

Stoichiometry

Stoichiometry

Equations, Reaction Types, AAM

- 3.1 Balancing Chemical Equations
- 3.2 Patterns of reactivity
 - Combustion
 - Synthesis
 - Decomposition
- 3.3 Atomic Weight
 - Why are they not whole numbers?
 - Average Atomic Weights

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The Mole

- 3.4 Mass, Mole, Particle conversions....

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Empirical Formulas

- Empirical
 - Based on experimentation
- Empirical formulas tell us the relative number of atoms of each element in a compound
- Steps in calculating
 - Assume a 100 g sample
 - Convert grams to moles
 - Find the whole number ratio by dividing by the smallest value
- Ethylene glycol is composed of 38.7% carbon, 9.7% hydrogen and 51.6% oxygen. What is its empirical formula?

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Molecular Formula

- A molecular formula represents a compound as it actually exists
- Molecular formulas can be found from empirical formulas
 - Must know the molecular weight of the compound
 - Steps:
 - Calculate the empirical mass
 - Divide the molecular mass by the empirical mass
 - Apply this “multiplier” to the empirical formula

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Molecular Formula

- What is the molecular formula of ethylene glycol, if its molecular mass is 62.1 g/mol?

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Specific Stoichiometry Calculations

- 3.6 Quantitative Information
 - Mass-Mass Problems
- 3.7 Limiting Reactants
 - The reactant which is consumed first in a chemical reaction
 - Steps:
 - Convert mass to moles
 - Divide by coefficients
 - Smallest number is limiting
- Theoretical Yield
 - The maximum amount of a product allowed, given the limiting reactant

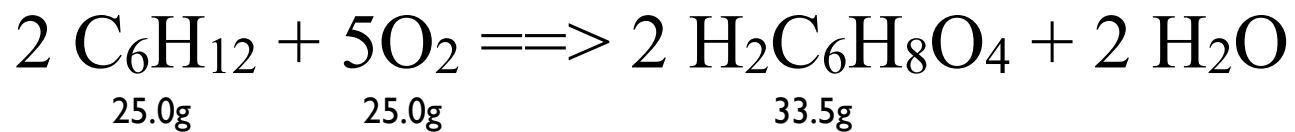
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Summary

- $2 \text{C}_6\text{H}_{12} + 5\text{O}_2 \implies 2 \text{H}_2\text{C}_6\text{H}_8\text{O}_4 + 2 \text{H}_2\text{O}$
- Assume you use 25.0 grams of cyclohexane and 25.0 grams of oxygen
 - What is the limiting reactant?
 - What is the theoretical yield for adipic acid?
 - If you receive 33.5 grams of the acid, what is the percent yield?

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Summary



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Homework

- 3, 5, 7, 16, 21, 27, 39, 47a, 51, 59, 63, 81
- Outline Chapter 4 - due in 2 class periods
- Summarize Table 4.1 (p.125) in a way that easily summarizes the significant trends in solubility