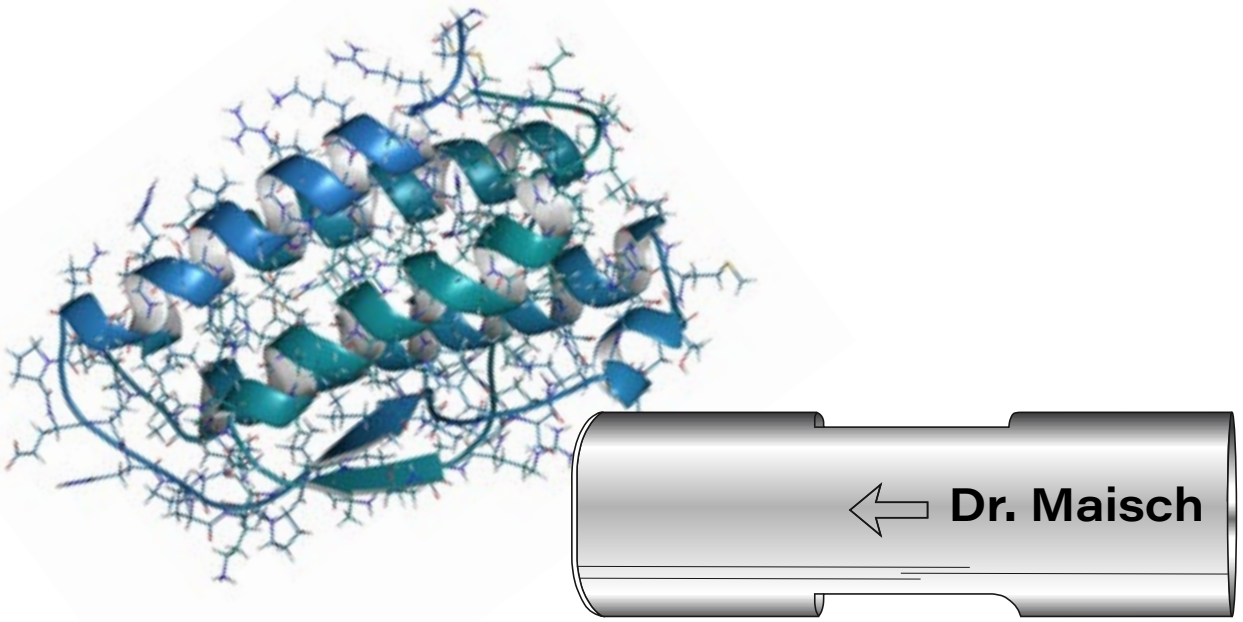
Dr. Maisch

Any Column, Any Size, Any Media



Trapping Cartridges & Holders

for Proteomics

MADE BY DR. MAISCH

CONTENT

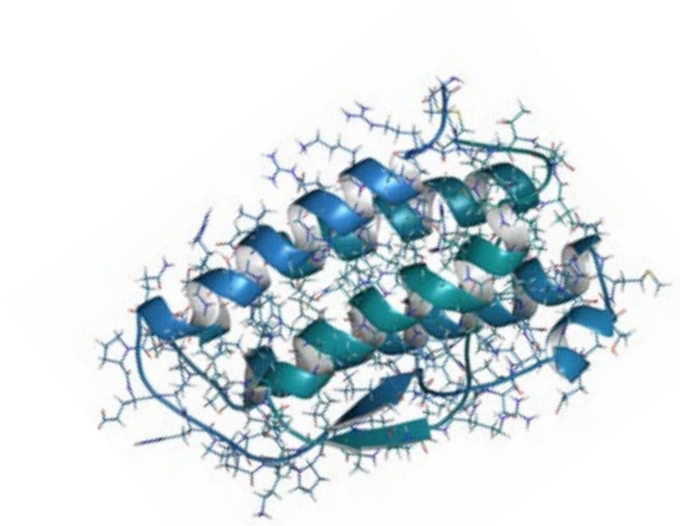
TRAPPING CARTRIDGES & HOLDERS MADE BY DR. MAISCH

From one of the biggest

High-**P**erformance **L**iquid **C**hromatography (HPLC) and

Ultra **H**igh-**P**erformance **L**iquid **C**hromatography (UHPLC)

Column Manufacturers in Europe.



INTRODUCTION

In micro- and nanoscale LC, a Trapping Cartridge is often used before the analytical column. There are several reasons why trapping could be of interest:

- Sample **clean-up.**
- **Pre-concentration** of very low concentrated samples.
- **Removal** of salts and contaminants.
- **Extension** of life time of the analytical column.
- Increase of **sensitivity**.
- Increase of loading **speed** of the sample.
- Increase of volumetric load **(= higher mass load** on the column).

