



Comparative studies of different sequential extraction schemes for characterization of environmental mobility of heavy metals in soils, sediments and gravitation dusts

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Mobility and bioavailability of metals and their potential ecotoxicity is strongly determined by their specific chemical forms in soils and aquatic sediments. Due to the complexity of the system the total elemental speciation is impossible, therefore the fractionation of element content by sequential extraction procedures were developed for risk assessment caused by heavy metal contamination in practice. These methodologies mostly are based on the Tessier five-step procedure (Tessier A, Campbell PGC, Bisson M (1979), Anal. Chem., 51: 844-851) which is, however, very time-consuming and labour-intensive for practical purposes. Nowadays mostly the BCR three-step sequential extraction scheme is used by which the acetic acid soluble, the reducible Fe and Mn oxide associated, and the oxidisable organic and sulfide-bound metal fractions can be distinguished by successive decomposition with a series of increasingly aggressive reagents. The whole fractionation procedure is still very time-consuming (3-4 days) and does not fit to the chemistry of natural mobilization pathways. A new sequential extraction scheme based on supercritical CO₂, subcritical H₂O and subcritical (H₂O+CO₂) solvents was developed for better modeling the natural mobilization processes (Heltai G, Fehér B, Percsich K, Barabás B, Fekete I (2002), Anal. Bioanal. Chem., 373: 863-866). These method was validated with soil, sediment and gravitation dust samples with different carbonate and TOC content. The information content and performance of this method was compared to BCR-procedure. Time demand of (CO₂/H₂O) based procedure is much less, the chemical interpretation is easier than

that of the BCR procedure. Extracts were analyzed by FAAS and ICP-OES methods.