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WATER-SOLUBLE VITAMINS ANALYSIS BY CAPILLARY ELECTROPHORESIS COUPLED WITH DIGITAL MICROFLUIDIC SAMPLER (CE-DMFS)

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An innovative sample introduction/analysis approach was developed by combining a digital microfluidic (DMF) device with a portable capillary electrophoresis (CE) analyzer based on short separation capillary and contactless conductivity detection¹.

In presented study open electrowetting on dielectric system with catenae² was used to actuate the sample and buffer droplets. For the fabrication of the DMF platform, we adapted the procedure described by Abdelgawad and Wheeler³.

The experiments procedure was described in ¹.

For reproducibility experiments two water-soluble vitamins were used namely: 40 $\mu\text{mol/L}$ thiamine and 80 $\mu\text{mol/L}$ pyridoxine. When evaluated in replicate trials, the sampler was characterized by good average retention time reproducibility (3% of RSD; 1% RST for relative migration time) and peak area variation (8% RSD).

Calibration lines were constructed using 7 concentration values for thiamine and pyridoxine with at least 5 parallels for each value. Thiamine and pyridoxine had correlation coefficients $CC = 0.995$ and $CC = 0.992$ correspondingly (over concentration ranges from 2–40 $\mu\text{mol/L}$ and 4–80 $\mu\text{mol/L}$). The limit of detection for analytes was 0.6 $\mu\text{mol/L}$ for thiamine and 1.7 $\mu\text{mol/L}$ for pyridoxine.

References

1. J. Gorbatsova, M. Jaanus, M. Kaljurand, *Anal. Chem.* **81**, (2009) 8590–8595.
2. J. Berthier, H.-C. Chang, *Microdroplets and Digital Microfluidics*, William Andrew Publishing, USA, NY, (2008) 226.
3. M. Abdelgawad, A. R. Wheeler, *Microfluid Nanofluid* **4**, (2008) 349–355.

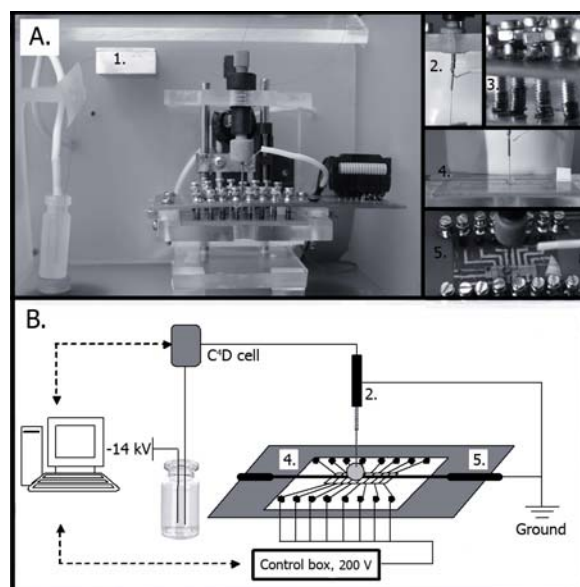


Fig.1. Interfacing DMF sampler into the portable CE analyzer. (A.) Portable CE analyser with DMF sampler. (B.) Instrumentation scheme, (1.) – capacitively coupled contactless conductivity detector (C4D), (2.) - grounded piece of syringe needle with inlet end of separation capillary, (3.) - spring-loaded contact pins, (4.) - ground electrode during droplet actuation and (5.) - rectangular opening for exposing electrode array.electrode.