INVESTIGATION

2-D

STRUCTURED INQUIRY

Physical and Chemical Changes

In this investigation, you will observe the results of physical and chemical changes.

Skills and Strategies

- Processing and Analyzing
- Evaluating
- Communicating

Safety

What You Need

- 1 mL measuring scoop
- test tubes and stoppers
- test tube rack
- resealable plastic bag
- beakers
- water
- ice
- matches
- sand
- baking soda
- citric acid
- table salt
- 0.1 mol/L potassium iodide
- 0.1 mol/L lead(II) nitrate
- vinegar

Question

What observations help to determine if a chemical or physical change has occurred?

Procedure

1. The procedures you will carry out are described in the table on the opposite page. Read them and predict what you think will happen in each case.
2. Design a table with headings like the ones below to record your observations.

Station Number	Procedure Summary	Observations			Type of Change
		Before	During	After	

3. Begin at the station assigned by your teacher. Move to the next station when directed by your teacher.
4. Each station has instructions for the procedure and how to dispose of the materials. Be sure to follow these instructions.
5. Wash your hands as soon as you have finished the investigation.

Process and Analyze

1. What physical changes did you observe? For each one, describe the observations that provide evidence of a physical change.
2. What chemical changes did you observe? For each one, describe the observations that provide evidence of a chemical change.
3. How did your predictions compare with your observations?

Evaluate and Communicate

4. Which changes were difficult to classify, and why? What further tests would have helped?

5. Summarize the types of evidence that someone can use to identify physical changes and chemical changes.

6. One of the substances in the materials list for this Investigation has lead in it. Your teacher may have used a different chemical instead of this one. Do research to find out why lead is a particular concern, and why disposing of it must be done in a special manner.

Chemical and Physical Changes

Station	Procedure
Station 1: baking soda and citric acid	• Place a 1 mL scoop of baking soda into one corner of a resealable plastic bag. • Add 1 mL scoop of citric acid in the same corner of the bag. Observe the bag for changes. • Twist the corner of the bag so that the solid chemicals are isolated. Add 3 mL of water in the other corner of the bag. Press the air out of the bag and seal the bag. • Untwist the corner of the bag and mix the contents.
Station 2: salt water	• Fill the bottom of a test tube with salt. • Add water to about one-third of the test tube, stopper the tube, and gently shake.
Station 3: ice	• Put 2 or 3 small pieces of ice into a 100 mL beaker, and cup the beaker in the palm of your hand.
Station 4: matches	• Strike a match and watch as it burns.
Station 5: potassium iodide and lead(II) nitrate	• Add 5 drops of potassium iodide solution into a test tube. • Add 5 drops of lead(II) nitrate solution **Due to the presence of a lead compound, it is very important for your teacher to follow the disposal instructions when you are done.**
Station 6: water and sand	• Add about 1 mL of water to a test tube. • Add a scoop of sand to the test tube, stopper the tube, and gently shake.
Station 7: water and vinegar	• Add about 1 mL of water to a test tube. • Add about 1 mL of vinegar to the test tube, stopper the tube, and gently shake.