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# X-ray spectroscopic study and chemical fractionation of Pb(II) compounds in soil under contamination conditions

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Currently extraction methods are widely applied for analysis of the composition of metal compounds. During the last 30 years, the development of X-ray absorption spectroscopy methods based on synchrotron radiation provided information on the structural organization of metal compounds in the soil. The results of transformation of Pb (II) compounds in Chernozem under contamination are presented. These studies were carried out using the technique of X-ray absorption spectroscopy and chemical extractive fractionation. In a model experiment, soil samples were artificially contaminated with elevated rates of Pb(NO3)2 and PbO (2000 and 10000 mg kg-1). The composition of Pb compounds in soil samples were analyzed by sequential extractive fractionation by Tessier method. The measurements of X-ray absorption spectroscopy XANES and EXAFS were performed at the Structural Materials Science beamline of the Kurchatov Center for Synchrotron Radiation (NRC "Kurchatov Institute", Moscow). The results of successive extraction showed that Pb is associated with strongly bound organic substances, Fe and Mn (hydr)oxides, and carbonates. An increase in the portion of exchangeable fraction is observed under extreme loads. At the addition of Pb in the form of oxide and nitrate to the soil, the fractional compositions were similar, which indicates the good transformation of PbO in Chernozem. Lead ions in Chernozem samples are incorporated in the positions of the inner-sphere complex replacing some aluminum ions in the octahedral sites. This results in changes the Pb–O distances in Pb-bearing octahedrons. We may suggest that Pb2+ is also sorbed by dimer (Pb–Pb) silicate and/or aluminum groups.

## Biography

Viktoriia Tsitsuashvili is a Post-graduate student of the Academy of Biology and Biotechnology of the Southern Federal University. She received her Master's degree in Geography. She has 12 scientific publications, of which 2 articles indexed in the Scopus databases. She is a part of 3 research projects.

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