



Fluoropolymer Materials and Chemical Compatibility Guide



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Fluorinated Polymers Overview

Chemical Properties

- Resistivity to corrosive agents
- Non-solubility
- Long term weatherability
- Non-adhesiveness
- Nonflammability

Electrical Properties

- Low dielectric constant
- Low dissipation factor
- High arc resistance
- High surface resistance
- High volume resistivity

Mechanical Properties

- Flexibility at low temperatures
- Low coefficient of friction
- Stability at high temperatures

PTFE: Polytetrafluoroethylene

PTFE is a fluorocarbon resin that is isostatically compression molded into various shapes and configurations. It is chemically resistant to all chemicals and solvents with the exception of some molten alkali metals, molten sodium hydroxide, elemental fluorine and certain fluorinating agents. This unique chemical resistance stems from the following characteristics of the PTFE molecule: (1) the strong interatomic bonds between fluorine and carbon atoms, (2) shielding of the polymer's carbon atom backbone by fluorine atoms, and (3) high molecular weight. At Partek we use PTFE for machining the bodies and components of various valves and manifolds. It offers chemical resistance and stability at high temperatures.

PTFE: Modified

The modified PTFE material is used primarily for diaphragms and bellows in our products. This material has several advantages over PTFE material including better creep resistance and five times the flexural life of conventional PTFE. This material has the same processing and chemically resistant characteristics as the standard product but offers superior cycle life and integrity in diaphragm products.

PFA: Perfluoroalkoxy

PFA is a copolymer of tetrafluoroethylene and perfluoroalkyl vinyl ether. The resultant polymer contains the carbon-fluorine backbone chain typical of PTFE, but unlike PTFE, does not require special fabricating techniques. PFA pellets have good melt flow characteristics that allow for processing via extrusion, compression, blow, transfer and injection molding methods. It has outstanding chemical and solvent resistant characteristics over a temperature range even greater than PTFE. PFA is offered in various grades of purity and cleanliness making it the material of choice for the semiconductor market.

FEP: Fluorinated Ethylene Propylene

FEP is a copolymer of tetrafluoroethylene and hexafluoropropylene. The resultant polymer contains the carbon-fluorine backbone chain similar to PTFE. Unlike PTFE, FEP does not require special fabricating techniques. FEP pellets have good melt flow characteristics that allow for processing via extrusion, compression, and injection molding methods. It exhibits similar properties to PTFE, however it is susceptible to attack by concentrated perchloric acid. As well, it does not exhibit as broad a temperature range as PTFE or PFA.

PVDF: Polyvinylidene Fluoride

PVDF is a partially fluorinated, high molecular weight thermoplastic polymer. The PVDF molecule contains the carbon-fluorine backbone chain similar to PTFE with the addition of 3% hydrogen by weight. The combination of high impact and tensile strength makes it the ideal choice for trim materials and non-wetted structural members. It is highly resistant to oxidizing agents and halogens but is unsuitable for use with strong alkalis, fuming acids, polar solvents, amines, ketones and esters. PVDF can be processed via extrusion, compression and injection molding.

ETFE: Ethylene-Tetra Fluoroethylene

ETFE is a copolymer of ethylene and tetrachloroethylene. The resultant polymer is a material with high impact resistance, chemical resistance, electrical properties similar to fully fluorinated polymers. ETFE is available in pellet grades for extension and molding and in powder form for rota-molding. ETFE's low specific gravity makes it ideal for aerospace applications where weight and durability are critical factors.

Typical PFA Physical and Mechanical Properties

Property	ASTM Method	Industrial Tubing PFA	High Purity Component PFA	High Purity Tubing PFA
Specific Gravity		2.12 - 2.17	2.13 - 2.16	2.12 - 2.17
Nominal Melting Point	DTA-E168	575 - 590° F (302 - 310° C)	575 - 590° F (302 - 310° C)	575 - 590° F (302 - 310° C)
Melt Flow Rate, gms./10 min.	D-3307	2	14	2
Continuous Use Temperature		500° F (260° C)	500° F (260° C)	500° F (260° C)
Tensile Yield, PSI/MPA 73° F (23° C) 482° F (250° C)	D-3307	2,200 / 152	2,000 / 138 500 / 3.5	2,200 / 152
Tensile Strength, PSI/MPA 73° F (23° C) 482° F (250° C)	D-3307	4,000 / 28 2,000 / 14	3,600 / 25 1,800 / 12	4,000 / 28 2,000 / 14
Ultimate Elongation, % 73° F (23° C) 482° F (250° C)	D-3307	300 500	300 480	300 500
Flexural Modulus, PSI/MPA 73° F (23° C) 482° F (250° C)	D-790	90,000 / 625 10,000 / 69	85,000 / 590 5,000 / 55	90,000 / 625 10,000 / 69
Creep Resistance Tensile Modulus, PSI/MPA* 73° F (23° C) 482° F (250° C)	D-695 D-695	40,000 / 270 6,000 / 41	40,000 / 270 6,000 / 41	40,000 / 270 6,000 / 41
Hardness Durometer, D	D-2240	55	55	55
MIT Folding Endurance, cycles 7 - 8 mils	D2176	500,000	50,000	500,000
Water Absorption, %	D-570	< 0.03	< 0.03	< 0.03
Coefficient of Linear Thermal Expansion, in./in./mm/mm 70 - 212° F (20 - 100° C) 212 - 300° F (100 - 150° C) 300 - 408° F (150 - 212° C)	D-696	7.8 X 10 ⁻⁵ (14 X 10 ⁻⁵) 9.8 X 10 ⁻⁵ (18 X 10 ⁻⁵) 12.1 X 10 ⁻⁵ (22 X 10 ⁻⁵)	7.6 X 10 ⁻⁵ (14 X 10 ⁻⁵) 9.2 X 10 ⁻⁵ (17 X 10 ⁻⁵) 11.5 X 10 ⁻⁵ (21 X 10 ⁻⁵)	7.8 X 10 ⁻⁵ (14 X 10 ⁻⁵) 9.8 X 10 ⁻⁵ (18 X 10 ⁻⁵) 12.1 X 10 ⁻⁵ (22 X 10 ⁻⁵)

