Can You Bottle Up an Egg? Understand Atmospheric Pressure!

by Aubrey Brieger
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Understand Atmospheric Pressure!

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What is the PURPOSE of this lab?
You will learn about how air pressure relates to atmospheric pressure and temperature.

What Materials Will You Need?
1 Glass Bottle
1 Hard Boiled Egg
1 Match or Lighter
1 Piece of Paper

Procedure Instructions

Getting the egg IN your bottle!
1. Crumple up your piece of paper, catch it on fire, and immediately toss it into your bottle.
2. Place your hardboiled egg (already peeled) on top of the bottle. (It will not fit through the top).
3. While the paper is burning, the air inside the bottle will heat up, expand, and become less dense than the air surrounding the bottle. (As soon as the oxygen is used up inside the bottle, the paper that you caught on fire will burn out.)
4. The air will immediately cool, and cause the egg to fall into the bottle. (This is because of the difference in pressure that you caused inside the bottle versus the pressure outside of the bottle. You just created a vacuum!)

Getting your egg OUT of your bottle!
1. Hold your glass bottle upside down.
2. Dump out the piece of paper.
3. Covering the end of the bottle with your mouth, blow air into the bottle. (This adds extra air into the bottle, which leads to an increase in pressure.)
4. Because of the variation in pressure, your egg will fall out of the bottle!

What should you have learned today?
When temperature rises, the air pressure lessens. When temperature falls, the air pressure rises. The heat and depletion of oxygen was caused by the piece of paper lit on fire and thrown into the bottle sealed by the egg. Once the flame died, the air inside lowered its temperature, reducing the pressure in the bottle. The force of high air pressure outside of the bottle, and the temperature within the bottle caused the egg to
be pushed inside of the bottle because it contained a lower air pressure than the air around it. While air in the atmosphere moves higher and the pressure gets lower, the temperature decreases as a result. As you go up in the atmosphere 1000m, the temperature falls about 6 degrees Celsius. This explains why mountains are so much colder than valleys.

**SIMILAR EXPERIMENTS**

1. **Crumple a Can** - After heating up a can with a spoonful of water, the can will fill up with water vapor. The air inside the can will become warmer than the air outside of it. After cooling the outside of the can, the can will crumple because the temperature inside the can will lower, causing the pressure inside to become lower than the surrounding air.

2. **Marshmallows in a Bottle** - After attaching a bottle pump to a bottle full of marshmallows, you will be able to observe the change of air pressure in the bottle when the marshmallows either shrink, or expand.

3. **Inflate a Balloon** - After freezing a water bottle and placing a balloon around the lip of the bottle; place the bottle in a tub of hot water. The balloon will inflate because the warm air outside of the bottle is less dense than the cool air inside the bottle.