



Accuracy Starts Here



## Agilent Bond Elut Specialty, Disk and Bulk SPE Selection Guide

The Measure of Confidence



**Agilent Technologies**



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### Tips & Tools

Learn the core concepts surrounding Solid Phase Extraction and best practices for Sample Prep. View the video at [www.agilent.com/chem/spevideo](http://www.agilent.com/chem/spevideo)

Learn about the new generation of polymeric SPE products, Agilent Bond Elut Plexa. Request the brochure using publication number 5990-8589EN.





## SOLID PHASE EXTRACTION (SPE)

# Agilent Bond Elut: Accuracy Starts Here

For over 30 years, Bond Elut has been the most trusted name in solid phase extraction. Years of use by demanding chemists at top companies worldwide have thoroughly documented its many applications and proven its performance. To this day, you will find more literature references for Bond Elut than any other SPE product in the industry.

Bond Elut is manufactured using state-of-the-art automation to guarantee quality and consistency. Optical scanners installed throughout our automated assembly process inspect each Bond Elut tube at multiple points. And during manufacture, 25 different tests are conducted to ensure reproducibility. If an imperfection is spotted, the tube is removed from the assembly line. The result is consistently reliable Bond Elut cartridges, time and time again.

Over 40 different sorbent functionalities are available in a variety of cartridge formats including straight barrel, large reservoir capacity (LRC) and Bond Elut Junior (Jr).

## THE BOND ELUT DIFFERENCE

- **Heritage of Reliability:** With years of use in some of the most demanding analytical laboratories in the world, Bond Elut products have a proven track record resulting in a strong publication pedigree
- **Options for Your Needs:** Offering extraction solutions for the widest range of analytes and matrices, with over 40 bonded silica phases for high specificity methods and polymeric phases for rapid method development, Bond Elut has the largest choice of formats and sorbents in the market
- **Innovative Products Designed for Lab Efficiency:** Whether it be fast flow polymeric particles or our patented 96-well plate design, all Bond Elut products are created for ease-of-use and flexibility to meet both manual and automated requirements
- **Technical Support at Every Step:** For your specific applications, or to help solve occasional technical issues, a global team of analytical scientists is on hand to assist
- **World Class Manufacturing and Quality:** Unrivaled manufacturing control, plus exacting ISO 9001: 2000 compliant inspections guarantee the consistent quality of Bond Elut

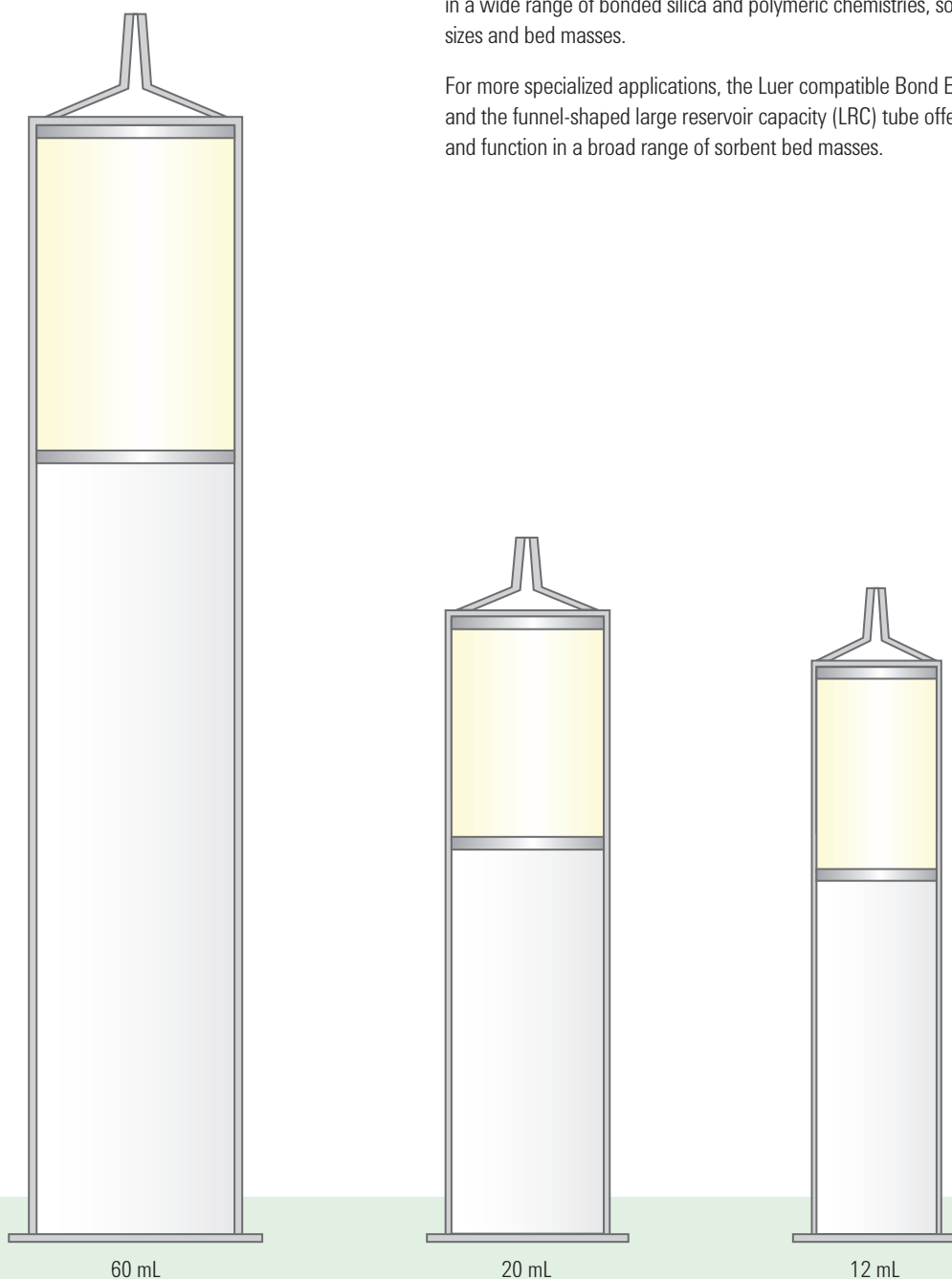


## SAMPLE PREPARATION FORMATS

# Agilent Offers the Broadest Range of Tube Formats and 96-well Plate Designs

We have a full set of straight barrel SPE tubes ranging from 1-150 mL in a wide range of bonded silica and polymeric chemistries, sorbent particle sizes and bed masses.

For more specialized applications, the Luer compatible Bond Elut Jr and the funnel-shaped large reservoir capacity (LRC) tube offer flexibility and function in a broad range of sorbent bed masses.

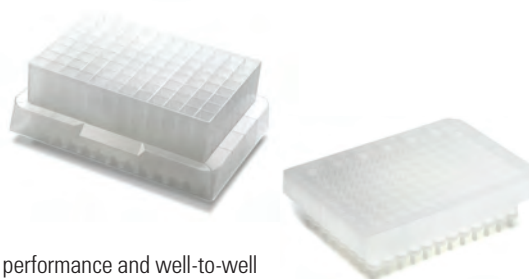


Diagrams are to scale

60 mL

20 mL

12 mL



### Bond Elut 96-well Plates

Bond Elut 96-well plate formats are best in class for flow performance and well-to-well reproducibility. These specially designed plates are available with well depths of 1 mL and 2 mL and in a large range of different sorbent chemistries.

