



# Agilent Captiva Syringe Filters RAISE YOUR SAMPLE FILTRATION STANDARDS

The Measure of Confidence



**Agilent Technologies**

# SAMPLE FILTRATION

## Your time is precious... and so are your samples

Now more than ever, chromatographers are using filtration to help meet their unrelenting analytical demands and uncompromising expectations for quality, speed, and reproducibility.

For years, Agilent has understood that filtering samples prior to HPLC, UHPLC, GC/MS, and LC/MS analysis can improve both system performance and analytical quality – and this experience is reflected in our new line of Captiva syringe filters.



### Performance begins here: Now you can improve accuracy without adding time to the chromatography process

- **More choices:** Agilent Captiva filtration products are available in a wide range of sizes, formats, and membranes to cover every matrix and sample.
- **Certified cleanliness:** Agilent Captiva Premium syringe filters are shipped with an HPLC or LC/MS Certificate that guarantees extremely low levels of observed extractables.
- **Top speed:** Our new syringe filters have excellent flow rates and maximum sample loading capacity.
- **Unmatched quality:** Every syringe filter is constructed with the highest-grade virgin polypropylene or MBS housing, and is securely welded to prevent bursting and ensure sample integrity.

For optimal performance, column lifetime, and sample integrity, you can count on Agilent – the world chromatography leader – to help you improve your productivity.

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## Benefits of Filtration

Optimal Instrument Performance	Less System Downtime	Extend Column Lifetime	Greater Sample Integrity
			

Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

# Agilent Captiva Premium Syringe Filters



Sample filtration prior to HPLC, UHPLC, GC, GC/MS, or LC/MS analysis is critical to achieving optimal system performance. Agilent Captiva Premium Syringe Filters make the process faster than ever with the industry's highest flow rates and loading capacities. In addition, Agilent sets the standard for LC/MS testing and certifying more syringe filters to be completely free of observed extractables than any other manufacturer. All Agilent Captiva Premium Syringe Filters are supplied with a HPLC or LC/MS Certificate. Choose from a variety of membrane types and pore sizes to suit your needs.

## Premium Filters, 100/pk

Description	Diameter (mm)	Pore Size ( $\mu\text{m}$ )	Certification	Housing	Part No.
<b>PTFE</b>	4	0.2	LC	Polypropylene	5190-5082
	4	0.45	LC	Polypropylene	5190-5083
	15	0.2	LC	Polypropylene	5190-5084
	15	0.45	LC	Polypropylene	5190-5085
	25	0.2	LC	Polypropylene	5190-5086
	25	0.45	LC	Polypropylene	5190-5087
<b>Nylon</b>	15	0.2	LC	Polypropylene	5190-5088
	15	0.45	LC	Polypropylene	5190-5091
	25	0.2	LC	Polypropylene	5190-5092
	25	0.45	LC	Polypropylene	5190-5093
<b>PES</b>	15	0.2	LC/MS	Polypropylene	5190-5096
	4	0.45	LC	Polypropylene	5190-5095
	4	0.2	LC/MS	Polypropylene	5190-5094
	15	0.45	LC	Polypropylene	5190-5097
	25	0.2	LC/MS	Polypropylene	5190-5098
	25	0.45	LC	Polypropylene	5190-5099
<b>Regenerated cellulose</b>	4	0.2	LC	Polypropylene	5190-5106
	4	0.45	LC	Polypropylene	5190-5107
	15	0.2	LC	Polypropylene	5190-5108
	15	0.45	LC	Polypropylene	5190-5109
	25	0.2	LC	Polypropylene	5190-5110
	25	0.45	LC	Polypropylene	5190-5111
<b>Cellulose acetate</b>	28	0.2	LC	MBS	5190-5116
	28	0.45	LC	MBS	5190-5117
<b>Glass microfiber</b>	15		LC/MS	Polypropylene	5190-5120
	28		LC	MBS	5190-5122

Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

# Layered Filters with Pre-Filter

The integrated microfiber glass pre-filter offers the added benefit of filtering difficult solutions without adversely affecting the efficiency of the membrane. Pre-filters reduce the effort required to move highly particulate-laden samples through a filter and eliminate the need for sequential filtration.

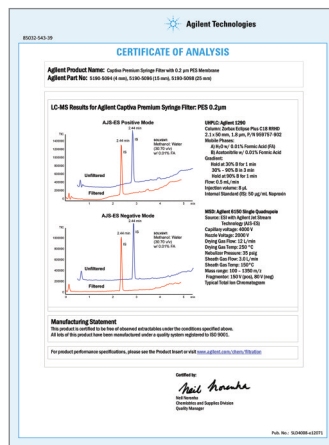
## Layered Filters, 100/pk

Description	Diameter (mm)	Pore Size (µm)	Certification	Housing	Part No.
Glass microfiber/ PTFE	15	0.2	LC	Polypropylene	5190-5126
	15	0.45	LC	Polypropylene	5190-5127
	25	0.2	LC	Polypropylene	5190-5128
	25	0.45	LC	Polypropylene	5190-5129
Glass microfiber/ Nylon	15	0.2	LC	Polypropylene	5190-5132
	15	0.45	LC	Polypropylene	5190-5133
	25	0.2	LC	Polypropylene	5190-5134
	25	0.45	LC	Polypropylene	5190-5135

## Captiva Disposable Syringes, Individually bagged, 100/pk

Volume (mL)	Part No.
5	9301-6476
10	9301-6474
20	5190-5103

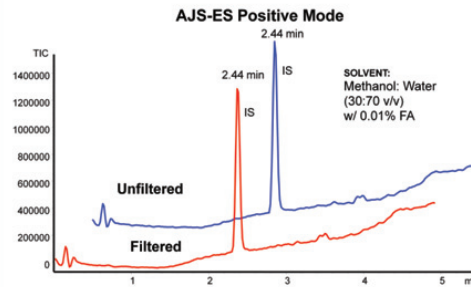
### LC/MS Certificate



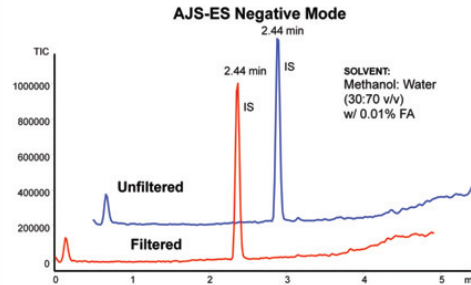
## CERTIFICATE OF ANALYSIS

**Agilent Product Name:** Captiva Premium Syringe Filter with 0.2 µm PES Membrane  
**Agilent Part No:** 5190-5094 (4 mm), 5190-5096 (15 mm), 5190-5098 (25 mm)

### LC-MS Results for Agilent Captiva Premium Syringe Filter: PES 0.2µm



**UHPLC: Agilent 1290**  
 Column: Zorbax Eclipse Plus C18 RRHD  
 2.1 x 50 mm, 1.8 µm, P/N 959757-902  
**Mobile Phases:**  
 A) H<sub>2</sub>O w/ 0.01% Formic Acid (FA)  
 B) Acetonitrile w/ 0.01% Formic Acid  
**Gradient:**  
 Hold at 30% B for 1 min  
 30% – 90% B in 3 min  
 Hold at 90% B for 1 min  
**Flow:** 0.5 mL/min  
**Injection volume:** 8 µL  
**Internal Standard (IS):** 50 µg/mL Naproxin



**MSD: Agilent 6150 Single Quadrupole**  
 Source: ESI with Agilent Jet Stream  
 Technology (AJS-ES)  
 Capillary voltage: 4000 V  
 Nozzle Voltage: 2000 V  
 Drying Gas Flow: 12 L/min  
 Drying Gas Temp: 250 °C  
 Nebulizer Pressure: 35 psig  
 Sheath Gas Flow: 3.0 L/min  
 Sheath Gas Temp: 150 °C  
 Mass range: 100 – 1350 m/z  
 Fragmentor: 150 V (pos), 80 V (neg)  
 Typical Total Ion Chromatogram

### Manufacturing Statement

This product is certified to be free of observed extractables under the conditions specified above. All lots of this product have been manufactured under a quality system registered to ISO 9001.

