Technical Information

March 2013

Lutensol® XL types

® = Registered trademark of BASF

Lutensol® XL 40
Lutensol® XL 50
Lutensol® XL 60
Lutensol® XL 70
Lutensol® XL 79
Lutensol® XL 80
Lutensol® XL 89
Lutensol® XL 90
Lutensol® XL 100
Lutensol® XL 140

Nonionic surfactants for detergents and cleaners, and for the chemical and allied industries

BASF
The Chemical Company

Chemical character

The Lutensol® XL types are nonionic surfactants. They are alkyl poly-propylene and ethylene glycol ethers made from a C_{10}-Guerbet Alcohol and ethylene oxide. These products contain also higher alkylene oxides in small amounts.

PRD-Nos.*

30222389 Lutensol® XL 40
30222392 Lutensol® XL 50
30261869 Lutensol® XL 60
30190859 Lutensol® XL 70
30194090 Lutensol® XL 79
30188711 Lutensol® XL 80
30194129 Lutensol® XL 89
30188712 Lutensol® XL 90
30188715 Lutensol® XL 100
30188719 Lutensol® XL 140

*BASF's commercial product numbers.

Properties

Lutensol® XL 40, XL 50, XL 60 and XL 70 are clear to cloudy liquids at room temperature, and they tend to form a sediment.

Lutensol®, XL 80 and XL 90 are cloudy liquids at room termperature, and they tend to form a sediment.

Lutensol® XL 100 and XL 140 are soft, colourless or slightly yellowish pastes at 23 °C.

Lutensol® XL 40, XL 50, XL 60, XL 70, XL 80, XL 90, XL 100 and XL 140 become clear liquids at 50 °C.

Lutensol® XL 79 and XL 89 are clear liquids at room temperature.

Lutensol®		**XL 40**	**XL 50**	**XL 60**	**XL 70**	**XL 79**
Physical form (23 °C)		Liquid	Liquid	Liquid	Liquid	Liquid
Degree of ethoxilation		approx. 4	approx. 5	approx. 6	approx. 7	approx. 7
Concentration	%	approx. 100	approx. 100	approx. 100	approx. 100	approx. 85
Cloud point (EN 1890)*						
Method A	°C	–	–	–	–	–
Method B	°C	–	–	–	–	–
Method C	°C	–	–	–	–	–
Method D	°C	approx. 54	approx. 64	approx. 72	approx. 71	approx. 71
Method E	°C	approx. 46	approx. 60	approx. 69	approx. 68	approx. 68
pH (EN 1262, solution B)**		approx. 7	approx. 7	approx. 7	approx. 7	approx. 7
Density (DIN 51757, 23 °C)	g/cm^3	approx. 0.95	approx. 0.97	approx. 0.99	approx. 0.99	approx. 1.01
Dropping point (DIN 51801)	°C	approx. 10	approx. 16	approx. 20	approx.18	<5
Congealing point (ISO 2207)	°C	<5	<5	approx. 5	approx. 4	<5
Viscosity (EN 12092, 23 °C, Brookfield, 60 rpm)	mPa·s	approx. 40	approx. 50	approx. 80	approx. 70	approx. 120
Hydroxylnumber (DIN 53240)	mgKOH/g	approx. 150	approx. 130	approx. 115	approx. 100	approx. 100
HLB value		approx. 10.5	approx. 11.5	approx. 12.5	approx. 12.5	approx. 12.5
Flash point (ISO 2592)	°C	>140	>140	>150	>180	>180
Wetting (EN 1772, distilled water, 23 °C, 2 g Soda ash/l)						
0.5 g/l	s	approx. 50	approx. 40	approx. 50	approx. 40	approx. 40
1 g/l	s	approx. 25	approx. 15	approx. 15	approx. 10	approx. 10
2 g/l	s	approx. 15	approx. 5	approx. 5	approx. 5	approx. 5
Foam volume (EN 12728, 40 °C, 2 g/l water at a hardness of 1.8 mmol Ca-ions/l, after 30 s)	cm^3	approx. 10	approx. 60	approx. 310	approx. 300	approx. 300
Surface tension (EN 14370, 1 g/l in distilled water, 23 °C)***	mN/m	approx. 26	approx. 26	approx. 26	approx. 27	approx. 27

