# Single Replacement Reaction Stoichiometry

Student Name

Date

## Data

### Activity 1

1. Write the balanced equation for the reaction of aluminum with copper(II) sulfate solution.
2. What is the mole ratio of the reactants to one another and what is the mole ratio of Al metal to Cu Metal?
3. How many moles of aluminum will be required to produce 0.45 moles of copper metal?
4. How many grams of aluminum will be required to produce 4.5 g of copper metal?
5. Based on the information in the procedure, why does the copper metal have to be completely dry before the yield is calculated?

Data Table 1

Balanced Chemical Equation:

|  | **Answer** | **Show Your Work** |
| --- | --- | --- |
| Volume of 1 M CuSO4 |  |  |
| Mass of Al foil |  |  |
| Moles CuSO4 |  |  |
| Moles of Al |  |  |
| Moles Cu Product based on Starting CuSO4 |  |  |
| Moles Cu Product based on Starting Al |  |  |
| Limiting Reactant |  |  |
| Theoretical Yield of Cu in Moles |  |  |
| Theoretical Yield of Cu in grams |  |  |
| Actual Yield of Cu in grams |  |  |
| Percent Yield of Cu |  |  |

1. Describe the appearance of the copper(II) sulfate solution and the aluminum foil before the reaction starts.
2. Describe your observations of the solution during the reaction.
3. Describe the appearance of the solution and any solids after the reaction.
4. Describe the appearance of the solid after it is dried.
5. Was all of the copper(II) sulfate reacted in this lab? Explain your answer both with observations and calculations.
6. Identify the excess and limiting reactants.
7. Identify two aqueous substances that were washed away from the final solid.
8. If the solids were not washed before drying, how would this change the copper metal yield?
9. If the copper is not completely dried, how would this change the yield of copper metal?
10. Explain why the percent yield was not 100%. What are some sources of error?