




Chemical resistance

for Krah pipes



Chemical resistance

- PE** = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure
s.s. = saturated solution

- Symbols:**
 = resistant
 = limited resistance
 = non-resistant

The following data is derived from DIN and ISO codes.






































































The most important advantages of plastic pipes are durability, low weight, flexibility and the chemical resistance. Especially for industrial and sewage application the chemical resistance is decisive. Polyethylene and Polypropylene are extremely resistant against many acids, lyes and other hazardous chemicals in comparison to other pipe material. For more than 50 years Polyethylene and Polypropylene have been successfully used for multitudes of chemical load cases. The following table shows different applications where the chemical resistance has been tested in detail. It considers experience of worldwide-acting Krah pipe producers accompanied by general literature references.

Please notice that the Krah Pipes GmbH cannot be held liable for errors contained in these information.

Chemicals	Formulae	Conc.	Temp.	PE	PP
Acet aldehyde	CH ₃ CHO	100%	20°C 60°C	 	
Acetic acid	CH ₃ COOH	10%	20°C 60°C	 	
Acetic acid glacial	(CH ₃ CO) ₂ O	96%	20°C 60°C	 	
Acetic anhydride	CH ₃ CO-O-COOH ₃	100%	20°C 60°C	 	
Acetone	CH ₃ COCH ₃	100%	20°C 60°C	 	
Acetic acid	CH ₃ COOH	100%	20°C 60°C	 	
Acetic alcohol	CH ₂ =CH-CH ₂ OH	96%	20°C 60°C	 	
Alum	KAl(SO ₄) ₂	≤10%	20°C 60°C	 	
Aluminium Chloride	AlCl ₃	s.s.	20°C 60°C	 	
Aluminium fluoride	AlF ₃	s.s.	20°C 60°C	 	




PE = PE80,PE100;Polyethylene;high density
 PP = Polypropylene
 a.s. = aqueous solution
 t.p. = technically pure




























































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Aluminium sulphate	$Al_2(SO_4)_3$	s.s.	20°C 60°C	 	 
Ammonia (aqueous solution)	NH_3	≤10%	20°C 60°C	 	 
Ammonia (gas)	NH_3	100%	20°C 60°C	 	 
Ammonia chloride	NH_4Cl	s.s.	20°C 60°C	 	 
Ammonium bicarbonate	NH_4HCO_3	s.s.	20°C 60°C	 	 
Ammonium fluoride	NH_4F	≤20%	20°C 60°C	 	 
Ammonium nitrate	NH_4NO_3	s.s.	20°C 60°C	 	 
Ammonium sulphate	$(NH_4)_2SO_4$	s.s.	20°C 60°C	 	 
Ammonium sulphide	$(NH_4)_2S$	≤10%	20°C 60°C	 	 
Amyl acetate	$CH_3COO-C_5H_{11}$	t.p.	20°C 60°C	 	 
Aniline	$C_6H_5NH_2$	t.p.	20°C 60°C	 	 
Antimony trichloride	$SbCl_3$	s.s.	20°C 60°C	 	 
Aqua regia	HNO_3+HCl	s.s.	20°C 60°C	 	 
Arsenic acid	H_3AsO_4	s.s.	20°C 60°C	 	 
Barium carbonate	$BaCO_3$	s.s.	20°C 60°C	 	 
Barium chloride	$BaCl_2$	s.s.	20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Krah does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Krah will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure










s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Barium hydroxide	$Ba(OH)_2 \cdot 8 H_2O$	s.s.	20°C 60°C	 	 
Barium sulphate	$BaSO_4$	s.s.	20°C 60°C	 	 
Barium sulphide	BaS	s.s.	20°C 60°C	 	 
Beer		100%	20°C 60°C	 	 
Benzaldehyde	C_6H_5CHO	s.s.	20°C 60°C	 	
Benzine	$C_5H_{12} - C_{12}H_{26}$	t.p.	20°C 60°C	 	 
Benzoid acid	C_6H_5COOH	t.p.	20°C 60°C	 	 
Benzene	C_6H_6	t.p.	20°C 60°C	 	 
Borax	$Na_2B_4O_7$	s.s.	20°C 60°C	 	 
Boric acid	H_3BO_3	s.s.	20°C 60°C	 	 
Bromine (dry gas)	Br_2		20°C 60°C	 	 
Bromine (liquid)	Br_2	s.s.	20°C 60°C	 	 
Butane (gas)	C_4H_{10}		20°C 60°C	 	 
Butanol	C_4H_9OH	a.s.	20°C 60°C	 	 
Butyric acid	C_3H_7COOH	t.p.	20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Kran does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Kran will help the customer to find the right surveyor, if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure

























































