

BiEau® Actif Green Algae



bioactive botanical waters
 moisturization
 isotonic harmonization
 natural sustainable
 decreased TEWL refreshing
 improve barrier function

BACKGROUND

Plants naturally utilize and bind water in their cells as a mechanism of survival. This cellular water or plant essence offers the ability to harness a nutritional, isotonic solution capable of nourishing the skin and hair in personal care applications. **BiEau® Actif** botanical waters combine advancements in sustainable beauty and leading edge science to provide brands essential ingredients to support their unique aspirations. Innovative development of botanical waters promote the natural balance of the skin, scalp, and hair while utilizing natural plant properties to work in conjunction with the skin.

Botanical waters offer brand-differentiating properties including unique origin stories, sustainability appreciation, and efficacious beauty benefits that work with your hair and skin care for a healthy complexion. From cultured algal and mushroom cells to reanimated agricultural waste, Active Concepts maximizes raw material sourcing and creation for minimal environmental impact with the development of our **BiEau® Actif** botanical waters line.

BiEau® Actif Green Algae is the sustainably sourced essence of *Spirulina platensis*, designed to elevate skin moisture levels and promote effective beauty with an environmental conscience. *Spirulina platensis* is a blue-green algae considered as a superfood and recognized as an abundant resource of nutrients, including niacinamide, or Vitamin B3. Topical application of niacinamide can help strengthen the skin barrier and increase the moisture content of the skin. **BiEau® Actif Green Algae** employs a novel approach to sustainability while capitalizing on the presence of niacinamide from *Spirulina platensis* to improve moisturization and promote supple, healthier-looking skin.

BiEau® Actif Green Algae utilizes cellular plant essence to deliver isotonic nutrients and harmonize skin and hair. Skin is the largest organ of the body and is composed of approximately 60% water. As a protective barrier, the skin is our

Code Number: 16906

INCI Name: Spirulina Platensis Extract

INCI Status: Conforms

REACH Status: Compliant

CAS Number: 223751-80-2

EINECS Number: N/A

Origin: Botanical

Processing:

GMO Free

No Ethoxylation

No Irradiation

No Sulphonation

Additives:

Natural Antimicrobial: Lactobacillus Ferment

Preservatives: None

Antioxidants: None

Other additives: None

Solvents Used: N/A

Appearance: Clear to Hazy,
Colorless to Yellow Liquid

Soluble/ Miscible: Water Soluble

Microbial Count: < 100CFU/g,
No Pathogens

Suggested Use Levels: 1.0 – 10.0%

Suggested Applications:

Enhance Moisturization,
Improve Barrier Function

Benefits of BiEau® Actif Green Algae:

- Increased Moisturization
- Reduction of TEWL
- Sustainably Manufactured



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best defense against external aggressors. However, the skin's permeability can be influenced by a variety of environmental attributes including pollution particles, cosmetic actives, temperature fluctuations, and water exchange. A delicate balance exists between water introduced onto our skin, using cosmetics, cleansers etc, and the water present in our skin and cells. Water exchange occurs through the cell membrane through the process of osmosis. Deionized or demineralized water can be traditionally used in the creation of cosmetic ingredients, but this water typically lacks minerals and natural components that our skin craves. Isotonic solutions offer an environment most beneficial and least disruptive to skin cells while enhancing affinity with the skin due to a mineral content close to that of skin cells. Isotonic materials maintain the size, shape, and integrity of skin cells. Some cosmetic solutions are hypotonic or hypertonic and can damage skin cells by drawing out cellular water, thereby drying out the skin, or even forcing water into the cells and causing cell deformation. Isotonic solutions maintain a natural environment and healthy balance for the skin.

SCIENCE

Algae embodies the concept of marine sourced sustainability promoting utilization in various industries as food, biofuels, filtering materials, soil fertilizer, pharmaceuticals and laboratory growth media. Grown in house, cultured algae cells diminish the demand for algae harvesting while allowing the manufacture of various algae ingredients including algae botanical waters. The renewable nature of algae prompts their incorporation into beauty applications across skin, hair, and body care formulations. As a powerhouse of natural nutrients, vitamins, and minerals algae actives maintain the cutting edge of innovation in the cosmetic market.

Algae absorbs water and nutrients in their cells, directly from the surrounding water. Depending on the species, fresh algae are 70-90 percent water by weight.¹ This internal cellular water contains an abundance of biologically active components and is often disregarded in the extraction of algal lipids for biofuel. Active Concepts has utilized solar energy to effectively evaporate and isolate the nutrient-rich water of *Spirulina Platensis* to produce a bioactive cellular water capable of enhancing barrier function and increasing skin moisture.

