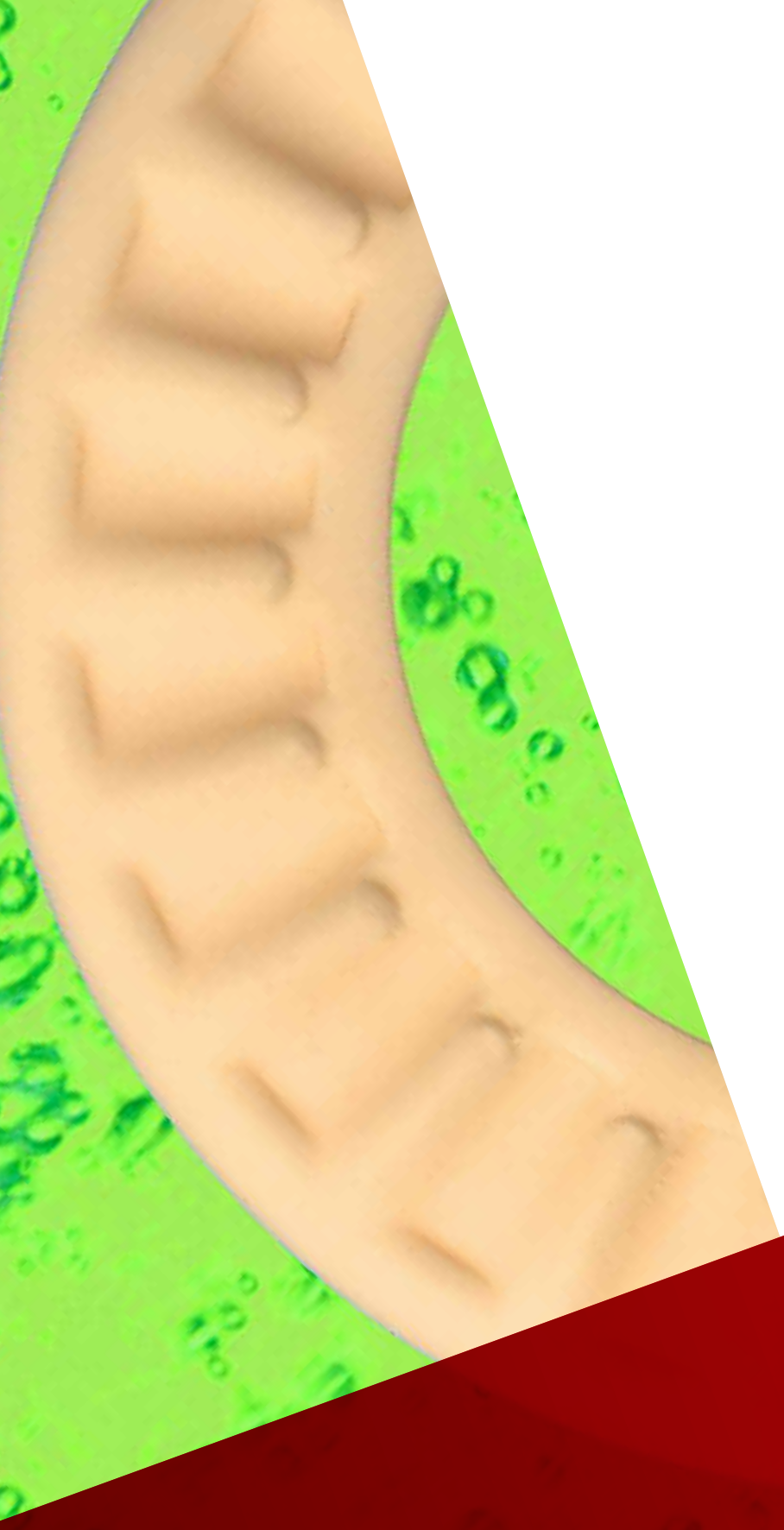

CORROSION RESISTANCE

High-performance ceramics

Corrosion resistance for oxide ceramics

OXIDE CERAMIC MATERIALS

F99.7
Pure Al_2O_3, dense, extremely resistant to wear and corrosion, very high electrical insulating properties.

DEGUSSIT AL23
Pure Al_2O_3, dense, excellent thermal and electrical properties, corrosion resistant.

FZT
Al_2O_3 doped with ZrO_2, dense, high strength, good resistance to thermal shock, extremely resistant to wear and corrosion, fine grain size.

FZM
ZrO_2 partially stabilized with MgO, dense, high strength and wear resistance, extremely resistant to corrosion and thermal shock.

FZM+
ZrO_2 partially stabilized with MgO, dense, very high flexural strength and fracture toughness, high wear resistance, extremely resistant to corrosion and thermal shock.

The following tables show the corrosion properties of oxide ceramics and other special materials. These data are based on chemical conditions as far as we know them.

To a large extent the corrosion resistance data of the different materials result from laboratory tests. Generally, however, corrosive conditions in practical operation are essentially more differentiated. The smallest portions of an intermediate product appearing only for a short time may finally determine corrosive attacks.

In cases where a particular application cannot be based on reliable experiences, the corrosion resistance of our materials is to be determined by test specimens under process conditions.

