

TECHNICAL INFORMATION

Corrosion Data

The information presented in this data chart is intended as a guide to the chemical resistance to materials used in the offer of Die Erste valves.

Many factors which will influence corrosion rating such as - temperature fluctuations, concentrations and aeration of fluids, high velocity or abrasions in the fluid steam, etc. have to be taken into account. The physical properties of material are affected differently by each corrosive media and is sometimes necessary to sacrifice valves in one property to gain a maximum valve in another property.

An "A" rating should be given to internal moving parts, in direct contact with the media. In some cases a "B" rating can be given to body material in direct contact with media, when the corrosion rate is not one to cause any serious problems.

Ratings Explanation

A = Excellent / **B** = Good / **C** = Poor / **D** = Do not use

Blank = No information available.

Ratings are based on media at room temperatures = unless otherwise specified.

We would advise that ratings given to be used as a guide to the selection of valve materials and not as an absolute recommendation.

Although most of the suggested ratings in this corrosion chart are based on experience, Die Erste cannot accept responsibility for problems arising from use of this data.

We do however recommend that in critical applications, tests be conducted to verify the rating.

Corrosion Data

Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Acetaldehyde	B	C	C	C	A		A	A	A	D	A	B	C		A
Acetamide	B	B	B	B	B					A	A				A
Acetate Solvents	A	B	A	B	A			A	A	D	D		D		A
Acetic Acid, aerated	B	D	D	D	A			A	A	C	D		C	A	A
Acetic Acid, Air Free	B	B	D	D	A	A	A	A	A	C	D		D	A	A
Acetic Acid, crude	C	C	C	C	A	A	A	B	A	D	D		D	A	A
Acetic Acid, glacial						A			A	D		B	C	A	A
Acetic Acid, pure	C	C	D	D	A	A	A	D	A	D	D		D	A	A
Acetic Acid, 10%	C	C	C	C	A	A	A	B	A	D	B	B	D	A	A
Acetic Acid, 80%	C	C	C	C	A	A	A	B	A	D	D	C	D	A	A
Acetic Acid Vapors	B	D			D	D	B	C	A	D				A	A
Acetic Anhydride	B	D	D	D	B	B	B	B	A	D	C	C	D	A	A
Acetone	A	A	A	A	A	A	A	A	A	D	A	A	D	A	A
Other Ketones	A	A	A	A	A	A	A	A	A	D	A	D	D		A
Acetyl Chloride	D	A		D	C			B	A	D	D	D	D		A
Acetylene	A	B	A	A	A	A	A	A	A	B	A	A	A		A
Acid Fumes	B	D	D	D	B		B			C	D				A
Acrylonite	B	A	A	C	A		B	A	A	D	D	D	C		A
Air	A	A	A	A	A		A	A	A	A	A	A	A		A
Alcohol, Amyl	B	B	B	C	A		B	B	B	C	A	A	B	A	A
Alcohol, Butyl	B	B	B	C	A		A	A	A	B	A	C	A	A	A
Alcohol, Diacetone	A	A	A	A	A		A	B	A	D	A	B	D	A	A
Alcohol, Ethyl	B	B	B	B	B		A	B	A	A	A	A	A	A	A
Alcohol, Fatty	B	B	B	B	A		A		A	B	A	A	A	A	A
Alcohol, Isopropyl	B	B	B	B	B		A	B	B	C	A	A	A	A	A
Alcohol, Methyl	B	B	B	B	A		A	A	A	B	A	A	C	A	A
Alcohol, Propyl	A	A	B	B	A		A	A	A	B	A	A	A	A	A
Alumina	A	A							A	A	A	A			A
Aluminum Acetate	C	D		D	A	B	B	C	B	D	D	A	D		A
Aluminum Chloride dry	B	B	C	D	C		D	B	B	B	A	A	A	A	A
Aluminum Chloride Solution	C				D	C	B	B	A	B	D		A	A	A
Aluminum Fluoride	C		D	D	C			B	A	A	C	A	A		A
Aluminum Hydroxide	A	A	D	D	A	B	B	B	B	A	C	A	A		A
Aluminum Nitrate	D	D		D	C		B	C	B	B	D	B	D		A
Aluminum Oxalate	B						A	B	A						A
Alum (Aluminum Potassium Sulfate)	D	D		D	B	C	B	C	A	B	D		B	A	A
Alum (Aluminum Sulfate)	C	C	D	D	B	A	B	C	A	A	D	A	A	A	A
Amines	B	B	B	C	A	A	A	B	B	D	C	C	D		A
Ammonia, Alum	C				A		A		A	B	C			A	A
Ammonia, Anhydrous Liquid	A	D	A	B	A	A	A	B	A	B	D	B	D	A	A
Ammonia, Aqueous	B	D	A	A	A		A	B	B	B	D		A	A	A
Ammonia, Gas, hot	A	D		B	A		A	B	B	C	D	A	D	A	A
Ammonia Liquor					A		A		B					A	A
Ammonia Solutions	C	D	B	B	A		A	B	B	B	D	B	D	A	A
Ammonium Acetate	B	D		B	B		A	B	B	B	D	A	D		A
Ammonium Bicarbonate	B	B	C	B	B		B	B		B	A	A	A		A
Ammonium Bromide 5%	D				B		B	B			A				A
Ammonium Carbonate	B	B	B	B	B		B	B		C	D	A	B		A
Ammonium Chloride	D	D	D	D	C	C	B	B	B	B	C	A	A		A
Ammonium Hydroxide 28%	C	D	C	C	B	A	A	D	B	B	D	B	A	A	A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

