Zircadyne® Zirconium Corrosion Data

THE FOLLOWING TABLES OUTLINE ALL ZIRCONIUM PRODUCT CORROSION DATA IN ALPHABETICAL ORDER.

TABLE 1

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Acetaldehyde	100	Boiling	<2	–	
Acetic Acid	5-99.5	35-Boiling	<1	<1	
Acetic Acid (anhydride)	99	Room-Boiling	<1	<1	
Acetic Acid (glacial)	99.7	Boiling	<5	–	
Acetic Acid	100	200	<1	<1	
Acetic Acid + 1% Acetyl Chloride	99	Boiling	>50	–	
Acetic Acid (glacial) + 0.5% CH_3OH	99	200	<1	–	
Acetic Acid (glacial) + 200 ppm $FeCl_3$	99	200	<1	–	
Acetic Acid (glacial) + 0.5% CH_3OH + 200 ppm $FeCl_3$ + 1% H_2O	98	200	<1	–	
Acetic Acid + 50 ppm I^-(KI)	100	160, 200	<1	–	
Acetic Acid + 1% I^-(KI) + 100 ppm $Fe^{+3}(Fe_2(So_4)_3)$	99	200	<1	<1	
Acetic Acid + 2% HI	80	100	<1	<1	
Acetic Acid + 2% HI + 1000 ppm Fe (Fe powder)	80	100	<1	–	
Acetic Acid + 2% HI + 1% methanol + 500 ppm formic + 100 ppm Cu	80	150	<1	<1	
Acetic Acid + 2% HI + 1% methanol + 500 ppm formic + 100 ppm Fe	80	150	<1	<1	
Acetic Acid + 2% HI	98	150	<1	<1	

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Acetic Acid + 2% HI + 200 ppm $Fe^{+3}(FeCl_3)$	80	100	<1	<1	
Acetic Acid + 2% HI + 200 ppm $Fe^{+3}(Fe_2(So_4)_3)$	80	100	<1	<1	
Acetic Acid + 2% I^-(KI)	98	100	<1	<1	

TABLE 2

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Acetic Acid +2% HI + 1% CH_3OH = 500 ppm HCOOH	80	150	<1	<1	
Acetic Acid + 2% HI +200 ppm Cl^-(NaCl)	80	100	<1	<1	
Acetic Acid + 50% Acetic Anhydride	50	Boiling	<1	<1	
Acetic Acid + 50% 48% HBr	50	115	<1	<1	
Acetic Acid + Saturated gaseous HCl and Cl_2	100	Boiling	>200	>200	
	100	40	<1	–	
Acetic Acid + 0.5% CH_3OH + 200 ppm $FeCl_3$ + 5% H_2O	94	200	<1	–	
Acetic Acid + 10% CH_3OH	90	200	<1	–	
Acetic Acid + 10% CH_3OH + 200 ppm $FeCl_3$ + 5% H_2O	84	200	<1	–	
Acetic Acid + 10% CH_3OH + 200 ppm $FeCl_3$ + 1% H_2O	88	200	<1	–	
Acetyl Chloride	100	25	>200	–	
Aluminum Chlorate	30	100	<2	–	
Aluminum Chloride	5, 10, 25	35-100	<1	–	
	25	Boiling	<1	<1	
	40	100	<2	–	
Aluminum Chloride (aerated)	5, 10	60	<2	–	
Aluminum Chloride	25-50	Boiling	<1	<1	
Aluminum Chloride + Saturated 1% HCl	–	RT	<1	–	
	–	110	10-20	–	

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Aluminum Fluoride	20	Room	>50	–	pH = 3.2
Aluminum Fluoride + 0.5% HF + 16% Zr sponge	7.2	90	<1	–	
Aluminum Potassium Sulfate	10	Boiling	nil	nil	pH = 3.2

TABLE 3

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Aluminum Sulfate	25	Boiling	nil	nil	
	60	100	<2	–	
Ammonia (wet)	+ water	38	<5	–	
Ammonium Carbamate	–	193	<1	–	58.4% Urea, 16.8% Ammonia, 14.8% CO_2, 9.9% H_2O at 3,200-3,500 psi
Ammonium Chloride	1, 10, saturated	35-100	<1	–	
Ammonium Hydrogen Phosphate	22.8	204	nil	–	
Ammonium Hydroxide	28	Room-100	<1	–	
Ammonium Fluoride	20	28	>50	–	pH = 8
	20	98	>50	–	pH = 8
Ammonium Oxalate	100	100	<2	–	
Ammonium Sulfate	10	Boiling	nil	–	
Aniline Hydrochloride	5.20	35-100	<1	–	
	5.20	100	<2	–	
Aqua Regia	3.1	Room	>50	–	3 parts HCl, 1 part HNO_3
Barium Chloride	5, 20	35-100	<1	–	
	25	Boiling	5-10	–	
Bromine	100-Liquid	20	<10	20-50	Pitting
	Vapor	20	–	>50	Pitting
Bromochloromethane	100	100	<2	–	
Cadmium Chloride	100	Room	<2	–	
Calcium Bromide	100	100	<2	–	
Calcium Chloride	5, 10, 25	35-100	<1	–	
	70	Boiling	<1	<1	B.P. = 162°C

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	75	Boiling	<5	–	
	Mixture	79	<1	–	14% $CaCl_2$, 8% NaCl, 0.2% $Ca(OH)_2$

TABLE 4

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Calcium Chloride + 0.1% $MgCl_2$	0.2	80	<1	–	pH = 1
Calcium Chloride + 0.1% $MgCl_2$ + 300 ppm F^- (as CaF_2)	0.2	80	>50	–	pH = 1
Calcium Chloride + 0.1% $MgCl_2$ + 300 ppm F^- (as CaF_2) + 1200 ppm P_2O_2	0.2	80	5-20	–	pH = 1
Calcium Chloride + 1% $MgCl_2$	2	80	<1	–	pH = 1
Calcium Chloride + 1% $MgCl_2$ + 300 ppm F^- (as CaF_2)	2	80	>50	–	pH = 1
Calcium Chloride + 1% $MgCl_2$ + 300 ppm F^- (as CaF_2) + 1200 ppm P_2O_5	2	80	<1	–	pH = 1
Calcium Chloride + 3.3% $MgCl_2$	6.6	80	<1	–	pH = 1
Calcium Chloride + 3.3% $MgCl_2$ + 300 ppm F^- (as CaF_2)	6.6	80	20-25	–	pH = 1
Calcium Chloride + 3.3% $MgCl_2$ + 300 ppm F^- (as CaF_2) + 1200 ppm P_2O_5	6.6	80	<1	–	pH = 1
Calcium Fluoride	Saturated	28	nil	–	pH = 5
	Saturated	90	nil	–	pH = 5
Calcium Hypochlorite	2, 6, 20	100	<5	–	
Carbonic Acid	Saturated	100	<5	–	
Carbon Tetrachloride	0-100	Room-100	<2	–	
Chlorine (water saturated)	–	Room	>50	–	
	–	75	>50	–	
Chlorine Gas (more than 0.13% H_2O)	100	94	>50	–	
Chlorine Gas (dry)	100	Room	<5	–	

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Chlorinated Water	–	100	<2	–	

