

TABLE 2-32 Densities of Inorganic and Organic Liquids (mol/dm<sup>3</sup>)

Cmpd. no.	Name	Formula	CAS no.	Mol. wt.	C1	C2	C3	C4	T <sub>min</sub> , K	Density at T <sub>min</sub>	T <sub>max</sub> , K	Density at T <sub>max</sub>
1	Acetaldehyde	C <sub>2</sub> H <sub>4</sub> O	75-07-0	44.053	1.6994	0.26167	466	0.2913	150.15	21.499	466.00	6.4944
2	Acetamide	C <sub>2</sub> H <sub>5</sub> NO	60-35-5	59.067	1.016	0.21845	761	0.26116	353.33	16.936	761.00	4.6509
3	Acetic acid	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	64-19-7	60.052	1.4486	0.25892	591.95	0.2529	289.81	17.492	591.95	5.5948
4	Acetic anhydride	C <sub>4</sub> H <sub>6</sub> O <sub>3</sub>	108-24-7	102.089	0.86852	0.25187	606	0.31172	200.15	11.643	606.00	3.4483
5	Acetone	C <sub>3</sub> H <sub>6</sub> O	67-64-1	58.079	1.2332	0.25886	508.2	0.2913	178.45	15.683	508.20	4.7640
6	Acetonitrile	C <sub>2</sub> H <sub>3</sub> N	75-05-8	41.052	1.3064	0.22597	545.5	0.28678	229.32	20.628	545.50	5.7813
7	Acetylene	C <sub>2</sub> H <sub>2</sub>	74-86-2	26.037	2.4507	0.27448	308.3	0.28752	192.40	23.692	308.30	8.9285
8	Acrolein	C <sub>3</sub> H <sub>4</sub> O	107-02-8	56.063	1.3261	0.26124	506	0.2489	185.45	16.822	506.00	5.0762
9	Acrylic acid	C <sub>3</sub> H <sub>4</sub> O <sub>2</sub>	79-10-7	72.063	1.2414	0.25822	615	0.30701	286.15	14.693	615.00	4.8075
10	Acrylonitrile	C <sub>3</sub> H <sub>3</sub> N	107-13-1	53.063	1.0816	0.2293	535	0.28939	189.63	17.265	535.00	4.7170
11	Air	Mixture	132259-10-0	28.960	2.8963	0.26733	132.45	0.27341	59.15	33.279	132.45	10.8340
12	Ammonia	H <sub>3</sub> N	7664-41-7	17.031	3.5383	0.25443	405.65	0.2888	195.41	43.141	405.65	13.9070
13	Anisole	C <sub>7</sub> H <sub>8</sub> O	100-66-3	108.138	0.77488	0.26114	645.6	0.28234	235.65	9.668	645.60	2.9673
14	Argon	Ar	7440-37-1	39.948	3.8469	0.2881	150.86	0.29783	83.78	35.491	150.86	13.3530
15	Benzamide	C <sub>7</sub> H <sub>7</sub> NO	55-21-0	121.137	0.7371	0.25487	824	0.28571	403.00	8.938	824.00	2.8921
16	Benzene	C <sub>6</sub> H <sub>6</sub>	71-43-2	78.112	1.0259	0.26666	562.05	0.28394	278.68	11.422	562.05	3.8472
17	Benzenethiol	C <sub>6</sub> H <sub>6</sub> S	108-98-5	110.177	0.83573	0.26326	689	0.30798	258.27	10.074	689.00	3.1745
18	Benzoic acid	C <sub>7</sub> H <sub>6</sub> O <sub>2</sub>	65-85-0	122.121	0.71587	0.24812	751	0.2857	395.45	8.894	751.00	2.8852
19	Benzonitrile	C <sub>7</sub> H <sub>5</sub> N	100-47-0	103.121	0.8552	0.26785	699.35	0.30523	260.40	10.011	699.35	3.1928
20	Benzophenone	C <sub>13</sub> H <sub>10</sub> O	119-61-9	182.218	0.43743	0.24833	830	0.27555	321.35	5.950	830.00	1.7615
21	Benzyl alcohol	C <sub>7</sub> H <sub>8</sub> O	100-51-6	108.138	0.59867	0.22849	720.15	0.23567	257.85	9.905	720.15	2.6201
22	Benzyl ethyl ether	C <sub>9</sub> H <sub>12</sub> O	539-30-0	136.191	0.60917	0.26925	662	0.2632	275.65	7.065	662.00	2.2625
23	Benzyl mercaptan	C <sub>7</sub> H <sub>8</sub> S	100-53-8	124.203	0.70797	0.25982	718	0.32144	243.95	8.862	718.00	2.7248
24	Biphenyl	C <sub>12</sub> H <sub>10</sub>	92-52-4	154.208	0.52257	0.25833	773	0.27026	342.20	6.425	773.00	2.0229
25	Bromine	Br <sub>2</sub>	7726-95-6	159.808	2.1872	0.29527	584.15	0.3295	265.85	20.109	584.15	7.4075
26	Bromobenzene	C <sub>6</sub> H <sub>5</sub> Br	108-86-1	157.008	0.8226	0.26632	670.15	0.2821	242.43	9.909	670.15	3.0888
27	Bromoethane	C <sub>2</sub> H <sub>5</sub> Br	74-96-4	108.965	1.1908	0.25595	503.8	0.29152	154.55	15.833	503.80	4.6525
28	Bromomethane	CH <sub>3</sub> Br	74-83-9	94.939	1.6762	0.26141	467	0.28402	179.47	20.640	467.00	6.4121
29	1,2-Butadiene	C <sub>4</sub> H <sub>6</sub>	590-19-2	54.090	1.187	0.26114	452	0.3065	136.95	15.123	452.00	4.5455
30	1,3-Butadiene	C <sub>4</sub> H <sub>6</sub>	106-99-0	54.090	1.2346	0.27216	425	0.28707	164.25	14.058	425.00	4.5363
31	Butane	C <sub>4</sub> H <sub>10</sub>	106-97-8	58.122	1.0677	0.27188	425.12	0.28688	134.86	12.620	425.12	3.9271
32	1,2-Butanediol	C <sub>4</sub> H <sub>10</sub> O <sub>2</sub>	584-03-2	90.121	0.81696	0.24755	680	0.24535	220.00	11.734	680.00	3.3002
33	1,3-Butanediol	C <sub>4</sub> H <sub>10</sub> O <sub>2</sub>	107-88-0	90.121	0.81856	0.24967	676	0.22023	196.15	11.872	676.00	3.2786
34	1-Butanol	C <sub>4</sub> H <sub>10</sub> O	71-36-3	74.122	0.98279	0.26830	563.1	0.25488	183.85	12.035	563.10	3.6630
35	2-Butanol	C <sub>4</sub> H <sub>10</sub> O	78-92-2	74.122	0.9682	0.26244	535.9	0.26749	158.45	12.471	535.90	3.6892
36	1-Butene	C <sub>4</sub> H <sub>8</sub>	106-98-9	56.106	1.0877	0.26454	419.5	0.2843	87.80	14.264	419.50	4.1117
37	cis-2-Butene	C <sub>4</sub> H <sub>8</sub>	590-18-1	56.106	1.1591	0.27085	435.5	0.28116	134.26	13.894	435.50	4.2795
38	trans-2-Butene	C <sub>4</sub> H <sub>8</sub>	624-64-6	56.106	1.1448	0.27154	428.6	0.28419	167.62	13.080	428.60	4.2160
39	Butyl acetate	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	123-86-4	116.158	0.67794	0.2637	575.4	0.29318	199.65	8.337	575.40	2.5709
40	Butylbenzene	C <sub>10</sub> H <sub>14</sub>	104-51-8	134.218	0.50812	0.25238	660.5	0.29373	185.30	7.026	660.50	2.0133
41	Butyl mercaptan	C <sub>4</sub> H <sub>10</sub> S	109-79-5	90.187	0.89458	0.27463	570.1	0.28512	157.46	10.585	570.10	3.2574
42	sec-Butyl mercaptan	C <sub>4</sub> H <sub>10</sub> S	513-53-1	90.187	0.89137	0.27365	554	0.2953	133.02	10.761	554.00	3.2573
43	1-Butyne	C <sub>4</sub> H <sub>6</sub>	107-00-6	54.090	1.3409	0.27892	440	0.29661	147.43	14.901	440.00	4.8075
44	Butyraldehyde	C <sub>4</sub> H <sub>8</sub> O	123-72-8	72.106	1.0361	0.26731	537.2	0.28397	176.75	12.589	537.20	3.8760
45	Butyric acid	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	107-92-6	88.105	0.88443	0.25828	615.7	0.248	267.95	11.087	615.70	3.4243
46	Butyronitrile	C <sub>4</sub> H <sub>7</sub> N	109-74-0	69.105	0.87533	0.24331	582.25	0.28586	161.25	13.047	582.25	3.5976
47	Carbon dioxide	CO <sub>2</sub>	124-38-9	44.010	2.768	0.26212	304.21	0.2908	216.58	26.828	304.21	10.5600
48	Carbon disulfide	CS <sub>2</sub>	75-15-0	76.141	1.7968	0.28749	552	0.3226	161.11	19.064	552.00	6.2500
49	Carbon monoxide	CO	630-08-0	28.010	2.897	0.27532	132.92	0.2813	68.15	30.180	132.92	10.5220
50	Carbon tetrachloride	CCl <sub>4</sub>	56-23-5	153.823	0.99835	0.274	556.35	0.287	250.33	10.843	556.35	3.6436
51	Carbon tetrafluoride	CF <sub>4</sub>	75-73-0	88.004	1.955	0.27884	227.51	0.28571	89.56	21.211	227.51	7.0112
52	Chlorine	Cl <sub>2</sub>	7782-50-5	70.906	2.23	0.27645	417.15	0.2926	172.12	24.242	417.15	8.0666
53	Chlorobenzene	C <sub>6</sub> H <sub>5</sub> Cl	108-90-7	112.557	0.8711	0.26805	632.35	0.2799	227.95	10.385	632.35	3.2498
54	Chloroethane	C <sub>2</sub> H <sub>5</sub> Cl	75-00-3	64.514	1.3	0.26019	460.35	0.27155	134.80	17.016	460.35	4.9963
55	Chloroform	CHCl <sub>3</sub>	67-66-3	119.378	1.0841	0.2581	536.4	0.2741	209.63	13.702	536.40	4.2003
56	Chloromethane	CH <sub>3</sub> Cl	74-87-3	50.488	1.817	0.25877	416.25	0.2833	175.43	22.347	416.25	7.0217
57	1-Chloropropane	C <sub>3</sub> H <sub>7</sub> Cl	540-54-5	78.541	1.087	0.26832	503.15	0.28055	150.35	13.328	503.15	4.0511
58	2-Chloropropane	C <sub>3</sub> H <sub>7</sub> Cl	75-29-6	78.541	1.1202	0.27669	489	0.27646	155.97	12.855	489.00	4.0486
59	m-Cresol	C <sub>7</sub> H <sub>8</sub> O	108-39-4	108.138	0.9061	0.28268	705.85	0.2707	285.39	9.612	705.85	3.2054

