

SOFW

JOURNAL

8-2010

English Edition

International Journal for Applied Science
• Personal Care • Detergents • Specialties

M. Leschke

Ethylhexylglycerin
for a Improved
Skin Feel



M. Leschke*

Ethylhexylglycerin for a Improved Skin Feel

■ Introduction

Nowadays more and more new cosmetic products with many different claims such as anti-aging, moisturising, repairing etc. are launched in the cosmetic market. Consumers are swamped with new concepts to look younger, to prevent or remove wrinkles, to look shiny and healthy. But it is not only new sophisticated concepts making cosmetic products successful. The best new technology can fail if the tactile properties of a cosmetic product are not acceptable. Sensory attributes, such as spreading, tackiness, greasiness or absorption, play an important role in formulating cosmetics. Only a combination of optimal sensory properties combined with functionality will result in an excellent product. Emollient properties and rheology are obviously important formulation parameters for skin application. As these cannot be measured by any test method, expert panels are necessary to evaluate them in sensory assessment tests.

Some actives used in cosmetic formulations can negatively influence sensory attributes. Glycerine used in high amounts is known to impair the tactile properties of cosmetic formulations while on the other hand having very good moisturising properties.

Emollients in a balanced combination can help to improve the tactile properties of cosmetic emulsions. Beside their emollient character, some ingredients meet many other demands in cosmetic formulations. Some multifunctional cosmetic additives can be used as moisturiser or solubiliser. Several of them show certain antimicrobial efficacy or

can improve the efficacy of traditional preservative actives.

■ Ethylhexylglycerin

Ethylhexylglycerin is a globally approved, versatile and multifunctional additive (1, 2), as well as a very effective deodorant active (3, 4).

As an emollient and mild humectant, it improves the skin feel of cosmetic formulations. It reliably inhibits the growth and multiplication of odour-causing bacteria, while at the same time not affecting the beneficial skin flora. Additionally,

it can boost the efficacy of traditional preservatives (5, 6) and act as an antimicrobial stabiliser in combination with other cosmetic ingredients.

Ethylhexylglycerin is a representative of the 1-alkyl glycerine ethers. It is a high purity, colourless and almost odourless liquid; with excellent properties for use in cosmetic formulations.

Ethylhexylglycerin was introduced to the cosmetic market as a commercial product (sensiva® SC 50) in the year 1992 as a skin care additive and deodorant active. As a new substance it is listed on the ELINCS file.

Abstract

Beside all other claims e.g. anti-aging, moisturising, repairing etc. the overall skin feel and the sensory properties of a cosmetic product are the key factors influencing the decision of consumers in buying cosmetic products. Without acceptable tactile properties the greatest new technology in anti-aging can fail to please the customer.

However, many actives used in cosmetic formulations can negatively influence sensory attributes e.g. tackiness, greasiness, absorption etc.

A sensory assessment test has proven the multifunctional skin care additive ethylhexylglycerin to compensate for some of these well-known disadvantages, while on the other hand it meets many of the other demands of cosmetic formulations.

