UNITAMURON H-22

MULTIFUNCTIONAL POLYSACCHARIDE COMPLEX
OF VEGETAL ORIGIN
FOR MODERN SKIN CARE PRODUCTS
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1. Introduction

Modern cosmetic concepts increasingly require natural active ingredients which are purified to a great extent but as far as possible left in their natural state. The plant kingdom provides us with countless biopolymers, while polysaccharides are of special importance for skin care in cosmetics incorporating active substances. In addition, modern consumers look for ingredients of ecologically compatible origin. Polysaccharides of vegetable origin broadly speaking belong to the group of renewable raw materials and are thus environmentally friendly.

Unitamuron H-22 contains an aqueous extract of tamarind seeds which consists mainly of polysaccharides in their original natural composition.

2. Concept of the active ingredient complex Unitamuron H-22

Polysaccharides occur widely in nature both in the plant and animal kingdoms. We find polysaccharides of differing structure in the connective tissue of the so-called extracellular matrix of human skin. There they exercise an extremely important function in maintaining the moisture balance. The outward condition of the skin and consequently its appearance depend decisively on the optimal fulfilment of this function.

The film-forming and moisture-regulating polysaccharides contained in Unitamuron H-22, extracted from tamarind seeds, are incorporated in a carrier system consisting of pentylene glycol (1,2-pentanediol) and water that is well tolerated by the skin. Pentylene glycol is an active substance which enhances the outstanding cosmetic effect of Unitamuron H-22 with its moisturizing properties. In addition, pentylene glycol possesses antimicrobial properties (1), so that the complex of active substances needs no special protection against microbial attack and therefore can be described as free of preservatives.

Cosmetics for skin care containing Unitamuron H-22 form a hydrocolloid film on the skin which protects it against transepidermal water loss and also effectively moisturizes the corneocytes. The natural protective mechanisms of the skin are also activated in the process. This makes the surface of the skin soft and supple, improves its elasticity and reduces wrinkles.
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2.1 Structure and origin of polysaccharides

The plant with the Latin name Tamarindus indica L. is an evergreen tree which normally grows to a height of 10 to 15 meters and bears fruit in pods (2). As a consequence of its slow growth, it can take more than 10 years for the first fruits to ripen. On the other hand, the life span of the tree can easily exceed 150 years.

The tamarind tree (Figure 1) grows mainly in India, although it probably originated from East Africa. Nowadays it is cultivated in different tropical countries, particularly in Southeast Asia.

The trees flower in spring (Figure 2) and bear ripe fruit in the following winter (Figure 3). A fully grown tree can yield a harvest of 200 to 250 kg.

Young pods are used for nutritional purposes and for manufacturing spices. Thus, for instance, well-known Worcester sauce contains spices obtained from tamarind trees.
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Figure 2: Tamarind flower

Figure 3: Tamarind fruits
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The fruit contains seeds with a high content of polysaccharides which are used to store energy (3). They are mainly galactoxyloglycans consisting of a main chain of glucose molecules with xylose and xylose-galactose side-groups. Arabinose is also present to a smaller extent. The structure is highly branched and can be seen from Figure 4. Its molecular weight is about 650,000 Dalton.

\[
\begin{align*}
&\text{(gal)} \\
&\text{xyl} \quad \text{xyl} \quad \text{xyl} \\
&\text{[} \text{glu – glu – glu – glu -}\text{]}n
\end{align*}
\]

\[
\text{glu} = \text{Glucose, xyl} = \text{Xylose, gal} = \text{Galactose}
\]

Figure 4: Structure of galactoxyloglycan

After careful mechanical cleaning, drying and grinding of the seed material, the polysaccharides contained in Unitamuron H-22 are obtained by aqueous extraction at room temperature. The tamarind extract purified in this way is then incorporated into a carefully balanced carrier system consisting of pentylene glycol/water and filtered via different stages.

The isolation, handling and purification of the native polysaccharides present in tamarind seeds is extremely demanding on account of the high molecular weight and the high degree of branching and requires special know-how and correspondingly expensive technical facilities. In the form of the finished aqueous ingredient complex, the handling of Unitamuron H-22 is perfectly easy.

