

November 1, 2005

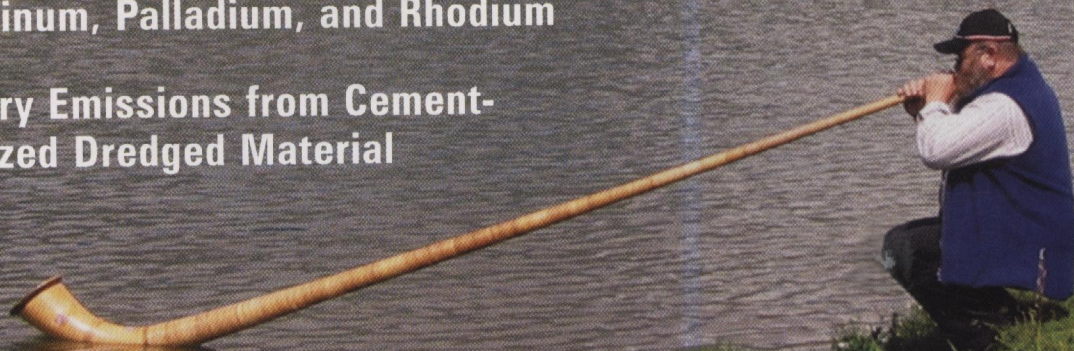
# ENVIRONMENTAL Science & Technology

<http://pubs.acs.org/est>

## Where Have All *the* **FISH GONE?**

Importance of Automobile Exhaust  
Catalyst Emissions for the Deposition  
of Platinum, Palladium, and Rhodium

Mercury Emissions from Cement-  
Stabilized Dredged Material





## Characterization of Natural and Affected Environments

8113

### Characteristics of Metals in Nano/Ultrafine/Fine/Coarse Particles Collected Beside a Heavily Trafficked Road

Chih-Chung Lin, Shui-Jen Chen, Kuo-Lin Huang, Wen-Ing Hwang, Guo-Ping Chang-Chien, and Wen-Yinn Lin

Mass concentrations and metal components/concentrations in particles are determined; traffic-related metals (anthropogenic metals and silicon) make up a significant portion of the nanosized particles.

8123

### Tracking Toxaphene in the North American Great Lakes Basin. 1. Impact of Toxaphene Residues in United States Soils

Jianmin Ma, Srinivasan Venkatesh, Yi-Fan Li, and Sreerama Daggupaty  
A coupled atmospheric transport model reveals that the toxaphene budget in the Great Lakes ecosystem is attributable primarily to residues in soil in the southeastern U.S.

8132

### Tracking Toxaphene in the North American Great Lakes Basin. 2. A Strong Episodic Long-Range Transport Event

Jianmin Ma, Srinivasan Venkatesh, Yi-fan Li, Zuohao Cao, and Sreerama Daggupaty

A single, intense, weeklong episodic event may be a major pathway for atmospheric transport of toxaphene from the southern U.S. to the Great Lakes.

■ 8142

### Fluorescence Spectroscopy Reveals Ubiquitous Presence of Oxidized and Reduced Quinones in Dissolved Organic Matter

Rose M. Cory and Diane M. McKnight

The role of quinone-like fluorophores in DOM is investigated.

8150

### Enhanced Deposition and Bioaccumulation of Mercury in Antarctic Terrestrial Ecosystems Facing a Coastal Polynya

Roberto Bargagli, Chiara Agnorelli, Francesca Borghini, and Fabrizio Monaci

Enhanced mercury accumulation occurs in Antarctic soils, lichens, and mosses in ice-free coastal areas of Victoria Land that face a coastal polynya.

8156

### Importance of Automobile Exhaust Catalyst Emissions for the Deposition of Platinum, Palladium, and Rhodium in the Northern Hemisphere

Richard P. Zito, Donald F. Hammond, Carlo Barbante, Manojit Dey,

■ 8170

### Distribution and Mass Inventory of Total Dichlorodiphenyl-dichloroethylene in the Water Column of the Southern California Bight

Eddy Y. Zeng, David Tsukada, Dario W. Diehl, Jian Peng, Kenneth Schiff, James A. Noblet, and Keith A. Maruya

The spatial distribution of DDEs in the water column of the Southern California Bight is measured with a solid-phase microextraction-based technique, and the inventory and flux of DDEs are estimated.

