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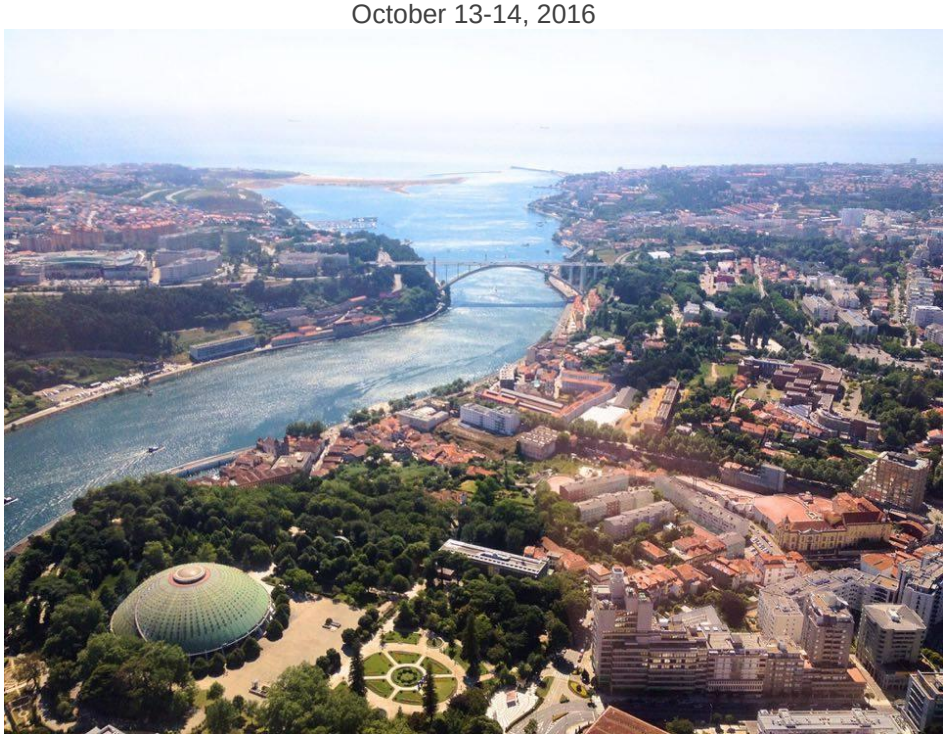

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BOOK OF ABSTRACTS

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Determination of diazepam by flow-injection with amperometric detection in beverages

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Diazepam belongs to the group of benzodiazepine drugs, and its consumption with alcohol enhances its sedative effect and absorption rate. That is why it is often used as “date rape drug” [1]. In our experiments we applied the flow injection system on diazepam determination on a bare glassy carbon electrode. The electrochemical determination of diazepam is based on reduction of the azomethine group yielding a dyhidrodiazepam. The single cathodic peak is caused by the reduction of diazepam by a two electron change. The reduction potential is highly dependent on pH value of the electrolyte, shifting to more negative potentials with higher pH [2].

In our work we applied simple FIA setup on a determination of diazepam in different beverage samples. The setup consists of a injection valve equipped with 50 µl sample coil, a mixing coil (30 cm x 0.5mm) and amperometric thin layer flow cell from BASi. The three electrode detection system consisted of a glassy carbon electrode (BASi) with dual-series cross-flow electrode configuration, reference Ag/AgCl electrode (in 3M NaCl) and the auxiliary electrode made of stainless steel. The potential of the working electrode was -0.8V (*vs*. Ag/AgCl), since the reduction of the diazepam was hindered by oxygen reduction at that potential, all solutions had to be held under nitrogen atmosphere during all the experiments (the purging of the solutions prior the analysis was useless). The carrier was HCl/KCl buffer pH 1 with 10% methanol, and the same solution was used for preparation of the diazepam sample. The applied FIA setup showed good linearity, 10-1000 µM of diazepam, with the slope of 0.0083 µA/µM and the intercept 0.4489 µA with the correlation coefficient of 0,99981 (r^2). The interference studies showed that there were no significant hindrance by lactose, ascorbic acid, citric acid cellulose and talc when they are present in ten times higher concentrations.

This system was applied on diazepam determination on the following beverages: two non-alcoholic (energetic and carbonated) and a beer sample. The samples were prepared and spiked with 50, 100 and 150 µM of diazepam, ultrasonicated for 30 minutes after the buffer was added, and then injected. The results showed that diazepam could be quantified with external calibration in a beer and carbonated beverage sample, whereas for the energetic beverage an internal calibration should be performed.

References

[1] K.C:Honeychurch, A.Crew, H.Northall, S.Radbourne, O.Davies, S.Newman, J.P.Hart, Talanta 116 (2013) 300-307.
[2] N.Nagappa, T.Mimani, B.Shishadri, S.M.G. Mayanna, Chem.Pharm.Bull. 46 (1998) 715-717.