Accepted Manuscript

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PII: S0165-9936(15)00141-7
DOI: http://dx.doi.org/doi:10.1016/j.trac.2015.03.013
Reference: TRAC 14454

To appear in: *Trends in Analytical Chemistry*

Please cite this article as: A. Melnyk, J. Namieśnik, L. Wolska, Theory and recent applications of coacervate-based extraction techniques, *Trends in Analytical Chemistry* (2015), http://dx.doi.org/doi:10.1016/j.trac.2015.03.013.

Theory and recent applications of coacervate-based extraction techniques

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HIGHLIGHTS

- Basics of coacervate-based extraction procedures
- Coacervates fulfill the principles of green analytical chemistry
- Coacervates may be used for extraction of different compounds from various samples

ABSTRACT

In recent years, development of sample-preparation techniques with significant advantages over conventional methods for the extraction of organic compounds from different samples became increasingly important. Coacervates emerged as promising environment-friendly alternatives for sample preparation. This review covers the basic theory of coacervates and summarizes recent applications (2010–15) of coacervates for preconcentration of organic compounds, metal ions and nanoparticles from various types of sample.

Keywords:
Cloud-point extraction
Coacervate
Coacervative extraction
Green analytical chemistry
Metal ion
Nanoparticle
Organic
Preconcentration
Sample preparation
Surfactant

Abbreviations: ASTP, Aqueous surfactant two-phase; CAE, Coacervative extraction; CMC, Critical micelle concentration; CPE, Cloud-point extraction; CPT, Cloud-point temperature; CTAB, Hexadecyltrimethylammonium bromide; DAD, Diode-array detection; ET-AAS, Electrothermal atomic absorption spectrometry; GC, Gas chromatography; HPLC, High-performance liquid chromatography; ICP-MS, Inductively coupled plasma – mass spectrometry; LC, Liquid chromatography; LLE, Liquid-liquid extraction; LOD, Limit of detection; LOQ, Limit of quantification; NP, Nanoparticle; PAH, Polycyclic aromatic hydrocarbon; SDS, Sodium dodecyl sulfate; SFVCDME, Solidified floating vesicular coacervative drop microextraction; SPE, Solid-phase extraction; UV-vis, Ultraviolet-visible spectrophotometry

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1. Introduction

Available analytical techniques are not always sensitive enough to detect, to identify and to quantify compounds at trace levels in samples with complex matrices, so it is necessary to