Technical Data Sheet

Magnetic Flowmeter Material Selection Guide

Selection Guide

ROSEMOUNT®

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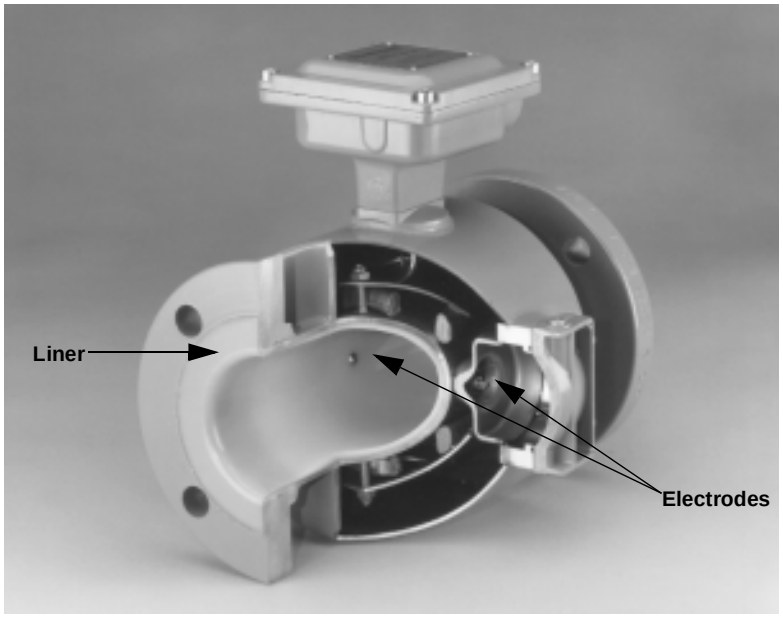

FIGURE 1. Cutaway View of a Magnetic Flowtube.

INTRODUCTION

The purpose of this guide is to provide a general resource for the selection of materials for the magnetic flowmeter. One of the advantages of the electromagnetic flowmeter is that it is suitable for a wide variety of applications including severely corrosive chemicals and highly abrasive slurries. The key to this versatility is that there is a large choice of materials available for the electrodes and the flowtube liner.

DISCLAIMER

Rosemount Inc. neither represents nor warrants the accuracy or sufficiency of the information set forth in this guide for specific end-user applications. Ultimate responsibility for materials selection remains with the end-user. Nothing in this guide constitutes a change to the terms and conditions under which the Rosemount product was sold.

The data presented in this guide is based on field experience and published data. However, because of the wide variety of processes and applications it is impossible to guarantee material compatibility in a given process without performing corrosion tests under actual operating conditions. Therefore, the final decision of material resides with the user.

Additionally, some of the process fluids listed in this guide do not meet the minimum conductivity requirements (5 micro-siemens/cm) for a magmeter. However, they are listed to aid the user in instances where there may be trace amounts contained in the process fluid.

LINER MATERIALS

Rosemount presently offers six different lining materials including PTFE (Teflon®), ETFE (Tefzel®), Polyurethane, Neoprene, Natural Rubber, and Ryton®. These materials have different characteristics that allow different liners to be chosen for different applications as described in the following paragraphs.

PTFE-Teflon

PTFE lining material is the most popular because it is one of the most chemical-resistant materials available commercially. PTFE is not normally selected for abrasive service; for example slurries.

PTFE retains many useful properties up to 500 °F; however, the rigorous requirements of the flowtube environment result in a practical limit at the process temperature of 350 °F. Although not a common problem, avoid subjecting flowtubes larger than 4-inch to vacuum conditions. The potential for liner failure under vacuum conditions increases as line size and temperature increase. Consider the possibility of a vacuum occurring under transient conditions such as the draining of a line.

With the proper selection and installation, PTFE-lined flowtubes give many years of trouble-free service. The tens of thousands of successful installations of PTFE-lined flowtubes in a wide variety of industries are testimony to its wide applicability.

ETFE-Tefzel

Tefzel lining material is becoming increasingly popular. Tefzel offers enhanced mechanical properties, when compared to PTFE, with only slightly reduced chemical resistance. Its excellent wear resistance combined with its chemical resistance make it an effective choice for many process conditions. The Tefzel liner bonds to its accompanying stainless steel tube, virtually eliminating any possibility of the liner shifting or collapsing under vacuum conditions. However, the maximum allowable process temperature for Tefzel is lower than that of PTFE (300 °F rather than 350 °F).

Polyurethane

Polyurethane lining material is commonly used with abrasive process fluids; for example, mining applications. Polyurethane is resilient, and is much more resistant than PTFE to the wearing effects of the particles contained in fluids such as slurries. However, Polyurethane has very poor chemical resistance and is limited to a maximum process temperature of 140 °F.

Neoprene

The abrasion resistance of Neoprene is generally not as good as polyurethane but it has superior chemical resistance. In applications where a combination of chemical attack and abrasive wear are present the Neoprene lining could exhibit significantly longer life. Neoprene has a maximum temperature limit of 185 °F.

Natural Rubber

The abrasion resistance characteristics of natural rubber are similar to neoprene but it has slightly less chemical resistance in acid service. It also has a temperature limit of 185 °F. Natural rubber is a softer material with a durometer of 35 compared to Polyurethane and Neoprene at 65.

Ryton

Ryton lining material is an economical choice that is available in fractional line sizes. Through proper application, Ryton provides satisfactory service in many installations. Its maximum allowable process temperature is 200 °F.

ELECTRODE MATERIALS

There are presently 5 different materials available for the electrodes including: 316 SST, Hastelloy C-276®, Tantalum, 90% Platinum-10% Iridium, and Titanium. The proper selection of the electrode material is crucial to the survival of the flowmeter. Because of the relatively small size of the electrode and the importance of the seal between the electrode and flowtube liner only small corrosion rates are acceptable, typically less than 0.002 inches per year. Whenever possible, it is essential to select an electrode material with a corrosion rate of less than 0.002 inches per year.

316 Stainless Steel

This is the most commonly selected electrode material. It provides a good combination of corrosion resistance and abrasion resistance, and thus is favored as a general purpose electrode material. It generally is suitable for use with nitric acid, but in most instances it is not suitable for use with sulfuric acid or hydrochloric acid.

Hastelloy C-276

This alloy provides increased corrosion resistance over 316 SST in certain process fluids. For example Hastelloy C-276 will perform better than 316 SST in oxidizing conditions, sea water, and many reducing media. In addition, Hastelloy C-276 is a high-strength material that makes it the preferred choice in many slurry applications with a high percentage of solids.

Tantalum

Tantalum may be used with a wide range of process fluids. In nearly all environments, it gives improved service over 316 SST or Hastelloy C-276. Tantalum is very resistant to hydrochloric acid, nitric acid, or aqua regia. Do not use Tantalum with fluids such as hydrofluoric acid, fluosilicic acid, or sodium hydroxide.

90% Platinum-10% Iridium

This material provides the greatest resistance to attack of all the available electrode materials. It is also the most expensive; consider the possibility of using an alternate material. Do not use 90% platinum-10% iridium with aqua regia.

Titanium

Titanium generally performs well in caustic solutions unless they are hot and concentrated. It is more resistant to nitric acid than 316 SST, and gives excellent performance in sea water. Titanium is not a good choice for use with hydrofluoric acid, hydrochloric acid, or sulfuric acid.

HOW TO USE THIS GUIDE

Chemical names are listed in alphabetical order. Each chemical may have one or more temperature and concentration combination. In instances where the temperature limit is not given or the compatibility information is left blank, this indicates there is no information available.

Flowtube Liner

Each liner material has two considerations—compatibility to the chemical and temperature limit. The following codes define the compatibility with each chemical listed:

Compatibility	Code
Resistant	A
Not Resistant	N
No Information	(Blank)
Temperature Limit	**Code**
248 °F (120 °C)	1
212 °F (100 °C)	2
176 °F (80 °C)	3
140 °F (60 °C)	4
68 °F (20 °C)	5

NOTE
Temperature limit values are generally conservative and were chosen to best represent data available. Note that if an A1 code is specified the actual temperature limit of the material may be in excess of 248 °F.

Electrode Material

Each electrode material has two considerations—corrosion rate per year and temperature limit.

