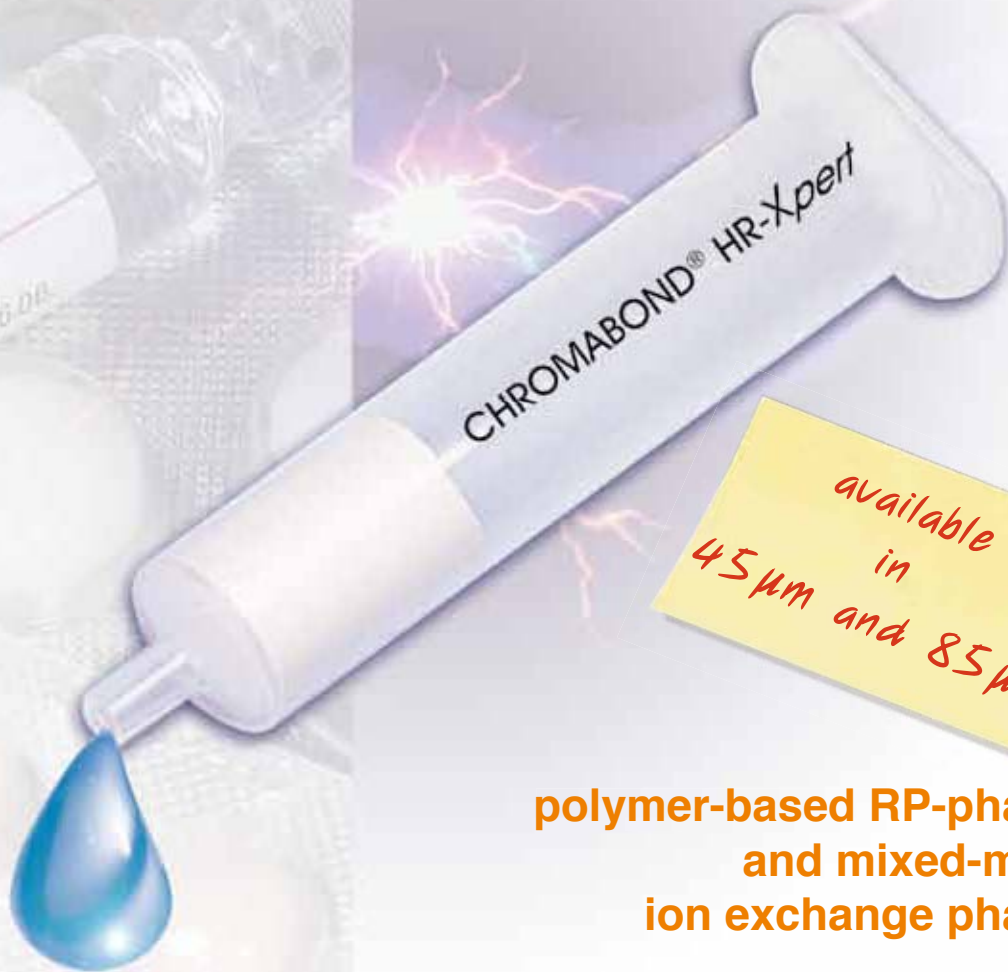


chromatography

# CHROMABOND® HR-*Xpert*

the professional concept of  
innovative SPE phases



available  
in  
45µm and 85µm

polymer-based RP-phases  
and mixed-mode  
ion exchange phases

MACHERY-NAGEL

[www.mn-net.com](http://www.mn-net.com)



Since 1911



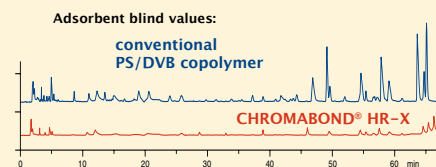
## CHROMABOND® HR-Xpert

... the innovative concept of five polymer-based RP- and mixed-mode ion exchange phases for SPE:

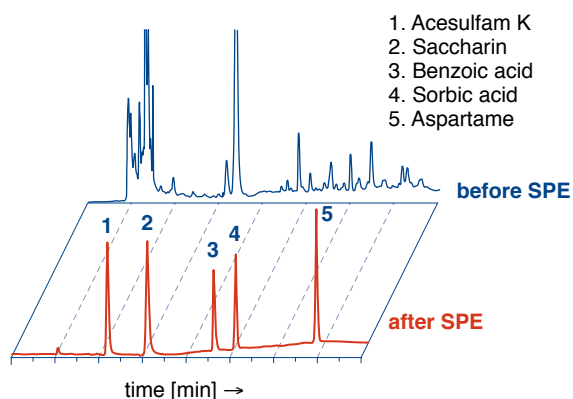
- CHROMABOND® HR-X hydrophobic PS/DVB copolymer
- CHROMABOND® HR-XC strong mixed-mode cation exchanger
- CHROMABOND® HR-XA strong mixed-mode anion exchanger
- CHROMABOND® HR-XCW weak mixed-mode cation exchanger
- CHROMABOND® HR-XAW weak mixed-mode anion exchanger

## ... these innovative SPE phases offer:

- **state-of-the-art spherical polymer**
  - ⇒ different particle sizes (45 µm and 85 µm) suitable depending on the sample volume and matrix
  - ⇒ broad spectrum of applications with special suitability for enrichment of pharmaceuticals from biological matrices
  - ⇒ ideal flow properties due to low content of particulate matter
- **optimized pore structure and high specific surface**
  - ⇒ high loadability and outstanding elution properties
  - ⇒ low solvent consumption
  - ⇒ rapid, economical analyses
- **high-purity adsorbent material**
  - ⇒ allows highest reproducibility with extremely low blind values
  - ⇒ reliable analyses at ultra trace level
  - ⇒ no method adaptation for new batches necessary



### Separation of food additives



## In modern analyses SPE fulfills 3 important tasks:

- ⇒ **enrichment of analytes**  
up to factor 10.000 – increase of chromatographic sensibility/improved limits of detection
- ⇒ **removal of interfering compounds**  
protection of subsequent analyses like HPLC, GC, TLC, MS, UV or IR spectroscopy, ...
- ⇒ **changing of an analyte's matrix**  
matrix which is simpler or more suitable for subsequent analyses