2.2 Biological properties

Extensive investigations have confirmed that polysaccharides derived from higher plants show an immunostimulating potential (4). Highly branched and high-molecular polysaccharides show a broad profile of biological activity.

Strickland et al. showed that galactoxyloglycans obtained from tamarind seeds are molecules with signal functions which regulate the defence reactions of living cells to environmental influences such as ultraviolet radiation or other damaging factors (5).

Another investigation has shown that polysaccharides from tamarind seeds display a tumor-inhibiting effect (6).
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In North African countries the tamarind is one of the sources of raw materials used in traditional folk medicine. Systematic investigations have shown that tamarind extracts exert an antiinflammatory effect (7).

Polysaccharides from tamarind seeds can exert a positive effect on cellular adhesion and so promote wound healing (8).

Highly effective natural antioxidants have also been isolated from extracts of tamarind seeds and identified. Their effectiveness is comparable with that of $\alpha$-tocopherol (9).

Since polysaccharides from tamarind seeds are also increasingly used by industry as thickening agents in foods, their toxicological profile has recently been studied in detail (10). It has thus been established that tamarind polysaccharides do not possess either mutagenic, carcinogenic or any other toxic properties.

All these favourable properties predestine the tamarind extract as a valuable component of the ingredient complex Unitamuron H-22 which can display its multifunctional efficacy particularly in the form of cosmetics on human skin. The outstanding cosmetological properties are confirmed in the efficacy tests described below. The phenomenal beneficial nature of Unitamuron H-22 opens up new dimensions to the cosmetics manufacturer in the production of valuable skin care products which give the skin a velvety feeling with a lasting effect.

3. Efficacy

In the assessment of the effectiveness of Unitamuron H-22 we have deliberately concentrated exclusively on in vivo tests.

The following efficacy tests were carried out by Derma Consult GmbH in D-53347 Alfter Germany. All the studies of effectiveness were conducted with an o/w cream containing 5% Unitamuron H-22 and compared with a similar placebo preparation on 5 volunteers aged between 29 and 44 years. The preparations were applied by the subjects to the inner surface of the forearm twice daily (morning and evening). The measurements were taken before the first application to precisely circumscribed areas of the inner surface of the forearm. After one and/or two weeks of application additional measurements were taken 8 hours after the last daily application.
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3.1 Improvement of skin elasticity

Skin elasticity was measured with a Cutometer SEM 474. The test results demonstrate that skin after regular treatment with the test cream was firmer than untreated skin or skin treated with the placebo cream. The results are shown graphically in Figure 5 and can be summarized as follows:

After 14 days of application of a test cream with 5% Unitamuron H-22 the firmness or elasticity of skin improved by 35.9% (placebo 8%).

The results show that very outstanding values can be achieved with Unitamuron H-22 in terms of improvement of skin elasticity.

Figure 5: Improvement in skin elasticity due to Unitamuron H-22 (skin firmness)
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3.2 Improvement of skin hydration

The improvement in skin moisture was determined capacitively with a Corneometer CM 825. Application of the test cream after 7 and 14 days of treatment led to an increasing improvement in skin hydration both compared with the initial values and with the placebo treatment in each case. The results are presented in graphic form in Figure 6 and can be summarized as follows:

After 7 days of application of a test cream with 5% Unitamuron H-22 a 15.1% increase in skin hydration was achieved (placebo 4.8%). After 14 days of application the moisture content was increased to 18.9% (placebo 6.8%). These results illustrate the long-term effect of Unitamuron H-22.

