

Week 7: Titration and Spectroscopy of Amino Acid Compounds

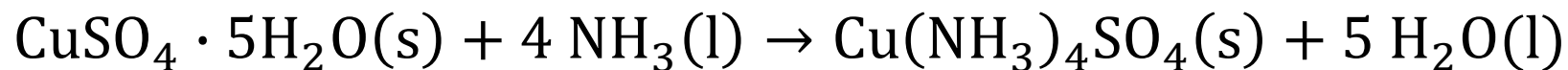
Dr. Turner



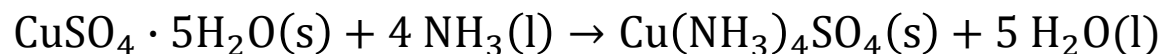
Prelab Review



Balanced Reaction for Model Compound



Calculating Theoretical Yield



$$\sim 10 \text{ g CuSO}_4 \cdot 5\text{H}_2\text{O} \left(\frac{1 \text{ mol CuSO}_4 \cdot 5\text{H}_2\text{O}}{249.70 \text{ g CuSO}_4 \cdot 5\text{H}_2\text{O}} \right) \left(\frac{1 \text{ mol Cu}(\text{NH}_3)_4\text{SO}_4}{1 \text{ mol CuSO}_4 \cdot 5\text{H}_2\text{O}} \right) \left(\frac{227.76 \text{ g Cu}(\text{NH}_3)_4\text{SO}_4}{1 \text{ mol Cu}(\text{NH}_3)_4\text{SO}_4} \right)$$

= Theoretical Yield

Percent Yield



$$\% \text{ Yield} = \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100$$

Possible Empirical Formulas

	Monodentate ligand	Bidentate ligand
4 Chelation Sites	$\text{Cu}(\text{C}_3\text{H}_7\text{NO}_2)_4$	$\text{Cu}(\text{C}_3\text{H}_7\text{NO}_2)_2$
6 Chelation Sites	$\text{Cu}(\text{C}_3\text{H}_7\text{NO}_2)_6$	$\text{Cu}(\text{C}_3\text{H}_7\text{NO}_2)_3$

Note: $\text{C}_3\text{H}_7\text{NO}_2$ is the formula of alanine

Determining the empirical formula

1. Perform titration analysis to determine the mass percent of alanine and spectroscopic analysis to determine the mass percent of copper
2. Determine the empirical formula of the amino acid compound using the mass percentages of alanine and copper

Determining the percent yield

1. Write out the synthesis equation for the formation of the alanine compound
2. Use your synthesis equation to find the theoretical yield of the amino acid compound
3. Use the theoretical yield to calculate the percent yield of the amino acid compound