

## How Does Rock Salt Work, Anyway?

Directions: Read the following passage and then answer the corresponding questions.

"How come adding rock salt to your ice cream maker makes the ice cream freeze and putting it on the road makes ice melt?" That's a good question, and here's the answer: in both of these scenarios, humans take advantage of the same scientific properties to achieve two different objectives.



Adding sodium chloride (otherwise known as table salt) to water acts to depress the freezing point of the salt-water solution. In other words, salt water freezes at a lower temperature than fresh water. The exact temperature depends on the concentration of salt and the type of salt used.

When rock salt is added to an ice cream maker, the resulting salt water solution can bathe the metal canister at a temperature less than 32°F (or 0°C). As the human adds ice, the temperature drops below 0°C, but the salt water solution doesn't freeze. The result? Harder ice cream!

When rock salt is added to the street, it depresses the freezing point of any water which dissolves it. This salt water solution can exist as a liquid at lower temperatures than fresh water. The result? Salty water, instead of clean ice, if the solution is strong enough to withstand the surface temperature.

### Speaking of Melting Ice ...

Pouring table salt on snowy (or pre-snowy) roads isn't the only way to melt ice. Sodium chloride is used because it is cheap and easy to obtain in large quantities. But, as any New Yorker with a car can tell you, salt can be quite corrosive. And as hard as it is on cars, it's just as hard on roadways and bridge decks. This is costly in the long run.

So, alternative methods to road salting are desirable. One type of alternative is using a different kind of salt. Some salts are more effective than others at lowering freezing points, and some salts are more environmentally friendly (and road-, car-, and bridge-friendly). However, these salts are typically much more expensive than ordinary sodium chloride.

written by Derek Arndt Meteorologist with the Oklahoma MesoNet

1. Why do we put salt on snow covered roads?
2. How does adding rock salt to an ice cream maker make the ice cream harder?
3. Why is it better to use salt on roads instead of sugar (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>)?

Name \_\_\_\_\_  
Period \_\_\_\_\_

Date \_\_\_\_\_

- Name two advantages to using NaCl on snowy roads instead of another type of salt.
- What is the scientific term used to describe the fact that adding salt to water decreases its freezing point?
- Explain why some people add salt to water. Does it make the water boiling faster? What exactly does the salt do to the water that would be a benefit for cooking?
- Explain why adding a molecular solid to water will not elevate boiling point as much as adding salt to water.
- If you add 2.0-g of MgO to water what will happen to the freezing and boiling points of water?
- Rank 1 mole of the substances  $C_{12}H_{22}O_{11}$ , NaCl,  $PbCl_2$ , and  $CaBr_2$  from least to most effective on snowy roads. Be sure to explain your answer—and you may need your reference tables for this one.
- If you add 2.0-g of MgO to water what will happen to the freezing and boiling points of water?
- Rank 1 mole of the substances  $C_{12}H_{22}O_{11}$ , NaCl,  $PbCl_2$ , and  $CaBr_2$  from least to most effective on snowy roads. Be sure to explain your answer—and you may need your reference tables for this one.