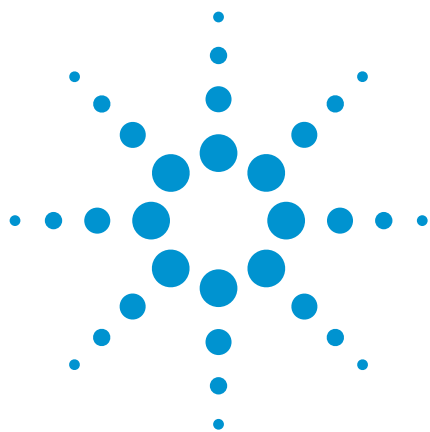




# Rapid Determination of Water Pollutants

## Application Note

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### Introduction

The requirement for a rigorous yet straightforward means of testing the quality of tap and surface water is a growing need of national and international importance, as efforts continue to monitor and improve the quality of this vital ecological resource. One research initiative is the Rhine Basin Program, an international collaboration designed to facilitate better assessment of environmentally relevant parameters, which take the program from simple data generation and acquisition, right through to a better understanding of this complicated ecosystem. This initiative will provide Europeans, in particular, and nations in general, with a basis for supplying better water quality.

Part of the first step, the use of new analytical concepts, is under way at the Department of Analytical Chemistry at the Free University of Amsterdam. A team guided by Brinkman and Lingeman<sup>1</sup> has established a rapid means of determining trace level polar pollutants in water by isocratic LC with UV detection. An on-line preconcentration step is required for these determinations, and the use of two precolumns allows rapid analysis with minimal sample preparation. One precolumn traps solutes by means of hydrophobic interactions and the other permits capture of basic pollutants as ion-pairs on a sodium dodecyl sulfate-loaded stationary phase. The use of a polymeric PLRP-S analytical column allows selection from a wide range of mobile phase pH and composition, while permitting easy clean-up after injection of very dirty or strongly adsorbing samples.



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## Sample Preparation

10 mL samples were preconcentrated at 2 mL/min on precolumns in series. This was followed by a wash step of 1.3 mL (at 0.5 mL/min) of 10% acetonitrile, 90% 10mM phosphate buffer at pH 3. Subsequently, each type of solute was transferred to its particular analytical column system.

## Conditions

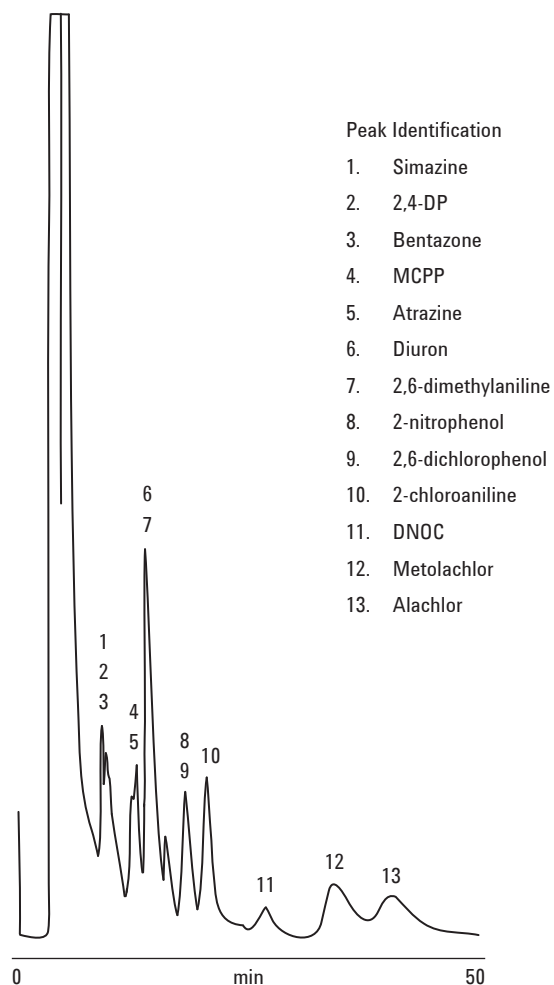
### *Polar analytes*

Column: PLRP-S 100Å 5 µm, 250 x 4.6 mm (p/n PL1512-5500)  
Eluent: 50% Acetonitrile, 50% 10mM Phosphate buffer, pH 3  
Flow Rate: 1.0 mL/min  
Detection: UV, 230 nm

### *Basic analytes*

Column: PLRP-S 100Å 5 µm, 150 x 4.6 mm (p/n PL1111-3500)  
Eluent: 20% Acetonitrile, 80% 10mM Phosphate buffer, pH 8  
Flow Rate: 1.0 mL/min  
Detection: UV, 230 nm

## Results and Discussion



**Figure 1. Preconcentration of 10 mL of River Rhine water spiked with 25 µg/L of 13 pollutants.**

## Conclusion

Isocratic HPLC using PLRP-S columns allows the rapid quantification of pesticides and herbicides in water. As a single column, PLRP-S operates across the entire range of HPLC eluents. It is chemically stable and physically robust, and so it is possible to switch between organic modifiers, such as ACN and tetrahydrofuran, and eluent pH 0 to 14.

## Reference

[1] E. R. Brouwer, I. Liska, R. B. Geerdink, P. C. M. Frintrop, W. H. Mulder, H. Lingeman, U. A. Th. Brinkman (1991) Determination of polar pollutants in water using an on-line liquid chromatographic preconcentration system. *Chromatographia*, 32, 445-452.

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