



Curly Hair: Structure, Properties, and Care

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Introduction of research (short paragraph)

A comprehensive evaluation of the structure and properties of curly hair, especially in comparison with those of straight hair, was performed. Curly hair samples were collected from African-Descent individuals and were categorized as hair Type 3 or hair Type 4. Straight hair samples were collected from Caucasian individuals and were categorized as hair Type 1. Hair samples with varying degree of curl were evaluated for porosity, ease of wet and dry combing, elasticity, tensile strength, fiber ellipticity, moisture content, and the number of twists along the hair shaft. Extensive hair typing was undertaken to characterize fibers according to curl diameter, curl index, curvature, and number of twists and waves. Trends were established to understand how these properties incrementally change with increasing degree of curl. Additionally, the scalp's moisture content and transepidermal water loss (TEWL) were quantified and compared between African and Caucasian individuals. Based on the findings herein, conditioning agents, as well as styling and maintenance techniques for each specific hair type were established.

Conclusion

Type 3 & 4 hair fibers required higher combing energy in both the wet and dry state than Type 1 hair fibers. Type 1 fibers exhibited higher tensile strength and greater elasticity as compared with Type 3 and Type 4 hair fibers. While Type 1 hair fibers were cylindrical in shape, showing an ellipticity of $\sim 1.0 - 1.40$, Type 3 & 4 hair fibers were oval in shape, exhibiting higher ellipticity values of $1.0 - 3.0$. Within a single hair fiber, the variance in ellipticity was much higher for Type 3 & 4 hair fibers as compared with Type 1 fibers. An increase in fiber porosity was observed as the hair fiber increased in degree of curl. The moisture content of Type 1 hair fibers was greater than Type 3 & 4 hair fibers at both low and high humidity levels. The moisture content of Caucasian scalp was greater than that of African-Descent scalp.

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About the speaker



An innovative entrepreneur, Dr. Ali N. Syed is a master chemist with a wealth of experience in the formulation of hair and skin care products. He has many published and 1 pending patents, 6 journal articles, 3 book chapter publications, and 21 published magazine articles. He completed his Bachelor of Science in Chemistry with honors and then went on to complete his Masters in Chemistry. He also has completed an MBA in Marketing/Management and holds a PhD. Since 1984, Dr. Ali N. Syed has served as the Founder and Master Chemist of his own international corporation: Avlon Industries, which manufactures hair care products under the brand names of Affirm, Keracare, FiberGuard, MoisturColor, Texture Release, and Uberliss. Dr. Syed has also developed several world-renowned consumer brands. His most recent consumer brand, "As I Am," sold under Salon Commodities, is currently available in Mass retailers.



Dr. Maliha Syed is a research scientist, using her diverse background in chemistry, economics, and polymer science & engineering to formulate cosmetic technologies. She graduated from the George Washington University (GWU) in 2009 with a Bachelor of Science in Chemistry and Economics. She completed her PhD in Polymer Science & Engineering at the University of Southern Mississippi (USM) in the School of Polymers and High Performance Materials. Her dissertation research specialized in the hydrogen bond-driven structural ordering, volumetric, and thermodynamic properties of dendritic polymers. After completing her PhD in 2015 she joined Avlon Industries as a Principal Scientist. She currently holds 2 published journal articles and has received various fellowships and awards including 2017 Speaker of the Year Award from the Midwest Chapter of the Society of Cosmetic Chemists (SCC), the National Science Foundation (NSF) GK-12 Fellowship, and first-place poster at the 2014 Annual Society of Cosmetic Chemists (SCC) Meeting.