Designation: D3984 – 08

Standard Specification for Ethane Thermophysical Property Tables[1]

This standard is issued under the fixed designation D3984; 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 ethane are for use in the calculation of the pressure-volume-temperature (PVT), thermodynamic, and transport properties of ethane for process design and operations. Tables are provided for gaseous and liquid ethane at temperatures between 92 and 600 K at pressures to 20 MPa. One table provides properties at the conditions of liquid-vapor equilibrium (saturation properties). The other 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 8.0.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

2. Applicability

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

3. Tables

3.1 These thermophysical property tables are:

3.1.1 *Thermophysical Properties of Coexisting Gaseous and Liquid Ethane*, in SI units. See Table 1.

3.1.2 *Thermophysical Properties of Ethane Along Isobars*, in SI units. See Table 2.

3.2 The tabulated thermophysical 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 (μPa·s)
λ, thermal conductivity ($mW \cdot m^{-1} \cdot K^{-1}$)

3.3 These tables were produced by equations from a computer package, "NIST Standard Reference Database 23; Reference Fluid Thermodynamic and Transport Properties Database (REFPROP): Version =8.0" A wide selection of units (SI units, engineering units, chemical units) is 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 ($H = 11874.2$ J/mol and $S = 221.116$ J/(mol K). The molar mass of ethane is 30.069 g/mol.

5. Keywords

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

[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 Coexisting Gaseous and Liquid Ethane

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}
90.4	1.15E-06	21.667	-14794	69.195	48.26	69.93	2008.5	255.6	1279
90.4	1.15E-06	1.53E-06	3089.2	267.02	26.81	35.13	180.97	2.910	3.044
92	1.74E-06	21.608	-14682	70.419	47.85	69.60	1996.7	254.3	1193
92	1.74E-06	2.28E-06	3145.5	264.2	26.90	35.22	182.48	3.000	3.089
94	2.86E-06	21.535	-14543	71.912	47.39	69.27	1982.1	252.8	1097
94	2.86E-06	3.65E-06	3216	260.84	27.02	35.34	184.36	3.113	3.145
96	4.58E-06	21.462	-14405	73.368	46.99	69.01	1967.5	251.1	1013
96	4.58E-06	5.74E-06	3286.8	257.66	27.14	35.46	186.22	3.227	3.202
98	7.2E-06	21.389	-14267	74.788	46.64	68.80	1952.9	249.5	939.1
98	7.2E-06	8.83E-06	3357.8	254.64	27.26	35.58	188.05	3.341	3.259
100	1.11E-05	21.316	-14130	76.176	46.32	68.64	1938.4	247.8	873.2
100	1.11E-05	1.33E-05	3429.1	251.77	27.38	35.70	189.86	3.456	3.316
102	1.68E-05	21.243	-13993	77.534	46.04	68.52	1924	246.1	814.5
102	1.68E-05	1.98E-05	3500.6	249.04	27.50	35.82	191.65	3.572	3.373
104	2.49E-05	21.17	-13856	78.864	45.79	68.44	1909.5	244.4	761.9
104	2.49E-05	2.88E-05	3572.3	246.44	27.63	35.94	193.42	3.689	3.430
106	3.64E-05	21.097	-13719	80.167	45.56	68.38	1895.1	242.7	714.6
106	3.64E-05	4.13E-05	3644.2	243.97	27.75	36.07	195.17	3.807	3.488
108	5.24E-05	21.024	-13582	81.445	45.36	68.36	1880.8	240.9	672.0
108	5.24E-05	5.83E-05	3716.4	241.62	27.87	36.19	196.9	3.925	3.545
110	7.43E-05	20.951	-13446	82.699	45.17	68.35	1866.4	239.1	633.4
110	7.43E-05	8.12E-05	3788.7	239.37	28.00	36.32	198.61	4.045	3.603
112	0.000104	20.878	-13309	83.931	45.00	68.36	1852	237.3	598.3
112	0.000104	0.000112	3861.3	237.24	28.12	36.45	200.3	4.165	3.662
114	0.000144	20.805	-13172	85.141	44.85	68.39	1837.6	235.5	566.3
114	0.000144	0.000152	3934.1	235.2	28.25	36.58	201.98	4.286	3.720
116	0.000196	20.731	-13035	86.331	44.71	68.43	1823.2	233.6	537.1
116	0.000196	0.000203	4007.0	233.25	28.38	36.71	203.63	4.409	3.778
118	0.000264	20.658	-12898	87.501	44.57	68.48	1808.8	231.8	510.4
118	0.000264	0.000269	4080.2	231.39	28.52	36.85	205.27	4.532	3.837
120	0.000352	20.584	-12761	88.653	44.45	68.54	1794.4	229.9	485.8
120	0.000352	0.000353	4153.5	229.61	28.65	36.99	206.89	4.657	3.896
122	0.000465	20.511	-12624	89.786	44.34	68.61	1780	228.0	463.1
122	0.000465	0.000459	4227.0	227.91	28.79	37.14	208.49	4.782	3.955
124	0.000608	20.437	-12487	90.903	44.24	68.69	1765.5	226.1	442.2
124	0.000608	0.00059	4300.6	226.29	28.93	37.29	210.07	4.909	4.015
126	0.000787	20.363	-12349	92.002	44.14	68.78	1751	224.2	422.8
126	0.000787	0.000752	4374.4	224.73	29.08	37.45	211.63	5.037	4.074
128	0.001009	20.289	-12212	93.086	44.05	68.86	1736.5	222.3	404.9
128	0.001009	0.000949	4448.3	223.24	29.23	37.61	213.17	5.166	4.134
130	0.001284	20.214	-12074	94.154	43.96	68.96	1722	220.4	388.2
130	0.001284	0.001189	4522.3	221.82	29.38	37.77	214.69	5.296	4.194
132	0.00162	20.14	-11936	95.208	43.88	69.06	1707.5	218.4	372.6
132	0.00162	0.001478	4596.4	220.45	29.53	37.94	216.19	5.427	4.254
134	0.002028	20.065	-11798	96.247	43.81	69.16	1692.9	216.4	358.1
134	0.002028	0.001824	4670.6	219.14	29.69	38.11	217.68	5.560	4.314
136	0.002521	19.991	-11659	97.273	43.74	69.27	1678.3	214.5	344.5
136	0.002521	0.002234	4744.8	217.89	29.84	38.28	219.14	5.694	4.374

