

Homemade Lava Lamp

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Summary

Have you ever used a lava lamp to light up your room? Make a homemade lava lamp using supplies in your kitchen! In this experiment, vinegar will be colored with food coloring. It will then be poured into a bottle that is already filled with vegetable oil and baking soda on the bottom. Watch how different densities and a simple chemical reaction transform your typical cooking supplies into a cool lava lamp!

Materials

1. Long cup/bottle
2. Small container (can be a bowl, cup, etc.)
3. Vinegar
4. Vegetable oil (or any other type of oil)
5. Baking soda
6. Food coloring
7. Spoon

Procedure

Link to Video: (shared w/ Amanda)

Written Out Instructions:

1. Add 2-3 spoons of baking soda into the bottle/cup. Make sure that the bottle/cup does not have a lid.
2. Fill $\frac{1}{2}$ or $\frac{2}{3}$ of the cup with vegetable oil. Make sure to not mix the vegetable oil and baking soda.
3. Pour some vinegar into the other container.
4. Mix in 3 drops of food coloring.

5. Gradually add the colored vinegar into the cup and observe as the bubbles begin to float to the top.
6. For a glowing effect, turn the lights off and put a flashlight underneath the bottle.

Materials & Resources

Tips on Cleaning

After the reaction is done, pour all the contents out of the bottle/cup. If the bottle/cup has a lid, squeeze 1-2 drops of dish soap into the bottle/cup and fill halfway with water. Put the lid on and shake the dish soap mixture inside.

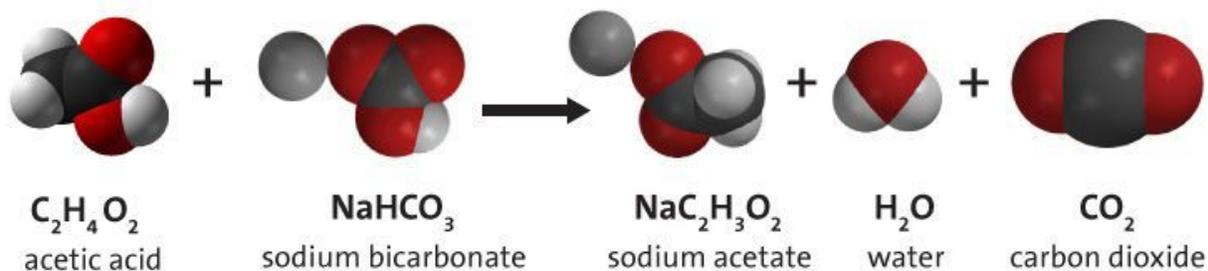
Explanation

So what is happening? How did the vinegar sink underneath the oil and create colorful bubbles? Basically, all matter (solid, liquid, gas, plasma) has properties. We can easily see some properties such as color and length. In this experiment, it was the property of density that allowed the colored vinegar to sink beneath the oil.

Density is a word we use to describe how much space an object or substance takes up. To calculate it, you divide the mass of an object by its volume. The equation is $p = \frac{m}{v}$, where p represents density, m represents mass, and v represents volume. (An easy way to remember the equation is that the m stacked on the v looks like a heart.)

The density of vegetable oil is 0.93 g/cm^3 , while the density of vinegar is 1.05 g/cm^3 . Since the density of oil is less than vinegar ($0.93 < 1.05$), it floats above while the vinegar moves down. Density also allows oil to float above water, which is one of the reasons why oil spills are so terrible for the environment. Animals such as seals and otters might come to the surface, but because of the layer of oil that floats above water, their fur will get oiled and matted.

When the vinegar sinks beneath the oil, it chemically reacts with baking soda. All matter is made of atoms and molecules. In a chemical reaction, bonds between atoms break and rearrange to form new bonds. When the oil reaches the baking soda, there is a chemical reaction between sodium bicarbonate and acetic acid.



Sodium bicarbonate is just another name for baking soda, while acetic acid is in vinegar. The vinegar that we use to cook is a mixture of water, acetic acid, and some other chemicals for taste. The atoms of the reactants, which are in the first part of the equation, rearrange to form the products, which are sodium acetate (a salt that is dangerous if swallowed!), water, and carbon dioxide.

The bubbles you see shooting up in the lava lamp are carbon dioxide, a colorless and odorless gas that is naturally present in air. We humans actually breathe out carbon dioxide through respiration and plants take in carbon dioxide through photosynthesis. Since we colored the vinegar with food coloring, we can clearly see the colorful bubbles of carbon dioxide. In conclusion, because of different densities and a simple chemical reaction, we've created a homemade lava lamp!

