ACTIVITY 5: USING SALT TO MELT ICE

The purpose of this activity is for students to learn how salt affects the freezing point of water, helping to melt ice in the winter.

Materials Needed:

- zipper-lock quart bags
- ice
- large-crystal salt (coarse kosher or rock salt)
- thermometer

First, inform students that they will be working with their groups to learn how salt causes ice to melt. Provide them the materials and have them fill the bags approximately with equal amounts of ice and record the initial temperature of both bags and tightly seal one of them.

Then, have students add about 100g of salt to the other open bag of ice and tightly seal it. Have each student touch both bags and record their subjective observations of how cold the bags feel and what they notice about the phases of water present in each bag at the start.

Next, have students shake both bags gently (careful not to cause them to open and spill!) for approximately five minutes. Have students again feel each bag so they can record their subjective observations of how cold the bags feel, and have them list out what they notice about the phases of water present in each bag. Is any salt still visible? Have them open and record the temperature of each bag with the thermometer.

Last, have students analyze their observations and the temperature changes from before to later in the experiment. They should draw a particle diagram to represent each bag at the start and end of the five minutes.

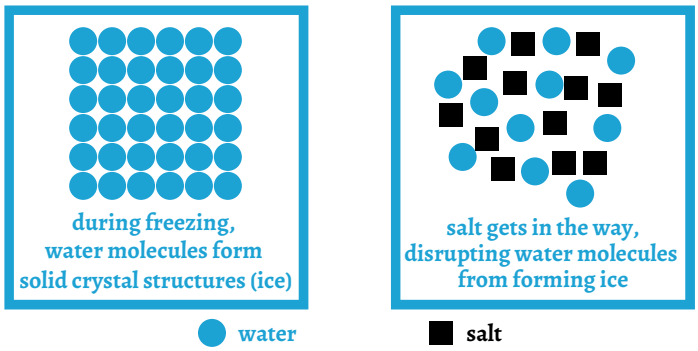

Image Credit: Gary Abud, Jr.

Engage students in a whole-group discussion about their results, helping them to notice agreement among their experiences with the ice. Elicit ideas from their particle diagrams to help them explain and understand how the salt interrupts the ability of the water to freeze at its normal temperature.

Explain to them this is known as **freezing point depression**, a product of adding extra particles to a substance like water that interrupts its ability to form hydrogen bonds, causing it to need colder-than-normal temperatures in order for its molecules to come together and freeze. The more particles there are (e.g., the more salt added to the bag in this case) to interrupt the freezing process, the more the freezing point gets lowered —this ultimately means the water would remain a liquid at colder temperatures.

Check for understanding by having students turn and talk with a partner to explain freezing point depression to each other and then elicit some student explanations of it to the whole group.

Finally, ask students to discuss freezing point depression with their groups and apply this concept to explain why people might put rock salt on their walkways during the wintertime when it snows.