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Chemical Resistance of Thermoplastics Piping Materials

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Foreword

This report was developed and published with the technical help and financial support of the members of the PPI (Plastics Pipe Institute, Inc.). The members have shown their interest in quality products by assisting independent standards-making and user organizations in the development of standards, and also by developing reports on an industry-wide basis to help engineers, code officials, specifying groups, and users.

The purpose of this technical report is to provide information on the transport of various chemicals using thermoplastic piping materials.

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This report has been developed as an informative guide on resistance of thermoplastic piping materials to chemical attack. It is divided into two main sections: (1) a discussion of chemical resistance and general considerations for end use applications and (2) a listing of chemical resistance data (table) for several thermoplastic piping materials applicable to *non-pressure* applications. Determination of suitability for specific applications under stress (pressurized service) is beyond the scope of this report.

SECTION I: CHEMICAL RESISTANCE IN GENERAL

Thermoplastic materials generally are resistant to attack from many chemicals which makes them suitable for use in many process applications. The suitability for use in a particular process piping application is a function of:

I. Material

- A. The specific plastic material: ABS, CPVC, PP, PVC, PE, PB, PVDF, PEX[1], PA11, PK
- B. The specific plastic material physical properties as identified by its cell classification according to the appropriate ASTM material specification.

II. Product and Joint System

- A. Piping product dimensions, construction, and composition (layers, fillers, etc.).
- B. Joining system. Heat fusion and solvent cementing do not introduce different materials into the system. Mechanical joints can introduce gaskets such as elastomers, or other thermoplastic or non-thermoplastic materials used as mechanical fitting components.
- C. Other components and appurtenances in the piping system.

III. Use Conditions - Internal and External

- A. Chemical or mixtures of chemicals, and their concentrations.
- B. Operating temperature — maximum, minimum, and cyclical variations.
- C. Operating pressure or applied stress — maximum, minimum and cyclical variations.
- D. Life-cycle information — such as material cost, installation cost, desired service life, maintenance, repair and replacement costs, etc.

[1] Once cross-linked, PEX is no longer considered a thermoplastic material; however, it is included in this report as convenience for the reader.

Types of Chemical Attack on Plastics

In general, chemicals that affect plastics do so in one of two ways. One effect is chemical solvation or permeation; the other is direct chemical attack.

Chemical Solvation or Permeation

In the case of solvation or permeation, physical properties may be affected, but the polymer molecule structure itself is not chemically changed, degraded or destroyed. In solvation or permeation, gas, vapor or liquid molecules pass through the polymer, typically without damaging the plastic material itself. If the solvating chemical can be removed completely, the plastic is generally restored to its original condition. However, removal of the chemical is not always possible, and, in such cases, these chemical solvation effects may be permanent.

Sometimes the polymer itself may not be soluble, but it may contain a soluble compounding ingredient that may be extracted from the polymer compound. This is rare because such extractable ingredients are either not used in pipe compounds, or they are chemically bonded to the molecular polymer matrix and in such small amounts that they cannot be leached out to any significant extent.

Permeation may do little if any harm to the material, but it may have application-related effects. The permeating chemical may transfer into a fluid on the other side of the pipe. In general, thermoplastic pipes should not be used where a permeating chemical in the environment surrounding the pipe could compromise the purity of a fluid, such as potable water inside the pipe (See also PPI *Statement N* on Pipe Permeation). In gas or vapor transmission service, there may be a very slight loss of contents through the pipe wall. Lastly, a permeating chemical entrained in the material may be released when heat fusion or solvent cement joining is performed. Thus, heat fusion or solvent cement joining may be unreliable if performed on permeated pipes.

Direct Chemical Attack

Direct chemical attack occurs when exposure to a chemical causes a chemical alteration of the polymer molecules by chain scission, crosslinking, oxidation or substitution reactions. Direct chemical attack may cause profound, irreversible changes that cannot be restored by removal of the chemical. Examples of this type of attack are 50% chromic acid at 140 °F on PVC, aqua regia on PVC at 73 °F, 95% sulfuric acid at 73 °F on PE and wet chlorine gas on PVC and PE. Direct chemical attack frequently causes a severe reduction of mechanical physical properties such as tensile strength, ductility, and impact resistance, and susceptibility to cracking from applied stress (stress cracking).

Chemical resistance may vary greatly from one plastic material to another (i.e., PVC, ABS, PE, etc.), and also among different cell classifications of the same plastic type (e.g. PVC 1120 to PVC 2110, PE 3608 to PE 4710, etc.). There may also be slight variations among commercial products having the same cell classification.

The chemical resistance of plastic piping is basically a function of the chemical resistance of the thermoplastic material, in addition to additives and other ingredients in the final compound. In general, the less inert compounding ingredients used the better the chemical resistance. Thermoplastic pipes with significant filler percentages may be susceptible to chemical attack where an unfilled material may be affected to a lesser degree or not at all.

Other Considerations

Chemical Families

While the effect of each individual chemical is specific, some chemicals can be grouped into general categories based on similarities in chemical characteristics (acids, bases, alcohols, etc.). For example, water-based (aqueous) solutions of neutral inorganic salts generally have the same effect on thermoplastic piping materials as water alone; thus, sodium chloride, potassium alum, calcium chloride, copper sulfate, potassium sulfate and zinc chloride solutions have the same effect as water. However, at elevated temperatures and/or high concentrations, some oxidizing salt solutions may attack some plastic materials.

Further, with organic chemicals in a specific series such as alcohols, ketones, or acids, etc., as the molecular weight of the organic chemical series increases, the chemical resistance of a particular plastic material to members of the specific organic chemical series frequently also increases. Thus, while one type of polyvinyl chloride at 73 °F is not suitable for use with ethyl acetate, it is suitable for the higher molecular weight butyl acetate.

Accelerating factors (concentration, temperature, stress)

Generally, the resistance of a particular plastic to a specific chemical decreases with an increase in concentration. For example, at 73°F polyethylene pipe can be used to carry 70% sulfuric acid but is not satisfactory for 95% sulfuric acid.

Also, the resistance of a particular plastic to a specific chemical generally decreases as temperature increases, generally decreases with increasing applied stress, and generally decreases where temperature or applied stress are varied or cycled. These effects can be greater overall in combination.

Combinations of Chemicals

In some cases, combinations of chemicals may have a synergistic effect on a thermoplastic material where the individual chemicals do not. It cannot be assumed that an individual chemical's lack of effect would apply for combinations that include several chemicals. When the possible combined effect of several chemicals is unknown, the material should be tested in the complete chemical mixture(s) in question.

Multi-Layered (Composite) Piping

Some piping products utilize a multi-layered (*composite*) construction, in which the pipe wall is constructed of layers of different materials. The layers may consist of both thermoplastic and non-thermoplastic – for example, PE/AL/PE and PEX/AL/PEX pipes, which contain a mid-wall aluminum layer. An all-thermoplastic composite pipe may contain PVC, ABS, and PVC layers. Layered composite material pipes may have chemical resistance that differs from the chemical resistance of the individual materials.

Rate of Chemical Attack

Chemicals that attack plastics do so at a certain rate, some slowly and some more quickly. But usually, any chemical attack is increased when temperature or stress are increased, or when temperature or stress are varied. The particular rate must be taken into consideration in the life-cycle evaluation for a particular application. It has been observed in some chemical plants that while a particular application may have a relatively short service life, the overall life-cycle cost may be economically feasible and justifiable. Each combination of material cost, installation cost and service life must be evaluated and judged on its own merits.

In some cases involving a slow rate of chemical attack, particularly when the application will be pressurized, simple immersion data, like that represented in the following resistance tables, may not adequately characterize performance throughout the intended design life. Longer-term testing to replicate service conditions is advisable to fully measure the effects of these chemicals.

SECTION 2: CHEMICAL RESISTANCE DATA FOR THERMOPLASTIC PIPING IN ***NON-PRESSURE*** APPLICATIONS AND DATA TABLE

When thermoplastic pipes come into contact with chemical agents, it is important to know how the pipe may be affected. For gravity flow or non-pressure applications, where the pipe is not subject to continuous internal pressure or thermal stress, chemical immersion test data may provide suitable information. The pipe manufacturer may have additional data from similar tests, or information on previous installations under similar field conditions.

The following table provides resistance data, with the following cautions:

I. *Data Sources.* The following chemical resistance information has been obtained from numerous sources. The data are based primarily on plastic material test specimens that have been immersed in the chemical, and to a lesser degree, on field-experience. In most cases, detailed information on the test conditions (such as exposure time), and on test results (such as change in weight, change in volume, and change in strength) was not available. Therefore, this information is best used only for comparison of different thermoplastic materials.

II. *Combinations of Chemicals.* . Chemicals that individually do not have an effect may affect the pipe if combined with certain other chemicals. The listings that follow do not address chemical combinations.

III. *Composite Piping.* Layered composite piping may have chemical resistance that differs from that of the individual materials in the layers. The listings that follow are not applicable to layered composite piping products.

IV. *Applicability to fiberglass, filled materials.* The listings that follow are not applicable to composite piping products such as reinforced epoxy resin (fiberglass) pipes, or to thermoplastic pipes containing significant percentages of filler materials.

V. *Concentrations.* Where no concentrations are given, the relatively pure material is indicated, except in the case of solids where saturated aqueous solutions are indicated.

NOTE: *Even though indicated as acceptable with certain temperature limitations, the use of PVC piping with liquid hydrocarbons such as gasoline and jet fuels should be limited to short-term exposure such as secondary containment systems. This piping is not recommended for long-term exposure to liquid hydrocarbons.*

Resistance Codes

The following code is used in the data table:

Code	Meaning	Typical Result
140	Plastic type is generally resistant to temperature (°F) indicated by code.	Swelling < 3% or weight loss < 0.5% and elongation at break not significantly changed.
R to 73	Plastic type is generally resistant to temperature (°F) indicated by code and may have limited resistance at higher temperatures.	Swelling < 3% or weight loss < 0.5% and elongation at break not significantly changed.
C to 73	Plastic type has limited resistance to temperature (°F) indicated by code and may be suitable for some conditions.	Swelling 3-8% or weight loss 0.5-5% and/or elongation at break decreased by < 50%.
N	Plastic type is not resistant.	Swelling > 8% or weight loss > 5% and/or elongation at break decreased by > 50%.
—	Data not available.	

Plastic Materials Identification

ABS	acrylonitrile-butadiene-styrene
CPVC	chlorinated polyvinyl chloride
PP	polypropylene
PVC	polyvinyl chloride
PE	polyethylene
PB	polybutylene
PVDF	poly vinylidene fluoride
PEX	crosslinked polyethylene
PA11	polyamide 11
PK	polyketone

CHEMICALS THAT DO NOT NORMALLY AFFECT THE PROPERTIES OF AN UNSTRESSED THERMOPLASTIC MAY CAUSE COMPLETELY DIFFERENT BEHAVIOR (SUCH AS STRESS CRACKING) WHEN UNDER THERMAL OR MECHANICAL STRESS (SUCH AS CONSTANT INTERNAL PRESSURE OR FREQUENT THERMAL OR MECHANICAL STRESS CYCLES). UNSTRESSED IMMERSION TEST CHEMICAL RESISTANCE INFORMATION IS APPLICABLE ONLY WHEN THE THERMOPLASTIC PIPE WILL NOT BE SUBJECT TO MECHANICAL OR THERMAL STRESS THAT IS CONSTANT OR CYCLES FREQUENTLY.

