

**Table Thermodynamique R 23**

	Liquide	Liquide	Vapeur	Liquide	Vapeur	Liquide	Vapeur
Temperature	Pression	Densité	Densité	Enthalpie	Enthalpie	Entropie	Entropie
(°C)	(bar abs)	(Kg/M <sup>3</sup> )	(Kg/M <sup>3</sup> )	(KJ/Kg)	(KJ/Kg)	(KJ/Kg-K)	(KJ/Kg-K)
-150	0.0013793	1685.3	0.0094388	2.5431	291.73	-0.018961	2.3293
-149	0.0016174	1682	0.010979	3.7471	292.22	-0.0092242	2.3143
-148	0.001891	1678.7	0.012735	4.9493	292.71	0.00042038	2.2997
-147	0.0022046	1675.4	0.014731	6.15	293.2	0.0099766	2.2855
-146	0.0025631	1672.1	0.016994	7.3495	293.69	0.019448	2.2715
-145	0.0029718	1668.7	0.019552	8.548	294.19	0.028836	2.2578
-144	0.0034367	1665.4	0.022438	9.7456	294.68	0.038145	2.2444
-143	0.0039641	1662.1	0.025685	10.943	295.17	0.047377	2.2312
-142	0.004561	1658.7	0.029331	12.139	295.66	0.056534	2.2184
-141	0.005235	1655.4	0.033415	13.335	296.15	0.065617	2.2058
-140	0.0059941	1652	0.037979	14.53	296.65	0.074629	2.1934
-139	0.0068474	1648.6	0.043069	15.725	297.14	0.083572	2.1813
-138	0.0078044	1645.2	0.048733	16.92	297.63	0.092446	2.1695
-137	0.0088754	1641.8	0.055023	18.115	298.12	0.10125	2.1579
-136	0.010072	1638.4	0.061994	19.31	298.61	0.11	2.1465
-135	0.011405	1635	0.069705	20.505	299.11	0.11868	2.1353
-134	0.012887	1631.6	0.078217	21.7	299.6	0.12729	2.1244
-133	0.014534	1628.2	0.087598	22.895	300.09	0.13585	2.1137
-132	0.016358	1624.8	0.097917	24.09	300.58	0.14435	2.1032
-131	0.018375	1621.4	0.10925	25.285	301.07	0.15278	2.0929
-130	0.020603	1617.9	0.12166	26.48	301.56	0.16116	2.0828
-129	0.023058	1614.5	0.13525	27.676	302.05	0.16948	2.0729
-128	0.025758	1611.1	0.1501	28.872	302.54	0.17775	2.0632
-127	0.028725	1607.6	0.16629	30.068	303.04	0.18596	2.0537
-126	0.031978	1604.2	0.18392	31.264	303.52	0.19412	2.0443
-125	0.035539	1600.7	0.20309	32.461	304.01	0.20222	2.0352
-124	0.039431	1597.2	0.2239	33.658	304.5	0.21027	2.0262
-123	0.04368	1593.8	0.24646	34.855	304.99	0.21827	2.0174
-122	0.04831	1590.3	0.27088	36.053	305.48	0.22622	2.0087
-121	0.053348	1586.8	0.29728	37.252	305.97	0.23412	2.0002
-120	0.058822	1583.3	0.32578	38.45	306.45	0.24197	1.9919
-119	0.064762	1579.9	0.35651	39.65	306.94	0.24977	1.9837
-118	0.071199	1576.4	0.3896	40.849	307.42	0.25753	1.9757
-117	0.078164	1572.9	0.42518	42.05	307.91	0.26524	1.9678
-116	0.085692	1569.3	0.4634	43.25	308.39	0.2729	1.9601
-115	0.093818	1565.8	0.50439	44.452	308.87	0.28052	1.9525
-114	0.10258	1562.3	0.54832	45.654	309.36	0.28809	1.945
-113	0.11201	1558.8	0.59533	46.856	309.84	0.29562	1.9377
-112	0.12215	1555.3	0.64559	48.06	310.32	0.3031	1.9305