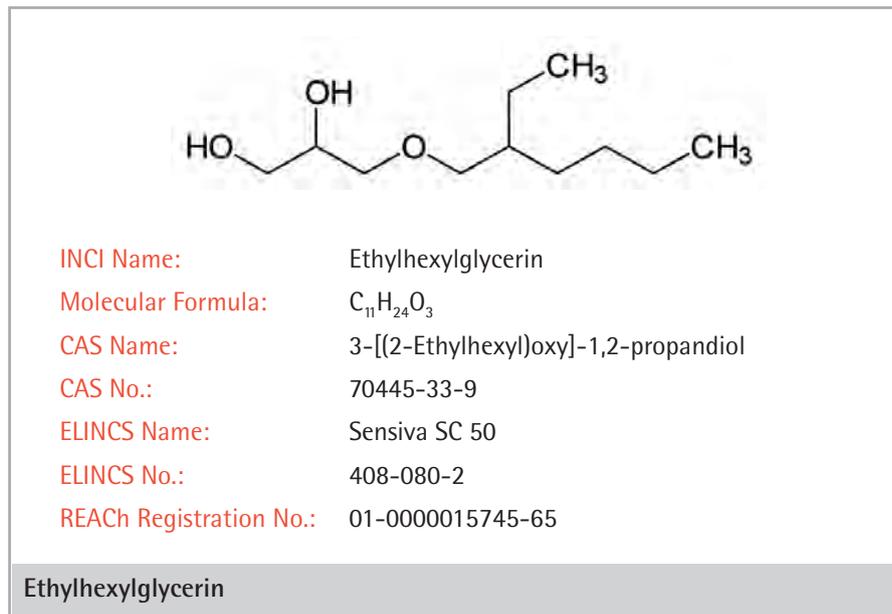
ETHYLHEXYLGLYCERIN

■ Skin Care Properties

The selection of emollients is critical to the character of a cosmetic product. High contents of fast spreading emollients lead to light creams with a smooth skin feel. High contents of slow spreading emollients are used in rich creams with refatting properties. Medium spreading emollients close the gap between fast and slow spreading emollients, improving the refatting properties and extending the smooth skin feel of cosmetic formulations. One or two emollients are not sufficient to achieve a long lasting soft and smooth skin feel. That is why a combination of fast, medium and slow spreading emollients is necessary. This concept is the so called »spreading cascade«, developed by Henkel (7).

Ethylhexylglycerin is a medium spreading emollient with a spreading coefficient of about 700 mm²/10 min). (The spreading coefficient has been determined by Cognis GmbH & Co. KG, Düsseldorf, Germany). The spreading properties are similar to those of dodecyl oleate, hexyldecanol or cetearyl isononanoate. It helps to improve the skin feel by closing the gap between fast and slow spreading emollients.

Moisturising properties also play an important role in determining the overall aesthetics of an emulsion. The most frequently used moisturiser in cosmetic formulations is glycerine. However, higher use concentrations of glycerine may lead to some disadvantages in skin feel of cosmetic formulations, such as slow penetration, tackiness or soaping (whitening during application). Ethylhexylglycerin can



compensate for some well-known disadvantages of glycerine containing cosmetic products. This has been tested in a sensory assessment test, carried out at proDerm Institut für Angewandte Dermatologische Forschung, Hamburg, Germany, which has been performed on a glycerine-containing oil-in-water emulsion (Table 1).

The sensory assessment test has been carried out on twenty trained subjects using the test material on the inner forearm on a 3x3 cm test area according to the described conditions.

Different aspects such as tackiness, penetration, greasiness, soaping or the overall impression have been evaluated by a ranking of 0 - 10.

The test results are summarised in the diagrams 1 - 5 (Fig. 1).

The sizes of the balls correspond to the number of subjects at each rating point. The results that follow show that ethylhexylglycerin is able to reduce the tackiness and increase the speed of absorption of glycerine-containing emulsions significantly (p < 0.05). In addition, ethylhexylglycerin is shown to reduce the greasiness and soaping and improve the overall impression of those formulations. Due to its surfactant-like molecular structure, ethylhexylglycerin can have an influence on stability and/or viscosity of some emulsions by affect the hydrophilic-lipophilic-balance (HLB) of those systems. The HLB value of ethylhexyl-

	INCI Name	Trade Name	Cream A	Cream B
Phase A	Arachidyl alcohol, behenyl alcohol, arachidyl glucoside	Montanov 202	5.0	5.0
	Cetearyl ethylhexanoate	Lanol 1688	20.0	20.0
	Ethylhexylglycerin	sensiva® SC 50	-	1.0
Phase B	Polyacrylate 13, polyisobutene, polysorbate 20	Sepiplus 400	0.2	0.2
Phase C	Aqua		ad 100	ad 100
	Glycerin	Glycerin 85 %	9.4	9.4
Phase D	Phenoxyethanol, Ethylhexylglycerin	euxyl® PE 9010	1.0	1.0

Table 1 Glycerine-containing oil-in-water emulsion used for the sensory assessment test

ETHYLHEXYLGLYCERIN

glycerin has been calculated to approximately 7.5. This is relatively high for the use in water-in-oil emulsions and relatively low for the use in oil-in-water emulsions. Thus it can influence a given emulsifier system in the opposite direction.

