

# USE OF A RHODAMINE-BASED CHELATOR IN A MICROFLUIDIC PAPER-BASED ANALYTICAL DEVICE FOR THE *IN-SITU* COPPER QUANTIFICATION IN NATURAL WATERS

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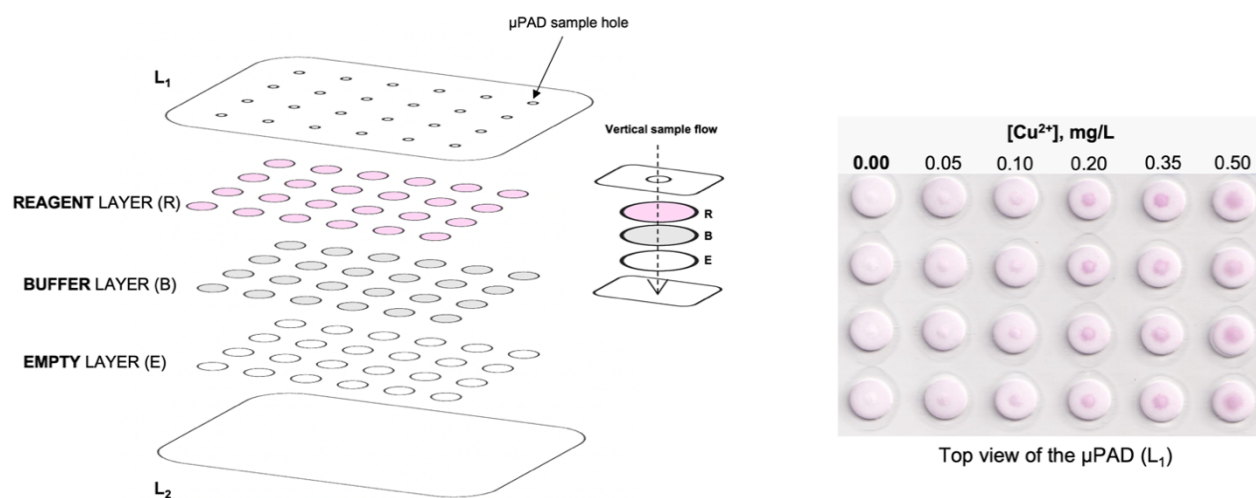
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## ABSTRACT

In this work, a microfluidic paper-based analytical device ( $\mu$ PAD) for copper(II) determination in natural water is described. The determination was based on the reaction between a rhodamine-based chelator with copper(II) forming a pink complex. It was the first application of this ligand as a colour reagent in a microfluidic paper-based analytical device, so the studied conditions for the best performance included detailed reagent concentration and dissolution studies. In these studies, several physical and chemical parameters were also assessed to attain the highest sensitivity on the copper determination: the  $\mu$ PAD number of layers, type and porosity of filter paper used and sample volume. The developed device enabled copper(II) determination in the range of 50.0 to 500  $\mu$ g/L with a detection limit of 10.0  $\mu$ g/L. The accuracy of the proposed method was assessed analysing water samples and comparing the results obtained with the  $\mu$ PAD and the results obtained with inductively coupled plasma (relative deviation < 10%). Additionally, recovery studies were also performed using different types of water samples, tap, well, river, and seawater, and an average recovery percentage of 102 $\pm$ % was obtained indicating no matrix interferences. The successful application of the described  $\mu$ PAD to different natural water sources with no need for any sample pre-treatment provides a fast, low-cost, real-time, and *in-situ* analysis, complying with World Health Organization guidelines.

**Keywords:** Microfluidic paper device, Copper(II) determination, Natural waters, *In-situ* analysis.



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