chemistry

EUTROPHICATION

Pickling solution for phosphates

Phosphates in detergents have been accused of causing eutrophication, or algae growth, in lakes and streams (SN: 12/27, p. 591). A palliative could come from the manufacturers of iron and steel products who use a solution called a pickling liquor which contains iron sulfate.

Chemists at the Jones Island Sewage Treatment Plant in Milwaukee have found that liquor treatment of sewage that contains detergent phosphates results in removal of 95 percent of the phosphate.

The iron sulfate produces an insoluble precipitate phosphate.

Chief chemist L. A. Ernest cautions that the technique worked at the plant because the sludge is removed to make fertilizer; it might not work in another plant where the sludge is returned to the water.

SOLVENTS

New life for carbon tet

Carbon tetrachloride, once a popular grease and stain remover, will be banned for sale in the home after April 3 by the Government because of its toxicity (SN: 3/15/69, p. 259). But new life has been breathed into it at Southern Illinois University in Carbondale by Dr. Cal Y. Meyers and his co-workers.

The limiting factor in the number of reactions carbon tet can engage in with other organic compounds has been the large chlorine atoms. These block reagents from getting at the carbon atom, the usual reaction site in organic molecules. By choosing optimal conditions of proper temperature, alkalis and water and solvent concentrations, they have produced reactions between a large number of organic compounds and the chlorine atoms of carbon tet, rather than with the carbon atom. As a result, dozens of promising compounds—many of them new—have been produced for use as pharmaceuticals, plastics and drugs. Such compounds would have to be produced in factory conditions under safety controls that insure against the toxic effects of carbon tet.

INSECT CONTROL

Making eggs for insects

The aphid lion is an insect predator of the cotton bollworm and tobacco budworm, two cotton pests. The big problem has been raising them economically in enough quantities. To do this chemists at the Southwest Research Institute, San Antonio, Tex., have made artificial eggs for the aphid lion larvae. The eggs are thin shells, .020 inch in diameter, which contain dietary fluids needed for the rearing of the larvae.

Biochemist Dr. Erma S. Vanderzant developed the dietary fluid. After experimenting with 50 different shell mixtures for a year, a research team led by Clark E. Schuetz came up with the right one. The shell material is a mixture of waxes and resins.

In making it the scientists had to take into consideration the following: the shell had to be soft so it could be punctured yet strong enough to hold a high payload of fluid, the ration of contained material to shell weight had to be high and the shell had to be nontoxic, the right size and impervious to fluid seepage.

CHEMICAL ENGINEERING

Hydrogen separation process

Hydrogen can be both a contaminant, as in the case of synthetic processing gases such as carbon monoxide, or a desirable product, to be retrieved from discarded gases from oil refineries. The DuPont Co. of Wilmington, Del., has developed a process that will more effectively remove hydrogen from such gases.

To accomplish this, 32 million hollow fibers are arranged in bundles and put in a cylindrical vessel 18 feet long and 12 inches in diameter. The fibers are 36 microns in diameter. The hydrogen in the feed gas, which is under pressure, selectively permeates them and then passes through their walls into the shell of the vessel, where it exits through a nozzle and is collected. In this way the company expects to separate hydrogen from such gases as carbon monoxide, nitrogen, methane and heavier hydrocarbons.

DENTISTRY

Improved dental cements

Ethoxybenzoic acid (EBA) cements were developed three years ago by the National Bureau of Standards as crown and bridge cements and for bases under metal fillings. Now, through new formulations, researchers from the NBS and Walter Reed Army Hospital have increased EBA's usefulness, possibly making it the material of choice for long-lasting temporary fillings and for pulp capping work.

By adding EBA to eugenol (an ingredient of conventional cement) and mixing that with a powder of zinc oxide, rosin, methylmethacrylate and aluminum oxide, a long-term temporary filling with improved tensile strength and stress-bearing properties is produced.

Using a similar formulation, it was found that when EBA cements capped exposed tooth pulp, they were well tolerated and a restorative dentin layer was able to form.

ANTIOXIDANTS

Vaccine for rubber

The natural enemy of natural rubber is oxygen, which attacks it as either ordinary oxygen or ozone, causing it to become brittle. Although various antioxidant additives have been formulated to immunize the rubber, they have always been lost, either by leaching when tires get wet or by evaporation when rubberized garments are heated with solvents during cleaning.

Scientists at the Natural Rubber Producers' Research Association have found a way to keep the antioxidant locked into the rubber. The technique involves adding organo-nitrogen compounds to the rubber during vulcanization (heating raw rubber with sulfur or sulfur compounds). They are converted to powerful antioxidants that actually become part of the rubber molecule at its vulnerable points.