AIR QUALITY

Reacclimating biofilters

Biofiltration is an increasingly popular technique for controlling the emission of VOCs from gas streams. It uses microbes to degrade the pollutant VOC to carbon dioxide and water. F. J. Martin and R. C. Loehr have studied the time required to reacclimate the biofilter after periods of nonuse. This time factor is important, because the biofilter does not work efficiently during the acclimation period and thus VOCs escape into the atmosphere. They studied the degradation of benzene, toluene, and xylene in biofilters made from a 1.5-month-old and a 6-month-old compost. Their results showed that the aged compost took longer to acclimate to benzene but an equivalent time to acclimate to toluene. The longer the period of nonuse, the longer the time required for acclimation. (*J. Air Waste Manage. Assoc.* **1996**, *46*, 539–46)

DRINKING WATER

U.K. radon levels

Elevated radon levels in drinking water are an environmental concern because radon is a contributor to human radiation exposure, and the gas dissolves easily in water. There is a risk associated with radon ingested with the water and inhaled from boiling or aeration. D. Clapham and N. J. Horan report on radon in private water supplies in the United Kingdom. Most local authorities in the United Kingdom do not monitor radon in water. In some cases, the levels are more than 10 times the recommended U.S. levels. Households dependent on such supplies are therefore at risk. The efficiency and cost-effectiveness of granular activated carbon filtration is recommended for private supplies. (*Water Environ. Management*, **1996**, *10*, 211–14)

Impact of surfactants on remediation

Surfactant flushing has been used to remediate subsurface environments contaminated with persistent nonaqueous-phase liquids. Surfactants can have a major impact on hydrocarbon dissolution and transport in contaminated sites. S. J. Grimberg and colleagues previously developed a mechanistic model to describe dissolution of solid phenanthrene into water solutions containing nonionic surfactants. Now they have confirmed the validity of the model by comparing predictions with data collected from a flow-through system with well-defined hydrodynamics. Effluent concentrations of phenanthrene were predicted and observed to be lower than saturation (equilibrium) concentrations. (*Environ. Sci. Technol.*, this issue, 2967–74)

New coliform method

Accurate monitoring of public drinking-water supplies for the presence of fecal contamination is critical for safeguarding public health. Adherence to Safe Drinking Water Act regulations requires that samples be monitored for total coliforms, an indicator of potential fecal contamination. Positive samples are further monitored to confirm the presence of fecal coliforms. K. P. Brenner and colleagues compared the present EPA-approved methodology for these tests with a newly developed method. Both methods use membrane filtration technology, but the new method uses MI agar with specific additives for the simultaneous detection of total coliforms and *Escherichia coli*. Results indicate that recoveries of total coliforms and *E. coli* with the new technique are significantly better those using the current method. (*Appl. Environ. Microbiol.* **1996**, *62*, 203–08)

GREEN CHEMISTRY

Polysaccharide packaging

Cellulose and other polysaccharides have great potential for use in biodegradable packaging and other materials. The challenge comes in modifying polysaccharides to improve their physical properties without diminishing biodegradability. D. S. Roessner and colleagues synthesized (6-*O*)- and (2-*O*/3-*O*)-acetyl amylose polymers (substituted at the primary and secondary hydroxyls, respectively), which retained the water solubility of the original polysaccharide. These polymers were then tested for biodegradability by various bacteria. The (2-*O*/3-*O*)-acetyl amylose polymers were degraded more rapidly and to a greater extent than their (6-*O*)-counterparts, thus illustrating the importance of the substitution site in conjunction with biodegradability in these polysaccharides. (*Macromolecules* **1996**, *29*, 1–9)

MEASUREMENTS

VOC analysis

Recent developments in membrane introduction mass spectrometry (MIMS) make it an attractive technique for the direct analysis of VOCs in air samples. P. H. Hemberger and colleagues report that by combining charge exchange ionization with MIMS, they can produce a 4- to 20-fold improvement in the sensitivity of the technique as compared with conventional electron ionization (EI). In their technique, a hollow fiber polymeric silicone membrane is interfaced to an ion trap mass spectrometer through a jet separator. Membrane-transported oxygen provides the charge exchange reagent gas. Results are shown for several oxygenated VOCs and several hydrophobic VOCs with the greatest en-

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hancements as compared with EI seen for alcohols. The resulting mass spectra also had greater amounts of the molecular ion and less fragmentation as compared with EI. (*Anal. Chem.* **1996**, *68*, 2097–2101)