A Trapping Cartridge is a storage and cleaning area for the injected sample before the components are eluted and separated on the analytical column.

The typical approach to achieve this is to use a less retentive media in the Trapping Cartridge.

For C18 columns this could be:

- The same base silica but shorter alkyl chain modification (e.g. C8 instead of C18).
- Different C18 silica with less carbon load.
- Completely different media that is less retentive.

The analytes are refocused at the head of the analytical column after elution from the Trapping Cartridge.

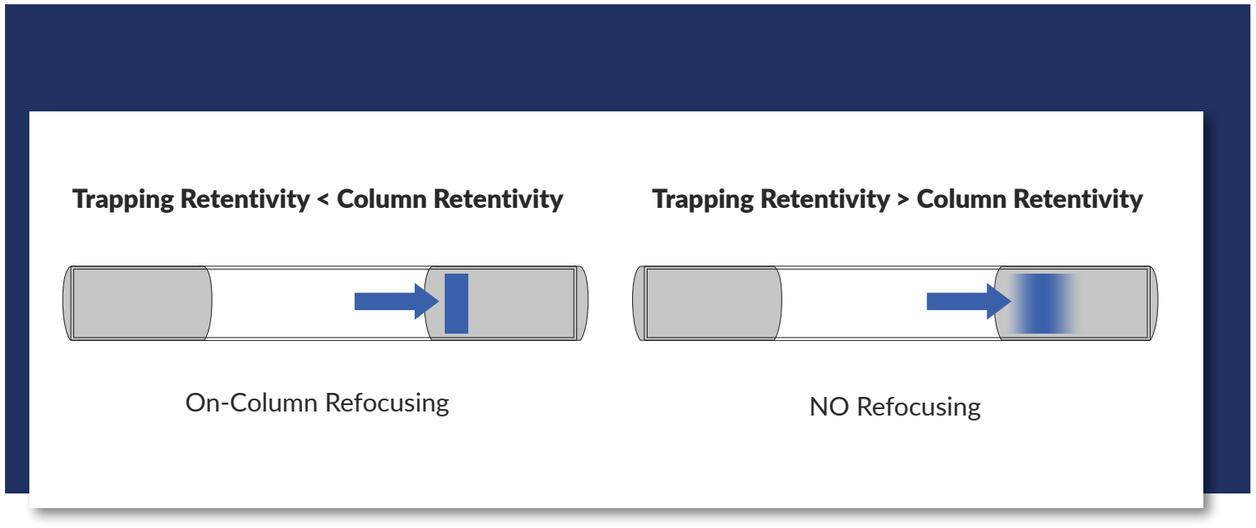


Figure 1: Illustration of the Trapping Mechanism.

TRAPPING STEPS

General Trapping Steps

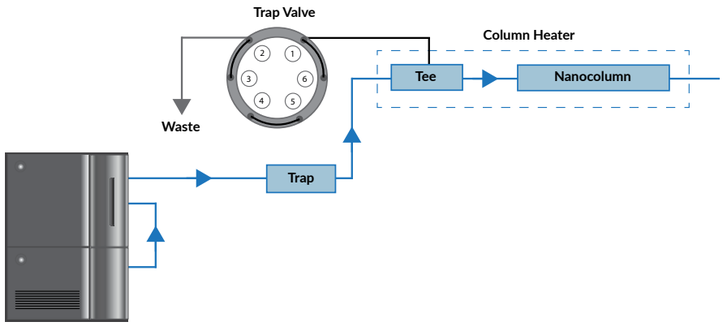
Table 1: 3 steps of the Trapping Mechanism.

1) Loading	Sample is injected and focused on the Trapping Cartridge at high flow rates in a short time. Larger inner diameter of the Trapping Cartridge and larger particles compared to analytical column. Injected analyte band is retained and focused near the inlet of the Trapping Cartridge.
2) Cleaning (if needed)	Impurities or unwanted species in the sample are washed from the Trapping Cartridge. Analytes of interest are retained.
3) Elution	Trapped analytes are reconstituted in the mobile phase and eluted onto the analytical column at lower flow rate suitable for the small bores of the nano LC-column. The elution step may be used in Forward-Trap-Elute and Reverse-Trap-Elute-Configuration.

This trap-and-elute technique requires some time for method development. The advantages of a well-optimized trapping method definitely justify the effort for the reasons mentioned earlier.

Trapping Set-Up

Forward-Trap-Elute: Simple Set-Up



- The sample is eluted from the trap in the same flow direction as in the loading step.
- One flow path with added up backpressure (bp) but the “felt” bp is lower on the Trapping Cartridge.

Figure 2: Illustration of the Forward-Trap-Elute Set-Up.

