



Investigation 3.4

Investigating How Warm Air and Cool Air Move

Materials

For your teacher

- Butane lighter

For you

- Science notebook

For your group

- 2 Convection Tubes™
- 2 Pieces of plastic wrap
- 2 Rubber bands
- 1 Aluminum pan
- 1 Flashlight
- 1 Funnel
- 1 Metric ruler
- 1 Piece of plastic tubing
- 1 Plastic container of crushed ice, 120 mL (with screw-top lid)
- 1 Plastic container of hot water, 120 mL (with screw-top lid)
- 1 Punk stick
- Paper towels
- Scissors

Procedure

1. Record the purpose of this investigation in your science notebook. Write it in the form of a question. Then share it with your group or class. Also share with the class your ideas on how to test this question.
2. Your teacher will demonstrate how to do this investigation. Follow along using procedure Steps 4–9.
3. Make a prediction about the temperature of the air in the cylinder. How do you think air will move above a hot surface? How do you think

air will move above a cold surface? Record your predictions. Discuss your ideas with your group or class.

4. Pick up your materials. Set up the Convection Tubes™ with hot water and crushed ice, as you did in Investigation 3.3. You will not be recording temperature changes in this investigation. Use the ruler and paper towel to clear the cylinder, or temporarily cover the containers with plastic wrap.
5. Attach the funnel and tubing to the Convection Tube™ with ice. (It is important that you begin with the ice.)
6. When you are ready, ask your teacher to light your group's punk stick. Immediately blow it out and hold the smoking punk over the aluminum pan, as shown in Figure 3.6. Position the funnel at an angle over the punk so the smoke goes inside. Do not touch the funnel with the burning punk.



Safety Warning

- Follow safety precautions when working with a burning punk. Do not walk around the room with the punk while it is burning.
7. Your teacher will turn off the classroom lights. Use your flashlight to see the smoke particles moving. Hold the flashlight behind the Convection Tube™ and then at the top of it. Do not cover the opening of the Convection Tube™. (See Figure 3.7.) Kneel down so you can see the smoke at eye level as it enters the Convection Tube™. Talk to your partners about how the smoke moves.

Answer the questions from Step # 3 on the left w/ the title Pre-Lab Questions

8. Move the tubing and funnel to the Convection Tube™ with hot water. (One member of your group should carefully continue to hold the burning punk.) Clear the cylinder with the ruler and paper towel if needed. Place the punk under the funnel to add smoke to the Convection Tube™ with hot water. Observe. Use the flashlight to view the smoke.

9. When you have finished observing the Convection Tube™ with hot water, clean up your work area. Carefully dip just the tip of the punk into a container of water. This will stop the tip from smoldering. Then cut off the wet tip.

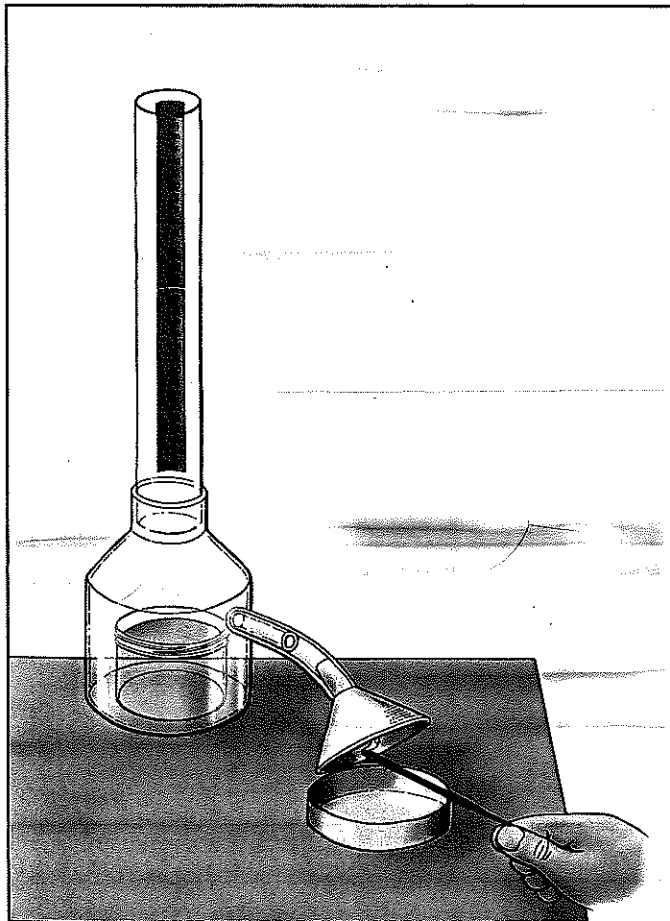


Figure 3.6
Putting smoke into the Convection Tube™

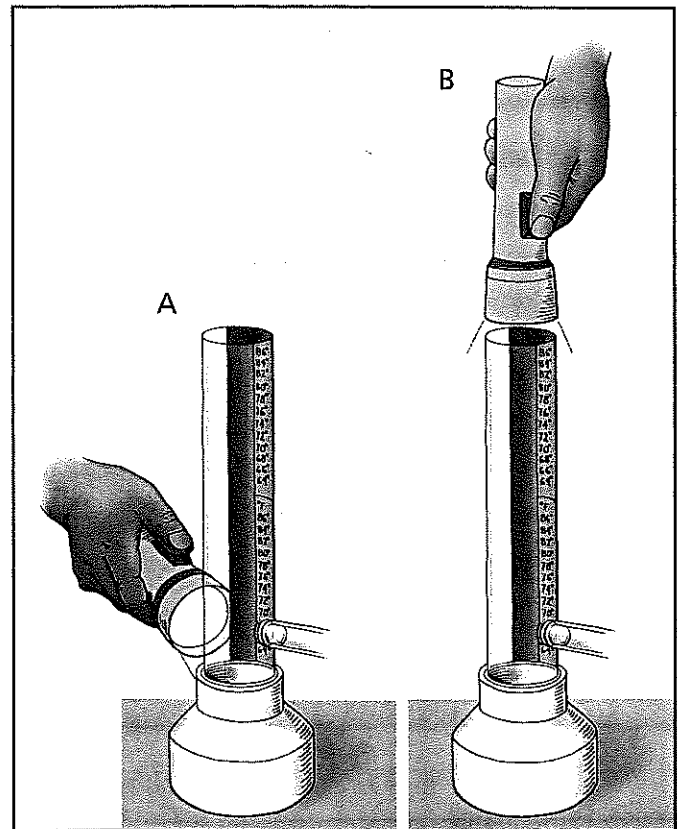


Figure 3.7
(A) Shine the flashlight from behind the Convection Tube™ to view the air as it enters the cylinder. (B) Hold the flashlight at the top of the Convection Tube™ to see the smoke throughout the cylinder. Do not block the opening of the cylinder.