Designation: D3956 – 12

Standard Specification for Methane Thermophysical Property Tables[1]

This standard is issued under the fixed designation D3956; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 The thermophysical property tables for methane are for use in the calculation of the pressure-volume-temperature (PVT), thermodynamic, and transport properties of methane for process design and operations. Three tables are provided for gaseous and liquid methane at temperatures between 90 K and 600K at pressures to 30 MPa. Two tables provide properties for the liquid and vapor phases at liquid-vapor equilibrium (saturation properties). The third table provides properties at selected T, p points for the equilibrium phase at those conditions. The tables were developed by the National Institute of Standards and Technology from a Standard Reference Database product REFPROP, version 9.0.

2. Applicability

2.1 These tables apply directly only to pure gaseous methane. However, it is expected that they may find substantial use in mathematical models and tables for the thermophysical properties of mixtures containing methane.

3. Tables

3.1 *Thermophysical Properties of Methane Liquid at Liquid-Vapor Equilibrium,* in SI units.

3.2 *Thermophysical Properties of Methane Vapor at Liquid-Vapor Equilibrium,* in SI units.

3.3 *Thermophysical Properties of Methane Along Isobars,* in SI units.

3.4 The tabulated properties are:

ρ = molar density ($mol \cdot L^{-1}$)
H = molar enthalpy ($J \cdot mol^{-1}$)
S = molar entropy ($J \cdot K^{-1} \cdot mol^{-1}$)
C_v = constant volume molar heat capacity ($J \cdot K^{-1} \cdot mol^{-1}$)
C_p = constant pressure molar heat capacity ($J \cdot K^{-1} \cdot mol^{-1}$)
c = speed of sound ($m \cdot s^{-1}$)
η = viscosity ($\mu Pa \cdot s$)
λ = thermal conductivity ($mW \cdot m^{-1} \cdot K^{-1}$)

3.5 These tables were produced by equations from a computer package, "NIST Standard Reference Database 23; Reference Fluid Thermodynamic and Transport Properties Database (REFPROP): Version 9.0." A wide selection of units (SI units, engineering units, chemical units) and additional properties are available with this program.[2]

4. Additional Information

4.1 Reference state properties are required to calculate certain of the thermodynamic properties (enthalpy, entropy, etc.) from an equation of state formulation. The reference state properties used to generate the tables in this specification are: enthalpy, H, and entropy, S, at 298.15 K and 0.101325 MPa (H = 10018 J/mol and S = 186.266 J/(mol K)). The molar mass of methane is 16.043 g/mol.

5. Keywords

5.1 methane gas tables; natural gas; thermodynamic properties of methane; transport properties of methane

[1] This specification is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.08 on Thermophysical Properties.

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[2] Available from Standard Reference Data, National Institute of Standards and Technology (NIST), 100 Bureau Drive, Stop 3460, Gaithersburg, MD 20899.

TABLE 1 Thermophysical Properties of Methane Liquid at Liquid-Vapor Equilibrium

T K	p MPa	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
90.7	0.011705	28.141	84267	67.794	34.775	54.029	1538.5	193.53	211.18
92	0.013801	28.033	84338	68.563	34.641	54.102	1526.7	186.13	209.64
94	0.017613	27.866	84446	69.728	34.445	54.226	1508.4	175.87	207.20
96	0.022233	27.698	84555	70.870	34.258	54.366	1489.8	166.73	204.71
98	0.027778	27.528	84664	71.992	34.08	54.517	1471.0	158.48	202.16
100	0.034376	27.357	84773	73.095	33.908	54.681	1452.0	150.97	199.56
102	0.04216	27.185	84883	74.178	33.741	54.854	1432.9	144.06	196.92
104	0.051275	27.010	84993	75.244	33.579	55.039	1413.6	137.66	194.24
106	0.061868	26.835	85103	76.293	33.421	55.234	1394.1	131.71	191.53
108	0.074099	26.657	85214	77.326	33.266	55.439	1374.5	126.14	188.79
110	0.08813	26.478	85326	78.343	33.115	55.656	1354.7	120.90	186.02
112	0.10413	26.297	85438	79.346	32.966	55.885	1334.8	115.97	183.24
114	0.12228	26.113	85550	80.335	32.82	56.127	1314.7	111.30	180.44
116	0.14275	25.928	85663	81.310	32.677	56.383	1294.4	106.88	177.62
118	0.16574	25.740	85777	82.273	32.537	56.653	1274.0	102.68	174.79
120	0.19143	25.551	85891	83.224	32.4	56.941	1253.5	98.680	171.95
122	0.22002	25.358	86006	84.164	32.265	57.246	1232.7	94.874	169.11
124	0.2517	25.163	86121	85.092	32.133	57.571	1211.9	91.243	166.26
126	0.28667	24.966	86237	86.010	32.005	57.917	1190.8	87.777	163.41
128	0.32514	24.765	86354	86.919	31.879	58.288	1169.5	84.465	160.55
130	0.36732	24.562	86472	87.819	31.757	58.684	1148.1	81.298	157.69
132	0.41341	24.355	86591	88.710	31.639	59.110	1126.4	78.267	154.83
134	0.46363	24.145	86710	89.593	31.525	59.567	1104.6	75.363	151.98
136	0.51819	23.931	86831	90.468	31.414	60.060	1082.5	72.581	149.12
138	0.57730	23.713	86952	91.337	31.308	60.593	1060.2	69.913	146.27
140	0.64118	23.491	87075	92.200	31.206	61.169	1037.7	67.354	143.41
142	0.71006	23.265	87199	93.057	31.109	61.795	1014.9	64.896	140.56
144	0.78415	23.034	87324	93.910	31.018	62.477	991.81	62.536	137.71
146	0.86368	22.798	87450	94.758	30.932	63.221	968.46	60.267	134.87
148	0.94887	22.556	87578	95.603	30.852	64.036	944.81	58.085	132.02
150	1.0400	22.309	87707	96.444	30.78	64.932	920.85	55.984	129.18
152	1.1372	22.055	87839	97.284	30.714	65.922	896.54	53.960	126.33
154	1.2408	21.794	87972	98.123	30.656	67.019	871.87	52.008	123.49
156	1.3509	21.526	88107	98.961	30.608	68.241	846.82	50.124	120.64
158	1.4680	21.249	88244	99.801	30.569	69.611	821.35	48.303	117.79
160	1.5921	20.964	88384	100.64	30.541	71.156	795.43	46.541	114.93
162	1.7235	20.668	88526	101.49	30.526	72.912	769.03	44.832	112.06
164	1.8626	20.360	88671	102.34	30.525	74.924	742.10	43.172	109.18
166	2.0096	20.040	88820	103.19	30.541	77.252	714.59	41.556	106.29
168	2.1647	19.706	88972	104.06	30.576	79.979	686.42	39.978	103.38
170	2.3283	19.355	89129	104.94	30.634	83.218	657.52	38.432	100.46
172	2.5007	18.984	89290	105.83	30.721	87.130	627.77	36.911	97.508
174	2.6822	18.591	89457	106.74	30.843	91.954	597.05	35.407	94.534
176	2.8732	18.170	89631	107.67	31.011	98.060	565.18	33.911	91.535
178	3.0740	17.716	89814	108.64	31.24	106.05	531.94	32.411	88.513
180	3.2852	17.218	90006	109.65	31.554	116.99	497.01	30.888	85.482
182	3.5071	16.664	90213	110.72	31.996	132.94	459.94	29.320	82.478
184	3.7405	16.028	90438	111.87	32.641	158.52	420.00	27.665	79.598
186	3.9860	15.267	90693	113.16	33.654	206.68	375.88	25.848	77.150
188	4.2448	14.270	91003	114.73	35.503	332.70	324.57	23.683	76.437
190	4.5186	12.515	91488	117.18	41.746	1508.2	250.31	20.291	94.151

