

December 15, 2003

ENVIRONMENTAL Science & Technology

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



*Destruction of the
World Trade Center
and PCBs, PBDEs,
PCDD/Fs, PBDD/Fs,
and Chlorinated
Biphenylenes*

**Perfluorinated Chemicals Infiltrate
Ocean Waters**

Research

Critical Reviews

5471

Manure-Borne Estrogens as Potential Environmental Contaminants: A Review

Travis A. Hanselman, Donald A. Graetz, and Ann C. Wilkie

A review of the physicochemical properties of natural steroidal estrogens, the occurrence of estrogens in livestock excreta, and the fate of manure-borne estrogens in the environment.

Characterization of Natural and Affected Environments

5479

Occurrence and Fate of Macrolide Antibiotics in Wastewater Treatment Plants and in the Glatt Valley Watershed, Switzerland

Christa S. McArdell, Eva Molnar, Marc J.-F. Suter, and Walter Giger

Clarithromycin is the most abundant macrolide and is not significantly eliminated along the Glatt River stretch of 36 km.

■ 5487

Size-Dependent Mixing Characteristics of Volatile and Nonvolatile Components in Diesel Exhaust Aerosols

Hiromu Sakurai, Kihong Park, Peter H. McMurry, Darrick D. Zarling, David B. Kittelson, and Paul J. Ziemann

On the basis of volatility measurements, particles can be separated into two overlapping modes varying in peak diameter and magnitude depending on engine operating conditions.

5496

Temporal Trend Studies on Tetra- and Pentabrominated Diphenyl Ethers and Hexabromocyclododecane in Guillemot Egg from the Baltic Sea

Ulla Sellström, Anders Bignert, Amelie Kierkegaard, Lisbeth Häggberg, Cynthia A. de Wit, Mats Olsson, and Bo Jansson

5511

Model of Microbial Transport and Inactivation in the Surf Zone and Application to Field Measurements of Total Coliform in Northern Orange County, California

Alexandria B. Boehm

The length of shoreline impacted by a point source of total coliform depends primarily on dilution by rip currents and generally does not exceed 4000 m.

5518

Watershed Vulnerability to Herbicide Transport in Northern Missouri and Southern Iowa Streams

R. N. Lerch and P. E. Blanchard

The runoff potential of soils is a critical factor affecting watershed vulnerability to herbicide transport within the northern Missouri/southern Iowa region of the Corn Belt.

■ 5528

Estimation of Primary and Secondary Particulate Matter Intake Fractions for Power Plants in Georgia

Jonathan I. Levy, Andrew M. Wilson, John S. Evans, and John D. Spengler

The primary and secondary particulate matter intake fractions (population exposures per unit emissions) are estimated for seven power plants in Georgia using two long-range dispersion models.

5537

Ambient Silver Concentration Anomaly in the Finnish Arctic Lower Atmosphere

M. Shamsuzzoha Basunia, Sheldon Landsberger, Tarja Yli-Tuomi, Phillip K. Hopke, Paul Wishinski, Jussi Paatero, and Yrjö Viisanen

Historical records of atmospheric silver concentrations in the northern Finland show a distinct time period of industrial activities arising from the Kola Peninsula in Russia.

5545

Perfluorinated Chemicals Infiltrate Ocean Waters: Link between Exposure Levels and Stable Isotope Ratios in Marine Mammals

Kristin Inneke Van de Vijver, Philippe Tony Hoff, Krishna Das, Walter Van Dongen, Eddy Louis Esmans, Thierry Jauniaux, Jean-Marie Bouqueneau, Ronny Blust, and

■ 5559

Analysis of Sources of Dioxin Contamination in Sediments and Soils Using Multivariate Statistical Methods and Neural Networks

Rainer Götz and Raimund Lauer

Multivariate statistical methods and neural networks are used for the identification of dioxin sources of sediments of the river Elbe, its tributaries, and the Port of Hamburg as well as soils influenced by dredging material.

Environmental Processes

5566

Critical Evaluation of Desorption Phenomena of Heavy Metals from Natural Sediments

Yan Gao, Amy T. Kan, and Mason B. Tomson

This study evaluates heavy metal sorption/desorption hysteresis by investigating desorption induced by lowering supernatant metal concentrations, lowering the solution pH, and sequestration with EDTA.

5574

Mechanisms of Dioxin Formation from the High-Temperature Pyrolysis of 2-Bromophenol

Catherine S. Evans and Barry Dellinger

The role of gas-phase pyrolysis of 2-bromophenol in illustrating the mechanisms of dioxin formation is demonstrated using a 1-cm i.d. fused-silica flow reactor equipped with a GC/MS.

