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An Investigation of cosmetic textiles in consumer products: the use of Vitamin E in hair wraps

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Introduction

As consumers strive to enrich the quality of their lives with the use of more natural products, the use of cosmetic textiles has increased (Cheng et al., 2009). The application of cosmetic substances such as: Vitamin E, Shea butter or Olive Oil to textile materials have varied. Microencapsulation, padding, binding, spraying and emulsion all have benefits depending on the end use of the cosmetic textile (Cheng et al., 2009). With the goal of cosmetic textiles having the ability to transfer substances such as these directly to the skin or scalp, the efficacy of the method is of utmost importance. Consumers want a lasting and effective product. A consumer of cosmetic textiles wants to know that fiber properties are inherent in their garment or textile, and that they will last (Nelson, 2002). While the textile industry has been slow to respond to the commercialization of these products, many appear on store shelves with organic or natural ingredient branding. Some manufacturers have increasingly had a fast turn over of production to market thus capitalizing on the trend towards the use of natural ingredients. Much of the packaging lists the natural ingredients on the front in bold to attract the attention of the consumer. Some even hint at the application of the ingredients by using such words as: scented or treated. One such product is the Qfitt Double Mesh Wrap product, which is an open top, adjustable (Velcro) head/hair wrap meant to protect the hair while sleeping. Other performance fabric benefits stated are: provides moisture and prevents breakage. The Qfitt Double Mesh Wrap is a polyester knit fabric which supposedly includes: Shea Butter, Olive Oil and Vitamin E. Shea Butter and Olive Oil are two of the most familiar and sought after natural ingredients in the world. But how would consumers know that: 1) these ingredients have really been applied to these products? 2) that product use will yield the stated results?

The purpose of this study is to investigate the ingredients of the Qfitt Double Mesh Wrap product, specifically to confirm that the natural ingredients cited on the packaging are present in measurable amounts.

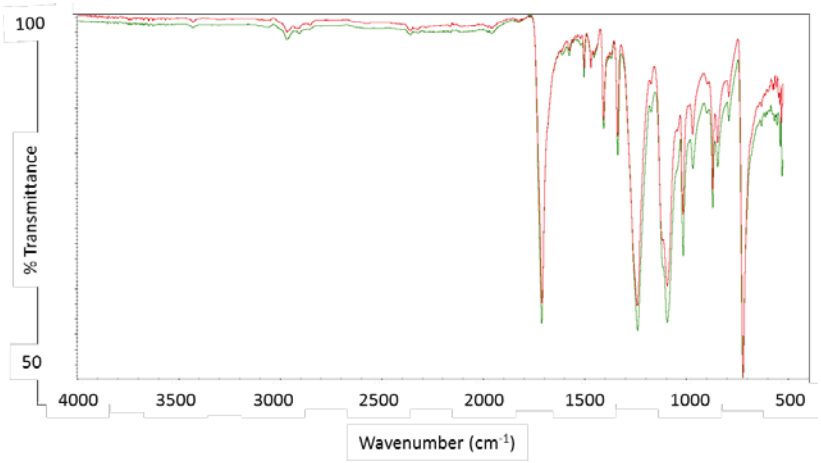
Materials and Testing

A comparison of the "treated" Qfitt Double Mesh Wrap (front and back) was done against a purchased black mesh "untreated" polyester fabric using Fourier Transfer Infrared Spectroscopy (FT-IR). Thermal gravimetric analysis (TGA) was also done, testing for polyester control and evidence of shea butter and Vitamin E. Published FT-IR spectra were used for comparison of Vitamin E and shea butter presence (Ajala, E.O. et al., 2015).

Results and Discussion

No significant deviation in untreated polyester control and 'treated' wrap samples were seen in the FT-IR analysis (Fig.1). Results show no evidence of the natural additives on the Double Mesh Wrap. The shape of the spectra for vitamin E has a large absorbance at 3000cm^{-1}, as reported by Guillen and Cabo 1997 which the Qfitt Double Mesh Wrap lacks, indicating no detectable amounts of vitamin E or shea butter. Further testing is recommended to examine possible vitamin E presence using aqueous extraction and UV-Vis absorbance.

Fig. 1. Spectrum 2-Brown backing (red) and mesh (green) FT-IR spectra from "treated" product.



TGA results show that the polyester control, the backing of the wrap, and the mesh of the wrap reach thermal degradation at 429.68°C, 424.83°C, and 426.07°C respectively. All samples had a % weight loss during pyrolysis ranging from 84.88 to 87.14%. These very similar behaviors indicate that the chemical composition of the materials is likely the same material, with no significant additives present. Shea butter has a thermal degradation temperature closer to 350°C (Alaba, 2016). The sample TGA curves do not indicate a significant mass loss at 350°C, nor does the derivative of the weight change curve show any significant deviation of mass loss as a function of temperature, indicating that there is likely little to no shea butter present on the wrap.

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