Warm-Up | Introduction to Stoichiometry

Lesson Objectives

By the end of this lesson, you should be able to:

- Use a balanced equation to write mole ratios correctly to use in stoichiometry problems.
- Perform stoichiometric calculations to determine the mole-to-mole relationships between reactants and products of a reaction.

Science Practice: Use mathematical procedures, including dimensional analysis and significant figures, when solving mole-to-mole stoichiometry problems.

Words to Know

Fill in this table as you work through the lesson. You may also use the glossary to help you.

stoichiometry	the study and calculation of the relative amounts of substances involved in chemical reactions

Instruction | Introduction to Stoichiometry

Slide 1

Lesson Question What is stoichiometry?

Slide 2

Product-Reactant Ratios

Recipe:

- 2 graham crackers + 3 squares of chocolate + 1 marshmallow = 1 s'more

Chemical equation:

- $Mg(OH)_2 +$ [2] $HCl \rightarrow MgCl_2 + 2$ [H_2O]

Stoichiometry

Stoichiometry – the study and calculation of the [relative] amounts of substances involved in [chemical] reactions

S'more stoichiometry

- 2 graham crackers + [3] squares of chocolate + 1 marshmallow = 1 s'more

Chemical [reaction] stoichiometry

- $Mg(OH)_2 + 2$ [HCl] $\rightarrow MgCl_2 + 2H_2O$

Instruction | Introduction to Stoichiometry

Slide 2

Stoichiometry and Ratios

Stoichiometry is based on ratios.

- Reactant:Product
- Product :Reactant
- Reactant: Reactant
- Product:Product

Example:

$Mg(OH)_2 + 2HCl \rightarrow$ $MgCl_2$ $+ 2H_2O$

Slide 4

Using Reactant-Product Ratios

Use conversion factor to predict how many moles of a substance will be in product

Balanced reaction:

$2KMnO_4 + 16HCl \rightarrow 2$ KCl $+ 2MnCl_2 + 8H_2O + 5Cl_2$

$KMnO_4:Cl_2 = 2:$ 5

$30KMnO_4 \rightarrow ? Cl_2$

$30 \times 2.5 \rightarrow$ 75 Cl_2

Mole ratios are always exact whole -number measurements.

A ratio of 2:2 is the same as 1:1 .

Instruction | Introduction to Stoichiometry

Slide 8

Reactant:Reactant and Product: Product Ratios

Reactant:Reactant ratios

- Calculating amount of reactants required to react completely
- Identifying the reactant that will run out first

Product:Product ratios

- Predicting the amount of byproducts
- Predicting storage requirements

Summary | Introduction to Stoichiometry

Lesson Question

What is stoichiometry?

Answer

(Sample answer) Stoichiometry is the study of the ratios of products and reactants in a chemical reaction. It is represented as the ratio of reactants to product.

Slide 2

Mole Ratios and Stoichiometry

- The proportion of one substance to another in a balanced reaction is the mole ratio. [chemical]
- Given the amount of any substance in a reaction, the amount of any substance needed or produced can be calculated using the [mole] ratios.
- Stoichiometry is the study and calculation of relative amounts of reactants and products in a chemical reaction.

Summary | Introduction to Stoichiometry

Use this space to write any questions or thoughts about this lesson.