



The study by Raman and FTIR spectrometry of structure and stability of organic-minerals combinations from soils

D. BULGARIU (1,3), L. BULGARIU (2), C. RUSU (1)

(1) "Al. I. Cuza" University, Faculty of Geography and Geology, Iași, Romania; (2) Technical University "Gh. Asachi" from Iași, faculty of Chemical Engineering and Environmental Protection, Iași, Romania;

(3) Romanian Academies, Filial from Iași, Collective of Geography

The organic-minerals combinations represent a special category of soils components, these being represented by organic-mineral combinations with alkaline metals cations, clay-humic and clay-ironhumic combinations, chelates complexes and allophanohumic complexes. Such combinations are present practically in any type of soil, but the composition, structure, stability and their weight varied in very large limits, in function of pedogenesis conditions and chemical-mineralogical characteristics of soils. Between organo-minerals combinations are an assemble of equilibriums very sensitive even at relative low variations of physic-chemical conditions from soil and in consequence, this manifest a strong influence on evolution of organic compounds, clay minerals and metal ions in soil.

Although some times are considered meta-stable combinations, the stability of organic-minerals combinations (in special clay-humic, clay-ironhumic and allophanohumic combinations) was proved to be relative high. This is probable due to higher flexibility of structure at variation of chemical-mineralogical composition of these and of physic-chemical conditions from soil. From this reason, both the separation and determination of organic-minerals combinations from soils, and the structure determination of these, are very difficult problems from practical point of view.

In this paper are presented the results about the composition, structure and stability of

organic-minerals combinations in function of chemical-mineralogical characteristics of soils. The studies were realized using three types of soils: antrosoils, technosoils and hortico antrosoils. The experiments were done both on raw soil samples and on mineral fractions separated from these. These results have been completed with the studies realized on blank samples, obtained by laboratory synthesis of some organic-minerals compounds with very close compositions. The nondestructive separation of organic-minerals compounds from soil samples was performed by iso-dynamic magnetic method and extraction in aqueous two-phase system. The studies by Raman and FTIR spectrometry were realized on raw soil samples, separated mineral fractions and on extracts obtained from soil samples. These results were completed with those obtained by chemical analysis, microscopic studies, differential thermal analysis and UV-VIS absorption spectrometry. On the basis of these have been discussed the effects of clay minerals type, type and concentration of organic compounds, type of metallic cations, speciation forms and concentration of these on the structure and stability of organic-minerals combinations.

Acknowledgments

The authors would like to acknowledge the financial support from Romanian Ministry of Education and Research (Project PNCDI 2-D5 no. 51045/07).