



TRI-SOLVE®

Paving the way
to beauty

Sinerga
SKIN EVOLUTION

BECOMING SENSITIVE



In **industrialized countries**, we have been observing an increasing trend towards sensitive skin for years.

Sensitive skin is prone to **irritation, flare-ups and redness**, due to its **damaged barrier layer**.

Skin physiology could be impaired by different **factors**:

- **Physical** (temperature, radiation, clothing and shoes)
- **Chemical** (working substances, water and dissolved substances, cosmetics)
- **Biological** (germs, nutrition, hormones, genetics)

Aging, as involves physiological changes, is also responsible for the increase of skin's sensitivity.

NORMAL SKIN

SENSITIVE SKIN

Efficient hydrolipidic film

Regular dermo-epidermic junction

Low TEWL

Impaired hydrolipidic film

Thinner dermo-epidermic junction

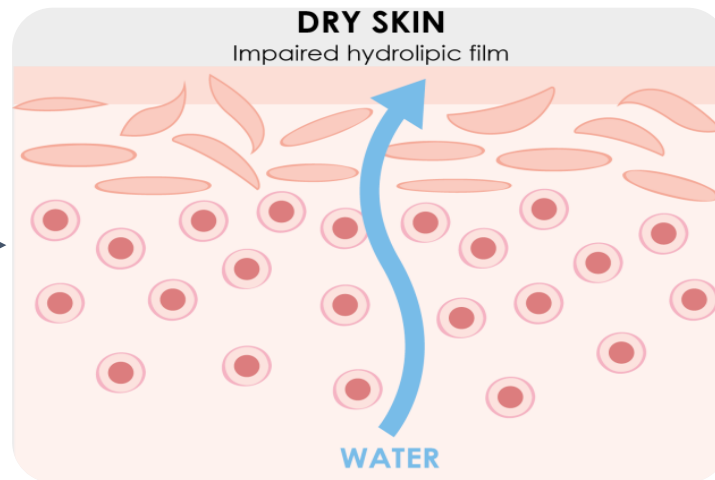
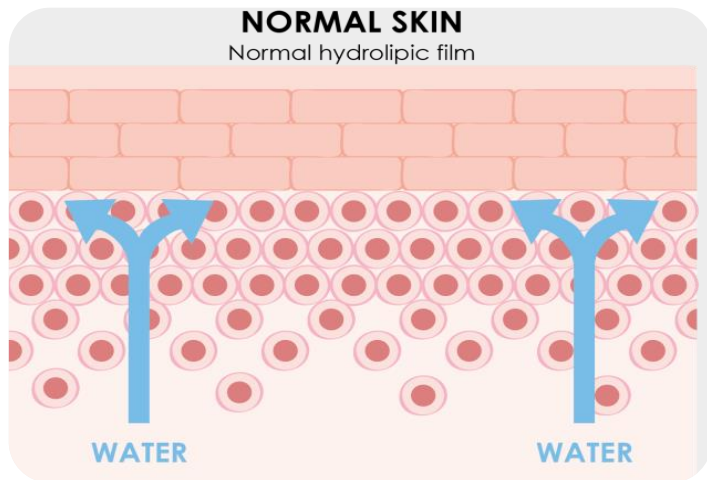
Dehydration



DEHYDRATION



- 20% of the total water content is stored in the skin
- 60-70% of skin water is in the dermis
- Water is important for the structures and mechanical properties of many proteins and their mutual interactions
- The ability of the skin to hold water is primarily related to the stratum corneum, which plays the role of barrier to water loss.



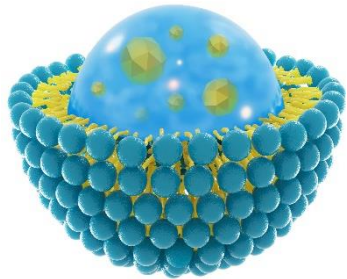
A dehydrated skin is more exposed to external agents.

In order to maintain a healthy skin is fundamental to restore a normal skin condition.

TRI-SOLVE®

A **skin barrier recovery agent** obtained by a patented vehiculation technology that allows to form extremely stable nano-structures to better deliver its active compounds.

