

Dustex – Environmental-, Health- and Safety assessment

Dustex products from Borregaard are lignosulfonates manufactured from the sulphite pulping of wood. Available data shows that they are non-hazardous and safe to handle. The products have a low toxicity towards aquatic and terrestrial species and are eco-friendly alternatives when used as a binder for stabilisation and dust control.

Environment

(Bio)degradation

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. In natural environments there is evidence for biodegradation within a few months (LignoTech, 2008).

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 only when the log Kow is ≥ 4 , (UN, 2019)).

Effects on aquatic organisms

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 an EC₅₀ of 604 mg/l (according to OECD TG 201). Short term toxicity on fish gave LC₅₀ values of > 2.400 mg/l (according to OECD TG 203), whereas the acute immobilisation test on daphnids gave EC₅₀ (48h) values of > 800 mg/l (according to OECD TG 202).

Effects on terrestrial organisms

Borregaard has investigated the effect of lignosulfonates on earthworm, soil microflora and plants (Borregaard-reports). In the 56-day earthworm reproduction study (according to OECD TG 222), there was no statistically significant adverse effects on mortality, biomass and reproduction, even at the highest tested dose of 3333 mg test item/kg soil dry weight. Lignosulfonates also show no adverse effects on the activity of soil microflora (according to OECD TG 216) at the highest dose of 3333 mg test item/kg soil dry weight 98 days after application. In the plant study (according to 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 after 21 days on seedling emergence, survival of emerged seedlings and shoot fresh weight.

These above results support earlier work showing that lignosulfonates have no negative effect on woody vegetation or herbaceous plants at normal concentrations (Stapanian & Shea, 1986), and have a very low toxicity to earthworms (Deneault, 1992).

Health and Safety

Lignosulfonates from Borregaard have been shown to have low toxicity to rats (according to OECD TG 401) with a LD₅₀ (oral) > 5.000 mg/kg bw. They are non-irritating and non-corrosive to skin or eyes (according to OECD TG 404 and 405), and not regarded as a skin sensitizer (according to OECD TG 429) (Borregaard-reports).

Conclusion

Dustex products are non-hazardous and safe to handle, they 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 (UN, 2019). The safety is further supported by the approval of lignosulfonate (E 565) as a feed additive in Europe (Regulation-1831/2003).

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 (Adams, 1988). Based on laboratory and field experiments, the risk of negative effects on ground water and plants are low when lignosulfonates are applied on roads at recommended levels (Walterson, 1995).

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Definitions

- EC₅₀ Concentration of test substance which results in a 50 percent reduction in growth, growth rate or immobilization
- LC₅₀ Concentration at which 50% of the animals will be expected to die
- LD₅₀ Dose at which 50% of the animals will be expected to die
- K_{OW} 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.

References

- Adams. (1988). *Report; Environmental effects of applying lignosulfonate to roads.*
- Borregaard-reports. (various). *Study Reports, External independent laboratory (Intellectual Property).*
- Deneault, G. (1992). *Report; Ecotoxicological study on dust laying agents.*
- LignoTech. (2008). *Technical bulletin - Biodegradability of lignosulfonates.*
- Regulation-1831/2003. (2019). Consolidated version of Regulation (EC) No 1831/2003 on additives for use in animal nutrition. *Official Journal L 268.*
- Stapanian, M., & Shea, D. (1986). Lignosulfonates: effects on plant growth and survival and migration through the soil profile. *International Journal of Environmental Studies, 27:1-2, 45-56.*
- UN. (2019). *Globally Harmonized System of Classification and Labelling of Chemicals (GHS): Eighth Revised Edition, UN, New York.*
- Walterson. (1995). *Report; Bedömning av miljöpåverkan vid behandling av vägar med dammbindmedel (Swedish).*