

A natural-gas-powered fuel cell goes to work

The first commercial fuel cell powered by natural gas has begun operating at a laundry in Portland, Ore. It is the first of some fifty 40-kw fuel cells that will be deployed at various sites in the U.S. under a project sponsored by the Energy Dept. and others. Natural gas is the hydrogen source for the fuel cell reaction, which essentially is the reverse of the electrolysis of water. Hydrogen and oxygen are combined to produce heat and an electric current. At the Portland site, the cell is used to generate electricity for the plant and supplemental heat for the boilers. Excess power will be sold to Portland General Electric. Overall efficiency of the fuel cell operated at full capacity is about 80%, compared with 30% for a conventional power plant. Northwest Natural Gas is directing the project. United Technologies designed and built the cell.

Testing the safety of vitrified nuclear waste

Scientists at Sandia National Laboratories in Albuquerque, N.M., have developed a technique that may give them a rapid way to test the quality of glass and ceramic encapsulations of nuclear waste, a major issue in nuclear waste disposal technology. Glass and ceramic materials, considered to be the most effective forms for immobilizing containerized high-level radioactive wastes, incur damage from the radiation emitted by the wastes. It is this damage that researchers at Sandia have attempted to simulate. The technique involves the implanting of lead ions in small disks of borosilicate glass and titanate-based crystalline ceramics that contain nonradioactive isotopes of typical wastes. The implanted disks are then compared with similar disks without the lead, and with naturally-occurring radioactive materials that have experienced radiation self-damage. Electron microscopy and ion beam tests by Sandia scientists have shown that the implanted ions gradually change the crystalline ceramic into an amorphous, glassy material. "Results clearly suggest that ion implantation produces physical changes in the test samples that closely simulate natural self-damage," concludes Clyde Northrup, supervisor of Sandia's Chemical Technology Div. But he adds that "it is not yet clear whether observed changes in implanted samples can reliably predict waste form behavior many years into the future."

A new process for waste encapsulation

At last week's International Congress on Technology and Technology Exchange in Pittsburgh, Sludge Master (Aurora, Colo.) unveiled a new method for solidifying toxic and radioactive wastes—such as ura-

nium tailings, refinery sludges and transformer oils containing polychlorinated biphenyls—in a polymeric capsule. According to tests performed by Controls for Environmental Pollution of Santa Fe, N.M., the process has reduced emission of radon-222 gas from uranium tailings by 92%. The company claims that the technique could cut hazardous-waste-disposal tabs by 60-70%. The cost of encapsulating uranium tailings is estimated at \$15-30/ton. Price estimates for PCBs and refinery sludge are not as firm, but the company says that they could be less than \$1/gal.

A new monitor for PCBs

The accumulation of polychlorinated biphenyls in several common plant species can be used to gauge levels of the carcinogen circulating in the atmosphere, as well as around known PCB dumpsites. These findings, reported in the Apr. 30 issue of the journal *Science* by Cornell University biochemist Edward H. Buckley, may eventually make it possible to use vegetation to monitor seasonal levels of atmospheric PCBs, Buckley says. Buckley estimates that there is probably 70 million kg of PCBs circulating in the environment, of which 18,000 kg is in the atmosphere. "Although the apparent major sources of airborne PCBs, vaporization of plasticizers, and open and burning dumps, decreased substantially during the 1970s," Buckley says, "the drop in atmospheric PCB levels has been slow." As a result, he adds, "PCBs have become a component of our atmosphere." To detect local PCB contamination, Buckley used his plant-analysis technique to find the source of elevated PCB levels along public roadways in upstate New York. The source: Material dredged from the Hudson river, which is contaminated with PCBs, had been used to sand highways during winter months.

An aspirin competitor enters the analgesics market

Merck last week began U.S. marketing of a new prescription analgesic that it says is safer and more effective than aspirin. The drug, 5-(2,4-difluorophenyl)-salicylic acid, is known as diflunisal and is tradenamed Dolobid. The drug has been approved by the Food and Drug Administration for treatment of "mild to moderate pain" and osteoarthritis. According to Merck, diflunisal is less irritating to the stomach lining and has a longer-lasting analgesic effect than aspirin. The firm also notes that clinical studies show diflunisal to provide longer-lasting pain relief than acetaminophen (Tylenol), a combination of acetaminophen and codeine, or a combination of propoxyphene (Darvon) and acetaminophen. Diflunisal is already marketed in 75 other countries.