SG.09 – Determination of mercury in sea waters by magnetic dispersive solid phase extraction prior to quantitation by FI-CV-GFAAS

J.C. García-Mesa*, P. Montoro-Leal*, S. Maireles-Rivas, M.M. López Guerrero, E. Vereda Alonso
Dpto. Analytical Chemistry, Faculty of Science, University of Malaga, Spain.
*Email: jcgm95@uma.es

Abstract
Mercury is a non-essential trace element that is toxic to humans due to the bioaccumulation effect. In this work, a shell structured Fe_3O_4@graphene oxide nanospheres were used to develop a magnetic dispersive solid phase extraction (MDSPE) method for the extraction and preconcentration of ultra-trace amounts of Hg(II). After first enrichment, a second online preconcentration by cold vapor generation was conducted, followed by the determination of the analyte by graphite furnace atomic absorption spectrometry (CV-GFAAS). The influences of several analytical parameters were optimized for MDSPE and CV-GFAAS. Under the optimized conditions, %RSD, detection limit and determination limit were 2.9%, 0.25 ng·L^{-1} and 4.9 ng·L^{-1}, respectively. Thanks to the 500 µL loop, a high preconcentration factor can be achieved even with low sample volume. For example, 5 mL of sample would be preconcentrated 10 times. Moreover, this method is suitable for high sample volume, resulting in a preconcentration factor >250. The accuracy of the proposed method was verified using a certified reference material (mussel tissue NIST 2976) and by determining the analyte content in spiked sea waters and tap water samples collected from Málaga and Cádiz (Spain). The determined values were in good agreement with the certified values and the recoveries for the spiked samples were close to 100% in all cases. The results showed the proposed method is simple, rapid, environmentally friendly and sensitive enough for the accurate determination of mercury.

Keywords
Ultra-trace, Mercury, MDSPE, CV-GFAAS

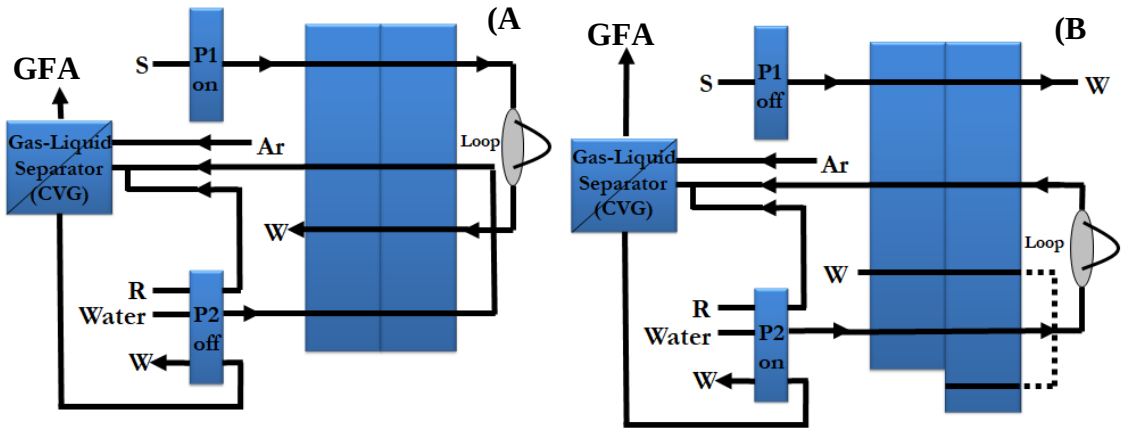

Figure 1. FI system schematic diagram for load step (A) and elution step (B). P1 and P2, peristaltic pumps; W, waste; S, sample; R, reductant.

Acknowledgements
The authors thank "Plan Propio, Universidad de Málaga" for supporting this study and also FEDER funds and Junta de Andalucia (Project UMA18-FEDERJA-060) for financial support of this work.