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Arsenic release from Fe/Mn oxide-rich (model) soils/sediments – A comparison of single extraction procedures

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Arsenic extractability in As-modified Fe(III) and Mn(III,IV) oxide-coated sands was tested using five widely used 2-h single extraction procedures: deionised water, 0.01 M CaCl2, 1 M $NH4NO_3$, 0.1 M Na2HPO4 and 0.005 DTPA. In general, the highest As recoveries reaching 39–50% of total As concentration were observed for all extracting media in the birnessite (delta-MnO_2) system, indicating relatively weak adsorption of As onto the Mn oxides.
The Na2HPO4 extracts from the Fe oxide systems (i.e. associated with ferrihydrite and goethite) were highest in As, accounting for up to 34% of total As amount. Surprisingly, comparable recoveries of As (14–20%) yielded deionised water, CaCl2, $NH4NO_3$, DTPA as extracting media for both ferrihydrite and goethite coatings.
Deionised water and Na2HPO4 extractions are suggested for quick estimation of easily soluble, exchangeable and/or specifically adsorbed As in real soil/sediment samples.