



Snowfall Activity 3

SuperCool Edible Ice

Objectives and Standards

- To learn the effects of salt on water; specifically its ability to change the freezing point of water and other solutions.

NSTA Standards Addressed

Content Standards
A, B, E, F, G

4-H SET Abilities Addressed

Research problem
Measure
Observe
Communicate
Infer
Question

Background

As a community, we do different things to survive in our regional climate. People in warm climates use air conditioning, dress in light colored clothing, paint their houses light colors, and roof their houses with light colored roofing material. In cooler climates, people have to learn how to live with precipitation when it falls as snow, or when rain freezes to the ground. Commonly, salt is placed on our roads and driveways to prevent slipping on ice. Salt is also abundant in ocean water, and oceans control the climate of many different regions, whether they are in our backyards or not. This activity explores the science behind the effect salt has on changing the physical properties of water, which also helps people adapt their lifestyles to their surroundings.

Supplies Needed

(per bag of ice cream)

- 1/2 cup milk
- 1/2 tsp vanilla
- 1tbs sugar
- 4 cups crushed ice
- 4 tbs salt
- 2 quart-sized ziplock bags
- 1 gallon sized ziplock bag
- hand towel or gloves

CoCoRaHS Extension Ideas

Salt is not the only thing that can change the melting point of water and more rapidly melt ice on our roads and driveways; sand is also frequently used. Sand is dark in color, which absorbs more sunlight and therefore increases the speed of ice melt. It is also a coarse surface for shoes and wheels to grab onto. The next time you have an icy driveway, cover part of it with salt, and part of it with sand. Which is more effective? Is there a time when each could be more effective than the other? Why or why not?

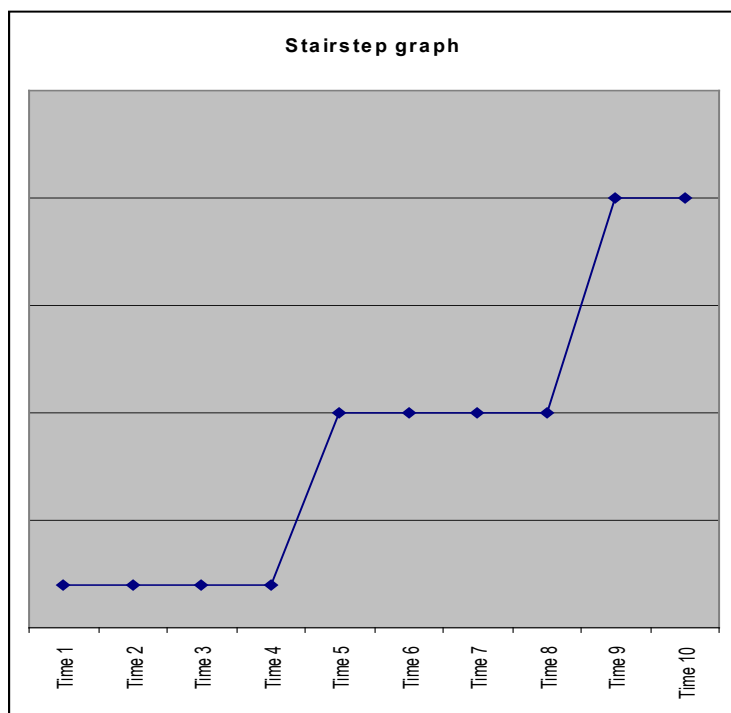
Activity

1. Mix milk, vanilla, and sugar together in a quart sized bag and seal tightly, allowing no air in bag.
2. Place bag inside another quart sized bag, leaving as little air in bag as possible.
3. Place double bagged mixture into the gallon sized bag.
4. Fill remaining space in gallon sized bag with ice.
5. Add salt into the gallon sized bag, removing the remaining air, and seal bag.
6. Using gloves or a towel to hold the bag, shake and massage the bag, surrounding the ice cream mixture with ice.
7. Continue for 5-10 minutes, or until mixture is frozen.

