CHEMICAL COMPATIBILITY GUIDE

Attached you will find 2 charts: 1 from Nibco® and 1 from FMC Technologies®

Also go to our website for the best valve materials chemical compatibility chart: - www.globalsupplyline.com.au/pdfs/catalogues/gsl/Valve_chemical_resistance.pdf

These “Chemical Compatibility Charts” are indicative only. You will find a wide variation between different valve material corrosion charts. Other than our own chart, these are the best two charts we could find and their benefit is that they specifically relate to body and trim materials used in valve construction and they cover some material types and media types not listed in our chart. Go to the Technical section of our website for another chart on other valve body & trim material chemical composition characteristics. You will find there is a wide degree of variation between different charts so it pays to cross check a few charts.

If we don’t have the valve in stock we can source it from our overseas network of stockists and very short lead-time specialty manufacturers. We can even supply exotic grades like Nickel, Super Duplex F55 and Monel (ASTM A494-M35-1) Cd4M-Cu, Hastelloy C (ASTM A-494 CW12MW), 317 (C8G8M) in short lead-time.

We stock valves in A105, LF2, 304, 304L, 316, 316L, F51, CF8, CF3, CF8M, WC5, WC6, WC9, F11, F22, F5, Bronze, Iron, etc. in Ball, Butterfly, Check, Control, Gate, Globe, Needle, Parallel slide, Plug, etc. Valves are manufactured to API600, API602, API603, API6A, API6D, BS1868 and numerous other standards.

We put the same level of care and attention to detail that went into this website into every facet of our business. If you found this website helpful, recommend us to your plant managers, engineers and purchasing staff!

DISCLAIMER:
This is a general overview. Information provided should not be used to make an operational or design decision. We accept no liability or responsibility for the information and do not guarantee its correctness.

CATALOG C-CRG-1011

CHEM-GUIDE

CHEMICAL RESISTANCE
INFORMATION
FOR PLASTIC AND METAL
VALVES AND FITTINGS

NIBCO®
AHEAD OF THE FLOW®

Material Ratings and Definitions

INTRODUCTION

This Chemical Resistance Guide has been compiled to assist the piping system designer in selecting chemical-resistant materials. The information given is intended as a guide only. Many conditions can affect the material choices. Careful consideration must be given to temperature, pressure and chemical concentrations before a final material can be selected.

The physical characteristics of thermoplastics and elastomers are more sensitive to temperature than metals. For this reason, a rating chart has been developed for each.

MATERIAL RATINGS FOR THERMOPLASTICS & ELASTOMERS

Temp. in °F	=	"A" rating, maximum temperature which is recommended, resistant under normal conditions
B to Temp. in °F	=	Conditional resistance, consult factory
C	=	Not recommended
Blank	=	No data available

MATERIAL RATINGS FOR METALS

A	=	Recommended, resistant under normal conditions
B	=	Conditional, consult factory
C	=	Not recommended
Blank	=	No data available

Temperature maximums for thermoplastics, elastomers and metals should always fall within published temp/pressure ratings for individual valves. **THERMOPLASTICS ARE NOT RECOMMENDED FOR COMPRESSED AIR OR GAS SERVICE.***

This guide considers the resistance of the total valve assembly as well as the resistance of individual trim and fitting materials. The rating assigned to the valve body plus trim combinations is always that of the least resistant part. In the cases where the valve body is the least resistant, there may be conditions under which the rate of corrosion is slow enough and the mass of the body large enough to be usable for a period of time. Such use should always be determined by test before installation of the component in a piping system.

In the selection of a butterfly valve for use with a particular chemical, the liner, disc, and stem must be resistant. All three materials should carry a rating of "A." The body of a properly functioning butterfly valve is isolated from the chemicals being handled and need not carry the same rating.

THERMOPLASTICS & ELASTOMERS

ABS — Acrylonitrile Butadiene Styrene Class 32222 conforming to ASTM D3965 is a time-proven material. The smooth inner surface and superior resistance to deposit formation makes ABS drain, waste, and vent material ideal for residential and commercial sanitary systems. The residential DWV system can be exposed in service to a wide temperature span. ABS-DWV has proven satisfactory for use from -40°F to 180°F. These temperature variations can occur due to ambient temperature or the discharge of hot liquids into the system. ABS-DWV is very resistant to a wide variety of materials ranging from sewage to commercial household chemical formulations. ABS-DWV is joined by solvent cementing or threading and can easily be connected to steel, copper, or cast iron through the use of transition fittings.

CPVC — Chlorinated Polyvinyl Chloride Class 23447 conforming to ASTM D1784, has physical properties at 73°F similar to those of PVC, and its chemical resistance is similar to or generally better than that of PVC. CPVC, with a design stress of 2000 psi and maximum service temperature of 210°F, has proven to be an excellent material for hot corrosive liquids, hot or cold water distribution, and similar applications above the temperature range of PVC. CPVC is joined by solvent cementing, threading or flanging.

PP (Polypropylene) — Polypropylene is a polyolefin, which is lightweight and generally high in chemical resistance. Although polypropylene is slightly lower in physical properties compared to PVC, it is chemically resistant to organic solvents as well as acids and alkalies. Generally, **polypropylene should not be used in contact with strong oxidizing acids, chlorinated hydrocarbons, and aromatics**. With a design stress of 1000 psi at 73° F, polypropylene has gained wide acceptance where its resistance to sulfur-bearing compounds is particularly useful in salt water disposal lines, crude oil piping, and low pressure gas gathering systems. Polypropylene has also proved to be an excellent material for laboratory and industrial drainage where mixtures of acids, bases, and solvents are involved. Polypropylene is joined by the heat fusion process, threading or flanging. **At 180°F, or when threaded, PP should be used for drainage only at a pressure not exceeding 20 psi.**

PVC — Polyvinyl Chloride Class 12454 conforming to ASTM D1784. PVC is the most frequently specified of all thermoplastic materials. It has been used successfully for over 40 years in such areas as chemical processing, industrial plating, chilled water distribution, deionized water lines, chemical drainage, and irrigation systems. PVC is characterized by high physical properties and resistance to corrosion and chemical attack by acids, alkalies, salt solutions, and many other chemicals. It is attacked, however, by polar solvents such as ketones, some chlorinated hydrocarbons and aromatics. The maximum service temperature of PVC is 140°F. With a design stress of 2000 psi, PVC has the highest long-term hydrostatic strength at 73°F of any of the major thermoplastics being used for piping systems. PVC is joined by solvent cementing, threading, or flanging.

PVDF — Polyvinylidene Fluoride is a strong, tough and abrasion-resistant fluorocarbon material. It resists distortion and retains most of its strength to 280°F. It is chemically resistant to most acids, bases, and organic solvents and is ideally suited for handling wet or dry chlorine, bromine and other halogens. No other

*** WARNING: Failure to follow these instructions could result in personal injury or property damage.**

Material Definitions

solid thermoplastic piping components can approach the combination of strength, chemical resistance and working temperatures of PVDF. PVDF is joined by the heat fusion process, threading or flanging.

EPDM — EPDM is a terpolymer elastomer made from ethylene-propylene diene monomer. EPDM has good abrasion and tear resistance and offers excellent chemical resistance to a variety of acids and alkalines. **It is susceptible to attack by oils and is not recommended for applications involving petroleum oils, strong acids, or strong alkalines.** It has good ozone resistance. It is fairly good with ketones and alcohols and has an excellent temperature range from -20°F to 250°F.

POLYCHLOROPRENE (CR) — Polychloroprenes were one of the first synthetic rubbers developed. Polychloroprene is an all-purpose polymer with many desirable characteristics and features high resiliency with low compression set, flame resistance, and is animal and vegetable oil resistant. Polychloroprene is principally recommended for food and beverage service. Generally, polychloroprene is not affected by moderate chemicals, fats, greases, and many oils and solvents. **Polychloroprene is attacked by strong oxidizing acids, most chlorinated solvents, esters, ketones, aromatic hydrocarbons, and hydraulic fluids. Polychloroprene has a moderate temperature range of -20°F to 160°F.**

NITRILE (NBR) — BUNA-N is a general purpose oil-resistant polymer known as nitrile rubber. Nitrile is a copolymer of butadiene and acrylonitrile and has a moderate temperature range of 20°F to 180°F. Nitrile has good solvent, oil, water, and hydraulic fluid resistance. It displays good compression set, abrasion resistance and tensile strength. **Nitrile should not be used in highly polar solvents such as acetone and methyl ethyl ketone, nor should it be used in chlorinated hydrocarbons, ozone or nitro hydrocarbons.**

FLUOROCARBON (FKM) — Fluorocarbon elastomers are inherently compatible with a broad spectrum of chemicals. Because of this extensive chemical compatibility, which spans considerable concentration and temperature ranges, fluorocarbon elastomers have gained wide acceptance as a material of construction for butterfly valve o-rings and seats. Fluorocarbon elastomers can be used in most applications involving mineral acids, salt solutions, chlorinated hydrocarbons, and petroleum oils. They are particularly good in hydrocarbon service. Fluorocarbon elastomers have one of the broadest temperature ranges of any of the elastomers, -20°F to 300°F; **however, they are not suited for steam service.**

PTFE — Polytetrafluoroethylene has outstanding resistance to chemical attack by most chemicals and solvents. PTFE has a temperature rating of -20°F to 400°F in valve applications. PTFE, a self-lubricating compound, is used as a seat material in ball valves.

GRAPHITE — Graphite is the packing and seal material of choice for most fire-rated products, primarily because of its high temperature rating of approximately 2000°F. Graphite has excellent chemical resistance, can retain compressibility at all temperatures and has a low coefficient of friction. **Graphite is not recommended for use in strong oxidizing atmospheres.**

METALS USED IN VALVES & FITTINGS

COPPER — Among the most important properties of wrot copper materials are their thermal and electrical conductivity, corrosion resistance, wear resistance, and ductility. Wrot copper performs well in high temperature applications and is easily joined by soldering or brazing. Wrot copper is exclusively used for fittings.

BRONZE — One of the first alloys developed in the bronze age is generally accepted as the industry standard for pressure-rated bronze valves and fittings. Bronze has a higher strength than pure copper, is easily cast, has improved machinability, and is very easily joined by soldering or brazing. Bronze is very resistant to pitting corrosion, with general resistance to most chemicals less than that of pure copper.

SILICONE BRONZE — Silicone bronze has the ductility of copper but much more strength. The corrosion resistance of silicon bronze is equal to or greater than that of copper. Commonly used as stem material in pressure-rated valves, silicon bronze has greater resistance to stress corrosion cracking than common brasses.

ALUMINUM BRONZE — The most widely accepted disc material used in butterfly valves, aluminum bronze is heat treatable and has the strength of steel. Formation of an aluminum oxide layer on exposed surfaces makes this metal very corrosion resistant. **Not recommended for high pH wet systems.**

BRASS — Generally, brass has good corrosion resistance. **Susceptible to de-zincification in specific applications**; excellent machinability. Primary uses for wrot brass are for ball valve stems and balls, and iron valve stems. A forging grade of brass is used in ball valve bodies and end pieces.

GRAY IRON — An alloy of iron, carbon and silicon, gray iron is easily cast, and has good pressure tightness in the as-cast condition. Gray iron has excellent dampening properties and is easily machined. It is standard material for bodies and bonnets of Class 125 and 250 iron body valves. Gray iron has corrosion resistance that is better than steel in certain environments.

DUCTILE IRON — Ductile iron has composition similar to gray iron. Special treatment modifies metallurgical structure, which yields higher mechanical properties; some grades are heat-treated to improve ductility. Ductile iron has the strength properties of steel using similar casting techniques to that of gray iron.

CARBON STEEL — Carbon steel has very good mechanical properties and is resistant to stress corrosion and sulfides. Carbon steel has high and low temperature strength, is very tough and has excellent fatigue strength. Mainly used in gate, globe, and check valves for applications up to 850°F, and in one-, two-, and three-piece ball valves.

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Material Definitions and Standards

3% NICKEL IRON — 3% Nickel iron has improved corrosion resistance over gray and ductile iron. Higher temperature corrosion resistance and mechanical properties. Very resistant to oxidizing atmospheres.

NICKEL-PLATED DUCTILE IRON — Nickel coatings have received wide acceptance for use in chemical processing. These coatings have very high tensile strength, 50 to 225 ksi. To some extent, the hardness of a material is indicative of its resistance to abrasion and wear characteristics. Nickel plating is widely specified as a disc coating for butterfly valves.

400 SERIES STAINLESS STEEL — An alloy of iron, carbon, and chromium, 400 series stainless steel is normally magnetic due to its martensitic structure and iron content. It is resistant to high temperature oxidation and has improved physical and mechanical properties over carbon steel. Most 400 series stainless steels are heat-treatable. The most common applications in valves are for stem material in butterfly valves and backseat bushings and wedges in cast steel valves.

316 STAINLESS STEEL — An alloy of iron, carbon, nickel, and chromium, 316 stainless steel is nonmagnetic with more ductility than 400SS. Austinetic in structure, 316 stainless steel has very good corrosion resistance to a wide range of environments, is not susceptible to stress corrosion cracking and is not affected by heat treatment. Most common uses in valves are stem, body and ball materials.

630 STAINLESS STEEL — 630 stainless steel is a martensitic precipitation/age hardening stainless steel, offering high strength and hardness. 630 SS withstands corrosive attack better than any of the 400 series stainless steels, and in most conditions its corrosion resistance closely approaches that of 300 series stainless steel. 630 SS is primarily used as a stem material for butterfly and ball valves.

MATERIAL DESIGNATIONS & ASTM STANDARDS FOR LISTED VALVE METALS

Copper	ASTM B75 Wrot & ASTM B88
Bronze	ASTM B61 Cast ASTM B62 Cast ASTM B584, Alloy 844
Silicon Bronze	ASTM B98 Alloy B ASTM B371 Wrot
Aluminum Bronze	ASTM B148 Cast ASTM B150 Rod
Brass	ASTM B16 Wrot ASTM B124 Forged
Gray Iron	ASTM A126 Class B
Ductile Iron	ASTM A395 Heat Treated ASTM A536 As Cast
Carbon Steel	ASTM A216-Grade WCB Cast ASTM A105 Forged ASTM A352-Grade LCB Cast
3% Ni-Iron	ASTM A126-Class B Modified
Ni-Plated Ductile Iron	ASTM B320 Plating
400 Series Stainless Steel	ASTM B582 Type 416 Wrot ASTM A217-Grade CA-15 ASTM A276 Type 410 Wrot
316 Stainless Steel	ASTM A276 Type 316 ASTM A351-Grade CF-8M
630 Stainless Steel	ASTM A564 Type 630

Chemical Resistance Guide for Valves and Fittings

CHEMICALS AND FORMULA	CONCENTRATION	PLASTICS MAX TEMPERATURE (°F)							SEAL MATERIALS MAX TEMPERATURE (°F)						METALS												
		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Acetaldehyde CH_3CHO	Conc.		C	140	C		C		350	B to 200	C	C	C	A	C	C	C	C	B	B	A		B	B	A		C
Acetamide CH_3CONH_2									200	B to 200	B to 180	B to 200	C		A		A		A	A			A	A	A	A	
Acetic Acid CH_3COOH	25%	C	180	180	140		140	B to 73	350	176	C	70	C	A	C	C	C	C	C	C	C	C	C	C	A	A	A	C
Acetic Acid CH_3COOH	50%					B to 140	B to 176		350	140	C	C	C	A	C	C	C	C	C	C	C	C	C	A	A	A	C
Acetic Acid CH_3COOH	85%	C	C	120	73		73		350	70	C	C	C	A	C	C	C	C	C	C	C	C	C	A	A	A	C
Acetic Acid CH_3COOH	Glacial	C	C	120	73	B to 104	B to 68		350					A	C	C	C	C	C	C	C	C	C	C	A	B	C
Acetic Anhydride $(CH_3CO)_2O$		C	C	73	C	C	73		350	C	C	B to 70	C	A	C	C	C	C	C	C	C	C	C	C	B	B	C
Acetone CH_3COCH_3		C	C	B	C	B	C	C	350	B to 300	C	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Acetophenone $C_6H_5COCH_3$									350	B to 176	C	C	C		C	C	C	C	C	C	C	C	C	C	C		C
Acetyl Chloride CH_3COCl		C	C		C	C			200	C	C	C	B		A	A	A	A	C	C	A		C		A	A	A
Acetylene	Gas, 100%	73	C	73	C		73		250	B to 250	200	104	200		C	C	C	C	A	A	A	A	A		A	A	C
Acrylonitrile $H_2C=CHCN$			C		C		140		350	104	C	C	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Adipic Acid $COOH(CH_2)_4COOH$	Sat'd.		180	140	140	B to 176	140		350	140	B to 220	B to 160	176						C	C	B		C		B to 200		A
Allyl Alcohol $CH_2=CHCH_2OH$	96%		C	140	B to 73		C		250	B to 300	B to 180	B to 120	B to 70		A	A	A	A	A	A	A	A	A	A	A	A	
Allyl Chloride $CH_2=CHCH_2Cl$			C		C	140	C		350	C	B to 70	C	C								C						
Aluminum Acetate $Al(C_2H_4O_2)_3$	Sat'd.								350	176	C	C	C		C		C			C					A		
Aluminum Ammonium Sulfate (Alum) $AlNH_4(SO_4)_212H_2O$	Sat'd.		180	140	140		140		250	B to 200	B to 140	C	190	A	B	B	B	B			C			B	A		B
Aluminum Chloride (Aqueous) $AlCl_3$	Sat'd.	160	180	180	140	B to 212	140		250	176	B to 200	B to 200	176	A	C	C	C	C	C	C	C	C	C	C	A	C	C
Aluminum Fluoride AlF_3	Sat'd.	160	180	180	73	B to 212	140		250	B to 300	B to 200	B to 200	176	A	C	C	C	C	C	C	C		C	C	B	C	C
Aluminum Hydroxide $Al(OH)_3$	Sat'd.	160	180	180	140	B to 212	140		250	176	160	B to 180	176		C	C	C	C	B	B	C		B	B	A	A	C

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CHEMICALS AND FORMULA	CONCENTRATION	PLASTICS MAX TEMPERATURE (°F)							SEAL MATERIALS MAX TEMPERATURE (°F)						METALS												
		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Aluminum Nitrate $Al(NO_3)_3 \bullet {}_9H_2O$	Sat'd.		180	180	140	B to 212	140		250	176	140	B to 200	B to 400	A	C	C	C	C	C	C	C	C	C		A	A	C
Aluminum Potassium Sulfate (Alum) $AlK(SO_4)_2 \bullet {}_{12}H_2O$	Sat'd.	160	180	140	140	B to 212	140		400	B to 200	B to 200	B to 200	248	A	B	B	B	B			C			B	A		B
Aluminum Sulfate (Alum) $Al_2(SO_4)_3$	Sat'd.	160	180	140	140	B to 212	140		250	B to 300	B to 300	B to 200	B to 390	A	C	C	C	C	C	C	C		C	C		B	
Ammonia Gas NH_3	100%	C	C	140	140		140		400	140	B to 140	140	C	A	B			C	A		A				A	A	B
Ammonia Liquid NH_3	100%	160	C	140	C		140		400	212	70	B to 160	C	A	C	C	C	C			A			A	A	A	C
Ammonium Acetate CH_3COONH_4	Sat'd.	120	180	73	140	B to 212	140		400	140	140	140			C	C	C	C							B		
Ammonium Bifluoride NH_4HF_2	Sat'd.		180	180	140		140		400	140	B to 140	C	140	A	C			C	C	C	C	C	C	C	B	B	B
Ammonium Carbonate $(NH_4)_2CO_3$	Sat'd.		180	212	140	B to 248	140		400	176	B to 200	B to 200	212		C			C			A to 140	C		B	B	B	B
Ammonium Chloride NH_4Cl	Sat'd.	120	180	212	140	B to 212	140		400	300	B to 200	B to 212	250	A	C			C	C	C	C	C	C	C	B	C	
Ammonium Fluoride NH_4F	10%	120	180	212	140	B to 212	140		400	300	B to 200	B to 100	140	A	C			C			C				C		C
Ammonium Fluoride NH_4F	25%	120	180	212	C		140		400	300	B to 120	B to 100	140	A	C			C			C				C		C
Ammonium Hydroxide NH_4OH	10%	120	C	212	140		140		400	B to 300	200	200	B to 190	A	C	C		C			C			B	A	A	C
Ammonia Hydroxide NH_4OH	Sat'd.								400	B to 300	C	200	B to 190	A	C	C					C			B to 70	A to 140		C
Ammonium Nitrate NH_4NO_3	Sat'd.	120	180	212	140	B to 212	140		400	B to 300	200	200	176	A	C	C		C								A	C
Ammonium Persulphate $(NH_4)_2S_2O_8$			180	140	140	B to 212	140		200	B to 70	C	70	B to 140		C	C	C	C	C	C	C	C	C	B	A		C
Ammonium Phosphate (Monobasic) $NH_4H_2PO_4$	All	120	180	212	140	B to 248	140		400	B to 200	200	B to 200	B to 180	A	C	C	C	C	B	B	C		B	A	A	A	C
Ammonium Sulfate $(NH_4)_2SO_4$		120	180	212	140	B to 212	140		400	300	200	200	176	A	C	C	C	C	B	B	C	B	B	B	B	B	C
Ammonium Sulfide $(NH_4)_2S$	Dilute	120	180	212	140		140		350	B to 300	B to 180	B to 160	B to 70		C	C	C	C	C	C	C		C		B		C
Ammonium Thiocyanate NH_4SCN	50 - 60%	120	180	212	140	B to 212	73			B to 300	B to 180	B to 200	B to 190		C	C	C	C	C	C	C		C		A	A	C
Amyl Acetate $CH_3COOC_5H_{11}$		C	C	C	C	B to 122	73		100	210	C	C	C		B	B	B	B	B	B	B	A	B	A	A	A	
Amyl Alcohol $C_5H_{11}OH$			C		C	B to 212	B to 140		400	B to 300	B to 180	B to 200	B to 212	A	A	A	A	A	B	B	B		B	A	A	A	A

