

TAKING SENSORY FROM NATURE

INTENDED USE

Cosmetic powder, sensory additive

BENEFITS AT A GLANCE

- Natural cellulose from sustainable European forestry
- Eco-friendly alternative to microplastics in leave-on applications
- Improves absorption and reduces oiliness of cosmetic formulations on skin
- Absorbs human sebum and provides a mattifying effect
- Compatible with oil in water as well as water in oil formulations and water-free systems

INCI (PCPC NAME)

Cellulose

CHEMICAL AND PHYSICAL PROPERTIES

Form	powder
Color	white to off-white

FURTHER PRODUCT INFORMATION (MIGHT CONTAIN OTHER PARAMETERS THAN SPECIFICATION)

Source	beech and spruce from sustainable European forestry
Bulk density (g/L)	180–300
Average particle size	30 µm
Content of cellulose	≥99%

PROPERTIES

- Readily biodegradable (OECD-Test 301 F, > 60%)
- Non-toxic to aquatic organisms (OECD-Test 202, *Daphnia*)
- Certificates: Ecocert, Cosmos, Halal
- Vegan according to the definition of the European Union

TEGO® Feel C 10 is a natural cellulose fiber without derivatization or chemical modification. Sustainably sourced from forests all over Europe, mainly beech and spruce are processed to cellulose fibers with an average particle size of 30 µm, using a procedure employing renewable energy.

OUR STUDIES BASED ON TEGO® FEEL C 10

In an *in vitro* study the absorption of human sebum (human model sebum according to Bey), sunflower oil and mineral oil was assessed. For this study two grams of particles were weighed in a petri dish and oil was added slowly until no more fluid could be absorbed. The point of maximum absorption was visually assessed. The absorption capacity is indicated in gram oil per gram particle.

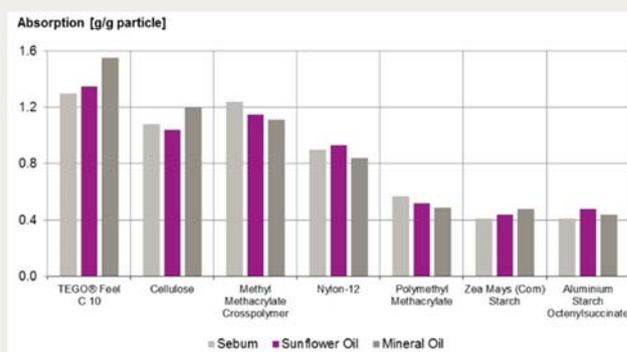


Figure 1: Sebum and oil absorption capacity [g/g particle].

With values ranging from 1.3–1.6 g/g particle, TEGO® Feel C 10 efficiently absorb human model sebum as well as commonly used cosmetic emollients. This absorption ability is due to the porous structure of TEGO® Feel C 10.

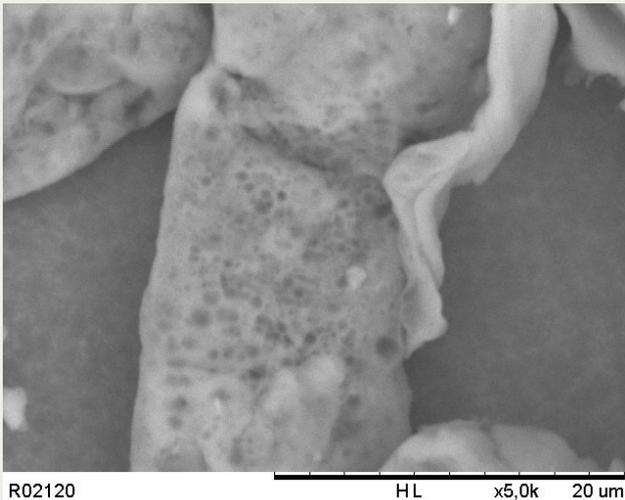


Figure 2: High resolution scanning electron microscopy (SEM) image of TEGO® Feel C 10 showing its porous structure

In another *in vitro* study the mattifying effect was evaluated. 2 mg/cm² of a natural W/O test formulation with and without 2% TEGO® Feel C 10 were applied on PMMA plates. The increase in gloss value was determined with a Byk-Gardner Micro-TRI-Gloss glossmeter five minutes after application of the test formulations. Cosmetically relevant (matte) gloss is determined at an angle of 85°.

