2$.

100 gms. H_2O dissolve 0.123 gm. $AgC_8H_{15}O_2$ at 11.7°, and 0.190 gm. at 72°.

(Fürth — Monatsh. Ch. **9**, 311, '88.)

SILVER Methyl Ethyl **ACETATE** $Ag.CH_3.CH_2.CH(CH_3)COO$.

SILVER Di Ethyl **ACETATE** $Ag.[(C_2H_5)_2CH.COO]$.

SILVER Tri Methyl **ACETATE** $Ag.(CH_3)_3CCOO$.*

SOLUBILITY OF EACH WATER.

(Sedlitzky — Monatsh. Ch. **8**, 563, '87; Keppish — *Ibid.* **9**, 589, '88; Stiassny — *Ibid.* **12**, 601, '91.)

t°.	Gms. per 100 Gms. H_2O.			t°.	Gms. per 100 Gms. H_2O.		
	$Ag.C_5H_9O_2$.	$AgC_6H_{11}O_2$.	$AgC_5H_9O_2$.*		$AgC_5H_9O_2$.	$AgC_6H_{11}O_2$.	$AgC_5H_9O_2$.*
0	1.112	0.402	1.10	50	1.602	0.536	1.47
10	1.126	0.413	1.15	60	1.827	0.585	1.57
20	1.182	0.432	1.22	70	2.093	0.643	1.68
30	1.280	0.458	1.22	80	2.402	...	1.80
40	1.420	0.494	1.37				

SILVER BENZOATE C_6H_5COOAg.

One liter of aqueous solution contains 1.763 gms. C_6H_5COOAg at 14.5°, and 2.607 gms. at 25°.

(Holleman — Z. physik. Ch. **12**, 129, '93; Noyes and Schwartz — *Ibid.* **27**, 287, '98.)

SOLUBILITY OF SILVER BENZOATE AT 25° IN AQUEOUS SOLUTIONS OF:

Nitric Acid (N. and S.).				Chlor Acetic Acid (N. and S.).			
Millimols per Liter.		Grams per Liter.		Millimols per Liter.		Grams per Liter.	
HNO_3.	C_6H_5COOAg.	HNO_3.	C_6H_5COOAg.	$CH_2ClCOOH$.	C_6H_5COOAg.	$CH_2ClCOOH$.	C_6H_5COOAg.
0.0	0.01144	0.0	2.607	0.0	0.01144	0.0	2.607
0.004435	0.01395	0.280	3.195	0.00394	0.01385	0.371	3.172
0.00887	0.01698	0.559	3.889	0.00787	0.01612	0.744	3.691
0.00892	0.01715	0.562	3.926	0.01574	0.02093	1.487	4.792
0.01774	0.02324	1.118	5.321				
0.02674	0.03071	1.686	7.031				

One liter of cold alcohol dissolves 0.169 gm. C_6H_5COOAg; one liter of boiling alcohol dissolves 0.465 gram. (Liebermann — Ber. **35**, 1094, '02.)

SILVER BORATE $AgBO_2$.

One liter of aqueous solution contains about 9.05 gms. $AgBO_2$ at 25°.

(Abegg and Cox — Z. physik. Ch. **46**, 11, '03.)

SILVER BROMATE $AgBrO_3$.

SOLUBILITY IN WATER.

t°.	Gms. $AgBrO_3$ per Liter.	Authority.
20	1.586	(Böttger — Z. physik. Ch. **46**, 602, '03.)
24.5	1.911	(Noyes — Z. physik. Ch. **6**, 246, '90.)
25	1.68	(Longi — Gazz. chim. ital. **13**, 87, '83.)

SOLUBILITY OF SILVER BROMATE IN AQUEOUS AMMONIA AND NITRIC ACID SOLUTIONS AT 25°.

(Longi.)

Solvent.		Grams $AgBrO_3$ per 1000 cc. Sol.	Grams $AgBrO_3$ per 1000 Gms. Sol.
Ammonia	Sp. Gr. 0.998 = 5%	35.10	35.54
Ammonia	Sp. Gr. 0.96 = 10%	443.6	462.5
Nitric Acid	Sp. Gr. 1.21 = 35%	3.81	3.12

Solubility of Silver Bromate at 24.5° in Aqueous Solutions of:

Silver Nitrate (Noyes).				Potassium Bromate (N.).			
Normal Content.		Gms. per Liter.		Normal Content.		Gms. per Liter.	
$AgNO_3$.	$AgBrO_3$.	$AgNO_3$.	$AgBrO_3$.	$KBrO_3$.	$AgBrO_3$.	$KBrO_3$.	$AgBrO_3$.
0.0	0.0081	0.0	1.911	0.0	0.0081	0.0	1.911
0.0085	0.0051	1.445	1.203	0.0085	0.00519	1.42	1.225
0.0346	0.0022	5.882	0.510	0.0346	0.00227	5.78	0.536

SILVER BROMIDE AgBr.

Solubility in Water.

t°.	Gms. AgBr per Liter.	Authority.
20	0.000084	(Böttger — Z. physik. Ch. **46**, 602, '03.)
25	0.000137	(Abegg and Cox — Z. physik. Ch. **46**, 11, '03.)
100	0.00370	(Böttger — Z. physik. Ch. **56**, 93, '06.)

(See also Holleman — Z. physik. Ch. **12**, 129, '93; Kohlrausch — *Ibid.* **50**, 365, '05.)

Solubility of Silver Bromide in Aqueous Ammonia Solutions.

(Longi — Gazz. chim. ital. **13**, 87, '83; at 80°, Pohl — Sitzber. Akad. Wiss. Wien, **41**, 267, '60.)

Solvent.	Gms. AgBr at 12° per 1000 cc. Solvent.	Gms. AgBr at 12° per 1000 Gms. Solvent.	Gms. AgBr at 80° per 1000 Gms. Solvent.
Ammonia Sp. Gr. 0.998 = 5%	0.114	0.114	...
Ammonia Sp. Gr. 0.96 = 10%	3.33–4.0	3.47	...
Ammonia Sp. Gr. 0.986	...	...	0.51* 1.0†

* Dried AgBr. † Freshly pptd.

Solubility of Silver Bromide in Aqueous Solutions of:

Ammonia at 0°. (Jarry — Ann. chim. phys. [7] **17**, 363, '99.)

Mono Methyl Amine at 11.5°. (Jarry.)

Ammonia: NH_3 Gas.	AgBr.	NH_3 Gas.	AgBr.	Methyl Amine: NH_2CH_3.	AgBr.
3.07	0.080	26.27	1.067	11.01	0.07
4.88	0.096	31.26	1.568	13.17	0.12
6.69	0.172	33.89	1.987	15.13	0.16
8.29	0.212	36.52	2.669	17.97	0.28
11.51	0.349	37.22	2.888	32.58	0.55
15.32	0.557	37.70	2.930	35.62	0.73
18.09	0.722	39.26	2.892	43.11	1.27
19.53	0.741	39.95	2.852	48.44	2.89

(All values: Grams per 100 cc. Solution.)

Solubility of Silver Bromide in Aqueous Solutions of Sodium Thio Sulphate at 35°.

(Richards and Faber — Am. Ch. J. **21**, 186, '99.)

Gms. Cryst. Na Thio Sulphate per Liter.	Gms. AgBr Dissolved per Gram of Thio Sulphate.	Mols. AgBr Dissolved per Mol. of $Na_2S_2O_3$.
100	0.376	0.496
200	0.390	0.515
300	0.397	0.524
400	0.427	0.564

SOLUBILITY OF SILVER BROMIDE IN AQUEOUS SALT SOLUTIONS.

(Valenta — Monatsh. Ch. 15, 250, '94; see also Cohn — Z. physik. Ch. 18, 61, '95.)

Salt Solution.	t°.	Gms. AgBr per 100 Gms. Aq. Solution of Concentration: 1:100.	5:100.	10:100.	15:100.	20:100.
Sodium Thio Sulphate	20	0.35	1.90	3.50	4.20	5.80
" " Calc. by Cohn	20	0.50	2.40	4.59	6.58	8.40
Sodium Sulphite	25	...	...	0.04	...	0.08
Potassium Cyanide	25	...	6.55	...	...	...
" " Calc. by Cohn	25	...	6.85	...	...	...
Potassium Sulphocyanide	25	...	...	0.73	...	...
Ammonium Sulphocyanide	20	...	0.21	2.04	5.30	...
Calcium Sulphocyanide	25	...	...	0.53	...	...
Barium Sulphocyanide	25	...	...	0.35	...	...
Aluminum Sulphocyanide	25	...	...	4.50	...	...
Thio Carbamide	25	...	...	1.87	...	...
Thio Cyanime	25	0.08	0.35	0.72	...	...

NOTE. — Cohn shows that the lower results obtained by Valenta are due to the excess of solid AgBr used and the consequent formation of the less soluble di salt $3(AgS_2O_3Na)_2$ instead of the more soluble salt $(AgS_2O_3Na)_2Na_2S_2O_3$.

100 cc. H_2O containing 10 per cent of normal mercuric acetate, $Hg(C_2H_3O_2)_2$ + Aq., dissolve 0.0122 gram AgBr at 20°.

100 gms. NaCl in conc. aq. solution dissolve 0.474 gm. AgBr at 15°.

100 gms. NaCl in 21 per cent solution dissolve 0.182 gm. AgBr at 15°.

100 gms. KBr in conc. solution dissolve 3.019 gms. AgBr at 15°.

95 gms. NaCl + 10 gms. KBr in conc. aq. solution dissolve 0.075 gm. AgBr at 15°.

(Schierholz — Sitzber. K. Akad. Wiss. (Vienna) 101, 2b, 4, '90.)

SILVER BUTYRATE C_3H_7COOAg.

SILVER (Iso) BUTYRATE $(CH_3)_2CHCOOAg$.

SOLUBILITY OF EACH IN WATER.

(Goldschmidt — Z. physik. Ch. 25, 93, '98; Arrhenius — *Ibid.* 11, 396, '93; Raupenstrauch — Monatsh Ch. 6, 589, '85.)

t°.	Gms. per 100 Grams H_2O. Butyrate.	Iso Butyrate.	t°.	Grams per 100 Gms. H_2O. Butyrate.	Iso Butyrate.
0	0.363	0.796	30	0.561 (1.102 G.)	1.060
10	0.419	0.874	40	0.647	...
17.8	0.432 (A.)	...	50	0.742	1.313
18.8	0.445 (A.)	...	60	0.848	...
20	0.484 (0.999 G.)	0.961	70	0.901	1.670
25	... (1.044 G.)	...	80	1.14	1.898

SOLUBILITY OF SILVER BUTYRATE IN AQ. SOLUTIONS OF SILVER ACETATE, SILVER NITRATE AND OF SODIUM BUTYRATE.

(Arrhenius — Z. physik. Ch. 11, 396, '93.)

In Silver Acetate at 17.8°. In Silver Nitrate at 18.8°.

G. Mols. per Liter.		Grams per Liter.		G. Mols. per Liter.		Grams per Liter.	
CH_3COOAg.	C_3H_7COOAg.	CH_3COOAg.	C_3H_7COOAg.	$AgNO_3$.	C_3H_7COOAg.	$AgNO_3$.	C_3H_7COOAg.
0.0	0.0221	0.0	4.32	0.0	0.0228	0.0	4.445
0.0270	0.0139	4.51	2.71	0.0667	0.0078	11.33	1.521
0.0506	0.0103	8.45	2.01	0.100	0.0062	17.00	1.209

In Sodium Butyrate at 18.2°.

G. Mols. per Liter.		Grams per Liter.		G. Mols. per Liter.		Grams per Liter.	
C_3H_7COONa.	C_3H_7COOAg.	C_3H_7COONa.	C_3H_7COOAg.	C_3H_7COONa.	C_3H_7COOAg.	C_3H_7COONa.	C_3H_7COOAg.
0.0	0.0224	0.0	4.363	0.0658	0.0091	7.24	1.774
0.0066	0.0199	0.73	3.881	0.1315	0.0060	14.47	1.170
0.0164	0.0169	1.81	3.296	0.263	0.0040	28.96	0.780
0.0329	0.0131	3.62	2.555	0.493	0.0027	54.28	0.526

SILVER CAPROATES $Ag(C_6H_{11}O_2)$.

SOLUBILITY IN WATER.

(Keppish — Monatsh. Ch. 9, 589, '88; Stiassny — *Ibid.* 12, 596, '91; Kulisch — *Ibid.* 14, 570, '93; König — *Ibid.* 15, 26, '94; Altschul — *Ibid.* 17, 568, '96.)

Results in terms of grams salt per 100 grams H_2O.

t°.	Normal Caproate $CH_3(CH_2)_4COOAg$.		2 Methyl Pentan 4 Acid $CH_3.CH.CH_3.(CH_2)_2COOAg$.	Methyl 3 Pentan Acid 4 $CH_3.CH_2.CHCH_3CH_2COOAg$.	4 Methyl Pentan 4 Acid $CH_3(CH_2)_2CH(CH_3).COOAg$.
0	0.076 (A.)	0.078 (Keppisch)	0.168 (König)	0.880 (Kulish)	0.510 (Stiassny)
10	0.085	0.089	0.162	0.858	0.528
20	0.100	0.107	0.163	0.849	0.550
30	0.123	0.131	0.170	0.854	0.574
40	0.154	0.161	0.183	0.871	0.602
50	0.193	0.198	0.203	0.902	0.632
60	0.240	0.243	0.229	0.946	0.666
70	0.295	0.288	0.263	1.003	0.702
80	0.354	...	0.300	1.073	0.742
90	...	...	0.347	1.157	...

SILVER CARBONATE Ag_2CO_3.

SOLUBILITY IN WATER.

t°.	Gms. Ag_2CO_3 per Liter.	Authority.
15	0.031	(Kremers — Pogg. Ann. 85, 248, '52.)
25	0.033 (0.00012 gm. atoms Ag.)	(Abegg and Cox — Z. physik. Ch. 46, 11, '03.)
100	0.50	(Joulin — Ann. chim. phys. [4] 30, 260, '73.)
15	0.85 (in H_2O sat. with CO_2)	(Johnson — Ch. News, 54, 75, '86.)

SILVER CHLORATE $AgClO_3$.

100 grams cold water dissolve 10 grams $AgClO_3$ (Vauquelin); 20 gms. $AgClO_3$ (Wächter).

SILVER CHLORIDE AgCl.

Solubility in Water.

(A large number of determinations are quoted by Abegg and Cox — Z. physik. Ch. 46, 11, '03; see also Kohlrausch — *Ibid.* 50, 356, '04-'05; Böttger — *Ibid.* 46, 602, '03, 56, 93, '06.)

t°.	14°.	20°.	25°.	42°.	100°.
Gms. AgCl per liter	0.0014	0.0016	0.0020	0.0040	0.0218

Solubility of Silver Chloride in Aqueous Solutions of:

Ammonia at 0°.

(Jarry — Ann. chim. phys. [7] 17, 342, '99.)

Grams per 100 Grams Solution.			
NH_3 Gas.	AgCl.	NH_3 Gas.	AgCl.
1.45	0.49	28.16	6.59
1.94	1.36	29.80	7.09
5.60	3.44	30.19	7.25
6.24	4.00	32.43	5.87
11.77	4.68	34.56	4.77
16.36	5.18	37.48	3.90

Mono Methyl Amine at 11.5.°

(Jarry.)

Gms. per 100 Gms. Solution.	
NH_2CH_3.	AgCl.
1.78	0.16
4.44	0.62
5.51	0.83
7.66	1.32
13.70	3.29
18.69	5.43
36.69	9.93

Solubility of Silver Chloride in Aqueous Solutions of Ammonia.

(Longi — Gazz. chim. ital. 13, 87, '83; at 25°, Valenta — Monatsh. Ch. 15, 250, '94; at 80°, Pohl — Sitzber. Akad. Wiss, Wien, 41, 627, '60.)

Solvent.	t°.	Gms. AgCl per 100 Gms. Solvent.
Aq. Ammonia of 0.998 Sp. Gr. = 5%	12	0.233
" 0.96 Sp. Gr. = 10%	18	7.84
" 0.986 Sp. Gr.	80	1.49
" = 3%	25	1.40
" = 15%	25	7.58

Solubility of Silver Chloride in Aqueous Solutions of Ammonium Chloride.

(Schierholz — Sitzber. K. Akad. Wiss. (Vienna) 101, 2b, 8, '90; see also Vogel — N. Rep. Pharm. 23, 335, '74. Hahn — Wyandotte Silver Smelting Wks., 1877.)

Solubility at 15°.

Grams per 100 Gms. Solution.	
NH_4Cl.	AgCl.
10.00	0.0050
14.29	0.0143
17.70	0.0354
19.23	0.0577
21.98	0.110
25.31	0.228
28.45	0.340 (24.5)
Sat. at ord. temp.	0.157

Solubility at Different Temperatures.

t°.	Gms. per 100 Gms. Solution.	
	NH_4Cl.	AgCl.
15	26.31	0.276
40	"	0.329
60	"	0.421
80	"	0.592
90	"	0.711
100	"	0.856
110	"	1.053

Sp. Gr. of 26.31 % NH_4Cl solution at 15° = 1.08.

Solubility of Silver Chloride in Aqueous Solutions of Aluminum and Ammonium Salts.

(Valenta; see also Cohn — Z. physik. Ch. 18, 61, '95.)

Aq. Salt Solution.	t°.	Gms. AgCl per 100 Gms. Solvent of Concentration: 1 : 100.	5 : 100.	10 : 100.
Aluminum Sulphocyanide	25	...	...	2.02
Ammonium Carbonate	25	...	...	0.05
" Sulphocyanide	20	...	0.08	0.54
" Thio Sulphate	20	0.57	1.32	3.92
" " Calc. by Cohn*		0.64	3.07	5.86

* See Note, p. 281.

Solubility of Silver Chloride in Aqueous Hydrochloric Acid Solutions at Ordinary Temperature.

(Pierre — J. pharm. chim. [3] 12, 237, '47; Vogel.)

Solvent.	Gms. AgCl per Liter.	Solvent.	Gms. AgCl per Liter.
Conc. HCl + Aq.	5.0	100 vol. sat. HCl + 10 vol. H_2O	0.56
1 vol. Conc. HCl + 1 vol. H_2O	1.6	" + 20 " "	0.18
Sat. HCl. Sp. Gr. 1.165	2.98	" + 30 " "	0.09
" " (at b. pt.)	5.60	" + 50 " "	0.035

Solubility of Silver Chloride in Aqueous Salt Solutions.

(Vogel; Hahn; Valenta)

Salt Solution.	Conc. of Salt.	t°.	Gms. AgCl per 100 Gms. Solution.	
Barium Chloride	27.32%	24.5	0.057	(H.)
Barium Chloride	saturated	ord. temp.	0.014	(Vg.)
Barium Sulphocyanide	10 : 100	25	0.20	(Vl.)
Calcium Sulphocyanide	10 : 100	25	0.15	(Vl.)
Calcium Chloride	41.26%	24.5	0.571	(H.)
Calcium Chloride	saturated	ord. temp.	0.093	(Vg.)
Copper Chloride	"	24.5	0.053	(H.)
Ferrous Chloride	"	"	0.169	(H.)
Ferric Chloride	"	"	0.006	(H.)
Manganese Chloride	"	"	0.013	(H.)
Magnesium Chloride	50 : 100	25	0.50	(Vl.)
Magnesium Chloride	36.35%	24.5	0.531	(H.)
Magnesium Chloride	saturated	ord. temp.	0.171	(Vg.)
Strontium Chloride	"	"	0.088	(Vg.)
Zinc Chloride	"	24.5	0.0134	(H.)
Potassium Chloride	"	ord. temp.	0.0475	(Vg.)
Potassium Chloride	24.95%	19.6	0.0776	(H.)
Potassium Cyanide	5: 100	25	2.75	(Vl.)
Potassium Cyanide	5: 100	25	5.24	(Cohn*)
Potassium Sulphocyanide	10: 100	25	0.11	(Vl.)
Sodium Chloride	saturated	ord. temp.	0.095	(Vg.)
Sodium Chloride	25.95%	19.6	0.105	(H.)

* See Note, page 281.

Solubility of Silver Chloride in Aqueous Solutions of Potassium Chloride at 15°.

(Schierholz — Sitzber. K. Akad. Wiss. (Vienna) 101, 2b, 8, '90.)

Grams per 100 Grams Solution.		Grams per 100 Grams Solution.	
KCl.	AgCl.	KCl.	AgCl.
10.0	0.000	22.47	0.045
14.29	0.004	24.0	0.072
16.66	0.008	25.0	0.084
20.00	0.020		

Sp. Gr. of 25% KCl sol., = 1.179

Mixtures of Silver Chloride and Silver Hydroxide in Equilibrium with Aq. Potassium Hydroxide Solutions at 25°.

(Noyes and Kohr — J. Am. Ch. Soc. 24, 1144, '02.)

Normality of KOH.	Millimols per Liter.		Grams per Liter.		
	KCl.	KOH.	KCl.	KOH.	AgCl.
0.333	3.414	347.8	0.255	10.05	0.4896
0.065	0.598	65.0	0.0446	2.00	0.0828

Solubility of Silver Chloride in Aq. Sol. of Sodium Chloride.

(Schierholz; Vogel; Hahn.)

Solubility at 15°.

Gms. per 100 Gms. Solution.	
NaCl.	AgCl.
10.0	0.0025
14.29	0.0071
18.18	0.0182
21.98	0.0439
23.53	0.0706
25.64	0.103
26.31	0.127

Sp. Gr. of 26.31% NaCl sol. = 1.207.

Solubility at Different Temperatures.

t°.	Gms. AgCl per 100 Gms. Solution in:	
	14% NaCl	26.3% NaCl.
15	0.007	0.128
30	0.011	0.132
40	0.014	0.158
50	0.023	0.184
70	0.042	0.263
80	0.054	0.315
90	0.069	0.368
100	0.090	0.460
109	0.107 (104°)	0.571

Solubility at 20°, 50°, and 90° (Calc. from Original).

(Barlow — J. Am. Chem. Soc. 28, 1446, '06.)

Gms. NaCl per 100 cc. Solution.	Gms. AgCl dissolved per 100 cc. Solution at:			Gms. NaCl per 100 cc. Solution.	Gms. AgCl dissolved per 100 cc. Solution at:		
	20°.	50°.	90°.		20°.	50°.	90°.
3.43	0.00018	0.0016	0.0067	11.5	0.0031	0.0124	0.0436
4.60	0.00025	0.0025	0.0100	15.3	0.0090	0.0191	0.0732
5.75	0.00047	0.0034	0.0135	23.0	0.0313	0.0889	0.1706
7.67	0.00125	0.0058	0.0236				

Results are also given for the solubility of silver chloride in aqueous sodium chloride solutions containing hydrochloric acid.

Solubility of Silver Chloride in Aq. Sodium Nitrate Solutions.

t°.	Gms. per 100 Gms. H_2O.		t°.	Gms. per 100 Gms. H_2O.	
	$NaNO_3$.	AgCl.		$NaNO_3$.	AgCl.
5	0.787	0.00086	15–20	0.393	0.00096
18	0.787	0.00146	"	0.787	0.00133
30	0.787	0.00233	"	2.787	0.00253
45–55	0.787	0.00399			

(Mulder.)

SOLUBILITY OF SILVER CHLORIDE IN AQUEOUS SOLUTIONS OF SODIUM THIO SULPHATE, ETC.

(Valenta; Cohn; Richards and Faber — Am. Ch. J. 21, 168, '99.)

Salt Solution.	t°.	Gms. AgCl per 100 Gms. Aq. Solutions of Concentration: 1 : 100.	5 : 100.	10 : 100.	15 : 100.	20 : 100.
Sodium Sulphite	25	...	...	0.44	...	0.95
Sodium Thio Sulphate	20	0.40	2.00	4.10	5.50	6.10
" " Calc. by Cohn*		0.38	1.83	3.50	5.02	6.41
Sodium Thio Sulphate	35	...	...	...	...	9.08 †
Thio Carbamide	25	...	...	0.83	...	...
Thio Cyanime	25	0.40	1.90	3.90	...	...

* See Note, page 281. † Gms. per 100 cc. solution (R. and F.).

SILVER CHROMATE Ag_2CrO_4.

One liter of water dissolves 0.026 gm. Ag_2CrO_4 at 18°, and 0.020 gm. at 25°. (Abegg and Cox — Z. physik. Ch. 46, 11, '03; Kohlrausch — *Ibid.* 50, 356, '04–'05.)

SOLUBILITY OF SILVER CHROMATE IN AQUEOUS SOLUTIONS OF NITRATES AT 100°.

(Carpenter — J. Soc. Chem. Ind. 5, 286, '86.)

Solvent.	Gms. Salt per 100 cc. H_2O.	Gms. Ag_2CrO_4 per 100 cc. Solution.
Water	0	0.064
Sodium Nitrate	50	0.064
Potassium Nitrate	50	0.192
Ammonium Nitrate	50	0.320
Magnesium Nitrate	50	0.256

SILVER (Di) CHROMATE $Ag_2Cr_2O_7$.

One liter of aqueous solution contains 0.00019 gram mols. or 0.083 gram $Ag_2Cr_2O_7$ at 15°. (Mayer — Ber. 36, 1741, '03.)

SILVER CITRATE $C_6H_5O_7Ag_3$.

100 gms. H_2O dissolve 0.0277 gm. $C_6H_5O_7Ag_3$ at 18°, and 0.0284 gm. at 25°. (Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

SILVER CYANIDE AgCN.

One liter of aqueous solution contains 0.000043 gm. AgCN at 17.5° and 0.00022 gm. at 20° (by Conductivity Method). (Abegg and Cox — Böttger — Z. physik. Ch. 46, 602, '03.)

SOLUBILITY OF SILVER CYANIDE IN AQUEOUS AMMONIA SOLUTIONS.

(Longi — Gazz. chem. ital. 13, 87, '83.)

100 gms. aq. ammonia of 0.998 Sp. Gr. = 5% dissolve 0.232 gm. AgCN at 12°.

100 gms. aq. ammonia of 0.96 Sp. Gr. = 10% dissolve 0.542 gm. AgCN at 18°.

SILVER SODIUM CYANIDE AgCN.NaCN.

100 gms. H_2O dissolve 20 gms. at 20°, and more at a higher temperature. 100 gms. 85% alcohol dissolve 4.1 gms. at 20°. (Baup — Ann. chim. phys. [3] 53, 468, '58.)

SILVER THALLOUS CYANIDE AgCN.TlCN.

100 gms. H_2O dissolve 4.7 gms. at 0°, and 7.4 gms. at 16°. (Fronmiller — Ber. 11, 92, '78.)

SILVER FLUORIDE AgF.

100 gms. H_2O dissolve 181.8 gms. at 15.8°. Sp. Gr. of sol. = 2.61.
(Gore — Proc. Roy. Soc. 18, 158, '70.)

SILVER FULMINATE $CAg_2(NO_2)CN$.

One liter of aqueous solution contains 0.075 gm. $C_2Ag_2N_2O_2$ at 13°, and 0.180 gm. at 30°. (Holleman — Rec. trav. chim. 15, 159, '96.)

SILVER HEPTOATE (Önanthylate) $AgC_7H_{13}O_2$.

SOLUBILITY IN WATER.
(Laudau — Monatsh. Ch. 14, 709, '93; Altschul — *Ibid.* 17, 568, '96.)

t°.	Gms. $AgC_7H_{13}O_2$ per 100 Gms. H_2O.		t°.	Gms. $AgC_7H_{13}O_2$ per 100 Gms. H_2O.	
0	0.0635 (Landau)	0.0436 (Altschul)	50	0.1652 (Landau)	0.0858 (Altschul)
10	0.0817	0.0494	60	0.1906	0.1036
20	0.1007	0.0555	70	0.2185	0.1351
30	0.1206	0.0617	80	0.2495	0.1688
40	0.1420	0.0714			

SILVER IODATE $AgIO_3$.

One liter of aqueous solution contains 0.04 gram or 0.00014 g. mols. at 18°–20°, and 0.05334 gm. or 0.000189 g. mols. at 25°.
(Longi; Böttger; Kohlrausch; Noyes and Kohr — J. Am. Ch. Soc. 24, 1141, '02.)

SOLUBILITY OF SILVER IODATE IN AQUEOUS SOLUTIONS OF AMMONIA AND OF NITRIC ACID AT 25°.
(Longi — Gazz. chim. ital. 13, 87, '83.)

100 gms. aq. ammonia of 0.998 Sp. Gr. = 5% dissolve 2.36 gms. $AgIO_3$.

100 gms. aq. ammonia of 0.96 Sp. Gr. = 10% dissolve 45.41 gms. $AgIO_3$.

100 gms. aq. nitric acid of 1.21 Sp. Gr. = 35% dissolve 0.096 gm. $AgIO_3$.

SILVER IODIDE AgI.

One liter of aqueous solution contains 0.0000028 gm. AgI at 20°–25°.
(Average of several determinations by Kohlrausch, Abegg and Cox, etc. Holleman gives higher figures.)

1 liter of aq. ammonia of 0.96 Sp. Gr. = 10% dissolve 0.035 gm. AgI at 12°. (Longi.)

SOLUBILITY OF SILVER IODIDE IN AQUEOUS SALT SOLUTIONS.
(Valenta — Monatsh. Chem. 15, 250, '94; Cohn — Z. physik. Ch. 18, 61, '95.)

Aq. Salt Solution.	t°.	Gms. AgI per 100 Gms. Aq. Solution of Concentration: 1 : 100.	5 : 100.	10 : 100.	15 : 100.	20 : 100.
Sodium Thio Sulphate	20	0.03	0.15	0.30	0.40	0.60
" " Calc. by Cohn*		0.623	2.996	5.726	8.218	10.493
Potassium Cyanide	25	...	8.28	...	...	...
" " Calc. by Cohn*		...	8.568	...	...	...
Sodium Sulphite	25	...	...	0.01	...	0.02
Ammonium Sulphocyanide	20	...	0.02	0.08	0.13	...
Calcium "	25	...	...	0.03	...	...
Barium "	25	...	...	0.02	...	...
Aluminum "	25	...	...	0.02	...	...
Thio Carbamide	25	...	...	0.79	...	...
Thio Cyanime	25	0.008	0.05	0.09	...	...

* See Note, page 281.

SOLUBILITY OF SILVER IODIDE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE, POTASSIUM BROMIDE AND OF POTASSIUM IODIDE AT 15°.

(Schierholz — Sitzb. K. Akad. Wiss. (Vienna) 101, 2b, 10, '90.)

In Sodium Chloride.

Gms. per 100 Gms. Solution.	
NaCl.	AgI.
26.31	0.0244
25.00	0.00072

In Potassium Bromide.

Gms. per 100 Gms. Solution.	
KBr	AgI
30.77	0.132

In Potassium Iodide.

Gms. per 100 Gms. Solution.	
KI.	AgI.
59.16	53.13
57.15	40.0
50.0	25.0
40.0	13.0
33.3	7.33
25.0	2.75
21.74	1.576
20.0	0.80

100 gms. sat. silver nitrate solution dissolve 2.3 gms. AgI at 11°, and 12.3 gms. at b. pt.

100 gms. pyridine dissolve 0.10 gm. AgI at 10°, and 8.60 gms. at 121°.

(von Laszcynski — Ber. 27, 2285, '94.)

SILVER MALATE $C_4H_4O_5Ag_2$.

100 gms. H_2O dissolve 0.0119 gm. at 18°, and 0.1216 gm. at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

SILVER NITRATE $AgNO_3$.

SOLUBILITY IN WATER.

(Etard — Ann. chim. phys. [7] 2, 526, '94; Kremers — Pogg. Ann. 92, 497, '54; Tilden and Shenstone — Phil. Trans. 23, '84.)

t°.	Grams $AgNO_3$ per 100 Gms. Solution.		Water.	t°.	Grams $AgNO_3$ per 100 Gms. Solution.		Water.
−5	48 (Etard)	..	...	50	79 (Etard)	82	455
0	53	55	122	60	81.5	84	525
10	62	63	170	80	85.5	87	669
20	68	69	222	100	88.5	90½	952
25	70.5	72	257	120	91	95	1900
30	72.5	75	300	140	93.5	...	...
40	76.5	79	376	160	95	...	...

100 gms. $2HNO_3.3H_2O$ dissolve 3.33 gms. $AgNO_3$ at 20°, and 16.6 gms. at 100°.

100 gms. conc. HNO_3 dissolve 0.2 gm. $AgNO_3$.

(Schultz — Zeit. Chem. [2] 5, 531, '69.)

MUTUAL SOLUBILITY OF SILVER NITRATE AND SODIUM NITRATE IN AQ. ETHYL ALCOHOL.

(Hissnik — Z. physik. Ch. 32, 557, '00.)

Results at 25°. (In Aq. Alcohol of d_{20} 0.945 = 37 wt. %.)

