



Haematococcus pluvialis *AS A COSMETIC INGREDIENT*

COSMETICS

Article published in issue 043 of Industria Cosmética.

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The cosmetics industry is undergoing a transformation towards highly effective, sustainable, and naturally derived ingredients. Astaxanthin, produced by the microalga *Haematococcus pluvialis*, stands out for its high antioxidant capacity, its ability to repair sun damage, and its excellent safety profile.

This white paper presents scientific results from cell assays, advanced delivery technologies (etosomes and Skin Diver®), and biotechnological processes for cultivation and extraction. The data demonstrate that esterified natural astaxanthin offers clear benefits in dermocosmetic applications, especially in photoprotection, cell repair, and anti-aging formulations.

1. HAEMATOCOCCUS PLUVIALIS: A COSMETIC BIOFACTORY

Haematococcus pluvialis is recognized as the largest natural producer of **astaxanthin**. Its life cycle features four cell morphologies, allowing it to direct its metabolism towards the maximum accumulation of the carotenoid.

Key cultivation phases:

- Vegetative growth under **controlled conditions**
- **Induction of stress** through nutrient restriction
- Massive accumulation of astaxanthin in **48-72 hours**
- Extraction of oleoresin containing **10% astaxanthin**. This cultivation system yields a 100% natural ingredient, rich in antioxidant compounds, highly standardizable, traceable, and sustainable.



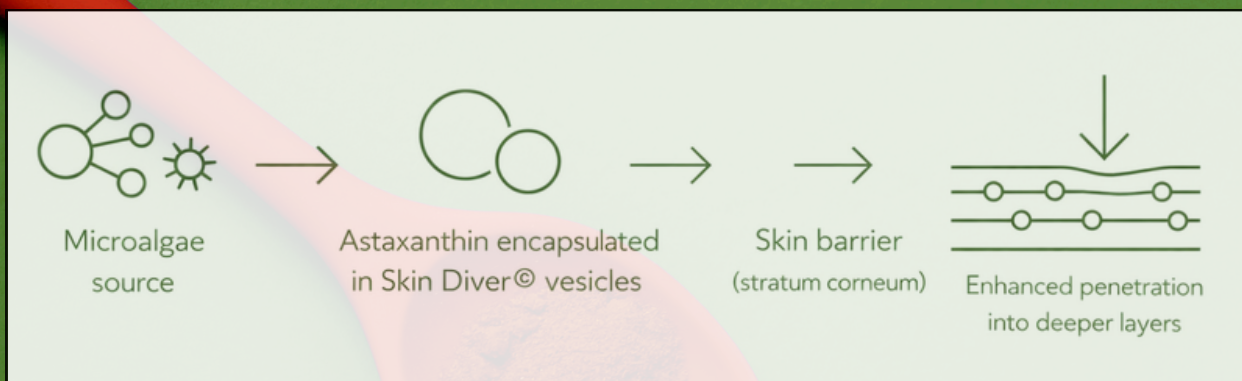
2. INTELLIGENT VEHICLE TECHNOLOGY:

SKIN DIVER®

Delivery technology, developed by Neoalgae, capable of:

- **transporting lipid extracts** from microalgae,
 - **improving penetration into deeper layers**,
 - functioning under both occlusive and non-occlusive conditions,
- increasing vesicular elasticity**,
- crossing the skin barrier, and **improving the bioavailability of lipophilic actives**.

Skin Diver® offers a clear competitive advantage for **high-potency actives** such as astaxanthin.



3. IN VITRO ASSAY: REPAIR OF SOLAR DAMAGE IN HaCAT CELLS

One of the most solid results of the document is an in vitro study that evaluates the repairing effect of *H. pluvialis* Skin Diver after solar irradiation.

