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Needle-based extraction techniques with protected sorbent as powerful sample preparation tools to gas chromatographic analysis: Trends in application

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Highlights:

- Needle-based extraction techniques have been developed to overcome problems related with SPME
- The robustness of SPDE, ITEX and NTD is related with the sorbent protected in needle
- Needle-based techniques have been widely applied in gas chromatographic analysis
- Due to small size, needle devices may be applied for workplace exposure monitoring

Abstract:

Microextraction techniques are widely applied for sample preparation to gas chromatographic analysis of target compounds in samples with a complex matrix. Recently, needle-based microextraction techniques have been developed in order to improve performance of the extraction. The main advantages of these techniques are miniaturization, automation, high performance, environmentally friendliness and on-line coupling with analytical instruments. This review focuses on the three needle-based microextraction techniques including solid-phase dynamic extraction (SPDE), in-tube extraction (ITEX) and needle trap device extraction (NTD). The core of the aforementioned techniques is an extraction phase protected in the stainless steel needle. The application of the sorbent-protected needle extraction techniques for the gas chromatographic analysis of environmental, biological and food samples is discussed. The fundamental aspects and development over the years are also summarized.

Keywords: Sample preparation, Microextraction, Solid-phase dynamic extraction (SPDE), In-tube extraction (ITEX), Needle trap device (NTD), Gas chromatography

Abbreviations:

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