WHEN THE PIPE WILL BE SUBJECT TO A CONTINUOUS APPLIED MECHANICAL OR THERMAL STRESS OR TO COMBINATIONS OF CHEMICALS, TESTING THAT DUPLICATES THE EXPECTED FIELD CONDITIONS AS CLOSELY AS POSSIBLE SHOULD BE PERFORMED ON REPRESENTATIVE SAMPLES OF THE PIPE PRODUCT TO PROPERLY EVALUATE PLASTIC PIPE FOR USE IN THIS APPLICATION.

May not be fully applicable to pressurized applications

Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Acetaldehyde $CH_3\ CHO$	--	---	N	140	N	C to 73	C to 73	---	C to 140	C to 176	R to 73
	Aq. Of 40%	---	N	---	C to 73	R to 73	---	N	R to 73	---	---
Acetamide $CH_3\ CONH_2$	5%	120	---	140	---	140	---	---	140	---	---
Acetic Acid $CH_3\ COOH$	vapor	120	180	180	140	140	140	---	140	---	---
	5%	---	---	---	---	---	---	---	---	---	R to 176
	10%	---	---	---	---	---	---	R to 248	140	R to 176	---
	25%	N	180	180	140	140	140	---	140	---	---
	40%	---	---	---	---	---	---	R to 140	R to 176	---	---
	50%	---	---	---	---	---	---	R to 140	R to 176	C to 68	---
	60%	N	N	180	73	73	73	R to 104	73	---	---
	80%	---	---	---	---	---	---	R to 104	---	---	---
	85%	N	N	120	73	73	73	---	73	---	---
	glacial	N	N	120	73	73	73	R to 104	R to 68	---	---
Acetic Anhydride $(CH_3\ CO)_2\ O$	---	N	N	73	N	73	140	N	73	C to 68	---
Acetone $CH_3\ COCH_3$	5%	N	N	73	N	C to 73	140	R to 212	C to 73	C to 140	---
	10%	---	---	---	---	---	---	R to 122	---	---	---
	100%	---	---	---	---	---	---	---	---	---	R to 73 C to 122
Acetophenone $C_6\ H_5\ COCH_3$	---	N	---	120	--	73	---	R to 68	73	---	---
Acetyl Chloride $CH_3\ COCl$	---	N	N	---	N	---	---	N	---	---	---
Acetylene HC≡CH	gas 100%	73	N	73	N	73	C to 73	---	73	140	---
Acetylnitrile	---	---	N	---	N	---	---	---	---	---	---
Acrylic Acid $H_2\ C{=}CHCOOH$	97%	---	N	---	N	140	---	---	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Acrylonitrile $H_2C{=}CHC{\equiv}N$	---	---	N	---	N	140	---	---	140	---	---
Adipic Acid $COOH(CH_2)_4COOH$	sat'd	---	180	140	140	140	73	R to 176	140	---	---
Allyl Alcohol $CH_2 = CHCH_2OH$	96%	---	C to 73	140	R to 73	140	140	---	N	---	---
Allyl Chloride $CH_2{=}CHCH_2Cl$	--	---	N	---	N	C to 73	---	140	C to 73	---	---
	Liquid	---	---	---	---	---	---	R to 68	---	---	---
Aluminum Ammonium Sulfate (Alum) $AlNH_4(SO_4)_2 \cdot 12H_2O$	sat'd	---	180	140	140	140	---	---	140	---	---
Aluminum Chloride Aqueous $AlCl_2$	sat'd	160	180	180	140	140	140	R to 212	140	---	---
Aluminum Fluoride Anhydrous AlF_3	sat'd	160	180	180	73	140	140	R to 212	140	---	---
Aluminum Hydroxide $Al(OH)_3$	sat'd	160	180	180	140	140	140	R to 212	140	---	N
Aluminum Nitrate $Al(NO_3)_3 \cdot 9H_2O$	sat'd	---	180	180	140	140	140	R to 212	140	---	---
Aluminum Oxychloride	--	---	180	180	140	---	140	---	---	---	---
Aluminum Potassium Sulfate (Alum) $AlK(SO_4)_2 \cdot 12H_2O$	sat'd	160	180	140	140	140	---	R to 212	140	---	---
Aluminum Sulfate (Alum) $Al_2(SO_4)_3$	sat'd	160	180	140	140	140	C to 73	R to 212	140	194	---
	20%	---	---	---	---	---	---	---	---	---	R to 73
Ammonia Gas NH_3	100%	N	N	140	140	140	140	---	140	140	---
Ammonia Liquid NH_3	100%	160	N	140	N	140	73	---	140	140	---
Ammonium Acetate CH_3COONH_4	sat'd	120	180	73	140	140	---	R to 212	140	---	---
Ammonium Bifluoride NH_4HF_2	sat'd	---	180	180	140	---	140	---	140	---	---
Ammonium Bisulfide $(NH_4)HS$	---	---	---	---	140	---	---	---	---	---	---
Ammonium Carbonate $(NH_4)_2CO_3$	sat'd	---	180	212	140	140	140	R to 248	140	---	---
Ammonium Chloride NH_4Cl	sat'd	120	180	212	140	140	140	R to 212	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Ammonium Dichromate $(NH_4)_2Cr_2O_7$	--	---	73	---	73	---	---	---	---	---	---
Ammonium Fluoride NH_4F	10%	120	180	212	140	140	---	R to 212	140	---	---
	25%	120	180	212	C to 140	140	73	---	140	---	---
Ammonium Hydroxide NH_4OH	10%	120	N	212	140	140	140	---	140	---	N
	30%	---	---	---	---	R to 140	---	---	R to 140	---	---
	Conc.	---	---	---	---	---	---	---	194	---	---
Ammonium Metaphosphate	Sat'd	--	--	R to 212	R to 140	R to 140	R to 140	R to 248	R to 140	---	---
Ammonium Nitrate NH_4NO_3	sat'd	120	180	212	140	140	140	R to 212	140	---	---
Ammonium Persulfate $(NH_4)_2S_2O_8$	---	---	180	140	140	140	140	R to 212	140	---	---
Ammonium Phosphate (Monobasic) $NH_4H_2PO_4$	all	120	180	212	140	140	140	R to 248	140	---	---
Ammonium Sulfate $(NH_4)_2SO_4$	Sat'd.	120	180	212	140	140	140	R to 212	140	---	---
	20%	---	---	---	---	---	---	---	---	---	R to 73
Ammonium Sulfide $(NH_4)_2S$	dilute	120	180	212	140	140	140	---	140	---	---
	Sat'd.	---	---	---	---	140	---	---	---	---	---
Ammonium Thiocyanate NH_4SCN	50-60%	120	180	212	140	140	140	R to 212	73	---	---
Amyl Acetate $CH_3COOC_5H_{11}$	--	N	N	N	N	73	---	R to 122	73	C to 194	---
Amyl Alcohol $C_5H_{11}OH$	--	---	N	---	N	140	140	R to 212	R to 140	---	---
	100%	---	---	---	---	---	C to 140	---	---	---	---
n-Amyl Chloride $CH_3(CH_2)_3CH_2Cl$	--	N	N	N	N	C to 73	---	---	C to 73	---	---
Anisole C_7H_8O	--	---	---	---	---	---	---	---	---	---	C to 73
Aniline $C_6H_5NH_2$	--	N	N	---	N	73	C to 140	R to 68	C to 140	---	N
Aniline Chlorohydrate	--	---	N	---	N	C to 73	N	---	C to 73	---	---

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Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Aniline Hydrochloride $C_6 H_5 NH_2 \bullet HCl$	sat'd	---	N	---	N	140	N	---	140	---	---
Anthraquinone $C_{14}H_8O_2$	--	---	180	---	140	C to 73	C to 73	---	C to 73	---	---
Anthraquinone Sulfonic Acid $C_{14} H_7 O_2 \bullet SO_3 \bullet H_2O$	--	---	180	73	140	140	C to 73	---	C to 73	---	---
Antifreeze	--	---	---	---	---	---	---	---	---	---	R to 73 C to 176
Antimony Trichloride $SbCl_3$	sat'd	---	180	140	140	140	140	R to 140	140	---	---
Aqua Regia (Nitrohydrochloric Acid)	--	N	R to 73	N	C to 73	N	N	C to 194	N	---	---
Arsenic Acid $H_3 AsO_4$	80%	---	180	140	140	140	140	R to 248	140	---	---
Aryl Sulfonic Acid $C_6 H_5 SO_3 H$	--	---	180	---	140	73	---	---	73	---	---
Asphalt	--	---	N	73	N	73	140	---	73	---	---
Barium Carbonate $BaCO_3$	sat'd	120	180	140	140	140	140	R to 248	140	---	---
Barium Chloride BaCl2 •2H2O	sat'd	120	180	140	140	140	140	R to 212	140	194	---
Barium Hydroxide $Ba(OH)_2$	sat'd	73	180	140	140	140	140	---	R to 212	---	---
	10%	---	---	---	---	---	---	---	---	---	R to 73
	30%	---	---	---	---	R to 140	---	---	R to 140	---	---
Barium Nitrate $Ba(NO_3)_2$	sat'd	73	180	140	73	140	---	---	140	---	---
Barium Sulfate $BaSO_4$	sat'd	73	180	140	140	140	140	R to 212	140	---	---
Barium Sulfide BaS	sat'd	73	180	140	140	140	140	---	R to 248	---	---
Beer	--	120	180	180	140	R to 140	140	R to 248	R to 140	68	R to 73
Beet Sugar Liquors	--	---	180	180	140	73	140	---	73	---	---
Benzaldehyde $C_6 H_5 CHO$	10%	N	R to 73	73	R to 73	73	C to 73	---	73	R to 104	---
	99%	---	---	---	---	---	---	---	---	---	C to 73
Benzene $C_6 H_6$	--	N	N	N	N	C to 120	N	C to 122	R to 68	---	---

