Rising Water

Purpose

To demonstrate atmospheric pressure and the volume difference between a liquid and a gas.

Materials

large beaker

large cylinder

hot plate

food coloring

Procedure

1. Fill the large beaker about halfway with water. Add a few drops of food coloring.

2. Place the cylinder upside down in the water.

3. Boil the water and continue heating for several minutes. Bubbles should be coming out of the cylinder.

4. Remove the beaker from the heat.

5. Notice the water being pushed up into the cylinder.

Additional Information

1. Water vapor from the boiling water fills the cylinder, pushing the air out (hence the bubbles). Atmospheric pressure pushes the water into the cylinder once the vapor cools and condenses.

2. If you are using a large enough beaker and cylinder for a lecture hall (on the order of 1 to 2 liters), it could take quite a while to heat the water (close to an hour). In this case, you should heat the water to almost boiling before the lecture to save time during the

lecture. It may also take a few minutes for the pressure difference to be enough to cause the water to be pushed up the cylinder.

Questions for the Students

1. What is the cause of the bubbles coming out of the cylinder?

2. What is the pressure in the cylinder before the water boils? as it is boiling? after the beaker is taken from the heat?

3. How does water get into the tube? Is it pushed or pulled?

Reference

DeCoste, Don. University of Illinois, Urbana-Champaign