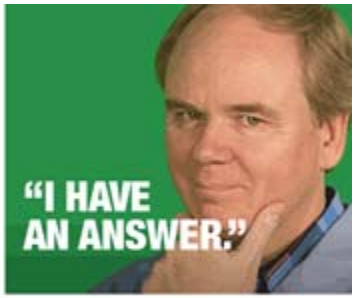
THANK YOU FOR SUBMITTING YOUR QUESTION...



ask DOCTOR SCOTT
Clear answers. Safer roads.

Your question:

Dr Scott: I have a deicing customer using MgCl treated salt, he's interested in adding YSP for anti-caking. I cannot find anyone that knows anything about what the dosage rate per ton of salt? Can it be mixed with liquid MgCl?

My answer:

Generally speaking, salt that has been treated with liquid magnesium chloride should not need an additional anti-caking agent. The liquid magnesium chloride itself will act as an anti-caking agent and rock salt treated with 6 to 8 gallons of liquid magnesium chloride per ton should remain free flowing under most winter storage conditions (assuming it is kept in covered storage and is not exposed to precipitation). But a little further explanation of how anti-caking agents work may be helpful to better understand the difference between salt treated with YPS and with liquid magnesium chloride.

Caking of deicing salt is primarily caused by evaporation of moisture from salt. Rock salt will usually contain a small amount of moisture and this will cause a thin layer of brine to form between adjacent salt crystals. As the temperature and humidity change in storage that moisture can evaporate, and when it does the layer of brine between salt crystals dries and forms new salt crystals which act as bridges between the neighboring crystals, fusing them together and forming a hard cake. YPS is the commonly used anti-caking for rock salt and it is extremely effective at preventing caking by this mechanism. YPS works by changing the shape of the salt crystals. Normally when a salt brine evaporates it will form cubic crystals, which act as strong bridges between neighboring crystals. In the presence of YPS, on the other hand, salt forms a type of crystal called a "dendrite." Dendritic salt crystals have a feathery appearance and are very fragile, preventing them from forming strong bonds between adjacent salt crystals.

Magnesium chloride, on the other hand, prevents caking by an entirely different mechanism. Magnesium chloride primarily inhibits caking by preventing the salt from drying out in the first place. Magnesium chloride is very "hygroscopic," which means it will absorb moisture from the air unless the humidity is very low. This is why pavements treated with liquid magnesium chloride tend to stay wet. Under typical winter temperature and humidity conditions, the magnesium chloride liquid treatment on the rock salt will not evaporate and so caking will not occur. If

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the temperature gets high enough and the humidity gets low enough, the treated salt will dry out and cake, but as soon as the humidity rises it will reabsorb water from the air and become free flowing again.

Caking can also be caused by the freezing of wet salt if the temperature gets very cold. YPS will not prevent caking by this mechanism, but magnesium chloride treatment will.

I do not recommend adding YPS to magnesium chloride treated salt as an anti-caking agent as I expect it will be poorly effective. The effect of YPS is very specific to the sodium chloride crystal. It does not have the same effect on magnesium chloride, and if conditions are such that the magnesium chloride treated salt can dry out, it will form magnesium chloride crystal bridges which the YPS will have no effect on. I did a quick test to check this. I prepared samples of salt treated with 50 ppm YPS alone (a standard treatment level for rock salt) and with 50 ppm YPS together with 8 gallons of liquid magnesium chloride per ton. After being forced dry in an oven, the samples with YPS and no liquid magnesium chloride were completely free flowing, but the samples treated both with YPS AND magnesium chloride were strongly caked.

Providing customers with deicing solutions that save lives, enhance commerce and reduce environmental impact.