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
n-Amyl Chloride $CH_3(CH_2)_3CH_2Cl$		C	C	C	C		C		400	C	C	C	200		A	A	A	A	A	A	A	A	A	A	A	A	
Aniline $C_6H_5NH_2$		C	C		C	B to 68	C		200	B to 140	C	C	B to 70	A	C	C	C	C	B	B	C	B	B	A	A	A	C
Aniline Hydrocloride $C_6H_5NH_2 \bullet HCl$	Sat'd.		C		C		140							C	C	C	C	C	C	C	C	C	C	C	C	C	
Anthraquinone $C_{14}H_8O_2$			180		140		C						C						C	C	C						
Anthraquinone Sulfonic Acid $C_{14}H_7O_2 \bullet SO_3 \bullet H_2O$			180	73	140		C																				
Antimony Trichloride $SbCl_3$	Sat'd.		180	140	140	B to 140	140			C	70	B to 70	70	A	C	C	C	C	C	C	C	C	C	C	C	C	
Aqua Regia (Nitrohydrochloric Acid)		C	B to 73	C	C	C	C		200	C	C	C	B to 190	C	C	C	C	C	C	C	C	C	C		B		
Argon Ar	Dry								350	B to 400	250	B to 100	B to 500		A		A		A		A				A	A	A
Arsenic Acid H_3AsO_4	80%		180	140	140	B to 248	140		400	B to 176	B to 200	B to 180	140	A	C	C	C	C	C	C	C		C	B	A	B	
Asphalt			C	73	C		73		350	C	C	C	212		A	A	A	A	A	A	A	A	A	A	A	A	A
Barium Carbonate $BaCO_3$	Sat'd.	120	180	140	140	B to 248	140		400	B to 300	140	B to 160	248		A	A	A	A	B	B	B	B	B	A	A	A	
Barium Chloride $BaCl_2 \bullet {}_2H_2O$	Sat'd.	120	180	140	140	B to 212	140		400	B to 300	B to 200	B to 160	B to 400	A	A	A	A	A	B	B	C	B	B	B	A		A
Barium Hydroxide $Ba(OH)_2$	Sat'd.	73	180	140	140				400	B to 300	B to 220	B to 200	248		C	C	C	C	B	B	C		B	A	A	A	
Barium Nitrate $Ba(NO_3)_2$	Sat'd.	73	180	140	73		140		250	176	140	B to 200	248	A	C	C	C	C	A	A	A		A		A		
Barium Sulfate $BaSO_4$	Sat'd.	73	180	140	140	B to 212	140		400	B to 300	B to 200	B to 200	B to 380	A	B	B	B	B	B	B	A		B	A	A	A	
Barium Sulfide BaS	Sat'd.	73	180	140	140				400	B to 310	B to 200	B to 200	B to 400		C	C	C	C	B	B	C		B	A	A	A	C
Beer		120	180	180	140	B to 248	B to 140		300	120	B to 250	B to 140	B to 300		A	A	A	A	C	C	C		C	A	A	A	A
Beet Sugar Liquors			180	180	140		73			B to 300	200	B to 180	B to 400				A		B	B	B				A	A	
Benzaldehyde C_6H_5CHO	10%	C	B to 73	73	B to 73		73			200	C	C	C	A	A	A	A	A	C	C	B		C	A	A	A	A
Benzene C_6H_6		C	C	C	C	C	B to 68	C	250	C	C	C	B to 140	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Benzene Sulfonic Acid $C_6H_5SO_3H$	10%		180	180	140		B to 73			C	C	B to 100	200		B	B	B	B	C	C	C		C	B	B	B	
Benzoic Acid C_6H_5COOH		160	180	73	140				350	C	C	B to 150	176		C	C	C	C	C	C		C	A	A	A	A	

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CHEMICALS AND FORMULA	CONCENTRATION	PLASTICS MAX TEMPERATURE (°F)							SEAL MATERIALS MAX TEMPERATURE (°F)						METALS												
		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Benzyl Alcohol $C_6H_5CH_2OH$			C	120	C	B to 122	140		400	C	C	B to 70	B to 250		A	A	A	A	B	B	B		B	A	A	A	A
Bismuth Carbonate $(BiO)_2CO_3$			180	180	140		140			70	70	70	B to 200														
Black Liquor	Sat'd.		180	140	140		120		225	220	140	70	212		C	C	C	C	B	B	B		B	B	A	B	
Bleach (Sodium Hypochlorite)	12% Cl	73	185	120	140		73																				
Blood									200	70	C	70	70		B		B		C	C			B		A	A	
Borax $Na_3B_4O_7 \bullet {}_{10}H_2O$	Sat'd.	160	180	212	140		140			300	B to 200	B to 200	200		A	A	A	A	A	A	B	A	A	A	A	A	
Boric Acid H_3BO_3	Sat'd.	160	180	212	140	B to 212	140			B to 300	B to 200	B to 200	185	A	B	B	B	B	C	C	B		C	B	A	B	
Brine	Sat'd.		180	140	140		140		400	B	B	B	B		A	A	A		C	C	C	B	C	B	A	B	
Bromic Acid $HBrO_3$			180	C	140	B to 212	C			200	C	C	200		C	C	C	C									C
Bromine Br_2	Liquid	73	C	C	C	B to 248	C		300	C	C	C	B to 350	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Bromine Br_2	Gas, 25%		180	C	140		C		200	C	C	C	B to 180	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Bromine Water	Sat'd.		180	C	140	B to 176	C		300	C	C	C	B to 210	C	C	C	C	C	C	C	C		C				C
Butadiene $H_2C=CHHC=CH_2$	50%		180	C	140		73		C	C	C	C	70		A	A	A	A	A	A	A	A	A	A	A	A	A
Butane C_4H_{10}	50%		180	140	140		140	73	350	C	B to 250	B to 200	B to 400		A	A	A	A	A	A	A	A	A	A	A	A	A
Butyl Acetate $CH_3COOCH_2CH_2CH_2CH_3$		C	C	C	C	C	C		175	C	C	C	C		B	B	B	B	B	B	B		B	A	A	A	
Butyl Alcohol $CH_3(CH_2)_2CH_2OH$			C	180	140		140		300	B to 250	B to 190	140	B to 390	A	B	B	B			B			A	A	A	A	B
Butyl Cellosolve			C		73				200	B to 300	C	C	C	A	A	A	A	A	A	A			A	A	A	A	
n-Butyl Chloride C_4H_9Cl		C	C						400	C	C	C	70		B	B	B	B	B	B	B		B	B	B	B	
Butylene © $CH_3CH=CHCH_3$	Liquid			C	140		120		400	C	250	C	B to 400		A	A	A	A			A			A	A	A	
Butyl Phthalate $C_{16}H_{22}O_4$			C	180		B to 140				250	C	C	C														
Butyl Stearate					73				250	C	C	C	B to 400		A	A	A	A	B	B			B	A	A	A	
Butyric Acid $CH_3CH_2CH_2COOH$		C	C	180	73		73		300	C	C	C	C		A	A	A	A	C	C	C	C	C	B	A	A	
Calcium Bisulfide $Ca(HS)_2 \bullet {}_6H_2O$			73		C		140		200	200	B to 140	140	140												A		

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Calcium Bisulfite $Ca(HSO_3)_2$			180	180	140		C		350	C	B to 200	B to 200	B to 400		C	C	C	C	C	C	C		C	B	A		
Calcium Carbonate $CaCO_3$			180	180	140	B to 248	140		350	B to 210	B	140	248		C	C	C	C	B	B	B		B	A	A	A	A
Calcium Chlorate $Ca(ClO_3)_2 \bullet {}_2H_2O$			180	180	140	B to 248	140		350	B to 200	B to 200	B to 200	B to 190	140	B	B	B	B	B	B	B	B	B	B	A		C
Calcium Chloride $CaCl_2$		120	180	180	140	B to 248	B to 176		350	B to 212	B to 200	B to 200	300	A	B	B	B	B	A	A	C		C	B	A	B	B
Calcium Hydroxide $Ca(OH)_2$		160	180	180	140		140		250	210	B to 200	B to 220	212		C	C	C	C	C	C	C		C	A	A	A	C
Calcium Hypochlorite $Ca(OCl)_2$	30%	160	180	140	140		140		200	B to 310	C	C	B to 400	90	C	C	C	C	C	C	C		C	B	B	B	C
Calcium Nitrate $Ca(NO_3)_2$			180	180	140		140		200	B to 300	B to 200	B to 200	B to 390	C	B	B	B	B	B	B			B		A		B
Calcium Oxide CaO			180		140		140			B	B to 200	B to 200	140						A	A	B				A	A	
Calcium Sulfate $CaSO_4$		100	180	180	140	B to 212	140		200	B to 300	B to 176	B to 70	B to 212	A	A	B	B	B	A	A	B	A	A	A	A	A	A
Camphor $C_{10}H_{16}O$		C		73	73		73		350	C	100	C	70		B	B	B	B	B	B	B		B	A	A	A	
Cane Sugar $C_{12}H_{22}O_{11}$			180	180	140		140		400						A	A	A	A	A	A	A	A	A	A	A	A	
Caprylic Acid $CH_3(CH_2)COOH$									350		C		B to 140						A	A	B		A		A		
Carbitol			C		73				200	B to 80	B to 80	C	C		B	B	B	B	B	B	B		B		B		
Carbon Dioxide CO_2	Dry, 100%	160	180	140	140	B to 212	140		400	B to 250	200	B to 200	212	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Carbon Dioxide CO_2	Wet	160	180	140	140		140		400	B to 250	140	C	212	A	A	A	A	A	B	B	B	B	B	A	A	A	A
Carbon Disulfide CS_2		C	C	C	C		B to 68		200	C	C	C	B to 400	A	B	B	B	B	A	A	A		A	A	A		C
Carbon Monoxide CO	Gas		180	180	140	B to 140	140		400	B to 300	160	140	B to 400	A	A	A	A	A	A	A	B		A	A	A	A	
Carbon Tetrachloride CCl_4		C	C	C	73	C	C	B to 73	350	C	C	C	B to 350	A	A	A	A	A	C	C	A		C	A	A	A	B
Carbonic Acid H_2CO_3	Sat'd.	185	180	140	140		140		350	B to 300	70	200	B to 400	A	C	C	C	C	B	B	B	B	B	A	A	A	
Castor Oil			C	140	140		73		350		212	200	B to 400	550	A	A	A	A	A	A	A	A	A	A	A	A	A
Caustic Potash (Potassium Hydroxide) KOH	50%	160	180	180	140		140			200	B to 150	B to 70	B to 140														

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Caustic Soda (Sodium Hydroxide) NaOH	40%	160	180	180	140		140			B to 200	212	B to 200	80														
Cellosolve			C	73	73		C		200		C		C	A	A	A	A	A	A	A	A		A		A		
Cellosolve Acetate $CH_3COOCH_2CH_2OC_2H_5$			C	73	73				300	C	C	C	C		B		B			B					B		
Chloral Hydrate $CCl_3CH(OH)_2$			180	C	140		120			B to 70	C	70	C														
Chloramine NH_2Cl	Dilute		C	73	73		73			70		B to 80	70		B	B	B	B	C	C	C				B		
Chloric Acid $HClO_3 \bullet {}_7H_2O$	10%		180	73	140		73		140	212	C	B to 120	B to 120		C	C	C	C	C	C	C	C	C	C	B	C	
Chloric Acid $HClO_3 \bullet {}_7H_2O$	20%		185	73	140		73		140	212	C	70	C		C	C	C	C	C	C	C	C	C	C	C	C	
Chlorine Gas (Moisture Content < 150 ppm)									400	C	C	C	B	A	C	C	C	C	B	A*	A*	B	B	B	A		C
Chlorine Gas (Moisture Content > 150 ppm)		C	C	C	C		C		400	C	C	C	C		C	C	C	C	C	C	C	C	C	C	C	C	C
Chlorine	Liquid	C	C	C	C		C			C	C	C	B		B	B		B	C	C	C		C	C	C	C	
Chlorinated Water (< 3500 ppm)									400					73	B	B	C	C			C		C	B	A	A	C
Chlorinated Water (> 3500 ppm)									400					73	C	C	C	C			C			C	A	B	C
Chloroacetic Acid $CH_2ClCOOH$	50%	C	180	C	140		120		200	B to 175	C	C	C		C	C	C	C	C	C	C		C	C	C	C	C
Chlorobenzene C_6H_5Cl	Dry	C	C	73	C		C	C	200	C	C	C	B to 400	A	A	A	A	A	C	C	B		C	A	A	A	
Chloroform $CHCl_3$	Dry	C	C	C	C		C	C	200	C	C	C	B to 400	A	A	A	A	A	C	C	C		C	A	A	A	
Chlorosulfonic Acid $ClSO_2OH$			73	C	73		C		200	C	C	C	C		C	C	C	C	B	B	C	C	B	C	C	C	C
Chromic Acid H_2CrO_4	10%	73	180	140	140	B to 212	73		350	70	C	C	B to 400	C	C	C	C	C	C	C	C	C	C	B to 212	A to 70		C
Chromic Acid H_2CrO_4	30%	C	180	73	140	B to 212	73		350	70	C	C	B to 400	C	C	C	C	C	C	C	C	C	C	B to 212	B to 70		C
Chromic Acid H_2CrO_4	50%	C	C	73	C	B to 212	73		200	C	C	C	B to 400	C	C	C	C	C	C	C	C	C		C	B to 70		C
Citric Acid $C_6H_8O_7$	Sat'd.	160	180	140	140	B to 248	140		200					A	C	C	C	C	C	C	C		C	B	A	A	C
Coconut Oil			C	73	140	B to 248	73		400	C	250	C	B to 390		B	B	B	B	C	C	B		C	B	A		
Coffee			180	140	140		140			B to 140	140	140	B to 200		A	A	A	A	C	C	C			A	A	A	A
Coke Oven Gas				73	140		140		400	C	C	C	B to 390		B	B	B	B	A	A	A	A	A	A	A	A	

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Copper Acetate $Cu(C_2H_3O_2)_2 \bullet H_2O$	Sat'd.		73	73	73				350	B to 300	C	C	C		C	C	C	C	C	C	C		C	B	A		
Copper Carbonate $CuCO_3$	Sat'd.		180		140		140		350	B to 210	C	70	B to 190											B	A		
Copper Chloride $CuCl_2$	Sat'd.	73	180	140	140		140		350	B to 212	176	B to 210	B to 400	A	C	C	C	C	C	C	C	C	C	B	A		C
Copper Cyanide CuCN			180		140	B to 212	140		350	B to 300			B to 390		C	C	C	C	C	C	C	A	C	B	A		C
Copper Fluoride $CuF_2 \bullet {}_2H_2O$	2%		180	73	140		140			B to 250	80	140	B to 190	A													
Copper Nitrate $Cu(NO_3)_2 \bullet {}_3H_2O$	30%		180	140	140					B to 210	B to 230	B to 200	212	A	C	C	C	C	C	C	C		C	B	A		C
Copper Sulfate $CuSO_4 \bullet {}_5H_2O$	Sat'd.	120	180	120	140	B to 212	140			B to 300	B to 212	200	B to 212	A	C	C	C	C	C	C	C		C	A	A	A	C
Corn Oil			C	73	140		120		400	C	250	C	B to 400		B	B	B	B	B	B	B	B	B	A	A	A	A
Corn Syrup			185	140	140		140			200	200	C	212														
Cottonseed Oil		120	C	140	140		B to 140		400	B to 70	200	C	B to 400		B	B	B	B	B	B	B		B	A	A	A	
Creosote			C	73	C		140		350	C	B to 220	C	B to 400		B	B	B	B	A	A	A	A	A	A	A	A	B
Cresol $CH_3C_6H_4OH$	90%	C	C	B to 73	C	B to 68	73		200		C	C	B												B		
Cresylic Acid	50%		180		140		C		200	C	C	C	140		A	A	A	A	A	A	B	A	A	A	A	A	A
Crude Oil			C	140	140	B to 212	C		400	C	B to 250	C	B to 300		C	C	C	C	C	C	B			A	A	A	C
Cuprlc Sulfate $CuSO_4 \bullet {}_5H_2O$	Sat'd.	100	180	73	140				250					A													
Cuprous Chloride CuCl	Sat'd.	70	180		140		140		350					A	C			C									C
Cyclohexane C_6H_{12}		73	C	C	C	B to 248	C		300	C	250	C	B to 400		A	A	A	A	B	B	A		B	A	A	A	
Cyclohexanol $C_6H_{11}OH$		C	C	140	C	B to 104	73		250	C	B to 70	B to 70	B to 400						A	A			A	A	A	A	
Cyclohexanone $C_6H_{10}O$	Liquid	C	C	73	C	C	C	C	200	C	C	C	C		B	B	B	B	B	B	B		B	B	A		
Detergents (Heavy Duty)			C	180	140		B to 140								A	A	A	A	A	A	A	A	A	A	A	A	A
Dextrin (Starch Gum)	Sat'd.		180	140	140		140		200	176	B to 180	B to 200	212		A	A	A	A	B	B	B				A		A
Dextrose $C_6H_{12}O_6$			180	140	140		140		400	200	200	200	B to 400		A	A			A						A		
Diacetone Alcohol $CH_3COCH_2C(CH_3)_2OH$			C	120	C				350	B to 300	C	C	C		A	A	A	A	A	A	A	A	A	A	A	A	A

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Dibutoxyethyl Phthalate $C_{20}H_{30}O_6$			C		C										A	A	A	A	A	A	A		A		A		
Dibutyl Phthalate $C_6H_4(COOC_4H_9)_2$		C	C	73	C		73		350	B to 250	C	C	C		A	A	A	A	A	A	A				A		
Dibutyl Sebacate $C_4H_9OCO(CH_2)_8OCOC_4H_9$				73	73		73		350	C	C	C	C														
Dichlorobenzene $C_6H_4Cl_2$		C	C	C	C		C			C	C	C	B						A	A			A		A		
Dichloroethylene $C_2H_4Cl_2$			C	C	C		C		350	C	C	C	200				B			B					B		
Diesel Fuels			C	140	140	B to 212	73		350	C	B	C	C		A	A	A	A	A	A	A	A	A	A	A	A	A
Diethylamine $C_4H_{10}NH$		C	C		C	C	C		200	70	C	70	C	A	C	C	C	C	A	A	C			A	A	A	C
Diethyl Cellosolve $C_6H_{14}O_2$																			A	A			A		A		
Diethyl Ether $C_4H_{10}O$		C	C	73	73		C	B to 73		C	C	C	C	A													
Diglycolic Acid $O(CH_2COOH)_2$	Sat'd.		180	140	140		140		250	B to 300	200	B to 200	C														
Dimethylamine $(CH_3)_2NH$				73	140	C	73			B to 140	C	C	C						C						A		
Dimethyl Formamide $HCON(CH_3)_2$		C	C	180	C		120	C	250	B to 122	C	C	C		B	B	B	B	B	B	B				A		
Dioctyl Phthalate $C_6H_4(COOC_8H_{17})_2$		C	C	C	C		73		200	C	C	C	C		A	A	A	A	C	C	C						
Dioxane $C_4H_8O_2$			C	C	C		140			B to 160	C	C	C	A	A	A	A	A	A	A	A					A	
Diphenyl Oxide $(C_6H_5)_2O$	Sat'd.						73			C	C	C	B to 310		A	A	A	A	A								
Disodium Phosphate Na_2HPO_4			180	140	140		140		400	B to 210	70	80	90	A	B	B	B	B	B	B					A		
Dow Therm A $C_{12}H_{10}•C_{12}H_{10}O$					C				212	C	C	C	B to 350	A	A	A	A	A	B	A	A		A	A	A	A	
Ether ROR		C	C	C	C		73			C	C	C	C		A	A	A		B	B	B	A	A	A	A	A	A
Ethyl Acetate $CH_3COOCH_2CH_3$		C	C	C	C		73	C	200	B to 158	C	C	C		A	A	B		A	A	A			A	A	A	
Ethyl Acrylate $CH_2=CHCOOC_2H_5$			C		C				350	C	C	C	C		A	A			A	A	A		A	A	A	A	
Ethyl Alcohol (Ethanol) C_2H_5OH			C	140	140		140	73	300	200	B to 200	158	C	A	A	A	A	A	A	A	A	A	A	A	A	A	
Ethyl Benzene $C_6H_5C_2H_5$				C	C				350	C	C	C	70		B	B			B	B	B		B		A		
Ethyl Chloride C_2H_5Cl	Dry		C	C	C		C		350	140	200	C	B to 400	A	A	A	B		A	A	A	A	A	A	A	A	

