Technical Information

September 2006
Supersedes issue dated April 2006

MEMC 050102e-06/Page 1 of 14

Luviskol® VA Grades

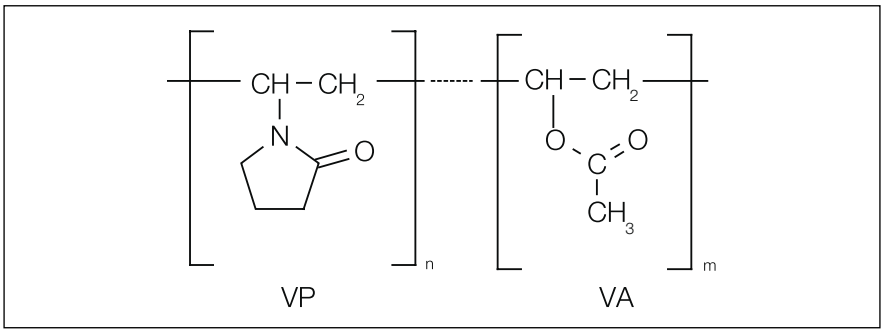
The Luviskol VA grades are polymeric film-forming agents that are used as hair fixatives particularly in aerosol sprays, pump sprays, liquid products, mousses and gels.

Cosmetic Solutions

- Hair Care
- Skin Care
- Oral Care

BASF
The Chemical Company

Structural formula



Chemical nature

Vinylpyrrolidone (VP)/vinyl acetate (VA) copolymer

INCI name

VP/VA Copolymer

Product range

Product name	Composition VP:VA	INCI name	CAS number	Product number	PRD number
Luviskol® VA 37 E	30:70	VP/VA Copolymer	25086-89-9	10062639	30035021
Luviskol® VA 37 I	30:70	VP/VA Copolymer (and) Isopropanol	25086-89-9	10015456	30035022
Luviskol® VA 55 I	50:50	VP/VA Copolymer (and) Isopropanol	25086-89-9	10015455	30035027
Luviskol® VA 64 P	60:40	VP/VA Copolymer	25086-89-9	10007996	30035019
Luviskol® VA 64 W	60:40	VP/VA Copolymer	25086-89-9	10084624	30035030
Luviskol® VA 73 W	70:30	VP/VA Copolymer	25086-89-9	10086130	30035031
Luviskol® VA 73 E	70:30	VP/VA Copolymer	25086-89-9	10065903	30035024

The ethanolic (E), isopropanolic (I) and aqueous (W) each contain approx. 50% polymer. Luviskol VA 64 P (powder) is an approx. 100% powder product.

Appearance

The solutions are clear and colorless to slightly yellowish. The powder is white.

Odour

Faint, characteristic

Specifications

	K value (1% in ethanol)	Solids content, %	Water, %	pH value (10% aqueous solution)	NVP content, %	VAc content, %	APHA HAZEN UNITS
Method No.	02/ 0038.00	02/ 0039.00	02/ 0040.00	02/ 0041.00	02/ 0042.00	02/ 0042.00	
Luviskol VA 37 E	28.0-36.0	48.0-52.0	≤0.50	-	≤0.005	≤0.01	-
Luviskol VA 37 I	25.0-31.0	48.0-52.0	≤0.50	-	≤0.005	≤0.01	-
Luviskol VA 55 I	22.0-28.0	48.0-52.0	≤0.50	-	≤0.005	≤0.01	-
Luviskol VA 64 P	26.0-34.0	≥95%	≤5.0	3.8-6.0	≤0.005	≤0.01	-
Luviskol VA 64 W	26.0-34.0	48.0-52.0	approx. 50	5.0-7.0	≤0.005	≤0.01	≤40[1)]
Luviskol VA 73 W	24.0-32.0	48.0-52.0	approx. 50	5.0-7.0	≤0.005	≤0.01	≤40[2)]
Luviskol VA 73 E	28.0-38.0	48.0-52.0	≤0.50	-	≤0.005	≤0.01	-

