

AC Vegan Keratin SF



hair smoothing
 increases hair hydration
 gluten-free plant based
 vegan keratin alternative
 enhances overall hair feel

BACKGROUND

Keratin is a basic building block of the complex morphological structure of hair and essential for hair fortification and reparation. Consumers traditionally seek animal derived keratin proteins in hair care products to improve hydration and overall feel. However, the rising trend of vegan beauty inspires the development of new functional equivalents from a botanical source. Active Concepts meets the ethos of the new-age consumer with **AC Vegan Keratin SF**, a vegan and sustainable hydrolyzed keratin alternative in a water soluble form.

Eco-ethical lifestyles join the clean beauty narrative as conscious consumers consider the environmental and ethical impact of their choices. Once considered a niche concept, veganism is rapidly becoming a mainstream lifestyle choice adopted by millennials and Generation Z as a holistic approach to sustainable living.¹ The rise of ethical consumerism translates into a shift toward products with no animal derivatives, favoring growth of vegan beauty products through 2028.² In the hair care sector, shampoos dominate the vegan hair care market with 43% of launches in the last five years, and conditioners and treatments closely following with 26% and 22% of launches, according to Mintel's Global New Product Database.² The outlook for vegan hair care products is nothing short of optimistic.

A healthy planet and great skincare products mutually exist in the contemporary consumers' mind, and indeed in their world of consumption. Ethical products made from natural ingredients must also be effective and not compromise on delivering sought after benefits. Hydrolyzed keratin, while naturally derived, has conventionally been prepared from keratin-containing animal parts, including feathers, hair and wool. In the nature of a true innovation, Active Concepts rose to the challenge and created a water soluble hydrolyzed keratin equivalent using plant derivatives. The enzymatic hydrolysis of plant proteins presents a vegan, non-GMO, gluten-free replacement to animal derived hydrolyzed keratin for hair care. **AC Vegan Keratin SF** consists of hydrolyzed chickpea, lentil, and quinoa proteins that mimic the composition of hydrolyzed keratin to provide a sustainable, accountable, and effective solution for hair smoothing and hydration.

Code Number: 20977

INCI Name: Water & Lens Esculenta (Lentil) Seed Extract & Hydrolyzed Cicer Seed Extract & Chenopodium Quinoa Seed Extract

INCI Status: Conforms

REACH Status: Compliant

CAS Number: 7732-18-5 & 90063-40-4 & 92113-26-3 & 225234-01-5

EINECS Number: 231-791-2 & 289-998-9 & 295-631-3 & 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: Prunus Armeniaca (Apricot) Kernel Oil

Appearance: Clear to Slightly Hazy Liquid

Soluble/ Miscible: Water Soluble

Microbial Count:

< 100CFU/g, No Pathogens

Suggested Use Levels: 1.0 – 10.0%

Suggested Applications:

- Conditioning, Hydrating, Vegan Alternative to Hydrolyzed Keratin

Benefits of AC Vegan Keratin SF:

- Increases Hair Hydration
- Vegan Alternative
- Anti-Oxidant



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Chickpea, lentil, and quinoa are superfoods plentiful in nature and provide an easily accessible path to mimic the amino acid composition of hydrolyzed animal keratin. Chickpeas and lentils are old world pulses in the legume family and have traditionally been incorporated into many culinary creations. Lentils and chickpeas are sources of high quality protein, rich in amino acids such as arginine, aspartic and glutamic acids, and leucine.^{3,4} Quinoa, also known as 'the mother grain', is best known as a food ingredient and offers a complete amino acid profile – the highest level of protein of all grains.⁵ Quinoa contains an amino acid profile rich in lysine, methionine, and cysteine.⁵ The use of plant based protein as source for cosmetic innovation satisfies the growing consumer demand for vegan beauty and ingredient transparency.

SCIENCE

Keratin is a fibrous protein with excellent mechanical properties. Keratin makes up more than 90% of the hair follicle and is rich in cysteine, a sulfur-containing amino acid that gives the protein its unique strength and protective quality.⁶ The major function of the keratin cuticle is to protect the inner cortex of the hair from damage caused by factors including thermal styling, chemical processing, and daily maintenance. The large molecular weight of intact keratin (40-60 kDa) makes the direct application of this protein ineffective at penetrating the hair shaft to support the integrity of the hair.⁷ Keratin proteins need to undergo hydrolysis to effectively deliver hair care benefits.

