

20562.

# AC Curezyme

Bioactive Strength  
Weightless Protection  
Post-Quat Era



VEGAN



SEPHORA  
CLEAN



CREDO  
CLEAN



## THE FEATURES.

Welcome to the post-quat era! It's time to say goodbye to traditional quaternary ammonium compounds, long relied upon for their conditioning, detangling, and anti-static benefits, and step into a cleaner, smarter future for hair health. While effective, quats are notorious for causing buildup, scalp irritation, and raising many environmental concerns. Introducing AC Curezyme, a next-generation haircare technology created specifically by engineering Curamina®, a dual-action biomimetic active that emulates an enzyme naturally found in skin and hair follicles, with AC Hydrolyzed Vegetable Protein PF, a sustainable, plant-based alternative to keratin. By tailoring Curamina® with AC Hydrolyzed Vegetable Protein PF, we've achieved an optimal enzyme-to-protein ratio, unlocking a powerful synergy that drives visible results.

*INCI: Vegetable Protein Keratinoligase*

TECHNICAL DATA SHEET.

## THE STORY.

For decades, traditional quaternary ammonium compounds (quats) have been the gold standard in haircare for their detangling, conditioning, and anti-static benefits. Evolving to the use of quaternized proteins, or hydrolyzed proteins modified with quaternary groups, they also gained momentum in both salon and commercial formulas, blending the appeal of nature with scientific credibility.

However, consumer awareness has sparked new conversation. Traditional quats, while effective, can lead to buildup, scalp irritation, and environmental concerns. They also fall short when repairing deeper structural damage. Enter bond builders, actives that work on the molecular level to repair broken bonds.

At the intersection of quaternization and bond-building is next-generation technology, introduced as AC Curezyme. This innovative hybrid bridges the gap between classic conditioning and advanced bond-building. Powered by Curamina®, a biomimetic active that mimics an enzyme naturally found in skin and hair follicles to build peptide bonds, AC Curezyme not only seals and strengthens the hair fiber, but also leverages an optimized enzyme-to-protein ratio with AC Hydrolyzed Vegetable Protein PF, a plant-based, sustainable alternative to keratin. Together, this system offers a weightless, deeply nourishing, and sustainable solution that supports the demands of consumers entering their post-quat era!



## THE SCIENCE.

The hair fiber is composed primarily of keratin proteins, which are rich in amino acids such as lysine and glutamine.<sup>1</sup> These amino acids are integral to maintaining the structural integrity and mechanical strength of hair due to their ability to form crosslinked bonds.<sup>2,3</sup> Over time, chemical treatments, heat styling, and environmental stressors degrade these natural protein networks, leading to weakened, brittle strands. To restore resilience, modern conditioning systems often rely on synthetic quaternary ammonium compounds, which provide immediate smoothing but can accumulate and contribute to long-term buildup, dullness, and scalp irritation.

AC Curezyme offers a next-generation, quat-free solution by harnessing the power of Curamina®, a biomimetic active that emulates the function of an enzyme naturally involved in catalyzing protein crosslinking.<sup>4,5</sup> Specifically, Curamina® mimics the enzymatic activity by forming covalent bonds between the amine group of lysine and the carboxamide group of glutamine. These bonds act as molecular “glue,” reinforcing the hair’s structure by bridging damaged sites and rebuilding a protein matrix.

What makes this system unique is the optimized enzyme-to-protein ratio with AC Hydrolyzed Vegetable Protein PF, a sustainably sourced blend of hydrolyzed corn, wheat, and soy proteins. The low molecular weight of these hydrolyzed proteins enables deeper penetration into the hair shaft and better surface interaction. Once Curamina® facilitates the formation of lysine-glutamine bonds, the hydrolyzed corn, wheat, and soy proteins are anchored in place and are able to mimic the natural crosslinking behavior found in healthy, undamaged hair. This targeted approach enhances tensile strength, elasticity, and resilience without the occlusive film-forming characteristics of synthetic polymers.

