

# environmental sciences

## AIR POLLUTION

### Isotope identification of pollutants

A new approach to air sampling reveals the presence of some highly toxic chemical elements even in air generally regarded as clean, say two researchers in the February *ANALYTICAL CHEMISTRY*.

Drs. Glen E. Gordon and William Zoller of the University of Maryland passed air samples through an extremely fine filter (0.5 microns), then bombarded the material obtained with neutrons. The neutrons transformed the elements into isotopes which were identified by the energies and intensities of gamma rays emitted.

They found 25 identifiable chemical elements, including vanadium, which acts as a catalyst with the common pollutant sulfur dioxide to form substances shown to be highly lethal in animal experiments. Other elements were aluminum, chlorine, bromine, iron and zinc, as well as the more exotic ytterbium, cerium, hafnium, thorium and others, some of which are reported to be toxic at very low concentrations.

The method is regarded by the researchers as superior to the present spectroscopy technique used by the Department of Health, Education and Welfare to monitor air pollution. Spectroscopy would have missed more than half the elements identified by his method, Dr. Gordon says.

Air samples reported on were gathered in Boston. The research group is now gathering similar information in Los Angeles, San Diego and Honolulu. The scientists plan later to sample air in New York, Detroit and Chicago.

## EROSION

### Prediction of shoreline changes

Men who build along the sea or lake shore sometimes learn to their dismay that shorelines are among the more impermanent of nature's creations. High water levels in Lake Michigan, for example, have caused cliffs to fall into the lake and highways to collapse, and some of the lake's best beaches are now endangered.

Dr. William T. Fox of Williams College in Williamstown, Mass., says that computer models—as opposed to the currently used physical models—can take into account 17 variables, mostly meteorological, and predict what will happen to shorelines.

Dr. Fox's model so far takes in only 1,000 feet of Lake Michigan, 90 miles north of Chicago. But he sees the technique as being eventually applicable to vast reaches of shorefront, so that man will better be able to design highways, homes and other features subject to damage.

Californians among Dr. Fox's students have come up with a novel use for the model, he says. They predict the best days for surfing.

## SOIL ANALYSIS

### Lead and traffic

Two California researchers report a correlation between levels of lead in soils and nearby traffic density. Data going back 40 years show soil lead going up with

the increase in traffic in various California areas.

Lead in gasoline is coming under heavy attack, both as a possible health threat and as a block to effective auto emission controls (SN: 2/14, p. 167).

Dr. A. L. Page and T. J. Canje of the University of California at Riverside report in the February *ENVIRONMENTAL SCIENCES AND TECHNOLOGY* that the increases have sometimes been nearly threefold—from 17 to 50 parts per million in La Habra, for example. But they emphasize that soil lead concentrations are no higher than in many parts of the world not subject to atmospheric pollution. Even the highest levels found are not yet high enough to be toxic to plant life, they say.

## SEWAGE

### Human waste for agriculture

Oriental nations have used human wastes as a fertilizer for thousands of years. Russian and United States researchers wonder if this may be a way of usefully getting rid of the sewage that is polluting rivers in both countries.

The Bulgarian journal, *PLANT SCIENCE* (Vol. VI, no. 9, 1969), reports on the use of unsterilized sewage to irrigate maize on a state farm shortly after planting. Increased yields to 25 percent were reported from the sewage as opposed to water irrigation. Although the soil was heavily polluted two days after irrigation, pathogens were gone from fields by harvest time.

Dr. James E. Etzel of Purdue University has proposed a similar program to the city of Chicago, which is now doing economic evaluations. Sewage sludge would be blended with solid wastes, metals extracted, and the slurred mixture piped to lands not now agriculturally productive. Dr. Etzel says studies by the University of Illinois agronomy department show this could make the lands fertile.

Dr. Etzel's plan calls for pasteurization of the wastes, either with steam or through gamma-ray irradiation from isotopes produced by nuclear power plants. He says United States law would not allow use of unsterilized wastes.

## AUTO EMISSIONS

### Selective analysis of smog sources

A low-cost device to analyze auto exhaust for its content of photochemically active hydrocarbons and carbon monoxide has been developed by two California researchers.

Catalysts which allow for the selective oxidation of exhaust components, then quantitatively analyze the components through heat measurement, are the key to the device, say Dr. W. B. Innes and A. J. Andreatch of Purad, Inc., Upland, Calif.

The vanadium oxide catalyst, for example, allows the device to segregate the highly reactive—and thus smog producing—hydrocarbon butylene from the far less reactive butane.

A copper-manganese oxide catalyst allows measurement of levels of carbon monoxide.

The device may also be useful in assessing proposed catalytic mufflers (SN: 2/14, p. 167), says Dr. Innes.