

LAB-ON-VALVE SYSTEM FOR FULLY AUTOMATED OF STABLE AND RADIOACTIVE STRONTIUM DETERMINATION IN SAMPLES OF ENVIRONMENTAL INTEREST



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A novel and miniaturized lab-on-valve system has been developed for strontium determination in environmental samples. Miniaturized lab-on-valve (LOV) system potentially offers facilities to allow any kind of chemical and physical processes, including fluidic and carrier bead control, homogenous reaction and liquid-solid interaction. A rapid, cheap and fully automated method for the separation and pre-concentration of radioactive strontium, using a solid phase resin (Sr-Resin, TRISKEM International, France), has been developed. In order to optimize the method, stable strontium concentrations are determined by ICP-OES. The Sr-90 activities are measured by a low background proportional counter. The method is applying to different samples of environmental interest.

The proposed system reaches the minimization of sample handling, drastic reduction of reagent volume, improving the reproducibility and the sample throughput and attaining a significant decrease of both time and cost per analysis.

MANIFOLD AND SOFTWARE

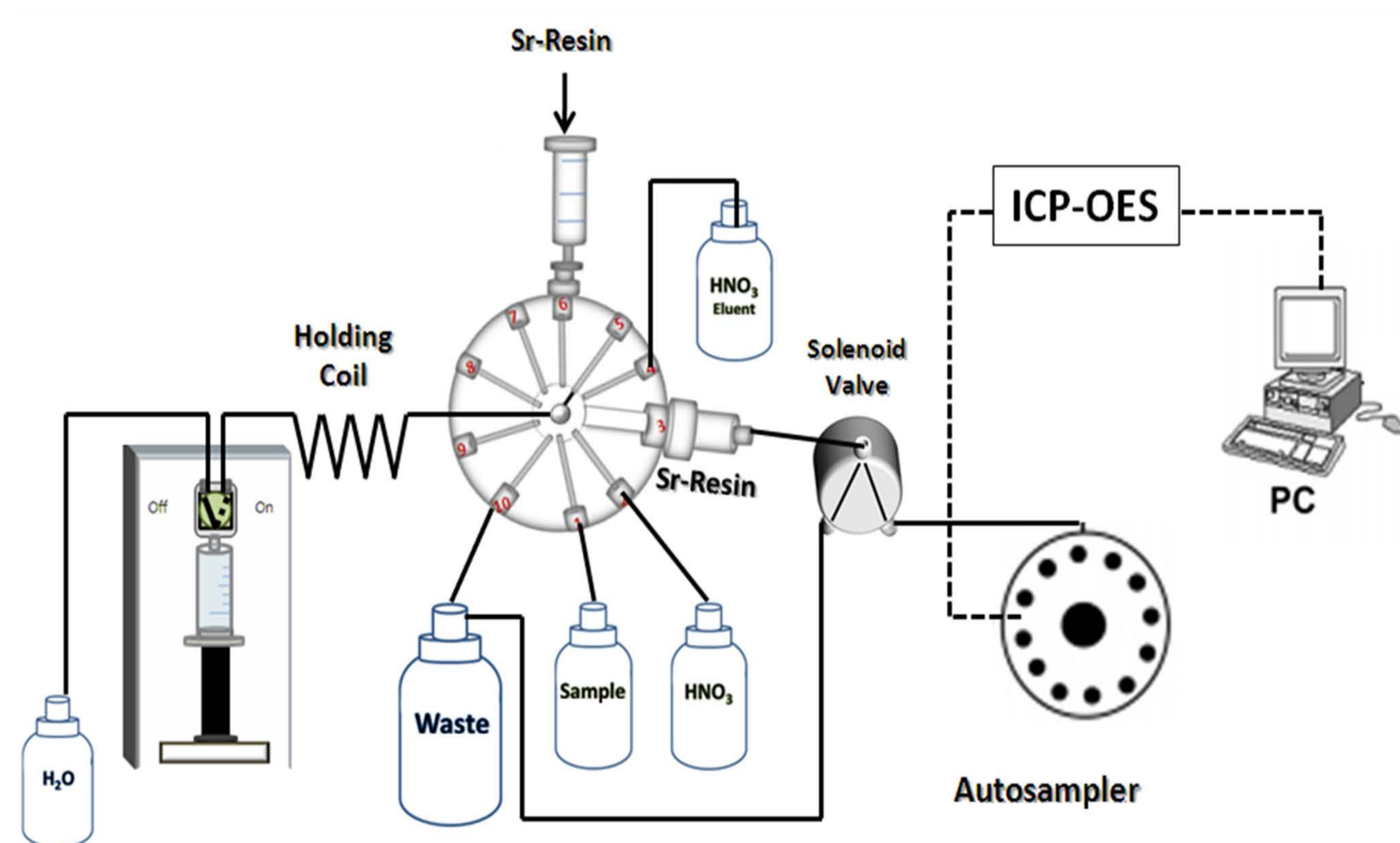


Figure1. LOV system for miniaturized Strontium isolation and pre-concentration prior to determination.