The following codes define the compatibility with each chemical listed:

Corrosion Rate Per Year	Code
Less than 0.002 in.	A
Less than 0.020 in.	B
Less than 0.050 in.	C
Greater than 0.050 in.	N
No Information	(Blank)
Temperature Limit	**Code**
248 °F (120 °C)	1
212 °F (100 °C)	2
176 °F (80 °C)	3
140 °F (60 °C)	4
68 °F (20 °C)	5

NOTE
Temperature limit values are generally conservative and were chosen to best represent data available. Note that if an A1 code is specified the actual temperature limit of the material may be in excess of 248 °F.

REFERENCES

The data found in the Material Selection Guide is based on field experience and data from the follow sources:

National Association of Corrosion Engineers (1985) *Corrosion Data Survey.*

Miller, Richard W. (1989) *Flow Measurement Engineering Handbook*.

Schweitzer, Philip A. P.E. (1991) *Corrosion Resistance Tables.*

Example

This example illustrates how to use the Material Selection Guide to choose compatible flowtube materials for a given process. The example process fluid is 98% sulfuric acid at 100 °F (38 °C).

Process Liquid	Maximum Concentration	Flowtube Liner							Electrode Material				
		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Sulfuric Acid	70%	A1	N	A1	A3	N	N		N	B3	B1	A1	N
Sulfuric Acid	80%	A1	N	A1	N	N	N		B5	A5	B1	A1	N
Sulfuric Acid	90%	A1	N	A1	N	N	N		B5	A4	B1	A1	
Sulfuric Acid	95%	A1	N	A1	N	N	N		B3	A4	B1	A1	
Sulfuric Acid	98%	A1	N	A1	N	N	N		B3	A5	B1	A1	N
Sulfuric Acid	100%	A1	N	A1	N	N	N		B3	A5	B1	A1	N

Liner Compatibility (from table)

- Teflon—resistant up to 248 °F (120 °C).
- Polyurethane—not resistant.
- Tefzel—resistant up to 248 °F (120 °C).
- Neoprene—not resistant.
- Natural Rubber—not resistant.
- Ryton—not resistant.

Electrode Compatibility (from table)

- 316 SST—corrosion rate of less than 0.020 in. per year, up to 176 °F (80 °C).
- Hastelloy C-276—corrosion rate of less than 0.0020 in. per year, up to 68 °F (20 °C).
- Tantalum—corrosion rate of less than 0.020 in. per year, up to 248 °F (120 °C).
- Platinum-10% Iridium—corrosion rate of less than 0.0020 in. per year, up to 248 °F (120 °C).
- Titanium—corrosion rate of greater than 0.050 in. per year (not recommended).

The proper material selection would be a Teflon or Tefzel liner with platinum-10% Iridium electrodes.

Rosemount Inc. does not guarantee the accuracy of this guide. See the disclaimer on page 94.

Legend	Liners	Electrodes (Corrosion Rate per Year)	Temperatures
	A=Resistant N=Not Resistant (Blank)=No Information	A=Less than 0.002 inches B=Less than 0.020 inches C=Less than 0.050 inches N=Greater than 0.050 inches Blank= No information	1=248°F (120 °C) 2=212°F (100 °C) 3=176°F (80 °C) 4=140°F (60 °C) 5=68°F (20 °C)

Process Liquid	Maximum Concentration	Flowtube Liner							Electrode Material				
		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Acetaldehtde	100%	A1	N	A2	A2	N	A2		B4	A4	B5	A5	A1
Acetamide	100%	A1	N	A1	A3	N	A1		B1				
Acetic Acid	50%	A1	N	A1	A4	N	A1		B3	A3	A1	A	A1
Acetic Acid	75%	A1	N	A2	A4	N	A1		N	A1	A1	A	A1
Acetic Acid, Glacial	100%	A1	N	A2	N	N	A1		A1	A1	A1	A	A
Acetic Anhydride	100%	A1	N	A1	A5	N	A1		B1	A1	A5	A2	A1
Acetone	50%	A1	N	A4	N	N	A1		B1	A3	A3	A	A3
Acetone	100%	A1	N	A4	N	N	A1		A1	A4	A1		A3
Acetophenone	100%	A1		A1	N	N	A3		B1	B3	B5		B3
Acetonitrile	100%	A1		A4			A		B4		B5		
Acetyl Chloride (dry)	100%	A1	N	A4	N	N	A		B1		B5	A2	
Acetylene	100%	A1		A1	A3	A5	A		A1	B3	B5		B5
Acetylene Tebrabromide	100%			A									
Acetylene Tetrachloride	100%			A								A2	
Acid Mine Water	100%						A						
Acrylontrile	100%	A1		A4	A4	A5			B3	B3	B3	A2	B3
Adipic Acid	100%	A1		A1	A4	A5	A1		B3	A3	B3		A1
Alcohol & Glycerin	100%	A	N		N				A	A	A	A	A
Alcohol, 2-Aminoethanol	100%						A						
Alcohol, Allyl	100%	A1		A3	A5	A5			A1	B1	B1	A2	B3
Alcohol, Amyl	100%						A						
Alcohol, Butyl	100%						A						
Allyl Chloride	100%	A1		A3	N	N			A5			A2	
Alum	10%	A			N				B	B	A	A	A
Alum	100%	A1		A1	A3	A4	A1		B3	B4	B5	A	A3
Alumina	100%	A	N		N				N	A	A	A	A
Aluminium Flouride	100%	A		A					N	N	N	A	
Aluminium Hydroxide	100%	A		A					B	N	A	A	
Aluminum Ammonium Sulfate	100%			A1									
Aluminium Sulfate	100%	A							B	B	A	A	B
Aluminum Chloride	20%	A	N	A	A				N	A	A	A5	B
Aluminum Chloride Aqueous	100%	A1	A5	A1	A3	A4	A1		N	A3	B1	A5	N
Aluminum Chlorohydrate	100%	A							N	B	A	A	
Aluminum Fluoride	Sat	A1	N	A1	A3	A4			B5		N	A5	A5
Aluminum Hydroxide	100%	A1		A1	A3		A1		A1	B5	A5		B4

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Process Liquid	Maximum Concentration	Flowtube Liner							Electrode Material				
		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Aluminum Oxychloride	100%	A1		A1			A1						
Aluminum Nitrate	Sat	A1		A1	A3	A4	A1		B3	B	B5	A	A3
Aluminum Potassium Sulfate	100%	A1	N	A1	A3	A4	A1		N		B3	A3	A3
Aluminum Sulfate	Sat	A1	N		A3	A4	A		B3	B3	A1	A2	A3
Amidosulfonic Acid	100%	A							N	N	A	A	
Amino Acids	100%			A									
Ammonia (Anhydrous)	100%	A1	A5	A1	A3	N	A		A1	B1	A1		A1
Ammonium Bicarbonate	50%	A	N		N				B	N	A	A	A
Ammonium Bicarbonate	100%	A1					A2		B4	B5	B3	A2	A3
Ammonium Bifluoride	50%	A	N		N	N			N	B	N	A	N
Ammonium Bifluoride	100%	A1	N	A1	N	N				B1		A5	
Ammonium Bisulfate	100%	A			A						A	A	A
Ammonium Bromide	5%	A1		A1					B1	A5	B3	A2	
Ammonium Carbamate	50%	A	N		N				N	B			A
Ammonium Carbonate	50%	A	N	A	N				B	B	A	A2	
Ammonium Carbonate	Sat	A1		A1	A3	A4	A5		B1	B1	A3	A5	A3
Ammonium Chloride	50%	A1		A1	A3	A4	A1		N	A3	A3	A2	A3
Ammonium Chloride	Sat	A1	A	A1	A3	A4	A1		N	B1	A1	A2	A3
Ammonium Dichromate	100%			A									
Ammonium Flouride	10%	A1		A1	A5	A4			B5	A3	N	A	B5
Ammonium Fluoride	25%	A1		A1	A3	A5			N	A3	N	A	A5
Ammonium Fluoride	100%	A		A			A1		N	B	N	A	
Ammonium Hydroxide	25%	A1	A5	A1	A3	N	A1		A5	B1	A1	A2	A5
Ammonium Nitrate	5%	A	A		N		A1		A1	B	A	A1	A
Ammonium Nitrate	100%	A1	N	A2	A3	A4	A2		A1		A3	A1	
Ammounium Perchlorate	100%			A							A1	A1	
Ammonium Persulfate	100%	A1	N	A1	A3	A5			N	N	A5	A2	B5
Ammonium Phosphate	100%	A1	N	A1	A3	A4	A1		N	N	A	A	A
Ammonium Sulfate	40%	A1	N	A1	A3	A4	A1		B1	B3	A1	A1	A3
Ammonium Sulfide	100%	A1		A1	A4				B1		B5		

