ANALÍTICA2024

11TH MEETING OF THE ANALYTICAL CHEMISTRY DIVISION

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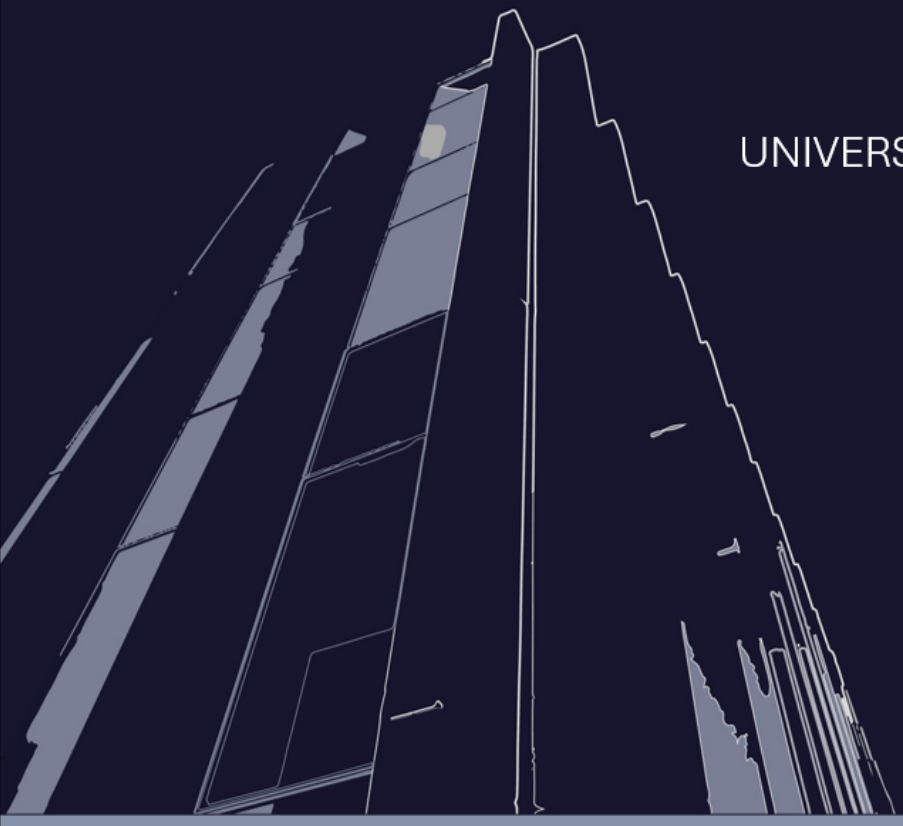

25TH AND 26TH OF MARCH 2024

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DEVELOPMENT OF A MICROFLUIDIC PAPER-BASED SENSOR FOR ALUMINIUM ASSESSMENT IN WATER FOR DOMESTIC CONSUMPTION

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Aluminium is one of the most abundant metal ions in soil and its leaching into groundwater is an expected consequence. Monitoring the presence of Al^{3+} in water sources used for domestic consumption water is crucial, considering its relationship with some neurogenetic disorders, namely Alzheimer's and Parkinson's diseases, autism, and multiple sclerosis. In this work, the design and development of a novel microfluidic paper-based analytical device (μPAD) specifically designed for the determination of aluminium in water sources for domestic consumption is presented (Figure 1). The proposed μPAD methodology is based on the colorimetric reaction between Al^{3+} and Chrome Azurol S (CAS), resulting in the formation of a blue complex. Several physical and chemical parameters affecting the formation of the colour complex were studied to attain the best performance of the paper sensor. These parameters included the μPAD filter paper layers, in terms of number, type and porosity, reagent and buffer concentration, and sample volume. The developed paper device should enable aluminium quantification within in the analytical range of 50 – 1000 μg/L.

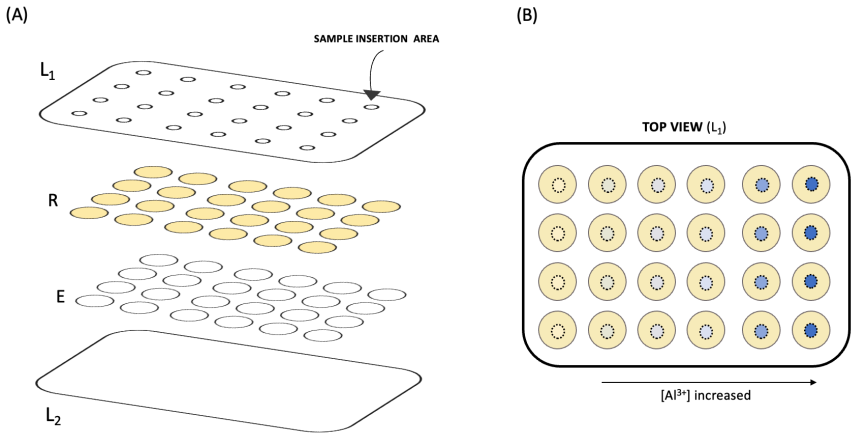

Figure 1: Schematic representation of the μPAD assembly: (A) paper discs alignment and the respective layers of the μPAD; L1 and L2, laminating pouches sheets; R, reagent layer; E, empty layer; (B) schematic representation of the μPAD detection zone (top view) after loading the aluminium standard solutions.

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