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Summary of Corrosion Resistance of Various Materials

It must be understood that these data are shown to serve only as a general suggestion and not as a guarantee. Final selection must be based on actual evaluation of the metal in the corrosive medium under study.

A- FULLY RESISTANT
B- SLIGHTLY ATTACKED
C- UNSATISFACTORY

.__ - SUBJECT TO PITTING AT AIR LINE OR WHEN ALLOWED TO DRY
+ + __- MAY ATTACKED WHEN SULFURIC ACID IS PRESENT

CORROSION DATA- SALTS

MEDIA	CONCENTRATION	TEMP. *F	NICKEL-ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Acetyl Chloride		Cold and boiling				
Aluminum Acetate	Saturated		A	A		
Aluminum Chloride	5%	Room	A	A	A	A
Aluminum Fluoride	5%	Room	A	C		
Aluminum Hydroxide	Saturated			A		
Aluminum Oxalate			A			
Aluminum Potassium Sulfate	2%	Room		A		
Aluminum Potassium Sulfate	10%	Room	A	A		
Aluminum Potassium Sulfate	10%	Boiing		A		
Aluminum Potassium Sulfate	Saturated	Boiling	A			
Aluminum Sulfate	10%	Room	A	A		A
Aluminum Sulfate	10%	Boiling	A	A		A
Aluminum Sulfate	Saturated	Room	A	A		
Aluminum Sulfate	Saturated	Boiling		A		
Ammonia (Anhydrous Dry)			A			
Ammonium Alum				A	A	
Ammonium Alum (Slightly Ammonical)						
Ammonium Bicarbonate		Hot		A		
Ammonium Bromide	5%	Room	A	A		
Ammonium Carbonate	All conc.	Hot and Cold				
Ammonium Chloride	1%	Room	A	A	A	A
Ammonium Chloride	10%	Boiling	A	A	A	A
Ammonium Chloride	28%	Boiling	A	A		A
Ammonium Chloride	50%	Boiling	A	A		A
Ammonium Hydroxide			A		A	A
Ammonium Monosulfate			A	A		

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MEDIA	CONCENTRATION	TEMP. *F	NICKEL-ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Ammonium Nitrate	5%	Room	A	A		
Ammonium Oxalate	5%	Room	A	A		
Ammonium Persulfate	5%	Room	A	A		
Ammonium Phosphate	5%	Room	A	A		
Ammonium Sulfate	1% to 5% Agitated, Aerated	Room A		A		A
Ammonium Sulfate	10%	Boiling	B	A		
Ammonium Sulfate	Saturated	Boiling	B	A		
Ammonium Sulfite	Saturated	Cold and Boiling	A			
Amyl Acetate			A	A		
Amyl Chloride			A	A		
Aniline Hydrochloride	5%	Room	A	A		
Antimony Tricholride		Room		A		
Barium Carbonate		Room	A	A		
Barium Chloride	5% to Saturated	Room	A	A	A	A
Barium Chloride	Aqueous Sol.	Hot		A		A
Barium Hydrate			A			
Barium Nitrate	Aqueous	Hot		A		
Barium Sulfate		Room		A		
Butyl Acetate			A	A		
Calcium Carbonate		Room	A	A		
Calcium Chlorate	Dilute	Hot or Cold	A	A		
Calcium Chloride	Dilute or Conc.	Room	A	A	A	A
Calcium Hydroxide	10% to 20%	Boiling	A	A		
Calcium Hydroxide	50%	Boiling	A			
Calcium Hypochlorite	2%	Room	A		A	B
Calcium Sulfate	Saturated	Room		A		
Carbon Bisulfide		Room		A		
Carbon Tetrachloride	Pure	Room	A	A	A	A
Carbon Tetrachloride	5% to 10% Aqueous Sol.	Room A			A	A
Chlorebenzene (Pure)	Concentrated	Room				
Copper Acetate	Saturated	Room	A	A		
Copper Carbonate	Saturated Sol.		A	A		
Copper Chloride	1% Agitated and Aerated	Room	A	A		
Copper Chloride	5% Agitated	Room	A	A		
Copper Chloride	5% Aerated	Room	A	A		
Copper Cyanide	Saturated	Boiling	A	A		

