INFORMATION
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LAMESOFT® PO 65
a naturally based care additive with polyfunctional properties

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It is no longer sufficient for modern cosmetic body-cleansing preparations such as shower gels, bubble baths, baby products and shampoos only to exhibit good washing and cleansing properties; special care effects are increasingly in demand.
This is largely attributable to our changed attitudes towards personal hygiene; the once accepted weekly bath day has long been displaced by daily showers and frequent hair washing. As a consequence it is more important than ever to incorporate mild surfactant systems in formulations for frequently used modern body-cleansing preparations. Washing does more than just cleanse the skin, it also removes its fats. The inclusion of lipid layer enhancing additives can prevent undesirable defatting and drying-out of the skin.

LAMESOFT® PO 65 is a modern care additive which can perform this function and also exhibits other practical properties. LAMESOFT® PO 65 is a cold-processable composite of alkyl polyglycoside and fatty acid monoglyceride, and is a suitable lipid layer enhancer for the manufacture of clear and pearlescent body cleansing products. Moreover it has a positive effect on key performance characteristics of shampoo formulations, such as hair conditioning and gloss.

LAMESOFT® PO 65

Composition:	Coco Glucoside	Dispersant, hair structurizer
	Glyceryl Oleate	lipid layer enhancer, hair conditioner
Total solids:	65 - 70%	
Properties:	• Based on vegetable raw materials (coconut oil, palm kernel oil, sunflower oil, maize)	
	• Contains no ethylene oxide or nitrogen	
	• No added preservatives	
	• Cold-processable	
	• Can be incorporated in clear and pearlescent formulations	
	• Viscosity-increasing properties in surfactant systems	
	• Contains alkyl polyglycoside ⇒ contributes to WAS	
	• Biodegradable (individual components to OECD 301 A-F)	
	• Mild to skin with care effect	

Lipid layer enhancer

Besides the epidermis, dermis and subcutaneous layer, the skin consists of appendages such as the sebaceous glands, which are closely connected with the hair follicles. The skin lipid formed here consist of about 16% free fatty acids, the main one of which is oleic acid, and about 40% glycerols. It is therefore a logical approach to use lipids related to those found naturally in the skin to counteract the defatting and drying effects caused by cleansing with surfactants. Such a lipid is oleic acid monoglyceride.

Washing studies were carried out on volunteers to determine whether surfactant preparations containing LAMESOFT® PO 65 can cause detectable lipid layer enhancement. The studies were carried out with the following formulations. The surface of the skin was analyzed to determine whether lipid layer enhancement had occurred:

Test formulations (WAS 10%):

A: 30% TEXAPON® NSO,
3% PLANTACARE® 818 UP
to 100% NaCl, preservative, water

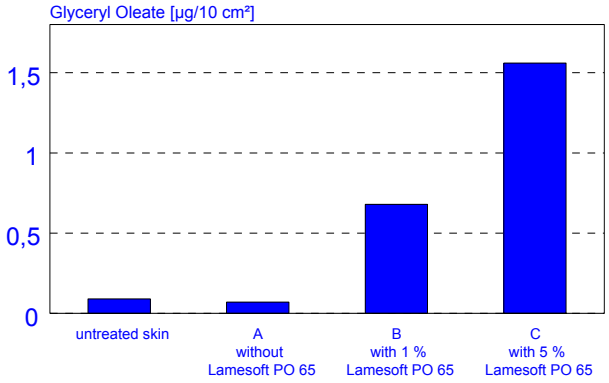
B: 34% TEXAPON® NSO,
1% LAMESOFT® PO 65,
to 100% NaCl, preservative, water

C: 30% TEXAPON® NSO,
5% LAMESOFT® PO 65,
to 100% NaCl, preservative, water

Test procedure:

1. Wash fore arm for 15 s with 1 ml test formulation
2. Rinse with water
3. Dry the skin
4. Extract lipids with ethanol-impregnated pads
5. Quantitative analysis of Glyceryl Oleate

Fig. 1: Lipid layer enhancement / analytical evaluation LAMESOFT® PO 65 (Glyceryl Oleate)