60	<i>o</i> -Cresol	C <sub>7</sub> H <sub>8</sub> O	95-48-7	108.138	1.0861	0.30624	697.55	0.30587	304.19	9.575	697.55	3.5466
61	<i>p</i> -Cresol	C <sub>7</sub> H <sub>8</sub> O	106-44-5	108.138	1.1503	0.31861	704.65	0.30104	307.93	9.449	704.65	3.6104
62	Cumene	C <sub>9</sub> H <sub>12</sub>	98-82-8	120.192	0.58711	0.25583	631	0.28498	177.14	7.939	631.00	2.2949
63	Cyanogen	C <sub>2</sub> N <sub>2</sub>	460-19-5	52.035	1.0743	0.20948	400.15	0.20724	245.25	18.520	400.15	5.1284
64	Cyclobutane	C <sub>4</sub> H <sub>6</sub>	287-23-0	56.106	1.3931	0.29255	459.93	0.24913	182.48	14.074	459.93	4.7619
65	Cyclohexane	C <sub>6</sub> H <sub>12</sub>	110-82-7	84.159	0.88998	0.27376	553.8	0.28571	279.69	9.380	553.80	3.2509
66	Cyclohexanol	C <sub>6</sub> H <sub>12</sub> O	108-93-0	100.159	0.8243	0.26545	650.1	0.28495	296.60	9.469	650.10	3.1053
67	Cyclohexanone	C <sub>6</sub> H <sub>10</sub> O	108-94-1	98.143	0.86464	0.26888	653	0.29943	242.00	10.090	653.00	3.2157
68	Cyclohexene	C <sub>6</sub> H <sub>10</sub>	110-83-8	82.144	0.92997	0.27056	560.4	0.28943	169.67	11.160	560.40	3.4372
69	Cyclopentane	C <sub>5</sub> H <sub>10</sub>	287-92-3	70.133	1.0897	0.28356	511.7	0.25142	179.28	11.906	511.70	3.8429
70	Cyclopentene	C <sub>5</sub> H <sub>8</sub>	142-29-0	68.117	1.1035	0.27035	507	0.28699	138.13	13.470	507.00	4.0817
71	Cyclopropane	C <sub>3</sub> H <sub>6</sub>	75-19-4	42.080	1.7411	0.28205	398	0.29598	145.59	18.658	398.00	6.1730
72	Cyclohexyl mercaptan	C <sub>6</sub> H <sub>12</sub> S	1569-69-3	116.224	0.78578	0.27882	664	0.31067	189.64	8.905	664.00	2.8182
73	Decanal	C <sub>10</sub> H <sub>20</sub> O	112-31-2	156.265	0.46802	0.27146	674.2	0.26869	267.15	5.383	674.20	1.7241
74	Decane	C <sub>10</sub> H <sub>22</sub>	124-18-5	142.282	0.41084	0.25175	617.7	0.28571	243.51	5.393	617.70	1.6320
75	Decanoic acid	C <sub>10</sub> H <sub>20</sub> O <sub>2</sub>	334-48-5	172.265	0.39348	0.2492	722.1	0.28571	304.55	5.181	722.10	1.5790
76	1-Decanol	C <sub>10</sub> H <sub>22</sub> O	112-30-1	158.281	0.38208	0.24645	688	0.26125	280.05	5.261	688.00	1.5503
77	1-Decene	C <sub>10</sub> H <sub>20</sub>	872-05-9	140.266	0.43981	0.25661	616.6	0.29148	206.89	5.733	616.60	1.7139
78	Decyl mercaptan	C <sub>10</sub> H <sub>22</sub> S	143-10-2	174.347	0.44289	0.27636	696	0.27668	247.56	5.005	696.00	1.6026
79	1-Decyne	C <sub>10</sub> H <sub>18</sub>	764-93-2	138.250	0.46877	0.25875	619.85	0.29479	229.15	5.895	619.85	1.8117
80	Deuterium	D <sub>2</sub>	7782-39-0	4.032	5.2115	0.315	38.35	0.28571	18.73	42.945	38.35	16.5440
81	1,1-Dibromoethane	C <sub>2</sub> H <sub>4</sub> Br <sub>2</sub>	557-91-5	187.861	0.95523	0.26364	628	0.29825	210.15	11.799	628.00	3.6232
82	1,2-Dibromoethane	C <sub>2</sub> H <sub>4</sub> Br <sub>2</sub>	106-93-4	187.861	1.0132	0.26634	650.15	0.28571	282.85	11.704	650.15	3.8042
83	Dibromomethane	CH <sub>2</sub> Br <sub>2</sub>	74-95-3	173.835	1.1136	0.24834	611	0.27583	220.60	15.358	611.00	4.4842
84	Dibutyl ether	C <sub>8</sub> H <sub>18</sub> O	142-96-1	130.228	0.55941	0.27243	584.1	0.29932	175.30	6.607	584.10	2.0534
85	<i>m</i> -Dichlorobenzene	C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	541-73-1	147.002	0.74495	0.26147	683.95	0.31526	248.39	9.121	683.95	2.8491
86	<i>o</i> -Dichlorobenzene	C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	95-50-1	147.002	0.74404	0.26112	705	0.30815	256.15	9.166	705.00	2.8494
87	<i>p</i> -Dichlorobenzene	C <sub>6</sub> H <sub>4</sub> Cl <sub>2</sub>	106-46-7	147.002	0.74858	0.26276	684.75	0.30788	326.14	8.518	684.75	2.8489
88	1,1-Dichloroethane	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	75-34-3	98.959	1.1055	0.26533	523	0.287	176.19	13.549	523.00	4.1665
89	1,2-Dichloroethane	C <sub>2</sub> H <sub>4</sub> Cl <sub>2</sub>	107-06-2	98.959	1.2591	0.27698	561.6	0.30492	237.49	13.462	561.60	4.5458
90	Dichloromethane	CH <sub>2</sub> Cl <sub>2</sub>	75-09-2	84.933	1.3897	0.25678	510	0.2902	178.01	17.974	510.00	5.4120
91	1,1-Dichloropropane	C <sub>3</sub> H <sub>6</sub> Cl <sub>2</sub>	78-99-9	112.986	0.9551	0.27794	560	0.24132	200.00	10.862	560.00	3.4364
