



Application Note

Low Extractable Syringe Filters for LCMS Applications

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Introduction

In analytical sample preparation, extraction and leaching of chemical compounds from filters are major concerns, particularly when using liquid chromatography mass spectrometry (LCMS) for analysis. LCMS has gained popularity due to its versatility and superior sensitivity for both qualitative and quantitative analyses. In LCMS instrumentation, one of the major foci of recent advancements is the improvement of method sensitivity that affords analysis at much lower limits of detection ($< \text{pg/mL}$).¹

The emerging trend in LCMS enables analysis at low levels, while the demand to reduce external contaminations, such as those coming from the filter, becomes more apparent. It is obvious that an underlying issue, when filtration is used for sample preparation, is the need to reduce the amount of extractables and leachables in the filter effluents that may ultimately jeopardize analytical results and data interpretation. To address this concern, Pall has introduced a new, unique Acrodisc® MS syringe filter that is certified for low extractables in highly sensitive LCMS methods.

This Application Note compares the cleanliness of the effluents using Pall's Acrodisc MS syringe filters with two other commercially-available, alternative syringe filters from Competitor A (PVDF filter) and Competitor B (hydrophilic PTFE filter) by LCMS analysis under the same filtration and test conditions unless otherwise noted.²

Experimental Conditions

Ten filters from one lot each of Pall's Acrodisc MS syringe filters, Competitor A (PVDF filters), and Competitor B (hydrophilic PTFE filters) were tested. For Pall's Acrodisc MS syringe filters and Competitor B filters, 50:50 Acetonitrile:water (v/v), pure Methanol, and 50:50 Methanol:water (v/v) were used as test fluids. Since the syringe filters from Competitor A were not recommended by the manufacturer for sample preparations using Acetonitrile, only pure Methanol and 50:50 Methanol:water (v/v) were tested with this type of filter. These fluids were chosen based on the most commonly used solvents for analytical sample preparations.

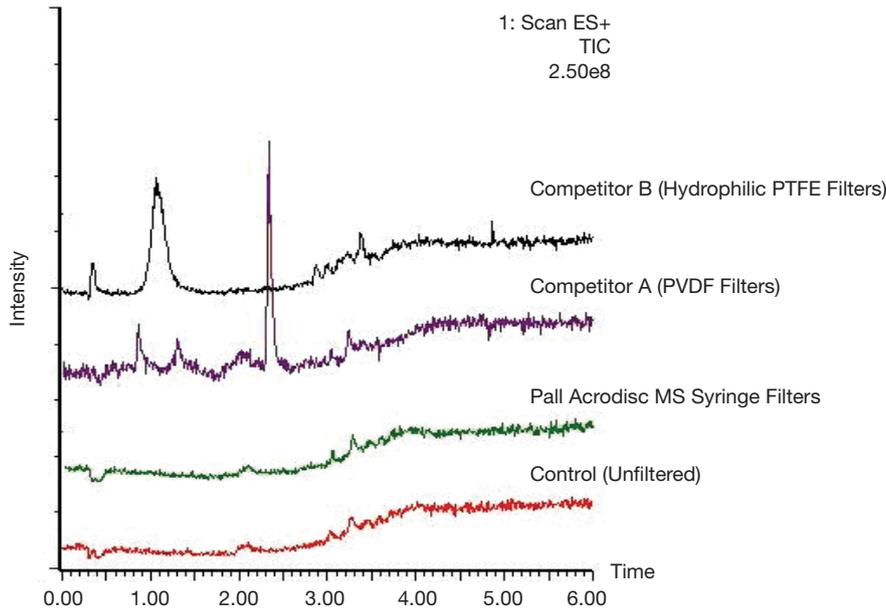
The test fluids were passed through each filter using a glass syringe, and the first approximately 2 mL of the effluents were collected and tested under the same LCMS test conditions. The analytical procedure for this evaluation consists of an ultra high performance liquid chromatographic (UHPLC) gradient elution method capable of detecting a broad range of organic compounds in the ES+ (Electrospray Positive) MS ionization mode in the parts per billion (ppb) level over a mass range of 100-1400 atomic mass units. The column used was an ACQUITY UPLC® BEH C18, 1.7 μm (Waters Corporation) with Mobile Phase A (LCMS-grade Methanol with 0.01% Formic Acid) and Mobile Phase B (LCMS-grade water with 0.01% Formic Acid).

Results and Discussion

The cleanliness of the effluents from Pall's Acrodisc MS syringe filters and two other syringe filters from Competitor A (PVDF filter) and Competitor B (hydrophilic PTFE filter) were evaluated using the same filtration procedure and LCMS test conditions. Representative Total-Ion-Current (TIC) chromatograms are shown in Figures 1-3. The results show consistent performance of the Acrodisc MS syringe filters using any of the fluids tested as compared to those from the competitor products under test conditions used in this study. In general, both the PVDF filters from Competitor A and the hydrophilic PTFE filters from Competitor B showed more extractable/leachable peaks than the Acrodisc MS syringe filters. The high degree of performance exhibited by the Acrodisc MS syringe filters can be attributed to the low level extractable/leachable compounds from the optimized water-wettable WWPTFE membrane and the materials of construction of the device.