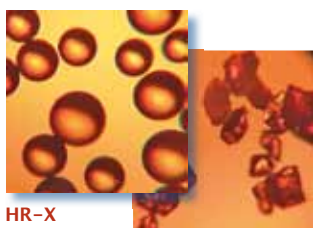
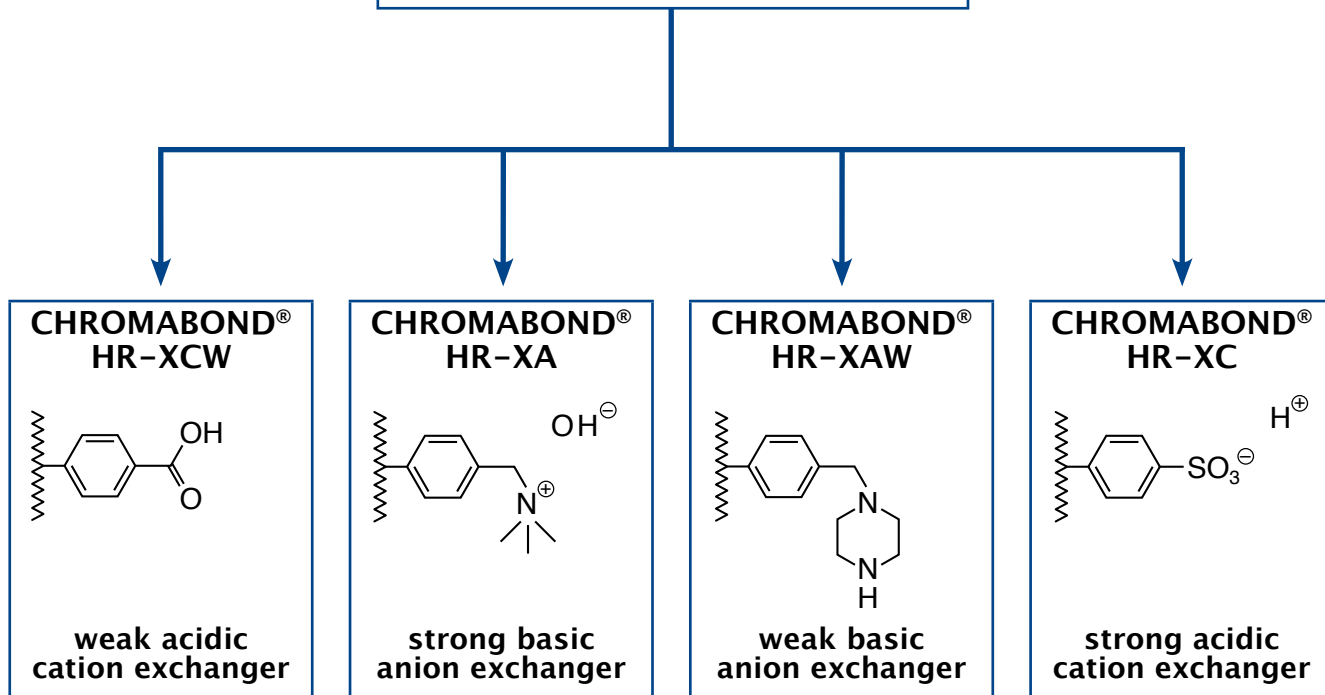
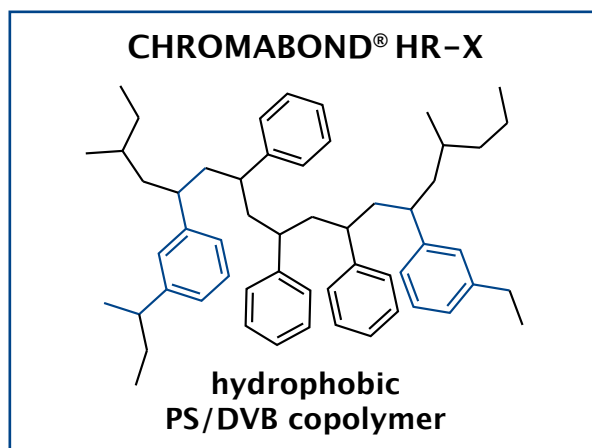
## ... the HR-Xpert concept guarantees:

- RP- and mixed-mode SPE-phases with distinct ion exchange and reversed-phase properties  
**your benefit** ⇒ excellent enrichment of neutral, acidic and basic compounds
- modern, spherical support-polymer with optimized pore structure and high surface  
**your benefit** ⇒ good reproducibility, reliable and cost-efficient analysis
- possibility for more aggressive washing procedures for matrix removal  
**your benefit** ⇒ cleaner samples and protection of your HPLC and GC-machines
- quantification of analytes also from heavily contaminated samples  
**your benefit** ⇒ lower limits of detection also for critical matrices

**CHROMABOND® HR-Xpert is the perfect combination for all tasks in sample preparation**



## Chemical structures



HR-X

conventional  
PS/DVB copolymer

**HR-X: spherical base material for efficient enrichment and ideal flow behavior**

**Solid Phase Extraction**

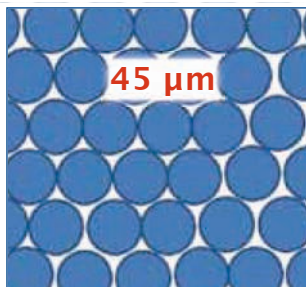
### Similar phases:

- |                            |   |
|----------------------------|---|
| <b>CHROMABOND® HR-X:</b>   | Oasis® HLB, Strata™ X, Nexus, ENVI-Chrom P                      |
| <b>CHROMABOND® HR-XC:</b>  | Oasis® MCX, Strata™ X-C, StyreScreen® DBX, HyperSep™ Retain™-CX |
| <b>CHROMABOND® HR-XA:</b>  | Oasis® MAX, Strata™ X-A, HyperSep™ Retain™-AX, StyreScreen® QAX |
| <b>CHROMABOND® HR-XCW:</b> | Oasis® WCX, Strata™-X-CW  |
| <b>CHROMABOND® HR-XAW:</b> | Oasis® WAX, Strata™-X-AW  |

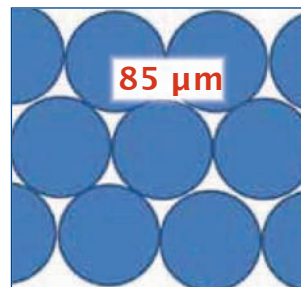
(Trademarks of Waters, Phenomenex, Varian, Thermo Fisher Scientific Inc. and UCT)



**2 particle sizes – 1 goal ... with HR-Xpert to the ideal application**  
for different applicative requirements the particle sizes complement each other perfectly



- ideal for:
- ⊕ smaller sample volumes
  - ⊕ smaller amount of sorbent
  - ⊕ lower elution volumes



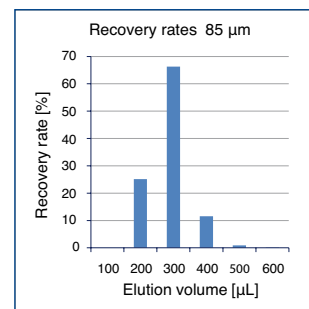
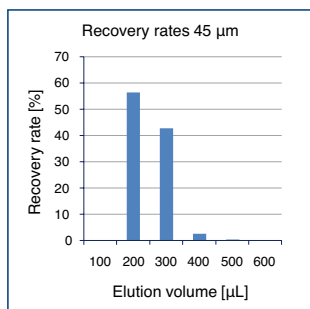
- ⊕ voluminous or viscous samples / strong matrix load
- ⊕ operation without vacuum (e.g. for volatile analytes)
- ⊕ higher amount of sorbent without pressure rise

### Comparison of 45 µm and 85 µm

- Larger number of particles per volume at 45 µm by about half radius
  - ⇒ eightfold particle number at same amount of sorbent
- Specific surface is equal for both particle sizes
  - ⇒ freely accessible external surface is at 45 µm particles much larger
- More compact sorbent package: Enhanced interaction of the analytes with the sorbent
  - ⇒ improved extraction results

### Ideal elution characteristics

**Method:** 1 mL column with 30 mg CHROMABOND® HR-X, 1 mL standard solution (1 mg/mL hexobarbital); drying; elution in portions of 100 µL with methanol, according to MN Appl. No. 305490



- ⊕ at 45 µm · faster elution · lower elution volumes needed

### Breakthrough behavior in enrichment

**Method:** 1 mL column with 15 mg CHROMABOND® HR-X; apply portions of 1 mL standard solution (250 µg/mL hexobarbital in water); collect the eluate, according to MN Appl. No. 305480

#### 45 µm (red):

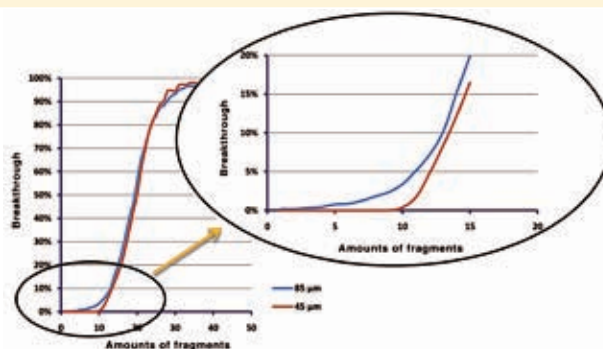
Analyte is completely retained up to the fraction 10.