92	1,2-Dichloropropane	C <sub>3</sub> H <sub>6</sub> Cl <sub>2</sub>	78-87-5	112.986	0.89833	0.26142	572	0.2868	172.71	11.526	572.00	3.4363
93	Diethanol amine	C <sub>4</sub> H <sub>11</sub> NO <sub>2</sub>	111-42-2	105.136	0.68184	0.23796	736.6	0.2062	301.15	10.390	736.60	2.8654
94	Diethyl amine	C <sub>4</sub> H <sub>11</sub> N	109-89-7	73.137	0.85379	0.25675	496.6	0.27027	223.35	10.575	496.60	3.3254
95	Diethyl ether	C <sub>4</sub> H <sub>10</sub> O	60-29-7	74.122	0.9554	0.26847	466.7	0.2814	156.85	11.487	466.70	3.5587
96	Diethyl sulfide	C <sub>4</sub> H <sub>10</sub> S	352-93-2	90.187	0.82227	0.26314	557.15	0.27369	169.20	10.470	557.15	3.1248
97	1,1-Difluoroethane	C <sub>2</sub> H <sub>4</sub> F <sub>2</sub>	75-37-6	66.050	1.4345	0.25774	386.44	0.28178	154.56	18.006	386.44	5.5657
98	1,2-Difluoroethane	C <sub>2</sub> H <sub>4</sub> F <sub>2</sub>	624-72-6	66.050	1.173	0.22856	445	0.28571	215.00	17.424	445.00	5.1321
99	Diffuoromethane	CH <sub>2</sub> F <sub>2</sub>	75-10-5	52.023	1.9973	0.24653	351.26	0.28153	136.95	27.399	351.26	8.6070
100	Di-isopropyl amine	C <sub>6</sub> H <sub>15</sub> N	108-18-9	101.190	0.6181	0.25786	523.1	0.271	176.85	8.054	523.10	2.3970
101	Di-isopropyl ether	C <sub>6</sub> H <sub>14</sub> O	108-20-3	102.175	0.69213	0.26974	500.05	0.28571	187.65	8.067	500.05	2.5659
102	Di-isopropyl ketone	C <sub>7</sub> H <sub>14</sub> O	565-80-0	114.185	0.64619	0.26881	576	0.28036	204.81	7.680	576.00	2.4039
103	1,1-Dimethoxyethane	C <sub>4</sub> H <sub>10</sub> O <sub>2</sub>	534-15-6	90.121	0.89368	0.26599	507.8	0.28571	159.95	11.029	507.80	3.3598
104	1,2-Dimethoxypropane	C <sub>5</sub> H <sub>12</sub> O <sub>2</sub>	7778-85-0	104.148	0.76327	0.26742	543	0.28571	226.10	8.843	543.00	2.8542
105	Dimethyl acetylene	C <sub>4</sub> H <sub>6</sub>	503-17-3	54.090	1.1717	0.25895	473.2	0.27289	240.91	13.767	473.20	4.5248
106	Dimethyl amine	C <sub>2</sub> H <sub>7</sub> N	124-40-3	45.084	1.5436	0.27784	437.2	0.2572	180.96	16.964	437.20	5.5557
107	2,3-Dimethylbutane	C <sub>6</sub> H <sub>14</sub>	79-29-8	86.175	0.7565	0.27305	500	0.27408	145.19	9.031	500.00	2.7706
108	1,1-Dimethylcyclohexane	C <sub>8</sub> H <sub>16</sub>	590-66-9	112.213	0.55873	0.25143	591.15	0.27758	239.66	7.342	591.15	2.2222
109	<i>cis</i> -1,2-Dimethylcyclohexane	C <sub>8</sub> H <sub>16</sub>	2207-01-4	112.213	0.52953	0.24358	606.15	0.26809	223.16	7.578	606.15	2.1739
110	<i>trans</i> -1,2-Dimethylcyclohexane	C <sub>8</sub> H <sub>16</sub>	6876-23-9	112.213	0.54405	0.25026	596.15	0.2658	184.99	7.626	596.15	2.1739
111	Dimethyl disulfide	C <sub>2</sub> H <sub>6</sub> S <sub>2</sub>	624-92-0	94.199	1.1058	0.27866	615	0.31082	188.44	12.413	615.00	3.9683
112	Dimethyl ether	C <sub>2</sub> H <sub>6</sub> O	115-10-6	46.068	1.5693	0.2679	400.1	0.2882	131.65	18.950	400.10	5.8578
113	<i>N,N</i> -Dimethyl formamide	C <sub>3</sub> H <sub>7</sub> NO	68-12-2	73.094	0.89615	0.23478	649.6	0.28091	212.72	13.954	649.60	3.8170
114	2,3-Dimethylpentane	C <sub>7</sub> H <sub>16</sub>	565-59-3	100.202	0.72352	0.28629	537.3	0.27121	160.00	7.874	537.30	2.5272
115	Dimethyl phthalate	C <sub>10</sub> H <sub>10</sub> O <sub>4</sub>	131-11-3	194.184	0.47977	0.25428	766	0.30722	274.18	6.233	766.00	1.8868
116	Dimethylsilane	C <sub>2</sub> H <sub>6</sub> Si	1111-74-6	60.170	1.0214	0.26351	402	0.28421	122.93	12.898	402.00	3.8761
117	Dimethyl sulfide	C <sub>2</sub> H <sub>6</sub> S	75-18-3	62.134	1.4029	0.27991	503.04	0.2741	174.88	15.556	503.04	5.0120
118	Dimethyl sulfoxide	C <sub>2</sub> H <sub>6</sub> OS	67-68-5	78.133	1.1096	0.25189	729	0.3311	291.67	14.111	729.00	4.4051
119	Dimethyl terephthalate	C <sub>10</sub> H <sub>10</sub> O <sub>4</sub>	120-61-6	194.184	0.50824	0.26885	772	0.2612	413.80	5.538	772.00	1.8904
120	1,4-Dioxane	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	123-91-1	88.105	1.1819	0.2813	587	0.3047	284.95	11.838	587.00	4.2016
121	Diphenyl ether	C <sub>12</sub> H <sub>10</sub> O	101-84-8	170.207	0.52133	0.26218	766.8	0.31033	300.03	6.265	766.80	1.9884
122	Dipropyl amine	C <sub>6</sub> H <sub>15</sub> N	142-84-7	101.190	0.659	0.26428	550	0.2766	210.15	7.993	550.00	2.4936

