

AHA FOR THE SKIN

CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID

CONTROLLED-RELEASE GLYCOLIC ACID FOR COSMETICS

The company

IRA - Istituto Ricerche Applicate



I.R.A. cosmetic and pharmaceutical laboratory was established by university professors and researchers and has been a benchmark for Italian innovation since 1983. Our main characteristic is not settling for anything less than the best. Our applied research laboratories are the core of our company. This is where, every day, we choose the highest quality to identify and develop revolutionary ideas and transform scientific research into state-of-the-art treatments. Innovating is a brave choice that has allowed us to have one of the market's most comprehensive product ranges with the highest quality standards.

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CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID

CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID results from a challenge transforming a **cyclodextrin** and **glycolic acid** complex into a powerful tool for cosmetic formulators. This complex gives the smallest **alpha hydroxy acid (AHA)** molecule a gentle exfoliating and smoothing effect on the skin, minimising irritation. This way, all the properties that make this fruit acid so widespread in modern cosmetics are kept intact.

The system

Based on **Cyclosystem Complex®**, this ingredient uses a slow-release system to deliver its active ingredients through cyclodextrins. Cyclodextrins are cyclic oligosaccharides formed by starch degradation by the Cyclodextrin-glucose-transferase enzyme (CGT). They are biotechnological products obtained from plant-derived materials. In addition to the remarkable moisturising properties typical of cyclic sugar molecules, cyclodextrins enhance the activity of the functional substance included in the complex, thanks to their controlled release. They also reduce irritation associated with free-form active ingredients. Moreover, cyclodextrins make included substances more stable and resistant to oxidation, thus improving their preservation and handling.

CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID introduces an innovative **system encapsulating glycolic acid into cyclodextrins**. This system ensures maximum **skin compatibility** and a gentle renewal effect for smoother, radiant skin. The advanced technology behind this ingredient allows it to fully exploit the benefits of glycolic acid, giving it the ideal versatility for a wide range of skincare products. In addition to its well-known exfoliating effect, this complex combines smoothing and brightening properties, overcoming traditional formulation compromises and the challenges associated with its use. This is a complete system that maximises the use of glycolic acid in the cosmetic and aesthetic fields.

Compared to free-form glycolic acid, this encapsulation system is an innovative approach that enhances its effectiveness in the cosmetic field with remarkable advantages, including the following:

- ✓ **reduced irritation:** this complex minimises adverse effects associated with free-form glycolic acid;
- ✓ **long-lasting efficacy:** this complex preserves all the beneficial properties of glycolic acid, maintaining its efficacy over time;

- ✓ **increased bioavailability:** the cyclodextrin complex is poorly absorbed by the skin; therefore, the slow release of glycolic acid increases its bioavailability while protecting it from external agents;
- ✓ **increased stability:** this encapsulation system improves stability when formulated in emulsions and gel products.

The ingredient

In a world continuously pursuing innovative substances, providing ingredients that meet market requirements and the highest quality, safety, and effectiveness standards is paramount. The characteristics, safety assessments, and claims of this complex are essential for meeting regulatory requirements and enhancing the properties of this product.

CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID has a full range of properties that protect the glycolic acid encapsulated into cyclodextrins to control its release onto the skin and enhance its effectiveness. The advantages offered by the controlled (and more consistent) release of the substance into the skin and its reduced aggressiveness compared to free-form glycolic acid make this complex ideal for body and skincare, ensuring remarkable results in products like creams, gels, lotions, and masks.

Composition

EU INCI	USA INCI	Composition %	CAS No.	EINECS No.
GLYCOLIC ACID	Glycolic Acid	25 - 50	79-14-1	201-180-5
CYCLODEXTRIN	Cyclodextrin	25 - 50	7585-39-9/17465-86-0	231-493-2/241-482-4

Features

Product specifications			
Type of test	Method	Unit of measurement	Acceptance criteria
Physical state	Visual		Viscous fluid
Gardner Colour Scale	CH067		1-4
Odour	CH102		Slight-Absent
pH	CH001		1.70-2.00 (10% aqueous solution)
Total Bacterial Load	MB001	CFU/g-ml	0-10
Yeasts and mould	MB010	CFU/g-ml	0-10
Pseudomonas aeruginosa	MB003	CFU/g-ml	Absent

Staphylococcus aureus	MB004	CFU/g-ml	Absent
Candida albicans	MB005	CFU/g-ml	Absent

The formulator's suggestions

Ideal for the following formulations: emulsions, masks, serums, gel, and lotions.

