Chemical Compatibility Guide for Savillex Products

APPLICATION NOTE

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Savillex

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OVERVIEW - EFFECTS OF CHEMICALS ON PLASTICS

Savillex PFA labware

Chemicals can affect the strength, flexibility, surface appearance, color, dimensions or weight of plastics. The basic modes of interaction which cause these changes are:

1. Chemical attack on the polymer chain, with resultant reduction in physical properties, including oxidation; reaction of functional groups in or on the chain, and depolymerization
2. Physical change, including absorption of solvents, resulting in softening and swelling of the plastic; ermeation of solvent through the plastic, and dissolution in a solvent
3. Stress-cracking from the interaction of a “stress-cracking agent” with molded-in or external stresses

Mixing and/or dilution of certain chemicals in plastic labware can be potentially dangerous. The reactive combination of compounds of two or more classes may cause a synergistic or undesirable chemical effect. Other factors affecting chemical resistance include temperature, pressure and internal or external stresses (e.g., centrifugation), length of exposure and concentration of the chemical. As temperature increases, resistance to attack decreases.

Another concern is environmental stress cracking, which is the failure of a plastic material in the presence of certain types of chemicals. This failure is not a result of chemical attack. Simultaneous presence of three factors causes stress cracking: tensile strength, a stress cracking agent and inherent susceptibility of the plastic to stress cracking. Common stress cracking agents are detergents, surface active chemicals, lubricants, oils, ultra-pure water and plating additives such as brighteners and wetting agents. Relatively small concentrations of stress cracking agent may be sufficient to cause cracking. **Mixing and/or dilution of certain chemicals may result in reactions that produce excessive heat which may lead to product failure. Pre-test your specific usage and always follow correct lab safety procedures.**

NOTE: Although several polymers may have excellent resistance to various flammable organic chemicals and solvents, OSHA H CFR 29 1910.106 for flammable and combustible materials, or other local regulations, may restrict the volume of solvents which may legally be stored in an enclosed area.

CAUTION: Do not store strong oxidizing agents in plastic labware except those made of FEP or PFA. Prolonged exposure causes embrittlement and failure.

The Chemical Resistance Charts on the following pages are provided as general references for comparing Savillex PFA and FEP products with products manufactured of other common polymers. Because there are many different factors which can affect the chemical resistance of a given product, we recommend that you test under your own conditions. If any doubt exists about specific applications, please contact Savillex. These Chemical Resistance Charts can be used for all PFA and FEP labware including Purillex™ bottles.

Rating	Meaning
A (Excellent)	Little or no damage; suitable for long-term use.
B (Good)	Minor effect; suitable for short-term use.
C (Fair/Poor)	Significant damage; use with caution or only for temporary exposure.
D/NR (Not Recommended)	Immediate or severe damage; avoid.

