

Contents in Context

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Measuring Marine Iron(III) Complexes by CLE-AdSV

R. M. Town, H. P. van Leeuwen

Environ. Chem. 2005, 2, 80

Iron is an essential element for life in the world's oceans, and in some regions its concentration limits the growth of phytoplankton. The amount of iron(III) which is available to an organism depends on the exact chemical form in which it exists, for example as dissolved ions or associated with organic compounds. There are widespread reports that marine iron(III) is predominantly bound in extremely strong complexes. We show that such claims might be the result of an artefact of the measurement technique, CLE-AdSV. Ensuing ideas about the iron biogeochemistry in marine systems might require reconsideration as well.

Comment on 'Measuring Marine Iron(III) Complexes by CLE-AdSV'

K. A. Hunter

Environ. Chem. 2005, 2, 85

Town and Leeuwen's paper (*Environ. Chem. 2005, 2, 80*) challenges interpretations of the role of organic matter binding iron in the ocean. This challenge is based on the theory behind a commonly used electrochemical technique, CLE-AdSV. Consistent experimental measurements for iron and other metals and the use of other techniques suggests that their interpretation of iron(III) being non-bioavailable is incorrect and, rather, the use of CLE-AdSV needs to be modified.

Organic Iron Complexation Is Real, The Theory Is Used Incorrectly. Comment on 'Measuring Marine Iron(III) Complexes by CLE-AdSV'

C. M. G. van den Berg

Environ. Chem. 2005, 2, 88

The theoretical basis on which Town and van Leeuwen (*Environ. Chem. 2005, 2, 80*) dispute current ideas on the speciation of iron in seawater is valid only for the simplified condition of the binding of ionic Fe^{3+} with an ionic organic ligand. The possibilities of different pathways for complex formation and dissociation involving mixed hydroxide-organic species, or of different redox states, were not considered. The mismatch with experimental reality shows that the simplification is incorrect.

Reply to Comments on 'Measuring Marine Iron(III) Complexes by CLE-AdSV'

R. M. Town, H. P. van Leeuwen

Environ. Chem. 2005, 2, 90

The interpretation of CLE-AdSV based iron(III) speciation data for marine waters has been called into question in light of the kinetic features of the measurement. The implications of the re-think may have consequences for understanding iron biogeochemistry and its impact on ecosystem functioning. The challenging of previously accepted results stimulated this debate on what is actually being measured by the CLE-AdSV technique.

Firework Emissions for Satellite Validation?

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Environ. Chem. 2005, 2, 94

Satellite-based instruments for monitoring the Earth's atmosphere observe the distribution of many gases and particles of interest. Many common sources of atmospheric gases and particles, such as fires, are geographically widespread and occur over a moderately long period. In contrast, fireworks pollute only a local area and for a brief period, and thus act as an ideal test of satellite instruments.

Caudal Fin Mercury as a Non-Lethal Predictor of Fish-Muscle Mercury

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Environ. Chem. 2005, 2, 96

Surveys to assess the body burden of mercury in fish to support research or contamination advisory programs typically involve capturing and killing fish and analyzing muscle tissue for mercury. Lethal sampling may not be feasible in protected waters or in studies involving threatened or endangered species. We analyzed tail fin samples of two fish species for total mercury and compared results with muscle-tissue mercury and concluded that fin-Hg can be used as a predictor of muscle-Hg. This approach enables catch and release studies for mercury in fish.

Effect of Sulfate on Selenium Uptake and Chemical Speciation in *Convolvulus arvensis* L.

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Environ. Chem. 2005, 2, 100

Selenium (Se) is one of the most serious problems confronted in agricultural soils derived from Se-containing rocks. This metalloid, an essential nutrient for animals and humans, may be toxic at relatively low concentrations. Se removal from soil and water using plants is a promising alternative to traditional chemical or electrochemical techniques. However, very few plant species are able to accumulate Se at high concentrations. Since Se and sulfur (S) have similar chemical properties, sulfate (SO_4^{2-}) in the plant growth media may interfere in the process of Se uptake by plants. Thus, plant species able to uptake more Se than S when both elements are present are desired for Se phytoremediation purposes.

Occurrence and Speciation of Arsenic in Common Australian Coastal Polychaete Species

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Environ. Chem. **2005**, 2, 108

In well-oxygenated water and sediments, nearly all arsenic is present as arsenate (AsO_4^{3-}). As arsenate is a phosphate (PO_4^{3-}) analogue, organisms living in arsenate-rich environments must acquire the nutrient phosphorus yet avoid arsenic toxicity. Organisms take in and transform arsenic compounds by many means. Three major modes of arsenic biotransformation have been found to occur in the environment—redox transformation between arsenate and arsenite (AsO_2^-), the reduction and methylation of arsenic, and the biosynthesis of organoarsenic compounds such as arsenobetaine. These biotransformations lead to biogeochemical cycling of arsenic compounds and bioconcentration of arsenic in aquatic organisms and thence into the food web.

Arsenic's Interaction with Humic Acid

P. Warwick, E. Inam, N. Evans

Environ. Chem. **2005**, 2, 119

Arsenic is of significant environmental concern in much of the world because of its contamination of waters, from mining, industry, sewage disposal, and agriculture. The environmental mobility of arsenic is controlled primarily by adsorption onto metal oxides, especially iron. Humic substances (natural organic matter), which are ubiquitous in aquatic and soil environments, may interfere with this adsorption and arsenic mobility may be increased. Thus, even if it is assumed that humic substances sorb arsenic less strongly than hydrous iron oxides, they may, nevertheless, influence arsenic sorption and mobility, particularly when the iron oxide content in the environment is low.

Indirect Oxidation of RDX, HMX, and CL-20 Cyclic Nitramines in Aqueous Solution at Boron-Doped Diamond Electrodes

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Environ. Chem. **2005**, 2, 125

Nitramine explosives, including RDX, HMX, and the more newly developed CL-20, are the source of groundwater contamination ("pinkwater") especially around military installations. These materials all possess an abundance of nitro (NO_2) groups, which, like synthetic organohalogens, render them resistant to biodegradation and thereby allows them to persist in the soil and waters. In this study it was shown that these substances can be indirectly oxidized at a boron-doped diamond electrode to small molecules (carboxylic acids and mineralized nitrogen-containing compounds).

Photocatalytic Activity of Neodymium Ion Doped TiO_2 for 2-Mercaptobenzothiazole Degradation under Visible Light Irradiation

F. B. Li, X. Z. Li, K. W. Cheah

Environ. Chem. **2005**, 2, 130

Conventional titanium dioxide catalysts can assist oxidation reactions upon ultraviolet light irradiation. Such photocatalysts are used to degrade organic pollutants in water to less harmful inorganic materials. By modifying the catalyst with luminescent lanthanide ions, the pollutant degradation reaction takes place upon visible light illumination. 2-Mercaptobenzothiazole, a poorly biodegradable and malodourous pollutant used both as a corrosion inhibitor and antifungal agent, is shown to be efficiently mineralized to carbon dioxide, water, ammonium, nitrate, and sulfate with this new catalyst.