## THE TECHNICAL DETAILS.

**INCI.** Vegetable Protein Keratinoligase

**CAS.** 100209-45-8

**EINECS.** 309-353-8

**Europe.** Contact Us

**USA.** Compliant

**CHINA.** Contact Us

**Origin.** Botanical/Biotechnology/Bacteria

**Natural Antimicrobial.** Leuconostoc/Radish Root Ferment Filtrate\*

**Preservatives.** None

**Solvents Used.** Water

**Appearance.** Slightly Hazy to Hazy Liquid

## THE FORMULATION TIPS.

**pH Stability.** 3 - 7

**Temperature Stability.** Stable up to 40°C

**Use Level.** 2 - 5%

**Ionic State.** Anionic

**Alcohol Compatibility.** Compatible with up to 50% alcohol at 5% use level

**Solubility.** Water Soluble

**Pro Tips.** It is recommended that this product is added to the aqueous phase of the formulation at < 40°C

\* Please note this product contains Leuconostoc/Radish Root Ferment Filtrate (Tradename: M15008-Leucidal® Liquid) - produced by Active Micro Technologies, LLC - containing 18.0 - 22.0% Phenolics (tested as Salicylic Acid). Please refer to Leucidal® Liquid product literature for additional information.

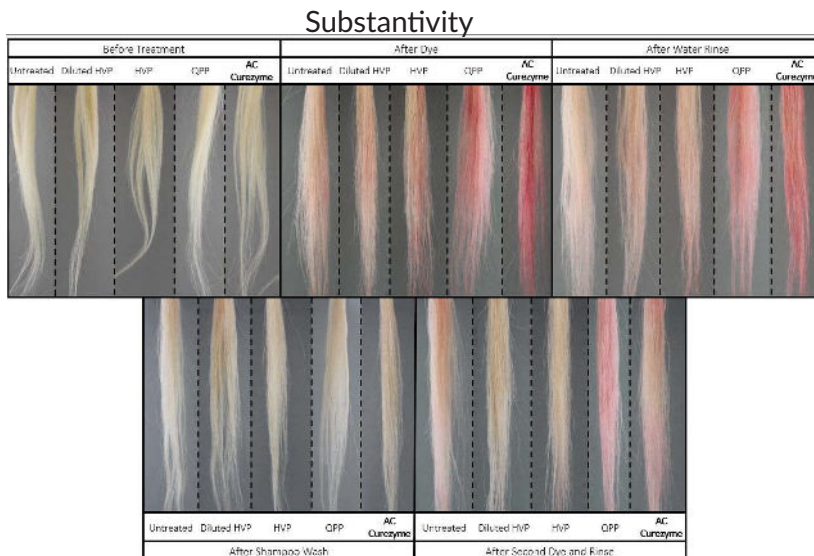
## THE BENEFITS OVERVIEW.

<p><b>Stylist Approved</b> Salon Half-Head Study (alone vs. Hydrolyzed Vegetable Protein vs. Quaternized Plant Protein)</p>		<p><b>Curl Resilience</b> Curl Retention Assay (alone vs. Hydrolyzed Vegetable Protein)</p>	
<p><b>Conditioning Without Buildup</b> Substantivity Assay</p>		<p><b>Frizz Protection</b> Humidity Analysis (alone vs. Hydrolyzed Vegetable Protein)</p>	
<p><b>Environmental Shield</b> Airborne Pollutant Hair Protection Assay (alone vs. Hydrolyzed Vegetable Protein)</p>		<p><b>Long-Lasting Color</b> Color Protection Assay</p>	
<p><b>Sun-Safe Strands</b> UV Hair Protection</p>		<p><b>Hair Fiber Integrity</b> Tensile Strength</p>	

## THE EFFICACY.

### Conditioning Without Buildup

An *ex vivo* substantivity study was performed to evaluate how effectively AC Curezyme deposits onto hair while avoiding excessive buildup, compared to a non-enzymatically modified protein and a quaternized plant protein. Using a modified Rubine Red dye method, treated blonde hair tresses were stained, rinsed, shampooed, and re-stained to assess both deposition strength (color retention after rinsing) and washability (removal after shampooing without residual buildup). Color intensity and retention served as indicators of product substantivity, while repeated dyeing cycles evaluated potential accumulation on the hair. Image analysis (RGB changes) quantified performance, demonstrating how AC Curezyme balances effective deposition with clean removal, aligning with optimal substantivity behavior.