### VersaPlate

VersaPlate is a highly innovative, flexible design that lets you customize plates. Insert different phases for sorbent screening or insert only enough tubes to match the number of samples to be extracted for minimal waste. VersaPlate can be purchased in a pre-packed format or as loose tubes.

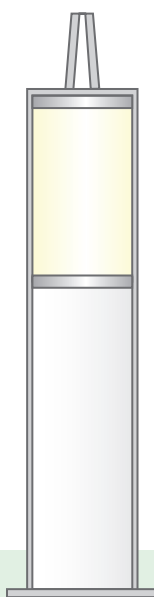


### Packed Formats for Automation

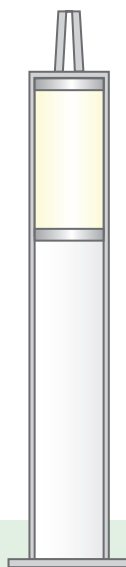
Bond Elut sorbents are also available in packed bed formats for automation platforms, such as the Spark Holland Symbiosis, Gilson ASPEC and Gerstel MPS systems. Agilent's unique OMIX pipette format is also used with a wide range of liquid handling devices, ranging from hand-held pipettors to high-throughput automated systems.



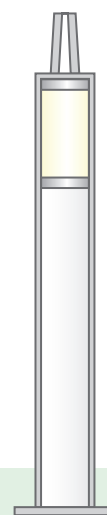
10 mL LRC



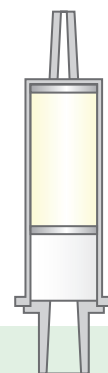
6 mL



3 mL



1 mL



Bond Elut Jr

## SOLID PHASE EXTRACTION (SPE)

### Sorbent Specifications

Sorbent Phase	Category	Bonded Functional Group/ Base Material	Endcapped	Format	Typical Carbon Loading (%)	Surface Area (m <sup>2</sup> /g)	Particle Size (µm) and Shape	Mean Pore Size (Å)
FL	Polar	Florisil		Packed bed			200	
Alumina (AL-A)	Polar	Aluminium oxide – acidic		Packed bed	0.0		25	
Alumina (AL-B)	Polar	Aluminium oxide – basic		Packed bed	0.0		25	
Alumina (AL-N)	Polar	Aluminium oxide – neutral		Packed bed	0.0		25	
Carbon	Strongly Non-polar	Graphitized carbon	No	Packed bed				
PCB	Application specific	Layered phase		Packed bed		500		
PBA	Covalent	Phenylboronic acid/silica based	No	Packed bed	7.9	500	40, irregular	60
EnvirElut 1664	Application specific	Trifunctional octadecyl/silica based	No	Packed bed	18.0	500	40 and 120, irregular	60
SPEC Aminopropyl (NH <sub>2</sub> )	Polar/Anion Exchanger	Aminopropyl/silica based	No	Monolithic disk		220		70
SPEC C2	Non-polar	Dimethyl/silica based	No	Monolithic disk	2.7	220		70
SPEC C8	Non-polar	Octyl/silica based	Yes	Monolithic disk	5.0	220		
SPEC C18	Non-polar	Monofunctional octadecyl/silica based	No	Monolithic disk	8.0	220		70
SPEC C18 AR	Non-polar	Trifunctional octadecyl/silica based	Yes	Monolithic disk	9.0	220		70
SPEC Cyano	Polar	Cyanopropyl/silica based	No	Monolithic disk		220		70
SPEC DAU	Application specific	Silica based		Monolithic disk		220		70
SPEC MP1	Mixed Mode	Non-polar and benzenesulfonic acid (SCX)/silica based		Monolithic disk	6.0	220		70
SPEC MP3	Mixed Mode	Slightly polar and benzenesulfonic acid (SCX)/silica based		Monolithic disk		220		70
SPEC PSA	Anion Exchanger	Ethylenediamine-N-propyl/silica based	No	SPEC disk		220		70

(Continued)

## Sorbent Specifications

Sorbent Phase	Category	Bonded Functional Group/ Base Material	Endcapped	Format	Typical Carbon Loading (%)	Surface Area (m <sup>2</sup> /g)	Particle Size (µm) and Shape	Mean Pore Size (Å)
SPEC PH	Non-polar	Phenyl/silica based	Yes	Monolithic disk		220		70
SPEC SAX	Anion Exchanger	Trimethylaminopropyl/silica based	No	Monolithic disk		220		70
SPEC SCX	Cation Exchanger	Benzenesulfonic acid/silica based	No	Monolithic disk		220		70
SPEC SI	Polar	Silica	No	Monolithic disk		220		70

## Sample Preparation Reference Guide

Product	Typical Matrices	Primary Extraction Mechanism	Compound Types
Bond Elut Florisil	Non-polar organics	Polar compounds	Organic extracts, non-polar environmental extracts
Bond Elut Alumina	Non-polar organics	Polar	Polar cleanup
Bond Elut Carbon	Organic plant and tissue extracts	Wide range non-polar retention	Cleanup of pigments and endogenous plant extracts for pesticide and herbicide analysis
Bond Elut Atrazine	Water sources	Non-polar	Atrazine and atrazine by-products
Bond Elut Cellulose	Aqueous and non-polar organics	Polar (Hydroxyl)	Polar impurities/compounds
Bond Elut PCB	Water sources	Polar	PCBs
Bond Elut Mycotoxin	Aqueous and polar organic grain extracts (beer, wine, sake)	Ionic cleanup	Mycotoxins (trichothecenes and zearalenones)
Bond Elut PBA	Plasma, urine, aqueous and biological fluids	Covalent bonding	cis-diol-containing compounds, catecholamines, ribonucleotides, amino alcohols, diketo and triketo compounds
EnvirElut	Water sources, extracted soil samples	Non-polar	Pesticide and industrial chemical residues
Chem Elut	Aqueous, biological fluids, organic reaction mixtures (scavenging)	Solid supported LLE	Nitrosamines, pesticides, herbicides
Hydromatrix	Aqueous, biological fluids, organic reaction mixtures (scavenging)	Solid supported LLE	Nitrosamines, pesticides, herbicides



## Inorganic SPE

The following SPE phases have varying degrees of polarity and surface acidity or basicity. They are primarily used to retain polar analytes. For these phases, solvent retention generally decreases as the solvent becomes more polar.

### Bond Elut Florisil

- Pesticide Residue (PR) grade
- Economical
- For cleanup of polar interferences from non-polar samples
- Fast flow, ideal for viscous samples

Florisil is a magnesia-loaded silica gel. Like silica, it is extremely polar in nature and ideal for the isolation of polar compounds from non-polar matrices. The larger particle size of the sorbent enables fast flow for large sample volumes and is therefore an attractive alternative to silica if the sample matrix is particularly viscous.

