

Unit 4 – Chemical Quantities & Stoichiometry

STUDY GUIDE

Chapter 10 – Chemical Quantities

Chapter 11 – Chemical Reactions

Chapter 12 – Stoichiometry

Vocabulary

- Avogadro's number
- Mole
- Molar mass
- Empirical formula
- Molecular formula
- Chemical equation
- Synthesis reaction
- Decomposition reaction
- Single Replacement reaction
- Double Replacement reaction
- Combustion reaction
- Stoichiometry
- Mole ratio
- Actual yield
- Theoretical yield
- Percent yield
- Excess reagent
- Limiting reagent

Equations

$$\text{Percent Yield} = \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100$$

Core Concepts

- Three methods for measuring the amount of a substance.
 - 1 mol = 6.02×10^{23} representative particles
 - 1 mol = molar mass
 - 1 mol = 22.4 L of a gas at STP
- How to calculate molar mass.
- Determining the percent by mass of any element in a given compound (percent composition).
- Determine the empirical formula.
- Determine the molecular formula.
- Writing word equation from chemical formulas or writing chemical formulas from a sentence.
- Balancing chemical equations to obey the law of conservation of mass.
- What are the 5 reaction types?
 - Synthesis
 - Decomposition
 - Single Replacement (*use activity series to determine if the reaction works*)
 - Double Replacement (*reaction only works if a solid, water or gas forms*)
 - Combustion
- Predicting the reaction type and products from the given reactants.
- Balance equations are used to calculate how much reactant or product is formed in a chemical reaction.
- What is the mole ratio?
- How do you solve a stoichiometry problem?
 - Must get to moles of the starting material.
 - Use the mole ratio to get to the moles of the item you need to solve for.
 - End the problem in the desired unit.
- What is a limiting reagent?
- Determine the limiting reagent.
- What is an excess reagent?
- Calculate the theoretical yield of the reaction (must use limiting reagent).
- Determine the percent yield of the reaction.