Gms. per 100 Gms. Sol. $AgNO_3$.	$NaNO_3$.	Wt. per cent in Mix Crystals. $AgNO_3$.	$NaNO_3$.
47.32	0.0	100	0.0
44.01	8.78	99.1	0.9
36.78	20.42	42.9	57.1
29.97	23.2	33.6	66.4
24.56	24.82	27.6	72.4
8.02	26.41	9.9	90.1
0.0	26.77	0.0	100.0

Results at 50°. (In Aq. Alcohol of d_{17} 0.859 = 75 wt. %.)

Gms. per 100 Gms. Sol. $AgNO_3$.	$NaNO_3$.	Wt. per cent in Mix Crystals. $AgNO_3$.	$NaNO_3$.
29.78	0.0	100	0.0
27.9	2.5	99.5	0.5
26.4	4.2	99.3	0.7
23.0	6.3	42.9	57.1
18.3	7.1	31.0	69.0
9.5	8.3	17.5	82.5
0.0	8.54	0.0	100.0

Solubility of Silver Nitrate in Alcohols.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

100 gms. abs. methyl alcohol dissolve 3.72 gms. $AgNO_3$ at 19°.
100 gms. abs. ethyl alcohol dissolve 3.10 gms. $AgNO_3$ at 19°.

Solubility of Silver Nitrate in Aqueous Ethyl Alcohol.

(Eder — J. pr. Ch. [2] 17, 45, '78.)

Sp. Gr. of Aq. Alcoholic Mixture.	Volume per cent Alcohol.	Gms. $AgNO_3$ per 100 Gms. Aq. Alcohol at:		
		15°.	50°.	75°.
0.815	95	3.8	7.3	18.3
0.863	80	10.3	...	42.0
0.889	70	22.1	...	...
0.912	60	30.5	58.1	89.0
0.933	50	35.8	...	...
0.951	40	56.4	98.3	160.0
0.964	30	73.7	...	...
0.975	20	107.0	214.0	340.0
0.986	10	158.0	...	...

100 gms. of a mixture of 1 vol. (95%) alcohol + 1 vol. ether dissolve 1.6 gms. $AgNO_3$ at 15°.

100 gms. of a mixture of 2 vols. (95%) alcohol + 1 vol. ether dissolve 2.3 gms. $AgNO_3$ at 15°.

100 gms. H_2O sat. with ether dissolve 88.4 gms. $AgNO_3$ at 15°.

(Eder.)

100 gms. acetone dissolve 0.35 gm. $AgNO_3$ at 14°, and 0.44 gm. at 18°. (von Lasczynski — Ber. 27, 2285, '94; Naumann — Ber. 37, 4332, '04.)

SILVER NITRITE $AgNO_2$.

Solubility in Aqueous Solutions of Silver Nitrate at 18°.

(Naumann and Rucker — Ber. 38, 2293, '05.)

Mols. per Liter.		Grams per Liter.		Mols. per Liter		Grams per Liter.	
$AgNO_3$.	$AgNO_2$.	$AgNO_3$.	$AgNO_2$.	$AgNO_3$.	$AgNO_2$.	$AgNO_3$.	$AgNO_2$.
0.0000	0.02067	0.000	3.184	0.02067	0.01435	3.512	2.201
0.00258	0.01975	0.439	3.042	0.04134	0.01168	7.024	1.799
0.00517	0.01900	0.878	2.926	0.08268	0.00961	14.048	1.480
0.01033	0.01689	1.756	2.601				

SILVER OXALATE $C_2O_4Ag_2$.

One liter of H_2O dissolves 0.035 gm. at 18°, and 0.0365 gm. at 20°.

(Böttger; Kohlrausch.)

SILVER OXIDE Ag_2O.

One liter of H_2O dissolves 0.021 gm. at 20°, and 0.025 gm. at 25°.

(Noyes and Kohr; Böttger; Abegg and Cox.)

SILVER PERMANGANATE $AgMnO_4$.

100 gms. cold water dissolve 0.92 gm.; hot water dissolves more.

(Mitscherlich — Pogg. Ann. 25, 301, '32.)

SILVER PHOSPHATE Ag_3PO_4.

One liter ot water dissolves 0.00644 gm. at 20°.

(Böttger — Z. physik. Ch. 46, 602, '03.)

SILVER PROPIONATE C_2H_5COOAg.

SOLUBILITY IN WATER.

(Raupenstrauch — Monatsh. Ch. 6, 587, '85; Arrhenius — Z. physik. Ch. 11, 396, '93; Goldschmidt — *Ibid.* 25, 93, '98.)

t°.	Gms. $C_3H_5O_2Ag$ per Liter.	t°.	Gms. $C_3H_5O_2Ag$ per Liter.	t°.	Gms. $C_3H_5O_2Ag$ per Liter.
0	5.12	20	8.36 (8.48)	50	13.35
10	6.78	25	9.06	70	17.64
18.2	8.36 (A.)	30	9.93 (9.70)	80	20.30

SOLUBILITY OF SILVER PROPIONATE IN AQUEOUS SOLUTIONS OF:

(Arrhenius.)

Silver Nitrate at 19.7°.

Mols. per Liter.		Grams per Liter.	
$AgNO_3$.	$C_3H_5O_2Ag$.	$AgNO_3$.	$C_3H_5O_2Ag$.
0.0	0.0471	0.0	8.519
0.0133	0.0415	2.289	7.511
0.0267	0.0379	4.577	6.86
0.0533	0.0307	9.059	5.556
0.100	0.0222	16.997	4.019

Sodium Propionate at 18.2°.

Mols. per Liter.		Grams per Liter.	
$C_3H_5O_2Na$.	$C_3H_5O_2Ag$.	$C_3H_5O_2Na$.	$C_3H_5O_2Ag$
0.0	0.0462	0.0	8.362
0.0167	0.0393	1.607	7.114
0.0333	0.0345	3.215	6.244
0.0667	0.0258	6.429	4.670
0.1333	0.0191	12.859	3.456
0.2667	0.0131	25.718	2.371
0.5000	0.0101	48.77	1.828

SILVER SALICYLATE $C_6H_4.OH.COOAg$ 1,2.

One liter of aqueous solution contains 0.95 gm. at 23°.

(Holleman — Z. physik. Ch. 12, 129, '93.)

SILVER SUCCINATE $C_4H_4O_4Ag_2$.

100 gms. H_2O dissolve 0.0176 gm. at 18°, and 0.0199 gm. at 25°.

(Partheil and Hübner — Archiv. Pharm. 241, 413, '03)

SILVER SULPHATE Ag_2SO_4.

SOLUBILITY IN WATER.

(Euler — Z. physik. Ch. 49, 314, '04; Wright and Thomson — Phil. Mag. [5] 17, 288, '84; Wentzel — Dammer's "Handbuch" II, 2, 858; Drucker — Z. anorg. Ch. 28, 362, '01.)

t°.	Gms. Ag_2SO_4 per Liter.	Gm. Mols. Ag_2SO_4 per Liter.	
17	7.70	0.0247	(Euler.)
18	7.28	0.0233	(W. and T.)
25	8.01	0.0257	(D.)
100	14.60	...	(W.)

One liter of aqueous solution in contact with a mixture of silver sulphate and silver acetate contains 3.95 gms. Ag_2SO_4 + 8.30 gms. CH_3COOAg at 17°. Sp. Gr. of solution = 1.0094. (Euler.)

SOLUBILITY OF SILVER SULPHATE AT 25° IN AQUEOUS SOLUTIONS OF:

(Drucker.)

Sulphuric Acid.

Mols. per Liter.		Grams per Liter.	
Ag_2SO_4.	H_2SO_4.	Ag_2SO_4.	H_2SO_4.
0.0260	0.02	8.11	0.98
0.0264	0.04	8.23	1.96
0.0271	0.10	8.45	4.90
0.0275	0.20	8.58	9.81

Potassium Sulphate.

Mols. per Liter.		Grams per Liter.	
Ag_2SO_4.	K_2SO_4.	Ag_2SO_4.	K_2SO_4.
0.0246	0.02	7.67	1.74
0.0236	0.04	7.36	3.49
0.0231	0.10	7.20	8.72
0.0232	0.20	7.24	17.44

SOLUBILITY OF SILVER SULPHATE AT 18° IN AQUEOUS SOLUTIONS OF:

(Eder — J. pr. Ch. [2] 17, 44, '78.)

Ammonium Sulphate. Gms. per 100 Gms. Solution.		Potassium Sulphate. Gms. per 100 Gms. Solution.		Sodium Sulphate. Gms. per 100 Gms Solution.	
$(NH_4)_2SO_4$.	Ag_2SO_4.	K_2SO_4.	Ag_2SO_4.	Na_2SO_4.	Ag_2SO_4.
5	0.66	6	0.60	12	0.65
15	0.85	18	0.76	32	0.80

SILVER SULPHOCYANIDE AgSCN.

One liter of aqueous solution contains 0.0002 gm. at 25°, and 0.0064 gm. at 100°.

(Abegg and Cox — Z. physik. Ch. 46, 11, '03; Böttger — *Ibid.* 46, 60, '05; 56, 93, '06.)

SOLUBILITY OF MIXTURES OF SILVER THIOCYANATE AND POTASSIUM THIOCYANATE IN WATER AT 25°.

(Foote — Am. Ch. J. 30, 332, '03.)

Gms. per 100 Gms. Solution. KSCN.	AgSCN.	Mols. per 100 Mols. H_2O. KSCN.	AgSCN.	Solid Phase.
70.53	...	44.36	...	KSCN
66.55	9.32	51.13	4.19	KSCN + 2KSCN.AgSCN
64.47	10.62	47.98	4.60	Double Salt. 2KSCN.AgSCN = 53.92% KSCN
61.25	11.76	42.07	4.72	"
58.34	13.55	38.47	5.23	"
53.21	17.53	33.71	6.50	"
50.68	20.43	32.52	7.67	2KSCN.AgSCN+KSCN.AgSCN
49.43	20.32	30.29	7.28	Double Salt. KSCN.AgSCN = 36.9% KSCN
32.51	18.34	12.26	4.05	"
24.68	16.41	7.77	3.02	"
23.86	16.07	7.36	2.90	KSCN.AgSCN + AgSCN

SILVER TARTRATE $C_4H_4O_6Ag_2$.

100 gms. H_2O dissolve 0.2012 gm. $C_4H_4O_6Ag_2$ at 18°, and 0.2031 gm. at 25°. (Partheil and Hübner — Archiv. Pharm. 241, 413, '03.)

SILVER VALERATES $AgC_5H_9O_2$.

SOLUBILITY IN WATER.

Normal Valerate $CH_3(CH_2)_3.COOAg$. Iso Valerate $CH_3.CH(CH_3)_2CH_2COOAg$.

(Fürth — Monatsh. Ch. 9, 311, '88; Sedlitzky — *Ibid.* 8, 563, '87.)

t°.	Gms. per 100 Gms. H_2O. Normal V.	Iso V.	t°.	Gms. per 100 Gms. H_2O. Normal V.	Iso V.
0	0.229	0.177	50	0.474	0.360
10	0.259	0.211	60	0.552	0.401
20	0.300	0.246	70	0.636	0.443
30	0.349	0.283	80	...	0.486
40	0.408	0.321			

100 gms. H_2O dissolve 0.73 gm. silver valerate at 20°.

(Markwald — Ber. 32, 1089, '99.)

SOLUBILITY OF SILVER VALERATE IN AQUEOUS SOLUTIONS OF SILVER ACETATE, SILVER NITRATE AND OF SODIUM VALERATE.

(Arrhenius — Z. physik. Ch. 11 396, '93.)

In Silver Acetate at 17.8°.

Mols. per Liter.		Gms. per Liter.	
$C_2H_3O_2Ag$.	$C_5H_9O_2Ag$.	$C_2H_3O_2Ag$.	$C_5H_9O_2Ag$.
0.0	0.0094	0.0	1.96
0.0067	0.0070	1.13	1.46
0.0135	0.0057	2.27	1.19
0.0270	0.0037	4.54	0.77
0.0505	0.00265	8.48	0.55

In Silver Nitrate at 16.5°.

Mols. per Liter.		Gms. per Liter.	
$AgNO_3$.	$C_5H_9O_2Ag$.	$AgNO_3$.	$C_5H_9O_2Ag$.
0.0	0.0094	0.0	1.96
0.0067	0.0068	1.14	1.42
0.0133	0.0051	2.29	1.07
0.0267	0.0031	4.58	0.65
0.1000	0.0012	17.00	0.25

In Sodium Valerate at 18.6°.

Mols. per Liter.		Grams. per Liter.	
$C_2H_3O_2Na$.	$C_5H_9O_2Ag$.	$C_2H_3O_2Na$.	$C_5H_9O_2Ag$.
0.0	0.0095	0.0	1.986
0.0175	0.0047	2.17	0.982
0.0349	0.0030	4.32	0.627
0.0698	0.0018	8.65	0.376
0.1395	0.0015	17.31	0.313

SILVER VANADATE $Ag_6V_4O_{13}$.

One liter of aqueous solution contains 0.047 gram at 14°, and 0.073 gm. at 100°.

(Carnelly — Liebig's Ann. **166**, 155, '73.)

SODIUM ACETATE $CH_3COONa.3H_2O$.

SOLUBILITY IN WATER.

Interpolated from original.

(Schiavor — Gazz. chim. ital. **32**, II, 532, '02.)

t°.	Gms. CH_3COONa per 100 Gms. Water.	Gms. CH_3COONa per 100 Gms. Solution.	t°.	Gms. CH_3COONa per 100 Gms. Water.	Gms. CH_3COONa per 100 Gms. Solution.
0	34	25.4	25	53	34.7
10	41	29.1	30	57	36.3
20	49	32.9	40	65	39.4

100 gms. H_2O dissolve 46.9 gms. CH_3COONa at 31.5°.

(Köhler — Z. Ver. Zuckerind. **47**, 447, '97.)

100 cc. aqueous solution contain 41.11 gms. CH_3COONa at 10°.

(Enklaar.)

SOLUBILITY OF SODIUM ACETATE IN AQUEOUS SOLUTIONS OF ACETIC ACID.

(Enklaar — Rec. trav. chim. **20**, 183, '01.)

Gram Mols. per Liter.		Grams per Liter.	
CH_3COOH.	CH_3COONa.	CH_3COOH.	CH_3COONa.
0	5.0	0.0	411.1
0.085	5.0	5.1	410.3
0.12	5.0	7.2	410.4

SOLUBILITY OF SODIUM ACETATE IN ABSOLUTE ALCOHOL AT ROOM TEMPERATURE.

(Bödtker — Z. physik. Ch. **22**, 510, '97.)

100 gms. alcohol dissolve 1.81 gms. CH_3COONa or 7.49 gms. $CH_3COONa.3H_2O$.

Solubility of Sodium Acetate in Aqueous Alcohol:

At 18°.

(Gerardin — Ann. chim. phys. [4] 5, 158, '65.)

Wt. per cent Alcohol.	Gms. CH_3COONa per 100 Gms. Aq. Alcohol.
5.2	38.0
9.8	35.9
23.0	29.8
29.0	27.5
38.0	23.5
45.0	20.4
59.0	14.6
86.0	3.9
91.0	2.1

At Different Temperatures.

(Schiavor.)

t°.	Degree of Alcohol.	Gms. per 100 Gms. Alcohol. CH_3COONa.	Gms. per 100 Gms. Alcohol. $CH_3COONa.3H_2O$.
8	98.4	2.08	3.45
12	98.4	2.12	3.51
19	98.4	2.33	3.86
11	90	2.07	3.42
13	90	2.13	3.52
15	63	13.46	22.32
18	63	13.88	23.03
21	63	14.65	24.30
23	40	28.50	47.27

100 gms. H_2O dissolve 237.6 gms. sugar + 57.3 grams CH_3COONa, or 100 gms. of the saturated solution contain 58.93 gms. sugar + 14.44 gms. CH_3COONa at 31.25°. (Köhler.)

SODIUM ARSENATE $Na_3AsO_4.12H_2O$.

100 grams aqueous solution contain 21.1 grams $Na_3AsO_4.12H_2O$. (= 10.4 gms. Na_3AsO_4) at 17°. Sp. Gr. of solution = 1.1186.

(Schiff — Liebig's Ann. 113, 350, '60.)

100 grams glycerine dissolve 50 gms. sodium arsenate at 15.5°.

(Pharm. Centralh. No. 30, '81.)

SODIUM HYDROGEN ARSENATE $Na_2HAsO_4.12H_2O$.

100 gms. H_2O dissolve 17.2 gms. $Na_2HAsO_4.12H_2O$ (= 7.3 gms. anhydrous) at 0°. 56.0 gms. (= 19.89 gms. anhydrous) at 14°. Sp. Gr. 1.1722, 37.0 gms. anhydrous at 21°, and 140.7 gms. hydrated at 30°.

(Schiff — Liebig's Ann. 113, 350, '60; Tilden — J. Ch. Soc. 45, 409, '84.)

SODIUM BENZOATE $C_6H_5.COONa$.

100 gms. H_2O dissolve 62 gms. at 25°, and 77 gms. at b. pt.
100 gms. alcohol dissolve 2.3 gms. at 25°, and 8.3 gms. at b. pt.

(U. S. P.)

SODIUM (Tetra) BORATE $Na_2B_4O_7.10H_2O$ (Borax).

Solubility in Water.

(Horn and Van Wagener — Am. Ch. J. 30, 347, '03.)

t°.	Gms. $Na_2B_4O_7$ per 100 Gms. H_2O.	t°.	Gms. $Na_2B_4O_7$ per 100 Gms. H_2O.	t°.	Gms. $Na_2B_4O_7$ per 100 Gms. H_2O.	
5	1.3	50	10.5	60	19.4	20.3
10	1.6	54	13.3	62	22.0	20.7
21.5	2.8	55	14.2	65	22.0	21.9
30	3.9	56	15.0	70	24.4	
37.5	5.6	57	16.0	80	31.5	
45	8.1			90	41.0	
				100	52.5	

Transition temperature $Na_2B_4O_7.10H_2O \rightarrow Na_2B_4O_7.5H_2O$ approximately 62°. Sp. Gr. of saturated solution at 15° = 1.032. (Gerlach.)

SOLUBILITY OF SODIUM BORATES IN WATER AT 30°.

(Dukelski — Z. anorg. Ch. 50, 42, '06, complete references given.)

Gms. per 100 Gms. Solution.		Gms. per 100 Gms. Residue.		Solid Phase.
K_2O.	B_2O_3.	K_2O.	B_2O_3.	
42.0	...	...	...	$NaOH.H_2O$
41.37	5.10	43.54	4.19	"
38.85	5.55	37.20	11.18	$Na_2O.B_2O_3.4H_2O$
34.44	3.73	33.52	10.80	"
29.39	2.51	29.63	10.11	"
26.13	2.75	27.85	15.21	"
23.00	3.82	24.91	11.60	"
16.61	13.69	21.29	20.64	"
21.58	4.63	24.52	19.04	$Na_2O.B_2O_3.4H_2O + Na_2O.B_2O_3.8H_2O$
20.58	4.69	21.61	16.59	$Na_2O.B_2O_3.8H_2O$
15.32	6.21	19.70	17.84	"
12.39	9.12	18.05	18.17	"
8.85	10.49	11.72	20.62	$Na_2O.2B_2O_3.10H_2O$
5.81	6.94	10.82	21.31	"
1.88	2.41	7.31	15.50	"
1.38	5.16	7.16	17.44	"
2.02	7.79	6.24	16.38	"
4.08	17.20	8.96	29.20	$Na_2O.2B_2O_3.10H_2O + Na_2O.5B_2O_3.10H_2O$
3.79	15.84	5.68	28.19	$Na_2O.5B_2O_3.10H_2O$
2.26	12.14	5.21	29.19	"
1.99	11.84	5.74	39.66	$Na_2O.2B_2O_3.10H_2O + B(OH)_3$
1.86	11.18	1.06	28.78	$B(OH)_3$
0.64	6.11	0.31	31.19	"
...	3.54	...	...	"

100 gms. alcohol of 0.941 Sp. Gr. dissolve 2.48 gms. sodium borate at 15.5°.

100 gms. glycerine dissolve 60.3 gms. at 15.5°, and 100 gms. at 80°. (U.S.P.)

Gaudolphe — J. pharm. chim. [4] **22**, 366, '75 — says that glycerine dissolves its weight of sodium borate at ordinary temperatures.

SODIUM BROMATE $NaBrO_3$.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 94, 271, '55; 97, 5, '56.)

t°.	0°	20°	40°	60°	80°	100°
Gms. $NaBrO_3$ per 100 Gms. H_2O	27.5	34.5	50.2	62.5	75.7	90.9

Sp. Gr. of saturated solution at 19.5° = 1.231. (Gerlach.)

SODIUM BROMIDE $NaBr.2H_2O$.

Solubility in Water.

(Etard — Compt. rend. **98**, 1432, '84; de Coppet — Ann. chim. phys. [5] **30**, 411, '83.)

t°.	Grams NaBr per 100 Gms. H_2O.		t°.	Grams NaBr per 100 Gms. H_2O.	
−20	57.5*	71.4†	50	95–112*	116†
0	66	79.5	60	112	117
10	72	84.5	80	113	119
20	77	90.3	100	114	121
30	82.5	97.3	120	116	124
40	88.0	105.8	140	118	...

* Etard. † de Coppet.

Transition temperature for $NaBr.2H_2O \rightarrow NaBr$ is approximately 50°. Kremers — Pogg. Ann. **97**, 14, '56 — gives results which fall near those of de Coppet for the $NaBr.2H_2O$, and near those of Etard for the NaBr section of the curve.

Solubility of Sodium Bromide in Aqueous Solutions of Sodium Hydroxide at 17°.

(Ditte — Compt. rend. **124**, 30, '97.)

Gms. per 100 Gms. H_2O.		Gms. per 100 Gms. H_2O.		Gms. per 100 Gms. H_2O.	
NaOH.	NaBr.	NaOH.	NaBr.	NaOH.	NaBr.
0.0	91.38	17.17	63.06	28.43	48.00
3.26	79.86	19.12	62.51	36.61	38.41
9.24	68.85	22.35	59.60	46.96	29.37
13.43	64.90	24.74	55.03	54.52	24.76

Solubility of Sodium Bromide in Alcoholic Solutions.

(Rohland — Z. anorg. Ch. **18** 327, '98; Z. anal. Ch. **44**, 252, '05; de Bruyn — Z. physik. Ch. **10**, 783 '92; Eder — Dingl. polyt. **221**, 89, '75.)

Alcohol.	Concentration of Aq. Alcohol.	t°.	Gms. NaBr per 100 Gms. Alcohol.	
Methyl Alcohol	$d_{15}=0.799$	room temp.	21.7	(R.)
Ethyl "	$d_{15}=0.810$	"	7.14	"
Propyl "	$d_{15}=0.816$	"	2.01	"
Ethyl "	90% by vol.	?	4.0 (hydrated NaBr)	
Methyl "	Absolute	19.5	17.35	(de Bruyn.)
Ethyl "	"	15	6.3	($NaBr2H_2O$) (Eder.)
Ethyl Ether		15	0.08	"

SODIUM CARBONATE $Na_2CO_3.10H_2O$.

Solubility in Water.

(Mulder; Löwel — Ann. chim. phys. [3] **33**, 382, '51; at 15°, Reich — Monatsh. Ch. **12**, 464, '91; at 32–34.5° $Na_2CO_3.7H_2O$ *b*, Ketner — Z. physik. Ch. **39**, 646, '01–'02.)

Solid Phase:

t°.	$Na_2CO_3.10H_2O$. Gms. Na_2CO_3 per 100 Gms. Water.	Solution.	$Na_2CO_3.7H_2O$ (*b*). Gms. Na_2CO_3 per 100 Gms. Water.	Solution.	$Na_2CO_3.7H_2O$ (*a*). Gms. Na_2CO_3 per 100 Gms. Water.	Solution.
0	7.0	6.5	20.4	16.9	32.0	24.2
5	9.5	6.9	23.2	18.8	35.0	25.9
10	12.5	11.1	26.2	20.8	37.8	27.4
15	16.4	14.1	29.5	22.8	41.2	29.2
20	21.5	17.7	33.5	25.1	45.5	31.3
25	28.2 (29.8*)	22.0	38.0	27.5		
30	37.8 (40.9*)	27.4	43.5	30.3		
32.5	46.2	31.6	(32.1°) 46.6	31.8		
			(33.3°) 48.6	32.7		
35	46.2	31.6	(34.5°) 51.3	33.9		
40	46.1 (49.7*)	31.5				
60	46.0 (46.4*)	31.5				
80	45.8 (45.2*)	31.4				
100	45.5	31.3				
105	45.2	31.1				

Solid Phase $Na_2CO_3.H_2O$ (35° to 105°)

* Epple — Dissertation, Heidelberg, p. 26, 1899.

Sp. Gr. of solution saturated at 17.5°, 1.165 (Hager); at 18°, 1.172 (Kohlrausch); at 23°, 1.222 (Schiff); at 30°, 1.342 (Lunge). See also Wegschroeder and Waller — Monatsh. Chem. **26**, 685, '05, for Sp. Gr. determinations at other temperatures.

Solubility of Sodium Carbonate in Aqueous Solutions of Sodium Chloride at 15°.

(Reich.)

Gms. per 100 Gms. H_2O. NaCl.	$Na_2CO_3.10H_2O$	Gms. NaCl per 100 Gms. Solution.	Gms. Na_2CO_3 per 100 Gms. NaCl Solution.	Gms. per 100 Gms. H_2O. NaCl.	$Na_2CO_3.10H_2O$.	Gms. NaCl per 100 Gms. Solution.	Gms. Na_2CO_3 per 100 Gms. NaCl Solution.
0.0	61.42	0.0	16.42	23.70	39.06	15.96	9.76
4.03	53.86	2.92	14.47	27.93	39.73	18.26	9.62
8.02	48.00	5.80	12.87	31.65	41.44	20.06	9.73
12.02	43.78	8.61	11.62	35.46	43.77	21.75	7.95
16.05	40.96	11.31	10.70	37.23	45.27*	22.46	10.13
19.82	39.46	13.71	10.11				

* Both salts in solid phase.

Solubility of Sodium Carbonate in Aqueous Solutions of Ethyl and of Propyl Alcohol at 20°.

(Linebarger — Am. Ch. J. **14**, 380, '92.)

Wt. per cent Alcohol.	Gms. Na_2CO_3 per 100 Gms. Sol. In Ethyl.	In Propyl.	Wt. per cent Alcohol.	Gms. Na_2CO_3 per 100 Gms. Sol. In Ethyl.	In Propyl.
28	...	4.4	48	0.9	1.3
38	...	2.7	50	0.84	1.2
44	1.7	1.7	54	0.80	0.9
46	1.13	1.5	62	...	0.4

Solubility of Sodium Carbonate in Aqueous Solutions of Ethyl Alcohol.

(Ketner — Z. physik. Ch. 39, 646, '01–'02.)

Note. — The mixtures were so made that an alcoholic and an aqueous layer were formed, and these were brought into equilibrium with the solid phase.

t°.	Gms. per 100 Gms. Alcoholic Layer.			Gms. per 100 Gms. Aq. Layer.			Solid Phase.
	C_2H_5OH.	Na_2CO_3.	H_2O.	C_2H_5OH.	Na_2CO_3.	H_2O.	
35	62.9	0.3	36.8	1.0	32.4	66.6	$Na_2CO_3.H_2O$
40	61.0	0.4	38.6	1.2	31.9	66.9	"
49	61.0	0.4	38.6	1.2	31.5	67.3	"
68	55.8	0.9	43.3	2.3	28.8	68.9	"
31.2	52.4	0.8	46.8	...	29.3	...	$Na_2CO_3.7H_2O$ (*b*)
31.9	54.8	0.7	44.5	1.7	29.8	68.5	"
32.3	56.1	0.6	43.3	1.5	30.2	68.3	"
33.2	58.1	0.5	42.4	1.4	31.0	67.6	"
27.7	Crit. sol. ±14% C_2H_5OH ±13% Na_2CO_3 ±73% H_2O						
28.2	23.5	7.3	69.2	7.9	18.6	73.5	$Na_2CO_3.10H_2O$
29.0	32.7	3.8	63.5	4.3	22.7	73.0	"
29.7	40.0	2.1	57.9	2.9	25.5	71.6	"
30.6	47.8	1.2	51.0	2.3	27.8	69.9	"

Solubility of $Na_2CO_3.10H_2O$ in Dilute Alcohol at 21°.

(Ketner.)

Grams per 100 Grams Solution.			Grams per 100 Grams Solution.		
Na_2CO_3.	C_2H_5OH.	H_2O.	Na_2CO_3.	C_2H_5OH.	H_2O.
18.5	0.0	81.5	1.2	39.2	59.6
12.7	6.2	81.1	0.2	58.2	41.6
6.9	15.3	77.8	0.1	67.1	32.8
3.2	26.1	70.7	0.06	73.3	26.64

100 gms. saturated solution in glycol contain 3.28–3.4 gms. sodium carbonate. (de Coninck — Bull. acad. roy. Belgique, 359, '05.)

100 gms. H_2O dissolve 229.2 gms. sugar + 24.4 gms. Na_2CO_3, or 100 gms. sat. aq. solution contain 64.73 gms. sugar + 6.89 gms. Na_2CO_3. (Köhler —Z. Ver. Zuckerind. 47, 447, '97.)

SODIUM (Bi) CARBONATE $NaHCO_3$.

Solubility in Water.

(Dibbits — J. pr. Ch. [2] 10, 439, '74.)

t°.	Gms. $NaHCO_3$ per 100 Gms. Water.	Gms. $NaHCO_3$ per 100 Gms. Solution.	t°.	Gms. NaHCO per 100 Gms. Water.	Gms. NaHCO per 100 Gms. Solution.
0	6.9	6.5	30	11.1	10.0
10	8.15	7.5	40	12.7	11.3
20	9.6	8.8	50	14.45	12.6
25	10.35	9.4	60	16.4	13.8

Sp. Gr. of sat. solution at 16° = 1.069. (Stolba.)
100 gms. alcohol of 0.941 Sp. Gr. dissolve 1.2 gms. $NaHCO_3$ at 15.5°.
100 gms. glycerine dissolve 8 gms. $NaHCO_3$ at 15.5°.

SOLUBILITY OF SODIUM BICARBONATE IN AQUEOUS AMMONIUM BICARBONATE SOLUTIONS SATURATED WITH CO_2.

(Fedotieff — Z. physik. Ch. 49, 169, '04.)

t°.	Wt. of 1 cc. Solution.	Mols. per 1000 Gms. H_2O.		Grams per 1000 Gms. H_2O.	
		NH_4HCO_3.	$NaHCO_3$.	NH_4HCO_3.	$NaHCO_3$.
0	1.072	1.39	0.58	109.4	48.2
"	...	0.0	0.82	0.0	69.0
15	1.056	0.0	1.05	0.0	88.0
"	1.061	0.29	0.95	23.0	80.0
"	1.065	0.56	0.89	44.0	74.6
"	1.073	1.08	0.79	85.7	66.7
"	1.090	2.16	0.71	170.6	59.2
30	...	0.0	1.65	0.0	138.6
"	...	2.91	0.83	23.0	70.0

SOLUBILITY OF SODIUM BICARBONATE IN AQUEOUS SOLUTIONS OF SODIUM CHLORIDE SATURATED WITH CO_2.

(Fedotieff; see also Reich — Monatsh. Ch. 12, 464, '91.)

t°.	Wt. of 1 cc. Solution.	Mols. per 1000 Gms. H_2O.		Grams per 1000 Gms. H_2O.	
		NaCl.	$NaHCO_3$.	NaCl.	$NaHCO_3$.
0	...	0.0	0.82	0.0	69.0
"	1.208	6.0	0.09	350.1	7.7
15	1.056	0.0	1.05	0.0	88.0
"	1.063	0.52	0.82	30.2	68.6
"	1.073	1.03	0.64	60.1	53.6
"	1.096	2.11	0.41	123.1	34.8
"	1.127	3.20	0.28	187.2	23.0
"	1.158	4.39	0.19	256.9	16.1
"	1.203	6.06	0.12	354.6	10.0
30	1.066	0.0	1.31	0.0	110.2
"	1.079	1.02	0.87	59.9	72.8
"	1.100	2.08	0.56	121.9	47.3
"	1.127	3.18	0.38	186.3	32.0
"	1.156	4.38	0.27	256.0	22.3
"	1.199	6.12	0.17	358.1	13.9
45	1.077	0.0	1.65	0.0	138.6
"	1.086	1.04	1.12	60.7	94.0
"	1.115	2.65	0.62	155.2	52.0
"	1.127	3.24	0.52	189.4	43.4
"	1.155	4.38	0.37	256.1	30.7
"	1.198	6.18	0.23	361.5	19.5

100 grams alcohol of 0.941 Sp. Gr. dissolve 5.55 grams sodium sulpho carbonate at 15.5°.

SODIUM CHLORATE $NaClO_3$.

SOLUBILITY IN WATER.

(Kremers — Pogg. Ann. 97, 4, '56.)

t°.	Grams per 100 Grams Water.	Grams per 100 Grams Solution.	t°.	Grams per 100 Grams Water.	Grams per 100 Grams Solution.
0	81.9	45.0	60	147.1	59.5
12	89.3	47.2	80	175.6	63.7
20	99.0	49.7	100	232.6	69.9
40	123.5	55.3	120	333.3	76.9

SOLUBILITY OF SODIUM CHLORATE IN AQUEOUS SODIUM CHLORIDE SOLUTIONS AT 20°.