PESTICIDES

Drift damage

Several factors are encouraging replacement of older herbicides such as atrazine and 2,4-D with newer compounds from the sulfonylurea and other chemical families. J. S. Fletcher and colleagues studied the sulfonylurea compound, chlorsulfuron, to assess the effect of drift onto nontarget plants. Chlorsulfuron was applied at low rates (0.1–0.8% of the recommended field rate) to four nontarget plants (canola, soybean, smartweed, and sunflower) at different stages of growth. Low-level application of the herbicide depressed the yield of all plants. The application of glyphosphate, atrazine, or 2,4-D at the same rate did not affect plant growth. The authors reported that chlorsulfuron may be as much as 10,000 times more toxic to soybean yields than other conventional herbicides. (*Environ. Toxicol. Chem.* **1996**, *15*, 1189–96)

RADIOACTIVITY

Chernobyl effects

The 1986 Chernobyl nuclear power plant explosion resulted in some of the most intense radioactive contamination on Earth. D. W. Sugg and colleagues studied radiocesium (^{137}Cs) concentrations and genetic damage in catfish (*Ictalurus punctatus*) living in a cooling pond at the reactor site. Assessments of genetic damage were made by analyzing the percentage of DNA strand breaks in gills, liver, and red blood cells and the number of micronuclei in red blood cells. This research indicated significant genetic damage and radiocesium concentrations in the catfish. The authors note that such studies provide an extraordinary chance to observe long-term adaptation and evolutionary changes in wildlife exposed to highly polluted environments. (*Environ. Toxicol. Chem.* **1996**, *15*, 1057–63)

Sampling colloids

Colloids are often involved in transport of contaminants through aquifers. N. Weisbrod and co-workers describe a new method for passive sampling of groundwater colloids. The sampler uses dialysis cells with large-pore membranes in dynamic equilibrium with the mobile colloid and liquid phases. In laboratory tests using a suspension of latex microspheres, the dialysis cells reached equibrillium in 44–100 h. It took 50–180 h with a suspension of kaolinite. Field profiles under natural flow conditions in a sand and sandstone aquifer showed large variability in colloid content within and between the profiles. The authors describe the system as suitable for long-term sampling of groundwater colloids under very turbid conditions. (*Environ. Sci. Technol.*, this issue, pp. 3094–3101)

REMEDIATION

TCE biodegradation

Trichloroethylene (TCE) is a suspected carcinogen and the most commonly reported VOC in groundwater. Degradation of TCE by microorganisms using toluene as the primary growth substrate has been extensively studied. There is a need, however, to better characterize the environmental and physiological conditions under which individual bacterial strains degrade TCE. J. G. Leahy and colleagues studied and compared factors influencing TCE degradation for a number of bacterial strains under aerobic and hypoxic conditions. Results for aerobic conditions indicated that organisms expressing toluene dioxygenases degraded TCE at lower rates than those expressing toluene monooxygenases. Degradation rates were generally lower under hypoxic conditions using nitrate as an electron acceptor or lactate as an electron donor. (*Appl. Environ. Microbiol.* **1996**, *62*, 825–33)

PAH biodegradation

Polycyclic aromatic hydrocarbons (PAHs) from shipping activities, fuel spills, runoff, and sewage plant effluents often contaminate harbor sediments. Natural microbial degradation may remove PAHs from sediments. But previous studies suggested that PAHs are degraded only in the presence of oxygen or nitrate, not in sulfate or under methanogenic conditions. J. D. Coates and colleagues studied the oxidation of PAHs in sediment from San Diego Bay under sulfate-reducing conditions. Oxidation occurred with no detectable lag period. This research is significant because oxygen and nitrate are present in only a thin surface layer of sediment. Sulfate reduction is the primary mechanism for organic biodegradation in sediments. The results suggest that natural PAH degradation in sediments by sulfate-reducing organisms may impact remediation. (*Appl. Environ. Microbiol.* **1996**, *62*, 1099–1101)

WASTEWATER

TCDD reductions

There has been much concern about the presence of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) in wastewater discharges from pulp mills using chlorine bleach. The forest products industry has responded with process changes that have resulted in a 90% reduction in discharges since 1988. J. D. Abbott and S. W. Hinton assembled a database of TCDD concentration in fish tissues at sites downstream of 39 pulp mills and examined this database to determine temporal trends in the TCDD concentration. Their results show a median rate of 0.36 annual fractional decrease in the lipid normalized concentration of TCDD in fish tissues. This annual fractional decrease in fish tissue concentrations is consistent with the reduction in TCDD discharges. (*Environ. Toxicol. Chem.* **1996**, *15*, 1163–65)

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