Concentration: 2-4% of the recommended dose.

pH: 3.5 to 4

Suggestions for use: add it to the aqueous phase or after emulsion. Heat it (about 40 °C) until completely homogeneous.

Notes: In a complex with β -cyclodextrins, glycolic acid is balanced with free-form β -cyclodextrins and free-form glycolic acid. If changes in T°, pH, etc., shift this balance towards the free-form components, the product may become cloudy. However, once heated, it becomes transparent again and can be used without problems.

Storage: free of preservatives. Store it in its closed original container in a cool and dry place below 25 °C away from light.

Safety

CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID is a safe, well-tolerated ingredient. Formulated with skin compatibility in mind, this ingredient is ideal for a wide range of cosmetic products.

Rigorous skin tolerability tests have shown that CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID is skin-compatible and safe for cosmetic use. **DERMATOLOGICALLY TESTED.**

A patch test was conducted on 10 volunteers (men and women). Free-form glycolic acid (GA) and Cyclosystem Complex® 50% glycolic acid (CCGA) were applied as aqueous solutions in standard 5 and 10% concentrations. The mean skin irritation scores showed that, at a 5% concentration, both free-form glycolic acid (GA) and Cyclosystem Complex® 50% glycolic acid (CCGA) are NON-IRRITATING. Given the same procedure, free-form glycolic acid's mean skin irritation score was slightly higher at that concentration than glycolic acid encapsulated into cyclodextrins. However, at a 10% concentration, the free-form glycolic acid was SLIGHTLY IRRITATING, while encapsulated glycolic acid was still NON-IRRITATING. This means that, at that concentration, GA had a significantly higher skin irritation score than CCGA.

Effectiveness

An in-vivo assessment of its cosmetic efficacy has shown that CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID offers tangible benefits for the skin.

In particular, the test explored the ingredient's potential, highlighting its **performance** and **versatile effect on the skin's texture and colour**. In addition, the test emphasised the **tolerability** of the complex compared to non-encapsulated glycolic acid, confirming the absence of side effects when used correctly.

INSTRUMENTAL EFFICACY TEST*

*Conducted by **Etichub s.r.l.**, an academic spin-off of the University of Pavia



The efficacy assessment of CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID was performed through biometric skin measurements. Parameters like skin redness and water loss (essential for confirming the product's skin compatibility), texture, colour, and protein content of the horny layer were analysed. The table below shows the specifications of the efficacy test.

EFFICACY TEST PROTOCOL

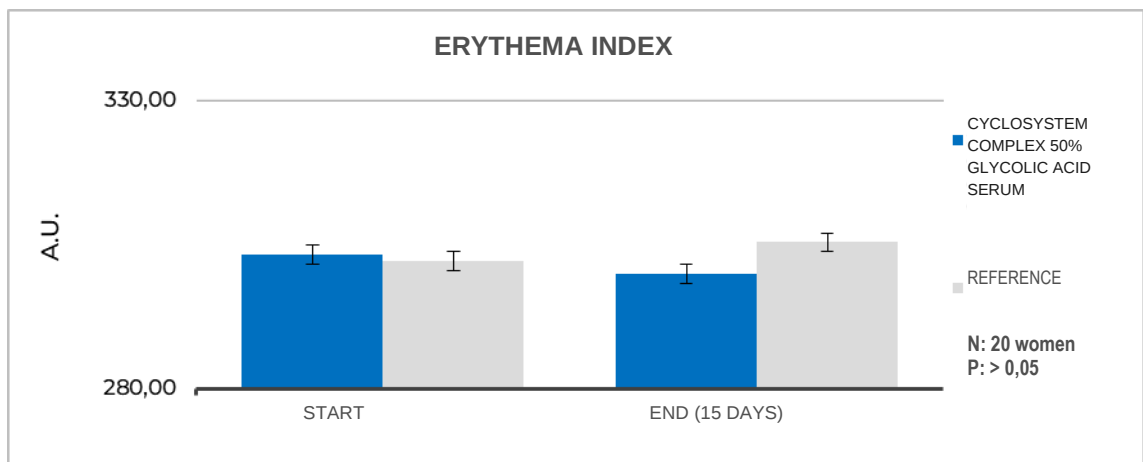
Volunteers	20 women
Trial design	Cyclosystem Complex 50% Glycolic Acid vs non-encapsulated glycolic acid (reference)
Application	Every other day for 15 days
Application area	Décolleté
Analysis period:	t0 (start) and t15 days (end)
Formulation:	Serum (2%) in free form – Serum (4%) in formula
Ingredients list	Cyclosystem Complex 50% Glycolic Acid: Aqua, Pentylene Glycol, Cyclodextrin, Glycolic Acid, Hydroxyethyl Acrylate/Sodium Acryloyldimethyl Taurate Copolymer, Phenoxyethanol, Polyisobutene, Peg-7 Trimethylolpropane Coconut Ether

