

UNITITAMER T-40

FILM-FORMING, WATER-RESISTANT, PHYSICAL UV BROAD-SPECTRUM FILTER

Composition Unititamer T-40 is a concentrate of ultrafine titanium dioxide (~20 nm) which is permanently suspended in a film-forming matrix conferring water-resistance. Its titanium dioxide content is 40%. The matrix consists of triacontanyl-PVP (alkylated vinylpyrrolidone copolymer) and isoeicosane (paraffin).

Appearance White powder which has a melting range of 65°C – 70°C.

Analytical data See specifications.

Solubility Dispersible in all relevant cosmetic oils.
Insoluble in ethanol and water.

Properties Inorganic UV filters are effective over the whole range of UV wavelengths and are becoming increasingly popular as UV broad-spectrum filters. The precondition for an adequate protective effect, however, is a homogeneous and agglomeration-free dispersion in the sunscreen product. This calls for considerable knowledge of formulation technique and production facilities of a correspondingly high technical standard.

Thanks to an innovative production technology, Unititamer T-40 contains already homogeneously predispersed, ultrafine titanium dioxide that allows very simple handling in the manufacture of sunscreen products. The accompanying high degree of dispersion leads to a high degree of UV absorption (Figure 1).

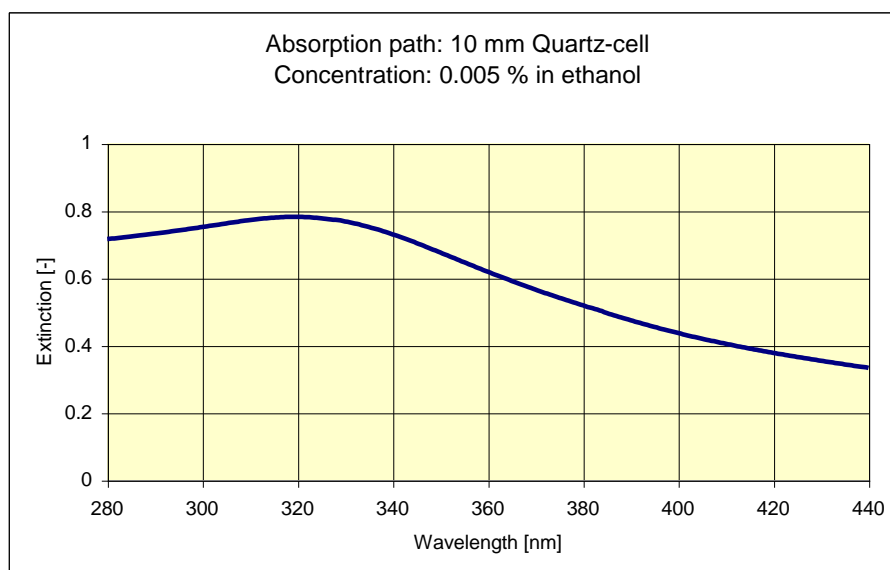


Figure 1: UV absorption spectrum of Unititamer T-40

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In addition to the innovative production technology, the high degree of dispersity is achieved by means of an optimally balanced matrix consisting of Unimer U-6 (Triacontanyl-PVP) and isoecosane. With its outstanding film-forming property Unimer U-6 increases the sun protection factor (no deposit-formation in the wrinkles of the skin, (cf. Figure 2) and also improves the water-resistance thanks to its lipophilic reticular structure [1].

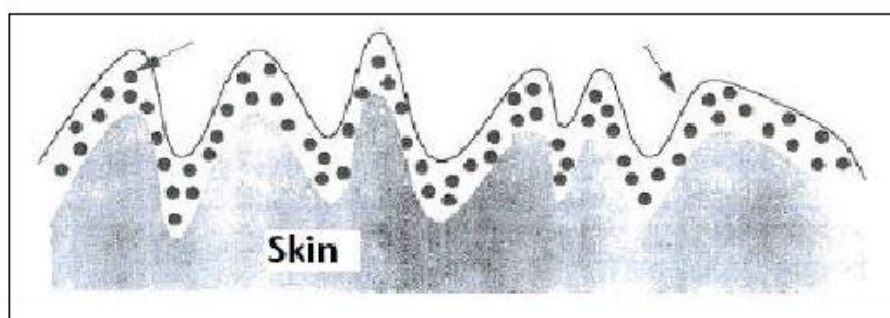


Figure 2: Unititamer T-40 allows a homogeneous distribution of ultrafine titanium dioxide on the skin without deposit-formation in the folds of the skin.

The manufacturing process of Unititamer T-40 has been optimized with a view to obtaining the highest possible degree of dispersity and thus the best possible sun protection factor. A sunscreen product with a 10% content of Unititamer T-40 (without the addition of other UV filters) in vivo produced an SPF of 11. When the different components of Unititamer T-40 were incorporated in the same formulation individually a SPF of only 7 resulted. This indicates that the incorporation of Unititamer T-40 leads to a SPF which is more than 55% higher than of the individual components.