Typical Matrices
Non-polar organics
Primary Extraction Mechanism
Polar compounds
Compound Types
Organic extracts, non-polar environmental extracts

#### Bond Elut Florisil

Description	Unit	Part No.
<b>LRC Cartridges</b>		
500 mg, 10 mL	50/pk	12113049
<b>Straight Barrel Cartridges</b>		
100 mg, 1 mL	100/pk	12102024
500 mg, 3 mL	50/pk	12102050
1 g, 3 mL	50/pk	12102109
1 g, 6 mL	30/pk	12256014
1 g, 20 mL	20/pk	12256047
2 g, 12 mL	20/pk	12256022
2 g, 20 mL	20/pk	12256046
5 g, 20 mL	20/pk	12256030
10 g, 60 mL	16/pk	12256038
<b>Bond Elut Jr</b>		
500 mg, 100/pk	100/pk	12162050B
1 g, 100/pk	100/pk	12166014B
<b>Other Formats</b>		
500 mg, 3 mL, Gerstel format	50/pk	164632G



## Bond Elut Alumina

- Available in acidic (A), basic (B) and neutral (N) formats
- High extraction efficiency
- Better high pH stability than unfunctionalized silica

Alumina, like silica, is an extremely polar sorbent. The alumina surface tends to be slightly more stable under high pH conditions than unfunctionalized silica. The small particle size of the Bond Elut Alumina range ensures high extraction efficiency even when small bed masses are used.

Typical Matrices
Non-polar organics
Primary Extraction Mechanism
Polar
Compound Types
Polar cleanup

### Bond Elut Alumina A

Description	Unit	Part No.
<b>Straight Barrel Cartridges</b>		
50 mg, 1 mL	100/pk	12102069
500 mg, 3 mL	50/pk	12102047
1 g, 6 mL	30/pk	12256043

### Bond Elut Alumina B

Description	Unit	Part No.
<b>Straight Barrel Cartridges</b>		
500 mg, 3 mL	50/pk	12102048
1 g, 6 mL	30/pk	12256044
<b>Bond Elut Jr</b>		
500 mg	100/pk	12162048B

### Bond Elut Alumina N

Description	Unit	Part No.
<b>LRC Cartridges</b>		
500 mg	50/pk	12113048
<b>Straight Barrel Cartridges</b>		
100 mg, 1 mL	100/pk	12102023
500 mg, 3 mL	50/pk	12102049
20 g, 60 mL	16/pk	12256059
<b>Bond Elut Jr</b>		
500 mg	100/pk	12162049B
1 g	100/pk	12166045B

## Bond Elut Sodium Sulfate Drying Cartridges

- Highly effective pre-packed dessicant
- Clean ACS grade, anhydrous sodium sulfate
- Pre-packed for convenience

Simplify sodium sulfate mediated drying steps by using cartridges pre-packed with ACS grade, granular anhydrous sodium sulfate. Available in three formats (LRC, Bond Elut Jr and straight barrels).

Bond Elut Jr cartridges have top and bottom luer fittings allowing easy sample processing when used in conjunction with standard SPE cartridges. Bond Elut LRC cartridges have a large reservoir above the sorbent bed and are suitable for use on any standard SPE vacuum manifold.

### Bond Elut Sodium Sulfate Drying Cartridges

Description	Unit	Part No.
<b>LRC Cartridges</b>		
1 g, 10 mL	100/pk	12131033
<b>Straight Barrel Cartridges</b>		
15 g, 60 mL	100/pk	12132004
<b>Bond Elut Jr</b>		
1.4 g	100/pk	12162052B
2.2 g	100/pk	12162054B
3 g	100/pk	12162051B



### Tips & Tools

Agilent offers Bond Elut Adapters compatible with these tube formats.

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## Specialty SPE

### Bond Elut Carbon

- Excellent retention for small organics, including those that are too polar to retain on C18 or polymeric SPE
- Removal of chlorophyll and other pigments leads to fewer chromatographic or mass interferences
- Broader retention and easier elution of analytes across the polarity range, for improved multi-residue analysis

Bond Elut Carbon cartridges are packed with ultra-pure graphitized carbon particles that have been optimized for the absorption of pigments in food, fruits and vegetables, and small organic residues in waste water. The powerful retention mechanisms of these products are appropriate for a broad range of analytes. In addition, careful manufacturing techniques result in lower carbon fines on the wall of the device.

#### Typical Matrices

Organic plant and tissue extracts

#### Primary Extraction Mechanism

Wide range non-polar retention

#### Compound Types

Cleanup of pigments and endogenous plant extracts for pesticide and herbicide analysis

#### References

Japanese Positive List System for Agricultural Chemical Residues in Food.  
<http://www.ffcr.or.jp>

EPA Method 535: Measurement of Chloroacetanilide and Other Acetamide Herbicide Degradates In Drinking Water By Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS).

#### Bond Elut Carbon

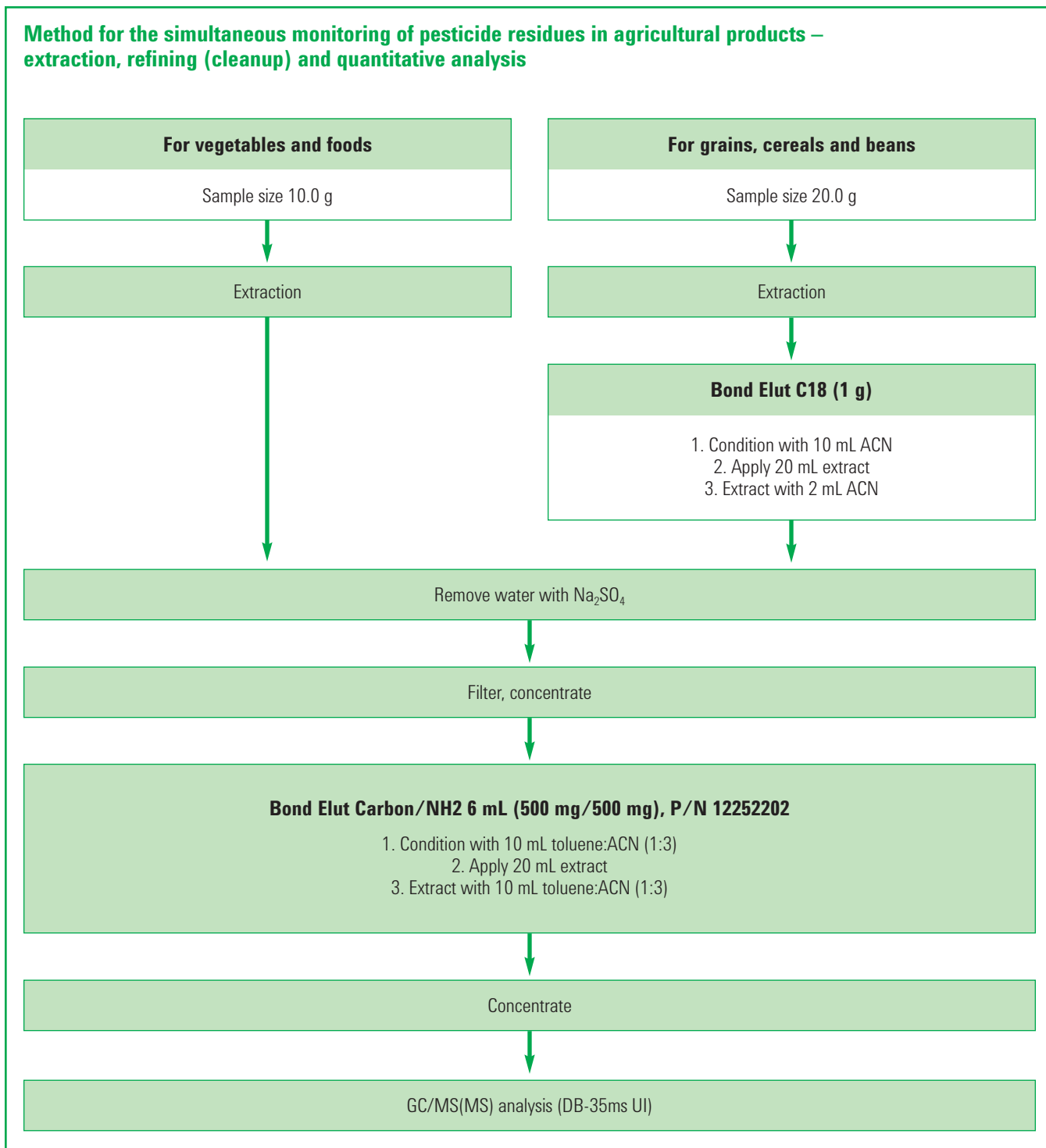
Description	Unit	Part No.
<b>Straight Barrel Cartridges</b>		
50 mg, 1 mL	100/pk	126414
100 mg, 1 mL	100/pk	126418
250 mg, 6 mL	30/pk	12102201
500 mg, 6 mL	30/pk	12252201

