

# Recovery and separation of rhenium and molybdenum from aqueous solutions that simulate mine waters using magnetite nanoparticles functionalized with amine-derivative groups

Gaete, José

Molina, Lorena

Alfaro, Ian

Yañez, Joaquin

Valenzuela, Fernando

Basualto, Carlos

© 2019 Elsevier Ltd The recovery and separation of rhenium and molybdenum from acidic aqueous solutions that simulate mine waters is studied through an adsorption process using magnetite nanoparticles functionalized with tertiary (TA-MNP) and quaternary amine (QA-MNP) groups as adsorbents. The functionalized nanoparticles (FMNP) were efficiently synthesized and physical and chemically characterized. An average particle size in the range of 6–8 nm based on HR-TEM analysis was determined for the nanoparticles, which exhibited a high saturation magnetization varying between 53 and 60 emu/g. Several factors that affected the recovery of Re(VII) and Mo(VI) from aqueous solution using the synthesized FMNP were studied, such as the adsorbent dose, initial concentration of metal and pH of the aqueous feed solution. In all experiments, QA-MNP presented a slightly better adsorption of both metals compared to TA-MNP. At pH 3, maximum rhenium loading capacities of 30 and 38 mg Re(VII) /g adsorbent