

SPEARS® LabWaste™ CPVC Corrosive Waste Drainage System

LW-2-0603

Proven Solvent Cement Joining Eliminates Troublesome Fusion Equipment, Mechanical Joints & Elastomer Problems
NSF Certified for Corrosive Waste Use, Meets IAPMO IGC 210 and ICC-ES AC252 For CPVC Chemical Waste Systems



- Complete System of Pipe, Fittings & Adapters
- All CPVC Construction in Full Assortment of Standard DWV Patterns
- Custom Fabricated Accessories-Drains, Neutralization Tanks & Pump Stations
- Specially Formulated One-Step Solvent Cement Provides Chemical Resistance Equal to System Pipe & Fittings – Now in Special Yellow Color
- ULC Flame & Smoke Rated
- Non-Pressure Drainage Service to 220°F

Chemical & Corrosion Resistant CPVC

One of the key advantages of the **LabWaste™** CPVC system is its excellent resistance to a broad range of corrosive environments. CPVC is inert to most mineral acids, bases, salts and aliphatic hydrocarbons, and compares favorably to other non-metals in these chemical environments.

General Chemical Resistance Overview:

Weak Acids	Excellent	Salts	Excellent
Strong Acids	Excellent	Aliphatic Solutions	Good
Weak Bases	Excellent	Halogens	Good-Fair
Strong Bases	Excellent	Strong Oxidants	Good-Fair

The **LabWaste™** CPVC System has been developed for use in academic, research, and institutional laboratory chemical waste drainage applications, which is the routine disposal of a wide variety of hot and cold chemicals accompanied by water for the purpose of dilution and flushing.

Full Assortment of Drainage Pattern Fitting Configurations

Spears® broad line of **LabWaste™** CPVC fittings are produced in ASTM D 3311 and other drainage patterns required in corrosive waste system installations. Standard configurations are available in nominal sizes of 1-1/2" through 24" with many specialty fittings.

NSF Certified For Corrosive Waste

Spears® **LabWaste™** CPVC Corrosive Waste Drainage System of pipe, fittings, and cement is tested and certified for use in corrosive waste systems by NSF International, tested to IAPMO IGC 210 and ICC-ES AC252 for CPVC Chemical Waste Systems.

Cost Saving Solvent Weld Joining Eliminates Troublesome Electro-Fusion and Mechanical Connections

A proven joining method reliably used for over 50 years, Solvent Cement Welding requires no special tools, no costly fusion equipment, and provides a solid, chemically bonded joint for easy installation, repairs or alterations. Most importantly, solvent cement joints end problems typical of polypropylene system installation, such as mechanical connector pullout, maintenance on elastomer sealed joints, internal fusion wire corrosion, and cumbersome fusion joining methods. Saves time, saves cost, saves worry!

ULC Flame & Smoke Rated Components

Spears® **LabWaste™** system components have been evaluated as finished products for surface burning characteristics of flame spread and smoke density by Underwriters Laboratories of Canada under standard test method CAN/ULC S102.2-M88.

Spears® LabWaste™ System General Specifications

Spears® CPVC LabWaste™ System is a specially designed product line developed in accordance with portions of existing ASTM Standards used in its design and manufacture as specified below.

Applicable Conformance Standards

Conformance Criteria	Applicable Standard	Standard Specification or Practice Title
Product Certification, Acceptance Criteria, and Interim Guide Criteria	NSF Standard 14 Special Engineered (SE) product certification for corrosive waste end use. ICC Acceptance Criteria, AC252 IAPMO Interim Guide Criteria, IGC 210	Standard 14: <i>Plastics Piping System Components and Related Material</i> , NSF-cw S.E. Certified to specified conformance standards & specifications. Acceptance Criteria for CPVC Systems of Piping, Fittings and Solvent Cement Used in Chemical Waste Systems Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Limited Chemical Drainage Systems
Material	D 1784, cell class 23447 (CPVC).	D 1784: <i>Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds</i>
Dimensions and Tolerances - Pipe Dimensions and Tolerances - Fittings Chemical Resistance Adjusted concentrations for CPVC Water Absorption Mechanical Joint - Transition Fittings Flattening - Pipe Impact Resistance - Pipe & Fittings Workmanship, Finish & Appearance	ASTM F1412, Section 6.1 ASTM F1412, Section 6.2 ASTM F1412, Section 6.3 ASTM F1673, Section 8.3 ASTM F1412, Section 6.4 ASTM F1412, Section 6.5 ASTM F1412, Section 6.8 ASTM F1412, Section 6.9 ASTM F1412, Section 7	F1412: <i>Standard Specification for Polyolefin Pipe and Fittings for Corrosive Waste Drainage Systems</i> F1673: <i>Standard Specification for Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems</i>
Solvent Cement (Special Yellow Color)	F493	F493: <i>Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings</i>

Flammability & Surface Burning Characteristics

Flammability Material Rating	UL94, V-0	UL94: <i>Tests for Flammability of Plastic Materials for Parts in Devices and Appliances</i>
Flame & Smoke Rating Pipe Flame Spread: Smoke Developed:	CAN/ULC S102.2 0 5 - 20	CAN/ULC S102.2: <i>Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials</i>
Fittings Flame Spread: Smoke Developed:	5 - 10 15 - 50	

Flame spread and smoke development ratings based on tests of finished product, pipe and fittings solvent cement welded as assemblies.