TABLE 2 Thermophysical Properties of Methane Vapor at Liquid-Vapor Equilibrium

T K	p MPa	ρ $mol \cdot L^{-1}$	H $J \cdot mol^{-1}$	S $J \cdot mol^{-1} \cdot K^{-1}$	C_v $J \cdot mol^{-1} \cdot K^{-1}$	C_p $J \cdot mol^{-1} \cdot K^{-1}$	c $m \cdot s^{-1}$	η μPa·s	λ $mW \cdot m^{-1} \cdot K^{-1}$
90.7	0.011705	0.015641	92999	164.06	25.244	33.851	249.13	3.5980	8.7991
92	0.013801	0.018199	93039	163.15	25.272	33.916	250.76	3.6414	8.9478
94	0.017613	0.022770	93101	161.81	25.32	34.025	253.20	3.7087	9.1797
96	0.022233	0.028198	93163	160.54	25.372	34.145	255.57	3.7765	9.4154
98	0.027778	0.034587	93224	159.34	25.427	34.279	257.87	3.8449	9.6551
100	0.034376	0.042048	93283	158.20	25.487	34.425	260.09	3.9139	9.8989
102	0.042160	0.050695	93343	157.12	25.550	34.585	262.24	3.9832	10.147
104	0.051275	0.060649	93401	156.09	25.617	34.760	264.31	4.0530	10.400
106	0.061868	0.072034	93458	155.11	25.688	34.950	266.29	4.1232	10.657
108	0.074099	0.084980	93514	154.18	25.763	35.156	268.20	4.1938	10.920
110	0.088130	0.099622	93569	153.28	25.842	35.378	270.01	4.2647	11.188
112	0.10413	0.11610	93623	152.43	25.925	35.619	271.75	4.3360	11.461
114	0.12228	0.13455	93676	151.61	26.011	35.879	273.39	4.4077	11.740
116	0.14275	0.15514	93727	150.83	26.102	36.159	274.94	4.4797	12.026
118	0.16574	0.17801	93777	150.07	26.196	36.461	276.40	4.5521	12.318
120	0.19143	0.20332	93826	149.35	26.295	36.786	277.76	4.6250	12.617
122	0.22002	0.23125	93873	148.65	26.397	37.137	279.03	4.6983	12.923
124	0.25170	0.26197	93918	147.97	26.505	37.514	280.21	4.7721	13.237
126	0.28667	0.29567	93962	147.32	26.616	37.922	281.28	4.8465	13.560
128	0.32514	0.33254	94004	146.69	26.733	38.361	282.25	4.9215	13.891
130	0.36732	0.37278	94045	146.07	26.854	38.836	283.13	4.9972	14.232
132	0.41341	0.41662	94083	145.47	26.981	39.350	283.90	5.0738	14.583
134	0.46363	0.46428	94120	144.89	27.113	39.907	284.57	5.1512	14.944
136	0.51819	0.51601	94154	144.32	27.252	40.511	285.13	5.2297	15.317
138	0.57730	0.57209	94186	143.76	27.397	41.169	285.58	5.3094	15.703
140	0.64118	0.63279	94216	143.21	27.549	41.885	285.93	5.3904	16.102
142	0.71006	0.69843	94243	142.67	27.709	42.668	286.16	5.4730	16.515
144	0.78415	0.76935	94268	142.14	27.877	43.525	286.29	5.5573	16.945
146	0.86368	0.84593	94291	141.61	28.054	44.467	286.30	5.6436	17.391
148	0.94887	0.92857	94310	141.09	28.241	45.507	286.19	5.7323	17.857
150	1.0400	1.0177	94326	140.57	28.439	46.657	285.97	5.8236	18.344
152	1.1372	1.1140	94340	140.05	28.649	47.936	285.63	5.9179	18.854
154	1.2408	1.2178	94350	139.54	28.872	49.365	285.16	6.0157	19.390
156	1.3509	1.3299	94356	139.02	29.110	50.971	284.57	6.1176	19.957
158	1.4680	1.4511	94358	138.50	29.363	52.785	283.86	6.2242	20.557
160	1.5921	1.5821	94356	137.97	29.636	54.849	283.01	6.3362	21.197
162	1.7235	1.7241	94349	137.43	29.928	57.217	282.03	6.4546	21.884
164	1.8626	1.8782	94338	136.89	30.244	59.958	280.91	6.5803	22.625
166	2.0096	2.0459	94321	136.33	30.588	63.165	279.65	6.7149	23.433
168	2.1647	2.2289	94297	135.76	30.962	66.963	278.23	6.8599	24.322
170	2.3283	2.4294	94267	135.16	31.374	71.527	276.66	7.0175	25.314
172	2.5007	2.6500	94229	134.54	31.829	77.111	274.93	7.1906	26.436
174	2.6822	2.8944	94182	133.89	32.337	84.089	273.02	7.3827	27.732
176	2.8732	3.1671	94124	133.20	32.912	93.049	270.92	7.5989	29.263
178	3.0740	3.4744	94054	132.46	33.570	104.95	268.60	7.8460	31.127
180	3.2852	3.8257	93967	131.65	34.338	121.51	266.04	8.1346	33.484
182	3.5071	4.2349	93860	130.75	35.257	146.04	263.17	8.4811	36.620
184	3.7405	4.7255	93724	129.73	36.397	185.97	259.89	8.9141	41.100
186	3.9860	5.3422	93544	128.49	37.893	262.03	255.97	9.4902	48.246
188	4.2448	6.1945	93286	126.87	40.109	461.61	250.72	10.354	62.294
190	4.5186	7.8027	92783	124.00	45.796	2259.0	238.55	12.237	120.52