CHEMICALS AND FORMULA	CONCENTRATION	PLASTICS MAX TEMPERATURE (°F)							SEAL MATERIALS MAX TEMPERATURE (°F)						METALS												
		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Ethylene Bromide $BrCH_2CH_2Br$	Dry		C		C				350						A					A	A				A		
Ethylene Chloride (Vinyl Chloride) CH_2CHCl	Dry	C	C	C	C		C		350	C	C	C	200												A		
Ethylene Chlorohydrin $ClCH_2CH_2OH$			C	73	C				200	C	C	C	70	A								A					
Ethylene Diamine $NH_2CH_2CH_2NH_2$		C		73	C		140			B to 300	80	B to 90	C		A	C		A	A	B				A		A	A
Ethylene Dichloride $C_2H_4Cl_2$	Dry	C	C	C	C		C		350	C	C	C	B to 400	A	A	A			A	A	A		A		A	A	
Ethylene Glycol $OHCH_2CH_2OH$		73	C	212	140	B to 212		B to 220	400	250	250	250	B to 250	A	A	A	A	A	A	A	A		A	A	A	A	A
Ethylene Oxide CH_2CH_2O			C	C	C		73		400	C	C	C	C		A	A			B	A	A		A		A		
Ethyl Formate										C	C	C	B to 400		A	A			A	A			A		A		
Fatty Acids R-COOH		160	73	120	140		120		400	C	B to 250	C	250	A	C	C	C	C	C	C	C		C		A		
Ferric Chloride (Aqueous) $FeCl_3$	Sat'd.	120	180	140	140	B to 212	140		400	B to 300	B to 200	160	176	A	C	C	C	C	C	C	C	C		C	C	C	C
Ferric Hydroxide $Fe(OH)_3$	Sat'd.	160	180	140	140		140		400	B to 210	B to 176	B to 200	B to 200						C	C			C		A		C
Ferric Nitrate $Fe(NO_3)_3 \bullet {}_9H_2O$	Sat'd.	160	180	140	140	B to 212	140		400	B to 300	B to 176	B to 200	B to 400	A	C	C	C	C	C	C	C		C	B	A	A	C
Ferric Sulfate $Fe_2(SO_4)_3$		160	180	140	140	B to 212	140		200	B to 280	B to 200	B to 200	176	A	C	C	C	C	C	C	C		C	B	A	A	C
Ferrous Chloride $FeCl_2$	Sat'd.	160	180	140	140	B to 212	140		400	210	B to 200	200	185	A	C	C	C	C	C	C	C	C	C	C	C	C	C
Ferrous Hydroxide $Fe(OH)_2$	Sat'd.	160	180	140	140		140		400	B to 200	B to 176	B to 200	212						C						A		
Ferrous Nitrate $Fe(NO_3)_2$		160	180	140	140		140		400	B to 210	B to 200	B to 200	212	A											A	A	
Ferrous Sulfate $FeSO_4$		160	180	140	140	B to 212	140		400	B to 200	B to 200	B to 200	B to 200	A	C	C	B		C	C	C	C	C	A	A	A	B
Fish Oil			180	180	140		140		300	C	250	B to 70	B to 400		A	A	C		B	A	A		A	A	A	A	A
Flue Gas															A	A			A	A	A		A	A	A	A	
Fluoroboric Acid HBF_4		73	73	140	140		140		350	70	C	70	140		B	B			C	C			C		A		C
Fluorine Gas F_2	Dry, 100%		73	C	73		C		C		C		C	B to 300	B	B			C	C	A				A	A	
Fluorine Gas F_2	Wet	C	73	C	73		C		C		C		C	C	C	C			C	C	C				A	A	

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CHEMICALS AND FORMULA	CONCENTRATION	PLASTICS MAX TEMPERATURE (°F)							SEAL MATERIALS MAX TEMPERATURE (°F)						METALS												
		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Fluorosilicic Acid (Hydrofluosilicic Acid) H_2SiF_6	50%		73	73	140	B to 212			300	B to 300	160	158	185							C	C		C	B	B	B	C
Formaldehyde HCHO	Dilute	160	73	140	140	B to 176			300	212	140	150	C	A	A	A	B		C	C	B			A	A	A	
Formaldehyde HCHO	35%	160	C	140	140	B to 212	140	100	300	212	140	150	C	A	A	A	B		C		B			A	A	A	
Formaldehyde HCHO	50%		C		140		140		300	B to 140	C	B to 70	C	A	B	B	B		C		B			B	A	A	
Formic Acid HCOOH		C	C	140	73	B	140		300	210	C	B	B	A	C	C	B		C	C	C	B	C	A	A	A	
Freon $_{11}$ CCl_3F	100%	C	73	C	140		73		300	C	B to 250	C	C	A	A	A	A	A	B	B	B		B	A	A	A	A
Freon $_{12}$ CCl_2F_2	100%		73	73	140		73		C	B	B	B	C	A	A	A	A	A	B	B	B		B	A	A	A	A
Freon $_{21}$ $CHCl_2F$	100%			C	C		C		300	C	C	C	C	A	A	A	A	A	B	B	B		B	A	A	A	A
Freon $_{22}$ $CHClF_2$	100%		73	73	C		C		C	140	C	250	C	A	A	A	A	A	B	B	B		B	A	A	A	A
Freon $_{113}$ $C_2Cl_2F_3$	100%			C	140		73		300	C	B	B	C	A	A	A	A	A	B	B	B		B	A	A	A	A
Freon $_{114}$ $C_2Cl_2F_4$	100%			C	140		73		300	B	B	B	C	A	A	A	A	A	B	B	B		B	A	A	A	A
Fructose $C_6H_{12}O_6$	Sat'd.	73	180	180	140		140		300										A	A			A	A	A	A	
Furfural C_4H_3OCHO		C	C	C	C		C		300	B to 160	C	C	C		A	A	A	A	A	A	A		A	A	A	A	A
Gallic Acid $C_6H_2(OH)_3CO_2H \bullet H_2O$			73		140		73		300	C	C	C	B to 400		B	B	C		C	C	C		C	A	A	A	
Gasoline (Leaded)		C	C	C	B		73		200	C	190	C	250	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Gasoline (Unleaded)		C	C	C	B		73		200	C		C	190	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Gasohol		C	C	C	B		73		200					A	A	A	A	A	A	A	A	A	A	A	A	A	A
Gasoline (Sour)		C	C	C	B		C		200	C	250	C	B to 250	A	B	B			A	A	A		A	B	A	A	
Gelatin			180	180	140		140		300	200	200	200	212		C	C	B		C	C	C		C	C	C	A	
Glauber's Salt									200	B to 200	C	B to 200	B to 400		A	A		A	A	A			A	A	A	A	
Glucose $C_6H_{12}O_6 \bullet H_2O$		120	180	212	140		140		400	B to 212	200	200	B to 400		A	A	A	A	A	A	A	A	A	A	A	A	A
Glue				140	140		140		400	B	B	B	B		A	A	A	A	A	A	A	A	A	A	A	A	A
Glycerin $C_3H_5(OH)_3$		140	180	212	140		140	B to 320	400	B to 200	250	B to 180	250	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Glycol Amine															C	C	C		A	A	A		A		A		
Glycolic Acid $OHCH_2COOH$	Sat'd.		180	73	140		140		200	140	B	140	C		B	B			C	C	C		C		A		

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Glyoxal OCHCHO							140								B	B	B		C	C	C		C		A	A	
Grease										C	100	C	140		C	C	C	C	A	A	A		A		A	A	
Green Liquor		160	180		140					B to 300	B to 200	B to 160	B to 400		C	C	C		A	A		A	A		A	A	
Gypsum	Slurry								350						A	A	B	B	A	A	B	A	A	A	A	A	A
Heptane C_7H_{16}		73	180	C	140		73		300	C	250	B to 200	200		A	A	A		A	A	A	A	A	A	A	A	
n-Hexane C_6H_{14}		C	73	73	73				300	C	250	B to 140	B to 250		A	A	A		A	A	A	A	A	A	A	A	
Hexanol $CH_3(CH_2)_4CH_2OH$			180		140		140		300	C	140	C	212		A	A	A		A	A	A		A	A	A	A	
Hydraulic Oil (Petroleum)					73		73		300	C	250	C	70	A	A	A	B		A	A	A		A	A	A		
Hydrazine H_2NNH_2			C	73	C				250		C	C	C	A	C	C	C	C	C	C	C		C		A		
Hydrobromic Acid HBr	20%	73	73	140	140	B to 212	140		250	B to 300	C	C	200	A	C	C	C	C	C	C	C	C	C	C	C	C	C
Hydrobromic Acid HBr	50%	C		120		B to 140	140		250	200	C	C	200	A	C	C	C	C	C	C	C	C	C	C	C	C	C
Hydrochloric Acid HCl	10%	C	180	140	140	B to 212		73	250	176	B to 150	140	230	A	C	C	C	C	C	C	C	C	C	C	B	C	C
Hydrochloric Acid HCl	30%	C	180	140	140	B to 212			250	B to 130	B to 70	B to 100	160		C	C	C	C	C	C	C	C	C	C	B	C	C
Hydrocyanic Acid HCN	10%	160	180	73	140	B to 248	140		250	B to 300	B to 200	C	B to 400		C	C	C	C	C	C	C	C	C	C	A	B	C
Hydrofluoric Acid HF	Dilute	73	73	180	73	B to 212	140		300	212	B to 70	B to 185	212	A	C	C	C	C	C	C	C	C	C	C	C	C	C
Hydrofluoric Acid HF	30%	C	73	140	73		140		300	B to 140	C		212	A	C	C	C	C	C	C	C	C	C	C	C	C	C
Hydrofluoric Acid HF	50%	C	C	73	73	B to 212	120		300	B to 140	C	C	70	A	C	C	C	C	C	C	C	C	C	C	C	C	C
Hydrofluosilicic Acid	50%								300	140	B to 220	C	B to 400	C	B	B			C	C	C		C	B	B	B	C
Hydrogen H_2	Gas		73	140	140	B to 248	140		300	200	B to 220	200	210		A	A	A	A	A	A	A	A	A	A	A	A	A
Hydrogen Peroxide H_2O_2	50%		180	73	140	B to 212	140	B to 73	300	B to 100	C	C	70	A	C	C	C	C	C	C	B	C	C	A	A	A	C
Hydrogen Peroxide H_2O_2	90%		180	C	140		73		30	B to 70	C	C	C	C	C	C	C	C	C	C	B	C	C	A	A	A	C
Hydrogen Sulfide H_2S	Dry		180	150	140	B to 248	140			250	140	140	C	A	B				B		B				A	B	
Hydrogen Sulfide H_2S	Wet		180		140		140			130	C	70	C	A	C	C	C	C	C	C	C		C	C	A	C	C

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Hydrogen Sulfite H_2SO_3															C	C	C	C	C	C	C		C	C	A		C
Hypochlorous Acid HOCl	10%	73	180	73	140	B to 212	140		300	104	C	C	120														C
Inks				140			140		300	B	B	B	70		A	A	A		C	C	C		C		A		
Iodine I_2	10%	C	73	73	C	B to 176	C		200	B to 160	80	B to 80	190	B to 70	C	C	C	C	C	C	C		C	C	C	C	C
Iron Phosphate														A	C	C	C	C					B	A	A	A	C
Isobutane									140	C	250	C	250		A	A	A	A	A	A	A	A	A	A	A	A	A
Isobutyl Alcohol $(CH_3)_2CHCH_2OH$		C	C	73			140		300	B to 300	C	160	B to 400												A		
Isooctane $(CH_3)_3CCH_2CH(CH_3)_2$				C			73	73	300	C	250	C	250	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Isopropyl Acetate $CH_3COOCH(CH_3)_2$		C	C				73		200	B to 160	C	C	C	A	A				A	A	A		A	A	A	A	A
Isopropyl Alcohol $(CH_3)_2CHOH$			C	212	140	C	140	B to 130	300	160	70	B to 120	170	550	A	A	A	A	A	A	A	A	A	A	A	A	A
Isopropyl Ether $(CH_3)_2CHOCH(CH_3)_2$			C	C	C		73		140	C	C	C	C		A	A		A	A	A	A	A	A	A	A	A	
JP-3 Fuel									200	C	70	C	140		A	A	A	A	A	A	A	A	A	A	A	A	A
JP-4 Fuel			C	C	B		73		300	C	250	C	B to 400		A	A	A	A	A	A	A	A	A	A	A	A	A
JP-5 Fuel			C	C	B		73		300	C	250	C	B to 400		A	A	A	A	A	A	A	A	A	A	A	A	A
JP-6 Fuel									200	C	B to 120	C	70		A	A	A	A	A	A	A	A	A	A	A	A	A
Kelp Slurry															B	B	B	B	B	B	B		B	A	A	A	
Kerosene		73	B	C	B		C		250	C	250	C	B to 400	A	A	A	A	A	A	A	A	A	A		A	A	A	A
Ketchup					73				250	210	200	70	200		C	C	C		C	C	C		C	B	A	A	
Ketones		C	C	C	C		73		200	200	200	C	C	A	A	A	A		A	A	A		A	A	A	A	
Kraft Liquors		73	180		140		120		250						C	C	C	C	C	C	C		C		A		
Lactic Acid $CH_3CHOHCOOH$	25%	73	180	212	140		140		300	212	80	70	B to 400	A	C	C	C	C	C	B	C		B	A	A	A	
Lactic Acid $CH_3CHOHCOOH$	80%	C	C	140	73		140		300	176	80	70	B to 400	A	C	C	C	C	C	B	C		B	A	A	A	
Lard Oil			C		140		C		300						C	C	C	C	B	B	B		B		A		C
Latex				140			140		200	B to 200	200	160	160		A	A			A	A			A		A		
Lauric Acid $CH_3(CH_2)_{10}COOH$			180	140	140		120		300	C	70	70	70						C	C			C		A		
Lauryl Chloride $CH_3(CH_2)_{10}CH_2Cl$			73		140	B to 248	120		300										C	C			C		A		

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Lead Acetate $Pb(CH_3COO)_2 \bullet {}_3H_2O$	Sat'd.		180	180	140	B to 212	140		300	200	B to 140	B to 140	C		C	C			C	C	C		C		A		
Lead Chloride $PbCl_2$			180	140	140		120		300	176	140	C	212	A													
Lead Nitrate $Pb(NO_3)_2$	Sat'd.		180	140	140		120		300	B to 300	B to 220	200	212	A							A				A		
Lead Sulfate $PbSO_4$			180	140	140		120		300	B to 210	120	B to 180	212	A	B	B			C	C	C		C		B		
Lemon Oil			C	C				B to 73	300	C	70	C	70						C	C			C	B	A	A	
Lime Sulfur			73	73	73		120			B to 300	B to 220	B to 180	B to 420		C	C	C	C	A	A	A		A		A		
Linoleic Acid			180	180	140				300	C	C	C	C		C	C	C	C	C	C	C		C	C	B	B	C
Linseed Oil		73	C	140	140	B to 248	B to 73		300	C	200	B to 180	250		A	A	A	A	A	A	A	A	A	A	A	A	A
Lithium Bromide LiBr				140	140		140	B to 212	300					A													
Lithium Chloride LiCl				140	140		120			160	160	160	160	A	B	B	B		B	B	C		B		A		
Lithium Hydroxide LiOH				140			120			160	C	70	C		C	C	C	C	A	A			A		A		
Lubricating Oil (ASTM #1)			180	C	140	B to 248	73		350	C	180	150	70		A	A	A	A	A	A	A	A	A	A	A	A	A
Lubricating Oil (ASTM $\#_2$)			180	C	140		73		350	C	B to 180	C	70 - 300		A	A	A	A	A	A	A	A	A	A	A	A	A
Lubricating Oil (ASTM $\#_3$)			180	C	140		73		350	C	180	C	350		A	A	A	A	A	A	A	A	A	A	A	A	A
Ludox															C	C	C	C	A	A	A		A		A		
Magnesium Carbonate $MgCO_3$		120	180	212	140	B to 212	140		225	B to 300	140	B to 180	212		B	B			B	B	B		B	A	A	A	
Magnesium Chloride $MgCl_2$	Sat'd.	120	180	140	140	B to 140	140		400	230	176	B to 200	185	A	A	A	B	B	C	C	C		C	C	C	C	A
Magnesium Citrate $MgHC_6H_5O_7 \bullet {}_5H_2O$			180		140		140		300	176	140		212														
Magnesium Oxide MgO		160													A	A				A			A				
Magnesium Sulfate $MgSO_4 \bullet {}_7H_2O$		160	180	212	140	B to 212	140		300	194	B to 230	B to 200	B to 390	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Maleic Acid HOOCCH=CHCOOH	Sat'd.	160	180	140	140	B to 140	140		250		C	C	140	A	C	C	B	C	C	C	C		C	B	A	B	B
Manganese Sulfate $MnSO_4 \bullet {}_4H_2O$			180	180	140		140		300	176	B to 200	B to 200	212	A	A	A	A		C	C	B		C		A		
Mercuric Chloride $HgCl_2$			180	180	140		140		300	B to 210	B to 200	160	B to 300	A	C	C	C	C	C	C	C	C	C	C	C	C	C

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CHEMICALS AND FORMULA	CONCENTRATION	PLASTICS MAX TEMPERATURE (°F)							SEAL MATERIALS MAX TEMPERATURE (°F)						METALS												
		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Mercuric Cyanide $Hg(CN)_2$	Sat'd.		180	140	140	B to 212	140		300	B to 210	B to 160	B to 70	C		C	C	C	C	C	C	C		C		A		C
Mercuric Sulfate $HgSO_4$	Sat'd.		180	140	140		140		300	70	70	B to 70	C	A	C	C	C	C									C
Mercurous Nitrate $HgNO_3 \bullet {}_2H_2O$	Sat'd.		180	140	140		140		300	100	B to 90	90	C	A	C	C	C	C	C	C	C		C	A	A	A	C
Mercury Hg			180	140	140	B to 248	140		300	210	140	140	185	A	C	C	C	C	A	A	A		A	A	A	A	C
Methane CH_4		C	73	73	140		140		300	C	B	B to 140	B		A	A	A	A	A	A	A	A	A	A	A	A	A
Methanol (Methyl Alcohol) CH_3OH			C	180	140		B to 140		300	B to 176	B to 160	160	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Methyl Acetate $CH_3CO_2CH_3$		C	C	140	C		C		300	160	C	C	C		B	B			B	B	B		B	B	A		
Methyl Acetone														C	A	A	A	A	A	A	A	A	A	A	A	A	A
Methyl Amine CH_3NH_2			C	C	C				300						C	C			A	A	B		A		A		
Methyl Bromide CH_3Br			C	C	C		C		300	C	C	C	185		C	C	B		C	C	B				B		
Methyl Cellosolve $HOCH_2CH_{20}CH_3$			C	73	C		C			C	C	C	C		A	A	B		B	B	B			A	A	A	
Methyl Chloride CH_3Cl	Dry	C	C	C	C		C		250	C	C	C	C		A	A	C	C	A	A	A	A	A	A	A	A	
Methyl Chloroform CH_3CCl_3		C	C	C	C		C		200	C	C	C	C						A	A			A		A		
Methyl Ethyl Ketone (MEK) $CH_3COC_2H_5$		C	C	73	C			C	200	B to 200	C	C	C	A	A	A	A	A	A	A	A		A	A	A	A	A
Methyl Formate										B to 120	C	C	C		A	A	A		A	A	C		A	A	A	A	
Methyl Isobutyl Ketone $(CH_3)_2CHCH_2COCH_3$		C	C	73	C		73		200	B to 130	C	C	C	A					A						A	A	
Methyl Isopropyl Ketone $CH_3COCH(CH_3)_2$			C		C		73		150	C	C	C	C														
Methyl Methacrylate $CH_2=C(CH_3)COOCH_3$			C		73		140		150	C	C	C	C								C						
Methylene Bromide CH_2Br_2			C	C	C		C		250	C	C	C	C														
Methylene Chloride CH_2Cl_2			C	C	C	C	C	C	250	C	C	C	C		B	B	B		B	B	B				A	A	
Methylene Chlorobromide CH_2ClBr			C		C														A	A					A		
Methylene Iodine CH_2I_2			C	C	C		C		200			C	70														
Methylsulfuric Acid CH_3HSO_4			180	140	140					70	C	70	C														
Milk		160	180	212	140	B to 212	140		400	250	250	250	250		B	B	B	B	C	C	C		C	C	A	A	A

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Mineral Oil		73	180	C	140	B to 212		B to 73	300	C	250	B to 200	B to 400		A	A	A	A	A	A	A	A	A	A	A	A	A
Molasses			180	140	140		140		300	B to 212	200	200	212		A	A	A	A	A	A	A		A	A	A	A	A
Monochloroacetic Acid $CH_2ClCOOH$	50%			140	140		140		200		C	70	C	A	C	C	C	C	C	C	C		C	C	C	C	C
Monochlorobenzene C_6H_5Cl			C	73	C		C		200	C	C	C	C	A	A	A			A	A	A	A	A	A	A	A	
Monoethanolamine $HOCH_2CH_2NH_2$					C				100	120	C	C	C	A			C		B	B	B		B		A		
Morpholine C_4H_8ONH				140			140		200	C	C	C	B to 70		B	B			B	B	B		B	B	B	B	
Motor Oil			180	C	140		B to 140		350	C	190	B to 70	190	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Muriatic Acid	37%								250						C	C	C	C	C	C	C	C	C	C	B	C	C
Naphtha			73	73	140	B to 122			200	C	B to 250	C	B to 400		A	A	B		A	A	A	A	A	A	A	A	
Naphthalene $C_{10}H_8$			C	73	C		73		250	C	C	C	176		A	A	B		A	A	A	A		A	A	A	
Natural Gas		73		73	140		140		300	C	250	140	250		A	A	A	A	A	A	A	A		A	A	A	A
Nickel Ammonium Sulfate									250	70	70	70	B to 70		C	C	C	C	C	C	C				A		
Nickel Chloride $NiCl_2$	Sat'd.	160	180	180	140	B to 212	140		406	176	176	B to 200	B to 400	A	C	C	B		C	C	C				A		
Nickel Nitrate $Ni(NO_3)_2 \bullet {}_6H_2O$	Sat'd.	160	180	180	140	B to 248	140		400	212	B to 200	B to 200	248	A	C	C			C	C	C			A	A	A	
Nickel Sulfate $NiSO_4$	Sat'd.	160	180	180	140	B to 212	140		400	176	176	160	B to 400	A	C	C	B		C	C	C						A
Nicotine $C_{10}H_{14}N_2$			180		140		140				C	C	C											B	A		
Nicotinic Acid C_5H_4NCOOH			180		140	B to 212	140			B to 140	70	B to 200			B	B			C	C	C			B	B	B	A
Nitric Acid HNO_3	<10%	C	180	180	140	B to 212			250	B to 104	C	C	B to 185	A	C	C	C	C	C	C	C	C		B	A	A	C
Nitric Acid HNO_3	30%	C	B to 130	140	140	B to 212			250		C	C	B to 185	C	C	C	C	C	C	C	C		B	A		A	C
Nitric Acid HNO_3	40%	C	B to 120	73	140				250	C	C	C	70	C	C	C	C	C	C	C	C		B	A		A	C
Nitric Acid HNO_3	50%	C	110	C	100				250	C	C	C	70	C	C	C	C	C	C	C	C	C		B	A		C
Nitric Acid HNO_3	70%	C	100	C	73				250	C	C	C	C	C	C	C	C	C	C	C	C	C		C	A		C
Nitric Acid	Fuming								70	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	A		C
Nitrobenzene $C_6H_5NO_2$		C	C	C	C	B to 122	C		400	C	C	C	C	A	B	B			A	A	A				A		

