

FIXED POINT PROPERTIES OF H₂O AND D₂O

Temperatures are given on the IPTS-68 scale.

References

1. Haar, L., Gallagher, J. S., and Kell, G. S., *NBS/NRC Steam Tables*, Hemisphere Publishing Corp., New York, 1984.
2. Levelt Sengers, J. M. H., Straub, J., Watanabe, K., and Hill, P. G., Assessment of critical parameter values for H₂O and D₂O, *J. Phys. Chem. Ref. Data*, 14, 193, 1985.
3. Kestin, J. et. al., Thermophysical properties of fluid D₂O, *J. Phys. Chem. Ref. Data*, 13, 601, 1984.
4. Kestin, J. et. al., Thermophysical properties of fluid H₂O, *J. Phys. Chem. Ref. Data*, 13, 175, 1984.
5. Hill, P. G., MacMillan, R. D. C., and Lee, V., A fundamental equation of state for heavy water, *J. Phys. Chem. Ref. Data*, 11, 1, 1982.

| | Unit | H ₂ O | D ₂ O |
|-----------------------------------|--------------------|------------------|------------------|
| Molar mass | g/mol | 18.01528 | 20.02748 |
| Melting point(101.325 kPa) | °C | 0.00 | 3.82 |
| Boiling point(101.325 kPa) | °C | 100.00 | 101.42 |
| Triple point temperature | °C | 0.01 | 3.82 |
| Triple point pressure | Pa | 611.73 | 661 |
| Triple point density(l) | g/cm ³ | 0.99978 | 1.1055 |
| Triple point density(g) | mg/L | 4.885 | 5.75 |
| Critical temperature | °C | 373.99 | 370.74 |
| Critical pressure | MPa | 22.064 | 21.671 |
| Critical density | g/cm ³ | 0.322 | 0.356 |
| Critical specific volume | cm ³ /g | 3.11 | 2.81 |
| Maximum density(saturated liquid) | g/cm ³ | 0.99995 | 1.1053 |
| Temperature of maximum density | °C | 4.0 | 11.2 |

THERMAL CONDUCTIVITY OF SATURATED H₂O AND D₂O

This table gives the thermal conductivity λ for water (H₂O or D₂O) in equilibrium with its vapor. Values for the liquid (λ_l) and vapor (λ_v) are listed, as well as the vapor pressure.

References

1. Sengers, J.V. and Watson, J.T.R., Improved international formulations for the viscosity and thermal conductivity of water substance, *J. Phys. Chem. Ref. Data*, 15, 1291, 1986.
2. 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.

| t/°C | H ₂ O | | | D ₂ O | | |
|------|------------------|-------------------------------|-------------------------------|------------------|-------------------------------|-------------------------------|
| | P/kPa | $\lambda_l / (\text{mW/K m})$ | $\lambda_v / (\text{mW/K m})$ | P/kPa | $\lambda_l / (\text{mW/K m})$ | $\lambda_v / (\text{mW/K m})$ |
| 0 | 0.6 | 561.0 | 16.49 | | | |
| 10 | 1.2 | 580.0 | 17.21 | 1.0 | 575 | 17.0 |
| 20 | 2.3 | 598.4 | 17.95 | 2.0 | 589 | 17.8 |
| 30 | 4.2 | 615.4 | 18.70 | 3.7 | 600 | 18.5 |
| 40 | 7.4 | 630.5 | 19.48 | 6.5 | 610 | 19.3 |
| 50 | 12.3 | 643.5 | 20.28 | 11.1 | 618 | 20.2 |
| 60 | 19.9 | 654.3 | 21.10 | 18.2 | 625 | 21.0 |
| 70 | 31.2 | 663.1 | 21.96 | 28.8 | 629 | 21.9 |
| 80 | 47.4 | 670.0 | 22.86 | 44.2 | 633 | 22.8 |
| 90 | 70.1 | 675.3 | 23.80 | 66.1 | 635 | 23.8 |
| 100 | 101.3 | 679.1 | 24.79 | 96.2 | 636 | 24.8 |
| 150 | 476 | 682.1 | 30.77 | 465 | 625 | 30.8 |
| 200 | 1555 | 663.4 | 39.10 | 1546 | 592 | 39.0 |
| 250 | 3978 | 621.4 | 51.18 | 3995 | 541 | 52.0 |
| 300 | 8593 | 547.7 | 71.78 | 8688 | 473 | 75.2 |
| 350 | 16530 | 447.6 | 134.59 | 16820 | 391 | 143.0 |