TABLE 3 Thermophysical Properties of Methane Along Isobars

T K	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
Pressure = 0.1 MPa								
92	28.037	84340	68.554	34.645	54.093	1527.3	186.44	209.71
100	27.360	84775	73.087	33.911	54.672	1452.6	151.12	199.62
110	26.478	85326	78.342	33.115	55.654	1354.8	120.92	186.04
111.51	26.341	85410	79.101	33.003	55.828	1339.7	117.16	183.93
111.51	0.11186	93610	152.64	25.904	35.558	271.33	4.318	11.393
120	0.10316	93909	155.22	25.568	34.879	282.84	4.653	12.310
130	0.094632	94255	157.99	25.364	34.427	295.56	5.044	13.444
140	0.087479	94598	160.53	25.250	34.150	307.59	5.433	14.602
150	0.081375	94938	162.88	25.186	33.972	319.04	5.819	15.771
160	0.076095	95277	165.07	25.154	33.858	330.01	6.202	16.945
170	0.071476	95616	167.12	25.146	33.788	340.55	6.581	18.121
180	0.067399	95953	169.05	25.161	33.755	350.71	6.957	19.301
190	0.063770	96291	170.88	25.198	33.754	360.51	7.329	20.501
200	0.060518	96628	172.61	25.259	33.784	369.98	7.697	21.648
210	0.057586	96967	174.26	25.345	33.845	379.14	8.061	22.817
220	0.054929	97305	175.83	25.459	33.937	388.01	8.420	24.000
230	0.052508	97645	177.34	25.602	34.063	396.60	8.775	25.198
240	0.050295	97987	178.80	25.776	34.221	404.91	9.125	26.412
250	0.048261	98330	180.20	25.981	34.414	412.96	9.471	27.647
260	0.046387	98675	181.55	26.218	34.640	420.77	9.812	28.904
270	0.044655	99023	182.86	26.487	34.899	428.34	10.149	30.188
280	0.043047	99373	184.14	26.788	35.192	435.68	10.482	31.499
290	0.041552	99727	185.38	27.119	35.515	442.81	10.811	32.841
300	0.040158	100080	186.59	27.479	35.869	449.74	11.136	34.214
310	0.038855	100440	187.77	27.866	36.251	456.48	11.456	35.620
320	0.037635	100810	188.93	28.280	36.659	463.05	11.773	37.059
330	0.036489	101180	190.06	28.718	37.092	469.45	12.085	38.533
340	0.035411	101550	191.18	29.178	37.548	475.70	12.394	40.040
350	0.034395	101930	192.27	29.658	38.025	481.81	12.700	41.581
360	0.033436	102310	193.35	30.157	38.520	487.79	13.002	43.156
370	0.032529	102700	194.41	30.672	39.032	493.64	13.300	44.764
380	0.031670	103090	195.46	31.202	39.560	499.38	13.595	46.405
390	0.030855	103490	196.50	31.745	40.100	505.02	13.887	48.077
400	0.030082	103890	197.52	32.300	40.652	510.56	14.176	49.779
410	0.029346	104300	198.53	32.864	41.215	516.01	14.461	51.512
420	0.028646	104720	199.53	33.437	41.786	521.38	14.744	53.272
430	0.027978	105140	200.52	34.018	42.364	526.66	15.023	55.061
440	0.027341	105570	201.50	34.604	42.949	531.88	15.300	56.876
450	0.026732	106000	202.47	35.195	43.539	537.03	15.574	58.716
460	0.026150	106440	203.43	35.791	44.133	542.11	15.845	60.581
470	0.025593	106880	204.39	36.389	44.730	547.13	16.113	62.469
480	0.025059	107330	205.34	36.990	45.329	552.09	16.380	64.380
490	0.024546	107790	206.28	37.592	45.931	557.00	16.643	66.312
500	0.024055	108250	207.21	38.196	46.533	561.86	16.904	68.264
510	0.023583	108720	208.14	38.800	47.136	566.66	17.163	70.237
520	0.023129	109190	209.06	39.403	47.738	571.43	17.419	72.228
530	0.022692	109670	209.98	40.006	48.340	576.14	17.674	74.237
540	0.022271	110160	210.89	40.608	48.941	580.82	17.926	76.263
550	0.021866	110650	211.79	41.208	49.541	585.45	18.175	78.306
560	0.021475	111150	212.69	41.807	50.139	590.04	18.423	80.365
570	0.021098	111650	213.58	42.404	50.735	594.59	18.669	82.438
580	0.020734	112160	214.47	42.998	51.329	599.11	18.913	84.526
590	0.020382	112680	215.35	43.590	51.920	603.59	19.155	86.628
600	0.020042	113200	216.23	44.179	52.509	608.04	19.395	88.743
Pressure = 1 MPa								
92	28.074	84363	68.459	34.682	54.010	1533.5	189.65	210.52
100	27.403	84797	72.984	33.950	54.562	1459.6	153.31	200.50
110	26.529	85347	78.226	33.156	55.497	1363.2	122.50	187.02
120	25.606	85908	83.106	32.437	56.733	1262.4	99.85	172.95
130	24.616	86484	87.71	31.786	58.434	1156.6	82.137	158.57
140	23.532	87080	92.13	31.220	60.937	1043.7	67.819	143.99
149.14	22.416	87652	96.08	30.810	64.535	931.21	56.879	130.40
149.14	0.97852	94320	140.79	28.353	46.147	286.08	5.784	18.131
150	0.96844	94359	141.06	28.165	45.565	287.76	5.827	18.161
160	0.87050	94792	143.85	26.991	41.516	305.18	6.280	18.759
170	0.79596	95196	146.30	26.470	39.472	320.20	6.692	19.629
180	0.73599	95584	148.52	26.161	38.186	333.74	7.085	20.636
190	0.68611	95961	150.56	25.976	37.322	346.20	7.466	21.786
200	0.64363	96331	152.46	25.879	36.730	357.81	7.838	22.739
210	0.60682	96696	154.24	25.850	36.325	368.73	8.204	23.806
220	0.57450	97058	155.92	25.878	36.060	379.06	8.563	24.914
230	0.54581	97418	157.52	25.956	35.903	388.88	8.917	26.050
240	0.52011	97776	159.05	26.078	35.834	398.24	9.265	27.214