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Nitrogen N_2	Gas								300	B to 350	B to 230	300	B to 400	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Nitroglycerin $CH_2NO_3CHNO_3CH_2NO_3$					C		73	B to 73	70	70	C	70	C		B	B				B	B				A		
Nitrous Acid HNO_2	10%		180	C	140		73		400	100	C	100	C		C	C	C	C	C	C	C			B	B	B	C
Nitrous Oxide N_2O			73	73	73		73	73	400	140	70	B to 80	C	A	B	B			C	B	B				A		
n-Octane C_8H_{18}			C					B to 250	400	C	B to 200	C	B to 400	550	A	A	A	A	A	A	A	A		A	A	A	A
Oleic Acid		160	180	73	140	B to 248	C		250	C	B to 225	C	B to 212	A	B	B	A		B	B	C			B	A	A	A
Oleum (Sulfuric Acid) $xH_2SO_4 \bullet ySO_3$	Fuming	C	C	C	C	C	C			C	C	C	C														
Olive Oil		160	C	73	140	B to 248	B to 68		350	C	250	C	250		A	A	A	A	A	A	A	A	A		A	A	A
Oxalic Acid $HOOCCOOH \bullet {}_2H_2O$	50%	160	180	140	140	B to 122	140		300	300	C	C	B to 400	A	C	C	C		C	C	C	C	C	B	A	A	
Oxygen O_2	Gas	160	180	C	140	B to 212	140		406		C		B to 190	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Ozone O_3			180	C	140		C		300	B	C	C	B	C	A	A	A	A	A	A	A	A	A	A	A	A	A
Palm Oil				73			140		200	C	250	C	250		C	C			C	C	C		C		A		
Palmitic Acid $CH_3(CH_2)_{14}COOH$	10%	73	73	180	140		120		300	C	220	C	400		B	B	B	A	B	B	B		B	B	A	A	A
Palmitic Acid $CH_3(CH_2)_{14}COOH$	70%		73	180	73		120		300	C	220	C	400		B	B	B	A	B	B	B		B	B	A	A	
Parafin $C_{36}H_{74}$		73	180	140	140	B to 212	C		250	C	250	C	400		A	A	A		B	A	A	B	B	A	A	A	A
Peanut Oil			C	140		B to 248			250	C	250	C	400		A	A			A	A			A		A		
n-Pentane $CH_3(CH_2)_3CH_3$		C	C	C	C		C		100	C	250	70	200		A	A	A	A	A	A	A	A	A	A	A	A	A
Peracetic Acid CH_3COOOH	40%	C		73	73			B to 73		C	C	70	C														
Perchloric Acid $HClO_4$	10%					B to 212			250	B to 140	C	140	400	A					C						A		
Perchloric Acid $HClO_4$	70%	73	180	C	73	B to 212	73			B to 140	C	70	400	C					C						B		
Perchloroethylene (Tetrachloroethylene) $Cl_2C{=}CCl_2$		C	C	C	C	C	C	C	200	C	C	C	400		B	B			B	B	B		B	A	A	A	
Perphosphate			73	140	73				250																		
Phenol C_6H_5OH		C	73	73	73		140	B to 140		C	C	C	B to 210	A	A	A	C		C	C	C		C	A	A	A	

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Phenylhydrazine $C_6H_5NHNH_2$			C	C	C	B to 104	C		B to 70	C	C	C	C														
Phosphate Esters										250	C	C			C	C			C	C			C		A		
Phosphoric Acid H_3PO_4	10%		180	212	140		140		300	B to 300	104	B to 206	B to 400	A	C	C	C	C	C	C	C	C	C	B	A	A	C
Phosphoric Acid H_3PO_4	50%	73	180	212	140	B to 212	140		300	176	B to 104	171	212	A	C	C	C	C	C	C	C	C	C	B	A	A	C
Phosphoric Acid H_3PO_4	85%		180	212	140		73		300	176	C	122	B to 185	A	C	C	C	C	C	C	C	C	C	B	A	B	C
Phosphoric Anhydride P_2O_5			73	73	73					200	B	B	B								C				A		
Phosphorus Pentoxide P_2O_5			73	73	73		140										C				B				A		
Phosphorus Trichloride PCl_3			C	73	C	C	120		300	70	C	C	70	A											A		
Photographic Solutions			180	140	140		140			B to 104	B to 70	B to 140	185							C					A		
Phthalic Acid $C_6H_4(COOH)_2$				140	C		140			B to 100	C	B to 100	C	A	A	A			B	B	C		B		A	A	A
Picric Acid $C_6H_2(NO_2)_3OH$	10%	C	C	73	C	B to 212	73			200	B to 200	70	400		C	C	C	C	C	C	C	C	C	B	A		C
Pine Oil			C	140			B to 73			C	70	C	70		C	C	B		B	B	B		B	A	A	A	
Plating Solutions (Brass)			180	140	140		140		300	70	B	140	140														
Plating Solutions (Cadmium)			180	140	140		140		300	300	B to 180	B to 200	190														
Plating Solutions (Chrome)			180	140	140		140		300	210	C	C	B to 400												A		
Plating Solutions (Copper)			180	140	140		140		300	B to 300	B to 190	B to 160	185														
Plating Solutions (Gold)			180	140	140		140		300	B	B	B	B														
Plating Solutions (Lead)			180	140	140		140		300	B to 300	B to 190	140	185														
Plating Solutions (Nickel)			180	140	140		140		300	B to 300	B	B to 200	185	A		C		C							A		C
Plating Solutions (Rhodium)			180	140	140		140		300	120	B to 200	80	B to 190														
Plating Solutions (Silver)			180	140	140		140		300	B to 300	B to 180	B to 200	B to 190												A		
Plating Solutions (Tin)			180	140	140		140		300	210	B to 180	140	140														
Plating Solutions (Zinc)			180	140	140		140		300	B to 300	B to 180	B	B to 190								B						

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Polysulfide Liquor									300						C	C	C	C	B	B			B		B		C
Polyvinyl Acetate									350	B to 280	80	C	C		B	B	B		A	A	C		A	B	B	B	
Potassium Alum			180		140		140		400	176	B to 180	B to 200	212														
Potassium Aluminum Sulphate			180		140		140		400	176	B to 180	B to 200	212			B		C			C			B	A		B
Potassium Bicarbonate $KHCO_3$	Sat'd.		180	140	140	B to 212	140		400	200	200	200	212								A				A		
Potassium Bichromate $K_2Cr_2O_7$	Sat'd.		180	140	140	B to 212			400	140	140	104	212	A		A		B			B			B	A		
Potassium Bisulfate $KHSO_4$			180	212	140	B to 212	140		400	B	140	70	212	A	B	B	B		C	C	C	C	C		A		
Potassium Bromate $KBrO_3$			180	212	140	B to 212	140		400	212	B to 70	B to 140	212						C	A	A		A		A		
Potassium Bromide KBr			180	212	140	B to 248	140		400	212	200	200	B to 212	A	B	B	B		C	C	C				A		
Potassium Carbonate (Potash) K_2CO_3		73	180	180	140	C	140		400	B	200	200	B to 212	A	B	B	B	B	A	A	A	A	A	A	A	A	B
Potassium Chlorate (Aqueous) $KClO_3$		160	180	212	140	C	140		400	B to 200	70	B to 200	B	C	B	B			A	A	A	A		A	A	A	B
Potassium Chloride KCl		160	180	212	140	B to 212	140		400	B	200	200	212			B	A	A	B	B	B	B	C	B	B	B	A
Potassium Chromate K_2CrO_4			180	212	140		140		400	176	B to 140	140	B to 212	C	A	A	B		B	B	B		B		A	A	
Potassium Cyanide KCN			180	180	140	B to 212	140		400	B	200	200	200		C	C	C	C	B	B	B	B		A	A	A	C
Potassium Dichromate $K_2Cr_2O_7$	Sat'd.		180	180	140		140		400	212	140	120	212	C	B	B	C		B	B	C			A	A	A	
Potassium Ferricyanide $K_3Fe(CN)_6$			180	180	140	B to 248	140		400	70	C	70	B to 212		C	C			B	B	C				A		
Potassium Ferrocyanide $K_4Fe(CN)_6 \bullet {}_3H_2O$			180	180	140	B to 248	140		400	140	C	70	140		B	B	C	C	C	C	C			B	A		C
Potassium Fluoride KF			180	180	140	B to 212	140		400	200	B to 180	70	212	A											A		
Potassium Hydroxide KOH	25%	160	180	212	140		B to 140	248	300	320	B to 80	B to 212	80	A	C	C	C		B	B	B	B		A	A	A	
Potassium Hypochlorite KClO		160	180		140		120		400	70	C	B to 70	C		C	C					C				A		
Potassium Iodide KI			180	73	73	B to 212	140		400	70		70	B	A	B	B					B	B			A		
Potassium Nitrate KNO_3		160	180	140	140		140		400	B	B to 200	B to 200	212	C	A	A	B	B	B	B	B	B		A	A	A	A

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Potassium Perborate KBO_3			180	140	140		140		400	70	B to 70	70	B to 70	A													
Potassium Perchlorate $KClO_4$			180	140	140		140		200	140	C	70	190														
Potassium Permanganate $KMnO_4$	10%		180	73	140		140		400	210	C	140	B to 212		B	B			A	A	A			A	A	A	
Potassium Permanganate $KMnO_4$	25%		180	73	73	B to 212	140		400	200	C	140	B to 212		B	B			A	A	A			A	A	A	
Potassium Persulfate $K_2S_2O_8$			180	140	140	B to 176	140		400	180	C	B	210														
Potassium Sulfate K_2SO_4		160	180	180	140	B to 212	140		200	176	B to 200	B to 200	212	A	A	A	B	B	A	A	A	A	B	A	A	A	A
Potassium Sulfide K_2S			180	140		68	140		300	70		70	210		C	C	C	C	C	C	C	B		B	B	B	C
Potassium Sulfite $K_2SO_3 \bullet {}_2H_2O$			180	140			140		300	200	B to 150	B to 150	210		B	B	B		C	C	C				A		
Potassium Tetraborate									400					A						A	A		A		A		
Potassium Tripolyphosphate									300					A			B		A		A	A			A		
Propane C_3H_8			73	73	140	B to 248	140		300	C	250	140	250	A	A	A	A	A	A	A	A	A		A	A	A	A
Propargyl Alcohol			C	140	140		140			140	70	70	140														
Propionic Acid $CH_3CH_2CO_2H$		C	C	140		B to 140	140			200		C	C												A		A
Propyl Acetate									140	C	C	C	C					A			A			A	A	A	
Propyl Alcohol $CH_3CH_2CH_2OH$		73	C	140	140	B to 122	B to 140		350	B to 225	180	B to 176	B to 300		A	A	A	A	A	A	A	A		A	A	A	A
n-Propyl Bromide									300						B	B	B		B	B	B				A		
Propylene Glycol	<25%							180	300	200	180	70	250	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Propylene Glycol	>25%							B to 180	300	200	180	70	250	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Propylene Oxide CH_3CHCH_2O			C	73	C		140		150	C	C	C	C							A					A		
n-Propyl Nitrate									200	C	C	C	C						A	A			A		A		
Pyridine $N(CH)_4CH$			C	C	C	B to 68	73			C	C	C	C		B	B			B	B	B		B	C	B		
Pyrogallic Acid $C_6H_3(OH)_3$					73				150	C	B to 100	C	140		A	A			A	A	A		A	A	A	A	
Pyrrole										C	C	C	C		B	B			B	B	B		B		B		
Quinone $C_6H_4O_2$				140			140			C	C	C	C						A	A			A		A		
Rosin									200	C	B to 200	200	B		C	C			C	C	C		C	A	A	A	

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CHEMICALS AND FORMULA	CONCENTRATION	PLASTICS MAX TEMPERATURE (°F)							SEAL MATERIALS MAX TEMPERATURE (°F)						METALS												
		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Salicylic Acid $C_6H_4(OH)(COOH)$				140	140	B to 212	140		300	300	C		300		B	B			C	C	C		C		A		
Selenic Acid H_2SeO_4			180		140		140			70	C	70	C														
Silicic Acid $SiO_2 \bullet nH_2O$			180	140	140	B to 212	140		400	176	176	70	212														
Silicone Oil			180	212	73		73		350	140	212	212	400	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Silver Chloride AgCl		160	180	140	140					70	C	70	90	A	C	C	C	C	C	C	C		C	C	C	C	C
Silver Cyanide AgCN			180	180	140	B to 212	140		350	70	C	70	140		C	C	C	C	C	C	C		C		A to 100		C
Silver Nitrate $AgNO_3$		160	180	180	140		B to 140		350	300	C	B to 200	185	A	C	C	C	C	C	C	C		C	B	A		C
Silver Sulfate Ag_2SO_4		160	180	140	140		140		350	176	140	70	212	A													
Soaps		73	180	140	140		B to 140		400						B	B	A		B	B	B		B	A	A	A	
Sodium Acetate CH_3COONa	Sat'd.		180	212	140	B to 212	140		400	212	C	C	B		A	A	B		B	B	C		B	B	A		
Sodium Aluminate $Na_2Al_2O_4$	Sat'd.				140				300	B to 200	B to 180	140	B to 200		C	C	B		B	B	A		B		A		
Sodium Benzoate C_6H_5COONa			180	140	140		140		300	140	B to 140	B to 70	B to 140														
Sodium Bicarbonate $NaHCO_3$		73	180	212	140	B to 212	140		400	212	B to 200	B to 200	212		A	A	B	B	A	A	C		A	A	A	A	A
Sodium Bichromate	Sat'd.								400	176	140	B to 70	B to 212	C	C	C								A	A	A	
Sodium Bisulfate $NaHSO_4$		73	180	140	140		140			B to 200	B to 200	B to 200	212		C	C	C	C	C	C	C		C	B	A		C
Sodium Bisulfite $NaHSO_3$			180	140	140		140		400	176	160	B to 200	212		B	B			C	C	C		C		A		
Sodium Borate (Borax) $Na_2B_4O_7 \bullet {}_{10}H_2O$	Sat'd.	160	180	180	140		140		300	B to 300	B to 220	B to 200	210	A	A	A			B	B			B	A	A	A	
Sodium Bromide NaBr	Sat'd.	120	180	140	140		140		300	140	C	70	B to 180	A	B	B			C	C	C		C		A		
Sodium Carbonate Na_2CO_3		73	180	212	140	C	140	B to 73	400	176	B to 200	B to 200	212		A	A	B	B	A	A	A	A	A		A	A	C
Sodium Chlorate $NaClO_3$	Sat'd.		180	140	73	C	140		350	B to 200	B to 200	B to 200	B to 200		A	A	C		B	B	B		B	B	A	A	
Sodium Chloride NaCl		120	180	212	140		140		350	B to 212	160	120	212		B	A	A	A	B	B	B	B	C	A	B	B	A
Sodium Chlorite $NaClO_2$	25%		180	73	C		140		200	70	C		B to 140	C													

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Sodium Chromate $Na_2CrO_4 \bullet {}_4H_2O$		120	180	140		B to 176	140			140	140	70	140	C	A	A			B	B	B		B	A	A	A	
Sodium Cyanide NaCN			180	180	140	B to 212	140		350	176	B to 230	140	176	200	275	C	C	C	C	A	A	A	A		A	A	C
Sodium Dichromate $Na_2Cr_2O_7 \bullet {}_2H_2O$	20%		180	180	140		140		300	176	140	C	B to 212	C	C	C	C		B	B	B				A		
Sodium Ferricyanide $Na_3Fe(CN)_6 \bullet {}_2H_2O$	Sat'd.		180	140	140		140		350	300	70	70	140		C	C			C	C					A		
Sodium Ferrocyanide $Na_3Fe(CN)_6 \bullet {}_{10}H_2O$	Sat'd.		180	140	140		140		350	140	80	70	140												A		
Sodium Fluoride NaF		120	180	180	140	B to 212	140		350	140	100	140	140	A	A	A	B		C	C	C				A		
Sodium Hydroxide NaOH	<5%					B to 68																					
Sodium Hydroxide NaOH	<10%								400	B to 200	212	B to 200	B to 140	A	A		A			A	A		B	A	A	A	
Sodium Hydroxide NaOH	30%	120	180	212	140	C	B to 140		350	B to 130	212	B to 200	80	A	A		B			B	B		B	A	A	A	
Sodium Hydroxide NaOH	50%	120	180	212	140		B to 140	194	350	B to 130	212	B to 200	B to 70	A	B	C	C	C	B	B	B	B	B	A	A	A	B
Sodium Hydroxide NaOH	70%	120	180	212	140		B to 140		350	B to 130	B to 70	B to 200	B to 70	A	C	C	C	C	B	B	B	B	B	A	A	A	B
Sodium Hypochlorite $NaOCl \bullet {}_5H_2O$		120	180	73	73		140	B to 190	350	C	C	C	70		C	C	C	C	C	C	C	C	C	C	C	C	C
Sodium Metaphosphate $(NaPO_3)n$			180	120	140					300	220	150	B to 400	A	C	C	C		C	C	C				A		
Sodium Nitrate $NaNO_3$	Sat'd.	160	180	180	140	B to 212	140		400	200	B to 171	B to 200	212	A	A	A	B	B	A	A	A	A	A	A	A	A	B
Sodium Nitrite $NaNO_2$		160	180	73	140	B to 212	140		400	176	171	B to 140	212		A	A			B	B	B				A		
Sodium Perborate $NaBO_3 \bullet {}_4H_2O$		120	180	73	140		73		350	140	C	B	140	A	C	C			B	B	B			A	A	A	
Sodium Perchlorate $NaClO_4$			180	212	140		140		350	70	C	70	C														
Sodium Peroxide Na_2O_2	10%		180		140		140		250	300	C	C	400	C	C	C	C	C	C	C	C			A	A	A	B
Sodium Phosphate NaH_2PO_4	Acid	120	180	212	140	B to 140	140		400					A	B	B	B	B	B	B	B	A	B	A	A	A	B
Sodium Phosphate NaH_2PO_4	Alkaline		120	180	212		140		400					A	B	B	B	B	B	B	B	A	B	A	A	A	B
Sodium Phosphate NaH_2PO_4	Neutral		120	180	212				400					A	B	B	B	B	B	B	B	A	B	A	A	A	B
Sodium Silicate			180	140	140		140			B to 200	140	B to 200	212		C	C	B		A	A	A		A	A	A	A	

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		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Sodium Sulfate Na_2SO_4	Sat'd.	160	180	212	140				400	B to 200	200	B to 200	212	A	A	A	B	B	A	A	A	A	A	A	A	A	A
Sodium Sulfide Na_2S	Sat'd.	160	180	212	140		140		350	200	B to 200	B to 200	176		C	C	C	C	B	B	C	B	B	A	A	A	C
Sodium Sulfite Na_2SO_3	Sat'd.	160	180	212	140	B to 212	140	B to 73	350	200	B to 200	B to 200	140		A	A	C		B	B	B		B	B	A	A	
Sodium Thiosulfate $Na_2S_2O_3 \bullet {}_5H_2O$			180	180	140		140		350	140		160	140		B	B	C		C	C	C		C		A		
Sour Crude Oil				140	140					C	C	C			C				A	A	A		B	A	A	A	
Soybean Oil				73			140		400	C	250	250	B to 400		A	A	B		A	A	B	A	A	A	A	A	
Stannic Chloride $SnCl_4$	Sat'd.		180	140	140		140		350	300	220	C	B to 400	A	C	C	C	C	C	C	C	C	C	C	C	C	C
Stannous Chloride $SnCl_2$	15%	120	180	140	140		140		350	B to 210	B to 150	B to 140	B to 185	A	C	C	C	C	C	C	C	C	C		A		
Starch			180	140	140		140		300	176	B to 176	212	212		B	B	B	B	B	B	B		B	A	A	A	
Steam (Low Pressure)									400					A	A	A	A	A	A	A	A	A	A	A	A	A	A
Steam (Medium Pressure)									400						A	A	A	A	A	A	A	A	A	A	A	A	A
Steam (High Pressure)									C						C	C	C	C	C	B	A	C	B	A	A	A	C
Stearic Acid $CH_3(CH_2)_{16}COOH$			180	73	140		120		350	C	B to 70	C	140	A	A	A	C	B	C	C	C	B	C	A	A	A	A
Stoddard's Solvent			C		C		73			C	250	C	250		A	A			A	A	A		A		A	A	
Styrene $C_6H_5CH=CH_2$				73			C		350	C	C	C	C		B	B	B		B	B	B		B		A		
Succinic Acid $COOH(CH_2)_2COOH$			180	140	140		140		200	140	70	B to 70	B to 176		A	A			A	A	A		A	A	A	A	
Sugar $C_6H_{12}O_6$			180		140		140		350						C	C				B	C		B	A	A	A	
Sulfamic Acid HSO_3NH_2	20%		C	180	C					70	C	B to 150	C		B	B	B		C	C	C		C		A		A
Sulfate Liquors (Oil)	6%		180	140	140				200	B to 250	B to 150	B to 150	170		C	C	C	C	B	A			A		A		C
Sulfite Liquors	6%	73	180		140				350	B	C	B to 70	140								C	B			A		
Sulfur S			180	212	140				350	250	C	70	266	A	C	C	C	C	B	B	C	B	B	B	A		C
Sulfur Chloride S_2Cl_2				C					350	C	C	C	140	A	C	C	C	C	C	C	C	C	C	C	C	C	C
Sulfur Dioxide SO_2	Gas (Dry)	C	73	140	140		140		350	160	C	C	B to 250	A	A	B	A	A	A	A	A		A	A	A	A	A
Sulfur Dioxide SO_2	Gas (Wet)	C	C	140	73		120			140	C	C	B to 140	A	C	B	B	C							C	A	C	C

