

Inquiry Question

Why does putting salt on the road when it is icy help to make it less slippery?

Name: _____ Date: _____



In the winter time when the roads are icy, sometimes salt is put on the road. Salt is not ideal in all ways, as it does make vehicles rust faster, but it also makes the road less slippery. Why?

Often, salt is used on icy sidewalks where there is not the concern of rusting feet. 😊

What effect does the salt have on the ice?

In this project, you will be looking at the effect of salt and sugar on the freezing point of water. This will help to explain why it may be used on icy roads and sidewalks, particularly in climates where the winter temperatures hover just below zero degrees Celsius.

General Instructions

The goal of this project is to find out how the freezing point of water is affected by the presence of sugar or salt.

Materials you'll need:

- sugar
- salt
- 800 mL of distilled water
- 8 test tubes (alternatively, glass cups can be used)
- 8 beakers (glass cups or paper cups could be used instead)
- a basin
- tap water
- freezer
- ice cube trays
- 8 thermometers
- digital weighing scale for small masses
- black marker

Ideas and Hints:

1. For this science project, the independent variable is the amount of salt or sugar added to the solution. The dependent variable is the freezing point of the solution and this will be measured with a thermometer. The constants (control variables) are the temperature of the environment (which will remain at room temperature), the amount of solution in each test tube, and the temperature of the ice in the basin.
2. Mix 200 g of salt into 1 liter of water and then pour the solution into ice cube trays. Place the trays in a freezer and then leave overnight. The ice will be used to form an ice bath in the basin.
3. On the second day, label the 8 beakers and test tubes as Salt 0.5M, Salt 1.0M, Salt 1.5M, Salt 2.0M, Sugar 0.5M, Sugar 1.0M, Sugar 1.5M, and Sugar 2.0M.
4. Prepare 8 different solutions, into the correspondingly labelled beaker, as described below:
 - a. Salt 0.5M – Mix 100 mL of water with 2.9 g of salt
 - b. Salt 1.0M – Mix 100 mL of water with 5.8 g of salt
 - c. Salt 1.5M – Mix 100 mL of water with 8.7 g of salt
 - d. Salt 2.0M – Mix 100 mL of water with 11.6 g of salt
 - e. Sugar 0.5M – Mix 100 mL of water with 17 g of sugar
 - f. Sugar 1.0M – Mix 100 mL of water with 34 g of sugar
 - g. Sugar 1.5M – Mix 100 mL of water with 51 g of sugar
 - h. Sugar 2.0M – Mix 100 mL of water with 68 g of sugar
5. Create an ice bath by filling a basin with the ice cubes that you prepared earlier.

6. Pour some solution from each beaker into its respective test tube up to the halfway mark or about a height of 5 cm. Place a thermometer into each test tube. Then, place the 8 test tubes into the ice bath.
7. Observe when the first ice crystals start to form and make note of this temperature.
8. Record your results using a table.

Project submission:

You can either submit photos or a video of your project (along with an explanation and/or steps of construction) or, if you can drop-in to the school, you can present this project to your teacher in-person. Be sure to carefully organize any data collected so that any other student or teacher could reproduce your experiment and achieve the same results.