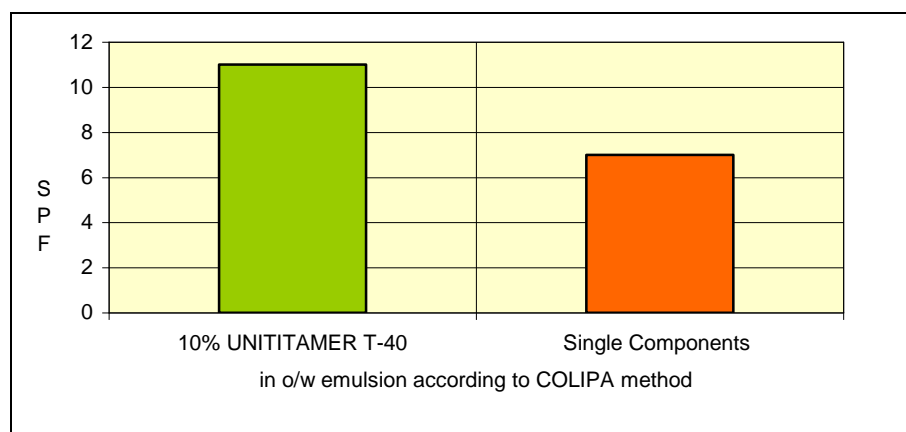


Figure 3: Increase in SPF by Unititamer T-40 over that of the individual components thanks to outstanding distribution on the skin.

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On account of its Unimer U-6 content Unititamer T-40 has emollient and conditioning properties and does not feel sticky in spite of its film-forming properties.

Titanium dioxide, after exposure to UV light, may develop a photocatalytic activity which adversely affects the stability of the enveloping medium particularly the unsaturated components [2]. Unititamer T-40 has been optimized with respect to photocatalytic activity and compared with conventional commercial grades of titanium dioxide using the lead carbonate test [3] (Figure 4). In the lead carbonate test the photocatalytic activity is determined by the decrease in brightness of a lead carbonate paste. The test results show that, in the sample with Unititamer T-40, the brightness value, in contrast to the comparison products, is scarcely altered and that Unititamer T-40 thus displays practically no photocatalytic activity.

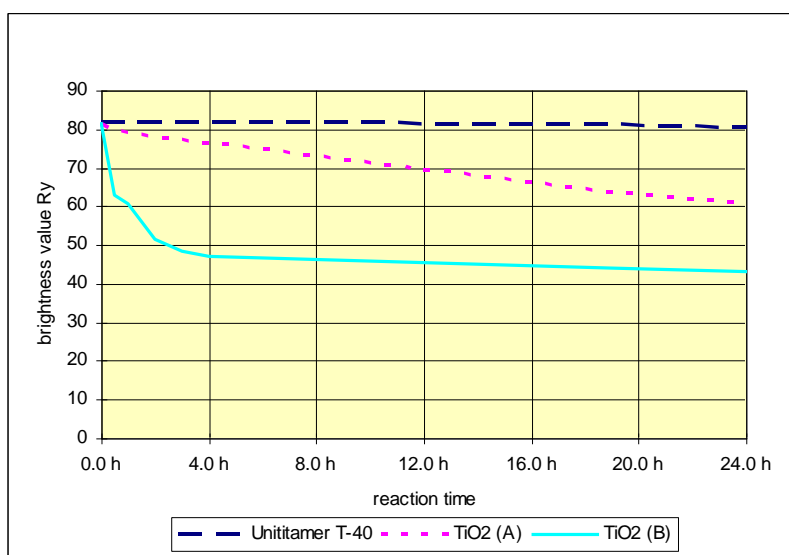


Figure 4: Lead carbonate test: The slight decrease in the brightness value over time confirms that Unititamer T-40 has an outstandingly low photocatalytic activity.

Unititamer T-40 is dermatologically tested. The patch test has been performed on 50 subjects with 50% Unititamer T-40 in isoparaffin. No skin changes occurred in any of the subjects after 48 or 72 hours. The test results show that the product is safe with respect to an irritating or sensitizing effect. These tests were carried out by Dermatest, Gesellschaft für allergologische Forschung in Münster, Germany. The mucous membrane compatibility of Unititamer T-40 was determined by means of alternative in vitro technology.

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Unititamer T-40 50% in isoparaffin was tested on a proven cornea model composed of cultivated fibroblasts. The cell culture underwent an MTT test after a contact time of 24 hours. The sample tested was judged to be practically non-irritating. This strongly suggests that Unititamer T-40 presents no risk to the ocular mucous membrane. These tests were carried out by the Laboratoire de Toxicologie of the University of Bordeaux, France.

Summarized properties:

- UV-broad-spectrum filter
- SPF-booster
- water-resistant
- easy-to-handle
- dust free
- photo stable
- skin caring

Use

Unititamer T-40 is used as a physical UV broad-spectrum filter in sunscreen products, either alone or in combination with conventional chemical UV filters.

Products containing Unititamer T-40 are non-sticky and form moisture-regulating films that are insoluble in water thanks to their lipophilic reticular structure. This results in better water-resistance.

Unititamer T-40 can be incorporated without problem in preparations such as emulsions (O/W and W/O), lotions, oils or sticks.

Dosage

5 – 15% depending on application

Processing

Unititamer T-40 is relatively stable and can, under normal conditions, be processed without problem in the manufacture of cosmetics. In contrast to the conventional ultrafine grades of titanium dioxide, Unititamer T-40 is completely dust-free and therefore particularly pleasant and presents no problem in processing.

Storage

5°C - 25°C (see safety data sheet)

Shelf life

2 years (see specification)

Identification

INCI Monograph ID	INCI Name	Chinese Name	CAS No.
3217	Titanium Dioxide (nano)	二氧化钛	13463-67-7
5297	Triacantanyl PVP	蜂花烷基 PVP	136445-69-7
4552	Isoeicosane	异二十烷	93685-79-1

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References

1. Induchem AG Sales documentation Unimer U-6.
2. Sayre, R.M. *et al.* Titanium Dioxide and Zinc Oxide Induce Photooxidation of Unsaturated Lipids, *Cosmet. & Toil.* **115**, 75-82, (2000).
3. Driller, H. *et al.* Ein Titandioxid der neuen Generation: *Parf. Kosm.* **78** (9) 8-13 (1997).

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