The image features a central yellow background with a faint, repeating pattern of gears and lightbulbs. A black circuit line runs vertically on the left and right sides, connecting to lightbulbs and gears. The text is centered in blue, with the main title in a larger font. At the bottom, there is a white horizontal band containing the text 'Cool Treats Edition' and a red safety warning at the very bottom.

STEM Outreach Presents:

STEM Every Day Keeps the Boredom Away

Cool Treats Edition

Always ask a trusted adult before starting any Science or Engineering project.

TIME: 5-10 DAYS

Rock Candy

**DIFFICULTY
LEVEL: NOVICE**

PURPOSE

To explore the crystallization.

MATERIALS

- 6" Wooden Skewers or Candy Sticks
- Pint-Sized Wide-Mouth Mason Jars
- Food Coloring
- Trusted adult to help
- Clothespins
- Granulated Sugar
- Candy Flavoring, optional
- 3-Quart Saucepan
- Warm Water

INSTRUCTIONS

1. Soak sticks briefly in water and roll in sugar to coat. Allow to dry completely.
2. Add warm water to a large saucepan. Stir in sugar until no more will dissolve.
3. Have trusted adult place the saucepan on the stove, and bring to a low boil over medium heat. Add additional sugar as needed until you reach a fully saturated solution and no more sugar will dissolve. Allow to cool for 20-30 minutes.
4. Carefully pour the mixture into mason jars and mix in food coloring and/or candy flavoring as desired.
5. Add two sugared sticks to each jar, making sure that the sticks don't touch the jar or each other. Use clothespins to hold the sticks in place as needed.
6. Place the jars in a warm and undisturbed location. Wait for 5-10 days until crystals are fully formed. Remove the sticks from the jar and enjoy the candy.

CONCEPT #1

Starting Crystals

Crystals are a material that molecules fit together like puzzle pieces in a repeating pattern. The process of crystal forming is called crystallization. The stick will provide the surface on which the crystals will grow. As water evaporates from the stick, small crystals of sugar will encrust the stick. These tiny seed crystals provide starting points for larger crystals.

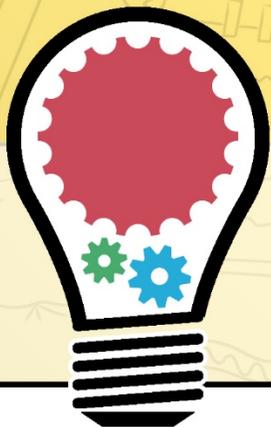


<https://www.happinessishomemade.net/rock-candy-tutorial/>

CONCEPT #2

Crystal Formation

A solution is a mixture where one substance, called the solute, is dissolved into another, called the solvent. In this case, sugar is dissolved into water. The solute (sugar) in the solution is unstable because there is not enough solvent (water) to keep it dissolved, so the sugar will come out of the solution and bond to other sugar molecules to form a crystal. Your finished rock candy will be made up of about a quadrillion (1,000,000,000,000,000) molecules attached to the stick.



<https://www.happinessishomemade.net/rock-candy-tutorial/>



<https://www.happinessishomemade.net/rock-candy-tutorial/>

EXTENSIONS

Learn more about molecules and crystallization by watching the following Magic School Bus Episode:
<https://www.teachertube.com/videos/msb-meets-molly-cule-435188>

REFERENCES

Adapted from:

<https://www.happinessishomemade.net/rock-candy-tutorial/>
<https://www.exploratorium.edu/cooking/candy/rock-pop.html>

Ice Cream

**DIFFICULTY
LEVEL:
INTERMEDIATE**

PURPOSE

To explore the best way to chill the ingredients to make them become a creamy delicious treat!

MATERIALS

Measuring spoons

Measuring cup

Sugar

Half-and-half (alternatively, heavy whipping cream)

Vanilla extract

Salt (table salt or rock salt)

Ice cubes (8 cups)

Sandwich-sized zipper-lock plastic bags

Gallon-sized zipper-lock plastic bags (2)

Oven mitts or a small towel

Timer or clock

INSTRUCTIONS

With the help of a trusted adult:

1. In each small sealable bag, place one tablespoon of sugar, $\frac{1}{2}$ cup of half-and-half (or milk or heavy whipping cream), and $\frac{1}{4}$ teaspoon of vanilla extract. Seal both bags well.
2. Add four cups of ice cubes to one of the large, gallon-sized bags. Then add $\frac{1}{2}$ cup of salt to the bag.
3. Put one of the small bags you prepared into the large bag with the ice cubes. Be sure both bags are sealed shut.

CONCEPT #1

Heat

Everything in the universe is made of atoms and molecules that are constantly moving.

When heat is added to a substance, the molecules and atoms vibrate faster. The amount of motion of the particles determines the state of matter (i.e., solid, liquid, or gas). The warmer the surrounding temperature, the more the molecules bounce around. As it gets colder, the molecules will slow down.



<https://www.delish.com/cooking/recipe-ideas/recipes/a54721/ice-cream-in-a-bag-recipe/>

Ice Cream (cont.)

