

GENU pHresh™

PECTIN



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Bringing Skin Into Balance, Naturally



Properly maintaining pH balance of the acid mantle is the foundation for healthy skin and an important component to the skin's integrity against environmental impacts. Personal care products designed to restore and avoid disruption of the natural pH balance can be useful to provide a day-to-day skin-friendly feeling as well as a regimen for long-term skin health.

The skin's acid mantle is the body's first line of defense. It helps protect skin from the elements, such as wind or pollutants. It inhibits the growth of harmful bacteria and fungi. The acidic pH of the skin encourages the growth of skin-healthy microflora, thus boosting the skin's defense system.

While the acid mantle plays a critical role in overall skin health, it is easily disrupted through daily activities as basic as washing, shaving, abrasion and exposure to the elements. Surfactants in typical soaps can remove not only dirt and other materials from the skin, but also damage the acid mantle. These surfactants raise the skin's surface pH to neutral or higher, making it more difficult for the body to restore the acid mantle and results in a dry, uncomfortable feeling.

Introducing GENU pHresh™ Pectin

GENU® pectins (INCI name: Pectin) are partially methyl esterified, anionic polysaccharides that are the gel-forming component in fruits and vegetables. Because of traditional uses in food products, pectin is well known by consumers and accepted as label friendly. Due to the multi-functionality and natural origin, citrus-based pectin is gaining popularity in pharmaceutical, personal care and cosmetic applications.

CP Kelco has discovered and patented that nature has provided an ideal material to help the skin restore and maintain a skin-friendly pH in the form of GENU pHresh™ pectin.

To prove the effect of pectin on skin's acid mantle, CP Kelco performed a series of tests, from *in-vitro* evaluation of buffering and the scavenging effect of pectin, to *in-vitro* clinical tests to demonstrate its performance to help protect skin barrier functions.

In order to achieve proper skin care functionality, GENU pHresh is produced using proprietary processes requiring careful extraction from select peel, mild purification and gentle precipitation. *What is remarkable about GENU pHresh is its ability to buffer the skin's natural pH and the speed with which it can adjust skin pH.*

Unlike other acidic materials such as alpha hydroxy acid or citric acid, which penetrate the skin and cause irritation, GENU pHresh pectin is a long-chain polysaccharide which makes it exceptionally mild.

The Proof Behind Our Claim

CP Kelco conducted several *in-vivo* clinical studies using GENU pHresh where the following results were seen.

Adjusting Skin pH. pH measurements were conducted on forearms of 21 subjects for 7 hours after soap cleansing, using a control lotion (no pectin) and a GENU pHresh pectin lotion. The reference data set is a skin condition with no lotion applied.

A normal, comfortable, natural pH is in the range of pH 5.7. After washing, skin pH increases to roughly pH 7.2. If left to adjust on its own, the skin will return to a normal pH. However, as the graph shows, using a lotion with GENU pHresh can shorten the time with which the skin is brought into balance and can sustain this level for extended periods of time.

A statistically significant decrease of the pH after the pectin lotion application was observed. Thus showing GENU pHresh has a favorable effect on adjusting skin pH.

Additionally, tests demonstrating the ability of GENU pHresh pectin to maintain low pH over time after several cycles of alkali addition have shown conclusive. GENU pHresh pectin will help the skin quickly recover its natural pH when affected by different actions from both internal and external factors.

Single Patch Test. CP Kelco conducted dermal toxicity testing of GENU pHresh pectin on Asian skin types in an effort to determine its safety for cosmetic applications. This Human Skin Patch test concluded that:

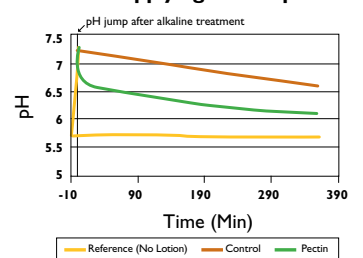
1. No skin reactions were observed in a 24-hour Single Patch Test
2. GENU pHresh is non-irritating (based on a 30 subject single patch test where no skin reactions were observed)

Based on these results, and the conclusions of the toxicology test center, GENU pHresh pectin is suitable for dermal cosmetic applications.

