LAB-IN-SYRINGE PLATFORM.
A NOVEL SAMPLE PREPARATION TOOL FOR
ATOMIC ABSORPTION SPECTROMETRIC ASSAYS

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Although there is a wide technological progress in the field of chemical analysis, several analytical instruments cannot handle directly samples with complex matrices or very low analyte concentration. Thus, a sample preparation technique is usually involved in the analytical method which is the most time consuming and error-prone step. Automated flow approaches have attracted the researchers’ attention due to the fact that all chemical and physical manipulations can be made on-line in a completed controllable and reproducible way prior the final determination. Flow injection analysis (FIA) and its last generations (SIA and SIA-LOV) have given a tremendous impetus towards the automation, miniaturization and portability of the analytical methods.

An interesting automated sample preparation platform, the so-called lab-in-syringe (LIS), was recently reported and proved to be an excellent tool for downscaling fluidic manipulations including in-syringe accommodation of wet chemicals or heterogeneous reactions at will. The LIS concept has been initially used for automatic DLLME methods coupled with spectro-photometric detectors.

Recently, hyphenation of LIS platform with atomic absorption spectrometry has been reported by our group in two different modes. A novel miniaturized gas–liquid separator (GLS) module incorporated on the selection valve of a bidirectional microsyringe pump has been developed for inorganic mercury determination by CVAAS [1]. This integrated and fully automatic system combines the advantages offered by the use of the sealed glass syringe as a reaction vessel and the GLS unit on the top of it for effective sample treatment, release, and transfer of the evolved volatile species toward the detector. In our latest work, the LIS platform was improved and applied for automated headspace single drop microextraction (HS-SDME) for preconcentration assays [2]. The proposed manifold was demonstrated for electrothermal atomic absorption spectrometric (ETAAS) determination of mercury via in-situ vapor generation and sequestration into the microdrop. Both LIS methods are characterized by compactness, simplicity and low reagent consumption following the trends of Green Analytical Chemistry.

KEYWORDS: atomic absorption spectrometry, headspace single drop microextraction, lab-in-syringe, mercury, on-line preconcentration

REFERENCES: