Biotage® Analytical Sample Preparation

2012 Catalog

Applications

- Agrochemical & Food
- Bioanalysis
- Clinical
- Environmental
- Forensic

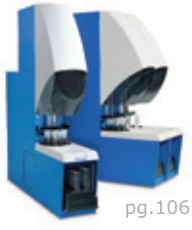
Consumables

- ISOLUTE® SLE+
- EVOLUTE® Polymeric SPE
- ISOLUTE SPE Columns and 96-Well Plates
- AFFINILUTE™ MIP
- ISOLUTE QuEChERS
- ISOLUTE SPE Columns and 96-Well Plates

Instruments

- PRESSURE+ Manifolds
- RapidTrace® SPE Automation
- SPE Dry Evaporators
- TurboVap® Evaporators

New Analytical Instruments



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Biotage®

IST®

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2012 Analytical Sample Preparation Catalog

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New Products

Biotage® PRESSURE+ 48 and 96

Positive Pressure Manifolds

Biotage® PRESSURE+ manifolds deliver positive pressure, parallel processing for 96 well plates, 1 mL, 3 mL and 6 mL column formats. The systems utilize a consistent, uniform flow of positive pressure to move both low and high viscosity liquids through Solid Phase Extraction, Supported Liquid Extraction and Protein Precipitation plates and columns. This precise control of applied pressure increases reproducibility of analyte recoveries and ensures consistent extraction efficiencies especially when compared with vacuum controlled processing. **See page 94.**

RapidTrace®+

Automated SPE Workstation

The RapidTrace+ SPE Workstation has been updated to include new features. These include the ability to process larger sample volumes of up to 40 mL, a new turret system allowing for 1 mL, 3 mL and 6 mL SPE columns to be used on the same unit and the ability to use a broader range of column bed sizes. **See page 106.**

TurboVap®

Concentration Workstations for Sample Evaporation

Biotage offers a range of TurboVap Concentration Workstations for sample evaporation. TurboVap units use a patented vortex evaporation system that together with a water bath for precise temperature control, increases the speed of evaporation by a factor of 10 compared with other techniques. **See page 113**.

1-Point Support™

The Answer to All Your Questions

Customer Support

Method Development and Troubleshooting Advice

Biotage is ready to assist you with our team of Analytical Chemists who have many years of experience in providing practical, theoretical and technical knowledge relating to sample preparation techniques.

If you need help choosing the best sample preparation method for your application, or want to solve an existing sample preparation problem, please contact your local 1-Point Support team who will ensure you receive fast advice from our sample preparation experts.

Technical Information

Throughout this catalog, we highlight chemistry data sheets and application notes that provide detailed information on sample preparation techniques and SPE sorbents.

SPE QuickStart Guide

Use our NEW QuickStart Guide on **page 173** for an introduction to SPE.

Supported Liquid Extraction User's Guide

ISOLUTE SLE+ supported liquid extraction is a quick, easy and cost effective sample preparation solution for analytical chemistry. The Biotage SLE User Guide provides a simple 4-step method development guide which outlines the efficient 3-step sample procedure of loading your sample, wait five minutes and elute. To request a copy please visit **www.biotage.com**.

Sample Preparation Application Database

Biotage's Sample Preparation Application Database is a vital resource for analytical chemists looking to optimize sample preparation procedures. As sample preparation experts, Biotage are dedicated to finding the ideal solution to your sample preparation requirements with a regularly updated database containing application notes, technical notes and scientific presentations. The Sample Preparation Application Database has been optimized to provide the most appropriate, efficient and effective sample preparation solutions, taking into consideration matrix effects, analyte structure/functionality and relevant regulatory requirements.

The Sample Preparation Application Database is fully searchable by keyword, analyte, matrix, analytical technique, format, product type and industry type. This search feature allows analytical chemists to obtain relevant application notes suitable for their needs in an efficient and dynamic manner. If you cannot find a suitable application on the database, the Sample Preparation Application Database can direct an email request to one of our fully trained application specialists who will endeavour to find a suitable solution. Visit the Sample Preparation Application Database **www.biotage.com/applications.**

Contact 1-Point Support

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www.biotage.com
The Biotage web site offers our customers easy access to current information on new products, applications, and events.

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To locate a distributor
please visit our web site at
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How to Place Your Order

Product information is displayed with easy-to-follow application details and supporting documentation. Ordering information is found following each product listing.

How to Order

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- Biotage part number(s)
- Product description(s)
- Shipping address
- Billing address
- Contact person, including telephone number
- Product user name and department

Orders can also be placed using your VISA or MasterCard account (and American Express **IN THE US ONLY**).

Prices and Specifications
Prices in the Biotage catalog are suggested list prices and are current at the time of the book's printing and are subject to change without notice. Specifications not listed in this catalog can be obtained by contacting Biotage Customer Service or your local distributor.

Product Quality

Biotage is committed to developing and manufacturing sample preparation products of the highest quality. State-of-the-art manufacturing techniques are supported by a comprehensive Quality Control (QC) testing program documented under our ISO9001:2008 registered Quality Management System.

All the components used to make our sample preparation products (tubes, frits, 96-well plates and SPE sorbents) are rigorously cleaned and QC tested to ensure they meet our demanding purity specifications.

We use sophisticated instrumental techniques to confirm the physical and chemical nature of every batch of SPE sorbent – ensuring reproducible performance in your application.

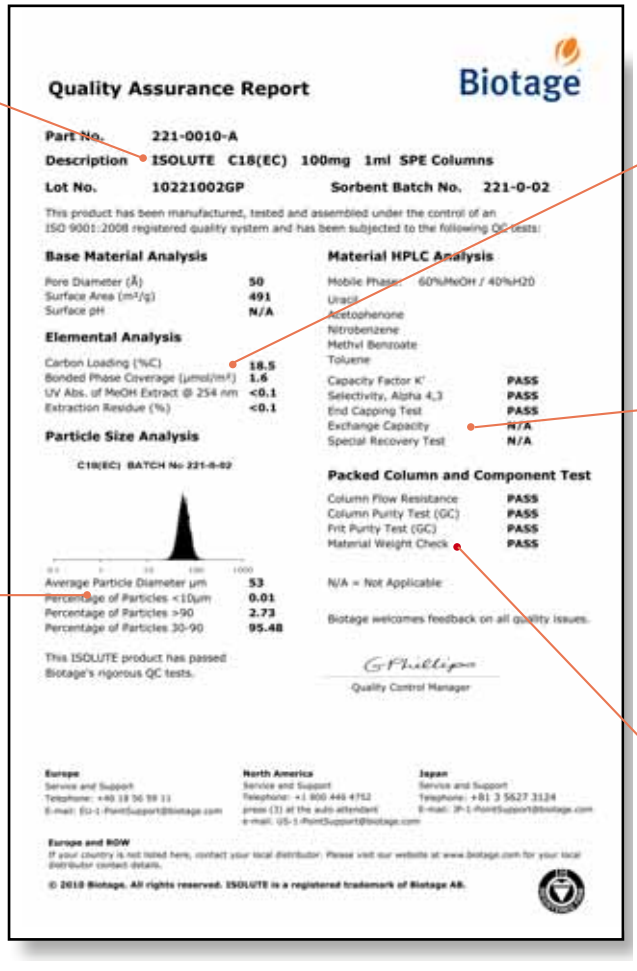
Every ISOLUTE or EVOLUTE SPE product is accompanied by a detailed Quality Assurance (QA) report for your reference. This page explains the importance of the information it contains, and the impact this has on every sample preparation procedure you perform.

Reproducible sorbent mass packed into SPE columns:

- Column capacity and analyte elution volume requirements are constant
- Consistent column-to-column and batch-to-batch recoveries

Well controlled particle size distribution with minimal fines from column-to-column and batch-to-batch:

- Reliable sample processing using manifolds and automated devices
- Consistent flow through columns, from column-to-column and batch-to-batch
- Low back pressure – automation friendly
- Gravity loading of samples with some column configurations
- No fines in final extract to plug injectors or absorb analytes when sample is reconstituted in another solvent
- No channeling in sorbent beds minimizes sorbent mass requirements, reducing elution volumes and costs
- Minimal drying time, reproducible from batch-to-batch
- Large sorbent mass columns with good flow characteristics



Quality Assurance Report

Biotage

Part No. 221-0010-A

Description ISOLUTE C18(EC) 100mg 1ml SPE Columns

Lot No. 10221002GP Sorbent Batch No. 221-0-02

This product has been manufactured, tested and assembled under the control of an ISO 9001:2008 registered quality system and has been subjected to the following QC tests:

Base Material Analysis

Pore Diameter (Å)	50
Surface Area (m²/g)	491
Surface pH	N/A

Elemental Analysis

Carbon Loading (%C)	18.5
Bonded Phase Coverage (µmol/m²)	1.6
UV Abs. of MeOH Extract @ 254 nm	<0.1
Extraction Residue (%)	<0.1

Particle Size Analysis

C18(EC) BATCH No 221-0-02

Average Particle Diameter µm	53
Percentage of Particles <10µm	0.01
Percentage of Particles >90	2.73
Percentage of Particles 30-90	95.48

This ISOLUTE product has passed Biotage's rigorous QC tests.

Material HPLC Analysis

Mobile Phase: 60%MeOH / 40%H20

Uracil
Acetophenone
Nitrobenzene
Methyl Benzoate
Toluene

Capacity Factor K'	PASS
Selectivity, Alpha 4,3	PASS
End Capping Test	PASS
Exchange Capacity	N/A
Special Recovery Test	N/A

Packed Column and Component Test

Column Flow Resistance	PASS
Column Purity Test (GC)	PASS
Frit Purity Test (GC)	PASS
Material Weight Check	PASS

N/A = Not Applicable

Biotage welcomes feedback on all quality issues.

Quality Control Manager

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E-mail: JP-1-PointSupport@biotage.com

Europe and ROW
If your country is not listed here, contact your local distributor. Please visit our website at www.biotage.com for your local distributor contact details.

Reproducible, optimized chemistry for ISOLUTE and EVOLUTE sorbents:

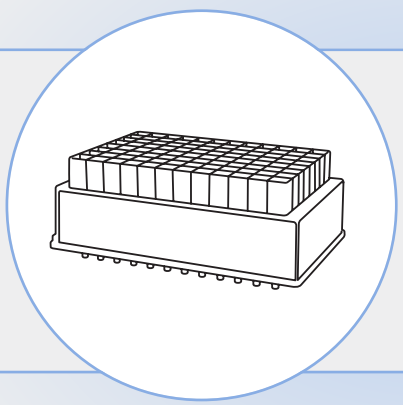
- Minimize method development time
- Eliminate need for time-consuming method changes when different batches of sorbent are used

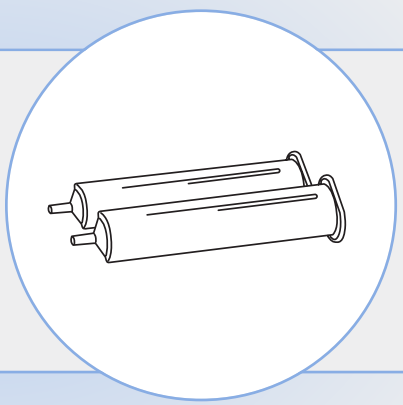
High and reproducible capacities of ISOLUTE ion exchange sorbents:

- Reproducible high recoveries in ion exchange SPE without using columns with excessively large sorbent mass
- Saves time, money and increases analyte concentration in final extract

High purity sorbents, frits, columns and 96-well SPE plates:

- The purity of all the components used to manufacture ISOLUTE and EVOLUTE SPE products are monitored to ensure compatibility with the most demanding applications

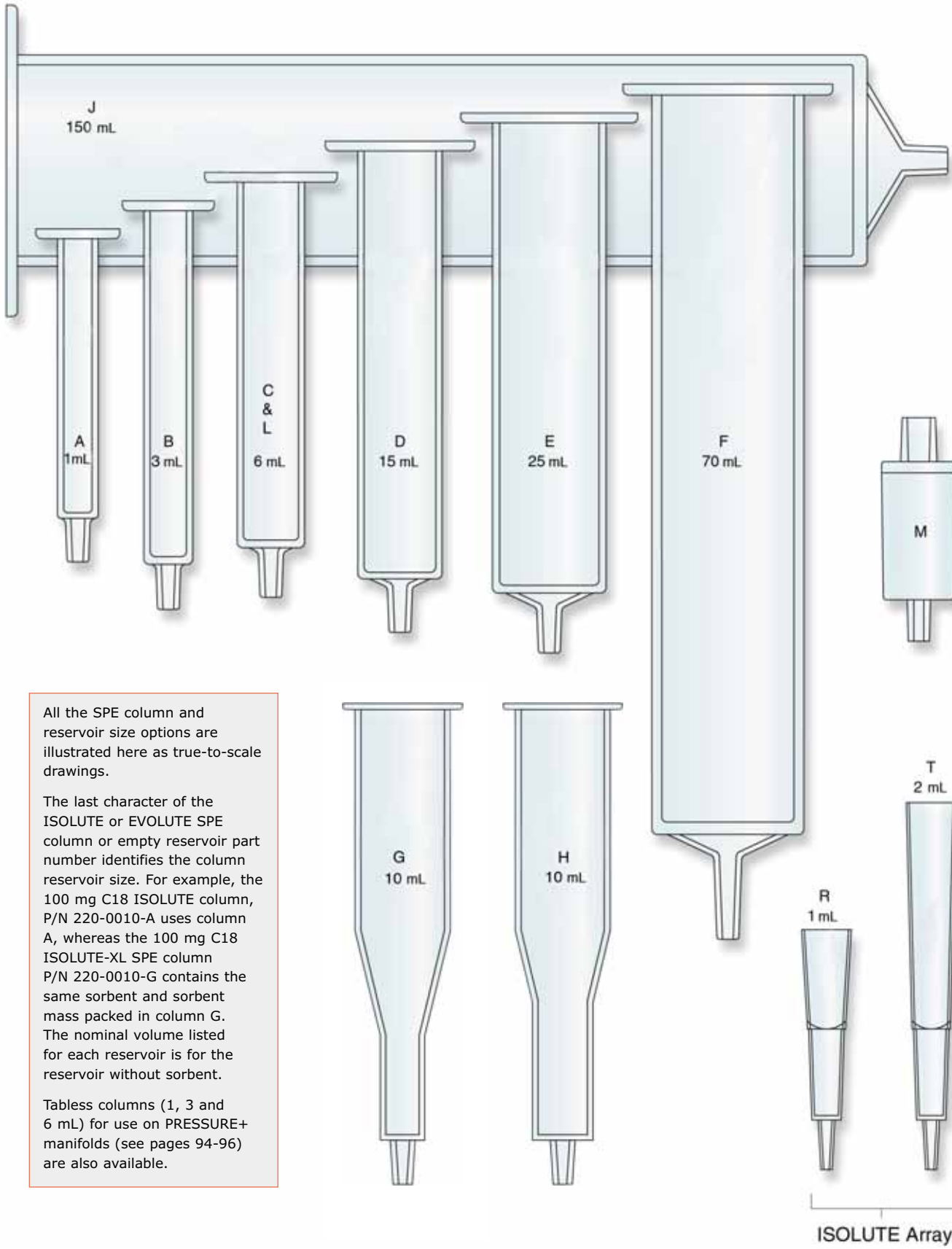




Sample Preparation Format Options

Sample Prep Format Options

True-to-Scale Columns



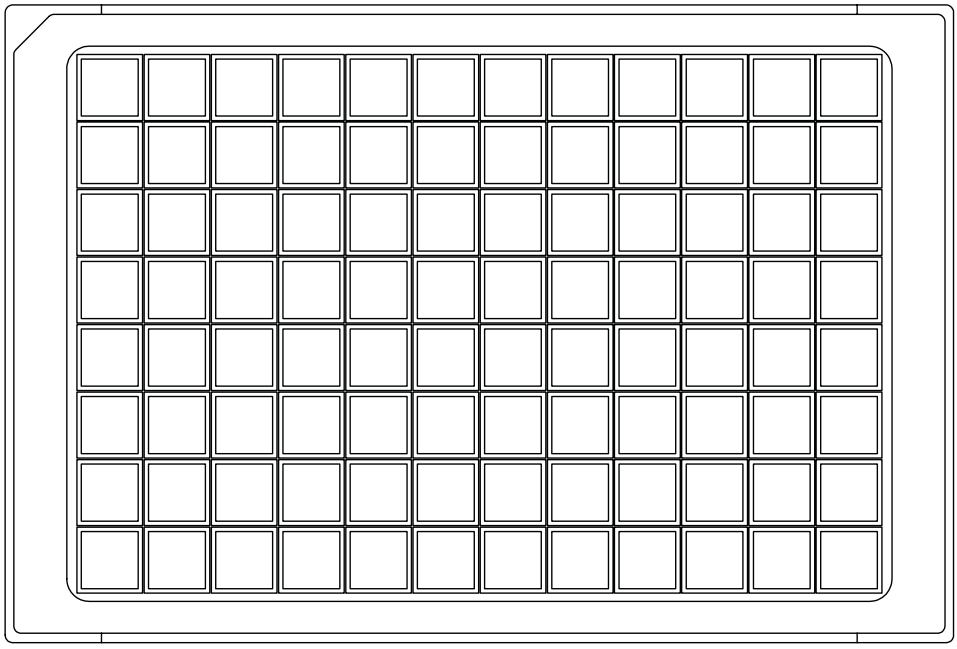
All the SPE column and reservoir size options are illustrated here as true-to-scale drawings.

The last character of the ISOLUTE or EVOLUTE SPE column or empty reservoir part number identifies the column reservoir size. For example, the 100 mg C18 ISOLUTE column, P/N 220-0010-A uses column A, whereas the 100 mg C18 ISOLUTE-XL SPE column P/N 220-0010-G contains the same sorbent and sorbent mass packed in column G. The nominal volume listed for each reservoir is for the reservoir without sorbent.

Tabless columns (1, 3 and 6 mL) for use on PRESSURE+ manifolds (see pages 94-96) are also available.

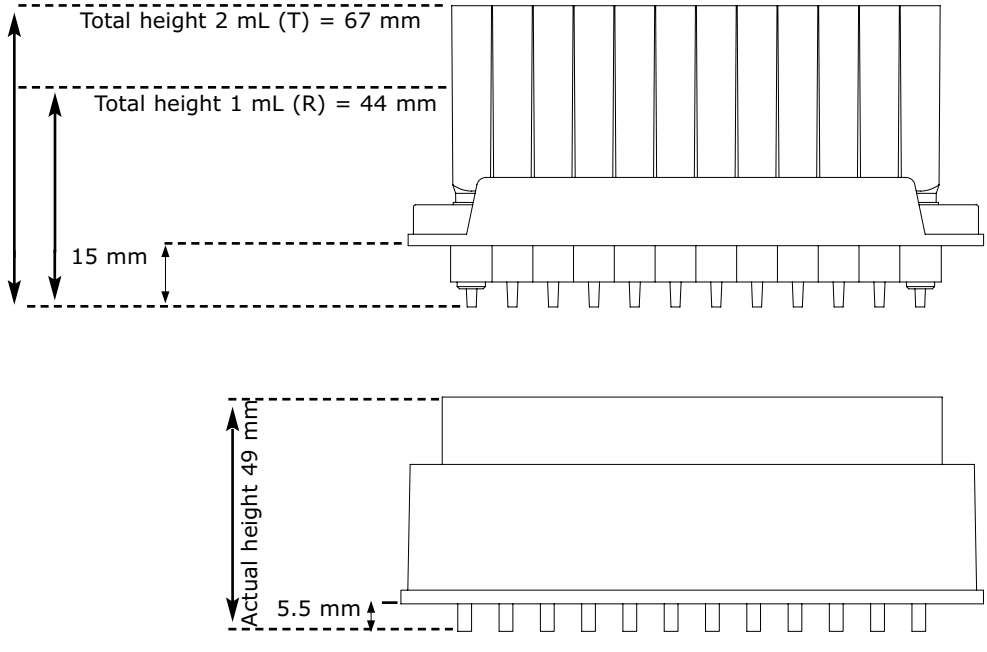
Sample Prep Format Options

True-to-Scale 96-well plate (Fixed well and Array plate)



Biotage supplies two 96-well plate formats, the fixed well plate and the modular Array. As with individual columns, the last character(s) of the part number identifies the format/column type. The suffix for fixed well plates is -P01, while the suffix for Array wells is -R (1 mL) and -T (2 mL). Prepacked Array plates have the suffixes -RP and –TP.

Scale diagrams (60% of actual size) of the fixed well and pre-assembled Array plate are shown below. Note the 'skirt' heights (distance from well outlet to sealing edge) of the two plates are different. To eliminate cross talk when processing plates, well outlets should penetrate the collection plate correctly. To accommodate this skirt height difference, the VacMaster-96 is supplied complete with a spacer for use with the Array format. This spacer is not required for processing the fixed well format.



Side elevation (60% of actual size) of populated Array plate (top) and fixed well plate (bottom).

AFFINILUTE™ MIP

Molecularly
Imprinted Polymers

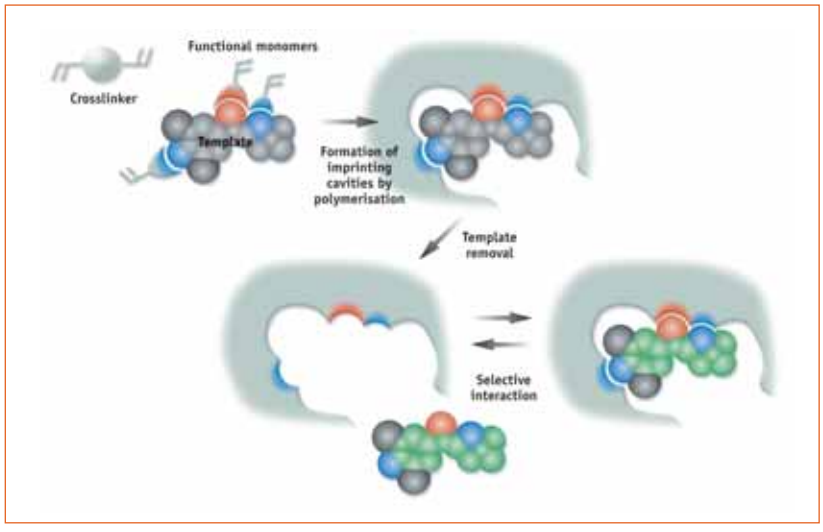
AFFINILUTE™ MIP

Biotage AFFINILUTE™ MIP products offer analytical chemists ultimate selectivity compared with standard solid phase extraction techniques. Unlike other methods, Biotage AFFINILUTE MIP products rely on the specific molecular structure of the analyte for targeted capture resulting in exceptional clean up. Biotage AFFINILUTE MIP columns combine high affinity with standard flow through sample preparation methodology.

