G.P.S.®

EXSYMOL

Trehalose Monomethylsilanetriol

INCI name : SILANETRIOL TREHALOSE ETHER

Chemical family

G.P.S.® belongs to the chemical family : ***Silanols***. ***Silanols*** are hydrosoluble derivatives of ***organic silicon***, obtained by condensation of methylsilanol, an organosilane with numerous silanols functions, on a specific radical which confers on the ***Silanol*** obtained, its specific action mode. **G.P.S.**® results from the reaction of methylsilanetriol with ***trehalose***, a constitutive element of some reviviscent plants, capable of resisting to a severe cell dehydration, and rebirth as soon as some traces of water are present.

Analytical composition

Trehalose		4.5%
Methylsilanetriol		0.26%
	in which silicon	0.08%
Water sq		100.00%

Technical characteristics

Colorless liquid, limpid to slightly opalescent
pH : about 5.5
Density at 20°C : about 1.0
Miscible with water, alcohols and glycols.

Availability

5, 30 or 60 kg drums

G.P.S.® is also available as NANOSPHERES 100 G.P.S. (NCK).

Use

Anti-dehydration, anti-dryness
(hydrous stress)

Moisturization
(skin exposed to extreme conditions)

Anti-aging

BIOLOGICAL ACTIVITES

ANTI-HYDROUS STRESS

G.P.S.® is an excellent solution for the treatment of ***highly dehydrated states*.**

G.P.S.® combines the ***Silanol*** properties, restructurant of the connective tissue, therefore accountable for a maximized moisturization, to that of ***trehalose***, a disaccharide capable, in situation of extreme dehydration, of substitution with water in the tissue.associe les propriétés de la fonction

SPECIFIC CYTO PROTECTING ACTIVITY.

The ***Silanol***, which affinity for biological membranes has been showed, favors the action of trehalose, targetting the cell membranes : its action site. This particular mechanism of action allows to consider this active as a ***cytoprotector*** which increases the resistance of the cells to other stress, such as oxidative stress or thermal shocks (freezing, high temperatures), capable of damaging cell membranes.

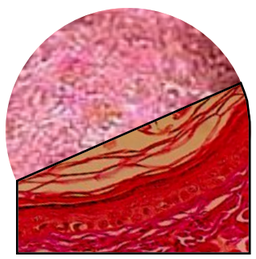
ROLES OF THE CONSTITUTIVE ELEMENTS OF G.P.S.®

Trehalose : osmoregulator

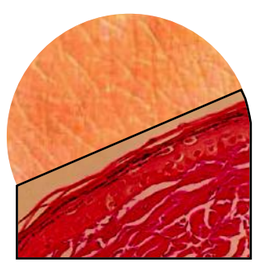
Trehalose is a non-glycosylating disaccharide, commonly present in the ***organisms capable of outliving in dehydrated state*** and which accumulates in some organisms as a consequence of a stress.
Mushrooms, insects and certain vegetables can, in situation of thermal or osmotic stress, survive a state of full dessication, by storing this sugar.

ATACAMA DESERT

SAME DESERT
AFTER A SHORT WHILE



HIGHLY DEHYDRATED SKIN
FURTHER TO HYDROUS STRESS



NORMALIZED SKIN

Silanol : biomoisturizer vehicle

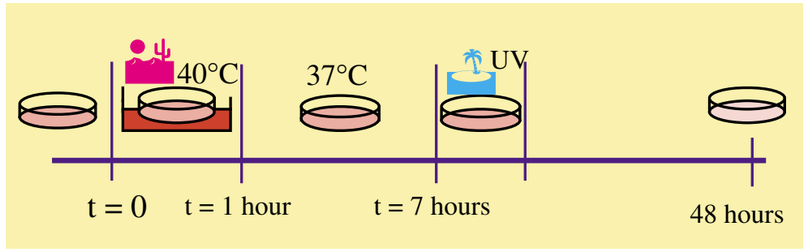
The ***Silanol*** is a moisturizing agent which forms hydrogen bonds with surrounding water molecules. This «linked water» creates a sphere of hydration which constitutes a reserve of water for a long lasting moisturizing effect on the skin.
But beyond this mechanism, proper to all moisturizers, the ***Silanol*** works in depth due to its action on the connective tissue, it favors the formation of ***a healthy tissue which moisturizing capacity is maximized.***