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ABBREVIATIONS:

A	resistant
B	weak reaction
C	strong reaction
rt	room temperature
b	boiling
conc.	concentrated
sat.	saturated
Empty cells	no data available

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
Acetaldehyde	CH_3CHO		rt	A	A	A	A	A	C	C	C	B	B	C
Acetic acid	CH_3COOH	5	rt	A	A	A	A	A	C	C	A	B	B	B
		5	b	A	A	A	A	A	C	C	A	B	B	B
		10	rt	A	A	A	A	A	C	C	A	B	B	B
		10	b	A	A	A	A	A	C	C	A	B	B	B
		50	rt	A	A	A	A	A	C	C	A	B	B	B
		50	b	A	A	A	A	A	C		A	B	B	B
		80	rt	A	A	A	A	A	C	C	A	B	B	B
		80	b	A	A	A	A	A	C	C	A	B	B	B
		conc.	rt	A	A	A	A	A	C	C	A	B	B	B
		conc.	b	A	A	A	A	A	C	C	A	B	B	B
Acetic acid anhydride	$(CH_3CO)_2O$		rt	A	A	A	A	A	C	C	A	B	B	B
Acetone	CH_3CHOCH_3	100	rt	A	A	A	A	A	C	C	B	B	A	C
Alum	$K_2Al_2(SO_4)_4$	10	rt	A	A	A	A	A	A	B	A	A	A	A
Aluminium chloride	$AlCl_3$	10	rt	A	A	A	A	A	A	B	A	B	A	A
		10	100	A	A	A	A	A	A	B	A	B	A	A
		25	60	A	A	A	A	A	A	B	A	B	A	A
		25	100	A	A	A	A	A	A	B	A	B	A	A
		80	b	A	A	A	A	A	A	B	A	B	A	A
Aluminium sulfate	$Al_2(SO_4)_3$	10	rt	A	A	A	A	A	A	B	A	A	A	A
		10	b	A	A	A	A	A	A	B	A	A	A	A
		15	50	A	A	A	A	A	A	B	A	A	A	A
		20	55	A	A	A	A	A	A	B	A	A	A	A
		25	b	A	A	A	A	A	A	B	A	A	A	A
		50	b	A	A	A	A	A	A	B	A	A	A	A
		55	40	A	A	A	A	A	A	B	A	A	A	A
		57	120	A	A	A	A	A	A	B	A	A	A	A
Ammonia, Ammonium hydroxide	NH_3 NH_4OH	10	rt	A	A	A	A	A	B	B	A	A	A	A
		10	b	A	A	A	A	A	B	B	A	A	A	A
		20	b	A	A	A	A	A	B	B	A	A	A	A
		25	b	A	A	A	A	A	B	B	A	A	A	A
		conc.	rt	A	A	A	A	A	B	B	A	A	A	A
		conc.	100	A	A	A	A	A	B	B	A	A	A	A
Ammonium bromide	NH_4Br	10	25	A	A	A	A	A	A	A	A	A	A	A
Ammonium carbonate	$(NH_4)_2CO_3$	10-20	b	A	A	A	A	A	A	B	A	A	A	A
		30	80	A	A	A	A	A	A	B	A	A	A	A
		30	b	A	A	A	A	A	A	B	A	A	A	A
		40	b	A	A	A	A	A	A	B	A	A	A	A
		50	b	A	A	A	A	A	A	B	A	A	A	A
		sat.	rt	A	A	A	A	A	A	B	A	A	A	A
		sat.	b	A	A	A	A	A	A	B	A	A	A	A
Ammoniumchloride	NH_4Cl	10	rt	A	A	A	A	A	A	A	A	A	A	A
		10	b	A	A	A	A	A	A	A	A	A	A	A
		25	rt	A	A	A	A	A	A	A	A	A	A	A

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
		25	b	A	A	A	A	A	A	A	A	A	A	A
		50	rt	A	A	A	A	A	A	A	A	A	A	A
Ammonium chloride	NH_4Cl	50	b	A	A	A	A	A	A	A	A	A	A	A
		sat.	rt	A	A	A	A	A	A	B	A	A	A	A
		sat.	b	A	A	A	A	A	A	B	A	A	A	A
Ammonium fluoride	NH_4F	20	80				A				A	A		
Ammonium hydroxide	NH_4OH	28	20-60	A	A	A	A	A	B	B	A	A	A	A
Ammonium nitrate	NH_4NO_3	10	rt	A	A	A		A	A	B	A	A	A	A
		20	rt	A	A	A		A	A	B	A	A	A	A
		20	rt	A	A	A		A	A	B	A	A	A	A
		50	rt	A	A	A		A	A	B	A	A	A	A
		50	b	A	A	A		A	A	B	A	A	A	A
Ammonium sulfate	$(NH_4)_2SO_4$	all	rt	A	A	A	A	A	A	B	A	A	A	A
		all	b	A	A	A	A	A	A	B	A	A	A	A
Aniline	$C_6H_5NH_2$		rt	A	A	A	A	A	A	C	C	B	A	C
			b	A	A	A	A	A	A	C	C	B	A	C
Aqua regia	$HCI:HNO_3$	3:1	rt	A	A	A	A	A	B	C	C	C	C	B
Arsenic acid	H_3AsO_3		rt	A	A	A	A	A	A	B	A	A	A	A
Barium chloride	$Ba(OH)_2$	20	rt	A	A	A	A	A	A	A	A	A	A	A
		20	100	A	A	A	A	A	A	A	A	A	A	A
Barium hydroxide	$Ba(OH)_2$	sat.	rt	A	A	A	A	A		A	A	A		
		sat.	b	A	A	A	A	A						
Benzenesulfonic acid	$C_6H_5SO_3H$		70	A	A	A	A	A				A		
Benzoic acid	C_6H_5COOH	all	rt	A	A	A	A	A				A		
Benzol, Benzene	C_6H_6		rt	A	A	A	A	A	A	C	C	C	C	C
Boric acid	H_3BO_3	10	b	A	A	A	A	A	A	B	A	A	A	A
		50	b	A	A	A	A	A	A	B	A	A	A	A
Bromide	Br	dry	rt	A	A	A	C	A	B	C	C	C	C	B
			b	A	A	A	C	A	B	C	C	C	C	B
Butyl acetate	$C_6H1_2O_2$		rt	A	A	A	A	A	C	C	C	C	B	C
Butyl alcohol	C_4H_9OH		rt	A	A	A	A	A	A	B	A	A	A	B
			b	A	A	A	A	A	A	B	A	A	A	B
Butyric acid	C_3H_7COOH	100	rt	A	A	A	A	A			A	A		
		100	b	A	A	A	A	A			A	A		
Calcium bisulfite	$Ca(HSO_3)$		rt	A	A	A	A	A	A	C	B	B	A	A
Calcium hypochlorite	$CaCI_2O_2$	20	40	A	A	A	A	A	A	C	B	C	C	A
Calcium nitrate	$Ca(NO_3)_2$		rt	A	A	A	A	A	A	B	A	A	A	A
Calcium sulfate	$CaSO_4$	1-5	rt	A	A	A	A	A	A	B	A	A	A	A
		10	b	A	A	A	A	A	A	B	A	A	A	A
Carbon disulfide	CS_2		rt	A	A	A	A	A	A	C	C	C	C	C
			b	A	A	A	A	A	A	C	C	C	C	C
Carbon tetrachloride	CCl_4		rt	A	A	A	A	A	B	C	C	C	C	C
Carnallite	$MgCl_2KCI_6H_2O$		90	A	A	A	A	A	A	B	A	A	A	A
Chloral	CCl_3CHO		50	A	A	A	A	A						
Chloride	Cl_2	dry	rt	A	A	A	A	A	A	C	C	C	B	B