TABLE 3 *Continued*

T K	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
250	0.49693	98135	160.51	26.242	35.840	407.20	9.609	28.404
260	0.47587	98493	161.92	26.446	35.911	415.79	9.948	29.623
270	0.45665	98853	163.27	26.688	36.040	424.04	10.283	30.872
280	0.43902	99214	164.59	26.966	36.221	431.98	10.613	32.153
290	0.42278	99578	165.86	27.277	36.450	439.64	10.939	33.467
300	0.40776	99943	167.10	27.621	36.721	447.04	11.261	34.815
310	0.39381	100310	168.31	27.995	37.031	454.19	11.579	36.197
320	0.38084	100680	169.49	28.397	37.376	461.13	11.893	37.615
330	0.36872	101060	170.65	28.824	37.753	467.87	12.203	39.069
340	0.35738	101440	171.78	29.275	38.160	474.42	12.510	40.558
350	0.34675	101820	172.89	29.747	38.592	480.80	12.813	42.083
360	0.33674	102210	173.99	30.239	39.048	487.02	13.113	43.642
370	0.32732	102600	175.06	30.748	39.524	493.09	13.409	45.235
380	0.31842	103000	176.12	31.272	40.019	499.04	13.702	46.862
390	0.31001	103400	177.17	31.810	40.531	504.86	13.991	48.520
400	0.30205	103810	178.20	32.360	41.056	510.57	14.278	50.211
410	0.29449	104230	179.22	32.920	41.595	516.18	14.562	51.931
420	0.28731	104640	180.23	33.489	42.143	521.69	14.842	53.681
430	0.28048	105070	181.23	34.066	42.702	527.11	15.120	55.459
440	0.27397	105500	182.22	34.650	43.268	532.44	15.395	57.264
450	0.26776	105930	183.20	35.238	43.840	537.70	15.667	59.095
460	0.26184	106380	184.17	35.831	44.418	542.89	15.937	60.951
470	0.25617	106820	185.13	36.427	45.001	548.01	16.204	62.831
480	0.25075	107280	186.08	37.025	45.587	553.06	16.468	64.733
490	0.24556	107730	187.03	37.626	46.176	558.05	16.730	66.658
500	0.24058	108200	187.97	38.227	46.766	562.99	16.990	68.603
510	0.23580	108670	188.90	38.829	47.358	567.87	17.247	70.568
520	0.23121	109150	189.82	39.431	47.950	572.70	17.502	72.552
530	0.22680	109630	190.74	40.032	48.543	577.48	17.755	74.555
540	0.22255	110120	191.66	40.633	49.135	582.21	18.006	76.575
550	0.21847	110610	192.56	41.232	49.726	586.90	18.255	78.612
560	0.21453	111110	193.46	41.830	50.316	591.55	18.501	80.665
570	0.21073	111620	194.36	42.425	50.905	596.15	18.746	82.733
580	0.20707	112130	195.25	43.019	51.492	600.71	18.989	84.815
590	0.20353	112650	196.14	43.610	52.077	605.24	19.229	86.912
600	0.20012	113170	197.02	44.198	52.659	609.73	19.468	89.022
				Pressure = 2 MPa				
92	28.115	84389	68.355	34.722	53.921	1540.4	193.22	211.40
100	27.450	84822	72.871	33.992	54.445	1467.4	155.72	201.47
110	26.585	85371	78.100	33.201	55.329	1372.3	124.23	188.10
120	25.674	85930	82.962	32.483	56.489	1273.3	101.28	174.16
130	24.701	86502	87.542	31.831	58.063	1169.7	83.443	159.94
140	23.641	87093	91.922	31.258	60.331	1060.1	69.093	145.58
150	22.453	87713	96.195	30.798	63.871	941.45	57.245	131.01
160	21.055	88380	100.50	30.526	70.193	807.65	47.125	115.92
165.87	20.061	88810	103.14	30.539	77.093	716.36	41.658	106.48
165.87	2.0348	94322	136.37	30.565	62.944	279.73	6.7060	23.379
170	1.9032	94565	137.81	29.192	55.613	290.52	6.9116	23.040
180	1.6770	95075	140.73	27.775	47.612	311.34	7.3293	23.101
190	1.5180	95530	143.19	27.121	43.836	328.40	7.7102	23.852
200	1.3957	95957	145.38	26.741	41.587	343.30	8.0758	24.329
210	1.2969	96365	147.37	26.521	40.122	356.70	8.4324	25.179
220	1.2143	96761	149.21	26.415	39.129	368.98	8.7824	26.138
230	1.1437	97148	150.94	26.394	38.447	380.37	9.1271	27.163
240	1.0823	97530	152.56	26.443	37.986	391.03	9.4672	28.239
250	1.0283	97909	154.11	26.552	37.689	401.07	9.8029	29.357
260	0.98014	98285	155.58	26.712	37.521	410.57	10.135	30.515
270	0.93689	98659	157.00	26.919	37.457	419.61	10.462	31.712
280	0.89775	99034	158.36	27.168	37.480	428.22	10.786	32.948
290	0.86210	99409	159.68	27.457	37.576	436.47	11.106	34.221
300	0.82945	99786	160.95	27.781	37.736	444.38	11.423	35.534
310	0.79940	100160	162.19	28.138	37.951	452.00	11.736	36.884
320	0.77164	100540	163.40	28.526	38.215	459.34	12.045	38.273
330	0.74590	100930	164.58	28.941	38.521	466.43	12.351	39.701
340	0.72194	101320	165.74	29.382	38.865	473.30	12.653	41.166
350	0.69958	101710	166.87	29.845	39.243	479.96	12.952	42.668
360	0.67864	102100	167.98	30.328	39.650	486.45	13.248	44.207
370	0.65900	102500	169.07	30.830	40.084	492.76	13.541	45.781
380	0.64052	102900	170.15	31.348	40.540	498.91	13.831	47.390
390	0.62311	103310	171.21	31.881	41.017	504.93	14.117	49.033
400	0.60667	103720	172.25	32.425	41.511	510.82	14.401	50.708
410	0.59111	104140	173.28	32.981	42.021	516.59	14.681	52.414
420	0.57636	104560	174.30	33.546	42.544	522.24	14.959	54.150
430	0.56236	104990	175.31	34.119	43.079	527.80	15.234	55.916

TABLE 3 *Continued*

T K	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
440	0.54905	105420	176.31	34.699	43.624	533.26	15.507	57.709
450	0.53638	105860	177.29	35.285	44.176	538.64	15.777	59.528
460	0.52431	106310	178.27	35.874	44.736	543.93	16.044	61.373
470	0.51278	106760	179.24	36.468	45.302	549.15	16.309	63.243
480	0.50176	107210	180.20	37.064	45.873	554.30	16.571	65.136
490	0.49123	107680	181.15	37.662	46.447	559.38	16.832	67.051
500	0.48113	108140	182.09	38.261	47.024	564.39	17.089	68.987
510	0.47146	108620	183.03	38.862	47.604	569.35	17.345	70.944
520	0.46218	109100	183.96	39.462	48.185	574.25	17.598	72.920
530	0.45326	109580	184.88	40.061	48.766	579.09	17.849	74.915
540	0.44470	110070	185.80	40.660	49.349	583.89	18.098	76.928
550	0.43645	110570	186.71	41.258	49.931	588.63	18.346	78.958
560	0.42852	111070	187.62	41.854	50.512	593.33	18.591	81.004
570	0.42087	111580	188.52	42.449	51.093	597.98	18.834	83.065
580	0.41350	112090	189.41	43.041	51.672	602.59	19.075	85.142
590	0.40638	112610	190.30	43.631	52.249	607.16	19.315	87.232
600	0.39951	113140	191.18	44.218	52.825	611.69	19.552	89.336
				Pressure = 3 MPa				
92	28.156	84415	68.252	34.762	53.835	1547.1	196.78	212.29
100	27.496	84848	72.760	34.034	54.331	1475.0	158.13	202.43
110	26.640	85395	77.976	33.245	55.169	1381.2	125.95	189.17
120	25.740	85952	82.821	32.528	56.258	1283.8	102.70	175.35
130	24.783	86521	87.378	31.876	57.717	1182.4	84.725	161.29
140	23.746	87108	91.726	31.298	59.781	1075.8	70.336	147.13
150	22.595	87720	95.949	30.823	62.908	961.61	58.513	132.85
160	21.264	88373	100.16	30.505	68.179	835.51	48.504	118.24
170	19.600	89102	104.58	30.508	79.233	687.08	39.559	102.68
177.27	17.885	89746	108.28	31.148	102.880	544.18	32.957	89.612
177.27	3.3584	94081	132.74	33.320	100.210	269.47	7.752	30.404
180	3.1212	94324	134.09	31.392	80.386	280.27	7.841	28.964
190	2.6146	94984	137.67	28.798	57.334	307.50	8.142	27.597
200	2.3157	95515	140.39	27.846	49.701	327.51	8.452	26.708
210	2.1029	95990	142.71	27.328	45.725	344.24	8.769	27.049
220	1.9386	96434	144.78	27.032	43.298	358.90	9.089	27.711
230	1.8054	96859	146.67	26.883	41.704	372.09	9.409	28.537
240	1.6940	97270	148.42	26.840	40.619	384.17	9.729	29.466
250	1.5987	97672	150.06	26.881	39.875	395.36	10.047	30.472
260	1.5157	98068	151.61	26.990	39.373	405.81	10.364	31.540
270	1.4425	98460	153.09	27.157	39.051	415.63	10.679	32.663
280	1.3772	98850	154.51	27.375	38.870	424.92	10.992	33.836
290	1.3185	99238	155.87	27.638	38.802	433.75	11.302	35.057
300	1.2653	99626	157.19	27.942	38.827	442.16	11.610	36.322
310	1.2168	100010	158.46	28.282	38.930	450.21	11.915	37.632
320	1.1723	100410	159.70	28.655	39.098	457.93	12.217	38.985
330	1.1314	100800	160.91	29.058	39.324	465.36	12.516	40.380
340	1.0934	101190	162.08	29.487	39.598	472.53	12.813	41.816
350	1.0582	101590	163.24	29.941	39.915	479.47	13.106	43.292
360	1.0254	101990	164.37	30.417	40.269	486.19	13.397	44.807
370	0.99476	102390	165.48	30.911	40.656	492.72	13.685	46.359
380	0.96602	102800	166.56	31.423	41.071	499.07	13.970	47.948
390	0.93902	103220	167.64	31.950	41.511	505.27	14.253	49.571
400	0.91360	103630	168.69	32.490	41.972	511.32	14.533	51.229
410	0.88961	104060	169.74	33.041	42.452	517.23	14.810	52.919
420	0.86692	104480	170.77	33.602	42.948	523.03	15.084	54.640
430	0.84544	104910	171.78	34.171	43.458	528.71	15.356	56.391
440	0.82505	105350	172.79	34.748	43.980	534.29	15.626	58.170
450	0.80567	105790	173.78	35.33	44.513	539.77	15.893	59.977
460	0.78723	106240	174.77	35.917	45.054	545.16	16.158	61.810
470	0.76966	106700	175.74	36.508	45.603	550.47	16.420	63.669
480	0.75289	107150	176.71	37.102	46.158	555.70	16.680	65.551
490	0.73686	107620	177.66	37.698	46.717	560.85	16.938	67.456
500	0.72154	108090	178.61	38.295	47.281	565.94	17.193	69.383
510	0.70686	108560	179.55	38.893	47.848	570.96	17.447	71.331
520	0.69279	109050	180.49	39.492	48.417	575.93	17.698	73.298
530	0.67929	109530	181.42	40.090	48.988	580.83	17.947	75.285
540	0.66633	110030	182.34	40.687	49.560	585.68	18.195	77.290
550	0.65387	110520	183.25	41.284	50.133	590.47	18.440	79.312
560	0.64188	111030	184.16	41.879	50.706	595.22	18.683	81.351
570	0.63034	111540	185.06	42.472	51.278	599.92	18.925	83.405
580	0.61921	112050	185.96	43.063	51.849	604.57	19.165	85.475
590	0.60849	112570	186.85	43.651	52.420	609.18	19.402	87.559
600	0.59814	113100	187.74	44.238	52.988	613.74	19.639	89.657
				Pressure = 5 MPa				
92	28.236	84467	68.049	34.841	53.670	1560.4	203.87	214.03