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Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Ammonium Hydroxide Concentrated	C	D	C	C	B	A	A	C	B	C	D	A	A	A	A
Ammonium Monosulfate	D				A		B	B	B		D				A
Ammonium Nitrate	B	D	D	D	A	A	B	D	B	A	D	A	A		A
Ammonium Oxalate 5%	A				A		A	B			A				A
Ammonium Persulfate	C	C			A		A	D		D	D	B	B		A
Ammonium Phosphate	C	D	D	D	B		B	C		A	C	A	A		A
Ammonium Phosphate Di-basic	B	C	D	D	B		B	C	B	A	A		A		A
Ammonium Phosphate Tri-basic	C	C	D	D	B		B	C	B	A	A		A		A
Ammonium Sulfate	C	C	C	D	B	B	B	B	B	A	B	A	B	A	A
Ammonium Sulfide	C	D	D	D	B		B	B		A	A	A	D		A
Ammonium Sulfite	C	C	C	C	A		B	D		B	A	B	A		A
Amyl Acetate	B	B	C	C	B	A	A	B	A	D	A	B	D		A
Amyl Chloride	D	B		B	A		A	B	B	D	A	D	D		A
Aniline	C	D	C	C	B		A	B	B	D	D	C	C	A	A
Aniline Dyes	C	C	C	C	A		A	A		C	A	C	B		A
Apple Juice	B	C	D	D	B		A	A		A	A	B	A		A
Aqua Regia (Strong Acid)	D	D	D	D	B		B	B		D	D	D	D	D	A
Aromatic Solvents	A	A	C	B	A		A	B		D	A	D	D		A
Arsenic Acid	D	D	D	D	B		B	D	B	A	D	B	A	A	A
Asphalt Emulsion	C	A	B	B	A		A	A	A	D	A	D	A		A
Asphalt Liquid	C	A	B	B	A		A	A	A	C	A	D	A		A
Barium Carbonate	C	B	B	B	B		B	B	A	B	A	A	A		A
Barium Chloride	D	B	C	C	B	B	C	B		A	A	A	A		A
Barium Cyanide	D	C		C	B		B	D		B	A	B	B		A
Barium Hydrate	D	D			A		A	B		A					A
Barium Hydroxide	D	C	C	B	B	A	A	B		A	A	B	A		A
Barium Nitrate	B				A		A				A				A
Barium Sulfate	D	C	C	C	A		A	B		A	A	B	A		A
Barium Sulfide	D	D	C	D	B		B	C		A	A	A	A		A
Beer	A	B	D	D	A	A	A	A		B	A	B	A		A
Beet Sugar Liquors	A	A	B	B	A		A	A		A	A	B	A		A
Benzaldehyde	A	A	A	C	A		A	B	B	D	A	A	D		A
Benzene (Benzol)	B	B	B	B	B	B	A	A	B	D	C	D	B	A	A
Benzoic Acid	B	B	D	D	B	A	B	B	A	C	A	D	B		A
Beryllium Sulfate	B	B		B	B		A	B		B	A	B	B		A
Bleaching Powder wet		B			C		B	D	A	D	D	B	B		A
Blood (Meat Juices)	B	B		D	A	A	A	B		B	A	B	B		A
Borax (Sodium Borate)	C	D	C	C	A			A	A	B	A	A	A		A
Bordeaux Mixture					A		A				A				A
Borax Liquors	C	A	C	C	B		A	A	B		A	A	A		A
Borax Acid	B	C	D	D	B		B	B	A	B	A	B	A	A	A
Brake Fluid	B	B		B	B	A		B		D	B	B	D		A
Brines, saturated	C	B	D	C	B		B	B	A	A	A	A	A		A
Bromine, dry	C	B	D	D	D		B	A	A	D	D	D	B	B	A
Bunker Oils (Fuel)	A	B	B	B	A		A	A		B	A		A		A
Butadiene	B	C	B	B	A		A	C	B	C	A	C	B		D
Butane	A	A	B	B	A		A	B	A	B	A	D	A		A
Butter					A		A			B	A				A
Buttermilk	A	D	D	D	A		A	D		A	A	B	A		A
Butyl Acetate	B	B		B	B		A	B	B	D	B	D	D		A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

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Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Butylene	A	A	A	A	A		A	A		D	A	D	D		A
Butyric Acid	B	C	D	D	B		B	B	A	C	A	C	C		A
Calcium Bisulfate	C	C	D	D	B		B	D	B	A	D	D	A		A
Calcium Carbonate	C	C	D	D	B		B	B	B	A	A	B	A		A
Calcium Chlorate	B	D		C	B		B	B		B	D	B	B	B	A
Calcium Chloride	C	B	C	C	B	B	B	B	A	A	A	B	A		A
Calcium Hydroxide	D	C	C	C	B		B	A	A	A	A	A	A		A
Calcium Nitrate	B				B		B			B	C	B			A
Calcium Phosphate	D	C		C	B		B			B	B	B	B		A
Calcium Silicate	D	C		C	B		B			B	A	B	B		A
Calcium Sulfate	B	C	C	C	B	B	B	B	B	A	A	B	A		A
Caliche Liquor			B		A		A			B	A	A			A
Camphor	C	C		C	B		C	C		B	A	A	B		A
Cane Sugar Liquors	A	B		B	A		A	B		B	A	D	B		A
Carbonated Beverages	B	B	D	B	B	B	B	C		B	A	B	B	A	A
Carbonated Water	A	B	B	A	A	B	A	B		A	A	A	A	A	A
Carbon Bisulfide	A	C	B	B	B		B	B		D	A	D	A		A
Carbon Dioxide, Dry	A	A	A	B	A	A	A	A		C	A	B	B	A	A
Carbonic Acid	A	D	D	D	B	B	A	B		B	A	B	A	A	A
Carbon Monoxide	A	A		B	A	A	A	A	A	B	A	B	B		A
Carbon Tetrachloride, dry	B	C	B	C	A	A	A	A	A	D	A	D	B	A	A
Carbon Tetrachloride, wet		D	D	D	B		B	B	B	D	B	D	B	A	A
Casein	C	C		C	B		B	C		B	A	B	B		A
Caster Oil	A	A	B	B	A		A	A	A	A	A	B	A		A
Caustic Potash					A		A	B		B	D				A
Caustic Soda	D		B	B	A		A	A		C	D	B	B		A
Cellulose Acetate	B	B		B	B			B	B	D	C	B	D		A
China Wood Oil (Tung)	A	C	C	C	A		A	A	A	A	A	D	A		A
Chlorinated Solvents	D	C	C	C	A		A	B		D	A	D	C		A
Chlorinated Water	C				C	D	A	D	D	B	D		A	B	A
Chlorine Gas, dry	B	C	B	B	B	C	A	A	A	C	D	D	B	A	A
Chlorobenzene, dry	B	B	B	B	A		A	B	B	D	B	D	A		A
Chloroform, dry	D	B	B	C	A	B	A	A	B	D	A	D	B		A
Chlorophyll, dry	B	B		B	B		A	B		B		B	B		A
Chlorosulfonic Acid, dry	B	C	B	B	B		B	B	A	D	D	D	D		A
Chrome Alum	C	C	B	C	A		A	B		B	B	B	B		A
Chromic Acid < 50%	C	D	D	D	C	C	B	C	B	D	D	C	C		A
Chromic Acid > 50%	D	D	D	C	C	D	B	D	B	D	D	C	C		A
Chromium Sulfate	B	C		D	B		C	B		B	C	B	B		A
Cider	B				A		B	A			A				A
Citric Acid	B	C	D	D	B	C	A	B	A	B	A	B	A	A	A
Citric Juices	C	B	D	D	B		A	A		A	A		A		A
Coca-Cola Syrup					A		A			B	A		B		A
Coconut Oil	B	B	C	C	B		A	B		A	A	A	A		A
Coffee	A	A		D	A		A	B		A	A	A	A		A
Coffee Extracts, hot	A	B	C	C	A		A	A			A				A
Coke Oven Gas	A	C	B	B	A		A	B		C	D	D	B	A	A
Cooking Oil	B	B	B	B	A		A	A		A	A	D	A		A
Copper Acetate	D	D	D	D	A		A	C	B	C	D	B	D		A
Copper Carbonate	D				A		A				A				A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