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Ammonium Thiocyanate	100%	A1		A1	A3				B5	B3	B5		
Amyl Acetate	100%	A1	N	A1	N	N	A1		A1	A1	B1	A2	A3
Amyl Alcohol	100%	A1	N	A1	A4	A4	A3		B1	B3	B1	A2	B4
Amyl Chloride	100%	A1		A1	N	N	A3		B4	A5	B1	A2	
Aniline	100%	A1	N	A2	N	N	A1		A1	B1	B3	A1	A3
Aniline Hydrochloride	100%	A1		A2	N	N	A3		N	N	B3	A2	A3
Anthraquinone	100%	A1		A1						B3	B3	A2	
Anthraquinone-Sulfonic Acid	100%	A1		A1						B5	B3		
Antimony Pentoxide	100%	A							N	N	A	A	
Antimony Trichloride	100%	A1		A3	A4				N	B3	B3	A2	B5
Aqua Regia	100%	A1	N	A3	N	N			N	N	A1	N	A5
Arsenic Acid	100%	A1		A1	A3	A4			B1	B3		A2	
Arsenous Acid	100%	A							N	N	A	A	
Asphalt Emulsions	100%	A1			N		A3		A5				
Barium Acetate	100%	A							N	N	A	A	
Barium Carbonate	Sat	A1		A1	A4	A3	A3		B5	B1	B5	A	A5
Barium Chloride	Sat	A1		A1	A3	A5	A3		B3	A3		A2	
Barium Hydroxide	50%	A	A		A				A	B	A	A2	
Barium Hydroxide	Sat	A1		A1	A3	A4			B1	B1	B1	A2	A3
Barium Sulfate	100%	A1	A	A1	A4	A3	A2		B3	N	B3	A	A3
Barium Sulfide	100%	A1		A1	A4	A4	A2		B3	N	B5	A4	B5
Battery Acid	100%			A									
Bauxite Slurry	100%	B	A		B				N	A	A	A	A
Beer	100%	A1	N	A1	A5	A5			A1	A5	A5	A	B5
Benzaldehyde	100%	A1		A3			A2		B1	B3	B3	A2	B5
Benzene	100%	A1		A3			A1		B1	B3	A2	A2	A2
Benzene Sulfonic Acid	100%	A1		A3		N			B3	B3		A2	B3
Benzoic Acid	100%	A1	N	A1	A3	A4	A2		B1		A3	A2	A1
Benzonitrile	100%	A1		A3			A3				A1	A2	A1
Benzoyl Chloride	100%	A1		A4		N			A5		A1	A2	
Benzyl Alcohol	100%	A1		A1	N	N	A3		A1	B3	B3	A2	B3
Benzyl Chloride	100%	A1		A1	N	N	A1		B3		B2	A1	
Bismuth Carbonate	100%	A1		A1							B5		
Black Liquor	100%	A1	N	A1	A3	A5			B5	C1	N	A	B
Bleach, Active Chlorine 12.5%	100%	A1	N	A3	A5	A5			N	A4			
Borax	100%	A1	A	A1	A3	A4	A3		A1	A5	N	A	B3

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Process Liquid	Maximum Concentration	Flowtube Liner							Electrode Material				
		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Boric Acid	100%	A1		A1	A3	A4	A3		B1	A1	A1	A	A3
Boron Fluoride	100%	A							N	N	N	A	N
Brine Acid	100%	A1		A1	A4	A3	A1		N	A4	A	A	A
Bromic Acid	100%	A1		A1	A5						B5	A2	
Bromine Liquid	100%	A1		A1			N		N		A1		
Bromobenzene	100%	A1		A3		N					A1	A2	A3
Bromoform	100%			A									
m-Bromotoluene	100%			A									
Butadiene (Butylene)	100%	A1	N	A2	A5	N	A5		B1	B3	B5		
Butane	100%	A1	A5	A1	N	N	A2		B1	B2	A5	A2	A5
Butanediol	100%			A							A1	A2	A1
Butyl Acetate	100%	A1	N	A2		N	A2		B1	B1	B5	A2	A3
Butyl Acrylate	100%			A									
Butyl Alchol	100%	A1		A1	A3	A4	A3		A1	B3	B5		B3
Butyl Alcohol Secondary	100%	A1		A1			N		B5	B5	B5		B3
Butyl Alcohol Tertiary	100%	A1		A1			N		B5	B5	B5		B3
n - Butylamine	100%	A1		A5			N		B1	B3			B3
sec - Butylamine	100%			A									
tert - Butylamine	100%			A									
di-n-Butyl Amine	100%			A									
tri-n-Butyl Amine	100%			A									
Butyl Amine	100%						N						
Butyl Bromide	100%	A1		A1									
Butyl Chloride	100%	A1		A1	N		A1		B5	B5	B3	A2	B5
Butyl Ether	100%	A1		A3			A3		A5				
Butyl Phenol	100%	A1		A2	N				A1	B3	B2	A2	
Butyl Phthalate	100%	A1		A4			A		B3	B3	B3		B3
Butylene (Butadiene)	100%	A1	N	A1	A4	N	A5		B1		B5		
Butyraldehyde	100%	A							A2	A2			
Butyric Acid	100%	A1		A1	N	N	A1		B1	A1	B1	A2	A3
n-Butyl Mercaptan	100%	A1		A1					B3	B1			
Cadmium Chloride	100%	A							N	N	A2	A2	
Calcium Bisulfate	100%	A1		A1					B3	N	A1	A	
Calcium Bisulfite	100%	A1				A5	A3		B1	B5	A5	A5	A3
Calcium Carbonate	100%	A1	A	A1	A5	A3	A1		B3	B3	A2	A2	A2
Calcium Chlorate	30%	A	N		A				B4	B3	B3	A2	B4
Calcium Chlorate	100%	A1		A1	A3	A4			B3	B3	B3	A2	B4
Calcium Chloride	50%	A	A	A	A				N	A	A1	A2	A
Calcium Chloride	Sat	A1	A5	A1	A3	A4	A1		B3	A1		A2	A3

Legend

Liners
A=Resistant
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Temperatures
1=248°F (120 °C)
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5=68°F (20 °C)

Process Liquid	Maximum Concentration	Flowtube Liner							Electrode Material				
		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Calcium Hydroxide	25%	A1	A5	A1	A2	A3			B3	A4	A1	A5	A2
Calcium Hydroxide	Sat	A1		A1	A2	A3	A1		B3		A1	A2	A2
Calcium Hypochlorite	Sat	A1		A1	A5	A5			B5		B1	A2	A3
Calcium Nitrate	10%	A							B	B	A	A2	A
Calcium Nitrate	100%	A1	A5	A1	A3	A4	A		B1	B3	B5	A2	B3
Calcium Oxide	100%	A1		A1	A5				B5	B5			
Calcium Sulfate	10%	A	N	A	N				A		A	A2	A
Calcium Sulfate	100%	A1	N	A1	A4	A3	A		B3	B1	B3	A	A3
Calcium Sulfide	100%			A									
Cane Sugar Juice	100%	A	N		A				A	A	A	A	A
Caprylic Acid	100%	A1		A3					B1	B1	B1		B3
Carbon Dioxide (Dry)	100%	A1	A5	A1	A3	A4	A3		B1	A1	B1	A1	A5
Carbon Dioxide (Wet)	100%	A1	A5	A1	A3	A4			B3	B3	A1	A1	A5
Carbon Disulfide (Bisulfide)	100%	A1		A4	N	N	N		B1	B3	A5		A3
Carbon Slurry	100%	N	A		N				A	A	A	A	A
Carbon Tetrachloride	100%	A1	N	A1	N	N	A5		A1	A5	A1		A3
Carbonic Acid	100%	A1		A1	A5	A3			B1	A5	B1	A1	A3
Castor Oil	100%	A1		A1	A4	A4	A1		B4	A5			
Caustic Soda	50%	A	N	A	N				B		N	A	B
Cellosolve	100%	A1		A1	N	N	N		B1	B3	B3		B3
Cheese	100%	A	N		N				A	A	A	A	A
Chloral Hydrate	100%	A1		A3									
Chlorinated Brine	100%			A									
Chlorinated Phenol	100%			A									
Chlorine (Liquid)	100%	A1		A	N	N			N	A5	B1	N	
Chlorine Dioxide	15%	A1		A1	N	N	N		N	A4	A1		A3
Chlorine Dioxide	100%	A		A	N				N	N	A	N	A
Chlorine Water	Sat	A1		A5	N	A4	N		N	A3	B1	A	A3
Chloroacetic Acid	100%	A1	N		N	N	A4		N	A4	A1	A2	A3
Chloroacetic Acid (50% H_2O)	50%	A1		A2	N	N			N	B3	A3	A2	A3
Chlorobenzene (Phenylchloride)	100%	A1		A3	N	N	A3		B1	A1	B1		B3
Chlorobenzyl Chloride	100%			A									
Chloroform	100%	A1	N	A2	N	N	A4		A5	B3	A3	A2	A3
Chlorohydrate Aluminum	100%	A							N	N	A	A	
Chlorohydrin	100%			A								A1	

