

INTEGRATED PEST MANAGEMENT FOR SNOW AND ICE

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Introduction

Managing snow and ice is similar to managing landscape pests or the health of turfgrass. An *integrated* approach will be most successful, providing reasonable control with the least economic and environmental cost. The term “ice melter” is analogous to the terms “pesticide” and “fertilizer;” each represents a wide variety of chemicals and products which behave and react differently from each other. All are intended to achieve a common goal: to control a pest; to grow plants; or – to melt ice.

The process of selecting an ice melter, therefore, is similar to the process used to select a pesticide or fertilizer. You first need to know what your **goals** are, then form a **management strategy** and review the available **control tactics** and, in some cases, make a **cost/benefit analysis**:

- How important is the protection of the *surface* (walkway, driveway, parking lot) being treated? Your product selection will depend on it. Around steel structures, you would not want to use a corrosive ice melter. New (less than a year old) concrete needs different treatment from seasoned concrete.
- Is your goal to simply make the surface (walkway) safe for pedestrians or the driveway safe for vehicles? Or, do you also need to be concerned about the impact of ice melters on these surfaces?
- As a building facilities manager, you may want to specify *non-aggressive* ice melters in your contracts. For new construction projects, consider installing heat cables under walkways and entrance ramps. What about protecting landscape plants? Is this important to you or someone *else's* worry?
- As a snow-removal (ice-removal) contractor, you will likely want to use the most cost-effective product, that which provides the greatest ice melting and protection against re-freezing for the least money. You may not be as concerned about the long-term effects on the paved surfaces or on plants.

Integrated Pest Management for Ice

Safe, effective snow and ice management *begins* with the design of the building and landscape:

- Planned areas for snow dumps (especially in a heavy snowfall winter like this one)!
- Planned drainage to remove snow and ice melt water.
- Roof / gutter heating cables for melting snowload and resultant ice buildup.
- Heating cables or hot water runs installed beneath walkways, entrance ramps, etc.

Develop a Snow and Ice Management Strategy:

- Protection against lawsuits from trip and falls?
- Protection of the surface materials?
- Safety for pedestrians and/or vehicles?

Explore the Available Snow and Ice Control Tactics:

- Permanent heat cables
- Traction aides
- Ice melting chemicals

Ice Melting Products and Their Components

Calcium Chloride (CaCl₂) – Effective melting to about -20°F. The most common brand name of 100% calcium chloride is **Peladow**, which is sold in pellets that work well in a spreader, or “chunky” flakes, which do not. Calcium and magnesium chlorides have the lowest effective working (melting) temperatures, and are both considered moderately aggressive to concrete, especially *new* concrete (less than a year old). Both calcium chloride and magnesium chloride are *exothermic*, releasing heat as they dissolve. **Peladow** brand calcium chloride is a premium product, and is priced accordingly. Use it for low temperature melting, where maximum effectiveness is required.

Magnesium Chloride (MgCl₂) - Effective melting to about -20°F. Many brand names are promoted; be sure to check the actual percentage of magnesium chloride content. Beware of the words “with,” “includes,” or “featuring” preceding “magnesium chloride,” as they could contain only a small percentage in the product. The brand **FreezGard** is 100% magnesium chloride, which has about the same effective melting temperature as calcium chloride, but is more *hygroscopic* – readily absorbs moisture (even from humidity) and becomes liquefied into a viscous state if left exposed to air. Magnesium chloride *wants* to be in the liquid state. It does everything it can do to convert from a solid to a liquid, and then resists evaporation. The result is that it melts ice very readily, but the “melt” may be slippery.

Both magnesium chloride and calcium chloride are classified as *hygroscopic*, but I personally have not observed the **Peladow** brand calcium chloride to change as rapidly to liquid in the bag or spreader. No problem when emptying the hopper after each application, but I would *not* recommend leaving either calcium chloride or magnesium chloride in the hopper between applications. These same characteristics mean they are effective at much lower temperatures, so many of the *blended* ice melters include a small portion (+\ - 5%) of calcium chloride or magnesium chloride to initiate the melting process.

