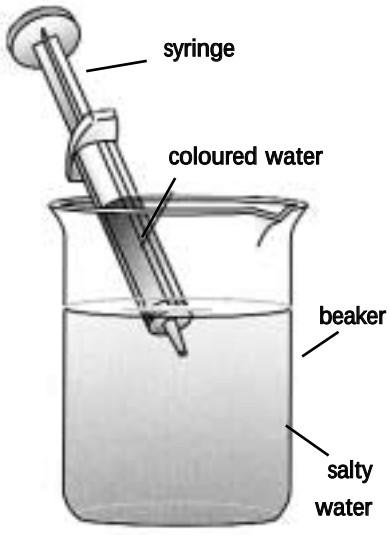
Activity 1. Modelling pyroclastic flow and ash plumes

Stephen Sparks and his colleagues have used dyes spreading through water as a simple way to model pyroclastic flows and ash plumes.



Pyroclastic flow

1. Take a large beaker of fairly salty water and fill a large plastic syringe with tap water coloured with a few drops of food dye.
2. Gently squirt the coloured water into the beaker and watch the fountain form.
3. Imagine this upside down and you have a pyroclastic flow.

Ash plume

4. Repeat the experiment, but this time have **very salty coloured water** in the syringe. When you squirt the coloured, very salty water into the beaker you get a plume. Again if you imagine this upside down it is just like an ash plume.

Stephen and his team also developed ideas of what causes molten lava to flow at different speeds. They wanted to understand the flow of lava and what caused it to stop. The existing theory said that the speed of lava flow was controlled by the conditions outside the volcano. Unfortunately this theory didn't explain the behaviour of some volcanoes like the volcano on Montserrat.

Stephen Sparks and his colleagues finally realised that water dissolved in lava controls how fast it flows on the surface. Mixing a little bit of water with magma lowers it's melting temperature. This is like mixing a little bit of salt with water. The salt lowers the water's freezing point. This is why salt is put on the roads in winter to melt ice. More water lowers the melting point and makes the lava less 'sticky'. This theory seems to fit better with what is known about the 'stickiness' of lava in different places.