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Toxic Effects *of* CONTAMINANTS *in* Polar Marine Environments

Formation of Chloroform and Chlorinated Organics by Free-Chlorine-Mediated Oxidation of Triclosan

Microbial Phenazine Production Enhances Electron Transfer in Biofuel Cells

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Research

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Characterization of Natural and Affected Environments

Environmental Processes

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Corina M. Ciocan and Jeanette M. Rotchell
The conservation of cancer genes *ras* and *p53* in *Mytilus edulis* is described.

3034
Methylmercury in Mosquitoes Related to Atmospheric Mercury Deposition and Contamination
Chad R. Hammerschmidt and William F. Fitzgerald
Mosquitoes may be a sensitive indicator of food-web methylmercury accumulation and atmospheric mercury deposition.

3040
Cadmium Uptake by a Green Alga Can Be Predicted by Equilibrium Modelling
Heliana Kola and Kevin J. Wilkinson
Cadmium biouptake by two strains of *Chlamydomonas reinhardtii* is quantitatively predicted by $[Cd^{2+}]$ over a wide range of pH, $[Ca^{2+}]$, and concentrations of other competing ions.

■ 3048
Extended X-ray Absorption Fine Structure Spectroscopy Evidence for the Complexation of Cadmium by Reduced Sulfur Groups in Natural Organic Matter
Torbjörn Karlsson, Per Persson, and Ulf Skyllberg
Reduced sulfur groups in natural organic matter are involved in the complexation of cadmium.

3056
Modeling Cadmium Exchange by an Aquatic Moss (*Fontinalis dalecarlica*)
Louis Croisetière, Landis Hare, André Tessier, and Sophie Duchesne
A two-compartment model successfully describes cadmium uptake and loss by the aquatic moss *Fontinalis dalecarlica*.

3061
Arsenic Mobilization through Microbially Mediated Deflocculation of Ferrihydrite
Christopher J. Tadanier, Madeline E. Schreiber, and Jonathan W. Roller
Bioreduction of As-bearing ferrihydrite by *Geobacter metallireducens* leads to mineral transformation, which causes surface charge alteration, subsequent deflocculation of micrometer-sized ferrihydrite aggregates, and formation of nanometer-sized colloids.

■ 3069
Simultaneous Utilization of Acetate and Hydrogen by *Geobacter sulfurreducens* and Implications for Use of Hydrogen as an Indicator of Redox Conditions
Derick G. Brown, John Komlos, and Peter R. Jaffé
Multisubstrate kinetics of H_2 and acetate use under iron-reducing conditions are presented, along with the implications of these kinetics on aqueous H_2 concentrations.

■ 3077
Thermal Growth and Decomposition of Methylnaphthalenes
Jun Yang and Mingming Lu
Product formation mechanisms from the combustion of 1- and 2-methylnaphthalenes—the main alkylated aromatic components in diesel fuels—are experimentally investigated.

3083
▶ Recovery of Chlorine-Exposed *Escherichia coli* in Estuarine Microcosms
Carl H. Bolster, Jonathan M. Bromley, and Stephen H. Jones
The inoculation of estuarine water microcosms containing chlorine-injured *E. coli* resulted in significant increases in the concentrations of culturable cells over a three-day period.

■ 3090
In Vitro Assessment of Modes of Toxic Action of Pharmaceuticals in Aquatic Life
Beate I. Escher, Nadine Bramaz, Rik I. L. Eggen, and Manuela Richter
An in vitro test battery provides preliminary hazard assessment and classification of the mode of toxic action for pharmaceuticals in the aquatic environment.

■ 3101
Black Carbon and Ecological Factors Affect In Situ Biota to Sediment Accumulation Factors for Hydrophobic Organic Compounds in Flood Plain Lakes
Caroline T. A. Moermond, John J. G. Zwolsman, and Albert A. Koelmans
Measured and modeled results show that both black carbon and ecological factors explain the variation of in situ BSAFs for hydrophobic organic compounds.

3110
Cloud Point Extraction of Direct Yellow
Elzbieta Tatara, Katarzyna Materna, Achim Schaadt, Hans-Jörg Bart, and Jan Szymanowski
The cloud-point phenomenon of nonionic surfactants induces the separation of an aqueous phase and a surfactant-rich phase that concentrates the dye.

3116
Effect of Chemical Speciation on Toxicity of Mercury to *Escherichia coli* Biofilms and Planktonic Cells
Isaac Najera, Chu-Ching Lin, Golenaz Adeli Kohbodi, and Jennifer A. Jay
The relationship between Hg uptake and speciation along a chloride gradient is similar in biofilm and planktonic cultures of *E. coli*.

