

Name:

Period:

LAB 21 - SINGLE-REPLACEMENT REACTIONS

BACKGROUND

This lab deals with a type of chemical reaction that we have seen before, though we will be using different chemicals today. If you think back to the reactions we did with sodium (Na) and magnesium (Mg), you are already familiar with the basics of chemical reactions. In a chemical reaction, the atoms of the *reactants* are rearranged to form *products*. The atoms themselves do not change, only how they are connected to (or disconnected from) other atoms.

In a **single-replacement reaction**, an uncombined element replaces an element that is part of a compound. These reactions take the form:



Notice that the atom represented by the letter X gets a new partner during the reaction. The chemical reaction you saw with sodium and water is an example of this.



| | | | | | | |
|-----|---|-------------------|---|-------|---|----------------|
| A | + | BX | → | AX | + | B |
| 2Na | + | 2H ₂ O | → | 2NaOH | + | H ₂ |



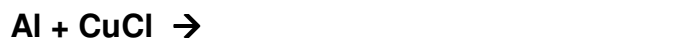
PROBLEM

If Copper(II)Chloride solution is mixed with Aluminum, what will the result be?

HYPOTHESIS

| | | | | | | |
|----|---|------|---|----|---|---|
| A | + | BX | → | AX | + | B |
| Al | + | CuCl | → | | + | |

This equation is not balanced



MATERIALS

- ◆ Beakers (250mL)
- ◆ Ring stand
- ◆ Thermometer clamp
- ◆ Thermometer
- ◆ Goggles & Apron
- ◆ Aluminum foil (approximately 1.5cm x 1.5cm)
- ◆ Copper(II)Chloride Solution

WARNING: THE BLUE COPPER(II)CHLORIDE CRYSTALS ARE AN IRRITANT. IF ANY CHEMICALS GET ON YOUR SKIN OR IN YOUR EYES, FLUSH IMMEDIATELY WITH WATER AND INFORM MR. KOERGER.

PROCEDURE

1. Set up the ring stand with the thermometer clamp.
2. Put approximately 100mL of Copper(II)Chloride solution in the beaker.
3. Place the thermometer in the solution and record the temperature in table 21-1.
4. *Slightly* crumple the piece of aluminum foil so that it is a wrinkled sheet (not a crumpled ball). Place it into the solution and use the thermometer to fully submerge it.
5. Observe the aluminum foil. Record your observations in table 21-2.
6. Watch the thermometer as well. Record any observations of temperature in table 21-1.
7. When the reaction appears to be completed, stir the solution with the stirring rod. Make any final observations in table 21-2, and then pour the solution down the drain, flushing it with copious amounts of cold water.
8. Clean up your lab station by washing and drying all equipment.

DATA

Table 21-1: Temperature of Copper(II)Chloride Solution

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|--|

Table 21-2: Qualitative and/or Quantitative Observations

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|---|--|
| Aluminum foil submerged in Copper(II)Chloride solution. | |
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| | |

SUMMARY

Summary and Challenge Questions must be typed on a separate piece of paper.

1. Summarize your observations of the reaction.
2. Based on your observations, was your hypothesis correct? What evidence do you have that supports or refutes your original hypothesis?
3. What evidence (based on your observations) do you have that a chemical reaction took place?

CHALLENGE

On Moodle