**TABLE 2-32 Densities of Inorganic and Organic Liquids (mol/dm<sup>3</sup>) (Continued)**

Cmpd. no.	Name	Formula	CAS no.	Mol. wt.	C1	C2	C3	C4	$T_{\min}$ , K	Density at $T_{\min}$	$T_{\max}$ , K	Density at $T_{\max}$
123	Dodecane	C <sub>12</sub> H <sub>26</sub>	112-40-3	170.335	0.33267	0.24664	658	0.28571	263.57	4.521	658.00	1.3490
124	Eicosane	C <sub>20</sub> H <sub>42</sub>	112-95-8	282.547	0.18166	0.23351	768	0.28571	309.58	2.729	768.00	0.7780
125	Ethane	C <sub>2</sub> H <sub>6</sub>	74-84-0	30.069	1.9122	0.27937	305.32	0.29187	90.35	21.640	305.32	6.8447
126	Ethanol	C <sub>2</sub> H <sub>6</sub> O	64-17-5	46.068	1.6288	0.27469	514	0.23178	159.05	19.410	514.00	5.9296
127	Ethyl acetate	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	141-78-6	88.105	0.8996	0.25856	523.3	0.278	189.60	11.478	523.30	3.4793
128	Ethyl amine	C <sub>2</sub> H <sub>7</sub> N	75-04-7	45.084	1.0936	0.22636	456.15	0.25522	192.15	17.588	456.15	4.8312
129	Ethylbenzene	C <sub>8</sub> H <sub>10</sub>	100-41-4	106.165	0.70041	0.26162	617.15	0.28454	178.20	9.041	617.15	2.6772
130	Ethyl benzoate	C <sub>9</sub> H <sub>10</sub> O <sub>2</sub>	93-89-0	150.175	0.48864	0.23894	698	0.28421	238.45	7.291	698.00	2.0450
131	2-Ethyl butanoic acid	C <sub>8</sub> H <sub>16</sub> O <sub>2</sub>	88-09-5	116.158	0.66085	0.25707	655	0.31103	258.15	8.220	655.00	2.5707
132	Ethyl butyrate	C <sub>8</sub> H <sub>16</sub> O <sub>2</sub>	105-54-4	116.158	0.63566	0.25613	571	0.27829	175.15	8.491	571.00	2.4818
133	Ethylcyclohexane	C <sub>8</sub> H <sub>16</sub>	1678-91-7	112.213	0.61587	0.26477	609.15	0.28054	161.84	7.868	609.15	2.3261
134	Ethylcyclopentane	C <sub>7</sub> H <sub>14</sub>	1640-89-7	98.186	0.71751	0.26903	569.5	0.27733	134.71	9.018	569.50	2.6670
135	Ethylene	C <sub>2</sub> H <sub>4</sub>	74-85-1	28.053	2.0961	0.27657	282.34	0.29147	104.00	23.326	282.34	7.5789
136	Ethylenediamine	C <sub>2</sub> H <sub>8</sub> N <sub>2</sub>	107-15-3	60.098	0.7842	0.20702	593	0.20254	284.29	15.055	593.00	3.7880
137	Ethylene glycol	C <sub>2</sub> H <sub>6</sub> O <sub>2</sub>	107-21-1	62.068	1.315	0.25125	720	0.21868	260.15	18.310	720.00	5.2338
138	Ethyleneimine	C <sub>2</sub> H <sub>5</sub> N	151-56-4	43.068	1.3462	0.23289	537	0.23357	195.20	21.450	537.00	5.7804
139	Ethylene oxide	C <sub>2</sub> H <sub>4</sub> O	75-21-8	44.053	1.836	0.26024	469.15	0.2696	160.65	23.477	469.15	7.0550
140	Ethyl formate	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	109-94-4	74.079	1.1343	0.26168	508.4	0.2791	193.55	14.006	508.40	4.3347
141	2-Ethyl hexanoic acid	C <sub>8</sub> H <sub>16</sub> O <sub>2</sub>	149-57-5	144.211	0.47428	0.25028	674.6	0.25442	235.00	6.563	674.60	1.8950
142	Ethylhexyl ether	C <sub>8</sub> H <sub>18</sub> O	5756-43-4	130.228	0.55729	0.2714	583	0.29538	180.00	6.612	583.00	2.0534
143	Ethylisopropyl ether	C <sub>6</sub> H <sub>14</sub> O	625-54-7	88.148	0.8185	0.26929	489	0.30621	140.00	9.924	489.00	3.0395
144	Ethylisopropyl ketone	C <sub>8</sub> H <sub>16</sub> O	565-69-5	100.159	0.68162	0.25152	567	0.3182	204.15	8.975	567.00	2.7100
145	Ethyl mercaptan	C <sub>2</sub> H <sub>6</sub> S	75-08-1	62.134	1.3047	0.2694	499.15	0.27866	125.26	16.242	499.15	4.8430
146	Ethyl propionate	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	105-37-3	102.132	0.7405	0.25563	546	0.2795	199.25	9.632	546.00	2.8968
147	Ethylpropyl ether	C <sub>6</sub> H <sub>14</sub> O	628-32-0	88.148	0.7908	0.266	500.23	0.292	145.65	9.847	500.23	2.9729
148	Ethyltrichlorosilane	C <sub>2</sub> H <sub>5</sub> Cl <sub>3</sub> Si	115-21-9	163.506	0.58579	0.24246	559.95	0.29509	167.55	8.653	559.95	2.4160
149	Fluorine	F <sub>2</sub>	7782-41-4	37.997	4.2895	0.28587	144.12	0.28776	53.48	44.888	144.12	15.0050
150	Fluorobenzene	C <sub>6</sub> H <sub>5</sub> F	462-06-6	96.102	1.0146	0.27277	560.09	0.28291	230.94	11.374	560.09	3.7196
151	Fluoroethane	C <sub>2</sub> H <sub>5</sub> F	353-36-6	48.060	1.6525	0.27099	375.31	0.2442	129.95	19.785	375.31	6.0980
152	Fluoromethane	CH <sub>3</sub> F	593-53-3	34.033	2.1854	0.24725	317.42	0.27558	131.35	29.526	317.42	8.8388
153	Formaldehyde	CH <sub>2</sub> O	50-00-0	30.026	1.9415	0.22309	408	0.28571	181.15	30.945	408.00	8.7028
154	Formamide	CH <sub>3</sub> NO	75-12-7	45.041	1.2486	0.20352	771	0.25178	275.60	25.488	771.00	6.1350
155	Formic acid	CH <sub>2</sub> O <sub>2</sub>	64-18-6	46.026	1.938	0.24225	588	0.24435	281.45	26.806	588.00	8.0000
156	Furan	C <sub>4</sub> H <sub>4</sub> O	110-00-9	68.074	1.1339	0.24741	490.15	0.2612	187.55	15.702	490.15	4.5831
157	Helium-4	He	7440-59-7	4.003	7.2475	0.41865	5.2	0.24096	2.20	37.115	5.20	17.3120
158	Heptadecane	C <sub>17</sub> H <sub>36</sub>	629-78-7	240.468	0.21897	0.23642	736	0.28571	295.13	3.219	736.00	0.9262
159	Heptanal	C <sub>7</sub> H <sub>14</sub> O	111-71-7	114.185	0.59006	0.25609	616.8	0.28384	229.80	7.600	616.80	2.3041
160	Heptane	C <sub>7</sub> H <sub>16</sub>	142-82-5	100.202	0.61259	0.26211	540.2	0.28141	182.57	7.700	540.20	2.3371
161	Heptanoic acid	C <sub>7</sub> H <sub>14</sub> O <sub>2</sub>	111-14-8	130.185	0.53066	0.24729	677.3	0.28289	265.83	7.221	677.30	2.1459
162	1-Heptanol	C <sub>7</sub> H <sub>16</sub> O	111-70-6	116.201	0.55687	0.24725	632.3	0.31471	239.15	7.502	632.30	2.2523
163	2-Heptanol	C <sub>7</sub> H <sub>16</sub> O	543-49-7	116.201	0.57114	0.25534	608.3	0.26487	230.00	7.454	608.30	2.2368
164	3-Heptanone	C <sub>7</sub> H <sub>14</sub> O	106-35-4	114.185	0.59268	0.25663	606.6	0.27766	234.15	7.575	606.60	2.3095
165	2-Heptanone	C <sub>7</sub> H <sub>14</sub> O	110-43-0	114.185	0.58247	0.25279	611.4	0.29818	238.15	7.551	611.40	2.3042
166	1-Heptene	C <sub>7</sub> H <sub>14</sub>	592-76-7	98.186	0.66016	0.26657	537.4	0.28571	154.12	8.226	537.40	2.4765
167	Heptyl mercaptan	C <sub>7</sub> H <sub>16</sub> S	1639-09-4	132.267	0.58622	0.2726	645	0.29644	229.92	6.728	645.00	2.1505
168	1-Heptyne	C <sub>7</sub> H <sub>12</sub>	628-71-7	96.170	0.67304	0.26045	547	0.28388	192.22	8.492	547.00	2.5841
169	Hexadecane	C <sub>16</sub> H <sub>34</sub>	544-76-3	226.441	0.23289	0.23659	723	0.28571	291.31	3.415	723.00	0.9844
170	Hexanal	C <sub>6</sub> H <sub>12</sub> O	66-25-1	100.159	0.71899	0.26531	591	0.27628	217.15	8.724	591.00	2.7100
171	Hexane	C <sub>6</sub> H <sub>14</sub>	110-54-3	86.175	0.70824	0.26411	507.6	0.27537	177.83	8.747	507.60	2.6816
172	Hexanoic acid	C <sub>6</sub> H <sub>12</sub> O <sub>2</sub>	142-62-1	116.158	0.62833	0.25598	660.2	0.25304	269.25	8.096	660.20	2.4546
173	1-Hexanol	C <sub>6</sub> H <sub>14</sub> O	111-27-3	102.175	0.70093	0.26776	611.3	0.24919	228.55	8.456	611.30	2.6178
174	2-Hexanol	C <sub>6</sub> H <sub>14</sub> O	626-93-7	102.175	0.67393	0.25948	585.3	0.26552	223.00	8.518	585.30	2.5972
175	2-Hexanone	C <sub>6</sub> H <sub>12</sub> O	591-78-6	100.159	0.67816	0.25634	587.61	0.28365	217.35	8.732	587.61	2.6455
176	3-Hexanone	C <sub>6</sub> H <sub>12</sub> O	589-38-8	100.159	0.67666	0.25578	582.82	0.27746	217.50	8.763	582.82	2.6455
177	1-Hexene	C <sub>6</sub> H <sub>12</sub>	592-41-6	84.159	0.76925	0.26809	504	0.28571	133.39	9.581	504.00	2.8694
178	3-Hexyne	C <sub>6</sub> H <sub>10</sub>	928-49-4	82.144	0.78045	0.26065	544	0.28571	170.05	10.021	544.00	2.9942
179	Hexyl mercaptan	C <sub>6</sub> H <sub>14</sub> S	111-31-9	118.240	0.66372	0.27345	623	0.29185	192.62	7.773	623.00	2.4272
180	1-Hexyne	C <sub>6</sub> H <sub>10</sub>	693-02-7	82.144	0.84427	0.27185	516.2	0.2771	141.25	10.230	516.20	3.1056
181	2-Hexyne	C <sub>6</sub> H <sub>10</sub>	764-35-2	82.144	0.76277	0.25248	549	0.31611	183.65	10.133	549.00	3.0211