■ 3121
Photochemical Oscillation of Fe(II)/Fe(III) Ratio Induced by Periodic Flux of Dissolved Organic Matter
Wenjing Song, Wanhong Ma, Jiahai Ma, Chuncheng Chen, and Jincai Zhao
Variations of iron species in the presence of different dissolved organic matter were examined in UV-irradiated aqueous solutions.

3128
Hydrolysis of Environmental Contaminants as an Experimental Tool for Indication of Their Persistency
Sara Rahm, Nicholas Green, Jessica Norrgran, and Åke Bergman
To improve understanding of persistency, a method is described for estimating the relative susceptibility of some potential environmental pollutants to hydrolysis reactions.

3134
Sorption and Related Properties of the Swine Antibiotic Carbadox and Associated N-Oxide Reduced Metabolites
Troy J. Strock, Stephen A. Sassman, and Linda S. Lee
Sorption of the swine antibacterial drug carbadox and its metabolites is influenced by organic-matter content, clay type, and the inorganic cations that are present.

3143
Impact of the Hydrocarbon to NO_x Ratio on Secondary Organic Aerosol Formation
Chen Song, Kwangsam Na, and David R. Cocker, III
Lower NO_x levels generate considerably more secondary organic aerosol mass than higher levels, when reacted *m*-xylene is held constant.

■ 3150
Influence of Smectite Hydration and Swelling on Atrazine Sorption Behavior
Mark A. Chappell, David A. Laird, Michael L. Thompson, Hui Li, Brian J. Teppen, Vaneet Aggarwal, Cliff T. Johnston, and Stephen A. Boyd
The atrazine sorption behavior of a smectite is significantly influenced by crystalline swelling, which controls the hydration status of the smectite interlayers.

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

■ **3157**

Kinetic Desorption and Sorption of U(VI) during Reactive Transport in a Contaminated Hanford Sediment

Nikolla P. Qafoku, John M. Zachara, Chongxuan Liu, Paul L. Gassman, Odeta S. Qafoku, and Steven C. Smith

Laboratory experiments find strong kinetic effects for U(VI) desorption and sorption; these results suggest that the release and transport of the contaminant in the field are probably kinetically controlled.

3166

Comparison of Copper Speciation in Estuarine Water Measured Using Analytical Voltammetry and Supported Liquid Membrane Techniques

Kuria Ndungu, Matthew P. Hurst, and Kenneth W. Bruland

A supported liquid membrane incorporating a carboxylic polyether ionophore, lasalocid, as a membrane carrier is used to measure copper speciation in estuarine water.

■ **3176**

▶ **Formation of Chloroform and Chlorinated Organics by Free-Chlorine-Mediated Oxidation of Triclosan**

Krista L. Rule, Virginia R. Ebbett, and Peter J. Vikesland

Triclosan readily reacts with free chlorine under drinking-water conditions to produce chlorinated phenols and chloroform.

Environmental Modeling

■ **3186**

Illustrating Sensitivity and Uncertainty in Environmental Fate Models Using Partitioning Maps

Torsten Meyer, Frank Wania, and Knut Breivik

Maps of environmental parameter sensitivity from multimedia, mass-balance model results provide valuable insights into organic contaminant fate and model behavior.

3197

Retrospective Analyses and Future Predictions of Snowmelt-Induced Acidification: Example from a Heavily Impacted Stream in the Czech Republic

H. Laudon, J. Hruška, S. Köhler, and P. Krám

A model is presented for hindcast and forecast of transient short-term acidification, and it is applied to the Lysina catchment in the Czech Republic.

■ **3203**

Indoor Sorption of Surrogates for Sarin and Related Nerve Agents

Brett C. Singer, Alfred T. Hodgson, Hugo Destaillats, Toshifumi Hotchi, Kenneth L. Revzan, and Richard G. Sextro

Indoor environment sorption models are presented for nerve agents, with parameter values determined experimentally using surrogates; because of sorption, sheltering indoors substantially reduces toxic load.

■ **3215**

Modeling the Influence of Decomposing Organic Solids on Sulfate Reduction Rates for Iron Precipitation

Paulo S. Hemsi, Charles D. Shackelford, and Linda A. Figueroa

Modeling illustrates the influence of the type of kinetics used to describe the decomposition of organic solids on metal precipitation in sulfate-reducing systems.

