Performance Comparison from Standard HPLC Phases and Bidentate C18 - Tech Information

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What Is the Biggest Difference Between Traditional Silica-Based HPLC Phases and Cogent Bidentate C18™ (TYPE-C™)?

The major difference between traditional Type A/Type B silica-based HPLC phases and Cogent Bidentate C18™ lies in the chemistry of the silica surface—specifically, the dominance of silicon-hydride (Si-H) groups on TYPE-C™ silica versus the silanol (Si-OH) groups found on all conventional silica materials.

This fundamental structural difference drives superior performance, broader mode flexibility, and distinctive selectivity options not available with conventional bonded phases.

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1. Surface Chemistry: Si-OH vs. Si-H

Traditional silica (Type A & B): dominated by Si-OH

- Contains abundant silanol groups, which are polar, acidic, and highly interactive with analytes
- Can cause undesired secondary interactions
- Limits selectivity and restricts usable chromatographic modes

Cogent TYPE-C™ silica: dominated by Si-H

- Surface is overwhelmingly silicon-hydride (Si-H) rather than silanols
- Si-H groups are non-polar, non-acidic, and far less interactive
- Enables unique retention mechanisms and dramatically different selectivity

This difference in surface polarity fundamentally changes how analytes interact with the stationary phase.

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2. Novel Separation Mechanisms & Selectivity

Unlike traditional C18 phases, Cogent TYPE-C™ bonded phases—including Bidentate C18™—provide enhanced selectivity flexibility due to the underlying Si-H surface. The result is new separation mechanisms that allow users to achieve resolutions and elution patterns not possible on classical silica phases.

This expanded selectivity is especially valuable for:

- Polar analytes
- Mixed-polarity mixtures
- Difficult or co-eluting compounds on standard RP columns
- Orthogonal method development

3. Multi-Mode Chromatography on a Single Column

Unlike conventional C18 columns, Cogent Bidentate C18™ can be used in three different chromatographic modes:

- ✔ Normal Phase (NP)
- ✔ Aqueous Normal Phase (ANP)
- ✔ Reversed Phase (RP)

All Cogent TYPE-C™ phases—including Bidentate C18™—support this multi-mode versatility because of their unique surface chemistry.

This means one column can replace three, drastically simplifying development workflows and saving time, solvent, and method-transfer complexity.

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4. Practical User Benefits

- Reduced secondary interactions (less tailing, better peak shape)
- Broader mobile-phase compatibility
- Greater reproducibility due to lower surface polarity variability
- Access to orthogonal selectivity without changing column families
- Ability to retain polar compounds in ANP while still using a C18 ligand

In short, TYPE-C silica provides chromatographers more capability, more flexibility, and more reliable performance across a wide range of analytes.

COGENT HPLC Columns™

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