

# LC-Pak<sup>®</sup> Point-of-use Polisher

## C18 Reverse phase silica

### Key Benefits

- The LC-Pak<sup>®</sup> cartridge is easily connected to the outlet of all Merck Millipore Type I water systems (Milli-Q<sup>®</sup>, Direct-Q<sup>®</sup>, Synergy<sup>®</sup> and Simplicity<sup>®</sup>)
- Final purification step uses efficient C18 reverse phase silica technology to provide fresh ultrapure water with low traces of organics—at high flow rate, when you need it
- Delivers a minimum of 500 L of organic-free ultrapure water
- Designed to answer the demands of UPLC, LC-MS and LC-MS/MS analytical techniques used for organic trace and ultra-trace analysis
- Validated for the production of water whose quality equals or exceeds the specifications of bottled water for LC-MS
- Each LC-Pak cartridge is delivered with a Certificate of Quality

Recent advances in analytical techniques such as UPLC, LC-MS, LC-MS / MS have considerably improved the sensitivity of organic and biochemical molecule detection. As a result, these techniques now require improved water quality for the production of mobile phase, buffers, blanks, standards preparation, sample dilution, glassware rinsing or extraction.



Although fresh Milli-Q® water has proved adequate for most procedures involving these techniques until recently, there is now a growing need for higher water quality in some advanced applications.

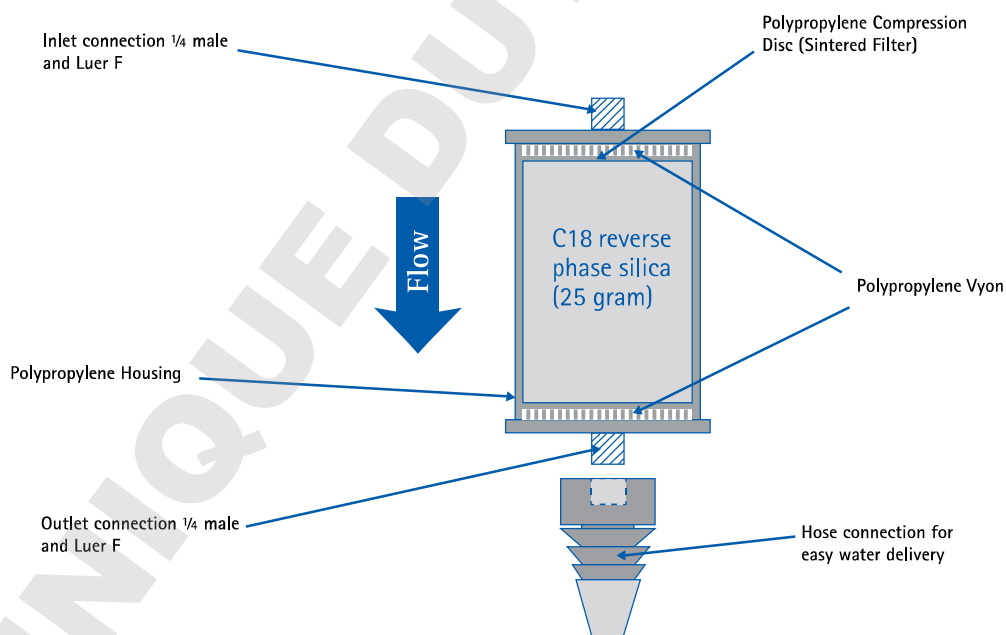
To answer this emerging need, Merck Millipore has developed a new POD-Pak® designed to produce ultrapure water with an organics contamination level below most water sources available today, at a fraction of the cost.

The LC-Pak® cartridge can be connected to the outlet of existing and new Merck Millipore Type I water systems (Milli-Q®, Direct-Q®, Synergy® and Simplicity®) to produce water with a TOC level below 5 ppb and deliver at least 500 L of ultrapure water with minimum trace organic contamination. The LC-Pak® cartridge uses the well-known reversed-phase silica purification media to remove traces of neutral organics.



### LC-PAK® CARTRIDGE DESIGN

The LC-Pak® is designed to provide scientists with the certitude that the ultrapure water that they are using in critical organic molecules analysis at trace and ultra-trace levels will be adequate.



The granular C18 reverse phase silica in the polypropylene housing is tightly packed by a compression disc to avoid any channeling effect. This ensures that the water passing through the LC-Pak® will be in close contact with the C18 chains binding organic molecules by hydrophobic interactions.

When required, the LC-Pak® outlet can be connected to a 0.22 µm in-line filter.

## LC-PAK® CARTRIDGE OPERATION

The LC-Pak® is easy to use: simply flush it with 50 mL methanol to properly wet the pores of the C18 reverse phase purification media, connect the LC-Pak® to the outlet of the Merck Millipore ultrapure water system and flush with ultrapure water for 10 minutes. You are now ready to deliver at least 500 L of ultrapure water with low trace organic.

