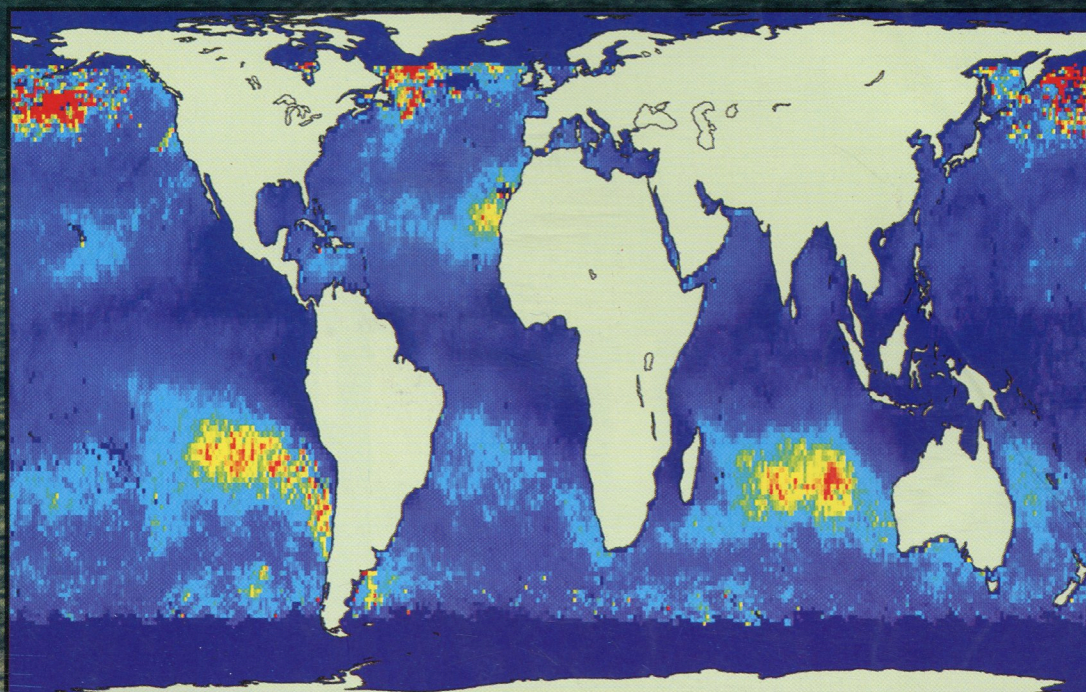


November 1, 2004

ENVIRONMENTAL Science & Technology

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Atmospheric **Dry Deposition**
of POPs to Oceans



The Challenges of Sustainable Papermaking

Continuous Electricity Generation from
Domestic Wastewater and Organic Substrates

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THE AMERICAN
CHEMICAL SOCIETY

Characterization of Natural and Affected Environments

5489

Effect of Application Variables on Emissions and Distribution of Fumigants Applied via Subsurface Drip Irrigation

Sharon K. Papiernik, Robert S. Dungan, Wei Zheng, Mingxin Guo, Scott M. Lesch, and Scott R. Yates

In subsurface drip application of fumigants to bedded soil, the configuration of the drip system has little impact on the fumigant compounds' volatilization and distribution.

■ 5497

Distribution and Fate of HBCD and TBBPA Brominated Flame Retardants in North Sea Estuaries and Aquatic Food Webs

Steven Morris, Colin R. Allchin, Bart N. Zegers, Joris J. H. Haftka, Jan P. Boon, Claude Belpaire, Pim E. G. Leonards, Stefan P. J. van Leeuwen, and Jacob de Boer

New environmental evidence shows that HBCD diastereomers strongly bioaccumulate and biomagnify in aquatic food webs, whereas TBBPA has a much lower potential for bioaccumulation.

■ 5505

Atmospheric Dry Deposition of Persistent Organic Pollutants to the Atlantic and Inferences for the Global Oceans

Elena Jurado, Foday M. Jaward, Rainer Lohmann, Kevin C. Jones, Rafael Simó, and Jordi Dachs

A novel methodology that combines satellite retrievals, models, and field measurements can estimate atmospheric dry deposition fluxes of POPs to the Atlantic Ocean.

