



Scharlau

The wise choice

ExtraBond®

Solid Phase Extraction



Scharlab and Phase Extraction

Solid Phase Extraction (SPE) has become the ideal method for sample preparation prior to analysis using HPLC, GC, TLC, RIA, NMR... and other analytical techniques. The popularity of this technique has grown dramatically over the past two decades due to advances in analytical instrumentation or robots (automated instrumentation).

SPE is used in various analytical fields such as:

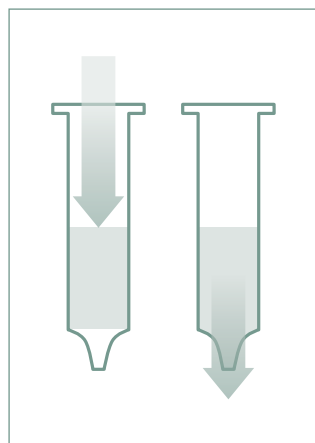
- **Chemical**
- **Food & Beverages**
- **Pharmaceuticals**
- **Cosmetics**
- **Drug Abuse**
- **Environment**
- **Agrochemicals**
- **Clinical and Forensic**

The main objectives in using SPE are cleaning, concentrating or changing the solvent (for example, from aqueous to organic). It offers greater selectivity and cleanup than liquid-liquid extraction, as well as less solvent consumption, time saving, and the possibility of automation.

SPE is based on the same principle of selective retention as liquid chromatography. The extraction is carried out in columns (straight walled syringe barrel tubes) containing modified or plain silica gel or other packing materials. There are a variety of columns that differ in the type of stationary phase (packing material), the capacity and the amount of stationary phase they contain.

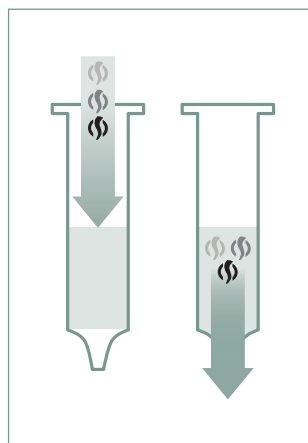
Development of the extraction method with ExtraBond®

Generally, an SPE method usually consists of 4 stages:



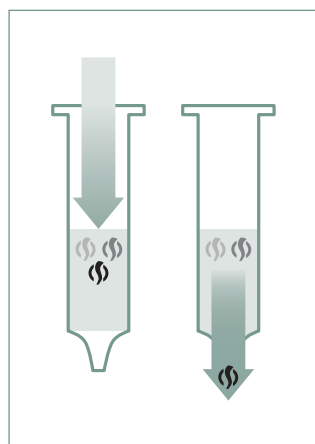
Conditioning

Sorbent ligands must be “activated” and the bed then equilibrated before applying the sample to obtain a reproducible interaction. This is carried out by passing a volume of suitable solvent through the stationary phase, followed by a volume of liquid similar to the sample matrix. 4 bed volumes are commonly recommended.



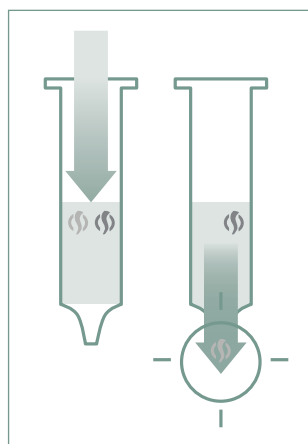
Retention

After applying the sample, the analyte (☞) and possibly other matrix components (☞ and ☞), are retained on the phase due to one or several chemical interactions. Other matrix components can pass through the stage without being retained.



Wash

This stage should result in the elution of all the unwanted components of the matrix (☞) that were retained in the phase at the retention stage. 6-8 bed volumes are commonly recommended.



Elution

An elution solvent that only “breaks” the bonds between the analyte (☞) and the phase should be chosen which results solely in the selective elution of the analyte. 4-5 bed volumes are commonly recommended.

The SPE methodology varies with the type of phase used (normal, reversed or ion exchange). The following are proposed simplified generic methods for each type of phase although the protocols may differ slightly from one sample to another and should be optimised for each application. For polymeric phases see the [ExtraBond® Polymeric](#) section in this brochure.

	Normal phase	Reversed phase	Ion Exchange	
			Anionic	Cationic
Typical phases	Florisil, Silica, Amine, Cyano, Diol	C18, C8, C2, C1, Cyclohexyl, Cyano, Phenyl	NH ₂ , SAX, DEA, PSA	CBA, SCX, PRS
Phase polarity	High	Low	High	
Matrix	Organic solvents	Aqueous	Organic solvents or aqueous (buffer)	
Analyte	Polar / without load	Non polar / without load	Acid	Base
Retained compounds	Polar	Non polar	Ionised	
Stage 1: Conditioning	1) IPA 2) hexane	1) methanol 2) water	1) methanol: water (50:50) 2) buffer* (0,1M)	
Stage 2: Retention	Load sample 1-5 ml/min	Load sample 1-5 ml/min	Load sample 1 ml/min	
Stage 3: Wash	Hexane or Hexane: IPA (98:2)	Water or water: methanol (95:5)	Methanol: buffer* (0,1M) (10:90)	
Stage 4: Elution	IPA, ethyl acetate, acetone or hexane: IPA (50:50)	Methanol o acetonitrile**	Buffer*** (0,5M-1,0M) or modify pH until the analyte is no longer retained	

* Low ionic strength buffer

** Could require addition of acid or base

*** High ionic strength buffer

Choosing a phase

The choice of a cartridge is determined by the type and volume of the matrix and the type and concentration of analytes. For an extraction to take place, 3 types of interactions must be taken into account:

- **Analyte/phase:** are responsible for the retention of the analyte in the stationary phase.
- **Analyte/matrix:** also affect the retention of the analyte in the stationary phase.
- **Matrix/phase:** are competing with those of the analyte/phase.

The stationary phase chosen must have a high affinity for either the analytes to be extracted or the interferences to be eliminated. The choice of this phase will define a specific selectivity for the compounds of interest and a loading capacity sufficient for complete adsorption.

Two approaches are possible:

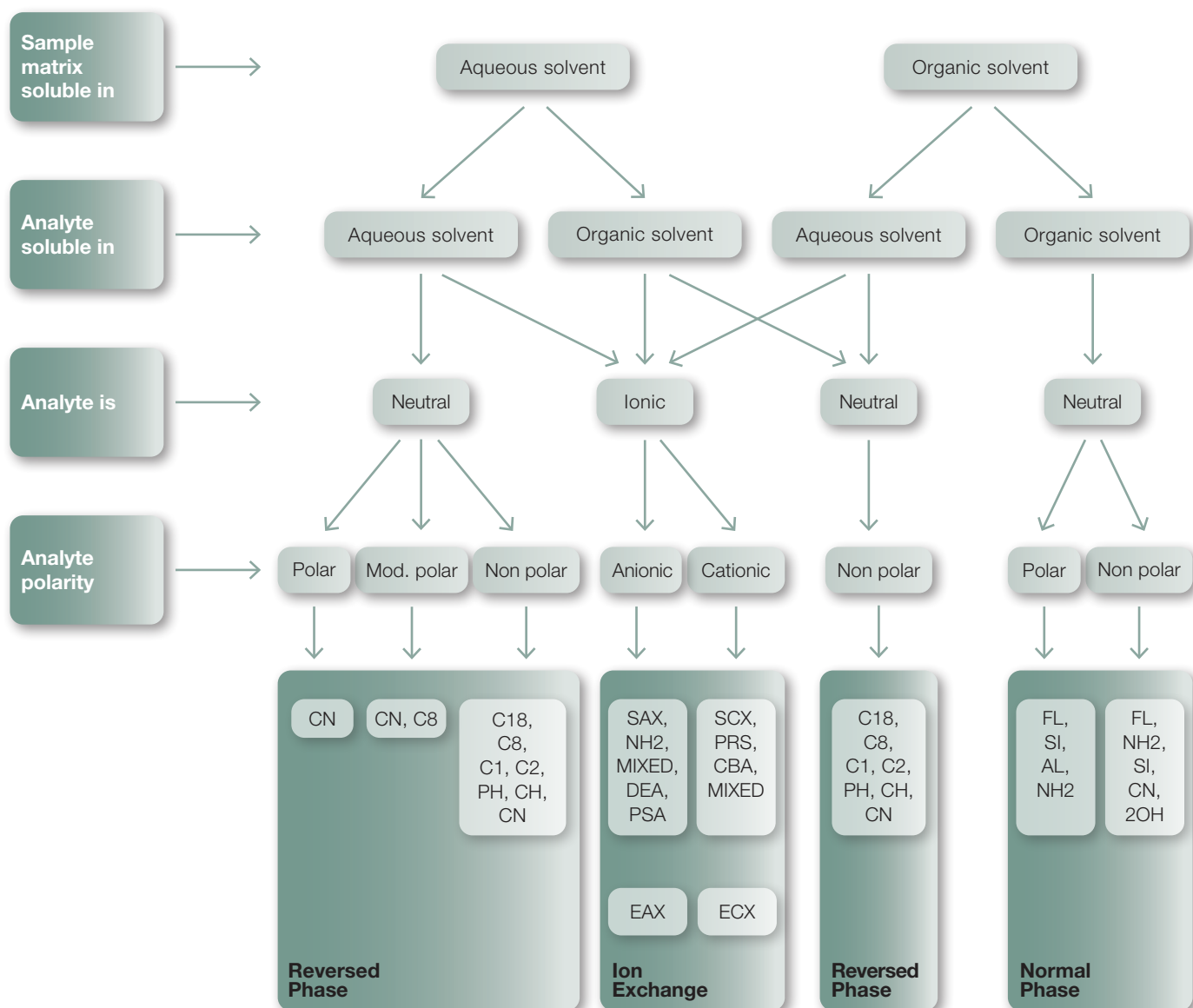
- The analyte of interest can be retained in order to separate it from interferences which may pass through.
- The interferences may be retained and the analytes of interest are allowed to pass through.

