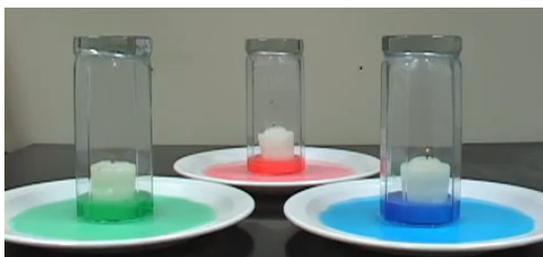


Candle and Water Trick

As the temperature falls, so does the pressure

Equipment

- ◇ A glass
- ◇ Matches
- ◇ Candle
- ◇ Food colour
- ◇ Water
- ◇ Saucer or plate



Method

- 1 Put a very little water on a plate, and mix in a couple of drops of food colour.
- 2 Place a candle in the middle of the plate, and light it. Slowly bring a glass down on top of the candle until it is standing in the water, on the plate.
- 3 Watch what happens next!

The burning candle heats the air above it, including the air that goes into the glass. Once the glass is standing on the plate, the burning candle uses up all the available oxygen in the glass, then goes out. As it does so, the air in the glass cools, and as it cools, the air pressure in the glass falls below atmospheric pressure. Water is drawn into the glass until the pressure is equalised.

You can turn this experiment into a competition by placing a small coin on the plate under the water and, offering students a variety of possible tools, seeing who can retrieve the coin without getting their fingers wet.

So how does this relate to atmosphere?

When we measure the air pressure at the surface of the Earth, we are literally measuring how much air is above us. If the air pressure falls, there is less air above us, if the air pressure rises, there is more air above us.

The relationship between temperature and pressure is very important – as the temperature falls, so does the pressure and as the temperature rises, so does the pressure. That means that as air moves up in the atmosphere and the pressure falls (because there is less remaining atmosphere above) its temperature has to fall as well. Typically, the temperature of the atmosphere falls about 6°C for each 1000m you go up –so the tops of mountains are always much colder than the valleys below.

This experiment also demonstrates how storm surges work – when the air pressure is low over a sea or ocean, the water level can rise. This can have devastating consequences – for example the North Sea flood of 1953.

Some more experiments

For many other experiments investigating air pressure, look at the 'how to crumple a can' experiment on www.rmets.org/experiments, or have a go at making a water barometer.

For another experiment looking at the relationship between temperature and pressure, all you need is a plastic syringe (the sort sold in pharmacies for administering medicine to babies). With your finger over the nozzle, pour a little very hot, but not boiling, water into the syringe. There will be a bubble of air at the bottom, so you won't scald your finger! Now use the plunger to push all but 3ml of the water out, then put your finger over the nozzle again, and pull the plunger out. As the pressure in the syringe falls, the temperature falls but so does the boiling point of water – you should see the water starting to boil!

www.rmets.org/experiments