Tensile Strength Hair Data

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Tradename: AC Split End Complex MSX

Code: 20375MSX

CAS #: 562075-01-5 & 68553-81-1

Test Request Form #: 7641

Lot #: 7809500

Sponsor: *Active Concepts, LLC; 107 Technology Drive Lincolnton, NC 28092*
Study Director: *Maureen Danaher*
Principle Investigator: *Kara Rivera*

Test Performed:
Tensile Strength

Introduction

The study was conducted to measure the Tensile Strength of hair when treated with **AC Split End Complex MSX.**

Methods & Materials

This study was conducted using Royal Impression's 100% Unprocessed Brazilian Virgin Human Hair to analyze the effect of **AC Split End Complex MSX** on several parameters of a Tensile Strength test after thermal damage. Two hair swatches were collected: one was sprayed with 2.0% **AC Split End Complex MSX** in a water solution and left to dry, while the other was untreated. Both hair swatches were passed through a flat iron 25 times at 232°C (450°F). A third hair swatch was set aside as a control. Photo images of each hair swatch were captured and qualitatively analyzed.

Gaston College Textile Technology Center located in Belmont, North Carolina was asked to perform Tensile Strength on swatches provided by Active Concepts, LLC. Gaston College used an Instron 5966 to perform the test, using test method ASTM-D2256-10. This method specifies the test conditions for determining the tensile properties of hair using the single-strand method. The process determines the quality of the raw material and aides in controlling the quality of the end product. To determine tensile strength and elongation at break, specimens are clamped in the appropriate grips and extended at constant rate until failure occurs. This process was performed in triplicated per sample to provide an average.

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According to ASTM-D2256-10, single-strand hair specimens are broken on a tension testing machine at a predetermined elongation rate and the breaking force and the elongation at break are determined. Elongation at a specified force or the force or tenacity at a specified elongation may also be obtained. Breaking force, breaking tenacity, elongation, initial and chord modulus, and breaking toughness of the test specimen, in terms of linear density, may be calculated from machine scales, dials, recording charts, or by an interfaced computer.

Results

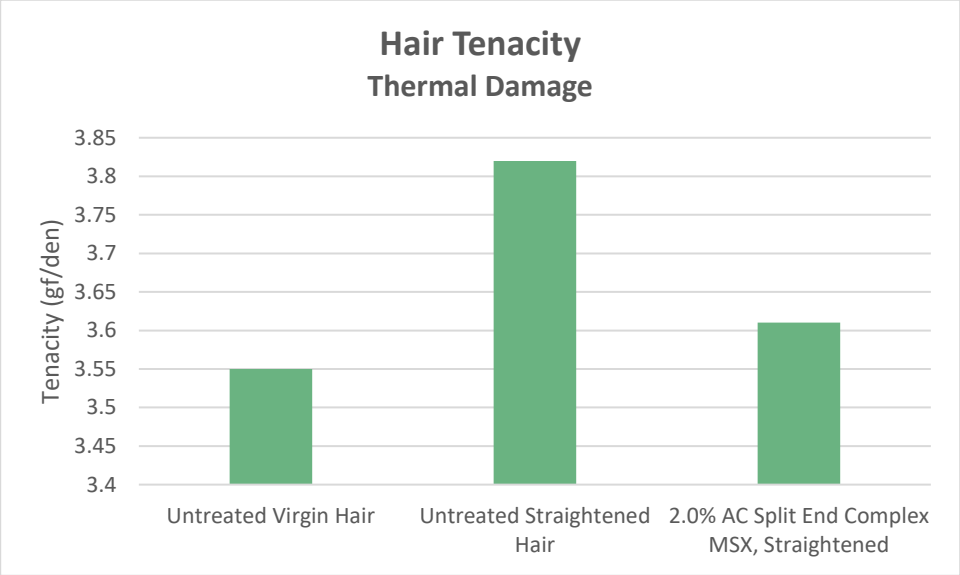

Figure 1. Tenacity, defined as the ultimate (breaking) force of the fiber (in gram-force units) divided by the denier.

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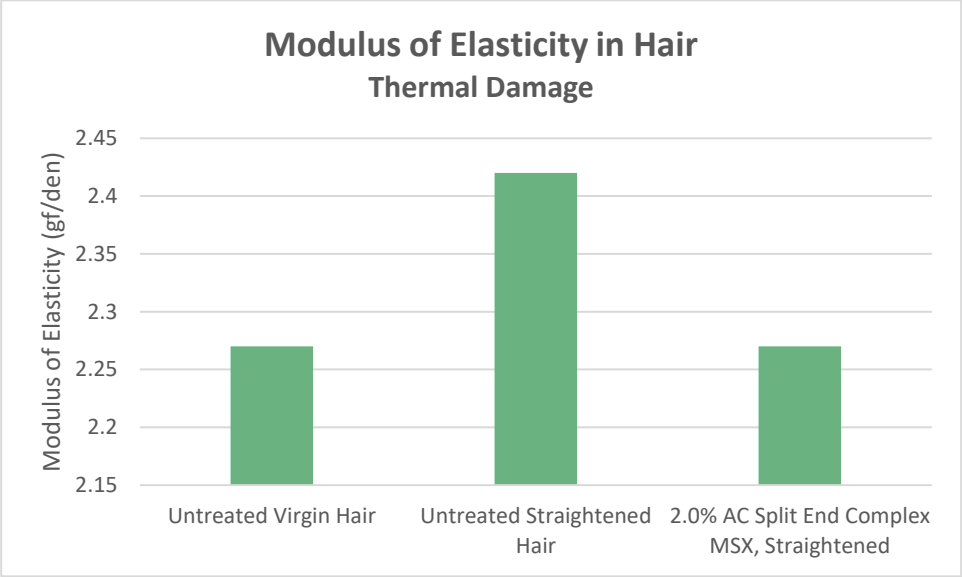

Figure 2. Modulus of Elasticity (Young's Modulus) is the ratio of tensile stress to tensile strain (gf/den)

Discussion

Tensile strength is defined as the resistance of a material to break under tension. Gaston College Textile Technology Center assessed the following tensile strength factors; 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 1 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 2 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. Based on the images captured from the hair swatch study in combination with data provided from Gaston College's tensile strength analysis, **AC Split End Complex MSX** offers significant thermal protection to hair by improving parameters such as Tenacity and Modulus of Elasticity.