

Intended use

Active for skin care

Benefits at a glance

- Ideal for the improvement of skin radiance & evenness of skin tone.
- Induces endogenous cellular defence mechanisms against oxidative stress.
- Has significant anti-oxidant activity.
- Due to the optimized production process the colour and the odour is reduced.
- TEGO® Turmerone is COSMOS approved
- TEGO® Turmerone ORG is COSMOS certified and gathered from organic cultivated curcuma longa
- IECSC and CFDA: yes.

INCI (PCPC name)

Curcuma Longa (Turmeric) Root Extract

Chemical and physical properties (not part of specifications)

Form	liquid
Active matter	min. 65% of turmerones

Properties

Turmeric (*Curcuma longa*) is a plant of the ginger family named Zingiberaceae, which is native in South Asia. Turmeric powder, with its typical deep orange-yellow colour, is extensively used as a spice in curries and Indian cuisine. In India, the biggest producer of turmeric, it is also known since ancient times for its cosmetic and wound healing properties. Traditionally, turmeric paste was applied to the bride before marriage in some regions of India to give glow to the skin and to keep harmful bacteria away from the body. In the Ayurvedic medicine, turmeric is thought to have many medicinal properties.

TEGO® Turmerone (ORG) is the distilled fraction of turmeric oil that is extracted from the root of *Curcuma longa* by supercritical carbon dioxide. This solvent-free extraction process has a low environmental impact. *Curcuma longa* yields to 4–5 % of turmeric oil, whose main constituents are turmerones (approx. 60 %, Figure 1). Molecular distillation as a second main step improves the colour of the oil (from brown to light yellow), enriches the turmerones, removes the undesired curcumins and reduces the strong odor without altering the efficacy of the product.

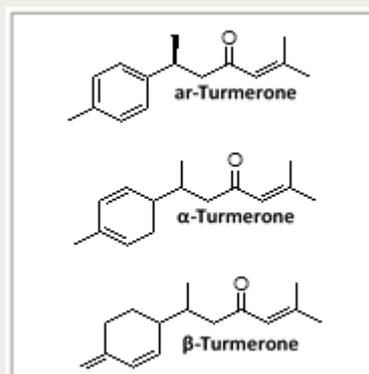


Figure 1: Chemical structures of ar-Turmerone, α-Turmerone and β-Turmerone

Efficacy Studies

In vitro evaluation of intrinsic anti-oxidant activity of TEGO® Turmerone

The anti-oxidant activity is measured by the inhibition of the coupled autoxidation of linoleic acid and β-carotene as compared with a negative control (methanol). The bleaching of β-carotene is monitored photometrical at 470 nm for 1 h. The gradient of the curves between 20 and 40 min is calculated. The anti-oxidant activity (AOA) is the percentage of inhibition of β-carotene bleaching relative to the negative control.



Figure 2: Anti-oxidant activity of TEGO® Turmerone

The anti-oxidant activity of TEGO® Turmerone inhibits the oxidation of β -carotene by approx. 90%. The test confirmed as well that the distillation does not influence the product's efficacy (Figure 2).

Evaluation of the activity of TEGO® Turmerone on cellular anti-oxidant system on skin model

Reactive oxygen species (ROS) play a significant role in skin aging. This includes oxidation of cellular macromolecules such as DNA, and peroxidation of membrane lipids that results in dysfunction of the cellular integrity, in chromosomal damage and, therefore, in mutagenesis and sometimes apoptosis. In order to counteract these detrimental effects of ROS, the cell possesses a variety of anti-oxidative mechanisms mainly based on enzymatic systems. Among these are catalase (CAT), thioredoxin reductase (TXNRD1), glutathione peroxidase (GPX1) and NAD(P)H dehydrogenase, quinone 1 (NQO1). Whereas catalase is able to directly eliminate the ROS hydrogen peroxide (H₂O₂) by catalyzing its decomposition to water and oxygen, thioredoxin reductase and glutathione peroxidase generate ROS scavengers called thioredoxin and glutathione. Both of these ROS scavengers possess highly reactive SH-groups that are able to neutralize ROS. Generation of thioredoxin and glutathione requires NAD(P)H that is provided by NAD(P)H dehydrogenase.