8177

### Novel Approach to Identifying Supersaturated Metastable Ambient Aerosol Particles

Klaus Wittmaack and Markus Strigl

Submicrometer-sized aerosol particles are analyzed by atomic force microscopy in terms of height and diameter to determine their deformation after soft landing.

8185

### Mercury Emissions from Cement-Stabilized Dredged Material

Sandra M. Goodrow, Robert Miskewitz, Richard I. Hires, Steven J. Eisenreich, W. Scott Douglas, and John R. Reinfelder

Volatilization fluxes of mercury from land-applied, cement-stabilized dredged sediments taken from New York/New Jersey Harbor are estimated.

8191

### Characterization of Environmental Estrogens in River Water Using a Three Pronged Approach: Active and Passive Water Sampling and the Analysis of Accumulated Estrogens in the Bile of Caged Fish

Etiënne L. M. Vermeirssen, Oliver Körner, René Schönenberger, Marc J.-F. Suter, and Patricia Burkhardt-Holm

The polar organic chemical integrative sampler (POCIS) accumulates estrogens at a rate similar to caged brown trout, thus providing a biologically meaningful measure of river-water estrogenicity.

■ 8199

### Temporal Development of Brominated Flame Retardants in Peregrine Falcon (*Falco peregrinus*) Eggs from South Greenland (1986–2003)

Katrin Vorkamp, Marianne Thomsen, Knud Falk, Heather Leslie, Søren Møller, and Peter B. Sørensen

Brominated flame retardants were detected at high concentrations in eggs of Greenland peregrine falcons, with increasing trends for PBDEs between 1986 and 2003.

■ 8207

### Porewater Evidence of Metal (Cu, Ni, Co, Zn, Cd) Mobilization in an Acidic, Ombrotrophic Bog Impacted by a Smelter, Harjavalta, Finland and Comparison with Reference Sites

Nicole Rausch, Liisa Ukonmaanaho, Tiina M. Nieminen, Michael Krachler, and William Stratyk

Journal of Environmental Quality, Vol. 35, No. 4, December 2006



Jiping Zhu, Henrik Li, Mark Korchinski, and Phil Fellin

Initial emission rates in liquid materials can be predicted more accurately from headspace concentrations than from chemical composition in the products, with the mass transfer coefficient generated under the defined environmental conditions.

## ■ 8220

### Seasonal Variation in the Occurrence of Pharmaceuticals in Effluents from a Sewage Treatment Plant and in the Recipient Water

Niina M. Vieno, Tuula Tuhkanen, and Leif Kronberg

The concentration of pharmaceuticals in effluents from a sewage treatment plant and in the recipient river is higher in winter than during other seasons.

## ■ 8227

### Sources, Vertical Fluxes, and Accumulation of Aliphatic Hydrocarbons in Coastal Sediments of the Río de la Plata Estuary, Argentina

J. C. Colombo, N. Cappelletti, J. Laschi, M. C. Migoya, E. Speranza, and C. N. Skorupka

Settling particles and underlying sediments collected from metropolitan Buenos Aires were analyzed to evaluate the sources and accumulation of resolved, unresolved, and biomarker aliphatic hydrocarbons.

## 8235

### Identification of Polybrominated Dibenzo-*p*-dioxins in Blue Mussels (*Mytilus edulis*) from the Baltic Sea

Anna Malmvärn, Yngve Zebühr, Sören Jensen, Lena Kautsky, Erik Greyerz, Takeshi Nakano, and Lillemor Asplund

PBDDs are identified at high levels in blue mussels from the Baltic Sea by accurate mass determination and comparison with authentic synthesized standards.

## 8243

### Polybrominated Diphenyl Ethers and Polychlorinated Biphenyls in a Marine Foodweb of Coastal Florida

Boris Johnson-Restrepo, Kurunthachalam Kannan, Rudolf Addink, and Douglas H. Adams

Biomagnification and temporal changes in PBDE and PCB concentrations in a coastal marine foodweb are examined.

