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Complexes of metals with humus substances as natural biocolloids: mechanism and size

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Metal complexes with humus substances in the soil are natural biocolloids, which are characterized by the size of the nano- to milli grams. Physical state of the compound functional features humus substances (HS), the nature of metal - all these parameters define different mechanisms transportation of the metal in the soil profile.
To assess changes in the composition humus substances complexes with metals and molecular weights humus substances used methods ultrotsentrifugation and filtration (<8 microns, <1.6 microns, <100 kDa), followed by analysis of the samples - ICP-MS electrochemical and chromatographic methods. Soil samples of gleepodzolic were selected in Hibin (Russia) by layers (0-50 cm) by 5 cm.
According to the data within the layers ultrafiltration alkali metals do not stay in any of the fractions and to migrate as the ions (40-50 cm). Alkali- earth metals, on the contrary, delayed a layer (2-7 cm), most humified layer, explained by the appearance of active d- orbital of the metal cations, and their greater ability to form complexes than alkali metals. Aluminum content of elements of the subgroup represented by several peaks, mainly in the upper layers of the soil in those areas where the most represented type of fulvic humus substances. High concentration of iron in all studied soil layers. An exception is the 15-35 cm layer which contains humic substance in large quantities compared with fulvic acids, that may explain the decrease in the affinity of the metal to the functional groups and less strong sorption communication mechanism. Metal concentrations of nickel and cobalt are practically unchanged with soil depth. Indicating that almost the same ability to bind to humic and fulvic acids. In samples of 5-8 cm identified reduction of zinc and copper ions in the filtrates from 8 microns to 100 kDa. However, complexes with zinc ions of HS molecular weight less than 100 kDa in all filtrates predominates, particularly fulvic type complexes.
Lead ions are predominantly high molecular weight complexes of over 1000 kD, so the filtrate was less than 100 kDa lead content is minimal. The content of zinc ion in layers 8-11 sharply decreases with decreasing pore size of the filter is comparable to the reduction in the organic matter content of from 1 mg / l to 0.1 mg / l. Lead ions are presented only in the filtrate from 8 to 1.2 microns, and almost entirely associated with humus substances. Content of copper ions is changed slightly to a fraction of less than 100 kDa in all samples represented copper complexes with humus substances.