Hydrophobicity, lipophilicity and bio-availability of trace metals in coastal systems

Fact Sheet

Project Information

HOMER

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Project closed

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Human resources and Mobility in the specific programme for research, technological development and demonstration "Structuring the European Research Area" under the Sixth Framework Programme 2002-2006

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No data

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Coordinated by
UNIVERSITY OF PLYMOUTH HIGHER EDUCATION CORPORATION
United Kingdom

Objective

It is widely accepted that the most chemically reactive and biologically available form of trace metal in natural environments is the free ion. For many metals, organic complexes dominate metal speciation in natural waters and the free ion comprises a relatively small fraction of total metal.

Some complexes of trace metals are, however, thought to display toxic characteristics when they are sufficiently small and hydrophobic (or lipophilic) to cross the plasma membrane directly. The partitioning of a chemical between water and n-octanol is a widely used and internationally accepted standard test for determining the lipophilicity and bioavailability of organic contaminants.

In this study, we propose to apply this approach to examine the hydrophobicity, lipophilicity and bioavailability of trace metals in estuarine environments of European coastal areas. Water samples from contaminated freshwater and brackish water environments will be filtered through a series of standard and ultra filters in the range 1000 Da to 0.5 µm in order to distinguish the size fractionation of hydrophobic metals.

Fractionated samples will be incubated with n-octanol and the two phases then separated and analysed for metals (Al, Cd, Cu, Fe, Hg, Mn, Pb, Zn) by ICP-MS or AAS. Additional experiments will involve the addition of toxic platinum group metals (Pt; Rh; Pd) to natural samples and the kinetics of formation of lipophilic platinum group metals will be examined.

The results will be presented in terms of conditional octanol-water water partition coefficients, Dow, representing hydrophobicity, and Kow, representing lipophilicity and specific to metal species that are small enough to penetrate the cell membrane.

The results of this study will afford a novel, yet invaluable insight into the speciation (including the refinement of chemical speciation models), bioavailability and toxicity of trace metals in the natural environment and will have a general application to European coastal systems.

Fields of science (EuroSciVoc)

natural sciences > chemical sciences > inorganic chemistry > **transition metals**

engineering and technology > **materials engineering**

Programme(s)

FP6-MOBILITY - Human resources and Mobility in the specific programme for research, technological development and demonstration "Structuring the European Research Area" under the Sixth Framework

Programme 2002-2006

Topic(s)

MOBILITY-2.1 - Marie Curie Intra-European Fellowships (EIF)

Call for proposal

FP6-2002-MOBILITY-5
See other projects for this call

Funding Scheme

EIF - Marie Curie actions-Intra-European Fellowships

Coordinator

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No data

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Links

Contact the organisation Website
HORIZON collaboration network

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