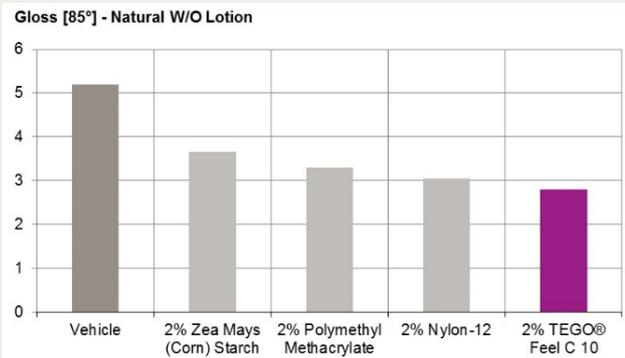


Figure 3: Gloss values at 85° angle on PMMA plates determined five minutes after application of test formulations.

As can be seen, a mattifying effect is achieved when particles are added into the formulation. By adding 2% of TEGO® Feel C 10 into the natural W/O test formulation, the gloss on PMMA plates was reduced by 46%.

In an *in vivo* study the gloss of a formulation with and without 2% TEGO® Feel C 10 was evaluated on the volar forearm. 2.5 mg/cm² of the test formulation was applied on either arm. The increase in gloss value at 85° was determined with a Zehntner ZGM 1130 glossmeter five minutes after application.

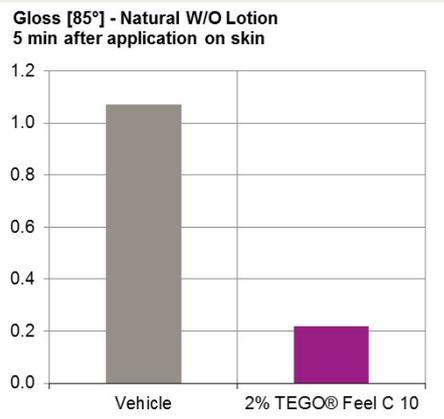


Figure 4: Gloss values on volar forearm determined at 85° angle five minutes after application of formulations.

The usage of 2% TEGO® Feel C 10 in the tested natural W/O formulation lead to an 80% reduction of gloss values on the forearm compared to the lotion without the fibers.

In a second *in vivo* study, a half side test was conducted on the face of 10 panelists. On each side of the face 300 µL of a W/O lotion formulation with and without 2% TEGO® Feel C 10 was applied. Images were taken by VISIA-CR photography before and five minutes after application of the test formulations.



Figure 5: Images of an example panelist by VISIA-CR photography. On the left cheek vehicle and on the right cheek 2% TEGO® Feel C 10 formulation was applied.

The gloss is significantly reduced on the half face where the formulation with 2% TEGO® Feel C 10 was applied, compared to the vehicle formulation without cellulose. The average reduction of gloss value over the whole panel was 29%.

Cosmetic formulations containing TEGO® Feel C 10 are characterized by a quick absorption and reduced oiliness when applied on skin. Evonik's interactive online tool, Sensory Kaleidoscope 2.0, was used to put the effect into a sensorial context.

The sensory panel data of the test formulations which were also used in the *in vitro* and *in vivo* studies was analyzed and added to the sensory map of ISOLAN® GPS (Polyglyceryl-4 Diisostearate/Polyhydroxystearate/Sebacate) to visualize the effect of the different particles on the skin feel.

