



# Dust Control and Base Stabilization

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All gravel roads give off dust under traffic. Dust not only reduces driver visibility, but also causes road surface deterioration. Studies have shown that an untreated gravel road carrying 200 vehicles per day will experience the loss of 150 metric tonnes of aggregate per kilometer per year. Users of Tiger's calcium chloride products have reported a reduction of aggregate losses by as much as 75%. The cost of dust control can more than pay for itself with the benefits of reduced material loss or 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.

## Benefits of Tiger's Calcium Chloride Products

Calcium Chloride liquid is **one of the most effective dust control and road stabilization compounds available**, making up over 80% of the material applied to Canadian roads annually (*Source: Roads and Transportation Association of Canada*). Calcium chloride is hygroscopic in nature, meaning it attracts moisture from air and surroundings until equilibrium is reached between the vapor pressure of the solution and that of the 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 3.8lbs of water until the concentration of  $\text{CaCl}_2$  reaches its equilibrium concentration:

ex. 21%. One litre of Tiger's 35% calcium chloride brine absorbs one litre 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:

**The advantages of Tiger Calcium Services’ Dust Control & Road Stabilization Products:**

- Absorb moisture from the road surface creating a film of water that attracts dust particles
- Regulate moisture on road surfaces, giving them durability that results in a longer life span
- Reduces pot-holing and rutting and works as a road stabilizer, making roads safer year round
- Significantly reduces the frequency and costs associated with regular grading
- Help protect road bases from winter freezing and related frost heaving
- Lowers the freezing point of the moisture in road bases to nearly 60 degrees below zero
- Create a road with cumulative and long-lasting protection of road base with minimal migration

**Comparison with other Dust Control Products**

- Magnesium chloride – is 3-4 times more toxic to aquatic life than calcium chloride
- Lignos – it provides cohesion to bind the soil particles together. Negative environmental impact.
- Resin & Oil Emulsions – the cost is high and may cause slippery conditions
- Oil Well Brines (crude oil) – low concentration and less effective. These brines may also contain organic, heavy materials, or heavy metals, which can be bad for the environment.

**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 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 with road
- Pre-wetting the road is recommended to facilitate full absorption of product into road

**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 good shoulder drainage.
- It is essential to loosen about 2cm of the existing surface and leave it loose at a uniform depth across the roadway.
- Pre-wetting the road is recommended to facilitate full absorption of the product into the road
- Calibrate the spraying system and select a good application rate
- Uniformly apply the calcium chloride solution and compact the road
- Add a second application later in the summer

**Tiger’s Brine Application Rates**

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

**Tiger Calcium Brine Analysis**

Type of Brine	Brine Concentration						
	25%	27%	30%	32%	35%	38%	40%
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 <sub>2</sub> /MgCl <sub>2</sub>
1464 litres	38% CaCl <sub>2</sub> /MgCl <sub>2</sub>
1632 litres	35% CaCl <sub>2</sub> /MgCl <sub>2</sub>
1816 liters	32% CaCl <sub>2</sub> /MgCl <sub>2</sub>
1944 litres	30% CaCl <sub>2</sub> /MgCl <sub>2</sub>
2200 liters	27% CaCl <sub>2</sub> /MgCl <sub>2</sub>
2389 litres	25% CaCl <sub>2</sub> /MgCl <sub>2</sub>

Relative Humidity of Air in Equilibrium with Calcium Chloride Concentration at 10~30 °C

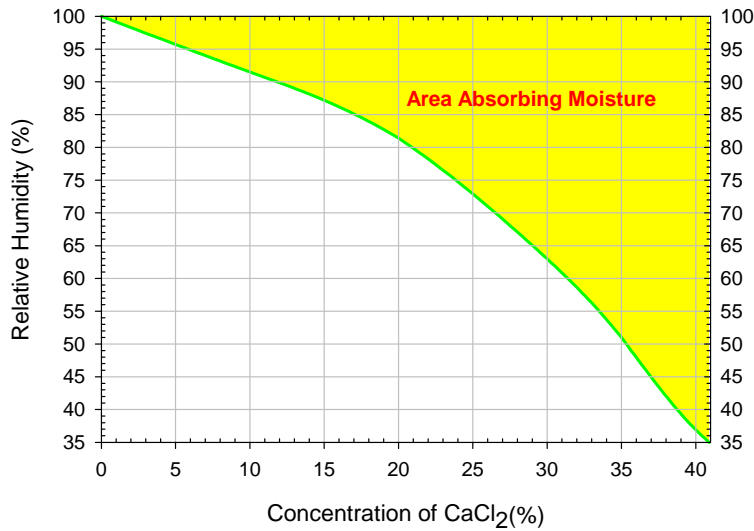


Table 1. Pounds of Water Absorbed per lb Calcium Chloride (100% based) at different Atmospheric Humidity