December 1, 2005

Environmental Science & Technology

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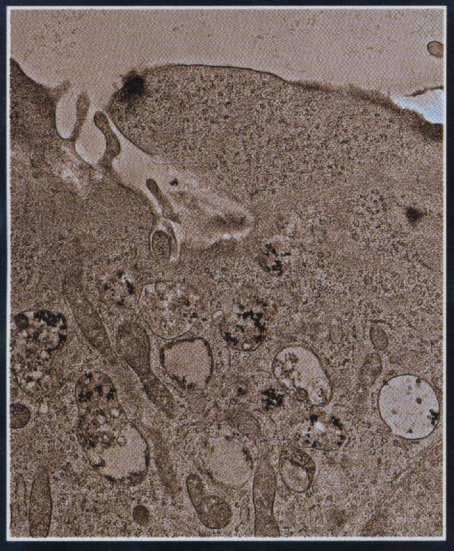

Oxide NANOPARTICLE Uptake *in* Human Lung Fibroblasts

Chemical Reactivity as a Tool for Estimating Persistence

Research

Critical Reviews

■ **9009**

Molecular Structure in Soil Humic Substances: The New View

Rebecca Sutton and Garrison Sposito

Soil humic substances are diverse collections of small moieties, including biomolecules, that are stabilized by hydrophobic interactions or hydrogen bonds and capable of organizing into micellar structures.

Policy Analysis

9016

Improved Accounting of Emissions from Utility Energy Storage System Operation

Paul Denholm and Tracey Holloway

A potentially more useful and accurate method is evaluated for measuring the emissions from utility energy storage systems, which provide alternatives to traditional power plants.

■ **9023**

▶ **Learning from the U.S. National Assessment of Climate Change Impacts**

M. Granger Morgan, Robin Cantor, William C. Clark, Ann Fisher, Henry D. Jacoby, Anthony C. Janetos, Ann P. Kinzig, Jerry Melillo, Roger B. Street, and Thomas J. Wilbanks

Lessons to guide future similar activities are drawn from an examination of the U.S. National Assessment of the Potential Consequences of Climate Variability and Change.

Characterization of Natural and Affected Environments

9033

Effects of River Flooding on PCDD/F and PCB Levels in Cows' Milk, Soil, and Grass

Iain R. Lake, Christopher D. Foxall, Andrew A. Lovett, Alwyn Fernandes, Alan Dowding, Shaun White, and Martin Rose

River flooding acts as a mechanism for transferring PCDD/Fs and PCBs to the human food chain in contaminated river catchments.

■ **9039**

Microbial Incorporation of ^{13}C-Labeled Acetate at the Field Scale: Detection of Microbes Responsible for Reduction of U(VI)

Yun-Juan Chang, Philip E. Long, Roland Geyer, Aaron D. Peacock, Charles T. Resch, Kerry Sublette, Susan Pfiffner, Amanda Smithgall, Robert T. Anderson, Helen A. Vrionis, John R. Stephen, Richard Dayvault,

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ment of ambient organic carbon measured at urban receptor sites.

■ **9057**

Chlorinated, Brominated, and Perfluorinated Contaminants in Livers of Polar Bears from Alaska

Kurunthachalam Kannan, Se Hun Yun, and Thomas J. Evans

Concentrations and profiles of organohalogen contaminants in two subpopulations of polar bears from Alaska are examined.

■ **9064**

Effect of Sewage-Sludge Application on Concentrations of Higher-Brominated Diphenyl Ethers in Soils and Earthworms

Ulla Sellström, Cynthia A. de Wit, Nadja Lundgren, and Mats Tysklind

Sewage-sludge amendment leads to increased concentrations of higher-brominated diphenyl ethers, including deca-BDE, in soils and earthworms.

■ **9071**

Influence of Climate Change, Tidal Mixing, and Watershed Urbanization on Historical Water Quality in Newport Bay, a Saltwater Wetland and Tidal Embayment in Southern

Youngsul Jeong, Stanley B. Grant, Scott Ritter, Abhishek Pednekar, Linda Candelaria, and Clinton Winant

Sources, transport pathways, and spatiotemporal variability of fecal indicator bacteria at two marinas in Newport Bay in southern California are identified.