Figure 1

Overlaid TIC Chromatograms of the Control (Unfiltered Test Fluid) and the Effluents from Pall Acrodisc MS Syringe Filters, Competitor A Filters, and Competitor B Filters Using Methanol:Water (50:50, v/v) as the Test Fluid



Note: All chromatograms are displayed on the same scale.

Figure 2

Overlaid TIC Chromatograms of the Control (Unfiltered Test Fluid) and the Effluents from Pall Acrodisc MS Syringe Filters, Competitor A Filters, and Competitor B Filters Using Methanol as the Test Fluid

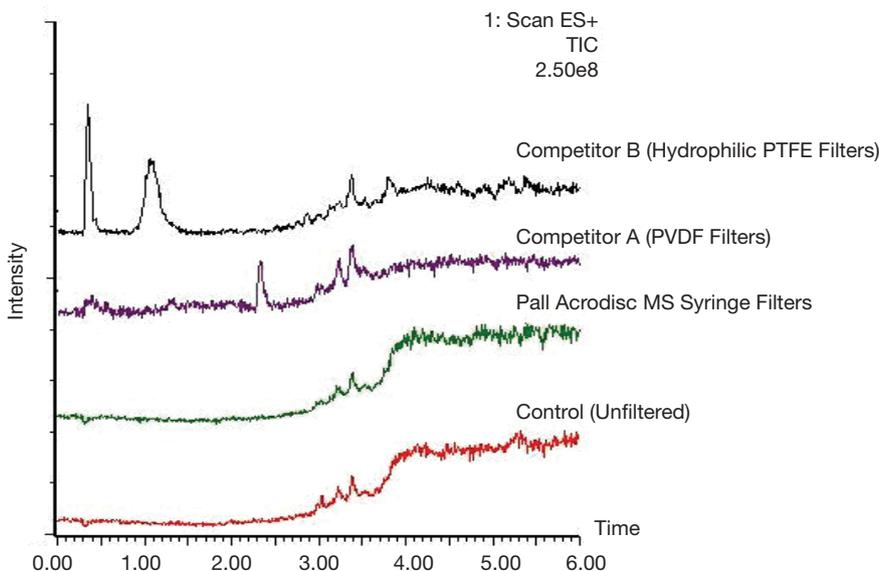
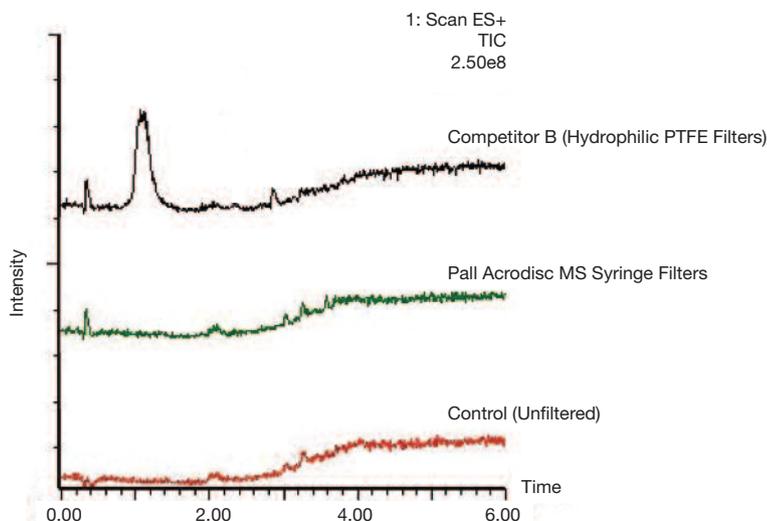


Figure 3

Overlaid TIC Chromatograms of the Control (Unfiltered Test Fluid) and the Effluents from Pall Acrodisc MS Syringe Filters and Competitor B Filters Using Acetonitrile:Water (50:50, v/v) as the Test Fluid



Conclusions

Cleanliness of filter effluents is an important consideration for LCMS analysis. Pall's Acrodisc MS syringe filters are qualified to ensure that effluents contain very low levels of extractable/leachable materials. Based on this study, Acrodisc MS syringe filters are an excellent choice for LCMS analysis using aqueous and mild organic solvents for sample preparation.

Ordering Information

Acrodisc MS Syringe Filters

Part Number	Description	Pkg
MS-3201	WWPTFE membrane, 0.2 µm, 25 mm	50/pkg

References

1. From Agilent Technologies website: http://www.chem.agilent.com/Library/brochures/5990-6301en_lo%20CMS.pdf
2. Pall Corporation Scientific and Laboratory Services, Report No. 16384GT.



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