The combination of an intracellular lipid component (ceramides) and a sugary humectant agent (trehalose) makes Tri-Solve the perfect ingredient to **restore the stratum corneum** and **inhibit dehydration damages**.



Claims

Improves barrier homeostasis

Skin barrier recovery agent

Restores inter-cellular lipids

Hydrating & moisturizing agent

TECHNICAL DATA

INCI Name Tri-Solve:

Trehalose, Cholesterol, Ceramide NS, Hydrogenated Lecithin

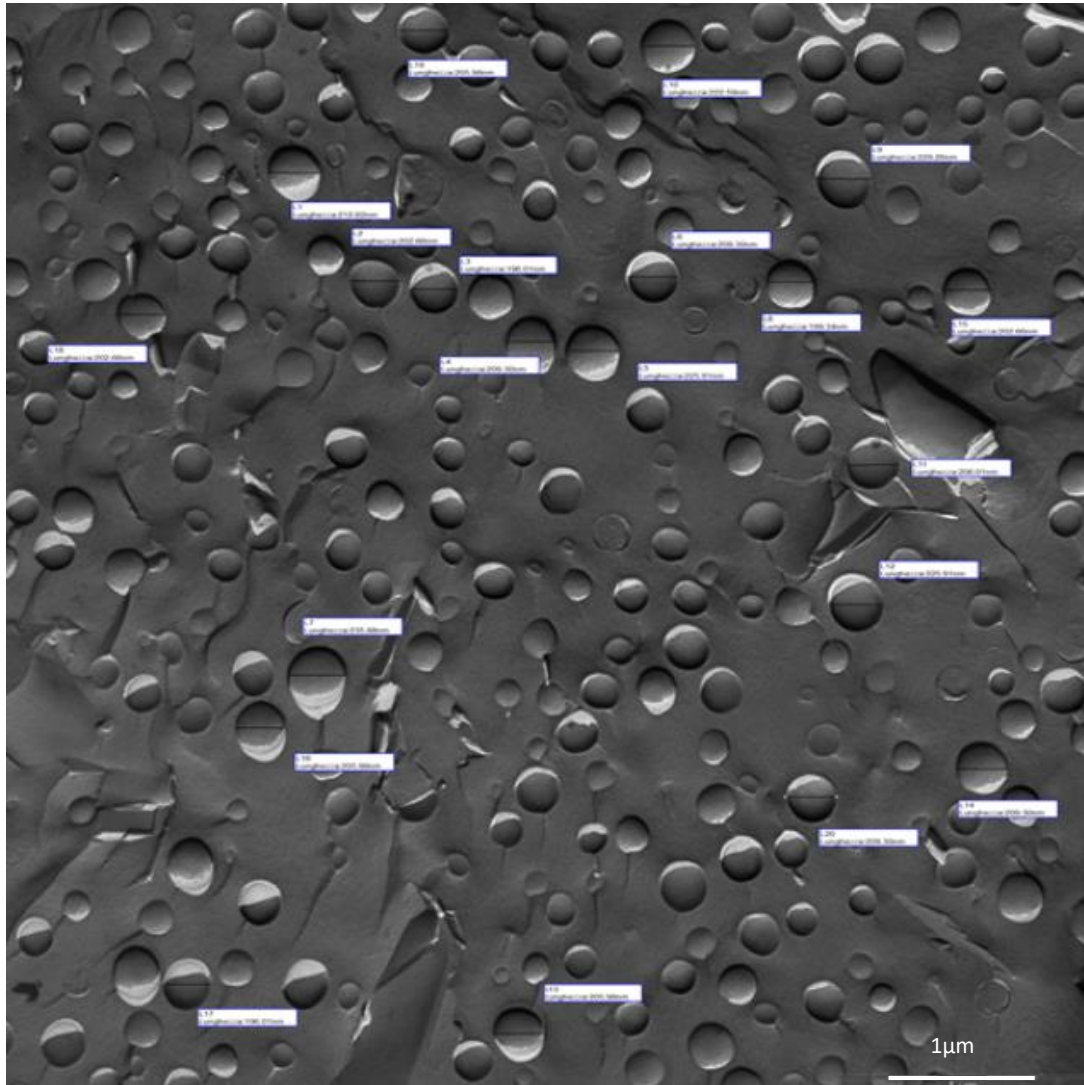
INCI Name Tri-Solve P:

Trehalose, Phytosterols, Ceramide NS, Hydrogenated Lecithin

Aspect:	viscous gel
Colour:	from yellow to amber
Odour:	characteristic
pH (10% sol.):	4.50-7.50
Suggested dosage:	1-3%
Preservation:	Preservative free



TRI-SOLVE[®] TECHNOLOGY:



Tri-Solve is the product of a patented vehiculation technology^[9] that allows to **form extremely stable nano-emulsion**.

Thanks to the formation of these nano-structures, Tri-Solve is able **to deliver the active compounds** contained in its droplets into the lower layer of *Stratum Corneum*. The final effect is **a faster and more effective** reconstruction of the natural skin structure.

FIGURE: TEM image of a cryo-treated sample of TRISOLVE. The average diameter of the nano-structures is 209 nm.

9. Italian patent P02900/IT, *Cosmetic and dermatopharmaceutical compositions for preventing and restructuring alteration of the natural skin barrier*.

TRI-SOLVE® :

1. Threalose

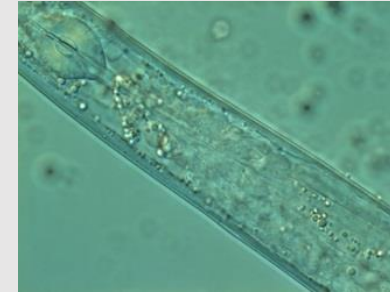
Trehalose is a non-reducing disaccharide obtained by the linkage of two glucose units, fundamental in the anhydrobiosis process.

It is present in a wide variety of organisms where it may serve as:

- Source of energy
- Component of glycolipids which constitutes cell wall structures
- Protector of proteins and cellular membranes from inactivation or denaturation caused by oxidation, desiccation, dehydration, heat and cold^[1]

ANHYDROBIOSIS

Mechanism that allows to some organism to survive even when the 99% of their water content is removed.



APHELENCHUS AVENAE

This nematode, if slowly dehydrated, converts as much as 20% of its dry weight into trehalose.^[2]



SELAGINELLA LEPIDOPHYLLA

This plant, known as “resurrection plant”, uses trehalose in order to survive to extreme dehydration.^[3]



ARTEMIA (BRINE SHRIMP)

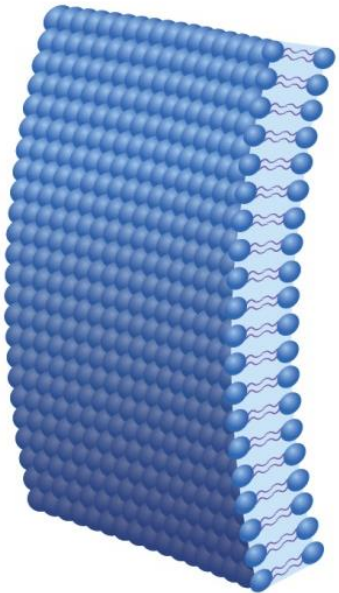
Artemia is a micro-crustacean. Also for this animal, Trehalose is at the basis of its anhydrobiotic capability.^[4]

1. A. D. Elbein, Y. T. Pan, I. Pastuszak, D. Carrol, “New insights on threalose: a multifunctional molecule”, *Glycobiology*, 4 (13), **2003**, 17-27.
2. K. A. C. Madin. J. H. Crowe, “Anhydrobiosis in nematodes: carbohydrate and lipid metabolism during dehydration”, *J. Exp. Zool.*, 193, **1975**, 335-342
3. R. Zentella, J. O. Mascordo-Gallardo,, P. Van Dijck, J. Folcj-Mallol, B. Bonini, C. VanVaeck, R. Gaxiola, A. A. Covarrubias, J. Sotelo, J. M. Thevelein, G. Iturriaga, “ A *Selaginella lepidophylla* trehalose-6-phosphate synthase complements growth and stress-tolerance defects in a yeast *tps1* mutant”., *Plant. Physiol.*, 119, **1999**, 1473-1482
4. A. C. Leopold, “Membranes, metabolism and dry organisms.”, *Cornell University Press, Ithaca, NY*, **1986**, 1-377

TRI-SOLVE® :

Thanks to its triple action, Trehalose is able to **completely suppress the damages induced by dehydration** on our skin. This aspect makes it the best choice in formulating products for dry and sensitive skin.

