

**Final Exam Review
Study Guide
Chemistry I
Dr. Stover**

Directions: You must answer ALL of the questions from this study guide. This will be a great help to your preparation for the final exam. This must be done on a separate sheet of paper. No need to copy questions.

Turn it in on or not later than March 30, 2020.

You will receive 10 points extra credit added to your final exam score.

Chapter 7- Ionic Bonds and Ionic Compounds/ Chapter 8- The Nature of Covalent Bonding

- **Define** chemical bond.
- **Explain** why most atoms form chemical bonds.
- **Describe** ionic and covalent bonding.
- **List** the six basic steps used in writing Lewis structures.
- **Explain** how to determine Lewis structures for molecules containing single bonds, multiple bonds, or both. Give examples.
- **List and compare** the distinctive properties of ionic and molecular compounds.
- **Describe** the electron-sea model of metallic bonding, and explain why metals are good electrical conductors.
- **Explain** why metal surfaces are shiny.
- **Explain** why metals are malleable and ductile but ionic-crystalline compounds are not.

Chapter 9- Chemical Formulas and Chemical Compounds

- **Explain** the significance of a chemical formula.
- **Determine** the formula of an ionic compound formed between two given ions.
- **Name** an ionic compound given its formula.
- **Name** the ten prefixes used for binary molecular compound from its formula and write the meaning of each prefix.
- **Write** the formula of a binary molecular compound given its name. Give 3 examples.
- **Calculate** the formula mass or molar mass of any given compound.
- **Convert** between mass in grams and amount in moles of a chemical compound, using molar mass.
- **Calculate** the number of molecules, formula units, or ions in a given molar amount of a chemical compound.

Chapter 10- Chemical Quantities

- **What** are three methods for measuring the amount of something?
- **How** is Avogadro's number related to a mole of any substance?
- **How** is the atomic mass of an element related to the molar mass of an element?
- **How** is the mass of a mole of a compound related?
- **How** do you convert the mass of a substance to the number of moles of the substance?
- **What** is the volume of a gas at STP?

Chapter 11- Chemical Reactions

- **List** four observations that suggest that a chemical reaction has taken place.
- **List** three requirements for a correctly written chemical equation.
- **Write** a word equation and a formula equation for a given chemical reaction.
- **Balance** a formula equation by inspection.
- **Define and give** general equations for synthesis, decomposition, single-displacement, and double-displacement reactions.
- **Classify** a reaction as synthesis, decomposition, single-displacement, double-displacement, or combustion.
- **List** three types of synthesis reactions and six types of decomposition reactions.
- **List** four types of single-displacement reactions and three types of double-displacement reactions.
- **Predict** the products of simple reactions given the reactants.

Chapter 12- Stoichiometry

- **How** is a balanced equation like a recipe?
- **How** do chemists use balanced chemical equations?
- **In terms** of what quantities can you interpret of a balanced chemical equation?
- **What** quantities are conserved in every chemical reaction?
- **How** are mole ratios used in chemical calculations?
- **What** is the general procedure for solving a stoichiometric problem? Write the steps for converting mole-mole, mole to grams, grams to mole, mole to RP, RP to moles
- **How** is the amount of product in a reaction affected by an insufficient quantity of any of the reactants?

Chapter 14- The Behavior of Gases

- **Why** are gases easier to compress than solids or liquids are?
- **What** are the three factors that affect gas pressure?
- **How** are the pressure, volume, and temperature of a gas related?
- **When** is the combined gas law used to solve problems?
- **Write** the formula for each of the gas law: Boyle's, Charles', Gay-Lusaac's.

Chapter 16- Concentrations of Solutions

- **How** do you calculate the molarity of a solution? Write formula.
- **What** effect does dilution have on the total moles of solute in solution?
- **What** are two ways to express the percent concentration of a solution?

Chapter 19- Acids, Bases, and Salts

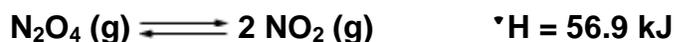
What are the properties of acids and bases?

- **How** did Arrhenius define an acid and a base?
- **What** distinguishes an acid from a base in the Bronsted-Lowry theory?
- **How** did Lewis define an acid and a base?
- **How** are $[H^+]$ and $[OH^-]$ related in an aqueous solution?
- **How** is the hydrogen-ion concentration used to classify a solution as neutral, acidic, or basic?
- **What** is the most important characteristic of an acid-base indicator?
- **What** are the products of the reaction of an acid with a base?

Scroll down for Equilibrium Practice. Read Le Chatelier's Principle to answer these correctly.

Practice on Equilibrium: You may write on this page to answer the questions.

Consider the following equilibrium when answering questions 1 to 4.



1. Which of the following is true about reaction (3) when an amount of $\text{NO}_2 (\text{g})$ is added to the equilibrium reaction?
 - a. Equilibrium will shift to consume $\text{N}_2\text{O}_4 (\text{g})$.
 - b. Equilibrium will shift to produce more $\text{NO}_2 (\text{g})$.
 - c. Equilibrium will shift to consume the $\text{NO}_2 (\text{g})$.
 - d. No effect on the equilibrium.
2. Which of the following is true about reaction (1) when the pressure is lowered by increasing the volume of the reaction container.
 - a. Equilibrium will produce more $\text{N}_2\text{O}_4 (\text{g})$ to offset the pressure drop.
 - b. Equilibrium will shift to the right to produce more $\text{NO}_2 (\text{g})$.
 - c. Equilibrium will shift to consume more $\text{NO}_2 (\text{g})$.
 - d. No effect on the equilibrium.
3. Which of the following is true about reaction (1) when the temperature is raised?
 - a. Equilibrium will shift to the left.
 - b. Equilibrium will shift to the right.
 - c. Equilibrium will shift to produce more heat.
 - d. No effect on the equilibrium.
4. Which of the following is true about reaction (1) when a catalyst is added to the system?
 - a. Equilibrium will shift to the left.
 - b. Equilibrium will shift to the right.
 - c. Equilibrium will shift to lower the heat.
 - d. No effect on the equilibrium.

Consider the following equilibrium when answering questions 5 and 6.



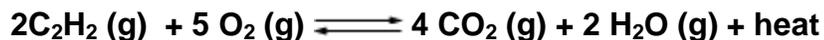
5. Which of the following is true about reaction (4) when the concentration of CO is increased?

- a. Equilibrium will shift to the left.
- b. Equilibrium will shift to the right.
- c. No effect on the equilibrium.
- D Equilibrium constant will increase.

6. Which of the following is true about reaction (4) when the concentration of CH₄ (g) is increased?

- a. Equilibrium will shift to the left.
- b. Equilibrium will shift to the right.
- c. No effect on the equilibrium.
- d. Equilibrium constant will decrease.

Consider the following equilibrium when answering questions 7 and 9



7. Which of the following is true about reaction (5) when the concentration of O₂ (g) is decreased?

- a. Equilibrium will shift to the left.
- b. Equilibrium will shift to the right.
- c. No effect on the equilibrium.
- d. Equilibrium constant will decrease.

8. Which of the following is true about reaction (5) when the temperature is increased?

- a. Equilibrium will shift to the left.
- b. Equilibrium will shift to the right.
- c. No effect on the equilibrium.
- d. No effect on the equilibrium constant.

9. Which of the following is true about reaction (5) when the pressure is increased by decreasing the volume of the reaction container?

- a. Equilibrium will shift to the left.
- b. Equilibrium will shift to the right.
- c. No effect on the equilibrium.
- d. No effect on the heat produced.