TABLE 5

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Chloroacetic Acid	100	Boiling	<1	–	
Chlorosulfonic Acid	100	R.T.	5-10	–	
	100	0	<2	–	
Chromic Acid	10-50	Boiling	<1	–	
Citric Acid	10-50	35-100	<1	–	
	10, 25, 50	100	<1	–	
	50	Boiling	<5	–	
Chrome Plating Solution	–	66	>50	>50	M + T Chemicals CR-100
Cupric Chloride	5, 10, 20	35-100	>50	>50	
	20, 40, 50	Boiling	>50	>50	
Cupric Cyanide	Saturated	Room	>50	–	
Cupric Nitrate	40	Boiling	nil	nil	B.P. = 115°C
Dichloroacetic Acid	100	Boiling	<20	–	
Ethylene Dichloride	100	Boiling	<5	–	
Ferric Chloride	0-50	Room-100	>50	>50	
	0-50	Boiling	>50	>50	
Ferric Sulfate	10	0-100	<2	–	
Formaldehyde	6-37	Boiling	<1	<1	
	0-70	Room-100	<2	–	
Fluoboric Acid	5-20	Elevated	>50	–	
Fluosilicic Acid	10	Room	>50	–	
Formic Acid	10-90	35-Boiling	<1	–	
Formic Acid (aerated)	10-90	Room-100	<1	–	
Formic Acid	50	Boiling	<1	<1	
	70, 98	Boiling	<1	–	
Formic Acid + 5% H_2SO_4	50, 70, 93	Boiling	<1	–	
Formic Acid + 5% HCl	50, 70, 85	Boiling	<1	–	
Formic Acid + 1% Fe Powder	50, 70, 98	Boiling	<1	–	

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TABLE 6

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Formic Acid + 1% Cu^{+2}	50, 70, 96	Boiling	<1	–	
Formic Acid + 5% HI	50, 70, 90	Boiling	<1	–	
Hydrazine	50	200	nil	nil	
	Mixture	109	<1	–	2% Hydrazine + saturated NaCl + 6% NaOH
	Mixture	130	nil	–	2% Hydrazine + saturated NaCl + 6% NaOH
Hydriodic Acid	47	120	<1	<1	
Hydrobromic Acid	48	Boiling	<5	<5	B.P. + 125°C (shallow pits) 24% HBr + 50% Acetic Acid (glacial)
	Mixture	Boiling	<1	<1	B.P. + 125°C (shallow pits) 24% HBr + 50% Acetic Acid (glacial)
Hydrochloric Acid	2	100	<1	–	
	2	225	<1	<1	
	10	30	<1	–	
	10	100	<1	–	
	20	30	<1	–	
	20	100	<1	–	
	20	150	<2	–	
	32	30	<1	–	
	32	77	<1	–	Weld sensitization
	37	30	<1	–	Weld sensitization
	37	51	<2	–	Weld sensitization
Hydrochloric Acid + Cl_2 gas	20	58	5-10	–	Pitting
	37	58	<5	–	
Hydrochloric Acid + 100 ppm $FeCl_3$	10	30	<1	<1	SCC observed

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TABLE 7

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Hydrochloric Acid + 100 ppm $FeCl_3$	20	105	<5	–	
	34	53	5-10	–	SCC observed
Hydrochloric Acid + 50 ppm Fe^{+3}	10	30	<1	–	
	10	60	<1	–	
	10	100	<1	–	Pitting
	20	30	<1	–	
	20	60	<1	–	
	20	100	<1	–	Pitting
	32	30	<1	–	
	32	77	<2	–	Weld sensitization
	37	30	<2	–	Weld sensitization
	37	51	<5	–	Weld sensitization
Hydrochloric Acid + 100 ppm Fe^{+3}	10	30	<1	–	
	10	60	<1	–	
	10	100	<1	–	Pitting
	20	30	<1	–	
	20	60	<1	–	Pitting
	20	100	<1	–	
	32	30	<1	–	
	32	77	<2	–	Weld sensitization
	37	30	<2	–	Weld sensitization
	37	51	<5	–	Weld sensitization
Hydrochloric Acid + 500 ppm Fe^{+3}	10	30	<1	–	Pitting, SCC
	10	60	<1	–	Pitting, SCC
	10	100	<1	–	Pitting, SCC
	20	30	<1	–	Pitting, SCC
	20	60	<1	–	Pitting, SCC
	20	100	<1	–	Pitting, SCC

