Analysis of Bentazone and Phenoxyacid Herbicides in Water Samples using Automated On-Line Solid-Phase Extraction

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Key Words: *Phenoxyacid Herbicides, Bentazone, Solid Phase Extraction, 9200 Prospekt*

Introduction

Bentazone and phenoxyacid herbicides have been reported to contaminate drinking-water originating from the river Rhine. An automated method has been developed for frequent monitoring of Rhine and drinking-water samples.

Experimental

Instrumentation

For chromatographic separation an isocratic high performance pump was used (pump 1), detection was performed by a variable wavelength UV/VIS detector. A second isocratic pump (pump 2) fitted with a low pressure switching valve was used to wash the cartridge with various solvents, a third isocratic pump was used to load the sample on the cartridge (pump 3). Automated on-line solid-phase extraction was performed by the 9200 Prospekt Controller. Pumps 2 and 3 could be replaced by the Solvent Delivery Unit (SDU). The switching diagram of the system is shown in Figure 1.

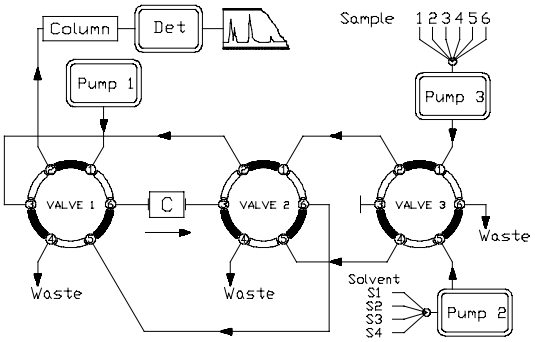

Figure 1: System Diagram

Chromatographic Conditions

Analytical Column	PRP-1, 150 x 4.1 mm, 10 µm
Mobile-Phase (Pump 1)	30% Acetonitrile in 0.01 M Tetrabutylammonium Hydrogen-Sulfate, pH 11.0
Flow Rate	1 mL/min
Detection	230 nm

Sample Preparation

Solid-phase extraction cartridge: PLRP-S, 15-25 µm 9200 Prospekt Sample Prep. Program:

1. Wet cartridge with 2 ml methanol (pump 2).
2. Condition cartridge with 4 ml perchloric acid, 1 mM, pH 2.5 (pump 2).
3. Load sample on cartridge (25 - 50 ml, pump 3).
4. Remove impurities from cartridge with 0.15 ml 30% Acetonitrile (pump 2, 0.15 ml/min).
5. Elute sample from cartridge to analytical column under analytical conditions (pump 1) for 12 seconds only, to prevent other substances from eluting and interfering in the chromatographic separation.

Results

Figure 2 shows the analysis of a 50 ml Rhine water sample after an accidental dumping of the herbicide 2-[2,4-dichlorophenoxy]propionic acid.

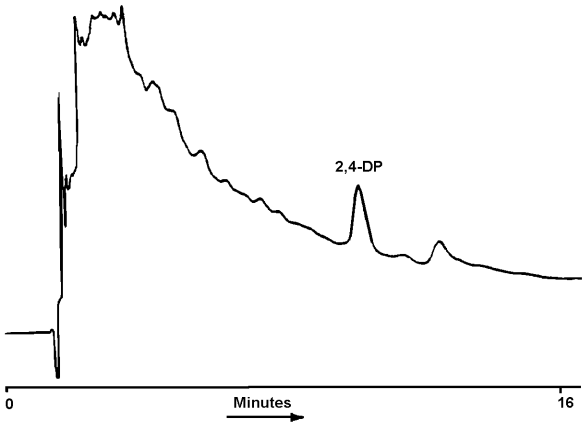

Figure 2: 2,4-DP, 2.2 µg/L in Rhine water

Figure 3 shows the analysis of 25 ml drinking-water spiked with some phenoxyacid herbicides and Bentazone.

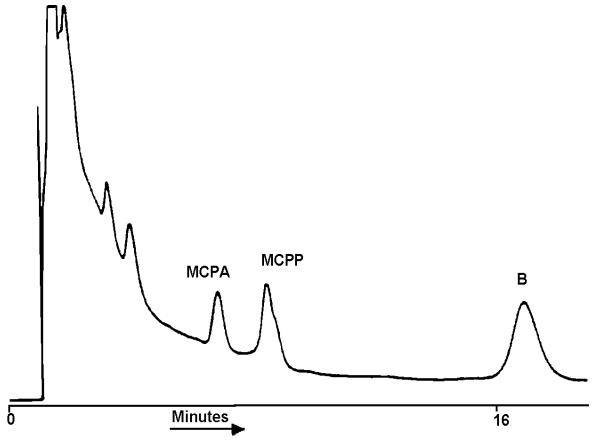

Figure 3: 4-chloro-2-methylphenoxyacetic acid (MCPA), 2-[4]-chloro-2-methyl-phenoxy]propionic acid (MCPP) and Bentazone (B), 1 µg/L in drinking water.

Reference

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