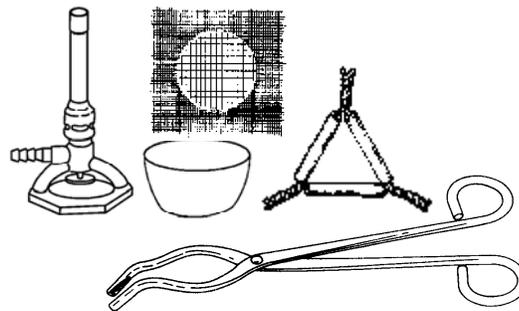


# Stoichiometry

## In an Incomplete Reaction



### **Objective:**

To examine the quantitative relationship between copper and oxygen when copper metal is heated strongly in air. This laboratory exercise will provide an opportunity to develop the skills of recording data carefully and neatly while furnishing a chance to increase proficiency in measuring and calculating with the correct number of significant figures.

**Safety:** Hydrochloric acid is very corrosive to the eyes, skin and clothing. Hot crucibles and iron rings can instantly cause severe burns upon contact.

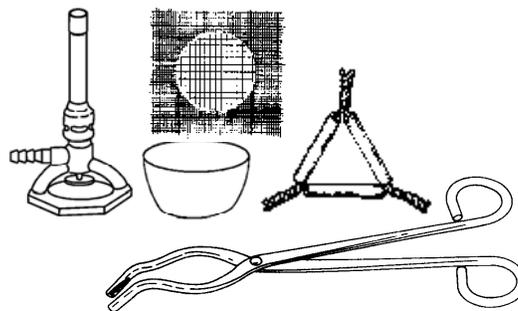
### **Procedure:**

- ❑ Put on your goggles and apron.
- ❑ Read through the entire laboratory procedure.
- ❑ Create a data table that will accommodate all of your measured values. Use your own paper. Neatness counts a lot. Using a spreadsheet program like MS Excel and printing it out is STRONGLY recommended. If not, you will want to use a ruler. Keep in mind such things as units and significant figures.
- ❑ Obtain a crucible and record its mass.
- ❑ Heat the crucible for 2 minutes and allow it to cool to room temperature.
- ❑ Mass the crucible again and compare it to the previous mass.
- ❑ Obtain about 2 - 3 grams of finely ground (or precipitated) copper metal. Place it into the crucible and determine the mass as accurately as possible.
- ❑ Heat the crucible containing the copper. Heat the crucible as hot as possible for at least 15 minutes. Be sure to observe the copper very closely for at least the first 2 minutes of heating.
- ❑ Allow the crucible to cool to room temperature. This may happen faster if it is placed onto the wire gauze square on the tabletop.  
DO NOT PLACE THE HOT CRUCIBLE DIRECTLY ONTO THE LAB TABLE TOP.
- ❑ Mass the crucible and its contents.
- ❑ Break up the contents of the crucible with a metal spatula and examine the pieces.
- ❑ Using 6.0 M hydrochloric acid as a solvent, place the pieces into a clean pre-massed 100 mL beaker and add about 25 mL of acid. Stir with a stirring rod for 5 to 10 minutes. Be sure the solid pieces are completely broken up.
- ❑ After letting the solid settle to the bottom, slowly pour off the liquid into another beaker (Your teacher will tell you what to do with this solution).
- ❑ Now wash the remaining solid several times with distilled water and discard the washings.
- ❑ Place the 100 mL beaker and un-reacted copper into the oven to be dried before finding its mass.
- ❑ Be sure the beaker and contents are at room temperature before the mass is measured.
- ❑ Dispose of all waste as directed by your teacher.

# Stoichiometry

In an Incomplete Reaction

## REPORT SHEET



NAME \_\_\_\_\_

DATE \_\_\_\_\_

- Describe the visual changes throughout the lab. Be sure to include a description of all substances used and/or produced.
- Explain the increase in mass as the copper is heated.
- Write a balanced equation for this reaction.
- Calculate the mass of copper (II) oxide that should theoretically be produced.
- Use your data and calculate the percent yield of copper (II) oxide.
- Give an explanation why the yield of this reaction was not 100%.