■ **3226**

Critical Body Residues Linked to Octanol–Water Partitioning, Organism Composition, and LC_{50} QSARs: Meta-Analysis and Model

A. Jan Hendriks, Theo P. Traas, and Mark A. J. Huijbregts

Accumulation models for lipid and nonlipid phases for various modes of action and species groups are used to link LC_{50} QSARs to lethal body burdens.

■ **3237**

Predicting Methyl *tert*-Butyl Ether, *tert*-Butyl Formate, and *tert*-Butyl Alcohol Levels in the Environment Using the Fugacity Approach

Hans Peter H. Arp, Kathrin Fenner, and Torsten C. Schmidt

A multimedia transformation model, parameterized according to known sensitivities, successfully predicts environmental concentrations of MTBE and its transformation products TBF and TBA in Europe.

3245

Optimization-Based Source Apportionment of $PM_{2.5}$ Incorporating Gas-to-Particle Ratios

Amit Marmur, Alper Unal, James A. Mulholland, and Armistead G. Russell

Use of gas-phase species has been found useful in deriving more reliable source contributions of $PM_{2.5}$ in Atlanta, Ga., and in reducing collinearity between sources.

3255

Effect of Declining Lake Base Cation Concentration on Freshwater Critical Load Calculations

Shaun A. Watmough, Julian Aherne, and Peter J. Dillon

The impact of soil acidification on the determination of critical loads of acidity for freshwaters is presented.

Environmental Measurements Methods

3261

A Field Comparison of Volatile Organic Compound Measurements Using Passive Organic Vapor Monitors and Stainless Steel Canisters

Gregory C. Pratt, Don Bock, Thomas H. Stock, Maria Morandi, John L. Adgate, Gurumurthy Ramachandran, Steven J. Mongin, and Ken Sexton

The methods are in agreement for some compounds but not all, with the observed differences similar across measurement sites, seasons, and meteorological variables.

3269

Estimating Ground-Level $PM_{2.5}$ in the Eastern United States Using Satellite Remote Sensing

Yang Liu, Jeremy A. Sarnat, Vasu Kilaru, Daniel J. Jacob, and Petros Koutrakis

Aerosol optical thickness measurements derived from satellite remote sensors may provide a cost-effective and supplemental source of information for determining ground-level $PM_{2.5}$.

■ **3279**

Evaluation of Methods To Obtain Geosorbent Fractions Enriched in Carbonaceous Materials That Affect Hydrophobic Organic Chemical Sorption

Sangjo Jeong and Charles J. Werth

Chemical and thermal treatments used to obtain carbonaceous material enrichments of geosorbents are applied to a char, two soots, and a humic acid.

3289

New Method for Assimilable Organic Carbon Determination Using Flow-Cytometric Enumeration and a Natural Microbial Consortium as Inoculum

Frederik A. Hammes and Thomas Egli

A new method based on flow-cytometric cell enumeration is presented. It allows quick and realistic determination of assimilable organic carbon by natural microbial consortia.

3295

Field-Flow Fractionation–Inductively Coupled Plasma Mass Spectrometry: An Alternative Approach to Investigate Metal–Humic Substances Interaction

Atitaya Siripinyanond, Sumattana Worapanyanond, and Juwadee Shiowatana

Field-flow fractionation–inductively coupled plasma mass spectrometry is a useful hyphenated technique for investigating metal distributions in different-sizedfractions of humic aggregates.

■ 3302
A New In Situ Method to Analyze Mineral Particle Reactions in Soils

Andreas Birkefeld, Rainer Schulin, and Bernd Nowack

A new experimental in situ method is used to analyze the dissolution and phase transformation of small mineral particles in soils under field conditions.

Remediation and Control Technologies

3308
Sorption Enhancement of Aromatic Sulfonates onto an Aminated Hyper-Cross-Linked Polymer

Bingcai Pan, Quanxing Zhang, Fanwei Meng, Xiaotiao Li, Xiao Zhang, Jianzhong Zheng, Weiming Zhang, Bingjun Pan, and Jinlong Chen

A macroreticular resin adsorbent, CHA-101, is aminated by dimethylamine to obtain a novel sorbent named M-101.

3314
Preparation and Characterization of a New Class of Starch-Stabilized Bimetallic Nanoparticles for Degradation of Chlorinated Hydrocarbons in Water

Feng He and Dongye Zhao

Starched palladized iron (Fe–Pd) nanoparticles prepared with a water-soluble starch are less agglomerating and more reactive than nonstarched nanoparticles.