* 10 hour apparent modulus: stress = 1,000 PSIG at RT, 100 PSIG at 482°

Typical PTFE, FEP, and Modified PTFE Physical and Mechanical Properties

Property	ASTM Method	PTFE	FEP	Modified PTFE
Specific Gravity	D-792	2.16	2.15	2.15
Nominal Melting Point	-	621° F (327° C)	520° F (271° C)	-
Continuous Use Temperature	-	500° F (260° C)	400° F (204° C)	500° F (260° C)
Tensile Strength, PSI/MPA 73° F (23° C)	D-638	5,900 / 41.3	3,130 / 21.6	6,350 / 44.5
Flexural Modulus, PSI/MPA 73° F (23° C)	D-790	27,000 / 186	90,000 / 619	26,500 / 182
Hardness Durometer, D	D-2240	50	55	50
Water Absorption, %	D-570	< 0.01	0.01	< 0.01
Ultimate Elongation, %	D-1708	410	410	420

Typical PVDF Physical and Mechanical Properties

Property	ASTM Method	PVDF
Specific Gravity	ISO 1183 D	1.77 - 1.79
Melting Point	ISO 12086	336 - 342° F (169 - 172° C)
Tensile Yield, PSI / MPA 77° F (23° C)	ISO R 527-2 ISO 12086	7,100 - 7,830 / 49 - 54
Tensile Strength, PSI / MPA 77° F (23° C)	ISO R 527-2 ISO 12086	5,080 - 6,530 / 35 - 45
Ultimate Elongation, % 77° F (23° C)	ISO R 527-2 ISO 12086	20 - 100
Hardness Durometer, D	ISO 868	75 - 80

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Fluoropolymer Chemical Compatibility

The following table is intended as a guide to the user in the selection of materials for fluid compatibility. The information in the table is based on chemical resistance ratings at ambient temperatures (20°C, 68°F). Generally, resistance decreases at higher temperatures. Consult factory for details.

No one material can be expected to be compatible with the wide variety of fluids found in the world today. Users must test under their own operating conditions to determine the suitability of any material in a particular application.

Parker Hannifin Corporation is not responsible for the accuracy of this data and assumes no obligations or liability in connection with its use. This information is accepted at the user's sole risk.