#### Bond Elut Carbon/NH<sub>2</sub>

Description	Unit	Part No.
<b>Straight Barrel Cartridges</b>		
500/500 mg, 6 mL	30/pk	12252202
500/500 mg, 20 mL	20/pk	3664325032

#### Bond Elut Carbon/PSA

Description	Unit	Part No.
<b>Straight Barrel Cartridges</b>		
250/250 mg, 3 mL	50/pk	12102042C250
500/500 mg, 6 mL	30/pk	12102042C500

**Method for the simultaneous monitoring of pesticide residues in agricultural products – extraction, refining (cleanup) and quantitative analysis**

## Bond Elut Atrazine

- Large particle size allows flow of large sample volumes
- Controlled carbon content enhances atrazine selectivity
- Large bed mass offers optimized capacity for atrazine

Bond Elut Atrazine is a specially bonded, low load, high-flow C18 phase designed for atrazine extraction. Methods are fast, reproducible and require minimal organic solvent consumption.

Typical Matrices
Water sources
Primary Extraction Mechanism
Non-polar
Compound Types
Atrazine and atrazine by-products

### Bond Elut Atrazine

Description	Unit	120 µm Particle Size
Straight Barrel Cartridges		
3 g, 20 mL	20/pk	12256111

## Bond Elut Cellulose

- High purity micro-granular cellulose with high  $\alpha$ -cellulose content
- Stable across a broad pH range
- Extremely low metal content (Fe, Cu <5 ppm)

Bond Elut Cellulose columns use a pure micro-granular cellulose powder that is packed between two 20 µm polypropylene frits. The cellulose phase is very stable over a wide pH range with extremely low metal content. The combination of surface area and polymeric structure results in a sorbent with excellent capacity. The cellulose media contains numerous hydroxyl groups; because of its polar nature, it is able to accept high loading of many polar substances from aqueous and organic phases.

Typical Matrices
Aqueous and non-polar organics
Primary Extraction Mechanism
Polar (Hydroxyl)
Compound Types
Polar impurities/compounds

### Bond Elut Cellulose

Description	Unit	Part No.
Straight Barrel Cartridges		
300 g, 3 mL	500/pk	12102095

## Bond Elut PCB

- Optimized bed mass affords excellent extraction reproducibility
- Special dual-phase enhances PCB selectivity
- All extractions can be completed with one solvent to simplify procedures

Bond Elut PCB is a specially designed sorbent which allows for the easy extraction of polychlorinated biphenyl (PCB) compounds from a variety of matrices. Desired analytes can be loaded and eluted using a simple, single solvent method prior to analysis by GC/ECD.

Typical Matrices
Water sources
Primary Extraction Mechanism
Polar
Compound Types
PCBs

### Bond Elut PCB

Description	Unit	Part No.
<b>Straight Barrel Cartridges</b>		
1 g, 3 mL	50/pk	12105032



### Tips & Tools

Learn the core concepts surrounding Solid Phase Extraction and best practices for Sample Prep. View the video at [www.agilent.com/chem/spevideo](http://www.agilent.com/chem/spevideo)

## Bond Elut Mycotoxin

- Simple methodology saves time and increases throughput
- Use with a broad range of food matrices
- Economic and time-saving alternative to immunoaffinity techniques

Bond Elut Mycotoxin is a novel sorbent which cleans up food extracts for improved trichothecene and zearalenone analysis. Results are comparable or superior to competing methods, including immunoaffinity columns (IAC) and charcoal/alumina columns. The sorbent is a proprietary silica-based ion exchange material.

The Bond Elut Mycotoxin method for extraction and cleanup is successful with a variety of food and grain sample types, including wheat, corn, durum, oats, bread, muesli and infant food.

Bond Elut Mycotoxin is easy to use and acts in a selective non-retention way – the toxin analytes pass through the cartridge while the food matrix components are retained.

### Typical Matrices

Aqueous and polar organic grain extracts (beer, wine, sake)

### Primary Extraction Mechanism

Ionic cleanup

### Compound Types

Mycotoxins (trichothecenes and zearalenones)

### References

Kiötzel, M, Lauber, U & Humpf, H-U (2006) A new solid phase extraction clean-up method for the determination of 12 type A and B trichothecenes in cereals and cereal-based food by LC-MS/MS. Mol. Nutr. Food Res, 50, 261-269.

Bretz, M, Beyer, M, Cramer, B & Humpf, H-U (2006) Stable isotope dilution analysis of the fusarium mycotoxins deoxynivalenol and 3-acetyldeoxynivalenol. Mol. Nutr. Food Res., 50, 251-260.

### Bond Elut Mycotoxin

Description	Unit	Part No.
500 mg, 3 mL	50/pk	12102167
<b>Bond Elut Jr</b>		
500 mg	100/pk	12165001B

## General Mycotoxin Methods

### For Solids

1. Finely grind 25 g sample and extract with a solution of 100 mL acetonitrile/water (80:20) by blending at high speed for 3 min. For simultaneous determination of zearalenone, spike extract at a level of 50 ng/g sample with zearalenone (ZAN) solution in acetonitrile internal standard. Filter.
2. Pass 4 mL of the filtrate through a Bond Elut Mycotoxin column.
3. Evaporate 2 mL of eluate to dryness at 50°C under a gentle stream of nitrogen.
4. Reconstitute in 0.5 mL ACN/H<sub>2</sub>O (1:4; v/v). Inject 10 µL into LC for analysis.

### For Beverages

1. Sonicate the beverage sample for 30 min. Filter.
2. Pass 4 mL of the filtrated sample extract through a Bond Elut Mycotoxin cartridge.
3. Evaporate 2 mL of the eluate to dryness at 50°C under a gentle stream of nitrogen.
4. Reconstitute in 0.5 mL ACN/H<sub>2</sub>O (20/80; v/v).
5. Inject into LC/MS QQQ.

### Wheat beer

Mycotoxin	% Recovery		% RSD	
	35 ng/g	350 ng/g	35 ng/g	350 ng/g
DON	92.0	2.6	95.5	1.5
ZEA	116.0	6.1	101.9	1.3
T-2	61.3	12.6	60.1	1.1
HT-2	81.8	5.6	76.1	1.4

### Sake wine

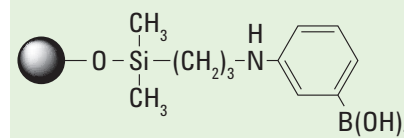
Mycotoxin	% Recovery		% RSD	
	35 ng/g	350 ng/g	35 ng/g	350 ng/g
DON	94.3	7.4	96.8	0.5
ZEA	99.3	1.3	99.8	0.8
T-2	101.3	1.3	66.0	0.9
HT-2	113.9	8.3	111.0	1.0

This application shows the optimized extraction and cleanup of type A- and B-trichothecenes [deoxynivalenol [DON], HT-2 toxin [HT-2], T-2 toxin [T-2] and zearalenone (ZEA).



