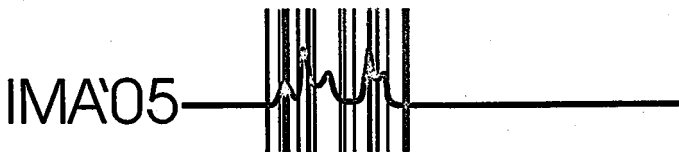


4th INTERNATIONAL CONFERENCE ON

INSTRUMENTAL METHODS OF ANALYSIS

MODERN TRENDS AND APPLICATIONS



2-6 OCTOBER 2005 IRAKLION CRETE GREECE

TRACE-LEVEL DETERMINATION OF PAHs IN WATER BY HPLC WITH ON-LINE PRECONCENTRATION ON FLUOROPLASTIC MATERIALSOliferova L. A., Statkus M.A., Tsysin G. I.^{*}, Zolotov Yu. A.

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PAHs are ubiquitous environmental contaminants that mainly result from incomplete combustion of various organic materials. These compounds are high-toxic, therefore it is necessary to determine small quantities of PAHs, particularly in waters. The enhancement of analysis sensitivity could be achieved by the development of automated methods including on-line sorption preconcentration and HPLC determination. New fluoroplastic sorbents and capillaries were proposed for on-line preconcentration of PAHs in flow analysis systems.

Sorption of biphenyl, naphthalene, acenaphthene, anthracene and pyrene was investigated under batch and flow conditions, and kinetic and thermodynamic parameters were evaluated. It was found out that sorption isotherms are S-shaped; the surface of sorbent is covered with monolayer of naphthalene. Experimental and calculated breakthrough curves were obtained. It was shown that breakthrough curves of sorption of naphthalene, biphenyl and acenaphthene on fluorocarbon polymers F-40P, F-2M and F-4AN are adequately described by linear models of sorption dynamics. Conditions for quantitative extraction of PAHs were chosen.

It was shown that desorption of PAHs with water-acetonitrile mixtures from these sorbents requires significantly less amount of eluent than from octadecilsilica and hyper cross-linked polystyrene. Desorption eluent flow rates were varied from 0.50 to 1.75 ml min⁻¹ and the volume of analyte-containing eluent stream zone was 1.0-1.1 column volume.

Various manifold systems for sorption preconcentration with subsequent HPLC determination (direct introduction of pre-column effluent to the analytical column, preliminary excision of concentrate segment using injection loop, focusing of the concentrate in the analytical column) were proposed and compared experimentally.

Automated method for PAHs and biphenyl determination in natural and potable water including on-line sorption preconcentration followed by HPLC was proposed. It was found that 20 min of preconcentration provides detection limits up to 200 times lower than for direct injection. Detection limits were 5 (biphenyl), 7 (anthracene), 8 (acenaphthene), 30 (pyrene) and 40 (naphthalene) ng/l. Application of fluorocarbon polymer sorbents results in better extraction selectivity towards PAHs in comparison with several other sorbents and provides no additional peak broadening.