-111	0.13304	1551.7	0.69926	49.264	310.8	0.31055	1.9235
-110	0.14473	1548.2	0.75651	50.468	311.27	0.31795	1.9165
-109	0.15726	1544.6	0.81753	51.674	311.75	0.32531	1.9097

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(°C)	(bar abs)	(Kg/M <sup>3</sup> )	(Kg/M <sup>3</sup> )	(KJ/Kg)	(KJ/Kg)	(KJ/Kg-K)	(KJ/Kg-K)
-108	0.17067	1541.1	0.88248	52.88	312.23	0.33263	1.903
-107	0.185	1537.5	0.95155	54.087	312.7	0.33991	1.8964
-106	0.20032	1533.9	1.0249	55.295	313.17	0.34715	1.89
-105	0.21667	1530.3	1.1028	56.503	313.64	0.35436	1.8836
-104	0.23409	1526.8	1.1855	57.713	314.11	0.36152	1.8773
-103	0.25265	1523.2	1.273	58.923	314.58	0.36865	1.8712
-102	0.2724	1519.6	1.3656	60.135	315.05	0.37574	1.8652
-101	0.29339	1515.9	1.4637	61.347	315.52	0.3828	1.8592
-100	0.31568	1512.3	1.5672	62.561	315.98	0.38982	1.8534
-99	0.33933	1508.7	1.6766	63.775	316.44	0.3968	1.8477
-98	0.3644	1505.1	1.792	64.991	316.9	0.40375	1.842
-97	0.39096	1501.4	1.9136	66.207	317.36	0.41067	1.8365
-96	0.41906	1497.8	2.0418	67.425	317.82	0.41755	1.831
-95	0.44878	1494.1	2.1767	68.644	318.27	0.4244	1.8256
-94	0.48018	1490.4	2.3186	69.865	318.72	0.43122	1.8203
-93	0.51332	1486.8	2.4678	71.086	319.17	0.43801	1.8151
-92	0.54828	1483.1	2.6245	72.309	319.62	0.44477	1.81
-91	0.58513	1479.4	2.789	73.534	320.07	0.45149	1.805
-90	0.62394	1475.7	2.9615	74.759	320.51	0.45819	1.8
-89	0.66479	1471.9	3.1425	75.987	320.95	0.46486	1.7951
-88	0.70775	1468.2	3.332	77.215	321.39	0.4715	1.7903
-87	0.7529	1464.5	3.5305	78.446	321.83	0.47811	1.7856
-86	0.80032	1460.7	3.7382	79.677	322.26	0.48469	1.7809
-85	0.85009	1456.9	3.9554	80.911	322.69	0.49124	1.7763
-84	0.90228	1453.2	4.1825	82.146	323.12	0.49777	1.7718
-83	0.95699	1449.4	4.4197	83.383	323.55	0.50427	1.7673
-82	1.0143	1445.6	4.6674	84.621	323.97	0.51075	1.7629
-81	1.0743	1441.7	4.9258	85.862	324.39	0.5172	1.7586
-80	1.137	1437.9	5.1955	87.104	324.81	0.52363	1.7543
-79	1.2027	1434.1	5.4765	88.348	325.22	0.53003	1.7501
-78	1.2712	1430.2	5.7694	89.595	325.63	0.53641	1.7459
-77	1.3428	1426.4	6.0745	90.843	326.04	0.54276	1.7418
-76	1.4175	1422.5	6.3921	92.093	326.44	0.54909	1.7378
-75	1.4955	1418.6	6.7226	93.345	326.84	0.5554	1.7338
-74	1.5768	1414.7	7.0664	94.6	327.24	0.56169	1.7299
-73	1.6615	1410.7	7.4239	95.857	327.63	0.56795	1.726
-72	1.7496	1406.8	7.7953	97.116	328.03	0.57419	1.7221
-71	1.8415	1402.8	8.1813	98.377	328.41	0.58042	1.7184
-70	1.937	1398.9	8.5821	99.641	328.79	0.58662	1.7146
-69	2.0363	1394.9	8.9981	100.91	329.17	0.5928	1.7109