## Bond Elut PBA

- Unique phenylboronic acid sorbent
- High specificity for cis-diol compounds
- Amenable for a broad range of bio-molecule applications



Bond Elut PBA is a unique silica SPE sorbent containing a phenylboronic acid functionality that can retain analytes via a reversible covalent bond. This very strong covalent retention mechanism enables high specificity and cleanliness. The boronate group has a strong affinity for cis-diol containing compounds such as catechols, nucleic acids, some proteins, carbohydrates and PEG compounds. Aminoalcohols, alpha-hydroxy amides, keto compounds, and others can also be retained.

### Typical Matrices

Plasma, urine, aqueous and biological fluids

### Primary Extraction Mechanism

Covalent bonding

### Compound Types

cis-diol-containing compounds, catecholamines, ribonucleotides, amino alcohols, diketo and triketo compounds

### Bond Elut PBA

Description	Unit	Part No.
<b>LRC Cartridges</b>		
100 mg, 10 mL	50/pk	12113018
<b>Straight Barrel Cartridges</b>		
100 mg, 1 mL	20/pk	12102018
100 mg, 1 mL	100/pk	12102019
500 mg, 6 mL	30/pk	12102105

### Generic Method

#### Condition:

1. 70:30 H<sub>2</sub>O:ACN with 1% TFA
2. 50 mM phosphate buffer (pH 10)

#### Sample Addition:

Sample should be buffered to pH 8.5 with 50 mM phosphate buffer

#### Interference Wash:

10 mM phosphate buffer (pH 8.5) with 5% ACN

#### Analyte Elution:

70:30 H<sub>2</sub>O:ACN with 1% TFA

#### Compound Class

#### Examples

Polyhydroxy	Mannitol, fructose-6-phosphate, CDP-ethanol-amine, glycoproteins
Aromatic O-dihydroxy	Catechols, tannins, epinephrine
α-Hydroxy acids	Lactate, 6-phospho-gluconate
Aromatic O-hydroxy acids and amines	Salicylate, salicylamide
1,3-Dihydroxy	Tris, pyridoxine
Diketo & triketo	Dehydroascorbic acid, benzil, alloxan
Other dihydroxys	Steroids, prostaglandins

## EnvirElut

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- Extreme purity offers cleanliness in extract
- High capacity allows for the processing of large sample volumes
- Broad compound specificity

EnvirElut sorbents are specially designed for the extraction of a wide range of compounds from aqueous matrices. EnvirElut PAH and Pesticides are available in standard SPE straight barrel cartridges, which can be used on conventional Vac Elut vacuum manifolds.

Typical Matrices
Water sources, extracted soil samples
Primary Extraction Mechanism
Non-polar
Compound Types
Pesticide and industrial chemical residues

### EnvirElut

Description	Unit	Part No.
<b>Straight Barrel Cartridges</b>		
1 g, 6 mL (PAH)	30/pk	12272005
500 mg, 6 mL (Pesticide)	30/pk	12272004



## Diatomaceous Earth Sorbents

### Chem Elut and Hydromatrix

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- High purity sorbent supported liquid extraction (SLE) applications
- Available in pre-packed cartridges or bulk
- Packing method delivers excellent tube-to-tube reproducibility

Chem Elut is an economical broad performance sorbent for rapid, general sample preparation of biological samples such as plasma, serum, whole blood and urine. Chem Elut products are available in buffered and unbuffered formats. The buffered devices can be used for simple scrubbing operations on organic reactions. The base-treated cartridge can remove residual acid compounds from a variety of matrices.

Hydromatrix is a high purity, inert diatomaceous earth sorbent available in 96-well plates and as bulk material, offering end user flexibility and an excellent diversity of applications.

## Typical Matrices

Aqueous, biological fluids, organic reaction mixtures (scavenging)

## Primary Extraction Mechanism

Solid supported LLE

## Compound Types

Nitrosamines, pesticides, herbicides

## References

Plum, J & Daldrup, T (1986) Detection of digoxin, digitoxin, their cardioactive metabolites and derivatives by high performance liquid chromatography and high performance liquid chromatography radioimmunoassay. *J. Chromatogr. A*, 377, 221-231.

Biondi, PA, Guidotti, L, Montana, M, Manca, F, Brambilla, G & Lucarelli, C (1991) A derivatization procedure suitable for HPLC analysis of clenbuterol. *J. Chromatogr. Sci.*, 29(5), 190-193.

Raou, S, Gremaud, E, Biaudet, J & Turesky, R (1997) Rapid solid-phase extraction method for the detection of volatile nitrosamines in food. *J. Agricultural and Food Chem.*, 45, 4706-4713.

European method for azodyes in manufactures, EN 1471.



Combilute plate, 200 mg, 65401507

## Chem Elut Cartridges

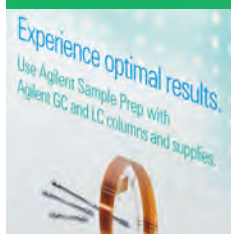
Buffered pH	Volume (mL)	Unit	Part No.
4.5	3	100/pk	12198004
9.0	3	100/pk	12198005
Unbuffered	0.3	100/pk	12198001
	1	100/pk	12198002
	3	100/pk	12198003
	5	100/pk	12198006
	10	100/pk	12198007
	20	100/pk	12198008
	50	50/pk	12198009
	100	25/pk	12198010
	300	15/pk	12198011

## Hydromatrix

Description	Part No.
Hydromatrix bulk material, 1 kg	198003
Hydromatrix bulk material, 4 kg	198004

## Other Formats

Description	Part No.
Combilute plate, 200 mg	65401507
Preassembled 96-well plate	75430260
VersaPlate tubes, 96/pk	75530260



## Bulk SPE

### Bondesil Bulk Sorbents

- Ideal for dispersive cleanup techniques
- Advanced bonding offers reproducible batch-to-batch performance
- Multi-kilo quantities available upon request

#### Bondesil Bulk Sorbents

Description	Particle Size (µm)	Unit	Part No.
Alumina-N	25	1000 g	12213073
C18	40	10 g	12213011
	40	100 g	12213012
	40	1000 g	12213013
	120	100 g	14213012
	120	1000 g	14213013
C18 OH	40	100 g	12213049
C2	40	100 g	12213006
C8	40	100 g	12213009
CBA	40	100 g	12213033
CN-E	40	100 g	12213061
DEA	40	100 g	12213047
ENV (polymeric)	125	100 g	12216061
EnvirElut	40	100 g	12214016
	40	1000 g	12214019
Florisil	200	100 g	12214013
	200	1000 g	12214015
NH <sub>2</sub>	40	10 g	12213020
	40	100 g	12213021
	120	100 g	14213021
PH	40	100 g	12213015
PSA	40	10 g	12213023
	40	100 g	12213024
	40	1000 g	12213025
SAX	40	100 g	12213042
SCX	40	100 g	12213039
	40	1000 g	12213040
	120	100 g	14213039
SI	40	500 g	12213001

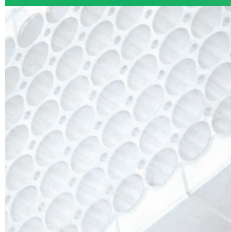
## Mega Bond Elut Flash

- Convenient disposable cartridges eliminate the need for packing glass columns
- Flexible "open" tube design for either liquid or solid samples
- Reliable, consistent flow characteristics deliver high-resolution performance

Mega Bond Elut Flash cartridges offer excellent levels of performance and productivity for the purification of organic compounds, but also for scale-up, solid phase extraction. Pre-packed, disposable cartridges offer greater convenience than glass columns that require washing, drying and re-packing after every sample.

