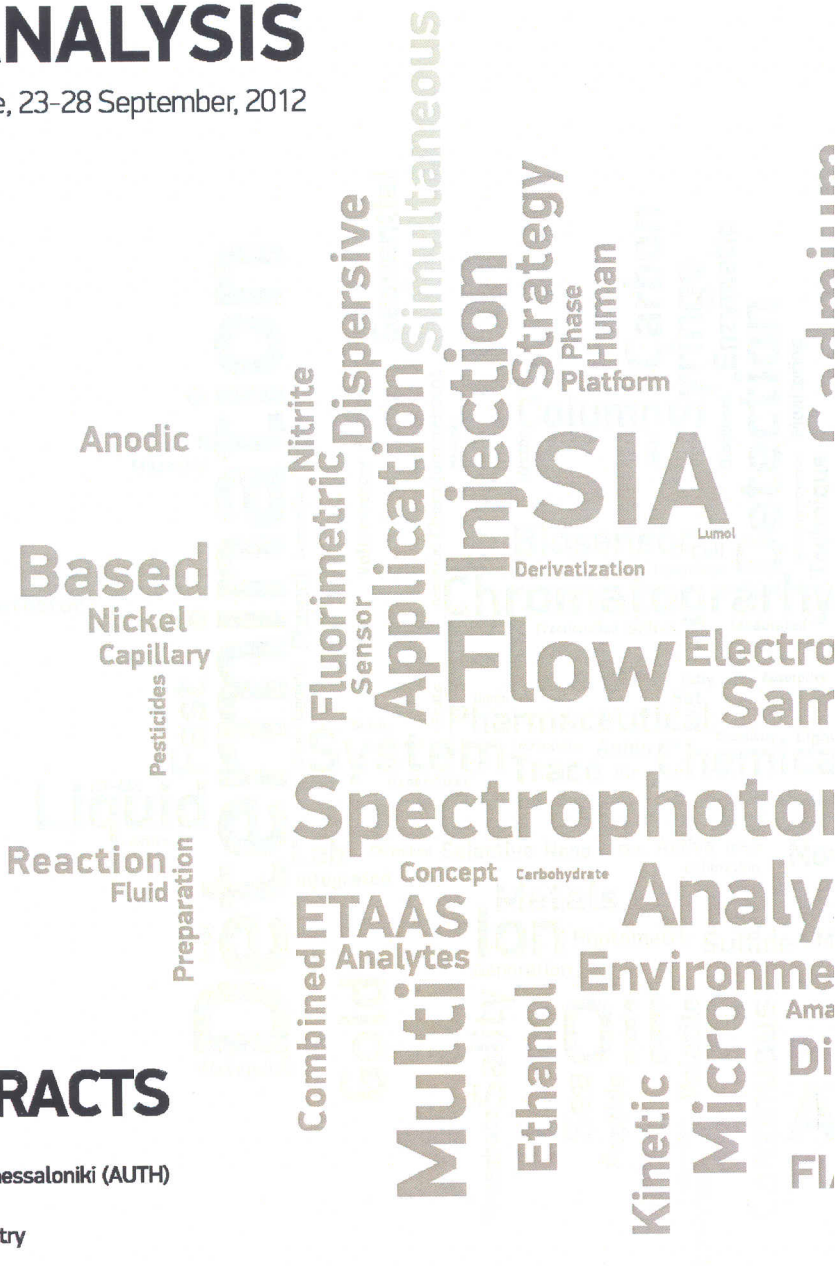
Flow Analysis XII

12 INTERNATIONAL CONFERENCE ON FLOW ANALYSIS

Thessaloniki, Greece, 23-28 September, 2012



BOOK OF ABSTRACTS

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Multi-parametric sequential injection system for carbon speciation in bathing waters

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Water is a vital resource essential to all organisms and any changes in its composition may be due to pollution or contamination. In this context, the continuous monitoring of key parameters such as nutrients, metals and organic compounds is of great importance. Carbon, present in water in different forms (inorganic and organic), can be used as an indicator of water pollution/contamination. Alkalinity is an important water quality routine parameter providing information on the buffering capacity which can be altered by the dissolution of atmospheric acidic species. Dissolved inorganic carbon (DIC) and dissolved carbon dioxide levels in natural waters are indicators of air pollution due to dissolution of atmospheric CO_2 which has been increasing recently. Dissolved organic carbon (DOC) can also be used as an indicator of water pollution since it may result from anthropogenic activities.

Aiming for the carbon speciation in dynamic water systems, namely bathing waters, the development of reliable, fast and automatic flow methods represent an effective alternative to expensive and laborious conventional techniques. Among the different flow techniques, sequential injection analysis (SIA) was chosen due to some main advantages, such as robustness and versatility. The use of SIA not only allows real time analysis with reduced volumes of reagents and waste as it also enables multi-parametric determinations necessary for the monitoring of different parameters and/or speciation.

In this work, carbon speciation was aimed by the multi-parametric determination of different forms of carbon (alkalinity, DIC, CO_2). A single SIA manifold was used to accommodate the different determinations. The determination of alkalinity was based on the reaction with acetic acid and corresponding color change of bromcresol green (λ = 620 nm) according to previous work by Mesquita and Rangel (2004) [1]. The DIC and CO_2 determination was based in the color change of bromothymol blue (BTB) indicator (λ = 660 nm) after the diffusion of the gaseous CO_2 through a hydrophobic membrane in a gas diffusion unit (GDU). For the DIC determination, an in-line acidification prior to the GDU was needed. A multi-reflective flow cell combined with a LED was used as detection system enabling the minimization of the schlieren effect.

The follow-up of this work will be the determination of DOC with in-line UV photo-oxidation of the sample, converting all carbon forms to CO_2.

References

[1] R.B.R. Mesquita, A.O.S.S. Rangel, Analytical Sciences, 20 (2004) 1205-1210.

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. This work was also supported by National Funds from FCT through projects PTDC/AAC-AMB/104882/2008 and PEst-C/EQB/LA0016/2011.