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Fast blood plasma separation device for point-of-care applications

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Abstract

In this work, a simple device for extremely fast separation of blood plasma from diluted whole blood was developed. The device accommodates an asymmetric polysulfone membrane/supporting membrane sandwich that allows collection of 10 µL blood plasma into a narrow glass capillary in less than 10 seconds. The composition of diluent solution was optimized in order to achieve maximum recoveries for selected metabolites of alcohol intoxication. 5% solution of [tris(hydroxymethyl)methylamino] propanesulfonic acid provided recoveries of formate, oxalate and glycolate close to 100% and only moderate erythrocyte lysis. Both charged and uncharged compounds from the whole blood samples can be analyzed in the separated blood plasma by capillary electrophoresis with contactless conductometric detection and spectrophotometry, respectively. The developed device might find wide application in on-site testing and point-of-care analysis, when only microliter volumes of whole blood are available.

Keywords: blood plasma separation, point of care analysis, capillary electrophoresis, alcohol intoxication, metabolites, methanol.