KLK OLEO

Excipients

Derived from **Nature**
Driven by **Innovation**

Hedjuvan
Swiss Made Excipients

Edition October 2024

KLK

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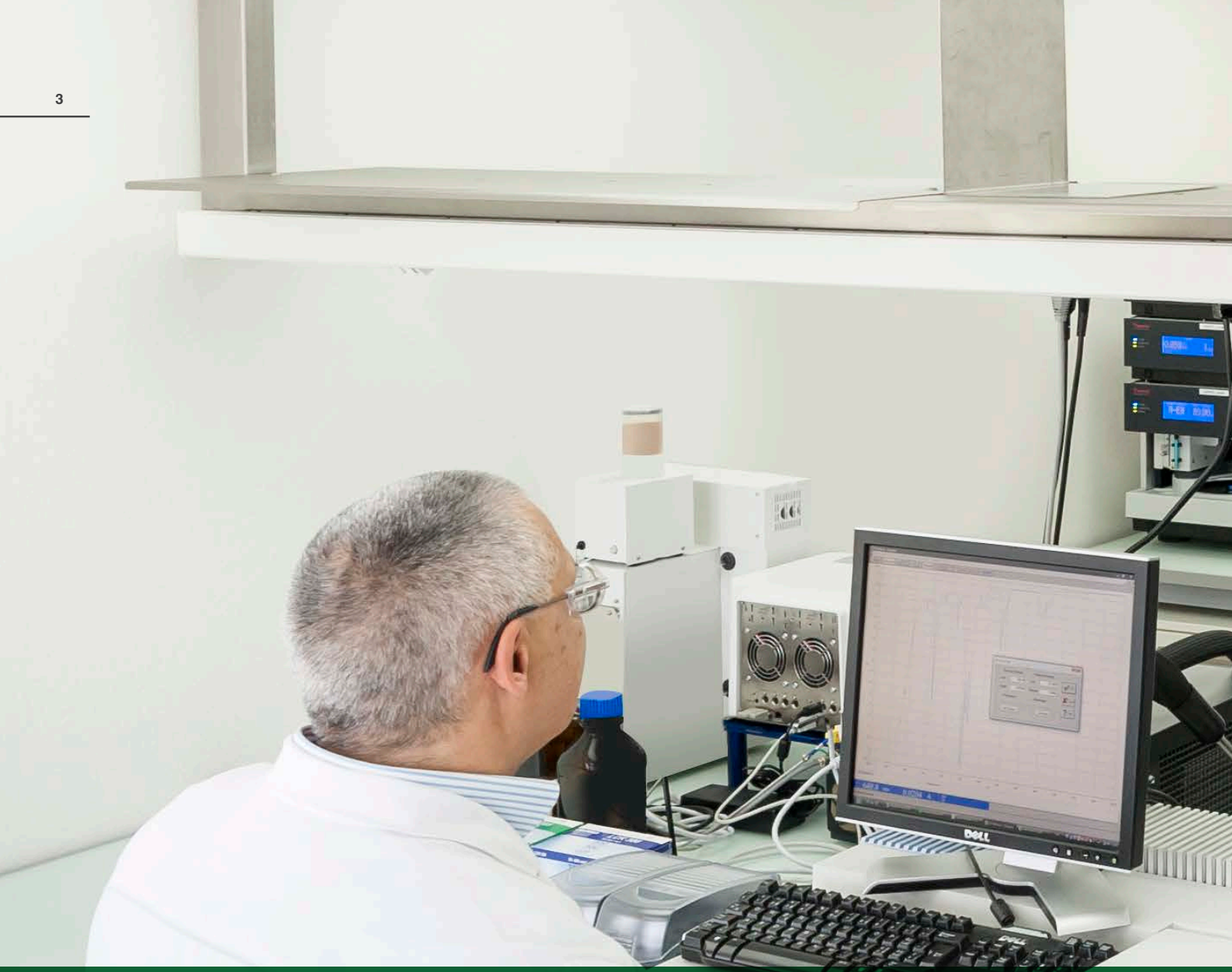


KLK Kolb Excipients – Hedjuvan

Our excipients, marketed under the Hedjuvan brand, are all produced at the Hedingen facility in Switzerland. These versatile excipients find extensive use in human, veterinary and biopharmaceutical industry. As surfactants, they play a crucial role in surface-to-surface interactions, including shear protection, solubilizing, and emulsifying. This makes them essential for maximizing the efficacy of active ingredients and optimizing the yield of biotechnical processes. As a result of this versatility, Hedjuvan excipients are utilized in nearly every dosage form, including tablets, capsules, syrups, ointments, injections, and more.

