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Ultrasound-assisted dispersive micro-solid-phase extraction based on N-doped mesoporous carbon and high-performance liquid chromatographic determination of 1-hydroxypyrene in urine samples

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Abstract

In this research, a new ultrasound-assisted dispersive micro-solid-phase extraction method based on N-doped mesoporous carbon sorbent followed by high-performance liquid chromatography equipped with diode array detector for trace measurement of 1-hydroxypyrene as a metabolite of exposure to polycyclic aromatic hydrocarbons was optimized. Herein, the hard template method was used for the preparation of N-doped mesoporous carbon sorbent. The prepared sorbent was characterized using the Brunauer–Emmett–Teller method, transmission electron microscopy, and elemental analysis. Parameters affecting the extraction of the target metabolite were investigated using the Box–Behnken design method. Considering optimum parameters, the plotted calibration curve for 1-hydroxypyrene was linearly correlated with the concentration span of 0.1–50 $\mu\text{g/L}$ for urine media. The accuracy of the optimized procedure was examined through the relative recovery tests on the fortified urine specimens. The relative recoveries fell between 95 and 101%. The method detection limit of the proposed procedure was also calculated to be 0.03 $\mu\text{g/L}$.

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