

Equilibrio vapore-liquido

T °C	$p_{\text{sat}}(T)$ kPa	v_f m ³ /kg	v_g m ³ /kg	u_f kJ/kg	u_{fg} kJ/kg	u_g kJ/kg	h_f kJ/kg	h_{fg} kJ/kg	h_g kJ/kg	s_f kJ/kg K	s_{fg} kJ/kg K	s_g kJ/kg K
0.01	0.61166	0.0010002	205.99	0	2374.9	2374.9	0.0006	2500.9	2500.9	0	9.1555	9.1555
5	0.87258	0.0010001	147.01	21.019	2360.8	2381.8	21.020	2489.1	2510.1	0.07625	8.9485	9.0248
10	1.2282	0.0010003	106.30	42.020	2346.6	2388.6	42.021	2477.2	2519.2	0.15109	8.7487	8.8998
15	1.7058	0.0010009	77.875	62.980	2332.5	2395.5	62.981	2465.3	2528.3	0.22446	8.5558	8.7803
20	2.3393	0.0010018	57.757	83.912	2318.4	2402.3	83.914	2453.5	2537.4	0.29648	8.3695	8.6660
25	3.1699	0.0010030	43.337	104.83	2304.3	2409.1	104.83	2441.7	2546.5	0.36722	8.1894	8.5566
30	4.2470	0.0010044	32.878	125.73	2290.2	2415.9	125.73	2429.8	2555.5	0.43675	8.0153	8.4520
35	5.6290	0.0010060	25.205	146.63	2276.1	2422.7	146.63	2417.9	2564.5	0.50513	7.8466	8.3517
40	7.3849	0.0010079	19.515	167.53	2261.9	2429.4	167.53	2406.0	2573.5	0.57240	7.6831	8.2555
45	9.5950	0.0010099	15.252	188.43	2247.7	2436.1	188.43	2394.0	2582.4	0.63861	7.5247	8.1633
50	12.352	0.0010121	12.027	209.33	2233.4	2442.7	209.34	2382.0	2591.3	0.70381	7.3710	8.0748
60	19.946	0.0010171	7.6672	251.16	2204.7	2455.9	251.18	2357.6	2608.8	0.83129	7.0768	7.9081
70	31.201	0.0010228	5.0395	293.03	2175.9	2468.9	293.07	2333.0	2626.1	0.95513	6.7989	7.7540
80	47.414	0.0010291	3.4052	334.96	2146.6	2481.6	335.01	2308.0	2643.0	1.0756	6.5355	7.6111
90	70.182	0.0010360	2.3591	376.97	2117.0	2494.0	377.04	2282.5	2659.5	1.1929	6.2852	7.4781
100	101.42	0.0010435	1.6718	419.06	2086.9	2506.0	419.17	2256.4	2675.6	1.3072	6.0469	7.3541
110	143.38	0.0010516	1.2093	461.26	2056.4	2517.7	461.42	2229.7	2691.1	1.4188	5.8193	7.2381
120	198.67	0.0010603	0.89121	503.60	2025.3	2528.9	503.81	2202.1	2705.9	1.5279	5.6012	7.1291
130	270.28	0.0010697	0.66800	546.09	1993.4	2539.5	546.38	2173.7	2720.1	1.6346	5.3918	7.0264
140	361.54	0.0010798	0.50845	588.77	1960.8	2549.6	589.16	2144.2	2733.4	1.7392	5.1901	6.9293
150	476.16	0.0010905	0.39245	631.66	1927.4	2559.1	632.18	2113.7	2745.9	1.8418	4.9953	6.8371
160	618.23	0.0011020	0.30678	674.79	1893.0	2567.8	675.47	2081.9	2757.4	1.9426	4.8065	6.7491
170	792.19	0.0011143	0.24259	718.20	1857.5	2575.7	719.08	2048.8	2767.9	2.0417	4.6233	6.6650
180	1002.8	0.0011274	0.19384	761.92	1820.9	2582.8	763.05	2014.2	2777.2	2.1392	4.4448	6.5840
190	1255.2	0.0011415	0.15636	806.00	1783.0	2589.0	807.43	1977.9	2785.3	2.2355	4.2704	6.5059
200	1554.9	0.0011565	0.12721	850.47	1743.7	2594.2	852.27	1939.7	2792.0	2.3305	4.0997	6.4302
210	1907.7	0.0011727	0.10429	895.39	1702.9	2598.3	897.63	1899.7	2797.3	2.4245	3.9318	6.3563
220	2319.6	0.0011902	0.086092	940.82	1660.4	2601.2	943.58	1857.3	2800.9	2.5177	3.7663	6.2840
230	2797.1	0.0012090	0.071503	986.81	1616.1	2602.9	990.19	1812.7	2802.9	2.6101	3.6027	6.2128
240	3346.9	0.0012295	0.059705	1033.4	1569.7	2603.1	1037.6	1765.4	2803.0	2.7020	3.4403	6.1423
250	3976.2	0.0012517	0.050083	1080.8	1521.0	2601.8	1085.8	1715.1	2800.9	2.7935	3.2786	6.0721
260	4692.3	0.0012761	0.042173	1129.0	1469.7	2598.7	1135.0	1661.6	2796.6	2.8849	3.1167	6.0016
270	5503.0	0.0013030	0.035621	1178.1	1415.6	2593.7	1185.3	1604.4	2789.7	2.9765	2.9539	5.9304
280	6416.6	0.0013328	0.030153	1228.3	1358.1	2586.4	1236.9	1543.0	2779.9	3.0685	2.7894	5.8579
290	7441.8	0.0013663	0.025555	1279.9	1296.6	2576.5	1290.0	1476.7	2766.7	3.1612	2.6222	5.7834
300	8587.9	0.0014042	0.021660	1332.9	1230.7	2563.6	1345.0	1404.6	2749.6	3.2552	2.4507	5.7059
310	9865.1	0.0014479	0.018335	1387.9	1159.2	2547.1	1402.2	1325.7	2727.9	3.3510	2.2734	5.6244
320	11284	0.0014990	0.015471	1445.3	1080.7	2526.0	1462.2	1238.4	2700.6	3.4494	2.0878	5.5372
330	12858	0.0015606	0.012979	1505.8	993.4	2499.2	1525.9	1140.1	2666.0	3.5518	1.8904	5.4422
340	14601	0.0016376	0.010781	1570.6	893.8	2464.4	1594.5	1027.3	2621.8	3.6601	1.6755	5.3356
350	16529	0.0017400	0.0088024	1642.1	776.0	2418.1	1670.9	892.7	2563.6	3.7784	1.4326	5.2110
355	17570	0.0018079	0.0078684	1682.0	706.4	2388.4	1713.7	812.9	2526.6	3.8439	1.2941	5.1380
360	18666	0.0018954	0.0069493	1726.3	625.5	2351.8	1761.7	719.8	2481.5	3.9167	1.1369	5.0536
365	19821	0.0020172	0.0060115	1777.8	526.0	2303.8	1817.8	605.1	2422.9	4.0014	0.9483	4.9497
370	21044	0.0022152	0.0049544	1844.1	386.2	2230.3	1890.7	443.8	2334.5	4.1112	0.6900	4.8012
373.95	22064	0.0031056	0.0031056	2015.7	0	2015.7	2084.3	0	2084.3	4.4070	0	4.4070

