

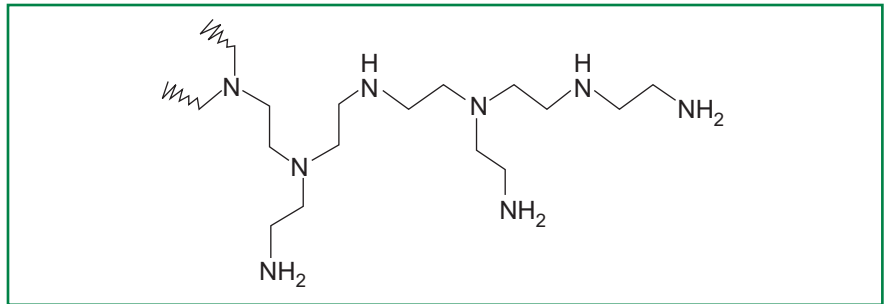
Lupasol® G 20 Waterfree

Fields of application:

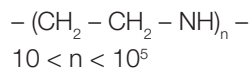
Printing inks, Adhesion promoters in car tires, Adhesives, Complexing, Plastics modification, Coatings and paints, Pigment manufacture, Protein immobilization, Textile auxiliaries, Packaging, Water treatment.

Nature

Lupasol® G 20 Waterfree 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-Nos.*

30048280

*BASF's commercial product numbers.

Appearance

Lupasol® G 20 Waterfree is a clear, colorless to yellowish liquid.

Handling and Storage**Handling**

- Lupasol® G 20 Waterfree should be stored in the tightly sealed original containers in cool, dry rooms.
- High temperatures and direct sunlight can lead to discoloration and the formation of surface films.
- At temperatures below 0 °C, the product may solidify, but brief heating to a maximum of 80 °C and stirring reverses the process.
- Prolonged exposure to atmospheric oxygen can cause discoloration. We therefore recommend storage under an inert atmosphere of nitrogen.
- Please refer to the latest Safety Data Sheet for detailed information on product safety.

Shelf life

Lupasol® G 20 Waterfree has a shelf life of at least 12 months, provided it is stored in its original packaging and kept tightly sealed.

Materials

Suitable materials for containers are stainless steel and numerous plastics (e. g. PE, PP and PVC). Containers of low alloy steel, copper or copper alloys cause discoloration and are therefore unsuitable.

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).

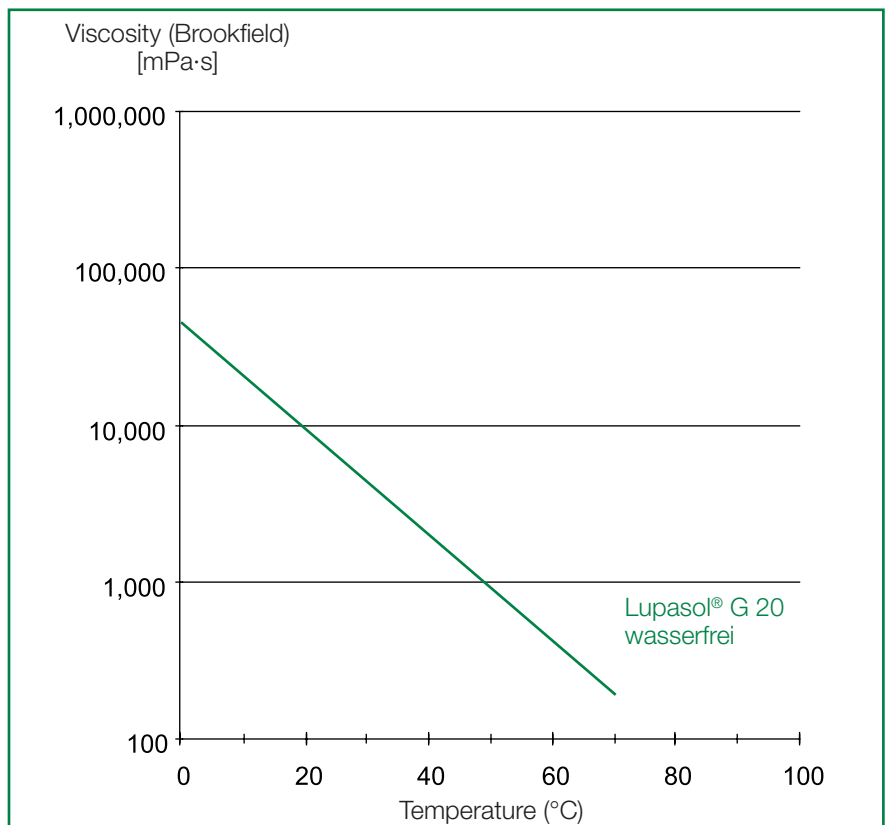
Lupasol® G 20 Waterfree is an anhydrous polyethyleneimine and is miscible with water in all proportions.