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Calcium carbonate	CaCO ₃	s.s.	20°C 60°C	 	 
Calcium chlorate	Ca(ClO ₃) ₂		20°C 60°C	 	 
Calcium chloride	CaCl ₂	s.s.	20°C 60°C	 	 
Calcium hydroxide	Ca(OH) ₂	s.s.	20°C 60°C	 	 
Calcium hypochlorite	Ca(OCL) ₂	>10%	20°C 60°C	 	 
Calcium nitrate	Ca(NO ₃) ₂	s.s.	20°C 60°C	 	 
Calcium sulphate	CaSO ₄	s.s.	20°C 60°C	 	 
Calcium sulphide	CaS	s.s.	20°C 60°C	 	 
Carbon disulphide	CS ₂	100%	20°C 60°C	 	
Carbon monoxide	CO	100%	20°C 60°C	 	 
Carbon tetrachloride	CCl ₄	100%	20°C 60°C	 	
Caustic soda	NaOH	>10%	20°C 60°C	 	 
Caustic soda (sodium hydroxide)	NaOH	40%	20°C 60°C	 	 
Caustic soda (sodium hydroxide)	NaOH	70%	20°C 60°C	 	 
Chlorine (aqueous solution)	Cl ₂		20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Krah does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Krah will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure


























































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Chlorine dioxide (dry gas)	ClO ₂	100%	20°C 60°C		 
Chlorine (dry gas)	Cl ₂	100%	20°C 60°C	 	
Chlorine methane	CH ₃ Cl	100%	20°C 60°C	 	 
Chloroacetic acid	ClCH ₂ COOH	>10%	20°C 60°C	 	 
Chloroform	CHCl ₃	100%	20°C 60°C	 	 
Chromic acid	H ₂ CrO ₄	>10%	20°C 60°C	 	
Citric acid	(COOH) ₃ C(CH ₂) ₂ OH		20°C 60°C	 	 
Cupric chloride	CuCl ₂	s.s.	20°C 60°C	 	 
Cupric nitrate	Cu(NO ₃) ₂		20°C 60°C	 	 
Cupric sulphate	CuSO ₄	s.s.	20°C 60°C	 	 
Cyclohexanol	C ₆ H ₁₁ OH	t.p.	20°C 60°C	 	 
Cyclohexanone	C ₆ H ₁₀ O	t.p.	20°C 60°C	 	 
Dekalin	C ₁₀ H ₁₈	t.p.	20°C 60°C	 	 
Developer (photographic)		norm. conc	20°C 60°C	 	 
Dextrine	(C ₆ H ₁₀ O ₅) _n	s.s.	20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Kranh does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Kranh will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure



























































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Diethyl ether	$(C_2H_5)_2O$	t.p.	20°C 60°C	 	 
Dioktyl phthalate	$C_6H_4(COOC_8H_{17})_2$		20°C 60°C	 	 
Dioxane	$O(C_2H_4)_2O$	t.p.	20°C 60°C	 	 
Ethanol	C_2H_5OH	96%	20°C 60°C	 	 
Ethyl acetate	$CH_3COOC_2H_5$	s.s.	20°C 60°C	 	 
Ethylene glycol	$(CH_2OH)_2$	100%	20°C 60°C	 	 
Ferrous chloride	$FeCl_3$		20°C 60°C		 
Ferrous sulphate	$Fe_2(SO_4)_3$		20°C 60°C	 	 
Fluorine (gas)	F_2	100%	20°C 60°C	 	 
Formaldehyde	$HCHO$	40%	20°C 60°C	 	 
Formic acid	$HCOOH$	90%	20°C 60°C	 	 
Furfuryl alcohol	$C_5H_6O_2$	t.p.	20°C 60°C	 	
Glucose	$C_6H_{12}O_6$		20°C 60°C	 	 
Glycerol	$C_3H_8O_3$	s.s.	20°C 60°C	 	 
Heptane	C_7H_{16}	100%	20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Krah does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Krah will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure


























































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Hydrobromic acid	HBr	20%	20°C		
			60°C		
Hydrochlorid acid	HCl	10%	20°C		
			60°C		
Hydrochloric acid	HCl	38%	20°C		
			60°C		
Hydrocyanic acid	HCN	10%	20°C		
			60°C		
Hydrofluoric acid	HF	30%	20°C		
			60°C		
Hydrofluoric acid	HF	50%	20°C		
			60°C		
Hydrogen	H ₂	100%	20°C		
			60°C		
Hydrogen sulphide (gas)	H ₂ S	100%	20°C		
			60°C		
Hydroquinon	HO-<->-OH	s.s.	20°C		
			60°C		
Iron nitrate	Fe(NO ₃) ₃ .9H ₂ O	s.s.	20°C		
			60°C		
Lactic acid	CH ₃ CH(OH)COOH	80%	20°C		
			60°C		
Machine oil			20°C		
			60°C		
Magnesium carbonate	MgCO ₃		20°C		
			60°C		
Magnesium chloride	MgCl ₂		20°C		
			60°C		
Magnesium hydroxide	Mg(OH) ₂		20°C		
			60°C		