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
			70	A	A	A	C	A	A	C	C	C	B	B
Chloride	CH_3+H_2O>0,6%	moist	rt	A	A	A	A	A	A	C	C	C	C	B
			100	A	A	A	C	A	A	C	C	C	C	B
Chloroacetic acid	$CH_2ClCOOH$	50	20	A	A	A	A	A	C	C	C	C	B	B
		70	b	A	A	A	A	A	C	C	C	C	B	B
Chloroacetic acid	$CH_2ClCOOH$	100	rt	A	A	A	A	A	C	C	C	C	B	B
		100	b	A	A	A	A	A	C	C	C	C	B	B
Chlorobenzene	C_6H_5Cl		20	A	A	A	A	A	B	C	C	C	C	C
Chlorosulfonic acid	$SO_2(OH)Cl$		rt	A	A	A	A	A	C	C	C	C	C	C
			b	A	A	A	C	A	C	C	C	C	C	C
Chromium acid	H_2CrO_4	10	rt	A	A	A	A	A	A	C	C	C	C	B
		10	b	A	A	A	C	A	A	C	C	C	C	B
		50	rt	A	A	A	C	A	A	C	C	C	C	B
		50	b	A	A	A	C	A	A	C	C	C	C	B
Citric acid	$C_6H_8O_7$	5	rt	A	A	A	A	A	A	B	A	A	A	A
		5	b	A	A	A	A	A	A	B	A	A	A	A
		25	rt	A	A	A	A	A	A	B	A	A	A	A
		25	b	A	A	A	A	A	A	B	A	A	A	A
		50	rt	A	A	A	A	A	A	B	A	A	A	A
		50	b	A	A	A	A	A	A	B	A	A	A	A
Copper sulfate	$CuSO_4$	5	rt	A	A	A	A	A	A	A	A	A	A	A
		5	b	A	A	A	A	A	A	A	A	A	A	A
		25	b	A	A	A	A	A	A	A	A	A	A	A
		50	b	A	A	A	A	A	A	A	A	A	A	A
		all	b	A	A	A	A	A	A	A	A	A	A	A
Copper-(II)-chloride	$CuCl_2 \cdot {}_2H_2O$	20	rt	A	A	A	A	A	A	A	A	A	A	A
		20	b	A	A	A	A	A	A	A	A	A	A	A
		40	b	A	A	A	A	A	A	A	A	A	A	A
		50	rt	A	A	A	A	A	A	A	A	A	A	A
		sat.	b	A	A	A	A	A	A	A	A	A	A	A
Dichloro ethane	$C_2H_4Cl_2$	100	50	A	A	A	A	A		C		C		
Dichloro ethylene	C_2H_2Cl		b	A	A	A	A	A				C		
Dioxane	$O_2(CH_2)_4$			A	A	A	A	A		C	C	C	C	
Diphenyl	$C_6H_5C_6H_5$			A	A	A	A	A	C	C	C	C	C	
Ether	$(C_2H_5)_2O$		rt	A	A	A	A	A	C	C	C	C	C	C
Ethylacetate	$CH_3COOC_2H_5$		rt	A	A	A	A	A	C	C	C	C	B	C
Ethylalcohol, Ethanol	C_2H_5OH		rt	A	A	A	A	A	A	B	A	A	A	A
Ethylchloride	C_2H_5Cl		rt	A	A	A	A	A	B	C	C	C	C	C
Ferric nitrate	$Fe(NO_3)_3$	all	rt	A	A	A	A	A	A	B	A	B	A	A
Ferric-(II)-Chloride	$FeCl_2$	30	100	A	A	A	A	A	A	B	A	B	A	A
		10	b	A	A	A	A	A	A	B	A	B	A	A
		30	rt	A	A	A	A	A	A	B	A	B	A	A
		50	50	A	A	A	A	A	A	B	A	B	A	A
		sat.	100	A	A	A	A	A	A	B	A	B	A	A
Ferric-(II)-Sulfate	$FeSO_4 \cdot {}_7H_2O$	10	rt	A	A	A	A	A	A	B	A	B	A	A

