Recent developments in automatic solid-phase extraction with renewable surfaces exploiting flow-based approaches

Solid-phase extraction (SPE) is the most versatile sample-processing method for removal of interfering species and/or analyte enrichment. Although significant advances have been made over the past two decades in automating the entire analytical protocol involving SPE via flow-injection approaches, on-line SPE assays performed in permanent mode lack sufficient reliability as a consequence of progressively tighter packing of the bead reactor, contamination of the solid surfaces and potential leakage of functional moieties. This article overviews the current state-of-the-art of an appealing tool for overcoming the above shortcomings, so-called bead-injection (BI) analysis, based on automated renewal of the sorbent material per assay exploiting the various generations of flow-injection analysis. It addresses novel instrumental developments for implementing BI and a number of alternatives for online chemical-derivatization reactions, and it pinpoints the most common instrumental detection techniques utilized. We present and discuss in detail relevant environmental and bioanalytical applications reported in the past few years.

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