



Density Columns

Why do objects sink or float? Explore the density of household items in this layered experiment. It's sure to "stack up" your knowledge!

TEKS:

SCI 4.5 A: The student is expected to measure, compare, and contrast physical properties of matter, including mass, volume, states (solid, liquid, gas), temperature, magnetism, and the ability to sink or float.

SCI 5.5 A: The student is expected to classify matter based on measurable, testable, and observable physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating using water as a reference point), solubility in water, and the ability to conduct or insulate thermal or electric energy.

Materials:

- Clear cup or glass
- Food coloring
- Pancake syrup
- Small household items (Grape, penny, ping pong ball, plastic pony bead, popcorn kernel, etc.)
- Vegetable oil
- Water

How To:

1. Start with an empty clear cup or glass. Fill the cup one-third full with water.
2. Add food coloring to the water so that it is easier to view.
3. Pour some syrup into the glass. The syrup should settle below the water, forming two liquid layers.
4. Pour vegetable oil into the glass. The vegetable oil will form a layer above the water. There should now be three liquid layers in the glass.
5. Drop the following items into the glass and observe where they fall: grape, penny, ping pong ball, plastic pony bead, popcorn kernel.
6. Try adding additional liquids or dropping other objects into your density column! Object suggestions include: birthday candle, ice cube, metal nail, peanut, raisin, and wooden cork.

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STEM Explanation:

Density is the amount of mass in an object compared to the object's volume. Mass is how much "stuff," or matter, is in something. Volume is the amount of space something takes up.

Liquids like vegetable oil are less dense or have less matter packed into them than liquids like syrup. Every liquid has a numerical density. Water has a density of 1.0 g/cm^3 (grams per cubic centimeter). Syrup has more grams (mass) per cubic centimeter (volume) than water. Vegetable oil has fewer grams (mass) per cubic centimeter (volume) than water. This means that syrup is denser than water, and vegetable oil is less dense than water. The table below shows the density of vegetable oil, water, and syrup.

Liquid	Density (g/cm^3)
Vegetable oil	0.92
Water	1.0
Syrup	1.37

When dropping objects into the density column, the objects sink through the liquid(s) they are denser than, and float on top of the liquid they are less dense than. The penny is made of metal, which is a very dense material. The penny sank to the bottom of the glass, which means that it was denser than syrup. The popcorn kernel and grape float on top of the layer of syrup. This means these objects are less dense than the syrup but denser than vegetable oil and water. The plastic pony bead floats on top of the water. This means the plastic pony bead is less dense than syrup and water, but denser than vegetable oil. The ping pong ball floats on top of the vegetable oil making it less dense than vegetable oil, and less dense than all of the liquids!

Career Connection:

Chemists study the properties of matter at the level of atoms and molecules. Their research includes understanding the structure and composition of many different chemicals and even creating new substances that help our lives!

Resources:

<https://www.youtube.com/watch?v=Z50jEi1igNQ>

<https://slideplayer.com/slide/13521444/>

<https://science-u.org/experiments/density-tower.html>

<https://www.stevespanglerscience.com/lab/experiments/seven-layer-density-column/>

<https://www.youtube.com/watch?v=mwC2-cqGFU>

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