Functions

- Increase Drug Bioavailability
- Virus Deactivation in Blood Separation
- Shear Protection in Biopharma Application
- Viscosity Adjustment
- Emulsifier System
- and many more

Dosage Forms

Tablets & Capsules

Ointments

Suppositories

Syrups

Dental Gels

Solutions

Eye Drops

Injectables

and many more

More than 60 Years' Experience in Alkoxylation & Esterification

KLK Kolb boasts over 60 years of expertise in producing non-ionic surfactants, with a proven track record of quality and reliability.

Our polysorbates (ethoxylated sorbitan esters) and macrogols (polyethylene glycols) are integral to a wide range of applications and dosage forms. Sorbitan esters, used as excipients in the pharmaceutical industry, are also a key raw material for the production of polysorbates at our Hedingen facility in Switzerland. This unique capability underscores KLK Kolb's exceptional proficiency in manufacturing high-quality polysorbates and sorbitan esters for decades.

Adhering to industry standards, we maintain a well-trained workforce and robust processes and documentation, making us a dependable partner for your excipient supply chain.

Our Excipients are manufactured under GMP EXCiPACT since 2022. This reflects our mindset towards highest requirement for our (bio)pharmaceutical partners and ultimately the patients using our partners drugs.

Certifications, Membership and Award

ISO Certifications

The different ISO certifications are the foundation of the production standard at KLK Kolb. Most of the additional certifications are based upon the ISO certifications.

GMP EXCiPACT

KLK Kolb is GMP EXCiPACT certified and produces all excipients under the Hedjuvan brand in accordance to this standard

Ecovadis

In 2023 KLK Kolb earned a gold medalfor a successful assessment by Ecovadis. Only the top 5% participants are within this gold status. KLK Kolb is proud that the invested effort in supply chain and sustainability project is reflected in this excellent rating.

www.ecovadis.com

Free of Animal-Based Materials

To exclude any contamination with material of animal origin, the whole production site is free of animal-based raw materials and processing aids.

Kosher | Halal

All of the KLK Kolb pharmaceutical grade excipients are Kosher and Halal compliant products. Some of them are certified and for some of them statements are available.

Please contact us to learn more about the Kosher and Halal status of our products.

IPEC Europe Membership

Since 2018, KLK Kolb is an active member of IPEC-Europe and therefore we are in close exchange with other excipient producers, associations and authorities. This supports us to provide our customers also with the current and future hot issues of the pharmaceutical industry.

Sustainability - RSPO

KLK Kolb is a subsidiary of Kuala Lumpur Kepong Berhad (KLK), a prominent international plantation group headquartered in Malaysia. This affiliation ensures that KLK Kolb is back-integrated for most of the fatty acids used in the production of our sorbitan esters and polysorbates.

KLK was a founding member of the Roundtable on Sustainable Palm Oil (RSPO) in 2004 and played a significant role in developing a comprehensive Sustainability Policy in 2014. This policy, based on the RSPO's Principles and Criteria (P&C), emphasizes commitments to No Deforestation, No Peat, and No Exploitation (NDPE).

As a result, KLK Kolb offers all sorbitan esters and polysorbates in RSPO mass balance (MB) grade where applicable.

RSPO-1106058

Roundtable on Sustainable Palm Oil (RSPO)

Established in 2004, the RSPO is a global, non-profit, multi-stakeholder initiative dedicated to sustainable palm oil. It unites over 4,000 members worldwide, representing all segments of the palm oil supply chain. These members include growers like KLK, processors, traders, consumer goods manufacturers, retailers, financial institutions, and environmental and social non-governmental organizations from various countries involved in palm oil production and usage.

The RSPO's objective is to promote the growth and use of sustainable palm oil products through credible global standards and multi-stakeholder governance. It has developed a set of environmental and social criteria to achieve this goal.