Spirulina platensis is one of richest, natural sources of niacinamide available. One of the unique benefits of niacinamide as a skin care ingredient is its ability to enhance barrier function. Niacinamide is converted in the body to NADPH, which is a cofactor for the synthesis of fatty acids and lipids, such as ceramides, that are crucial for epidermal barrier function.¹ In addition, niacinamide is known to increase the production of epidermal proteins that are vital for the formation and maintenance of the outermost layer of the skin.² Barrier compromise is common in aging skin and can contribute to heightened sensitivity and irritation by allowing external insults easier entry into the skin. Transepidermal water loss (TEWL) can be used as an indicator of skin barrier function as TEWL is the amount of water that passively evaporates through skin to the external environment due to water vapor pressure gradient on both sides of the skin barrier. Topical application of niacinamide has demonstrated the ability to decrease TEWL and, therefore, improve skin barrier function for increased skin hydration.³

BENEFITS

BiEau® Actif Green Algae is a vital botanical essence capable of decreasing transepidermal water loss while increasing skin moisture. **BiEau® Actif Green Algae** utilizes a novel approach to eco-conscious cosmetic active development while capitalizing on the presence of niacinamide from blue-green algae to promote hydrated, healthier-looking skin. **BiEau® Actif Green Algae** can be used in a variety of cosmetic and personal care formulations aimed to hydrate, harmonize, and nourish.

EFFICACY

An Osmotic Cell Pressure Membrane study was performed to evaluate how cellular water or plant essence offers the ability to harness a nutritional, isotonic solution capable of nourishing the skin and hair in personal care applications. Human dermal keratinocytes were seeded into 24-well tissue culture plates and allowed to grow to confluency in complete media. The complete media was removed and either 100% Deionized Water or 100% **BiEau® Actif Green Algae** was added to the respective test well. Set to a 40x magnification, images were

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taken at time zero and every 5 minutes all the way up to the final 45 minute time mark. Crystal Violet Stain was used for enhanced microscopy imaging and a final stain image was taken of the test well.

As demonstrated in Figure 1, nature constantly tends to maintain balance. In the presence of a hypotonic deionized water solution, the deionized water will penetrate the skin cells to balance out the differences in concentration on either side of the membrane. Skin cells then swell due to the water pressure on the cell walls. The internal cellular water of the plants used in the production of our **BiEau® Actif** product line harnesses a nutritional, isotonic solution capable of supporting the skin's natural environment and promotes cellular balance. The skin cells remain in a natural environment and their morphology and integrity remain unaltered.

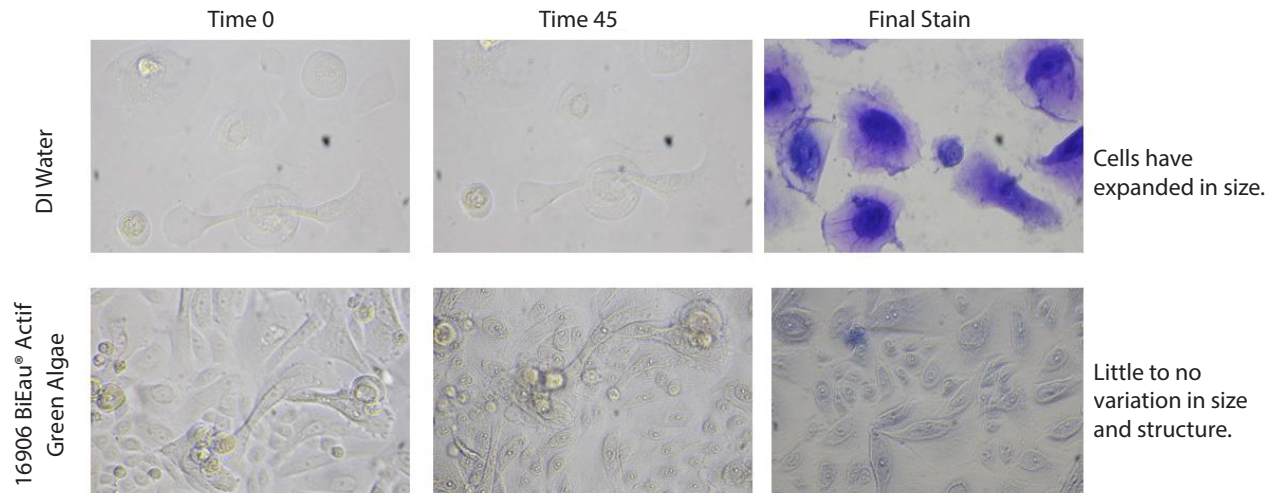


Figure 1. Cell Images.

*Please note that due to the post treatment fixation and staining, the plate was removed from the microscope to complete the process. Final stain images were taken of the exact same treatment culture well, though the individual cells captured may vary from the original images.