TABLE 1 *Continued*

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}
138	0.003111	19.916	-11520	98.285	43.67	69.38	1663.7	212.5	331.8
138	0.003111	0.002718	4819.2	216.69	30.00	38.45	220.58	5.829	4.435
140	0.003814	19.84	-11382	99.284	43.61	69.50	1649.1	210.6	319.8
140	0.003814	0.003286	4893.6	215.53	30.15	38.62	222.01	5.966	4.496
142	0.004645	19.765	-11242	100.27	43.55	69.62	1634.4	208.6	308.5
142	0.004645	0.003947	4968.0	214.43	30.31	38.79	223.42	6.104	4.556
144	0.005623	19.689	-11103	101.24	43.49	69.74	1619.7	206.6	297.9
144	0.005623	0.004714	5042.4	213.37	30.45	38.96	224.80	6.244	4.617
146	0.006766	19.613	-10963	102.21	43.44	69.87	1605.0	204.7	287.9
146	0.006766	0.005599	5116.8	212.35	30.60	39.13	226.17	6.385	4.678
148	0.008097	19.537	-10823	103.16	43.40	70.00	1590.3	202.7	278.5
148	0.008097	0.006614	5191.2	211.37	30.74	39.29	227.51	6.528	4.740
150	0.009638	19.461	-10683	104.1	43.35	70.14	1575.5	200.7	269.6
150	0.009638	0.007773	5265.6	210.42	30.88	39.45	228.84	6.672	4.801
152	0.011413	19.384	-10543	105.03	43.31	70.28	1560.7	198.7	261.1
152	0.011413	0.009091	5339.8	209.52	31.01	39.61	230.14	6.819	4.863
154	0.013448	19.307	-10402	105.95	43.27	70.42	1545.9	196.8	253.0
154	0.013448	0.010582	5414.0	208.65	31.14	39.76	231.42	6.967	4.924
156	0.015772	19.23	-10261	106.86	43.24	70.57	1531.1	194.8	245.4
156	0.015772	0.012264	5488.1	207.81	31.26	39.92	232.68	7.116	4.986
158	0.018414	19.152	-10120	107.76	43.21	70.73	1516.2	192.8	238.1
158	0.018414	0.014151	5561.9	207.01	31.39	40.08	233.91	7.268	5.048
160	0.021405	19.074	-9977.8	108.65	43.18	70.89	1501.3	190.8	231.2
160	0.021405	0.016263	5635.6	206.23	31.51	40.24	235.12	7.422	5.110
162	0.024779	18.996	-9835.8	109.53	43.16	71.05	1486.3	188.9	224.5
162	0.024779	0.018617	5709.0	205.48	31.64	40.40	236.3	7.577	5.172
164	0.02857	18.918	-9693.3	110.4	43.14	71.22	1471.4	186.9	218.2
164	0.02857	0.021232	5782.2	204.76	31.76	40.57	237.45	7.735	5.234
166	0.032814	18.839	-9550.6	111.27	43.12	71.40	1456.4	184.9	212.2
166	0.032814	0.024127	5855.0	204.07	31.90	40.75	238.57	7.895	5.297
168	0.037551	18.759	-9407.4	112.12	43.11	71.58	1441.4	183.0	206.4
168	0.037551	0.027324	5927.6	203.4	32.03	40.94	239.67	8.057	5.360
170	0.042819	18.68	-9263.9	112.97	43.10	71.77	1426.3	181.0	200.8
170	0.042819	0.030843	5999.7	202.75	32.17	41.14	240.73	8.221	5.422
172	0.04866	18.6	-9120.0	113.81	43.09	71.96	1411.2	179.1	195.5
172	0.04866	0.034706	6071.4	202.13	32.32	41.35	241.76	8.388	5.485
174	0.055118	18.519	-8975.6	114.64	43.09	72.16	1396.1	177.1	190.4
174	0.055118	0.038935	6142.7	201.53	32.48	41.58	242.76	8.557	5.548
176	0.062235	18.438	-8830.9	115.47	43.09	72.37	1380.9	175.2	185.5
176	0.062235	0.043553	6213.5	200.95	32.65	41.83	243.72	8.728	5.612
178	0.07006	18.357	-8685.7	116.28	43.10	72.59	1365.7	173.3	180.7
178	0.07006	0.048584	6283.7	200.38	32.83	42.09	244.65	8.902	5.675
180	0.078638	18.275	-8540.0	117.1	43.11	72.81	1350.5	171.3	176.2
180	0.078638	0.054053	6353.4	199.84	33.02	42.38	245.54	9.079	5.739
182	0.088019	18.193	-8393.8	117.9	43.12	73.04	1335.2	169.4	171.8
182	0.088019	0.059985	6422.6	199.31	33.21	42.68	246.39	9.258	5.803
184	0.098253	18.11	-8247.2	118.7	43.14	73.28	1319.9	167.5	167.6
184	0.098253	0.066405	6491.2	198.8	33.42	43.00	247.2	9.441	5.867
186	0.10939	18.026	-8100.0	119.49	43.16	73.53	1304.5	165.6	163.5