To counteract this influence the HLB value of the whole system has to be adapted by changing the emulsifier system, increasing the main emulsifier or using HLB independent emulsifier.

■ **Booster for Preservative Actives and Antimicrobials**

Recent discussions about traditional preservative actives has increased interest in reducing the amount of traditional preservatives in cosmetic formulations or in finding novel ways to keep cosmetic products microbiologically stable. It is now more important than ever that preservation or microbiological stability is part of new formulation concepts. At an early stage of product development formulators must consider all possible methods of enhancing the efficacy of traditional preservative actives, as well as various methods of preventing microorganisms from growing e.g. modifying the pH value or water activity of a formulation, using chelating agents or multifunctional materials, as well as looking for suitable packaging (8).

As described earlier, ethylhexylglycerin is a medium spreading emollient. The emolliency character is based on its surface activity due to its surfactant-like structure. Due to this surface activity ethylhexylglycerin affects the interfacial tension at the cell membrane of microorganisms allowing some active ingredients, such as antimicrobials and preservative actives, to penetrate more effectively.

Ethylhexylglycerin can enhance the efficacy of preservative actives, such as phenoxyethanol, methylisothiazolinone or methylparaben, so that lower levels of these materials can be used. The combination of ethylhexylglycerin with phenoxyethanol is well-described in literature (5, 6). It is protected by patent and commercially available under the trade name euxyl® PE 9010. The combination

Test Panel	20
Sex	female
Age	> 18
Application area	volar forearm, 3x3 cm area for each test product
Application volume	one fingertip
Application mode	Test materials were applied by the volunteers themselves and rubbed in for 2 minutes each.

