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Green sample-preparation methods using room-temperature ionic liquids for the chromatographic analysis of organic compounds

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HIGHLIGHTS

- Solvent classification reported for ionic liquids
- Physicochemical properties of ionic liquids used for sample preparation
- The use of ionic liquids in microextraction techniques
- The green credentials of ionic liquids for use in sample preparation

ABSTRACT

Room-temperature ionic liquids (RTILs) are novel solvents composed entirely of ions. They can dissolve a wide range of compounds, while some possess virtually no vapor pressure over a wide temperature range, and have high thermal stability, low toxicity, and low flammability, properties desirable of green solvents. Applications that take advantage of their characteristic properties are starting to appear regularly embodied in techniques, such as liquid-phase microextraction, solid-phase microextraction, and microwave-assisted extraction. In this review, we present a contemporary picture of how, where and when to use ILs in sample-preparation techniques, while recognizing limitations that inhibit their use for some applications. Since the number of potential RTILs is very large, and only a small number have been evaluated in laboratory studies, it is important not to overgeneralize on their potential as general solvents based on this small database of rather limited chemical diversity.

Keywords:

Chromatographic analysis
Dispersive liquid-phase microextraction
Green sample preparation
Ionic liquid
Liquid-phase microextraction
Microwave-assisted extraction
Solid-phase microextraction
Solvent classification
Solvent property
Ultrasound-assisted extraction

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1 Introduction

Ionic liquids (ILs) are non-conventional solvents composed entirely of ions. For sample preparation, the room-temperature ILs (RTILs) are of primary interest. RTILs are essentially organic salts with melting points below room temperature that can be substituted for conventional organic solvents in common sample-preparation procedures [1–3]. Several hundred

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