Lupasol® G 20 Waterfree	Unit	Value
Average molar mass (GPC, BASF method)	g/mol	1 300
Viscosity (ISO 2555, Brookfield)	mPa·s	8 000
Concentration (ISO 3251)	%	99
Water content (ISO 760, K. Fischer)	%	1
Refractive index (DIN 51423, 20 °C)		1.526
pH value (DIN 19268, 1% dry substance in dist. H ₂ O)		11
Density (DIN 51757, 20 °C)	g/cm ³	1.03
Charge density (cationic) ¹⁾	meq/g DS	16
Monomeric Ethyleneimine (BASF method)	ppm	<0.1
Pour point (ISO 3016)	°C	-16
Ratio of prim./sec./tert. amine (BASF method, ¹³ C NMR)		1/0.9/0.6
Amine value (BASF method)	mmol/g DS	19

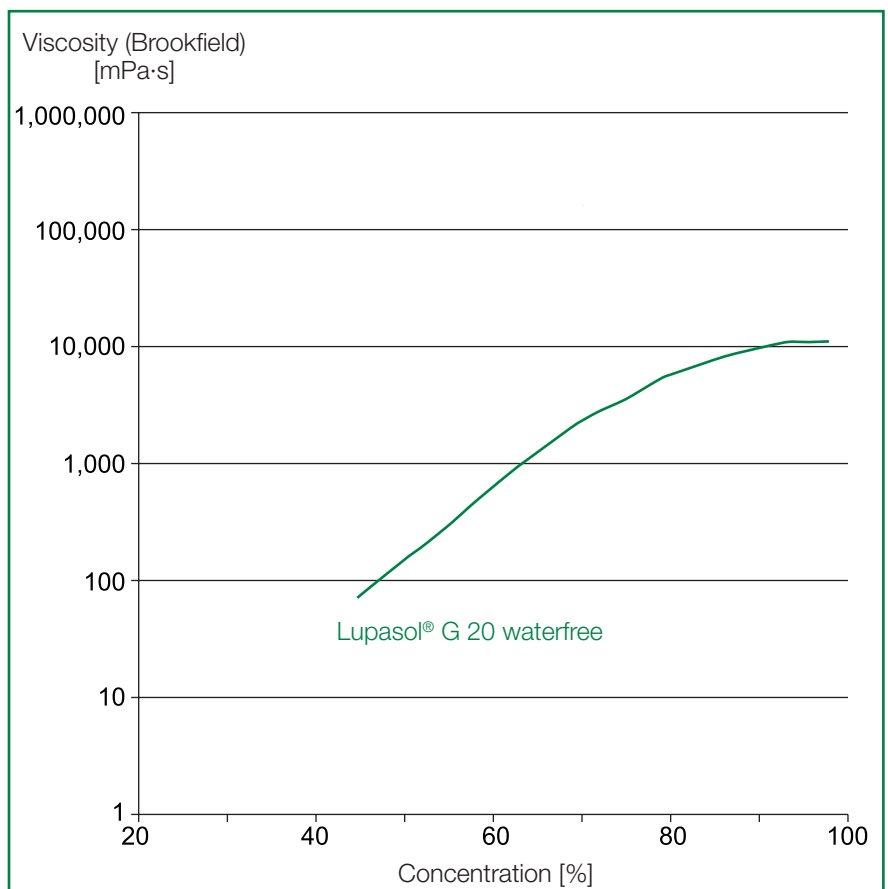
1) BASF method, 100% dry substance at pH 4.5

Viscosity

It is important for the transport, storage and processing of Lupasol® G 20 Waterfree to know how its viscosity changes with temperature and concentration. The graph below shows the viscosity of Lupasol® G 20 Waterfree as a function of temperature.



The following graph shows how the viscosity of Lupasol® G 20 Waterfree depends on the water content.



Solubility

Lupasol® G 20 Waterfree 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® G 20 Waterfree to be dissolved. Aldehydes, ketones and chlorinated hydrocarbons are unsuitable as solvents, since they are likely to react with Lupasol® G 20 Waterfree. 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® G 20 Waterfree is compatible with cationic and nonionic systems. In anionic systems, the addition of Lupasol® G 20 Waterfree can result in incompatibilities (gelatinization, precipitation). The compatibility can generally be improved by selecting the appropriate molecular weight or by adding ammonia.

Lupasol® G 20 Waterfree may change the coloristic properties of dyes and pigments.

Application

Because of its high charge density, Lupasol® G 20 Waterfree 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® G 20 Waterfree 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® G 20 Waterfree 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® G 20 Waterfree in dispersion-based label adhesives results in significantly increased cohesion for the same level of adhesion.

Low-molecular anhydrous Lupasol® G 20 Waterfree 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® G 20 Waterfree 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® G 20 Waterfree exhibits outstanding binding capacities towards divalent metal ions (Zn²⁺, Hg²⁺, Cu²⁺, Pb²⁺, Ni²⁺, Cd²⁺).

Coatings and paints

Lupasol® G 20 Waterfree is used as primer in coating applications, where it improves adhesion to the substrate.

Low-molecular, anhydrous Lupasol® G 20 Waterfree can also be used as a crosslinking polyamine component in epoxy resin and polyurethane coatings. Lupasol® G 20 Waterfree improves the early rain resistance of stucco finishes.

Pigment manufacture

Pigments dispersed with Lupasol® G 20 Waterfree-based compounds is easier to process and exhibit higher color strength.

Protein immobilization

Lupasol® G 20 Waterfree can be used to immobilize proteins on inorganic materials. The proteins are usually bound to the Lupasol® G 20 Waterfree 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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