This study showed that at the same concentration as free-form glycolic acid, glycolic acid encapsulated into cyclodextrins is released gradually, making it more skin-compatible and active.

Skin redness

The erythema index expresses the presence of skin redness in relation to the haemoglobin content. This is an indicative parameter to assess skin reactions and irritation and intrinsically establish a product's skin tolerability.

The erythema index, calculated using a reflectance spectrophotometer, confirmed that CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID is well-tolerated and does not cause irritation or discomfort.



EFFECT: the erythema index decreased by 1.08% with CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID versus 1.21% with the reference product with non-encapsulated glycolic acid

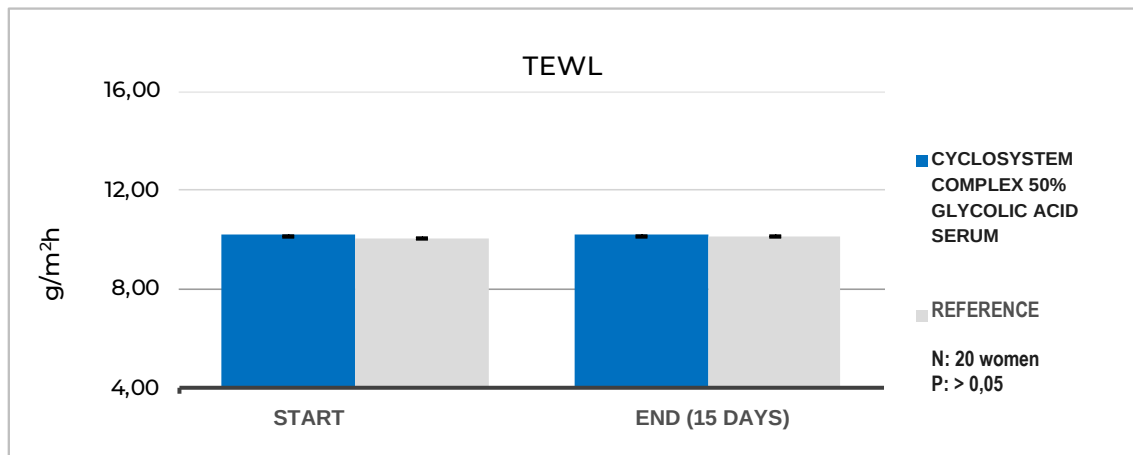
CLAIMS: mild and well-tolerated

After 15 days, CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID maintained the erythema index unchanged in the delicate décolleté area, confirming it does not cause redness of any kind. On the other hand, non-encapsulated glycolic acid showed a slightly increased erythema index in the treated area.

Skin water loss

Trans-epidermal water loss (TEWL) is essential for measuring how much water the skin loses. This parameter helps assess the skin barrier function and integrity since values above the physiological ones may indicate damage.

The TEWL assessment confirmed that CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID is well-tolerated and does not damage the skin barrier in any way.