### Mega Bond Elut Flash

Description	Sorbent Mass (g)	Volume (mL)	Unit	40 µm Particle Size
C18	1	60	16/pk	12256060
	2	12	20/pk	12256015
	5	20	20/pk	12256023
	10	60	16/pk	12256031
	20	60	16/pk	12256078
	25	150	8/pk	12256079
	50	150	8/pk	12256080
	75	150	8/pk	12256081
NH2	2	12	20/pk	12256020
	5	20	16/pk	12256028
	10	60	16/pk	12256036
	20	60	16/pk	12256074
	25	150	8/pk	12256075
	50	150	8/pk	12256076
	70	150	8/pk	12256077
SCX	20	60	16/pk	12256066
	25	150	8/pk	12256070
	50	150	8/pk	12256072
	70	150	8/pk	12256073
SI	2	12	20/pk	12256018
	5	20	20/pk	12256026
	10	60	16/pk	12256034
	15	60	16/pk	12256068
	20	150	16/pk	12256042
	25	150	8/pk	12256069
	50	150	8/pk	12256067
	70	150	8/pk	12256071



## Bond Elut Accessories

### Bond Elut Manifolds and Accessories

#### Bond Elut Manifolds and Accessories

Description	Part No.
96-well manifold, acrylic	5133000
96-well manifold, shimset	12236104
Square-well collection plates, 2 mL	5133009
Square-well collection plates, 1 mL	5133008
Square-well collection plates, 350 $\mu$ L	5133007
Square-well collection plate cover	WA77040004
Sealing tape pad	12143105



## Bond Elut Empty SPE Cartridges

- Made with high purity polypropylene for cleaner extracts
- Uniform batch-to-batch size for consistent performance
- Economical for everyday use

A variety of empty reservoirs is available for packing custom SPE cartridges with bulk Bondesil or other desired sorbents. Cartridges are available from 1 to 60 mL. Order frits separately, or see below for reservoirs with pre-installed frits.

### Bond Elut Empty SPE Cartridges

Volume (mL)	Unit	Part No.
1	100/pk	12131007
3	100/pk	12131008
6	100/pk	12131009
12	100/pk	12131010
20	100/pk	12131011
60	100/pk	12131012

## Bond Elut Empty SPE Cartridges with Two Frits

- Pre-installed frits for ease-of-use
- Broad range of filtration operations for maximum flexibility
- Customizable packing for specific applications

These clean polypropylene reservoirs contain two polypropylene frits pre-inserted, an ideal configuration for simple filtration. For custom sorbent packing, additional frits can be purchased separately. Available from 1 to 60 mL.

### Bond Elut Empty SPE Cartridges with Two Frits

Volume (mL)	Unit	Part No.
1	100/pk	12131013
3	100/pk	12131014
6	100/pk	12131015
12	100/pk	12131016
20	100/pk	12131017
60	100/pk	12131018



## 20 $\mu$ m Polypropylene Frits for SPE Cartridges

- Made with high-grade, clean polyethylene for clean extracts
- Pre-cut to correct size for accuracy
- Use with reservoirs or custom packing

These frits are pre-cut to fit into Bond Elut reservoirs for use in filtration applications or for custom SPE sorbent packing.



Polypropylene Frits, 12131021

### 20 $\mu$ m Polypropylene Frits for SPE Cartridges

Diameter (mm)	To Fit Tube Size (mL)	Unit	Part No.
6.4	1	100/pk	12131019
9.5	3	100/pk	12131020
12.7	6	100/pk	12131021
15.9	12	100/pk	12131022
20.6	20	100/pk	12131023
27.0	60	100/pk	12131024

### Tips & Tools




Learn the core concepts surrounding Solid Phase Extraction and best practices for Sample Prep. View the video at [www.agilent.com/chem/spevideo](http://www.agilent.com/chem/spevideo)

## Bond Elut Adapters

- Connect SPE cartridges in series for large samples
- Expand cartridge volume for even more applications
- Transfer large-volume samples to any SPE cartridge

Bond Elut adapters fit on top of any Bond Elut cartridge and contain a female Luer fitting that accommodates the tip of another cartridge, allowing the following configurations:



### Bond Elut Adapter Configurations

**Configuration 1:** Stack two cartridges to perform multi-sorbent methods

**Configuration 2 + 3:** Increase any cartridge's volume by stacking an empty reservoir on top of the device.

**Configuration 4:** Standard Luer-tipped syringes will fit into any Bond Elut adapter. Gentle pressure can then be used to apply conditioning solvents, samples, rinsing solvents and eluents. This configuration is particularly useful for single sample processing, where a vacuum manifold is not required.

**Configuration 5:** For excessively large sample volumes, 1/8 in. OD tubing can be connected to the end of an adapter and the sample can be drawn directly from the sample container via high vacuum.

### Bond Elut Adapters

Description	Unit	Part No.
Adapter cap for 1, 3 and 6 mL Bond Elut cartridges	15/pk	12131001
Adapter cap for 12 and 20 mL Bond Elut cartridges	10/pk	12131003
Adapter cap for 60 mL Bond Elut cartridges	10/pk	12131004

## ASPEC Adapter Caps

- Enhance the high-throughput compatibility of Bond Elut cartridges
- Converts 1, 3 and 6 mL cartridges for use in Gilson SPE systems
- Specially engineered for leak-free operation

Gilson-engineered caps produce a positive pressure seal with the needle in Gilson ASPEC, ASPEC XL and ASPEC XL4 solid phase extraction systems.



Gilson adapter cap, 12131034

### ASPEC Adapter Caps

Description	Unit	Part No.
Gilson adapter cap, 1 mL, yellow	1000/pk	12131034
Gildson adapter cap, 3 mL, blue	1000/pk	12131035

## Luer Stopcocks

- Control flow rates during SPE
- Improve method reproducibility
- Instant isolation from vacuum reduces accidental tube drying

Luer stopcocks are used to provide independent flow control of each individual Bond Elut cartridge when used with vacuum manifolds. They are made from solvent resistant high-grade polypropylene, are reusable and can be readily cleaned using organic solvents such as methanol or acetone.



Luer stopcocks, 12131005

### Luer Stopcocks

Description	Unit	Part No.
Luer stopcocks	15/pk	12131005

## Vac Elut 20 Manifold

- Increased productivity/sample throughput
- Disposable needles eliminate cross contamination
- Rugged, reliable construction

Engineered to increase laboratory productivity, the corrosion-resistant Vac Elut 20 permits simultaneous processing of up to 20 Bond Elut cartridges. The manifold's clear glass base allows careful monitoring of the entire sample collection process. Its compact, linear design requires very little bench space.

