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www.elsevier.com/locate/talanta

PII: S0039-9140(18)30087-0
DOI: <https://doi.org/10.1016/j.talanta.2018.01.082>
Reference: TAL18305

To appear in: *Talanta*

Received date: 17 October 2017
Revised date: 25 January 2018
Accepted date: 29 January 2018

Cite this article as: Magdalena Beldowska, Dominika Saniewska, Karolina Gębka, Urszula Kwasigroch, Ewa Korejwo and Justyna Kobos, Simple screening technique for determination of adsorbed and absorbed mercury in particulate matter in atmospheric and aquatic environment, *Talanta*, <https://doi.org/10.1016/j.talanta.2018.01.082>

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ACCEPTED MANUSCRIPT

Simple screening technique for determination of adsorbed and absorbed mercury in particulate matter in atmospheric and aquatic environment

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Abstract

The threat connected to mercury results from its capacity to be transported over long distances and its ability to bioaccumulate and biomagnify in the trophic chain, making it a global problem. Humans are situated at the top of the trophic ladder, and excess mercury manifests itself mainly in the onset of neurological conditions. The toxicity of mercury, as well as its residence time, depends on the form in which it occurs. However, analysis of mercury speciation is time-consuming and poses a high risk of additional or negative contamination. Hence, the mercury thermodesorption method, and particularly its use for fractionating Hg, offers many new possibilities. Here, the thermodesorption technique was applied to the determination of mercury fraction in particulate matter using a DMA-80 direct mercury analyser (Milestone, Italy). The presented method allows direct (without prior mineralisation) determination of labile and stabile mercury fractions within a relatively short time. Heating sample in subsequent temperatures enables determination the share of mercury adsorbed on the surface (mainly associated with halogenides (Hg_{ads1}) and $HgSO_4/HgO/HgF_2$ (Hg_{ads2}), as well as absorbed within the suspended particulate organic matter (Hg_{abs}), in a relatively short time. This fractionation is of great importance in terms of estimating the transfer of mercury to and along the trophic chain. This method determines the contribution of two stable

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