#### 85 µm (blue):

Small amounts even break through at fraction 4.

### Comparison of 45 µm and 85 µm

- ⇒ 45 µm are smaller particles and provide better enrichment of sorbent and a superior breakthrough behavior.



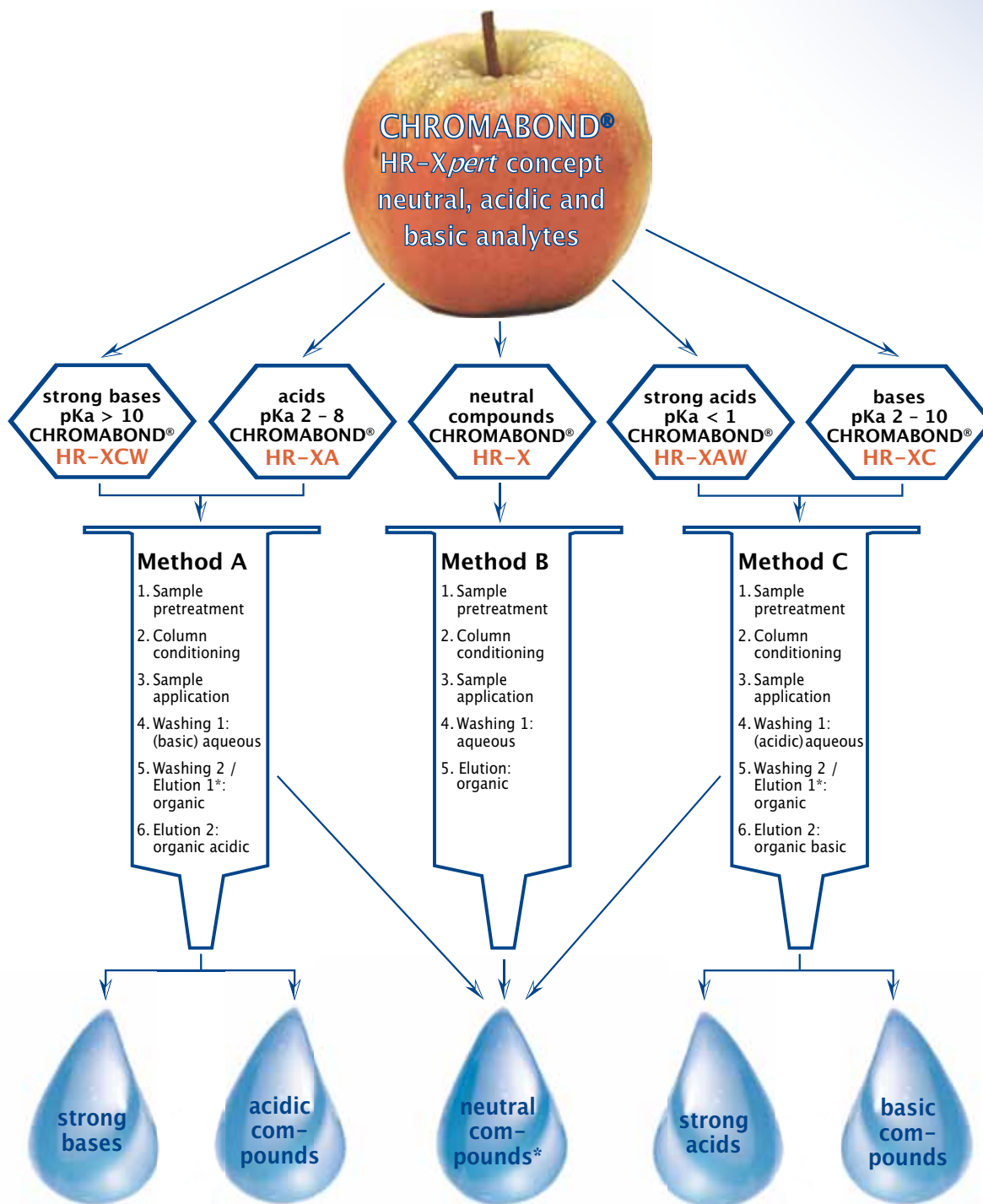
- ⊕ When using larger amounts of sorbent this effect is less distinct. Also using 85 µm particles sufficient contact of analyte and sorbent is given. So, 45 µm particles are ideal for small sample and elution volumes, while for large amounts of sample or sorbent 85 µm particles provide advantages due to with better flow properties.



## 3 paths – 1 goal ... cleaner samples by HR-*Xpert*:

Depending on the character of the analytes HR-*Xpert* offers the suitable adsorbent and optimal method for sample preparation, cleaning and concentration.

# Solid Phase Extraction



\* under organic washing and elution conditions the following compounds will be also eluted:

HR-X: polar compounds as organic acids and bases

HR-XC/HR- XCW: acidic compounds/impurities

HR-XA/HR- XAW: basic compounds/impurities



## HR-X

spherical, hydrophobic polystyrene-divinylbenzene adsorbent resin

- hydrophobic polystyrene-divinylbenzene copolymer pH stability 1-14
- high-purity material with highest reproducibility and lowest blank values due to a novel manufacturing process
- spherical particles, size 45 µm and 85 µm (standard); pore size 55-60 Å, very high surface 1000 m<sup>2</sup>/g capacity 390 mg/g (caffeine in water)
- excellent recovery rates especially for the enrichment of pharmaceuticals / active ingredients due to the spherical structure of the particles, very homogeneous surface, and optimized pore structure

- recommended application: pharmaceuticals / active ingredients from tablets, creams and water / waste water
- drugs and pharmaceuticals from urine, blood, serum and plasma
- trace analysis of pesticides, herbicides, phenols, PAHs and PCBs from water

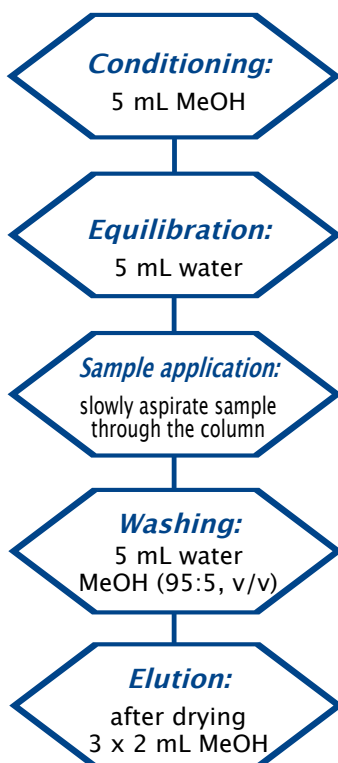
### Solid Phase Extraction

#### Standard protocol for CHROMABOND® HR-X

MN Appl. No. 304310

**Column type:** CHROMABOND® HR-X/3 mL/200 mg, REF 730931

**Sample pretreatment:** individual sample preparation with reference to analytes and matrix



**Further analysis:** if necessary, evaporate and redissolve in a suitable solvent; HPLC or GC

These conditions are a starting point for SPE method development. Further optimisation may be required to improve results.

