Matter Changing States: Optional Extensions

Taking Away Heat- Ice Cream in a Bag

Students can make ice cream in plastic bags by using the following ice cream recipe: cup milk, teaspoon vanilla, and 1 tablespoon sugar. You will also need 4 cups crushed ice, 4 tablespoons salt, 2 quart-sized plastic bags, 1 gallon-sized plastic freezer bag (it must be a freezer bag with the greater thickness), and a hand towel or gloves to keep fingers from freezing. To prepare the bags, pour the ice cream liquid mixture into the first quart-sized bag. When sealing the bag, make sure all air pockets have been pushed out before sealing. Place that bag into the second quart-sized bag, and remove all air pockets again before sealing. Place those double bags inside the larger, gallon-sized bag. Fill the remaining space inside the gallon-sized bag with ice, then sprinkle salt on top. Again, let all the air escape, then seal the gallon-sized bag. Wrap the bag in the towel or put on gloves. Students should take turns shaking and massaging the bag, making sure the ice surrounds the cream mixture. An adequate amount of time for the mixture to freeze into ice cream is 5 to 8 minutes. Carefully open the bags and pour out the water from the melted ice cubes. Wipe the top of the smaller bags to remove any salty water. Serve the ice cream in plastic cups with plastic spoons. Some variations can include adding peppermint flavor to the ice cream liquid mixture. Discuss how salt lowers the temperature surrounding the ice cream mixture, which allows it to freeze faster.

Insulation Experiment

You will need three water bottles, four thermometers, four insulation devices, a small Styrofoam cooler, a plastic cooler, a thermos, and a small baby blanket. Each team will receive a thermometer and one insulation device. Heat the water to about 80F so that the hot water will not melt the plastic water bottles. Immediately pour the hot water into the thermos and into the three water bottles. The teams with the two coolers and the baby blanket will each get the water bottle containing hot water to immediately put into their container. The thermos team doesn't need a water bottle. Teams should predict which insulation best retains the heat and will have the highest temperature after 1 hour. After 1 hour, teams should remove the container from the insulation (or take off the thermos lid) and record the final temperatures. Teams should compare results.

Do Foam Can Wrappers Really Work

Have teams bring in a variety of the flexible foam holders that slip around the bottom of a soda can, which are supposed to insulate the can and keep it cold. Each team should have an equal number of cans with foam holders and cans without foam holders. Chill the soda cans in a cooler of ice. Teams should predict the number of degrees cooler the insulated cans will be than the noninsulated cans at the end of an hour. Teams will prepare a simple T-chart to record the temperatures of insulated cans with the temperatures of noninsulated cans. Quickly pass out cooled cans to teams. They will open each can and record the temperature of the liquid before placing half of them in foam holders and setting the others on the table without insulation. Measure and record the temperature of the liquid every 15 minutes. After 1 hour, compare the final temperatures from each team to see how many degrees cooler, if at all, the foam insulators differed from the cans without insulation. Students should graph the temperatures with the x-axis as time in minutes and the y-axis as the temperature in degrees Celsius. Each line of the soda can should be drawn with a different-colored pencil for easy comparison.