

Investigation of Manganese Fulvate Complexes by The Gel Chromatographic Method

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Macromolecular organic substances, fulvic acids, thanks to their functional groups, actively participate in the processes of complex formation and sorption occurring in natural waters, bottom sediments and soil. They form stable compounds with both heavy metals and radioactive elements and determine the forms of their migration in natural objects. Data on the stability constants of fulvic acids complexes are heterogeneous and vary by several ranges. This situation is mainly due to the unpredictability of changes in the average molecular weights of their associates during complex formation, which depend both on the degree of ionization of fulvic acids and on pH values, ultimately leading to incorrect results. Our goal was to determine the composition of Mn(II) fulvate complexes at pH 5 and calculate the stability constants using gel chromatography. Pure samples of fulvic acids were isolated from natural waters of Georgia using adsorption chromatography. It was shown that when calculating the stability constants of fulvic acids, it is optimal to use the average molecular weight of the 'oligomer' rather than the associate. The results obtained can be successfully used to calculate the patterns of heavy metal migration in natural waters of any class and type, as well as to predict the ecological state of water bodies [1-6].

References

- [1] G. Makharadze, Fulvic Acids (2009), "Meridiani", Tbilisi (Geo).
- [2] Schnitzer, M. Reactions between Fulvic Acid, a Soil Humic Compound and Inorganic Soil Constituents. Soil Science Society of America Journal. 1969, 33, 75-81.
- [3] Schnitzer, M., Hansen, E. H. Organo-metallic interactions in soils 8. Scally of methods for the determination of stability constants of metal-fulvic acid complexes. Soil Science. 1970, 109, 333-340.
- [4] Mantoura, R.F.C., et al. P. The Complexation of Metals with Humic Materials in Natural Waters. Estuarine and Coastal Marine Science (1978) 6, 387-408.
- [5] Hirata, S. Stability constants for the complexes of transition metal ions with fulvic and humic acids in sediments measured by filtration. Talanta. 1981, 28, 809-15.
- [6] Schnitzer, M., Kerndorff, H. Reactions of fulvic acid with metal ions. Water Air Soil Pollut. 1981, 15, 97-108.