Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supplementary Information

A new microfluidic-chip device for selective and simultaneous extraction of drugs with various properties

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LEGENDS

Experimental Section

Chip preparation for simultaneous EME: The designed EME chip consisted of three PMMA plates as the substrate due to their low cost and ease of fabrication by conventional micromilling methods. Each plate of the chip had a microfluidic channel with an "M" shaped pattern, and the plates were used in a sandwiched format. For this reason, the upper and lower plates were used as compartments for the stagnant acceptor phases, while the middle plate provided a flow pass for the sample solution and the two surface contacts for different SLMs. All channels were 5.0 cm long, 1.0 mm wide, 400 μm and 1.0 mm deep for the corresponding channels for the acceptor phases and the donor phase flow pass, respectively. To provide inlets, outlets, and a hole for the electrodes entrance, three individual holes were drilled in the upper and lower plates. Additionally, four holes were drilled in the middle plate for providing the sample solution inlet and outlet and mounting the third stainless steel electrode.

Calculation of preconcentration factor, extraction recovery, and relative recovery:

The preconcentration factor (*PF*) was considered as the ratio of the final analyte concentration in the acceptor phase ($C_{f,a}$) and the initial concentration of the analyte ($C_{i,s}$) in the sample solution:

$$PF = \frac{C_{f,a}}{C_{i,s}} \quad (1)$$

Extraction recovery (ER%) is equal to the percentage of the mole numbers of the analyte extracted into the acceptor phase ($n_{f,a}$) to that initially presented in the sample solution ($n_{i,s}$).

$$ER\% = \frac{n_{f,a}}{n_{i,s}} \times 100 = \frac{C_{f,a} \times V_{f,a}}{C_{i,s} \times V_{i,s}} \times 100 \quad (2)$$

$$ER\% = \left(\frac{V_{f,a}}{V_{i,s}}\right) \times PF \times 100 \quad (3)$$

In the above equations, $V_{f,a}$ and $V_{i,s}$ represent the volumes of the acceptor phase and the sample solution, respectively. Relative recovery (*RR*) was determined from the following equation:

$$RR\% = \frac{C_{found} - C_{real}}{C_{added}} \times 100 \quad (4)$$

$$Error\% = RR - 100 \quad (5)$$

Where C_{found}, C_{real}, and C_{added} show the concentration of the analyte after adding a known amount of the standard into the real sample, the concentration of analyte in the real sample, and the concentration of the spiked standard solution into the real sample, respectively.