Agrochemicals

Additives and raw materials

pcc

More than Chemistry

Table of contents

01/RAW MATERIALS AND INTERMEDIATES 4

Chlorobenzenes and Hydrochloric acid 5

Phosphorus trichloride and phosphorus oxychloride 6

02/ADDITIVES & ADJUVANTS 8

Dispersing agents 9

Surfactants 10

Mixtures (EXOemul series and EXOwet series) 24

01 RAW MATERIALS AND INTERMEDIATES

RAW MATERIALS AND INTERMEDIATES

Chlorobenzen and Hydrochloric acid

Monochlorobenzene, ortodichlorobenzene and **hydrochloric acids** are the main products used in agrochemical production. PCC Rokita SA is one of the two manufacturers of chlorobenzenes in Europe. The products from our installations are of the highest global quality and meet requirements of all possible applications. Our synthesis plant produces hydrochloric acid with unique concentrations and exceptional purity.

COMMERCIAL NAME	CHEMICAL FORMULA	OTHER COMMERCIAL NAMES	FORM	CONCENTRATION	QUALITY	CHARACTERISTICS	PACKAGING	MAIN APPLICATIONS
Monochloroben-zene	C_6H_5Cl	Chlorobenzene, MCB, phenyl chloride	Liquid	99.9%	Very High	Product of chlorobenzene plant	Steel drums 220 kg, road tank cars, isotanks, rail tank cars	Component for the production of fungicides, herbicides and other plant protection products
Ortodichloroben-zene	$C_6H_4Cl_2$	1.2 dichloro-bezneze, ODCB	Liquid	99.8%	High	Product of chlorobenzene plant	Steel drums 220 kg, road tank cars, isotanks	Component for the production of fungicides, herbicides and other plant protection products
Hydrochloric acid technical grade	HCl	Hydrogen chloride water solution	Liquid	>=31% water solution	Standard	Product of chlorobenzene plant	IBC 1000L, steel drums 220 kg, road / rail tank cars	Component for the production of fungicides, herbicides and other plant protection products
Hydrochloric acid food grade	HCl	Hydrogen chloride water solution	Liquid	>=33% water solution	Very High	Product of inorganic synthesis, approved for use in food industry installation and production processes	IBC 1000L, steel drums 220 kg, road / rail tank cars	Component for the production of plant protection products
Synthetic hydrochloric acid	HCl	Hydrogen chloride water solution	Liquid	>=33% water solution	High	Product of inorganic Synthesis	IBC 1000L, steel drums 220 kg, road / rail tank cars	Component to the production of plant protection products

Phosphorus trichloride and Phosphorus oxychloride

Phosphorus trichloride and **phosphorus oxychloride** are one of the most important raw materials, which might be used as a substrate in the reaction introducing phosphor, as well as chlorinating agent. Due to applied production technology, both products are characterized by high purity, which made them useful for several, even very demanding reactions.

PRODUCT NAME	CHEMICAL NAME	CAS	APPEARANCE	PCL_3 [%]	$POCL_3$ [%]	DENSITY AT 20°C [g/cm³]	FUNCTION
PCl_3	Phosphorus trichloride	7719-12-2	colourless liquid	min. 99.50		1.570-1.580	Product used as raw materials/intermediates in preparation of crop protection chemicals, e.g. in herbicides and insectcides.
$POCl_3$	Phosphorus oxychloride	10025-87-3	colourless or straw liquid		min. 99.50	1.672-1.678	

02 ADDITIVES & ADJUVANTS

ADDITIVES & ADJUVANTS

Dispersing Agents

Dispersing agents from Rodys series are high quality products, that neither have an environmental classification, nor contribute to increasing the content of free aromatic hydrocarbons in finished products. Therefore, they are an ideal solution for agrochemicals. Rodys products are mainly dedicated for water dispersion. They allow to obtain dispersion stable in time, characterized by the appropriate size of the dispersed particles and viscosities enabling their pumpability. Rodys products are available in a powder, as well as a liquid form.

