CHEMICAL RESISTANCE OF BELZONA® 4301

FN10208

	Chemical name (Synonym)	Chemical formula (CAS number)	Concentration	Service at 20°C (68°F)	Service at 40°C (104°F)
Inorganic Acids	Carbonic acid	H_2CO_3 (463-79-6)	15%	Ex	Ex
	Fluorosilicic acid	H_2SiF_6 (16961-83-4)	30%	Ex	Ex
			10%	Ex	Ex
	Hydrobromic acid	HBr (10035-10-6)	40%	Ex	Ex
			20%	Ex	Ex
			10%	Ex	Ex
	Hydrochloric acid	HCl (7647-01-0)	37%	**Ex**	Ex
			20%	Ex	Ex
			10%	**Ex**	Ex
	Nitric acid	HNO_3 (7697-37-2)	65%	P	P
			20%	Ex*	G
			10%	Ex*	G
	Oleum	$H_2SO_4 \cdot (SO_3)_x$ [8014-95-7]	30%	M	M
	Phosphoric acid (orthophosphoric acid)	H_3PO_4 (7664-38-2)	85%	G*	G*
			20%	G*	G*
			10%	Ex	Ex
	Sulfuric acid	H_2SO_4 (7664-93-9)	100%	P	P
			98%	**Ex**	Ex*
			50%	**Ex**	Ex*
			20%	**Ex**	Ex*
			10%	Ex	Ex*
Organic Acids	Acetic acid (ethanoic acid)	CH_3COOH (64-19-7)	30%	M*	M*
			20%	M*	M*
			10%	M	M
	Acrylic acid	$CH_2=CHCO_2H$ (79-10-7)	-	G*	M*
	Citric acid	$C_6H_8O_7$ (77-92-9)	-	Ex	Ex
	Cresylic acid (cresol)	C_7H_8O (1319-77-3)	-	Ex*	Ex*
	Formic acid (methanoic acid)	HCOOH (64-18-6)	10%	P	P
	Lactic acid (2-hydroxypropanoic acid)	$CH_3CH(OH)(COOH)$ (50-21-5/79-33-4/10326-41-7)	88%	M	M
			5%	Ex	Ex
	Phenol	C_6H_5OH (108-95-2)	-	P	P

Excellent	**Ex**	No significant deterioration / barrier properties retained for greater than 52 weeks. *suitable for all applications including long term immersion*
Good	**G**	No significant deterioration / barrier properties retained for 12-52 weeks *Suitable for short-term immersion and general chemical contact*
Moderate	**M**	No significant deterioration / barrier properties retained for 1-12 weeks *Suitable for applications involving short term chemical contact e.g. spillage, splashing or secondary containment*
Poor	**P**	Significant deterioration / loss of barrier properties after 1 week or less *Not suitable for any applications*
*		Product must be post cured to deliver quoted chemical resistance. As for general guidance, the coating should be subjected to the following conditions as a minimum; 1hr at 100 °C/2hrs at 90 °C/4hrs at 80 °C/8hrs at 70 °C/16hrs at 60 °C. For specific recommendations, please contact Belzona.
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	Chemical name (Synonym)	Chemical formula (CAS number)	Concentration	20°C (68°F)	40°C (104°F)
Alcohols	n-Butanol (butyl alcohol)	C_4H_9OH (71-36-3)	-	Ex	Ex
	2-Ethoxyethanol (Cellosolve)	$C_4H_{10}O_2$ (110-80-5)	-	Ex	Ex
	Ethanol (ethyl alcohol)	CH_3CH_2OH (64-17-5)	-	Ex	Ex
	Ethylene glycol (ethan-1,2-diol, monoethylene glycol, MEG)	$(CH_2OH)_2$ (107-21-1)	-	Ex	Ex
	Glycerol (glycerine, propane-1,2,3-triol)	$HOCH_2CH(OH)CH_2OH$ (56-81-5)	-	Ex	Ex
	1-Hexanol	$CH_3(CH_2)_5OH$ (111-27-3)	-	Ex	Ex
	Isobutanol	$(CH_3)_2CHCH_2OH$ (78-83-1)	-	Ex	Ex
	Methanol (methyl alcohol)	CH_3OH (67-56-1)	-	**M**	M
	2-Methoxyethanol	$C_3H_8O_2$ (109-86-4)	-	Ex	Ex
	Propylene glycol (1,2-Propanediol)	$CH_3CH(OH)CH_2OH$ (57-55-6)	-	Ex	Ex
Alkalis	Ammonia	NH_3 (7664-41-7)	25%	**Ex**	Ex
			10%	Ex	Ex
	Potassium hydroxide (caustic potash)	KOH (1310-58-3)	40%	Ex	Ex
			20%	Ex	Ex
			10%	Ex	Ex
	Sodium hydroxide (caustic soda)	NaOH (1310-73-2)	50%	**Ex**	Ex
			40%	Ex	Ex
			20%	Ex	Ex
			10%	Ex	Ex
Amines & Amides	Diethanolamine (DEA) (2,2'-iminodiethanol)	$HN(CH_2CH_2OH)_2$ (111-42-2)	-	Ex	Ex
	Diethylenetriamine (DETA)	$HN(CH_2CH_2NH_2)_2$ (111-40-0)	-	P	P
	Dimethylformamide (DMF)	$(CH_3)_2NC(O)H$ (68-12-2)	-	P	P
	Diethylene glycolamine (DGA) (2-(2-aminoethoxy) ethanol)	$H_2NCH_2CH_2OCH_2CH_2OH$ (929-06-6)	-	Ex*	Ex*
	N-Methyl diethanolamine (MDEA)	$CH_3N(CH_2CH_2OH)_2$ (105-59-9)	-	**Ex**	Ex