5581

Cake-Enhanced Concentration Polarization: A New Fouling Mechanism for Salt-Rejecting Membranes

Eric M. V. Hoek and Menachem Elimelech

Cake-enhanced concentration polarization is the key phenomenon governing the permeate flux and salt rejection behavior in colloidal fouling of RO and NF membranes.

■ 5589

The Effects of Reaction-Product Formation on the Reductive Dissolution of MnO₂ by Fe(II)

John E. Villinski, James E. Saiers, and Martha H. Conklin

The inhibitory effect of Fe(III)(s) reaction products on the reductive dissolution of β -MnO₂ by Fe(II) are investigated and quantified

■ 5603

Influence of Calcium Carbonate on U(VI) Sorption to Soils

Zuoping Zheng, Tetsu K. Tokunaga, and Jiamin Wan

U(VI) sorption to soils in the presence of calcium carbonate is strongly depressed because of the formation of neutral pH high-stability calcium uranyl carbonate complexes.

5609

Voltammetry Assisted by Multivariate Analysis as a Tool for Speciation of Metallothioneins: Competitive Complexation of α - and β -Metallothionein Domains with Cadmium and Zinc

María José López, Cristina Ariño, Silvia Díaz-Cruz, José Manuel Díaz-Cruz, Roman Tauler, and Miquel Esteban

The capability of voltammetry assisted by MCR-ALS in the understanding of competitive metal complexation by metallothionein domains is shown.

5617

Pore-Scale Analysis of Anaerobic Halorespiring Bacterial Growth along the Transverse Mixing Zone of an Etched Silicon Pore Network

Indumathi M. Nambi, Charles J. Werth, Robert A. Sanford, and Albert J. Valocchi

Flow hydrodynamics and nutrient mass transfer limitations are found to affect the morphology and location of microbial growth along a transverse mixing zone.

■ 5625

Ion Budgets and Sediment–Water Interactions during the Experimental Acidification and Recovery of Little Rock Lake, Wisconsin

Carolyn J. Sampson and Patrick L. Brezonik

Data show Ca²⁺, Mg²⁺, and K⁺ release from bottom sediments to the water column and NH₄⁺, NO₃⁻, and SO₄²⁻ removal, for a net internal alkalinity generation.

5636

Behavior of the Polycyclic Musks HHCB and AHTN in Lakes, Two Potential Anthropogenic Markers for Domestic Wastewater in Surface Waters

Jürgen J. Euring, Hans-Rudolf Buser, Markus D. Müller



5651

Reductive Dechlorination of Polychlorinated Biphenyls: Threshold Concentration and Dechlorination Kinetics of Individual Congeners in Aroclor 1248

Young-Cheol Cho, Roger C. Sokol, Robert C. Frohnhoefer, and G-Yull Rhee

The threshold concentration for microbial dechlorination varies widely among PCB congeners, and these differences affect the level and pattern of dechlorination in contaminated sediments.

■ 5657

Classifying NOM—Organic Sorbate Interactions Using Compound Transfer from an Inert Solvent to the Hydrated Sorbent

Mikhail Borisover and Ellen R. Graber

An inert solvent reference state is valuable for delineating differences in organic compound interactions with NOM, enabling sorbate classification according to strength of sorbate—NOM interactions.

5665

Products of Aqueous Chlorination of 17 β -Estradiol and Their Estrogenic Activities

Jianying Hu, Shuijie Cheng, Takako Aizawa, Yoshiyasu Terao, and Shoichi Kunikane

The products of aqueous chlorination of 17 β -estradiol are characterized using LC-MS, and the estrogenic activities of these compounds are evaluated.

5671

Surface Chemical Heterogeneity of Bacteriogenic Iron Oxides from a Subterranean Environment

Raul E. Martinez, D. Scott Smith, Karsten Pedersen, and F. Grant Ferris

Modeling of the surface reactivity of bacteriogenic iron oxides through the use of a fully optimized continuous affinity pK_a spectroscopy method.

Environmental Measurements Methods

5678

Congener-Based Aroclor Quantification and Speciation Techniques: A Comparison of the Strengths, Weaknesses, and Proper Use of Two Alternative Approaches

Paula J. Sather, John W. Newman, and Michael G. Ikonomou

Two approaches to Aroclor quantification and speciation are systematically compared to determine strengths and limitations of each, identify sources of bias, and determine the best use for each.

