ASHEVILLE MUSEUM OF SCIENCE

The Science Behind Lava Lamps

The lava lamp is a popular decorative item that has been enjoyed for over 50 years! It was invented by an Englishman named Edward Craven Walker.

FUN FACT: The largest lava lamp ever made was 4ft tall and contained 10 gallons of lava formula!

You can create your own lava lamp at home using some simple materials and learn some cool science concepts along the way!

Make your own lava lamp at home!

What you will need:

- Vegetable oil
- Water
- Water-based food coloring
- A recycled plastic bottle
- Alka-Seltzer tablets

*__Please note__: the solution may spill over once the reaction starts, so it's best to do this fun experiment on some paper towels, newspapers, or a plastic tablecloth you can clean and re-use!

Instructions:

1. Pour vegetable oil into the bottle until it is about $^{2}/_{3}$ full.
2. Fill the last $^{1}/_{3}$ with water.
3. Add 3-5 drops of water-based food coloring.
4. Add $^{1}/_{4}$ - $^{1}/_{2}$ of an Alka-Seltzer tablet.
5. Watch the reaction take place!

Consider this!

1) What did you notice when you added the water to the vegetable oil?

You've probably heard the common phrase **oil and water don't mix**. This occurs because of **polarity**.

Oil is classified as a **non-polar** substance, meaning the electrons circling the atoms in the molecule are equally attracted to each type of atom. Oils are **hydrophobic**, meaning "water fearing". They are repelled by water molecules.

Water is a **polar** substance. There is an electronegativity difference between the atoms in the molecule, so the electrons are more attracted to the oxygen atom than the hydrogen atoms in the molecule.

2) But why did the water sink to the bottom and the oil stayed on top?

This occurs because of **density**. Water has a greater density (mass per unit volume) than oil, so it sunk to the bottom while the oil layered on top!

3) What happened when you added the Alka-Seltzer tablet?

The Alka-Seltzer underwent a **chemical reaction** with the water at the bottom of the bottle. This reaction produces carbon dioxide, or CO2. Oil has a greater density than carbon dioxide, so the CO2 bubbles were able to move up through the oil to the top of the bottle, producing that awesome lava lamp effect!