INSTRUCTIONS (cont.)

- Put on oven mitts or wrap the bag in a small towel and then shake the bag for five minutes. Feel the smaller bag every couple of minutes while you shake it, and take a peek at it.
- Now add four cups of ice cubes to the other large, gallon-sized bag, but this time do not add any salt to it. What do you think will happen without using salt?
- Put the other small bag you prepared into this large bag. Be sure both bags are sealed.
- Put on oven mitts or wrap the bag in a small towel and then shake the bag for five minutes, as you did before. Again, feel the smaller bag every couple of minutes while you shake it, and take a peek at it.
- You can also compare how cold the different ice cube bags feel. Does one feel much colder than the other?
- If you successfully made some ice cream, you can enjoy it now as a tasty reward for your chemistry challenge! Do not worry, the second bag is not wasted — you can go back and turn the still liquid ingredients into ice cream! Simply put the small bag in the large bag that had ice cubes and salt and shake them for another five minutes.

CONCEPT #2

Ice

Ice is the crystallized form of water. For the crystals to form, the water molecules have to slow down (by cooling down) and carefully line up in an orderly pattern. Even after the ice is formed two things are constantly happening at the surface of the ice:

- The ice at the surface is melting.
- The melted water is re-freezing.



<https://www.sciencebuddies.org/stem-activities/ice-cream-bag?from=Blog#summary>

CONCEPT #3

Fluctuating Freezing Point

One way to alter the freezing point of water is to add another substance that will separate the water molecules, and make it make difficult for them to stick together. This phenomenon is called freezing point depression. Salt is one substance that can lower waters freezing point. This is why roads and sidewalks are sometimes salted in cold icy climates. Sugar, such as the type in fruit juice, also works to lower waters freezing point, but is not as effective as salt. In general, the more particles (such as salt or sugar) that are added to the water, the more difficult it will be for the water molecules to stick together and the lower its freezing point will be.



<https://jerryjamesstone.com/recipe/5-minute-ice-cream-no-ice-cream-maker-needed/>

EXTENSIONS

Explore more about states of matter through a simulation at

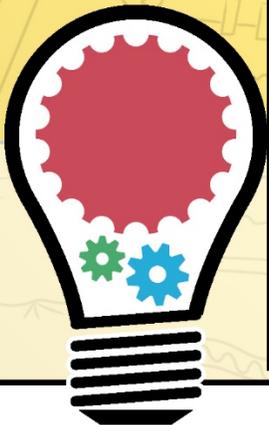
<https://phet.colorado.edu/en/simulation/states-of-matter-basics>

REFERENCES

Adapted from: <https://www.sciencebuddies.org/stem-activities/ice-cream-bag?from=Blog#summary>

<https://jerryjamesstone.com/recipe/5-minute-ice-cream-no-ice-cream-maker-needed/>

<https://www.delish.com/cooking/recipe-ideas/recipes/a54721/ice-cream-in-a-bag-recipe/>



Slushies

**DIFFICULTY
LEVEL:
ADVANCED**

PURPOSE

To explore chemistry behind freezing a sweet treat that you can drink!

MATERIALS

Water

Table salt

Measuring cups

Small mixing bowl

Four zipper-lock sandwich bags

Freezer

Gloves or a towel

32 oz. food containers with lid, preferably transparent (2)

Fruit juice, e.g. orange, apple, or grape juice. Do not use a light version.

INSTRUCTIONS

Prep Work

1. Pour half a cup of water into a bowl. Add one teaspoon of salt and stir until the salt is dissolved. If you have food coloring, you can mix in one or two drops. This will give your special ice a nice color and makes it easier to detect leaked salt water solution in your slushy.
2. Pour the contents in a zipper-lock bag. Close the bag and set it aside.
3. Repeat the steps 1–2 three more times until you have four zipper-lock bags of salt water solution.

CONCEPT #1

Slushies

A slushy is a dense, icy-cold beverage that resembles melting snow.

There are two ways to make slushies:

1. Crush ice and add flavoring
2. Alter the freezing process of flavored water, so that loose, icy crystals form. This is accomplished by having sugar in the water and shaking the water as it cools.



<https://www.lovefromtheoven.com/easy-homemade-slushee-recipe/>

Slushies (cont.)

INSTRUCTIONS (cont.)

Prep Work (cont.)

4. Store the bags for at least five hours or overnight in the freezer. Make sure the bags do not touch each other so they do not freeze together.
5. Store at least one cup of juice and water in the refrigerator.

Procedure

1. Check if the four salt water solution bags in the freezer are frozen. If not, wait a few hours longer before proceeding.
2. Take the frozen bags of salt water solution from the freezer using gloves or a towel to protect your hands. For each bag, open the zipper, push the air from the bags, and close the zipper again.
3. Touch the bag with ice briefly with your fingers. If you have a thermometer, measure how cold this ice is. Ice cubes made of pure water are 0°C or 32°F .
4. Gather all the materials for the activity: juice and water at refrigerator temperature, the four bags of special ice, two food containers and a measuring cup.
5. Pour one cup of juice in a food container. Rinse the measuring cup and pour one cup of water in the other shaker or food container.
6. Put two of the sealed zipper-lock bags with frozen salt water solution into each container before closing the lid.

