Technical Information

TEGO® enlight

Intended use

Active for skin care

Benefits at a glance

- Brightening efficacy based on the power of nature
- In vivo proven activity
- Age spot correction
- Broad application profile
- 100% naturally derived

INCI

Morus Alba Fruit Extract; Sodium Phytate; Aqua; Glycerin; Alcohol

Chemical and physical properties (not part of specifications)	
Appearance	colorless to brownish liquid
pH	~ 3

Properties

An even skin tone is a desire all over the world and a lot of ingredients are already used to cover this need in cosmetic applications. The main reason for an uneven skin tone is related to the pigment melanin. The natural function of Melanin is to protect our skin from UV irradiation while higher levels leads to spot formation and hyper-pigmented areas on the skin surface. This is due to an increased melanin production in epidermal skin melanocytes. There are different ways in calming down these processes. The enzyme tyrosinase is the key driver of cutaneous melanin production. Inhibition of the tyrosinase enzyme activity leads to a reduced production of melanin. The initial reaction of melanin formation is triggered by cellular inflammation processes as occur while UV irradiation or oxidative stress. Therefore, anti-oxidants are capable to calm down inflammation induced hyperpigmentation and contribute to an even skin tone.

Another way to counter lightening of the skin tone is to promote the natural exfoliation process. The pigment melanin is transported in the upper layers of the skin, the dead corneocytes. Within the natural exfoliation process, these pigment filled cells are shedded off and replaced by new cell with lower amounts of melanin. This leads to a lighter overall skin tone appearance like in winter time.

Two ingredients – three ways to brighten the skin

Evonik Nutrition & Care GmbH offers an effective natural lightening blend which is best suitable for the treatment of age spots and hyperpigmentation. The activity of this raw material is based on phytic acid and the constituents of white mulberry extract.

Sodium phytate from rice bran reduces the melanin synthesis in the newly emerging epidermis, as it inhibits tyrosinase enzyme activity. Sodium phytate also stimulates the natural exfoliation (skin peeling) on the skin surface. Calcium ions, which are involved in the cohesion of the dead stratum corneum cells, get bound. This leads to the destabilization of cell-to-cell adhesion accelerating the natural exfoliation of dead melanin-filled corneocytes. The melanin-filled cells are replaced by new melanin-reduced cells.

Morus alba fruit extract from White Mulberry comprises multiple bioactive substances. They are involved in the reduction of melanin synthesis mostly as inhibitors of the tyrosinase activity and providing anti-oxidant activity.

IN VITRO EFFICACY

Tyrosinase inhibition

Method: Tyrosinase from normal human epidermal melanocytes was used in this assay to analyze a potential tyrosinase inhibition activity. Dihydroxy-phenyl-alanine L3,4 (L-DOPA) was used as substrate while Kojic acid was set as reference.

The test compounds were pre-incubated with the enzyme for 10 minutes on ice. The substrate was added at a final concentration of 2 mM. Plates were incubated at 37 °C for one hour. Enzymatic activity was evaluated by measuring the optical density (OD) at 540 nm. Test results were expressed as percentage of activity compared to negative control in % inhibition.

Results: The results demonstrate that TEGO® enlight induced a strong concentration-dependent inhibition of the enzymatic activity of human tyrosinase. At the recommended usage concentration of 2%, TEGO® enlight inhibited 94% of the enzyme activity, under the experimental conditions of the assay (figure 1). The control kojic acid inhibited tyrosinase activity already at lower concentrations in this assay. Nevertheless, kojic acid is criticized at least in the EU, and even prohibited in Switzerland. It is very harsh to the skin and therefore not well accepted as brightening ingredient any more.

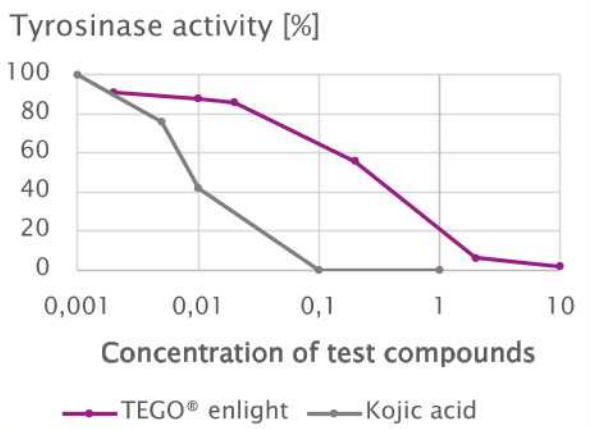

Figure 1 Tyrosinase activity [%] in addition of increasing concentrations of TEGO® enlight or kojic acid.

IN VIVO EFFICACY

Brightening study

Method: Over a course of 8 weeks, a gel containing 2% TEGO® enlight was applied twice daily on selected age spots on hands and face of 20 participants. The effect was compared to a placebo gel in a blinded randomized study design. Measurements of skin color (Chromameter CR 400, Minolta) and images of the skin surface (Fotofinder Dermoscope Ver. 2.0) were taken at baseline and after 8 weeks of application on the vehicle-and active-treated area.

The color rating system is CIE system L*a*b*:

- L* refers to black - white axis. L* values range from 0 to 100, where 0 corresponds to black color and 100 to white.
- a* and b* refer to two-colors axis: a* represents the red-green color while b* the yellow-blue color. Both parameters range from -60 (100% green for a* and blue for b*) to + 60 (100% red for a* and yellow for b*).