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Sulfur Trioxide SO_3	Gas		C		73		C			B to 120	C	C	B	C	C			C						C	B	B	C
Sulfuric Acid H_2SO_4	<30%	120	180	180	140	B to 248	B to 140	B to 73	250	212	B	158	248	A	C	C	C	C	C	C	C	C	C	C	C	A	B	C
Sulfuric Acid H_2SO_4	50%	73	180	140	140	B to 212	B to 140	212	250	212	C	158	212	A	C	C	C	C	C	C	C	C	C	C	C	A	C	C
Sulfuric Acid H_2SO_4	70%	C	180	73	140				200	140	C	C	180	212	C	C	C	C	C	C	C	C	C	C	B	C	C
Sulfuric Acid H_2SO_4	90%	C	150	73	73	B to 212			200	70	C	C	158	212	C	C	C	C	C	C	C	C	C	C	C	C	C
Sulfuric Acid H_2SO_4	100%	C	C	C	C				200	C	C	C	158	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Sulfurous Acid H_2SO_3	Sat'd.		180	140	140	B to 212	140		350	C	C	C	C	A	C	C	C	C	C	C	C	C	C	B	A	A	C
Tall Oil			C	180	140		120		250	C	200	C	200		B	B	B		B	B	B		B	A	A	A	
Tannic Acid $C_{76}H_{52}O_{46}$	10%	C	180	73	140	B to 212	140		250	200	200	B to 200	200		A	A			B	B	C	B	B	B	A	A	
Tanning Liquors		160	180	73	140		120			200	B to 200	70	200		A	A			B						A		
Tar			C		C				250	C	C	C	B		A	A	A	A	A	A	A	A	A	A	A	A	A
Tartaric Acid $HOOC(CHOH)_2COOH$		160	180	140	140	B to 248	140		250	C	200	158	B to 200	A	A	A	C	C	C	C	C	C	C	A	A	A	B
Tetrachloroethane $CHCl_2CHCl_2$				C	C		C	C	400	C	C	C	200												A		
Tetrachloroethylene $Cl_2C=CCl_2$		C	C	C	C		C		350	C	C	C	212														
Tetraethyl Lead $Pb(C_2H_5)_4$			73	73	73				350	C	C	C	120		A	A				B	B		A				
Tetrahydrofuran C_4H_8O		C	C	C	C		C	C		C	C	C	C														
Thionyl Chloride $SOCl_2$			C	C	C	C	C	C		C	C	C	C	A													
Thread Cutting Oils			73	73	73			73	350						A				A	A	A			A	A	A	
Titanium Tetrachloride $TiCl_4$				140	C		120			C	C	C	160	A	C	C					C				B		
Toluene (Toluol) $CH_3C_6H_5$		C	C	C	C		C	C	200	C	C	C	B to 200		A	A	A	A	A	A	A	A		A	A	A	A
Tomato Juice			180	212	140		140		350	70	140	140	140		B				C	C	B				A	A	
Transformer Oil			180	73	140		C		300	C	B	C	300	A	A					A	A				A	A	
Transformer Oil $DTE/_{30}$			180		140		B to 120		300					A	A					A	A				A	A	
Tributyl Phosphate $(C_4H_9)_3PO_4$			C	C	C		73		300	250	C	C	C		B	B	B		A	A	A			B	A		
Trichloroacetic Acid CCl_3COOH	50%			140	140	B to 104	140		200	C	C	C	C	A	B	C			C	C	C			C	B		

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Trichloroethylene $CHCl=CCl_2$		C	C	C	C	B to 176	C	C	200	C	C	C	200	A	A	A	A	A	B	B	B			A	A	A	A
Triethanolamine $(HOCH_2CH_2)_3N$		C	73	140	73	C	73	B to 190		B	C	B	C		C	C			C	C	C	C		C	A		
Triethylamine $(C_2H_5)_3N$				C	140		73	B to 73		160	140	B to 70	C			A	A										
Trimethylpropane $(CH_2OH)_3C_3H_5$				140	73		C			C	C	C	70														
Trisodium Phosphate $Na_3PO_4 \bullet {}_{12}H_2O$		73	180	140	140		140		350	212	C	C	B to 300	A	C	C			B	B		A			A	A	
Tung Oil										C	250	B to 120	250		B	B	B		B	B	B			B	A	A	
Turpentine		C	C	C	140		C			C	250	C	B to 200		A	A	A	A	A	A	A	A		A	A	A	A
Urea $CO(NH_2)_2$			180	180	140		140									B	B			C	C	C				A	C
Urine		160	180	180	140		140		400	140	140	C	140						C	C	C			A	A	A	
Varnish									350	C	C	C	B to 400		A	A	B	B	C	C	C			B	A	A	A
Vaseline (Petroleum Jelly)			C	140	C		120		300	C	140	140	140						A	A	A			A	A	A	
Vegetable Oil			C	140	140	B to 248	B to 140		300	C	200	C	200		A	A				A	A			A	A	A	
Vinegar		73	150	140	140		140		300	B to 210	C	C	200		C	C	C	C	C	C	C			A	A	A	B
Vinyl Acetate $CH_3COOCH=CH_2$			C	73	C	C	140		350	C	C	C	C		B	B		B	B	B				A		A	
Water (Acid Mine) H_2O		160	180	140	140		140		400	200	B to 210	C	B to 190	A	C	C	C	C	C	C	C	C	C	A	A	A	C
Water (Deionized) H_2O		160	180	140	140		140		400	B to 140	B to 200	B to 150	B to 200	A	B	B	C	C	C	C	C		C	B	A	A	A
Water (Distilled) H_2O		160	180	212	140	B to 248	140		400	140	B to 210		250	A	A	A	B	B	C	C	C	B	C	A	A	A	A
Water (Potable) H_2O		160	180	212	140	B to 248	140		400					A	A	A	A	A	B	B	B	A	B	A	A	A	A
Water (Salt) H_2O		160	180	212	140		140		400	B to 250	B to 210	140	B to 200	A	B	B	B	C	C	C	C	B	C	B	A	A	B
Water (Sea) H_2O		160	180	212	140	B to 248	140		400	B to 250	B to 210	B to 140	212	A	B	B	B	C	C	C	C	B	C	B	B	A	B
Water (Soft) H_2O		160	180	212	140		140		400					A	A	A	A	B	C	C	B	B	C	A	A	A	A
Water (Waste) H_2O		73	180	212	140		140		400					A	B	B	B	B	B	B	B	B	B	B	A		B

CHEMICALS AND FORMULA	CONCENTRATION	PLASTICS MAX TEMPERATURE (°F)							SEAL MATERIALS MAX TEMPERATURE (°F)						METALS												
		ABS	CPVC	PP	PVC	PVDF	PEX	PPSU	PTFE	EPDM	NITRILE (Buna-N)	POLYCHLORO-PRENE	FKM	GRAPHITE	BRONZE (85% Cu)	SILICON BRONZE	ALUMINUM BRONZE	BRASS	GRAY IRON	DUCTILE IRON	CARBON STEEL	3% NI/IRON	NI PLATED DUCTILE	400 SERIES SS	316 SS	630 SS	COPPER
Whiskey			180	140	140	B to 212	140		350	200	200	140	B		C	C	B		C	C	C		C	B	A		A
White Liquor		73	180		140					300	104	140	190		C	C	C		C	C	C		C		A		
Wine		73	180	140	140	B to 248	140		350	200	200	140	200		C	C			C	C	C		C	B	A		
Xylene (Xylol) $C_6H_4(CH_3)_2$		C	C	C	C	C	C	C	350	C	C	C	B to 200	A	A	A	A	A	A	A	A	A	A	A	A	A	A
Zinc Acetate $Zn(CH_3COO)_2 \bullet {}_2H_2O$			180							140	C	C	C		C	C	C	C	C	C	C		C		A		
Zinc Carbonate $ZnCO_3$			180	140		B to 212	140			70	70	70	70		B	B									B		
Zinc Chloride $ZnCl_2$		120	180	180	140		140		400	210	B to 200	194	212	A	C	C	C		C	C	C		C	C	B	B	
Zinc Nitrate $Zn(NO_3)_2 \bullet {}_6H_2O$		160	180	180	140		140			180	140	100	190	A											A	A	
Zinc Sulfate $ZnSO_4 \bullet {}_7H_2O$		160	180	212	140		140		400	B to 300	B to 220	171	B	A	C	C	B		C	C	C	B	C	A	A	A	A

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FMC Technologies

Compatibility Manual

Liquids—Metals—Elastomers—Plastics

Issue/Rev. 0.2 (12/96) Bulletin AB0A002

This manual contains a list of liquids and their compatibility with materials of construction for oval gear, rotary PD and turbine meters. The list is to be used as a guide to determine type of meter to recommend for a particular fluid. Additional information, such as operating temperature, viscosity, contamination, flow rates, etc., should be known before a final decision is made. The seals and packing for meters are also applicable to valves and other accessories.

Compatibility Table

Metals and elastomers noted as:

A–Excellent

B–Good

C–Poor

D–Not Recommended

Blank Space–Insufficient Information

Note 1 Avoid dissimilar metals.

Note 2 For rotary meters recommend LPG trim.

Note 3 C or D rating given due to possible contamination of metered product by metal. Material compatibility may be satisfactory.

The information contained herein is general in nature and while drawn from sources deemed to be reliable and presumed to be accurate, is not guaranteed in any way by Smith Meter.

Any application to a particular situation requires the use of qualified experts and is subject to limitations which are normally present.

Specifications of Materials Used in Smith Meters and Valves

Metals

1. Aluminum—ASTM, B-26, SG-70T6

Chemical Composition

Copper	0.20%
Iron	0.60%
Silicon	6.57.5%
Manganese	0.35%
Zinc	0.30%
Titanium	0.25%
Magnesium	0.20-0.40%
Others	0.15%
Aluminum	Remainder

Density: 0.10 lb/in^3.

Thermal Coefficient of Expansion: 11.9 x 10^{-6} in/in °F.

Chemical Resistance: Organic acids, amines, solvents, alcohols, ketones.

Not Resistant To: hydroxides, acids, acid salts, alkalis.

2. Bronze—ASTM, B-145, Alloy 4A

Chemical Composition

Copper	85%
Tin	5%
Zinc	5%
Lead	5%

Density: 0.318 lb/in^3.

Thermal Expansion: 10.2 x 10^{-6} in/in °F.

Chemical Resistance: Solvents, acetates, esters, alcohols, ketones, petroleum solvents, glycols, aromatic hydrocarbons, and water.

Not Resistant To: Mineral acids, amines, alkalis, hydroxides.

3. Cast Iron—ASTM, A-48, Class 25 and 30

Chemical Composition

Carbon	2.75–3.40%
Sulfur	0.08–0.12%
Silicon	2.10–2.30%
Phosphorous	0.15–0.30%
Iron	Remainder

Density: 0.25 lb/in^3.

Thermal Coefficient of Expansion: 6 x 10^{-6} in/in °F.

Chemical Resistance: 93–95% sulfuric acid, alkalis, hydroxides, ammonia, amines, solvents, alcohols, ethers, ketones, petroleum solvents.

Not Resistant To: Organic acids, dilute acids.

4. Ductile Iron—ASTM, A-536, Grade 60-40-18

Chemical Composition

Total Carbon	3.2–4.1%
Phosphorous	0.015–0.10%
Silicon	1.8–3.0%
Nickel	0–3%
Manganese	0.10–1.00%

Density: 0.24–0.26 lb/in^3.

Thermal Coefficient of Expansion: 6.8 x 10^{-6} in/in °F.

Used in pressure castings for singlecase PD meters and DuraFlow meters, good high temperature applications requiring maximum toughness, and several thermal and mechanical shock.

5. Tungsten Carbide—Carboloy 883 or Equivalent

Chemical Composition (Bearing Material)

Tungsten Carbide	94%
Cobalt	6%

Hardness: 92 Ra.

Specific Gravity: 14.9.

Thermal Coefficient of Expansion: 2.5 x 10^{-6} in/in °F.

Temperature Range: -250°F to 400°F.

Chemical Resistance: Due to cobalt binder, tungsten carbide is attacked by acids with Ph of 2–3 but is resistant to alkalis, such as sodium hydroxide, up to 40%.

6. Carbon Steel—ASTM, A-216, Grade WCB

Chemical Composition

Carbon	0.30%
Sulfur	0.06%
Manganese	1.00%
Silicon	0.60%
Phosphorous	0.05%
Iron	Remainder

Residual Elements

Copper	0.50%
Chromium	0.40%
Nickel	0.50%
Molybdenum	0.25%

Density: 0.283 lb/in^3.

Thermal Coefficient of Expansion: 8.3 x 10^{-6} in/in °F.

Chemical Resistance: High resistance to alkalis, petroleum products.

Not Resistant To: Acids, water.

Used mainly for strength and for high-pressure vessels.

7. *Carbon Steel—ASTM, A-285, Grade C*

Chemical Composition

Carbon	0.35%
Sulfur	0.06%
Manganese	0.80%
Silicon	0.69%
Phosphorous	0.05%
Iron	Remainder
Residual Elements	
Copper	0.50%
Chromium	0.40%
Nickel	0.50%
Molybdenum	0.25%

Density: 0.283 lb/in^3.

Thermal Coefficient of Expansion: 8.3 x 10^{-6} in/in °F.

Chemical Resistance: High resistance to alkalis, petroleum products.

Not Resistant To: Acids, water.

Used mainly for strength and for high-pressure vessels.

8. *Austenitic Stainless Steels*
316 SS Casting—ASTM, A-295, Grade CF-8M
304 SS Wrought—ASTM, A167

Chemical Composition

316

Carbon	0.08%
Silicon	1.50%
Manganese	1.50%
Chromium	18.0–21.0%
Phosphorous	0.04%
Nickel	9.0–12.0%
Sulfur	0.04%
Molybdenum	2.0–3.0%

304

Carbon	0.08%
Silicon	1.0%
Manganese	2.0%
Chromium	18.0–20.0%
Phosphorous	0.45%
Nickel	8.0–12.0%
Sulfur	0.30%

Density: 0.29 lb/in^3.

Thermal Coefficient of Expansion: 9.2 x 10^{-6} in/in °F.

Chemical Resistance: Organic acids, amines, hydroxides, food products, fatty acids, anilines, solvents, alcohols, ethers, and ketones.

Not Resistant To: Mineral acids, high concentrations of acid salts.

9. *ARMCO 17-4 PH Stainless Steel*

Chemical Composition

Carbon	0.07%
Phosphorous	0.04%
Chromium	15.5–17.5%
Sulfur	0.03%
Nickel	3–5%
Silicon	1.0%
Copper	3.5%
Others	0.15–0.45%
Manganese	1.0%

Density: 0.282 lb/in^3.

Thermal Coefficient of Expansion: 6.0 x 10^{-6} in/in °F.

Condition H900: 38–44 RC.

Excellent corrosion resistance and high hardness to resist effects of wear and corrosion. Better resistance than 400 series stainless steel, but less than 316 stainless steel.

10. *Martensitic Stainless Steel—ASTM, A-276, Type 440C SS, Type 416 SS*

Chemical Composition

440C (Hardness - 55–60 Rockwell C)

Carbon	0.95–1.20%
Silicon	1.0%
Manganese	1.0%
Chromium	16–18%
Phosphorous	0.040%
Molybdenum	0.75%
Sulfur	0.030%

416 (Hardness - 39–41 Rockwell C)

Carbon	0.15%
Sulfur	0.15%
Manganese	1.25%
Silicon	1.0%
Phosphorous	0.060%
Chromium	12–14%

Density: 0.28 lb/in^3.

Thermal Coefficient of Expansion: 5.6 x 10^{-6} in/in °F.

Stainless steel always used in hardened condition for shafts and bearings.

Chemical Resistance: Resistant to water, steam, crude oil, gasoline, alcohols.

11. *HYMU 80*

Chemical Composition

Carbon	0.05%
Nickel	79%
Manganese	0.50%
Molybdenum	4%
Silicon	0.15%
Iron	Remainder

Density: 0.316 lb/in^3.

Thermal Coefficient of Expansion: 7.2 x 10^{-6} in/in °F.

High permeability allow used for electromagnetic devices—can become magnetized in low-strength magnetic field.

Corrosion Resistance: Not as good as chromium steel alloys, and protective coatings are needed to improve resistance.

12. *Austenitic Stainless Steel—ASTM A479 UNS S 21800, Nitronic 60**

Chemical Composition

Carbon	0.03–0.06%
Chromium	20.2–23.5%
Manganese	4.0–6.0%
Nickel	11.5–13.5%
Phosphorous	0.04%
Molybdenum	1.5–3.0%
Sulfur	0.03%
Nitrogen	0.20–0.40%
Silicon	1.0%
Columbium	0.10–0.30%
Vanadium	0.10–0.30%

Density: 0.285 lb/in^3.

Thermal Coefficient of Expansion: 9.2 x 10^{-6} in/in°C.

Hardness: 31 to 43 Rc.

Chemical Resistance: Excellent resistance to stress corrosion cracking and pitting. Not resistant to mineral acids.

Application: Oval meter shafts, as a substitute for 316 stainless steel, to provide a hard wear-resistant surface and compliance to NACE.

**Trademark: Armco Inc.*

13. *Hastelloy C265—ASTM B622 N01276*

Chemical Composition

Nickel	54-56%
Chromium	14-16%
Tungsten	3.0-4.5%
Molybdenum	15%-17%
Iron	4.0%-7%
Cobalt	2.5%
Silicon	.08%
Manganese	1.0%
Carbon	.010%
Vanadium	.35%
Phosphorus	.03%
Sulfur	.010%

Density: 8.89 g/cm3

Coefficient of Thermal Expansion: 7.3 x 10^{-6} in/in°F

Chemical Resistance: Ferric and cupric chlorides, hot contaminated mineral acids, solvent, chlorine and inorganic and organic acids, sea water and brine solutions resistant to pitting and stress corrosion.

Not resistant to: Dilute hydrochloric acid, hydrofluoric acids.

Platings

1. *Electroless Nickel*

A nickel coating containing 5–10% phosphorous applied by chemical reduction. It can be applied up to 0.003" thick and hardness will be 40 Rockwell C and above. It is resistant to weak acids, salts, and sea water, and is used as a barrier under hard chrome platings.

2. *Hard Chrome*

A hard, dense chromium coating applied electrolytically. It can be applied in thicknesses ranging from 0.0002" to 0.010". Its purpose is mainly wear-resistance when applied on hardened shafts. Its microporosity can be a detriment when used on acid applications.

3. *Tungsten Carbide (83% Tungsten Carbide 17% Cobalt)*

A hard dense thermal spray coating (high velocity oxygen fuel process with cobalt binder). Recommended for severe fretting, sliding and abrasive conditions (bearing applications). Ideal for petroleum applications but not recommended for acidic environments.

Non-Metals

Elastomers/Sealants

1. *Buna-N*

A co-polymer of butadiene and acrylonitrile. It has excellent resistance to petroleum products, water and ethylene glycol-base fluids. It is not recommended for ketones, acids, and halogenated hydrocarbons.

Temperature Range: -40°F to 225°F.

Color Code: Red.

Hardness: 75–90 Durometer.

2. *Viton A*

A fluoroelastomer composed of vinylidene fluoride and hexafluoro propylene. It contains about 65% fluorine and is recommended for aromatic hydrocarbons, acids, and halogenated hydrocarbons (Trichloroethylene). It is not recommended for ketones and amines.

Temperature Range: 10°F to 400°F.

Color Code: Yellow.

Hardness: 80–90 Durometer.

3. *Ethylene Propylene Rubber (EPR)*

A co-polymer of ethylene and propylene. It is recommended for ketones, alcohols, water, and steam. It is not recommended for petroleum products as it swells rapidly in contact with these fluids.

Temperature Range: -65°F to 300°F.

Color Code: Green and Red.

Hardness: 75–90 Durometer.

4. *Fluorosilicone*

A group of elastomers made up of silicon, oxygen, carbon hydrogen, and fluorine. Used mainly as diaphragm material. Excellent resistance to petroleum oils and fluids, mildly resistant to aromatic hydrocarbons and chlorinated solvents. Poor abrasion resistance.

Temperature Range: -80°F to 400°F.

5. *Polyurethane*

Formed by reaction of polyols with diisocyanates. Used in seals of 4-way valve and prover spheres. Resistant to oils, gasoline, and other petroleum-based products. Not recommended for ketones, cholorinated solvents, and water-based solutions.

Temperature Range: -20°F to 180°F.

Thermal Coefficient of Expansion: 5.5–10 x 10^{-5} in/in °F.

Specific Gravity: 1.04 to 1.26.

Hardness: 85–90 Shore A.

6. *Master Gasket**

A methacrylate ester which, when isolated from air contact, form a flexible polymer seal. It acts as the seal between the single-case meter housing and cover.

It is resistant to glycols, water, oils, gasoline, and diesel fuels but should not be used with sodium and potassium hydroxide, acids, lyes, and ammonia solutions.

Temperature Range: -60°F to 300°F.

**Trademark: Loctite Company.*

7. *Gylon**

A filled polytetrafluoroethylene (PTFE) which is compressible and can be formed into diaphragms and gaskets.

It is chemically inert, has good abrasion resistance, and resists cold-flow common to unfilled Teflon materials.

Temperature Range: -350°F to 500°F.

**Trademark: Garlock Inc.*

8. *Gore Tex**

A pure, soft polytetrafluoroethylene (PTFE) which is used as a sealant or gasket for irregular surfaces. It has the same chemical inertness as Teflon (TFE).

Temperature Range: -350°F to 500°F.

**Trademark: W.L. Gore & Associates, Inc.*

9. *Chemraz**

An elastomeric teflon which is used as O-Rings and other types of seals in meters, valves, and accessories. It combines the resilience and low sealing force of an elastomer with the chemical resistance approaching Teflon.

Temperature Range: -20°F to 450°F.

Color Code: Two green stripes.

Hardness: 75–85 Durometer.

**Trademark: Greene, Tweed and Company.*

Plastics

1. *Teflon**

A fluorocarbon consisting of polytetrafluorethylene (TFE). This material is relatively inert to most chemicals, has low coefficient of friction, good abrasion resistance and low coefficient of expansion.

Temperature Range: -40°F to 300°F (diaphragm and seal applications).

Color Code: White, milk-like.

Density: 2.22 g/cm^3.

Thermal Coefficient of Expansion: 4.8 x 10^{-5} in/in °F.

Temperature Range: -100°F to 400°F.

**Trademark: E.I. Dupont Corporation.*

2. *Tefzel**

Tefzel is an injection molding grade of ethylene and tetrafluoroethylene (TFE), modified with glass fibers. It has outstanding chemical resistance, mechanical strength, and abrasion resistance. Very strong oxidizing agents, such as nitric, organic bases, and amines, at their boiling points will affect it to various degrees.

