AC Split End Complex MSX

Versatile
Strengthens Cuticles
Naturally Derived
Repair
Healthier feeling hair

BACKGROUND

Split ends are ultimately the result of mechanical damage to the hair. A variety of factors influence the mechanical damage that promotes split ends. Chemical influence or sunlight induced hair damage will weaken the hair making it more prone to split ends. Hair care products rich in conditioning agents reduce combing force making split ends more likely.

A well-formulated hair care regimen will significantly reduce the formation of split ends. The question remains how does one reduce the appearance or repair split ends once they have formed. The truth is that there is no way to reseal the hair. There are however several strategies for creating the illusion of undamaged hair until healthy hair can be grown.

SCIENCE

Hair damage is directly correlated with charge density. As the tip of a hair fiber begins to crack, fray, and eventually split, this in turn multiplies the electronegative sites for that follicle, making it many times stronger than an undamaged follicle.

Like with any electrical charge, the electronegative sites will tend to repel each other, exacerbating the appearance of split ends. By applying a cationic, low molecular weight, quaternary compound such as a hydroxypropyltrimonium hydrolyzed rice protein, it is possible to neutralize the electric charge. This, in turn, virtually eliminates the static interaction.

This achieves the effect of eliminating some of the pressure pushing the ends of the hair apart. Having neutralized the charge with the quaternized compound, a material is applied to help hold the damaged ends together. For this, we have chosen a high molecular weight glucan based rice biopolymer. The polyglucan seals the hair while providing enhanced lubricity to reduce combing force. Although **AC Split End Complex MSX** has a higher molecular weight, the rice polyglucan does not contribute to build-up due to its water-soluble nature.

Code Number: 20375MSX

INCI Name: Hydroxypropyltrimonium Hydrolyzed Rice Protein/ Siloxysilicate & Oryza Sativa (Rice) Extract
INCI Status: Conforms
REACH Status: Complies
CAS Number: 56275-01-5 & 68553-81-1
EINECS Number: N/A & 271-397-8

Origin: Botanical
Processing:
GMO Free
No Ethoxylation
No Irradiation
No Sulphonation
Additives:
Natural Antimicrobial: Leuconostoc/Radish Root Ferment Filtrate & Populus Tremuloides Bark Extract
Preservatives: None
Antioxidants: None
Other additives: None
Solvents Used: Water
Appearance: Clear to Slightly Hazy Liquid
Soluble/ Miscible: Water Soluble
86.05% Biodegradability
Microbial Count: <100 CFU/g, No Pathogens

Suggested Use Levels: 1.0 - 5.0%
Suggested Applications: Hair Repair, Hair Strengthening

Benefits of **AC Split End Complex MSX:**

- Strengthens Existing Hair
- Repairs Damaged Cuticles
- Versatile in Formulations

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BENEFITS

Split ends are the bodies' way of signifying damaged or unhealthy hair, thankfully, by utilizing **AC Split End Complex MSX** you will be able to give the body time to repair itself while not having to worry about your appearance or further damage with other harsh chemicals. Using **AC Split End Complex MSX** in formulation will help bring balance and health for a natural, youthful appearance.

EFFICACY

An ex-vivo Scanning Electron Microscopy study evaluated the ability of **AC Split End Complex MSX** to shield virgin hair strands as well as bleached hair strands from thermal damage. Four hair swatches offered various testing parameters including one untreated, straightened hair swatch, one straightened hair swatch treated with 2.0% **AC Split End Complex MSX** solution, one bleach (40V) untreated hair swatch, and one bleach (40V) hair swatch treated with 2.0% **AC Split End Complex MSX** solution. All swatches were spritzed with either water alone or the water and **AC Split End Complex MSX** solution before being blown dry and flat ironed at 232°C (450°F) for 25 passes. The blow dry and flat iron process mimics long-term effects of styling the hair.

Scanning Electron Microscopy Imaging (SEM) provides images of chemically treated hair by scanning the hair with a focused beam of electrons. These electrons interact with the atoms of the hair sample to provide longitudinal and cross-section images of the hair's surface topography and composition.

AC Split End Complex MSX treated swatches, a significant decrease in damage of the both the cuticle and cortex is exhibited. Better yet, the **AC Split End Complex MSX** treated SEM images prevented cortex cracking in both Straightened and Straightened + Bleached samples. Overall **AC Split End Complex MSX** is an ideal addition to everyday treatment to repair and protect against thermal styling stressors and chemical treatments.

