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Determination of methyl mercury in biological samples by SPME-GC-ICP-MS

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The qualitative speciation and determination of organomercury compounds at ultra trace levels are of special interest, because toxicity, bioavailability and detoxification depend mainly on the chemical form of this element. Alkylated mercury species can cross the blood-brain barrier and cause heavy intoxifications. Much is known about the mercury circle in of aquatic systems and the microbial methylation but less about the bioavailability in soil and the effect on soil feeding invertebrates. The circle of mercury in soil is of special interest because of a high methylation potential by microorganisms. Mainly sulphate reducing bacteria are responsible for the methylation of mercury (1). This omnipresents of microorganisms in the gut of soil living and feeding invertebrates is a way to alkylated mercury and accumulate higher concentrations of organomercury compounds. The development of a food chain model which shows an increase of methyl mercury concentrations by an increasing trophic level is of special interest. This could show the way of organomercury accumulation into human tissue.

The isotope specific ICP-MS coupled to gas chromatography is a highly sensitive method for speciation of volatile organometalic compounds (2). For investigation of the alkylation process, especially the methylation of mercury, different biological samples were used. As an invertebrate model organism the annelidae *Eisenia foetida* was chosen. First measurements showed a methylation of mercury and an accumulation in tissue of *Eisenia foetida*. For detailed studies, cultures of the microbial flora of the worm gut were isolated and enriched with inorganic mercury. Also the availability of mercury in soil was measured by adsorption studies.

Speciation and determination of methyl mercury in the biological samples were done by SPME-GC-ICP-MS (3, 4). Water soluble organomercury compounds were transferred into peralkylated by a derivatization with sodium tetra-(n-propyl)-borate and extracted with dichlormethane. Determination of the extracted methyl mercury was done by the isotope dilution method. Adsorption experiments were done by sequential extraction of the inorganic mercury from soil samples (5) which were measured by ICP-MS.

References:

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