Temperature Range: -100°F to 302°F.

Thermal Coefficient of Expansion: 5.2 x 10^{-5} in/in °F.

Specific Gravity: 1.70–1.86.

**Trademark: E.I. Dupont Corporation.*

3. *Rulon**

Trade name for a family of specially-compounded forms of TFE fluorocarbons. It is used as a bearing material with a low coefficient of friction, excellent abrasion resistance, and chemical resistance equal to TFE. It requires no lubrication and is capable of performing under severe temperatures.

Temperature Range: -400°F to 550°F.

Color Code: Maroon.

**Trademark: Dixon Corporation.*

4. *Ryton**

Trade name for material made from polyphenylene sulfide. It is used as engineering plastic with high strength, low coefficient of expansion, high temperature resistance, and good chemical resistance.

Temperature Range: -20°F to 300°F.

Density: 1.34–1.69 g/cm^3.

Thermal Coefficient of Expansion: 1.5–2.0 x 10^{-5} in/in °F.

Not Resistant To: Concentrated sulfuric acid or nitric acids.

**Trademark: Phillips Petroleum Company.*

5. *Kynar**

Trade name for fluoroplastic polyvinylidene fluoride used for coating magnets and other metals in corrosion environments.

Temperature Range: -80°F to 350°F.

Specific Gravity: 1.75.

Thermal Coefficient of Expansion: 8.5 x 10-5in/in °F.

Resistant To: Acids and bases, solvents, oxidizing agents.

Not Resistant To: Polar solvents such as ketones and esters.

**Trademark: Pennsalt Chemical Company.*

6. *Nylons*

Family of thermoplastic polyamide resins. Used as injection-molded units or fluidized bed powders. Used in meters as functional parts—wear strips, valve guides, exterior parts, bearing retainers, absorbs moistures, not resistant to mineral acids.

Temperature Range: -20°F to 250°F.

Thermal Coefficient of Expansion: 5.5 x 10^{-5} in/in °F.

7. *Epoxies*

Powder coatings designed for coating interior of pipes, valve float guards, etc., for resistance to dilute acids, alkalines, salts, aliphatic and aromatic hydrocarbons.

Temperature Range: -20°F to 180°F.

Thermal Coefficient of Expansion: 2.5–3.6 x 10^{-5} in/in °F.

Not Resistant To: Methylene chloride, phenols, and some mineral acids.

8. Peek (Polyetheretherketone)

A high temperature engineering plastic which is compounded with 35% carbon fiber and 5% PTFE (Teflon). It has excellent mechanical properties. It has excellent resistance to oxygenated hydrocarbons, ethers alcohols reformated gasoline and neat MTBE.

Density: 1.49 g/cm^3

Coefficient of Thermal Expansion: 1.7 x 10^{-5} in/in °F

Temperature Range: -40 to 500 °F

** Vitrex (ICI) Trademark*

Ceramics and Carbon

1. *Ceramagnet A-19**

Family of ceramic permanent magnetic materials belonging to group of hard ferrites consisting of Barium Ferrite. Parts are magnetized with multiple poles on OD and ID of ring to transmit torque through a barrier without a mechanical connection, thus eliminating packing glands.

Temperature Range: -20°F to 600°F.

Thermal Coefficient of Expansion: 10.2 x 10^{-6} in/in °C.

Density: 4.7–5.11 g/cm^3.

Resistant To: Solvents, salts, petroleum oils, caustics. When immersed in corrosive fluids, the material is encapsulated with Tefzel and Ryton.

**Trademark: Stackpole Carbon.*

2. *Carbon Pure-Bon (P-6038C2)**

Resin impregnated carbon-graphite self-lubricating and non-galling material. Remarkable chemical resistance; only strong oxidizing acids, such as fuming nitric, will attack carbon.

Temperature Range: -65°F to 350°F.

Thermal Coefficient of Expansion: 2.0 x 10^{-6} in/in °F.

Hardness (Scleroscope): 90.

**Trademark: Pure Carbon Company.*

Chemicals (60°F) Remarks	Typical Formula	Viscosity (CPS)	Sp. Gr. (60°F)
Abetic Acid			

A - Excellent B - Good C - Poor
D - Not Recommended
Blank Space - Insufficient Information

				Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PhSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	
		A	A						A	A		A	A	A							
Acetaldehyde	CH_3CHO	0.783	0.22	B	D	C	A	C	A	A	A	C	A	D	A	A	A	A	A	D	
Acetates	(CH_3COO-)			A	A	B	A	B	A	A	A	D	A	D	A	A	A	A	A	A	
Acetic Acid (50%)	CH_3COOH	1.057	1.22	C	D	D	C	D	A	A	D	B	B	D	A	A	A	A	A	A	
Acetic Acid (Glacial)	CH_3COOH	1.049		A	B	D	C	D	A	A	B	B	B	D	A	A	A	A	A	A	
Acetic Anhydride	$(CH_3CO)_2O$	1.083	0.90	B	C	D	A	D	B	B	C	D	B	D	A	A	A	D	A	A	
Acetone	CH_3COCH_3	0.797	0.31	B	A	A	A	A	B	B	B	D	A	D	A	A	A	A	A	A	
Acrylic Emulsions				B	B	C	A	C	A	A	A	A		A	A	A	A	A	A	A	
Acrylonitrile	H2CCHCN	0.800		B	A	C	A	A	A	A	A	D	D	C	A	A	A	A	A	A	Note 1
Alcohol-Allyl	CH_2CHCH_2OH	0.852	1.36	B	B	B	A	B	B	B	B	A			A	A	A	A	A	A	Note 1
Alcohol-Amyl	$CH_3(CH_2)_3CH_2OH$	0.817	4.65	A	B	B	A	B	A	A	B	B	A	B	A	A	A	A	B	A	
Alcohol-Butyl	$CH_3(CH_2)_2CH_2OH$ (Butanol)	0.810	2.94	A	B	B	A	B	A	A	B	A	B	A	A	A	A	A	A	A	
Alcohol-Diacetone	$CH_3COCH_2C(CH_3)_2OH$	0.940	3.20	A	B	B	A	B	A	A	B	D	A	D	A	A	A	A	A	A	
Alcohol-Ethyl	C_2H_5OH	0.804	1.20	B	B	B	A	B	A	A	B	A	A	C	A	A	A	A	A	A	
Alcohol-Furfuryl	$C_4H_3OCH_2OH$	1.128		B	B	B	A	B	B	B	B	D	B	C	A	A	A	A	A	A	
Alcohol-Isopropyl	$(CH_3)_2CHOH$	0.786		B	B	B	A	B	B	B	B	B	A	A	A	A	A	A	A	A	
Alcohol-Methyl	CH_3OH	0.792	0.59	D	B	B	A	B	A	A	B	A	A	D	A	A	A	A	A	A	Note 1
Aliphatic Solvents				A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	A	
Alkyd Resin				B	B	C	A	C	A	A	A	A	D	A	A	A	A	A	A	A	Viscosity Prime Factor
Alkyl Benzene	C_2H_5-C_6H_6			B	B	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	
Allyl Chloride	CH_2CHCH_2CL	0.938		D	B	B	B	B	B	B	B	A			A	A	A	A	A	A	
AluminumAmmonium Sulfate (Alum.)	$AlNH_4(SO_4)_2$	1.645		D	D	D	D	D	B	A	D	A	A	A	A	A	A	A	A	A	
Aluminum Chloride (10%)	$AlCl_3 \cdot 6H_2O$	1.07		D	D	D	D	D	B	A	D	A	A	A	A	A	A	A	B	A	
AluminumSodium Sulfate (Aq.)	$AL_2(SO_4)_3 \cdot Na_2SO_4 \cdot 24H_2O$	1.67		D	D	D	D	D	B	A	D	A	A	A	A	A	A	A	A	A	
Amines	(NH_3)			C	D	B	A	B	A	A	A	B	B	D	A	A	A	A	A	A	Note 1
Ammonia (Anh.)	NH_3	0.77	0.25	B	D	B	B	A	A	A	A	B	A	D	A	A	A	A	A	A	Note 1
Ammonia Solutions	NH_4		@ -33°F	B	D	B	B	A	A	A	A	B	A	D	A	A	A	A	A	A	Note 1
Ammonium Carbonate	NH_4HCO_3			B	D	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	Note 1
Ammonium Chloride (0–24%)	NH_4Cl	1.04-1.06		C	D	B	B	B	A	A	B	A	A	A		A	A	A	A	A	
AmmoniumHydroxide (28%)	NH_4OH	0.900		C	D	B	B	B	B	B	B	C	A	D	A	A	A	A	A	A	Note 1
AmmoniumHydroxide (34%)	NH_4OH	0.882		C	D	B	B	B	B	B	B	D	A	D	A	A	A	A	A	A	Note 1
Ammonium Nitrate (8–42%)	NH_4NO_3	1.03		B	D	D	B	D	A	A	A	A	A	B	A	A	A	A	A	A	
Ammonium Phosphate	$(NH_4)_3HPO_4$	1.61		B	D	D	B	D	A	A	A	A	A		A	A	A	A	A	A	Note 1
Ammonium Sulfate	$(NH_4)_2SO_4$	1.28		C	B	C	B	C	A	A	B	A	A	D	A	A	A	A	A	A	Note 1
Amyl Acetate	$CH_3CO_2C_5H_{11}$	0.879	0.89	B	B	C	A	C	A	A	A	D	A	D		A	A	A	A	A	
Aniline	$C_6H_5NH_2$	1.023	4.40	C	C	C	A	C	A	A	B	D	B	C	A	A	A	A	A	A	Note 1
Anionic Detergents				A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Antimony Trichloride	$SbCl_3$	3.14		D	D	D	D	D	D	D	D				A			A	A	A	
Asphalt @ 450°F	Bitumens		2,000 SSU	C	A	A	B	A	A	A	A	D	D	C	A		A	A	A	A	Ventilated Ext.
Barium Carbonate	$BaCO_3$	3.85		B	B	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	
Barium Chloride (26%)	$BaCl_2 \cdot 2H_2O$	1.27		D	B	C	C	C	C	C	B	A	A	A	A	A	A	A	A	A	Note 1
Barium Hydroxide	$Ba(OH)_2$	1.656		D	B	B	B	B	B	A	B	A	A	A	A	A	A	A	A	A	Note 1
Barium Sulfate	$BaSO_4$	4.25		D	C	C	B	C	B	B	B	A	A	A	A	A	A	A	A	A	

Note 1: Avoid dissimilar metals.

A - Excellent B - Good C - Poor
D - Not Recommended
Blank Space - Insufficient Information

Chemicals	Formula	Sp. Gr. (60°F)	Typical (60°F) Viscosity (CPS)	Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PHSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	Remarks
Barium Sulfide	BaS	4.25		D	C	C	B	C	B	B	B	A	A	A	A	A	A	A	A	A	
Beef Tallow				D	D	B	A	B	A	A	A	A	B	A	A	A	A	A	A	A	Steam Clean
Beer				A	B	C	A	C	A	A	A	A	A	A	A	A	A	A	A	A	SS Meter Preferred
Beet Sugar Liquors	Sucrose			A	A	B	A	B	A	A		A	A	A	A	A	A	A	A	A	
Benzaldehyde				A	A	A	A	A	A	A	A				A	A	A		A	A	
Benzene	C_6H_6	0.879	0.652	B	B	B	A	B	B	B	B	D	D	A	A	A	A	A	A	A	
Benzoic Acid	C_6H_5COOH	1.265		B	B	D	B	D	B	B	B	D	D	A	A	A	A	A	A	A	
Benzyl Alcohol	$C_6H_5CH_2OH$	1.040		B	B	A	A	A	B	B	B	D	B	A	A	A	A	A	A	A	
Boric Acid	H_3BO_3	1.434		B	B	D	B	D	A	A	B	A	A	A	A	A	A	A	A	A	
Butadiene	C_4H_6	0.621		A	C	B	A	B	A	A	A			A	A	A	A	A	A	A	Note 2
Butane	C_4H_{10}	0.599		A	A	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Butyl Acetate	$CH_3COOC_4H_9$	0.875	0.732	B	B	A	A	B	B	B	B	D	B	D	A	A	A	A	A	A	
Butylene	C_4H_8	0.595		A	A	A	A	A	A	A	A	B	D	A	A	A	A	A	A	A	Note 2
Butylene Glycol	$HOCH_2CH_2CH(OH)CH_3$	1.00		A	A	A	A	A	A	A	A	A		A	A	A	A	A	A	A	
Butylethyl Ketone	$C_4H_9COC_2H_5$	0.819		A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Butylraldehyde	$CH_3(CH_2)CHO$	0.804	0.43	A	A	A	A	A	A	A	A	D	B	D	A	A	A	A	A	B	
Butycellosolve	$CH_2OHCH_2OC_4H_9$	0.901	6.40	A	A	A	A	A	A	A	A	D	B	D	A		A	A	A	A	
Butyric Acid	C_3H_7OOH	0.958	1.61	B	C	D	B	D	B	B	C	D	B	B	A		A	A	A	A	
Buttermilk				A	D	D	B	D	A	A	A	A	A	A	A	A	A	A	A	A	
Bunker Oils				A	B	B	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Calcium Chloride (38%)	$CaCl{\cdot}6H_2O$	1.33		D	B	D	B	D	B	B	C	A	A	A	A	A	A	A	A	A	Note 1
Calcium Hydroxide	$Ca(OH)_2$	2.34		D	C	C	B	C	B	B	B	A	A	A	A	A	A	A	A	A	
Calcium Hypochlorite (Aq.)	$Ca(OCl)_2$			C	D	D	C	D	C	C	C	B	A	A	A	D	A	D	C	A	Hastelloy C
Calcium Nitrate (Aq.)	$Ca(NO_3)_2{\cdot}4H_2O$	1.82		D	B	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	Note 1
Calcium Sulfate (10%)	$CaSO_4$	2.45	14 CPS	B	B	B	B	B	A	A	A	B	A	A	A	A	A	A	B	A	Note 1
Camphene	$C_{10}H_{16}$	0.833		B	B	B	B	B	B	B	B	A	D	A	A	A	A	A	A	A	
Carbolic Acid (20%)	Phenol	1.07	65 SSU	A	A	D	B	D	A	A	B	D	B	A	A		A		A	A	Note 3
Capric Acid	$CH_3(CH_2)_8COOH$	0.885 @ 40°C		B	B	B	C	B	C	A	B	B	C	A	A		A	A	A	A	
Caproic Acid	$CH_3(CH_2)_4COOH$	0.927 @ 20°C	3.10	A	C	D	B	D	A	A	B	B	C	A	A		A	A	A	A	Fatty Acid
Caprylic Acid	$CH_3(CH_2)_6COOH$	0.915 @ 20°C		A	C	D	B	D	A	A	B	B	C	A	A		A	A	A	A	Fatty Acid
Carbitol	$C_4H_9OC_2H_4OC_2H_4OH$	0.953	6.40	A	A	A	A	A	A	A	A	B	B	B	A	A	A	A	A	A	
Carbitol Acetate	$CH_3COOC_2H_4OC_2H_4OC_2H_5$	1.01	2.70	A	A	A	A	A	A	A	A	D	B	D	A		A	A	A	A	
Carbon Dioxide	CO_2	1.10 @ -37°C		A	A	A	A	A	A	A	A	A	B	B	A		A	A	A	A	Note 2
Carbonic Acid	H_2CO_3	2.44		A	D	C	A	A	A	A	A	B	A	A	A		A	A	A	A	Exists Only in Solid
Carbon Tetrachloride (Dry)	CCl_4	1.59	1.03	C	C	C	A	C	A	A	C	B	D	A	A	A	A	A	A	A	
Carbon Disulphide	CS_2	1.26	0.36	A	C	B	B	B	A	A	B	A	D	A	A	A	A	A	A	A	Note 1
Castor Oil		0.969	98.0	A	A	A	A	A	A	A	A	B	A	A	A	A	A	A	A	A	
Cellosolve	$HOC_2H_4OC_4H_9$	0.901	6.40	A	A	A	A	A	A	A	A	D	B	D	A		A	A	A	A	
Cellosolve Acetate	$CH_3COOC_2H_4OC_2H_5$	0.978	1.32	A	A	A	A	A	A	A	A	D	B	D	A	A	A	A	A	A	
Cerotic Acid	$CH_3(CH_2)_{24}COOH$	0.819 @ 100°C		A	C	D	C	D	A	A	B	B	C	A	A		A	A	A	A	
Cetane	Hexadecane	0.773		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Chlorinated Solvents				A	A	A	A	A	A	A	A	D	D	A	A		A	A	A	A	No Water Present
Chlorine (Dry)	CL_2	1.46		D	D	B	D	C	B	B	B	D	D	A	A	D	A	D	A	A	No Moisture Present

Note 1: Avoid dissimilar metals.
Note 2: For rotary meters recommend LPG trim.
Note 3: C or D rating given due to possible contamination of metered product by metal. Material compatibility may be satisfactory.

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Blank Space - Insufficient Information

Chemicals	Formula	Sp. Gr. (60°F)	Typical (60°F) Viscosity (CPS)	Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PhSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	Remarks
Chloroacetic Acid	$CH_2ClCOOH$	1.370 @ 70°C		D	D	D	D	D	D	D	D	D	B	D	A	D	A		A	A	Hastelloy
Chlorobenzene	C_6H_5Cl	1.105 @ 25°C	0.79	B	B	B	A	B	B	B	B	D	D	A	A	B	A	A	A	A	
Chloroform (Dry)	$CHCl_3$	1.485 @ 20°C	0.58	D	B	B	A	B	A	A	A	D	D	A	A	A	A	A	A	A	Note 1
Chlorosulfonic Acid	$ClSO_2OH$	1.76 @ 20°C		B	B	B	D	B	B	B	D	D	D	D	A	D	A	A	A	A	
Chlorothene	CH_3CCl_3	1.319 @ 25°C		A	A	A	A	A	A	A	A	D		A	A	B	A	A	A	A	
Chromic Acid	H_2CrO_4	2.67		D	D	D	D	D	C	C	D	B	D	A	A	D	A	D	D	A	Lead, Alloy 20
Citric Acid	$C_3H_4OH(COOH)_3$	1.54		C	D	D	C	D	A	A	D	A	A	A	A	A	A	A	A	A	
Coca Cola							A		A	A	A				A	A	A	A	A	A	
Coconut Oil		0.925	27.0	B	B	C	A	C	A	A	B	A	A	A	A	A	A	A	A	A	Note 3
Codliver Oil		0.918	160 SSU	A	A	D	A	D	A	A	B	A	A	A	A	A	A	A	A	A	Note 3
Copper Nitrate 5–50%	$Cu(NO_3)_2 \cdot 3H_2O$	2.174		D	D	D	D	D	A	A	B				A	A	A	A	A	A	
Copper Sulfate	$CuSO_4 \cdot 5H_2O$	2.284		C	D	D	C	D	B	B	B	A	A	A	A	A	A	A	A	A	
Cottonseed Oil		0.915–0.921	70.4	B	B	C	A	C	B	B	B	A	C	A	A	A	A	A	A	A	No Cd. Plating Note 3
Corn Oil	(Fatty Acid)	0.914–0.921	26.0*	B	B	C	A	C	A	B	B	A	C	A	A	A	A	A	A	A	*Vis. @ 130°F Note 3
Cresylic Acid (50%)	(Cresol)	1.034		C	C	D	C	C	B	B	A	D	D	A	A		A		A	A	
Creosote	(Coal Tar)	1.04–1.10	12.0	B	A	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Crude Oil (Sweet)	0.2–0.5% Sulfur			A	B	B	A	A	A	A	A	B	D	A	A	A	A	A	A	A	
Crude Oil (Sour)	0.5–2.5% Sulfur			A	D	B	B	B	A	A	B	B	D	A	A	A	A	A	A	A	Note 1
Cryogenics	Liquid O_2, N_2, CO_2			A	D	D	A	D	A	A	B	D	D	D	A	D	D		A	D	
Cumene	$C_6H_5CH(CH_3)_2$	0.862	0.73	B	B	A	B	B	B	B	B	D	D	A	A	D	A	A	A	A	
Cupric Chloride	$CuCl_2 \cdot 2H_2O$	2.39		D	D	D	D	D	D	D	D	A	A	A	A	A	A	A	A	A	
Cuprous Chloride	CuCl	3.35		D	D	D	D	D	D	D	D	A	A	A	A	A	A	A	A	A	
Cutting Oil-Water Emulsions				A	A	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Cyclo Hexane	C_6H_{12}	0.779	1.02	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Cyclo Hexanone	$C_6H_{10}O$	0.943		B	B	B	A	D	B	B	B	D	B	D	A	A	A	A	A	A	
D.D.T.	$(ClC_6H_4)_2CHCCl_3$			D	D	A	A	A	A	A	A	B	D	A	A	A	A	A	A	A	
Decyl Alcohol	$C_{10}H_{21}OH$	0.829		A	A	A	A	A	A	A	A			A	A	A	A	A	A	A	
Denatured Alcohol	(Denatured Ethyl Alcohol)			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Diammonium Phosphate	Ammonium Phosphate	1.61		B	D	D	D	D	A	A	B	A	A		A	A	A	A	A	A	
Dioctylphthalate	$(C_8H_{17}COO)_2C_6H_4$	0.965		B	A	B	A	B	B	A	B	D	B	B	A	A	A	A	A	A	
Dibutyl Phthalate	$C_6H_4(COOC_4H_9)_2$	1.048 @ 20°C	20.0	B	B	B	A	B	B	A	B	D	B	B	A	A	A	A	A	A	
Dichloroethyl Ether	$C_2H_4ClOC_2H_4Cl$	1.222	2.95	A	A	A	A	A	A	A	A	D	C	C	A		A	A	A	A	
Dichloro Propane	$CH_3CHCLCH_2CL$	1.158	0.88	B	B	A	A	A	A	A	A	B	D	A	A	A	A	A	A	A	
Diethanol Amine	$(HOCH_2CH_2)_2NH$	1.092		A	D	A	A	A	A	A	A	B	B	D	A		A	A	A	A	Note 1
Diethyl Aniline	$(C_2H_5)_2C_6H_3NH2$	0.959		B	D	A	A	A	B	B	B	D	A	D	A		A	A	A	A	Note 1
Diethyl Ketone	$C_2H_5COC_2H_5$	0.816		A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Diethylene Glycol	C_4H_8			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Hygroscopic Liquid
Diethylene Triamine	$(NH_2C_2H_4)_2NH$	0.954	7.0	A	D	A	A	A	A	A	A	B	B	D	A	A	A	A	A	A	Note 1
Diethyl Sulfate	$(C_2H_5)_2SO_4$	1.180	1.79	A	A	A	B	A	A	A	A	A		A	A		A	A	A	A	Anhydrous
Di-octyl Adipate	D.O.A.	0.926	13.7	D	D	A	A	A	A	A	A	D	B	B	A	A	A	A	A	A	
Dipentine	$C_{10}H_{16}$	0.847 @ 15°C		A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	

Note 1: Avoid dissimilar metals.
Note 3: C or D rating given due to possible contamination of metered product by metal. Material compatibility may be satisfactory.

