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FACILE PREPARATION OF AN AMINO-SILANE COATED Fe_3O_4 NANOPARTICLES AND ITS APPLICATION FOR SEPARATION OF ANTIMONY (III) AND ANTIMONY (III) FROM AQUEOUS SOLUTION

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Abstract

The proffered research defines the synthesization of Fe_3O_4 nanoparticles coated with tetraethyl orthosilicate, (3-chloropropyl) triethoxysilane and 3-amino-1,2,4-triazole-5-thiol respectively, and performing as adsorbent for antimony speciation. Nanoparticles that successfully synthesized were characterized by FESEM, EDX, XRD, FT-IR, TGA and antimony species were determined by USN-ICP-OES. Time-consuming processes such as filtration or centrifugation are eliminated, as magnetic nanoparticles that have absorbed target metals can be readily separated from aqueous medium with magnetic decantation. Optimum conditions for speciation study were found by adjusting the pH value as 9, adsorbent amount as 20 mg and contact time as 60 min. At these conditions, Sb^{3+} was retained from the aqueous solution while Sb^{5+} remained in solution. Also, adsorption isotherms, adsorption kinetics, common ion studies and analytical values were conducted. The limit of detection (LOD), the enrichment factor (EF), and the relative standard deviation (RSD) was calculated as 1,35 µg.L^{-1}, 116, and 1.03%, respectively. Although the method is compatible with both the Langmuir and Freundlich isotherm models, it is only compatible with pseudo-first order equation in kinetic studies. Indium was used as an internal standard in all experiments.

Key words: heavy metal recovery, ICP-OES, magnetic nanoparticles, preconcentration, solid phase extraction

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