

## Lava Lunacy

Create a vigorous reaction inside a bottle using water and oil!



### Grab this stuff:

- A** Plastic bottle
- B** Funnel
- C** Vegetable oil
- D** Water
- E** Food colouring
- F** Alka-Seltzer tablet

# Lava Lunacy



Pour water into a clean bottle until it is one-third full.



Add a few drops of food colouring.



Then fill the rest of the bottle with vegetable oil.



Break the Alka-Seltzer tablet in half and add it to the bottle. Watch the lava blobs!

## Lava Lunacy notes

### Aims

- Predictions – pose questions and try to investigate the answers.
- Investigation – learn about carbon dioxide (CO<sub>2</sub>) and discover that not all liquids can be mixed together.
- Materials – an introduction to acids and bases.
- Materials – an introduction to molecules.
- Materials – an introduction to density.

### Practicalities and preparation

- Do not use yellow food colouring, as it will not show up against the oil!
- If the bottle is knocked over, mopping up may be problematic because of the oil.

### Safety information

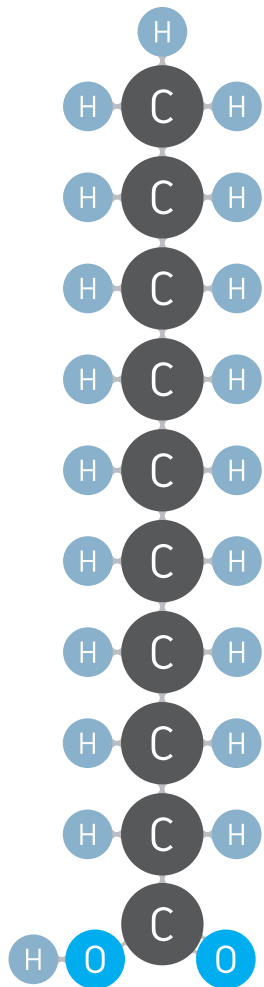
Alka-Seltzer tablets contain aspirin, so students should not be left unsupervised with them.

### The science – an introduction

Water and oil do not mix, as you probably know! This is because water is denser than oil, and sinks to the bottom. The food colouring mixes only with the water, which is why the oil stays its normal colour. The Alka-Seltzer tablet falls through the oil and when it reacts with the water it creates tiny bubbles of CO<sub>2</sub>. This gas floats to the surface because it is much lighter (less dense) than both the water and the oil, carrying drops of coloured water with it. When the bubbles pop and the gas is released, the denser water sinks back down again.

### Discussion

- Why does the food colouring not mix with the oil?  
Food colouring has water in it, so it goes into the water layer and does not mix with the oil.
- Why do oil and water not mix?  
Water is denser than oil – in other words, for a given volume, water is heavier than oil, so in the bottle it sinks to the bottom.
- What is CO<sub>2</sub>?
- What do we use CO<sub>2</sub> for?
- What makes oil different from water? Introduce molecules to the children.  
Oils of all kinds – cooking oil, motor oil, light machine oil – are all long molecules made up of chains of carbon atoms with hydrogen atoms attached to them.  
Water is made up of two atoms of hydrogen attached to one oxygen atom.



An oil molecule



A water molecule

## Extensions

- Instead of using Alka-Seltzer, you can put a straw in the bottle and blow bubbles into the water.
- Add crayon shavings to the oil. Will the crayon shavings mix with the oil or with the water? The crayon shavings are more like the oil, so they stay in the oil layer.

## Links to real life

Real lava lamps use heat rather than  $\text{CO}_2$  to create the effect, but the principle is the same. At the base is an electric light bulb that heats a flask filled with water. The flask also contains a blob of a waxy material which when cold is slightly denser than the water, so it sits at the bottom. As the wax warms up it expands until eventually it becomes less dense than the water and rises to the top of the flask. At the top, away from the heat of the lamp, the temperature is much lower, so the wax cools and begins to shrink. This makes it denser than the water again, so it sinks to the bottom of the flask and the process starts again. This is called convection.

## Links to the Science Museum

Galleries:

- Challenge of Materials
- atmosphere... exploring climate science

## Further information

- Alka-Seltzer Rocket
- Blow-Up Balloon
- Fizzy Fountain
- Milk Magic