**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Mon/Thurs Period:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
Partner:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date March 11, 2016**

**NSHAHS Chemistry**

**Determination of an Empirical Formula**

**Introduction:**

The empirical formula of a compound is the simplest whole-number ratio of the atoms that make up the compound. In this experiment, the law of conservation of mass will be used to determine the empirical formula of magnesium oxide. A known mass of magnesium will be burned with oxygen present. From the known mass of the magnesium used, and by measuring the mass of the products formed, the mass of the oxygen can be determined. From the masses of the magnesium and oxygen, the number of moles of magnesium and oxygen can then be calculated to determine the empirical formula of magnesium oxide.

**Objective:** To determine, experimentally, the empirical formula of magnesium oxide.

|  |
| --- |
| **CAUTION:** * Do NOT look directly at burning magnesium! Signed:\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Dated:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
 |



**Procedure:**

1. Determine the mass of a clean, dry crucible and record your findings on the data chart.

2. Obtain a 4 cm length of magnesium ribbon.

3. Determine the mass of the crucible and magnesium ribbon and record it on the data chart.

4. Qualitatively observe the magnesium ribbon.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. Use a conductivity meter to test its conductivity \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

6. Light the Bunsen burner.

7. Turn off the lights in the room.

8. Ignite the magnesium ribbon. Do not look directly at the magnesium. Hold the ribbon over the empty crucible.

9. Measure the mass of the product of the combustion in the crucible. Record in the data table.

10. Qualitatively observe the product. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The observed reaction is:

magnesium + oxygen yields magnesium oxide

What type of reaction is this? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**DATA CHART (include units)**

| **1** | Mass of crucible |  |
| --- | --- | --- |
| **2** | Mass of crucible and magnesium |  |
| **3** | Mass of crucible and product – after burning  |  |

**Calculations and Analysis of Data: (be sure all answers contain units!)**

1. Calculate the mass of magnesium used.
2. Calculate the number of moles of magnesium used. (Hint: use the mole wheel!)
3. Determine the mass of the product formed.
4. Determine the mass of oxygen that combined with the magnesium. (Hint: product minus initial magnesium)
5. Calculate the number of moles of oxygen atoms.
6. Divide the answers to numbers (2) and (5) above by the smaller of the two values. This will give you the whole number molar ratio of magnesium to oxygen.

1. Using the molar ratio determine the experimental empirical formula for the product formed.
2. Using your reference tables and the “criss-cross” method, determine the accepted empirical formula for magnesium oxide.
3. Write a balanced equation for the reaction of magnesium with oxygen that you saw in today’s lab.
4. A student burned a quantity of aluminum metal in a crucible. Determine the formula of the product, aluminum oxide, using the experimental data below. Be organized and neat in showing all calculations below.

Mass of crucible and cover……………………………………………….28.45 g

Mass of crucible, cover and aluminum metal…………………………….32.50 g

Mass of crucible, cover and product after heated to constant mass………36.10 g