Product Certification (3rd Party Approval Standards)

Spears® **LabWaste™** CPVC Corrosive Waste Drainage System is a complete system of pipe, fittings and solvent cement. Since specific ASTM Standards have not been developed for CPVC corrosive waste systems, Spears® **LabWaste™** CPVC pipe and fittings are tested and certified for use in corrosive waste systems by NSF International as a Special Engineered (SE) product. Spears® **LabWaste™** CPVC system meets the requirements of IAPMO IGC 210 and ICC-ES AC252 for CPVC Corrosive Waste Drainage Systems

Spears® **LabWaste™** - A Complete System

Spears® **LabWaste™** is offered as a complete system of pipe, fittings, solvent cement. A broad assortment of additional accessories are available including Valves, Unions, Flanges and Adapters.

Fitting configurations are produced to applicable DWV patterns of ASTM D3311, Standard Specification for Drain, Waste, and Vent (DWV) Plastic Fitting Patterns, and various specialty patterns. All drainage fittings with 90° angles (sanitary tees, elbows, etc.) have socket pitch to maintain approximately 1/4" per foot drainage.

System Integrity

Spears® **LabWaste™** products have been developed and designed to be used as a total system consisting of pipe, fittings, accessories, solvent cement and thread sealant. All Spears® **LabWaste™** components must be used in order to insure a sound piping system. Substitution of other products for Spears® **LabWaste™** pipe, fittings, or solvent cement may be detrimental to system integrity and is not recommended. The Spears® Limited Warranty (located at end of this manual) does not cover problems occurring within the piping system as the direct result of non-use of Spears® **LabWaste™** system products.

System Transition Adapters

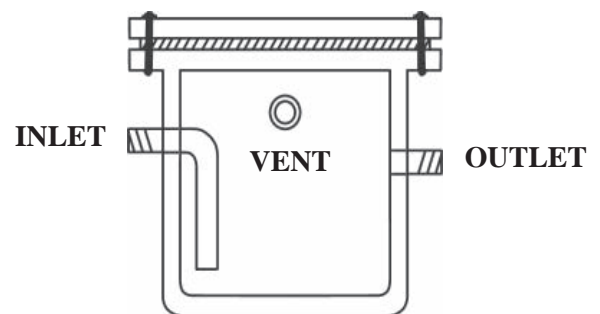
Easy transition from PP/PVDF, Glass or Duriron systems to **LabWaste™** CPVC using one of these special adapters for sizes 1-1/2" through 4" piping.

Spears® **LabWaste™** Custom System Accessories

Acid Neutralization/Dilution Tanks for Use With **LabWaste™** CPVC Systems

Neutralization or dilution tanks are required by codes for the purpose of neutralizing corrosive wastes. Corrosive liquids, spent acids or other harmful chemicals that destroy or injure a drain, sewer, soil or waste pipe, or create noxious or toxic fumes or interfere with sewage treatment processes are prohibited from being discharged into the plumbing system without being neutralized or treated. Spears® offers a standard selection of HDPE tanks in 5 gallon to 3000 gallon capacities and CPVC tanks in 5 gallon to 55 gallon capacities to meet these needs. Tanks can also be produced in virtually any custom size, shape, or connection configurations. Contact Spears® Technical Services with desired specifications for custom quotation. See Spears® price schedule LWNT-1, **LabWaste™** Neutralization Tanks & Accessories for additional information on the following features and options.

- CPVC Tanks 5-gallon to 55-gallon
- HDPE Tanks 5-gallon to 3000-gallon
- Optional Vented Tanks
- Socket (CPVC), Thread or Flanged Connection
- Inspection & Manhole Port Options
- Pedestrian or Vehicular Traffic Cover Options
- Tank Extension Options
- Limestone Chip Neutralization Medium



LabWaste™ Floor Drains & Cleanouts

Spears® **LabWaste™** CPVC Floor Drains are available for connection to 1-1/2" through 4" drainage pipe. Standard drains have adjustable 5" round CPVC grates and can be ordered with optional CPVC 1/8" perforated sediment strainer to trap debris. CPVC drains also available with adjustable round Stainless Steel grates in 5", 6", 7" or 8" diameters. Standard CPVC Floor Cleanouts have 5" round, adjustable Stainless Steel access covers. All Floor Drains and Floor Cleanouts are available with optional membrane plate for clamping housing to waterproof membranes when used in floor installations.



Sample Engineering Specification

Special drainage systems for corrosive chemical or acid waste shall be manufactured from CPVC Type IV, ASTM Cell Classification 23447. All systems components shall be certified by NSF International for use in corrosive waste drainage systems as a Special Engineered (SE) product and bear the NSF mark. All system pipe and fittings shall be Schedule 40 CPVC produced to the dimensional requirements of ASTM F1412 and the manufacturer's specifications. All pipe shall be CAN/ULC S102.2 Listed for flame spread and smoke development with rating designated on the pipe marking. All pipe markings shall be accompanied by a yellow stripe for identification of CPVC chemical waste system. All fittings shall be CPVC drainage patterns meeting the requirements of ASTM D3311 and the manufacturer's specifications, as applicable. All fittings shall be CAN/ULC S102.2 listed for flame spread and smoke development and rating designated on the original package labeling. Joining method for pipe and fittings shall be solvent cement welding. Solvent cement shall be a "one-step" primerless type CPVC cement specially formulated for resistance to corrosive chemicals and manufactured in accordance with ASTM F493. All pipe, fittings, and cement shall be supplied together as a system, as Spears® **LabWaste™** CPVC Corrosive Waste Drainage Systems manufactured by Spears® Manufacturing Company.