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Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Copper Cyanide	D	D		D	A		A	C		A	A	B	B		A
Copper Nitrate	D	D	D	D	B		B	D		A	A	B	A		A
Copper Sulfate	D	D	D	D	B	B	B	C	A	A	A	A	A	A	A
Corn Oil	B	B	C	C	B		B	B		A	A	C	A		A
Cottonseed Oil	B	B	C	C	B		B	B		A	A	C	B		A
Cresol					B		B			D	D	D	D		A
Creosote Oil	B	B	B	B	B	B	A	B	B	C	D	D	A		A
Cresylic Acid	C	C	C	D	B		B	B		D	D	D	B		A
Crude Oil, sour	B	C	B	C	A		A	B		A	A	D	A		A
Crude Oil, sweet	A	B	B	B	A		A	A		A	A		A		A
Cupric Nitrate	D				A		A	D			D				A
Cutting Oils, Water Emulsions	A	A	B	B	A		A			A	A		A		A
Cyanide Plating Solution	D	D		D	B		B	D		B	D	B	B		A
Cyclohexane	A	A	A	A	A		A	B	B	C	A	D	A		A
Cyclohexanone	B	B			A		A	B	B	D	A				A
Detergents, synthetic	B	B		B	B		A	B		B	A	B	A		A
Dextrin	B	B		B	B		B	B		B	A	B	B		A
Dichloroethane				C	C		B	B		D	D	D			A
Dichloroethyl Ether	B	B		B	B		B			D	D	D	D		A
Diesel Oil Fuels	A	A	A	A	A		A	A		A	A	D	A		A
Diethylamine	B	B	A	B	A		A	B		B	A	C	D		A
Diethyl Benzene					B		B			D	C	D			A
Diethylene Glycol	B	B		A	A		A	B		A	A	A	B		A
Diethyl Sulfate	B	B		B	B		B	B		C	A	C	B		A
Dimethyl Formamide	B	B		B	A		A	B		B	A	D	D		A
Dimethyl Phthalate										B	C		D		A
Dioxane	B	B		B	B		B	B		D	C	C	D	A	A
Dipentane (Pinene)	A	A		A	A		A			B	A	D	B		A
Disodium Phosphate	B				B		B	C		B	A		B		A
Dowtherm	A	A	B	B	A		A	A		D	A	D	A	A	A
Drilling Mud	B	B	B	B	A		A	B		A	A	A	A		A
Dry Cleaning Fluids	A	C	B	B	A		A	B		D	A		B		A
Drying Oil	C	C	C	B	B		B	B		A	A				A
Enamel		A								B	A	D			A
Epsom Salts (MgSO ₄)	A	B	C	C	B		B	B		A	A		A		A
Ethane	A	B	C	C	B		B	B		A	A	D	A		A
Ethers	A	B	A	B	A	B	A	B		D	C	C	C		A
Ethyl Acetate	A	C	B	C	B	A	B	B	B	D	C	C	D		A
Ethyl Acrylate	C	B	C	C	A		A	B	A	D	B	C	D		A
Ethyl Benzene							A		A	C	A	D			A
Ethyl Bromide	B	A		B	B		C	B		B	A	B	B		A
Ethyl Chloride, dry	B	B	B	B	A	A	A	B	B	C	A	C	B		A
Ethyl Chloride, wet	D	C	D	D	B		B	B	B	C	A	B	B		A
Ethylene Chloride	C				A		A	B	B	D	A		D		A
Ethylene Dichloride					B		A	B		D	C	D	D	A	A
Ethylene Glycol	A	B	B	B	B	A	A	B	A	A	A	A	A		A
Ethylene Oxide	C	C	B	B	B		B	B	A	D	A	D	D		A
Ethyl Ether	B	B		C	A		A	A	B	D	A	D	D		A
Ethyl Silicate	A	B		B	B		B	B		B	A	B	B		A
Ethyl Sulfate					B		B			B	A	C	A		A

