Agrochemicals

Additives and raw materials

Local. Global. Integrated.


Operating in 17 countries, in 39 different locations, PCC SE currently employs over 3 300 people.

About us

The PCC Group is an international capital structure made up of dozens of companies operating in three major sectors of the economy: Chemicals, Energy and Logistics. The organisations within the PCC Group are both business units engaged in production activities and service companies operating simultaneously for the external market.

The PCC Group is centrally managed by the German company PCC SE and comprises more than 74 companies at 39 locations in 17 countries around the world. One of the key elements of PCC SE's strategy is the dynamic development of the chemicals business by exploiting the potential of new market segments and diversifying the portfolio of raw materials and chemical formulations in line with current trends in various industries. Every day, our specialists work on the stable growth and development of their organisations, making the PCC Group stronger and building a solid business platform for all contractors interested in reliable and longterm cooperation.

PCC ROKITA SA
PCC PCG
OXYALKYLATES
IRPC

Polyols

- Polyether polyols
- Polyester polyols
- Prepolymers
- Polyurethane Systems

PCC
ROKITA SA

Chlorine

- Chlorine
- MCAA
- Other Chlorine Downstream Product

PCC
ROKITA SA

Phosphorus

- Phosphorus derivatives
- Naphthalene derivatives
- Polycarboxyethers (PCE)

PCC EXOL SA
PCC CHEMAX INC
PCC PCG OXYALKYLATES

Surfactants

- Anionic surfactants
- Cationic surfactants
- Nonionic surfactants
- Amphoteric surfactants (betaines)
- Chemical formulation

PCC
SYNTEZA

Alkylphenols

- Nonylphenol
- Dodecylphenol
- Tristyrylphenol

PCC CONSUMER PRODUCTS SA

Consumer Products

- Household & industrial Cleaners, Detergents and Personal Care Products

PCC
ROKITA SA

Energy

- Renewable Energy
- Conventional Energy

PCC
INTERMODAL SA

Logistics

- Intermodal transport
- Road Haulage
- Rail Transport

PCC
BAKKISILICON HF.

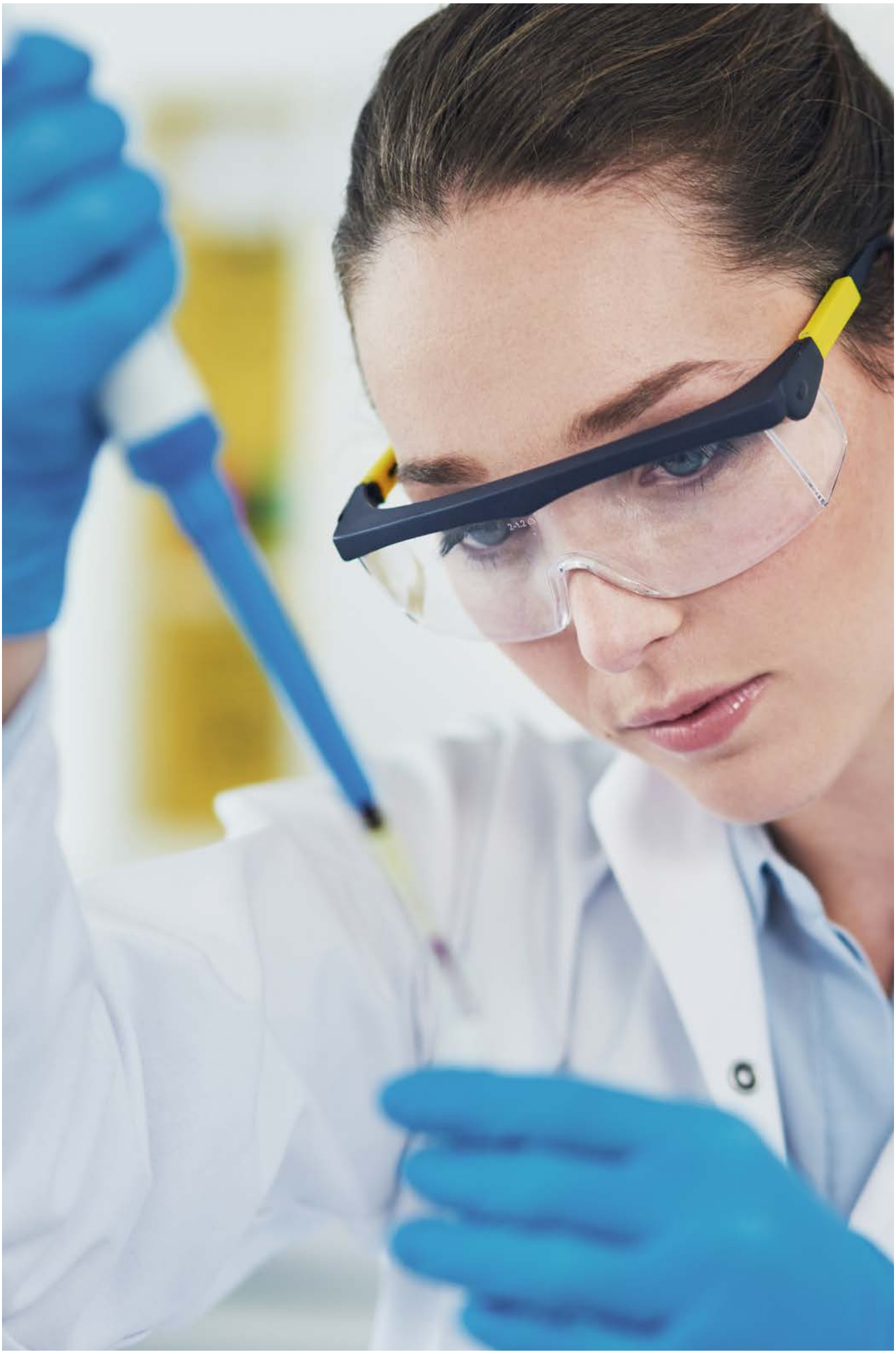
Silicon

- Microsillica
- Silicon Metal

PCC
SE

Holding & Projects

- Portfolio Management
- Project Development



About PCC Exol

PCC Exol your sustainable partner with crop protection formulations.

PCC Exol is the unquestionable leader in its industry in Central and Eastern Europe. Most of the production facilities and the company's headquarters are located in Brzeg Dolny, near Wrocław in Poland. This is where we design, test, and manufacture a wide range of anionic, nonionic, amphoteric surfactants as well as specialized industrial formulations.