LIPID BILAYER



During the dehydration, lipid bilayers are subjected to two stress mechanisms:

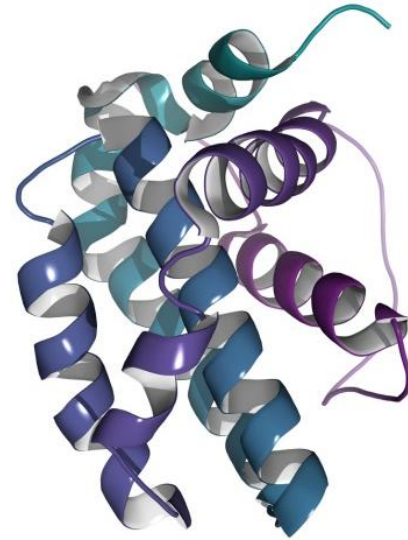
FUSION OF VESICLES:
trehalose is able to inhibit the fusion between vesicles during the dehydration;^[5]

LIPID PHASE TRANSITION:
trehalose maintains lipids in their liquid crystalline phase in absence of water depressing lipid phase transition.^[5]

PROTEINS

Extreme dehydration induces denaturation of proteins:

PROTEIN DISSOCIATION:
Trehalose is a non-reducing sugar so it is able to bind to proteins without undergoing the typical browning reaction with protein aldehyde sites. In this way it stabilizes proteins during extreme drying, avoiding their dissociation.^[6]



5. J. H. Crowe, L. M. Crowe, "Lyotropic effects of water on phospholipids." In: F. Franks (ed.), *Water science reviews*. Cambridge University Press, Cambridge, England, **1990**, 1-23.

6. J. F. Carpenter, J. F. Crowe, "An infrared spectroscopic study of the interactions of carbohydrates with dried proteins.", *Biochemistry*, 28, **1989**, 3916 ± 3922.

TRI-SOLVE® :

2. Ceramides

Ceramides are one of the principal constituent of Stratum Corneum: they make up about the 50% of the lipidic content of the skin. [7]

Ceramides act as a water modulator and a permeability barrier by forming multi-layered lamellar structures with other lipids between cells in the SC layers. [8]



7. R. Darlenski, J. Kazandjieva, N. Tsankov, "Skin Barrier Function: Morphological Basis And Regulatory Mechanisms", J Clin Med., 4(1), 2011, 36-45.

8. G. Imokawa, K. Ishida, "Role of Ceramide in the Barrier Function of the Stratum Corneum: Implications for the Pathogenesis of Atopic Dermatitis", J Clin Exp Dermatol Res, 2014, 5(1),

EFFICACY TESTS



- Hydration (*corneometer*)
- TEWL reduction (*tewameter*)

