

Heat – Energy Extraordinaire!

Heat is a form of energy that can do a lot. One of the ways we use heat energy is to heat water to make steam. The steam can then be used to run an engine or even a generator to make electrical energy (electricity). There it is again - one form of energy being changed to another! Heat can also be used to make water evaporate or to make the molecules in air move faster and farther apart or expand. Here's an activity that shows that heat can make molecules move!

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 ...

The air inside the bottle is made up of molecules. The heat energy from the water in the cup made these gas molecules move faster and further apart. Do you think heat energy has anything to do with evaporation?

Where's the Chemistry?

Heat is a form of energy. The heat energy from the water makes the molecules in the gas inside the bottle move faster and spread further apart. This is heat energy being changed to the mechanical energy of moving molecules. In evaporation, heat energy makes water molecules move faster and further apart. Some of the molecules have enough energy to break away from the others and enter the air.



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".