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Poor **P**	Significant deterioration / loss of barrier properties after 1 week or less *Not suitable for any applications*
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	Chemical name (Synonym)	Chemical formula (CAS number)	Concentration	20°C (68°F)	40°C (104°F)
Amines & Amides continued	Monoethanolamine (MEA) (2-aminoethanol)	$H_2NCH_2CH_2OH$ (141-43-5)	-	Ex*	Ex*
	Pyridine	C_5H_5N (110-86-1)	-	M	M
	Sulphanol solution (50% diisopropanolamine, 25% tetramethylene sulphone, 25% water)	N/A	-	Ex	Ex
	Triethanolamine (TEA) (2,2',2"-nitrilotriethanol)	$N(CH_2CH_2OH)_3$ (102-71-6)	-	Ex	Ex
	Triethylenetetramine (TETA)	$[CH_2NHCH_2CH_2NH_2]_2$ (112-24-3)	-	M	M
Beverages & Foodstuffs	Apple juice	-	-	Ex	Ex
	Beer	-	-	Ex	Ex
	Beet sugar	-	-	Ex	Ex
	Butter	-	-	Ex	Ex
	Buttermilk	-	-	Ex	Ex
	Cider	-	-	Ex	Ex
	Citrus juices	-	-	Ex	Ex
	Fermentation liquor	-	-	Ex	Ex
	Glucose	-	-	Ex	Ex
	Ketchup	-	-	Ex	Ex
	Margarine	-	-	Ex	Ex
	Mayonnaise	-	-	Ex	Ex
	Milk	-	-	Ex	Ex
	Molasses	-	-	Ex	Ex
	Mustard	-	-	Ex	Ex
	Salad Oil	-	-	Ex	Ex
	Sugar liquids	-	-	Ex	Ex
	Tomato juice	-	-	Ex	Ex
	Vinegar	-	-	Ex	Ex
	Whisky and Wine	-	-	Ex	Ex
	Yeast	-	-	Ex	Ex

