



Study of coagulation processes of selected humic acids under copper ions influence*

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Humic acids have limited sorption capacity and big dose of metal or other mineral component which can be sorbed on humic acids, can cause saturation of negative, surface charge of humic acids leading to destabilization of dissolved humic acids compounds. Destabilisation can be observed as coagulation and flocculation process of humic acids. However there are a lot of mechanisms which causing precipitation of humic acids. Thereby, in order to full description of coagulation process, different methods should be applied. Ordinarily, humic acids coagulation is studied by measurement of absorbance, transmittance or carbon loss in solution. Meanwhile, very significant information is also variation of metal content in soil solution and information whether metal goes to precipitate together with humic acids or stays in dissolved form in solution. So, that, from one side, processes of stronger accumulation of metal can lead to soil degradation and micronutrient deficiency for plants. However, there is also possibility to stay metal in solution in toxic and bioavailable form for plants.

Main aim of this paper was to study coagulation process of different humic acids extracted from mucking peats under copper ions influence at adjusted pH to 5.

In order to this, four peaty-muck soils were taken from selected places in east part of Poland (meadows and river valleys). These soils differed by humification degree, secondary transformation, density and pH. At next step, humic acids were extracted from soils using sodium hydroxide (NaOH) extractant. After exact purification by washing with HF-HCl mixture and water, humic acids were lyophilized. Solutions of humic acids were prepared at concentration 40 mg/dm³ with addition of different amount of copper ions to obtain final concentration of Cu(II) ranged from 0-40mg/dm³. After 24 hours solutions were investigated using measurements of absorbance at 470nm (UV-VIS spectrometer Jasco V-530), measurements of organic carbon in solution (carbon analyzer: Multi NC2000, Analytik Jena) and measurements of copper content in solution (atomic absorption spectrometer: Contraa300, Analytik Jena). On the base of obtained results initial and end point of coagulation was determined for each of humic acids.

Results showed that coagulation points differed for different humic acids and it was probably depended on sorption possibilities. Coagulation points determined from UV-VIS measurements overlapped with points from carbon measurement. Loss of carbon during coagulation was almost total but loss of copper in solution during humic acid coagulation was much smaller and did not cover exactly points of carbon precipitation. So that, coagulation of humic acids under copper influence could result from both bonding of metal by functional groups and creating complexes and also from increasing ionic strength. Important is that organic carbon went to insoluble form and copper stayed in movable compounds. Such studies and conclusions coming from them, can be very important from ecological side.

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