

## Chem 141 Final Exam Formula Sheet

$$PV = nRT$$

$$X_a = n_a/n_{total} = P_a/P_{total}$$

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

$$\Delta E = q + w$$

$$\Delta H_{rxn} = H_{products} - H_{reactants}$$

$$\Delta H^\circ_{rxn} = \sum n \Delta H_f^\circ \text{ products} - \sum m \Delta H_f^\circ \text{ reactants}$$

$$\lambda \nu = c$$

$$\Delta p \times \Delta x \geq \frac{h}{4\pi} \quad \text{or} \quad m \Delta v \times \Delta x \geq \frac{h}{4\pi}$$

$$E_n = \left( -2.178 \times 10^{-18} \text{ J} \right) \left( \frac{1}{n^2} \right)$$

$$u_{mp} = \sqrt{\frac{2RT}{M}}$$

$$\frac{r_1}{r_2} = \sqrt{\frac{M_2}{M_1}}$$

$$\ln \left( \frac{P_2}{P_1} \right) = -\frac{\Delta H_{vap}}{R} \left( \frac{1}{T_2} - \frac{1}{T_1} \right)$$

$$S_g = kP_g$$

$$\Delta T_b = T_b(\text{solution}) - T_b(\text{solvent}) = iK_b m$$

$$\Delta T_f = T_f(\text{solution}) - T_f(\text{solvent}) = iK_f m$$

$$R = 8.3145 \text{ J mol}^{-1} \text{ K}^{-1} = 0.08206 \text{ L atm mol}^{-1} \text{ K}^{-1}$$

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

$$R = 8.3145 \text{ J mol}^{-1} \text{ K}^{-1} = 0.08206 \text{ L atm mol}^{-1} \text{ K}^{-1}$$

$$\text{Electron mass: } m_e = 9.10939 \times 10^{-31} \text{ kg}$$

$$\text{Proton mass: } m_p = 1.673 \times 10^{-27} \text{ kg}$$

$$P_{total} = \sum_i P_i$$

$$w = F \times d = -P \Delta V$$

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

$$q = C_s m \Delta T$$

$$E_{photon} = h\nu = \frac{hc}{\lambda}$$

$$\lambda = \frac{h}{p} = \frac{h}{mv}$$

$$\Delta E = \left( -2.178 \times 10^{-18} \text{ J} \right) \left( \frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$$

$$u_{rms} = \sqrt{\frac{3RT}{M}}$$

$$\left[ P_{obs} + a \left( \frac{n}{V} \right)^2 \right] (V - nb) = nRT$$

$$P_{solution} = X_{solvent} P^0_{solvent}$$

$$1 \text{ atm} = 760 \text{ torr} = 1.01325 \times 10^5 \text{ Pa}$$

$$c = 2.9979 \times 10^8 \text{ m s}^{-1}$$

$$e = 1.60218 \times 10^{-19} \text{ C}$$

$$\text{Neutron mass: } m_n = 1.675 \times 10^{-27} \text{ kg}$$