

**Oil and water don't mix, but what about other liquids?
Where will the solid objects settle in the liquid layers**

The Aim

- To explore the density of different liquids.
- To compare the density of solids and liquids.



What you will need

- Honey
- Dish soap
- Water
- Vegetable oil
- Isopropyl alcohol or methylated spirits
- Tall, thin glass container
- Measuring jug
- Spoon
- Ping pong ball
- Cherry tomato or blueberry
- Metal nut or screw

Follow these steps

Step 1

Use water and the measuring jug to measure the capacity of your chosen container. Divide this by 5 to determine the volume of each liquid to be added (this will ensure the most even layers)

Step 2

Pour in the honey into the bottom of the glass ensuring it remains level and does not run up the sides of the container. Hold the spoon slightly above the honey and pour the dish soap on top. Do this slowly so that the dish soap lays on top of the honey. Repeat with the water, followed by the vegetable oil and finally the alcohol.

Step 3

Drop each of the solid items into the density column and observe what happens.

Bonus

Try adding a bottle cap or even a layer of corn syrup between the honey and dish soap! What other items do you think might work in the density column?

The Science Behind It



Liquids are classified based on their particles ability to **flow** over each other, however the **density** of these particles also affects their ability to flow. Honey is only about 20% water; the rest is dissolved sugar that exhibits high levels of **hydrogen bonding**, pulling the particles closer together. Similarly, dish soap displays hydrogen bonding, but the inclusion of **surfactants** in the mixture makes it **less dense** than honey. Oil is less dense than water because the **molecules** are much longer than water molecules that cannot pack together as well. Oil molecules also have a **hydrophobic** area, meaning they push water away! Finally, alcohol is the least dense in this column because it has a very low **molecular weight** in comparison to the oil. However, if it was added above the water, it would mix freely.

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