

Technical Bulletin

Importance of Product Concentration for Potassium Acetate Runway Deicers

Customers have recently asked our opinion about potassium acetate runway deicers containing 35% potassium acetate instead of the usual 50% potassium acetate. These lower concentrations are being offered to lower product price.

SUMMARY

The active ingredient for deicing or anti-icing in potassium acetate runway deicers is potassium acetate. Traditionally, these deicers have standardized with a minimum concentration of 50% potassium acetate in water, by weight. Today, some suppliers are offering 35% solutions (more water) as a way to cut product cost. Customers should understand that the value of a deicer is determined by potassium acetate content. This can be determined by calculating the delivered cost of competing products on a dry weight basis (or 100% basis). A lower dry weight cost usually means better value for the consumer. The most cost efficient use of Cryotech E36, or other potassium acetate runway deicers, is to ship, store, and apply in the most concentrated form available.

IMPORTANCE OF POTASSIUM ACETATE CONCENTRATION

Potassium acetate is highly soluble in water. In laboratory conditions, more than 250 grams of pure potassium acetate can be dissolved in 100 grams of cold water, resulting in a 71% concentration. However, this concentration is not practical for deicer applications primarily due to the tendency for solid potassium acetate to fall out of solution from variations in temperature.

A concentration of 50% potassium acetate in water, by weight, was selected as the standard by the industry because it is a convenient upper limit based on economic manufacturing techniques and provides a stable liquid product for storage and handling in all field conditions. Deicing effectiveness is directly tied to the amount of potassium acetate present. If a weaker solution is applied, more volume will be required to get the same effect. Plus, there are additional operational costs from using a weaker solution: more storage, higher application rates, and higher freight costs.

Dilution affects freeze point; a 35% potassium acetate solution freezes at -22F (-30C), whereas a 50% solution freezes at -76F (-60C). The lowest effective temperature of a deicer is always well above its actual freeze point due to dilution effects. The most effective use of a deicer is to apply in the most concentrated form available, reducing applications and extending time between applications.

CALCULATING VALUE

It is common in the chemical industry to measure the value of active ingredients on a "dry weight basis", that is, without water present. For potassium acetate (KAc) runway deicers, this is the cost per pound of KAc per gallon of product. A 50% solution contains 5.4 lbs. of KAc per gallon. A 35% solution contains 3.5 lbs. of KAc per gallon. To calculate the cost per pound of KAc on a dry weight basis, divide the delivered product cost per gallon by the corresponding weight. Cryotech can provide additional assistance in determining the dry weight cost for other concentrations.