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Stoichiometry

9.1 Introduction to Stoichiometry

1. Reaction Stoichiometry Problems

a. Reaction stoichiometry involves balanced chemical reactions and the mole ratios between the mol ratios of the molecules in the reaction.

i. Reaction stoichiometry involves the mass relationships between reactants and products of a chemical equation.

ii. Composition stoichiometry involves the mass relationships of elements in compounds.

2. What is stoichiometry?

a. It is the math of mass relationships.

9.2 Ideal Stoichiometric Calculations

1. Conversions of Quantities in Moles

a. amount of given substance 🡪 amount of unknown substance

 1. Figure 1 (Pp.305) shows how to solve the above stoichiometry problem.

2. Conversions of Amounts in Moles to Mass

a. amount of given substance 🡪 amount of unknown substance 🡪 mass of unknown substance.

 1. Figure 2 (Pp.306) shows how to solve the above stoichiometry problem.

3. Conversions of Mass to Amounts of Moles

a. mass of given substance 🡪 amount of given substance 🡪 amount of unknown substance

1. Figure 3 (Pp.308) shows how to solve the above stoichiometric problem.

4. Mass-Mass Calculations

a. mass of given substance 🡪 amoun of given substance 🡪 amount of unknown substance 🡪 mass of unknown substance

 1. Figure 4 (Pp.310) shows ho to solve the above stoichiometric problem.

5. What a mol ratio?

a. A mole ratio is a ratio of the moles of the reactants and products evident in a balanced chemical reaction, used for stoichiometric calculations.

9.3 Limiting Reactants and Percent Yield

a. Limiting reactant determines that actual product made in the chemical equation.

i. A limiting reactant is the reactant that limits the amount of the other reactant that can combine and the amount of product that can form in a chemical reaction.

ii. An excess reactant is the substance that is not used up completely in a reaction.

1. Figure 5 (Pp. 312) shows the limiting reactant in the CO2 reaction.
2. Percentage Yield
3. Percent yield is calculated by actual and theoretical yield.
4. Actual yield is the measured amount of a product obtained from a reaction.
5. Theoretical yield is the maximum amount of product that can be produced from a given amount of reactant.
6. Percentage is the ratio of actual yield to theoretical yield multiplied by 100.
7. What is excess reactant?
8. The substance that is not used up in a reaction.