SULFURIC ACID

Specific Gravity of Aqueous Sulfuric Acid Solutions at $\frac{20°}{4°}$ C.*

Bé.	Sp. gr.	Per cent H_2SO_4	G. per liter	Lbs. per cu. ft.	Lbs. per gal.
0.7	1.0051	1	10.05	0.6275	0.0839
1.7	1.0118	2	20.24	1.263	0.1689
2.6	1.0184	3	30.55	1.907	0.2550
3.5	1.0250	4	41.00	2.560	0.3422
4.5	1.0317	5	51.59	3.220	0.4305
5.4	1.0385	6	62.31	3.890	0.5200
6.3	1.0453	7	73.17	4.568	0.6106
7.2	1.0522	8	84.18	5.255	0.7025
8.1	1.0591	9	95.32	5.950	0.7955
9.0	1.0661	10	106.6	6.655	0.8897
9.9	1.0731	11	118.0	7.369	0.9851
10.8	1.0802	12	129.6	8.092	1.082
11.7	1.0874	13	141.4	8.825	1.180
12.5	1.0947	14	153.3	9.567	1.279
13.4	1.1020	15	165.3	10.32	1.379
14.3	1.1094	16	177.5	11.08	1.481
15.2	1.1168	17	189.9	11.85	1.584
16.0	1.1243	18	202.4	12.63	1.689
16.9	1.1318	19	215.0	13.42	1.795
17.7	1.1394	20	227.9	14.23	1.902
18.6	1.1471	21	240.9	15.04	2.010
19.4	1.1548	22	254.1	15.86	2.120
20.3	1.1626	23	267.4	16.69	2.231
21.1	1.1704	24	280.9	17.54	2.344
21.9	1.1783	25	294.6	18.39	2.458
22.8	1.1862	26	308.4	19.25	2.574
23.6	1.1942	27	322.4	20.13	2.691
24.4	1.2023	28	336.6	21.02	2.809
25.2	1.2104	29	351.0	21.91	2.929
26.0	1.2185	30	365.6	22.82	3.051
26.8	1.2267	31	380.3	23.74	3.173
27.6	1.2349	32	395.2	24.67	3.298
28.4	1.2432	33	410.3	25.61	3.424
29.1	1.2515	34	425.5	26.56	3.551
29.9	1.2599	35	441.0	27.53	3.680
30.7	1.2684	36	456.6	28.51	3.811
31.4	1.2769	37	472.5	29.49	3.943
32.2	1.2855	38	488.5	30.49	4.077
33.0	1.2941	39	504.7	31.51	4.212
33.7	1.3028	40	521.1	32.53	4.349
34.5	1.3116	41	537.8	33.57	4.488
35.2	1.3205	42	554.6	34.62	4.628
35.9	1.3294	43	571.6	35.69	4.770
36.7	1.3384	44	588.9	36.76	4.914
37.4	1.3476	45	606.4	37.86	5.061
38.1	1.3569	46	624.2	38.97	5.209
38.9	1.3663	47	642.2	40.09	5.359
39.6	1.3758	48	660.4	41.23	5.511
40.3	1.3854	49	678.8	42.38	5.665
41.1	1.3951	50	697.6	43.55	5.821
41.8	1.4049	51	716.5	44.73	5.979
42.5	1.4148	52	735.7	45.93	6.140
43.2	1.4248	53	755.1	47.14	6.302
44.0	1.4350	54	774.9	48.37	6.467

Specific Gravity of Aqueous Sulfuric Acid Solutions at $\frac{20^\circ}{4^\circ}$ C.*

