Technical Information

July 2013
Supersedes issue dated March 2013

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Last change WF-No. 2418

Lutensol® M types

Lutensol® M 5
Lutensol® M 7

Nonionic surfactants for detergent and cleaner industry

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Chemical character

The Lutensol® M types are nonionic surfactants. They are alkyl polyethylene glycol ethers made from a C_{10-18}-alcohol and ethylene oxide.

They conform to the following formula:

$$RO(CH_2CH_2O)_xH$$

R = C_{10-18} Alkyl
x = 5, 7

The numeric code in the product name indicates in general the degree of ethoxilation.

Properties

Lutensol® M 5 is a cloudy liquid, M 7 is a paste at room temperature and they tend to form sediment. Lutensol® M 5 and M 7 become clear liquids at 60 °C.

Lutensol®		**M 5**	**M 7**
Physical form (23 °C)		Liquid	Paste
Degree of ethoxilation		approx. 5	approx. 7
Concentration	%	approx. 100	approx. 100
Cloud points (EN 1890)*			
Method A	°C		approx. 57
Method B	°C		approx. 43
Method C	°C		approx. 35
Method D	°C	approx. 65	approx. 75
Method E	°C	approx. 61	approx. 75
Average molar mass (from OH number)	g/mol	approx. 400	approx. 500
pH (EN 1262, solution B)**		approx. 7	approx. 7
Density (DIN 51757, 50 °C)	g/cm^3	approx. 0.90	approx 0.97
Dropping point (DIN 51801)	°C	approx. 28	approx. 28
Congealing point (ISO 2207)	°C	approx. 10	approx. 17
Viscosity (EN 12092, 60 °C, Brookfield, 60 rpm)	mPa·s	<20	<20
Hydroxyl number (DIN 53240)	mg KOH/g	approx. 140	approx. 111
HLB value		approx. 11.4	approx. 12.9
Flash point (ISO 2592)	°C	>130	>150
Wetting (EN 1772, distilled water, 23 °C, 2 g Soda ash/l)			
0.5 g/l	s	approx. 65	approx. 130
1 g/l	s	approx. 20	approx. 20
2 g/l	s	approx. 12	approx. 9
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. 110	approx. 300
Surface tension (EN 14370, 1 g/l in distilled water, 23 °C)***	mN/m	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® M 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® M types in various solvents are given in the table below:

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

	Distilled water	Potable water (2.7 mmol Ca^{2+}-Ions/l)	Caustic soda (5%)	Hydro-chloric acid (5%)	Salt solution (5%)	Solvent naphtha	Ethanol Isopro-panol	Aromatic hydro-carbons
Lutensol® M 5	–	–	–	–	O	–	+	+
Lutensol® M 7	+	+	+	+	+	–	+	+

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

Viscosity

The relationship between viscosity and temperature is always an important point to consider when Lutensol® M 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® M 5	$>10^5$	$>10^5$	$>10^5$	30000	290	30	<20	<20
Lutensol® M 7	Solid	$>10^5$	$>10^5$	$>10^5$	300	90	30	<20

We would recommend the preparation of 10 – 25% stock solutions of Lutensol® M 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® M 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® M types at 23 °C as a function of concentration in water (all values in mPa·s)

Water content in %	Lutensol® M 5	Lutensol® M 7
0	30000	$>1{\cdot}10^5$
10	90	130
20	100	90
30	430	1000
40	3100	230
50	6400	160
60	530	170
70	380	50
80	100	10
90	20	10

1) opaque
2) two separate phases are formed

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

Storage

a) The Lutensol® M types should be stored indoors in a dry place. Storage rooms must not be overheated (see flash point).

b) The Lutensol® M 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® M 5 is a cloudy liquid, M 7 is a paste at room temperature and they tend to form sediment. Lutensol® M 5 and M 7 become clear liquids at 60 °C.

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

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. Please mix sufficiently prior to use. 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® M 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 discolored 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® M 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® M types for the purpose for which they are intended and from processing them in accordance with current practices.

According to the experience that we have gained over many years and other information at our disposal, Lutensol® M 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.

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

PRD-Nos.*

30317197 Lutensol® M 5
30317194 Lutensol® M 7

*BASF's commercial product numbers.

Note

July 2013