Ice cream: treat in any culture

By Nick Straw, Chaputnguak School

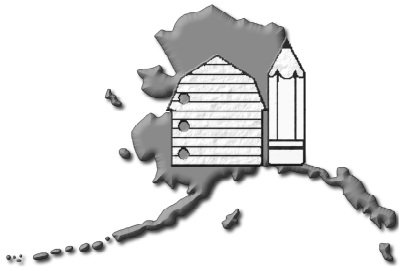
Materials
• See recipes/body text

Objectives
Teach students how to make ice cream by using salt to lower the freezing point of the water that is made when melting the snow; introduce students to cultural differences in foods between Native and nonNative populations.

Suggested grade levels
4-12

Alaska Content Standards
Science A2, A14, B1-4, C3
History B2
Cultural B1, C1, E5

Terms to Define
Freezing point
Sodium Chloride
Pre-measured
Solution
Solvent
Solute



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Science of Making Ice Cream

Purpose: To learn about the lowering of the freezing point of water by the use of rock salt and ice. To study the making of ice cream using ice/salt mixtures that gives temperatures below the freezing point of water.

Introduction

Dissolving any substance in water causes the freezing point of the solution to be lower than 0^{o}C. The use of rock salt (sodium chloride) to melt ice on roads is an illustration of this principle. Putting the salt on ice melts the ice since the resulting mixture has a lower freezing point than 0^{o}C. The amount the freezing point is lowered depends on the amount of salt used. Usually a temperature of - 10^{o}C is reached. Many students will be familiar with the use of rock salt to make ice cream. In Part I of this experiment the students will be measuring the lowest temperature reached when rock salt is added to ice. In Part II they will be making ice cream using a rock salt/ice mixture.

Background

In Western Alaska Ice cream is made out of tundra berries, Crisco, sugar, and oil. When large amounts of packaged food started coming to the Yupik Eskimo villages, milk ice cream was introduced to their culture. Now their berry ice cream, called "akutaq" when spoken in Yupik, is one of three kinds of ice cream. They eat milk ice cream, berry ice cream, and popsicles.

• Milk ice cream can be made out of many different kinds of ingredients. You can use condensed milk, snow from outside, ice cubes, soda, Kool-aid, sugar, half and half, and many other kind of ingredients.

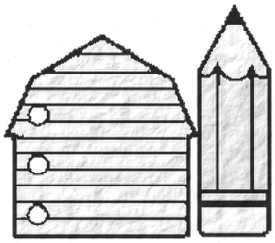
• berry ice cream called akutaq can also be made out of different kinds of ingredients. You can use black berries, blueberries, red berries, salmon berries, seal oil, Crisco, lard, fish eggs, any kind of fish meat, tundra plants, and sugar.

• a frozen popsicle is also called ice cream. Many people in Western Alaska refer to popsicles as ice cream.

Large amounts of ice cream are consumed in Western Alaska. The favorite kind remains to be akutaq, but more and more packaged foods, including milk ice cream, are making their way into all villages.

Materials - Enough for 15 pairs of students

15 #1 bags containing:
1 plastic cup marked for 1/4 cup of salt
1 plastic cup marked for 1 cup of ice
1 quart size Zipper-lock bag - use Bag #1
1 thermometer
2 containers of ice (need enough for 60 cups of ice)
1 small container of Dry Ice
2 boxes of rock salt (enough for 16 cups)
1 container of dry ice



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Nick Straw teaches at Chaputnguak School, Chefornak, in the Lower Kuskokwim School District.

3 quarts of half and half
1 bottle of vanilla
35 small paper cups for ice cream
35 small spoons
1 roll paper towels
2 trash bags - 1 for measuring cups and wet cups, 1 for trash/spoons and cups
15 #2 bags containing:
1 1-oz cup containing 1 Tbsp of sugar
2 quart size Zipper-lock bags
2 gallon size Zipper-lock bags
1 #3 bag containing:
2 plastic measuring cups for half and half (Marked for 3/8 cup)
2 plastic pipettes (marked for squirt of vanilla)
15 data sheets (see last page of lesson plan)

Part I Instructions:
Give each pair a #1 bag and tell them to do the following:
- Use plastic cup with 1 cup line to measure out 1 cup of ice.
- Pour it into a quart size zipper-lock bag (they should use the #1 bag for this)
- Use the thermometer to take the temperature of ice and record it.
- Use plastic cup with 1/4 cup line to measure out 1/4 cup of rock salt
- Add salt to bag with ice.
- Shake/rock the bag until ice melts.
- Take the lowest temperature of the melted ice with the rock salt and record it.

