

PRE-LAB DISCUSSION

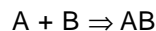
There are many kinds of chemical reactions and several ways to classify them. One useful method classifies reactions into four major types. These are;

1. Combination (synthesis)

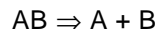
2. Decomposition or analysis

3. Displacement

In a combination reaction (synthesis) reaction, two or more substances combine to form a more complex substance. Equations for synthesis reactions have the general form;



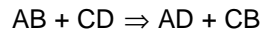
A decomposition reaction is the opposite of a synthesis reaction. In decomposition, a compound breaks down into two or more simpler substances. Equations for decomposition reactions have the form;



In single replacement reaction, one substance in a compound is replaced by another, more active substance. Equations for single replacement reactions have two general forms;



In a double replacement reaction, the metal ions of two different ionic compounds can be thought of as replacing one another. Equations for this type of reaction have the general form;



In a double replacement reaction, one of the products is a precipitate, an insoluble gas and water.

In this investigation, you will observe examples of four types of reactions described above. You will be expected to balance the equations representing the observed reactions.

PURPOSE

Observe some chemical reactions and identify reactants and products of those reactions. Classify the reactions and write balanced equations.

EQUIPMENT

Burner	test tubes
test tube holder	test tube
rack spatula	wood splints
crucible tongs	

MATERIALS

Zn, Cu, Mg wires	H ₂ O ₂
HCl solution	CuCl ₂ solution
Fe nail	NaCl solution
AgNO ₃ solution	CuCO ₃
Ca(OH) ₂ solution	K ₂ CrO ₄ solution
Pb(NO ₃) ₂ solution	

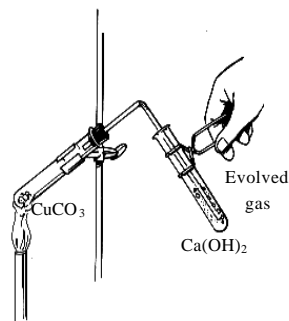


figure 1

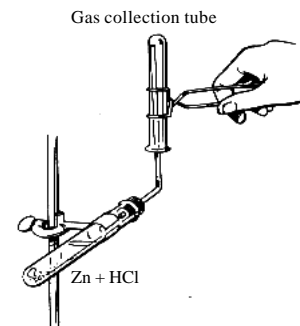


figure 2

PROCEDURE

PART A. Synthesis reaction:

1. Use fine sandpaper to clean a piece of copper or magnesium wire until the wire is shiny. Note the appearance of the wire.
2. For the copper wire, use crucible tongs, hold the wire in the hottest part of a burner flame for 1-2 minutes. Examine the wire and note any change in its appearance caused by heating.

PART B. Decomposition reaction:

1. Obtain two spatulas full of CuCO₃, and place them in a large test tube. (figure 1)
2. Insert the glass tube into a one-hole rubber stopper.

3. Pour about 5mL of limestone, Ca(OH)_2 , into a small test tube and place the end of the right angle glass tube in the lime-water solution as shown in the Figure.
4. Heat the tube containing CuCO_3 . A cloudy appearance in the Ca(OH)_2 solution indicates the presence of CO_2 .

PART C. Single replacement reaction:

(I)

1. Add about 5mL of 6M HCl solution into a dry test tube. (Caution: Handle this acid with care. Do not inhale any HCl fumes). Now carefully add a small piece of zinc metal into the acid. Observe and record what happens. (figure 2)
2. With the glass tubing turned up, collect some of the gas being liberated. Collect the gas as shown in figure.
3. Remove the test tube containing the gas and keep it inverted. Bring a burning splint near the mouth. A 'pop' or 'bark' indicates the presence of hydrogen gas.

(II)

1. Add about 5mL of 1M CuCl_2 solution to a clean test tube. Place a clean iron nail into the solution. Take out the nail and observe the changes. Add a little iron powder into the solution and record the color changes.

PART D. Double replacement reaction:

(I)

1. Add about 2mL of 0.5M AgNO_3 solution to clean, dry test tube. Next, add about 2mL of 0.5M NaCl solution into the test tube. Observe what happens and note any changes in the mixture.

(II)

1. Add 2mL of K_2CrO_4 to a large test tube and add about 10 drops of $\text{Pb(NO}_3)_2$ to the test tube. Observe the formation of the precipitate.

OBSERVATION AND DATA:

	<u>Before reaction</u>	<u>After reaction</u>
Part A		
Mg	_____	_____
Part B		
CuCO ₃	_____	_____
Part C		
Zn +HCl	_____	_____
Fe+CuCl ₂	_____	_____
Part D		
NaCl+AgNO ₃	_____	_____
K ₂ CrO ₄ +Pb(NO ₃) ₂	_____	_____

CONCLUSION AND QUESTIONS

1. Write the balanced chemical equations.
2. What test was used to identify hydrogen gas?
3. Which substance is more active Cu or Fe?
4. How can you tell if a chemical reaction has occurred?