For **LabWaste™** Product Line Information See Publications:

LW-1	LabWaste™ CPVC Corrosive Waste Drainage System Prices
LWNT-1	LabWaste™ Standard CPVC, PP & HDPE Neutralization Tanks Prices
LW-4	LabWaste™ CPVC Corrosive Waste Drainage System Technical Information

Not for Use With Compressed Air or Gases

Spears® LabWaste™ Custom System Accessories

Complete drainage waste systems are composed of more than just pipe and fittings. Spears offers custom fabrication of virtually any system accessory for use with LabWaste™ CPVC Corrosive Waste Drainage Systems such as Floor Drains, Wall Drains, Collection Tanks, Neutralization Tanks, and Pump Stations. Plus, custom built supplemental equipment including Fume Hoods, Wet-Station, Laboratory Faucets and much more – all fabricated from corrosion resistant thermoplastic materials.

LabWaste™ Neutralization Tanks

Neutralization tanks allow pH balancing of corrosive wastes prior to disposal. Custom produced to virtually any capacity.



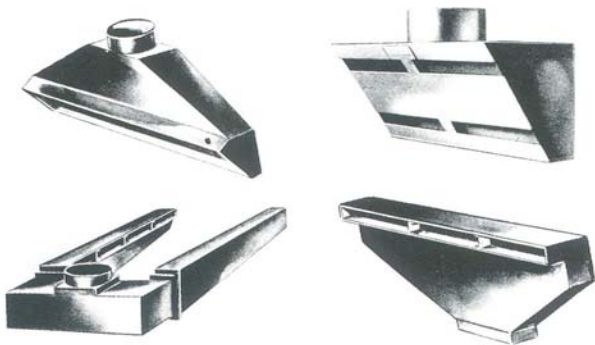
LabWaste™ Complete Tank & Pump Station

Tank & Pump Station provides collection of corrosive waste for Neutralization, holding, or transfer. Standard tank holding capacities range from 12 to 1100 gallons with pumping rates from 5 to 75 GPM and can be custom produced to virtually any capacity with optional actuated control valves and pH sensors for full automation.

Engineered for installation above or below ground with internal piping, pumps and liquid level controls ready for electrical and drainage system connection.



Supplemental Equipment for LabWaste™ Installations



Fume Hoods & Wet Process Stations

Full cabinet or counter-top models built to specifications



Laboratory Fixtures

Standard and Recirculating designs

Spears® LabWaste™ System General Specifications

Spears CPVC **LabWaste™** System is a specially designed product line for which there is no designated ASTM Standard Specification of conformance. However, certain portions of existing ASTM Standards are used in its design and manufacture as specified below.

LabWaste™ Material

CPVC ASTM D 1784,
Cell Classification 23447

LabWaste™ Pipe

Dimensions ASTM F441, Schedule 40
Hydrostatic Burst ASTM D 2665
Flattening ASTM F441

LabWaste™ Fittings

Dimensions ASTM D 2665¹
Hydrostatic Burst ASTM D 2665
Load Deflection ASTM D 2665
Standard Patterns ASTM D 3311
Other Patterns Spears Specifications
Threads
(Accessory Fittings) ASTM F 1498
Flange Bolt Pattern
(Accessory Fittings) ANSI B16.5, Class 150

LabWaste™ Solvent Cement

CPVC, primerless type “One-Step”,
Special Formulation for corrosive
Applications² ASTM F 493

LabWaste™ Fire Resistance

Flamability	V0	UL94
Flame Spread	5	CAN 102.2-M88
Smoke Density	25	CAN 102.2-M88

Notes:

- 1 – Fittings socket dimensions run slightly smaller than standard DWV for improved interference fit.
- 2 – “One-Step” solvent cement requires no primer application; chemical formulation developed specifically for caustic solutions such as sodium hypochlorite and sodium hydroxide that can have adverse effect on standard CPVC cements.

Chemical Resistance Information

In general, CPVC is inert to most mineral acids, bases, salts and aliphatic hydrocarbons, and is comparable to other non-metals in these chemical environments. Application conditions including chemical concentration, temperature, pressure, and external stress must be taken into consideration. Due to the many variables involved, final suitability often must be based on in-service testing.

The following information and Chemical Resistance Tables are compiled from the Plastic Pipe Institute (PPI), *Technical Report TR 1/2000, Thermoplastic Piping for the Transport of Chemicals*, provided as a service to the plastics industry, and other industry sources. The information is offered in good faith and believed to be accurate at the time of its preparation, but is offered without any warranty, expressed or implied, including warranties of merchantability and fitness for a particular purpose by PPI or Spears Manufacturing Company. Chemical resistance testing is generally based on 90-day immersion tests in different chemicals at 73°(23°C) and 180°F (82°C). Results for each sample are evaluated for changes in weight and tensile strength to develop the recommendation shown for non-pressure applications. Immersion testing results are applicable only if the system is not under applied mechanical or thermal stress. These recommendations are guidelines for use and the final decision regarding material suitability must rest with the end-user.