There are two major groups of packings: stationary phases **based on silica gel or non silica gel** and stationary phases **based on polymers**. Polymeric phases offer the advantage of being very stable chemically and pH resistant in ranges from 1 to 14. On the other hand, they are generally less selective than those with a silica base. Their loading capacity is higher and elution volume lower, so the process can be faster, minimising the evaporation stage.

Silica based stationary phases have a lower chemical stability (pH 2 to 7,5) but are much more selective than polymer phases which is why they remain widely in use. The silica based phases include 4 major groups according to the mechanism of interaction and selectivity: **reversed-phase, normal phase, ion-exchange and mixed mode**.



Choose the phase according to the sample characteristics



Quantity of phase and elution volume

Once the phase is chosen it is necessary to determine the quantity required to ensure complete extraction.

As a general rule for silica and no silica based cartridges:

- The **capacity** of a cartridge corresponds to approx. 5% of the mass of the phase contained in the cartridge.
- The **minimum volume of elution** is considered to be twice the volume of the bed. The bed volume is the amount of solvent required to fill all the internal pores and interstitial spaces of the phase particles. Consider that the optimum volume of elution is at least 4 or 5 times the bed volume. The bed volume for a silica based phase 50 μ and 60 \AA is about 120 μl /100 mg of adsorbent.

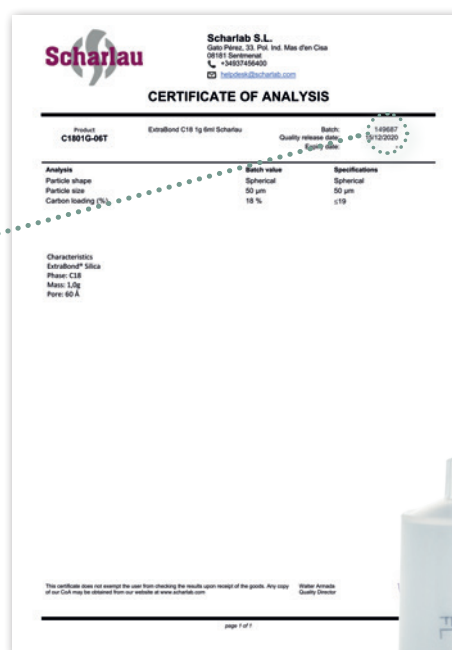
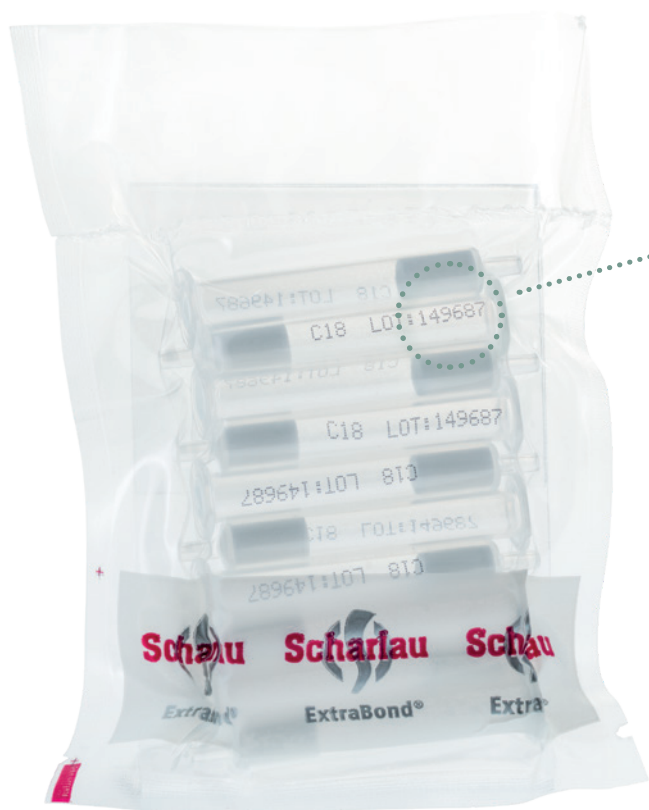
Cartridge mass	50 mg	100 mg	200 mg	500 mg	1 g	2 g	5 g	10 g
Capacity	2,5 mg	5 mg	10 mg	25 mg	50 mg	100 mg	250 mg	500 mg
Min. Elution Vol.	125 μl	250 μl	500 μl	1,2 ml	2,4 ml	4,8 ml	12 ml	24 ml

For polymeric cartridges, the following must be taken into consideration:

- The **capacity** of a cartridge corresponds to approx. **15% of the mass** of the phase contained in the cartridge.
- The **bed volume** is generally **180 μl /100 mg** of adsorbent.

FEATURES OF EXTRABOND®:

- ✓ Lot number printed on each cartridge
- ✓ Phase type printed on each cartridge
- ✓ Vacuum packed
- ▶ Total traceability
- ▶ Decrease of mistakes
- ▶ Protection against moisture and possible phase detachments



ExtraBond® cartridges are supplied with a certificate of analysis that includes the results of tests carried out prior to the approval of each lot.

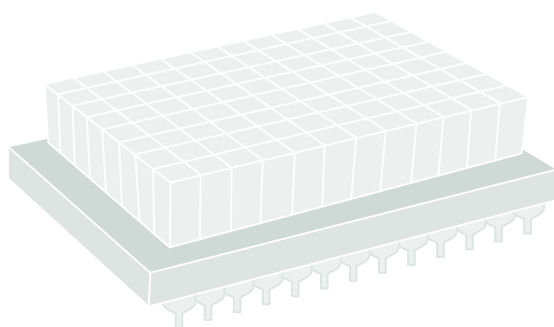


ADVANTAGES YOU CAN BENEFIT FROM USING EXTRABOND®:

- ✓ Obtain perfect traceability
- ✓ Avoid confusions
- ✓ Keep cartridges fresh for a longer period of time

ExtraBond® Formats

ExtraBond® is available in a wide range of formats: open straight cartridges from 1 to 60 ml, wide opening Large Reservoir Cartridges (LRC) of 10 or 15 ml, closed cartridges, glass cartridges, 48 and 96 well extraction plates. Except in the case of the glass cartridges, the plastic is medical grade polypropylene and the frits are polyethylene although frits are available in other materials.

