

Types of Reactions

Name: _____

Purpose: To learn to identify different types of chemical reactions.

Equipment:

Bunsen burner	wood splints
Metal tongs	matches
Spatula	safety glasses
Test tube clamp	metal test tube rack
Test tube caps	wire gauze pad
Large graduated cylinder	evaporating dish
Watch glass	100 ml beaker

Materials:

Mg ribbon	calcium chloride
Copper (II) carbonate (green powder)	sodium bicarbonate
Fe filings (black powder)	potassium chloride
0.1 M Calcium Chloride	Zn
3 M Hydrochloric acid (colorless solution)	$\text{CuCl}_2 \cdot \text{H}_2\text{O}$
Copper (II) sulfate solution (blue solution)	small ball of aluminum foil
0.1 M Silver nitrate solution (brown bottles)	copper wire
Red Litmus paper	isopropyl alcohol
Potassium chromate (yellow solution)	

Procedure:

YOU MUST WEAR SAFETY GOGGLES AT ALL TIMES WHILE YOU ARE IN THIS ROOM AND ANYONE IS STILL WORKING ON THE LAB.

A. Combination Reactions

1. Light the burner and adjust the flame. Pick up a piece of Mg ribbon with the metal tongs. Hold the Mg in the flame until it ignites. (Watch out! It's bright) When it begins to burn, just place it on a wire gauze pad until it is down burning. Do not set the burning ribbon on the table or on a piece of paper. You can leave the burner on for the rest of the lab. Just be careful. Write your observations below. Describe the materials before and after the reaction. Also note anything that happened during the reaction, formation of gas (bubbles), formation of a precipitate (solid material), evolution of heat, etc. Record your observations.

2. Add a few drops of distilled water to the ash. Stir with a stirring rod and place a drop of the solution on red litmus paper. Red litmus turning blue is evidence for the presence of a base. Describe what happened.

B. Decomposition Reactions

- a. Add a scoop of copper (II) carbonate to a large DRY test tube. Heat over the burner flame. Do not point the end of the test tube at anyone including yourself. Invisible carbon dioxide gas is given off during this process. To detect it, slowly insert a BURNING wood splint into the opening of the test tube (Don't drop it in). What happened? Record your observations.

C. Single Replacement Reactions

1. Place a strip of Copper in a test tube with enough 0.1M AgCl to cover it. Set this test tube aside then observe the surface of the metal after 5-10 minutes. Record your observations.

2. Stand a test tube in the test tube rack. Add some pieces of Zn metal then add 3M HCl until the test tube is approximately $\frac{1}{4}$ full. BE CAREFUL! ACID CAN CAUSE BURNS. If it spills notify your teacher. While the reaction is going on, place your finger over the top of the test tube. Have a lighted splint ready then remove your finger and AT THE SAME TIME place the splint over the tube opening. A squeaky pop indicates the presence of hydrogen. If it didn't work replace your finger and try again, as long as the reaction is still bubbling. You have to be quick with the flame. Record your observations. Hold the test tube in your hand to feel if the temperature has changed. Record your observations.

3. Fill the 100 ml beaker about $\frac{1}{4}$ full with distilled water. Without stirring add 1 level teaspoonful of $\text{CuCl}_2 \cdot \text{H}_2\text{O}$ crystals to the water. Record your observations of both the crystals and the water. Use the glass stirring rod to stir the mixture until the crystals are completely dissolved. Place the thermometer in the copper (II) chloride solution and record the temperature. Place a loosely crumpled ball of aluminum in the solution and record your observations. Stir the mixture occasionally and observe for at least 10 minutes. Record any change in temperature. Record your observations.

D. Double Replacement Reactions:

1. Place another test tube in the rack. Add a few squirts of 0.1M silver nitrate solution to it. Then add a few squirts of 0.1 M Calcium Chloride to the same tube. Allow it to stand for a moment or two. Record your observations.