Noted Caution Areas for CPVC

1. CPVC is not recommended for use with most polar organic materials including various solvents such as chlorinated or aromatic hydrocarbons, esters, or ketones. Solvents that are insoluble in water, such as aromatics, will be absorbed by the piping system over time, leading to a decreased service life expectancy. Most solvents are prohibited by law from disposal in chemical waste drainage systems.
2. CPVC may or may not be affected by combinations of chemicals. Chemicals that individually have no effect may have an effect when used in combination. The following Chemical Resistance Tables do not reflect chemicals used in combination. Testing closely duplicating field conditions should be made in advance with the chemical or chemical combinations to be used.
3. Chemicals that do not normally affect CPVC can cause cracking to occur when stress is applied. Test samples under stress can exhibit environmental stress cracking when exposed to surfactants, certain oils, or grease. This is a result of chemical attack on the material being propagated by external stresses. Such stresses include external stresses from expansion/contraction and installation. Special consideration should be taken during design and installation to avoid unusual stresses in the piping system.
4. In general, chemical resistance of plastics tends to decrease with an increase in chemical concentration and/or temperature. As a result, various chemicals may be safely handled in limited concentrations or within certain temperature limits and are specified accordingly in the Chemical Resistance Tables.

CHEMICAL RESISTANCE TABLE

Resistance Rating Codes

- 180 = resistant to temperature indicated, °F.
 R to 73 = resistant to temperature indicated, °F, but may have limited resistance to higher temperatures.
 C to 73 = limited resistance to temperature indicated, °F, and may be suitable for some conditions.
 N = not resistant to specified chemical.
 — = data not provided

CHEMICAL	RATING	CHEMICAL	RATING	CHEMICAL	RATING
A					
Acetaldehyde	N	Beet Sugar Liquors	180	Chlorine Gas 0-20	C to 73
Acetaldehyde Aq. Of 40%	N	Benzaldehyde 10%	R to 73	Chlorine Gas 20-50 PPM	N
Acetamide	---	Benzaldehyde 99%	---	Chlorine Gas 50 + PPM	N
Acetic Acid Vapor	180	Benzene	N	Chlorine Liquid	N
Acetic Acid 5%	---	Benzene Sulfonic Acid 10%	180	Chlorinated Water 10 PPM	180
Acetic Acid 10%	---	Benzene Sulfonic Acid 10% +	N	Chlorinated Water Sat'd	180
Acetic Acid 25%	180	Benzoic Acid	180	Chloroacetic Acid 50%	180
Acetic Acid 40%	---	Benzoyl Chloride	---	Chloroacetic Acid > 10%	---
Acetic Acid 50%	---	Benzyl Alcohol	N	Chloroacetyl Chloride	---
Acetic Acid 60%	N	Benzyl Chloride	---	Chlorobenzene Dry	N
Acetic Acid 80%	---	Bismuth Carbonate	180	Chlorobenzene Liquid	---
Acetic Acid 85%	N	Black Liquor	180	Chlorobenzyl Chloride	N
Acetic Acid glacial	N	Bleach 5% Active	180	Chloroethanol	---
Acetic Anhydride	N	Bleach 12% Active	185	Chloroform Dry	N
Acetone 5%	N	Borax	180	Chloroform Liquid	---
Acetone 10%	---	Boric Acid	180	Chloromethane	---
Acetone 100%	---	Brake Fluid	---	Chloropicrin	---
Acetophenone	---	Brine	180	Chlorosulfonic Acid	73
Acetyl Chloride	N	Bromic Acid Sat'd	180	Chlorosulfonic Acid 50%	---
Acetylene	N	Bromic Acid 10%	---	Chlorosulfonic Acid 100%	---
Acetylnitrile	N	Bromine Liquid	N	Chromic Acid Sat'd	---
Acrylic Acid	---	Bromine Vapor 25%	180	Chromic Acid 10%	180
Acrylonitrile	N	Bromine Water Cold	180	Chromic Acid 20%	---
Adipic Acid	180	Bromobenzene	---	Chromic Acid 25%	---
Allyl Alcohol	C to 73	Bromotoluene	---	Chromic Acid 30%	180
Aluminum Ammonium	180	Butadiene	180	Chromic Acid 40%	180
Aluminum Chloride	180	Butane 50%	180	Chromic Acid 50%	C to 140
Aluminum Flouride	180	Butane Gas	---	Chromium Pot Sulfate >10%	---
Aluminum Hydroxide	180	n-Butanol	---	Chromium Pot Sulfate Sat'd	---
Aluminum Nitrate	180	Butyl Acetate	N	Citric Acid	180
Aluminum Oxychloride	180	Butyl Alcohol	C to 73	Coconut Oil	C to 180
Aluminum Potassium	180	Butyl Cellosolve	N	Cod Liver Oil	---
Aluminum Sulfate	180	n-Butyl Chloride	N	Coffee	180
Ammonia Gas	N	Butyl Glycol	---	Coke Oven Gas	---
Ammonia Liquid	N	Butylene ©	---	Copper Acetate	73
Ammonia Acetate	180	Butyl Phenol	---	Copper Carbonate	180
Ammonium Bifluoride	180	Butyl Phthalate	N	Copper Chloride	180
Ammonium Bisulfide	---	Butyl Stearate	---	Copper Cyanide	180
Ammonium Carbonate	180	Butynediol	---	Copper Fluoride	180
Ammonium Chloride	180	Butyric Acid	N	Copper Nitrate 30%	180
Ammonium Dichromate	73	Butyric Acid 20%	---	Copper Nitrate 50%	---
Ammonium Fluoride 10%	180	C			
Ammonium Fluoride 25%	180	Cadmium Cyanide	180	Copper Sulfate	180
Ammonium Hydroxide 10%	N	Calcium Bisulfide	73	Corn Oil	C to 180
Ammonium Hydroxide 30%	---	Calcium Bisulfite	180	Corn Syrup	185
Ammonium Nitrate	180	Calcium Bisulfite Sat'd	---	Cottonseed Oil	C to 180
Ammonium Persulphate	---	Calcium Carbonate	180	Creosote	N
Ammonium Phosphate	180	Calcium Chlorate	180	Cresol	N
Ammonium Sulfate Sat'd	180	Calcium Chloride 5%	180	Cresylic Acid	180
Ammonium Sulfate 20%	---	Calcium Chloride Sat'd	180	Croton Aldehyde	N
Ammonium Sulfide	180	Calcium Hydroxide	180	Croton Aldehyde Liquid	---
Ammonium Thiocyanate	180	Calcium Hydroxide 2%	---	Crude Oil	C to 180
Amyl Acetate	N	Calcium Hydroxide 30%	---	Cupric Chloride	---
Amyl Alcohol	N	Calcium Hypochlorite 30%	180	Cupric Fluoride	180
Amyl Alcohol 100%	---	Calcium Hypochlorite Sat'd	---	Cupric Sulfate	180
n-Amyl Chloride	N	Calcium Nitrate	180	Cuprous Chloride	180
Anisol	---	Calcium Nitrate 50%	---	Cyclohexane	N
Aniline	N	Calcium Nitrate Sat'd	---	Cyclohexanol	N
Aniline Chlorohydrate	N	Calcium Oxide	180	Cyclohexanone	N
Aniline Hydrochloride	N	Calcium Sulfate	180	D	
Anthraquinone	180	Calcium Sulfate	180	Detergents	C to 180
Anthraquinone Sulfonic Acid	180	Calcium Hydrogen	---	Dextrin	180
Antifreeze	---	Camphor	---	Dextrose	180
Antimony Trichloride	180	Cane Sugar Liquors	180	Diacetone Alcohol	N
Aqua Regia	R to 73	Carbitol	N	Dibutoxyethyl Phthalate	---
Arsenic Acid	180	Carbon Dioxide Dry	180	n-Dibutyl Ether	---
Aryl Sulfonic Acid	180	Carbon Dioxide Wet	180	Dibutyl Phthalate	N
Asphalt	N	Carbon Disulfide	N	Dibutyl Sebacate	---
B		Carbon Monoxide	180	Dichloroacetic Acid	---
Barium Carbonate	180	Carbon Tetrachloride	N	Dichlorobenzene	N
Barium Chloride	180	Carbonic Acid	180	Dichlorobenzene Liquid	---
Barium Hydroxide Sat'd	180	Castor Oil	C to 180	Dichloroethylene	N
Barium Hydroxide 10%	---	Caustic Potash	180	Dichloroethylene Liquid	---
Barium Hydroxide 30%	---	Caustic Soda	160	Diesel Fuels	C to 180
Barium Nitrate	180	Cellosolve	N	Diethanolamine Solid	---
Barium Sulfate	180	Cellosolve Acetate	N	Diethanolamine 20%	---
Barium Sulfide	180	Chloral Hydrate	180	Diethylamine	N
Beer	180	Chloramine	N	Diethyl Ether	N
		Chloric Acid 10%	180	Diglycolic Acid Sat'd	180
		Chloric Acid 20%	185	Diglycolic Acid 10%	---