EFFECT: the TEWL index varied by 0.93% with CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID versus 2.21% with the reference product with non-encapsulated glycolic acid

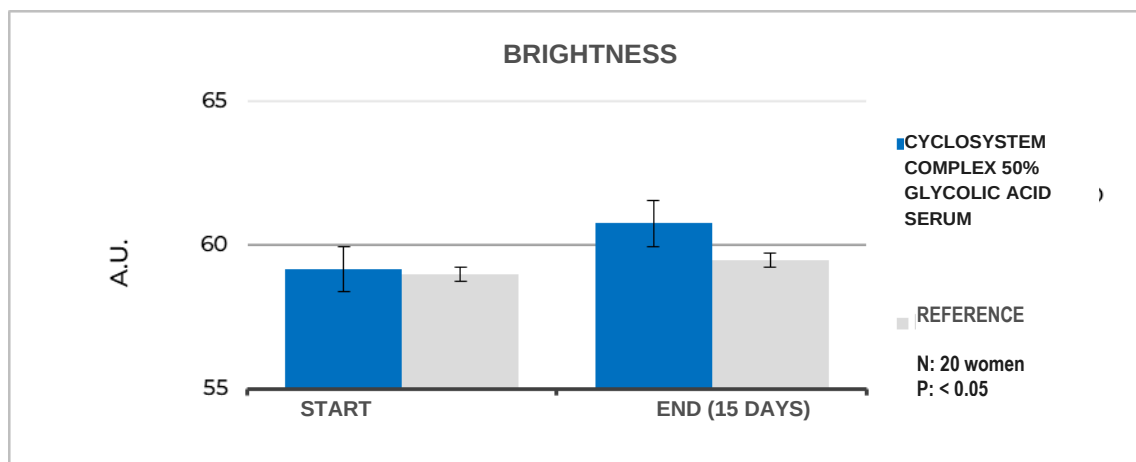
CLAIMS: mild, well-tolerated, and respects the skin barrier

After 15 days, CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID maintained the TEWL index unaffected in the delicate décolleté area, confirming its skin tolerability.

Skin brightness

Bright skin indicates healthy skin and a radiant complexion. The "L*" parameter is used to assess the skin's colour brightness. Its value ranges from 0 (black) to 100 (white). The higher the value and the brighter, the more radiant the skin.

The skin brightness (L) assessment through tristimulus reflectance colourimetry showed that CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID SERUM positively affects the complexion, giving the skin a natural, more radiant appearance.



EFFECT: skin brightness (L) increased by 2.74% with CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID versus 0.83% with the reference product with non-encapsulated glycolic acid

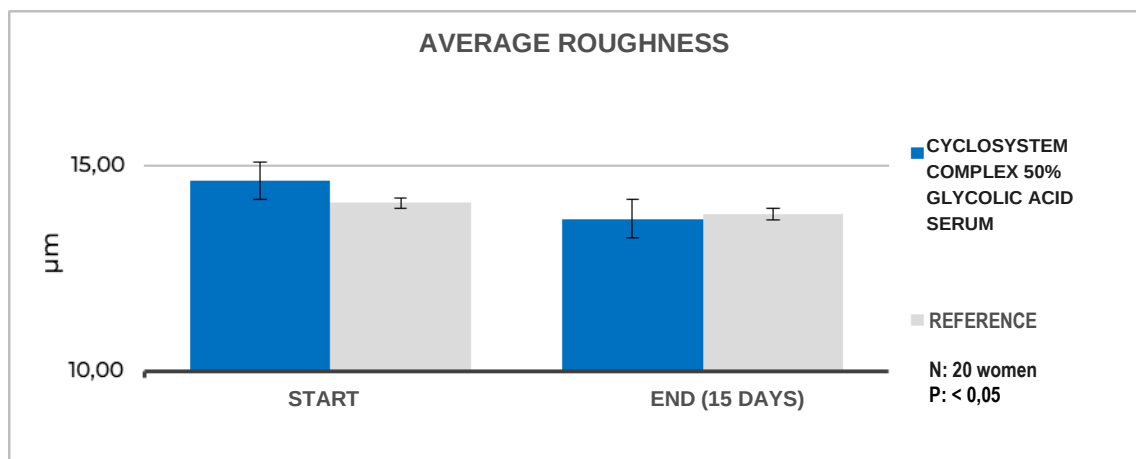
CLAIMS: a brightening effect for glowing skin and a radiant appearance

After 15 days, CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID improved skin brightness in the delicate décolleté area. In particular, it improved it by 1.91%, which is a better result than the product with free-form glycolic acid, which also had a positive effect but not as good.

Skin texture

Skin texture refers to the surface of the skin. Smooth, even skin is characterised by a low average surface roughness value and a regular structure.

The skin texture assessment based on the average surface roughness (μm) was conducted using a 3D imaging system and showed a reduction in the parameter's average value with CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID.