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TABLE 8

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Hydrochloric Acid + 500 ppm Fe^{+3}	32	30	<1	–	SCC
	32	77	<5	–	Weld sensitization, SCC
	37	30	<2	–	Weld sensitization, SCC
	37	51	<5	–	Weld sensitization, SCC
Hydrochloric Acid + 200 ppm HF	10	100	>50	–	
Hydrochloric Acid + 200 ppm HF + 800 ppm Zr sponge	10	100	<1	–	
Hydrochloric Acid	Mixture	Room	Dissolved	–	20% HCl + 20% HNO_3
	Mixture	Room	Dissolved	–	10% HCl + 10% HNO_3
Hydrofluoric Acid	All	Room	>50	–	
Hydrogen Peroxide	30	Boiling	nil	nil	
	50	100	<2	–	
Hydroxyacetic Acid	70	205	<1	<1	
Iodine Vapor	–	100, 180	<1	–	
Iodine Liquid	100	120	5-20	–	
	100	180	>50	–	
Lactic Acid	10-100	148	<1	–	
	10-85	35-Boiling	<1	–	
Lithium Chloride	Saturated	30-80	5-10	–	
Lithium Chloride	Saturated	80	nil	–	pH adjusted to 6.0 with NaOH
Magnesium Chloride	5-40	Room-100	<2	–	
	47	Boiling	nil	nil	
	30	Boiling	<2	<2	
Magnesium Chloride + 1% HCl	30	Boiling	<2	<2	
Magnesium Chloride + 5% HCl	30	Boiling	<2	<2	
Magnesium Chloride + 10% HCl	30	Boiling	<2	<2	

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TABLE 9

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Manganese Chloride	5, 20	Room-100	<1	–	
Mercuric Chloride	Saturated	35-100	<1	–	
	Saturated	Boiling	<1	<1	
Methanol	100	Boiling 200	nil	nil	
Methanol + 0.1% KI + 0.1% HCOOH	99.8	65	nil	nil	
Methanol + 1% KI	99	200	<1	<1	500 ppm Fe^{+3}
Nickel Chloride	5, 20	35-100	<1	–	
	5-20	100	<1	–	
	30	Boiling	nil	nil	
Nitric Acid	20	103	<1	<1	
	70	121	<1	<1	
	10-70	Room-260	<1	–	
	70-98	Room-Boiling	<1*	–	*SCC observed
	80	120, 150	<1	–	
	90	120, 150	<1	–	
Nitric Acid + Saturated Cl_2	30, 50, 70	Boiling	<1	–	Pitting may be observed in the vapor phase
Nitric Acid + 200 ppm HF	90	25	>50	–	
Nitric Acid + 200 ppm HF + 800 ppm Zr sponge	90	25	<1	–	
Nitric Acid + 1% Fe	65	120, 204	<1	–	
Nitric Acid + 1.45% 304 S.S.	65	120, 204	nil	–	
Nitric Acid + 1% Cl^-(as NaCl)	30, 50, 70	120	nil	–	
Nitric Acid + 1% Seawater	70	120	nil	–	
Nitric Acid + 1% $FeCl_3$	70	120	nil	–	
Oxalic Acid	0-100	100	<1	–	

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TABLE 10

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Perchloric Acid	70	100	<2	–	
Phenol	Saturated	Room	<5	–	
Phosphoric Acid	5-30	Room	<5	–	
	5-35	60	<5	–	
	5-50	100	<5	–	
	35-50	Room	<5	–	
	45	Boiling	<5	–	
	50	Boiling	<5	10-15	B.P. = 108°C
	65	100	5-10	<20	
	70	Boiling	>50	>50	B.P. = 123-126°C
	85	38	5-20	–	
	85	80	20-50	20-50	
	85	Boiling	>50	>50	B.P. = 156°C
	Mixture	Room	nil	–	88% H_3PO_4 + 0.5% HNO_3
	Mixture	Room	nil	–	88% H_3PO_4 + 5% HNO_3
	Mixture	89	>50	>50	85% H_3PO_4 + 4% HNO_3
	20	150	<1	–	
Phosphoric Acid + 4.3% Ammonia	18	204	nil	–	
Phosphoric Acid + 2 ppm F^-	30-50	Boiling	20-50	–	
Phosphoric Acid + 4.3% NH_3	18.5	204	<1	–	
Potassium Chloride	Saturated	60	<1	–	
	Saturated	Room	<1	–	
Potassium Fluoride	20	28	nil	–	pH = 8.9
	20	90	>50	–	pH = 8.9
	0.3	Boiling	<1	–	

