Five Layer Density Column

Children's Museum of Houston

What happens when you pour different liquids into a cup?

MATERIALS

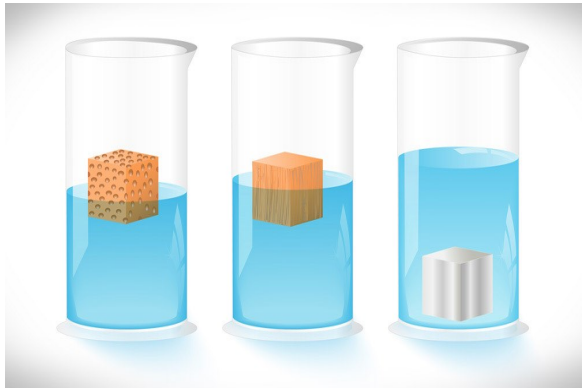
- 1 Large clear cup
- 5 Measuring cups
- Food Coloring
- Honey
- Corn Syrup
- Dish Soap
- Water
- Vegetable Oil
- Sharpie
- Washer
- Paper clip
- Dice
- Plastic bead
- Chopstick

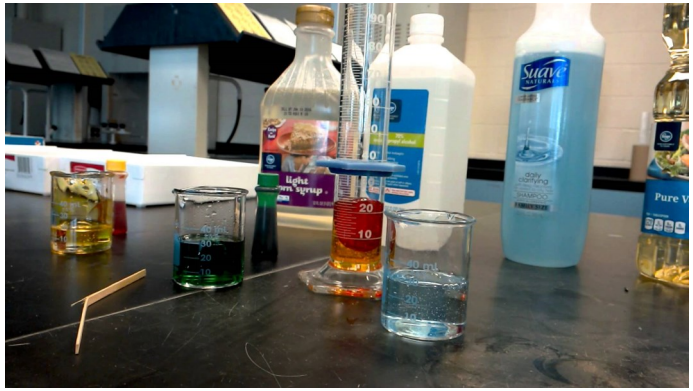
GET SET UP

1. You will need five measuring cups—1 measuring cup for each different liquid and 1 clear 16 oz. cup. If you only have one measuring cup, clean it really good between each liquid.
2. Make a hypothesis (an educated guess) about what will happen when you pour the different liquids into the cup.
3. Line up your measuring cups. In the first cup you will measure 2 ounces of honey. The second cup you will measure 2 ounces of corn syrup. The third cup you will measure 2 ounces of dish soap. The fourth you will measure 2 ounces of water. Add two drops of food coloring to the water. In the fifth cup you will measure 2 ounces of vegetable oil.
4. You are going to pour one liquid at a time into your clear cup. You will go in order from honey to vegetable oil. With the honey, corn syrup and dish soap you want to pour directly in the middle and avoid getting any of the liquid on the side of the cup. With the water and vegetable oil, it is ok if some gets on the side. Make sure each liquid layer is settled before moving on to the next. Using a sharpie, write down the name of each liquid layer.
5. Compare your hypothesis to the density column you created. Was your hypothesis correct?
6. Gather a washer, paper clip, di and plastic bead or any other solid object you can drop in the density column. Make a hypothesis where each solid object will settle in which layer. Drop one item into your cup at a time. What happens?
7. Select a chopstick and stir all the contents of the cup together. Watch the cup for a few minutes. What happens?

DID YOU KNOW...

Matter is anything that contains mass and takes up space. All of the liquids you poured into the cup, as well as the cup, are made up of matter. Matter is expressed in four different states—solids (the cup), liquids (the substances you poured into the cup), gas (the air inside the cup) and plasma (ionized gasses like the stars). Each substance you poured into the cup has mass. **Mass** is the amount of matter in a particular substance and **density** is how compact the mass within a substance is. Water can have slightly different densities as it changes state from solid to liquid to gas. Solids are typically more compact, liquids less compact and gasses even less compact. The liquids you poured into the cup did not mix because they all have different densities. Even when you stir them together they will eventually resettle into their layers. The solid objects you dropped into the cup stayed in a layer depending on its density. Being solid does not automatically mean it will be denser.





CHALLENGE

1. *What do you think would happen if you poured the liquids in a different order?*
2. *Explain the relationship between matter, mass and density. Support your answer.*
3. *When drinking ice water why do you suppose the ice stays at the top? Both the liquid water and ice are water. Do they have different densities?*

STEAM Challenge: The density of water is 1 and the density of ice is .92. What is the difference between the two densities? What would the density of water and ice be if it was 18 times higher? What would the density of water and ice be if it was half the density?