5514

Seasonal and Spatial Variation of Polychlorinated Naphthalenes and Non-/Mono-Ortho-Substituted Polychlorinated Biphenyls in Arctic Air

Paul A. Helm, Terry F. Bidleman, Henrik H. Li, and Phil Fellin

PCN levels are higher in the winter at Alert and Dunai, whereas episodic trans-Pacific transport impacts levels at Tagish; non-/mono-*o*-PCBs do not show seasonal trends.

5522

Analysis of Perfluorinated Acids at Parts-Per-Quadrillion Levels in Seawater Using Liquid Chromatography-Tandem Mass Spectrometry

Nobuyoshi Yamashita, Kurunthachalam Kannan, Sachi Taniyasu, Yuichi Horii, Tsuyoshi Okazawa, Gert Petrick, and Toshitaka Gamo

With this method, perfluorinated acids can be detected at pg/L levels in oceanic waters where PFOA is the major perfluorinated compound detected, followed by PFOS.

Environmental Processes

5529

Pyromorphite Growth on Lead-Sulfide Surfaces

Andrew G. Stack, Rolf Erni, Nigel D. Browning, and William H. Casey

Electrochemical scanning tunneling microscopy and electron microscopies are used to follow the nucleation and growth of pyromorphite particles on a galena substrate under oxidative conditions.

5535

Inhibited Cr(VI) Reduction by Aqueous Fe(II) under Hyperalkaline Conditions

Y. Thomas He, Chia-Chen Chen, and Samuel J. Traina

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1. Effective now, titles must be included in the Reference section of *ES&T* research papers.
2. Effective January 1, 2005, all *ES&T* research papers must be submitted via the Web (<https://paragon.acs.org/paragon/index.jsp>). Email submissions or paper copies will not be accepted.

Chromate reduction by aqueous ferrous iron is inhibited and nonstoichiometric under hyperalkaline conditions, forming mixed iron-chromium (oxyhydro)oxides.

5540

Box Model Investigation of the Effect of Soot Particles on Ozone Downwind from an Urban Area through Heterogeneous Reactions

Yayne-abeba Aklilu and Diane V. Michelangeli

The effect of heterogeneous reactions on ozone concentrations is studied by representing a number of heterogeneous reactions on soot particles in a box model.

■ 5548

Fate of Chlorinated Fatty Acids in Migrating Sockeye Salmon and Their Transfer to Arctic Grayling

Huiling Mu, Göran Ewald, Einar Nilsson, Peter Sundin, and Clas Wesén

Salmon act as a vector for transferring nonpersistent, nonvolatile pollutants to remote ecosystems.

5555

Gas-Phase HO•-Initiated Reactions of Elemental Mercury: Kinetics, Product Studies, and Atmospheric Implications

Biswajit Pal and Parisa A. Ariya

Temperature-dependence kinetics and product study of HO•-initiated reactions of Hg⁰(g) under tropospheric conditions are presented; atmospheric implications are discussed.

■ 5567

Study of the OH and Cl-Initiated Oxidation, IR Absorption Cross-Section, Radiative Forcing, and Global Warming Potential of Four C₄-Hydrofluoroethers

Nathan Oyaro, Stig R. Sellevag, and Claus J. Nielsen

Estimates indicate that the tropospheric lifetimes of the hydrofluoroethers are short and that, compared with CFC-11, their global warming potentials are small.

5577

Aqueous Chlorination Kinetics of Some Endocrine Disruptors

Marie Deborde, Sylvie Rabouan, Hervé Gallard, and Bernard Legube

The chlorination kinetics of six endocrine disruptors are studied over a wide range of pH conditions to assess their fate during water treatment.

