

HPLC Retention Time Shift Troubleshooting - Tips and Suggestions

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Unexpected retention time shifts are often linked to inconsistencies in the mobile phase composition reaching the pump. One common—and easily overlooked—cause is the presence of residual solvents in the mobile-phase lines from previous users or methods.

Verify Mobile-Phase Line Integrity

Before starting any analysis, confirm that each solvent line is actually immersed in the correct mobile phase required for your method. If a previous method used different solvents, remnants may still remain in the tubing.

Purge Lines Thoroughly

If there is any possibility of solvent mismatch:

- Purge each solvent line to waste using the mobile phase designated for the method, continuing until the line has been completely displaced by the correct solvent (typically several system volumes).
- Prevent any *non-method solvents from entering the column, as their introduction can alter stationary-phase selectivity or cause retention-time variability.
- Thoroughly flush the injector needle and sample loop to remove residual solvent and eliminate the risk of analyte carryover.

***Special Considerations for Single-Component Mobile Phases**

Methods requiring 100% organic or 100% aqueous conditions are especially sensitive to contamination:

- Even small amounts of carryover from another mobile-phase line (e.g., water entering an organic-only method or vice versa) can significantly alter retention behavior.
- This contamination may lead to inconsistent, irreproducible, or unexpected chromatographic results.

Performing a full purge of all active lines with the specified mobile phase eliminates this variable and ensures consistent baseline conditions.

Summary

Retention time stability depends on mobile-phase consistency. Ensuring that all solvent lines are properly purged with the correct mobile phase is a simple but critical step in preventing unexpected retention time shifts and maintaining method reproducibility.



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