An *in-vivo* study was conducted to measure TEWL. This characteristic is evaluated with an open chamber probe that measures the vapor diffusion gradient, or the amount of water that evaporates from the skin. Therefore, the lower the TEWL values, the better the skin's barrier function. As shown in Figure 2, results indicate continuous improvements in the barrier of the skin throughout the 4 week test period. After 1 week, the lotion containing 2.0% **BiEau® Actif Green Algae** decreased TEWL by 3.99% more effectively than the base lotion alone and 22.06% more than the untreated site. After four weeks, the lotion containing 2.0% **BiEau® Actif Green Algae** demonstrated even more effective barrier protection, decreasing TEWL 12.90% better than the base lotion alone and 16.76% more than the untreated site. These results indicate that **BiEau® Actif Green Algae** is capable of efficiently reducing TEWL, helping to improve barrier function and allow for moisture retention.

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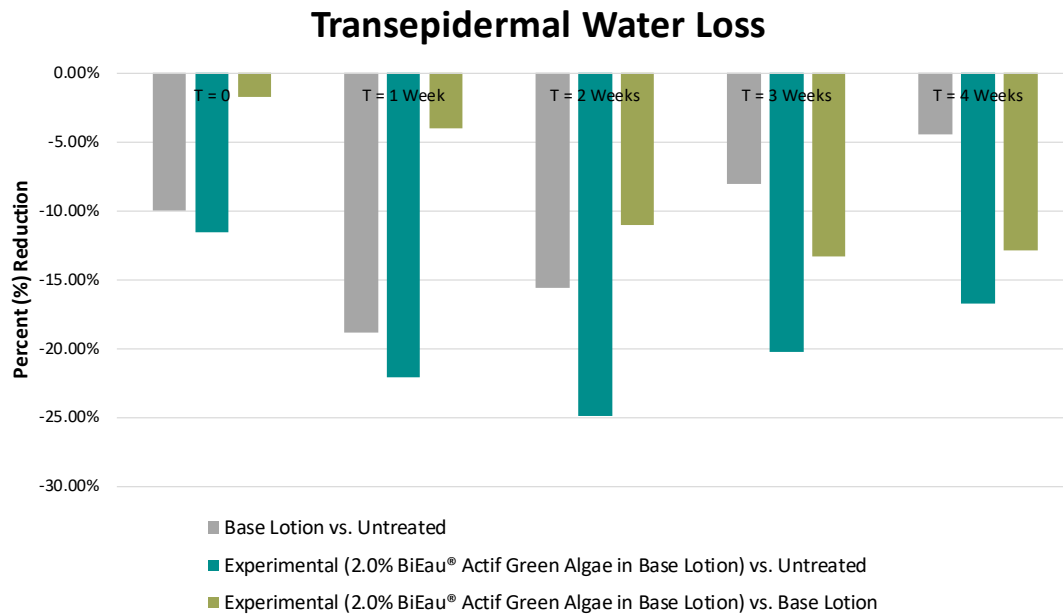


Figure 2. Improvements in barrier function following application of the test materials over a period of 4 weeks.

Another study was conducted to measure the *in-vivo* moisturizing ability of **BiEau® Actif Green Algae**. Initial readings were taken on 20 M/F panelists, followed by measurements after 24 hours, and each week for four weeks using an Impedance Meter. This piece of equipment employs an impedance-based electronic sensing system to evaluate conductance. Comparisons of the base lotion to the experimental lotion containing 2.0% **BiEau® Actif Green Algae** demonstrate the experimental material moisturized the skin 10.71% better after 24 Hours. After four weeks the base lotion containing 2.0% **BiEau® Actif Green Algae** moisturized skin 36.37% better than the base lotion alone.