182	Hydrazine	H <sub>4</sub> N <sub>2</sub>	302-01-2	32.045	1.0516	0.16613	653.15	0.1898	274.69	31.934	653.15	6.3300
183	Hydrogen	H <sub>2</sub>	1333-74-0	2.016	5.414	0.34893	33.19	0.2706	13.95	38.487	33.19	15.5160
184	Hydrogen bromide	HBr	10035-10-6	80.912	2.832	0.2832	363.15	0.28571	185.15	27.985	363.15	10.0000
185	Hydrogen chloride	HCl	7647-01-0	36.461	3.342	0.2729	324.65	0.3217	158.97	34.854	324.65	12.2460
186	Hydrogen cyanide	CHN	74-90-8	27.025	1.3413	0.18589	456.65	0.28206	259.83	27.202	456.65	7.2156
187	Hydrogen fluoride	HF	7664-39-3	20.006	2.5635	0.1766	461.15	0.3733	189.79	60.203	461.15	14.5160
188	Hydrogen sulfide	H <sub>2</sub> S	7783-06-4	34.081	2.7672	0.27369	373.53	0.29015	187.68	29.130	373.53	10.1110
189	Isobutyric acid	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	79-31-2	88.105	0.88575	0.25736	605	0.26265	227.15	11.420	605.00	3.4417
190	Isopropyl amine	C <sub>3</sub> H <sub>9</sub> N	75-31-0	59.110	1.2801	0.2828	471.85	0.2972	177.95	13.561	471.85	4.5265
191	Malonic acid	C <sub>3</sub> H <sub>4</sub> O <sub>4</sub>	141-82-2	104.061	0.84266	0.217	805	0.28571	407.95	13.533	805.00	3.8832
192	Methacrylic acid	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	79-41-4	86.089	0.87025	0.24383	662	0.28571	288.15	11.834	662.00	3.5691
193	Methane	CH <sub>4</sub>	74-82-8	16.042	2.9214	0.28976	190.56	0.28881	90.69	28.180	190.56	10.0820
194	Methanol	CH <sub>3</sub> O	67-56-1	32.042	2.3267	0.27073	512.5	0.24713	175.47	27.915	512.50	8.5942
195	N-Methyl acetamide	C <sub>3</sub> H <sub>7</sub> NO	79-16-3	73.094	0.88268	0.23568	718	0.27379	301.15	13.012	718.00	3.7452
196	Methyl acetate	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	79-20-9	74.079	1.13	0.2593	506.55	0.2764	175.15	14.475	506.55	4.3579
197	Methyl acetylene	C <sub>3</sub> H <sub>4</sub>	74-99-7	40.064	1.6085	0.26436	402.4	0.27987	170.45	19.031	402.40	6.0845
198	Methyl acrylate	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	96-33-3	86.089	0.97286	0.26267	536	0.2508	196.32	12.203	536.00	3.7037
199	Methyl amine	CH <sub>3</sub> N	74-89-5	31.057	1.39	0.21405	430.05	0.2275	179.69	25.378	430.05	6.4938
200	Methyl benzoate	C <sub>8</sub> H <sub>8</sub> O <sub>2</sub>	93-58-3	136.148	0.53382	0.23274	693	0.28147	260.75	8.220	693.00	2.2936
201	3-Methyl-1,2-butadiene	C <sub>5</sub> H <sub>8</sub>	598-25-4	68.117	0.84623	0.24625	490	0.29041	159.53	11.994	490.00	3.4365
202	2-Methylbutane	C <sub>5</sub> H <sub>12</sub>	78-78-4	72.149	0.91991	0.27815	460.4	0.28667	113.25	10.764	460.40	3.3072
203	2-Methylbutanoic acid	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	116-53-0	102.132	0.72762	0.25244	643	0.28571	193.00	9.992	643.00	2.8823
204	3-Methyl-1-butanol	C <sub>5</sub> H <sub>12</sub> O	123-51-3	88.148	0.80828	0.26783	577.2	0.23588	155.95	10.254	577.20	3.0179
205	2-Methyl-1-butene	C <sub>5</sub> H <sub>10</sub>	563-46-2	70.133	0.91619	0.26752	465	0.28164	135.58	11.332	465.00	3.4248
206	2-Methyl-2-butene	C <sub>5</sub> H <sub>10</sub>	513-35-9	70.133	0.93391	0.27275	470	0.2578	139.39	11.216	470.00	3.4241
207	2-Methyl-1-butene-3-yne	C <sub>5</sub> H <sub>6</sub>	78-80-8	66.101	1.1157	0.27671	492	0.30821	160.15	12.581	492.00	4.0320
208	Methylbutyl ether	C <sub>5</sub> H <sub>12</sub> O	628-28-4	88.148	0.8363	0.27514	512.74	0.27553	157.48	9.758	512.74	3.0395
209	Methylbutyl sulfide	C <sub>5</sub> H <sub>12</sub> S	628-29-5	104.214	0.75509	0.27183	593	0.29127	175.30	9.006	593.00	2.7778
210	3-Methyl-1-butyne	C <sub>5</sub> H <sub>8</sub>	598-23-2	68.117	0.94575	0.26008	463.2	0.30807	183.45	11.519	463.20	3.6364
211	Methyl butyrate	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	623-42-7	102.132	0.76983	0.26173	554.5	0.26879	187.35	9.764	554.50	2.9413
212	Methylchlorosilane	CH <sub>3</sub> ClSi	993-00-0	80.589	1.0674	0.26257	442	0.26569	139.05	13.626	442.00	4.0652
213	Methylcyclohexane	C <sub>7</sub> H <sub>14</sub>	108-87-2	98.186	0.73109	0.26971	572.1	0.29185	146.58	9.017	572.10	2.7107