TABLE 1 *Continued*

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}
186	0.10939	0.07334	6559.1	198.3	33.65	43.34	247.98	9.626	5.931
188	0.12149	17.942	-7952.3	120.28	43.18	73.79	1289.2	163.7	159.5
188	0.12149	0.080817	6626.4	197.82	33.88	43.69	248.71	9.814	5.996
190	0.13459	17.858	-7804.1	121.06	43.21	74.06	1273.7	161.8	155.7
190	0.13459	0.088865	6693.0	197.36	34.12	44.07	249.41	10.00	6.061
192	0.14876	17.773	-7655.2	121.83	43.24	74.33	1258.3	156.0	152.0
192	0.14876	0.097512	6758.9	196.91	34.37	44.46	250.06	10.20	6.126
194	0.16405	17.687	-7505.8	122.6	43.28	74.62	1242.8	158.1	148.4
194	0.16405	0.10679	6824.1	196.47	34.63	44.89	250.67	10.40	6.192
196	0.18052	17.601	-7355.8	123.37	43.32	74.92	1227.2	156.2	144.9
196	0.18052	0.11672	6888.6	196.04	34.90	45.31	251.24	10.60	6.258
198	0.19823	17.514	-7205.1	124.13	43.36	75.23	1211.7	154.4	141.5
198	0.19823	0.12735	6952.3	195.63	35.18	45.76	251.77	10.80	6.324
200	0.21723	17.426	-7053.8	124.88	43.41	75.55	1196.0	152.6	138.3
200	0.21723	0.1387	7015.2	195.23	35.46	46.22	252.26	11.01	6.391
202	0.23759	17.337	-6901.8	125.63	43.46	75.88	1180.4	150.7	135.1
202	0.23759	0.1508	7077.3	194.84	35.74	46.70	252.70	11.22	6.458
204	0.25936	17.248	-6749.1	126.38	43.52	76.23	1164.7	148.9	132.0
204	0.25936	0.1637	7138.6	194.45	36.04	47.19	253.10	11.44	6.526
206	0.28261	17.158	-6595.7	127.12	43.58	76.58	1148.9	147.1	129.0
206	0.28261	0.17742	7199.0	194.08	36.33	47.70	253.45	11.66	6.594
208	0.3074	17.068	-6441.5	127.86	43.65	76.96	1133.1	145.3	126.1
208	0.3074	0.192	7258.5	193.72	36.63	48.23	253.76	11.88	6.663
210	0.3338	16.976	-6286.6	128.59	43.72	77.34	1117.3	143.5	123.2
210	0.3338	0.20749	7317.1	193.37	36.94	48.77	254.02	12.11	6.732
212	0.36185	16.884	-6130.8	129.32	43.79	77.75	1101.4	141.7	120.5
212	0.36185	0.22392	7374.8	193.03	37.24	49.33	254.24	12.34	6.802
214	0.39164	16.79	-5974.2	130.05	43.87	78.17	1085.4	139.9	117.8
214	0.39164	0.24133	7431.5	192.69	37.55	49.90	254.41	12.58	6.872
216	0.42323	16.696	-5816.7	130.77	43.95	78.60	1069.5	138.1	115.1
216	0.42323	0.25976	7487.1	192.36	37.86	50.49	254.54	12.82	6.944
218	0.45667	16.601	-5658.3	131.49	44.04	79.06	1053.4	136.4	112.6
218	0.45667	0.27927	7541.7	192.04	38.17	51.09	254.62	13.07	7.016
220	0.49205	16.504	-5498.9	132.21	44.13	79.53	1037.3	134.6	110.0
220	0.49205	0.29989	7595.2	191.73	38.49	51.72	254.65	13.32	7.089
222	0.52941	16.407	-5338.6	132.93	44.23	80.02	1021.2	132.8	107.6
222	0.52941	0.32168	7647.6	191.42	38.80	52.36	254.63	13.58	7.163
224	0.56884	16.309	-5177.3	133.64	44.33	80.54	1005.0	131.1	105.2
224	0.56884	0.34468	7698.8	191.12	39.12	53.03	254.56	13.84	7.238
226	0.6104	16.209	-5015.0	134.35	44.44	81.07	988.76	129.4	102.9
226	0.6104	0.36896	7748.7	190.83	39.43	53.72	254.44	14.11	7.313
228	0.65416	16.108	-4851.5	135.06	44.54	81.64	972.46	127.7	100.6
228	0.65416	0.39457	7797.4	190.53	39.76	54.43	254.27	14.38	7.390
230	0.70018	16.006	-4687.0	135.76	44.66	82.22	956.09	126.0	98.34
230	0.70018	0.42157	7844.7	190.25	40.08	55.18	254.05	14.66	7.469
232	0.74854	15.903	-4521.2	136.47	44.78	82.84	939.66	124.2	96.15
232	0.74854	0.45003	7890.6	189.97	40.40	55.95	253.78	14.95	7.548
236	0.85256	15.692	-4186.0	137.87	45.04	84.16	906.6	120.9	91.89
236	0.85256	0.51158	7977.9	189.41	41.06	57.60	253.07	15.55	7.712

TABLE 1 *Continued*

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}
238	0.90836	15.584	-4016.5	138.57	45.17	84.86	889.97	119.2	89.82
238	0.90836	0.54482	8019.2	189.14	41.40	58.49	252.64	15.86	7.796
240	0.96679	15.475	-3845.6	139.27	45.31	85.61	873.25	117.5	87.80
240	0.96679	0.57983	8058.7	188.87	41.74	59.42	252.14	16.18	7.881
242	1.0279	15.364	-3673.2	139.97	45.46	86.40	856.45	115.8	85.81
242	1.0279	0.61668	8096.6	188.61	42.09	60.40	251.59	16.51	7.969
244	1.0918	15.251	-3499.3	140.67	45.61	87.23	839.57	114.2	83.86
244	1.0918	0.65547	8132.5	188.34	42.44	61.44	250.98	16.85	8.059
246	1.1585	15.136	-3323.9	141.37	45.77	88.11	822.59	112.6	81.94
246	1.1585	0.6963	8166.5	188.08	42.80	62.54	250.31	17.20	8.151
248	1.2282	15.019	-3146.8	142.06	45.94	89.04	805.51	110.9	80.05
248	1.2282	0.73929	8198.5	187.81	43.17	63.71	249.58	17.56	8.245
250	1.3008	14.901	-2968.0	142.76	46.11	90.02	788.33	109.3	78.19
250	1.3008	0.78456	8228.2	187.55	43.55	64.96	248.79	17.93	8.342
252	1.3766	14.779	-2787.4	143.46	46.29	91.08	771.03	107.7	76.36
252	1.3766	0.83224	8255.7	187.28	43.93	66.29	247.93	18.32	8.442
254	1.4555	14.656	-2604.9	144.16	46.47	92.20	753.60	106.0	74.56
254	1.4555	0.88247	8280.8	187.02	44.33	67.72	247.00	18.72	8.545
256	1.5376	14.53	-2420.3	144.86	46.66	93.39	736.05	104.4	72.78
256	1.5376	0.93543	8303.3	186.75	44.74	69.26	246.01	19.14	8.652
258	1.623	14.401	-2233.7	145.57	46.87	94.68	718.36	102.8	71.03
258	1.623	0.99127	8323.0	186.49	45.16	70.91	244.95	19.57	8.762
260	1.7118	14.27	-2044.8	146.27	47.08	96.06	700.52	101.2	69.30
260	1.7118	1.0502	8339.9	186.21	45.59	72.71	243.81	20.02	8.876
262	1.8041	14.135	-1853.6	146.98	47.29	97.55	682.53	99.64	67.60
262	1.8041	1.1124	8353.6	185.94	46.03	74.67	242.61	20.50	8.995
264	1.9	13.997	-1659.8	147.69	47.52	99.17	664.38	98.05	65.91
264	1.9	1.1782	8364.0	185.66	46.49	76.80	241.33	21.00	9.119
266	1.9996	13.855	-1463.3	148.41	47.76	100.93	646.06	96.47	64.24
266	1.9996	1.2478	8370.9	185.38	46.96	79.15	239.97	21.52	9.248
268	2.1029	13.709	-1264	149.12	48.01	102.8	627.58	94.89	62.58
268	2.1029	1.3215	8373.9	185.09	47.46	81.75	238.54	22.08	9.384
270	2.21	13.559	-1061.5	149.85	48.27	105.0	608.92	93.31	60.94
270	2.21	1.3998	8372.7	184.79	47.97	84.63	237.02	22.67	9.526
272	2.321	13.405	-855.75	150.58	48.54	107.3	590.08	91.73	59.30
272	2.321	1.4829	8367.0	184.48	48.51	87.86	235.42	23.29	9.676
274	2.4361	13.245	-646.35	151.31	48.82	109.9	571.04	90.16	57.68
274	2.4361	1.5713	8356.4	184.17	49.08	91.51	233.73	23.97	9.834
276	2.5554	13.079	-433.02	152.06	49.11	112.8	551.77	88.58	56.06
276	2.5554	1.6657	8340.3	183.84	49.68	95.65	231.95	24.69	10.00
278	2.6789	12.907	-215.36	152.81	49.42	116.1	532.23	87.01	54.45
278	2.6789	1.7666	8318.2	183.5	50.31	100.4	230.07	25.47	10.18
280	2.8067	12.728	7.0624	153.57	49.74	119.9	512.38	85.43	52.84
280	2.8067	1.8748	8289.5	183.15	50.99	105.9	228.1	26.33	10.37
282	2.9391	12.541	234.80	154.34	50.09	124.3	492.15	83.86	51.22
282	2.9391	1.9913	8253.3	182.78	51.70	112.4	226.01	27.26	10.58
284	3.076	12.345	468.51	155.13	50.47	129.4	471.46	82.28	49.60
284	3.076	2.1172	8208.7	182.38	52.47	120.0	223.82	28.31	10.80

