Length

$1\ \text{km} = 0.62137\ \text{mi}$

$1\ \text{in} = 2.54\ \text{cm (exact)}$

$1\ \text{Å} = 1 \times 10^{10}\ \text{m}$

Energy

$1\ \text{J} = 1\ \text{kg m}^2\ \text{s}^{-2}$

$1\ \text{cal} = 4.184\ \text{J}$

$1\ \text{Cal} = 1\ \text{kcal} = 10^3\ \text{cal}$

$1\ \text{L atm mol}^{-1}\ \text{K}^{-1} = 101.325\ \text{J}$

Pressure

$1\ \text{Pa} = 1\ \text{N m}^{-3} = 1\ \text{kg m}^{-1}\ \text{s}^{-2}$

$1\ \text{atm} = 101.325\ \text{kPa} = 760\ \text{mmHg} =$
$760\ \text{torr} = 14.70\ \text{lb in}^{-2}$

$1\ \text{bar} = 1 \times 10^5\ \text{Pa (exact)}$

Temperature

$t/\text{K} = t/^\circ\text{C} + 273.15$

$t/^\circ\text{C} = (t/^\circ\text{F} - 32)/1.8$

Mass

$1\ \text{kg} = 2.205\ \text{lb}$

Volume

$1\ \text{mL} = 1\ \text{cm}^3 = 1\ \text{cc}$

Constants

$c = 2.998 \times 10^8\ \text{m s}^{-1}$

$h = 6.626 \times 10^{-34}\ \text{J s}$

$R = 0.08206\ \text{L atm mol}^{-1}\ \text{K}^{-1}$
$= 8.314\ \text{J mol}^{-1}\ \text{K}^{-1}$

$c(\text{H}_2\text{O,l}) = 4.184\ \text{J g}^{-1}\ \text{K}^{-1}$

$m_\text{e} = 9.109 \times 10^{-31}\ \text{kg}$

$m_\text{p} = 1.673 \times 10^{-27}\ \text{kg}$

$\text{Ry} = 2.18 \times 10^{-18}\ \text{J}$

$K_\text{W} = 1.0 \times 10^{-14}\ \text{(at 25 °C)}$

$k_\text{B} = 1.381 \times 10^{-23}\ \text{J K}^{-1}$

$F = 96\,485\ \text{J (V mol } e^-)^{-1}$

$N_\text{A} = 6.022 \times 10^{23}$

Equilibrium and Acid/Base

$$K_\text{P} = K_\text{c}\,(RT)^{\Delta n}$$

$$\ln\frac{K_2}{K_1} = \frac{-\Delta_\text{r}H^\circ}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

Equations

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

$$M = \frac{mRT}{PV}$$

$$d = \frac{MP}{RT}$$

$$\mu_\text{rms} = \sqrt{\frac{3RT}{M}}$$

$$\frac{\text{rate of effusion A}}{\text{rate of effusion B}} = \sqrt{\frac{MW_\text{B}}{MW_\text{A}}}$$

$$\Delta E = -2.18 \times 10^{-18}\ \text{J}\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$$

$$\ln\left(\frac{P_2}{P_1}\right) = \frac{-\Delta_\text{vap}H}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

$$C_\text{g} = k_\text{H}P_\text{g}$$

$$P_\text{solution} = \chi_\text{solvent}P^\circ_\text{solvent}$$

$$P_\text{solution} = \sum P_j = \sum \chi_j P_j$$

$$\Pi = iMRT$$

Thermodynamics and Electrochemistry

$$S = k_\text{B}\ln W$$

$$\Delta S = \frac{q_\text{rev}}{T}$$

$$\Delta G = \Delta G^\circ + RT\ln Q$$

$$\Delta G^\circ = -RT\ln K$$

$$\Delta G = -nFE_\text{cell}$$

$$E^\circ_\text{cell} = \frac{RT}{nF}\ln K$$

$$E^\circ_\text{cell} = \frac{0.0257}{n}\ln K = \frac{0.0592}{n}\log K$$

$$E_\text{cell} = E^\circ_\text{cell} - \frac{RT}{nF}\ln Q$$

$$E_\text{cell} = E^\circ_\text{cell} - \frac{0.0257}{n}\ln Q$$

$$Q = I \times t = n \times F$$

Chemical Kinetics

$$[\text{A}]_t = -kt + [\text{A}]_0$$

$$\ln[\text{A}]_t = -kt + \ln[\text{A}]_0$$

$$\frac{1}{[\text{A}]_t} = kt + \frac{1}{[\text{A}]_0}$$

$$t_{1/2} = \frac{[\text{A}]_0}{2k}$$

$$t_{1/2} = \frac{\ln 2}{k} \approx \frac{0.693}{k}$$

$$t_{1/2} = \frac{1}{k[\text{A}]_0}$$

$$\ln\frac{k_2}{k_1} = \frac{-E_\text{a}}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$