

# chemistry

## PESTICIDES

### Decontaminating spray planes

A problem with spraying pesticides from aircraft is that the chemicals tend to get inside the craft and have affected pilots. Conventional chemicals, such as acetone, kerosene, acids and alkalis, which are used to remove the pesticides between flights, damage the body of an aircraft, besides being toxic, flammable, caustic and inefficient.

Soviet scientists have devised a detergent to do the job safely and efficiently. Called Dias, it contains disodium salts of derivatives of sulfosuccinic acid, sodium soaps of some synthetic fatty acids, ethylene glycol, sodium carbonate, sodium silicate and water.

According to its developers, led by D.M. Bolyanovskiy of the U.S.S.R. Ministry of the Chemical Industry, the detergent works well enough to be recommended for widespread use in civil aviation.

## POWER GENERATION

### Submersible thermochemical plant

A closed thermochemical power system is ideally suited to supply the electricity a deep sea submersible needs for its propulsion, instruments and lighting. The reason is that exhaust products can be stored so none of the energy produced need be wasted in pushing them out into the sea.

Dr. C.V. Burkland of CCI Aerospace Corp. advocates a steam engine power plant with a boron slurry fuel. The system, which puts out 5,000 watts, consists of two separate and closed loops: a heat-source loop and a power loop.

In the heat-source loop, boron slurried in water is reacted with oxygen while water is added to reduce the temperature. Steam and boron oxide compounds are given off. They are cooled in a heat exchanger, where the heat given off superheats water into steam, which is expanded in a small, high-speed engine that drives an electric generator.

The cooled steam and boron compounds, in their heat source loop, pass further downstream to the subcooler-separator, where as a liquid they are further cooled. As a result, solid boron compounds precipitate out and are removed, leaving a boric acid sludge, which is stored.

## PHOTOSYNTHESIS

### Isolating the centers

Until now the reaction centers in plants and bacteria where photosynthesis occurs have been difficult to study because they were located in complex membrane fragments complicated by the presence of many other pigments and enzymes.

Drs. J.P. Thornber and John Olson of Brookhaven National Laboratory, Upton, N.Y., have isolated reaction centers from two widely different types of organisms: blue-green algae and photosynthetic bacteria. The reaction centers in these organisms are chlorophyll-protein complexes. They were isolated by treating the organisms with the detergent dodecyl sulfate, precipitat-

ing the products with ammonium sulfate and then separating them out with column chromatography.

The work has confirmed that both bacteria and plants contain a similar type of reaction center for converting light energy to chemical energy.

## METALLURGY

### New alloying method

Nodular cast iron is an alloy made by introducing a metal, normally magnesium, into the molten iron before casting. The result is a ductile and malleable product. To introduce the magnesium, however, it must be combined in an alloy with another substance, usually nickel, which is expensive and in short supply.

The Swedish firm AB Jarnforadling in Halleforsnas has come up with a cheaper method of doing it. In the new process, sponge, or porous iron, is the vehicle used to carry the magnesium. Porous briquettes with a high magnesium content are the result.

## SPECTROSCOPY

### Metal-nonmetal bonds

Using isotopes of metals, Dr. Kazuo Nakamoto of Marquette University is able to get information about the nature of bonds between metal and nonmetal atoms, he reports in the current **CHEMICAL AND ENGINEERING NEWS**.

If two compounds are identical except that one has regular metal atoms and the other isotopic atoms, their bonds will be stretched differently, resulting in different peak values when observed on a spectrophotometer. By measuring the amount of shift in these values, Dr. Nakamoto can get important information, such as whether an iron atom is bonded to a sulfur or oxygen atom.

## MATERIALS

### Incombustible ceramic foam

A new type of completely nonflammable foam insulation has been announced by The Dow Chemical Co. Until now conventional foam materials have been made of plastics such as urethane or polystyrene, which only retard flames. The new material is a ceramic foam made of fired clay that is a glassy, inorganic and closed cell material suitable for industrial applications that require noncombustibility. Although denser than plastic, it is structurally stronger.

## AIR POLLUTION

### Government moves to cleaner cars

The dual fuel system for cars that can run on both natural gas and gasoline (SN: 7/26, p. 84) has caught on with the General Services Administration in Washington. The GSA plans to have roughly 1,000 such vehicles in its motor pools by the end of 1970. The reason: air pollution. The system can cut auto exhaust emissions by 90 percent. Gov. Ronald Reagan of California issued an order that his state's vehicles be converted to it.