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Fatty Acids	B	C	D	D	A		A	B	A	B	A	D	A	A	A
Ferric Hydroxide					A		A	A		B	A				A
Ferric Nitrate	D	D	D	D	C	B	A	D	B	A	A	A	A		A
Ferric Sulfate	D	D	D	D	B	B	A	D		A	A	A	A		A
Ferrous Ammonium Citrate	B				B		B				A				A
Ferrous Chloride	D	B	D	D	D		D	D	D	A	A	A	A	A	A
Ferrous Sulfate	C	B	D	D	B		B	B	B	A	A	A	A	A	A
Ferrous Sulfate, Saturated	C	C	C	C	A		A	B	B	C	A	B	B		A
Fertilizer Solutions	B	C	B	B	B		B	B		B					A
Fish Oils	C	B	B	B	A		A	A		A	A	D	A		A
Flue Gases	C	B		B	A		A	B		C	C	D	C		A
Fluoboric Acid	B				B		A			A	D				A
Fluorosilicic Acid	D	B	D	D	B		B	A	B	C	C	C	C		A
Formaldehyde, cold	A	A	A	B	A	A	A	A	B	B	A	B	D		A
Formaldehyde, hot	B	B	D	D	C		B	B	B	B	A				A
Formic Acid, cold	D	B	D	D	B	B	A	B	A	D	D		B	A	A
Formic Acid, hot	D	B	D	D	B	D	B	B	B	D	D		A	A	A
Freon Gas, dry	B	B	B	B	A	A	A	A	B	C	A	C	C	A	A
Freon 11, MF, 112, BF	B	B		C	A		A	B	B	C	A	C	D	A	
Freon 12, 13, 32, 114, 115	A	A		B	A		A	B	B	B	A	A	D	A	
Freon 21, 31	B	B		C	A		A	B	B	D	A	D	D	A	
Freon 22	A	A		B			A		B	D	A	D	D	A	
Freon 113, TF	B	B		C	A		A	B	B	B	A	C	C	A	
Freon, wet	D	D		D	C	B	B	B	B	B	A	B	D	A	A
Fruit Juices	B	B	D	D	A		A	B		A	A	A	A		A
Fuel Oil	A	B	B	B	A		A	B		A	A	D	A		A
Fumaric Acid							A			B	A				A
Furfural	A	A	A	B	A	B	A	B	B	D	A	C	D		A
Gallic Acid 5%	A	C	D	D	B		B	B	B	B	A	C	A		A
Gas, Manufactured	B	B	B	B	B		B	A		A	A		A		A
Gas, Natural	B	B	B	B	A		B	A		A	A	D	A		A
Gas, Odorizers	A	A	B	B	B		A	B		B	A		A		A
Gasoline, Aviation	A	A	A	B	A		A	A	A	C	A		A	A	A
Gasoline, Leaded	A	A	A	A	A		A	B	A	C	A		A	A	A
Gasoline, Motor	A	A	A	B		A	A	A	A	C	A	D	A	A	A
Gasoline, Refined	A	B	B	B	A		A	B	A	C	A	D	A	A	A
Gasoline, Sour	A	B	B	B	A		A	C	A	C	A	D	A	A	A
Gasoline, Unleaded	A	A	A	B	A		A	A	A	C	A		A	A	A
Gelatin	A	A	D	D	A		A	B		A	A	A	A		A
Glucose	A	A	B	B	A		A	A	A	A	A	A	A		A
Glue	A	B	A	B	B		A	B	A	A	A	B	A		A
Glycerine (Glycerol)	A	B	C	B	A	A	A	A	A	C	A	A	B	A	
Glycol Amine	C	D		B	B	A			D	A	C	D	D	A	
Glycol	A	B	C	B	B		A	B		B	C	A	A		A
Graphite	B	B		C	B		A	B		B	A	B	B		A
Grease	B	C	A	A	A		A	B		A	A	D	A		A
Helium Gas	B	B		B	A		A	B	A	B	A	B	B		A
Heptane	A	A	B	B	A		A	B	A	A	A	D	A		A
Hexane	A	B	B	B	A		A	B	A	A	A	D	A		A
Hexanol, Tertiary	A	A	A	A	A		A	A	A	A	A	D	B		A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