AFFINILUTE MIP columns contain **M**olecularly **I**mprinted **P**olymers (MIPs) which are a class of highly cross-linked polymers engineered to bind one target compound or a class of structurally related target compounds with high selectivity. This selectivity is introduced during MIP synthesis in which a template molecule, designed to mimic the analyte, guides the formation of specific cavities or imprints that are sterically and chemically complementary to the target analyte(s).

MIPs are prepared by first mixing a template molecule that consists of a structural analog of the analyte(s) of interest with one or more functional monomers. The monomers form spontaneous complexes around the template. Upon complex formation, cross-linking monomers are then added with a suitable porogen (solvent that aids in the role in pore formation) to drive polymerization. An extensive wash procedure is used to remove the template from the polymer, leaving imprints or binding sites that are sterically and chemically complementary to the template.

The very specific selectivity designed into each AFFINILUTE MIP ensures high affinity binding even of rare analytes in large sample volumes, thus lowering limits of detection.



Achieve lower detection limits through superior selectivity

Minimize ion-suppression

AFFINILUTE MIPs are so selective that stringent wash steps can be applied prior to analyte elution in order to remove all interferences and thus minimize matrix effects.

Minimal to no method development required

Each box of AFFINILUTE MIP product contains a detailed application note/method card that in most cases will require no further optimization as Biotage have optimized the method during polymer development.

Stable at broad pH ranges and high temperatures

AFFINILUTE MIPs are highly cross linked polymers that can withstand extremes of pH and temperature allowing for stringent elution interference washes and extended shelf life.

AFFINILUTE MIP Amphetamines

One of the difficulties of analyzing amphetamines is the short half-life of the drug once ingested such that testing by conventional methods needs to occur within 48 hours of ingestion. The class selectivity of AFFINILUTE MIP Amphetamines allows for amphetamine detection up to 5 days after intake. Additionally, the class selectivity will allow for the capture of "designer drugs" based on the amphetamine core structure.

Description	Quantity	Part number
AFFINILUTE MIP Amphetamines 25 mg/3 mL	50	M28-0002-B

AFFINILUTE MIP β-agonists

β-2-adrenergic receptor agonists (β-agonists) have been internationally banned in human and equine sports in addition to being prohibited for non-veterinary use in livestock. After therapeutic use, these drugs are not completely metabolized and are often excreted in wastewaters. As a result, there is concern for the long-term chronic effects of these drugs on humans and the ecosystem.

Description	Quantity	Part number
AFFINILUTE MIP Full β-agonist 25 mg/10 mL	50	M02-0002-G
AFFINILUTE MIP Full β-agonist 25 mg/3 mL	50	M02-0002-B

AFFINILUTE MIP β-blockers

β-adrenergic blocking agents (β-blockers) are a class of drugs used to treat various cardiac disorders such as hypertension, angina, congestive heart failure and arrhythmia. β-blockers have been used to enhance performance by athletes by lowering heart rate and reducing tremor and as such, the International Olympic Committee has banned the use of β-blockers. The application note for AFFINILUTE MIP β-blockers describes the extraction of β-blockers from urine and other biological fluids, as well as water.

Description	Quantity	Part number
AFFINILUTE MIP β-blockers 25 mg/10 mL	50	M18-0002-G
AFFINILUTE MIP β-blockers 25 mg/3 mL	50	M18-0002-B

AFFINILUTE MIP Clenbuterol

Clenbuterol is a non-steroidal β2 adrenergic agonist (β-receptor) used as a decongestant and bronchodilator in the treatment of respiratory disorders (e.g. asthma). Like all β-receptors, its use in food chain livestock is internationally banned. The application note for AFFINILUTE MIP Clenbuterol describes the extraction of clenbuterol from calf urine. Please note that this product is specific for clenbuterol, to capture the entire family of β-agonists, please see the section relating to AFFINILUTE MIP β-agonists above.

Description	Quantity	Part number
AFFINILUTE MIP Clenbuterol 25 mg/10 mL	50	M01-0002-G

AFFINILUTE MIP Chloramphenicol

Chloramphenicol is a broad spectrum antibiotic that may be a causative agent for aplastic anemia and certain cancers. As a consequence, the use of chloramphenicol in food-producing livestock has been banned in Europe, the US and Canada. Chloramphenicol however, is still widely available in many food producing countries and because no safe levels have been determined in food, public health concerns still arise. As such, a "zero" tolerance level has been established for this antibiotic in foodstuffs. It is therefore critical to develop highly selective and sensitive analytical assays to monitor chloramphenicol residues in difficult matrices such as foods. The application note for AFFINILUTE MIP Chloramphenicol describes the extraction of chloramphenicol from milk and plasma.

Description	Quantity	Part number
AFFINILUTE MIP Chloramphenicol 25 mg/10 mL	50	M10-0002-G
AFFINILUTE MIP Chloramphenicol 25 mg/3 mL	50	M10-0002-B

AFFINILUTE MIP Nitroimidazoles

Nitroimidazole antibiotics are used to treat anaerobic bacterial and parasitic infections in animals. Whilst prohibition/legislation varies from state to state, there are restrictions on the use of these compounds in food livestock and permitted levels in food for human consumption. The application note for AFFINILUTE MIP Nitroimidazoles describes the extraction of nitroimidazoles from solid tissue samples and liquid samples.

Description	Quantity	Part number
AFFINILUTE MIP Nitroimidazoles 50 mg/3 mL	50	M34-0005-B

AFFINILUTE MIP PAH

Polycyclic aromatic hydrocarbons (PAHs) are chemical compounds containing fused aromatic rings. The health hazard of PAHs depends on structure and in particular isomeric form, ranging from non-toxic to extremely toxic and carcinogenic. PAHs can be found in foods, where studies have shown that most food intake of PAHs comes from cereals, oils and fats. The application note for AFFINILUTE MIP PAH describes the extraction of nine of the most toxic PAHs from olive oil: fluoranthene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(123-cd)pyrene, dibenzo(ah)anthracene, and benzo(ghi)perylene.

Description	Quantity	Part number
AFFINILUTE MIP PAH 25 mg/3 mL	50	M73-0002-B

AFFINILUTE MIP NSAIDs

Nonsteroidal anti-inflammatory drugs (NSAIDs) are analgesic and antipyretic (fever-reducing) agents which at higher doses also have anti-inflammatory effects. The most common members of this group of drugs are aspirin, ibuprofen and naproxen which are widely available as over-the-counter drugs in many areas. This widespread availability can lead to toxicity (both intentional and unintentional), hence accurate extraction and analysis is often required in clinical and forensic testing laboratories. Biotage have developed an application note for AFFINILUTE MIP NSAIDs that describes the extraction of NSAIDs from solid tissue as well as liquid samples.

Description	Quantity	Part number
AFFINILUTE MIP NSAIDs 25 mg/3 mL	50	M72-0002-B
AFFINILUTE MIP NSAIDs 25 mg/10 mL	50	M72-0002-G

AFFINILUTE MIP Fluoroquinolones

Fluoroquinolones are a family of synthetic broad-spectrum veterinary antibiotics, which are on the US EPA list for required testing of all imported foodstuffs. The application note for AFFINILUTE MIP Fluoroquinolones describes the extraction of fluoroquinolones specifically from bovine kidney and is applicable to many tissues for food testing.

Description	Quantity	Part number
AFFINILUTE MIP Fluoroquinolones 25 mg/3 mL	50	M69-0002-B

AFFINILUTE MIP TSNAs

Tobacco-specific nitrosamines (TSNAs) are created through the burning, curing and fermentation of tobacco leaf. In 1989, the US Surgeon General provided a list of carcinogens found in tobacco products. Among that list were nine nitrosamines that can be found in chewing, smoking and snuff tobacco. These TSNAs are highly carcinogenic and have been linked to lung, oral, esophageal, cervical and liver cancer. The monitoring of humans for exposure to tobacco smoke (active or passive) is an important clinical test. Nicotine is metabolized in the tobacco curing process to the TSNAs NNK and NNN; NNK is further metabolized in the body to NNAL. Because TSNAs are only found in tobacco products, their characterization is invaluable in the study of tobacco's cancerous nature. The application note for AFFINILUTE MIP TSNAs describes the extraction of TSNAs from urine.

Description	Quantity	Part number
AFFINILUTE MIP TSNAs 50 mg/10 mL	50	M21-0005-G
AFFINILUTE MIP TSNAs 50 mg/3 mL	50	M21-0005-B

AFFINILUTE MIP NNAL

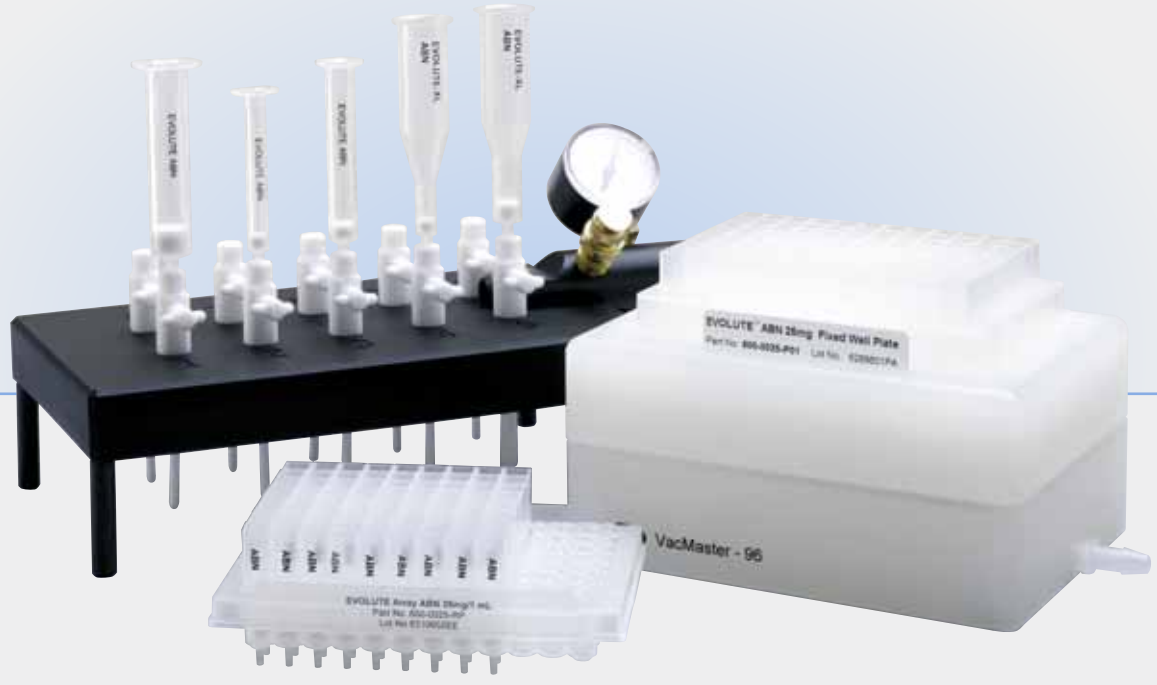
NNK (4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone) is a tobacco specific nitrosamine which is present in significant quantities in tobacco smoke. Upon inhalation (both passive and active) NNK is rapidly metabolized to NNAL (4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol). The extraction and quantification of NNAL in urine is therefore a useful biomarker when assessing exposure to tobacco smoke. The analysis of NNAL however is challenging due to the detection limits required, especially in the monitoring of nonsmokers exposed to passive smoking where detection limits are below 10 ng/L (<10 ppt). Such detection limits are not obtainable using conventional SPE and procedures are often laborious and time-consuming. The application note for AFFINILUTE MIP NNAL describes the extraction of NNAL from urine with detection limits down to 5 pg/mL and recoveries of greater than 90%.

Description	Quantity	Part number
AFFINILUTE MIP NNAL 25 mg/10 mL	50	M06-0002-G
AFFINILUTE MIP NNAL 25 mg/3 mL	50	M06-0002-B

AFFINILUTE MIP Triazines

Triazine compounds are used as the basis for various herbicides. AFFINILUTE MIP Triazine provides excellent extraction and selectivity for a spectrum of 10 triazines enabling lower detection limits with lower sample volumes. The 10 triazines and triazine metabolites that can be extracted are; atrazine, simazine, propazine, cyanazine, sebuthylazine, deisopropylatrazine, deethylatrazine, deethylterbutylazine, prometon and hydroxyterbutylazine.

Description	Quantity	Part number
AFFINILUTE MIP Triazines 25 mg/10 mL	50	M08-0002-G


EVOLUTE ABN 25mg Fixed Well Plate
VacMaster - 96

EVOLUTE® Sample Preparation Products

Optimized for Reduced Ion Suppression in LC-MS Applications

EVOLUTE® Sample Preparation Products

EVOLUTE polymer based SPE products offer a simple, robust, generic approach to the isolation and clean up of small molecules from a variety of matrices including plasma, serum, whole blood, urine, foodstuffs and water.

- Extract a wide range of analytes using a choice of 5 sorbent chemistries
- Simple, fast method development
- Robust, water wettable sorbents are stable from pH 0–14
- Formats to match all sample volume and throughput demands
- Methodology optimized for clean extracts in LC-MS
- Excellent protein and phospholipid removal properties

EVOLUTE sorbent chemistry

The EVOLUTE family offers a full range of SPE options, with sorbents and methodologies optimized to provide solutions to a wide variety of sample preparation problems. The five sorbent chemistries are based on a modified polystyrene-divinylbenzene polymer, incorporating hydroxy-functionalized oligomers (EVOLUTE ABN, **Figure** 1). The mixed-mode sorbents are manufactured by surface modification of EVOLUTE ABN. The water wettable hydrophobic/hydrophilic balanced sorbents maintain their optimum retention/elution capabilities even if they dry completely during processing.

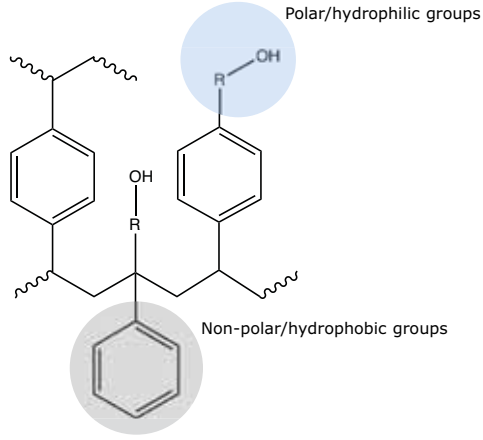


Figure 1. EVOLUTE ABN consists of a modified polystyrene-divinylbenzene polymer for reversed phase (non-polar or hydrophobic) retention, incorporating non-ionizable hydroxyl groups which ensure the phase is fully water wettable.

EVOLUTE Sorbent	Functionality	Non-polar	Strong cation exchange	Weak cation exchange	Strong anion exchange	Weak anion exchange
EVOLUTE ABN	Non-polar	●				
Mixed-mode sorbents						
EVOLUTE CX	Non-polar and $-SO_3^-$	●	●			
EVOLUTE WCX	Non-polar and $-COO^-$/-COOH	●		●		
EVOLUTE AX	Non-polar and $-N(CH_3)_3^+$	●			●	
EVOLUTE WAX	Non-polar and $-NH_3^+$/$-NH_2$	●				●

Table 1. Summary of EVOLUTE family functionality ● primary interaction ● secondary interaction

EVOLUTE Extract purity

EVOLUTE SPE sorbents are manufactured with a very narrow pore size distribution (see **Figure 2**). Pore size optimization dramatically reduces protein contamination in extracts of biological fluids as illustrated (see **Figure 3**). Such removal or reduction of protein contamination from sample extracts avoids their transfer into the analytical system thus reducing matrix effects in LC-MS analysis. Additionally, increased back pressure in UPLC systems due to protein contamination is eliminated, avoiding the need for column back flushing and / or frequent replacement of guard columns.

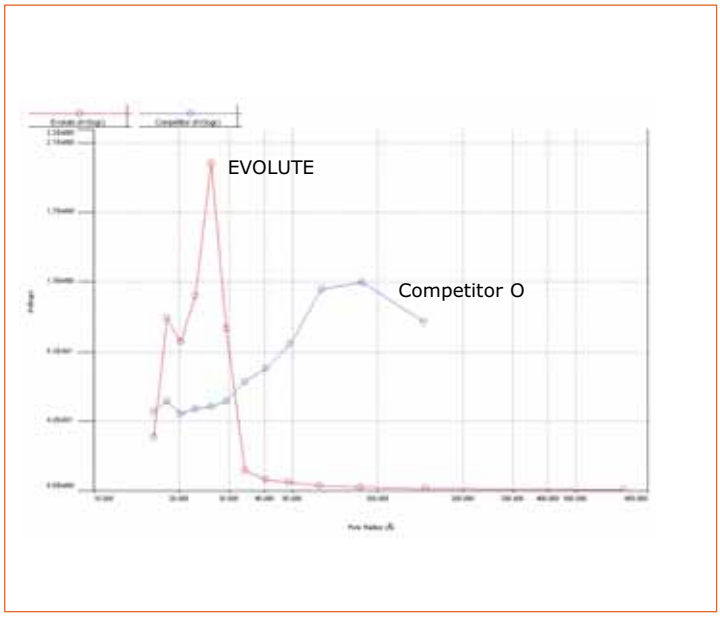


Figure 2. Pore size distribution of EVOLUTE ABN compared with a competitor product. Note the tight distribution of pore size in the 15–40 µm range relative to the broad distribution of the competitor product.

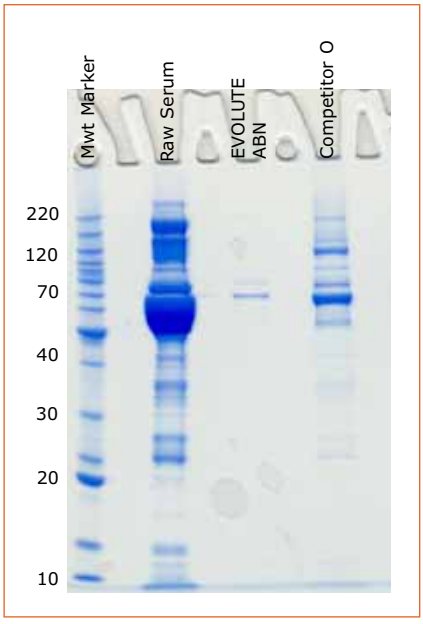


Figure 3. Gel electrophoresis image showing protein removal using the EVOLUTE ABN generic method.

Method development using EVOLUTE SPE sorbents

EVOLUTE SPE products and methods can be used to extract many compound classes, either singly or as multiple analytes, from aqueous samples using either non-polar (hydrophobic) or mixed-mode SPE.

Analyte Functionality	EVOLUTE sorbent selection				
	ABN	CX	WCX	AX	WAX
Neutral	●				
Weakly acidic pK_a 2–8	○			●	
Strongly acidic pK_a<2	○				●
Weakly basic pK_a 2–10	○	●			
Strongly basic pK_a>10	○		●		
Amphoteric	○	●		●	
Acidic, neutral, basic mix	●				
Fractionation acidic/neutral/basic		●			

Table 2. EVOLUTE sorbent selection ● First choice ○ Alternative

Method development using EVOLUTE SPE products is fast and simple. Generic procedures for each sorbent and a wealth of optimization tips are described in the comprehensive EVOLUTE User Guide. Download the EVOLUTE User Guide from biotage.com.

EVOLUTE applications

The EVOLUTE SPE family has been successfully used for extraction of a wide range of analytes from many matrices, including plasma, urine, whole blood, water, milk and tissue extracts.

We are continually developing new applications using EVOLUTE SPE products. Visit the applications database (**www.biotage.com/applications**) to find the latest information.

