

Density Lab: D.J. Perkins

Middle School General Science

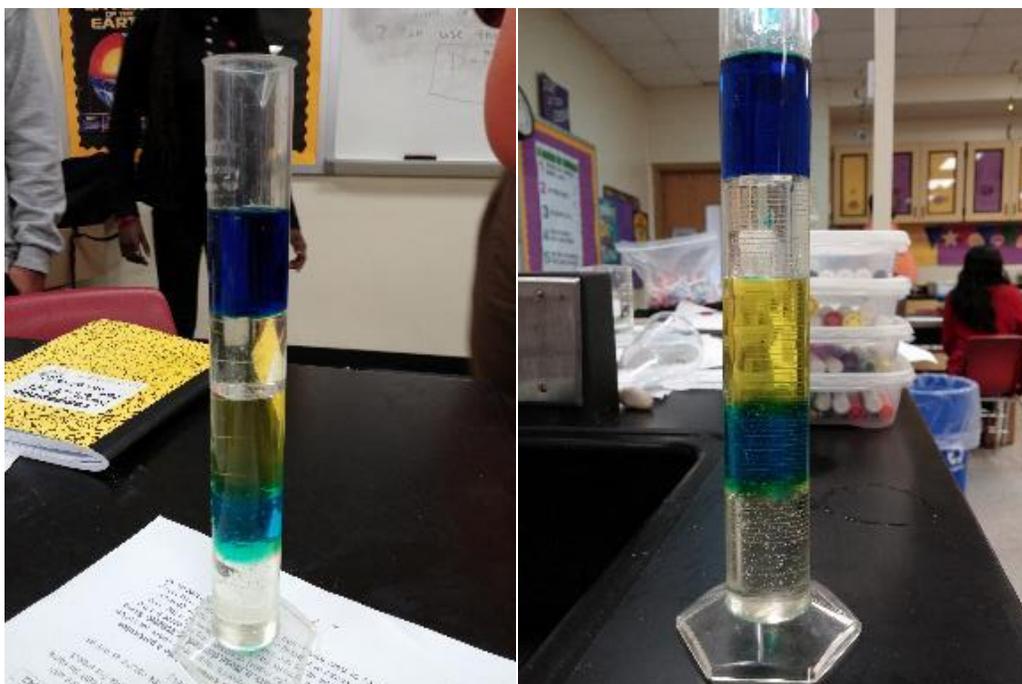
Purpose: To learn the concept of fluid density and observe how, because of differences in densities, fluids can separate and not mix.

Tools/Supplies:

- Clear graduated cylinder
- Small cups (size of a medicine cup)
- Food coloring
- Chart of known densities
- Any of the following testable liquids:
 - Isopropyl Alcohol
 - Baby Oil
 - Vegetable Oil
 - Ice cube
 - Water
 - Milk
 - Dish soap
 - Light Corn Syrup
 - Maple syrup
 - Honey

Summary: Using common liquids, this lab shows students how, based on differences in density, liquids can 'stack' and not mix within a graduated cylinder. Liquids will layer based on density and not on the 'thickness' of the liquid. This is an important concept to share with students to reinforce the concept and units used when describing density

Special notes: Because not every liquid in this lab is hydrophobic, pouring the correct order of the liquids matters as they will not 'automatically' sort with respect to density. The key is slow pouring of the liquids to achieve the greatest results. Additionally, pour height is important as any splashing can cause the layers to mix within the graduated cylinder; therefore, slow pouring is essential and if possible, pour so the liquids run down the side the inner wall of the graduated cylinder to minimize splashing. Use the ice cube as the last addition in order to watch it sink through layers of less density.



Lab Procedure with notes:

1. Obtain a clean, clear graduated cylinder. Make sure that you will be able to wash to the bottom of it as the lab requires clean-up
2. Determine what liquids you plan to use for the lab and use the food coloring to adjust their color as needed for the best effect when creating multiple layers
3. Measure an equal amount (approximately 20-30ml) of each liquid you plan to use for the lab into separate medicine cups
4. Give the students the chart (at right) which displays the varying densities of the liquids you plan to use
5. Have the students hypothesize how to put the liquids into the graduated cylinder in order to make sure that they don't 'mix'
6. Time and supply permitting, you may let them proceed, or check to make sure they have the order correct
7. Pour the liquid with the most density first. This substance is likely to be thick and syrupy so try not to have it touch the sides of the graduated cylinder
8. Continue pouring the liquids in order, taking special care not to have them splash into the next layer or mixing
9. After all layers are poured, have the students predict where an ice cube will go if you put it into the cylinder
10. Ask them what will happen as the ice cube melts
11. Release an ice cube in the highest layer and watch it sink through the liquids until it reaches an equilibrium point
12. As the ice cube melts, the density increases and the liquid should be seen flowing into the water layer

Liquid	Density
Rubbing Alcohol	.79
Lamp Oil	.80
Baby Oil	.83
Vegetable Oil	.92
Ice Cube	.92
Water	1.00
Milk	1.03
Dawn Dish Soap	1.06
Light Corn Syrup	1.33
Maple Syrup	1.37
Honey	1.42

To evaluate the student performance first check to make sure all liquids are clearly visible in the graduated cylinder. If the liquids were not poured in the correct order there will still be layers, however there will be fewer than designed. After this is checked, look for clean, clear layers. If poured properly the layers should not be mixed and there should be no 'intermediary' layers between what was intended for the lab.