

Constants, Conversion Factors and Equations

Constants and Conversion Factors:

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

$$c = 2.9979 \times 10^8 \frac{\text{m}}{\text{s}}$$

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

$$N_A = 6.022 \times 10^{23}$$

$$R = 0.08206 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}} = 8.31451 \frac{\text{J}}{\text{mol}\cdot\text{K}}$$

$$1 \text{ V} = 1 \text{ J/C}$$

$$F = 96485 \text{ C/mol}$$

$$1 \text{ cal} = 4.184 \text{ J} = 1 \times 10^{-3} \text{ Cal}$$

$$1 \text{ atm} = 760 \text{ Torr} = 101.3 \text{ kPa} = 1.013 \text{ bar}$$

Equations:

$$d = \frac{m}{V}$$

$$v = \frac{c}{\lambda}$$

$$E_{\text{photon}} = h\nu$$

$$E_K (\text{ejected electron}) = E_{\text{photon}} - \phi$$

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

$$E_{\text{photon}} = |\Delta E|$$

$$\lambda_{\text{matter}} = \frac{h}{mv}$$

$$F = \frac{q^+ \times q^-}{r^2}$$

$$M_i V_i = M_f V_f$$

$$PV = nRT$$

$$PM = dRT$$

$$P_A = \chi_A P_{\text{total}}$$

$$\chi_A = \frac{n_A}{n_{\text{total}}}$$

$$E_K = \frac{1}{2} mv^2$$

$$\bar{E}_K = \frac{3}{2} RT$$

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

$$q = mC_s \Delta T$$

$$q_{\text{rxn}} = -q_{\text{soln}}$$

$$\Delta H = q_p$$

$$\text{pH} = -\log[\text{H}_3\text{O}^+]$$

$$\text{pH} + \text{pOH} = 14.00 \text{ at } 25^\circ\text{C}$$

$$K_a \times K_b = K_w = 1.00 \times 10^{-14} \text{ at } 25^\circ\text{C}$$

$$\Delta G = \Delta H - T\Delta S$$

$$\Delta S^\circ_{\text{rxn}} = \Sigma[nS^\circ_m (\text{products})] - \Sigma[nS^\circ_m (\text{reactants})] \text{ (similar for } \Delta G^\circ, \Delta H^\circ)$$

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

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

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

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