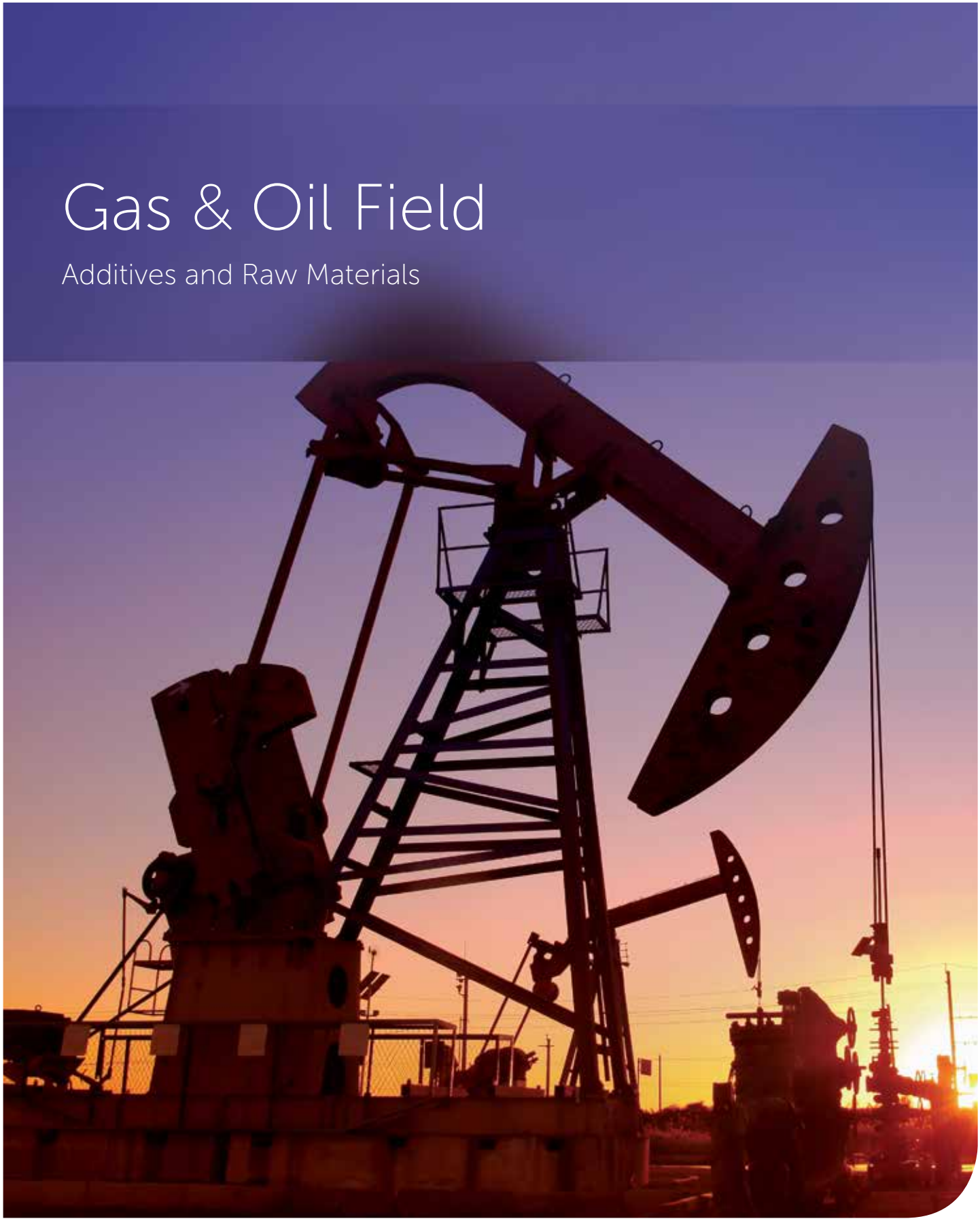
Gas & Oil Field

Additives and Raw Materials



pcc

More than Chemistry

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GAS & OIL FIELD ADDITIVES AND RAW MATERIALS

High quality and chemical purity of PCC Group products guarantee stability and repeatability of production processes for our customers.

DCP

Dichloropropane - is a clear, colorless liquid without mechanical impurities and with characteristic scent.

Dichloropropane is obtained in the production of propylene oxide and after that, it is several times distilled. Thanks to continuous improvement of product quality, the product's purity increased from min. 97.5% to min. 99%. As a result, the product is gaining more and more recognition in the overseas markets.
One of the main benefits of our product is that it can successfully replace other solvents such as toluene, acetone or other xylene derivatives which are widely used in the petrochemical industry Dichloropropane may be also used as extractant for example as lead removal in petrol. Dichloropropane can be also used for petroleum catalyst regeneration. The catalyst cost is regarded as one of the most important obstacles in petroleum industry. Therefore, the regeneration of catalysts could be more economic process to achieve high performance and low cost.

Sodium hydroxide

Sodium hydroxide is an inorganic chemical compound from the group of hydroxides that is one of the strongest bases. It is available as colorless, odorless and non-flammable liquid called soda lye. In solid form, it takes the shape of flakes. It belongs to the group of basic chemical raw materials; thanks to that it is used in almost every industry.

Sodium hydroxide is produced in PCC Rokita S.A. by membrane electrolysis and is supplied to the market as a solution of 49%-51%. This production method provides the product with high quality and purity - which is confirmed by PZH certificate. A wide range of applications significantly increases the popularity of the product in the market.

In the oil and gas industry, sodium hydroxide is successfully used in many applications. One of them includes the control of alkalinity and pH in aqueous solutions as well as breaking down organic matter. It is a strong base, with good solubility in water and lower solubility in ethanol and methanol. However, it is insoluble in ether and other non-polar solvents.

Sodium hydroxide is used as an important substance for maintaining the integrity of water-based drilling fluids. The drilling fluids are responsible for optimizing and improving drilling efficiency and borehole stability. Providing proper pH and viscosity is a major step in the drilling process. In boreholes, drilling sodium hydroxide neutralizes gases in rock formations. The increased viscosity prevents heavy material from settling in the borehole. In drilling muds or drilling fluids, it is used in the neutralization of hydrogen sulfide and to improve the dispersion of bentonite in water

Sodium hydroxide is also used in petroleum production and refining. It is applied to remove impurities such as carbon dioxide, mercaptans and other sulfur compounds from petroleum products. Its caustic effect provides a colorless product which is relatively safe for the environment. The presence of sulfur compounds generates environmental problems and provide a yellowish color to petroleum products. With our caustic wash, we obtain a colorless product which is relatively safe for the environment. Removal of impurities is a part of the improvement process of refining and a necessary requirement to meet regulatory specifications. The oil and gas industry use sodium hydroxide for its alkalizing properties to maintain proper and effective drilling fluid performance as well as refining the final products.

Hydrochloric acid

Hydrochloric acid is a chemical compound that is an aqueous solution of gaseous hydrogen chloride. It has strong corrosive properties, sharp irritating odor, colorless to light yellow. On the market, it is delivered in solution with concentrations depending on the type of product (quality, a production method). Hydrochloric acid is produced as a result of the direct synthesis of the elements - burning of chlorine in hydrogen and subsequent absorption in the water of the hydrogen chloride formed. Synthetic hydrochloric acid is delivered to the market with a concentration of 33%-35.5%. Hydrochloric acid on an industrial scale, is also formed as a by-product of the processes of chlorination of organic compounds.

In oil and gas production HCL is used in the recovery of oil and natural gas from geologic formations. Oil and gas reserves are found in deep sea beds, tight sand formations, shales, and coalbed methane formations. Hydrochloric acid aids in the removal of obstacles that form in the boreholes during the drilling process.

Due to its chemical properties, hydrochloric acid is also used to dissolve contaminants in boreholes to clear the way for the oil and gas to flow into the borehole. In lower concentrations, the hydrochloric acid solution acidifies the formations of limestones or carbonates and removes impurities such as scale or the rust. It's also used in the borehole acidizing process. In extracting gas from rock crevices, high acidity plays an important role in the ability of the borehole to retrieve the trapped natural gas. In new boreholes, it ensures the proper flow. It is also used in existing boreholes/wells to restore the natural permeability of the rock formation, in order to the flow. Hydrochloric acid can also be combined with mud acid such as hydrofluoric acid to dissolve sand, quartz, and clay from the borehole.