## LC-PAK® CARTRIDGE SPECIFICATIONS

The LC-Pak® cartridge was extensively validated to ensure that the water quality at the outlet matches the most demanding requirements.

Parameter	Specification of LC-Pak® ultrapure water	Comments
HPLC Gradient Test – Absorbance of highest eluted peak	ZRXQ003 WW*	Concentration of 60 mL water at 1 mL/min prior to elution
HPLC Gradient Test – Absorbance of highest eluted peak	At 210 nm < 0.006 AU At 254 nm < 0.002 AU	No water preconcentration
Optical properties: absorbance in UV range	UV 200 nm < 0.05 AU UV 205 nm < 0.01 AU UV 210 nm < 0.01 AU UV 254 nm < 0.005 AU	
Fluorescence as quinine	At 254 nm < 1 ppb At 365 nm < 1 ppb	
Compliance with suitability for LC/MS: Reserpine test	No peak higher than 10 ppb Reserpine at 609 m/z in ESI +	
Residue after evaporation	< 0.0001 % w/w	Test performed as specified in ISO 3696 procedure

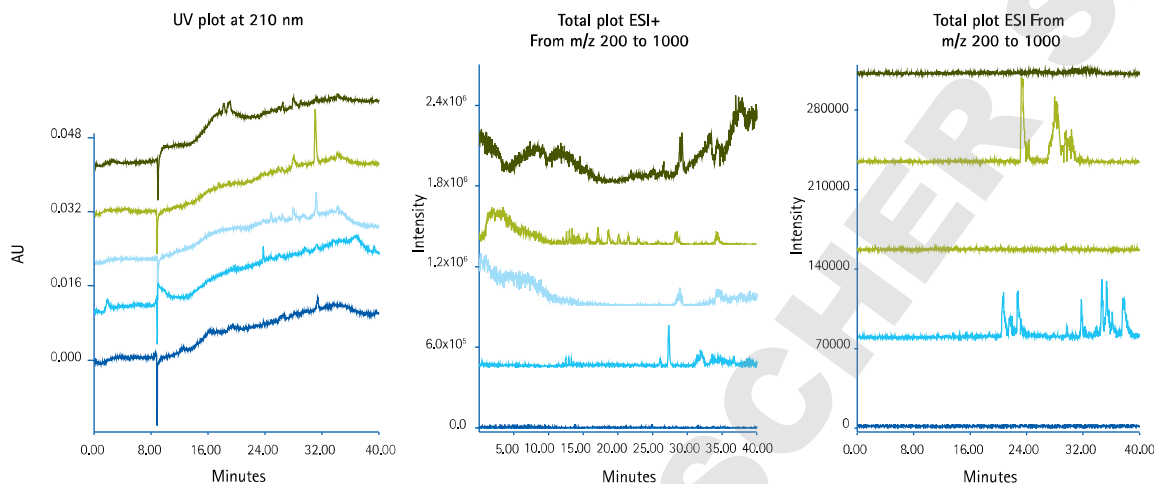
An LC-Pak® validation guide is available should you wish to review the details of the validation report.

OPTIONAL  
Millipak® 0.22 µm end filter  
MPGP04001



## COMPARISON OF LC-PAK® AND SOME LC-MS BOTTLED WATER

In order to verify that fresh ultrapure water produced by a Milli-Q® system and an LC-Pak® cartridge matched or exceeded the quality of commercially available bottled water for LC-MS applications, different 60 mL water samples were pre-concentrated on a C18 reverse phase chromatography column, then eluted and analyzed by LC-MS (PDA, single quadrupole). Examples of the results obtained are shown below.



Bottled water F for LC-MS  
 Bottled water J for LC-MS  
 Bottled water R for LC-MS  
 Bottled water B for LC-MS  
 Milli-Q® Integral with LC-Pak®

## EQUIPMENT

The equipment used throughout the experiment was from Waters® Corporation, Milford, MA, U.S.A.

- LC system: Alliance® 2695
- Pre-column Column: C18 X-Terra®; 3 µm, 4.6 x 30 mm
- Column: C18 Atlantis; 3 µm, 2.1 x 150 mm
- Detectors: PDA Model 2996
- Mass detector ZQ 2000™
- Elution solvents: Water to be tested, Acetonitrile HPLC grade (J.T. Baker)
- Computer for data acquisition and system control equipped with Empower® software

Detailed analytical conditions available upon request: internal procedure No. 00084229S0.

The entire study, including details of analytical procedures, is provided in the LC-Pak® cartridge Validation Guide.

## ORDERING INFORMATION

Description	Comments
LC-Pak® Cartridge (1/pk) delivered hermetically sealed, with a Certificate of Quality	LCPAK001
Cartridge installation and Conditioning Kit including the following reusable parts:	EDSKIT001
<ul style="list-style-type: none"> <li>• Polyethylene ¼ Gaz F-Hose barb connection with O-ring</li> <li>• Polyethylene ¼ G F – ¼ Gaz F connectors for connection to Millipak®</li> </ul>	
Millipak® 0.22 µm end filter	MPGP04001

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