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Mineralogical approach to BCR extraction procedure of urban playgorund soils in Zagreb (Croatia)

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Trace metals in urban soils were investigated by sequential chemical extraction provided by the BCR extraction procedure. BCR method was combined with x-ray diffraction to determine the availability and speciation of trace metals. X-ray diffraction is applied to the residues at each stage in the extraction to precisely identify which mineral phases are remaining. This analyses allowed for qualitative interpretations of mineral proportions and semi-quantitative evaluation. Urban area of Zagreb was used to detect these changes. Urban soils are, in a great manner, a threat to the young children as a playground area. They affect children health (under the age of 7) due to their contamination by certain heavy metals. The playground soils located in the central and former industrial sites in Zagreb is enriched with Pb, Hg, Sb, and Zn compared with sites located in new residential and former rural surroundings of Zagreb. At these sites both topsoil and subsoil samples have high concentrations of Hg and Pb. The general soil properties as well as Ca and Mg contents show the differences in soil parent materials the alluvial sediments in the Sava river floodplain and the Pleistocene terrace and Miocene deposits on the slopes. Trioctahedral clays progresively dissolve throughout extraction process. After treatment with HOAc, HA-HCl i H_2O_2 clay content had decreased and completely disappears in post aqua stage. The greatest amount of trioctahedral clay dissolution occures during aqua regia extraction. Kaolinite peak at 7.1 Å remains after aqua regia extraction and this indicate that the posat aqua regia 7.1 Å peak cannot be produced by chlorite. Content of all other minerals (quartz, muscovite, feldspars, amphibole, kaolinite) remains constant throughout the extraction process. Carbonates are completely destroyed after third step. The combination of sequential extractions with mineralogical sample investigation provided information on the reactivity and solubility of minerals in the samples. This improved the interpretation, at least within the detection limits of the mineralogical analysis applied. Besides the improved interpretation of the results of the sequential extractions for sediments in which minerals are identified, the information concerning the reactivity of minerals is an important tool to evaluate the risk associated with contaminated soils.