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Fluid Density

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Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.

Start learning right now about how you can determine the density of a given fluid. Take the following brief quiz to see how much you already know about the density of various substances. See the bottom of page 4 to check your answers.

1. How many times more dense than water is Venus?
   a. 1.32
   b. 2.06
   c. 3.93
   d. 5.42

2. Which of the following fluids is so dense that you can float cannon balls in it?
   a. bromine
   b. glucose
   c. mercury
   d. glycerine

3. When cans of regular cola and diet cola are put in a large container of water, regular cola will sink and diet cola will float.
   a. true
   b. false

4. According to legend, who discovered the properties of density while in the bathtub?
   a. Euclid
   b. Archimedes
   c. Aristotle
   d. Socrates

5. What will happen if an egg is placed in salty water?
   a. The egg will explode from the pressure.
   b. The egg will float.
   c. The egg will sink.
   d. The egg will cook.

Density Spectrum

Density is the measure of compactness of molecules and is equal to the mass over the volume. Therefore, the volume of two liquids could be the same, but more mass could be present, creating unequal densities.

Supplies Needed:

- a clear tall straight glass (tall enough to hold 3 cups of liquid)
- a spoon
- 1/2 cup honey
- 1/2 cup whole milk (dye it yellow with food coloring)
- 1/2 cup green dish soap
- 1/2 cup water (dye it blue with food coloring)
- 1/2 cup vegetable oil
- something to stir with
- a camera (optional)

Directions:

1. Carefully pour the liquids into the glass over the spoon, one at a time, in order to avoid accidental splashing. Pour in the following order: honey, yellow milk, green soap, blue water, and vegetable oil.

2. Note how the fluids interact. Take a picture of how it looks now.

3. Vigorously stir the fluids. Immediately take a picture after the contents are well stirred.

4. Now wait a few moments for the liquids to settle again. Take the last picture.

Questions:

1. What does the glass originally look like at step 2? Why do you think that is?

2. What does the glass look like when you stir it all together? What color(s) is the mixed solution?

3. What does the glass look like after the contents have settled?

4. Does the glass look different at step 4 then at steps 3 or 2? Why do you think that is?

Fluid Density

Catch More Flies with Honey than with Vinegar

Have you ever heard the expression, “you can catch more flies with honey than with vinegar”? What does that mean? Well metaphorically, it means that being sweet or kind will work better than being acidic or bitter when trying to accomplish something. But who wants to catch flies in the first place? However, if we look at this phrase more literally, do you think it would be easier to catch flies in a dense liquid like honey or a less dense liquid like vinegar? Why?

The density of a solid, liquid, or gas is equal to its mass divided by its volume. This means that density is directly proportional to mass and indirectly proportional to its volume. If more mass is compacted into the same volume, the density increases. If the same amount of mass expands to a larger volume, the density decreases. Density can be manipulated by temperature or pressure changes. The best example to illuminate how temperature affects density is a simple glass of water with ice cubes. Water demonstrates the remarkable propensity to expand rather than contract when frozen. You will notice that your ice cubes float to the top of your glass rather than sinking to the bottom. This is because ice is less dense than liquid water because the same amount of mass has now expanded to a larger volume. This is also part of the reason why icebergs float (another reason why they float is because they are pure H_2O, which is less dense than the salt water surrounding it).

Returning to our original question, there are multiple factors that must be considered in this equation. *Drosophila* (vinegar flies) are more attracted to vinegar than to honey. Honey is nearly four times more viscous (or thicker) than vinegar. Yet it is more likely that a fly will float on top of honey and sink in vinegar. To be certain, conduct your own experiment with a bowl of honey and a bowl of vinegar and see which one catches more flies!

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Answers: Page 2 Answers: 1) d. 2) c. 3) a. 4) b. 5) b. **Page 3 Answers**: 1) Answers will vary. It should look like a stacked rainbow of liquids because of the varying densities. 2) Answers will vary. It will most likely look muddy green. 3) The glass should look similar to a rainbow except some elements are miscible, so the colors will blend. 4) Originally the liquids were carefully placed in order of density, but now they mix due to other properties.

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