[1)] telquel (as is)
[2)] 3.5% in water

Physical properties

Solubility

The solubility of the Luviskol VA grades in water depends on the VP:VA ratio. Products with a high proportion of vinylpyrrolidone (Luviskol VA 64 and Luviskol VA 73) form clear solutions in water. The other grades can be dispersed in water. The solutions are slightly acidic. The polymers are nonionic and thus do not need to be neutralized. All the Luviskol grades are soluble in ethanol, isopropanol, n-propanol, glycerin, methylene chloride, esters and ketones. Any precipitates that occur in solutions in ethanol or isopropanol in the cold disappear again on heating. Luviskol VA 37 forms clear solutions in ethanol abs., ethanol 96% and ethanol/ water (VOC 80% and VOC 55%). Solutions in isopropanol are clear, sometimes with a bluish tint.
Without a solubilizer, the products are not soluble in ether or aliphatic hydrocarbons.

Water absorption

Water absorption by films of Luviskol VA compared with Luviskol® K 30 as a function of relative humidity at 20°C.

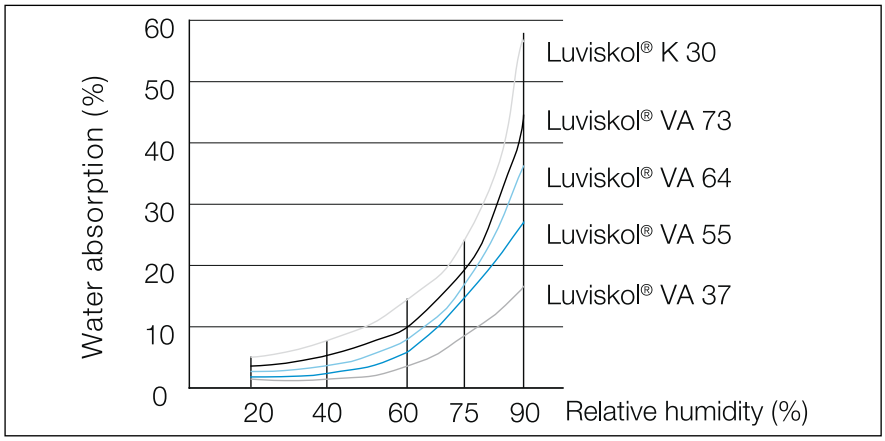


Fig. 1

Technical properties

Suitability for hair sprays

The Luviskol VA grades are used as film-forming agents and fixatives in hair care. They possess excellent properties both for aerosol sprays and for non-aerosol products. The higher the proportion of vinylpyrrolidone, the more hygroscopic the Luviskol VA grade is. The adhesion of Luviskol VA films (e.g. Luviskol VA 64 and VA 73) to the hair also increases with the proportion of vinylpyrrolidone, without adversely affecting their excellent combing-out and washing-out properties, thanks to the nonionic nature of the polymer.

Luviskol VA 37 and VA 55 grades are particularly suitable for hair sprays whose films it must be possible to remove from the hair by brushing. The hair is even degreased on brushing, as the grease is effectively removed together with the Luviskol film.

The Luviskol VA 64 grades and the Luviskol VA 55 grades, by contrast, are preferable for hairsprays that are to have a particularly hydrophilic character, e.g. for use in dry climates. They are also suitable for sprays with a high water content. Hair sprays for dry and brittle hair should include a small quantity of plasticizer (0.1 - 0.2%), such as a polyethylene glycol like Pluracare® E 400, or Palatinol® M (dimethyl phthalate), Luvitol® EHO, silicone oils or other plasticizers frequently used in cosmetics.

Propellant compatibility

Solutions of the Luviskol VA grades are readily compatible with dimethyl ether (DME). Propane, butane, isobutane, pentane DME/pentane and DME/butane mixtures can be used together with solvents such as ethanol and methylene chloride.