Anionic, Nonionic, Cationic, Amphoteric Surfactants

- over 700 products and formulations
- 7 manufacturing plants
- 144,000 tons of production capacity

Natural fatty Alcohols & Natural Oils

Oleochemicals

Polymers & Synthetic fatty Alcohols

Petrochemicals

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Applications of Surfactants in Agrochemicals

The agrochemical industry focuses its efforts on developing active ingredients specifically designed to help farmers fight weeds, fungi, pests and other, destroying their crops. Such active co-formulants are not suitable for use in their raw state. Instead, they must be formulated with specialist additives, co-formulant and adjuvants which improve active delivery and performance.

PCC EXOL products have many uses and applications across the broad spectrum of crop protection formulations and adjuvants. Our focus is the development of additives, which enhance the performance of customers formulations. The following table shows different product groups and their main applications by formulation type.

Product group	EC	SC	EW	ME	OD	SL	WG	WP
Alkyl Sulfates		•			•	•	•	•
Alkylbenzene Sulfonates	•	•	•	•	•	•	•	•
Alkyl Ether Sulfates		•	•	•		•	•	•
Sulfosuccinates		•	•	•		•	•	•
Betaines		•				•		
Fatty Amine Ethoxylates	•	•	•	•	•	•	•	•
Nonylphenol Ethoxylates	•	•	•	•	•	•	•	•
Fatty Alcohol Ethoxylates	•	•	•	•	•	•	•	•
Sorbitan Esters	•		•	•				
Sorbitan Esters Ethoxylates	•		•	•		•	•	•
EO/PO Alcohol Ethoxylates	•	•					•	
Castor Oil Ethoxylates	•	•	•	•	•			
EO/PO Block Copolymers	•	•	•	•				
Phosphate esters	•	•			•		•	•

Formulation codes:
EC - Emulsifiable Concentrate
SC - Suspension Concentrate
EW - Emulsion (Oil-in-Water)
ME - Microemulsion
OD - Oil Dispersion
SL - Soluble Concentrate
WG - Water Soluble Granules
WP - Water Soluble Powders

Surfactants
are used primarily as wetting agents, emulsifiers and dispersing agents but also have uses as low foaming agents and anti-caking agents. They play a very important role as adjuvants and additives in crop-protection formulations.

Adjuvants
are used to aid or modify the action of agrochemical or their physical characteristics. Adjuvants must be adjusted to the pesticides, the crop species, the weed species and the prevailing environment for maximum effectiveness. Adjuvants are already included in the formulations of some pesticides available for sale or they may be purchased separately and added into a tank mix prior to use. In this way, adding an appropriate adjuvant can decrease the amount of pesticide applied and lower the total costs of weed control.

Wetting agents
are substances that decrease the surface tension which permits spreading drops onto a surface increasing the spreading abilities of a liquid. The molecules of these compounds are composed of a hydrocarbon chain with low affinity to water and a hydrophilic head. They form micelles, thanks to which they allow for easy distribution of liquids and perfect moisturizing of the surface. They also have the ability to remove air from solids.

Emulsifiers
are substances that enable the formation of emulsions and prevent the reaggregation of molecules. Emulsifiers are chemical compounds of amphiphilic structure, which means that hydrophilic polar groups (called 'head') and hydrophobic non-polar groups (called 'tail') are present in their structure. The emulsifier molecules adsorb at the phase boundary, reducing the interfacial tension. After reducing the tension, a spontaneous emulsification process takes place under the influence of the movement of particles. The resulting stable system is called an emulsion.

Dispersing agents
are substances that break down larger particles and prevent their further reaggregation. The dispersion system consists of two immiscible phases – one of which is a continuous phase and the other is a dispersed phase. Additional mechanical energy is required to disperse the substance, which will cause the dispersant to mix with the phases that make up the system. Dispersants adsorb on the surface of the particles of the phase to be dispersed. Surfactant molecules surrounding the droplets protect them from reaggregation due to electrostatic repulsion.

Low foaming agents
are additives whose main role is to prevent the formation of abundant foam. Low-foaming preparations are used wherever the effect of rapid growth and stabilization of the foam is undesirable. Not only do they reduce foaming, but they also act as surfactants, and because of that they are also characterized by wetting and emulsifying properties. These products are required to be active in a wide temperature range and to be compatible with other ingredients in the preparations

Anti-caking agents
are a additives used in the most type of powder and granulated products or materials. They are used so that the powdered or granulated content doesn`t form lumps in moist conditions and can be packed easily. The most common anti-caking agents for fertilizers contain oils and fats to avoid the interaction of fertilizer particles with that of the atmosphere. Anti-caking agents operate by increasing the separation of the single particles, reducing the absorption of moisture and regulating the growth of crystals.