CHEMICAL	RATING	CHEMICAL	RATING	CHEMICAL	RATING
Dimethylamine	---	Glycerine Liquid	---	Lemon Juice	---
Dimethyl Formamide	N	Glycol	C to 180	Ligroin	---
Dimethylhydrazine	---	Glycolic Acid Sat'd	180	Lime Slurry	---
Dimethyl Phthalate	N	Glycolic Acid 10%	---	Lime Sulfur	73
Diocyl Phthalate	N	Glycolic Acid 30%	---	Linoleic Acid	180
Dioxane	N	Glycolic Acid 65%	---	Linoleic Oil	---
Dioxane Liquid	---	Glyoxal	---	Linseed Oil	C to 180
Diphenyl Oxide	---	Grape Sugar	180	Liqueurs	---
Disodium Phosphate	180	Grapefruit Juice	---	Lithium Bromide	---
Dishwashing Liquid	---	Grease	---	Lithium Chloride	---
Dow Therm A	---	Green Liquor	180	Lithium Hydroxide	---
Dow Therm A 40%	---			Lubricating Oil ASTM #1	180
Dow Therm A 95%	---			Lubricating Oil ASTM #2	180
Dow Therm A Liquid	---			Lubricating Oil ASTM #3	180
E		H		M	
Ether	N	Heptane (Type 1)	180	Magensium Carbonate	180
Ethyl Acetate	N	Heptane Liquid	---	Magnesium Chloride Sat'd	180
Ethyl Acetate Liquid	---	n-Hexane	73	Magnesium Chloride 50%	---
Ethyl Acetoacetate	N	n-Hexane Liquid	---	Magnesium Citrate	180
Ethyl Acrylate	N	Hexanol, Tertiary Type 1	180	Magnesium Hydroxide	180
Ethyl Alcohol	C to 140	Hydraulic Oil	---	Magnesium Nitrate	180
Ethyl Benzene	---	Hydrazine	N	Magnesium Oxide	---
Ethyl Chloride Dry	N	Hydrobromic Acid 20%	73	Magnesium Sulfate	180
Ethyl Chloride Gas	---	Hydrobromic Acid 50%	---	Maleic Acid Sat'd	180
Ethyl Chloroacetate	---	Hydrobromic Acid 66%	---	Maleic Acid 10%	---
Ethyl Ether	N	Hydrochloric Acid 1%	---	Maleic Acid 50%	---
Ethylene Bromide	N	Hydrochloric Acid 10%	180	Malic Acid	180
Ethylene Chloride	N	Hydrochloric Acid 20%	---	Manganese Sulfate	180
Ethylene Chlorohydrin	N	Hydrochloric Acid 30%	180	Margarin	---
Ethylene Chlorohydrin Liq	---	Hydrochloric Acid Conc.	---	Mercuric Chloride	180
Ethylene Diamine	---	Hydrocyanic Acid	180	Mercuric Chloride Sat'd	---
Ethylene Dichloride	N	Hydrocyanic Acid Sat'd	---	Mercuric Cyanide	180
Ethylene Glycol	C to 180	Hydrocyanic Acid 10%	---	Mercuric Sulfate	180
Ethylene Oxide	N	Hydrofluoric Acid Dilute	73	Mercurous Nitrate Sat'd	180
2-Ethylhexanol	---	Hydrofluoric Acid 30%	73	Mercurous Nitrate 10%	---
F		Hydrofluoric Acid 40%	---	Mercury	180
Fatty Acids	73	Hydrofluoric Acid 50%	N	Methane	73
Ferric Chloride	180	Hydrofluoric Acid 60%	---	Methanol	N
Ferric Hydroxide	180	Hydrofluoric Acid 70%	---	Methanol 5%	---
Ferric Nitrate	180	Hydrofluoric Acid 100%	N	Methanol Liquid	---
Ferric Sulfate	180	Hydrofluoric Acid Gas	---	Methoxyethyl Oleate	---
Ferrous Chloride	180	Hydrofluosilic Acid 50%	140	Methyl Acetate	N
Ferrous Hydroxide	180	Hydrogen	73	Methyl Acrylate	---
Ferrous Nitrate	180	Hydrogen Cyanide	---	Methyl Amine	N
Ferrous Sulfate	180	Hydrogen Fluoride	C	Methyl Bromide	N
Ferrous Sulfate 20%	---	Hydrogen Peroxide 3%	---	Methyl Butyl Ketone	---
Ferrous Sulfate Sat'd	---	Hydrogen Peroxide 10%	---	Methyl Cellosolve	N
Ferrous Chloride	180	Hydrogen Peroxide 30%	---	Methyl Chloride	N
Fish Oil	180	Hydrogen Peroxide 50%	180	Methyl Chloroform	N
Fluoboric Acid	73	Hydrogen Peroxide 90%	180	Methyl Ethyl Ketone	N
Fluoboric Acid Solid	---	Hydrogen Phosphide	73	Methyl Isobutyl Carbinol	N
Fluorine Gas (Dry)	73	Hydrogen Sulfide Dry	180	Methyl Isobutyl Ketone	N
Fluorine Gas (Wet)	73	Hydrogen Sulfide Wet	180	Methyl Isopropyl Ketone	N
Fluosilicic Acid 25%	---	Hydrogen Sulfite	---	Methyl Methacrylate	---
Fluosilicic Acid 30%	R to 140	Hydroquinone	180	Methyl Sulfate	73
Fluosilicic Acid 40%	---	Hydroxylamine Sulfate	180	Methylene Bromide	N
Fluosilicic Acid 50%	73	Hypochlorous Acid 10%	180	Methylene Chloride	N
Fluosilicic Acid Sat'd	---	Hypochlorous Acid 70%	---	Methylene Chlorobromide	N
Flormaldehyde Dilute	73			Methylene Iodine	N
Flormaldehyde 35%	C to 73	I		Methylsulfuric Acid	180
Flormaldehyde 37%	C to 73	Inks	---	Milk	180
Flormaldehyde 50%	C to 73	Iodine	73	Mineral Oil	180
Formic Acid	C to 73	Isobutyl Alcohol	C to 73	Molasses	180
Formic Acid 10%	---	Isocotane	---	Monochloroacetic Acid	---
Formic Acid 40%	---	Isocotane Liquid	---	Monochlorobenzene	N
Formic Acid 50%	---	Isopropyl Acetate	N	Monoethanolamine	---
Formic Acid 85%	---	Isopropyl Alcohol	C to 180	Motor Oil	180
Formic Acid 100%	---	Isopropyl Ether	N	Morpholine	---
Freon 11	73	J		Mustard, Aqueous	---
Freon 12 100%	73	JP-4 Fuel	C to 73	N	
Freon 12 Work. Sol	---	JP-5 Fuel	C to 73	N-methyl Pyrrolidone	---
Freon 21	---	K		Naphtha	73
Freon 22	73	Kerosene	73	Naphthalene	N
Freon 113	---	Ketchup	---	Natural Gas	---
Freon 114	---	Ketones	N	Nickel Acetate	---
Fructose Sat'd	180	Ketones Work. Sol.	---	Nickel Chloride	180
Fructose Work. Sol.	---	Kraft Liquors	180	Nickel Nitrate	180
Furfural	N	L		Nickel Sulfate	180
G		Lactic Acid 10%	---	Nicotine	180
Gallic Acid	73	Lactic Acid 20%	---	Nicotinic Acid	180
Gasoline, Leaded	N	Lactic Acid 25%	180	Nitric Acid 5%	---
Gasoline, Unleaded	N	Lactic Acid 80%	C to 180	Nitric Acid 10%	C to 73
Gasoline (Fuel)	---	Lactic Acid Liquid	---	Nitric Acid 20%	---
Gasohol	N	Lard Oil	C to 180	Nitric Acid 25%	---
Gasoline, Sour	N	Latex	---	Nitric Acid 30%	R to 130
Gelatin	180	Lauric Acid	180	Nitric Acid 35%	---
Glucose	180	Lauryl Chloride	73	Nitric Acid 40%	R to 120
Glucose 10%	---	Lead Acetate	180	Nitric Acid 50%	110
Glue	---	Lead Chloride	180	Nitric Acid 65%	---
Glycerine	180	Lead Nitrate	180	Nitric Acid 70%	100
		Lead Sulfate	180		
		Lead Tetraethyl	---		
		Lemon Oil	N		