EFFECT: the skin texture improved with a 6.30% decrease in roughness with CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID SERUM versus a 2.23% reduction with the reference product with non-encapsulated glycolic acid

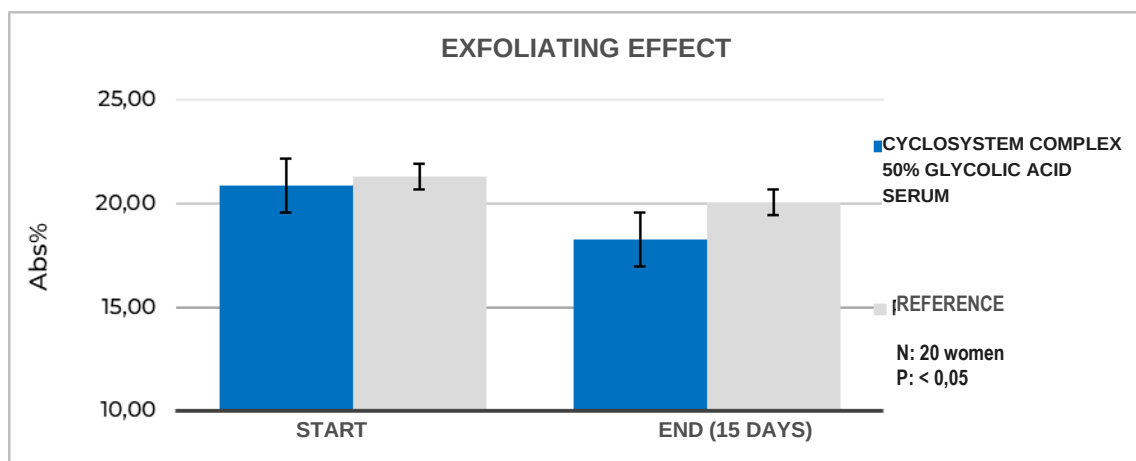
CLAIMS: smoothing effect. It improves skin texture and reduces the average surface roughness

After 15 days, CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID SERUM improved the skin texture in the delicate décolleté area. This result is even more remarkable when compared to that of the product with non-encapsulated glycolic acid, which only produced a negligible improvement.

Protein content in the horny layer

The protein content in the horny layer is used to assess the skin's condition and the exfoliating (and resulting skin renewal) effect of a cosmetic product.

The quantification of the proteins in the horny layer through infrared spectroscopy and tape stripping showed a reduction in the tape's absorption, confirming CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID's exfoliating effect and the skin renewal process it triggered.



EFFECT: CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID SERUM showed a 10.51% exfoliating effect versus 3.93% with the reference product with non-encapsulated glycolic acid