EXSYMOL

Anti-dehydratation effect, on skin exposed to extreme conditions during hydrous stress

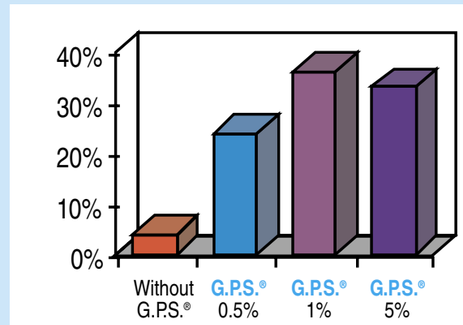
Potentiation of the effect of heat shock proteins, cells protecting proteins

A momentary stress, such as a few degree increase of temperature, stimulates the cell process and increases the synthesis of heat shock proteins and trehalose.



The model consists in submitting cultured keratinocytes to a temporary slight increase of temperature (3°C during 1 hour) to set up a very light stress, then culture these cells for 6 hours in a medium containing, or not, G.P.S.®
After 6 hours, the culture medium is eliminated and replaced by a saline solution and the cells are then exposed to UVB irradiations. The cell viability is assessed after 48 hours.
The introduction of G.P.S.® in the culture medium reinforces the natural thermo-protecting effect of heat shock proteins. *G.P.S.® is therefore an active suitable for highly dehydrated states which improves the cell resistance to different stresses such as UV irradiations, dehydration, or oxidative stress.*

IMPROVEMENT OF CELL VIABILITY OBSERVED ON KERATINOCYTES SUBMITTED TO A UV STRESS SUBSEQUENT TO A THERMAL CONDITIONING.



Affinity of G.P.S.® for cell membranes

The ***trehalose*** must usually be used at high concentration to exert its protecting effect, notably during the lyophilization process. This is probably due to its lack of affinity for the cell membranes : its site of action.

G.P.S.®, due to the natural affinity of the ***Silanols*** for the membrane phospholipids, is capable of carrying ***trehalose*** to its action site.

Some experiments have shown that cells incubated at 37°C with G.P.S.® fix about 10% of the trehalose and silicon supplied by the active.

This experiment confirms that G.P.S.® «targets» the plasmic membrane and thus favors the effect of trehalose at the level of the lipid bilayers.

G.P.S. ® CAN ACT WHERE THE ACTION IS NECESSARY AND IMPROVE THE RESISTANCE OF THE CELLS AGAINST STRESS

EXSYMOL

Tolerance study

The tests performed showed that the product is neither toxic nor irritant.

The tolerance has been studied *in vitro* by alternative methods on both cell culture and reconstituted epidermis. The ocular tolerance is evaluated by studying the cytotoxicity on cornea-isolated fibroblasts culture. The cutaneous tolerance is evaluated on reconstituted epidermis by measure of the cell viability after a contact period of 24 hours with the product.

Formulation

G.P.S.® is stable for pH included between 3.5 and 6.5. The suggested concentration is of 3 to 6 %. The product is incompatible with calcium salts and concentrated alcohols.

Importante remark : G.P.S.® must not be stored at temperature inferior to 0°C otherwise an irreversible polymerization might occur.

Existing Studies
(available upon request)

Technical Document
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G.P.S.® in cosmetics
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G.P.S.® : Anti-hydrous stress and potentiation of the natural protecting effect of heat shock proteins
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Effect of **G.P.S.®** on HSP 72 expression in a reconstituted epidermis exposed to UV (sun radiations model)
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Tolerance data

EXSYMOL S.A.M. - 4 avenue du Prince Héréditaire Albert - MC 98000 MONACO
Tél. : +377 92 05 66 77 - Fax : +377 92 05 25 02
E-mail : exsymol@exsymol.com - Internet : http://www.exsymol.com

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