CHEMICAL	RATING
Nitric Acid 85%	---
Nitric Acid 95%	---
Nitric Acid 100%	N
Nitrobenzene	N
Nitroglycerine	---
Nitroglycol	---
Nitrous Acid	180
Nitrous Oxide	73
O	
n-Octane	C to 73
Oleic Acid	180
Oleum	N
Olive Oil	C to 180
Oxalic Acid 50%	180
Oxalic Acid 10%	---
Oxalic Acid Sat'd	---
Oxygen Gas	180
Ozone	180
Ozone Sat'd	---
P	
Palm Oil	---
Palmitic Acid 10%	73
Palmitic Acid 70%	73
Paraffin	180
Peanut Oil	C to 180
n-Pentane	C to 180
Peracetic Acid	---
Perchloric Acid 10%	---
Perchloric Acid 15%	180
Perchloric Acid 20%	---
Perchloric Acid 70%	180
Perchloroethylene	C to 180
Perphosphate	73
Petroleum Ether	---
Phenol	73
Phenol 5%	---
Phenol 50%	---
Phenol Solid	---
Phenol 90%	---
Phenyldrazine	N
Phenyldrazine 10%	---
Phosphine	---
Phosphoric Acid 10%	180
Phosphoric Acid 50%	180
Phosphoric Acid 75%	---
Phosphoric Acid 85%	180
Phosphoric Acid 98%	---
Phosphoric Anhydride	73
Phosphorous (Red)	---
Phosphorous (Yellow)	---
Phosphorous (Yellow) Liq.	---
Phosphorous Pentoxide	73
Phosphorous Trichloride	N
Photographic Solutions	180
Phtalic Acid	---
Phtalic Acid Susp.	---
Picric Acid 10%	N
Picric Acid 50%	---
Picric Acid Sat'd	---
Pine Oil	N
Plating Solutions (Brass)	180
Plating Solutions (Cadmium)	180
Plating Solutions (Chrome)	180
Plating Solutions (Copper)	180
Plating Solutions (Gold)	180
Plating Solutions (Lead)	180
Plating Solutions (Nickel)	180
Plating Solutions (Rhodium)	180
Plating Solutions (Silver)	180
Plating Solutions (Tin)	180
Plating Solutions (Zinc)	180
Potash	180
Potassium Alum	180
Potassium Aluminum	180
Potassium Amyl Xanthate	---
Potassium Bicarbonate	180
Potassium Bichromate Sat'd	180
Potassium Bichromate 40%	---
Potassium Bisulfate	180