5687

Disposable Indicators for Monitoring Lighting Conditions in Museums

Mauro Bacci, Costanza Cucci, Anne-Laurence Dupont, Bertrand Lavédrine, Marcello Picollo, and Simone Porcinai

A colorimetric indicator is investigated and proposed as an early warning system for fast and easy assessment of the light exposure of objects in museums.

5695

Portable Sick House Syndrome Gas Monitoring System Based on Novel Colorimetric Reagents for the Highly Selective and Sensitive Detection of Formaldehyde

Yoshio Suzuki, Nobuo Nakano, and Koji Suzuki

Highly selected and sensitive detection of indoor formaldehyde gas was carried out using a hand-held instrument based on a novel colorimetric agent.

5701

Fluorescence Excitation—Emission Matrix Regional Integration to Quantify Spectra for Dissolved Organic Matter

Wen Chen, Paul Westerhoff, Jerry A. Leenheer, and Karl Booksh

Fluorescence regional integration, a quantitative technique that integrates the volume beneath an excitation emission matrix, is illustrated by analysis of drinking water and wastewater.

5711

A Continuous Analyzer for Soluble Anionic Constituents and Ammonium in Atmospheric Particulate Matter

Rida Al-Horr, Gautam Samanta, and Purnendu K. Dasgupta

A novel steamless particle collector/analysis system is described; field data are presented.

5721

Direct Injection GC Method for Measuring Light Hydrocarbon Emissions from Cooling-Tower Water

Max M. Lee, Tim D. Logan, Kefu Sun, N. Spencer Hurley, Jr., Robert A. Swatoski, and Steve J. Gluck

A new GC method for quantifying low level (~1 ppb (w/v)) of light hydrocarbons (C₁—C₆) in cooling-tower water is developed and validated.

5727

Determination of Strongly Reducing Substances in Sediment

Qingman Li, Shuping Bi, and Guoliang Ji

Strongly reducing substances in sediments are determined by the proposed method based on the oxidation by Fe(III) and determination of the produced Fe(II) by colorimetry.

5732

Prototype for In Situ Detection of Atmospheric NO₃ and N₂O₅ via Laser-Induced Fluorescence

Ezra C. Wood, Paul J. Wooldridge, Jens H. Freese, Tim Albrecht, and Ronald C. Cohen

A prototype designed for in situ detection of NO₃ by LIF and of N₂O₅ by thermal dissociation followed by LIF detection of NO₃ is described.

5739

Quantification of Metallothionein-like Proteins in the Mussel *Mytilus galloprovincialis* Using RP-HPLC Fluorescence Detection

Issam El Ghazi, Sieglinde Menge, Juergen Miersch, Abdelghani Chafik, Ali Benhra, M. Khalid Elamrani, and Gerd-Joachim Krauss

A new HPLC fluorescence method was developed for quantification of metallothionein isoforms in mussels to indicate heavy metal pollution.

Remediation and Control Technologies

5745

Mechanism and Kinetics of the Catalytic Oxidation of Aqueous Ammonia to Molecular Nitrogen

Deuk Ki Lee

Reaction pathway and kinetics of the aqueous phase catalytic oxidation of ammonia to nitrogen over Ru/TiO₂ catalyst have been proposed.

■ 5750

Arsenic(III) Oxidation by Iron(VI) (Ferrate) and Subsequent Removal of Arsenic(V) by Iron(III) Coagulation

Yunho Lee, Ik-hwan Um, and Jeyong Yoon

This paper reports the oxidation mechanism of arsenite by ferrate and demonstrates the combination of Fe(VI) and ferric salt as a novel arsenic removal technology.

■ 5757

Subcritical (Hot/Liquid) Water Dechlorination of PCBs (Aroclor 1254) with Metal Additives and in Waste Paint

Alena Kubátová, Jamie Herman, Tamara S. Steckler, Marleen de Veij, David J. Miller, Edgar B. Klunder, Chien M. Wai, and Steven B. Hawthorne

Degradation of PCBs in the subcritical water was enhanced in the presence of metals, showing suitability of the method for PCB decontamination of radioactive waste.

5763

Simulation and Evaluation of Elemental Mercury Concentration Increase in Flue Gas Across a Wet Scrubber

John C. S. Chang and S. Behrooz Ghorishi

The increase of elemental mercury concentration in flue gas across wet scrubbers is simulated by a first-order reaction model and critical wet scrubber control parameters are identified to minimize the mercury emissions.

