

# Shrinking Water Bottle

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## Materials

- 1 empty .5 liter water bottle
- 1/2 cup of water
- thermometer
- any water heating device

## Procedure

- Heat up the half-cup of water until it reaches a temperature of 152 degrees Fahrenheit (67 degrees Celsius), so that the water starts to steam. Be careful when handling the hot water; you may need an adult to help you.
- Allow the water to cool if it is too hot to handle, and then pour it into the empty bottle.
- Allow steam to collect in the bottle for 10 seconds.
- Unscrew the cap for a couple of seconds to let out the steam, and then quickly replace the cap.
- Allow the water inside the bottle to cool for ten minutes.

- Observe the bottle as it cools and record anything you notice about the bottle's shape.

## The Scientific Explanation

If you have ever seen party balloons left out overnight, you may notice that the balloons are smaller in the morning. You may even notice the balloons becoming larger during the day. When substances are warmed, the particles in those substances expand, and take up more space. As the objects cool the particles take up less space. This experiment shows a similar situation using a water bottle. When you release the steam from the bottle, there is less air inside the bottle, and the particles are just moving around quickly enough to keep the bottle full. As the water cools, the air inside the bottle takes up less space, and the plastic contracts. If you were to reheat the bottle, it would regain its original shape.

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