Product portfolio

Product name	Description	CAS	Appearance	HLB	Surface tension at 25°C [mN/m]	Active content [%]	Function				
							Emulsifier	Wetting agent	Low-foaming agent	Dispersing agent	Anti-caking agent
ABS Acid	Dodecylbenzene Sulfonic Acid	85536-14-7	liquid	–	36	min. 96.0	•	•		•	
ABSNa 25	Sodium Dodecylbenzenesulfonate	68411-30-3	clear liquid	–	–	24-26	•	•		•	
ABSNa 30	Sodium Dodecylbenzenesulfonate	68411-30-3	liquid	–	–	28-32	•	•		•	
ABSNa 50	Sodium Dodecylbenzenesulfonate	68411-30-3	paste/liquid	–	37	48-52	•	•		•	
ROSULfan L	Sodium Lauryl Sulfate	85586-07-8	liquid	–	39	27.5-30	•	•			
SULFOROKAnol L225/1	Sodium Laureth Sulfate + 2 EO	68891-38-3	liquid	–	30	25-27	•				
SULFOROKAnol L227/1	Sodium Laureth Sulfate + 2 EO	68891-38-3	liquid	–	30	26-28	•				
SULFOROKAnol L270/1	Sodium Laureth Sulfate + 2 EO	68891-38-3	paste/liquid gel	–	36	68-72	•				
SULFOSUCCINATE DOSS	Diethylhexyl Sodium Sulfosuccinate	577-11-7	liquid	–	–	min. 60.0	•	•		•	
SULFOSUCCINATE DOSS70GP	Diethylhexyl Sodium Sulfosuccinate	577-11-8	liquid	–	–	min. 70.0	•	•		•	
ROKAmina K30B	Coco Beaine	68424-94-2	liquid	–	30	29-32	•	•			
ROKAnol DB3	Alcohols. C12-15. ethoxylated	68131-39-5	liquid/paste	7.8	27	min. 99.7	•				
ROKAnol DB5	Alcohols. C12-15. ethoxylated	68131-39-5	liquid	10.2	28	min. 99.5	•				
ROKAnol DB7	Alcohols. C12-15. ethoxylated	68131-39-5	liquid/paste	12.0	29	min. 99.5	•	•			
ROKAnol DB7W	Alcohols. C12-15. ethoxylated	68131-39-5	oily liquid	12.0	29	91-93	•	•			
ROKAnol DB9	Alcohols. C12-15. ethoxylated	68131-39-5	paste	13.2	30	min. 99.5	•			•	
ROKAnol DB11W	Alcohols. C12-15. ethoxylated	68131-39-5	oily liquid/paste	13.6	34	88-92	•				
ROKAnol GA3	Alcohols. C10. ethoxylated	160875-66-1	liquid with tendency to separation	–	28	min. 99.5	•				
ROKAnol GA4	Alcohols. C10. ethoxylated	160875-66-1	liquid with tendency to separation	–	27	min. 99.5	•				
ROKAnol GA4LA	Polyoxyalkylene glycol based on Guerbet alcohol	166736-08-9	liquid	–	–	min. 99.5	•				
ROKAnol GA5	Alcohols. C10. ethoxylated	160875-66-1	liquid with tendency to separation	–	27	min. 99.5	•				
ROKAnol GA7	Alcohols. C10. ethoxylated	160875-66-1	liquid	12.0	27	min. 99.5	•	•	•		
ROKAnol GA7W	Alcohols. C10. ethoxylated	160875-66-1	liquid	12.0	27	84-86	•	•	•	•	
ROKAnol GA7LA	Alcohols. C10. ethoxylated	160875-66-1	liquid	–	28	min. 99.5	•		•		

Product portfolio

Product name	Description	CAS	Appearance	HLB	Surface tension at 25°C [mN/m]	Active content [%]	Function				
							Emulsifier	Wetting agent	Low-foaming agent	Dispersing agent	Anti-caking agent
ROKAnol GA7LAW	Polyoxyalkylene glycol based on Guerbet alcohol	166736-08-9	liquid	–	28	84-86	•		•		
ROKAnol GA8	Alcohols. C10. ethoxylated	160875-66-1	liquid	–	28	min. 99.5	•	•	•		
ROKAnol GA8W	Alcohols. C10. ethoxylated	160875-66-1	liquid	–	28	84-86	•	•	•	•	
ROKAnol GA9	Alcohols, C10, ethoxylated	160875-66-1	liquid	–	28	min. 99.5	•	•	•		
ROKAnol GA9W	Alcohols, C10, ethoxylated	160875-66-1	liquid	–	28	84-85	•	•	•		
ROKAnol GA9LA	Polyoxyalkylene glycol based on Guerbet alcohol	166736-08-9	liquid	–	30	min. 99.5	•	•	•		
ROKAnol GA12	Alcohols, C10, ethoxylated	160875-66-1	liquid	–	–	min. 99.5	•	•	•		
ROKAnol ID5	Alcohols, C9-11-iso-C10-rich, ethoxylated	78330-20-8	liquid	11.6	27	min. 99.5		•			
ROKAnol ID6	Alcohols, C9-11-iso-C10-rich, ethoxylated	78330-20-8	liquid	–	27	min. 99.5		•			
ROKAnol ID7	Alcohols, C9-11-iso-C10-rich, ethoxylated	78330-20-8	liquid	13.2	27	min. 99.5		•			
ROKAnol ID8	Alcohols, C9-11-iso-C10-rich, ethoxylated	78330-20-8	liquid	13.8	28	min. 99.5		•			
ROKAnol IT3	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	8.0	28	min. 99.0		•			
ROKAnol IT5	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	10.5	29	min. 99.5		•			
ROKAnol IT6	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	11.4	28	min. 99.5		•			
ROKAnol IT7	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	12.1	29	min. 99.0		•			
ROKAnol IT7W	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	12.1	29	89-91		•			
ROKAnol IT8	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid/paste	12.8	27	min. 99.5		•		•	
ROKAnol IT8W	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	12.8	27	89-91		•			
ROKAnol IT9	Alcohols, C13, branched, ethoxylated	69011-36-5	oily liquid/paste	13.3	28	min. 99.0		•			
ROKAnol IT9W	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	13.3	28	89-91		•			
ROKAnol IT10	Alcohols, C13, branched, ethoxylated	69011-36-5	turbid liquid/paste	13.8	29	min. 99.5		•			
ROKAnol IT10W	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	13.8	29	84-86		•			
ROKAnol IT12	Alcohols, C13, branched, ethoxylated	69011-36-5	turbid liquid/paste	14.5	29	min. 99.5		•			
ROKAnol IT12W	Alcohols, C13, branched, ethoxylated	69011-36-5	liquid	14.5	29	89-91		•			