The Vac Elut 20 vacuum control valve, vacuum gauge, and quick release valve are mounted on the lid, away from the corrosive solvent stream and within convenient reach. The solvent-resistant polypropylene rack is available in a variety of sizes to accommodate collection tubes commonly used in sample preparation.

To minimize the risk of sample carryover, low-cost, disposable, medical grade polypropylene delivery needles can be easily replaced. Polypropylene extender tips are also available as a replacement for the standard needle valves, ensuring a direct path into the collection tube. Correct sample identification is also ensured by an interlocking fit between the lid and internal test tube rack.

### Vac Elut 20 Manifold

Description	Part No.
Vac Elut 20 manifold with collection rack for 10 x 75 mm test tubes	12234105
Vac Elut 20 manifold with collection rack for 13 x 75 mm test tubes	12234100
Vac Elut 20 manifold with collection rack for 13 x 100 mm test tubes	12234101
Vac Elut 20 manifold with collection rack for 16 x 75 mm test tubes	12234102
Vac Elut 20 manifold with collection rack for 16 x 100 mm test tubes	12234103
<b>Racks for Glass Basins</b>	
Standard glass basin	12234505
Collection rack for 10 x 75 mm test tubes	12234517
Collection rack for 13 x 75 mm test tubes	12234507
Collection rack for 13 x 100 mm test tubes	12234508
Collection rack for 16 x 100 mm test tubes	12234510
<b>Replacement Components and Accessories</b>	
Polypropylene delivery needles, 25/pk	12234511
Replacement exit valve for glass basin	12234506
Replacement lid gasket	12234502
Vac Elut 20 lid cover	12234501
Vacuum gauge assembly	12234504

## Vac Elut 20 Manifold Tall Glass Basin

- For extractions greater than 10 mL
- Transparent glass base allows you to monitor the whole collection operation
- Simple vacuum adjustment

The Vac Elut 20 with a large glass basin and collection rack accommodates larger 16 x 150 mm test tubes. The same high quality material and features on the standard Vac Elut system are incorporated on this special unit. These collection vessels can be utilized in combinatorial chemistry applications using large boiling tubes for collection of purified synthesis mixtures, or for any SPE extraction in which an elution volume greater than 10 mL is required.



Vac Elut 20 manifold tall glass basin, 12234104

### Vac Elut 20 Manifold Tall Glass Basin

Description	Part No.
Vac Elut 20 Manifold with tall glass basin and collection rack for 16 x 150 mm test tubes, complete system	12234104

## Vac Elut 12 Manifold

Agilent manifolds and accessories complement the quality of our sorbents. Configurations and individual components can be purchased, providing flexibility and increased capability at any stage, from method development to high-throughput operation.



Vac Elut 12 manifold, 5982-9110

### Vac Elut 12 Manifold

Description	Part No.
Vac Elut 12 manifold with collection rack for 16 x 100 mm test tubes	5982-9110

### Replacement Parts for Vacuum Manifolds

Description	Part No.
Manifold ball ring/vacuum quick release	5982-9106
Manifold exit valve replacement kit	5982-9107
Manifold vacuum gauge assembly with valve	5982-9108
White cover for 12-port manifold	5982-9111
Sealing gasket for 12-port manifold	5982-9112
Glass chamber for 12-port manifold	5982-9113
12-port rack for 13 x 75 mm tubes	5982-9114
12-port rack for 13 x 100 mm tubes	5982-9115
12-port rack for 16 x 75 mm tubes	5982-9116
12-port rack for 16 x 100 mm tubes	5982-9117

### Parts and Disposables for Cartridge Manifolds

Description	Unit	Part No.
Manifold disposable needle tip	20/pk	5982-9100
Manifold stainless steel needle with polypropylene coating	20/pk	5982-9101
Manifold short valve stopcock	20/pk	5982-9102
Manifold long valve stopcock	20/pk	5982-9103
Manifold male luer plugs	25/pk	5982-9104
Manifold needle tip ejector tool		5982-9105
Cartridge stacking adapters	12/pk	5982-9109

## Vac Elut SPS 24 Manifold

- Closed operation prevents cross contamination
- Stainless steel tips deliver maximum extract purity
- Range of rack sizes covers most tube configurations

The Vac Elut SPS 24 allows simultaneous processing of up to 24 SPE cartridges. Like all Vac Elut manifolds, the SPS 24 is made from durable, solvent-resistant materials and engineered to last. The glass sides allow easy viewing of the entire sample collection process.

The ultimate feature of the SPS 24 manifold is its waste diversion funnel, which enables all steps of the SPE procedure to be completed without removing the lid. Since the collection rack is placed inside the unit before extraction begins, splash back and cross contamination are eliminated, while hazardous waste and biohazard exposure are minimized.

Complete with replacement stainless steel delivery tips for maximum extract purity, the Vac Elut SPS 24 system also includes a vacuum controller/release, collection rack, and port sealing plugs. Racks for several different collection tube configurations are available.



Vac Elut SPS 24 manifold

### Vac Elut SPS 24 Manifold

Description	Part No.
Vac Elut SPS 24 manifold with collection rack for 10 x 75 mm test tubes	12234003
Vac Elut SPS 24 manifold with collection rack for 12 x 75 mm test tubes	12234041
Vac Elut SPS 24 manifold with collection rack for 13 x 100 mm test tubes	12234022
Vac Elut SPS 24 manifold with collection rack for 16 x 100 mm test tubes	12234004
Replacement Components and Accessories	
Collection rack and funnel set for 12 or 15 mL conical tubes	12234027
Collection rack and funnel set for 12 x 75 mm test tubes	12234030
Collection rack and funnel set for 13 x 100 mm test tubes	12234031
Collection rack and funnel set for 16 x 100 mm test tubes	12234028
Elastic lid fasteners, 6/pk	12234034
SPS 24 lid cover	12234025
SPS 24 waste tower repair kit	12234005
Includes base exit tube, hose connector, washer, center tube, 900 connector elbow	
Stainless steel delivery needles, 25/pk	12234038
Waste funnel for 12 x 75 or 13 x 100 mm test tubes, 5/pk	12234032

## Vacuum Manifolds for 96-well Plates

- Can handle 96-well fixed position plates or second version to handle 96-well flexible format plate
- Constructed with polypropylene base and polyethylene lid
- Small footprint
- Supplied with on/off valve, vacuum gauge, and fine vacuum control valve
- disposable reservoir tray collects excess sample and wash solvents
- Spacer inserts can be placed into the base so that collection plates of differing heights can be processed (both deep-well and standard microtiter plates), ensuring maximum penetration of the SPE plate into the collection plate and reducing well-to-well contamination
- Solvent resistance gasket in the manifold lid



96-well vacuum manifold base assembly, 5185-5797



Base O-ring, 5185-5779



Collection plate spacer in sizes to match the collection plate used

### Vacuum Manifolds for 96-well Plates

Description	Part No.
96-well vacuum manifold base assembly Includes base, vacuum gauge and needle valve	5185-5797

### Parts and Disposables for 96-well Plate Manifolds

Description	Unit	Part No.
Base O-ring for 96-well plate manifold		5185-5779
Collection plate spacer for Agilent 1 mL deep-well, 12 mm		5185-5775
Collection plate spacer for microtiter plate and Agilent 0.5 mL shallow well plate, 29 mm		5185-5781
Collection plate spacer for most industry-standard deep-well plates, 2 mm		5185-5780
Disposable reservoir tray for 96-well manifold	25/pk	5185-5782
96-well vacuum manifold base assembly Includes base, vacuum gauge and needle valve		5185-5797
Lid for 96-fixed well vacuum manifold		5185-5798
Lid gasket for 96-well plate manifold		5185-5778
Luer adapters for 96-well flexible cartridge	25/pk	5185-5789
Needle valve for 96-well manifold		5185-5783
On/off valve for 96-well manifold		5185-5785
Vacuum gauge for 96-well manifold		5185-5786
Vacuum outlet (Ni plated) for 96-well manifold		5185-5784



## Sealing Mats

Sealing mats help prevent sample contamination or evaporation that can occur when plates are exposed to environmental conditions.



