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Applicability of non-exhaustive extraction procedures using Tenax[®] and HPCD to estimate biodegradable contaminant fractions in soil

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Conventional soil extraction has focused on removing the total quantity of contaminants using exhaustive extraction techniques. However, not the total concentration of a contaminant present in a given soil is available for uptake by living organisms. A large number of investigations has demonstrated that the exposure of soils to organic contaminants over long periods of time generally results in tighter associations with the soil matrix and, consequently, in a reduced availability for transport and uptake by biological systems. The need to understand the uptake and release of hydrophobic organic pollutants has led to various laboratory approaches, such as non-exhaustive extraction techniques, to determine the degree of bioaccessibility of organics in soils. In the joint research project "BioRefine" (*"Assessment of pollutants in the sustainable management of areas based on availability and bioavailability"*) existing non-exhaustive extraction techniques using Tenax[®] and HPCD are tested for their ability to predict PAH and petroleum hydrocarbon biodegradation in soil. 11 historically contaminated soils with PAH concentrations between 74 and 680 mg/kg and concentrations of petroleum hydrocarbons from 330 to 4704 mg/kg were analyzed. Both extraction procedures showed promising results for estimating the biodegradable contaminant fraction of both contaminant groups concerning the feasibility, reproducibility and correlation with soil biodegradation. Both methods have the potential to be used to assess the biodegradable hydrophobic organic pollutant fraction in contaminated soils. In a direct comparison of the two extraction procedures, Tenax[®] extraction is assessed to be more time-consuming than HPCD extraction. Furthermore, a sufficient soil/Tenax[®] ratio has to be considered.

Biography

Kerstin Derz has received her diploma in biology and her PhD from RWTH Aachen University, Germany. She is working since 2004 at Fraunhofer IME with the focus on environmental fate and metabolism, availability and bioavailability of substances. She is a member of the national working group "Bioavailability" of the DIN committee of standardization.

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