

Eco-friendly magnetic Solid-Phase extraction and deep eutectic solvent for the separation and detection of parabens from the environmental water and urine samples

ABSTRACT

This work reports an eco-friendly, cheap, and sensitive magnetic solid-phase extraction (MSPE) and deep eutectic solvent (DES) for the isolation and detection of parabens from water and urine. The parabens were determined by liquid chromatography equipped with an ultraviolet detector (HPLC-UV). The magnetic-activated carbon (MAC) was synthesized from coffee waste was used as an adsorbent. DL-menthol and acetic acid-based deep eutectic solvent (DES) were synthesized and applied as a less toxic solvent in the paraben's desorption. The ideal conditions which increase the efficiencies are 10 mg of adsorbent amount, adsorption time 8 min, DL-menthol and acetic acid-based DES used as eluent, eluent volume 200 μL , desorption time 3 min. The parabens exhibited superior linearity between the 0.3 ~ 1000 ng mL⁻¹. The regression coefficient (R²) values among 0.9962 ~ 0.9990. The developed MSPE-DES- HPLC-UV exhibited excellent sensitivity. The detection limit (LOD) ranged from 0.1 ~ 0.3 ng mL⁻¹ and the quantification limit (LOQ) between 0.3 ~ 0.5 ng mL⁻¹. The precision of the method expressed as RSDs was over the range of 3.49 ~ 9.15%, correspondingly. This technique was employed for the analysis of the real sample (swimming pool, river, and urine samples). The attained recoveries are 82.60 ~ 114.40% with RSD \leq 9.67% for water samples, 81.80 ~ 118.20% with RSD \leq 9.28% for urine samples. All the method validation results are in the acceptable range. This method claims its practical solicitation in the analytical sector in the near future.