For product performance specifications, please see the Product Insert or visit [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

## Agilent Captiva Syringe Premium Filter Specifications

	PTFE						Cellulose Acetate	
	4 mm		15 mm		25 mm		28 mm	
Pore size	0.2	0.45	0.2	0.45	0.2	0.45	0.2	0.45
Filter area (cm <sup>2</sup> )	0.07	0.07	1.7	1.7	4.8	4.8	6.2	6.2
Housing material	PP	PP	PP	PP	PP	PP	MBS (blue)	MBS (yellow)
Bubble point	>1.4 bar	>0.9 bar	>1.4 bar	>0.9 bar	>1.4 bar	>0.9 bar	>3.2 bar	>2.0 bar
Burst pressure before stabilization	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar
Average flow rate for ethanol (@ 1.0 bar)	>1.0 mL/min @ 3.0 bar	>2.0 mL/min @ 3.0 bar	>20 mL/min	>45 mL/min	>70 mL/min	>130 mL/min		
Average flow rate for water (@ 1.0 bar)							>60 mL/min	>160 mL/min
Sterile filtration capability (Bacterial Challenge Test with 10 <sup>7</sup> Brevundimones diminuta for 0.2 µm)	Not tested	Not tested	All filtrates sterile @ 4.0 bar		All filtrates sterile @ 4.0 bar		All filtrates sterile @ 4.0 bar	Not tested
Key properties	Broad chemical compatibility, highly resistant to strong acids and bases. Hydrophobic						Very low protein binding. Hydrophilic	
pH range	1 to 14						4 to 8	
Gamma globulin adsorption (protein binding)							<10 µg/cm <sup>2</sup>	

	Glass Microfiber/Nylon		Glass Microfiber/PTFE			
	25 mm		15 mm		25 mm	
Pore size	0.2 µm (nylon)	0.45	0.2	0.45	0.2	0.45
Filter area (cm <sup>2</sup> )	4.8	4.8	1.7	1.7	4.8	4.8
Housing material	PP	PP	PP	PP	PP	PP
Bubble point	>3.0 bar	>2.0 bar	>1.4 bar	>0.9 bar	>1.4 bar	>0.9 bar
Burst pressure before stabilization	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar
Average flow rate for ethanol (@ 1.0 bar)			>20 mL/min	>45 mL/min	>70 mL/min	>130 mL/min
Average flow rate for water (@ 1.0 bar)	>50 mL/min	>80 mL/min				
Sterile filtration capability (Bacterial Challenge Test with 10 <sup>7</sup> Brevundimones diminuta for 0.2 µm)	Not tested	Not tested	All filtrates sterile @ 4.0 bar		All filtrates sterile @ 4.0 bar	
Key properties	Best for highly particulate laden samples; compatible with most organic solvents. Not suitable for protein recovery applications. Hydrophilic		Best for highly particulate laden samples; broadest chemical compatibility, particularly with strong acids and bases. Hydrophobic			
pH range	3 to 14		1 to 14			
Gamma globulin adsorption (protein binding)						

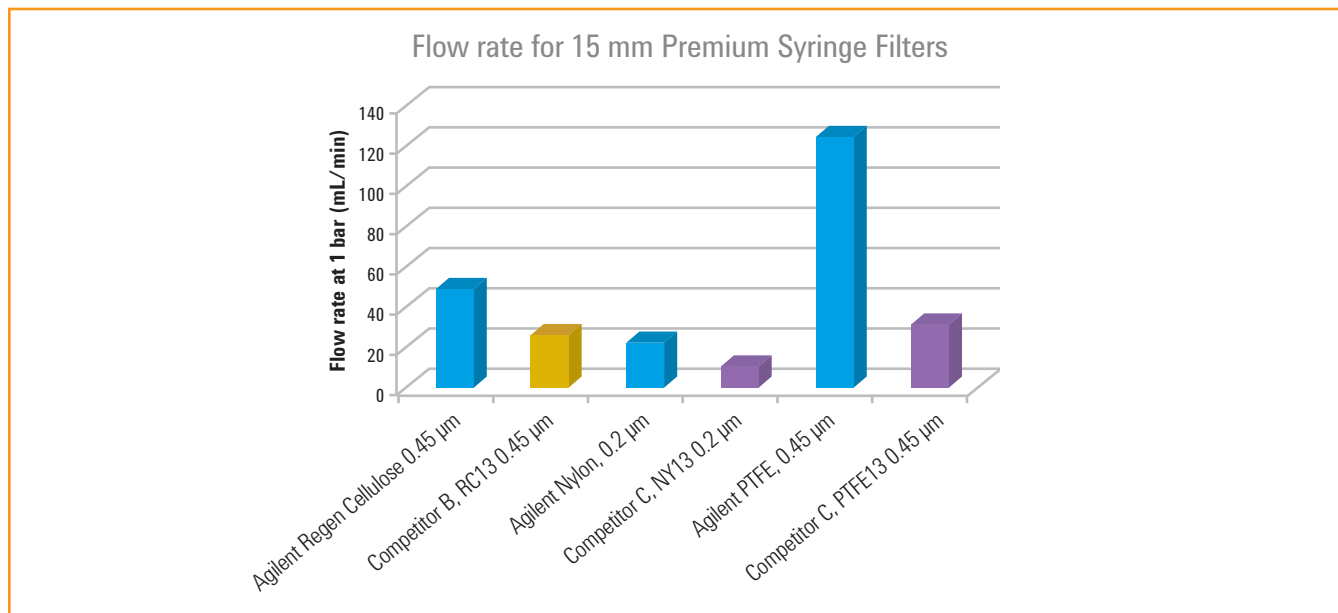
Regenerated Cellulose						Glass Microfiber/Nylon	
4 mm		15 mm		25 mm		15 mm	
0.2	0.45	0.2	0.45	0.2	0.45	0.2	0.45
0.07	0.07	1.7	1.7	4.8	4.8	1.7	1.7
PP	PP	PP	PP	PP	PP	PP	PP
>3.4 bar	>2.0 bar	>3.4 bar	>2.0 bar	>3.4 bar	>2.0 bar	>3.0 bar	>2.0 bar
>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar
>0.5 mL/min @ 3.0 bar	>1.5 mL/min @ 3.0 bar	>10 mL/min	>30 mL/min	>60 mL/min	>100 mL/min @ 1.0 bar	>20 mL/min	>40 mL/min
Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested	Not tested
Broad chemical compatibility, also low protein binding. Suitable for most HPLC & UHPLC applications. Hydrophilic						Best for highly particulate laden samples; compatible with most organic solvents. Not suitable for protein recovery applications. Hydrophilic	
3 to 12						3 to 14	
<10 µg/cm <sup>2</sup>							

