

## What is the effect of extra column volume for different HPLC instruments on the same method - FAQ

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The impact of **Extra Column Volume (ECV)** on chromatographic performance can be substantial—especially when using modern, high-efficiency columns with small particle sizes. Even when using the same certified HPLC column, identical NIST-traceable standards, and running the method on the same day, differences in instrument plumbing and hardware design can lead to markedly different chromatographic results.

### Understanding the Source of Extra Column Volume

ECV arises from components external to the column, including:

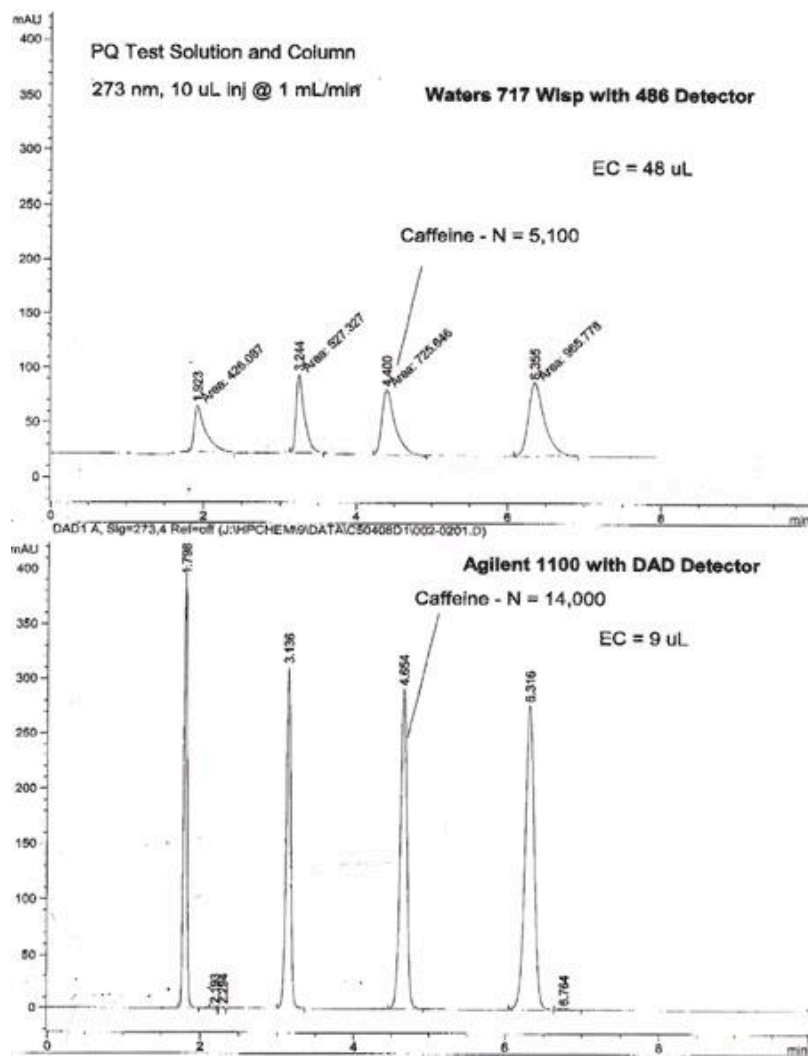
- Injector and detector flow paths
- Tubing length and internal diameter
- Fittings and connectors
- Detector flow cell volume

These components contribute to Extra Column Dispersion (ECD), which broadens peaks and reduces resolution. The effect is amplified with smaller particle columns (e.g., sub-2  $\mu\text{m}$  or core-shell), where system dispersion can easily dominate column efficiency.

### Real-World Example

Two chromatograms generated using the same method and column on two different HPLC instruments can show significant differences in peak shape and resolution. This is often due to:

- Older instruments having longer or wider tubing
- Non-optimized flow cells with larger internal volumes
- Poorly cut or mismatched fittings introducing dead volume



## Best Practices to Minimize ECV

- Use short, narrow-bore tubing (e.g., 0.007" ID) between the injector, column, and detector.
- Ensure fittings are properly cut, clean, and securely tightened.
- Replace aging or worn components that may introduce dead volume.
- Consult your instrument manufacturer for ECV specifications and optimization guidelines.

## Qualification and Measurement

To quantify and monitor ECV in your system, we recommend using one of the **Chemical Solutions DIY Qualification Kits™**. These kits allow you to:

- Measure system dispersion using traceable standards
- Benchmark performance across instruments
- Ensure compliance with internal or regulatory qualification protocols

The kit is cost-effective, easy to use, and ideal for self-compliance and routine system checks.



Click [HERE](#) for the Chemical Solutions PQ and HSQ Kit™ ordering information and images.

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