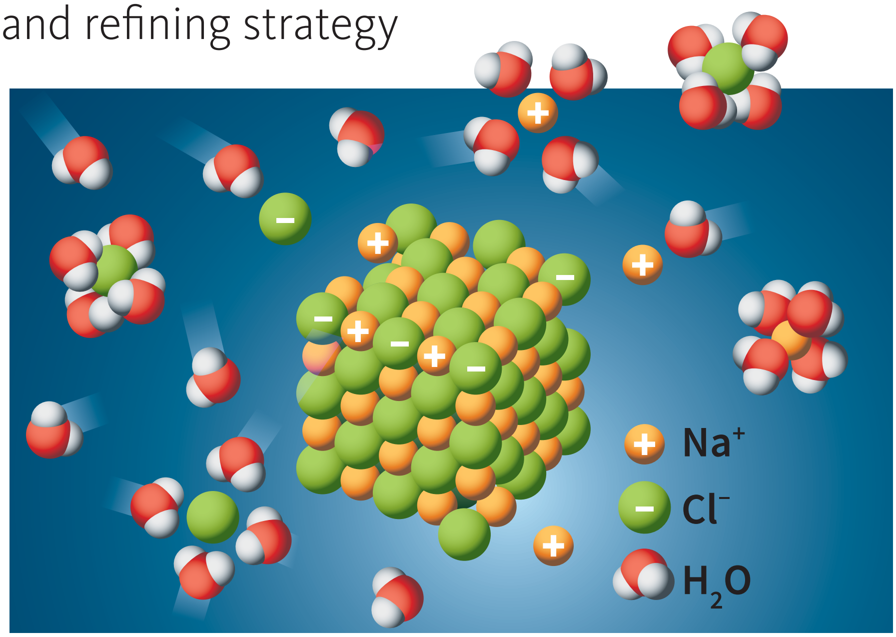
A MATTER OF CHEMISTRY

Key to using liquids correctly and effectively? Understanding science and refining strategy

BY DIANA CLONCH



How many times have you heard (or even said) "liquids don't work" for snow and ice control? I have heard this many times and am confident there have been many times where the use of liquids in a given situation did not provide the desired results. However, I am also confident it is more about a lack of understanding on how to use liquids than their ability to work or, as the case may be "not work."

It is essential to understand the key factors that are likely to influence the ability of a liquid product to be used successfully.

How they work

While there are a variety of chemicals available for snow and ice control, those primarily used in the private snow and ice industry are from the chloride family: sodium, calcium and magnesium. Depending upon the type of chemical and the amount of chemical in solution, they depress the freezing point of water to some temperature lower than 32°F.

Of these, sodium chloride (or rock salt) is the most commonly used since it is fairly affordable, available, easy to use and works under most conditions.

Rock salt is a naturally occurring mineral of a solid state. When rock salt is used for snow and ice control, the solid material must mix with the moisture (i.e., go into solution) to be effective or to create a solution that freezes at some temperature below 32°F. Once a solution is created, the freezing point of the solution remains below 32°F until the solution takes on additional moisture and dilutes. As this dilution occurs, decreasing the amount of chemical in the solution, the freezing point will approach the 32°F freeze point of water. The bottom line is that the chemicals must go into liquid form to actually work.

Typical treatment strategies

Deicing. Traditionally, snow and ice chemicals have been used for deicing. Once snow and ice accumulate, we typically use mechanical removal (e.g., plowing, shoveling, brooming, blowing) and then apply chemicals to promote melting of the remaining snow and ice. Typically these chemicals are in a solid form and they may also be pre-wetted with a liquid solution to improve their effectiveness. Deicing is a reactive approach.

Anti-icing. Since the early '90s, the anti-icing strategy has been gaining momentum as a treatment option to increase efficiency and effectiveness in snow and ice removal. Liquid sodium chloride (rock salt) salt brine is commonly used for this treatment but there are other options with varying properties available.

The proactive treatment strategy involves the application of a deicing chemical to the surface prior to the event to prevent a freeze bond of the snow and ice to the surface thus providing for more efficient removal. Additionally anti-icing can prevent the formation of frost and ice on a surface if such is likely to occur. In many cases, an anti-icing application has proven to be an efficient treatment of a surface so as to eliminate the need for further applications. The results will largely depend upon the previously stated factors but such outcomes are regularly achieved.

Combination strategy. Utilizing a combination of anti-icing and de-icing strategies can optimize successful outcomes providing for increased effectiveness and efficiency. For example, for an event that is expected to start with freezing rain, rock salt or treated rock salt may be applied since a liquid brine product would quickly dilute and wash away. As the winter event continues, the anti-icing treatment can help prevent the snow and ice from bonding to the surface and improve the efficiency of removal. Once the removal is performed, additional deicers may be applied to further prevent refreeze.

Building a knowledge and skill set will create an understanding of why a selected treatment "doesn't work" and allow the user to create the outcome in which a selected treatment will be successful. SB

Diana Clonch owns DW Clonch, LLC, and is a long-time consultant to the professional snow and ice management industry. Email her at dwclonch@gmail.com and visit www.dwclonch.com.

TREATMENT STRATEGY GUIDANCE

Several factors must be considered when choosing your treatment strategy. Attention to the various details and decision-making factors are critical for achieving desired outcomes and results regardless of the chosen strategy. Take time to understand the properties associated with the chemical being used as well as the variables associated with weather events and the nature of the environment being treated. A few critical factors to consider include:

1. **Surface temperatures (not air temperatures)**. There can be a vast difference between the two and since we are treating the surface, surface temperature is a major factor in determining the treatment timing, type and duration.
2. **Precipitation type, intensity and duration**. Differences in the moisture content of various precipitation types, the amount of moisture occurring and how long it actually occurs all impact the dilution of the chemical and its performance (e.g., how long will it work and when and if it will it be necessary to reapply). As an example, consider the difference between treating freezing rain and typical snowfall.
3. **Solar radiation (including shading and cold spots)**. This can strongly impact surface temperatures, creating heating and cooling.
4. **Surface composition, type and use**. Not all surfaces heat and cool at the same rate, which impacts chemical choice and its performance.
5. **Traffic patterns and frequency**. Chemical performance is impacted through movement (or lack of movement) on the surface and the generation of friction.
6. **Chemical properties**. Each product has different working temperatures, optimal concentrations, application rates and timing.