



A36 Determination of the Origin of Commercial Pepper Spray Residues Using Gas Chromatography-Mass Spectrometry (GC-MS) and Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy (ATR-FTIR)

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After attending this presentation, attendees will be familiar with the feasibility of techniques using GC-MS and FTIR to classify residues of commercial pepper sprays and to discriminate them from each other. Limitations of these methods and continuing studies aimed at refining them will be described.

This presentation will impact the forensic science community by revealing a potential method of classifying and discriminating a stain residue on a suspect's clothing or other surfaces. This technique could be applicable to either include or exclude a suspect in a case where a defensive spray weapon was discharged.

Studies have been conducted to explore the feasibility of using two analytical techniques—gas chromatography-mass spectrometry (GC-MS) and attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR)—to match an extracted pepper spray residue with its can of origin. Pepper spray samples representing cans from three different manufacturers and nine distinct lots were studied. Fabric stains from the commercial pepper spray cans were prepared on white 100% cotton tee shirts. The tee shirt stains were analyzed either by GC-MS, to determine the normalized area percents of six capsaicinoids in the sample, or by ATF-FTIR, to examine their bulk organic content. The analytical data obtained from the shirts were statistically compared to the contents of each can to determine if classification and discrimination were possible. Principal component analysis of the GC-MS and ATR-FTIR data allowed good discrimination between manufacturers, fair discrimination between some lots within the same manufacturer, and poor discrimination between cans within the same lot. Details of the experimental design, data analysis, conclusions, and implications will be presented. Ongoing studies of these techniques will also be described.

Pepper Spray, Classification, Principal Component Analysis