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
		all	b	A	A	A	A	A	A	B	A	B	A	A
Ferric-(III)-Chloride	$FeCl_3$	5	25	A	A	A	A	A	A	B	A	B	A	A
		10	65	A	A	A	A	A	A	B	A	B	A	A
		15	25	A	A	A	A	A	A	B	A	B	A	A
		45	25	A	A	A	A	A	A	B	A	B	A	A
		50	50	A	A	A	A	A	A	B	A	B	A	A
		50	b	A	A	A	A	A	A	B	A	B	A	A
Ferric-(III)-Sulfate	$Fe(SO_4)_3$		rt	A	A	A	A	A	A	B	A	B	A	A
		til 30	til 65	A	A	A	A	A	A	B	A	B	A	A
Flourosilic acid	H_2SiF		rt	A	B	A	A	A			A	A		
Formaldehyde	CH_2O	30	30	A	C	A	A	A			A	A		
		all	til b	A	A	A	A	A	A	B	A	A	A	A
Formic acid	HCOOH	10	rt	A	A	A	A	A	B	C	B	B	A	A
		10	65	A	A	A	A	A	B	C	B	B	A	A
		10	b	A	A	A	A	A	B	C	B	B	A	A
		20-40	65	A	A	A	A	A	B	C	B	B	A	A
		50	rt	A	A	A	A	A	B	C	B	B	A	A
		50	b	A	A	A	A	A	B	C	B	B	A	A
		60	65	A	A	A	A	A	B	C	B	B	A	A
		80	rt	A	A	A	A	A	B	C	B	B	A	A
		80	65	A	A	A	A	A	B	C	B	B	A	A
		80	b	A	A	A	A	A	B	C	B	B	A	A
		90	100	A	A	A	A	A	B	C	B	B	A	A
		conc.	rt	A	A	A	A	A	B	C	B	B	A	A
		conc.	b	A	A	A	A	A	B	C	B	B	A	A
Fuming sulfuric acid	$H_2S_2O_7$	10	rt	A	A	A	C	A	A	C	C	C	C	B
		10	b	A	A	A	C	A	A	C	C	C	C	B
		25	rt	A	A	A	C	A	A	C	C	C	C	B
		25	b	B	B	B	C	A	A	C	C	C	C	B
Furfuryl alcohol	$C_5H_4O_2$	25	b	A	A	A	A	A	C	C	C	A	A	A
		100	rt	A	A	A	A	A	C	C	C	A	A	A
		100	b	A	A	A	A	A	C	C	C	A	A	A
Glycerine	$CH_{2O}HCHOH$		rt	A	A	A	A	A	A	A	A	A	A	A
	CH_2OH		b	A	A	A	A	A	A	A	A	A	A	A
Hydrochloric acid	HCI	0,5	rt	A	A	A	A	A	A	C	B	B	B	A
		0,5	b	A	A	A	A	A	B	C	C	C	C	B
		5	rt	A	A	A	A	A	A	C	B	B	B	A
		5	60	A	A	A	A	A	A	C	B	B	B	A
		5	b	A	A	A	A	A	B	C	C	C	C	B
		10	rt	A	A	A	A	A	A	C	B	B	B	A
		10	50	A	A	A	A	A	A	C	B	B	B	A
		10	b	A	A	A	A	A	B	C	C	C	C	B
		15	rt	A	A	A	A	A	A	C	B	B	B	A
		15	b	A	A	A	A	A	B	C	C	C	C	B
		20	rt	A	A	A	A	A	A	C	B	B	B	A

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
		20	b	A	A	A	A	A	B	C	C	C	C	B
		30	rt	A	A	A	A	A	A	C	B	B	B	A
		30	b	A	A	A	A	A	B	C	C	C	C	B
		37	rt	A	A	A	A	A	A	C	B	B	B	A
		37	b	A	A	A	A	A	B	C	C	C	C	B
Hydrocholoric acid + Nitric acid	HCI:HNO_3	3:1	rt	A	A	A	A	A	B	C	C	C	C	B
Hydrogen bromide	HBr		rt	A	A	A	A	A	A	C	B	C	A	A
Hydrogen bromide	HBr	0-50	b	A	A	A	A	A	A	C	B	C	A	A
Hydrogen cyanide	HCN		rt	A	A	A	A	A	A	B	B	B	B	A
Hydrogen flouride	HF	1	rt	A	C	A	A	A	A	C	B	B	B	A
		40	rt	A	C	A	A	A	A	C	B	B	B	A
		40	50	A	C	A	A	A	A	C	C	C	C	B
		50	rt	A	C	A	A	A	A	C	B	B	B	A
		100	rt	A	C	A	C	A	A	C	C	C	C	A
		100	b	A	C	B	C	A	A	C	C	C	C	B
Hydrogen sulfide	H_2S		rt	A	A	A	A	A	A	C	B	C	A	A
			100	A	A	A	A	A	A	C	C	C	A	A
Lactic acid	$H_6C_3O_3$	1,5	rt	A	A	A	A	A	B	B	B	C	B	B
		1,5	b	A	A	A	A	A	B	B	B	C	B	B
		10	rt	A	A	A	A	A	B	B	B	C	B	B
		10	b	A	A	A	A	A	B	B	B	C	B	B
		conc.	b	A	A	A	A	A	B	B	B	C	B	B
Lead acetate	$C_4H_6O_4Pb$	all	rt	A	A	A	A	A	A	A	A	A	A	A
Magnesium chloride	$MgCl_2$	10	rt	A	A	A	A	A	A	B	A	A	A	A
		20	b	A	A	A	A	A	A	B	A	A	A	A
		30	rt	A	A	A	A	A	A	B	A	A	A	A
		42	b	A	A	A	A	A	A	B	A	A	A	A
Magnesium sulfate	$MgSO_4$	10	rt	A	A	A	A	A	A	B	A	A	A	A
		25		A	A	A	A	A	A	B	A	A	A	A
		50		A	A	A	A	A	A	B	A	A	A	A
		sat.		A	A	A	A	A	A	B	A	A	A	A
Maleic acid	$C_4H_4O_4$	10	til 80	A	A	A	A	A	C	C	A	B	B	A
		10	b	A	A	A	A	A	C	C	A	B	B	A
		50	100	A	A	A	A	A	C	C	A	B	B	A
Malic acid	$C_4H_6O_5$	til 50	rt	A	A	A	A	A	A	A	A	A	A	A
			b	A	A	A	A	A	A	A	A	A	A	A
Manganese chloride	$MnCl_2$	5	100	A	A	A	A	A	A		A	A		
		20	100	A	A	A	A	A	A		A	A		
		50	100	A	A	A	A	A	A		A	A		
Manganese sulfate	$MnSO_4$	all	rt	A	A	A	A	A	A		A	A		
Mercury	Hg		20	A	A	A	A	A	A	A	A	A	A	A
			50	A	A	A	A	A	A	A	A	A	A	A
			b	A	A	A	C							
Methanol	CH_3OH	all	rt	A	A	A	A	A	C	B	A	A	A	A