Suitability for hair-setting solutions, gels and mousses

Because of their good solubility in water, the Luviskol VA 64 and Luviskol VA 73 grades are particularly suitable for liquid hair setting products, gels and mousses. Further, these polymers possess excellent setting properties. All the Luviskol VA grades can be completely removed from the hair by straightforward washing.

The easy-to-use aqueous Luviskol VA solutions (VA 64 W and VA 73 W) as well as Luviskol VA 64 Powder are particularly suitable for alcohol-free formulations. In the usual concentrations (1 - 5% solid polymer), they form clear solutions in water and are very compatible with carbomers.

The moderate hydrocarbon compatibility of Luviskol VA 37 can be greatly improved by adding small quantities of water. This makes it possible to achieve cloud points below 0°C (Fig. 2).

Cloud point

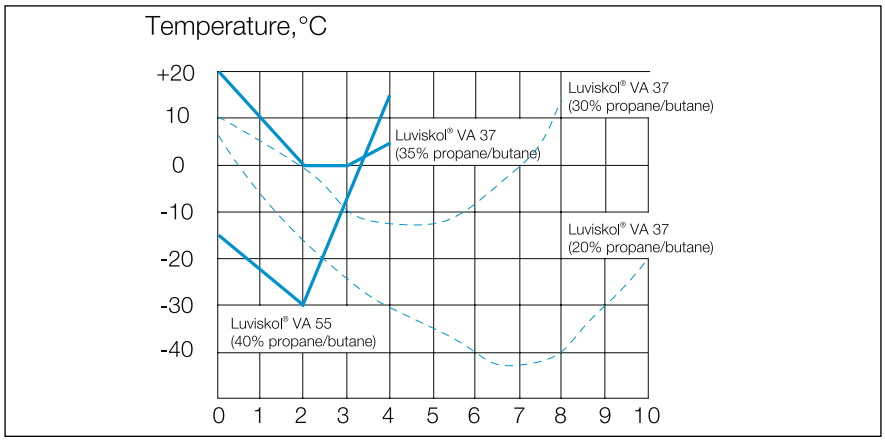


Fig. 2: Reduction in cloud point by adding water to ethanolic solutions containing 3% solid polymer

Examples of applications

Luviskol VA grades

The composition of hair sprays depends on a number of factors. These include the hair type (thick, thin, dry, greasy hair), the climate (dry, humid), legal requirements and the approval status of the various propellants and solvents, the solvent system (with or without water) and consumer habits. The following typical formulations provide a starting point for formulating hair sprays, hair setting lotions, mousses, gels and waxes. To facilitate selection of the most suitable formulation, the cloud point, density, and pressure in the case of aerosol sprays, are given. We have allocated a number to each formulation.

In the manufacture of hair sprays and hair setting lotions, it is worth filtering the solutions before filling, to remove any particulate matter that may be present.

The following concentrations are recommended (solids):

- Aerosol hair spray 2 - 6%
- Pump spray 3 - 7%
- Setting lotions 1 - 5%
- Setting mousse 1 - 5%
- Gels 1 - 5%
- Hair waxes 1 - 5%

The formulation section contains details of examples of all types of product. The following table contains their main features:

1. Aerosol hair spray with propane/butane

Aerosol hair spray with propane/butane, water-free **No. 01/00504**

%	Ingredients	Supplier	INCI name
6.00	Luviskol® VA 55 I	(1)	VP/VA Copolymer (and) Isopropanol
q.s.	Perfume		
54.00	Ethanol abs.		Alcohol
40.00	Propane/butane		Propane/Butane

Production: Weigh out the individual ingredients and stir in ethanol until a clear solution is obtained.

Properties: Normal setting effect, for dry climate, good combing-out and washing-out properties.