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D - Not Recommended
Blank Space - Insufficient Information

Chemicals	Formula	Sp. Gr. (60°F)	Typical (60°F) Viscosity (CPS)	Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PhSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	Remarks
Diisobutyl Ketone	$C_4H_9COC_4H_9$	0.808		A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Dimethylamine	$(CH_3)_2NH$	0.686		A	D	A	A	A	A	A	A	B	B	D	A	B	A	A	A	A	Note 1
Dimethyl Formamide	$HCON(CH_3)_2$	0.953		D	D	A	A	A	A	A	A	D	B	B	A	A	A	A	A	B	
Dioxane	$C_4H_8O_2$	1.035 @ 20°C	1.31	B	A	A	A	A	A	A	A	D	B	D	A	A	A	A	A	A	
Dipropylene Glycol	$(C_3H_6OH)_2O$	1.025	107.0	A	A	A	A	A	B	B	B	A	A	A	A	A	A	A	A	A	
Dodecyl Benzene	Detergent			A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	
Dowtherms	Diphenyl Oxides	1.060		A	A	B	A	B	A	A	A	D	D	A	A		A	A	A	A	
Ethane	C_6H_5	0.446		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Ether Dimethyl	CH_3OCH_3	0.661	0.23	B	B	B	B	A	A	A	A	D	C	C	A	A	A	A	A	A	
Ethers	$(C_2H_5)_2O$	0.736	0.23	B	B	B	A	B	A	A	A	D	C	C	A	A	A	A	A	A	
Ethanol Amine	$HOCH_2CH_2NH_2$	1.017		A	D	B	A	B	A	B	B	B	B	D	A	A	A	A	A	A	Note 1
Ethyl Acetate	$CH_3COOC_2H_5$	0.883	0.45	A	C	C	A	B	B	B	B	D	B	D	A	A	A	A	A	A	
Ethyl Acrylate	$CH_2CHCOOC_2H_5$	0.92		A	A	A	A	A	A	A	A	D	B	D	A	A	A	A	A	A	
Ethyl Amine	$CH_3CH_2NH_2$	0.689		A	D	B	A	B	A	B	B	B	B	D	A	A	A	A	A	A	Note 1
Ethyl Aniline	$C_2H_5NHC_6H_5$	0.963	2.04	B	D	A	A	A	B	B	B	D	A	D	A	A	A	A	A	A	
Ethyl Benzene	$C_6H_5C_2H_5$	0.867	0.64	A	B	B	A	A	B	B	B	D	A	A	A	A	A	A	A	A	Note 2
Ethyl Chloride (Dry)	C_2H_5Cl	0.921		B	B	B	B	B	A	A	A	A	A	A	A	A	A	A	D	A	Note 2
Ethyl Chloride (Wet)	C_2H_5Cl	0.921		D	C	D	C	D	C	C	D	A	A	A	A	A	A	A	D	A	Note 2
Ethyl Ether	$(C_2H_5)_{20}$	0.714	0.23	B	B	B	B	A	A	A	A	D	C	C	A	A	A	A	A	A	
Ethyl Hexanol	$CH_3CH_2CH_2COH(C_2H_5)_2$	0.83		B	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Ethyl Lactate	$CH_3CHOHCOOC_2H_5$	0.1020		B	B	B	B	B	B	B	B	A		A	A	A	A	A	A	A	
Ethyl Mercaptan	C_2H_5SH	0.839		B	D	A	B	D	B	B	B	D	D	A	A	A	A	A	A	A	Note 1
Ethyl Propyl Myristate	$CH_3(CH_2)_{12}COOC_2H_5$			A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Ethyl Propyl Palmitate	$C_2Hg(CH_2)_{14}COOC_2H_5$	0.83		A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Ethylene Chlorohydrin	$ClCH_2CH_2OH$	1.204	3.4	D	B	B	B	B	B	B	B	D	B	A	A	A	A	A	A	A	
Ethylene Cyanohydrin	$HOCH_2CH_2CN$	1.04		B	B	B	B	D	B	B		A	D	A	A	A	A	A	A	A	
Ethylene Diamine	$(CH_2)_2(NH_2)_2$	0.899	1.54	C	D	B	A	B	A	A	B	A	A	D	A	A	A	A	D	A	Note 1
Ethylene Dichloride	CH_2ClCH_2Cl	1.25	0.83	D	B	D	B	D	A	A	B	C	C	A	A	A	A	A	D	A	Anhydrous
Ethylene Glycol	$(CH_2OH)_2$	1.15	2.18	A	B	B	A	B	B	B	B	A	A	A	A	A	A	A	A	A	
Ethylene Glycol Acetate	$CH_{200}CH_2$						A			A		D	A	D	A	A	A	A	A	A	
Ethyl Oxide	Ether	0.714	0.23	B	B	B	A	B	A	A	A	D	C	C	A	A	A	A	A	A	Dry Liquid
Ethylene	H_2CCH_2	0.610 @ 0°C		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Ethyl Teritary Butyl Ether (ETBE)	$C_2H_5OC_4H_9$			A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Fatty Acids				A	D	D	B	D	B	A	B	B	C	A	A	A	A	A	A	A	
Ferric Chloride	$FeCl_3$	2.8		D	D	D	D	D	D	D	D	D	D	A	A	A	D	A	C	A	Hastelloy C
Ferric Sulphate	$Fe_2(SO_4)_3 \cdot 9H_2O$	2.0–2.1		D	D	D	D	D	B	A	B	A	A	A	A	A	A	A	A	A	
Ferrous Chloride	$FeCl_2 \cdot 4H_2O$	1.93		D	D	D	D	D	D	D	D	A	A	A	A	A	D	A	B	A	
Ferrous Sulphate	$FeSO_4 \cdot 7H_2O$	1.89		D	B	D	D	D	B	A	A	A	A	A	A	A	A	A	A	A	
Fish Oil							A		A	A	A	A		A	A	A	A	A	A	A	
Flexol Plasticizer	DoP			A	A	A	A	A	B	B	B	D	B	B	A		A	A	A	A	
Formaldehyde (37%)	HCHO	1.075		B	A	C	C	C	A	A	B	C	B	D	A	A	A	B	A	A	Note 3
Formic Acid	HCOOH	1.22 @ 20°C		B	C	D	C	D	B	A	C	A	A		A	A	A		A	A	All Concentration
Fruit Juices	Fructose			B	B	D	A	D	A	A	A	A	A		A	A	A	A	A	A	No SO_2 Present
Furfural (25%)	C_4H_3OCHO	1.15	1.49	B	B	B	B	B	B	B	B	D	B	D	A	A	A	A	A	A	
Fertilizer Solutions	NH_4NO_3 Phosphate KC_1NH_4	0.811		D	D	A	A	A	A	A	A	A	A		A	A	A	A	A	A	Note 1
Freon-11, 12	CCl_3F			B	B	B	A	B	A	A	A	B	D	B	A	A	A	D	A	B	

Note 1: Avoid dissimilar metals.
Note 2: For rotary meters recommend LPG trim.
Note 3: C or D rating given due to possible contamination of metered product by metal. Material compatibility may be satisfactory.

A - Excellent B - Good C - Poor
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Chemicals	Formula	Sp. Gr. (60°F)	Typical (60°F) Viscosity (CPS)	Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PhSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	Remarks
Fuel Oils #1–#3		0.82–0.95		A	A	A	A	A	A		A	A	D	A	A	A	A	A	A	A	34–45 SSU
Fuel Oils #4–#6		0.82–0.95		A	A	A	A	A	A		A	A	D	A	A	A	A	A	A	A	50–3,000SSU
Gallic Acid	$C_6H_2(OH)_3CO_2H$	1.69		B	C	D	B	D	B	B	B	B	B	A	A	A	A	A	A	A	
Gasoline	C_6H_{12}-$C_{10}H_2$	0.66–0.69		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Glass Water	Sodium Silicate			D	D	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	Note 1
Galuber's Salts	Sodium Sulfate	1.46		A	B	B	B	B	B	A	B	D	B	A	A	A	A	A	A	A	Note 1
Gluconic Acid	$CH_2OH(CHON)_4COOH$			B	B	B	B	A	B	B	B	A		A	A		A	A	A	A	
Glycerol (Glycerine)	$C_3H_5(OH)_3$	1.260		A	A	B	A	B	A	A	A	A	A	A	A	A	A	A	A	A	2.950 SSU @ 68.6°F
Glyoxal	OHCCHO	1.26		B	B	B	A	B	A	A	A	A	A	A	A	A	A	A	A	A	
Gypsum	$CaSO_4 \cdot 2H_2O$	2.31		B	B	B	B	B	A	A	A	A	A	A	A		A	A	A	A	
Glucose	Corn Syrup			A	A	B	A	B	A	A	A	A	A	A	A	A	A	A	A	A	67,500 SSU @ 100°F
Glycols	Ethanediol	1.11		B	B	D	A	B	A	A	B	A	A	A	A	A	A	A	A	A	90–240 SSU @ 70°F
Hempseed Oil		0.925													A		A	A	A	A	
Heptane	C_7H_{16}	0.683	0.409	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Hexadecane	(Cetane) $C_{16}H_{34}$	0.773	3.3	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Hexane	C_6H_{14}	0.659	0.326	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Hexyl Alcohol	$C_6H_{13}OH$	0.818		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Hexylene Glycol	$C_6H_{12}(OH)_2$	0.921		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Hydraulic Oil	Petroleum Based		60.0	A	B	B	A	A	A	A	A	D	A	A	A	A		A	A	A	
Hydroidic Acid	HI	1.70		D	D	D	D	D	B	B	B		A	A		A		A		A	
Hydrobromic Acid (48%)	HBr	1.488		D	D	D	D	D	D	D	D	D	A	A	A	A	A	D	B	A	
Hydrochloric Acid-All Concentration Rubber,Glass-	HCl	1.19		D	D	D	D	D	D	D	D	D	C	A	A	D	D	D	A	A	Hastelloy A- Lined Vessels
Hydrocyanic Acid	HCN	0.697		A	D	B	D	A	B	B	B	B	A	A	A	A	A	D		A	
Hydrofluoric Acid	HF			D	D	D	D	D	D	D	D	D		B	D	A	A	D	B	A	Rubber, Lead Linings
Hydrogen Peroxide (30%)	H_2O_2			D	D	D	D	D	A	A	B	B	A	A	A	A	A	A	A	A	Low Pressure and Temp.
Hydrogen Peroxide (70%)	H_2O_2	1.46		D	D	D	D	D	A	A	A	D	C	A	A	A	A	A	A	A	SS Must be Passivated
Hydrogen Sulfide (N. Aq.)	H_2S	1.185		A	D	B	D	D	A	A	B	A	A	D	A	A	A	A	A	A	
Hydrogen Sulfide (Aq.)	H_2S	1.185		A	D	B	D	D	A	A	B	D	A	D	A	A	A	A	A	A	
Iron Potassium Sulfate	$FeK(SO_4)_2 \cdot 12H_2O$	1.80		A	B	D	B	D	B	B	B	A	A	A	A		A	A	A	A	
Iso-Butane	$(CH_3)_2CHCH_3$	0.564		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Iso-Butanol	$(CH_3)_2CHCH_2OH$	0.806	4.0	A	B	B	A	B	A	A	A	A	B	A	A	A	A	A	A	A	
Iso-Butylamine	$(CH_3)2CHCH_2NH_2$	0.731	0.55	A	D	B	A	B	A	A		C	D	D	A	A	A	A	A	A	
Isobutyl Acetate	$C_4H_{900}CCH_3$	0.868	0.7	A	B	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Iso-Decanol	$C_{10}H_{21}OH$	0.839		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Iso-Hexanol	C_6H13OH	0.818		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Iso-Octane	C_8H_{18}	0.691		A	A	B	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Iso-Pentane	$(CH_3)_2CHCH_2CH_3$	0.619	0.22	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Iso-Propanol	C_3H7OH	0.786	2.10	A	A	B	A	B	A	A	B	B	A	A	A	A	A	A	A	A	
Iso-Propyl Acetate	$CH_3COOCH(CH_3)_2$	0.869	0.49	A	C	C	A	B	B	B	B	D	B	D	A	A	A	A	A	A	
Iso-Propyl Ether	$(CH_3)_2CHOCH(CH_3)_2$	0.723	0.32	A	A	B	A	A	A	A	A	B	D	D	A	A	A	A	A	A	
Iso-Propyl Amine	$C_3H_7NH_2$	0.688		A	D	B	A	B	A	B	B		A		A	A	A	A	A	A	
Iso-Phorone	$C_9H_{14}O$	0.922	2.62	A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	

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Chemicals	Formula	Sp. Gr. (60°F)	Typical (60°F) Viscosity (CPS)	Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PhSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	Remarks
Iso-Valeric Acid	C_5H_9OOH	0.931											A		A		A	A		A	
Inks—Printers		1.00–1.38	500.0	B	C	D	A	D	B	A	B				A	A	A	A	A	A	
Jet Fuel	JP-4, JP-5, JP-6			A	B	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Gasoline-Kerosene Blend
Kerosene		0.802	30 SSU	A	A	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Ketone, Butylethyl	$C_4H_9COC_2H_5$	0.819		A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Ketone, Diethyl	$(C_2H_5)_2CO$	0.816		A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Ketone, Di-Iso-Propyl	C_4H_8CO			A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Ketone, Methyl Ethyl	$CH_3COC_2H_5$	0.825	.40	A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Ketone (MIBK)	$C_4H_9COCH_3$	0.804	0.59	A	A	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Lactic Acid	$CH_3CHOHCOOH$	1.2 @ 20°C		A	D	D	C	D	A	A	C	A	A	A	A	A	A	A	B	A	
Lacquer		0.900		A	A	D	A	D	A	A	A	A		A	A	A	A	A	A	A	
Lard Oil	Grease Oil	1.470		A	A	C	A	C	A	A	A	A	B	A	A	A	A	A	A	A	287 SSU @ 100°F - Note 3
Latex Sol (70%)	Ph 1.7		900.0						A	A	A	A		A	A	A	A	A	A	A	
Lauric Acid	$CH_3(CH_2)_{10}COOH$	0.833		A	C	D	C	A	A	A	A	A		A	A	A	A	A	A	A	
Lecithin	1.0	5,000 SSU		A	A	C		C	A	A	A			A	A	A	A	A	A	A	
Ligroin	Petroleum Ether			A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Linoleic Acid	$C_{10}H_{17}(CH_2)_7COOH$	0.905		A	B	B	C	B	A	A	B	B	D	B	A	A	A	A	A	A	
Linolenic Acid	$(C_{10}H_{15}CH_2)_7COOH$	0.916		A	B	B	C	B	A	A	B	B	D	B	A	A	A	A		A	
Linseed Oil	Flaxseed Oil	0.931	33.0	A	B*	B*	A	B*	A	A	B	A		A	A	A	A	A	A	A	Corrosive if Free Acid Present
Liquefied Pet. Gas	L.P.G.			A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Liquid Feed	Morea	1.2	22.0					A	A	A	A		A	A	A	A		A	A	A	
Magnesium Hydroxide	$Mg(OH)_2$	2.36		D	B	B	B	B	A	A	A	B	A	A	A	A	A	A	A	A	Note 1
Magnesium Chloride (10%)	$MgCl_2 \cdot 6H_2O$	1.56		D	D	B	B	B	A	A	C	A	A	A	A	A	A	B	A	A	
Magnesium Nitrate	$Mg(NO_3)_2 \cdot 6H_2O$	1.46		B	C	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	Note 1
Magnesium Sulfate	$Mg(SO_4) \cdot 7H_2O$	1.678		B	D	B	B	B	A	A	D	A	A	A	A	A	A	A	A	A	Note 1
Maize Oil									A	A	A	A		A	A	A	A	A	A	A	
Maleic Acid	$(CHCOOH)_2$	1.59		B	B	B	C	B	A	A	B	D	D	A	A	A	A	A	A	A	
Malonic Acid	$CH_2(COOH)_2$	1.63					C		A	A					A	A	A	A	A	A	
Menhaden Oil (10%)	Moss Bunker Oil	0.927–0.933	28.0				A		A	A					A	A	A	A	A	A	Viscosity @ 100°F
Mercuric Chloride	$HgCl_2$	5.32		D	D	D	D	D	D	D	D	A	A	A	A		A		A	A	Titanium
Mesityl Oxide (Ketone)	$(CH_3)_2C_3HOCH_3$	0.863	0.60	B	B	B	A	A	B	B	B	D	B	D	A		A	A	A	A	
Methyl Acetate	CH_3COOCH_3	0.924	0.38	A	C	C	B	B	B	B	B	D	B	D	A	A	A	A	A	A	Alloy 20
Methyl Acrylate	$C_3H_9OOCH_3$	0.957		A	B	B	A	A	A	A	A	D	B	D	A	A	A	A	A	A	
Methyl Amine	CH_3NH_2		0.23	B	D	B	B	B	B	B	B		A		A	A	A	A	A	A	Note 1
Methyl Amyl Acetate	$C_8H_{16}O_2$	0.859		A	C	C	B	B	B	B	B		A	D	A	A	A	A	A	A	
Methyl Amyl Alcohol	$C_6H_{13}OH$	0.807		A	B	B	A	B	A	A	A		A		A	A	A	A	A	A	
Methyl Aniline	$C_6H_5NH(CH_3)$	0.991	2.02	B	D	A	B	A	B	B	B	D	A	D	A	A	A	A	A	A	Note 1
Methyl Cellosolve	$CH_3OCH_2CH_2OH$			A	A	B	A	B	A	A	A	C	B	D		A	A	A	A	A	
Methyl Cyclohexane	C_7H_{14}	0.769		A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	A	
Methyl Cyclo Hexanol	$CH_3C_6C_{10}OH$			A	B	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Methyl Glycol Acetate				A	C	C	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Methyl Methacrylate	$CH_2C(CH_3)COOCH_3$	0.940		A	A	A	A	A	A	A	A	D	D	D	A	A	A	A	A	A	
Methyl Pyrrolidone	$CH_3NC_3H_6CO$			D	D	A	A	A	A	A	A	D	A	D	A	A	A	A	A	A	
Methyl Salicylate	$C_6H_4OHCOOCH_3$	1.180					A		A	A	A	D	B	C	A	A	A	A	A	A	

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Chemicals	Formula	Sp. Gr. (60°F)	Typical (60°F) Viscosity (CPS)	Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PhSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	Remarks
Methyl Teritary Butyl Ether (MTBE)	$CH_3OC_4H_9$	0.74	.35	A	A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	
Methylene Chloride	CH_2Cl_2	1.33	0.42	D	B	B	B	B	B	B	B	D	D	B	A		A	A	A	A	Note 1
Methylene Dichloride				C	B	B	B	B	B	B	B	D	D	B	A	A	A	A	A	A	Note 1
Methylene Glycol	$CH_2(OH)_2$			B	B	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Milk	Lactic Acid	1.028–1.035	1.16				A		A	A	A	A	A	A	A		A	A	A	A	
Mineral Spirits	Naphtha			A	B	B	A	B	B	B		A	D	A	A	A	A	A	A	A	Note 2
Molasses (Crude)	Mother Liquor	1.40–1.46	151.5	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Viscosity @ 130°F
Molasses (Edible)	Blackstrap	1.46–1.49	1320.0	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Viscosity @ 130°F
Monochlorobenzene	C_6H_5CL	1.105		B	B	B	A	B	B	B	B	D	D	A	A	A	A	A	A	A	
Monoethanolamine				D	D	A	A	A	A	A	A	D	B	D	A	A	A	A	A	A	
Muriatic Acid	Hydrochloric			D	D	D	D	D	D	D	D	C	A	A	A	A	D	A	A		
Myristic Acid	$CH_3(CH_2)_{12}COOH$	0.873		A	A	A	C	A	A	A	A			A		A	A	A	A		
Methane	CH_4	0.554		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Naphtha (Aliphatic)		0.665		A	B	B	A	A	B	B	B	A	D	A	A	A	A	A	A	A	Note 2
Naphtha (Aromatic)		0.885–0.970		A	B	B	A	A	B	B	B	B	D	A	A	A	A	A	A	A	Note 2
Naphtha (V.M. and P.)				A	B	B	A	A	B	B	B	B	D	A	A	A	A	A	A	A	Note 2
Neatsfood Oil		0.916					A		A	A	A	A	B	A	A	A	A	A	A	A	230 SSU @ 100°F
Nickel Ammonium Sulfate (10%)	$NiSO_4 \cdot (NH_4)_2 \cdot 6H_{2O}$	1.92		D	D	D	D	D			D	A	A	A	A		A	A	A	A	Monel
Nickel Chloride (37%)	$CiCl_2 \cdot 6H_2O$	1.35		D	D	D	D	D	D	B	D	A	A	A	A		A	A	A	A	
Nickel Sulfate (25%)	$NiSO_4 \cdot 6H_2O$	1.20		D	B	D	D	D	A	A	A	A	A	A	A		A	A	A	A	
Nitro Benzene	$C_6H_5NO_2$	1.198		B	B	B	A	A	B	B	B	D	D	B	A	A	A	C	B	A	
Nitro Ethane	$C_2H_5NO_2$	1.052		A	A	A	A	A	A	A	A	D	B		A	A	A	C	B	A	
Nitro Propane	$C_3H_7NO_2$	1.003		A	A	A	A	A	A	A	A	D	B	D	A	A	A	C	B	A	
Nonenes	C_9H_{18}	0.743		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Nitric Acid (10%)	HNO_3	1.074		B	D	D	D	D	A	A	B	D	D	A	A	A	A	A	B	A	
Nitric Acid (30%)	HNO_3	1.186		D	D	D	D	D	A	A	B	D	D	A	A	D	A	D	A	A	
Nitric Acid (50%)	HNO_3	1.318	0.76	D	D	D	D	D	A	A	B	D	D	B	A	D	A	D	A	A	
Nitric Acid (70%)	HNO_3	1.421		D	D	D	D	D	A	A	B	D	D	B	A	D	A	D	B	A	
Nitric Acid (100%)	HNO_3	1.502		A	D	D	D	D	A	A	D	D	D	B	A	D	A	D	B	D	
Nitrocumene	$C_6H_4CH(CH_3)_2NO_2$			C	D	B	B	B	B	B	B	B	C	D	A	A	A	A	A		
Nitro Fluorobenzene	$C_6H_4NO_2FL$		2.0	C	D	B	B	B	B	B	B	B	C	D	A	A	A	C	B		
N. Octane	C_8H_{18}	0.702	0.54	A	A	A	A	A	A	A	A	B	D	A	A	A	A	A	A	A	
Oleic Acid (40%)	$CH_3(CH_2)_{14}C_2H_2$	0.890		D	D	D	C	D	A	A	B	C	D	B	A		A		A	A	Note 3
Oxalic Acid (50%)	$(COOH)_2$	1.653		D	D	B	C	B	A	A	B	B	A	A	A		A	C	A	A	
Olive Oil	Sweet Oil	0.910	84.0	A	B	B	A	B	A	A	A	A	B	A	A	A	A	A	A	A	200 SSU @ 100°F
Oil-Lube			113.0	A	B	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Oils-Mineral				A	B	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Oils-Petroleum				A	B	B	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Oils-Water Emu.				A	A	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Ortho-Dichloro-Benzene	$C_6H_4CL_2$	1.305		B	B	B	B	B	B	B	B	D	D	A	A	A	A	A	B	A	
Palmitic Acid	$CH_3(CH_2)_{14}COOH$	0.841		B	B	C	C	C	B	B	B	A	D	A	A		A	A	A	A	
Palm Oil		0.924 @ 100°	44.0	A	B	C	A	C	B	B	B	A	C	A	A	A	A	A	A	A	
Paradyne				A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	

