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SOME RECENT DEVELOPMENTS IN THE PLASTICS FIELD

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SOME RECENT DEVELOPMENTS IN THE PLASTICS FIELD

By

J. H. Kleinpeter

Process Equipment Development Operation
Chemical Development
Chemical Research and Development
HANFORD LABORATORIES

April 6, 1962

HANFORD ATOMIC PRODUCTS OPERATION

RICHLAND, WASHINGTON

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Mylar* polyester film can now be cemented to metals to form a moisture barrier. Mylar has excellent resistance to many organic liquids such as carbon tetrachloride, hexone, and both Purex and Recuplex solvents. It is moderately resistant to both 60% nitric acid and 50% caustic. The maximum service temperature of Mylar is 150°C but the temperature limit of the adhesive is unspecified. Mylar is available in film of .25 mil to 7.5 mils thickness both clear or metallized. The adhesive is marketed by Coast Pro-seal and Manufacturing Company, Los Angeles, California.

Optically clear Kel-F^{R} 81 has been announced by Minnesota Mining and Manufacturing Company. This new material is chemically identical with the older type Kel-F which is a homopolymer of chlorotrifluoroethylene. This material should be useful as a highly chemical resistant window which will tolerate high temperature (200°C). Kel-F 81 is also available as non-porous tubing and pipe lining which can be formed to make its own gasket. It is available to 8" pipe size in practically unlimited lengths.

Halon VK^{R} and Halon TVS^{R} are two new thermoplastic fluorohalocarbon resins which have been announced by Allied Chemical Corporation, 40 Rector Street, New York 6, New York. In addition to fluorine, these resins have other halogen atoms, notably chlorine, in the molecule. The service temperature for these materials is 390°F and sections as thick as 1/8 inch are described as transparent. The chemical resistance of these products is said, by the manufacturer, to be outstanding.

*Mylar is DuPont Trademark

Pluton[R], a non-flammable organic fabric produced by Minnesota Mining and Manufacturing Company has extraordinary resistance to heat and flame. Local tests indicate that this material is not suitable for use with 60% nitric acid, 50% caustic soda, Recuplex CAX or Purex HAX.

A new Viton* rubber compound produced by Haveg Industries, Inc. has superior compression set characteristics. Haveg grade 16075 Viton compound has outstanding resistance to high temperature and organic solvents, especially aromatics. This material should be especially useful for gaskets, "O" rings and similar sealing applications. In addition to its outstanding organic solvent resistance, Viton rubber is resistant to both acids and alkalies. This together with the low compression set make it especially promising for difficult sealing problems.

A clear potting compound which is flexible, easy to remove and patch known as LTV 602 is available from the Silicon Products Department of the General Electric Company. This material provides excellent protection from shock for delicate components but will not damage fragile parts by stress during cure. It provides both mechanical and dielectric protection, flows freely in and around complicated parts, is flexible, and self supporting. It cures at approximately 75°C (167°F).

A high heat and chemical resistant plastic is marketed by Pennsalt Chemicals Corporation under the trade name Kynar[R]. This material is a polymer of vinylidene chloride. It is a hard white thermoplastic with a slippery surface similar to polyethylene. Local tests indicate its radiation tolerance is better than most fluorine bearing polymers.

DuPont has announced a Teflon[R] monofiliment in 250 and 1200 denier sizes suitable for weaving into filter fabrics. This product should be useful in filtering highly corrosive liquids where the temperature is not excessive. Although it is

*Viton is a DuPont Trademark

not specifically stated, it is assumed that this monofiliment is extruded from Teflon FEP which has an upper temperature limit of about 200°C. Tetrafluoroethylene (TFE) is not amenable to fabrication into monofiliment.

A plastic pipe welding technique which is fast and produces strong joints has been announced by Phillips Petroleum Company. This technique, which is applicable only to thermoplastic pipe such as polyethylene or polyvinyl chloride yields a butt fusion weld which is said to be stronger than the parent material. The pipes to be joined are alinged and a heated plate inserted between them. After the plastic has softened, the plate is removed and the softened ends pressed together to form a joint.

Lubricants which are 1000 times more resistant to radiation damage than conventional materials are expected from a new organic fluid called hexafluorobenzene. In addition to extraordinary tolerance of nuclear radiation, this material is said to be resistant to oxidation and can withstand temperatures above 1200°F. This new lubricant, which was announced by Sperry Rand Corporation should be useful for lubricating in-cell equipment.

Plastic lined pipe by a dry coating technique is now available. Two companies, Polymer Corporation, Reading, Pennsylvania and Englehard Hanovia Inc., Newark, New Jersey have announced processes which use dry resin powder instead of resin in solution. These schemes have several advantages over conventional methods: speed, thicker more durable coatings and the elimination of solvent release problems. With these processes, pipe will be available coated with a variety of thermoplastics, polyethylene, polyvinylchloride, chlorinated polyether (Penton*) nylon epoxies, and cellulosics. A wide range of pipe sizes can be coated by these processes.

*Hercules Powder Company