

# Heat – Energy Extraordinaire!

Heat energy is amazing. It always flows from warmer areas to cooler areas and it makes molecules move faster. Try this activity to see the power of speedy molecules.

## Materials:

- Hot tap water
- 2 plastic cups (wide enough for plastic bottle to fit in)
- ½ liter plastic bottle (from bottled water)
- Liquid dish detergent

## Procedures:

1. In a cup, make a detergent solution by mixing ½ teaspoon of liquid dish detergent with 1 tablespoon of water.
2. Add hot water to another cup until it is about half full.
3. Lower the open mouth of the bottle into the cup with detergent. Carefully tilt and lift the bottle out so that a detergent film covers the opening of the bottle.



4. Slowly push the bottom of the bottle down into the hot water. What happens?

## Think about this ...

Heat energy always flows from warmer areas to cooler ones. When you push the bottle into the warm water, which direction does the heat energy flow? Which direction would the heat energy flow if you push the bottle into a cup of cold water?

## Where's the Chemistry?

The air inside the bottle is made up of molecules. When you push the bottle into the warm water, heat energy from the warm water moves into the bottle. This makes the molecules in the bottle move faster. These speedy molecules hit the insides of the bottle harder and more often and push harder than ever against the thin bubble film. Eventually, these moving molecules push the bubble film into a bubble shape.



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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](http://www.acs.org/kids).

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## 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](http://www.acs.org/education) and click on "Safety Guidelines".**