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		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Chlorohydroxide (wet)	100%						A						
Chlorophenol, 5% Aqueous	100%	A1					A3		B1	A5		A2	
Chlorosulfonic Acid	100%	A1		A5	N	N	N		N	A2	B3	A1	A3
Chlorosulfuric Acid	100%	A							N	B	A	A	
Chromic Acid	30%	A1		A4	A5	N	A3		B1	B3	B1	A2	A3
Chromic Acid	50%	A1		A4	A5	N	A3		B4	B3	A1	A2	A3
Chromic Acid	100%	A	N	A	N		A		N	N	A	A2	B
Chromic Chloride	100%			A									
Chromium Fluoride	100%	A											
Chromium Sulfate	50%	A	N		N				B	B	A	A2	
Chromium Sulfate	100%	A							N	B	A	A	
Chromyl Chloride	100%	A1		A3					B3	B3	B3	A2	B5
Clorox Bleach Solution(5.5% Chlorine)	100%	A1		A3	N	N			B5				
Citric Acid	50%	A1	N	A3	A	A4	A2		B1	A3	A1	A2	A3
Clay Slurry	100%	A	A		A				A	A	A	A	A
Coal & Water Slurry	100%	N	A		A				N	A	A	A	A
Coffee Extract	100%	A	A		A				A	A	A	A	A
Cola Syrup	100%	A	A		A				A	A	A	A	A
Copper Chloride	5%	A	A		A				N	B	A	N	A
Copper Chloride	100%	A1		A1	A3	A4	A2		N	B3	A1	N	A3
Copper Cyanide	100%	A1	A5	A1	A4	A4	A3		B3	A4	B1	A	A5
Copper Fluoride	100%	A1		A1	A4				N	N	N	A	
Copper Nitrate	50%	A	A	A					B	N	A	A	A
Copper Nitrate	100%	A1		A1	A3	A3			A1	B5	B1	A	A5
Copper Oxychloride	100%	A							N	N	N	A	
Copper Sulfate	40%	A	A		A				B	A	A	A2	A
Copper Sulfate	70%	A	A		A				B	A	A	A	B
Copper Sulfate	100%	A1		A1	A3	A4	A1		B1	A3	A1		A3
Copper Sulfide	100%	A							B	B	A	A	
Corn Oil	100%	A1			A3	N	A3		B1				
Cottonseed Oil	100%	A1			A4	N	A3		B4				
Cresol	100%	A1	N	A1	N	N	A3		B5	B3			B3
Cresylic Acid	100%	A1	N	A1	N	N			B1	A1	B2		B5
Cresyldiphenyl Phosphate	100%						A						
Croton Aldehyde	100%	A1		A3	A5					B3	B3		
Crude Oil	100%	A1	A5	A1	N	N	A1		A3	A5	A5		A5

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Cupric Chloride	50%	A1			A4				N	B3	A5	N	B3
Cupric Chloride	100%	A							N	N	A	A	B
Cyclohexane	100%	A1		A1	N	N	A3		B1	B3	B5	A2	A1
Cyclohexanol	100%	A1		A1	N		A1		B5	B5	B5	A2	B5
Cyclohexanone	100%	A1		A1	N	N	A3		B3	B3	B5		B5
DDT	100%			A							A2	A2	A2
Dairy Products	100%	A	N		N				A	A	A	A	A
Decalin	100%			A									
Decane	100%			A									
Detergents	100%	A1	A5	A1	A3		A1		B1	A5	A4		A4
Dextrin	100%	A1		A1	A3		B1			B5			
Diacetone Alcohol	100%	A1		A3	N		A1		B1	A3	A2	A2	A2
1.2 Dibromo Propane	100%			A									
Dibutyl Phthalate	100%	A1		A4	N	N	A1		B1	B3	B3	A1	B3
Dichloroacetic Acid	100%	A1		A4	N						A1		A1
Dichlorobenzene	100%	A1		A4	N	N	A3		B5	A1		A2	
Dichloroethylene	100%	A1		A4	N		A3		B3	B3	B3	A2	B3
Dichloropropionic Acid	100%			A									
Diesel Fuel	100%	A1		A1	A5	N	A1		A5	B3			B3
Diethylamine	100%	A1		A2	A5	A5			B1			A2	
Diethyl Benzene	100%			A									
Diethyl Cellosolve	100%	A1		A1	A5				B3				
Diethyl Ether	100%	A1		A3	N	N			B2	B5	B5		B5
Diethylene Triamine	100%	A1		A3							B5		A5
Diglycolic Acid	100%	A1		A3	A3				B1	B3	B3	A2	B3
Diisobutyl Ketone	100%			A									
Diisobutylene	100%			A			A						
Dimethylamine	100%	A1		A5	N						B5	A2	
Dimethyl Aniline	100%	A1		A1	N	N	A					A2	
Dimethyl Formamide	100%	A1		A1	A4	N	A1		B1				
Dimethyl Phthalate	100%	A1		A3	N	N	A1		A5				
Dimethyl Sulfate	100%			A									
Dimethyl Sulfoxide	100%	A1		A3			A3						
Dioctyl Phthalate	100%	A1		A4	N	N	A3		B5			A2	
Diphenyl Ether	100%			A			A						
Disulfide	100%						A						
p-Dioxane	100%			A									
Divinyl Benzene	100%			A									

