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SEEING CHEMICALS *in* Environmental Samples

Incorporating Risk, Regulation, and Liability for Carbon Capture and Sequestration

Particle Emission Characteristics

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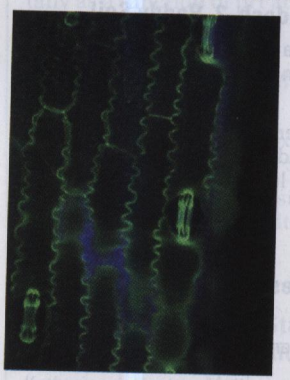
News and Features

NEWS

FEATURE



Environmental chemists and toxicologists are frequently interested in *where* an analyte resides within a sample. Are chemicals on surfaces, in matrices, or associated with particular phases or subcellular compartments? Exciting developments in microscopy and imaging are helping to make in situ visualization of chemicals possible. Wild and Jones describe how a new technique called two-photon excitation microscopy coupled with autofluorescence (TPEM-AF) works, and how it can be used to directly observe the uptake, transport, storage, and degradation of PAHs in the cells and subcellular structures of intact living plants.

Research

POLICY ANALYSIS

ENVIRONMENTAL PROCESSES

■ 6059

Formation of *N*-Nitrosodimethylamine (NDMA) from Humic Substances in Natural Water

Zhuo Chen and Richard L. Valentine

The NDMA formation potential of solutions containing various humic fractions obtained from a surface water indicates that precursor substances are distributed in all fractions; this suggests either the nonspecificity of the fractionation procedure with respect to discrete precursors or that humic substances represent a nonspecific source of precursor material.

6066

Inhibition of Humic Substances Mediated Photooxygenation of Furfuryl Alcohol by 2,4,6-Trimethylphenol. Evidence for Reactivity of the Phenol with Humic Triplet Excited States

Sabrina Halladja, Alexandra ter Halle, Jean-Pierre Aguer, Abdelaziz Boulkamh, and Claire Richard

The competition technique is used to demonstrate that triplet excited states of humic substances react directly with 2,4,6-trimethylphenol and that the same triplets are responsible for producing singlet oxygen and oxidizing this phenol.

■ 6074

Regulated and Non-Regulated Emissions from In-Use Diesel-Electric Switching Locomotives

Aniket A. Sawant, Abhilash Nigam, J. Wayne Miller, Kent C. Johnson, and David R. Cocker, III

Detailed chemical characterization of gaseous (NO_x, CO, THC, carbonyl) and particulate (PM, EC, OC, PAH) emissions from three in-use diesel-electric switching locomotives is presented.

■ 6084

Control of Ferrous Iron Oxidation within Circumneutral Microbial Iron Mats by Cellular Activity and Autocatalysis

Jeremy A. Rentz, Charoenkwan Kraiya, George W. Luther, III, and David Emerson

The metabolic activity of microbes and surface-mediated oxidation both contribute significantly to the overall oxidation of ferrous iron in circumneutral microbial iron mats.

6090

Incidence of the Enterococcal Surface Protein (*esp*) Gene in Human and Animal Fecal Sources

Richard L. Whitman, Katarzyna Przybyla-Kelly, Dawn A. Shively, and Muruleedhara N. Byappanahalli

The proposed and increasingly used sewage marker, the *esp* gene in enterococci, is found in both human and animal fecal sources.

■ 6096

Effect of Ammonia on Secondary Organic Aerosol Formation from α-Pinene Ozonolysis in Dry and Humid

6109

Mechanism of OH-Initiated Atmospheric Photooxidation of Dichlorvos: A Quantum Mechanical Study

Qingzhu Zhang, Xiaohui Qu, and Wenxing Wang

A theoretical study indicates that four product pathways are energetically feasible for the degradation of DDVP initiated by OH radicals in the atmosphere.

■ 6117

Iron(III) Hydrolysis and Solubility at 25 °C

Andri Stefánsson

Iron(III) hydrolysis and solubility are determined experimentally as a function of pH at 25 °C.

6124

Enantioselectivity in Estrogenic Potential and Uptake of Bifenthrin

Lumei Wang, Weiping Liu, Caixia Yang, Zhiyan Pan, Jianying Gan, Chao Xu, Meirong Zhao, and Daniel Schlenk

This study demonstrates significant enantioselectivity in the uptake of bifenthrin and its ability to cause estrogenic effects in vivo and in vitro.

■ 6129

Oligomers in the Early Stage of Biogenic Secondary Organic Aerosol Formation and Growth

Katherine J. Heaton, Matthew A. Dreyfus, Shenyi Wang, and Murray V. Johnston

When monoterpenes react with ozone to produce SOA, oligomers composed mainly of organic peroxides are produced very quickly—within a few seconds of the reaction.

■ 6137

▶ **Concentration Changes of Organochlorine Compounds and Polybromodiphenyl Ethers during Metamorphosis of Aquatic Insects**

Mireia Bartrons, Joan O. Grimalt, and Jordi Catalan

An enrichment of OCs and PBDEs from larvae to pupae in aquatic insects may result in a 2–5-fold higher pollutant intake for predators.

