High pH Use with Cogent Diamond Hydride™ Columns: Technical Guidance and Limitations - Tech Information

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Operating HPLC columns outside their recommended pH range can significantly impact column stability, chromatographic performance, and long-term reproducibility. For analysts working with Cogent Diamond Hydride™ TYPE-C Silica columns, it is important to understand that these phases are not recommended for use above pH 7.

Why pH Above 7 Is Problematic

The primary concern when exceeding pH 7 is the increasing solubility of silica at elevated pH, which can lead to silica dissolution. As silica begins to dissolve, voids may form inside the column bed. This manifests chromatographically as:

- Broad peaks
- Split peaks
- Loss of efficiency
- Poor reproducibility

These symptoms directly compromise both qualitative and quantitative performance and can shorten column lifespan dramatically.

What If My Mobile Phase Naturally Exceeds pH 7?

Analysts using buffers such as ammonium acetate in DI water/acetonitrile will find that these mixtures typically result in pH values above 7. In these cases, the article recommends adjusting the pH to approximately 6.5 using acetic acid. The additional acetate formed during adjustment is not detrimental to method performance.

Columns with Higher pH Tolerance

Not all TYPE-C Silica™ columns behave identically at higher pH. Some phases—including the Bidentate C18™ and UDC-Cholesterol™ columns—exhibit greater resistance to dissolution under elevated pH conditions.

This enhanced stability is believed to arise from:

- Their bulkier bonded ligands, which shield the silica-hydride surface
- Direct silicon–carbon bonds, which provide improved protection against alkaline attack

These alternative phases may be appropriate when higher-pH methods are required.

Practical Recommendations for Analysts

1. Keep pH ≤ 7 when using Cogent Diamond Hydride™ columns.

2. Adjust high-pH mobile phases (e.g., ammonium acetate systems) using acetic acid to ~pH 6.5.
3. If high-pH operation is unavoidable, select a TYPE-C phase with a higher pH threshold, such as Bidentate C18™ or UDC-Cholesterol™.
4. Monitor chromatograms for early signs of silica dissolution (peak splitting, abnormal broadening).

Click HERE for Cogent Diamond Hydride™ HPLC column ordering information and pictures of the column.

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