Reverse-Trap-Elute: More sophisticated Set-Up

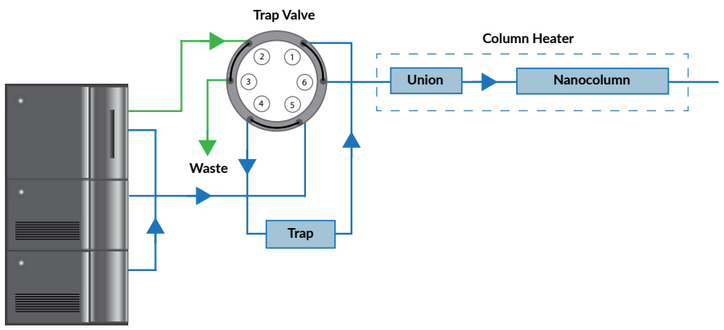


Figure 3: Ilustration of the Reverse-Trap-Elute Set-Up.

Trapped Analytes of Interest

- Elution in reverse flow direction.
- Short distance migration along the packed bed.
- Less band broadening.
- Two separate flow paths with different backpressure.

Features of the Dr. Maisch Trapping Cartridge Solution

- Utility-Patent: With a stopper on the outlet side (**auto-centering of the cartridge**).
- **Back and forward flush** of the mobile phase possible.
- Short sample loading times – **reduces** total HPLC analysis **run times**.
- Cartridge system allows **fast exchange** of Trapping Cartridges.
- Wide variety available.
- Wide variety of Trapping Cartridge dimensions available.
- **Suitable for PepMap ™ Neo Trap Cartridge.**

Technical Data

Stainless steel cartridges with stainless steel fits on inlet and outlet side.

Pressure:	800 bar
Typical Particle Size:	3 µm or 5 µm Other particle sizes on request.
Package Size:	3 cartridges / pack
Holder:	2 different lengths available (5 mm and 10 mm) 3 different IDs available (0.3 mm, 0.5 mm, 1.0 mm)

Loading Capacity

Table 2: Loading Capacity and Technical Data of the available Dr. Maisch Trapping Cartridges.

Length [mm]	ID [mm]	Density [kg/m³]	Volume [ml]	Used Media	Media Amount [µg]	Loading Capacity 5% [µg]
5	0.3	600	0.4	C18 Silica-Media	212	11
5	0.5	600	1.0		589	29
5	1.0	600	3.9		2356	118
10	0.3	600	0.7		424	21
10	0.5	600	2.0		1178	59
10	1.0	600	7.9		4712	236

Ordering Information

Figure 4: Trapping Cartridge and Holder.

Table 3: Available 5 mm Trapping Cartridges.

Description	Dimension [mm]	Part Number (PN)
Cartridges (3/pck)	5 x 0.3	media code.t000.3
Cartridges (3/pck)	5 x 0.5	media code.t000.5
Cartridges (3/pck)	5 x 1.0	media code.t0001
Trapping Cartridge Holder - short (with standard PEEK-Fingertights for 1/32" capillaries)	5.0	FSH.05

Figure 5: Trapping Cartridge (5 x 0.3 mm).

Table 4: Available 10 mm Trapping Cartridges.

Description	Dimension [mm]	Part Number (PN)
Cartridges (3/pck)	10 x 0.3	media code.t010.3
Cartridges (3/pck)	10 x 0.5	media code.t010.5
Cartridges (3/pck)	10 x 1.0	media code.t0101
Trapping Cartridge Holder FS (with standard PEEK-Fingertights for 1/32" capillaries)	10	FSH.01

Figure 6: Trapping Cartridge (10 x 0.3 mm).

Popular Trapping Cartridges made by Dr. Maisch

ReproSil-Pur 120 C18-AQ

Table 5: Technical Data of the available Trapping Cartridges packed with ReproSil-Pur 120 C18-AQ.

Media	Modifi-cation	Pore Size [Å]	Surface Area [m²/g]	Carbon Load [%]	Particle Size [µm]	Length [mm]	ID [mm]	Cartridge Holder PN	Part Number (PN)
ReproSil-Pur 120 C18-AQ	C18	120	300	15	5	5	0.3	FSH.05	r15.aq.t000.3
	C18	120	300	15	5	10	0.3	FSH.05	r15.aq.t010.3
	C18	120	300	15	5	10	0.5	FSH.05	r15.aq.t010.5
	C18	120	300	15	5	5	0.3	FSH.05	r13.aq.t000.3
	C18	120	300	15	5	10	1.0	FSH.05	r13.aq.t0101
	C18	120	300	15	5	10	0.5	FSH.05	r13.aq.t010.5

- ReproSil-Pur 120 C18-AQ, 1.9 µm is the golden standard in many Proteomics labs for packed capillary columns.
- Pore Size of 120 Å is suitable for molecules <10 kDa.
- Larger particles (3 µm, 5 µm) are recommended for Trapping Cartridges.
- Moderate Surface Area (loadability) and Carbon Load (hydrophobicity).

