

PRE-LAB DISCUSSION

Chemistry is the study of matter and the changes it undergoes. These changes can be broken down into two classes—physical changes and chemical changes. In a physical change, one or more physical properties of a substance are altered. Examples of such physical properties include size, shape, color, and physical phase. Grinding, melting, dissolving, and evaporating all are physical changes. No new substance or substances are formed as a result of a physical change.

A chemical change results in the formation of one or more "new" substances. These new substances differ in chemical properties and composition from the original substance. The rusting of iron and the burning of paper are two examples of chemical change.

This experiment will help you to understand the difference between physical and chemical change and to recognize each type of change when it occurs.

PURPOSE

Recognize and distinguish between chemical and physical changes.

EQUIPMENT

lab balance	micro spatula
lab burner	dropper pipette
5 test tubes (18x150-mm)	mortar and pestle
test tube rack	magnet
test tube holder	insulating pad
watch glass	safety goggles
glass square	lab apron or coat

MATERIALS

copper sulfate penta hydrate ($\text{CuSO}_4 \cdot 5 \text{H}_2\text{O}$)	iron filings (Fe)
sodium chloride (NaCl)	magnesium ribbon (Mg)
hydrochloric acid (6 M HCl)	paper (5 cm x 10 cm)
silver nitrate (0.1 M AgNO_3)	birthday candle
sulfur (S) powdered	matches
	salt

SAFETY

When heating a substance in a test tube, be sure the open end of the tube points away from yourself and others.

Handle all acids with extra caution. Always wear safety goggles when handling acids. Report all acid spills to your teacher, and flush with cold water and a dilute solution of sodium bicarbonate (NaHCO_3).

Give heated glass ample time to cool before handling it. Glass retains heat. Tie back long hair and secure loose clothing before working with an open flame. Wear safety goggles and a lab apron or coat at all times when working in the lab.

PROCEDURE

Note and record all observations in your data table.

1. Place a small amount of wax from a birthday candle into a test tube. Heat gently over a burner flame until the wax melts completely; then allow the sample to cool. Next, light the candle, secure it to a glass square, and allow it to burn until it extinguishes itself. Proceed with the rest of the experiment while the candle burns.
2. Tear a piece of paper (about 5 cm x 10 cm) into small pieces. Set a watch glass on an insulating square and place the pieces of paper on the glass. Ignite the paper with a match and allow to burn.
3. Add a microspatula of NaCl (sodium chloride) to a small quantity of water (about 5 mL) in a test tube. Shake the contents of the tube. Next, use a dropper to add 10 drops of 0.1 M AgNO_3 (silver nitrate) to the NaCl-water mixture.
4. Obtain a piece of magnesium ribbon about 5 cm long. Tear the ribbon into 1-cm pieces. Place two of the pieces into a test tube and add a few drops of 6 M HCl (hydrochloric acid).

CAUTION: Use extreme care in handling this acid. It will cause severe burns if allowed to come in contact with the skin. Touch the bottom of the test tube with your fingertip.

- Use a mortar and pestle to grind several crystals of $\text{CuSO}_4 \cdot 5 \text{H}_2\text{O}$ into a uniform powder. Place one microspatula of the powder into a test tube. Heat gently over a burner flame for 5 minutes. Allow the sample to cool and then add a few drops of water.
- Using a lab balance, measure out the following samples: 0.50 g of iron filings and 0.50 g of powdered sulfur. Test each sample with a magnet. Mix the two samples thoroughly in a test tube. Run the magnet along the bottom and sides of the test tube.

OBSERVATION AND DATA

Record all qualitative observations for each step of the procedure.

CONCLUSION AND QUESTIONS

- Indicate whether the following changes are physical or chemical. Support your conclusion.

- Melting candle wax
- Burning a candle
- Tearing paper
- Burning paper
- Dissolving NaCl
- Mixing NaCl with AgNO_3
- Tearing Mg ribbon
- Adding HCl to Mg
- Grinding $\text{CuSO}_4 \cdot 5 \text{H}_2\text{O}$
- Heating $\text{CuSO}_4 \cdot 5 \text{H}_2\text{O}$
- Mixing Fe and S
- Heating a mixture of Fe and S

