

VALIDATION OF SPME METHOD FOR THE ANALYSIS OF ORGANOPHOSPHORUS INSECTICIDES IN NATURAL WATERS

D. A. LAMBROPOULOU, V. A. SAKKAS and T. A. ALBANIS

Department of Chemistry, University of Ioannina, Ioannina 45110, Greece

EXTENDED ABSTRACT

A study of solid phase microextraction (SPME) optimization and application for the determination of the organophosphorus insecticides, diazinon, dichlofenthion, parathion methyl, malathion, fenitrothion, fenthion, parathion ethyl, bromophos methyl, bromophos ethyl, and ethion in natural waters has been developed. Four SPME fibers coated with different stationary phases (PDMS, PA, PDMS-DVB, CW-DVB) were used in order to examine their extraction efficiencies for the tested compounds. Parameters that might affect the SPME procedure, such as extraction time and salt content were investigated in order to determine the analytical performance of the above fiber coatings to organophosphorus insecticides. The optimised procedure was applied to spiked natural waters such as tap, sea, river as well as lake water in a concentration range of 0.5 to 50 µg/L in order to obtain the analytical characteristics. Recoveries were in relatively high levels over >80% in all types of aqueous sample matrices and the calibration curves were reproducible and linear ($R^2 > 0.982$) for all analytes with all the tested fibers. The limits of detection ranged from 2 to 90 ng/L, depending on the detector and the compound investigated, with relative standard deviations in the range of 3-15% at all concentration levels tested. The influence of organic matter such as humic acids on extraction efficiency was also studied. The analytical performance of the SPME procedure using all fibers in the tested natural waters proved to be effective for the above compounds.

Key words: Organophosphorus insecticides, SPME, environmental water analysis, gas chromatography