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Copper Nitrate	1% to 5%	Room	A	A		
Copper Nitrate	50% Aqueous	Room	A	A		
Copper Sulfate	5%	Room	A	A	A	
Copper Sulfate	Saturated	Boiling		A	A	
Cupric Chloride		105*	A	A	A	C
Cupric Nitrate			A	A		
Ethyl Acetate			A	A		
Ethyl Chloride	5%	Room	A	A		
Ethylene Chloride		Room		A		AB
Ferric Chloride	1% Still	Room	A	A	A	C
Ferric Chloride	1% Still	Boiling	A	A	A	C
Ferric Chloride	5% Still	Room	A	A	A	C
Ferric Chloride	5% Agitated	Room	A	A	A	C
Ferric Chloride	5% Aerated	Room	A	A	A	C
Ferric Hydroxide		Room	A	A		
Ferric Nitrate	1% to 5%	Room	A	A		
Ferric Sulfate	1% to 5%	Room	A	A		
Ferrous Chloride		Room	A	A		
Ferrous Sulfate	Dilute	Room	A	A		
Ferrous Ammonium Citrate			A	A		
Hydrogen Peroxide		Room	A	A	A	A
Hydrogen Peroxide		Boiling	A	A	A	
Hydrogen Sulfide	Dry	Room	A	A	A	
Hyposulfite Soda (Hypo)				A		
Latic Acid Salts			A	A		
Lead Acetate			A	A		
Manganese Carbonate				A		
Manganese Chloride	10% to 50% Aqueous Sol.	Boiling			A	A
Magnesium Carbonate			A	A		
Magnesium Chloride	1% to 5% Still	Room	A	A	A	A
Magnesium Chloride	1% to 5% Still	Hot	A	A	A	A
Magnesium Hydroxide	Thick Suspension	Room	A	A		
Magnesium Nitrate			A	A		
Magnesium Sulfate	5%	Hot	A	A		
Methylene Chloride	40%	Room to Boiling	A			
Mercuric Bichloride	0.07%	Room	C	A		
Mercuric Chloride	Dilute	Room	A	A	A	A
Mercuric Cyanide			A	A		

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MEDIA	CONCENTRATION	TEMP. *F	NICKEL-ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Mercurous Nitrate			A	A		
Nickel Chloride		Room	A	A	A	AB
Nickel Nitrate	10%	Room	A	A		
Nickel Sulfate	10%	Room	A	A		
Nitrous Oxide	Dry		A	A		
Phosphoric Anhydride	Dry	Room		A		
Phosphorous Trichloride			A	A		
Potassium Bichromate	Neutral	Room	A	A		
Potassium Bromide	5%	Room	A	A		
Potassium Carbonate	1%	Room	A	A		
Potassium Chlorate			A	A		
Potassium Chloride	1% to 5%	Room	A	A	A	
Potassium Chloride	1% to 5%	Boiling	A	A		
Potassium Cyanide			A	A		
Potassium Dichromate	Neutral		A	A		
Potassium Ferricyanide	5%	Room	A	A		
Potassium Ferrocyanide	5%	Room	A	A		
Potassium Hydrate			A			
Potassium Hydroxide	5%	Room	A	A		A
Potassium Hydroxide	27%	Boiling	A	C		A
Potassium Hydroxide	50%	Boiling	A	C		
Potassium Hypochlorite			A			
Potassium Iodide			A	A		
Potassium Nitrate	5%	Room	A	A		
Potassium Oxalate			A	A		
Potassium Permanganate	Neutral		A	A		
Potassium Sulfate	1% to 5%	Room	A	A		
Potassium Sulfate	1% to 5%	Hot		A		
Potassium Sulfide (Salt)				A		
Quinine Bisulfate (Dry)			A	A		
Quinine Sulfate (Dry)			A	A		
Silver Bromide			A	A		
Silver Chloride			A	A		
Silver Cyanide			A	A		
Silver Nitrate			AB	A		
Sodium Acetate (Moist)	5%	Room	A	A		
Sodium Benzoate			A	A		
Sodium Bicarbonate	All Conc.	150*	A	A		
Sodium Bichromate	Neutral		A	A		

