INVESTIGATION OF HORIZONTAL AND VERTICAL LIQUID FLOW INTERACTION AT VARIOUS VISCOSITY OF SUCROSE SOLUTION ON PAPER-BASED MICROFLUIDIC ANALYTICAL DEVICES

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ABSTRACT

Nowadays the use of paper-based microfluidic analytical devices (µPADs) which is fabricated by patterning paper into the hydrophilic and hydrophobic channel are developing in diagnostics field especially in resource-limited countries due to its low-cost, simplicity and user-friendly properties. However, these devices are less sensitive with slow reaction time. According to the World Health Organization (WHO), the diagnostics devices must be ASSURED which are affordable, sensitive, specific, user-friendly, rapid and robust, equipment-free and deliverable to end-users. In this research, the parameters that affect the flow of liquid in the channel are investigated and discussed. Wax channel is drawn on the paper by applying the handcrafted technique and heated on the hotplate within 3 minutes for the diffusion of wax into the paper. Different viscosities of sucrose solution ranging up to 70% of solutes are tested on two different platforms of the channel which are a horizontal and vertical platform on three types of paper that are filter paper type 1; chromatography paper type 1 and blue litmus paper. For the study of the horizontal flow of liquid in the channel, the sucrose solution is pipetted into the channel while for the vertical flow procedure, the tip of the wax channel is dipped into the solution. From the investigation, when the viscosity of sucrose solution increased, the time taken for the flow of liquid in the channel becomes longer. The ability of a liquid to flow in a horizontal platform is 48 percents faster than in vertical platform. Therefore, these results could emphasise upon the reaction time of µPAD.

Keywords: Paper-based microfluidic analytical devices (µPADs), horizontal flow, vertical flow, viscosity

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