■ 6142

U(VI)-Kaolinite Surface Complexation in Absence and Presence of Humic Acid Studied by TRLFS

Adéla Kepelová, Vinzenz Brendler, Susanne Sachs, Nils Baumann, and Gert Bernhard

TRLFS is used to characterize the U(VI) surface species on kaolinite in the absence and presence of HA.

■ 6148

Enhanced Diffusion of Polycyclic Aromatic Hydrocarbons in Artificial and Natural Aqueous Solutions

Philipp Mayer, Margit M. Fernqvist, Peter S. Christensen, Ulrich Karlson, and Stefan Trapp

■ 6163

Chiral Source Apportionment of Polychlorinated Biphenyls to the Hudson River Estuary Atmosphere and Food Web

Brian J. Asher, Charles S. Wong, and Lisa A. Rodenburg

The enantiomeric composition of chiral PCBs is measured to determine the sources of contamination to the Hudson River estuary atmosphere and food web.

■ 6170

Photochemical Attenuation of *N*-Nitrosodimethylamine (NDMA) and other Nitrosamines in Surface Water

Megan H. Plumlee and Martin Reinhard

An aquatic photolysis study of wastewater-derived nitrosamines reports the measured quantum yields and expected photolysis decay rates in engineered and natural systems.

■ 6177

Ozone-Initiated Chemistry in an Occupied Simulated Aircraft Cabin

Charles J. Weschler, Armin Wisthaler, Shannon Cowlin, Gyöngyi Tamás, Peter Strøm-Tejsen, Alfred T. Hodgson, Hugo Destaillats, Jason Herrington, Junfeng (Jim) Zhang, and William W. Nazaroff

Ozone reacts with the surfaces of people and their clothing, seats, carpeting, and other materials inside a simulated aircraft cabin to produce a mixture of oxidation products, including saturated and unsaturated aldehydes, ketones, and organic acids.

ENVIRONMENTAL MODELING

■ 6185

Modeling Decreased Food Chain Accumulation of PAHs Due to Strong Sorption to Carbonaceous Materials and Metabolic Transformation

Caroline T. A. Moermond, Theo P. Traas, Ivo Roessink, Karin Veltman, A. Jan Hendriks, and Albert A. Koelmans

BC-inclusive PAH food chain accumulation modeling allows estimation of in situ PAH metabolization rates.

■ 6192

Modeling the Effect of Snow and Ice on the Global Environmental Fate and Long-Range Transport Potential of Semivolatile Organic Compounds

Judith Stocker, Martin Scheringer, Fabio Wegmann, and Konrad Hungerbühler

Snow and ice can strongly influence the environmental partitioning and long-range transport of organic chemicals.

ENVIRONMENTAL MEASUREMENTS METHODS

■ 6199

Evaluation and Comparison of Portable Emissions Measurement Systems and Federal Reference Methods for

Adsorption of SO_2 by the silica gel tube and subsequent oxidation in the extraction process is the source of artifact sulfate when NIOSH Method 7903 is used.

■ 6210

▶ In Situ Applications of a New Diver-Operated Motorized Microsensor Profiler

Miriam Weber, Paul Faerber, Volker Meyer, Christian Lott, Gabriele Eickert, Katharina E. Fabricius, and Dirk de Beer

A new diver-operated motorized microsensor profiler is described, and three field applications are discussed.

REMEDIATION AND CONTROL TECHNOLOGIES

6216

Manipulating the Size and Dispersibility of Zerovalent Iron Nanoparticles by Use of Carboxymethyl Cellulose Stabilizers

Feng He and Dongye Zhao

The size and dispersibility of zerovalent iron nanoparticles can be controlled by using carboxymethyl cellulose as a stabilizer and by manipulating synthesis conditions.

■ 6222

Degradative Capacities and Bioaugmentation Potential of an Anaerobic Benzene-degrading Bacterium Strain DN11

Yuki Kasai, Yumiko Kodama, Yoh Takahata, Toshihiro Hoaki, and Kazuya Watanabe

A denitrifying bacterium strain DN11 degrades benzene and other monoaromatic compounds under anaerobic conditions and is potentially useful for bioaugmentation of benzene-contaminated underground aquifers.

■ 6228

Unexpected Products and Reaction Mechanisms of the Aqueous Chlorination of Cimetidine

Jeffrey M. Buth, William A. Arnold, and Kristopher McNeill

Substantial structural changes are observed upon chlorination of cimetidine, leading to imidazole and sultam products, two of which have higher predicted toxicity than the parent molecule.

■ 6234

Synergetic Effect of Bi_2WO_6 Photocatalyst with C_{60} and Enhanced Photoactivity under Visible Irradiation

Shengbao Zhu, Tongguang Xu, Hongbo Fu, Jincai Zhao, and Yongfa Zhu

The use of Bi_2WO_6 is investigated as a plausible strategy to develop an efficient photocatalyst for the destruction of pollutants by using visible light and solar energy.

■ 6240

Highly Efficient Decomposition of Organic Dyes by Aqueous-Fiber Phase Transfer and in Situ Catalytic Oxidation Using Fiber-Supported Cobalt Phthalocyanine