#### Sulfonamides from serum

MN Appl. No. 304220

**Column type:** CHROMABOND® HR-X/3 mL/200 mg REF 730931

**Sample:** 2 µg/ml each in serum

**Column conditioning:** 5 mL MeOH, 5 mL dest. water

**Sample application:** 1 mL spiked serum

**Column washing:** 5 mL water - MeOH (95:5, v/v)

**Elution:** after drying 3 x 2 mL MeOH

**Recovery rate [%]:**

Compound	HR-X	Oasis® HLB	Strata™ X
Sulfanilamide	66	62	63
Sulfadiazine	107	101	108
Sulfamerazine	114	111	111
Sulfadimidine	94	86	89
Succinylsulfathiazole	70	43	48

**Further analysis:**

HPLC see MN Appl. No. 117880

**Column:** 125/4 mm NUCLEODUR® C<sub>18</sub> Gravity, 5 µm

**Eluent:** MeOH - 0.1 % TFA (20:80, v/v)

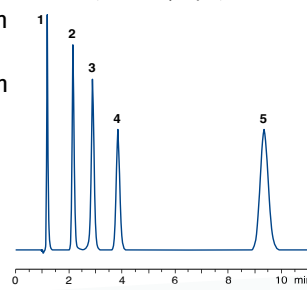
**Flowrate:** 1.0 mL/min

**Temperature:** 22 °C

**Detection:** UV, 230 nm

**Peaks:**

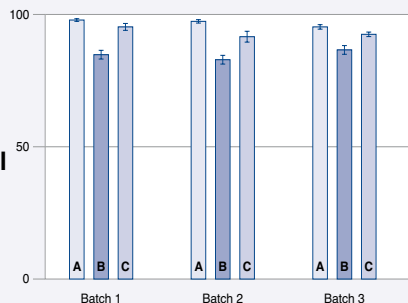
- Sulfanilamide
- Sulfadiazine
- Sulfamerazine
- Sulfadimidine
- Succinylsulfathiazole





## Highest reproducibility

- ✓ within each batch
- ✓ from batch to batch



### Compounds:

- A** phenobarbital
- B** pentobarbital
- C** hexobarbital

## Barbiturates from serum

MN Appl. No. 304290

**Column type:** CHROMABOND® HR-X/3 mL/200 mg  
REF 730931

**Sample:** 100 ng/ml each in serum

**Column conditioning:** 5 mL MeOH, 5 mL dist. water

**Sample application:** 1 mL spiked Serum

**Column washing:** 5 mL water

**Elution:** after drying 3 x 2 mL MeOH

**Further analysis:** HPLC on NUCLEODUR® 100-5 C<sub>18</sub>ec, see MN Appl. No.117820

## Pesticides from water

MN Appl. No. 304250 and 304260

GIU GmbH, Teningen

**Column type:** CHROMABOND® HR-X/3 mL/200 mg  
REF 730931

**Sample:** 500 ng/L each in water; pH value adjusted

**Column conditioning:** 10 mL MeOH, 10 mL water

**Sample application:** slowly aspirate 1 L sample through the column

**Drying:** stream of nitrogen

**Elution:** 5 mL MeOH – THF (1:1, v/v)

### Recovery rate [%]:

Compound	pH 7	Compound	pH 2
Desisopropylatrazine	90	Metamitron	86
2,4-Dichlorbenzamide	95	Quinmerac	90
Desethylatrazine	89	Chloridazone	93
Hexazinone	95	Picloram	83
Bromacil	103	Metribuzine	84
Simazine	91	Cyanazine	83
Desethylterbutylazine	89	Metabenzthiazuron	94
Atrazine	88	Chlortoluron	91
Metalaxyl	97	Isoproturon	89
Metazachlor	93	Diuron	91
Propazine	88	Dimethenamid-P	89
Terbuthylazine	86	Linuron	94
Metolachlor	97	Epoxiconazole	86
		Penconazole	90
		Alachlor	93
		Propiconazole-1	89
		Flufenacet	91

### Further analysis:

HPLC e.g. on NUCLEODUR® 100-3 C<sub>8</sub>ec see MN Appl. No. 118610 or 120485

## Drugs from water

MN Appl. No. 304240

**Column type:** CHROMABOND® HR-X/3 mL/200 mg  
REF 730931

**Sample:** each 1 µg/L in water

**Column conditioning:** 5 mL MeOH, 5 mL water

**Sample application:** slowly aspirate 500 mL water (pH 3) through the column

**Column washing:** 5 mL water

**Elution:** after drying 3 x 2 mL acetonitrile

### Recovery rate [%]:

Compound	HR-X	Strata™ X
Ketoprofen	98	92
Ibuprofen	91	93
Pentobarbital	99	95
Meclofenamic acid	92	93
Protriptyline	63	45
Nortriptyline	53	39

**Further analysis:** HPLC see MN Appl. No. 121690

**Column:** 125/4 mm  
NUCLEODUR® C<sub>18</sub> Gravity, 5 µm

**Eluent:** A) 20 mmol KH<sub>2</sub>PO<sub>4</sub>, pH 7  
B) acetonitrile

**Gradient:** 20 % B → 50 % B in 25 min

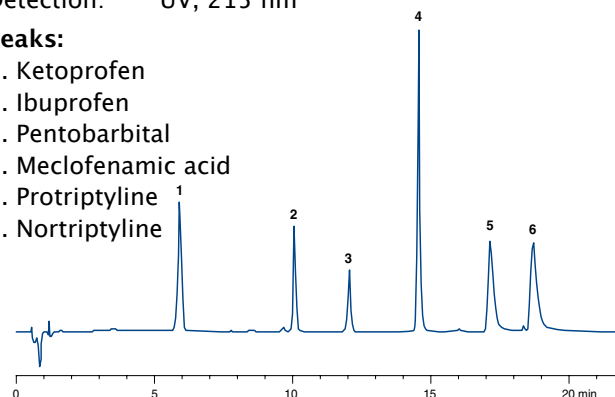
**Flow rate:** 0.5 mL/min

**Temperature:** 22 °C

**Detection:** UV, 215 nm

### Peaks:

1. Ketoprofen
2. Ibuprofen
3. Pentobarbital
4. Meclofenamic acid
5. Protriptyline
6. Nortriptyline





## HR-XC

- strong acidic benzenesulphonic acid cation exchanger  
exchange capacity 1.0 meq/g, pKa <1
- base material polystyrene-divinylbenzene copolymer  
pH stability 1-14
- high purity material, highest reproducibility and lowest blank values due to an optimized production process
- spherical particles, size 45 µm and 85 µm (standard);  
pore size 65-75 Å, very large specific surface 800 m<sup>2</sup>/g; pore volume 1.4 cm<sup>3</sup>/g, RP capacity 300 mg/g (caffeine in water)
- outstanding recovery rates especially for the enrichment of basic analytes

## strong cation exchanger

- recommended application:
  - basic active ingredients from heavily matrix-contaminated samples like e.g. urine, plasma, serum
  - fungicides from food
  - melamine from milk products
  - basic analytes like e.g. amines
  - bases with pKa 2 – 10