EXPLANATION OF RATINGS

A-Recommended

NR-Not Recommended

B-Satisfactory

Blank-No Information

CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE	CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE
Acetamide	A	A	A	NR	A	A	Aluminum Sulfate <10% Boiling	A	A	A	A		A
Acetate Solvents Crude	A	A	A	A	A	A	Aluminum Sulfate >10% Boiling	A	A	A	A		A
Acetate Solvents Pure	A	A	A	A	A	A	Aluminum Chlorohydroxide Wet	A	A	A		A	A
Actaldehyde	A	A	A	NR	A	A	Amines	A	A	A		A	A
Acetic Acid	A	A	A	B	A	A	Ammonia 100% Anydrous	A	A	A	A	A	A
Acetic Acid Vapors	A	A	A	NR	A	A	Ammonia Aqueous	A	A	A	A	A	A
Acetic Acid Glacial	A	A	A	NR	A	A	Ammonium Bifluoride	A	A	A	A	A	
Acetic Anhydride	A	A	A	NR	A	A	Ammonium Carbonate	A	A	A	A	A	
Acetone	A	A	A	NR	A	A	Ammonium Chloride Saturated	A	A	A	A	A	A
Acetonitrile	A	A	A	NR	A	A	Ammonium Chloride 10%	A	A	A	A	A	A
Acetophenone	A	A	A	NR	A	A	Ammonium Chloride <10% Boiling	A	A	A	A	A	A
Acetelyne	A	A	A	B	A	A	Ammonium Chloride >10% Boiling	A	A	A	A	A	A
Acetyl Chloride	A	A	A	B	A	A	Ammonium Fluoride	A	A	A	A	A	
Acid Mine Water	A	A	A	A	A	A	Ammonium Hydroxide	A	A	A	A	A	A
Acrylonitrile	A	A	A	NR	A		Ammonium Nitrate	A	A	A	A	A	A
Adipic Acid	A	A	A	A	A		Ammonium Persulfate	A	A	A	A	A	A
Alcohols General	A	A	A	A	A	A	Ammonium Phosphate Dibasic	A	A	A	A	A	A
Alcohol Amyl	A	A	A	A	A	A	Ammonium Sulfate Saturated	A	A	A	A	A	A
Alcohol Butyl (BUTANOL)	A	A	A	A	A	A	Ammonium Sulfate 10%	A	A	A	A	A	A
Alcohol Ethyl (ETHANOL)	A	A	A	A	A	A	Ammonium Sulfate 10% Boiling	A	A	A	A	A	A
Alcohol, 2 Aminoethanol	A	A	A	NR	A	NR	Ammonium Sulfate	A	A	A		A	A
Allyl Alcohol	A	A	A		A		Amyl Chloride	A	A	A	A	A	A
Allyl Chloride	A	A	A	A	A	A	Amyl Acetate	A	A	A	NR	A	A
Aluminum Chloride 10%	A	A	A	A	A	A	Aniline	A	A	A	B	A	B
Aluminum Chloride 10% Boiling	A	A	A	A	A	A	Aniline Hydrochloride	A	A	A	B	A	A
Aluminum Chloride 100%	A	A	A	A	A	A	Antimony Trichloride	A	A	A	A	A	A
Aluminum Fluoride	A	A	A	A	A		Aroclor	A	A	A		A	A
Aluminum Hydroxide	A	A	A	A	A	A	Aqua Regia	A	A	A	A	A	A
Aluminum Nitrate	A	A	A	A	A		Arsenic Acid	A	A	A	B	A	
Aluminum Potassium Sulfate (ALUM)	A	A	A	A	A	A	Asphalt	A	A	A	A		A
Aluminum Sulfate 100%	A	A	A	A	A	A	Asphalt Emulsions	A	A	A	A		A
Aluminum Sulfate 10%	A	A	A	A	A	A	Barium Carbonate	A	A	A	A	A	A

Ratings: A-Recommended **B**-Satisfactory **NR**-Not Recommended **Blank**-No Information