Product portfolio

Product name	Description	CAS	Appearance	HLB	Surface tension at 25°C [mN/m]	Active content [%]	Function				
							Emulsifier	Wetting agent	Low-foaming agent	Dispersing agent	Anti-caking agent
ROKAnol K3	Alcohols, C16-18 and C18-unsatd., ethoxylated	68920-66-1	semi-liquid paste	7.2	–	26	•				
ROKAnol K5	Alcohols, C16-18 and C18-unsatd., ethoxylated	68920-66-1	liquid/paste	9.2	28	min. 99.0	•				
ROKAnol K7	Alcohols, C16-18 and C18-unsatd., ethoxylated	68920-66-1	semi-liquid/paste	10.8	31	min. 99.0	•				
ROKAnol K14	Alcohols, C16-18 and C18-unsatd., ethoxylated	68920-66-1	paste/wax	14.0	36	min. 99.0	•				
ROKAnol K18	Alcohols, C16-18 and C18-unsatd., ethoxylated	68920-66-1	paste/wax	15.8	41	min. 99.0	•				
ROKAnol K21	Alcohols, C16-18 and C18-unsatd., ethoxylated	68920-66-1	paste/wax	16.5	41	min. 99.0	•				
ROKAnol L3A	Alcohols. C12-16. ethoxylated	68551-12-2	liquid	8.0	–	min.99.0	•				
ROKAnol L4	Alcohols. C12-14. ethoxylated	68439-50-9	liquid	10.0	27	min. 99.0	•				
ROKAnol L4P5	Alcohols. C12-14. alkoxylated	68439-51-0	liquid	5.3	–	min. 99.0			•		
ROKAnol L5A	Alcohols. C12-16. ethoxylated	68551-12-2	liquid	10.5	–	min. 99.0	•				
ROKAnol L5P5	Alcohols. C12-14. alkoxylated	68439-51-0	liquid	6.0	–	min. 99.0			•		
ROKAnol L7	Alcohols. C12-14. ethoxylated	68439-50-9	liquid	12.9	29	min. 99.0	•				
ROKAnol L7W	Alcohols. C12-14. ethoxylated	68439-50-9	liquid	12.9	29	89-91	•				
ROKAnol LP2023	Alkoxylated fatty alcohol	68002-96-0	liquid	3.0	33	min. 99.5		•	•		
ROKAnol LP2024W/95	Alkoxylated fatty alcohol	37251-67-5	liquid	6.3	29	min. 95.0			•		
ROKAnol LP2126	Alkoxylated fatty alcohol	68002-96-0	liquid	1.3	–	min. 99.5			•		
ROKAnol LP2529	Alkoxylated fatty alcohol	68551-13-3	liquid	3.5	31	min. 99.5			•		
ROKAnol LP100	Alkoxylated fatty alcohol	–	liquid	–	36	min. 95.0			•		
ROKAnol LP200	Alkoxylated fatty alcohol	68439-30-5	liquid	7.3	31	min. 99.5			•		
ROKAnol LP400	Alkoxylated fatty alcohol	102782-43-4	liquid	9.6	29	min. 99.5			•		
ROKAnol LP700	Alkoxylated fatty alcohol	–	liquid	9.4	28	min. 99.5			•		
ROKAnol LP3034	Alkoxylated fatty alcohol	68551-13-3	liquid	–	31	min. 99.0			•		
ROKAnol LP3135	Alkoxylated fatty alcohol	154518-36-2	liquid	7.5	30	94-96			•		
ROKAnol LP3943	Alkoxylated fatty alcohol	68551-13-3	liquid	3.0	30	min. 99.5			•		

Product portfolio

Product name	Description	CAS	Appearance	HLB	Surface tension at 25°C [mN/m]	Active content [%]	Function				
							Emulsifier	Wetting agent	Low-foaming agent	Dispersing agent	Anti-caking agent
ROKAnol NL3	Alcohols. C9-11. ethoxylated	68439-46-3	liquid	8.5	26	min. 99.8		•			
ROKAnol NL4	Alcohols. C9-11. ethoxylated	68439-46-3	liquid	10.3	27	min. 99.5		•			
ROKAnol NL5	Alcohols. C9-11. ethoxylated	68439-46-3	liquid	11.6	27	min. 99.5		•			
ROKAnol NL6	Alcohols. C9-11. ethoxylated	68439-46-3	liquid	12.3	27	min. 99.5		•			
ROKAnol NL6W	Alcohols. C9-11. ethoxylated	68439-46-3	liquid	1.3	27	88-92		•			
ROKAnol NL8	Alcohols. C9-11. ethoxylated	68439-46-3	liquid	13.8	29	min. 99.5		•			
ROKAnol NL8P4	Alcohols. C9-11. alkoxylated	103818-93-5	liquid	9.5	31	min. 99.0		•	•		
ROKAnol NL9	Alcohols. C9-11. ethoxylated	68439-46-3	liquid	14.2	–	min. 99.5		•			
ROKAnol O3	Alcohols. C16-18 unsaturated. ethoxylated	9004-98-2	liquid	6.6	–	min. 99.0	•				
ROKAnol O5	Alcohols, C16-18 unsaturated, ethoxylated	9004-98-2	liquid	9.1	–	min. 99.0	•			•	
ROKAnol O18	Alcohols, C16-18 unsaturated, ethoxylated	9004-98-2	paste	16.3	44	min. 99.0	•				
ROKAnol O20	Alcohols, C16-18 unsaturated, ethoxylated	9004-98-2	paste	15.6	–	min. 99.0	•				
ROKAnol O100	Alcohols, C16-18 unsaturated, ethoxylated	9004-98-2	wax	18.9	48	min. 99.0	•				
ROKAnol RZ4P11	Alcohols, C16-18, alkoxylated	68002-96-0	liquid	12.5	33	min. 99.0	•		•	•	
ROKAnol T6	Alcohols, C16-18, ethoxylated	68439-49-6	wax	10.0	38	min. 99.5	•				
ROKAnol T10	Alcohols, C16-18, ethoxylated	68439-49-6	wax	12.5	36	min. 99.5	•				
ROKAnol T12	Alcohols, C16-18, ethoxylated	68439-49-6	wax	13.5	37	min. 99.5	•				
ROKAnol T18	Alcohols, C16-18, ethoxylated	68439-49-6	wax	15.8	42	min. 99.0	•				
ROKAnol TSP16	Ethoxylated tristyrylphenol	99734-09-5	viscous liquid	13.5	–	min. 99.5	•	•		•	
ROKAfenol N3	Nonylphenol, ethoxylated	127087-87-0	oily liquid	7.6	–	min. 99.0	•			•	
ROKAfenol N4	Nonylphenol, ethoxylated	127087-87-0	oily liquid	8.8	–	min. 99.0	•			•	
ROKAfenol N5	Nonylphenol, ethoxylated	127087-87-0	oily liquid	10.0	–	min. 99.0	•			•	
ROKAfenol N6	Nonylphenol, ethoxylated	127087-87-0	oily liquid	11.0	–	min. 99.0	•			•	
ROKAfenol N7	Nonylphenol, ethoxylated	127087-87-0	oily liquid	11.6	–	min. 99.0	•			•	
ROKAfenol N8	Nonylphenol, ethoxylated	127087-87-0	oily liquid	12.8	–	min. 99.0	•			•	