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
		all	b	A	A	A	A	A	C	B	A	A	A	A
Methylene chloride	CH_2Cl_2		rt - b	A	A	A	A	A	B	C	C	C	C	C
Monochloro acetic	CH_2ClCO_2H	50	rt	A	A	A	A	A	C	C	C	C	B	B
		70	b	A	A	A	A	A	C	C	C	C	B	B
		100	rt	A	A	A	A	A	C	C	C	C	B	B
		100	b	A	A	A	A	A	C	C	C	C	B	B
Naphta	$C_{10}H_8$		rt	A	A	A	A	A	B	C	C	C	C	C
Nickel chloride	$NiCl_2 \cdot {}_6H_2O$	10	60	A	A	A	A	A	A	A	A	A	A	A
		10	b	A	A	A	A	A	A	A	A	A	A	A
		20	rt	A	A	A	A	A	A	A	A	A	A	A
		30	b	A	A	A	A	A	A	A	A	A	A	A
		80	95	A	A	A	A	A	A	A	A	A	A	A
Nickel nitrate	$Ni(NO_3)_2 \cdot 6H_2O$		rt	A	A	A	A	A	A	A	A	A	A	A
Nickel sulfate	$NiSO_4 \cdot 7H_2O$		80	A	A	A	A	A	A	A	A	A	A	A
Nitric acid	HNO_3	7	rt	A	A	A	A	A	B	C	C	C	C	B
		7	b	A	A	A	B	A	B	C	C	C	C	B
		10	rt	A	A	A	A	A	B	C	C	C	C	B
		10	b	A	A	A	C	A	B	C	C	C	C	B
		25	rt	A	A	A	B	A	B	C	C	C	C	B
		25	b	A	A	A	C	A	B	C	C	C	C	B
		37	rt	A	A	A	C	A	B	C	C	C	C	B
		37	b	A	A	A	C	A	B	C	C	C	C	B
		50	rt	A	A	A	C	A	B	C	C	C	C	B
		50	b	A	A	A	C	A	B	C	C	C	C	B
		65	rt	A	A	A	C	A	B	C	C	C	C	B
		65	b	A	A	A	C	A	B	C	C	C	C	B
		70	100	A	A	A	C	A	B	C	C	C	C	B
	Fuming	100	rt				C	A	B	C	C	C	C	B
		100	50-70				C	A	B	C	C	C	C	B
		100	b				C	A	B	C	C	C	C	B
Nitrobenzene				A	A	A	A	A	A	A	A	A	A	A
Oxalic acid	$H_2C_2O_4$	5	rt	A	A	A	A	A	A	A	A	B	A	A
		5	b	A	A	A	A	A	A	A	A	B	A	A
		10	rt	A	A	A	A	A	A	A	A	B	A	A
		10	b	A	A	A	A	A	A	A	A	B	A	A
		25	rt	A	A	A	A	A	A	A	A	B	A	A
		25	b	A	A	A	A	A	A	A	A	B	A	A
		50	rt	A	A	A	A	A	A	A	A	B	A	A
		50	b	A	A	A	A	A	A	A	A	B	A	A
		sat.	rt	A	A	A	A	A	A	A	A	B	A	A
		sat.	b	A	A	A	A	A	A	A	A	B	A	A
Ozone	O_3	liquid		A	A	A	C	A	A	C	B	C	A	A
Percholoro ethylene	C_2Cl_4		rt	A	A	A	A	A	B	C	C	C	C	C
			b	A	A	A	A	A	B	C	C	C	C	C
Phenol	C_6H_5OH	pure	rt	A	A	A	A	A	B	C	C	C	C	C