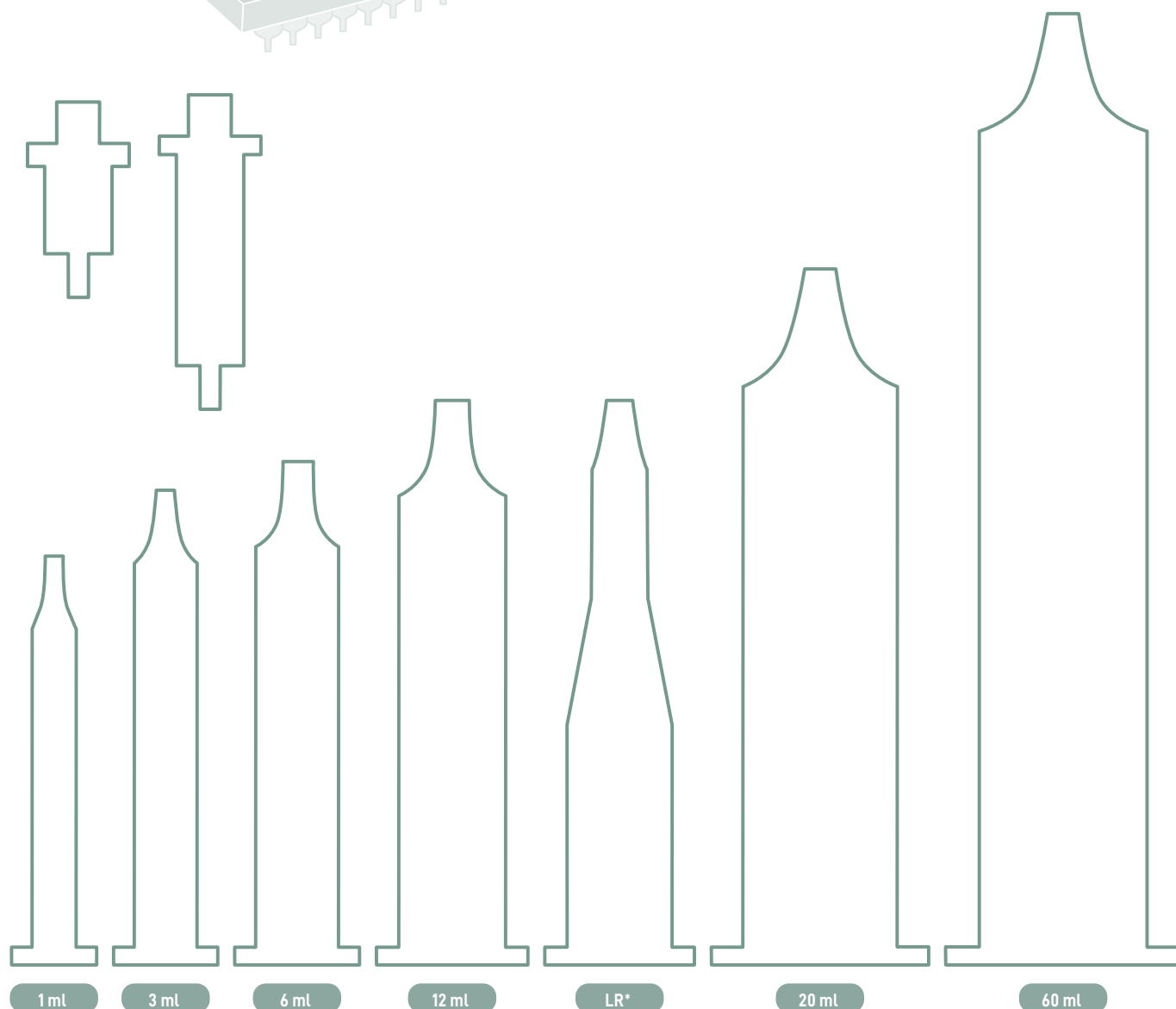


ExtraBond® Product Range

Below are the ExtraBond® cartridges available for immediate delivery (subject to prior sale). These cartridges are manufactured in medical grade polypropylene.

For any other cartridge format, glass cartridges or 96 and 48 well plates, contact **helpedesk@scharlab.com**.

- ▶ **ExtraBond® Silica**, see page 7
- ▶ **ExtraBond® Drug**, see page 10
- ▶ **ExtraBond® No Silica**, see page 13
- ▶ **ExtraBond® Polymeric**, see page 14
- ▶ **ExtraBond® LLE**, see page 16
- ▶ **ExtraBond® accessories**, see page 18
- ▶ **ExtraBond® Flash**, see page 19
- ▶ **ExtraBond® QuEChERS**, see page 21



*Large Reservoir

ExtraBond® Silica

PRODUCT RANGE



Certificate of Analysis



Lot number on each cartridge



Vacuum packed



Closed cartridges

C18. Silica-based octadecyl. Nonpolar phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
C18	50	1	60	50	100	C18050-01C
C18	100	1	60	50	100	C18100-01C
C18	200	3	60	50	50	C18200-03L
C18	500	3	60	50	50	C18500-03L
C18	500	6	60	50	30	C18500-06T
C18	500	10	60	50	50	C18500-10L
C18	1.000	6	60	50	30	C1801G-06T
C18	2.000	12	60	50	20	C1802G-12A
C18	5.000	20	60	50	20	C1805G-20A
C18	10.000	60	60	50	16	C1810G-60B
C18	500	-	125	50	50	C18500-00L
C18	1.000	-	125	50	50	C181000-0L

C8. Silica-based octyl. Nonpolar phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
C8	200	15	60	50	50	C8E200-15L
C8	500	3	60	50	50	C8E500-03L

NH2. Silica-based aminopropyl. Polar phase / anion exchange.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
NH2	100	1	60	50	100	NH2100-01C
NH2	500	3	60	50	50	NH2500-03L
NH2	500	6	60	50	30	NH2500-06T
NH2	500	15	60	50	50	NH2500-15L
NH2	1.000	6	60	50	30	NH201G-06T

2OH. Silica-based diol. Polar phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
2OH	500	3	60	60	50	2OH500-03L
2OH	1.000	6	60	60	30	2OH01G-06T

SIL. Silica. Polar phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
SIL	50	1	60	50	100	SIL050-01C
SIL	100	1	60	50	100	SIL100-01C
SIL	500	3	60	50	50	SIL500-03L
SIL	500	6	60	50	50	SIL500-06T
SIL	1.000	6	60	50	30	SIL01G-06T
SIL	2.000	12	60	50	20	SIL02G-12A
SIL	5.000	20	60	50	20	SIL05G-20A

PRS. Silica-based propylsulphonic acid. Cation exchange phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
PRS	500	3	60	50	50	PRS500-03L
PRS	500	10	60	50	50	PRS500-10L

SCX. Silica-based benzenesulfonic acid. Cation exchange phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
SCX	500	3	60	60	50	SCX500-03L
SCX	1.000	6	60	60	30	SCX01G-06T
SCX	5.000	20	60	60	20	SCX05G-20A
SCX	2.000	12	60	60	20	SCX02G-12A

SAX. Silica-based trimethyl aminopropyl. Anion exchange phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
SAX	500	3	60	60	50	SAX500-03L
SAX	500	6	60	60	30	SAX500-06T
SAX	1.000	6	60	60	30	SAX01G-06T

PCB. Silica and silica-based benzenesulfonic acid. Polar phase / cation exchange.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
PCB	1.000	6	60	-	50	PCB01G-06L
PCB	1.000	3	60	-	50	PCB01G-03L

CN. Cyanopropyl on silica base.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
CN	100	1	60	50	100	CN0100-01C
CN	200	3	60	50	50	CN0200-03L
CN	500	3	60	50	50	CN0500-03L
CN	500	6	60	50	50	CN0500-06T
CN	1.000	6	60	50	30	CN001G-06T

Drug. Mixed phase nonpolar / silica-based cation exchange. Designed for the extraction of drugs of abuse with greater reproducibility and efficiency. Its advantages are spectacular when used with sensitive detectors such as MS.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
Drug	130	10	60	50	50	DRG130-10L
Drug	200	3	60	50	50	DRG200-03L
Drug	300	10	60	50	50	DRG300-10L
Drug	500	6	60	50	30	DRG500-06T

SA82. Octyl mixed phase and silica-based TMA acetate. Nonpolar phase / anion exchange.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
SA82	200	10	60	50	50	SA2200-10L

PH.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
PH	100	1			100	PH0100-01C
PH	500	3			50	PH0500-03L
PH	1.000	6			30	PH001G-06T

PSA. (N-aminoethyl) Aminopropyl. Anion exchange phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
PSA	100	1	60	40-60	100	PSA100-01C
PSA	500	3	60	40-60	50	PSA500-03L
PSA	500	6	60	40-60	30	PSA500-06T
PSA	1.000	6	60	40-60	30	PSA01G-06T

SCX. Silica-based benzenesulfonic acid. Cation exchange phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
SCX	500	3	60	60	50	SCX500-03L
SCX	1.000	6	60	60	30	SCX01G-06T
SCX	5.000	20	60	60	20	SCX05G-20A
SCX	2.000	12	60	60	20	SCX02G-12A



Validation Data of 127 Pesticides Using a Multiresidue Method by LC-MS/MS and GC-MS/MS in Olive Oil

EURL EUROPEAN UNION REFERENCE LABORATORY PESTICIDES IN FRUITS AND VEGETABLES

Scharlau ExtraBond® cartridge C18 C18500-06T is included in the EURL Method "Validation Data of 127 Pesticides Using a Multiresidue Method by LC-MS/MS and GC-MS/MS in Olive Oil"

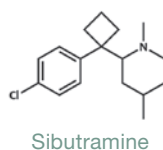
ExtraBond® Drug

ExtraBond® Drug is a revolutionary silica based packing designed for the extraction of drugs of abuse with greater reproducibility and efficiency. Using sensitive detectors such as MS, the advantages are dramatic.

ExtraBond® Drug is manufactured under strict hygienic conditions and the levels of extractables are monitored. Each batch undergoes stringent control of various parameters. These levels of control and precision mean that ExtraBond® Drug offers remarkably consistent results and batch to batch reproducibility, essential factors in current validation requirements.

Following are some examples, but the same method of extraction as that for BondElut® Certify (manufactured by Agilent Technologies) can be employed.

Extraction of Sibutramine from human plasma with ExtraBond® Drug



Sample preparation: 0,1 ml human plasma and 2,0 ml 1% Acetic acid



Conditioning: 3 ml Methanol and 3 ml Water



Load prepared sample



Wash: 3 ml Water and 3 ml Methanol (vacuum 5" Hg)



Elution: 3 ml 5% Ammonia / Methanol (gravity)

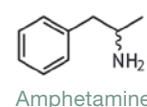
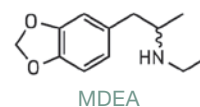
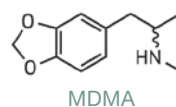
› Optimum volumes for 500 mg of phase.