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Esters & Ethers	Amyl acetate	$CH_3COO(CH_2)_4CH_3$ (628-63-7)	-	Ex	Ex
	Butyl acetate	$C_6H_{12}O_2$ (123-86-4)	-	Ex	Ex
	N-Butyl ether	$C_8H_{18}O$ (142-96-1)	-	Ex	Ex
	Dibutyl phthalate	$C_{16}H_{22}O_4$ (84-74-2)	-	Ex	Ex
	Dibutyl sebacate	$C_{18}H_{34}O_4$ (109-43-3)	-	Ex	Ex
	Diethyl ether	$(C_2H_5)_2O$ (60-29-7)	-	Ex	Ex
	Dioctyl adipate	$C_{22}H_{42}O_4$ (123-79-5)	-	Ex	Ex
	Dioctyl phthalate	$C_6H_4(C_8H_{17}COO)_2$ (117-81-7)	-	Ex	Ex
	Dioctyl sebacate	$(CH_2)_8(COOC_8H_{17})_2$ (2432-87-3)	-	Ex	Ex
	Ethyl acetate	$CH_3COOCH_2CH_3$ (141-78-6)	-	**Ex**	Ex
	Methyl acetate	CH_3COOCH_3 (79-20-9)	-	Ex	Ex
	Propylene glycol monomethyl ether acetate	$CH_3CO_2CH(CH_3)CH_2OCH_3$ (108-65-6)	-	Ex	Ex
	Tributyl phosphate	$(CH_3CH_2CH_2CH_2O)_3PO$ (126-73-8)	-	Ex	Ex
Gases	Butane	C_4H_{10} (106-97-8)	-	Ex	Ex
	Carbon dioxide	CO_2 (124-38-9)	-	Ex	Ex
	Carbon monoxide	CO (630-08-0)	-	Ex	Ex
	Chlorine gas	Cl_2 (7782-50-5)	-	G	G
	Hydrogen gas	H_2 (1333-74-0)	-	Ex	Ex
	Hydrogen sulphide	H_2S (7783-06-4)	-	Ex	Ex
	Natural Gas (Methane)	CH_4 (74-82-8)	-	Ex	Ex
	Nitrous oxide (dinitrogen monoxide)	N_2O (10024-97-2)	-	Ex	Ex
	Ozone (aqueous solution)	O_3 (10028-15-6)	-	G	G
	Sulphur dioxide	SO_2 (7446-09-5)	-	Ex	Ex
	Sulphur trioxide (sulphuric anhydride)	SO_3 (7446-11-9)	-	Ex	Ex

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Halocarbons	Chlorobenzene	C_6H_5Cl (108-90-7)	-	Ex	Ex
	Chloroform	$CHCl_3$ (67-66-3)	-	P	P
	Methylene chloride (dichloromethane)	CH_2Cl_2 (75-09-2)	-	P	P
Hydrocarbons	Aviation fuel (AVCAT, AVGAS, AVTAG, AVTUR)	N/A	-	Ex	Ex
	Benzene (benzol)	C_6H_6 (71-43-2)	-	Ex	Ex
	Cyclohexane	C_6H_{12} (110-82-7)	-	Ex	Ex
	Gasoline (petrol)	N/A (8032-32-4)	-	Ex	Ex
	Heptane	$CH_3CH_2CH_2CH_2CH_2CH_2CH_3$ (142-82-5)	-	Ex	Ex
	Hexane	$CH_3CH_2CH_2CH_2CH_2CH_3$ (110-54-3)	-	Ex	Ex
	Iso-octane (2,2,4-trimethylpentane)	$(CH_3)_3CCH_2CH(CH_3)_2$ (540-84-1)	-	Ex	Ex
	Kerosene	N/A (8008-20-6)	-	Ex	Ex
	Mesitylene (1,3,5-trimethylbenzene)	$C_6H_3(CH_3)_3$ (108-67-8)	-	Ex	Ex
	Naphtha	N/A (8030-30-6)	-	Ex	Ex
	Naphthalene	$C_{10}H_8$ (91-20-3)	-	Ex	Ex
	Paraffin	N/A (8002-74-2)	-	Ex	Ex
	Styrene	$C_6H_5CH=CH_2$ (100-42-5)	-	Ex	Ex
	Toluene (methylbenzene, phenylmethane, toluol)	$C_6H_5CH_3$ (108-88-3)	-	Ex	Ex
	Turpentine	N/A (8006-64-2)	-	Ex	Ex
	White Spirit (Stoddard solvent, Mineral spirits)	N/A (8052-41-3)	-	Ex	Ex
	Xylene (dimethyl benzene, xylol)	$C_6H_4(CH_3)_2$ (95-47-6/108-38-3/106-42-3/1330-20-7)	-	**Ex**	Ex
Ketones & Aldehydes	Acetone	$(CH_3)_2CO$ (67-64-1)	-	Ex	Ex*
	Formaldehyde	HCHO (50-00-0)	37%	P	P
	Propionaldehyde	CH_3CH_2CHO (123-38-6)	-	P	P
	Methyl amyl ketone (2-Heptanone)	$C_7H_{14}O$ (110-43-0)	-	Ex	Ex
	Methyl ethyl ketone (MEK, butanone)	$CH_3C(O)CH_2CH_3$ (78-93-3)	-	**Ex**	Ex*

