



Layering Liquids

Purpose:

In this experiment, you will explore the difference density makes.

Background Information:

The science secret here is **density**. Density is a measure of how much **mass** is contained in a given unit **volume** (density = mass divided by volume). Mass is a measure of how much “stuff” there is in an object or liquid and density is a measure of how tightly that “stuff” is packed together.

Based on this density equation (Density = Mass ÷ Volume), if the weight (or mass) of something increases but the volume stays the same, the density goes up. Likewise, if the mass decreases but the volume stays the same, the density goes down.

Materials (What You Need):

- Clear drinking glass
- Food coloring (optional)
- Honey
- Corn syrup
- Dish soap
- Water
- Vegetable oil
- Rubbing alcohol

If you don't have all of these liquids, that's okay, just use what you have.

Procedure:

1. Do your best to keep each layer an equal volume. It may be helpful to measure 1/4 cup of each liquid prior to adding to the glass.
2. Start your layers by pouring the honey into the glass. It is very important to pour the liquids carefully into the center of the glass. Make sure the honey does not touch the sides of the glass while you are pouring. It is important to let each layer settle before adding the next one. Take your time and pour slowly and carefully.
3. Next add a layer of corn syrup. You may want to add a few drops of food coloring to the corn syrup before adding so that you will be able to easily see the layer. Make sure you are adding each layer slowly and evenly.
4. Now add the dish soap.
5. Stop for just a second to enjoy your success. You're almost halfway to your goal of stacking six layers of liquid. The next liquid is water. From this point forward, it's okay to slowly pour the liquids down the sides of the glass. This will help to be liquids to slowly trickle down the glass to create the next layer. Take your time!

6. After you add the water, add a layer of vegetable oil in the same manner. Slowly let the oil trickle down the side of the glass to rest on top of the water.
7. Now it's time to add the rubbing alcohol. Use a couple drops of food coloring to color the rubbing alcohol before adding it as the last layer.

What Is Happening?

Lighter liquids (like water or rubbing alcohol) are less dense or have less "stuff" packed into them than heavier liquids (like honey or corn syrup). So, the next time you're enjoying a glass of iced tea, you'll know why those ice cubes float. That's right... it's all about density.

If you want to keep experimenting, try these ideas too!

- What other liquids could you add to the rainbow? What layer do you think they will end up in?
- Select a few items from around the house (safety pin, key, staple, peanut, raisin, chocolate chip, small rubber bouncy ball, ping pong ball, etc.) and carefully drop each item individually into the center of the glass. Some items will stay on or near the top of the stack of liquids and other items will sink part or all of the way down to the bottom of the glass. Why the difference?