CHEMICAL	RATING
Potassium Borate	180
Potassium Bromate	180
Potassium Bromate 10%	---
Potassium Bromide	180
Potassium Carbonate	180
Potassium Chlorate	180
Potassium Chloride	180
Potassium Chromate	180
Potassium Cyanide	180
Potassium Dichromate	180
Potassium Ethyl Xanthate	---
Potassium Ferricyanide	180
Potassium Ferrocyanide	180
Potassium Fluoride	180
Potassium Hydroxide 4%	---
Potassium Hydroxide 10%	---
Potassium Hydroxide 20%	---
Potassium Hydroxide 25%	180
Potassium Hydroxide 45%	---
Potassium Hydroxide 50%	---
Potassium Hydrogen 10%	---
Potassium Hydrogen Sat'd	---
Potassium Hydrochlorite	180
Potassium Hydrochlorite 3%	---
Potassium Iodide	180
Potassium Nitrate	180
Potassium Nitrate 50%	---
Potassium Orthophosphate	---
Potassium Perborate	180
Potassium Perchlorate	180
Potassium Permanganate 10%	180
Potassium Permanganate 20%	---
Potassium Permanganate 25%	180
Potassium Permanganate 30%	---
Potassium Permanganate Sat'd	---
Potassium Persulfate	180
Potassium Sulfate	180
Potassium Sulfide	180
Potassium Sulfite	180
Propane	73
Propargyl Alcohol	C to 180
Propionic Acid	N
Propyl Alcohol	C to 73
Propylene Carbonate	---
Propylene Dichloride	N
Propylene Oxide	N
Pyridine	N
Pyrogallic Acid	---
Q	
Quinone	---
R	
Rayon Coagulating Bath	180
S	
Salicylaldehyde	---
Salicylic Acid	---
Selenic Acid, Aq.	180
Silicic Acid	180
Silicone Oil	180
Silver Acetate	---
Silver Chloride	180
Silver Cyanide	180
Silver Nitrate	180
Silver Nitrate 50%	---
Silver Sulfate	160
Soaps	180
Sodium Acetate	180
Sodium Alum	180
Sodium Aluminate	---
Sodium Benzoate	180
Sodium Benzoate 35%	---
Sodium Benzoate 50%	---
Sodium Bicarbonate	180
Sodium Bichromate Sat'd	180
Sodium Bichromate 50%	---
Sodium Bisulfate	180
Sodium Bisulfate 50%	---
Sodium Bisulfite	180
Sodium Borate	180
Sodium Bromide Sat'd	180

