Degradation of Samples Due to Hydrolysis in HPLC Columns - HPLC Primer

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Hydrolysis: A Hidden Challenge in HPLC Analysis
Hydrolysis is a common degradation pathway for many compounds, often accelerated by acids or bases present in solution—or even by solid surfaces in contact with the liquid phase.

Research in fields such as natural products, bioactives, and forensic science has shown that **10–20% of certain bioactive compounds can hydrolyze "on-column"** under typical HPLC conditions. This degradation is influenced by surface chemistry and surface area: the greater the surface area, the higher the hydrolysis potential.

Traditional silica-based phases, whether irregular or spherical, have very high surface-to-volume ratios and are populated with silanol (Si–OH) groups. Even fully end-capped phases can retain **30–50% free silanols**, which contribute to hydrolytic activity. Advanced detection methods like PDA and LC/MS have made this degradation more evident.

Cogent **TYPE-C™ Silica** columns, featuring a silica-hydride (Si–H) surface, are far less hydrolytically active than conventional silanol-based phases. This reduced activity helps preserve sensitive compounds, enabling accurate quantitation of injected analytes rather than their degradation products. This advantage is especially valuable when analyzing **non-targeted or trace-level compounds**.

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