

chemistry

MATERIALS

Artificial Gunn oscillator

Gunn effect is the name given to the behavior of the electrons in certain semiconductor materials that makes them electrical oscillators rather than producers of steady current. But applications have been largely limited to natural materials that just happened to have the Gunn effect, and of these only gallium arsenide is very efficient (SN: 8/3/68, p. 116).

Now, however, the IBM Corporation reports that its scientists have designed a material that shows the Gunn effect at a lower voltage than gallium arsenide and shows promise of being a more efficient oscillator. The new material is a mixture of gallium, indium and antimony. Such solid state oscillators could reduce radio transmitters from room size to pocket size.

FOOD PRESERVATION

Fruit spoilage retarded

Chemists have known for some time that ethylene, a gaseous hydrocarbon and plant hormone, is responsible for starting the sequence of events that leads to ripening of fruits. New insight by researchers at the British Agricultural Council in Norwich into the mechanism whereby plants produce ethylene could lead to ways to control or prevent ethylene formation, thereby permitting prolonged storage of fruits without refrigeration.

An outcome of the research has been the discovery of the importance of oxygen to the production of ethylene. Experiments have shown that ethylene production by whole fruit is dependent upon the amount of oxygen available to it and that by regulating that amount, the ripening process can be controlled.

CEMENT

Shrinkage and trace elements

Drying, or water loss, is the chief factor responsible for cement shrinkage. But the possible effects of other factors, such as trace elements, have largely been ignored.

In tests conducted by the National Bureau of Standards to examine the role of trace elements in cement drying-shrinkage, cement specimens were dried for periods ranging from one day to one year and the resulting decreases in lengths were measured. The specimens were also subjected to stress to see how long they would take to crack. In general, the results show that those cement samples that were composed of finer particles and had relatively large amounts of tetracalcium aluminoferrite had the least shrinkage, while those samples with relatively large amounts of magnesium oxide, sodium oxide and potassium oxide had the greatest shrinkage. Those samples that decreased the most also cracked in the shortest time.

PESTICIDES

Thallium sulfate warning

The U.S. Department of Agriculture, worried that the pesticide thallium sulfate—which is banned for interstate sale—might still be around in homes and stores, has re-

issued a warning against its use. Thallium sulfate looks like table salt and is mixed with cereals and sugar as bait for pests. Children who mistakenly took it as sugar suffered effects ranging from vomiting, cramps and diarrhea to nerve damage and death.

Although the product was banned in 1965, the ban only covers interstate retail sales of the pesticide and does not prohibit manufacture and sale within a state or sale to licensed pest control operations.

WATER POLLUTION

Coal for sewage treatment

Tests by the Interior Department's Bureau of Mines indicate that coal can be effective in cleaning up rivers and streams contaminated by sewage.

The ground-up coal would work in two ways. It would afford microorganisms a large surface area on which to degrade organic material that consumes oxygen from rivers and streams. And it would attract inorganic chemicals, such as orthophosphates, that aquatic microbes feed on. The reduction of such inorganic nutrients would reduce microbial populations, lessening the consumption of oxygen from rivers and streams. This reduced consumption would make more oxygen available for fish and other aquatic animals.

SYNTHETICS

Shoe uppers not so stiff

German scientists at Farbwerke Hoechst, Frankfurt, expect to have a nonleather shoe by 1970 that will mold itself to the shape of the foot. Stiffness is the big drawback to present poromeric shoes, so named for the tiny pores that permit them to breathe and the polymers which comprise them.

Although details on the new materials are not available because patents are pending, the manufacturing process is similar to that for other poromerics. A web of intricately interlaced fibers is formed, then compacted. The web is filled and bonded with finely dispersed elastic material, coated with polyurethane and finally surface-finished.

MINERALOGY

Debate over materials

Two minerals that do not occur in nature have received a classification hassle. They are tin compounds called romarchite and hydromarchite and were formed by the oxidation of small tin pans lost in the Winnipeg River when a fur trader's canoe overturned in the 19th century. Over the years, the action of air and water created the two new minerals. Scientists believe that the air was trapped by the overturned canoe, and the water prevented complete oxidation, which probably would have led to a common mineral or minerals.

Although man-assisted minerals have been accepted in the past by the International Mineral Association, which has also officially accepted the two new ones, considerable debate has been stirred up among mineralogists that may make such acceptances difficult in the future.