Cloud point: -20°C
Pressure: 3.3 bar
Density: 0.6932 g/ml

Aerosol hair spray with propane/butane with water **No. 01/00431**

%	Ingredients	Supplier	INCI name
6.00	Luviskol® VA 37 E	(1)	VP/VA Copolymer
q.s.	Perfume		
64.00	Ethanol 96%		Alcohol
30.00	Propane/butane		Propane/Butane

Production: Weigh out the individual ingredients and stir in ethanol until a clear solution is obtained.

Properties: Normal setting effect, for all climates, good combing-out and washing-out properties.

Cloud point: -15°C
Pressure: 3.2 bar
Density: 0.7444 g/ml

Aerosol hair spray with dimethyl ether with high water content **No. 01/00646**

%	Ingredients	Supplier	INCI name
6.00	Luviskol® VA 55 I	(1)	VP/VA Copolymer (and) Isopropanol
4.00	Ethanol abs.		Alcohol
40.00	Water dem.		Aqua
50.00	Dimethyl ether		Dimethyl Ether
q.s.	Perfume		

Production: Weigh all the ingredients into a mixer, stir until dissolved, then fill into spray cans.

Properties: Strong setting effect, for normal and dry climates, good combing-out and washing-out properties.

Cloud point: -20°C
Pressure: 5.0 bar
Density: 0.8484 g/ml

Hairspray with Luviskol® VA 37 E **No. 01/00647**

	%	Ingredients	Supplier	INCI name
A	6.00	Luviskol VA 37 E	(1)	VP/VA Copolymer
	39.00	Ethanol abs.		Alcohol
	5.00	Water, dem.		Aqua
	q.s.	Perfume		
B	50.00	Dimethyl ether		Dimethyl Ether

Production: Weigh out the individual ingredients and stir in ethanol until a clear solution is obtained. Finally, add the water.

Properties: Normal setting effect, for all climatic zones, good combing-out and washing-out properties.

Cloud point: -35°C
Density: 0.7640 g/ml
Pressure: 3.7 bar

Aerosol hair spray with dimethyl ether without water **No. 01/00573**

	%	Ingredients	Supplier	INCI name
A	6.00	Luviskol® VA 37 E	(1)	VP/VA Copolymer
	54.00	Ethanol abs.		Alcohol
	q.s.	Perfume		
B	40.00	Dimethyl ether		Dimethyl Ether

Production: Weigh the components of phase A and stir until a homogeneous solution is obtained.
Fill into appropriate containers and charge with phase B.

Properties: Normal setting effect, for all climatic zones, good combing-out and washing-out properties.

Cloud point: -35°C
Density: 0.7452 g/ml
Pressure: 3.7 bar

Aerosol hairspray with dimethylether and pentane **No. 01/00197**

	%	Ingredients	Supplier	INCI name
A	12.00	Luviskol® VA 37 I	(1)	VP/VA Copolymer, Isopropyl Alcohol
	25.00	Ethanol abs.		Alcohol
	q.s.	Perfume		
B	20.00	n-Pentane		
C	43.00	Dimethyl ether		Dimethyl Ether

Production: Weigh out the individual ingredients and stir in ethanol until a clear solution is obtained.

Properties: Very strong setting effect for all climatic zones, good combing-out and washing-out properties.

Cloud point: -35°C
Density: 0.7128 g/ml
Pressure: 3.0 bar

2. Pump spray

Pump spray **No. 01/00143**

%	Ingredients	Supplier	INCI name
14.00	Luviskol® VA 37 E	(1)	VP/VA Copolymer
q.s.	Perfume		
10.00	Water, dem.		Aqua
76.00	Ethanol abs.		Alcohol

Production: Weigh out the individual ingredients and stir in ethanol until a clear solution is obtained.

Properties: Very strong setting effect, for all climatic zones, good combing-out and washing-out properties.

