

Formulae and Possibly Useful Information

$$P_A = X_A P_A^\circ$$

$$P_A = K_A[A]$$

$$\Pi = MRT$$

$$\Delta T_b = K_b m$$

$$\Delta T_f = K_f m$$

$$PV = nRT$$

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

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

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

$$q_p = nC_p\Delta T$$

$$\Delta E = q + w$$

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

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

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

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

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

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

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

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

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

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

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

$$\pi = 3.1415927$$

$$N_0 = 6.02214199 \times 10^{23} \text{ mol}^{-1}$$

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

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

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

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

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

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

$$K_b (\text{H}_2\text{O}) = 0.512 \text{ K}\cdot\text{kg/mol}$$