## Environmental Processes

## ■ 8251

### Compositional Evolution of the Emplaced Fuel Source in the Vadose Zone Field Experiment at Airbase Værlose, Denmark

Mette M. Broholm, Mette Christophersen, Uli Maier, Erling H. Stenby, Patrick Höhener, and Peter Kjeldsen

The compositional evolution of a fuel source emplaced in the vadose zone and the resulting compound concentrations in the pore-air are documented in a field experiment.

The abundance, composition, and vertical transport of PAHs in marsh sediments 30 years after the West Falmouth oil spill are described.

## 8281

### Can Dawsonite Permanently Trap CO<sub>2</sub>?

Helge Hellevang, Per Aagaard, Eric H. Oelkers, and Bjørn Kvamme  
Dawsonite rapidly dissolves after a decrease of CO<sub>2</sub> pressure out of its stability field, and the mineral can be a permanent storage host only in systems maintaining high CO<sub>2</sub> pressures.

## ■ 8288

### Zinc Sorption by a Bacterial Biofilm

Brandy Toner, Alain Manceau, Matthew A. Marcus, Dylan B. Millet, and Garrison Sposito

The Zn-complexing functional groups present in a bacterial biofilm are characterized with extended XAFS.

## 8295

### Phosphine from Rocks: Mechanically Driven Phosphate Reduction?

Dietmar Glindemann, Marc Edwards, and Peter Morgenstern

Reduction of phosphate to phosphine can occur via mechanochemical reactions and tribochemistry in rock.

## 8300

### Photo-Fenton Degradation of Diclofenac: Identification of Main Intermediates and Degradation Pathway

Leónidas A. Pérez-Estrada, Sixto Malato, Wolfgang Gernjak, Ana Agüera, E. Michael Thurman, Imma Ferrer, and Amadeo R. Fernández-Alba

The solar photodegradation of diclofenac in aqueous solution by photo-Fenton is studied; the reaction pathway is established (18 intermediates are identified in 2 routes) by GC/MS and LC/TOFMS.

## ■ 8307

### Modeling Receptor Kinetics in the Analysis of Survival Data for Organophosphorus Pesticides

Tjalling Jager and Sebastiaan A. L. M. Kooijman

A mechanistic model to analyze survival data is presented; the model, which is based on specific interactions with a receptor, is demonstrated with literature data for organophosphorus pesticides.

## ■ 8315

### Sorption and Conformational Characteristics of Reconstituted Plant Cuticular Waxes on Montmorillonite

Baoliang Chen and Baoshan Xing

The melting phase transition of the reconstituted plant cuticular waxes is induced by PAH adsorption, which then contributes to desorption hysteresis.

## ■ 8324

### Humic Material Induces Behavioral and Global Transcriptional Responses in the Nematode *Caenorhabditis elegans*

Ralph Menzel, Stephan Gutzgenbaun, Anne Hüttenwaidt, Jana Külar, and Christian F. W. Stark



David Imhof, Ernest Weingartner, Carlos Ordóñez, Robert Gehrig, Matz Hill, Brigitte Buchmann, and Urs Baltensperger

A heavy-duty vehicle emits on average 10–30× more particulate air pollutants, in terms of both number and volume, than a light-duty vehicle.

**8351**

### **Aerosol Transport in the California Central Valley Observed by Airborne Lidar**

Russell J. De Young, William B. Grant, and Kurt Severance

Aerosol scattering ratio lidar profiles taken in California's Central Valley show the aerosol spatial distribution over the valley's topography.

**8358**

### **Phylogenetic Analysis of TCE-Dechlorinating Consortia Enriched on a Variety of Electron Donors**

Ryan A. Freeborn, Kimberlee A. West, Vishvesh K. Bhupathiraju, Sadhana Chauhan, Brian G. Rahm, Ruth E. Richardson, and Lisa Alvarez-Cohen

Cultures containing *Dehalococcoides* strains enriched on lactate, methanol, propionate, and butyrate exhibit only minor shifts in community structure accompanied by similar minor shifts in functionality.

