
LIQUID EXPANSION!
S19

purpose

The purpose of my experiment is to observe the expansion of liquids. How does freezing a liquid affect its volume? How much does it expand?

HYPOTHESIS

I think that if I freeze a liquid it will expand. My hypothesis is that if a liquid has more water in it, it will expand more and weigh more.

Research Notes

I watched videos on YouTube from teachers that showed them doing experiments with freezing water and other liquids. I also read websites about measuring volume, mass, and thermal expansion.

- Volume is how much space something takes up
- Density is how close the molecules are to each other
- Just because something takes up more space doesn't mean it will weigh more. The molecules might just be farther apart.
- Different liquids expand more or less than others. It depends on what the liquid is made out of.

Materials

- 6 clear empty bottles
- 308 ml of water
- 315 ml of milk
- 315 ml of orange juice
- 312 ml of oat milk
- 320 ml of apple cider
- 311 ml of vegetable broth

- A metric ruler
- a gram scale
- Freezer

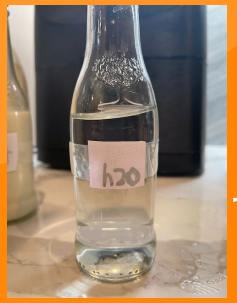
Experiment procedures

1. Get materials and make sure all the bottles are clean.
2. Draw a line 95mm from the bottom of the bottle.
3. Fill each bottle as close as you can to that line with water (H2O)
4. Do this again for the other 5 liquids
5. Measure each liquid and write down the final height in mm
6. Take a picture of the liquid in the bottles before freezing them
7. Weigh each bottle and write down the weight in grams
8. Put the bottles in the freezer at night and check it in the morning

Experiment procedures

9. Take the frozen bottles and measure each one
10. Compare the frozen height to the liquid height
11. Weigh each bottle
12. Compare the frozen weights to the liquid weight
13. Write conclusions

Before Photos



After Photos

Analysis

Liquid	Before Weight	Before Height	After Weight	After Height	Height Difference
Water	308g	95mm	308g	105mm	10mm
Orange Juice	317g	95mm	317g	101mm	6mm
Milk	315g	92mm	315g	97mm	5mm
Broth	311g	96mm	311g	103mm	7mm
Oat Milk	312g	94mm	312g	98mm	4mm
Cider	320g	95mm	320g	187mm	92mm

Analysis

Cider expanded the most!

Cider expanded the most and almost doubled in height.

Weight stays the same!

All of the liquids expanded but they all weighed the same.

Some liquids expand better than others

Besides cider, water expanded the most. Milk and Oat Milk expanded the least.

conclusion

From my experiment I learned that when liquids freeze they do not get heavier. The liquids take up more room which is called volume. This is caused by the molecules in the liquid spreading apart when the liquid is frozen.

Different liquids spread apart more. Cider has lots of bubbles and maybe that is why the molecules spread apart more when frozen.

My hypothesis was that if a liquid had more water in it it would expand more and weigh more. This was wrong. Liquids weigh the same even if they are frozen. The liquids that expanded the most might have more water. We can't tell from this experiment. I would have to do another experiment to see how much water is in each liquid. Does Milk have more water in it or less than orange juice.

Real World Connections

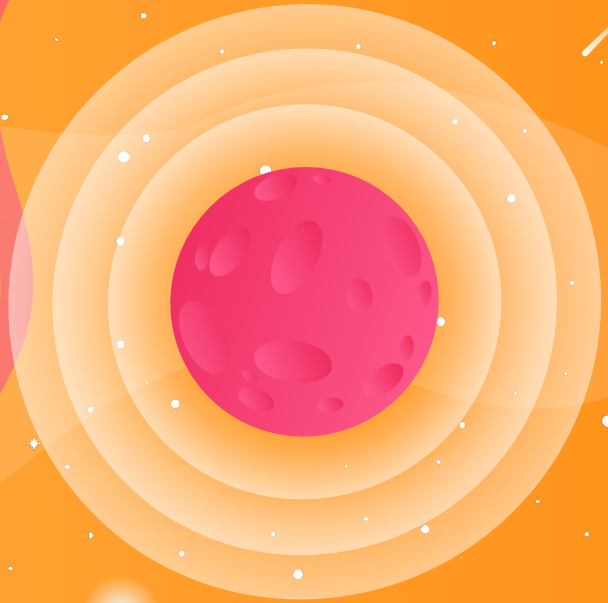
Anti-Freeze

In cars they put chemicals to keep the water from freezing when it is very cold so that the water does not expand and ruin the engine

Protect Pipes

Water can freeze in pipes when it is very cold and pipes might burst. People wrap their pipes in insulation to keep the water from freezing

works cited



Thermal Contraction and Expansion
https://www.youtube.com/watch?v=X4GSTnsEfOk

Thermal Expansion and Contraction of Solids, Liquids and Gases
https://www.youtube.com/watch?v=9UtfegG4DU8

Measurement
https://www.youtube.com/watch?v=7omxmCDpW7U

Measuring Matter
https://www.youtube.com/watch?v=e_gGCunofg1


THANKS!
Does anyone have any questions?
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