Chromatography

MACHEREY-NAGEL

CHROMABOND® WAX

Ideal for PFAS analysis

- Weak mixed-mode polymer-based anion exchanger
- Low blind values
- Reproducible results

Distribútor pre SR:
AZ CHROM s.r.o., Robotnícka 10, 831 03 Bratislava Tel. 0907 244526
azetchrom@hplc.sk, www.azetchrom.sk
eshop.azetchrom.sk

CHROMABOND® WAX

Introduction

For the enrichment of acids from aqueous matrices anion exchange adsorbents are common. This also applies for the enrichment of per- and polyfluoroalkyl substances (PFAS) which are a group of >4700 persistent and bioaccumulative man-made compounds. Most PFAS contain either a sulfonic or carboxylic acid functionality. Due to their adverse health effects, some of them were already banned or are under investigation and therefore the development of optimized methods as well as the monitoring of these compounds is essential.

CHROMABOND® WAX was specially developed for the enrichment of short-chain PFAS from water, soil and sediments. Its properties e.g. high ion exchange capacity and very low blind value levels make this polymeric anion exchanger ideal for use in many official methods e.g. EPA 533 and Draft 1633 as well as ISO 21675:2019.

Recommended application

- strong acids with $pk_a > 1$
- per- and polyfluoroalkyl substances (PFAS) from drinking water, soil, sediment, and wastewater
- EPA Method 533 and Draft 1633
- ISO 21675:2019

Benefits

By using CHROMABOND® WAX you profit from:

- A SPE phase designed especially for PFAS extraction
- Low PFAS blind value levels of <1, 2 or 10 ng/L, respectively
- High ion exchange capacity of ≥ 0.80 meq/g
- High batch-to-batch reproducibility
- High recovery rates especially for short-chain PFAS
- Extensive certificate of analysis data for each batch to ensure high quality and reliability. These include:
  - Recovery rates of selected analytes
  - Blind value levels
  - Physicochemical data
  - Sorbent elution test

Technical data

- Polystyrene-divinyl benzene copolymer (PS-DVB)
- Weak mixed-mode anion exchanger
- Particle shape: spherical
- Particle size: 30 µm
- pK_a: > 8
- Specific surface area: ≥ 800 m^2/g
- Pore diameter: 60–80 Å
- pH stability: 1–14
- Ion exchange capacity: ≥ 0.80 meq/g

Good to know

A possible replacement for:

- Oasis® WAX for PFAS analysis
- Strata™ X-AW
- Bond Elut® PFAS WAX

Recovery rates of PFAS analytes from water (acc. to EPA draft 1633 and EPA 533, respectively)

CHROMABOND® WAX is the choice of SPE phase for the enrichment of short-chain PFAS according to EPA Draft 1633 and EPA 533. Find more detailed information about these applications in the chromatography database (https://chromaappdb.mn-net.com/) by using application numbers 306960 and 306950.

Good to know

CHROMABOND® WAX provides recovery rates, which are very comparable to those of Oasis® WAX for PFAS analysis.