The Palm Oil Supply Chain

Overview of
Hedjuvan
Swiss Made Excipients

Monograph Title	Product	Tested According to	Production Standard
POLYSORBATES			
Polysorbate 20	**Hedjuvan-PS20**	Ph. Eur. / USP / ChP	GMP EXCiPACT / IPEC GMP
Polysorbate 60	**Hedjuvan-PS60**	Ph. Eur.	GMP EXCiPACT / IPEC GMP
Polysorbate 80	**Hedjuvan-PS80**	Ph. Eur. / USP / ChP / JP	GMP EXCiPACT / IPEC GMP
MACROGOLS			
Macrogol 300	**Hedjuvan-MG300**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
Macrogol 400	**Hedjuvan-MG400**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
Macrogol 600	**Hedjuvan-MG600**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
Macrogol 1000	**Hedjuvan-MG1000**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
Macrogol 1500	**Hedjuvan-MG1500**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
Macrogol 3350	**Hedjuvan-MG3350**	Ph. Eur.	GMP EXCiPACT / IPEC GMP
Macrogol 4000	**Hedjuvan-MG4000**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
Macrogol 6000	**Hedjuvan-MG6000**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
SORBITAN ESTERS			
Sorbitan Monolaurate	**Hedjuvan-SE20**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
Sorbitan Monostearate	**Hedjuvan-SE60**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
Sorbitan Monooleate	**Hedjuvan-SE80**	Ph. Eur. / USP	GMP EXCiPACT / IPEC GMP
OTHERS			
Macrogol Laurylether	**Hedjuvan-PD9**	Ph. Eur.	GMP EXCiPACT / IPEC GMP

Our pharma portfolio is based on products where KLK Kolb has a longstanding experience. These products are supported by multi-compendial testing to meet international requirements. A variety of documents and pharma related support to enable approval and use of these products by our customers are available.

Overview of

KLK Emmerich Excipients for Pharmaceuticals

Made in Germany

Monograph Title	Product	Tested According to	Production Standard
GLYCERINE			
Glycerine / Glycerol	ENHEX G 99.8 PH	Ph. Eur. / USP / *	GMP EXCiPACT
	ENHEX G 86 PH	Ph. Eur.	GMP EXCiPACT
	ENHEX G 86 XPS	Ph. Eur. / *	GMP EXCiPACT

Monograph Title	Product	Ratio C8 / C10 (%)	Tested According to	Production Standard
MCT OILS (CAPRYLIC / CAPRIC TRIGLYCERIDE)				
Medium-Chain Triglycerides	ENHEX MCT 64	60 / 40	Ph. Eur. / *	GMP EXCiPACT
	ENHEX MCT 73*	70 / 30	Ph. Eur. / *	GMP EXCiPACT

* Currently implementing additional monographs. For further details, please contact us.

Our sister company KLK Emmerich GmbH offers a range of various grades of glycerine and medium-chain triglycerides which are manufactured in accordance to GMP EXCiPACT (GMP/GDP) certified process. For ENHEX G 99.8 PH a registration at NMPA (CDMF) is established. A registration at EDQM (CEP) is filed for ENHEX G 99.8 PH as well as ENHEX MCT 64.

Applications of
Sorbitan Esters

All sorbitan esters are produced using bio-based raw materials. These esters are extensively used as excipients for solubilization and emulsifying in drug products for both human and veterinary pharmaceuticals across various dosage forms.

KLK Kolb has a long-standing reputation for producing sorbitan esters for diverse markets. Thanks to consistent production parameters and reliable raw material sourcing, KLK Kolb ensures exceptional batch-to-batch consistency and possesses extensive expertise in the characterization of sorbitan esters.

Overview of possible functions and dosage forms

- ✓ Emulsifying agent in oral liquids
- ✓ Glident and/or anticaking agent in tablets and capsules
- ✓ Suspending and/or viscosity increasing agent for semisolids, topicals and suppositories
- ✓ Wetting and/or solubilizing agents

	Hedjuvan-SE20	Hedjuvan-SE60	Hedjuvan-SE80
Monograph Name	Sorbitan Monolaurate	Sorbitan Monostearate	Sorbitan Monostearate
Grade	Excipient	Excipient	Excipient
Production Standard	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP
CAS No.	1338-39-2	1338-41-6	1338-43-8
Form	Liquid	Solid / Pastilles	Liquid
Meets the specification of the Ph. Eur. Monograph	Yes	Yes	Yes
Meets the specification of the USP Monograph	Yes	Yes	Yes
Sustainability Notice	RSPO	RSPO	Palm oil free
Packaging	25 kg can 200 kg drum	25 kg bag	25 kg can 200 kg drum
Production Site	Switzerland	Switzerland	Switzerland

All Hedjuvan Sorbitan Esters are manufactured in Switzerland according to GMP-EXCiPACT.

