

# Properties of Water

Boiling Point (at 1 atm):	100°C = 373.15 K
Heat of Fusion:	335 J/g
Heat of Vaporization:	2259 J/g
Triple Point:	0.01°C/611.73 Pa
Critical Point:	373.99°C/22.064 MPa
Melting Point (at 1 atm):	0°C = 273.15 K
Molal Boiling Point Elevation Constant:	0.51°C/m
Molal Freezing Point Depression Constant:	-1.86°C/m
Molar Mass:	18.02 g
Specific Heat:	4.184 J/g°C = 1 cal/g°C
Ion product constant:	$1.0 \times 10^{-14}$
Density at 25°C:	1.00 g/mL (rounded)

Lide, David R. *CRC Handbook, 83<sup>rd</sup> ed.*; CRC Press: Boca Raton, Florida, 2004; p 6-4.

## Vapor Pressure Approximation

The formula given below is acceptable for approximating the vapor pressure (in mm Hg) of water from 0 to 100°C. The temperature substituted into the formula must be in kelvin.

$$P = e^{\left(20.386 - \frac{5132}{T}\right)}$$

## Solubility Rules

- All common compounds of alkali metal ions and ammonium salts are soluble
- All common nitrates, acetates, and most perchlorates are soluble
- All common chlorides, bromides, and iodides are soluble, except those of  $\text{Ag}^+$ ,  $\text{Pb}^{+2}$ ,  $\text{Cu}^+$ , and  $\text{Hg}_2^{+2}$
- All common fluorides are soluble, except  $\text{Pb}^{+2}$  and those of the alkali earth metals
- All common sulfates are soluble, except  $\text{Ca}^{+2}$ ,  $\text{Sr}^{+2}$ ,  $\text{Ba}^{+2}$ ,  $\text{Ag}^+$ , and  $\text{Pb}^{+2}$
- All common metal hydroxides are insoluble, except those of the alkali metals and the alkali earth metals greater than or equal to  $\text{Ca}^{+2}$
- All common carbonates and phosphates are insoluble, except those of the alkali metals and  $\text{NH}_4^+$
- All common sulfides are insoluble except those of the alkali metals, alkali earth metals, and  $\text{NH}_4^+$

Silberberg, Martin S. *Chemistry: The Molecular Nature of Matter and Change, 4<sup>th</sup> ed.*; McGraw-Hill: New York, 2006; p 143.