Introduction

Solid-phase extraction (SPE) has revolutionized sample preparation. Variations on the technique offer enhanced recovery, greater speciation and reduced solvent and sample consumption over other techniques. Micro-Extraction Packed Sorbent (MEPS) is the miniaturization of conventional SPE from milliliter to microliter bed volumes that allows SPE to be used with very small samples. The manipulation of the small volumes is achieved with a precision gas-tight syringe. With a typical void volume of 7µL, the MEPS elution is compatible with GC and LC inlets making it ideal for integration into an automated sampling system for on-line SPE.

In most cases, MEPS allows the same level of sample concentration as is possible with off-line conventional SPE while providing opportunities for truly hybrid multi-dimensional methods. MEPS methods may be readily adapted from established SPE methods including those based on mixed mode or complex chemistries.

Like SPE, MEPS is for use with liquid samples (either normal or reversed phase) and yields four fractions: the unretained, weakly bound, strongly bound and irreversibly bound. However, because MEPS is a double pass system (sample and solvent enter and exit from the bottom of the bed, the weakly bound fraction (commonly the interferences eliminated by washing) is less strongly bound. The irreversibly bound fraction affects MEPS and conventional SPE and is usually associated with sorbent wetting rather than sample purification and so the irreversible binding of matrix material from one sample does not preclude reuse of the device for a sample of the same type.

Like conventional SPE, the number of times the device can be reused is dependent on the sample matrix. For simple applications, MEPS devices have been used successfully for >50 cycles.

Benefits of MEPS

- MEPS allows SPE methodology to be applied to small sample volumes.
- MEPS can be integrated into autosampler robotics and allows on-line use of SPE.
- MEPS can reduce sample and reagent consumption and waste disposal.
- Double pass flows can reduce the weakly bound fraction.
- MEPS is field portable for remote sampling with or without the use of automated equipment.
- MEPS is adaptable for other analytical techniques including immunoassay and off-line analysis by NMR, IR and other methods.

ON-LINE AND OFF-LINE APPLICATION OF MICRO-SPE (MEPS)

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