Single-drop microextraction as a powerful tool for trace element analysis and speciation

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During last decade, miniaturization of classical approaches for separation and preconcentration has been proposed with the aim of decreasing the volume of the extractant phase. Thus, through miniaturization of classical liquid-liquid extraction (LLE), several techniques have emerged, such as single-drop microextraction (SDME), being the most important, hollow-fibre liquid-phase microextraction (HF-LPME) and dispersive liquid-liquid microextraction (DLLME). Several operations needed for accomplishing applications in speciation analysis such as derivatization, separation, preconcentration and clean-up can be performed in an integrated manner, thus eliminating tedious sample treatments and minimizing errors by losses and contamination.
SDME is a simple, low-cost, fast and virtually solvent-free sample preparation technique based on a great reduction of the extractant phase-to-sample volume ratio. SDME is not exhaustive, and only a small fraction of analyte(s) is extracted/preconcentrated for analysis. This technique can be accomplished in two main modes, i.e. immersed or direct and headspace (HS). Direct-SDME requires the use of a water-immiscible extractant phase, whereas, in principle, HS-SDME allows the use of organic, ionic and aqueous solvents. Volatile analytes or suitable derivatization procedures yielding volatile species are required for the successful application of HS-SDME.
In this work, several examples of SDME methods for ultratrace analysis and speciation using both headspace and immersed approaches along with detection techniques such as ETAAS, ETV-ICPMS, GC-MS, HPLC-UV and UV-Vis spectrophotometry will be discussed.

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References

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Miniaturized preconcentration methods based on liquid–liquid extraction and their application in inorganic ultratrace analysis and speciation: A review, Spectrochim. Acta Part B, 64 (2009) 1-15