Through hydrolysis of chickpea, lentil, and quinoa proteins, initiated by the probiotic bacteria *Lactobacillus bulgaricus*, we are able to derive a controlled keratin peptide analogue with a lower molecular weight (approximately 1kDa oligopeptides as opposed to the 2-4 kDa traditional protein hydrolysates). When compared to traditional hydrolyzed proteins, this controlled, lower molecular weight fraction can efficiently penetrate the hair shaft, and deposit at the cuticle junctions. This helps to maintain the hairs' structural integrity while promoting conditioning, smoothness, and shine. As this process uses a plant fermentation it is considered more sustainable and environmentally friendly than other hydrolysis methods.^{8,9}

The hydro-lipid layer is a film that assembles across the hair shaft helping to keep each strand moisturized and promoting general hair health. This protective barrier is formed of ceramides, cholesterol, essential fatty acids, triglycerides and water. All styling processes, such as washing, chemical or heat treatments, can strip these essential lipids and moisture from the hair. Additionally, disrupting this hydro-lipid layer, whether by washing or by dry shampooing, may be damaging to the hair. Dispersing the vegan, hydrolyzed keratin peptide analogues can help to replenish some of the essential lipids to the hair and scalp without adding to an oily look or feel.

BENEFITS

AC Vegan Keratin SF offers a biomimetic and vegan alternative to hydrolyzed keratin protein. The selective combination of quinoa, lentil, and chickpea peptides provides a plant-based, non-GMO, gluten-free functional equivalent to animal-derived hydrolyzed keratin. **AC Vegan Keratin SF** effectively increases hair hydration and helps to protect against free radicals. Perfect for emulsions and sprays, **AC Vegan Keratin SF** allows brands to capture eco-conscious beauty without compromise.

EFFICACY

A gravimetric analysis was performed in order to assess the hydrating ability of **AC Vegan Keratin SF** on the hair. The purpose was to determine if **AC Vegan Keratin SF** could provide hair hydration benefits comparable to animal-derived keratin. Four hair swatches were weighed, and then treated with either 2.0% **AC Vegan Keratin SF**, 2.0% AC Keratin Hydrolysate 30 PF, water, or nothing (untreated control). After treatment, hair swatches were weighed another time, then placed into a constant temperature-drying oven for 1 hour at 105°C. When removed from the oven, the hair was allowed time to cool in a humidity-controlled chamber and weighed one last time. Hair hydration was determined by calculating the percent moisture per hair swatch.

Results indicate that **AC Vegan Keratin SF** is capable of maintaining hair hydration, comparable to animal (sheep's wool)-derived hydrolyzed keratin after an equivalent and controlled drying time.

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Hair Hydration via Gravimetric Analysis

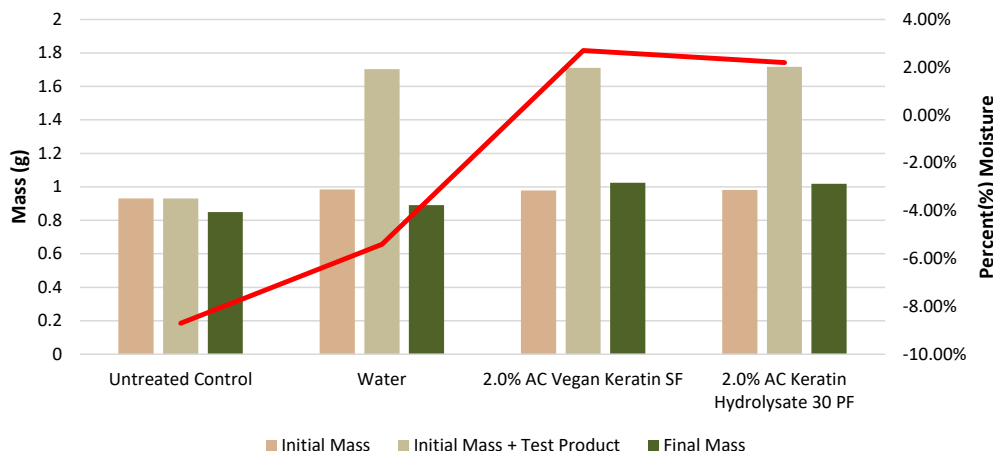


Figure 1. Assessment of hair hydration via gravimetric analysis.

