



# Optimize Your UHPLC System

## Product Guide

A central graphic depicts a laboratory workflow. A white line starts from the left, loops through a circular inset showing a green-tipped pipette tip, then loops through another circular inset showing a scientist in a white lab coat and safety glasses using a pipette. The line then rises to a peak, loops through a circular inset showing a scientist in a white lab coat and safety glasses pouring liquid from a vial into a vial, and then descends through a circular inset showing a purple laboratory instrument. The background is light blue with a grid pattern and several white circles of varying sizes.

For the highest quality results and minimum system downtime, trust Millipore's high efficiency filtration products.

# For ultra-sensitive UHPLC analysis, trust Millipore's high efficiency filtration products.



UHPLC/UPLC® is a revolutionary chromatography technique using columns packed with very small (sub-2  $\mu\text{m}$ ) particles. This technology provides

- o Improved resolution
- o Shorter chromatographic runs
- o Fast method development
- o 3-10 fold decrease in reagent use/disposal costs

However, the small size of the particles used to pack UHPLC columns means that very high pressures are required to operate UHPLC instruments, posing challenges in sample and mobile phase preparation. Any impurities can create backpressure buildup in the UHPLC system, causing system failure.

## Protect Your Expensive System with an Inexpensive Filter

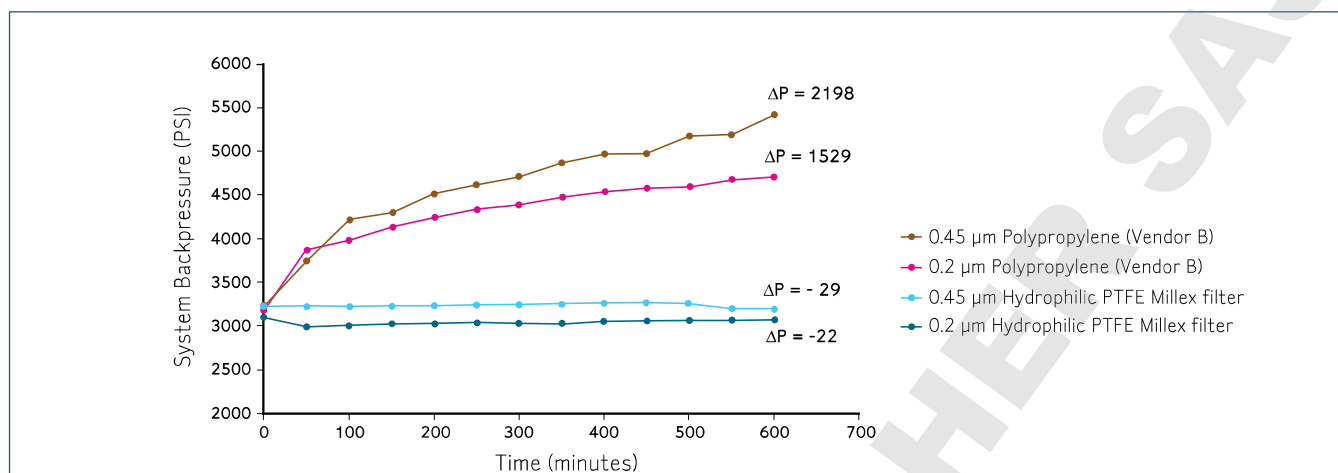
Membrane filtration removes contaminating particles from samples, solvents and mobile phases, increasing column life, minimizing backpressure, and preventing system failure. That's why most UHPLC instrument manufacturers, including Waters Corporation, recommend filtration of mobile phases using 0.2  $\mu\text{m}$  filters.

Membranes that display the highest particle retention tend to be the most effective at minimizing backpressure. Polypropylene membranes exhibit poor particle retention, and therefore filtering UHPLC mobile phases through polypropylene is the least effective for reducing backpressure buildup (Figure 2). In contrast, filtering the mobile phase through PTFE membranes, which show excellent particle retention, enabled the UHPLC system to run without significant backpressure buildup.



**Figure 1.** Particles trapped on a 0.2  $\mu\text{m}$  PVDF membrane filter after filtration of 2 L of 50 mM sodium bicarbonate buffer. If the buffer were not filtered before running through the column, these particles could contaminate and clog the expensive UHPLC column.

## Filtration through 0.2 µm hydrophilic PTFE Millex filters prevents backpressure buildup on a UHPLC system.



**Figure 2.** Water and acetonitrile were passed through polypropylene or PTFE syringe filters (as indicated in legend), then used 1:1 (v/v) to prepare the mobile phase for UHPLC. The system was run at 0.25 mL/min for 600 min with backpressure recorded every 50 min.  $\Delta P$  represents total change in backpressure after 600 min.

## Filtration tools for preparing UHPLC buffers and mobile phases

### Disc Filters

Description	Catalogue Number
0.2 µm Durapore® PVDF Membrane Filter, 47 mm	GVWP04700
0.2 µm Durapore PVDF Membrane Filter, 90 mm	GVWP09050
0.2 µm Millipore Express® PLUS PES Membrane Filter, 47 mm	GPWP04700
0.2 µm Millipore Express PLUS PES Membrane Filter, 90 mm	GPWP09050
0.2 µm Omnipore® PTFE Membrane Filter, 47 mm	JGWP04700
0.2 µm Omnipore PTFE Membrane Filter, 90 mm	JGWP09025
0.2 µm Nylon Membrane Filter, 47 mm	GNWP04700
0.22 µm Fluoropore Membrane Filter, 47 mm	FGLP04700
Stericup®-GP Filter, 500 mL	SCGPU05RE
Steritop®-GP Filter, 500 mL	SCGPS05RE



### Filter Holders and Pumps

Description	Catalogue Number
47 mm, all glass filter holder with 250 mL funnel	XX1504700
90 mm glass filter holder with stainless steel screen, with 1 L funnel	XX1009020
Filter forceps, blunt-tipped, sterilizable	XX6200006P
Chemical Duty Vacuum Pump, 115 V	WP6111560
Chemical Duty Vacuum Pump, 220 V	WP6122050
Millivac® Vacuum Pump, 115 V	SD1M001V00
Millivac Vacuum Pump, 230 V	XF5423050
Millivac Maxi Vacuum Pump, 230 V	SD1P014M04





# Trust Millipore Filters for Preparing UHPLC Samples

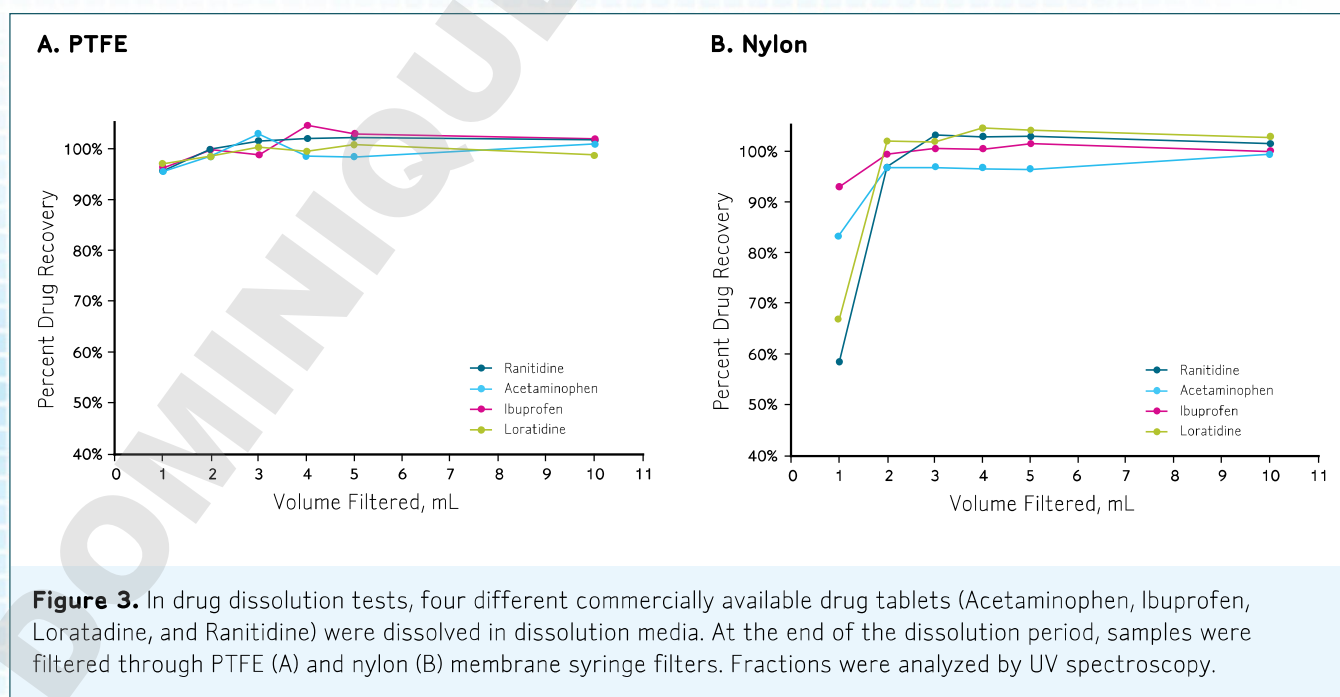
Reduce signal-to-noise ratios and maintain clean baselines by filtering samples with Millex® syringe filter units. With their broad chemical compatibility, low holdup volumes, and consistent quality, Millex filters are ideal for preparing samples for UHPLC analysis.

## Low analyte binding Millex filters

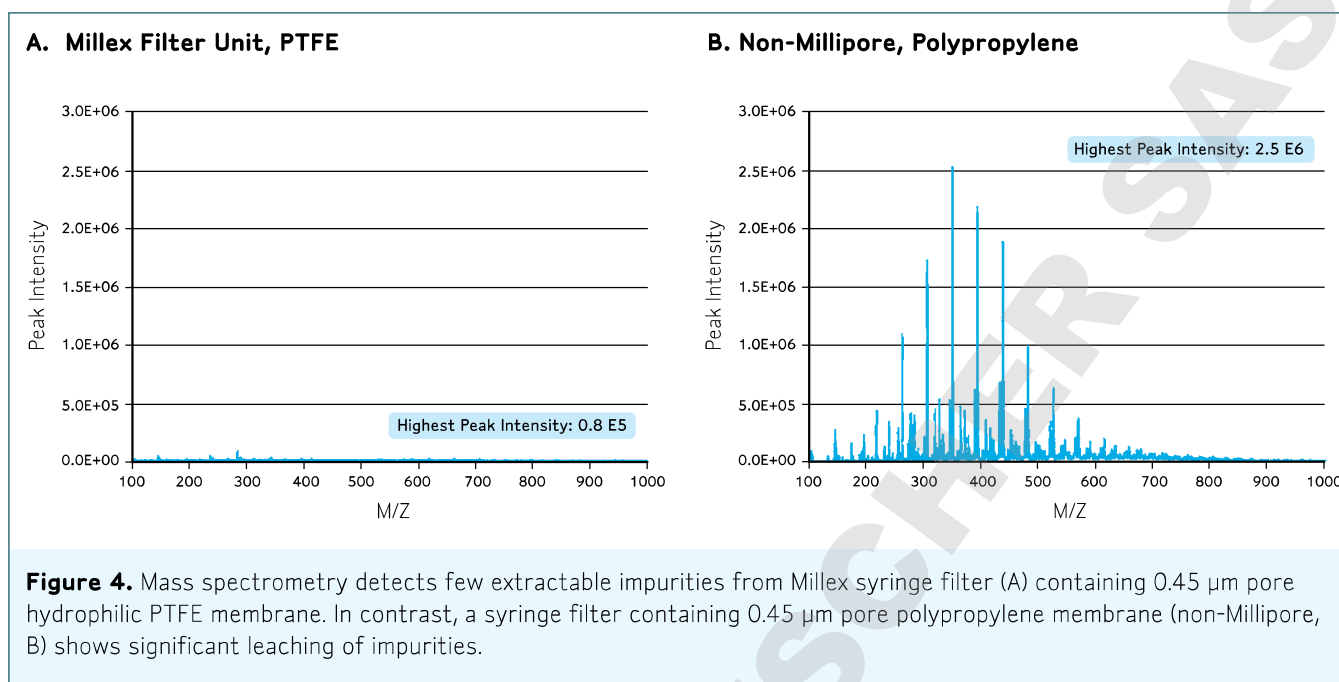
Millex filters with PTFE membrane consistently provide greater than 90% drug recovery in the first mL of filtrate, indicating low drug binding to PTFE (Figure 3A).



## Samples filtered through PTFE and nylon membrane syringe filters



## Millex filter units feature low extractables



## Filtration tools for preparing UHPLC samples

UHPLC system manufacturers recommend filtering samples through 0.2 µm membranes for optimal removal of interfering particulates, better separation, and less column clogging.

