

Sink or Float?

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Preparation page (Per child)

- 1 tall clear plastic cup (16 oz)
- 1/4 cup of water in 5.5 oz plastic cup with lid
- 1/4 cup of vegetable oil in 5.5 oz plastic cup with lid
- 1/4 cup of honey in 5.5 oz plastic cup with lid
- 1 nail or penny per child
- 1 grape per child
- 1 plastic bottle cap
- 1 sponge cut 1 square inch

Sink or Float?

Materials

- 1 tall clear plastic cup (16 oz)
- $\frac{1}{4}$ cup Tap water
- Food coloring (optional)
- $\frac{1}{4}$ cup Honey (or syrup)
- $\frac{1}{4}$ cup Vegetable oil
- 1 bolt (or 1 nail, 1 penny)
- 1 grape (or 1 cherry tomato)
- 1 plastic bottle cap
- a piece of a sponge



Procedure

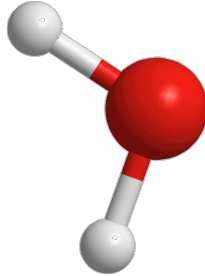
1. Pour the honey in the empty tall glass. (~ 1 inch or 2.5 cm).
2. Pour water with or without the food coloring slowly on top of the honey along the side of the glass. Do not disturb the honey when pouring.
3. Pour the Vegetable oil slowly on top of the water by using the side of the glass.
4. Let it sit for a little bit until all the layers are settled.
5. Drop the bolt in the glass.
6. Drop the grape in the glass.
7. Drop the bottle cap in the glass
8. Drop the sponge piece in the glass

Note: You can try to drop different objects in your density tower. Which objects can float? In which layer? What is denser?

What is Density?

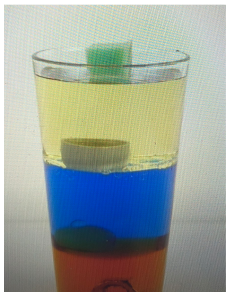
Density is a word we use to describe how much space an object or substance takes up (its volume) in relation to the amount of matter in that object or substance (its mass). Another way to put it is that density is the amount of mass per unit of volume. If an object is heavy and compact, it has a high density.

The **honey**, the water and the **vegetable oil** separate in different layers because they have different densities. Different densities don't mix.



A **molecule** is the smallest unit of a substance that has all the properties of that substance. For example, a water molecule is the smallest unit that is still water.

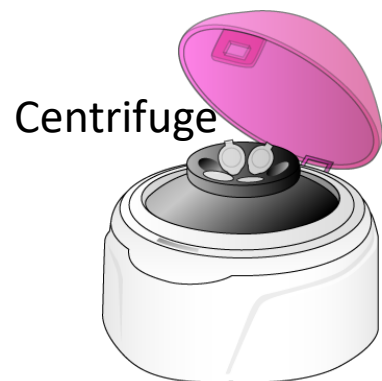
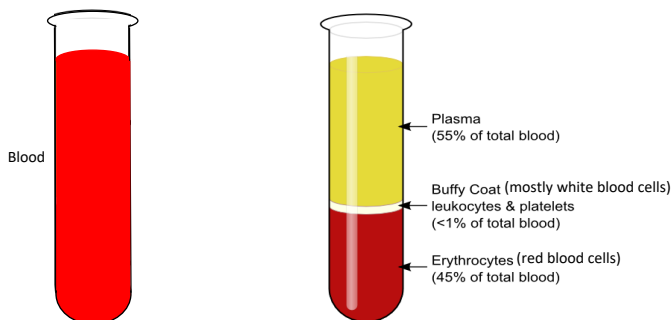
When you drop different objects in the glass (bolt/nail, grape, plastic bottle cap, sponge) their density will determine if the object will float, sink or semi sink.



- Oil molecules have wide spaces between them
- Water molecules are more tightly packed
- Syrup/Honey is water and dissolved sugar

- Water has low density. Molecules from other substances can mix with water molecules, occupy some of the empty spaces and increase the density.
- **Honey** has the highest density and therefore sits at the bottom of the glass.
- The **vegetable oil** molecules do not pack together so tightly, which means it has a low density and rises to the top.

In a laboratory, blood can be separated into different layers/types of cells by collecting it in a tube that contains a special gel (ficoll or sucrose). An instrument called centrifuge is used to spin the tube. As the tube spins, the different types of cells and blood components move in the tube and create layers depending on their density.



Centrifuge

Credits

Content:

- <https://www.youtube.com/watch?v=Z50jEi1igNQ>
- Challoner, Jack and Jack Andraka (Foreword). (2016). Maker lab: 28 Super Cool Projects: Build* Invent* Create* Discover, *Density Tower* (p.97). DK, Penguin Random House.
- www.sciencedaily.com
- www.kids.britannica.com

- Pictures:
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