FLINN
SCIENTIFIC

Laboratory Report

Chemical Bonding and the Properties of Solids

Physical Property	Aluminum	Silicon Dioxide	Sodium Chloride	Stearic Acid	Sucrose
Color and Appearance					
Volatility and Odor					
Conductivity (Solid)					
Solubility in Water					
Conductivity (Aqueous Solution)					
Solubility in Hexane					
Brittleness					
Melting Point*					

*The average temperature of a Bunsen burner flame is greater than 1000 °C. Microburners will have a lower flame temperature.

Mineral Hardness

(Optional) Use this space to record observations of the hardness of mineral samples.

1. Compare the volatility and odor of stearic acid and sucrose. Which is more volatile? Why? Is it possible for a compound to be volatile but have no odor? Explain.

2. Both stearic acid and sucrose are molecular substances, but one is polar and the other is nonpolar. Compare the solubility of the two compounds in water and in hexane to determine which is which.

3. Based on the answers to Questions 1 and 2, predict whether the intermolecular forces (forces between molecules) are stronger in polar or nonpolar substances.

4. Explain the conductivity results observed for sodium chloride in the solid state and in aqueous solution.

5. Name the three hardest substances that were tested. To what classes of solids do these substances belong? What general feature do these three types of solids have in common?

6. Compare the hardness and brittleness of aluminum versus salt. Suggest a reason, based on the crystal structure of metals versus ionic compounds, why hardness and brittleness are not the same thing.

7. Complete the following table summarizing the **general properties** of various solids.

General Properties	Type of Solid			
	Covalent-network	**Ionic**	**Metallic**	**Molecular**
Melting Point				
Solubility				
Conductivity of Solid				
Hardness				
Brittleness				

8. Fill in the blanks in the sample flow chart to show how different solids may be identified using a sequence of simple laboratory tests.

Ionic solid, Polar covalent solid, Metallic solid, Nonpolar covalent solid

Test for solid conductivity.

No conductivity   Conducts

Test melting point.

Melts ≤100 °C   Melts 100–500 °C

Yes   No

To confirm—test solubility in water and test solution for conductivity.

Conducts – yes/no?   Conducts – yes/no?