



Density Column Layers

Target Grade: K-5

Time Required: 15 minutes

Standards/Topics Covered:

Next Generation Science Standards:

- 5-PS1-3. Make observations and measurements to identify materials based on their properties.
- 2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

Central Focus:

The standards may be dense, but this activity isn't! In this activity, students will be able to actively observe the different densities of common liquid substances. This activity can be done as a demonstration or can be made into an experiment! Students will learn about how density affects the layers of different substances.

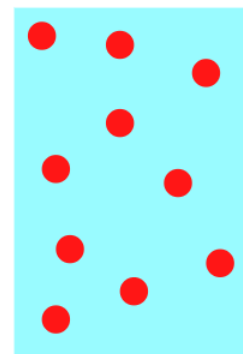
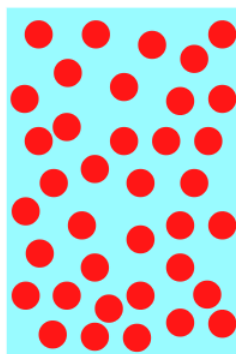
Key terms: mass, volume, property, properties, physical, observation

Background Information:

Density is the amount of mass per unit volume, or how much space the substance takes up compared to its mass. Density causes more dense substances to go to the bottom, while less dense substances float to the top. In this activity, the different substances do not mix due to differing densities, causing one layer to sit on top of the other.

Materials:

- 1 Large Clear Glass, Vase, or Container
- 1 Food Baster
- Honey
- Dish Soap
- Water
- Food Coloring
- Vegetable Oil
- Rubbing Alcohol
- Lamp Oil



More Dense Less Dense



Instructions:

1. Begin the column by carefully pouring the honey into the clear container. Do not let the honey touch the sides. Pour slowly and carefully, and give the honey a few seconds to settle afterwards.
2. Slowly and carefully pour in the dish soap. Utilizing the same procedure used for the honey, pour the dish soap slowly and carefully. Do not let the dish soap touch the sides of the container.
3. Add a few drops of food coloring into the water and mix thoroughly. Then, draw up some water into the food baster.
4. From this point onward, every liquid that is going to be a part of the density column actually HAS TO touch the sides of the container as it is added to form its own layer. Touch the tip of the food baster to the side of the clear container and release very small amounts of liquid into the column at a time. Slowly, but surely, a layer of that liquid will start to form. Depending upon how thick you want your layer of water to be, you should pace the release of the water from the food baster so that it takes about 10 minutes to form the water layer (by releasing a few drops at a time).
5. Next, add vegetable oil in the same manner (with the food baster at a very slow pace with the tip of the baster touching the sides of the container). After the desired amount of vegetable oil is added, wash the baster thoroughly in order to be able to use it to form the next liquid layer.
6. Add a few drops of food coloring to the rubbing alcohol and dispense it into the column in the exact same manner the vegetable oil was added. Be sure to add it very carefully and very slowly.
7. Rinse the food baster in the sink and use it to add lamp oil for the top layer. Utilize the same method for adding the lamp oil that was used for the water, vegetable oil, and rubbing alcohol.
8. Rinse the food baster and admire the beauty of the column!

Optional Extension:

- Determine the relative densities of each substance:
 1. Have students observe the properties of each substance. Students should note the consistency, weight, and any other property.
 2. Students should then determine the order they should pour each substance into the column.
 3. Students should observe the results and revise the order on the next attempt.



Closure:

1. Have students describe what they saw. How does each layer seem to float on the top of the other layers? Why are there some layers that sink below other layers?

Each layer appears to “float” on another layer due to each substance’s density. Density is the amount of mass per unit of volume, or how much space the substance takes up compared to its mass. Density causes the more dense substances (like honey) to stay at the bottom of the column, while less dense substances, like lamp oil, sit on top, not mixing with the heavier substances below.

2. What would happen if more honey were to be added to make a thicker layer after all of the other layers of the column had been completed? Why?

The honey would sink to the bottom of the column, due to its density. A substance’s density allows the “heavier,” more dense substances to move to stay below the less dense substances without mixing. As the honey is the densest substance in the column, it will move through the other layers to the honey at the bottom of the column.

3. Why is density a physical property? Explain.

Density is a physical property because it can be determined through the mass and volume of the substance, unlike a chemical property that requires a chemical reaction to be observed.

4. Put the substances in the mixture in order from lightest density to heaviest density. Then tell how you know.

Lamp oil, rubbing alcohol, vegetable oil, water, dish soap, honey. You can tell the density of each layer due to how they settle in the column. The highest density substance will settle in the bottom, with the next highest density settling above that. The least dense substance will settle on the top.