Part number	Description	Quantity
Fixed Well Plates		
EVOLUTE ABN		
600-0010-P01	EVOLUTE ABN 10 mg Fixed Well Plate	1
600-0025-P01	EVOLUTE ABN 25 mg Fixed Well Plate	1
EVOLUTE CX		
601-0010-P01	EVOLUTE CX 10 mg Fixed Well Plate	1
601-0025-P01	EVOLUTE CX 25 mg Fixed Well Plate	1
EVOLUTE WCX		
602-0010-P01	EVOLUTE WCX 10 mg Fixed Well Plate	1
602-0025-P01	EVOLUTE WCX 25 mg Fixed Well Plate	1
EVOLUTE AX		
603-0010-P01	EVOLUTE AX 10 mg Fixed Well Plate	1
603-0025-P01	EVOLUTE AX 25 mg Fixed Well Plate	1
EVOLUTE WAX		
604-0010-P01	EVOLUTE WAX 10 mg Fixed Well Plate	1
604-0025-P01	EVOLUTE WAX 25 mg Fixed Well Plate	1
EVOLUTE Array Pre-Filled 96-well Plates		
EVOLUTE ABN		
600-0010-RP	EVOLUTE Array ABN 10 mg/1 mL Plate	1
600-0025-RP	EVOLUTE Array ABN 25 mg/1 mL Plate	1
EVOLUTE CX		
601-0010-RP	EVOLUTE Array CX 10 mg/1 mL Plate	1
601-0025-RP	EVOLUTE Array CX 25 mg/1 mL Plate	1
EVOLUTE Array Loose Wells		
EVOLUTE ABN		
600-0010-R	EVOLUTE Array ABN 10 mg Wells	100
600-0025-R	EVOLUTE Array ABN 25 mg Wells	100
EVOLUTE CX		
601-0010-R	EVOLUTE Array CX 10 mg/1 mL Wells	100
601-0025-R	EVOLUTE Array CX 25 mg/1 mL Wells	100
EVOLUTE WCX		
602-0025-R	EVOLUTE Array WCX 25 mg/1 mL Wells	100
EVOLUTE AX		
603-0025-R	EVOLUTE Array AX 25 mg/1 mL Wells	100
EVOLUTE WAX		
604-0025-R	EVOLUTE Array WAX 25 mg/1mL Wells	100

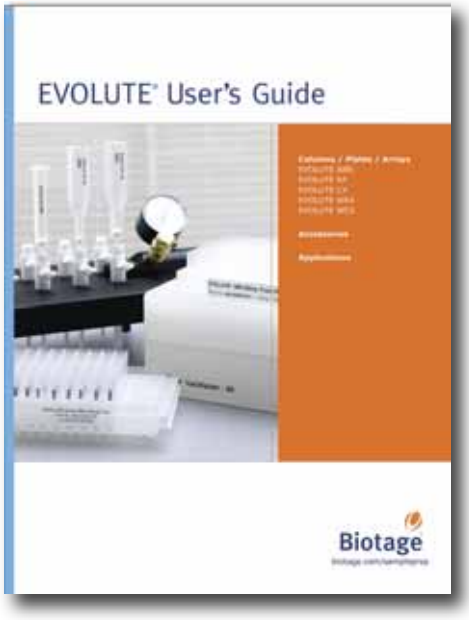
Part number	Description	Quantity
SPE Columns		
EVOLUTE ABN		
600-0001-A	EVOLUTE ABN 10 mg/1 mL	100
600-0002-A	EVOLUTE ABN 25 mg/1 mL	100
600-0002-AG	EVOLUTE ABN 25 mg/1 mL (Tabless)*	100
600-0002-B	EVOLUTE ABN 25 mg /3 mL	50
600-0002-H	EVOLUTE ABN 25 mg/10 mL XL	50
610-0005-B	EVOLUTE ABN 50 mg/3 mL	50
610-0005-BG	EVOLUTE ABN 50 mg/3 mL (Tabless)*	50
610-0010-B	EVOLUTE ABN 100 mg/3 mL	50
610-0010-H	EVOLUTE ABN 100 mg/10 mL XL	50
610-0020-B	EVOLUTE ABN 200 mg/3 mL	50
610-0020-C	EVOLUTE ABN 200 mg/6 mL	30
610-0050-C	EVOLUTE ABN 500 mg/6 mL	30
EVOLUTE CX		
601-0001-A	EVOLUTE CX 10 mg/1 mL	100
601-0001-AG	EVOLUTE CX 10 mg/1 mL (Tabless)*	100
601-0002-A	EVOLUTE CX 25 mg/1 mL	100
601-0002-AG	EVOLUTE CX 25 mg/1 mL (Tabless)*	100
611-0005-B	EVOLUTE CX 50 mg/3 mL	50
611-0005-BG	EVOLUTE CX 50 mg/3 mL (Tabless)*	50
611-0010-B	EVOLUTE CX 100 mg/3 mL	50
611-0010-BG	EVOLUTE CX 100 mg/3 mL (Tabless)*	50
611-0010-H	EVOLUTE CX 100 mg/10 mL XL	50
611-0020-B	EVOLUTE CX 200 mg/3 mL	50
611-0020-C	EVOLUTE CX 200 mg/6 mL	30
611-0050-C	EVOLUTE CX 500 mg/6 mL	30
611-0050-CG	EVOLUTE CX 500 mg/6 mL (Tabless)*	30
EVOLUTE WCX		
602-0002-A	EVOLUTE WCX 25 mg/1 mL	100
612-0005-B	EVOLUTE WCX 50 mg/3 mL	50
612-0010-B	EVOLUTE WCX 100 mg/3 mL	50
612-0010-H	EVOLUTE WCX 100 mg/3 mL XL	50
612-0020-C	EVOLUTE WCX 200 mg/6 mL	30
612-0050-C	EVOLUTE WCX 500 mg/6 mL	30
EVOLUTE AX		
603-0002-A	EVOLUTE AX 25 mg/1 mL	100
603-0002-AG	EVOLUTE AX 25 mg/1 mL (Tabless)*	100
613-0005-B	EVOLUTE AX 50 mg/3 mL	50
613-0010-B	EVOLUTE AX 100 mg/3 mL	50
613-0010-BG	EVOLUTE AX 100 mg/3 mL (Tabless)*	50
613-0010-H	EVOLUTE AX 100 mg/10 mL XL	50
613-0020-C	EVOLUTE AX 200 mg/6 mL	30
613-0050-C	EVOLUTE AX 500 mg/6 mL	30
613-0050-CG	EVOLUTE AX 500 mg/6 mL (Tabless)*	30
EVOLUTE WAX		
604-0002-A	EVOLUTE WAX 25 mg/1 mL	100
614-0005-B	EVOLUTE WAX 50 mg/3 mL	50
614-0010-B	EVOLUTE WAX 100 mg/3 mL	50
614-0010-H	EVOLUTE WAX 100 mg/10 mL XL	50
614-0020-C	EVOLUTE WAX 200 mg/6 mL	30
614-0050-C	EVOLUTE WAX 500 mg/6 mL	30

*Tabless columns for use with Pressure+ Positive Pressure Manifolds and other automated SPE systems.
Other tabless columns are available, contact Biotage for details.

Applications

Application number	Analyte	Matrix	Format	Part number	Industry	Page
AN702	Basic Drugs	Plasma	EVOLUTE CX, 25 mg fixed well plate	601-0025-P01	Bioanalytical	25
AN739	Catecholamines	Plasma	EVOLUTE WCX, 50 mg/3 mL column	612-0005-B	Clinical	26
AN745	Catecholamines	Plasma	EVOLUTE WCX, 25 mg fixed well plate	602-0025-P01	Clinical	25
AN719	Cocaine and metabolites	Biological fluids	EVOLUTE CX, 25 mg fixed well plate	601-0025-P01	Forensic	25
AN700	Diuretics	Urine	EVOLUTE ABN, 50 µm, 100 mg/10 mL column	610-0010-H	Clinical	26
AN718	Ethyl Glucuronide (EtG)	Urine	EVOLUTE AX, 25 mg fixed well plate and other formats	603-0025-P01	Forensic	25
AN733	Melamine	Biological fluids	EVOLUTE CX, 50 mg/3 mL column	611-0005-B	Clinical	26
AN732	Melamine	Milk	EVOLUTE CX, 50 mg/3 mL column	611-0005-B	Food	26
AN743	Mephedrone	Biological fluids	EVOLUTE CX, 25 mg fixed well plate	601-0025-P01	Forensic	25
AN737	Organophosphate Pesticide Metabolites	Urine	EVOLUTE WAX, 25 mg fixed well plate	604-0025-P01	Clinical	25
AN701	Pharmaceuticals	Water	EVOLUTE ABN, 50 µm 200 mg/6 mL column	610-0020-C	Environmental	25

Visit the Sample Preparation Application Database at **www.biotage.com/applications**



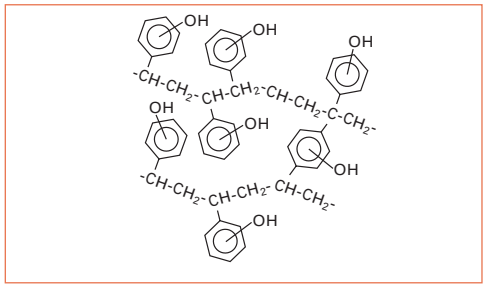
A comprehensive user guide is available detailing EVOLUTE generic methods, along with practical advice on method optimization and robust application development. To request a copy visit **www.biotage.com**


ISOLUTE-96
C18
25mg
VacMaster - 96

ISOLUTE® SPE Columns and 96-well Plates

For Extract Purity and High Analyte Recovery

ISOLUTE ENV+
Hydroxylated Polystyrene Divinylbenzene



Chemical structure of ISOLUTE ENV+, a hydroxylated polystyrene divinylbenzene co-polymer

Applications

Matrix	Analytes	Retention Mechanism
Aqueous	Wide polarity range	Primary: Non-polar

Ordering Information

ISOLUTE ENV+ SPE Columns

Part number	Description	Quantity
915-0001-A	ISOLUTE ENV+ 10 mg/1 mL	100
915-0002-A	ISOLUTE ENV+ 25 mg/1 mL	100
915-0002-G	ISOLUTE ENV+ 25 mg/10 mL	50
915-0005-A	ISOLUTE ENV+ 50 mg/1 mL	100
915-0005-AG	ISOLUTE ENV+ 50 mg/1 mL (Tabless)*	100
915-0005-B	ISOLUTE ENV+ 50 mg/3 mL	50
915-0005-G	ISOLUTE ENV+ 50 mg/10 mL	50
915-0010-A	ISOLUTE ENV+ 100 mg/1 mL	100
915-0010-B	ISOLUTE ENV+ 100 mg/3 mL	50
915-0010-BG	ISOLUTE ENV+ 100 mg/3 mL (Tabless)*	50
915-0010-C	ISOLUTE ENV+ 100 mg/6 mL	30
915-0010-H	ISOLUTE ENV+ 100 mg/10 mL	50
915-0020-B	ISOLUTE ENV+ 200 mg/3 mL	50
915-0020-C	ISOLUTE ENV+ 200 mg/6 mL	30
915-0050-B	ISOLUTE ENV+ 500 mg/3 mL	50
915-0050-BG	ISOLUTE ENV+ 500 mg/3 mL (Tabless)*	50
915-0050-C	ISOLUTE ENV+ 500 mg/6 mL	30
915-0100-C	ISOLUTE ENV+ 1 g/6 mL	30
915-0100-CG	ISOLUTE ENV+ 1 g/6 mL (Tabless)*	30
915-0100-E	ISOLUTE ENV+ 1 g/15 mL	20

ISOLUTE-96 ENV+ Fixed Well Plates

Part number	Description	Quantity
915-0010-P01	ISOLUTE-96 ENV+ 10 mg plate	1
915-0025-P01	ISOLUTE-96 ENV+ 25 mg plate	1
915-0050-P01	ISOLUTE-96 ENV+ 50 mg plate	1

ISOLUTE Array ENV+ Loose Wells

Part number	Description	Quantity
915-0010-R	ISOLUTE Array ENV+ 10 mg/1 mL wells	100
915-0025-R	ISOLUTE Array ENV+ 25 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

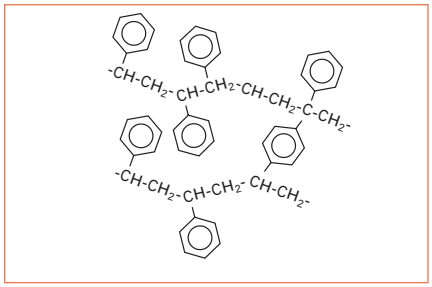
TN109: Method Development in Solid Phase Extraction using ISOLUTE ENV+ SPE Columns for the Extraction of Aqueous Samples

See **pages 156** and **157** for additional technical information about ISOLUTE ENV+

*Tabless columns for use with Pressure+ Positive Pressure Manifolds and other automated SPE systems.
Other tabless columns are available, contact Biotage for details.

Applications

Matrix	Analytes	Retention Mechanism
Aqueous	Wide polarity range	Primary: Non-polar



Chemical structure of ISOLUTE 101, an unmodified polystyrene divinylbenzene co-polymer

Ordering Information

ISOLUTE 101 SPE Columns

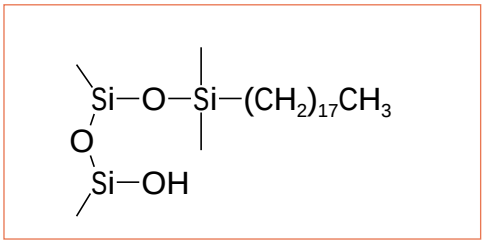
Part number	Description	Quantity
101-0010-B	ISOLUTE 101 100 mg/3 mL	50
101-0020-B	ISOLUTE 101 200 mg/3 mL	50
101-0020-C	ISOLUTE 101 200 mg/6 mL	30
101-0050-B	ISOLUTE 101 500 mg/3 mL	50
101-0050-C	ISOLUTE 101 500 mg/6 mL	30

Support Documents

TN119: Method Development in Solid Phase Extraction using ISOLUTE 101 SPE Columns for the Extraction of Aqueous Samples

See **pages 156** and **157** for additional technical information about ISOLUTE 101

ISOLUTE C18
Octadecyl (non-endcapped)



Chemical structure of C18 silane covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Wide polarity range	Primary: Non-polar
		Secondary: Polar and weak cation exchange

Ordering Information

ISOLUTE C18 SPE Columns

Part number	Description	Quantity
220-0002-A	ISOLUTE C18 25 mg/1 mL	100
220-0002-AG	ISOLUTE C18 25 mg/1 mL (Tabless)*	100
220-0005-A	ISOLUTE C18 50 mg/1 mL	100
220-0005-G	ISOLUTE C18 50 mg/10 mL	50
220-0010-A	ISOLUTE C18 100 mg/1 mL	100
220-0010-B	ISOLUTE C18 100 mg/3 mL	50
220-0010-BG	ISOLUTE C18 100 mg/3 mL (Tabless)*	50
220-0010-G	ISOLUTE C18 100 mg/10 mL	50
220-0020-B	ISOLUTE C18 200 mg/3 mL	50
220-0020-H	ISOLUTE C18 200 mg/10 mL	50
220-0050-B	ISOLUTE C18 500 mg/3 mL	50
220-0050-BG	ISOLUTE C18 500 mg/3 mL (Tabless)*	50
220-0050-C	ISOLUTE C18 500 mg/6 mL	30
220-0050-H	ISOLUTE C18 500 mg/10 mL	50
220-0100-B	ISOLUTE C18 1 g/3 mL	50
220-0100-C	ISOLUTE C18 1 g/6 mL	30
220-0100-CG	ISOLUTE C18 1 g/6 mL (Tabless)*	30
220-0200-C	ISOLUTE C18 2 g/6 mL	30
220-0200-D	ISOLUTE C18 2 g/15 mL	20
220-0500-E	ISOLUTE C18 5 g/25 mL	20
220-1000-F	ISOLUTE C18 10 g/70 mL	16

ISOLUTE-96 C18 Fixed Well Plates

Part number	Description	Quantity
220-0025-P01	ISOLUTE-96 C18 25 mg plate	1
220-0050-P01	ISOLUTE-96 C18 50 mg plate	1
220-0100-P01	ISOLUTE-96 C18 100 mg plate	1

ISOLUTE Array C18 Loose Wells

Part number	Description	Quantity
220-0025-R	ISOLUTE Array C18 25 mg/1 mL wells	100
220-0050-R	ISOLUTE Array C18 50 mg/1 mL wells	100
220-0100-T	ISOLUTE Array C18 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

TN112: General Approach to the Extraction of Basic Drugs from Biological Fluids using Non-polar Non-endcapped Sorbents

TN126: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Drugs from Biological Fluid Samples

See **pages 156** and **157** for additional technical information about ISOLUTE C18

*Tabless columns for use with Pressure+ Positive Pressure Manifolds and other automated SPE systems.
Other tabless columns are available, contact Biotage for details.

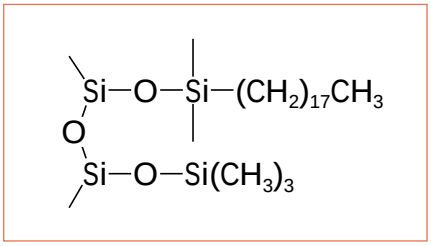
ISOLUTE C18(EC)

Octadecyl (endcapped

Applications

Matrix	Analytes	Retention Mechanism*
Aqueous	Wide polarity range	Primary: Non-polar

*Endcapped sorbent to minimize secondary silanol interactions



Chemical structure of C18 silane and trimethyl silyl group covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE C18(EC) SPE Columns

Part number	Description	Quantity
221-0002-A	ISOLUTE C18(EC) 25 mg/1 mL	100
221-0005-A	ISOLUTE C18(EC) 50 mg/1 mL	100
221-0005-G	ISOLUTE C18(EC) 50 mg/10 mL	50
221-0010-A	ISOLUTE C18(EC) 100 mg/1 mL	100
221-0010-B	ISOLUTE C18(EC) 100 mg/3 mL	50
221-0010-G	ISOLUTE C18(EC) 100 mg/10 mL	50
221-0020-B	ISOLUTE C18(EC) 200 mg/3 mL	50
221-0020-H	ISOLUTE C18(EC) 200 mg/10 mL	50
221-0050-B	ISOLUTE C18(EC) 500 mg/3 mL	50
221-0050-C	ISOLUTE C18(EC) 500 mg/6 mL	30
221-0050-H	ISOLUTE C18(EC) 500 mg/10 mL	50
221-0100-B	ISOLUTE C18(EC) 1 g/3 mL	50
221-0100-C	ISOLUTE C18(EC) 1 g/6 mL	30
221-0200-C	ISOLUTE C18(EC) 2 g/6 mL	30
221-0200-D	ISOLUTE C18(EC) 2 g/15 mL	20
221-0500-E	ISOLUTE C18(EC) 5 g/25 mL	20
221-1000-F	ISOLUTE C18(EC) 10 g/70 mL	16

ISOLUTE-96 C18(EC) Fixed Well Plates

Part number	Description	Quantity
221-0025-P01	ISOLUTE-96 C18(EC) 25 mg plate	1
221-0050-P01	ISOLUTE-96 C18(EC) 50 mg plate	1
221-0100-P01	ISOLUTE-96 C18(EC) 100 mg plate	1

ISOLUTE Array C18(EC) Loose Wells

Part number	Description	Quantity
221-0025-R	ISOLUTE Array C18(EC) 25 mg/1 mL wells	100
221-0050-R	ISOLUTE Array C18(EC) 50 mg/1 mL wells	100
221-0100-T	ISOLUTE Array C18(EC) 100 mg/2 mL wells	100

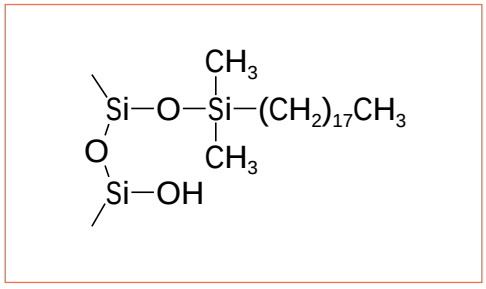
Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

See **pages 156** and **157** for additional technical information about ISOLUTE C18(EC)

ISOLUTE MFC18
Octadecyl (non-endcapped)



Chemical structure of monofunctional C18 silane covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Wide polarity range	Primary: Non-polar
		Secondary: Polar and weak cation exchange

Ordering Information

ISOLUTE MFC18 SPE Columns

Part number	Description	Quantity
240-0005-A	ISOLUTE MFC18 50 mg/1 mL	100
240-0005-G	ISOLUTE MFC18 50 mg/10 mL	50
240-0010-A	ISOLUTE MFC18 100 mg/1 mL	100
240-0010-B	ISOLUTE MFC18 100 mg/3 mL	50
240-0010-G	ISOLUTE MFC18 100 mg/10 mL	50
240-0020-B	ISOLUTE MFC18 200 mg/3 mL	50
240-0020-H	ISOLUTE MFC18 200 mg/10 mL	50
240-0050-B	ISOLUTE MFC18 500 mg/3 mL	50
240-0050-C	ISOLUTE MFC18 500 mg/6 mL	30
240-0050-H	ISOLUTE MFC18 500 mg/10 mL	50
240-0100-C	ISOLUTE MFC18 1 g/6 mL	30
240-0200-D	ISOLUTE MFC18 2 g/15 mL	20
240-0500-E	ISOLUTE MFC18 5 g/25 mL	20

ISOLUTE-96 MFC18 Fixed Well Plates

Part number	Description	Quantity
240-0025-P01	ISOLUTE-96 MFC18 25 mg plate	1

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

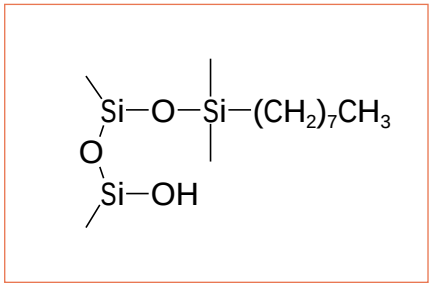
TN112: General Approach to the Extraction of Basic Drugs from Biological Fluids using Non-polar Non-endcapped Sorbents

See **pages 156** and **157** for additional technical information about ISOLUTE MFC18

ISOLUTE C8
Octyl (non-endcapped)

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Wide polarity range	Primary: Non-polar
		Secondary: Polar and weak cation exchange



Chemical structure of C8 silane covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE C8 SPE Columns

Part number	Description	Quantity
290-0002-A	ISOLUTE C8 25 mg/1 mL	100
290-0005-A	ISOLUTE C8 50 mg/1 mL	100
290-0010-A	ISOLUTE C8 100 mg/1 mL	100
290-0010-B	ISOLUTE C8 100 mg/3 mL	50
290-0020-B	ISOLUTE C8 200 mg/3 mL	50
290-0020-H	ISOLUTE C8 200 mg/10 mL	50
290-0050-B	ISOLUTE C8 500 mg/3 mL	50
290-0050-C	ISOLUTE C8 500 mg/6 mL	30
290-0100-C	ISOLUTE C8 1 g/6 mL	30
290-0200-D	ISOLUTE C8 2 g/15 mL	20

ISOLUTE-96 C8 Fixed Well Plates

Part number	Description	Quantity
290-0025-P01	ISOLUTE-96 C8 25 mg plate	1
290-0050-P01	ISOLUTE-96 C8 50 mg plate	1
290-0100-P01	ISOLUTE-96 C8 100 mg plate	1

ISOLUTE Array C8 Loose Wells

Part number	Description	Quantity
290-0025-R	ISOLUTE Array C8 25 mg/1 mL wells	100
290-0050-R	ISOLUTE Array C8 50 mg/1 mL wells	100
290-0100-T	ISOLUTE Array C8 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

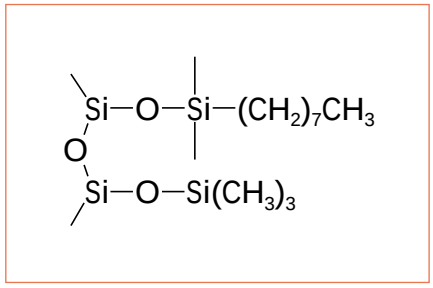
TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

TN112: General Approach to the Extraction of Basic Drugs from Biological Fluids using Non-polar Non-endcapped Sorbents

TN126: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Biological Fluid Samples

See **pages 156** and **157** for additional technical information about ISOLUTE C8

ISOLUTE C8 (EC)
Octyl (endcapped)



Chemical structure of C8 silane and trimethyl silyl group covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanism*
Aqueous	Wide polarity range	Primary: Non-polar

*Endcapped sorbent to minimize secondary silanol interactions

Ordering Information

ISOLUTE C8(EC) SPE Columns

Part number	Description	Quantity
291-0010-A	ISOLUTE C8(EC) 100 mg/1 mL	100
291-0010-B	ISOLUTE C8(EC) 100 mg/3 mL	50
291-0010-G	ISOLUTE C8(EC) 100 mg/10 mL	50
291-0020-B	ISOLUTE C8(EC) 200 mg/3 mL	50
291-0020-H	ISOLUTE C8(EC) 200 mg/10 mL	50
291-0050-B	ISOLUTE C8(EC) 500 mg/3 mL	50
291-0050-C	ISOLUTE C8(EC) 500 mg/6 mL	30
291-0100-C	ISOLUTE C8(EC) 1 g/6 mL	30
291-0200-D	ISOLUTE C8(EC) 2 g/15 mL	20
291-0500-E	ISOLUTE C8(EC) 5 g/25 mL	20

