DETERMINATION OF CALCIUM IONS IN SALIVA SAMPLES WITH AN EQUIPMENT FREE PAPER BASED COLORIMETRIC METHOD

Tarara Maria, Tzanavaras Paraskevas, Tsogas George

Laboratory of Analytical Chemistry, School of Chemistry, Faculty of Sciences, Aristotle University of Thessaloniki, GR-54124 Thessaloniki, Greece

A novel, rapid, and facile method for the colorimetric determination of calcium using microanalytical paper-based devices (μ-PADs) was developed. The proposed analytical method utilizes the color differences developing, after the addition of calcium, on the surface of the devices because of the complexation reaction of calcium with Methylthymol Blue (MTB) at room temperature, in alkaline pH. The devices were manufactured with chromatographic paper, using wax barriers, and the analytical protocol was easily implemented without the need of any experimental apparatus except for a simple imaging device. The user must regulate the pH, add the solutions on the paper, and measure the color intensity of the formed Ca (II)–MTB complex with a flatbed scanner. The experimental conditions for optimum color development, the possible interfering substances, and the reliability of the paper devices in different preserving conditions were optimized, with satisfactory results. The method exhibited acceptable detection limits (2.9 mg L^{-1}) with sufficiently good precision, which varied from 4.2% (intra-day) to 6.4% (inter-day). Saliva samples from healthy volunteers were successfully analyzed, and the calcium levels were calculated in the range of 30.71 to 84.15 mg L^{-1}.