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Sorption of chemical elements by plankton in the presence of humic acid

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Humic acids (HA) are one of few omnipresent natural substances, which govern the migration trends of chemical elements in the biosphere. Being a complex mixture of high molecular organic compounds, they take part in accumulation, aqueous transfer and sorption of chemical elements in natural environment. The impact of HA on the sorption of stable trace elements and radionuclides in the geochemical media still remains a subject of intensive investigations. The role of HA complexes formation in the bioavailability (sorption) of microelements by plankton, lake plankton in particular, is significantly less studied. To determine the formal characteristics of trace elements sorption by living (active) and dead (inactive) species of lake plankton and to quantify the effect of HA concentration on these characteristics, we have performed an experimental investigation of the sorption systems "lake water - plankton - trace elements" under laboratory conditions. The plankton samples were collected in the Beloyarskoe Reservoir (Urals, RF). Plankton was chosen as a model object because of its leading role in the distributive biosedimentation of chemical elements in continental reservoirs. Due to its high productivity and accumulation ability, plankton is supposed to be one of the best bioindicators of contamination of water ecosystems with radionuclides and other pollutants, as well as a natural sorbent of trace elements [1].

The list of the microelements used in the sorption experiments included more than 50 chemical elements, the level of which in the lake water was above the detection limits of ICP-MS ELAN 9000. The experimental results of the analysis of sorption behavior of trace elements with respect to plankton are discussed in the presentation. It was found that for the most trace elements studied sorption by plankton (both active and inactive species) obeys the Langmuir law. The presence of soluble HA in water medium results in the reduction of the distribution coefficients of selected microelements towards active plankton. It is deduced that lake plankton interacts with trace elements in lake water and may be considered as a promising bio-sorbent of trace elements and radionuclides.

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Reference

[1]. M.Ya. Chebotina, V.P. Guseva, E.V. Polyakov. In "Zooplankton: species diversity, distribution and seasonal dynamics"/Ed. G. Kehayias. Published by Nova Science Publishers, Inc. New York, 2014. Pp.127-148. ISBN QL123.Z67 2014 (eBook).

Primary author: Dr POLYAKOV, Evgeny (Institute of Solid State Chemistry, UB RAS)

Co-authors: Mr VOLKOV, Ilya (Institute of Solid State Chemistry, UB RAS); Dr KHELEBNIKOV, Nikolai (Institute of Solid State Chemistry, UB RAS); Prof. GUSEVA, Valentina (Institute of Plant and Animal Ecology, Ural Branch RAS)

Presenter: Mr VOLKOV, Ilya (Institute of Solid State Chemistry, UB RAS)

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