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Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Benzene Sulfonic Acid $C_6H_5SO_3H$	10%	---	180	180	140	R to 73	---	---	R to 73	---	---
	10%+	---	N	---	N	---	---	---	---	---	---
Benzoic Acid C_6H_5COOH	all	160	180	73	140	140	140	---	R to 248	---	---
Benzoyl Chloride C_6H_5COCl	Sat. Sol.	---	---	---	---	---	---	C to 68	---	---	---
Benzyl Alcohol $C_6H_5CH_2OH$	--	---	N	120	N	140	---	R to 122	140	R to 68	---
Benzyl Chloride C_7H_7Cl	--	---	---	---	---	---	---	---	R to 140	---	---
Bismuth Carbonate $(BiO)_2CO_3$	Sat'd.	---	180	180	140	140	140	---	140	---	---
Black Liquor	sat'd	---	180	140	140	120	140	---	120	---	---
Bleach	5% Active Cl_2	---	180	120	140	C to 140	---	---	C to 140	---	R to 73
	12% Active Cl_2	73	185	120	140	73	140	---	73	---	---
Borax $Na_3B_4O_7 \cdot 10H_2O$	sat'd	160	180	212	140	140	140	---	140	---	---
Boric Acid H_3BO_3	Sat'd	160	180	212	140	140	140	R to 212	140	---	---
Brake Fluid	--	---	---	140	---	140	---	---	140	---	---
Brine	sat'd	---	180	140	140	140	140	---	140	---	---
Bromic Acid $HBrO_3$	Sat'd	---	180	N	140	N	140	R to 212	N	---	---
	10%	---	---	---	---	140	---	---	---	---	---
Bromine Br_2	Liquid	73	N	N	N	N	N	R to 248	N	N	---
	vapor 25%	---	180	N	140	N	---	---	N	---	---
Bromine Water	cold sat'd	---	180	N	140	N	C to 73	R to 176	N	---	---
Bromobenzene C_6H_5Br	--	---	---	---	N	---	---	---	---	---	---
Bromotoluene (Benzyl bromide) $C_6H_5CH_2Br$	--	---	---	C	N	---	---	---	---	---	---
Butadiene $H_2C{=}CHCH{=}CH_2$	50%	---	180	N	140	73	---	---	73	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
	Gas	---	---	---	---	---	---	R to 212	---	---	---
Butane C_4H_{10}	50%	---	180	140	140	140	N	---	140	---	---
	Gas	---	---	---	---	---	---	R to 68	---	---	---
n-Butanol C_4H_9OH	Liquid	---	---	---	---	---	---	R to 140	---	---	R to 73
Butyl Acetate $CH_3COOCH_2CH_2CH_2CH_3$	100%	N	N	C to 73	N	C to 73	C to 73	C to 104	C to 73	R to 194	---
Butyl Alcohol $CH_3(CH_2)_2CH_2OH$	--	---	C to 73	180	140	140	140	---	140	C to 104	---
Butyl Cellosolve $HOCH_2CH_2O(CH_2)_3CH_3$	--	---	N	---	73	---	---	---	---	---	---
n-Butyl Chloride C_4H_9Cl	--	N	N	---	---	---	---	---	---	---	---
Butyl Glycol $HOCH_2CH_2O(CH_2)_3CH_3$	Liquid	---	---	---	---	---	---	R to 212	---	---	---
Butylene © $CH_3CH{=}CHCH_3$	Liquid	---	---	N	140	120	---	---	120	---	---
Butyl Phenol $C_4H_9C_6H_4OH$	--	---	---	N	C to 73	73	73	---	R to 176	---	---
Butyl Phthalate $C_{16}H_{22}O_4$	--	---	N	180	---	---	---	R to 140	---	---	---
Butyl Stearate $CH_3(CH2)_{16}COO(CH_2)_3CH_3$	--	---	---	---	73	---	---	---	---	---	---
Butynediol $HOCH_2C{\equiv}CCH_2OH$	--	---	---	---	73	---	---	----	---	---	---
Butyric Acid $CH_3CH_2CH_2COOH$	--	N	N	180	73	73	73	---	73	---	---
	20%	---	---	---	---	---	---	R to 212	---	---	---
	Liquid	---	---	---	---	---	---	R to 176	73	---	---
Cadmium Cyanide $Cd(CN)_2$	--	---	180	---	140	---	---	---	---	---	---
Calcium Bisulfide $Ca(HS)_2 o6H_2O$	--	---	73	---	N	140	---	---	140	---	---
Calcium Bisulfite $Ca(HSO_3)_2$	--	---	180	180	140	N	140	---	N	---	---
	Sat'd	---	---	---	---	---	---	R to 248	---	---	---
Calcium Carbonate $CaCO_3$	Sat'd	---	180	180	140	140	140	R to 248	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Calcium Chlorate $Ca(ClO_3)_2 \cdot 2H_2O$	--	---	180	180	140	140	140	R to 248	140	---	---
Calcium Chloride $CaCl_2$	5%	---	---	---	---	---	---	---	---	---	R to 176
	Sat'd	120	180	180	140	140	140	R to 248	R to 176	R to 194	---
Calcium Hydroxide $Ca(OH)_2$	--	160	180	180	140	140	140	---	140	---	---
	2%	---	---	---	---	---	---	---	---	---	R to 73
	30%	---	---	---	---	R to 140	---	---	R to 140	---	---
Calcium Hypochlorite $Ca(OCl)_2$	30%	160	180	140	140	140	140	---	140	---	---
	Sat'd	---	---	---	---	---	---	C to 212	---	---	---
Calcium Nitrate $Ca(NO_3)_2$	--	---	180	180	140	140	140	---	140	---	---
	50%	---	---	---	---	140	---	R to 212	140	---	---
	Sat'd	---	---	---	---	---	---	R to 176	---	---	---
Calcium Oxide CaO	--	---	180	---	140	140	---	---	140	---	---
Calcium Sulfate $CaSO_4$	--	100	180	180	140	140	140	R to 212	140	---	---
Calcium Hydrogen Sulfide $Ca(HS)_2$	>10%	---	---	---	---	---	---	R to 248	---	---	---
Camphor $C_{10}H_{16}O$	--	N	---	73	73	73	---	---	73	---	---
Cane Sugar Liquors $C_{12}H_{22}O_{11}$	--	---	180	180	140	140	150	---	140	---	---
Carbitol $CH_3CH_2O(CH_2)_2O(CH_2)_2OH$	--	---	N	---	73	---	---	---	---	---	---
Carbon Dioxide CO_2	Dry 100%	160	180	140	140	140	---	R to 212	140	---	---
	Wet	160	180	140	140	140	140	---	140	---	---
Carbon Disulfide CS_2	--	N	N	N	N	C to 140	---	---	R to 68	R to 104	---
Carbon Monoxide CO	Gas	---	180	180	140	140	140	R to 140	140	---	---
Carbon Tetrachloride CCl_4	--	N	N	N	73	C to 73	N	C to 212	C to 68	N	R to 73

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Carbonic Acid $H_2 CO_3$	Sat'd	185	180	140	140	140	---	---	140	---	---
Castor Oil	--	---	C to 180	140	140	73	140	---	73	---	---
Caustic Potash KOH	50%	160	180	180	140	140	73	---	140	---	---
Caustic Soda (Sodium Hydroxide) NaOH	40%	160	180	180	140	140	73	---	140	---	---
Cellosolve	--	---	N	73	73	C to 120	140	---	C to 120	---	---
Cellosolve Acetate $CH_3 COOCH_2 CH_2 OC_2 H_5$	--	---	N	73	73	---	---	---	---	---	---
Chloral Hydrate $CCl_3 CH (OH)_2$	All	---	180	C to 73	140	120	140	---	120	---	---
Chloramine $NH_2 Cl$	Dilute	---	N	73	73	73	---	---	73	---	---
Chloric acid $HClO_3 \bullet 7H_2 O$	10%	---	180	73	140	73	---	---	73	---	---
	20%	---	185	73	140	73	---	---	73	---	---
Chlorine Gas Cl_2	0-20 PPM moisture content	N	C to 73	N	C to 73	C to 73	---	R to 212	C to 73	---	---
	20-50 PPM moisture content	N	N	N	N	C to 73	---	---	C to 73	---	---
	50+ PPM moisture content	N	N	N	N	C to 73	---	N	C to 73	---	---
Chlorine	Liquid	N	N	N	N	N	---	---	N	---	N
Chlorinated Water											
	Sat'd	---	180	180	140	C to 120	140	R to 212	C to 120	---	---
Chloroacetic Acid $CH_2 ClCOOH$	50%	N	180	C to 73	140	120	N	---	120	---	---
	>10%	---	---	---	---	---	---	R to 140	---	---	---
Chloroacetyl Chloride $ClCH_2 COCl$	--	---	---	---	73	---	---	---	---	---	---
Chlorobenzene $C_6 H_5 Cl$	Dry	N	N	73	N	C to 75	N	---	C to 75	---	---
	Liquid	---	---	---	---	---	---	R to 140	R to 68	C to 176	---
Chlorobenzyl Chloride $ClC_6 H_4 CH_2 Cl$	--	---	N	---	N	C to 120	---	---	C to 120	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Chloroethanol $ClCH_2CH_2OH$	Liquid	---	---	---	---	---	N	R to 122	---	---	---
Chloroform $CHCl_3$	Dry	N	N	N	N	C to 75	C to 73	---	C to 75	---	---
	Liquid	---	---	---	---	---	---	R to 212	N	---	C to 73
Chloromethane CH_3Cl	Gas	---	---	---	---	---	---	R to 212	---	---	---
Chloropicrin $CCl_3\ NO_2$	--	---	---	---	N	73	---	---	73	---	---
Chlorosulfonic Acid $ClSO_2\ OH$	--	---	73	N	73	C to 120	N	---	C to 120	---	---
	50%	---	---	---	---	---	---	R to 68	---	---	---
	100%	---	---	---	---	N	---	---	N	---	---
Chromic Acid $H_2\ CrO_4$	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
	10%	73	180	140	140	73	140	R to 212	73	N	---
	20%	---	---	---	---	---	---	R to 212	---	---	---
	25%	---	---	---	---	---	---	R to 212	---	---	---
	30%	N	180	73	140	73	140	R to 212	73	---	---
	40%	N	180	73	140	73	73	R to 212	73	---	---
	50%	N	C to 140	73	N	73	N	R to 212	73	---	---
Chromium Potassium Sulfate $CrK(SO_4)_2 \bullet 12H_2\ O$	>10%	---	---	---	---	---	---	R to 212	---	---	---
	--	-	--	73	---	73	---	---	73	---	---
	Sat'd	---	---	---	---	---	R to 212	---	---	---	---
Citric Acid $C_6\ H_8\ O_7$	Sat'd	160	180	140	140	140	140	R to 248	140	C to 140	---
Coconut Oil	--	---	C to 180	73	140	73	140	R to 248	73	---	---
Cod Liver Oil	Work Sol.	---	---	---	---	---	---	R to 248	---	---	---
Coffee	--	---	180	140	140	140	---	---	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Coke Oven Gas	--	---	---	73	140	140	---	---	140	---	---
Copper Acetate $Cu(C_2H_3O_2)_2 \cdot H_2O$	Sat'd	---	73	73	73	---	---	---	---	---	---
Copper Carbonate $CuCO_3$	Sat'd	---	180	---	140	140	---	---	140	---	---
Copper Chloride $CuCl_2$	Sat'd	73	180	140	140	140	140	---	140	---	---
Copper Cyanide $CuCN$	Sat'd	---	180	---	140	140	140	R to 212	140	---	---
Copper Fluoride $CuF_2 \cdot 2H_2O$	2%	---	180	73	140	140	140	---	140	---	---
Copper Nitrate $Cu(NO_3)_2 \cdot 3H_2O$	30%	---	180	140	140	140	140	---	---	---	---
	50%	---	---	---	---	---	---	R to 212	---	---	---
Copper Sulfate $CuSO_4 \cdot 5H_2O$	Sat'd	120	180	120	140	140	140	R to 212	140	R to 194	---
Corn Oil	--	---	C to 180	73	140	120	---	---	120	---	---
Corn Syrup	--	---	185	140	140	140	---	---	140	---	---
Cottonseed Oil	--	120	C to 180	140	140	R to 140	140	---	R to 140	---	---
Creosote	--	---	N	73	N	140	---	---	140	---	---
Cresol $CH_3C_6H_4OH$	90%	N	N	R to 73	N	73	N	R to 68	73	---	---
Cresylic Acid	50%	---	180	---	140	C to 73	N	---	C to 73	---	---
Crotonaldehyde $CH_3CH{=}CHCHO$	--	---	N	C to 73	N	---	---	---	---	---	---
	Liquid	---	---	---	---	---	---	R to 104	--	---	---
Crude Oil	--	---	C to 180	140	140	C to 120	C to 73	R to 212	C to 120	R to 140	---
Cupric Chloride $CuCl_2 \cdot 2H_2O$	20%	---	---	---	---	---	---	---	---	---	R to 73
Cupric Fluoride CuF_2	--	---	180	---	140	140	---	---	140	---	---
Cupric Sulfate $CuSO_4 \cdot 5H_2O$	Sat'd	100	180	73	140	140	---	---	---	---	---
Cuprous Chloride $CuCl$	Sat'd	70	180	---	140	140	---	---	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Cyclohexane C_6H_{12}	--	73	N	N	N	N	---	R to 248	N	C to 140	---
Cyclohexanol $C_6H_{11}OH$	--	C to 120	N	140	N	73	C to 73	R to 104	73	---	---
Cyclohexanone $C_6H_{10}O$	Liquid	N	N	73	N	120	N	N	C to 176	C to 140	---
Detergents (Heavy Duty)	--	---	C to 180	180	140	R to 140	---	---	R to 140	---	R to 73
Dextrin (Starch Gum)	Sat'd	---	180	140	140	140	140	---	140	---	---
Dextrose $C_6H_{12}O_6$	Sat'd	---	180	140	140	140	140	---	140	---	---
Diacetone Alcohol $CH_3COCH_2C(CH_3)_2OH$	--	---	N	120	N	---	---	---	---	C to 140	---
Dibutoxyethyl Phthalate $C_{20}H_{30}O_6$	--	---	N	---	N	---	---	---	---	---	---
n-Dibutyl Ether $C_4H_9OC_4H_9$	--	---	---	---	---	73	---	---	73	---	---
Dibutyl Phthalate $C_6H_4(COOC_4H_9)_2$	--	N	N	73	N	73	---	---	73	---	---
Dibutyl Sebacate $C_4H_9OCO(CH_2)_8OCOC_4H_9$	--	---	---	73	73	73	---	---	73	---	---
Dichloroacetic Acid $CHCl_2COOH$	50%	---	---	---	---	---	---	R to 176	---	---	---
Dichlorobenzene $C_6H_4Cl_2$	--	N	N	C to 73	N	C to 120	---	---	C to 120	---	R to 73
	Liquid	---	---	---	---	---	---	R to 140	---	---	---
Dichloroethylene $C_2H_2Cl_2$	--	---	N	C to 73	N	C to 120	---	---	C to 120	---	---
	Liquid	---	---	---	---	---	---	R to 248	---	---	---
Diesel Fuels	--	---	C to 180	140	140	73	C to 73	R to 212	73	---	---
Diethanolamine $(CH_2CH_2OH)_2NH$	Solid	---	---	---	---	---	---	N	---	---	---
	20%	---	---	---	---	---	---	---	R to 194	---	---
Diethylamine $C_4H_{10}NH$	--	N	N	---	N	C to 120	N	N	C to 120	---	---
Diethyl Ether $C_4H_{10}O$	--	N	N	73	73	C to 140	---	---	C to 140	140	---
Diglycolic Acid $O(CH_2COOH)_2$	Sat'd	---	180	140	140	140	140	---	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
	10%	---	---	---	---	---	---	R to 140	---	---	---
Dimethylamine $(CH_3)_2NH$	--	---	---	73	140	73	N	N	73	---	---
Dimethylformamide $HCON(CH_3)_2$	--	N	N	180	N	120	---	---	120	---	C to 73
	Liquid	---	---	---	---	---	---	---	N	---	---
Dimethylhydrazine $(CH_3)_2NNH_2$	--	---	---	---	N	---	---	---	---	---	---
Dimethyl Phthalate $C_6H_4(COOCH_3)_2$	--	---	N	---	---	C to 73	---	---	C to 73	---	---
Dioctyl Phthalate $C_6H_4(COOC_8H_{17})_2$	--	N	N	C to 73	N	73	C to 73	---	73	140	---
Dioxane $C_4H_8O_2$	--	--	N	C to 140	N	140	---	---	140	---	---
	Liquid	---	---	---	---	---	---	C to 68	---	---	---
Diphenyl Oxide $(C_6H_5)_2O$	Sat'd	---	---	---	---	73	---	---	73	---	---
Disodium Phosphate Na_2HPO_4	--	---	180	140	140	140	140	---	140	---	---
Dishwashing Liquid (Cascade®)	--	---	---	---	---	---	---	---	---	---	R to 73
DOWTHERM A	--	---	---	---	N	---	---	---	---	---	---
Ethanol C_2H_5OH	40%	---	---	---	---	---	---	R to 68	---	---	---
	95%	---	---	---	---	---	---	R to 122	R to 140	---	---
	Liquid	---	---	---	---	---	---	R to 122	R to 140	---	R to 176
Ether ROR	--	N	N	C to 73	N	73	N	---	73	---	---
Ethyl Acetate $CH_3COOCH_2CH_3$	--	N	N	C to 140	N	73	C to 73	---	73	140	R to 73 C to 176
	Liquid	---	---	---	---	---	---	C to 68	---	---	---
Ethyl Acetoacetate $CH_3COCH_2COOC_2H_5$	--	N	N	---	N	---	---	---	---	---	---
Ethyl Acrylate $CH_2{=}CHCOOC_2H_5$	--	---	N	---	N	---	---	---	---	---	---
Ethyl Alcohol (Ethanol) C_2H_5OH	--	---	C to 140	140	140	140	140	---	140	C to 104	R to 176