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MEDIA	CONCENTRATION	TEMP. *F	NICKEL-ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Sodium Bisulfate			A	A		
Sodium Borate			A	A		
Sodium Bromide	5%	Room	A	A		
Sodium Carbonate	All Conc.	Room	A	A	A	
Sodium Chlorate	25%		A	A	A	
Sodium Chloride	5% Still	Room to 150*	A	A	A	A
Sodium Chloride	20% Aerated	Room	A	A	A	
Sodium Chloride	Saturated	Room	A	A	A	
Sodium Chloride	Saturated	Boiling	A	A	A	
Sodium Citrate			A	A		
Sodium Ferricyanide			A	A		
Sodium Ferrocyanide				A		
Sodium Fluoride	5%	Room	A	C		
Sodium Hydrosulfite			A	A		
Sodium Hydroxide	10%	Room	A	C	B	A
Sodium Hypochlorite	5%	Room	A		B	B
Sodium Hyposulfite	Dilute	Room	A	A		
Sodium Lactate			A	A		
Sodium Nitrate	All Conc.	Room	A	A	A	
Sodium Nitrite				A		
Sodium Peroxide		212*	A	C		
Sodium Phosphate	5%	Room	A	A	A	
Sodium Silicate			A	A		
Sodium Sulfate	5% Still	Room	A	A		
Sodium Sulfate	Concentrated	Room	A	A		
Sodium Sulfide	Saturated	Room	A	A	A	
Sodium Sulfite	5%	Room	A	A		
Stannic Chloride	5% R	oom	A	A	A	A
Stannous Chloride	5%	Room	A	A		
Sulfur Chloride	Dry		A	A		
Sulfur Dioxide	Dry	Room	A	A	A	
Sulfur Dioxide	Moist	Room	A	A	A	
Titanium Tetrachloride			A	A		
Zinc Chloride	5% Still	Room	A	A	A	A
Zinc Chloride	5% Still	Boiling	AB	A	A	A
Zinc Sulfate	5%	Room	A	A		
Zinc Sulfate	Saturated	Room	A	A		
Zinc Sulfate	25%	Boiling	A	A		

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CORRISION DATA- ACIDS

MEDIA	CONCENTRATION	TEMP. *F	NICKEL-ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Acetic Acid	5% Unaerated	Room	A	A	A	A
Acetic Acid	20% Unaerated	Room	A	A	A	A
Acetic Acid	50% Unaerated	Room	A	A	A	A
Acetic Acid	50% Unaerated	Boiling	A	A	A	A
Acetic Acid	100% Unaerated	Room	A	A	A	A
Acetic Acid	100% Unaerated	Boiling	A	A	A	A
Acetic Anhydride	Unaerated	Room	A		A	A
Acetic Anhydride	Unaerated	Boiling	A		A	A
Acetic Vapors	100% Unaerated	Hot	A			
Arsenic Acid 90%		225*				
Benzoic Acid 5%		Room	A	A		
Boric Acid 5%		Boiling	A	A		
Butyric Acid 5%		Room	A	A		
Carbonic Acid			A	A		
Carbonic Acid, C.P.		Room	A	A	A	
Chloroacetic Acid		Room	A	A	A	B
Chloric Acid		Room				
Chlorosulfonic Acid 1	0%		A	A		
Chromic Acid 5%		Room	A	A	A	
Chromic Acid, C.P.	10%	Boiling	A	A	A	
Chromic Acid 50%		Boiling	B	A	B	
Citric Acid	5% Still	150*	A	A	A	A
Citric Acid 15%		Room	A	A	A	A
Citric Acid 15%		Boiling	A	A	A	A
Citric Acid	Concentrated	Boiling	A	A	A	AB
Fatty Acids			A	A		
Formic Acid	5% Still	Room	A	A	A	
Gallic Acid	5%	Room to Boiling	A			
Hydrobromic Acid		Boiling	B	A		
Hydrochloric Acid	5% Unaerated	Room	A	A	B	A
Hydrochloric Acid	10% Unaerated	Room	A	A	B	A
Hydrochloric Acid	20% Unaerated	Room	A	A	C	A
Hydrochloric Acid	All	100* F	A	A	C	A
Hydrochloric Acid	All	122* F	B	A	C	A
Hydrochloric Acid	All	160* F	B	A	C	A
Hydrochloric Acid Fumes	Concentrated	100*		A	C	C
Hydrocyanic Acid			A	A		

