20830.

ProCutiGen®
Vegan Thermal Shield

PROTEINS

Active Concepts

VEGAN

EX VIVO

CHINA

ISO 16128

THE FEATURES.

ProCutiGen® Vegan Thermal Shield utilizes the concept of synthetic biology to self-assemble into a biomimetic neocuticle on the hair. The formation of this biomimetic cuticle offers protection from heat styling and other thermal treatments to promote healthy hair cuticles. ProCutiGen® Vegan Thermal Shield is an ideal ingredient for use in a wide range of hair care applications to protect hair from thermal styling damage. Incorporate ProCutiGen® Vegan Thermal Shield into shampoo, conditioner, and styling applications to offer revolutionary ProBonding protection!

Saccharomyces Cerevisiae Extract

Actions

ProBonding
Thermal Protection
Moisturizing
Barrier Protection

TECHNICAL DATA SHEET.

ProCutiGen® Vegan Thermal Shield

THE REGULATION.

INCI. Saccharomyces Cerevisiae Extract
CAS. 84604-16-0
EINECS. 283-294-5
EUROPE. Compliant
USA. Compliant
CHINA. Compliant

THE SPECIFICATION.

Origin. Yeast/Botanical
Natural Antimicrobial. Leuconostoc/Radish Root Ferment Filtrate
Preservatives. None
Solvents Used. None
Soluble/Miscible. Water Soluble
Appearance. Clear to Slightly Hazy Liquid
Use pH. 4.0 - 6.0
Use Level. 1 - 10 %

Note: When handling this product, please prevent exposure to temperatures above 25˚C. Exposure to temperatures above 25˚C may cause darkening.

THE STORY.

The "Plex Phenomenon" has swept the global haircare industry – resulting in a myriad of products focused on bond multiplying or re-bonding. As the market is currently saturated with formulations claiming to re-bond the hair, Active Concepts has taken a proactive approach towards technology that protects the hair. Active Concepts is shifting the focus to proactively protect the hair shaft through "ProBonding." ProCutiGen® Vegan Thermal Shield is an incredible scientific breakthrough that is slated to shake the foundations of how we consider preventative hair care – repair beyond the bond.

ProCutiGen® Vegan Thermal Shield prevents the thermally induced damage that breaks the cysteine bridges of the hair, making it porous, weakened, and more prone to breakage. Rather than focusing on repairing broken bonds that occur during thermal stress, ProCutiGen® Vegan Thermal Shield consists of bivalent cationic peptides that create a *de novo* cuticle on the hair to prevent damage from happening in the first place.

Cuticle preservation is essential to prevent hair damage. The cuticle is the outermost layer of the hair, composed of overlapping cells that shield the cortex while holding moisture and protecting hair from the environment. Damage to the cuticle compromises the structural integrity of the hair shaft, making hair prone to breakage. Utilizing the concept of synthetic biology, ProCutiGen® Vegan Thermal Shield is a bivalent cationic lipopeptide that self-assembles into a neo-cuticle on the hair. The formation of this biomimetic cuticle offers protection from high temperature styling to promote healthy hair.

THE SCIENCE.

Damage that occurs to hair after heat styling is a result of the structural integrity of the cuticle being compromised. Blow drying and flat ironing hair can strip moisture from the cuticle, resulting in cracking and consequently a rigid, brittle, and dry appearance. Hair needs a solid foundation to prevent damage, and the building block of hair is protein. Hair is full of protein, which is necessary to strengthen and restore the hair fiber, but the key functional proteins are the keratins. The cortex makes up majority of the hair mass and contains keratin and keratin-associated proteins (KAP), providing much of the fiber's mechanical strength. In cosmetic applications, keratin-based particles have been developed to improve the mechanical and thermal properties of virgin and overbleached hair. ProCutiGen® Vegan Thermal Shield is a lipopeptide derived from yeast that mimics the structure and function of kertain for hair protection.

Yeast, or *Saccharomyces cerevisiae*, can be induced to increase thermal resistance (or thermotolerance) by prior exposure to a heat stress. Exposing yeast to a mild preconditioning heat treatment has showed yeast acquiring a certain degree of thermotolerance that is related to the heat shock factor and stress response element pathways. These pathways help regulate the synthesis of heat shock proteins, which are known to be the major factors in obtaining thermotolerance. Additionally, damage to yeast DNA can act as the signal for inducing heat resistance. The extent of induced thermal or radiation resistance has been shown to be proportional to the amount of DNA damage. Research has shown that the synthesis of heat-shock protein is managed by heat-shock transcription factors, and when activated in response to a stress, bind to heat-shock elements and control gene expression. In yeast, the heat-shock factor is bound to the heat-shock element. ProCutiGen® Vegan Thermal Shield uses the heat resistance benefits of *Saccharomyces cerevisiae* to aid in providing thermal protection to personal care and cosmetic formulations.

ProCutiGen® Vegan Thermal Shield

THE BENEFITS.

Hair

Thermal Protection *Thermal Protection Assay*

Cuticle Protection *Scanning Electron Microscopy*

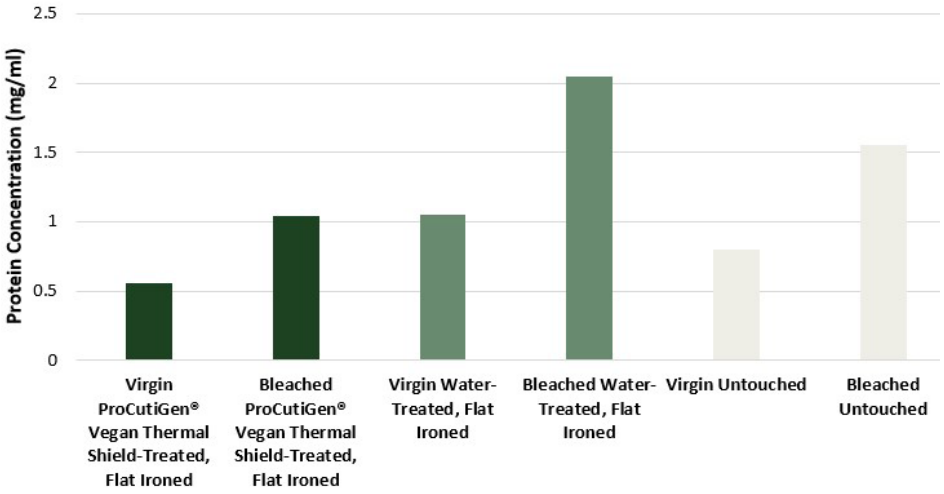
Hair Strengthening *Thermal Protection Assay Flexabrasion*

Hair Pollution Protection *Hair Pollution Protection Assay Analysis*

THE EFFICACY.

Thermal Protection Assay.

An *ex vivo* study was conducted to assess the ability of ProCutiGen® Vegan Thermal Shield to protect hair from heat styling damage. A total of six hair swatches were used by salon professionals using Sensationnel Bare & Natural Brazilian 100% Virgin Remi Unprocessed Human Hair. The virgin untouched and bleach untouched hair swatches served as controls.



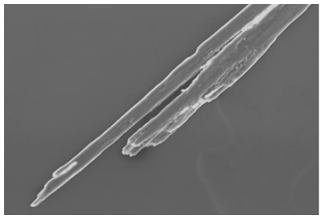
Increase in extractable protein obtained through bleaching and heat treatment
(34.3% decrease in protein loss)

Thermal Protection.

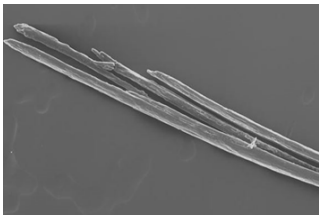
Heat protectant capabilities

Scanning Electron Microscopy Assay.

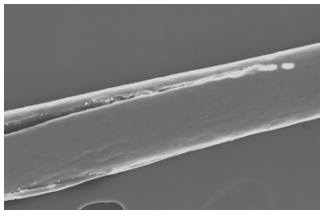
An *ex vivo* study was conducted to determine if ProCutiGen® Vegan Thermal Shield is capable of protecting the hair when thermal styling stress is applied. A total of six hair swatches were used by salon professionals using Sensationnel Bare & Natural Brazilian 100% Virgin Remi Unprocessed Human Hair. One swatch, left unaltered, was analyzed as the control. Two test swatches were treated and submitted for testing.



Untreated Virgin Hair



Water + Blown Dry & Flat Ironed



Water + 20830 ProCutiGen® Vegan Thermal Shield + Blown Dry & Flat Ironed

Creation of a *de novo* cuticle on damaged cuticle
(Tested at 2.0%)

Cuticle Protection.

Heat + Barrier protection
&
Moisturization

References:
1. Tinoco, Ana, et al. "Ohmic heating as an innovative approach for the production of keratin films." International journal of biological macromolecules 150 (2020): 671-680.
2. Malinauskyte, Ernesta, et al. "Effect of equilibrium pH on the structure and properties of bleach-damaged human hair fibers." Biopolymers 111.11 (2020): e23401.
3. Guyot, Stephane, Eric Ferret, and Patrick Gervais. "Responses of Saccharomyces cerevisiae to thermal stress." Biotechnology and bioengineering 92.4 (2005): 403-409.
4. Boreham, D. R., and R. E. J. Mitchel. "Regulation of heat and radiation stress responses in yeast by hsp-104." Radiation research 137.2 (1994): 190-195.

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