TABLE 1 *Continued*

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 $mW \cdot m^{-1} \cdot K^{-1}$
286	3.2177	12.138	709.01	155.93	50.89	135.5	450.22	80.71	47.96
286	3.2177	2.254	8154.3	181.96	53.30	129.3	221.51	29.47	11.05
288	3.3643	11.918	957.38	156.75	51.37	142.9	428.34	79.14	46.30
288	3.3643	2.4034	8088.7	181.52	54.20	140.8	219.07	30.80	11.32
290	3.5159	11.684	1215.0	157.6	51.93	152.2	405.7	77.57	44.60
290	3.5159	2.5679	8009.7	181.03	55.18	155.2	216.5	32.32	11.62
292	3.6728	11.431	1483.7	158.48	52.59	164.2	382.18	76.04	42.87
292	3.6728	2.7507	7914.6	180.5	56.27	174.1	213.78	34.11	11.95
294	3.8351	11.155	1766.3	159.39	53.39	180.2	357.64	74.55	41.07
294	3.8351	2.9566	7799.3	179.91	57.49	199.9	210.88	36.27	12.34
296	4.0031	10.849	2066.6	160.36	54.40	203.2	331.84	73.18	39.19
296	4.0031	3.1925	7658.2	179.25	58.92	237.1	207.77	38.95	12.79
298	4.177	10.502	2391.2	161.4	55.70	238.7	304.47	72.04	37.18
298	4.177	3.4695	7481.7	178.48	60.63	295.5	204.37	42.48	13.34
300	4.3573	10.094	2751.6	162.54	57.49	301.4	274.91	71.49	34.97
300	4.3573	3.8079	7253.0	177.55	62.82	399.9	200.51	47.46	14.02
302	4.5442	9.5785	3173.2	163.88	60.28	443.3	241.95	72.47	32.40
302	4.5442	4.2525	6935.7	176.34	65.96	637.9	195.74	55.66	14.97
304	4.7387	8.8094	3740.0	165.68	66.07	1064	202.16	79.53	28.94
304	4.7387	4.9503	6411.8	174.47	71.74	1657	188.14	75.46	16.57
305	4.8392	8.0469	4242.7	167.29	74.26	4934	175.12	106.3	25.90
305	4.8392	5.6788	5852.4	172.57	78.86	7441	178.83	122.1	18.40

