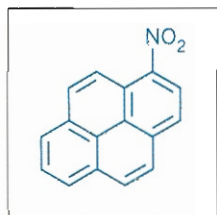


SOLVENT CAN DOMINATE OPTICAL ROTATION

The three-dimensional arrangement of achiral solvent molecules surrounding chiral solute molecules has been shown to make an unexpectedly large contribution to the optical properties of the solution. Achiral solvents are known to affect the experimentally measured optical rotation of chiral solutes, but the magnitude and fundamental nature of such effects were unknown until now. David N. Beratan of Duke University, Peter Wipf of the University of Pittsburgh, and coworkers find that the optical properties of a solution of methyloxirane in benzene are dominated not by the chiral solute but by the arrangement of the achiral solvent molecules (*Angew. Chem. Int. Ed.*, DOI: 10.1002/anie.200702273). They believe this to be the first evidence of a chiroptical property dominated by induced solvent dissymmetry. This type of solvent effect “has to be playing a role in all chiral molecular recognition events,” Wipf says. He notes that this effect will have to be accounted for in the kinetics and thermodynamics of processes such as protein-substrate and protein-inhibitor binding and homogeneous and heterogeneous catalysis.

TRACKING DIESEL EXHAUST EXPOSURE

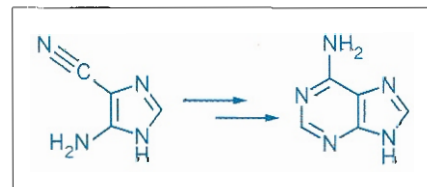
Urinary metabolites of 1-nitropyrene (1-NP, shown), a major component of diesel exhaust, can be used as a biomarker to assess human exposure to this kind of environmental pollution, according to a new study (*Chem. Res. Toxicol.* 2007, 20, 999).



Diesel exhaust has been classified as a probable human carcinogen and nitrated polycyclic aromatic hydrocarbons have been fingered as some of the most likely culprits. Akira Toriba of Kanazawa University, in Japan, and colleagues demonstrate that certain 1-NP metabolites are excreted in the urine of human subjects exposed to 1-NP in the environment. The researchers devised a highly specific and sensitive analytical method using liquid chromatography with tandem mass spectrometry to quantify 1-NP metabolites in

ADENINE FROM OUTER SPACE

A major goal of origin-of-life studies is to determine potential mechanisms for the prebiotic synthesis of nucleic acid bases, such as adenine. Possible adenine precursors are known to exist in space, and adenine has been observed in asteroids and comets. Rainer Glaser of the University of Missouri, Columbia, and coworkers now have used a theoretical model of gas-phase chemistry to predict mechanisms for adenine production in space (*Astrobiology* 2007, 7, 455). The most likely pathway is a four-step cyclization of the precursor aminoimidazolecarbonitrile (shown, left) to adenine (right). The key reaction step requires no catalyst, has essentially no activation barrier, and is irreversible. The mechanism implies that “it’s adenine’s destiny to accumulate,” Glaser says. “This might explain why it eventually became a central molecule in life processes.” If adenine formation occurs throughout space, “life everywhere might have started out pretty much the same way,” he adds.



urine samples. “These findings suggest that urinary 1-NP metabolites may be used as a representative biomarker for assessing exposure to diesel exhaust,” the authors note. The biomarker is expected to aid the study of cancer risk associated with such exposure, they add.

ANTIFUNGAL HYDROGELS THWART INFECTIONS

Fungal infections are a potentially serious complication stemming from implanted medical devices. But newly developed antifungal hydrogels could be used as a coating for medical implants, helping to ward off such infections. A team led by Daniel S. Kohane of Children’s Hospital, Boston; Robert Langer of MIT; and Gerald R. Fink of the Whitehead Institute, Cambridge, Mass., has developed a dextran-based hydrogel loaded with the antifungal compound amphotericin B (*Proc. Natl. Acad. Sci. USA*, DOI: 10.1073/pnas.0705250104). The hydrogel, made by soaking cross-linked dextran disks in a dimethylformamide solution containing amphotericin B, kills fungi within two hours of contact and maintains its effectiveness against the fungus *Candida albicans* for at least 53 days. So far, the researchers have shown that the biocompatible material is effective at killing fungi when implanted in mice. An

amphotericin-containing hydrogel made of the polysaccharide inulin also is effective against fungi, the researchers report.

OIL-SPILL DISPERSANTS ARE TOXIC TO CORALS

Oil dispersants, the tool of choice for treating oil spills in tropical oceans, turn out to be significantly more toxic to marine life than the crude oil itself, according to a study on corals (*Environ. Sci. Technol.* 2007, 41, 5571). An Israeli research team led by Shai Shafir of the National Institute of Oceanography and Hebrew University of Jerusalem evaluated the short- and long-term impact on more than 10,000 specimens of two coral species exposed in the lab to crude oil or crude oil treated with different commercial oil dispersants. The dispersants contain surfactants and/or solvents that break down the oil into small droplets, which help prevent oil spills from reaching shore. The researchers observed that exposure to the manufacturer-recommended dispersant concentrations killed all of the coral samples while many of the samples exposed to the water-soluble fraction of crude oil survived. “Decision-making authorities should carefully consider these results when evaluating possible use of oil dispersants as a mitigation tool against oil pollution near coral reef areas,” they note.