Product portfolio

Product name	Description	CAS	Appearance	HLB	Surface tension at 25°C [mN/m]	Active content [%]	Function				
							Emulsifier	Wetting agent	Low-foaming agent	Dispersing agent	Anti-caking agent
ROKAfenol N9	Nonylphenol, ethoxylated	127087-87-0	oily liquid	13.1	–	min. 99.0	•			•	
ROKAfenol N10	Nonylphenol, ethoxylated	127087-87-0	oily liquid	13.3	–	min. 99.0	•			•	
ROKAfenol N12	Nonylphenol, ethoxylated	127087-87-0	oily liquid	14.0	–	min. 99.0	•			•	
ROKAfenol N14	Nonylphenol, ethoxylated	127087-87-0	oily liquid	15.0	–	min. 99.0	•			•	
ROKAfenol N22	Nonylphenol, ethoxylated	127087-87-0	paste/wax	16.2	–	min. 99.0	•			•	
ROKAfenol N22/30	Nonylphenol, ethoxylated	127087-87-0	liquid	16.2	–	25-26.5	•			•	
ROKAmin K5	Cocamine, ethoxylated	61791-14-8	liquid	–	–	min. 99.0	•				
ROKAmin K15	Cocamine, ethoxylated	61791-14-8	liquid	15.5	40	min. 99.8	•				
ROKAmin SR5	Tallow amine, ethoxylated	61791-26-2	liquid/semi-liquid paste	9.8	–	min. 99.0	•				
ROKAmin SR8	Tallow amine, ethoxylated	61791-26-2	liquid/paste	12.4	–	72-77	•				
ROKAmin SR11	Tallow amine, ethoxylated	61791-26-2	liquid/paste	12.5	–	min. 99.0	•				
ROKAmin SR15	Tallow amine, ethoxylated	61791-26-2	liquid/paste	14.1	–	min. 99.5	•				
ROKAmin SR22	Tallow amine, ethoxylated	61791-26-2	paste	16.1	–	min. 99.0	•				
ROKAcet K7	Fatty acids, coco, ethoxylated	61791-29-5	liquid	11.6	–	min. 99.0	•				
ROKAcet O7	Oleic acid, ethoxylated	9004-96-0	liquid	10.6	–	min. 99.0	•				
ROKAcet R11	Castor oil, ethoxylated	61791-12-6	liquid	6.9	–	min. 99.5	•			•	
ROKAcet R26	Castor oil, ethoxylated	61791-12-6	liquid	11.0	–	min. 99.5	•			•	
ROKAcet R36	Castor oil, ethoxylated	61791-12-6	paste	–	–	min. 99.0	•			•	
ROKAcet R40	Castor oil, ethoxylated	61791-12-6	paste	13.0	–	min. 99.0	•			•	
ROKAcet R40W	Castor oil, ethoxylated	61791-12-6	paste	13.0	–	89-91	•			•	
ROKAcet R70	Castor oil, ethoxylated	61791-12-6	paste	15.4	–	min. 99.0	•			•	
ROKAcet R250	Castor oil, ethoxylated	61791-12-6	solid	18.5	–	min.99.0	•			•	
ROKAcet RZ17	Rapeseed oil, ethoxylated	70914-02-2	oily liquid	–	–	min. 99.0	•				
ROKAcet RZG12	Esters of rapeseed oil acids and ethoxylated glycerol	–	liquid	–	–	min. 99.0	•				

Product portfolio

Product name	Description	CAS	Appearance	HLB	Surface tension at 25°C [mN/m]	Active content [%]	Function				
							Emulsifier	Wetting agent	Low-foaming agent	Dispersing agent	Anti-caking agent
ROKAcet S24	Glycols, polyethylene, monostearate	9004-99-3	wax	15.8	–	min. 99.0	•			•	
ROKAcet S7	Glycols, polyethylene, monostearate	9004-99-3	paste	10.6	32	min. 99.0	•	•		•	
ROKAmer 2000	PEG/PPG Copolymer	9003-11-6	liquid	2.4	33	min. 99.0	•		•	•	
ROKAmer 2600	PEG/PPG Copolymer	9003-11-6	liquid	5.6	37	min. 99.0	•		•	•	
ROKAmer 2100	PEG/PPG Copolymer	9003-11-6	liquid	3.4	41	min. 99.0	•	•	•	•	
ROKAmer 2330	PEG/PPG Copolymer	9003-11-6	liquid	4.9	41	min. 99.0	•		•	•	
ROKAmer 1010	PEG/PPG Copolymer	9003-11-6	wax	16.6	46	min. 99.0	•		•	•	
ROKAmer 1010/50	PEG/PPG Copolymer	9003-11-6	liquid	16.6	46	49-51	•		•	•	
ROKAmer 2950	PEG/PPG Copolymer	9003-11-6	liquid/semi liquid paste	8.1	42	min. 99.0	•		•	•	
ROKAmer 6500	PEG/PPG Copolymer	9003-11-6	wax	–	35	min. 99.5	•	•		•	
ROKAmer 6500W	PEG/PPG Copolymer	9003-11-6	liquid	–	36	17–19	•	•		•	
ROKAmer 1000	PEG/PPG Copolymer	9003-11-6	liquid	–	44	min. 99.0	•		•	•	
ROKAmer R2800	PEG/PPG Copolymer	9003-11-6	liquid	2.8	36	min. 99.5	•		•	•	
ROKAmer G3500	Glycerine, alkoxylated	9003-11-6	liquid	–	–	min. 99.5	•		•	•	
ROKAmer G5000E	Glycerine, alkoxylated	9082-00-2	liquid	–	–	min. 99.5	•		•	•	
POLIkol 200	Polyoxyethylene glycol	25322-68-3	liquid	–	–	min. 99.5	•	•		•	
POLIkol 300	Polyoxyethylene glycol	25322-68-3	liquid	–	–	min. 99.5	•	•		•	
POLIkol 400	Polyoxyethylene glycol	25322-68-3	liquid	–	–	min. 99.5	•	•		•	
POLIkol 600	Polyoxyethylene glycol	25322-68-3	liquid	–	–	min. 99.5	•	•			
POLIkol 1500	Polyoxyethylene glycol	25322-68-3	wax	–	–	min. 99.0	•	•			
POLIkol 1500 FLAKES	Polyoxyethylene glycol	25322-68-3	flakes	–	–	min. 98.5	•	•			
ROKwin 80	Sorbitan monooleate	1338-43-8	liquid	4.3	–	min. 98.5	•				
ROKwinol 20	Sorbitan monolaureate, ethoxylated	9005-64-5	liquid	16.7	36	min. 97.0	•				
ROKwinol 80	Sorbitan monooleate, ethoxylated	9005-65-6	liquid	15.0	–	min. 99.0	•				

