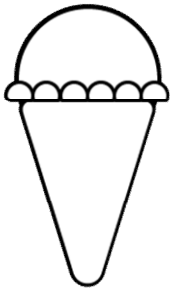


MoLab Mondays!

Sweet Science Ice Cream

MoLab is excited to have the opportunity to stay in touch with our MoFamilies and continue to provide on-the-go, dynamic, hands-on, and inquiry-based science experiences through a mobile laboratory that promotes discovery. Our weekly activities will engage your little investigators with hands-on learning that proves anyone can think like a scientist.

It's the sixth installment of MoLab Mondays! Sweet Science Ice Cream is one of our favorites. MoLab presents this activity at the end of each school year with students in Holy Comforter's extended care program. It can get a little messy, but it is perfect for our warmer weather!

Tools & Materials:

- ½ cup of cream (half and half or heavy whipping)
- 2 tablespoons of sugar
- ¼ teaspoon of vanilla extract, chocolate syrup, or other flavoring
- 6 tablespoons rock salt
- crushed ice
- small Ziploc or Hefty freezer bag
- large Ziploc or Hefty freezer bag
- Oven mitts or a towel (optional)

Making Your Ice Cream

- Fill the large freezer bag with crushed ice and sprinkle over with the salt. No need to run out to the store if you don't have rock salt. Try using ¼ - ½ cup of table salt instead.
    - Sturdy bags are SUPER important if you don't want a real mess on your hands—the freezer bags are a heavy-duty plastic and hold up better for this activity. Cheaper bags have weaker zipper seams that can break. Salty ice cream is never a hit.
- Combine the cream, sugar, and vanilla in the small bag, seal, and drop into the large bag.
- Seal and shake, shake, shake! The shaking process could take 5 – 10 minutes. Use oven mitts or a towel to protect your hands from the cold.
- Watch your ice cream solidify right before your eyes. Grab a spoon and enjoy!
- If it is still a little soupy, add more salt to the ice and keep shaking, or grab a straw and sip your homemade milkshake!

Make Observations and Ask Your Student

- How do the ingredients change during the process?
- What causes the cream mixture to solidify?
- Why is it important to shake the concoction?
- What role does the salt play?

What's Going On?

Making ice cream is a great opportunity to discuss phase changes and explore chemistry!

We know that matter is anything that takes up space. The three most common states of matter are solid, liquid, and gas. Solid particles are bond tightly together and do not have much space to move. Solids have a fixed volume and a definite shape. Particles in a liquid are bound more loosely and are farther apart. Liquids have a fixed volume, but they can flow and take the shape of the container they are in. Gas is cool because it can expand to occupy whatever volume is available. Think of a balloon at a party. The helium gas is contained inside the balloon until it pops! The helium gas then spreads out all over the room. The gas particles are spread further apart than in liquids.

Energy can cause matter to change states. Most children have had experience with ice cream or a snow cone melting on a hot day. When a substance melts, it goes from a solid to a liquid. Heat causes the temperature of the substance to increase and the particles gain energy. If heat energy is removed from a substance, it will eventually freeze when it reaches 32º F. You can place your soupy snow cone in the freezer to turn it from a liquid back into a solid. Your ice cream mix changed from a liquid to a solid because it was cooled by its surrounding environment.

In chemistry, the ingredients that you used to make your ice cream is called a mixture. A mixture is two or more things put together. Examples include salads, chocolate milk, sweet tea, soups, cakes, etc. Some mixtures can be easily separated. A salad is a good example of a type of mixture called a suspension. This is where the solute (minor component) is only suspended in the solvent (major component). It is easy to pick out onions from a salad. If you dissolve a solid in a liquid, you will create a special mixture called a solution. These mixtures can be difficult to separate. In a solution, the solute (minor component) is completely dissolved into the solvent (major component). Sweetened iced-tea is a good example where a solid (sugar) is completely dissolved into a liquid (tea). A solution is a homogeneous mixture which means it appears uniform throughout. Your ice cream is a homogeneous mixture.

Dig a Little Deeper

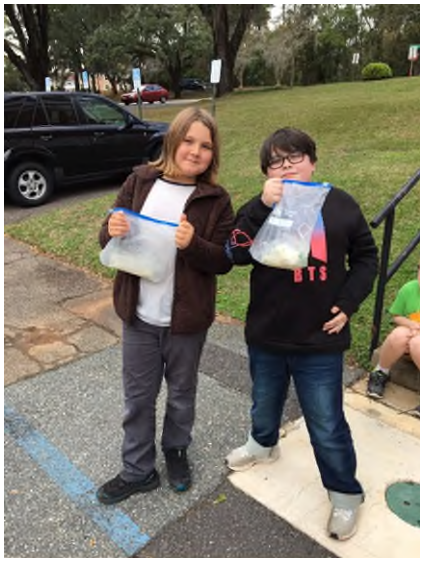
What's up with the salt? Maybe not in Florida, but up north they use salt on icy roads in the winter. When the salt is mixed with ice it causes the ice to melt. When salt comes into contact with ice, the freezing point of the ice is lowered. The lowering of the freezing point depends on the amount of salt added. The more salt added, the lower the temperature will be before the salt-water solution freezes. For example, water will normally freeze at 32º F. A 10% salt solution freezes at 20º F, and a 20% solution freezes at 2º F.

When salt is added to the ice in your bag, some of the ice melts because the freezing point is lowered. Always remember that heat must be absorbed by the ice for it to melt. The heat that causes the melting comes from the surroundings (the warmer cream mixture). By lowering the temperature at which ice is frozen, you were able to create an environment in which the cream mixture could freeze at a temperature below 32º F into ice cream.

Did You Know? In 1846, Nancy Johnson invented the hand-cranked ice cream churn and ice cream surged in popularity. Then, in 1904, ice cream cones were invented at the St. Louis World Exposition. An ice cream vendor ran out of dishes and improvised by rolling up some waffles to make cones.

Extension Activity Ideas

- Try substituting brown sugar for sugar.
- Try making the ice cream without adding the salt to the bag to see what happens.
- Explore the science of a brain freeze!



Happy Experimenting from MoLab, Inc!