

## Pre-Lab Information

<b>Purpose</b>	Explore the differences between physical changes and chemical changes by performing an experiment.
<b>Time</b>	Approximately 45 minutes
<b>Question</b>	How can you distinguish a physical change from a chemical change?
<b>Hypothesis</b>	<p>If a substance undergoes a physical change, then most of its original properties will be retained because a new substance is not formed.</p> <p><b>OR:</b> If a substance undergoes a chemical change, then it will not retain its original properties because a new substance is formed.</p>
<b>Summary</b>	You will conduct 8 experiments and determine whether you observed a physical or chemical change.

## Safety

Behavior in the lab must be purposeful. Be sure to do the following:

- Keep work area clear and uncluttered.
- Always wear a lab coat and safety goggles when performing an experiment.
- Use the right gear such as chemical resistant gloves (when handling chemicals) and tongs (when moving hot beakers and crucibles).
- Use caution when handling chemicals and hot materials.
- Check glassware such as beakers and crucibles for cracks and chips prior to use.
- Do not smell or taste any of the chemicals.
- Report all accidents – no matter how big or small – to your teacher.
- Dispose of chemicals as instructed by your teacher.

# Student Guide

## Procedure

### Step 1: Materials

#### Steps 2 and 3

- 2 inch piece of calcium carbonate (white chalk)
- 25 mL 1M hydrochloric acid
- mortar and pestle
- spoon
- 50 mL beaker

#### Step 4

- 40 mL water
- 100 mL beaker
- hot plate
- hot pad

#### Step 5

- 2 g copper(II) sulfate pentahydrate
- spoon
- crucible
- crucible tongs
- clay triangle
- tripod
- Bunsen burner

#### Steps 6

- 1 spoonful iron filings
- 1 spoonful powdered sulfur
- spoon (2)
- petri dish
- magnet

#### Step 7

- 25 mL 0.1M potassium iodide
- 10 mL 0.1M lead nitrate
- 50 mL beaker
- 25 mL graduated cylinder

#### Step 8

- 25 mL 1M hydrochloric acid
- 3 cm magnesium ribbon (2)
- 50 mL beaker
- thermometer
- tweezers

#### Step 9

- 1 candle on dish
- matches

### Step 2: Calcium carbonate

- Place a 2-inch piece of calcium carbonate (from chalk) in a mortar. Crush the calcium carbonate with the pestle.
- Record all changes observed, the type of change, and your reasoning in the data table.
- Keep for Step 3.

### Step 3: Calcium carbonate and hydrochloric acid

- Pour approximately 25 mL of 1M hydrochloric acid into a 50 mL beaker.
- Use the spoon to add crushed calcium carbonate from Step 2 to the hydrochloric acid.
- Record all changes observed, the type of change, and your reasoning in the data table.
- When finished, dispose of the mixture by pouring it into a receptacle provided by your teacher.

### Step 4: Water

- Fill a 100 mL beaker with 40 mL of water. Note its physical characteristics.
- Using a hot plate, heat the water until it boils.

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- c. Record all changes observed, the type of change, and your reasoning in the data table.
- d. Use the beaker tongs to remove hot beaker from hot plate and place on a hot pad.
- e. Turn off the hot plate and dispose of the water in a drain.

### Step 5: Copper(II) sulfate pentahydrate

- a. To allow heating, place the clay triangle on top of the tripod and position the Bunsen burner under the tripod.
- b. Measure 2 g (approximately 1/2 tsp.) of copper(II) sulfate pentahydrate in a crucible. Note its physical characteristics.
- c. Place the crucible on the clay triangle.
- d. Turn the Bunsen burner on to heat the crucible to see a change happen.
- e. Record all changes observed, the type of change, and your reasoning in the data table.
- f. Use crucible tongs to remove crucible from clay triangle and let cool.
- g. When cooled, dispose of the copper(II) sulfate powder into the receptacle provided by your teacher.

### Step 6: Iron filings and sulfur

- a. Measure 2 g (approximately 1/2 tsp.) iron filings on the one side of a petri dish. Note the physical characteristics of the iron filings.
- b. Measure 2 g (approximately 1/2 tsp.) of sulfur on the other side of a petri dish. Note the physical characteristics of the sulfur.
- c. Mix the two materials with the spoon. Note the physical characteristics of the resulting mixture.
- d. Run a magnet over the resulting mixture, but do not allow the magnet to touch the mixture.
- e. Record all changes observed, the type of change, and your reasoning in the data table.
- f. Place the iron filings and sulfur separately into receptacles provided by your teacher.

### Step 7: Potassium iodide and lead nitrate

- a. Fill a 50 mL beaker with 25 mL 0.1M potassium iodide.
- b. Measure 10 mL of 0.1M lead nitrate into a 25 mL graduated cylinder.
- c. Pour lead nitrate into the potassium iodide slowly.
- d. Record all changes observed, the type of change, and your reasoning in the data table.
- e. Dispose of the mixture in the receptacle provided by your teacher.

### Step 8: Magnesium and hydrochloric acid

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- a. Fill a 50 mL beaker with approximately 20 mL of 1M hydrochloric acid.
- b. Use a thermometer to measure the temperature of the hydrochloric acid in °C.
- c. Use tweezers to drop the two 3 cm magnesium ribbons in the hydrochloric acid.
- d. Measure the temperature of the solution again.
- e. Record all changes observed, the type of change, and your reasoning in the data table. (Be sure to consider the change of temperature!)
- f. Following your teacher's instructions, dispose of the mixture in a filter set-up provided by your teacher.

### Step 9: Candle

- a. Clear the area of flammable materials.
- b. Place the candle on a dish so that it is firmly on it.
- c. Use a match to light the candle. Let it burn for approximately 1 minute.
- d. Record all changes observed, the type of change, and your reasoning in the data table.
- e. Blow out the candle and put the candle and matches in receptacles provided by your teacher.

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### Data

Record your data either in your lab notebook or in the space below.

Step	Material	Change(s) Observed	Type of Change (Physical/Chemical)	Reasoning
2	Calcium carbonate			
3	Calcium carbonate and hydrochloric acid			
4	Water			
5	Copper(II) sulfate pentahydrate			
6	Iron filings and sulfur			
7	Lead nitrate and potassium iodide			
8	Magnesium and hydrochloric acid			
9	Candle			