Midterm Study Guide

Mid-First Semester Examination

Academic Year 2025-2026

Subject: Chemistry

Grade 10

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Content: Experience Chemistry

Storyline 2: Understanding Chemical Reactions

- ☐ Investigation 7: Stoichiometry
  - Experience 1: Quantifying Reactants and Products
  - Experience 2: Chemical Calculations
  - Experience 3: Limiting Reagent and Percent Yield

Materials Included

Chapter	Lesson	Pages
Stoichiometry	1- Quantifying Reactants and Products	252-257
	2- Chemical Calculations	259-267
	3- Limiting Reagent and Percent Yield	269-277

Please study the material listed in the table above with a focus on the points below.

Storyline 2: Understanding Chemical Reactions

Investigation 7: Stoichiometry

Lesson 1: Quantifying Reactants and Products

- Analyze data on proportionality of reactants and products to predict their stoichiometric ratios in the corresponding chemical equation.
- Develop a model that demonstrates conservation of mass in a chemical equation.
- Apply mathematical concepts to interpret a chemical equation.

Lesson 2: Chemical Calculations

- Use dimensional analysis to determine the mass of reactant required to obtain a given amount of product.
- Use the mole ratio in a chemical reaction to relate amounts of participating substances

- Develop and use a model of different units of measurement.
- Calculate and communicate data on different units of measurement.

Lesson 3: Limiting Reagent and Percent Yield

- Explain the concept of limiting reactant and how it affects the amount of product produced in a reaction.
- Explain theoretical and actual yield and why the former is usually larger than the latter.
- Use computational thinking to predict the grams of product given the grams of reactant.

Stoichiometry

Quantifying Reactants and Products

Lesson 1

1. This chemical reaction follows the law of conservation of mass.

   $Mg(OH)_2\ (aq) + 2HCl(aq) \longrightarrow 2H_2O(l) + MgCl_2\ (aq)$

   Which of the statements are **true**? Select all that apply.

   a. In this reaction, atoms rearrange to form new molecules.
   b. Atoms are created and destroyed in this chemical reaction.
   c. Atoms are neither created nor destroyed in this chemical reaction.
   d. In this reaction, atoms do not rearrange to form new molecules.
   e. In this reaction, the number of atoms of the reactants is the same as the number of atoms of the products.

2. Find the reactant and product molar masses for this photosynthesis reaction reported to one place after the decimal point.

   a. The reactant mass is 186.0 grams, and the product mass is 186.0 grams.
   b. The reactant mass is 186.0 grams, and the product mass is 372.0 grams.
   c. The reactant mass is 372.0 grams, and the product mass is 186.0 grams.
   d. The reactant mass is 372.0 grams, and the product mass is 372.0 grams.

Chemical Calculations

Lesson 2

1. This chemical reaction follows the law of conservation of mass.

   H_2 (g) + Cl_2 (g) ⟶ 2HCl(g)

   If 3.7 liters of Cl_2 are used for this reaction, how much HCl will be formed? Assume there are enough reactants to complete the reaction and assume the reaction occurs at STP.

   a. 1.3 liters
   b. 3.7 liters
   c. 7.4 liters
   d. 9.3 liters

2. Which of the given mole ratios are possible for the salt formation equation?

   2Na(s) + Cl_2 (g) ⟶ 2NaCl(s)

   a. Na:Cl_2
   b. 2Na:Cl_2
   c. Cl:2NaCl
   d. Na2 :NaCl
   e. Cl_2 :2NaCl
   f. 2Na:2NaCl

Limiting Reagent and Percent Yield

Lesson 3

1. Which statements about limiting and excess reagents are true? Select **all** that apply.
   a. Any reactant that is not used up during the chemical reaction is called a limiting reagent.
   b. Any reactant that is not used up during the chemical reaction is called an excess reagent.
   c. The reactant that determines how much product can be formed during a chemical reaction is called the limiting reagent.
   d. The reactant that determines how much product can be formed during a chemical reaction is called the excess reagent.
   e. The chemical reaction continues after the limiting reagent is used up because some amount of the other reactant remains.
   f. The chemical reaction stops after the limiting reagent is used up even though some amount of the other reactant remains.

2. A reaction produces 14.2 grams of a product. The theoretical yield of that product is 17.1 grams.

   Which of the statements are true? Select **all** that apply.

   a. The percent yield of the product is 14.2%.
   b. The percent yield of the product is 17.1%.
   c. The percent yield of the product is 83.0%.
   d. The percent yield of the product is 120.0%.
   e. The actual yield of the product is 14.2 grams.
   f. The actual yield of the product is 17.1 grams.