■ 5767

Mechanisms of the Aqueous Photodegradation of Polycyclic Aromatic Hydrocarbons

Matthew P. Fasnacht and Neil V. Blough

The role of dioxygen (O₂), cation radicals, and photoionization in the aqueous photodegradation of polycyclic aromatic hydrocarbons (PAHs) is defined.

5773

Dechlorination of Polychlorinated Biphenyls in Industrial Transformer Oil by Radiolytic and Photolytic Methods

Cynthia G. Jones, Joseph Silverman, Mohamad Al-Sheikhly, Pedatsur Neta, and Dianne L. Poster

Used transformer oils containing high concentrations of PCBs are fully dechlorinated by treatment with electron beam, γ , and UV radiation.

5778

Pyrene Degradation in the Rhizosphere of Tall Fescue (*Festuca arundinacea*) and Switchgrass (*Panicum virgatum* L.)

Yen-Chih Chen, M. Katherine Banks, and A. Paul Schwab

The biodegradation of pyrene is found to be significantly enhanced in the rhizosphere of fescue when compared to unvegetated soil.

■ 5783

Modeling of Thin-Film Slurry Photocatalytic Reactors Affected by Radiation Scattering

Gianluca Li Puma

A simple, dimensionless mathematical model for steady-state, continuous flow, thin-film, slurry photocatalytic reactors for water purification using solar radiation and UV lamps.

5792

Sorption of Basic Dyes onto Iron Humate

Pavel Janoš

Iron humate was proposed as a new sorbent for removing basic dyes from waters, and the effect of various parameters on the dye sorption was examined.

5799

Aminated Polyacrylonitrile Fibers for Humic Acid Adsorption: Behaviors and Mechanisms

Shubo Deng and Renbi B. Bai

Aminated polyacrylonitrile fibers are prepared through a simple method and are found to be very effective in adsorbing humic acid from aqueous solutions.

5806

Investigation of the Inhibitory Effect of Silica on the Degradation of 1,1,1-Trichloroethane by Granular Iron

Tamar Kohn, Sheryl R. Kane, D. Howard Fairbrother, and A. Lynn Roberts

The inhibiting effect of silica on the reduction of 1,1,1-trichloroethane by iron is discussed as a function of silica concentration, pH, and iron exposure time to silica.

■ 5813

Environmental Remediation by an Integrated Microwave/UV Illumination Method. V. Thermal and Nonthermal Effects of Microwave Radiation on the Photocatalyst and on the Photodegradation of Rhodamine-B under UV/Vis Radiation

Satoshi Horikoshi, Aiko Saitou, Hisao Hidaka, and Nick Serpone

Photocatalytic decomposition of the cationic rhodamine-B dye is examined in aqueous TiO₂ dispersions using an integrated microwave/UV illumination method to investigate the influence of microwave radiation.

5823

Trichloroethylene Degradation in a Coupled Anaerobic/Aerobic Reactor Oxygenated Using Hydrogen Peroxide

B. Tartakovsky, M.-F. Manuel, and S. R. Guiot

Combined reductive—oxidative degradation of trichloroethylene in a coupled anaerobic—aerobic biofilm reactor fed with ethanol and oxygenated using hydrogen peroxide is demonstrated.

5829

Pilot-Scale Demonstration of Cyclodextrin as a Solubility-Enhancement Agent for Remediation of a Tetrachloroethene-Contaminated Aquifer

Geoffrey R. Tick, Fara Lourenso, A. Lynn Wood, and Mark L. Brusseau

The performance of cyclodextrin as a solubility-enhancement agent is evaluated for remediation of an aquifer contaminated with immiscible-liquid phase tetrachloroethene.

Correspondence

5835

Comment on "Evidence for the Absence of *Staphylococcus aureus* in the Land Applied Biosolids"

David L. Lewis and David K. Gattie

5836

Response to Comment on "Evidence for the Absence of *Staphylococcus aureus* in Land Applied Biosolids"

Patricia A. Rusin, Sheri L. Maxwell, John P. Brooks, Charles P. Gerba, and Ian L. Pepper

5837

Comment on "Locating and Quantifying PCB Sources in Chicago: Receptor Modeling and Field Sampling"

Ali K. Oskouie, David T. Lordi, Bernard Sawyer, and Richard Lanyon

5838

Response to Comment on "Locating PCB Sources in Chicago: Receptor Modeling and Field Sampling"

Ying-Kuang Hsu, Thomas M. Holsen, and Philip K. Hopke

5839

Author Index to Volume 37, 2003

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

37(24) 1C—6C / 5471—5864

ISSN 0013 936X