Exam 3 Equation Sheet

Constants:

h = 6.626 ×10^{-34} J·s

N_A = 6.02 ×10^{23} molecules/mol

c = 2.9979 ×10^{8} m/s

k_B = 1.38 ×10^{-23} J/K = 0.695 cm^{-1}·K^{-1}

R = 0.0820 L·atm·mol^{-1}·K^{-1} = 8.314 J·mol^{-1}·K^{-1} = 0.08314 L·bar·mol^{-1}·K^{-1}

$$\frac{dP}{dT} = \frac{\Delta_{trs}\overline{H}}{T\Delta_{trs}\overline{V}} \qquad \mu = -RT\left(\frac{\partial \ln Q}{\partial N}\right)$$

$$\ln\frac{P_2}{P_1} = -\frac{\Delta_{vap}\overline{H}}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right) \qquad \frac{1}{P}\frac{dP}{dT} = \frac{d\ln P}{dT} = \frac{\Delta_{vap}\overline{H}}{RT^2}$$

$$x_A d\mu_A + x_B d\mu_B = 0 \qquad \mu = \mu^\circ + RT\ln\left(\tfrac{P}{P^\circ}\right) \qquad \mu_A = \mu_A^* + RT\ln\left(\tfrac{P_A}{P_A^*}\right)$$

$$P_A = x_A P_A^* \qquad P_A = x_A k_{H,A}$$

$$a_j = \frac{P_j}{P_j^*} \qquad \gamma_j = \frac{a_j}{x_j} \qquad \Pi = cRT \qquad \Delta T_f = K_f m_2$$

$$\Delta T_b = K_b m_2 \qquad \Delta P = P_1^* - P_1 = x_2 P_1^* \qquad \Pi = vcRT \qquad \Delta T_f = vK_f m_2$$

$$\Delta T_b = vK_b m_2 \qquad K_b = \frac{R\left(T_{vap}^*\right)^2 M_1}{\Delta_{vap}\overline{H}} \qquad a = a_\pm^v = (m_+^{v_+} m_-^{v_-})(\gamma_+^{v_+}\gamma_-^{v_-})$$

$$a_2 = a_\pm^v \qquad a = a_\pm^v = (c_+^{v_+} c_-^{v_-})(\gamma_+^{v_+}\gamma_-^{v_-})$$

$$\ln\gamma_\pm = -1.173|z_+ z_-|I_c^{1/2} \qquad I_c = \frac{1}{2}\sum_{j=1}^{s} z_j^2 c_j \qquad \ln\gamma_\pm = \frac{-1.173|z_+ z_-|I_c^{1/2}}{1 + I_c^{1/2}}$$

$$K_P = K_c\left(\frac{c^\circ RT}{P^\circ}\right)^{v_Y + v_Z - v_A - v_B} \qquad K_c = \frac{(q_Y/V)^{v_Y}(q_Z/V)^{v_Z}}{(q_A/V)^{v_A}(q_B/V)^{v_B}}$$

$$\Delta_r G = \left(\frac{\partial G}{\partial \xi}\right)_{T,P} = v_Y\mu_Y + v_Z\mu_Z - v_A\mu_A - v_B\mu_B \qquad \Delta_r G = \Delta_r G^\circ(T) + RT\ln Q$$

$$\frac{d\ln K_P(T)}{dT} = \frac{\Delta_r H^\circ}{RT^2} \qquad \ln a = \frac{\overline{V}}{RT}(P-1) \qquad \Delta_r G = RT\ln\frac{Q_p}{K_p}$$

$$\ln\left(\frac{K_P(T_2)}{K_p(T_1)}\right) = -\frac{\Delta_r H^\circ}{R}\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$