

Chapter 3

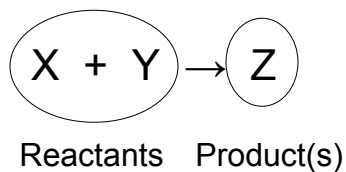
Chemical Equations and Reaction Stoichiometry

Chapter 3 Outline

- I. Chemical Equations
- II. Reaction Stoichiometry
- III. Limiting Reactants
- IV. Percent Yield
- V. Solution Concentration and Dilution
- VI. Solution Stoichiometry

I. Chemical Equations

Typical Chemical Equation:



I. Chemical Equations (cont.)

- *Law of Conservation of Matter:*
mass of reactants = mass of products
- *Dalton's Interpretation:*
Atoms just change places
- *Equation must be **balanced**:*
and type of reactant atoms = # and type of product atoms

II. Reaction Stoichiometry

Reaction Stoichiometry:

The quantitative relationships among various substances as they participate in a chemical reaction

III. Limiting Reactants

Limiting Reactant:

- First reactant to be used up in a chemical reaction
- Reactant that determines the amount of product that can be made

IV. Percent Yield

Theoretical Yield:

How much product CAN we make?

Actual Yield:

How much product DID we make?

Percent Yield:

$$\% \text{ yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$$

V. Solution Concentration and Dilution

Solution -

Homogeneous mixture of two or more substances

Solvent -

Substance present in the greatest amount

Solute -

Substance(s) present in lesser amounts than the solvent

V. Solution Concentration and Dilution (cont.)

Solution Concentration -

- Measure of the amount of solute in a given amount of solvent or solution
- Most common measure of concentration is **molarity** (M)

Demonstration – Dissolve CaCl_2 (FM = 110.98 g/mol) in water in a volumetric flask

Using Solutions in Chemical Reactions...

V. Solution Concentration and Dilution (cont.)

Solution Dilution -

We often make solutions by diluting a known amount of more concentrated solution

Another way to indicate concentration -

Percent by mass