Description	Catalogue Number
0.2 µm PTFE Millex Filter Unit, 13 mm	SLFGX13NL
0.2 µm PTFE Millex Filter Unit, 25 mm	SLFG025NS
0.2 µm PTFE Millex-LG Filter Unit, 25 mm	SLLGH25NB
0.2 µm PTFE Millex-HPF LCR Filter Unit, 25 mm with prefilter	SLLGM25NS



## Low Extractable Filtration

Low binding hydrophilic PTFE membrane filters both aqueous and organic solvents.

Description	Catalogue Number
0.45 µm PTFE Millex-LCR Filter Unit, 13 mm	SLCR013NL
0.45 µm PTFE Millex-LCR Filter Unit, 25 mm	SLCR025NS

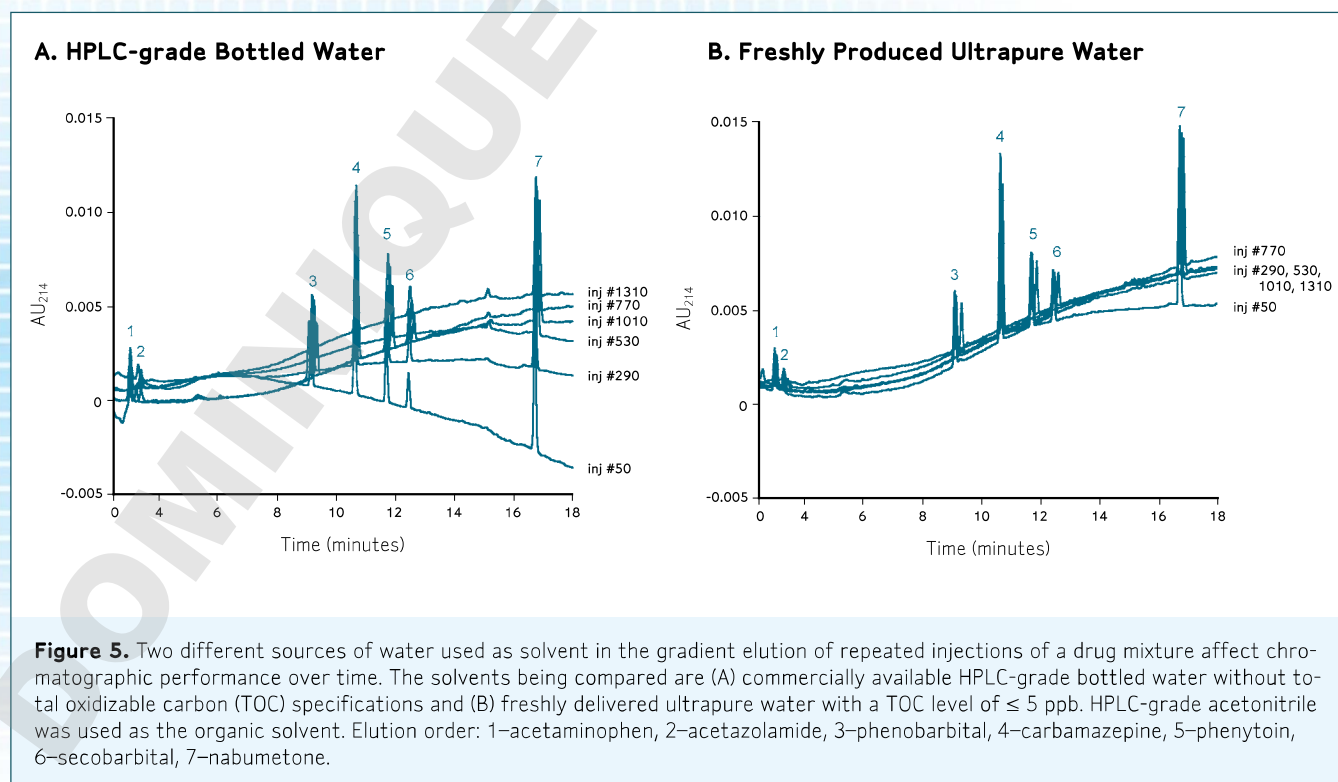


# High Quality Water Can Improve UHPLC Performance

Contaminating solutes may contribute to baseline variability and poor chromatographic performance when bottled water instead of freshly-delivered water is used to prepare the mobile phase (Figure 5). Use Milli-Q® water purification systems to ensure that your mobile phases are free of organic contaminants, for the best, most reproducible chromatographic results. Especially when fitted with a 0.2 µm final filter, Milli-Q systems are the ideal water source for UHPLC, LC-MS, and other ultra-sensitive analytical applications.



