
Technical Information

Lupasol® PR 8515

Fields of application:

Adhesives, complexing, coatings and paints,
pigment manufacture, protein immobilization.

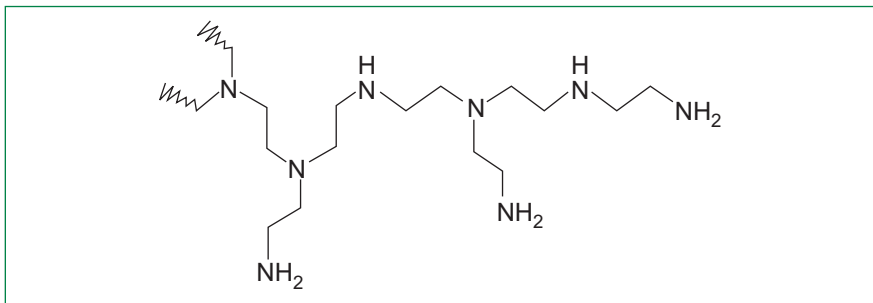
December 2020 | Supersedes issue dated May 2017 | Last change WF-No. 26165

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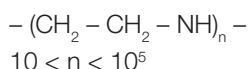
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Nature

Lupasol® PR 8515 is a multifunctional cationic polyethyleneimine (PEI) with a branched polymer structure.



Its composition is expressed by the following general molecular formula:



The nitrogen to carbon ratio in polyethyleneimines is 1:2, so that they have the largest possible amino group density of all known commercial polyamines. Polyethyleneimines have a definite ratio of primary, secondary and tertiary amino groups.

PRD-No.*

30048286

* BASF's commercial product numbers.

Appearance

Lupasol® PR 8515 is a clear, colorless to rarely slightly yellowish liquid.

**Handling and Storage****Handling**

- Lupasol® PR 8515 should be stored indoors in a dry place. Storage rooms must have a maximum temperature of +40 °C.
- Lupasol® PR 8515 must be protected from sunlight and high temperatures (max. +40 °C) to avoid discoloration and the formation of surface films.
- Lupasol® PR 8515 is a clear liquid and tends to separate in the coldness. This is a reversible process. It becomes a clear liquid at approx. +25 °C. Liquid that has solidified or that shows signs of sedimentation must be heated to max +40 °C and homogenized before it is processed. It must be mixed sufficiently prior to use.
- Lupasol® PR 8515 must be blanketed with nitrogen if it is stored to prevent air contact. Air contact can cause discoloration.
- Please refer to the latest Safety Data Sheet for detailed information on product safety.

Materials

The following materials can be used for tanks and drums:

- HDPE – high density polyethylene
- LDPE – low density polyethylene

Shelf life

Lupasol® PR 8515 has a shelf life of at least 24 months in its original packaging.

Properties

Some physical properties are listed in the table below. These are typical values only and not all of them are monitored on a regular basis. They are correct at the time of publication and do not necessarily form part of the product specification. A detailed product specification is available on request or via BASF's WorldAccount: <https://worldaccount.basf.com> (registered access).