ReproSil Saphir

Table 6: Technical Data of the available Trapping Cartridges packed with ReproSil Saphir.

Media	Modifi-cation	Pore Size [Å]	Surface Area [m²/g]	Carbon Load [%]	Particle Size [µm]	Length [mm]	ID [mm]	Cartridge Holder PN	Part Number (PN)
ReproSil Saphir	C18	100	400	20	5	5	0.5	FSH.01	ra15.9e.t000.3
	C8	100	400	12	5	5	0.3	FSH.05	ra15.4e.t000.3
	C4	100	400	4	5	5	0.3	FSH.05	ra15.8e.t000.3

- ReproSil Saphir C18, 1.5 µm media shows a very high efficiency packed in capillary columns and growing popularity.
- Pore Size of 100 Å is suitable for molecules <10 kDa.
- Bigger particles (5 µm) are recommended for Trapping Cartridges.
- High Surface Area (loadability) and high Carbon Load.
- Hydrophobicity C18 > C8 > C4.
- ReproSil Saphir C18 is an excellent alternative to PepMap ™ Neo C18, 5 µm from Thermo Scientific.

ReproSil Wide Pore Media

Table 7: Technical Data of the available Trapping Cartridges packed with ReproSil wide pore media.

Media	Modifi-cation	Pore Size [Å]	Surface Area [m²/g]	Carbon Load [%]	Particle Size [µm]	Length [mm]	ID [mm]	Cartridge Holder PN	Part Number (PN)
ReproSil-XR	C8	300	100	5	5	5	0.3	FSH.05	rx35.8e.t000.3
ReproSil-XR	C4	300	120	3	5	5	0.3	FSH.05	rx35.4e.t000.3
ReproSil-Gold	C4	300	100	8	5	10	0.3	FSH.01	r35.4g.t010.3

- 300 Å media for the analysis of biomolecules >10 kDa.
- Bigger particles (5 µm) are recommended for Trapping Cartridges.
- C4 media is used for most biomolecules.
- ReproSil-XR C4 is less hydrophobic than ReproSil Gold C4.

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Trapping Cartridge Installation

- 2 different holders for 2 different cartridge lengths available.

FSH.05 for 5 mm cartridges with 1/16“ connection.
FSH.01 for 10 mm cartridges with 1/16“ connection.

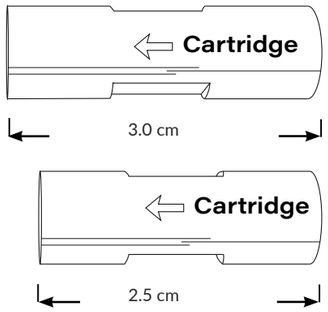

Figure 7: Trapping Cartridge Holder FSH.05 and FSH.01.

The 3 different IDs (0.3 mm, 0.5 mm and 1 mm) fit all in the same holder.
- Insert the cartridge in the indicated direction on the holder (1/16“).

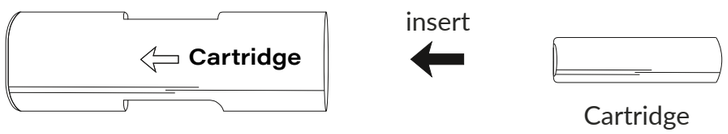

Figure 8: Trapping Cartridge Holder and Trapping Cartridge.

TRAPPING CARTRIDGE INSTALLATION

- Trapping Cartridge Holder (with standard PEEK-Fingertights for 1/32“ capillaries) (FSH.01 and FSH.05)

Figure 9: Trapping Cartridge (FSH.01), Trapping Cartridge (FSH.05) and 1/32“ Thread.

- Suitable for Nanoviper & Marvel XACT (Zero Dead Volume Connection).

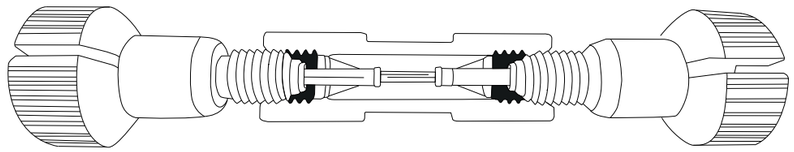

Figure 10: Cross-Section of the Trapping Cartridge Holder, Trapping Cartridge and Nanoviper & Marvel X ACT.

- Visit our Dr. Maisch YouTube channel to watch our installation tutorials.

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