CHEMICAL	RATING
Sodium Bromide 50%	---
Sodium Carbonate	180
Sodium Chlorate	180
Sodium Chloride	180
Sodium Chloride Sat'd	---
Sodium Chloride 10%	---
Sodium Chlorite	180
Sodium Chromate	180
Sodium Cyanide	180
Sodium Dichromate	180
Sodium Ferricyanide	180
Sodium Ferrocyanide	180
Sodium Fluoride	180
Sodium Hydrogen	---
Sodium Hydroxide 1%	---
Sodium Hydroxide 5%	---
Sodium Hydroxide 15%	180
Sodium Hydroxide 30%	180
Sodium Hydroxide 40%	---
Sodium Hydroxide 50%	180
Sodium Hydroxide 60%	---
Sodium Hydroxide 70%	180
Sodium Hypochlorite	180
Sodium Hypochlorite 2%	---
Sodium Hypochlorite 12.5%	---
Sodium Iodide	180
Sodium Metaphosphate	180
Sodium Nitrate	180
Sodium Nitrite	180
Sodium Palmitate	180
Sodium Perborate	180
Sodium Perchlorate	180
Sodium Peroxide	180
Sodium Phosphate Acid	180
Sodium Phosphate Alkaline	120
Sodium Phosphate Neutral	120
Sodium Silicate	180
Sodium Silicate 10%	---
Sodium Silicate 50%	---
Sodium Sulfate Sat'd	180
Sodium Sulfate 0.1%	---
Sodium Sulfide	180
Sodium Sulfite	180
Sodium Thiosulphate	180
Sodium Thioussulphate 50%	---
Sour Crude Oil	---
Soybean Oil	---
Stannic Chloride	180
Stannous Chloride 15%	180
Stannous Chloride Sat'd	---
Starch	180
Starch Solution	---
Stearic Acid	180
Stearic Acid 100%	---
Stoddard's Solvent	N
Styrene	---
Succinic Acid	180
Sugar	180
Sulfamic Acid	N
Sulfate Liquors	180
Sulfite Liquors	180
Sulfur	180
Sulfur Chloride	---
Sulfur Dioxide Gas Dry	73
Sulfur Dioxide Gas Wet	N
Sulfur Trioxide Gas Dry	---
Sulfur Trioxide Gas	N
Sulfuric Acid 5%	---
Sulfuric Acid 30%	180
Sulfuric Acid 50%	180
Sulfuric Acid 60%	180
Sulfuric Acid 70%	180
Sulfuric Acid 80%	180
Sulfuric Acid 90%	150
Sulfuric Acid 93%	140
Sulfuric Acid 94%-98%	130
Sulfuric Acid 100%	N
Sulfurous Acid	180
T	
Tall Oil	C to 180

CHEMICAL	RATING
Tannic Acid 10%	180
Tannic Acid Sat'd	---
Tanning Liquors	180
Tar	N
Tartaric Acid 10%	180
Tartaric Acid Sat'd	---
Terpineol	---
Tetrachloroethane	---
Tetrachloroethylene	N
Tetraethyl Lead	73
Tetrahydrofuran	N
Tetralin	N
Tetra Sodium Pyrophosphate	180
Thionyl Chloride	N
Thread Cutting Oils	73
Tin (II) Chloride	---
Tin (IV) Chloride	---
Titanium Tetrachloride	---
Toluene (Toluol)	N
Tomato Juice	180
Transformer Oil	180
Transformer Oil DTE/30	180
Tributyl Citrate	---
Tributyl Phosphate	N
Trichloroacetic Acid 50%	---
Trichloroacetic Acid 10%	---
Trichlorobenzene	---
Trichloroethane	---
Trichloroethylene	N
Triethanolamine	C to 73
Triethylamine	---
Trimethylpropane	---
Trisodium Phosphate	180
Turpentine	N
U	
Urea	180
Urea 10%	---
Urea Sat'd	---
Urine	180
V	
Vaseline	N
Vegetable Oil	C to 180
Vinegar	150
Vinyl Acetate	N
W	
Water, Acid Mine	180
Water, Deionized	180
Water, Distilled	180
Water, Potable	180
Water, Salt	180
Water, Sea	180
Water, Soft	180
Water, Waste	180
Whiskey	180
White Liquor	180
Wine	180
Wine and Spirits	---
X	
Xylene	N
Z	
Zinc Acetate	180
Zinc Carbonate	180
Zinc Chloride	180
Zinc Chloride 50%	---
Zinc Chloride Sat'd	---
Zinc Nitrate	180
Zinc Oxide	---
Zinc Stearate	---
Zinc Sulfate	180
Zinc Sulfate Sat'd	---