Figure 6: Improvement in skin hydration due to Unitamuron H-22
3.3 Improvement of skin roughness

The tests for assessing the improvement in skin roughness were carried out with a Skinvisiometer SV 500. The principle of measurement was based on screening of a very thin, specially colored silicone impression of the skin followed by computer evaluation using an image digitizing technique. The results indicate that even after a brief period of treatment skin roughness shows far better measurements than untreated skin or skin treated with the placebo cream. The results are present in graphic form in Figure 7 and can be summarized as follows:

After 7 days of application of a test cream containing 5% Unitamuron H-22 an improvement in skin roughness values of 13.8% (placebo 3.1%) was achieved. This was confirmed after 14 days of application with comparable values of 13.7% (placebo 4.0%).

With reference to skin roughness, these values show an outstanding smoothing effect even after a brief application period.

Figure 7: Improvement in skin roughness values due to Unitamuron H-22
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4. Physiological properties

Animal tests to confirm the toxicological safety of Unitamuron H-22 were deliberately omitted. On the basis of values in the literature and empirical values the components can be described as toxicologically unproblematic. As expected this was confirmed by the in vitro and in vivo tests described below.

4.1 Mucous membrane compatibility

The mucous membrane compatibility of Unitamuron H-22 was determined by means of alternative in vitro technology, the acute ocular toxicity test. Unitamuron H-22 was tested undiluted on a proven model of the cornea, consisting of cultured human keratinocytes. The model of the cornea was subjected to an MTT test after exposure for 10 minutes, 1, 3 and 24 hours. The product was described as non-irritating. These tests were carried out by the Laboratoire SKINETHIC at Nice (France).

4.2 Skin compatibility

A closed patch test was carried out with undiluted Unitamuron H-22 under occlusive conditions on the inner surface of the forearm of 50 subjects. None of the subjects showed any skin changes in the test area after 24, 48 or 72 hours. This enables us to conclude that Unitamuron H-22 in practical use will not lead to undesirable skin reactions caused by primary irritation or allergic hypersensitivity. These tests were performed by Dermatest, Gesellschaft für allergologische Forschung at D-48155 Münster (Germany).
5. Use

The active ingredient complex Unitamuron H-22, based on natural polysaccharides of vegetable origin, provides the manufacturer of skin care cosmetics with a modern ingredient which exerts extremely beneficial effects particularly on the skin of present-day consumers subject to strain. Products containing Unitamuron H-22 not only improve the elasticity and hydration of the skin, they also show a demonstrable and exceptional smoothing effect. The extremely beneficial properties of Unitamuron H-22 with regular use confer a lasting, extremely pleasant velvety feeling on the skin. Unitamuron H-22 is suitable specifically for incorporation in skin care products designed to make the skin firmer and smoother and particularly for exposed skin but also for protection against premature aging of the skin.

Unitamuron H-22 is water-soluble and therefore suitable for incorporation into all kinds of high-grade emulsions, both of the o/w and w/o type, but also into transparent and semitransparent gels, lotions etc., such as face and body care products in all conceivable forms and of all conceivable classes.

The efficacy studies described in section 3 have shown excellent effects with a use concentration of 5% which stand out impressively against the comparable placebo values. On the basis of these results we recommend for Unitamuron H-22 a working concentration within the range of 5%.

Guiding formulas are available on request.
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6. Characteristics

Composition
Unitamuron H-22 is a complex of active substances, consisting of a combination of an extract of tamarind seeds with pentylene glycol in an aqueous system.
Unitamuron H-22 contains no preservatives (self-preserving)

Description
A clear to opalescent, practically colorless liquid with a faint characteristic odor.

Analytical data
See specification

Solubility
Miscible with water in any ratio.
Soluble in aqueous glycol solutions.
Soluble in aqueous alcohol.
Insoluble in lipids.

Storage
Storage conditions: see safety data sheet
Shelf life: see specifications

Processing
Due to its stability, Unitamuron H-22 can be processed without difficulty under the usual conditions for the preparation of cosmetics.

Biodegradability
A biodegradability of 81 % was determined with the OECD 301 D Closed Bottle Test.
Unitamuron H-22 may thus be described as readily biodegradable.

Identification

<table>
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<tr>
<th>INCI name</th>
<th>CAS No.</th>
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<tbody>
<tr>
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<td>Tamarindus Indica Seed Extract</td>
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7. References


