B65 Analysis of Cannabinoids Found in Seized Marijuana Using Automated Headspace Solid-Phase Microextraction Coupled With Gas Chromatography/ Mass Spectrometry

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After attending this presentation, attendees will better understand automatic headspace solid-phase microextraction methodology and its application to the analysis of Cannabis sativa L. plant material.

This presentation will impact the forensic science community by providing an automated method for the direct headspace sampling of cannabinoids from solid samples of suspected marijuana. This presentation will enhance the applicability of Headspace Solid/Phase Microextraction coupled with Gas Chromatography/Mass Spectrometry (HS/SPME/GC/MS) to controlled substance analysis.

After attending this presentation, attendees will gain an understanding of the use of HS-SPME methodology to identify and quantify cannabinoids in marijuana samples.

The term marijuana refers to the plant material of Cannabis sativa L. There are more than 60 natural cannabinoids found in marijuana. The primary psychoactive component is Δ^9-tetrahydrocannabinol (Δ^9-THC). Current analytical methods for the detection of cannabinoids and other natural constituents of marijuana include solvent extractions followed by gas or liquid chromatography. Such methods have several limitations, including the use of hazardous solvents, the expense of said solvents, disposal of the waste generated from solvent use, and the time needed to perform such extractions. A solution that may eliminate such limitations for the detection of cannabinoids in marijuana samples is the use of HS/SPME/GC/MS.

In this research, an optimal automated HS/SPME/GC/MS method has been developed using cannabinoid standard reference materials and actual marijuana material samples. Internal standards and any standard reference samples used were placed in a vial and the solvent evaporated before analysis. The plant material was ground and sieved before being weighed out into sample vials. Unlike previous methods that would require the sample to be extracted with solvents before analysis, the HS/SPME/GC/MS method required the sample to be sealed in the sample vial and placed on a GC/MS autosampler that would carry out the HS/SPME extraction using a Polydimethylsiloxane (PDMS) 23-gauge, 100µm absorbent fiber and inject the extracted sample into the GC/MS. The optimized extraction temperature for cannabinoids was found to be 150°C and the optimal extraction time was found to be five minutes. Regeneration of the PDMS fiber was achieved by heating the fiber to 250°C in the autosampler conditioning chamber during the run after the fiber was exposed to the inlet of the GC/MS.

Results from the optimized HS/SPME/GC/MS method show the method to be comparable to the common liquid extraction method. The same cannabinoids can be seen with both methods and in some cases the HS/SPME/GC/MS method shows more cannabinoids than the liquid extraction suggesting it has a higher sensitivity. Chemical constituents of marijuana other than cannabinoids could also be extracted and detected with the optimal HS/SPME/GC/MS method. Future research will include statistical analysis of the data collected from marijuana plant samples using this method with the goal being to determine whether or not two samples share a common origin.

Marijuana, HS Solid-Phase Microextraction, Drug Analysis