Chemistry 1104 Lab: Empirical Formula of an Oxide:

Goals:
1. Introduction to Empirical Formula.
2. Introduction into weighing.
3. Introduction to a reaction equation.
4. Preparation of an oxide of Magnesium through a combustion reaction.
5. Determination of the mass of magnesium and oxygen in the oxide and thus the empirical formula of magnesium oxide.

Reaction Equation:

A reaction equation is a syntax for expressing a chemical reaction in which reactants are converted into products.

$$\text{Reactants} \rightarrow \text{Products}$$

$\rightarrow$ represents yields.

Example:
   FLOUR + MILK + EGGS $\rightarrow$ A CAKE

Reaction Equations cont:

A reaction equation is a recipe that gives the ratio at which substances combine to produce a certain amount of products.

Ex: $2H_2(g)$ + $O_2(g)$ → $2H_2O(g)$

2 H_2 molecules react with 1 O_2 molecule to yield 2 H_2O molecules.

Ex: $\qquad 2H_2(g) \quad + \quad O_2(g) \quad \rightarrow \quad 2H_2O(g)$

Likewise,

2 dozen H_2 molecules react with 1 dozen O_2 molecule to yield 2 dozen H_2O molecules.

Thus,

Represents a reaction where

2 mol H_2 reacts with 1 mol O_2 to yield 2 mol H_2O.

Empirical Formula:

empirical formula - A chemical formula for a compound that is written using the simplest whole-number ratio of atoms present in the compound.

Ex1: hydrogen peroxide

H_2O_2 **molecular formula**

HO **empirical formula**

Ex2: rocket fuel

N_2H_4 **molecular formula**

NH_2 **empirical formula**

Determining the Empirical Formula for Magnesium Oxide:

$$Mg_XO_Y$$

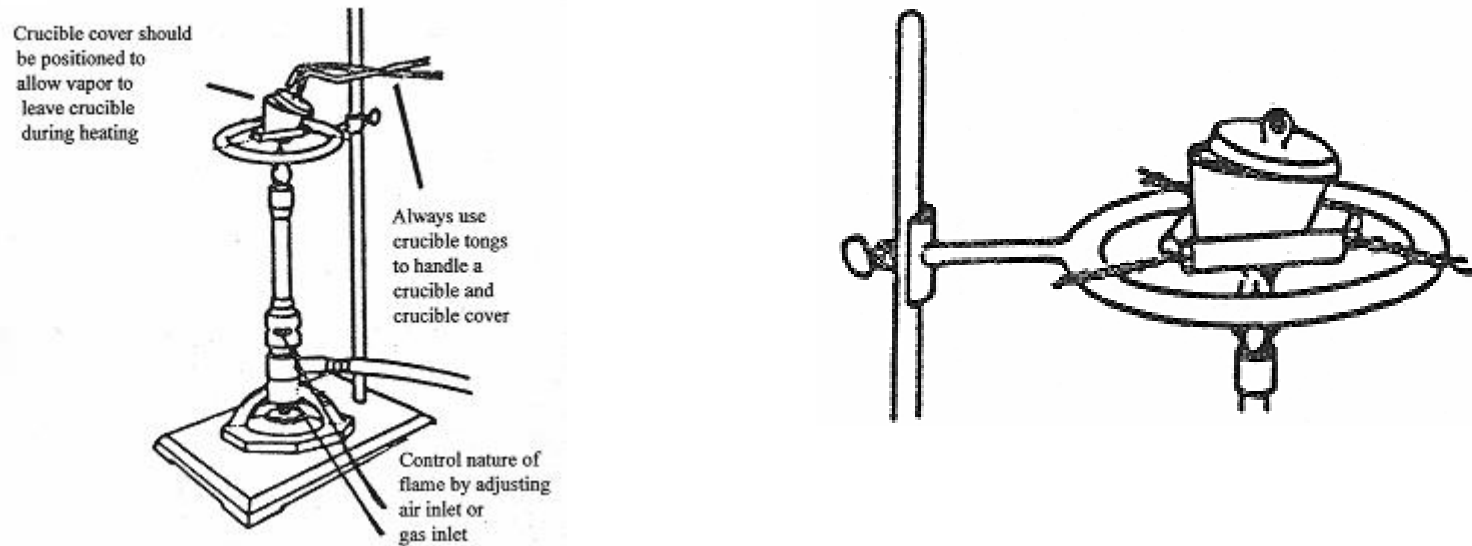X, Y are whole number coefficients. Purpose of experiment is to determine the values of X and Y.

Combustion of Magnesium to Form Magnesium Oxide:

Unbalanced reaction equation:

$$Mg(s) \quad + \quad O_2(g)(AIR) \quad \xrightarrow{\text{heat}} \quad Mg_XO_Y(s)$$

Combustion of Magnesium:

Magnesium metal combusted in a crucible in the presence of oxygen.

Crucible cover should be positioned to allow vapor to leave crucible during heating

Always use crucible tongs to handle a crucible and crucible cover

Control nature of flame by adjusting air inlet or gas inlet

CAUTION: Combustion will involve use of an open flame. NO DISPOSABLE GLOVES.

Calculations:

Record the mass of empty crucible.

Record mass crucible + Mg.

Record mass crucible + Mg_XO_Y.

Know masses of

Mg

mass crucible + Mg – mass crucible

Mg_XO_Y

mass crucible + Mg_XO_Y – mass crucible

Calculations cont:

Calculate the mass of O
Mass of Mg_XO_Y – Mass of Mg

Convert masses into moles
g Mg into moles Mg
g O into moles O

Fill into X and Y. Determine the simplest ratio.