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
			b	A	A	A	A	A	B	C	C	C	C	C
Phosphorous acid	H_3PO_4	1	rt	A	A	A	A	A	A	B	A	A	A	A
		1	b	A	A	A	A	A	A	C	A	A	A	A
		1	140	A	A	A	A	A	A	C	A	A	A	A
		10	rt	A	A	A	A	A	A	B	A	A	A	
		10	b	A	A	A	A	A	A	C	A	A	A	A
		30	rt	A	A	A	A	A	A	B	A	A	A	A
		30	b	A	A	A	A	A	A	C	A	A	A	A
		45	rt	A	A	A	A	A	A	B	A	A	A	A
		45	b	A	A	A	A	A	A	C	A	A	A	A
		80	rt	A	A	A	A	A	A	B	A	A	A	A
		80	60	A	A	A	A	A	A	C	A	A	A	A
		80	b	B	B	B	A	A	A	C	A	A	A	A
		90	rt	A	A	A	A	A	A	B	A	A	A	A
		90	b	B	B	B	C	A	A	C	A	A	A	A
		conc.	rt	A	A	A	A	A	A	B	A	A	A	A
		conc.	b	C	C	C	C	A	A	C	A	A	A	A
Potassium choloride	KCI	10	rt	A	A	A	A	A	A	A	A	A	A	A
		10	b	A	A	A	A	A	A	A	A	A	A	A
		20	b	A	A	A	A	A	A	A	A	A	A	A
		30	b	A	A	A	A	A	A	A	A	A	A	A
		sat.	100	A	A	A	A	A	A	A	A	A	A	A
Potassium cyanide	KCN	10	rt	A	A	A	A	A	B	C	A	B	A	A
Potassium hydroxide	KOH	10	rt	A	A	A	A	A	C	B	A	A	A	A
		10	b	A	A	A	A	A	C	B	A	A	A	A
		20	rt	A	A	A	A	A	C	B	A	A	A	A
		20	b	A	A	A	A	A	C	B	A	A	A	A
		28	rt	A	A	A	A	A	C	B	A	A	A	A
		28	b	A	A	A	A	A	C	B	A	A	A	A
		40	til b	A	A	A	B	A	C	B	A	A	A	A
		50	rt	A	A	A	A	A	C	B	A	A	A	A
		50	b	B	A	B	C	A	C	B	A	A	A	A
Potassium hypochlorite	KOCl	20g Cl/l	til 40	A	A	A	A	A	A	C	C	C		
		130g	rt	A	A	A	A	A	A	C	C	C		
		130g	150	A	A	A	C	A	A	C	C	C		
Potassium nitrate	KNO_3	25	rt	A	A	A	A	A	A	A	A	A	A	A
		25	b	A	A	A	A	A	A	A	A	A	A	A
		40	rt	A	A	A	A	A	A	A	A	A	A	A
		40	b	A	A	A	A	A	A	A	A	A	A	A
		50	rt	A	A	A	A	A	A	A	A	A	A	A
		50	b	A	A	A	A	A	A	A	A	A	A	A
		sat.	rt	A	A	A	A	A	A	A	A	A	A	A
		sat.	b	A	A	A	A	A	A	A	A	A	A	A
Potassium perchlorate	$KClO_4$	25	25	A	A	A	A	A			A	A		
		50	25	A	A	A	A	A			A	A		

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
		75	25	A	A	A	A	A			A	A		
Potassium permanganate	$KMnO_4$	all	rt	A	A	A	A	A			A	A		
		all	b	A	A	A	A	A			A	A		
Potassium sulfate	K_2SO_4	10	rt	A	A	A	A	A	A	A	A	A	A	A
		20	til 50	A	A	A	A	A	A	A	A	A	A	A
Prussiate of potash	KCN	10	rt	A	A	A	A	A	B	C	A	B	A	A
Pyridine	C_5H_5N	50	rt-60	A	A	A	A	A	C	C	C	C	C	B
		100	rt-60	A	A	A	A	A	C	C	C	C	C	B
Salt water			rt	A	A	A	A	A	A	A	A	A	A	A
Sodium bicarbonate	$NaHCO_3$	10	til b	A	A	A	A	A	B	B	A	A	A	A
		20	40-b	A	A	A	A	A	B	B	A	A	A	A
		all	all	A	A	A	A	A	B	B	A	A	A	A
Sodium bisulfate	$NaHSO_4$	10	rt	A	A	A	A	A			A	A		
		10	b	A	A	A	A	A			A	A		
		sat.	rt	A	A	A	A	A			A	A		
		sat.	b	A	A	A	A	A			A	A		
Sodium bisulfite	$NaHSO_3$	50	rt	A	A	A	A	A			A	A		
				A	A	A	A	A			A	A	A	A
Sodium carbonate	Na_2CO_3	10	b	A	A	A	C	A	C	B	A	A	A	A
		20	rt	A	A	A	A	A	C	B	A	A	A	A
		20	50-b	A	A	A	A	A	C	B	A	A	A	A
		50	rt	A	A	A	A	A	C	B	A	A	A	A
		50	b	A	A	A	A	A	C	B	A	A	A	A
		sat.	rt	A	A	A	A	A	C	B	A	A	A	A
		sat.	b	A	A	A	C	A	C	B	A	A	A	A
Sodium chlorate	$NaClO_3$	5	rt	A	A	A	A	A	A	A	A	A	A	A
		5	b	A	A	A	A	A	A	A	A	A	A	A
Sodium chloride	NaCl	3.5	rt	A	A	A	A	A	A	A	A	A	A	A
		3.5	b	A	A	A	A	A	A	A	A	A	A	A
Sodium chloride solution		techn.	rt	A	A	A	A	A	A	A	A	A	A	A
			b	A	A	A	A	A	A	A	A	A	A	A
Sodium chlorite	$NaClO_2$	5	rt	A	A	A	C	A			C	C		
		5	b	A	A	A	C	A			C	C		
		10	rt	A	A	A	C	A			C	C		
Sodium hydroxide	NaOH	10	rt	A	A	A	A	A	C	B	A	A	A	A
(Caustic soda)		10	b	A	A	A	A	A	C	B	A	A	A	A
		20	rt	A	A	A	A	A	C	B	A	A	A	A
		20	b	A	A	A	C	A	C	B	A	A	A	A
		34	rt	A	A	A	C	A	C	B	A	A	A	A
		34	b	A	A	A	C	A	C	B	A	A	A	A
		50	rt	A	A	A	C	A	C	B	A	A	A	A
		50	b	B	A	B	C	A	C	B	A	A	A	A
		60	b	B	A	B	C	A	C	B	A	A	A	A
		70	b	C	B	C	C	A	C	B	A	A	A	A

