

Buoyant Bubble

Primary Audience: K – 2nd

Description: Compare the density of water, oil, and isopropyl alcohol.

Key Words: Chemistry, Bubbles, Density

Materials:

- Small jar with sealable lid
- Tap water
- Isopropyl rubbing alcohol
- Vegetable oil
- Teaspoon

Instructions:

1. In a mixing bowl, mix three parts alcohol to one part water (example, 3 half cups of alcohol to 1 half cup of water). Stir to mix. Pour into jar.
2. Measure 1 teaspoon of vegetable oil and carefully bring the spoon close to the surface of the alcohol-water mixture in the jar, then gently tip the spoon over. If you've done the job right, a single blob of oil will slide into the jar. What happens to the oil?
3. If the blob of oil is floating on the surface, carefully add a bit more alcohol to the mixture using the teaspoon. If the blob sinks to the bottom of the jar, spoon in some more water. What happens? Can you get the blob of oil to form a bubble that hovers in the middle of the jar? Is the bubble round?
4. Try cutting the ball of oil with a butter knife. What happens? When you're finished experimenting, secure the lid on the jar — you now have an object of scientific curiosity.

What's going on?

This experiment is one of density. All matter takes up space and has mass. How much space that mass takes up is called density. Oil floats on water because oil is less dense than water. That means the molecules, particles, of oil take up more space than those of water. When objects float scientists call that object positively buoyant. However, oil sinks in pure alcohol because it is denser than the alcohol; this is called negatively buoyant. In this experiment we mix water and alcohol to get a liquid that is the same density as the oil. When that happens the oil will hover in the middle; this is called neutrally buoyant.

Topic: Chemistry

The blob of oil forms a ball, or sphere, when it is hovering in the water. This is because all the forces (like gravity, buoyancy, molecular attraction, etc.) acting on the oil are equal. When all forces balance out like that, the shape that forms is a sphere, the simplest shape there is. That is why stars and planets are generally round and not cubes or other shapes.

Relevant Ohio Science Content Standards:

Physical Science: 1.1, 1.3,1.4