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## FACILE PREPARATION OF AN AMINO-SILANE COATED Fe<sub>3</sub>O<sub>4</sub> NANOPARTICLES AND ITS APPLICATION FOR SEPARATION OF ANTIMONY (III) AND ANTIMONY (V) FROM AQUEOUS SOLUTION

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### Abstract

The proffered research defines the synthesis of Fe<sub>3</sub>O<sub>4</sub> nanoparticles coated with tetraethyl orthosilicate, (3-chloropropyl)triethoxysilane, and 3-amino-1,2,4-triazole-5-thiol respectively, being used as adsorbent for antimony speciation. Nanoparticles that were 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 the 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<sup>3+</sup> was retained from the aqueous solution, while Sb<sup>5+</sup> 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) were calculated as 1.35 µg.L<sup>-1</sup>, 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:* ICP-OES, heavy metal recovery, magnetic nanoparticles, preconcentration, solid-phase extraction

*Received: June, 2021; Revised final: December, 2021; Accepted: December, 2021; Published in final edited form: March, 2022*

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