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	**Concentration**	**ABS**	**CPVC**	**PP**	**PVC**	**PE**	**PB**	**PVDF**	**PEX**	**PA 11**	**PK**
Ethyl Benzene $C_6 H_5 C_2 H_5$	--	---	---	C to 73	N	C to 73	---	---	---	---	---
Ethyl Chloride $C_2 H_5 Cl$	Dry	---	N	C to 73	N	C to 73	---	---	C to 73	---	---
	Gas	---	---	---	---	---	---	R to 212	---	---	---
Ethyl Chloroacetate $ClCH_2COOC_2H_5$	--	---	---	---	N	---	---	---	---	---	---
Ethyl Ether $(C_2 H_5)_2 O$	Liquid	---	N	N	N	N	N	R to 122	R to 68	---	---
Ethylene Bromide $BrCH_2 CH_2 Br$	Dry	---	N	---	N	---	N	---	---	---	---
Ethylene Chloride (Vinyl Chloride) $CH_2 CH Cl$	Dry	N	N	C to 73	N	C to 140	---	---	C to 140	---	---
Ethylene Chlorohydrin $ClCH_2 CH_2 OH$	--	---	N	73	N	---	N	---	---	---	---
	Liquid	---	---	---	---	---	---	C to 68	---	---	---
Ethylene Diamine $NH_2 CH_2 CH_2 NH_2$	--	N	---	73	N	140	---	---	140	---	---
Ethylene Dichloride $C_2 H_4 Cl_2$	Dry	N	N	C to 140	N	C to 73	140	---	C to 73	---	---
Ethylene Glycol $OHCH_2CH_2 OH$	Liquid	73	C to 180	212	140	140	140	R to 212	R to 212	---	C to 176
Ethylene Oxide $CH_2 CH_2 O$	--	---	N	C to 73	N	73	---	---	73	C to 140	---
2-Ethylhexanol $CH_3 (CH_2)_3 CHC_2 H_5 CH_2OH$	--	---	---	---	---	73	---	---	73	---	---
Fatty Acids R-COOH	--	160	73	120	140	120	150	---	120	194	---
Ferric Chloride (Aqueous) $FeCl_3$	Sat'd	120	180	140	140	140	150	R to 212	140	---	---
Ferric Hydroxide $Fe(OH)_3$	Sat'd	160	180	140	140	140	---	---	140	---	---
Ferric Nitrate $Fe(NO_3)_3 \bullet 9H_2 O$	Sat'd	160	180	140	140	140	140	R to 212	140	---	---
Ferric Sulfate $Fe_2 (SO_4)_3$	--	160	180	140	140	140	140	---	140	---	---
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Ferrous Chloride $FeCl_2$	Sat'd	160	180	140	140	140	140	R to 212	140	---	---
Ferrous Hydroxide $Fe(OH)_2$	Sat'd	160	180	140	140	140	---	---	140	---	---

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Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Ferrous Nitrate $Fe(NO_3)_2$	--	160	180	140	140	140	---	---	140	---	---
Ferrous Sulfate $FeSO_4$	--	160	180	140	140	140	140	---	140	---	---
	20%	---	---	---	---	---	---	---	---	---	R to 73
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Ferrous Chloride $FeCl_2$	Sat'd	160	180	140	140	140	140	R to 212	140	---	---
Fish Oil	---	---	180	180	140	140	140	---	140	---	---
Fluoroboric Acid HBF_4	---	73	73	140	140	140	---	---	140	---	---
	Solid	---	---	---	---	---	---	R to 104	---	---	---
Fluorine Gas (Dry) F_2	100%	---	73	N	73	C to 73	C to 73	---	C to 73	N	---
Fluorine Gas (Wet) F_2	--	N	73	N	73	N	N	---	N	N	---
Fluorosilicic Acid H_2SiF_6	25%	---	---	---	---	---	---	R to 212	---	---	---
	30%	---	R to 140	140	140	140	---	R to 212	---	---	---
	40%	---	---	---	---	---	---	R to 140	---	---	---
	50%	---	73	73	140	140	140	R to 212	--	---	---
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Formaldehyde HCHO	Dilute	160	73	140	140	140	140	R to 176	---	C to 104	---
	35%	160	C to 73	140	140	140	140	---	140	---	---
	37%	160	C to 73	140	140	140	140	R to 212	140	---	---
	50%	---	C to 73	---	140	140	140	---	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Formic Acid HCOOH	--	N	C to 73	140	73	140	150	---	140	---	---
	10%	---	---	---	---	---	---	R to 212	R to 140	N	N
	40%	---	---	---	---	---	---	R to 212	R to 140	---	---
	50%	---	---	---	---	---	---	R to 176	R to 140	---	---
	85%	---	---	---	---	---	---	R to 212	---	---	---
	100%	---	---	---	---	140	---	---	140	---	---
Freon 11 CCl_3F	100%	N	73	N	140	73	---	---	73	---	---
Freon 12 CCl_2F_2	100%	---	73	73	140	73	---	---	73	68	---
	Work. Sol.	---	---	---	---	---	---	R to 212	R to 68	---	---
Freon 21 $CHCl_2F$	100%	---	---	N	N	C to 120	---	---	C to 120	---	---
Freon 22 $CHClF_2$	100%	---	73	73	N	C to 120	---	---	C to 120	68	---
Freon 113 $C_2Cl_2F_3$	100%	---	---	N	140	73	---	---	73	---	---
Freon 114 $C_2Cl_2F_4$	100%	---	---	N	140	73	---	---	73	---	---
Fructose $C_6 H_{12} O_6$	Sat'd	73	180	180	140	140	140	---	140	---	---
Fruit Juice	Work. Sol.	---	---	---	---	---	---	R to 212	---	104	---
Furfural $C_4 H_3 OCHO$	100%	N	N	N	N	C to 140	---	---	C to 140	C to 140	---
Gallic Acid $C_6 H_2 (OH)_3 CO_2 H \cdot H_2 O$	--	---	73	---	140	73	---	---	73	---	---
Gasoline, Leaded*	--	N	N	N	140	73	N	---	73	---	---
Gasoline, Unleaded*	--	N	N	N	140	73	N	---	73	---	R to 176
Gasoline (Fuel)	--	---	---	---	---	---	---	R to 212	---	R to 160	---
Gasohol*	--	N	N	N	140	73	N	---	73	---	---
Gasoline, Sour*	--	N	N	N	140	C to 73	N	---	C to 73	---	---