Trans Epidermal Water Loss (TEWL).

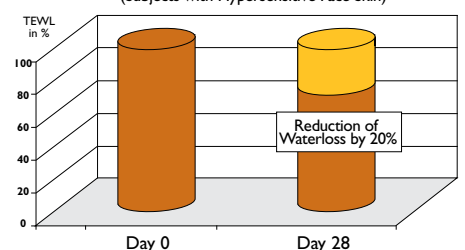
CP Kelco conducted TEWL test to determine GENU pHresh possibility to moisturize the skin. The results showed a statistically significant decrease in TEWL, showing a protective effect of the skin through an improvement of the moisture retention as compared to a placebo.

pH Development Over Time With or Without Applying GENU pHresh™



GENU pHresh™ Protective Effect Against Waterloss on Skin Barrier Function:

TransEpidermal Waterloss (g/h/m²) after 28 day Facial Treatment (Subjects with Hypersensitive Face Skin)

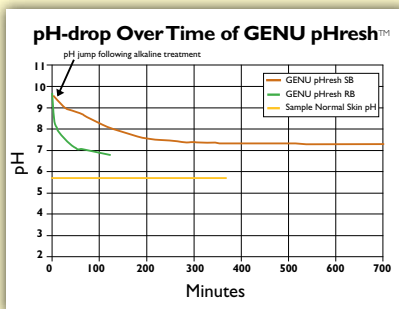


...you can

Formulation Flexibility

Depending on the formulator's objective one may want to create a product that quickly restores skin pH, such as an after shave balm or a post depilatory lotion. Or, the goal may be a day-time lotion with a high buffering capacity to counteract the environmental effects on the skin throughout the day. The proprietary technology offered by CP Kelco provides formulation flexibility, making the correct product choice is easy.

- If the desired result is a rapid pH decrease as a result of alkali generation, **GENU pHresh RB** (Rapid Buffering) is preferred.
- If, conversely, the need calls for extended buffering capacity **GENU pHresh SB** (Sustained Buffering) would be the product of choice.



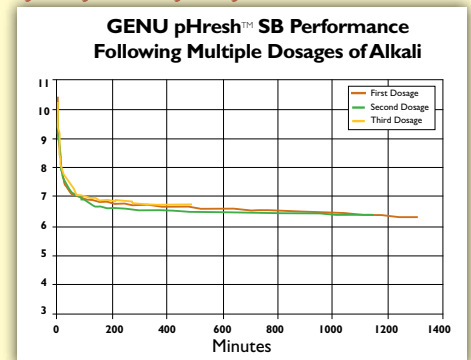
The buffering difference in GENU pHresh RB and GENU pHresh SB

If a combined effect is desired, **GENU pHresh DF** (Dual Function) is the products best fit. Initially, the skin's pH is reduced by roughly 2 pH units. As time progresses, the skin's pH is further adjusted to its optimal pH level (5.7-6.2), providing further protection from environmental factors.

It keeps going and going and going...

In order to demonstrate the buffering effect of GENU pHresh pectin, the following experiment was conducted:

- First, 200 mL's of a 1% solution of GENU pHresh SB was prepared
- Then the pH was raised to 10.0 by the addition of 19 mL's of 0.1M NaOH (First Dosage)
- Once the pH of the solution reached 6.0-7.0, it was adjusted to pH 10.0 by the addition of 1.1 mL's of 0.1M NaOH (Second Dosage)
- Once the pH was decreased to 6.0-7.0, it was adjusted to pH 10.0 by the addition of 1.2 mL's of 0.1M NaOH (Third Dosage)



The experiment helps demonstrate that GENU pHresh pectin can assist the skin to quickly recover its natural pH during the day as to protect against harsh factors such as wind, water and chemicals.