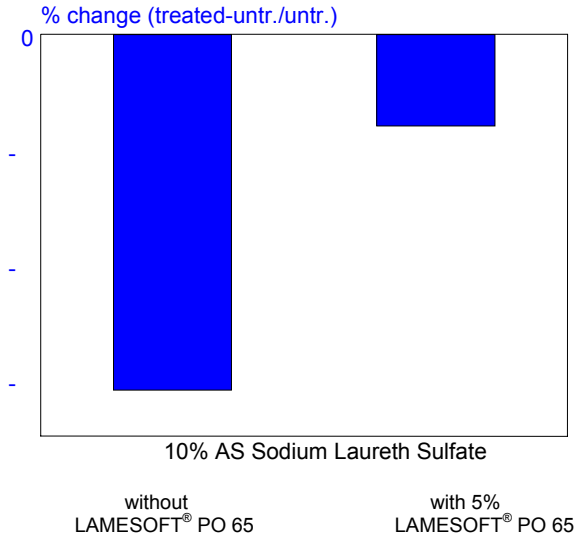
Results:

1. Glyceryl Oleate was also detected in untreated skin.
2. The incorporation of just 1% LAMESOFT® PO 65 to surfactant formulations results in a significant increase in the Glyceryl Oleate content of the skin surface. The lipid layer enhancing effect can be increased by increasing the LAMESOFT® PO 65 content.
3. The lipid layer enhancing component of LAMESOFT® PO 65 can be claimed to be a nature-identical lipid.

The influence of LAMESOFT® PO 65 on the softness of the skin was studied under *in vitro* conditions. The epidermis was washed with surfactant solutions with and without added LAMESOFT® PO 65 and the decrease in the softness of the skin (difference between treated and untreated skin) was determined by applying a torque as the influencing factor.

Fig.2: Influence of LAMESOFT® PO 65 on the softness of the skin

Method: *in vitro* torsion measurement/ angle of twist



Treating the surface of the skin with a surfactant solution containing no added LAMESOFT® PO 65 reduces the softness of the skin. The lipids in the upper layers of the skin are washed out during the cleansing process. As a consequence the reduced "lubricant effect" in the epidermis causes hardening.

Under the above-mentioned *in vitro* conditions, the addition of 5% LAMESOFT® PO 65 to the surfactant solution brought about a significant reduction of this undesirable effect.

Moisturizing effects

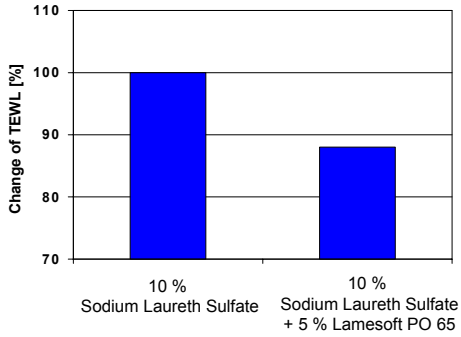
The affinity of Glyceryl Oleate for the surface of the skin justifies the conclusion that transepidermal water loss (TEWL) can be favorably influenced.

To confirm this, the water-permeability and moisture loss of the skin were measured after treatment with surfactant solutions with and without 5% added LAMESOFT® PO 65 under *in vitro* conditions.

As can be seen from the following diagram, the addition of LAMESOFT® PO 65 reduces the rate of water loss from the skin.

Fig. 3: Moisturizing effects of LAMESOFT® PO 65

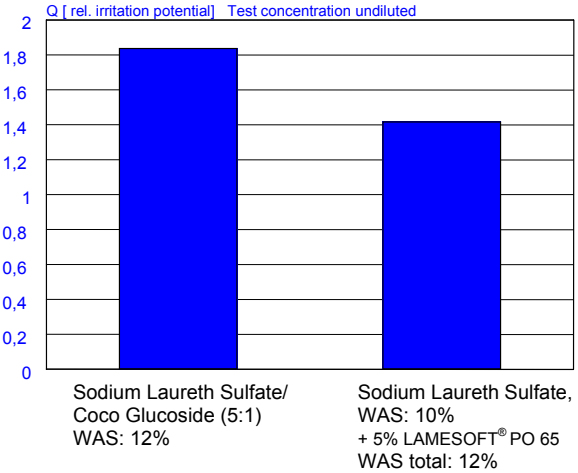
Method: Determination of transdermal water loss (TEWL) under in vitro conditions



Mildness concept

The good compatibility of cosmetic ingredients is a key condition for the formulation of modern body cleansing preparations. The addition of LAMESOFT® PO 65 improves the compatibility of surfactant systems.

