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PII: S0039-9140(18)30626-X
DOI: <https://doi.org/10.1016/j.talanta.2018.06.021>
Reference: TAL18763

To appear in: *Talanta*

Received date: 30 January 2018
Revised date: 6 June 2018
Accepted date: 7 June 2018

Cite this article as: Chao Wang, Man He, Beibei Chen and Bin Hu, Polymer monolithic capillary microextraction on-line coupled with ICP-MS for determination of inorganic selenium species in natural waters, *Talanta*, <https://doi.org/10.1016/j.talanta.2018.06.021>

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Polymer monolithic capillary microextraction on-line coupled with ICP-MS for determination of inorganic selenium species in natural waters

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Abstract

In this work, ethylenediamine modified poly(glycidyl methacrylate-ethylene dimethacrylate)(poly(GMA-EDMA-NH₂)) was prepared for highly selective extraction of Se(VI) with high adsorption capacity of 0.825 mg m⁻¹ (530 μm i.d.). Based on it, a novel method of polymer monolithic capillary microextraction (CME) on-line coupling with inductively coupled plasma-mass spectrometry (ICP-MS) was developed for the determination of inorganic selenium species (Se(IV)/Se(VI)) in natural waters. Under the optimized conditions, the analytical performance of the proposed on-line CME-ICP-MS method was evaluated for Se(VI). The limit of detection for Se(VI) was 14.2 ng L⁻¹, and the enrichment factor was 50-fold with the sample throughput of 5 h⁻¹. For Se(IV), the concentration was obtained by subtracting Se(VI) from the total Se(VI) obtained by the proposed method after oxidation of Se(IV) to Se(VI). The accuracy of the method was validated by the analysis of a Certified Reference Materials of GBW(E)080395. The proposed method was applied for the analysis of inorganic selenium species in natural waters with good recoveries. The developed method of monolithic CME-ICP-MS is sensitive, simple and rapid for the analysis of inorganic selenium species in natural waters.

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