PRODUCT NAME	CHEMICAL NAME	CAS	APPEARANCE	PH [5%] SOLUTION	ACTIVE SUBSTANCE [%]	SO_4^{2-} [%]	WATER [%]	FUNCTION
Rodys CP	Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt	9084-06-4	Light brown powder	6.5 - 9.5	min. 78	max. 8	max. 10	
Rodys OP	Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt	9084-06-4	Light brown powder	7.0 - 11.0	min. 87	max. 2	max. 10	Dispersing agents
Rodys LP	Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt	9084-06-4	Light brown powder	7.0 - 10.0	min. 85	max. 5	max. 8	

PRODUCT NAME	CHEMICAL NAME	CAS	APPEARANCE	PH [5%] SOLUTION	DRY MATTER [%]	SO_4^{2-} [%]	DENSITY AT 20°C [g/cm³]	ADDITIONAL PARAMETERS	FUNCTION
Rodys C	Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt	9084-06-4	Dark brown liquid	7.0 - 9.0	36-39	max. 3	1.150-1.190		
Rodys O	Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt	9084-06-4	Dark brown liquid	7.5 – 10.5	39-41	max. 0.8	1.190-1.205	Free formaldehyde 50 ppm	Dispersing agents
Rodys L	Naphthalenesulfonic acid, polymer with formaldehyde, sodium salt	9084-06-4	Dark brown liquid	7.5 – 9.5	39-41	max. 2	1.190-1.210		

Surfactants

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 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 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 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 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	•				
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 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 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 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	•				
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	•	•			

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-184	Oleyl Phosphate, ethoxylated	39464-69-2	Liquid			min. 99.0	•				
EXOfos PB-264	Lauryl Phosphate, ethoxylated	68511-37-5	Liquid			min. 98.0	•				
EXOantifoam S100	Silicone anti-foam emulsion	-	Liquid						•		
EXOdust Green	Mixture	-	Liquid								•

EXOemul SERIES – tank mix adjuvants

EXOemul series is a group of emulsifier blends for the preparation of an adjuvant (tank-mix) based on mineral oils, vegetables and their derivatives. EXOemul series shows high emulsifying efficiency and ensures the stability of emulsion.

Action of EXOemul:

- Enables wetting and dispersion of the oil phase into aqueous phase by decreasing interfacial tension,
- Facilitates dispersion of the oil-phase upon addition into water,
- Introduces electrostatic and steric stabilization to the fine droplets; preventing coalescence or flocculation,
- Improves 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	RO1	RO2
Appearance at (20-25)°C	yellow liquid	yellow to dark yellow liquid	light brown liquid	clear liquid	clear liquid
pH of 1% solution	5.0-7.0	7.0-9.5	6.0-8.0	5.5-7.0	5.5-7.0
Colour at (20-25)°C	max. 6 (Gardner)	max. 250 (Hazen)	max. 10 (Gardner)	max. 270 (Hazen)	max. 230 (Hazen)
Solubility in water	insoluble	insoluble	good	insoluble	insoluble
Other solvents	octanol, acetone, ethyl ether, methanol	methanol, ethyl ether	octanol, ethyl ether, methanol, acetone	ethyl ether, acetone	ethyl ether, acetone
Flash point, °C (Open cup)	>120	approx.110	approx. 54 (Closed cup)	>120	>120
Density at 20°C, g/cm^3	0.90-1.00	0.95-1.05	0.95-1.10	0.90-0.99	0.90-0.99
Solidification point,°C	approx. 1	approx. -14	approx. -15	approx. 12	approx. 12
Viscosity at 20°C, mPa·s	approx. 50	approx. 60	approx. 2300	approx. 120	approx. 120
HLB	9.2	-	-	6.9	6.8

Example of formulations:

EXOemul OM2 **Paraffin oil**	15 – 25% 75 – 85%
EXOemul OM3 LSP **Paraffin oil**	15 – 25% 75 – 85%
EXOemul EM260 **Rapeseed oil methyl ester**	15 – 25% 75 – 85%
EXOemul RO1 **Vegetable oil** **(e.g. rapeseed oil, linseed oil)**	18 – 25% 75 – 82%
EXOemul RO2 **Vegetable oil** **(e.g. rapeseed oil, linseed oil)**	18 – 25% 75 – 82%

EXOemul A3 & EXOemul A3C – effective emulsifiers for EC and EW formulations

EXOemul A3 and **EXOemul A3C** are anionic and non-ionic mixtures of herbicide emulsifying properties, including herbicides based on an active substance esters of 2,4-D acid, MCPA, dicamba, clethodim, tebuconazole, phenmedipham/desmedipham and propiconazole/cyproconazole.