Equilibrio vapore-ghiaccio

T °C	$p_{\text{subl}}(T)$ kPa	T °C	$p_{\text{subl}}(T)$ kPa	T °C	$p_{\text{subl}}(T)$ kPa
-45	0.007202	-19	0.11362	-9	0.28394
-40	0.012841	-18	0.12492	-8	0.30998
-35	0.022347	-17	0.13725	-7	0.33819
-30	0.038012	-16	0.15068	-6	0.36873
-25	0.063287	-15	0.16530	-5	0.40176
-24	0.069908	-14	0.18122	-4	0.43747
-23	0.077159	-13	0.19852	-3	0.47606
-22	0.085095	-12	0.21732	-2	0.51772
-21	0.093775	-11	0.23774	-1	0.56267
-20	0.10326	-10	0.25990	0	0.61115

Equilibrio vapore-liquido

T °C	$p_{\text{sat}}(T)$ kPa	T °C	$p_{\text{sat}}(T)$ kPa	T °C	$p_{\text{sat}}(T)$ kPa	T °C	$p_{\text{sat}}(T)$ kPa	T °C	$p_{\text{sat}}(T)$ kPa
0.01	0.61166	10	1.2282	20	2.3393	30	4.2470	40	7.3849
1	0.65709	11	1.3130	21	2.4882	31	4.4969	41	7.7878
2	0.70599	12	1.4028	22	2.6453	32	4.7596	42	8.2096
3	0.75808	13	1.4981	23	2.8111	33	5.0354	43	8.6508
4	0.81355	14	1.5990	24	2.9858	34	5.3251	44	9.1124
5	0.87258	15	1.7058	25	3.1699	35	5.6290	45	9.5950
6	0.93536	16	1.8188	26	3.3639	36	5.9479	46	10.099
7	1.0021	17	1.9384	27	3.5681	37	6.2823	47	10.627
8	1.0730	18	2.0647	28	3.7831	38	6.6328	48	11.177
9	1.1483	19	2.1983	29	4.0092	39	7.0002	49	11.752