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CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE	CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE
Barium Chloride Saturated	A	A	A	A	A	A	Carbon Tetrachloride Dry	A	A	A	A	A	A
Barium Chloride 30%	A	A	A	A	A	A	Carbonic Acid	A	A	A	A	A	A
Barium Chloride 5%	A	A	A	A	A	A	Caustic Potash	A	A	A	B	A	A
Barium Chloride >5% Hot	A	A	A	A	A	A	Caustic Soda (SODIUM HYDROXIDE)	A	A	A	A	A	A
Barium Cyanide	A	A	A				Cellosolves	A	A	A	A	A	A
Barium Hydroxide	A	A	A	A	A	A	Chloric Acid	A	A	A			A
Barium Nitrate	A	A	A			A	Chlorinated Water	A	A	A	A	A	A
Barium Sulfate	A	A	A	A	A	A	Chlorine Dry	A	A	A	A	A	NR
Barium Sulfide	A	A	A	A	A		Chlorine Wet	A	A	A	A	A	B
Beer	A	A	A	A	A		Chloroacetic Acid	A	A	A	A	A	A
Beet Sugar Liquor	A	A	A			A	Chlorobenzene	A	A	A	A	A	A
Benzaldehyde	A	A	A	A	A	A	2 Chloroethanol	A	A	A	A	A	A
Benzene	A	A	A	A	A	A	Chloroform	A	A	A	A	A	B
Benzene Hot	A	A	A	B	A	B	Chlorophenol	A	A	A	B	A	
Benzene Sulfonic Acid	A	A	A	NR	A	NR	Chlorosulfonic Acid	A	A	A	C	A	A
Benzoic Acid	A	A	A	A	A	A	Chlorosulfonic Acid Dilute	A	A	A		A	A
Benzonitrile	A	A	A		A	A	Chromic Acid Dilute	A	A	A	A	A	A
Benzyl Alcohol	A	A	A	A	A	A	Chromic Acid Concentrated	A	A	A	A	A	A
Benzyl Chloride	A	A	A	A	A	A	Chromic Acid <10% Boiling	A	A	A	NR	A	A
Blood	A	A	A		A	A	Chromic Acid >10% Boiling	A	A	A	NR	B	A
Borax	A	A	A	A	A	A	Citric Acid Concentrated	A	A	A	A	A	A
Boric Acid 5%	A	A	A	A	A	A	Citric Acid Dilute	A	A	A	A	A	A
Boric Acid 10%	A	A	A	A	A	A	Copper Cyanide	A	A	A	A	A	
Bromine Dry Gas	A	A	A	A	A	A	Copper Fluoride	A	A	A	A	A	
Bromine Moist Gas	A	A	A	A	A	A	Copper Nitrate	A	A	A	A	A	A
Butadiene	A	A	A	A	A	A	Copper Sulfate	A	A	A	A	A	A
Butane	A	A	A	A	A	A	Cotton Seed Oil	A	A	A	A		A
Buttermilk	A	A	A	A	A	A	Creosote Hot (WOOD & COAL TAR)	A	A	A			A
Butylene	A	A	A	A	A	A	M Cresol (CRUDE)	A	A	A	A	A	A
Butyric Acid 5%	A	A	A	A	A	A	Crude Oil	A	A	A	A	A	A
Butyric Acid Concentrated	A	A	A	A	A	A	Cresylic Acid	A	A	A	B	A	
Butyl Acetate	A	A	A	NR	A	A	Cresyldiphenyl Phosphate	A	A	A			A
Butyl Amine	A	A	A	NR	B	NR	Cupric Chloride <2%	A	A	A	A	A	A
Butyl Ether	A	A	A	A	A	A	Cupric Chloride	A	A	A	A	A	A
Butyl Phthalate	A	A	A	NR	A	A	Cyanic Acid	A		A			
Butyl Chloride	A	A	A	A	A	A	Cyclohexane	A	A	A	A	A	A
Calcium Bisulfate	A	A	A	A		A	Cyclohexanol	A	A	A	A	A	A
Calcium Carbonate	A	A	A	A	A		Cyclohexanone	A	A	A	A	A	A
Calcium Chloride Saturated	A	A	A	A	A	A	Detergents General	A	A	A		A	A
Calcium Chloride Dilute	A	A	A	A	A	A	Diacetone Alcohol (ACETOL)	A	A	A	A	A	
Calcium Chloride 10% Boiling	A	A	A	A	A	A	Dibutyl Phthalate	A	A	A	NR	A	A
Calcium Chloride 20% Boiling	A	A	A	A	A	A	Dichlorobenzene	A	A	A	A	A	
Calcium Chloride 30% Boiling	A	A	A	A	A	A	Dichloroethane	A	A	A	A	A	A
Calcium Hypochlorite 100%	A	A	A	A	A	A	Dichlorodifluoro Methane (F-12)	A	A	A	A	A	A
Calcium Hypochlorite 2% Boiling	A	A	A	A	A	A	Dichloroethylene	A	A	A	A	A	A
Carbolic Acid (PHENOL)	A	A	A	A	A	A	Diesel Fuel	A	A	A	A	A	A
Calcium Nitrate	A	A	A	A	A	A	Diethanolamine	A	A	A			
Calcium Sulfate	A	A	A	A	A	A	Diethylamine	A	A	A	A	A	A
Carbon Dioxide	A	A	A	A	A	A	Diethylene Glycol	A	A	A		A	
Carbon Disulfide	A	A	A	A	A	A	Diethyl Ether	A	A	A	B	A	A
Carbon Monoxide	A	A	A	B	A	A	Diisobutylene	A	A	A	A	A	A
Carbon Tetrachloride Wet	A	A	A	A	A	A	Dimethyl Aniline	A	A	A	A	A	A

