Simple and rapid thread-based analytical device for monitoring chloride in environmental and food samples

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Abstract: A novel microfluidic thread-based analytical device (µTAD), fabricated from untreated cotton thread, provides an easy-to-use platform for the rapid measurement of chloride concentrations in environmental and food samples. Threads were fixed to a supporting polypropylene sheet to allow capillary wicking of liquid samples, free from contact with outside surfaces. In this method, interaction between deposited reagents and analytes within samples produces colored zones of differing lengths on the threads within only a few minutes based on argentometric titration. µTAD was prepared by first coating threads with AgNO\textsubscript{3} and K\textsubscript{2}CrO\textsubscript{4}, respectively. The reaction between chloride ions (3 µL) and their indicator produced regions of white color on threads. The length of the white colored zones analyzed by unaided human eyes using the printed scales correlates with the concentrations of the chloride in the samples demonstrated working concentration range of 75-600 mg L\textsuperscript{-1}. Chloride in waters, fish sauce and food seasoning investigated using developed µTAD were agreed well with those obtained by classical titration.

Keywords: Chloride; Argentometric titration; Microfluidic thread-based analytical device (µTAD)