There was a time when dyeing your hair was considered so taboo that women were driven to extreme lengths to guard their beauty secret. They would slink into salons via back entrances and receive color treatments in private booths, emerging with rejuvenated locks they passed off as natural. That changed when Clairol released the first at-home commercial hair dye in 1956, followed by a clever and memorable marketing tagline: "Does she … or doesn't she?" Within a decade, the proportion of women who dyed their hair skyrocketed from 7% to 50% and hair dye sales increased from $25 million to $186 million.[1] Nearly 60 years later, 75% of women and nearly 10% of men report artificially changing their hair color, and the biggest concern faced by those of us with dyed tresses isn't stigma or fear of discovery, but preserving the color we love. In response, shampoos, conditioners, and hair treatments formulated to optimize color retention are increasingly entering the marketplace and represent one of the fastest growing segments within the hair care industry. Spectral analysis allows hair product manufacturers to objectively evaluate the efficacy of their formulations to improve color protection and create products that meet consumer expectations.

Protecting Against Color Fading

The premature fading of dyed hair color is a frustrating experience primarily caused by color wash-out as the result of shampooing. In response, hair product manufacturers have developed formulas that seek to decrease the wash-out rate of dyes and improve color retention by using surfactants and conditioning agents that protect against color fading. The formulation of these products requires thoughtful and informed design to create a balance of color protection, cleaning ability, conditioning properties, and sensory experience. This may be particularly challenging in shampoo formulation, as the most popular cleansing agents are anionic surfactants containing sodium laureth sulfate (SLS) and sodium lauryl ether sulfate (SLES). Although these are effective and economical agents that produce the rich lather most customers expect from shampoos, they are also prone to stripping color from dyed hair. Choosing a milder anionic or a different surfactant type can improve color retention performance. If SLS and SLES are used, researchers have discovered that introducing an amphoteric co-surfactant such as cocamidopropyl can be used to minimize color loss.[2] Additionally, conditioning agents such as cationic and specialty silicone polymers can significantly improve color retention as well as offer additional sensory, aesthetic, and protective benefits. However, the chemical and physical properties of these conditioners must be considered to ensure compatibility with other ingredients, particularly organic materials such as natural waxes, oils, or butters.[3] Particular conditioning agents may be used synergistically with certain surfactants to fortify color retention efficacy and enhance produce performance.

Evaluating Color Retention Using Spectral Analysis

To evaluate the efficacy of both individual color retention ingredients and hair product formulations, an objective basis of color measurement must be employed to accurately quantify product behavior. Spectral analysis using spectrophotometric instrumentation is considered the gold standard in hair color analysis and is the first choice for evaluating color change in response to shampooing, conditioning, or treatment. Spectrophotometers are ideally suited for providing objective color data to precisely identify even slight color variations and allow you to develop a fully articulated picture of a product's functionality. By taking baseline measurements of newly dyed hair samples and comparing them to measurements after each washing, conditioning, or treatment event, you can clearly track color changes and observe the rate of color loss over time to correlate color changes to specific individual ingredients or test the efficacy of a completed product. As a result, you can more precisely tailor formulations to enhance color retention as well as produce accurate, evidence-based claims to market your product.

Full article with photos available here:

https://www.hunterlab.com/blog/color-chemical-industry/evaluating-effectiveness-color-retention-hair-care-products-via-spectral-analysis/