-68	2.1395	1390.9	9.4299	102.18	329.55	0.59897	1.7073
-67	2.2468	1386.8	9.8777	103.45	329.92	0.60511	1.7037

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(°C)	(bar abs)	(Kg/M <sup>3</sup> )	(Kg/M <sup>3</sup> )	(KJ/Kg)	(KJ/Kg)	(KJ/Kg-K)	(KJ/Kg-K)
-66	2.3582	1382.8	10.342	104.72	330.29	0.61124	1.7001
-65	2.4737	1378.7	10.824	106	330.65	0.61735	1.6966
-64	2.5937	1374.7	11.323	107.28	331.01	0.62344	1.6931
-63	2.718	1370.6	11.839	108.56	331.36	0.62951	1.6897
-62	2.8469	1366.4	12.375	109.85	331.71	0.63557	1.6863
-61	2.9805	1362.3	12.929	111.13	332.06	0.64161	1.683
-60	3.1188	1358.1	13.503	112.43	332.4	0.64764	1.6796
-59	3.262	1353.9	14.096	113.72	332.73	0.65365	1.6763
-58	3.4102	1349.7	14.711	115.02	333.06	0.65964	1.6731
-57	3.5635	1345.5	15.346	116.32	333.39	0.66562	1.6699
-56	3.722	1341.3	16.003	117.62	333.71	0.67159	1.6667
-55	3.8859	1337	16.682	118.93	334.02	0.67754	1.6635
-54	4.0552	1332.7	17.383	120.24	334.33	0.68348	1.6604
-53	4.2301	1328.4	18.108	121.56	334.64	0.68941	1.6573
-52	4.4106	1324	18.858	122.88	334.94	0.69532	1.6542
-51	4.597	1319.7	19.631	124.2	335.23	0.70123	1.6512
-50	4.7893	1315.3	20.43	125.53	335.52	0.70712	1.6482
-49	4.9876	1310.8	21.255	126.86	335.8	0.713	1.6452
-48	5.1921	1306.4	22.107	128.19	336.07	0.71887	1.6422
-47	5.4029	1301.9	22.986	129.53	336.34	0.72473	1.6392
-46	5.6201	1297.4	23.893	130.87	336.61	0.73058	1.6363
-45	5.8439	1292.9	24.83	132.22	336.86	0.73642	1.6334
-44	6.0743	1288.3	25.795	133.57	337.11	0.74226	1.6305
-43	6.3115	1283.7	26.792	134.93	337.36	0.74808	1.6276
-42	6.5557	1279	27.819	136.29	337.59	0.7539	1.6248
-41	6.8069	1274.4	28.879	137.65	337.82	0.75971	1.6219
-40	7.0653	1269.7	29.972	139.02	338.04	0.76551	1.6191
-39	7.331	1264.9	31.099	140.4	338.26	0.77131	1.6163
-38	7.6042	1260.2	32.262	141.78	338.46	0.7771	1.6135
-37	7.8849	1255.3	33.46	143.17	338.66	0.78289	1.6107
-36	8.1734	1250.5	34.695	144.56	338.85	0.78867	1.608
-35	8.4697	1245.6	35.969	145.95	339.04	0.79445	1.6052
-34	8.774	1240.7	37.281	147.36	339.21	0.80022	1.6025
-33	9.0864	1235.7	38.635	148.76	339.38	0.80599	1.5997
-32	9.4071	1230.7	40.03	150.18	339.53	0.81176	1.597
-31	9.7363	1225.6	41.468	151.6	339.68	0.81753	1.5942
-30	10.074	1220.5	42.95	153.03	339.82	0.8233	1.5915
-29	10.42	1215.3	44.479	154.46	339.95	0.82906	1.5888
-28	10.775	1210.1	46.054	155.9	340.06	0.83483	1.5861
-27	11.14	1204.9	47.678	157.35	340.17	0.84059	1.5833
-26	11.513	1199.6	49.352	158.8	340.27	0.84636	1.5806
-25	11.896	1194.2	51.079	160.26	340.36	0.85213	1.5779