Product list

CHEMICAL NAME	CHEMICAL FORMULA	OTHER COMMERCIAL NAMES	FORM	CONCENTRATION	QUALITY	CHARACTERISTIC	PACKING	MAIN APPLICATIONS
Dichloropropane	CHCl	1,2 dichlo-ropropan, propylene dichloride	liquid	solution min 99%	high	Obtained in the production of propylene oxide	tank cars, sotank, drum	Used as extractant for example as lead removal in petrol, can be also used as petroleum catalyst regeneration.
Sodium hydroxide	NaOH	Caustic soda flakes	solid, flakes	min. 98%	high	Product of membrane electrolysis	bags 25 kg	Used in petroleum and refining industry for removing impurities such as carbon dioxide, mercaptans and other sulfur compounds from petroleum products. The oil and gas industry use sodium hydroxide with its alkalizing properties to maintain proper and effective drilling fluid performance as well as refining the final products.
Hydrochloric acid	NaOH	Soda lye; Soda lye aqueous solution 50%	liquid	solution 50% (+/-1%)	high	Product of membrane electrolysis	tank trucks, rail tank cars and IBCs	
Hydrochloric acid synthetic min. 33%	HCl	hydrogen chloride	liquid	solution min 33%	high	Product of inorganic synthesis	tank trucks, rail tank cars and IBCs	Used in recovering oil and natural gas from geologic formations. Oil and gas reserves are found in deep sea beds, tight sand formations, shales, and coalbed methane formations. Hydrochloric acid aids in the removal of obstacles that form in the wells during the drilling process.

Anioninic and Nonionic products

Oil and gas are main resources for many industries and the base of many products. Their processing involves many different intermediate stages, in which surfactants often play a key role. In the mining and drilling industry the surfactants are used as additives for enhanced oil recovery, oil and gas processing, drilling fluids and cementing boreholes. Moreover, surfactants are used as scale and corrosion inhibitors, emulsifiers and emulsion breakers, defoamers and polyelectrolytes, biocides and solvents. PCC Exol offers a variety of specialized products for miscellaneous applications. Their role is to ensure proper wetting, emulsification or demulsification, dispersing processes and foaming stability. The following table presents our products used during processing of oil and the stage of their application.

Anionic and Nonionic product list

PRODUCT GROUP	DRILLING	CEMENTING	ENHANCED OIL RECOVERY	OIL & GAS PROCESSING
Alkyl benzene sulphonates	•	•	•	•
Alkylsulphates	•	•	•	•
Alkylethersulphates	•		•	•
Sulphosuccinates			•	•
Betaines	•			•
Ethoxylated fatty alcohols			•	•
Alkoxylated fatty alcohols	•			•
Ethoxylated nonylphenols			•	•
Ethoxylated fatty acids			•	•
Fatty acid amide ethoxylated	•		•	•
Fatty amines ethoxylated			•	•
EO/PO Block copolymers	•	•	•	•
Sorbitan esters	•	•	•	•
Amines	•			•

Demulsifiers

Demulsifiers are the chemicals used to break emulsions (i.e. to separate two phases). The type of demulsifier selected depends on the type of emulsion, either oil-in-water or water-in-oil. Demulsifiers are used in the chemical analysis of oil and synthetic muds and to treat produced hydrocarbons.

One of the main aims of oil production is to obtain low water and inorganic salts contents. Also during desalting phase, an appropriate amount of water should be added to the oil. Because crude oil contains natural emulsifiers, some amount of water is present as W/O emulsion. The produced W/O emulsion increases the oil viscosity and makes it harder to transfer. This is the reason why efficient demulsifying agents are used during crude oil processing.

The demulsifier is absorbed at the interface layer and decreases surface tension between oil and water which consequently breaks the W/O emulsion. Coalescence of water droplets and macro- separation of water and oil phase is observed. To easily estimate the demulsification properties of various chemical substances, the RSN index can be used. RSN shows the relative solubility of product in water. When the number increases the hydrophilic character of the product or blend also increases. The crude oil demulsifiers should typically have an RSN of 8 to 15. To optimize the separation, blends of demulsifiers can be applied. Because of various oil compositions and production conditions, each blend should be tested individually.

Chemal BP-261 may be used as a demulsifier due to its low HLB value and molecular weight. This product may also act as a defoamer and wetting agent.

Chemal BP-262LF may be used as a demulsifier due to its low HLB value and molecular weight. This product may also act as a defoamer and wetting agent.

Chemal 2EH-5 is a short-chain synthetic alcohol ethoxylate having limited water solubility. This substance rejects oil and may also act as a defoamer for multiple applications.

Rokamer 2600 is a non-ionic surface-active compound applied mainly for reducing foam in various preparations intended for washing, cleaning, laundering. Its composition makes it useful as a component compatible with other non-ionic or anionic/becationic surfactants.

ROKAmer 2330 is a non-ionic surfactant with wetting properties; it also reduces surface tension in aqueous solutions and offers emulsification and dispersion properties. It has low foaming properties. In certain formulations it is used as an antifoaming agent. ROKAmer 2330 can be used in oxidizing, reducing and hard water environments. It is active in cold water, in an acid and neutral bath, as well as in diluted alkalis. It can be used in a mixture with other non-ionic auxiliary agents and in mixtures with anionic and cationic surface active agents.

ROKAmer 2950 is used as a component of emulsifying, washing, dispersing, wetting and softening agents. It has low foaming properties. ROKAmer 2950 can be used in oxidizing, reducing and hard water environments. It is active in cold water, in an acid and neutral bath, as well as in diluted alkalis. It can be used in a mixture with other non-ionic auxiliary agents and in mixtures with anionic and cationic surface active agents.

Demulsifier product list

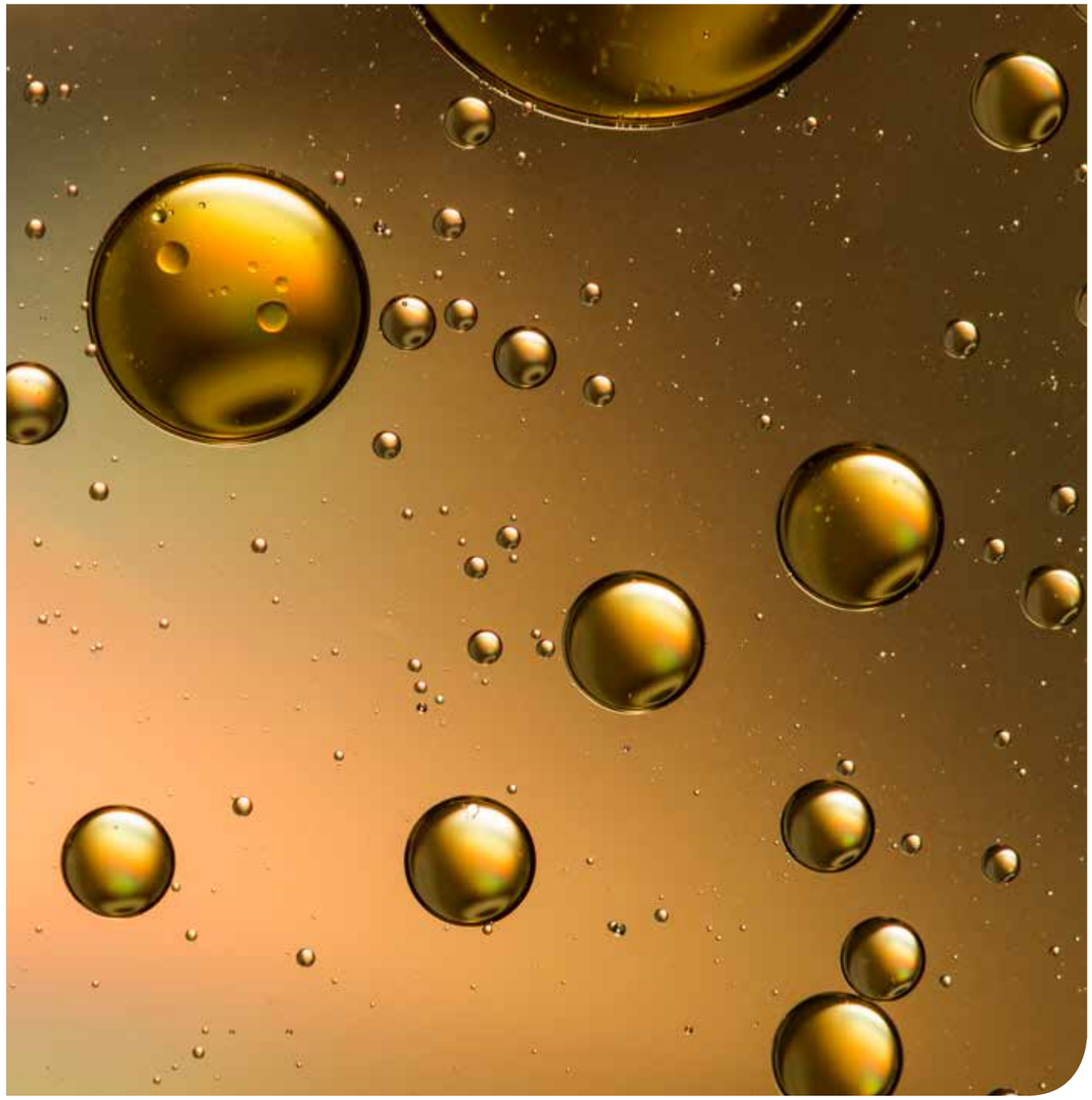
PRODUCT CHARACTERISTIC								SOLUBILITY (10% PRODUCT IN)*				
PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	Cloud point [°C], Cloud point Tanaka [°C][1]; Saponification value[2] [mgKOH/g]; Amine value[3] [mgKOH/g];	ISOPROPANOL	WATER	BASE OIL	MOLECULAR WEIGHT Mw [g/mol]	LIMITED AVAILABILITY IN THE EU
Chemal BP-261	9003-11-6	N	liquid	3	EO/PO block polymer	~100	22-28	N/A	insoluable	N/A	2000	
Chemal BP-262LF	9003-11-6	N	liquid	6.5	EO/PO block polymer	~100	26	N/A	dispersible	N/A	2450	
Chemal 2EH-5	26468-86-0	N	liquid	12.6	EO (5) 2-ethylhexanol	~100	<25	N/A	dispersible	N/A	356	•
ROKAmer 2600	9003-11-6	N	liquid	5.6	EO/PO block copolymer	min. 99	16-20 A	soluble	soluble	soluble	2600	
ROKAmer 2330	9003-11-6	N	viscous liquid	4.9	EO/PO block copolymer	min. 99	21-26	soluble	soluble	soluble	2200	
ROKAmer 2950	9003-11-6	N	viscous liquid	8.1	EO/PO block copolymer	min. 99	54-60	soluble	soluble	soluble	2900	

