DETERMINATION OF INORGANIC PLATINUM-CHLORO COMPLEXES AND THEIR HYDROLYSIS PRODUCTS IN SPIKED SOIL SAMPLES (Ab110)

Valentina LYUBOMIROVA, Veronika MIHAIOVA, Rumyana DJINGOVA

Department of Analytical Chemistry, Faculty of Chemistry, University of Sofia, BG, 1164-Sofia, 1,J. Bouchier blvd., Bulgaria, (vlah0i.chem.chem.uni-sofia.bg, Tel: ++359 2 8161 243, Fax: ++359 2 962 54 38)

Key Words: Speciation, Tetrachloroplatinate, Hexachloroplatinate, Hydrolysis Products, Anion-exchange, HPLC-DAD, ICP-AES

The emission of platinum from automobile catalytic converters is well known and the determination of total Pt contents in environmental and biomedical matrices has gained a considerable interest within the last decades. The bioaccumulation of Pt in environmental samples, i.e. soil samples has been studied by the analysis of total Pt content. However, the (eco)toxicity and bioavailability of the emitted Pt are strongly dependent on oxidation state and the binding forms of Pt in the environmental matrix, i.e. the Pt speciation.

In this work two methods for determination of water soluble species of Pt (tetrachloroplatinate PtCl4^2- and hexachloroplatinate PtCl6^3-) in environmental samples, based on the different kinetics of Pt compounds are proposed. Special attention to avoid species interconversion is paid.

A method for the separation and determination of PtCl4^2- and PtCl6^3- with IC-HPLC-DAD with aqueous standards of Pt(II) and Pt(IV)-chlorocomplexes is proposed. The stability of the model species was investigated using isocratic as well as gradient elution. The species purity of standard solutions was determined and the hydrolysis kinetics was investigated. Hydrolysis products of both Pt(II) and Pt(IV) were identified and quantitatively determined.

Earlier in our laboratory a method for the separation of PtCl4^2- and PtCl6^2-, by solid-phase extraction, using a Dowex 1x10 anion exchange resin has been developed [1]. The sequential elution and separation of PtCl4^2- and PtCl6^2- was achieved using selective complexing agents. The eluates, containing Pt(II) and Pt(IV) were analyzed by inductively coupled plasma-atomic emission spectrometry (ICP-AES). Recoveries of 102% for PtCl4^2- and 94% for PtCl6^2- and detection limit of 15 ng.g^-1 were achieved.

Using these methods determination of Pt(II) and Pt(IV) in soil samples, spiked with different platinum species was performed. The comparison of these methods showed a very good agreement.

References