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Dowtherm (Diphenyl)	100%	A1		A4	A3	N	A3		B3	B3	B3		B3
Dyes	100%	A	N		N				A	A	A	A	A
pichlorhydrin	100%	A1		A4	N	N	A1		B1	A5	B5	A2	
Ethylamine	100%			A			A						
Ethers	100%	A1		A3	N	N	A1		A3	B3	B3		B5
Ethyl Alcohol	100%	A1		A1					B1	A2	A3		A3
Ethyl Acetate	100%	A1	N	A4	N	N	A1		B1	B1	B3	A1	A3
Ethyl Acrylate	100%	A1		A3	N	N	A3		B3	A3	B5	A2	
Ethyl Chloroacetate	100%			A									
Ethyl Chloride	100%	A1		A1	N	N	A3		A1	B3	A3	A1	A3
Ethyl Cyanoacetate	100%			A									
Ethyl Acetoacetate	100%			A									
Ethylene Bromide	100%	A1		A1	N	N			A3	A3	B5		B3
Ethylene Chloride	100%	A1		A1	N	N			B2		B3		A3
Ethylene Chlorohydrin	100%	A1		A4	N	N	A3		B3	B3	B3		B3
Ethylene Diamine	100%	A1		A5	N	A5	N		B1	N	B5	A2	A5
Ethylene Dichloride	100%	A1			N	N	A3		B1	B2	A3	A2	B3
Ethylene Glycol	100%	A1	A5	A1	A4	A4	A1		B1	A1	A5	A2	A3
Ethylene Oxide	100%	A1		A2	N	N			B1	A5	A5	A2	A5
Esters	100%			A									
Fatty Acids	100%	A1		A1	A4	N	A1		A1	A1	A1	A1	A3
Ferric Chloride 50% H_2O	50%	A1		A1	A4	A4	A3		N	B3	A3	A	A3
Ferric Hydroxide	100%	A1		A1	A5				A5	A5	A3	A5	B3
Ferric Nitrate	10%	A1		A1	A3	A4	A3		B1	A5	B3	A2	A5
Ferric Nitrate	100%			A1								A2	
Ferric Sulfate	10%	A							A3	A4	A2	A2	A2
Ferric Sulfate	100%	A1		A1	A3	A4	A3		N	B	A3	A	A
Ferrous Chloride	10%	A	N		N				N	N	A	A2	A
Ferrous Chloride	Sat	A1		A1	A5	A4	A3		N	B1	A3	A2	A3
Ferrous Hydroxide	100%			A									
Ferrous Nitrate	100%	A1		A1	A3	A4	A3		B5	B	A	A	A
Ferrous Sulfate	10%	A	N		N				N	N	A	A	A
Ferrous Sulfate	50%	A1	N		N				N	N	A	A	A
Ferrous Sulfate	100%	A1		A1	A3	A4	A3		B3	B2	B1	A	A5
Fluoroboric Acid	100%	A1		A1	A4	A4			N	A3	N		N
Fluosilicic Acid	40%	A	N		N				N	N	N	A	N
Fluosilicic Acid	100%	A1		A1	A4	A5			B3	B5	N		N
Formalhehyde	35%	A1	N	A2	A4		A3		A3	B3	A1	A2	A3

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Process Liquid	Maximum Concentration	Flowtube Liner							Electrode Material				
		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Formic Acid	50%	A1	N	A1	A4	N			B1	A2	A1	A2	B5
Formic Acid	80%	A1	N	A1	A4	N			B1	A3	A1	A2	B5
Formic Acid	100%	A1	N	A1	A5	N	N		B3	A2	A1	A2	B5
Freon F-11	100%	A1	A5	A3	A3	N	A3		B1				
Freon F-12	100%	A1	A5	A2	A3	N	A3		B1	A5	B5		B5
Freon F-22	100%	A1	N	A2	A5	N	A3		B1	B1	B5		B5
Fruit Juices, Pulp	100%	A1	N		A3				B1	A3	A5	A	A5
Fuel Oil	100%	A1		A1	A4	N	A3		B4	B3	B3		A5
Fumaric Acid	100%			A									
Furane	100%			A			A						
Furfural	100%	A1	N	A3	A3	N	A1		B1	B5	A1		A3
Gallic Acid	100%	A1	N	A3	A5	A4	A1		B1	B3	B5		
Gas Oil	35%	A							N	B	N	A	
Gas Oil	100%	A							N	N	N	A	
Gas - Manufactured	100%	A1		A1					B5				
Gasoline - Leaded	100%	A1	A5	A1	A5	N	A1		B5	A5	A5		A5
Gasoline - Unleaded	100%	A1	A5	A3	A5	N	A1		B5	A1	A5		B5
Gasoline - Sour	100%	A1	A5	A1	A5	N	A1		B5	B1	B5		
Glacial Acetic Acid	100%	A							N	A	A	A	
Glucose (Corn Syrup)	100%	A1			A5	A5	A1		B1	A	A	A	A
Glycerin (Glycerol)	100%	A1	A5	A1	A3	A4	A1		A3	A1	B5	A	A3
Glycol	100%	A1		A1	A4	A5			B5				
Glycolic Acid	100%	A1		A1	A3				B1	B3	B3		A3
Green Liquor	100%	A1	N		A4	A4	A1		B	B	A	A	A
Heptane	100%	A1		A1	A3	N	A1		B1	A3	B3	A2	B3
Hexane	100%	A1	A5	A1	A5	N	A1		A1	A1	B5	A2	A4
Hormaldehyde	100%	A							N	B	A	A	
Hydrazine	100%			A									
Hydrazine Dihydroanioride	100%			A									
Hydriodic Acid	100%			A									
Hydrobromic Acid	50%	A1	N	A1	N	A5	A3		N	B5	A1	A2	A3
Hydrochloric Acid	5%	A							N	N	A	A2	
Hydrochloric Acid	20%	A1	A5	A1	A5	A4	A2		N	A5	A1	A2	N
Hydrochloric Acid	40%	A1		A1	A5	A3	A3		N	A5	A1	A2	N
Hydrocyanic Acid	10%	A1	N	A1	N	A5	A1		B3	B	A	A2	B
Hydrofluoric Acid	20%	A1	N	A1	A3	A5	A3		N	B3	N	A2	N
Hydrofluoric Acid	35%	A1	N	A1	A3	A5	A3		N	B3	N	A2	N
Hydrofluoric Acid	70%	A1	N	A1	A3	N			N	B3	N	A2	N

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Hydrofluorosilicic Acid	35%	A1		A1	A4	A5	A4		B5	B5	N	A	N
Hydrofluorosilicic Acid	100%			A									
Hydrogen Cyanide	100%	A1		A1	N	A5			A5	A5	B5	A	
Hydrogen Fluoride	100%	A1			N	N			A5	B1	N	B	A5
Hydrogen Peroxide	30%	A1	N	A1	N	N			B1	A5	B1	A2	A3
Hydrogen Peroxide	50%	A1	N	A4	N	N			B1	B5	B1	A2	A3
Hydrogen Peroxide	90%	A1	N	A4	N	N			A5	A3	B1	A2	B3
Hydrogen Sulfide	100%	A1		A1	A3	N			B1	A5	A1		A5
Hydrogen Phosphide	100%	A1		A4									
Hydroquinone	100%	A1		A1	A3	A5			B1	B3	B3	A1	B3
Hydroxy Acetic Acid	35%	A1							B	B	A	A	
Hydroxy Acetic Acid	70%	A1							B	B	A	A	
Hypochlorous Acid	20%	A							N	B	N	A	B
Hypochlorous Acid	100%	A1	N	A1	N	A4			N	B5	B1	A2	B5
Iodine	100%	A1		A2	N	N	A4		N	A1	B1	A1	A5
Idoform	100%	A1		A2					A1	N	B3	A2	B2
Iron Chloride	100%	A							N	B	N	A	
Iron Nitrate	100%	A							N	B	A	A	
Iron Sulfate	100%	A							N	B	A	A	A
Isobutyl Alcohol	100%			A									
Isopropylamine	100%			A									
Jet Fuels - JP4	100%	A1	N	A2	N	N	A		B1	A5			A5
Jet Fuels - JP5	100%	A1	N	A2	N	N	A		B1	A5			A5
Kerosene	100%	A1	N	A1	A3	N	A1		B1	B2	B5		A5
Ketones	100%	A1		A1	N		A		B1	A5			A5
Kraft Liquor	100%	A1			A5				A5	A5			
Lactic Acid	100%	A1		A1	A5	A5	A1		B1	B2	A1	A2	A1
Lard Oil	100%	A1		A1	N	N			B5	A5	A5		
Latex	100%	A	N		N				A	A	A	A	A
Lauric Acid	100%	A1		A1					B5	B5		A2	
Lauryl Chloride	100%	A1		A1									
Lauryl Sulfate	100%			A									
Lead Acetate	100%	A1		A1	A3	A5			B3	B3	B3	A2	A3
Lead Nitrate	100%	A1		A5	A3	A3			B5	B3	A	A2	
Lime Slurry	100%	A	A		A				A	A	A	A	A
Linoleic Acid	100%	A1		A1	N	N	A1		B1	B1	B1		B3
Linseed Oil	100%	A1		A1	A3	N	A1		B5	B5	B3		A5
Lithium Bromide	100%	A1		A1	A3				B1				

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Electrodes (Corrosion Rate per Year)
A=Less than 0.002 inches
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Temperatures
1=248°F (120 °C)
2=212°F (100 °C)
3=176°F (80 °C)
4=140°F (60 °C)
5=68°F (20 °C)

