What Substance Melts Ice The Best? Essay, Research Paper

OBJECTIVE The objective for my project was to simply find out what the best substance for melting ice was. I used 5 substances traditionally used for melting ice in everyday life. For example, table salt. I made this into an experiment that shows how well and how fast the ice melted, and also, how much residue was left over after the experiment was completed. APPARATUS These are the materials I used to perform my experiment. Most of these things can be found in any local store. + 5 aluminum pie pans + water to fill each pan + 2 tablespoons of table salt + 2 tablespoons of sand + 2 tablespoons of kitty-litter + 2 tablespoons of safety salt + 2 tablespoons of common driveway pellets + Film + A camera EXPERIMENT This experiment involves leaving the pans in a cold environment for 24 hours after pouring the substances onto them. Then recording the results, for the amount of ice left, if the water reformed into ice, and the amount of the original substance left over at the end of the experiment. PROCEDURE Step 1: Pour an equal amount of water into each pie pan, then let freeze for two days. Step 2: Once there is ice in the pans, place the substances in different pans, and record by taking pictures. Step 3: Leave for 24 hours. Step 4: Take pictures of the pans again, record with pictures and perform observations. (\*\* NOTE: this must be done when the temperature stays near the same levels for 24 H.) HYPOTHESIS I believe that there will be three substances that will melt ice the best. I believe that the sand, the safety salt, and the driveway pellets will work the best out of all five substances over a period of 24 hours. I believe this because city work crews all over the world use these types of substances in their daily street clearing efforts. MORE ON THE APPARATUS ICE: Ice, as most people know, is frozen water. Cold temperatures cause it to form. It naturally forms on lakes, rivers, streams, and when it is extremely cold, even in the ocean. Snow, sleet, hail, and frost are all examples of ice in various forms, as well as the huge glaciers leftover from the ice age. Ice forms when the temperature of pure water is below 0.C (32.F). The only way ice won t freeze at this temperature is if the ice is diluted with another substance such as alcohol, salt or sugar. With substances like this in it, the ice will freeze at a lower temperature. The actual temperature is determined by the amount of “other” substances in the ice. Most substances contract as they get colder. Water on the other hand, only contracts until it reaches 4.C. As it freezes, water expands in volume by about 1/11 of the original water. i.e. when 11cmX of water is put into a freezer, it will come out 12cmX of ice. The molecules of unfrozen water are close together. They move about fast and randomly. As water freezes the molecules move further away and move slower. Such expansion may cause pipes to burst in the wintertime. Expansion also makes ice lighter than water. And that is why ice floats when it is in your drink. Ice begins to melt as soon as the temperature around it reaches 0.C. Since ancient times people have used ice. The first manufactured ice was in the USA in 1851. Today the industry sells 19 million cubic tons of ice a year. Every day ice is used to do things in your life. It chills your drinks, and it keeps your food from spoiling. Ice is used for lots of things, it s not just a winter annoyance. SALT: People use salt all the time. We add it to almost everything we eat; meat, vegetables, even bread and cake. Salt brings out the flavour in foods, but it does a lot more than that. It keeps water in our bodies. And as most people will know, the body is 2/3 made up of water. Even animals know they need salt to stay alive. They find salty rocks and plants to lick. Farmers give cattle big blocks of salt called salt licks, and sometimes farmers mix that in with the animal s food. Our blood, heart, and tears have salt in them. If you taste a tear you will find it tastes salty. People who do not eat enough salt will become unable to complete everyday tasks. Sometimes if the problem becomes too serious, they may die. Every day, people lose salt and water from their bodies. Sweating is one of the ways the salt and water gets out. People who work hard in the sun will sweat a lot and in turn will lose a lot of water and salt. The only way to replenish the loss is to eat. Some workers even take salt tablets. Athletes sometimes will takes these pills as well.

Older people need less salt than younger people, and some people can t put any salt into their bodies because they have too much water in their bodies. Today salt doesn t cost very much, but a long time ago it was very expensive and hard to get. Traders in India became rich from thier salt mines. They sold the salt to people in other countries, and in ancient Greece people used salt as money. Salt is not a food, it is a mineral. The scientific name for it is sodium chloride. Salt is found in two places on this planet. In the ground, and in the water. Large beds of salt lie deep in the earth, these beds are called salt deposits. These deposits are found worldwide, and sometimes they can be as much as 3,000 feet deep or more. In the world s oceans, there is enough salt to cover the USA 17 times. Salt is divided into two types, table salt, and coarse salt. Table salt is the small granules used in food, and coarse salt is the large pieces of salt used for melting ice. SAND: Sand is made up of melted glass particles. A single sand grain is an irregularly shaped rock. We are able to tell its composition by its shape. Some sand grains may also be volcanic rock. Erosion provides sand as well. Other sand can be seashells or large boulders crushed over time into tiny pieces. The shapes of sand can vary, it can be cigar shaped, or spherical. It can even be disk shaped. Sandstone is hard sand packed hard for thousands of years. Sand is used in places like Winnipeg during the winter for placing on roads for better traction for cars, trucks, and other vehicles. DRIVEWAY PELLETS: Driveway pellets are a store-bought composition. They have an immediate reaction when they hit ice, causing it to crack andeventually melt. Unfortunately these pellets, that are the size of cereal flakes, may not work in extremely cold temperatures and will freeze colder than the ice itself. These pellets can be found at most local hardware stores for 5 to $10 a bottle. OBSERVATIONS The following is what I observed immediately after the 24 hour period. TABLE SALT: The table salt had begun to work right away. It melted the ice down about half way, and because of the salt still in the pan, the water did not freeze again. There was a lot of the salt left over. You could still see it on top, and inside the ice. SAND: With the sand, one of the substances I expected to do a good job, there was a total opposite response. There had been no melting that could be seen, and if there was, the sand did not stop the water from freezing again. All of the sand was left over. KITTY-LITTER: The kitty-litter seemed to act much like the sand. There was no visible melting, and if there was, the water froze back up right away. As with the sand, most of the kitty-litter was left over. SAFETY SALT: The safety salt did a very good job, not only was all of the ice gone, but all that was left of the salt was a few pellets. This type of salt kept the ice from reforming by dissolving into the water. DRIVEWAY PELLETS: The driveway pellets did about the same amount of work as the regular table salt. It melted the ice to a point, but from there it just seemed to stop. The good point was, the water didn t reform into ice. But there was a lot of residue from the pellets left over. CONCLUSIONS Three of the substances did do a good job, but only two of the ones I had expected. I had thought that sand would be a valuable melting substance because so many cities and towns use it on their streets. But obviously it is only meant for grip, and nothing more. This is the same thing with the kitty-litter. It can keep you from falling, but it won t get rid of the problem. The other three substances, table salt, driveway pellets, and safety salt, all did a good job, but only safety salt completely melted the ice, and left very little visible leftovers. Table salt and driveway pellets melted the ice to a point, it eventually stopped and there was some residue left over. So the best substance for melting ice according to my experiment is, safety salt, which can be bought in any hardware store. My advice is to wait for a large discount store has it on sale, then buy your supply there at a reduced cost. ACKNOWLEDGMENTS I would like to thank the following people. My dad for helping me to get my materials you don t know how hard it is to find sand in the middle of winter. I also would like to thank the weatherman for telling me “It s going to be cold” during my experiment. And I d also like to thank my mom, who kept telling me that I had to finish my project before I went to Florida, and for making sure I saved all of my work in two separate places on the computer, “Just in case!”