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# METALWORKING ADDITIVES

RANGE OF PRODUCTS

## ANIONIC SURFACTANTS

### ETHER CARBOXYLIC ACIDS

<b>AKYPO® LF</b>	<b>Solubilizers with short alkyl chains (C<sub>4-8</sub>) and a moderate to high degree of ethoxylation; besides their excellent foam control ability, they are multifunctional stabilizers for metalworking concentrates and emulsions.</b>	
NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS
AKYPO® LF 1	Capryleth-6 carboxylic acid	Low foaming surfactant also in combination with high foaming surfactants, outstanding electrolyte stability, hydrotropic properties.
AKYPO® LF 2	Capryleth-9 carboxylic acid	Low foaming surfactant also in combination with high foaming surfactants, outstanding electrolyte stability, helps in the solubilization of lime soaps, hydrotropic properties.
AKYPO® LF 4	Hexeth-4 carboxylic acid + Capryleth-9 carboxylic acid	Very low foaming surfactant also in combination with high foaming surfactants, outstanding electrolyte stability, helps in the solubilization of lime soaps, hydrotropic properties, can be used to adjust drip off behavior.
AKYPO® LF 6	Capryleth-9 carboxylic acids + Buteth-2 carboxylic acid	Very low foaming surfactant also in combination with high foaming surfactants, good electrolyte stability, very good solubilizer, hydrotropic properties, can be used to adjust drip off behavior.
AKYPO® LF 10	Iso-capryleth-9 carboxylic acid	Very low foaming surfactant also in combination with high foaming surfactants, hard water tolerant anionic surfactant with outstanding electrolyte stability, helps in the solubilization of lime soaps, hydrotropic properties.

**AKYPO® RLM/RO** **Emulsifiers with medium to long alkyl chains (C<sub>12</sub>- C<sub>18</sub>) and a low degree of ethoxylation; enhancement of anti-corrosion properties.**

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS
AKYPO® RLM 25	Laureth-4 carboxylic acid	Excellent emulsifier, provides strong enhancement of anti-corrosion properties, good wetting ability and improved hard water stability, improves lubricity.
AKYPO® RO 20 VG	Oleth-3 carboxylic acid	Excellent emulsifier especially when used in formulations with a high oil content, provides strong enhancement of anti-corrosion properties, good wetting ability and improved hard water stability, improves lubricity.

### ETHER CARBOXYLIC ACIDS

<b>AKYPO® RO</b>	<b>Co-emulsifiers with long alkyl chains (C<sub>16-18</sub>) and a moderate to high degree of ethoxylation; essential for increasing the shelf life of water-miscible metalworking fluids; very powerful in lime soap dispersion.</b>	
NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS
AKYPO® RO 50 VG	Oleth-6 carboxylic acid	Stabilizer with good emulsifying properties, strong improvement of hard water stability (lime soap dispersing agent), enhances corrosion prevention, moderately improves lubricity.
AKYPO® RO 90 VG	Oleth-10 carboxylic acid	Stabilizer to balance even sensitive formulations, excellent improvement of hard water stability (lime soap dispersing agent), enhances corrosion prevention, moderately improves lubricity.
AKYPO® RCO 105	Oleth-12 carboxylic acid	Stabilizer, excellent improvement of hard water stability (lime soap dispersing agent), enhances corrosion prevention, moderately improves lubricity.

## ANIONIC SURFACTANTS

<b>AKYPO® PO-EO</b>	<b>Strong co-emulsifiers with propoxylated long saturated alkyl chains (C<sub>16-18</sub>) and a low to high degree of ethoxylation; essential for increasing the shelf life of water-miscible metalworking fluids with decreased foam stability, particularly when used with AKYPO®ROX PO-EO.</b>	
NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS
AKYPO® RS-0602	Alkoxyated stearyl carboxylic acid	Excellent co-emulsifier with foam control ability, good improvement of hard water stability, enhances corrosion prevention, improves lubricity.
AKYPO® RSPE 66	Alkoxyated stearyl carboxylic acid	Very strong co-emulsifier with foam control ability, strong improvement of hard water stability (lime soap dispersing agent), enhances corrosion prevention, improves lubricity.
AKYPO® RC-0960	Alkoxyated cetyl carboxylic acid	Strong co-emulsifier with foam control ability, very strong improvement of hard water stability (lime soap dispersing agent), enhances corrosion prevention, improves lubricity.

### AKYPO® specialties and others

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS
AKYPO® TEC AM VG	Oleth-10 carboxylic acid + Capryleth-9 carboxylic acid + Hexeth-4 carboxylic acid	Ready-to-use mixture that combines the benefits of AKYPO®RO 90 VG and AKYPO® LF 4 for easier handling, low foaming co-emulsifiers for the stabilization of metalworking concentrates and emulsions, excellent electrolyte and lime soap dispersion power, ideal additive for an increased shelf life of metalworking fluids.
AKYPO® RA 50	Rapeseed oil amide -5 ether carboxylic acid (canola oil amide -5 ether carboxylic acid)	Amide based co-emulsifiers with a long alkyl chain and moderate degree of ethoxylation, good emulsifying properties, remarkable combination of corrosion protection and excellent hard water stability (lime soap dispersion power) for an increased shelf life of metalworking fluids.
AKYPO® IN-0202	Alkoxyated Isononyl carboxylic	Low foaming co-emulsifier, corrosion inhibiting properties on ferrous and light metals, hard water tolerant anionic surfactant with outstanding electrolyte stability, excellent wetting properties, hydrotropic properties.
AKYPO® TD-70	Trideceth-8-carboxylic acid	Good emulsification capability along with low foaming potential, strong improvement of hard water stability (lime soap dispersion agent) for an increased shelf life of metalworking fluids.

### ALKOXYLATE PHOSPHATE ESTERS

<b>FOSFODET</b>	<b>Corrosion inhibiting emulsifiers with propoxylated long saturated alkyl chains (C<sub>16-18</sub>) and a low to high degree of ethoxylation; outstanding low foam formation behavior and fast foam collapse as well as enhanced lime soap dispersion power.</b>	
NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS
FOSFODET CS-0602	Alkoxyated stearyl ether phosphate	Foam control, best corrosion inhibition <sup>1</sup> , hard water stable, extreme pressure and anti-wear additive.
FOSFODET CS-0606	Alkoxyated stearyl ether phosphate	Foam control, good corrosion inhibition <sup>1</sup> , hard water stable, moderate lime soap dispersion power <sup>1</sup> , extreme pressure and anti-wear additive.
FOSFODET CS-0609	Alkoxyated cetyl ether phosphate	Foam control, moderate corrosion inhibition <sup>1</sup> , hard water stable, strong lime soap dispersion power <sup>1</sup> , extreme pressure and anti-wear additive.

(\*compared in this product group)

## NONIONIC SURFACTANTS

### ETHOXYLATED AMIDES

<b>AMIDET®</b>	<b>Ethoxylated alkyl monoethanol amide based on rapeseed (canola oil); ideal combination of emulsifying properties and corrosion inhibition.</b>	
NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS
AMIDET® TEC N	PEG-4 rapeseed amide (PEG-4 canola amide)	Excellent emulsifier based on natural raw material, corrosion protection properties, moderate hard water stability.
AMIDET® TEC-111	PEG-4 rapeseed amide (PEG-4 canola amide + MEA + TEA + fatty acid)	Emulsifier blend based on natural raw materials to simplify formulation process; combines corrosion inhibition, good emulsifying properties and low foaming tendency <sup>1</sup> .

(\*compared in this product group)

### FATTY ALCOHOL ALKOXYLATES

<b>AKYPO® ROX KAO FINDE</b>	<b>Main emulsifiers with propoxylated long saturated alkyl chains (C<sub>16-18</sub>) and a low to high degree of ethoxylation; designed for enhanced foam control and increased shelf life metalworking fluids, particularly when used with AKYPO® PO-EO, RO or RA.</b>	
NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS
KAO FINDET MB-212	Alkoxyated cetyl/stearyl alcohol	Hydrophobic low foaming emulsifier, synergistic effects with AKYPO® PO-EO, RO or RA for optimized hard water stability.
AKYPO® ROX RS-0606N	Alkoxyated stearyl alcohol	Medium polarity, low foaming emulsifier, moderate hard water and electrolyte stability, synergistic effects with AKYPO® PO-EO, RO or RA for optimized hard water stability.
AKYPO® ROX RC-0960N	Alkoxyated cetyl alcohol	Hydrophilic low foaming emulsifier, moderate hard water and electrolyte stability, synergistic effects with AKYPO® PO-EO, RO or RA for optimized hard water stability.

In addition to our standard product range, the Kao Metalworking Toolbox, we also offer customized solutions. KAO's desire is to design ecofriendly products using renewable resources. Depending on our customer requirements, we do, however, also offer solutions using petrochemical distillates, low-salt AKYPO® and the like.