TABLE 2 Thermophysical Properties of Ethane 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	21.609	-14678	70.41	47.85	69.60	1997.1	1194	254.4
100	21.317	-14126	76.17	46.33	68.64	1938.8	873.9	247.9
110	20.952	-13442	82.69	45.18	68.35	1866.8	633.8	239.2
120	20.586	-12757	88.64	44.46	68.54	1794.9	486.1	230.0
130	20.216	-12070	94.15	43.97	68.95	1722.5	388.4	220.4
140	19.842	-11378	99.28	43.61	69.49	1649.6	320.0	210.6
150	19.463	-10680	104.09	43.36	70.13	1576.1	269.7	200.8
160	19.076	-9975.0	108.64	43.19	70.88	1501.8	231.3	190.9
170	18.681	-9262.0	112.96	43.10	71.76	1426.7	200.9	181.1
180	18.276	-8539.3	117.09	43.11	72.81	1350.6	176.2	171.4
184.33	18.096	-8223.3	118.83	43.14	73.32	1317.4	166.9	167.2
184.33	0.067496	6502.2	198.72	33.46	43.05	247.33	5.877	9.471
190	0.065270	6747.3	200.03	33.86	43.31	251.25	6.055	9.912
200	0.061716	7182.9	202.26	34.55	43.81	257.90	6.368	10.72
210	0.058558	7623.8	204.41	35.29	44.39	264.25	6.680	11.57
220	0.055728	8071.0	206.49	36.09	45.07	270.34	6.991	12.47
230	0.053174	8525.5	208.51	36.96	45.85	276.18	7.300	13.40
240	0.050854	8988.3	210.48	37.90	46.71	281.81	7.608	14.39
250	0.048735	9460.0	212.41	38.89	47.64	287.25	7.913	15.41
260	0.046792	9941.4	214.29	39.93	48.63	292.53	8.217	16.48
270	0.045003	10433	216.15	41.01	49.68	297.65	8.518	17.60
280	0.043349	10935	217.98	42.13	50.76	302.63	8.817	18.76
290	0.041815	11448	219.78	43.29	51.89	307.49	9.114	19.97
300	0.040388	11973	221.55	44.48	53.05	312.23	9.408	21.22
320	0.037813	13058	225.05	46.92	55.45	321.43	9.989	23.85
340	0.035551	14191	228.49	49.43	57.93	330.28	10.56	26.65
360	0.033547	15375	231.87	51.99	60.47	338.84	11.12	29.62
380	0.031760	16610	235.21	54.57	63.02	347.15	11.67	32.72
400	0.030155	17896	238.51	57.15	65.59	355.24	12.21	35.96
420	0.028706	19234	241.77	59.72	68.14	363.13	12.74	39.33
440	0.027391	20622	245.00	62.26	70.66	370.85	13.27	42.80
460	0.026192	22060	248.19	64.76	73.15	378.40	13.78	46.37
480	0.025094	23547	251.36	67.21	75.60	385.81	14.28	50.03
500	0.024084	25083	254.49	69.62	78.00	393.08	14.78	53.77
520	0.023154	26667	257.60	71.98	80.35	400.22	15.26	57.57
540	0.022292	28297	260.68	74.28	82.65	407.24	15.74	61.44
560	0.021493	29973	263.72	76.53	84.89	414.15	16.21	65.36
580	0.020749	31693	266.74	78.73	87.09	420.94	16.68	69.33
600	0.020056	33456	269.73	80.87	89.23	427.63	17.14	73.34
				Pressure = 1 MPa				
92	21.620	-14643	70.34	47.89	69.59	2000.7	1204	254.8
100	21.329	-14091	76.10	46.36	68.61	1942.4	880.2	248.3
110	20.965	-13407	82.62	45.21	68.31	1870.5	638.0	239.6
120	20.600	-12723	88.57	44.49	68.50	1798.9	489.2	230.5
130	20.232	-12036	94.06	44.00	68.90	1727.0	390.8	221.0
140	19.860	-11345	99.19	43.65	69.43	1654.5	322.0	211.2
150	19.482	-10647	104.00	43.39	70.05	1581.4	271.4	201.4
160	19.098	-9943.3	108.54	43.22	70.78	1507.7	232.8	191.6
170	18.706	-9231.3	112.86	43.14	71.64	1433.2	202.3	181.8
180	18.303	-8509.9	116.98	43.15	72.66	1357.9	177.5	172.1
190	17.888	-7777.5	120.94	43.24	73.87	1281.5	156.9	162.6
200	17.457	-7031.7	124.77	43.44	75.33	1204.0	139.3	153.3
210	17.007	-6269.8	128.48	43.74	77.10	1124.9	124.1	144.2
220	16.532	-5488.3	132.12	44.14	79.28	1044.0	110.7	135.2
230	16.026	-4682.4	135.70	44.66	82.01	960.67	98.76	126.3
240	15.477	-3845.3	139.26	45.31	85.58	873.85	87.85	117.6
241.1	15.414	-3751.1	139.65	45.39	86.04	864.04	86.70	116.6
241.1	0.59982	8079.7	188.73	41.93	59.95	251.85	7.929	16.36
250	0.56362	8601.3	190.85	41.69	57.60	260.39	8.191	17.04
260	0.52980	9171.1	193.09	42.10	56.52	268.91	8.486	17.92
270	0.50106	9734.1	195.21	42.76	56.16	276.67	8.779	18.88
280	0.47613	10296	197.25	43.57	56.20	283.85	9.072	19.91
290	0.45416	10859	199.23	44.48	56.53	290.57	9.363	21.01
300	0.43455	11427	201.15	45.48	57.06	296.92	9.652	22.18
320	0.40085	12582	204.88	47.66	58.56	308.73	10.22	24.67
340	0.37271	13772	208.49	50.01	60.43	319.64	10.79	27.36
360	0.34872	15001	212.00	52.46	62.53	329.86	11.34	30.24
380	0.32793	16274	215.44	54.96	64.76	339.54	11.88	33.27
400	0.30970	17592	218.82	57.48	67.07	348.76	12.42	36.46
420	0.29353	18957	222.15	59.99	69.42	357.62	12.94	39.78