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neopren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
Sodium hypochlorite	NaOCl	10g Cl/l	rt	A	A	A	A	A	A	C	C	C	C	A
(Bleaching soda)		10g Cl/l	50	A	A	A	A	A	A	C	C	C	C	A
		20g Cl/l	rt	A	A	A	A	A	A	C	C	C	C	A
		20g Cl/l	40	A	A	A	A	A	A	C	C	C	C	A
		120g	rt	A	A	A	A	A	A	C	C	C	C	A
		120g	b	A	A	A	A	A	A	C	C	C	C	A
Sodium nitrate	$NaNO_3$		rt	A	A	A	A	A	A	A	A	A	A	A
			100	A	A	A	A	A	A	A	A	A	A	A
Sodium nitrite	$NaNO_2$		70	A	A	A	A	A	A	A	A	A	A	A
			100	A	A	A	A	A	A	A	A	A	A	A
Sodium peroxide	Na_2O_2	10	rt	A	A	A	A	A			A	A		
		10	b	A	A	A	C	A			A	A		
Sodium sulfate	$Na_2SO_4 \cdot 10H_2O$	sat.	rt	A	A	A	A	A	A	C	B	C	A	A
		sat.	b	A	A	A	A	A	A	C	B	C	A	A
Sodium sulfide	$Na_2S \cdot 9H_2O$	25	rt	A	A	A	A	A	A	C	B	C	A	A
		25	b	A	A	A	A	A	A	C	B	C	A	A
		50	rt	A	A	A	A	A	A	C	B	C	A	A
		50	b	A	A	A	A	A	A	C	B	C	A	A
		sat.	rt	A	A	A	A	A	A	C	B	C	A	A
Sodium sulfite	$Na^2SO^3 \cdot 7H^2O$	25	rt	A	A	A	A	A	A	C	B	C	A	A
		25	b	A	A	A	A	A	A	C	B	C	A	A
		50	rt	A	A	A	A	A	A	C	B	C	A	A
		50	b	A	A	A	A	A	A	C	B	C	A	A
Sodium thiol	$Na_2S_2O_3 \cdot 5H_2O$	25	rt	A	A	A	A	A	A	C	B	C	A	A
		25	b	A	A	A	A	A	A	C	B	C	A	A
Spinning bath	til 10% H_2SO_4		70	A	A	A	A	A	A	C	A	B	A	A
	over 10% H_2SO_4		70	A	A	A	A	A	A	C	A	B	A	A
Stearic acid	$C_{17}H_{35}COOH$	techn.	100	A	A	A	A	A	A	A	B	C	C	C
		techn.	150	A	A	A	A	A	A	A	B	C	C	C
		100	rt	A	A	A	A	A	A	A	B	C	C	C
		100	b	A	A	A	A	A	A	A	B	C	C	C
		100	135	A	A	A	A	A	A	A	B	C	C	C
		100	315	A	A	A	C							
Sulfur chloride	S_2Cl_2		rt	A	A	A	A	A	C	C	C	C	C	C
			b	A	A	A		A	C	C	C	C	C	C
Sulfuric acid	H_2SO_4	2	rt	A	A	A	A	A	A	A	A	A	A	A
		2	b	A	A	A	A	A	A	C	A	B	A	A
		5	rt	A	A	A	A	A	A	A	A	A	A	A
		5	b	A	A	A	A	A	A	C	A	B	A	A
		10	rt	A	A	A	A	A	A	C	C	C	B	A
		10	b	A	A	A	A	A	A	C	C	C	C	B
		25	rt	A	A	A	A	A	A	C	C	C	B	A
		25	b	A	A	A	A	A	A	C	C	C	C	B
		50	rt	A	A	A	A	A	A	C	C	C	B	A
		50	b	A	B	A	A	A	A	C	C	C	C	B

