

CHEMISTRY LAB: TYPES OF CHEMICAL REACTIONS

PURPOSE: To study four different types of chemical reactions

INTRODUCTIONS: Most chemical reactions can be classified into one of four categories:

1. SYNTHESIS: $A + B \rightarrow C$
ex. $2S(g) + 3O_2(g) \rightarrow 2SO_3(g)$
2. DECOMPOSITION: $A \rightarrow B + C$
ex. $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$
3. SINGLE DISPLACEMENT: $A + BC \rightarrow B + AC$
ex. $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$
4. DOUBLE DISPLACEMENT: $AB + CD \rightarrow AD + CB$
ex. $NaCl(aq) + AgNO_3(aq) \rightarrow NaNO_3(aq) + AgCl(s)$

In this experiment you will study a few different chemical reactions. Some will be teacher demonstrations for safety reasons. You will identify the products, balance the equations, and classify each of the reactions as one of the four types listed above.

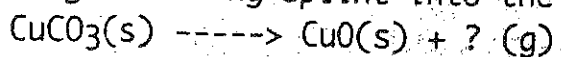
APPARATUS AND MATERIALS:

- A. Copper(II) carbonate, Bunsen burner, striker, test tube, test tube holder, wooden splint, scoop
- B. 3 cm strip of magnesium ribbon, tongs, Bunsen burner, striker
- C. Spot plate, solutions of barium nitrate and copper(II) sulfate
- D. Powdered iron, spot plate, scoop, copper(II) sulfate solution
- E. Steel wool, copper wire, tongs, Bunsen burner, striker
- F. Small graduated cylinder, test tube, hydrogen peroxide, manganese dioxide, splint
- G. Test tube, graduated cylinder, mossy zinc, dilute sulfuric acid, splint

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PROCEDURE: Do each experiment or watch your teacher do it. For each reaction, record your observations and the equation for the reaction. Balance each equation. State the type of each reaction.

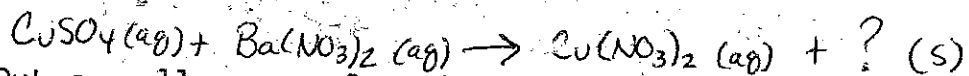
A. Put a small scoop of copper(II) carbonate in a test tube. Heat in the flame of a Bunsen burner. Test the gas escaping by inserting a burning splint into the test tube.



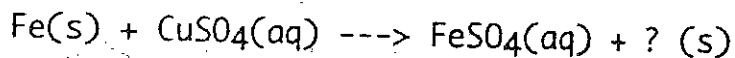
B. Hold a 3 cm strip of magnesium ribbon in the flame of a Bunsen burner with tongs. Do NOT look directly into the flame. Use your peripheral vision.



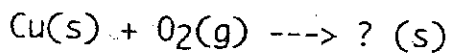
C. Place 2 drops of copper(II) sulfate solution on a spot plate. Add 1 drop of _____ solution. When you are done, wash the spot plate with tap water.



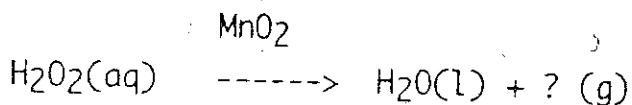
D. Put a small scoop of powdered iron in the well of a spot plate. Cover with copper(II) sulfate solution and let stand a few minutes. Note the color of the solution. Pour it off and note the color of the solid remaining. Discard the solid in the waste basket.



E. Clean a 5 cm piece of copper wire with steel wool. Hold the copper in the flame of a Bunsen burner with tongs for a few minutes. (Note: Copper will have a +2 charge in the compound that forms)



F. - Pour 3 mL of 3% hydrogen peroxide into a test tube. Add a small pinch of manganese dioxide. Insert a glowing splint into the mouth of the test tube.



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6. Place a small piece of mossy zinc into a test tube. Add 5 mL of dilute sulfuric acid. Hold a burning splint at the end of the test tube.



OPTIONAL TEACHER DEMONSTRATIONS.

QUESTIONS:

1. You have generated 3 gases which react quite differently when in the present of a lit or glowing splint. Which gas:

- could be used to extinguish fires?
- was used in the Hindenberg?
- causes fires to burn more efficiently?

2. Balance and classify each of the following reactions as one of the four categories you have studied in this lab.

