B77 The Identification of Drugs in Powder Form With No Sample Preparation Via Headspace Solid-Phase Microextraction (SPME) and Gas Chromatography/Mass Spectrometry (GC/MS) Methods

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Learning Overview: The goal of this presentation is to inform attendees of the use of high-temperature headspace SPME and GC/MS for the detection of various drugs, including methamphetamine, cocaine, and fentanyl.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by informing attendees of the use of high-temperature headspace SPME for the identification of drugs in powder form.

SPME is a technique in which analytes are sorbed onto a fiber coated with a polymeric material. SPME methods may be used in conjunction with GC/MS to identify illicit and licit drugs often within a matrix. These methods include headspace, immersion, and Total Vaporization (TV) SPME. When immersion and TV-SPME are utilized, a sample is dissolved into a matrix, such as methanol or acetonitrile; however, illicit drugs are often found in the form of powders and in a mixture with other drugs or adulterants. For this work, traditional headspace SPME methods were utilized for the detection of various drugs in powder form using a Polydimethylsiloxane/Divinylbenzene (PDMS/DVB) SPME fiber.

It was hypothesized that headspace SPME could be used to identify drugs in powder form by placing the drug into a headspace vial and heating the vial to 120 °C. Drugs of interest included methamphetamine, pseudoephedrine, caffeine, cocaine, procaine, inositol, heroin, diphenhydramine, fentanyl, and pharmaceutical tablets, including hydrocodone and oxycodone. These drugs were analyzed individually as well as in a realistic mixture. Seized drug samples were also analyzed. To analyze these drugs using a headspace SPME method, a sample of the powered drug or drug mixture (~1–2mg) was placed into a headspace vial with no prior sample preparation or extraction. This vial was then heated to 120°C inside of a Gerstel agitator and the sample was adsorbed onto the SPME fiber for ten minutes. If derivatization was necessary, the PDMS/DVB fiber was first inserted into a vial containing the appropriate derivatization agent, then inserted into the sample vial for 30 minutes. All drugs, excluding inositol, were identified in powder form using this headspace SPME method without any prior sample preparation and without dissolving the drug in a solvent. These drugs were successfully identified individually as well as within a realistic mixture. This headspace SPME method is simple, efficient, and cost effective for the detection of legal and illegal drugs.

Drugs, Solid-Phase Microextraction, GC/MS