

Development of a solid-phase microextraction-based method for sampling of persistent chlorinated hydrocarbons in oceanic environments

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ABSTRACT

Solid phase microextraction (SPME) has been used as an in-situ sampling technique for a wide range of volatile organic chemicals, but SPME field sampling of non-volatile organic pollutants has not been reported. This paper describes the development of a SPME-based sampling method employing a polydimethylsiloxane (PDMS)-coated (100- μ m thickness) fiber as the sorbent phase. The laboratory-calibrated, PDMS-coated fibers were used to construct SPME samplers, and field tests were conducted at three coastal locations off southern California to determine the equilibrium sampling time and compare the efficacy of the SPME samplers with that of an Infiltrex 100 water pumping system (Axys Environmental Systems Ltd., Sidney, British Columbia, Canada). *p,p'*-DDE and *o,p'*-DDE were the components consistently detected in the SPME samples among 42 polychlorinated biphenyl congeners and 17 chlorinated pesticides targeted. SPME samplers deployed at two locations with moderate and high levels of contamination for 18 and 30 d, respectively, obtained statistically identical concentrations of *p,p'*-DDE and *o,p'*-DDE. In addition, SPME samplers deployed for 23 and 43 d, respectively, at a location of low contamination also contained statistically identical concentrations of *p,p'*-DDE. These results indicate that equilibrium could be reached within 18 to 23 d. The concentrations of *p,p'*-DDE, *o,p'*-DDE, or *p,p'*-DDD obtained with the SPME samplers and the Infiltrex 100 system were virtually identical. In particular, two water column concentration profiles of *p,p'*-DDE and *o,p'*-DDE acquired by the SPME samplers at a highly contaminated site on the Palos Verdes Shelf overlapped with the profiles obtained by the Infiltrex 100 system in 1997. The field tests revealed the advantages of the SPME samplers compared to the Infiltrex 100 system and other integrative passive devices, but also indicated the need to improve the detection capacity of the SPME-based sampling technique.

Full Text

ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2003_04AnnualReport/ar08-zeng_pg84-93.pdf