Lutensol®		**XL 80**	**XL 89**	**XL 90**	**XL 100**	**XL 140**
Physical form (23 °C)		Liquid	Liquid	Liquid	Liquid/Paste	Paste
Degree of ethoxilation		approx. 8	approx. 8	approx. 9	approx. 10	approx. 14
Concentration	%	approx. 100	approx. 80	approx. 100	approx. 100	approx. 100
Cloud point (EN 1890)*						
Method A	°C	approx. 56	approx. 56	approx. 69	approx. 80	approx. 96
Method B	°C	approx. 43	approx. 43	approx. 53	approx. 64	approx. 78
Method C	°C	approx. 34	approx. 34	approx. 42	approx. 52	approx. 62
Method D	°C	approx. 75	approx. 75	approx. 78	approx. 80	approx. 85
Method E	°C	approx. 74	approx. 74	approx. 77	approx. 80	approx. 85
pH (EN 1262, solution B)**		approx. 7	approx. 7	approx. 7	approx. 7	approx. 7
Density (DIN 51757, 23 °C)	g/cm^3	approx. 1.00	approx. 1.02	approx. 1.02	approx. 0.99 (60 °C)	approx. 1.01 (60 °C)
Dropping point (DIN 51801)	°C	approx. 23	approx. 3	approx. 24	approx. 26	approx. 31
Congealing point (ISO 2207)	°C	approx. 10	<5	approx. 11	approx. 13	approx. 18
Viscosity (EN 12092, 23 °C, Brookfield, 60 rpm)	mPa·s	approx. 120	approx. 200	approx. 400	approx. 30 (60 °C)	approx. 40 (60 °C)
Hydroxylnumber (DIN 53240)	mgKOH/g	approx. 95	approx. 95	approx. 90	approx. 75	approx. 65
HLB value		approx. 13	approx. 13	approx. 14	approx. 15	approx. 16
Flash point (ISO 2592)	°C	>180	>180	>180	>190	>200
Wetting (EN 1772, distilled water, 23 °C, 2 g Soda ash/l)						
0.5 g/l	s	approx. 50	approx. 50	approx. 60	approx. 80	approx. 160
1 g/l	s	approx. 10	approx. 10	approx. 10	approx. 20	approx. 50
2 g/l	s	approx. 5	approx. 5	approx. 5	approx. 10	approx. 10
Foam volume (EN 12728, 40 °C, 2 g/l water at a hardness of 1.8 mmol Ca-ions/l, after 30 s)	cm^3	approx. 360	approx. 360	approx. 420	approx. 470	approx. 500
Surface tension (EN 14370, 1 g/l in distilled water, 23 °C)***	mN/m	approx. 27	approx. 27	approx. 27	approx. 28	approx. 29

The above information is correct at the time of going to press. It does not necessarily form part of the product specification.
A detailed product specification is available from your local BASF representative.

* *Cloud point EN 1890:*
Method A: 1 g of surfactant + 100 g of dist. Water
Method B: 1 g of surfactant + 100 g of NaCl solution (c = 50 g/l)
Method C: 1 g of surfactant + 100 g of NaCl solution (c = 100 g/l)
Method D: 5 g of surfactant + 45 g of butyldiglycol solution (c = 250 g/l)
Method E: 5 g of surfactant + 25 g of butyldiglycol solution (c = 250 g/l)

** *The pH of the Lutensol® XL types can decrease during storage, but this does not have any effect on their performance.*

*** *Applying Harkins-Jordan correction.*

Solubility

Details on the solubility of the Lutensol® XL types in various solvents are given in the table below.

Solubility of the Lutensol® XL types (10% at 23 °C)

	Destilled water	Potable water (2.7 mmol Ca^{2+}-Ions/l)	Caustic soda (5%)	Hydrochloric acid (5%)	Salt solution (5%)	Solvent naptha	Ethanol Isopropanol	Aromatic hydro-carbons
Lutensol® XL 40	–	–	–	–	–	+	+	+
Lutensol® XL 50	•	•	–	–	•	+	+	+
Lutensol® XL 60	+	+	•	+	±	±	±	+
Lutensol® XL 70	+	+	•	+	–	+	+	+
Lutensol® XL 79	+	+	•	+	–	+	+	–
Lutensol® XL 80	+	+	–	+	+	±	+	+
Lutensol® XL 89	+	+	–	+	+	+	+	–
Lutensol® XL 90	+	+	+	+	+	±	+	+
Lutensol® XL 100	+	+	+	+	+	–	+	+
Lutensol® XL 140	+	+	+	+	+	–	+	+

\+ = *clear solution*
± = *sparingly soluble (insoluble sediment)*
– = *insoluble (phase separation)*
• = *forms an opaque soluble, homogeneous emulsion*

Viscosity

The relationship between viscosity and temperature is always an important point to consider when Lutensol® XL types are stored or shipped. This is shown in the following table (mPa·s, Brookfield LVT):

Viscosity at °C	0	10	20	23	30	40	50	60
Lutensol® XL 40	250	110	40	40	30	20	20	10
Lutensol® XL 50	3500	650	70	50	40	30	20	10
Lutensol® XL 60	$>10^5$	$>10^5$	230	80	60	40	30	20
Lutensol® XL 70	$>10^5$	1500	100	70	50	40	30	20
Lutensol® XL 79	550	250	130	120	80	50	30	20
Lutensol® XL 80	$>10^5$	$>10^5$	400	120	60	40	30	20
Lutensol® XL 89	$>10^5$	350	180	200	100	60	40	30
Lutensol® XL 90	$>10^5$	$>10^5$	4000	400	100	50	40	30
Lutensol® XL 100	$>10^5$	$>10^5$	$>10^5$	$>10^5$	200	60	40	30
Lutensol® XL 140	$>10^5$	$>10^5$	$>10^5$	$>10^5$	300	80	50	40

We would recommend the preparation of 10 – 25% stock solutions of Lutensol® XL types if they are to be used in the form of very dilute solutions, or if they are to be added to other solutions. This makes it very much easier to dilute them later on.