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TABLE 11

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Potassium Hydroxide	50	27	<1	–	
	10	Boiling	<1	–	
	25	Boiling	<1	–	
	50	Boiling	<1	–	
	50-anhydrous	241-377	>50	–	
	Mixture	29	<1	–	13% KOH, 13% KCl
Potassium Iodide	0-70	Room-100	<2	<2	
Potassium Nitrite	0-100	Room-100	<2	–	
Silver Nitrate	50	Room	<5	–	
Sodium Bisulfate	40	Boiling	<1	<1	B.P. = 107°C
Sodium Carbonate	10	R.T.-Boiling	<1	<1	
Sodium Chlorate	20	Boiling	nil	–	
Sodium Chloride	3-Saturated	35-Boiling	<1	<1	
	29	Boiling	<1	–	
	Saturated	Room	<1	–	
	Saturated	Boiling	<1	<1	Adjusted to pH = 1
	Saturated	107	nil	–	Adjusted to pH = 0
Sodium Chloride + Saturated SO_2	3.5	80	nil	–	
	25	80	nil	–	
	Saturated	80	nil	–	
Sodium Chloride	Mixture	215	nil	nil	25% NaCl + 0.5% Acetic Acid + 1% S + Saturated H_2S
Sodium Chloride + 0.5% CH_3COOH + Saturated H_2S	25	R.T.-Boiling	<1	<1	
Sodium Chloride + 0.5% CH_3COOH + 0.1% S + Saturated (H_2S + CO_2)	25	204, 232	<1	–	
Sodium Chloride + 0.5% CH_3COOH + 0.1% S + Saturated H_2S	25	250	<1	<1	

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TABLE 12

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Sodium Fluoride	Saturated	28	nil	–	
	Saturated	90	>50	–	
Sodium Formate	0-80	100	<2	–	
Sodium Hydrogen Sulfite	40	Boiling	<1	<1	
Sodium Hydroxide	5-10	21	<1	–	
	28	Room	<1	–	
	10-25	Boiling	<1	–	
	40	100	<1	–	
	50	38-57	<1	–	
	50	149	<2	<2	
	50-73	188	20-50	–	
	70	150	<5	–	
	73	110-129	<2	–	
	73 to anhydrous	212-538	20-50	–	
	Mixture	82	<1	–	9-11% NaOH, 15% NaCl
	Mixture	10-32	<1	–	10% NaOH, 10% NaCl & wet $CoCl_2$
	Mixture	129	<1	–	0.6% NaOH, 2% $NaClO_3$ + trace of NH_3
	Mixture	191	<1	–	7% NaOH, 53% NaCl, 7% $NaClO_3$, 80-100 ppm NH_3
	Mixture	138	<5	–	52% NaOH + 16% NH_3
Sodium Hydroxide (Suspended salt-violent boiling)	20	60	10-20	–	
Sodium Hydroxide + 750 ppm Free Cl_2	50	38	<1	–	
	50	38-57	<1	–	

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TABLE 13

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Sodium Hypochlorite	6	100	<5	–	as received super chlor.
	6	50	nil	nil	
Sodium Iodide	0-60	100	<2	–	
Sodium Peroxide	0-100	Room-100	<2	–	
Sodium Oxychloride +15% Sodium Chloride + 5% Sodium Carbonate	15	46	0	<1	
Sodium Silicate	0-100	Room-100	<2	–	
Sodium Sulfate	0-20	Room-100	<2	–	
Sodium Sulfide	10	200	nil	nil	
	33	Boiling	nil	nil	
Stannic Chloride	5	100	<1	–	
	24	Boiling	<1	–	
Succinic Acid	0-50	100	<2	–	
	100	150	<2	–	
Sulfuric Acid	0-75	20	<1	<1	
	80	20	<5	–	
	80	30	20-50	>50	
	77.5	60	10-20	<10	
	75	50	<1	–	
	77	50	5-10	–	
	80	50	>50	>50	
	75	80	<5	<5	
	65	100	–	<5	
	70	100	<2	<5	
	75	100	<5	<5	
	76	100	<10	–	
	77	100	<20	–	
	77.5	100	>50	>50	

