



Bubbles on Bottles Activity

Air on the Rise Exploration

Students observe that a change in the temperature of air can impact the size of a bubble.

DIRECTIONS ▶

The steps below can be altered to a format that best fits the activity when necessary.

1. Fill a clear plastic shoebox with 3 to 5” of ice water for each group of two to four students. (Have hot water on standby to fill another shoebox for each group). Add approximately 1/4” of diluted dishwashing soap to a small container for each group.
2. Demonstrate dipping the narrow, open end of the bottle (mouth) into the soap container to form a film over it. Then have students practice this. If the film pops, have students try again.
3. Instruct students to place the bottom of the bottle into the cold water and observe what happens.
4. Provide a shoebox with 3 to 5” of hot water to each group. Review safety precautions related to working with hot water.
5. Have students place the bottom of a bottle with soap film over its mouth in the hot water and observe what happens.
6. Encourage students to place their bottles in both the hot and cold water without breaking the bubble to see it rise and fall due to the temperature change.

Reflection and Assessment

Ask the students the following questions:

- How do you make the bubble grow larger? Smaller?
- Is the same amount of air in the bottle if the bubble does not pop?
- Is the volume of air increasing or decreasing in the bottle when it is warmed? What happens when the air is cooled?

Background information

Changes in the temperature of air inside the bottle make the air’s volume grow or shrink. The warm bath causes the air inside the bottle to warm and expand, thus increasing the volume that the air needs. The air pushes the bubble up above the bottle’s mouth. The cold bath creates a slower and more densely packed air that sinks into the bottle, pulling the bubble inside the bottle’s neck. As the temperature in the bottle fluctuates between cold and warm, the bubble shows students how the space the air takes up (its volume) changes as a result of its temperature.

FOR TEACHERS

Student Learning Objective

Students will:

- observe that change in air temperature will change the volume of the bubble
- be able to describe the relationship between air temperature and volume

Time

- Teacher preparation: 20 minutes
- Class Time: 30-45 minutes

Materials

For each pair of students:

- 2 clear plastic 1-liter bottles
- 2 plastic shoeboxes or similar
- small plastic containers
- hot water in an open-top kettle
- ice water
- dishwashing soap - diluted

Grade Level

Lower Elementary

Science Standards

Next Generation Science Standards:

- Disciplinary Core Ideas: PS1.A
- Science and Engineering Practices: Planning and Carrying Out Investigations, Analyzing and Interpreting Data