Exam 3 Study Guide

- Chapter 4 (4.5, 4.7-4.10)
  - applying solubility rules (Table 4.1)
  - assigning oxidation states of atoms in molecules and polyatomic ions (Table 4.2)
  - definitions: oxidation, reduction, oxidizing agent, reducing agent
  - balancing oxidation reduction reactions

- Chapter 5 (5.1 - 5.7)
  - Definitions: barometer, manometer, mm Hg, torr, Pa, atm, ideal gas (see p 229)
  - Properties of gases: P, V, T, n
  - Pressure and Force: equations
  - Boyle’s Law
  - Charle’s Law
  - Avagadro’s Law
  - Combined Law
  - Ideal Gas Eq.
  - molar volume of a gas
  - molar mass of a gas
  - STP
  - Dalton’s Law of Partial Pressures – mole fractions
  - KMT Description
    - definitions: effusion, diffusion, kinetic energy, joule

- Chapter 6 (6.1-6.4)
  - Definitions: work, heat, kinetic energy, potential energy, chemical energy, temperature, pathway, state function, system, surroundings, exothermic, endothermic, thermodynamics, 1st law of thermodynamics, internal energy, enthalpy, calorimetry (constant P and V), calorimeter, heat capacity (specific and molar)
  - Equations: internal energy, pressure, work, PV work, enthalpy, heat capacity
  - Hess’s Law
  - Standard enthalpy of formation
EQUATIONS:

\[ PV = k, \quad V = bT, \quad V = an, \quad PV = nRT, \quad \frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}, \]

\[ n = \frac{m}{mw}, \quad d = \frac{m}{V}, \]

\[ P_{\text{total}} = P_1 + P_2 + ..., \quad \chi_1 = \frac{n_1}{n_1 + n_2 + ...} = \frac{n_1}{n_{\text{total}}}, \]

\[ \chi_1 = \frac{P_1}{P_1 + P_2 + ...} = \frac{P_1}{P_{\text{total}}}, \quad P_1 = \chi_1 P_{\text{total}}, \]

\[ KE_{\text{ave}} = N_A \left( \frac{1}{2} m \bar{u}^2 \right), \quad KE_{\text{ave}} = \frac{3}{2} RT, \quad u_{\text{rms}} = \sqrt[3]{RT}, \quad u_{\text{rms}} \text{ gas 1} = \frac{\sqrt{M_2}}{\sqrt{M_1}}, \quad u_{\text{rms}} \text{ gas 2} = \frac{\sqrt{M_1}}{\sqrt{M_2}}, \]

\[ KE = \frac{1}{2} m v^2, \quad E_{\text{total}} = KE + PE, \quad w = F \times \Delta h, \quad w = -P \Delta V, \quad \Delta E = q + w, \]

\[ H = E + PV, \quad E_{\text{rxn}} = s \cdot m \cdot \Delta T \]

\[ \Delta H_f^o = \sum n_p \Delta H_f^o(\text{products}) - \sum n_p \Delta H_f^o(\text{reactants}) \]