214	1-Methylcyclohexanol	C <sub>7</sub> H <sub>14</sub> O	590-67-0	114.185	0.7013	0.266	686	0.28571	285.15	8.209	686.00	2.6365
215	cis-2-Methylcyclohexanol	C <sub>7</sub> H <sub>14</sub> O	7443-70-1	114.185	0.70973	0.26544	614	0.26016	280.15	8.293	614.00	2.6738
216	trans-2-Methylcyclohexanol	C <sub>7</sub> H <sub>14</sub> O	7443-52-9	114.185	0.72836	0.27241	617	0.2478	269.15	8.263	617.00	2.6738
217	Methylcyclopentane	C <sub>6</sub> H <sub>12</sub>	96-37-7	84.159	0.84758	0.27037	532.7	0.28258	130.73	10.491	532.70	3.1349
218	1-Methylcyclopentene	C <sub>6</sub> H <sub>10</sub>	693-89-0	82.144	0.88824	0.26914	542	0.27874	146.62	10.980	542.00	3.3003
219	3-Methylcyclopentene	C <sub>6</sub> H <sub>10</sub>	1120-62-3	82.144	0.9109	0.276	526	0.26756	115.00	11.014	526.00	3.3004
220	Methyldichlorosilane	CH <sub>3</sub> Cl <sub>2</sub> Si	75-54-7	115.034	0.97608	0.28209	483	0.22529	182.55	10.789	483.00	3.4602
221	Methylethyl ether	C <sub>3</sub> H <sub>8</sub> O	540-67-0	60.095	1.2635	0.27878	437.8	0.2744	160.00	13.995	437.80	4.5322
222	Methylethyl ketone	C <sub>4</sub> H <sub>8</sub> O	78-93-3	72.106	0.93767	0.25035	535.5	0.29964	186.48	12.663	535.50	3.7454
223	Methylethyl sulfide	C <sub>3</sub> H <sub>8</sub> S	624-89-5	76.161	1.067	0.27102	533	0.29364	167.23	12.671	533.00	3.9370
224	Methyl formate	C <sub>2</sub> H <sub>4</sub> O <sub>2</sub>	107-31-3	60.052	1.525	0.2634	487.2	0.2806	174.15	18.811	487.20	5.7897
225	Methylisobutyl ether	C <sub>6</sub> H <sub>12</sub> O	625-44-5	88.148	0.84005	0.27638	497	0.27645	150.00	9.738	497.00	3.0395
226	Methylisobutyl ketone	C <sub>6</sub> H <sub>12</sub> O	108-10-1	100.159	0.71687	0.26453	574.6	0.28918	189.15	8.862	574.60	2.7100
227	Methyl isocyanate	C <sub>2</sub> H <sub>3</sub> NO	624-83-9	57.051	1.0228	0.20692	488	0.28571	256.15	17.666	488.00	4.9430
228	Methylisopropyl ether	C <sub>4</sub> H <sub>10</sub> O	598-53-8	74.122	0.97887	0.27017	464.48	0.28998	127.93	11.933	464.48	3.6232
229	Methylisopropyl ketone	C <sub>5</sub> H <sub>10</sub> O	563-80-4	86.132	0.86567	0.26836	553.4	0.28364	180.15	10.460	553.40	3.2258
230	Methylisopropyl sulfide	C <sub>4</sub> H <sub>10</sub> S	1551-21-9	90.187	0.78912	0.25915	553.1	0.26512	171.64	10.352	553.10	3.0450
231	Methyl mercaptan	CH <sub>3</sub> S	74-93-1	48.107	1.9323	0.28018	469.95	0.28523	150.18	21.564	469.95	6.8966
232	Methyl methacrylate	C <sub>5</sub> H <sub>8</sub> O <sub>2</sub>	80-62-6	100.116	0.7761	0.25068	566	0.29773	224.95	10.176	566.00	3.0960
233	2-Methyloctanoic acid	C <sub>9</sub> H <sub>18</sub> O <sub>2</sub>	3004-93-1	158.238	0.4416	0.2521	694	0.28532	240.00	5.938	694.00	1.7517
234	2-Methylpentane	C <sub>6</sub> H <sub>14</sub>	107-83-5	86.175	0.72701	0.26754	497.7	0.28268	119.55	9.204	497.70	2.7174
235	Methyl pentyl ether	C <sub>6</sub> H <sub>14</sub> O	628-80-8	102.175	0.71004	0.26981	546.49	0.29974	176.00	8.445	546.49	2.6316
236	2-Methylpropane	C <sub>4</sub> H <sub>10</sub>	75-28-5	58.122	1.0631	0.27506	407.8	0.2758	113.54	12.574	407.80	3.8650
237	2-Methyl-2-propanol	C <sub>4</sub> H <sub>10</sub> O	75-65-0	74.122	0.92128	0.25442	506.2	0.27586	298.97	10.556	506.20	3.6211
238	2-Methyl propene	C <sub>4</sub> H <sub>8</sub>	115-11-7	56.106	1.1446	0.2724	417.9	0.28172	132.81	13.507	417.90	4.2019
239	Methyl propionate	C <sub>4</sub> H <sub>8</sub> O <sub>2</sub>	554-12-1	88.105	0.9147	0.2594	530.6	0.2774	185.65	11.678	530.60	3.5262
240	Methylpropyl ether	C <sub>4</sub> H <sub>10</sub> O	557-17-5	74.122	0.96145	0.26536	476.25	0.30088	133.97	12.043	476.25	3.6232
241	Methylpropyl sulfide	C <sub>4</sub> H <sub>10</sub> S	3877-15-4	90.187	0.87496	0.26862	565	0.30259	160.17	10.689	565.00	3.2572
242	Methylsilane	CH <sub>3</sub> Si	992-94-9	46.144	1.3052	0.26757	352.5	0.28799	116.34	15.791	352.50	4.8780
243	alpha-Methyl styrene	C <sub>9</sub> H <sub>8</sub>	98-83-9	118.176	0.64856	0.25877	654	0.31444	249.95	8.010	654.00	2.5063
244	Methyl tert-butyl ether	C <sub>5</sub> H <sub>12</sub> O	1634-04-4	88.148	0.928	0.289	497.1	0.286	164.55	9.710	497.10	3.2111