(Winteler — Z. Electrochem. 7, 360, '00.)

Volume Wt. of Solutions.	Grams per Liter. NaCl.	NaClO₃.	Volume Wt. of Solutions.	Grams per Liter. NaCl.	NaClO₃.
1.426	5	668	1.365	175	393
1.419	25	638	1.345	200	338
1.412	50	599	1.319	225	271
1.405	75	559	1.289	250	197
1.398	100	522	1.256	275	120
1.389	125	484	1.235	290	78
1.379	150	442	1.217	300	55

100 gms. H_2O dissolve 24.4 gms. NaCl + 50.75 gms. $NaClO_3$ at 12°.
100 gms. H_2O dissolve 11.5 gms. NaCl + 249.6 gms. $NaClO_3$ at 122°.
(Schlosing — Compt. rend. 73, 1273, '71.)

100 gms. alcohol of 77 Wt. per cent dissolve 2.9 gms. $NaClO_3$ at 16°.
(Wittstein.)

100 gms. alcohol dissolve 1 gm. $NaClO_3$ at 25°, and 2.5 gms. at b. pt.
100 gms. glycerine dissolve 20 gms. $NaClO_3$ at 15.5°.

SODIUM CHLORIDE NaCl.

SOLUBILITY IN WATER.

(Mulder; de Coppet — Ann. chim. phys. [5] 30, 411, '83; Andræ — J. pr. Ch. [2] 29, 456, '84; above 100°, Tilden and Shenstone — Phil. Trans. 23, '84; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 206, '04; Etard — Ann. chim. phys. [7] 2, 527, '94, gives irregular results.)

t°.	Gms. NaCl per 100 Gms. H_2O.		Gms. NaCl per 100 g. Sol.	t°.	Gms. NaCl per 100 Gms. H_2O.		Gms. NaCl per 100 g. Sol.
0	35.7*	35.63†	26.28†	70	37.8*	37.51†	27.27†
10	35.8	35.69	26.29	80	38.4	38.00	27.54
20	36.0	35.82	26.37	90	39.0	38.52‡	27.80
25	36.12	35.92	26.43	100	39.8	39.12‡	28.12
30	36.3	36.03	26.49	118		39.8	28.46
40	36.6	36.32	26.65	140		42.1	29.63
50	37.0	36.67	26.83	160		43.6	30.37
60	37.3	37.06	27.04	180		44.9	30.98

* M.; de C. † A. ‡ B.

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS SOLUTIONS OF AMMONIUM CHLORIDE.

(Fedotieff — Z. physik. Ch. 49, 170, '04.)

t°.	Wt. of 1 cc. Solution.	Mols. per 1000 Gms. H_2O. NH_4Cl.	NaCl.	Grams per 1000 Gms. H_2O. NH_4Cl.	NaCl.
0	...	0.0	6.09	0.0	356.3
"	1.185	2.73	4.89	146.1	286.4
15	1.200	0.0	6.12	0.0	357.6
"	1.191	1.07	5.58	57.3	326.4
"	1.183	2.22	5.13	118.9	300.0
"	1.176	3.48	4.64	186.4	271.6
"	1.175	3.72	4.55	198.8	266.8
30	...	0.0	6.16	0.0	360.3
"	1.166	4.77	4.26	255.4	249.0
45	...	0.0	6.24	0.0	365.0
"	...	6.02	4.0	322.1	233.9

Solubility of Sodium Chloride in Aqueous Solutions of Hydrochloric Acid.

(Engel — Ann. chim. phys. [6] 13, 374, '88; Enklaar — Rec. trav. chim. 20, 183, '01.)

At °. (Engel.)

Mg. Mols. per 10 cc. HCl.	Mg. Mols. per 10 cc. NaCl.	Sp. Gr. of Solution.	Gms. per Liter. HCl.	Gms. per Liter. NaCl.
0.0	54.7	1.207	0.0	32.0
1.0	53.5	1.204	0.365	31.3
1.85	52.2	1.202	0.674	30.5
5.1	48.5	1.196	1.859	28.4
9.28	44.0	1.185	3.38	25.7
15.05	37.9	1.173	5.49	22.2
30.75	23.5	1.141	11.20	13.7
56.35	6.1	1.119	20.54	3.6

At 10°–10.5°. (Enklaar.)

Mols. per Liter. HCl.	Mols. per Liter. NaCl.	Grams per Liter. HCl.	Grams per Liter. NaCl.
0.0	6.11	0.0	35.77
0.27	5.77	9.84	33.76
0.35	5.67	12.76	33.19
0.43	5.59	15.68	32.71
0.57	5.43	20.78	31.77
0.72	5.28	26.06	30.89
2.60	3.42	94.77	20.01
2.80	3.18	102.1	19.04
3.31	2.74	120.6	16.03

Solubility of Mixtures of Sodium Chloride and Other Salts in Water, etc.

Solvent.	t°.	Gms. per 100 Gms. Solvent.	Authority.
Water	17	26.4 NaCl + 22.1 NH_4Cl*	(Karsten.)
"	17	34.5 " + 4.1 $BaCl_2$	"
"	?	38.3 " + 29.5 KNO_3	"
"	25	38.5 " + 41.14 "	(Soch — J. Physic. Ch. 2, 46, '98.)
"	80	39.81 " + 168.8 "	"
Alcohol (40%)	25	15.78 " + 13.74 "	"
Water	20	30.54 " + 13.95 KCl	(Quoted by Euler — Z. physik. Ch. 49, 315, '04.)
"	25	28.90 " + 16.12 "	

* Sp. Gr. of solution at 17° = 1.179.

Solubility of Mixtures of Sodium Chloride and Potassium Sulphate in Water at Various Temperatures.

(Precht and Wittgen — Ber. 15, 1666, '82.)

t°.	Grams per 100 Grams H_2O. NaCl	K_2SO_4	KCl	t°.	Grams per 100 Grams H_2O. NaCl	K_2SO_4	KCl
10	33.4	8.1	3.2	60	36.4	11.9	2.7
20	34.0	8.9	3.1	70	36.6	12.8	3.2
30	34.6	9.6	2.9	80	36.0	12.3	5.1
40	35.2	10.4	2.8	90	35.9	12.4	7.0
50	35.8	11.1	2.8	100	35.6	12.6	8.8

Solubility of Sodium Chloride in Aqueous Solutions of Sodium Bicarbonate Saturated with CO_2.

(Fedotieff.)

t°.	Wt. of 1 cc. Solution.	Mols. per 1000 Gms. H_2O. $NaHCO_3$.	Mols. per 1000 Gms. H_2O. NaCl.	Grams per 10000 Gms. H_2O. $NaHCO_3$.	Grams per 10000 Gms. H_2O. NaCl.
0	...	0.0	6.09	0.0	356.3
"	1.208	0.09	6.0	7.7	350.1
15	1.203	0.0	6.12	0.0	357.6
"	1.203	0.12	6.06	10.0	354.6
30	1.196	0.0	6.16	0.0	360.3
"	1.199	0.17	6.12	13.9	358.1
45	1.189	0.0	6.24	0.0	356.0
"	1.198	0.23	6.18	0.23	361.5

Solubility of Sodium Chloride in Aqueous Sodium Hydroxide Solutions.

(Engel; Winteler — Z. Electrochem. 7, 360, '00.)

At 0° (Engel).

Mg. Mols. per 10 cc. Na_2O.	Mg. Mols. per 10 cc. NaCl.	Sp. Gr. of Solutions.	Grams per Liter. NaOH.	Grams per Liter. NaCl.
0	54.7	1.207	0.0	320.0
4.8	49.38	1.221	38.4	288.9
6.73	47.21	1.225	53.8	276.2
10.41	42.38	1.236	183.2	247.9
14.78	39.55	1.249	118.2	231.4
30.50	24.95	1.295	244.0	146.0
37.88	19.30	1.314	303.0	112.9
53.25	9.41	1.362	426.0	55.0

At 20° (Winteler).

Gms. per Liter NaOH.	Gms. per Liter NaCl.	Sp. Gr. of Solutions.
10	308	1.200
50	297	1.230
100	253	1.250
150	213	1.270
200	139	1.305
300	112	1.330
400	61	1.375
500	30	1.425
640	18	1.490

Solubility of Sodium Chloride in Aqueous Solutions of Sodium Nitrate and Vice Versa.

(Bodländer — Z. physik. Ch. 7, 361, '91; Nicol — Phil. Mag. [5] 31, 369, '91; results at 25° by Soch — J. Physic. Ch. 2, 46, '98.)

NaCl in Aqueous $NaNO_3$. Results at 15.5° (B.).

Sp. Gr. of Solutions.	Gms. per 100 cc. Sat. Solution. $NaNO_3$.	H_2O.	NaCl.
1.2025	0	88.47	31.78
1.2305	7.53	87.63	27.89
1.2580	13.24	86.25	26.31
1.2810	21.58	82.66	23.98
1.3090	28.18	80.42	22.30
1.3345	33.80	79.25	20.40
1.3465	37.88*	77.37	19.40*
1.3465	37.64*	77.34	19.67*

$NaNO_3$ in Aqueous NaCl. Results at 15° (B.).

Sp. Gr. of Solutions.	Gms. per 100 cc. Sat. Solution. NaCl.	H_2O.	$NaNO_3$.
1.3720	0	74.82	62.38
1.3645	4.0	75.69	56.76
1.3585	7.24	75.71	52.09
1.3530	11.36	76.86	47.08
1.3495	15.33	76.96	42.66
1.3485	17.81	77.14	39.90
1.3485	18.97*	77.15	38.73*
1.3485	19.34*	77.49	38.02*

Results at 20° (N.).

Grams per 100 Grams H_2O.			
0	$NaNO_3$	35.91	NaCl
14.17	"	32.82	"
28.33	"	29.78	"
42.50	"	26.91	"
54.63*	"	24.92*	"

Grams per 100 Grams H_2O.			
0	NaCl	87.65	$NaNO_3$
6.5	"	77.34	"
13.0	"	68.50	"
19.5	"	60.49	"

100 gms. H_2O dissolve 43.66* gms. $NaNO_3$ + 26.58* gms. NaCl at 25°.

100 gms. H_2O dissolve 121.6* gms. $NaNO_3$ + 17.62* gms. NaCl at 80°.

100 gms. aq. alcohol of 40 wt. per cent dissolve 22.78 gms. $NaNO_3$ + 10.17 gms. NaCl at 25°.

* Indicates solutions saturated with both salts.

Solubility of Sodium Chloride in Alcohols.

(At 18.5°, de Bruyn — Z. physik. Ch. 10, 782, '92; Rohland — Z. anorg. Ch. 18, 327, '98.)

t°.	Alcohol.	Gms. NaCl per 100 Gms. Alcohol.	t°.	Alcohol	Gms. NaCl per 100 Gms. Alcohol
18.5	Abs. Methyl	1.41	room temp.	Methyl d_{15}=0.799	1.33
"	" Ethyl	0.065	"	Ethyl d_{15} =0.81	0.176
			"	Propyl d_{15} =0.816	0.033

Solubility of Sodium Chloride in Aqueous Ethyl Alcohol Solutions.

(Bodländer — Z. physik. Ch. 7, 317, '91; Taylor — J. Phys. Ch. 1, 723, '97; also Bathrick — *Ibid.* 1, 159, '96.)

Results at 11.5° (B.).

Sp. Gr. of Solutions.	Gms. per 100 cc. Solution. C_2H_5OH.	H_2O.	NaCl.
1.2035	0	86.62	31.73
1.1865	2.86	86.14	29.66
1.1710	5.41	83.93	27.77
1.1548	7.93	81.50	26.05
1.1350	10.84	78.78	24.28
1.1390	11.22	78.62	23.65
1.1088	16.85	73.40	20.63

Results at 13° (B.).

Sp. Gr. of Solutions.	Gms. per 100 cc. Solution. C_2H_5OH.	H_2O.	NaCl.
1.2030	0	88.70	31.60
1.1348	11.81	78.41	23.26
1.1144	15.99	74.64	20.81
1.0970	19.39	71.45	18.86
1.0698	24.95	69.80	16.23
1.0295	32.33	57.96	12.66
0.9880	40.33	49.34	9.13
0.9445	49.28	38.54	5.93
0.9075	57.91	29.37	3.47
0.8700	63.86	21.62	1.52
0.8400	72.26	11.24	0.50

Results at 30° and at 40° (T.).

Wt. per cent Alcohol in Solvent.	At 30°, Gms. NaCl per 100 Gms. Solution.	Water.	At 40°, Gms. NaCl per 100 Gms. Solution.	Water.
0	26.50	36.05	26.68	36.38
5	24.59	34.29	24.79	34.69
10	22.66	32.57	22.90	33.00
20	19.05	29.40	19.46	30.20
30	15.67	26.53	16.02	27.25
40	12.45	23.70	12.75	24.37
50	9.34	20.60	9.67	21.42
60	6.36	16.96	6.65	17.82
70	3.36	12.75	3.87	13.10
80	1.56	7.95	1.69	8.68
90	0.43	4.30	0.50	5.10

100 gms. alcohol of 0.9282 Sp. Gr. = 54.0% by wt. dissolve at:

4°	10°	13°	23°	32°	33°	44°	51°	60°	
10.9	11.1	11.43	11.9	12.3	12.5	13.1	13.8	14.1	gms. NaCl

(Gerardin — Ann. chim. phys. [4] 5, 146, '56.)

100 gms. of a mixture of equal parts of 96% alcohol and 98% ether dissolve 0.11 gm. NaCl.

(Mayer — Liebig's Ann. 98, 205, '56.)

SOLUBILITY OF SODIUM CHLORIDE IN AQUEOUS SOLUTIONS OF:

Acetone at 20°.

(Herz and Knoch — Z. anorg. Ch. 41, 318, '04.)

cc. Acetone per 100 cc. Solvent.		NaCl per 100 cc. Solution. Millimols.	Grams.
0		537.9	31.47
10		464.6	27.18
20		394.8	23.10
30		330.1	19.32
32	Lower layer	308.5	18.05
87	Upper layer	7.7	0.45
88		7.3	0.43
90		4.3	0.25

Glycerine at 25°.

(H. and K. — *Ibid.* 45, 267, '05.)

Wt. per cent Glycerine in Solvent.	NaCl per 100 cc. Solution. Millimols.	Grams.	Sp. Gr. of Solution.
0.0	545.6	31.93	1.1960
13.28	501.1	29.31	1.2048
25.98	448.4	26.23	1.2133
45.36	370.2	21.66	1.2283
54.23	333.9	19.54	1.2381
83.84	220.8	12.91	1.2666
100.00*	167.1	9.78	1.2964

*Sp. Gr. of Glycerine, 1.2592. Impurities about 1.5%.

100 gms. sat. solution in glycol contain 31.7 gms. NaCl at 14.8°.

(de Coninck — Chem. Centralb. 76, II, 883, '05.)

100 gms. H_2O dissolve 236.3 gms. sugar + 42.3 gms. NaCl at 31.25°, or 100 gms. sat. aq. solution contain 62.17 gms. sugar + 11.13 gms. NaCl.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

SODIUM CHROMATES (Mono, Di, etc.)

SOLUBILITY IN WATER.

(Mylius and Funk — Wiss. Abh. p. t. Reichanstalt 3, 451, '00; see also Salkowski — Ber. 34, 1948, '01.)

Sodium Mono Chromate.

t°.	Gms. Na_2CrO_4 per 100 Gms. Solution.	Mols. Na_2CrO_4 per 100 Mols H_2O.	Solid Phase.
0	24.07	3.52	$Na_2CrO_4.10H_2O$
10	33.41	5.55	"
18*	40.10	7.43	"
18.5	41.65	7.94	"
19.5	44.78	9.01	"
21	47.40	10.00	"
25.6	46.08	9.52	$Na_2CrO_4.4H_2O$
31.5	47.05	9.90	"
36	47.98	10.2	"
40	48.97	10.6	"
45	50.20	11.6	"
49.5	50.93	11.5	"
54.5	52.28	12.2	"
59.5	53.39	12.7	"
65	55.23	13.7	Na_2CrO_4
70	55.15	13.6	"
80	55.53	13.8	"
100	55.74	14.0	"

Sodium Di Chromate.

t°.	Gms. $Na_2Cr_2O_7$ per 100 Gms. Solution.	Mols. $Na_2Cr_2O_7$ per 100 Mols. H_2O.	Solid Phase.
0	61.98	11.2	$Na_2Cr_2O_7.2H_2O$
17	63.82	12.1	"
18‡	63.92	12.16	"
34.5	67.36	14.2	"
52	71.76	17.4	"
72	76.9	22.8	"
81	79.8	27.1	"
93	81.19	29.6	$Na_2Cr_2O_7$
98	81.25	29.8	"

Sodium Tri Chromate.

t°.	Gms. $Na_2Cr_3O_{10}$ per 100 Gms. Solution.	Mols. $Na_2Cr_3O_{10}$ per 100 Mols. H_2O	Solid Phase.
0	80.03	19.9	$Na_2Cr_3O_{10}.H_2O$.
15†	80.44	20.4	"
18	80.60	20.56	"
55	82.68	23.7	"
99	85.78	29.9	"

*Sp. Gr. of sat. sol. at 18° = 1.432. †Sp. Gr. of sat. sol. at 18° = 2.059. ‡Sp. Gr. of sat. solution at 18° = 1.745.

Sodium Tetra Chromate.

t°.	Gms. $Na_2Cr_4O_{13}$ per 100 Gms. Solution.	Mols. $Na_2Cr_4O_{13}$ per 100 Mols. H_2O.	Solid Phase.
0	72.96	10.5	$Na_2Cr_4O_{13}.4H_2O$
16	74.19	11.2	"
18*	74.60	11.27	"
22	76.01	12.3	"

* Sp. Gr. of sat. solution at 18° = 1.926.

Tetra Sodium Chromate.

t°.	Gms. Na_4CrO_5 per 100 Gms. Solution.	Mols. Na_4CrO_5 per 100 Mols. H_2O.	Solid Phase.
0	33.87	4.11	$Na_4CrO_5.13HO_2$
10	35.58	4.42	"
18†	37.50	4.81	"
27.7	40.09	5.38	"
37	45.13	6.62	"

† Sp. Gr. of sat. solution at 18° = 1.446.

Solubility of Sodium Chromates in Water at 30°.

(Schreinemaker — Z. physik. Ch. 55, 91, '06.)

Composition in weight per cent:

Of Solution. %CrO_3.	%Na_2O.	Of Residue. %CrO_3.	%Na_2O.	Solid Phase.
0	±42	...	...	$NaOH.H_2O$
2.00	41.44	5.83	42.64	$NaOH.H_2O + Na_2CrO_4$
2.04	40.89	...	...	Na_2CrO_4
4.23	35.51	27.52	36.57	"
6.64	32.34	27.72	34.60	"
15.19	27.06	37.07	32.20	"
10.22	29.39	15.48	28.41	$Na_2CrO_4 + Na_4CrO_5.13H_2O$
8.93	28.49	18.09	26.89	$Na_4CrO_5.13H_2O$
8.62	26.91	...	...	"
13.12	23.91	18.57	25.92	"
18.44	22.86	...	...	"
19.26	22.98	21.54	25.31	$Na_4CrO_5.13H_2O + Na_2CrO_4.4H_2O$
17.84	24.21	26.24	24.98	$Na_2CrO_4.4H_2O$
28.82	17.88	31.97	23.47	"
38.93	16.30	40.70	20.83	"
48.70	16.49	47.49	19.75	$Na_2CrO_4.4H_2O + Na_2Cr_2O_7.2H_2O$
50.68	15.72	...	...	$Na_2Cr_2O_7.2H_2O$
58.08	13.89	62.76	17.38	"
66.13	13.70	69.48	16.06	$Na_2Cr_2O_7.2H_2O + Na_2Cr_3O_{10}.H_2O$
65.98	14.15	69.46	15.15	$Na_2Cr_3O_{10}.H_2O$
68.46	10.95	73.88	13.38	$Na_2Cr_3O_{10}.H_2O + Na_2Cr_4O_{13}.4H_2O$
66.88	9.85	71.27	10.67	$Na_2Cr_3O_{13}.4H_2O$
70.06	11.85	83.95	9.57	" (?)
69.04	11.04	81.80	6.43	CrO_3
67.84	9.81	82.85	5.42	"
64.48	4.51	79.49	2.71	"
62.28	0.0	100.00	...	"

100 gms. of a saturated aqueous solution contain at 30°:
46.627 gms. Na_2CrO_4, or 100 gms. H_2O dissolve 87.36 gms. Na_2CrO_4.
66.4 gms. $Na_2Cr_2O_7$, or 100 gms. H_2O dissolve 197.6 gms. $Na_2Cr_2O_7$.
100 gms. absolute methyl alcohol dissolve 0.345 gm. Na_2CrO_4 at 25°.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

SODIUM CITRATE $2C_3H_4(OH)(COONa)_3.11H_2O$.

100 gms. H_2O dissolve 90.9 gms. citrate at 25°, and 250 gms. at b. pt. (U.S.P.)

SODIUM (Ferro) **CYANIDE** $Na_4Fe(CN)_6$.

SOLUBILITY IN WATER.

(Conroy — J. Soc. Chem. Ind. 17, 104, '98.)

t°	20°.	42°.	80°.	98.5°.
Gms. $Na_4Fe(CN)_6$ per 100 gms. H_2O	17.9	30.2	59.2	63.0

SODIUM FORMATE HCOONa. SOLUBILITY IN WATER.

(Groschuff — Ber. 36, 1788, '03.)

t°.	Gms. HCOONa per 100 Gms. Solution.	Mols. HCOONa per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. HCOONa per 100 Gms. Solution.	Mols. HCOONa per 100 Mols. H_2O.	Solid Phase.
−20	22.80	7.82	$HCOONa.3H_2O$	25.5	50.53	27.0	$HCOONa.2H_2O$
0	30.47	11.6	"	18	49.22	25.65	HCOONa
+15	41.88	19.1	"	29	50.44	26.9	"
18	44.92	21.6	"	54	53.80	30.8	"
18	44.73	21.4	$HCOONa.2H_2O$	74.5	56.82	34.8	"
21	46.86	23.3	"	100.5	61.54	42.35	"
23	48.22	24.65	"	123	66.20	51.8	"

Sp. Gr. of the saturated solution of the dihydrate at 18° = 1.317.

SOLUBILITY OF SODIUM ACID FORMATE (EXPRESSED AS NEUTRAL SALT) IN AQUEOUS SOLUTIONS OF FORMIC ACID.

(Groschuff.)

t°.	Gms. HCOONa per 100 Gms. Solution.	Mols. HCOONa per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. HCOONa per 100 Gms. Solution.	Mols. HCOONa per 100 Mols. H_2O.	Solid Phase.
0	22.35	19.5	HCOONa.HCOOH	45.5	38.85	43.1	HCOONa
25.5	29.62	28.45	"	70	41.27	47.5	"
66.5	41.08	47.1	"	85	43.09	51.2	"

SODIUM FLUORIDE NaF.

100 gms. sat. aq. solution contain 4.3 gms. NaF at 18°. Sp. Gr. of solution = 1.044. (Mylius and Funk — Ber. 30, 1718, '97.)

SOLUBILITY OF SODIUM FLUORIDE IN AQUEOUS SOLUTIONS OF HYDROFLUORIC ACID AT 21°.

(Ditte — Compt. rend. 123, 1282, '96.)

Grams per 1000 Grams H_2O.		Grams per 1000 Grams H_2O.	
0.0 HF	41.7 NaF	83.8 HF	22.9 NaF
10.0 "	41.4 "	129.7 "	23.8 "
45.8 "	22.5 "	596.4 "	48.8 "
56.5 "	22.7 "	777.4 "	81.7 "

SODIUM FLUO SILICATE Na_2SiF_6.

100 gms. H_2O dissolve 0.65 gm. at 17.5°, and 2.45 gms. at 100°. (Stolba — Z. anal. Ch. 11, 199, '72.)

SODIUM HYDROXIDE NaOH.

SOLUBILITY IN WATER.

(Pickering — J. Ch. Soc. 63, 890, '93; Mylius and Funk (Dietz) — Wiss. Abh. p. t. Reichanstalt 3, 450, '00.)

t°.	Gms. NaOH per 100 Gms. Solution.	Gms. NaOH per 100 Gms. Water.	Solid Phase.	t°.	Gms. NaOH per 100 Gms. Solution.	Gms. NaOH per 100 Gms. Water.	Solid Phase.
−7.8	8.0	8.7	Ice	20	52.2	109	$NaOH.H_2O$
−20	16.0	19.1	"	30	54.3	119	"
−28	19.0	23.5	Ice + $NaOH.7H_2O$	40	56.3	129	"
−24	22.2	28.5	$NaOH.7H_2O + NaOH.5H_2O$	50	59.2	145	"
−17.7	24.5	32.5	$NaOH.5H_2O + NaOH.4H_2O\ \alpha$	60	63.5	174	"
0	29.6	42.0	$NaOH.4H_2O\ \alpha$	64.3	69.0	222.3	" f. pt
+5	32.2	47.5	$NaOH.4H_2O\ \alpha + NaOH3\frac{1}{2}H_2O$	61.8	74.2	288	$NaOH.H_2O$ + NaOH
10	34.0	51.5	$NaOH.3\frac{1}{2}H_2O$	80	75.8	313	NaOH (?)
15.5	38.9	63.53	" f. pt.	110	78.5	365	"
5	45.5	83.5	$NaOH.3\frac{1}{2}H_2O + NaOH.2H_2O$	192	83.9	521	"
12	50.7	103.0	$NaOH.2H_2O + NaOH.H_2O$				

Sp. Gr. of sat. solution at 18° = 1.539.

For determinations of the Sp. Gr. of sodium hydroxide solution, see Kohlrausch — Wied. Ann. 1, 1879; Wegschnider and Waller — Monatsh. Chem. **26**, 685, '05.

SODIUM IODATE $NaIO_3$.

SOLUBILITY IN WATER.

(Gay-Lussac; Kremers — Pogg. Ann. 97, 5, '56.)

t°.	0°.	20°.	40°.	60°	80°.	100°.
Gms. $NaIO_3$ per 100 gms. H_2O	2.5	9	15	21	27	34

SODIUM IODIDE $NaI.2H_2O$.

SOLUBILITY IN WATER.

(de Copper — Ann. chim. phys. [5] 30, 411, '83; see also Etard — Compt. rend. 98, 1434, '84; and Kremers — Pogg. Ann. 97, 14, '56.)

t°.	Grams NaI per 100 Gms. Water.	Grams NaI per 100 Gms. Solution.	Solid Phase.	t°.	Grams NaI per 100 Gms. Water.	Grams NaI per 100 Gms. Solution.	Solid Phase.
−20	148.0	59.7	$NaI.2H_2O$	60	256.8	72.0	$NaI.2H_2O$
0	158.7	61.4	"	65	278.4	73.6	"
10	168.6	62.8	"	67	293	74.6	NaI
20	178.7	64.1	"	70	294	74.6	"
25	184.2	64.8	"	80	296	74.7	"
30	190.3	65.6	"	100	302	75.1	"
40	205.0	67.2	"	120	310	75.6	"
50	227.8	69.5	"	140	321	76.3	"

SOLUBILITY OF SODIUM IODIDE IN SEVERAL SOLVENTS.

(At 22.5°, de Bruyn — Z. physik. Ch. 10, 783, '92; at ord. temp., Rohland — Z. anorg. Ch. 18, 327, '98; Walden — Z. physik. Ch. 55, 713, 718, '06.)

Solvent.	t°.	Gms. NaI per 100 Gms. Solvent.	Solvent.	Gms. NaI per 100 Gms. Solution. at 0°.	Gms. NaI per 100 Gms. Solution. at 25°.
Absolute Ethyl Alcohol	22.5	43.1	Acetonitril	22.09	18.43
d_{15} 0.810 Ethyl Alcohol	ord. temp.	58.8	Propionitril	9.09	6.23
Absolute Methyl Alcohol	22.5	77.7	Nitro Methane	0.34	0.48
d_{15} 0.799 Methyl Alcohol	ord. temp.	83.3	Acetone	very soluble	
d_{15} 0.816 Propyl Alcohol	ord. temp.	26.3	Furfurol	...	25.10

SODIUM MOLYBDATE Na_2MoO_4.

SOLUBILITY IN WATER.

(Funk — Ber. 33, 3697, '00.)

t°.	Gms. Na_2MoO_4 per 100 Gms. Solution.	Mols. Na_2MoO_4 per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. Na_2MoO_4 per 100 Gms. Solution.	Mols. Na_2MoO_4 per 100 Mols. H_2O.	Solid Phase.
0	30.63	3.86	$Na_2MoO_4.10H_2O$	15.5	39.27	5.65	$Na_2MoO_4.2H_2O$
4	33.83	4.47	"	18	39.40	5.70	"
6	35.58	4.83	"	32	39.82	5.78	"
9	38.16	5.39	"	51.5	41.27	6.14	"
10	39.28	5.65	$Na_2MoO_4.2H_2O$	100	45.57	7.32	"

100 gms. H_2O dissolve 3.878 gms. sodium tri molybdate $Na_2Mo_3O_{10}$ at 20°, and 13.7 gms. at 100°.

(Ullik — Liebig's Ann. 144, 244, '67.)

SODIUM NITRATE $NaNO_3$.

SOLUBILITY IN WATER.

(Mulder; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 211, '04; see also Ditte — Compt. rend. 80, 1164, '75; Maumee — *Ibid.* 58, 81, '64; Etard — Ann. chim. phys. [7] 2, 527, '94.)

t°.	Gms. $NaNO_3$ per 100 Gms. Solution.	Gms. $NaNO_3$ per 100 Gms. Water.	Mols. per Liter.	t°.	Gms. $NaNO_3$ per 100 Gms. Solution.	Gms. $NaNO_3$ per 100 Gms. Water.	Mols. per Liter.
0	42.2	72.9– 73.0*	6.71*	80	59.7	148.0–148.0*	10.35*
10	44.7	80.8– 80.5	7.16	100	64.3	180.0–175.8	11.30
20	46.7	87.5– 88.0	7.60	120	68.6	218.0–208.8†	12.22†
25	47.6	91.0– 92.0	7.80	180	78.1	356.7	
30	48.7	94.9– 96.2	8.06	220	83.5	506.0	
40	50.5	102.0–104.9	8.51	225	91.5	1076.0	
50	52.8	112.0–114.0	8.97	313 m. pt.	100.0	∞	
60	54.9	122.0–124.0	9.42	...			

* Berkeley. † 119°.

SOLUBILITY OF SODIUM NITRATE IN AQUEOUS SOLUTIONS OF NITRIC ACID AT 0°.

(Engel — Compt. rend. 104, 911, '87; see also Schultz — Zeit. Ch. [2] 5, 531, '62.)

Equivalents per 10 cc. Solution. $NaNO_3$.	Equivalents per 10 cc. Solution. HNO_3.	Sp. Gr. of Solutions.	Grams per 100 cc. Solution. $NaNO_3$.	Grams per 100 cc. Solution. HNO_3.
66.4	0	1.341	56.5	0.00
63.7	2.65	1.338	54.2	1.67
60.5	5.7	1.331	51.48	3.59
56.9	8.8	1.324	48.42	5.55
52.75	12.57	1.312	44.88	7.92
48.7	16.9	1.308	41.44	10.65
39.5	27.0	1.291	33.61	17.02
35.1	32.25	1.285	29.86	20.33
31.1	37.25	1.282	26.46	23.48
23.5	48.0	1.276	20.0	30.26
18.0	57.25	1.276	15.32	36.09
12.9	71.0	1.291	10.97	44.76

Solubility of Mixtures of Sodium Nitrate and Potassium Nitrate in Water at 20°.

(Carnelly and Thomson — J. Ch. Soc. 53, 799, '88.)

Per cent $NaNO_3$ in Mixtures Used.	Gms. per 100 Gms. H_2O.		Per cent $NaNO_3$ in Mixtures Used.	Gms. per 100 Gms. H_2O.	
	$NaNO_3$.	KNO_3.		$NaNO_3$.	KNO_3.
100	86.8	0	45.7	53.3	34.7
90	96.4	13.2	40	45.6	35.5
80	98.0	38.5	20	20.8	33.3
60	90.0	47.6	10	9.4	31.5
50	66.0	40.0	0	0.0	33.6

100 gms. H_2O dissolve 24.9 gms. NaCl + 53.6 gms. $NaNO_3$ at 20°.

(Rüdorff — Ber. 6, 484, '73; Karsten; Nicol — Phil. Mag. [5] 31, 386, '91.)

Solubility of Sodium Nitrate in Aqueous Solutions of Sodium Hydroxide at 0°.

(Engel — Bull. soc. chim. [3] 6, 16, '91.)

