

Abstract

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Title of the diploma thesis: Determination of contaminants using online hyphenation of extraction and liquid chromatography via column-switching system

This diploma thesis is focused on testing new types of nanofibers as sorbents for extraction and their online connection with liquid chromatography using a column-switching system. In this work, polyamide nanofibers (PA) were tested, including types PA 6, PA 11, PA 4/6, PA 6/12, and PA 6(3)T. PA 4/6 nanofibers, which exhibited the best extraction properties, were applied for a method optimization using the online connection of extraction and liquid chromatography via a column-switching system for the determination of contaminants in natural waters. During the method optimization, a suitable analytical column was selected. Furthermore, optimal gradient elution was determined experimentally, and the process of packing the extraction column, manually filled with polyamide nanofibers, was optimized. Parameters such as duration of washing, valve switching time, and sample volume were also optimized. Detection was carried out using a DAD detector at a wavelength of 220 nm. The result of the work was a successfully developed and validated analytical method, including extraction, demonstrating good accuracy and precision.

Afterwards, the method was applied for the determination of contaminants in rivers from various locations in the Czech Republic. The target contaminants in this thesis are a selection of pesticides and phenolic compounds that may appear in rivers, groundwater, and surrounding soil. The release of these substances into the environment is mainly a consequence of industrial production and soil fertilization. None of the sought analytes reached the limit of quantification. This is generally positive news, as efforts are made to minimize their presence in local waters and surrounding soils due to their toxic effects.