Bé.	Sp. gr.	Per cent H_2SO_4	G. per liter	Lbs. per cu. ft.	Lbs. per gal.
44.7	1.4453	55	794.9	49.62	6.634
45.4	1.4557	56	815.2	50.89	6.803
46.1	1.4662	57	835.7	52.17	6.974
46.8	1.4768	58	856.5	53.47	7.148
47.5	1.4875	59	877.6	54.79	7.324
48.2	1.4983	60	899.0	56.12	7.502
48.9	1.5091	61	920.6	57.47	7.682
49.6	1.5200	62	942.4	58.83	7.865
50.3	1.5310	63	964.5	60.21	8.049
51.0	1.5421	64	986.9	61.61	8.236
51.7	1.5533	65	1010	63.03	8.426
52.3	1.5646	66	1033	64.46	8.618
53.0	1.5760	67	1056	65.92	8.812
53.7	1.5874	68	1079	67.39	9.008
54.3	1.5989	69	1103	68.87	9.207
55.0	1.6105	70	1127	70.38	9.408
55.6	1.6221	71	1152	71.90	9.611
56.3	1.6338	72	1176	73.44	9.817
56.9	1.6456	73	1201	74.99	10.02
57.5	1.6574	74	1226	76.57	10.24
58.1	1.6692	75	1252	78.15	10.45
58.7	1.6810	76	1278	79.75	10.66
59.3	1.6927	77	1303	81.37	10.88
59.9	1.7043	78	1329	82.99	11.09
60.5	1.7158	79	1355	84.62	11.31
61.1	1.7272	80	1382	86.26	11.53
61.6	1.7383	81	1408	87.90	11.75
62.1	1.7491	82	1434	89.54	11.97
62.6	1.7594	83	1460	91.16	12.19
63.0	1.7693	84	1486	92.78	12.40
63.5	1.7786	85	1512	94.38	12.62
63.9	1.7872	86	1537	95.95	12.83
64.2	1.7951	87	1562	97.49	13.03
64.5	1.8022	88	1586	99.01	13.23
64.8	1.8087	89	1610	100.5	13.43
65.1	1.8144	90	1633	101.9	13.63
65.3	1.8195	91	1656	103.4	13.82
65.5	1.8240	92	1678	104.8	14.00
65.7	1.8279	93	1700	106.1	14.19
65.8	1.8312	94	1721	107.5	14.36
65.9	1.8337	95	1742	108.7	14.54
66.0	1.8355	96	1762	110.0	14.70
66.0	1.8364	97	1781	111.2	14.87
66.0	1.8361	98	1799	112.3	15.02
65.9	1.8342	99	1816	113.4	15.15
65.8	1.8305	100	1831	114.3	15.28

TABLES OF THE MANUFACTURING CHEMISTS' ASSOCIATION

SULFURIC ACID

Authorities — W. C. FERGUSON; H. P. TALBOT

This table has been approved and adopted as a standard by the Manufacturing Chemists' Association of the United States.

Specific Gravity determinations were made at 60° F., compared with water at 60° F.

From the Specific Gravities the corresponding degrees Baumé were calculated by the following formula:

$$\text{Baumé} = 145 - \frac{145}{\text{Sp. Gr.}}.$$

Baumé Hydrometers for use with this table must be graduated by the above formula, which formula should always be printed on the scale.

66° Baumé = Sp. Gr. 1.8354.

1 cu. ft. water at 60° F. weighs 62.37 lbs. av.

Atomic weights from F. W. Clarke's table of 1901. O = 16.

H_2SO_4 = 100 per cent.

	H_2SO_4	O. V.	60°
O. V.	93.19	100.00	119.98
60°	77.67	83.35	100.00
50°	62.18	66.72	80.06

Acids stronger than 66° Bé. should have their percentage compositions determined by chemical analysis.

Bé.°	Sp. gr.	Tw.°	Per cent H_2SO	Weight of 1 cu. ft. in lbs. av.	Per cent O. V.	Pounds O. V. in 1 cu. ft.	* Freezing (melting) point.
0	1.0000	0.0	0.00	62.37	0.00	0.00	32.0° F.
1	1.0069	1.4	1.02	62.80	1.09	.68	31.2 "
2	1.0140	2.8	2.08	63.24	2.23	1.41	30.5 "
3	1.0211	4.2	3.13	63.69	3.36	2.14	29.8 "
4	1.0284	5.7	4.21	64.14	4.52	2.90	28.9 "
5	1.0357	7.1	5.28	64.60	5.67	3.66	28.1 "
6	1.0432	8.6	6.37	65.06	6.84	4.45	27.2 "
7	1.0507	10.1	7.45	65.53	7.99	5.24	26.3 "
8	1.0584	11.7	8.55	66.01	9.17	6.06	25.1 "
9	1.0662	13.2	9.66	66.50	10.37	6.89	24.0 "
10	1.0741	14.8	10.77	66.99	11.56	7.74	22.8 "
11	1.0821	16.4	11.89	67.49	12.76	8.61	21.5 "
12	1.0902	18.0	13.01	68.00	13.96	9.49	20.0 "
13	1.0985	19.7	14.13	68.51	15.16	10.39	18.3 "
14	1.1069	21.4	15.25	69.04	16.36	11.30	16.6 "

* Calculated from Pickering's results, Journal of London Chemical Society, vol. 57, p. 363.

