

Density & Sugar in Food

How much sugar do you eat each day? Most American eat more sugar than they should, every day!

1. Do you know what the recommended maximum amount of sugar you should not consume more than (per day) is?
Just like there are recommended daily intakes for vitamins/minerals a day, there are also maximum recommendations for ingredients like sugar and salt.
2. Grab your favorite cereal, candy, drink, dessert (or find it online, if you do not have it at home)?
3. Find the ingredient statement, how much sugar is in it? Do you eat ½, 1, 2, or more of the 'serving size?'
4. Calculate how much sugar you would consume, if you ate your favorite treat & drank your favorite drink, all at once. (Example: # of servings you typically eat x grams of sugar = amount of sugar consumed)
5. Let's compare the number you calculated above to the current maximum recommendation.
6. Recommendations for adults from the American Heart Association for added sugar consumption (not including sugars naturally found in fruits & vegetables)
 - **Younger kids**, you are probably ½ of an adult's recommendation, because you are about ½ the size of an average adult! **Older kids**, you may be the size of an adult, do your best to estimate!
 - *FYI: 4 grams=1 teaspoon (approximately)*
 - Adult Males should not consume more than 36 grams of added sugar/day (9 tsp or 150 calories)
 - Adult Females should not consume more than 25 grams of added sugar (6 tsp or 100 calories)

What you will need:

1. 1 Tablespoon measuring spoon
2. ½ cup measuring cup
3. 4 empty cups (*included*)
4. Sugar
5. Water
6. Food coloring (red, yellow, blue) (*included*)
7. Plastic syringe (5-10 mL) (*included*)

Here's what to do:

1. Put 1 tablespoon of sugar in one of the cups + 3 drops of red, yellow or blue food coloring.
2. Put 2 tablespoons of sugar in a different cup + 3 drops of red, yellow or blue food coloring (different than the first cup).
3. Put 3 drops of the 3rd and/last color into one of the empty, sugarless cups.
4. Add ½ cup of water to each of the cups (you should have a red, yellow & blue colored cup and 1 empty cup).
5. *Stir & set aside for a few minutes to allow time to dissolve.*

Let's learn before we do the activity:

1. Do you know what density is?

**You have learned about density your whole life, but may have never heard the word 'density.'*

Watch this video for a quick lesson on Density. 5 Facts about Density: <https://youtu.be/zlkpZZW29b0>

2. Density is the amount of matter inside something. The more dense something is, typically the more mass there is.

Think of it this way: You and your family living in your house have plenty of room in your house to walk around, it's not super packed in the house, it is not densely populated. The size of your house does not change. The next day, your parents have a party and invite 100 people over. All those people are tightly packed inside your house, making it more difficult to move around. Your house is packed with people & is more densely populated. Does that make sense? The size (or volume) of your house didn't change, but the mass (all the weights of the 100 guests added together) increased and so did the density of the house.

3. Just like the example of the soda (in the video '5 Facts about Density') the diet version floated, the sugar version sank because it had a greater density than water.
4. We are going to attempt this very thing with the red, yellow and blue solutions you just prepared.
5. **If you have a Cola & it's diet version at home, you can do a sink/float test with these.



Hypothesis: Which solution is most dense/least dense? Why?

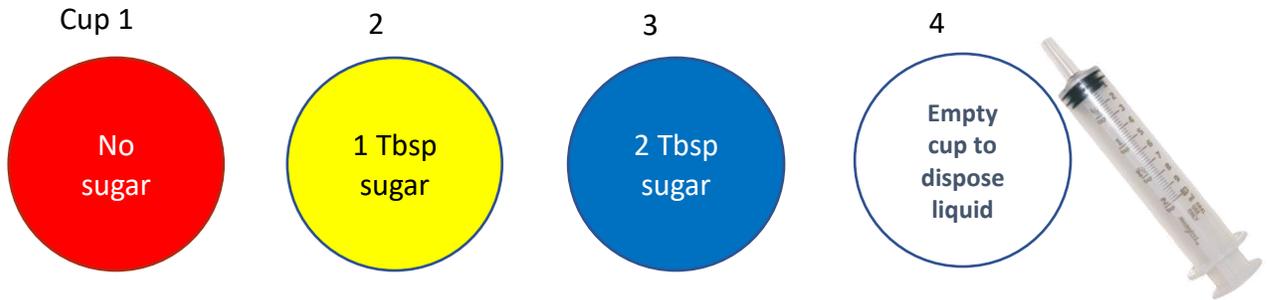
What's your hypothesis based on what you learned about Density in the video and what you know about the ingredients of each cup of sugar solution.

- What is Density?
- Relationship between mass & volume

$$D_{\text{ensity}} = \frac{M_{\text{ass}}}{V_{\text{olume}}}$$

Density and Sugar in Food

What you will need:



The Activity:

1. You have 3 cups with liquid and 1 without liquid.
 2. Take your syringe and slowly suck up 1 of the solutions.
 3. SLOWLY (without mixing with the 1st solution) suck up the second colored solution.
 - ✓ If the two solutions mix, squirt the liquid into the extra 'empty' cup & try again!
 4. SLOWLY (without mixing with the 1st solution) suck up the third colored solution.
 5. You should have 3 stacked solutions in the syringe, it should look like this:
 - Why did the colors separate, how do they stay separated and what happens if you turn the syringe on its side, or upside down (slowly)?
 - Which color is more dense (or has more sugar)?
- ✓ You can see the solution with the most sugar was the densest.
- ✓ The water, with food coloring only, was the least dense. **Is this what you hypothesized?**
- ✓ You can also relate this demonstration to our own bodies/body masses. The more sugar you consume, the more dense your body mass *may* become.



Have your parents ever told you, "you have had too much sugar today!"?

They tell you that because it is easy to consume a lot of added sugar! There are a lot of health issues associated with over consumption of sugar, over time. Can you name a few diseases that are associated with eating/drinking too much sugar? Besides the obvious diseases linked to over consumption of sugar (obesity & diabetes) there are others that are directly or indirectly caused by over consumption, too: heart disease, high blood pressure, elevated triglycerides, and some doctors are linking excess sugar consumption over an extended period of time to dementia.

Want to learn more:

<https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/sugar/how-much-sugar-is-too-much>