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Miscellaneous	Brake fluid	-	-	Ex	Ex
	Bromine water (saturated)	-	-	G	G
	Emulsion paint	-	-	Ex	Ex
	Fertilizer solutions	-	-	Ex	Ex
	Grease	-	-	Ex	Ex
	Ink (water based)	-	-	Ex	Ex
	Isothiazolinone	C_3H_3NOS (1003-07-2)	-	Ex	Ex
	N-Methylpyrrolidone (NMP)	C_5H_9NO (872-50-4)	-	M	M
	Resins & rosins (natural)	-	-	Ex	Ex
	Roof pitch	-	-	Ex	Ex
	Rubber latex emulsions	-	-	Ex	Ex
	Sewage	-	-	Ex	Ex
	Sodium hypochlorite (bleach)	NaOCl (7681-52-9)	10%	G	G
	Starch	$(C_6H_{10}O_5)_n$ (9005-25-8)	-	Ex	Ex
	Tar	-	-	Ex	Ex
	Tetraethyl lead	$(CH_3CH_2)_4Pb$ (78-00-2)	-	Ex	Ex
	Tetrahydrofuran	$(CH_2)_4O$ (109-99-9)	-	G	G
	Urea	$CO(NH_2)_2$ (57-13-6)	32%	Ex	Ex
	Water (deionised, distilled, fresh & sea)	H_2O (7732-18-5)	-	Ex	Ex
Oils - Mineral	Castor oil	-	-	Ex	Ex
	Coconut oil	-	-	Ex	Ex
	Cod liver oil	-	-	Ex	Ex
	Corn oil	-	-	Ex	Ex
	Diesel oil	-	-	Ex	Ex
	Hydraulic oil	-	-	Ex	Ex
	Lubricating oil	-	-	Ex	Ex
	Oil, petroleum	-	-	Ex	Ex
	Oil/water mixtures	-	-	Ex	Ex
	Silicone oil	-	-	Ex	Ex
	Soybean oil	-	-	Ex	Ex