Addition (ng/ ml) levels	Recovery (% para N=6)	RSD (%)
1,00	81	10
5,00	82	7
20,00	80	4

Cartridge:

· Art. No. DRG500-06T, ExtraBond® Drug 500 mg LR

Extraction of MDMA, MDEA and Amphetamine from Urine with ExtraBond® Drug



Sample preparation: 0,5 ml urine and 2,5 ml Sulfuric acid (0,1M)



Conditioning: 2x3 ml Methanol and 2x3 ml Sulfuric acid (0,1M)



Load prepared sample



Wash: 3 ml Phosphate buffer (KH₂PO₄/K₂HPO₄, pH=7,0) and 3 ml Sulfuric acid (0,1M) and 3 ml Methanol



Elution: 2x3 ml Ammonia ac. (5%v/v)

› Optimum volumes for 200 mg of phase.

MDMA	MDEA	Amphetamine
96%	98%	89%

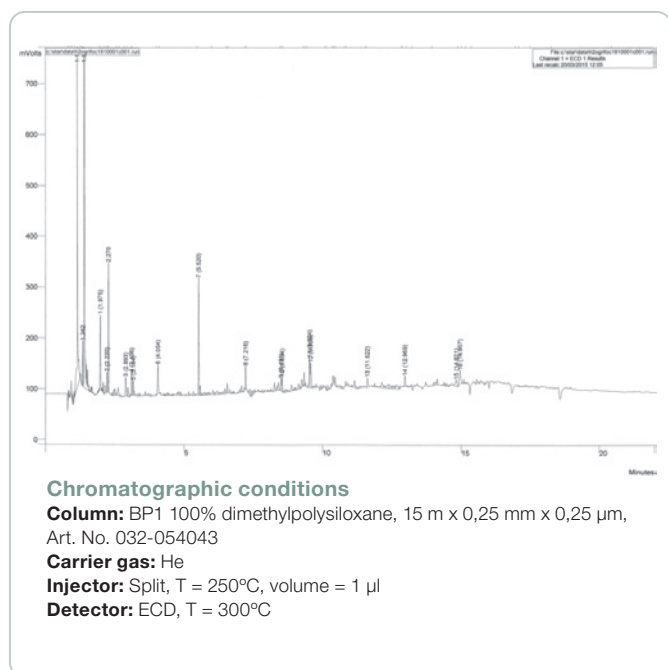
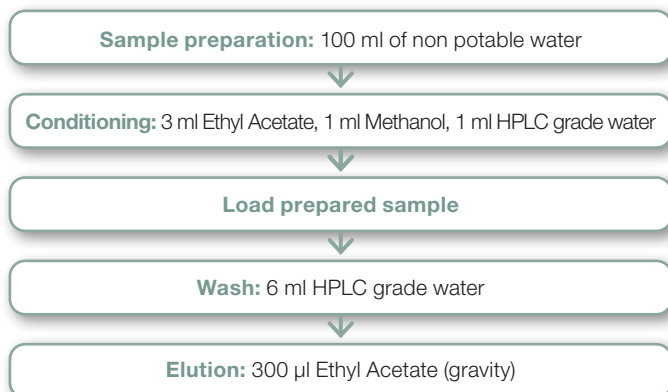
Cartridge:

· Art. No. DRG200-03L, ExtraBond® Drug 200 mg 3 ml

Drug. Mixed phase nonpolar / silica-based cation exchange. Designed for the extraction of drugs of abuse with greater reproducibility and efficiency. Its advantages are spectacular when used with sensitive detectors such as MS.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
Drug	130	10	60	50	50	DRG130-10L
Drug	200	3	60	50	50	DRG200-03L
Drug	300	10	60	50	50	DRG300-10L
Drug	500	6	60	50	30	DRG500-06T

Extraction of organic compounds from water with ExtraBond® C18



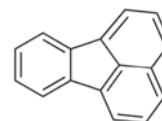
Cartridge:

· Art. No. C18100-01C, ExtraBond® C18 100 mg 1 ml

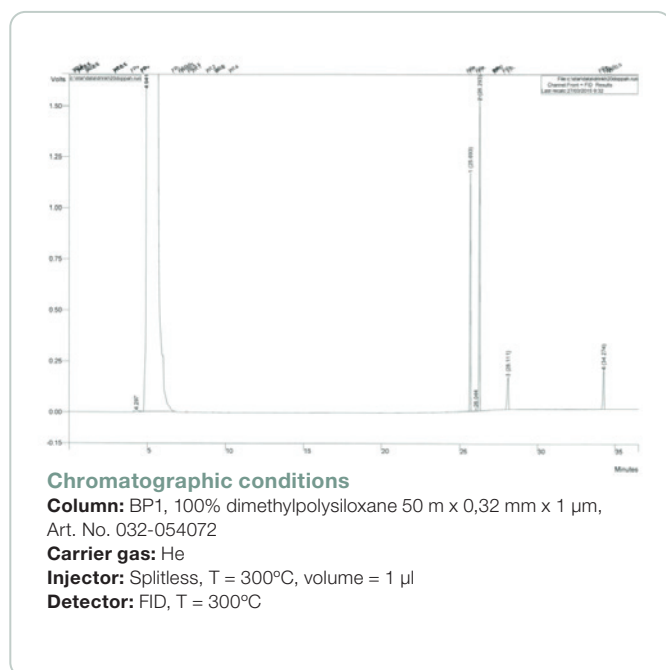
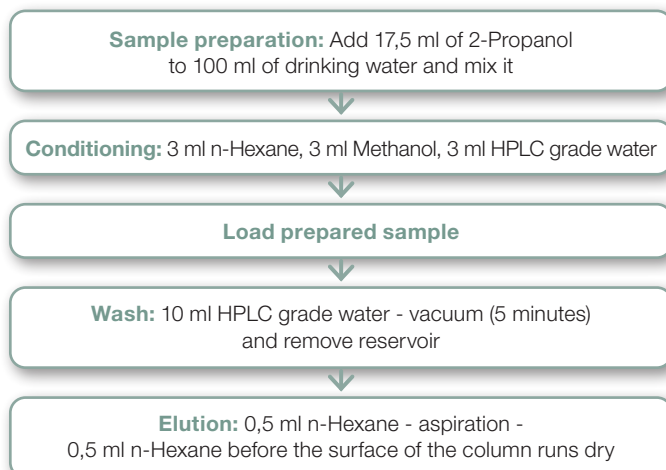
Reagents:

- Ethyl acetate, GC ultra-trace analysis grade (Art. No. AC0149, lot 11643114)
- Methanol, for GC residue analysis (Art. No. ME0318, lot 16169216)
- Water, gradient HPLC grade (Art. No. AG0001, lot 15881903)

Extraction of PAHs from drinking water with ExtraBond® C18



Fluoranthene



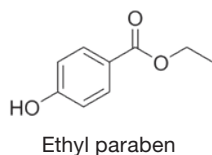
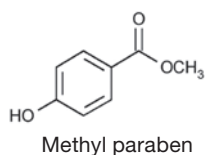
Cartridge:

· Art. No. C18500-03L, ExtraBond® C18 500 mg 3 ml

Reagents:

- n-Hexane, 96%, GC ultra-trace analysis grade (Art. No. HE0239, lot 15709211)
- 2-Propanol, for GC residue analysis (Art. No. AL0319, lot 149379)
- Methanol, for GC residue analysis (Art. No. ME0318, lot 16169216)
- Water, gradient HPLC grade (Art. No. AG0001, lot 15881903)

Extraction of Parabens from creams with ExtraBond® C18



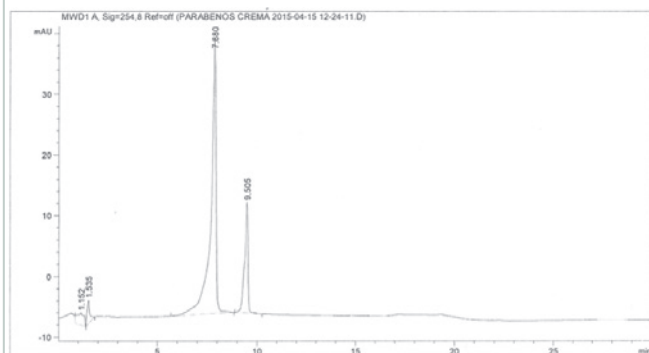
Sample preparation: Add 10 ml Methanol to 1 g sample - centrifuge - add 500 ml of the supernatant and dilute with Methanol

Conditioning: 2 x 3 ml of Hexane: Chloroform (80:20)

Sample loading: Add 0,5 ml of sample

Wash: 3 x 1 ml of Hexane

Elution: 2 x 0.5 ml of Methanol



Chromatographic conditions

Column: Kromaphase 100 C18 5 µm 125x4,6 mm, Art. No. 066-B1Y803

Mobile Phase: Solvent A: Water

Solvent B: Methanol

Flow rate: 0.8 ml/min

Temperature: 40°C

Detector: UV 254 nm

Injection Volume: 20 μ l

Cartridge:

· Art. No. SIL100-01C, ExtraBond® SIL 100 mg 1 ml

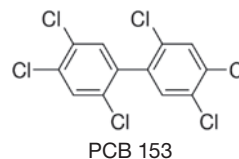
Reagents:

- n-Hexane, 96%, HPLC grade (Art. No. HE0231, lot 15719506)
- Chloroform, extra pure, stabilized with 150 ppm of amylene (Art. No. CL0210, lot 15189706)
- Methanol, supragradient HPLC grade (Art. No. ME0306, lot 16164713)

Mobile Phase:

- Methanol, supragradient HPLC grade (Art. No. ME0306, lot 16164713)
- Water, gradient HPLC grade (Art. No. AG0001, lot 16258803)

Extraction of PCBs from an organic matrix with ExtraBond® PCB

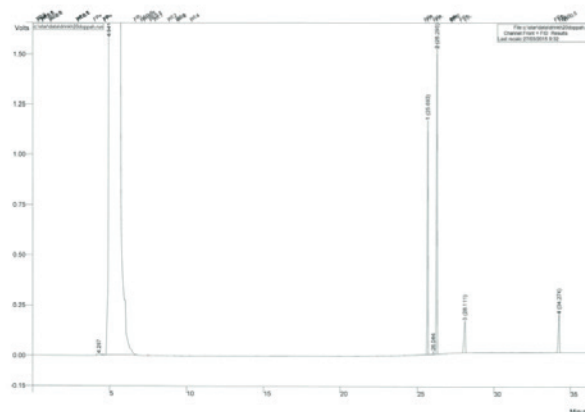


Sample preparation: 250 ml tBME

Conditioning: 1 ml n-Hexane through the cartridge under light vacuum (5 inches of Hg)

Sample loading: Add 250 µl sample to extraction column

Elution: 1 ml n-Hexane - elution - 1 ml n-Hexane - vacuum elution (20" Hg) - 3x0,5 ml n-Hexane under vacuum



Chromatographic conditions

Column: BP1, 100% dimethylpolysiloxane 15 m x 0,25 mm x 0,25 µm,
Art. No. 032-054043

Carrier gas: He

Injector: Splitless, T = 250°C, volume = 1 µl

Detector: ECD, T = 300°C

Cartridge:

• Art. No. PCB01G-03L, ExtraBond® PCB 1 g 3 ml

Reagents:

- n-Hexane, 96%, GC ultra-trace analysis grade (Art. No. HE0239, lot 15709211)

ExtraBond® No Silica

PRODUCT RANGE



Certificate of Analysis



Lot number on each cartridge



Vacuum packed



Closed cartridges

FL. Florisil. Polar phase.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
FL	500	3	-	200	50	FLO500-03L
FL	1.000	6	-	200	30	FLO01G-06T
FL	2.000	12	-	200	20	FLO02G-12A
FL	5.000	20	-	200	20	FLO05G-20A

ALB. Basic aluminum oxide.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
ALB	200	3	80	100-200	50	ALB200-03L
ALB	500	3	80	100-200	50	ALB500-03L
ALB	500	6	80	100-200	50	ALB500-06T
ALB	1.000	6	80	100-200	50	ALB01G-06T

ALA. Acid aluminium oxide.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
ALA	500	3	80	100-200	50	ALA500-03L
ALA	500	6	80	100-200	50	ALA500-06T
ALA	1.000	6	80	100-200	50	ALA01G-06T

ALN. Aluminium oxide with neutralized surface.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
ALN	100	1	80	100-200	50	ALN100-01C
ALN	500	3	80	100-200	50	ALN500-03L
ALN	500	6	80	100-200	50	ALN500-06T
ALN	1.000	6	80	100-200	50	ALN01G-06T

GCB/NH2. Graphitized carbon black/amine (equivalent volume).

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
GCB/NH2	300	6			50	CNH300-06T
GCB/NH2	500	6			50	CNH500-06T

GCB. Graphitized Carbon Black.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
GCB	100	1		120-400	50	GCB100-01C
GCB	200	3		120-400	50	GCB200-03L
GCB	500	6		120-400	50	GCB500-06T

ExtraBond® Bulk phases

ExtraBond® phases are available in bulk so you can prepare your own cartridges or, for extraction of solid samples by putting the packing directly in contact with the sample.



Phase	Pack (u.)	Art. No.
C18	100	KQ00240100
NH2	100	000NH2100G
AL-N	100	000ALN100G
FL	100	000FLO100G
PSA	100	KQ00230100
GCB	100	CA03530100
C18	1.000	KQ00241000

Phase	Pack (u.)	Art. No.
NH2	1.000	00NH21000G
AL-N	1.000	00ALN1000G
FL	1.000	00FLO1000G
PSA	1.000	KQ00231000
GCB	1.000	CA03531000

ExtraBond® Polymeric

PRODUCT RANGE

ExtraBond® Polymeric EB

Cartridges from the **ExtraBond® Polymeric** line are based on the ExtraBond® EB phase. This sorbent is a spherical divinylbenzene polystyrene.

It has more capacity and surface area than silica-based packings with high recovery and extraction rates. It is a material that provides a balance between hydrophilic and hydrophobic properties and can be used in a pH range of 1 to 14.

The ExtraBond® Polymeric range consists of 4 types of packing materials with differing polarities due to modifications:

ECX. Cation exchange polymer phase, styrenedivinylbenzene-based. It acts as a dual phase: reversed-phase and cation exchanger.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
ECX	30	1	70	55	100	ECX030-01C
ECX	60	3	70	55	50	ECX060-03L
ECX	200	6	70	55	30	ECX200-06T
ECX	500	6	70	55	30	ECX500-06T

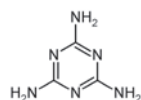
EAX. Anion exchange polymer phase, styrenedivinylbenzene-based. It acts as a dual phase: reversed-phase and anion exchanger.

Phase	Amount (mg)	Volume (ml)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
EAX	30	1	70	55	100	EAX030-01C
EAX	200	6	70	55	30	EAX200-06T
EAX	500	6	70	55	30	EAX500-06T

Extraction of melamine from pet food with ExtraBond® ECX

Cation exchange

ExtraBond® ECX acts as a dual phase, reversed phase and cation exchanger.



Melamine

Conditioning: 3 ml Methanol and 3 ml Water

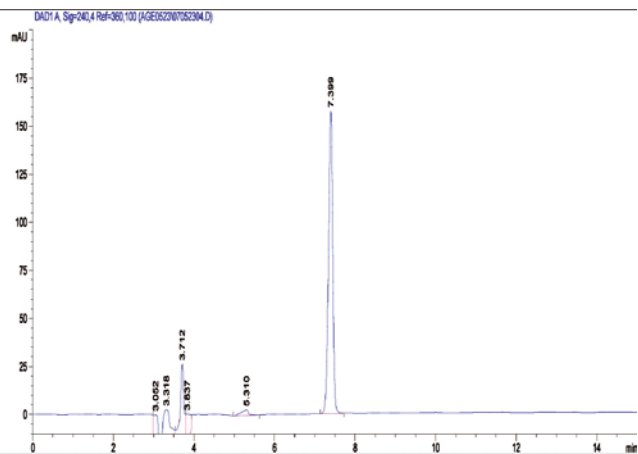
Sample loading: 3 ml sample

Wash: 3 ml Water and 3 ml Methanol.
Dry: 4 minutes

Elution: 3 ml 5% Ammonia / Methanol

➤ Optimum volumes for 60 mg of phase.

Addition (mg/L)	Recovery
0,1	108%
0,5	92%
2	96%



Chromatographic conditions

Column: Kromaphase C18 250x4,6mm, Art. No. 066-B6Y803
Mobil phase: 85% 10mM Citric acid, 10mM Heptanesulfonic acid, 15% Acetonitrile
Temperature: 40°C
UV: 240nm

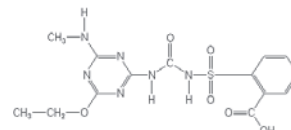
Cartridge:

· Art. No. ECX060-03L, ExtraBond® ECX 40um 60 mg 3 ml

Extraction of Ethametsulfuron (herbicide) with ExtraBond® EAX

Anion exchange

ExtraBond® EAX acts as a dual phase, reversed phase and anion exchanger. Stable from pH 0 to 14.



Ethametsulfuron

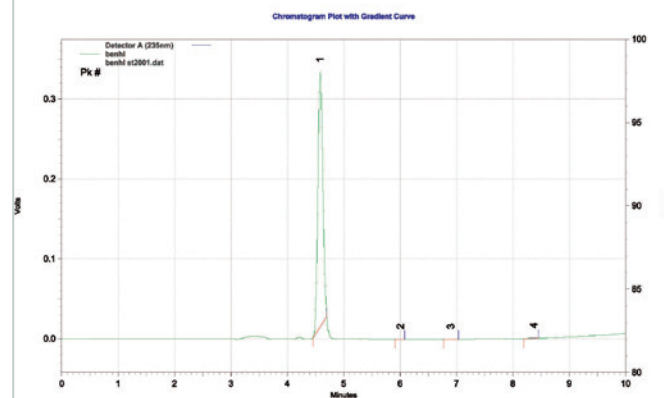
Conditioning: 1 ml Methanol and 1 ml Water

Sample loading: 2 ml sample (2% Ammonia)

Wash: 2 ml 2% Ammonia and Methanol.
Dry: 4 minutes

Elution: 3 ml 2% Acetic acid/Methanol

➤ Optimum volumes for 60 mg of phase.



