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Multielement Speciation of Mercury and Tin in Inland Surface Waters using GC-ICP-HR-MS

S. McSheehy, T. Lindemann, J. Wills, T. Oki, M. Hamester

Thermo Fisher Scientific, Hanna-Kunath-Str. 11, 28199 Bremen, Germany
shona.mcsheehy@thermofisher.com

Speciation is indispensable for accurately assessing physiochemical properties such as toxicity, mobility and reactivity in biogeochemical cycles of trace elements. Pollutants, such as methylmercury and organotins have generated the most interest over recent years due to their high toxicity and persistent nature. To contend with these contaminants, a series of directives police maximal concentrations for various elemental species in a number of matrices. Recent amendments to the EU Water Framework Directive (WFD) impose ppt levels of mercury species and sub-ppt levels for tributyltin compounds as annual average concentrations in inland waters.

To address the need for determination of ultratrace concentrations representative of real world samples, GC-ICP-HR-MS was evaluated as a technique which offers high resolution of species and the ultimate in sensitivity. The outcome is the ability to use a sample preparation protocol which does not require huge sample volumes in order to attain the LODs required to conform to recent legislation. Additionally, the ICP-MS allows the simultaneous determination of mercury species and organotin compounds. This presentation highlights the remarkable features of GC-ICP-HR-MS for the analysis of trace element species in a number of inland water samples from the Bremen, Germany area. Validation of the technique is performed using spiked recovery procedures and figures of merit are presented.