

Dust Control and Base Stabilization – Tiger Calcium Services Inc.

All gravel roads give off dust under traffic. Dust not only reduces driver visibility but also cause road surface deterioration. Studies have shown that an untreated gravel road carrying 200 vehicles per day will experience the loss of 150 metric tons of aggregate per kilometer per year. Users of Tiger calcium chloride products have reported a reduction of aggregate losses by as much as 80%. The cost of dust control can more than pay for itself with the benefits of reduced material loss and reduced need for blade maintenance. Calcium chloride is one of the most commonly used dust control agents in Canada and the United States because of its high performance and low cost. Users of Tiger’s calcium chloride brine consistently report that the total unpaved road maintenance cost is reduced by 30-35%. Whereas, oil based emulsion dust control agents deteriorate road bed and consume valuable aggregate resource.

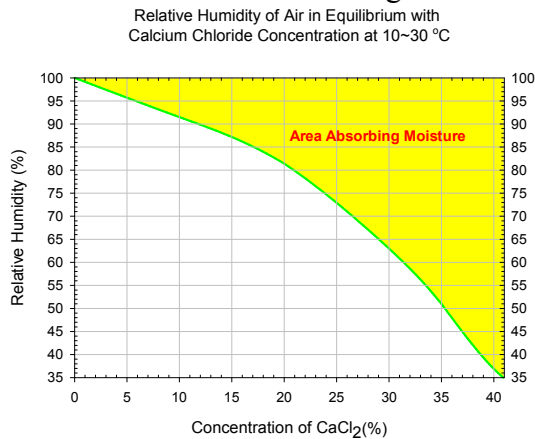


Table 1. Pounds of Water Absorbed per lb Calcium Chloride (100% based) at different Atmospheric Humidity

Relative Humidity (%)	95	90	85	80	75	70	65	60	55	50	45	40	35	30
lbs of Water Absorbed per lb of CaCl ₂	18.3	8.8	4.9	3.8	3.3	2.8	2.5	2.2	2.0	1.8	1.6	1.5	1.4	1.3

Benefits of Tiger’s Calcium Chloride Products

Calcium chloride is hygroscopic in nature, meaning it attracts moisture from air and surroundings until equilibrium is reached between vapor pressure of the solution and that of atmosphere. As the humidity of the air increases, more moisture is absorbed by the solution. Therefore, the equilibrium concentration of calcium chloride decreases with the increase of the air humidity. For instance, in an atmosphere with a relative humidity of 80%, one pound of pure calcium chloride can absorb 3.8 lbs of water until the concentration of CaCl₂ reaches its equilibrium concentration, i.e. 21%. One liter of Tiger’s 35% calcium chloride brine absorbs one liter of water from air having a relative humidity of 81%. The moisture absorbed helps keep road surfaces damp and dust down. Calcium chloride has low vapor pressure and therefore resists evaporation. A single application lasts a long time. Other benefits of Tiger’s calcium chloride products include,

- Reduces pot-holing and rutting
- Environmentally safe
- Easily applied with common road maintenance equipment
- Cost competitive
- Surface stabilization makes roads safer year round
- Reduces aggregate loss
- Significantly reduces the frequency and costs associated with periodic grading
- Helps protect road bases from winter freezing and related frost heaving
- Cumulative and long-tasting protection of road base with minimal migration

Comparison with other Dust Control Products

- Magnesium chloride brine – 3-4 times more toxic to aquatic life than calcium chloride.
- Lignos - it provides cohesion to bind the soil particles together. Negative environmental impact has been a concern.
- Resin and Oil Emulsions – the cost is high and may cause slippery conditions.
- Oil Well Brines – low concentration and less effective. These brines may also contain organic or heavy metals.

Application Tips for Dust Control

- The gravel must have a good gradation – particularly a good percentage of fine material with some plasticity (typical 10 –30% fines).
- The road must have a good crown (3-4%) in the driving surface and a good shoulder drainage.
- It is essential to loosen about 2 cm of the existing surface and leave it loose at a uniform depth across the roadway.
- Calibrate the spraying system and select a good application rate.
- Uniformly apply calcium chloride solution and compact the road.
- Add a second application later in the summer.

Preparation Tips for Base Stabilization

- Grade roadway to remove the deepest potholes and to maximize penetration of the product.
- Add additional gravel (clay fines: min. 10%, max. 30%) to provide an adequate wearing surface.
- Final grading should be done with a 3-4% crown for adequate drainage of water.
- Ensure adequate drainage in ditches to prevent water from ponding along road.
- Prewetting the road is recommended to facilitate full absorption of product into road.

Tiger's Brine Application Rates

% of Active Ingredients	25%	27%	30%	32%	35%	38%	40%
Rate for Light Traffic, liter/m ²	2.0	1.8	1.6	1.4	1.3	1.2	1.0
Rate for Medium Traffic, liter/m ²	2.4	2.2	1.9	1.7	1.6	1.4	1.3
Rate for Heavy Traffic, liter/m ²	3.0	2.8	2.4	2.2	2.0	1.8	1.6
Rate for Stabilization, liter/m ²	3.7	3.4	3.0	2.8	2.5	2.2	2.1

Tiger Calcium Brine Analysis

Type of Brine	Brine Concentration						
	<u>25%</u>	<u>27%</u>	<u>30%</u>	<u>32%</u>	<u>35%</u>	<u>38%</u>	<u>40%</u>
Calcium Chloride (%)	23.1	23.9	27.4	28.5	31.8	33.9	35.6
Magnesium Chloride (%)	2.3	2.8	2.9	3.5	3.7	4.1	4.3
Other Chlorides (%)	5.5	5.6	3.0	2.4	1.5	1.9	1.8
Specific Gravity	1.286	1.296	1.320	1.325	1.355	1.384	1.400
Hygroscopic Chlorides (%)	25-26	26-27	30-31	32-33	35-36	38-39	40-42

Flake Equivalent Tonne of Tiger's Calcium Brine

Litres/FET	Brine Concentration
1375 litres	40% CaCl ₂ /MgCl ₂
1464 litres	38% CaCl ₂ /MgCl ₂
1632 litres	35% CaCl ₂ /MgCl ₂
1816 liters	32% CaCl ₂ /MgCl ₂
1944 litres	30% CaCl ₂ /MgCl ₂
2200 liters	27% CaCl ₂ /MgCl ₂
2389 litres	25% CaCl ₂ /MgCl ₂