

Protect HPLC Columns from Permanently Adsorbed Compounds - HPLC Primer

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Overview

A common misconception in analytical laboratories is that syringe filters can remove or “trap” unwanted dissolved chemicals before they reach an HPLC column. In reality, syringe filters are engineered as particulate exclusion devices, not chemical scavengers.

Understanding this distinction is essential for proper sample preparation and for setting correct expectations about column protection.

What Syringe Filters *Do* Protect Against

Syringe filters are designed to:

- Remove undissolved particles, precipitates, and debris
- Prevent particulates from damaging column frits
- Reduce high back pressure caused by physical blockages
- Improve injection reproducibility by ensuring particle-free samples

They accomplish this by size-exclusion: particles larger than the pore rating (0.45 μm , 0.22 μm , etc.) are physically prevented from passing through.

What Syringe Filters *Do Not* Do

Syringe filters **cannot** remove:

- Dissolved organic compounds
- Impurities that are fully solubilized
- Ionized species
- Matrix components in true solution
- Molecules that are chemically reactive with column surfaces

Once the membrane reaches steady state, it stops adsorbing anything dissolved in the solvent. At that point, it functions strictly as a pore-based physical barrier.

In other words:

- If it's dissolved → it passes through.**
- If it's a particle → the filter removes it.**

This is true regardless of membrane type (Nylon, PTFE, PES, PVDF, etc.).

Why Dissolved Compounds Still Reach the Column

Syringe filters work by mechanical separation, not by chemical affinity. The membrane surface may temporarily adsorb trace material during initial wetting, but this effect is minimal and non-selective.

Therefore:

- Dissolved compounds will reach the column and may adsorb onto the stationary phase.
- Syringe filters cannot prevent permanently adsorbing or “sticky” analytes from binding to the column.
- Preventing chemical adsorption requires method optimization, not filtration.

How to Reduce Chemical Adsorption on HPLC Columns

While syringe filters cannot remove dissolved compounds, other strategies can help protect columns:

- Use appropriate mobile phase strength to keep analytes in solution
- Adjust pH to minimize unwanted interactions
- Employ guard columns or inline filters
- Validate solvent compatibility and sample stability
- Use column chemistries designed to reduce secondary interactions

These tools, combined with proper filtration, form a complete protection strategy.

AQ™ Advanced Quality brand Syringe Filter Resources

For ordering information, membrane compatibility charts, and product images:

- Click [HERE](#) for AQ™ syringe filter ordering information and pictures
- Attachment: MICROSOLV filters equivalency study pdf [Download File](#)

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