



Properties and structure of peat humic acids depending on humification and precursor biota in bogs

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Humic substances form most of the organic component of soil, peat and natural waters, but their structure and properties very much differs depending on their source. The aim of this study is to characterize humic acids from raised bog peat profiles to evaluate the homogeneity of humic acids isolated from the bog bodies and study peat humification impact on properties of humic acids. A major impact on the structure of peat humic acids have raised bog biota (dominantly represented by bryophytes of different origin) void of lignin. For characterization of peat humic acids their elemental (CHNOS), functional (-COOH, phenolic OH) analysis, spectroscopic characterization (UV, fluorescence, FTIR, ¹H NMR, CP/MAS ¹³C NMR, ESR) and degradation studies (Py-GC/MS) were done. Peat humic acids (HA) have an intermediate position between the living organic matter and coal organic matter and their structure is formed in a process in which more labile structures (carbohydrates, amino acids, etc.) are destroyed, but thermodynamically more stable aromatic and polyaromatic structures emerge. Comparatively, the studied peat HAs are at the start of the transformation process of living organic matter. Concentrations of carboxyl and phenolic hydroxyl groups changes depending on the depth of peat from which HAs have been isolated: and carboxylic acidity is increasing with depth of peat location and the humification degree. The ability to influence the surface tension of peat humic acids isolated from a well-characterized bog profile demonstrates dependence on age and humification degree. With increase of the humification degree and age of humic acids, their molecular complexity and ability to influence surface tension decreases; even so, the impact of the biological precursor (peat-forming bryophytes and plants) can be identified.