

Publication

An optimised sequential extraction scheme for evaluation of vanadium mobility in soils

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Reviewing the current state of knowledge about sequential extraction applied for soil vanadium (V) fractionation, we identified an urgent requirement of an sequential extraction (SE) specified for V. Namely, almost all previous SE extracted only 8.4%–48% of total V in soils (excluding residue). Thus, we proposed an eight-step SE for V fractionation in soils according to the knowledge gained from literature and our own dissolution experiments with model minerals. After extracting the mobilisable and adsorbed V with de-ionised water and 5 mmol/L phosphate, 1 mol/L pyrophosphate was applied to gather organic matter bound V which minimised the artefact dissolving Al and Fe (hydr)oxides occurred when using HNO₃–H₂O₂ for extraction. Extraction with 0.4 mol/L NH₂OH · HCl was highly selective toward manganese oxides. Fractionation of different crystalline Al and Fe (hydr)oxides associated V with 1 mol/L HCl, 0.2 mol/L oxalate buffer and 4 mol/L HCl at 95°C especially improved the extractability of V incorporated with crystalline phase associated V. The suitability of our new SE scheme was confirmed by its higher selectivity against the target phases and higher extraction efficiencies (55%–77% of total V) with model minerals and 6 soils of different properties than previous SE.

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