Advantages

- Excellent emulsifying and stabilizing properties
- Excellent solubility in water
- Ideal for use with herbicides
- Nonylphenol free

Benefits

- Safe for water environments
- Easily biodegradable

PHYSICAL AND CHEMICAL PROPERTIES	EXOEMUL A3	EXOEMUL A3C
Appearance (temp. 20-25°C)	viscous, yellow liquid	yellow liquid with a tendency to become turbid
pH (2% solution)	5.0-8.0	6.0-9.0
Dry matter, % (m/m)	87-93	85-88
Solidification point (°C)	approx. 8	approx. 1
Viscosity at 20°C (mPa·s)	approx. 3 000	approx. 2 900
Density at 20°C (g/cm³)	1.050-1.069	approx. 1.045
Flash point (°C)	approx. 53	approx. 39
Solubility	water, methanol, acetone, etyl ether	water, acetone, methanol, diethyl ether
Application range (%)	8-12	8-12

EXOwet Series

EXOwet a series are adjuvant to agrochemicals that decrease the surface tension of a working fluid of applied agrochemicals. A lowered surface tension and better wettability enable precise covering of a leaf surface with an agent and prevent it from being washed down with rain or drew.

Action of EXOwet:

- Decreases the surface tension of a working fluid,
- Causes spreading of a liquid drops 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 the agrochemicals from being washed down with rain and dew.

Advantages

- Excellent wetting properties
- Decreases the surface tension of working fluid; allowing spreading and penetration
- Allows reduction of spray volumes
- Safe for water environments
- Greater or equal up-take of pesticide in less time, thus improve rainfastness

Benefits

- Lower pesticide doses, which:
  - contributes to cost reduction of crop protection
  - reduces the negative impact on the environment

Physical and chemical properties of wetting agents:

EXOwet	R3	R8	D15	D17
Appearance at (20-25)°C	colourless to light yellow liquid	colourless to light yellow liquid	colourless liquid	colorless liquid
pH of 1% solution	5.0-7.5	4.5-7.0	4.5-7.5	4.5-7.5
Solubility in water	very good	very good	very good	very good
Other solvents	acetone, methanol	acetone, methanol	methanol, acetone, methyl ester	methanol, acetone, eethyl ester
Flash point, °C (Open cup)	approx. 63 (Closed cup)	approx. 63 (Closed cup)	>200	
Density at 20°C, g/cm³	approx. 1.00	approx. 1.00	approx. 0.99 (at 25°C)	approx. 1.0
Solidification point,°C	approx. 0	approx. -1	approx. -20	approx. -18
Viscosity at 20°C, mPa·s	approx. 30	approx. 30	approx. 60	approx. 78
Application range	50 ml/100 l of working fluid			
Biodegradation	no data	Readily biodegradable: 65.9% (Closed Bottle Test, 28 days)	Readily biodegradable: 76% (Manometric Respirometry Test, 28 days)	Readily biodegradable: >60%

EXOwet Series dedicated to use with foliar fertilizers

Foliar fertilizers are the most effective and the fastest way to supplement nutrients in stressful situations and in the periods of increased demand for nutrients. Efficiency of foliar fertilizers may be observed through observation of plants after they reach the dewpoint. After ineffective spraying, large drops flow down to the top as a result of too high surface tension, and therefore they cover only a limited area of the leaf blade. In case of foliar fertilizers with surfactants that lower the surface tension, we can observe more efficient spraying due to even coverage of the leaf blade. The result of even coverage of a leave blade during spraying translates into better efficacy of an applied fertilizer.

Action of EXOwet:

- Decreases the surface tension of foliar fertilizers,
- Causes spreading of a liquid drop, which contributes to perfect wetting of a leaf surface,
- Improves coverage of a leaf surface by sprayed fertilizers, which increases the efficiency of foliar fertilizers,
- Causes retention of liquid droplets on plants,
- Facilitates penetration of substances into a plant,
- Prevents agrochemicals from being washed down by rain and dew.

