

Chemical Changes
Aluminum (Al) with Copper (II) Chloride (CuCl₂)
Teacher Resource

Grade Level **9-12**

Objectives

1. The student will develop an understanding of temperature and the ability of Aluminum to react with Copper (II) Chloride.
2. The student will employ simple equipment and tools to gather data.
3. The student will demonstrate the use of 21st century technology with a document camera, an electronic balance, and a temperature gauge to locate, evaluate, and collect information from a variety of sources.

National Standards

[NS.K-4.1](#); [NS.5-8.1](#); [NS.9-12.1](#)

Science as Inquiry

[NS.K-4.2](#); [NS.5-8.2](#); [NS.9-12.2](#)

Physical Science

[NS.K-4.5](#); [NS.5-8.5](#); [NS.9-12.5](#)

Science & Technology

[NT.K-12.1](#)

Basic Operations and Concepts

[NT.K-12.3](#)

Technology Productivity Tools

[NT.K-12.6](#)

Technology Problem-Solving & Decision-Making Tools

Teacher Background Information

In this experiment, the student will take a piece of aluminum and place it into a solution. They will observe its behavior. By measuring the temperature at the beginning and end of the experiment, the student will be able to qualitatively investigate any changes that occur. Before each activity have students state a hypothesis.

MATERIALS

Document camera	Thermometer
Personal computer	Water
Interactive white board/Projector	Stirring rod
Electronic Balance	Scoopula

Safety goggles

Aluminum foil

Gloves

Large test tube

150mL beaker

Copper (II) Chloride crystals (CuCl_2)

PROCEDURE

1. Wear safety goggles and gloves at all times.
2. Focus the document camera on the beaker and start recording.
3. Measure 25mL of water in the graduated cylinder and place in the 150mL beaker.
4. Place the thermometer in the beaker and record the temperature.
5. Weigh out 2 grams CuCl_2 and add to the beaker, stir.
6. Loosely crumple up a piece of aluminum foil and place into the solution.
7. Let the mixture sit for 3 minutes and stir gently once or twice.
8. Observe and record observations.
9. Take the temperature after 3 minutes and stop recording.
10. Clean up according to teacher's instructions.

QUESTIONS

1. Construct a data table of your findings.
2. Write the balanced equation for the reaction of Aluminum (Al) with Copper (II) Chloride (CuCl_2).
 - a. Does the equation you wrote agree with your hypothesis?
3. What type of reaction is this? (exothermic or endothermic)
4. Do the observations seem to indicate evidence of a physical change or chemical change for the aluminum foil?
5. What products were produced? What evidence can support your observations?
6. How would the following change the reaction rate of the experiment?
 - a. Larger CuCl_2 crystals
 - b. Hot water
 - c. Tightly crumpling the aluminum foil

PRESENTATION

Have students prepare a lab report including the data, images, and video to give a presentation on the interactive white board or projector for the class.