# Solid Phase Extraction

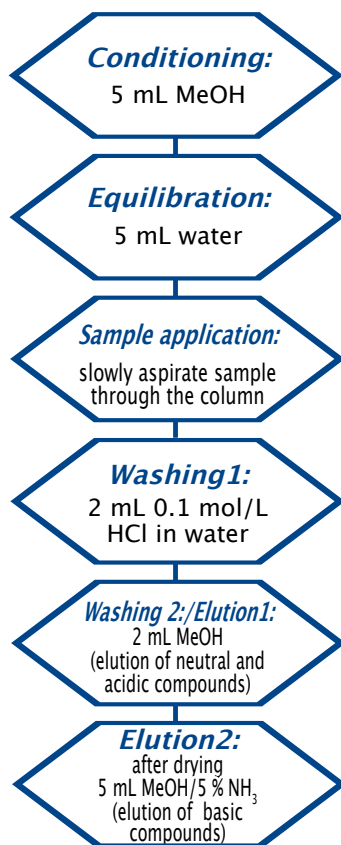
## Standard protocol for CHROMABOND® HR-XC

MN Appl. No. 304790



Column type: CHROMABOND® HR-XC/3 mL, 200 mg, REF 730952

Sample pretreatment: individual sample preparation with reference to analytes and matrix



Further analysis: if necessary, evaporate and redissolve in a suitable solvent; HPLC or GC

These conditions are a starting point for SPE method development. Further optimisation may be required to improve results.

## Fractionation of acidic, neutral and basic analytes from serum

MN Appl. No. 304780



Column type: CHROMABOND® HR-XC/3 mL, 200 mg, REF 730952

Sample: 1 mL spiked matrix, acidified with 200 µL 2 % H<sub>3</sub>PO<sub>4</sub>

Column conditioning: 5 mL MeOH, then 5 mL water

Sample application: 1.2 mL spiked serum

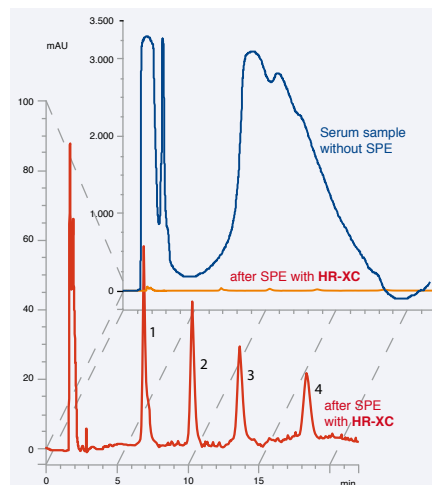
Washing: 2 mL 0.1 N HCl in water

Elution: a) 2.5 mL MeOH

Fraction A: neutral and acidic analytes

b) 5 mL MeOH/10 % NH<sub>3</sub>

Fraction B: basic analytes



### Peaks:

- Doxepin
- Imipramine
- Amitriptyline
- Trimipramine

### Recovery rates [%]:

Fraction A: acidic and neutral analytes

Fraction B: basic analytes

Compound	HR-XC	Compound	HR-XC	Oasis® MCX	Strata™ X-C
Suprofen	108	Doxepin	101	68	82
Naproxen	85	Imipramine	95	71	85
Tolmetin	73	Amitriptyline	94	72	78
Phenobarbital	108	Trimipramine	92	70	81
Indomethacin	33				
Hexobarbital	80				

Further analysis: HPLC on NUCLEODUR® C18 e.g. C8 Gravity; see MN Appl. No. 122230 and 118520





## HR-XA

- strong basic quaternary ammonium anion exchanger  
exchange capacity 0.25 meq/g, pKa ~ 18
- base material polystyrene-divinylbenzene copolymer  
pH stability 1 - 14
- high purity material with highest reproducibility and  
lowest blank values due to an optimized production process
- spherical particles, size 45 µm and 85 µm (standard);  
pore size 55 - 65 Å, very large specific surface 850 m<sup>2</sup>/g; pore  
volume 1.4 cm<sup>3</sup>/g, RP capacity 350 mg/g (caffeine in water)
- outstanding recovery rates especially for the enrichment of acidic  
analytes

strong anion exchanger

- recommended application:  
acidic active ingredients from  
heavily matrix-contaminated  
samples like e. g. urine, plasma,  
serum  
phenolic acids  
acidic herbicides  
weak/medium-strength acids with  
pKa 2 - 8



### Acidic Pharmaceuticals from serum

MN Appl. No. 305000

Column type: CHROMABOND® HR-XA/3 mL,  
200 mg, REF 730951

Sample: 5 mL spiked serum (1 µg/ml each), adjusted  
basic with 1 N NaOH

Column conditioning: 5 mL MeOH

Equilibration: 5 mL water

Sample application: apply sample

Washing: a) 2.5 mL water  
b) 2.5 mL 0,1 N NaOH  
c) 5 mL MeOH

Elution: after drying, 5 mL MeOH / 1 % formic acid

Further analysis: HPLC on  
NUCLEODUR® C18 Gravity; see MN Appl.-No. 122840

Recovery rate [%]:

Compound	HR-XA	Oasis® MAX
Ketoprofen	90	85
Fenoprop	104	123
Fenoprofen	98	69
Flurbiprofen	106	98
Ibuprofen	88	58
Carprofen	69	89
Diclofenac	95	94
Meclofenamic acid	92	93

### Further applications on CHROMABOND® HR-XA

- Appl. No. 304980 Acidic Herbicides
- Appl. No. 305020 Fractionation of Acidic and  
Basic Analytes from serum
- Appl. No. 304990 Phenolic Acids

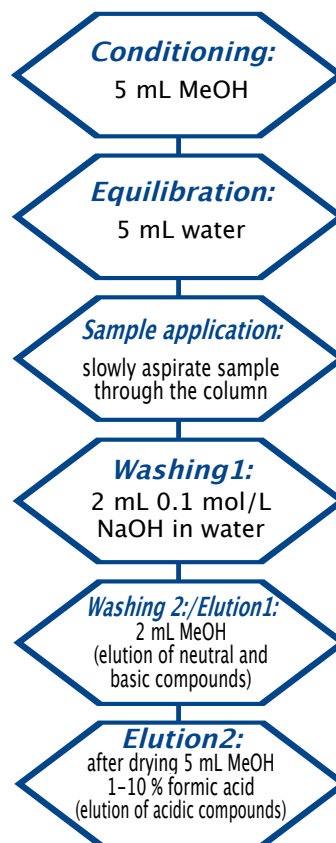
[www.mn-net.com/apps](http://www.mn-net.com/apps)

### Standard protocol for CHROMABOND® HR-XA

MN Appl. No. 304970

Column type: CHROMABOND® HR-XA/3 mL,  
200 mg, REF 730951

Sample pretreatment: individual sample preparation  
with reference to analytes and matrix



Further analysis: if necessary, evaporate and  
redissolve in a suitable solvent; HPLC or GC

These conditions are a starting point for SPE method  
development. Further optimisation may be required to  
improve results.



