



Teflon™ AF

Amorphous Fluoroplastic Resins

Preparing Solutions of Teflon™ AF

Processing Guide

Product names may be followed by an X. Products labeled AF 1600 and AF 1600 X are equivalent, as are AF 2400 and AF 2400 X.

Solutions of Teflon™ AF may be prepared by either stirring the polymer powder with solvent in a clean glass container or rolling the mixture of the polymer and solvent on rollers. In the case of dilute solutions, placing the polymer/solvent mixture in an ultrasonic bath will sometimes hasten the solution process. In general, complete solution of the polymer is slow (sometimes requiring days) and dependent on the polymer concentration, type of stirring, solvent, temperature, and grade of Teflon™ AF. Initially, the polymer agglomerates and swells; then, the swollen mass slowly breaks up to form polymer solution. Because the refractive indices of polymer and solvent are often close, it can be difficult to determine when the polymer gel is completely dissolved. A swollen mass of polymer may often be seen by quickly rotating or inverting the glass container.

Teflon™ AF 1600 usually forms solutions faster than Teflon™ AF 2400, and the solubility of Teflon™ AF 1600 is greater than Teflon™ AF 2400; for example, the solubility limit at 60 °C (140 °F) for Teflon™ AF 1600 in Fluorinert® FC-40 is about 4% and that of Teflon™ AF 2400 is about 1%. All known commercially available solvents for Teflon™ AF are perfluorinated. Those with higher boiling points tend to be poorer solvents for the polymer at

room temperature. Solubility, however, increases with temperature. A partial listing of solvents that can be used for Teflon™ AF include:

	Designations	Boiling Point, °C (°F)	Manufacturer
Fluorinert®	FC-72	56 (133)	3M
	FC-40	155 (311)	3M
Flutec®	PP2	76 (169)	F2 Chemicals
	PP6	142 (288)	F2 Chemicals
Galden®	HT-110	110 (230)	Solvay Solexis
	HT-135	135 (275)	Solvay Solexis
	D02, D03, D05	165-230 (329-446)	Solvay Solexis
Vertrel™	XF	55 (130)	Chemours

The higher boiling point solvents tend to be poorer solvents for Teflon™ AF at room temperature vs. the lower boilers. Solubility, however, generally improves for all solvents with increasing temperature.

Typical Procedure

Weigh out polymer and perfluorinated solvent into a clean sealed container. For rolling agitation, we recommend bottles certified to be pre-cleaned to 5 microns particle size. As an example, using Fluorinert® FC-40, the maximum solubility at 60 °C (140 °F) for each grade of Teflon™ AF is:

Resin Grade	Nominal Solubility Limit, wt% Polymer	Time to Dissolve (via Rolling)
Teflon™ 2400	1	5–7 days
Teflon™ 1600	4	4–5 days

For some applications, it is desirable to subject solutions of Teflon™ AF to ultrafiltration. Ultrafilters that have proven useful in limited application testing at Chemours include membranes made of polypropylene, silver, and cellulose acetate. Other membrane materials may be

suitable; however, we do not recommend membranes made of polytetrafluoroethylene (PTFE), as they tend to clog easily due to swelling from the perfluorinated solvents. Suppliers of ultrafiltration membranes and filtration apparatus include, but are not limited to, Gelman, Millipore, Pall, and Schleicher and Schuell. Solutions may also be filtered to remove any gel particles. For 1% and 3% solutions, we recommend a 0.2 micron filter. For 18% solutions, we suggest a 5.0 micron filter. Recommended filters should be certified pharmaceutical grade in plastic self-contained assemblies (rated at 75 psig for liquids and 50 psig for gases). Temperature range of 0–38 °C [32–100 °F]). We have had good experience limiting filtration pressures to less than 20 psig. After solutions are prepared and filtered, containers may be filled in a clean room environment to minimize airborne contamination.

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