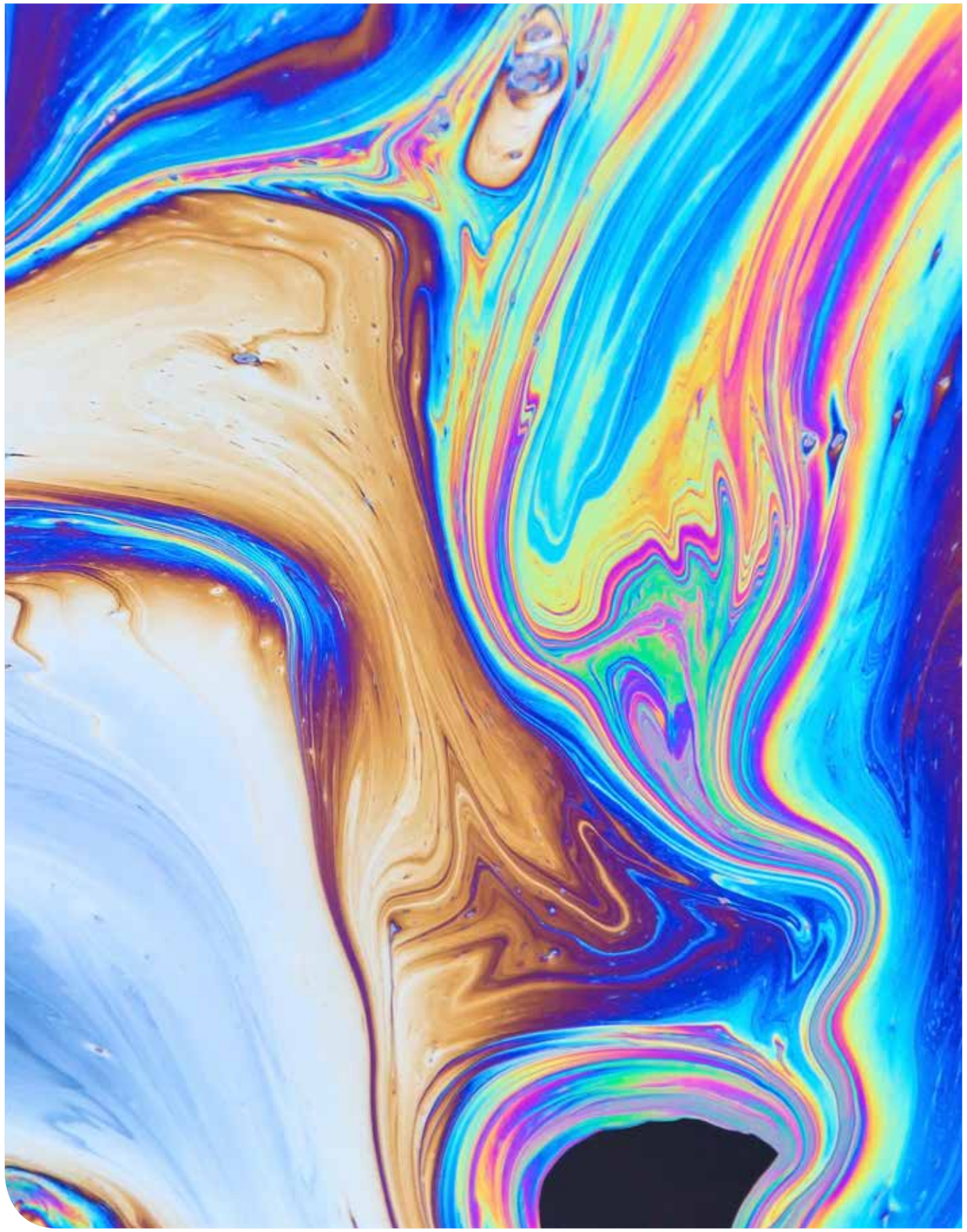
Wetting Agents

Wetting agents are chemical substances that increase the spreading and penetrating properties of a liquid by lowering the surface tension, i.e. tendency of its molecules to adhere to each other at the surface. Surface active agents are essential for reducing interfacial tension between water/ oil, water/solid water/ air and other contacting surfaces. They are used in oil mud and reversed emulsion drilling fluid applications. Those compounds are known for enhancement, replacement and supplementation of secondary emulsifier action.

Wetting Agents product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Chemal BP-261	9003-11-6	N	liquid	3	EO/PO Block Polymer	100	N/A	22-28	
Chemfac PB-106K	68071-17-0	A	liquid	N/A	Organic Phosphate Ester	90	N/A	>100	•
Chemal 2EH-18/80	26468-86-0	N	liquid	12.6	EO (18) 2-Ethyl Hexanol Solution	80	N/A	74	•
Chemal OA-20	9004-98-2	N	liquid	15.3	EO (20) Oleyl Alcohol	100	N/A	>100	
Chemal TDA-9/85	24938-91-8	N	liquid	13	EO (9) Tridecyl Alcohol - 85%	85	N/A	53-56	
Chemal BP-262LF	9003-11-6	N	liquid	6.5	EO/PO Block Polymer	100	N/A	26	
Chemal 2EH-5	26468-86-0	N	liquid	12.6	EO (5) 2-ethylhe-xanol	100	N/A	<25	•
Chemal EM-500	Proprietary	N	liquid	9.2	Proprietary Surfactant	100	N/A	73-83	•
Sulfosuccinates DOSS70GP	577-11-7	A	liquid	–	Di (2-ethylhexyl) Sulfosuccinic acid sodium salt	min. 70	N/A	–	
ABS acid	85536-14-7	A	liquid	–	Dodecylbenzene Sulfonic Acid	min. 96.0	N/A	–	
Rokanol IT7	69011-36-5	N	liquid	12.1	Alcohols, C13, branched, ethoxylated	min. 99.0	N/A	65-70 E	
Rokanol NL6	160901-09-7	N	liquid	12.5	Alcohols, C9-11, ethoxylated	min. 99.5	N/A	50-57 A	
Rokanol GA5	160875-66-1	N	liquid	11.9	Alcohols C10, ethoxylated	min. 99.0	99.5	54- 57 E	
Rokanol ID7	68439-45-2	N	liquid	13.2	Alcohols, C6-12, ethoxylated	min. 99.5	N/A	56 - 62 A	
Rokanol EH3	27252-75-1	N	liquid	10.2	Isooctanol, ethoxylated	min. 99.5	N/A	–	





Oilfield cleaners

Drilling cuttings cleaners and general cleaner

EXOclean OC1 is a specialized cleaning agent for industrial applications. The product exhibits high degreasing properties - also for highly oily surfaces. These properties make it useful in the oil field industry as a cleaner for cutting and drilling elements.

