Unit 3 – Chapter 3: Stoichiometry **Name _____**

Lab: Chemical Formula of Copper and Iodine **Period _____**

Pre-Lab: Place the pre-lab questions at the beginning of the lab report.

Purpose: To synthesize and determine the formula of an iodide of copper.

Equipment and supplies:

1 large, clean, dry test tube
1 strip of Cu metal, about 15 cm X 15 cm
Analytical balance
1 – 1.2 grams of iodine (make sure you do not exceed this amount)

Procedure: You will do two trials

1. Clean the surface of the Cu strip **very carefully** with steel wool and determine the mass of it to the nearest 0.1 mg (4 decimal points on the analytical balance. Measurement is crucial in this lab, so make sure you are aware of significant figures). After the strip has been massed, do NOT TOUCH THE SURFACES WITH YOUR FINGERS. Hold it by the sides as you would a photograph or use a forceps. Make sure you also record the balance number and use only that balance throughout the experiment.

2. Place 1.0 to 1.2 grams of iodine (use a small balance, not an analytical balance for this step) in the dry test tube and **under the fume hood** heat gently in a back and forth motion for about 45 seconds, making sure you are wearing safety glasses. During this time, you should observe that the iodine turns to a gas according to the following equation: $I_{2(s)} \rightarrow I_{2(l)} + I_{2(g)}$

3. Insert the clean Cu strip into the test tube containing the warmed iodine and continue heating for 1.5 to 2 minutes. Avoid overheating or heating too long by waving the test tube back and forth over the flame as the compound becomes loose and flakes off, resulting in loss of material before weighing.

4. **Carefully** take out the strip, again, touching only the sides and being careful not to dislodge any of the solid.

5. Record the mass of the strip after the reaction. With this value you can now determine the mass of the iodine atoms which reacted with the copper strip. (Only new atoms on the strip are iodine atoms if you followed this procedure carefully.)

6. Gently knock off and wash away the compound using water and your fingers. Hold the clean strip over a flame for several seconds to dry it. **Caution: do not melt or oxidize the Cu** and determine the mass of Cu after removing the film. This value now enables you to calculate the mass of Cu which reacted with the iodine to form the compound.

7. Empty any remaining iodine crystals in the container provided, clean out the test tube by dissolving the residue in 10 mL of ethyl alcohol, followed by soap and water. If permanently stained, turn in the test tube to the instructor. **Do not throw it away**. Return the clean Cu strip.

Observations:

	Mass (before heating)	Mass (after heating)	Mass (after cleaning)
Trial 1			
Trial 2			

Calculations: (Both trials)

1. Mass of iodine atoms which reacted:

2. Mass of copper atoms which reacted:

3. Moles of iodine atoms reacted:

4. Moles of copper atoms reacted:

5. Mole ratio of Cu to I atoms:

6. Chemical formula for this compound:

Conclusions:

1) Explain how the value of the ratio would have been altered if:
   a. Some of the copper iodide had been knocked off before being massed.
   b. The strip was not thoroughly dry for the last massing.
   c. When drying the strip, it was heated too strongly, resulting in some dark copper being formed on the surface.
2) Define the following:
   a) Law of Definite Proportions
   b) Law of Multiple Proportions
3) Determine the formula of a compound of iodine and Cu formed by the reaction of 0.6537 grams of Cu and 2.5380 grams of iodine.
   a) Is this compound the same one which you prepared? How do you explain this difference?
4) Do the following conclusion questions provided.