Chromatographic conditions

Column: KromaPhase C18 250x4,6mm, Art. No. 066-B6Y803
Mobil phase: Methanol / 0,2% Acetic acid (70/30)
Temperature: 30°C
UV: 355nm

Cartridge:

· Art. No. EAX060-03L, ExtraBond® EAX 40 µm 60 mg 3 ml

ExtraBond® LLE PRODUCT RANGE



Developed to speed up liquid-liquid extractions in laboratories. ExtraBond® LLE cartridges are made of polypropylene medical grade and contain diatomaceous earth, a high purity packing chemically stable to solvents.

Unlike solid phase extraction cartridges, ExtraBond® LLE operates simply by gravity without the need for vacuum.

For preparation of biological samples, the cartridge must be selected with the volume of adsorbent corresponding to the total volume of the sample, including buffers and additives. The method is very simple. When an aqueous sample is added to ExtraBond® LLE, it acts to distribute it as a thin film on its surface. When the organic solvent (immiscible with water) is added, the resulting liquid-liquid extraction is very fast and efficient. This is a general method suitable for sample preparation prior to LC/MS.

For purification of organic reaction mixtures, fill the cartridge with acidified water (to remove amines) or water with an alkaline pH (to remove acids). The cartridge selection must be based on the total volume of aqueous buffer to be used. Then pass the reaction mixture through the cartridge. It is an easy, fast and reproducible way to remove excess reagents or reaction byproducts from an organic reaction mixture.

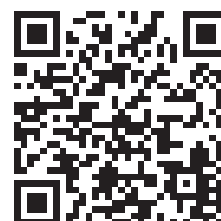
Phase	Volume (ml)	Pack (u.)	Art. No.
Diatomaceous earth	3	100	LLE-03C000
Diatomaceous earth	5	100	LLE-05C000
Diatomaceous earth	10	50	LLE-10C000
Diatomaceous earth	20	50	LLE-20C000

CUSTOM-MADE ORGANIC STANDARDS



The custom-made standards are manufactured under the same conditions as the standards included in our catalogue and according ISO 17025 and ISO 17034

- Neat standards
- Standards in solution ready-to-use
- Mixtures according customer requirements



How to use ExtraBond®

We recommend using pressure equipment (positive or negative) being careful not to allow the solvents to elute by gravity for maximum reproducibility.

There are several ways of carrying out solid phase extraction using ExtraBond®.

- For a small number of samples use a syringe and an adapter to "push" the solvents through the column by positive pressure using the adapters that are listed on page 18. See **Figure 1**.
- As an alternative, you can use the negative pressure provided by a vacuum source. See **Figure 2 and 3**.
- When the number of samples is high and you want better reproducibility and faster extractions, vacuum manifolds are the best choice. See **Figure 4**.

► Ordering information on page 18

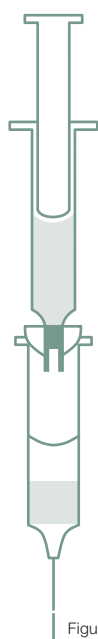


Figure 1

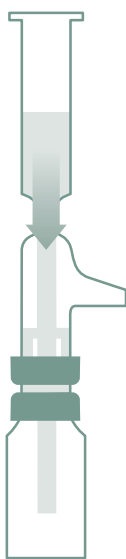


Figure 2

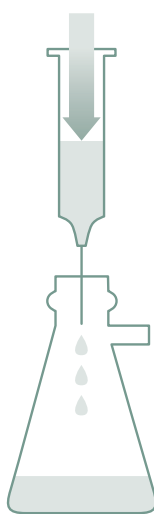


Figure 3



Figure 4

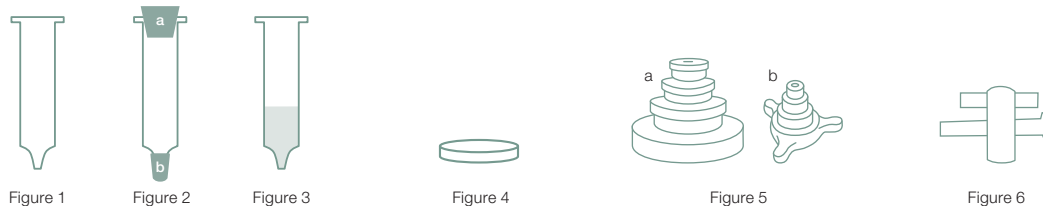
CUSTOM-MADE PRODUCTS



- Customised solvent purification
- Mixtures of solvents
- Aqueous or organic solutions
- Flexible packaging
- Tailor-made analysis



Accesorios ExtraBond®



Descripción	Pack	Referencia
Scharlau ExtraVac, Vacuum manifold 12 complete, 12 positions	1	EXTRAVAC12*
Scharlau vacuum manifold ExtraVac 20 complete, 20 positions	1	EXTRAVAC20*
KNF vacuum pump mod. N820FT.18 (20 L/min, 100 mbar final vacuum, chemically resistant)	1	00N820FT18
500 ml Büchner filtration flask 29/32	1	073-000163
Male adapter with lateral olive 29/32	1	073-000652
Rubber latex vacuum tubing, 10 mm I.D. x 20 mm O.D.	1	288-430.11
Vacuum adapter 24/40	1	ADAVAC2440
Vacuum adapter 19/22	1	ADAVAC1922
Vacuum adapter 14/20	1	ADAVAC1420
Vacuum adapter for vial 20-400 with vial	1	ADAVACVIAL
Vacuum adapter for vial 20-400 without vial	1	ADAVASVIAL
PP Stopcocks for ExtraVac (Figure 6)	12	STOPCOCKVA
1 ml empty column (Figure 1)	100	EMPTY0-01C
3 ml empty column (Figure 1)	100	EMPTY0-03C
6 ml empty column (Figure 1)	100	EMPTY0-06C
12 ml empty column (Figure 1)	100	EMPTY0-12C
20 ml empty column (Figure 1)	100	EMPTY0-20C
60 ml empty column (Figure 1)	100	EMPTY0-60C
1 ml empty column with 2 20 µm PE frits (Figure 3)	100	EMP2FR-01C
3 ml empty column with 2 20 µm PE frits (Figure 3)	100	EMP2FR-03C
6 ml empty column with 2 20 µm PE frits (Figure 3)	100	EMP2FR-06C
12 ml empty column with 2 20 µm PE frits (Figure 3)	100	EMP2FR-12C
20 ml empty column with 2 20 µm PE frits (Figure 3)	100	EMP2FR-20C
60 ml empty column with 2 20 µm PE frits (Figure 3)	100	EMP2FR-60C
1 ml 20 µm PE frits (Figure 4)	100	FRITPE-01C
3 ml 20 µm PE frits (Figure 4)	100	FRITPE-03C
6 ml 20 µm PE frits (Figure 4)	100	FRITPE-06C
12 ml 20 µm PE frits (Figure 4)	100	FRITPE-12C
20 ml 20 µm PE frits (Figure 4)	100	FRITPE-20C
60 ml 20 µm PE frits (Figure 4)	50	FRITPE-60L
Top adapter for 1,3 and 6 ml cartridges (Figure 5b)	15	ADAPTS00-E
Top adapter for 10, 12, 20 and 60 ml cartridges (Figure 5a)	6	ADAPTL00-S
Luer Tip cap (Figure 2b)	100	CAPLUER0-C
1 ml Top cap (Figure 2a)	100	CAPT0P-01C
3 ml Top cap (Figure 2a)	100	CAPT0P-03C
6 ml Top cap (Figure 2a)	100	CAPT0P-06C
12 ml Top cap (Figure 2a)	100	CAPT0P-12C
20 ml Top cap (Figure 2a)	100	CAPT0P-20C
60 ml Top cap (Figure 2a)	50	CAPT0P-60L
Tube PTFE 3,2mm (1/8) O.D. x 1,50mm I.D.	10 m	08T3215010
Needles PP	12	NEEDLEPP-F
Adapter luer male	2	ADAPLUERM2
Adapter luer female	2	ADAPLUERF2

* For the ExtraVac vacuum manifolds 13x100 mm, 16x100 mm and 16x125 mm collection tubes may be used.

› See page 14 for bulk phases

ExtraBond® Flash cartridges

The Flash chromatography technique is increasingly used for synthesis and purification. Universal ExtraBond® Flash cartridges are available from Scharlab.