Ratings: A-Recommended B-Satisfactory NR-Not Recommended Blank-No Information



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CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE	CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE
Dimethyl Formamide	A	A	A	NR	A	A	Gasoline Leaded Refined	A	A	A	A	A	A
Dimethyl Phthalate	A	A	A	A	A	A	Gelatin	A	A	A	A		
Dimethyl Sulfoxide	A	A	A		A	A	Glucose	A	A	A	A		
Diphenyl	A		A		A		Glue	A	A	A			
Diphenyl Ether	A	A	A		A	A	Glycerine (GLYCEROL)	A	A	A	A	A	A
Diphenyl Oxide	A			B	A		Glycolic Acid (HYDROXY ACETIC)	A	A	A	A	A	A
Dipropylene Glycol	A	A	A	B	A		Glycol (ETHYLENE GLYCOL)	A	A	A	A	A	A
Diethyl Phthalate	A	A	A	B	A	A	Helium	A	A	A			A
P-Dioxane	A	A	A	NR	A	A	Heptane	A	A	A	A	A	A
Dow Therm	A	A	A		A	A	Hexane	A	A	A	A	A	A
Epichlorohydrin Dry	A	A	A	NR	A	A	Hexamine		A	A			
Ethane	A	A	A		A		Hexanol Tertiary	A	A	A			
Ethanolamine	A	A	A	NR	A	NR	Hydrazine	A	A	A	A	A	
Ethers	A	A	A	B	A	B	Hydraulic Fluid (PETROLEUM)	A	A	A		A	A
Ethyl Acetate	A	A	A	A	A	A	Hydraulic Fluid (SYNTHETIC)	A	A	A		A	A
Ethyl Benzoate	A	A	A		A		Hydrobromic Acid	A	A	A	A	A	A
Ethyl Benzene	A	A	A		A		Hydrochloric Acid >20%	A	A	A	A	A	A
Ethyl Butyrate	A	A	A		A		Hydrochloric Acid 1-20%	A	A	A	A	A	A
Ethyl Chloride Wet	A	A	A	A	A	B	Hydrochloric Acid <1%	A	A	A	A	A	A
Ethyl Ether	A	A	A	A	A	A	Hydrochloric Acid 1% 175°F	A	A	A	A	A	
Ethyl Sulfate	A	A	A				Hydrochloric Acid 0.5% to 2% 175°F	A	A	A	A	A	A
Ethylene Bromide	A	A	A	A	A		Hydrochloric Acid >2% 175°F	A	A	A	A	A	A
Ethylene Chlorohydrin	A	A	A	A	A	A	Hydrochloric Acid <0.25% Boiling	A	A	A	A	A	A
Ethylene Chloride	A	A	A	A	A	A	Hydrochloric Acid <1% Boiling	A	A	A	A	A	A
Ethylene Diamine	A	A	A	B	A	NR	Hydrochloric Acid >1% Boiling	A	A	A	A	A	A
Ethylene Dibromide	A	A	A	A			Hydrocyanic Acid	A	A	A	A	A	
Ethylene Dichloride	A	A	A	A	A	A	Hydrofluoric Acid <40%	A	A	A	A	A	A
Ethylene Glycol (DIHYDROXYETHANE)	A	A	A	A	A	A	Hydrofluoric Acid 35%	A	A	A	A	A	A
Ethylene Oxide	A	A	A	A	A	A	Hydrofluoric Acid >40%	A	A	A	A	A	A
Fatty Acids	A	A	A	A	A	A	Hydrofluoric Acid Boiling	A	A	A	A	A	A
Ferric Chloride Concentrated	A	A	A	A	A	A	Hydrofluosilicic Acid	A	A	A	A	A	A
Ferric Chloride <1%	A	A	A	A	A	A	Hydrofluorosilicic Acid	A	A	A	A	A	A
Ferric Chloride >1%	A	A	A	A	A	A	Hydrogen Gas	A	A	A	A	A	A
Ferric Chloride <1% Boiling	A	A	A	A	A	A	Hydrogen Chloride Gas Dry	A	A	A	B	A	A
Ferric Chloride >1% Boiling	A	A	A	A	A	A	Hydrogen Chloride Gas Wet	A	A	A	A	A	A
Ferric Nitrate	A	A	A	A	A	A	Hydrogen Cyanide	A	A	A	A	A	
Ferric Sulfate	A	A	A	A	A	A	Hydrogen Fluoride Anhydrous	A	A	A		A	
Ferrous Chloride	A	A	A	A	A	B	Hydrogen Peroxide	A	A	A	A	A	A
Ferrous Sulfate	A	A	A	A	A	A	Hydrogen Sulfide Dry	A	A	A	A	A	A
Fluoboric Acid	A	A	A	A	A		Hydrogen Sulfide Wet	A	A	A	A	A	A
Fluosilic Acid	A	A	A	A	A	A	Hypochlorous Acid	A	A	A	A	A	
Fluorine Gas Dry	A	A	A	A	A	NR	Iodine	A	A	A	A	A	A
Fluorine Gas Wet	A	A	A	NR	NR	A	Isobutyl Alcohol	A	A	A	A	A	A
Formaldehyde (FORMALIN)	A	A	A	A	A	A	Isooctane	A	A	A	A	A	A
Formic Acid	A	A	A	A	A	A	Isopropyl Acetate	A	A	A		A	
Freon Dry	A	A	A	A	A	A	Isopropyl Alcohol	A	A	A	A	A	
Freon Wet	A	A	A	A	A	A	Isopropyl Ether	A	A	A			A
Fuel Oils	A	A	A	B	A	A	Jet Fuel (JP3, JP4, JP5)	A	A	A	A	A	A
Furan	A	A	A	NR	A	A	Kerosene	A	A	A	A	A	A
Furfural (FURFURALDEHYDE)	A	A	A	B	A	B	Keytones	A	A	A	NR	A	B
Gallic Acid	A	A	A	A	A	A	Lactic Acid	A	A	A	B	A	A
Gas Natural	A	A	A	A	A		Lacquers and Lacquer Solvents	A	A	A			A