Process Liquid	Maximum Concentration	Flowtube Liner							Electrode Material				
		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Lithium Chloride	30%	A1		A5					N	A3	A3	A	A3
Lithium Chloride	100%	A							N	A	A	A	A
Lithium Hydroxide	10%	A1		A1					B3	B3	B3		
Lubricating Oil	100%	A1		A1	A3	N	A1		B4				A5
M-Cresol (crude)	100%						A						
Magnesium Bisulfate	100%	A							B	B			
Magnesium Carbonate	10%	A							B	B	A		
Magnesium Carbonate	100%	A1		A1	A3	A3	A1		B3		B3	A	A5
Magnesium Chloride	42%	A1	A5	A1	A2	A4	A1		B2	A1	A1	A	A1
Magnesium Chloride	100%	A1	A5	A1	A3	A4	A1			A1			
Magnesium Hydroxide	100%	A1		A1	A3	A3	A1		A2	A2	A5	A	A5
Magnesium Nitrate	100%	A1		A1	A3	A4	A3		B1	A5	B3	A	A5
Magnesium Sulfate	25%	A							B	N	A	A	B
Magnesium Sulfate	40%	A							A	B3	A4	A	A
Magnesium Sulfate	100%	A1	A5	A1	A3	A4	A1		B1	A	A4	A	B3
Maleic Acid	100%	A1	A5	A1	N	A5	A1		B1	B3	B3		A3
Maleic Anhydride	100%			A									
Malic Acid	100%	A1		A1	A5	A5			A1	B3	B3		A3
Mercuric Chloride	60%	A	N		A				N	N	A	A	A
Mercuric Chloride	100%	A1		A1	N	A4			B1		A1	A2	B3
Mercuric Cyanide	100%	A1		A1	N	A4			B5	B5	B1		A5
Mercuric Nitrate	100%	A1		A1	A5	A5			N		B1	A2	
Mercury	100%	A1	A5	A1	A3	A4			A1	A1	B1	N	A1
Methacrylic Acid	100%			A									
Methane	100%	A1		A1	A3	N			A1	A3	B1		A3
Methane Sulfonic Acid	50%	A1		A2									
Methyl Alcohol	100%	A1	A5	A1	A3	A4	A3		B1	A1	B1		B3
Methyl Benzoate	100%			A									
Methyl Bromide	100%	A1		A1	N	N			B1		B3		
Methyl Cellosolve	100%	A1		A1	A3		A1		B1		B5		
Methyl Chloride	100%	A1		A1	N	N			A1	B5	B3		A3
Methyl Chloroform	100%	A1		A4	N								
Methyl Chloromethyl Ether	100%			A									
Methyl Cyanoacetate	100%			A									
Methyl Ethyl Ketone	100%	A1	N	A2	N	N	A3		B1	B3	B3		B3
Methyl Methacrylate	100%	A1		A4	N	N			B5		B5		

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		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton	316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Methyl Salicylate	100%	A1		A3		N	A3			B5		
Methyl Sulfuric Acid	100%	A1		A3				B5		A1		
Methyl Isobutyl Ketone	100%	A1		A1	N	N	A1	B1	B3	B3		B3
Methyl Trichlorosilane	100%			A								
Methylene Bromide	100%			A								
Methylene Chloride	100%	A1	N	A3	N	N	A3	B1	A3	N		A3
Methylene Iodide	100%			A								
Milk	100%	A1	A5		A3	A5		A1	A5	A1	A	A5
Mineral Oil	100%	A1	A5	A1	A3	N	A	B1		A1		A5
Molasses	100%	A1	N		A3	A4		A1	A5	A5	A	A
Monochlorobenzene	100%	A1		A2	N	N		B5	B5	B4		B4
Monoethanolamine	100%	A1		A4	A5	A5	A3	A3	B3	A3	A2	B3
Morpholine	100%	A1		A4	N			B1			B2	
Motor Oil	100%	A1					A1	B1				
Mud Drilling	100%	N	A		N			A	A	A	A	A
Naphtha	100%	A1	A5	A1	N	N	A	B3	B3	B5	A2	B5
Naphthalene	100%	A1		A1	N	N	A1	A1	B3	B3	A1	A3
Nickel Chloride	10%	A						N	A	B	A	B
Nickel Chloride	20%	A						N	N	A	A	N
Nickel Chloride	100%	A1		A1	A3	A4		B5	N	B3	A2	A3
Nickel Nitrate	10%	A							B	B	A	
Nickel Nitrate	100%	A1		A1	A3	A4		A1	B1	B3	A2	A5
Nickel Sulfate	10%	A						B	B	A3		B3
Nickel Sulfate	100%	A1		A1	A3	A4		B3	B3	N	A2	N
Nicotine	100%	A1		A3	N			B3		B5		
Nicotonic Acid	100%	A1		A1	A3			B1				
Nitric Acid (Anhydrous)	100%	A1	N	N	N	N		A5	B5	A1	A2	B3
Nitric Acid	10%	A1	N	A4	N	N	A5	A3	A3	A1	A	A1
Nitric Acid	20%	A1	N	A4	N	N	A5	A5	A4	A1	A2	A1
Nitric Acid	40%	A1	N	A4	N	N	A5	A5	A5	A1	A	A1
Nitric Acid	50%	A1	N	A4	N	N		A5	A5	A1		A1
Nitric Acid	70%	A1	N	A5	N	N		A5	A5	A1	A	A1
Nitric Acid-Sulfuric Acid	50%/50%	A1		A3				A4		B5		
Nitrobenzene	100%	A1	N	A1	N	N	N	B1	N	B3	A2	A3
Nitrogen	100%	A1		A1	A3	A3	A1	A1	A1	A1		
Nitrogen Dioxide	100%	A1		A3						A1		
Nitromethane	100%	A1		A3	N	A5		B5		B5		

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		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Nitrous Acid	Conc	A1		A3	N	N			B5	N	B1	A2	
Octane	100%	A1		A1	A2		A1		B5				
Octene	100%			A									
Oleic Acid	100%	A1	A5	A1	N	N			A1	B3	B3	A1	A5
Oleum	100%	A1	N	A4	N	N	A5		B5		N	A	A
Oxalic Acid	Sat	A1		A2	N	A4	A3		N	B3	A3	A	B5
p-Dioxane	100%						A						
Palmitic Acid	Conc	A1		A1	N				B1	B5			
Paper Stock	100%	A1		A1					A	A	A	A	A
Perchloric Acid	10%	A1	N	A2	A5	A4			N		A1		N
Perchloric Acid	70%	A1	N	A4	N				N	B2	A1	A	N
Perchloric Acid	100%	A							N	N	A	A	
Perchlorethylene	100%	A1	N	A1	N	N	A1		A5	B3	B3		A3
Petrolatum	100%	A1		A1	A3				B1		A5		
Petroleum Oils, Refined	100%	A1		A1	A5	N			B5		A1		
Petroleum Ether	100%	A1		A3					A5	A5	A5		A5
Phenol	10%	A1	N	A2	N	A5			B3	B1	B1	A	B5
Pheno (Carbolic Acid)	100%	A1	N	A3	N	N	A1		A1	A1	B1	A1	A5
Phenolsulfonic Acid	100%			A									
Phenylhydrazine	100%	A1		A3	A5	A5						A2	
Phenylhydrazine Hydrochloride	100%	A1		A3								A2	
o-Phenylphenol	100%			A									
Phosgene Liquid	100%	A1		A3					B2		B1	A1	
Phosphate Slurry	100%	A							N	A	A	A	A
Phosphoric Acid	30%	A1	A5	A1	A3	A4	A2		B3	A4	A1		C5
Phosphoric Acid	85%	A1	N	A1	N	A5	A2		B1	A3	A1	A	C5
Phosphoric Anhydride	100%	A1			A5		N		B3		A5	A2	
Phosphorus	100%	A1							A5	A4	B1		
Phosphorus Pentoxide	100%	A1		A2					B5	N	B5	A2	
Phosphorus Oxychloride	100%	A1		A3					N	B3	B1	A2	A5
Phosphorus Pentachloride	100%			A								N	
Phosphorus Trichloride	100%	A1		A1	N		A3		A5	B5	A1	N	A5
Photographic Solutions	100%	A1	N		A3	A4			A1		A5		B5