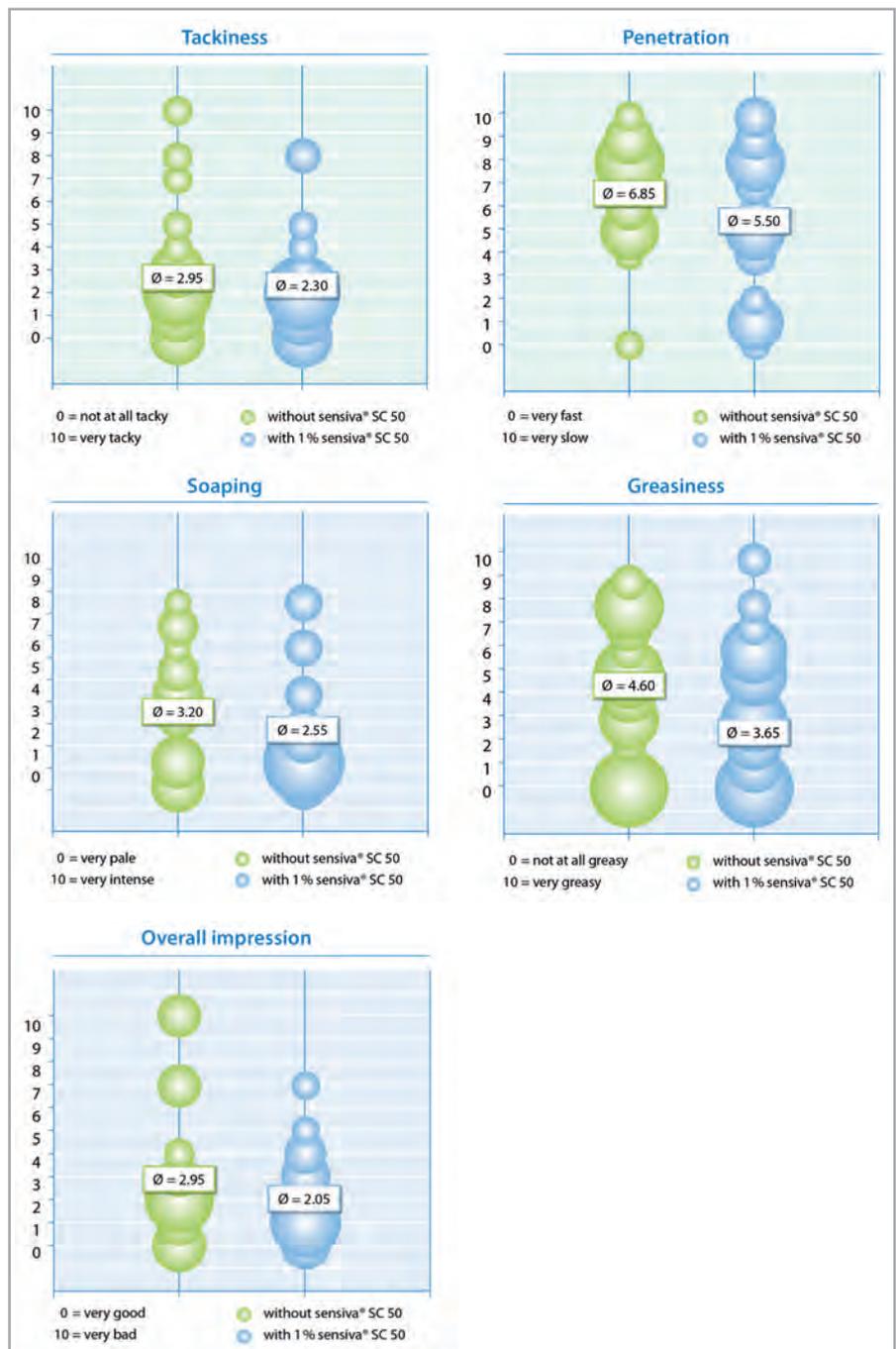


Fig. 1 Ethylhexylglycerin can compensate some well-known disadvantages of glycerine-containing emulsions

with methylisothiazolinone is also protected by patent and supplied in the market as euxyl® K 220.

Some multifunctional additives used in cosmetic products such as glycols, fatty esters or fragrances beside their primary function, display a certain antimicrobial efficacy.

Glycols used at certain levels are known to be antimicrobial. The longer the chain length of a glycol, the lower is the level necessary to prevent micro-organisms from growing. The limitation is the water solubility, as the water solubility decreases with increasing chain length (8). Ethylhexylglycerin can not only enhance the efficacy of traditional preservative actives but also improve the antimicrobial efficacy of glycols, such as pentylene glycol or caprylyl glycol. The combination of ethylhexylglycerin with caprylyl glycol is available as sensiva® SC 10.

■ Conclusion

Ethylhexylglycerin is a multifunctional skin care additive meeting various requirements of cosmetic formulations. Due to its emollient character it can compensate for some disadvantages of glycerine-containing emulsions, improving the overall skin feel of those formulations. In addition, it can boost the efficacy of traditional cosmetic preservatives, such as parabens or phenoxyethanol, thus minimising the preservative load. In combination with cosmetic glycols it offers new options for keeping cosmetic products microbiologically stable.

Literature

- (1) *H. Eggensperger*, Multiaktive Wirkstoffe für Kosmetika, Verlag für chemische Industrie H. Ziolkowsky GmbH Augsburg, 1995, 141-159
- (2) *W. Beilfuß, W. Siegert*, *Cosma*, 2003, 6, 54 – 55
- (3) *W. Beilfuß*, *SÖFW Journal*, 1998, 6, 360 – 366 (German)
- (4) *H. M. Fishman*, *Happi*, 2005, Vol. 42, No. 2, part 1 of 2, 35
- (5) *W. Beilfuß, K. Weber, M. Leschke*, *SÖFW-Journal*, 2005, 11, 30 – 36 (English)
- (6) *M. Leschke, S. Wüstermann*, *SÖFW-Journal*, 2006, 4, 78 – 82 (English)
- (7) *B. Salka*, Choosing emollients, *Cosm. Toil.*, 1997, 112, 10, 101 – 106
- (8) *D. C. Steinberg*, *Preservatives for Cosmetics*, 2nd Edition, Allured Publishing Corporation, 2006

* Author's address:

Dr. Marion Leschke
Schülke & Mayr GmbH
Robert-Koch-Strasse 2
22851 Norderstedt
Germany

Email: marion.leschke@schuelke.com