ISOLUTE-96 C8(EC) Fixed Well Plates

Part number	Description	Quantity
291-0025-P01	ISOLUTE-96 C8(EC) 25 mg plate	1
291-0050-P01	ISOLUTE-96 C8(EC) 50 mg plate	1
291-0100-P01	ISOLUTE-96 C8(EC) 100 mg plate	1

ISOLUTE Array C8(EC) Loose Wells

Part number	Description	Quantity
291-0025-R	ISOLUTE Array C8(EC) 25 mg/1 mL wells	100

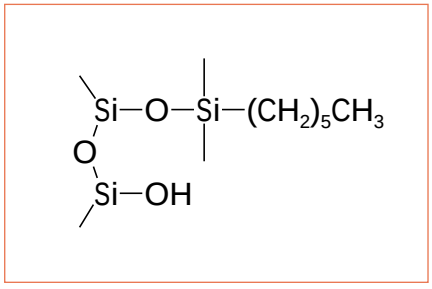
Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

See **pages 156** and **157** for additional technical information about ISOLUTE C8(EC)

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Wide polarity range	Primary: Non-polar
		Secondary: Polar and weak cation exchange



Chemical structure of C6 silane covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE C6 SPE Columns

Part number	Description	Quantity
380-0010-A	ISOLUTE C6 100 mg/1 mL	100
380-0010-B	ISOLUTE C6 100 mg/3 mL	50
380-0020-B	ISOLUTE C6 200 mg/3 mL	50
380-0050-B	ISOLUTE C6 500 mg/3 mL	50
380-0050-C	ISOLUTE C6 500 mg/ 6 mL	30
380-0100-C	ISOLUTE C6 1 g/6 mL	30

ISOLUTE-96 C6 Fixed Well Plates

Part number	Description	Quantity
380-0025-P01	ISOLUTE-96 C6 25 mg plate	1

ISOLUTE Array C6 Loose Wells

Part number	Description	Quantity
380-0025-R	ISOLUTE Array C6 25 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

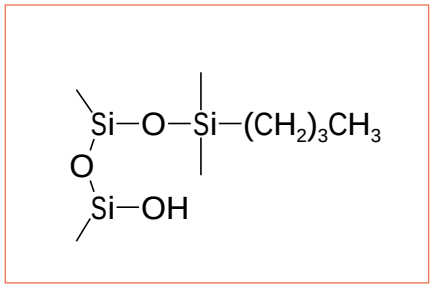
Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

TN112: General Approach to the Extraction of Basic Drugs from Biological Fluids using Non-polar Non-endcapped Sorbents

See **pages 156** and **157** for additional technical information about ISOLUTE C6

ISOLUTE C4
Butyl (non-endcapped)



Chemical structure of C4 silane covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Wide polarity range	Primary: Non-polar
		Secondary: Polar and weak cation exchange

Ordering Information

ISOLUTE C4 SPE Columns

Part number	Description	Quantity
390-0010-A	ISOLUTE C4 100 mg/1 mL	100
390-0010-B	ISOLUTE C4 100 mg/3 mL	50
390-0020-B	ISOLUTE C4 200 mg/3 mL	50
390-0050-B	ISOLUTE C4 500 mg/3 mL	50
390-0050-C	ISOLUTE C4 500 mg/6 mL	30
390-0100-C	ISOLUTE C4 1 g/6 mL	30

ISOLUTE-96 C4 Fixed Well Plates

Part number	Description	Quantity
390-0025-P01	ISOLUTE-96 C4 25 mg plate	1

ISOLUTE Array C4 Loose Wells

Part number	Description	Quantity
390-0025-R	ISOLUTE Array C4 25 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

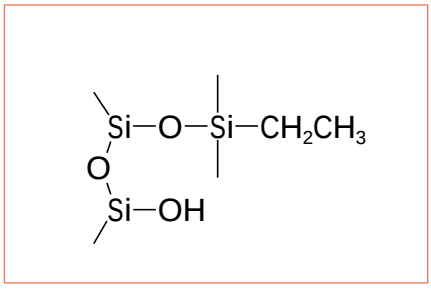
TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

TN112: General Approach to the Extraction of Basic Drugs from Biological Fluids using Non-polar Non-endcapped Sorbents

See **pages 158** and **159** for additional technical information about ISOLUTE C4

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Wide polarity range	Primary: Non-polar
		Secondary: Polar and weak cation exchange



Chemical structure of C2 silane covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE C2 SPE Columns

Part number	Description	Quantity
320-0002-A	ISOLUTE C2 25 mg/1 mL	100
320-0005-A	ISOLUTE C2 50 mg/1 mL	100
320-0010-A	ISOLUTE C2 100 mg/1 mL	100
320-0010-B	ISOLUTE C2 100 mg/3 mL	50
320-0010-G	ISOLUTE C2 100 mg/10 mL	50
320-0020-B	ISOLUTE C2 200 mg/3 mL	50
320-0050-B	ISOLUTE C2 500 mg/3 mL	50
320-0050-C	ISOLUTE C2 500 mg/6 mL	30
320-0100-C	ISOLUTE C2 1 g/6 mL	30
320-0200-D	ISOLUTE C2 2 g/15 mL	20

ISOLUTE-96 C2 Fixed Well Plates

Part number	Description	Quantity
320-0025-P01	ISOLUTE-96 C2 25 mg plate	1
320-0050-P01	ISOLUTE-96 C2 50 mg plate	1
320-0100-P01	ISOLUTE-96 C2 100 mg plate	1

ISOLUTE Array C2 Loose Wells

Part number	Description	Quantity
320-0025-R	ISOLUTE Array C2 25 mg/1 mL wells	100
320-0050-R	ISOLUTE Array C2 50 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

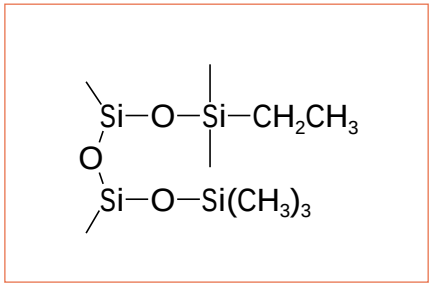
TN112: General Approach to the Extraction of Basic Drugs from Biological Fluids using Non-polar Non-endcapped Sorbents

TN126: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Biological Fluid Samples

See **pages 158** and **159** for additional technical information about ISOLUTE C2

ISOLUTE C2(EC)

Ethyl (endcapped)



Chemical structure of C2 silane and trimethyl silyl group covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanism*
Aqueous	Wide polarity range	Primary: Non-polar

*Endcapped sorbent to minimize secondary silanol interactions

Ordering Information

ISOLUTE C2(EC) SPE Columns

Part number	Description	Quantity
321-0005-A	ISOLUTE C2(EC) 50 mg/1 mL	100
321-0010-A	ISOLUTE C2(EC) 100 mg/1 mL	100
321-0010-B	ISOLUTE C2(EC) 100 mg/3 mL	50
321-0010-G	ISOLUTE C2(EC) 100 mg/10 mL	50
321-0020-B	ISOLUTE C2(EC) 200 mg/3 mL	50
321-0050-B	ISOLUTE C2(EC) 500 mg/3 mL	50
321-0050-C	ISOLUTE C2(EC) 500 mg/6 mL	30
321-0050-H	ISOLUTE C2(EC) 500 mg/10 mL	50
321-0100-C	ISOLUTE C2(EC) 1 g/6 mL	30

ISOLUTE-96 C2(EC) Fixed Well Plates

Part number	Description	Quantity
321-0025-P01	ISOLUTE-96 C2(EC) 25 mg plate	1

ISOLUTE Array C2(EC) Loose Wells

Part number	Description	Quantity
321-0025-R	ISOLUTE Array C2(EC) 25 mg/1 mL wells	100
321-0050-R	ISOLUTE Array C2(EC) 50 mg/1 mL wells	100
321-0100-T	ISOLUTE Array C2(EC) 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

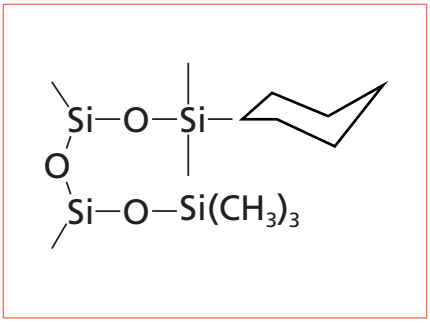
See **pages 158** and **159** for additional technical information about ISOLUTE C2(EC)

ISOLUTE CH(EC)
Cyclohexyl (endcapped)

Applications

Matrix	Analytes	Retention Mechanism*
Aqueous	Wide polarity range	Primary: Non-polar

*Endcapped sorbent to minimize secondary silanol interactions



Chemical structure of cyclohexyl silane and trimethyl silyl group covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE CH(EC) SPE Columns

Part number	Description	Quantity
351-0010-A	ISOLUTE CH(EC) 100 mg/1 mL	100
351-0010-B	ISOLUTE CH(EC) 100 mg/3 mL	50
351-0020-B	ISOLUTE CH(EC) 200 mg/3 mL	50
351-0050-B	ISOLUTE CH(EC) 500 mg/3 mL	50
351-0050-C	ISOLUTE CH(EC) 500 mg/6 mL	30
351-0050-H	ISOLUTE CH(EC) 500 mg/10 mL	50
351-0100-C	ISOLUTE CH(EC) 1 g/6 mL	30

ISOLUTE Array CH(EC) Loose Wells

Part number	Description	Quantity
351-0025-R	ISOLUTE Array CH(EC) 25 mg/1 mL wells	100

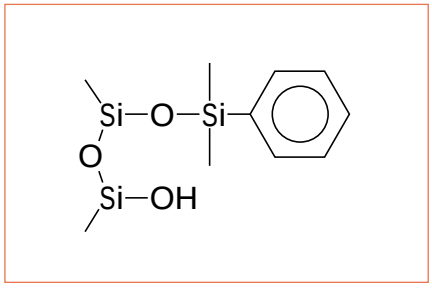
Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

See **pages 158** and **159** for additional technical information about ISOLUTE CH(EC)

ISOLUTE PH
Phenyl (non-endcapped)



Chemical structure of phenyl silane covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Wide polarity range	Primary: Non-polar
		Secondary: Polar and weak cation exchange

Ordering Information

ISOLUTE PH SPE Columns

Part number	Description	Quantity
360-0002-A	ISOLUTE PH 25 mg/1 mL	100
360-0005-A	ISOLUTE PH 50 mg/1 mL	100
360-0010-A	ISOLUTE PH 100 mg/1 mL	100
360-0010-B	ISOLUTE PH 100 mg/3 mL	50
360-0050-B	ISOLUTE PH 500 mg/3 mL	50
360-0050-C	ISOLUTE PH 500 mg/6 mL	30
360-0100-C	ISOLUTE PH 1 g/6 mL	30

ISOLUTE-96 PH Fixed Well Plates

Part number	Description	Quantity
360-0025-P01	ISOLUTE-96 PH 25 mg plate	1
360-0050-P01	ISOLUTE-96 PH 50 mg plate	1
360-0100-P01	ISOLUTE-96 PH 100 mg plate	1

ISOLUTE Array PH Loose Wells

Part number	Description	Quantity
360-0025-R	ISOLUTE Array PH 25 mg/1 mL wells	100
360-0050-R	ISOLUTE Array PH 50 mg/1 mL wells	100
360-0100-T	ISOLUTE Array PH 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

TN112: General Approach to the Extraction of Basic Drugs from Biological Fluids using Non-polar Non-endcapped Sorbents

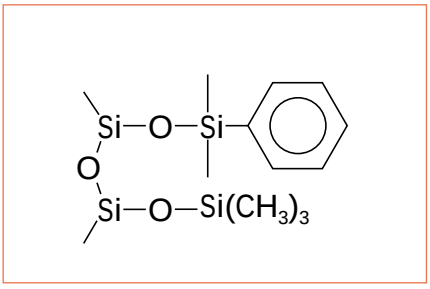
See **pages 158** and **159** for additional technical information about ISOLUTE PH

ISOLUTE PH(EC)
Phenyl (endcapped)

Applications

Matrix	Analytes	Retention Mechanism*
Aqueous	Wide polarity range	Primary: Non-polar

*Endcapped sorbent to minimize secondary silanol interactions



Chemical structure of phenyl silane and trimethyl silyl group covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE PH(EC) SPE Columns

Part number	Description	Quantity
361-0005-A	ISOLUTE PH(EC) 50 mg/1 mL	100
361-0010-A	ISOLUTE PH(EC) 100 mg/1 mL	100
361-0010-B	ISOLUTE PH(EC) 100 mg/3 mL	50
361-0020-B	ISOLUTE PH(EC) 200 mg/3 mL	50
361-0050-B	ISOLUTE PH(EC) 500 mg/3 mL	50
361-0050-C	ISOLUTE PH(EC) 500 mg/6 mL	30
361-0100-C	ISOLUTE PH(EC) 1 g/6 mL	30

ISOLUTE-96 PH(EC) Fixed Well Plates

Part number	Description	Quantity
361-0025-P01	ISOLUTE-96 PH(EC) 25 mg plate	1

ISOLUTE Array PH(EC) Loose Wells

Part number	Description	Quantity
361-0025-R	ISOLUTE Array PH(EC) 25 mg/1 mL wells	100
361-0050-R	ISOLUTE Array PH(EC) 50 mg/1 mL wells	100

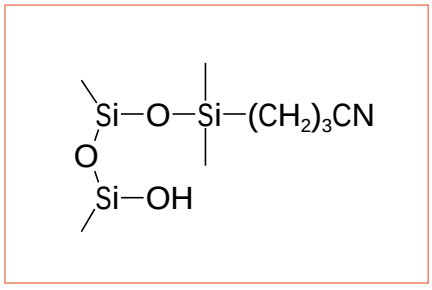
Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

See **pages 158** and **159** for additional technical information about ISOLUTE PH(EC)

ISOLUTE CN
Cyanopropyl (non-endcapped)



Chemical structure of cyanopropyl silane covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Non-polar	Polar	Primary: Polar
Aqueous	Wide polarity range	Primary: Non-polar
		Secondary: Weak cation exchange

Ordering Information

ISOLUTE CN SPE Columns

Part number	Description	Quantity
420-0010-A	ISOLUTE CN 100 mg/1 mL	100
420-0010-B	ISOLUTE CN 100 mg/3 mL	50
420-0020-B	ISOLUTE CN 200 mg/3 mL	50
420-0050-B	ISOLUTE CN 500 mg/3 mL	50
420-0050-C	ISOLUTE CN 500 mg/6 mL	30
420-0100-C	ISOLUTE CN 1 g/6 mL	30

ISOLUTE-96 CN Fixed Well Plates

Part number	Description	Quantity
420-0025-P01	ISOLUTE-96 CN 25 mg plate	1
420-0100-P01	ISOLUTE-96 CN 100 mg plate	1

ISOLUTE Array CN Loose Wells

Part number	Description	Quantity
420-0025-R	ISOLUTE Array CN 25 mg/1 mL wells	100
420-0100-T	ISOLUTE Array CN 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

TN102: Method Development in Solid Phase Extraction using Polar ISOLUTE SPE Columns for the Extraction of Non-aqueous Samples

TN112: General Approach to the Extraction of Basic Drugs from Biological Fluids using Non-polar Non-endcapped Sorbents

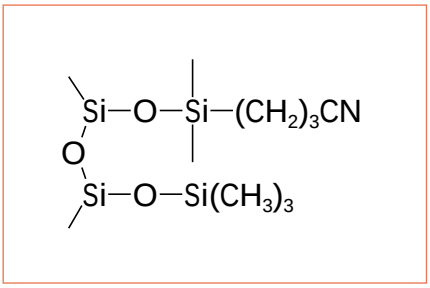
See **pages 158** and **159** for additional technical information about ISOLUTE CN

ISOLUTE CN(EC)
Cyanopropyl (endcapped)

Applications

Matrix	Analytes	Retention Mechanisms
Non-polar	Polar	Primary: Polar
Aqueous	Wide polarity range	Primary: Non-polar

*Endcapped sorbent to minimize secondary silanol interactions



Chemical structure of cyanopropyl silane and trimethyl silyl group covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE CN(EC) SPE Columns

Part number	Description	Quantity
421-0005-A	ISOLUTE CN(EC) 50 mg/1 mL	100
421-0010-A	ISOLUTE CN(EC) 100 mg/1 mL	100
421-0010-B	ISOLUTE CN(EC) 100 mg/3 mL	50
421-0020-B	ISOLUTE CN(EC) 200 mg/3 mL	50
421-0050-B	ISOLUTE CN(EC) 500 mg/3 mL	50
421-0100-C	ISOLUTE CN(EC) 1 g/6 mL	30

ISOLUTE-96 CN(EC) Fixed Well Plates

Part number	Description	Quantity
421-0025-P01	ISOLUTE-96 CN(EC) 25 mg plate	1

ISOLUTE Array CN(EC) Loose Wells

Part number	Description	Quantity
421-0025-R	ISOLUTE Array CN(EC) 25 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

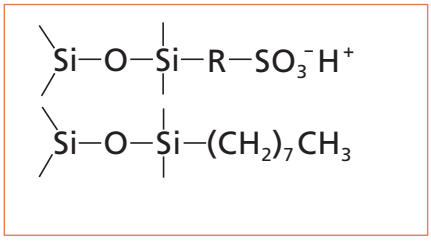
TN101: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Aqueous Samples

TN102: Method Development in Solid Phase Extraction using Polar ISOLUTE SPE columns for the Extraction of Non-aqueous Samples

TN126: Method Development in Solid Phase Extraction using Non-polar ISOLUTE SPE Columns for the Extraction of Biological Fluid Samples

See **pages 158** and **159** for additional technical information about ISOLUTE CN(EC)

ISOLUTE HCX
Octyl and Sulfonic Acid



ISOLUTE HCX combines C8 (Octyl) and sulfonic acid functionalities

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Non-polar and Cationic	Primary: Non-polar* and strong cation exchange

* ISOLUTE HCX has increased non-polar character compared with ISOLUTE HCX-5 and reduced non-polar character compared with ISOLUTE HCX-3

Ordering Information

ISOLUTE HCX SPE Columns

Part number	Description	Quantity
902-0002-A	ISOLUTE HCX 25 mg/1 mL	100
902-0002-AG	ISOLUTE HCX 25 mg/1 mL (Tabless)*	100
902-0005-A	ISOLUTE HCX 50 mg/1 mL	100
902-0010-A	ISOLUTE HCX 100 mg/1 mL	100
902-0010-B	ISOLUTE HCX 100 mg/3 mL	50
902-0013-A	ISOLUTE HCX 130 mg/1 mL	100
902-0013-B	ISOLUTE HCX 130 mg/3 mL	50
902-0013-BG	ISOLUTE HCX 130 mg/3 mL (Tabless)*	50
902-0013-C	ISOLUTE HCX 130 mg/6 mL	30
902-0013-CG	ISOLUTE HCX 130 mg/6 mL (Tabless)*	30
902-0013-H	ISOLUTE HCX 130 mg/10 mL	50
902-0020-B	ISOLUTE HCX 200 mg/3 mL	50
902-0020-H	ISOLUTE HCX 200 mg/10 mL	50
902-0030-B	ISOLUTE HCX 300 mg/3 mL	50
902-0030-C	ISOLUTE HCX 300 mg/6 mL	30
902-0030-CG	ISOLUTE HCX 300 mg/6 mL (Tabless)*	30
902-0030-H	ISOLUTE HCX 300 mg/10 mL	30

ISOLUTE-96 HCX Fixed Well Plates

Part number	Description	Quantity
902-0025-P01	ISOLUTE-96 HCX 25 mg plate	1
902-0050-P01	ISOLUTE-96 HCX 50 mg plate	1
902-0100-P01	ISOLUTE-96 HCX 100 mg plate	1

ISOLUTE Array HCX Loose Wells

Part number	Description	Quantity
902-0025-R	ISOLUTE Array HCX 25 mg/1 mL wells	100
902-0050-R	ISOLUTE Array HCX 50 mg/1 mL wells	100
902-0100-T	ISOLUTE Array HCX 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN116: Generic Method for the Extraction of Basic Drugs from Biological Fluids using ISOLUTE Mixed-mode SPE Columns and 96-well Plates

TN125: Method Development in Solid Phase Extraction using ISOLUTE HCX for the Extraction of Drugs from Biological Fluid Samples

See **pages 162** and **163** for additional technical information about ISOLUTE HCX

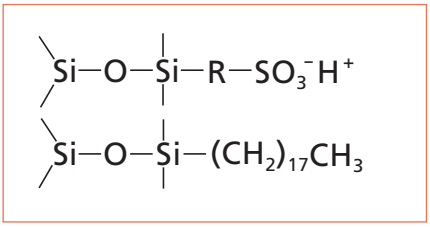
*Tabless columns for use with Pressure+ Positive Pressure Manifolds and other automated SPE systems.
Other tabless columns are available, contact Biotage for details.