Bé.°	Sp. gr.	Tw.°	Per cent H_2SO_4	Weight of 1 cu. ft. in lbs. av.	Per cent O. V.	Pounds O. V. in 1 cu.ft.	* Freezing (melting) point.
15	1.1154	23.1	16.38	69.57	17.58	12.23	14.7 F.
16	1.1240	24.8	17.53	70.10	18.81	13.19	12.6 "
17	1.1328	26.6	18.71	70.65	20.08	14.18	10.2 "
18	1.1417	28.3	19.89	71.21	21.34	15.20	7.7 "
19	1.1508	30.2	21.07	71.78	22.61	16.23	4.8 "
20	1.1600	32.0	22.25	72.35	23.87	17.27	+ 1.6 "
21	1.1694	33.9	23.43	72.94	25.14	18.34	− 1.8 "
22	1.1789	35.8	24.61	73.53	26.41	19.42	− 6.0 "
23	1.1885	37.7	25.81	74.13	27.69	20.53	−11 "
24	1.1983	39.7	27.03	74.74	29.00	21.68	−16 "
25	1.2083	41.7	28.28	75.36	30.34	22.87	−23 "
26	1.2185	43.7	29.53	76.00	31.69	24.08	−30 "
27	1.2288	45.8	30.79	76.64	33.04	25.32	−39 "
28	1.2393	47.9	32.05	77.30	34.39	26.58	−49 "
29	1.2500	50.0	33.33	77.96	35.76	27.88	−61 "
30	1.2609	52.2	34.63	78.64	37.16	29.22	−74 "
31	1.2719	54.4	35.93	79.33	38.55	30.58	−82 "
32	1.2832	56.6	37.26	80.03	39.98	32.00	−96 "
33	1.2946	58.9	38.58	80.74	41.40	33.42	−97 "
34	1.3063	61.3	39.92	81.47	42.83	34.90	−91 "
35	1.3182	63.6	41.27	82.22	44.28	36.41	−81 "
36	1.3303	66.1	42.63	82.97	45.74	37.95	−70 "
37	1.3426	68.5	43.99	83.74	47.20	39.53	−60 "
38	1.3551	71.0	45.35	84.52	48.66	41.13	−53 "
39	1.3679	73.6	46.72	85.32	50.13	42.77	−47 "
40	1.3810	76.2	48.10	86.13	51.61	44.45	−41 "
41	1.3942	78.8	49.47	86.96	53.08	46.16	−35 "
42	1.4078	81.6	50.87	87.80	54.58	47.92	−31 "
43	1.4216	84.3	52.26	88.67	56.07	49.72	−27 "
44	1.4356	87.1	53.66	89.54	57.58	51.56	−23 "
45	1.4500	90.0	55.07	90.44	59.09	53.44	−20 "
46	1.4646	92.9	56.48	91.35	60.60	55.36	−14 "
47	1.4796	95.9	57.90	92.28	62.13	57.33	−15 "
48	1.4948	99.0	59.32	93.23	63.65	59.34	−18 "
49	1.5104	102.1	60.75	94.20	65.18	61.40	−22 "

* Calculated from Pickering's results. Journal of London Chemical Society, vol. 57, p. 363.

Bé.°	Sp. gr.	Tw.°	Per cent H_2SO_4	Weight of 1 cu. ft. in lbs. av.	Per cent O. V.	Pounds O. V. in 1 cu.ft.	*Freezing (melting) point.
50	1.5263	105.3	62.18	95.20	66.72	63.52	–27 F.
51	1.5426	108.5	63.66	96.21	68.31	65.72	–33 "
52	1.5591	111.8	65.13	97.24	69.89	67.96	–39 "
53	1.5761	115.2	66.63	98.30	71.50	70.28	–49 "
54	1.5934	118.7	68.13	99.38	73.11	72.66	–59 "
55	1.6111	122.2	69.65	100.48	74.74	75.10	..
56	1.6292	125.8	71.17	101.61	76.37	77.60	..
57	1.6477	129.5	72.75	102.77	78.07	80.23	.. Below – 40
58	1.6667	133.3	74.36	103.95	79.79	82.95	..
59	1.6860	137.2	75.99	105.16	81.54	85.75	– 7
60	1.7059	141.2	77.67	106.40	83.35	88.68	+12.6 F
61	1.7262	145.2	79.43	107.66	85.23	91.76	27.3 "
62	1.7470	149.4	81.30	108.96	87.24	95.06	39.1 "
63	1.7683	153.7	83.34	110.29	89.43	98.63	46.1 "
64	1.7901	158.0	85.66	111.65	91.92	102.63	46.4 "
64¼	1.7957	159.1	86.33	112.00	92.64	103.75	43.6 "
64½	1.8012	150.2	87.04	112.34	93.40	104.93	41.1 "
64¾	1.8068	161.4	87.81	112.69	94.23	106.19	37.9 "
65	1.8125	162.5	88.65	113.05	95.13	107.54	33.1 "
65¼	1.8182	163.6	89.55	113.40	96.10	108.97	24.6 "
65½	1.8239	164.8	90.60	113.76	97.22	110.60	13.4 "
65¾	1.8297	165.9	91.80	114.12	98.51	112.42	– 1 "
66	1.8354	167.1	93.19	114.47	100.0	114.47	–29 "