May not be fully applicable to pressurized applications

Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Gelatin	--	---	180	180	140	140	140	---	140	---	---
Glucose $C_6H_{12}O_6 \cdot H_2O$	--	120	180	212	140	140	140	---	140	---	---
	10%	---	---	---	---	---	---	R to 248	---	---	---
Glue	--	---	---	140	140	140	---	---	140	---	---
Glycerine $C_3H_5(OH)_3$	--	140	180	212	140	140	140	---	140	---	---
	Liquid	---	---	---	---	---	---	R to 248	---	---	---
Glycol $OHCH_2CH_2OH$	--	---	C to 180	212	140	140	---	---	140	C to 140	---
Glycolic Acid $OHCH_2COOH$	Sat'd	---	180	73	140	140	---	---	140	---	---
	10%	---	---	---	---	---	---	R to 212	---	---	---
	30%	---	---	---	---	---	---	R to 140	---	---	---
	65%	---	---	---	---	---	---	R to 212	---	---	---
Glyoxal OCHCHO	--	---	---	---	---	140	---	---	140	---	---
Grape Sugar	--	---	180	---	140	---	---	---	---	---	---
Grapefruit Juice	Work. Sol.	---	---	---	---	---	---	R to 122	---	---	---
Grease	--	---	---	---	---	---	---	---	---	194	---
Green Liquor	--	160	180	---	140	---	140	---	---	---	---
Heptane (Type 1) C_7H_{16}	--	73	180	N	140	73	N	---	73	---	---
	Liquid	---	---	---	---	---	---	R to 212	C to 176	---	---
n-Hexane C_6H_{14}	--	C	73	73	73	---	---	---	---	---	---
	Liquid	---	---	---	---	---	---	R to 176	---	---	R to 73
Hexanol, Tertiary Type I $CH_3(CH_2)_4CH_2OH$	--	---	180	---	140	140	140	---	140	---	---
Hydraulic Oil (Petroleum)	--	---	---	---	73	73	---	---	73	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Hydrazine $H_2 NNH_2$	--	---	N	73	N	---	---	---	---	---	---
Hydrobromic Acid HBr	20%	73	73	140	140	140	140	R to 212	140	---	---
	50%	N	---	120	---	140	---	R to 140	140	---	---
	66%	---	---	---	---	---	---	R to 212	---	---	---
Hydrochloric Acid HCl	1%	---	---	---	---	---	---	---	---	---	R to 176
	10%	C to 120	180	140	140	140	140	R to 212	R to 212	C to 104	N
	20%	---	---	---	---	---	---	R to 212	R to 212	---	---
	30%	C to 73	180	140	140	140	140	R to 212	R to 140	---	---
	Conc.	---	---	---	---	---	---	---	R to 140	---	---
Hydrocyanic Acid HCN	--	160	180	73	140	140	140	---	140	---	---
	Sat'd	---	---	---	---	---	---	R to 248	---	---	---
	10%	---	---	---	---	---	---	R to 248	---	---	---
Hydrofluoric Acid HF	Dilute	73	73	180	73	140	140	R to 212	140	---	---
	30%	N	73	140	73	140	140	---	140	---	---
	40%	---	---	---	---	---	---	R to 212	---	---	---
	50%	N	N	73	73	120	140	R to 212	120	---	---
	60%	---	---	---	---	140	---	R to 140	140	---	---
	70%	---	---	---	---	---	---	R to 212	---	---	---
	100%	N	N	C to 73	N	120	---	---	120	---	---
	Gas	---	---	---	---	---	---	R to 104	---	---	---
Hydrogen H_2	Gas	---	73	140	140	140	140	R to 248	140	194	---
Hydrogen Cyanide HCN	--	---	---	73	140	---	---	---	---	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Hydrogen Fluoride, Anhydrous HF	--	---	C	73	N	---	---	---	---	---	---
Hydrogen Peroxide $H_2 O_2$	3%	---	---	---	---	---	---	---	---	---	R to 73
	10%	---	---	---	---	---	---	R to 212	---	---	---
	30%	---	---	---	---	---	---	R to 212	---	C to 104	---
	50%	---	180	73	140	140	N	R to 212	140	---	---
	90%	---	180	C to 73	140	73	N	---	73	---	---
Hydrogen Phosphide (Type I) PH_3	--	---	73	---	140	140	140	---	140	---	---
Hydrogen Sulfide $H_2 S$	Dry	---	180	150	140	140	140	R to 248	140	---	---
	Wet	---	180	---	140	140	---	---	140	---	---
Hydrogen Sulfite H_2SO_3	10%	---	---	---	---	140	---	R to 248	140	---	---
Hydroquinone $C_6 H_4 (OH)_2$	Sat'd	---	180	---	140	140	140	---	---	140	---
Hydroxylamine Sulfate $(NH_2 OH)oH_2 SO_4$	--	---	180	---	140	140	---	---	140	---	---
Hypochlorous Acid HOCl	10%	73	180	73	140	140	140	---	140	---	---
	70%	---	---	---	---	---	---	R to 212	---	---	---
Inks	--	---	---	140	---	140	---	---	140	---	---
Iodine I_2	10%	N	73	73	N	C to 120	N	R to 176	C to 120	---	---
Isobutyl Alcohol $(CH_3)_2 CHCH_2 OH$	--	C to 73	C to 73	73	---	140	---	---	140	---	---
Isooctane $(CH_3)_3 CCH_2 CH(CH_3)_2$	--	---	---	C to 73	---	73	---	---	73	---	---
	Liquid	---	---	---	---	---	---	R to 212	---	---	---
Isopropyl Acetate $CH_3 COOCH(CH_3)_2$	--	N	N	---	---	73	---	---	73	---	---
Isopropyl Alcohol $(CH_3)_2 CHOH$	--	---	C to 180	212	140	140	140	C to 212	140	---	R to 73
Isopropyl Ether $(CH_3)_2 CHOCH(CH_3)_2$	--	---	N	C to 73	N	73	---	---	73	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
JP-4 Fuel*	--	---	C to 73	C to 73	140	73	---	---	73	---	---
JP-5 Fuel*	--	---	C to 73	C to 73	140	73	---	---	73	---	---
Kerosene*	--	73	73	C to 140	140	C to 140	C to 73	---	C to 140	---	---
Ketchup	--	---	---	---	73	---	---	---	---	---	---
Ketones	--	N	N	C to 73	N	73	---	---	73	---	---
	Work Sol	---	---	---	---	---	---	---	R to 302	---	---
Kraft Liquors	--	73	180	---	140	120	140	---	120	---	---
Lactic Acid $CH_3\ CHOHCOOH$	10%	---	---	---	---	---	---	R to 140	---	---	---
	20%	---	---	---	---	---	---	---	---	---	R to 73
	25%	73	180	212	140	140	140	---	140	---	---
	80%	N	C to 180	140	73	140	---	---	140	---	---
	Liquid	---	---	---	---	---	---	R to 212	---	R to 194	---
Lard Oil	--	---	C to 180	---	140	C to 120	73	---	C to 120	---	---
Latex	--	---	---	140	---	140	---	---	140	---	---
Lauric Acid $CH_3\ (CH_2\ )_{10}\ COOH$	--	---	180	140	140	120	---	---	120	---	---
Lauryl Chloride (Type I) $CH_3(CH_2)_{10}CH_2Cl$	--	---	73	---	140	120	73	R to 248	120	---	---
Lead Acetate $Pb(C\ H_3\ COO\ )_2\ o3H_2\ O$	Sat'd	---	180	180	140	140	140	R to 212	140	---	---
Lead Chloride $PbCl_2$	--	---	180	140	140	120	---	---	120	---	---
Lead Nitrate $Pb(NO_3\ )_2$	Sat'd	---	180	140	140	120	---	---	120	---	---
Lead Sulfate $PbSO_4$	--	---	180	140	140	120	---	---	120	---	---
Lead Tetraethyl $C_8H_{20}Pb$	--	---	---	---	---	---	---	R to 212	---	---	---
Lemon Oil	--	---	N	C to 73	---	---	---	---	---	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Lemon Juice	--	---	---	---	---	C to 140	---	---	C to 140	---	---
Ligroin	--	---	---	140	---	---	---	---	---	---	---
Lime Slurry	--	---	---	---	---	140	---	---	140	---	---
Lime Sulfur	--	---	73	73	73	120	140	---	120	---	---
Linoleic Acid $CH_3(CH_2)_4(CH{=}CHCH_2)_2(CH_2)_6COOH$	--	---	180	180	140	---	73	---	---	---	---
Linoleic Oil (Type I)	--	---	---	---	140	---	73	---	---	---	---
Linseed Oil	--	73	C to 180	140	140	R to 73	73	R to 248	R to 73	194	---
Liqueurs	--	---	---	140	140	120	140	---	120	---	---
Lithium Bromide LiBr	--	---	---	140	140	140	---	---	140	---	---
Lithium Chloride LiCl	--	---	---	140	140	120	---	---	120	---	---
Lithium Hydroxide LiOH	--	---	---	140	---	120	---	---	120	---	---
Lubricating Oil (ASTM #1)	--	---	180	C to 140	140	73	140	R to 248	73	---	---
Lubricating Oil (ASTM #2)	--	---	180	C to 140	140	73	140	---	73	---	---
Lubricating Oil (ASTM #3)	--	---	180	C to 140	140	73	140	---	73	---	---
Magnesium Carbonate $MgCO_3$	--	120	180	212	140	140	140	R to 212	140	---	---
Magnesium Chloride $MgCl_2$	Sat'd	120	180	140	140	140	140	R to 140	140	---	---
	50%	---	---	---	---	---	---	R to 212	----	194	---
Magnesium Citrate $MgHC_6H_5O_7 \text{o} 5H_2O$	--	---	180	---	140	140	---	---	140	---	---
Magnesium Hydroxide $Mg(OH)_2$	Sat'd	160	180	180	140	140	140	R to 212	140	---	---
Magnesium Nitrate $Mg(NO_3)_2 \text{o} 2H_2O$	--	160	180	212	140	140	140	R to 248	140	---	---
Magnesium Oxide MgO	--	160	---	---	---	---	---	---	---	---	---
Magnesium Sulfate $MgSO_4 \text{o} 7H_2O$	--	160	180	212	140	140	140	R to 212	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Maleic Acid HOOCCH=CHCOOH	Sat'd	160	180	140	140	140	140	R to 140	140	---	---
	50%	---	---	---	---	---	---	R to 212	---	---	---
	10%	---	---	---	---	---	---	R to 140	---	---	---
Malic Acid $COOHCH_2\ CH(OH)COOH$	--	---	180	140	140	140	140	---	140	---	---
Manganese Sulfate $MnSO_4 \cdot 4H_2O$	--	---	180	180	140	140	---	---	140	---	---
Margarine	Work Sol.	---	---	---	---	---	---	R to 248	---	---	---
Mercuric Chloride $HgCl_2$	--	---	180	180	140	140	140	---	140	---	---
	Sat'd	--	---	---	---	---	---	R to 212	---	---	---
Mercuric Cyanide $Hg(CN)_2$	Sat'd	---	180	140	140	140	140	R to 212	140	---	---
Mercuric Sulfate $HgSO_4$	Sat'd	---	180	140	140	140	---	---	140	---	---
Mercurous Nitrate $HgNO_3 \cdot 2H_2O$	Sat'd	---	180	140	140	140	140	---	140	---	---
	10%	---	---	---	---	---	---	R to 212	---	---	---
Mercury Hg	Liquid	---	180	140	140	140	140	R to 248	140	194	---
Methane CH_4	--	N	73	73	140	140	---	---	140	140	---
Methanol (Methyl Alcohol) CH_3OH	--	---	N	180	140	R to 140	140	---	R to 140	---	---
	5%	---	---	---	---	---	---	R to 140	---	---	---
	Liquid	---	---	---	---	---	---	C to 176	R to 140	---	R to 176
Methoxyethyl Oleate $CH_3\ OCH_2\ CH_2\ OOCC_{17}H_{33}$	--	---	---	---	73	---	---	---	---	---	---
Methyl Acetate $CH_3\ CO_2\ CH_3$	--	N	N	140	N	C to 120	---	---	C to 120	---	---
Methyl Acrylate $CH_2=CHCOOCH_3$	Tech Pure	---	---	---	---	140	---	---	140	---	---
Methyl Amine $CH_3\ NH_2$	--	---	N	N	N	---	---	---	---	---	---
Methyl Bromide $CH_3\ Br$	--	---	N	N	N	C to 73	---	---	C to 73	R to 68	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Methyl Butyl Ketone $CH_3CO(CH_2)_3CH_3$	Liquid	---	---	---	---	---	---	C to 122	---	---	---
Methyl Cellosolve $HOCH_2\ CH_2\ OCH_3$	--	---	N	73	N	C to 120	---	---	C to 120	---	---
Methyl Chloride $CH_3\ Cl$	Dry	N	N	N	N	C to 120	N	---	C to 120	R to 68	---
Methyl Chloroform CH_3CCl_3	--	N	N	C to 73	N	C to 120	---	---	C to 120	---	---
Methyl Ethyl Ketone (MEK) $CH_3\ COC_2\ H_5$	100%	N	N	73	N	N	73	C to 68	R to 140	C to 140	R to 73 C to 176
Methyl Isobutyl Carbinol $(CH_3\ )_2\ CHCH_2\ CH(CH_3\ )OH$	--	---	N	---	N	---	---	---	---	---	---
Methyl Isobutyl Ketone $(CH_3\ )_2\ CHCH_2\ COCH_3$	--	N	N	73	N	73	---	---	73	---	---
Methyl Isopropyl Ketone $CH_3\ COCH(CH_3\ )_2$	--	---	N	---	N	73	---	---	73	---	---
Methyl Methacrylate $CH_2{=}C(CH_3\ )COOCH_3$	--	---	N	---	73	140	---	R to 68	140	---	---
Methyl Sulfate $(CH_3\ )_2\ SO_4$	--	---	73	C to 73	73	140	---	---	---	68	---
Methylene Bromide $CH_2\ Br_2$	--	---	N	N	N	C to 120	---	---	C to 120	---	---
Methylene Chloride $CH_2\ Cl_2$	100%	---	N	N	N	N	73	C to 104	N	---	C to 176
Methylene Chlorobromide $CH_2\ ClBr$	--	---	N	--	N	---	---	---	---	---	---
Methylene Iodide $CH_2\ I_2$	--	---	N	N	N	C to 120	---	---	C to 120	---	---
Methylsulfuric Acid $CH_3\ HSO_4$	--	---	180	140	140	---	---	---	---	---	---
Milk	--	160	180	212	140	140	140	R to 212	140	194	---
Mineral Oil	--	73	180	C to 140	140	R to 73	C to 73	R to 212	C to 176	---	---
Molasses	--	---	180	140	140	140	140	---	140	---	---
Monochloroacetic Acid $CH_2ClCOOH$	50%	---	---	140	140	140	---	---	140	---	---
Monochlorobenzene $C_6\ H_5\ Cl$	Tech Pure	---	N	73	N	C to 120	---	---	C to 120	---	---
Monoethanolamine $HOCH_2\ CH_2\ NH_2$	--	---	---	---	N	---	---	---	---	---	---
Motor Oil	--	---	180	C to 140	140	R to 140	---	---	R to 140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Morpholine C_4H_8ONH	--	---	---	140	---	140	---	---	140	---	---
Mustard, Aqueous	Work. Sol.	---	---	---	---	---	---	R to 248	---	---	---
N-methyl Pyrrolidone C_5H_9NO	100%	---	---	---	---	---	---	---	---	---	C to 73
Naphtha	--	---	73	73	140	73	73	R to 122	C to 176	R to 140	---
Naphthalene $C_{10}H_8$	--	---	N	73	N	73	73	---	73	R to 194	---
Natural Gas	--	73	---	73	140	140	73	---	140	---	---
Nickel Acetate $Ni(OOCCH_3)_2 \cdot 4H_2O$	--	---	---	73	---	140	---	---	140	---	---
Nickel Chloride $NiCl_2$	Sat'd	160	180	180	140	140	140	R to 212	140	---	---
Nickel Nitrate $Ni(NO_3)_2$ o6H_2O	Sat'd	160	180	180	140	140	140	R to 248	140	---	---
Nickel Sulfate $NiSO_4$	Sat'd	160	180	180	140	140	140	R to 212	140	---	---
Nicotine $C_{10}H_{14}N_2$	--	---	180	---	140	140	140	---	140	---	---
Nicotinic Acid C_5H_4NCOOH	--	---	180	---	140	140	140	R to 212	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Nitric Acid HNO_3	5%	---	---	---	---	---	---	R to 176	C to 140	N	---
	10%	C to 73	180	180	140	73	C to 73	R to 212	C to 140	---	---
	20%	---	---	---	---	---	---	R to 212	C to 140	---	---
	25%	---	---	---	---	---	---	R to 212	C to 140	---	---
	30%	N	R to 130	140	140	73	N	R to 212	C to 140	---	---
	35%	---	---	---	---	---	---	---	C to 140	---	---
	40%	N	R to 120	73	140	73	N	C to 248	140	---	---
	50%	N	110	N	100	C to 73	N	---	140	---	---
	65%	---	---	---	---	---	---	C to 248	---	---	---
	70%	N	100	N	73	C to 73	N	---	C to 73	---	---
	85%	---	---	---	---	---	---	N	---	---	---
	95%	---	---	---	---	---	N	---	---	---	---
	100%	N	N	N	N	N	N	---	N	---	---
Nitrobenzene $C_6H_5NO_2$	100%	N	N	C to 140	N	N	---	R to 122	N	---	---
Nitroglycerine $CH_2NO_3CHNO_3CH_2NO_3$	--	---	---	---	N	73	---	---	73	---	---
Nitroglycol $NO_3(CH_2)_2NO_3$	--	---	---	---	N	---	---	---	---	---	---
Nitrous Acid HNO_2	10%	---	180	C to 73	140	73	---	---	73	---	---
Nitrous Oxide N_2O	--	---	73	73	73	73	---	---	73	---	---
n-Octane C_8H_{18}	--	---	C to 73	---	---	---	---	---	---	---	---
Oleic Acid $CH_3(CH_2)_7CH{=}CH(CH_2)_7COOH$	--	160	180	73	140	C to 140	150	R to 248	C to 140	R to 140	---
Oleum x H_2SO_4 oySO_3	--	N	N	N	N	N	N	N	N	---	---
Olive Oil	--	160	C to 180	73	140	140	---	R to 248	R to 68	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Oxalic Acid $HOOCCOOHo2H_2O$	50%	160	180	140	140	140	140	---	140	---	---
	10%	---	---	---	---	---	---	R to 140	---	R to 140	---
	Sat'd	---	---	---	---	---	---	R to 122	---	---	---
Oxygen Gas O_2	--	160	180	N	140	140	---	R to 212	140	R to 140	---
Ozone O_3	--	---	180	C to 73	140	C to 120	---	---	C to 120	C to 68	---
	Sat'd	---	---	---	---	---	---	R to 68	---	---	---
Palm Oil	--	---	---	73	---	140	---	---	140	---	---
Palmitic Acid $CH_3 (CH_2)_{14} COOH$	10%	73	73	180	140	120	150	---	120	---	---
	70%	---	73	180	73	120	---	---	120	---	---
Paraffin $C_{36} H_{74}$	--	73	180	140	140	C to 140	---	R to 212	C to 140	---	---
Peanut Oil	--	---	C to 180	140	---	---	---	R to 248	---	---	---
n-Pentane $CH_3 (CH_2)_3 CH_3$	--	N	C to 180	N	C to 140	C to 120	---	---	C to 120	---	--
Peracetic Acid $CH_3 COOOH$	40%	N	---	73	73	---	---	---	---	---	---
Perchloric Acid (Type I) $HClO_4$	10%	---	---	---	---	---	---	R to 212	---	---	---
	20%	---	---	---	---	---	---	R to 212	---	---	---
	15%	---	180	140	73	140	C to 73	---	140	---	---
	70%	73	180	C to 73	73	73	N	R to 212	73	---	---
Perchloroethylene (tetrachloroethylene) $Cl_2 C=CCl_2$	--	N	N	C to 73	C to 140	C to 120	---	C to 212	C to 120	C to 68	---
Perphosphate	--	---	73	140	73	---	---	---	---	---	---
Petroleum Ether	--	---	---	---	---	---	---	R to 212	---	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Phenol $C_6 H_5 OH$	--	N	73	73	73	140	73	---	140	N	---
	5%	---	---	---	---	---	---	---	R to 248	---	---
	50%	---	---	---	---	---	---	R to 176	---	---	---
	90%	---	---	---	---	R to 140	---	---	R to 140	---	---
	Solid	---	---	---	---	---	---	C to 122	---	---	---
Phenylhydrazine $C_6H_5 NHNH_2$	--	---	N	N	N	C to 120	---	R to 104	C to 120	---	---
Phenylhydrazine Hydrochloride $C_6H_5NHNH_2{\cdot}HCl$	10%	---	---	---	---	---	---	R to 140	---	---	---
Phosphine PH_3	Gas	---	---	---	---	---	---	R to 104	---	---	---
Phosphoric Acid $H_3 PO_4$	10%	---	180	212	140	140	140	---	140	---	---
	50%	73	180	212	140	140	73	R to 212	140	C to 104	---
	75%	---	---	---	---	---	---	R to 212	---	---	---
	85%	---	180	212	140	73	---	C to 284	73	---	---
	98%	---	---	---	---	---	---	R to 212	---	---	---
Phosphoric Anhydride $P_2 O_5$	--	---	73	73	73	---	---	---	---	---	---
Phosphorous (Red)	--	---	---	---	73	140	---	---	140	---	---
Phosphorous (Yellow)	--	--	---	---	73	140	---	---	140	---	---
Phosphorus Oxychloride $POCl_3$	Liquid	---	---	---	---	---	---	R to 68	---	---	---
Phosphorus Pentoxide $P_2 O_5$	--	---	73	73	73	140	---	---	140	---	---
Phosphorus Trichloride PCl_3	--	--	N	73	N	120	C to 73	C to 122	120	---	---
Photographic Solutions	--	---	180	140	140	140	140	---	140	---	---
Phthalic Acid $C_6 H_4 (COOH)_2$	--	---	---	140	C to 140	140	---	---	140	---	---
	Susp.	---	---	---	---	---	---	R to 212	---	---	---

