chemistry

MACROMOLECULES

Water-degradable polymers

A new type of polymer—one that degrades in water—has been developed by Austin Science Associates, Inc., Austin, Tex. The chief virtue of such polymers is that their release into plants, animals or the soil can be controlled.

To make such a polymer, a carboxylic acid group and metal ions, such as iron, copper or nickel, are reacted in the presence of an aldehyde catalyst. The polymer chain is built up through a series of alternating linkages of the carboxylic acid groups and the metal ions.

A typical example is the herbicide 2,4-D, which has been polymerized by the addition of iron. This polymerized herbicide degrades in moist soil at a controlled rate, thus making repeated applications unnecessary and avoiding the run-off problem. The same idea can be applied to drugs, says Austin Science's Dr. M. L. Beasley. Polymer implants would permit them to enter the bloodstream gradually and at a fixed rate. Degradable plastic packaging to alleviate the solid waste problem could be another application.

COSMOLOGY

Tracing extinct aluminum 26

Based on measurements of magnesium isotopes found in feldspar from meteorites, scientists at McMaster University in Ontario, Canada, conclude that the radioactive isotope aluminum 26, which decays into magnesium 26, might have been a factor in heating meteorites. By measuring the magnesium 26 content with a mass spectrometer and using the half-life of aluminum 26, Dr. W. B. Clarke and his co-workers have determined that there must have been enough aluminum 26 around in the early history of the solar system to heat up objects as large as asteroids and perhaps the moon.

In addition, since aluminum 26, now extinct, has a half-life of 720,000 years, they estimate that it must have existed in solid objects within the first five million years of the processes that produced it. If so, this means that meteorites must have solidified from the gaseous state within five million years of the creation of the solar system. Dr. Clarke and his associates are now analyzing Apollo 12 lunar samples to see if this holds true for the moon as well.

PETROLEUM

Sanding oil

Shell Oil Co. has successfully tested a new method to fight oil spills at sea. Called sand sink, it involves the use of a slurry of sand and water, which is sprayed on the spill. The sand has been treated with an amine, an ammonia derivative, used to treat sand and gravel in road building. It causes the oil to coat each grain. The sand then sinks to the bottom where it remains. The chemical is said to be harmless in the concentrations used (0.1 percent of the sand by weight).

In a test off the Dutch coast, 100 tons of crude oil were dumped in the ocean. Then the slurry was sprayed onto the oil from two 60-foot booms amidships, each boom containing 20 nozzles. Within 45 minutes the surface was nearly clear again; the test was deemed 95 percent successful.

The test vessel was a 298-foot hopper dredge able to hold enough sand to treat 2,500 tons of oil. The amine and the sand are mixed on board. The weight ratio of sand to oil is one to one.

METALLURGY

New interest in an old alloy

Overlooked for 12 years, a light alloy has kindled renewed interest among aircraft manufacturers. An Australian team led by Dr. Ian Polmear at the Aeronautical Research Laboratory in Sydney, developed it in 1958 by taking an aluminum alloy of zinc, magnesium and copper and adding silver. The alloy has remained largely unused, but recent concern over problems with stress corrosion (SN: 4/5/69, p. 331) has sparked new interest; the alloy combines high strength with high resistance to stress corrosion. The British Aircraft Corp. has announced its intention to use a version of it in the wing components of a projected air bus.

RUBBER CHEMISTRY

New use for old tires

The idea of processing scrap auto tires to get valuable chemicals, oils and gases (SN: 12/14/68, p. 598) has reached the pilot plant stage. The Firestone Tire & Rubber Co. is building the plant, which is expected to be operational at the end of the summer.

Key to its operation will be a destructive distillation process worked out in conjunction with the U.S. Bureau of Mines. In it shredded tires are fed into a closed reactor and heated to boil off the various compounds, such as sulfur, olefins, aromatics, paraffins, naphthenes and hydrogen, which are then collected. If the process proves commercially feasible—and Firestone thinks it will—then 10 full-scale destructive distillation plants will be set up to process 100 million tires annually.

PHYSICAL CHEMISTRY

Diamond gems made

Synthetic diamonds have been around since 1955, but until now no one has made diamonds of gem quality. Drs. Herbert M. Strong and Robert H. Wentorf Jr., of General Electric Co.'s research and development center in Schenectady, N.Y., have devised a process that does it.

They start with a seed crystal of synthetic diamond less than a millimeter across. This seed, and synthetic diamond powder and a metal catalyst such as nickel or iron, are subjected to 60,000 atmospheres of pressure and a temperature of 2,500 degrees F. for several days. The catalyst melts, dissolving the diamond powder. The seed is kept from dissolving by cooling the end of the tube in which it is housed. Then by careful regulation of temperature and pressure, carbon atoms from the diamond powder are transported through the catalyst to deposit on the seed crystal and form a diamond about a carat in size.

Because of their high cost and limited production, the diamonds are not yet ready for commercialization.