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		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Phthalic Acid	100%	A1		A3	A3				A1	B1	B1	A1	A5
Phthalic Anhydride	100%	A1		A3		A4			A1	A1	B1		
Picric Acid	100%	A1		A5	A3	N			B1	B1	B3		A5
Polyvinyl Acetate	100%	A1		A1	A3				A3		B5		
Potassium Aluminum Chloride	100%			A									
Potassium Aluminum Sulfate	50%			A									
Potassium Aluminum Sulfate	100%	A1	N		A4				B5	A5	A3	A	A3
Potassium Bicarbonate	30%	A1	N	A1	N		A1		A3	B3	B5		A3
Potassium Bicarbonate	100%	A		A					B	B	A	A	
Potassium Borate	100%	A1		A1	A4								
Potassium Bromate	100%	A1		A1	A4								
Potassium Bromide	30%	A1		A1	A4	A4			B1	B5	A5		A3
Potassium Carbonate	50%	A1		A1	A3	A4	A1		A3	B3	B1	A2	A3
Potassium Chlorate, Aqueous	30%	A1		A1	A5				A1	B3	B5	A2	A3
Potassium Chloride	30%	A1	N	A1	A4	A4	A1		A1		A1	A	A3
Potassium Chloride	60%	A							B	N	A	A	B
Potassium Chloride	100%	A	N	A	A		A		N	A	A	A	A
Potassium Chromate	30%	A1		A1	A5				B1	B3	B5		A3
Potassium Cyanide	30%	A1		A1	A3	A4	A1		B3	B3	A5	A2	N
Potassium Dichromate	30%	A1	N	A1	N	N	A1		A1	B3	A1	A	A3
Potassium Dichromate	60%	A	N		A				A	B	A	A2	A
Potassium Ferricyanide	30%	A1			A2				N	N	A5	N	A5
Potassium Ferrocyanide	30%	A1		A1	A3				N	N	B3	N	A5
Potassium Fluoride	100%	A1		A1		N			B3		B5		N
Potassium Hydroxide (Caustic Potash)	10%	A	N		N				B	N	N	A1	A
Potassium Hydroxide (Caustic Potash)	50%	A1		A3	A3	A5	A1		B1	B1	N	A1	A3
Potassium Hypochlorite	40%	A	N		N				N	B	B		A
Potassium Hypochlorite	100%	A1		A1					B5	B3	B3		
Potassium Nitrate	80%	A1	N	A1	A3	A4	A1		B1	B3	B1	A	A3

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		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Potassium Nitrite	100%	A1							N	N	A	A	B3
Potassium Perborate	100%	A1		A1									
Potassium Perchlorate	100%	A1		A3					B1				
Potassium Permanganate	10%	A1		A1	A5	N	A1		B1	A5	B3	A2	B5
Potassium Permanganate	100%	N		A			A		N	N	A	A2	A
Potassium Persulfate	10%	A							A	N	A	A	A
Potassium Persulfate	100%	A1		A4	A4		A1		B1	N	A	A	
Potassium Sulfate	10%	A1	A5	A1	A3	A4	A1		A1	A3	A5	A1	A5
Potassium Sulfate	20%	A	N		A				A	A	A	A1	A
Potassium Sulfate	100%	A	N	A	A				A	A	A	A	A
Potassium Sulfide	10%	A							B		B		A
Potassium Sulfide	100%	A1		A1	A5				B3	B5	A5		A5
Propane	100%	A1		A1	A5	N			B1	B5	B5		B5
Propionic Acid	100%	A1		A3	N				B3	A1		A1	
Propyl Alcohol	100%	A1		A3	A3	A4			A1	A5	B5		A5
Propylene Chlorohydrin	100%						N						
Propylene Dibromide	100%			A									
Propylene Dichloride	100%	A1		A3	N								
Propylene Glycol	100%	A1			A5				B3	B5	A5		A5
Propylene Oxide	100%	A1		A4	N	N				B5			
Pyridine	100%	A1		A4	N	N	A1		B1	A4	B1	A2	B2
Pyrogallol	100%	A1		A4					B2	B2			
Salicyalldehyde	100%	A1		A3									
Salicylic Acid	100%	A1	N	A1	A5	A5			B1	A1	B3	A2	A5
Salt Brine	100%			A									
Sea Water	100%	A	N	A	A				N	A	A	A	A
Sewage, Raw	100%	A	N		N				A	A	A	A	A
Silicon Tetrachloride	100%			A									
Silver Chloride	100%	A1		A1					N		A5		A5
Silver Cyanide	100%	A1		A1	A3				A5	A5	A5		A5
Silver Nitrate	50%	A							A5	A5	A1		A5
Silver Nitrate	100%	A1	A5	A1	A3	A4			N		A	A	A
Sludge, Activated	100%	A	N		A				A	A	A	A	A
Sludge, Primary	100%	A	N		A				A	A	A	A	A
Sludge, Thickened	100%	A	A		A				A	A	A	A	A
Sludge, Waste	100%	A	A		A				A	A	A	A	A
Soap Solutions	100%	A1	A5		A3	A4			B5	A5	A5	A	A5

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Sodium Acetate	100%	A1	N	A1	A3		A1		B1		A5	A1	A2
Sodium Benzene-Sulfonate	100%			A									
Sodium Benzoate	100%	A1		A1						B5	A5		A5
Sodium Bicarbonate	20%	A1		A1	A3	A4	A1		A1		A4	A	A3
Sodium Bicarbonate	100%	A		A	A		A		B	B	A	A	A
Sodium Bisulfate	40%	A	N	A	A				N	N	A	A2	
Sodium Bisulfate	100%	A1		A1	A3	A4	A3		N	N	A	A	A
Sodium Bisulfide	100%	A							N	B	A	A	
Sodium Bisulfite	40%	A							B2	B2		A2	B2
Sodium Bisulfite	100%	A1		A1	A3	A4	A3		B1	B3	B5	A5	
Sodium Borate (Borax)	100%	A1		A3	A3	A4			B3	B3	A5	A	A5
Sodium Boric Acid	100%	A							N	N	A	A	
Sodium Bromide	100%	A1		A3	A5						B1	A	B5
Sodium Carbonate	10%	A	N		A				A	A	A2	A2	A
Sodium Carbonate	20%	A							A	A	A2	A2	A
Sodium Carbonate	100%	A1		A1	A3	A3	A1		B1	B3		A2	A3
Sodium Chloride	Sat	A1	A5	A1	A3	A5	A1		N	A	A1	A2	A3
Sodium Chlorate	40%	A	N		A				B	B	A		A
Sodium Chlorate	100%	A1		A1	A5	A4	A2		N		N	A	A3
Sodium Chloride	30%	A			A				B1	B2	A	A	A
Sodium Chlorite	10%	A							N	B	A	B	
Sodium Chlorite	100%	A1				A3			N	N	A1	B	
Sodium Chromate	80%	A1		A1	A5		A		A3	A3	A	A	A
Sodium Cyanide	100%	A1		A1	A3	A3	A3		A1	B5	B2	N	A5
Sodium Dichromate	100%	A1		A3	N		A1		B5	A5	A5		
Sodium Ferricyanide	100%	A1		A1	N				B1	A3	A5		
Sodium Ferrocyanide	100%	A1		A1					B5	B	A5		
Sodium Fluoride	100%	A1		A1	A4	A4			N	B3	N		A5
Sodium Glutamate	100%			A									
Sodium Hydrosulfite	100%	A1							B	A5	A5	A	
Sodium Hydroxide	5%	A1	N		N		A2		A		N	A	A
Sodium Hydroxide	10%	A1	A5	A3	A3	A4	A3		A1	B2	N		A3
Sodium Hydroxide	25%	A	N		N				N	A	N	A	A
Sodium Hydroxide	30%	A1	A5	A2	A3	A4	A3		A4	B3	N	A	A3
Sodium Hydroxide	40%	A					A		B	A	N	A	A
Sodium Hydroxide	50%	A1	A5	A2	A3	A4	A3		A4	A3	N	A	A5
Sodium Hypochlorite	Conc	A1	N	A1	N	A5	A				B1		

