

DETERMINATION OF HEAVY METAL CONTENT IN THE ROOTS OF SOME MEDICINAL PLANTS BY MICROWAVE PLASMA ATOMIC-EMISSION SPECTROMETRY

Natia Tchanturia, Nino Takaishvili, Bezhan Chankvetadze

natia.tchanturia641@ens.tsu.edu.ge

Chair of Physical and Analytical Chemistry, Department of Chemistry, Iv.Javakhishvili Tbilisi State University

3 Ilia Chavchavadze Avenue, 0179, Tbilisi, Georgia

Chemical composition of plants depends on their species, stage of development, climatic conditions and other factors of growing. Species of plants play an important role in a distribution of chemical substances (phytoaccumulation, translocation) from soil to plants [1].

We evaluated the concentration of some heavy metals (Cd, Pb, Zn, Cu, Ni, Mn and Fe) in Licorice and Valeriana roots of various origin, which are often used for medicinal purposes. For determination of heavy metal concentrations Microwave Plasma Atomic-Emission Spectrometry was used.

The obtained values were compared with the recommendations about permissible limits of heavy metals in medicinal plants set by the World Health Organization (WHO) [2, 3]. Concentrations of Zinc, Manganese, Copper and Lead in all samples are within permissible range. Content of Cadmium in sample №6 exceeds the recommended value (0.3mg/kg). Concentration of Nickel in samples №2, 4, 5, 6 is above the upper limit (1.5 mg/kg). All analyzed samples contained excessive amount of Iron considering its maximal allowed concentration of 200 mg/kg.

Table Content of heavy metals(mg/kg) in Licorice and Valeriana roots of various origin

№	Sample	Cd	Pb	Zn	Cu	Ni	Mn	Fe
1	Licorice Roots (kreuter Mix), (02.06.2022)	0.06	0.74	1.96	23.40	0.76	13.92	286.00
2	Valeriana Roots (Kreuter Mix), (02.06.2022)	0.16	0.06	17.42	7.22	3.76	172.78	1028.00
3	Licorice Roots (Bolnisi, Georgia)	-	1.18	14.43	17.88	0.43	14.33	390.25
4	Licorice Roots (Kazakhstan)	-	1.23	13.03	24.70	29.93	17.20	281.25
5	Valeriana Roots (Germany)	0.23	1.63	43.25	10.83	10.75	149.98	688.00
6	Valeriana Roots (Georgia)	0.47	4.00	39.70	41.07	4.50	185.60	2730.00

Based on our results, it can be concluded that every batch of medicinal plant should be checked for heavy metal contamination before processing it for further pharmaceutical purposes.

[1] G. Supatashvili, Environmental Chemistry, TSU, 2009, pp.1-187

[2] WHO guidelines for assessing quality of herbal medicines with reference to contaminants and residues, 2007, p.118. https://apps.who.int/iris/bitstream/handle/10665/43510/9789241594448_eng.pdf

[3] Baba, H. S. and Mohammed, M. I. Determination of some essential metals in selected medicinal plants, ChemSearch Journal, 12(1):15-20, June. 2021.

<https://www.ajol.info/index.php/csj/article/view/209959/197947>