Product portfolio

Product name	Description	CAS	Appearance	HLB	Surface tension at 25°C [mN/m]	Active content [%]	Function				
							Emulsifier	Wetting agent	Low-foaming agent	Dispersing agent	Anti-caking agent
EXOfos PB-136	Tridecyl Ether Phosphate, ethoxylated	9046-01-9	liquid	–	–	min. 99.0	•	•			
EXOfos PB-139	Tridecyl Ether Phosphate, ethoxylated	9046-01-9	liquid	–	–	min. 98.0	•	•			
EXOfos PB-184	Oleyl Phosphate, ethoxylated	39464-69-2	liquid	–	–	min. 99.0	•				
EXOfos PB-264	Lauryl Phosphate, ethoxylated	68511-37-5	liquid	–	–	min. 98.0	•				
EXOfos PT-E	Ethoxylated tristyrylphenol phosphoric ester	90093-37-1	viscous liquid	–	43.5	min.98.0	•	•		•	
EXOfos PT-A	Ethoxylated Tristyrylphenol phosphoric ester triethanolamine salt	105362-40-1	viscous liquid	–	–	min. 97	•	•		•	
EXOfos PT-A75	Ethoxylated tristyrylphenol phosphoric ester triethanolamine salt	–	viscous liquid	–	–	74-77		•		•	
EXOfos PT-K60	Ethoxylated tristyrylphenol phosphoric ester potassium salt	–	viscous liquid	–	–	58-61		•		•	
EXOfos PT-K25	Ethoxylated tristyrylphenol phosphoric ester potasium salt	–	liquid	–	–	24-26		•		•	
EXOantifoam S100	Silicone anti-foam emulsion	–	liquid	–	–	–			•		
EXOdust Green	Mixture	–	liquid	–	–	–					•
EXOcal 60	Calcium Dodecylbenzenesulfonate in n-butanol	–	liquid	8.6	–	60	•				
EXOcal 60B	Calcium Dodecylbenzenesulfonate in isobutanol	–	liquid	8.6	–	60	•				
EXOcal 60EH	Calcium Dodecylbenzenesulfonate in 2-ethylhexanol	–	liquid	8.6	–	60					•

EXOemul Series - effective emulsifiers for EC and EW formulations

Emulsifiers - agents that promote the formation of an emulsion. An emulsifier involves water soluble hydrophilic parts and oil-soluble lipophilic parts within its. Adding an emulsifier to a mixture of water and oil, the emulsifier is arranged on the interface, anchoring its hydrophilic part into water and its lipophilic part into oil.

On the interface of water, the hydrophilic part and the lipophilic part are adsorbed and arranged around the interface. It reduces interfacial tension. The result is that oil and water is easily mixed.

The hydrophilicity and lipophilicity are different among emulsifiers, and the balance between the two is called HLB value (ranges from 0 to 20). An emulsifier with higher lipophilicity shows a lower HLB whereas higher hydrophilicity has high HLB.

The EXOemul series is a group of emulsifier blends dedicated to the formulation of EC and EW plant protection products as well as to the preparation of adjuvants (tank mixes) based on mineral oils, vegetable oils and their derivatives. EXOemul series shows high emulsifying efficiency and ensures the stability of emulsions.

Action of EXOemul:

- enable emulsification of the oil phase into aqueous phase by decreasing interfacial tension,
- they ensure spontaneous emulsification and the formation of milky emulsions when the formulation is added to water,
- introduce electrostatic and steric stabilization to the fine droplets; preventing coalescence or flocculation,
- improve compatibility with other components in the aqueous phase.

Advantages

- excellent emulsifying and stabilizing properties
- excellent solubility in vegetable and mineral oils
- nonylphenol free

Benefits

- safe for water environments
- easily biodegradable

Physical and chemical properties of our emulsifiers

EXOemul	OM2	OM3 LSP	EM260	A3
Appearance at (20-25)°C	yellow liquid	yellow to dark yellow liquid	light brown liquid	viscous yellow liquid
pH	5.0-7.0 (1% solution C)	7.0-9.5 (1% solution C)	6.0-8.0 (1% solution C)	5.0-8.0 (2% solution B)
Colour	max. 6 (at 20-25°C)	max. 250 (at 20-25°C)	max. 10 (at 20-25°C)	max 500 (Hazen at 40°C)
Solubility in water	insoluble	insoluble	good	very good
Other solvents	octanol, acetone, ethyl ether, methanol	methanol, ethyl ether	octanol, ethyl ether, methanol, acetone	methanol, ethyl ether, acetone, xylene
Flash point, °C (Open cup)	>120	approx.110	approx. 54 (Closed cup)	approx. 53
Density at 20°C, g/cm³	0.90-1.00	0.95-1.05	0.95-1.10	1.05-1.07
Solidification point,°C	approx. 1	approx. -14	approx. -15	approx. 8
Viscosity at 20°C, mPa·s	approx. 50	approx. 60	approx. 2300	approx. 3000
HLB	9.2	–	–	10.5

Example of formulations:

EXOemul OM2	15 – 25%
Paraffin oil	75 – 85%
EXOemul OM3 LSP	15 – 25%
Paraffin oil	75 – 85%
EXOemul EM260	15 – 25%
Tebuconazole	24 – 26%
Rapeseed oil methyl esters	15 – 25%
N,N-dimethylformamide	10 – 20%
Other additives	0.5 – 2%
Water	up to 100%
EXOemul A3	10 – 20%
Alpha cypermethrin	10 – 11%
Solvent naphtas (e.g. Solvesso 100)	up to 100%

EXOwet Series - tank mix adjuvants

Wetting agents play a crucial role in crop spraying. Thanks to their amphiphilic structure and small, mobile molecules, they migrate efficiently to liquid–solid and liquid–gas interfaces, where they lower surface tension in aqueous solutions.

This function is particularly important during the milling of suspension formulations (SC and FS): wetting agents reduce suspension viscosity, enhance grinding efficiency and prevent premature wear of the bead mill.

The EXOwet product series can also be used as standalone tank adjuvants; their addition improves spray formation, retention and leaf coverage. Enhancing these spray properties translates into more effective treatments or the same efficacy at lower doses of plant protection products.

The EXOwet product series are environmentally friendly and readily biodegradable.

Action of EXOwet:

- decreases a surface tension of a working fluid,
- causes spreading of a liquid drop contributing to perfect wetting of a leaf surface,
- improves coverage of a leaf surface by sprayed agrochemicals,
- causes retention of liquid droplets on plants,
- facilitates substances penetration into a plant,
- prevents washing of agrochemicals by rain and dew.

