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# The Chemistry of Complex lons

## Data Tables

#### Part 1

Test Tube	Reagent	Coordination Number	Formula of Complex Ion or Ionic Solid	Color of Complex Ion or Ionic Solid	Absorbed Energy Color (wavelength)
1	Copper(II) sulfate solution				
2	Cobalt(II) sulfate solution				
3	$Cu(H_2O)_4^{2+}(aq) + NO_2^{-}(aq)$				
4	$Cu(H_2O)_4^{2+}(aq) + C_2H_8N_2(aq)$				
5	$Co(H_2O_6^{2+}(aq) + C_2O_4^{2-}(aq))$				
6	$Co(H_2O)_6^{2+}(aq) + C_2H_8N_2(aq)$				

## Part 2. Color of Reaction Products



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## **Post-Lab Calculations**

- 1. Determine the formula of the complex ion or ionic compounds formed during Part 1 in test tubes #2, #3, #5, and #6 in Part 1. Record these values in Part 1 of the Data Table.
- 2. Using the color wheel on page 2, determine the color and wavelength range of the visible light absorbed by the complex ion or precipitate in each test tube #1 through #6. Record these values in Part 1 of the Data Table.
- 3. Determine the formula of each complex ion or ionic solid formed in Part 2. The coordination number of the copper is four. Write a balanced chemical equation for the formation of each complex ion or ionic compound and the expression for its stability constant  $(K_f)$ .

4. From the results, rank the stability constants for the five complex ions or ionic compounds in Part 2 from highest to lowest. For example, if adding hydroxide ion to the copper–ammonia complex ion solution causes a precipitate and/ or color change, then the stability constant for the copper–hydroxide complex ion is greater than that for the copper–ammonia complex ion.

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