

Unit 3 Chemistry – Lessons 3 – 6 Study Guide

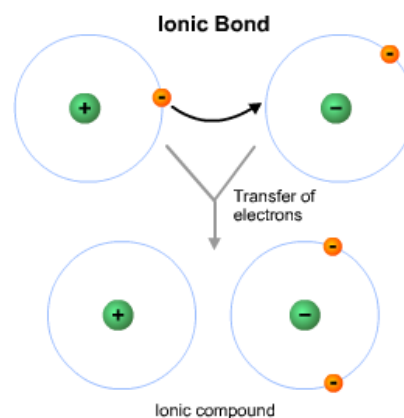
Unit 3 Lessons 3-6 VOCABULARY

Lesson	Term	Definition
3	Covalent bond	a bond in which electrons are shared between the bonded atoms
3	Covalent compound	any compound resulting from covalent bonding
3	Ionic bond	the force of attraction between a charged atom (or group of connected atoms) and another with the opposite charge
3	Ionic compound	any compound resulting from ionic bonding
3	Polymer	a molecule consisting of repeating chemical units
5	Catalyst	a substance present during a chemical reaction that speeds up the reaction but is not used up or changed during the reaction
5	Equilibrium	that state of chemical system in which the rates of the forward and reverse reactions are equal
5	Reaction Rate	how quickly a specific chemical reaction occurs under specific conditions over time

Lesson 3 Chemical Formulas

REVIEW: Ionic & Covalent Bonds

- Ionic bonds are formed from the electrical _____ of two oppositely charged ions.
 - They usually contain a metal and nonmetal.
- A covalent bond forms when atoms _____ pairs of electrons.
 - They usually contain nonmetals.



Writing Chemical Formulas

- Example: C_3H_8O = rubbing alcohol
 - C_3 = **3** atoms of carbon
 - H_8 = ___ atoms of hydrogen
 - O = **1** atom of oxygen

Ionic Compound Formulas

- While ionic compounds deal with ions –charged atoms– the compound formulas are balanced or neutral with a charge of _____.
- Example: Salt –Sodium Chloride ($NaCl$)
 1. Sodium (Na) ion has a positive charge of one (Na^{1+})
 2. Chloride (Cl), has a negative charge of one (Cl^{1-}).
 3. Positive and negative charges have the sum of zero if there is one sodium atom for every chlorine, so the formula $NaCl$ is correct.

Covalent Compound Formulas

- For a covalent compound, the chemical formula shows how many _____ of each kind join together to form the molecules of the compound. Therefore, it is called a molecular formula.
 - _____ are used to signal how many atoms of each element are in the molecular formula.
 - Example: Sulfur trioxide (SO₃)

Writing Chemical Equations

- A chemical equation _____ a chemical reaction using symbols and numbers.
- Chemical formulas (example: H₂O) are used to write chemical _____.
- Just like a math equation, a chemical equation shows a relationship between substances on the left (reactants) and right (products) sides
 - A "_____" sign means two substances are added together.
 - The " \rightarrow " is similar to an equal sign.
 - Example: the reaction of carbon and oxygen to form carbon dioxide.

Number of atoms	Prefix
1	mono-
2	di-
3	tri-
4	tetra-
5	penta-
6	hexa-
7	hepta-
8	octa-
9	nona-



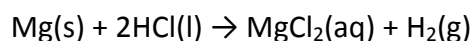
Polymers

- A polymer is a covalently bonded molecule consisting of _____ chemical units.
 - These units can form long chains.
 - Each of the repeating units is called a monomer.
 - The chemical formula of the monomer is simply repeated many times in the polymer.
 - Example: _____ becoming starch

Lesson 5 Rates of Chemical Reactions

Explore Rates of Chemical Reactions

- When you put magnesium into a hydrochloric acid solution, the following reaction occurs:



- The symbol (s) after the Mg tells us that the magnesium is a solid;
- The symbol (l) after hydrochloric acid means it is a liquid;
- The symbol (aq), for "aqueous" indicates that the substance is in a water solution;
- And the symbol (g) means that the H₂ is in the form of a gas.

How FAST does the reaction occur?

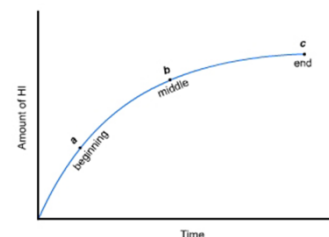
- All chemical reactions are processes that take place during a period of _____.
 - A chemical reaction is not instantaneous, even if it seems that way.
 - Even an explosion takes place over time.

Reaction Rate

- The reaction rate is the _____ of a reaction under specific conditions.
 - You can determine the reaction rate by figuring out how much of the _____ is used up over a period of time
 - or how much time it takes to form a certain amount of the _____.

Interpreting Graphs

- You can determine the rate of the reaction by judging how steep the curve is at points
 - Steeper the curve, faster the reaction
 - Looking at the graph, the reaction starts fast, slows down, and stops.



Rate of Reaction

- Factors that determine reaction rate are:
 1. Temperature—the higher the temperature, the _____ the reaction rate.
 2. Concentration—the more concentrated the reactants, the _____ the reaction rate.
 3. Surface area—when the reaction involves solids, an increased surface area will result in an **increased** reaction rate.
 4. Catalyst—the presence of a catalyst _____ up the reaction rate.

Equilibrium

- Equilibrium is the state of chemical system in which the rates of the forward and reverse reactions are _____.

Lesson 6 Chemical Equations

Writing an Equation

- Aluminum is not found “pure” in nature. A chemical reaction is used to produce the aluminum for your aluminum foil. Here’s the reaction and the chemical _____:
aluminum chloride + potassium → aluminum + potassium chloride
$$\text{AlCl}_3 + \text{K} \rightarrow \text{Al} + \text{KCl}$$

_____ → **Products**
- The equation tells you the basic facts of the reaction. But as written, this reaction violates a basic law of nature.

The Law of Conservation of Mass

- The Law of Conservation of Mass states: the mass of substances does **not** change during chemical reactions.

Balancing Equations

- Both sides of a chemical equation need to have the _____ number of atoms of each element for the equation to be _____.

- How to balance chemical equations:
 1. Write the chemical equation with chemical symbols.
 2. _____ the number of atoms of each element on both sides of the equation.
 3. Balance atoms using coefficients. (A coefficient is a number placed _____ the element or compound.)
 4. Check to make sure the equation is balanced.
- Example: balance the aluminum reaction