Another source of ROS is the reaction of photosensitizers with UV irradiation. The reaction of ROS with membrane lipids and DNA provides not only direct cytotoxic effects, but also induces melanogenesis through diverse intermediates.

Method: The study was performed at the University of Regensburg (D). The objective was to investigate the effects of 0.5% TEGO® Turmerone on UV-B irradiated skin.

For this purpose untreated and TEGO® Turmerone treated reconstructed human skin (SkinEthic skin models) were irradiated with 350 mJ/cm² UV-B. Cells were harvested, lysed and RNA samples were isolated 12 hrs after irradiation. DNA-Chip technique was used to evaluate the effect of TEGO® Turmerone on irradiated reconstituted human skin on the molecular level. Quantitative RT-PCR was carried out in order to verify the expression levels of selected upregulated genes.

Results: Most prominent expression for TEGO® Turmerone was found for genes involved in the cellular oxidative stress response. Among these genes were thioredoxin reductase (TXRDN1), catalase (CAT), glutathione peroxidase (GPX1) as well as NAD(P)H dehydrogenase, quinone 1 (NQO1). As presented in Figure 3 up regulation of these genes could be confirmed by quantitative RT-PCR.

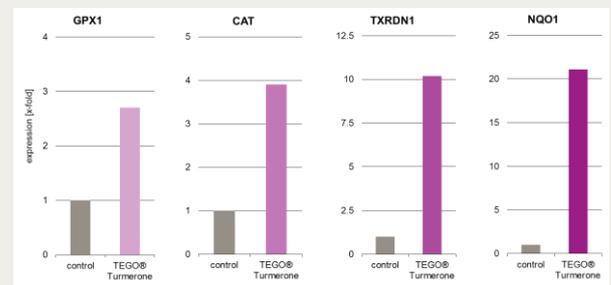


Figure 3: RT-PCR measurements of upregulated genes

These results confirmed that TEGO® Turmerone increases the components of the body's inherent anti-oxidative systems. TEGO® Turmerone triggers cellular radical defense mechanisms against oxidative stress.

This information and all further technical advice are based on our present knowledge and experience. However, it implies no liability or other legal responsibility on our part, including with regard to existing third party intellectual property rights, especially patent rights. In particular, no warranty, whether express or implied, or guarantee of product properties in the legal sense is intended or implied. We reserve the right to make any changes according to technological progress or further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods. Performance of the product described herein should be verified by testing, which should be carried out only by qualified experts in the sole responsibility of a customer. Reference to trade names used by other companies is neither a recommendation, nor does it imply that similar products could not be used.

Evonik Nutrition & Care GmbH
 Goldschmidtstraße 100
 45127 Essen, Germany
 Phone +49 201 173 2546
 Fax +49 201 173 712546
personal-care@evonik.com
www.evonik.com/personal-care



In vivo evaluation of TEGO® Turmerone

Method: For this study 30 volunteers were recruited. 15 volunteers received a test formulation with 0.5% TEGO® Turmerone, 15 received the formulation without active ingredient (vehicle). They applied the test formulation twice daily over a period of 8 weeks on the left inner forearm.

The measurement was carried out before the treatment started and after 8 weeks of application. Prior to each measurement the volunteers had to acclimatize for at least 15 min. at room temperature and 50% relative humidity.

For the evaluation of the skin tone a special camera (Visioscan VC 98, Courage & Khazaka, Cologne, D) was used. Via the grey level distribution the software calculates different texture parameters. These texture parameters are related to colour differences of neighbouring pixels and reflect the skin tone.