* Calculated from Pickering's results, Journal of London Chemical Society, vol. 57, p. 363.

APPROXIMATE BOILING POINTS

50°	Bé.	295 F.
60°	"	386 "
61°	"	400 "
62°	"	415 "
63°	"	432 "
64°	"	451 "
65°	"	485 "
66°	"	538 "

Per cent 60°	Pounds 60° in 1 cu. ft.	Per cent 50°	Pounds 50° in 1 cu. ft
61.93	53.34	77.36	66.63
63.69	55.39	79.56	69.19
65.50	57.50	81.81	71.83
67.28	59.66	84.05	74.53
69.09	61.86	86.30	77.27
70.90	64.12	88.56	80.10
72.72	66.43	90.83	82.98
74.55	68.79	93.12	85.93
76.37	71.20	95.40	88.94
78.22	73.68	97.70	92.03

FIXED POINTS

Sp. gr.	Per cent H_2SO_4	Sp. gr.	Per cent H_2SO_4
1.0000	.00	1.5281	62.34
1.0048	.71	1.5440	63.79
1.0347	5.14	1.5748	66.51
1.0649	9.48	1.6272	71.00
1.0992	14.22	1.6679	74.46
1.1353	19.04	1.7044	77.54
1.1736	23.94	1.7258	79.40
1.2105	28.55	1.7472	81.32
1.2513	33.49	1.7700	83.47
1.2951	38.64	1.7959	86.36
1.3441	44.15	1.8117	88.53
1.3947	49.52	1.8194	89.75
1.4307	53.17	1.8275	91.32
1.4667	56.68	1.8354	93.19
1.4822	58.14		

Per cent 60°	Pounds 60° in 1 cu. ft.	Per cent 50°	Pounds 50° in 1 cu. ft
80.06	76.21	100.00	95.20
81.96	78.85	102.38	98.50
83.86	81.54	104.74	101.85
85.79	84.33	107.15	105.33
87.72	87.17	109.57	108.89
89.67	90.10	112.01	112.55
91.63	93.11	114.46	116.30
93.67	96.26	117.00	120.24
95.74	99.52	119.59	124.31
97.84	102.89	122.21	128.52
100.00	106.40	124.91	132.91
102.27	110.10	127.74	137.52
104.67	114.05	130.75	142.47
107.30	118.34	134.03	147.82
110.29	123.14	137.76	153.81
111.15	124.49	138.84	155.50
112.06	125.89	139.98	157.25
113.05	127.40	141.22	159.14
114.14	129.03	142.57	161.17
115.30	130.75	144.02	163.32
116.65	132.70	145.71	165.76
118.19	134.88	147.63	168.48
119.98	137.34	149.87	171.56

ALLOWANCE FOR TEMPERATURE

At 10° Bé. .029° Bé. or .00023 Sp. Gr. = 1° F.
At 20° Bé. .036° Bé. or .00034 Sp. Gr. = 1° F.
At 30° Bé. .035° Bé. or .00039 Sp. Gr. = 1° F.
At 40° Bé. .031° Bé. or .00041 Sp. Gr. = 1° F.
At 50° Bé. .028° Bé. or .00045 Sp. Gr. = 1° F.
At 60° Bé. .026° Bé. or .00053 Sp. Gr. = 1° F.
At 63° Bé. .026° Bé. or .00057 Sp. Gr. = 1° F.
At 66° Bé. .0235° Bé. or .00054 Sp. Gr. = 1° F.