3. Compressed gas spray

Pump Setting Spray **No. 01/00015**

%	Ingredients	Supplier	INCI name
8.00	Luviskol® VA 37 E	(1)	VP/VA Copolymer
q.s.	Perfume		
92.00	Ethanol abs.		Alcohol

Production: Weigh out the individual ingredients and stir in ethanol until a clear solution is obtained. Fill and pressurize with N_2, CO_2, or compressed air (compressed gas).

Properties: Normal setting effect, for dry and normal climates, good combing-out and washing-out properties.

4. Hair setting preparations

Setting solutions

Hair Styling Lotion **No. 02/00041**

%	Ingredients	Supplier	INCI name
6.00	Luviskol® VA 73 E	(1)	VP/VA Copolymer
0.20	Perfume Cremophor® RH 40 or CO 40 (1:4)		
35.00	Ethanol abs.		Alcohol
58.80	Water, dist.		Aqua

Production: Mix Luviskol with ethanol, add Perfume and water.

Properties: Normal setting effect, for use in moist hair, for all climatic zones.

Gels

Colored gel — No. 04/00005

	%	Ingredients	Supplier	INCI name
A	0.70	Cremophor® RH 40 or CO 40	(1)	PEG-40-Hydrogenated Castor Oil
	20.00	Ethanol abs.		Alcohol
	q.s.	Perfume		
B	0.60	Carbopol 940	(6)	Carbomer
	4.00	Luviskol® VA 64 Powder *	(1)	VP/VA Copolymer
	0.05	Uvinul® D 50	(1)	Benzophenone-2
	q.s.	FD&C Blue No. 1	(1)	Acid Blue 9
	73.85	Water, dist. *		Aqua
C	0.80	Triethanolamine Care	(1)	Triethanolamine

* or alternatively 8.00% Luviskol® VA 64 W and 69.85% dist. water.

Production: Prepare Phases A and B separately. Stir Phase B into Phase A. Add Phase C to the mixture.

Properties: Clear hair gel with strong setting effect, without preservative.

Colorless gel with Luviskol® VA 64 W — No. 04/00084

	%	Ingredients	Supplier	INCI name
A	0.50	Carbopol 940	(6)	Carbomer
	49.50	Water, dist.		Aqua
	0.67	Triethanolamine Care	(1)	Triethanolamine
B	12.00	Luviskol VA 64 W	(1)	VP/VA Copolymer
	q.s.	Cremophor® RH 40 or CO 40	(1)	PEG-40-Hydrogenated Castor Oil
	q.s.	Perfume		
	q.s.	Preservative		
	37.33	Water, dist.		Aqua

Production: Prepare Phases A and B separately. Stir Phase B into Phase A.

Properties: Clear hair gel with strong setting effect.
Viscosity: approx. 25 000 mPa·s

Colored gel with Luviskol® VA 73 W **No. 04/00027**

	%	Ingredients	Supplier	INCI name
A	0.60	Carbopol 940	(6)	Carbomer
	40.00	Water, dist.		Aqua
B	1.50	Cremophor® RH 410 or CO 410	(1)	PEG-40-Hydrogenated Castor Oil
	q.s.	Perfume		
	6.00	Luviskol VA 73 W	(1)	VP/VA Copolymer
	0.05	Uvinul® D 50	(1)	Benzophenone-2
	q.s.	Preservative		
	51.25	Water, dist.		Aqua
	q.s.	Sicovit® Patent Blue 85 E 131	(1)	Acid Blue 3
C	0.70	Triethanolamine Care	(1)	Triethanolamine

Production: Leave Phase A to swell. Prepare a clear solution of Phase B. Stir Phase B into Phase A. Neutralize with Phase C.

