Bubbling lava

Materials

Tip: Send your child on a scavenger hunt for the following items so they can complete the activity. See the last page for a list you can hand to them.

- 1 liquid measuring cup
- Water
- Empty clear water bottle
- Funnel
- Gel or liquid food coloring
- 1 tsp (1 oz) loose glitter (optional)
- Piece of paper (if using glitter)
- Spoon or butter knife
- Alka-Seltzer™ or generic (aspirin, citric acid, and sodium bicarbonate) tablets
- 1 cup (250 mL) of oil (vegetable, canola, or other)

Experiment

1. Using your measuring cup, measure 1 cup (250 mL) of water
2. Place the funnel into the top of the water bottle and pour water in, or carefully pour the water into your water bottle using the spout of the measuring cup; fill approximately halfway
3. Measure ¾ cup (175 mL) of oil in your measuring cup and add to your water bottle, leaving 1–2 inches of space from the top
4. Add drops of food coloring until the water reaches your desired color
5. Add glitter to your container (optional)
   a. Folder your piece of paper in half, creating a crease, and then unfold
   b. Pour glitter onto the paper
   c. Lift the paper and allow glitter to fall into the crease, then pour it into your bottle
6. Using a spoon or butter knife, break the Alka-Seltzer or generic tablet into a few smaller pieces
7. Drop the tablet pieces into the bottle and observe what happens

Note: Do not put the cap onto the water bottle until the solution stops bubbling

The science behind the activity

Chemistry is the study of matter, which is defined as anything that has mass and takes up space. There are many different kinds of matter and they can be described using their properties. There are two different kinds of properties: chemical properties and physical properties. Chemical properties are qualities that can be observed during a chemical reaction. Physical properties are qualities that can be observed without changing the makeup of the matter.

In this experiment, you can see the difference between the physical properties of the water and oil. You can also see the chemical reaction occur between the water and the compounds found within the Alka-Seltzer tablet.

Discussion questions

Why didn't the water combine (mix) with the oil to form one solution?

Oil is a hydrophobic molecule, meaning it doesn't like water. This is due to the highly polar nature of water molecules—positively charged on one side and negatively charged on the other. The oil molecule has a fairly neutral charge. For this reason, the two molecules do not mix when added together.

Why did the water go to the bottom of the water bottle or glass when you added the oil?

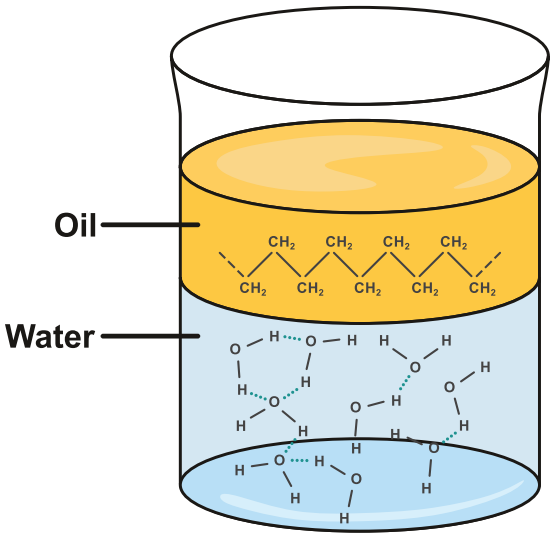
The more "mass," or number and weight, of molecules that can fit within a specific space, the more dense the substance is. Water molecules can pack more tightly together, making it more dense than oil, which makes it heavier.

Why doesn't the oil change color when you add the food coloring?

Food coloring is mostly made up of water, so it will mix with the water layer. Since the oil layer is hydrophobic, it will not mix with the food coloring.

Why does the addition of the Alka-Selzer tablets imitate the bubbling of lava?

When Alka-Seltzer tablets are dissolved in water, bicarbonate forms (from the sodium bicarbonate), which in turn reacts with hydrogen from citric acid to form water and carbon dioxide gas. The gas is what creates the bubbles you see.



Oil and water don't mix

Polar molecule: In a polar bond, the electronegativity of the atom will be different.

Nonpolar molecule: In a nonpolar bond, the electronegativity of the atom will be equal.

Polar dissolves polar. → **Polar + Polar = Solution**

Nonpolar dissolves nonpolar. → **Nonpolar + Nonpolar = Solution**

Water is polar.
Oil is nonpolar. → **Polar + Nonpolar = Suspension (won't mix evenly)**

Careers in chemistry

Personality traits that make a good chemist

- Someone who likes learning and using knowledge to solve problems
- Someone who enjoys experimenting with materials
- Someone who enjoys math
- Someone who is curious about how matter works

Careers as a chemist

- **Analytical chemist**—studies matter to determine its structure, composition, and nature, and the way substances interact with each other; some analytical chemists work in food safety, pharmaceuticals, and pollution control
- **Organic chemist**—studies molecules that contain carbon; some organic chemists even make new carbon-containing substances for everyday products, such as medications and plastics
- **Quality control (QC) chemist**—analyzes chemical raw materials and manufactured drugs to ensure they meet standards for safety, efficacy, and purity

Careers with an education in chemistry

- **Manufacturing operator**—mixes and tests the final formulation of chemicals before they are sold
- **Sales person**—uses knowledge of chemistry to help customers identify the right products to meet their chemical needs
- **Marketing/product manager**—uses understanding of laboratory chemicals to identify end users and help them realize their need for a particular product

Chemistry helps us explain why some of the physical things in our world behave the way they do. It also helps us explain the biological processes—like converting sun or food into energy—that plants and animals use to grow and move. When chemical reactions contribute to pollution or someone gets sick with a disease, chemists can help us come up with environmentally friendly solutions and new medicines.

People who study and work in chemistry are coming up with ways to make the world healthier, cleaner, and safer for everyone.

Scavenger hunt

Find the following items around your house so that you can complete this activity

- [ ] 1 liquid measuring cup
- [ ] Water
- [ ] Empty clear water bottle
- [ ] Funnel
- [ ] Gel or liquid food coloring
- [ ] 1 tsp (1 oz) loose glitter (optional)
- [ ] Piece of paper (if using glitter)
- [ ] Spoon or butter knife
- [ ] Alka-Seltzer or generic tablets (aspirin, citric acid, and sodium bicarbonate)
- [ ] 1 cup (250 mL) of oil (vegetable, canola, or other)

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