LAD D2 (pg 1 of 2) Law of Constant Composition

Name_____Per____

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 of a chemical compound will be analyzed. By comparing the class data, the law of **constant** composition may be verified. Since we have not yet studied chemical formulas, the chemical compound will be named SG, and the two parts of this compound will be called S and G, (Solid and Gas). The data will allow the determination of the mass ratio of S to G.

PreLAD −

Set up a Data/Results table in a new tab of your Google Lab Sheets. This should include embedded calculations.

Procedure

Avoid handling the chemicals with your hands. Wash your hands after the lab.
Goggle should be worn at all times during this LAD.

1. Mass an empty clean dry evaporating dish. Then tare the dish and determine the mass of all of the chemical compound (SG).
2. Establish a proper HOT flame with the burner, and heat the chemical compound (SG) with a good hot flame for until movement of the compound stops indicating all the gas has been released. The heat will cause the compound to decompose into just S as G escapes as a gas.
3. Allow the dish to cool and then determine the mass of the dish with the new product chemical compound (S). Repeat the strong heating a second time to be sure all the G has been removed. After the dish cools, mass the product (S) in the dish again. (Put this measurement in a separate row titled "second heating") If the reaction was completed the first time, the mass should be close to the same (within 0.1 g). If the reaction had not been completed and more G was left the compound, the product (S) will not have been "heated to a constant mass" and it will be necessary to heat the product (S) a third time. (Which would necesitate yet another row.)
4. Thus if necessary, repeat the heating procedure for a third time to confirm that the reaction was completed after the second heating. After the dish cools determine the mass of the dish with the compound (S). You will use the final mass measured to perform your calculations.

Disposal

You can touch the S compound. Put S into the trash. Leave the evaporating dish and all other materials on your tray. Wash your hands after the lab.

Processing the data

1. Calculate the mass of the chemical compound (S). (A simple subtraction should allow this calculation. You should use the mass after your final heating. Maybe after the second or for some of you it may be after the third.)
2. Calculate the mass of the gas portion of this compound (G) that was in the starting compound (SG). (A simple subtraction should allow you to make this calculation.)
3. Determine the mass ratio of S to G that was in the starting chemical compound (SG). A ratio is always a quotient. So S/G will give you the mass ratio.
4. Send your group's data in to the class data table using the Google Form on the unit D home page.

Questions 5, 6 and 7 will be done together in class after the lab. Answer them in the space below.

5. So just what is the name and chemical formula of this compound we called SG?

6. Label the parts S, G, and SG on the formula.
7. Calculate the theoretical mass ratio for S/G. Show the work here.

8. Put the theoretical mass ratio for S/G into your data table.
9. Calculate percent error between the theoretical mass ratio and your experimental mass ratio.

Law of Constant Composition

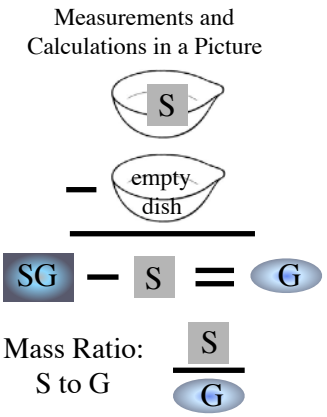
Post-Lab Questions

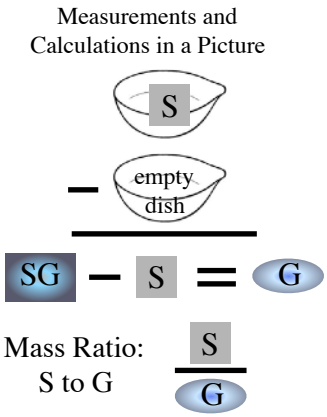
1. How can you tell when you are done heating?
   - Does the appearance of the chemical change during the reaction?
   - Why shouldn't you just heat this chemical just once?
   - How does "heating to a constant mass" help?

2. State the Law of Constant Composition in your own words so it is accurate and makes sense to you.

3. Comment on the accuracy and precision of the class data. Random or systematic error? Be sure and define these terms in the context of your explanation.

4. Mark each item in the picture to the right with an "m" for measurement and "c" for calculation.
   - If you had not heated the SG long enough or hot enough, would the final S/G ratio be larger or smaller than the theoretical ratio?
     ****Circle one ****
   - Justify your response by putting ↑, ↓, or = to indicate what measurements change and the resulting effect on any calculations.





5. If you had heated your SG so aggressively at first that some solid chemical popped out of the dish, would the final S/G ratio be larger or smaller than the theoretical ratio.
   ****Circle one ****
   - Justify your response by putting ↑, ↓, or = to indicate what measurements change and the resulting effect on any calculations.