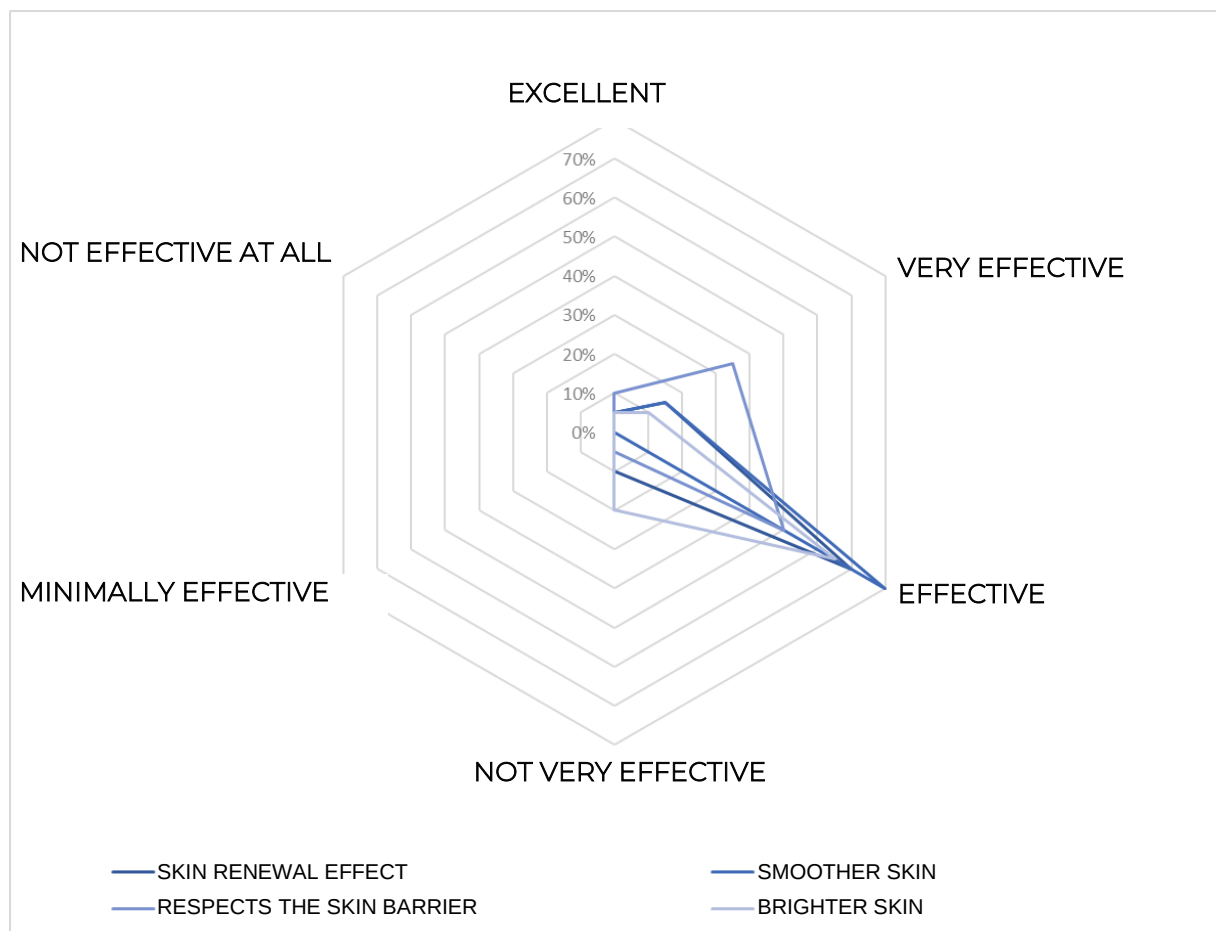
CLAIMS: exfoliating effect. Improved cell turnover. Skin renewal effect

After 15 days, CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID had an exfoliating effect on the delicate décolleté area. This result is even more significant when compared to that of the product with non-encapsulated glycolic acid, which produced a minor improvement.

Self-evaluation

People's experience with a cosmetic product is integral to its success. That's why we collected the impressions of those who used CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID SERUM. Consumers' opinions on a product's effectiveness are crucial to meet their expectations.

- ✓ 90% said they noticed a **skin renewal effect**;
- ✓ 100% said it **makes the skin smoother**;
- ✓ 95% said it **respects the skin barrier**;
- ✓ 85% said it **brightens the skin**.



Product Features

- ✓ **Gentle** on the skin;
- ✓ Good **skin tolerability**;
- ✓ **More effective** than non-encapsulated glycolic acid;
- ✓ **Brightening** effect**;
- ✓ **Smoothing** effect**;
- ✓ **Exfoliating** effect**;
- ✓ Instrumental results **after only 15 days****.

**Instrumental test conducted by Etichub srl on 20 women using the serum formulation of the ingredient

CYCLOSYSTEM COMPLEX 50% GLYCOLIC ACID contains glycolic acid encapsulated into cyclodextrins, prolonging the presence of the fruit acid on the skin and countering adverse effects that may occur with free-form glycolic acid. This complex ensures a gentle exfoliating effect, stimulates cell turnover, gives the skin a more radiant appearance, and promotes unprecedented skin renewal. All this while minimising irritation.

This is possible because the cyclodextrins enhance the effectiveness of the glycolic acid encapsulated within them, promoting its controlled release and mitigating any potential irritation. The smallest AHA molecule has well-known exfoliating and smoothing properties. Its encapsulation into cyclodextrins provides an innovative way to ensure its gradual release onto the skin, enhancing its effects and reducing the risk of redness and discomfort. In addition, it promotes cell renewal, giving the skin a renewed appearance and a radiant glow. Moreover, glycolic acid's effect on the horny layer can promote the absorption of other functional substances.