Heatless Lava Lamps

Ages: 5-12 with parent supervision and help
STEAM Concepts: Science, Art
Time: 15-20 minutes

Hello everyone! Did you see the video circulating around on Facebook that shows how to make your own Lava Lamp at home? We did, and we wanted to take a closer look at the science of why this experiment works using water, oil, and an Alka Seltzer tablet.

We'll be talking about three main scientific concepts today: **polarity, density, and chemical changes**.

If you've seen a lava lamp in action before, you may remember how mesmerizing it is to watch those brightly coloured blobs rise and fall through another liquid—and how hot the lamp can get! Lava lamps use the concepts of polarity and density to make sure the liquid and melted wax (which is in a liquid form!) don't mix and move separately. In a lava lamp, the wax expands and rises when heated, and then when it gets cool at the top of the lamp, it shrinks and gets heavier. This is how the coloured bubbles move up and down from the top to bottom of the lamp.

For our experiment, we'll be using density, polarity, and a chemical change do make our heatless lava lamp work.

Please note: adult supervision is required due to the use of Alka Seltzer tablets in this experiments.

Let's get started!

Heatless Lava Lamp

VOCABULARY

Chemical change

- Is when the bonds between atoms are broken or undergo another change to create a different molecule
- Is when a new substance is created
- Usually need another chemical change to undo what happened
- **Examples:**
  - Burning wood
  - Rusting iron
  - Milk going sour
  - Baking a cake
  - Mixing baking soda and vinegar
  - Alka Seltzer and water reacting to create carbon dioxide

Density

- A measurement of how compact a substance is
  - An equal amount (1 cup) of water is heavier than oil because the water is denser and its water molecules are packed more tightly

Polarity

- Atoms and molecules can have a positive or negative charge, just like a magnet, due to how they naturally are or the bonds they form
  - Polar molecules like water can attract other atoms, which is why carbon dioxide bubbles stick to the water droplets in the experiment
  - Oil does not have a charge, or is nonpolar (this is why oil and water don't mix together)

Heatless Lava Lamp

DIY Lava Lamp

Materials: Plastic or glass cup (tall and narrow works best)
Cold water
Cooking Oil (vegetable or canola)
1 Alka Seltzer Tablet
Food colouring

Instructions:

- Fill up your cup about 2/3 full with oil
- Add a small amount of water on the top—1 to 2 centimeters (your measurements don't have to be exact—you just want about four parts oil to 1 part water!)
- Add 3-4 drops of food colouring
- You can add the whole Alka Seltzer tablet in, or break it into a few smaller pieces.
- Watch as the tablet dissolves to create bubbles and make the Lava Lamp turn on!

How it works: When you drop the Alka Seltzer tablet in, a chemical reaction happens between the water and Alka Seltzer to create carbon dioxide gas bubbles. These bubbles stick to the water droplets, which makes them lighter—and lets them float up through the oil! When the water droplets float up to the top of the oil, the carbon dioxide bubbles pop when they break the surface, which makes the water more dense than the oil again, so it floats back down.

This process is repeated until the Alka Seltzer tablet has finished dissolving and the chemical reaction ends.

Change it up: Try the experiment again, this time using hot water instead of cold water.

What changes do you notice?

Does the experiment happen faster, or slower?

Go further: Can you think of any other things in your house that might have a polar charge?

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Resources

Websites:

Home Made Lava Lamp experiment: https://www.homesciencetools.com/article/how-to-make-a-homemade-lava-lamp-science-project/

Oil and Ice Density experiment: https://thestemlaboratory.com/oil-ice-density-experiment/

From the Catalogue:

The Big Book of Science Experiments by Time for Kids

Crafty Science by Jane Bull

Science is Magic by Steve Mould

The Super Book of Science by Vilhelm Anton Jonsson

Pop sizzle boom! By Amy Oyler

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