

technology notes

DESALINATION

Graphitic oxide for reverse osmosis

A material for desalting water by reverse osmosis, called graphitic oxide, is showing promise of performing better than the only other candidate for the job at present, cellulose acetate.

The membrane material, a compound of graphite and oxygen, acts as a sort of sieve, allowing pure water molecules to pass through while holding back the dissolved salt.

Osmosis in nature is the way fluids enter the roots of plants and into cells in the body. Normally, the direction of osmosis is from a weak solution into a more concentrated one.

When pressure is applied on the more concentrated liquid, however, the flow can be reversed. In this way, water can flow from the more concentrated salt water into the less concentrated fresh.

Graphitic oxide doesn't compact and become impermeable under pressure, as do acetate membranes. And, since it is an inorganic material, it shouldn't be as susceptible to biological degradation as cellulose acetate. The membrane is being developed by Westinghouse Corp., for the Office of Saline Water.

ACOUSTICS

Diesels calmed by foam

British navy engineers have developed a method of blanketing diesel motors to cut down noise while still allowing access for maintenance.

The cladding consists of a two-inch layer of soft polyurethane open-celled foam sandwiched between a stiff outer layer and a pliable inner skin. The outer layer, a thin lead sheet covered by fiber glass-reinforced polyester resin, combines with the foam to damp vibration of the engine surface and cut out radiated noise. The inner skin, a single layer of reinforced resin, allows the cladding to fit the contour of the engine.

The cladding is divided into panels and is completely removable. Edges of panels are sealed to prevent oil from leaking into the foam.

ELECTRONICS

Diamond heat sinks

With semiconducting devices getting smaller and smaller, the heat generated by their operation concentrates in such a small area that it can burn up the devices. To solve the problem, the pinhead-sized devices are usually mounted on larger blocks of material that is a good heat conductor, such as copper.

Experimenters at Bell Telephone Laboratories have found even copper isn't satisfactory in some cases, and have substituted tiny chips of industrial diamond, which conduct heat about five times better than copper at room temperature.

In one experiment, a silicon diode mounted on diamond was able to run at four times the power level of one on copper.

In another, a gallium arsenide laser could operate when the diamond was cooled to minus 68 degrees C., instead of the minus 132 degrees necessary for copper. This

meant that the laser could be cooled with dry ice instead of liquid nitrogen.

Although the tiny industrial diamonds aren't too expensive, the type that has a high heat conductivity is rare, so diamonds will be used only where copper just won't do.

METALLURGY

Aluminum from mining wastes

High-grade alumina, from which aluminum is made, can be recovered economically from mineral waste solutions such as copper-mine waste water, a Bureau of Mines engineer reports.

Major source of alumina today is bauxite, an ore which costs about \$56 a ton to import. Laboratory test runs on the new technique indicate that alumina could be recovered from copper-mine waste water for \$51 to \$58 a ton, says D. R. George of the Bureau's Salt Lake City Metallurgy Research Center.

The method was developed several years ago to extract alumina from clay, but was found to be more expensive than the bauxite source.

Using mine waste solutions, however, the engineers avoid the cost of mining, crushing and leaching, which makes the process economical.

George says it should also be possible to remove economically from the waste water such by-products as uranium, yttrium and rare earths.

PRESERVATION

Emancipation Proclamation protected

A double-sealed capsule for preserving Abraham Lincoln's handwritten preliminary Emancipation Proclamation is easier to maintain and safer than previous capsules, engineers at New York University claim.

The glass-and-aluminum chambers are sealed with Teflon gaskets and filled with pressurized nitrogen. The inner chamber has slightly more pressure than the outer one.

Pressure gauges indicate any leak. Minor leaks in the outer chamber can be sealed by tightening screws from the outside, but the entire outer chamber can be opened and repaired if necessary without allowing air to contaminate the document, which will be displayed at a new library building planned for Albany, N.Y.

COMMUNICATIONS

Radio interference bill moves up

Working its way through the House last week was a bill to regulate the manufacture of devices that generate enough radiation to interfere with communications.

Presently, control is over the operators of such devices, which include some electronic door openers, heaters, welders and ultrasonic cleaners.

Locating offending users is a big problem: the Federal Communications Commission spent 150,000 man-hours on it in 1966. The new bill would require manufacturers to keep their products from radiating energy that interferes with air traffic control, police and fire communications, and other radio bands. The Senate passed an identical bill in the previous Congress, and is scheduled to hold hearings again later this year.