BOKU UNIVERSITY

TECHNOLOGY OFFER

Valve for renewable and inline solid phase extraction prior HPLC

This invention describes a multi-position valve that uses an injection loop as a reconfigurable microcolumn to integrate sorbent packing, sample cleanup/enrichment, and direct injection into the mobile phase, then expels the sorbent to reset for the next cycle.

BACKGROUND

Sample preparation is mandatory prior to HPLC, with SPE being the most commonly used method; inline cartridges offer automated, affordable SPE but are consumables that require regular replacement, and swapping among different particle sizes, chemistries, or bed masses remains manual. Past cartridge exchangers were costly and limited to proprietary options, underscoring the need for a flexible, automated system to exchange the sorbent within the HPLC injection loop.

TECHNOLOGY

This invention is a multi-position valve with a custom flow path designed to integrate sorbent handling, sample preparation, and injection within a single fluidic architecture. The valve geometry allows an injection loop to be installed between selected positions, creating a compact, reconfigurable zone that can serve as both a packing chamber and an injection interface. In operation, a sorbent slurry can be aspirated from an ancillary port and packed into the injection loop by controlled flow, forming an in-line microcolumn without external hardware. Once packed, the system processes the fluidic sample by passing it through the loop, where the analyte is retained on the sorbent while the matrix is washed to waste under defined flow and solvent conditions. After cleanup and enrichment, the analyte retained in the loop is eluted by switching the valve so that the loop's content is injected directly into the mobile-phase stream, enabling seamless transfer to downstream analysis (e.g., LC). When the analysis is complete, the sorbent is expelled from the loop and sent to waste using forward flow, restoring the loop to an un-packed state and readying the system for the next cycle.

BENEFITS

- Integrated valve cuts hardware, dead volume, and footprint.
- On-demand microcolumn enables strong cleanup/enrichment, boosting sensitivity.
- Renewable column prevents carryover.
- Reconfigurable loop supports rapid method changes by software, without external packing or manual steps.

REFERENZ:
2024-07

OPTIONEN:
• R&D Cooperation
• Licensing

KEYWORDS:
Programmable valve, Microcolumn packing, Sorbent injection

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