## HR-XCW

- weak acidic carboxylic acid cation exchanger  
exchange capacity >0.7 meq/g, pKa ~ 5
- base material spherical PS/DVB copolymer  
pH stability 1-14
- high purity material, highest reproducibility and  
lowest blank values due to an optimized production process
- spherical particles, size 45 µm and 85 µm (standard); pore size 50-60 Å  
very large specific surface 850 m<sup>2</sup>/g; pore volume 1.2-1.4 cm<sup>3</sup>/g  
RP capacity 350 mg/g (caffeine in water)
- outstanding recovery rates especially for enrichment of strongly basic analytes

## weak cation exchanger

- recommended application:  
basic compounds like  
quaternary amines  
active ingredients from  
heavily matrix-contaminated samples like e.g.  
urine, plasma, serum  
strong bases with  
pKa > 10

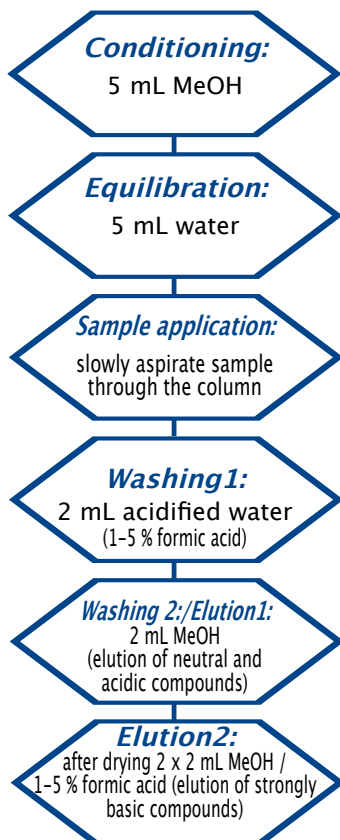
# Solid Phase Extraction

### Standard protocol for CHROMABOND® HR-XCW

MN Appl. No. 305300

**Column type:** CHROMABOND® HR-XCW/3 mL,  
200 mg, REF 730739

**Sample pretreatment:** individual sample preparation  
with reference to analytes and matrix



Alternatively elution 2 can be achieved by basic methanol (NH<sub>3</sub>), e.g. for primary to tertiary amines. Deprotonation of the analytes interrupts the interaction with the cation exchange resin.

**Further analysis:** if necessary, evaporate and redissolve in a suitable solvent; HPLC or GC

These conditions are a starting point for SPE method development. Further optimisation may be required to improve results.

### Tricyclic Antidepressants

MN Appl. No. 305340

**Column type:** CHROMABOND® HR-XCW/3 mL, 60 mg  
REF 730735

**Sample:** 250 µL spiked Serum, diluted with 1 mL 10 %  
formic acid in water

**Conditioning:** 3 mL MeOH

**Equilibration:** 3 mL water

**Sample application:** slowly aspirate sample through  
the column

**Washing:** 1 mL 5 % formic acid in water, then  
1 mL MeOH

**Elution:** after drying by vacuum (15 min)  
3 mL 5 % formic acid in MeOH

**Further analysis:**  
evaporate and redissolve in a suitable solvent  
for HPLC on NUCLEODUR® C8; Gravity see  
MN Appl. No. 118520

**Recovery rate [%]:**

Compound	HR-XCW	HR-XC*	PCA**	Oasis® WCX
Doxepine	79	5	11	41
Imipramine	79	9	20	67
Amitriptyline	91	9	14	46
Trimipramine	98	7	14	27

\* **HR-XC:** Basic analytes can not be eluted with slightly acidic organic conditions from the strong cation exchanger CHROMABOND® HR-XC, because the eluting power is not sufficient to dissociate the interaction with the ion exchanger. However, with the usage of basic methanol a complete elution can be achieved (please see also MN Appl. No. 304780).

\*\* **PCA:** Due to the missing RP interactions of silica based weak cation exchanger, CHROMABOND® PCA gives only a small enrichment elution of the analytes.





## HR-XAW

- weak basic secondary and tertiary ammonium anion exchanger  
exchange capacity >0.5 meq/g, pKa ~ 6
- base material spherical PS/DVB copolymer  
pH stability 1-14
- high purity material with highest reproducibility and  
lowest blank values due to an optimized production process
- spherical particles, size 45 µm and 85 µm (standard); pore size 55-65 Å  
very large specific surface 850 m<sup>2</sup>/g; pore volume 1.2-1.4 cm<sup>3</sup>/g  
RP capacity 350 mg/g (caffeine in water)
- outstanding recovery rates especially for enrichment of acidic analytes

## weak anion exchanger

- recommended application:  
perfluorinated surfactants  
acidic compounds like  
sulfonates  
active ingredients from  
heavily matrix-contam-  
inated samples like e.g.  
urine, plasma, serum  
strong acids with pKa < 1



Impregnated with fluorosurfactants?

## Surfactants from water

MN Appl. No. 305140



Column type: CHROMABOND® HR-XAW/3 mL,  
60 mg, REF 730747

Sample: 500 mL water, spiked with 1 mL standard  
solution (20 µg/L of each compound)

Conditioning: 2 mL MeOH + 5 % ammonia, then  
2 mL methanol

Equilibration: 2 mL water

Sample application: slowly aspirate sample through  
the column

Washing: 1. 2 mL water  
2. 2 mL acetone - acetonitrile -  
formic acid (50:50:1, v/v/v),  
3. 2 mL MeOH

Elution: after drying by vacuum 2 mL methanol +  
5 % ammonia

Further analysis:  
evaporate to dryness in a stream of nitrogen under  
slight heating, and redissolve in a suitable solvent  
for HPLC on NUCLEODUR® Sphinx RP;  
see MN Appl. No. 123340

Recovery rate [%]:

Compound	HR-XAW	Oasis® WAX
Perfluoropropionic acid (PFPrA)	103	76
Perfluoropentanoic acid (PFPeA)	94	81
Perfluorohexanoic acid (PFHxA)	94	91
Perfluorooctanoic acid (PFOA)	95	95
Perfluorooctane sulfonate K salt (PFOS)	81	80
Perfluorododecanoic acid (PFDoDA)	82	34

Application in accordance with DIN 38407-42.

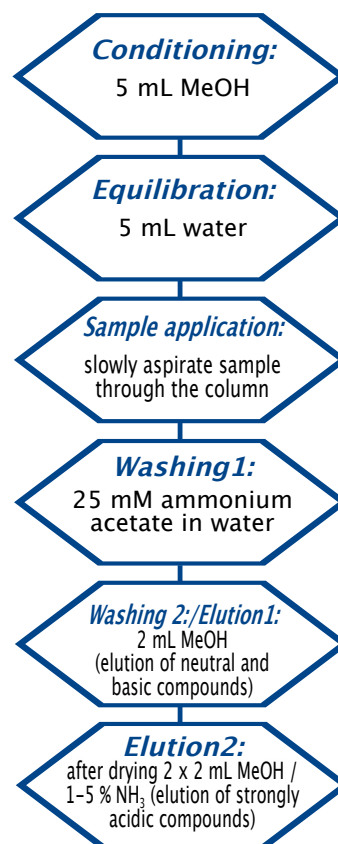
## Standard protocol for CHROMABOND® HR-XAW

MN Appl. No. 305200



Column type: CHROMABOND® HR-XAW/3 mL,  
200 mg, REF 730748

Sample pretreatment: individual sample preparation  
with reference to analytes and matrix



Alternatively elution 2 can be achieved by acidified  
methanol (formic acid). Protonation of the analytes inter-  
rupts the interaction with the anion exchange resin.

Further analysis: if necessary, evaporate and  
redissolve in a suitable solvent; HPLC or GC

These conditions are a starting point for SPE method  
development. Further optimisation may be required to  
improve results.