**8369**

### **Sorption of Aromatic Organic Pollutants to Grasses from Water**

Jason P. Barbour, James A. Smith, and Cary T. Chiou

Lipid-water partition coefficients, estimated from sorption and plant lipid content data, are significantly greater than the corresponding octanol-water partition coefficients.

**8374**

### **Leaching of Metribuzin Metabolites and the Associated Contamination of a Sandy Danish Aquifer**

Jeanne Kjær, Preben Olsen, Trine Henriksen, and Marlene Ullum

Several years after the application on a sandy soil in Denmark, the metabolites of metribuzin are leaching to and persisting in the groundwater.

**8382**

### **Structure-Dependent Reactivity of Low Molecular Weight Fulvic Acid Molecules during Ozonation**

Anja These and Thorsten Reemtsma

Mass spectrometric investigations show how fulvic acid molecules are altered by ozonation and how their elemental composition and molecular structure determine their reactivity.

**8388**

### **Naphthenic Acids in Athabasca Oil Sands Tailings Waters Are Less Biodegradable than Commercial Naphthenic Acids**

Angela C. Scott, Michael D. Mackinnon, and Phillip M. Fedorak

Studying the biodegradation of commercial naphthenic acids as surrogates for naturally occurring naphthenic acids in oil sands tailings water provides overly optimistic results.

## **Environmental Measurements Methods**

■ **8403**

### **Pore-Scale Characterization of Organic Immiscible-Liquid Morphology in Natural Porous Media Using Synchrotron X-ray Microtomography**

G. Schnaar and M. L. Brusseau

The pore-scale morphology of organic immiscible liquid residing within natural porous media is characterized quantitatively with synchrotron X-ray microtomography.

**8411**

### **Evaluation of Novel Techniques for Measurement of Air-Water Exchange of Persistent Bioaccumulative Toxicants in Lake Superior**

Judith A. Perlinger, David E. Tobias, Patrick S. Morrow, and Paul V. Doskey

Gaseous PBTs, collected in the field in diffusion denuders that contain sections of chromatography columns, are thermally extracted into the cooled injection inlet of a gas chromatograph.

**8420**

### **Development and Application of an Electron Spin Resonance Spectrometry Method for the Determination of Oxygen Free Radical Formation by Particulate Matter**

Jacob J. Briedé, Theo M. C. M. de Kok, Janneke G. F. Hogervorst, Edwin J. C. Moonen, Cliff L. B. op den Camp, and Jos C. S. Kleinjans

An improved ESR spectrometry method shows the correlations between the reactive oxygen species-generating capacity of PM<sub>10</sub> and PM<sub>2.5</sub> and the levels of transition metals and PAHs.

**8427**

### **Automated System for Fast and Accurate Analysis of SF<sub>6</sub> Injected in the Surface Ocean**

Chul-Min Koo, Kitack Lee, Miok Kim, and Dae-Ok Kim

An automated sampling system for fast and accurate analysis of SF<sub>6</sub> aboard a ship is described.

■ **8434**

### **Improving Data Quality for Environmental Fate Models: A Least-Squares Adjustment Procedure for Harmonizing Physicochemical Properties of Organic Compounds**

Urs Schenker, Matthew MacLeod, Martin Scheringer, and Konrad Hungerbühler

A new method for adjusting physicochemical properties to achieve consistency is presented, and its application to identification of biased property measurements is illustrated with PCB congeners.

**8442**

### **Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry with a Matrix of Carbon Nanotubes for the Analysis of Low-Mass Compounds in Environmental Samples**

Ligang Hu, Songyun Xu, Chensong Pan, Chungang Yuan, Hanfa Zou, and Guibin Jiang

A rapid sample method for the determination of environmen



8453

### **Mass-Transfer Limitations for Nitrate Removal in a Uranium-Contaminated Aquifer**

Jian Luo, Olaf A. Cirpka, Weimin Wu, Michael N. Fienen, Philip M. Jardine, Tonia L. Mehlhorn, David B. Watson, Craig S. Criddle, and Peter K. Kitanidis

Mass-transfer limitations on nitrate removal in a U(VI) bioremediation experiment are studied through a forced-gradient tracer test and a modified mobile-immobile transport model.