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Chemicals	Formula	Sp. Gr. (60°F)	Typical (60°F) Viscosity (CPS)	Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PhSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	Remarks
Paraffin		0.83–0.93		A	A	B	A	B	A	A	A	A	B	A	A	A	A	A	A	A	
Para-tert-Amyl Phenol	$(CH_3)_2C_2H_5CC_6H_4OH$	0.955		A	A	B	A	B	A	A	A	D	A	A	A	A	A	B	B	A	
Para-tert-Butyl Phenol	$(CH_3)_3CC_6H_4OH$	1.03		D	D	A	A	A	A	A	A	A		A	A	A	A		B	A	
Paratex	Water Softner			D	D	A	A	A	A	A	A	A		A	A	A	A	A	A	A	
Parathion	$C_{10}H_{14}NO_5PS$						A		A	A	A	A		A	A	A	A	A	A	A	
Peanut Oil		0.920 @ 100°	38.0	A	B	C	A	C	B	B	B	A	C	A	A	A	A	A	A	A	
Pear Oil	Amyl Acetate	0.879	0.89	A	B	C	A	C	B	B	B	D	A	D	A	A	A	A	A	A	Note 3
Pentane	C_5H_{12}	0.626		A	B	B	A	B	B	B	B	A	D	A	A	A	A	A	A	A	
Perchloroethylene	C_2Cl_4	1.65	0.84	B	C	B	A	A	A	A	A	B	D	A	A	A	A	A	A	A	
Perilla Oil		0.932		A	B	B	A	B	A	A	B	A	A	A	A		A	A	A	A	
Petroleum Ether	Ligroin	0.665		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Petroleum Spirits	Naphtha			A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Phenolic Resins				A	C	C	A	C	A	A	A	A	B	A	A	A	A	A	A	A	
Phenol (20%)	C_6H_5OH	1.07	12.7	A	A	B	A	B	A	A	B	D	A	A	A	A	A	D	A	A	Use SS to Prevent Product Discoloration
Phosphoric Acid (10%)	H_3PO_4	1.053		D	D	D	D	D	B	B	B	D	D	A	A	A	A	A	A	A	
Phosphoric Acid (25%)	H_3PO_4	1.152		D	D	D	D	D	B	B	D	D	D	A	A	A	A	A	A	A	Most Concentrations Use Hastelloy, Alloy 20
Phosphoric Acid (75%)	H_3PO_4	1.579		D	D	D	D	D	D	B	D	D	D	A	A	A	A	A	A	A	
Phthalic Acid	$C_6H_4(CO_2H)_2$	1.58		B	B	C	C	D	B	B	B	C	C	A	A		A	A	A	A	
Phthalic Anhydride	$C_6H_4(CO)_{20}$	1.527		B	B	C	B	D	B	B	B	C	C	A	A	A	A	A	A	A	
Picric Acid	$C_6H_2(NO_2)_3OH$	1.76		C	D		C		A	A		A	A	A	A	A	A	A	A	A	
Polyethylene Glycol	$H(OC_2H_4)NOH$			A	B	B	A	B	B	B	B	A	A	A	A	A	A	A	A	A	
Polyester Resin				D	D	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Polypropylene Glycol	CH_3CHOH $(CH_2OCHCH_3)N\text{-}CH_2OH$			A	B	B	A	B	B	B	B	A	A	A	A	A	A	A	A	A	
Polyvinyl Acetate	$(H_2C_2HOOC_2H_3)$	1.19		A	A	A	A	B	A	A	A		A		A		A	A	A	A	
Polyvinyl Acetate Emulsion	$PVac+H_2O$			A	A	A	A	B	A	A	A		A		A	A	A	A	A	A	
Polyvinyl Alcohol	$(CH_2CHOH)x$	1.98	2000.0	A	B	A	A	A	A	A	A	A		A	A	A	A	A	A	A	
Polymerized Gasoline				A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Potassium Chloride	KCl	1.98		D	B	C	C	C	A	A	B	A	A	A	A	A	D	A	A	A	Note 1
Potassium Aluminum Sulfate	$AlK(SO_4)_2 \cdot 12H_2O$	1.75		B	B	C	C	C	A	A	B	A	A	A	A	A	A	A	A	A	Note 1
Potassium Cyanide (25%)	KCN	1.52		D	D	D	D	B	A	A	B	A	A	A	A		A		A	A	Note 1
Potassium Hydroxide (25%)	KOH	2.044		D	D	B	B	B	B	B	B	B	A	D	A	A	A	A	A	A	Note 1
Potassium Hydroxide	KOH			D	D	D	B	D	A	A	A	B	A	D	A	A	A	A	A	A	Note 1
Potassium Sulfate	K_2SO_4	2.66		B	B	C	B	B	B	B	B	A	A	A	A	A	A	A	A	A	Note 1
Potassium Sulfide	K_2S	1.80		B	D	D	B	D	B	B	B	A	A	A	A	A	A	A	A	A	Note 1
Potash (Aq.)	K_2CO_3	2.33		C		A	B	A	A	A	B	A	A	A	A	A	A	A	A	A	Note 1
Propane	C_3H_8	0.531		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	Note 2
Propionic Acid (20%)	$CH_3CH_2CO_2H$	0.994		B	B	D	C	D	B	B	D		A		A	A	A	A	A	A	
Propylene	C_3H_7	0.513		A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	Note 2
Propylene Diamine	$C_3H_6(NH_2)_2$	0.873	1.70	B	B	B	A	B	A	A		D	D	D	A	A	A	A	A	A	
Propylene Glycol	$C_3H_6(OH)_2$	1.038	58.0	A	B	B	A	B	B	B	B	A	A	A	A	A	A	A	A	A	
Propylene Oxide	C_3H_8O	0.830		B	B	B	A	B	A	A	B	D	B	D	A	A	A	A	A	A	
Prussic Acid	HCN	0.697		A	D	B	C	A	B	B	B	B	A	A	A		A		A	A	
Pyridine	$N(CH)_4CH$	0.978		A	B	B	B	B	A	A	B	D	B	D	A	B	A	A	A	A	

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Pyrogallic Acid	$C_6H_3(OH)_3$	1.463		B	B	D	C	D	B	B	B	B	B	A	A		A	A	A	A	
Pyrrolidine	C_4H_9N	0.866		B	B	B	A	B	A	A	B	D	A	D	A		A	A	A		
Rayon (Spun Viscose)				B	B	B	A	B	A	A	B		A		A		A	A	A	A	40,000 SSU @ 80°F
Raffinate		0.712		A	A	A	A	A	A	A	A	A		A	A		A	A	A	A	
Resins and Rosins				B	B	C	A	C	B	B	B	A		A	A	A	A	A	A	A	Note 3
Ricinoleic Acid	$C_{18}H_{32}O(OH)_2$	0.940		B	A	A	C	A	A	A	A				A		A	A	A	A	Not Over 21°F
Rotograve-Ink				D	D	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	
Rubber Solvent				A	A	A	A	A	A	A	A			A	A		A	A	A	A	100,000 SSU
Salicylic Acid	$C_6H_4(OH)(COOH)$	1.48	2.71	C	C	D	C	D	A	A	B	B	A	A	A	A	A	A	A	A	
Shellacol				A	A	B	A	A	A	A	A			A	A	A	A	A	A	A	
Shortening							A		A	A	A	A		A	A	A	A	A	A	A	Note 3
Sodium Aluminate	$Na_2Al_2O_4$			C	B	C	B	C	B	A	B	A	A	A	A	A	A	A	A	A	
Soap Solutions (0–20%)	Stearates			C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Sodium Bicarbonate (50%)	$NaHCO_3$	1.019–1.108		D	B	B	B	B	A	A	B	A	A	A	A	A	A	A	A	A	Note 1
Sodium Carbonate (0–20%)		1.146		D	D	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	
Sodium Chloride (30%)	NaCl	1.012–1.164		D	B	B	B	B	A	A	A	A	A	A	A	A	A	A	A	A	Pitting may Occur
Sodium Chromate	$NaCrO_4$	1.261		B	B	B	B	B	B	B	B	A	A	A	A	A	D	A	A	A	
Sodium Cyanide	NaCn			D	D	B	D	D	A	A	B	A	A		A	A	A		A	A	Note 1
Sodium Hydroxide (20%)	NaOH	1.219		D	A	A	A	A	A	A	A	B	A	B	A	A	A	A	A	A	Note 1
Sodium Hydroxide (30%)	Caustic	1.262		D	A	A	A	A	A	A	A	B	A	B	A	A	A	A	A	A	Note 1
Sodium Hydroxide (50%)	Soda	1.525		D	D	B	C	B	B	B	B	B	A	B	A	A	A	A	A	A	Note 1
Sodium Hydroxide (70%)	Soda	1.788		D	D	D	C	D	B	B	B	B	A	B	A	A	A	A	A	A	Note 1
Sodium Hypochlorite (5%)	NaOCl			D	D	D	C	D	D	D	D	B	B	A	A	A	A	A	A	A	Hastelloy C
Sodium Meta Phosphate	$NaPO_3$			D	B	B	B	D	B	B	B	A	A	A	A		A	A	A	A	Note 1
Sodium Metasilicate	Na_2SiO_3	2.61		D	D	B	C	B	A	A	A	A	A	A	A	A	A	A	A	A	No Brass
Soidum Monochloro Acetic Acid	$NaCH_3COOCL$	1.328		D	D	D	D	D	A	A	A	D	D	A	A	A	A	A	A	A	
Sodium Nitrate	$NaNO_3$	1.36		A	B	B	C	B	A	A	B	B	A		A	A	A	A	A	A	Note 1
Sodium Perborate (10%)	$NaBO_2$			D	B	B	B	B	B	B	B	B	A	A	A	A	A	A	A	A	
Sodium Peroxide (10%)	Na_2O_2	2.80		C	D	C	B	B	A	A	B	B	A	A	A	A	A	A	A	A	Note 1
Sodium Phosphate (5%)	Na_2HPO_4	1.52		D	B	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	Note 1
Sodium Silicate	$Na_2O{\cdot}SiO_2$	1.56		D	D	B	B	B	B	B	B	A	A	A	A	A	A	A	A	A	Note 1
Sodium Sulfate (0–50%)	Na_2SO_4	1.047		A	B	B	B	B	B	A	A	A	A	A	A	A	A	A	A	A	Note 1
Sodium Sulfide	$Na_2S{\cdot}5H_2O$	1.02–1.36		D	D	C	B	C	B	B	B	A	A	A	A	A	A	A	A	A	Note 1
Sodium Thiosulfate (25%)	$Na_2S_2O_3$	1.232		A	B	D	B	D	B	B	B	B	A	A	A	A	A	A	A	A	Pitting may Occur
Sodium Xylene Sulfonate	$(CH_3)_2C_6H_3SO_3Na{\cdot}H_2O$			A	B	A	A	A	A	A	A	D	D	A	A	A	A	A	A		
Solvesso-100–150 Aromatic Solvents		0.889	1.17	A	A	A	A	A	A	A	A	C	D	A	A	A	A	A	A	A	
Soybean Oil		0.924	40.6	B	B	D	A	D	A	A	A	A	D	A	A	A	A	A	A	A	No Cad. Plating - Note 3
Stoddard's Solvent		0.780		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Soups							A		A	A					A	A	A	A	A	A	
Sperm Oil		0.878	42.0				A		A	A					A	A	A	A	A	A	110 SSU & 100°F
Stannic Chloride	$SnCl_4$	1.21		D	D	D	D	D	D	D	D	A	A	A	A	A	A	A	A	A	
Stannous Chloride	$SnCl_2$	2.71		D	D	D	D	D	D	D	D	A	A	A	A	A	A	A	A	A	
Starch	$(C_6H_{10}O_5)N$	1.5		B	B	A	A	A	A	A	A		B	A	A	A	A	A	A	A	Visc. 100–100,000 SSU

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Steam Condensate				A	A	A	A	A	A	A	A	D	A	C	A	A	A	A	A	A	
Stearic Acid	$CH_3(CH_2)_{16}CO_2H$	0.839		B	C	C	C	C	A	A	B	B	B		A	A	A	A	A	A	
Styrene	$C_6H_5CHCH_2$	0.904		A	B	A	A	A	A	A	A	D	D	B	A	A	A	A	A	A	
Sugar Solutions	Glucose		2.8×10^5	A	A	D	A	B	A	A	A	A	A	A	A	A	A	A	A	A	
Sulfate Liquors				D	D	B	A	B	B	A	B	B	A	A	A	A	A	A	A	A	
Sulfonic Acid	$C_6H_5HSO_3$			D	B	D	C	D	B	B	B				A		A	A	B	A	
Sulfur	S	2.06	10.94	A	D	A	B	A	A	A	B	D	D	C	A		A	A	A	A	All Iron Up to 350°F
Sulfur Dioxide	SO_2		@ 120°C	B	B	B	B	B	B	D	D	B	A	A	A	A		A	A		
Sulfuric Acid (0–7%)	H_2SO_4	1.074		D	D	D	C	D	D	B	D	D	D	A	A	A	A	A	A	A	Hastelloy B, C, D
Sulfuric Acid (30%)	H_2SO_4	1.228		D	D	D	D	D	D	D	D	D	D	A	A	A	A	A	A	A	Rubber or Glass-Lined Equip. Needed
Sulfuric Acid (50%)	H_2SO_4	1.407		D	D	D	D	D	D	D	D	D	D	A	A	A	A	D	A	A	
Sulfuric Acid (85%)	H_2SO_4	1.790		D	D	B	D	B	B	A	D	D	D	A	A	D	D	D	A	A	
Sulfuric Acid (93%)	H_2SO_4	1.835	23.0	D	D	B	D	B	B	A	C	D	D	A	A	D	D	D	A	A	
Sulfurized Oil				B	D	B	B	B	B	B	B	D	D	D	A	A	A	A	A	A	
Tall Oil	Liquid Rosin			D	B	B	A	B	B	B	B	B	D	A	A	A	A	A	A	A	
Tallow—Oil				B			A	A	A	A	A	A		A	A	A	A	A	A	A	
Tar Oil	Creosote	1.04–1.10	12.0	B	A	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Tannic Acid (10%)	$C_{14}H_{10}O_9$	1.04		C	B	C	C	C	A	A	B	A	A	A	A	A	A	A	A	A	
Tergitol Nonionic NPX	Phenyl Ether	1.063	373 cks			D	A	D	A	A	A				A	A	A	A	A	A	
Teritary Amyl Methyl Ether	$C_5H_{11}OC_4H_9$			A	A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	
Tetrahydrofuran	C_4H_8O	0.880		A	A	A	A	A	A	A	A	D	A	D	A	A	A		A	A	
Tetra Methyl Benzene	$(CH_3)_4C_6H_2$	0.896		A	A	A	A	A	A	A	A	A		A	A	A	A	A		A	
Tetrapropylene	$C_{12}H_{24}$	0.770		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A		A	
Textile Spirits		0.689		A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	
Titanium Sulfate (10%)	$(TiSO_4)_2 \cdot 9H_2O$	1.47		D	B	D	B	D	B	B	D						A			B	Hygroscopic
Toluene	$C_6H_5CH_3$	0.866	0.59	A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	
Toluene Diisocynate	$CH_3C_6H_3(NCO)_2$	1.22	38–750 SSU	D	D	A	A	A	A	A	A	D	A	B	A	A	A	A	A	A	
Tomato Paste				B	C	C	A	C	A	A	A	D	A	D	A	A	A	A	A	A	
Tri-Chloro-Acetic Acid	CCl_3COOH	1.62		D	D	D	D	D	D	D	D	B	B	C	A	A	A		A	A	Glass Linings Needed
Trichloro Ethane (Dry)	$C_2H_3Cl_3$	1.44	1.20	A	A	A	A	A	A	A	A	D	D	A	A	C	A	A	A	A	No Water
Trichloroethylene	C_2HCl_3	1.45	0.55	A	B	B	A	B	B	B	B	D	D	A	A	C	A	A	A	A	
Triclene D	Trichloroethylene	1.45	0.55	A	B	B	A	B	B	B	B	D	D	A	A	C	A	A	A	A	
Tri-Decyl Alcohol	$C_{12}H_{25}CH_2OH$	0.845		A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	
Triethanol Amine	$(HOCH_2CH_2)_3N$	1.12	500 SSU	A	D	A	A	A	A	A	A	B	B	D	A	A	A	A	A	A	Note 1
Triethylene Glycol	$HO(C_2H_4O)_3H$	1.12	0.47	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Trimethylamine	$(CH_3)_3N$	0.662		A	D	A	A	A	A	A	A	B	A	D	A	A	A	A	A	A	Note 1
Triethylene Tetraamine	$Na_3PO_4 \cdot 10H_2O$	2.53		D	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Tri-Sodium Phosphate	$Na_3PO_4 \cdot 10H_2O$	2.53		D	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
Triton X-100	Surfactant		34.0	A	A	A	A	A	A	A	B	A		A	A	A	A	A	A	A	
Tuna Fish Oil				B	D	B	A	B	A	A	A	A		A	A	A	A	A	A	A	
Tung Oil	Wood Oil	0.936		B	B	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Turpentine	$C_{10}H_{16}$	0.87	1.48	A	B	B	A	B	A	A	A	A	D	A	A	A	A	A	A	A	
Urea	$CO(NH_2)_2$	1.335		B	D	C	A	C	B	B	B	A	B		A	A	A	A	B	A	
Urea Formaldehyde				D	D	A	A	A	A	A	A	A		A	A	A	A	A	A	A	

Note 1: Avoid dissimilar metals.

A - Excellent B - Good C - Poor
D - Not Recommended
Blank Space - Insufficient Information

Chemicals	Formula	Sp. Gr. (60°F)	Typical (60°F) Viscosity (CPS)	Aluminum	Bronze	Cast Iron	Tungsten Carb.	Carbon Steel	304SS-17-4PhSS	316 SS	440CSS	Buna-N	EPR	Viton	Teflon	Ryton	Carbon	Peek	Hastelloy C-276	Chemraz	Remarks
Uran-Poly-N	Fertilizer			D	D	A	A	A	A	A	A	A		A	A	A	A	A	A	A	Note 1
Varnish	Spar	0.900	281.0	A	A	C	A	C	A	A	A	B	D	A	A	A	A	A	A	A	
Vegetable Oil				A	B	B	A	B	A	A	B	A	A	A	A	A	A	A	A	A	No Cad. Plating
Vinyl Acetate	$CH_3COOCHCH_2$	0.933		D	D	A	B	A	A	A	A		A	D	A	A	A	A	A	A	
Vinyl Chloride	CH_2CHCl	0.912		D	D	A	B	A	A	A	A			A	A	D	A	A	A	A	
Vinegar	4% Acetic Acid	1.04		C	B	D	C	D	A	A	D	B	A	A	A	A	A	A	A	A	
Water (Distilled)	H_2O	1.00		A	A	D	B	D	A	A	A	A	A	D	A	A	A	A	A	A	
Water-Sea	H_2O	1.025		B	B	D	B	D	A	A	C	A	A	D	A	A	A	A	A	A	Note 1
Water-Fresh	H_2O	1.00		A	A	C	B	C	A	A	A	A	A	D	A	A	A	A	A	A	Note 1
Whiskey and Wine				D	A	D	A	D	A	A	A	A	A	A	A	A	A	A	A	A	SS Preferred
Xylene	$C_6H_4(CH_3)_2$	0.868	0.620	A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	
Zeolites	Hydrated Silicates			D	D	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	Note 1
Zinc Sulfate	$ZnSO_4$	1.966		D	C	B	B	B	A	A	C	A	A	A	A	A	A	A	A	A	
Zinc Chloride	$ZnCl_2$	2.91		D	D	C	D	D	D	D	D	A	A	A	A	A	A	A	A	A	

Note 1: Avoid dissimilar metals.