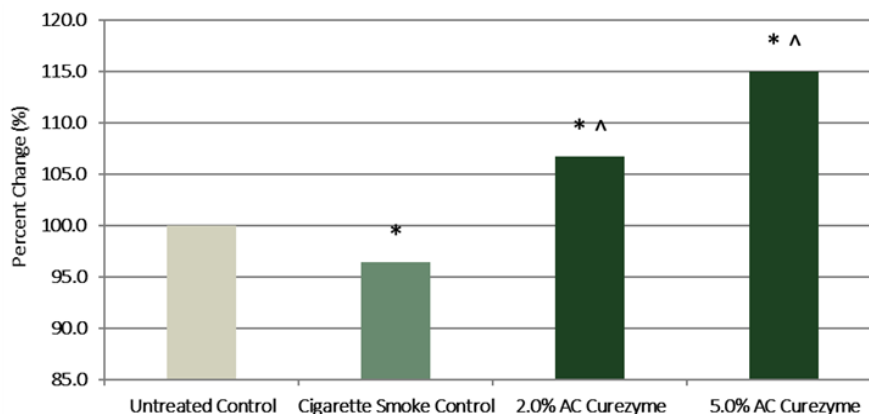


**Increases substantivity by +57%**

### Environmental Shield

This *ex vivo* study used cigarette smoke as a model for PM 2.5 exposure—an airborne pollutant known to penetrate and oxidize hair fibers. Human brunette hair tresses were treated with water, 2.0% or 5.0% AC Curezyme, or left untreated, then exposed to controlled cigarette smoke conditions. Tryptophan levels, a marker for protein integrity, were measured via fluorescence; lower fluorescence indicated greater oxidative damage. Results demonstrated that AC Curezyme significantly preserved tryptophan levels compared to the smoke-only control, suggesting it offers protective benefits against pollution-related hair damage without interfering residues.

**Protein Content After Smoke Exposure**



**Retains +18.6% more tryptophan compared to smoke-exposed hair**

## THE EFFICACY CONTINUED.

### Curl Resilience

An *ex vivo* study was conducted using virgin brunette hair tresses treated with either deionized water or 2.0% AC Curezyme. Tresses were curled using heatless curlers to ensure consistency and then exposed to both ambient and high humidity (>90% RH) conditions. Curl retention was evaluated through timed imaging over 24 hours and analyzed by measuring curl length. Results showed that AC Curezyme-treated hair maintained curl structure more effectively under both normal and humid conditions, indicating enhanced style-holding performance.

Hair Curl Retention

	Uncurled	Curled	30 Minute	1 Hour	2 Hours	4 Hours	8 Hours
DI Water							
2.0% AC Curezyme							

**Prolongs  
curl retention  
after 4 hours  
by +29%**

### Frizz Protection

Twelve human hair tresses—bleached blonde, virgin brunette, and curly—were treated with DI water, 2.0% AC Curezyme, or left untreated. After treatment and drying, initial images were taken. Tresses were then exposed to high humidity in a controlled chamber, and final images were captured after 30 minutes. Qualitative analysis revealed that AC Curezyme-treated tresses maintained smoother, more defined appearance compared to the water-treated and untreated controls, indicating improved resistance to humidity-related frizz and shape loss.

Humidity Analysis

Before Humidity Exposure				30 Minutes After Humidity Exposure			
Untreated Control	Negative Control	DI Water	2.0% AC Curezyme	Untreated Control	Negative Control	DI Water	2.0% AC Curezyme

**Visibly reduces  
frizz**

## THE EFFICACY CONTINUED.

### Long-Lasting Color

Red-dyed blonde hair tresses were subjected to multiple wash cycles and UV exposure. Tresses were treated with either base shampoo and conditioner, the same base with 2.0% AC Curezyme, or left untreated. Color intensity (CIELab\*) was measured before treatment, after 7 and 14 washes, and following 0, 10, 20, or 30 hours of UV exposure using Xenon-Arc light to simulate sunlight. Microscopy and color analysis revealed that AC Curezyme-treated tresses retained color more effectively and showed less structural damage.

