

# Stoichiometry

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Moles  
Conversions

Balancing  
Equations

## Stoichiometry

The mathematical study of the quantitative relationships that exist in chemical reactions

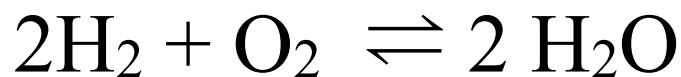
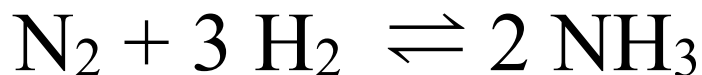
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## Stoichiometry

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### Introduction

- Stoichiometric ratios
  - The molar ratio of one reactant/product to another reactant/product



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## Stoichiometry

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### Steps for Problem Solving

- Mass-Mass problems
  - A stoichiometric process that allows us to predict how much reactant (or product) will be consumed (or created) in a chemical reaction.
- Steps:
  - 1. Write a balanced equation
  - 2. Convert mass to moles
  - 3. Apply the stoichiometric ratio from the balanced equation
  - 4. Convert moles to grams

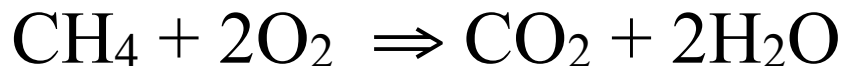
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Sample #1

- How much water will be produced when 12.5 grams of methane (CH<sub>4</sub>) are consumed in a combustion reaction?



$$\frac{12.5\text{g CH}_4 \left| \frac{1 \text{ mol CH}_4}{16.0\text{g CH}_4} \right| \frac{2 \text{ mol H}_2\text{O}}{1 \text{ mol CH}_4} \left| \frac{18.0\text{g H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \right|}{1} = \text{g H}_2\text{O}$$

$$28.1\text{g H}_2\text{O}$$

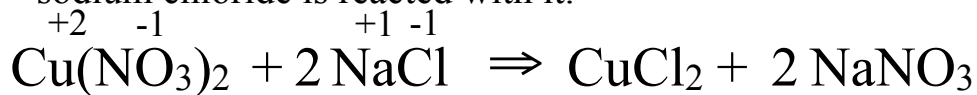
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## Stoichiometry

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Sample #2

- How much copper II nitrate will be consumed when 10.2 grams of sodium chloride is reacted with it.



$$\frac{10.2\text{g NaCl} \left| \frac{1 \text{ mol NaCl}}{58.5 \text{ NaCl}} \right| \frac{1 \text{ mol Cu(NO}_3)_2}{2 \text{ mol NaCl}} \left| \frac{187.5\text{g Cu(NO}_3)_2}{1 \text{ mol Cu(NO}_3)_2} \right|}{1} = \text{g Cu(NO}_3)_2$$

$$16.3\text{g Cu(NO}_3)_2$$

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