Agent	Chemical formula	Conc. (%)	Temp. (°C)	Oxide ceramics			Graphite impregna-ted	PTFE	Viton	Perbu-nan	Neo-pren	Neutral rubber	Butyl rubber	Hypalon
				F99.7 AL23	FZM FZM+	FZT								
		60	rt	A	A	A	A	A	A	C	C	C	B	A
		60	b	A	B	A	A	A	A	C	C	C	C	B
		77	rt	A	A	A	A	A	A	C	C	C	B	B
		77	b	B	C	B	C	A	A	C	C	C	C	C
		80	rt	A	A	A	A	A	A	C	C	C	B	B
		80	b	B	C	B	C	A	A	C	C	C	C	C
		85	rt	A	A	A	A	A	A	C	C	C	B	B
		85	b	B	C	B	C	A	A	C	C	C	C	C
		90	rt	A	A	A	B	A	A	C	C	C	B	B
		90	b	B	C	B	C	A	A	C	C	C	C	C
		96	rt	A	A	A	B	A	A	C	C	C	B	B
		96	b	B	C	B	C	A	A	C	C	C	C	C
Sulfuric acid	H_2SO_3	sat.	rt	A	A	A	A	A	A	B	B	B	B	A
Sulfuric acid + nitric acid	H_2SO_4:HNO_3	10:90	35	A	A	A	C	A	B	C	C	C	C	B
		30:70	35	A	A	A	C	A	B	C	C	C	C	B
		50:50	35	A	A	A	C	A	B	C	C	C	C	B
		60:40	35	A	A	A	C	A	B	C	C	C	C	B
		70:30	35	A	A	A	C	A	B	C	C	C	C	B
		80:20	35	A	A	A	A	A	A	C	C	C	C	B
		90:10	35	A	A	A	A	A	A	C	C	C	C	B
		99:1	35	A	A	A	A	A	A	C	C	C	C	B
Tannic acid	$C_{76}H_{52}O_{44}$	10	rt	A	A	A		A	A	C	B	B	B	A
		10	b	A	A	A		A	A	C	B	B	B	A
		50	50	A	A	A		A	A	C	B	B	B	A
		50	b	A	A	A		A	A	C	B	B	B	A
Tartaric acid	$C_4H_6O_6$	all	rt	A	A	A	A	A	A	A	A	A	A	A
		all	b	A	A	A	A	A	A	A	A	A	A	A
Tin chloride	$SnCl_2$, $SnCl_4$	all	rt	A	A	A	A	A	A	A	A	A	A	A
		all	150	A	A	A	A	A	A	A	A	A	A	A
Trichloro ethylene	$CHCl=CCl_2$		rt	A	A	A	A	A	B	C	C	C	C	C
Uric acid	$C_5H_4N_4O_3$		rt	A	A	A	A	A	A	A	A	A	A	A
Zinc chloride	$ZnCl_2$	10	rt	A	A	A	A	A	A	B	A	B	A	A
		10	b	A	A	A	A	A	A	B	A	B	A	A
		20	rt	A	A	A	A	A	A	B	A	B	A	A
		20	b	A	A	A	A	A	A	B	A	B	A	A
		60	rt	A	A	A	A	A	A	B	A	B	A	A
		60	b	A	A	A	A	A	A	B	A	B	A	A
		100	b	A	A	A	C	A	A	B	A	B	A	A

KYOCERA FINECERAMICS SOLUTIONS GMBH
THIS IS US. INNOVATION IN CERAMICS.

ELEVATOR MESSAGE

"Our extensive experience in high-performance ceramics and our alliance with Kyocera as a leading global technology group grant us access to innovation and resources that allow us to realize ambitious projects and take the lead for the future. We share our knowledge, and bring it together to create something new that goes beyond our company, beyond different industries and countries. As a team. Together with our customers."
Armin Kayser, General Manager of KYOCERA Fineceramics Solutions GmbH

KYOCERA Fineceramics Solutions GmbH - Summary

Location:	Mannheim, metropolitan Rhein-Neckar region
Founding year:	2019 - Spin-off from FRIATEC GmbH
Employees:	approx. 300 incl. approx. 30 trainees and apprentices
Subsidiaries:	KYOCERA Fineceramics Nordics AB (sales office for Northern Europe)

We look back on a long tradition in the manufacturing of ceramic products: Founded in Mannheim in 1863 as a brickyard known as "Deutsche Steinzeug", and later as "Friedrichsfeld GmbH", from 1993, the ceramics department continued its successful development under the brand FRIATEC GmbH. Since September 2019 we have been part of Kyocera Group, a leading global ceramics and technology company.

Kyocera companies benefit from the group's cross-department way of thinking and working.
Because innovation and real milestones can only be achieved together. This is what we believe.

We are a supplier of innovative solutions for numerous industries: system components for high-tech applications in electrical and sensor technology, mechanical engineering, analysistechnology, medical and semiconductor technology, as well as laboratory technology.

We possess internationally recognized know-how in the field of high-performance ceramics, especially for ceramic-to-metal assemblies. Our products are characterized by high quality, precision, and durability. Our production and development location in Central Europe and our customized supply-chain solutions make us extremely agile and ensure maximum reliability for our customers.

We see ourselves as a partner in the development of high-performance ceramics solutions that provide added value for our customers and ensure their technological advantage in their respective markets. Our focus today is on where we want to be tomorrow – together. We develop sustainable solutions that meet the demands of the future, supported by an experienced team of 50 highly qualified and quality-oriented engineers, scientists, technology experts, and masters.

ELECTRICAL ENGINEERING


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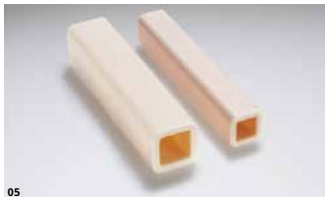
02


03


04

HIGH TEMPERATURE TECHNOLOGY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MECHANICAL ENGINEERING


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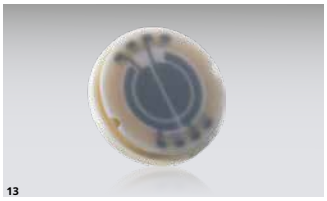
SENSOR AND MEASURING TECHNOLOGY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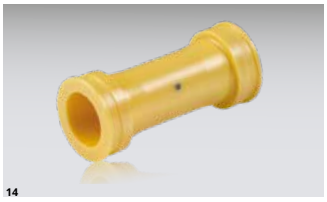
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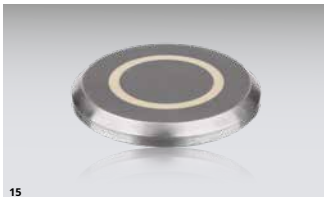
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01. UHV vacuum chamber
02. Special insulation tube for research institutes
03. Feedthroughs with ISO-KF flange
04. High-voltage feedthrough

05. Rectangular tubes
06. Multi-bore tubes
07. Crucibles, boats and annealing
06. Boxes
08. Plates with hole

09. Forming tools used in body construction
10. Dosing unit used in the pharmaceutical and cosmetic industry
11. Containment shells for the pump industry
12. Grinding tools used in metal processing

13. Pressure sensor for aerospace
14. Flow meters
15. Humidity sensor
16. Oxygen sensor

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