Chemistry

Tigard High

Lab: Physical and Chemical Change

Introduction

As you read this, it is probably fall. Summer flowers are fading and dying. Leaves are changing from green to red, yellow, and orange. All these changes involve chemistry.

As you have learned, chemistry is the study of matter and the changes that it undergoes. These changes can be classified as either physical or chemical. When a physical change occurs, the physical properties of a substance—such as its size, shape, density, or state—are altered, but its chemical composition remains the same. Examples of physical changes include melting ice, crushing gravel, tearing paper, grinding pepper, and boiling water. No new substances are formed as a result of these changes.

Chemical changes, also known as chemical reactions, result in the formation of one or more new substances with different chemical properties and compositions from the original material. Examples of chemical changes include plants dying, leaves changing color, paper burning, bananas ripening, bread baking, or iron rusting. Some signs of chemical changes include a change in color, the formation of a precipitate (a new solid substance that settles out of solution), the production and release of gas, or a change in temperature.

It is important that you distinguish between pure substances and mixtures as you observe physical and chemical changes in matter. Remember that pure substances—such as elements or compounds—are made up of one type of matter. Mixtures are two or more pure substances that are combined physically. Mixtures can be separated into their components by physical means, such as evaporation, filtration, or distillation.

In this investigation, you will conduct tests on several substances and then use your data to determine whether the resulting changes are chemical or physical. As you observe each change, remember to ask yourself, "Has the change altered the identity of the substances?"

Practice -

1. Identify the following as either a chemical or a physical change:

a. burning wood _____

b. dry ice (solid) changing into a gas _____

c. freezing water _____

d. ripening fruit _____

e. sugar dissolving in water _____

(over)

Procedure

1. Put on your goggles and lab apron. Break off a small amount of wax from the bottom of a birthday candle, and place it into a test tube. Holding the test tube with tongs, heat it gently over a burner flame until the wax melts completely. Place the test tube in the test-tube rack and let it cool for ten minutes. Record your observations in the Data Table. **CAUTION:** *Keep loose hair tied back or covered. Hold the tube away from you and others while heating it. Use tongs to hold the hot test tube.*
2. With the matches, light the candle. Secure the candle to the glass square by dripping wax onto the square and then holding the base of the candle in the molten wax until the wax hardens. Allow the candle to burn until it goes out. Record your observations in the Data Table.
3. Tear a small piece of paper into tiny pieces, and place the pieces in a watch glass. Place the watch glass on an insulating pad and ignite the paper with the matches. **CAUTION:** *Keep all other flammable material away from the burning paper.* Allow the paper to burn completely. Record your observations in the Data Table.
4. Measure 5 mL of water in the graduated cylinder. Pour the water into a test tube and add a microspatula of sodium chloride (NaCl). Stir the contents to mix. Put on latex gloves. Using the micropipet, add 10 drops of silver nitrate (0.1 *M* $AgNO_3$) to the NaCl-water mixture. **CAUTION:** *Silver nitrate is toxic and can stain your skin and clothing, so avoid direct contact with it.* Record your observations in the Data Table. Dispose of the solutions containing silver according to your teacher's instructions.
5. Obtain a 5-cm piece of magnesium (Mg) ribbon and use scissors to cut it into 1-cm pieces. Place two of the pieces into a test tube and, using the micropipet, add a few drops of hydrochloric acid (6.0 *M* HCl). **CAUTION:** *The 6.0* M *hydrochloric acid is highly corrosive. Do not let any get on your skin or clothing. Wear latex gloves.* Touch the outside of the test tube with your fingertip. Record your observations in the Data Table. Dispose of the solution according to your teacher's instructions.
6. Grind several crystals of copper sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$) with the mortar and pestle. Place a microspatula of the powder into a test tube. Heat gently over a burner flame for 2 minutes. Allow to cool for 5 minutes; then add a few drops of water. Touch the bottom of the test tube with your fingertip. Record your observations in the Data Table.

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Name_____Date_____

Lab: Physical and Chemical Change
= Observations & Analysis =

Data Table

Step	Action	Observation
1		
2		
3		
4		
5		
6	i)	
	ii)	
	iii)	

Analysis

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

a. melting candle wax: _____

Support: _____

b. burning a candle: _____

Support: _____ (over)

c. tearing paper: _____

Support: _____

d. burning paper: _____

Support: _____

e. dissolving NaCl: _____

Support: _____

f. mixing NaCl and $AgNO_3$: _____

Support: _____

g. cutting Mg ribbon: _____

Support: _____

h. adding HCl to Mg: _____

Support: _____

i. grinding $CuSO_4 \bullet 5H_2O$: _____

Support: _____

j. heating $CuSO_4 \bullet 5H_2O$: _____

Support: _____

k. adding water to the $CuSO_4$ anhydrate : _____

Support: _____

Questions

1. List three possible indications that a chemical change has occurred.

_____

2. From this investigation, what was an instance of a color change that was not a chemical change?

_____

3. In order to separate sodium from chlorine in the compound sodium chloride (NaCl), what kind of change would be needed?

_____

4. A mixture is made by dissolving sugar in water and then adding sand. In order to separate the sugar, sand, and water, would you need a physical change, a chemical change, or both?

_____