

Density Rainbow

ROY G. BIV! Which mnemonic device do you use to remember the colors of a rainbow? Discover how different liquid densities can create your own sugar water rainbow. How many teaspoons of sugar will be the densest?

TEKS:

M 3.7E: The student is expected to determine liquid volume (capacity) or weight using appropriate units and tools.

SCI 5.5D: The student is expected to identify changes that can occur in the physical properties of the ingredients of solutions, such as dissolving salt in water or adding lemon juice to water.

SCI 5.5A: The student is expected to classify matter based on physical properties, including mass, magnetism, physical state (solid, liquid, and gas), relative density (sinking and floating), solubility in water, and the ability to conduct or insulate thermal energy or electric energy.

SCI 7.4A: The student is expected to use appropriate tools to collect, record, and analyze information, including life science models, hand lens, stereoscopes, microscopes, beakers, Petri dishes, microscope slides, graduated cylinders, test tubes, meter sticks, metric rulers, metric tape measures, timing devices, hot plates, balances, thermometers, calculators, water test kits, computers, temperature and pH probes, collecting nets, insect traps, globes, digital cameras, journals/notebooks, and other equipment as needed to teach the curriculum.

Materials:

- Baster
- 6 cups
- Food coloring (red, orange, yellow, green, blue, and purple)
- 1-cup measuring cup
- Plastic test tubes
- Spoon
- Sugar
- Teaspoon
- Water

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How To:

Preparing Densities:

1. Measure and pour one cup of water into each cup. It is important that all the glasses have the same volume of water.
2. Add 3-4 drops of red food coloring to one cup, then 3-4 drops of orange food coloring to another cup, and repeat this process for the remaining colors. Use a spoon to thoroughly mix the color in the water.
3. Now it is time to change the densities of each solution. We will be adding sugar to solutions in different amounts. Follow the table below:

Water Color	Amount of Sugar Added (tsp)
Red	0
Orange	2
Yellow	4
Green	6
Blue	8
Purple	10

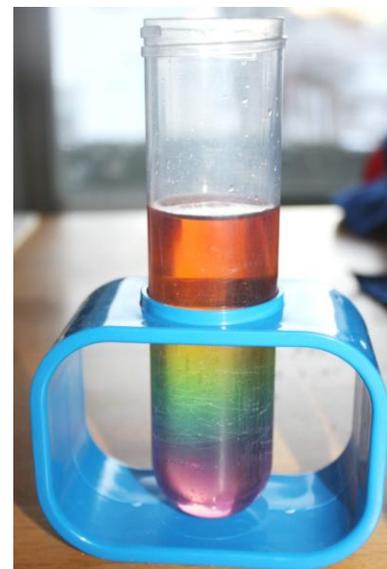
4. Stir until the sugar is dissolved in the water.

Combining Colors Method 1:

1. Take the baster and squeeze all the air out of the bulb.
2. Put the tip in the red water, and release a bit of pressure to suck up a bit of the red water.
3. While still squeezing the bulb, transfer the tip into the orange water to suck up a bit of the orange water.
4. Continue to do this for the rest of the colors. Make sure you have enough pressure to suck up all the colors.
5. Slowly squeeze out the contents of the baster into the test tube, making sure to move the baster up as each color is released from its tip.
6. Observe what happens to the colors in your test tube! Does it change after a few days?

Combining Colors Method 2:

1. Start with the test tube.
2. Using the baster, suck up the purple water and add it to the tube.
3. Suck up some of the blue water, and very slowly add it to the tube, just above the surface of the purple solution. Make sure to add it to the middle of the surface.
4. Continue working backwards through the rainbow, ensuring to slowly add the later colors. It may take some practice to get a perfect rainbow.
5. Observe what happens to the colors in your test tube! Does it change after a few days?



<https://littlebinsforlittlehands.com/sugar-water-density-rainbow-science-experiment/>

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STEM Explanation:

Density is a measure of how compactly molecules are packed into a set volume and it is a property of every material. When we add more sugar to each color of water, we are increasing its density. This happens because the mass of the sugar is increasing, but the volume in each color of water remains constant. By adding food coloring, we can visually see the different densities we created.

Career Connection:

Chemists study the properties of matter. There are many specializations within chemistry, but all chemists seek to understand the structure, properties, and compositions of various substances. They also study the dynamics of systems and processes at a molecular level.

Resource:

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