

Ultrasound-assisted surfactant enhanced emulsification microextraction method coupled with gas chromatography-mass spectrometry for the determination of selected polycyclic aromatic hydrocarbons in aqueous samples

ABSTRACT

A simple and rapid microextraction method termed as ultrasound-assisted surfactant enhanced emulsification microextraction (UASEME) was developed for the determination of fluoranthene (FLU) and phenanthrene (PHE) in aqueous samples followed by gas chromatography-mass spectrometry (GC-MS). Six important parameters, that affect the extraction efficiency of polycyclic aromatic hydrocarbons (PAHs) were evaluated and the results were as follows; extraction solvent (toluene), volume of extraction solvent (30 μL), surfactant (Tween 20), volume of surfactant (15 μL), extraction time (2 minutes) and with no salt addition. Under the optimum conditions, the method showed good linearity over the concentration range from 1 – 1000 $\mu\text{g L}^{-1}$ with correlation coefficients ($R^2 \geq 0.9932$), acceptable limits of detection (0.3 $\mu\text{g L}^{-1}$) and limits of quantification (1.0 $\mu\text{g L}^{-1}$) for both analytes. Good relative recovery values, in the range of 91.75 – 104.1%, were obtained for tap water samples. The relative standard deviations (RSDs) were 1.62 – 10.32% ($n = 3$). The proposed method was applied for the determination of FLU and PHE in tap water and sugarcane juices.

Keyword: Ultrasound-assisted; Surfactant; Emulsification; Polycyclic aromatic hydrocarbons; Gas chromatography-mass spectrometry