

Silica-coated magnetite nanoparticles functionalized with betaine and their use as an adsorbent for Mo(VI) and Re(VII) species from acidic aqueous solutions

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The aim of this work is to produce a superparamagnetic core-shell adsorbent material composed of magnetite nanoparticles coated with a silica layer and functionalized with betaine for applications associated with the recovery of molybdenum and rhenium anions from highly acidic aqueous solutions. The resulting nanoparticles with a quaternary amine surface were predominantly spherical with average diameters of 14.3 ± 1.7 nm. Adsorption experiments at pH values of 1-2 confirmed that it was possible to uptake molybdate and perrhenate species using this adsorbent nanomaterial, achieving maximum loading capacities of 15 mg/gMNP for Mo and 19 mg/gMNP for Re.