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The penetration of green sample-preparation techniques in comprehensive two-dimensional gas chromatography

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HIGHLIGHTS

- Green sample preparation in comprehensive two-dimensional gas chromatography (GC×GC)
- Solid-phase microextraction is the most common green sample-preparation method
- Significant applications coupling green sample preparation and GC×GC
- Possible future scenarios on coupling green sample preparation and GC×GC

ABSTRACT

This critical review focuses on the use and the penetration of green sample-preparation (GSP) methods in comprehensive two-dimensional gas chromatography (GC×GC). The first GSP GC×GC experiment (supercritical-fluid extraction) appeared in 1994, and, since then, there has been a relatively-moderate use of this combination. Specifically, one approach (solid-phase microextraction) has been exploited quite often, while all others very rarely, apart from solid-phase extraction, which often does not fully fit within the GSP category. As well as descriptions of significant GSP GC×GC applications, we explain this divergent tendency and describe possible future scenarios.

Keywords:
Comprehensive two-dimensional gas chromatography
DLLME
Green sample preparation
MSPD
PLE
SBSE
SFE
SPE
SPME
UAE

Abbreviations: BFR, Brominated flame retardant; GSP, Green sample preparation; HR, High resolution; LR, Low resolution; NT, Needle trap; OCC, Organochlorine contaminant; OPP, Organophosphorus pesticide; PBDE, Polybrominated diphenyl ether; PCA, Polychlorinated alkane; PCDDs, Polychlorinated dibenzo-p-dioxin; PCDF, Polychlorinated dibenzofuran; PCDT, Polychlorinated dibenzothiophene; PCN, Polychlorinated naphthalene; PCP, Personal-care product; PCT, Polychlorinated terphenyl; POP, Persistent organic pollutant; PPCP, Pharmaceutical and personal-care product; PT, Polychlorinated toxaphene; qMS, Quadrupole mass spectrometry; SE, Soxhlet extraction; SP, Sample preparation; SPy, synthetic pyrethroid

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