Activity

Design Your Own Experiment

Become a Bond Breaker

Lab Preview

Directions: *Answer these questions before you begin the Activity.*

1. What precautions should you take when working with a laboratory burner?

2. Why should you wear goggles during this experiment?

The basic structural units of ionic compounds are ions. For covalent substances, molecules make up the basic units. By using controlled heat to melt substances, you can test various compounds to rate the attractive forces between their basic units. Would a substance that is difficult to melt have strong forces or weak forces holding its basic units together?

Recognize the Problem

How do the attractive forces between ions compare to the attractive forces between molecules?

Form a Hypothesis

Based on what you know about ions and molecules, state a hypothesis about which generally would have stronger attractions between their structural units.

Goals

- **Observe** the effect of heat on melting points of selected substances.
- **Design** an experiment that allows you to make some inferences that relate ease of melting and forces of attraction between particles of a substance.

Possible Materials

small samples of crushed ice, table salt, and sugar
wire test-tube holder
test tubes
laboratory burner
stopwatch

Safety Precautions

Keep a safe distance from the open flame of the lab burner. Wear proper eye protection. Do not continue heating beyond 5 min.

Test Your Hypothesis

Plan

1. As a group, agree upon and write a hypothesis statement.
2. As a group, write a detailed list of steps that are needed to test your hypothesis. Determine what your control will be.
3. As you heat materials in a test tube, what variables are held constant?
4. How will you time the heating of the individual substances?
5. Will you run any tests more than one time?
6. Make a list of materials you will need to complete your experiment.
7. **Design** a data table on a separate sheet of paper to record your observations.
8. Make sure your teacher approves your plan before you start.

Activity (continued)

Do

1. Carry out the experiment exactly as planned.
2. While you are observing the heating of each substance, think about the movement of the particles. Which particles are held together by ionic bonds? Which are made up of covalent molecules? How does that affect their movement?
3. Be sure to write down exactly how long it takes to melt each tested substance.

Analyze Your Data

1. **Compare** your results with those of other groups in the class.

2. **Classify** your tested substances as more likely ionic or covalent.

3. Which substances are generally more difficult to melt?

4. Did you have a control in this experiment? Variables?

Draw Conclusions

1. How did the results of your experiment support or disprove your hypothesis?

2. Sugar is known as a polar covalent compound. Knowing this, infer from your results how polarity affects melting point.

Communicating Your Data

Make a chart showing your results and pointing out ways to distinguish between the different kinds of bonds.