Nylon				PES					Glass Microfiber	
15 mm		25 mm		4 mm	15 mm		25 mm		15 mm	28 mm
0.2	0.45	0.2	0.45	0.2	0.2	0.45	0.2	0.45	n/a	n/a
1.7	1.7	4.8	4.8	0.07	1.7	1.7	4.8	4.8	1.7	6.2
PP	PP	PP	PP	PP	PP	PP	PP	PP	PP	MBS (white)
>3.0 bar	>2.0 bar	>3.0 bar	>2.0 bar	>3.2 bar	>3.2 bar	>2.3 bar	>3.2 bar	>2.3 bar		>0.5 bar
>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar	>6.0 bar
>20 mL/min	>40 mL/min	>50 mL/min	>80 mL/min	>2.5 mL/min	>40 mL/min	>60 mL/min	>100 mL/min	>140 mL/min	>250 mL/min	>450 mL/min
All filtrates sterile @ 4.0 bar	Not tested	All filtrates sterile @ 4.0 bar	Not tested	Not tested	All filtrates sterile @ 4.0 bar	Not tested	All filtrates sterile @ 4.0 bar	Not tested	Not tested	Not tested
Broad chemical compatibility, excellent choice for organic solvents and samples with higher pH. Hydrophilic				Compatible with aqueous solutions, and some organic solvents extremely low extractables and excellent flow rates; low protein binding. Hydrophilic					Used as a pre-filter, broad compatibility with organic solvents and strong acids. Hydrophilic	
3 to 14				3 to 12					1 to 14	
~50 µg/cm <sup>2</sup>				<8 µg/cm <sup>2</sup> (for BSA)						

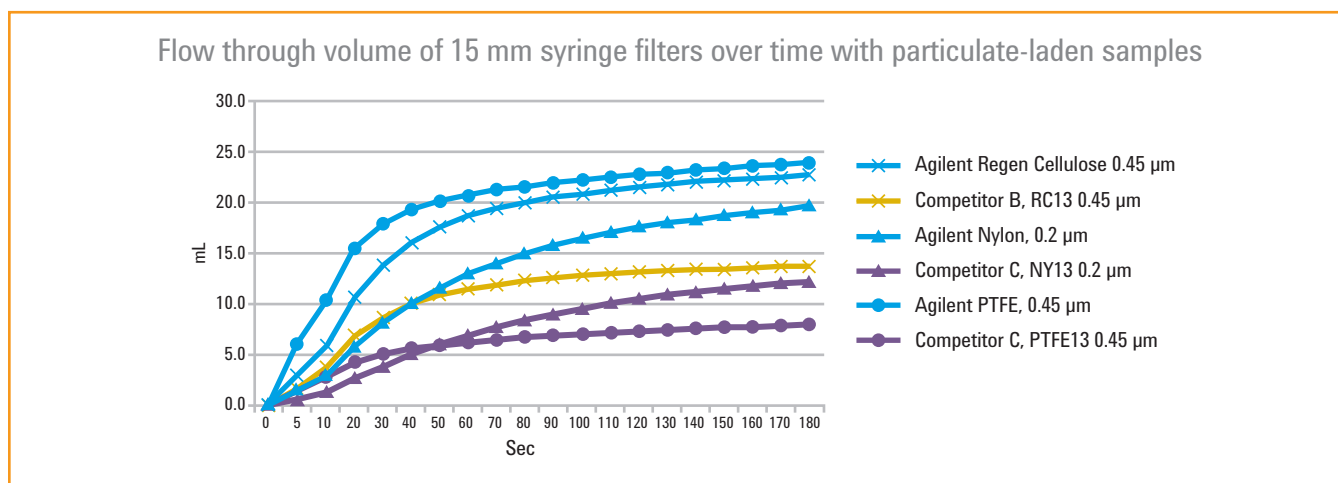
Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

# Proof of Performance: Flow Rate & Volume Capacity

Choose Agilent Captiva Premium Syringe filters for greater filtration speed and recovery than other filters of the same size. We understand the demands on chromatographers, so we've designed our syringe filters to make filtration fast, easy and effective.



With Agilent syringe filters, particulates will not clog the membrane as easily as with competitor's syringe filters. Even with highly particulate-laden samples, you can be assured more of your sample will be filtered than with competitor's products.



Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)



# Proof of Performance: Filtration Efficiency

## Testing Method

### Sample preparation

The surfactant solution, 0.1% Triton X-100, was used to prepare 0.01% latex beads (0.3 µm and 0.5 µm) solution. The 0.1% Triton X-100 was used to maintain the homogeneity of latex beads solutions.

### Filtration

The challenging solution was passed through each individual syringe filter and a 1-mL filtrate was collected in a 2-mL vial for an HPLC run.

Ten different filters of each kind of filter were tested.

### Filtrate measuring on HPLC/UV

The maximum absorbance of the latex beads solutions was observed at 272 nm, which was used to correlate latex beads concentration with absorbance.

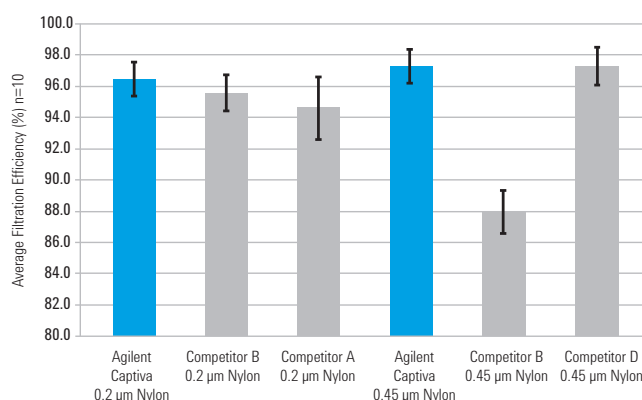
A simple HPLC method was used for automatic testing under UV 272 nm. No column was used. The mobile phase was water and a flow rate of 1.0 mL/min was used.

The eluted peak at 272 nm was used for filtration efficiency calculation.

Blank 0.1% Triton X-100 was run to correct contributions from surfactant absorbance at 272 nm.

**Agilent Captiva Syringe Filters provide equivalent or better filtration efficiency than competitors' equivalent products on particulates removal**

Average Filtration Efficiency of Agilent Captiva Syringe Filters vs. Competitors



$$\text{Filtration efficiency (\%)} = \frac{\left( \frac{\text{PeakArea}_{\text{Unfiltered LBSolution}}}{\text{PeakArea}_{\text{Unfiltered Blank}}} \right) - \left( \frac{\text{PeakArea}_{\text{Filtered LBSolution}}}{\text{PeakArea}_{\text{Filtered Blank}}} \right)}{\left( \frac{\text{PeakArea}_{\text{Unfiltered LBSolution}}}{\text{PeakArea}_{\text{Unfiltered Blank}}} \right)} \times 100\%$$

**Agilent Captiva Syringe Filters provide consistent and higher than 90% filtration efficiency on particulate removal**

### Agilent premium 0.2 µm syringe filters

### Agilent premium 0.45 µm syringe filters

	Nylon	PTFE	RC	PES	GF/NY	GF/PTFE	Nylon	PTFE	PES	CA	GF/NY	GF/PTFE
1	96.0	92.3	89.8	92.1	99	99.4	95.2	97	93.6	92.4	96.8	98.4
2	95.9	91.4	90.6	91.4	99	98.9	93.2	96.5	93.6	95.0	97.1	98.8
3	94.5	93.3	90.3	89.5	99.2	99.0	95.5	97.5	93.5	96.3	96.4	97.7
4	96.6	92.3	91.7	99.0	99.6	98.6	95.4	96.6	88.5	97.2	99.3	98.8
5	95.4	91.2	92.4	96.3	98.8	98.8	94.9	96.0	88.2	96	99.0	99.7
6	95.6	91.1	90.8	99.9	99.3	98.5	95.3	95.7	92.3	95.6	100	96.8
7	99.9	91.1	98.2	99.0	99.4	99.4	99.5	95.2	94.9	96.7	98.2	97.6
8	99.8	91.2	99.0	97.8	95.0	99.0	98.0	97.8	89.4	93.8	98.9	98.5
9	99.7	90.9	96.4	95.2	95.9	99.9	97.7	94.9	87.3	92.5	100.2	98.0
10	99.2	91.3	95.7	96.1	94.7	99.6	99.7	94.8	87.5	92.8	100.5	101.3
<b>Average Eff (%)</b>	<b>97.3</b>	<b>91.6</b>	<b>93.5</b>	<b>95.6</b>	<b>98.0</b>	<b>99.1</b>	<b>96.4</b>	<b>96.2</b>	<b>90.9</b>	<b>94.8</b>	<b>98.6</b>	<b>98.6</b>
RSD (%)	2.2	0.8	3.7	3.7	2.0	0.5	2.2	1.1	3.3	1.9	1.5	1.3

# Filtration Impact on LC Column Life

## Importance of Filtration

Column plugging is the most frequent cause of column failure encountered by chromatographers. Injection of samples containing even small amounts of particulate will clog the column inlet, cause high column backpressure, retention-time shift and loss of resolution, and subsequently shorten the normal column lifetime. This impact can be more significant for sub-2  $\mu\text{m}$  columns. These smaller particle-size columns are usually used under high pressure, thus are more sensitive to pressure increase caused by the accumulated particulates on column.