Applications of
Polysorbates

Polysorbates are among the most widely used excipients for solubilization and emulsifying in drugs for both human and veterinary pharmaceuticals across various dosage forms.

KLK Kolb has an extensive track record in producing polysorbates for various markets, particularly the pharmaceutical sector. By manufacturing all intermediates and final products at our Swiss site in Hedingen, we ensure unique advantages, maintaining complete control over quality, storage, documentation, and audit trails. Consistent production parameters and reliable raw material sourcing result in outstanding batch-to-batch consistency.

Polysorbates are primarily bio-based from renewable sources, except for the ethylene oxide, which is of synthetic origin. All polysorbates are manufactured according to GMP EXCiPACT standards.

Added Value for Your Formulation by KLK Kolb Polysorbates

A well-established purification step results in a product with a significantly lower impurity profile (e.g., ethylene oxide, dioxane, peroxides, ash content), meeting the stringent requirements of related monographs. This is crucial for various drug product formulations, ensuring excellent product stability over its shelf life.

Additional Microbiological Testing

In addition to meeting monograph requirements, we determine the microbiological load for selected products in ever batch before release and show them on the CoA.

DEG/EG values on CoA

Currently, there are uncertainties due to potential contamination of excipients by DEG/EG. To provide our customers with assurance on this matter, the content of DEG/EG in each batch of Hedjuvan-PS20 and Hedjuvan-PS80 is specified on the certificate of analysis.

Registrations

Polysorbate 20 and Polysorbate 80 are registered with the Chinese authority (NMPA), and access to the related CDMF can be granted. Additionally, a CEP is available at the EDQM. We are happy to support you during your registration process by providing access to the necessary documents.

We would be happy to support you during your registration process by giving access to the related documents.

Overview of Possible Functions and Dosage Forms

- ✓ Emulsifying agent in oral liquids
- ✓ Lubricant in tablets and capsules
- ✓ Glident and/or anticaking agent in tablets and capsules
- ✓ Suspending and/or viscosity increasing agent for semisolids, topicals and suppositories
- ✓ Wetting and/or solubilizing agents
- ✓ Virus inactivation in blood treatment

	Hedjuvan-PS20	Hedjuvan-PS60	Hedjuvan-PS80
Monograph Name	Polysorbate 20	Polysorbate 60	Polysorbate 80
Grade	Excipient	Excipient	Excipient
Production Standard	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP
CAS No.	9005-64-5	9005-67-8	9005-65-6
Form	Liquid	Liquid	Liquid
Meets the Specifications of the Ph. Eur. Monograph	Yes	Yes	Yes
Meets the Specifications of the USP Monograph	Yes	-	Yes
Meets the Specifications of the ChP Monograph	Yes	-	Yes
Meets the Specifications of the JP Monograph	n.a.	n.a	Yes
TAMC	≤ 100 CFU/g	-	≤ 100 CFU/g
TYMC	≤ 10 CFU/g	-	≤ 10 CFU/g
Bacterial Endotoxins	≤ 12 IU/g	-	≤ 12 IU/g
CEP Available	In preparation	In preparation	R0-CEP 2020-048 – Rev 00
NMPA Registration (CDMF)	FA20230000060	In preparation	F20190000592
Sustainability Notice	RSPO	RSPO	Palm oil free
Packaging	1 kg bottle on request 5 kg can on request 25 kg can 200 kg drum 950 kg IBC	25 kg can 200 kg drum	1 kg bottle on request 5 kg can on request 25 kg can 200 kg drum 950 kg IBC
Production Site	Switzerland	Switzerland	Switzerland

All Hedjuvan Polysorbates are manufactured in Switzerland according to GMP-EXCiPACT.

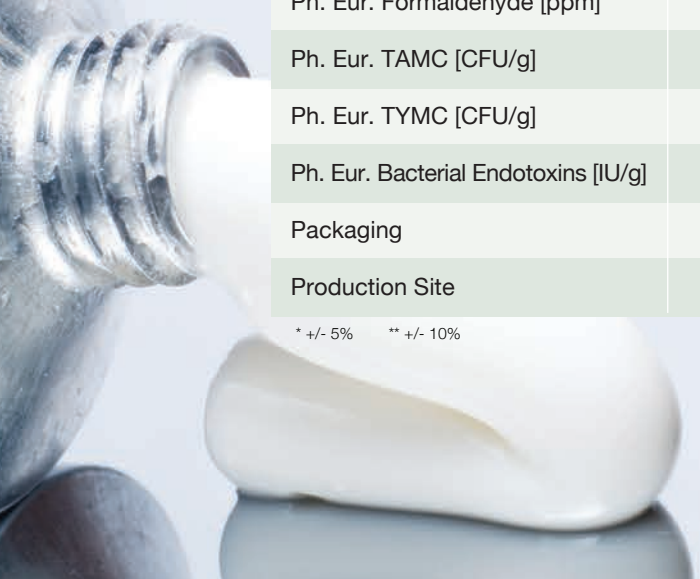
Applications of
Macrogols / Polyethylene Glycols

