AC Water Kefir PHA

gentle alternative to AHA and BHA
exfoliate
increase cellular renewal
potent collagen synthesis
natural & vegan
polyhydroxy acid
great for sensitive skin

BACKGROUND

Akin to AHAs and BHAs, there is a new family member in town: A gentler version of the well-known alpha and beta hydroxy acids, polyhydroxy acids or PHAs. Skin care regimens are not complete without effective exfoliation to remove dead skin cells and buildup on the skin's surface. However, many individuals experience irritation and dry skin when incorporating traditional chemical exfoliants, such as synthetic AHAs or BHAs, into their daily routines. PHAs can provide a gentle alternative for individuals with more sensitive skin types. PHAs like lactobionic acid are typically derived from lactose/milk and are not considered vegan. **AC Water Kefir PHA** delivers a vegan source of gluconic acid from water kefir to enhance natural skin beauty by promoting collagen synthesis and cellular renewal.

Water kefir, also referred to as tibicos, is a beverage created by the fermentation of water kefir grains harvested from prickly pear cactus with bacteria and yeast. This symbiotic culture of bacteria and yeast, or SCOBY, transform the water kefir grains into a tangy beverage rich in antioxidants. The fermentation process enhances the water kefir's natural properties bolstering nutrition, as well as enhancing cosmetic attributes such as promoting collagen synthesis and cellular renewal. Natural, vegan materials are of increasing importance to the modern consumer, as eco-ethical and veganism are becoming mainstream lifestyle choices. Fermentation technology utilizing symbiotic bacteria and yeast provide a vegan provenance that consumers can feel good about. **AC Water Kefir PHA** provides efficacious activity while addressing the ethos of contemporary society.

Water kefir contains a variety of beneficial compounds such as gluconic acid. The fermentation process of water kefir produces this organic acid, which maintains an important role in the food industry for the ability to encourage the growth of beneficial gut bacteria. In personal care, gluconic acid offers cellular renewal properties as a more gentle form of chemical exfoliants. Standardized for 18-24% gluconic acid, **AC Water Kefir PHA** offers the benefits of a natural, vegan polyhydroxy acid for use in a variety of skin and scalp care applications.

Code Number: 22064

INCI Name: Water & Opuntia Ficus-Indica Fruit Extract & Lactobacillus Ferment
INCI Status: Conforms
REACH Status: Complies
CAS Number: 7732-18-5 & 90082-21-6 & 1686112-36-6 (or) 68333-16-4 & 9015-54-7
EINECS Number: 231-791-2 & 290-109-1 & N/A (or) N/A & 295-635-5

Origin: Plant/Bacteria
Processing:
GMO Free
No Ethoxylation
No Irradiation
No Sulphonation
Additives:
Natural Antimicrobial: Lactobacillus Ferment
Preservatives: None
Antioxidants: None
Other additives: None
Solvents Used: Water
Appearance: Clear to Slightly Hazy, Yellow to Orange Liquid
Soluble/ Miscible: Water Soluble
Microbial Count: < 100 CFU/g, No Pathogens

Suggested Use Levels: 1.0 - 10.0%
Suggested Applications: Exfoliating, Sensitive Skin Types, Revitalizing

Benefits of **AC Water Kefir PHA**:

- Increases Cellular Renewal
- Stimulates Collagen Production
- Great for All Skin Types

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SCIENCE

Hydroxy acids are a common addition to personal care products to provide consumers a mechanism to address problem skin, uneven skin texture and a dull complexion. Hydroxy acids are organic compounds containing a carboxylic acid moiety. Hydroxy acids can be further categorized by chemical structure. Alpha hydroxy acids (AHAs), such as glycolic or lactic acid, contain a hydroxyl group on the first carbon, or the alpha position, from the carboxylic acid. Beta hydroxy acids (BHAs), such as salicylic acid, contain a hydroxyl group on the second carbon, or the beta position, from the carboxylic acid. Polyhydroxy acids (PHAs), such as lactobionic and gluconic acids, contain multiple hydroxyl groups, including alpha and beta positions.

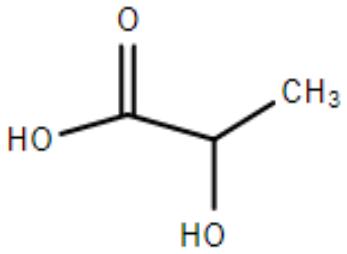

Figure 1. Lactic acid, an alpha hydroxy acid.

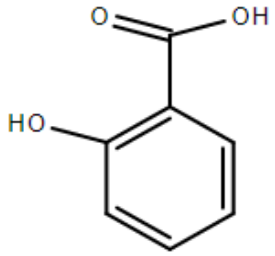

Figure 2. Salicylic acid, a beta hydroxy acid.

