

Chapter 11-

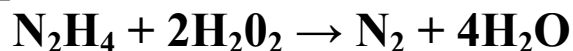
The Mathematics of Chemical Equations

11.1 Stoichiometry

How is a cooking recipe analogous to chemical reactions?

What is stoichiometry?

Interpret the following chemical equation in terms of a) representative particles, b) moles, and c) volume (@STP):



a) ___ molecule(s) of _____ and ___ molecule(s) of _____ react to form ___ molecule(s) of _____ and ___ molecule(s) of water.

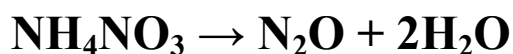
b) ___ mole(s) of _____ and ___ mole(s) of _____ react to form ___ mole(s) of _____ and ___ mole(s) of water.

c) _____ liter(s) of _____ and _____ liter(s) of _____ react to form _____ liter(s) of _____ and _____ liter(s) of water.

How is the ratio of moles, or molar ratios, essential in solving stoichiometry problems?

Why is it important for the chemical equations to be balanced when doing stoichiometry?

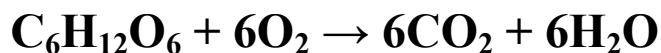
Mole-to-Mole Stoichiometry:



How many moles of N_2O and H_2O are produced from 2.25 moles of NH_4NO_3 ?

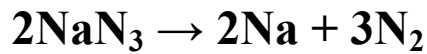
11.2 Solving Stoichiometry Problems

Mass-Mass Stoichiometry:



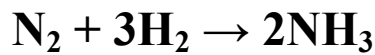
What mass of water is produced from 1.5 grams of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$)?

Mass-Volume Stoichiometry:



What volume of nitrogen gas is produced from the explosive decomposition of 125 grams of sodium azide (NaN_3) at STP?

Volume-Volume Stoichiometry:



What volume of hydrogen gas reacts with 15.5 liters of nitrogen?

Draw Figure 11-9 on page 354 and relate them to the three different types of stoichiometry discussed within this section.

11.3 Limiting Reactants and Percent Yield

What is a limiting reactant?

Identify the limiting reactant when 5.0 grams of water reacts with 2.25 grams of sodium to produce sodium hydroxide and hydrogen gas.

Suppose 2.0 grams of sodium bicarbonate and 0.5 gram of citric acid are present. Which is the limiting reactant, and what volume of carbon dioxide will be produced?



What is percent yield and what is its general formula?

Determine the percent yield for the reaction between 2.80 grams of aluminum nitrate and excess sodium hydroxide if 0.966 grams of aluminum hydroxide is recovered.