Corrosion Data

Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Hydraulic Oil, Petroleum Base	A	B	A	B	A		A	A		A	A	D	A		A
Hydrazine	C	D		D	B		B	A		C	D	B	D		A
Hydrocyanic Acid	A	D	D	C	A		A	D	B	B	D	B	A		A
Hydrofluosilicic Acid	D	A	D	D	C		B	D		B	A	B	A	A	A
Hydrogen Gas, cold	A	B	B	B	A		A			B	A	B	A		A
Hydrogen Gas, hot	C		B		B		A		A	B	A	B			A
Hydrogen Peroxide, Concentrated	A	D	D	D	B		B	D	D	D	D	B	B		A
Hydrogen Peroxide, Dilute	A	C	D	D	B		B	D	D	A	D	B	A		A
Hydrogen Sulfide, Dry	A	C	B	B	A	B	B	B	B	C	C	A	A	A	A
Hydrogen Sulfide, Wet	B	D	C	D	B		B	C	D	C	C	B	A	A	A
Hypo (Sodium Thiosulfate)	B	C	D	C	B		B	B		A	A	A	A		A
Illuminating Gas	A	A	A	A	A		A	A		C	A	D	A		A
Ink-Newsprint	C	C	D	D	A		A	B		A	A	B	A		A
Iodoform	C	C	B	C	A		A	C			A		A		A
Iso-Butane					B		B			B	A	D			A
Iso-Octane	A	A	A	B	A		A	A		A	A	D	A		A
Isopropyl Acetate					B		A			D	A	D		A	A
Isopropyl Ether	B	A	A	B	A		A	B	A	C	A	D	D	A	A
J P-4 Fuel	A	A	A	B	A		A	A	A	A	A		A		A
J P-5 Fuel	A	A	A	A	A		A	A	A	B	A		A		A
J P-6 Fuel	A	A	A	A	A		A	A	A	A	A		A		A
Kerosene	A	A	B	B	A		A	A	A	A	A	D	A	A	A
Ketchup	D	D	D	D	A		A	B		A	A		A		A
Ketones	A	A	A	A	A		A	A		D	A	D	D		A
Lacquer (and Solvent)	A	A	C	C	A		A	A		D	A	D	D		A
Lactic Acid Concentrated Cold	C	D	D	D	A	D	A	D	A	B	D	B	A	A	A
Lactic Acid Concentrated Hot	C	D	D	D	B	D	A	D	B	C	D	B	B	A	A
Lactic Acid Dilute Cold	A	D	D	D	A	B	A	C	A	B	D	B	A	A	
Lactic Acid Dilute Hot	B	D	D	D	A	D	A	D	B	C	D	D	D	A	A
Lactose	B	B		C	B		B	B		B	A	B	B		A
Lard	A	B		A	A		A			B	A	C			A
Lard Oil	B	B	C	C	B		A	B		A	A	B	A		A
Lead Acetate	D	C	D	D	B		B	B		A	A	B	B		A
Lead Sulfate	D	C		D	B		B	B		B	A	B	B		A
Lecithin	C	C		C	B		B	B		D	A	D	B		A
Linoleic Acid	A	B	B	B	A		A	B		B	A	D	B		A
Linseed Oil	A	B	A	A	A		A	B		A	A	D	A		A
Lithium Chloride	D	B		B	B		A	B		B	A	B	B		A
LPG	A	A	B	B	B		B	B		A	A	D	A		A
Lubricated Oil Petroleum Base	A	B	A	A	A		A	B		A	A	D	A		A
Ludox	D	D		B	B		B	B		B	B	B	B		A
Magnesium Bisulfate	B	B	B	B	A		A	B		B	A	B	B		A
Magnesium Bisulfide	C	D		D	B		B	B		B	A	B	B		A
Magnesium Carbonate	B	B		B	A		A	B		B	A	B	B		A
Magnesium Chloride	D	B	C	D	B	C	B	B	A	A	A	A	A		A
Magnesium Hydroxide	D	B	B	B	A	A	A	B	B	A	A	A	A		A
Magnesium Hydroxide Hot	D	D	B	B	A	A	A	A	B	B	A		A		A
Magnesium Nitrate	B			A			A	B		B	A		B		A
Magnesium Sulfate	B	B	B	B	A	A	A	B	A	A	A	A	A		A
Maleic Acid	B	B	B	C	B		B	B	A	B	A	D	A		A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

Corrosion Data

Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Maleic Anhydride	B	B		B	B		B	B	B	D	C	D	B		A
Malic Acid	B	B	D	D	B		B	B		A	A		A		A
Malt Beverages					A		B	A		A	A	B	A		A
Manganese Carbonate	B				B		A			B	A				A
Manganese Sulfate	B	B		D	A		A	B		B	A	B	B	A	A
Mayonnaise	D	D	D	D	A		A	B		A	A		A		A
Meat Juices	B	D			A		A			B	A				A
Melamine Resins				D	C		C			B	A				A
Methanol	B	B		B	A		A	B		B	C	D	B		A
Mercuric Chloride	D	D	D	D	B		B	D	B	A	A	A	A		A
Mercuric Cyanide	D	D	D	D	A		A	C	B	A	A	A	A		A
Mercuric Nitrate	D	D			A		A	D			A		B		A
Mercury	D	D	A	A	A		A	B	B	A	A	A	A		A
Methane	A	A	B	B	A		A	B	A	A	A		A		A
Methyl Acetate	A	A	B	B	A		A	B	A	D	B	B	D		A
Methyl Acetone	A	A	A	A	A		A	A		D	B	A	D		A
Methylamine	A	D	B	B	A		A	C	B	D	A	B	D		A
Methyl Bromide 100%	C	C		D	B		A	B		B	A	D	B		
Methyl Cellosolve	A	A	B	B	A		A	B	B	C	A	B	D		A
Methyl Cellulose					A		A		B	D	A				A
Methyl Chloride	D	B	B	B	A		A	B		D	A	D	B		A
Methyl Ethyl Ketone	A	A	A	A	A		A	A	B	D	A	B	D	A	A
Methyl Chloride	C	A	B	B	A		A	B	B	D	A	D	C		A
Methyl Formate	C	A	C	C	B		A	B	B	D	A	B	D		A
Methyl Isobutyle Ketone					A		A			D	A			A	A
Milk and Milk Products	A	B	D	D	A		A	B		A	A	A	A		A
Mineral Oils	A	B	B	B	A		A	A		A	A	D	A		A
Mineral Spirits	A	B	B	B	B		B	B		A	A		A		A
Mixed Acids (cold)	D	D	C	C	B		B	C		D	D	D	B		A
Molasses, crude	B	A	A	A	A		A	A		A	A		A		A
Molasses, Edible	A	A	C	C	A		A	A		A	A		A		A
Molybdic Acid					A		A				A				A
Monochloro Benzene Dry					B		B	B		D	C			A	A
Morpholine	B	B		B	A		A	B		D	A	B	D		A
Mustard	B	A	B	B	A		A	A		A	A		A		A
Naptha	A	B	B	B	B		B	B	A	B	A	D	A		A
Napthalene	B	B	B	B	B		B	B	B	D	A	D	A		A
Natural Gas, Sour	B	B	B	B	A		A	D	A	A	A	D	A		A
Nickel Ammonium Sulfate	D	D	D	D	A		A	C		A	C	B	D		A
Nickel Chloride	D	D	D	D	B		A	B	A	A	D	B	A	A	A
Nickel Nitrite	C	D	D	D	B		A	B		A	C	A	A		A
Nickel Sulfate	D	D	D	D	B		A	B	B	A	C	B	A	A	A
Nicotinic Acid	A	A	B	C	A		A	A		D	C	D	B		A
Nitric Acid 10%	D	D	D	D	A	A	A	D		C	D		A	A	A
Nitric Acid 30%	D	D	D	D	A	D	A	D		C	D	B	A	B	A
Nitric Acid 80%	B	D	D	D	C	D	B	D		D	D	B	B	B	A
Nitric Acid 100%	B	D	D	D	A	D	A	D		D	D	D	B	B	A
Nitric Acid Anhydrous	B	D	D	D	A	D	A	D		D	D	D	A	B	A
Nitrobenzene	C	D	B	B	A		A	B	B	D	B	C	C		A
Nitrogen	A	A	A	A	A		A	A		A	A	B	A		A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