9094

Chemical Heterogeneity of Organic Soil Colloids Investigated by Scanning Transmission X-ray Microscopy and C-1s NEXAFS Microspectroscopy

Marc Schumacher, Iso Christl, Andreas C. Scheinost, Chris Jacobsen, and Ruben Kretzschmar

The organic matter associated with water-dispersible soil colloids is chemically heterogeneous at the single-particle scale, but interparticle heterogeneity is much greater than intraparticle heterogeneity.

■ 9101

Perfluorinated Compounds in the Plasma of Loggerhead and Kemp's Ridley Sea Turtles from the Southeastern Coast of the United States

Jennifer M. Keller, Kurunthachalam Kannan, Sachi Taniyasu, Nobuyoshi Yamashita, Rusty D. Day, Michael D. Arendt, Al L. Segars, and John R. Kucklick

Species differences and a spatial gradient along the southeastern U.S. coast were observed for perfluorinated contaminants in the plasma of two species of marine reptiles.

■ 9109

Source Diagnostics of Polycyclic Aromatic Hydrocarbons Based on Species Ratios: A Multimedia Approach

X. L. Zhang, S. Tao, W. X. Liu, Y. Yang, Q. Zuo, and S. Z. Liu

Changes in PAH diagnostic ratios for source apportionment in multimedia environments are demonstrated, and the site-specific rectification factors are defined to correct such changes.

■ 9115

Passive and Active Air Samplers as Complementary Methods for Investigating Persistent Organic Pollutants in the Great Lakes Basin

T. Gouin, T. Harner, P. Blanchard, and D. Mackay

The complementary nature of data obtained from passive and active air samplers for monitoring POPs in the Great Lakes Basin is explored.

Environmental Processes

9123

Spectroscopic Study of Carbaryl Sorption on Smectite from Aqueous Suspension

Maurilio Fernandes de Oliveira, Cliff T. Johnston, G. S. Premachandra, Brian J. Teppen, Hui Li, David A. Laird, Dongqiang Zhu, and Stephen A. Boyd

Carbaryl sorption is due, in part, to site-specific interactions between the carbamate functional group with exchangeable

■ 9140

Fate and Effects of Enrofloxacin in Aquatic Systems under Different Light Conditions

C. W. Knapp, L. A. Cardoza, J. N. Hawes, E. M. H. Wellington, C. K. Larive, and D. W. Graham

Enrofloxacin degrades at different rates under different light conditions but has minimal detectable effects on water chemistry or microbial communities at environmentally relevant exposures.

■ 9147

EXAFS Analysis of Arsenite Adsorption onto Two-Line Ferrihydrite, Hematite, Goethite, and Lepidocrocite

Georges Ona-Nguema, Guillaume Morin, Farid Juillot, Georges Calas, and Gordon E. Brown Jr.

EXAFS analysis of As(III) sorption onto ferric (oxyhydr)oxides indicates that inner-sphere surface complexes on ferrihydrite and hematite differ from those on goethite and lepidocrocite; this might be explained by differences in the arrangement of reactive surface OH groups.

9156

Oxidation of Gaseous Elemental Mercury to Gaseous Divalent Mercury during 2003 Polar Sunrise at Ny-Alesund

Francesca Sprovieri, Nicola Pirrone, Matthew S. Landis, and Robert K. Stevens

State-of-the-art atmospheric measurements of mercury species performed in the Arctic during spring 2003 are presented; the dynamics of mercury depletion events with changing air-mass transport patterns are emphasized.

■ 9166

Sorption of the Antimicrobial Ciprofloxacin to Aluminum and Iron Hydrous Oxides

Cheng Gu and K. G. Karthikeyan

This work reports on the role of aluminum and iron hydrous oxides in influencing the environmental reactivity of a ciprofloxacin, an important antimicrobial compound.

9174

Controls on Arsenic Speciation and Solid-Phase Partitioning in the Sediments of a Two-Basin Lake

J. A. Jay, N. K. Blute, K. Lin, D. Senn, H. F. Hemond, and J. L. Durant

Sulfur controls arsenic and iron partitioning in sediments of an arsenic-contaminated lake.

