

Physics

Ivars Peterson reports from Washington, D.C., at an American Physical Society meeting

Lightning treatment of waste

In previous decades, the Department of Energy and its predecessors often disposed of radioactive and hazardous waste by burying it at various sites throughout the country. Now, the department is faced with the enormous task of cleaning up these sites and disposing of huge volumes of buried waste and contaminated soil. One answer to this immense problem may lie in the use of plasma technology originally developed for research on magnetically confined nuclear fusion.

Researchers at the Massachusetts Institute of Technology's Plasma Fusion Center are now testing a novel furnace in which a huge, high-voltage electric spark between graphite electrodes creates a high-temperature plasma of ions and electrons. The intense heat in the vicinity of this arc melts the waste material and destroys organic molecules.

The process generates a substantially smaller volume of waste gases than conventional incineration, says MIT's Daniel R. Cohn. Moreover, instead of being left with ash, furnace operators end up with blocks of a stable glass resembling a kind of lava. Other possible applications of this type of waste disposal include treatment of incinerator ash and hospital waste — even municipal garbage, Cohn notes.

To remove low concentrations of gasborne toxic solvents, MIT researchers have also developed a low-temperature plasma process to destroy particular molecules. An electron beam of moderate energy traveling through contaminated air creates a plasma of electrons, ions, and reactive atoms and molecules. Selective interactions between electrons and molecules of toxic compounds induce these molecules to decompose.

Carbon tetrachloride, for example, breaks up and re-forms

into chlorine, carbon dioxide, and hydrochloric acid. Further treatment converts these compounds into carbon dioxide and sodium chloride. The entire process can be adjusted to treat other toxic vapors at different concentrations.

Monitoring heat and exhaust gas

Operating high-temperature furnaces for treating a variety of wastes — and for other purposes, such as manufacturing and power production — requires reliable, accurate sensors for measuring temperature inside a furnace and for continuously monitoring toxic and heavy metals in the gaseous exhaust. Researchers at MIT's Plasma Fusion Center have now developed instrumentation to handle each of these tasks.

To measure the temperature of internal furnace surfaces, Paul P. Woskov and his coworkers rely on detecting emissions of millimeter-wave radiation, which has a wavelength between that of microwaves and infrared light. Unlike infrared light, millimeter-wave radiation readily penetrates the swirling dust and smoke in a hot furnace and even passes through surface deposits on viewing windows or mirrors. Yet its wavelength is short enough to provide good spatial resolution.

To monitor emissions of heavy metals, MIT's David Y. Rhee and his collaborators have developed and are now testing a microwave device to detect such metals as iron and manganese. A microwave-induced plasma vaporizes particles and ionizes vapors that pass through it. Spectroscopic measurements of light emitted by excited metal atoms enable researchers to determine the types of elements and their concentrations in the exhaust gas.

Letters continued from p.275

speaker alive in another community. Furthermore, even though Edna Guerrero, the speaker who recently died, is believed by all to be the last completely fluent speaker who commanded all registers of the language, she has some younger relatives who are semi-speakers — who know a good deal of vocabulary and are able to carry on some basic conversation.

A large number of deeply committed Native Americans in California and elsewhere are trying to maintain or revive their languages of heritage. Whether they will manage in the end to make these languages the medium of daily communication again or to develop two or three fluent speakers or just to become familiar with the materials that exist in the language and gain some appreciation of its unique character, they will have spent their time well and will reap rewards for themselves, their communities, and their descendants.

Leanne Hinton
Department of Linguistics
University of California, Berkeley
Berkeley, Calif.

Support for alternative medicine

Obviously, Wallace Sampson ("Alternative reading," SN: 3/4/95, p.131) has not been reading SCIENCE NEWS or any medical journal regularly. If he had, he would have noticed the many articles outlining the benefits of vitamin and mineral supplements in the prevention and treatment of a variety of diseases.

No doubt he also suffers from an intermittent

blindness that does not allow him to read in the same sources the less frequent articles on the uses of a variety of herbs.

Ronald Greenburg
Vancouver, B.C.

In keeping with Sampson's warning about the "dangers" of using plants in the healing of disease and the (implied) safety of pharmaceuticals, we should all be gratified to know that drug companies are presently scurrying to extract beneficial chemicals from soy and cole vegetables so that we will not have to continue running the risk of "uncontrolled dosages" in our orders of broccoli and tofu, Hunan style.

Burt Rashby
Topanga, Calif.

I recommend Peterson's *Field Guide to Medicinal Plants*, by James A. Duke and Steven Foster, and *Tales of a Shaman's Apprentice*, by Mark Plotkin. Both detail current and potential benefits of plant medicines.

M. Tupper
Newcastle, Maine

To round out your recommended reading list, I suggest Omar K. Garrison's seminal work, *The Dictocrats*, and a work whose author I have forgotten, *In the Name of Profit*. These two tell the horror stories of establishment medicine far better than I could.

Edward G. Robles Jr.
Franklin, N.C.

Racketeering in Medicine: The Suppression

of *Alternatives*, by James P. Carter, is a must for all those who have been victimized by our profit-driven medical industry.

Richard Averett
New Berlin, N.Y.

According to the Department of Health and Human Services, there are over 6 million adverse drug reactions resulting in over 100,000 deaths per year in the United States from prescription medication.

Congress' Office of Technology Assessment has concluded that over 75 percent of what is practiced as medicine is without any kind of scientific basis or has never been proven safe or effective in clinical trials.

Public Citizen (the Ralph Nader organization) has concluded that at least 60 percent of prescription drugs are unnecessary.

Charles Davy
Phoenicia, N.Y.

Contrary to Sampson's bald assertions, commercial herbal products are among the safest of all consumer products, as measured by deaths, and many of them are now offered in standardized potencies. Deaths from concentrated or spiked ma huang products only underscore the stupidity of America's drug-oriented, quick-fix mentality (have the Chinese encountered this problem in thousands of years of use?) and the tragedy of policies that keep the public ignorant of alternatives to profitable, but life-threatening, medical interventions. Please don't scuttle Michael T. Murray's excellent book.

Laughing Water
Helena, Mont.