Potential Applications Using GENU pHresh™

The concept of GENU pHresh pectin can be used in a range of products such as:

- **Lotions and creams** – Products for sensitive skin, acne (soothing effect and restores pH of natural flora against outside contaminants), suncare, after depilatory, peeling and whitening treatments.
- **Shaving and depilatory products** – The application of a conventional shaving preparation of high alkalinity is often irritating to the skin. GENU pHresh pectin can be useful to provide a non-irritating skin pH during or after shaving.
- **Deodorant products** – Especially following shaving, a deodorant product containing GENU pHresh can help skin feel less irritated.
- **Hair care** – Hair tonics/serums to normalize pH on scalp. It has been observed that low pH is useful in reducing dandruff, seborrheic dermatitis, and psoriasis.
- **Lotionized tissue products** – While products exist to address the problems of skin irritation and inflammation, they inevitably fail to address the short-term impact of various additives on the pH balance of the skin. Formulating GENU pHresh into such products will help address such issues.

Getting a pHresh Start: Create a Unisex Post-Shave / Post-Depilatory Cream

The example unisex cream utilizes the pH balancing effect of GENU pHresh™ pectin to normalize the skin's pH after the treatment of highly alkaline products. GENU pHresh pectin moisturizes skin and imparts emollient feel to skin.

PROCEDURE:

1. Disperse GENU pHresh pectin in the water phase under high speed mixing. Add glycerin.
2. Heat Phase A to 80-85°C, mix to hydrate pectin. Heat Phase B to 75-80°C.
3. Add Phase B with propeller mixing to Phase A. Homogenize for a short time (2500 rpm for 1 min.)
4. Start cooling with mixing.
5. Add remaining ingredients below 45°C. Mix to get a uniform cream. Adjust water loss.

Suppliers: (1) CP Kelco, (2) Gattefossé

Ingredient	INCI Nomenclature	QTY(%W/W)
A DM WATER	Water (Aqua)	q.s. to 100
GENU pHresh™ Pectin ¹	Pectin	1.25
Glycerin	Glycerin	2.0
B Emulum delta ²	Cetyl alcohol (and) Glyceryl Stearate (and) PEG-75 Stearate (and) Ceteth-20 (and) Steareth-20	6.0
Dimethicone	Dimethicone	1.0
Cetyl octanoate	Cetyl octanoate	3.0
Mango butter	Mangifera Indica (Mango) seed butter	1.0
Caprylic capric tryglyceride	Caprylic capric tryglyceride	8.0
Cetearyl alcohol	Cetearyl alcohol	2.0
Vitamin E acetate	Tocopheryl acetate	0.3
Macadamia nut oil	Macadamia Integriifolia seed oil	2.7
C Preservative		q.s.
Appearance:	Thick cream	Stability At least 1 month @ 45°C
pH:	4.0-5.0	Passed 2 Freeze-thaw cycles
Viscosity	330000 cP @ 0.5rpm #LV4	Passed Centrifuge test

Benefits to Processors and Consumers

Divided into four squares, the benefits of GENU pHresh™ can be seen across the manufacturing and consumer interface.

GENU pHresh™ Pectin for pH Balancing

(4-Square Value Determination Plan)

SQUARE 1: Ingredient Costs	SQUARE 2: Preparation	SQUARE 3: Productivity	SQUARE 4: Quality
<i>Raw Materials</i>	<i>Formulation / Batch Prep / Ingredient Combination</i>	<i>Filling Operation, Equipment Runnability and Performance</i>	<i>Finished Product</i>
<ul style="list-style-type: none"> • Functions at low use levels (as low as 0.75-1.50%) • Not tied to price issues of petroleum-based products • 100% functional ingredient 	<ul style="list-style-type: none"> • Water soluble • Temperature tolerant pH performance occurs whether the pectin solution is made hot or cold • Stabilized at low pH (4.5) 	<ul style="list-style-type: none"> • Recommended to add via the water phase 	<ul style="list-style-type: none"> • Skin pH normalization provides opportunity to create unique skin feel for dry skin lotions, tissues, scalp/hair care, shaving products, diapers • Tested for suitability in dermal cosmetic applications • Can be used to support an organic or natural label claim • ECOCERT® validated
Ready for Combination	Combined Intermediate Batch	Processing and Filling	Finished Product Sale
Low cost-in-use for unique functionality	Easy to use on existing processing equipment		Branders benefit from unique end-product function

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