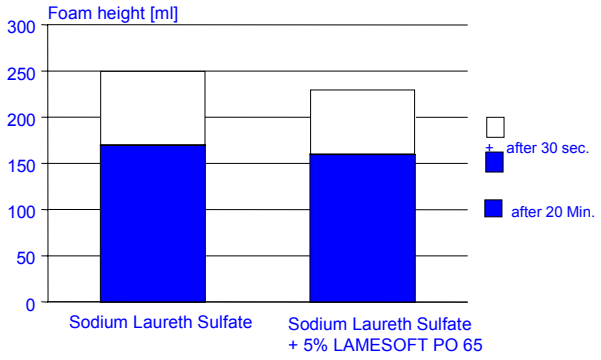
Fig. 4: *in vitro* mucous membrane compatibility (HET-CAM)



Foaming properties

The addition of lipids to surfactant-based cleansing preparations should have as little effect as possible on the foaming properties of the surfactants.

Fig. 5: Foaming properties
Whipped foam method (DIN 53902)
Concentration 10 g/l
15° dh = 2.7 mmol Ca^{2+}
0.1 g/l sebum



The results obtained under these diluted test conditions show comparable foam generation. The addition of 5% LAMESOFT® PO 65 to the surfactant system results in a creamier foam structure.

Perforated disk test

Whereas the whipped foam method enables conclusions to be drawn about the foam volumes of diluted surfactant systems, the perforated disk method answers questions that are more closely related to actual practice.

A perforated disk is rotated, generating foam from a dilute surfactant preparation at constant temperature. This method closely reflects what happens during showering (foaming up a shower product on wet skin). The rate of foam formation (ml foam/s) is continuously monitored. After 3 minutes the volume of foam is read off. The foaming properties of the system are assessed over the first 60 s of the test period.

The following formulations were studied under perforated disk test conditions:

	A	**(WAS)**	**B**	**(WAS)**
Texapon NSO Sodium Laureth Sulfate	37.0%	(10.0%)	37.0%	(10.0%)
Dehyton K Cocamidopropyl-betaine	10.0%	(3.0%)	6.7%	(2.0%)
Lamesoft PO 65 Coco Glucoside (and) Glyceryl Oleate	-	-	3.0%	(1.0%)
Water	53.0%		53.3%	
Total WAS		13.0%		13.0%

Test conditions:

Concentration 20 g/l test substance, water hardness 2.7 mmol Ca^{2+} /l (= 15 °dH), water temperature 40°C, sebum 0.1 g/l

Results:

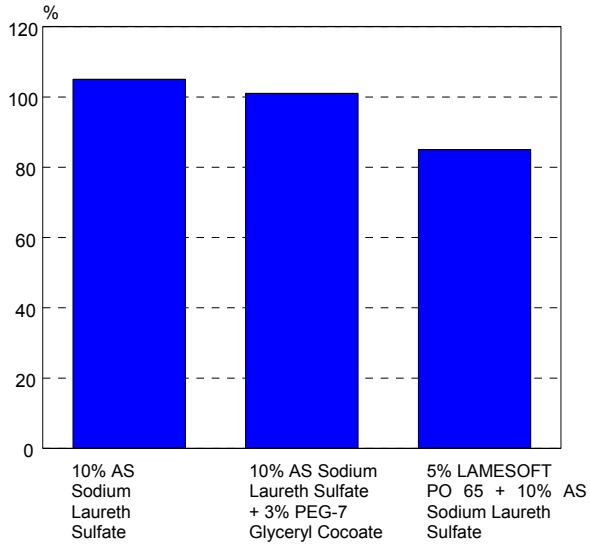
1. Formulation B was derived from formulation A by reducing the WAS contribution of DEHYTON® K and

introducing a WAS contribution from LAMESOFT® PO 65. Both formulations have a surfactant WAS content of 13%.
2. Under these conditions the addition of LAMESOFT® PO 65 had no significant effect on foaming properties. During the foaming-up phase the foam formed by the test formulation with LAMESOFT® PO 65 was rated as having a finer and creamier bubble structure.
3. This result confirms that surfactant WAS in the form of LAMESOFT® PO 65 can be actively incorporated in the formulation without having a negative effect on the key consumer criterion "foam properties."

Hair conditioning/ wet combability improvement

Not only can LAMESOFT® PO 65 be employed as an effective lipid layer enhancing component in surfactant skin cleansing preparations but it also exhibits characteristics that can be exploited to improve hair shampoo formulations.

Fig. 6: Wet combability



The hair tress model was used to study the influence of LAMESOFT® PO 65 in comparison to a standard refatter in a surfactant system.