Protocol



15 volunteers, 18-60 years old, with atopic skin



Baseline, 3 days, 1 week, 2 weeks, 4 weeks



Twice a day

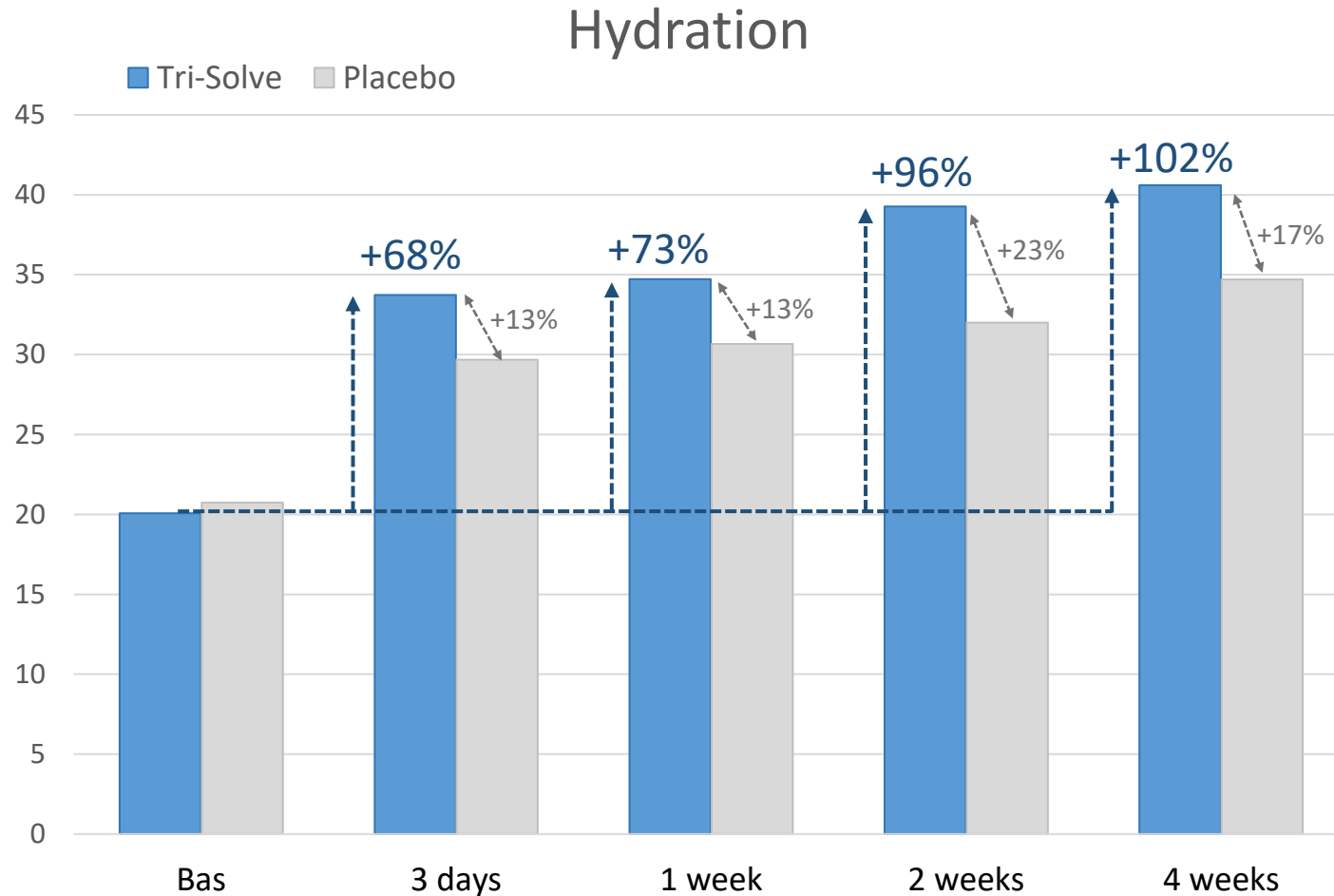


Limbs



2% TRISOLVE Vs Placebo, double blind

HYDRATION



2% Trisolve is able to **effectively improve skin hydration:**

+ 68% after 3 days

+ 102% after 4 weeks

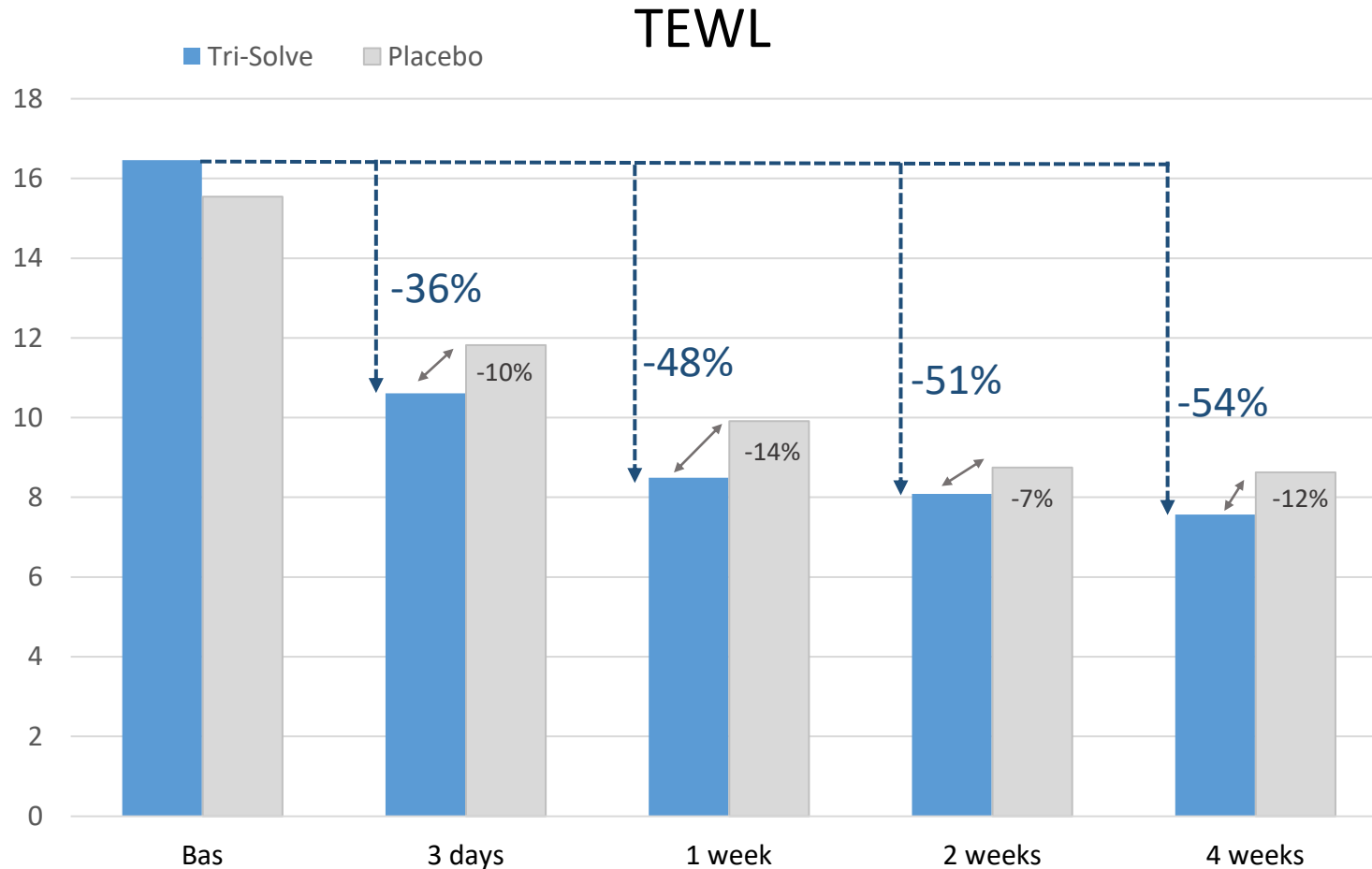
It is also **more effective** compared to **placebo:**

+ 13% after 3 days and 1 week

+ 23% after 2 weeks

+17% after 4 weeks

TEWL



2% Trisolve is able to **reduce skin TEWL:**

- **36% after 3 days**
- **54% after 4 weeks**

It is also **more effective** compared to **placebo:**

- **10% after 3 days**
- **14% after 1 week**
- **7% after 2 weeks**
- **12% after 4 weeks**

Evaluation of the Filming and Protective Properties of a New Trehalose and Ceramides Based Ingredient

Trisolve has been subject of a **scientific article** published on **Cosmetics**: an international, scientific, peer-reviewed, open access journal on the science and technology of cosmetics published by **MDPI**.