$p = 500 \text{ kPa}$								
T	v	u	h	s	c_v	c_p	κ_T	α_p
$^{\circ}\text{C}$	$\frac{\text{m}^3}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{10^{-6}}{\text{kPa}}$	$\frac{10^{-6}}{\text{K}}$
cong -0.03	0.0010000	-0.1595	0.3405	-0.00058	4.215	4.218	0.5084	-66.77
25	0.0010028	104.79	105.29	0.36710	4.136	4.180	0.4520	257.7
50	0.0010119	209.26	209.76	0.70358	4.025	4.180	0.4412	457.7
75	0.0010256	313.89	314.40	1.0155	3.898	4.192	0.4557	612.5
100	0.0010433	418.94	419.47	1.3069	3.768	4.215	0.4896	750.0
125	0.0010648	524.73	525.26	1.5813	3.641	4.251	0.5431	884.3
liq sat 151.83	0.0010925	639.54	640.09	1.8604	3.515	4.312	0.6271	1038
"fg" →	0.37372	1921.2	2108.0	4.9603				
sat vap 151.83	0.37481	2560.7	2748.1	6.8207	1.759	2.410	2105	2933
175	0.39948	2601.6	2801.4	6.9427	1.640	2.224	2076	2603
200	0.42503	2643.3	2855.8	7.0610	1.594	2.143	2058	2370
250	0.47443	2723.8	2961.0	7.2724	1.566	2.079	2037	2051
300	0.52261	2803.2	3064.6	7.4614	1.572	2.067	2025	1829
350	0.57015	2883.0	3168.1	7.6346	1.591	2.076	2018	1660
400	0.61730	2963.7	3272.3	7.7955	1.617	2.096	2013	1523
500	0.71094	3129.0	3484.5	8.0892	1.677	2.149	2008	1313
600	0.80409	3300.4	3702.5	8.3543	1.744	2.212	2005	1156
700	0.89696	3478.5	3927.0	8.5977	1.813	2.279	2003	1034
800	0.98966	3663.6	4158.4	8.8240	1.883	2.348	2002	936.1
900	1.0823	3855.4	4396.6	9.0362	1.951	2.416	2001	855.3
1000	1.1748	4054.0	4641.4	9.2364	2.017	2.481	2001	787.4

$p = 1 \text{ MPa}$								
T	v	u	h	s	c_v	c_p	κ_T	α_p
$^{\circ}\text{C}$	$\frac{\text{m}^3}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{10^{-6}}{\text{kPa}}$	$\frac{10^{-6}}{\text{K}}$
cong -0.06	0.0009997	-0.2768	0.7229	-0.00101	4.213	4.215	0.5078	-65.39
25	0.0010026	104.75	105.75	0.36697	4.135	4.179	0.4514	258.5
50	0.0010117	209.18	210.19	0.70335	4.024	4.179	0.4407	457.6
75	0.0010254	313.78	314.81	1.0152	3.897	4.191	0.4550	612.2
100	0.0010430	418.80	419.84	1.3065	3.767	4.214	0.4887	749.1
125	0.0010645	524.54	525.60	1.5808	3.641	4.250	0.5420	882.9
liq sat 150	0.0010901	631.41	632.50	1.8412	3.523	4.305	0.6188	1025
179.88	0.0011272	761.39	762.52	2.1381	3.395	4.405	0.7546	1221
"fg" →	0.19323	1821.3	2014.6	4.4469				
sat vap 179.88	0.19436	2582.7	2777.1	6.5850	1.927	2.711	1089	3115
200	0.20602	2622.2	2828.3	6.6955	1.752	2.428	1067	2720
250	0.23275	2710.4	2943.1	6.9265	1.635	2.211	1039	2216
300	0.25799	2793.6	3051.6	7.1246	1.610	2.143	1026	1923
350	0.28250	2875.7	3158.2	7.3029	1.614	2.125	1018	1719
400	0.30661	2957.9	3264.5	7.4669	1.632	2.129	1013	1562
500	0.35411	3125.0	3479.1	7.7641	1.685	2.168	1008	1333
600	0.40111	3297.5	3698.6	8.0310	1.748	2.224	1005	1168
700	0.44783	3476.2	3924.1	8.2755	1.816	2.287	1003	1041
800	0.49438	3661.7	4156.1	8.5024	1.885	2.353	1002	940.5
900	0.54083	3853.9	4394.8	8.7150	1.953	2.420	1001	858.1
1000	0.58721	4052.7	4639.9	8.9155	2.018	2.484	1001	789.3