Advantages

- excellent wetting properties
- reduces the surface tension of the spray liquid,
- allowing it to spread
- increases spraying efficiency
- safe for water environment
- faster absorption of substances by penetrating the cuticular wax

Benefits

- lower pesticide doses, which:
  - contribute to cost reduction of crop protection
  - reduce a negative impact on the environment

Spray coverage test performed using a spray chamber on water-sensitive paper.

with wetting agent

without wetting agent

Physical and chemical properties of wetting agents

EXOwet	D15	L5	T7	A7W	D7
Appearance at (20-25)°C	colourless liquid	clear or slightly turbid liquid	clear or slightly turbid liquid	clear or cloudy liquid	clear or turbid liquid
pH of 1% solution B	4.5 – 7.5	4.6 – 7.4	5.0 – 7.0	5.0 – 7.0	5.0 – 7.0
Solubility in water	very good	very good	limited, creates turbid solutions	good	good
Other solvents	methanol, acetone, methyl ester	acetone, ethyl ether	acetone	low aliphatic alcohols, acetone, ethyl ether	methanol
Flash point [°C]	>200	>120	>200	>170	>180
Density [g/cm³]	approx. 0.99 (at 25°C)	approx. 0.97 (at 25°C)	approx. 0.97 (at 30°C)	approx. 0.95 – 1.00 (at 30°C)	approx. 1.01 (at 25°C)
Solidification point [°C]	approx. -20	approx. 0	approx. 2	approx. 5	approx. 6
Viscosity [mPa·s]	approx. 60 (at 20°C)	approx. 40 (at 20°C)	approx. 130 (at 20°C)	approx. 120 (at 20°C)	approx. 30 (at 40°C)
Application range	50 ml/100 l of working fluid	0.1 – 0.5%	0.1 – 0.5%	0.1 – 0.5%	0.1 – 0.5%
Biodegradation	Readily biodegradable: 76% (Manometric Respirometry Test, 28 days)	Readily biodegradable: 70.1% (Manometric Respirometry Test, 28 days)	Readily biodegradable: 64.0% (Closed Bottle Test, 28 days)	Readily biodegradable: 65.4% (Manometric Respirometry Test, 28 days)	Readily biodegradable: 70.4% (Closed Bottle Test, 28 days)

Application:

EXOwet series can be used with crop protection products for which it is recommended to use wetting agents. EXOwet L5 and T7 are specially recommended to use with foliar fertilizers.

EXOcal 60 & EXOcal 60B & EXOcal 60EH – Basic electrosteric emulsifiers for EC, EW and SE formulations

The products are calcium dodecylbenzenesulfonate CaDDBS salts in three different variants in: n-butanol, isobutanol and 2-ethylhexanol. Due to its structure, the substance is characterized by a low HLB of about 8.6 and an electrosteric mechanism of action, which ensures spontaneous emulsification and emulsion stability over time.

Advantages

- excellent emulsifying and stabilizing properties.
- very good emulsion stabilizer.
- ideal for use with pesticides.
- nonylphenol free.
- product soluble in most organic solvents.

Benefits

- safe for water environments
- easily biodegradable

Physicochemical properties of EXOcals: 60, 60B and 60EH

Physical and chemical properties	EXOcal 60	EXOcal 60B	EXOcal 60EH
Appearance at (20-25)°C	liquid	liquid	liquid
Water [% m/m]	0.5	1.0	1.0
pH of 5% solution isopropanol: water 1:1, at 20°C	5.0 – 7.0	4.6 – 7.4	5.0 – 7.5
Content active substance [% m/m]	approx. 60	approx. 60	approx. 60
Water solubility	insoluble	insoluble	insoluble
Other solvents	alcohols, xylene, ketones, aromatic hydrocarbons	xylene, kerosene	xylene, kerosene
Density at 50 °C [g/cm³]	1.02	approx. 6	approx. 0
Density at 25 °C [g/cm³]	–	0.98	0.97
Flash point [°C]	> 65	approx. 30	approx. 39
Odor	characteristic	characteristic	characteristic

ROKAmer 6500 & ROKAmer 6500W – Basic co-dispersants and wetting agents for SC, FS and SE formulations and potential emulsifier in EW

The products are EO/PO block copolymers. Due to their large molecule of 6.5 KDa and the presence of both hydrophilic and lipophilic groups, they have both dispersing and wetting properties. They work perfectly with ionic dispersants, stabilize suspensions and reduce viscosity during wet grinding. They are also hygroscopic, which limits too rapid evaporation of the spray from the plants after treatment and ensures better access to water by the seeds after sowing in the case of seed treatments-this has a positive effect on their germination and growth.

Advantages

- dispersing properties.
- wetting properties.
- hygroscopicity.
- solubility in water.
- product not classified as a hazardous substance.
- product approved for contact with food.
- product reactivity – possibility of modification with other substances.

Benefits

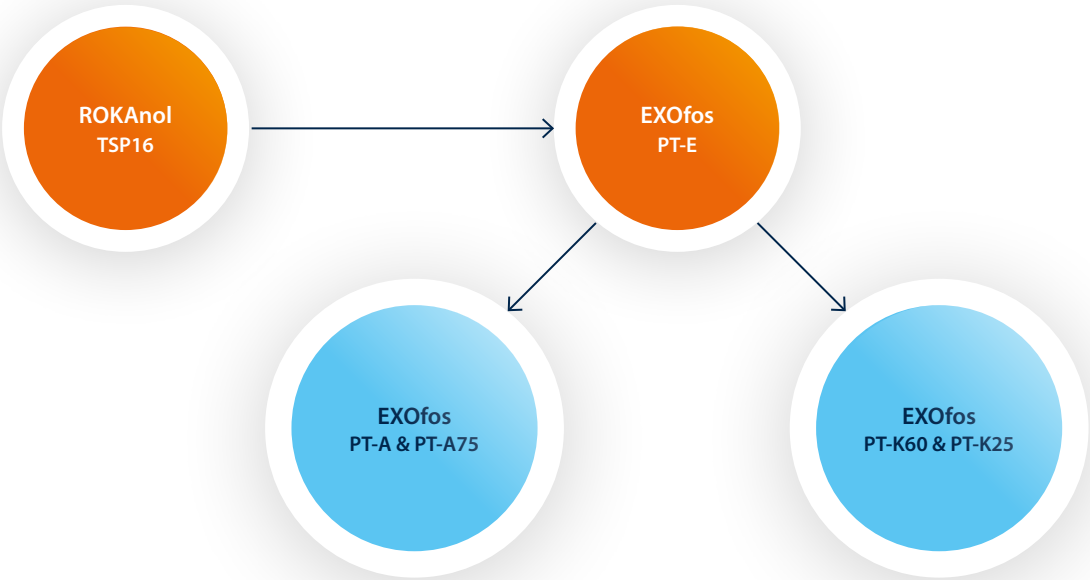
- safe for water environments.
- chemical stability.
- compatibility with other surfactants.
- versatility