5584

Lead Phosphate Minerals: Solubility and Dissolution by Model and Natural Ligands

Carmen Enid Martínez, Astrid R. Jacobson, and Murray B. McBride

Nonequilibrium conditions prevail in lead-phosphate mineral suspensions even after three years of aging; soluble ligands, however, can potentially dissolve lead from these "highly insoluble" mineral phases.

5591

Cryogenic Laser Induced Fluorescence Characterization of U(VI) in Hanford Vadose Zone Pore Waters

■ Supporting Information is available free of charge via the Internet at <http://pubs.acs.org>.

▶ This issue contains a news story about this research.

Zheming Wang, John M. Zachara, Wassana Yantasee, Paul L. Gassman, Chongxuan Liu, and Alan G. Joly

Cryogenic laser-induced fluorescence spectra indicate that uranyl tricarbonate is the major uranium(VI) species in Hanford vadose zone pore waters.

5598

Use of Ferrocenyl Surfactants of Varying Chain Lengths To Study Electron Transfer Reactions in Native Montmorillonite Clay

Carla Swearingen, Jun Wu, Joseph Stucki, and Alanah Fitch

Electron transfer between Fe(III) within montmorillonite and ferrocenyl surfactants is found to occur if they are in close physical proximity and the reaction is thermodynamically favorable.

■ **5604**

Origin of Oxygen in Sulfate during Pyrite Oxidation with Water and Dissolved Oxygen: An In Situ Horizontal Attenuated Total Reflectance Infrared Spectroscopy Isotope Study

Courtney R. Usher, Curtis A. Cleveland, Jr., Daniel R. Strongin, and Martin A. Schoonen

In situ infrared spectroscopy shows that the sulfate product resulting from pyrite oxidation in water containing dissolved oxygen is primarily derived from the water.

5607

Transformation of the Antibacterial Agent Sulfamethoxazole in Reactions with Chlorine: Kinetics, Mechanisms, and Pathways

Michael C. Dodd and Ching-Hua Huang

Free chlorine rapidly transforms sulfamethoxazole via *N*-chlorination, leading to ortho-chlorination, back-reaction to sulfamethoxazole, or sulfonamide system rupture, depending on oxidant: substrate molar ratio.

5616

Apparent Decreases in Colloid Deposition Rate Coefficients with Distance of Transport under Unfavorable Deposition Conditions: A General Phenomenon

Xiqing Li, Timothy D. Scheibe, and William P. Johnson

In transport of polystyrene microspheres in packed glass beads, the retained profiles indicate a decreasing rate coefficient of colloid deposition with increasing transport distance.

■ **5626**

Sorption and Desorption of Cd²⁺ and Zn²⁺ Ions in Apatite-Aqueous Systems

Merike Peld, Kaia Tõnsuaadu, and Villem Bender

Sorption and desorption of cadmium and zinc ions on synthetic carbonate and fluorine-substituted calcium apatites are studied as well as the factors affecting these processes.

5632

Three-Dimensional Dual-Morphotype Species Modeling of Activated Sludge Flocs

Antônio M. P. Martins, Cristian Picioreanu, Joseph J. Heijnen, and Mark C. M. van Loosdrecht

A 3-D model with floc-forming and filamentous bacteria shows the importance of substrate diffusion, microbial growth type, and attachment in the morphogenesis of activated sludge flocs.

5642

Uptake of Bromide by Two Wetland Plants (*Typha latifolia* L. and *Phragmites australis* [Cav.] Trin. ex Steud.)

Shangping Xu, Alessandra C. Leri, Satish C. B. Myneni, and Peter R. Jaffé

Uptake rates of bromide by two wetland plants show that bromide should not be used as conservative tracer in freshwater wetlands.

5649

Microbial Reduction of U(VI) at the Solid-Water Interface

Byong-Hun Jeon, Shelly D. Kelly, Kenneth M. Kemner, Mark O. Barnett, William D. Burgos, Brian A. Dempsey, and Eric E. Roden

Microbial reduction of U(VI) sorbed to natural Fe(III) oxide-containing solids was slower and less extensive compared with reduction of U(VI) associated with synthetic Fe(III) oxide surfaces.

