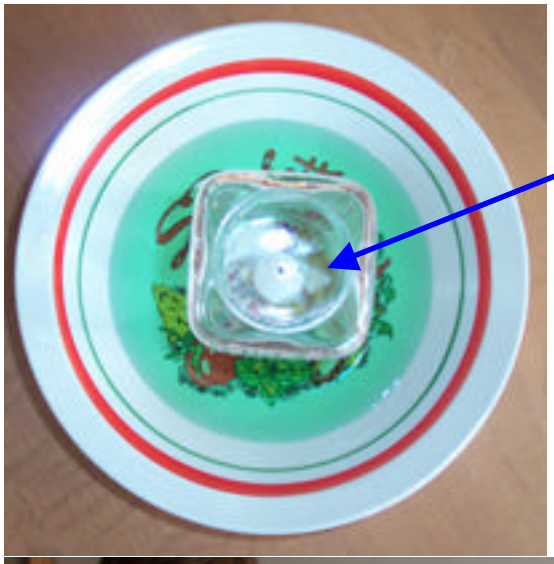
The Effects of Atmospheric Pressure



A pasta bowl is filled with water and green food colouring, an unlit candle is placed standing in the middle of the water. The candle is then covered with a jar.

Notice there is practically no water in the jar. This is because the air pressure inside the jar is about equal to the weight of the air exerted on the water outside the jar. If you repeat the experiment with more water, the pressure due to the water will slightly tip the balance in favour of the external pressure, and you will see a small amount of dyed water inside the jar.

The candle is lifted temporarily; the candle is lit and covered again. While the flame appears, oxygen inside the jar is consumed. This in itself does not reduce the number of gas molecules inside the jar because the combustion of hydrocarbons (such as wax) produces both carbon dioxide and water. But the water condenses against the cold glass jar, and the hot expanding CO_2 slips under the jar's lips and dissolves in the water. (Some may even bubble out, but you don't always see bubbles if you repeat the experiment) Suddenly there is less pressure inside the jar. The external pressure remains unchanged, and its weight is able to push some of the water into the jar. There is still water remaining outside because of the lingering inert nitrogen from the air within the jar.

The height of the liquid inside the jar divided by the jar's total height approximately equals the percent of oxygen in the air.