EXOclean AL is a concentrated, alkaline cleaning mixture, designed for professional use. It exhibits a high efficiency in dissolving and removing tough stains from the stainless steel, glazed, glass and concrete surfaces. The product is intended for cleaning e.g. fatty contaminations like oils or soot. EXOclean AL Oilfield cleaners product list can be used, inter alia, for inner cleaning of tanks, pipelines and other containers. EXOclean AL can be used in a form of a concentrate or a dilution of 1:5 to 1:3, depending on the degree of surface contamination.

ROTclean and ROTquick are products for degreasing and removing petroleum-contaminated dirt from all types of smooth and porous hard surfaces such as asphalt, concrete floors, plastics, metal surfaces and others. These products are particularly recommended for: fire brigades, road managers, fuel stations and industrial plants.

Oilfield cleaners product list

PRODUCT NAME	PHYSICAL FORM	DESCRIPTION	FUNCTION	LIMITED AVAILABILITY IN THE EU
EXOclean OC1	liquid	mixture of surface active agents and additives	drilling cuttings cleaner	
EXOclean AL.	liquid	mixture of surface active agents and additives	highly alkaline oil cleaner	
Rotquick	liquid	mixture of surface active agents and additives	general purpose cleaner and degreaser	
Rotclean	liquid	mixture of surface active agents and additives	general purpose cleaner and degreaser	
EXOclean BCK	liquid	mixture	degreasing hard surfaces	
EXOdis OS6	liquid	mixture	alkaline degreasing agent	

Lubricants

Lubricants are mud additives for lowering torque (rotary friction) and drag (axial friction) in boreholes and to lubricate bit bearings if they are not sealed. Lubricants are available in various forms: e.g. plastic beads, glass beads, nut hulls and graphite, or as liquids, such as oils, synthetic fluids, glycols, modified vegetable oils, fatty-acid soaps and surfactants.

Lubricants product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Maxlube DG-1 SW	Proprietary	N	liquid	N/A	Proprietary Surfactants	~100	N/A	N/A	•
Chemax DFO-Renew Lube	Mixture	N/A	liquid	N/A	Proprietary Surfactants	~100	N/A	N/A	•
Maxlube HPH-1	Proprietary	N	liquid	N/A	Proprietary Surfactants	~100	N/A	N/A	•
Maxlube DG-1	Proprietary	N	liquid	N/A	Proprietary Surfactants	~100	N/A	N/A	•
Chemax NDO-917	Proprietary	N	liquid	N/A	Proprietary Surfactants	~100	N/A	N/A	•
Chemid TODA-100	68953-28-6	N	liquid	N/A	Fatty Amide	~100	N/A	>100	•
Chemal OA-20	9004-98-2	N	solid	15	EO (20) Oleyl Alcohol	~100	N/A	N/A	
Chemstat® HTSA #54	115-83-3	N	solid	N/A	Pentaerythritol Treastearate	~100	195 max	N/A	•
Chemax CO-5	61791-12-6	N	liquid	3.8	EO (5) Castor Oil	~100	145	N/A	
Sorbax PMO-20	9005-65-6	N	liquid	15	EO (20) Sorbitan Monooleate	~100	50	>100	
Sorbax HO-50	57171-56-9	N	liquid	11	EO (50) Sorbitan Hexaoleate	~100	85	10% in DB-39C	•
Chemax HCO-16	61788-85-0	N	liquid	8.6	EO (16) Hydrogenated Castor Oil	~100	100	N/A	•
Chemal OA-23/70	9004-98-2	A	liquid	16	EO (23) Oleyl Alcohol Solution	70	N/A	>100	•
Chemal G-35/90	31694-55-0	N	liquid	19	EO (35) Glycerol	90	N/A	>100	•
Chemax E-400MO	9004-96-0	N	liquid	11.8	EO (9) Monooleate	100	75-88	N/A	
Chemax EMX-1154	Proprietary	N	liquid	N/A	Proprietary Surfactants	100	N/A	N/A	•
Chemal EM-500	Proprietary	N	liquid	9.2	Proprietary Surfactant	100	N/A	73-83	•
Chemfac PA-800	68186-45-8	A	liquid	N/A	Organic Phosphate Ester	100	N/A	N/A	•

Maxlube DG-1 SW is an environmentally friendly premium lubricant designed as self-emulsifying in freshwater, seawater, and brine applications. Maxlube DG-1 SW reduces torque and drag in directional drilling applications resulting in a decrease of the coefficient of friction.

Chemax DFO-Renue Lube is an environmentally friendly lubricant which provides superior performance in aluminum pipe down-hole drilling. By lowering the operation temperature and extending tool life, Chemax DFO-Renue Lube ensures economic benefits for the customer. The product reduces or even eliminates the use of diesel fluids in mud slurries and minimizes environmental impact.

Maxlube HPH-1 is an environmentally friendly premium lubricant designed for silicate systems. Maxlube HPH-1 is stable in high pH systems and its purpose is to reduce torque and drag in directional drilling applications. A 2% addition in sodium silicate mud reduces torque by 76% after heat rolling.

Maxlube DG-1 is an environmentally friendly premium lubricant designed to be self-emulsifying in freshwater applications. Maxlube DG-1 SW reduces torque and drag in directional drilling applications by lowering the friction coefficient.

Chemax NDO-917 is a synthetic polymerized ester that provides corrosion inhibition and wetting, in addition to be an exceptional lubricant. Based on a branched chain fatty acid, it exhibits outstanding bio-stable oxidative and hydrolytic stability. It will provide both boundary and extreme pressure properties to oil field formulations.

Chemid TODA-100 is an oil-soluble, water-dispersible DIPA alklanolamide, manufactured from tall oil fatty acid. This product has primary and secondary emulsion properties and enhances corrosion protection in water extendable systems. Its manufacturing process minimizes the soap content and ensures excellent hard water stability.

Chemal OA-20 is used as a lubricant and emulsifier in many industries. It is highly water-soluble and may provide boundary lubrication, in addition to wetting attributes.

Chemstat® HTSA #54 is a high molecular weight ester with outstanding thermal stability. The product is offered in a convenient bead form for ease of formulating as a lubricant and emulsifier for multiple industries.

Chemax CO-5 is an oil-soluble triglyceride ethoxylate which produces highly stable oil-in-water emulsions and enhanced lubricity attributes.

Sorbax PMO-20 can provide both dispersant and emulsification properties for oil-in-water systems. Its chemical structure promotes exceptional lubricity attributes while being readily compatible with ionic materials.

Sorbax HO-50 is a hydrophobic substance with high molecular weight and a long hydrophilic chain that is able to provide both dispersant and emulsification effects for oil-in-water systems. Its chemical structure promotes exceptional lubricity attributes while being readily compatible with ionic materials.

Chemax HCO-16 is an excellent emulsifier and lubricant. Its additional advantage is its recyclable nature, as most of its components are natural substances.

Chemal OA-23/70 is used as a lubricant and emulsifier in many industries. It is highly water-soluble and may provide boundary lubrication, as well as wetting features.