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(°C)	(bar abs)	(Kg/M <sup>3</sup> )	(Kg/M <sup>3</sup> )	(KJ/Kg)	(KJ/Kg)	(KJ/Kg-K)	(KJ/Kg-K)
-24	12.288	1188.8	52.859	161.73	340.43	0.85791	1.5752
-23	12.689	1183.3	54.695	163.21	340.5	0.86368	1.5724
-22	13.1	1177.8	56.588	164.69	340.55	0.86946	1.5697
-21	13.522	1172.2	58.541	166.18	340.59	0.87525	1.5669
-20	13.953	1166.6	60.556	167.68	340.62	0.88104	1.5642
-19	14.394	1160.8	62.634	169.19	340.63	0.88684	1.5614
-18	14.846	1155	64.779	170.71	340.63	0.89265	1.5586
-17	15.308	1149.2	66.993	172.24	340.62	0.89847	1.5558
-16	15.781	1143.2	69.279	173.77	340.59	0.9043	1.553
-15	16.265	1137.2	71.639	175.32	340.55	0.91013	1.5502
-14	16.76	1131.1	74.077	176.88	340.49	0.91598	1.5473
-13	17.266	1125	76.596	178.44	340.42	0.92185	1.5445
-12	17.784	1118.7	79.199	180.02	340.33	0.92773	1.5416
-11	18.313	1112.3	81.89	181.61	340.22	0.93362	1.5386
-10	18.853	1105.9	84.672	183.21	340.09	0.93953	1.5357
-9	19.406	1099.3	87.551	184.83	339.95	0.94546	1.5327
-8	19.971	1092.7	90.531	186.45	339.78	0.95141	1.5297
-7	20.548	1085.9	93.616	188.09	339.6	0.95739	1.5266
-6	21.137	1079.1	96.812	189.75	339.39	0.96338	1.5235
-5	21.739	1072.1	100.12	191.42	339.16	0.96941	1.5204
-4	22.354	1064.9	103.56	193.1	338.91	0.97546	1.5172
-3	22.982	1057.7	107.12	194.8	338.63	0.98154	1.514
-2	23.624	1050.3	110.82	196.51	338.33	0.98766	1.5107
-1	24.278	1042.8	114.67	198.25	338	0.99381	1.5073
0	24.947	1035.1	118.67	200	337.64	1	1.5039
1	25.629	1027.2	122.83	201.77	337.25	1.0062	1.5004
2	26.326	1019.2	127.17	203.56	336.83	1.0125	1.4969
3	27.037	1011	131.69	205.38	336.38	1.0188	1.4932
4	27.762	1002.5	136.41	207.22	335.89	1.0252	1.4895
5	28.503	993.88	141.34	209.08	335.36	1.0317	1.4857
6	29.259	985.01	146.5	210.97	334.78	1.0382	1.4817
7	30.03	975.88	151.91	212.89	334.17	1.0447	1.4777
8	30.817	966.47	157.59	214.84	333.5	1.0514	1.4735
9	31.619	956.77	163.57	216.82	332.78	1.0582	1.4692
10	32.438	946.75	169.87	218.84	332.01	1.065	1.4647
11	33.274	936.37	176.52	220.9	331.17	1.0719	1.46
12	34.127	925.59	183.56	223	330.27	1.079	1.4552
13	34.997	914.36	191.05	225.16	329.29	1.0862	1.4501
14	35.885	902.64	199.03	227.37	328.22	1.0936	1.4448
15	36.791	890.35	207.58	229.64	327.06	1.1011	1.4392
16	37.715	877.42	216.77	231.98	325.79	1.1089	1.4333
17	38.659	863.73	226.72	234.41	324.39	1.1169	1.427

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18	39.622	849.13	237.57	236.93	322.84	1.1252	1.4203
19	40.606	833.46	249.5	239.57	321.12	1.1338	1.413
20	41.61	816.43	262.79	242.36	319.17	1.143	1.405