As Fig. 6 shows, LAMESOFT® PO 65 improves the combability of wet hair, whereas the standard refatter had no effect. The positive influence of LAMESOFT® PO 65 can be explained, by analogy with the demonstrated effects on the skin, in terms of substantivity to the hair surface.

Improved hair surface gloss

One of the major demands made on a formulation is that it should improve hair gloss. Consumers associate glossy hair with beautiful and healthy hair. The desired effects can also be achieved by the addition of, for example, silicone oil derivatives and cationic polymers.

LAMESOFT® PO 65 can also be included in formulations for the purpose of improving hair gloss.

The following test model was developed to enable hair gloss to be quantified.

Test procedure:

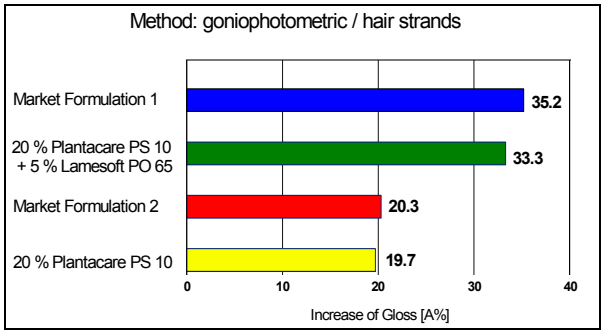
Hair: European natural hair tresses

1. Wash the hair tresses with Sodium Laureth Sulfate (14% AS, pH 6.5, duration 15 min)
2. Rinse with tap water
3. Treat with 1% curd soap (temp. 45°C, duration 20 min)
4. Rinse with demineralized water
5. Dry the hair tresses
6. Measure the gloss (light reflected from the surface of the hair)
7. Treat with 2 g test product/ hair tress (5 min exposure time)
8. Rinse with tap water
9. Dry the hair tresses
10. Measure the gloss (light reflected from) the treated hair tresses

Test products:

A = Market product 1 (contains silicone oil)
B = 20% PLANTACARE® PS 10 + 5% LAMESOFT® PO 65
C = Market product 2 (contains silicone oil)
D = 20% PLANTACARE® PS 10

Fig. 7: Surface gloss of European hair



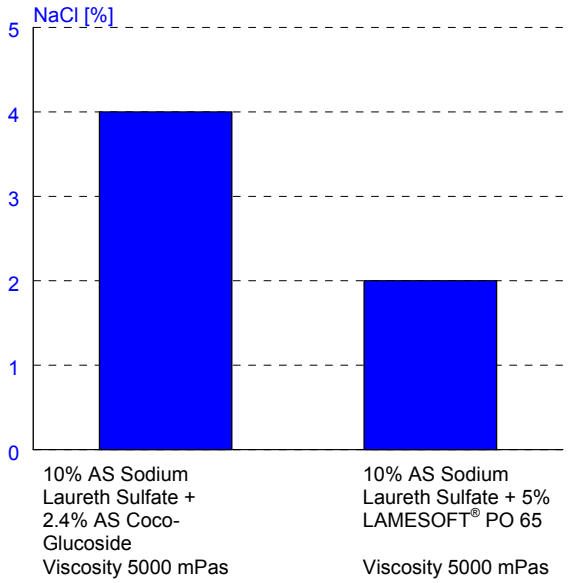
Market formulations 1 and 2 are leading silicone-containing shampoo products. The addition of 20% PLANTACARE® PS 10 imparts a gloss equal to that achieved with market formulation 2. Adding 5% LAMESOFT® PO 65 significantly increased the hair's gloss to the level of market formulation 1.

Thickening properties

LAMESOFT® PO 65 acts as a viscosity-enhancer in surfactant systems.

As the following diagram shows, the addition of 5% LAMESOFT® PO 65 to a surfactant system consisting of NaLES/Coco Glucoside reduces by 50% the amount of common salt that is necessary to achieve a viscosity of 5000 mPas. Both systems were adjusted to the same WAS content, taking into account the surfactant content of the LAMESOFT® PO 65.

Fig. 8: Thickening properties with NaCl



More WAS

The main components of LAMESOFT® PO 65 are the lipid layer enhancer, Glyceryl Oleate, and Coco Glycoside. Depending on the amount of LAMESOFT® PO 65 used, the alkyl polyglycoside component can significantly increase the surfactant content of the final product, as can be seen from the following model formulation.

