Selected constants:

$N_A = 6.022\times10^{23}$

R = 8.314 J/mol•K
0.08206 atm□L/mol□K
62.36 torr□L/mol□K

$R_y = 2.180 \times 10^{-18}$ J
1313 kJ/mol

$c = 2.998\times10^{8}$ m/s

$h = 6.626\times10^{-34}$ J□s

$e = -1.602\times10^{-19}$ C

$m_e = 9.109\times10^{-31}$ kg

Selected unit conversion factors and helpful values:

4.184 J = 1 cal

1 atm = 760 torr = 101325 Pa

0.00°C = 273.15 K

101.325 J = 1 atm□L

Selected constants for water:

specific heat of $H_2O(s)$ at -5°C, c_s = 2.09 J/g·°C

specific heat of $H_2O(l)$ at 25°C, c_s = 4.18 J/g°C

specific heat of $H_2O(g)$ at 105°C c_s = 2.01 J/g·°C

heat of fusion of $H_2O(s)$ at 0°C, ΔH_{fus} = 6.009 kJ/mol

heat of vap. of $H_2O(l)$ at 100°C, ΔH_{vap} = 40.67 kJ/mol

heat of vap. of $H_2O(l)$ at 25°C, ΔH_{vap} = 44.01 kJ/mol

Density and Vapor Pressure Data for Water		
0°C	0.9998 g/mL	4.6 torr
10°C	0.9997 g/mL	9.2 torr
20°C	0.9982 g/mL	17.5 torr
25°C	0.9970 g/mL	23.8 torr
30°C	0.9957 g/mL	31.8 torr
40°C	0.9922 g/mL	55.3 torr

Selected formulas:

$PV = nRT$ $\qquad \left[P+a\left(\frac{n}{V}\right)^2\right](V-nb)=nRT$

$KE=\frac{1}{2}mv^2$ $\qquad KE_{ave}=\frac{3}{2}RT$ $\qquad KE_{mp}=\frac{1}{2}RT$

$v_{rms}=\sqrt{\frac{3RT}{M}}$ $\qquad v_{mp}=\sqrt{\frac{2RT}{M}}$ $\qquad v_{ave}=\sqrt{\frac{8RT}{pM}}$ $\qquad \frac{\text{rate 1}}{\text{rate 2}}=\sqrt{\frac{M_2}{M_1}}$

$c = \nu\lambda$ $\qquad E = h\nu$ $\qquad \lambda=\frac{h}{mv}$ $\qquad \Delta x\cdot\Delta p=\Delta x(m\Delta v)\geq\frac{h}{4\pi}$

$E=-R_y\left(\frac{Z^2}{n^2}\right)$ $\qquad E=R_yZ^2\left(\frac{1}{n_1^2}-\frac{1}{n_2^2}\right)$

$\Delta E = q + w$ $\qquad q = mc_s\Delta T$ $\qquad w_{PV} = -P_{ext}\Delta V$

$\Delta H = \Delta E + RT\Delta n_{gas}$ $\qquad K_p = K_c(RT)^{\Delta n}$

$pH = -\log[H^+]$ $\qquad K_w = [H^+][OH^-] = 1.0\times10^{-14}$ (at 25°C)

Selected Solubility Information
(excluding the ions you are required to know)

Compounds containing this anion...	...and this cation, are **soluble**.	...and this cation, are **insoluble.**
Cl^-	*most cations*	Ag^+, Pb^{2+}, Hg_2^{2+}
Br^-, I^-	*most cations*	Ag^+, Pb^{2+}, Hg^{2+}, Hg_2^{2+}
SO_4^{2-}	*most cations*	Ag^+, Pb^{2+}, Hg_2^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}
CO_3^{2-}, PO_4^{3-}	*only a few cations*	*most cations*
OH^-	Ba^{2+} *and a few others*	*most cations*
S^{2-}	Mg^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+} (group IIA), *a few others*	*most cations*