

Stir Bar Sorptive Extraction in Combination with Large Volume Injection-Gas Chromatography-Mass Spectrometry (SBSE-LVI-GC-MS) for Monitoring Ultra-Traces of Phthalates in Drinking Water Samples

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A stir bar sorptive extraction method in combination with capillary gas chromatography–mass spectrometry using the selected-ion monitoring mode acquisition (SBSE-GC-MS(SIM)), has been developed for the determination of seven phthalate esters (dimethyl phthalate, diethyl phthalate, di-*n*-butyl phthalate, butyl benzyl phthalate, di-2-ethyl hexyl phthalate, di-*n*-octyl phthalate and bis(2-ethyl hexyl) adipate), which are included in the priority lists by several national and international regulatory organizations [1,2].

The discussion of important parameters that could affect the SBSE process is presented as well as the extraction kinetics, according to previous studies [3]. The optimized method showed linear response ($r^2 > 0.99$) and good precision ($< 14.8\%$) for all targets studied. The detection limits of the actual method showed values within 0.003 and 0.040 $\mu\text{g/L}$, which are in the same range of other reports [4]. The contamination profile was also studied and levels of particular phthalates were achieved in blanks of real matrices, ranging from 0.01 $\mu\text{g/L}$ (di-*n*-octyl phthalate) to 0.52 $\mu\text{g/L}$ (di-*n*-butyl phthalate), which are lower than the recommended concentration for phthalates in water established by US EPA [2]. To overcome the contamination level, the standard addition approach was implemented to evaluate the performance of the SBSE-GC/MS method in drinking water matrices, including tap and mineral water samples. Di-*n*-butyl phthalate was the major contaminant found in the water matrices and levels of phthalates were detected below 0.10 $\mu\text{g/L}$, the maximum permissible concentration for particular endocrine disruptors chemicals, according to European Union directive on drinking water quality.

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References

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