An effective microfluidic device for the extraction of fluoroquinolones using liquid phase microextraction and its analysis by HPLC

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Abstract

This experimental work reports the first microfluidic-chip based system for liquid-phase microextraction (LPME-chip) for the determination of fluoroquinolones in water samples. In 2011, a HPLC DAD–FLD method combined with prior traditional hollow fiber-liquid phase microextraction was developed for the sensitive determination of eight widely used fluoroquinolones. However, high sample volumes and longer extraction times were needed. In the recent years, miniaturization of analytical procedures has been a tendency with the aim of reducing costs, extraction times and improving extraction efficiencies. We present a poly (methyl methacrylate) microfluidic chip based on a double-flow working mode for the extraction of six fluoroquinolones in water samples. 1-octanol was used as support liquid membrane. Extraction parameters were fixed at pH 3 (donor phase), pH 12 (acceptor phase) and 1 µL/min for both acceptor and sample flow rate; resulting in extraction efficiencies over 40%. This technique offer faster extractions in only 5 minutes and minimum sample volume (less than 10 µL).

Image

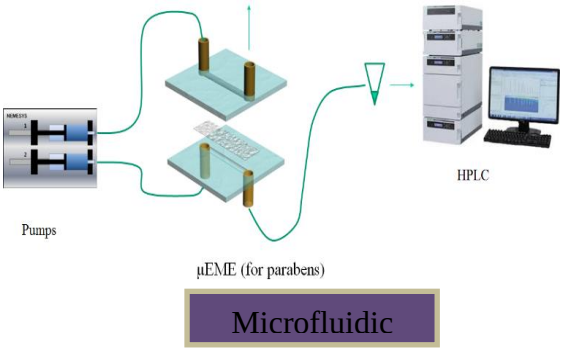
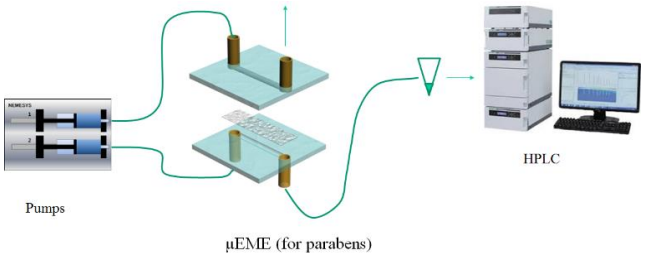


Figure 1: Schematic of microfluidic device. The extract collected is analyzed by HPLC.



Recent Publications

1. Maria Ramos Payan, Santiago Maspoch, Andreu Llobera (2016) An effective microfluidic based liquid-phase microextraction device (µLPME) for extraction of non-steroidal anti-inflammatory drugs from biological and environmental samples. Anal Chim Acta doi: 10.1016/j.aca.2016.09.040.
2. Maria Ramos Payan, Santiago Maspoch, Andreu Llobera (2017) A simple and fast double-flow microfluidic device based liquid-phase microextraction (DF-µLPME) for the determination of parabens in water samples. Talanta 165: 496-501.
3. Maria Ramos Payan, Henrik Jensen, Nicolaj Petersen, Steen Honoree, Sig Pedersen Bjeergard (2017) Liquid-phase microextraction in a microfluidic-chip – high enrichment and sample clean-up from small volumes of biological fluids. Analytica Chimica Acta 735: 46-53.



Biography

Maria Ramos Payan has expertise in improving sample preparation techniques focused on microfluidic-chip devices as miniaturization. The novelty of her microfluidic devices offer more advantages than the existing methodologies. The devices work either using biological and environmental samples and can be coupled on-line to HPLC or Mass Spectrometry. She has also demonstrated the applicability of microchip devices for diagnostic diseases as diabetes. She has worked at different institutions (University of Seville, University of Huelva, University of Lund, University of Copenhagen and University of North Carolina, USA). Currently, she works at Microelectronic National Center of Barcelona and Universitat Autonoma of Barcelona with the aim of implementing optical detection into microfluidic devices for multiple applications.

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Notes/Comments: