

Weird Science: We Scream For Ice Cream!

Happy last day of school! It's summer so let's celebrate with some ice cream science!

You'll Need:

- ◆ Half & half
- ◆ Vanilla extract
- ◆ Sugar
- ◆ Ice
- ◆ Rock salt or Kosher salt
- ◆ Gallon & quart sized ziplocks

Let's Make Ice Cream

1. Mix 1/2 cup of half and half, 1/4 teaspoon vanilla, and 1 Tablespoon of sugar in a quart sized ziploc bag. Seal well.
2. Fill a gallon sized ziploc bag with about 3 cups of ice. Pour in about 1/2 cup rock salt or kosher salt.
3. Place the small ziploc with the half and half mixture inside the larger bag with ice. Seal the top.
4. SHAKE for about 5 minutes or until your mixture solidifies into ice cream! Be sure to stop every few minutes to observe what is happening. Eat your ice cream!

Make It An Experiment

Make this activity an experiment by choosing one (or multiple) of the options below and comparing your results with the regular recipe above.

- Make a different batch simultaneously, but don't use any salt. What happens?
- Make a different batch simultaneously, and use two different types of salt. One bag with regular table salt and one with rock salt. What happens? How are the two results similar or different?
- Mix up the ice cream mixture and place it in the freezer. Time it to see how long it takes for it to solidify. How is the end result different from the shaken one? What do you think shaking does?
- Follow the instructions above but substitute a milk alternative for half and half (almond milk, etc.). How is the end result similar or different? How long did it take to freeze?

What Happened?

Let's start by reviewing what ice is! Ice is the solid (or crystalized form of water). In order for ice crystals to form (water to freeze), the water molecules have to slow down and line up in a pattern. But even when ice is frozen two things are always happening! The ice molecules at the surface are melting and then refreezing!

You may have noticed that the ice inside your bag started to melt and then melted a lot! This is because salt lowers the freezing point of water (the temperature that water can freeze). As the ice starts to melt, the water molecules mix with the salt molecules. . . This means they need a colder temperature to refreeze!

But where did the energy (heat) come from for the ice to melt in the first place? The heat comes from the surroundings...in this case your bag of milk mixture. As the ice takes the heat energy from the milk it allows the milk to freeze! The temperature inside the bag will get colder and colder as the ice and salt continue to interact. In fact, it will soon be several degrees below freezing!

But why do we shake the bag? Shaking the bag helps the warmer milk mixture move from the inside to the outside of the bag so it freezes evenly. It also adds lots of air bubbles and pockets to the mixture so that you get fluffy ice cream! It also helps create the emulsion — a mixture of liquids that normally don't mix well—like fat (milk/cream) and water (ice crystals).

Think: Why do you think we add ice to roads in winter?