

Oral Presentations

Speciation Analysis of Nano Quantities of Antimony in Environmental Samples Using Isotope Dilution Method

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Abstract

In this study a novel method was developed to determine the distribution of Sb and Sb species (Sb III and Sb V) in soils and grass samples in a roadside profile. The Sb species distribution after the chromatographic separation was determined using on-line isotope dilution after their extraction from a contaminated soil sample using 100 mmol L⁻¹ citric acid. The separation of Sb(III) and Sb(V) was achieved using an anion exchange column (PRP-X100) and 10 mmol L⁻¹ EDTA, 1 mmol L⁻¹ phthalic acid at pH 4.5 as a mobile phase. After optimization, the extraction procedure for inorganic Sb species 6% Sb(III) (1.3% RSD, n=3) and 43.2% Sb(V) (2.9% RSD, n= 3) as percents of total Sb were detected in the examined soil sample using on-line ID after coupling the HPLC to ICP-MS. The detection limits achieved by the proposed method were 20 ng L⁻¹ and 65 ng L⁻¹ for Sb(V) and Sb(III), respectively. The precision, evaluated by using RSD with 100 ng L⁻¹ calibration solutions, were 2.7% and 3.2% (n=6) for Sb(V) and Sb(III), respectively in aqueous solutions.

Finally, after the development of a suitable speciation analysis method, the procedure was applied successfully for the first time to study the inorganic antimony species distribution in soil and grass samples profiles taken at different locations from traffic roads edges. Emissions from vehicles are the most common and important anthropogenic source of Sb in environment. Correlations between magnetic susceptibility data for roadside samples and inorganic Sb species were observed. Very interesting environmental interruptions were obtained concerning the antimony species distributions Sb(III) and Sb(V).