chemistry

EXPLOSIVES

Making dynamite

Asahi Chemical Industries Co., Ltd., of Osaka has developed a streamlined, continuous process for producing dynamite in one operation as opposed to processing in batches.

In the Japanese process wet nitrocellulose, fed from a rotating drum onto a conveyor belt, is shredded by a spiked wheel. It then falls into a stream of nitroglycerin oil, or nitroglycerin and nitroglycol, and flows down an inclined chute.

Immediately a slurry forms that slides down onto a second belt carrying powdered oxidizing agents, sodium and ammonium nitrate, which gel it into a pasty mixture. Then rotary knives slice it into pieces that are pushed into a hopper where a reciprocating plunger squeezes the mixture into a polymer tube. Rollers knead the tube and push its contents along until a dense dough-like mixture falls out and is extruded into waiting cartridge cases.

ANALYTICAL CHEMISTRY

Laser check

Since impurities in the parts-per-million and -billion range can affect the performance of a ruby laster crystal, scientists at the National Bureau of Standards have applied neutron activation analysis to detecting elements at these levels.

By bombarding ruby crystals with slow neutrons, Dr. Barbara A. Thompson and Eric C. Miller have determined the presence of barium, strontium, copper, cobalt, tungsten, gold, lanthanum, manganese, gallium and iridium at the parts-per-million level and below. Their presence was indicated by the emission of characteristic gamma rays resulting from their being made radioactive through neutron absorption.

AUTOMOBILES

Plastic as a lubricant

Plastics are being tested as a water lubricant to make ships go faster (SN: 3/29/69, p. 308), and now are being suggested for use in multigrade motor oils to improve their lubrication properties.

Ulrich Schodel of Rohm and Haas Co., reports that wear tests on a number of European gasoline and diesel engines show that polymethacrylate in multigrade motor oils reduce wear of rod and main bearings, cylinders, compression rings and lifters.

Schodel found that piston deposits from polymers in the oil were no problem at all. In fact, he reports, polymethacrylate with chemical additives (amine, amide and hydroxyl groups) improved piston cleanliness.

EXTINGUISHERS

Fire-fighting foam

A new fire-fighting foam has been patented by the United Kingdom Atomic Energy Authority. It relies on perlite, an aluminum silicate rock of volcanic origin, that is ground into a powder. Upon heating to 900 degrees C., the perlite softens and is expanded by its own steam (it contains 5 percent water) to form a foamy product of 4 to 20 times increased volume.

When applied to a fire, it coalesces as a stable, viscous foam—two advantages over similar foams—that smothers the fire.

POLYMERS

Glass beads in plastic

Solid glass spheres are being used to enhance the properties of plastics. Averaging about 30 microns in diameter, the glass beads are finding increased use in a range of polymers, including nylon, polyethylene, silicones, epoxy resins and polyesters. The beads improve properties such as compression strength, abrasion resistance, hardness and stiffness.

They are introduced into the plastic when it is in the resin stage and are encapsulated by it. The product has the additional advantage, says James Ritter, director of research at Potters Bros., Inc., in Carlstadt, N.J., that as a combined filler and reinforcement they make for more economical plastics.

SOLID WASTE

Ashes to tires

Fly ash, the waste product from coal-fired electric generators, totals 20 million tons a year. It is being proposed by the U.S. Bureau of Mines as a way to make winter driving safer. Scientists at the bureau's Coal Research Center at Morgantown, W. Va., have found that rubber samples formulated like tire treads showed improved traction and skid resistance when they contained fly ash. Preliminary tests indicate that a tire could take up to two pounds of fly ash without noticeable effect on its wear properties.

The bureau's next step is to get a manufacturer to produce such tires for comparison with conventional winter tires.

ELECTROCHEMISTRY

Experimental batteries

Scientists at Argonne National Laboratory are eyeing a unique family of batteries that will store more electricity than conventional batteries and can also be recharged more quickly and easily. Heart of the experimental units is a cell with a lithium anode and a cathode of lithium-alloyed sulfur, selenium or tellurium. The electrolyte, the material that carries the current from anode to cathode, is a paste of fused lithium compounds with halogens such as chlorine and iodine.

The main reason for the cells' greater capacity and improved recharging is that they operate at high temperatures (500 to 800 degrees F.), which reduce electrical resistance. At these temperatures the anodes and cathodes are molten. As batteries they would be insulated to prevent heat escape.

The cells are being groomed for such jobs as powering an electric car and an artificial heart, reports Dr. Elton J. Cairns of Argonne's chemical engineering division.