Corrosion Data

Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Nitrous Acid 10%	D	D	D	D	B		B	D		C	B		A		A
Nitrous Gases	B	D	B	C	A		A	D		B	B				A
Nitrous Oxide	C	B	B	C	B		B	D	B	B	A		A		A
Oils & Fats	B				A		A			B	A	D			A
Oils, Animal	A	A	A	A	A		A	B	A	A	A	B	B		A
Oils, Petroleum Refined	A	B	A	A	A		A	A	A	A	A	D	A		A
Oils, Petroleum Sour	A	C	B	C	A		A	A	A	B	A	D	A		A
Oils, Water Mixture	A	A	B	B	A		A		A	A	A		A		A
Olaic Acid	B				B		B	A		D	C		C		A
Oleic Acid	B	B	C	C	B		A	B	B	B	C	D	A	A	A
Oleum	B	C	B	D	B		B	C	B	D	D	D	C		A
Oleum Spirits	D	D		D	B		B	D		C	D	D	A		A
Olive Oil	B	C	B	B	A		A	A		A	A	B	A		A
Oxalic Acid	C	B	D	D	B	D	B	B		C	C	B	A	A	A
Oxygen	A	A	B	B	A	A	A	A	A	B	D	A	A		A
Ozone, Dry	A	A	A	A	A		A	A	A	D	C	A	B		A
Ozone, Wet	B	B	C	C	A		A	A	A	D	C	B	B		A
Paints & Solvents	A	A	A	A	A		A	A		D	A	D	B		A
Palmitic Acid	B	B	C	C	B		B	B		B	A	B	A		A
Palm Oil	A	B	C	C	B		A	A		B	A	D	A		A
Paper Pulp	D	B		B	A		A	B		B	A	B	B		
Paraffin	A	A	B	B	A		A	A	A	A	A	D	A		A
Paraformaldehyde	B	B	B	B	B		B	B		B	A	D			A
Paraldehyde					B		B			B	A	D		A	A
Pentane	A	A	B	B	A		A	B		A	A	D	A		A
Perchloroethylene, dry	B	C	B	B	A		A	B	B	D	B	D	A		A
Petroleum (Vaseline Petroleum Jelly)	B	B	C	C	B		A	A		A	A		A		A
Phenol	A	B	D	D	A	B	A	A	A	D	C	D	B		A
Phosphate Ester 10%	D	D	A	A	A		A	A		D	A	A			A
Phosphoric Acid 10%	D	D	D	D	D	B	B	D		B	D	B	A	A	A
Phosphoric Acid 50% Cold	D	D	D	D	B	B	B	C		B	D	B	A	A	A
Phosphoric Acid 50% Hot	D	D	D	D	D	D	B	C		B	D	B	A	A	A
Phosphoric Acid 85% Cold	D	D	B	B	A	C	B	A		C	D		B	A	A
Phosphoric Acid 85% Hot	D	D	C	C	B	D	B			C	D			A	A
Phosphoric Anhydride	A				A		A			D	B		B	A	A
Phosphorous Trichloride	D		B	C	A		A			D	D	B	B	A	A
Phthalic Acid	B	B	C	C	B		B	A	B	C	B		A		A
Phthalic Anhydride	B	B	C	C	B		B	A	A	C	A		A		A
Picric Acid	C	C	D	D	B	C	B	D	B	C	D	B	B		A
Pineapple Juice	A	C	C	C	A		A	A		A	A		A		A
Pine Oil	B	B	B	B	A		A	B		A	A	D	A		A
Pitch (Bitumen)					A		A			C	A	D			A
Polysulfide Liquor	D	D		B	B		A	B		B	D	B	B		A
Polyvinyl Acetate	B	B		B	B		B	B			A	B			A
Polyvinyl Chloride	B	B		B	B		B	B			A	B			A
Potassium Bicarbonate	A				A		A	B		B	A				A
Potassium Bichromate	A				A		A	A		B	B		B		A
Potassium Bisulfate	B				A		A	B		B	A		A		A
Potassium Bisulfite	C	C	D	D	B		B	D		A	A	B	A		A
Potassium Bromide	C	C	D	D	A	C	B	B		A	A	B	A		A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information