			Surfactant WAS
1.	TEXAPON® N 70 Sodium Laureth Sulfate	11.5%	8.0%
	DEHYTON® PK45 Cocamidopropyl Betaine	10.0%	4.0%
	Conventional lipid layer enhancing component	3 - 5%	
			12%

2.	TEXAPON® N 70 Sodium Laureth Sulfate	11.5%	8.0%
	DEHYTON® PK 45 Cocamidopropyl Betaine	5.8%	2.3%
	LAMESOFT® PO 65 Coco Glucoside	5.0%	1.7%
			12%

The incorporation of 5% LAMESOFT® PO 65, with the dermatologically valuable Coco Glucoside, increases the proportion of surfactant WAS by 1.7%. This means that the amounts of primary and secondary surfactants in the formulation can be reduced. This has a positive effect on the cost structure of the formulation.

Storage and processing information

LAMESOFT® PO 65 is a highly concentrated lipid layer enhancing compound. It is supplied as a water-white to light yellow paste, which is pumpable and can be cold processed at temperatures above 15°C.

The following information on the storage and processing of LAMESOFT® PO 65 facilitates its simple handling and incorporation into surfactant concepts under practical conditions.

Storage:

LAMESOFT® PO 65 should preferably be stored at temperatures between +15 and 30°C. Crystallization may occur at temperatures below 10°C. This property is typical for the product. The effect can be reversed by heating the product to + 30 to 35°C while stirring.

The compound can easily withstand short periods of exposure to temperatures below +10°C or above + 40°C. After exposure to such temperatures for a period of about one week, slight discoloration may occur. This has no effect on the final formulation.

The viscosity of LAMESOFT® PO 65 remains stable at temperatures up to + 40°C. Up to this temperature it can still be poured, even under high shearing forces. The product can therefore be easily pumped over a wide range of temperature (+ 15°C to 40°C).

The temperature range from +15 to 30°C is ideal for storing LAMESOFT® PO 65 in tanks. Storage tanks located in unheated areas should be provided with means of heating. A jacket heating system or internal heating coils are recommended that can be fed with water at about 30°C.

Processing

LAMESOFT® PO 65 can be processed without difficulty, preferably at temperatures between +15 and +30°C. At temperatures below 15°C the product should be heated to about 20 to 25°C before it is processed, to ensure that it can be blended into the final product and that short-term chill hazes do not occur.

PROCESSING INFORMATION

1. Stir water and basic surfactants (e.g., TEXAPON® N 70 or TEXAPON® NSO) together until the mixture is homogeneous.
2. Add LAMESOFT® PO 65 (> 15°C, acid pH) and stir the mixture until it is homogeneous. Gel particles may form for a short while, but will dissolve on stirring.
3. Add secondary surfactants (e.g., Cocamidopropyl Betaine - DEHYTON® PK 45, alkyl glycosides - PLANTACARE® types) while stirring.
4. Adjust pH with dilute sodium hydroxide solution or citric acid.
5. Add perfume oil and preservative, then adjust the final viscosity with, for example, sodium chloride.

Component	%	Function
TEXAPON N 70 Sodium Laureth Sulfate	11.7	Surfactant
PLANTACARE K 55 Lauryl Glucoside (and) Cocamidopropyl Betaine	4.0	Cosurfactant
LAMESOFT PO 65 Coco Glucoside (and) Glyceryl Oleate	3.0	Lipid layer enhancer/thickener
NaCl	1.7	Thickening agent
Water	79.6	
Preservative	ad lib	
pH	5 - 6	
Viscosity, mPas Brookfield, RVF, 23°C Rotor 5, 20 rpm	7400	
WAS	11	

Preparation on a laboratory scale:
Stir water and TEXAPON® N 70 together until homogeneously. Add LAMESOFT® PO 65 and stir until the mixture is homogeneous. Add PLANTACARE® K 55 while stirring. Finally adjust the pH and the viscosity.

Sample shower gel formulation
Formulation no.: 96/144/1

LAMESOFT® PO 65 is a valuable care component for developing modern cosmetic body cleansing preparations. Its polyfunctional properties allow its universal use in surfactant formulations for, e.g., shower gels and bubble baths, shampoos and cleansing products for babies. The WAS content in LAMESOFT® PO 65 can be actively incorporated in formulation design. This is a far from negligible economic factor. The naturally based product profile of LAMESOFT® PO 65 supports competitive advertising claims.

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