Properties: Clear hair gel with normal setting effect.
Viscosity: approx. 20 000 mPa·s
pH value: approx. 7

Pump gel sprays

Pump gel spray with Luviskol® VA 64 W and Luviquat Hold **No. 04/00083**

	%	Ingredients	Supplier	INCI name
A	0.15	Carbopol 940	(6)	Carbomer
	50.00	Water, dist.		Aqua
B	6.00	Luviskol VA 64 W	(1)	VP/VA Copolymere
	0.50	Luviquat Hold	(1)	Polyquaternium-46
	3.00	1.2-Propylene Glycol USP	(1)	Propylene Glycol
	20.00	Ethanol 96%		Alcohol
	20.15	Water, dist.		Aqua
	q.s.	Perfume		
	q.s.	Cremophor® CO 40	(1)	PEG-40-Hydrogenated Castor Oil
C	0.20	Triethanolamine Care	(1)	Triethanolamine

Production: Leave Phase A to swell and neutralize with Phase C. Weigh out the ingredients for Phase B and prepare a clear solution. Stir Phase B into Phase A+C.

Properties: Clear gel spray for normal to good setting effect.

Hair Gel with Luviskol® VA 64 P, D-Panthenol and Luviquat® Mono LS **No. 04/00082**

	%	Ingredients	Supplier	INCI name
A	0,50	Carbopol 940	(6)	Carbomer
	49,50	Water dem.		Aqua dem.
B	0,90	Neutrol® TE	(1)	Tetrahydroxypropyl Ethylenediamine
C	q.s	Perfume		
	q.s.	Cremophor® RH 410	(1)	PEG-40 Hydrogenated Castor Oil
	27,30	Water dem.		Aqua dem.
	15,00	Ethanol 96%		Alcohol
	0,10	Edeta® BD	(1)	Disodium EDTA
	0,20	Luviquat Mono LS	(1)	Cocotrimonium Methosulfate
	6,00	Luviskol VA 64 P	(1)	PVP/VA Copolymer
	0,50	D-Panthenol USP	(1)	Panthenol

Production: Allow phase A to swell and neutralize with phase B. Dissolve phase C and stir it into phase A+B.

Properties: strong setting effect, for all climatic zones
Viscosity: 4500 mPa·s Haake Viscotester VT-02
pH value: 6,5

Setting mousse (with aerosol)

Mousse (with aerosol), strong setting with Luviskol® VA 64 W/P **No. 02/00387**

	%	Ingredients	Supplier	INCI name
A	q.s.	Cremophor® CO 40	(1)	PEG-40 Hydrogenated Castor Oil
	q.s.	Perfume		
B	5.00	Luviskol® VA 64 Powder *	(1)	VP/VA Copolymer
	0.10	Cremophor® A 25	(1)	Ceteareth-25
	0.50	Luviquat® Mono LS	(1)	Cocotrimonium Methosulfate
	15.00	Ethanol 96%		Alcohol
	69.40	Water, dem. *		Aqua
C	10.00	Propane/Butane 3.5 bar (20°C)		Propane/Butane

Production: Solubilize phase A. Weigh phase B into phase A. Stir phase B into phase A and dissolve clearly. Adjust the pH value to 6-7. Fill into appropriate containers and charge with phase C.

Properties: Strong setting effect, for use on the moist hair, for all climatic zones.

* or alternatively 10.00% Luviskol VA 64 W and 64.40% dem. water.

Mousse (with aerosol), with conditioner **No. 02/00385**

	%	Ingredients	Supplier	INCI name
A	2.00	Luviquat® Mono LS	(1)	Cocotrimonium Methosulfate
	0.20	Perfume		
B	5.00	Luviquat® Style	(1)	Polyquaternium-16
	4.00	Luviskol® VA 73 W	(1)	VP/VA Copolymer
	0.10	Cremophor® A 25	(1)	Ceteareth-25
	q.s.	Presevative		
	78.70	Water, dem.		Aqua
C	10.00	Propane/Butane 3.5 bar (20°C)		Propane/Butane

Production: Mix the components of phase A. Weigh out phase B and dissolve it clearly. Stir phase B into phase A. Fill into appropriate containers and charge with phase C.

Properties: Strong setting effect, for use on the moist hair, improves wet combability, gives the hair volume, prevents electrostatic charging.