Corrosion Data

Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Potassium Carbonate	D	B	B	B	B	A	B	B		A	A	B	A		A
Potassium Chlorate	C	B	B	B	B	B	B	C		A	A	B	A		A
Potassium Chloride	D	C	C	B	B	B	A	B	B	A	A	A	A		A
Potassium Chromate	B	B		B	B		B	B		B	A	B	B		A
Potassium Cyanide	D	D	B	B	B		B	B	B	A	A	A	A		A
Potassium Dichromate	A	D	C	C	B		A	B		A	A	B	A		A
Potassium Ferricyanide	B	D	C	C	A	B	B	B		A	A	B	A		A
Potassium Ferrocyanide	B	B	C	C	B		B	A		A	A		A		A
Potassium Hydroxide Dilute Cold	D	D	A	A	B	B	B	A		A	D		D		A*
Potassium Hydroxide To 70%, Cold	D	D	B	B	B	C	B	A		B	D	B	D		A*
Potassium Hydroxide Dilute Hot	D	D	B	B	B	C	B	A		B	D				A*
Potassium Hydroxide To 70%, Hot	D	D	A	B	B	D	B	A		C	D	A			A*
Potassium Iodine	D	D	C	C	B	B	B	C		A	A	B	A		A
Potassium Nitrate	A	B	B	B	B	B	B	B	B	A	A	B	A		A
Potassium Oxalate	C				A		A				A				A
Potassium Permanganate	B	B	B	B	B	B	B	B	B	A	A	B	A		A
Potassium Phosphate	D	C		C	B		B	B	B	A	A	A	A		A
Potassium Phosphate Di-basic	B	B	A	A	A		A	B	B	A	A	B	A		A
Potassium Phosphate Tri-basic	D		A	A	B		B	B		B		B			A
Potassium Sulfate	A	B	B	C	A	A	A	B		A	A	A	A		A
Potassium Sulfide	B	B	B	B	A		A	C	A	A	A	B	B		A
Potassium Sulfite	B	B	B	B	A		A	C	B	B	A	A	B		A
Producer Gas	B	B	B	B	B	A	B	A		A	A	D	A		A
Propane Gas	A	A	B	B	B	A	A	B	A	A	A	D	A		A
Propyl Bromide	B	B		B	B		A	B		B	A	B	B		A
Propylene Glycol	A	B	B	B	B		B	B		A	C	B	A		A
Pyridine	B			B	B		A			D	D		D		A
Pyrogallic Acid	B	B	B	B	B	B	A	B		A	A		A		A
Quench Oil	A	B	B	B	A		A			A	A		A		A
Quinine, Sulfate, dry					A	B	A	B			A				A
Resins & Rosins	A	A	C	C	A	B	A	A		C	A		A		A
Resorcinol					B		B								A
Road Tar	A	A	A	A	A		A	A		B	A	D	A		A
Roof Pitch	A	A	A	A	A		A	A		B	A		A		A
Rosin Emulsion	A	B	C	C	A		A	A		D	A		B		A
R P-1 Fuel	A	A	A	A	A		A	A		B	A		A		A
Rubber Latex Emulsions	A	A	B	B	A		A				A		A		A
Rubber Solvents	A	A	A	A	A		A	A		D	C		D		A
Salad Oil	B	B	C	C	B		A	B		A	A	B	A		A
Salicylic Acid	C	C	D	D	A		B	B		A	A	B	A		A
Salt (NaCl)	B	B	C	C	B		A	A		A	A		A		A
Salt Brine	B	B		D	B		B	B		A	A	B	B		A
Sauerkraut Brine					B		B				C				A
Sea Water	C	C	D	D	B		B	A		A	A	A	A		A
Sewage	C	C	C	D	B	A	B	B		A	B	B	B		A
Shellac	A	A	A	B	A		A	A		A	A				A
Silicone Fluids	B	B		B	B		B			B	A		B		A
Silver Bromide	D				A	C	A	B			D				A
Silver Cyanide	D	D		D	A		A	B		B	D		B		A
Silver Nitrate	D	D	D	D	A		A	D		C	A	A	A		A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information * - Not with Reinforced or Polyfill

Corrosion Data

Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Silver Plating Sol.	B				A		A				D				A
Soap Solutions (Stearates)	C	A	A	B	A		A	A		A	A	A	A		A
Sodium Acetate	B	B	C	C	B		B	B	B	B	A	B	A		A
Sodium Aluminate	D	B	C	C	A		B	B	B	A	A	B	A		A
Sodium Benzoate	B				B		B	B			B				A
Sodium Bicarbonate	B	B	C	C	B		A	B		A	B	A	A		A
Sodium Bichromate	A				B		B			D	A				A
Sodium Bisulfate 10%	D	B	D	D	A		A	B		A	D	B	A		A
Sodium Bisulfite 10%	D	B	D	D	A		B	B	B	A	D	B	A		A
Sodium Borate	B	B	C	C	B		B	B		A	A	B	A		A
Sodium Bromide 10%	B	B	C	D	B		B	B		A	A	B	A		A
Sodium Carbonate (Soda Ash)	D	B	B	B	A		A	B	B	A	A	B	A		A
Sodium Chlorate	C	B	C	C	B		B	C	B	A	A	B	A	B	A
Sodium Chloride	B	B	C	C	B		A	A	B	A	A	B	A	A	A
Sodium Chromate	D	C	B	B	A		B	B		A	A	B	A		A
Sodium Citrate	D				B		B				A				A
Sodium Cyanide	D	D	B	B	A	B	A	B		A	A	B	A		A
Sodium Ferricyanide	A				A		A	B			A				A
Sodium Fluoride	C	C	D	D	B	B	A	B		A	A	B	A		A
Sodium Hydroxide 20% Cold	D	A	A	A	A	A	B	A		A	D	B	B	A	A*
Sodium Hydroxide 20% Hot	D	A	B	B	A	C	A	A		B	D	B	C	A	A*
Sodium Hydroxide 50% Cold	D	A	A	B	A	B	A	A		A	D	B	C	A	A*
Sodium Hydroxide 50% Hot	D	A	B	B	A	C	A	B		B	D		C	A	A*
Sodium Hydroxide 70% Cold	D	A	A	A	A	B	B	A		B	D	B	C	A	A*
Sodium Hydroxide 70% Hot	D	B	B	B	A	C	B	B		D	D	B	C	A	A*
Sodium Hypochlorite (Bleach)	D	D	D	D	D	D	C	D	A		D		A		A
Sodium Hyposulfite	B				B		B	B			A				A
Sodium Lactate	D				A		A	B			A				A
Sodium Metaphosphate	A	C	B	C	B	B	B		A	A	B	B		A	
Sodium Metasilicate Cold	B	B	C	C	A		A	A		B	A		B		A
Sodium Metasilicate Hot	B	B	D	D	A		A	A	A		A				A
Sodium Nitrate	A	B	B	B	A	B	A	B	B	C	A	B	A		A
Sodium Nitrite	A				B		B	C	B	C	B	A	B		A
Sodium Perborate	B	B	B	B	B	B	B	B	B	C	A	A	A		A
Sodium Peroxide	C	D	C	C	B	B	B	B	B	C	A	A	A		A
Sodium Phosphate	D	C	C	C	B	B	B	B	B	B	B	A	A		A
Sodium Phosphate Di-basic	D	C	C	C	B		B	B	B	A	A	A	A		A
Sodium Phosphate Tri-basic	D	C	C	C	B		B	B	B	B	A	A	A		A
Sodium Polyphosphate					B		B	B	B	B		A			A
Sodium Salicylate					A		A				A				A
Sodium Silicate	B	B	B	B	B		B	B		A	A	B	A		A
Sodium Silicate, Hot	C	C	C	C	B		B	B			A	B			A
Sodium Sulfate	B	B	B	B	A	B	A	A		A	A	A	A		A
Sodium Sulfide	C	D	B	B	B	A	B	B		A	A	B	A		A
Sodium Sulfite	B	C		A	A	A	A	B	B	A	A	B	B		A
Sodium Tetraborate				A	A		A			A	A	B			A
Sodium Thiosulfate	B	C	B	C	B	A	B	B		A	A	A	A		A
Soybean Oil	B	B	C	C	A		A	A		A	B	B	A		A
Starch	B	B	C	C	B		A	A		A	A	C	A		A
Steam (212° F)	A	A	A	A	A	A	A	B		D	D	B	C	A	A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information * - Not with Reinforced or Polyfill

