

## BIODEGRADATION

### Mixed phenol species

Mixed species of chlorinated phenols in the environment present a major health threat, but removal of these compounds can be costly. In an effort to apply a well-characterized and cost-effective technology to this problem, B. Bae, R. L. Autenrieth, and J. S. Bonner studied growth and degradation kinetics for a mixture of phenolic compounds in a continuous-flow reactor using activated sludge. The researchers tested phenol, dichlorophenol (DCP), and pentachlorophenol (PCP). They added 1 mg/L of DCP or PCP to 750 mg/L phenolic wastewater, which resulted in a decreased growth rate of the mixed culture. When PCP alone was added, only 3% of the PCP was removed. However, when DCP was added to the PCP-phenol system, 38% of the PCP was removed. A loss of culture species diversity resulted with the addition of DCP and PCP to the phenolic system. Results indicated the potential for activated sludge in treating mixed phenolic wastewater by controlling the ratio of inhibitory to noninhibitory substrates and maintaining species diversity in the reactor. (*Water Environ. Res.* **1995**, 67(2), 215-23)

## BIOREMEDIATION

### Jet fuel in groundwater

Jet fuel-4 (JP-4) contains significant levels of benzene, toluene, ethylbenzene, and xylene (BTEX). Pump-and-treat cleanup of BTEX-contaminated soils or groundwater has been jeopardized by stricter air pollution regulations. P. S. Yocum, R. L. Irvine, and J. A. Bumpus used a modified sequencing batch reactor to treat JP-4-contaminated groundwater. JP-4 feedstocks were fed to a bench-scale, sequencing batch reactor using microbial consortia from contaminated soil. The reactor operated for 180

### In situ vinyl chloride transformation

Can methane-oxidizing bacteria transform vinyl chloride in situ? M. E. Dolan and P. L. McCarty evaluated this possibility using a small-column microcosm and a methane-stimulated culture. Starting material from aquifers at a chloroethene-contaminated Superfund site was placed in 15-mL test tubes fitted with a fluid exchange system for sequential batch testing. Influent vinyl chloride concentrations ranged from 1 to 17 mL, and methane concentrations ranged from 0.5 to 4 mL. Results indicated that methanotrophic bacteria were stimulated within 60 days. Vinyl chloride transformations were observed in all microcosms. Researchers observed variations in transformation yields from different aquifer samples. Maximum transformation yields ranged from 1 to 3.5 mg of vinyl chloride per milligram of methane. Up to 16 mg/L of vinyl chloride could be transformed by adding methane with no observed toxic effects. (*Environ. Sci. Technol.*, this issue, 1892-97)

days and was fed feedstock with total petroleum hydrocarbon (TPH) concentrations ranging from 30 to 42 mg/L. Effluent typically contained less than 50 µg/L of TPH and lower concentrations of BTEX compounds. (*Water Environ. Res.* **1995**, 67(2), 174-80)

## MEASUREMENTS

### Sediment screening

EPA researchers have developed a screening procedure to assess chemicals in effluents and sediments with a high potential to form residues in aquatic organisms. L. P. Burkhard and B. R. Sheedy studied this screening procedure to determine if it effectively isolates residue-forming

chemicals and whether the isolated chemicals persist in sediments. The screening method, used on field site sediments and effluent, isolated 187 chemicals that would not have been analyzed using EPA Method 610, which screens priority polycyclic aromatic hydrocarbons in wastewater. The authors also observed a low probability of false positives in the screening procedure. (*Environ. Toxicol. Chem.* **1995**, 14(4), 697-711)

### PAH metabolism

When polycyclic aromatic hydrocarbons (PAHs) metabolize they form dihydrodiol epoxides, which can react with DNA and elicit mutagenic and carcinogenic responses. P. S. Branco and colleagues studied the mass spectrometry of PAH dihydrodiol epoxide DNA adducts, using fast atom bombardment tandem mass spectrometry. Their studies included product ion, constant neutral loss, and precursor ion scanning modes with underivatized and trimethylsilyl-derivatized adducts. They found greater fragmentation in the underivatized adducts but greater sensitivity in the derivatized adducts. Results showed that a precursor ion scan of the 191 *m/z* fragment could simultaneously determine several adducts at low picomole levels. (*J. Am. Soc. Mass Spectrom.* **1995**, 6, 248-56)

### Herbicide detection

New analysis methods are required for determining chlorophenoxy carboxylic acid herbicides at trace levels. D. Barceló and colleagues report an on-line, liquid-solid extraction (LSE) electrospray mass spectrometry method for analyzing these herbicides in environmental waters. The on-line method uses a 50-mL water sample that is preconcentrated by LSE. The researchers transferred the sample to an analytical LC column and added tripropylamine postcolumn. They next analyzed the sample by mass spectrometry in the negative ion, selected ion monitoring mode. Using high-flow, pneumati-