Name _____ Period _____

Partner_____ Date _____

Complex Ions Lab

Prelab Questions

1) If you have a positive ion in solution what else must you have?

2) What is a complex ion?

3) What is a ligand?

4) What is a counter ion?

Procedure

1) Observe the peacock blue solution of copper (II) sulfate. The pretty blue color is due to the complex ion, tetraquacopper (II) ion. Write the formula:

This could also be called tetraquacopper (II) sulfate because there is a sulfate ion present. The sulfate ion is not part of the complex ion.

2) Place about a "finger's worth" of the blue solution in the bottom of a test tube. Add a few drops of 1 M NaOH. Mix and write your observations:

Now think of this as an AP predicting reactions problem.

Solutions of sodium hydroxide and copper (II) sulfate are mixed

3) Add some concentrated ammonia solution to the copper (II) hydroxide suspension in the tube. *Keep your nose away from the fumes!* The deep blue (indigo) color comes from the tetraamminecopper(II) ion. Write the formula for the complex ion:

4) Keep adding and mixing the ammonia solution until all of the pale blue precipitate has become deep blue. Is the deep blue substance a precipitate?

Concentrated ammonia solution is added to a suspension of freshly precipitated copper(II) hydroxide.

5) Remove some of the deep blue solution (in to another test tube) until you have about one finger's worth.

6)Add a few drops of 1 M Hydrochloric acid solution now to the mixture.

7) Observe the color where the acid mixes with the deep blue solution. What do you see?

8) Mix and add acid until the entire solution is pale blue.

9) Ammonia is a proton acceptor (Lewis Base). Write the equation for what happens to the ammonia:

10) Will this new ion be attracted to the Cu^{2+} ions?

11) What is the pale blue color is due to?

A solution of dilute hydrochloric aid is added to a solution of tetramminecopper(II) hydroxide:

12) Finally add enough HCl solution until the blue solid begins to disappear.

A solution of hydrochloric acid is added to a suspension of copper(II) hydroxide.

13) Check for where to put the waste products for this experiment.

14) Before leaving the laboratory, wash your hands thoroughly with soap and water.

Post Lab Question

1) At first you can add a little hydroxide ion to a copper (II) solution and it forms a precipitate. Then as you add more the precipitate dissolves. What is happening?