Finding a Formula With %   Name_____

Intro
    By heating a compound composed of copper and oxygen in a stream of methane, you will remove all of the oxygen, leaving only copper. Each group will use a different amount of the compound. In the end we will compare results and see if we can determine the correct formula.

Procedure

All procedures must be followed extremely carefully, because of the fire hazard involved.

1) Obtain the following items:
    From the lab bench
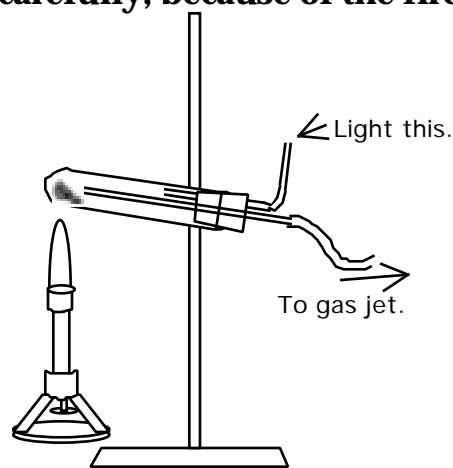   - methane reduction set-up
    From the center drawer and cabinet
        - ring stand
        - Bunsen burner
        - a test tube clamp
    From your personal drawer
        - test tube

2) Using the electric balance, measure the mass of a test tube.
3) Using the triple beam balance, obtain between 2 and 2.5 g of the substance and put it in the test tube.
4) Using the *same* electric balance, reweigh the test tube containing the compound to get a precise mass of the copper oxide inside of the tube.
5) Construct the following apparatus according to the diagram above. Be sure not to touch the powder with the glass pipe as you insert it into the test tube.
6) Make sure the methane reduction set-up fits snugly in the test tube. There is possibility of explosion if this is to accidentally fall out. Then connect the rubber tube to a gas jet.
7) **After checking your apparatus with the teacher you may proceed.**
8) Very carefully and slowly turn on the gas connected to the rubber tube. Turning the gas on with too much pressure will scatter the copper oxide powder, and you want to avoid this. Use your wrist to feel for a gentle gas flow from the other tube extending from the rubber stopper.
9) Let the gas flow into the room for about 30 seconds to rid the inside of the test tube of air. (Methane will explode if ignited while confined with a mixture of air.) Then ignite the end of the glass tube and adjust the flame carefully to give a steady flame 4 - 5 cm in length.
10) Turn on the Bunsen burner and, using a gentle flame, start heating the end of the tube where the compound is located. As time progresses use a stronger, higher temperature flame. Eventually, use a blow torch-like flame until all of the compound has changed color.

11) As you heat the powder some water is formed as part of the reaction. If this water enters the glass tubing, it could extinguish the flame. If this happens relight the flame. Relight as many times as is necessary.

12) When the black color is completely gone, turn down the Bunsen burner so that it is now a gentle flame, and move the burner away from the test tube, allowing it to cool down. However, leave the gas flowing into the test tube while it cools.

13) When the test tube has cooled some, turn off the gas going to the test tube. Using a paper towel to remove any water that has collected at the top of the test tube. If there is any water that you cannot remove with the towel put the test tube in your test tube holder from your lab drawer. Then, with the Bunsen Burner on low gently move the test tube in and out of the flame to evaporate the remaining water. Take care not to heat the part of the test tube that has copper in it. If you heat the copper you will reform the original compound.

16) When the test tube has cooled enough to be handled reweigh it, and write the following data on the board: Test tube mass, test tube and compound (before heating), test tube and copper (after heating).

17) You can now remove the copper from the test tube. If you rub this copper on a piece of paper you can polish it to its shiny metallic luster.

Questions (**on a separate sheet of paper**)

1) In this lab we are trying to figure out the formula for this compound. To do this we will look at the percent composition of the substance you were using. Find the percent composition of each of the following compounds.

$$CuO$$
$$Cu_2O$$
$$CuO_2$$

2) Calculate the percent copper and percent oxygen of the compound you used in lab today.

3) Prepare an example of a ClarisWorks spreadsheet that you could use to show the percent Cu and the percent O in the class data. What columns would you need? Which columns would be entered as data, and which columns could be calculated? How will you calculate the calculated columns? **Don't actually create a table. We will do this on the computer. Just determine the titles of the columns, and how to calculate the appropriate numbers. Fill in only one line of your data table.**