

Contents in Context

Environmental Chemistry, Vol. 6(4), 2009

The role of speciation in environmental chemistry and the case for quality criteria

Graeme E. Batley, Kevin A. Francesconi and William A. Maher

Environ. Chem. 2009, 6, 273

Critical review perspective: elemental speciation analysis methods in environmental chemistry – moving towards methodological integration

Jörg Feldmann, Pascal Salaün and Enzo Lombi

Environ. Chem. 2009, 6, 275

Elemental speciation defines mobility, accumulation behaviour and toxicity of elements in the environment. Environmental processes are then modelled using species information. Hence, it is important for environmental chemists to rely on unequivocal, precise and accurate analytical data for the identification and quantification of elemental species.

Metal speciation and bioavailability: revisiting the ‘big questions’

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Four decades of research on metal speciation and bioavailability have failed to answer the ‘big questions’ of the ecological consequences of metal stress. Important, though still insufficient, insights have been gained from analytical approaches derived from inorganic environmental chemistry (targeting the quantification of free metal ion or ‘labile’ metal concentrations) and from organic environmental chemistry (focusing on the structure of ambient metal species). The ‘omics’ approach, not yet widely applied to this topic, offers the possibility of providing sufficient information to identify a quantitative signature of metal stress.

Enhancing reliability of elemental speciation results – quo vadis?

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Environ. Chem. 2009, 6, 294

The majority of publications reporting research in the field of metal speciation devote too little effort to ensuring quality, reliability or traceability of data. This essay discusses the current state of practice and proposes that we adopt a minimum set of standards or benchmarks to which such studies should be held accountable.

Insect excretes unusual six-coordinate pentavalent arsenic species

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Arsenate, in which oxidised arsenic is coordinated to four oxygen atoms, is common in the environment. We have found that a moth larva excretes an unusual form of oxidised arsenic which is bound to six oxygen atoms. Since the chemical groups which give rise to this species are abundant in environmental and biological systems, more research is needed into the possible presence of such six-coordinate complexes in natural systems.

Impact of pH on Cd^{II} partitioning between alginate gel and aqueous media

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Environ. Chem. 2009, 6, 305

Biogels, such as those in cell walls or biofilm matrices, generally comprise negative structural charge which leads to accumulation of positively charged species, e.g. metal ions. The magnitude of the effective charge, and hence the local chemical speciation within the gel phase, is pH dependent. In situ speciation measurements in biogels, such as the model alginate studied in this work, offer a better estimate of bioavailable concentrations than does analysis of the surrounding aqueous medium.

Fast determination of methyl chloride and methyl bromide emissions from dried plant matter and soil samples using HS-SPME and GC-MS: method and first results

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Environ. Chem. 2009, 6, 311

Headspace solid-phase microextraction (HS-SPME) and analysis by gas chromatography–mass spectrometry (GC/MS) system has been employed for quantifying the emissions of methyl chloride (CH₃Cl) and methyl bromide (CH₃Br) from plants and soils. Compared with more commonly used techniques, HS-SPME coupled to GC/MS is simple, fast, sensitive, economical and non-destructive, with potential for laboratory-based and field studies.

Arsenic speciation in bodily fluids of harbor seals (*Phoca vitulina*) and harbor porpoises (*Phocoena phocoena*)

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Environ. Chem. 2009, 6, 319

Marine mammals play an important role in their ecosystem. As top predators they ingest a lot of arsenic from their food. In the present study bodily fluids and tissue samples of harbor seals and porpoises were investigated for arsenic speciation in order to obtain a clearer picture on their feeding habits and consequently a better understanding of the mass mortality of the animals in the North and Baltic Sea.

Hexabromocyclododecanes in human adipose tissue from Japan

Tomohiko Isobe, Hiroko Oda, Nozomi Takayanagi, Tatsuya Kunisue, Hiroaki Komori, Norimasa Arita, Norifumi Ueda, Masato Nose, Taketo Yamada, Shin Takahashi and Shinsuke Tanabe

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Contamination by hexabromocyclododecanes (HBCDs), a group of brominated flame retardants, is of great concern due to their bioaccumulative nature and toxic implications. HBCD consumption in Japan is the highest among Asian countries and is still growing. In this regard, human exposure to HBCDs is of great concern in Japan. We present here the results of our investigation on Japanese human adipose tissue using LC-MS/MS. HBCDs were detected in all the samples analysed, and were generally higher in men than in women.

Estimation of the association and dissociation rate constants of Cd complexes with various aminopolycarboxylic acids by an exchange method

André Schneider, Christophe Nguyen and Laurence Denaix

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Phytoremediation is a potential way to remove cadmium from polluted soils. The process of plant uptake of cadmium can be enhanced by the addition of chelating compounds. The ability of roots to effectively take up Cd when bound to these complexes is dependent on the speed at which the Cd is associated or dissociated (bound or unbound) from the complex. An exchange method is used here to estimate these association and dissociation rates for a series of Cd–aminopolycarboxylate complexes (some of which have been tested elsewhere in phytoextraction studies). The results of these studies may make it possible to better model the bioavailability of Cd to plant roots.

The major source and impact of phenyltin contamination on freshwater aquaculture clam *Corbicula fluminea* and wild golden apple snail *Pomacea canaliculata*

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Phenyltin contamination is worldwide, and can be detrimental for aquatic ecosystems. Such contamination is largely due to the wide use of triphenyltin-based antifouling paints in the marine environment, but also to its use as fungicides and molluscicides in agriculture. This study provided the data to allow assessment of the accumulation potential of phenyltin compounds in molluscs, and established the correlation of phenyltin concentrations between biota and environmental matrices.

Molecular modeling of iron and arsenic interactions with carboxy groups in natural biomass

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Environ. Chem. **2009**, *6*, 350

Arsenic has been considered one of the most important global environmental pollutants. Its occurrence in water systems is a result of natural processes and anthropogenic activities. In view of their high toxicity and the consequent health problems associated with human exposure to contaminated waters and food, there is an increasing interest in the study of the specific interactions of arsenic species with organic matter. Here, specific interactions among arsenic, iron and a vegetable biomass are investigated with a view to demonstrate how these interactions can affect arsenic mobility in the environment.