

Formulae and Possibly Useful Information

$$P_A = X_A P_A^{\circ}$$

$$P_A = K_A [A]$$

$$\Pi = MRT$$

$$\Delta T_b = K_b m$$

$$\Delta T_f = K_f m$$

$$PV = nRT$$

$$\Delta S_{\text{sys}} = q_{\text{rev}}/T = \Delta H/T$$

$$\Delta S_{\text{surr}} = -\Delta H/T$$

$$w = -P_{\text{ext}}V$$

$$q_p = nC_p \Delta T$$

$$\Delta E = q + w$$

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

$$\Delta H = \Delta E + RT\Delta n$$

$$\Delta S_{\text{univ}} = \Delta S_{\text{sys}} + \Delta S_{\text{surr}}$$

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

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

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

$$\ln(K_2/K_1) = -(\Delta H^{\circ}/R)[(1/T_2) - (1/T_1)]$$

$$K_w = [H^+][OH^-]$$

$$\text{pH} = -\text{Log}[H^+]$$

$$K_w = 1.0 \times 10^{-14} \text{ (at } 25^{\circ}\text{C)}$$

$$K_a K_b = K_w$$

$$\text{pH} + \text{pOH} = \text{p}K_w$$

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

$$\text{pH} = \text{p}K_a + \text{Log}([A^-]/[HA])$$

$$1 \text{ Joule} = 1 \text{ Volt} \times 1 \text{ Coulomb}$$

$$\Delta G^{\circ} = -n F E^{\circ}_{\text{cell}}$$

$$E^{\circ}_{\text{cell}} = (0.0592/n) \text{Log}K \text{ (at } 25^{\circ}\text{C)}$$

$$E_{\text{cell}} = E^{\circ}_{\text{cell}} - (0.0592/n) \text{Log}Q \text{ (at } 25^{\circ}\text{C)}$$

$$1 \text{ calorie} = 4.184 \text{ Joule}$$

$$1 \text{ Joule} = 1 \text{ kg}\cdot\text{m}^2\cdot\text{s}^{-2} = 1 \text{ N}\cdot\text{m}$$

$$c = 2.99792458 \times 10^8 \text{ m/s}$$

$$h = 6.62606876 \times 10^{-34} \text{ J}\cdot\text{s}$$

$$\pi = 3.1415927$$

$$N_o = 6.02214199 \times 10^{23} \text{ mol}^{-1}$$

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

$$^{\circ}\text{F} = (9/5)^{\circ}\text{C} + 32 \text{ (exactly)}$$

$$F = \frac{-Gm_1m_2}{r^2} \quad G = 6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2\cdot\text{kg}^{-2}$$

$$F = \frac{1}{4\pi\epsilon_0} \times \frac{q_1q_2}{r^2} \quad \epsilon = 8.85 \times 10^{-12} \text{ C}^2\cdot\text{N}^{-1}\cdot\text{m}^{-2}$$

$$R = 8.3145 \text{ J/mol}\cdot\text{K} = 0.08206 \text{ L}\cdot\text{atm/mol}\cdot\text{K}$$

$$1 \text{ atm} = 760 \text{ torr} = 101325 \text{ Pa}$$