

## SG.10 – Semiautomatic method for the ultra-trace arsenic speciation in environmental waters via magnetic solid phase extraction prior to HPLC-ICP-MS determination

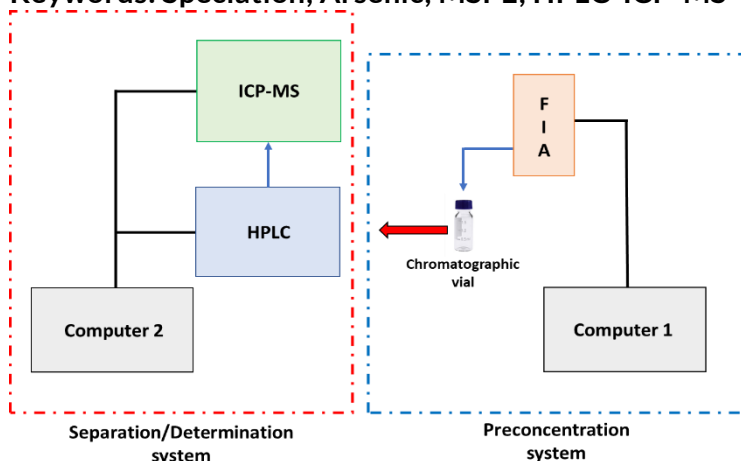
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### Abstract

A new magnetic functionalized material based on graphene oxide magnetic nanoparticles (MGO) was designed and characterized in order to develop a magnetic solid phase extraction method (MSPE) to enrich both inorganic and organic arsenic species in environmental waters. A FIA system is used to preconcentrate the arsenic species simultaneously, while the ultra-trace separation and determination of arsenobetaine (AsBet), cacodylate, As(III) and As(V) species have been achieved by high performance liquid chromatography coupled to inductively coupled plasma mass spectrometry (HPLC-ICP-MS) technique. The sample is introduced in the FIA system where the MSPE takes place, and 1 ml of eluent is collected in a chromatographic vial. After preconcentration, the vial is introduced in the autosampler of HPLC-ICP-MS. Therefore, preconcentration and separation/determination processes are automatic and conducted separately (Figure 1). The strategy of this work was focused on the compatibility between the MSPE eluent and the mobile phase of HPLC column system, resulting in an efficient and reliable semiautomatic preconcentration and detection of inorganic and organic arsenic speciation. To the best of our knowledge, this is the first method combining an online MSPE and HPLC-MS, and one of the first using a magnetic nanomaterial based on MGO for online MSPE. Under the optimized conditions, the preconcentration factors obtained for AsBet, cacodylate, As(III) and As(V) with 12 mL sample solution were 4, 12, 6 and 19, respectively. The LODs for the arsenic species were AsBet 7 ng L<sup>-1</sup>, cacodylate 0.4 ng L<sup>-1</sup>, As(III) 1.0 ng L<sup>-1</sup> and As(V) 0.2 ng L<sup>-1</sup> and RSDs < 5%. The developed method was validated by analyzing tap water, well water and seawater samples, and Certified Reference Materials; fortified lake water TMDA 64.3 and seawater Cass-6 NRC, promising for routine monitoring of arsenic species in environmental water.

**Keywords:** Speciation; Arsenic; MSPE; HPLC-ICP-MS



**Figure 1.** Online MSPE coupled to HPLC-ICP-MS technique.

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