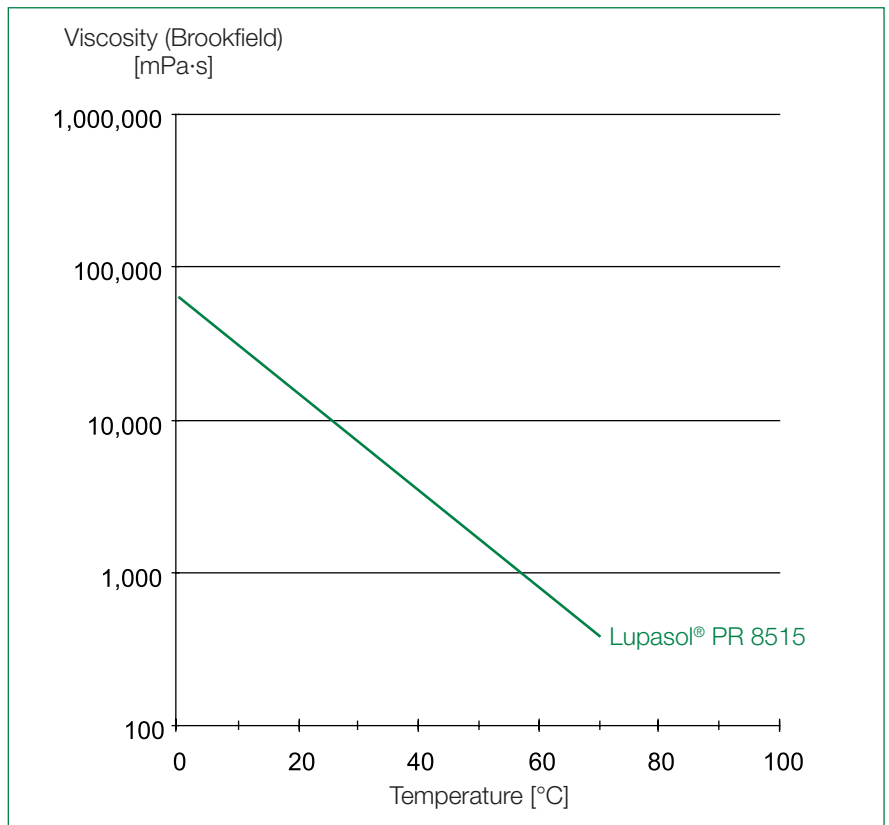
Lupasol® PR 8515 is an anhydrous polyethyleneimine and is miscible with water in all proportions.

Lupasol® PR 8515	Unit	Value
Physical form (25 °C)		liquid
Average molar mass (GPC, BASF method)	g/mol	approx. 2000
Viscosity (EN 12092, Brookfield, 25 °C, as is)	mPa · s	approx. 14 000
Concentration (= 100%-water content)	%	approx. 99
Water content (ISO 760, K. Fischer)	%	approx. 1
Refractive index (DIN 51423-1, 25 °C)		approx. 1.526
pH value (DIN 19268, 10% dry substance in dist. H ₂ O)		approx. 11
Density (DIN 51757, method 3, 25 °C)	g/cm ³	approx. 1.04
Charge density (cationic) ¹⁾	meq/g DS	approx. 16
Monomeric Ethyleneimine (BASF method)	ppm	<0.1
Pour point (ISO 3016)	°C	approx. -10
Ratio of prim./sec./tert. amine (BASF method, ¹³ C NMR)		approx. 1/0.9/0.6
Amine value (BASF method)	mmol/g DS	approx. 18

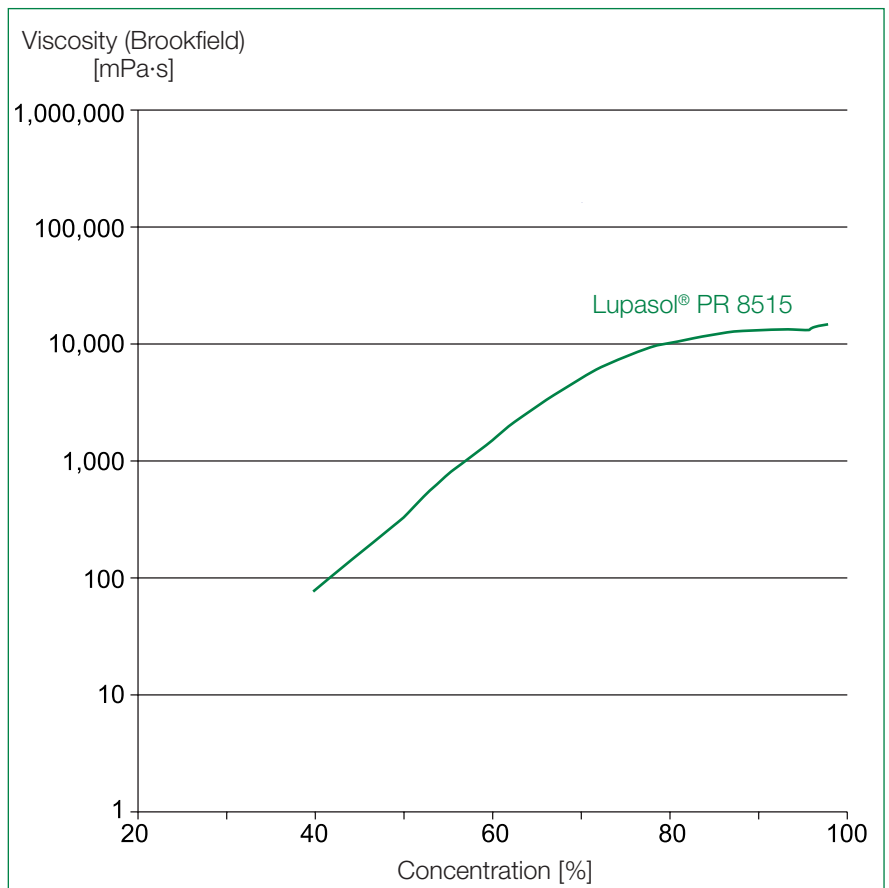
¹⁾ BASF method, 100% dry substance at pH 4.5

