

## ANALYTICAL CHEMISTRY

### Reverse chromatography

In gas chromatography—an analytical technique for identifying the composition of substances—a small sample is vaporized and carried along by a gas, the individual components separating out according to molecular weight. By reversing this process, an analytical technique called a molecular probe for examining polymers has been devised by Dr. James E. Guillet of the University of Toronto.

In operation, instead of moving, the polymer is stationary, coated on to the walls of a narrow tube through which an inert carrier gas and a reactant, or probing, gas are passed. If the probing gas interacts with the polymer, its passage through the tube will be slowed down. The time it takes for it to make its way down the tube gives information about the strength and nature of the interactions it has undergone. By plotting a series of times and temperatures on a graph, a picture of the physical and chemical properties of the polymer can be obtained.

## PETROLEUM

### Oil from garbage

The U.S. Bureau of Mines is on the trail of a commercial process to make oil from garbage. The process has reached the point where research chemists from the bureau's Coal Research Center in Pittsburgh have been able to make one barrel of crude oil from a ton of wet urban refuse. Objects such as bottles and cans were removed beforehand.

The crude oil was obtained by treating organic waste with carbon monoxide and steam at 480 degrees F. under a pressure of 1,500 pounds per square inch. The work stemmed from other research the bureau is conducting in making oil from lignite (SN: 7/26, p. 84). Previously bureau scientists had obtained a benzene soluble oil. The new tests on small batches of shredded waste have produced a thicker acetone soluble oil, more simply and at less cost. Before, more carbon monoxide was required along with higher temperature (1,700 degrees F.) and pressure (5,000 pounds per square inch).

## WATER POLLUTION

### Cleaning up the Potomac

The U.S. Interior Department has developed a technique which it says can clean up the Potomac River—one of the nation's dirtiest—and which can also be applied to lakes and other rivers. The process combines known methods of sewage treatment into a practical system. For example, pure oxygen is used instead of air in the aeration stage, thus reducing the size of aeration tanks and consequently plant size.

The whole method is a tertiary process—sedimentation, biological and physical-chemical treatment—to remove three primary pollutants: carbon, nitrogen and phosphorus compounds. The carbon is removed by biological degradation and subsequent chemical purification of the sludge; the phosphorus is eliminated by adding

lime or alum, followed by filtration of residual solids, and the nitrogen is removed by either microorganisms or ion exchange resins.

## INSULATION

### NBS findings disputed

A few months ago, a National Bureau of Standards study reported the danger to firemen from hydrogen chloride gas, a product of burning polyvinyl chloride insulation (SN: 12/6, p. 528). In last month's MODERN PLASTICS, the plastics industry disputes the NBS study.

The industry is bothered by the NBS test procedures. Because the PVC was heated without direct flame in a test chamber, the industry feels the tests did not approximate conditions in a burning building. Cited in rebuttal is a study by the British Joint Fire Research Organization under actual fire conditions. The study turned up lower levels of HCl than expected and demonstrated that in addition to the quantity of PVC, its closeness to the fire, the fire's growth rate, and ventilation are other important factors in HCl production.

All the tests show is that the presence of hydrochloric acid is likely in a burning building, assert the industry spokesmen.

## RADIATION

### Quick test for X-rays

The Environmental Health Service's Bureau of Radiological Health has developed a quick and relatively simple chemical test to enable technicians to determine the ability of glass in TV sets to stop X-rays (SN: 7/19 p. 47).

Leaded glass is used in TV sets to shield viewers from X-rays. The lead content is measured by taking a mixture of hydrofluoric acid and sodium iodide and reacting it on the lead in the glass to produce a yellow precipitate. Just a drop of the mixture is applied and then quickly washed away to avoid damaging the glass.

To estimate the amount of lead in the glass, the intensity of the yellow color is compared with standards prepared from powdered glass samples with known lead concentrations.

## MATERIALS SCIENCE

### Theory for corrosion

Chemists know how metal corrosion occurs but they do not know why. A theory to explain the mechanism has been advanced by Prof. James Waber of Northwestern University, Evanston, Ill. He sees the corrosion problem as one of molecular structure.

Based on his investigation of a stainless steel alloy, he concludes that when metal atoms are arranged so they are in a cube structure, each of whose faces contains an iron atom, the metal is less likely to undergo corrosion than if the atoms are in a cube with one iron atom in the center. The reason for this is that the face-centered cube has a different effect on the electrons of an oxygen atom (oxygen being the primary agent in corrosion) than does the body-centered cube.