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The development and application of LC/MS methods for passive sampling of cyanotoxins microcystins

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Abstract

Microcystins are toxic oligopeptides produced by various species of cyanobacteria. Presence of these contaminants in the aquatic environment can inadvertly influence many ecosystem functions. Last not least, recreational and drinking water use can be affected too. Massive occurence of cyanobacteria is very often connected with process of anthropogenic eutrophication of surface waters. And this phenomenon became global problem. Regarding the serious consequences of microcystin contamination there is the necessity of appropriate sampling and detection methods.

Presented dissertation thesis is focused on the development of sensitive and robust methods for sampling and instrumental analyses of microcystins. Among others, development of passive sampling technique is a part of this work. The key factors influencing sampling process were evaluated. The comparison with conventional grab sampling under natural conditions is also presented. Achieved results reveal the advantages of passive sampling approach in monitoring of cyanobacterial toxins. And the present study demonstrate that the modification of POCIS passive sampler is suitable for monitoring of occurrence and retrospective estimations of microcystin water concentrations, especially with respect to the control of drinking water quality

Analyses of microcystins in complex environmental matrices comprise further part of this work. Particularly evaluation and optimization of toxin extraction from sediments is discussed. Attention is devoted also to comparison of analytical techniques used for detection of microcystins in sediments. Our results demonstrate the suitability of the methods described here for studying the occurrence and fate of MCs in the aquatic environment

Determination of microcystins and their metabolites in tissue samples is the next topic compiled within the dissertation thesis. The development of analytical method based on liquid chromatographic separation with single and tandem mass spectrometric detection is presented. Different results obtained by these two methods are discussed. Screening of fish from natural reservoirs was also performed as a part of our work. This study provide first comparison of liquid chromatography with single (LC-MS) and tandem mass spectrometric detection (LC-MS/MS) for analyses of microcystins in complex fish tissue samples.