Milligram Mols. per 10 cc. Solution.		Sp. Gr. of Solutions.	Grams per 100 cc. Solution.	
Na_2O.	$NaNO_3$.		NaOH.	$NaNO_3$.
0.0	66.4	1.341	0.0	56.50
2.875	62.5	1.338	2.30	53.19
6.1	57.15	1.333	4.89	48.63
12.75	47.5	1.327	10.21	40.42
26.0	29.5	1.326	20.83	25.10
39.0	17.5	1.332	31.25	14.89
45.88	13.19	1.356	36.76	11.22
60.88	6.05	1.401	48.75	5.15

Solubility of Sodium Nitrate in Alcohols.

100 gms. abs. methyl alcohol dissolve 0.41 gm. $NaNO_3$ at 25°.
100 gms. abs. ethyl alcohol dissolve 0.036 gm. $NaNO_3$ at 25°.

(de Bruyn — Z. physik. Ch. 10, 783, '92.)

Solubility of Sodium Nitrate in Aqueous Ethyl Alcohol at Different Temperatures.

(Bodländer — Z. physik. Ch. 7, 317, '91; Taylor — J. Physic. Ch. 1, 723, '97; Bathrick — *Ibid.* 1, 162, '96.)

Results at 13° (B.).

Sp. Gr. of Solutions.	Gms. per 100 cc. Solution.		
	C_2H_5OH.	H_2O.	$NaNO_3$.
1.3700	0.0	75.34	61.66
1.3395	3.08	73.53	57.34
1.3120	6.01	71.81	53.39
1.2845	8.30	70.85	49.30
1.2580	10.91	69.47	45.42
1.2325	13.77	67.12	42.36
1.2010	16.46	66.16	37.48

Results at 16.5° (B.).

Sp. Gr. of Solutions.	Gms. per 100 cc. Solution.		
	C_2H_5OH.	H_2O.	$NaNO_3$.
1.3745	0.0	75.25	62.20
1.3162	6.16	70.82	54.64
1.2576	11.60	68.10	46.06
1.2140	16.49	65.04	39.87
1.1615	22.17	61.67	32.31
1.0855	32.22	52.92	23.41
1.0558	37.23	48.50	19.85
1.0050	43.98	42.78	13.74
0.9420	52.60	32.13	9.47
0.9030	60.00	25.65	4.65
0.8610	63.16	21.31	1.63

Results at 30° (T.).

Wt. per cent Alcohol in Solvent.	Gms. $NaNO_3$ per 100 Gms. Solution.	Gms. $NaNO_3$ per 100 Gms. Water.
0	49.10	96.45
5	46.41	91.15
10	43.50	85.55
20	37.42	74.75
30	31.31	65.10
40	25.14	55.95
50	18.94	46.75
60	12.97	37.25
70	7.81	28.25
90	1.21	12.25

Results at 40°. (Bathrick.)

Wt. per cent Alcohol.	Gms. $NaNO_3$ per 100 Gms. Aq. Alcohol.
0	104.5
8.22	90.8
17.4	73.3
26.0	61.6
36.0	48.4
42.8	40.6
55.3	27.1
65.1	18.1
77.0	9.4
87.2	4.2

SOLUBILITY OF SODIUM NITRATE IN AQUEOUS SOLUTIONS OF ACETONE.

Results at 30°. (Taylor.)

Wt. per cent Acetone in Solvent.	Gms. $NaNO_3$ per 100 Gms. Solution.	Gms. $NaNO_3$ per 100 Gms. Water.
0	49.10	96.45
5	46.96	93.20
9.09	45.11	90.40
20	40.10	83.70
30	35.08	77.20
40	29.80	70.75
50	24.34	64.40
60	18.55	59.95
70	13.15	50.50
80	7.10	38.20
90	1.98	20.20

Results at 40°. (Bathrick.)

Wt. per cent Acetone.	Gms. $NaNO_3$ per 100 Gms. Aq. Acetone.
0.0	105
8.47	91.2
16.8	78.3
25.2	66.4
34.3	57.9
44.1	46.2
53.9	32.8
64.8	23.0
76.0	10.8
87.6	3.2

SODIUM NITRITE $NaNO_2$.

100 gms. H_2O dissolve 83.3 gms. at 15°.

(Divers — J. Ch. Soc. 75, 86, '99.)

100 gms. abs. methyl alcohol dissolve 4.43 gms. $NaNO_2$ at 19.5°.
100 gms. abs. ethyl alcohol dissolve 0.31 gm. $NaNO_2$ at 19.5°.

(de Bruyn — Z. physik. Ch. 10, 783. '92.)

SODIUM RHODO NITRITE $Na_6Rh_2(NO_2)_{12}$.

100 gms. H_2O dissolve 40 gms. at 17°, and 100 gms. at 100°.

(Leidie — Compt. rend. 111, 107, '90.)

SODIUM OXALATE $C_2O_4Na_2$.

SOLUBILITY IN WATER.

(Souchay and Leussen — Liebig's Ann. 99, 33, '56; Pohl — J. pr. Ch. 56, 216, '52.)

t°.	15.5°.	21.8°.	100°.
Gms. $Na_2C_2O_4$ per 100 gms. H_2O	3.22	3.74	6.33

Solubility of Mixtures of Sodium Oxalate and Oxalic Acid in Water at 25°.

(Foote and Andrew — Am. Ch. J. 34, 154, '05.)

Gms. per 100 Gms. Solution. $H_2C_2O_4$.	Gms. per 100 Gms. Solution. $Na_2C_2O_4$.	Mols. per 100 Mols. H_2O. $H_2C_2O_4$.	Mols. per 100 Mols. H_2O. $Na_2C_2O_4$.	Solid Phase.
10.20	...	2.274	...	$H_2C_2O_4.2H_2O$
10.50	0.83	2.370	0.130	$H_2C_2O_4.2H_2O + HNaC_2O_4.H_2O$
9.15	0.71	2.032	0.106	Double Salt, $HNaC_2O_4.H_2O$
6.88	0.86	1.493	0.125	Double Salt, $HNaC_2O_4.H_2O$
1.14	1.25	0.234	0.172	Double Salt, $HNaC_2O_4.H_2O$
0.47	3.20	0.098	0.446	Double Salt, $HNaC_2O_4.H_2O$
0.42	3.85	0.090	0.541	$HNaC_2O_4.H_2O + Na_2C_2O_4$
...	3.60	...	0.502	$Na_2C_2O_4$

SODIUM *p* NITRO PHENOL $C_6H_4.ONa(1).NO_2(4)$.

Solubility in Water and in Aqueous Normal Solutions of Non Electrolytes.

(Goldschmidt — Z. physik. Ch. 17, 154, '95.)

Gms. $C_6H_4.ONa(1).NO_2(4)$ per 100 Gms. Solution in:

t°.	Water.	Alcohol.	Urea.	Glycerine.	Acetone.	Propionitril.	Acetonitril.	Urethane.
23.7	5.597	5.615	6.244	6.188	6.225	6.257	6.065	6.520
28.6	6.721	6.874	7.489	7.440	7.498	7.571	7.328	7.889
30.6	7.256	...	...	...	...	...	...	...
33.6	8.125	8.318	9.000	9.025	9.025	9.066	8.886	9.507
35.9	8.851	...	...	...	...	...	...	...
36.1	8.883	...	9.683	9.688	9.665	9.911	9.667	10.248
40.2	9.881	10.147	10.666	10.777	10.695	10.905	10.667	11.379
45.2	11.235	11.513	12.068	12.229	...	...	...	12.869
50.1	12.730	13.133	13.555	13.785	...	...	...	...

The solid phase is $C_6H_4ONa.NO_2.4H_2O$ below 36°, and $C_6H_4ONa.NO_2.2H_2O$ above 36° in each case.

SODIUM PHOSPHATES, Ortho, Hydrogen, and Pyro.

Solubility of Each in Water.

(Mulder; Poggiale.)

t°.	Gms. per 100 Gms. Water. Na_3PO_4.	Na_2HPO_4.	$Na_4P_2O_7$.	t°.	Gms. per 100 Gms. H_2O. Na_3PO_4.	Na_2HPO_4.	$Na_4P_2O_7$.
0	1.5	2.5	3.16	40	31.0	63.9	13.50
10	4.1	3.9	3.95	50	43.0	82.5	17.45
20	11.0	9.3	6.23	60	55.0	91.6	21.83
25	15.5	15.4	8.14	80	81.0	96.6	30.04
30	20.0	24.1	9.95	100	108.0	99.0	40.26

Solid phases, $Na_3PO_4.12H_2O$, $Na_2HPO_4.12H_2O$ and $Na_4P_2O_7.10H_2O$ respectively. Sp. Gr. of saturated solution of Na_2HPO_4 at 15° = 1.047.

100 gms. alcohol of 0.941 Sp. Gr. dissolve 0.33 gm. sodium phosphate at 15.5°.

SODIUM (Double) PHOSPHATE, FLUORIDE $Na_3PO_4.NaF.12H_2O$.

100 gms. water dissolve 12 gms. of the double sodium salt at 25°, and 57.5 gms. at 70°. Sp. Gr. of solution at 25° = 1.0329; at 70° = 1.1091.

(Briegleb — Liebig's Ann. 97, 95, '56.)

Solubility of Sodium Phosphites, etc., in Water.

Salt.	Formula.	t°.	Gms. Salt per 100 Gms. H_2O.	Authority.
Hydrogen Phosphite	$(NaH)HPO_3.2\frac{1}{2}H_2O$	0	56	(Amat. — Compt. rend. 106, 1351, '88.)
"	"	10	66	
"	"	42	193	
Hypophosphate	$Na_4P_2O_6.10H_2O$	cold	3.3	(Salzer — Liebig's Ann. 211, 1, '82.)
Hydrogen Hypophosphate	$Na_3HP_2O_6.9H_2O$	?	4.5	
Tri Hydrogen "	$NaH_3P_2O_6 3H_2O$	cold	6.7	
Di Hydrogen "	$Na_2H_2P_2O_6.6H_2O$	cold	2.2	(Salzer — Liebig's Ann. 187, 331, '77)
Di Hydrogen "	$Na_2H_2P_2O_6.6H_2O$	b. pt.	20.0	
Hypophosphite	$(NaH)HPO_2.H_2O$	25	100.0	(U. S. P.)
Hypophosphite	$(NaH)HPO_2.H_2O$	b. pt.	830	"

SODIUM SELENATE $Na_2SeO_4.10H_2O$. Solubility in Water.

(Funk — Ber. 33, 3697, '00.)

t°.	Gms. Na_2SeO_4 per 100 Gms. Solution.	Mols. Na_2SeO_4 per 100 Mols. H_2O.	Solid Phase.	t°	Gms. Na_2SeO_4 per 100 Gms. Solution.	Mols. Na_2SeO_4 per 100 Mols. H_2O.	Solid Phase.
0	11.74	1.26	$Na_2SeO_4.10H_2O$	35.2	45.47	7.94	Na_2SeO_4
15	25.01	3.18	"	39.5	45.26	7.87	"
18	29.00	3.90	"	50	44.49	7.63	"
25.2	36.91	5.57	"	75	42.83	7.14	"
27	39.18	6.13	"	100	42.14	6.93	"
30	44.05	7.50	"				

Sp. Gr. of saturated solution at 18° = 1.315.

SODIUM STANNATE $Na_2SnO_3.3H_2O$.

100 gms. H_2O dissolve 67.4 gms. at 0°, and 61.3 gms. at 20°. Sp. Gr. of solution at 0° = 1.472; at 20° = 1.438.

(Ordway — Am. J. Sci. [2] 40, 173, '65.)

SODIUM SULPHATE Na_2SO_4. Solubility in Water.

(Mulder; Löwel — Ann. chim. phys. [3] 33, 382, '51; Tilden and Shenstone — Proc. Roy. Soc. (Lond.) 35, 345, '83; Etard — Ann. chim. phys. [7] 2, 527, '94; Funk — Ber. 33, 3701, '00; Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 209, '04.)

t°.	Gms. Na_2SO_4 per 100 Gms. Solution.	Gms. Na_2SO_4 per 100 Gms. Water.	Mols. Na_2SO_4 per Liter (B.).	Solid Phase.	t°.	Gms. Na_2SO_4 per 100 Gms. Solution.	Gms. Na_2SO_4 per 100 Gms. Water.	Mols. Na_2SO_4 per Liter (B.).	Solid Phase.
0	4.76	5.0	0.31	$Na_2SO_4.10H_2O$	50	31.8	46.7	2.92	Na_2SO_4
5	6.0	6.4	...	"	60	31.2	45.3	2.83	"
10	8.3	9.0	0.631	"	80	30.4	43.7	2.69	"
15	11.8	13.4	...	"	100	29.8	42.5	2.60	"
20	16.3	19.4	1.32	"	120	29.5	41.95	...	"
25	21.9	28.0	...	"	140	29.6	42	...	"
27.5	25.6	34.0	...	"	160	30.7	44.25	...	"
30	29.0	40.8	2.63	"	230	31.7	46.4	...	"
31	30.6	44.0	...	"	0	16.3	19.5	...	$Na_2SO_4.7H_2O$
32	32.3	47.8	...	"	5	19.4	24	...	"
32.75	33.6	50.65	3.11	"	10	23.1	30	...	"
33	33.6	50.6	...	Na_2SO_4	15	27.0	37	...	"
35	33.4	50.2	...	"	20	30.6	44	...	"
40	32.8	48.8	3.01	"	25	34.6	53	...	"

Solubility of Mixtures of Sodium Sulphate and Magnesium Sulphate in Water (Astrakanite) $Na_2Mg(SO_4)_2.4H_2O$.

(Roozeboom — Rec. trav. chim. 6, 342, '87; Z. physik. Ch. 2, 518, '88.)

t°.	Mols. per 100 Mols. H_2O.		Grams per 100 Grams H_2O.		Solid Phase.
	Na_2SO_4.	$MgSO_4$.	Na_2SO_4.	$MgSO_4$.	
22	2.95	4.70	23.3	31.4	Astrakanite
24.5	3.45	3.68	27.2	24.6	"
30	3.59	3.59	28.4	24.1	"
35	3.71	3.71	29.4	24.8	"
47	3.6	3.6	28.4	24.1	"
22	2.95	4.70	23.3	31.4	Astrakanite + Na_2SO_4
24.5	3.45	3.62	27.2	24.2	"
30	4.58	2.91	36.1	19.1	"
35	4.3	2.76	33.9	18.44	"
18.5	3.41	4.27	43.0	45.5	Astrakanite + $MgSO_4$
22	2.85	4.63	35.2	48.9	"
24.5	2.68	4.76	32.5	50.3	"
30	2.3	5.31	25.9	55.0	"
35	1.73	5.88	23.5	59.4	

Solubility of Mixtures of Sodium Sulphate, Potassium Chloride, Potassium Sulphate, etc., in Water.

(Meyerhoffer and Saunders — Z. physik. Ch. 28, 469; 31, 382, '99.)

t°.	Sp. Gr. of Solutions.	Mols. per 1000 Mols. H_2O.				Solid Phase.
		SO_4	K_2	Na_2	Cl_2	
*4.4	...	5.42	14.39	51.83	60.8	$K_3Na(SO_4)_2+Na_2SO_4.10H_2O+KCl+NaCl$
0.2	...	3.35	12.78	50.93	60.36	$Na_2SO_4.10H_2O+KCl+NaCl$
− 0.4	...	3.59	16.38	40.75	53.54	$Na_2SO_4.10H_2O+KCl+K_3Na(SO_4)_2$
16.3	...	4.72	17.58	50.56	63.42	$K_3Na(SO_4)_2+KCl+NaCl$
24.8	1.2484	4.37	20.00	48.36	64.01	$K_3Na(SO_4)_2+KCl+NaCl$
*16.3	...	16.29	9.16	61.06	53.93	$K_3Na(SO_4)_2+NaCl+Na_2SO_4.10H_2O+Na_2SO_4$
24.5	1.2625	14.45	9.90	58.46	53.91	$K_3Na(SO_4)_2+NaCl+Na_2SO_4$
0.3	...	2.75	25.77	17.93	40.95	$K_3Na(SO_4)_2+KCl+K_2SO_4$
25.0	1.2034	2.94	36.20	14.80	48.06	$K_3Na(SO_4)_2+KCl+K_2SO_4$
*17.9	1.2474	13.84	0.0	62.57	48.70	$Na_2SO_4.10H_2O+Na_2SO_4+NaCl$
*30.1	1.2890	50.41	10.08	40.33	0.0	$K_3Na(SO_4)_2+Na_2SO_4.10H_2O+Na_2SO_4$
−21.4	...	...	...	46.61	46.36	$NaCl.2H_2O+Na_2SO_4.10H_2O$
−23.7	...	...	10.51	39.58	50.09	$NaCl.2H_2O+KCl$
−10.9	...	1.45	30.68	...	29.23	$KCl+K_2SO_4$
− 3	...	16.25	10.03	6.21	...	$K_3Na(SO_4)_2+Na_2SO_4.10H_2O$
− 3	...	16.24	10.03	6.21	...	$K_3Na(SO_4)_2+K_2SO_4$
−14	...	1.39	25.59	8.78	32.94	$K_3Na(SO_4)_2+Na_2SO_4.10H_2O+KCl$
−14	...	1.39	25.59	8.78	32.94	$K_3Na(SO_4)_2+K_2SO_4+KCl$
−23.3	...	0.41	15.15	44.20	58.97	$Na_2SO_4.10H_2O+KCl+NaCl.2H_2O$

* Indicates transition points.

Solubility of Sodium Sulphate in Aqueous Solutions of Sulphuric Acid.

(D'Ans, Shepherd and Günther — Z. anorg. Chem. 49, 356–61, '06.)

Gms. per 1000 Gms. Solution.		Mols. per 1000 gms. Solution.		Solid Phase.
H_2SO_4	Na_2SO_4	H_2SO_4	Na_2SO_4	
0.0	219.0	0.0	1.541	$Na_2SO_4 \cdot 10H_2O$
28.1	237.4	0.286	1.671	"
33.2	247.5	0.338	1.742	"
86.7	320.7	0.884	2.256	$Na_2SO_4 \cdot 10H_2O + Na_2SO_4$
154.6	335.8	1.576	2.363	$Na_3H(SO_4) \cdot H_2O + Na_2SO_4$
163.5	346.4	1.666	2.437	$Na_3H(SO_4)_2 + Na_2SO_4$
256.3	297.4	2.611	2.091	$Na_3H(SO_4)_2 + Na_3H(SO_4)_2 \cdot H_2O$

Solubility of Sodium Sulphate in Aqueous Solutions of Sodium Chloride at Different Temperatures.

(Seidell — Am. Ch. J. 27, 52, '02.)

Results at 10°.

Sp. Gr. of Solutions.	Gms. per 100 Gms. H_2O. NaCl.	Na_2SO_4.
1.080	0.0	9.14
1.083	4.28	6.42
1.102	9.60	4.76
1.150	15.65	3.99
1.164	21.82	3.97
1.192	28.13	4.15
1.207	30.11	4.34
1.217	32.27	4.59
1.223	33.76	4.75

Results at 21.5°.

Sp. Gr. of Solutions.	Gms. per 100 Gms. H_2O. NaCl.	Na_2SO_4.
1.164	0.0	21.33
1.169	9.05	15.48
1.199	17.48	13.73
1.214	20.41	13.62
1.243	26.01	15.05
1.244	26.53	14.44
1.244	27.74	13.39
1.244	31.25	10.64
1.243	31.80	10.28
1.245	32.10	8.43
1.219	33.69	4.73
1.212	34.08	2.77
1.197	35.46	0.00

Results at 27°.

Sp. Gr. of Solutions.	Gms. per 100 Gms. H_2O. NaCl.	Na_2SO_4.
1.228	0.0	31.10
1.230	2.66	28.73
1.230	5.29	27.17
1.235	7.90	26.02
1.259	16.13	24.83
1.253	18.91	21.39
1.249	19.64	20.11
1.245	20.77	19.29
1.238	32.33	9.53

Results at 30°.

Sp. Gr. of Solutions.	Gms. per 100 Gms. H_2O. NaCl.	Na_2SO_4.
1.281	0.0	39.70
1.282	2.45	38.25
1.284	5.61	36.50
1.290	7.91	35.96
1.276	10.61	31.64
1.270	12.36	29.87
1.258	15.65	25.02
1.249	18.44	21.30
1.244	20.66	19.06
1.236	32.43	9.06

Results at 33°.

Sp. Gr. of Solutions.	Gms. per 100 Gms. H_2O. NaCl.	Na_2SO_4.
1.329	0.0	48.48
1.323	1.22	46.49
1.318	1.99	45.16
1.315	2.64	44.09
1.309	3.47	42.61
1.265	12.14	29.32
1.237	21.87	16.83
1.234	32.84	8.76
1.217	33.99	4.63
1.208	34.77	2.75

Results at 35°.

Sp. Gr. of Solutions.	Gms. per 100 Gms. H_2O. NaCl.	Na_2SO.
1.324	0.0	47.94
1.314	2.14	43.75
1.256	13.57	26.26
1.238	18.78	19.74
1.231	31.91	8.28
1.193	35.63	0.00

Solubility of Sodium Sulphate in Aqueous Ethyl Alcohol.

(de Bruyn — Z. physik. Chem. 32, 101, '00.)

t°.	Content of Alcohol.	Gms. Na_2SO_4 per 100 Gms. Aq. Alcohol.	Gms. per 100 Gms. Solution.			Solid Phase.
			H_2O.	C_2H_5OH.	Na_2SO_4.	
15	0.7	12.7	88.7	0.0	11.3	$Na_2SO_4.10H_2O$
"	9.2	6.7	85.1	8.6	6.3	"
"	19.4	2.6	78.6	18.9	2.9	"
"	39.7	0.5	60.0	39.5	0.5	"
"	58.9	0.1	41.1	58.8	0.1	"
"	72.0	0.0	28.0	72.0	0.0	"
"	0.0	37.4	72.8	0.0	27.2	$Na_2SO_4.7H_2O$
"	11.2	16.3	76.5	9.5	14.0	"
"	20.6	7.0	74.3	19.2	6.5	"
"	30.2	2.0	68.4	29.6	2.0	"
25	0.0	28.2	78.1	0.0	21.9	$Na_2SO_4.10H_2O$
"	10.6	13.9	78.5	9.3	12.2	"
"	24.0	4.5	72.8	22.9	4.3	"
"	54.0	0.4	45.6	54.0	0.4	"
36	0.0	49.3	67.0	0.0	33.0	Na_2SO_4
"	8.8	29.2	70.6	6.8	22.6	"
"	12.8	22.4	71.2	10.5	18.3	"
"	17.9	15.4	71.1	15.5	13.4	"
"	18.1	15.3	71.0	15.7	13.3	"
"	28.9	5.4	66.5	28.4	5.1	"
"	48.7	0.8	50.9	48.3	0.8	"
45	0.0	47.9	67.6	0.0	32.4	"
"	9.0	27.5	71.3	7.1	21.6	"
"	14.5	19.2	71.8	12.1	16.1	"
"	20.6	12.3	70.6	18.4	10.0	"
"	31.0	5.1	65.6	29.5	4.9	"

Between certain concentrations of the aqueous alcohol the liquid separates into two layers at 25°, 36° and 45°.

t°.	Upper Layer.			Lower Layer.		
	Gms. H_2O.	Gms. C_2H_5OH.	Gms. Na_2SO_4.	Gms. H_2O.	Gms. C_2H_5OH.	Gms. Na_2SO_4.
25	66.5	27.3	6.2	67.4	5.1	27.5
"	68.1	23.9	8.0	68.5	6.0	25.5
"	68.3	23.1	8.6	68.3	6.7	25.0
36	...	...	...	66.6	4.1	29.3
"	57.7	38.4	3.9	...	...	...
"	65.0	28.3	6.7	68.8	5.9	25.3
"	68.1	21.2	10.7	68.9	9.4	21.7
45	61.8	32.9	5.3	...	...	...
"	65.8	25.3	8.9	68.4	8.8	22.8
"	66.0	24.0	10.0	68.6	10.1	21.3

SOLUBILITY OF SODIUM SULPHATE IN AQUEOUS PROPYL ALCOHOL AT 20°.

(Linebarger — Am. Ch. J. 14, 380, '92.)

Gms. C_3H_7OH per 100 Gms. Alcohol-Water Mixture.	Gms. Na_2SO_4 per 100 Gms. Sat. Solution.	Gms. C_3H_7OH per 100 Gms. Alcohol-Water Mixture.	Gms. Na_2SO_4 per 100 Gms. Sat. Solution.
42.20	1.99	56.57	0.55
49.77	1.15	60.64	0.44
55.65	0.72	62.81	0.38

100 gms. H_2O dissolve 183.7 gms. sugar + 30.5 gms. Na_2SO_4 at 31.25°, or 100 gms. sat. solution contain 52.2 gms. sugar + 9.6 gms. Na_2SO_4. (Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

SODIUM (Bi) SULPHATE $NaHSO_4$.

100 gms. H_2O dissolve 28.6 gms. at 25°, and 50.0 gms. at 100°.
100 gms. alcohol dissolve 1.4 gms. at 25°. (U. S. P.)

SODIUM THIO SULPHATE $Na_2S_2O_3$.

SOLUBILITY IN WATER.

(Young and Burke — J. Am. Chem. Soc. 26, 1417, '04.)

t°.	Gms. $Na_2S_2O_3$ per 100 Gms. Solution.	Gms. $Na_2S_2O_3$ per 100 Gms. Water.	Solid Phase.	t°.	Gms. $Na_2S_2O_3$ per 100 Gms. Solution.	Gms. $Na_2S_2O_3$ per 100 Gms. Water.	Solid Phase.
10	37.38	59.69	Pentahydrate (com.)	20	62.11	163.92	Monohydrate
20	41.20	70.07	"	25	62.73	168.32	"
25	43.15	75.90	"	30	63.53	174.20	"
30	45.19	82.45	"	20	55.15	122.68	Dihydrate
35	47.71	91.24	"	25	56.03	127.43	"
40	50.83	103.37	"	30	57.13	133.27	"
45	55.33	123.87	"	35	58.13	138.84	"
20	49.38	97.55	Pentahydrate (β)	40	59.17	144.92	"
25	52.15	108.98	"	50	62.28	165.11	"
28	54.48	119.69	"	33.5	58.59	141.48	Tetrahydrate (?)
29.5	55.85	126.50	"	36.2	60.51	153.23	"
30	56.57	130.26	"	36.6	62.80	168.82	"

100 gms. alcohol dissolve 0.0025 gm. $Na_2S_2O_3$ and 0.0034 gm. $Na_2S_2O_3.5H_2O$ at room temperature. (Bödtker — Z. physik. Chem. 22, 510, '97.)

100 gms. alcohol of 0.941 Sp. Gr. dissolve 33.3 gms. at 15.5°.
(See also Parmentier — Compt. rend. 122, 136, '96.)

SODIUM SULPHITE Na_2SO_3.

100 gms. H_2O dissolve 14.1 gms. at 0°, 25.8–28.7 gms. at 20°, and 49.5 gms. at 40°. (Kremers — Pogg. Ann. 99, 50, '56.)

SODIUM TELLURIATE $Na_2TeO_4.2H_2O$.

100 gms. H_2O dissolve 0.77 gm. Na_2TeO_4 at 18°, and 2.0 gms. at 100°. Solid phase $Na_2TeO_4.2H_2O$.

100 gms. H_2O dissolve 1.43 gms. Na_2TeO_4 at 18°, and 2.5 gms. at 50°. Solid phase $Na_2TeO_4.4H_2O$. (Mylius — Ber. 34, 2208, '01.)

SODIUM TUNGSTATE (Wolframate) $Na_2WO_4.2H_2O$.

SOLUBILITY IN WATER.

(Funk — Ber. 33, 3701, '00.)

t°.	Gms. Na_2WO_4 per 100 Gms. Solution.	Mols. Na_2WO_4 per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. Na_2WO_4 per 100 Gms. Solution.	Mols. Na_2WO_4 per 100 Mols. H_2O.	Solid Phase.
−5	30.60	2.70	$Na_2WO_4.10H_2O$	−3.5	41.67	4.37	$Na_2WO_4.2H_2O$
−4	31.87	2.86	"	+5	41.73	4.39	"
−3.5	32.98	3.01	"	18	42.0	4.40	"
−2	34.52	3.23	"	21	42.27	4.48	"
0	36.54	3.52	"	43.5	43.98	4.81	"
+3	39.20	3.95	"	80.5	47.65	5.57	"
5	41.02	4.26	"	100	49.31	5.95	"

Sp. Gr. of sat. solution at 18° = 1.573. For Sp. Gr. determinations of aqueous solutions at 20°, see Pawlewski — Ber. **33**, 1223, '00.

SODIUM Fluo ZIRCONATE $5NaF.ZrF_4$.

100 gms. H_2O dissolve 0.387 gm. at 18°, and 1.67 gms. at 100°.

(Marignac — J. pr. Chem. 83, 202, '61.)

STRONTIUM BENZOATE $Sr(C_7H_5O_2)_2.H_2O$.

SOLUBILITY IN WATER.

(Paietta — Gazz. chim. ital. 36, II, 67, '06.)

t°.	15.7°	24.7°	31.4°	40.9°
Gms. $Sr(C_7H_5O_2)_2$ per 100 gms. solution	5.31	5.4	5.56	5.77

STRONTIUM BROMATE $Sr(BrO_3)_2$.

One liter of aqueous solution contains 0.9 gram molecules or 309 gms. $Sr(BrO_3)_2$ at 18°. (Kohlrausch — Sitzb. K. Akad. Wiss. (Berlin) 90, '97.)

STRONTIUM BROMIDE $SrBr_2.6H_2O$.

SOLUBILITY IN WATER.

(Average curve from results of Kremers — Pogg. Ann. 103, 65, '58; and Etard — Ann. chim. phys. [7] 2, 540, '94.)

t°.	Gms. $SrBr_2$ per 100 Gms. Solution.	Gms. $SrBr_2$ per 100 Gms. Water.	t°.	Gms. $SrBr_2$ per 100 Gms. Solution.	Gms. $SrBr_2$ per 100 Gms. Water.
0	46.0	85.2	40	55.2	123.2
10	48.3	93.0	50	57.6	135.8
20	50.6	102.4	60	60.0	150.0
25	51.7	107.0	80	64.5	181.8
30	52.8	111.9	100	69.0	222.5

Sp. Gr. of sat. solution at 20° approximately 1.70.

100 gms. abs. alcohol dissolve 64.5 gms. $SrBr_2$ at 0°. Sp. Gr. of solution = 1.21. (Fonzes; Diacon — J. pharm. chim. [6] 1, 59, '95.)

STRONTIUM CARBONATE $SrCO_3$.

One liter of water dissolves 0.0082 gm. at 8.8° and 0.0109 gm. at 24° by conductivity method.

(Holleman — Z. physik. Chem. 12, 130, '93; Kohlrausch and Rose — *Ibid.* 12, 241, '93.)

One liter of water saturated with CO_2 dissolves 1.19 gms. $Sr(HCO_3)_2$.

STRONTIUM CHLORATE $Sr(ClO_3)_2$.

100 gms. H_2O dissolve 174.9 gms. $Sr(ClO)_2$, or 100 gms. sat. solution contain 63.6 gms. at 18°. Sp. Gr. of solution is 1.839.

(Mylius and Funk — Ber. 30, 1718, '97.)

STRONTIUM CHLORIDE $SrCl_2.6H_2O$.

Solubility in Water.

(Average curve from the results of Mulder; Etard; see also Tilden — J. Chem. Soc. 45, 409, '84.)

t°.	Gms. $SrCl_2$ per 100 Gms. Solution.	Gms. $SrCl_2$ per 100 Gms. Water.	Solid Phase.	t°.	Gms. $SrCl_2$ per 100 Gms. Solution.	Gms. $SrCl_2$ per 100 Gms. Water	Solid Phase.
−20	26.0	35.1	$SrCl_2.6H_2O$	60	45.0	81.8	$SrCl_2.6H_2O$
0	30.3	43.5	"	70	46.2	85.9	$SrCl_2.2H_2O$
10	32.3	47.7	"	80	47.5	90.5	"
20	34.6	52.9	"	100	50.2	100.8	"
25	35.8	55.8	"	120	53.0	112.8	"
30	37.0	58.7	"	140	55.6	125.2	"
40	39.5	65.3	"	160	58.5	141.0	"
50	42.0	72.4	"	180	62.0	163.1	"

Transition temperature about 62.5°. Sp. Gr. of sat. solution at 0° = 1.334; at 15° = 1.36.

Solubility of Strontium Chloride in Aqueous Solutions of Hydrochloric Acid at 0°.

(Engel — Ann. chim. phys. [6] 13, 376, '88.)

Mg. Mols. per 10 cc. Solution. ½$SrCl_2$.	Mg. Mols. per 10 cc. Solution. HCl.	Sp. Gr. of Solution.	Grams per 100 cc. Solution. $SrCl_2$.	Grams per 100 cc. Solution. HCl.
51.6	0	1.334	40.9	0.0
44.8	6.1	1.304	35.5	2.22
37.85	12.75	1.269	30.0	4.65
27.2	23.3	1.220	21.56	8.49
22.0	28.38	1.201	17.44	10.35
14.0	37.25	1.167	11.09	13.58
4.25	52.75	1.133	3.37	19.23

100 gms. abs. methyl alcohol dissolve 63.3 gms. $SrCl_2.6H_2O$ at 6°.
100 gms. abs. ethyl alcohol dissolve 3.8 gms. $SrCl_2.6H_2O$ at 6°.