CONCEPT #2

Sugary Slushies

Sugar is an important part of a slushy. Sugar acts as an antifreeze in a slushy because the sugar and water molecules bond together before the water completely freezes, keeping it from becoming solid ice. This is why it is important that the juice you use has sugar.



<https://www.sciencebuddies.org/stem-activities/homemade-slushy?from=Blog#summary>

Slushies (cont.)

INSTRUCTIONS (cont.)

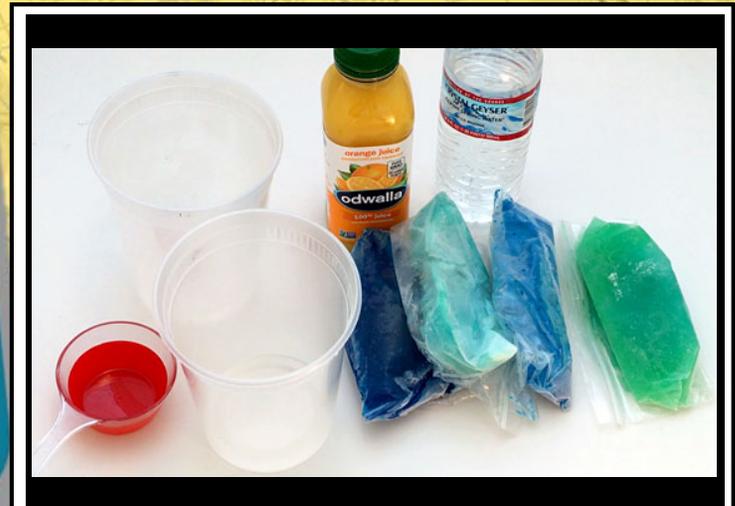
Procedure (cont.)

7. Shake one container a couple of times. Look through the sides of the container. Repeat with the other container.
 8. Place your containers down and count slowly to 20 before repeating the previous step. Do this for several minutes.
 9. Once you see a thick mass sliding down the sides of a container, open the container and look inside.
 10. If the special bag of ice still has solid pieces of ice inside, you can close the container and continue shaking intermittently to make a denser slushy.
 11. If the special ice is melted, take out the bags of salt water and set them aside. If saltwater has leaked in your slushy, disregard the slushy, freeze the zipper-lock bags with salt water solution after rinsing them and try again.
 12. There is a possibility that the juice never turned into a slushy. If your juice did not freeze, refreeze the zipper-lock bags with salt water solution after rinsing the outside and dissolving an additional $\frac{1}{2}$ teaspoon of salt in each.
 13. Pour the slushy content into a glass. Drink your juice slushy!
- OPTIONAL:** If you have diluted syrup or soda, pour some over the slushy made with just water, mix well, and drink!

CONCEPT #3

Supercooling

Supercooling is the process of getting a substance colder than its freezing point, without it becoming a solid. For instance, supercooled water is actually colder than 32°F (water's freezing point)—but it is not frozen! Slushies can be an example of a supercooled liquid.



<https://www.sciencebuddies.org/stem-activities/homemade-slushy?from=Blog#summary>

CONCEPT #3 Cont.

Supercooled Examples

Clouds are a good example of supercooled liquids: they contain tiny droplets of water that do not form ice despite the low temperatures.

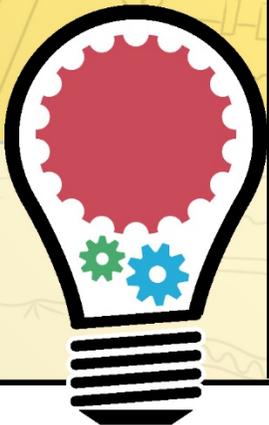
Some animals, such as the winter flounder, use supercooling to allow them to avoid freezing (which can cause cell damage and death) in extremely low temperatures.



<https://www.sciencebuddies.org/stem-activities/homemade-slushy?from=Blog#summary>

REFERENCES

Adapted from: <https://www.sciencebuddies.org/stem-activities/homemade-slushy?from=Blog#summary>





More Food-Related Activities

Making Plastic from Milk

https://www.howweelearn.com/turn-milk-into-plastic/?utm_content=buffer27dc8&utm_medium=social&utm_source=pinterest.com&utm_campaign=buffer

Extracting Strawberry DNA

<https://www.stevespanglerscience.com/lab/experiments/strawberry-dna/>

Making Homemade Butter

<https://www.123homeschool4me.com/homemade-butter-science-experiment-37>

Building an Edible STEM Structure

<https://thestemlaboratory.com/pretzel-and-marshmallow-structures/>

Planting a pineapple, green onion, and avocado indoors

<https://modernparentsmessykids.com/15936/>

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