B18 Differentiation of Cosmetic Foundations Using Liquid Chromatography/Tandem Mass Spectrometry

Thomas A. Brettell, PhD, Cedar Crest College, 100 College Drive, Allentown, PA 18104; Thomas H. Pritchett, MS, 100 College Drive, Allentown, PA 18104; and Emily A. Myers, BS, 2133 Stoops Court, PO Box 602, North Apollo, PA 15673*

After attending this presentation, attendees will have a better understanding of how cosmetic foundation can be analyzed as a form of trace evidence.

This presentation will impact the forensic science community by providing a simple and sensitive Liquid Chromatography with Tandem Mass Spectrometry (LC/MS/MS) method to differentiate different cosmetic foundations through the analysis of specific preservatives.

Preservatives are natural or synthetic ingredients that are commonly added to products in order to prevent spoilage, including but not limited to microbial growth or undesirable chemical changes, ultimately extending the products' shelf life. Without the addition of preservatives, the foundation has the ability to easily become contaminated, leading to product degradation, and increasing the risk of irritation or infection. In the United States, the Food and Drug Administration (FDA) regulates the use of preservatives under the cosmetic provisions of the law and manufacturers to determine at what levels the preservatives are considered "safe" for consumer use. The most widely used preservatives in cosmetic products are parabens.

This study has developed an LC/MS/MS method for differentiating different brands of cosmetic foundations by observing the absence and/or presence of specific preservatives, including six different parabens. The analyte preservatives used in this study were methylparaben, ethylparaben, n-propylparaben, isopropylparaben, butylparaben, benzylparaben, tocopheryl acetate, and 3,5-di-tert-Butyl-4-Hydroxytoluene (BHT). The method is capable of separating and identifying all eight preservatives in less than seven minutes including the separation of n-propylparaben and isopropylparaben which has not been accomplished and reported prior to this method. LC/MS/MS data was acquired using an ABI® Sciex 3200 QTRAP® triple quadrupole mass spectrometer interfaced with a Shimadzu® LC system. The instrument utilized Electrospray Ionization (ESI) and all samples were run in positive-ion mode monitoring. Chromatography was performed on a 5.0cm x 3.0mm x 2.7µm Ultra® biphenyl column. The strong mobile phase used was 0.1% formic acid in 2-propanol and the weak mobile phase used was 0.1% formic acid in High-Performance Liquid Chromatography (HPLC) -grade methanol. A Shimadzu® SIL-20AC Prominence auto sampler injected 2.0µL of sample and the column oven temperature was set isothermally at 25ºC throughout the run with a flow rate of 0.300µL/min. A retention time optimization study provided preeminent separation conditions.

Foundation samples were prepared by adding approximately 100mg of each foundation to 5mL of methanol:acetonitrile (1:1) and sonicating for ten minutes. After sonication, the solution was placed into centrifuge tubes and centrifuged for 5 minutes at 3,000rpm. After centrifugation, the supernatant was carefully removed using disposable pipettes and filtered using a 0.2µm Millipore® filter. One mL of the supernatant was added to a vial along with 60µL of the internal standard. Lastly, 2.0µL of sample was injected onto the LC column.

Separating and identifying the six parabens as well as the other preservatives proved to be simple and quick. The method is capable of identifying which preservatives are present in a cosmetic sample with a limit of detection of 0.5µg/mL. Twelve different brands of cosmetic foundations were tested and all were easily differentiated by analysis of the preservatives in the samples using the LC/MS/MS method.

Preservatives, Cosmetic Foundation, LC/MS/MS

Copyright 2015 by the AAFS. Unless stated otherwise, noncommercial *photocopying* of editorial published in this periodical is permitted by AAFS. Permission to reprint, publish, or otherwise reproduce such material in any form other than photocopying must be obtained by AAFS.