



SASOL

Surfactants for emulsion polymerization

EMEA

Sasol Performance Chemicals



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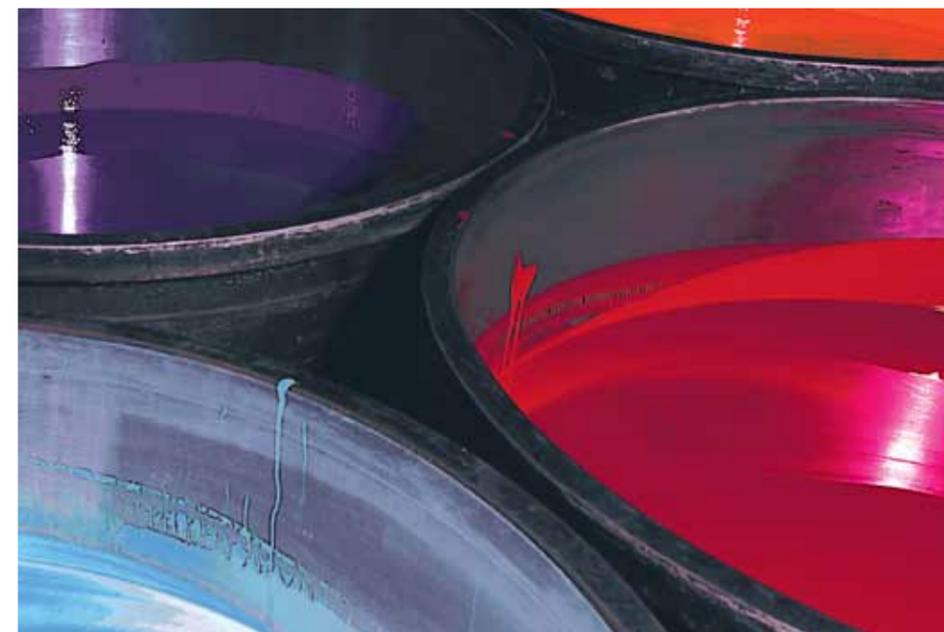
1. About us

Sasol's Performance Chemicals business unit markets a broad portfolio of organic and inorganic commodity and speciality chemicals. Our business consists of four key business divisions: Organics, Inorganics, Wax and PCASG (Phenolics, Carbon, Ammonia and Speciality Gases). About 6300 people including employees from our Regional Operating Hubs in offices in 18 countries serve customers around the world with a multi-faceted portfolio of state-of-the-art chemical products and solutions for a wide range of applications and industries.

Our key products include surfactants, surfactant intermediates, fatty alcohols, linear alkylbenzene (LAB), short-chain linear alpha olefins, ethylene, petrolatum, paraffin waxes, synthetic waxes, cresylic acids, high-quality carbon solutions as well as high-purity and ultra-high-purity alumina. Our speciality gases subdivision supplies its customers with high-quality ammonia, hydrogen and CO₂ as well as liquid nitrogen, liquid argon, krypton and xenon gases.

Our products are as individual as the industrial applications they serve, with tailor-made solutions creating real business value for customers. Ongoing research activities result in a continuous stream of innovative product concepts that help our customers position themselves successfully in future markets.

Our products are used in countless applications in our daily lives to add value, security and comfort. Typical examples include detergents, cleaning agents, personal care, construction, paints and coatings, leather and metal processing, hot-melt adhesives, bitumen modification, and catalyst support for automotive catalysts and a wide range of other specialty applications, including oil and gas recovery, aroma production, plastic stabilisation, and polymer production. Every day, our researchers explore ways to improve our products and develop innovations that improve the quality of people's lives.



2. Alkylphenol ethoxylate (APEO) free surfactants for emulsion polymerization

Sasol Performance Chemicals produces and markets a broad range of anionic and nonionic APEO free surfactants. These products exhibit excellent stabilisation properties in the emulsion polymerisation manufacturing processes of acrylic, vinylic, styrene-acrylic, vinyl-acrylic, and other polymer resin systems and help to improve end product performance in terms of appearance, mechanical resistance and storage stability.

2.1 Anionic surfactants

DACPON alcohol sulfates facilitate excellent particle size control and can also work as foaming agent.

ANIODAC DSN and **MARLON** linear alkylbenzene sulfonate salts are suitable emulsifiers for all types of monomers, yielding a low particle size, and are thus especially suited for the production of seed latexes. In addition, these products offer stability in hydrolysis and almost all reaction conditions.

ANIODAC, **DACLOR**, **COSMACOL AES** and **MARLINAT** alcohol ethoxy sulfates are suitable emulsifiers of various monomer emulsions, leading to a lower grit level and better stabilization of the latex compared to alcohol sulfates.

NOVELUTION PA 89N is a low-foaming anionic product with a very low CMC that allows for good performance with a low dosage. The surfactant yields a small particle size, excellent pre-emulsion stability and the opportunity to produce microemulsions.

Product	Alkyl chain structure	Appearance @ 25 °C	Ethoxylation degree	Active concentration	CMC @ 25 °C, ppm	Surface tension at CMC, mN/m
Fatty alcohol sulfate						
DACPON 27-23	C ₁₂₋₁₃ linear and branched	Clear liquid	--	27%	1,100	20
Linear alkyl benzene sulfonate Na salt						
MARLON A323	C ₁₀₋₁₃	Clear liquid	--	23%	650	35
ANIODAC DSN25	C ₁₀₋₁₃	Clear liquid	--	25%	650	35
MARLON AMI80	C ₁₀₋₁₃ ; MIPA salt	Clear liquid	--	78%	1,100	32
MARLON ARL	C ₁₀₋₁₃	White powder	--	80%	600	35
Fatty alcohol ethoxy sulfate						
ANIODAC 11P7-27	C ₁₁ linear and branched	Clear liquid	medium	27%	800	30
DACLOR 27-1-23AL	C ₁₂₋₁₃ linear and branched	Clear liquid	low	27%	380	24
DACLOR 27-20-23NE	C ₁₂₋₁₃ linear and branched	Clear liquid	high	27%	1,000	30
ANIODAC 13P20-27	C ₁₃ branched	Clear liquid	high	27%	420	37
COSMACOL AES 27-2-24 NE	C ₁₂₋₁₄ linear	Clear liquid	low	27%	200	34
MARLINAT 242-28	C ₁₂₋₁₄ linear	Clear liquid	low	27%	200	34
COSMACOL AES 70-2-24 NE	C ₁₂₋₁₄ linear	Flowable paste	low	70%	200	34
MARLINAT 242-70	C ₁₂₋₁₄ linear	Flowable paste	low	70%	200	34
COSMACOL AES 27-3-24 NE	C ₁₂₋₁₄ linear	Clear liquid	low	27%	140	30
Fatty alcohol propoxy sulfate						
NOVELUTION PA 89 N	C ₁₂₋₁₃ linear and branched	Amber liquid	--	85%	7	33

This is a selection of the Sasol product portfolio. If you are interested in a different product and you don't see it here, please contact us.

A variety of product concentrations is available

2.2 Nonionic surfactants

Sasol alcohol ethoxylates are versatile products that are used as co-surfactant in all types of formulations, improving latex stability and having a positive influence on the shelf life and the handling of the emulsions.

NONIDAC products are based on oxo alcohols and are good dispersing agents. NONIDAC products stabilize the polymer emulsion, improving freeze-thaw and electrolyte stability.

The **MARLIPAL O13** and **TRIDAC ISO** types are based on isotridecanol alcohol. They boast good wetting properties and low foaming behavior. They are useful as co-emulsifiers in almost all formulations, providing freeze-thaw and storage stability. In addition, a wide range of HLB values and ethoxylation degrees are available for a variety of applications.

EMULDAC and **MARLIPAL 1618** products are based on cetyl-stearyl alcohol, while **EMULGANTE CO** is based on cetyl oleyl alcohol. They are excellent dispersants and stabilizers, providing good monomer pre-emulsion stability. They are available in a wide range of HLB values and ethoxylation degrees to match all the requirements of any recipe.



Product	Alkyl chain structure	Appearance @ 25 °C	Cloud point °C	Ethoxylation degree	HLB	Active concentration
Alcohol ethoxylates						
NONIDAC 11P15	C ₁₁ linear and branched	White solid	71 ⁽³⁾	15	15,8	100%
NONIDAC 11P21-70	C ₁₁ linear and branched	Clear liquid	n.a.	21	16,8	70%
NONIDAC 11P30-70	C ₁₁ linear and branched	Clear liquid	n.a.	30	17.7	70%
MARLIPAL 31-90	C ₁₁₋₁₃ branched	Clear liquid	55 ⁽²⁾	9	13.2	100%
MARLIPAL A24/3065	Linear	Liquid	n.a.	30	16.6	65%
SLOVASOL 2430/70	C ₁₂₋₁₄ linear	Liquid	82 ⁽³⁾	30	17.4	70%
LIALET 125-3	C ₁₂₋₁₅ linear and branched	Liquid	54 ⁽¹⁾	3	7.8	100%
MARLIPAL O13-30 TRIDAC ISO 3	C ₁₃ branched	Liquid	51 ⁽¹⁾	3	8.0	100%
MARLIPAL O13-50 TRIDAC ISO 5	C ₁₃ branched	Liquid	65 ⁽¹⁾	5	10.4	100%
MARLIPAL O13-60 TRIDAC ISO 6	C ₁₃ branched	Liquid	73 ⁽¹⁾	6	12.0	100%
MARLIPAL O13-80 TRIDAC ISO 8	C ₁₃ branched	Liquid	77 ⁽¹⁾	8	12.8	100%
MARLIPAL O13-120 TRIDAC ISO 12	C ₁₃ branched	Liquid	55 ⁽³⁾	12	14.6	100%
MARLIPAL O13-307 TRIDAC ISO 30-70	C ₁₃ branched	Clear liquid	n.a.	30	17.4	70%
TRIDAC ISO 40-70	C ₁₃ branched	Clear liquid	n.a.	40	18.0	70%
MARLIPAL 1618-1	C ₁₆₋₁₈ linear	White solid	59 ⁽⁴⁾	1	2.9	100%
EMULDAC AS25	C ₁₆₋₁₈ linear	White flakes	78 ⁽³⁾	30	16.8	100%
EMULDAC ALCS100	C ₁₆₋₁₈ linear	White flakes	76 ⁽³⁾	50	18.0	100%
EMULDAC AS80	C ₁₆₋₁₈ linear	White flakes	75 ⁽³⁾	80	18.6	100%
EMULGANTE CO22	C ₁₆₋₁₈ unsaturated	Waxy solid	76 ⁽²⁾	22	15.6	100%
EMULGANTE CO55	C ₁₆₋₁₈ unsaturated	Waxy solid	n.a.	55	18.0	100%

⁽¹⁾ 10 % active matter in 25 % BDG solution

⁽²⁾ 1 % active matter in water

⁽³⁾ 1 % active matter in 10 % NaCl solution

⁽⁴⁾ 5 % active matter in 25 % BDG solution

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2.3 Special surfactants

The **MARLOX** products are alkoxyated fatty alcohols, generally they have good wetting properties and low viscosity at room temperature and low pour point. This type of products avoid gel phases when diluted in water and are readily soluble in water. In addition they have low foaming behavior, helping to decrease the usage of defoamer in formulations.

PLURODAC are EO/PO block copolymer, their properties depend from the selected grade. Products with high EO amounts works as co-emulsifier and dispersant, products with low EO act as low foamer.

Product	Alkyl chain structure	Appearance @ 25 °C	Cloud point °C	Active concentration
Low foam surfactants				
MARLOX FK 86	C ₁₀₋₁₂ linear	Clear liquid	39 ⁽¹⁾	100%
MARLOX OP1	C ₁₁ linear and branched	Clear liquid	37 ⁽²⁾	100%
MARLOX 11009	C ₁₁ linear and branched	Clear liquid	10 ⁽²⁾	100%
MARLOX 11027	C ₁₁ linear and branched	Clear liquid	27 ⁽²⁾	100%
EO-PO block copolymers				
PLURODAC 44		Clear liquid	65 ⁽²⁾	100%
PLURODAC 61		Clear liquid	23 ⁽²⁾	100%
PLURODAC 62		Clear liquid	27 ⁽²⁾	100%
PLURODAC 81		Clear liquid	19 ⁽²⁾	100%
PLURODAC F-68		White flakes	72 ⁽³⁾	100%

⁽¹⁾ 10 % active matter in 25 % BDG solution

⁽²⁾ 1 % active matter in water

⁽³⁾ 1 % active matter in 10 % NaCl solution

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3. Formulation examples

3.1 All acrylic

- Load the reactor with reagents listed under A except ammonium persulfate and warm the solution up to 80 °C
- When temperature was reached start feeding 5% of B solutions and let react for 20 minutes
- Feed continuously residual pre-emulsion in 4.5 hours. After addition of pre-emulsion, use 10 g of water to clean line pumps. When feeding is finished let react at 80 °C for 60 minutes
- Start with redox turn C: add in 10 minutes first component, wait 5 minutes while cleaning the line with 1.5 g of water and add the second component in 10 minutes, wait 5 minutes while cleaning the line with 1.5 g of water
- Cool to 75 °C and add the components D following the same procedure described in the previous point C
- Cool the polymer emulsion down to 40 °C and add reagents listed under E

	Reagent	Amount (g)	Notes
A	Water	210	21%
	ANIODAC DSN 25	12.1	1.21%
	Ammonium persulfate	0.3	0.3%
B	Water	192.5	19.25%
	ANIODAC DSN 25	50.7	5.07%
	Butyl Acrylate	246	24.6%
	Methylmethacrylate	246	24.6%
	Methacrylic acid	1.0	0.1%
	Ammonium persulfate	1.0	0.1%
	Water (cleaning)	10.0	1%
C	Tert-butylhydroperoxid (7%)	4.6	0.46%
	Sodium Formaldehyde Sulfoxylate (4%)	4.6	0.46%
D	Tert-butylhydroperoxid (7%)	4.6	0.46%
	Sodium Formaldehyde Sulfoxylate (4%)	4.6	0.46%
	Water (cleaning)	6.0	0.6%
E	Ammonia (25%)	3.0	0.3%
	Preservative	3.0	0.3%

SPD	Brookfield viscosity/RPM	Viscosity at 25 °C (mPa*s)
2	20	1000

Solid content at 150 °C 49.5% pH at 10% in deionized water 9.4

Particle size/Z-average(nm)	PDI
98	0.03 (narrow distribution)

3.2 Styrene/acrylic

- Load the reactor with product listed under A and warm up to 80 °C
- Prepare monomer pre-emulsion mixing under vigorous stirring products listed under B
- Start feeding the 5% of pre-emulsion in 10 minutes and let initiate for 30 minutes
- Feed continuously residual pre-emulsion in 4 hours
- When feeding is finished let react at 80 °C for 60 minutes
- Add C and let react 1 hour at 80 °C
- Cool to 45 °C and add D

	Reagent	Amount (g)	Notes
A	Water	191.0	18.91%
	ANIODAC 11P7-27	7.0	0.69%
	Sodium bicarbonate	0.5	0.049%
B	Water	282.1	27.93%
	ANIODAC 11 P7-27	13.0	1.28%
	NONIDAC 11P30-70	19.5	1.93%
	Styrene	232.2	23%
	Butyl Acrylate	232.2	23%
	Acrylamide	6.1	0.6%
C	Methacrylic Acid	9.2	0.91%
	Ammonium Persulfate	2.5	0.25%
	Ammonium Persulfate	0.7	0.07%
	Water	4.0	0.39%
	NaOH (30%)	3.0	0.346%
D	Ammonia (25%)	3.0	0.346%
	Preservative agent	3.0	0.297%

SPD	Brookfield viscosity/RPM	Viscosity at 25 °C (mPa*s)
4	20	2500

Solid content at 150 °C 49.2% pH at 10% in deionized water 8.4

3.3 Vam/VeoVa

- Load the reactor with reagents listed under A except cellulose and warm the solution up to 80 °C
- When 50 °C is reached, add hydroxyethyl cellulose
- When temperature was reached start feeding 10% contemporary B and C solutions and let react for 20 minutes
- Feed continuously residual pre-emulsion in 5 hours
- When feeding is finished let react at 80 °C for 60 minutes
- Add the chaser solution D and leave reacting for additional 1 hour at 80 °C
- Cool the polymer emulsion down to 40 °C and add reagent listed under E

	Reagent	Amount (g)	Notes
A	Water	300	38.47%
	Hydroxyethyl cellulose	6.3	0.81%
	NONIDAC 11P30 70	10.0	1.28%
	ANIODAC 11P7 27	11.2	1.44%
	Sodium bicarbonate	0.25	0.03%
B	Vinyl acetate	339.8	43.58%
	VEOVA	85.1	10.92%
C	Water	24.0	3.07%
	Ammonium persulfate	0.8	0.1%
D	Water	0.77	0.09%
	Ammonium persulfate	0.09	0.01%
E	Preservative	1.6	0.2%

SPD	Brookfield viscosity/RPM	Viscosity at 25 °C (mPa*s)
4	20	7000

Solid content at 150 °C 54.5% pH at 10% in deionized water 3.5

Particle size/Z-average(nm)	PDI
227	0.7 (narrow distribution)

The specification data and further general description as well as packaging of the individual product can be obtained from the corresponding product data sheet. Data on material safety, transport classes, toxicology and biogradability can be obtained from the material safety data sheets.

Regulations on food contact status (FDA) as well as recommendations are subjects to change. We recommend periodic review of these products so that suitability for a particular application may be verified. Sasol cannot be held liable for legal compliance if our products are processed or modified from the original form.

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