ISOLUTE HCX-3
Octadecyl and Sulfonic Acid

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Non-polar and Cationic	Primary: Non-polar* and strong cation exchange

* ISOLUTE HCX-3 has increased non-polar character compared to ISOLUTE HCX and HCX-5



ISOLUTE HCX-3 combines C18 (Octadecyl) and sulfonic acid functionalities

Ordering Information

ISOLUTE HCX-3 SPE Columns

Part number	Description	Quantity
905-0002-A	ISOLUTE HCX-3 25 mg/1 mL	100
905-0005-A	ISOLUTE HCX-3 50 mg/1 mL	100
905-0010-A	ISOLUTE HCX-3 100 mg/1 mL	100

ISOLUTE-96 HCX-3 Fixed Well Plates

Part number	Description	Quantity
905-0025-P01	ISOLUTE-96 HCX-3 25 mg plate	1
905-0100-P01	ISOLUTE-96 HCX-3 100 mg plate	1

ISOLUTE Array HCX-3 Loose Wells

Part number	Description	Quantity
905-0025-R	ISOLUTE Array HCX-3 25 mg/1 mL wells	100
905-0100-T	ISOLUTE Array HCX-3 100 mg/2 mL wells	100

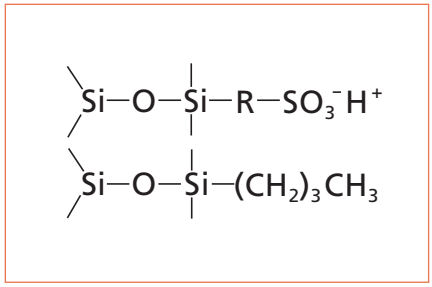
Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN116: Generic Method for the Extraction of Basic Drugs from Biological Fluids using ISOLUTE Mixed-mode SPE Columns and 96-well Plates

See **pages 162** and **163** for additional technical information about ISOLUTE HCX-3

ISOLUTE HCX-5
Butyl and Sulfonic Acid



ISOLUTE HCX-5 combines C4 (Butyl) and sulfonic acid functionalities

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Non-polar and Cationic	Primary: Non-polar* and strong cation exchange

* ISOLUTE HCX-5 has reduced non-polar character compared to ISOLUTE HCX & HCX-3

Ordering Information

ISOLUTE HCX-5 SPE Columns

Part number	Description	Quantity
906-0002-A	ISOLUTE HCX-5 25 mg/1 mL	100
906-0005-A	ISOLUTE HCX-5 50 mg/1 mL	100
906-0010-A	ISOLUTE HCX-5 100 mg/1 mL	100
906-0010-G	ISOLUTE HCX-5 100 mg/10 mL	50
906-0013-H	ISOLUTE HCX-5 130 mg/10 mL	50

ISOLUTE-96 HCX-5 Fixed Well Plates

Part number	Description	Quantity
906-0025-P01	ISOLUTE-96 HCX-5 25 mg plate	1
906-0100-P01	ISOLUTE-96 HCX-5 100 mg plate	1

ISOLUTE Array HCX-5 Loose Wells

Part number	Description	Quantity
906-0025-R	ISOLUTE Array HCX-5 25 mg/1 mL wells	100
906-0100-T	ISOLUTE Array HCX-5 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

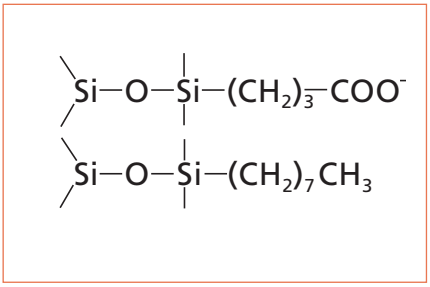
TN116: Generic Method for the Extraction of Basic Drugs from Biological Fluids using ISOLUTE Mixed-mode SPE Columns and 96-well Plates

See **pages 162** and **163** for additional technical information about ISOLUTE HCX-5

ISOLUTE HCX-Q
Octyl and Carboxylic Acid

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Non-polar and quaternary amine or polybasic	Primary: Non-polar and weak cation exchange



ISOLUTE HCX-Q combines C8 (Octyl) and carboxylic acid functionalities

Ordering Information

ISOLUTE HCX-Q SPE Columns

Part number	Description	Quantity
986-0002-A	ISOLUTE HCX-Q 25 mg/1 mL	100
986-0005-A	ISOLUTE HCX-Q 50 mg/1 mL	100
986-0010-A	ISOLUTE HCX-Q 100 mg/1 mL	100

ISOLUTE-96 HCX-Q Fixed Well Plates

Part number	Description	Quantity
986-0025-P01	ISOLUTE-96 HCX-Q 25 mg plate	1
986-0100-P01	ISOLUTE-96 HCX-Q 100 mg plate	1

ISOLUTE Array HCX-Q Loose Wells

Part number	Description	Quantity
986-0025-R	ISOLUTE Array HCX-Q 25 mg/1 mL wells	100
986-0100-T	ISOLUTE Array HCX-Q 100 mg/2 mL wells	100

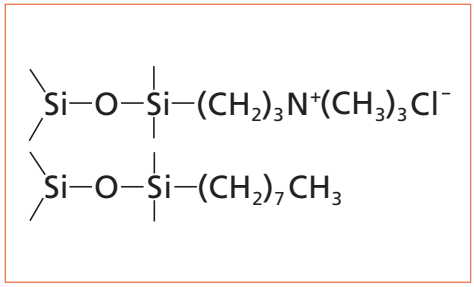
Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN129: Generic Method for the Extraction of Quaternary Amine and Polybasic Drugs from Biological Fluids using ISOLUTE HCX-Q SPE Columns and 96-well Plates

See **pages 162** and **163** for additional technical information about ISOLUTE HCX-Q

ISOLUTE HAX
Octyl and Quaternary Amine



ISOLUTE HAX combines C8 (Octyl) and quaternary amine functionalities

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Non-polar and anionic	Primary: Non-polar and strong anion exchange

Ordering Information

ISOLUTE HAX SPE Columns

Part number	Description	Quantity
903-0005-A	ISOLUTE HAX 50 mg/1 mL	100
903-0010-A	ISOLUTE HAX 100 mg/1 mL	100
903-0020-B	ISOLUTE HAX 200 mg/3 mL	50
903-0020-H	ISOLUTE HAX 200 mg/10 mL	50

ISOLUTE-96 HAX Fixed Well Plates

Part number	Description	Quantity
903-0025-P01	ISOLUTE-96 HAX 25 mg plate	1
903-0100-P01	ISOLUTE-96 HAX 100 mg plate	1

ISOLUTE Array HAX Loose Wells

Part number	Description	Quantity
903-0025-R	ISOLUTE Array HAX 25 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN127: Method Development in Solid Phase Extraction using ISOLUTE HAX for the Extraction of Drugs from Biological Fluid Samples

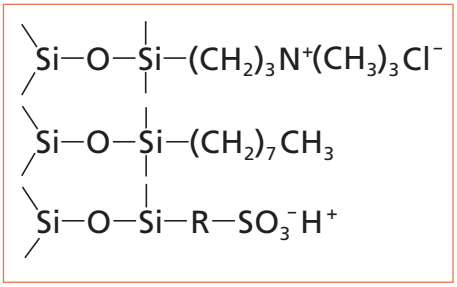
See **pages 162** and **163** for additional technical information about ISOLUTE HAX

ISOLUTE MULTIMODE

Octadecyl, Quaternary Amine and Sulfonic Acid)

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Non-polar, anionic and cationic	Non-polar, polar, anion and cation exchange



ISOLUTE Multimode combines C18 (Octadecyl), quaternary amine and sulfonic acid functionalities

Ordering Information

ISOLUTE Multimode SPE Columns

Part number	Description	Quantity
904-0010-A	ISOLUTE Multimode 100 mg/1 mL	100
904-0030-B	ISOLUTE Multimode 300 mg/3 mL	50
904-0030-C	ISOLUTE Multimode 300 mg/6 mL	30
904-0050-B	ISOLUTE Multimode 500 mg/3 mL	50
904-0100-C	ISOLUTE Multimode 1 g/6 mL	30

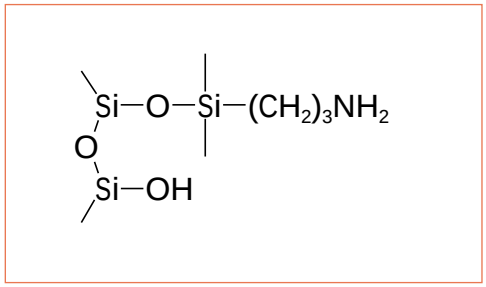
Support Documents

IST1022: Extraction of Aflatoxins from Cereals

IST1076: Extraction of Acrylamide from Cooked Foodstuffs

See **pages 162** and **163** for additional technical information about ISOLUTE Multimode

ISOLUTE NH2
Aminopropyl (non-endcapped)



Chemical structure of NH2 silane covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Non-polar	Polar	Primary: Polar
Aqueous	Anionic	Primary: Weak anion exchange

Ordering Information

ISOLUTE NH2 SPE Columns

Part number	Description	Quantity
470-0002-A	ISOLUTE NH2 25 mg/1 mL	100
470-0005-A	ISOLUTE NH2 50 mg/1 mL	100
470-0005-G	ISOLUTE NH2 50 mg/10 mL	50
470-0010-A	ISOLUTE NH2 100 mg/1 mL	100
470-0010-B	ISOLUTE NH2 100 mg/3 mL	50
470-0010-G	ISOLUTE NH2 100 mg/10 mL	50
470-0020-B	ISOLUTE NH2 200 mg/3 mL	50
470-0050-B	ISOLUTE NH2 500 mg/3 mL	50
470-0050-C	ISOLUTE NH2 500 mg/6 mL	30
470-0050-H	ISOLUTE NH2 500 mg/10 mL	50
470-0100-C	ISOLUTE NH2 1 g/6 mL	30
470-0200-C	ISOLUTE NH2 2 g/6 mL	30
470-0200-D	ISOLUTE NH2 2 g/15 mL	20

ISOLUTE-96 NH2 Fixed Well Plates

Part number	Description	Quantity
470-0050-P01	ISOLUTE-96 NH2 50 mg plate	1
470-0100-P01	ISOLUTE-96 NH2 100 mg plate	1

ISOLUTE Array NH2 Loose Wells

Part number	Description	Quantity
470-0025-R	ISOLUTE Array NH2 25 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN102: Method Development in Solid Phase Extraction using Polar ISOLUTE SPE Columns for the Extraction of Non-aqueous Samples

TN104: Method Development in Solid Phase Extraction using ISOLUTE NH2 SPE Columns for the Extraction of Aqueous Samples

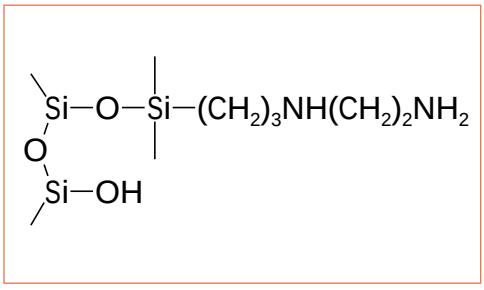
See **pages 164** and **165** for additional technical information about ISOLUTE NH2

ISOLUTE PSA

Ethylenediamine-n-propyl (non-endcapped)

Applications

Matrix	Analytes	Retention Mechanisms
Non-polar	Polar	Primary: Polar
Aqueous	Anionic	Primary: Weak anion exchange



Chemical structure of PSA silane covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE PSA SPE Columns

Part number	Description	Quantity
480-0010-A	ISOLUTE PSA 100 mg/1 mL	100
480-0010-B	ISOLUTE PSA 100 mg/3 mL	50
480-0020-B	ISOLUTE PSA 200 mg/3 mL	50
480-0050-B	ISOLUTE PSA 500 mg/3 mL	50
480-0050-C	ISOLUTE PSA 500 mg/6 mL	30
480-0100-C	ISOLUTE PSA 1 g/6 mL	30

ISOLUTE-96 PSA Fixed Well Plates

Part number	Description	Quantity
480-0025-P01	ISOLUTE-96 PSA 25 mg plate	1
480-0100-P01	ISOLUTE-96 PSA 100 mg plate	1

ISOLUTE Array PSA Loose Wells

Part number	Description	Quantity
480-0025-R	ISOLUTE Array PSA 25 mg/1 mL wells	100
480-0100-T	ISOLUTE Array PSA 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

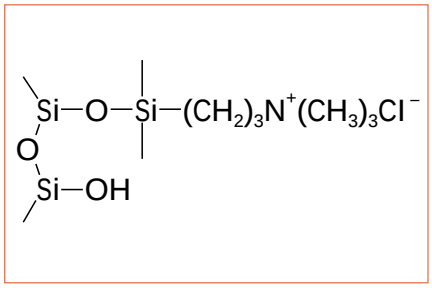
Support Documents

TN102: Method Development in Solid Phase Extraction using Polar ISOLUTE SPE Columns for the Extraction of Non-aqueous Samples

TN105: Method Development in Solid Phase Extraction using ISOLUTE PSA SPE Columns for the Extraction of Aqueous Samples

See **pages 164** and **165** for additional technical information about ISOLUTE PSA

ISOLUTE SAX
Quaternary amine (non-endcapped)



Chemical structure of SAX silane covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Anionic	Primary: Strong anion exchange
		Secondary: Non-polar
Non-polar	Anionic	Primary: Strong anion exchange

Ordering Information

ISOLUTE SAX SPE Columns

Part number	Description	Quantity
500-0002-A	ISOLUTE SAX 25 mg/1 mL	100
500-0005-A	ISOLUTE SAX 50 mg/1 mL	100
500-0005-AG	ISOLUTE SAX 50 mg/1 mL (Tabless)*	100
500-0005-G	ISOLUTE SAX 50 mg/10 mL	50
500-0010-A	ISOLUTE SAX 100 mg/1 mL	100
500-0010-B	ISOLUTE SAX 100 mg/3 mL	50
500-0010-C	ISOLUTE SAX 100 mg/6 mL	30
500-0010-G	ISOLUTE SAX 100 mg/10 mL	50
500-0020-B	ISOLUTE SAX 200 mg/3 mL	50
500-0020-H	ISOLUTE SAX 200 mg/10 mL	50
500-0050-B	ISOLUTE SAX 500 mg/3 mL	50
500-0050-BG	ISOLUTE SAX 500 mg/3 mL (Tabless)*	50
500-0050-C	ISOLUTE SAX 500 mg/6 mL	30
500-0050-H	ISOLUTE SAX 500 mg/10 mL	50
500-0100-B	ISOLUTE SAX 1 g/3 mL	50
500-0100-C	ISOLUTE SAX 1 g/6 mL	30
500-0100-CG	ISOLUTE SAX 1 g/6 mL (Tabless)*	30
500-0200-D	ISOLUTE SAX 2 g/15 mL	20

ISOLUTE-96 SAX Fixed Well Plates

Part number	Description	Quantity
500-0025-P01	ISOLUTE-96 SAX 25 mg plate	1
500-0050-P01	ISOLUTE-96 SAX 50 mg plate	1
500-0100-P01	ISOLUTE-96 SAX 100 mg plate	1

ISOLUTE Array SAX Loose Wells

Part number	Description	Quantity
500-0050-R	ISOLUTE Array SAX 50 mg/1 mL wells	100
500-0100-T	ISOLUTE Array SAX 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN103: Method Development in Solid Phase Extraction using ISOLUTE PE-AX and SAX SPE Columns for the Extraction of Aqueous Samples

See **pages 164** and **165** for additional technical information about ISOLUTE SAX

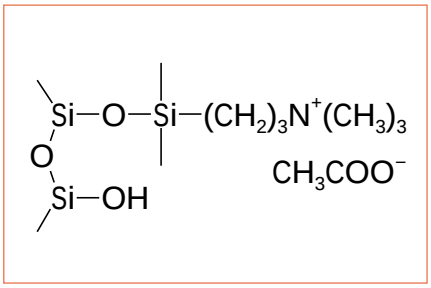
*Tabless columns for use with Pressure+ Positive Pressure Manifolds and other automated SPE systems.
Other tabless columns are available, contact Biotage for details.

ISOLUTE PE-AX

Quaternary amine (non-endcapped)

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Anionic	Primary: Strong anion exchange
		Secondary: Non-polar
Non-polar	Anionic	Primary: Strong anion exchange



Chemical structure of PE-AX silane covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE PE-AX SPE Columns

Part number	Description	Quantity
503-0002-A	ISOLUTE PE-AX 25 mg/1 mL	100
503-0005-A	ISOLUTE PE-AX 50 mg/1 mL	100
503-0010-A	ISOLUTE PE-AX 100 mg/1 mL	100
503-0010-B	ISOLUTE PE-AX 100 mg/3 mL	50
503-0010-C	ISOLUTE PE-AX 100 mg/6 mL	30
503-0020-B	ISOLUTE PE-AX 200 mg/3 mL	50
503-0050-B	ISOLUTE PE-AX 500 mg/3 mL	50
503-0050-C	ISOLUTE PE-AX 500 mg/6 mL	30
503-0100-C	ISOLUTE PE-AX 1 g/6 mL	30
503-0200-D	ISOLUTE PE-AX 2 g/15 mL	20

ISOLUTE-96 PE-AX Fixed Well Plates

Part number	Description	Quantity
503-0025-P01	ISOLUTE-96 PE-AX 25 mg plate	1
503-0100-P01	ISOLUTE-96 PE-AX 100 mg plate	1

ISOLUTE Array PE-AX Loose Wells

Part number	Description	Quantity
503-0050-R	ISOLUTE Array PE-AX 50 mg/1 mL wells	100
503-0100-T	ISOLUTE Array PE-AX 100 mg/2 mL wells	100

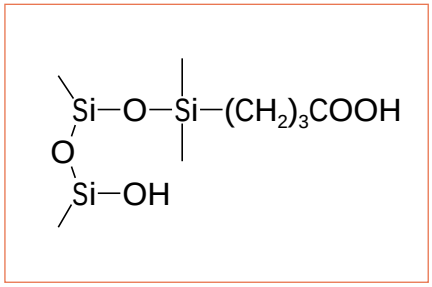
Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN103: Method Development in Solid Phase Extraction using ISOLUTE PE-AX and SAX SPE Columns for the Extraction of Aqueous Samples

See **pages 164** and **165** for additional technical information about ISOLUTE PE-AX

ISOLUTE CBA
Propylcarboxylic acid (non-endcapped)



Chemical structure of CBA silane covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Cationic	Primary: Weak cation exchange
Non-polar	Cationic	Primary: Weak cation exchange

Ordering Information

ISOLUTE CBA SPE Columns

Part number	Description	Quantity
520-0002-A	ISOLUTE CBA 25 mg/1 mL	100
520-0005-A	ISOLUTE CBA 50 mg/1 mL	100
520-0010-A	ISOLUTE CBA 100 mg/1 mL	100
520-0010-B	ISOLUTE CBA 100 mg/3 mL	50
520-0020-B	ISOLUTE CBA 200 mg/3 mL	50
520-0050-B	ISOLUTE CBA 500 mg/3 mL	50
520-0050-C	ISOLUTE CBA 500 mg/6 mL	30
520-0100-C	ISOLUTE CBA 1 g/6 mL	30
520-0200-D	ISOLUTE CBA 2 g/15 mL	20

ISOLUTE-96 CBA Fixed Well Plates

Part number	Description	Quantity
520-0025-P01	ISOLUTE-96 CBA 25 mg plate	1
520-0050-P01	ISOLUTE-96 CBA 50 mg plate	1
520-0100-P01	ISOLUTE-96 CBA 100 mg plate	1

ISOLUTE Array CBA Loose Wells

Part number	Description	Quantity
520-0025-R	ISOLUTE Array CBA 25 mg/1 mL wells	100
520-0050-R	ISOLUTE Array CBA 50 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

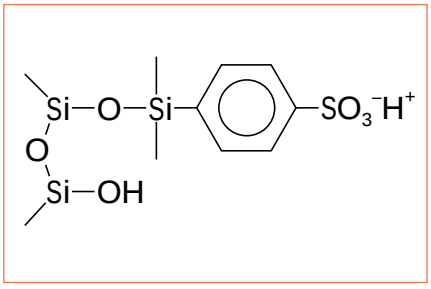
Support Documents

TN108: Method Development in Solid Phase Extraction using ISOLUTE CBA SPE Columns for the Extraction of Aqueous Samples

See **pages 166** and **167** for additional technical information about ISOLUTE CBA

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Cationic	Primary: Strong cation exchange
		Secondary: Non-polar
Non-polar	Cationic	Primary: Strong cation exchange



Chemical structure of benzenesulfonic acid functional group covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE SCX SPE Columns

Part number	Description	Quantity
530-0005-A	ISOLUTE SCX 50 mg/1 mL	100
530-0010-A	ISOLUTE SCX 100 mg/1 mL	100
530-0010-B	ISOLUTE SCX 100 mg/3 mL	50
530-0020-B	ISOLUTE SCX 200 mg/3 mL	50
530-0050-B	ISOLUTE SCX 500 mg/3 mL	50
530-0050-C	ISOLUTE SCX 500 mg/6 mL	30
530-0050-H	ISOLUTE SCX 500 mg/10 mL	50
530-0100-B	ISOLUTE SCX 1 g/3 mL	50
530-0100-C	ISOLUTE SCX 1 g/6 mL	30
530-0200-D	ISOLUTE SCX 2 g/15 mL	20

ISOLUTE-96 SCX Fixed Well Plates

Part number	Description	Quantity
530-0025-P01	ISOLUTE-96 SCX 25 mg plate	1
530-0050-P01	ISOLUTE-96 SCX 50 mg plate	1
530-0100-P01	ISOLUTE-96 SCX 100 mg plate	1

ISOLUTE Array SCX Loose Wells

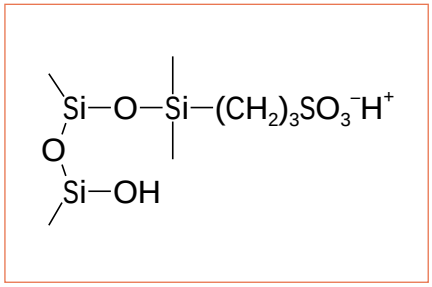
Part number	Description	Quantity
530-0050-R	ISOLUTE Array SCX 50 mg/1 mL wells	100
530-0100-T	ISOLUTE Array SCX 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN106: Method Development in Solid Phase Extraction using ISOLUTE SCX and SCX-3 SPE Columns for the Extraction of Aqueous Samples

ISOLUTE SCX-2
Propylsulfonic Acid (non-endcapped)



Chemical structure of propylsulfonic acid functional group covalently bonded to the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Cationic	Primary: Strong cation exchange
Non-polar	Cationic	Primary: Strong cation exchange

Ordering Information

ISOLUTE SCX-2 SPE Columns

Part number	Description	Quantity
532-0002-A	ISOLUTE SCX-2 25 mg/1 mL	100
532-0005-A	ISOLUTE SCX-2 50 mg/1 mL	100
532-0010-A	ISOLUTE SCX-2 100 mg/1 mL	100
532-0010-B	ISOLUTE SCX-2 100 mg/3 mL	50
532-0020-B	ISOLUTE SCX-2 200 mg/3 mL	50
532-0050-B	ISOLUTE SCX-2 500 mg/3 mL	50
532-0050-C	ISOLUTE SCX-2 500 mg/6 mL	30
532-0050-H	ISOLUTE SCX-2 500 mg/10 mL	50
532-0100-B	ISOLUTE SCX-2 1 g/3 mL	50
532-0100-C	ISOLUTE SCX-2 1 g/6 mL	30
532-0200-D	ISOLUTE SCX-2 2 g/15 mL	20

ISOLUTE-96 SCX-2 Fixed Well Plates

Part number	Description	Quantity
532-0025-P01	ISOLUTE-96 SCX-2 25 mg plate	1
532-0050-P01	ISOLUTE-96 SCX-2 50 mg plate	1
532-0100-P01	ISOLUTE-96 SCX-2 100 mg plate	1

ISOLUTE Array SCX-2 Loose Wells

Part number	Description	Quantity
532-0025-R	ISOLUTE Array SCX-2 25 mg/1 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN107: Method Development in Solid Phase Extraction using ISOLUTE SCX-2 SPE Columns for the Extraction of Aqueous Samples

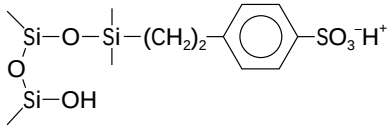
See **pages 166** and **167** for additional technical information about ISOLUTE SCX-2

ISOLUTE SCX-3

Ethylbenzene Sulfonic Acid (non-endcapped)