### Alkaloids from serum

*MN Appl. No. 304300*

**Column type:** CHROMABOND® HR-X/3 mL/200 mg  
REF 730931

**Sample pretreatment:** Serum samples are spiked with alkaloids (each 2 µg/mL).

**Conditioning:** 5 mL MeOH

**Equilibration:** 5 mL water (Do not let run the column dry!)

**Sample application:** 1 mL spiked serum sample is passed through the column by vacuum

**Washing:** 5 mL water

**Drying:** with nitrogen or air

**Elution:** after drying 3 x 2 mL acetone

**Further analysis:** HPLC with NUCLEODUR® C<sub>18</sub> Gravity, according to MN Appl. No. 117950

**Recovery rates [%]:**

Compound	HR-X
Atropine	99
Papvarine	97
Noscapine	95
Strychnine	94
Quinine	60

### Fungicides in fruit juice

*MN Appl. No. 304740*

**Column type:** CHROMABOND® HR-XC/3 mL/200 mg  
REF 730952

**Sample pretreatment:** 5 mL spiked apple juice (c=1 µg/mL) + 0.5 mL 0.1 N NaOH

**Conditioning:** 5 mL MeOH

**Equilibration:** 5 mL 2 % NH<sub>3</sub> (Do not let run the column dry!)

**Sample application:** prepared sample is passed through the column by vacuum.

**Washing:**

- 2 mL 2 % NH<sub>3</sub>
- 2 mL 30 % MeOH/5 % NH<sub>3</sub>
- 2 mL 0.1 N HCl
- 2 mL MeOH

**Drying:** with nitrogen or air

**Elution:** 4 mL MeOH/5 % NH<sub>3</sub>

Evaporation to dryness and reconstitution with 1 mL of mobile phase from subsequent HPLC

**Further analysis:** HPLC with NUCLEODUR® C<sub>18</sub> Gravity, according to MN Appl. No. 122200

**Recovery rates [%]:**

Compound	HR-XC
Carbendazime	89
Thiabendazole	92

### Extraction of melamine from milk

*MN Appl. No. 304920*

**Column type:** CHROMABOND® HR-XC/3 mL/200 mg  
REF 730952

**Step 1:** Add 1 mL 1N HCl to 10 mL spiked milk (1 µg/mL or 0.1 µg/mL); then add 10 mL methylene chloride.

**Step 2:** vortex to mix, centrifuge for 15 min at 4500 rpm, remove the aqueous layer  
add 5 mL 0.1 N HCl to the organic layer  
repeat twice step 2

At least combine all aqueous phases for SPE.

**Conditioning:** 5 mL MeOH

**Equilibration:** 5 mL water (Do not let run the column dry!)

**Sample application:** The prepared sample is passed through the column by gravity or low vacuum.

**Washing:** 5 mL 0,1 N HCl + 5 mL MeOH

**Drying:** 10 min vacuum

**Elution:** 2 x 2.5 mL MeOH/5 % NH<sub>3</sub>

Evaporation with nitrogen stream and reconstitution with a suitable solvent for the subsequent analysis

**Further analysis:** HPLC with NUCLEODUR® 100-5 C<sub>8</sub> ec, according to MN Appl. No. 122670

**Recovery rates [%]:**

Compound	HR-XC
1 µg melamine in 1 mL milk	99
0.1 µg melamin in 1 mL milk	88

### Extraction of campher sulfonic acid from serum

*MN Appl. No. 305320*

**Column type:** CHROMABOND® HR-XAW/3 mL/60 mg  
REF 730747

**Sample pretreatment:** Stock solution: Camphor sulfonic acid in water (c=0.5 mg/mL)

Standard solution: 5 µL stock solution is diluted to 10 mL (c=0.25 µg/mL)

Sample solution: 5 mL serum is spiked with 5 µL stock solution and diluted with 4 % H<sub>3</sub>PO<sub>4</sub> to 10 mL

**Conditioning:** 2 mL MeOH

**Equilibration:** 2 mL water (Do not let run the column dry!)

**Sample application:** 2 mL sample solution is passed through the column by vacuum.

**Washing:** 2 mL ormic acid in water, then 2 mL MeOH

**Drying:** with vacuum

**Elution:** 2 mL MeOH + 5 % ammonia

Evaporation to dryness (mild nitrogen stream, slightly warming), reconstitution in suitable eluent

**Further analysis:** HPLC-MS mit NUCLEODUR® C<sub>18</sub> Gravity, according to MN Appl. No. 123520

**Recovery rate:** 98.9 %



### Allantoin in cosmetic products

**MN Appl. No. 305440**

**Column type:** CHROMABOND® HR-XA/3 mL/60 mg  
REF 730950

**Sample pretreatment:** mix 1 g of cosmetic product with 100 mL of water and adjust pH to 10 - 11 with conc. ammonia solution.

**Conditioning:** 1 mL MeOH

**Equilibration:** 1 mL ammonium hydroxide solution (w(NH<sub>3</sub>) = 5 %)

**Sample application:** slowly force or aspirate 1 mL sample through the column.

**Washing:** 1 mL ammonium hydroxide solution (w(NH<sub>3</sub>) = 5 %), then 1 mL MeOH (do not dry the column completely!)

**Elution:** 2 x 600 µL HCl (w(HCl) = 0.6 %)

Fill up to 10 mL with acetonitrile/30 mM ammonium chloride, pH 3.0 (80:8, v/v) for HPLC analysis.

**Further analysis:** HPLC with NUCLEODUR® HILIC, according to MN Appl. No. 305446

### Acidic herbicides

**MN Appl. No. 304980**

**Column type:** CHROMABOND® HR-XA/3 mL/200 mg  
REF 730951

**Sample pretreatment:** 1 µg/mL sample adjusted on basic pH with 1 N NaOH

**Conditioning:** 5 mL MeOH

**Equilibration:** 5 mL water (Do not let run the column dry!)

**Sample application:** prepared sample is passed through the column by vacuum.

**Washing:**

- a) 2.5 mL 50 mM NaOAc
- b) 2.5 mL MeOH

**Drying:** with nitrogen or air

**Elution:** 5 mL MeOH/10 % formic acid

Evaporation to dryness and reconstitution with 1 mL of mobile phase from subsequent HPLC

**Further analysis:** HPLC with NUCLEODUR® C<sub>18</sub> Gravity, according to MN Appl. No. 122820

**Recovery rates [%]:**

Compound	HR-XA	Oasis® WAX
Dicamba	87	78
Bentazon	79	72
2,4-D	82	80
MCPA	76	72

### Extraction of paraquat and diquat from water

**MN Appl. No. 305370**

**Column type:** CHROMABOND® HR-XCW/3 mL/60 mg  
REF 730735

**Conditioning:** 1 mL MeOH

**Equilibration:** 1 mL water (Do not let run the column dry!)

**Sample application:** 1 mL spiked water (0.5 µg/mL)

**Washing:** 1 mL water

**Drying:** with nitrogen or air

**Elution:** 1 mL acetonitrile/water + 2 % formic acid (1:1, v/v)

Evaporation and reconstitution is suitable solvent

**Further analysis:** HPLC with NUCLEODUR® HILIC, according to MN Appl. No. 123060

**Recovery rates [%]:**

Compound	HR-XA
Paraquat	103
Diquat	113

### Desalting and selective Elution of peptides and proteins

**MN Appl. No. 305290**

**Column type:** CHROMABOND® HR-X/1 mL/30 mg  
REF 730934

**Conditioning:** 1 mL acetonitrile

**Equilibration:** 1 mL de-ionized water (0.1 % TFA)

**Sample application:** Slowly force or aspirate the sample through the column.

**Washing:** 2 x 1 mL de-ionized water (0.1 % TFA)

**Elution:** 250 µL of

40:60 ACN/water (acidic peptides)