Advantages

- Excellent wetting properties
- Decreases the surface tension of working fluid; allowing its spreading and penetration
- Application range is relatively wide in relation to the achievable benefits

Benefits

- Safe for water environments
- Easily biodegradable

Physical and chemical properties of our wetting agents:

EXOwet	A7W	D7	L5	T7
Appearance at (20-25)°C	clear or cloudy liquid	clear or turbid liquid	clear or slightly turbid liquid	clear or slightly turbid liquid
pH of 1% solution	5.0-7.0	5.0-7.0	4.6-7.4	5.0-7.0
Solubility in water	good	good	very good	limited, creates turbid solutions
Other solvents	low aliphatic alcohols, acetone, ethyl ether	methanol	acetone, ethyl ether	acetone
Flash point, °C (Open cup)	>170	>180	>120	>200
Density at 20°C, g/cm^3	approx. 0.95-1.00 (at 30°C)	approx. 1.01 (at 25°C)	approx. 0.97 (at 25°C)	approx. 0.97 (at 30°C)
Solidification point,°C	approx. 5	approx. 6	approx. 0	approx. 2
Viscosity at 20°C, mPa·s	approx. 120	approx. 30 (at 40°C)	approx. 40	approx. 130
Application range	0.1-0.5%			
Biodegradation	readily biodegradable: 65.4% (Manometric Respirometry Test, 28 days)	readily biodegradable: 70.4.0% (Closed Bottle Test, 28 days)	readily biodegradable: 70.1% (Manometric Respirometry Test, 28 days)	readily biodegradable: 64.0% (Closed Bottle Test, 28 days)

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 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):

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

where:

LZ saponification number of **ethoxylated** product, mgKOH/g

LK acid number of acids subjected to **ethoxylated**, 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 behaviour of water or other organic solutions of nonoionicnonionic 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 CONTENTS IN PRODUCT, %	PRODUCT APPLICATION
1-3	5-15	Anti-foaming agent
4-6	20-30	Emulsifier W/O
7-11	35-55	Wetting agent
8-18	40-90	Emulsifier O/W
10-15	50-75	Detergent
10-18	50-90	Solubilizer

PCC Group
We build value through sustainable innovation

Each project or venture with a long-term success story shares one common thing – it's based on in-depth market research and knowledge acquired through years of experience. It is knowledge and experience that enable us to constantly aim higher and deliver greater value through dynamic and sustainable worldwide development of the PCC Group.

The companies operating as a part of the PCC Group act with responsibility and care. We only embark on new business challenges when we are certain that we have the skills and knowledge to achieve success. We operate in three major markets: chemicals, energy and logistics. Several dozen business units, managed by PCC SE, work in synergy to generate the greatest possible competitive advantage on both local and international markets. Each day nearly three thousand professionals contribute their energy and effort to secure the sustainable develop-

ment of the PCC Group. The key element of our strategy is to ensure the development of each individual business unit through taking advantage of innovative technology and new market applications. We achieve our goals in a sustainable and responsible way – we care about the environment and the society within which we operate.
We are always ready to reach our strategic goals. Efficient and dynamic management helps our employees to fully develop their potential and therefore enhances the overall PCC Group value. Joint enterprises and individual initiatives of our companies are the results of the entrepreneurship culture promoted within the PCC Group.

Our philosophy is built on simple values - integrity, trust and reliability. We believe that following those principles is the only way to build a long-term competitive advantage.

The PCC Group currently employs nearly 3500 people. We operate in 18 countries, in 41 different locations around the world. Our portfolio includes eight basic segments. Individual operational responsibility is assigned to seven of them - Polyols, Surfactants, Chlorine, Specialty Chemicals, Consumer Products, Energy and Logistics. Each of these segments is supported by 19 business units, all under the management of the PCC Group.

The divisions, segments and business units of the PCC Group

Divisions	Segments	Business units
Chemicals	Polyols	• Polyols • Polyurethane Systems
	Surfactants	• Anionic Surfactants • Non-ionic Surfactants • Amphoteric Surfactants (Betaines)
	Chlorine	• Chlorine • MCAA • Other Chlorine Downstream Products
	Speciality Chemicals	• Phosphorus and Naphthalene Derivatives • Alkylphenols • Chemicals and Commodities Trading • Quartzite
	Consumer Products	• Household and Industrial Detergents, Detergents and Personal Care Products • Matches and Lighters
Energy	Energy	• Renewable Energies • Conventional Energies
Logistics	Logistics	• Intermodal Transport • Road Haulage • Rail Transport
Holding	Holding	• Portfolio Management • Projects • Services

PCC Group - Industrial Park in Brzeg Dolny, Poland

PCC Rokita SA

PCC Rokita Capital Group, 22 companies, including:
PCC Rokita SA
PCC Prodex Sp. z o.o.
PCC Prodex GmbH (Germany)
PCC PU Sp. z o.o.
IRPC PCC Co. Ltd. (Thailand)
PCC Therm Sp. z o.o.