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TABLE 14

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Sulfuric Acid	60	130	–	<5	
	65	130	<1	–	
	70	140	<5	<10	
	58	Boiling	–	<5	B.P. = 140°C
	62	Boiling	<5	10-20	B.P. = 146°C
	64	Boiling	<5	20-50	B.P. = 152°C
	68	Boiling	<5	–	B.P. = 165°C
	69	Boiling	<5	–	B.P. = 167°C
	71	Boiling	<5	–	B.P. = 171°C
	72-74	Boiling	5-10	–	
	75	Boiling	10-20	–	B.P. = 189°C
Sulfuric Acid + 1,000 ppm Fe^{3+}	60	Boiling	<1	–	B.P. = 142°C
Sulfuric Acid + 10,000 ppm Fe^{3+}	60	Boiling	<5	–	Added as $Fe_2(SO_4)_3$
Sulfuric Acid + 200-1,000 ppm Fe^{3+}	65	Boiling	<5	–	B.P. = 152-155°C
Sulfuric Acid + 10,000 ppm Fe^{3+}	65	Boiling	5-10	–	Added as $Fe_2(SO_4)_3$
Sulfuric Acid + 14 ppm-141 ppm Fe^{3+}	70	Boiling	5-10	–	B.P. = 167-171°C
Sulfuric Acid + 200 ppm	70	Boiling	10-20	–	Added as $Fe_2(SO_4)_3$
Sulfuric Acid + 1,410 ppm-10,000 ppm Fe^{3+}	70	Boiling	>50	–	
Sulfuric Acid + 1,000 ppm $FeCl_3$	60	Boiling	<5	<20	B.P. = 138-142°C
Sulfuric Acid + 10,000 ppm $FeCl_3$	60	Boiling	<5	20-50	
Sulfuric Acid + 20,000 ppm $FeCl_3$	60	Boiling	20-50	>50	

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TABLE 15

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Sulfuric Acid + 200 ppm $FeCl_3$	65	Boiling	<5	<20	B.P. = 152-155°C
Sulfuric Acid + 1,000 ppm $FeCl_3$	65	Boiling	<5	<20	
Sulfuric Acid + 10,000 ppm $FeCl_3$	65	Boiling	<5	<20	
Sulfuric Acid + 10 ppm $FeCl_3$	70	Boiling	<20	>50	B.P. = 167-171°C
Sulfuric Acid + 100 ppm $FeCl_3$	70	Boiling	<20	>50	
Sulfuric Acid + 200 ppm $FeCl_3$	70	Boiling	<20	>50	
Sulfuric Acid + 1,000 ppm $FeCl_3$	70	Boiling	<20	>50	
Sulfuric Acid + 10,000 ppm $FeCl_3$	70	Boiling	20-50	>50	
Sulfuric Acid + 200 ppm Cu^{2+}	60	Boiling	<5	–	Added as $CuSO_4$
Sulfuric Acid + 1,000-10,000 ppm Cu^{2+}	60	Boiling	<1	–	
Sulfuric Acid + 200-10,000 ppm Cu^{2+}	65	Boiling	<5	–	Added as $CuSO_4$
Sulfuric Acid + 3 ppm Cu^{2+}	70	Boiling	5-10	–	Added as $CuSO_4$
Sulfuric Acid + 27-266 ppm Cu^{2+}	70	Boiling	>50	–	
Sulfuric Acid + 1,000-10,000 ppm NO^-_3	60	Boiling	<5	–	Added as $NaNO_3$
Sulfuric Acid + 50,000 ppm NO^-_3	60	Boiling	>50	–	

