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Chiral pollutants

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Abstract

Changes of enantiomeric fraction (EF) of chiral compounds interacting with components of soil and the effect of amount of soil components on EF value were investigated. Soil components (humic acid and ash) were isolated from soil using method recommended by the International Humic Substance Society (IHSS). Dichloromethane was used as an extraction solvent for extraction of enantiomers of polychlorinated biphenyls (PCBs), mecoprop and its methyl ester from humic acid (HA) and ash sample. The extracts were analyzed by a high performance liquid chromatography (HPLC). HPLC columns filled with silica gel modified by permethylated cyclodextrine acting as a chiral selector were used for analytical separation of enantiomers. The results confirm the stereoselective effect of soil components on extractable amount of individual enantiomers. Significant changes of EF of chiral pollutants were observed for investigated PCBs enantiomers (HA 0.49–0.45, ash 0.50–0.58) and for mecoprop-methyl ester (HA 0.55–0.59, ash 0.49–0.34), smaller changes of EF were observed for mecoprop (HA 0.52–0.50, ash 0.49–0.50). The changes of EF were dependent on an amount of humic acid and ash. Inverse trends of EF changes of humic acid were obtained comparing to trends of EF changes of ash.

Changes of enantiomeric fraction (EF) of chiral environmental pollutants, polychlorinated biphenyls (PCBs 84, 135, 175), mecoprop and mecoprop-methyl ester, were investigated as a soil pH function. Suitable method enabling adjustment of a stable soil pH in the range of pH 4–7 was used. Addition of phosphate buffer and direct soil pH measurement was used for the study of soil pH effect on EF changes during 40–55 days incubation. Monitoring of EF changes (0.45–0.56) was feasible in the whole incubation interval according to the properties of pollutants. Changes of EF were quantitatively and qualitatively dependent on the soil pH. Different trends of EF changes were recorded for different soil pH. The most significant changes of enantiomeric fraction (EF) were observed in the beginning of all

experiments. Differences in adsorption rate and extent of enantioselective sorption of enantiomers on soil components can be used for explanation of obtained results.

Second part will be focused on development and optimization of LC/MS/MS method for analysis of polycyclic aromatic nitrogen heterocycles (PANHs), Cylindrospermopsin and Microcystins (MCs) in environmental samples.