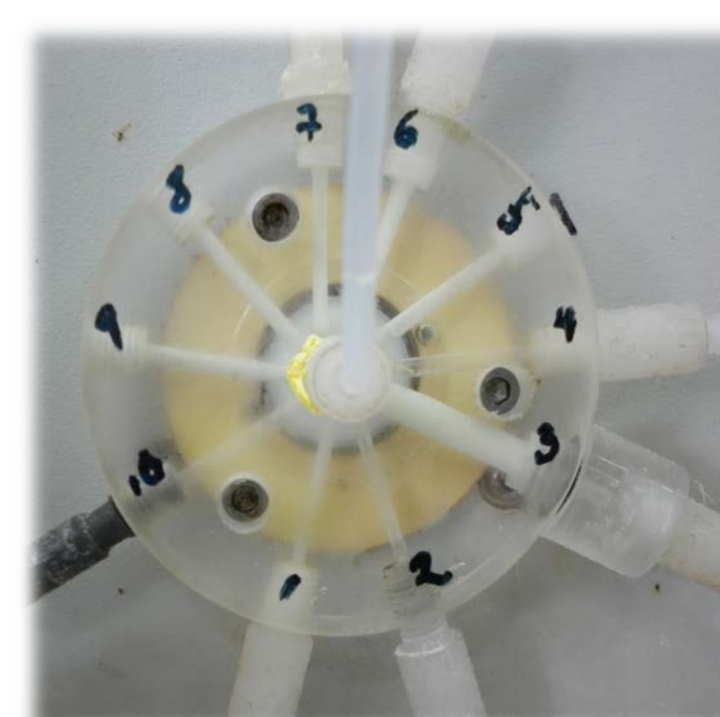
Instrumental control and acquisition of spectrophotometric data were performed using the software package AutoAnalysis 5.0* (Sciware, Palma de Mallorca, Spain). The distinguished feature of the developed software based on dynamic link libraries (DLLs) at 32 bits is the viability to use a single and versatile application without further modification for whatever instrumentation and detection system needed. It involves a basic protocol, which allows the implementation of specific and individual DLLs attending the configuration of the assembled flow analyzer.

*May be requested at: www.sciware-sl.com

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ANALYTICAL FEATURES

Detection limit ($\eta\text{g L}^{-1}$)	1.76
Repeatability (%) (n=10)	1.2
Reproducibility (%) (n=5)	2.6
Resin durability (injections)	30
Pre-concentration volume (mL)	8
Sensitivity ($\text{IU } \eta\text{g}^{-1}$)	3484
Linear working range (ηg)	0-500
Regression coefficient	0.9987
Injection throughput (h^{-1})	3-5



LOV piece mounted atop a ten-port selection valve.



Low Background Proportional Counter.

OPTIMIZED CONDITIONS

HNO_3 (Eluent) Concentration (mol L^{-1})	0.01
HNO_3 (Eluent) Volume (mL)	5.125
Flow Rate (mL min^{-1})	2.0

The optimization was made by experimental design using Minitab® 15

ACKNOWLEDGEMENTS

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