Additionally, particulates can affect a variety of other components in the LC flow path, including the pump, the autosampler needle, and the injector switch valve. When particulates are caught in the switch valve the surface of the rotor can be damaged, causing carryover, sample cross-talk and leakage from the rotor. Therefore, Agilent always recommends filtration prior to any HPLC, UHPLC, or LC/MS injection. It is the best way to ensure proper system performance and column lifetime.

It is the intent of this work to demonstrate that sample filtration will lengthen the life of a column, not only the traditional LC columns using 0.45  $\mu\text{m}$  filters, but also the sub-2 micron LC columns using 0.2  $\mu\text{m}$  filters. To correlate the increased column life to the actual application, the plasma extracts by PPT treatment compared to samples without filtration, samples with centrifugation and samples with filtration.



Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

# Testing Method

## Sample preparation

- A.) The surfactant solution, 0.002% Triton X-100, was used to prepare 0.05% latex beads (0.3  $\mu\text{m}$  and 0.5  $\mu\text{m}$ ) solution.
- B.) Latex beads solution (0.3  $\mu\text{m}$ ) was used for sub-2 micron column life test. Unfiltered and filtered (using 0.2  $\mu\text{m}$  filters) samples were used for comparison of impact on sub-2 micron column life.
- C.) Human plasma extract was used for sub-2 micron column life test. Unfiltered, centrifuged, and filtered (using 0.2  $\mu\text{m}$  filters) samples were used for comparison of impact on sub-2 micron column life. The sample was prepared following the below steps.
1. 2 mL of human plasma was aliquoted into a test tube.
  2. 10 mL of acetonitrile with 1% acetic acid was added.
  3. Sample was vortexed vigorously and then centrifuged at 4000 rpm for 5 min.
  4. The supernatant was transferred into a clean test tube.
  5. The supernatant was blown dry with  $\text{N}_2$  at 37  $^\circ\text{C}$ .
  6. The dried sample was reconstituted in 10:90 MeOH/ $\text{H}_2\text{O}$ , vortexed and sonicated.

## Filtration

The challenge solution was passed through each individual syringe filter and a 1-mL filtrate was collected in a 2-mL vial for the HPLC run.

## UHPLC instrumentation (for sub-2 column life test)

**Column:** Agilent ZORBAX Eclipse Plus C18 RRHD column, 2.1 x 50 mm, 1.8  $\mu\text{m}$ , P/N 959757-902

Column was disconnected from the detector and allowed to run to drain.

**Mobile phase:** Acetonitrile: Water (35:65, v/v)

**Flow rate:** 0.4 mL/min, isocratic

**Injections:** 10  $\mu\text{L}$  per injection, 1 injection per minute

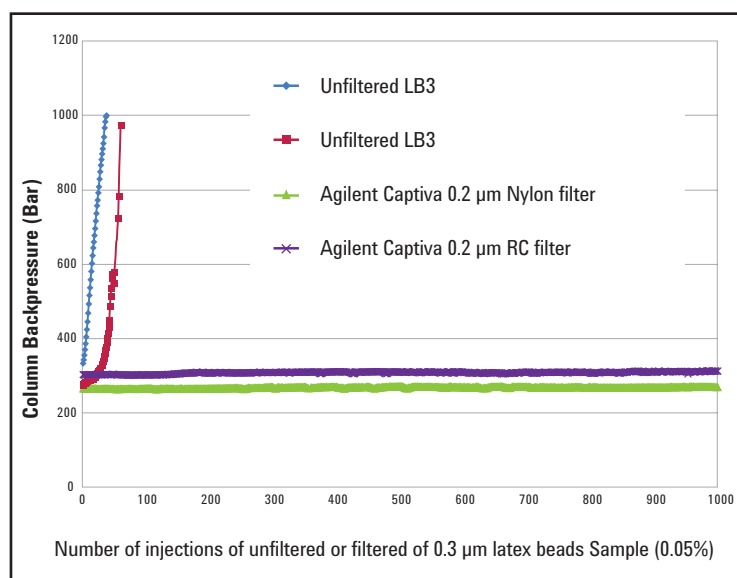
**Monitoring:** Column backpressure was recorded with the number of injections.

**Column failure:** When column backpressure exceeds 1000 bar.

**Sequence:** A sequence of 1000 injections was usually used, unless column failed in the middle due to high pressure. A new column was used for each individual sequence.

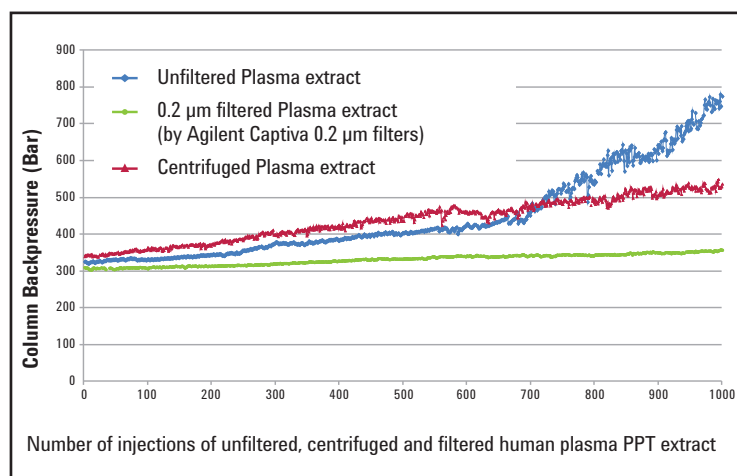
## Results – Filtration impact on sub-2 micron column A by Latex Bead 0.3 $\mu\text{m}$ solution

Effects on Filtration on sub-2 micron Column Life



## Results – Filtration impact on sub-2 micron column B by Human Plasma PPT Extract

Effects of filtration on sub-2 column life time



## Conclusion

Sample filtration prior to introduction into an HPLC system was shown to significantly improve column lifetime.

# Polyethersulfone (PES): the new standard in HPLC, UHPLC, and LC/MS sample preparation

LC/MS requires analysis at low levels, which means that there is a greater demand to reduce contaminants in your sample. Extractables and contaminants that can cause ion suppression or jeopardize analytical results are more apparent in LC/MS analyses. Therefore, filters that were previously fine for use on HPLC are no longer good enough. That's why Agilent has developed the Agilent Captiva PES Premium Syringe Filter. Certified on LC/MS for extremely low levels of extractables, thereby ensuring the integrity of your sample and the quality of your results.

