Name _____ Honors Chemistry ____/____/____

Empirical Formula Lab

In this experiment you will determine the empirical formula of a compound formed when magnesium is reacted with oxygen gas. In determining this empirical formula, you will make use of the law of conservation of mass. According to this law, the total mass of the products of a chemical reaction must equal the total mass of the reactants.

$$\text{mass of Mg} + \text{mass of } O_2 = \text{mass of } Mg_xO_y$$

Once you know the masses of each element, you can convert to moles (instructions below) and then determine the empirical formula by finding the lowest mole ratio. Everyone must turn in their own data table. Performing the lab, making observations and making correct calculations are worth 50 points.

Equipment & Chemicals:

Equipment		Chemicals Used
Porcelain crucible & cover	Clay triangle	Magnesium ribbon
Crucible tongs	Bunsen burner	Steel Wool
Ring stand	Iron ring	

Safety:

1. Wear an apron and safety googles.
2. Handle the crucible only with tongs. Use the tongs to CAREFULLY grasp the lid by its porcelain knob. The crucible should be grasped by one of its edges.
3. Adjust the height of your ring support before you begin heating.
4. Do not look directly at burning magnesium.
5. Do not inhale the "smoke" produced when the magnesium is burned.

Procedure:

□ 1. Use a dry paper towel to remove any dust or debris in your crucible.
□ 2. Set up a clay triangle on a ring stand. Place your crucible and cover in the triangle. Adjust the triangle so that the crucible sits firmly.
□ 3. Weigh your **crucible and cover** using the nearest balance. Record the weight. Use all digits on the balance!
□ 4. Obtain a 6 inch strip of magnesium ribbon. Scrub it clean using steel wool.
□ 5. Coil the magnesium ribbon into a spiral and place it in the crucible.
□ 6. Weigh the **crucible, cover and magnesium** using the nearest balance. Record the weight.
□ 7. Adjust your ring support so that the hottest part of the flame will reach the bottom of your crucible.
□ 8. Set up the crucible on the clay triangle with the cover very slightly ajar.
□ 9. Heat the crucible strongly until the magnesium ignites.
□ 10. When the magnesium begins to burn, immediately place the cover on the crucible ajar and vent it regularly.
□ 11. Use your spatula to break up your solid while you vent your combustion.
□ 12. Once all of the magnesium ribbon has been fully converted to a dull gray powder, remove the cover and heat the crucible strongly for an **additional 2 minutes**.
□ 13. Remove the heat and allow the crucible and contents to cool to room temperature (4-5 minutes).
□ 14. Once your crucible is completely cooled to room temperature, weigh your crucible, cover and contents on the nearest balance. Record the weight using all digits. DO NOT WEIGH A HOT CRUCIBLE.
□ 15. Clean your crucible and cover by rinsing with water washing the contents down the drain. Clean up your lab station.

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Calculations:

 1. Determine the weight of magnesium ribbon used in the experiment.
 2. Determine the weight of magnesium oxide formed in the reaction.
 3. Using the weight of magnesium used and the weight of magnesium oxide formed determine the weight of oxygen that reacted. (See the introduction).
 4. To determine the moles of magnesium, take the weight of magnesium used and divide by the atomic weight of Mg. Record in your data table.
 5. To determine the moles of oxygen, take the weight of oxygen and divide by the atomic weight of O_2. Note that there are two oxygen in O_2. Record in your data table.
 6. Divide the moles of each element by the smallest number of moles (either Mg or O_2).
 7. Write these values as the subscripts for each element.
 8. Round the values to the nearest whole number (one of these values should already be 1) and use them to write the empirical formula in data table.

Observations:

_____

_____

_____

Data Table:

1. Weight of empty crucible and cover	grams
2. Weight of crucible, cover and Mg ribbon	grams
3. Weight of crucible, cover & magnesium oxide formed	grams
4. Weight of Mg	grams
5. Weight of magnesium oxide produced	grams
6. Weight of O_2 gained	grams
7. Moles of Mg	moles
8. Moles of O_2	moles
9. Empirical formula (unrounded)	
10. Empirical formula (rounded)	

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