Potassium Chloride (KCl) - Effective melting to about +15°F. A plethora of brand names are promoted for potassium chloride and potassium chloride *containing* products, so be sure to check the actual percentage in the contents. The brand names tend to be pretty ambiguous, so check the label, MSDS, or ask the seller for proof. One example of a 100% potassium chloride product is Northern Star Mineral’s **IceMelt**. If the temperature is at least 15°F, this will do a fine job melting ice, and it is priced well. It is a good value, spreads well, and has been of consistently good quality from Northern Star Mineral. With potassium chloride, the melted liquid will evaporate readily if conditions are right (low humidity, some air movement, sunshine/warming temps), and the melt is not at all viscous, so it can be used safely anywhere.

Sodium Chloride (NaCl) - Effective melting to about +15°F. Halite is 100% sodium chloride, commonly called rock salt. Halite is just a fancy word for rock salt (from the Greek word for salt: hals). Most people think Halite is a brand, because Diamond Crystal (now Cargill) has been very effective at promoting it as their "brand." Now other halites are jumping on the bandwagon. Be careful when selecting a brand, as most cheap versions are full of clumps, fine dusts, and often contain debris or trash, so they are always clogging-up spreaders. The effective melting temperature of rock salt is about the same as potassium chloride, not much below 15°F. Rock salt is the cheapest and most widely used ice melter by far, and is sold by the railcar and bulk truckload to municipalities and businesses, and by the bag to anyone else.

At Mollema, our customers depend on push spreaders to apply their ice melters, so we sell only **Cargill (Diamond Crystal) Halite** brand rock salt, the highest quality on the market. Commercial applicators cannot afford the additional labor time spent on cleaning and unclogging spreaders, so the cheap rock salt ends-up costing a whole lot more than the good stuff. Cargill Halite 100% sodium chloride is a good value for users that need full pallets, and compares with potassium chloride in effectiveness.

Blended / Combination Products

The effective temperature range of blended (combination) ice melting products is entirely dependent on the percentage of each of the components. Nearly all blended ice melters are just different mixtures of the same basic four components, listed above. The greatest percentage is always going to be the cheapest component – sodium chloride (rock salt), and for the more expensive products it may be potassium chloride. There will be *some* calcium chloride and/or magnesium chloride in small amounts to get the effective working range down much lower.

I tend to look very closely at the blended products, not because they don't melt ice, but because the price per pound value relationship is often difficult to judge. That is because the manufacturers hate to disclose the actual percentage of each component in their blends. It is all but impossible to find this information, but the best place is often the MSDS for the product. There, the ingredients are not always given in specific percentages, but *are* listed in order of greatest-to-least content. Examples of successful combination products are: **Safe Step, Remove, EC Grow Power Thaw, and Thaw Master.**

The best application for blended/combination ice melters is for people who want to have a single option, so they do not have to monitor the weather conditions or consider the effect on the treated surfaces. Because they contain mostly the lower-cost components, combination products are usually very economical also. And because most combination products include some calcium chloride and/or magnesium chloride, many of them can provide cost-effective ice melting.

Other Chemicals Used for Melting Ice

Ammonium Sulfate. This fertilizer is very aggressive on concrete, and not a very good ice melter. The effective melting temperature is only about +20°F. Not very cost-effective when compared to potassium chloride or sodium chloride.

Urea. A common, low-cost, fast-release nitrogen fertilizer (46-0-0) sometimes used to melt ice. Only effective to about +20°F. Does not contain chlorides, so it is less corrosive to steel and less damaging to concrete rebar. Not very cost-effective when compared to potassium chloride or sodium chloride.

Calcium Magnesium Acetate (CMA). Biodegradable, generally safe for the environment and does not attack concrete – but *very expensive!* (At least 30 times the cost of rock salt.) Roughly the same effective temperature as rock salt and potassium chloride, about +15°F. Can be effective, when applied *prior* to snowfall, at preventing ice from forming on paved surfaces. Not yet practical for wide use, except on bridges over rivers and lakes, to reduce pollution. Still way to expensive for most situations.

Potassium Acetate (PA). Liquid formulation works only to about +15°F, same as potassium chloride and sodium chloride, but without the negative environmental impact of the chlorides (or sodium).

Ethylene glycol. Liquid ice melter often mixed with liquid urea and sprayed on airplanes for pre-flight deicing.

Case Histories – Questions for Discussion?