Applications

Matrix	Analytes	Retention Mechanisms
Aqueous	Cationic	Primary: Strong cation exchange
		Secondary: Non-polar
Non-polar	Cationic	Primary: Strong cation exchange



Chemical structure of ethylbenzene sulfonic acid functional group covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE SCX-3 SPE Columns

Part number	Description	Quantity
533-0002-A	ISOLUTE SCX-3 25 mg/1 mL	100
533-0005-A	ISOLUTE SCX-3 50 mg/1 mL	100
533-0010-A	ISOLUTE SCX-3 100 mg/1 mL	100
533-0010-B	ISOLUTE SCX-3 100 mg/3 mL	50
533-0020-B	ISOLUTE SCX-3 200 mg/3 mL	50
533-0050-B	ISOLUTE SCX-3 500 mg/3 mL	50
533-0050-C	ISOLUTE SCX-3 500 mg/6 mL	30
533-0050-H	ISOLUTE SCX-3 500 mg/10 mL	50
533-0100-B	ISOLUTE SCX-3 1 g/3 mL	50
533-0100-C	ISOLUTE SCX-3 1 g/6 mL	30
533-0200-D	ISOLUTE SCX-3 2 g/15 mL	20

ISOLUTE-96 SCX-3 Fixed Well Plates

Part number	Description	Quantity
533-0025-P01	ISOLUTE-96 SCX-3 25 mg plate	1
533-0050-P01	ISOLUTE-96 SCX-3 50 mg plate	1
533-0100-P01	ISOLUTE-96 SCX-3 100 mg plate	1

ISOLUTE Array SCX-3 Loose Wells

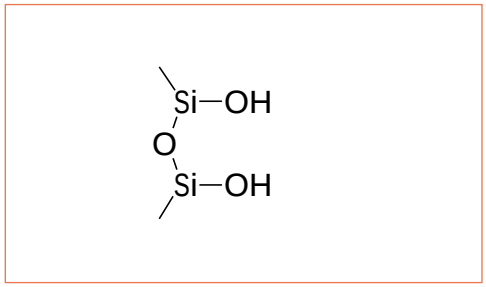
Part number	Description	Quantity
533-0025-R	ISOLUTE Array SCX-3 25 mg/1 mL wells	100
533-0050-R	ISOLUTE Array SCX-3 50 mg/1 mL wells	100
533-0100-T	ISOLUTE Array SCX-3 100 mg/2 mL wells	100

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

Support Documents

TN106: Method Development in Solid Phase Extraction using ISOLUTE SCX and SCX-3 SPE Columns for the Extraction of Aqueous Samples

See **pages 166** and **167** for additional technical information about ISOLUTE SCX-3



Chemical structure of silanol groups on the surface of a silica particle

Applications

Matrix	Analytes	Retention Mechanisms
Non-polar	Polar	Primary: Polar
Aqueous	Cationic	Primary: Weak cation exchange

Ordering Information

ISOLUTE SI SPE Columns

Part number	Description	Quantity
460-0002-A	ISOLUTE SI 25 mg/1 mL	100
460-0010-A	ISOLUTE SI 100 mg/1 mL	100
460-0010-B	ISOLUTE SI 100 mg/3 mL	50
460-0010-G	ISOLUTE SI 100 mg/10 mL	50
460-0020-B	ISOLUTE SI 200 mg/3 mL	50
460-0020-H	ISOLUTE SI 200 mg/10 mL	50
460-0050-B	ISOLUTE SI 500 mg/3 mL	50
460-0050-C	ISOLUTE SI 500 mg/6 mL	30
460-0050-H	ISOLUTE SI 500 mg/10 mL	50
460-0100-B	ISOLUTE SI 1 g/3 mL	50
460-0100-C	ISOLUTE SI 1 g/6 mL	30
460-0200-C	ISOLUTE SI 2 g/6 mL	30
460-0200-D	ISOLUTE SI 2 g/15 mL	20
460-0500-E	ISOLUTE SI 5 g/25 mL	20
460-1000-F	ISOLUTE SI 10 g/70 mL	16

Support Documents

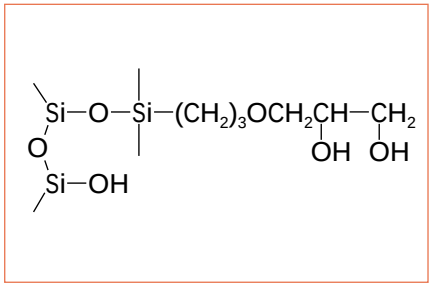
TN102: Method Development in Solid Phase Extraction using Polar ISOLUTE SPE Columns for the Extraction of Non-aqueous Samples

See **pages 168** and **169** for additional technical information about ISOLUTE SI

ISOLUTE DIOL
2,3-Dihydroxypropoxypropyl

Applications

Matrix	Analytes	Retention Mechanisms
Non-polar	Polar	Primary: Polar
Aqueous	Non-polar and semi-polar	Primary: Non-polar



Chemical structure of DIOL silane covalently bonded to the surface of a silica particle

Ordering Information

ISOLUTE Diol SPE Columns

Part number	Description	Quantity
430-0010-A	ISOLUTE DIOL 100 mg/1 mL	100
430-0010-B	ISOLUTE DIOL 100 mg/3 mL	50
430-0010-G	ISOLUTE DIOL 100 mg/10 mL	50
430-0020-B	ISOLUTE DIOL 200 mg/3 mL	50
430-0050-B	ISOLUTE DIOL 500 mg/3 mL	50
430-0050-C	ISOLUTE DIOL 500 mg/6 mL	30
430-0050-H	ISOLUTE DIOL 500 mg/10 mL	50
430-0100-C	ISOLUTE DIOL 1 g/6 mL	30

Support Documents

TN102: Method Development in Solid Phase Extraction using Polar ISOLUTE SPE Columns for the Extraction of Non-aqueous Samples

See **pages 168** and **169** for additional technical information about ISOLUTE DIOL

ISOLUTE FL
Florisil® PR grade

Florisil is a powdered magnesia-silica gel. Florisil PR is specially processed to give consistent results when used for sample preparation purposes. It is activated for separation of chlorinated pesticides. The approximate chemical composition is: MgO • 3.6 SiO_2 • 0.1 OH. The particle size range is 150 – 250 µm.

Applications

Matrix	Analytes	Retention Mechanisms
Non-polar	Polar	Polar

Ordering Information

ISOLUTE FL SPE Columns

Part number	Description	Quantity
712-0010-A	ISOLUTE FL 100 mg/1 mL	100
712-0020-A	ISOLUTE FL 200 mg/1 mL	100
712-0020-B	ISOLUTE FL 200 mg/3 mL	50
712-0020-H	ISOLUTE FL 200 mg/10 mL	50
712-0050-B	ISOLUTE FL 500 mg/3 mL	50
712-0050-C	ISOLUTE FL 500 mg/6 mL	30
712-0050-H	ISOLUTE FL 500 mg/10 mL	50
712-0050-L	ISOLUTE FL 500 mg/6 mL (glass)	30
712-0100-B	ISOLUTE FL 1 g/3 mL	50
712-0100-C	ISOLUTE FL 1 g/6 mL	30
712-0200-D	ISOLUTE FL 2 g/15 mL	20
712-0500-E	ISOLUTE FL 5 g/25 mL	20
712-2000-F	ISOLUTE FL 20 g/70 mL	16

Support Documents

IST1080 Multi-residue Extraction and Clean-up of Pesticides from Fruits and Vegetables

See **pages 170** and **171** for additional technical information about ISOLUTE FL

ISOLUTE ALUMINA
(acidic, neutral and basic)

High activity, 50 – 200 µm particle size range alumina, available in acidic, neutral and basic surface pH options. The surface of the alumina can absorb molecules by interaction with the aluminium metal center, hydrogen bonding with surface hydroxyl groups, or by ion exchange if the surface carries a charge. The extent of these different interactions can be enhanced by control of the surface pH by treatment with acidic, basic or neutral solutions.

ISOLUTE AL-A

Acid washing results in a surface with decreased capacity for basic compounds. Compounds are retained by ion exchange with the positively charged surface or by specific interactions with the metal center.

ISOLUTE AL-N

Neutral surface allows interactions of the aluminium metal center with compounds whose heteroatoms are electronegative (e.g. N, O, P & S) or whose highly aromatic structure make them "electron rich". The adsorbent can be useful for retaining amines and aromatic compounds from either aqueous or non-aqueous solvents.

ISOLUTE AL-B

Washing this material with a basic solution results in a net negative charge. Cationic compounds are retained on the negatively charged surface or by specific interactions with the metal center.

Ordering Information

Column configuration	Quantity	Part numbers		
		AL-A	AL-N	AL-B
100 mg/1 mL	100	713-0010-A	714-0010-A	715-0010-A
200 mg/1 mL	100	713-0020-A	714-0020-A	715-0020-A
200 mg/3 mL	50	713-0020-B	714-0020-B	715-0020-B
500 mg/3 mL	50	713-0050-B	714-0050-B	715-0050-B
500 mg/6 mL	30	713-0050-C	714-0050-C	715-0050-C
1 g/3 mL	50	713-0100-B	714-0100-B	715-0100-B
1 g/6 mL	30	713-0100-C	714-0100-C	715-0100-C
2 g/6 mL	30	—	714-0200-C	—
2 g/15 mL	20	713-0200-D	714-0200-D	715-0200-D
5 g/25 mL	20	713-0500-E	714-0500-E	715-0500-E
10 g/70 mL	16	—	714-1000-F	715-1000-F

See **pages 170** and **171** for additional technical information about ISOLUTE AL-A, AL-N and AL-B


BULK ISOLUTE
NH2
Mean Particle Size Micron :
Average Pore Size :
QUANTITY
PART No.
9470-0100
LOT No.
470-5-01
International Sorbent
ISOLUTE SORBENT
C18
40 - 70
60
100g
Sorbent Technology Ltd

ISOLUTE® Bulk SPE Sorbents

The same high quality sorbents used to manufacture ISOLUTE SPE columns and 96-well plates are also available in bulk. The tightly controlled physical and chemical properties of these sorbents which provide reproducible performance in SPE procedures also ensure their suitability when used in applications that require loose material.

Ordering Information

Non-polar Sorbents

Part number	Description	Quantity
9220-0100	ISOLUTE C18, bulk	100 g
9221-0100	ISOLUTE C18(EC)[a], bulk	100 g
9290-0100	ISOLUTE C8, bulk	100 g
9291-0100	ISOLUTE C8(EC)[a], bulk	100 g
9320-0100	ISOLUTE C2, bulk	100 g
9321-0100	ISOLUTE C2(EC)[a], bulk	100 g

[a](EC) - endcapped, a chemical process to reduce the concentration of silica surface silanol groups that provide polar and weak cation exchange secondary interactions. For more details see the QuickGuide to SPE, **pages 173-185.**

Polar Sorbents

Part number	Description	Quantity
9460-0100	ISOLUTE SI, bulk	100 g
9470-0100	ISOLUTE NH2, bulk	100 g
9480-0100	ISOLUTE PSA, bulk	100 g
9712-0100	ISOLUTE FL, bulk	100 g

Ion Exchange Sorbents

Part number	Description	Quantity
9470-0100	ISOLUTE NH2, bulk	100 g
9480-0100	ISOLUTE PSA, bulk	100 g
9500-0100	ISOLUTE SAX, bulk	100 g
9503-0100	ISOLUTE PE-AX, bulk	100 g
9520-0100	ISOLUTE CBA, bulk	100 g
9532-0100	ISOLUTE SCX-2, bulk	100 g
9533-0100	ISOLUTE SCX-3, bulk	100 g

ISOLUTE sorbents are available in additional quantities to those detailed in the above table. Please contact your local Biotage representative or Distributor for details of our **Custom Manufacturing Service** (**see page 187-189**).

ISOLUTE HM-N, a modified form of diatomaceous earth, is also available in bulk. The material is used for applications requiring an inert support as part of the sample preparation process (e.g. SFE). For details of pre-packed columns containing ISOLUTE HM-N, see **page 79.**

Ordering Information

Inert Support (modified diatomaceous earth)

Part number	Description	Quantity
9800-1000	ISOLUTE HM-N, bulk	1 Kg
9800-5000	ISOLUTE HM-N, bulk	5 Kg

ISOLUTE HM-N is available in additional quantities to those detailed in the above table. Please contact your local Biotage representative or Distributor for details of our **Custom Manufacturing Service** (**see page 187-189**).


ISOLUTE QuEChERS
EN WAXED FRUIT + VEG
ISOLUTE QuEChERS
EN FRUIT + VEGETABLE
ISOLUTE QuEChERS
AOAC WAXED FRUIT + VEG
ISOLUTE QuEChERS
AOAC PIGMENTED FRUIT + VEG

ISOLUTE® QuEChERS

Fast and Efficient Clean up of Complex Food Samples

ISOLUTE® QuEChERS

Fast and efficient clean up of complex samples

QuEChERS (pronounced "catchers") stands for **Qu**ick, **E**asy, **Ch**eap, **E**ffective, **R**ugged, and **S**afe. The technique is designed to be simple and involve a minimum number of steps; but still allow for effective clean up of complex samples. The QuEChERS technique involves two stages.

i) a crude extraction and partitioning step using organic solvent and a salt solution

ii) followed by further extraction and clean up using dispersive solid phase extraction.

Using Biotage QuEChERS tubes, analysts no longer need to weigh individual components, which makes the method quicker and more reliable.

Biotage QuEChERS products include extraction tubes for the initial extraction and partitioning of analytes from homogenized food samples and clean up tubes for the dispersive solid phase extraction. All Biotage QuEChERS products come packed in a rack for ease of storage and use on the bench. Additionally, solvent resistant paper labels aid hassle free sample identification.

AOAC 2007.01 and European EN 15662 Methodologies

Biotage supplies pre-weighed extraction and clean up tubes that conform with AOAC[1,2] and the EU[3] published methods, including those for waxed and highly pigmented fruit and vegetable samples.

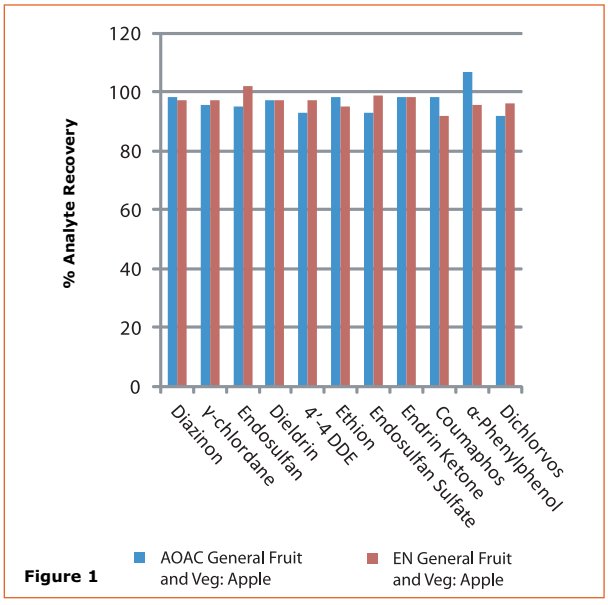


Figure 1

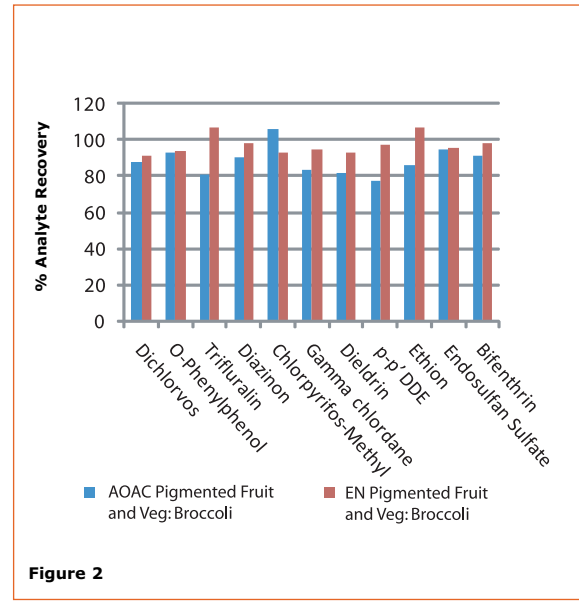


Figure 2

Figures 1 and 2: Pesticide suite was extracted using Biotage QuEChERS products and the relevant methodology (AOAC or EN) for apple (fig 1) and broccoli (fig 2). In all instances, recoveries were above 75%.

References

1) AOAC Official Method 2007.01. Pesticide residues in foods by acetonitrile extraction and partitioning with magnesium sulfate.
2) Anastassiades, M., Lehotay, S.J., Stajnbaher, D. and Schenk, F.J. (2003) J AOAC International 86, 412-431.
3) EN 15662. Foods of plant origin – Determination of pesticide residues using GC-MS and /or LC-MS/MS following acetonitrile extraction/partitioning and clean up by dispersive SPE-QuEChERS method.

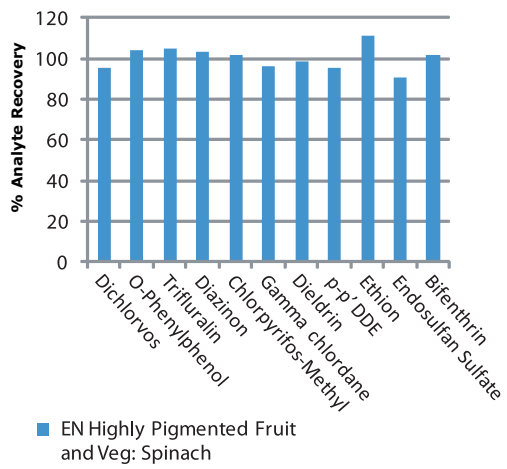


Figure 3

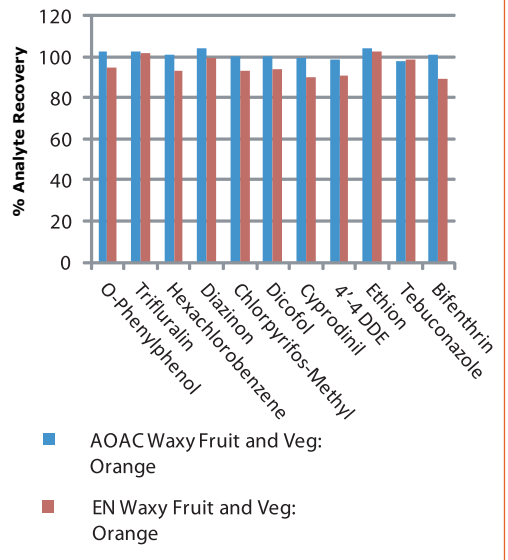


Figure 4

Figures 3 and 4: Pesticide suite was extracted using Biotage QuEChERS products and the relevant methodology (AOAC or EN) for spinach (fig 3) and orange (fig 4). In all instances, recoveries were above 80%.

Ordering Information

Extraction Tubes

Description	Part No	Tube	Pack Size	$MgSO_4$	Na Acetate	Na Citrate	Na Citrate sesquihy-drate	NaCl
15 g QuEChERS AOAC 15 mL Extraction Tube	Q0010-15V	15 mL	25	6 g	1.5 g			
10 g QuEChERS EN 15 mL Extraction Tube	Q0020-15V	15 mL	25	4 g		1 g	0.5 g	1 g

Clean up Tubes

Description	Part No	Tube	Pack Size	PSA	$MgSO_4$ (purest)	C18(EC)	GCB
AOAC Fruit and Vegetables Clean up Tube	Q0030-15V	15 mL	25	400 mg	1200 mg		
EN Fruit and Vegetable Clean up Tube	Q0035-15V	15 mL	25	150 mg	900 mg		
AOAC Waxed Fruit and Vegetables Clean up Tube	Q0050-15V	15 mL	25	400 mg	1200 mg	400 mg	
EN Waxed Fruit and Vegetables Clean up Tube	Q0060-15V	15 mL	25	150 mg	900 mg	150 mg	
AOAC Pigmented Fruit and Vegetables Clean up Tube	Q0070-15V	15 mL	25	400 mg	1200 mg		400 mg
EN Pigmented Fruit and Vegetables Clean up Tube	Q0080-15V	15 mL	25	150 mg	900 mg		15 mg
EN Highly Pigmented Fruit and Vegetables Clean up Tube	Q0090-15V	15 mL	25	150 mg	900 mg		45 mg

Ordering Information Centrifuge Tube

Description	Part No	Tube	Pack Size
50 mL Centrifuge Tube with Rack	Q0000-50V	50 mL	25

Supported Liquid Extraction

Faster, Cleaner
and More Efficient
Sample Preparation

ISOLUTE® SLE+

Improve productivity and maximize analyte recovery

ISOLUTE SLE+ Supported Liquid Extraction plates and columns offer an efficient alternative to traditional liquid-liquid extraction (LLE) for bioanalytical sample preparation, extracting up to 10 mL of aqueous sample. ISOLUTE SLE+ provides high analyte recoveries, eliminates emulsion formation and reduces sample preparation time by half.

Each ISOLUTE SLE+ well and column contains a highly modified form of diatomaceous earth. When the aqueous biological fluid sample is applied, it spreads over the surface of the support and is absorbed. The analytes remain on the surface of the support forming the interface for the extraction; equivalent to the phase interface in LLE. When the water immiscible extraction solvent is applied, analytes are efficiently desorbed, and the solvent is collected. This process is shown schematically in **Figure 1**.

ISOLUTE SLE+ 96 well plates and columns are optimized for the simultaneous extraction of aqueous samples using a generic methodology* for neutral, acidic or basic compounds. Plates and columns can be processed manually using positive pressure or vacuum manifolds (**see pages 94-100** for details), or a variety of automated liquid handling systems. Sample is added to the plate or column, and vacuum or pressure applied to load the sample. The aqueous portion is absorbed onto the sorbent for 5 minutes, but unlike SPE, sample does NOT flow through the plate. A water immiscible solvent is then applied to the plate, desorbing the analytes of interest, which are collected in a collection plate/tube. Extracts can then be evaporated and reconstituted in a solvent suitable for analysis (generally by LC-MS/MS).

ISOLUTE SLE+ is available in formats suitable for processing from 100 µL to 5 mL sample volumes.

