



Slurpee Science

Is a slurpee a solid or a liquid? Explore different states of matter while making a refreshing summer treat!

TEKS:

SCI 3.5 B: The student is expected to describe and classify samples of matter as solids, liquids, and gases and demonstrate that solids have a definite shape and that liquids and gases take the shape of their container.

SCI 3.5 C: The student is expected to predict, observe, and record changes in the state of matter caused by heating or cooling such as ice becoming liquid water, condensation forming on the outside of a glass of ice water, or liquid water being heated to the point of becoming water vapor.

SCI 4.5 A: The student is expected to measure, compare, and contrast physical properties of matter, including mass, volume, states (solid, liquid, gas), temperature, magnetism, and the ability to sink or float.

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

Materials:

- 1 cup of your favorite beverage - juice, soda, water, etc.
- ¼ cup salt (coarse, kosher salt works best)
- 4 cups of ice
- 2 gallon-sized baggies
- 2 sandwich-sized baggies
- Warm gloves or towel

Experiment/How To:

Steps 1-6 and 8-9 can be done indoors, but we recommend that you go outside for step 7!

1. Pour one cup of your favorite beverage into a sandwich-sized baggie. Seal this baggie tightly, making sure to carefully squeeze out as much air as possible.
2. Place this sealed baggie into your second sandwich-sized baggie. Seal the second baggie tightly as well, making sure to squeeze out as much air as possible. This will make sure that your beverage doesn't spill!

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3. Now, add approximately four cups of ice to a gallon-sized baggie.
4. Sprinkle $\frac{1}{4}$ cup of salt over the ice.
5. Place your double-sandwich-bagged beverage into this gallon-sized baggie and seal it tightly.
6. Place the sealed gallon-sized baggie into your second gallon baggie and seal the second one tightly as well. This will help prevent any salt or ice from leaking out of the bag!
7. Shake the bag all around for 5-10 minutes. You may want to switch off with someone if your arms get tired. Put on gloves or wrap the gallon baggie in a towel as you shake it so that your hands don't get too cold!
8. After 5-10 minutes, open the gallon baggies and take out your beverage. Does it look any different?
9. Grab a straw or spoon and enjoy your slurpee treat!

STEM Connection:

Is the slurpee you just made a solid or a liquid? Solids keep their own shape while liquids take the shape of the container they are placed into. Your slurpee probably has characteristics of both! When you first put your beverage into the baggie it was a liquid. After shaking the baggie around in the ice and salt mixture, however, the liquid became frozen and started to appear more like a solid. How did that happen?

Water freezes into ice at 32°F , and ice starts melting into water at 32°F . This means that 32°F is known as the "freezing point" and "melting point" of water. When you add salt to ice, this freezing/melting point lowers. The more salt you add, the lower the freezing/melting point. So how does this affect our slurpee experiment? In order to turn our liquid beverage into a frozen slurpee, we needed the liquid to get super cold—below freezing! To accomplish this, we made a solution of salt and ice in a baggie. Remember, salt makes the freezing/melting point of ice lower, which means the salt, ice, and water solution in the baggie was able to get colder than freezing. It may have even gotten too cold to handle without gloves!

Because your beverage was surrounded by this below-freezing solution for 5-10 minutes, the temperature of the beverage dropped below freezing, causing it to freeze/crystallize. Shaking the bag during this freezing process made sure that the newly-forming ice crystals were evenly distributed throughout your slurpee. This made your slurpee fluffy and soft, rather than a hard block of ice. What a refreshing treat!

Career:

Chemists study the properties of matter. They may specialize in a specific area of chemistry such as organic chemistry or physical chemistry. These scientists must understand the structure, properties, and compositions of various substances. They study the dynamics of systems and processes at a molecular level.

Resources:

<https://www.steampoweredfamily.com/activities/sweet-slurpee-science-activity-for-kids/>

<https://www.steampoweredfamily.com/activities/winter-stem-activity/>

<https://littlebinsforlittlehands.com/simple-homemade-ice-cream-in-a-bag-edible-science/>

<https://www.scientificamerican.com/article/scrumptious-science-making-ice-cream-in-a-bag/>

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