(de Bruyn — Z. physik. Chem. 10, 787, '92.)

Solubility of Strontium Chloride in Aqueous Ethyl Alcohol Solutions at 18°.

(Gerardin — Ann. chim. phys. [4] 5, 156, '65.)

Sp. Gr. of Aq. Alcohol at 0°.	Wt. per cent Alcohol.	Gms. $SrCl_2$ per 100 Gms. Alcohol.	Sp. Gr. of Aq. Alcohol at 0°.	Wt. per cent Alcohol.	Gms. $SrCl_2$ per 100 Gms. Alcohol.
0.990	6	49.81	0.939	45	26.8
0.985	10	47.0	0.909	59	19.2
0.973	23	39.6	0.846	86	4.9
0.966	30	35.9	0.832	91	3.2
0.953	38	30.4			

STRONTIUM CHROMATE $SrCrO_4$.

SOLUBILITY IN WATER, ETC., AT 15°.
(Fresenius — Z. anal. Chem. 29, 419, '90; 30, 672, '91.)

Solvent.	Gms. $SrCrO_4$ per 100 Gms. Solvent.	Solvent.	Gms. $SrCrO_4$ per 100 Gms. Solvent.
Water	0.12	Aq. Ethyl Alcohol (29%)	0.0132
Aq. NH_4Cl (5%)	0.195	Aq. Ethyl Alcohol (53%)	0.002
Aq. CH_3COOH (1%)	1.57		

STRONTIUM FLUORIDE SrF_2.

One liter of water dissolves 1.87 mg. equiv. or 0.117 gm. SrF_2 at 18°, by conductivity method. (Kohlrausch — Z. physik. Chem. 50, 356, '04–'05.)

STRONTIUM HYDROXIDE $Sr(OH)_2$.

SOLUBILITY IN WATER.
(Scheibler — N. Z. Rubenzuckerind. 7, 257; abstract in J. pharm. chim. [5] 8, 540, '83.)

t°.	Grams per 100 Grams Solution.		Grams per 100 cc. Solution.	
	SrO.	$Sr(OH)_2.8H_2O$.	SrO.	$Sr(OH)_2.8H_2O$.
0	0.35	0.90	0.35	0.90
10	0.48	1.23	0.48	1.23
20	0.68	1.74	0.68	1.74
30	1.00	2.57	1.01	2.59
40	1.48	3.80	1.51	3.87
50	2.13	5.46	2.18	5.59
60	3.03	7.77	3.12	8.00
70	4.35	11.16	4.55	11.67
80	6.56	16.83	7.02	18.01
90	12.0	30.78	13.64	34.99
100	18.6	47.71	22.85	58.61

STRONTIUM IODATE $Sr(IO_3)_2$.

100 gms. H_2O dissolve 0.026 gm. at 15°, and 0.72–0.91 gm. at 100°. (Gay-Lussac; Rammelsberg — Pogg. Ann. 44, 575, '38.)

STRONTIUM IODIDE $SrI_2.6H_2O$.

SOLUBILITY IN WATER.
(Average curve from the results of Kremers — Pogg. Ann. 103, 65, '58; and Etard — Ann. chim. phys. [7] 2, 528, '74.)

t°.	Gms. SrI_2 per 100 Gms Solution.	Gms. SrI_2 per 100 Gms Water.	Solid Phase.	t°.	Gms. SrI_2 per 100 Gms. Solution.	Gms. SrI_2 per 100 Gms. Water.	Solid Phase.
0	62.3	165.3	$SrI_2.6H_2O$	90	78.5	365.2	$SrI_2.2H_2O$
20	64.0	177.8	"	100	79.3	383.1	"
40	65.7	191.5	"	120	80.7	418.1	"
60	68.5	217.5	"	140	82.5	471.5	"
80	73.0	270.4	"	175	85.6	594.4	"

Transition temperature about 90°. Sp. Gr. of sat. solution at 20° = 2.15.

100 gms. saturated solution of strontium iodide in absolute alcohol contain 2.6 gms. SrI_2 at −20, 3.1 gms. at + 4°, 4.3 gms. at 39°, and 4.7 gms. at 82°. (Etard.)

STRONTIUM MALATE $SrC_4H_4O_5$.

SOLUBILITY IN WATER.

(Cantoni and Basadonna — Bull. soc. chim. 35, 731, '06.)

t°.	Gms. per 100 cc. Solution.	t°.	Gms. per 100 cc. Solution.	t°.	Gms. per 100 cc. Solution.
20	0.448	40	1.385	55	2.460
25	0.550	45	1.743	60	2.821
30	0.752	50	2.098	65	3.148
35	1.036			70	3.360

STRONTIUM MOLYBDATE $SrMoO_4$.

100 gms. H_2O dissolve 0.0104 gm. $SrMoO_4$ at 17°.

(Smith and Bradbury — Ber. 24, 2930, '91.)

STRONTIUM NITRATE $Sr(NO_3)_2$.

SOLUBILITY IN WATER.

(Mulder; see also Etard for slightly lower results.)

t°.	Gms. $Sr(NO_3)_2$ per 100 Gms. Solution.	Gms. $Sr(NO_3)_2$ per 100 Gms. Water.	Solid Phase.	t°.	Gms. $Sr(NO_3)_2$ per 100 Gms. Solution.	Gms. $Sr(NO_3)_2$ per 100 Gms. Water.	Solid Phase.
0	28.3	39.5	$Sr(NO_3)_2.4H_2O$	40	47.7	91.3	$Sr(NO_3)_2$
10	35.5	54.9	"	50	48.1	92.6	"
20	41.5	70.8	"	60	48.5	94.0	"
25	44.1	79.0	"	80	49.3	97.2	"
30	46.7	87.6	"	100	50.3	101.1	"

Transition temperature about 31°. Sp. Gr. of sat. solution at 20° = 1.44.

100 gms. absolute alcohol dissolve 0.024 gm. $Sr(NO_3)_2$.

100 gms. rectified spirit dissolve 0.50 gm. $Sr(NO_3)_2$.

(Hill — Pharm. J. Trans. [3] 19, 420, '88.)

STRONTIUM OXALATE $SrC_2O_4.H_2O$.

One liter of aqueous solution contains 0.52 mg. equivalent SrC_2O_4 or 0.046 gm. at 18°, conductivity method.

(Kohlrausch — Z. physik. Chem. 50, 356, '04–'05.)

SOLUBILITY OF STRONTIUM OXALATE IN AQUEOUS ACETIC ACID SOLUTIONS AT 26°–27°.

(Herz and Muhs — Ber. 36, 3715, '03.)

Normality of Acetic Acid.	Gms. per 100 cc. Solution. CH_3COOH.	Gms. per 100 cc. Solution. Residue $SrC_2O_4.H_2O$.	Normality of Acetic Acid.	Gms. per 100 cc. Solution. CH_3COOH.	Gms. per 100 cc. Solution. Residue $SrC_2O_4.H_2O$.
0.0	0.0	0.009	3.86	23.16	0.0898
0.58	3.48	0.0526	5.79	34.74	0.0496
1.45	8.70	0.0622	16.26	97.56	0.0060
2.89	17.34	0.0642			

STRONTIUM SALICYLATE $Sr(C_6H_4OH.COO)_2.2H_2O$.

100 gms. H_2O dissolve 5.55 gms. at 25°, and 28.6 gms. at b. pt. (U. S. P.)

100 cc. aqueous solution contain 1.830 gms. anhydrous salt. (Barthe.)

100 gms. alcohol dissolve 1.5 gms. at 25°, and 9.52 gms. at b. pt.

(U. S. P.; Barthe — Bull. soc. chim. [3] 11, 519, '94.)

STRONTIUM SULPHATE $SrSO_4$.

One liter of aqueous solution contains 1.24 mg. equivalents or 0.114 gm. $SrSO_4$ at 18°, by conductivity method.

(Kohlrausch — Z. physik. Chem. **50**, 356, '04–'05; Holleman — *Ibid.* **12**, 129, '93; Wolfmann — Öster. Ung. Z. Zuckerind. **25**, 997, '97.)

Solubility of Strontium Sulphate in Aqueous Solutions of Hydrochloric, Nitric, Chloracetic and Formic Acids.

(Banthisch — J. pr. Chem. [2] **29**, 52, '84.)

cc. of Aq. Acid containing 1 Mg. Equiv. in each case.	In Aq. HCl Gms. per 100 cc. Sol.		In Aq. HNO_3 Gms. per 100 cc. Sol.		In Aq. $CH_2ClCOOH$ Gms. per 100 cc. Sol.		In Aq. HCOOH Gms. per 100 cc. Sol.	
	HCl.	$SrSO_4$.	HNO_3.	$SrSO_4$.	CH_2Cl COOH.	$SrSO_4$.	HCOOH.	$SrSO_4$.
0.2	18.23	0.161	31.52	0.381	...	...	...	...
0.5	7.29	0.207	12.61	0.307	...	...	...	...
1.0	3.65	0.188	6.30	0.217	94.47	0.026	46.02	0.024
2.0	1.82	0.126	3.15	0.138	47.23	0.022	...	...
10.0	0.36	0.048	0.63	0.049	...	...	...	...

Solubility of Strontium Sulphate in Sulphuric Acid Solutions.

t°.	Conc. of H_2SO_4.	Gms. $SrSO_4$ per 100 Gms. Acid.	Authority.
ord.	concentrated	5.68	(Struve — Z. anal. Chem. **9**, 34, 1870.)
"	fuming	9.77	" "
"	91%	0.08	(Varenne and Paulean — Compt. rend. **93**, 1016, '81.)
70	Sp. Gr. 1.843 = 99%	14.0	(Garside — Chem. News, **31**, 245, '75.)

Solubility of Strontium Sulphate in Aqueous Salt Solutions.

(Virck — Chem. Centralb. 402, '62.)

In Aq. NaCl.		In Aq. KCl.		In Aq. $MgCl_2$.		In Aq. $CaCl_2$.	
(*a.*)	(*b.*)	(*a.*)	(*b.*)	(*a.*)	(*b.*)	(*a.*)	(*b.*)
8.44	0.165	8.22	0.193	1.59	0.199	8.67	0.176
15.54	0.219	12.54	0.193	4.03	0.206	16.51	0.185
22.17	0.181	18.08	0.251	13.63	0.242	33.70	0.171

(*a*) = Gms. salt per 100 gms. aq. solution. (*b*) = Gms. $SrSO_4$ per 100 gms. solvent.

STRONTIUM TARTRATE $SrC_4H_4O_6.3H_2O$.

Solubility in Water.

(Cantoni and Zachoder — Bull. soc. chim. [3] **33**, 751, '05.)

t°.	Gms. $SrC_4H_4O_6.3H_2O$ per 100 cc. Solution.	t°.	Gms. $SrC_4H_4O_6.3H_2O$ per 100 cc. Solution.	t°.	Gms. $SrC_4H_4O_6.3H_2O$ per 100 cc. Solution.
0	0.112	25	0.224	60	0.480
10	0.149	30	0.252	70	0.580
15	0.174	40	0.328	80	0.680
20	0.200	50	0.407	85	0.755

Solubility of Strontium Tartrate in Aqueous Solutions of Acetic Acid at 26°–27°.

(Herz and Muhs — Ber. 36, 3715, '03.)

Normality of Acetic Acid.	Gms. per 100 cc. Solution. CH_3COOH.	$SrC_4H_4O_6.3H_2O$.	Normality of Acetic Acid.	Gms. per 100 cc. Solution. CH_3COOH.	$SrC_4H_4O_6.3H_2O$
0.0	0.0	0.227	3.77	21.85	1.051
0.565	3.39	0.678	5.65	33.90	0.982
1.425	8.15	0.864	16.89	101.34	0.184
2.85	17.10	0.996			

STRONTIUM (Di) TUNGSTATE $SrW_2O_7.3H_2O$.

100 cc. H_2O dissolve 0.35 gm. at 15°.

(Lefort — Ann. chim. phys. [5] 15, 326, '78.)

STRYCHNINE $C_{21}H_{22}N_2O_2$.

Solubility in Several Solvents.

(U. S. P.; at 20°, Müller — Apoth.-Ztg. 18 258, '03; Schindelmeiser.)

Solvent.	Gms. $C_{21}H_{22}N_2O_2$ per 100 Gms. Solution at 20°.	Solvent at 25°.	Solvent.	Gms. $C_{21}H_{22}N_2O_2$ per 100 Gms. Solution at 20°.	Solvent at 25°.
Water	0.021	0.016	Petroleum Ether	0.0093	...
Water Sat. with Ether	0.0166	...	Acetic Ether	0.1972	...
Ether	0.0432	0.0182	Carbon Tetra Chloride	0.158	0.645(17°)(S.)
Ether Sat. with H_2O	0.0513	...	Alcohol	...	0.909
Benzene	0.770	0.666	Amyl Alcohol	...	0.555
Chloroform	100+	16.6	Glycerine	...	0.25 (15°)

100 gms. pyridine dissolve 1.24 gm. $C_{21}H_{22}N_2O_2$ at 26°.

(Holty — J. Physic. Chem. 9, 764, '05.)

Solubility of Strychnine Nitrate and Sulphate in Several Solvents.

(U. S. P.)

Solvent.	Strychnine Nitrate. Gms. per 100 Gms. Solvent at: 25°.	80°.	Strychnine Sulphate. Gms. per 100 Gms. Solvent at: 25°.	80°.
Water	2.38	12.5	3.23	16.6
Alcohol	0.83	1.66 (60°)	1.54	5.0 (60°)
Chloroform	0.64	...	0.31	...
Glycerine	1.66	4.0 (15°)	22.5 (15°)	...

SUBERIC ACID $C_6H_{12}(COOH)_2$.

Solubility in Water.

(Lamouroux — Compt. rend. 128, 998, '99.)

t°.	0°.	15°.	20°.	35°.	50°.	65°.
Gms. $C_6H_{12}(COOH)_2$ per 100 cc. solution	0.08	0.13	0.16	0.45	0.98	2.22

SUCCINIC ACID $(CH_2)_2(COOH)_2$.

Solubility in Water.

(Miczynski — Monatsh. Chem. 7, 263, '86; Van der Stadt — Z. physik. Chem. 41, 355, '02; Lamouroux — Compt. rend. 128, 998, '99; for other concordant results, see Bourgoin — Bull. soc. chim. [2] 21, 110 '74; Henry — Compt. rend. 99, 1157, '84.)

t°.	Gms. $(CH_2)_2(COOH)_2$ per 100 Gms. H_2O.	Gms. $(CH_2)_2(COOH)_2$ per 100 cc. Solution.	Gms. Succinic Anhydride $(CH_2)_2COCOO$ per 100 Gms. H_2O.	Mol. per cent. H_2O.	Mol. per cent. $(CH_2)_2COCOO$.
0	2.80	2.78 (L.)	2.34	99.58	0.42
10	4.51	4.0	3.80	99.32	0.68
20	6.89	5.8	5.77	98.97	1.03
25	8.06	7.0	6.74	98.80	1.20
30	10.58	8.5	8.79	98.44	1.56
40	16.21	12.5	13.42	97.64	2.36
50	24.42	18.0	19.95	96.53	3.47
60	35.83	24.5	28.77	95.07	4.93
70	51.07	...	40.11	93.26	6.74
80	70.79	...	54.08	91.12	8.88
89.4	95.45	...	70.62	88.71	11.29
104.8	146.3	...	101.2	84.57	15.43
115.1	188.5	...	126.8	81.4	18.6
134.2	335.4	...	187.8	74.72	25.28
159.5	748.2	...	295.2	65.27	34.73
180.6	1839.0	...	408.5	57.6	42.4
182.8	∞	...	542.3	50.0	50.0
174.4	...	...	808.5	40.7	59.3
153.3	...	...	2239.0	19.86	80.14
128.0	...	...	8865.0	5.89	94.11
118.8–119	...	...	∞	0.00	100.00

Solubility of Succinic Acid in Alcohols and in Ether.

(Timofeiew — Compt. rend. 112, 1137, '91; at 15°, Bourgoin — Ann. chim. phys. [5] 13, 405, '78.)

Solvent.	Gms. $(CH_2)_2(COOH)_2$ per 100 Gms. Solvent at: −1°.	+15°.	+21.5°.
Abs. Methyl Alcohol	10.51	...	19.40
Abs. Ethyl "	5.06	12.59	9.49
90% " "	...	7.51	...
Abs. Propyl "	2.11	...	4.79
Abs. Ether	...	1.265	...

Distribution of Succinic Acid between Water and Amyl Alcohol at 20°.

(Herz and Fischer — Ber. 37, 4748, '04.)

Millimols $\frac{1}{2}C_4H_6O_4$ per 10 cc. Alcohol Layer.	Aq. Layer.	Gms. $C_4H_6O_4$ per 100 cc. Alcohol Layer.	Aq. Layer.	Millimols $\frac{1}{2}C_4H_6O_4$ per 10 cc. Alcohol Layer.	Aq. Layer.	Gms. $C_4H_6O_4$ per 100 cc. Alcohol Layer.	Aq. Layer.
0.1888	0.2684	0.1114	0.1584	3.899	6.0795	2.302	3.588
0.3643	0.5252	0.215	0.310	5.199	8.099	3.069	4.779
0.7077	1.0373	0.418	0.612	6.334	10.170	3.739	6.000
1.440	2.1266	0.850	1.255	7.119	11.555	4.202	6.821
2.715	4.0495	1.603	2.391				

Solubility of Succinic Acid in Aqueous Acetone at 20°.

(Herz and Knoch — Z. anorg. Chem. 41, 320, '04.)

cc. Acetone per 100 cc. Solution.	$C_4H_6O_4$ per 100 cc. Solution. Millimols.	Grams.	cc. Acetone per 100 cc. Solution.	$C_4H_6O_4$ per 100 cc. Solution. Millimols.	Grams.
0	107.8	6.363	60	275.7	16.27
10	127.4	7.519	70	278.5	16.44
20	155.8	9.194	80	265.3	15.66
30	186.7	11.02	90	201.9	11.91
40	225.4	13.30	100	51.5	3.04
50	254.3	15.01			

Solubility of Succinic Acid in Aqueous Glycerine Solutions at 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 268, '05.)

Wt. % Glycerine in Solvent.	$C_4H_6O_4$ per 100 cc. Solution. Millimols.	Grams.	Sp. Gr. of Solutions.	Wt. % Glycerine in Solvent.	$C_4H_6O_4$ per 100 cc. Solution. Millimols.	Grams.	Sp. Gr. of Solutions.
0	133.4	7.874	1.0213	40.95	105.8	6.244	1.1120
7.15	128.2	7.566	1.0407	48.70	99.9	5.896	1.1298
20.44	118.3	6.982	1.0644	69.20	88.5	5.223	1.1804
31.55	109.7	6.476	1.0897	100.00*	74.6	4.440	1.2530

* Sp. Gr. of Glycerine = 1.2555. Impurity about 1.5 per cent.

SUCCINIMID $C_2H_4<{CO \atop CO}>NH$.

Solubility in Water and in Ethyl Alcohol.

Interpolated from original results. (Speyers — Am. J. Sci. [4] 14, 294, '02.)

t°.	In Water. Wt. of 1 cc. Solution.	Mols. per 100 Mols. H_2O.	Gms. per 100 Gms. H_2O.	In Ethyl Alcohol. Wt. of 1 cc. Solution.	Mols. per 100 Mols. C_2H_5OH.	Gms. per 10 Gms. C_2H_5OH
0	1.025	1.58	8.69	0.815	0.88	1.89
10	1.035	2.4	14.0	0.809	1.35	2.7
20	1.052	4.0	23.0	0.806	2.00	4.1
25	1.067	5.9	33.0	0.805	2.5	5.3
30	1.086	8.0	45.0	0.804	3.1	6.8
40	1.120	12.8	70.0	0.809	4.9	10.5
50	1.145	17.8	96.0	0.816	7.8	16.0
60	1.167	22.6	124.0	0.835	12.3	26.5
70	1.189	27.5	152.0	0.873	...	...
80	1.204	32.8	...	0.954	...	...

SUCCINIC NITRIL (Ethylene Cyanide) $CNCH_2CH_2CN$.

The solubility of succinic nitril in water and also in aqueous sodium chloride solutions at various temperatures has been determined by Schreinemaker (Z. physik. Chem. **23**, 439, '97), and the results presented in terms of mols. of nitril per 100 mols. of nitril + H_2O. The following calculation of these results to gram quantities was made by Rothmund. (Landolt and Börnstein, 3d ed. p. 596, '06.)

t°.	Gms. $CNCH_2CH_2CN$ per 100 Gms. Aq. Layer.	Nitril Layer.	t°.	Gms. $CNCH_2CH_2CN$ per 100 Gms. Aq. Layer.	Nitril Layer.
18.5	10.2	92.0	53.5	33.2	66.4
20	11.0	91.5	55	40.3	62.8
39	...	85.2	55.4 (crit. temp.)	51.0	
45	22.0	...			

SUGAR $C_{12}H_{22}O_{11}$ (Cane Sugar.)

Solubility in Water.

(Herzfeld — Z. Ver. Zuckerind. 181, '92; see also Courtonne — Ann. chim. phys. [5] 12, 569, '77.)

t°.	Gms. $C_{12}H_{22}O_{11}$ per 100 Gms. Solution.	Gms. $C_{12}H_{22}O_{11}$ per 100 Gms. Water.	t°.	Gms. $C_{12}H_{22}O_{11}$ per 100 Gms. Solution.	Gms. $C_{12}H_{22}O_{11}$ per 100 Gms. Water.
0	64.18	179.2	40	70.42	238.1
5	64.87	184.7	45	71.32	248.7
10	65.58	190.5	50	72.25	260.4
15	66.33	197.0	60	74.18	287.3
20	67.09	203.9	70	76.22	320.4
25	67.89	211.4	80	78.36	362.1
30	68.70	219.5	90	80.61	415.7
35	69.55	228.4	100	82.97	487.2

Sp. Gr. of sat. solution at 15° = 1.329; at 25° = 1.340.

Solubility of Sugar in Aqueous Salt Solutions at 30°, 50°, and 70°.

Interpolated from original results.

(Schukow — Z. Ver. Zuckerind. 50, 313, '00.)

t°.	Gms. Salt per 100 Gms. H_2O.	Gms. $C_{12}H_{22}O_{11}$ per 100 grams H_2O in Aq. Solution of: KCl.	KBr.	KNO_3.	NaCl.	$CaCl_2$.
30	0	219.5	219.5	219.5	219.5	219.5
"	10	216	218	217	210	197
"	20	221	220	216	211	189
"	30	228	224	216	219	192
"	40	237	228	217	233	200
"	50	...	...	218	250	218
"	60	...	...	...	269	243
50	0	260.4	260.4	260.4	260.4	260.4
"	10	261	262	260	255	239
"	20	266	266	261	260	228
"	30	274	272	262	269	228
"	40	284	276	262	284	236
"	50	296	280	263	302	253
"	60	...	...	...	...	276
70	0	320.5	320.5	320.5	320.5	320.5
"	10	326	324	321	323	295
"	20	334	328	324	330	286
"	30	345	334	327	344	286
"	40	357	341	331	361	295
"	50	370	349	334	384	308
"	60	384	357	337	406	327

Solubility of Cane Sugar in Saturated Aqueous Salt Solutions at 31.25°.

(Köhler — Z. Ver. Zuckerind. 47, 447, '97.)

Salt.	Gms. Sugar per 100 Gms. Solution.	Gms. Sugar per 100 Gms. Water.	Salt.	Gms. Sugar per 100 Gms. Solution.	Gms. Sugar per 100 Gms. Water.
CH_3COOK	...	324.8	Na_2CO_3	64.73	229.2
C_3H_7COOK	49.19	306.1	KNO_3	61.36	224.7
$C_3H_4.OH.(COOK)_3$	50.30	303.9	K_2SO_4	66.74	219.0
K_2CO_3	56.0	265.4	CH_3COOCa	60.12	190.0
KCl	62.28	246.5	Na_2SO_4	52.20	183.7
CH_3COONa	59.93	237.6	$CaCl_2$	42.84	135.1
NaCl	62.17	236.3	$MgSO_4$	46.52	119.6

Solubility of Cane Sugar in Aqueous Alcohol Solutions.

(Scheibler — Ber. 5, 343, '72; correction Ber. 24, 434, '91.)

Per cent Alcohol by Vol.	Results at 0°. Sp. Gr. of Solution at 17.5°.	Results at 0°. Gms. Sugar per 100 cc. Solution.	Results at 14°. Sp. Gr. of Solution at 17.5°.	Results at 14°. Gms. per 100 cc. Solution. Sugar.	Gms. per 100 cc. Solution. C_2H_5OH.	Gms. per 100 cc. Solution. H_2O.	Results at 40°. Gms. Sugar per 100 cc. Solution.
0	1.325	85.8	1.326	87.5	0	45.10	...
10	1.299	80.7	1.300	81.5	3.91	44.82	95.4
20	1.236	74.2	1.266	74.5	8.52	43.83	90.0
30	1.229	65.5	1.233	67.9	13.74	41.87	82.2
40	1.182	56.7	1.185	58.0	20.24	40.38	74.9
50	1.129	45.9	1.131	47.1	28.13	38.02	63.4
60	1.050	32.9	1.058	33.9	37.64	34.47	49.9
70	0.972	18.2	0.975	18.8	46.28	29.57	31.4
80	0.893	6.4	0.895	6.6	61.15	21.95	13.3
90	0.837	0.7	0.838	0.9	71.18	12.83	2.3
97.4	0.806	0.08	0.808	0.36	77.39	3.28	0.5

Solubility of Cane Sugar in Aqueous Alcohol Solutions at 14°.

(Schrefeld — Z. Ver. Zuckerind. 44, '971 '94.)

Wt. per cent Alcohol.	Wt. per cent Sugar.	Gms. Sugar per 100 cc. Alcohol-H_2O Mixture.	Wt. per cent Alcohol.	Wt. per cent Sugar.	Gms. Sugar per 100 cc. Alcohol-H_2O Mixture.
0	66.2	195.8	50	38.55	62.7
5	64.25	179.7	60	26.70	36.4
10	62.20	164.5	70	12.25	13.9
20	58.55	141.2	80	4.05	4.2
30	54.05	117.8	90	0.95	0.9
40	47.75	91.3	100	0.00	0.0

100 gms. absolute methyl alcohol dissolve 1.18 gms. sugar at 19°.

(de Bruyn — Z. physik. Chem. 10, 784, '92.)

Solubility of Sugars in Pyridine at 26°.

(Holty — J. Physic. Chem. 9, 764, '04.)

Sugar.	Formula.	Gms. Sugar per 100 Gms. Solution.	Sp. Gr. of Solutions.
Cane Sugar	$C_{12}H_{22}O_{11}$	6.45	...
Milk Sugar	$C_{12}H_{22}O_{11}.H_2O$	2.18	0.9811
Grape Sugar	$C_6H_{12}O_6.H_2O$	7.62	1.0521

Solubility of Cane Sugar in Aqueous Acetone at 25°.

(Herz and Knoch — Z. anorg. Chem. 41, 322, '04.)

Sp. Gr. of Solutions.	cc. Acetone per 100 cc. Solvent.	Gms. Sugar per 100 cc. Solution.	Gms. per 100 cc. Solution.		
			H_2O.	$(CH_3)_2CO$.	$C_{12}H_{22}O_{11}$.
1.3306	0.0	89.8	43.3	0.0	89.8
1.2796	20.0	76.7	42.9	8.4	76.7
1.2491	30.0	72.1	39.5	13.4	72.1
1.2002	40.0	59.3	39.8	20.9	59.3
1.1613	45.0	52.5	39.0	24.6	52.5

Above 45 cc. acetone per 100 cc. solvent the solution begins to separate into two layers. The lower of these contains 51 gms. sugar per 100 cc. and has Sp. Gr. 1.1522. The upper layer contains so little sugar that the amount could not be determined by the method employed. 100 cc. evaporated in a vacuum desiccator left a residue of 3.68 gms. Above the concentration of 80 cc. acetone per 100 cc. solvent the two layers unite. In pure acetone 100 cc. solution give a residue of 0.18 gram sugar.

Solubility of Grape Sugar in Water and in Aq. Alcohol.

100 gms. H_2O dissolve 81.68 gms. $C_6H_{12}O_6$ or 97.85 gms. $C_6H_{12}O_6.H_2O$ at 15°.

100 gms. aq. alcohol of 0.837 Sp. Gr. = 85 wt. per cent dissolve 1.95 gms. $C_6H_{12}O_6$ at 17.5°.

100 gms. aq. alcohol of 0.880 Sp. Gr. = 66 wt. per cent dissolve 8.10 gms. $C_6H_{12}O_6$ at 17.5°.

100 gms. aq. alcohol of 0.910 Sp. Gr. = 53 wt. per cent dissolve 16.01 gms. $C_6H_{12}O_6$ at 17.5°.

100 gms. aq. alcohol of 0.915 Sp. Gr. = 51 wt. per cent dissolve 32.50 gms. $C_6H_{12}O_6$ at 17.5°.

Solubility of Milk Sugar in Water and in Absolute Methyl Alcohol.

100 gms. H_2O dissolve 17.03 gms. $C_{12}H_{22}O_{11}.H_2O$ at 10°, 20.8 gms. at 25° (U. S. P.), 40 gms. at 100°, and 100 gms. at b. pt.

100 gms. abs. methyl alcohol dissolve 0.084 gm. at 19.5°.

(de Bruyn — Z. physik. Chem. 10, 784, '92.)

SULPHANILIC ACID $NH_2.C_6H_4SO_3H$.

Solubility in Water.

(Dolinski — Ber. 38, 1836, '05.)

t°.	Gms. Acid per 100 Gms. Solution.	Gms. Acid per 100 Gms. Water.	t°.	Gms. Acid per 100 Gms. Solution.	Gms. Acid per 100 Gms. Water.
0	0.64	0.64	60	3.01	3.10
10	0.83	0.84	70	3.65	3.78
20	1.07	1.08	80	4.32	4.51
30	1.47	1.49	90	5.25	5.54
40	1.94	1.97	100	6.26	6.67
50	2.44	2.51			

SULPHUR S.

SOLUBILITY IN:

Tin Tetra Chloride.

(Gerardin — Ann. chim. phys. [4] 5, 134, '65.)

t°.	Gms. S per 100 Gms. $SnCl_4$.	Solid Phase.
99	5.8	Solid S
101	6.2	"
110	8.7–9.1	"
112	9.4–9.9	Liquid S
121	17.0	"

Amyl Alcohol.

(Gerardin.)

t°.	Gms. S per 100 Gms. $C_5H_{11}OH$.	Solid Phase.
95	1.5	Solid S
110	2.1–2.2	"
112	2.6–2.7	Liquid S
120	3.0	"
131	5.3	"

SOLUBILITY OF SULPHUR IN ETHYL AND METHYL ALCOHOLS.

t°.	Alcohol.	Gms. per 100 Gms. Alcohol.	Authority.
15	Abs. Ethyl	0.051	(Pohl.)
18.5	"	0.053	(de Bruyn — Z. physik. Chem. 10, 781, '92.)
b. pt.	"	0.42	(Payen — Compt. rend. 34, 356, '52.)
18.5	Abs. Methyl	0.028	(de Bruyn.)

SOLUBILITY OF SULPHUR IN AQUEOUS ACETONE AT 25°.

(Herz and Knoch — Z. anorg. Chem. 45, 263, '05.)

Wt. per cent Acetone in Solvent.	Sulphur per 100 cc. Solution.		Sp. Gr. of Solution.
	Millimols.	Grams.	
100	65.0	2.084	0.7854
95.36	45.0	1.442	0.7911
90.62	33.0	1.058	0.8165
85.38	25.3	0.811	0.8295

SOLUBILITY OF SULPHUR IN BENZENE AND IN ETHYLENE DI BROMIDE.

(Etard — Ann. chim. phys. [7] 2, 571, '94; see also Cossa — Ber. 1, 139, '68.)

In C_6H_6.

t°.	Gms. S per 100 Gms. Solution.	t°.	Gms. S per 100 Gms. Solution.
0	1.0	70	8.0
10	1.3	80	10.5
20	1.7	90	13.8
25	2.1	100	17.5
30	2.4	110	23.0
40	3.2	120	29.0
50	4.3	130	36.0
60	6.0		

In $C_2H_4Br_2$.

t°.	Gms. S per 100 Gms. Solution.	t°.	Gms. S per 100 Gms. Solution.
0	1.2	50	6.4
10	1.7	60	8.4
20	2.3	70	11.4
25	2.8	80	16.5
30	3.3	90	24.0
40	4.4	100	36.5

100 gms. sat. solution of S in benzoyl chloride, C_7H_7Cl, contain 1 gram S at 0° and 55.8 gms. at 134°.

(Bogousky — J. Soc. Phys. Chim. R. 37, 92, '05.)