Discussion

Why did the mixture turn from liquid to ice cream? Why did we add salt to the ice? Would we have had the same result if we didn't add salt to the ice? Salt allows the ice to melt at cooler than 32°, which is needed to cool the cream enough to make ice cream. Think about a lake in comparison to an ocean. What is similar about both of them, and what is different? Do you think salt affects the role that oceans play in climate?

What is so unique about water? It can be a solid, a liquid, or a gas. It changes state from a solid to a liquid when it gets above 32° Fahrenheit, and from a liquid to a gas when it reaches boiling point, 212° Fahrenheit. This is a threshold, or stairstep, reaction. At 31°, a piece of ice isn't any more likely to melt than at 30°, but once it hits 32°, it melts. When the ice reaches a threshold temperature, it reacts, but not before then.



What other things in your life are stairstep or threshold reactions? Can you think of anything that is related to climate that has a threshold reaction? Answers could include glaciers, clouds turning to rain, the tree line on a mountain, the lack of vegetation in a particularly shady area next to an area with some exposure. All of these have threshold points beyond which they are not successful.

Water freezes at 32° Fahrenheit, making roads dangerous on cold days. When we put salt on the roads, it lowers the freezing point of water, effectively turning the ice on the roads into water. We used the same process to make our ice cream. When we lower the freezing point of the ice by adding salt, we allow the ice to turn to water while remaining below the freezing point. This allows the ice cream mixture to be supercooled from the ice turning into supercooled water and flowing around the full bag of ice cream.

Think about our roads again. Is there a situation in which salt is not effective in helping our community with icy roads and driveways? Yes, when it is much colder than 32° outside, adding salt lowers the freezing point but not enough to make the ice turn into water. During these instances, sand is a much more effective melting agent, as its dark color absorbs heat from the Sun to induce ice melt.





Please send us your feedback!

As a 4-H Educator, you know what has worked well, what has not, and how we can improve the *Tracking Climate in Your Backyard* curriculum. Please share your feedback about the curriculum. We'd love to receive copies of any reports or newspaper coverage about completed *Tracking Climate in Your Backyard* projects.

Fax or mail your completed feedback to Trisha Smrecak, Museum of the Earth, 1259 Trumansburg Rd., Ithaca, NY, 14850 or fax to: 607-273-6620.

Check the activity completed	Suggestions for improving the activity
Rainfall Activities <input type="checkbox"/> Make It Rain <input type="checkbox"/> Where Does the Rain Come From? <input type="checkbox"/> Stormy Weather	
Snowfall Activities <input type="checkbox"/> Confetti Snow Maps <input type="checkbox"/> How Much Water? <input type="checkbox"/> Edible Education <input type="checkbox"/> The Snowflake Game <input type="checkbox"/> Snow Journaling	
Temperature Activities <input type="checkbox"/> Energetic Weather <input type="checkbox"/> Shade of the Old Oak Tree <input type="checkbox"/> Temperature Through Time	
Wind Activities <input type="checkbox"/> Why Does the Wind Blow? <input type="checkbox"/> Make Your Own Wind Dial	
Hydrologic Cycle Activities <input type="checkbox"/> The Incredible Journey <input type="checkbox"/> Understanding Evapotranspiration <input type="checkbox"/> Pinecones: Mother Nature's Weather Forecasters <input type="checkbox"/> What is a Watershed?	
Climate Activities <input type="checkbox"/> Where is My Backyard? <input type="checkbox"/> Soak up the CO ₂ <input type="checkbox"/> Buckets O' CO ₂ : How Your Backyard Can Change the Ocean <input type="checkbox"/> Raise the Waters	
CoCoRaHS Participation <input type="checkbox"/> Precipitation measurements and other activities	

Please share your suggestions for improving the Tracking Climate in Your Backyard curriculum.

How have you used Tracking Climate in Your Backyard in your community?

Thank you for completing the Tracking Climate in Your Backyard curriculum feedback. We appreciate learning about how you are using the curriculum and receiving your suggestions for improving it.

Organization _____ **Contact Person** _____
Email _____ **Date** _____