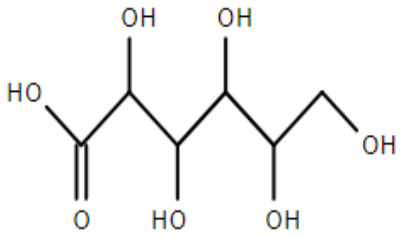

Figure 3. Gluconic acid, a poly hydroxy acid.

While all of these hydroxy acids serve as exfoliators, the positions of the hydroxyl groups ultimately determine the function. AHAs typically penetrate the skin more readily, while BHAs like salicyclic acid migrate into pores and sebum rich areas due to its lipophilic structure. PHAs present with less irritation for the consumer as the acids work exclusively on the skin's surface without interacting with deeper portions of the skin. Dead skin cells can clog skin or pores and while the skin naturally undergoes cellular turnover, exfoliation efficiently removes the barrier of dead cells making way for a more effective skin care routine and brighter complexion.

As a PHA, gluconic acid interacts with cells on the skin's surface to encourage cellular renewal by dissolving the bonds holding dead skin cells together. Imagine the skin is like a brick wall with the corneocytes as the bricks. These top layer bricks are dead, dried out skin cells that are getting ready to shed. The mortar between the bricks or corneocytes is the intercellular matrix that holds the bricks together. PHA materials, such as gluconic acid, influence cellular renewal by dissolving the glue or intercellular matrix that binds the skin cells together. This breakdown accelerates the elimination of dead skin cells, therefore allowing the lower epidermis layers to expedite the tissue renewal process.

BENEFITS

Reveal the beauty lying underneath. As a polyhydroxy acid, **AC Water Kefir PHA** enhances natural skin beauty and promotes collagen synthesis for a revitalized aesthetic. PHA incorporation into skin care inspires inclusive personalization for sensitive or reactive skin types. **AC Water Kefir PHA** offers standardized gluconic acid to buff away tired skin with a gentle approach. The selective use of water kefir grains encourages vegan, botanical derivatives suitable for addressing concerns of the modern consumer. Ideal for serums, toners, masks, or lotions, **AC Water Kefir PHA** allows brands to capture eco-conscious beauty without compromise.

AC Water Kefir PHA

EFFICACY

PHAs are the solution to effective exfoliation without the associated irritation that can come with AHAs or BHAs. In vitro dermal and ocular irritation studies were conducted to evaluate whether **AC Water Kefir PHA** would induce dermal irritation in the EpiDerm™ model assays. The EpiDerm™ assay has accuracy for the prediction of UN GHS R38 skin irritating and no-label (non-skin irritating) test substances. As shown in Figure 4, **AC Water Kefir PHA** was considered to be non-irritating.

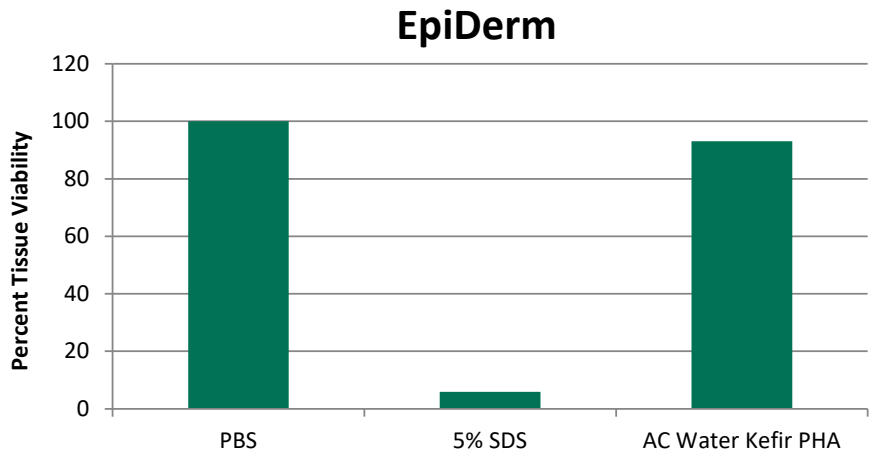

Figure 4. Epiderm tissue viability.

Age or environmental damage can leave the surface of skin looking dull and opaque. Treatment with PHAs can increase cellular renewal, making skin smooth and improved in translucency. A traditional skin pigmentation assay evaluated **AC Water Kefir PHA** for its ability to accelerate cell renewal. Skin cells are frequently exposed to ultraviolet light damage and other chemical and environmental aggressors. Their death and replacement through cellular renewal processes minimize the potential longer-term harmful effects of these exposures. Aiding in the processes of cellular renewal can improve the skin's physical appearance as well as function as a protective barrier. Dermal Dye Max™ was used to induce skin pigmentation, then the skin sites were treated with either 5% lactobionic acid positive control, 5% **AC Water Kefir PHA**, or the base lotion formula. Readings were taken every 24 hours until the active test sites returned to baseline.

Exfoliation was determined by calculating the pigmentation difference relative to the comparative skin site. Then, the percent difference was determined for each test site to the base and untreated control. The sum of cellular renewal over the course of 6 days is represented as Cumulative Cellular Renewal in Figure 5 compared to the base control.