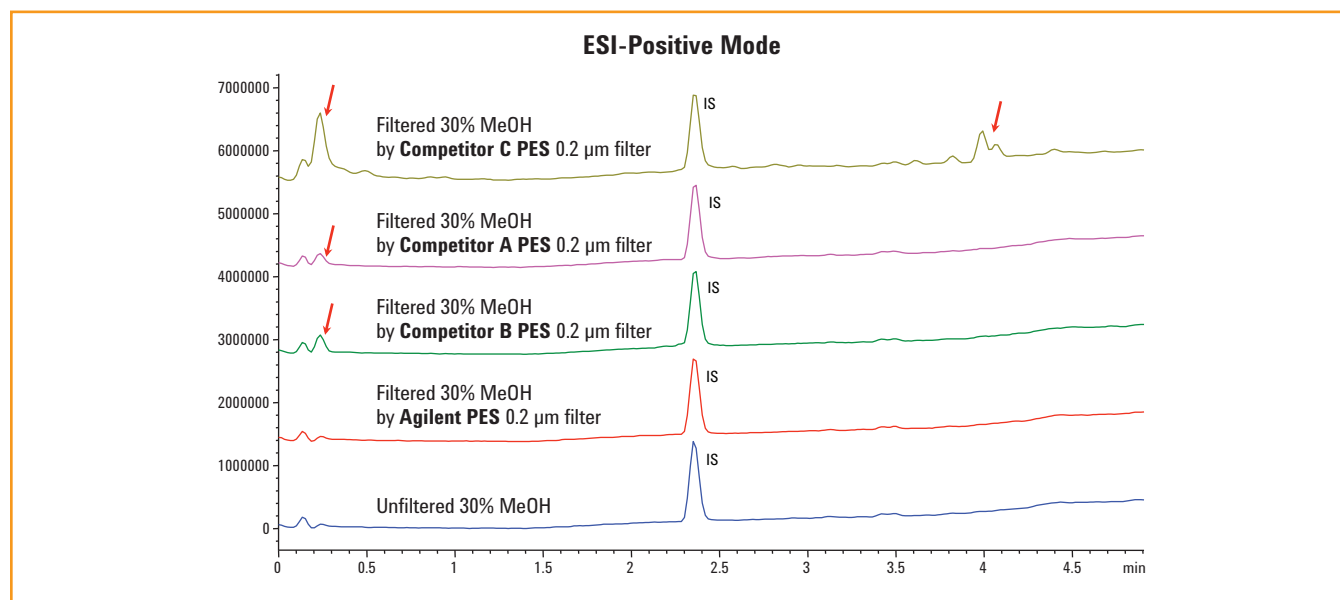
Additional features of the PES Premium Syringe Filter:

- **Superior flow rates:** hydrophilic membrane allows for fast flow of aqueous and slightly organic solutions, which leads to increased productivity
- **High loading capacity:** the highly asymmetric nature of the membrane allows for high loading capacity, increasing the efficiency of the filter
- **Extremely low protein binding:** Agilent PES filters have the lowest protein binding of any other filters in the industry, making them ideal for biological sample preparation
- **Virtually free of extractables\*:** as illustrated by the LC/MS chromatogram, these membranes are entirely free of extractables and therefore contribute no interference to chromatographic results

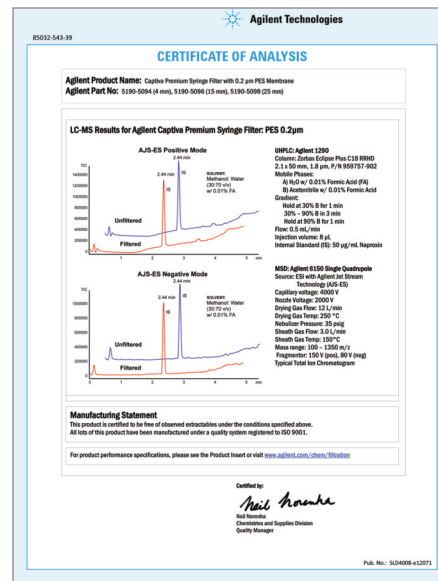
\*Free of extractables only under conditions specified on the certificate

The following LC/MS chromatogram shows that the Agilent PES syringe filter is cleaner than the competitors PES syringe filters.

## Premium Syringe Filter (ESI POS 30% MeOH)



## LC/MS Certificate:



# Agilent PES filters provide superior and consistent low protein binding for protein-related filtration

## PES is recommended for the following applications:

- General HPLC or UHPLC sample prep
- LC/MS sample prep
- Biological samples
- Tissue culture samples
- Drug filtration

A group of representative proteins were used for protein binding evaluation during filtration, from small to large size, from hydrophobic to hydrophilic properties.

Myoglobin was selected for further investigation at concentrations of 0.1 – 1.0 mg/mL.

Agilent PES filters provide higher and more consistent filtration recoveries for all of proteins evaluated, including dimers and monomers, than competitors' PES and PVDF filters.

Agilent PES membrane filters are the best choice for protein/peptide related sample filtration, consistently providing the lowest protein binding during filtration.

## Agilent PES filters provide higher recovery for protein filtration than competitors' PES and PVDF filters

Protein (tested at 0.5 mg/mL)		Recovery (%)		
		Agilent PES (0.2 µm)	P-PES (0.2 µm)	M-PES (0.2 µm)
BSA MW (monomer): 66.5 kDa	Dimer	99.7	99.7	99.5
	Monomer	100.2	100.0	100.6
Myoglobin MW (monomer): 17.6 kDa	Dimer	100.5	100.6	102.2
	Monomer	99.7	95.3	92.0
Ovalbumin MW (monomer): 45 kDa	Dimer	99.1	97.6	98.0
	Monomer	98.9	98.1	99.1
Cytochrome C MW: 12 kDa	Monomer	102.8	91.2	97.7
Thyroglobulin MW (monomer): 660kDa	Dimer	101.9	96.6	90.2
	Monomer	93.3	90.6	85.2

In a different experiment, Agilent PES filters provide higher and more consistent filtration recoveries for sticky protein myoglobin over the low to high concentrations, as compared to competitors' PES filters.

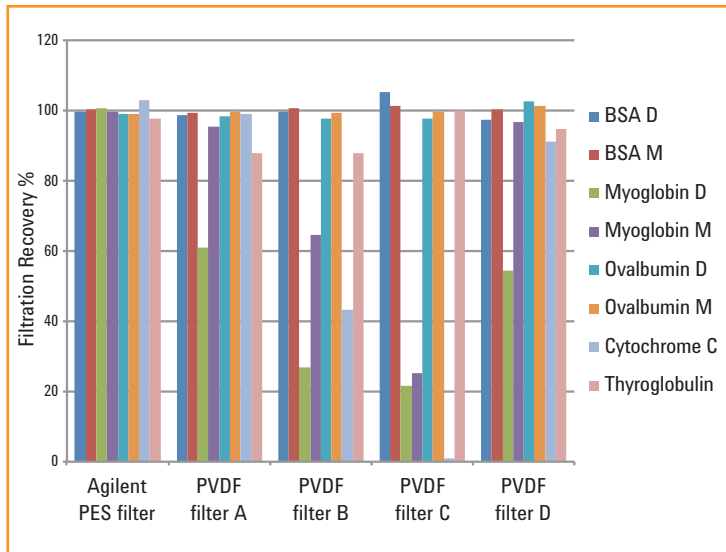
Myoglobin conc.	Agilent PES		M-PES		P-PES	
	D (Rec%)	M (Rec%)	D (Rec%)	M (Rec%)	D (Rec%)	M (Rec%)
0.1 mg/mL	81.6	96.1	19.3	61.4	16.5	58
0.2 mg/mL	83.3	96.3	29.7	84.9	23.6	76.3
0.5 mg/mL	85.4	97.0	70.5	95.3	56.5	92.0
1.0 mg/mL	98.3	98.4	93.4	98.4	77.6	97.1
Ave. Rec%	87.2	97.0	53.2	85.0	43.6	80.9
RSD	8.7	1.1	65.2	19.7	65.7	21.8

Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

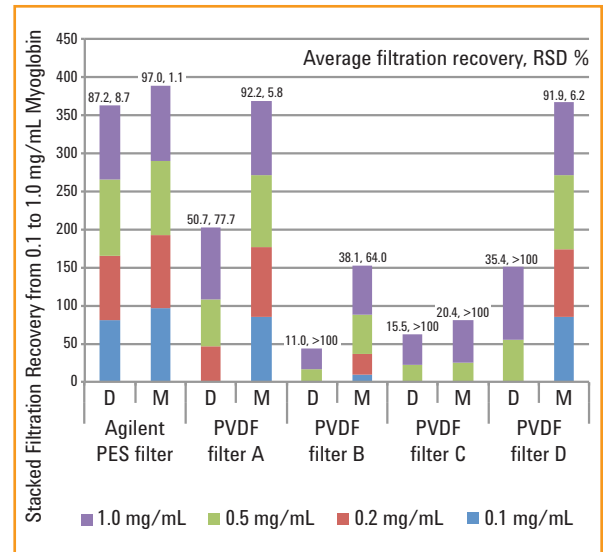
# Go with the flow with Agilent PES membranes

Agilent PES filter membranes are a better option than PVDF membranes for most LC analyses. Agilent PES has similar compatibility as PVDF for common LC solvents and is superior in terms of protein binding and cleanliness. Learn more about Agilent's clean syringe filters at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

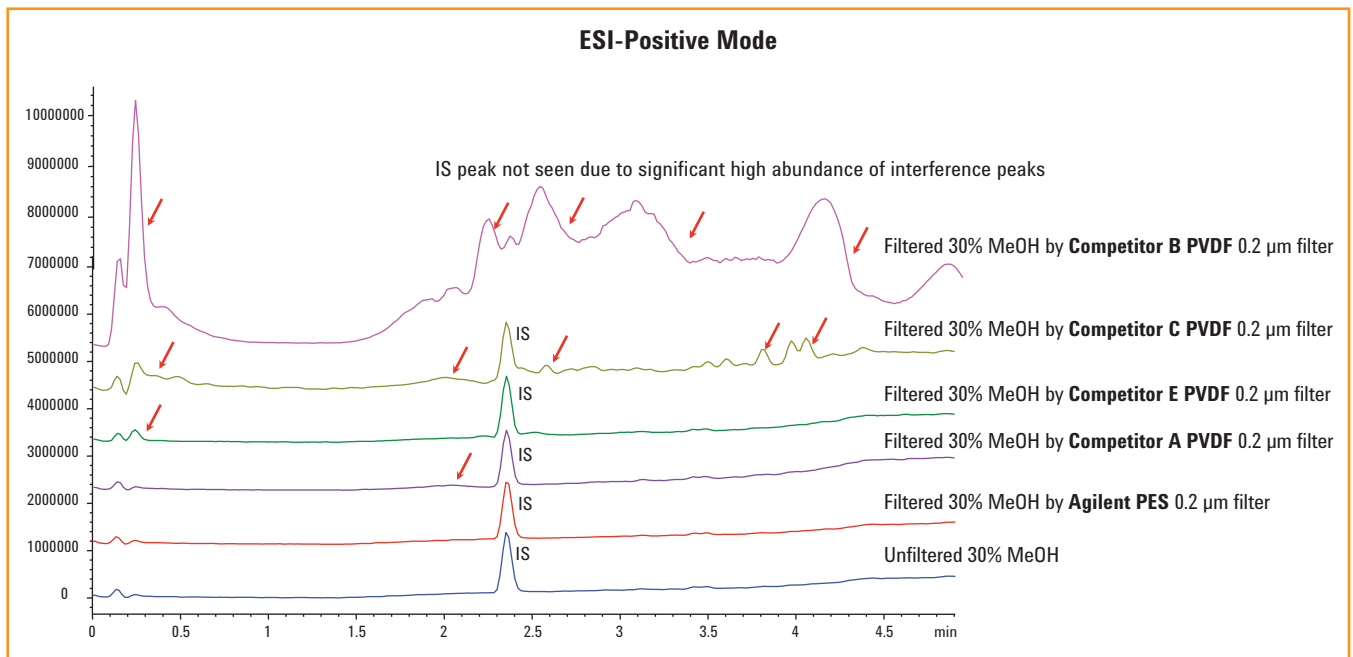
**Filtration recovery comparison for Agilent PES filter with other PVDF filters for different proteins at 0.5 mg/mL**



**Filtration recovery comparison for Agilent PES filter with other PVDF filters for myoglobin over different levels**



## Competitors' PES membranes



# Agilent Captiva Econofilters

High-quality Econofilters are shipped in large packs and are ideal for busy labs that need fast, efficient filtration at a reasonable price.

## Econofilters, 1000/pk

Description	Diameter (mm)	Pore Size (µm)	Housing	Part No.
PVDF	13	0.2	Polypropylene	5190-5261
	13	0.45	Polypropylene	5190-5262
	25	0.2	Polypropylene	5190-5263
	25	0.45	Polypropylene	5190-5264
PTFE	13	0.2	Polypropylene	5190-5265
	13	0.45	Polypropylene	5190-5266
	25	0.2	Polypropylene	5190-5267
	25	0.45	Polypropylene	5190-5268
Nylon	13	0.2	Polypropylene	5190-5269
	13	0.45	Polypropylene	5190-5270
	25	0.2	Polypropylene	5190-5271
	25	0.45	Polypropylene	5190-5272
PES	13	0.2	Polypropylene	5190-5273
	13	0.45	Polypropylene	5190-5274
	25	0.2	Polypropylene	5190-5275
	25	0.45	Polypropylene	5190-5276
Polypropylene	13	0.2	Polypropylene	5190-5277
	13	0.45	Polypropylene	5190-5278
	25	0.2	Polypropylene	5190-5279
	25	0.45	Polypropylene	5190-5280
Regenerated cellulose	13	0.2	Polypropylene	5190-5281
	13	0.2	Polypropylene	5190-5282
	25	0.2	Polypropylene	5190-5283
	25	0.45	Polypropylene	5190-5284



- Ideal for busy, high-volume labs
- Choose from a variety of membrane types and pore sizes
- Money-saving 1,000 packs

Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

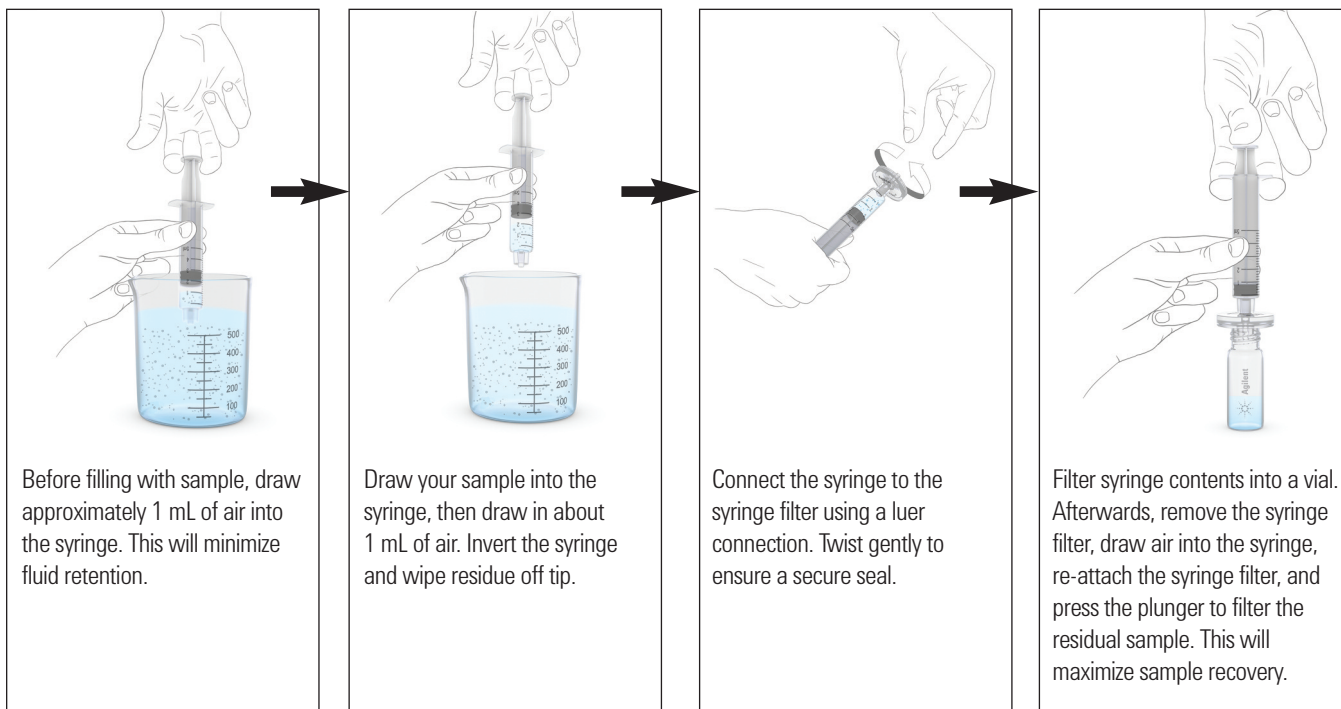
## Agilent Captiva Econofilter Specifications

Membrane	Diameter	Pore Size	Filtration Area (cm <sup>2</sup> )	Bubble Point (bar)	Flow Rate (mL/min@.07 bar)	Burst Pressure (bar)
PES	13	0.2 µm	0.92	≥3.5	≥7	6
		0.45 µm	0.92	≥2.2	≥11	6
	25	0.2 µm	2.98	≥3.5	≥30	6
		0.45 µm	2.98	≥2.2	≥45	6
PTFE	13	0.2 µm	0.92	≥1.0	≥6	6
		0.45 µm	0.92	≥0.5	≥12	6
	25	0.2 µm	2.98	≥1.0	≥24	6
		0.45 µm	2.98	≥0.5	≥50	6
PVDF	13	0.2 µm	0.92	≥3.0	≥6	6
		0.45 µm	0.92	≥1.6	≥12	6
	25	0.2 µm	2.98	≥3.0	≥20	6
		0.45 µm	2.98	≥1.6	≥45	6
PP	13	0.2 µm	0.92	≥0.15	≥50	6
		0.45 µm	0.92	≥0.05	≥100	6
	25	0.2 µm	2.98	≥0.15	≥150	6
		0.45 µm	2.98	≥0.05	≥300	6
Nylon	13	0.2 µm	0.92	≥2.8	≥2	6
		0.45 µm	0.92	≥1.8	≥6	6
	25	0.2 µm	2.98	≥2.8	≥8	6
		0.45 µm	2.98	≥1.8	≥24	6
RC	13	0.2 µm	0.92	≥3.0	≥16	6
		0.45 µm	0.92	≥3.0	≥26	6
	25	0.2 µm	2.98	≥2.5	≥50	6
		0.45 µm	2.98	≥3.0	≥80	6



## Step by step instructions

Follow these steps to realize the full benefits of filtration



**Warning:** Use caution with syringes smaller than 10 mL. They can easily generate enough pressure to burst the syringe filter. Agilent syringe filters are for laboratory use only. Pre-wetting the filter, while not necessary, can be performed as an extra step.



Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

# Agilent Captiva Syringe Filter Selection Guide

STEP 1

## Sample Composition

Aqueous		Solvents		
All aqueous solutions tissue culture/ protein applications/ large molecules		Hydrophilic aqueous/ solvent mixtures/ solvents	Hydrophilic solvent-mixtures/ solvents	Hydrophobic solvents/gases/ acids/bases
<b>PES</b> Polyethersulfone pH Range 3-12				
<b>CA</b> Cellulose Acetate pH Range 4-8	<b>RC</b> Regenerated Cellulose pH Range 3-12			
	<b>NY</b> Nylon pH Range 3-14			
		<b>PTFE</b> Polytetrafluorethylene pH Range 1-14		

STEP 2

## Sample Volume

4 mm for up to 1 mL	15 mm for up to 15 mL	25-28 mm for up to 150 mL
		
0.1-1 mL	15 mL	10-150 mL

STEP 3

## What is the Particle Size of Your LC Columnn?

Columns packed < 2 µm particles	Columns packed > 2 µm particles
<b>0.2 µm</b> UHPLC	<b>0.2 µm</b> or 0.45 µm HPLC

## Applications

Type of Filtration	Recommended	Alternatives
HPLC • UHPLC • LC/MS • GC	RC	PTFE or Nylon
ICP-MS	PTFE	Glass Fiber/PTFE (High Particle Samples)
CE	RC	Nylon
Undiluted Organic Solvents	PTFE	Nylon
Protein Analysis • Samples with Biomolecules – Buffers	PES	RC or CA
Tissue Culture Media	PES	RC or CA
High Particle-Load Samples – Organic Solvents	Glass Fiber/PTFE	
High Particle-Load Samples – Aqueous Solutions	Glass Fiber/Nylon	

# Premium Syringe Filter Chemical Compatibility

Legend		Polypropylene membrane	Polyethersulfone membrane	Cellulose Acetate membrane*	Polytetrafluorethylene membrane	Regenerated Cellulose membrane	Nylon membrane	Glass Fiber membrane*	Housing Methacrylate Butadiene Styrene	Housing Polypropylene
Compatible	••									
Limited compatibility	•									
Not compatible	—									
Not analyzed	N/A									
Filter		PP	PES	CA	PTFE	RC	Nylon	GF	MBS	PP
Housing										
<b>Solvents</b>										
Acetone		••	—	—	••	••	••	••	—	••
Acetonitrile		•	—	—	••	••	N/A	••	—	••
Benzene		—	—	•	••	••	••	••	—	••
Benzyl alcohol		••	—	—	••	••	••	••	—	•
n-Butyl acetate		N/A	—	—	••	••	••	••	—	••
n-Butanol		••	•	•	••	••	••	••	••	••
Carbon tetrachloride		•	—	—	••	••	••	••	—	—
Chloroform		•	—	—	••	••	••	••	—	••
Cyclohexane		••	—	•	••	••	••	••	•	•
Diethylacetamide		••	—	—	••	••	••	••	—	••
Diethyl ether		•	—	•	••	••	••	••	—	••
Dimethyl formamide		••	—	—	••	•	•	••	—	•
Dimethylsulfoxide		••	—	—	••	••	••	••	—	••
Dioxane		•	—	—	••	••	••	••	—	••
Ethanol, 98%		••	••	•	••	••	••	••	—	•
Ethyl acetate		•	—	—	••	••	••	••	—	•
Ethylene glycol		••	••	•	••	••	••	••	••	••
Formamide		N/A	••	—	••	•	••	••	••	••
Gasoline		•	•	•	••	••	••	••	••	••
Glycerin		••	••	•	••	••	••	••	•	•
n-Heptane		—	••	•	••	••	••	••	•	••
n-Hexane		—	••	•	••	••	••	••	•	•
Isopropanol		••	••	•	••	••	••	••	—	••
Isopropyl acetate		N/A	—	—	••	••	••	••	—	••
Methanol, 30%		••	••	N/A	••	••	••	••	••	••
Methanol, 98%		••	•	—	••	••	••	••	••	•
Methyl acetate		•	—	—	••	••	••	••	—	•
Methylene chloride		•	—	—	••	••	••	••	—	••

\*CA and GF membranes in MBS housing for 28 mm size

Contact time: 24 hours at 20 °C

Chemical compatibilities can be influenced by various factors. Therefore, we recommend that you confirm compatibility with the liquid you want to filter by performing a trial filtration run before you start your actual filtration.

(Continued)

Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

# Premium Syringe Filter Chemical Compatibility Continued

<b>Legend</b>		Polypropylene membrane	Polyethersulfone membrane	Cellulose Acetate membrane*	Polytetrafluorethylene membrane	Regenerated Cellulose membrane	Nylon membrane	Glass Fiber membrane*	Housing Methacrylate Butadiene Styrene	Housing Polypropylene
Compatible	••									
Limited compatibility	•									
Not compatible	—									
Not analyzed	N/A									
Filter	Housing	PP	PES	CA	PTFE	RC	Nylon	GF	MBS	PP
<b>Solvents</b>										
Methyl ethyl ketone		•	—	—	••	••	••	••	—	•
Methyl isobutyl ketone		•	—	—	••	••	••	••	—	•
Monochlorobenzene		••	—	—	••	••	••	••	•	••
Pyridine		•	—	—	••	••	••	••	—	••
Tetrahydrofuran		•	—	—	••	••	••	••	—	••
Toluene		—	—	•	••	••	••	••	—	••
Trichloroethane		N/A	—	—	••	••	••	••	—	N/A
Xylene		—	—	•	••	••	••	••	—	•
<b>Acids</b>										
Acetic acid, 25%		••	•	•	••	••	—	••	—	•
Acetic acid, 80%		••	N/A	—	••	••	—	••	—	•
Hydrochloric acid, 20%		••	••	—	••	—	—	••	•	•
Hydrofluoric acid, 25%		••	•	—	••	•	—	••	•	•
Nitric acid, 25%		••	•	—	••	—	—	••	•	•
Phosphoric acid, 1%		••	••	•	••	—	—	••	•	•
Sulfuric acid, 25%		••	•	—	••	•	—	••	•	••
Trichloroacetic acid, 10%		••	N/A	—	••	••	—	••	—	•
<b>Bases</b>										
Ammonium hydroxide, 25%		••	•	•	••	•	•	•	—	•
Sodium hydroxide, 1N		••	••	—	••	•	•	•	—	••
<b>Aqueous solutions</b>										
Formalin, 30%		••	•	••	••	•	••	••	•	•
Hydrogen peroxide, 30%		••	••	—	••	—	—	••	•	••
Sodium hypochlorite, 5%		N/A	••	—	••	—	—	••	•	•
<b>pH range</b>										
pH 1-14		••	—	—	••	—	—	••	—	••
pH 1-13		••	••	—	••	—	—	••	—	••
pH 3-14		••	•	—	••	•	••	••	—	••
pH 3-12		••	••	—	••	••	••	••	•	••
pH 4-8		••	••	••	••	••	••	••	••	••

\*CA and GF membranes in MBS housing for 28 mm size

Contact time: 24 hours at 20 °C

Chemical compatibilities can be influenced by various factors. Therefore, we recommend that you confirm compatibility with the liquid you want to filter by performing a trial filtration run before you start your actual filtration.

# Econofilters

## Chemical Compatibility

	Nylon membrane	Polyvinylidene Difluoride membrane	Polytetrafluorethylene membrane	Polyethersulfone membrane	Polypropylene membrane	Regenerated Cellulose membrane
Filter	Nylon	PVDF	PTFE	PES	PP	RC
<b>Solvents</b>						
Acetic Glacial	LC	R	R	NR	R	R
Acetone	R	LC	R	NR	R	R
Acetonitrile	LC	R	R	R	LC	R
Ammonium Hydroxide, 1N	R	LC	R	R	R	
Ammonium Hydroxide, 3N	R	NR	R	R	R	
Amyl Acetate	LC	LC	R		R	R
Amyl Alcohol	R	R	R	R	R	R
Aniline	LC	R	R	NR	LC	R
Benzene	LC	LC	R	LC	NR	R
Benzyl Alcohol, 100%	R	R	R	R	R	R
Butanone	LC	LC	R		R	R
Butyl Acetate	LC	R	R		LC	R
Butyl Alcohol	R	R	R	R	R	R
Carbon Tetrachloride	LC	NR	R	LC	LC	R
Chloroform	LC	LC	R	NR	LC	R
Cyclohexanone		LC	R	NR	R	R
Dichlorodifluoromethane, TF	R	R	R	R	LC	R
Dichlorodifluoromethane, TMC	LC	LC	R	NR	LC	R
Dimethyl Formamide, DMF	R	NR	R	NR	R	LC
Dioxane	R	LC	R		R	LC
Ethyl Acetate	LC	R	R	LC	LC	R
Ethyl Ether	LC	R	R	R	LC	R
Ethylene Dichloride	LR	LR	R	NR	LR	
Ethylene Glycol	R	R	R	LC	R	R
Formaldehyde Solution, 30%	R	R	R	R	R	LC

<b>Legend*</b>	
Recommended use	R
Not recommended use	NR
Limited Compatibility	LC
No instructions	

\*This guide is only for reference.

(Continued)

# Econofilters

## Chemical Compatibility

### Continued

	Nylon membrane	Polyvinylidene Difluoride membrane	Polytetrafluorethylene membrane	Polyethersulfone membrane	Polypropylene membrane	Regenerated Cellulose membrane
Filter	Nylon	PVDF	PTFE	PES	PP	RC
<b>Solvents</b>						
Gasoline	LC	LC	LC	R	LC	R
Glycerol	R	R	R	LC	R	R
Hydrochloric Concentrated	NR	R	NR	R	R	R
Hydrochloric, 25%	LC	R	R	R	R	R
Isopropanol	R	R	R	R	R	R
Isopropyl Ether		R	R		R	
Kerosene		R	R	R	R	
Methanol, 98%	LC	R	R	R	R	R
Methyl Acetate	LC	LC	R	NR	R	R
Methylene Chloride	NR	LC	R	NR	LC	R
Nitric, 25%	NR	LC	R		R	R
Nitric, Concentrated	NR	LC	R		R	NR
Phenol Aqueous, 10%	NR	LC	R	NR	R	R
Phosphoric, 25%	NR	R	R		R	R
Potassium hydroxide 3N	R	LC	R	R	R	
Propylene Glycol	R	R	R	LR	R	R
Pyridine	LC	LC	NR	NR	LC	R
Sodium Hydroxide, 3N	R	LC	R	R	R	
Sodium Hydroxide, 6N	R	NR	R	R	R	
Sulfuric, Concentrated	NR	LC	R	NR	R	LC
Tetrahydrofuran, THF	R	LC	R	NR	LC	LC
Toluene	NR	LC	R	NR	NR	R
Trichloroethylene	LC	NR	R	LC	LC	R
Water	R	R	R	R	R	R

#### Legend\*

Recommended use	R
Not recommended use	NR
Limited Compatibility	LC
No instructions	

\*This guide is only for reference.

Learn more about Agilent Captiva filtration products at [www.agilent.com/chem/filtration](http://www.agilent.com/chem/filtration)

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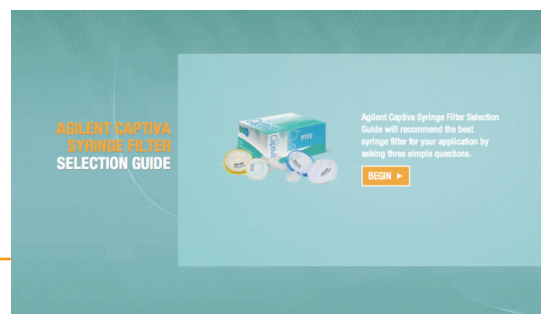
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