$p = 2 \text{ MPa}$								
T	v	u	h	s	c_v	c_p	κ_T	α_p
$^{\circ}\text{C}$	$\frac{\text{m}^3}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{10^{-6}}{\text{kPa}}$	$\frac{10^{-6}}{\text{K}}$
cong -0.14	0.0009992	-0.5955	1.4029	-0.00218	4.208	4.211	0.5066	-63.00
25	0.0010021	104.67	106.68	0.36671	4.131	4.176	0.4503	259.3
50	0.0010113	209.03	211.06	0.70289	4.021	4.177	0.4395	457.6
75	0.0010249	313.56	315.61	1.0145	3.895	4.189	0.4536	611.1
100	0.0010425	418.51	420.59	1.3057	3.765	4.211	0.4871	747.4
125	0.0010639	524.17	526.29	1.5799	3.639	4.248	0.5399	880.4
150	0.0010895	630.94	633.12	1.8401	3.522	4.302	0.6159	1021
175	0.0011198	739.36	741.60	2.0892	3.414	4.381	0.7240	1181
200	0.0011561	850.14	852.45	2.3298	3.318	4.493	0.8803	1375
liq sat 212.38	0.0011767	906.14	908.50	2.4468	3.274	4.566	0.9843	1492
"fg" →	0.098408	1693.0	1889.8	3.8922				
sat vap 212.38	0.099585	2599.1	2798.3	6.3390	2.159	3.191	578.0	3513
250	0.11150	2680.2	2903.2	6.5475	1.810	2.558	546.5	2648
300	0.12551	2773.2	3024.2	6.7684	1.696	2.320	528.7	2142
350	0.13860	2860.5	3137.7	6.9583	1.664	2.232	519.5	1848
400	0.15121	2945.9	3248.3	7.1292	1.664	2.201	514.0	1647
500	0.17568	3116.9	3468.2	7.4337	1.701	2.206	507.8	1374
600	0.19961	3291.5	3690.7	7.7043	1.758	2.247	504.7	1190
700	0.22326	3471.6	3918.2	7.9509	1.822	2.303	502.9	1055
800	0.24674	3658.0	4151.5	8.1790	1.889	2.365	501.8	949.2
900	0.27012	3850.9	4391.1	8.3925	1.956	2.428	501.1	863.8
1000	0.29342	4050.2	4637.0	8.5936	2.021	2.490	500.7	793.2

$p = 5 \text{ MPa}$								
T	v	u	h	s	c_v	c_p	κ_T	α_p
$^{\circ}\text{C}$	$\frac{\text{m}^3}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{\text{kJ}}{\text{kg K}}$	$\frac{10^{-6}}{\text{kPa}}$	$\frac{10^{-6}}{\text{K}}$
cong -0.36	0.0009977	-1.4666	3.5219	-0.00540	4.195	4.197	0.5032	-55.48
25	0.0010008	104.44	109.45	0.36592	4.121	4.167	0.4469	262.8
50	0.0010099	208.59	213.64	0.70150	4.014	4.170	0.4359	457.1
75	0.0010235	312.92	318.03	1.0127	3.889	4.183	0.4496	608.1
100	0.0010410	417.64	422.85	1.3034	3.761	4.205	0.4822	742.3
125	0.0010622	523.06	528.37	1.5771	3.636	4.240	0.5335	872.8
150	0.0010875	629.55	634.98	1.8368	3.519	4.293	0.6073	1010
175	0.0011174	737.61	743.19	2.0852	3.412	4.369	0.7114	1166
200	0.0011531	847.91	853.68	2.3251	3.316	4.476	0.8611	1353
225	0.0011962	961.40	967.38	2.5592	3.230	4.629	1.085	1596
liq sat 263.94	0.0012864	1148.2	1154.6	2.9210	3.120	5.037	1.755	2206
"fg" →	0.038160	1448.8	1639.6	3.0527				
sat vap 263.94	0.039446	2597.0	2794.2	5.9737	2.592	4.438	272.3	4870
300	0.045346	2699.0	2925.7	6.2110	2.062	3.172	240.3	3203
350	0.051969	2809.5	3069.3	6.4516	1.850	2.661	223.8	2367
400	0.057837	2907.5	3196.7	6.6483	1.775	2.461	215.9	1951
500	0.068583	3091.7	3434.7	6.9781	1.753	2.332	208.4	1509
600	0.078704	3273.3	3666.8	7.2605	1.787	2.322	204.9	1263
700	0.088518	3457.7	3900.3	7.5136	1.841	2.352	203.0	1097
800	0.098158	3646.9	4137.7	7.7458	1.902	2.399	201.8	975.7
900	0.10769	3841.8	4380.2	7.9618	1.965	2.453	201.1	881.2
1000	0.11715	4042.6	4628.3	8.1648	2.027	2.509	200.6	805.0