Macrogols / Polyethylene Glycols are the Swiss army knife of excipients, used for a multitude of applications and functions across a wide range of pharmaceutical formulations. Known as macrogols in the European and Chinese Pharmacopoeias and as polyethylene glycols in the United States Pharmacopoeia, we simplify by referring to them as macrogols.

To meet international market requirements, all macrogols are tested according to both the European Pharmacopoeia and the United States Pharmacopoeia (except for Macrogol 3350). For selected grades, additional microbiological testing, such as TAMC/TAMC and bacterial endotoxins as well as lower limits for Dioxane, is conducted on each batch.

	Hedjuvan-MG300	Hedjuvan-MG400	Hedjuvan-MG600
Chemical Description	Polyethylene Glycol	Polyethylene Glycol	Polyethylene Glycol
Monograph Name Ph. Eur.	Macrogol 300	Macrogol 400	Macrogol 600
Monograph Name USP	Polyethylene Gylcol 300	Polyethylene Gylcol 400	Polyethylene Gylcol 600
INCI Nomenclature	PEG-6	PEG-8	PEG-12
Grade	Excipient	Excipient	Excipient
CAS No.	25322-68-3	25322-68-3	25322-68-3
Production Standard	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP
Appearance	Liquid	Liquid	Liquid
Average Molecular Weight [g/mol]	300*	400*	600*
Meets the Specification of the Ph. Eur. Monograph	Yes	Yes	Yes
Meets the Specification of the USP Monograph	Yes	Yes	Yes
Ph. Eur. Formaldehyde [ppm]	≤ 15	≤ 15	≤ 15
Ph. Eur. TAMC [CFU/g]	-	≤ 100	-
Ph. Eur. TYMC [CFU/g]	-	≤ 10	-
Ph. Eur. Bacterial Endotoxins [IU/g]	-	≤ 12	-
Packaging	25kg can 200kg drum	25kg can 200kg drum	25kg can 200kg drum
Production Site	Switzerland	Switzerland	Switzerland

* +/- 5% ** +/- 10%



All Macrogols are manufactured in Switzerland according to GMP-EXCiPACT.

Macrogols as Excipient in

Oral Dosage Forms
Low molecular weight macrogols are excellent solvents, making them ideal for use in oral dosage forms such as syrups and drops. In tablet formulations, macrogols serve different roles, acting as binders and lubricants during the tableting process. Additionally, certain types of macrogols are used as coatings and/or anticaking agents, with the amount used depending on the specific function required.

Topical Applications
Macrogols are commonly used as ointment bases for creams and also function as solvents in these formulations.

Ophthalmic Applications
Macrogol is a widely used lubricant in eye drops.

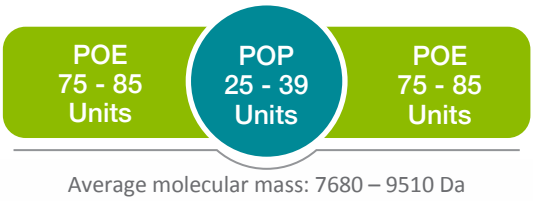
Injectables
In many injectable liquids, such as vaccines, macrogols are employed as solvents and solubilizers.

Suppositories
Beyond their use as binders and lubricants in tablet processing, macrogols are also a primary base material for suppositories.

