

Technical Information

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BASF Aktiengesellschaft

Pluronic® RPE types

Pluronic® RPE 1720

Pluronic® RPE 1740

Pluronic® RPE 2035

Pluronic® RPE 2520

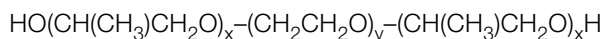
Pluronic® RPE 2525

Pluronic® RPE 3110

Low-foaming block copolymer

Chemical nature

The Pluronic® RPE types are nonionic surfactants. They consist of block copolymers in which the central polyethylene oxide block is flanked by two polypropylene oxide blocks, as shown by the following formula.



Properties

Pluronic®		RPE 1720	RPE 1740	RPE 2035
Physical form		Liquid	Liquid	Liquid
Average molar mass	g/mol	approx. 2150	approx. 2650	approx. 4100
Concentration	%	approx. 100	approx. 100	approx. 100
Cloud point (EN 1890)*				
Method A	°C	approx. 37	approx. 50	approx. 41
Method B	°C			
Method C	°C			
Method D	°C	approx. 42	approx. 53	approx. 45
Method E	°C	approx. 37	approx. 47	approx. 41
pH (EN 1262, Solution B)**		approx. 7	approx. 7	approx. 7
Density (DIN 51757, Method A, 23 °C)	g/cm ³	approx. 1.02	approx. 1.03	approx. 1.03
Viscosity (EN 12092, 23 °C, Brookfield, 60 rpm)	mPa·s	approx. 450	approx. 600	approx. 2400
Setting point (DIN 51583)	°C	approx. -32	approx. 9	approx. -17
Wetting power (EN 1772, 23 °C, 2 g soda ash/l, 1 g surfactant/l)	s	> 300	> 300	> 300
Surface tension*** (DIN 53914, 1 g/l, 23 °C)	mN/m	approx. 38	approx. 41	approx. 39

* Cloud point according to EN 1890:

Method A: 1 g surfactant + 100 g distilled water

Method B: 1 g surfactant + 100 g NaCl solution (c = 50 g/l)

Method C: 1 g surfactant + 100 g NaCl solution (c = 100 g/l)

Method D: 5 g surfactant + 45 g ethylene glycol monobutyl ether solution (c = 250 g/l)

Method E: 5 g surfactant + 25 g ethylene glycol monobutyl ether solution (c = 250 g/l)

** The pH of the Pluronic® RPE types can fall slightly in storage, but this has no effect on their performance

*** Applying Harkins-Jordan correction factor

Pluronic®		RPE 2520	RPE 2525	RPE 3110
Physical form		Liquid	Liquid	Liquid
Average molar mass	g/mol	approx. 3100	approx. 2000	approx. 3500
Concentration	%	approx. 100	approx. 100	approx. 100
Cloud point (EN 1890)*				
Method A	°C	approx. 28	approx. 35	approx. 21
Method B	°C			
Method C	°C			
Method D	°C	approx. 35	approx. 44	approx. 31
Method E	°C	approx. 31	approx. 37	approx. 25
pH (EN 1262, Solution B)**		approx. 7	approx. 7	approx. 7
Density (DIN 51757, Method A, 23 °C)	g/cm ³	approx. 1.02	approx. 1.03	approx. 1.02
Viscosity (EN 12092, 23 °C, Brookfield, 60 rpm)	mPa · s	approx. 600	approx. 400	approx. 600
Setting point (DIN 51583)	°C	approx. –20	approx. –31	approx. –30
Wetting power (EN 1772, 23 °C, 2 g soda ash/l, 1 g surfactant/l)	s	> 300	> 300	> 200
Surface tension*** (DIN 53914, 1 g/l, 23 °C)	mN/m	approx. 40	approx. 38	approx. 38

Solubility

As a general rule, the solubility of the Pluronic® RPE types in water increases in step with the proportion of polyethylene oxide they contain. If their polyethylene oxide content is constant, their solubility decreases as the molar mass of the polypropylene oxide block increases.

Solubility in selected solvents (10% solution at 23 °C)

	Pluronic® RPE 1720	Pluronic® RPE 1740	Pluronic® RPE 2035	Pluronic® RPE 2520	Pluronic® RPE 2525	Pluronic® RPE 3110
Water	–	+	+	–	–	–
Caustic soda (5%)	–	–	–	–	–	–
Hydrochloric acid (5%)	+	+	+	–	–	–
Ethanol	+	+	+	+	+	+
Isopropanol	+	+	+	+	+	+
Toluene	+	+	+	+	+	+
Mineral spirits	+	+	+	+	+	+

+ = Clear solution

– = Insoluble or sparingly soluble

Foaming

The Pluronic® RPE types do not foam or, at worst, they are very low-foaming. The amount of foam formed decreases in line with their polyethylene oxide content.

Foam formation can be tested in a number of ways. One method, which closely simulates the conditions encountered in practice, is to measure the level of foam produced in a dishwasher. The rotating spray arm is slowed down by foam, and the rate of revolution corresponds to the amount of foam present. A high rate of revolution means that little foam is formed. Foam can be encouraged to form by adding protein. Foam formation is assessed by adding 5 parts of Pluronic® RPE to 95 parts of a builder mixture consisting of 50% sodium metasilicate, 45% pentasodium triphosphate and 5% soda ash. The mixture is then tested at a concentration of 20 g per 10 l of water in the presence of protein.

Compatibility

Because they are nonionic, the Pluronic® RPE types can be combined with nonionic (Lutensol®, Plurafac® and Pluronic® PE types), anionic (Lutensit®) and cationic surfactants. They are insensitive to cations such as Ca^{2+} , Mg^{2+} and other hardness ions, and they do not react with soluble alkali salts or with polyanionic compounds such as carboxymethyl cellulose.

The resistance of the Pluronic® RPE types to acids is virtually unlimited in conventional applications. These products are also resistant to alkalis to some extent.

Processing

It is advisable to stir the surfactant into the water when making up aqueous solutions. Solutions mixed in the reverse order have a much higher viscosity.

Storage

- a) The Pluronic® RPE types should be stored indoors in their original packaging, which should be kept tightly sealed. Storerooms must not be overheated.
- b) They are hygroscopic and readily soluble in water, with the result that they absorb moisture very quickly. Drums must be resealed each time they are opened.
- c) They must be protected from frost.
- d) The Pluronic® RPE types can become slightly cloudy if they are stored at low temperatures, but this has no effect on their performance.

This cloudiness can be dissipated by heating them to 25 – 30 °C.

- e) Liquid that has solidified or that shows signs of precipitation should be heated to ca. 50 °C and rehomogenized 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 50 °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 Pluronic® RPE types must be blanketed with nitrogen if they are stored in heated tanks (at 40– 50 °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 316 Ti stainless steel (X6CrNiTi1810)
- b) AISI 321 stainless steel (X10CrNiMoTi1810)
- c) Iron lined with a phenolic resin

Shelf life

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

Applications

The main application for the Pluronic® RPE types is as foam suppressants in detergents, cleaners and other formulated products.

Detergents and cleaners

The Pluronic® RPE types can be used in cleaners for the dairy, brewery and soft-drinks industries, cleaners for removing shavings and swarf from machined metal parts and other industrial cleaners, provided this is permitted by local environmental protection legislation. They can also be used as low-foaming surfactants and defoamers in dishwasher detergents and rinse aids if this is allowed by local environment protection legislation. Synergistic effects can often be obtained by combining the Pluronic® RPE types with low-foaming surfactants from our Plurafac® LF range.

Lubricants

The Pluronic® RPE types can be employed as lubricants in synthetic metal-working fluids, mould-release agents and sythetic spin finishes. They are effective lubricants, especially at elevated temperatures, and they are easy to wash off. Also, the Pluronic® RPE types do not form tarry residues at high temperatures.

Chemical and allied industries

The Pluronic® RPE types can be used to control foaming in a variety of situations. They also contain reactive hydroxyl groups, which allows them to be modified by esterification, etc., to boost their foam-inhibiting properties or to adapt them to specific requirements. Modified polyglycols can be used as humectants, plasticizers and lubricants. They can be used to impregnate various materials, and they can be added to fluids to increase their viscosity. They also have a dispersing effect, and they are able to reduce tack.

Electronics

There are applications for the Pluronic® RPE types in the electronics industry in the production of printed circuit boards. They can also be used as heat-transfer fluids and hydraulic fluids.

Sugar refining

Action has to be taken to reduce the foam that forms when sugar juice is diffused and concentrated. Very effective defoamers can be formulated with the Pluronic® RPE types. Pluronic® RPE 2520 performs best at temperatures of around 100 °C.

Safety

We know of no ill effects that could have resulted from using the Pluronic® RPE types for the purposes for which they are intended and from processing them in accordance with current practice. According to the experience that we have gained over many years and other information at our disposal, the Pluronic® RPE types do not exert any 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 the Safety Data Sheets are observed.

Labelling

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

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

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