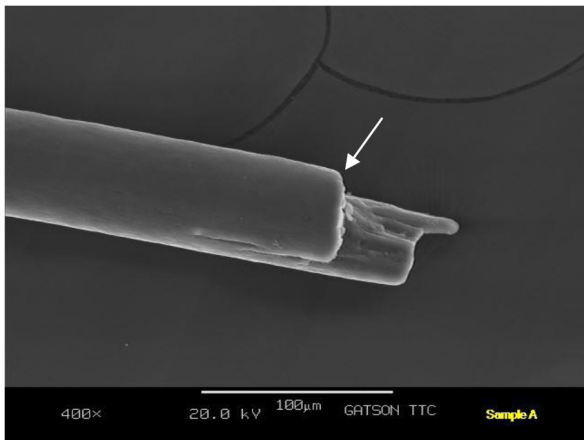

Figure 1. Longitudinal image of Straightened Hair, Untreated. Note, the hair strand is split, showing a damaged cuticle.

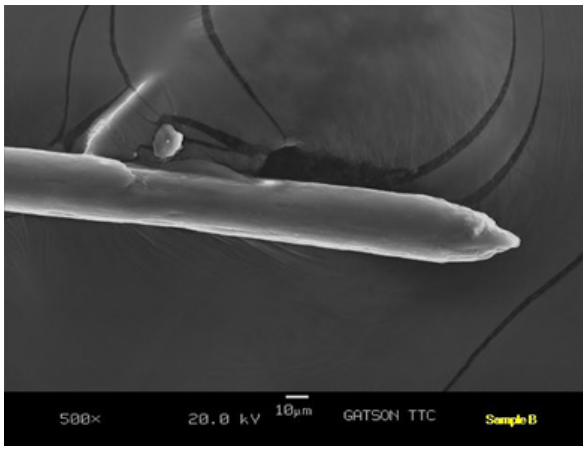

Figure 2. Longitudinal image of Straightened Hair treated with 2.0% **AC Split End Complex MSX**. The hair is intact and protected.

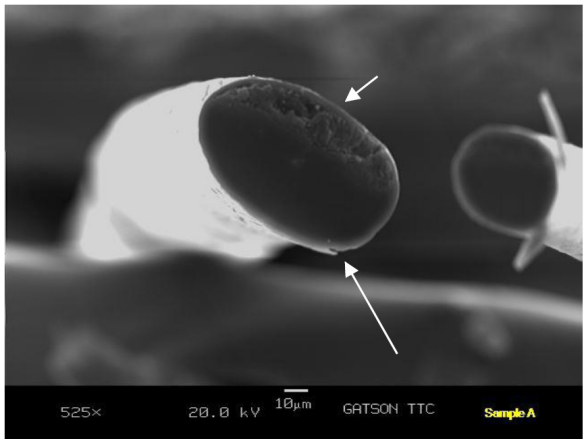

Figure 3. Cross-sectional image of Straightened Hair, Untreated. The hair is showing signs of damage at the edges and cuticle flaring.

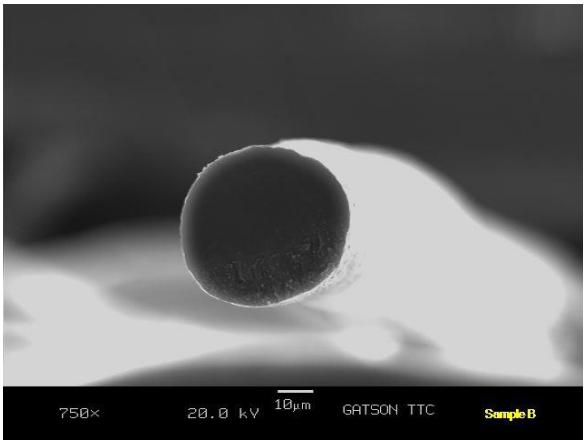

Figure 4. Cross-sectional image of Straightened Hair treated with 2.0% **AC Split End Complex MSX.** The cuticle layer is smooth with no flaring.

AC Split End Complex MSX

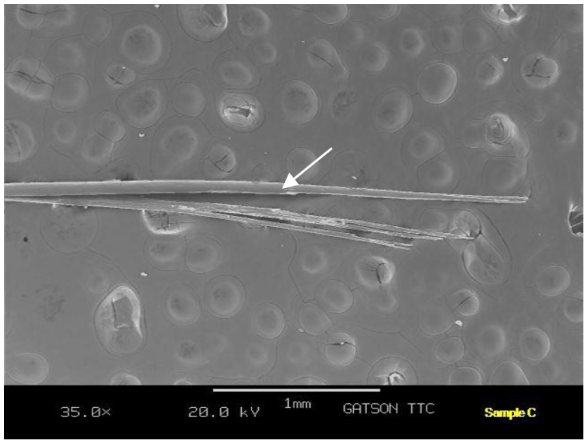

Figure 5. Longitudinal image of Bleached Hair (40V), Untreated. The hair strand is split in half and shows extensive damage to the cuticle.