TABLE 3 *Continued*

T K	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
100	27.586	84898	72.541	34.116	54.117	1490.0	162.91	204.33
110	26.746	85443	77.733	33.332	54.870	1398.6	129.34	191.28
120	25.868	85996	82.546	32.618	55.832	1304.3	105.47	177.69
130	24.940	86561	87.063	31.965	57.092	1206.8	87.221	163.91
140	23.944	87140	91.353	31.381	58.818	1105.3	72.736	150.10
150	22.856	87740	95.491	30.884	61.308	998.65	60.933	136.31
160	21.632	88370	99.560	30.506	65.159	884.35	51.068	122.46
170	20.190	89052	103.69	30.318	71.859	758.12	42.521	108.30
180	18.323	89833	108.15	30.541	86.815	609.53	34.577	93.268
190	15.003	90954	114.20	32.915	171.850	393.44	25.194	77.986
200	5.4706	94153	130.68	32.029	116.670	291.29	10.518	40.536
210	4.3438	95027	134.95	29.525	70.783	319.48	10.107	34.264
220	3.7699	95661	137.90	28.538	57.833	340.20	10.135	32.795
230	3.3870	96205	140.32	28.006	51.563	357.45	10.286	32.542
240	3.1023	96700	142.43	27.717	47.890	372.50	10.492	32.813
250	2.8772	97167	144.33	27.587	45.528	385.97	10.728	33.370
260	2.6924	97613	146.09	27.572	43.934	398.24	10.981	34.111
270	2.5363	98047	147.72	27.648	42.833	409.56	11.244	34.983
280	2.4018	98471	149.26	27.795	42.073	420.08	11.515	35.957
290	2.2841	98889	150.73	28.003	41.560	429.95	11.790	37.014
300	2.1799	99303	152.13	28.262	41.234	439.25	12.067	38.144
310	2.0866	99714	153.48	28.565	41.054	448.07	12.346	39.338
320	2.0024	100120	154.79	28.908	40.991	456.47	12.625	40.591
330	1.9259	100530	156.05	29.286	41.024	464.49	12.904	41.899
340	1.8559	100950	157.27	29.694	41.135	472.18	13.183	43.258
350	1.7916	101360	158.47	30.129	41.313	479.57	13.460	44.666
360	1.7322	101770	159.63	30.589	41.548	486.71	13.736	46.119
370	1.6772	102190	160.78	31.069	41.830	493.60	14.011	47.615
380	1.6259	102610	161.90	31.569	42.154	500.29	14.284	49.153
390	1.5781	103030	163.00	32.084	42.514	506.79	14.555	50.731
400	1.5333	103460	164.08	32.614	42.903	513.11	14.825	52.346
410	1.4912	103890	165.14	33.157	43.320	519.28	15.093	53.997
420	1.4516	104330	166.19	33.710	43.759	525.30	15.358	55.682
430	1.4142	104770	167.23	34.272	44.218	531.19	15.622	57.399
440	1.3789	105210	168.25	34.842	44.693	536.96	15.884	59.148
450	1.3454	105660	169.26	35.419	45.184	542.61	16.144	60.925
460	1.3137	106110	170.26	36.000	45.686	548.17	16.402	62.731
470	1.2835	106570	171.24	36.586	46.200	553.63	16.658	64.564
480	1.2548	107040	172.22	37.176	46.722	559.00	16.912	66.422
490	1.2275	107510	173.19	37.767	47.253	564.28	17.164	68.304
500	1.2013	107980	174.15	38.361	47.789	569.49	17.414	70.210
510	1.1764	108460	175.10	38.956	48.331	574.62	17.662	72.137
520	1.1525	108950	176.05	39.551	48.877	579.69	17.909	74.085
530	1.1296	109440	176.98	40.146	49.426	584.69	18.154	76.054
540	1.1077	109940	177.91	40.740	49.978	589.63	18.397	78.041
550	1.0866	110440	178.83	41.334	50.532	594.51	18.638	80.047
560	1.0664	110950	179.75	41.926	51.087	599.34	18.877	82.069
570	1.0470	111460	180.66	42.517	51.642	604.11	19.115	84.109
580	1.0282	111980	181.56	43.106	52.198	608.83	19.351	86.164
590	1.0102	112510	182.46	43.692	52.754	613.50	19.586	88.235
600	0.99281	113040	183.35	44.277	53.309	618.13	19.818	90.319
				Pressure = 7.5 MPa				
95	28.096	84694	69.518	34.651	53.606	1551.2	193.78	212.72
100	27.695	84962	72.274	34.217	53.869	1508.1	168.83	206.67
110	26.875	85504	77.438	33.438	54.529	1419.6	133.51	193.85
120	26.021	86053	82.217	32.728	55.357	1328.7	108.84	180.53
130	25.125	86612	86.688	32.075	56.414	1235.4	90.228	167.05
140	24.174	87183	90.917	31.486	57.815	1139.5	75.595	153.62
150	23.149	87770	94.968	30.972	59.742	1040.2	63.773	140.33
160	22.025	88380	98.906	30.552	62.511	936.47	54.000	127.17
170	20.756	89025	102.81	30.257	66.735	826.79	45.709	114.10
180	19.261	89724	106.81	30.150	73.823	708.67	38.410	100.99
190	17.361	90524	111.13	30.387	87.903	578.15	31.569	88.380
200	14.556	91555	116.41	31.379	124.95	434.03	24.332	74.231
210	10.183	93082	123.85	32.226	160.40	334.78	16.600	59.935
220	7.3716	94365	129.83	30.585	100.36	335.06	13.357	47.161
230	6.0799	95217	133.62	29.498	73.999	350.92	12.440	41.834
240	5.3123	95890	136.49	28.856	62.040	366.82	12.138	39.651
250	4.7819	96475	138.88	28.486	55.452	381.48	12.075	38.805
260	4.3831	97008	140.97	28.303	51.379	394.89	12.128	38.644
270	4.0670	97507	142.85	28.254	48.685	407.23	12.249	38.889
280	3.8071	97984	144.59	28.308	46.829	418.65	12.411	39.401
290	3.5879	98446	146.21	28.444	45.525	429.30	12.601	40.104
300	3.3992	98896	147.73	28.647	44.607	439.29	12.809	40.952