Solubility of Sulphur in Carbon Bisulphide.

(Etard — Ann. chim. phys. [7] 2, 571, '94; Cossa — Ber. 1, 138, '65; at 10°, Retgers — Z. anorg. Chem 3, 347, '93; below — 77°, Arctowski — *Ibid.* 11, 274, '95–96.)

t°.	Gms. S per 100 Gms. Solution.	Gms. S per 100 Gms. CS₂	t°.	Gms. S per 100 Gms. Solution.	Gms. S per 100 Gms. CS₂.	t°.	Gms. S per 100 Gms. Solution.	Gms. S per 100 Gms. CS₂.
−110	3.0	3.1	−10	13.5	15.6	50	59.0	143.9
−100	3.5	3.6	0	18.0	22.0	60	66.0	194.1
− 80	4.0	4.2	10	23.0*	29.9	70	72.0	257.1
− 60	3.5	3.6	20	29.5	41.8	80	79.0	376.1
− 40	6.0	6.4	25	33.5	50.4	90	86.0	614.1
− 20	10.5	11.7	30	38.0	61.3	100	92.0	1150.0
			40	50.0	100.0			

* 26.4 R.

Sp. Gr. of solution saturated at 15° containing 26 gms. S per 100 gms. solution = 1.372.

Solubility of Sulphur in Hexane (C_6H_{14}).

(Etard.)

t°.	Gms. S per 100 Gms. Solution.	t°.	Gms. S per 100 Gms. Solution.	t°.	Gms. S per 100 Gms. Solution.
−20	0.07	60	1.0	130	5.2
0	0.16	80	1.7	140	6.0
20	0.25	100	2.8	160	7.2
40	0.55	120	4.4	180	8.2

Solubility of Sulphur in Several Solvents.

(Cossa — Ber. 1, 139, '68; Retgers; Cap and Garot — J. pharm. chim. [3] 26, 81 '54; Kleven — Chem. Centralb. 434, '72.)

Solvent.	t°.	Gms. S per 100 Gms. Solvent.	Solvent.	t°.	Gms. S per 100 Gms. Solvent.
$C_6H_5NH_2$	130	85.3	$C_6H_5CH_3$	230	1.48
$CHCl_3$	22	1.21	CH_2I_2	10	10.0 (R.)
$(C_2H_5)_2O$	23.5	0.97	$C_{10}H_4N_2$*	100	10.58
C_6H_5OH	174	16.35	$C_5H_3(OH)_3$	ord. t.	0.05–0.1 (C. and G.)

* Nicotine.

Solubility of Sulphur in Coal Tar Oil, Linseed Oil and in Olive Oil.

(Pelouze — Compt. rend. 68, 1179, '69; 69, 56, '69; Pohl.)

t°.	Grams S per 100 Grams Coal Tar Oil of: Sp. Gr.: 0.87, b. pt.: 80°-100°.	0.88, 85°-120°.	0.882, 120°-220°.	0.885, 150°-200°.	1.01, 210°-300°.	1.02, 220°-300°.	G. S per 100 Gms. Linseed Oil.	Olive Oil of 0.885 Sp. Gr.
15	2.1	2.3	2.5	2.6	6.0	7.0	0.4	2.3
30	3.0	4.0	5.3	5.8	8.5	8.5	0.6	4.3
50	5.2	6.1	8.3	8.7	10.0	12.0	1.2	9.0
80	11.8	13.7	15.2	21.0	37.0	41.0	2.2	18.0
100	15.2	18.7	23.0	26.4	52.5	54.0	3.0	25.0
110	...	23.0	26.2	31.0	105.0	115.0	3.5	30.0
120	...	27.0	32.0	38.0	∞	∞	4.2	37.0
130	...	...	38.7	43.8	∞	∞	5.6	43.0
(160°)							10.0	

100 gms. oil of turpentine dissolve 1.35 gms. S at 16°, and 16.2 gms. at b. pt.

(Payen — Compt. rend. 34, 356, '52.)

SULPHUR DIOXIDE SO_2.

Solubility in Water.

(Schönfeld — Liebig's Ann. 95, 5, '55; Sims — *Ibid.* 118, 340, '61; Roozeboom — Rec. trav. chim. 3, 46, '84.)

	Schönfeld.				Sims.			Roozeboom.
t°.	Vols. SO_2 (at 0° and 760 mm.) per 1 Vol. Sat. SO_2 + Aq.	Vols. SO_2 (at 0° and 760 mm.) per 1 Vol. H_2O.	Gms. SO_2 per 100 Gms. H_2O at total pressure 760 mm.	t°.	SO_2 per 1 Gm. H_2O. Gms.	SO_2 per 1 Gm. H_2O. Vols.	t°.	SO_2 Dissolved per 1 pt. H_2O at 760 mm. pressure.
0	68.86	79.79	22.83	8	0.168	58.7	0	0.236
5	59.82	67.48	19.31	10	0.154	53.9	2	0.218
10	51.38	56.65	16.21	14	0.130	45.6	4	0.201
15	43.56	47.28	13.54	20	0.104	36.4	6	0.184
20	36.21	39.37	11.29	26	0.087	30.5	7	0.176
25	30.77	32.79	9.41	30	0.078	27.3	8	0.168
30	25.82	27.16	7.81	36	0.065	22.8	10	0.154
35	21.23	22.49	...	40	0.058	20.4		
40	17.01	18.77	5.41	46	0.050	17.4	12	0.142
				50	0.045	15.6		

Sp. Gr. of sat. solution at 0° = 1.061; at 10°, 1.055; at 20° = 1.024.

1 gm. H_2O dissolves 0.0909 gm. SO_2 = 34.73 cc. (measured at 25°) at 25° and 748 mm. pressure.

(Walden and Centnerszwer — Z. physik. Chem. 42, 462, '01–'02.

Solubility of Sulphur Dioxide in Sulphuric Acid of 1.84 Sp. Gr.

Interpolated from original results.

(Dunn — Chem. News, 45, 272, '82.)

t°.	Sp. Gr. of Sat. Solution.	Coefficient of Absorption (760 mm.).	t°.	Sp. Gr. of Sat. Solution.	Coefficient of Absorption (760 mm.)
0	...	53.0	50	1.8186	9.5
10	1.8232	35.0	60	1.8165	7.0
20	1.8225	25.0	70	1.8140	5.5
25	1.8221	21.0	80	1.8112	4.5
30	1.8216	18.0	90	1.8080	4.0
40	1.8205	13.0			

Solubility of Sulphur Dioxide in Aqueous Sulphuric Acid Solutions.

(Dunn; see also Kolb — Bull. soc. ind. Mulhouse — 222, '72.)

t°.	Sp. Gr. of H_2SO_4 Solution.	Approximate Per cent H_2SO_4.	Coefficient of Absorption.	t°.	Sp. Gr. of H_2SO_4 Solution.	Approximate per cent H_2SO_4.	Coefficient of Absorption
6.9	1.139	20	48.67	15.2	1.173	25	31.82
6.9	1.300	40	45.38	16.8	1.151	21	31.56
8.6	1.482	58	39.91	14.8	1.277	36	30.41
9.8	1.703	78	29.03	15.1	1.458	56	29.87
5.5	1.067	10	36.78	15.6	1.609	70	25.17
6.0	1.102	15	3.408	15.0	1.739	81	20.83

For Coefficient of Absorption, see Ethane page 133.

Solubility of Sulphur Dioxide in Aqueous Salt Solutions.

(Fox — Z. physik. Chem. 41, 461, '02.)

Pesults in terms of the Ostwald Solubility Expression. See page 105.

Aqueous Salt Solution.	Solubility Coefficient l of SO_2 in aq. Solutions of Concentrations: 0.5 Normal	1.0 N.	1.5 N.	2.0 N.	2.5 N.	3.0 N.
NH_4Cl	$l_{25}=34.58$	36.37	38.06	39.76	41.37	42.78
NH_4Br	$l_{25}=36.25$	39.46	42.78	46.06	49.17	52.25
NH_4CNS	$l_{25}=37.78$	42.74	47.26	52.26	57.01	61.46
NH_4NO_3	$l_{25}=33.96$	35.07	36.28	37.27	38.01	39.14
NH_4NO_3	$l_{35}=23.35$	24.23	24.78	25.57	26.66	27.43
$(NH_4)_2SO_4$	$l_{25}=33.35$	33.82	34.33	34.95	35.47	35.96
$(NH_4)_2SO_4$	$l_{35}=22.91$	23.14	23.49	23.93	24.23	24.60
$CdCl_2$	$l_{25}=31.66$	30.55	29.46	28.16	27.09	26.06
$CdCl_2$	$l_{35}=21.73$	21.23	20.55	20.02	19.23	18.68
$CdBr_2$	$l_{25}=31.91$	31.01	30.17	29.27	28.15	27.46
$CdBr_2$	$l_{35}=21.88$	21.46	20.81	20.60	19.70	19.17
CdI_2	$l_{25}=33.27$	33.76	34.16	34.74	34.98	35.77
CdI_2	$l_{35}=22.75$	23.06	23.36	23.71	23.99	24.30
$CdSO_4$	$l_{25}=31.11$	29.71	28.24	26.58	25.14	23.76
$CdSO_4$	$l_{35}=21.45$	20.43	19.42	18.31	17.41	16.25
KCl	$l_{25}=34.42$	36.05	37.76	39.32	40.96	42.27
KCl	$l_{35}=23.74$	25.15	26.54	27.94	28.93	30.02
KBr	$l_{25}=35.94$	39.11	42.41	44.96	48.87	52.26
KBr	$l_{35}=24.83$	27.49	29.64	31.93	34.12	36.14
$KCNS$	$l_{25}=37.57$	42.38	47.02	51.81	55.87	61.26
$KCNS$	$l_{35}=25.63$	28.79	32.03	35.05	38.13	42.94
KI	$l_{25}=38.66$	44.76	50.58	56.75	62.63	68.36
KI	$l_{35}=26.30$	30.25	34.64	38.04	41.87	45.43
KNO_3	$l_{25}=33.80$	34.79	35.77	36.66	37.57	38.52
KNO_3	$l_{35}=23.27$	24.03	24.79	25.72	26.54	27.33
K_2SO_4	$l_{25}=33.20$	33.61	...	...	...	...
$NaBr$	$l_{25}=33.76$	34.54	35.27	36.26	36.84	37.74
$NaCl$	$l_{25}=32.46$	32.25	31.96	31.76	31.51	31.36
$NaCNS$	$l_{25}=35.44$	38.24	40.78	43.37	45.86	48.34
Na_2SO_4	$l_{25}=31.96$	31.14	30.45	29.51	28.66	28.44
Na_2SO_4	$l_{35}=21.88$	21.35	20.81	20.21	19.75	19.27

Solubility of Sulphur Dioxide in Alcohols and in Other Solvents.

(de Bruyn — Rec. trav. chim. 11, 128, '92; Schulze — J. pr. Chem. [2] 24, 168, '81.)

t°.	In Ethyl Alcohol at 760 mm. Gms. SO_2 per 100 Gms. Solution.	C_2H_5OH.		In Methyl Alcohol at 760 mm. Gms. SO_2 per 100 Gms. Solution.	CH_3OH.
0	53.5	115.0		71.1	246.0
7	45.0	81.0		59.9	149.4
12.3	39.9	66.4		52.2	109.2
18.2	32.8	48.8	(17.8°)	44.0	78.6
26.0	24.4	32.3		31.7	46.4

In Several Solvents at 0° and 725 mm. (S.)

Solvent.	SO_2 per 1 Gm. Solvent. Grams.	Vols.
Camphor	0.880	308
CH_3COOH	0.961	318
$HCOOH$	0.821	351
$(CH_3)_2CO$	2.07	589
SO_2Cl_2	0.323	189

DISTRIBUTION OF SULPHUR DIOXIDE AT 20° BETWEEN:

(McCrae and Wilson — Z. anorg. Chem. 35, 11, '03.)

Water and Chloroform.

Gms. SO_2 per Liter in: Aq. Layer.	Gms. SO_2 per Liter in: $CHCl_3$ Layer.	Gm. Equiv. $\frac{1}{2}SO_2$ per Liter in: Aq. Layer.	Gm. Equiv. $\frac{1}{2}SO_2$ per Liter in: $CHCl_3$ Layer.
1.738	1.123	0.0543	0.0351
1.753	1.122	0.0547	0.0350
2.346	1.703	0.0732	0.0532
2.628	1.897	0.0821	0.0592
3.058	2.385	0.0955	0.0745
3.735	3.062	0.1166	0.0956
4.226	3.626	0.1319	0.1132
5.269	4.798	0.1645	0.1498
6.588	6.183	0.2057	0.1930
31.92	33.84	0.9968	1.056
33.26	37.25	1.038	1.163

Aq. HCl and Chloroform.

Conc. of HCl.	Gms. SO_2 per Liter in: Aq. Layer.	Gms. SO_2 per Liter in: $CHCl_3$ Layer.	Gm. Equiv. $\frac{1}{2}SO_2$ per Liter in: Aq. Layer.	Gm. Equiv. $\frac{1}{2}SO_2$ per Liter in: $CHCl_3$ Layer.
0.05	1.86	1.46	0.0581	0.0456
"	3.07	2.83	0.0960	0.0884
"	4.28	4.07	0.1336	0.1271
"	5.34	5.42	0.1667	0.1692
0.10	1.25	1.41	0.039	0.044
"	2.78	3.08	0.0868	0.0962
"	3.86	4.08	0.1199	0.1275
"	5.161	5.72	0.1612	0.1784
0.2	1.268	1.51	0.0396	0.0471
"	1.914	2.27	0.0597	0.0710
"	2.464	3.04	0.0769	0.0949
"	3.967	4.90	0.1239	0.1530
0.4	1.202	1.61	0.038	0.0504
"	1.894	2.26	0.059	0.0706

TANNIC ACID $C_{13}H_9O_7COOH$.

100 gms. H_2O dissolve about 294 gms. at 25°; 100 gms. alcohol dissolve about 439 gms. at 25°. (U. S. P.)

TARTARIC ACID $C_2H_2(OH)_2(COOH)_2$.

SOLUBILITY IN WATER.

(Leidie — Compt. rend. 95, 87, '82.)

t°.	Grams Tartaric Acid per 100 Gms. H_2O: Dextro and Laevo Acids.	Racemic Ac. Anhydrous.	Racemic Ac. Hydrated.	t°.	Gms. Tartaric Acid per 100 Gms. H_2O: Dextro and Laevo Acids.	Racemic Ac. Anhydrous.	Racemic Ac. Hydrated
0	115.04	8.16	9.23	50	195.0	50.0	59.54
10	125.72	12.32	14.00	60	217.55	64.52	78.33
20	139.44	18.0	20.60	70	243.66	80.56	99.88
25	147.44	21.4	24.61	80	273.33	98.12	124.56
30	156.2	25.2	29.10	90	306.56	117.20	152.74
40	176.0	37.0	43.32	100	343.35	137.80	184.91

SOLUBILITY OF TARTARIC ACID IN ALCOHOL AND IN ETHER AT 15°.

(Bourgoin — Ann. chim. phys. [5] 13, 405, '78.)

Solvent.	Gms. Tartaric Acid per 100 Gms. Sat. Solution.	Gms. Tartaric Acid per 100 Gms. Solvent.
Absolute Alcohol	20.385	41.135
90% Alcohol	29.146	25.604
Absolute Ether	0.389	0.40

TELLURIUM Te.

100 gms. methylene iodide CH_2I_2 dissolve 0.1 gm. Te at 12°.

(Retgers — Z. anorg. Chem. 3, 349, '93.)

TELLURIC ACID $H_2TeO_4.2H_2O$.

SOLUBILITY IN WATER.

(Mylius — Ber. 34, 2208, '01.)

t°.	Gms. H_2TeO_4 per 100 Gms. Sol.	Mols. H_2TeO_4 per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. H_2TeO_4 per 100 Gms. Sol.	Mols. H_2TeO_4 per 100 Mols. H_2O.	Solid Phase.
0	13.92	1.51	$H_2TeO_4.6H_2O$	30	33.36	4.67	$H_2TeO_4.2H_2O$
5	17.84	2.03	"	40	36.38	5.33	"
10	26.21	3.31	"	60	43.67	7.04	"
15	32.79	4.41	"	80	51.55	9.93	"
10	25.29	3.15	$H_2TeO_4.2H_2O$	100	60.84	14.52	"
18	28.90	3.82	"	110	67.0	19.0	"

TELLURIUM DOUBLE SALTS

SOLUBILITY OF TELLURIUM DOUBLE BROMIDES AND CHLORIDES IN AQUEOUS HYDROCHLORIC AND HYDROBROMIC ACIDS AT 22°.

(Wheeler — Z. anorg. Chem. 3, 432, '93.)

Tellurium Double Salt.	Formula.	Solvent.	Gms. Double Salt per 100 Gms. Solvent of 1.49 Sp. Gr.	Gms. Double Salt per 100 Gms. Solvent of 1.08 Sp. Gr.
Te Caesium Bromide	$TeBr_4.2CsBr$	Aq. HBr	0.02	0.13
Te Potassium Bromide	$TeBr_4.2KBr$	"	6.57	62.90
Te Rubidium Bromide	$TeBr_4.2RbBr$	"	0.25	3.88
Te Caesium Chloride	$TeCl_4.2CsCl$	Aq. HCl*	0.05	0.78
Te Rubidium Chloride	$TeCl_4.2RbCl$	"	0.34	13.09

* Sp. Gr. of Aq. HCl solutions 1.2 and 1.05 respectively.

THALLIUM ALUMS

SOLUBILITY IN WATER AT 25°

(Locke — Am. Ch. J. 26, 174, '01.)

Alum.	Formula.	Salt per 100 Grams H_2O. Gms. Anhydrous.	Gms. Hydrated.	Gm. Mols.
Tl Aluminum Alum	$TlAl(SO_4)_2.12H_2O$	7.5	11.78	0.0177
Tl Vanadium Alum	$TlV(SO_4)_2.12H_2O$	25.6	43.31	0.0573
Tl Chromium Alum	$TlCr(SO_4)_2.12H_2O$	10.48	16.38	0.0212
Tl Iron Alum	$TlFe(SO_4)_2.12H_2O$	36.15	64.6	0.0799

THALLIUM BROMATE $TlBrO_3$

One liter saturated aqueous solution contains 3.463 gms. $TlBrO_3$ at 19.96° (B.), and 7.355 gms. at 39.75° (N. and A.).

(Böttger — Z. physik. Chem. 46, 602, '03; Noyes and Abbott — *Ibid.* 16, 132, '95.)

THALLIUM BROMIDE TlBr

One liter saturated aqueous solution contains 0.42 gm. TlBr at 18°, 0.476 gm. at 20°, 0.57 gm. at 25°, and 2.467 gms. at 68.5°.

(Kohlrausch — Z. physik. Chem. 50, 356, '04; Noyes — *Ibid.* 6, 248, '90; Böttger.)

SOLUBILITY OF TlBr IN AQ. SOLUTIONS OF $TlNO_3$ AT 68.5°. (Noyes.)

Gram Molecules per Liter.		Grams per Liter.	
0.0163 $TlNO_3$	0.00410 TlBr	4.336 $TlNO_3$	1.164 TlBr
0.0294 "	0.00289 "	7.820 "	0.821 "
0.0955 "	0.00148 "	25.400 "	0.420 "

THALLIUM CARBONATE AND THALLIUM (Per) CHLORATE.

THALLIUM CHLORATE $TlClO_3$.

(See p. 338.)

SOLUBILITY IN WATER.

(Muir — J. Chem. Soc. 29, 857, '76.)

t°	0°	20°	50°	80°	100°
Gms. $TlClO_3$ per 100 gms. H_2O	2.80	3.92	12.67	36.65	57.31

SOLUBILITY OF MIXED CRYSTALS OF THALLIUM CHLORATE AND POTASSIUM CHLORATE IN WATER AT 10°.

(Roozeboom — Z. physik. Chem. 8, 532, '91.)

NOTE. — Solutions of the two salts were mixed in different proportions and allowed to crystallize, such amounts being taken that not more than one or two grams would separate from one liter.

Grams per 1000 cc. Solution.		Mg. Mols. per 1000 cc. Solution.		Sp. Gr. of Solutions.	Mol. per cent $KClO_3$ in Mixed Crystals.
$TlClO_3$.	$KClO_3$.	$TlClO_3$.	$KClO_3$.		
25.637	...	89.14	...	1.0210	0
19.637	6.884	68.27	56.15	1.0222	2.0
12.001	26.100	41.73	212.89	1.0278	12.61
9.036	40.064	31.42	326.79	1.0338	25.01
7.885	46.497	27.42	379.26	1.0359	36.30–97.93
7.935	46.535	27.60	379.57	1.0360	
6.706	46.410	23.32	378.55	1.0357	99.28
6.729	47.109	23.37	384.25	1.0363	99.60
4.858	47.312	16.89	385.91	1.0345	99.62
2.769	47.134	9.63	384.46	1.0330	99.67
...	49.925	...	407.22	1.0330	100.00

SOLUBILITY OF MIXED CRYSTALS OF THALLIUM CHLORATE AND POTASSIUM CHLORATE IN WATER AT DIFFERENT TEMPERATURES.

(Quoted by Rabe — Z. anorg. Chem. 31, 156, '02.)

100 gms. H_2O dissolve 2.8 gms. $TlClO_3$ + 3.3 gms. $KClO_3$ at 0°.
100 gms. H_2O dissolve 10.0 gms. $TlClO_3$ + 1.5 gms. $KClO_3$ at 15°.
100 gms. H_2O dissolve 12.67 gms. $TlClO_3$ + 16.2 gms. $KClO_3$ at 50°.
100 gms. H_2O dissolve 57.3 gms. $TlClO_3$ + 48.2 gms. $KClO_3$ at 100°.

THALLIUM CHLORIDE TlCl.

SOLUBILITY IN WATER.

(Average curve from results of Noyes — Z. physik. Chem. 9, 609, '92; Böttger — *Ibid.* 46, 602, '03; Kohlrausch — *Ibid.* 50, 350, '04; Hebberling; Crookes; Lamy — The results of Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 208, '04 are also given.)

t°.	Gms. TlCl per Liter.		t°.	Gms. TlCl per Liter.		t°.	Gms. TlCl per Liter.	
0	2.1 (av.)	1.7 (B.)	25	3.86	4.0	60	8.0	10.2
10	2.5	2.4	30	4.2	4.6	80	12.0	16.0
20	3.3	3.4	40	5.2	6.0	100	18.0	24.1 (99.3°)
			50	6.3	8.0			

THALLIUM CHLORIDE TlCl.

SOLUBILITY IN WATER AND IN AQ. SALT SOLUTIONS AT 25°.

(Noyes; Noyes and Abbott; Geffcken — Z. physik. Chem. 49, 296, '04.)

Aq. Salt Solution.	G. Mols. per Liter.		Grams per Liter.	
	Salt.	TlCl.	Salt.	TlCl.
Ammonium Nitrate NH_4NO_3	0.0	0.01612	0.0	3.861 (G.)
"	0.5	0.02587	40.02	6.209
"	1.0	0.03121	80.05	7.473
"	2.0	0.03966	160.10	9.497
Barium Chloride $BaCl_2$	0.0283	0.00857	5.895	2.052 (N.)
"	0.1468	0.00323	30.59	0.773
Cadmium Sulphate $CdSO_4$	0.030	0.0206	6.255	4.933 (N.)
"	0.0787	0.0254	16.41	6.081
"	0.1574	0.0309	32.82	7.399
Hydrochloric Acid HCl	0.0283	0.00836	1.032	2.002 (N.)
"	0.0560	0.00565	2.043	1.353
"	0.1468	0.00316	5.357	0.757
Lithium Nitrate $LiNO_3$	0.5	0.02542	34.53	6.085 (G.)
"	1.0	0.03035	69.07	7.266
"	2.0	0.03785	138.14	9.063
"	3.0	0.04438	207.21	10.630
Potassium Chlorate $KClO_3$	0.5	0.0237	61.28	5.674 (G.)
Potassium Nitrate KNO_3	0.015	0.0170	1.517	4.070 (N.)
"	0.030	0.0179	3.033	4.286
"	0.0787	0.0192	7.775	4.597
"	0.1574	0.0212	15.920	5.076
"	0.5	0.0257	50.55	6.153 (G.)
"	1.0	0.0308	101.11	7.375
"	2.0	0.0390	202.22	9.340
Sodium Acetate CH_3COONa	0.015	0.0168	1.231	4.023 (N.)
"	0.030	0.0172	2.462	4.118
"	0.0787	0.0185	6.46	4.430
"	0.1574	0.0196	12.92	4.693
Sodium Nitrate $NaNO_3$	0.5	0.02564	42.50	6.139 (G.)
"	1.0	0.03054	85.01	7.313
"	2.0	0.03851	170.02	9.221
"	3.0	0.04544	255.03	10.88
"	4.0	0.05128	340.12	12.28
Sodium Chlorate $NaClO_3$	0.5	0.02320	53.25	5.555 (G.)
"	1.0	0.02687	106.5	6.433
"	2.0	0.03060	213.0	7.326
"	3.0	0.03303	319.5	7.909
"	4.0	0.03850	426.0	9.215
Thallium Bromate $TlBrO_3$ (at 39.75°)	0.01567	0.01959	5.201	4.690 (N.andA.)
Thallium Nitrate $TlNO_3$	0.0283	0.0083	7.518	1.987 (N.)
"	0.0560	0.00571	14.89	1.368
"	0.1468	0.00332	39.05	0.795
Thallium Sulphate Tl_2SO_4	0.0283	0.00886	14.27	2.121 (N.)
"	0.0560	0.00624	28.23	1.494
Thallium Sulphocyanide TlSCN	Sat.	0.0119	Sat.	2.849 (N.)
" (at 39.75°)	0.02149	0.01807	5.504	4.326 (N.andA.)

SOLUBILITY OF THALLIUM CHLORIDE IN AQUEOUS SOLUTIONS OF SALTS AT 25°.

(Noyes — Z. physik. Chem. 9, 609, '92.)

Aq. Salt Solution.	Gram. Equiv. per Liter. Salt.		Gram. Equiv. per Liter. TlCl.	Grams per Liter. Salt.		Grams per Liter. TlCl.	Grams per Liter. Salt.		Grams per Liter. TlCl.
NH_4Cl	0.0	NH_4Cl or HCl	0.01612	0.00	NH_4Cl	3.861	0.00	HCl	3.861
and also	0.025	"	0.00873	1.338	"	2.101	0.886	"	2.0
HCl	0.05	"	0.00589	2.676	"	1.421	1.772	"	1.402
	0.10	"	0.00384	..		...	3.545	"	0.920
	0.20	"	0.00262	10.704	"	0.649	7.090	"	0.608
$CuCl_2$	0.025	$CuCl_2$ or $CaCl_2$	0.00902	3.36	$CuCl_2$	2.161	3.77	$CaCl_2$	2.161
and also	0.05	"	0.00619	6.72	"	1.483	7.55	"	1.483
$CaCl_2$	0.10	"	0.00419	13.45	"	1.003	15.11	"	1.003
	0.20	"	0.00287	26.90	"	0.688	30.22	"	0.687
$MgCl_2$	0.025	$MgCl_2$ or $MnCl_2$	0.00901	2.381	$MgCl_2$	2.158	3.147	$MnCl_2$	2.158
and also	0.05	"	0.00618	4.763	"	1.480	6.295	"	1.480
$MnCl_2$	0.10	"	0.00412	9.526	"	0.987	12.59	"	0.987
	0.20	"	0.00278	19.052	"	0.666	25.18	"	0.666
KCl	0.025	KCl or NaCl	0.00871	1.86	KCl	2.086	1.46	NaCl	2.086
and also	0.05	"	0.00592	3.73	"	1.418	2.925	"	1.418
NaCl	0.10	"	0.00397	7.46	"	0.951	5.85	"	0.951
	0.20	"	0.00268	14.92	"	0.642	11.70	"	0.642
$TlClO_3$	0.025	$TlClO_3$ or $TlNO_3$	0.00889	5.276	$TlClO_3$	2.129	4.74	$TlNO_3$	2.129
and also	0.05	"	0.00626	...		...	9.48	"	1.500
$TlNO_3$	0.10	"	0.00423	...		...	18.96	"	1.014
$ZnCl_2$	0.025	$ZnCl_2$	0.00899	3.41	$ZnCl_2$	2.153			
	0.05	"	0.00627	6.81	"	1.502			
	0.10	"	0.00412	13.63	"	0.987			
	0.20	"	0.00281	27.26	"	0.673			
$CdCl_2$	0.025	$CdCl_2$	0.0104	4.53	$CdCl_2$	2.491			
	0.05	"	0.0078	9.16	"	1.868			
	0.10	"	0.00578	18.33	"	1.385			
	0.20	"	0.00427	36.66	"	1.029			

One liter of water dissolves 2.7 gms. *thallo thallic chloride* $3TlCl.TlCl_3$ at 15°–17°, and 35.0 grams at 100°.

(Crookes; Lamy; Hebberling.)

THALLOUS CHROMATE Tl_2CrO_4.

100 gms. H_2O dissolve 0.03 gm. Tl_2CrO_4 at 60°, and 0.2 gm. at 100°.

(Browning and Hutchins — Z. anorg. Chem. 22, 380, '00.)

One liter of aq. 31 per cent KOH solution dissolves 18 grams Tl_2CrO_4.

(Lepierre and Lachand — Compt. rend. 113, 196, '91.)

One liter of H_2O dissolves 0.35 gram Thallous Tri Chromate $Tl_2Cr_3O_{10}$ at 15°, and 2.27 grams at 100°.

(Crookes.)

THALLOUS CYANIDE TlCN and Double Cyanides.

SOLUBILITY IN WATER.
(Fronmüller — Ber. 11, 92, '78.)

Cyanide.	Formula.	Gms. Salt per 100 Gms. H_2O.
Tl Cyanide	$TlCN$	at 28.5°, 16.8
Tl Cobalti Cyanide	$Tl_3Co(CN)_6$	at 0°, 3.6; at 9.5°, 5.86; at 19.5°, 10.04
Tl Zinc Cyanide	$2TlCN.Zn(CN)_2$	at 0°, 8.7; at 14°, 15.2; at 31°, 29.6
Tl Ferro Cyanide	$Tl_4Fe(CN)_6.2H_2O$	at 18°, 0.37 at 101°, 3.93.

(Lamy.)

THALLOUS FLUORIDE TlF.

100 gms. H_2O dissolve 80 gms. TlF at 15°.
(Buchner — Sitzb. K. Akad. Wiss. (Wein) 52, 2, 644, '65.)

THALLIUM IODATE $TlIO_3$.

One liter aq. solution contains 0.578 gram $TlIO_3$ at 20°.
(Böttger — Z. physik. Chem. 46, 602, '03.)

THALLIUM IODIDE TlI.

SOLUBILITY IN WATER.
(Average results from Böttger; Kohlrausch; Werther; Crookes; Lamy; Hebberling.)

t °.	0°.	20°.	40°.	60°.	80°.	100°.
Gms. TlI per liter	0.02	0.06	0.15	0.35	0.70	1.20

One liter of 2½ per cent aq. ammonia dissolves 0.761 gm. TlCl.
One liter of 6½ per cent aq. ammonia dissolves 0.758 gm. TlCl.
One liter of 90 per cent alcohol dissolves 0.0038 gm. TlCl.
One liter of 50 per cent alcohol dissolves 0.027 gm. TlCl.
(Long — J. Anal. Ch. 2, 243, '88.)

THALLIUM NITRATE $TlNO_3$.

SOLUBILITY IN WATER.
(Berkeley — Trans. Roy. Soc. (Lond.) 203 A, 213, '04; see also Etard — Ann. chim. phys. [7] 2, 527, '94; Crookes; Lamy.)

t°.	Gms. $TlNO_3$ per 100 Gms. Solution.	Gms. $TlNO_3$ per 100 Gms. Water.	t°.	Gms. $TlNO_3$ per 100 Gms. Solution.	Gms. $TlNO_3$ per 100 Gms. Water.
0	3.76	3.91	60	31.55	46.2
10	5.86	6.22	70	41.01	69.5
20	8.72	9.55	80	52.6	111.0
30	12.51	14.3	90	66.66	200.0
40	17.33	20.9	100	80.54	414.0
50	23.33	30.4	105	85.59	594.0

Solid phase. $TlNO_3$ rhombic.
100 gms. H_2O dissolve 43.5 gms. $TlNO_3$ + 104.2 gms. KNO_3 at 58°.
(Rabe — Z. anorg. Chem. 31, 156, '02.)

THALLIUM OXALATE $Tl_2C_2O_4$.

One liter of saturated aqueous solution contains 15.77 grams $Tl_2C_2O_4$ at 20°, and 18.69 gms. at 25°.
(Böttger — Z. physik. Chem. 46, 602, '03; Abegg and Spencer — Z. anorg. Chem. 46, 406, '05.)

SOLUBILITY OF THALLIUM OXALATE AT 25° IN AQ. SOLUTIONS OF:

Thallium Nitrate. (Abegg and Spencer.) — Potassium Oxalate. (A. and S.)

