



Metal-based nanoparticles in soil: Fate, behaviour, and effects on soil invertebrates

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Abstract

Metal-based nanoparticles (NPs) (e.g., silver, zinc oxide, titanium dioxide, iron oxide) are being widely used in the nanotechnology industry. Because of the release of particles from NP-containing products, it is likely that NPs will enter the soil compartment, especially through land application of sewage sludge derived from wastewater treatment. This review presents an overview of the literature dealing with the fate and effects of metal-based NPs in soil. In the environment, the characteristics of NPs (e.g., size, shape, surface charge) and soil (e.g., pH, ionic strength, organic matter, and clay content) will affect physical and chemical processes, resulting in NP dissolution, agglomeration, and aggregation. The behavior of NPs in soil will control their mobility and their bioavailability to soil organisms. Consequently, exposure characterization in ecotoxicological studies should obtain as much information as possible about dissolution, agglomeration, and aggregation processes. Comparing existing studies is a challenging task, because no standards exist for toxicity tests with NPs. In many cases, the reporting of associated characterization data is sparse, or missing, making it impossible to interpret and explain observed differences in results among studies.

Reference

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