5656

Cd and Proton Adsorption onto Bacterial Consortia Grown from Industrial Wastes and Contaminated Geologic Settings

David M. Borrok, Jeremy B. Fein, and Charles F. Kulpa, Jr.

Bacteria in highly contaminated environments adsorb cadmium to variable extents and often to greater extents than bacteria in uncontaminated natural settings.

Environmental Modeling

■ **5665**

Measures of Overall Persistence and the Temporal Remote State

Maximilian Stroebe, Martin Scheringer, and Konrad Hungerbühler

A new persistence indicator that represents the long-term elimination rate of chemicals in multicompartment systems is proposed, and methods for its calculation are presented.

5674

Development of a Physiologically Based Pharmacokinetic Model for Volatile Fractions of Gasoline Using Chemical Lunging Analysis

James E. Dennison, Melvin E. Andersen, Harvey J. Clewell, and Raymond S. H. Yang

A physiologically based pharmacokinetic model was developed for the complex mixture gasoline; the model provides a pharmacokinetic description of the full mixture in laboratory rats.

■ **5682**

Geo-Referenced Multimedia Environmental Fate Model (G-CIEMS): Model Formulation and Comparison to the Generic Model and Monitoring Approaches

Noriyuki Suzuki, Kaori Murasawa, Takeo Sakurai, Keisuke Nansai, Keisuke Matsuhashi, Yuichi Moriguchi, Kiyoshi Tanabe, Osami Nakasugi, and Masatoshi Morita

The model integrates the spatial variability of environmental levels and exposures.

Environmental Measurements Methods

5694

Mobile Laboratory with Rapid Response Instruments for Real-Time Measurements of Urban and Regional Trace Gas and Particulate Distributions and Emission Source Characteristics

Charles E. Kolb, Scott C. Herndon, J. Barry McManus, Joanne H. Shorter, Mark S. Zahniser, David D. Nelson, John T. Jayne, Manjula R. Canagaratna, and Douglas R. Worsnop

A fast-response trace-gas and fine-particle instrument suite has been deployed in a van to characterize urban emission sources and ambient pollutant distributions.

5704

New Method for Time-Resolved Diesel Engine Exhaust Particle Mass Measurement

U. Lehmann, V. Niemelä, and M. Mohr

The real-time mass measurement system (DMM, Dekati) is also able to measure the mass concentration of engine exhaust gas during transient test cycles.

5712

Receptor Modeling of Toronto PM_{2.5} Characterized by Aerosol Laser Ablation Mass Spectrometry

Sandy Owega, Badi-Uz-Zaman Khan, Ryan D'Souza, Greg J. Evans, Mike Fila, and Robert E. Jervis

Positive matrix factorization can be applied to single-particle mass spectrometric data to identify sources of particulate matter.

■ 5721**Anisotropic Diffusion in Layered Argillaceous Rocks: A Case Study with Opalinus Clay**

Luc R. Van Loon, Josep M. Soler, Werner Müller, and Michael H. Bradbury

The anisotropic diffusion of different radionuclides in an argillaceous rock (Opalinus clay) is studied using a new radial through-diffusion technique.

■ 5729**Pumping-Induced Ebullition: A Unified and Simplified Method for Measuring Multiple Dissolved Gases**

Bryant A. Browne

A method for rapidly harvesting dissolved gases facilitates the measurement of major, trace, and ultratrace gases in water and establishes a platform for in situ real-time dissolved gas measurements.

5737**Development of a Solid-Phase Microextraction-Based Method for Sampling of Persistent Chlorinated Hydrocarbons in an Urbanized Coastal Environment**

Eddy Y. Zeng, David Tsukada, and Dario W. Diehl

A solid-phase microextraction-based sampling method is developed and field-tested for sampling of persistent chlorinated hydrocarbons in the coastal ocean off southern California.

Remediation and Control Technologies**5744****Fate of Carbon Tetrachloride during Phytoremediation with Poplar under Controlled Field Conditions**

Xiaoping Wang, Michael P. Dossett, Milton P. Gordon, and Stuart E. Strand

A field-scale mass-balance study suggests that poplar can take up carbon tetrachloride and degrade it in plant tissues with negligible loss to the atmosphere.

