

SCOPE, SEQUENCE, and COORDINATION

A National Curriculum Project for High School Science Education

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Student Materials

Learning Sequence Item:

924

Physical Properties of Matter

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Adapted by: Ruth Mann, Brett Pyle, and Linda W. Crow

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Readings

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Science as Inquiry

Sticky Situations

Record your observations when you place the water and alcohol on the waxed paper. Include drawings to show what happened.

Describe the results of placing a needle and tissue paper into the beaker of water. Also, record the results when detergent was added.

1. In your own words, define adhesion and cohesion.

2. Explain how surface tension relates to adhesion and cohesion.

Science as Inquiry

What's the Point?**How can the melting point of a substance be determined?**

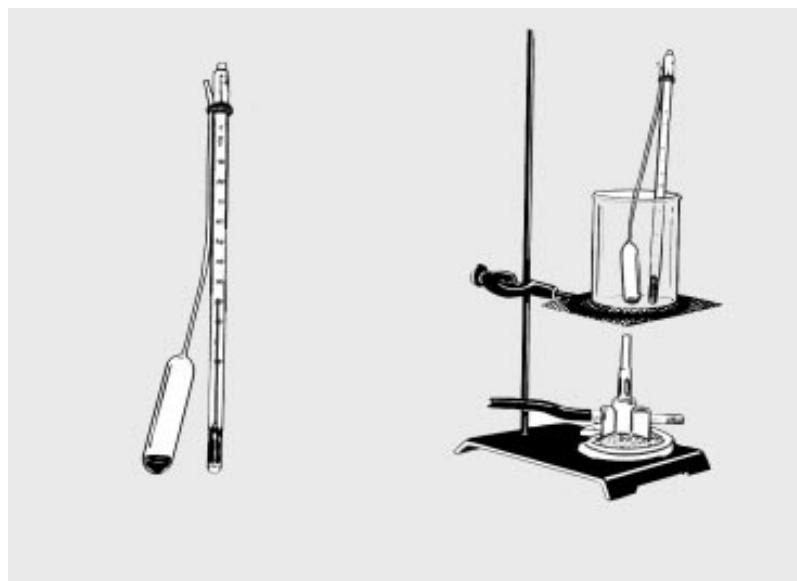
Your teacher will give you a substance for which you are to determine the melting point. Weigh and record the mass of 2 grams of the substance. Place the substance in a test tube and seal with aluminum foil. Fill a 400 mL beaker 2/3 full of water and place the sealed test tube in the beaker. Heat the beaker until the substance is completely melted. Once melted, insert a thermometer through the foil. Then turn off the heat and place the test tube containing the thermometer in an empty 400 mL beaker. Measure and record the temperature of the substance each minute until it becomes solid. Do not remove the thermometer from the test tube. Plot the data on a graph. Repeat for 4 and 6 grams of substance.

1. What does the melting-freezing point look like on the graph?
2. If the freezing point is defined as the temperature at which a substance changes from liquid to solid, what is the freezing point of naphthalene (or of P-dichlorobenzene)?
3. What is the relationship between the mass of a substance and its melting/freezing point?
4. Does the quantity of substance relate to the length of time it takes a substance to freeze?
5. Does the mass or length of time change the melting-freezing point?

Science as Inquiry

How Hot Is It?

Add 1 mL of isopropyl alcohol to a clean dry beral pipette. Attach a thermometer using a small rubber band (see figure below). Fill the beaker 3/4 full of warm water. Place the beral pipette/thermometer setup in the beaker. Begin heating while stirring frequently to insure even heating. When you observe a ring of condensation, remove the heat source. When the uppermost condensation ring becomes stationary record the temperature. Repeat this process using 2 mL then 3 mL. Then try to determine the boiling point of the unknown. Use the table to identify the unknown.

**Boiling Points of Common Organic Liquids**

Substance	Boiling Point
acetone	56.2 degrees
methanol	65.0 degrees
2-propanol	82.4 degrees
ethanol	78.5 degrees

Temperature measurements are based on the Celsius temperature scale.

1. What is the boiling point for isopropyl alcohol?
2. What is the relationship between quantity and boiling point?
3. Why is boiling point recognized as a property of matter?

Science as Inquiry

Dive! Dive!

Construct a data table to record the times for the ball to fall through each liquid. Repeat the test three times for each liquid and take an average. From these numbers, calculate the speed of the ball in each liquid. Use the following formula:

$$\text{speed of ball} = \text{distance the ball traveled} \div \text{time for the ball to travel the distance}$$

1. Define viscosity in your own words.
2. Explain how the ball is affected by the viscosities of the liquids tested.
3. List the liquids tested in order from least viscous to most viscous. Support your answer with your data.