

Contents in Context

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Monitoring advanced oxidation of Suwannee River fulvic acid

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Potentially toxic disinfection by-products form when water containing humic and fulvic acids is chlorinated to destroy pathogenic microorganisms. A pulsed electrical discharge was examined for its ability to destroy an aquatic fulvic acid by oxidation. Spectroscopically, changes in the organic structures were observed, but carbon content and disinfection by-products were not reduced.

Relationships between atmospheric organic compounds and air-mass exposure to marine biology

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Environ. Chem. 2010, 7, 232

The exchange of gases between the atmosphere and oceans impacts Earth's climate. Over the remote oceans, marine emissions of organic species may have significant impacts on cloud properties and the atmosphere's oxidative capacity. Quantifying these emissions and their dependence on ocean biology over the global oceans is a major challenge. Here we present a new method which relates atmospheric abundance of several organic chemicals over the South Atlantic Ocean to the exposure of air to ocean biology over several days before its sampling.

Dynamic features of speciation analysis by adsorptive stripping techniques

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Environ. Chem. 2010, 7, 242

The environmental fate and bioavailability of metal ions in natural waters is determined by their thermodynamic stability and kinetic features, both of which are distributed. Competing ligand exchange – adsorptive stripping (CLE-AdS) is a technique that measures a certain portion of these complexes as determined by the stability of the selected competing ligand and the dynamic features of the sample complexes that remain following ligand exchange. Exploitation of CLE-AdS to determine a spectrum of sample complexes requires insight into its thermodynamic and kinetic windows.

Impact of various inorganic oxyanions on the removal rates of hexavalent chromium mediated by zero-valent iron

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Environ. Chem. 2010, 7, 250

Oxyanions in soil extract can interfere with the zero valent iron induced reduction of chromium(VI) to chromium(III). At pH 6, the reaction rate was decreased (2- to 6-fold) by an equivalent of arsenate, phosphate or silicate but was increased by sulfate and remained unchanged by borate or nitrate. At pH 2, not only was the rate of reaction dramatically increased (~900-fold) but interferences from the major components of soil solution (nitrate, silicate and sulfate) were minimised.

Palladium(II) sequestration by phytate in aqueous solution – speciation analysis and ionic medium effects

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Environ. Chem. 2010, 7, 259

In the last 20 years, the demand for palladium and other platinum-group elements has intensified, causing a significant increase in their concentration in the environment, with particular accumulation in urban areas. Knowledge about Pd²⁺ speciation in aqueous media is fundamental for the understanding of its biological and environmental activity in contaminated areas. Phytic acid appears to be a good sequestering agent towards Pd²⁺ under various conditions, indicating its potential use in the remediation of contaminated sites.

Solubility of mimetite Pb₅(AsO₄)₃Cl at 5–55°C

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Environ. Chem. 2010, 7, 268

The mobility of toxic arsenic compounds in the environment can be controlled by the solubility of certain minerals. To predict and model the fate and behaviour of these contaminants, the solubility and related thermodynamic properties of the lead and arsenic mineral mimetite were determined. The data obtained in this study will be used to optimise and increase the effectiveness of remediation procedures that are already applied to contaminated sites.

Tolerance of seven perennial grasses to high nickel in sand culture

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Environ. Chem. 2010, 7, 279

High concentrations of Ni in soil may occur either naturally or as a result of human activities. We used a sand culture system to investigate the suitability of seven perennial grasses for the revegetation of Ni-contaminated sites. This study provides information on the toxic effects of Ni on plant growth and gives consideration to the health of animals consuming these plants, thereby increasing the accuracy of risk assessments.

Matrix-bound phosphine in paddy fields under a simulated increase in global atmospheric CO₂

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Although phosphine (PH₃) is an important gaseous carrier in the phosphorus cycle, its production and environmental behaviour remain unclear. Paddy fields are thought to be one of the main sources responsible for the production and emission of PH₃. Understanding the behaviour of PH₃ in paddy fields under elevated CO₂ concentration is crucial in understanding the phosphorus cycle and its response to rising global atmospheric CO₂ concentration.

Quantitative determination of fullerene (C₆₀) in soils by high performance liquid chromatography and accelerated solvent extraction technique

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Due to the increasing adoption of nanotechnology, synthetic nanoparticles such as fullerenes (*n*C₆₀), are likely to emerge as contaminants in aquatic and terrestrial environments. Currently our understanding of the fate and effects of C₆₀ in the terrestrial environment is poor and is primarily hampered by the lack of reliable quantitative analytical methods. In this paper, we describe a method for effective extraction and sensitive detection of C₆₀ residues in soils which will facilitate environmental fate studies on *n*C₆₀.

A method for determination of retention of silver and cerium oxide manufactured nanoparticles in soils

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Soils are the environmental compartment likely to be exposed most to manufactured nanoparticles, but there is no method available at present to assess their retention, which determines potential mobility and bioavailability. Optimisation and application of a method to determine retention values for silver (Ag) and cerium oxide (CeO₂) manufactured nanoparticles in soils found in many cases that they differed from the partitioning of their bulk and soluble counterparts. Wider application of this method can assist in comparing the risk of many different manufactured nanoparticles with other contaminants in soil systems and model their relationship to soil properties.

Cu and Pb accumulation by the marine diatom *Thalassiosira weissflogii* in the presence of humic acids

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Dissolved organic matter protects aquatic microorganisms from toxic metals by complexing and decreasing the concentration of the biologically reactive species such as free metal ions. However, there are some cases of enhancement of toxic effects when humic acids are present, which is thought to be due to effects of adsorbed humic acids on cell membranes. For a marine diatom, humic acids adsorbed to cell surfaces enhanced metal adsorption, whereas intracellular metal contents decreased as a result of metal binding by humic acids. These findings suggest that the diatom wall, the frustule, presents a barrier against direct effects of adsorbed humic acids on the plasma membrane.