

Identifying Physical and Chemical Changes

Purpose:

To collect and use evidence to identify physical and chemical changes.

Equipment and Materials:

- Eye protection
- 2 test tubes
- Test-tube rack
- Bunsen burner
- Utility stand with clamp
- Spark lighter
- Test tube stopper
- Laboratory scoop
- Warm water bath
- Thermometer (optional)
- Dropper bottles of
 - Dilute hydrochloric acid
 - Distilled water
 - Dilute sodium hydroxide
- Magnesium ribbon
- Wooden splint
- Copper(II)sulfate CuSO_4
- Steel Wool
- Prepared test tube of lauric acid ($\text{C}_{12} \text{H}_{24} \text{O}_2$)

Procedure

1. Prepare a data table in which to record your observation during this activity.
2. Put on your eye protection

Part A

Experiment 1

- Add HCl (Hydrochloric acid) to a test tube to a depth of about 2 cm.
- Add two 1 cm strips of magnesium ribbon to the test tube. Check for evidence of change occurring. Test the bottom of the test tube with your hand or measure the temperature of the acid and resulting solution using a steel thermometer.
- Place the test tube in a rack and wait 30 seconds for the gas produced to push any air out of the test tube.

Experiment 2

- Use a Bunsen burner flame or a candle flame to light a wooden splint
- Light a wooden splint using the candle
- Use the burning splint near the mouth of the acid + hydrochloric acid test tube. Now record your observation.

Part B

Experiment 1

- Pour distilled water into a test tube to a depth of about 3 cm
- Add about 0.5 g of Copper (II)sulfate (About half the size of an aspirin tablet) to the test tube.
- Stopper and invert the test tube several times to mix its contents well. Record your observation.

Experiment 2

- Remove the stopper from the above solution prepared and add a small ball of steel wool the size of half an aspirin.
- Stopper the test tube and mix the two reagents well.
- Allow the solids in the test tube to settle to the bottom. Record your observation.

Experiment 3

- Remove stopper and add about 5 drops of sodium hydroxide solution to the test tube.
- Slowly add drops of hydrochloric acid to the test tube. Gently swirl the test tube after every couple of drops. Continue adding dropwise until the solid disappears. Record your observation.
- Dispose of the contents of the test tube as instructed by your teacher into the waste disposal container.

Part C

- Examine a test tube of lauric acid
- Place the test tube in warm water bath. Wait until the substance in the test tube completely liquefies.
- Remove the test tube and cool it in a stream of tap water until its contents solidify again. Record your observations.

Analyze and Evaluate

1. Classify each of the changes that you observed as either chemical or physical changes. Use specific evidence from your observation table to justify your inference.
2. Which changes were the most difficult to classify? Why?
3. Give one example, from your everyday life, of a physical change that is
 - a. Reversible. Justify your inference.
 - b. Not reversible. Justify your inference.

Apply and Extend

1. Identify one chemical change in this activity that was reversible. What chemical could you add to reverse this change again?

2. In change 2, you may have heard a pop sound when a burning splint was inserted into the mouth of the test tube. Name the gas produced in the test tube.
3. Plan an experiment to determine the factors that could make the “pop” louder. Once your teacher approves your plan, conduct the experiment. (Do not attempt unless explicitly indicated)