** Copper Robber!** Follow the procedure and fill in the chart as you go:

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| **Procedure** | **Observations** | **Formula** | **Particle View/Lewis Diagram**  |
| 1. Obtain about 2 g copper(II) chloride. |  | solid copper(II) chloride | Particle view drawing |
| 2. Dissolve copper(II) chloride in 20 mL distilled water. |  | aqueous copper(II) chloride.  | Particle view drawing |
| aqueous complex ion tetrachlorocuprate(II)  | Lewis diagram (tetrahedral) |
| 3. Add 80 mL distilled water. |  | aqueous complex ion hexaaquacopper(II) | Lewis diagram (octahedral) |
| 4. Measure the temperature of the solution. | Record the temperature. |
| 5. Loosely roll a piece of 3 cm x 3 cm aluminum foil. |  | solid aluminum | Particle view drawing |
| 6. Place aluminum foil inside beaker of dissolved copper(II) chloride. |  | solid copper | Particle view drawing |
| aqueous aluminum chloride | Particle view drawing |
| 7. Measure the temperature of the mixture. | Record the temperature.  |
| Is the reaction endothermic or exothermic? Explain. |
| 8. Separate the copper by filtration.Wash the copper with distilled water.Spread some copper on the back of a porcelain spot plate.Observe, | Make a labeled sketch of your filtration set up. |
| 9. Clean up.  | * Pour solution with excess metal ions into the waste container.
* Scrape copper into marked container.
* Clean, dry and return all equipment.
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**Post-activity Questions**

1. Write a balanced net ionic equation for each description. Include phases.

1. Dissolving solid copper(II) chloride in water.
2. Forming the complex ion tetrachlorocuprate(II) from the monatomic ions in aqueous solution.
3. Forming the complex ion hexaaquacopper(II) from the copper(II) ion and water.
4. The ligand exchange (ligand substitution) reaction in which tetrachlorocuprate(II) changes to hexaaquacopper(II).
5. Redox reaction between aqueous copper(II) and solid aluminum.

2. Make a particle view drawing of the results of the reaction between aqueous copper(II) chloride and aluminum foil.

 Key:



3. Explain where the copper metal you get at the end of the reaction comes from?

4. Why do you think this activity is called the copper robber?

5. The aqueous complex ion tetrachlorocuprate(II) is yellow while hexaaquacopper(II) is blue. In procedure #2, when CuCl2 is dissolved in water the mixture looks green. Explain.