Chemistry B Final Study Guide

Aqueous Solutions (Chapter 8)
- Predicting reactions

- Solubility rules

- Types of reactions

Stoichiometry (Chapter 9)
- Balancing Equations

- Law of conservation of mass

- Stoichiometric calculations

    - mole-mole
    - mole-mass
    - mass-mole
    - mass-mass

Energy vs. Heat (Chapter 10)
- Measurement of heat, temperature, and energy

- Temperature conversions

- Kinetic/Potential energy

- Specific Heat Capacity

Gases (Chapter 13)
- Pressure vs. Force

- Units of pressure and temp (STP)

- Boyle's, Charles', and Avogadro's Law equations and concepts

- Ideal Gas Law and Combined Gas Law equations and concepts

- Stoichiometric calculations

Liquids and Solids (Chapter 14)
- Intermolecular forces (dipole-dipole and London dispersion forces)

- Hydrogen bonding (specialized dipole-dipole)

- Phase change diagrams (triple point etc.)

- Ionic compounds (do not contain molecules)

- Boiling point (molar heat of vaporization)/Freezing point (molar heat of fusion)

Solutions (Chapter 15)
- Heterogeneous vs. homogeneous

- Conductivity

- Rate of dissolution

- Solubility (saturated, unsaturated, supersaturated) affected by temperature

- Molarity (moles solute per liter solution)

- Polarity

Acids and Bases (Chapter 16)
- Characteristics of acids and bases

- Arrhenius, Bronstead-Lowry, and Lewis

- Conjugate acids and bases

- Neutralization

- pH/hydrogen ion and hydroxide ion calculation

Equilibrium (Chapter 17)
- Factors that affect equilibrium

- Dynamic equilibrium

- Equilibrium constant

- Le Chatelier's principle

Organic Chemistry (Chapter 20)
- Alkanes

- Structural Formulas

- Alkenes and Alkynes

- Alcohols

- Esters

- Nomenclature

Sample Problems

- What are the products of the reaction Na_3PO_4 + $ZnSO_4$ →

- Aqueous solutions of copper (II) sulfate and sodium sulfide are mixed. A solid forms.

    o   Write a molecular, complete ionic and net ionic equation for the above statement

- In the reaction $N_2 + 3H_2$ → $2NH_3$, what is the mole ratio of nitrogen to ammonia?

- For the reaction $AgNO_3 + NaCl$ → $NaNO_3 + AgCl$, how many moles of silver chloride, AgCl, are produced from 7 mol of silver nitrate $AgNO_3$?

- How many moles of oxygen are produced by decomposing 41.1 g of H_2O_2 according to the equation

$$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$$

- A 5.0 g sample of silver is heated from 0°C to 35°C and absorbs 42 J of energy as heat. What is the specific heat of silver?

- How many calories of heat were added to 5.0×10^2 g of water to raise its temperature from 25°C to 55°C?

- Convert 5.42 calories to joules

- Write an expression that defines specific heat

- The pressure of a sample of gas is 500. mm Hg and the volume is 30.0 L. If the volume is changed to 50.0 L, what is the new pressure?

- A balloon has a volume of 1.20 L at 24.0°C. The balloon is heated to 48.0°C. Calculate the new volume of the balloon.

- Gaseous chlorine is held in two separate containers at identical temperature and pressure. The volume of container 1 is 1.30 L, and it contains 6.70 mol of the gas. The volume of container 2 is 2.20 L. How many moles of the gas are in container 2?

- Convert 3.6×10^2 atm to torr.

- The unusually high boiling point of H_2O is primarily due to the presence of what?

- The escape of molecules from the liquid phase into the vapor phase at the surface of a liquid is called what?

- Which region of the line contains both the solid phase and the liquid phase?
- Which region of the line contains only the vapor phase?
- What type of diagram is this called?
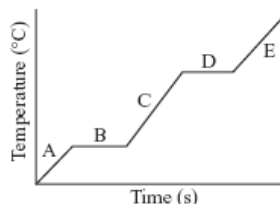
- If the pressure above a liquid is decreased, the boiling point of the liquid will do what?

- Which substance has the highest vapor pressure? CH_4 KCl H_2S H_2O

- A 75.80-g sample of NaCl is dissolved in 250.0 mL of solution. Calculate the molarity of this solution.

- Calculate the mass of silver nitrate (in grams) in a 145 mL solution of 4.31 M $AgNO_3$

- What number of moles of solute are present in 25.0 mL of 2.00 M HCl?

- Determine the equilibrium constant (units deleted) for the system $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ at 25°C. The equilibrium concentrations are shown here:
  $[N_2O_4] = 4.27 \times 10^{-2}\ M$ $[NO_2] = 1.41 \times 10^{-2}\ M$

- Write the equilibrium expression for the reaction
  $3O_2(g) \rightleftharpoons 2O_3(g)$

- What is the equilibrium expression for the following reaction is
  $2A(s) + 3B(l) \rightleftharpoons C(aq) + 4D(aq)$

- According to the Bronsted-Lowry model, what is an acid? What is a base?

- In your text, look at Example 16.1 and 16.2. Complete the self-check

- What is an amphoteric substance? What is $\mathbf{K_w}$? What does it represent? How is it calculated? How is it used to determine the strength of an acid or base? Look at Example 16.3. Complete the self-check.

- The pH of a solution is 10. What is its OH- concentration?

- Name the following compounds