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Recent advances in microwave-assisted extraction of trace organic pollutants from food and environmental samples

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HIGHLIGHTS

- An overview of microwave-assisted extraction (MAE) for trace organic analysis
- Recent advances in MAE from the perspective of green analytical chemistry
- MAE applied to food and environmental analysis in the period 2008–14
- Comparison of advantages and disadvantages of MAE with other techniques

ABSTRACT

In recent years, microwave-assisted extraction (MAE) has attracted growing interest, as it is an effective method for the rapid extraction of a number of trace organic pollutants from food and environmental samples, due to advantages in facilitating on-line measurements, high efficiency, significantly lower extraction time and solvent consumption than classical techniques. This review describes recent advances of MAE from the perspective of green analytical chemistry, and summarizes the main results in applications published in the period 2008–14. Finally, we compare the performance of this technique to that of traditional extraction and other recent techniques.

Keywords:
Analytical application
Environmental matrix
Extraction
Food sample
Gas chromatography-tandem mass spectrometry
Green analytical chemistry
High-performance liquid chromatography
Microwave-assisted extraction
Sample preparation
Trace organic pollutant

Abbreviations: ASE, Accelerated solvent extraction; DLLME, Dispersive liquid-liquid microextraction; DMAE, Dynamic microwave-assisted extraction; ECD, Electron-capture detector; FD, Fluorescence detection; FID, Flame-ionization detection; FMAE, Focused microwave-assisted extraction; GAC, Green analytical chemistry; GC, Gas chromatography; GC-MS/MS, Gas chromatography-tandem mass spectrometry; GPC, Gel-permeation chromatography; HAA, Heterocyclic aromatic amine; HPLC, High-performance liquid chromatography; LC-MS/MS, Liquid chromatography-tandem mass spectrometry; LOD, Limit of detection; LOQ, Limit of quantification; MAE, Microwave-assisted extraction; MAME, Microwave-assisted micellar extraction; MASE, Microwave assisted steam