Activity Convection in Gases and Liquids

Lab Preview

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

1. What does the safety symbol that shows an oven mitt tell you?

2. How many milliliters of water will you need for this activity? How many grams of black pepper?

A hawk gliding through the sky will rarely flap its wings. Hawks and some other birds conserve energy by gliding on columns of warm air rising up from the ground. These convection currents form when gases or liquids are heated unevenly, and the warmer, less dense fluid is forced upward. In this activity, you will create and observe your own convection currents.

What You'll Investigate

How can convection currents be modeled and observed?

Materials

water
500-mL beaker
black pepper
burner or hot plate
candle

Safety Precautions

CAUTION: *Use care when working with hot materials. Remember that hot and cold glass appear the same.*

Goals

- **Model** the formation of convection currents in water.
- **Observe** convection currents formed in water.
- **Observe** convection currents formed in air.

Procedure

1. Pour about 450 mL of water into a 500-mL beaker.
2. Use a balance to measure 1 g of black pepper.
3. Sprinkle the pepper into the beaker of water.
4. Let the pepper settle to the bottom of the beaker.
5. Heat the bottom of the beaker using the burner or by placing it on the hotplate.
6. **Observe** how the particles of pepper move as the water is heated, and make a drawing showing their motion in the Data and Observations section.
7. Turn off the hot plate or burner. Light the candle and let it burn for a few minutes.
8. Blow out the candle, and observe the motion of the smoke.
9. Make a drawing in the Data and Observations section.

Activity (continued)

Data and Observations

Drawing of pepper in beaker

Drawing of candle smoke

Conclude and Apply

1. **Describe** how the particles of pepper moved as the water became hotter.

2. How is the motion of the pepper particles related to the motion of the water?

3. **Explain** how a convection current formed in the beaker.

4. **Explain** why the motion of the pepper changed when the heat was turned off.

5. **Predict** how the pepper would move if the water were heated from the top.

6. **Describe** how the smoke particles moved when the candle was blown out.

7. **Explain** why the smoke moved as it did.

Communicating Your Data

Compare your conclusions with those of other students in your class. **For more help, refer to the Science Skill Handbook.**