- Ultra-clean Polypropylene Cartridges
- Guaranteed no leaks at 100psi (6,9bar)
- Bundled with ExtraBond® ultrapure silica (40-63 µm, 60Å)
- Narrow particle size distribution
- Neutral pH
- Water content controlled
- Variety of available phases: C18, Amino, Cyano, Diol, SCX...
- Innovative packaging
- Very good resolution, no tails
- Lot to lot reproducibility
- Also available high efficiency silica (20-40 µm)



Compatible with the following equipment:

- Teledyne Isco: CombiFlash® (Rf, Companion®, Retrieve™, Optix™)
- Biotage: Isolera™, SP™, Flash+™, FlashMater II
- Analogix (Varian): IntelliFlash 310 and 280, SimpliFlash, F12/40
- Interchim (PuriFlash™ 430evo)
- Armen (Spot Flash System)
- Moritex: Purif-α2, Purif-compact
- Yamazen (W-Prep 2XY)
- Büchi (Sepacore®)
- Grace Reveleris

➤ Contact helpdesk@scharlab.com indicating your Flash equipment model and we will confirm the compatibility. Ask for samples!

ExtraBond® Flash. Luer lock input. Luer output

Phase	Mass (g)	Pore size (Å)	Particle (µm)	Pack (u.)	Art. No.
Silica	4	60	40-63	20	FLASIL04GA
Silica	12	60	40-63	20	FLASIL12GA
Silica	25	60	40-63	15	FLASIL25GE
Silica	40	60	40-63	15	FLASIL40GE
Silica	80	60	40-63	12	FLASIL80GF
Silica	120	60	40-63	10	FLASIL120X
Silica	220	60	40-63	4	FLASIL220G
Silica	330	60	40-63	4	FLASIL330G
C18	4	60	40-63	20	FLAC1804GA
C18	12	60	40-63	20	FLAC1812GA
C18	25	60	40-63	15	FLAC1825GE
C18	40	60	40-63	15	FLAC1840GE
C18	80	60	40-63	12	FLAC1880GF
C18	120	60	40-63	10	FLAC18120X
C18	220	60	40-63	4	FLAC18220G
C18	330	60	40-63	4	FLAC18330G

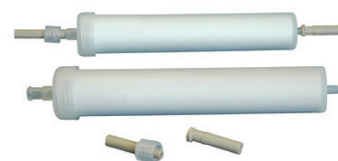
Adapters. ExtraBond® Flash fits virtually any unit directly. However, for some models adapters are required. Contact helpdesk@scharlab.com indicating your Flash computer model and we will confirm the compatibility.



New-line (Art. No. SOLVBIOTAG)



New-line (Art. No. SOLVBIOTAG)



Adapters (Art. No. ADAPBIOTAG)

Description	Pack (u.)	Art. No.
New-line adapters, Biotage SP1 and SP4	1	SOLVBIOTAG
Adapters for compression module, Biotage SP1 and SP4	2	ADAPBIOTAG
Adapter for Flash Master™	1	ADAPFLASMA

Guard columns/chargers. For both loading solid samples and dry load a plunger is used and a cartridge for load (empty or filled) connected to ExtraBond® Flash as shown in Figure A.

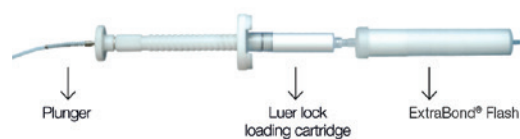


Figure A

Description	Pack (u.)	Art. No.
Plunger for 10 ml cartridges (16mm)	1	PLUNGER-10
Plunger for 60 ml cartridges (27mm)	1	PLUNGER-60
10 ml empty load cartridge with 2 frits	100	CHAREMP-10
60 ml empty load cartridge with 2 frits	100	CHAREMP-60
10 ml cartridge, 5g SI	20	CHARSIL05G
60 ml cartridge, 25g SI	16	CHARSIL25G

ExtraBond® Flash SLL - Screw Luer Lock

Hand screw-on head cap columns with luer lock design at both top and bottom. These are universal cartridges compatible with most of flash equipment including Biotage and Isco. Designed to be used with or without a spacer inside for solid sample method.

ExtraBond® Flash SLL without spacer



Fase	Masa (g)	Poros (Å)	Partícula (µm)	Pack (u.)	Referencia
Sílica	12	60	40-60	20	FLLNSI12GA
Sílica	20	60	40-60	20	FLLNSI20GA
Sílica	40	60	40-60	10	FLLNSI40GX
Sílica	80	60	40-60	5	FLLNSI80GV
Sílica	120	60	40-60	5	FLLNSI120V
C18	12	60	40-60	20	FLLN1812GA
C18	20	60	40-60	20	FLLN1820GA
C18	40	60	40-60	10	FLLN1840GX
C18	80	60	40-60	5	FLLN1880GV
C18	120	60	40-60	5	FLLN18120V

ExtraBond® Flash SLL without spacer

ExtraBond® Flash SLLS - Screw Luer Lock with spacer. Spacer must be purchased separately.

Fase	Masa (g)	Poros (Å)	Partícula (µm)	Pack (u.)	Referencia
Sílica	12	60	40-60	20	FLLSSI12GA
Sílica	20	60	40-60	20	FLLSSI20GA
Sílica	40	60	40-60	10	FLLSSI40GX
Sílica	80	60	40-60	5	FLLSSI80GV
Sílica	120	60	40-60	5	FLLSSI120V
C18	12	60	40-60	20	FLLS1812GA
C18	20	60	40-60	20	FLLS1820GA
C18	40	60	40-60	10	FLLS1840GX
C18	80	60	40-60	5	FLLS1880GV
C18	120	60	40-60	5	FLLS18120V

Spacers

Fase	Masa (g)	Poros (Å)	Partícula (µm)	Pack (u.)	Referencia
Sílica	1	60	40-60	20	FLLSPA12GA
Sílica	3	60	40-60	20	FLLSPA20GA
Sílica	4	60	40-60	10	FLLSPA40GX
Sílica	7	60	40-60	5	FLLSPA80GV
Sílica	10	60	40-60	5	FLLSPA120V
C18	1	60	40-60	20	FLLSP812GA
C18	3	60	40-60	20	FLLSP820GA
C18	4	60	40-60	10	FLLSP840GX
C18	7	60	40-60	5	FLLSP880GV
C18	10	60	40-60	5	FLLSP8120V

ExtraBond® QuEChERS



QuEChERS is a multi-residue extraction method for fruits and vegetables that combines two stages.

- **Extraction stage:** the sample is extracted using Acetonitrile and various salts.
- **Dispersive Solid Phase Extraction (SPE) stage:** the clean-up of an aliquot of the extract from the first stage is carried out. For this clean-up stage PSA (SPE sorbent) and Magnesium Sulphate are used.

Since the launch of QuEChERS in 2003¹ many variants of this method have been developed and employed according to the matrix and the pesticide residues to be determined. This method is approved by the European and American Food Regulatory Agencies². Despite being originally developed for the extraction of pesticides in fruits and vegetables, today QuEChERS is also being used to extract many compounds from a wide variety of matrices including milk, meat, fish, kidney, honey, wine and soils.

¹ Fast and Easy Multiresidue Method Employing Acetonitrile Extraction/Partitioning and "Dispersive SPE" for the Determination of Pesticide Residues in Produce M. Anastassiades, S.J. Lehotay, D. Štajnbaher, F.J. Schenck, J. AOAC Int., 86 (2) 412-431, 2003.

² EU Document No. SANCO/10476/2003, 5th February 2004 and method prEN 15662: 2007.

Scharlab offers extraction and dispersive kits according to European (EN 15662) and American (AOAC 2007.01) methods, as well as a variant of the European method, EN-A. The use of Scharlab variant EN-A, which contains a smaller amount of salts mixture, allows using the suitable quantity of aliquot and salts to optimize the analysis.

Variant EN-A

Extraction stage

Weigh 10 g of homogenized sample in a 50 ml centrifuge tube

Add 10 ml of Acetonitrile

Shake for 30 seconds

Add 4 g MgSO_4 , 1 g NaCl, 1 g $\text{Na}_3\text{Citrate}\cdot 2\text{H}_2\text{O}$, 0,5 g $\text{Na}_2\text{HCitr}\cdot 1,5\text{H}_2\text{O}$

Shake for 1 minute

Centrifuge

Dispersive stage

Add a 4 ml aliquot of the supernatant to a tube from the dispersive kit EN-A of choice

Shake 30 seconds

Centrifuge

Analyse (GC or HPLC)

EN 15662

Extraction stage

Weigh 10 g of homogenized sample in a 50 ml centrifuge tube

Add 10 ml of Acetonitrile

Shake for 30 seconds

Add 4 g MgSO_4 , 1 g NaCl, 1 g $\text{Na}_3\text{Citrate}\cdot 2\text{H}_2\text{O}$, 0,5 g $\text{Na}_2\text{HCitr}\cdot 1,5\text{H}_2\text{O}$

Shake for 1 minute

Centrifuge

Dispersive stage

Add a 6 ml aliquot of the supernatant to a tube from the dispersive kit EN of choice

Shake 30 seconds

Centrifuge

Analyse (GC or HPLC)

