**CHM 112 - EXAM 1**
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**Name** _____ **Section** ____

This test is administered under the auspices of the Mercer University Honor Code.

## Some Potentially Useful Equations

$$\left(P + \frac{n^2 a}{V^2}\right)(V - nb) = nRT \qquad \Delta H = q_p \qquad \Delta H = \Delta E + P\Delta V$$

$$q = C\Delta T \qquad q = c_s m \Delta T \qquad E^\circ_{\text{cell}} = E^\circ_{\text{cathode}} - E^\circ_{\text{anode}}$$

$$\Delta E = q + w = q - P\Delta V \qquad S = k_H P \qquad E^\circ_{\text{cell}} = \frac{RT}{nF} \ln K$$

$$\ln \frac{K_2}{K_1} = \frac{\Delta H}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right) \qquad \Delta S_{\text{vap}} = \frac{\Delta H_{\text{vap}}}{T_b} \qquad v = \frac{4}{3}\pi r^3 \text{ (sphere)}$$

$$\ln \frac{P_2}{P_1} = \frac{\Delta H_{\text{vap}}}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right) \qquad P_A = P^\circ_A X_A \qquad \text{pH} = \text{p}K_a + \log \frac{[\text{base}]}{[\text{acid}]}$$

$$\pi = MRT \qquad \Delta T_b = K_b m \qquad \Delta T_f = K_f m$$

$$[A]_t = [A]_0 - kt \qquad \ln \frac{[A]_t}{[A]_0} = -kt \qquad t_{1/2} = \frac{\ln 2}{k}$$

$$\frac{1}{[A]_t} = kt + \frac{1}{[A]_0} \qquad t_{1/2} = \frac{1}{k[A]_0} \qquad k = Ae^{-E_a/RT}$$

$$\ln \frac{k_2}{k_1} = \frac{E_a}{R}\left(\frac{1}{T_1} - \frac{1}{T_2}\right) \qquad PV = nRT \qquad t_{1/2} = \frac{[A]_0}{2k}$$

$$\Delta H^\circ = \sum_{i=1}^{\text{prod}} n_i \Delta H^\circ_i - \sum_{j=1}^{\text{react}} n_j \Delta H^\circ_j \qquad \Delta G^\circ = \Delta H^\circ - T\Delta S^\circ \qquad \Delta S^\circ = \sum_{i=1}^{\text{prod}} n_i S^\circ_i - \sum_{j=1}^{\text{react}} n_j \Delta S^\circ_j$$

$$\Delta G = \Delta G^\circ + RT \ln Q \qquad \Delta G^\circ = \sum_{i=1}^{\text{prod}} n_i \Delta G^\circ_i - \sum_{j=1}^{\text{react}} n_j \Delta G^\circ_j \qquad \Delta G^\circ = -RT \ln K$$

$$w_{\max} = -nFE_{\text{cell}} \qquad \Delta G^\circ = -nFE^\circ_{\text{cell}} \qquad E_{\text{cell}} = E^\circ_{\text{cell}} - \frac{RT}{nF} \ln Q$$

$$h\nu = -Z^2\left(\frac{1}{n^2_{\text{initial}}} - \frac{1}{n^2_{\text{final}}}\right) \text{Ry} \qquad E_n = -\frac{Z^2}{n^2}\text{Ry} = -\frac{Z^2}{n^2} 2.18 \times 10^{-18} \text{ J} \qquad r_n = \frac{n^2}{Z} a_o = \frac{n^2}{Z} 0.529 \text{ Å}$$

$$\mu_{\text{rms}} = \sqrt{\frac{3RT}{M}} \qquad \frac{\dot{A}}{\dot{B}} = \frac{N_{\text{A}}}{N_{\text{B}}}\sqrt{\frac{M_{\text{B}}}{M_{\text{A}}}} \qquad \lambda = \frac{1}{\sqrt{2}\pi d^2 N/V}$$