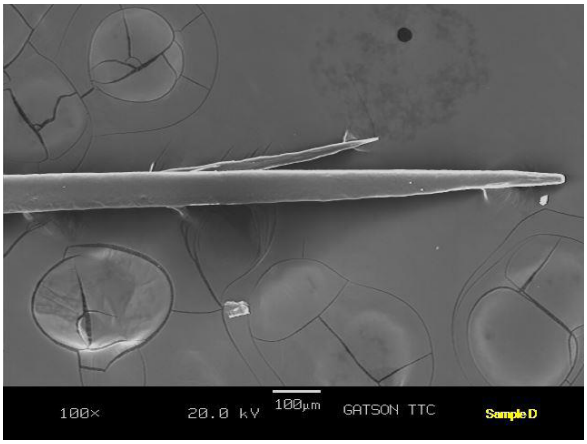

Figure 6. Longitudinal image of Bleached Hair (40V), Treated with 2.0% **AC Split End Complex MSX.** The hair is intact and protected.

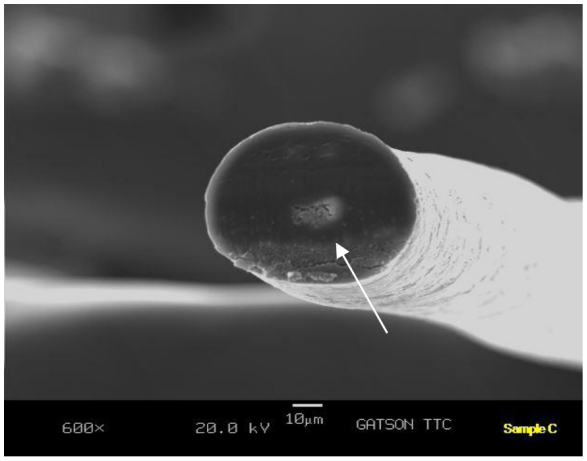

Figure 7. Cross-sectional image of Bleached Hair (40V), Untreated. The hair shows crumbling at the edges of the cuticle. Note that the cortex is cracked in the center.

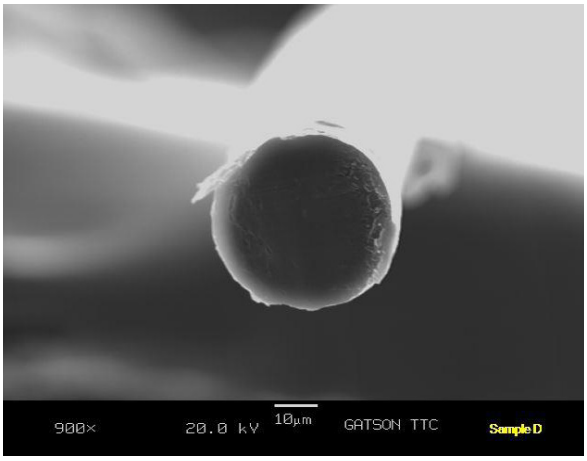

Figure 8. Cross-sectional image of Bleached Hair (40V), Treated with 2.0% **AC Split End Complex MSX**. No cracking within the cortex of the hair strand.

An *ex-vivo* Tensile Strength Hair Study evaluated the ability of **AC Split End Complex MSX** to affect several parameters of tensile strength such as Tenacity, Force to Rupture, and Modulus of Elasticity on Untreated Virgin Hair (control), Untreated Straightened Virgin Hair, and 2.0% **AC Split End Complex MSX** Treated Straightened Virgin Hair.

Tenacity is the customary measure of strength of a fiber usually defined as the ultimate (breaking) force of the fiber (in gram-force units) divided by the denier. The results shown in Figure 9 indicated that hair straightened and treated with AC Split End Complex MSX elicited similar results to that of untreated virgin hair with only a 1.7% difference between the two. Modulus of Elasticity (Young's modulus) describes tensile elasticity, or the tendency of the hair to deform along an axis when opposing forces are applied along that axis; it is defined as the ratio of tensile stress to tensile strain (gf/den). The results shown in Figure 10 indicated that hair straightened and treated with **AC Split End Complex MSX** elicited similar results to that of untreated virgin hair with no difference between the two. There was a 6.4% difference between the Untreated Straightened Hair and the Straightened Hair treated with 2.0% **AC Split End Complex MSX**.