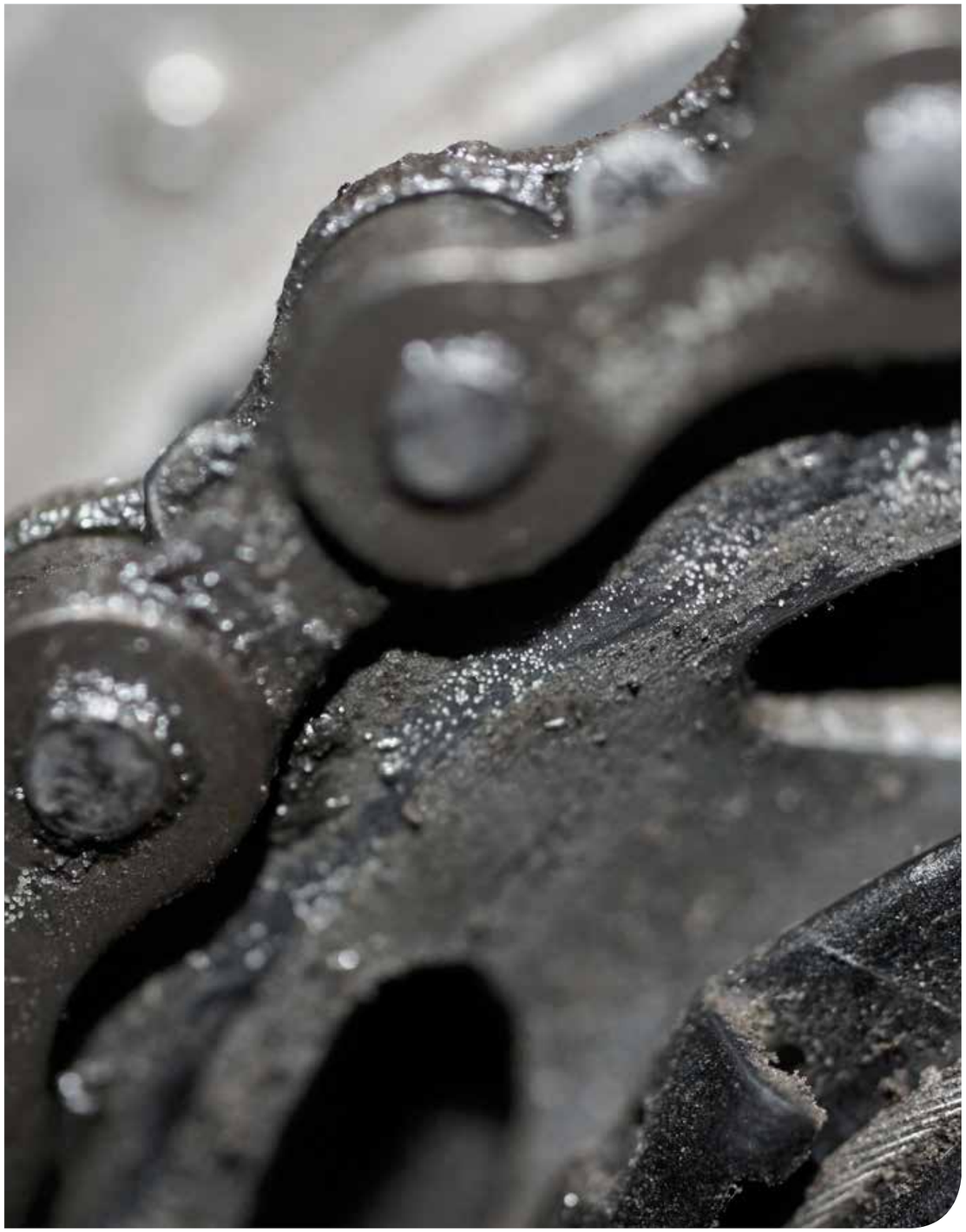
Chemal G-35/90 is an ethoxylated triglyceride which provides outstanding lubricity properties and emulsion stability in oil-in-water systems.

Chemax E-400MO is a medium range non-ionic surfactant used primarily as an emulsifying, stabilizing agent and HLB balancer to keep drilling muds stable and prevents settling. It is also, used as a lubricant in water-based mud systems to reduce torque and drag in the wellbore and to lubricate bit bearings.

Chemax EMX-1154 is an outstanding emulsifier for natural and mineral oils, which also provides outstanding boundary lubricity properties for metal to metal applications. The surfactant nature of this compound enables wetting of solid surfaces while producing minimal foam.

Chemal EM-500 is a multi-functional additive that can improve lubricity and wetting properties. It can be used as a primary emulsifier for naphthenic and paraffinic oils.

Chemfac PA-800 is highly oil-soluble phosphate ester which provides extreme pressure additives, lubricity and secondary emulsifier properties. It is low foaming and yet may provide wetting attributes to high oil systems.



Emulsifiers

Emulsifiers are chemical additives that create an emulsion, which is a dispersion of one immiscible liquid into another, by reducing the interfacial tension between the two liquids to achieve stability. Two emulsion types are used as muds: (1) oil-in-water (or direct) emulsion, known as an "emulsion mud" and (2) water-in-oil (or invert) emulsion, known as an "invert emulsion mud". The former is classified as a water-base mud and the latter as an oil-base mud.

Emulsifiers product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Chemax CO-5	61791-12-6	N	liquid	3.8	EO (5) Castor Oil	100	145	N/A	
Sorbax PMO-20	9005-65-6	N	liquid	15	EO (20) Sorbitan Monooleate	100	50	>100	
Sorbax HO-50	57171-56-9	N	liquid	11.4	EO (50) Sorbitan Hexaoleate	100	85	10% in DB-39C	•
Chemax HCO-16	61788-85-0	N	liquid	8.6	EO (16) Hydrogenated Castor Oil	100	100	N/A	•
Chemal OA-23/70	9004-98-2	N	liquid	15.8	EO (23) Oleyl Alcohol Solution	70	N/A	>100	•
Chemal G-35/90	31694-55-0	N	liquid	18.9	EO (35) Glycerol	90	N/A	>100	•
Chemax E-400MO	9004-96-0	N	solid	11.8	EO (9) Monooleate	100	75-88	N/A	
Chemax EMX-1154	Proprietary	N	solid	N/A	Proprietary Surfactant	100	N/A	N/A	•
Chemal EM-500	Proprietary	N	liquid	9.2	Proprietary Surfactant	100	N/A	73-83	•
Chemal 2EH-18/80	26468-86-0	N	liquid	12.6	EO (18) 2-Ethyl Hexanol Solution	80	N/A	74	•
Chemid TODA-100	68953-28-6	N	liquid	N/A	Fatty Amide	100	N/A	N/A	•

Special attention in petrochemical industry is paid to oilfield surfactants. Handling the water insoluble oil creates many problems resulting from contact with water. Application of surface active agents is crucial in gaining high efficiency of exploration, proper maintenance of field equipment and preservation the natural environment. Primary and secondary emulsifiers are widely used to influence the dispersing, emulsifying wetting and other properties of sludge and load fluids.

Emulsifiers product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Rokanol K7	68920-66-1	N	liquid/paste	10.8	Alcohols C16-C18 and C18 unsaturated, ethoxylated	100	N/A	N/A	
Rokanol K18	68920-66-1	N	solid	16.3	Alcohols C16-C18 and C18 unsaturated, ethoxylated	100	N/A	74-79 (met.C)	
Rokanol IT9W	69011-36-5	N	liquid	13.3	Alcohols, C13, branched, ethoxylated	90	N/A	58-62 (met. A)	
Roksapian N Flakes	mixture	N/A	solid/flakes	N/A	mixture	100	N/A	N/A	
Chemfac PB-106K	68071-17-0	A	liquid	N/A	Organic Phosphate Ester	90	N/A	>100	•
Chemal OA-20	9004-98-2	N	liquid	15.3	EO (20) Oleyl Alcohol	100	N/A	>100	
Chemstat HTSA #54	115-83-3	N	liquid	N/A	Pentaerythritol Treastearate	100	195 max	N/A	•
Chemfac PA-800	68186-45-8	A	liquid	N/A	Organic Phosphate Ester	100	N/A	N/A	•
Maxlube HPH-1	Proprietary	N	liquid	N/A	Proprietary Surfactant	100	N/A	N/A	•

Emulsifiers product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Rokacet R26	61791-12-6	N	liquid	11	Castor oil +26 EO	min. 99.5	74-82	N/A	
Rokwin 80	1338-43-8	N	oily liquid	4.3	Sorbitan Monooleate	min. 98.5	145-160	N/A	
Rokacet HR40W	61788-85-0	N	liquid	–	Castor oil, hydrogenated +40 EO	min. 99.0	45-60	N/A	
Rokanol O3	9004-98-2	N	liquid	7.1	Alcohols, C16-18 unsaturated + 3 EO	min. 99.0	N/A	37-41 E	
Rokanol O5	9004-98-2	N	liquid	9.1	Alcohols, C16-18 unsaturated + 5 EO	min. 99.0	N/A	N/A	
Rokacet O7	9004-96-0	N	liquid	9.1	C18 unsaturated acid ethoxylate, <10 EO	min.99	86-96	N/A	
Rokanol NL8W	68439-46-3	N	liquid	15.7	Alcohols, C9-11, branched and linear, ethoxylated 5-20 EO	88-92	N/A	78-85 A	
Rokanol GA9W	160875-66-1	N	liquid	14.5	Alcohol C10, ethoxylated	84-86	N/A	67-70 A	
Rokwinol 60	9005-67-8	N	liquid	14.9	EO (20) Sorbitan Monostearate	100	45-55	N/A	
Rokwinol 80	9005-65-6	N	liquid	15.0	EO (20) Sorbitan Monooleate	100	45-55	N/A	

Chemax CO-5 is an oil-soluble triglyceride ethoxylate which produces highly stable oil-in-water emulsions and enhanced lubricity attributes.

Sorbax PMO-20 can provide both dispersant and emulsification properties for oil-in-water systems. The chemical structure promotes exceptional lubricity attributes while being readily compatible with ionic materials.

Sorbax HO-50 is a high molecular weight hydrophobic substance with a long chain hydrophilic component that can provide both dispersant and emulsification properties for oil-in-water systems. The chemical structure promotes exceptional lubricity attributes while being readily compatible with ionic materials.

Chemax HCO-16 is an excellent emulsifier and a lubricant, and an added benefit is that it is considered renewable, because majority of its components are from natural substances.

Chemal OA-23/70 is used as a lubricant, emulsifier in a variety of industries. It is highly water-soluble and may provide boundary lubrication, in addition to wetting attributes.

Chemal G-35/90 is an ethoxylated triglyceride which provides outstanding lubricity properties and emulsion stability properties for oil-in-water systems.

Chemax E-400MO is a medium range non-ionic surfactant used primarily as an emulsifying, stabilizing agent and HLB balancer to keep drilling muds stable and prevent settling. Also, used as a lubricant in water-based mud systems to reduce torque and drag in the wellbore and to lubricate bit bearings.

Chemax EMX-1154 1154 is an outstanding emulsifier for natural and mineral oils, which also provides outstanding boundary lubricity properties for metal to metal applications. The ingredients of this compound allow solid surface wetting while producing minimal foam.

Chemal EM-500 is a multi-functional additive that can improve lubricity and wetting properties. It can be used as a primary emulsifier for naphthenic and paraffinic oils.

Chemal 2EH-18/80 is a short chain synthetic alcohol ethoxylate. This product is often used as a co-emulsifier but also provides durable foam in water- based systems and may provide wetting and detergency attributes.

Chemid TODA-100 is an oil-soluble, water dispersible DIPA alkanolamide manufactured from tall oil fatty acid. This product provides primary and secondary emulsion properties and enhances corrosion protection in water extendable systems. The manufacturing process employed in production minimizes soap content and ensures excellent hard water stability.

Chemfac PB-106K offers coupling properties to water-based systems, while providing lubrication and emulsification attributes. This product is hard water compatible and may help coupling of other additives.

Chemal OA-20 is used as a lubricant, emulsifier in a variety of industries. It is highly water-soluble and may provide boundary lubrication, in addition to wetting attributes.

Chemstat® HTSA #54 is a high molecular weight ester with outstanding thermal stability. The product is offered in a convenient bead form for ease of formulating as a lubricant and emulsifier for multiple industries.

Chemfac PA-800 is highly oil-soluble phosphate ester used in extreme pressure additives, lubricity and secondary emulsifier properties. It is low foaming and yet may impart wetting attributes to high oil systems.

Maxlube HPH-1 is an environmentally friendly premium lubricant designed for silicate systems. Maxlube HPH-1 is stable in high pH systems and is designed to reduce torque and drag in directional drilling applications. 2% addition in sodium silicate mud reduces torque by 76% after heat rolling.

Rokacet R26 is an emulsifier with dispersing properties. The product is obtained from recyclable raw materials and it is environmentally friendly.

Rokwin 80 is a universal emulsifier, which is a derivative of sorbitan and oleic acid. It is mainly used as water-in-oil (W/O) emulsifier. It has dispersing properties, making it suitably as a dispersant of asphaltene in crude oil and of petroleum substances spilled at the water surface.

Rokanol O3 is a natural ethoxylated alcohol used as an emulsifier in formation of W/O emulsions (water in oil) and O/W emulsions (oil in water). The type of emulsion obtained depends on the amount and chemical nature of the remaining components of the emulsifying package. These features make it possible to use the product in crop protection agents and cutting fluids.

Rokanol O5 O5 is a natural ethoxylated alcohol with poor solubility in water, used as an emulsifier in formation of O/W, emulsions. It also has also good dispersion and solubilizing properties.

Rokacet O7 is a polyoxyethylene fatty acid ester used mainly as an emulsifier for mineral oils. It may be used as a lubricant and an anti-wear additive. The product has also low-foaming properties.

Rokanol K7 is a natural ethoxylated fatty alcohol with low solubility in water. The product is used mainly as an emulsifier of mineral oils.

Rokanol K18 is a strong hydrophilic non-ionic surfactant, which belongs to the group of ethoxylated fatty alcohols. The product has very good emulsifying properties for white spirit, xylene and kerosene.

Rokanol IT9W is a highly water-soluble synthetic alcohol ethoxylate. This product is commonly used as a co-emulsifier but also provides exceptional wetting and detergent properties to water-based systems.

Rokanol NL8W is a water-soluble synthetic ethoxylated fatty alcohol. It has very good wetting and emulsifying properties, and it provides an exceptional degreasing effect.

Rokanol GA9W is a water-soluble synthetic ethoxylated fatty alcohol. It is a low-foaming substance of good wetting, degreasing and dispersing properties.

Foaming Agents

Foaming agents are additives that generate foam used as a drilling fluid. Drilling foam consists of water with air or gas bubbles, similar to shaving foam. It must withstand high salinity, hard water, solids, entrained oil and high temperature. Foaming agents are usually non-ionic surfactants and contain polymeric materials.

Old boreholes/wells usually have insufficient bottom pressure to remove fluids from their interior, which cause fluid accumulation at the bottom. Without of artificial lift techniques, the head pressure from accumulated liquid in the well reduces gas production more rapidly than the natural decline curve, and eventually production stops. One of the methods for Enhanced Oil Recovery is the application of various chemicals, mainly as diluted solutions. Usually gas wells are brine rich and can be successfully treated with conventional surfactant-based foaming agents. The injections are used to aid mobility through reduction of viscosity and the decrease in surface tension. In gas fields foaming agents have profitably increased production by unloading fluid and reducing hydrostatic pressure with little capital investment. Foaming agents are a relatively economical technology as no downhole equipment is necessary and the operating costs are proportional to the amount of fluid being treated but the application of these methods is usually limited by the cost of the chemicals and their adsorption and loss onto the rock of the oil containing formation. In all of these methods the chemicals are injected into several wells and the production occurs in other nearby wells.

Foaming agents product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Chemid TODA-100	68953-28-6	N	liquid	N/A	Fatty Amide	100	N/A	N/A	•
Chemfac PB-106K	68071-17-0	A	liquid	N/A	Organic Phosphate Ester	90	N/A	>100	•
Chemal 2EH-18/80	26468-86-0	N	liquid	12.6	EO (18) 2-Ethyl Hexanol Solution	80	N/A	74	•
Chemal TDA-9/85	24938-91-8	N	liquid	13	EO (9) Tridecyl Alcohol - 85%	85	N/A	53-56	
ROKAnol IT9W	69011-36-5	N	liquid	13.3	Alcohols, C13, branched, ethoxylated	90	N/A	58-62 (met. A)	
Sulfosuccinate DOSS70GP	577-11-7	N	liquid	N/A	Dioctyl Sulfosuccinate	70	N/A	N/A	
Roksapian N	Proprietary	M	mixture	N/A	Mixture	100	N/A	N/A	
ROKAmina K30	Proprietary	N	liquid	N/A	Cocamidorpopyl Betaine	29-32	N/A	below -1	
Roksapian N Flakes	Mixture	N/A	solid/flakes	N/A	Mixture	100	N/A	N/A	
Sulforokanol L270/1	68891-38-3	A	paste	N/A	Sodium Lauryl Ether Sulfate, 2 EO	70	N/A	N/A	
ROKAmid KAD/2A	68603-42-9	N	liquid	N/A	Coconut Diethanolamide	100	N/A	N/A	

Chemid TODA-100 is an oil-soluble, water-dispersible DIPA alkanolamide manufactured from tall oil fatty acid. This product provides primary and secondary emulsion properties and enhances corrosion protection in water extendable systems. The manufacturing process employed in production minimizes soap content and imparts excellent hard water stability.

Chemfac PB-106K offers coupling properties to water-based systems, while providing lubrication and emulsification attributes. This product is hard water compatible and may help coupling of other additives.

