

# Heat Up and Cool Down

When heat makes the particles of a substance speed up and spread out, the substance takes up more room. If a substance stays the same weight but takes up more room, it is less dense. Let's see if less dense water floats or sinks in more dense water.

## Materials:

- 2 identical small clear glass or plastic jars (baby food jars work well)
- Ice water
- Hot tap water
- Thin stiff plastic card (laminated playing card or rectangle or square cut from yogurt or cottage cheese lid)
- Red food coloring

## Procedures:

1. Fill one jar completely to the brim with ice water. Place this jar in a shallow pan or tray to catch any water that might spill.
2. Fill another jar all the way to the brim with hot tap water. Add 2 drops of red food coloring and stir to mix.



3. Place a plastic card over the hot water jar and turn it upside down, being sure to hold the plastic in place. Carefully place the plastic and hot water jar on top of the cold water jar so that the opening of the hot water jar is directly over the opening of the cold water jar.



4. Very carefully slide the plastic card out from between the jars while making sure that the openings of both jars are lined up so that as little water escapes as possible.

What do you observe? Do the hot water and cold water seem to be mixing? Why do you think this happens? What do you think it has to do with the density of hot water compared to the density of cold water?

## Think about this ...

What do you think would happen if you switched the jars around? Try the experiment again but this time, first place the jar with the hot tap water (colored red) on the tray. Then place the plastic on the cold water jar. Carefully turn the cold water jar over on the hot water jar and make sure the openings are lined up. Carefully slide the plastic from between the jars. What happens? Can you explain it?

## Where's the Chemistry?

When water is warm, the water molecules move faster and spread out more. This makes hot water less dense than cold water. Since hot water is less dense, it stays on top or "floats" on the colder water.



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".**