Exfoliation							
5% Lactobionic Acid	10.3	8.1	5.7	4.5	2.6	1.3	0.5
5% AC Water Kefir PHA	10.5	6	4.3	4.4	2.1	1.2	0.4
Base Lotion Control	11	10.8	6.9	6.2	5	3.6	2
Untreated Control	10.5	8.7	7.5	5.9	4.7	3.9	2.5

Table 1. Exfoliation (Pigmentation difference relative to the comparative skin site).

Cellular Renewal Percent Difference							
5% Lactobionic Acid v base	6%	25%	17%	27%	48%	64%	75%
5% Lactobionic Acid v UC	2%	7%	24%	24%	45%	67%	80%
5% AC Water Kefir PHA v base	5%	44%	38%	29%	58%	67%	80%
5% AC Water Kefir PHA v UC	0%	31%	43%	25%	55%	69%	84%

Table 2. Cellular renewal percent difference compared to base and untreated control.

The results indicate that **AC Water Kefir PHA** is capable of increasing cellular renewal when compared to the untreated and base control sites. Cellular renewal is beneficial for visibly improving skin tone and texture as well as aiding in the skin's function as a protective barrier from harmful chemical and environmental exposure that can lead to premature aging.

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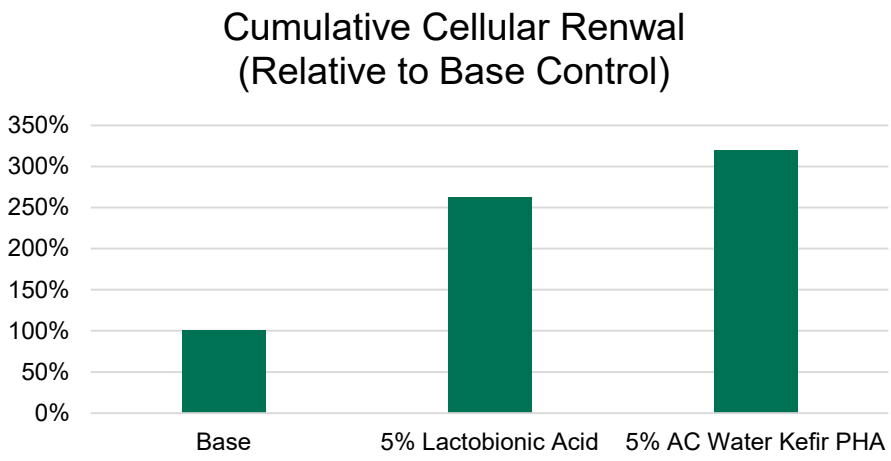

Figure 5. Cumulative cellular renewal relative to the base control.

In conjunction with cellular renewal, PHAs such as gluconic acid are capable of increasing collagen production. Exfoliation stimulates dermal fibroblasts to synthesize collagen. This process helps new skin cells generate more efficiently. An in-vitro Sirius Red/Fast Green Collagen Analysis assessed the changes in collagen synthesis by **AC Water Kefir PHA** on cultured human dermal fibroblasts. Collagen is the main protein of connective tissues. Collagen has great tensile strength while being responsible for skin's elasticity and, therefore, its degradation leads to wrinkles that accompany aging. Figure 6 demonstrates **AC Water Kefir PHA**'s ability to exhibit potent collagen synthesis activity. Therefore, **AC Water Kefir PHA** would be suitable for use in cosmetic applications designed to boost collagen synthesis to aid in providing a younger and healthier complexion.

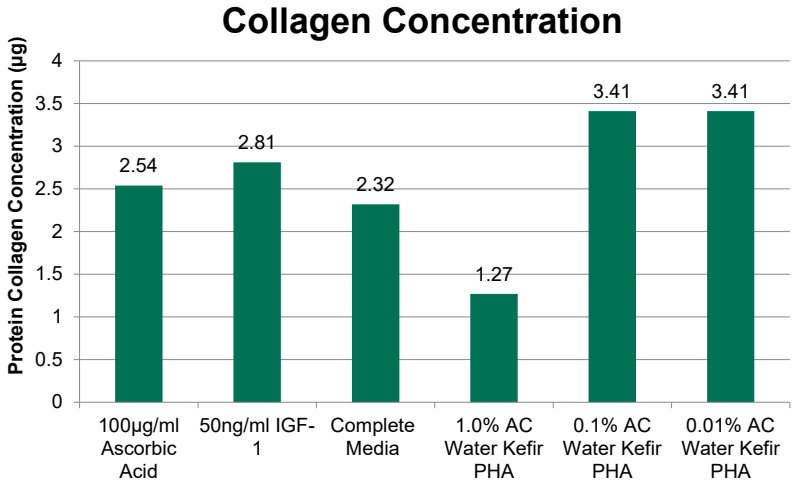

Figure 6. Collagen Concentration.

References:

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