TABLE 3 *Continued*

T K	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
310	3.2344	99339	149.19	28.905	43.969	448.71	13.031	41.917
320	3.0884	99776	150.57	29.211	43.543	457.63	13.262	42.980
330	2.9580	100210	151.91	29.557	43.282	466.12	13.500	44.127
340	2.8404	100640	153.20	29.939	43.152	474.23	13.743	45.347
350	2.7336	101070	154.45	30.352	43.129	482.00	13.989	46.634
360	2.6360	101510	155.67	30.792	43.193	489.47	14.237	47.982
370	2.5463	101940	156.85	31.256	43.330	496.67	14.488	49.385
380	2.4635	102370	158.01	31.741	43.529	503.63	14.739	50.839
390	2.3867	102810	159.14	32.244	43.779	510.38	14.990	52.342
400	2.3153	103250	160.25	32.763	44.072	516.93	15.242	53.889
410	2.2486	103690	161.35	33.295	44.404	523.30	15.493	55.478
420	2.1862	104140	162.42	33.839	44.768	529.51	15.744	57.106
430	2.1275	104590	163.48	34.393	45.159	535.58	15.994	58.772
440	2.0723	105040	164.52	34.955	45.575	541.50	16.243	60.472
450	2.0202	105500	165.55	35.525	46.011	547.31	16.491	62.206
460	1.9710	105960	166.57	36.100	46.464	553.00	16.738	63.971
470	1.9243	106430	167.57	36.680	46.933	558.58	16.984	65.765
480	1.8800	106900	168.56	37.264	47.414	564.07	17.229	67.587
490	1.8379	107370	169.55	37.851	47.907	569.46	17.472	69.436
500	1.7978	107860	170.52	38.440	48.409	574.77	17.714	71.310
510	1.7596	108340	171.48	39.030	48.919	580.00	17.954	73.207
520	1.7231	108830	172.44	39.622	49.436	585.15	18.193	75.128
530	1.6882	109330	173.39	40.213	49.958	590.24	18.431	77.070
540	1.6548	109830	174.32	40.804	50.485	595.25	18.667	79.032
550	1.6228	110340	175.26	41.395	51.015	600.20	18.902	81.014
560	1.5921	110850	176.18	41.984	51.549	605.09	19.136	83.014
570	1.5626	111370	177.10	42.572	52.084	609.93	19.368	85.032
580	1.5343	111900	178.01	43.158	52.621	614.70	19.599	87.067
590	1.5070	112420	178.91	43.742	53.159	619.43	19.828	89.118
600	1.4808	112960	179.81	44.324	53.698	624.11	20.056	91.185
				Pressure = 10 MPa				
95	28.194	84759	69.270	34.745	53.412	1567.6	201.24	214.90
100	27.802	85026	72.105	34.314	53.642	1525.7	174.69	208.96
110	26.999	85566	77.154	33.540	54.220	1439.8	137.59	196.37
120	26.167	86111	81.901	32.835	54.935	1351.9	112.11	183.29
130	25.299	86665	86.332	32.184	55.827	1262.3	93.124	170.08
140	24.386	87229	90.509	31.593	56.977	1171.0	78.320	156.97
150	23.414	87806	94.490	31.069	58.504	1077.6	66.444	144.08
160	22.365	88401	98.328	30.625	60.586	981.80	56.703	131.45
170	21.214	89020	102.080	30.277	63.513	882.98	48.540	119.09
180	19.919	89675	105.830	30.049	67.799	780.76	41.526	107.02
190	18.415	90384	109.660	29.981	74.405	675.09	35.303	95.664
200	16.593	91177	113.720	30.129	85.085	567.92	29.554	83.929
210	14.308	92104	118.240	30.450	100.72	469.31	24.088	72.951
220	11.693	93164	123.170	30.536	107.70	404.38	19.369	63.307
230	9.4897	94183	127.700	30.152	94.030	382.48	16.382	55.262
240	8.0039	95039	131.350	29.627	77.860	383.61	14.880	49.766
250	7.0079	95758	134.290	29.196	66.874	392.22	14.148	46.586
260	6.2963	96389	136.760	28.918	59.841	402.84	13.794	44.882
270	5.7571	96963	138.930	28.783	55.198	413.78	13.643	44.074
280	5.3299	97498	140.870	28.764	52.016	424.47	13.612	43.835
290	4.9800	98006	142.660	28.841	49.774	434.73	13.657	43.981
300	4.6859	98496	144.320	28.995	48.165	444.53	13.753	44.401
310	4.4340	98971	145.880	29.214	47.004	453.87	13.886	45.028
320	4.2146	99437	147.360	29.487	46.171	462.78	14.044	45.816
330	4.0212	99895	148.770	29.806	45.586	471.30	14.220	46.736
340	3.8489	100350	150.120	30.165	45.193	479.45	14.412	47.766
350	3.6939	100800	151.430	30.558	44.954	487.29	14.614	48.891
360	3.5536	101250	152.690	30.981	44.837	494.83	14.824	50.098
370	3.4257	101700	153.920	31.430	44.821	502.11	15.040	51.379
380	3.3084	102150	155.120	31.902	44.888	509.14	15.262	52.726
390	3.2003	102590	156.280	32.393	45.025	515.96	15.487	54.133
400	3.1002	103050	157.430	32.902	45.220	522.58	15.714	55.594
410	3.0072	103500	158.550	33.424	45.466	529.02	15.944	57.106
420	2.9206	103960	159.640	33.960	45.753	535.30	16.176	58.665
430	2.8395	104410	160.720	34.506	46.077	541.43	16.408	60.267
440	2.7634	104880	161.790	35.062	46.432	547.42	16.641	61.910
450	2.6919	105340	162.840	35.625	46.813	553.28	16.874	63.590
460	2.6244	105810	163.870	36.195	47.218	559.03	17.108	65.306
470	2.5607	106290	164.890	36.770	47.642	564.66	17.341	67.055
480	2.5003	106770	165.900	37.349	48.083	570.20	17.574	68.835
490	2.4431	107250	166.890	37.931	48.539	575.64	17.806	70.645
500	2.3887	107740	167.880	38.516	49.007	580.99	18.038	72.482
510	2.3370	108230	168.850	39.102	49.486	586.26	18.269	74.345