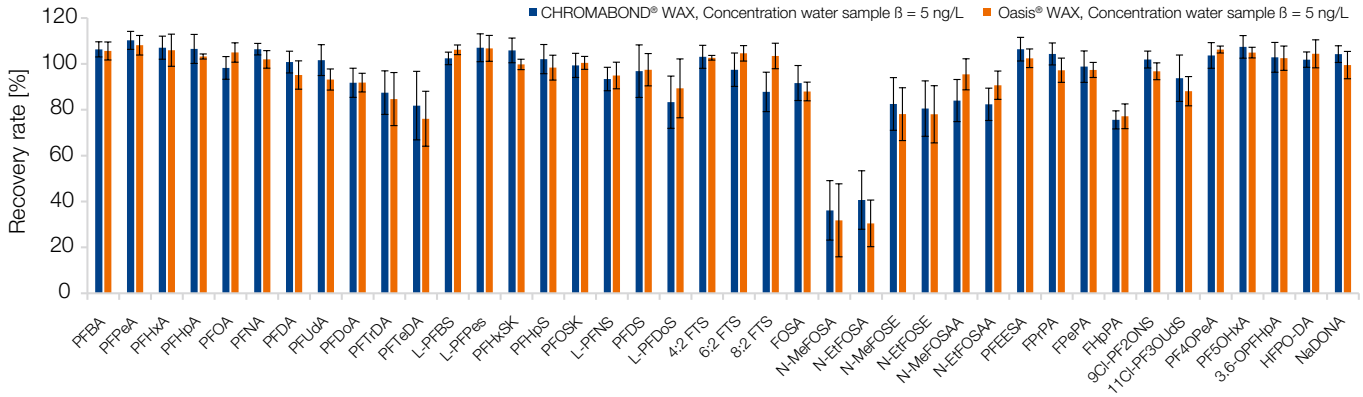

Figure 1: Recovery rate comparison of 40 PFAS analytes using CHROMBOND® WAX and Oasis® WAX for PFAS analysis (both 6 mL, 150 mg; n=5). The application was conducted according to EPA draft 1633.

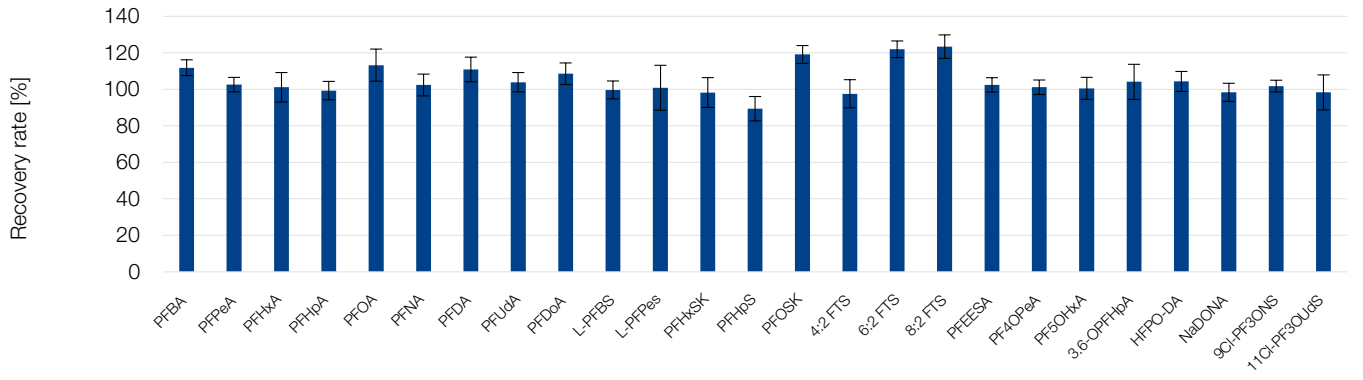

Figure 2: Recovery rates of 25 PFAS analytes using CHROMBOND® WAX (6 mL, 150 mg; n=5) according to EPA 533 (concentration of water sample ß = 2 ng/L).

PFAS blind value test (batch-based testing on the assembled cartridge)