AOAC 2007.01

Extraction stage

Weigh 15 g of homogenized sample in a 50 ml centrifuge tube

Add 15 ml of Acetonitrile

Shake for 30 seconds

Add 6 g MgSO_4 & 1,5g NaOAc

Shake for 1 minute

Centrifuge

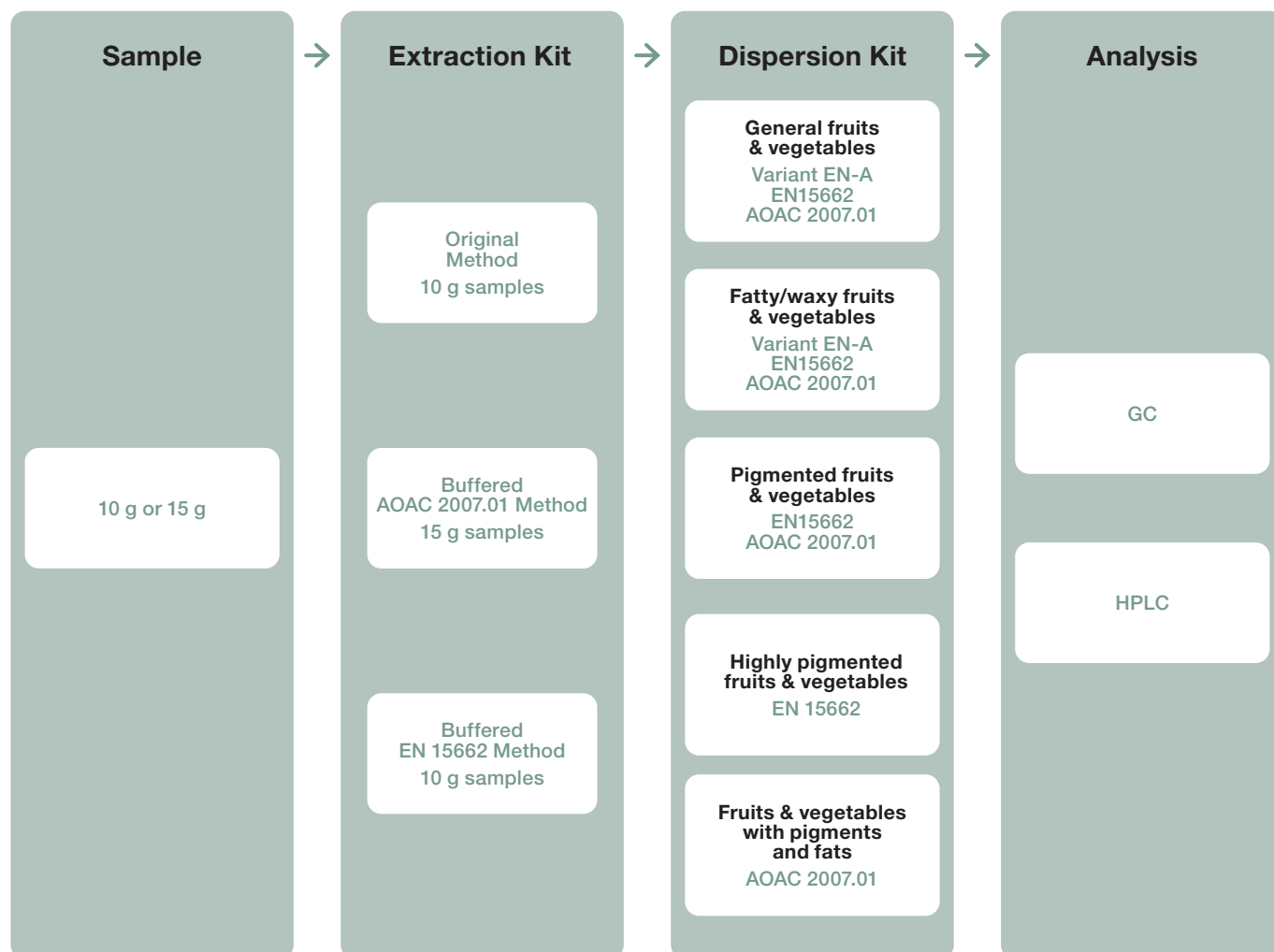
Dispersive stage

Add a 8 ml aliquot of the supernatant to a tube from the dispersive kit AOAC of choice

Shake 30 seconds

Centrifuge

Analyse (GC or HPLC)



Extraction kits

For the extraction stage, Scharlau employs mainly sachets for maximum convenience and ease-of-use, although tubes are also available. The content of the sachet is easily poured into a 50 ml tube at the appropriate time, after adding the acetonitrile to the sample. In this way the possible exothermic reaction is avoided and greater recoveries obtained.

Description	Method	Units	Pack (u.)	Art. No.
ExtraBond® QuEChERS extraction kit EN 1 g sodium citrate, 0,5 g sodium hydrogencitrate ses., 4 g MgSO ₄ , 1 g NaCl	EN15662	50/pk	Sachets	QUEXTENAK1
ExtraBond® QuEChERS extraction kit EN 1 g sodium citrate, 0,5 g sodium hydrogencitrate ses., 4 g MgSO ₄ , 1 g NaCl	EN15662	50/pk	15 ml tubes	QUEXTENBK1
ExtraBond® QuEChERS extraction kit EN 1 g sodium citrate, 0,5 g sodium hydrogencitrate ses., 4 g MgSO ₄ , 1 g NaCl	EN15662	25/pk	15 ml tubes	QUEXTENCK1
ExtraBond® QuEChERS extraction kit AOAC 6 g MgSO ₄ , 1,5 g sodio acetato	AOAC 2007.01	50/pk	Sachets	QUEXTAOAK1
ExtraBond® QuEChERS extraction kit for acrylamides 4 g MgSO ₄ , 0,5 g NaCl	–	50/pk	Sachets	QUEXTORAK1
ExtraBond® QuEChERS extraction kit Original 10 g 4 g MgSO ₄ , 1 g NaCl	Original 10	50/pk	Sachets	QUEXTORAK1

Dispersive kits

For the solid-phase dispersion stage, all tubes from ExtraBond® QuEChERS kits have the product code and batch number imprinted on them for maximum traceability. When working with Scharlab's variant EN-A, use kit QUDISENAK2 for general analysis and switch to kit QUDISENCK2 in case of fatty/waxy fruits and vegetables such as avocado, almonds and olives.

General fruits and vegetables

Description	Method	Units	Pack (u.)	Art. No.
ExtraBond® QuEChERS Dispersive kit EN-A for general fruits and vegetables 100 mg PSA, 600 mg MgSO ₄	Variant EN-A	50/pk	15 ml tubes	QUDISENAK2
ExtraBond® QuEChERS Dispersive kit EN for general fruits and vegetables 150 mg PSA, 900 mg MgSO ₄	EN 15662	50/pk	15 ml tubes	QUDISENNK2
ExtraBond® QuEChERS Dispersive kit AOAC for general fruits and vegetables 400 mg PSA, 1200 mg MgSO ₄	AOAC 2007.01	50/pk	15 ml tubes	QUDISAONK2

Fruits and vegetables with fats and waxes

Description	Method	Units	Pack (u.)	Art. No.
ExtraBond® QuEChERS Dispersive kit EN-A for fruits and vegetables with fats and waxes 100 mg PSA, 600 mg MgSO ₄ , 100 mg C18	Variant EN-A	50/pk	15 ml tubes	QUDISENCK2
ExtraBond® QuEChERS Dispersive kit EN for fruits and vegetables with fats and waxes 150 mg PSA, 900 mg MgSO ₄ , 150 mg C18	EN 15662	50/pk	15 ml tubes	QUDISENFK2
ExtraBond® QuEChERS Dispersive kit AOAC for fruits and vegetables with fats and waxes 400 mg PSA, 1200 mg MgSO ₄ , 400 mg C18	AOAC 2007.01	50/pk	15 ml tubes	QUDISAOFK2

Pigmented fruits and vegetables

Description	Method	Units	Pack (u.)	Art. No.
ExtraBond® QuEChERS Dispersive kit EN for pigmented fruits and vegetables 150 mg PSA, 885 mg MgSO ₄ , 15 mg GCB	EN 15662	50/pk	15 ml tubes	QUDISENPK2
ExtraBond® QuEChERS Dispersive kit AOAC for pigmented fruits and vegetables 400 mg PSA, 1200 mg MgSO ₄ , 400 mg GCB	AOAC 2007.01	50/pk	15 ml tubes	QUDISAOPK2

Highly pigmented fruits and vegetables

Description	Method	Units	Pack (u.)	Art. No.
ExtraBond® QuEChERS Dispersive kit EN for highly pigmented fruits and vegetables 150 mg PSA, 855 mg MgSO ₄ , 45 mg GCB	EN 15662	50/pk	15 ml tubes	QUDISENHK2

Pigmented fruits and vegetables with fats

Description	Method	Units	Pack (u.)	Art. No.
ExtraBond® QuEChERS Dispersive kit AOAC for pigmented fruits and vegetables with fats 400 mg PSA, 1200 mg MgSO ₄ , 400 mg C18, 400 mg GCB	AOAC 2007.01	50/pk	15 ml tubes	QUDISAOPK2



WE OFFER THE POSSIBILITY OF MANUFACTURING
CUSTOMISED QUECHERS FOR ANY TYPE
OF MATRIX AND SAMPLES.

FOR ANY FURTHER INFORMATION,
DO NOT HESITATE CONTACTING US THROUGH
helpdesk@scharlab.com

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