■ 9182

Photosensitizer Method to Determine Rate Constants for the Reaction of Carbonate Radical with Organic Compounds

Silvio Canonica, Tamar Kohn, Marek Mac, Francisco J. Real, Jakob Wirz, and Urs von Gunten

Flash photolysis and steady-state irradiation are used to assess the aqueous reactivity of carbonate radical ($CO_3^{\bullet-}$), which is a relevant oxidant present in advanced oxidation processes and sunlit natural waters.

■ 9189

Electrical measurements are indicative of corrosion and precipitation in Fe^0 columns; this method could monitor performance reduction in reactive barriers.

■ **9205**

Phosphorus Composition of Sheep Feces and Changes in the Field Determined by ^{31}P NMR Spectroscopy and XRPD

Charles A. Shand, Grace Coutts, Stephen Hillier, David G. Lumsdon, Alexander Chudek, and Jan Eubeler

Brushite and struvite are identified as major phosphorus components in fresh sheep feces; their contributions to the total phosphorus decrease with weathering in the field.

9211

Acceleration and Quenching of the Photolysis of PCB in the Presence of Surfactant and Humic Materials

W. Chu, K. H. Chan, C. Y. Kwan, and C. T. Jafvert

The rate of acceleration and retardation of tetrachlorobiphenyl photolysis in the presence of surfactant and humic material is quantified by a proposed model with corrected light intensity.

■ **9217**

Iron(II)-Catalyzed Oxidation of Arsenic(III) in a Sediment Column

Kevin J. Bisceglia, Kevin J. Rader, Richard F. Carbonaro, Kevin J. Farley, John D. Mahony, and Dominic M. Di Toro

Fe(II)-catalyzed oxidation of As(III) in a sediment column is examined by both computational and experimental studies.

9223

Oxidative Degradation of Glyphosate and Aminomethylphosphonate by Manganese Oxide

K. A. Barrett and M. B. McBride

Degradation of glyphosate and its decomposition product, aminomethylphosphonate, is catalyzed by birnessite, with C–P bond cleavage as a primary reaction pathway.

■ **9229**

Products and Mechanism of Secondary Organic Aerosol Formation from Reactions of *n*-Alkanes with OH Radicals in the Presence of NO_x

Yong Bin Lim and Paul J. Ziemann

Secondary organic aerosol from reactions of *n*-alkanes with OH radicals in the presence of NO_x consists of first- and higher-generation multifunctional organic nitrate products.

9237

Relationship between Mercury Accumulation in Young-of-the-Year Yellow Perch and Water-Level Fluctuations

John A. Sorensen, Larry W. Kallemeyn, and Michael Sydor

The dynamic annual changes in mercury concentrations of young-of-the-year yellow perch are compared with annual water-level fluctuations for several northeastern Minnesota lakes.

The first high-resolution atmospheric mercury speciation concentrations at a Detroit site are significant and are the result of a combination of local and regional sources.

Remediation and Control Technologies

9263

Removal and Inactivation of Waterborne Viruses Using Zerovalent Iron

Youwen You, Jie Han, Pei C. Chiu, and Yan Jin

Commercial Fe^0 can effectively remove and inactivate waterborne viruses and may help to disinfect water and wastewater.

9270

Sequential Electrolytic Oxidation and Reduction of Aqueous Phase Energetic Compounds

David M. Gilbert and Tom C. Sale

Laboratory experiments demonstrate the potential application of electrolytic reactive barriers in treating groundwater that contains dissolved energetic compounds.

9278

Decomposition of 2,4,6-Trinitrotoluene (TNT) by Gamma Irradiation

Byungjin Lee and Myunjoo Lee

Gamma irradiation is effective for the decomposition and mineralization of TNT in an aqueous solution.

9286

Reductive Biotransformation of Tetrachloroethene to Ethene during Anaerobic Degradation of Toluene: Experimental Evidence and Kinetics

Hai Shen and Guy W. Sewell

Reductive dechlorination of tetrachloroethene to ethene is achieved in an enrichment culture in which toluene is supplied as the sole carbon source.

