

ANALYSIS OF CHLORINATED HYDROCARBONS IN SOILS USING GCMS AND SOLID PHASE MICROEXTRACTION

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Chlorinated hydrocarbons are increasingly becoming a significant problem to the environment through landfills and illegal dumping. They can escape into the air during storage, transport, consumption and disposal. The sampling techniques, normally used in conjunction with GCMS to detect the presence of these compounds in soil matrices, often involve liquid-liquid extraction and purge and trap methods. Apart from being time consuming, these also require significant quantities of organic solvents. Solid phase microextraction (SPME) is a recently developed technique¹ that is fast and solvent free, combining both extraction and preconcentration into a single step. It has been used successfully to solve a wide range of environmental problems.² This study aims to investigate the feasibility of using headspace SPME/GCMS as an alternative analytical method for the detection of chlorinated hydrocarbons in soils.

Five commonly found chlorinated hydrocarbons (dichloromethane, 1,1,1-trichloroethane, trichloroethene, tetrachloroethene and 1,1,2,2-tetrachloroethane) were selected for the present study, with chlorobenzene used as an internal standard. The SPME fibre composition, fibre/analyte exposure time, sample temperature and solution ionic strength were all found to have a significant effect on the recovery of individual analytes. An optimisation of these experimental parameters has been carried out and used to assess the limits of detection and the reliability of this analytical method.

1. Solid Phase Microextraction. Theory and Practice, J. Pawliszyn, Wiley-VCH, New York, 1997 (ISBN 0-471-19034-9).

3. Applications of Solid Phase Microextraction, Ed. J. Pawliszyn, RSC Chromatography Monographs, 1999 (ISBN 0-85404-525-2).
