

Back Pressure That is Lower than Normal Using a Cogent Diamond Hydride HPLC Column - Tech Information

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Why Cogent Diamond Hydride™ Columns Show Lower Than Normal Back Pressure

Many users transitioning from traditional reversed-phase (RP) HPLC columns to Cogent Diamond Hydride™ TYPE-C™ silica hydride columns notice that system backpressure is significantly lower than expected—particularly at the beginning of ANP (Aqueous Normal Phase) gradients.

This article expands on the original FAQ to explain why this happens, what pressures should be considered normal, and how mobile phase composition and temperature influence the observed pressure.

1. Low Initial Back Pressure Is Normal for ANP Mode on Diamond Hydride™

Users often report backpressure values around 20 bar at the start of a gradient when acetonitrile (ACN) content is high. This is completely normal for ANP separations using Cogent Diamond Hydride™ columns.

Why?

- ANP mode begins with high organic (ACN), which has a lower viscosity than water.
- Lower viscosity translates directly to lower system backpressure.
- TYPE-C™ hydride columns are optimized for high-organic ANP starting conditions, so these pressures are expected.

Thus, if you observe low backpressure at the beginning of an ANP gradient, it simply indicates that the column and mobile phase are behaving correctly.

2. Back Pressure Increases as Water Content Rises—But Remains Lower Than RP

As the gradient shifts from high ACN to higher water composition, the backpressure typically increases to 40–50 bar, although this may still appear lower than what many chromatographers are accustomed to from traditional reversed-phase methods.

Reason for the Increase

- Water has significantly higher viscosity than acetonitrile.
- As the proportion of water increases, the mobile phase becomes more viscous, which raises pressure.
- Even so, pressures remain relatively modest due to the column's characteristics and the mobile phase system.

This pressure behavior is a hallmark of ANP chromatography and should not be considered a performance issue.

3. Comparison With Reversed-Phase Conditions

Chromatographers accustomed to RP conditions—which usually begin with higher aqueous content—may expect pressures substantially higher than those encountered with ANP on Diamond Hydride™ columns.

Key Differences:

- RP methods: more water → higher viscosity → higher backpressure
- ANP methods: more ACN → lower viscosity → lower backpressure

The observed pressure in ANP is not an indication of insufficient column packing or hardware issues—it is a normal aspect of the method's design.

4. Temperature Also Influences Back Pressure

Column temperatures around **30 °C** (as in the example) further contribute to reduced backpressure.

Why Temperature Matters

- Higher temperature decreases mobile phase viscosity.
- Lower viscosity reduces resistance across the column bed.
- Even modest temperature increases can noticeably reduce overall system pressure.

Thus, the combination of high ACN and moderate temperature produces very low backpressure early in the gradient.

5. What Pressure Range Should You Expect?

Under typical ANP gradients with Diamond Hydride™ columns:

- Starting pressure: ~20 bar (high ACN phase)
- Mid-to-late gradient: ~40–50 bar

These values are common and not indicative of any performance or hardware issue. If pressures fall within this range, the method is operating as expected.

[See Information about Diamond Hydride Columns](#)



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