PCC EXOL SA

PCC EXOL Capital Group, 5 companies, including:
PCC EXOL SA
PCC Chemax Inc. (the USA)
PCC EXOL Kimya Sanayi Ve Ticaret Limited Sirketi (Turkey)

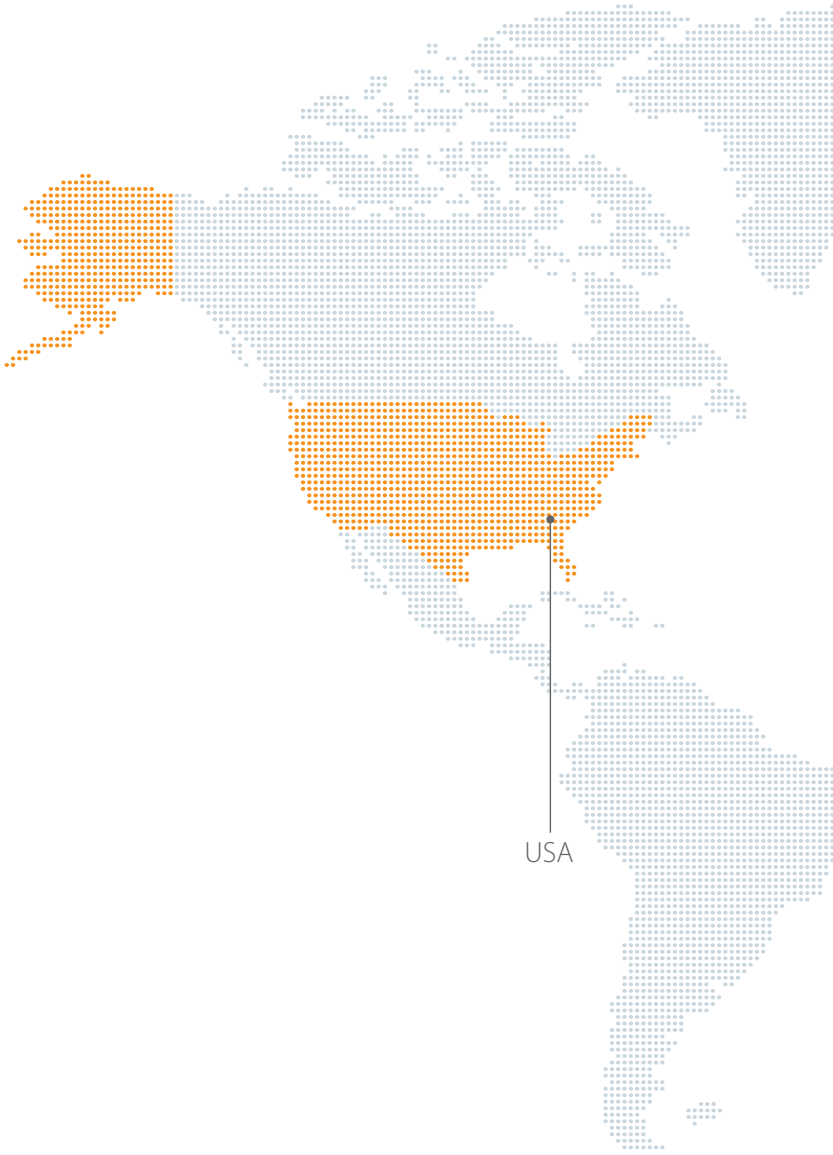
PCC CP Kosmet Sp. z o.o.