Extract at 4 concentrations: 0.02% - 0.01% - 0.005% - 0.0025%

Cell viability results (MTT)

Increase compared to irradiated control (C-IRR = 100%):

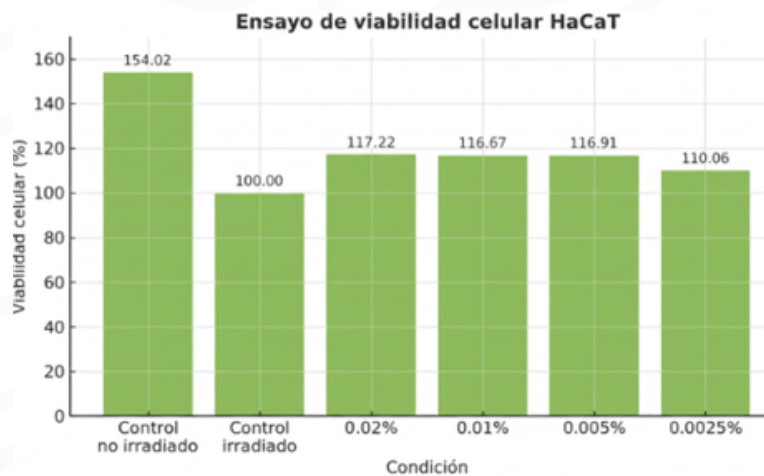
- 0,02% -> 117,22% ± 8,91
- 0,01% -> 116,67% ± 10,00
- 0,005% -> 116,91% ± 13,90
- 0,0025% -> 110,06% ± 14,80
- Non-irradiated control (C-): 154,02% ± 3,86

Experimental model

- HaCaT cells (human keratinocytes)
- Irradiation: 10 J/m² de luz solar (UVB + UVA + VIS + IR)

Comparison between

- Non-irradiated control (C-)
- Irradiated control (C-IRR)



Skin Diver HP, the vehicle extract of *Haematococcus pluvialis*, demonstrates a remarkable capacity to **repair sun damage**, especially at higher concentrations (0.02–0.005%). At these levels, it increases cell viability by up to 16–17% compared to the negative control, demonstrating a powerful restorative effect.

Even at moderate concentrations, **Skin Diver HP** continues to show efficacy, providing up to 10% more cell viability compared to the control.

An active ingredient that **protects, revitalizes, and strengthens** the skin's resilience against sun stress.

Study conclusion

Natural astaxanthin in a carrier:

- promotes cellular recovery after UV stress,
- exhibits a significant restorative effect,
- It is a candidate asset for claims such as:
 - a. "sun damage repair"
 - b. "protection against photoaging"
 - c. "boosting cellular vitality"

4. DIRECT COSMETIC APPLICATIONS

Based on the results of the document, natural astaxanthin from *H. pluvialis* is suitable for:

- Sun protection and after-sun
- Repair after exposure
- Complementary antioxidant action
- Maintaining cellular function

5. STRATEGIC BENEFITS FOR BRANDS AND LABORATORIES

- It facilitates formulation
- Improves stability
- Superior antioxidant activity
- Sustainability
- Production with a low environmental footprint
- Microalgae cultivation that contributes to circular models
- Ingredient aligned with global ecological trends
- Natural extract with excellent tolerance
- Vehicle compatible with sensitive skin
- A natural alternative to synthetic antioxidants
- Proven effectiveness
- Solid in vitro data





6. CONCLUSIONS

- ***Haematococcus pluvialis*** is the most potent and sustainable source of **astaxanthin** for cosmetics.
- Its effectiveness is enhanced thanks to **Skin Diver©** technology.
- The trial at HaCaT demonstrates a real capacity to **repair sun damage**.
- It is an ideal active ingredient for **photoprotection, anti-aging** and **high-performance cosmetic formulations**.

7. CONTACT AND COLLABORATION

Neoalgae makes available to brands and laboratories:

- **Technical assistance** for formulation
- Supply of **standardized extracts**
- **Samples**
- Support for **technical and scientific documentation**
- Exploration of **custom projects**

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