L* and b* parameters are sensible indexes of changes in pigmentation intensity and have been considered in this study.

Furthermore ITA°, which expresses the melanin index, is calculated from L* and b*. The ITA° value is inversely correlated to the pigmentation intensity: the higher the values, the clearer the color. The lightening efficacy is shown by increased ITA° and L* values.

The digital images taken with Fotofinder Dermoscope can be shown in their real colors but can also be converted into monochromatic images by means of UV-scan software module. This type of visualization, obtained by an appropriate algorithm, evidences all skin damages caused by age or excessive solar exposures.

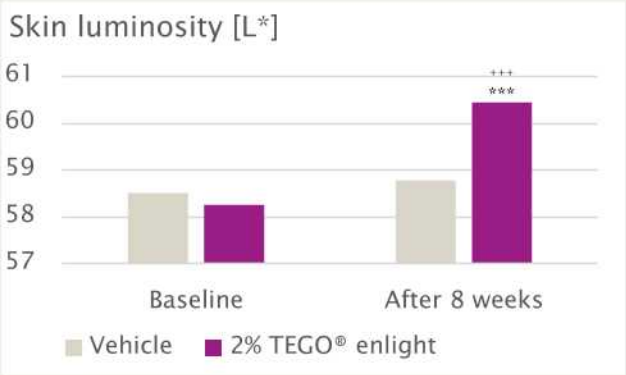

Figure 2: L* variation after 8 weeks of application (statistical significance: *** $p<0.001$ vs. baseline, +++ $p<0.001$ vs. vehicle).

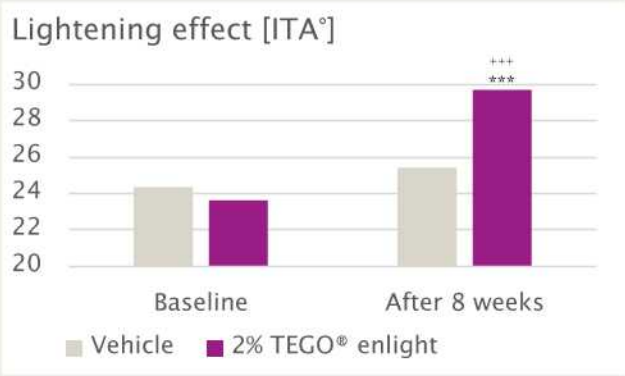

Figure 3: ITA° variation after 8 weeks of application (statistical significance: *** $p<0.001$ vs. baseline, +++ $p<0.001$ vs. vehicle).

Results: It could be shown that the active formulation containing 2% TEGO® enlight significantly reduced hyper-pigmented age spots as seen in measurements of skin luminosity (L*) and in ITA° values (sensible indexes of changes in pigmentation intensity).

This effect was visible on the skin surface as well, as shown in photographic images (figure 4).

Photographic documentation:

UV scan documentation:

Figure 4: Visible age spot correction by TEGO® enlight after 8 weeks of application.

Preparation

Preparation of emulsions: TEGO® enlight can be added after homogenization at a temperature below 40 °C.

In gel formulations, the product should be added after the gelling agent has been activated and neutralized.

TEGO® enlight should be incorporated in small portions and under stirring to avoid a punctual reduction of the pH of the formulation.

Always add TEGO® enlight before final pH-adjustment, due to the low pH of the raw material (pH ~3). For formulations we recommend a pH range of 4.0 -5.0.

Compatibility

- Various UV-Filters and pigments (pink discoloration with Avobenzone can be avoided by adding EDTA)
- Various gelling agents
- Various natural oils and emollients
- Various emulsifiers
- Other whitening agents

Incompatibility

- Electrolyte-sensitive materials
- Acrylate thickeners
- Divalent ions (complexation)
- Iron ions (pink discoloration)

Recommended usage concentration

2%

Applications

- Skin lightening products
- Products balancing out an uneven skin tone
- Anti-aging and multi-purpose formulations

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.

A 04/18

Guideline formulation

Natural Anti-Aging Spot Serum (L014-100.8-0318)	
Phase A	
Water	83.6%
Glycerin	5.0%
dermosoft® 1388 eco (Glycerin; Aqua; Sodium Levulinate; Sodium Anisate)	3.0%
Phase A 1	
Keltrol CG-SFT (Xanthan Gum)	0.9%
Carrageenan	0.1%
Phase B	
dermosoft® GSC (Glyceryl Stearate Citrate)	0.4%
Prunus Armeniaca Kernel Oil	0.5%
dermosoft® GMCY (Glyceryl Caprylate)	0.2%
dermofeel® sensolv (Isoamyl Laurate)	0.5%
dermofeel® MT 70 non GMO (Tocopherol; Helianthus Annuus Seed Oil	0.5%
Phase C	
TEGO® enlight (Morus Alba Fruit Extract; Sodium Phytate; Aqua; Glycerin; Alcohol)	2.0%
Alcohol Denat.	3.0%
Perfume	0.3%

Preparation

1. Heat phase A up to 75 °C and disperse A1.
2. Heat phase B up to 78 °C separately.
3. Mix components of phase B and add into phase A1/A.
4. Cool down to 35 °C and add phase C under slowly stirring. Adjust pH value to 5.30.

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