Corrosion Data

Chemicals	Aluminum	Brass	Carbon Steel	Ductile Iron/Cast Iron	316 Stainless Steel	17-4PH	Alloy 20	Monel	Hastelloy C	Buna-N (Nitrile)	Delrin	EPDM/EPR	Viton	Flexible Graphite	Teflon-Reinforced/ or NRG
Stearic Acid	A	C	C	C	B		B	B	A	A	A	B	A	A	A
Styrene	A	A	A	B	A		A	B	A	D	A	D	B		A
Sugar Liquids	A	A	B	B	A		A	A		A	A	B	A		A
Sugar, Syrups & Jam Sulfate, Black Liquor	B	B		C		A	A			A	A				A
Sulfate, Green Liquor	C	C	C	C	B	A	B	B		C	A		C		A
Sulfate, White Liquor	B	C	C	C	B	B	D	C		C	D		C		A
Sulfur	A	D	C	C	B		A	B		D	A	B	B		A
Sulfur Chlorides	D	B	D	D	D		A	B		D	A	C	A	A	A
Sulfur Dioxide, dry	A	B	B	B	A	A	B	B	A	D	A	A	A	A	A
Sulfur Dioxide, wet	C	D			A	C	B	A	B	D	D	B		A	A
Sulfur Hexafluoride	A	B			A		A			A					A
Sulfur, Molten	A	D	C	B	B		A	D	B	D	D	B	B		A
Sulfur Trioxide		B	B	B	B	B	B	B	B	D	D		B	D	A
Sulfur Trioxide, dry	A	B	B	B	B	B	B	B	B	D	A	B	A	D	A
Sulfuric Acid 0-77%	C	C	D	D	C		B	B		B	D		A	A	A
Sulfuric Acid 100%	D	C	C	B	A	B	A	D		D	D	C	B	D	A
Sulfurous Acid	C	D	D	D	B		B	D	B	C	C	C	A	A	A
Tall Oil	C	B	B	B	B		B	B	A	B	A	D	A		A
Tannic Acid (Tannin)	C	B	C	C	B	B	B	B	B	B	A	B	A		A
Tanning Liquors	A				B		B			B	D				A
Tar & Tar Oils	A	A	A	A	A	A	A	A		C	A	D	A		A
Tartaric Acid	B	B	D	D	A	A	A	B	B	C	A	B	A		A
Tetraethyl Lead	B	B	C	C	B		B	A			A				A
Toluol (Toluene)	A	A	A	A	A		A	A	A	D	C	D	B		A
Tomato Juice	A	C	C	C	A		A	B		A	A		A		A
Transformer Oil	A	B	A	B	A		A	A		A	A		A		A
Tributyl Phosphate	A	A	A	A	A		A	A		D	A	B	D		A
Trichloroethylene	A	B	B	C	B	A	B	B	A	D	A	D	B	A	A
Trichloroacetic Acid	D	B		D	D		B	B	A	C	D		D		A
Triethanolamine	B				B		B	B	A	C	A	B			A
Triethylamine		B			B		B		A	B	C				A
Trisodium Phosphate	D				B		B		A	A	A	B	B		A
Tung Oil	B	B	B	B	A		A	C	A	A	A	D	A		A
Turpentine	B	B	B	B	B	A	B	B	A	B	A	D	A		A
Urea	B	B	C	C	B		B	B	A	C	A	B	D		A
Uric Acid	D				A		A		A		B				A
Varnish	A	A	C	C	A		A	A	A	C	A	D	B		A
Vegetable Oils	A	B	B	B	A		A	B	A	A	A	D	A		A
Vinegar	C	B	D	D	A		A	B	A	D	B	A	D		A
Vinyl Acetate	B	B		B	B		B	B	A		D	A		A	A
Water, Distilled	A	A	D	D	A	A	A	A	A	C	A	B	A		A
Water, Fresh	A	A	C	C	A	A	A	A	A	C	A	B	A		A
Water, Acid Mine	D	D	D	D	B	B		D	C	B	A	A	D	A	
Waxes	A	A	A	A	A		A	A	A	A	A	C	A		A
Whiskey & Wines	D	B	D	D	A		A	A	A	B	A	A	A		A
Xylene (Xylol), Dry	A	A	B	B	A		A	A	A	D	A	D	B	A	A
Zinc Bromide	D	B		D	B		B	B	A	B	A	B	B		A
Zinc Hydrosulfite	D	C	A	B	A		A	B	A	A	A	A	A		A
Zinc Sulfate	D	B	D	D	B		A	B	A	A	A	A	A	A	A

Ratings: A - Excellent B - Good C - Poor D - Do not use Blank - No information