Ratings: A-Recommended B-Satisfactory NR-Not Recommended Blank-No Information



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CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE	CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE
LPG (PROPANE)	A	A	A	A	A	A	Naphthalene	A	A	A	A	A	A
Lard	A	A	A	A	A		Nickel Chloride	A	A	A	A	A	A
Latex	A	A	A				Nickel Nitrate	A	A	A	A	A	
Lead Acetate	A	A	A	A	A	A	Nickel Sulfate	A	A	A	A	A	A
Lead Nitrate	A	A	A		A		Nitric Acid	A	A	A	A	A	A
Lead Sulfamate	A	A	A		A		Nitric Acid Fuming >70%	A	A	A	B	A	A
Lime Sulfur (CALCIUM SULFIDE)	A	A	A	B	A		Nitric Acid Boiling	A	A	A	NR	NR	A
Lineoleic Acid	A	A	A	A	A		Nitrobenzene	A	A	A	A	A	A
Linseed Oil	A	A	A	A	A		Nitrogen	A	A	A	A	A	A
Lithium Chloride	A	A	A		A		Nitromethane	A	A	A	A	A	A
Lithium Hydroxide	A	A	A		A		Nitrous Acid	A	A	A	A	A	A
Lubricating Oil	A	A	A	A	A	A	Nitrous Oxide	A	A	A	NR	A	A
Lye	A	A	A	A	A	A	N-Octane	A	A	A	A	A	
Lime (CALCIUM OXIDE)	A	A	A	B	A		Oils Animal	A	A	A			
Magnesium Carbonate	A	A	A	A	A		Oils Crude	A	A	A	A	A	
Magnesium Chloride	A	A	A	A	A	A	Oils Mineral	A	A	A	A	A	A
Magnesium Bisulfate	A	A	A		A		Oils Olive	A	A	A	A		
Magnesium Hydroxide	A	A	A	A	A		Oils Vegetable	A	A	A	A		A
Magnesium Nitrate	A	A	A	A	A		Oleic Acid (RED OIL)	A	A	A	A	A	A
Magnesium Sulfate	A	A	A	A	A	A	Oxalic Acid	A	A	A	A	A	A
Malic Acid	A	A	A	A	A		Oxygen	A	A	A	A	A	A
Maleic Acid	A	A	A	A	A		Ozone	A	A	A	A	A	
Manganese Chloride	A	A	A			A	Palmitic Acid	A	A	A	A	A	
Manganese Sulfate	A	A	A			A	Paraffin	A	A	A			
Mercuric Chloride	A	A	A	A	A	A	Pentane	A	A	A			
Mercuric Cyanide	A	A	A	A	A	A	Perchloroethylene	A	A	A	A	A	A
Mercurous Nitrate	A	A	A	A	A		Perchloric Acid	A	A	A	A	B	A
Mercury	A	A	A	A	A	A	Petroleum	A	A	A	A	A	
Methane	A	A	A	A	A	A	Petroleum Ether	A	A	A	B	A	
Methyl Acetate	A	A	A		A		Phosphoric Acid Aerated	A	A	A	A	A	A
Methyl Acetone	A	A	A				Phosphoric Acid Air Free	A	A	A	A	A	A
Methyl Alcohol (METHANOL)	A	A	A	A	A	A	Phosphoric Acid Air Boiling	A	A	A	A	A	
Methyl Amine	A	A	A				Phosphorus	A	A	A			
Methyl Bromide	A	A	A	A	A		Phosphorus Trichloride	A	A	A	A	A	A
Methyl Cellosolve	A	A	A	A	A		Phosphorus Pentachloride	A	A	A	A	A	
Methyl Chloride Wet	A	A	A	A	A	A	Phenol Sulfonic Acid	A	A	A	B	A	A
Methyl Chloride Dry	A	A	A	A	A	A	Photographic Solutions (DEVELOPERS)	A	A	A	A	A	A
Methyl Ethyl Keytone	A	A	A	NR	A	A	Photographic Solutions	A	A	A	B	A	A
Methyl Isobutyl Keytone	A	A	A	A	A	A	Phthalic Acid	A	A	A	A	A	
Methylene Chloride	A	A	A	B	A	A	Phthalic Anhydride	A	A	A		A	
Milk	A	A	A	A		A	Picric Acid	A	A	A	A	A	A
Mineral Oil	A	A	A	A	A	A	Plating Solutions Brass	A	A	A	B	A	
Mixed Acids	A	A	A	A	A		Plating Solutions Cadmium	A	A	A	B	A	
Molasses	A	A	A	B		A	Plating Solutions Chrome	A	A	A	B	A	
Morpholine	A	A	A	B	A	A	Plating Solutions Copper	A	A	A	B	A	
Motor Oil	A	A	A	A	A	A	Plating Solutions Gold	A	A	A	B	A	
Mustard	A	A	A		A	A	Plating Solutions Lead	A	A	A	B		
Monochlorobenzene	A	A	A	A	A	A	Plating Solutions Nickel	A	A	A	A		
Monochlorodifluoromethane (F-22)	A	A	A	B	A		Plating Solutions Silver	A	A	A	A		
Monoethanolamine	A	A	A	NR	A	NR	Plating Solutions Tin	A	A	A	B		
Monochloroacetic Acid	A	A	A	A	A	A	Plating Solutions Zinc	A	A	A	B		
Naphtha	A	A	A	A	A	A	Potassium Acetate	A	A	A			