■ 8460

### **Combined Removal of Chlorinated Ethenes and Heavy Metals by Zerovalent Iron in Batch and Continuous Flow Column Systems**

Jan Dries, Leen Bastiaens, Dirk Springael, Spiros N. Agathos, and Ludo Diels

The individual heavy metals zinc, nickel, and Cr(VI) and mixtures of them have distinctive effects on the reductive dechlorination of chlorinated ethenes by zerovalent iron.

8466

### **Degradation of Dye Pollutants by Immobilized Polyoxyometalate with H<sub>2</sub>O<sub>2</sub> under Visible-Light Irradiation**

Pengxiang Lei, Chun Cheng Chen, Juan Yang, Wanhong Ma, Jincai Zhao, and Ling Zang

Keggin polyoxometalate supported on ion-exchange resin catalyzes the photodegradation of cationic dye pollutants by activating H<sub>2</sub>O<sub>2</sub> under visible-light irradiation.

8475

### **Uptake of Organic Pollutants by Silica-Polycation-Immobilized Micelles for Groundwater Remediation**

Yael G. Mishael and Paul L. Dubin

Silica-polycation-immobilized micelles are shown to simultaneously treat a wide range of pollutants and reduce their concentration in solution.

8481

### **Nanostructured Sorbents for Capture of Cadmium Species in Combustion Environments**

Myong-Hwa Lee, Kuk Cho, Apoorva P. Shah, and Pratim Biswas

Nanostructured sorbents provide a potential route for chemisorption of metallic species vapors in combustion systems and prevent the formation of submicrometer-sized particles and their emission into the atmosphere.

8490

### **Polyethylenimine-Modified Fungal Biomass as a High-Capacity Biosorbent for Cr(VI) Anions: Sorption Capacity and Uptake Mechanisms**

Shubo Deng and Yen Peng Ting

A modified fungal biomass with positive surface charges is prepared by grafting polyethylenimine onto the biomass surface; the biomass shows enhanced Cr(VI) anion removal.

8497

Effect of Lubricant on the Formation of Heavy Duty Diesel

8512

### **Phenol Degradation by a Nonpulsed Diaphragm Glow Discharge in an Aqueous Solution**

Yong Jun Liu and Xuan Zhen Jiang

DC diaphragm glow discharges generated by a specially designed small hole in a dielectric diaphragm are developed for efficient phenol degradation in an aqueous solution.

8518

### **Design of Quinonoid-Enriched Humic Materials with Enhanced Redox Properties**

Irina V. Perminova, Anton N. Kovalenko, Philippe Schmitt-Kopplin, Kirk Hatfield, Norbert Hertkorn, Elena Y. Belyaeva, and Valery S. Petrosyan

The concept of novel designer humic materials is formulated and is demonstrated by synthesizing a quinonoid-enriched material with enhanced redox properties.

■ 8525

### **Degradation of Drinking Water Disinfection Byproducts by Synthetic Goethite and Magnetite**

Chan Lan Chun, Raymond M. Hozalski, and William A. Arnold

Reduction, hydrolysis, and sorption can be important loss processes for chlorinated disinfection byproducts in the presence of Fe(II) associated with goethite or magnetite.

## **Ecotoxicology and Human Environmental Health**

■ 8533

### **Fractions Affected and Probabilistic Risk Assessment of Cu, Zn, Cd, and Pb in Soils Using the Free Ion Approach**

Stephen Lofts, David Spurgeon, and Claus Svendsen

Terrestrial risk assessment of copper, zinc, cadmium, and lead can account for spatial variability in soil chemistry with the free ion approach.

## **Correspondence and Rebuttal**

8541

### **Comment on "New Evaluation Scheme for Two-Dimensional Isotope Analysis to Decipher Biodegradation Processes: Application to Groundwater Contamination by MTBE"**

Frank-Dieter Kopinke, Anett Georgi, and Hans H. Richnow

8543

### **Response to Comment on "New Evaluation Scheme for Two-Dimensional Isotope Analysis to Decipher Biodegradation Processes: Application to Groundwater Contamination by MTBE"**

Stefan B. Haderlein, Torsten C. Schmidt, Martin Elsner, Luc Zwick, Michael Berg, and René P. Schwarzenbach