Compare the lowest temperatures recorded from each group of students. Ask the students why the salt melted the ice. Discuss how you will apply this technique to make ice cream in Part II.

Part II Instructions:
VSVS team members will be adding the half and half and the vanilla. Use items in Bag #3 for this. It will help move things along if two VSVS members add the half and half while one member adds the vanilla. Give each pair a #2 bag and tell them to do the following:

· Place one-quart size zipper-lock bag inside another of the same size, and one-gallon size
zipper-lock bag inside another of its same size. (This is to prevent water or ice cream from leaking out.)

· One of the VSVS team should remove the plastic measuring cup for half and half from
Bag #3 and go to each pair and add 3/8 cup of half and half to the inner small zipper-lock bag.

· Another member of the VSVS team should take the plastic pipette from Bag #3 and use it to add a squirt of vanilla to the inner small zipper-lock bag of each group.

· Then the student pair should add the pre-measured sugar from the 1-oz cup, mix together half and half, sugar and vanilla and seal both quart zipper-lock bags tightly, letting out most of the air in the bags.

· Next they should shake the bags gently to mix ingredients.
· In the inner gallon size zipper-lock bag, the student pair should mix together 3 cups of ice and 1/2 cup of rock salt, using their plastic measuring cups from Part I.
· Have them place the sealed bags with the ice cream mixture inside the larger zipper-lock bags with the ice and salt mixture.
· Seal both gallon zipper-lock bags tightly, again letting out most of the air in the bags.
· Gently rock the bag for about 5 minutes (Don't rock too hard or the bags will leak and you'll have salty ice cream!)
· When the ice cream is frozen enough, remove the quart bags from the gallon ones. Be sure to RESEAL the larger bags so that the salt water does not spill out!
· Remove the small inner zipper-lock bag, open the seal and squeeze the ice cream into the two plastic cups provided. Enjoy! :)

If any of the student pairs do not get solid ice cream, take their zipper-lock bag and place in the Dry Ice container for a few minutes.

Place the outer quart and gallon bags along with the measuring cups for ice in one trash bag. Put the other measuring cups and ice cream quart zipper-lock bags in the other trash bag. Return trash bags with kits. We will recycle the bags.

Websites
www.freerecipe.org/Dessert/Frozen/Ice_Cream/
www.ice-cream-recipes.com
www.bhg.com/home/Ice-Cream-Recipes.html

Other activities
How does homemade ice cream, or commercially made ice cream compare with akutaq? The word "akutaq" (phonetic: agoodik) means "the blended one, the mixture." Below is a Yupik recipe for akutaq from students at Marshall High School. Have your students try this or a similar recipe.

Akutaq
1 White fish
3 pounds Crisco lard
1 cup Wesson oil
1/4 cup sugar
1 gallon berries (your preference)
Boil White fish, take bones out, then squeeze juice out. Mix lard and Wesson oil together, and put sugar in. Add fish and berries. Whip it by hand until all the ingredients are mixed together.

Recipe Websites
http://www.ankn.uaf.edu/Marshall/gourmet/Akutaq.html
www.nortonsoundhealth.org/kaniqsirugut/k49/page20.pdf

Discussion Points (Social Studies unit)

1. The inclusion of milk-based ice cream in their diet is an example of how Alaska Natives' diets have changed because of contact with non Natives. What are other examples of this? Compare traditional Native foods with those from Western cultures.

2. The two recipes in the URLs referenced above are different. What might cause those differences? (Regional availability of game, fish and berries.)

Ice Cream Experiment Data Sheet

by _____

DATA SHEET
Initial temperature of ice: _____
Final temperature of melted ice and salt: _____
DATA SHEET
Initial temperature of ice: _____
Final temperature of melted ice and salt: _____
DATA SHEET
Initial temperature of ice: _____
Final temperature of melted ice and salt: _____
DATA SHEET
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