**TABLE 2-32 Densities of Inorganic and Organic Liquids (mol/dm<sup>3</sup>) (Concluded)**

Cmpd. no.	Name	Formula	CAS no.	Mol. wt.	C1	C2	C3	C4	$T_{\min}$ , K	Density at $T_{\min}$	$T_{\max}$ , K	Density at $T_{\max}$
245	Methyl vinyl ether	C <sub>3</sub> H <sub>6</sub> O	107-25-5	58.079	1.2587	0.26433	437	0.25819	151.15	15.691	437.00	4.7619
246	Naphthalene	C <sub>10</sub> H <sub>8</sub>	91-20-3	128.171	0.6348	0.25838	748.4	0.27727	333.15	7.755	748.40	2.4568
247	Neon	Ne	7440-01-9	20.180	7.3718	0.3067	44.4	0.2786	24.56	61.796	44.40	24.0360
248	Nitroethane	C <sub>2</sub> H <sub>5</sub> NO <sub>2</sub>	79-24-3	75.067	1.0024	0.23655	593	0.278	183.63	15.556	593.00	4.2376
249	Nitrogen	N <sub>2</sub>	7727-37-9	28.013	3.2091	0.2861	126.2	0.2966	63.15	31.063	126.20	11.2170
250	Nitrogen trifluoride	F <sub>3</sub> N	7783-54-2	71.002	2.3736	0.2817	234	0.29529	66.46	26.555	234.00	8.4260
251	Nitromethane	CH <sub>3</sub> NO <sub>2</sub>	75-52-5	61.040	1.3728	0.23793	588.15	0.29601	244.60	19.632	588.15	5.7698
252	Nitrous oxide	N <sub>2</sub> O	10024-97-2	44.013	2.781	0.27244	309.57	0.2882	182.30	27.928	309.57	10.2080
253	Nitric oxide	NO	10102-43-9	30.006	5.246	0.3044	180.15	0.242	109.50	44.487	180.15	17.2340
254	Nonadecane	C <sub>19</sub> H <sub>40</sub>	629-92-5	268.521	0.19199	0.23337	758	0.28571	305.04	2.889	758.00	0.8227
255	Nonanal	C <sub>9</sub> H <sub>18</sub> O	124-19-6	142.239	0.49587	0.26135	658	0.30736	255.15	6.017	658.00	1.8973
256	Nonane	C <sub>9</sub> H <sub>20</sub>	111-84-2	128.255	0.46321	0.25444	594.6	0.28571	219.66	6.043	594.60	1.8210
257	Nonanoic acid	C <sub>9</sub> H <sub>18</sub> O <sub>2</sub>	112-05-0	158.238	0.41582	0.24284	710.7	0.30036	285.55	5.759	710.70	1.7123
258	1-Nonanol	C <sub>9</sub> H <sub>20</sub> O	143-08-8	144.255	0.43682	0.25161	670.9	0.2498	268.15	5.850	670.90	1.7361
259	2-Nonanol	C <sub>9</sub> H <sub>20</sub> O	628-99-9	144.255	0.41687	0.24056	649.5	0.2916	238.15	6.031	649.50	1.7329
260	1-Nonene	C <sub>9</sub> H <sub>18</sub>	124-11-8	126.239	0.48661	0.25722	593.1	0.28571	191.91	6.372	593.10	1.8918
261	Nonyl mercaptan	C <sub>9</sub> H <sub>20</sub> S	1455-21-6	160.320	0.47377	0.27052	681	0.30284	253.05	5.453	681.00	1.7513
262	1-Nonyne	C <sub>9</sub> H <sub>16</sub>	3452-09-3	124.223	0.52152	0.25918	598.05	0.29177	223.15	6.537	598.05	2.0122
263	Octadecane	C <sub>18</sub> H <sub>38</sub>	593-45-3	254.494	0.20448	0.23474	747	0.28571	301.31	3.042	747.00	0.8711
264	Octanal	C <sub>8</sub> H <sub>16</sub> O	124-13-0	128.212	0.53636	0.26174	638.9	0.26348	246.00	6.664	638.90	2.0492
265	Octane	C <sub>8</sub> H <sub>18</sub>	111-65-9	114.229	0.5266	0.25693	568.7	0.28571	216.38	6.705	568.70	2.0500
266	Octanoic acid	C <sub>8</sub> H <sub>16</sub> O <sub>2</sub>	124-07-2	144.211	0.48251	0.25196	694.26	0.26842	289.65	6.311	694.26	1.9150
267	1-Octanol	C <sub>8</sub> H <sub>18</sub> O	111-87-5	130.228	0.48979	0.24931	652.3	0.27824	257.65	6.574	652.30	1.9646
268	2-Octanol	C <sub>8</sub> H <sub>18</sub> O	123-96-6	130.228	0.50726	0.25972	629.8	0.22	241.55	6.563	629.80	1.9531
269	2-Octanone	C <sub>8</sub> H <sub>16</sub> O	111-13-7	128.212	0.50006	0.24851	632.7	0.29942	252.85	6.648	632.70	2.0122
270	3-Octanone	C <sub>8</sub> H <sub>16</sub> O	106-68-3	128.212	0.5108	0.25386	627.7	0.26735	255.55	6.628	627.70	2.0121
271	1-Octene	C <sub>8</sub> H <sub>16</sub>	111-66-0	112.213	0.55449	0.25952	566.9	0.28571	171.45	7.216	566.90	2.1366
272	Octyl mercaptan	C <sub>8</sub> H <sub>18</sub> S	111-88-6	146.294	0.52577	0.27234	667.3	0.30063	223.95	6.099	667.30	1.9306
273	1-Octyne	C <sub>8</sub> H <sub>14</sub>	629-05-0	110.197	0.58945	0.26052	574	0.28532	193.55	7.483	574.00	2.2626
274	Oxalic acid	C <sub>2</sub> H <sub>2</sub> O <sub>4</sub>	144-62-7	90.035	1.0501	0.215	804	0.28571	462.65	16.271	804.00	4.8842
275	Oxygen	O <sub>2</sub>	7782-44-7	31.999	3.9143	0.28772	154.58	0.2924	54.35	40.770	154.58	13.6050
276	Ozone	O <sub>3</sub>	10028-15-6	47.998	3.3592	0.29884	261	0.28523	80.15	33.361	261.00	11.2410
277	Pentadecane	C <sub>15</sub> H <sub>32</sub>	629-62-9	212.415	0.25142	0.23837	708	0.28571	283.07	3.642	708.00	1.0550
278	Pentanal	C <sub>5</sub> H <sub>10</sub> O	110-62-3	86.132	0.83871	0.26252	566.1	0.29444	182.00	10.534	566.10	3.1948
279	Pentane	C <sub>5</sub> H <sub>12</sub>	109-66-0	72.149	0.84947	0.26726	469.7	0.27789	143.42	10.474	469.70	3.1784
280	Pentanoic acid	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	109-52-4	102.132	0.73455	0.25636	639.16	0.25522	239.15	9.587	639.16	2.8653
281	1-Pentanol	C <sub>5</sub> H <sub>12</sub> O	71-41-0	88.148	0.81754	0.26732	588.1	0.25348	195.56	10.061	588.10	3.0583
282	2-Pentanol	C <sub>5</sub> H <sub>12</sub> O	6032-29-7	88.148	0.79324	0.25806	561	0.28571	200.00	10.147	561.00	3.0739
283	2-Pentanone	C <sub>5</sub> H <sub>10</sub> O	107-87-9	86.132	0.90411	0.27207	561.08	0.30669	196.29	10.398	561.08	3.3231
284	3-Pentanone	C <sub>5</sub> H <sub>10</sub> O	96-22-0	86.132	0.71811	0.24129	560.95	0.27996	234.18	10.102	560.95	2.9761
285	1-Pentene	C <sub>5</sub> H <sub>10</sub>	109-67-1	70.133	0.89816	0.26608	464.8	0.28571	108.02	11.521	464.80	3.3755
286	2-Pentyl mercaptan	C <sub>5</sub> H <sub>12</sub> S	2084-19-7	104.214	0.65858	0.25367	584.3	0.28571	160.75	9.073	584.30	2.5962
287	Pentyl mercaptan	C <sub>5</sub> H <sub>12</sub> S	110-66-7	104.214	0.75345	0.27047	598	0.30583	197.45	8.858	598.00	2.7857
288	1-Pentyne	C <sub>5</sub> H <sub>8</sub>	627-19-0	68.117	0.8491	0.2352	481.2	0.353	167.45	12.532	481.20	3.6101
289	2-Pentyne	C <sub>5</sub> H <sub>8</sub>	627-21-4	68.117	0.92099	0.25419	519	0.31077	163.83	12.240	519.00	3.6232
290	Phenanthrene	C <sub>14</sub> H <sub>10</sub>	85-01-8	178.229	0.45554	0.2523	869	0.24841	372.38	5.985	869.00	1.8055
291	Phenol	C <sub>6</sub> H <sub>6</sub> O	108-95-2	94.111	1.3798	0.31598	694.25	0.32768	314.06	11.244	694.25	4.3667
292	Phenyl isocyanate	C <sub>7</sub> H <sub>5</sub> NO	103-71-9	119.121	0.63163	0.23373	653	0.28571	243.15	9.647	653.00	2.7024
293	Phthalic anhydride	C <sub>8</sub> H <sub>4</sub> O <sub>3</sub>	85-44-9	148.116	0.5393	0.22704	791	0.248	404.15	8.222	791.00	2.3754
294	Propadiene	C <sub>3</sub> H <sub>4</sub>	463-49-0	40.064	1.6087	0.26543	394	0.29895	136.87	19.479	394.00	6.0607
295	Propane	C <sub>3</sub> H <sub>8</sub>	74-98-6	44.096	1.3757	0.27453	369.83	0.29359	85.47	16.583	369.83	5.0111
296	1-Propanol	C <sub>3</sub> H <sub>8</sub> O	71-23-8	60.095	1.2457	0.27281	536.8	0.23994	146.95	15.206	536.80	4.5662
297	2-Propanol	C <sub>3</sub> H <sub>8</sub> O	67-63-0	60.095	1.1799	0.2644	508.3	0.24653	185.26	14.663	508.30	4.4626
298	Propenylcyclohexene	C <sub>9</sub> H <sub>14</sub>	13511-13-2	122.207	0.61255	0.26769	636	0.28571	199.00	7.476	636.00	2.2883
299	Propionaldehyde	C <sub>3</sub> H <sub>6</sub> O	123-38-6	58.079	1.296	0.26439	504.4	0.29471	170.00	15.929	504.40	4.9018
300	Propionic acid	C <sub>3</sub> H <sub>6</sub> O <sub>2</sub>	79-09-4	74.079	1.0969	0.25568	600.81	0.26857	252.45	13.935	600.81	4.2901
301	Propionitrile	C <sub>3</sub> H <sub>5</sub> N	107-12-0	55.079	1.0224	0.23452	564.4	0.2804	180.26	16.027	564.40	4.3595
302	Propyl acetate	C <sub>5</sub> H <sub>10</sub> O <sub>2</sub>	109-60-4	102.132	0.73041	0.25456	549.73	0.27666	178.15	9.794	549.73	2.8693
303	Propyl amine	C <sub>3</sub> H <sub>9</sub> N	107-10-8	59.110	0.9195	0.23878	496.95	0.2461	188.36	13.764	496.95	3.8508