TABLE 3 *Continued*

T K	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
520	2.2876	108730	169.820	39.690	49.974	591.45	18.499	76.233
530	2.2405	109230	170.780	40.278	50.470	596.57	18.729	78.145
540	2.1955	109740	171.720	40.866	50.972	601.62	18.957	80.079
550	2.1524	110250	172.660	41.453	51.480	606.60	19.185	82.034
560	2.1112	110770	173.600	42.040	51.992	611.52	19.411	84.009
570	2.0716	111290	174.520	42.625	52.508	616.38	19.637	86.003
580	2.0336	111820	175.440	43.209	53.027	621.18	19.861	88.015
590	1.9970	112350	176.350	43.791	53.548	625.93	20.084	90.044
600	1.9619	112890	177.250	44.371	54.070	630.63	20.307	92.090
				Pressure = 20 MPa				
100	28.198	85286	71.042	34.677	52.897	1591.1	197.68	217.75
110	27.454	85817	76.099	33.925	53.234	1513.8	153.32	205.93
120	26.694	86351	80.747	33.236	53.631	1435.7	124.44	193.65
130	25.915	86890	85.058	32.596	54.094	1357.3	103.81	181.29
140	25.113	87433	89.086	32.006	54.647	1279.2	88.191	169.12
150	24.284	87983	92.878	31.471	55.322	1201.4	75.920	157.30
160	23.424	88540	96.474	30.994	56.146	1124.3	66.034	145.92
170	22.527	89106	99.907	30.579	57.148	1048.2	57.916	135.07
180	21.588	89684	103.21	30.229	58.349	973.55	51.144	124.81
190	20.603	90274	106.40	29.945	59.758	901.01	45.418	115.30
200	19.567	90880	109.50	29.727	61.350	831.58	40.521	106.28
210	18.481	91501	112.54	29.573	63.046	766.53	36.300	98.031
220	17.351	92140	115.51	29.476	64.676	707.42	32.649	90.608
230	16.194	92794	118.41	29.425	65.967	655.86	29.509	84.084
240	15.036	93457	121.24	29.408	66.572	613.27	26.848	78.504
250	13.915	94122	123.95	29.417	66.246	580.44	24.649	73.853
260	12.866	94779	126.53	29.443	65.032	556.92	22.886	70.055
270	11.914	95421	128.95	29.488	63.201	541.27	21.509	67.006
280	11.069	96042	131.21	29.557	61.074	531.72	20.454	64.605
290	10.327	96642	133.32	29.661	58.919	526.67	19.659	62.770
300	9.6789	97221	135.28	29.805	56.917	524.86	19.068	61.428
310	9.1129	97781	137.12	29.995	55.160	525.31	18.636	60.512
320	8.6166	98325	138.84	30.230	53.674	527.32	18.328	59.963
330	8.1789	98856	140.48	30.508	52.453	530.41	18.115	59.727
340	7.7904	99375	142.03	30.826	51.471	534.23	17.978	59.755
350	7.4434	99886	143.51	31.180	50.698	538.57	17.901	60.010
360	7.1314	100390	144.93	31.566	50.104	543.24	17.871	60.458
370	6.8492	100890	146.29	31.980	49.664	548.14	17.879	61.072
380	6.5925	101380	147.61	32.419	49.355	553.19	17.918	61.832
390	6.3579	101880	148.89	32.881	49.157	558.33	17.983	62.717
400	6.1425	102370	150.13	33.361	49.054	563.52	18.068	63.714
410	5.9438	102860	151.35	33.859	49.033	568.73	18.171	64.810
420	5.7598	103350	152.53	34.371	49.081	573.95	18.289	65.994
430	5.5889	103840	153.68	34.896	49.190	579.15	18.419	67.257
440	5.4295	104330	154.82	35.431	49.351	584.33	18.559	68.591
450	5.2805	104830	155.93	35.975	49.556	589.48	18.708	69.990
460	5.1408	105320	157.02	36.528	49.801	594.60	18.864	71.448
470	5.0095	105820	158.09	37.086	50.079	599.67	19.026	72.960
480	4.8857	106320	159.15	37.650	50.387	604.70	19.194	74.522
490	4.7688	106830	160.19	38.218	50.720	609.69	19.366	76.129
500	4.6583	107340	161.22	38.790	51.076	614.64	19.542	77.779
510	4.5534	107850	162.24	39.364	51.452	619.54	19.722	79.468
520	4.4538	108370	163.24	39.939	51.844	624.40	19.904	81.194
530	4.3591	108890	164.23	40.516	52.251	629.21	20.088	82.953
540	4.2689	109410	165.21	41.094	52.671	633.98	20.275	84.745
550	4.1828	109940	166.18	41.672	53.103	638.70	20.463	86.566
560	4.1005	110480	167.14	42.249	53.544	643.38	20.653	88.415
570	4.0218	111010	168.09	42.825	53.993	648.02	20.844	90.290
580	3.9464	111560	169.04	43.401	54.449	652.62	21.036	92.190
590	3.8741	112100	169.97	43.975	54.912	657.18	21.228	94.114
600	3.8047	112650	170.90	44.547	55.380	661.70	21.422	96.059
				Pressure = 25 MPa				
100	28.381	85417	70.588	34.845	52.601	1621.4	208.95	221.95
110	27.661	85945	75.613	34.103	52.851	1547.5	160.87	210.46
120	26.930	86475	80.223	33.423	53.142	1473.2	130.24	198.50
130	26.185	87008	84.490	32.789	53.471	1399.0	108.73	186.48
140	25.424	87544	88.466	32.203	53.855	1325.5	92.655	174.65
150	24.644	88085	92.197	31.667	54.312	1252.9	80.132	163.17
160	23.842	88631	95.719	31.187	54.857	1181.6	70.100	152.17
170	23.017	89182	99.063	30.763	55.501	1111.7	61.899	141.72
180	22.167	89741	102.26	30.399	56.245	1043.8	55.086	131.89
190	21.289	90308	105.32	30.094	57.084	978.32	49.354	122.77
200	20.383	90883	108.27	29.848	57.992	915.93	44.479	114.21
210	19.452	91468	111.12	29.661	58.924	857.38	40.300	106.39