2. Place a scoopful of solid sodium carbonate in a test tube to a depth of about 1 cm. Add a dropperful of 3 M HCL. While the reaction is occurring, test with a flaming splint as in part B. Check to see if the temperature of the mixture has changed. Record your observations.

3. Place another test tube in the rack. Add a few squirts of silver nitrate to it. Then add a few squirts of potassium chromate to the same tube. Allow it to stand for a moment or two. Place a piece of filter paper in a funnel. Place the funnel into a clean test tube. Pour the contents of the first test tube through the funnel. Record your observations.

E. Combustion reactions:

1. Place about 10 drops of isopropyl alcohol, C_3H_7OH , in a small evaporating dish. Ignite the alcohol from the top of the liquid with a Bunsen burner. Hold a cold watch glass well above the flame and observe the condensation of water on the bottom. The formation of the mist will be fleeting; watch closely. Record your observations.

Analysis:

1. What are some of the observable changes that are evidence that a chemical reaction has taken place?

2. How did the flaming splint behave when it was inserted into the tube of $CO_2(g)$? In what way was this different from the reaction of the $H_2(g)$ to the flaming splint?

3. In the reaction of magnesium with oxygen gas, a considerable amount of energy was released. This is an example of an exothermic reaction. From this evidence what can you conclude about the energy stored in the reactants compared to the energy stored in the product? Rewrite the balanced equation for the reaction of Mg and O_2 , this time with the term '+ energy' on the appropriate side of the equation.

Data and Evaluation

Record your observations and balance the equations in the section below.

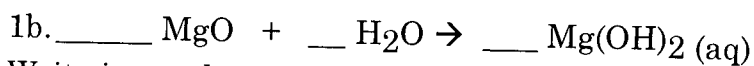
A. Combination reactions:

1a. Observations:



Write in words:

1b. Observations:



Write in words:

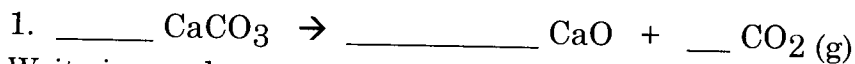
2. Observations:



Write in words:

B. Decomposition reactions

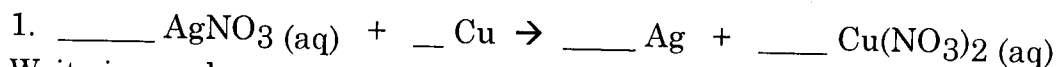
1. Observations:



Write in words:

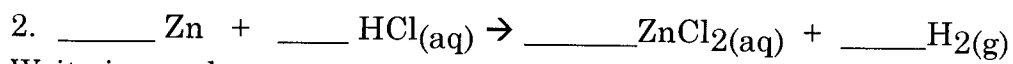
C. Single replacement reactions

1. Observations:



Write in words:

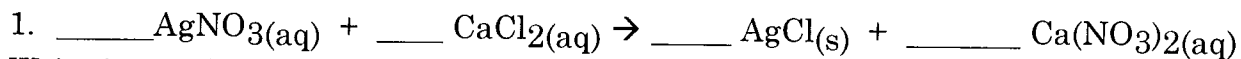
2. Observations



Write in words:

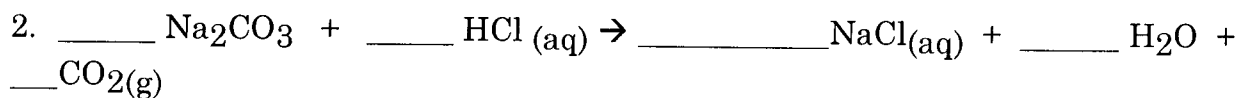
D. Double replacement reactions

1. Observations



Write in words:

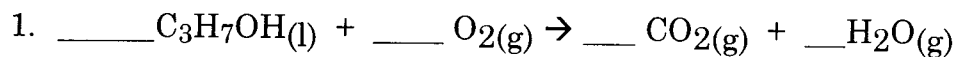
2. Observations



Write in words:

E. Combustion reactions

1. Observations



Write in words: