SURFACTANTS

Coatings & Emulsion Polymerization

APAC

Sasol Performance Chemicals

About us

Sasol's Performance Chemicals business unit markets a broad portfolio of organic and inorganic commodity and speciality chemicals. Our business employs about 1300 people in four key business divisions: Organics, Inorganics, Wax and PCASG (Phenolics, Carbon, Ammonia and Speciality Gases). Our 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 alkyl benzene (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 sub-division supplies its customers with high-quality ammonia, hydrogen and CO_2 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 other diverse 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.

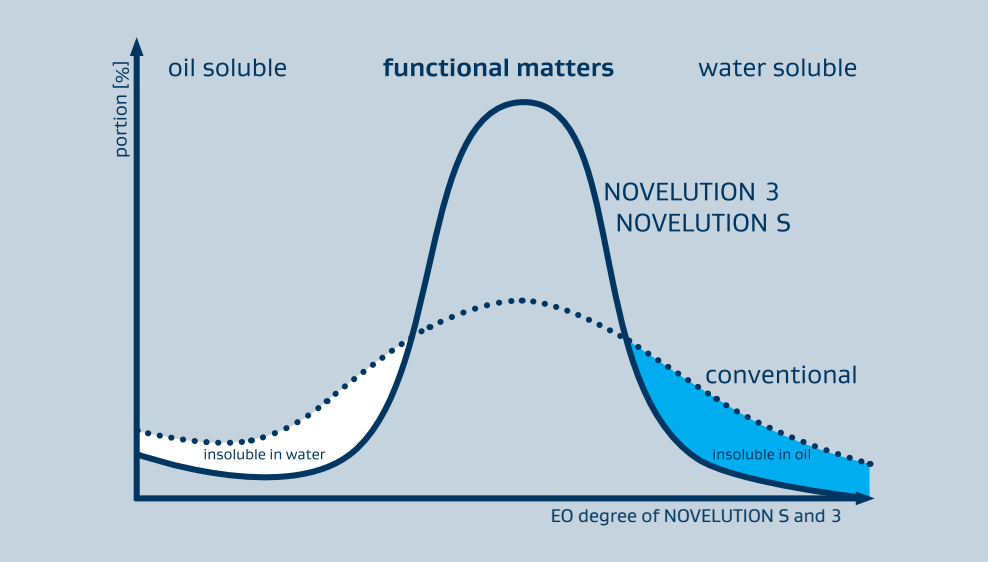
The advantages of Sasol surfactants

Back integration into feed

Sasol produces fatty alcohols by a variety of different processes and raw materials yielding one of the broadest alcohol portfolios in the market. These fatty alcohols are used to produce the wide range of Sasol's surfactants.

Tailored alkoxylation processes

Sasol uses different alkoxylation catalysts to obtain surfactants that are tailored to our customers' needs. For our narrow range product series Sasol employs a proprietary alkoxylation catalyst.



Product delivery

Sasol produces its products globally. The Asia Pacific market can be supplied safely from various production sites. In China Sasol produces alcohols and surfactants.

A technical support group is located at the Nanjing site in China to deliver first class product support to our clients.

APEO* free nonionic surfactants

Sasol offers a broad range of surfactants that are useful as wetting and dispersing additives in coatings and inks, and as emulsifiers for emulsion polymers.

NOVELUTION 3

This nonionic product line is based on Sasol's iso-C13 alcohol. **NOVELUTION 3** products exhibit excellent wetting power and low foaming.

Products of the **NOVELUTION 3** product line are useful as wetting and dispersing agent for pigments and will impart high stability and compatibility to the formulation. Products with high EO contents will provide stabilization of pigment dispersions and yield good color acceptance and improved freeze- thaw stability.

NOVELUTION S

The nonionic **NOVELUTION S** product line is based on Sasol's C12/C13 semi-branched alcohol. They provide excellent wetting properties and high stability to dispersions. They are recommended as APEO replacements in polymer emulsions, paint and tint formulas.

Product of the **NOVELUTION S** line can be used as the only emulsifier in the VAE or PVAc polymerization, or can be applied as secondary emulsifier in combination with all kinds of anionic emulsifiers for emulsion polymerization of styrene-acrylic and all acrylic systems. As additional benefit, surfactants with low EO content will lead to excellent wetting properties of the polymer emulsion.

NOVELUTION K

The **NOVELUTION K** product line is based on an alkoxylated fatty alcohol with a pour point lower than 0°C. The products exhibit a low viscosity at room temperature, which makes them easy to use. They hardly form gel phases and are thus easy to disperse and dissolve in the water.

NOVELUTION KE6 and **K08** are highly efficient wetting agents for pigments. These products are recommended for use as wetting agent in waterborne systems, including architecture coatings, industrial coatings, inks, and adhesives. In addition they exhibit low foaming. Formulations using these products will require less defoamer.

NOVELUTION L

The **NOVELUTION L** product line is based on an oxo-process synthetic alcohol. The products are very suitable for waterborne formulas, including inks, coatings and tints. They exhibit good wetting and stabilization for pigments dispersions.

NOVELUTION 950 & G800K

NOVELUTION 950 provides good wetting properties and permeability. It has a low viscosity and is easy to use.

NOVELUTION G800K is a flaked waxy solid. It is suitable as the stabilizer in polymer emulsions, and as emulsifier for resins, silicone, and mineral oil.

*APEO: Alkyl Phenol Ethoxylate

Nonionic surfactants

Products	Active matter	State 25 °C	Viscosity 20 °C cps	Cloud point °C	Pour point °C	HLB	Surface tension 25 °C, 1g/L mN/m
NOVELUTION 315	100 %	liquid	36	52(4)	<-10	5.0	—
NOVELUTION 330	100 %	liquid	38	49(1)	<-10	8.0	—
NOVELUTION 350	100 %	liquid	55	65(1)	<-10	10.5	27
NOVELUTION 370	100 %	liquid	70	74(1)	-5	12.1	28
NOVELUTION 380	100 %	liquid	74	77(1)	0	12.8	29
NOVELUTION 390	100 %	liquid	78	58(2)	5	13.3	30
NOVELUTION 3307	70 %	liquid	1444	76(3)	9	17.3	46
NOVELUTION 3400	100 %	waxy solid	—	80(3)	49	18.0	42
NOVELUTION S30	100 %	liquid	33	60(1)	-10	8.1	—
NOVELUTION S70	100 %	liquid	30	53(2)	11	12.2	31
NOVELUTION S90	100 %	liquid	248	81(2)	12	13.0	34
NOVELUTION S99	90 %	liquid	158	81(2)	2	13.0	34
NOVELUTION S300	100 %	waxy solid	—	78(3)	43	17.4	47
NOVELUTION LE217K	70 %	liquid	537	75(3)	11	16.5	37
NOVELUTION LE407K	70 %	liquid	1400	75(2)	8	18.2	54
NOVELUTION AE50K	100 %	liquid	47	66(1)	1	11.3	27
NOVELUTION AE70K	100 %	paste-like	—	74(1)	2	12.9	28
NOVELUTION KE6	100 %	liquid	86	18(2)	<-10	11.6	30
NOVELUTION K08	100 %	liquid	73	17(2)	<-10	10.6	32
NOVELUTION 950	100 %	liquid	30	46(2)	-3	12.5	29
NOVELUTION G800K	100 %	liquid	—	>100(2)	59	18.6	53

(1) 10 % A.M. in 25 % BDG aq.
(2) 1 % A.M. aq.
(3) 1 % A.M. in 10 % NaCl aq.
(4) 5 % A.M. in 25 % BDG aq.

Anionic surfactants

Sasol offers a broad range of anionic surfactants that are useful as emulsifiers for emulsion polymers.

NOVELUTION alcohol ether sulfate

The products provide excellent electrolyte stability.

NOVELUTION S27N is a cost effective emulsifier for emulsion polymerization. Sasol also manufactures lower viscous and pumpable products, including **NOVELUTION S23N.**

NOVELUTION A203KN and **3203N** can be used without any additional nonionic emulsifier for the production of emulsion polymers, e.g. in styrene-acrylic, all acrylic, and vinyl acetate-acrylic systems. At the same time, it improves the mechanical stability of the emulsion and minimizes formation of coagulum.

NOVELUTION PA

Products of the **NOVELUTION PA** product line are highly efficient, low foaming anionic surfactants for emulsion polymerization. They are available in high concentration at a low viscosity, and exhibit a low pour point for ease of use.

NOVELUTION PA89N leads to small particle size emulsion.

NOVELUTION PA89N increases the stability of the monomer pre-emulsion. The products are easy to disperse and dissolve in the water. This product is recommended for use in polymer emulsions of e.g. styrene-acrylic, all acrylic, vinyl acetate-acrylic systems.

NOVELUTION M

The **NOVELUTION M** product line are multi-functional ether carboxylic acids that can be used in a broad pH range. They are good emulsifiers with high hard water tolerance. They are stable to acid-alkali, electrolyte, temperature, hypochlorite and peroxide. **NOVELUTION M** products minimize yellowing of paint & coating formulations.

The products need to be neutralized by alkali before acting as the anionic emulsifier.

Anionic surfactants

Products	Type	Active matter	State 25 °C	Viscosity 20 °C cps	Pour point °C	CMC ppm	Surface tension 25 °C, 1g/L mN/m	Ross Miles Foam Height 0.1% 25 °C, ml initial/5min
NOVELUTION S27N	Sulfate	70 %	paste-like	—	9	490	38	466/454
NOVELUTION S23N	Sulfate	27 %	liquid	120	<-3	490	38	466/454
NOVELUTION S07N	Sulfate	70 %	paste-like	—	7	3480	28	495/490
NOVELUTION ZS27N	Sulfate	70 %	paste-like	—	9	750	37	466/454
NOVELUTION ZS23N	Sulfate	27 %	liquid	115	~0	750	37	466/454
NOVELUTION LE73N	Sulfate	27 %	liquid	31	<-10	800	30	433/217
NOVELUTION Z37A	Sulfate	70 %	paste-like	9000	9	270	38	542/533
NOVELUTION 3203N	Sulfate	29 %	liquid	18	<-10	800	50	285/120
NOVELUTION A203KN	Sulfate	27 %	liquid	25	7	780	46	330/237
NOVELUTION PA89N	Sulfate	85 %	liquid	1300	-31	7	33	325/258
NOVELUTION PA49N	Sulfate	85 %	liquid	1350	-4	160	36	369/297
NOVELUTION M39	Carboxylate	90 %	liquid	135	<-10	1620	38	298/87 (1)
NOVELUTION M70	Carboxylate	90 %	liquid	372	-2	100	32	277/145 (1)

(1) Test the value after neutralizing with 20% NaOH aqueous solution.

Quick select list

Nonionic surfactants

		NOVELUTION 315	NOVELUTION 330	NOVELUTION 350	NOVELUTION 370	NOVELUTION 380	NOVELUTION 390	NOVELUTION 3100	NOVELUTION 3307	NOVELUTION 3400	NOVELUTION S30	NOVELUTION S70	NOVELUTION S90	NOVELUTION S99	NOVELUTION S300	NOVELUTION LE217K	NOVELUTION LE407K	NOVELUTION AE50K	NOVELUTION AE70K	NOVELUTION KE6	NOVELUTION K08	NOVELUTION 950	NOVELUTION G800K
Safety	Low VOC				●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●		●
	APEO-free	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Waterborne coatings	Wetting agent of coatings				●	●	●	●	●			●	●	●		●	●		●	●	●	●	
	Substrate wetting				●	●	●					●							●	●	●	●	
	Dispersing stability								●							●	●						
	Color acceptance				●	●	●	●	●			●	●	●		●	●		●	●	●		
	Scrub resistance				●	●			●			●					●		●	●			
	Low foam				●	●	●													●			
	Freeze-thaw resistance								●							●	●						
Waterborne tint	Pigments wetting	●	●	●	●	●	●				●	●	●	●		●		●	●	●	●	●	
	Pigments dispersing						●	●	●	●			●	●		●	●						
	Low foam	●	●	●	●	●					●							●		●			
	Freeze-thaw resistance								●	●						●	●						
	Sedimentation resistance					●	●	●	●	●			●	●		●	●			●			
	Skinning resistance				●	●	●	●	●	●		●	●	●		●	●						
Emulsion polymerization	Color acceptance				●	●	●	●	●	●		●	●	●	●	●	●			●	●		●
	Wetting performance				●	●	●					●	●	●					●	●	●	●	
	Hard water tolerance								●	●					●	●	●						●
	Freeze-thaw resistance								●	●					●	●	●						●
	VAE emulsion polymerization					●	●		●	●		●	●	●	●		●						
	Emulsifier of resin								●	●					●		●						●

Quick select list

Anionic surfactants

		NOVELUTION S27N	NOVELUTION S23N	NOVELUTION S07N	NOVELUTION ZS27N	NOVELUTION ZS23N	NOVELUTION 3203N	NOVELUTION LE73N	NOVELUTION A37KN	NOVELUTION A33KN	NOVELUTION A203KN	NOVELUTION Z37A	NOVELUTION PA89N	NOVELUTION PA49N	NOVELUTION M39	NOVELUTION M70
Safety	Low VOC	●	●				●	●	●	●	●	●	●	●	●	●
	APEO-free	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Waterborne tint	Pigments dispersing						●	●			●		●			●
	Freeze-thaw resistance						●				●					
	Sedimentation resistance						●	●			●		●			●
Emulsion polymerization	High cost-performance	●		●	●	●						●				
	Low foam anionic emulsifier												●			
	Fine particle size latex												●			
	Freeze-thaw resistance						●				●					
	Emulsion of stone paints												●			
	Emulsion of multi-color paints						●	●			●					
	Low viscosity		●			●	●	●		●	●		●	●	●	●
	Low viscosity, high solid												●	●	●	●
	Color acceptance						●	●			●		●			
	Anti-yellow in high temp.														●	●
	Stable monomer pre-emulsion												●	●		
	Pre-emulsifying monomer	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Base emulsifier in reactor	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Examples

Semi-gloss paint formula

Material	Dosage	Use	Source
Grind			
Water	11.96	–	–
Ammonium hydroxide	0.16		Aldrich
Proxel® GXL	0.17	Preservative	Aldrich
Solsperse® 43000	0.90	Dispersant	Lubrizol
Drewplus® L-475	0.16	Defoamer	Ashland
Surfactant	0.28	Wetting agent	Sasol
Propylene glycol	2.70	Co-solvent	Aldrich
Potassium tripolyphosphate	0.13	Pigment	Aldrich
Ti-Pure® 706	18.99	Pigment	DuPont
417-W® zinc oxide	2.11	Pigment	Eagle Zinc
Minex® 4	10.63	Pigment	Unimim
Nytal® 300	4.22	Pigment	R.T. Vanderbilt
Letdown			
UCAR® 625	35.98	Latex	Dow
Texanol™	0.90	Co-solvent	Eastman
Drewplus® L 475	0.16	Defoamer	Ashland
Skane™ M-8	0.19	Mildewcide	Dow
Ammonium hydroxide	0.08	pH	Aldrich
Water	8.35	–	–
UCAR Polyphobe® 116	0.17	Rheology modifier	Dow
UCAR Polyphobe 117	1.76	Rheology modifier	Dow
Total	**100.00**		

Colour acceptance data (ASTM D4838)

Description	Type	Surfactant		
		OPE-9.5	NOVELUTION 390	NOVELUTION S70
Titanium white	KX	100	101.6	101.1
Magenta	V	100	103.0	101.1
Medium yellow	T	100	102.2	101.5
Organic red	R	100	100.1	100.0
Raw umber	L	100	101.7	100.7
Red oxide	F	100	101.9	100.3
Phthalocyanine blue	E	100	105.1	102.7
Phthalocyanine green	D	100	101.7	100.8
Yellow oxide	C	100	101.4	100.6
Lamp black	B	100	106.3	105.3

Colortrend® 888 series tint were obtained from Evonik for the color acceptance test.

Three coatings passed:

- 3 Freeze-thaw resistance cycles (ASTM D2243)
- Heat-age stability (ASTM D1849)

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Examples

Vinyl acetate-acrylic emulsion

- Add A into the reaction kettle and heat to 80 °C;
- When A has reached the reaction temperature, add B and C into the kettle according to the requirement;
- Maintain the temperature at 80 °C for 1 hour after adding all of B&C;
- Cool the emulsion to 40 °C after reaction, add in some ammonia and preservative solution.

VAE emulsion

- Dissolve PVA and NOVELUTION S70 in water and pre-emulsify the vinyl acetate;
- Add 2/3 vinyl acetate pre-emulsion and ethylene into reaction kettle, and keep 3.5MPa pressure;
- Heat the kettle to 75-80 °C and add initiator solution. When the reaction starts, continuously add the monomer pre-emulsion, initiator solution and ethylene and keep the reaction pressure and temperature;
- After using up vinyl acetate monomer, gradually stop adding the ethylene;
- When the reaction temperature continuously falls, add excessive initiator and heat to 90-95 °C. After 20 minutes cool down to 40 °C.
- Add the residual components, mix and adjust pH.

Styrene-acrylic emulsion

- Add A into the reaction kettle and heat to 80 °C;
- When A has reached the reaction temperature, add B, C and D into the kettle according to the requirements;
- Maintain the temperature at 80 °C for 1 hour after adding all components.

Vinyl acetate-acrylic emulsion

	Components	Weight (g)
A	Water	204
	Sodium acetate	1.02
	Add B into A during 3.5 hours	
B	Water	170
	NOVELUTION A203KN	36
	Vinyl acetate	436
	Butyl acrylate	106
	Acrylic acid	5.6
	Add C into A during 4 hours	
C	Water	68
	Sodium persulfate	2.78
	Total	**1029.4**

VAE emulsion

Components	Weight (g)
Polyvinyl alcohol	25
NOVELUTION S70	3.1
DI. Water	384
Vinyl acetate	438
Ethylene	187
Initiator / DI water	2.7/43
Sulfate salt+ zinc salt /DI water	(1.2 + 0.3)/43
Sodium bicarbonate /DI water	0.9/6
Total	**1134.2**

Styrene-acrylic emulsion

	Components	Weight (g)
A	Water	364.0
	Add B into A in 4 hours	
B	Butyl acrylate	222.1
	Styrene	211.0
	Acrylic acid	6.7
	Methacrylic acid	4.4
	Add C into A in 4 hours	
C	NOVELUTION S23N	9.3
	NOVELUTION 3307	2.2
	Water	88.4
	20 % NaOH aq.	0.4
	Add B into A in 4 hours and 10 mins	
D	Water	88.4
	$K_2S_2O_8$	3.1
	Total	**1000**

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