TABLE 2 *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	0.27908	20369	225.43	62.49	71.78	366.15	13.46	43.21
460	0.26607	21828	228.68	64.96	74.14	374.41	13.96	46.74
480	0.25428	23334	231.88	67.40	76.48	382.43	14.46	50.37
500	0.24355	24887	235.05	69.78	78.78	390.24	14.95	54.08
520	0.23372	26485	238.18	72.12	81.06	397.85	15.44	57.87
540	0.22468	28129	241.28	74.41	83.28	405.28	15.91	61.71
560	0.21635	29816	244.35	76.65	85.47	412.54	16.38	65.62
580	0.20863	31547	247.39	78.84	87.61	419.66	16.84	69.57
600	0.20145	33321	250.40	80.97	89.71	426.64	17.29	73.56
				Pressure = 2 MPa				
92	21.632	-14604	70.26	47.92	69.57	2004.6	1214	255.2
100	21.342	-14052	76.02	46.40	68.59	1946.3	887.3	248.8
110	20.980	-13368	82.53	45.25	68.28	1874.7	642.7	240.2
120	20.616	-12685	88.48	44.53	68.45	1803.4	492.5	231.0
130	20.249	-11999	93.97	44.04	68.85	1731.9	393.4	221.6
140	19.879	-11308	99.09	43.68	69.36	1659.9	324.1	211.8
150	19.504	-10611	103.90	43.43	69.97	1587.3	273.3	202.1
160	19.122	-9907.9	108.44	43.26	70.68	1514.2	234.5	192.3
170	18.732	-9197.0	112.75	43.18	71.51	1440.4	203.8	182.6
180	18.333	-8477.2	116.86	43.19	72.50	1365.8	179.0	172.9
190	17.922	-7746.5	120.81	43.28	73.66	1290.4	158.3	163.5
200	17.497	-7003.1	124.62	43.48	75.06	1213.9	140.7	154.2
210	17.053	-6244.3	128.33	43.77	76.75	1136.1	125.5	145.2
220	16.586	-5466.8	131.94	44.17	78.81	1056.8	112.1	136.3
230	16.091	-4666.4	135.5	44.68	81.36	975.52	100.1	127.5
240	15.558	-3837.3	139.03	45.31	84.62	891.42	89.31	118.9
250	14.972	-2970.4	142.57	46.08	88.98	803.18	79.30	110.4
260	14.309	-2051.1	146.17	47.04	95.32	708.23	69.82	101.8
266.01	13.854	-1462.5	148.41	47.76	100.93	645.98	64.23	96.46
266.01	1.2481	8370.9	185.38	46.96	79.16	239.97	9.249	21.52
270	1.1982	8677.3	186.52	46.39	74.71	245.72	9.332	21.59
280	1.0993	9390.7	189.11	46.10	68.78	257.97	9.562	22.08
290	1.0233	10063	191.47	46.43	65.94	268.34	9.810	22.84
300	0.96149	10714	193.68	47.04	64.46	277.51	10.07	23.75
320	0.86469	11991	197.80	48.71	63.56	293.45	10.59	25.91
340	0.79052	13265	201.66	50.76	64.09	307.28	11.12	28.38
360	0.73078	14559	205.36	53.03	65.35	319.68	11.65	31.10
380	0.68109	15882	208.94	55.41	67.03	331.07	12.17	34.02
400	0.63881	17242	212.42	57.84	68.94	341.67	12.69	37.12
420	0.60220	18641	215.84	60.30	71.00	351.66	13.20	40.36
440	0.57007	20082	219.19	62.76	73.14	361.14	13.71	43.73
460	0.54158	21567	222.49	65.19	75.32	370.21	14.20	47.22
480	0.51609	23095	225.74	67.60	77.51	378.91	14.69	50.81
500	0.49310	24667	228.95	69.96	79.70	387.31	15.17	54.48
520	0.47224	26283	232.12	72.28	81.87	395.43	15.65	58.23
540	0.45321	27942	235.25	74.56	84.01	403.31	16.11	62.05
560	0.43575	29643	238.34	76.78	86.13	410.97	16.58	65.93
580	0.41967	31386	241.40	78.95	88.21	418.44	17.03	69.86
600	0.40481	33171	244.42	81.08	90.25	425.73	17.48	73.84
				Pressure = 3 MPa				
92	21.644	-14565	70.18	47.96	69.55	2008.4	1225	255.6
100	21.355	-14013	75.94	46.44	68.56	1950.1	894.5	249.2
110	20.994	-13330	82.45	45.28	68.24	1878.8	647.4	240.7
120	20.632	-12647	88.39	44.56	68.41	1807.9	496.0	231.6
130	20.267	-11961	93.88	44.08	68.79	1736.8	396.1	222.1
140	19.898	-11270	99.00	43.72	69.30	1665.2	326.3	212.5
150	19.525	-10575	103.80	43.47	69.89	1593.1	275.2	202.8
160	19.145	-9872.4	108.33	43.30	70.58	1520.6	236.2	193.0
170	18.759	-9162.7	112.64	43.22	71.39	1447.4	205.4	183.3
180	18.363	-8444.2	116.74	43.23	72.34	1373.6	180.4	173.8
190	17.956	-7715.3	120.68	43.32	73.47	1299.1	159.6	164.3
200	17.535	-6974.1	124.48	43.52	74.81	1223.6	142.0	155.2
210	17.097	-6218.2	128.17	43.81	76.42	1147.1	126.8	146.2
220	16.639	-5444.5	131.77	44.20	78.37	1069.3	113.4	137.3
230	16.153	-4649.2	135.31	44.70	80.76	989.81	101.5	128.7
240	15.634	-3827.2	138.80	45.32	83.76	908.11	90.74	120.2
250	15.068	-2971.0	142.30	46.06	87.67	823.20	80.83	111.8
260	14.437	-2068.8	145.84	46.96	93.10	733.32	71.54	103.5
270	13.705	-1099.4	149.49	48.10	101.50	635.17	62.55	94.97
280	12.786	-14.14	153.44	49.66	117.77	521.43	53.36	85.97
282.9	12.454	338.98	154.69	50.26	126.45	482.92	50.49	83.15