Parameters tested within this set of data are solely based on linear stress applied to the hair. Linear stress applied as a direct parallel force is not the ideal measure of real world stress and strain applied to the hair on a daily basis. **AC Split End Complex MSX** offers significant thermal protection to hair by improving parameters such as Tenacity and Modulus of Elasticity.

AC Split End Complex MSX

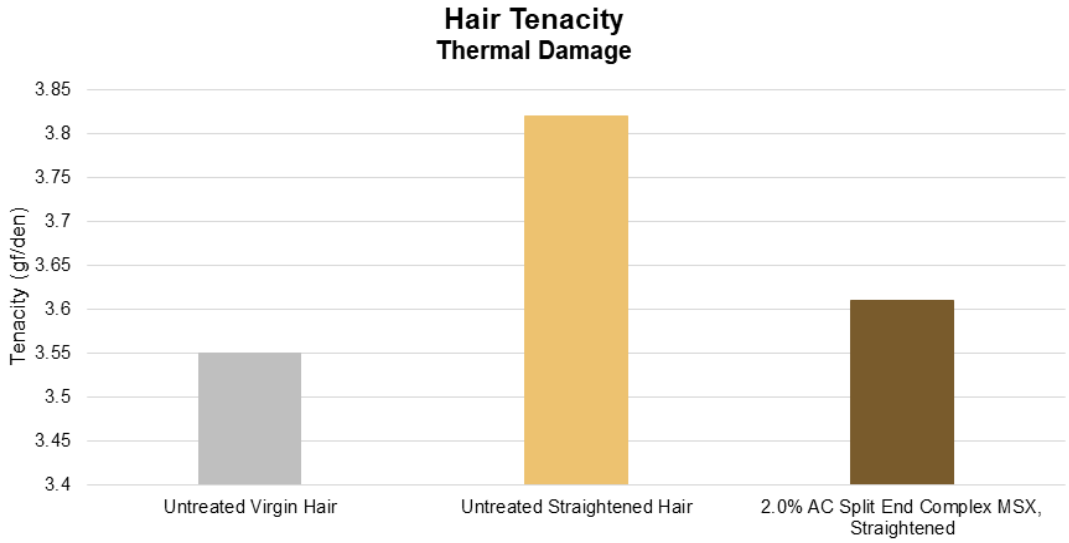

Figure 9. Tenacity, defined as the ultimate (breaking) force of the fiber (in gram-force units) divided by the denier.

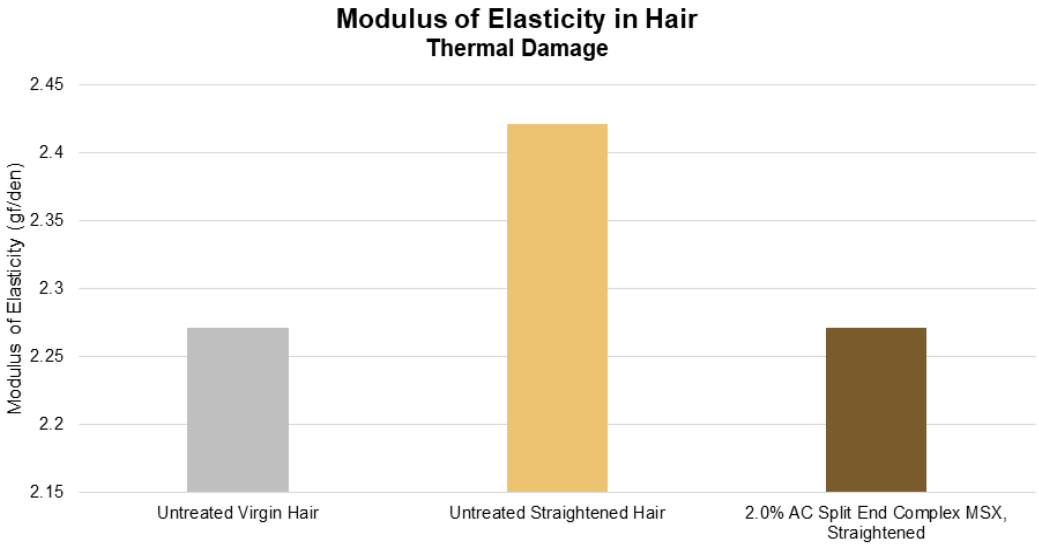

Figure 10. Modulus of Elasticity (Young's Modulus) is the ratio of tensile stress to tensile strain (gf/den).

References:

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2. Jachowicz, J (1987) "Hair damage and attempts to its repair" Journal of Cosmetic Chemistry,3 8, 263-286 (July/August1 987)
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