Capital Group PCC CP Kosmet, 3 companies, including:
PCC CP Kosmet Sp. z o.o.
OOO PCC Consumer Products Navigator (Belarus)
OOO PCC Consumer Products (Russia)

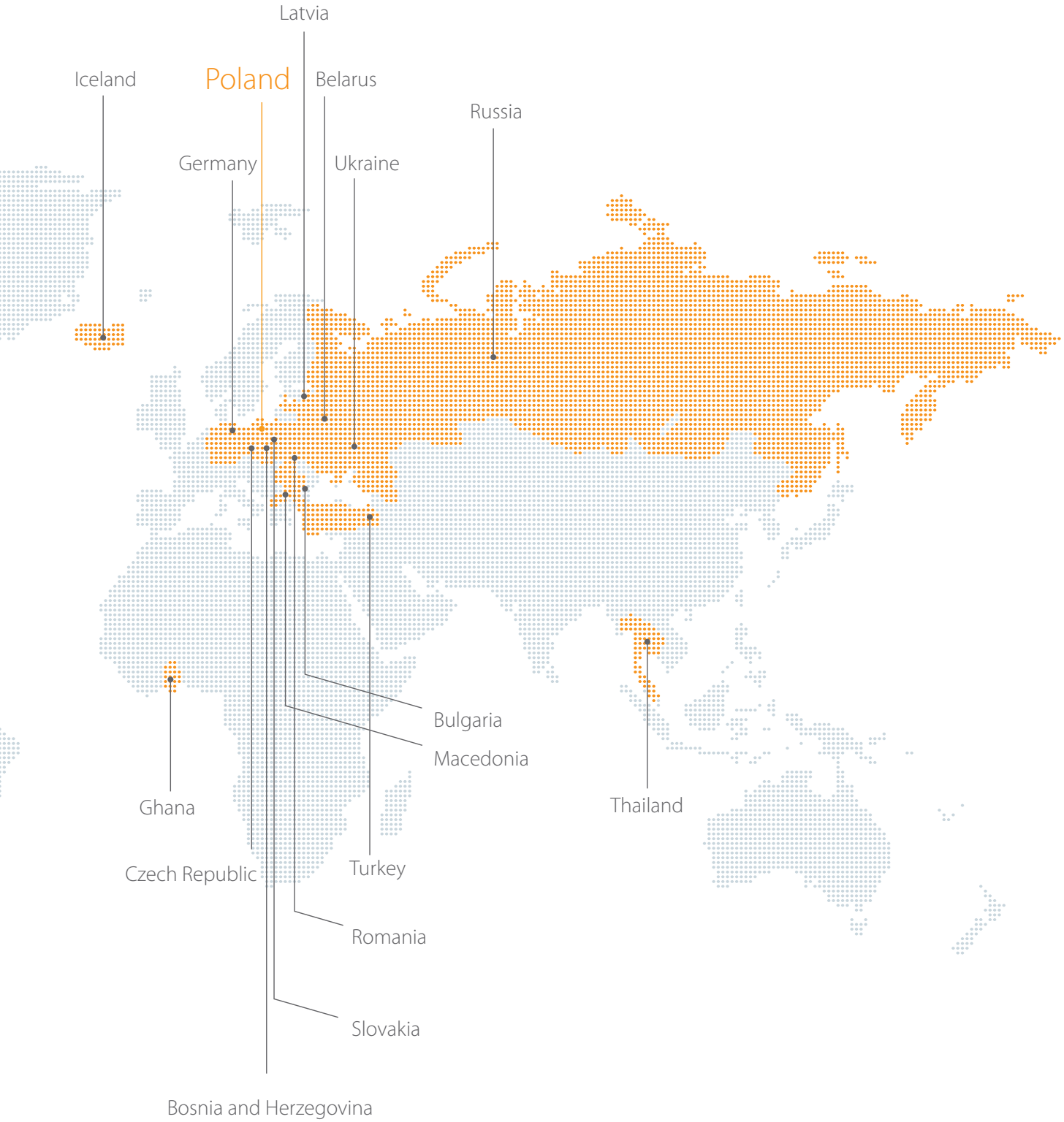
PCC MCAA Sp. z o.o.

PCC Autochem Sp. z o.o.

PCC Intermodal SA



PCC Group in the world



The products shall be used for industrial purposes described in this catalogue and by professional users. If you want to use the product for purposes other than those indicated in this document, please consult PCC or send an email to: **kontakt@pcc.eu**

Our company shall not be responsible for the manner and purpose of using our products, technical assistance and information provided (transmitted orally, in writing or in the form of production assessments), including offered studies and recommendations. Therefore, it is necessary to test our products, assess the level of provided technical support and information for own needs and own production, as well as check whether our products, technical support and information are applicable and may be used in intended applications. Such analysis adapted to the conditions of use of the product should include at least the future application tests, the relevance of the proposed solutions from a technical point of view, taking into account safety requirements, health issues and environmental protection.