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MEDIA	CONCENTRATION	TEMP. *F	NICKEL-ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Hydrofluoric Acid	All	All	A	C	C	C
Hydrofluoric Acid Vapors		212*	A	C		C
Hydrofluosilicic Acid	5%	70*	A	C	C	
Hydrofluosilicic Acid Vapors		212*		C		
Latic Acid	5%	Room	A	A	A	A
Latic Acid	5%	150*	A	A	A	A
Latic Acid	10%	150* to Boiling	A	A	A	AB
Malic Acid		Cold and Hot	A	A		
Molybdic Acid	5%	Room	A	A		
Muriatic Acid		Room	A	A		
Nitric Acid	5%	Room	A	A	A	A
Nitric Acid 20%		Room	A	A	A	A
Nitric Acid 50%		Room	A	A	A	A
Nitric Acid 5	0%	Boiling	C	A	A	A
Nitric Acid 6	5%	Boiling	C	A	A	A
Nitric Acid	95%	Room	A	A	A	A
Nitric Acid	Concentrated	Room	A	A	A	A
Nitric Acid	Concentrated	Boiling	C	A	A	A
Nitric Acid	Fuming	Room	A		A	A
Nitrous Acid	5%	Room		A		
Oleic Acid		Room	A	A		
Oleic Acid	5%	Cold and Hot	A	A	C	
Oleic Acid	10%	Room	A	A	A	AB
Oleic Acid	10%	Boiling	A	A	C	AB
Phosphoric Acid	1%	Room	A	A	A	A
Phosphoric Acid	5%	Room	A	A	A	A
Phosphoric Acid	10% Still	Room	A	A	A	A
Phosphoric Acid	10% Agitated	Room	A	A	A	A
Phosphoric Acid	10% Aerated	Room	A	A	A	A
Picric Acid	Concentrated	Room	A			
Pyrogallic Acid			A			
Salicylic Acid			A	A		
Stearic Acid	Concentrated	200*	A	A	A	
Succinic Acid		Molten	B			
Sulfuric Acid	5%	Room	A	A	B	A
Sulfuric Acid	5%	Boiling	B	A	C	A
Sulfuric Acid	10%	Room	A	A	B	A
Sulfuric Acid	10%	Boiling	B	A	C	A
Sulfuric Acid	50%	Room	A	A	B	A

MEDIA	CONCENTRATION	TEMP. *F	NICKEL-ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Sulfuric Acid	50%	Boiling	C	A	C	A
Sulfuric Acid	Concentrated	Room	A	A	C	C
Sulfuric Acid	Concentrated	Boiling	C	C	C	C
Sulfuric Acid	Concentrated	300*	C	C	C	C
Sulfuric Acid	Fuming	Room	B	C		
Sulfuric Anhydride	Dry	Room	A	C		
Sulfurous Acid	Saturated	300*	A	A		B
Sulfurous Spray		Room	A	A		
Tannic Acid	10%	Room	A	A	A	A
Tannic Acid		150*	A	A	A	A
Tartaric Acid	10%	Room	A	A	A	B
Tartaric Acid		150*	A	A	A	
Trichioroacetic Acid		Room			C	
Uric Acid	Concentrated		A			

CORROSION DATA- MISCELLANEOUS

MEDIA	CONCENTRATION	TEMP. *F	NICKEL- ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Acetone		Boiling	A	A		
Alcohol- Methyl, Propyl, Butyl, Ethyl		Room	A	A	A	A
Alkaform			A			
Aluminum		Molten	C	C		
Aniline	Conc.	Room A		A		
Baking Oven Gases			A	A		
Beer			A	A		
Benzene		Room	A	A	A	
Benzol		Hot	A	A		
Bleaching Powder	Solution	Hot	A	C		
Blood (Meat Juices)		Cold	A	A		
Borax		Fused	A	C		
Bromine	Dry		A	A		
Bromine Water		Room	A	A		C
Buttermilk		Room	A	A		
Camphor			A	A		
Carbonated Beverages			A	A		
Carbon Monoxide Gas		900*	A	C		
Cadmium		Molten	C	A		
Caustic Lime			A	A		
Caustic Soda			A	C		