Acceptance limits	Analytes (CAS#)
1 ng/L	PFMPA (377-73-1), PFBA (375-22-4), PFMBA (863090-89-5), PFPeA (2706-90-3), PFEESA (113507-82-7), PFBS (375-73-5), PFHxA (307-24-4), PFPeS (2706-91-4), PFHpA (375-85-9),PFHxS (355-46-4), ADONA (919005-14-4), PFHpS (375-92-8), PFOA (335-67-1), PFOS (1763-23-1), PFNA (375-95-19), 9Cl-PF_3ONS (73606-19-6), PFNS (68259-12-1), PFDA (335-76-2), FOSA (754-91-6), PFDS (335-77-3), PFUnDA (2058-94-8), 11Cl-PF_3OUdS (763051-92-9), PFDoDA (307-55-1), PFTrDA (72629-94-8), PFDoS (79780-39-5), NMeFOSE (24448-09-7), PFTeDA (376-06-7), NEtFOSE (1961-99-2)
2 ng/L	NFDHA (151772-58-6), HFPO-DA (13252-13-6)
10 ng/L	3:3FTCA (356-02-5), 4:2FTS (757124-72-4), 5:3FTCA (914637-49-3), 6:2FTS (27619-97-2), 7:3FTCA (812-70-4), 8:2FTS (39108-34-4), *N*-MeFOSAA (2355-31-9), *N*-EtFOSAA (2991-50-6), *N*-MeFOSA (31506-32-8), *N*-EtFOSA (4151-50-2)

Table 1: Selected PFAS analytes and their acceptance limits in quality control.

Recovery test of selected neutral, basic, and acidic analytes

Each sorbent batch undergoes a performance test in quality control, which contains recovery rate determinations of six selected analytes to ensure consistent results from batch-to-batch.

Extensive certificate of analysis

- PFAS blind value levels
- Recovery rates for selected analytes
- Physicochemical data
- Sorbent elution test

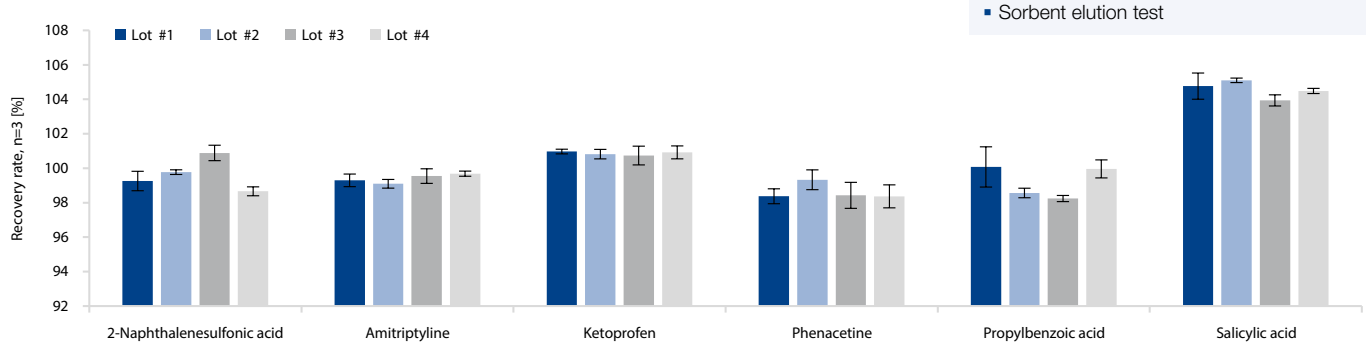

Figure 3: Recovery rates and batch-to-batch reproducibility of selected neutral, basic, and acidic analytes.

Ordering information

Volume	Adsorbent weight → 60 mg	150 mg	200 mg	500 mg
CHROMABOND® WAX (30 µm) polypropylene columns				
3 mL	7300014		7300015	
6 mL		7300011		7300012
CHROMABOND® WAX (30 µm) polypropylene columns BIGpacks				
3 mL	7300014.250			
6 mL		7300011.250		7300012.250

Registered trademarks

CHROMABOND®	MACHEREY-NAGEL GmbH & Co. KG (Germany)
Oasis®	Waters Corp. (USA)
Strata™	Phenomenex Inc. (USA)
Bond Elut®	Agilent Technologies Inc. (USA)

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TÜVRheinland CERTIFIED
www.tuv.com ID 9000008338

Distribútor pre SR:
AZ CHROM s.r.o., Robotnícka 10, 831 03 Bratislava Tel. 0907 244526
azetchrom@hplc.sk, www.azetchrom.sk
eshop.azetchrom.sk