



6th
EuChemS
Chemistry Congress



Inductively coupled plasma mass spectrometry study of the retention behavior of Arsenic on solid phase extraction and its application.

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Type: Poster

Theme: B. The Environment, Energy, and Sustainability

Topic: B2. Environment and Natural Resources Management

Keywords: MNPs, ICP-MS, environmental waters, As, SPE

SUMMARY:

A rapid and easy method has been developed for separation, pre-concentration and determination of arsenic by flow injection solid phase extraction coupled with on-line chemical vapour generation inductively coupled plasma mass spectrometry (ICP MS). Fe₃O₄ magnetic nanoparticles (MNPs) modified with [1,5-bis (2-pyridyl)-3-sulphophenyl methylene] thiocarbonohydrazide (PSTH) were synthesized and employed as a SPE adsorbent to remove the As from natural water.

The method has been developed on the basis of selective solid phase extraction (SPE) absorption and highly sensitive ICP MS detection. The main aim of this work was to develop a precise and accurate method for the determination of As from natural water samples (sea water, estuarine, lake and river water) by the on line pre-concentration SPE CVG ICP MS using PSTH-MNPs, with the least demanding and simple sample preparation procedure. Factors affecting the retention and elution of arsenic have been examined. Several variables as sample flow rate, eluent flow rate, eluent concentration and reductant concentration were considered as factors in the optimization process. Interactions between analytical factors and their optimal levels were investigated using three central composite designs. The results showed that the retention of As depend on the chemical characteristics.

The procedure has demonstrated to be fast, easy, automatic, selective, low cost and with good sensitivity. The main advantage of PSTH- MNPs is its very good stability and resistance because chemisorption of chelating molecules on the surface of solid supports provides immobility, mechanical stability and insolubility. Its cost is low compared with other chelating sorbents.

The detection and determination limits, precision and enrichment factor of the method are good. The pre-concentration factor and detection limit can be improved by increasing the pre-concentration time.

Acknowledgements The authors thank the Spanish Ministerio de Ciencia y Tecnología (MCyT project no. CTQ2013-44791-P) for supporting this study and also FEDER funds. And Universidad de Málaga, Plan Propio Universidad de Málaga.