[“Evaluation of the Filming and Protective Properties of a New Trehalose and Ceramides Based Ingredient”](#)

Abstract:

The aim of this study is showing the filming and skin barrier protective properties of a new ingredient based on ceramides and trehalose and carried in lipophilic vesicles composed of lecithin and cholesterol (or phytosterols). Through an in vivo study, the restructuring and hydrating properties of this trehalose and ceramides compound have been evaluated. Furthermore, this new ingredient has been used in a topical formulation for atopic dermatitis, proving to be effective in the alterations of skin barrier. This evidence makes it an interesting ingredient for topical dermatological compositions in the treatment of dermatitis and all manifestations correlated to these skin disorders, such as edema, swelling, rash, redness, and itching. Its soothing and protective action against the painful and annoying symptoms like those given by dermatitis makes this trehalose and ceramides based ingredient for topical use.

FORMULATION GUIDELINES

Intensive repairing treatment	LSIN8287		
Ingredients		Phase	%
Aqua		A	To 100
Panthenol			0,50
Glycerin			0,50
Disodium EDTA			0,10
Sodium Hyaluronate		A'	0,10
Xanthan Gum		A''	0,30
Prolix RB (Polyglyceryl-3 Rice Branate)		B	5,50
Cetearyl Alcohol			3,00
Prunus Amygdalus Dulcis Oil			4,00
Caprylic/Capric Triglyceride			4,00
Butyrospermum Parkii Butter			2,00
Dimethicone			1,00
Simmondsia Chinensis Seed Oil			1,00
Tocopheryl Acetate			0,10
Lecithin, Tocopherol, Ascorbyl Palmitate, Citric Acid			0,05
Avenolat (Aqua, Avena Sativa Kernel Extract, Potassium Palmitoyl, Hydrolyzed Oat Protein)		C	2,00
Bisabolol		D	0,20
TRI-SOLVE® (Trehalose, Ceramide NS, Cholesterol, Hydrogenated Lecithin)		E	1,00
Leniphenol® (Pinus Radiata Bark EXTRACT)		F	2,00
Lactic Acid		G	0,09
Preservative		H	qb

Intensive treatment able to create a **protective film** to shield skin from external aggressions, while also deeply **repairing skin barrier structure** thanks to Tri-Solve®. This formulation is especially created for both protecting skin and preventing it from breaking or irritating.

Aspect:	Semi-consistent emulsion
Color:	Beige
Odor:	Characteristic
pH:	5.0 – 5.5
Viscosity with Brookfield Sp 5 RPM 10	15000-20000 mPa·s

METHOD

Heat phase A at 75°C. Add A' and A'' under fast stirring. Heat phase B at 75°C. Add phase B to A under fast stirring until it forms a homogeneous system. Cool down and add the other phases under slow stirring until it forms a homogeneous system.

FORMULATION GUIDELINES

Deeply hydrating emulgel

Ingredient	Phase	%
Aqua	A	to 100
Bisodium EDTA		0.10
Carbomer		1.00
Acrylates/C10-30 Alkyl Acrylate Crosspolymer		0.15
NANOCREAM (Potassium Lauroyl Wheat Amino Acids, Palm Glycerides, Capryloyl Glycine)	B	2.00
Dimethicone		1.50
Dicaprylyl Carbonate		3.00
Sodium Hydroxide	C	q.b.
RED ALGA GEL® EC (Ahnfeltiopsis Concinna Extract)	D	3.00
MINTIOL (Parfum)	E	2.00
TRI-SOLVE® P (Ceramide NS, Trehalose, Phytosterol, Hydrogenated Lecithin)	F	2.00
Parfum	G	0.20
Blue colorant	H	q.b.

A facial jelly cream able to offer a **bouncy texture** (Nanocream) that encourage consumers to add an extra step to their routine; indeed, both its texture and its color can **enhance cooling** (Mintiol) and **hydrating** claims, and better confer the concept of **dewy-saturated skin**. Its deep hydration (Red Alga Gel® EC and Tri-Solve® P) improve the plump sensation on skin and therefore **increase light reflection**, for a glowing appearance.

Aspect	emulgel
Color	light blue
Odor	characteristics
pH	6.0 - 6.5
Brookfield viscosity SP 6 RPM 20	20000 - 50000 mPa*s



TRI-SOLVE®

Thank you for your
attention

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SKIN EVOLUTION