An ORAC Assay was conducted to evaluate **AC Vegan Keratin SF**'s ability to reduce oxidative stress. This assay is based upon the effect of peroxy radicals generated from the thermal decomposition of 2,2'-azobis-2-methylpropanimidamide dihydrochloride on the signal intensity from the fluorescent probe, fluorescein, in the presence of an oxygen radical absorbing substance. Results indicate that **AC Vegan Keratin SF** provides intense protection against Reactive Oxygen species comparable to Trolox, an analogue of Vitamin E.

ORAC AC Vegan Keratin SF

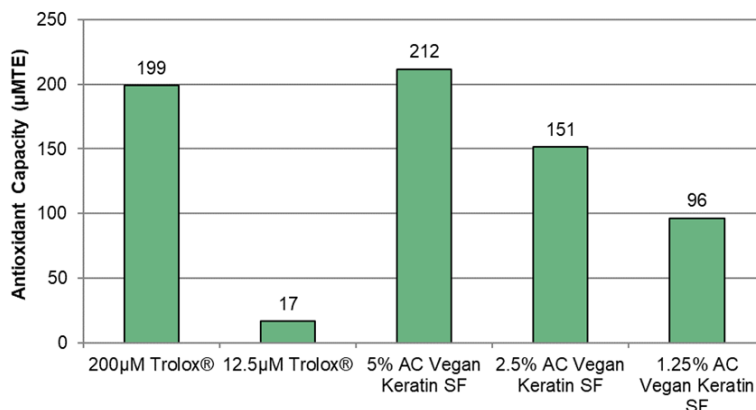


Figure 2. Antioxidant capacities.

References:

1. McDougall, Andrew. "How Beauty Brands Can Leverage Veganism's Popularity." Mintel, 26 July 2019.
2. Mintel. "How Will Veganism Develop around the World in 2020?" 10 Jan. 2020.
3. Wallace, T. C., Murray, R., & Zelman, K. M. (2016). The Nutritional Value and Health Benefits of Chickpeas and Hummus. *Nutrients*, 8(12), 766.
4. Ahmed, J, Mulla, M, Al-Ruwaih, N, Arfat, YA. Effect of high-pressure treatment prior to enzymatic hydrolysis on rheological, thermal, and antioxidant properties of lentil protein isolate. *Legume Science*. 2019; 1:e10.
5. The Chenopodium. Grains of the Andes: Inca Crops for Modern Agriculture. 1994. J.C. Risi and N.W. Galwey, In: *Advances in Applied Biology V. 10*, T.H. Coaker (ed.), pp. 145-216. Academic Press, London.
6. Kajjura Y, Watanabe S, Itou T, Nakamura K, Iida A, Inoue K, NYagi N, Shinohara Y, Amemiya Y. Structural analysis of human hair single fibres by scanning microbeam SAXS. *J Strut Biol*. 2006;155(3):438-444. doi: 10.1016/j.jsb.2006.04.008.
7. Costa F, Silva R, Boccaccini A. (2018). Fibrous protein-based biomaterials (silk, keratin, elastin, and resilin proteins) for tissue regeneration and repair. 10.1016/B978-0-08-100803-4.00007-3.
8. Karthikeyan R, Balaji S, Sehgal P. Industrial applications of keratins – a review. *J Sci Ind Res India*. 2007;66:710-715.
9. Villa, A. L., Aragão, M. R., Dos Santos, E. P., Mazotto, A. M., Zingali, R. B., de Souza, E. P., & Vermelho, A. B. (2013). Feather keratin hydrolysates obtained from microbial keratinases: effect on hair fiber. *BMC biotechnology*, 13, 15.



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