

Method Development for Polar Compound with TYPE-C Columns - Tips and Suggestions

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Why Aqueous Normal Phase (ANP) HPLC Methods Are Often Better Than HILIC for Polar Compound Analysis

When analyzing highly polar compounds, many chromatographers encounter recurring challenges with traditional Hydrophilic Interaction Liquid Chromatography (HILIC).

Although HILIC is widely used, its limitations can lead to slow method development, inconsistent results, and reduced productivity. Aqueous Normal Phase (ANP) chromatography—especially when performed on Cogent TYPE-C™ silica hydride columns—provides a more robust, precise, and efficient alternative for many applications.

1. Faster and More Reliable Equilibration

HILIC columns require extended equilibration due to the persistent “hydration shell” of water surrounding silica surfaces. This shell makes gradients slow to stabilize and often increases downtime between runs. ANP methods using TYPE-C silica hydride columns avoid this problem because these materials do not retain a water layer, enabling extremely fast equilibration—often in just 3–5 column volumes, compared to many minutes for HILIC.

2. Excellent Retention-Time Precision

The variable hydration layer in HILIC frequently leads to inconsistent retention times, especially when environmental conditions shift. In contrast, ANP with TYPE-C columns offers extraordinary retention-time precision because the stationary phase remains highly consistent, with <5% residual silanols and stable surface chemistry.

3. Longer Column Lifetime & Greater Robustness

HILIC columns may degrade unpredictably—sometimes failing overnight—due to chemical instability and salt stress. Silica hydride columns used in ANP methods are significantly more robust, often lasting up to 10× longer under similar conditions. This lowers replacement costs and increases uptime for demanding workflows.

4. Lower Salt Requirements and Superior LC-MS Compatibility

HILIC frequently requires high salt concentrations (up to 100 mM) to retain certain analytes, which:

- suppress ionization in LC-MS,
- contaminate MS inlets, and
- complicate preparative purifications.

ANP typically uses ≤ 15 mM salt and needs no buffers, making it ideal for LC-MS, reducing fouling, and allowing faster recovery of preparative fractions.

5. Broader Selectivity — Retains Both Polar and Some Non-Polar Compounds

Cogent TYPE-C™ silica phases retain polar compounds in ANP mode, but can also retain hydrophobic analytes via reversed-phase mechanisms. This unique dual-retention capability allows the same column to handle a broader class of molecules and dramatically simplifies method development.

6. Faster Method Development and Higher Throughput

With rapid equilibration, low salt requirements, and superior reproducibility, ANP reduces downtime and accelerates both development and routine analysis. Labs benefit from:

- higher sample throughput,
- lower solvent consumption,
- improved confidence in regulated/GMP environments.

Summary

Aqueous Normal Phase (ANP) chromatography provides meaningful advantages over HILIC for polar analyte analysis. HILIC often suffers from slow equilibration times, inconsistent retention due to hydration-shell variability, high salt dependency, and short column lifetimes.

By contrast, Cogent TYPE-C™ silica hydride columns used in ANP deliver fast equilibration, exceptional retention-time precision, greatly extended column life, and excellent LC-MS compatibility thanks to low-salt operation.

ANP also offers broader selectivity, retaining both polar and some non-polar compounds in the same run. These benefits lead to more reliable results, higher throughput, and lower total cost of ownership, making ANP a superior choice for many modern HPLC and LC-MS workflows.



Attachment:

COGENT TYPE-C Quick Start Guide [Download File](#)

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