Mobile Phase Additives Are Not Needed with Cogent Diamond Hydride Columns - Tech Information

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Cogent Diamond Hydride™ TYPE-C Silica columns are often used with acidic mobile phase modifiers such as formic acid to support robust peak shape, ionization efficiency (for LC-MS), and method stability.

However, there are situations where analysts prefer to run additive-free mobile phases, particularly when simplifying sample preparation, exploring fundamental retention behavior, or eliminating non-volatile components.

The Diamond Hydride™ column is fully compatible with mobile phases consisting only of acetonitrile and water, with no additives required for safe operation. Using additive-free eluents will not harm or degrade the stationary phase.

When Additive-Free Mobile Phases Are Appropriate

Running the column using only **ACN / H_2O** is useful when:

- Studying pure Aqueous Normal Phase (ANP) mechanisms
- Avoiding acidic modifiers that may interfere with detection
- Eliminating all non-volatile additives for certain analytical techniques
- Evaluating the intrinsic selectivity of the stationary phase

Under these conditions, the Diamond Hydride™ column maintains structural integrity and performs normally.

Impact on Peak Shape and Retention

While the column is compatible with additive-free mobile phases, analysts should be aware that peak shape may not be as sharp compared with methods that use formic acid or another mild acidic modifier. Peak distortion can occur because:

- Acidic additives suppress unwanted ion interactions
- Many analytes exhibit improved symmetry under slightly acidic conditions
- Additives can stabilize compound ionization at the silica-hydride interface

If poorer peak shapes are observed, a practical compensation is to use a steeper gradient, which can help sharpen elution and improve symmetry.

Additive Sensitivity Is Analyte-Dependent

Retention and peak shape effects vary significantly depending on:

- Analyte ionization state
- Functional groups

- Hydrogen-bonding behavior
- Hydrophobic/polar balance
- Mode of operation (ANP vs RP-like)

Some compounds will exhibit minimal differences with or without additives, while others may show substantial changes in retention time, selectivity, or peak quality.

This variability underscores the importance of method screening when deciding whether an additive-free method is suitable.

Recommendations for Additive-Free Operation

To optimize performance when not using formic acid:

1. Use a steeper gradient to enhance peak sharpness.
2. Evaluate both ANP and RP-like retention regions to determine where the analyte performs best.
3. Screen multiple injection solvents to avoid early elution distortions.
4. Compare with additive-based methods to quantify any loss in precision or retention consistency.

Additive-free methods can be extremely effective when optimized properly, especially for analytes that naturally exhibit good retention and symmetry.

Click HERE for Cogent Diamond Hydride™ ordering information

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