



Density Layer Tower

What is density?

Have you ever wondered why some things float in water while others sink?

It all has to do with something called density. The density of a substance is its mass per unit volume, or how compact a substance is. If something is more dense in comparison to something else then more of it will fit in the same amount of space. This means that if something is denser than water it will sink and if it is less dense than water it will float. This is true even for other liquids!

In this activity, we are going to examine density in action by using various liquids to create a colorful density tower.

Activity

Instructions

- Pour equal amounts of each liquid into the small glasses. Add a different food dye color to the water and rubbing alcohol to create contrast. If your dish soap is clear feel free to color it, too!
- Start the tower by pouring the honey into the tall glass. When you pour in the liquids, try to prevent them from touching the side of the glass – this will keep the tower’s layers clearly defined and neat
- Next, carefully add in the dish soap using the turkey baster, if available. Pour in the soap carefully, otherwise the layers may not be very neat. Don’t worry too much if the liquids mix a bit – they will eventually separate into even layers.
- Pour in the milk, water, and veggie oil using the same method you used for the soap.
- Pour in the rubbing alcohol.
- If any liquids mixed, let the tower sit for a bit and observe. What do you see?

How does it work?

Recall how you added equal amounts of each liquid to the tower, but each additional liquid floated on top of the previous one. In this case, the amount doesn’t matter – it’s all about density!

The formula for density is $\text{density} = \text{mass}/\text{volume}$. The liquids you used all had the same amount, or volume, so the difference in densities occurs because the liquids all have different masses. If volume is left unchanged, but mass is increased, the density of a substance will increase and if mass is decreased, density will decrease.

Honey has a greater mass and density than dish soap, therefore, the dish soap will float on top of the honey. Weight is closely related to mass, so if you want to check this try putting some honey on a kitchen scale and then an equal amount of dish soap. Which one weighs the most? This is why the liquids in the tower were able to be layered so well.

Materials

Water	Measuring cup
Milk	(any size)
Honey	Rubbing alcohol
Dish soap	
Veggie Oil	
Tall clear glass	
6 small glasses	
Food dye	
Turkey baster	

Explore Further

- Why do any mixed liquids return to their own layer?
- What would happen if you poured the liquids in a different order?
- If you dropped a small object like a popcorn kernel in the tower what would happen and why?
- What other liquids could you add to the tower and how might they behave?

