NANOVETORES

NV VITC MAP

Active Ingredient:

Magnesium Ascorbyl Phosphate

Benefits

- Hydration
- Antiaging
- Restore skin firmness
- Antioxidant action

Applications

- Emulsions
- Creams
- Serums
- Lotions

Preservative Free

Vegan

PRODUCT DESCRIPTION

NV VitC MAP is an active ingredient that contains nanoencapsulated magnesium ascorbyl phosphate in biopolymer capsules larger than 200 nm, which offers multiple benefits for the skin. This compound is an ascorbic acid derivative that acts as a powerful brightener and antioxidant, fighting damage caused by free radicals and preventingpremature aging caused by sun exposure. In addition, it stimulates collagen synthesis, a vital protein for maintaining the structure, elasticity and skin firmness.[1,2]

The nanoencapsulation technology used in NV VitC MAP significantly improves the cutaneous permeability of magnesium ascorbyl phosphate, a compound that naturally finds challenges to permeate into the skin.

Likewise, the technology enhances the effectiveness of the active ingredient by protecting it against oxidation, ensuring that its beneficial properties are maintained during use. This innovation also allows NV VitC MAP to be incorporated into cosmetic formulations with a transparent appearance, which is a significant advantage for this active, given the challenges of achieving transparency with ascorbic acid and its derivatives. Consequently, NV VitC MAP creates new possibilities for formulators seeking to develop advanced and innovative cosmetic solutions that meet market demands for both functional and visually appealing products.

ACTIVE INGREDIENT DESCRIPTION

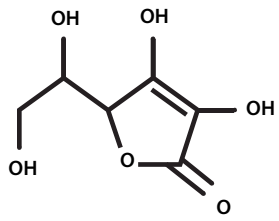
Vitamin C is a water-soluble and heat-labile vitamin that is highly valued in cosmetic and dermatological products for its remarkable benefits to the skin. However, ascorbic acid, its most active form, faces significant stabilization challenges due to its sensitivity to pH and light exposure, which can lead to rapid degradation[2]. To address this issue, more stable derivatives of ascorbic acid have been developed, each with unique structural characteristics.

Among these derivatives, ascorbyl palmitate stands out for its superior stability compared to ascorbic acid, although its conversion to L-ascorbic acid, the most effective form of vitamin C, is limited. Conversely, magnesium ascorbyl phosphate, despite being more stable than ascorbic acid, faces challenges in effectively penetrating the stratum corneum. These structural characteristics of the derivatives directly influence the efficacy and applicability of vitamin C in cosmetic formulations, underscoring the importance of selecting the appropriate derivative based on the specific goals of the product.

Magnesium ascorbyl phosphate is a derivative of ascorbic acid frequently used in cosmetic and dermatological products due to its superior chemical stability compared to ascorbic acid. Its molecular structure is formed through the esterification of a hydroxyl group with an inorganic chain. This reaction protects the enediol ring in the compound from degradation, enhancing the stability of the derivative, although it does not necessarily improve its skin permeability[2,3,4]. To address this limitation, Nanovetores encapsulation technology offers an effective solution by reducing the particle size of the active ingredient, facilitating its penetration into the skin. Moreover, the technology maintains the active substance within biocompatible nanocapsules, ensuring its stability and allowing for gradual and controlled release of the product.

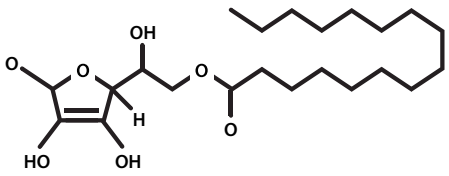
Compound name	Molar Weight	% of Ascorbate	1g of the compound contains X g of Ascorbate
Ascorbic Acid	176.12 g/mol	100	1
Magnesium Ascorbyl Phosphate	289.5 g/mol	60.8	0.608
Ascorbyl Palmitate	414.5 g/mol	42.5	0.425

Chart 1. Vitamin C characteristics on its diffrent forms.



