

Full of Hot Air!

Heat is a kind of energy that can cause substances, like gases, liquids, and solids to expand. Try the following activity to see if adding heat to a gas can create an uplifting experience!

Materials:

- Empty plastic water bottle with lid (8 oz)
- Plastic cup (bigger diameter than the bottle)
- Hot tap water

Procedures:

1. Dip your finger in a little room temperature water and wet the rim of your plastic bottle.
2. Turn the bottle cap upside down and place it on the rim as shown.



3. Fill a cup about 1/3 full of hot tap water.
4. Carefully place the bottle in the water and watch the lid.

What do you observe? Why do you think this happens?

Think about this ...

Heat causes the particles that make up air to move faster and to spread out more. Heat also does this to liquids and solids. Let's take a look at the effect of heat on a liquid.

1. Place some ice in water to make the water really cold. When the water is cold, pour it into a cup so that the cup is about 3/4 full.
2. Fill another cup about 3/4 full of hot tap water.
3. Gently place one drop of blue and one drop of yellow food coloring onto the water in each cup.

What do you observe? What does this tell you about the effect of heat on water?

Where's the Chemistry?

Just because the bottle looks empty doesn't mean that it is empty. The bottle actually contains air which is made up of different gases. When the bottle is placed in the hot tap water, the heat energy makes the gases in the air expand. The air expands in all directions and pushes against the inside of the bottle, knocking the lid off.



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The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

