

FINAL EXAM

Fall 2014

signature: _____

Be sure and write your name on this test copy. Turn in ALL materials (exam, bubblesheet, and scratch paper) when you are finished with the exam. A periodic table and other constants are located on the bubble sheet.

Unit 1

$$PV = nRT \quad x_A = P_A/P_{\text{total}}$$

$$P(V - nb) = nRT$$

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

$$P_{\text{total}} = P_A + P_B + P_C + \dots$$

$$v_{\text{rms}} = \sqrt{\frac{3RT}{M}} \quad E_k = U = \frac{3}{2}RT$$

Unit 2

$$E = h\nu \quad c = \lambda \cdot \nu$$

$$\frac{1}{2}mv^2 = h\nu - \Phi$$

$$\text{Rydberg: } \nu = \mathcal{R} \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$$

$$\mathcal{R} = 2.178 \times 10^{-18} \text{ J}$$

$$\mathcal{R} = 1.097 \times 10^7 \text{ m}^{-1}$$

$$\mathcal{R} = 3.29 \times 10^{15} \text{ s}^{-1}$$

Unit 3

(no formulas for unit 3)

Unit 4

$$\Delta U = q + w \quad H = U + PV$$

$$w = -P\Delta V \quad w = -\Delta nRT$$

$$\Delta U = \Delta H - P\Delta V$$

$$\Delta U = \Delta H - \Delta nRT$$

$$\Delta U = q_v = nC\Delta T$$

$$\Delta H = q_p = nC\Delta T$$

$$q_{\text{cal}} = q_{\text{water}} + q_{\text{hardware}} \quad q_{\text{sys}} = -q_{\text{cal}}$$

$$\Delta S = q_{\text{rev}}/T \quad S = k \ln \Omega$$

$$\Delta S = nC \ln \left(\frac{T_2}{T_1} \right)$$

$$\Delta H_{\text{rxn}} = \Delta H_1 + \Delta H_2 + \Delta H_3 + \dots$$

$$\Delta H_{\text{rxn}}^\circ = \sum n\Delta H_f^\circ(\text{prod}) - \sum n\Delta H_f^\circ(\text{react})$$

$$\Delta H_{\text{rxn}} = \sum BE_{\text{breaking}} - \sum BE_{\text{making}}$$

$$\Delta G_{\text{rxn}}^\circ = \sum n\Delta G_f^\circ(\text{prod}) - \sum n\Delta G_f^\circ(\text{react})$$

$$\Delta S_{\text{rxn}}^\circ = \sum nS^\circ(\text{prod}) - \sum nS^\circ(\text{react})$$

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

$$\Delta S_{\text{trans}} = \Delta H_{\text{trans}}/T_{\text{trans}}$$