5750**Colloid Formation in Hanford Sediments Reacted with Simulated Tank Waste**

Kholoud Mashal, James B. Harsh, Markus Flury, Andrew R. Felmy, and Hongting Zhao

The hypothesis is confirmed that waste solutions alter and dissolve the native minerals present in the sediments and that colloidal feldspathoids form.

■ 5757**Identification and Quantification of Mineral Precipitation in Fe⁰ Filings from a Column Study**

Wiwat Kamolpornwijit, Liyuan Liang, Gerilynn R. Moline, Todd Hart, and Olivia R. West

A severely corroded iron sample from a column simulating 17 years shows >75% porosity loss; such extensive losses will impact long-term performance of permeable reactive barriers.

5766**Efficient Control System for Low-Concentration Inorganic Gases from a Process Vent Stream: Application of Surfactants in Spray and Packed Columns**

Hungmin Chein, Shankar G. Aggarwal, and Hsin-Hsien Wu

The presence of charge on the gas-liquid interface is responsible for enhanced removal efficiency; important factors include type and concentration of surfactants.

5773**Discoloration and Mineralization of Orange II Using Different Heterogeneous Catalysts Containing Fe: A Comparative Study**

Jiyun Feng, Xijun Hu, and Po Lock Yue

A bentonite-clay-based iron nanocomposite, hematite, amorphous FeOOH, and calcined FeOOH are used as heterogeneous catalysts for discoloration and mineralization of Orange II.

5779**Influence of Ultrasonic Disintegration on Sludge Growth Reduction and Its Estimation by Respirometry**

Chockalingam Lajapathi Rai, Georg Struenkmann, Johannes Mueller, and Paruchuri Gangadhar Rao

Respirometric studies of sludge growth reduction in ultrasonically treated sludge are discussed.

5786**Adsorption of Aromatic Compounds from Water by Treated Carbon Materials**

Daniela M. Nevskaia, Eva Castillejos-Lopez, Vicenta Muñoz, and Antonio Guerrero-Ruiz

Chemical surface modifications of carbon materials are key parameters to control adsorption selectivity for different aromatic compounds from water solution mixtures.

5797**Simultaneous Hyperaccumulation of Nickel, Manganese, and Calcium in *Alyssum* Leaf Trichomes**

C. Leigh Broadhurst, Rufus L. Chaney, J. Scott Angle, Timothy K. Mangel, Eric F. Erbe, and Charles A. Murphy

Five *Alyssum* nickel-hyperaccumulators have region-specific localization of hyperaccumulated nickel, manganese, and calcium within trichomes and the highest metal concentration reported for vascular plants.

5803**Development of a Mercury Transformation Model in Coal-Combustion Flue Gas**

Ye Zhuang, Jeffrey S. Thompson, Christopher J. Zygarlicke, and John H. Pavlish

Studies on mercury transformation as a function of time and temperature in a real coal-combustion flue gas are presented.

Sustainability Engineering and Green Chemistry**5809****Continuous Electricity Generation from Domestic Wastewater and Organic Substrates in a Flat-Plate Microbial Fuel Cell**

Booki Min and Bruce E. Logan

Electricity is continuously generated in a microbial fuel cell that contains an anode directly contacting the proton exchange membrane and the direct-air cathode.

5815**Framework for Evaluating the "Greenness" of Chemical Processes: Case Studies for a Novel VOC Recovery Technology**

Alexei Lapkin, Lucy Joyce, and Barry Crittenden

A hierarchical methodology for comparing the greenness of alternative chemical technologies and products is developed and evaluated in two case studies.

Additions and Corrections**5824****Development of a Method To Assess Cigarette Smoke Intake**

Clifford Watson, Joan McCraw, Gregory Polzin, David Ashley, and Dana Barr

■ Supporting Information is available free of charge via the Internet at <http://pubs.acs.org>.