Chemal 2EH-18/80 is a short-chain synthetic alcohol ethoxylate. This product is commonly used as a co-emulsifier but also provides persistent foam in water-based systems and may provide wetting and detergency attributes.

Chemal TDA-9/85 is a highly water-soluble synthetic alcohol ethoxylate. This product is often used as a co-emulsifier but also provides exceptional wetting and detergent properties to water-based systems.

Roksapian N is a raw material for the manufacture of foaming sticks for water reservoirs.

Rokamina K30 Component of high-quality shampoos and bubble baths. Component of detergents and high quality personal hygiene agents, such as shampoos and body washes. ROKAmina K30 is active in cold water, in acidic and neutral baths, and in diluted alkali.

Roksapian N Flakes is especially composed mixture of surfactants, which is used as a raw material for producing foaming sticks for formation waters. Appropriately selected ingredients of the preparation ensure efficient and successive release of active substances from foaming sticks, ensuring foam generation in formation waters at lower temperatures.

Defoamers

Defoamers are mud additives used to lower interfacial tension, facilitating the escape of trapped gas from mud. Mechanical degassing equipment is commonly used along with defoamers. Substances such as octyl alcohol, aluminum stearate, various glycols silicones and sulfonated hydrocarbons may be used as defoamers.

During processing of the drilling fluids inside the separator, much foam is being produced. The foam tightly covers the surface and disables degassing.

Another important disadvantage is reduction of gas space inside the separator and possibility of escape through the gas outlet in form of a mist or larger liquid drops. This is why the defoamers are introduced upstream of the separator. By reduction of the surface tension of liquids defoamers prevent production of foams or break down existing ones.

Defoamers product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Maxlube HPH-1	Proprietary	N	liquid	N/A	Proprietary Surfactant	100	N/A	N/A	•
Chemal BP-261	9003-11-6	N	liquid	3	EO/PO Block Polymer	100	N/A	22-28	
Chemal BP-262LF	9003-11-6	N	liquid	6.5	EO/PO Block Polymer	100	N/A	26	
ROKAmer 2330	9003-11-6	N	liquid	N/A	EO/PO Block Polymer	100	N/A	approx. 30	
ROKAmer G5000E	Proprietary	N	liquid	N/A	glycerol based EO/PO Block Polymer	100	N/A	47.7	
ROKAmer G3500	Proprietary	N	liquid	N/A	glycerol based EO/PO Block Polymer	100	N/A	36-42	
EXOantifoam S100	Proprietary	N	liquid	N/A	silicone defoamer	N/A	N/A	N/A	
ROKAmer 2000	9003-11-6	N	liquid		EO/PO Block Polymer	100	N/A	23-27	
ROKAmer 3500	9003-11-6	N	liquid	N/A	EO/PO Block Copolymer	min. 99	N/A	33 - 38*	
Rokanol RZ4P11	68002-96-0	N	liquid	3.3	Alcohols, C16-18, ethoxylated, propoxylated	min. 99	N/A	23 - 27*	
ROKAmer PP2000	25322-69-4	N	liquid	N/A	Polyoxypropylenediol	~100	N/A	12 - 18*	
ROKAmer PP4000	25322-69-4	N	liquid	N/A	Polyoxypropylenediol	~100	N/A	N/A	
ROKAmer 2600	9003-11-6	N	liquid	5.6	EO/PO Block Copolymer	min. 99	N/A	16 - 20***	
ROKAnol LP2023	68002-96-0	N	liquid	N/A	Alcohols, C16-18, ethoxylated, propoxylated	min. 99	N/A	20 -23*	
ROKAnol LP2126	68002-96-0	N	liquid	N/A	Alcohols, C16-18, ethoxylated, propoxylated	min. 99	N/A	21 - 26**	

* method E, ** method D, *** method A

Dispersant

Dispersants are similar to emulsions, with the exceptions that one of their phases is a solid or particulate rather than a liquid. Powdered polymers are dispersed by pre-coating the particles with glycol-based substances to prevent formation of "fish-eye" globules. For dispersing (emulsification) of oil into water (or water into oils), surfactants selected on the basis of hydrophile-lipophile balance (HLB) number can be used. For foam drilling fluids, synthetic detergents and soaps are used, along with polymers, to disperse foam bubbles into the air or gas.

Chemal BP-261 is suitable for use as a demulsifier due to its low HLB value and molecular weight. This product may also act as a defoamer and wetting agent.

Chemal G-35/90 is an ethoxylated triglyceride which provides outstanding lubricity properties and emulsion stability properties for oil-in-water systems.

Chemax DOSS/70PG is high activity sulfosuccinate in a non-flammable diluent. This product generates large amounts of foam even in water with high hardness. Additionally, it is an exceptional wetting agent and may prevent redeposition of soils.

Chemal BP-262LF offers functionality as a demulsifier due to its low HLB value and molecular weight. This product may also act as a low foaming wetting agent.

ROKAmer is a non-ionic surfactant with wetting properties, aqueous solution surface tension reduction properties and emulsification and dispersion properties. It has low foaming properties. In certain formulations it is used as an antifoaming agent.

ROKAmer 2100 can be used in oxidizing, reduction and hard water environments. It is active in cold water, in an acid and neutral bath, as well as in diluted alkalis. It can be used in a mixture with other non-ionic auxiliary agents and in mixtures with anionic and cationic surface active agents.

Dispersant product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Chemal BP-261	9003-11-6	N	liquid	3	EO/PO Block Polymer	100	N/A	22-28C	
Chemal G-35/90	31694-55-0	N	liquid	18,9	EO (35) Glycerol	90	N/A	>100C	•
Chemax DOSS/70PG	577-11-7	A	liquid	N/A	Dioctyl Sulfosuccinate	70	N/A	N/A	
Chemal BP-262LF	9003-11-6	N	liquid	6.5	EO/PO Block Polymer	100	N/A	26	
ROKAmer 2100	9003-11-6	N	liquid	3.4	EO/PO Block Polymer	100	N/A	17-20 (10% in water)	
Sulfosuccinate DOSS70GP	577-11-7	A	liquid	N/A	Dioctyl Sulfosuccinate	70	N/A	N/A	
Rodys LP	9084-06-4	A	powder	N/A	Naphthalenesulfonic Acid, Polymer with Formaldehyde, Sodium Salt	min. 88.5	N/A	N/A	

Extreme Pressure

Products used for extreme pressure applications consist mainly of boron, phosphorus, sulfur, chlorine, or combinations of these. These compounds are activated by the higher temperature resulting from extreme pressure, not by the pressure itself. As the temperature rises, the extreme pressure molecules become reactive and release derivatives of phosphorus, chlorine, or Extreme Pressure product list sulfur (depending on which compound is used) to react with only the exposed metal surfaces to form a new compound such as iron chloride or iron sulfide. The new compound forms a solid protective coating that fills the asperities on the exposed metal. Thus, the protection is provided in locations, where it is required.

Extreme Pressure product list

PRODUCT NAME	CAS NUMBER	IONIC CHARACTER	PHYSICAL FORM	HLB	DESCRIPTION	ACTIVE CONTENT (%)	SAPONCIFICATION VALUE [mg KOH/g]	CLOUD POINT [°C]	LIMITED AVAILABILITY IN THE EU
Chemsulf SI-10E	Proprietary	A	liquid	N/A	Sulfurized Hydrocarbon	100	N/A	N/A	•
Chemfac PA-800	68186-45-8	A	liquid	N/A	Organic Phosphate Ester	100	N/A	N/A	•

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 aqueos 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 (polyoxyethylenated fatty acids):

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

where:

LZ saponification number of oxyethylenation product, mgKOH/g

LK acid number of acids subjected to oxyethylenation, mgKOH/g

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

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 W/O
10-15	50-75	Detergent
10-18	50-90	Solubilizer

