Smart Salting:
A Radnor Homeowners Guide to Winter De-icing

Earth Friendly Tips from the Radnor Township Environmental Advisory Council

FREQUENTLY ASKED QUESTIONS:

Q: Why is this information important?

A: Radnor Township ordinance requires homeowners and occupants of buildings or land abutting on a paved sidewalk to clear their sidewalks of snow and ice within 24 hours of storm. Here are some helpful answers to your questions about which type of de-icer will be the most watershed and wildlife friendly.

Q: What kinds of de-icing salt are there?

A: The most common de-icers are sodium chloride ($NaCl$), also known as rock salt, and calcium chloride ($CaCl_2$), both sold in solid form.

Q: Which is more effective at melting ice? Rock salt or Calcium Chloride?

A: Rock salt can melt ice down to 15-20ºF, making it a good option for mild freezing temperatures. However, calcium chloride melts ice at temperatures as low as -25ºF. Calcium chloride also melts ice faster than most other de-icers, by generating heat as it forms an ice melting brined.

Q: Which de-icer is better for pets?

A: Both chloride de-icing chemicals can cause a multitude of problems for animals walking on roads and sidewalks. Pets can develop dryness and irritation on their paws. Wipe all of the salt off their paws and fur and then wash carefully. Pets can also develop mouth irritation if they eat or lick the chemicals or the melt-water. They may even swallow enough sodium or calcium to poison themselves. If a pet develops drooling, vomiting, seizures, or other symptoms, call the veterinarian right away.

Q: Which de-icer is better for the environment?

A: De-icing chemicals, particularly rock salt, can impact plants and aquatic life after being washed onto lawns and gardens and into streams. The sodium ions in rock salt ($NaCl$) disrupt hydration and lead to scorched leaves or death. The calcium in $CaCl_2$, on the other hand, is an essential plant nutrient that is less likely to burn when properly applied around trees, shrubs, lawns, and sensitive roots.

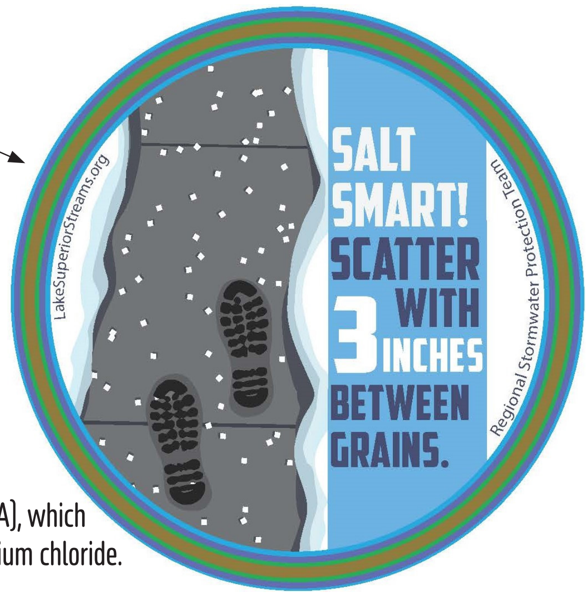
Q: How much de-icer should be applied to sidewalks and driveways?

A: No matter which deicing product you choose, **a little goes a long way. Please follow directions for application and *use sparingly*.** Additional de-icer won't speed up the melting process and increases the risk of harm to the environment and to pets.

Directions for application:

1) First, remove as much of the ice and snow as possible.
2) Next, for *rock salt*: apply about a handful per square yard.
   See graphic *(right)* to help you visualize the ideal spacing between grains.
   For *calcium chloride*: apply about a handful per 3-4 square yards*
3) Sweep and Keep: once the snow and ice have melted, consider sweeping up the remaining salt and saving it for the next round of wintry weather.

*NOTE: The lower application rate for calcium chloride offsets its roughly three-fold greater cost.



Q: Are there alternatives to sodium chloride and calcium chloride?

A: Yes, blended products combine the low cost of rock salt with the low freezing point of calcium chloride. You can also use magnesium chloride or calcium magnesium acetate (CMA), which are considered to be less toxic to plants and animals, but cost considerably more than calcium chloride.

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Pros and Cons of Rock Salt and Calcium Chloride De-Icers

The table below compares the properties of rock salt and calcium chloride de-icers. Calcium chloride is a superior de-icer compared to sodium chloride, owing to its lower melting temperature and faster melting. The lower application rate of calcium chloride rate not only can offset its greater cost, it may pose less risk of environmental harm.

Property	Rock Salt ($NaCl$)	Calcium Chloride ($CaCl_2$)	Notes
Cost	~1/3 of the cost of $CaCl_2$		Greater cost of $CaCl_2$ offset by its lower application rate (see below).
Form	Granular crystals	Pellets or flakes	NaCl crystals can hurt animal paws.
Availability	Widely Available	Less available	$CaCl_2$ is available online and big box home improvement centers.
Melting Temperature	20° F	-20° F	NaCl will not dissolve and work at severe sub-freezing temperatures.
Melting Speed	Slow	Fast	$CaCl_2$ generates heat as it dissolves.
Application Rate	Apply in a thin, even layer. A handful of rock salt per square yard. *See image below.	Apply in a thin, even layer. A handful of $CaCl_2$ per 3-4 square yards	Rock salt takes 3-4 times the amount of calcium chloride per square yard. Lower application rate of $CaCl_2$ may reduce risk of environmental harm.
Harm to Plants	Dehyration; chloride toxicosis	Dehydration; chloride toxicosis	$CaCl_2$ is a plant nutrient and less harmful if not over-applied.
Harm to Aquatic Life	Chloride loading, ferrocyanide	Chloride loading	Elevated chloride levels can cause cells to lose water and nutrients, ultimately killing fish, amphibians, plants and other aquatic organisms.
Harm to Pets	Chemical burns to paws and if ingested: dehydration, vomiting, diarrhea, and neurological toxicity	Chemical burns to paws, and vomiting, diarrhea, gastrointestinal irritation and/ or hemorrhage if ingested	Pet-safe ice melts typically contain urea or magnesium chloride which are considered slightly safer but may still cause gastrointestinal upset such as vomiting or diarrhea. These ingredients are also less effective at melting ice.

***Photograph of ideal spacing between rock salt grains** (*Clean Water Action*, 2024):

Resources:

Calcium Chloride or Sodium Chloride: Which Is Better for Melting Ice? *EarthDevelopment, Inc.*

Clean Water Action, Use Salt to Melt Ice? Here are some tips so you don't pollute your favorite lakes and rivers! , 2024.

Environmental impacts of road salt and other de-icing chemicals. *Minnesota Stormwater Manual.* Last edited: 23 November 2022.

Foss, TS. "The hazards of ice melts to dogs and cats," *Veterinary Technician. 2002*; February, pp. 94-95, 104.

Mansburger, Justin, "Watershed-Friendly Deicing," Penn State Extension, April 15, 2024.

Mishra, S.K. Winter Maintenance. *Roads and Bridges* January 4, 2002.

Pets, Kids, and Ice Melt Products. National Capital Poison Center.

Six Things to Know About Pet-Safe Ice Melts. *PetMD* Editorial. Reviewed by Veronica Higgs, DVM. Updated September. 26, 2023.

W. A. Nixon, G Kochumman, L. Qiu, J. Qiu, and J. Xiong. "Evaluation of Deicing Materials and Corrosion Reducing Treatments for Deicing Salts. Funded by the Iowa Highway Research Board Project TR 471." *IIHR Technical Report* #463. May 2007.

"What's New," *Lake Superior Streams*, 2018.