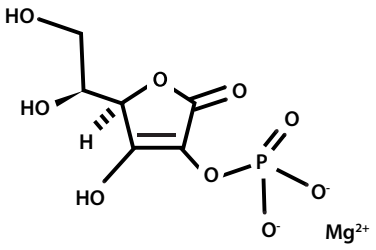
Ascorbic Acid

Compound name: L-Ascorbic Acid CAS: 50-81-7
Molar weight:178,12 g/mol



Ascorbyl Palmitate

Compound name: L-Ascorbyl-6-palmitate CAS: 137-66-6
Molar weight:414,5 g/mol



Magnesium Ascorbyl Phosphate

Compound name: L-Ascorbic acid-phosphate sesquimagnesium CAS: 113170-55-1
Molar weight:289,5 g/mol

ACTION MECHANISM

Due to the action of stearase enzymes present in the epidermis, magnesium ascorbyl phosphate reacts with these enzymes and releases ascorbic acid into the skin, enabling it to perform its functions. These functions include inhibiting melanogenesis, stimulating collagen production, and protecting against damage caused by free radicals.

Melanogenesis Inhibition and Antioxidant Action:

NV VitC MAP acts by inhibiting melanogenesis, a process that occurs in melanocytes located in the basal layer of the NV VitC MAP acts by inhibiting melanogenesis, a process that occurs in melanocytes located in the basal layer of the epidermis. Tyrosinase, a key enzyme, is responsible for activating these melanocytes and plays a crucial role in controlling melanin production. By inhibiting tyrosinase activity, NV VitC MAP effectively reduces melanin production, promoting spot lightening and evening out skin tone. This approach not only helps to diminish existing pigmentations but also prevents the appearance of new hyperpigmented areas[2,3,4].

Another way in which magnesium ascorbyl phosphate acts in inhibiting melanogenesis is by modulating the expression and function of TRP1 and TRP2 proteins, which are involved in regulating melanin formation. In addition, its antioxidant properties help neutralize free radicals, thereby reducing excessive melanin production in response to oxidative stress. These combined mechanisms result in reduced melanin production and, consequently, a more even skin tone[5].

Collagen Synthesis

NV VitC MAP stimulates collagen synthesis through its active form, ascorbic acid, which acts as a cofactor for the hydroxylation of proline and lysine, enzymes stabilizing and cross-linking collagen molecules, thereby providing strength and elasticity to the skin. Another mechanism by which vitamin C influences collagen synthesis is through the stimulation of lipid peroxidation. The resulting product of this process, a monoaldehyde, further enhances collagen gene expression[6,7].

DECAY OF MAGNESIUM ASCORBYL PHOSPHATE CONTENT DURING STABILITY STUDY

• **Active Ingredient dosed:** Magnesium Ascorbyl Phosphate

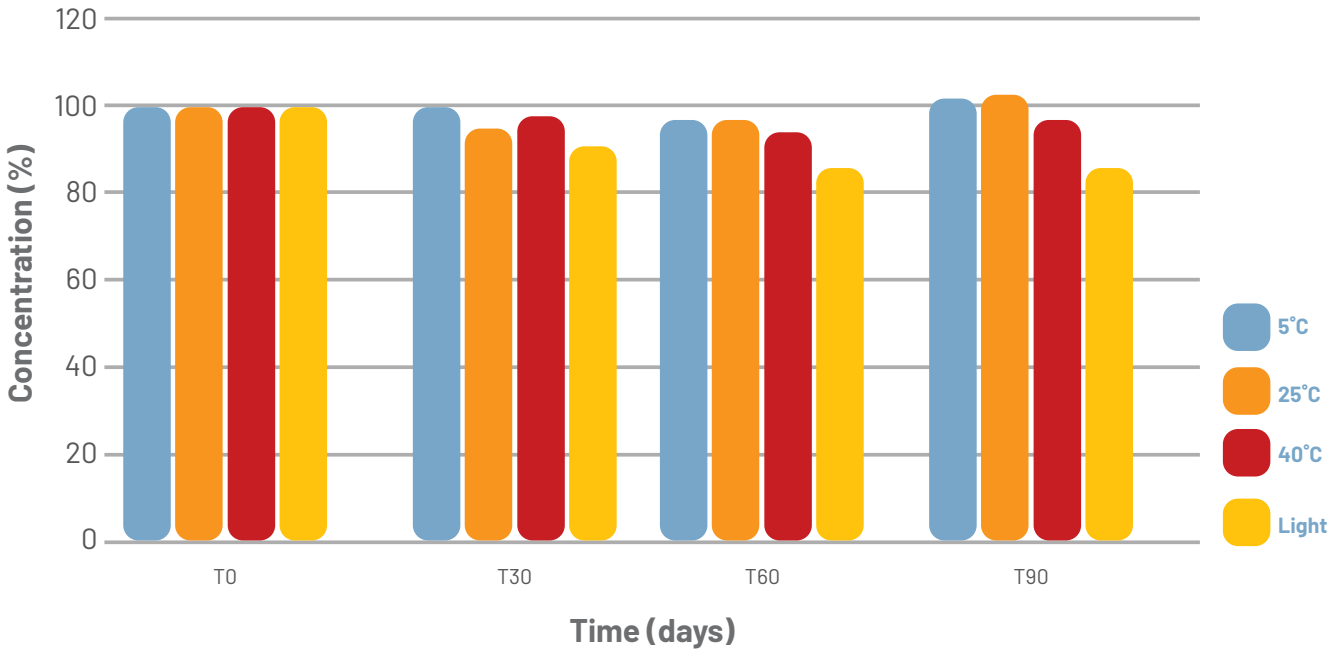
• **Analysis conditions:** 5°C; 25°C, 40°C and Sunlight