TABLE 3 *Continued*

T K	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
220	18.501	92061	113.88	29.529	59.805	803.51	36.701	99.321
230	17.536	92663	116.56	29.448	60.539	755.13	33.598	93.030
240	16.572	93271	119.15	29.413	61.014	712.90	30.931	87.535
250	15.624	93882	121.64	29.419	61.133	677.23	28.658	82.825
260	14.708	94493	124.04	29.463	60.846	648.23	26.745	78.863
270	13.839	95098	126.32	29.540	60.179	625.55	25.156	75.585
280	13.031	95695	128.49	29.650	59.221	608.49	23.855	72.913
290	12.288	96282	130.55	29.793	58.087	596.15	22.802	70.771
300	11.611	96857	132.50	29.969	56.884	587.63	21.958	69.090
310	10.999	97420	134.35	30.182	55.700	582.13	21.289	67.813
320	10.446	97971	136.10	30.431	54.597	578.98	20.764	66.890
330	9.9482	98512	137.76	30.716	53.612	577.66	20.356	66.280
340	9.4982	99044	139.35	31.036	52.763	577.71	20.045	65.946
350	9.0907	99568	140.87	31.388	52.054	578.83	19.813	65.855
360	8.7205	100090	142.33	31.770	51.478	580.76	19.647	65.978
370	8.3831	100600	143.73	32.180	51.026	583.31	19.534	66.291
380	8.0743	101110	145.09	32.613	50.687	586.32	19.466	66.771
390	7.7908	101610	146.40	33.068	50.449	589.70	19.434	67.400
400	7.5295	102120	147.67	33.543	50.299	593.36	19.434	68.160
410	7.2878	102620	148.91	34.033	50.228	597.23	19.460	69.039
420	7.0636	103120	150.13	34.539	50.227	601.26	19.509	70.024
430	6.8549	103620	151.31	35.057	50.286	605.41	19.576	71.103
440	6.6601	104130	152.46	35.586	50.398	609.66	19.659	72.269
450	6.4778	104630	153.60	36.125	50.557	613.97	19.756	73.513
460	6.3067	105140	154.71	36.671	50.758	618.34	19.864	74.827
470	6.1459	105650	155.81	37.224	50.994	622.74	19.983	76.207
480	5.9943	106160	156.88	37.782	51.262	627.16	20.111	77.645
490	5.8510	106670	157.94	38.345	51.557	631.60	20.247	79.139
500	5.7155	107190	158.99	38.912	51.877	636.04	20.389	80.682
510	5.5870	107710	160.02	39.481	52.219	640.48	20.537	82.272
520	5.4650	108230	161.04	40.052	52.580	644.92	20.690	83.905
530	5.3489	108760	162.04	40.625	52.957	649.34	20.847	85.578
540	5.2383	109290	163.03	41.199	53.349	653.75	21.008	87.288
550	5.1328	109830	164.02	41.772	53.753	658.15	21.173	89.033
560	5.0320	110370	164.99	42.346	54.169	662.53	21.340	90.810
570	4.9356	110910	165.95	42.919	54.594	666.88	21.510	92.617
580	4.8433	111460	166.90	43.491	55.028	671.22	21.683	94.453
590	4.7547	112010	167.85	44.061	55.470	675.53	21.857	96.316
600	4.6698	112570	168.79	44.630	55.917	679.82	22.033	98.204
				Pressure = 30 MPa				
100	28.556	85550	70.153	35.005	52.344	1650.3	220.11	226.05
110	27.857	86074	75.150	34.273	52.523	1579.5	168.26	214.85
120	27.151	86600	79.728	33.601	52.729	1508.5	135.83	203.18
130	26.435	87129	83.958	32.974	52.956	1437.9	113.43	191.44
140	25.708	87659	87.891	32.391	53.214	1368.2	96.878	179.90
150	24.968	88193	91.573	31.857	53.518	1299.8	84.086	168.71
160	24.214	88730	95.038	31.376	53.875	1232.9	73.889	158.00
170	23.444	89271	98.316	30.948	54.291	1167.8	65.580	147.85
180	22.658	89816	101.43	30.576	54.765	1104.9	58.694	138.31
190	21.855	90366	104.41	30.261	55.287	1044.4	52.911	129.46
200	21.037	90922	107.26	30.001	55.841	986.94	48.004	121.20
210	20.206	91483	110.00	29.798	56.400	932.89	43.806	113.64
220	19.364	92050	112.63	29.648	56.925	882.79	40.191	106.78
230	18.518	92621	115.17	29.551	57.370	837.11	37.070	100.64
240	17.674	93197	117.62	29.503	57.688	796.22	34.372	95.202
250	16.841	93774	119.98	29.501	57.835	760.36	32.045	90.463
260	16.029	94353	122.25	29.543	57.783	729.60	30.047	86.394
270	15.245	94929	124.42	29.625	57.528	703.82	28.342	82.949
280	14.499	95503	126.51	29.746	57.090	682.72	26.899	80.076
290	13.795	96071	128.50	29.903	56.509	665.84	25.685	77.714
300	13.137	96632	130.41	30.096	55.836	652.65	24.673	75.804
310	12.527	97187	132.23	30.323	55.122	642.60	23.834	74.291
320	11.963	97735	133.97	30.584	54.409	635.17	23.144	73.128
330	11.444	98276	135.63	30.878	53.732	629.89	22.579	72.274
340	10.966	98810	137.22	31.203	53.115	626.37	22.122	71.695
350	10.527	99338	138.76	31.558	52.574	624.29	21.755	71.362
360	10.123	99862	140.23	31.941	52.115	623.36	21.464	71.248
370	9.7505	100380	141.65	32.348	51.742	623.38	21.238	71.331
380	9.4068	100900	143.03	32.779	51.452	624.15	21.067	71.590
390	9.0887	101410	144.36	33.231	51.241	625.54	20.942	72.008
400	8.7937	101920	145.66	33.701	51.104	627.42	20.857	72.570
410	8.5195	102430	146.92	34.188	51.034	629.71	20.806	73.261
420	8.2640	102940	148.15	34.689	51.025	632.33	20.784	74.069
430	8.0254	103450	149.35	35.203	51.071	635.22	20.787	74.983

TABLE 3 *Continued*

T K	ρ mol·L^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
440	7.8019	103960	150.52	35.727	51.167	638.33	20.812	75.993
450	7.5923	104480	151.68	36.261	51.307	641.62	20.855	77.091
460	7.3951	104990	152.80	36.803	51.487	645.06	20.914	78.270
470	7.2094	105510	153.91	37.351	51.702	648.62	20.988	79.522
480	7.0340	106020	155.01	37.905	51.948	652.28	21.074	80.841
490	6.8681	106550	156.08	38.464	52.222	656.01	21.170	82.222
500	6.7110	107070	157.14	39.027	52.520	659.82	21.276	83.661
510	6.5618	107600	158.18	39.592	52.841	663.67	21.391	85.152
520	6.4201	108130	159.21	40.159	53.181	667.56	21.513	86.693
530	6.2851	108660	160.23	40.728	53.538	671.49	21.641	88.278
540	6.1565	109200	161.23	41.298	53.910	675.44	21.776	89.906
550	6.0337	109740	162.22	41.869	54.296	679.41	21.915	91.574
560	5.9163	110280	163.20	42.439	54.694	683.39	22.058	93.278
570	5.8040	110830	164.18	43.009	55.102	687.37	22.206	95.016
580	5.6964	111380	165.14	43.578	55.520	691.36	22.358	96.787
590	5.5932	111940	166.09	44.145	55.945	695.35	22.512	98.587
600	5.4941	112500	167.04	44.712	56.377	699.34	22.669	100.42

Symbols:

T = temperature (K)
ρ = molar density (mol·L^{-1})
H = molar enthalpy (J·mol^{-1})
S = molar entropy (J·K^{-1}·mol^{-1})
C_v = constant volume molar heat capacity (J·K^{-1}·mol^{-1})
C_p = constant pressure molar heat capacity (J·K^{-1}·mol^{-1})
c = speed of sound (m·s^{-1})
η = viscosity (μPa·s)
λ = thermal conductivity (mW·m^{-1}·K^{-1})