ADSORPTION OF LEAD ON A LUVISOL PROFILE FROM THE CSERHÁT MTS., NE HUNGARY

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Geochemical analyses using sequential extraction method, lead adsorption and analytical TEM studies were carried out in order to characterize the distribution and adsorption behaviour of lead on each genetic horizon of a Luvisol profile. This soil was developed on schlier, and it is characterized by clay illuviation as the most important pedogenic process. Clay minerals are presented in the profile by "chloritized" vermiculite species with increasing chlorite component downward. The amount of carbonate minerals strongly increases in the lower part of the profile resulting abrupt rise in soil pH within small distance (from 5.66 to 8.41).

The average Pb concentration of this soil is at the level of natural geochemical background in Hungary (14 ppm), and its amount decreases with depth suggesting the binding of Pb to soil organic matter (27 ppm at 5 cm, 15 ppm at 35 cm, 4 ppm at 65 cm). According to the sequential extraction analysis the organic matter is an important sink of lead: with decreasing organic matter content the amount of lead bound to it decreases, but its proportion increases. The distribution of lead among soil constituents varies especially in the function of the carbonate content of soil, as well. These effects vary in the different soil horizons.

Lead adsorption experiments were carried out on whole soil samples, soil clay fractions, as well as on their carbonate and organic matter free variant. The different soil horizons adsorb lead to different extent depending on their organic matter, clay mineral and carbonate content, and the mineralogical features of soil clays significantly affect their lead adsorption capacity. The clay fraction adsorbs 25% more lead than the whole soil, while in the calcareous subsoil the lead precipitated due to the high pH. 10% and 5% of adsorbed Pb can be leached with distilled water in the organic matter and clay mineral dominated soil horizons, respectively.

Samples treated with the highest amount of lead containing solution (2000 mg/l) were studied by analytical TEM. The results show that among mineral phases the most important lead adsorbing ones are the vermiculite and the chlorite. The amount of adsorbed lead increases with the increasing iron content of this phases. The lead also adsorb on Fe oxides in smaller extent, but lead adsorption on carbonates was not found.

These results suggest that the soil organic matter plays decisive role in the adsorption of Pb, but the fixation by clay minerals is stronger. The carbonate phases plays role in lead adsorption through their pH buffering capacity.