The Lutensol® XL types can form fairly stiff gels at certain concentrations when water is added. The figures below were measured using a Brookfield-viscosimeter at 23 °C and 60 rpm.

The viscosity of Lutensol® XL types at 23 °C as a function of concentration in water (all values in mPa·s)

Water content %	Lutensol® XL 40	Lutensol® XL 50	Lutensol® XL 60	Lutensol® XL 70	Lutensol® XL 79
0	40	50	80	70	120
10	50	70	100	100	1600
20	80	90	110	150	$>10^5$
30	110	1700	$>10^5$	$>10^5$	$>10^5$
40	120[1)]	$>10^5$	$>10^5$	90000	4300
50	130[1)]	$>10^5$	22000	2000	140[1)]
60	110[1)]	$>10^5$	120[1)]	200[1)]	120
70	110[1)]	$>10^5$	80[1)]	100	60
80	70[1)]	2400	30[1)]	30	20
90	10[1)]	140	10[1)]	10	10

[1)] *two separate phases are formed*

Water content %	Lutensol® XL 80	Lutensol® XL 89	Lutensol® XL 90	Lutensol® XL 100	Lutensol® XL 140
0	120	200	400	$>10^5$	$>10^5$
10	150	$>10^5$	150	150	200
20	200	17000	200	200	300
30	$>10^5$	300	85000	300	400
40	17000	200	400	400	$>10^5$
50	300	100	350	$>10^5$	$>10^5$
60	200	20	300	300	250
70	100	10	60	50	50
80	20	<10	20	20	20
90	10	<10	10	10	10

The numbers reported have to be regarded as maximum values; the values measured immediately after mixing will be lower than the numbers reported.

Storage

a) The Lutensol® XL types should be stored indoors in a dry place. Storerooms must not be overheated.

b) The Lutensol® XL types are hygroscopic due to their good solubility in water, with the result that they may absorb moisture very quickly. Drums must be resealed each time they are opened.

c) The storage temperature should not be allowed to fall substantially below 20 °C. The setting points of these products also need to be taken into account.

d) Lutensol® XL 40, XL 50, XL 60 and XL 70 are clear to cloudy liquids at room temperature, and they tend to form a sediment. Lutensol XL 80 and XL 90 are cloudy liquids at room termperature, and they tend to form a sediment.
Lutensol® XL 100 and XL 140 are soft, colourless or slightly yellowish pastes at 23 °C.
Lutensol® XL 40, XL 50, XL 60, XL 70, XL 80, XL 90, XL 100 and XL 140 become clear liquids at 50 °C
Lutensol® XL 79 and XL 89 are clear liquids at room temperature.

e) Liquid that has solidified or that shows signs of sedimentation should be heated to 50 – 70 °C and homogenized before it is processed.

f) Drums that have solidified or that have begun to precipitate should be reconstituted by gentle heating, preferably in a heating cabinet. The temperature must not be allowed to exceed 70 °C. This also applies if drums are heated by external electrical elements.
Internal electrical elements should not be used because of the localized anomalies in temperature that they cause.

g) The Lutensol® XL types must be blanketed with nitrogen if they are stored in heated tanks (at 50 – 60 °C) to prevent them from coming into contact with air. Constant, gentle stirring helps to prevent them being discoloured as a result of prolonged contact with electrical elements or external heating coils.

Materials

The following materials can be used for tanks and drums:

a) AISI 321 stainless steel (X6CrNiTi1810)
b) AISI 316 Ti stainless steel (X6CrNiMoTi17122)

Shelf life

Provided they are stored properly and drums are kept tightly sealed, the Lutensol® XL types have a shelf life of at least two years in their original packaging.

Safety

We know of no ill effects that could have resulted from using Lutensol® XL types for the purpose for which it is intended and from processing it in accordance with current practices.

According to the experience that we have gained over many years and other information at our disposal, Lutensol® XL types do not exert harmful effects on health, provided they are used properly, due attention is given to the precautions necessary for handling chemicals, and the information and advice given in our Safety Data Sheets are observed.

Handling

Protect the eyes and avoid prolonged contact with the skin. Safety glasses should be worn when handling these products in their undiluted form.

Biodegradability

These products fulfil the requirements of Regulation (EC) No 648/2004 on detergents, tested according to the methods listed on Annex III. Further information on their ecological and toxicological properties can be found in the Safety Data Sheets.

Labelling

Please refer to the latest Safety Data Sheet for detailed information on product safety.

Note

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