• **Technique:** HPLC (High Performance Liquid Chromatography)

In a stability test, the analysis of the variation in the concentration of the nanoencapsulated active ingredient Magnesium Ascorbyl Phosphate was carried out considering temperature variation and exposure to sunlight.

Results: Variation in the active ingredient Magnesium Ascorbyl Phosphate concentration considering the initial time (initial T) as 100%.

Conclusion: Based on the results of the tests using the HPLC technique, the result in 90 days at 40°C of the encapsulated active ingredient showed 97.39% of magnesium ascorbyl phosphate content during the stability study, proving the stability of the active ingredient and preserving all the properties and benefits of Magnesium Ascorbyl Phosphate.



Graph 1: Analysis of the content of Magnesium Ascorbyl Phosphate by HPLC, in NV VitC MAP samples exposed to conditions of 5°C, 25°C, 40°C and sunlight, at 0 day, 30 days, 60 days and 90 days.

In vitro study

COLLAGEN SYNTHESIS STIMULATION

The objective of the in vitro test was to evaluate and compare the potential of Ascorbyl Magnesium Phosphate and NV VitC MAP to stimulate the production of type I collagen using a human dermal fibroblast cell culture.

In this study, human fibroblast cell culture were distribuin culture dishes. Before analyzing collagen production, a preliminary cytotoxicity test was performed to determine the appropriate concentration of the study. Thus, a concentration of 1.0% was selected for the samples of Ascorbyl Magnesium Phosphate and NV VitC MAP in culture medium for the study and after quantitative analysis, the control group, which was a supplemented culture medium, was normalized to 100%.

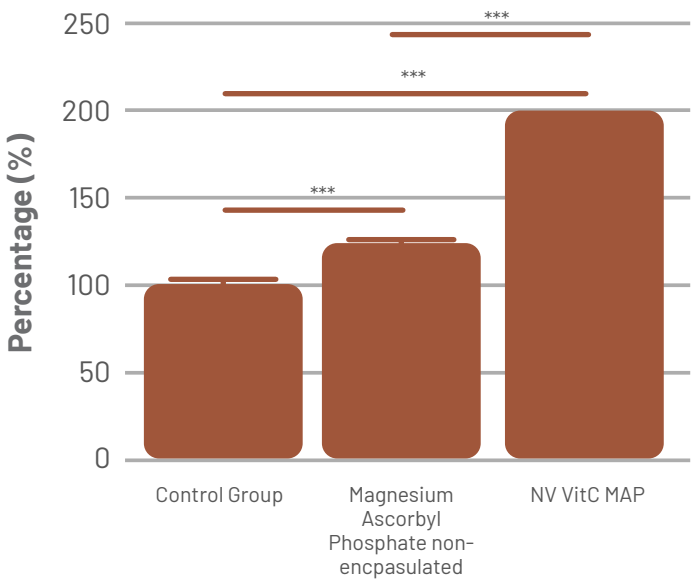
Ascorbyl Magnesium Phosphate, in its non-encapsulated form, showed a 25.2% increase in the expression of type I collagen when compared to the control group.