Physicochemical properties of ROKAmers: 6500 and 6500W

Physical and chemical properties	ROKAmer 6500	ROKAmer 6500W
Appearance at 20-25°C	wax	liquid clear
Iodine colour scale at 40°C	–	max. 2
Iodine colour scale at 70°C	max. 3	–
pH of 5% water solution at 20°C	5.0 – 8.0	5.5 – 8.5
Water [% m/m]	max. 0.5	82
Hydroxyl value, [mg KOH/g]	17	17
Molecular weight, [g/mol]	6500	6500
Water solubility	good	very good
Density at 25°C, [g/cm3]	1.04	1.02
Viscosity at 25°C, [mPa·s]	–	approx. 10
Viscosity at 60°C, [mPa·s]	approx. 600	–
Temperatura krzepnięcia, [°C]	48	-4
Preservative	–	MIT max. 100 ppm

ROKAnol TSP16 and related products – EXOfos series: PT-E, PT-A & PT-A75, PT-K60 & K25 as good dispersing agents for hydrophobic substances and good emulsifying agents

The series of products based on tristyrylphenol is distinguished by its versatility. As can be seen in the attached diagram, the basis of all products is ROKAnol TSP16, which is an amphiphilic non-ionic surfactant with a branched hydrophobic part and a linear hydrophilic part. Its modification is EXOfos PT-E, where a negatively charged phosphate group is additionally attached to the hydrophilic part. EXOfos PT-E is an excellent base for creating various salts and two groups of them, i.e. EXOfoses PT-A and PT-K are the last elements of the puzzle. The products work great as dispersants in SC and FS formulations, especially for hydrophobic substances, they also show some wetting properties. For EC and EW formulations, ROKAnol TSP16, EXOfos PT-E and EXOfos PT-A are recommended, where they are distinguished by good emulsifying properties as high HLB emulsifiers and, in the case of phosphates, additionally electrosteric emulsifiers. In SE formulations, all of the above products can act in a triple way: as dispersants, emulsifiers and wetting agents, which makes them very good coformulants in this type of formulation.



Physicochemical properties of ROKAnol TSP16 and EXOfos PT-E

Physical and chemical properties	ROKAnol TSP16	EXOfos PT-E
Appearance at 20-25°C	viscous liquid	viscous liquid
Hazen colour at 50°C	max. 200	–
pH of 5% water solution at 20°C	5.0 – 8.0	1.0 – 3.0
Acid number (to second inflection point), [mg KOH/g]	–	50 - 70
Cloud point (aqueous solution), [°C]	58 – 62	–
Water %(m/m)	max. 1	max. 1
Molecular weight, [g/mol]	approx 1060	–
Water solubility	good	very good
Other solvents	aliphatic alcohols	–
Density at 20°C [g/cm^3]	1.12	1.14
Viscosity at 20°C, [mPa·s]	approx. 1500	approx. 4500
Freezing point [°C]	approx. 11	approx. -1

Physicochemical properties of EXOfos series: PT-A and PT-A75

Physical and chemical properties	EXOfos PT-A	EXOfos PT-A75
Appearance at 20-25°C	viscous liquid	viscous liquid
pH of 5% water solution at 20°C	7.0-8.0	7.0-8.0
Water [% m/m]	max. 2.5	approx. 25
Water solubility	very good	very good
Density at 20°C [g/cm^3]	1.15	1.09
Viscosity at 20°C, [mPa·s]	approx. 3000	approx. 1600
Freezing point [°C]	below -20	approx. -11

Physicochemical properties of EXOfos series: PT-K60 and PT-K25

Physical and chemical properties	EXOfos PT-K60	EXOfos PT-K25
Appearance at 20-25°C	viscous liquid	clear liquid
pH of 5% water solution at 20°C	7.0 – 8.0	–
pH of 10% water solution at 20°C	–	7.0 – 8.0
Acid number [mg KOH/g]	1 -3	–
Water [% m/m]	approx. 35	approx. 70
Water solubility	very good	very good
Density at 20°C [g/cm^3]	0.97	1.05
Viscosity at 20°C, [mPa·s]	approx. 3000	approx. 1600
Freezing point [°C]	-19	-5

Notes for guidance concerning the functional parameters and notation used in the catalogue

HLB (Hydrophilic-Lipophilic Balance)

The hydrophilic-hydrophobic balance is a parameter that determines the ratio of the content of the hydrophilic group and that of the hydrophobic group in a particle. The validity scope of the HLB number for non-ionic surface-active compounds is included within the range of 0 to 20 and is the measure of the share of the hydrophilic group in the particle

$$HLB = 20 \cdot \frac{\text{molecular mass of hydrophilic part}}{\text{molecular mass of compound}}$$

On the other hand, for aqueous solution of ionic surface active agents, they acquire additional transformations increasing their degree of hydrophilicity, the value of the HLB number goes up to 40.

HLB for ester type compounds (ethoxylated fatty acids):

$$HLB = 20 \cdot \left(1 - \frac{LZ}{LK}\right)$$

LZ saponification number of ethoxylated product, mgKOH/g
LK acid number of acids subjected to ethoxylated product, mgKOH/g

On the basis of the HLB scale, the range of the utility fitness of surface-active agents can be determined.

Cloud point

Cloud point is an indicator determining the behavior of water or other organic solutions of non-ionic surfactants. Solutions of surfactants become cloudy during heating and revert to a clear solution at a certain temperature when cooled - this temperature is defined as 'cloud point'.

Depending on the temperature range at which the solution becomes cloudy, five determination methods are distinguished:

Method A – aqueous solution (10 - 90°C)
Method B – solution of NaCl 50g/l (>90°C)
Method C – solution of NaCl 100g/l (>90°C)
Method D – solution 45g of butyl diglycol/water (<10°C)
Method E – solution 25 g of butyl diglycol/water (<10°C)

HLB number	EO content in product %	Product application
1-3	5-15	Anti-foaming agent
4-6	20-30	W/O emulsifier
7-11	35-55	Wetting agent
8-18	40-90	W/O emulsifier
10-15	50-75	Detergent
10-18	50-90	Solubilizer

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