LAD C6 (pg 1 of 2) Law of Constant Composition
Synthesis of Magnesium Oxide

Name_____

INTRODUCTION

In the late 1700's Joseph Proust studied the chemical compounds and noticed that the elements always combined in constant mass ratio. In this lab the mass ratio that forms when magnesium and oxygen are combined, will be analyzed. By comparing the class data, the law of constant composition may be verified. Magnesium will react with oxygen in the air by heating the two together. This is a synthesis reaction (the combination of two or more substances into a single compound) and it is also a form of combustion (the reaction of oxygen with another substance producing heat and light and resulting in some oxide compound(s)). In order to determine if the ratio between Mg and O is constant, the mass of Mg and the mass of oxygen must be determined.

PreLAD

Read the LAD, then set up a Data/Results table.

Procedure *This will be done as a class demonstration.* ***Goggles are NOT optional. They are a MUST.***

A. Determine the mass of the clean, dry, empty crucible. The Mg must be completely free of any "rust" – so clean and shine the metal strip using sand paper. After cleaning the magnesium, determine its mass. Then crumple it and place it in the crucible as shown in class. The Mg must be touching the bottom of the crucible in order for it to ignite, yet you should not coil it in a tight ball or it is difficult for the air to get at all of the magnesium.

BE SURE AND READ THIS ENTIRE SECTION BEFORE BEGINNING.

B. Put the crucible without the cover on the clay triangle, making sure the base of the crucible sits at the hottest part of the flame, and heat until Mg ignites. To reduce the loss of any product (magnesium oxide powder) as smoke, quickly cover the crucible to catch the smoke, and REMOVE the burner IMMEDIATELY after it ignites. Lift the cover carefully to take a quick peek and see if the reaction has subsided, and is smoking less. If it has, replace the burner and watch carefully as the coil may ignite again causing more smoke, which you again should try to catch with the cover. When the smoking has subsided completely and the magnesium does not light up again, continue to heat with the cover off for about 5 minutes.

C. The completed reaction will result in a light gray residue. Turn off the burner and allow everything to cool. Mass the crucible, cover with the magnesium oxide product in it.

PROCESSING THE DATA - *Show worked out calculations for trial 1 here.*

1. Calculate the mass of the magnesium oxide product. (A simple subtraction should do it.)

2. Calculate the mass of oxygen that combined with the starting mass of magnesium using the starting mass of magnesium, and the mass of the magnesium oxide product. (Again, a simple subtraction should do it.)

3. Calculate the experimental mass ratio of magnesium to mass of oxygen: Mg / O using the mass of magnesium and the mass of oxygen that combined with that magnesium as calculated in #2.

4. Use the masses of Mg and O in the periodic chart to calculate the theoretical mass ratio. The chemical formula for magnesium oxide is MgO.

5. Calculate the % error.

 Law of Constant Composition with Mg

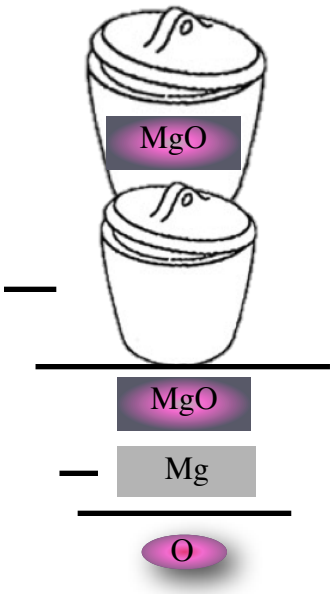
POST LAD QUESTIONS

1. Write out the combination (synthesis) reaction that represents the production of the magnesium oxide. Balance this reaction.

2. What caused the reaction to stop, and if it had been heated longer would the mass ratio have changed.

3. State the Law of Constant Composition. Does the class data verify the Law of Constant Composition? Why is it important to do more than one trial to verify this law?

4. If lots of "smoke" had been lost while heating the magnesium, would you expect the mass ratio of Mg/O to be larger or smaller than the theoretical ratio? Explain.
(Hint: You might want to think about what the "smoke" actually is.)



5. If soot had collected on the bottom of the dish during the heating, would you expect the mass ratio of Mg/O to be larger or smaller than the theoretical ratio? Explain.

6. If the magnesium had been covered with a thick coating of "rust" before burning, would you expect the mass ratio of Mg/O to be larger or smaller than the theoretical ratio? Explain.