3321
Chromium Release from Waste Incineration Air-Pollution-Control Residues

T. Astrup, C. Rosenblad, S. Trapp, and T. H. Christensen

Al(0), which is present in the residues, controls chromium leaching by reducing Cr(VI); exposure to oxygen depletes the reduction capacity of Al(0) and causes increased chromium leaching.

■ 3330
Pot and Field Studies on Bioremediation of *p*-Nitrophenol Contaminated Soil Using *Arthrobacter protophormiae* RKJ100

Sumeet Labana, Gunjan Pandey, Debarati Paul, Narinder K. Sharma, Aparajita Basu, and Rakesh K. Jain

This study describes the successful bioremediation of soil contaminated with PNP in pot and field conditions using *Arthrobacter protophormiae* RKJ100 immobilized on the carrier material, corncob powder.

3338
Inactivation of Microorganisms Using Electrostatic Fields

Maosheng Yao, Gediminas Mainelis, and Hey Reoun An

Nonpulsed electrostatic fields can inactivate sensitive microorganisms residing on nonconductive surfaces, if the proper combination of field strength and exposure time is selected.

3345
Primary Measures for Reduction of PCDD/F in Co-Combustion of Lignite Coal and Waste: Effect of Various Inhibitors

Marchela E. Pandelova, Dieter Lenoir, Antonius Kettrup, and Karl-Werner Schramm

Inexpensive and nontoxic $(NH_4)_2SO_4$ and $(NH_4)_2S_2O_3$ are effective inhibitors of PCCD/F formation in flue gases, suppressing formation by >98%.

3351
Fate of Steroid Estrogens in Australian Inland and Coastal Wastewater Treatment Plants

Olga Braga, George A. Smythe, Andrea I. Schäfer, and Andrew J. Feitz

Steroid estrogens are not removed during enhanced primary treatment, and a large fraction remains attached to particles, with implications for the receiving marine environment.

3359
Thermal Treatment of Metal-Enriched Biomass Produced from Heavy Metal Phytoextraction

Catherine Keller, Christian Ludwig, Frédéric Davoli, and Jörg Wochele

Experiments in a laboratory-scale reactor show that incineration is a viable option for the treatment of the heavy-metal-enriched plants produced by phytoextraction.

3368
Controlled Release of Nitrate and Sulfate to Enhance Anaerobic Bioremediation of Phenanthrene in Marine Sediments

Yinjie J. Tang, Shelly Carpenter, Jody Deming, and Barbara Krieger-Brockett

The enhanced rates of microbial anaerobic phenanthrene degradation when controlled-release nitrocellulose and $CaSO_4$ are placed at depth in marine sediments are measured and interpreted.

3374
Removal of PAH Compounds from Liquid Fuels by Pd Catalysts

B. Pawelec, J. M. Campos-Martin, E. Cano-Serrano, R. M. Navarro, S. Thomas, and J. L. G. Fierro

Palladium catalysts supported on γ-alumina, amorphous silica–alumina, and zeolite β are prepared and evaluated for use in reducing PAHs in diesel fuel.

3382
Experimental Study of Water and Salt Fluxes through Reverse Osmosis Membranes

Wenwen Zhou and Lianfa Song

Water and salt fluxes through reverse osmosis membranes are experimentally investigated, and more appropriate transport equations are proposed.

3388
Sonochemical Decomposition of Perfluorooctane Sulfonate and Perfluorooctanoic Acid

Hiroshi Moriwaki, Youichi Takagi, Masanobu Tanaka, Kenshiro Tsuruho, Kenji Okitsu, and Yasuaki Maeda

A novel method, sonication, has been developed for the efficient decomposition of perfluorooctane sulfonate and perfluorooctanoic acid.

3393
Predicting Adsorption Isotherms for Aqueous Organic Micropollutants from Activated Carbon and Pollutant Properties

Lei Li, Patricia A. Quinlivan, and Detlef R. U. Knappe

Water affinity coefficients, which are correlated with adsorbent hydrophilicity, are combined with the Polanyi–Dubinin–Manes model to predict the adsorption of organic contaminants in aqueous solution by activated carbons.

Sustainability Engineering and Green Chemistry

3401
▶ Microbial Phenazine Production Enhances Electron Transfer in Biofuel Cells

Korneel Rabaey, Nico Boon, Monica Höfte, and Willy Verstraete

Bacteria produce and/or use redox shuttles, thereby enhancing electron transfer in microbial fuel cells.

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