NV VitC MAP showed a 94.5% increase in type I collagen expression compared to the control group and a 3.75-fold increase in expression compared to free Magnesium Ascorbyl Phosphate, even at a concentration 33 times lower than the non-encapsulated version.

Based on the results obtained, it can be concluded that the NV VitC MAP sample presented superior results compared to the non-encapsulated active ingredient sample, which is associated with a greater potential to stimulate collagen production.

3,75X

more effective than non-encapsulated active ingredient



REGULATORY INFORMATION

INCI Name	CAS Number	EINECS Number
AQUA	7732-18-5	231-791-2
MAGNESIUM ASCORBYL PHOSPHATE	114040-31-2	-
PROPANEDIOL	504-63-2	207-997-3
DISODIUM EDTA	139-33-3	205-358-3
1,2-HEXANEDIOL	6920-22-5	230-029-6
ALGIN	9005-38-3	-
CAPRYLHYDROXAMIC ACID	7377-03-9	230-936-7
CALCIUM CHLORIDE	10043-52-4	233-140-8

Aspect (25°C)	Low viscosity liquid, transparent to almost transparent
Color	Transparent - yellowish
Odor	Characteristic
Density 25°C g/mL	0.9 to 1.1
pH	5.5 to 8.5
Dispersibility	Dispersion of encapsulated active ingredients in water.

How to use: Shake well before using. Add to formulation below 40°C, under light to moderate stirring, at desired concentration. Once opened, preferably consume the entire contents of the bottle.

Usage Concentration: 1.0 to 20%

Compatibilities: Compatible with emulsions, creams and lotions.

Incompatibility: Ethanol and other organic solvents.

pH Stability: 5.5 to 8.5

Storage: Keep it in a ventilated place, away from light and heat.

Our production process is based on Green Chemistry, being water-based and free of organic solvents, totally sustainable. We do not generate waste that could be harmful o users or the environment

We do not test on animals. All tests are conducted in trustworthy laboratories with human volunteers.

Essential oils, Vitamins, Acids and Natural Extracts are highly oxidative substances that degrade quickly and react constantly with the medium and other cosmetic compounds (light, oxygen, packaging, preservatives, fragrances, surfactants, etc.). By encapsulating it, we guarantee the stability of the active ingredients and protect them from potential reactions with the formulation or the environment.

References

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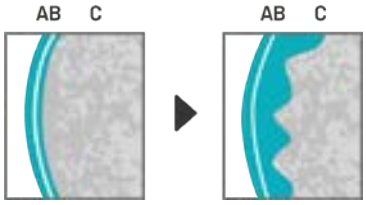
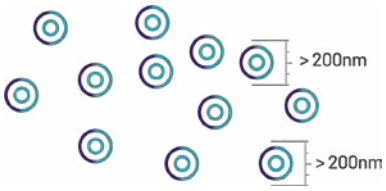
Nanovetores Encapsulation Technology

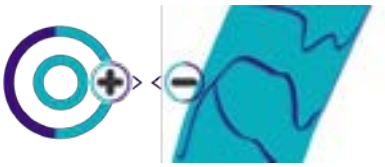
Active Ingredient Protection against oxidation resulted from interaction with external environment and other components of the cosmetic formulation.



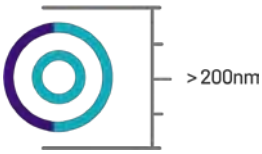
Greater Permeation on the contact surface due to the small size of the capsule.



Monodispersity, that ensures control of the particle size, providing adequate permeation to its proposed action.



Surface Charge Control of the particle, promoting greater affinity with the contact surface.



Secure Particle larger than 200nm, biocompatible and biodegradable.

Water Base . Active ingredients are manufactured without the use of organic solvents, ensuring safety for users and the enviroment.

Use Encapsulated Actives Ingredients and Ensure:

- Stability Improvement;
- Increased compability in the formulation;
- Occlusion of odors;
- Increased skin permeation;
- Reduced dose;
- Use of sensitive active ingredients (withou refrigeration);
- Increased Solubility;
- Prolonged release;
- Increased effectiveness.

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