

PROPERTIES OF SATURATED LIQUID D₂O

Allan H. Harvey

Properties of saturated liquid heavy water, D₂O, are given in this table as a function of temperature from the melting point to the critical point. Properties are calculated from formulations adopted for general and scientific use by the International Association for the Properties of Water and Steam (IAPWS). The background (including information about uncertainties) for the equation of state used for vapor pressure, density, and heat capacity is given by Herrig et al. (2018), and the background for the transport property correlations is given by Matsunaga and Nagashima (1983). The unpublished surface tension correlation and the other IAPWS formulations may be found on the IAPWS website (<http://www.iapws.org>). The temperature scale is ITS-90. Additional calculations at state points not listed below can be obtained with the NIST program REFPROP (<http://www.nist.gov/srd/refprop>). The properties are:

P : vapor pressure η : viscosity
 ρ : density λ : thermal conductivity
 C_p : isobaric heat capacity σ : surface tension

References

1. Matsunaga, N., and Nagashima, A., Transport Properties of Liquid and Gaseous D₂O over a Wide Range of Temperature and Pressure, *J. Phys. Chem. Ref. Data* **12**, 933 (1983).
2. Herrig, S., Thol, M., Harvey, A. H., and Lemmon, E. W., A Reference Equation of State for Heavy Water, *J. Phys. Chem. Ref. Data* **47**, 043102 (2018).
3. Lemmon, E. W., Bell, I. H., Huber, M. L., and McLinden, M. O., NIST Standard Reference Database 23: Reference Fluid Thermodynamic and Transport Properties-REFPROP, Version 10.0, National Institute of Standards and Technology, Standard Reference Data Program, Gaithersburg, Maryland, 2018 (www.nist.gov/srd/refprop).

$t/^{\circ}\text{C}$	P/kPa	$\rho/\text{kg m}^{-3}$	$C_p/\text{kJ kg}^{-1} \text{K}^{-1}$	$\eta/\text{mPa s}$	$\lambda/\text{W m}^{-1} \text{K}^{-1}$	$\sigma/\text{mN m}^{-1}$
3.82	0.6616	1105.3	4.247	2.087	0.564	74.93
10	1.027	1105.9	4.224	1.680	0.574	74.06
20	1.999	1105.3	4.200	1.247	0.589	72.61
30	3.701	1103.2	4.186	0.972	0.600	71.09
40	6.547	1100.0	4.177	0.785	0.610	69.52
50	11.117	1095.7	4.171	0.651	0.618	67.89
60	18.20	1090.6	4.168	0.552	0.625	66.21
70	28.80	1084.7	4.165	0.476	0.629	64.47
80	44.24	1078.2	4.163	0.416	0.633	62.67
90	66.09	1071.1	4.163	0.368	0.635	60.82
100	96.31	1063.4	4.163	0.329	0.636	58.93
110	137.16	1055.1	4.165	0.296	0.636	56.98
120	191.3	1046.4	4.170	0.269	0.635	54.99
130	261.8	1037.2	4.176	0.246	0.632	52.95
140	352.0	1027.4	4.185	0.227	0.629	50.87
150	465.7	1017.2	4.198	0.210	0.625	48.75
160	607.2	1006.5	4.214	0.195	0.620	46.59
170	781.0	995.2	4.234	0.182	0.614	44.39
180	992.0	983.5	4.259	0.171	0.607	42.16
190	1245.5	971.2	4.290	0.161	0.600	39.90
200	1547	958.3	4.327	0.152	0.592	37.61
210	1903	944.8	4.371	0.144	0.583	35.29
220	2319	930.6	4.423	0.136	0.574	32.95

230	2802	915.8	4.485	0.130	0.564	30.59
240	3360	900.1	4.558	0.123	0.553	28.22
250	3998	883.7	4.645	0.118	0.541	25.84
260	4726	866.3	4.750	0.112	0.529	23.45
270	5550	847.8	4.875	0.107	0.516	21.07
280	6480	828.2	5.028	0.103	0.502	18.69
290	7525	807.1	5.219	0.098	0.488	16.33
300	8693	784.5	5.463	0.094	0.473	13.99
310	9997	759.8	5.785	0.089	0.458	11.68
320	11447	732.6	6.234	0.085	0.441	9.428
330	13057	702.1	6.902	0.080	0.425	7.238
340	14843	666.7	8.006	0.075	0.408	5.141
350	16823	623.6	10.16	0.069	0.391	3.173
360	19020	565.7	16.22	0.062	0.382	1.405
370	21477	440.1	264.3	0.047	0.526	0.0467
370.697	21662	356.0				0