Identifying a Copper Compound by Percent Composition **Name:**_____

Introduction: All compounds have a definite composition in terms of the relative masses and the number of atoms of elements. However, the same elements may unite in different ratios. Compounds often can be identified by the relative amount of a particular element they contain. In this lab, by experimentally finding the amount of copper in a sample, we should be able to identify and select the formula of a compound from a number of possible choices.

Safety: Wear your protective goggles. Avoid skin contact with the compound and solution. Wash your hands before leaving the lab.

Procedure:

Day 1

1. Label a 250 ml beaker (your names/masking tape).
2. Determine the mass of the labeled beaker. Be sure all masses are measured to the nearest 0.01 g. Record all masses into the Data.
3. Add between one and two grams of the copper-containing salt to the beaker. Determine the mass of the beaker and its contents.
4. Add approximately 75 ml of distilled water to the beaker. Stir with a glass rod to dissolve the salt. Note the results.
5. Determine the mass of a piece of filter paper.
6. Place the ends of two aluminum strips into the solution. Stir with the strips, periodically scraping off the copper that accumulates.
7. When the solution's blue color disappears, and the reaction stops (approx. 15 minutes), scrape off as much of the copper as possible from the strips. You may also use small amount of distilled water to rinse the copper from the strips.
8. Remove the aluminum strips. Clean with water and steel wool. Set them aside for the next class to use.
9. Filter the copper mixture using the filter paper and funnel. Collect the filtrate in a large "waste" beaker. VERY IMPORTANT – you should pour the liquid portion of the mixture through the paper and try to keep the copper solid in the beaker. Allowing the solid to get into the filter paper will plug it up and filtration will be too slow. Once the liquid has been poured out of the mixture, you should use several small washings of distilled water. Swirling the distilled water in the copper and pouring the water out and into the filter paper will help to clean the copper.
10. When filtration is complete, place the filter paper in the beaker with the clean copper and put the beaker and its contents into the drying oven.
11. Dispose of the filtrate down the sink and clean the "waste" beaker.

Day 2

12. Determine the mass of the beaker and its dried contents.
13. Dispose of the filter paper and dried copper into the trash can.
14. Clean the beaker.
15. Complete the data and data analysis.

Data: Record and calculate masses:

Beaker and Copper Salt =
Beaker =_____
Copper Salt =

Beaker, Copper, Paper =
Beaker =
Paper =_____
Copper =

Data Analysis:

1. Determine the percent copper by mass in the original copper-containing compound. We are assuming that 100% of the copper in the compound was converted to copper metal.

2. Your sample is a compound containing copper, chlorine, and water. Three possible formulas are listed below. Determine the percent of copper my mass in each: $CuCl_2 \cdot 2H_2O$, $CuCl \cdot 2H_2O$, and $CuCl_2 \cdot H_2O$.

3. Based on your results, what is the formula for the compound you were given?

4. Calculate the % error in your experimental percent of copper.

5. Explain whether your calculated percent copper would have been higher or lower if the filter paper had not completely dried:

6. If a blue color appears on the filter paper with the recovered copper, what would this imply?

7. List other possible sources of error. Indicate whether each would cause a higher or lower result.

Application:

1. Why is it doubtful that the reddish-brown product could be rust?

2. List two observations that imply that a chemical change had taken place:

3. A student used an aluminum scoop to measure out 5.00 g of $CuCl_2 \cdot 2H_2O$. Why would this be considered a bad laboratory technique?

4. Determine the percent by mass of Mg in $MgSO_4 \cdot 7H_2O$.