

HPLC Columns for Reversed Phase are Not Suited for Polar Compounds - Tips & Suggestions

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End-capping as a common modification that is applied to traditional reversed-phase silica columns to improve the chromatography. By reacting residual silanol groups with small silyl reagents, manufacturers reduce unwanted polar interactions. This is ideal for neutral, non-polar, and hydrophobic analytes, which benefit from a cleaner hydrophobic environment and more predictable retention. Because of this, end-capping is standard for most classical reversed-phase stationary phases.

When End-Capped Columns Fall Short

While end-capped columns are excellent for hydrophobic analytes, they can be less effective for polar compounds. This is because:

- Residual silanol activity is reduced, limiting polar or ionic interactions
- Highly polar or ionizable compounds may show poor retention, even at high aqueous mobile-phase compositions
- Peak shape may suffer when polar analytes interact only weakly with the hydrophobic surface
- Method development becomes challenging when compounds elute near or at the void volume

In some cases, non-end-capped columns provide slightly more polar character, improving retention or selectivity. However, these benefits often come at the cost of:

- Increased silanol activity
- Potential tailing of basic analytes
- Batch-to-batch variability in older silica technologies

Better Options for Polar Retention

Rather than relying on non-end-capped columns as a workaround, modern stationary phases provide more reliable and tunable retention mechanisms.

This is where Cogent TYPE-C™ silica-based columns stand out.

Advantages of Cogent TYPE-C™ Columns

Cogent TYPE-C™ columns use **silica hydride** surfaces rather than traditional fully hydroxylated silica. As a result:

- They do not require end-capping, because the silica hydride surface has far fewer reactive silanol groups

- They support retention both polar and in some bonded phases, non-polar analytes
- They operate most effectively in Aqueous Normal Phase (ANP) but can be used in Reversed Phase as well.
- Peak shape for bases, acids, and ionic species is often superior compared to non-end-capped silica or other HILIC type phases.
- They offer excellent robustness, reproducibility, and compatibility with LC-MS.

In ANP methods, TYPE-C™ columns provide unique ionic interaction behavior that allows strong retention of highly polar compounds - without ion-pairing agents or extreme pH conditions.

Summary

- End-capped Reversed Phase Columns work best for hydrophobic, neutral compounds.
- Non-end-capped HILIC Type columns may improve retention of polar analytes, but with trade-offs.
- Cogent TYPE-C™ columns deliver the benefits of both approaches—robust RP performance for non-polar analytes and powerful ANP retention for polar compounds—all without requiring end-capping.
- Cogent TYPE-C columns offer fast equilibration between gradient runs, long column lifetimes and excellent precision with unique selectivity

These columns simplify method development and broaden the range of compound types that can be retained and separated effectively.

[Click here to learn about TYPE-C HPLC columns](#)



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