MAG

MAG Vs Calcium Chloride Chemistry

There are two primary differences between the Magnesium Chloride and Calcium Chloride molecule that affects its ice melting and dust control characteristics.

Chemical	Electric Charge	Molecular Weight
MgCl2	Mg^{2+} $2Cl^{-}$	95
CaCl2	Ca^{2+} $2Cl^{-}$	111

The two molecules are very similar except that molecular weight of Calcium is greater than Magnesium. You will find 17% more molecules in a pound of Magnesium Chloride than in a pound of Calcium Chloride.

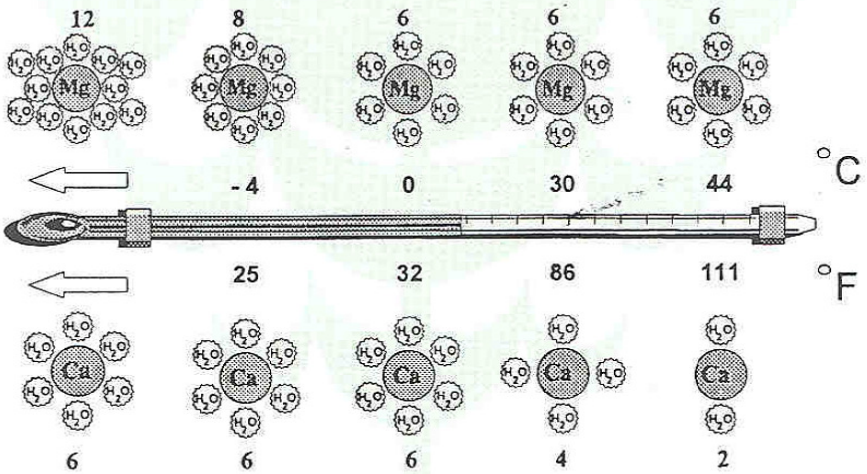
There is also a difference in the size of the molecules of the two chemicals with the Magnesium Chloride being smaller. The effect of this difference is more complex and calls for some background.

The ice melting and dust control ability of both chemicals is created by the bond between the negative ions of the water molecules and the positive ions of the metals Magnesium and Calcium. This bond keeps the water molecules in its liquid state and prevents freezing at low temperatures and evaporation at high temperatures.

Both metal ions have the same charge, but with the Magnesium molecule being smaller, the charge is distributed across a smaller surface area resulting in a stronger and denser electric field in the smaller molecule. The stronger the electric field, the tighter the bond between the Magnesium molecule and the attached water molecules.

The strength of this electric field and the tighter bond it forms with water determines the its ability to stay active as a liquid. As an ice melter, the water molecules bonded to a Magnesium or Calcium molecule will not freeze and remain a brine. As a dust suppresser, the water molecules bonded to either molecule will not evaporate and will maintain a moist condition.

To estimate the ability of both chemicals to bond water, lets look at he number of water molecules that crystals of Magnesium Chloride and Calcium Chloride contain at different temperatures.



Clearly, the more attached water molecules at working temperatures, either for ice melting or for dust control, means a more effective product. The characteristics of magnesium chloride is working in your favor for both ice melting and dust control.

TOTAL ICE CONTROL