

Useful Constants

Avogadro's Number:	$6.02214179 \times 10^{23} \text{ mol}^{-1}$
Standard Pressure:	$1 \text{ atm} = 760 \text{ torr} = 101325 \text{ Pa} = 760 \text{ mmHg (approx.)}$
Gas Constant:	$R = 0.0820575 \text{ L-atm/mol-K} = 8.314472 \text{ J/mol-K}$ $= 62.3637 \text{ L-torr/mol-K}$
Acceleration due to gravity:	9.80665 m/s^2
Faraday Constant:	$1 \text{ mole electrons} = 96485.3399 \text{ coulombs}$
Water Hydrolysis Constant:	$K_w = 1.00 \times 10^{-14} \text{ at } 25^\circ\text{C}$

Useful formulae

$$X^o = \sum_{i=1}^k n_i X_{f,i}^o(\text{products}) - \sum_{l=1}^m n_l X_{f,l}^o(\text{reactants}) \quad (\text{where } X \text{ is the state function } \Delta H, \Delta G)$$

$$\Delta X^o = \sum_{i=1}^k n_i X_{f,i}^o(\text{products}) - \sum_{l=1}^m n_l X_{f,l}^o(\text{reactants}) \quad (\text{where } X \text{ is the state function } S)$$

$$\Delta E = q + w; w = -P\Delta V$$

$$\Delta H = \Delta E + P\Delta V = \Delta E + \Delta nRT$$

$$\Delta G = \Delta G^o + RT \ln Q \quad (\text{where } Q \text{ is the reaction quotient})$$

$$\Delta G^o = \Delta H^o - T\Delta S^o = -RT \ln K = -nF\epsilon^o \quad (\text{where } K \text{ is the equilibrium constant})$$

$$\ln \left(\frac{K_2}{K_1} \right) = \left(\frac{\Delta H^o}{R} \right) x \left(\frac{T_2 - T_1}{T_2 T_1} \right)$$

$$K_p = K_c (RT)^{\Delta n}$$

$$\epsilon_{cell} = \epsilon_{cell}^o - \frac{RT}{nF} \ln Q$$

$$\epsilon_{cell} = \epsilon_{cell}^o - \frac{0.059159}{n} \log Q \quad \text{at } 25^\circ\text{C}$$

Nernst Equation:

Zero Order Reaction:

$$[A]_o - [A]_t = kt$$

1st Order Reaction:

$$\ln \left(\frac{[A]_o}{[A]_t} \right) = kt$$

2nd Order Reaction:

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

Arrhenius Equation:

$$k = A e^{\frac{-E_a}{RT}} \quad (A \text{ is the pre-exponential factor})$$

$$\ln \left(\frac{k_2}{k_1} \right) = \left(\frac{E_a}{R} \right) x \left(\frac{T_2 - T_1}{T_1 T_2} \right)$$

Freezing Point Depression:

$$\Delta T = i K_f m^l$$

Boiling Point Elevation:

$$\Delta T = i K_b m$$

¹ "i" is the van't Hoff factor