Types of Bonding in Solids

OBJECTIVES

- ***Observe*** **the physical properties of different solids.**
- ***Relate*** **knowledge of these properties to the type of bonding in each solid.**
- ***Identify*** **the type of bonding in an unknown solid.**

MATERIALS

- **beakers, 50 mL (6)**
- **Bunsen burner**
- **copper wire**
- **deionized water**
- **evaporating dishes or crucibles (6)**
- **graduated cylinder, 10 mL**
- **aluminum shot**
- **LED conductivity tester**
- **silicon dioxide (sand)**
- **sodium chloride (NaCl)**
- **spatula**
- **sucrose**
- **test tubes, small, with solid rubber stoppers (6)**
- **test-tube rack**
- **tongs**
- **unknown substance**
- **wire gauze, support stand, iron ring, and clay triangle**

BACKGROUND

The purpose of this experiment is to relate certain properties of solids to the type of bonding the solids have. These observable properties depend on the type of bonding that holds the molecules, atoms, or ions together in each solid. Depending on the type of bonding, solids may be described as ionic, molecular, metallic, or covalent network solids. The properties to be studied are relative melting point, solubility in aqueous solution, and electrical conductivity.

SAFETY

For review of safety, please see the **Safety in the Chemistry Laboratory** in the front of your book.

PREPARATION

1. Make a data table in which to record the results of melting, water solubility, solid conductivity, aqueous solution conductivity, and type of bonding of each substance tested.

PROCEDURE

1. Place 1 g samples of each substance into separate evaporating dishes.
2. Touch the electrodes of the conductivity tester to each solid. After each test, rinse with distilled water and carefully dry the electrodes. Note which substances conducted electricity.
3. Place one evaporating dish on a triangle, and heat with a Bunsen burner. As soon as a solid melts, remove the flame.
4. Repeat this procedure for every substance. Do not heat any substance for more than 5 min. There may be some substances that will not melt.