

Abstract (EN)

The presented dissertation is devoted to hydride generation from arsenic species and its application for speciation analysis based on atomic fluorescence detection.

Hydride generation from toxicologically relevant arsenic species was optimized in order to achieve a 100% efficiency. The resulted experimental setup was subsequently used for speciation analysis of arsenic in human urine by high performance liquid chromatography with detection by atomic fluorescence spectrometry. The accuracy of the developed method was verified by comparative analyses of human urine samples collected from five individuals with an independent reference method.

The cleavage of As–C bond during the reaction of methylated arsenic species with tetrahydridoborate(1–) (THB) in acidic media was studied in detail. Pronounced demethylation of methylated arsenic species was found during the reaction of THB with HCl, H₂SO₄, and HClO₄ while hydride generation from CH₃COOH or TRIS buffer after prereduction with L-cysteine resulted in the exclusive formation of the corresponding hydrides. Firstly, this phenomenon can endanger the accuracy of arsenic speciation which is based on hydride generation of substituted arsanes. Secondly, the more complex arsenic species can be converted to the hydride. That was demonstrated on hydride generation of arsenosugars.

Keywords: Arsenic, arsenic species, atomic fluorescence spectrometry, hydride generation.