Thallium Nitrate: Mol. Concentration $TlNO_3$.	$Tl_2C_2O_4$.	Grams per Liter $TlNO_3$.	$Tl_2C_2O_4$.	Potassium Oxalate: Mol. Concentration $K_2C_2O_4$.	$Tl_2C_2O_4$.	Grams per Liter $K_2C_2O_4$.	$Tl_2C_2O_4$.
0.0	0.03768	0.00	18.69	0.0498	0.0351	8.281	17.42
0.04114	0.0264	10.95	13.10	0.0996	0.03565	16.57	17.69
0.0799	0.0195	21.26	9.68	0.2467	0.0390	41.02	19.36
0.1597	0.01235	42.51	6.128	0.4886	0.04506	81.25	22.37
				0.9785	0.05536	162.6	27.48

THALLOUS PHOSPHATE (ortho) Tl_3PO_4.

One liter of sat. aqueous solution contains 4.97 gms. Tl_3PO_4 at 15° and 6.71 gms. at 100°. (Crookes.)

THALLIUM PICRATE $TlOC_6H_2(NO_2)_3$.

SOLUBILITY IN WATER.
(Rabe — Z. physic. Chem. 38, 179, '01.)

t°.	Gms. $TlOC_6H_2(NO_2)_3$ per 100 Gms. H_2O.	Solid Phase.	t°.	Gms. $TlOC_6H_2(NO_2)_3$ per 100 Gms. HO_2.	Solid Phase.
0	0.135	Monoclinic Red	45	1.04	Triclinic Yellow
18	0.36	"	47	1.10	"
30	0.575	"	50	1.205	"
40	0.825	"	60	1.73	"
45	1.01	"	70	2.43	"
47	1.14	"			"

100 gms. H_2O dissolve 0.132 gm. $C_6H_2(NO_2)_3OTl$ + 0.36 gram $C_6H_4(NO_2)_3OK$ at 0°.

100 gms. H_2O dissolve 0.352 gm. $C_6H_2(NO_2)_3OTl$ + 0.44 gram $C_6H_4(NO_2)_3OK$ at 15°.

100 gms. H_2O dissolve 0.38 gm. $C_6H_2(NO_2)_3OTl$ + 0.23 gram $C_6H_4(NO_2)_3OK$ at 20°. (Rabe.)

SOLUBILITY OF THALLIUM PICRATE IN METHYL ALCOHOL.
(Rabe.)

t°.	Gms. $TlOC_6H_2(NO_2)_3$ per 100 Gms. CH_3OH.	Solid Phase.	t°.	Gms. $TlOC_6H_2(NO_2)_3$ per 100 Gms. CH_3OH.	Solid Phase.
0	0.39	Red Form (monoclinic).	45	1.195	Yellow Form (triclinic).
18	0.59	"	48	1.265	"
25	0.70	"	50	1.325	"
30	0.795	"	53	1.41	"
35	0.90	"	57	1.54	"
40	1.02	"	60	1.65	"
45	1.17	"	65	1.84	"
47	1.265	"			

THALLIUM SULPHATE Tl_2SO_4.

SOLUBILITY IN WATER.

(Berkeley — Trans. Roy. Soc. (Lond.) 203 A 211, '04; see also Crookes; Lamy.)

t°.	Gms. Tl_2SO_4 per 100 Gms.		t°.	Gms. Tl_2SO_4 per 100 Gms.	
	Solution.	Water.		Solution.	Water.
0	2.63	2.70	60	9.89	10.92
10	3.57	3.70	70	11.31	12.74
20	4.64	4.87	80	12.77	14.61
30	5.80	6.16	90	14.19	16.53
50	8.44	9.21	99.7	15.57	18.45

100 gms. H_2O dissolve 4.74 gms. Tl_2SO_4 + 10.3 gms. K_2SO_4 at 15°.
100 gms. H_2O dissolve 11.5 gms. Tl_2SO_4 + 16.4 gms. K_2SO_4 at 62°.
100 gms. H_2O dissolve 18.52 gms. Tl_2SO_4 + 26.2 gms. K_2SO_4 at 100°.

(Rabe — Z. anorg. Ch. 31, 156, '02.)

THALLIUM SULPHIDE Tl_2S.

One liter of sat. aqueous solution contains 0.215 gm. Tl_2S at 20°.

(Böttger — Z. physic. Chem. 46, 602, '03.)

THALLIUM DOUBLE SULPHATES

SOLUBILITY IN WATER AT 25°.

(Locke — Am. Ch. J. 27, 459, '01.)

Double Sulphate.	Formula.	Salt per 100 cc. H_2O.	
		Gms. Anhydrous.	Gram Mols.
Tl Copper Sulphate	$Tl_2Cu(SO_4)_2.6H_2O$	8.1	0.0122
Tl Nickel Sulphate	$Tl_2Ni(SO_4)_2.6H_2O$	4.61	0.007
Tl Zinc Sulphate	$Tl_2Zn(SO_4)_2.6H_2O$	8.6	0.0129

THALLIUM SULPHOCYANIDE TlSCN.

SOLUBILITY IN WATER AND IN AQUEOUS SALT SOLUTIONS.

(Böttger; Noyes; Noyes and Abbott.)

One liter sat. aq. solution contains 3.154 gms. TlSCN at 20°, 3.905 gms. at 25°, and 7.269 gms. at 39.75°.

Aq. Salt Solution.	t°.	Gm. Mols. per Liter.		Grams per Liter.		
		Salt.	TlSCN.	Salt.	TlSCN.	
Thallium Chloride TlCl	25	sat.	0.0107	sat.	2.805	(N.)
Thallium Bromate $TlBrO_3$	39.75	0.01496	0.0221	4.966	5.793	(N. and A.)
Thallium Nitrate $TlNO_3$	25	0.0227	0.00852	6.04	2.233	(N.)
"	25	0.0822	0.00406	21.88	1.064	
Potassium Sulphocyanide, KSCN	25	0.0227	0.0083	2.208	2.176	(N.)

THALLIUM CARBONATE Tl_2CO_3.

SOLUBILITY IN WATER.

(Crookes; Lamy.)

t°	15.5°	18°	62°	100°	100.8°
Gms. Tl_2CO_3 per 100 gms. H_2O	4.2 (C.)	5.23	12.85	27.2 (C.)	22.4

THALLIUM (Per) CHLORATE $TlClO_4$.

100 grams H_2O dissolve 10 gms. $TlClO_4$ at 15°, and 166.6 gms. at 100°.

(Roscoe — J. Chem. Soc. 19, 504, '66.)

THALLIUM SULPHITE Tl_2SO_3.

100 gms. H_2O dissolve 3.34 gms. Tl_2SO_3 at 15.5°.

(Seubert and Elken — Z. anorg. Chem. 2 434, '92.)

THALLIUM VANADATES.

SOLUBILITY IN WATER.

(Carnelly — J. Chem. Soc. [2] 11, 323, '73; Liebig's Ann. 116, 155, '60.)

Vanadate.	Formula.	Gms. Vanadate per 100 Gms. H_2O. At 15°.	At 100°.
Tl. meta Vanadate	$TlVO_3$	0.087 (11°)	0.21
" ortho Vanadate	Tl_3VO_3	1.0	1.74
" pyro Vanadate	$Tl_4V_2O_7$	0.20 (14°)	0.26
" Vanadate	$Tl_{12}V_8O_{26}$	0.107	0.29

THEOBROMINE $C_5H_2(CH_3)_2N_4O_2$.

100 gms. carbon tetra chloride dissolve 0.0212 gm. at b. pt.
100 gms. ether dissolve 0.032 gm. at b. pt.

(Göckel — Chem. Centralb. ii, 401, '97.)

80 cc. H_2O containing 14.8 gms. tri sodium phosphate dissolve 3.5 gms. theobromine at 15°.

(Brisse-Moret — J. pharm. chim. [6] 7, 176, '98.)

THORIUM SELENATE $Th(SeO_4)_4.9H_2O$.

100 gms. H_2O dissolve 0.498 gm. $Th(SeO_4)_4$ at 0° and 1.972 gms. at 100°.

(Cleve — Bull. Soc. chim. [2] 43, 166, '85.)

THORIUM SULPHATE $Th(SO_4)_2$.

SOLUBILITY IN WATER.

(Roozeboom — Z. physic. Chem. 5, 201, '90; Demarcay — Compt. rend. 96, 1860, '83.)

t°.	Gms. $Th(SO_4)_2$ per 100 Gms. H_2O.		Solid Phase.	t°.	Gms. $Th(SO_4)_2$ per 100 Gms. H_2O.		Solid Phase.
0	0.74 (R)	0.88 (D)	$Th(SO_4)_2.9H_2O$	0	1.50 (R)		$Th(SO_4)_2.6H_2O$
10	0.98	1.02	"	15	1.63		"
20	1.38	1.25	"	30	2.45		"
30	1.995	1.85	"	45	3.85		"
40	2.998	2.83	"	60	6.64		"
50	5.22 (51°)	4.86	"	17	9.41 (D)		$Th(SO_4)_2.4H_2O$
55	6.76	6.5±	"	40	4.04 (R)	4.5 (35° D)	
0	1.0		$Th(SO_4)_2.8H_2$	50	2.54	1.94 (55°)	"
15	1.38			60	1.63	...	"
25	1.85		"	70	1.09	1.32 (75°)	"
44	3.71		"	95	...	0.71	"

TIN CHLORIDE (Stannous) $SnCl_2$.

100 gms. H_2O dissolve 83.9 gms. $SnCl_2$ at 0° and 269.8 gms. at 15°, Sp. Gr. of Solutions 1.532 and 1.827 respectively.

(Engel — Ann. chim. phys. [6] 17, 347, '89; Michel and Krafft — *Ibid.* [3] 41, 478,' 51.)

SOLUBILITY OF STANNOUS CHLORIDE IN AQUEOUS SOLUTIONS OF HYDROCHLORID ACID AT 0°.

(Engel.)

Milligram Mols. per 10 cc. Solution.		Sp. Gr. of Solution.	Grams per 100 cc. Solution.	
HCl.	½$SnCl_2$.		HCl.	$SnCl_2$.
0	74.0	1.532	0.0	70.26
6.6	66.7	1.489	2.405	63.33
13.54	63.75	1.472	4.935	60.52
24.8	68.4	1.524	9.04	64.95
34.9	81.2	1.625	12.72	77.11
40.0	94.2	1.724	14.58	89.45
44.0	117.6	1.883	16.04	111.7
49.4	147.6	2.114	18.01	138.6
66.0	156.4	2.190	24.05	148.5
78.0	157.0	2.199	28.43	149.0

100 gms. acetone dissolve 55.6 gms. $SnCl_2$ at 18°.

(Naumann — Ber. 37, 4332, '04.)

100 gms. ether dissolve 11.4 gms. $SnCl_2.2H_2O$ at 0°–35.5°.

100 gms. ethyl acetate dissolve 31.2 gms. $SnCl_2.2H_2O$ at − 2°, 35.53 gms. at +22° and 73.44 gms. at 82°. (von Laszczynski — Ber. 27, 2285, '94.)

TIN HYDROXIDE $Sn(OH)_2$.

SOLUBILITY IN AQUEOUS SODIUM HYDROXIDE SOLUTIONS. MOIST TIN HYDROXIDE USED, ORDINARY TEMPERATURE.

(Rubenbauer — Z. anorg. Chem. 30, 335, '02.)

Gms. per 20 cc. Solution.		Mol. Dilution of the NaOH.	Gms. per 20 cc. Solution.		Mol. Dilution of the NaOH.
Na.	Sn.		Na.	Sn.	
0.2480	0.1904	1.86	0.8326	0.5560	0.55
0.3680	0.2614	1.25	0.9661	0.7849	0.48
0.6394	0.4304	0.72	2.1234	1.8934	0.23

TIN IODIDE (Stannous) SnI_2.

SOLUBILITY IN WATER AND IN AQUEOUS HYDRIODIC ACID.

(Young — J. Am. Chem. Soc. 19, 851, '97.)

t°.	Gms. SnI_2 per 100 Gms. Aqueous HI Solutions of:							
	0% = H_2O.	5.83%.	9.60%.	15.2%.	20.44%.	24.8%.	30.4%.	36.82%.
20	0.98	0.20	0.23	0.60	1.81	4.20	10.86	25.31
30	1.16	0.23	0.23	0.64	1.81	4.06	10.28	23.46
40	1.40	0.33	0.28	0.71	1.90	4.12	10.06	23.15
50	1.69	0.46	0.38	0.82	2.12	4.34	10.35	23.76
60	2.07	0.66	0.55	1.11	2.51	4.78	11.03	24.64
70	2.48	0.91	0.80	1.37	2.92	5.43	11.97	25.72
80	2.95	1.23	1.13	1.83	3.70	6.38	13.30	27.23
90	3.46	1.65	1.52	2.40	4.58	7.82	15.52	29.84
100	4.03	2.23	2.04	3.63	5.82	9.60	...	34.05

TIN IODIDE (Stannic) SnI_4.

SOLUBILITY IN CARBON BISULPHIDE.

(Sneider — Pogg. Ann. 127, 624, '66; Arctowski — Z. anorg. Chem. 11, 274, '95.)

t°.	−114°.5	−94°	−89°	−84°	−58°	ord. temp.
Gms. SnI_4 per 100 gms. Solution	9.41	10.65	9.68	10.22	16.27	59.2(S.)

100 gms. methylene iodide, CH_2I_2, dissolve 22.9 gms. SnI_4 at 10°. Sp. Gr. of Solution 3.481.

(Retgers — Z. anorg. Chem. 3, 343, '93.)

TIN SULPHATE (Stannous) $SnSO_4$.

100 gms. H_2O dissolve 18.8 gms. $SnSO_4$ at 19° and 18.1 gms. at 100°.

(Marignac.)

TOLUENE $C_6H_5CH_3$.

SOLUBILITY IN SULPHUR.

Figures read from curve, synthetic method used, see Note, page 9.

(Alexejew — Ann. Physik. Ch. 28, 305, '86.)

t°.	Gms. $C_6H_5CH_3$ per 100 Gms. S Layer.	Gms. $C_6H_5CH_3$ per 100 Gms. Toluene Layer.	t°.	Gms. $C_6H_5CH_3$ per 100 Gms. S Layer.	Gms. $C_6H_5CH_3$ per 100 Gms. Toluene Layer.
100	3	73	150	12.5	59
110	4	71	160	16	53
120	5	68	170	22	47
130	7	66	175	25	43
140	9.5	63	178 crit. temp.	34	

TOLUIC ACIDS (Monomethyl Benzoic Acids) $CH_3.C_6H_4.COOH$.

SOLUBILITY IN WATER AT 25°.

(Paul — Z. physik. Chem. 14, 111, '94.)

Acid.	$CH_3.C_6H_4.COOH$ per Liter Solution. Grams.	Millimols.
Meta Toluic Acid	0.9801	7.207
Ortho Toluic Acid	1.1816	8.683
Para Toluic Acid	0.3454	2.540

TOLUIDINE $C_6H_4CH_3.NH_2$.

SOLUBILITY IN WATER.

(Vaubel — J. pr. Chem. [2] 52, 72, '95; Lowenherz — Z. physik. Chem. 25, 410, '98.)

t°.	Gms. $C_6H_4CH_3.NH_2$ per 1000 Gms. H_2O.	Solid Phase.	t°.	Gms. $C_6H_4CH_3NH_2$ per 1000 Gms. H_2O.	Solid Phase.
20	16.26	Liquid ortho T.	20.8	7.39	Para T.
20	0.15	Ortho T.	26.7	9.50	"
20	6.54	Para T.	31.7	11.42	"

Solubility of Para Toluidine in Ethyl Alcohol.

(Interpolated from original results of Speyers — Am. J. Sci. [4] 14, 295, '02.)

t°.	Wt. of 1 cc. Solution.	Mols. per 100 Mols. C_2H_5OH.	Gms. per 100 Gms. C_2H_5OH.	t°.	Wt. of 1 cc. Solution.	Mols. per 100 Mols. C_2H_5OH.	Gms. per 100 Gms. C_2H_5OH.
0	0.8885	20.72	48.1	20	0.9265	47.0	110.0
5	0.8982	26.0	60.0	25	0.9360	56.0	132.0
10	0.9080	32.0	74.0	30	0.9460	66.0	156.0
15	0.9180	38.6	90.0				

Distribution of para Toluidine between water and carbon tetra chloride.

(Vaubel — J. pr. Chem. [2] 67, 478, '03.)

Gms. *p* Toluidin Used.	Volumes of Solvents.	Gms. $C_6H_4(CH_3)NH_2$ *p* in: H_2O Layer.	Gms. $C_6H_4(CH_3)NH_2$ *p* in: CCl_4 Layer.
1.0	200 cc. H_2O + 100 cc. CCl_4	0.1406	0.8594
1.0	200 cc. H_2O + 200 cc. CCl_4	0.0666	0.9334

URANYL CHLORIDE $UO_2Cl_2.3H_2O$.

100 gms. H_2O dissolve 320 gms. UO_2Cl_2 at 18°.

(Mylius and Dietz — Ber. 34, 2774, '01.)

URANYL DOUBLE CHLORIDES.

Solubility of Uranyl Ammonium Chloride, U. Tetra Methyl Ammonium Chloride, U. Tetra Ethyl Ammonium Chloride, U. Caesium Chloride, U. Rubidium Chloride, and U. Potassium Chloride in Water.

(Rimbach — Ber. 37, 463, '04.)

Formula of Double Salt.	t°.	Gms. per 100 Gms. Sat. Solution.	Atomic Relation in Sol.	Solid Phase.
$UO_2Cl_2.2NH_4Cl.2H_2O$	15	40.67 UO_2 + 3.51 NH_4 + 19.15 Cl	1 UO_2 : 1.59 NH_4 : 3.59 Cl	1 Mol. double salt + 0.4 Mol. NH_4Cl
$UO_2Cl_2.2N(CH_3)_4Cl$	29.8	19.85 " + 10.44 Cl_2 = 41.24 *	1 UO_2 : 4.02 Cl	Double salt
"	80.7	20.23 " + 10.52 Cl_2 = 4.91 *	1 UO_2 : 3.98 Cl	"
$UO_2Cl_2.2N(C_2H_5)_4Cl$	27.1	15.02 " + 7.81 Cl_2 = 37.15 †	1 UO_2 : 3.97 Cl	"
"	80.7	15.12 " + 7.78 Cl_2 = 37.23 †	1 UO_2 : 3.94 Cl	"
$UO_2Cl_2.2CsCl$	29.75	22.11 " + 22.5 Cs = 56.04 ‡	1 UO_2 : 2.07 Cs	"
$UO_2Cl_2.2RbCl.2H_2O$	24.8	27.18 " + 16.6 Rb + 13.8 Cl §	1 UO_2 : 1.96 Rb : 3.90 Cl	"
"	80.3	30.66 " + 19.1 Rb + 15.8 Cl ‖	1 UO_2 : 1.98 Rb : 3.95 Cl	"
$UO_2Cl_2.2KCl.2H_2O$	0.8	38.57 " + 13.59 Cl + 3.86 K	1 UO_2 : 2.69 Cl : 0.69 K	The double salt is decomposed by water at temperatures below 60°.
"	14.9	33.71 " + 13.51 Cl + ... K	1 UO_2 : 3.06 Cl : 1.06 K	
"	17.5	37.36 " + 14.50 Cl + 5.27 K	1 UO_2 : 2.96 Cl : 0.96 K	
"	25.0	35.01 " + 15.26 Cl + ... K	1 UO_2 : 3.33 Cl : 1.33 K	
"	41.5	35.27 " + 15.92 Cl + 7.39 K	1 UO_2 : 3.44 Cl : 1.44 K	
"	50	34.18 " + 16.56 Cl + ... K	1 UO_2 : 3.71 Cl : 1.71 K	
"	60	34.19 " + 17.25 Cl + 9.14 K	1 UO_2 : 3.85 Cl : 1.85 K	
"	71.5	33.55 " + 17.44 Cl + 9.28 K	1 UO_2 : 3.96 Cl : 1.96 K	Double salt
"	78.5	35.26 " + 18.24 Cl + 9.95 K	1 UO_2 : 3.95 Cl : 1.95 K	"

* $UO_2Cl_2.2N(CH_3)_4Cl$, † $UO_2Cl_2.N(C_2H_5)_4Cl$, ‡ $UO_2Cl_2.2CsCl$,
§ = 57.9 gms. $UO_2Cl_2.2RbCl_2$, ‖ = 65.8 gms. $UO_2Cl_2.2RbCl_2$.

URANYL SODIUM CHROMATE $2(UO_2)CrO_4.Na_2CrO_4.10H_2O$.

100 gms. sat. aqueous solution contains 52.52 gms. $(2UO_2).CrO_4$. Na_2CrO_4 at 20°.
(Rimbach.)

URANYL POTASSIUM BUTYRATE $UO_2(C_4H_7O_2)_2.KC_4H_7O_2$.

The double salt is decomposed by water at ordinary temperatures and the solution gets richer in uranyl butyrate. The solubility at 29.4° in water containing $KC_4H_7O_2$ is 2.10 gms. $UO_2(C_4H_7O_2)$ + 0.38 gms. $KC_4H_7O_2$ per 100 gms. solution. The atomic relation being 1 : 0.64.
(Rimbach.)

URANYL NITRATE $UO_2(NO_3)_2.6H_2O$.

SOLUBILITY IN WATER, ETC.
(Bucholz; de Coninck — Compt. rend. 130, 1304, '00.)

100 gms. cold water dissolve 200 gms. $UO_2(NO_3)_2.6H_2O$.
100 gms. abs. alcohol dissolve 333 gms. $UO_2(NO_3)_2.6H_2O$.
100 gms. 85% alcohol dissolve 3.3 gms. $UO_2(NO_3)_2.6H_2O$ at 12° (de C.)
100 gms. ether dissolve 25 gms. $UO_2(NO_3)_2.6H_2O$.
100 gms. abs. acetone dissolve 1.5 gms. $UO_2(NO_3)_2.6H_2O$ at 12° (de C.)
For densities of Uranium nitrate solutions in water and other solvents see de Coninck — Compt. rend. **131**, 1219, '00.)

URANYL DOUBLE NITRATES.

SOLUBILITY OF URANYL AMMONIUM NITRATE, U. CAESIUM NITRATE, U. POTASSIUM NITRATE, AND U. RUBIDIUM NITRATE IN WATER.
(Rimbach.)

Formula of Salt.	t°.	Gms. per 100 Gms. Sat. Solution. UO_2.		Total Salt.	Atomic Relation in Solution.
$UO_2(NO_3)_2.NH_4NO_3$	0.5	29.71	+ 2.92 NH_4	= . . .	1 UO_2 : 1.47 NH_4 : 3.47 NO_3
"	24.9	36.46	+ 3.54 "	= 68.95	" : 1.46 " : 3.46 "
"	59.0	44.37	+ 2.90 "	= . . .	" : 0.98 " : 2.98 "
"	80.7	44.95	+ 2.98 "	= 78.95	" : 1.00 " : 3.00 "
$UO_2(NO_3)_2.CsNO_3$	16.0	31.39	+ 6.59 Cs	= 55.4	" : 0.44 Cs
$UO_2(NO_3)_2.KNO_3$	0.5	31.98	+ 1.72 K	= . . .	" : 2.37 NO_3 : 0.37 K
"	13.0	33.40	+ 2.72 "	= . . .	" : 2.57 " : 0.57 "
"	25.0	37.07	+ 4.01 "	*= 64.82	" : 1.60 " : 0.76 "
"	45.0	42.18	+ 5.16 "	= . . .	" : 2.84 " : 0.84 "
"	59.0	41.65	+ 6.03 "	= . . .	" : 3.00 " : 1.00 "
"	80.6	43.71	+ 6.38 "	= . . .	" : 3.01 " : 1.01 "
$UO_2.(NO_3)_2.RbNO_3$	25.0	35.41	+ 4.65 Rb	†= 59.60	" : 1.40 " : 0.45 Rb
"	80.0	34.66	+ 11.01 "	= 69.49	" : 3.00 " : 1.01 "

* + 23.5 NO_3. † + 19.74 NO_3.

URANYL AMMONIUM PROPIONATE $2UO_2(C_3H_5O_2)_2.NH_4C_3H_5O_2.2H_2O$ and Uranyl Potassium Propionate $2UO_2(C_3H_5O_2)_2.KC_3H_5O_2$.

(Rimbach.)

100 gms. aq. solution contain 16.48 gms. $2UO_2(C_3H_5O_2)_2.NH_4C_3H_5O_2$ at 29.8°.

100 gms. aq. solution contain 2.362 gms. $UO_2(C_3H_5O_2)_2$ + 0.82 gm. $KC_3H_5O_2$ at 29.4°, atomic relation, 1 : 1.29.

URANYL SULPHATE $(UO)_2SO_4.3H_2O$.

SOLUBILITY IN WATER, ETC.

(Bucholz; de Coninck — Bull. Acad. Roy. Belgique, 350, '01.)

100 gms. H_2O dissolve 16.6 gms. $UO_2(SO_4).3H_2O$ at 13.2°, 17.4 gms. at 15.5°, and 22.2 gms. at b. pt.

100 gms. abs. alcohol dissolve 4.0 gms. $UO_2(SO_4).3H_2O$ at 18.2° and 5.0 gms. at b. pt.

100 gms. 85% alcohol dissolve 2.6 gms. $UO_2(SO_4).3H_2O$ at 16°.

100 gms. 16.2% alcohol dissolve 12.3 gms. $UO_2(SO_4).3H_2O$ at 10°.

URANYL POTASSIUM SULPHATE $UO_2SO_4.K_2SO_4.2H_2O$

100 gms. sat. aq. solution contain 10.41 gms. $UO_2SO_4.K_2SO_4$ at 25° and 23.13 gms. at 70.5°. (Rimbach.)

SOLUBILITY OF $UO_2SO_4.2K_2SO_4.2H_2O+UO_2SO_4.K_2SO_4.2H_2O$ IN WATER.

t°.	Gms. per 100 Gms. Solution.			Atomic Relation in Sol.			Mol. % in Solid Phase.	
	UO_2.	K.	SO_4.	UO_2.	K.	SO_4.	Mono Salt.	Di Salt.
14	0.85	4.19	5.71	1	35.75	18.88	29	71
50	6.70	8.15	12.37	1	5.20	8.40	76	24
80	14.29	8.54	15.53	1	4.13	3.06	12	88

UREA $CO(NH_2)_2$.

SOLUBILITY IN WATER AND IN ALCOHOLS.

(Campetti — Abstract, Z. physic. Chem. 41, 109, '02; Speyers — Am. J. Sci. [4] 14, 259, '02.)

NOTE. — Speyer's original results are in terms of Mols. $CO(NH_2)_2$ per 100 Mols. H_2O at irregular temperatures.

t°.	In Water. Wt. of 1 cc. Solution.	In Water. Gms. $CO(NH_2)_2$ per 100 Gms. H_2O.		In Methyl Alcohol. Wt. of 1 cc. Solution.	In Methyl Alcohol. Gms. $CO(NH_2)_2$ per 100 Gms. CH_3OH.	In Ethyl Alcohol. Wt. of 1 cc. Solution.	In Ethyl Alcohol. Gms. $CO(NH_2)_2$ per 100 Gms. C_2H_5OH.
0	1.121	55.9	...	0.861	13.8	0.8213	2.5
10	1.134	66.0	85.0 (C)	0.863	16.0	0.814	3.5
20	1.146	79.0	108.2 (C)	0.869	20.0	0.809	5.0
30	1.156	93.0	...	0.876	24.0	0.806	6.5
40	1.165	106.0	...	0.890	30.0	0.804	8.5
50	1.173	120.0	...	0.908	37.0	0.803	10.5
60	1.180	132.0	...	0.928	47.0	...	13.0
70	1.187	145.0	...	...	...	...	17.5

100 gms. abs. methyl alcohol dissolve 21.8 gms. $CO(NH_2)_2$ at 19.5°.

100 gms. abs. ethyl alcohol dissolve 5.06 gms. $CO(NH_2)_2$ at 19.5°.

(de Bruyn — Z. physic. Chem. 10, 784, '92.)

100 gms. glycerine dissolve 50 gms. urea at 15.5°.

Phenyl Thio UREA (Phenyl thio carbamide) $CS.NH_2.NHC_6H_5$.

SOLUBILITY IN WATER.

(Rothmund — Z. physic. Ch. 33, 406, '00; Biltz — *Ibid.* 43, 42, '03; Holeman and Antusch — Rec. trav. chim. 13, 290, '94; Bogdan — Ann. Scien. L'Univ. Jassy 2, 43, '02.'03.)

One liter aq. solution contains 2.12 gms. $CS(NH_2).NHC_6H_5$ at 20° (B.), (R.) and 2.4 gms. at 25°. (H. and A.). Bogdan gives 2.547 gms at 25°.

SOLUBILITY OF PHENYL THIO UREA IN AQUEOUS SALT SOLUTIONS AT 20°.

(Biltz; Rothmund.)

Salt Solution.	Millimols and also Gms. $CS(NH_2)NHC_6H_5$ Dissolved per Liter of Aqueous Salt Solution of Concentration: 0.125 Normal Millimols.	0.125 Normal Gms.	0.25 Normal Millimols.	0.25 Normal Gms.	0.5 Normal Millimols.	0.5 Normal Gms.	1.0 Normal Millimols.	1.0 Normal Gms.
$\frac{1}{3}AlCl_3$	12.95	1.97	12.82	1.96	12.03	1.83	10.69	1.61
NH_4NO_3	14.17	2.15	14.4	2.21	14.53	2.22	14.91	2.27
$\frac{1}{2}(NH_4)_2SO_4$	13.51	2.05	12.84	1.96	11.78	1.79	9.98	1.52
$\frac{1}{2}BaCl_2$	13.12	1.99	12.92	1.97	12.22	1.86	10.44	1.59
$\frac{1}{2}Ba(NO_3)_2$	13.98	2.13	13.98	2.13	13.90	2.12	...	...
$CsNO_3$	14.53	2.21	14.90	2.27	15.23	2.33	...	...
$LiNO_3$	13.96	2.13	13.96	2.13	13.93	2.12	13.73	2.10
$\frac{1}{2}MgSO_4$	13.40	2.04	12.78	1.95	11.54	1.75	9.43	1.43
$KC_2H_3O_2$	13.40	2.04	12.95	1.97	12.14	1.85	10.74	1.62
KBr	13.50	2.05	13.35	2.04	12.80	1.95	11.76	1.79
$KClO_3$	13.86	2.11	13.60	2.06	13.12	1.99	...	...
KCl	13.40	2.04	12.73	1.94	12.19	1.85	10.54	1.60
KI	14.12	2.15	14.48	2.21	14.31	2.18	14.60	2.23
KNO_3	13.89	2.12	13.85	2.11	13.52	2.05	12.82	1.96
KNO_2	14.52	2.21	14.65	2.23	13.80	2.11	12.51	1.92
$\frac{1}{2}K_2SO_4$	13.25	2.03	12.49	1.91	11.11	1.69	8.73	1.33
$RbNO_3$	14.22	2.16	14.44	2.19	14.39	2.18	14.22	2.17
$\frac{1}{2}Na_2CO_3$	13.29	2.04	12.52	1.91	11.05	1.68	8.58	1.32
$NaClO_3$	13.75	2.09	13.65	2.08	13.07	1.98	12.21	1.86
$NaClO_4$	14.15	2.15	14.05	2.14	13.58	2.06	12.56	1.92
NaCl	13.28	2.02	12.83	1.95	11.90	1.81	10.02	1.52
NaI	13.98	2.13	14.07	2.14	14.29	2.18	13.96	2.13
$NaNO_3$	13.94	2.12	13.77	2.10	13.32	2.04	12.57	1.92
$NaNO_2$	14.34	2.18	13.82	2.11	13.06	1.98	11.52	1.75
$\frac{1}{2}Na_2SO_4$	13.19	2.00	12.35	1.87	10.85	1.63	8.30	1.27

SOLUBILITY OF PHENYL THIO UREA AT 25° IN AQUEOUS SOLUTIONS OF.

Potassium Nitrate.

(Bogdan.)

Gms. Mols. KNO_3 per 1000 Gms. H_2O.	Gms. per 1000 Gms. H_2O. KNO_3.	Gms. per 1000 Gms. H_2O. $CS(NH_2).NHC_6H_5$.
1.045	105.7	2.38
0.5123	51.84	2.48
0.2026	20.50	2.54
0.1007	10.19	2.56
0.0503	5.09	2.55
0.0333	3.36	2.55

Sodium Nitrate.

(Bogdan.)

Gms. Mols. $NaNO_3$ per 1000 Gms. H_2O.	Gms. per 1000 Gms. H_2O. $NaNO_3$.	Gms. per 1000 Gms. H_2O. $CS(NH_2).NHC_6H_5$.
1.024	87.14	2.26
0.5065	43.10	2.46
0.2031	17.28	2.51
0.0986	8.39	2.53
0.0540	4.59	2.54
0.0335	2.84	2.54

SOLUBILITY OF PHENYL THIO UREA IN MIXTURES OF ETHYL ALCOHOL AND WATER AT 25°.