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CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE	CHEMICALS	FEP	PFA	PTFE	PVDF	ETFE	CTFE
Potassium Aluminum Sulfate (ALUM)	A	A	A	A	A	A	Sodium Acid Sulfate	A	A	A			
Potassium Bicarbonate	A	A	A	B	A	A	Sodium Aluminate	A	A	A			
Potassium Bichromate	A	A	A	A	A	A	Sodium Aluminum Sulfate	A	A	A			
Potassium Bromide	A	A	A	A	A	A	Sodium Benzoate	A	A	A	A	A	
Potassium Carbonate	A	A	A	A	A	A	Sodium Bicarbonate	A	A	A	A	A	A
Potassium Chlorate	A	A	A	A	A	A	Sodium Bichromate	A	A	A	B	A	
Potassium Chloride	A	A	A	A	A	A	Sodium Bisulfate	A	A	A	A	A	A
Potassium Chromate	A	A	A	B	A		Sodium Bisulfite	A	A	A	A	A	
Potassium Cyanide	A	A	A	A	A	A	Sodium Borate (BORAX)	A	A	A	A	A	A
Potassium Dichromate	A	A	A	A	A	A	Sodium Bromide	A	A	A	A	A	A
Potassium Ferricyanide	A	A	A	A	A	A	Sodium Carbonate (SODA ASH)	A	A	A	A	A	A
Potassium Ferrocyanide	A	A	A	A	A	A	Sodium Chlorate	A	A	A	A	A	A
Potassium Hydrate	A	A	A				Sodium Chloride	A	A	A	A	A	A
Potassium Hydroxide	A	A	A	A	A	A	Sodium Chromate	A	A	A		A	A
Potassium Hypochlorite	A	A	A	A	A	A	Sodium Citrate	A	A	A			
Potassium Iodide	A	A	A	A	A		Sodium Cyanide	A	A	A	A	A	A
Potassium Nitrate	A	A	A	A	A	A	Sodium Dichromate	A	A	A	B	A	
Potassium Oxalate	A	A	A				Sodium Ferricyanide	A	A	A	B		
Potassium Permanganate	A	A	A	A	A	A	Sodium Fluoride	A	A	A	A	A	
Potassium Silicide	A	A	A				Sodium Hydroxide (CAUSTIC SODA)	A	A	A	NR	A	A
Potassium Sulfate	A	A	A	A	A	A	Sodium Hypochlorite	A	A	A	A	A	A
Potassium Sulfide	A	A	A	A	A	A	Sodium Hyposulfite	A	A	A	A	A	A
Potassium Sulfite	A	A	A	A	A		Sodium Metaphosphate	A	A	A			
Propane	A	A	A	A	A	A	Sodium Metasilicate	A	A	A		A	
Propyl Acetate	A	A	A			A	Sodium Nitrate	A	A	A	A	A	A
Propyl Alcohol (PROPANOL)	A	A	A	A	A		Sodium Perborate	A	A	A		A	A
Propylene	A	A	A				Sodium Peroxide	A	A	A	A	A	A
Propylene Chlorohydrin	A	A	A	A			Sodium Phosphates	A	A	A	A	A	A
Propylene Glycol	A	A	A		A	A	Sodium Silicate (WATER GLASS)	A	A	A	A	A	A
Propylene Oxide	A	A	A	NR	A		Sodium Sulfate	A	A	A	A	A	A
Pydraul		A	A				Sodium Sulfide	A	A	A	A	A	A
Pyridine	A	A	A	NR	A	A	Sodium Sulfite	A	A	A	A	A	A
Pyrogalllic Acid	A	A	A	B	A	A	Sodium Thiosulfate (HYPO)	A	A	A	A	A	A
Pyroligneous Acid	A	A	A	A	A	A	Sodium Tetraborate (BORAX)	A	A	A	A	A	A
Quinne Bisulfate		A	A				Soy Bean Oil	A	A	A			
Quinne Sulfate		A	A			A	Stannic Chloride	A	A	A	A	A	A
Rosin		A	A				Stannous Chloride	A	A	A	A	A	A
Resorcinol	A	A	A		A		Starch	A	A	A			
Salicylic Acid	A	A	A	A	A	A	Stearic Acid	A	A	A	A	A	
Salicylaldehyde	A	A	A	A	A		Steam	A	A	A	A	A	A
Salt Brine	A	A	A	A	A	A	Stoddard Solvent	A	A	A	A	A	A
Sea Water	A	A	A	A	A	A	Styrene	A	A	A		A	
Sewage	A	A	A	A	A		Sugar Juice	A	A	A			
Shellac	A	A	A				Sulfate Liquor Black	A	A	A	A	A	
Silicone Oil	A	A	A		A	A	Sulfate Liquor Green	A	A	A		A	
Silver Bromide	A	A	A			A	Sulfinol	A	A	A	A		
Silver Chloride	A	A	A		A	A	Sulfite Liquor	A	A	A			A
Silver Cyanide	A	A	A	A	A		Sulfolane	A	A	A		A	A
Silver Nitrate	A	A	A	A	A	A	Sulfur	A	A	A	A	A	A
Skydrol 500 & 7000	A	A	A		A		Sulfur Molten 266°F	A	A	A		A	A
Soap Solutions	A	A	A	A			Sulfur Chloride	A	A	A	A	A	A
Sodium Acetate	A	A	A	A	A	A	Sulfur Dioxide Gas Wet	A	A	A	A	A	A