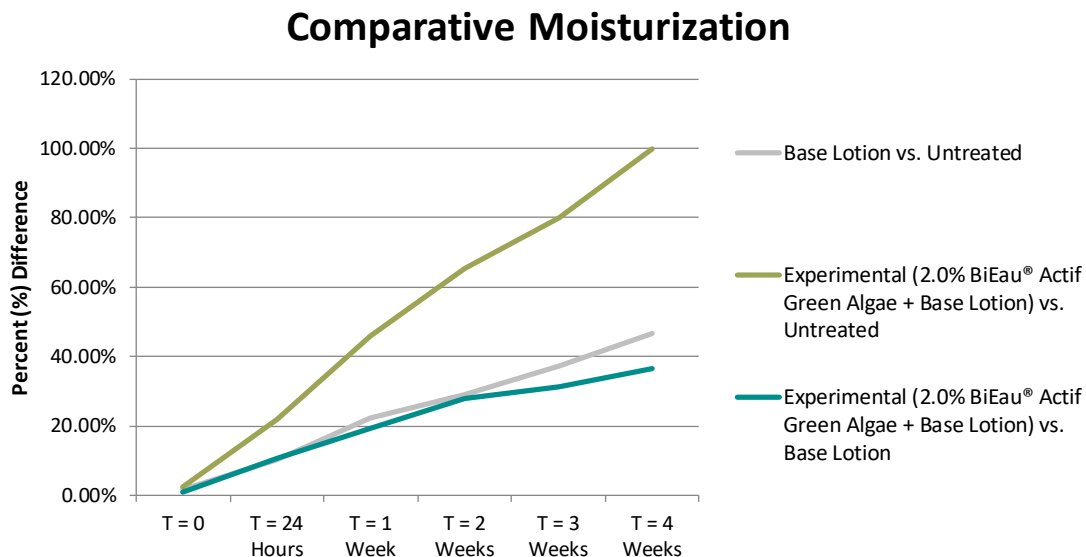


Figure 3. Percent difference in moisturization following applications of test materials over a period of 4 weeks.

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Furthermore, when examining the moisture levels on the skin after application of test materials stopped, it was determined that **BiEau® Actif Green Algae** is capable of sustaining increased skin moisturization when compared to the skin site that remained untreated through the duration of the study. After 24 Hours, the site testing 2.0% **BiEau® Actif Green Algae** + Base Lotion was approximately 75.67% more moisturized than the site which did not receive treatment. After 2 weeks, the experimental test site was still yielding moisturization results that were 61.75% higher than the untreated site. Additionally, in comparison to the site tested with the base lotion alone, the site treated with 2.0% **BiEau® Actif Green Algae** + Base Lotion moisturized the skin 79.51% better after 2 weeks and was still 96.87% more effective in moisturizing the skin when readings were taken 2 weeks after the applications of both test materials ceased.

Results from this *in-vivo* moisturization assay indicate that **BiEau® Actif Green Algae** is capable of increasing moisturization over a four week period and helps to retain moisturization up to two weeks after application.

Moisture Regression

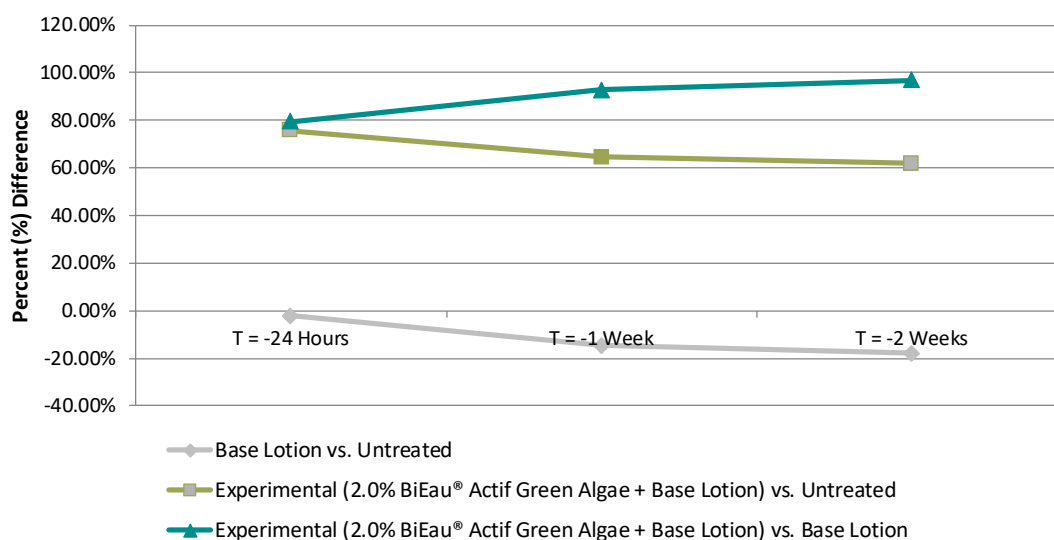


Figure 4. Percent difference in moisturization after application of test materials have ceased.

References:

1. Berson, D.S., Osborne, R., Oblong, J.E., Hakoziaki, T., Johnson, M.B., & Bissett, D.L. (2013). Niacinamide: A Topical Vitamin with Wide-Ranging Skin Appearance Benefits. *Cosmeceuticals and Cosmetic Practice*, First Edition.
2. Bissett DL, Oblong JE, Saud A, et al. Topical niacinamide provides skin aging appearance benefits while enhancing barrier function. *J Clin Dermatol*. 2003;32S:9–18.
3. Draelos, Zoe & Ertel, Keith & Berge, Cindy. (2005). Niacinamide-containing facial moisturizer improves skin barrier and benefits subjects with rosacea. *Cutis; cutaneous medicine for the practitioner*. 76. 135-41