

Microfluidic paper-based devices (μ PADs) for determination of ascorbic acid in tropical fruits in Thailand

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Simple and rapid microfluidic paper-based devices (μ PADs) for ascorbic acid determination in fifteen tropical fruits in Thailand were developed. The ascorbic acid was detected by using a colorimetric reaction. The detection was based on reduction reaction of iron (III) to iron (II) ion by the ascorbic acid. Then, the blue product was performed from reaction of iron (II) ion and potassium hexacyanoferrate(III). The Prussian blue intensity was monitored by co-operation of a smart phone and free mobile phone application. Optimizations including reagent volume and concentration, analysis time and μ PADs model were studied. The developed method presents good linearity and correlation coefficient ($r^2 = 0.9984$). The limit of detection (LOD) and quantitation (LOQ) were 0.016 mM and 0.053 mM, respectively. The content of standard ascorbic acid solutions obtained from the developed- μ PADs detection was compared to that obtained from a standard spectrophotometric and titration methods. The results obtained from the developed device agree well with both standard methods at 95% confident level. The developed μ PADs can be alternative method for determination of ascorbic acid because of cost effective and portable performances. Moreover, it could be identified as green chemical analysis due to less sample, reagent and time consumptions.

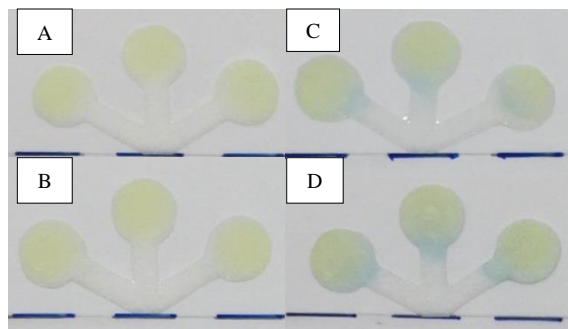


Figure 1. Example of microfluidic paper-based devices (μ PADs) with various concentrations of standard ascorbic acid; (A): blank, (B): 0.01 mM, (C): 0.05 mM, and (D): 0.1 mM

Keywords: Microfluidic paper-based devices; Ascorbic acid; Colorimetric method; Smart phone; Mobile application