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Sodium Hypochlorite	15%	A							N	B	B	A2	B
Sodium Hypochlorite	20%	A1	N	A1	N	A5			N	N	B1	A2	B3
Sodium Hypochlorite	25%	A1							N	B	B	A2	B
Sodium Hyposulfite	5%	A1		A1					N	A5	A5		
Sodium Iodide	100%	A1		A1	A4						B5		
Sodium Lignosulfonate	100%			A									
Sodium Metasilicate	100%			A									
Sodium Methane	100%	A											
Sodium Nitrate	40%	A	N		A				A		A	A2	A
Sodium Nitrate	50%	A							N	B	A	A2	A
Sodium Nitrate	100%	A1	A5	A1	A3	A4	A1			N	B1	A2	A5
Sodium Nitrite	40%	A							B2	B2	A	A	A
Sodium Nitrite	100%	A1		A1	A4		A1		N	N	B3	A	A3
Sodium Perborate	10%	A1		A3	A3	A4			B1	B3			
Sodium Perchlorate	100%			A								A2	
Sodium Peroxide	10%	A1		A1	A3	A4			B1	B3		A2	
Sodium Persulfate	100%			A									
Sodium Phosphate (Mono-Basic)	100%	A	N	A	A				B	A	A5	A2	A2
Sodium Phosphate (Tri-Basic)	100%	A1	A	A1	A4	A4			B3	B3	B2	A2	B3
Sodium Silicate	100%	A1		A1	A3	A3	A1		B1	B3	B1	A2	A3
Sodium Silicofluoride	100%			A									
Sodium Sulfate	20%	A								B	A1	A2	A2
Sodium Sulfate	30%	A	N		A				B	B	A	A2	B
Sodium Sulfate	100%	A1	A5	A1	A3	A4	A1		A1	B3			
Sodium Sulfide	10%	A1		A1	A3	A4	A1		B2	B2	B2	A2	B2
Sodium Sulfide	50%	A1		A1	A3	A4	A1		B3	B3		A2	
Sodium Sulfide	100%	A		A	N				N	N		A	
Sodium Sulfite	10%	A1		A1	A3	A4	A1		A3	N		A2	
Sodium Sulfite	30%	A							B	N	A	A2	A
Sodium Sulfite	100%	A		A	N				B	N	A	A	A
Sodium Tetraboric Acid	100%	A							B	B	A	A	
Sodium Thiosulfate (Hypo)	100%	A1	A5	A1	A3	A4	A1		B1	B5		A2	
Sorbic Acid	100%			A									
Sour Crude Oil	100%	A1	A5	A1						A4			
Stannic Chloride	100%	A1		A1	A3	A4	A2		N		B1	A	
Stannous Chloride	100%	A1		A1	A4	A4	A3			B3	B3	A2	A5

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Temperatures
1=248°F (120 °C)
2=212°F (100 °C)
3=176°F (80 °C)
4=140°F (60 °C)
5=68°F (20 °C)

Process Liquid	Maximum Concentration	Flowtube Liner							Electrode Material				
		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Stannous Fluoride	100%			A									
Stearic Acid	100%	A1	A5	A1	A3	N	A1		A1	A1	B1	A1	A1
Stoddard's Solvent	100%	A1		A1	N	N	A		B5	A5			
Styrene Monomer	100%					A							
Succinic Acid	100%	A1		A1			A3		B3	B3	B1		A1
Sulfamic Acid	100%	A1		A3	A4	A4					B1		A3
Sugar Juice	100%	A	N		N				A	A	A	A	A
Sulfinol	100%						A						
Sulfolane	100%						A						
Sulfur Dioxide (Wet)	100%	A1		A2	N	N	A3		B4	A4	B1	A1	N
Sulfur Trioxide	100%	A1		A5	N	A4			B1	B1	N		N
Sulfuric Acid	10%	A1	N	A1	A3	A4	A1		N	A3	B1	A1	N
Sulfuric Acid	30%	A1	N	A1	A3	A4	A1		N	A5	B1	A1	N
Sulfuric Acid	50%	A1	N	A1	A3	A5	N		N	A5	B1	A1	N
Sulfuric Acid	60%	A1	N	A1	A3	N	N		N	A1	B1	A1	N
Sulfuric Acid	70%	A1	N	A1	A3	N	N		N	B3	B1	A1	N
Sulfuric Acid	80%	A1	N	A1	N	N	N		B5	A5	B1	A1	N
Sulfuric Acid	90%	A1	N	A1	N	N	N		B5	A4	B1	A1	
Sulfuric Acid	95%	A1	N	A1	N	N	N		B3	A4	B1	A1	
Sulfuric Acid	98%	A1	N	A1	N	N	N		B3	A5	B1	A1	N
Sulfuric Acid	100%	A1	N	A1	N	N	N		B3	A5	B1		N
Sulfuric Acid (Fuming)	100%	A1		A5	N				A5	B5	N	A1	N
Sulfurous Acid	100%	A1	N	A2	N	N			A5	B1	A1	A2	A4
Tall Oil	100%	A1		A1	N	N			B1	A1	B1		
Tannic Acid	100%	A1		A1	A3	A5			B3	N	B3	A2	
Tartaric Acid	100%	A1		A1	A3	A4	A1		A1	B3		A2	
Tetraethyl Lead	100%	A1		A1					B1				
Tetrahydrofuran	100%	A1		A3	N	N	A1		B1	A5			B3
Tetramethyl Ammonium Hydroxide	50%	A1		A3									
Thionyl Chloride	100%	A1		A3	N	N	N		N		B1		
Tin Chloride	100%	A1			A3	A4			B4	B1	A5		
Tin Tetrachloride	100%			A									
Titanium Dioxide	100%	A	A	A	A				A	A	A	A	A
Titamium Tetrachloride	100%	A1		A2	N	N			B5	B5	A5		A1
Toluene	100%	A1	N	A1	N	N	A1		A1	A3	A1	A2	A3
Tomato Juice	100%	A1		A3	A3		A3		B1	B5	A5		
Tributyl Phosphate	100%	A1		A4	N	N	A1		B5	B5			

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		PTFE Teflon	Polyurethane	ETFE Tefzel	Neoprene	Natural Rubber	Ryton		316 SST	Hastelloy C-276	Tantalum	Platinum-10% Iridium	Titanium
Trichloroacetic Acid	100%	A1	A5	A3	N	N	A2		N	B3	B1		N
Trichlorethylene	100%	A1	N	A1	N	N	A3		B1	A3	B3		A3
Trichloromethane	100%			A									
Triethanolamine	100%	A1	N	A4	A4	A5			B5	B3	B3	A1	
Triethylamine	100%	A1		A2					B5		A3		
Triethyl Phosphate	100%						A						
Triphenyl Phosphite	100%						A						
Trisodium Phosphate	100%	A1	A5	A1	A3	A4	A1				B5	A	
Turpentine	100%	A1	N	A1	N	N	A1		A3	B5	B5	A1	B5
Urea	50%	A1	N	A1	A4	A4	A3		B3				A3
Varsol	100%			A									
Vinegar	100%	A1	N	A3	A3	A4	A		B3	B5	A5		A5
Vinyl Acetate	100%	A1		A1	A5		A3		A4	A1			
Vinyl Chloride (Monomer)	100%			A								A1	
Water (Pure)	100%			A									
Water, Clean or Dirty	100%	A	A		A				A	A	A	A	A
Water, Deionized	100%						A						
Water, Fresh	100%	A	A		A				A	A	A	A	A
Water, Salt	100%	A1	N	A1	A3	A4			B1	A1	A5		A5
Water, Sea	100%	A1	A5	A1	A3		A1		B1	A1	A5		A3
Water Sewage	100%	A1		A1	A4				B5		A5		A5
Wax	100%			A									
White Liquor	100%	A1	N		A4	N			B5	B5	N	A	A
Xylene	100%	A1	N	A1	N	N	A1		B3	A1	A3	A1	A3
Zinc Acetate	100%			A									
Zinc Chloride	20%	A	N	A	A		A		B3	B1	A2	A2	A3
Zinc Chloride	50%	A					A		N	N	A	A2	A3
Zinc Chloride	100%	A1		A1	A4	A4			N	B1	A3	A	
Zinc Hydrosulfite	10%			A									
Zinc Sulfate	Sat	A1	N	A1	A4	A4			A2	A2	A5	A2	A5
Zinc Sulfide	100%			A									
Zinc Sulfate	50%	A	N	A1	A4	A4			B3	B3	A5		A5

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