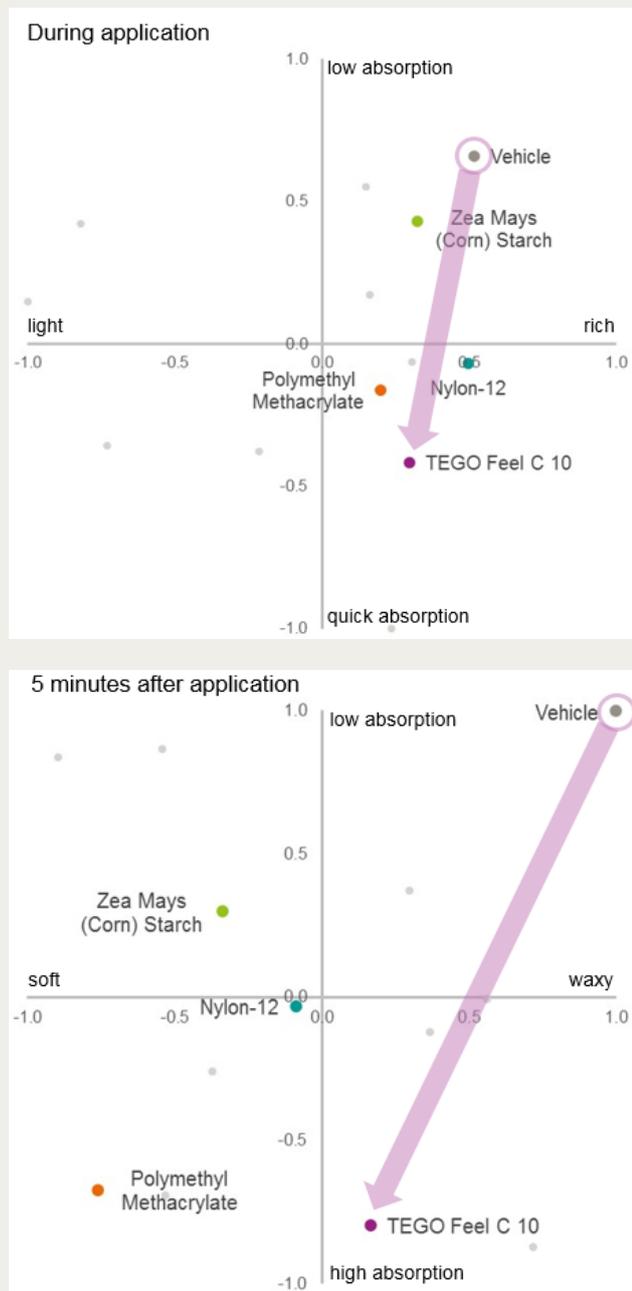


Figure 6: Maps for ISOLAN® GPS taken from Sensory Kaleidoscope 2.0. These sensory maps visualize the skin feel during application and five minutes after application. The effect of 2% TEGO® Feel C 10 on skin feel is indicated by arrow. Light grey dots indicate other formulations based on ISOLAN® GPS from Sensory Kaleidoscope 2.0

As can be clearly seen in the sensory maps, the absorption could instantly be improved when adding TEGO® Feel C 10 into the W/O lotion. Five minutes after application, overall absorption is changed from a particularly low absorption of the vehicle emulsion to a very high absorption when containing 2% TEGO® Feel C 10, outperforming the other particles or fibers, respectively. This drastic effect is in line with the superior sebum and oil absorption effect as shown in Figure 1. The relative effect is noticeably large for a system based on ISOLAN® GPS (Polyglyceryl-4 Diisostearate/Polyhydroxystearate/Sebacate).

PREPARATION

TEGO® Feel C 10 can be easily incorporated into O/W-, W/O-emulsions and anhydrous formulations. During processing of O/W systems, the fiber is preferably formulated via addition to the (hot) oil phase or, alternatively, after homogenization at approx. 40 °C. For W/O systems, TEGO® Feel C 10 is preferably added as last ingredient to the hot oil phase or, alternatively, after water addition to the pre-emulsion, before homogenization. In sun care formulations 0.05% EDTA prevents potential color changes.

In water-free systems TEGO® Feel C 10 is blended with other powders/particles before addition of liquid ingredients. Then the mixture is well mixed and pressed, if required.

RECOMMENDED USAGE CONCENTRATION

- 1-3% in O/W and W/O emulsions
- 5-20% in water-free systems

APPLICATION

TEGO® Feel C 10 is especially suitable for

- Natural cosmetics
- Face care
- Color cosmetics
- Sun care
- Body care

HAZARDOUS GOODS CLASSIFICATION

Information concerning

- classification and labelling according to regulations for transport and for dangerous substances
- protective measures for storage and handling
- measures in case of accidents and fires
- toxicity and ecological effects

is given in our material safety data sheets.

GUIDELINE FORMULATIONS

Natural Low Shine W/O Lotion (AL 11/16-72)	
<ul style="list-style-type: none"> • TEGO® Feel C 10 efficiently improves absorption • Fully based on natural ingredients • Daily lotion for dry skin 	
Phase A	
ISOLAN® GPS (Polyglyceryl-4 Diisostearate/ Polyhydroxystearate/Sebacate)	2.50
Hydrogenated Castor Oil	0.40
Cera Alba	0.60
TEGOSOFT® AC (Isoamyl Cocoate)	7.50
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	6.00
Simmondsia Chinensis (Jojoba) Seed Oil	5.00
TEGO® Feel C 10 (Cellulose)	2.00
Phase B	
Water	68.50
Glycerin	5.00
Panthenol	0.50
Magnesium Sulfate (Magnesium Sulfate Heptahydrate)	1.50
Sodium Benzoate, Potassium Sorbate, Water (Euxyl K 712, Schülke & Mayr GmbH)	0.50
Citric Acid (10% in water)	q.s.
Processing	
<ol style="list-style-type: none"> 1. Heat phase A to approx. 85°C. 2. Adjust the pH value of phase B to approx. 5.0-5.5. 3. Add phase B (room temperature) slowly while stirring. 4. Homogenize. 5. Cool with gentle stirring below 30°C and homogenize again. 	
Remarks	
Viscosity: 20 Pa·s (Brookfield RVDV-I, sp. 5, 10 rpm)	