** A generic procedure for supported liquid extraction of biological fluids using the ISOLUTE SLE+ plate is included with every plate.*

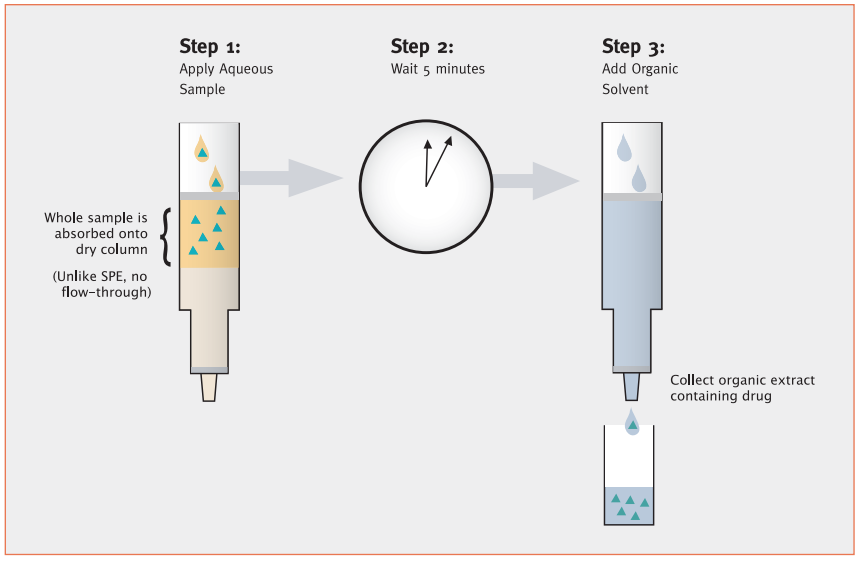


Figure 1. Schematic of Supported Liquid Extraction Process

Efficient Extraction

Supported liquid extraction mechanisms are very efficient, delivering higher analyte recoveries and cleaner extracts than the equivalent LLE methods.

No Emulsion Formation

Emulsions cannot form because the sample and immiscible extraction solvent are never in direct contact, preventing contamination and maximizing analyte recovery.

Easy to Automate

ISOLUTE SLE+ plates provide an easy-to-automate alternative to traditional liquid-liquid extraction. No manual 'off-line' steps (capping/mixing/centrifuge/de-capping) are required. All procedural steps can be fully automated with no manual intervention necessary.

Higher Productivity

Using ISOLUTE SLE+ plates 96 samples can be prepared in approximately half the time needed for liquid-liquid extraction as shown in **Table 1.**

Technique	Time for processing 96 samples
ISOLUTE SLE+	12.5 min
LLE	22.5 min

Table 1. Using the Quadra-96™ liquid handling system, standard ISOLUTE SLE+ generic procedure vs. equivalent LLE procedure

Good Flow Characteristics

ISOLUTE SLE+ plates and columns are packed with an optimized grade of diatomaceous earth, providing reproducible flow characteristics from sample to sample. Aqueous samples and extraction solvents load evenly on to the bed, an important feature for automated sample preparation procedures, where blockages can lead to loss of valuable samples.

Higher Analyte Recoveries

High extraction efficiency and elimination of emulsion formation deliver higher analyte recoveries and lower detection limits as seen in **Figure 2**.

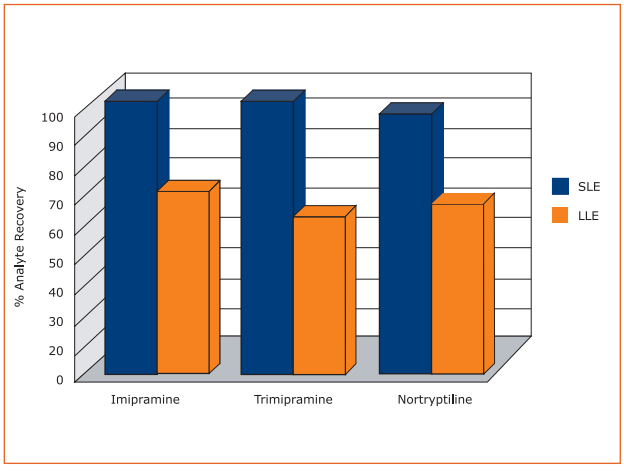


Figure 2. Comparison of analyte recovery by ISOLUTE SLE+ and LLE

Transferable Methods

The water immiscible extraction solvents used in LLE can also be used for ISOLUTE SLE+ procedures. Sample pre-treatment conditions are also the same, meaning existing LLE methods are easily transferable to ISOLUTE SLE+, reducing method development time. Additionally, Biotage have shown using a suite of analytes (β-blockers and NSAIDs) that methodologies are scalable between formats. See **Figure 3**.

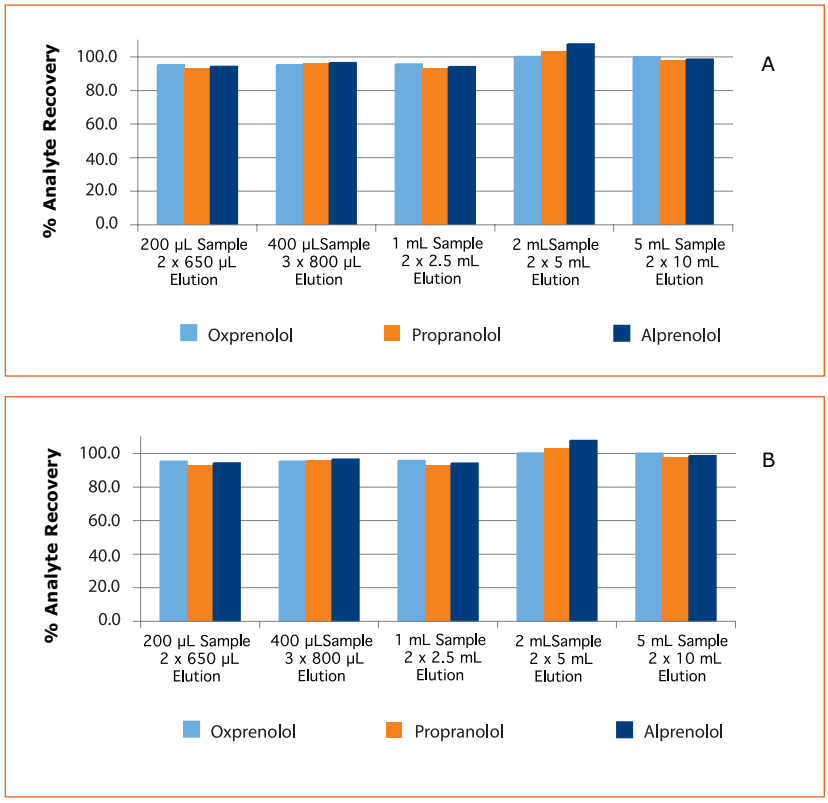


Figure 3.
Scalability of columns using both NSAIDS (A) and β-Blocker (B) analyte suites.

Ordering Information

Description	Quantity	Part number
Fixed Well Plates		
ISOLUTE SLE+ 200 µL Supported Liquid Extraction Plate	1	820-0200-P01
ISOLUTE SLE+ 400 µL Supported Liquid Extraction Plate	1	820-0400-P01
Array Wells		
ISOLUTE SLE+ 200 µL Array Wells	100	820-0200-T
ISOLUTE SLE+ 400 µL Array Wells	100	820-0400-T
Columns		
ISOLUTE SLE+ 1 mL Sample Volume	30	820-0140-C
ISOLUTE SLE+ 2 mL Sample Volume	20	820-0290-D
ISOLUTE SLE+ 5 mL Sample Volume	20	820-0690-E
ISOLUTE SLE+ 10 mL Sample Volume	16	820-1420-F

Applications

Application number	Analyte	Matrix	Format	Part number	Industry	Page
AN742	Amphetamines	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Forensic	76
AN746	Amphetamines	Urine	ISOLUTE SLE+, 1 mL column	820-0140-C	Forensic	76
AN751	Benzodiazepines	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate or ISOLUTE SLE+, 1 mL column	820-0200-P01 820-0140-C	Clinical	76 76
AN602	Corticosteroids	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Clinical	76
AN603	Non-steroidal Anti-inflammatory Drugs (NSAIDs)	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Clinical	76
AN741	Opiates	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate and ISOLUTE SLE+, 1 mL column	820-0200-P01 820-0140-C	Forensic	76 76
AN721	Tamoxifen	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Clinical	76
AN722	Tamoxifen	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Clinical	76
AN740	Testosterone and other steroid hormones	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Clinical	76
AN720	THC-COOH	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Forensic	76
AN601	Tricyclic Antidepressants	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Clinical	76
AN735	Vitamin D and metabolites	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Clinical	76
AN734	Warfarin	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	Clinical	76

Visit the Sample Preparation Application Database at **www.biotage.com/applications**

Supported Liquid Extraction

Supported Liquid Extraction User Guide

ISOLUTE SLE+ supported liquid extraction is a quick, easy and cost effective sample preparation solution for analytical chemistry. The Biotage SLE+ User Guide provides a simple 4-step method development guide which outlines the efficient 3-step sample procedure of loading your sample, wait five minutes and elute. To request a copy please visit **www.biotage.com**.

ISOLUTE HM-N Columns for Supported Liquid Extraction

ISOLUTE HM-N columns contain an inert, unprocessed support material for routine supported liquid extraction using gravity flow. A range of column sizes is available to match sample volume requirements.

Ordering Information

Description	Quantity	Part number
ISOLUTE HM-N (300 µL sample)	100	800-0040-BM
ISOLUTE HM-N (1 mL sample)	100	800-0100-CM
ISOLUTE HM-N (3 mL sample)	100	800-0220-DM
ISOLUTE HM-N (5 mL sample)	100	800-0350-EM
ISOLUTE HM-N (10 mL sample)	50	800-0700-FM
ISOLUTE HM-N (20 mL sample)	50	800-1300-FM

Note: Always use a column of equal or greater capacity than the sample volume. The maximum capacity of the column is included in the column description listed in the ordering table.

Please contact your local Biotage representative or Distributor for alternative configurations that are available through our **Custom Manufacturing Service** (**see page 187-189**).

For support documentation please request **TN118** The use of ISOLUTE HM-N for Rapid Sample Preparation.


ISOLUTE® PPT+
Part No. 120-2040-P01
Lot No. 600701P1A

Protein Precipitation Products

Fast, Simple
Protein Removal

ISOLUTE PPT+ Protein Precipitation Plates

Protein precipitation is a routinely used sample preparation technique for removal of proteins from biological fluid samples prior to analysis. Protein precipitation by filtration in the 96-well format is a high throughput alternative to the traditional centrifugation based technique using collection plates or micro tubes.

ISOLUTE PPT+ Protein Precipitation Plates have revolutionized this sample preparation technique. The optimized filtration system in ISOLUTE PPT+ plates provides an easy to automate solution for efficient protein removal. The procedure is streamlined, with no off-line steps.

The proprietary filtration system allows for "solvent first" methodology, such that the plasma sample can be applied to a pool of solvent (typically acetonitrile). This results in very efficient protein precipitation. Unlike membrane based devices, the system has an optimized porosity distribution and acts as a depth filter, holding up the precipitated protein without well blockage whilst allowing rapid transfer of the filtrate to the collection plate (see **Figure 1**).

Features and Advantages

- 'Solvent first' methodology produces efficient protein removal, eliminating cloudy extracts
- Optimized filter bed prevents well blocking
- No need for off-line vortex mixing in automated systems
- Fixed well plates allow for routine high throughput applications
- Modular Array plate format allows for method development and variable sample numbers

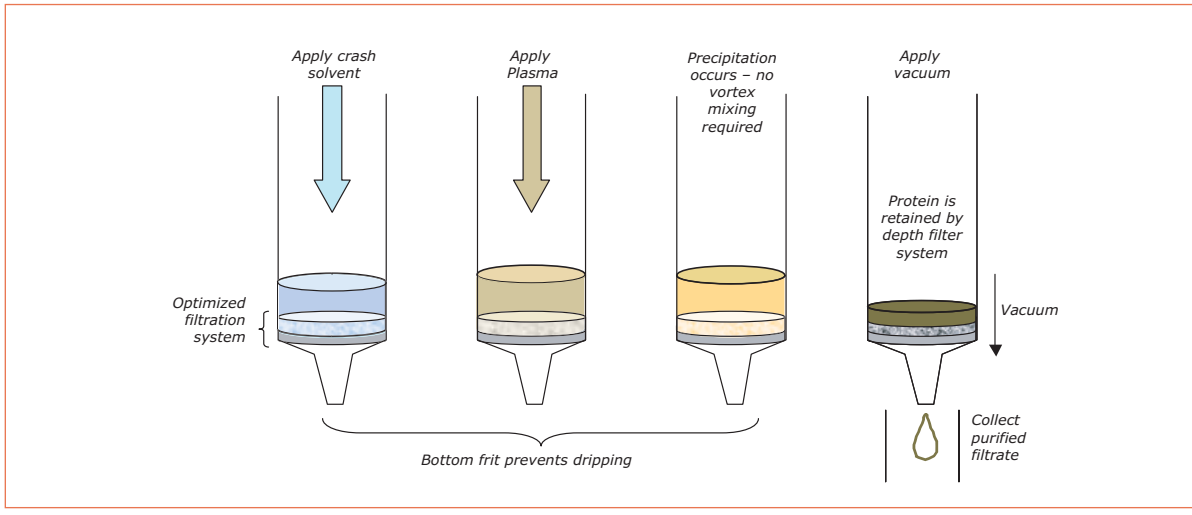


Figure 1. 'Solvent first' protein precipitation procedure

Ordering Information

Fixed Well Plate

Description	Quantity	Part number
ISOLUTE PPT+ fixed well plate, 2 mL	1	120-2040-P01

Modular ISOLUTE Array Wells

Description	Quantity	Part number
ISOLUTE Array PPT+ wells, 1 mL	100	120-2040-R
ISOLUTE Array PPT+ wells, 2 mL	100	120-2040-T

Pre-assembled ISOLUTE Array plates are available. To order, add the suffix P to the equivalent loose well part number.

ISOLUTE Array Accessories

Description	Quantity	Part number
ISOLUTE Array base plate	1	120-1000-P01
Strip of 8 base plate sealing plugs*	50	120-1200
Luer adaptors (to fit any standard sample processing manifold)	25	120-1201
Well removing tool	1	120-1202

**Required when processing a partially populated ISOLUTE Array PPT+ plate*

For support documentation please request **PS424:** ISOLUTE Protein Precipitation Plates and **TN130:** Sample Preparation using ISOLUTE PPT+ Protein Precipitation Plates.

Please contact your local Biotage representative or Distributor for products that are available through our **Custom Manufacturing Service** (see **page 187-189**).

Sample Preparation Accessories

Accessories
For SPE and Filtration

ISOLUTE Column Adaptors

Increase column capacity or fractionate complex mixtures by stacking SPE columns. ISOLUTE Column Adaptors attach empty reservoirs, filtration columns and depth filter reservoirs to SPE columns.

Ordering Information

Description	Quantity	Part number
1 PTFE Adaptor - 1, & 6 mL and XL (columns A, B, C, G & H)	10	120-1100
2 PE Adaptor - 1, 3 & 6 mL (columns A, B & C)	10	120-1101
3 PE Adaptor - 15 & 25 mL (columns D & E)	10	120-1102
4 PE Adaptor - 70 mL (column F)	10	120-1103

ISOLUTE Depth Filter Reservoirs

Remove particulate matter from aqueous samples and prevent blockage of the top frit of the SPE column. Also allows for separate analysis of particulate bound compounds.

Ordering Information

Description	Quantity	Part number
1 ISOLUTE depth filter, 6 mL	100	120-1003-CD
2 ISOLUTE depth filter, 70 mL	50	120-1009-FD

Please contact your local Biotage representative or Distributor for products that are available through our **Custom Manufacturing Service** (see **page 187-189**).

ISOLUTE Column Caps

Seal prepared columns, sample loaded columns or immunoaffinity columns for transportation.

Ordering Information

Description	Column type	Quantity	Part number
Bottom Luer cap, fits all columns	All	100	1201-0120
Top cap, 1 mL column	A	100	1201-0121-A
Top cap, 3 mL column	B	100	1201-0122-B
Top cap, 6 mL column	C	100	1201-0123-C
Top cap, 10 mL – XL column	G & H	100	1201-0125-H
Top cap, 15 mL column	D	100	1201-0126-D
Top cap, 25 mL column	E	100	1201-0127-E
Top cap, 70 mL column	F	100	1201-0128-F

ISOLUTE Empty Reservoirs

ISOLUTE empty reservoirs are available.

Ordering Information

Description	Quantity	Part number
ISOLUTE Reservoir 1 mL	100	120-1001-A
ISOLUTE Reservoir 3 mL	100	120-1002-B
ISOLUTE Reservoir 6 mL	100	120-1003-C
ISOLUTE Reservoir 15 mL	100	120-1006-D
ISOLUTE Reservoir 25 mL	100	120-1007-E
ISOLUTE Reservoir 70 mL	50	120-1009-F

ISOLUTE Frits

Biotage's filtration products are based on fritted systems consisting of sintered particles (e.g. polyethylene (PE), which are compressed to produce a porous material. The nominal porosity of the frit is the average or mean pore size (e.g. 20 µm). Frit materials are relatively thick (>1 mm) and pores run through the material in a multi-directional channel system. For this reason, a frit of nominal or mean pore size, e.g. 20 µm, can retain a high percentage of particles smaller than 20 µm in size.

Ordering Information

Description	Column Type	Quantity	Part number
ISOLUTE Frit, 6 mm (1/4") diameter – 20 µm PE	A (1 mL)	100	120-1031-A
ISOLUTE Frit, 6 mm (1/4") diameter – 20 µm PE	G (XL)	100	120-1032-G
ISOLUTE Frit, 9 mm (3/8") diameter – 20 µm PE	B (3 mL)	100	120-1033-B
ISOLUTE Frit, 9 mm (3/8") diameter – 20 µm PE	H (XL)	100	120-1034-H
ISOLUTE Frit, 13 mm (1/2") diameter – 20 µm PE	C (6 mL)	100	120-1035-C
ISOLUTE Frit, 16 mm (5/8") diameter – 20 µm PE	D (15 mL)	100	120-1036-D
ISOLUTE Frit, 20 mm (13/16") diameter – 20 µm PE	E (25 mL)	100	120-1037-E
ISOLUTE Frit, 27 mm (11/16") diameter – 20 µm PE	F (70 mL)	100	120-1038-F

The last character in the frit part number should match the last character of the reservoir part number into which it will be fitted

ISOLUTE Filtration Columns

Use as a stand-alone filter or stack above an SPE column to increase the reservoir volume. Fitted as standard with two 20 µm polyethylene (PE) frits.

Ordering Information

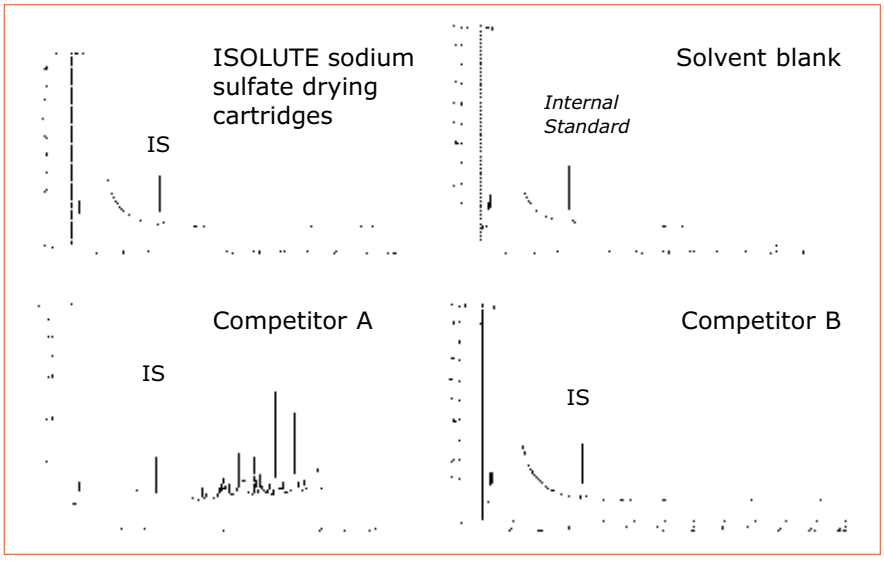
Description	Quantity	Part number
ISOLUTE double fritted filtration column, 1 mL – 20 µm PE	100	120-1021-A
ISOLUTE double fritted filtration column, 3 mL – 20 µm PE	100	120-1022-B
ISOLUTE double fritted filtration column, 6 mL – 20 µm PE	100	120-1023-C
ISOLUTE double fritted filtration column, 10 mL – 20 µm PE	50	120-1024-H
ISOLUTE double fritted filtration column, 15 mL – 20 µm PE	100	120-1025-D
ISOLUTE double fritted filtration column, 25 mL – 20 µm PE	100	120-1026-E
ISOLUTE double fritted filtration column, 70 mL – 20 µm PE	50	120-1028-F

ISOLUTE Sodium Sulfate Drying Cartridges

The use of sodium sulfate (Na_2SO_4) for drying water immiscible sample extracts prior to analyte derivatization or analysis is well documented. Traditionally this is achieved by adding loose material to the extract, followed by filtering or pipetting off the dry solvent.

ISOLUTE Sodium Sulfate Drying Cartridges are designed for efficient in-line drying of water immiscible extraction solvents. The cartridges feature a female Luer inlet and male Luer outlet, allowing them to be attached to the outlet of any SPE column. Elution solvents are dried as they pass through the cartridge.

The cartridges contain 2.5 g of high purity sodium sulfate, with capacity for up to 1.2 mL of water per gram. For additional capacity, two or more cartridges can be joined in series.



GC chromatograms comparing the purity of ISOLUTE sodium sulphate drying cartridges with equivalent competitor products.

Ordering Information

Description	Quantity	Part number
ISOLUTE Sodium Sulfate Drying Cartridge	50	802-0250-M

ISOLUTE Filtration Plates for High Throughput Applications

Suitable for general filtration applications, ISOLUTE filtration plates are fitted with a single 20 µm polyethylene (PE) frit.

Ordering Information

Description	Quantity	Part number
Filtration plate, fixed well, 2 mL – 20 µm	1	120-1022-P01

ISOLUTE Accessories for 96-well Plates

Accessories are available for both ISOLUTE-96 and the modular Array format 96-well plates. All ISOLUTE 96-well plate products are compatible with the VacMaster-96 Sample Processing Manifold. See **pages 99-100** for more information.

ISOLUTE-96 Fixed Well Plates

The ISOLUTE fixed-well format is an industry standard one-piece plate for routine high-throughput applications.

ISOLUTE-96 Fixed Well Plate Sealing Accessories

Seal both the inlet and outlet of fixed well plates for storage prior to elution.

The polypropylene Luer Cap Mat seals the outlet (drain holes) of the fixed well SPE plate.

The polypropylene Pierceable Sealing Cap seals the top of the wells of ISOLUTE SPE and collection plates.

