

Sugar Rainbow Density



Key words

- Density;
- Physics;
- Water;
- Sugar.

The science behind

It is intended to provide a colourful lesson in food science with the Sugar Rainbow Density Experiment, where density differences are revealed in a colourful set of sugar-water samples. With this experiment, you'll understand the concept of "density" and a simple combination of sugar and coloured water.

Solutions with water (coloured or not) with sugar are miscible solutions. This means a miscible solution occurs when two or more substances (solid, liquid or gas) can be mixed and create a homogeneous solution.

For example, we can dissolve sugar (solid) in a glass of water (liquid) and create a liquid homogeneous solution (these two substances are miscible). Still, if we try to dissolve olive oil in the water, it will be impossible to get a homogeneous solution (the olive oil cannot be dissolved in the water). In this second case, we will get a non-homogeneous solution.



This effect of this experiment occurs because the different solutions have different density levels. When we dissolve the sugar in the water, we increase the natural density of the water. How much density has, the heavier will be the solution, and because of that, the solution with less density will float on the top.

Everyday life

In our everyday life, we can find different applications of this concept.

One of the most impressive examples is the one about the ship. How can something so heavy stay on the water? For a given material to float, its weight is not the only factor determining it. We need to compare densities. And that is what happens on the ship. Although it is cumbersome, the engineers make calculations to build it so that the mass/volume ratio is lower than that of seawater. This way, with a lower density, it will be possible to remain on the water.

A dramatic saltwater density change can be experienced in this experiment. While humans will float in an ocean, they will float in bodies of salt-saturated water, like the Dead Sea in Israel and the West Bank. It is so salty that it's nearly impossible to sink in it.

Imagine if the density of the ocean changes significantly. What will happen with the boats and ships?