

HR-243 Production and Evaluation of Calcium Magnesium Acetate

Key Words: Calcium magnesium acetate, CMA deicer, CMA production, Winter maintenance

ABSTRACT

Calcium magnesium acetate (CMA) has been identified by Bjorksten Research Laboratories as an environmentally harmless alternative to sodium or calcium chloride for deicing highways. Their study found CMA to be noncorrosive to steel, aluminum and zinc with little or no anticipated environmental impact. When used, it degrades into elements found in abundance in nature. The deicing capabilities were found to be similar to sodium chloride. The neutralized CMA they produced did cause scaling of PC concrete, but they did not expect mildly alkaline CMA to have this effect.

In the initial investigation of CMA at the Iowa DOT laboratory, it was found that CMA produced from hydrated lime and acetic acid was a light, fluffy material. It was recognized that a deicer in this form would be difficult to effectively distribute on highways without considerable wind loss. A process was developed to produce CMA in the presence of sand to increase particle weight. In this report the product of this process, which consists of sand particles coated with CMA, is referred to as "CMA deicer". The mixture of salts, calcium magnesium acetate, is referred to as "CMA".

The major problems with CMA for deicing are: (1) it is not commercially available, (2) it is expensive with present production methods and (3) there is very little known about how it performs on highways under actual deicing conditions. In view of the potential benefits this material offers, it is highly desirable to find solutions or answers to these problems. This study provides information to advance that effort.

The study consisted of four principal tasks which were:

1. Production of CMA Deicer

The objective was to further develop the laboratory process for producing CMA deicer on a pilot plant basis and to produce a sufficient quantity for field trials. The original proposal called for producing 20 tons of CMA deicer.

2. Field Evaluation of CMA Deicer

The objective was to evaluate the effective-ness of CMA deicer when used under field con-ditions and

obtain information on application procedures. Performance was compared with a regular 50/50 mixture of sand and sodium chloride.

3. Investigation of Effects of CMA on PC Concrete

The objective was to determine any scaling effect that mildly alkaline CMA might have on PC concrete. Comparison was made with calcium chloride.

4. Determine Feasibility of Producing High Magnesium CMA

The objective was to investigate the possibility of producing a CMA deicer with magnesium acetate content well above that produced from dolomitic lime. A high magnesium acetate content is desirable because pure magnesium acetate has a water eutectic of -22 F° as compared with $+5\text{ F}^{\circ}$ for calcium acetate and is therefore a more effective deicer.