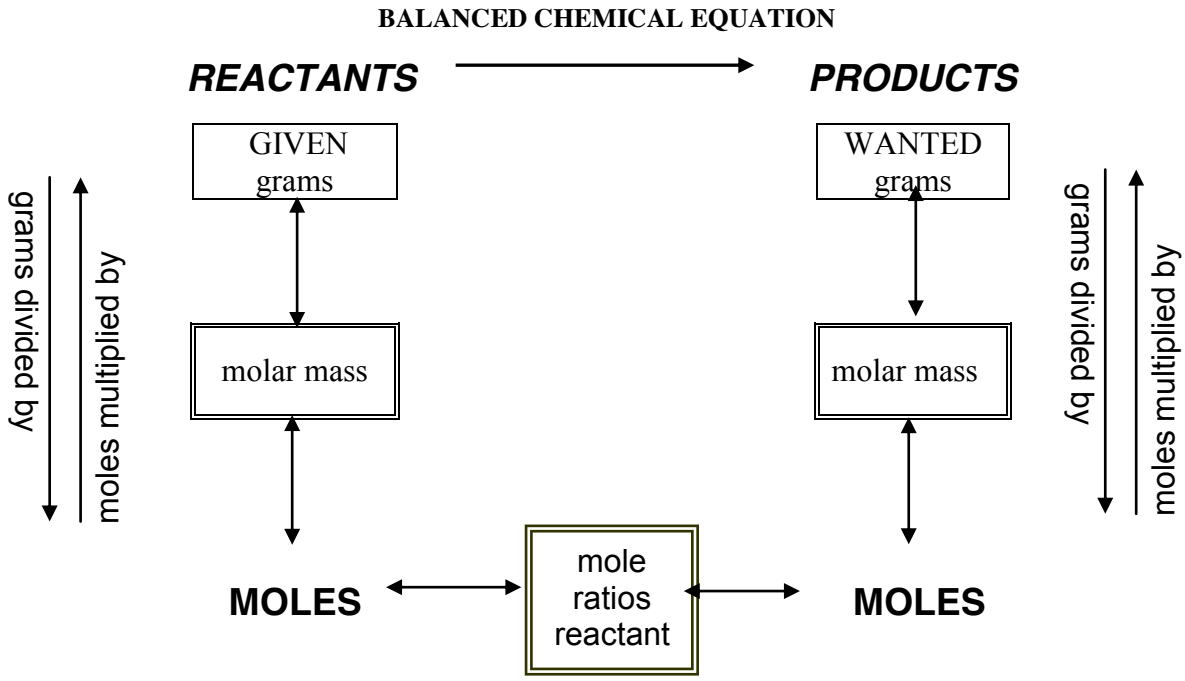
STOICHIOMETRY MAP FOR CHEMICAL REACTIONS

Double lined boxes are Conversion Factors to convert from one quantity to another.



xA ⟶ yB + zC

GIVEN: **WANTED:**

$$\text{Grams A} \times \underbrace{\frac{\text{1 mole A}}{\text{g A}}}_{\text{molar mass A}} \times \underbrace{\frac{\text{y mole B}}{\text{x mole A}}}_{\text{mole ratio from the balanced equation}} \times \underbrace{\frac{\text{g B}}{\text{1 mole B}}}_{\text{molar mass B}} = \text{Gram B}$$

Stoichiometric Calculations

1. Sodium metal burns in air according to the balanced reaction shown below.

$$4\ Na_{(s)} + O_{2(g)} \rightarrow 2\ Na_2O_{(g)}$$

Complete the setups with the correct factors to answer the following questions:

(a) How many moles of oxygen are needed to completely react with 9.5 g of sodium?

$$\boxed{\quad}\ g\ Na \times \frac{1\ mol\ Na}{\boxed{\quad}\ g\ Na} \times \frac{\boxed{\quad}\ mol\ O_2}{\boxed{\quad}\ mol\ Na} = \boxed{\quad}\ mol\ O_2$$

(b) How many grams of sodium are needed to produce 12.5 g of sodium oxide?

$$12.5\ g\ Na_2O \times \frac{1\ mol\ Na_2O}{62.0\ g\ Na_2O} \times \frac{mol\ Na \times}{mol\ Na_2O} \frac{g\ Na}{mol\ Na} =$$

2. Acetylene gas C_2H_2 undergoes combustion to form carbon dioxide and water when it is used in the oxyacetylene torch for welding. Balance the reaction and answer the following questions.

$$C_2H_{2(g)} + O_{2(g)} \rightarrow CO_{2(g)} + H_2O_{(g)}$$

(a) How many grams of water can form if 113 g of acetylene is burned?

(b) How many grams of acetylene react if 1.10 mol of CO_2 are produced?

Stoichiometry Practice Worksheet

Balancing Equations and Simple Stoichiometry

Balance the following equations:

1) ___ N_2 + ___ F_2 → ___ NF_3

2) ___ C_6H_{10} + ___ O_2 → ___ CO_2 + ___ H_2O

3) ___ HBr + ___ $KHCO_3$ → ___ H_2O + ___ KBr + ___ CO_2

4) ___ $GaBr_3$ + ___ Na_2SO_3 → ___ $Ga_2(SO_3)_3$ + ___ NaBr

5) ___ SnO + ___ NF_3 → ___ SnF_2 + ___ N_2O_3

Solve the following stoichiometry grams-grams problems:

6) Using the following equation:

$$2\ NaOH + H_2SO_4 \rightarrow 2\ H_2O + Na_2SO_4$$

How many grams of sodium sulfate will be formed if you start with 200 grams of sodium hydroxide and you have an excess of sulfuric acid?

7) Using the following equation:

$$Pb(SO_4)_2 + 4\ LiNO_3 \rightarrow Pb(NO_3)_4 + 2\ Li_2SO_4$$

How many grams of lithium nitrate will be needed to make 250 grams of lithium sulfate, assuming that you have an adequate amount of lead (IV) sulfate to do the reaction?

Use the following equation to answer questions 8-11:

$$2\ C_6H_{10} + 17\ O_2 \rightarrow 12\ CO_2 + 10\ H_2O$$

8) If I do this reaction with 35 grams of C_6H_{10} and 45 grams of oxygen, how many grams of carbon dioxide will be formed?

9) What is the limiting reagent for problem 6? _____

10) How much of the excess reagent is left over after the reaction from problem 6 is finished?

11) If 35 grams of carbon dioxide are actually formed from the reaction in problem 6, what is the percent yield of this reaction?

Answer the following stoichiometry-related questions:

12) Write the balanced equation for the reaction of acetic acid with aluminum hydroxide to form water and aluminum acetate:

13) Using the equation from problem #12, determine the mass of aluminum acetate that can be made if I do this reaction with 125 grams of acetic acid and 275 grams of aluminum hydroxide.

14) What is the limiting reagent in problem #13?

15) How much of the excess reagent will be left over in problem #13 after the reaction is complete?