The irreplaceability of CTFE-based polymers

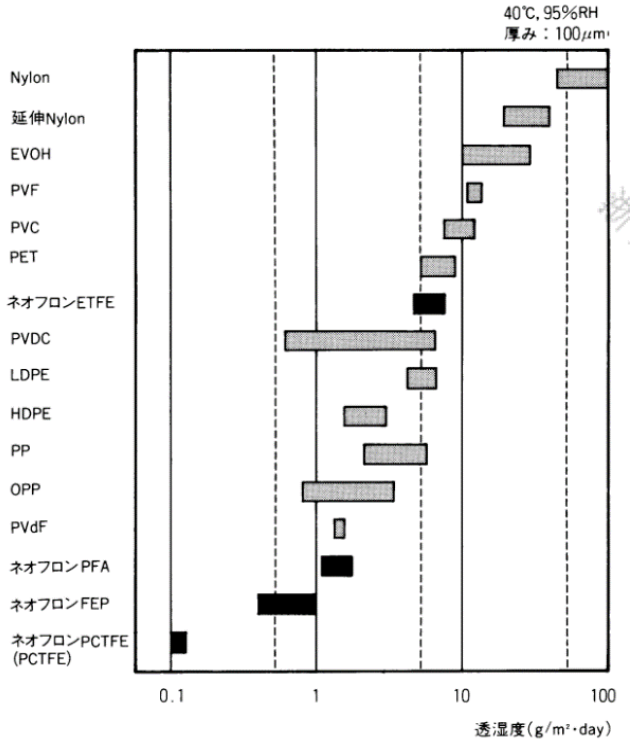
General Comment:

Sinochem Lantian is an enterprise specializing in the CTFE series of polymers. CTFE-based polymers is widely used to meet exceptional requirements in the aerospace field, with outstanding chemical resistance, ultra-low temperature resistance, and high barrier properties. Currently, there are no viable alternatives for this application. Therefore, we request an indefinite extension of this use until a feasible alternative is available.

The main reasons are as follows:

In the aerospace field, the CTFE series of polymers primarily achieve essential properties like ultra-low temperature resistance [1] and high barrier properties [2]. Specifically, when these polymers are applied in certain rocket valve systems, the sealing components in contact with liquid fuel must meet requirements such as not reacting with the liquid fuel, not becoming brittle at ultra-low temperatures, and not causing liquid fuel leakage. Currently available alternatives mentioned in the draft cannot fully replace them.

Table 1: Permeation Resistance Data Comparison



(According to the permeation data in Table 1, whether compared with fluorinated materials or materials produced from non-PFAS sources, PCTFE has the lowest water vapor permeability, at only about 0.2g/m2*day. This represents the excellent density of PCTFE material, making it highly suitable for sealing components in the aerospace field that come into contact with liquid fuel. It prevents liquid fuel from permeating or leaking. In contrast, using other materials would pose the risk of liquid fuel permeation and leakage.)

Table 2: Chemical Resistance Data Comparison

medium	Concentration %	PCTFE			PE			PVC			PA11			CPE			EP		
HCl	35	1	1	2	2	2	4	1	1	4	3	3	4	1	1	2	2	3	4
H_2SO_4	98	1	1	1	2	3	4	2	3	4	4	4	4	2	3	4	4	4	4
$ClHSO_3$	-	1	1	3	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4
HNO_3	60	1	1	1	3	4	4	2	3	4	4	4	4	1	3	4	4	4	4
H_2CrO_4	50	1	1	1	2	3	4	1	2	4	4	4	4	3	4	4	3	4	4
HF	40	1	2	3	2	3	4	1	1	4	2	3	4	1	1	3	2	3	3
NaOH	40	1	1	1	1	1	4	1	1	4	1	2	3	1	1	1	1	2	3
Na_2CO_3	Saturation	1	1	1	2	2	4	1	1	4	2	4	4	1	1	3	3	4	4
Cl_2	-	2	3	3	3	3	4	2	4	4	4	4	4	2	3	3	4	4	4
Br_2	-	1	1	1	4	4	4	4	4	4	4	4	4	3	3	4	4	4	4
H_2O_2	30	1	1	1	1	1	4	1	1	4	-			1	1	1	1	1	1
HCOOH	96	1	1	3	3	4	4	1	2	4	3	4	4	1	2	3	2	3	3
$CHCl_3$	-	2	2	-	2	4	-	4	4	-	2	3	-	2	3	-	3	4	-
CH_3COCH_3	-	1	3	-	2	4	-	4	4	-	1	2	-	2	3	-	3	4	-
C_6H_6	-	2	3	3	2	3	4	4	4	4	1	2	3	2	3	3	2	3	4

(Looking at the chemical resistance data in Table 2, PCTFE has exceptional corrosion resistance. It does not react with strong bases, strong acids, or most organic solvents. Therefore, it is very suitable for sealing components in the aerospace field that come into contact with liquid fuel. When using other materials produced from non-PFAS sources, their chemical resistance is insufficient, making the sealing components prone to reacting with the liquid fuel, thus contaminating it and even causing leakage, posing a danger.)

Reference:

[1] Wei C. Polytrifluorochloroethylene resin. *Organo-Fluorine Industry*, 1998(03), 5-11.
[2] Daikin PCTFE Product Manual.