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TABLE 16

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Sulfuric Acid + 200-1,000 ppm NO_3^-	65	Boiling	<5	–	Added as $NaNO_3$
Sulfuric Acid + 10,000 ppm NO_3^-	65	Boiling	10-20	–	
Sulfuric Acid + 50,000 ppm NO_3^-	65	Boiling	>50	–	
Sulfuric Acid + 200 ppm NO_3^-	70	Boiling	5-10	–	Added as $NaNO_3$
Sulfuric Acid + 6,000 ppm NO_3^-	70	Boiling	20-50	–	
Sulfuric Acid + 1,000 ppm NO_3^-	60	Boiling	<5	–	Added as HNO_3
Sulfuric Acid + 10,000 ppm NO_3^-	60	Boiling	10-20	–	
Sulfuric Acid + 50,000 ppm NO_3^-	60	Boiling	>50	–	
Sulfuric Acid + 1,000 ppm NO_3^-	65	Boiling	<5	–	Added as HNO_3
Sulfuric Acid + 10,000-50,000 ppm NO_3^-	65	Boiling	>50	–	
Sulfuric Acid	Mixture	Room-100	<1	–	1% H_2SO_4, 99% HNO_3
	Mixture	Room-100	nil	–	10% H_2SO_4, 90% HNO_3
	Mixture	Boiling	<1	–	14% H_2SO_4, 14% HNO_3
	Mixture	100	>50	>50	25% H_2SO_4, 75% HNO_3
	Mixture	Room	<1	–	50% H_2SO_4, 50% HNO_3
	Mixture	Boiling	>50	>50	68% H_2SO_4, 5% HNO_3
	Mixture	Boiling-135	10-20	>50	68% H_2SO_4, 1% HNO_3
	Mixture	Room	>50	>50	75% H_2SO_4, 20% HNO_3

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TABLE 17

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Sulfuric	Mixture	Boiling	<1	–	7.5% H_2SO_4, 19% HCl
	Mixture	Boiling	<1	–	34% H_2SO_4, 17% HCl
	Mixture	Boiling	<1	–	40% H_2SO_4, 14% HCl
	Mixture	Boiling	1-5	–	56% H_2SO_4, 10% HCl
	Mixture	Boiling	<1	–	60% H_2SO_4, 1.5% HCl
	Mixture	Boiling	<5	–	69% H_2SO_4, 1.5% HCl
	Mixture	Boiling	10-20	–	69% H_2SO_4, 4% HCl
	Mixture	Boiling	<20	–	72% H_2SO_4, 1.5% HCl
	Mixture	Boiling	>50	>50	20% H_2SO_4, 7% HCl with 50 ppm F impurities
	2	225	<1	<1	
	5	232	<1	<1	
	10	225	<1	–	
	15	225	<5	–	
Sulfuric Acid + 11% $SnSO_4$	10	103	<1	<1	
Sulfuric Acid + 1% $SnSO_4$	35	103	<1	<1	
Sulfuric Acid + 8% Fe	20	80	<1	–	
Sulfurous Acid	6	Room	<5	–	
	Saturated	192	5-50	–	
Sulfamic Acid	10	Boiling	nil	nil	B.P. = 101°C
Tannic Acid	25	35-100	<1	–	
Tartaric Acid	10-50	35-100	<1		
Trichloroacetic Acid	10-40	Room	<2		
	100	Boiling	>50		
	100	100	>50		B.P. = 195°C
Tetrachloroethane	100	Boiling	<5		B.P. = 146°C symmetrical B.P. = 129°C unsymmetrical
Trichloroethylene	99	Boiling	<5		B.P. = 87°C

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TABLE 18

Corrosive Media	Concentration %	Temperature °C	CORROSION RATE, mpy		Remarks
			Zr 702	Zr 705	
Trisodium Phosphate	5-20	100	<5	–	
Urea	50	Boiling	0.1	0.1	
Urea Reactor Mixture	Mixture	193	<1	–	58 Urea, 17 NH_3, 15 CO_2, 10 H_2O
Water - Sea (Pacific)	–	Boiling	nil	nil	
	–	200	nil	–	pH = 7.6
White Liquor	–	121, 177, 227	<1	<1	A mixture of NaOH, Na_2S, Na_2CO_3, etc.
Zinc Chloride	70	Boiling	nil	nil	
	5-20	35-Boiling	<1	–	
	40	Boiling-180	<1	<1	

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