**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Determination of an Empirical Formula Lab**

**Background Information:** Magnesium is a moderately reactive substance, which at room temperature can react slowly with oxygen. At higher temperatures, the reaction takes place much quicker, producing a white substance and a lot of light. During this lab, you will heat magnesium in air to produce magnesium oxide.

**Guiding Question**: When magnesium and oxygen react, in what whole number ratio will they combine?

**Materials:** Crucible, lid, ring stand, iron ring, clay triangle, tongs, burner, balance, Mg.

**Pre-Lab Questions:**

1. Find the empirical formula of the following:

N2O6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ C6H12O6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  H2O2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Write a scientific explanation to determine the empirical formula of a compound formed using magnesium metal and oxygen gas.

**Prediction**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Reasoning**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**Procedure: Record data with units!**

1. Measure the mass and record the cool crucible **without** the cover.

**Mass crucible: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Cut by bending Mg ribbon into very small pieces.
2. Place the Mg pieces in the crucible and weigh them together.

**Mass crucible and Mg: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Completely cover the crucible and place it on a clay triangle, on the ring, on the ring stand.
2. Heat *gently* for two minutes.
3. Using crucible tongs, carefully tilt the crucible cover to allow air in. Heat *strongly* for 10 minutes.

**DO NOT TOUCH THE CRUCIBLE WITH YOUR HANDS!!! EXTREMELY HOT!!!**

1. Turn off the burner, cover the crucible using tongs, and allow the contents to cool for *at least* 3 minutes.
2. Remove the cover using tongs and check the contents of your crucible. If you can see unreacted Mg, break up pieces using a stirring rod.

**Record Observations**:

1. Measure the combined mass of the crucible, and its new contents.

**Mass crucible and product #1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

1. Re-heat for 1-2 minutes, re-cool, and re-mass the crucible and contents until the mass stays constant.

**Mass crucible and product #2: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Mass crucible and product #3: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Calculations: Show all work! With sigfigs and units.**

1. Find the mass of the magnesium used.
2. Find the mass of the magnesium oxide recovered.
3. Find the mass of the oxygen that reacted.
4. Find the number of moles of Magnesium used.
5. Find the number of moles of Oxygen that reacted.
6. Find the whole number ratio of moles of Mg to moles of O2.
7. Using your calculations, write the empirical formula of magnesium oxide.
8. Compare your answer in question 7 to your prediction. Which do you think is more accurate, the calculations from the lab or the information from the periodic table?
9. Balance the reaction for Mg reacting with O2 and identify the type of reaction.

\_\_\_Mg + \_\_\_O2 🡪 \_\_\_\_ \_\_\_\_\_\_\_\_ Type: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Draw models of magnesium and oxygen reacting:



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1. What was the purpose of reheating the sample more than once?