Natural Mattifying Foundation (SZ 27/16-1)	
<ul style="list-style-type: none"> • Foundation fully based on natural ingredients • TEGO® Feel C 10 as microplastic replacement • For your selfie ready appearance 	
Phase A	
ISOLAN® GPS (Polyglyceryl-4 Diisostearate/ Polyhydroxystearate/Sebacate)	4.00
TEGOSOFT® AC (Isoamyl Cocoate)	6.00
TEGOSOFT® DC (Decyl Cocoate)	8.00
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	4.00
CI 77891, Hydrogenated Lecithin (Unipure White LC 981 HLC, Sensient)	5.00
CI 77492, Hydrogenated Lecithin (Unipure Yellow LC 182 HLC, Sensient)	0.60
CI 77491, Hydrogenated Lecithin (Unipure Red LC 381 HLC, Sensient)	0.35
CI 77499, Hydrogenated Lecithin (Unipure Black LC 989 HLC, Sensient)	0.10
TEGO® Feel C 10 (Cellulose)	2.00
Phase B	
Hydrogenated Castor Oil	0.50
Cera Alba	0.50
Phase C	
Water	63.45
Magnesium Sulfate (Magnesium Sulfate Heptahydrate)	2.00
Glycerin	3.00
Sodium Benzoate, Potassium Sorbate, Water (Euxyl K 712, Schülke & Mayr GmbH)	0.50
Citric Acid (10% in water)	q.s.
Processing	
<ol style="list-style-type: none"> 1. Add phase B to phase A, heat to 80 °C and mix well. 2. Prepare phase C and adjust the pH value to approx. 5.0-5.5. 3. Add phase C (room temperature) to phase A/B (80 °C) while stirring. 4. Homogenize. 6. Cool with gentle stirring below 30 °C and homogenize again. 	
Remarks	
Viscosity: 23 Pa·s (Brookfield RVDV-I, sp. 93, 10 rpm)	

Fun in the Sun SPF 30 Spray (AL 10/16–84)

- Easy spreadability due to sprayable format
- TEGO® Feel C 10 improves the absorption and reduces the oiliness on skin
- A must-have for your summer vacation

Phase A

TEGO® Care PBS 6 (Polyglyceryl-6 Stearate, Polyglyceryl-6 Behenate)	3.00
TEGOSOFT® TN (C12–15 Alkyl Benzoate)	3.00
TEGOSOFT® DC (Decyl Cocoate)	3.00
Bis-ethylhexyloxyphenol Methoxyphenyl Triazine (Tinosorb S, BASF)	2.00
Butyl Methoxydibenzoylmethane	4.00
Homosalate	4.00
Ethylhexyl Salicylate	4.00
Octocrylene	4.00
TEGO® Feel C 10 (Cellulose)	1.00

Phase B

Water	52.22
Gellan Gum (Kelcogel CG–HA, CP Kelco)	0.03
EDTA	0.05
Glycerin	3.00

Phase C

Phenylbenzimidazole Sulfonic Acid	2.00
Tromethamine	0.88
Water	7.12

Phase D

TEGO® Carbomer 341 ER (Acrylates/C10–30 Alkyl Acrylate Crosspolymer)	0.20
Water	9.80

Phase E

Tromethamine (30% in water)	q.s.
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Phase F

Phenoxyethanol, Ethylhexylglycerin (Euxyl PE 9010, Schülke & Mayr GmbH)	0.70
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Processing

1. Heat phase A and phase B separately to approx. 85 °C.
2. Add phase C to phase B.
3. Add phase A to phase B/C with stirring. ¹⁾
4. Homogenize.
5. Cool with gentle stirring to approx. 60 °C and add phase D.
6. Homogenize for a short time.
7. Cool with gentle stirring and add phase D and E below 40 °C. Adjust the pH value to 6.8 – 7.2.

¹⁾ Important: If phase A has to be charged into the vessel first, phase B must be added without stirring.

Remarks

Viscosity: 0.3 Pa·s (Brookfield RVDV–I, sp. 4, 100 rpm)

SPF: 32, UVA–Balance: 39% (Calculated values, BASF Sunscreen Simulator)

A 01/17

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Evonik Nutrition & Care GmbH
Goldschmidtstraße 100
45127 Essen, Germany
 P.O.BOX 45116 Essen
 PHONE + 49 201 173–2546
 FAX +49 201 173 712546
 personal-care@evonik.com
 www.evonik.com/personal-care