304	Propylbenzene	C <sub>9</sub> H <sub>12</sub>	103-65-1	120.192	0.57233	0.25171	638.35	0.29616	173.55	7.982	638.35	2.2738
305	Propylene	C <sub>3</sub> H <sub>6</sub>	115-07-1	42.080	1.4403	0.26852	364.85	0.28775	87.89	18.070	364.85	5.3638
306	Propyl formate	C <sub>7</sub> H <sub>8</sub> O <sub>2</sub>	110-74-7	88.105	0.915	0.26134	538	0.28	180.25	11.590	538.00	3.5012
307	2-Propyl mercaptan	C <sub>6</sub> H <sub>8</sub> S	75-33-2	76.161	1.093	0.27762	517	0.29781	142.61	12.610	517.00	3.9370
308	Propyl mercaptan	C <sub>6</sub> H <sub>8</sub> S	107-03-9	76.161	1.0714	0.27214	536.6	0.29481	159.95	12.716	536.60	3.9369
309	1,2-Propylene glycol	C <sub>3</sub> H <sub>8</sub> O <sub>2</sub>	57-55-6	76.094	1.0923	0.26106	626	0.20459	213.15	14.363	626.00	4.1841
310	Quinone	C <sub>6</sub> H <sub>4</sub> O <sub>2</sub>	106-51-4	108.095	0.83228	0.25385	683	0.23658	388.85	10.082	683.00	3.2786
311	Silicon tetrafluoride	F <sub>4</sub> Si	7783-61-1	104.079	1.1945	0.24128	259	0.16693	186.35	15.635	259.00	4.9507
312	Styrene	C <sub>8</sub> H <sub>8</sub>	100-42-5	104.149	0.7397	0.2603	636	0.3009	242.54	9.109	636.00	2.8417
313	Succinic acid	C <sub>4</sub> H <sub>6</sub> O <sub>4</sub>	110-15-6	118.088	0.70284	0.22268	806	0.28571	460.65	10.261	806.00	3.1563
314	Sulfur dioxide	O <sub>2</sub> S	7446-09-5	64.064	2.106	0.25842	430.75	0.2895	197.67	25.298	430.75	8.1495
315	Sulfur hexafluoride	F <sub>6</sub> S	2551-62-4	146.055	1.3587	0.2701	318.69	0.2921	223.15	12.631	318.69	5.0304
316	Sulfur trioxide	O <sub>3</sub> S	7446-11-9	80.063	1.4969	0.19013	490.85	0.4359	289.95	24.241	490.85	7.8730
317	Terephthalic acid	C <sub>8</sub> H <sub>6</sub> O <sub>4</sub>	100-21-0	166.131	0.42685	0.181	1113	0.28571	700.15	8.546	1113.00	2.3583
318	<i>o</i> -Terphenyl	C <sub>18</sub> H <sub>14</sub>	84-15-1	230.304	0.3448	0.25116	857	0.29268	329.35	4.553	857.00	1.3728
319	<i>o</i> -Terphenyl [use Eq. (2)]	C <sub>18</sub> H <sub>14</sub>	84-15-1	230.304	5.7136	-0.003474			288.15	4.713	313.19	4.6256
320	Tetradecane	C <sub>14</sub> H <sub>30</sub>	629-59-4	198.388	0.27248	0.24007	693	0.28571	279.01	3.889	693.00	1.1350
321	Tetrahydrofuran	C <sub>4</sub> H <sub>8</sub> O	109-99-9	72.106	1.2543	0.28084	540.15	0.2912	164.65	13.998	540.15	4.4662
322	1,2,3,4-Tetrahydronaphthalene	C <sub>10</sub> H <sub>12</sub>	119-64-2	132.202	0.67717	0.27772	720	0.2878	237.38	7.638	720.00	2.4383
323	Tetrahydrothiophene	C <sub>4</sub> H <sub>8</sub> S	110-01-0	88.171	1.1628	0.28954	631.95	0.28674	176.99	12.408	631.95	4.0160
324	2,2,3,3-Tetramethylbutane	C <sub>8</sub> H <sub>18</sub>	594-82-1	114.229	0.58988	0.27201	568	0.27341	373.96	5.724	568.00	2.1686
325	Thiophene	C <sub>4</sub> H <sub>4</sub> S	110-02-1	84.140	1.2874	0.28194	579.35	0.30781	234.94	13.430	579.35	4.5662
326	Toluene	C <sub>7</sub> H <sub>8</sub>	108-88-3	92.138	0.8792	0.27136	591.75	0.29241	178.18	10.487	591.75	3.2400
327	1,1,2-Trichloroethane	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub>	79-00-5	133.404	0.9062	0.25475	602	0.31	236.50	11.478	602.00	3.5572
328	Tridecane	C <sub>13</sub> H <sub>28</sub>	629-50-5	184.361	0.29934	0.2433	675	0.28571	267.76	4.182	675.00	1.2300
329	Triethyl amine	C <sub>6</sub> H <sub>15</sub> N	121-44-8	101.190	0.7035	0.27386	535.15	0.2872	158.45	8.284	535.15	2.5688
330	Trimethyl amine	C <sub>3</sub> H <sub>9</sub> N	75-50-3	59.110	1.0116	0.25683	433.25	0.2696	156.08	13.144	433.25	3.9388
331	1,2,3-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	526-73-8	120.192	0.6531	0.27002	664.5	0.26268	243.15	7.728	664.50	2.4187
332	1,2,4-Trimethylbenzene	C <sub>9</sub> H <sub>12</sub>	95-63-6	120.192	0.60394	0.25956	649.1	0.27713	229.33	7.689	649.10	2.3268
333	2,2,4-Trimethylpentane	C <sub>8</sub> H <sub>18</sub>	540-84-1	114.229	0.59059	0.27424	543.8	0.2847	165.78	6.915	543.80	2.1536
334	2,3,3-Trimethylpentane	C <sub>8</sub> H <sub>18</sub>	560-21-4	114.229	0.6028	0.27446	573.5	0.2741	172.22	7.093	573.50	2.1963
335	1,3,5-Trinitrobenzene	C <sub>6</sub> H <sub>3</sub> N <sub>3</sub> O <sub>6</sub>	99-35-4	213.105	0.48195	0.23093	846	0.28571	398.40	7.083	846.00	2.0870
336	2,4,6-Trinitrotoluene	C <sub>7</sub> H <sub>5</sub> N <sub>3</sub> O <sub>6</sub>	118-96-7	227.131	0.37378	0.21379	828	0.29905	354.00	6.452	828.00	1.7484
337	Undecane	C <sub>11</sub> H <sub>24</sub>	1120-21-4	156.308	0.36703	0.24876	639	0.28571	247.57	4.945	639.00	1.4750
338	1-Undecanol	C <sub>11</sub> H <sub>24</sub> O	112-42-5	172.308	0.33113	0.23676	703.9	0.2762	288.45	4.859	703.90	1.3986
339	Vinyl acetate	C <sub>4</sub> H <sub>6</sub> O <sub>2</sub>	108-05-4	86.089	0.9591	0.2593	519.13	0.27448	180.35	12.287	519.13	3.6988
340	Vinyl acetylene	C <sub>4</sub> H <sub>4</sub>	689-97-4	52.075	1.2703	0.26041	454	0.297	173.15	15.664	454.00	4.8781
341	Vinyl chloride	C <sub>2</sub> H <sub>3</sub> Cl	75-01-4	62.498	1.5115	0.2707	432	0.2716	119.36	18.481	432.00	5.5837
342	Vinyl trichlorosilane	C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub> Si	75-94-5	161.490	0.59595	0.24314	543.15	0.24856	178.35	8.824	543.15	2.4511
344	Water [use Eq. (2)]	H <sub>2</sub> O	7732-18-5	18.015	-13.851	0.64038	-0.00191	1.8211E-06	273.16	55.497	353.15	54.0012
345	<i>m</i> -Xylene	C <sub>8</sub> H <sub>10</sub>	108-38-3	106.165	0.68902	0.26086	617	0.27479	225.30	8.648	617.00	2.6413
346	<i>o</i> -Xylene	C <sub>8</sub> H <sub>10</sub>	95-47-6	106.165	0.69962	0.26143	630.3	0.27365	247.98	8.623	630.30	2.6761
347	<i>p</i> -Xylene	C <sub>8</sub> H <sub>10</sub>	106-42-3	106.165	0.67752	0.25887	616.2	0.27596	286.41	8.161	616.20	2.6172

Except for *o*-terphenyl and water, liquid density  $\rho$  is calculated by

$$\rho = C1/C2^{1 + (1-T/C3)^{C4}}$$

where  $\rho$  is in mol/dm<sup>3</sup> and  $T$  is in K. The pressure is equal to the vapor pressure for pressures greater than 1 atm and equal to 1 atm when the vapor pressure is less than 1 atm.

Equation (2), used for the limited temperature ranges as noted for *o*-terphenyl and water, is

$$\rho = C1 + C2T + C3T^2 + C4T^3$$

For water over the entire temperature range of 273.16 to 647.096 K, use

$$\rho = 17.863 + 58.606\tau^{0.35} - 95.396\tau^{2/3} + 213.89\tau - 141.26\tau^{4/3}$$

where  $\tau = 1 - T/647.096$ .

All substances are listed by chemical family in Table 2-6 and by formula in Table 2-7.

Values in this table were taken from the Design Institute for Physical Properties (DIPPR) of the American Institute of Chemical Engineers (AIChE), copyright 2007 AIChE and reproduced with permission of AIChE and of the DIPPR Evaluated Process Design Data Project Steering Committee. Their source should be cited as R. L. Rowley, W. V. Wilding, J. L. Oscarson, Y. Yang, N. A. Zundel, T. E. Daubert, R. P. Danner, DIPPR® Data Compilation of Pure Chemical Properties, Design Institute for Physical Properties, AIChE, New York (2007).

The number of digits provided for values at  $T_{\min}$  and  $T_{\max}$  was chosen for uniformity of appearance and formatting; these do not represent the uncertainties of the physical quantities, but are the result of calculations from the standard thermophysical property formulations within a fixed format.