## The effects of two different sources of water on chromatographic performance



## Laboratory water systems for UHPLC



### Milli-Q Integral system

The unique range of compact Milli-Q Integral water systems uses advanced technology to provide both pure and ultrapure water from tap water, all in a single unit. Dual points of delivery (PODs) save space and increase convenience. Equipped with online TOC and resistivity monitors, the Milli-Q Integral system gives the user total control over water quality and quantity at the point of delivery.

Description	Catalogue Number
Milli-Q Integral 15 Pure (15 L/hour) and Ultrapure (2 L/min) Water Production Unit with built-in resistivity and TOC meter designed for USP suitability test	ZRXQ015T0*



### Milli-Q Advantage A10 system

Using an optimized purification sequence, the Milli-Q Advantage A10 water purification system converts pure water to ultrapure water, then delivers it to a POD, which provides final polishing adapted to your specific needs.

Description	Catalogue Number
Milli-Q Advantage A10 Ultrapure Water Purification System	Z00Q0V0WW*



### LC-Pak™ polisher: designed just for HPLC/UHPLC

Add this unique final polisher to your Milli-Q water system for the most sensitive UHPLC analyses. The LC-Pak's C18 reverse-phase silica technology provides fresh ultrapure water with low traces of organics for use in organic trace and ultra trace analysis.

Description	Catalogue Number
LC-Pak for the production of at least 500 L of ultrapure water for organic trace analysis	LCPAK0001



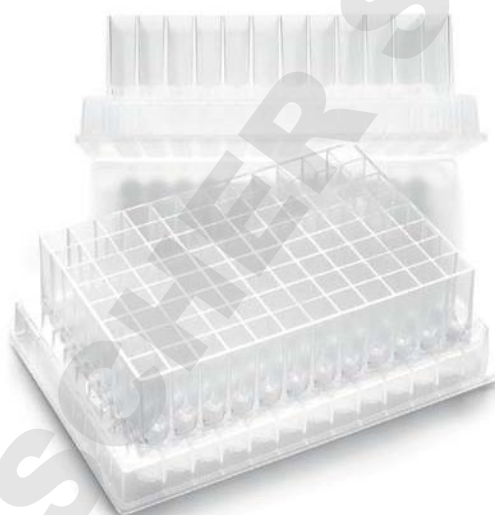
\*Contact your local Millipore sales representative for a country-specific part number.



# MultiScreen® Filter Plates Optimized for High Throughput Sample Prep

MultiScreen Solvinert™ plates and membranes demonstrate low binding, low extractables and high recoveries. To accommodate aqueous and non-aqueous samples, MultiScreen Solvinert filter plates – in deep well and standard well volumes – are available with either chemically resistant hydrophobic or hydrophilic PTFE membranes. The plate itself is optically clear and made of a resistant polyolefin copolymer for maximum chemical compatibility.

MultiScreen<sub>HTS</sub>-PCF filter plates feature the lowest binding of analytes in aqueous or ≤10 % DMSO solutions. These plates are validated for high drug recovery against a panel of nine drugs, and display 80-100% recovery from 10 µM solutions in 5% DMSO/PBS.



Description	Catalogue Number
0.4 µm Multiscreen Solvinert Filter Plate, hydrophilic PTFE	MSRLN0410
0.4 µm Multiscreen Solvinert Filter Plate, hydrophobic PTFE	MSRPN0410
0.4 µm Multiscreen Deep Well Solvinert Filter Plate, hydrophilic PTFE	MDRLN0410
0.4 µm Multiscreen Deep Well Solvinert Filter Plate, hydrophobic PTFE	MDRPN0410
0.4 µm Multiscreen Deep Well Solvinert Filter Plate, hydrophobic PTFE with prefilter	MDRPNP410
0.4 µm MultiScreen <sub>HTS</sub> -PCF Filter Plate, polycarbonate filter	MSSLBPC10
MultiScreen Vacuum Manifold	MSVMHTS00
Deep Well Collar, for vacuum manifold	MSVMHTS0D



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