70:30 ACN/water (neutral peptides)

70:30 ACN/1.0 % formic acid (basic peptides)





# Ordering information

Solid Phase Extraction

## CHROMABOND® HR-X

hydrophobic RP-phase

Volume	Adsorbent weight						Pack of
<b>CHROMABOND® HR-X polypropylene columns (85 µm)</b>							
	30 mg	60 mg	100 mg	200 mg	500 mg	1 g	
1 mL	730934		730935				30
3 mL		730936		730931	730937		30
6 mL				730938	730939		30
15 mL					730940	730941	20
<b>CHROMABOND® HR-X polypropylene columns (85 µm) · BIGpacks</b>							
3 mL				730931.250			250
6 mL				730938.250	730939.250		250
<b>CHROMABOND® HR-X polypropylene columns (45 µm) · NEW</b>							
1 mL	730934P45		730935P45				30
3 mL		730936P45		730931P45			30
<b>CHROMABOND® LV-HR-X (85 µm)</b>							
	30 mg	60 mg		200 mg			
15 mL	732130	732131		732132			30
<b>CHROMABOND® MULTI 96 HR-X</b>							
	96 x 10 mg (45 µm)	96 x 25 mg (45 µm)	96 x 50 mg (85 µm)		96 x 100 mg (85 µm)		
	738530.010M	738530.025M	738530.050M		738530.100M		1
<b>CHROMABOND® HR-X adsorbent (85 µm)</b>							
						730663	20 g

## CHROMABOND® HR-XC

strong cation exchanger

Volume	Adsorbent weight						Pack of
<b>CHROMABOND® HR-XC polypropylene columns (85 µm)</b>							
	30 mg	60 mg	100 mg	150 mg	200 mg	500 mg	
1 mL	730969		730049				30
3 mL		730956			730952	730953	30
6 mL				730957		730955	30
<b>CHROMABOND® HR-XC polypropylene columns (45 µm) · NEW</b>							
1 mL	730969P45		730049P45				30
3 mL		730956P45			730952P45		30
<b>CHROMAFIX® HR-XC cartridges (85 µm)</b>							
	Size	S	M	L			
	adsorbent weight Ø	155 mg	240 mg	500 mg			
		731755	731756	731757			50
<b>CHROMABOND® HR-XC adsorbent (85 µm)</b>							
						730664	100 g

## CHROMABOND® HR-XA

strong anion exchanger

Volume	Adsorbent weight						Pack of
<b>CHROMABOND® HR-XA polypropylene columns (85 µm)</b>							
	30 mg	60 mg	100 mg	150 mg	200 mg	500 mg	
1 mL	730968		730727				30
3 mL		730950			730951	730954	30
6 mL				730958		730966	30
<b>CHROMABOND® HR-XA polypropylene columns (45 µm) · NEW</b>							
1 mL	730968P45		730727P45				30
3 mL		730950P45			730951P45		30
<b>CHROMAFIX® HR-XA cartridges (85 µm)</b>							
	Size	S	M	L			
	adsorbent weight Ø	155 mg	240 mg	500 mg			
		731768	731769	731770			50
<b>CHROMABOND® HR-XA adsorbent (85 µm)</b>							
						730671	100 g



## CHROMABOND® HR-XCW

weak cation exchanger

Volume	Adsorbent weight						Pack of	
<b>CHROMABOND® HR-XCW polypropylene columns (85 µm)</b>								
	30 mg	60 mg	100 mg	150 mg	200 mg	500 mg		
1 mL	730731		730733				30	
3 mL		730735			730739	730741	30	
6 mL				730737		730743	30	
<b>CHROMABOND® HR-XCW polypropylene columns (45 µm) · NEW</b>								
1 mL	730731P45		730733P45				30	
3 mL		730735P45			730739P45		30	
<b>CHROMAFIX® HR-XCW cartridges (85 µm)</b>								
	<b>Size</b>	<b>S</b>	<b>M</b>	<b>L</b>				
	adsorbent weight Ø	155 mg	240 mg	500 mg				
		731774	731775	731776			50	
<b>CHROMABOND® HR-XCW adsorbent (85 µm)</b>							730674	100 g

## CHROMABOND® HR-XAW

weak anion exchanger

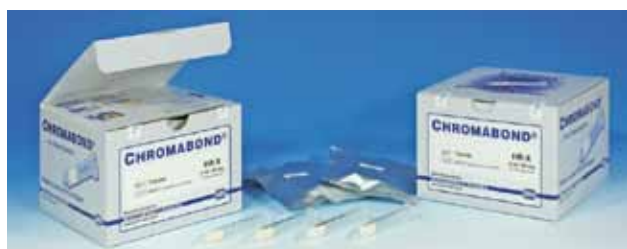
Volume	Adsorbent weight						Pack of	
<b>CHROMABOND® HR-XAW polypropylene columns (85 µm)</b>								
	30 mg	60 mg	100 mg	150 mg	200 mg	500 mg		
1 mL	730728		730729				30	
3 mL		730747			730748	730744	30	
6 mL				730749		730745	30	
<b>CHROMABOND® HR-XAW polypropylene columns (45 µm) · NEW</b>								
1 mL	730728P45		730729P45				30	
3 mL		730747P45			730748P45		30	
<b>CHROMAFIX® HR-XAW cartridges (85 µm)</b>								
	<b>Size</b>	<b>S</b>	<b>M</b>	<b>L</b>				
	adsorbent weight Ø	155 mg	240 mg	500 mg				
		731771	731772	731773			50	
<b>CHROMABOND® HR-XAW adsorbent (85 µm)</b>							730673	100 g

## CHROMABOND® HR-Xpert

development kits

	Pack of	
<b>CHROMABOND® polypropylene columns</b>		
10 x HR-X and 5 x HR-XC, HR-XA, HR-XCW, HR-XAW	Kit I 3mL/60mg 730723 (45 µm)	Kit II 3mL/200mg 730726 (85 µm)
		30

Further sizes and adsorbent weights for all HR-Xpert phases on request!



All our CHROMABOND® SPE-phases:

[www.mn-net.com](http://www.mn-net.com)

Please contact us . . .

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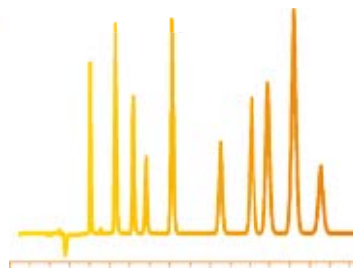
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Germany  
and international:  
Tel.: +49 24 21 969-0  
Fax: +49 24 21 969-199  
E-mail: [info@mn-net.com](mailto:info@mn-net.com)

Switzerland:  
MACHEREY-NAGEL AG  
Tel.: +41 62 388 55 00  
Fax: +41 62 388 55 05  
E-mail: [sales-ch@mn-net.com](mailto:sales-ch@mn-net.com)

France:  
MACHEREY-NAGEL EUROL  
Tel.: +33 388 68 22 68  
Fax: +33 388 51 76 88  
E-mail: [sales-fr@mn-net.com](mailto:sales-fr@mn-net.com)

USA:  
MACHEREY-NAGEL Inc.  
Tel.: +1 484 821 0984  
Fax: +1 484 821 1272  
E-mail: [sales-us@mn-net.com](mailto:sales-us@mn-net.com)



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