**Chapter 9 Stoichiometry**

**9.1 Introduction to Stoichiometry**

**i.** composition stoichiometry deals with the mass relationship of elements in compounds

ii. reaction stoichiometry involves the mass relationship between reactants and products in a chemical reaction

1. Reaction Stoichiometry Problems (Pp. 299)

a. The given and unknown may both be reactants, product or one may be a reactant and the other, a product

i. A mole ratio is a conversion factor that relates the amounts in moles of any two substances involved in a chemical reaction.

**9.2 Ideal Stoichiometric Calculations**

1. Conversions of Quantities in Moles (Pp.304)

a. Amount of given substance x (mole unknown/mole given) = amount of unknown substance.

2. Conversion of Amounts in Moles to Mass (Pp.306)

a. Amount of given substance x (mole unknown/mole given) x (Molar mass of unknown/1 mole of unknown) = Mass of unknown substance)

3. Conversions of Mass to Amounts in Moles (Pp. 308)

a. Mass of given substance x (1 mol given/ molar mass of given) x (mol unknown/mol given) = amount of substance. Amount of given substance🡪 amount of unknown substance🡪 mass of unknown substance

4. Mass-Mass Calculations (Pp. 310)

a. Mass of given substance x (1 mol given / molar mass of given) x (mol unknown/mol given) x (mol mass uknown/ 1 mol unknown) = mass of unknown substance

**9.3 Limiting Reactants and Percentage Yield**

1. Percentage Yield (Pp. 317)

a. The actual yield is usually always less than the theoretical yield

i. The theoretical yield is the maximum amount of product that can be produced from a given amount of reactant.

ii. The actual yield is the measured amount of product obtained from a reaction.

iii. The percentage yield is the ratio of the actual yield to the theoretical yield, multiplied by 100.

2. What is stoichiometry?

a. Stoichiometry deals with the mass relationships of elements in compounds

3. How is a mole ratio used in stoichiometry?

a. Stoichiometry problems are solved by using necessary mole ratios to convert the given information into the unknown information

4. When sodium chloride reacts with silver nitrate, silver chloride precipitates. What mass of AgCl is produced from 75.0 g AgNO3?

a. 62 g AgCl

5. (a) if 1.00 mol CS2 is combined with 1.00 mol O2. Identify the limiting reactant. (b) how many moles of excess reactant remain? (c) how many moles of each product are formed?

a. O2

b. 0.66mol CS2

c. 0.33 mol CO2 and 0.66mol SO2

6. (a) if 16.2 g Mg are heated with 12.0 H2O, what is the limiting reactant? (b) how many moles of the excess reactant are left? (c) How many grams of each product are formed?

a. H2O

b. 0.333 mol Mg

c. 19.4 g MgOH produced and 0.3g H2