TABLE 2 *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}
282.9	2.0466	8234.4	182.60	52.04	115.64	225.04	10.68	27.72
290	1.8425	8955.9	185.12	49.97	91.95	239.18	10.66	26.62
300	1.6569	9806	188.01	49.36	79.91	254.11	10.77	26.50
320	1.4224	11303	192.84	50.06	71.56	276.63	11.14	27.73
340	1.2681	12706	197.09	51.65	69.18	294.34	11.58	29.76
360	1.1538	14085	201.03	53.66	68.96	309.38	12.05	32.21
380	1.0635	15471	204.78	55.88	69.76	322.70	12.54	34.94
400	0.98955	16879	208.39	58.23	71.10	334.79	13.02	37.91
420	0.92718	18317	211.90	60.62	72.77	345.97	13.51	41.05
440	0.87358	19790	215.32	63.02	74.62	356.42	14.00	44.34
460	0.82680	21302	218.68	65.42	76.58	366.29	14.48	47.76
480	0.78548	22854	221.99	67.80	78.60	375.68	14.95	51.30
500	0.74862	24446	225.24	70.14	80.65	384.66	15.42	54.93
520	0.71546	26080	228.44	72.44	82.71	393.28	15.88	58.64
540	0.68542	27755	231.60	74.70	84.76	401.6	16.34	62.42
560	0.65805	29470	234.72	76.90	86.80	409.65	16.79	66.27
580	0.63298	31226	237.80	79.07	88.82	417.45	17.24	70.18
600	0.60990	33023	240.84	81.18	90.80	425.03	17.68	74.13
				Pressure = 5 MPa				
92	21.668	-14487	70.03	48.05	69.52	2015.9	1248	256.5
100	21.381	-13935	75.78	46.52	68.51	1957.7	909.2	250.2
110	21.022	-13253	82.29	45.36	68.18	1887.0	657.0	241.7
120	20.663	-12570	88.22	44.64	68.32	1816.8	502.9	232.7
130	20.301	-11885	93.71	44.15	68.69	1746.4	401.5	223.3
140	19.936	-11196	98.81	43.80	69.17	1675.7	330.8	213.8
150	19.566	-10502	103.60	43.55	69.73	1604.7	279.0	204.1
160	19.192	-9801.2	108.13	43.38	70.39	1533.2	239.6	194.4
170	18.811	-9093.6	112.42	43.30	71.15	1461.3	208.5	184.8
180	18.421	-8377.8	116.51	43.31	72.04	1389.0	183.3	175.4
190	18.022	-7652.2	120.43	43.40	73.10	1316.0	162.4	166.0
200	17.610	-6915.2	124.21	43.60	74.34	1242.5	144.7	157.0
210	17.184	-6164.5	127.87	43.88	75.82	1168.2	129.4	148.1
220	16.739	-5397.8	131.44	44.26	77.58	1093.1	116.0	139.4
230	16.272	-4611.7	134.93	44.75	79.70	1016.9	104.2	131.0
240	15.777	-3802.2	138.38	45.34	82.28	939.29	93.49	122.7
250	15.245	-2963.8	141.80	46.04	85.52	859.81	83.74	114.6
260	14.664	-2088.7	145.23	46.86	89.71	777.57	74.72	106.6
270	14.014	-1164.3	148.72	47.84	95.50	691.15	66.20	98.73
280	13.259	-168.87	152.34	49.05	104.31	598.06	57.94	90.72
290	12.317	945.38	156.25	50.69	120.57	492.98	49.50	82.34
300	10.907	2340.3	160.97	53.74	171.41	359.63	39.65	73.07
320	3.1778	9327.4	183.66	54.60	123.06	237.07	13.55	36.40
340	2.5102	11344	189.78	53.96	88.41	267.54	13.14	34.44
360	2.1661	13012	194.55	55.13	79.92	289.32	13.26	35.49
380	1.9362	14577	198.78	56.93	77.10	307.02	13.55	37.48
400	1.7653	16110	202.71	59.02	76.48	322.27	13.90	39.97
420	1.6305	17643	206.45	61.25	76.93	335.86	14.30	42.79
440	1.5199	19192	210.05	63.55	77.98	348.22	14.71	45.84
460	1.4268	20765	213.55	65.87	79.36	359.65	15.14	49.08
480	1.3467	22367	216.96	68.18	80.95	370.33	15.56	52.47
500	1.2769	24004	220.30	70.48	82.68	380.40	16.00	55.98
520	1.2151	25675	223.58	72.74	84.48	389.96	16.43	59.59
540	1.1601	27383	226.80	74.96	86.32	399.08	16.86	63.29
560	1.1105	29128	229.97	77.15	88.18	407.82	17.28	67.06
580	1.0655	30910	233.10	79.29	90.06	416.24	17.70	70.91
600	1.0245	32730	236.18	81.38	91.92	424.37	18.12	74.80
				Pressure = 7.5 MPa				
92	21.697	-14389	69.84	48.15	69.48	2025.0	1277	257.6
100	21.412	-13838	75.59	46.61	68.45	1967.1	927.9	251.3
110	21.057	-13156	82.09	45.45	68.10	1897.1	669.2	243.0
120	20.701	-12475	88.02	44.73	68.22	1827.7	511.6	234.1
130	20.343	-11791	93.49	44.24	68.56	1758.3	408.3	224.8
140	19.982	-11103	98.59	43.89	69.02	1688.7	336.4	215.3
150	19.618	-10410	103.37	43.64	69.55	1618.8	283.8	205.8
160	19.248	-9711.9	107.88	43.48	70.16	1548.6	243.8	196.2
170	18.874	-9006.8	112.15	43.40	70.87	1478.2	212.4	186.7
180	18.492	-8294.0	116.22	43.41	71.70	1407.5	186.9	177.4
190	18.101	-7572.3	120.13	43.50	72.68	1336.5	165.8	168.2
200	17.700	-6840.0	123.88	43.69	73.82	1265.1	148.0	159.2
210	17.286	-6095.3	127.52	43.97	75.16	1193.3	132.7	150.5
220	16.857	-5336.1	131.05	44.35	76.73	1121.1	119.3	142.0

