Pressure Expected When Using a Diamond Hydride 2.o UHPLC Column - Tech Information

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This note provides a reference backpressure profile for the Cogent Diamond Hydride™ 2.o column 2.2 µm, 120 Å, 2.1 × 50 mm, cat. 70200-05P-2 under a defined set of conditions on a Waters UPLC™ system.

Use it as a sanity-check when commissioning methods or troubleshooting pressure excursions. Keep in mind that observed pressure will vary with mobile-phase viscosity, temperature, column ID/length, system tubing, and detector backpressure.

Reference setup (for comparison)

- Column: Cogent Diamond Hydride™ 2.o, 2.2 µm, 120 Å, 2.1 × 50 mm (cat. 70200-05P-2)
- Flow range evaluated: 0.2 → 2.0 mL/min (isocratic reference)
- Temperature: 25 °C, thermostatted
- Mobile phase (premixed, v/v): 80% acetonitrile / 20% DI water / 0.1% formic acid
- System: Waters UPLC™ (note: absolute pressure depends on instrument configuration)

***Important**: The original FAQ stresses that pressure can vary widely; treat the data as illustrative, not absolute. Differences in solvent preparation (e.g., on-pump mixing vs. premix), additive concentration, and temperature will change viscosity, thus pressure.*

How to use this data in practice

1) **Check pressure scaling with flow**

Under constant solvent composition and temperature, column ΔP rises ~linearly with flow for low-compressibility liquids. If your pressure increase vs. flow is non-linear or exceeds expectations, look for:

- Partial blockages (frit, in-line filters)
- Viscosity changes (e.g., water content drift)
- Temperature drift (lab or compartment)
- Extra-column restrictions (narrow/long capillaries, detector cell)
- (Reference notes that viscosity, temperature, column ID/length are dominant drivers.)

2) **Normalize to your geometry**

The reference column is 2.1 mm ID, 50 mm L. If you use a longer column, expect proportionally higher pressure; if you use a wider ID, expect lower pressure at the same flow (but higher linear velocity is then needed for comparable efficiency). The article explicitly flags column ID and length as key pressure variables.

3) **Mind the organic fraction and premix**

The reference uses 80% ACN. If you raise water content (e.g., 60/40 ACN/H_2O), viscosity increases and pressure rises; with higher ACN, pressure drops. Also, premixed solvents vs. on-line proportioning can yield different effective viscosities and hence different ΔP. The source calls out mobile-phase viscosity as a primary factor.

4) **Temperature control**

At 25 °C the solvent viscosity is higher than at 35–40 °C. Even a 5–10 °C increase can significantly reduce pressure. The reference conditions specify 25 °C; deviations either direction will shift ΔP.

5) **System contributions**

UPLC-class systems add some backpressure from capillaries, valves and detectors. If your system uses narrower capillaries, longer tubing, or restrictive cells, your observed total pressure may be above the reference, even if the column itself is nominal. The note emphasizes that instrument configuration contributes to pressure outcomes.

Quick troubleshooting guide when pressure is higher than expected

- Verify solvent composition (are you truly at 80/20 ACN/H_2O + 0.1% FA premixed?). Small water-fraction errors elevate viscosity and ΔP.
- Check temperature (is the column compartment really 25 °C?). A colder lab/oven increases ΔP.
- Inspect in-line filters & frits (replace/clean if needed). Partial plugging presents as step-wise ΔP increases unrelated to flow linearity.
- Audit tubing ID/length (minimize narrow-bore and unnecessary length). Extra-column restriction elevates system pressure.
- Confirm column geometry (2.1 × 50 mm vs. your hardware). Longer beds or smaller IDs will raise ΔP at the same flow.

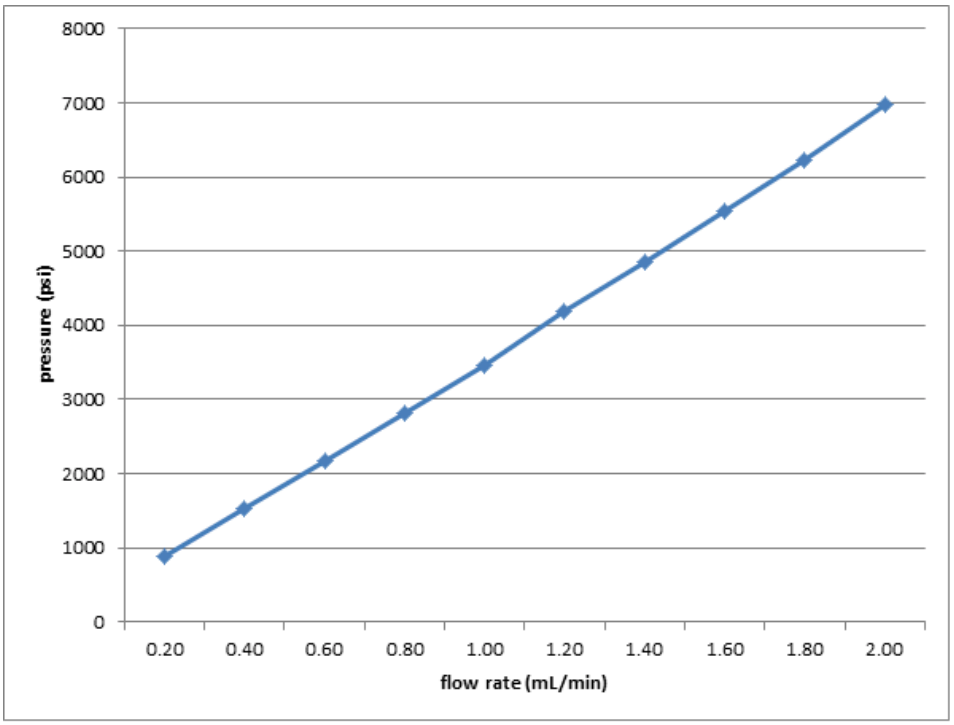
Transferring methods between systems

When moving from the reference UPLC to another platform:

- Match solvent composition (premix if the reference used premix).
- Match temperature.
- Adjust flow to keep linear velocity comparable if ID/length differ; expect different absolute ΔP. (This note highlights ID and length as key.)
- Expect a constant offset from system plumbing; compare ΔP vs. flow slope, not just absolute values.

Why this note matters

The original FAQ exists precisely to show that backpressure is condition-dependent and to provide a real-instrument reference for a common Diamond Hydride™ 2.0 format. Use it to validate system health and interpret ΔP against variables you can control (solvent, temperature) and those you must account for (tubing, detector).



Column: Cogent Diamond Hydride™, 2.2um 120A, 2.1 x 50mm, cat# 70200-05P-2
Flow Rate: 0.2-2.0 mL / minute
Temperature: 25°C, thermostatted
Mobile Phase: 80% Acetonitrile / 20% DI water / 0.1% formic acid, premixed (v/v)

COGENT HPLC Columns™

Cogent Diamond Hydride Product Page

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