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Salt Solutions (All Concentrations)	Aluminium chloride	$AlCl_3$ (7446-70-0)	-	Ex	Ex
	Aluminium sulphate	$Al_2(SO_4)_3$ (10043-01-3)	-	Ex	Ex
	Ammonium bicarbonate	$(NH_4)HCO_3$ (1066-33-7)	-	Ex	Ex
	Ammonium fluorosilicate	$(NH_4)_2SiF_6$ (16919-19-0)	-	Ex	Ex
	Ammonium nitrate	NH_4NO_3 (6484-52-2)	-	Ex	Ex
	Ammonium phosphate	$(NH_4)_3PO_4$ (10361-65-6)	-	Ex	Ex
	Ammonium sulfate	$(NH_4)_2SO_4$ (7783-20-2)	-	Ex	Ex
	Barium carbonate	$BaCO_3$ (513-77-9)	-	Ex	Ex
	Barium chloride	$BaCl_2$ (10361-37-2)	-	Ex	Ex
	Barium sulfate	$BaSO_4$ (7727-43-7)	-	Ex	Ex
	Barium sulphide	BaS (21109-95-5)	-	Ex	Ex
	Bromine chloride	BrCl (13863-41-7)	-	Ex	Ex
	Calcium carbonate	$CaCO_3$ (471-34-1)	-	Ex	Ex
	Calcium chloride	$CaCl_2$ (10043-52-4)	-	Ex	Ex
	Calcium fluoride	CaF_2 (7789-75-5)	-	Ex	Ex
	Calcium hypochlorite	$Ca(ClO)_2$ (7778-54-3)	-	Ex	Ex
	Calcium sulphate	$CaSO_4$ (7778-18-9)	-	Ex	Ex
	Chromium potassium sulphate (Chrome alum)	$KCr(SO_4)_2$ (10141-00-1)	-	Ex	Ex
	Copper acetate	$Cu(CH_3COO)_2$ (142-71-2)	-	Ex	Ex
	Copper chloride	$CuCl_2$ (7447-39-4)	-	Ex	Ex
	Copper nitrate	$Cu(NO_3)_2$ (3251-23-8)	-	Ex	Ex
	Copper sulphate	$CuSO_4$ (7758-98-7)	-	Ex	Ex
	Ferric chloride	$FeCl_3$ (7705-08-0)	-	Ex	Ex
	Ferric nitrate	$Fe(NO_3)_3$ (10421-48-4)	-	Ex	Ex
	Ferric sulfate	$Fe_2(SO_4)_3$ (10028-22-5)	-	Ex	Ex
	Ferrous chloride	$FeCl_2$ (7758-94-3)	-	Ex	Ex

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Salt Solutions (All Concentrations) continued	Ferrous sulfate	$FeSO_4$ (7720-78-7)	-	Ex	Ex
	Magnesium bisulfate	$Mg(HSO_4)_2$ (10028-26-9)	-	Ex	Ex
	Magnesium carbonate	$MgCO_3$ (546-93-0)	-	Ex	Ex
	Magnesium chloride	$MgCl_2$ (7786-30-3)	-	Ex	Ex
	Magnesium sulphate (Epsom salt)	$MgSO_4$ (7487-88-9)	-	Ex	Ex
	Mercuric chloride	$HgCl_2$ (7487-94-7)	-	Ex	Ex
	Mercuric cyanide	$Hg(CN)_2$ (592-04-1)	-	Ex	Ex
	Nickel ammonium sulfate	$(NH_4)_2Ni(SO_4)_2$ (7785-20-8)	-	Ex	Ex
	Nickel chloride	$NiCl_2$ (7718-54-9)	-	Ex	Ex
	Nickel nitrate	$Ni(NO_3)_2$ (13138-45-9)	-	Ex	Ex
	Nickel sulphate	$NiSO_4$ (7786-81-4)	-	Ex	Ex
	Potassium bisulfite	$KHSO_3$ (7773-03-7)	-	Ex	Ex
	Potassium bromide	KBr (7758-02-3)	-	Ex	Ex
	Potassium carbonate	K_2CO_3 (584-08-7)	-	Ex	Ex
	Potassium chlorate	$KClO_3$ (3811-04-9)	-	Ex	Ex
	Potassium chloride	KCl (7447-40-7)	-	Ex	Ex
	Potassium cyanide	KCN (151-50-8)	-	Ex	Ex
	Potassium dichromate	$K_2Cr_2O_7$ (7778-50-9)	-	Ex	Ex
	Potassium diphosphate	K_2HPO_4 (7758-11-4)	-	Ex	Ex
	Potassium ferricyanide	$K_3[Fe(CN)_6]$ (13746-66-2)	-	Ex	Ex
	Potassium ferrocyanide	$K_4[Fe(CN)_6]$ (13943-58-3)	-	Ex	Ex
	Potassium iodide	KI (7681-11-0)	-	Ex	Ex
	Potassium nitrate	KNO_3 (7757-79-1)	-	Ex	Ex
	Potassium permanganate	$KMnO_4$ (7722-64-7)	-	Ex	Ex
	Potassium sulfate	K_2SO_4 (7778-80-5)	-	Ex	Ex
	Potassium sulfide	K_2S (1312-73-8)	-	Ex	Ex