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Kran does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Kran will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure





















s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Magnesium nitrate	$Mg(NO_3)_2$		20°C 60°C	 	 
Maleic acid	$(CHCOO)_2$	>10%	20°C 60°C	 	 
Mercury chloride	$HgCl_2$		20°C 60°C	 	 
Mercuric nitrate	$Hg(NO_3)_2$		20°C 60°C	 	
Mercury	Hg	100%	20°C 60°C	 	 
Mercury cyanide	$Hg(CN)_2$		20°C 60°C	 	 
Methanol	CH_3OH	100%	20°C 60°C	 	 
Milk	(From cow or goat)	100%	20°C 60°C	 	 
Mineral oils			20°C 60°C	 	 
Nickel chloride	$NiCl_2$	s.s.	20°C 60°C	 	 
Nickel nitrate	$Ni(NO_3)_2$	s.s.	20°C 60°C	 	 
Nickel sulphate	$NiSO_4$	s.s.	20°C 60°C	 	 
Nicotinic acid	C_5H_4NCOOH	≤ 10%	20°C 60°C		 
Nitric acid	HNO_3	10%	20°C 60°C	 	
Nitric acid	HNO_3	50%	20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Krah does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Krah will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure
























































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Nitric acid	HNO ₃	75%	20°C		
			60°C		
Nitric acid	HNO ₃	98%	20°C		
			60°C		
Oils and greases			20°C		
			60°C		
Oils (animal and vegetable oils)			20°C		
			60°C		
Oils (essential)			20°C		
			60°C		
Oleic acid	C ₁₈ H ₃₄ O ₂	100%	20°C		
			60°C		
Oleum	H ₄ SO ₄ + SO ₃	fuming	20°C		
			60°C		
Orthophosphoric acid	H ₃ PO ₄	50%	20°C		
			60°C		
Orthophosphoric acid	H ₃ PO ₄	95%	20°C		
			60°C		
Oxalic acid	HOCCOOH	50%	20°C		
			60°C		
Oxygen	O ₂	100%	20°C		
			60°C		
Ozone	O ₃	100%	20°C		
			60°C		
Peroxide	H ₂ O ₂		20°C		
			60°C		
Peroxide	H ₂ O ₂	90%	20°C		
			60°C		
Phenol	C ₆ H ₅ OH	≥ 10%	20°C		
			60°C		

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Kran does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Kran will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure

















































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Phosphorus trichloride	PCl_3	t.p.	20°C 60°C		 
Picric acid	$C_6H_2(OH)(NO_2)_3$		20°C 60°C		 
Potassium bicarbonate	$KHCO_3$		20°C 60°C		 
Potassium bromate	$KBrO_3$		20°C 60°C	 	 
Potassium bromide	KBr		20°C 60°C	 	 
Potassium carbonate	K_2CO_3		20°C 60°C	 	 
Potassium chlorate	$KClO_3$		20°C 60°C	 	 
Potassium chloride	KCl		20°C 60°C	 	 
Potassium chromate	K_2CrO_4		20°C 60°C	 	 
Potassium cyanide	KCN	> 10%	20°C 60°C	 	 
Potassium dichromate	$K_2Cr_2O_7$	s.s.	20°C 60°C	 	 
Potassium ferri cyanide	$K_3[Fe(CN)_6]$		20°C 60°C	 	 
Potassium ferrocyanide	$K_4[Fe(CN)_6]$		20°C 60°C	 	 
Potassium fluoride	KF		20°C 60°C	 	 
Potassium hydrogen sulphate	$KHSO_4$		20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Krah does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Krah will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure






















































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Potassium hydrogen sulphide	KHSO_3	> 10%	20°C 60°C	 	
Potassium hydroxide	KOH	25%	20°C 60°C	 	 
Potassium hypochlorite	KClO	> 10%	20°C 60°C	 	
Potassium nitrate	KNO_3		20°C 60°C	 	 
Potassium orthophosphate	K_3PO_4		20°C 60°C	 	 
Potassium perchlorate	KClO_4		20°C 60°C	 	 
Potassium permanganate	KMnO_4	10%	20°C 60°C	 	 
Potassium persulfate	$\text{K}_2\text{S}_2\text{O}_8$		20°C 60°C	 	 
Potassium sulphate	KSO_4	t.p.	20°C 60°C	 	 
Potassium sulphide	K_2S		20°C 60°C	 	 
Propionic acid	$\text{CH}_3\text{CH}_2\text{COOH}$	50%	20°C 60°C		 
Pyridine	$\text{C}_5\text{H}_5\text{N}$	> 10%	20°C 60°C	 	 
Salicylic acid	$\text{C}_6\text{H}_4(\text{OH})(\text{CO}_2\text{H})$		20°C 60°C	 	
Silver acetate	CH_3COOAg		20°C 60°C		
Silver cyanide	AgCN		20°C 60°C		 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Kran does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Kran will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure























s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Silver nitrate	AgNO ₃		20°C 60°C	 	 
Sodium benzoate	C ₆ H ₅ COONa		20°C 60°C	 	 
Sodium bromide	NaBr	s.s.	20°C 60°C	 	 
Sodium carbonate	Na ₂ CO ₃	10%	20°C 60°C	 	 
Sodium chlorate	NaClO ₃	> 10%	20°C 60°C	 	 
Sodium chloride	NaCl	> 10%	20°C 60°C	 	 
Sodium cyanide	NaCN		20°C 60°C	 	 
Sodium ferricyanide	Na ₃ [Fe(CN) ₆] · H ₂ O		20°C 60°C		 
Sodium ferrocyanide	Na ₄ [Fe(CN) ₆] · 10 H ₂ O		20°C 60°C		 
Sodium fluoride	NaF		20°C 60°C	 	 
Sodium hydrogen carbonate	NaHCO ₃		20°C 60°C	 	 
Sodium hydrogen phosphate	Na ₂ HPO ₄		20°C 60°C	 	
Sodium hydrogen sulphide	NaHSO ₃	> 10%	20°C 60°C	 	 
Sodium hypochlorite	NaOCl	5%	20°C 60°C		 
Sodium nitrate	NaNO ₃	s.s.	20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Krah does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Krah will help the customer to find the right surveyor if requested.




PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure


















































s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Sodium nitrite	NaNO ₂	s.s.	20°C 60°C	 	 
Sodium orthophosphate	Na ₃ PO ₄		20°C 60°C	 	 
Sodium sulphate	Na ₂ SO ₄	s.s.	20°C 60°C	 	 
Sodium sulohide	Na ₂ S		20°C 60°C	 	 
Sodium sulphite	Na ₂ SO ₃		20°C 60°C	 	 
Stannic chloride	ZnCl ₂		20°C 60°C	 	 
Sulphuric acid	H ₂ SO ₄	10%	20°C 60°C	 	 
Sulphuric acid	H ₂ SO ₄	50%	20°C 60°C	 	 
Sulphuric acid	H ₂ SO ₄	95%	20°C 60°C		
Sulphuric acid	H ₂ SO ₄	98%	20°C 60°C	 	 
Sulphuric subacidity	H ₂ SO ₃	90%	20°C 60°C	 	 
Sulphur dioxide (dry)	SO ₂	100%	20°C 60°C	 	 
Sulphurtrioxide	SO ₃	100%	20°C 60°C	 	 
Tannic acid	C ₇₆ H ₅₂ O ₄₆	> 10%	20°C 60°C		 
Tartaric (dihydroxisuccinic) acid	C ₄ H ₆ O ₆	> 10%	20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Kran does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Kran will help the customer to find the right surveyor if requested.

PE = PE80,PE100;Polyethylene;high density
PP = Polypropylene
a.s. = aqueous solution
t.p. = technically pure

s.s. = saturated solution
 = resistant
 = limited resistance
 = non-resistant

Chemicals	Formulae	Conc.	Temp.	PE	PP
Toluene	$C_6H_5CH_3$	100%	20°C 60°C	 	 
Trichlorethylene	$Cl-CH=CCl_2$	100%	20°C 60°C	 	 
Triethanolamine	$(C_2H_4OH)_3N$	> 10%	20°C 60°C	 	
Urea	$(NH_2)_2CO$	> 10%	20°C 60°C	 	 
Urine			20°C 60°C	 	 
Water (incl. sea water)	H_2O		20°C 60°C	 	 
Wines and alcohols (commercial grades)			20°C 60°C	 	 
Wine vinegar			20°C 60°C	 	 
Xylene	$C_6H_4(CH_3)_2$	100%	20°C 60°C	 	 
Zinc carbonate	$ZnCO_3$		20°C 60°C	 	
Zinc chloride	$ZnCl_2$		20°C 60°C	 	 
Zinc nitrate	$Zn(NO_3)_2 \cdot 6 H_2O$		20°C 60°C	 	 
Zinc sulphate	$ZnSO_4$		20°C 60°C	 	 

All the stated information and data is drawn from the general empirical judgement in the field of polyethylene. Krah does not guarantee for safe handling with the named chemicals. The operator is asked to gather more information regarding the use of polyethylene chemicals and to eventually consult a surveyor. Krah will help the customer to find the right surveyor if requested.

KRAHTM
krah-pipes.com **PIPES**

Krah Pipes GmbH & Co. KG
Betzdorfer Str. 8
57520 Schutzbach / Germany

www.krah-pipes.com