May not be fully applicable to pressurized applications

Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Picric Acid $C_6H_2(NO_2)_3OH$	10%	N	N	73	N	73	73	R to 212	73	C to 68	---
	50%	---	---	---	---	---	---	R to 212	---	---	---
	Sat'd.	---	---	---	---	---	---	R to 212	---	---	---
Pine Oil	--	---	N	140	---	R to 73	---	---	R to 73	---	---
Plating Solutions (Brass)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Cadmium)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Chrome)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Copper)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Gold)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Lead)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Nickel)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Rhodium)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Silver)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Tin)	--	---	180	140	140	140	C to 73	---	140	---	---
Plating Solutions (Zinc)	--	---	180	140	140	140	C to 73	---	140	---	---
Potash (Aq) KOH	Sat'd	---	180	---	140	140	---	---	140	---	---
Potassium Alum $AlK(SO_4)_2 o12H_2O$	--	---	180	---	140	140	---	---	140	---	---
Potassium Aluminum Sulfate $AlK(SO_4)_2 o12H_2O$	--	---	180	180	140	---	C to 73	---	---	---	---
Potassium Amyl Xanthate $CH_3(CH_2)_4OC(=S)$-S.K	--	---	---	---	73	---	---	---	---	---	---
Potassium Bicarbonate $KHCO_3$	Sat'd	---	180	140	140	140	140	R to 212	140	---	---
Potassium Bi- chromate $K_2Cr_2O_7$	Sat'd	---	180	140	140	---	C to 73	R to 212	---	---	---
	40%	---	---	---	---	---	---	R to 212	---	---	---

Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Potassium Bisulfate $KHSO_4$	--	---	180	212	140	140	---	R to 212	140	---	---
Potassium Borate $K_2 B_4 O_7$ o$4H_2 O$	--	--	180	140	140	140	140	R to 212	140	---	---
Potassium Bromate $KBrO_3$	--	---	180	212	140	140	140	R to 212	140	---	---
	10%	---	---	---	---	---	---	---	R to 212	---	---
Potassium Bromide KBr	--	---	180	212	140	140	140	R to 248	140	---	---
Potassium Carbonate $K_2 CO_3$	--	73	180	180	140	140	140	N	140	---	---
Potassium Chlorate (Aqueous) $KClO_3$	--	160	180	212	140	140	140	N	140	---	---
Potassium Chloride KCl	--	160	180	212	140	140	140	R to 212	140	---	---
Potassium Chromate $K_2 CrO_4$	--	---	180	212	140	140	140	---	140	---	---
Potassium Cyanide KCN	--	---	180	180	140	140	140	R to 212	140	---	---
Potassium Dichromate $K_2 Cr_2 O_7$	Sat'd	--	180	180	140	140	140	---	140	---	---
Potassium Ethyl Xanthate $KS_2 COC_2 H_5$	--	---	---	---	73	---	---	---	---	---	---
Potassium Ferricyanide $K_3 Fe(CN)_6$	--	---	180	180	140	140	140	R to 248	140	---	---
Potassium Ferrocyanide $K_4 Fe(CN)_6$ o$3H_2 O$	--	---	180	180	140	140	---	R to 248	140	---	---
Potassium Fluoride KF	--	---	180	180	140	140	140	R to 212	140	---	---
Potassium Hydroxide KOH	4%	---	---	---	---	---	---	C to 104	---	---	---
	10%	---	---	---	---	---	---	R to 176	---	---	---
	20%	---	---	---	---	---	---	R to 176	---	---	---
	25%	160	180	212	140	R to 140	140	---	R to 140	---	---
	45%	---	---	---	---	---	---	---	---	---	R to 73
	50%	---	---	---	---	---	---	R to 176	---	C to 104	---

Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Potassium hydrogen Sulfite $KHSO_3$	10%	---	---	---	---	---	---	R to 140	---	---	---
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Potassium Hypochlorite KClO	--	160	180	---	140	120	---	---	120	---	---
	3%	---	---	---	---	---	---	R to 212	---	---	---
Potassium Iodide KI	--	---	180	73	73	140	---	R to 212	140	---	---
Potassium Nitrate KNO_3	--	160	180	140	140	140	140	---	140	C to 104	---
	50%	---	---	---	---	---	---	R to 212	---	---	---
Potassium Orthophosphate H_2KPO_4	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Potassium Perborate KBO_3	--	---	180	140	140	140	140	---	140	---	---
Potassium Perchlorate $KClO_4$	--	---	180	140	140	140	140	---	140	---	---
Potassium Permanganate $KMnO_4$	10%	---	180	73	140	140	140	R to 176	140	---	---
	20%	---	---	---	---	---	---	R to 212	---	---	---
	25%	---	180	73	73	140	---	---	140	---	---
	30%	---	---	---	---	---	---	R to 212	---	---	---
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Potassium Persulfate $K_2 S_2 O_8$	--	---	180	140	140	140	140	R to 176	140	---	---
Potassium Sulfate $K_2 SO_4$	--	160	180	180	140	140	140	R to 212	140	194	---
Potassium Sulfide $K_2 S$	--	---	180	140	---	140	140	68	140	---	---
Potassium Sulfite $K_2 SO_3$ o$2H_2 O$	--	---	180	140	---	140	---	---	140	---	---
Propane $C_3 H_8$	--	---	73	73	140	140	73	R to 248	140	140	---
Propargyl Alcohol $HC{\equiv}CCH_2 OH$	--	---	C to 180	140	140	140	140	---	140	---	---
Propionic Acid $CH_3 CH_2 CO_2 H$	--	N	N	140	---	140	---	R to 140	140	---	---

Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Propyl Alcohol (Type I) $CH_3CH_2CH_2OH$	--	73	C to 73	140	140	R to 140	140	R to 122	R to 140	---	---
Propylene Carbonate $C_4H_6O_3$	100%	---	---	---	---	---	---	---	---	---	R to 73
Propylene Dichloride $CH_3\ CHClCH_2\ Cl$	100%	---	N	N	N	N	---	---	N	---	---
Propylene Oxide $CH_3\ CHCH_2\ O$	--	---	N	73	N	140	---	---	140	---	---
Pyridine $N(CH)_4\ CH$	--	---	N	C to 140	N	73	---	R to 68	73	C to 68	---
Pyrogallic Acid $C_6\ H_3\ (OH)_3$	--	---	---	---	73	--	--	---	---	---	---
Quinone $C_6\ H_4\ O_2$	--	---	---	140	---	140	---	---	140	---	---
Rayon Coagulating Bath	--	---	180	---	140	140	140	---	140	---	---
Salicylaldehyde $C_6\ H_4\ OHCHO$	--	---	---	73	N	120	---	---	120	---	---
Salicylic Acid $C_6\ H_4\ (OH)(COOH)$	--	---	---	140	140	140	---	R to 212	140	---	---
Selenic Acid Aq. $H_2\ SeO_4$	--	---	180	---	140	140	140	---	140	---	---
Silicic Acid $SiO_2\ onH_2\ O$	--	---	180	140	140	140	140	R to 212	140	---	---
Silicone Oil	--	---	180	212	73	73	---	---	73	---	---
Silver Acetate $AgCH_3COO$	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Silver Chloride $AgCl$	--	160	180	140	140	---	---	---	---	---	---
Silver Cyanide $AgCN$	--	---	180	180	140	140	140	R to 212	140	---	---
Silver Nitrate $AgNO_3$	--	160	180	180	140	R to 140	C to 73	---	R to 140	---	---
	50%	---	---	---	---	---	---	R to 212	---	---	---
Silver Sulfate $Ag_2\ SO_4$	--	160	180	140	140	140	C to 73	---	140	---	---
Soaps	--	73	180	140	140	R to 140	140	---	R to 140	---	---
Sodium Acetate $CH_3\ COONa$	Sat'd	---	180	212	140	140	140	R to 212	140	---	---
Sodium Alum $AlNa(SO_4\ )_2\ o12H_2\ O$	--	---	180	---	140	---	---	---	---	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Sodium Aluminate $Na_2 Al_2 O_4$	Sat'd	---	---	---	140	---	---	---	---	---	---
Sodium Benzoate $C_6 H_5 COONa$	--	---	180	140	140	140	140	---	140	---	---
	35%	---	---	---	---	---	---	R to 68	---	---	---
	50%	---	---	---	---	---	---	R to 212	---	---	---
Sodium Bicarbonate $NaHCO_3$	--	73	180	212	140	140	140	R to 212	140	---	---
Sodium Bisulfate $NaHSO_4$	--	73	180	140	140	140	140	---	140	---	---
	50%	---	---	---	---	---	---	R to 212	---	---	---
Sodium Bisulfite $NaHSO_3$	--	---	180	140	140	140	---	---	140	---	---
Sodium Borate (Borax) $Na_2 B_4 O_7 \cdot 10H_2 O$	Sat'd	160	180	180	140	140	140	---	140	---	---
Sodium Bromide NaBr	Sat'd	120	180	140	140	140	140	---	140	---	---
	50%	---	---	---	---	---	---	R to 248	---	---	---
Sodium Carbonate $Na_2 CO_3$	--	73	180	212	140	140	140	N	140	R to 140	---
Sodium Chlorate $NaClO_3$	Sat'd	---	180	140	73	140	140	N	140	---	---
Sodium Chloride NaCl	---	120	180	212	140	140	140	---	140	---	---
	Sat'd	---	---	---	---	---	---	R to 212	---	194	---
	10%	---	---	---	---	---	---	R to 212	---	---	R to 176
Sodium Chlorite $NaClO_2$	25%	---	180	73	N	140	---	---	140	---	---
Sodium Chromate $Na_2 CrO_4 \cdot 4H_2 O$	--	120	180	140	---	140	---	R to 176	140	---	---
Sodium Cyanide NaCN	--	---	180	180	140	140	140	R to 212	140	---	---
Sodium Dichromate $Na_2 Cr_2 O_7 \cdot 2H_2 O$	Sat'd	---	180	---	140	---	---	---	---	---	---
	20%	---	180	180	140	140	140	---	140	---	---
	50%	---	---	---	---	---	---	R to 212	---	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Sodium Ferricyanide $Na_3 Fe(CN)_6 o2H_2 O$	Sat'd	---	180	140	140	140	140	---	140	---	---
Sodium Ferrocyanide $Na_3 Fe(CN)_6 o10H_2 O$	Sat'd	---	180	140	140	140	140	---	140	---	---
Sodium Fluoride NaF	--	120	180	180	140	140	140	R to 212	140	---	---
Sodium Hydrogen Sulfite $NaHSO_3$	50%	---	---	---	---	---	---	R to 212	---	---	---
Sodium Hydroxide NaOH	1%	---	---	---	---	---	---	---	R to 140	---	---
	5%	---	---	---	---	---	---	C to 68	---	---	---
	15%	120	180	212	140	140	140	---	R to 140	---	---
	30%	120	180	212	140	R to 140	140	N	R to 140	---	---
	40%	---	---	---	---	---	---	---	R to 140	---	---
	50%	120	180	212	140	140	140	---	140	C to 104	---
	60%	---	---	---	---	---	---	---	R to 140	---	---
	70%	120	180	212	140	140	140	---	140	---	---
Sodium Hypochlorite $NaOClo5H_2 O$	--	120	180	73	73	140	140	---	140	---	N
	2% Cl	---	---	---	---	---	---	R to 212	---	---	---
	12.5% Cl	---	---	---	---	---	---	R to 68	---	---	---
Sodium Iodide NaI	--	---	180	---	140	---	---	---	---	---	---
Sodium Metaphosphate $(NaPO_3)n$	--	---	180	120	140	---	---	---	---	---	---
Sodium Nitrate $NaNO_3$	Sat'd	160	180	180	140	140	140	R to 212	140	---	---
Sodium Nitrite $NaNO_2$	--	160	180	73	140	140	140	R to 212	140	---	---
Sodium Palmitate $CH_3 (CH_2)_{14}COONa$	5%	---	180	140	140	---	---	---	---	---	---
Sodium Perborate $NaBO_3 o4H_2 O$	--	120	180	73	140	73	---	---	73	---	---
Sodium Perchlorate $NaClO_4$	--	---	180	212	140	140	---	---	140	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Sodium Peroxide $Na_2 O_2$	10%	---	180	---	140	140	---	---	140	---	---
Sodium Phosphate $NaH_2 PO_4$	Acid	120	180	212	140	140	140	R to 140	140	---	---
	Alkaline	---	120	180	212	140	140	---	140	---	---
	Neutral	---	120	180	212	140	140	---	R to 212	---	---
Sodium Silicate $2Na_2 OoSiO_2$	--	---	180	140	140	140	140	---	140	---	---
	10%	---	---	---	---	---	---	R to 140	---	---	---
	50%	---	---	---	---	---	---	R to 212	---	---	---
Sodium Sulfate Na_2SO_4	Sat'd	160	180	212	140	140	140	R to 212	---	---	---
	0.10%	---	---	---	---	---	---	R to 140	---	---	---
Sodium Sulfide Na_2S	Sat'd	160	180	212	140	140	140	---	140	C to 104	---
Sodium Sulfite Na_2SO_3	Sat'd	160	180	212	140	140	140	R to 212	140	---	---
Sodium Thiosulfate $Na_2S_2O_3o5H_2O$	--	---	180	180	140	140	140	---	140	---	---
	50%	---	---	---	---	---	---	R to 248	---	---	---
Sour Crude Oil	--	---	---	140	140	---	---	---	---	---	---
Soybean Oil	--	---	---	73	---	140	---	---	140	---	---
Stannic Chloride $SnCl_4$	Sat'd	---	180	140	140	140	140	---	140	---	---
Stannous Chloride $SNCl_2$	15%	120	180	140	140	140	140	---	140	---	---
	Sat'd	---	---	---	---	140	---	---	140	---	---
Starch	--	---	180	140	140	140	---	---	140	---	---
Starch Solution	Sat'd	---	---	---	---	140	---	---	140	---	---
Stearic Acid $CH_3(CH_2)_{16}COOH$	--	---	180	73	140	120	150	---	120	C to 194	---
	100%	---	---	---	---	R to 120	---	---	R to 120	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Stoddard's Solvent	--	---	N	---	N	73	140	---	73	---	---
Styrene $C_6H_5CH{=}CH_2$	--	---	---	73	---	C to 73	---	---	C to 73	R to 104	---
Succinic Acid $COOH(CH_2)_2COOH$	--	---	180	140	140	140	---	---	140	---	---
Sugar $C_6H_{12}O_6$	Aq.	---	180	---	140	140	---	---	140	---	---
Sulfamic Acid HSO_3NH_2	20%	--	N	180	N	---	---	---	---	---	---
Sulfate Liquors (Oil)	6%	---	180	140	140	---	---	---	---	---	---
Sulfite Liquors	6%	73	180	---	140	140	---	---	---	---	---
Sulfur S	--	---	180	212	140	140	140	---	---	104	---
Sulfur Chloride S_2Cl_2	--	---	---	C to 73	---	---	---	---	---	---	---
Sulfur Dioxide SO_2	Gas Dry	N	73	140	140	140	---	---	140	---	---
	Gas Wet	N	N	140	73	120	73	N	120	---	---
Sulfur Trioxide SO_3	Gas Dry	---	---	---	140	N	---	N	N	C to 68	---
	Gas	---	N	---	73	N	---	N	---	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Sulfuric Acid H_2SO_4	5%	---	---	---	---	---	---	---	---	---	R to 73
	30%	120	180	180	140	140	140	R to 248	R to 140	---	N
	50%	73	180	140	140	120	C to 73	R to 212	R to 140	---	---
	60%	C to 73	180	73	140	120	C to 73	R to 248	---	---	---
	70%	C to 73	180	73	140	R to 120	C to 73	---	---	---	---
	80%	C to 73	180	73	140	R to 120	N	C to 248	---	---	---
	90%	C to 73	150	73	73	120	N	R to 212	---	---	---
	93%	N	140	C to 73	73	C to 73	N	---	---	---	---
	94% - 98%	N	130	C to 73	N	C to 73	N	C to 212	N	---	---
	100%	N	N	C to 73	N	C to 73	N	---	---	C to 194	---
Sulfurous Acid H_2SO_3	--	---	180	140	140	140	140	R to 212	140	---	---
Tall Oil	--	---	C to 180	180	140	120	---	---	120	---	---
Tannic Acid $C_{76}H_{52}O46$	10%	N	180	73	140	140	140	R to 212	140	---	---
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Tanning Liquors	--	160	180	73	140	120	140	---	120	---	---
Tar	--	---	N	---	N	---	---	---	---	---	---
Tartaric Acid $HOOC(CHOH)_2COOH$	--	160	180	140	140	140	140	R to 248	140	---	---
	Sat'd	---	---	---	---	---	---	R to 248	R to 176	R to 194	---
Terpineol $C_{10}H_{17}OH$	--	---	---	---	C to 140	---	---	---	---	---	---
Tetrachloroethane $CHCl_2CHCl_2$	--	---	---	C to 73	C to 140	C to 120	---	---	C to 120	---	---
Tetrachloroethylene $Cl_2C{=}CCl_2$	--	N	N	C to 73	C to 140	C to 120	---	C to 212	C to 120	C to 68	---
Tetraethyl Lead $Pb(C_2H_5)_4$	--	---	73	73	73	---	---	---	---	68	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Tetrahydrofuran C_4H_8O	--	N	N	C to 73	N	C to 73	C to 73	C to 68	N	---	---
Tetralin $C_{10}H_{12}$	--	---	N	N	N	N	---	---	N	---	---
Tetra Sodium Pyrophosphate $Na_4P_2O_7$o$10H_2O$	--	---	180	---	140	---	---	---	---	---	---
Thionyl Chloride $SOCl_2$	--	---	N	N	N	N	140	N	N	---	---
Thread Cutting Oils	--	---	73	73	73	---	---	---	---	---	---
Tin (II) Chloride $SnCl_2$	--	---	---	---	---	---	---	R to 212	---	---	---
Tin (IV) Chloride $SnCl_4$	--	---	---	---	---	---	---	R to 212	---	---	---
Titanium Tetrachloride $TiCl_4$	--	---	---	140	C to 73	120	---	---	120	---	---
Toluene (Toluol) $CH_3C_6H_5$	--	N	N	C to 73	N	C to 120	N	---	C to 120	R to 140	R to 73
Tomato Juice	--	---	180	212	140	140	---	---	140	--	---
Transformer Oil	--	---	180	73	140	C to 120	---	---	C to 120	---	---
Transformer Oil DTE/30	--	---	180	---	140	R to 120	---	---	R to 120	---	---
Tributyl Citrate $C_{18}H_{32}O_7$	--	---	---	C to 73	73	C to 120	---	---	C to 120	---	---
Tributyl Phosphate $(C_4H_9)_3PO_4$	--	---	N	C to 140	N	73	---	---	73	R to 194	---
Trichloroacetic Acid CCl_3COOH	50%	---	---	140	140	140	---	R to 104	140	---	---
	10%	---	---	---	---	140	---	---	140	---	---
Trichlorobenzene $C_6H_3Cl_3$	--	---	---	---	---	---	---	R to 140	---	---	---
Trichloroethane $C_2H_3Cl_3$	--	---	---	---	---	---	---	---	---	---	R to 122
Trichloroethylene $CHCl=CCl_2$	--	N	N	N	N	C to 120	N	R to 176	C to 68	C to 68	R to 176
Triethanolamine $(HOCH_2CH_2)_3N$	--	C to 73	73	140	73	73	73	C to 104	73	---	---
Triethylamine $(C_2H_5)_3N$	--	---	---	N	140	73	---	---	73	---	---
Trimethylolpropane $(CH_2OH)_3C_3H_5$	--	---	---	140	73	C to 120	---	---	C to 120	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Trisodium Phosphate $Na_3PO_4 \bullet 12H_2O$	--	73	180	140	140	140	140	---	140	---	---
Turpentine	--	N	N	N	140	C to 120	C to 73	---	C to 120	R to 140	---
Urea $CO(NH_2)_2$	--	---	180	180	140	140	140	---	140	---	---
	10%	---	---	---	---	---	---	R to 212	---	---	---
	Sat'd	---	---	---	---	---	---	R to 176	---	C to 140	---
Urine	--	160	180	180	140	140	140	---	140	---	---
Vaseline (Petroleum Jelly)	--	---	N	140	N	120	---	---	120	---	---
Vegetable Oil	--	---	C to 180	140	140	R to 140	---	R to 248	R to 140	---	---
Vinegar	--	73	150	140	140	140	140	---	140	194	---
Vinyl Acetate $CH_3COOCH{=}CH_2$	--	---	N	73	N	140	---	C to 68	140	---	---
Water, Acid Mine H_2O	--	160	180	140	140	140	180	---	140	---	194
Water, Deionized H_2O	--	160	180	140	140	140	180	---	140	194	176
Water, Distilled H_2O	--	160	180	212	140	140	180	R to 248	140	194	---
Water, Potable H_2O	--	160	180	212	140	140	180	R to 248	140	194	---
Water, Salt H_2O	--	160	180	212	140	140	180	---	140	194	---
Water, Sea H_2O	--	160	180	212	140	140	180	R to 248	140	194	R to 176
Water, Soft H_2O	--	160	180	212	140	140	180	---	140	194	---
Water, Waste H_2O	--	73	180	212	140	140	180	---	140	194	---
Whiskey	--	---	180	140	140	140	140	R to 212	140	---	---
White Liquor	--	73	180	---	140	---	---	---	---	---	---
Wine	--	73	180	140	140	140	140	R to 248	140	---	---
Wines and Spirits	--	---	---	---	---	---	---	R to 212	---	---	---

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Plastics at Maximum Operating Temperature (F)

Chemical (Formula)	Concentration	ABS	CPVC	PP	PVC	PE	PB	PVDF	PEX	PA 11	PK
Xylene (Xylol) $C_6H_4(CH_3)_2$	--	N	N	N	N	N	N	C to 140	N	C to 194	---
Zinc Acetate $Zn(CH_3COO)_2o2H_2O$	--	---	180	---	---	---	---	---	---	---	---
Zinc Carbonate $ZnCO_3$	--	---	180	140	---	140	---	R to 212	140	---	---
Zinc Chloride $ZnCl_2$	--	120	180	180	140	140	---	---	140	---	---
	50%	---	---	---	---	---	---	---	---	C to 73	---
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Zinc Nitrate $Zn(NO_3)_2o6H_2O$	--	160	180	180	140	140	140	---	140	---	---
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---
Zinc Oxide ZnO	--	---	---	---	---	---	---	R to 212	---	---	---
Zinc Stearate $(CH_3(CH_2)_{16}COO)_2Zn$	--	---	---	---	---	---	---	R to 122	---	---	---
Zinc Sulfate $ZnSO_4o7H_2O$	--	160	180	212	140	140	140	---	140	---	---
	Sat'd	---	---	---	---	---	---	R to 212	---	---	---