PVDF (Polyvinylidene Fluoride)

General information

Strengths

Transparent in thin films, meets the highest requirements for purity - useful for packaging chemicals and high-purity water. Good mechanical properties (for a fluoropolymer), highest tensile strength of the melt processable fluorocarbons, good impact strengths, flexible in thin sections and has a low modulus. Good chemical resistance (though worse e.g. than FEP and PTFE). High dielectric constant, piezoelectric, and pyroelectric properties. Better gamma radiation resistance than other fluorocarbons.

Limitations

Radiation wavelengths in the range 200-400nm cause gradual decomposition. Tends to dissolve in strongly polar solvents (e.g. dimethyl acetamide), some strongly basic amines (e.g. n-butylamine) cause embrittlement and discoloration, attacked by some concentrated acids. Dielectric properties are frequency dependent, limiting use as an electrical insulator. High dissipation factor. Contaminants may reduce thermal stability meaning that cleanliness must be maintained during processing. Usually cannot reinforce with glass fibers due to melt decomposition initiated by boron.

Typical uses

Chemical process industry - pipes, bearings, pipe fittings, wire insulation, chemical laboratory apparatus, heat-shrinkable tubing.

Composition overview

Compositional summary

(CH2CF2)n

Material family	Plastic (thermoplastic, semi-crystalline)
Base material	PVDF (Polyvinylidene difluoride)
CAS number	24937-79-9

Processing properties

Feedstocks & production

1-chloro-1,1-difluoroethane or

First commercial production	1961

Forming

Suitable for injection molding and extrusion, rotational molding difficult. Coating by spraying, dipping or casting possible. PVDF melts should not contact boron- or MoS2 containing materials to avoid spontaneous melt decomposition.

Machining

Easy to machine.

Joining

Adhesion possible with 2-component adhesives and glues. Solvent bonding difficult. Suitable for welding by friction, hot gas, hot plate, and ultrasonic. High frequency welding also possible though not common.

Surface treatment

Not suitable for

Notes

Warning

When processing fluoropolymer resins, the temperatures reached will cause some decomposition, with more at higher temperatures. For PVDF there is measurable decomposition above 230 ℃ (445 ℉). Overexposure to the fumes will in general produce influenza like symptoms and shaking. At or above 450 ℃ (840 ℉) carbonyl f luoride and hydrogen fluoride are the main gases produced. Above 475 ℃ (890 ℉) perfluoroisobutylene is produ ced in small quantities (gas production temperatures are for PTFE and so may be lower for fluoropolymers that start decomposing at lower temperatures).