Color Protection Assay

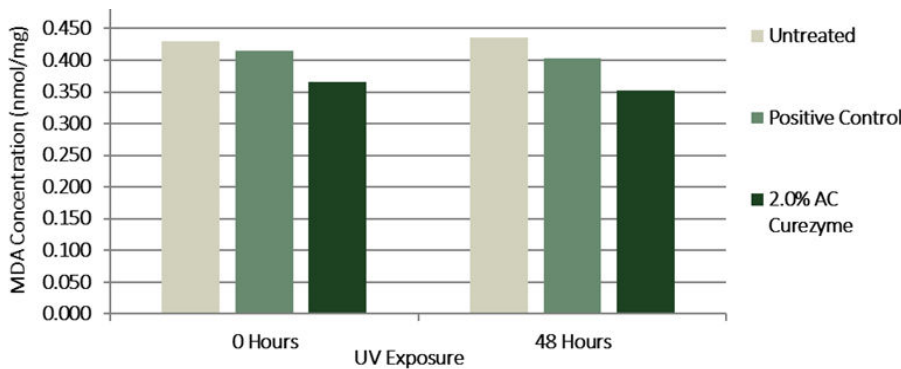
	UV Exposure Time			
	0 Hours	10 Hours	20 Hours	30 Hours
Untreated Control				
Base Shampoo and Conditioner 7 Wash Cycles				
2.0% AC Curezyme in Base Shampoo and Conditioner 7 Wash Cycles				
Base Shampoo and Conditioner 14 Wash Cycles				
2.0% AC Curezyme in Base Shampoo and Conditioner 14 Wash Cycles				

Reduces color change after 14 washes & 30 hours of UV by -79%

### Sun-Safe Strands

Virgin brunette hair tresses were treated with test materials and exposed to 48 hours of UVB irradiation. To assess UV-induced damage, three key markers were analyzed: tryptophan degradation (protein damage), total lipid content (moisture barrier integrity), and lipid peroxidation (oxidative stress), using fluorescence and colorimetric methods. AC Curezyme-treated tresses demonstrated reduced tryptophan loss, better lipid retention, and lower levels of lipid peroxides compared to untreated controls, indicating effective protection against UV-induced structural and oxidative hair damage.

UV Hair Protection Lipid Peroxidation



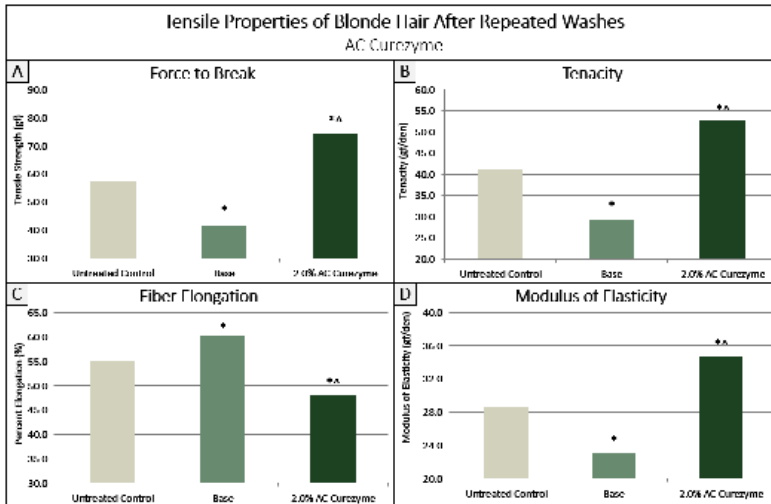
Reduces lipid peroxidation compared to untreated control after 48 hours by -21%

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## THE EFFICACY CONTINUED.

### Hair Fiber Integrity

An *ex vivo* tensile strength assay was conducted on human hair tresses subjected to 14 repeated wash cycles. Hair types varied across straight, wavy, and curly textures. Tresses were treated with either a base shampoo and conditioner or the same base containing 2.0% AC Curezyme. After treatment, individual hair fibers were tested using the ASTM D3822 method to evaluate mechanical properties including force to break, tenacity, elongation, and elasticity. Results showed that AC Curezyme-treated fibers exhibited significantly improved strength and resistance.



Improves force to break by +30%

### Stylist Approved

A Salon Half-Head Study was conducted to evaluate the perceived hair benefits of AC Curezyme in a shampoo and conditioner on wet and dry hair. These results indicate AC Curezyme improves the perceived benefits with wet and dry hair when added to shampoo and conditioner at recommended use levels. Collectively, AC Curezyme demonstrates visual and perceived hair characteristics which contribute to a healthier looking hair appearance.



Baseline      Base Shampoo and Base Conditioner      2.0% AC Curezyme

Improves frizz and hydration by +24% & +23%

#### References:

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