



## Flow injection system using a liquid waveguide capillary cell for the determination of bromate in mineral waters

Inês C. Santos<sup>1\*</sup>, Raquel B.R. Mesquita<sup>1,2</sup>, Ricardo N.M.J Páscoa<sup>1,3</sup>, Ildikó V. Tóth<sup>3</sup>, António O.S.S. Rangel<sup>1</sup>

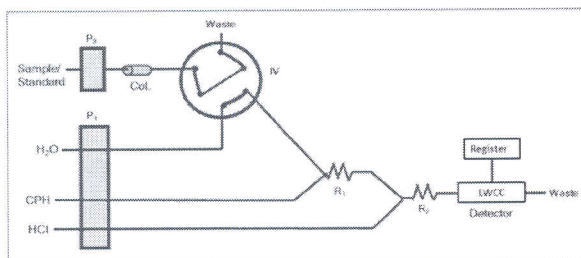
<sup>1</sup> CBQF/Escola Superior de Biotecnologia, Universidade Católica Portuguesa, Porto, Portugal

<sup>2</sup> Laboratory of Hydrobiology, Institute of Biomedical Sciences Abel Salazar (ICBAS) and Institute of Marine Research (CIIMAR), Universidade do Porto, Portugal

<sup>3</sup> REQUIMTE, Departamento de Química, Faculdade de Farmácia, Universidade do Porto, Portugal

\*e-mail: icsantos@porto.ucp.pt

Bromate ( $\text{BrO}_3^-$ ) is considered a disinfection by-product, being formed in bromide containing waters when they are subjected to an ozonation treatment. In drinking waters, a limit of  $10 \mu\text{g/L}$  has been established by US EPA and WHO since bromate is a possible human carcinogen. Ion chromatography and mass spectrometry have been used as a reference method for bromate determination. In this context, there is a need for alternative methods presenting lower acquisition and operational costs with equivalent quantification limits and enabling real time analysis. In this work, aiming to develop a simple, inexpensive method for the determination of low bromate levels in waters, a liquid waveguide capillary cell (LWCC) was coupled to a FIA system. The high optical path of the LWCC, 100 cm, improved the sensitivity and the limit of detection when compared to a 1cm optical path cell. The spectrophotometric determination was based on oxidation of chlorpromazine by bromate in acidic medium resulting in the formation of a colored radical product [1, 2]. Sulfamic acid was added to the reagent for minimizing the interference of nitrite and a cationic Chelex resin was used to remove major cationic interferences, namely  $\text{Fe}^{3+}$ . The developed system allowed the determination of bromate within the range between  $1 - 20 \mu\text{g/L}$  with a detection limit of  $0.2 \mu\text{g/L}$ .



**Figure:** FIA manifold; P<sub>1</sub>, peristaltic pumps; IV, injection valve; R<sub>1</sub>, 50 cm reaction coil; R<sub>2</sub>, 200 cm reaction coil; Col., column with Chelex resin; CPH, chlorpromazine and sulfamic acid.

### References

- [1] S.M. Oliveira, H.M. Oliveira, M.A. Segundo, A.O.S.S. Rangel, J.L.F.C. Lima, V. Cerdà, *Anal. Meth.*, 4 (2012) 1229-1236.
- [2] S.M. Oliveira, M.A. Segundo, A.O.S.S. Rangel, J.L.F.C. Lima, V. Cerdà, *Anal. Lett.*, 44 (2011) 284-297.

### Acknowledgements

I. C. Santos and R. B. R. Mesquita thank to Fundação para a Ciência e a Tecnologia (FCT, Portugal) and Fundo Social Europeu (FSE) the grants SFRH/BD/76012/2011 and SFRH/BPD/41859/2007, respectively. I. V. Tóth thanks FSE and Ministério da Ciência, Tecnologia e Ensino Superior for the financial support through the POPH-QREN program. This work was also supported by National Funds from FCT through projects PTDC/AAC-AMB/104882/2008, PEst-C/EQB/LA0006/2011 and PEst-C/EQB/LA0016/2011.