Viscosity

It is important for the transport, storage and processing of Lupasol® PR 8515 to know how its viscosity changes with temperature and concentration. The graph below shows the viscosity of Lupasol® PR 8515 as a function of temperature.



The following graph shows how the viscosity of Lupasol® PR 8515 depends on the water content.



Solubility

Lupasol® PR 8515 is soluble in water and polar solvents.

The following solubility data are of a general nature only and can vary according to the amount of Lupasol® PR 8515 to be dissolved. Aldehydes, ketones and chlorinated hydrocarbons are unsuitable as solvents, since they are likely to react with Lupasol® PR 8515. With acids, typical neutralization reactions occur.

Distilled water	+
Methanol ethanol, n-propanol isopropanol	+
n-Hexane	–
Ethyl acetate	O
Toluol Xylol	O

+ = *soluble*

– = *insoluble*

O = *partially soluble*

Compatibility

Lupasol® PR 8515 is compatible with cationic and nonionic systems. In anionic systems, the addition of Lupasol® PR 8515 can result in incompatibilities (gelatinization, precipitation). The compatibility can generally be improved by selecting the appropriate molecular weight or by adding ammonia.

Lupasol® PR 8515 may change the coloristic properties of dyes and pigments.

Application

Because of its high charge density, Lupasol® PR 8515 adsorbs strongly on negatively charged surfaces such as cellulose, polyester, polyolefins, polyamides and metals. It is therefore used as adhesion promoter for bonding different materials. The usual application rate for these applications is very low, in the 50 – 150 mg/m² range.

In addition, owing to the large number of peripheral amino groups, Lupasol® PR 8515 can act as physical or chemical crosslinking agent in coatings, paints and adhesives.

Adhesives

In combination with polyvinyl alcohol, polyvinylbutyral, polyvinyl acetate and styrene copolymers, Lupasol® PR 8515 can be used as adhesion promoter in adhesives. The application concentration is usually in the 0.1 – 5% range (percent active substance).

Because of its crosslinking action, the use of low-molecular Lupasol® PR 8515 in dispersion-based label adhesives results in significantly increased cohesion for the same level of adhesion.

Low-molecular anhydrous Lupasol® PR 8515 can also act as crosslinker and hardener in epoxy resin and polyurethane adhesives. The amounts used depend on the epoxide or isocyanate component and the desired product properties.

Complex formation

Lupasol® PR 8515 can form reversible complexes with heavy-metal ions. It has a high cation-binding capacity similar to that of EDTA. Complexing is preferably carried out in an alkaline medium. Lupasol® PR 8515 exhibits outstanding binding capacities towards divalent metal ions (Zn²⁺, Hg²⁺, Cu²⁺, Pb²⁺, Ni²⁺, Cd²⁺).

Coatings and paints

Lupasol® PR 8515 is used as primer in coating applications, where it improves adhesion to the substrate.

Low-molecular, anhydrous Lupasol® PR 8515 can also be used as a crosslinking polyamine component in epoxy resin and polyurethane coatings. Lupasol® PR 8515 improves the early rain resistance of stucco finishes.

Pigment manufacture

Pigments dispersed with Lupasol® PR 8515-based compounds is easier to process and exhibit higher color strength.

Protein immobilization

Lupasol® PR 8515 can be used to immobilize proteins on inorganic materials. The proteins are usually bound to the Lupasol® PR 8515 using dialdehydes (e. g. glutaraldehyde).

Safety and Labelling

Please refer to the safety data sheet for information on classification & labeling, safe use, handling and transport.

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December 2020