

Solid Phase Microextraction as a Sampling Method for Gas Chromatography/Mass Spectrometry in the Field

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In many instances, gas chromatography with detection by mass spectrometry (GC/MS) is well suited for detection and identification of unknown organic chemicals in the field. Numerous sampling techniques exist to detect GC/MS analytes in the important environmental matrices, and most of these involve some sample handling and use of solvents for extraction, increasing the complexity and time needed to complete the analytical procedure. Solid phase microextraction (SPME) is suitable for sampling environmental contaminants with a wide range of physical properties in air, water, and soil. We provide examples of environmental samples collected by SPME from air (a solvent mixture used in industry), water (the gasoline additive methyl tert-butylether), and soil (chemical warfare agents). Analyses were performed rapidly through direct exposure of the samples collected on SPME fibers using a field-portable Viking Spectra Trak 572 portable GC/MS system. The SPME sampling was simple for all three types of analytes, involving exposure of the SPME fiber used to the sample headspace (for the solvent and soil samples) or the water that contained the gasoline additive. The SPME method provided a concentrated sample that was easily introducible into the GC injection port for rapid desorption from the SPME fiber by heating. For screening of unknown samples, SPME sampling/sample introduction for GC/MS analysis does not require the typical solvent delay for collection of MS data, allowing examination of early eluting peaks that may be missed when unknown analytes are dissolved in solvent for GC/MS analysis. The SPME sampling method is highly suitable for field use owing to its portability, simplicity of use, broad range of applications, sensitivity, and favorable attributes as a sample introduction method for GC/MS analyses.