Collection plate, showing 96-position closing mat,  
5042-1389

### Sealing Mats

Description	Unit	Part No.
96-well plate sealing mats, round	50/pk	5042-1389
96-well plate sealing mats, square	10/pk	5982-9996



## Disk SPE

### SPEC Disk SPE

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- No loose sorbent means no channeling of sample
- Uniform flow and extraction properties offer robust performance
- Low elution volume affords excellent concentration of analyte, improving sensitivity

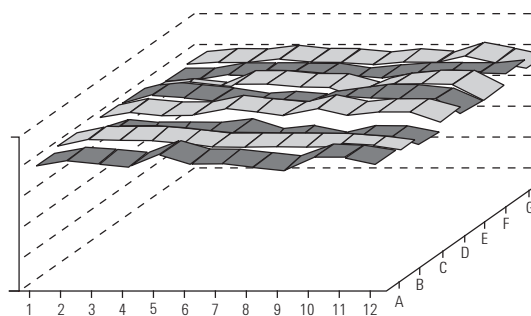
Using an advanced disk design, SPEC delivers superior flow characteristics and trouble-free automation. Due to the low volume of the extraction bed, very low elution volumes can be used. This means that, in some applications, evaporation and reconstitution steps can be eliminated, resulting in accelerated sample processing times. The combination of low bed masses, ultra-clean base materials and a broad toolbox of selectivities delivers higher recoveries free of the matrix interferences that can cause ion suppression.

SPEC provides high recoveries at low elution volumes – as low as 100  $\mu\text{L}$ . This is due to the very high surface area yet small physical volume of the monolithic disk. Overall, extraction efficiency is very high for this format of sample preparation product, and the range of functionalities allows fast method development.

## Unique phases available in SPEC 96-well and SPE tube formats

### Uniform recovery and reproducibility between wells from the same well plate

- DAU – This functionalized SPEC disk is specifically designed for the analysis of drugs of abuse in urine. Its unique sorbent chemistry results in excellent sample cleanup and concentration of samples prior to GC/MS and LC/MS.
- MP1 – SPEC MP1 is a mixed-mode, non-polar/SCX monolithic disk ideal for analytes with polar functional groups in plasma. The dual retention mechanism results in cleaner extracts. The SCX functionality strongly binds polar basic analytes allowing rigorous washing steps to be employed. Bond Elut Certify offers similar selectivity to SPEC MP1.
- MP3 – SPEC MP3 is slightly more polar than MP1, making it ideal for hydrophobic analytes that would bind too strongly to MP1. MP3 chemistry is particularly suited to the extraction of opiate alkaloids from biological fluids.



Note the high recovery (y axis) with an average deviation across the 96 wells of just 3.2% (well positions are shown on the x and z axes). SPEC provides the predictable flow characteristics analysts require for true walk-away automated processing. With SPEC you need not worry about clogging, and as an added benefit, the typically low vacuum pressure requirement prevents cross-talk (e.g. spraying of fast running eluates between wells in the collection plate).



### Tips & Tools

Learn the core concepts surrounding Solid Phase Extraction and best practices for Sample Prep. View the video at [www.agilent.com/chem/spevideo](http://www.agilent.com/chem/spevideo)

## SPEC 96-well Plates

When used on an automated platform, SPEC 96-well plates offer outstanding flow characteristics. Flow across all 96-well plates is uniform and highly reproducible, meaning your recoveries are too.



SPEC 96-well plate

### SPEC 96-well Plates, 15 mg

Sorbent Phase	Part No.
<b>Silica-based Sorbents</b>	
C18	A59603
C18AR	A59619
C18AR, 30 mg	A5960330
C2	A59601
C8	A59602
CN	A59606
DAU	A596DAU
NH2	A59607
Phenyl	A59610
<b>Ion Exchange Sorbents</b>	
SAX	A59605
SCX	A59604
<b>Mixed Mode Sorbents</b>	
MP1	A59611
MP3	A59620
<b>Method Development Kit</b>	
C2, C8, C18, C18AR, CN, MP1, MP3, PH	A59630

## SPEC SPE Cartridges

SPEC functionalities are also available in standard straight barrel tube format, offering flexibility in sample size. Use on any standard vacuum manifold such as the Vac Elut 20 or SPS 24.

### SPEC SPE Cartridges, 100/pk

Sorbent Phase	Description	Part No.
C18	15 mg, 3 mL	A5320320
	30 mg, 3 mL	A5320330
C18AR	15 mg, 3 mL	A5321920
	30 mg, 3 mL	A5321930
	35 mg, 10 mL	A5021935
C18/MP3	70 mg, 10 mL	A5022570
C2	30 mg, 3 mL	A5320130
C8	15 mg, 3 mL	A5320220
	30 mg, 3 mL	A5320230
DAS	15 mg, 3 mL	A532DAS
DAU	15 mg, 3 mL	A532DAU
MP1	15 mg, 3 mL	A5321120
	30 mg, 3 mL	A5321130
	35 mg, 10 mL	A5021135
	70 mg, 10 mL	A5021170
MP3	15 mg, 3 mL	A5322020
	30 mg, 3 mL	A5322030
	35 mg, 10 mL	A5020735
NH2	15 mg, 3 mL	A5320720
	70 mg, 10 mL	A5020770
Phenyl	15 mg, 3 mL	A5321020
	30 mg, 3 mL	A5321030
SAX	15 mg, 3 mL	A5320520
	30 mg, 3 mL	A5320530
	35 mg, 10 mL	A5020535



SPEC disks, C8, A74702, and SPEC SPE Cartridges, C18, A5320320

**SPEC Disks and Accessories**

Description	Part No.
SPEC disks, C18AR, 47 mm, 20/pk	A74819
SPEC disks, C18AR, 90 mm, 12/pk	A79019
SPEC environmental disk holder, 47 mm	A713
SPEC flask, 1 L, 40/35 mm	A714



## Empore Disk SPE

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- Good flow of large sample volumes
- Range of versatile sorbent chemistries
- Available in two disk diameters for better performance

Empore extraction disks provide a high flow rate solution for large volume sample preparation, and are available in a variety of bonded phases and two diameters, 47 and 90 mm. Increasing the diameter of the disk gives better solvent flow rates through the disk.

### Empore Disk SPE

Description	Unit	Part No.
Anion extraction disks, 47 mm	20/pk	12145012
Chelating extraction disks, 47 mm	20/pk	12145029
SDB-XC extraction disks, 47 mm	20/pk	12145010
SDB-XC extraction disks, 90 mm	10/pk	12145011
C8 extraction disks, 47 mm	20/pk	12145002
C8 extraction disks, 90 mm	10/pk	12145034
C18 extraction disks, 47 mm	20/pk	12145004
C18 extraction disks, 90 mm	10/pk	12145007



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 Printed in the USA July 12, 2011  
 5990-8592EN



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