Unless stated otherwise in writing, our products are offered in accordance with our standard terms and conditions of sale, available on our website. All information, including technical support, is granted without any guarantee, and its content may change without notice. The parties expressly agree that the customer accepts and expressly release our company from any tort, contractual or other liability for events arising in connection with the use of our goods and information and technical support. All statements and recommendations not included in this document are illegal and non-binding. Nothing in this document shall be construed as a recommendation to use the products in a manner inconsistent with the patent claims regarding materials or methods of use.

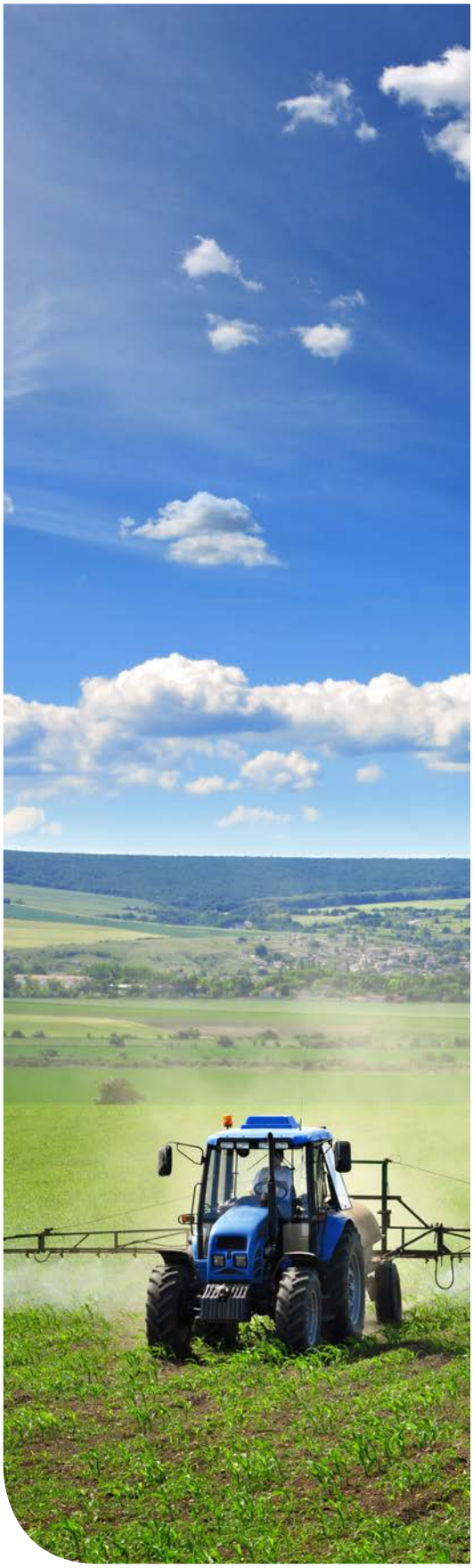
In accordance with our environmental concerns, this publication from the PCC Group was printed on Cocoon Silk - an ecological double-sided-coated matt paper. This paper is made of 100% waste paper via environment-friendly technology. The FSC® Certificate confirms that the raw materials used during the paper production process come from well-managed forests or other certified and controlled sources.

TEXT PAGES	
Brand	Cocoon Silk
Grammage	135
Number of pages	40
COVER PAGES	
Brand	Cocoon Silk
Grammage	250
Number of pages	4
PUBLICATION	
Size (cm)	21 x 29.7
Quantity	400

By using Cocoon Silk rather than non-recycled paper, the environmental impact was reduced by:

73	kg of landfill
9	kg CO_2 and greenhouse gases
98	km travel in the average European car
2 874	liters of water
168	kWh of energy
119	kg of wood

Carbon footprint data evaluated by Labelia Conseil in accordance with the Bilan Carbone® methodology. Calculations are based on a comparison between recycled paper used versus a virgin fiber paper - according to the latest European BREF data (virgin fiber paper) available.



PCC Group
Sienkiewicza 4
56-120 Brzeg Dolny, Poland
products@pcc.eu

Please visit our capital group business platform:
www.products.pcc.eu

PCC
More than Chemistry