Excellent	**Ex**	No significant deterioration / barrier properties retained for greater than 52 weeks. *suitable for all applications including long term immersion*
Good	**G**	No significant deterioration / barrier properties retained for 12-52 weeks *Suitable for short-term immersion and general chemical contact*
Moderate	**M**	No significant deterioration / barrier properties retained for 1-12 weeks *Suitable for applications involving short term chemical contact e.g. spillage, splashing or secondary containment*
Poor	**P**	Significant deterioration / loss of barrier properties after 1 week or less *Not suitable for any applications*
*		Product must be post cured to deliver quoted chemical resistance. As for general guidance, the coating should be subjected to the following conditions as a minimum; 1hr at 100 °C/2hrs at 90 °C/4hrs at 80 °C/8hrs at 70 °C/16hrs at 60 °C. For specific recommendations, please contact Belzona.
Ex		**Bold** text highlights real life data obtained via chemical resistance testing
Ex		Normal font indicates that the resistance has been predicted based upon partial test data and /or similar reagents
Note:		Chemical resistance ratings are assigned based on the ability of a Belzona product to resist chemical attack and/or protect the underlying substrate. Belzona cannot guarantee the purity of the chemical, appearance or colour stability following contact.

CHEMICAL RESISTANCE OF BELZONA® 4301

FN10208

	Chemical name (Synonym)	Chemical formula (CAS number)	Concentration	20°C (68°F)	40°C (104°F)
Salt Solutions (All Concentrations) continued	Potassium sulphite	K_2SO_3 (10117-38-1)	-	Ex	Ex
	Silver nitrate	$AgNO_3$ (7761-88-8)	-	Ex	Ex
	Sodium acetate	CH_3COONa (127-09-3)	-	Ex	Ex
	Sodium aluminate	$NaAlO_2$ (1302-42-7)	-	Ex	Ex
	Sodium bicarbonate	$NaHCO_3$ (144-55-8)	-	Ex	Ex
	Sodium bisulfate	$NaHSO_4$ (7681-38-1)	-	Ex	Ex
	Sodium bisulfite	$NaHSO_3$ (7631-90-5)	-	Ex	Ex
	Sodium borate (borax)	$Na_2B_4O_7$ (1303-96-4)	-	Ex	Ex
	Sodium bromide	NaBr (7647-15-6)	-	Ex	Ex
	Sodium carbonate (soda ash)	Na_2CO_3 (497-19-8)	-	Ex	Ex
	Sodium chlorate	$NaClO_3$ (7775-09-9)	-	Ex	Ex
	Sodium chloride	NaCl (7647-14-5)	-	Ex	Ex
	Sodium chromate	Na_2CrO_4 (7775-11-3)	-	Ex	Ex
	Sodium cyanide	NaCN (143-33-9)	-	Ex	Ex
	Sodium fluoride	NaF (7681-49-4)	-	Ex	Ex
	Sodium fluorosilicate	Na_2SiF_6 (16893-85-9)	-	Ex	Ex
	Sodium metaphosphate	$(NaPO_3)_6$ (10124-56-8)	-	Ex	Ex
	Sodium metasilicate (sodium silicate)	Na_2SiO_3 (6834-92-0)	-	Ex	Ex
	Sodium nitrate	$NaNO_3$ (7631-99-4)	-	Ex	Ex
	Sodium phosphate (dibasic)	Na_2HPO_4 (7558-79-4)	-	Ex	Ex
	Sodium phosphate (tribasic)	Na_3PO_4 (7601-54-9)	-	Ex	Ex
	Sodium sulfate	Na_2SO_4 (7757-82-6)	-	Ex	Ex
	Sodium sulfide	Na_2S (1313-82-2)	-	Ex	Ex
	Stannous chloride (tin chloride)	$SnCl_2$ (7772-99-8)	-	Ex	Ex
	Zinc chloride	$ZnCl_2$ (7646-85-7)	-	Ex	Ex
	Zinc sulfate	$ZnSO_4$ (7733-02-0)	-	Ex	Ex

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Ex		**Bold** text highlights real life data obtained via chemical resistance testing
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