DETERMINATION OF ATMOSPHERIC DEPOSITION OF ARSENIC AND SELENIUM ACROSS KING GEORGE ISLAND (ANTARCTICA) USING NEUTRON ACTIVATION ANALYSIS

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Keywords: atmospheric deposition ; moss; neutron activation analysis; gamma ray spectrometry

Introduction

As mosses are the most commonly used bio-indicators of atmospheric pollution [1], we used *Sanionia uncinata* moss samples for a monitoring study across King George Island (Antarctica). This presentation is focused on atmospheric deposition of selenium (Se) and arsenic (As) possibility released to the atmosphere from biogenic sources in the ocean [2][3]. These elements are often determined in environmental samples by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) [4]. In our work Instrumental Neutron Activation Analysis (INAA) at the reactor IBR-2 of FLNP, JINR was used [5].

Methods

Elemental concentrations of As and Se in moss samples were determined by instrumental neutron activation analysis (INAA) at the reactor IBR-2 of FLNP JINR in Dubna. About 300 mg of dry moss was pelletized and packed into polyethylene (for short-time irradiation) and in aluminum cups (for long-time irradiation). Samples were irradiated in cadmium screened channel with neutron flux density of 10^{12} n/(cm^2·s). Gamma-spectra of induced activity were measured using High Purity Germanium (HPGe) detectors and then processed using software developed in FLNP, JINR [6].

Results

The obtained results are showed in Table 1. For As concentration ranged from 0.36±0.02 mg/kg to 7.77±0.39 mg/kg with a mean value 2.45±0.13 mg/kg. Results of Se determination were in range 0.52±0.05 mg/kg to 14.50±0.67 mg/kg with average 3.10±0.16

Table 1. Results of determination arsenic and selenium in *Sanionia uncinata* samples

Sample code	Arsenic concentration [mg/kg]	Selenium concentration [mg/kg]
J-01	1.72±0.11	1.14±0.07
J-02	1.30±0.09	0.76±0.07
J-03	4.69±0.24	1.19±0.08
J-04	7.77±0.39	8.43±0.39
J-05	0.87±0.05	1.40±0.08
J-06	1.07±0.07	0.83±0.06
J-07	3.96±0.20	1.63±0.10
J-08	1.98±0.14	14.50±0.67
J-09	0.36±0.02	0.56±0.08
J-10	0.78±0.05	0.52±0.05

Conclusion

Determined concentrations of As and Se in the moss samples vary in a wide range. The highest values are observed near the polar research stations. Thus, one may assume that these stations are the main source of atmospheric deposition of As and Se to King George Island. However, it does not exclude their long-range atmospheric transport of with other air pollutants to Antarctica [7]. Moreover As and Se may be released from the ocean as a result of biogenic activity [8]. More detailed studies of this phenomena are needed.

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