Hedjuvan-MG1000	Hedjuvan-MG1500	Hedjuvan-MG3350	Hedjuvan-MG4000	Hedjuvan-MG6000
Polyethylene Glycol	Polyethylene Glycol	Polyethylene Glycol	Polyethylene Glycol	Polyethylene Glycol
Macrogol 1000	Macrogol 1500	Macrogol 3350	Macrogol 4000	Macrogol 6000
Polyethylene Gylcol 1000	Polyethylene Gylcol 1500	Polyethylene Gylcol 3350	Polyethylene Gylcol 4000	Polyethylene Gylcol 6000
PEG-20	PEG-32	PEG-75	PEG-90	PEG-150
Excipient	Excipient	Excipient	Excipient	Excipient
25322-68-3	25322-68-3	25322-68-3	25322-68-3	25322-68-3
GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP	GMP EXCiPACT / IPEC GMP
Solid	Solid / pastilles	Solid / pastilles	Solid / pastilles	Solid / pastilles
1000**	1500**	3350**	4000**	6000**
Yes	Yes	Yes	Yes	Yes
Yes	Yes	No	Yes	Yes
≤ 15	≤ 15	≤ 15	≤ 15	≤ 15
-	-	≤ 100	≤ 100	-
-	-	≤ 10	≤ 10	-
-	-	≤ 12	≤ 12	-
25kg can 200kg drum	25kg bag	25kg bag	25kg bag	25kg bag
Switzerland	Switzerland	Switzerland	Switzerland	Switzerland

Applications of
Poloxamer 188

Poloxamers are synthetic block copolymers of ethylene oxide and propylene oxide, with polyoxypropylene as the central core, flanked by polyoxyethylene on both sides.



Leveraging extensive experience in alkoxylation, KLK Kolb ensures exceptional batch-to-batch consistency, which is crucial for biopharma manufacturers. Within the specifications of Poloxamer 188, product capabilities can vary significantly depending on the application. Therefore, KLK Kolb offers various grades of Poloxamer 188, allowing you to select the one that perfectly suits your needs.

To get access to our Poloxamer 188, please ask as to introduce you to our exclusive distribution partner for this product. This partnership combines KLK Kolb's manufacturing excellence with a deep understanding of the market and applications of Poloxamer 188, providing a unique advantage for our customers.

Pharmacopoeia	Parameter	Specification
Ph. Eur.	Appearance	White to almost white solid
Ph. Eur.	Form	Granules
Ph. Eur. / USP	Average molecular mass	7680 – 9510 g/mol
Ph. Eur. / USP	Content of oxyethylene	79.9 – 83.7 %
USP	Unsaturation	≤ 0.034 mEq/g
Ph. Eur.	pH (10g/100ml)	5.0 – 7.5
USP	pH (25g/100ml)	5.0 – 7.5
Ph. Eur. / USP	Free ethylene oxide	≤ 1ppm
Ph. Eur. / USP	Free propylene oxide	≤ 5ppm
Ph. Eur. / USP	Free dioxane	≤ 10ppm
Ph. Eur.	Water content	≤ 1.0 %
Ph. Eur.	Total ash	≤ 0.4 %
Ph. Eur.	TAMC	≤ 100 KBE/g
Ph. Eur.	TYMC	≤ 10 KBE/g
Ph. Eur.	Endotoxins	Conform

Applications of
Macrogol Lauryl Ether (Polidocanol)

Macrogol Lauryl Ether serves as an emulsifier and solubilizer in pharmaceutical products, primarily in creams and lotions. Various types of Macrogol Lauryl Ethers are described in monographs, with the most common being Macrogol Lauryl Ether with an ethoxylation grade of 9 mol. This type is also known as Polidocanol or Lauromacrogol 400 when used as an active ingredient. Polidocanol is mainly utilized in ointments for itching relief and as a local anesthetic.

In addition to its use as an excipient and active drug substance, Polidocanol is also an ingredient in diagnostic reagents. Currently, KLK Kolb does not offer the API grade.

	Hedjuvan-PD9
Chemical name	Polyethylene glycol monolauryl ether (9EO)
Ph.Eur.	Macrogol Lauryl Ether
Chemical formula	$C_{30}H_{62}O_{10}$
INCI	Laureth-9
CAS No.	9002-92-0
Production Standard	GMP EXCiPACT / IPEC GMP
Molecular weight [g/mol]	Approx. 583
Density [g/cm^3]	Approx. 0.98 (at 25 °C)
Appereance / Form	White pasty mass
Melting point [°C]	Approx. 20 °C
Pharmacopoeial compliance	Current Ph.Eur. at time of production

Hedjuvan-PD9 is manufactured in Switzerland according to GMP-EXCiPACT.

Overview of Possible Functions and Dosage Forms

- ✓ Emulsifying agent in oral liquids
- ✓ Wetting and/or solubilizing agents in oral liquids
- ✓ Others

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