

**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

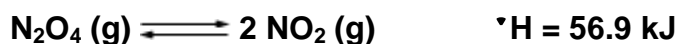
**What** are the properties of acids and bases?

- **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.**

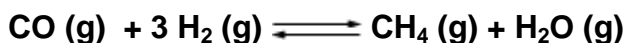
Practice on Equilibrium: You may write on this page to answer the questions.

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.



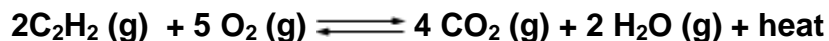
5. Which of the following is true about reaction (4) when the concentration of CO is increased?

- 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 CH<sub>4</sub> (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 O<sub>2</sub> (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.