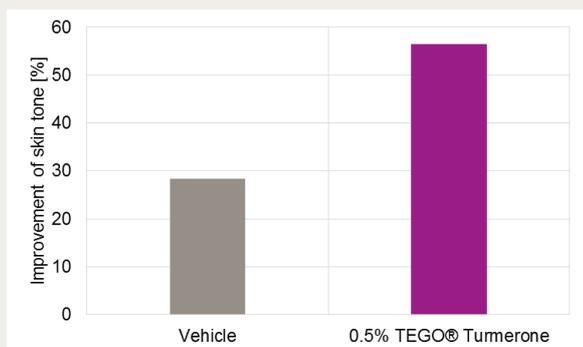


Figure 5: Improvement of skin tone parameters

Results: Figure 5 shows the improvement of the total of the skin tone parameters. The application of a formulation with 0.5% TEGO® Turmerone increases the skin tone by approximately 30% in comparison to vehicle. It could be demonstrated by this in vivo evaluation that TEGO® Turmerone leads to more even skin tone and improved radiance of the skin as shown in figure 6. The skin looks younger and healthier.

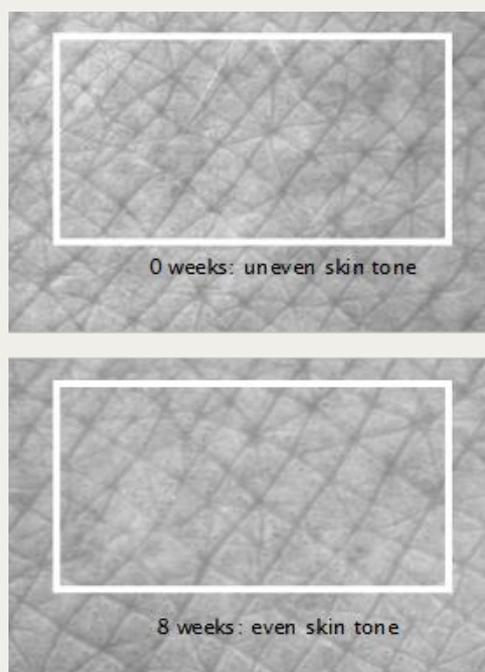


Figure 6: The skin before and after treatment with TEGO® Turmerone

This information and all further technical advice are based on our present knowledge and experience. However, it implies no liability or other legal responsibility on our part, including with regard to existing third party intellectual property rights, especially patent rights. In particular, no warranty, whether express or implied, or guarantee of product properties in the legal sense is intended or implied. We reserve the right to make any changes according to technological progress or further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods. Performance of the product described herein should be verified by testing, which should be carried out only by qualified experts in the sole responsibility of a customer. Reference to trade names used by other companies is neither a recommendation, nor does it imply that similar products could not be used.

Evonik Nutrition & Care GmbH
Goldschmidtstraße 100
45127 Essen, Germany
Phone +49 201 173 2546
Fax +49 201 173 712546
personal-care@evonik.com
www.evonik.com/personal-care

Preparation

TEGO® Turmerone (ORG) is oilsoluble and cold processable.

Preparation of O/W emulsion (cream or lotion):

The emulsion is prepared in the usual way. TEGO® Turmerone (ORG) is added during the cooling process at temperature below 40 °C.

Preparation of W/O emulsion (cream or lotion):

The emulsion is prepared in the usual way. TEGO® Turmerone (ORG) is added prior to homogenisation.

Recommended usage concentration

0.1 – 1.0%, clinically tested at 0.5%

Possible Applications

- Anti-Aging
- Face Care for an even skin tone
- Men's Care for dull & tired skin
- Sun Care

Hazardous goods classification

Information concerning

- classification and labelling according to regulations for transport of chemicals
- protective measures for storage and handling
- measures in case of accidents and fire
- toxicological and ecotoxicological effects

is given in our safety data sheets.

This information and all further technical advice are based on our present knowledge and experience. However, it implies no liability or other legal responsibility on our part, including with regard to existing third party intellectual property rights, especially patent rights. In particular, no warranty, whether express or implied, or guarantee of product properties in the legal sense is intended or implied. We reserve the right to make any changes according to technological progress or further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods. Performance of the product described herein should be verified by testing, which should be carried out only by qualified experts in the sole responsibility of a customer. Reference to trade names used by other companies is neither a recommendation, nor does it imply that similar products could not be used.

Evonik Nutrition & Care GmbH
Goldschmidtstraße 100
45127 Essen, Germany
Phone +49 201 173 2546
Fax +49 201 173 712546
personal-care@evonik.com
www.evonik.com/personal-care