Mousse with Luviskol® VA 73 E and Luviquat® Hold **No. 02/00415**

	%	Ingredients	Supplier	INCI name
A	2.00	Luviquat® Mono LS	(1)	Cocotrimonium Methosulfate
	q.s.	Perfume		
B	5.00	Luviquat Hold	(1)	Polyquaternium-46
	5.00	Luviskol VA 73 E	(1)	VP/VA Copolymer
	0.50	Cremophor® A 25	(1)	Ceteareth-25
	10.00	Ethanol 96%		Alcohol
	67.50	Water, dem.		Aqua
C	10.00	Propane/Butane 3.5 bar (20°C)		Propane/Butane

Production: Mix together the ingredients for phase A. Weigh in phase B and dissolve to give a clear solution. Stir phase B into phase A. Adjust to a pH value of 6-7. Pressurize with phase C.

Properties: Normal setting effect, For use on the moist hair, improves wet combability, gives the hair volume.

pH value: approx. 7
Pressure: approx. 3.5 bar

Pump mousse
Pump mousse with Luviskol® VA 64 W/P **No. 02/00386**

	%	Ingredients	Supplier	INCI name
A	q.s.	Cremophor® CO 40	(1)	PEG-40 Hydrogenated Castor Oil
	q.s.	Perfume		
B	6.00	Luviskol® VA 64 Powder *	(1)	VP/VA Copolymer
	0.50	Luviquat® Mono LS	(1)	Cocotrimonium Methosulfate
	0.10	Cremophor® A 25	(1)	Ceteareth-25
	q.s.	Preservative		
	93.40	Water, dem. *		Aqua

* or alternatively 12.00% Luviskol VA 64 W and 87.00% dem. water.

Production: Solubilize phase A. Weigh phase B into phase A. Stir phase B into phase A and dissolve clearly.

Properties: Strong setting effect, for all climatic zones, improves wet combability, gives the hair volume, prevents electrostatic charging.

Hair wax with Luviskol® VA 73 W and Panthenol **No. 03/00051**

	%	Ingredients	Supplier	INCI name
A	35.00	Pluracare® E 1500	(1)	PEG-32
	52.00	Pluracare® E 400	(1)	PEG-8
	2.00	D-Panthenol 50 P	(1)	Panthenol (and) Propylene Glycol
	1.00	Cremophor® RH 40 or CO 40	(1)	PEG-40 Hydrogenated Castor Oil
	q.s.	Perfume		
	q.s.	Preservative		
	10.00	Luviskol VA 73 W	(1)	VP/VA Copolymer

Production: Dissolve phase A at approx. 50°C.

Properties: Strong setting effect, soft, easy-to-spread wax, gives the hair sheen.

Suppliers

1. **BASF Aktiengesellschaft**
   D-67056 Ludwigshafen, Germany
   Tel.: (0621) 60-0
   Telefax: 60-42525

6. **Noveon, Inc.**
   9911 Brecksville Road
   Cleveland OH 44141, USA
   Tel.: 1 216 447-5000
   Fax: 1 216 447-5250

Storage

The products can be stored for at least 1 year at room temperature in the original sealed containers.

Luviskol VA 64 P can be stored for at least 2 years at room temperature in the original sealed containers.

Aqueous solutions of the VA grades with a pH value below 7 can tend to develop mould. This can be prevented by adding one of the preservatives commonly used in cosmetics, e.g. a hydroxybenzoate.

Toxicology

We have investigated the products and found no evidence of health hazards provided they are used in the recommended concentrations and fields of application. However, because of the wide range of possible applications, often in combination with other products, processors must conduct their own safety assessment on their products.

Safety Data Sheet

Safety Data Sheets are available for the Luviskol VA grades.

Note

„While the descriptions, designs, data and information contained herein are presented in good faith and believed to be accurate, it is provided for your guidance only. Because many factors may affect processing or application/use, we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use.
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September 2006

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