TABLE 2 *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}
230	16.410	-4559.8	134.50	44.82	78.58	1048.3	107.4	133.7
240	15.940	-3763.3	137.89	45.39	80.78	974.93	96.79	125.7
250	15.441	-2942.7	141.24	46.05	83.43	900.66	87.17	117.9
260	14.908	-2092.7	144.57	46.82	86.69	825.17	78.36	110.2
270	14.327	-1206.1	147.92	47.71	90.81	747.98	70.18	102.8
280	13.683	-272.14	151.31	48.72	96.25	668.37	62.48	95.50
290	12.948	726.34	154.81	49.91	103.9	585.39	55.08	88.23
300	12.071	1820.9	158.52	51.37	116.0	497.77	47.76	80.89
320	9.2863	4691.5	167.76	55.96	190.6	307.94	31.52	65.56
340	5.2506	8842.4	180.36	57.54	160.2	248.56	18.44	48.56
360	3.9090	11372	187.60	57.22	106.0	271.84	16.14	42.86
380	3.2854	13318	192.87	58.31	91.15	293.14	15.60	42.43
400	2.8949	15077	197.38	60.02	85.54	311.31	15.54	43.69
420	2.6161	16762	201.49	62.02	83.41	327.20	15.67	45.76
440	2.4021	18424	205.36	64.17	82.90	341.42	15.91	48.31
460	2.2301	20084	209.05	66.39	83.28	354.37	16.20	51.18
480	2.0874	21758	212.61	68.63	84.18	366.32	16.53	54.30
500	1.9661	23453	216.07	70.87	85.39	377.47	16.88	57.59
520	1.8613	25175	219.44	73.09	86.80	387.95	17.25	61.03
540	1.7693	26926	222.75	75.28	88.34	397.87	17.62	64.58
560	1.6878	28709	225.99	77.43	89.96	407.31	18.00	68.24
580	1.6147	30525	229.18	79.55	91.63	416.34	18.38	71.97
600	1.5488	32374	232.31	81.62	93.34	425.00	18.77	75.77
				Pressure = 10 MPa				
92	21.726	-14291	69.65	48.26	69.45	2033.8	1308	258.6
100	21.444	-13741	75.39	46.71	68.39	1976.2	947.3	252.5
110	21.091	-13059	81.89	45.54	68.02	1907.0	681.7	244.2
120	20.739	-12379	87.81	44.82	68.12	1838.5	520.6	235.4
130	20.384	-11696	93.27	44.33	68.45	1770.1	415.2	226.3
140	20.027	-11009	98.36	43.98	68.87	1701.4	342.0	216.9
150	19.668	-10318	103.13	43.74	69.37	1632.6	288.6	207.4
160	19.304	-9621.7	107.62	43.58	69.95	1563.7	248.1	198.0
170	18.935	-8918.9	111.88	43.50	70.62	1494.6	216.2	188.6
180	18.560	-8209.0	115.94	43.51	71.39	1425.5	190.5	179.3
190	18.177	-7490.7	119.83	43.60	72.29	1356.2	169.2	170.2
200	17.786	-6762.7	123.56	43.79	73.34	1286.7	151.3	161.4
210	17.383	-6023.3	127.17	44.06	74.56	1217.2	135.8	152.8
220	16.968	-5270.7	130.67	44.43	75.98	1147.5	122.4	144.4
230	16.538	-4502.8	134.08	44.89	77.63	1077.6	110.5	136.3
240	16.089	-3717.2	137.42	45.45	79.55	1007.6	100.0	128.5
250	15.618	-2910.7	140.72	46.09	81.80	937.43	90.42	120.9
260	15.120	-2079.8	143.97	46.83	84.46	866.92	81.74	113.6
270	14.588	-1219.8	147.22	47.66	87.65	795.96	73.77	106.4
280	14.013	-324.6	150.47	48.59	91.54	724.40	66.38	99.57
290	13.383	614.4	153.77	49.63	96.44	652.16	59.44	92.89
300	12.680	1609.1	157.14	50.80	102.80	579.32	52.87	86.39
320	10.934	3849.5	164.36	53.61	123.56	434.79	40.36	73.81
340	8.5099	6627.9	172.78	56.78	152.44	319.90	28.77	62.21
360	6.2185	9573.3	181.20	58.35	133.88	286.76	21.62	53.36
380	4.9360	11970	187.68	59.40	108.48	295.16	18.95	49.40
400	4.1977	14003	192.90	60.88	96.37	310.38	17.94	48.70
420	3.7099	15867	197.45	62.70	90.80	325.76	17.56	49.62
440	3.3557	17655	201.61	64.73	88.34	340.21	17.48	51.43
460	3.0823	19411	205.51	66.86	87.49	353.62	17.55	53.79
480	2.8621	21160	209.23	69.04	87.55	366.10	17.72	56.52
500	2.6794	22917	212.82	71.23	88.18	377.77	17.95	59.52
520	2.5243	24690	216.30	73.40	89.16	388.75	18.22	62.73
540	2.3903	26485	219.68	75.56	90.37	399.13	18.52	66.10
560	2.2729	28306	222.99	77.69	91.73	408.99	18.84	69.60
580	2.1688	30155	226.24	79.78	93.19	418.40	19.17	73.20
600	2.0757	32034	229.42	81.84	94.72	427.41	19.50	76.88
				Pressure = 20 MPa				
100	21.566	-13351	74.64	47.10	68.18	2011.4	1031	257.0
110	21.224	-12672	81.11	45.89	67.74	1945.4	735.0	249.2
120	20.884	-11994	87.01	45.16	67.78	1880.2	558.3	240.8
130	20.543	-11315	92.44	44.67	68.03	1815.2	444.0	232.0
140	20.201	-10633	97.50	44.34	68.37	1750.1	365.4	223.0
150	19.858	-9947.7	102.23	44.10	68.78	1685.2	308.4	213.8
160	19.512	-9257.7	106.68	43.95	69.24	1620.5	265.5	204.7
170	19.164	-8562.8	110.89	43.88	69.76	1556.1	232.0	195.7
180	18.813	-7862.2	114.90	43.89	70.36	1492.0	205.0	186.8

TABLE 2 *Continued*

T K	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 $mW \cdot m^{-1} \cdot K^{-1}$
190	18.458	-7155.2	118.72	43.98	71.06	1428.3	182.8	178.1
200	18.098	-6440.7	122.38	44.16	71.85	1365.1	164.2	169.6
210	17.732	-5717.8	125.91	44.43	72.76	1302.4	148.3	161.4
220	17.359	-4985.2	129.32	44.78	73.78	1240.3	134.5	153.5
230	16.979	-4241.7	132.62	45.22	74.94	1178.9	122.5	145.9
240	16.590	-3486.0	135.84	45.75	76.22	1118.3	111.8	138.6
250	16.192	-2716.7	138.98	46.35	77.65	1058.6	102.3	131.6
260	15.782	-1932.5	142.05	47.03	79.22	999.89	93.78	124.9
270	15.360	-1131.9	145.08	47.79	80.93	942.38	86.07	118.6
280	14.925	-313.4	148.05	48.61	82.80	886.21	79.07	112.5
290	14.474	524.56	150.99	49.50	84.82	831.57	72.69	106.8
300	14.007	1383.4	153.90	50.44	86.98	778.73	66.87	101.5
320	13.021	3169.1	159.66	52.49	91.66	679.76	56.67	91.88
340	11.966	5051.2	165.37	54.71	96.55	592.46	48.15	83.73
360	10.861	7027.6	171.02	57.01	100.91	520.55	41.16	77.14
380	9.7525	9076.1	176.55	59.30	103.55	467.46	35.64	72.16
400	8.7155	11153	181.88	61.50	103.74	433.55	31.50	68.79
420	7.8087	13214	186.91	63.65	102.19	415.36	28.58	66.88
440	7.0502	15237	191.61	65.77	100.15	408.01	26.59	66.19
460	6.4264	17222	196.03	67.89	98.43	407.37	25.26	66.48
480	5.9129	19178	200.19	70.02	97.29	410.71	24.37	67.53
500	5.4861	21118	204.15	72.16	96.74	416.34	23.80	69.16
520	5.1268	23051	207.94	74.28	96.67	423.25	23.41	71.25
540	4.8203	24987	211.59	76.38	96.99	430.85	23.23	73.69
560	4.5554	26933	215.13	78.45	97.60	438.79	23.14	76.40
580	4.3238	28893	218.57	80.49	98.44	446.85	23.13	79.32
600	4.1194	30871	221.92	82.50	99.43	454.90	23.19	82.39

The symbols are:
T, temperature (K)
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 ($mW \cdot m^{-1} \cdot K^{-1}$)