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Sulfur Dioxide Gas Dry	A	A	A	A	A	A	Triethyl Phosphate	A	A	A		A	A
Sulfur Trioxide	A	A	A	NR		A	Tripropylene Glycol	A	A	A		A	
Sulfuric Acid Air Free	A	A	A	NR	A	A	Trisodium Phosphate	A	A	A	A	A	A
Sulfuric Acid Aerated	A	A	A	NR	A	A	Tung Oil (CHINA WOOD OIL)	A	A	A			
Sulfuric Acid Boiling	A	A	A	NR	A		Turpentine	A	A	A	A	A	A
Sulfuric Acid Fuming Oleum	A	A	A	NR	A	A	Undecyl Alcohol (UNDECANOL)	A	A	A		A	
Sulfurous Acid	A	A	A	A	A	A	Urea	A	A	A	A	A	
Tall Oil	A	A	A	A	A		Uric Acid	A	A	A			
Tallow	A	A	A				Urine	A	A	A	A	A	
Tannic Acid	A	A	A	B	A	A	Varnish	A	A	A		A	A
Tanning Liquor (ALUM SOLUTION)	A	A	A				Vinegar	A	A	A	A	A	A
Tar & Tar Oil	A	A	A			A	Vinyl Acetate	A	A	A	A	A	
Tartaric Acid	A	A	A	B	A	A	Vinyl Chloride	A	A	A	B	A	
Tetrachloroacetic Acid	A	A	A	A	A		Vinylidene Chloride (RESIN)	A	A	A	B	A	
Tetrachloroethane	A	A	A	A	A	A	Water, Acid Mine	A	A	A	A	A	A
Tetrachloroethylene	A	A	A	A	A	A	Water, Boiler Feed	A	A	A		A	A
Tetra Ethyl Lead	A	A	A	A	A		Water, Distilled	A	A	A	A	A	A
Tetrahydrofuran	A	A	A	B	A	A	Water, Fresh	A	A	A	A	A	A
Tetrahydronaphthalene (Tetralin)	A	A	A				Water, Deionized	A	A	A	A	A	A
Tetraphosphoric Acid	A	A	A	A	A	A	Water, Demineralized	A	A	A	A	A	A
Thionyl Chloride	A	A	A	NR	A		Water, Brackish	A	A	A		A	A
Tin Tetrachloride	A	A	A	A	A	A	Water, Salt	A	A	A	A	A	A
Titanium Tetrachloride	A	A	A	B	A		Wax	A	A	A	A	A	A
Toluene (TOLUOL)	A	A	A	A	A	B	Whiskey	A	A	A	A		A
Tomato Juice	A	A	A	A	A	A	White Liquor, Pulp Mill	A	A	A	A	A	
Tributyl Citrate	A	A	A		A		White Spirit	A	A	A	A		
Tributyl Phosphate	A	A	A	A	A	A	Wine	A	A	A	A	A	A
Transformer Oil	A	A	A				Wood Pulp	A	A	A			
Trichloroacetic Acid	A	A	A	A	A	A	Xylene (XYLOL XYLOLE)	A	A	A	A	A	A
Trichloroethane	A	A	A	B	A	A	Zinc Carbonate	A	A	A			
Trichloroethylene	A	A	A	A	A	A	Zinc Chloride	A	A	A	A	A	A
Trichloromonofluoroethane (F-17)	A	A	A				Zinc Cyanide	A	A	A			
Trichloropropane	A	A	A			A	Zinc Nitrate	A	A	A	A	A	
Trichlorotrifluoroethane (F-113)	A	A	A	A	A	A	Zinc Stearate	A	A	A		A	
Tricresyl Phosphate	A	A	A	NR			Zinc Sulfate	A	A	A	A	A	A
Triethanolamine	A	A	A	NR	A		Atmosphere, Industrial	A	A	A	A	A	A
Triethylamine	A	A	A	A	A	A	Atmosphere, Marine	A	A	A	A	A	A
Triethylene Glycol	A	A	A		A		Atmosphere, Rural	A	A	A	A	A	A
Triethyl Phosphate	A	A	A	NR	A	A	Ultraviolet Light	no effect	no effect	no effect	excellent	no effect	no effect

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