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MEDIA	CONCENTRATION	TEMP. *F	NICKEL- ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Chlorinated Water	Saturated	Room	A	A	A	C
Chlorine Gas- Dry		Room	A	A	C	B
Chlorine Gas- Moist		Room	A	A	A	C
Chlorine Gas- Moist		212*	C	A	A	C
Chloroform		Room	A	A	A	A
Chromium Plating Bath		Room		A		
Cider		Room	A	A		
Coffee		Boiling	A	A		
Copal Varnish			A	A		
Cream of Tartar				A		
Creosote (Coal Tar)		Hot		A		
Crude Oil			A	A		
Developing Solutions		Room	A	A		
Distillery Wort				A		
Dyewood, Liquor		Room		A		
Ether		Room	A	A		
Flue Gases			A	A		
Fluorine		Room		C		
Food Pastes			A	A		
Formaldehyde		Room	A	A	A	
Fuel Oil		Hot	A	A		
Fuel Oil (containing H_2SO_4)		Hot	A	A		
Fruit Juices		Room	A	A		
Furfural			A	A	A	
Gasoline			A	A		
Glauber's Salt	Solution	Hot	A	A		
Glue- Dry		Room	A	A		
Glue- Solution Acid		Hot	A	A		
Glycerine		Room	A	A		
Gypsum				A		
Hydrocarbons			A	A		
Ink			A	A		
Iodine			A	A		
Iodoform				A		
Kerosene		Room	A	A		
Ketchup		Room	A	A		
Lard		Room	A	A		
Lead		Molten	A	A		
Linseed Oil			A	A		

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MEDIA	CONCENTRATION	TEMP. *F	NICKEL- ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Lye (caustic)	34%	230*	A	C		
Lysol		212*	A	A		
Mayonnaise		Cold and Hot	A	A		
Meats (Unsalted)		Room	A	A		
Mash		Hot	A	A		
Mercury			A	A		
Milk- Fresh or Sour		Hot or Cold	A	A		
Mine Water- Acid			A	A		
Molasses			A	A		
Mustard		Room	A	A		
Naptha			A	A		
Nitre Cake		Fused		C		
Oils- Crude		Hot and Cold	A	A		
Oils- Mineral, Vegetable		Hot and Cold	A	A		
Paraffin		Molten	A	A		
Paragoric Compound			A	A		
Petroleum Ether			A	A		
Phenol			A	A	A	
Phenolic Resins			A	A		
Pine Tar Oil			A	A		
Potash	Solution	Hot	A	C		
Resin		Molten	A	A		
Sal Ammoniac 20%		Boiling	A	A		
Salt	Saturated	Room	A	A	A	A
Salt Brine	Saturated	Hot	A	A	A	
Sea Water			A	A	A	A
Sewage				A		
Soaps		Room	A	A		
Soy Bean Oil			A	A		
Soda Pulp			A			
Starch	Solution			A		
Steam				A		
Sugar Juice			A	A		
Sulfur- Dry		Molten	A	A		
Sulfur- Wet				A		
Tin		Molten	A	A		
Tomato Juice		Room	A	A		
Turpentine Oil			A	A		
Tung Oil			A	A		

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MEDIA	CONCENTRATION	TEMP. *F	NICKEL- ALLOY	TANTALUM	TITANIUM	ZIRCONIUM
Varnish			A	A		
Vegetable Juices			A	A		
Vinegar- Still		Room	A	A	A	
Vinegar- Agitated		Room	A	A		
Vinegar- Aerated		Room	A	A		
Vinegar- Fumes			A	A		
Vinegar and Salt			A	A		
Water			A	A	A	A
Water- Hot			A	A	A	A
Water- Salt			A	A	A	A
Water- Sea			A	A	A	A
Whiskey				A		
Zinc		Molten	C	A		