SALT MANAGEMENT STRATEGY: NON-TRADITIONAL BMP WORKGROUP

COMPARISON OF NON-CHLORIDE DEICERS

A comparison of non-chloride deicers for the SaMS Non-Traditional BMP workgroup is provided below. The selected non-chloride deicers are intended for use on paved surfaces (e.g., roads, parking lots, sidewalks, etc.). Specifically, the tables below compile information on specified acetates (potassium acetate (KAc) and sodium acetate (NaAc)), formates (potassium formate (KFm) and sodium formate (NaFm)), and potassium succinate.

Information gathered in Table 1 includes the lowest practical melting temperature, whether it's available as a liquid and/or solid, any required equipment or training, corrosivity to steel, impacts to concrete, and environmental impacts. Table 2 lists regional vendors to contact for additional information on the deicers identified in Table 1.

Table 1. Non-chloride Deicer Information

Non-Chloride Deicer	Lowest Practical Melting Temperature		Specialized Equipment, Handling, Application and or Storage Required?	Metal Corrosivity	Impacts to Concrete	Environmental Impacts	Notes about Performance
Acetates	KAc (potassium acetate)	-15°F	Yes	Corrosive to galvanized steel	Reactive on concrete	Moderate BOD[1] and moderate toxicity	Fast acting with a high melting capacity. Less material needed than NaCl
	NaAc (sodium acetate)	0°F					Excellent melting properties, works faster and at lower temperatures than NaCl.
	CMA (calcium magnesium acetate)	20°F					Works slowly and requires more material than NaCL. Otherwise performs similarly to NaCl.
Formates	NaFm (sodium formate)	0°F	Yes	Corrosive to mixed metal	Reactive on concrete		Fast acting
	KFm (potassium formate)	-20°F					Efficient at deicing
Potassium Succinate	-4°F		Yes	None	Minimal to none		Functions similar to that of NaCl at improving friction on roadways during snow and ice conditions, but functions at lower temperatures.

[1] Biochemical Oxygen Demand – a measure of how much a substance can reduce the amount of dissolved oxygen available to aquatic species.

Table 2. Regional Vendors of Non-chloride Deicers Identified in Table 1.

Non-Chloride Deicer	Vendor Name	Web Address	Vendor Location and Contact Information	Notes
Acetates	Chemical Solutions, Inc.	http://meltsnow.com/products/acetates	Franklin, Massachusetts 508-520-3900	Wholesaler only; minimum order of 22 tons. Delivers to NoVA
	Cryotech	http://www.cryotech.com	Fort Madison, Iowa 800-346-7237 or 319-372-6012	Offers free training on use of products. Delivers to NoVA
	NASi	https://www.nasi-tm.com/alpine-ice-melt	Marion, Ohio 800-622-4877 ext. 300	
	Hawkins, Inc.	https://www.hawkinsinc.com/groups/oil-field-chemicals/liquid-potassium-acetate-60	Roseville, Minnesota 800-328-5460 customer.service@hawkinsinc.com	Supplier for companies, municipalities, and government entities. Delivers to NoVA
	Midwest Industrial	https://midwestind.com/enviro-mlt	Canton, Ohio 866-662-3878	
	Seneca Mineral	http://senecamineral.com	Erie, Pennsylvania 800-291-9222	
Formates	Hawkins, Inc.	https://www.hawkinsinc.com/groups/oil-field-chemicals/liquid-potassium-formate-53	Roseville, Minnesota 800-328-5460 customer.service@hawkinsinc.com	Supplier for companies, municipalities, and government entities.
	Five Star, Inc.	https://www.fyvestar.com/sodiumformatesafeway.html	Layton, Utah 801-552-9100 info@Fyvestar.com	Distributor, not manufacturer.
	NASi	https://www.nasi-tm.com/nasi-sf---dot	Marion, Ohio 800-622-4877 ext. 300	
	Seneca Mineral	http://senecamineral.com/potassium-formate-deicer	Erie, Pennsylvania 800-291-9222	
	Envirotech	https://envirotechservices.com/deicing-anti-icing/non-chloride-based-deicing-products/apogee	New Cumberland, Pennsylvania 877-664-3401	Accepts both large and small orders.
Potassium Succinate	City Chemicals	https://www.citychemical.com/potassium-succinate.html	West Haven, Connecticut 800-248-2436, 203-932-2489 sales@citychemical.com	

References:

1. Colorado Department of Transportation. 2009. Evaluation of Alternative Anti-icing and Deicing Compounds Using Sodium Chloride and Magnesium Chloride as Baseline Deicers-Phase I. Prepared by Western Transportation Institute College of Engineering Montana State University-Bozeman. 270p. https://www.codot.gov/programs/research/pdfs/2009/antiicing.pdf
2. Fay, L., M Akin. 2018. Investigation of Alternative Deicers for Snow and Ice Control. Prepared by Center for Environmentally Sustainable Transportation in Cold Climates and the U.S. Department of Transportation. 28p. http://cem.uaf.edu/media/258373/Alt-Deicer_CESTiCC_Final-Report.pdf
3. Minnesota Department of Transportation. 2017. Transportation Research Synthesis 1706: Field Usage of Alternative Deicers for Snow and Ice Control. Prepared by The Western Transportation Institute. 24p. http://dot.state.mn.us/research/TRS/2017/TRS1706.pdf
4. Minnesota Department of Transportation. 2014. Transportation Research Synthesis 1411: Chloride Free Snow and Ice Control Material. Prepared by Fortin Consulting. 42p. https://lrrb.org/media/reports/TRS1411.pdf