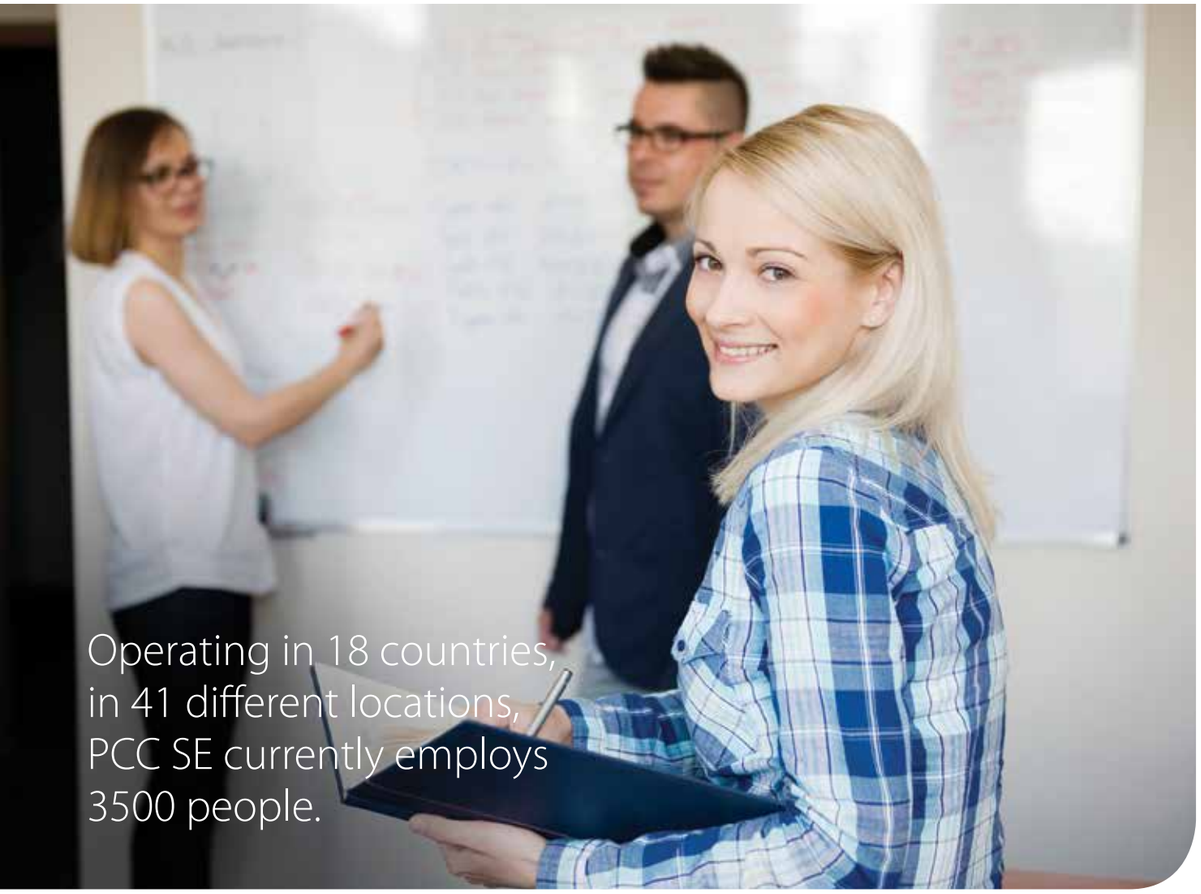
Cloud point

Cloud point is an indicator determining the behaviour of water or other organic solutions of nonoionic 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 discriminated:

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)

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 on the knowledge acquired through years of experience. It is knowledge and experience that enables us to constantly aim higher and deliver greater value through dynamic and sustainable world-wide development of the PCC Group.

The companies, operating as a part of the PCC Group, acts 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 in both local and international markets. Each day nearly three thousand professionals contribute their energy, and effort, to secure the sustainable development 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	Divisions	Segments	Business units
Chemicals	Polyols	• Polyols • Polyurethane Systems	Energy	Energy	• Renewable Energies • Conventional Energies
	Surfactants	• Anionic Surfactants • Non-ionic Surfactants • Amphoteric Surfactants (Betaines)	Logistics	Logistics	• Intermodal Transport • Road Haulage • Rail Transport
	Chlorine	• Chlorine • MCAA • Other Chlorine Downstream Products	Holding	Holding	• Portfolio Management • Projects • Services
	Speciality Chemicals	• Phosphorus and Naphthalene Derivatives • Alkylphenols • Chemicals and Commodities Trading • Quartzite			
	Consumer Products	• Household and Industrial Cleaners, Detergents and Personal Care Products • Matches and Firelighters			

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 Şirketi (Turkey)

PCC CP Kosmet Sp. z o.o.

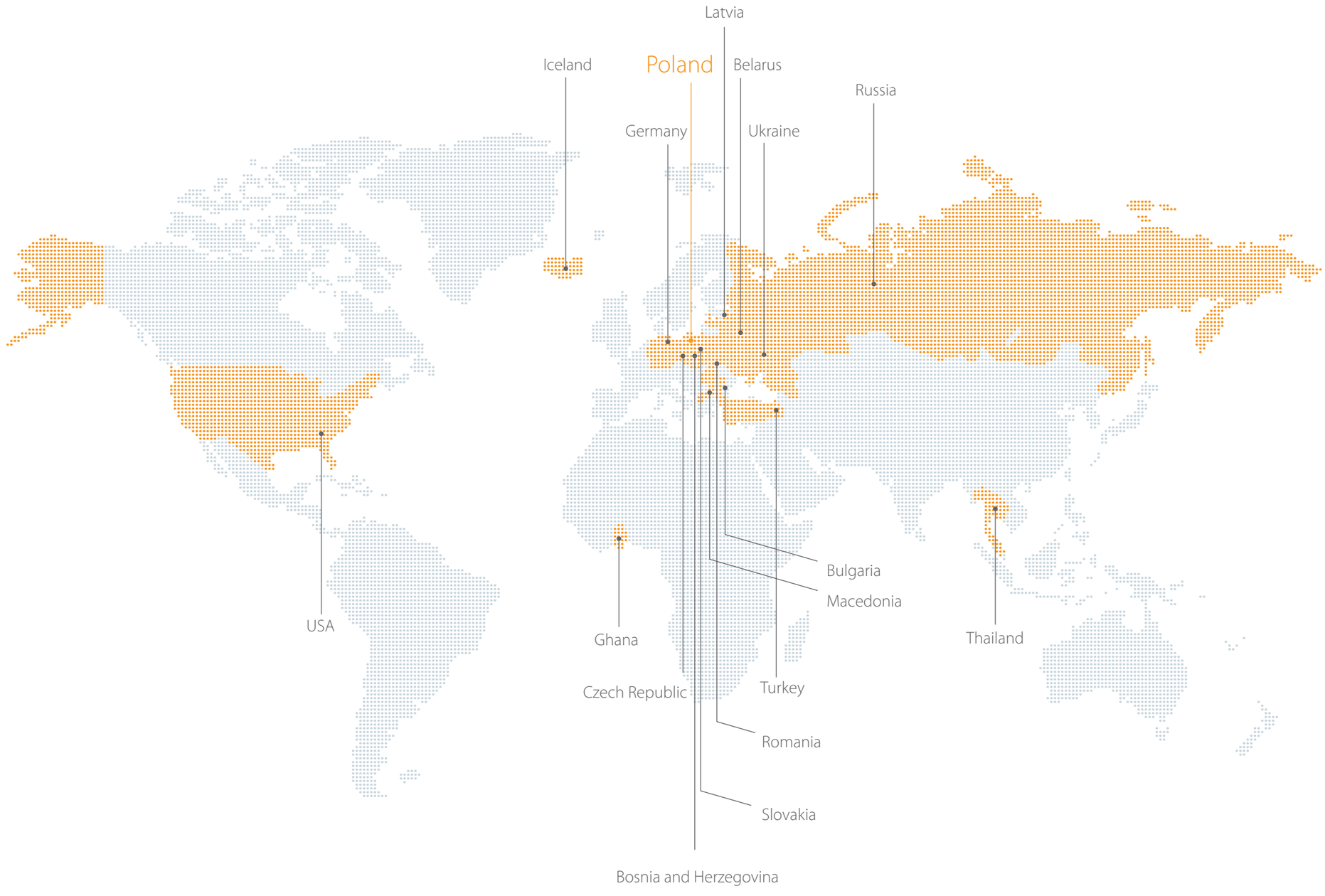
Capital Group PCC CP Kosmet, 3 companies, including:
PCC CP Kosmet Sp. z o.o.
OOO PCC Consumer Products Navigator (Belarus)
OOO PCC Consumer Products (Russia)

PCC MCAA Sp. z o.o.

PCC Autochem Sp. z o.o.

PCC Intermodal SA

PCC Group in the world



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.

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COVER PAGES	
Brand	Cocoon Silk
Grammage	250
Number of pages	4

PUBLICATION	
Size (cm)	21 x 29.7
Quantity	200

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

33	kg of landfill
4	kg CO_2 and greenhouse gases
45	km travel in the average European car
1 262	litres of water
71	kWh of energy
54	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 fibre paper - according to the latest European BREF data (virgin fibre paper) available.

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