

## LAB - MASS RELATIONSHIPS IN CHEMICAL REACTIONS

Purpose: To determine the % yield of Cu from the reaction of  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$  with Al.

Apparatus

150 mL beaker                      stirring rod  
hot plate                            100 mL graduated cylinder  
watch glass                        hot hands  
tweezers

Materials

$\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$   
Al foil (approximately 0.35g)  
Distilled water

Table I - Quantitative Results

mass of beaker	
mass of beaker & $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$	
mass of $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$	
mass of Al	
mass of beaker & Cu	
mass of Cu	

Procedure

1. Determine the mass of a clean, dry 150 mL beaker. To the beaker, add 1.50 g of  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ . Dissolve the solute in 50 mL of distilled water.
2. Obtain a piece of Al foil. Loosely coil the strip into a circle. Determine its mass. Place the foil in the  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$  solution.
3. Heat the mixture on the hot plate. Boil it gently until the solution becomes colourless (approximately five minutes). Allow it to cool until it can safely be handled.
4. Decant only the liquid into the sink making sure none of the Cu is lost. Add 50 mL of water to the beaker. Stir well to wash the Cu. Decant this mixture and repeat the washing procedure with another 50 mL of water. Be very careful not to lose any Cu.

while decanting the mixture.

5. Use tweezers to remove any unreacted Al. Use a water bottle to spray and dislodge any Cu clinging to the Al into the beaker. It is VERY important to collect ALL of the Cu produced.

6. Cover the beaker with a watch glass and gently heat it to evaporate any water. When the initial sputtering has stopped, remove the watch glass and continue heating to remove all traces of moisture. Be careful not to over heat the Cu.

7. Allow the beaker to cool. Determine the mass of the beaker and Cu.

### Concluding Calculations

1) Write a balanced equation for the reaction.



2) Determine the limiting reactant.

3) Calculate the theoretical yield of Cu.

4) Calculate the % yield of Cu.

### Discussion of Errors and Procedural Modifications