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# Aqueous Normal Phase ANP Advantages for Polar Compounds - White Paper

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*This document explains the benefits of using ANP*

**Aqueous Normal Phase (ANP) Advantages for Polar Compounds”**

**Introduction**

Aqueous Normal Phase (ANP) chromatography offers a powerful and efficient approach for analyzing hydrophilic and polar compounds, particularly when traditional reversed-phase methods fail to provide sufficient retention. ANP, performed using TYPE-C silica hydride phases, enables strong and predictable retention of polar analytes while maintaining full compatibility with modern LC–MS workflows.

**Why ANP Is Valuable for Polar Compounds**

Many polar and ionic compounds elute too quickly under reversed-phase conditions, often requiring ion-pairing agents, chemical derivatization, or high-pH mobile phases. These adjustments increase method complexity and may introduce LC–MS incompatibilities. ANP addresses these challenges by enabling meaningful retention using organic-rich mobile phases containing only small amounts of water, without the need for high pH or special additives.

**Key Advantages**

1. Strong retention of hydrophilic analytes

   Silica hydride surfaces used in ANP support strong interactions with polar and ionic species, improving retention for acids, amines, small metabolites, carbohydrates, and other hydrophilic compounds.

2. No need for high-pH conditions

   Traditional approaches for retaining basic compounds often rely on high pH to suppress ionization, which can damage columns, complicate method transfer, and reduce MS compatibility. ANP eliminates this requirement while still retaining polar analytes effectively.

3. Seamless compatibility with LC–MS

   Because ANP uses volatile, MS-friendly additives (e.g., formic or acetic acid), methods developed in ANP translate directly to LC–MS without modifying the mobile phase composition or compromising sensitivity.

4. Simplified method development

In ANP, retention generally increases with higher organic solvent content, providing predictable behavior and enabling rapid screening of conditions without elaborate optimization steps.

**Practical Application Scenarios**

**ANP is especially advantageous for:**

- Rapid LC–MS screening of drug metabolites
- Retention of small, polar pharmaceuticals
- Separation of highly water-soluble vitamins and nutrients
- Analysis of hydrophilic excipients
- Determination of biological acids, amines, or zwitterionic compounds

**Why TYPE-C Silica Matters**

TYPE-C silica hydride stationary phases differ fundamentally from traditional silica because the surface is dominated by stable **Si–H groups**, not reactive silanols. This results in:

- Reduced secondary interactions
- Greater reproducibility
- Improved retention of polar species under organic-rich conditions
- Exceptional long-term stability

**Conclusion**

Aqueous Normal Phase chromatography provides a highly effective, MS-compatible solution for retaining and separating polar and hydrophilic compounds. By eliminating the need for high pH, ion-pairing, and complex mobile phases, ANP accelerates method development and improves overall analytical reliability.

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