



B54 Optimization of Solid-Phase Microextraction/GC-MS for the Extraction of Organic Impurities in Seized MDMA

Heather M. Dotzauer, BS, and Ruth J.H. Waddell, PhD, Michigan State University, Forensic Science Program, 560 Baker Hall, East Lansing, MI 48824*

After attending this presentation, attendees will understand the application of experimental design to the optimization of headspace solid-phase microextraction (HS-SPME), the benefits of HS-SPME for the extraction of organic impurities from seized MDMA tablets, and the need for profiling illicit MDMA.

This presentation will impact the forensic community and/or humanity by the parameters for impurity extraction using HS-SPME, which has numerous advantages over conventional extraction procedures. Once optimized, HS-SPME can be used to extract impurities from seized MDMA tablets and the extracts subsequently analyzed by GC-MS. Chromatographic profiles of tablets can be compared using computer-aided procedures, such as artificial neural networks.

Commonly referred to as the club drug "ecstasy," MDMA (3,4- methylenedioxyamphetamine) is a schedule I drug with stimulant and psychoactive properties. A 2005 report by the National Forensic Laboratory Information System (NFLIS) showed that MDMA is one of the 25 drugs most frequently identified by regional, state, and national laboratories. According to the NFLIS, MDMA makes up 0.71% of the cases analyzed each year. Between January and June of 2005, MDMA was identified in 6,238 cases nationwide.¹

Chemical profiling of MDMA aids law enforcement agencies by linking tablets to common production methods based on the impurities present. Tablets with the same impurities present in similar levels may have a common origin. Law enforcement can then use the information generated from the profiles to monitor the activities of clandestine laboratories, identify dealer-user networks, and expose drug-trafficking organizations.

Traditionally, organic impurities are extracted from tablets by liquid- liquid extraction (LLE) or solid phase extraction (SPE) methods, with subsequent analysis and identification by GC-MS. HS-SPME is a promising alternative to these conventional extraction procedures. In this procedure, a thin, polymeric fiber is used to absorb and adsorb impurities from the headspace above a sample. Impurities are then desorbed from the fiber and analyzed by GC-MS. HS-SPME is advantageous because it decreases sample preparation time and solvent use.

Methods for the extraction of organic impurities from illicit MDMA tablets using HS-SPME have been developed and optimized using an experimental design procedure. The benefits of the experimental design in assessing the relative effect of each parameter on extraction efficiency and predicting interdependence between factors are presented. The optimized HS-SPME method was also compared to LLE and SPE methods in terms of extraction efficiency; results will be presented.

¹ *National Forensic Laboratory Information System Midyear Report*. DEA Office of Diversion Control. 2005.

MDMA, Impurity Profiling, Solid-Phase Microextraction