

CRYOGENICS

Advanced freezing unit

A spin-off from the Apollo space program is seen to have major significance for the food-freezing industry, reports the October QUICK FROZEN FOODS magazine. The Malaker Corp. of High Bridge, N.J., has adapted cryogenic equipment it developed for NASA to commercial use in trucks that haul perishable foods from milk to meat.

The new refrigerating system is one-sixth the size and one-tenth the weight of earlier truck freezer equipment, promising lower operating cost and twice the refrigerating capacity from less power input. Basically, it consists of a cryogenic cooler where helium is compressed to a liquid, a cryoconvector pipe through which the helium flows and picks up heat, and a temperature controller. A special feature of the system is that the gaseous helium is returned through an inner core of the cryoconvector to the cooler where it is reliquefied.

SOLID WASTE

Natural gas furnace system

Scientists in the battle against the solid waste explosion (SN: 9/27, p. 278) have been looking more and more toward natural gas as an answer since it provides complete combustion of wastes. Now, a natural gas furnace system called Pyrofuser, developed by Scienscope, Inc., Harrisburg, Pa., is reported to provide "total destruction" of all combustible material. Its intense heat (3,000 degrees F.) is also said to melt incombustibles (metal, concrete and glass) into usable construction material.

The system starts with the burning of natural gas, which heats air forced into silicon carbide tubes. The hot air is sent to a pyrolizer (furnace) where the refuse is burned, and molten slag from noncombustibles is collected. Harmful gases, such as carbon monoxide, are burned in a combustor, then cooled and chemically filtered so the system produces nearly no air pollutants.

EXPLOSIVES

Cooking bombs

The Navy has found that death and damage from shipboard fires, such as the 1967 Forrestal disaster, can be reduced if the cook-off time, the time that it takes for a bomb to explode from heat, can be increased. The extension would provide firefighters with more time.

The U.S. Naval Ordnance Laboratory's chemical engineering division at White Oak, Md., has now bought firefighters some of the extra time they need. The Navy's answer is to apply heat-resistant insulating material both on the inside and outside of the bombs. Wax with a high-melting point was added to asphalt and applied in a quarter-inch thick coating to the bomb's interior, while a coating of intumescent paint was put on the outside. Intumescent paint foams up when heated to form an insulating layer. In tests using burning jet fuel, cook-off time was extended from 90 seconds to five minutes.

WATER POLLUTION

Ozone on the job

Phenols are highly toxic chemical compounds given off by chemical plants, oil refineries and coking plants. They constitute a major water pollution headache, especially since their sterilization by chlorine produces smelly and distasteful chlorophenols.

Since conventional solutions have failed, the British are trying to combat the problem with ozone. The Electricity Council Research Center at Capenhurst in Cheshire reacts ozone, which is produced by electrical discharges in the air, with phenolic compounds. The ozone attacks the carbon atoms in the phenols, breaking them down and giving off oxygen.

RARE EARTHS

Out of one, many

Improved phosphors developed at Bell Telephone Laboratories, Murray Hill, N.J., are able to replicate all the colors of the spectrum. Previous phosphors were limited to two primary colors at most. The new phosphors—which could wind up in anything from TV sets to computers to electronic visual displays—owe their color capability to the fact that they are excited by the long wavelengths of infrared radiation, which they convert to the three primary colors, red, blue and green, from which all other colors are derived.

Their inefficient predecessors could not make this conversion and had to rely on shorter wavelengths to excite them. The new phosphors are made of rare earth metals, such as holmium, erbium and thulium.

POLYMERS

Danger from insulation

A new threat to firemen has been pointed out by the National Bureau of Standards. The danger this time comes from polyvinylchloride plastic insulation around wires, which upon burning emits toxic hydrogen chloride gas. The gas, though originally colorless, combines with water vapor to produce a dense white mist. "The vapor is very reactive," says the NBS, "and can be easily adsorbed on contact with a surface," such as the lungs.

Tests indicate that PVC insulation can generate dangerous hydrogen chloride levels.

METALLURGY

Bi-metal fastener

For three years, the Townsend Co., at Santa Ana, Calif., has worked on a small piece of metal no more than a quarter-inch in diameter. It has taken the firm that long to weld two different metals together to form a fastener for crucial jobs in the wings and fuselage of supersonic planes.

The two metals—pure titanium and a titanium alloy of aluminum and vanadium—were finally married with the aid of friction welding, a technique that relies on the heat produced by rubbing to fuse two metals together. A special machine had to be built to do the job.