(Holleman and Antusch — Rec. trav. chim. 13, 290, '94.)

Vol. per cent Alcohol.	Gms. $CS(NH_2)NHC_6H_5$ per 100 Gms. Solvent.	Sp. Gr. of Solutions.	Vol. per cent Alcohol.	Gms. $CS(NH_2)NHC_6H_5$ per 100 Gms. Solvent.	Sp. Gr. of Solutions.
100	3.59	...	65	3.40	0.9018
95	4.44	0.8200	60	2.80	0.9128
90	4.69	0.8389	50	1.87	0.9317
85	4.99	0.8544	40	1.13	0.9486
80	4.70	0.8679	25	0.56	0.9679
75	4.45	0.8810	15	0.38	0.9788
70	3.92	0.8915	0	0.24	0.9979

SOLUBILITY OF PHENYL THIO UREA IN AQUEOUS SOLUTIONS OF PROPYL AND OF ETHYL ALCOHOL AT 25°.

(Bagdan.)

In Propyl Alcohol.			In Ethyl Alcohol.		
G. Mols. C_3H_7OH per 1000 Gms. H_2O.	Gms. per 1000 Gms. H_2O		G. Mols. C_2H_5OH per 1000 Gms. H_2O.	Gms. per 1000 Gms. H_2O	
	C_3H_7OH.	$CS(NH_2)NHC_6H_5$.		C_2H_5OH.	$CS(NH_2)NHC_6H_5$.
1.035	62.10	3.587	1.1010	49.60	3.193
0.5448	32.688	3.124	0.5355	24.12	2.931
0.1059	6.354	2.643	0.1094	4.932	2.629
0.05526	3.316	2.599	0.05018	2.26	2.589
0.04854	2.912	2.586	0.03271	1.473	2.577
In Propyl Alcohol at 0°.					
1.000	60.06	1.21			
0.100	6.01	1.047			

SOLUBILITY OF PHENYL THIO UREA IN AQUEOUS SOLUTIONS OF ACETONE, MANNITE, CANE SUGAR, DEXTROSE, AND UREA.

(Bagdan.)

Aqueous Non Electrolyte.	t°.	Gms. per 1000 Gms. H_2O		Aqueous Non Electrolyte.	t°.	Gms. per 1000 Gms. H_2O.	
		Non Electrolyte.	$CS(NH_2)NH.C_6H_5$.			Non Electrolyte.	$CS(NH_2)NHC_6H_5$.
$(CH_3)_2CO$	25	7.478	2.667	$C_6H_{12}O_6$	25	180.40	3.042
"	"	2.513	2.579	"	"	90.46	2.83
"	"	1.908	2.573	"	"	29.29	2.69
$C_6H_8(OH)_6$	"	182.11	3.04	"	"	18.01	2.654
"	"	91.05	2.78	"	"	9.554	2.603
$C_{12}H_{22}O_{11}$	25	338.6	3.457	$CO(NH_2)_2$	"	63.08	3.306
"	"	170.4	3.015	"	"	29.93	2.892
"	"	34.36	2.634	"	"	6.132	2.618
"	"	18.28	2.596	"	"	4.942	2.605
"	"	10.09	2.572	"	"	2.009	2.572
"	0	342.18	1.420	"	0	60.11	1.310
"	"	34.22	1.044	"	"	6.01	1.048

URETHANE $CO(NH_2)OC_2H_5$. SOLUBILITY IN SEVERAL SOLVENTS.

(Speyers — Am. J. Sci. [4] 14, 294, '02.) See also Ethyl Carbamate, p. 138.

Interpolated and calculated from the original results which are given in terms of molecules Urethane per 100 Mols. solvent.

	Solubility in Water.			Solubility in Methyl Alcohol.		
t°.	Wt. of 1 cc. Solution.	Mols. $CO(NH_2)OC_2H_5$ per 100 Mols. H_2O.	Gms $CO(NH_2)OC_2H_5$ per 100 Gms. H_2O.	Wt. of 1 cc. Solution.	Mols. $CO(NH_2)OC_2H_5$ per 100 Mols. CH_3OH.	Gms. $CO(NH_2)OC_2H_5$ per 100 Gms. CH_3OH.
0	1.023	3.61	17.8	0.956	31.18	86.76
10	1.033	6.0	29.7	0.977	41.0	114.1
15	1.042	15.0	74.2	0.989	47.5	132.1
20	1.060	31.0	153.3	1.000	54.5	151.7
25	1.073	50.0	247.3	1.013	62.5	173.9
30	1.078	65.0	321.4	1.024	72.0	200.3
40	1.065	77.0	380.7	1.045	89.0	247.7

	Solubility in Ethyl Alcohol.			Solubility in Propyl Alcohol.		
t°.	Wt. of 1 cc. Solution.	Mols. $CO(NH_2)OC_2H_5$ per 100 Mols. C_2H_5OH.	Gms. $CO(NH_2)OC_2H_5$ per 100 Gms. C_2H_5OH.	Wt. of 1 cc. Solution.	Mols. $CO(NH_2)OC_2H_5$ per 100 Mols. C_3H_7OH.	Gms. $CO(NH_2)OC_2H_5$ per 100 Gms. C_3H_7OH.
0	0.8914	23.91	46.26	0.880	19.48	28.9
10	0.930	36.0	69.6	0.906	31.0	46.0
15	0.950	43.0	89.2	0.923	40.0	59.3
20	0.968	50.0	96.7	0.942	51.0	75.7
25	0.985	59.0	114.1	0.963	60.0	89.0
30	1.001	70.0	135.4	0.983	68.0	100.9
40	1.035	88.0	170.2	1.025	85.0	126.1

	Solubility in Chloroform.			Solubility in Toluene.		
t°	Wt. of 1 cc. Solution.	Mols. $CO(NH_2)OC_2H_5$ per 100 Mols. $CHCl_3$.	Gms. $CO(NH_2)OC_2H_5$ per 100 Gms. $CHCl_3$.	Wt. of 1 cc. Solution.	Mols. $CO(NH_2)OC_2H_5$ per 100 Mols. $C_6H_5CH_3$.	Gms. $CO(NH_2)OC_2H$ per 100 Gms. $C_6H_5CH_3$
0	1.404	27.56	20.6	0.887	1.77	1.71
10	1.340	41	30.6	0.874	5.0	4.84
15	1.310	46	34.4	0.875	10.0	9.68
20	1.280	53	39.6	0.883	16.0	15.48
25	1.240	60	44.8	0.902	25.0	24.18
30	1.203	67	50.0	0.927	44.0	42.58
40	1.125	80	59.7	0.995	85.0	82.24

URIC ACID $C_5H_4N_4O_3$. SOLUBILITY IN WATER.

(Blarez and Deniges — Compt. rend. 104, 1847, '87; at 15° Magnier — Bull. Soc. chim. [2] 23, 483, '75.)

t°.	Gms. $C_5H_4N_4O_3$ per 100 Gms. H_2O.	t°.	Gms. $C_5H_4N_4O_3$ per 100 Gms. H_2O.	t°.	Gms. $C_5H_4N_4O_3$ per 100 Gms. H_2O.
0	0.002	30	0.0088	70	0.0305
10	0.0037	40	0.0122	80	0.0390
15	0.0053	50	0.0170	90	0.0498
20	0.006	60	0.0230	100	0.0625

VALERIANIC ACID *n* $CH_3(CH_2)_3COOH$ (*n* Propyl acetic acid — Pentane acid) when shaken with water at 16° two layers are formed.

100 gms. of the aqueous layer contains 3.4 gms. $CH_3(CH_2)_3COOH$.
100 gms. of the acid layer contains 90.4 gms. $CH_3(CH_2)_3COOH$.

(Lieben and Rossi — Liebig's Ann. 159, 60, '71.)

YTTRIUM IODATE $Y(IO_3)_3.3H_2O$.

100 gms. H_2O dissolve 0.53 gm. yttrium iodate.

(Berlin.)

YTTRIUM SULPHATE $Y_2(SO_4)_3$.

100 gms. H_2O dissolve 15.2 gms. $Y_2(SO_4)_3$ at ord. temperature, 9.3 gms. $Y_2(SO_4)_3.8H_2O$ at ord. temp. and 4.8 gms. $Y_2(SO_4)_3.8HO_2$ at 100°.

(Cleve — Bull. soc. chim. [2] 21, 344, '74.)

YTTERBIUM SULPHATE $Yb_2(SO_4)_3.8H_2O$.

SOLUBILITY IN WATER.

(Cleve — Z. anorg. Chem. 32, 143, '02.)

t°.	Gms. $Yb_2(SO_4)_3$ per 100 gms. H_2O.	t°.	Gms. $Yb_2(SO_4)_3$ per 100 Gms. H_2O.	t°.	Gms. $Yb_2(SO_4)_3$ per 100 Gms. H_2O.
0	44.2	55	11.5	80	6.92
15.5	34.6	60	10.4	90	5.83
35	19.1	70	7.22	100	4.67

ZINC ACETATE $Zn(CH_3COO)_2.2H_2O$.

100 gms. H_2O dissolve 40 gms. at 25° and 66.6 gms. at b. pt.
100 gms. alcohol dissolve 2.8 gms. at 25° and 166.0 gms. at b.pt.

(U. S. P.)

ZINC BENZOATE $Zn(C_7H_5O_2)_2$.

SOLUBILITY IN WATER.

(Paietta — Gazz. chim. ital. 36, II, 67, '06.)

t°.	15.9°	17°	27.8°	31.3°	37.5°	49.8°	59°
Gms. $Zn(C_7H_5O_2)_2$ per 100 gms. aq. solution	2.55	2.49	2.41	2.05	1.87	1.62	1.45

ZINC BROMIDE $ZnBr_2$.

SOLUBILITY IN WATER.

(Dietz — Wiss. Abh. p. t. Reizhanstalt 3, 431, '00; see also Etard — Ann. chim. phys. [7] 2, 536, '94.)

t°.	Gms. $ZnBr_2$ per 100 Gms. Solution.	Mols. $ZnBr_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $ZnBr_2$ per 100 Gms. Solution.	Mols. $ZnBr_2$ per 100 Mols. H_2O.	Solid Phase.
−15	77.13	27.0	$ZnBr_2.3H_2O$	25	82.46	37.6	$ZnBr_2.2H_2O$
−10	78.45	29.1	"	30	84.08	42.3	"
− 5	80.64	33.3	"	37	86.20	50.0	"
− 8	79.06	30.2	$ZnBr_2.2H_2O$	35	85.45	46.9	$ZnBr_2$
0	79.55	31.1	"	40	85.53	47.4	"
+13	80.76	33.5	"	60	86.08	49.5	"
18	81.46	35.1	"	80	86.57	51.5	"
				100	87.05	53.8	"

ZINC CARBONATE $ZnCO_3$.

One liter H_2O dissolves 0.01 gm. at 15°.

One liter aq. 5.85 per cent NaCl solution dissolves 0.0586 gm. at 14°.

One liter aq. 7.45 per cent NaCl solutions dissolves 0.0477 gm. at 14°. (Cantoni and Passamanik — Ann. chim. anal. appl. 10, 258, '05.)

ZINC CHLORATE $ZnClO_3$.

SOLUBILITY IN WATER.

(Meusser — Ber. 35, 1417, '02; at 18°; Mylius and Funk — Ber. 30, 1718, '97.)

t°.	Gms. $Zn(ClO_3)_2$ per 100 gms. Solution.	Mols. $Zn(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Zn(ClO_3)_2$ per 100 Gms. Solution.	Mols. $Zn(ClO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−18	55.62	9.70	$Zn(ClO_3)_2.6H_2O$	30	76.66	16.20	$Zn(ClO_3)_2.4H_2O$
0	59.19	11.08	"	40	69.06	17.29	"
8	60.20	11.72	"	55	75.44	24.00	"
15	67.32	15.96	"		Ice curve		
18	66.52	15.39	$Zn(ClO_3)_2.4H_2O$	−13	30.27	3.36	Ice
				−9	26.54	2.80	"

Sp. Gr. of solution saturated at 18° = 1.916.

ZINC CHLORIDE $ZnCl_2$.

SOLUBILITY IN WATER.

(Mylius and Dietz — Z. anorg. Chem. 44, 217, '05; see also Dietz — Wiss. Abh. p. t. Reichanstalt 3, 429, '00; Etard — Ann. chim. phys. [7] 2, 536, '94.)

t°.	Gms. $ZnCl_2$ per 100 Gms. Water.	Gms. $ZnCl_2$ per 100 Gms. Solution.	Solid Phase.	t°.	Gms. $ZnCl_2$ per 100 Gms. Water.	Gms. $ZnCl_2$ per 100 Gms. Solution.	Solid Phase.
−5	14	12.3	Ice	9	360	78.3	$.2\frac{1}{2}H_2O + .H_2O$
−10	25	20.0	"	6	385	79.4	$ZnCl_2.2\frac{1}{2}H_2O$
−40	83	45.3	"	6	298	74.9	$ZnCl_2.1\frac{1}{2}H_2O$
−62	104	51.0	Ice + $ZnCl_2.4H_2O$	10	330	76.8	"
−50	113	53.0	$ZnCl_2.4H_2O$	20	368	78.6	"
−40	127	55.9	"	26	423	80.9	$.1\frac{1}{2}H_2O + ZnCl_2.H_2O$
−30	160	61.5	$.4H_2O + .3H_2O$	26.3	433	81.2	$.1\frac{1}{2}H_2O + ZnCl_2$
−10	189	65.4	$ZnCl_2.3H_2O$	0	342	77.4	$ZnCl_2.H_2O$
0	208	67.5	"	10	364	78.4	"
+5	230	69.7	"	20	396	79.8	"
6.5	252.4	71.6	"	28	436	81.3	$ZnCl_2.H_2O + ZnCl_2$
5	282	73.8	"	31	477	82.7	$ZnCl_2.H_2O$
0	309	75.5	$.3H_2O + .1\frac{1}{2}H_2O$	25	432	81.2	$ZnCl_2$
0	235	70.1	$ZnCl_2.2\frac{1}{2}H_2O$	40	452	81.9	"
6.5	252	71.6	$.2\frac{1}{2}H_2O + .3H_2O$	60	488	83.0	"
10	272	73.1	$ZnCl_2.2\frac{1}{2}H_2O$	80	543	84.4	"
12.5	303	75.2	"	100	615	86.0	"
11.5	335	77.0	$.2\frac{1}{2}H_2O + .1\frac{1}{2}H_2O$	262	∞	100.0	"

ZINC CYANIDE $Zn(CN)_2$.

100 cc. concentrated $Zn(C_2H_3O_2)_2$ + Aq. dissolve 0.4 gm. $Zn(CN)_2$.

100 cc. concentrated $ZnSO_4$ + Aq. dissolves 0.2 gm. (Joannis.)

Solubility of Zinc Chloride, Ammonium Chloride Mixtures in Water.

(Meerburg — Z. anorg. Chem. 37, 212, '03.)

Isotherm for 0°.			Isotherm for 20°.			Isotherm for 30°.		
Gms. per 100 Gms. Solution.		Solid Phase.	Gms. per 100 Gms. Solution.		Solid Phase.	Gms. per 100 Gms. Solution.		Solid Phase.
$ZnCl_2$.	NH_4Cl.		$ZnCl_2$.	NH_4Cl.		$ZnCl_2$.	NH_4Cl.	
0	22.8	NH_4Cl	0.0	26.9	NH_4Cl	0.0	29.5	NH_4Cl
3.5	23.0	"	5.1	27.1	"	9.2	29.4	"
7.1	23.5	"	9.5	27.4	"	16.0	29.7	"
10.2	23.9	"	12.7	27.5	"	20.2	30.1	"
15.1	24.7	"	15.7	27.7	"	24.7	30.4	"
18.0	25.3	"	18.0	27.9	"	26.3	30.8	NH_4Cl+a
22.4	26.0	"	23.5	29.0	"	27.2	30.2	a
24.2	26.1	"	26.0	29.5	NH_4Cl+a	30.1	29.6	"
25.7	26.3	NH_4Cl+a	29.5	28.1	a	36.8	28.2	"
27.5	26.4	a	32.3	27.7	"	42.4	27.3	"
30.7	25.7	"	35.8	27.0	"	43.8	27.3	$a+b$
33.9	25.3	"	38.7	26.9	"	45.0	24.4	b
38.8	24.4	"	40.2	26.6	"	51.2	17.6	"
42.6	24.6	$a+b$	41.9	26.3	"	61.9	10.4	"
44.3	21.3	b	43.2	26.0	$a+b$	66.9	9.2	$ZnCl_2+b$
49.2	15.3	"	46.9	21.0	b	75.6	6.1	$ZnCl_2$
52.6	11.9	"	53.2	14.5	"	70.3	7.6	"
55.4	10.0	"	58.4	11.1	"	78.5	3.2	"
59.3	7.5	"	62.7	8.7	"	76.9	3.5	"
62.1	6.8	"	66.6	7.9	"	79.8	1.6	"
						81.6	0.0	"

$a = ZnCl_2.3NHCl_3$.. $b = ZnCl_2.2NH_4Cl$.

100 gms. abs. acetone dissolve 43.5 gms. $ZnCl_2$ at 18°.
(Naumann — Ber. 37, 4332, '04.)

100 gms. glycerine dissolve 50 gms. $ZnCl_2$ at 15.5°.

ZINC FLUORIDE $ZnF_2.4H_2O$.

One liter of water dissolves 16 gms. at 18°.
(Dietz.)

ZINC HYDROXIDE $Zn(OH)_2$.

One liter of water dissolves 0.0042 gm. ZnO at 18°, conductivity method. (Dupre and Bratas — Z. angew. Chem. 16, 55, '03.)

Solubility of Zinc Hydroxide in one per cent Aqueous Salt Solutions at 16°–20°.

(Snyder — Ber. 11, 936, '78.)

The CO_2 free $Zn(OH)_2$ dissolved is calculated as milligrams Zn per liter of the given salt solution. Additional determinations are also given.

Aq. Salt Solution.	Mgs. Zn per Liter Solution.	Aq. Salt Solution.	Mgs. Zn per Liter Solution.	Aq. Salt Solution.	Mgs. Zn per Liter Solution.
NaCl	51	K_2SO_4	37.5	K_2CO_3	0
KCl	43	$MgSO_4$	27	NH_4Cl	95
$CaCl_2$	57.5	KNO_3	17.5	NH_4NO_3	77
$MgCl_2$	65	$Ba(NO_3)_2$	25	$(NH_4)_2SO_4$	88
$BaCl_2$	38				

Solubility of Zinc Hydroxide in Aqueous Solutions of:

Ammonia and Ammonia Bases at 17°–19°.

(Herz — Z. anorg. Chem. 30, 281, '02.)

Normality of the Base.	Normality of Dissolved Zn.	Gms. ZnO per 20 cc. Solution.
0.0942 NH_3	0.0011	0.00185
0.236 "	0.0110	0.0180
0.707 "	0.059	0.0958
0.0944 NH_2CH_3	0.0005	0.0008
0.472 "	0.0081	0.0132
0.944 "	0.03	0.0484
0.068 $NH_2C_2H_5$	0.0003	0.0005
0.51 "	0.0045	0.0074
0.68 "	0.0098	0.0161

Sodium Hydroxide at Ord. Temp.

(Rubenbauer — *Ibid.* 30, 333, '02.)

Gms. per 20 cc. Solution		Mol. Dilution of the NaOH.
Na.	Zn.	
0.1012	0.0040	4.50
0.1978	0.0150	2.33
0.4278	0.0442	1.06
0.6670	0.1771	0.70
0.9660	0.9630	0.48
1.4951	0.2481	0.31
2.9901	0.3700	0.16

Moist $Zn(OH)_2$ used. Solutions shaken 5 hours.

ZINC IODATE $Zn(IO_3)_2$.

100 gms. H_2O dissolve 0.87 gm. $Zn(IO_3)_2$ cold and 1.31 gms. hot.

(Rammelsberg — Pogg. Ann. 43, 665, '38.)

ZINC IODIDE ZnI_2.

Solubility in Water.

(Dietz — Wiss. Abh. p. t. Reichanstalt 3, 432, '00; see also Etard — Ann. chim. phys. [7] 2, 526, '94.)

t°.	Gms. ZnI_2 per 100 Gms. Solution.	Mols. ZnI_2 per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. ZnI_2 per 100 Gms. Solution.	Mols. ZnI_2 per 100 Mols. H_2O.	Solid Phase.
−10	80.50	23.3	$ZnI_2.2H_2O$	0	81.11	24.2	ZnI_2
− 5	80.77	23.7	"	18	81.20	24.4	"
0	81.16	24.3	"	40	81.66	25.1	"
+10	82.06	25.8	"	60	82.37	26.4	"
22	83.12	27.8	"	80	83.05	27.5	"
27	89.52	50.3	"	100	83.62	28.7	"

Sp. Gr. of sat. solution of the anhydrous salt at 18° = 2.725.
100 gms. glycerine dissolve 40 gms. ZnI_2 at 15.5°.

ZINC NITRATE $Zn(NO_3)_2$.

Solubility in Water.

(Funk — Wiss. Abh. p. t. Reichanstalt, 3, 438, '00.)

t°.	Gms. $Zn(NO_3)_2$ per 100 Gms. Solution.	Mols. $ZnNO_3$ per 100 Mols. H_2O.	Solid Phase.	t°.	Gms. $Zn(NO_3)_2$ per 100 Gms. Solution.	Mols. $Zn(NO_3)_2$ per 100 Mols. H_2O.	Solid Phase.
−25	40.12	6.36	$Zn(NO_3)_2.9H_2O$	18	53.50	10.9	$Zn(NO_3)_2.6H_2O$
−22.5	40.75	6.54	"	25	55.90	12.0	"
−20	42.03	6.89	"	36.4	63.63	16.7	"
−18	43.59	7.34	"	36	64.63	17.4	"
−18	44.63	7.67	$Zn(NO_3)_2.6H_2O$	33.5	65.83	18.3	"
−15	45.26	7.86	"	37	66.38	18.8	$Zn(NO_3)_2.3H_2O$
−13	45.51	7.94	"	40	67.42	19.7	"
−12	45.75	8.01	"	41	68.21	20.4	"
0	48.66	9.01	"	43	69.26	21.4	"
+12.5	52.0	10.3	"	45.5	77.77	33.3	"

ZINC OXALATE $ZnC_2O_4.2H_2O$.

One liter of water dissolve 0.083 Mg. equiv. = 0.0064 gm. ZnC_2O_4 at 18°.

(Kohlrausch — Z. physik. Chem. **50**, 356, '04–'05.)

ZINC SULPHATE $ZnSO_4$.

Solubility in Water.

(Cohen — Z. physik. Chem. **34**, 189, '00; at 50°; Callender and Barnes — Proc. Roy. Soc. **62**, 149, '97; Etard — Ann. chim. phys. [7] **2**, 536, '94; Poggiale *Ibid.* [3] **8**, 467, '43; Mulder.)

t°.	Gms. $ZnSO_4$ per 100 Gms. Solution.	Gms. $ZnSO_4$ per 100 Gms. Water.	Solid Phase.	t°.	Gms. $ZnSO_4$ per 100 Gms. Solution.	Gms. $ZnSO_4$ per 100 Gms. Water.	Solid Phase.
−5	28.21	39.30	$ZnSO_4.7H_2O$	25	38.94	63.74	$ZnSO_4.6H_2O$
0.1	29.54	41.93	"	39	41.22	70.06	$.6H_2O + .7H_2O$
9.1	32.01	47.09	"	50	43.45	76.84	$ZnSO_4.6H_2O$
15	33.81	50.88	"	70	47.5	88.7	$.6H_2O + .H_2O$
25	36.67	57.90	"	80	46.4	86.6	$ZnSO_4.H_2O$
35	39.98	66.61	"	90	45.5	83.7	"
39	41.21	70.05	"	100	44.7	80.8	"
−5	32.00	47.08	$ZnSO_4.6H_2O$	120	41.7	71.5	"
01	33.09	49.48	"	140	38.0	61.3	"
				160	33.0	49.3	"

100 gms. abs. methyl alcohol dissolve 0.65 gm. $ZnSO_4$ at 18°, 5.90 gms. $ZnSO_4.7H_2O$ at 18°.

100 gms. 50 per cent methyl alcohol dissolve 15.7 gms. $ZnSO.7H_2O$ at 18°.

(de Bruyn — Z. physik. Chem. **10**, 783, '92.)

Solubility of Zinc Sulphate in Aqueous Ethyl Alcohol.

(Schiff — Liebig's Ann. **118**, 365, '61.)

Concentration of Alcohol	10 per cent	20 per cent	40 per cent
Gms. $ZnSO_4.7H_2O$ per 100 Gms. Solution	51.1	39.0	3.45

100 gms. glycerine dissolve 35 gms. zinc sulphate at 15.5°.

Solubility of Zinc Sulphate — Sodium Sulphate Mixtures in Water.

(Koppel — Gumpery — Z. physik. Chem. 52, 409, '05.)

t°.	Gms. per 100 Gms. Solution. ZnSO4.	Na2SO4.	Gms. per 100 Gms. H2O. ZnSO4.	Na2SO4.	Mols. per 100 Mols. H2O. ZnSO4.	Na2SO4.	Solid Phase.
0	27.19	5.33	40.30	7.90	4.50	1.01	$ZnSO_4.7H_2O + Na_2SO_4.10H_2O$
5	27.85	6.27	42.28	9.52	4.71	1.21	
25	17.58	15.63	26.32	23.40	2.94	2.96	$ZnNa_2(SO_4)_2.4H_2O$
30	17.66	15.58	26.47	23.44	2.95	2.97	"
35	17.59	15.70	26.36	23.52	2.94	2.98	"
40	17.75	15.72	26.68	23.63	2.98	2.99	"
10	29.16	7.16	45.79	11.24	5.11	1.42	$ZnNa_2(SO_4)_2.4H_2O + ZnSO_4.7H_2O$
15	30.70	6.40	48.81	10.17	5.45	1.29	
20	32.51	5.36	52.34	8.62	5.84	1.09	
25	34.36	4.41	56.15	7.22	6.27	0.91	
30	36.28	3.80	60.55	6.34	6.76	0.81	
35	38.18	3.30	65.25	5.64	7.28	0.71	
38	38.83	2.90	66.64	4.98	7.44	0.63	$ZnNa_2(SO_4)_2.4H_2O + ZnSO_4.6H_2O$
40	38.26	2.78	64.89	4.71	7.24	0.60	
10	27.91	7.92	43.50	12.34	4.85	1.565	$ZnNa_2(SO_4)_2.4H_2O + Na_2SO_4.10H_2O$
15	24.28	10.90	36.92	16.71	4.12	2.12	
20	19.14	14.58	28.77	21.95	3.21	2.79	
25	13.31	19.94	19.93	29.87	2.22	3.785	
30	6.96	27.75	10.67	42.51	1.19	5.39	
35	5.61	30.03	8.72	46.61	0.971	5.91	$ZnNa_2(SO_4)_2.4H_2O + Na_2SO_4$
40	5.96	28.65	9.16	43.83	1.02	5.555	

ZINC SULPHITE $ZnSO_3.2H_2O$.

100 gms. H_2O dissolve 0.16 gm. $ZnSO_4.2H_2O$.

(Houston and Trichborne — Brit. Med. Jour. 1063, '90

ZINC TARTRATE $C_4H_4O_6.Zn.2H_2O$.

Solubility in Water.

(Cantoni and Zachoder — Bull. Soc. chim. [3] 33, 751, '05.)

t°.	Gms. $C_4H_4O_6.Zn.2H_2O$ per 100 cc. Solution.	t°.	Gms. $C_4H_4O_6.Zn.2H_2O$ per 100 cc. Solution.	t°.	Gms. $C_4H_4O_6.Zn.2H_2O$ per 100 cc. Solution.
15	0.019	40	0.060	65	0.100
20	0.022	45	0.073	70	0.088
25	0.036	50	0.087	75	0.078
30	0.041	55	0.116	80	0.059
35	0.055	60	0.104	85	0.041

ZINC VALERATE $(C_4H_9COO)_2Zn.2H_2O$.

100 gms. H_2O dissolve 2 gms. $(C_4H_9COO)_2.Zn.2H_2O$ at 25°.
100 gms. alcohol dissolve 2.8 gms. at 25°. (U. S. P.)

ADDENDUM

The distribution results shown in the following table were obtained by agitating together equal volumes of olive oil and aqueous solutions of the several narcotics, and determining the dissolved substance present in the aqueous layer before and after the agitation. The sum of the amount of substance in the oil and aqueous layers, as shown in the table, is the amount originally in 100 cc. of each aqueous solution used.

The work was done for the purpose of testing the Overton-Meyer Theory of Narcosis, that the anesthetic action of certain groups of narcotics is proportional to their distribution between water and the fatty material occurring in the nervous system, and olive oil was selected as the solvent best fulfilling the analytical requirements and at the same time offering a fair resemblance to the fatty substance of the nervous system. The results are believed to be of interest both as solubility studies and on account of their connection with the Theory of Narcosis.

The author is indebted to Dr. Reid Hunt of the Hygienic Laboratory for calling his attention to the papers containing the distribution results here tabulated.

Distribution of Several Substances between Water and Olive Oil.

(At ord. temp., Baum — Archiv. exp. Pathol. u. Pharmakol, 42, 130, '99; at 3°, 30° and 36°; Meyer — *Ibid.* 46, 344, '01; at 15°, Harrass — Archiv. internat. Pharmacodynamie et Therapie, 11, 458, '03.)

Name of Substance.	Formula.	t°.	Gms. Substance per 100 cc. Water layer (w.).	Olive Oil layer (f.).	$\frac{C(f.)}{C(w.)}$
Sulfonal	$(CH_3)_2C(SO_2.C_2H_5)_2$	ord.	0.0700	0.0686	0.979
Trional	$(CH_3)(C_2H_5)C(SO_2.C_2H_5)_2$	"	0.0404	0.1646	4.074
Tetronal	$(C_2H_5)_2C(SO_2.C_2H_5)_2$	"	0.0462	0.1446	3.756
Di methyl sulphon di methyl methane	$(CH_3)_2C(SO_2.CH_3)_2$	"	0.6072	0.0622	0.103
Di ethyl sulphon methane	$CH_2.(SO_2.C_2H_5)_2$	"	0.610	0.092	0.151
Ethyl urethane	$NH_2.CO_2.C_2H_5$	"	4.52	0.615	0.136
Methyl urethane	$NH_2.CO_2.CH_3$	"	7.50	0.275	0.037
Tertiary butyl alcohol	$(CH_3)_2C(OH)CH_3$	"	8.744	1.539	0.176
Amylene hydrate	$(CH_3)_2C(OH)CH_2.CH_3$	"	6.605	6.605	1.000
Mono acetin	$C_3H_5(OH)_2.(OC_2H_3O)$	"	4.28	0.254	0.059
"	"	3	2.349	0.229	0.099
"	"	36	2.417	0.161	0.066
Di acetin	$C_3H_5(OH)(OC_2H_3O)_2$	ord.	3.0	0.7	0.234
Tri acetin	$C_3H_5(OC_2H_3O)_3$	"	2.72	0.80	0.295
Bromal hydrate	$CBr_3CH(OH)_2$	"	9.81	6.52	0.665
Butyl chloral hydrate	$C_3H_4Cl_3.CH(OH)_2$	"	2.04	3.24	1.589
Chloral hydrate	$CCl_3CH(OH)_2$	"	16.31	3.10	0.190
"	"	"	4.12	0.91	0.22
"	"	3	1.34	0.08	0.053
"	"	30	1.15	0.27	0.237
Salicylamide	$OH.C_6H_4.CH_2NH_2$	3	0.056	0.126	2.25
"	"	36	0.075	0.107	1.40
Benzamide	$C_7H_5ONH_2$	3	1.062	0.706	0.66
"	"	36	1.235	0.533	0.43
Ethyl alcohol	C_2H_5OH	3	2.69	0.09	0.026
"	"	3	3.90	0.07	
"	"	30	2.64	0.14	0.047
"	"	30	3.82	0.16	
Acetone	$(CH_3)_2CO$	3	3.07	0.50	
"	"	3	4.14	0.52	0.146
"	"	3	3.92	0.61	
"	"	30	2.73	0.73	
"	"	30	3.86	0.81	0.235
"	"	30	3.71	0.87	
Valeryl di ethyl amide	$CH_3(CH_2)_3CON(C_2H_5)_2$	15	0.231	1.339	5.797
Valeryl di methyl amide	$CH_3(CH_2)_3CON(CH_3)_2$	15	0.911	0.379	0.416
Valeryl ethyl amide	$CH_3(CH_2)_3CONH(C_2H_5)$	15	1.029	0.261	0.254
Valer amide	$CH_3(CH_2)_3CONH_2$	15	0.769	0.241	0.313
Lactic acid di ethyl amide	$CH_3.CHOH.CON(C_2H_5)_2$	15	1.256	0.194	0.154
Sodium salicylate	$C_6H_4.OH.COONa$	15	1.444	0.156	0.108

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