

Phosphoric Acid and Sodium Phosphate Use with Cogent Diamond Hydride Columns - Tech Information

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Phosphate-based mobile phase additives—such as phosphoric acid and sodium phosphate—can technically be used with Cogent Diamond Hydride™ TYPE-C Silica columns, but several critical limitations and long-term performance considerations must be understood before incorporating them into a method.

1. Compatibility and Surface Chemistry Effects

While the stationary phase does tolerate phosphoric acid, there is documented evidence that phosphate exposure can semi-permanently modify the surface chemistry of the Diamond Hydride™ phase. This alteration may influence future separations. For instance:

- A method developed using formic acid may no longer behave the same after the column has been exposed to phosphoric acid.
- These changes can persist, resulting in irreversible shifts in selectivity, retention, or peak shape.

Because of this, any column used with phosphate should be dedicated exclusively to phosphate-containing methods to avoid cross-method degradation or unexpected chromatographic behavior.

2. LC-MS Incompatibility

Columns used with phosphoric acid or phosphate buffers should never be used with LC-MS systems.

Phosphate salts:

- Suppress ionization
- Cause significant ion-source contamination
- Produce non-volatile residues that compromise sensitivity and instrument performance

Therefore, phosphate usage is acceptable only for UV, PDA, or other non-MS detection workflows.

3. Recommended Concentrations and Operating Range

Although phosphoric acid and sodium phosphate are technically compatible, usage must follow key constraints:

- Stay within pH 2.5–7, the recommended operating pH range for Diamond Hydride™ columns.
- Begin at very low concentrations—as low as 0.01%—to minimize the risk of surface alteration.
- Increase concentration only if absolutely necessary for retention, buffering strength, or analyte ionization control.

For most methods, particularly those intended to translate to LC-MS, 0.1% formic acid remains the preferred acidic modifier due to its volatility, robustness, and consistent ANP/RP performance.

4. When to Consider Phosphate Additives

Phosphate additives may be justified when:

- Analytes require stronger buffering at low pH
- Peak shape improves significantly with phosphate
- The method will be run exclusively on UV-based detectors
- Long-term column dedication is acceptable

If phosphate is chosen, ensure:

- Column labeling (clear identification as “phosphate-only”)
- No interchange with LC-MS workflows
- Monitoring of retention and selectivity drift due to potential surface changes

Summary for Technical Users: Phosphoric acid and sodium phosphate can be used with Cogent Diamond Hydride™ columns, but should be viewed as special-case additives that may permanently alter the stationary phase. For routine and mass-spectrometry-compatible analyses, volatile acids such as formic or acetic acid remain the recommended choice.

Click on this link for more information about [Diamond Hydride HPLC Columns](#)



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MicroSolv Technology Corporation

9158 Industrial Blvd. NE, Leland, NC 28451

Tel: (732) 380-8900

Fax: (910) 769-9435

Email: customers@mtc-usa.com

Website: www.mtc-usa.com