

Accepted Manuscript

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PII: S0165-9936(15)00138-7

DOI: <http://dx.doi.org/doi:10.1016/j.trac.2015.03.012>

Reference: TRAC 14451

To appear in: *Trends in Analytical Chemistry*



Please cite this article as: Anna Laura Capriotti, Chiara Cavaliere, Patrizia Foglia, Roberto Samperi, Serena Stampachiacchiere, Salvatore Ventura, Aldo Laganà, Recent advances and developments in matrix solid-phase dispersion, *Trends in Analytical Chemistry* (2015), <http://dx.doi.org/doi:10.1016/j.trac.2015.03.012>.

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Recent advances and developments in matrix solid-phase dispersion

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HIGHLIGHTS

- Latest trends (2012–14) in matrix solid-phase dispersion (MSPD)
- Novel dispersants: molecularly-imprinted polymers, and carbon-based nanoparticles
- MSPD assisted by ultrasound and vortexing (in solution)
- New MSPD applications with conventional materials
- Limited success of new materials for MSPD

ABSTRACT

Matrix solid-phase dispersion (MSPD) is a sample-preparation process first introduced in 1989 for the extraction of drug residues from animal tissue. The feasibility and the versatility of MSPD mean it is still widely employed and applicable to a large variety of analytes and samples. The research papers reporting the development of analytical methods with a MSPD-based sample preparation are novel mainly by employing innovative or unusual materials as dispersants and/or the mode of analyte elution. This review gives an update on the MSPD from the literature in the period 2012–October 2014, focusing attention on improvements and the outlook for the technique.

Keywords:

Carbonaceous sorbent

Clean-up

Co-sorbent

Extraction

Matrix solid-phase dispersion

MIP

Molecularly-imprinted polymer

MSPD

Sample preparation

Sorbent

Abbreviations: ACN, Acetonitrile; CE, Capillary electrophoresis; DLLME, Dispersive liquid-liquid microextraction; ECD, Electron-capture detector; FID, Flame-ionization detector; FLD, Fluorescence detector; FPD, Flame-photometric detector; FQ, Fluoroquinolone; HFR, Halogenated flame retardant; HLLME, Homogeneous liquid-liquid microextraction; IL, Ionic liquid; LOQ, Limit of quantification; MEKC, Micellar electrokinetic chromatography; MeO-PBDE, Methoxy- polybrominated diphenyl ether; MIM, Methylimidazolium; MIP, Molecularly-imprinted polymer; MWCNT, Multi-walled carbon nanotube; NCI, Negative chemical ionization; NP, Normal phase; OCP, Organochlorine pesticide; OH-PBDE, Hydroxy-polybrominated diphenyl ether; OPP, Organophosphorus pesticide; PAH, Polycyclic aromatic hydrocarbon; PBDE, Polybrominated diphenyl ether; PCB, Polychlorobiphenyl; PSA, Primary-secondary amine; QuEChERS, Quick, Easy, Cheap, Effective, Rugged, and Safe; RP, Reversed phase; SPME, Solid-phase microextraction; SBSE, Stir-bar sorptive extraction; UA, Ultrasound-assisted; WCX, Weak cation-exchange

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