

Keratin Reconstruction: Evaluation of Green Peptides Technology on Hair Performance

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Abstract : Hair surface properties affect hair texture and shine, whereas the healthy state of the hair cortex sways hair ends. Even if cosmetic treatments are intrinsically safe, there is potentially damaging action on the hair fibers. Loss of luster, frizz, split ends, and other hair problems are particularly prevalent among people who repeatedly alter the natural style of their hair or among people with intrinsically weak hair. Technological and scientific innovations in hair care thus become invaluable allies to preserve their natural well-being and shine. The study evaluated restoring keratin-like ingredients that improve hair fibers' structural integrity, increase tensile strength, improve hair manageability and moisturizing. The hair shaft is composed of 65 - 95% of keratin. It gives the hair resistance, elasticity, and plastic properties and also contributes to their waterproofing. Providing exogenous keratin is, therefore, a practical approach to protect and nourish the hair. By analyzing the amino acid composition of keratin, we find a high frequency of hydrophobic amino acids. It confirms the critical role interactions, mainly hydrophobic, between cosmetic products and hair. The active ingredient analyzed comes from vegetable proteins through an enzymatic cut process that selected only oligo- and polypeptides (> 3500 KDa) rich in amino acids with hydrocarbon side chains apolar or sulfur. These chemical components are the most expressed amino acids at the level of the capillary keratin structure, and it determines the most significant possible compatibility with the target substrate. Given the biological variability of the sources, it isn't easy to define a constant and reproducible molecular formula of the product. Still, it consists of hydroxypropyltrimonium vegetable peptides with keratin-like performances. 20 natural hair tresses (30 cm in length and 0.50 g weight) were treated with the investigated products (5 % v/v aqueous solution) following a specific protocol and compared with non-treated (Control) and benchmark-keratin-treated strands (Benchmark). Their brightness, moisture content, cortical and surface integrity, and tensile strength were evaluated and statistically compared. Keratin-like treated hair tresses showed better results than the other two groups (Control and Benchmark). The product improves the surface with significant regularization of the cuticle closure, improves the cortex and the peri-medullar area filling, gives a highly organized and tidy structure, delivers a significant amount of sulfur on the hair, and is more efficient moisturization and imbibition power, increases hair brightness. The hydroxypropyltrimonium quaternized group added to the C-terminal end interacts with the negative charges that form on the hair after washing when disheveled and tangled. The interactions anchor the product to the hair surface, keeping the cuticles adhered to the shaft. The small size allows the peptides to penetrate and give body to the hair, together with a conditioning effect that gives an image of healthy hair. Results suggest that the product is a valid ally in numerous restructuring/conditioning, shaft protection, straightener/dryer-damage prevention hair care product.

Keywords : conditioning, hair damage, hair, keratin, polarized light microscopy, scanning electron microscope, thermogravimetric analysis

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