9295

Chemical Pathway and Kinetics of Phenol Oxidation by Fenton's Reagent

J. A. Zazo, J. A. Casas, A. F. Mohedano, M. A. Gilarranz, and J. J. Rodríguez

A detailed reaction scheme for Fenton oxidation of phenol and a simplified kinetic approach useful for design purposes are proposed.

9303

Reaction of Nonaqueous Phase TCE with Permanganate

Kyehee Kim and Mirat D. Gurol

Reaction of nonaqueous-phase trichloroethylene with permanganate in a batch system is investigated to understand the fundamental mechanisms of oxidative removal of

9317

Push–Pull Tests to Quantify In Situ Degradation Rates at a Phytoremediation Site

Mark T. Pitterle, Rikke G. Andersen, John T. Novak, and Mark A. Widdowson

Aerobic respiration rates in a phytoremediation system are measured by using push–pull tests to assess the effect of poplar trees over space and seasons.

9324

Improvement of the Desulfurization and Regeneration Properties through the Control of Pore Structures of the Zn–Ti-based H_2S Removal Sorbents

Suk Yong Jung, Hee Kwon Jun, Soo Jae Lee, Tae Jin Lee, Chong Kul Ryu, and Jae Chang Kim

A new Zn–Ti-based sorbent, which is prepared by coprecipitation, shows excellent sulfur removing capacity without deactivation and better regeneration properties than a conventional Zn–Ti sorbent.

■ **9331**

Determination of Kinetic Law for Toxic Metals Release during Thermal Treatment of Model Waste in a Fluid-Bed Reactor

Jing Liu, S. Abanades, D. Gauthier, G. Flamant, Chuguang Zheng, and Jidong Lu

The kinetic law for toxic metals release is determined during thermal treatment of municipal solid waste in a fluidized-bed reactor.

■ **9337**

Effect of Hydroxypropyl-β-cyclo-dextrin on the Degradation of Pentachlorophenol by Potassium Monopersulfate Catalyzed with Iron(III)-Porphyrin Complex

Masami Fukushima and Kenji Tatsumi

The formation of a supramolecular complex between iron(III)-porphyrin catalyst and hydroxypropyl-β-cyclo-dextrin results in the stabilization of the catalyst and an enhancement in catalytic activity.

■ **9343**

Modeling *Cryptosporidium parvum* Oocyst Inactivation and Bromate Formation in a Full-Scale Ozone Contactor

George Tang, Kwabena Adu-Sarkodie, Dooil Kim, Jae-Hong Kim, Susan Teefy, Hiba M. Shukairy, and Benito J. Mariñas

C. parvum oocyst inactivation and bromate formation are assessed in a full-scale ozone contactor with fluorescent microspheres used as oocyst surrogates.

Sustainability Engineering and Green Chemistry

9351

Inhibition of Biohydrogen Production by Undissociated Acetic and Butyric Acids

Steven Van Ginkel and Bruce E. Logan

Biohydrogen production is inhibited more by undissociated butyric acids produced from glucose fermentation than by acids externally added in the feed solution.

Ecotoxicology and Human Environmental Health

9357

Avian Toxicity Reference Values for Perfluorooctane Sulfonate

John L. Newsted, Paul D. Jones, Katie Coady, and John P. Giesy

The distribution of exposure concentrations associated with NOAELs and LOAELs is narrow, indicating that PFOS effects relate to a critical body burden, regardless of species.

9363

Uptake of Aqueous and Dietary Metals by Mussel *Perna viridis* with Different Cd Exposure Histories

Dalin Shi and Wen-Xiong Wang

Cadmium body and environmental concentrations are more important than history of pre-exposure in affecting cadmium accumulation in the green mussel.

■ **9370**

▶ **Oxide Nanoparticle Uptake in Human Lung Fibroblasts: Effects of Particle Size, Agglomeration, and Diffusion at Low Concentrations**

Ludwig K. Limbach, Yuchun Li, Robert N. Grass, Tobias J. Brunner, Marcel A. Hintermann, Martin Muller, Detlef Gunther, and Wendelin J. Stark

A quantitative measurement of the nanoparticle uptake in human lung fibroblast cells at physiologically relevant concentrations reveals the dominant role of agglomeration and diffusion in this process.

■ **Supporting information is available free at http://pubs.acs.org/est.**
▶ **This issue contains a news story about this research.**