Chemical	ETFE		FEP		HDPE		PETG		PFA		PET	
	20°C	50°C	20°C	50°C	20°C	50°C	20°C	50°C	20°C	50°C	20°C	50°C
Acetate buffer	A	A	A	A	A	A	A	A	A	A	A	A
Acetic acid (glacial)	A	A	A	A	B	C	D/NR	D/NR	A	A	D/NR	D/NR
Acetonitrile	A	A	A	A	B	C	C	D/NR	A	A	C	D/NR
Ammonium hydroxide	A	A	A	A	A	B	D/NR	D/NR	A	A	D/NR	D/NR
Ammonium sulfate	A	A	A	A	A	A	A	A	A	A	A	A
Butanol	A	A	A	A	A	A	B	B	A	A	B	B
Citrate buffer	A	A	A	A	A	A	A	A	A	A	A	A
Cyclohexane	A	A	A	A	C	D/NR	C	D/NR	A	A	C	D/NR
DI water / WFI	A	A	A	A	A	A	A	A	A	A	A	A
Dichloromethane (DCM)	A	A	A	A	D/NR	D/NR	D/NR	D/NR	A	A	D/NR	D/NR
Dimethylformamide (DMF)	A	A	A	A	B	C	D/NR	D/NR	A	A	D/NR	D/NR
Dimethylsulfoxide (DMSO)	A	A	A	A	B	C	C	D/NR	A	A	C	D/NR
EDTA solutions	A	A	A	A	A	A	A	A	A	A	A	A
Ethanol 20%	A	A	A	A	A	A	B	B	A	A	A	A
Ethanol 70%	A	A	A	A	A	A	B	B	A	A	A	A
Ethanol 95%	A	A	A	A	A	A	C	C	A	A	B	B
Ethanolamine	A	A	A	A	A	B	D/NR	D/NR	A	A	D/NR	D/NR
Ethidium bromide (10 ug/mL)	A	A	A	A	A	A	A	A	A	A	A	A
Ethylene glycol	A	A	A	A	A	A	A	A	A	A	A	A
Formaldehyde 10%	A	A	A	A	A	A	B	B	A	A	B	B
Formic acid	A	A	A	A	B	C	D/NR	D/NR	A	A	D/NR	D/NR
Glutaraldehyde 2%	A	A	A	A	A	A	B	B	A	A	B	B
Glycerol 100%	A	A	A	A	A	A	A	A	A	A	A	A
Glycerol 50%	A	A	A	A	A	A	A	A	A	A	A	A
Guanidine HCl	A	A	A	A	A	A	A	A	A	A	A	A
Guanidine thiocyanate	A	A	A	A	A	A	A	A	A	A	A	A
Heptane	A	A	A	A	C	D/NR	C	D/NR	A	A	C	D/NR
Hexane	A	A	A	A	C	D/NR	C	D/NR	A	A	C	D/NR
Hydrochloric acid (HCl) 0.1 N	A	A	A	A	A	B	B	C	A	A	B	C
Hydrochloric acid (HCl) 1 N	A	A	A	A	A	B	B	C	A	A	B	C
Hydrochloric acid (HCl) 6 N	A	A	A	A	B	C	C	D/NR	A	A	C	D/NR
Hydrogen peroxide 3%	A	A	A	A	A	B	B	C	A	A	B	C
Hydrogen peroxide 30%	A	A	A	A	B	C	C	D/NR	A	A	C	D/NR
Imidazole buffer	A	A	A	A	A	A	A	A	A	A	A	A
Isopropanol 20%	A	A	A	A	A	A	B	B	A	A	A	A
Isopropanol 70%	A	A	A	A	A	A	B	B	A	A	A	A
Isopropanol 99%	A	A	A	A	A	A	C	C	A	A	B	B
L-arginine buffer	A	A	A	A	A	A	A	A	A	A	A	A
Methanol	A	A	A	A	A	A	C	C	A	A	B	B
Methyl ethyl ketone (MEK)	A	A	A	A	B	C	D/NR	D/NR	A	A	D/NR	D/NR
Mineral oil	A	A	A	A	C	D/NR	C	D/NR	A	A	C	D/NR
n-Propanol	A	A	A	A	A	A	B	B	A	A	A	A
Nitric acid (HNO3) 0.1 N	A	A	A	A	A	B	B	C	A	A	B	C
Ozone (aqueous)	A	A	A	A	B	C	B	C	A	A	B	C
PEG-400	A	A	A	A	A	A	A	A	A	A	A	A
Peracetic acid 0.2%	A	A	A	A	A	B	A	B	A	A	B	C
Peracetic acid 5%	A	A	A	A	B	C	A	B	A	A	B	C
Phosphate-buffered saline (PBS)	A	A	A	A	A	A	A	A	A	A	A	A
Phosphoric acid (H3PO4) 10%	A	A	A	A	A	B	A	B	A	A	A	B
Potassium hydroxide (KOH) 1 N	A	A	A	A	A	B	D/NR	D/NR	A	A	D/NR	D/NR
Propylene glycol	A	A	A	A	A	A	A	A	A	A	A	A
SDS 0.1%	A	A	A	A	A	B	A	B	A	A	A	B
SDS 1%	A	A	A	A	A	B	A	B	A	A	A	B
Seawater	A	A	A	A	A	A	A	A	A	A	A	A
Sodium azide	A	A	A	A	A	A	A	A	A	A	A	A
Sodium bicarbonate solution	A	A	A	A	A	A	B	B	A	A	A	A
Sodium carbonate solution	A	A	A	A	A	A	B	B	A	A	A	A
Sodium chloride (brine)	A	A	A	A	A	A	A	A	A	A	A	A
Sodium citrate	A	A	A	A	A	A	A	A	A	A	A	A
Sodium hydroxide (NaOH) 0.1 N	A	A	A	A	A	B	C	D/NR	A	A	C	D/NR
Sodium hydroxide (NaOH) 1 N	A	A	A	A	A	B	D/NR	D/NR	A	A	D/NR	D/NR
Sodium hydroxide (NaOH) 6 N	A	A	A	A	A	B	D/NR	D/NR	A	A	D/NR	D/NR
Sodium hypochlorite (bleach) 1%	A	A	A	A	A	B	B	C	A	A	B	C
Sodium hypochlorite (bleach) 10%	A	A	A	A	B	C	C	D/NR	A	A	C	D/NR
Sodium phosphate	A	A	A	A	A	A	A	A	A	A	A	A
Toluene	A	A	A	A	C	D/NR	D/NR	D/NR	A	A	D/NR	D/NR
Tris buffer	A	A	A	A	A	A	A	A	A	A	A	A
Tris-HCl	A	A	A	A	A	A	A	A	A	A	A	A
Triton X-100 (0.1%)	A	A	A	A	A	B	A	B	A	A	A	B
Tween 20 (0.1%)	A	A	A	A	A	B	A	B	A	A	A	B
Tween 80 (0.1%)	A	A	A	A	A	B	A	B	A	A	A	B
Urea 1 M	A	A	A	A	A	A	A	A	A	A	A	A
Vegetable oils (soy/canola)	A	A	A	A	A	A	A	A	A	A	A	A
Xylene	A	A	A	A	C	D/NR	D/NR	D/NR	A	A	D/NR	D/NR

RESIN CODE REFERENCES

ABBREVIATION	FULL RESIN NAME
ECTFE	Halar ECTFE* (ethylene-chlorotrifluoroethylene copolymer)
ETFE	Tefzel ETFE* (ethylene-tetrafluoroethylene)
FEP	Teflon FEP* (fluorinated ethylene propylene)
HDPE	High-density polyethylene
LDPE	Low-density polyethylene
PC	Polycarbonate
PETG	Polyethylene terephthalate copolymer
PFA	Teflon PFA* (polyfluoroalkoxy)
PMP	Polymethylpentene
PP	Polypropylene
PPCO*	Polypropylene copolymer
PVDF	Polyvinylidene fluoride
TFE	Teflon TFE* (tetrafluoroethylene)
TMX	Thermanox
PMX	Permanox

**Halar is a registered trademark of Solvay Solexis*
**Teflon and Tefzel are registered trademarks of DuPont*
**PPCO has replaced polyallomer (PA) in all products*

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