Dustex and the environment

Dustex products from Borregaard are lignosulfonates manufactured from the sulphite pulping of wood. Available data shows that they have a low toxicity towards aquatic and terrestrial species, and can hence be regarded as an eco-friendly alternative when used for stabilisation and dust control.

Biodegradation
The fate of lignosulfonate in nature is similar to the fate of trees, it degrades slowly. In this process, some is used as an energy source, some is incorporated into new biomass, while most of it forms humic substances and enters the natural carbon cycle.

Aquatic toxicity
Available studies on the toxicity to aquatic algae, short-term toxicity to aquatic invertebrates and short-term toxicity to fish all confirm that lignosulfonates are not harmful to aquatic species (Borregaard reports). The most sensitive species appears to be algae with a EC50 of 604 mg/l (OECD TG 201). Short term toxicity on fish gave LC50 values of > 2.400 mg/l (OECD TG 203), whereas the acute immobilisation test on daphnids gave EC50 (48h) values of > 800 mg/l (OECD TG 202).

Terrestrial toxicity
The acute toxicity to rats (OECD TG 401) has been shown to be low under experimental conditions with LD50 (oral) > 5.000 mg/kg bw (Borregaard reports). Lignosulfonates from Borregaard are not irritating to the skin (OECD TG 404) or eyes (OECD TG 405), and not regarded as a skin sensitizer (OECD TG 429) (Borregaard reports).

Borregaard has recently investigated the effect of lignosulfonates on earthworm, soil microflora and plants. In the 56-day earthworm reproduction study (OECD TG 222), no statistically significant adverse effects on mortality, biomass and reproduction were determined up to and including 3333 mg test item/kg soil dry weight, the highest concentration tested.
Lignosulfonates had further no adverse effects on the activity of soil microflora (OECD TG 216, Nitrogen transformation test) at the highest dose of 3333 mg test item/kg soil dry weight 98 days after application.
At last, in the plant study (OECD TG 208), the incorporation of lignosulfonates into the soil at a concentration of 1700 mg test item/kg soil dry weight tested with six terrestrial plant species caused no adverse effects on seedling emergence, survival of emerged seedlings and shoot fresh weight.

These results support earlier work showing that lignosulfonates have no negative effect on woody vegetation or herbaceous plants at normal concentrations¹, and have a very low toxicity to earthworms².

¹ Stapanian & Shea (1986) Lignosulfonates: effects on plant growth and survival and migration through the soil profile, International Journal of Environmental Studies, 27:1-2, 45-56
² Daneault; Report; Ecotoxicological study on dust laying agents, 1992
Lignosulfonate (E 565) is an approved feed additive in Europe according to “Regulation (EC) No 1831/2003 on additives for use in animal nutrition”.

**Bioaccumulation**
Lignosulfonates are water soluble post-reacted natural polymers and due to their high molecular weight the absorption in living organisms is low. Further, the log Kow* of -1.7 clearly indicate that the substance is not bioaccumulative (substances are considered to have a potential to bioaccumulate when the log Kow is $\geq 4$).

*The Kow is defined as the ratio of the equilibrium concentrations of a dissolved substance in a 2-phase system consisting of the largely immiscible solvents n-octanol and water, as the neutral form of the molecule. As such, it is a measure of the hydrophobicity of the compound.

**Conclusion**
Dustex have a low toxicity towards aquatic and terrestrial species, and no potential for bioaccumulation.

Based on available data, the products shall not be classified as dangerous according to GHS (Globally Harmonised System of Classification and Labelling of Chemicals).

The overall impact on the environment from applying lignosulfonates to roads is negligible, and safer to use for stabilisation and dust control than competing classes of chemicals\(^3\). Based on laboratory and field experiments, there is a low risk of negative effects on ground water and plants when lignosulfonates are applied on roads at recommended levels\(^4\).

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\(^3\) Adams (1988) Report; Environmental effects of applying lignosulfonate to roads

\(^4\) Walterson (1995) Report; Bedömning av miljöpåverkan vid behandling av vägar med dammbindmedel (Swedish)