Topical Scientific Workshop on Risk Assessment for the Sediment Compartment
Poster summaries

Poster Number

12

Topic	Exposure assessment
Title	**Modeling Pore Water and Benthic Animal Tissue Concentrations in PCB Contaminated Lake Sediments**
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Keywords: Partitioning models, equilibrium passive samplers, pore water

Summary: Successful risk assessment of contaminated sediments requires knowledge on exposure and effects. Methods able to quantify exposure and estimate tissue concentrations for sparingly soluble hydrophobic organic contaminants are available in scientific literature but need further testing and empirical validations. The purpose of the present experiments was to test partitioning models for PCB pore water estimations and perform validations with passive sampling techniques. Further, models and passive samplers were applied to derive benthic animal steady state tissue concentrations and the success was tested with a laboratory bioaccumulation tests and field collected native animals.

Equilibrium sampling with polyoxymethylene (POM) strips and silicone coated vials was successfully used to measure pore water concentrations in three PCB contaminated sediments and served as empirical observations for partitioning models. Partitioning model dividing sorptive phases to amorphous and black carbon with a freundlich coefficient (0,7) was clearly better than a model with only one carbon phase for PCB congeners. These modeled and sampler detected pore water concentrations were multiplied with bioconcentration factors to derive steady state tissue concentrations and compared to empirical oligochaete and chironomid tissue residues. Both approaches underestimated empirical values but were within one log unit. Coated vial silicone concentrations were further converted to lipid based animal concentrations by multiplying Cpdms with Koliveoil,pdms ratio. Now oligochaete and chironomid concentrations were slightly overestimated. Native mussels, on the other hand, were fairly close around the 1:1 line.

Overall, these results support the importance of partitioning for the benthic bioconcentration of hydrophobic organic contaminants. The applicability of equilibrium sampling for analyzing pore water concentrations was also successfully demonstrated. The conversion of sampler concentrations to "equilibrium partitioning concentrations in lipids" is a simple approach that was either accurate or on the conservative side. This approach seems thus promising for risk assessment, but further research is needed to assess the applicability domain of this approach with regards to chemicals and organisms.