Ordering Information

Description	Quantity	Part number
Piercable Sealing Cap	50	121-5204
Luer Cap Mat	25	121-5205

ISOLUTE Array 96-well plates

ISOLUTE Array is a modular 96-well format with individual removal wells for an economical approach to SPE or filtration of variable or low sample numbers.

Array Accessories

Construct individual ISOLUTE Array wells into a microplate format with the Array base plate. Seal any unused positions with base plate plugs. Align wells or de-populate the plate after use with a Well Removing Tool. Use Luer Adapters to allow individual wells to be processed on a vacuum processing station.

Ordering Information

Description	Quantity	Part number
ISOLUTE Array base plate	1	120-1000-P01
ISOLUTE base plate sealing strips (strips of 8)	50	120-1200
Luer Adaptors (to fit any vacuum manifold)	25	120-1201
Well Removing Tool	1	120-1202

Deep Well Collection Plates

Square well polypropylene collection plates with capacity of 1 or 2 mL per well are available. Sealed with the piercable sealing cap (see **page 90**).

Ordering Information

Description	Quantity	Part number
Collection plate, 1 mL	50	121-5202
Collection plate, 2 mL	50	121-5203

Manual Sample Processing Products

PRESSURE+ 48 and PRESSURE+ 96
Positive Pressure Manifolds

Biotage PRESSURE+ manifolds deliver positive pressure, parallel processing for 96 well plates, 1 mL 3 mL and 6 mL column formats. The systems utilize a consistent, uniform flow of positive pressure to move both low and high viscosity liquids through SPE plates and columns. Each port of the PRESSURE+ manifold independently maintains constant pressure, increasing the overall reproducibility of analyte recoveries. This unique design allows for partially populated racks to be used without sacrificing extraction efficiency.

Features and Advantages

- Highly uniform flow from sample to sample for SPE, Protein Precipitation and Supported Liquid Extraction
- Improved reproducibility, accuracy and extraction efficiency, even with viscous samples
- Parallel processing for increased sample throughput
- Easy to set-up and use with just a gas source
- Universal designs accommodate all 96 well plates, or 1 mL, 3 mL and 6 mL SPE columns
- Built-in safety features ensure ease of use and safe operation

Uniform Flow

Unlike vacuum manifolds, in which faster flowing wells and columns dry before the processing run is completed, the independent ports of the PRESSURE+ manifolds deliver consistent output. This allows the same motive force to be applied to every cartridge and well, regardless of the contents.

Ideal for Viscous Samples

Biotage PRESSURE+ Positive Pressure manifolds allow for gas pressures of up to 100 psi, enabling greater pressure and force to be used with viscous samples. Smooth and immediate flow responses are achieved by adjusting gas pressure up or down through two regulators and a rotometer.

PRESSURE+ 96 Accommodates all 96 Well Plate Formats

The self-adjusting upper manifold of the PRESSURE+96 manifold is compatible with all 96 well plate formats including the popular 1 mL and 2 mL modular Array well formats without the need to purchase supplementary gaskets. Biotage collection plates are recommended for the most consistent and reliable results.

PRESSURE+ 48 for Column Processing

The same self-adjusting technology utilized in the PRESSURE+ 96 manifold allows the PRESSURE+ 48 to process all columns up to 6 mL size without the need to purchase additional gaskets. The unique design allows for between 1 and 48 columns to be processed without empty ports affecting flow rates. Tabless or flangeless columns should be used for full population and optimum sealing. Tabless columns are available from Biotage at the same cost as the equivalent standard column format (see page 96). The modular rack system accommodates most popular collection vessels.

Modular Rack System

By using stackable collection racks and extraction racks on the PRESSURE+ 48 manifold, many combinations are possible to accommodate varying methodologies. Racks only fit the system in one direction, ensuring consistent processing throughout.

Ease of Use

The intuitive Biotage PRESSURE+ is easily incorporated into laboratory work flow. Simply stack 96 well plates and collection plates (for PRESSURE+ 96) or column rack and collection racks (for PRESSURE+ 48) on the platform tray using the positioning markers and slide the tray under the gasket until it hits the stop. Rocker switches pressed simultaneously on the side/front of the unit lower the gasket and compress it onto the plates/columns. This simultaneous depression of the rocker switches is a safety feature that ensures hands are kept clear of moving parts during operation.

Ordering Information

PRESSURE+ 96

Part number	Description
PPM-96	PRESSURE+ 96 Positive Pressure Manifold 96 position. Includes 1 x 1 mL 96 well collection plate, 1 x 2 mL 96 well collection plate, 1 x 10 mL 24 well collection plate (waste plate), 96-column sealing gasket, gas supply adapter kit (6' of 1/8" i.d. polyethylene tubing and 1/8" and 1/4" NPT connectors), User Manual CD-ROM.
Accessories	
PPM-A96-GSKT	PRESSURE+ 96 Sealing Gasket 96 position
PPM-A96-1024	PRESSURE+ 96 Collection Tray 10 mL 24 well
PPM-GA	PRESSURE+ Gas Supply Adapter for all models
121-5202	96-well collection plate, 1 mL, pack of 50
121-5203	96-well collection plate, 2 mL, pack of 50

PRESSURE+ 48

Part number	Description
PPM-48	PRESSURE+ 48 Positive Pressure Manifold 48 position. Includes Sealing gasket 48 position, gas supply adapter kit (6' of 1/8" i.d. polyethylene tubing and 1/8" and 1/4" NPT connectors), waste bin rack, waste bin inserts, User Manual CD-ROM. Racks must be ordered separately.
Racks	
PPM-A48-1RCK	PRESSURE+ 48 SPE Column Rack 1 mL
PPM-A48-3RCK	PRESSURE+ 48 SPE Column Rack 3 mL
PPM-A48-6RCK	PRESSURE+ 48 SPE Column Rack 6 mL
PPM-A48-1275	PRESSURE+ 48 Collection Rack 12 X 75 mm
PPM-A48-13100	PRESSURE+ 48 Collection Rack 13 x 100 mm
PPM-A48-1232	PRESSURE+ 48 Sample Vial Rack 12 x 32 mm
PPM-A48-16100	PRESSURE+ 48 Collection Rack 16 x 100 mm
Accessories	
PPM-A48-GSKT	PRESSURE+ 48 Sealing Gasket 48 position
PPM-A48-WST	PRESSURE+ 48 Waste Bin Inserts
PPM-GA	PRESSURE+ Gas Supply Adapter for all models

Service options

Part number	Description
SER-PPM-IN	PRESSURE+ Manifold Service Installation
SER-PPM-PL	PRESSURE+ Manifold Platinum Service Contract - 1 year
SER-PPM-SLVR	PRESSURE+ Manifold Silver Repair Depot Service Contract - 1 year
SER-PPM-FYMP	PRESSURE+ Manifold 9 month extended warranty (1 year total)

Ordering Information

Tabless columns for use with PRESSURE+48 Positive Pressure Manifolds

Part number	Description	Quantity
EVOLUTE SPE Columns		
EVOLUTE ABN		
600-0002-AG	EVOLUTE ABN 25 mg/1 mL (Tabless)	100
610-0005-BG	EVOLUTE ABN 50 mg/3 mL (Tabless)	50
EVOLUTE CX		
601-0001-AG	EVOLUTE CX 10 mg/1 mL (Tabless)	100
601-0002-AG	EVOLUTE CX 25 mg/1 mL (Tabless)	100
611-0005-BG	EVOLUTE CX 50 mg/3 mL (Tabless)	50
611-0010-BG	EVOLUTE CX 100 mg/3 mL (Tabless)	50
611-0050-CG	EVOLUTE CX 500 mg/6 mL (Tabless)	30
EVOLUTE AX		
603-0002-AG	EVOLUTE AX 25 mg/1 mL (Tabless)	100
613-0010-BG	EVOLUTE AX 100 mg/3 mL (Tabless)	50
613-0050-CG	EVOLUTE AX 500 mg/6 mL (Tabless)	30
ISOLUTE SLE+ Columns		
820-0140-CG	ISOLUTE SLE+ 1 mL sample volume (Tabless)	30
ISOLUTE SPE Columns		
ISOLUTE C18		
220-0002-AG	ISOLUTE C18 25 mg/1 mL (Tabless)	100
220-0010-BG	ISOLUTE C18 100 mg/3 mL (Tabless)	50
220-0050-BG	ISOLUTE C18 500 mg/3 mL (Tabless)	50
220-0100-CG	ISOLUTE C18 1 g/6 mL (Tabless)	30
ISOLUTE SAX		
500-0005-AG	ISOLUTE SAX 50 mg/ 1mL (Tabless)	100
500-0050-BG	ISOLUTE SAX 500 mg/3 mL (Tabless)	50
500-0100-CG	ISOLUTE SAX 1 g/6 mL (Tabless)	30
ISOLUTE HCX		
902-0002-AG	ISOLUTE HCX 25 mg/1 mL (Tabless)	100
902-0013-BG	ISOLUTE HCX 130 mg/3 mL (Tabless)	50
902-0013-CG	ISOLUTE HCX 130 mg/6 mL (Tabless)	30
902-0030-CG	ISOLUTE HCX 300 mg/6 mL (Tabless)	30
ISOLUTE ENV+		
915-0005-AG	ISOLUTE ENV+ 50 mg/1 mL (Tabless)	100
915-0010-BG	ISOLUTE ENV+ 100 mg/3 mL (Tabless)	50
915-0050-BG	ISOLUTE ENV+ 500 mg/3 mL (Tabless)	50
915-0100-CG	ISOLUTE ENV+ 1 g/6 mL (Tabless)	30

Other configurations are available, at the same cost as the standard column format.

VacMaster-10 & -20
Sample Processing Manifolds

VacMaster Sample Processing Manifolds are used to process up to ten (VacMaster-10) or twenty (VacMaster-20) samples simultaneously. Designed to meet the most demanding criteria for safety, extract purity, flexibility and ease-of-use, VacMaster manifolds provide productivity enhancements in many applications. Both VacMaster-10 and -20 manifolds are supplied complete with thick walled glass tank, PTFE lid, fine vacuum control and vacuum safety valve, inert polyethylene collection tube rack, port sealing plugs and replaceable stainless steel needles that are compatible with all industry standard Luer tipped SPE columns.

Features and Advantages

- Robust, inert system constructed from glass, PTFE and polyethylene avoids sample contamination
- Optional PTFE stopcock and stopcock/needles allow for additional flow control and purity
- Multiple stations allow for parallel processing of SPE and filtration applications
- Thick walled glass tank allows clear view of the sample processing operation
- Collection tube rack with easy lift carrying handle allows for safe transfer of samples
- Vacuum safety valve fitted as standard to ensure safe sample processing
- Range of accessories for enhancing productivity

Versatile Collection Rack

Resistant to commonly used organic solvents, acids and bases, the VacMaster collection rack is constructed from inert material. Spacing between each rack plate is fully adjustable, to fit a wide range of collection vessels. The carrying handle makes lifting and transporting fully loaded racks easy and safe. Racks with alternative diameter holes are available through our **Custom Manufacturing Service** (**see page 187-189**).

Stopcock Options

We recommend VacMaster-10 or -20 manifolds are fitted with PTFE stopcocks for optimum flow control. For a totally inert system, the standard stainless steel needles can be replaced with optional one piece PTFE needles or stopcock/needle units (see **page 98**). Both have excellent solvent resistance and smooth operation without sticking.

Safety Features

Biohazard safety: for biological matrices such as plasma or urine, unique design features and operating procedures provide a safer working system. With the lid mounted vacuum controls, it is possible to use one tank to process samples and dedicate a second tank for analyte elution only, avoiding any contamination. Both tanks can be processed using the same vacuum source, connected with the PTFE T-valve (see **page 98**). All components are easy to clean.

Vacuum safety: Each system is fully tested under a strict vacuum cycling regime to ensure safe operation. A vacuum safety valve is fitted as standard to prevent safe vacuum levels being exceeded.

Vacuum Options

VacMaster manifolds should be used in conjunction with an external vacuum source (vacuum pump) or the VacMaster VCU-2 unit (**see page 99**. In either case, a solvent trap (**see page 101**) should be placed between the manifold and vacuum source.

Ordering Information

VacMaster-10 Sample Processing Manifold

Description	Quantity	Part number
VacMaster-10 Sample Processing Manifold complete with 16 mm collection rack and fitted with stainless steel needles (as option 4 below)	1	121-1016

Other collection rack sizes can be supplied through our **Custom Manufacturing Service**. Maximum hole diameter 27 mm.

VacMaster-20 Sample Processing Manifold

Description	Quantity	Part number
VacMaster-20 Sample Processing Manifold complete with 16 mm collection rack and fitted with stainless steel needles (as option 4 below)	1	121-2016

Other collection rack sizes can be supplied through our **Custom Manufacturing Service**. Maximum hole diameter 23 mm.

PTFE Stopcock Option and Spare Parts

Description	Quantity	Part number
Universal PTFE stopcock 1	10	121-0009
PTFE stopcock/needle unit 2	10	121-0001
PTFE needle 3	10	121-0002
Stainless steel needle 4	20	121-0003
Stainless steel needle retainer	10	121-0004
Port sealing plugs	30	121-0005
PTFE T-valve	1	121-0010
VacMaster-10 silicone lid gasket	5	121-1030
VacMaster-10 complete lid	1	121-1045
VacMaster-10 complete tank	1	121-1039
VacMaster-20 silicone lid gasket	5	121-2059
VacMaster-20 complete lid	1	121-2075
VacMaster-20 complete tank	1	121-2068

VacMaster-96
Sample Processing Manifold

The VacMaster-96 Sample Processing Manifold is a versatile system ideal for all 96-well SPE, protein precipitation, supported liquid extraction and filtration applications. The small footprint and lightweight construction make it suitable for manual processing or use with automated liquid handling systems. Vacuum control accessories are separate from the manifold body, allowing the use of a solvent trap (see **page 101**) to prevent contamination of vacuum controls. This is also convenient for use with liquid handling systems with built in vacuum control.

The manifold is designed for full compatibility with all commercially available extraction, filtration and collection plates. A simple system based on inserts and spacers optimizes extraction and collection plate positioning, eliminating well-to-well contamination and sample loss. The spacer required for compatibility with the modular Array format plate is supplied as standard with the VacMaster-96 manifold.

Features and Advantages

- Vacuum processing, for all 96-well sample preparation applications is compatible with fixed well and modular Array plates
- Solvent resistant construction for robust and reliable operation
- Separate vacuum control options prevent contamination
- Sloping internal base eliminates the need for disposable reservoir trays
- Simple design allows for easy cleaning

Ordering Information

Description	Quantity	Part number
VacMaster-96 Sample Processing Manifold (without vacuum control)	1	121-9600

Vacuum Control Options

VacMaster VCU-1: an independent polypropylene unit with vacuum gauge, on/off switch and fine controls. Use with a laboratory vacuum source.

VacMaster VCU-2: an independent polypropylene unit with all the controls of the VCU-1, plus an integral vacuum generator. The unit converts laboratory compressed air into a vacuum source, eliminating the need for a vacuum pump.

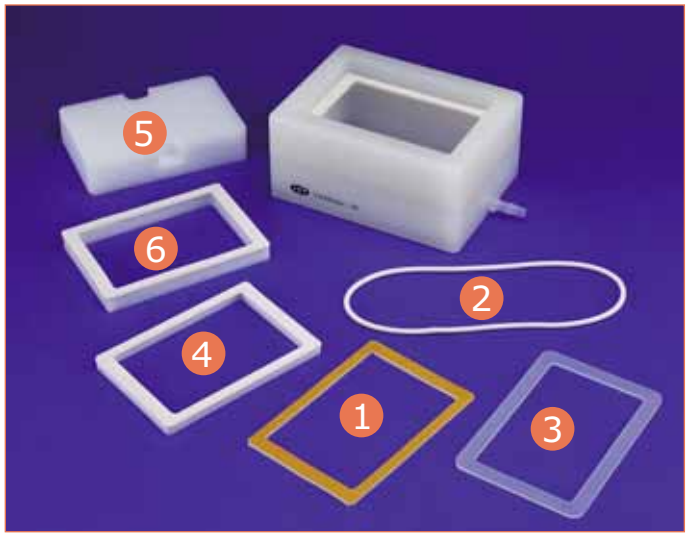
Ordering Information

Description	Quantity	Part number
VacMaster VCU-1	1	121-9601
VacMaster VCU-2	1	121-9602

Ordering Information

VacMaster-96 Accessories and Spare Parts

Description	Quantity	Part number
VacMaster-96 replacement gasket 1	1	121-9612
VacMaster-96 replacement o-ring 2	1	121-9613
Collection plate spacer (2 mm) for deep well collection plates 3	1	121-9614
Array insert (6 mm), acetal 4	1	121-9610
Collection plate spacer (29 mm) for shallow well collection plates 5	1	121-9615
VacMaster-96 insert (12 mm) for "shallow skirt" plates 6	1	121-9611



Sample Processing Accessories

VacMaster Trap Kit

The VacMaster Trap kit should be installed between the outlet of the sample processing manifold and the vacuum source, trapping all liquids aspirated through the manifold. The trap is compatible with VacMaster-10, -20 and -96 Sample Processing Manifolds. The kit consists of a 1 L polypropylene vacuum flask, polyethylene stopper with connectors, sealing gasket and 1.5 m vacuum tubing.

Features and Advantages

- Collect waste solvents and samples, cleanly and efficiently
- Prevent contamination of vacuum control units, removing spray of aspirated liquid
- Easy to clean components, reducing preparation time

Ordering Information

Description	Quantity	Part number
VacMaster Trap Kit (complete)	1	121-2095

VacMaster Drying Adapter

Prior to elution of analytes from an SPE column with water immiscible solvents, it is often necessary to dry the sorbent bed to achieve optimum and reproducible recoveries. The VacMaster Drying Adapter directs a stream of gas efficiently through the column, significantly reducing drying times compared to vacuum aspirated air flow. The adapter comes complete with all fittings for 1, 3 and 6 mL columns.

Features and Advantages

- Can be used with standard laboratory gas systems (e.g. nitrogen, air)
- Fast efficient SPE column drying
- Options for VacMaster-10 and VacMaster-20 sample processing manifolds

Ordering Information

Description	Quantity	Part number
VacMaster-10 Drying Adapter for 1,3 & 6 mL columns	1	124-1001
VacMaster-20 Drying Adapter for 1,3 & 6 mL columns	1	124-2001

Drying Adapters for other column sizes are available through our **Custom Manufacturing Service** (see **page 187-189**).

VacMaster Large Volume Extraction (LVE) Kit

The VacMaster Large Volume Extraction (LVE) Kit is designed to speed up processing of large volume samples using VacMaster Sample Processing Manifolds. PTFE tubing is placed into the sample container, and is secured with a tubing clip. The other end of the tubing is attached to the ISOLUTE SPE column using a column adaptor. When vacuum is applied, the sample is drawn through the inert tubing path and through the SPE column.

Each kit contains PTFE tubing (10 x 1 m lengths) with numbered tags, tubing clips (10) and column adaptors (10).

Features and Advantages

- Unattended loading of large volume samples
- PTFE components prevent sample contamination

Ordering Information

Description	Quantity	Part number
VacMaster LVE Kit for 1, 3 and 6 mL columns	1	121-2090

VacMaster LVE Kits for other column sizes are available through our **Custom Manufacturing Service (**see **page 187-189).**

IST Gravity Rack

The Biotage IST Gravity Rack is a free-standing rack for processing sample preparation columns using gravity. The rack is ideal for processing ISOLUTE HM-N columns in supported liquid extraction applications.

The rack is made of high density polyethylene, with excellent solvent resistance. The unique two part design ensures no cross contamination and easy access to extracts. Racks are available to accommodate 16 mm or 19 mm diameter collection tubes and are compatible with the whole range of PTFE stopcocks and needle units for additional flow control.

Features and Advantages

- Rack for gravity flow sample preparation applications
- Process up to 20 columns simultaneously

Ordering Information

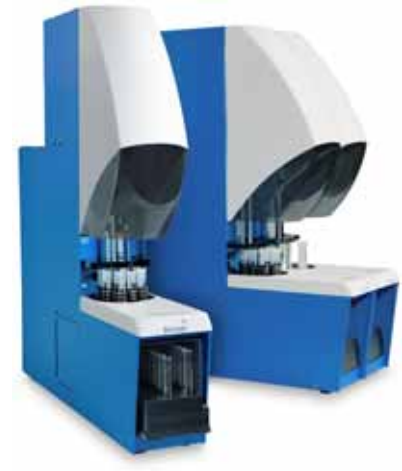
Description	Quantity	Part number
Gravity Rack		
IST Gravity Rack with 16 mm collection tube rack	1	123-2016
IST Gravity Rack with 19 mm collection tube rack	1	123-2019
Accessories		
Universal PTFE stopcock	10	121-0009
PTFE stopcock/needle unit	10	121-0001
PTFE needle unit	10	121-0002
Stainless steel needle	20	121-0003
Stainless steel needle retainer	10	121-0004

Automated Sample Processing Products

RapidTrace+
Automated High Throughput Solid Phase Extraction

RapidTrace®+ SPE Workstation

The RapidTrace+ is a robust automated platform for quickly developing rugged, reliable SPE methods in regulated pharmaceutical, clinical and forensic laboratories. The RapidTrace+ eliminates SPE bottlenecks so you can realize the full benefits of today's powerful analytical instruments.



The SPE Landscape

Advanced bioanalytical techniques like LC/MS/MS and GC/MS are meeting the increasing demand for greater speed and specificity in toxicological screening. Conventional sample preparation methods have not kept pace. Solid phase extraction (SPE) in particular, an essential step in the analysis of many biomolecules, has become a throughput limiting factor in many laboratories.

The New Solution

The RapidTrace+ is the perfect complement to high speed analytical techniques, a powerful high-throughput workstation dedicated specifically to SPE. In its fully modular configuration, a ten module workstation can process up to 100 samples per hour.

The RapidTrace+ delivers:

- More samples per headcount
- Faster turnaround of results
- Improved quality, precision, accuracy and sensitivity
- Consistency of preparation
- Compliance with regulatory requirements
- Improved safety
- Quick response to peak or unexpected work loads

Features and Advantages

- **NEW! Compatible with 1, 3, and 6 mL SPE Columns**
  Increased bed height enables the use of a wider range of SPE cartridges including all ISOLUTE® and EVOLUTE® bed masses allowing for flexibility in methodology.
- **NEW! Larger Sample Volumes**
  A new 5 position rack for 40 mL scintillation vials allows for larger sample volumes to be processed, often desired for food and environmental applications.
- **NEW! Delay Start Feature**
  Easily leave extracted samples unattended. Extracts are freshly prepared when you return.
- **Modular Design Allows for up to 10 Linked Units**
  The Modular design allows users to start with one module and expand up to 10 linked units. Modules within a group can run different methods independently and if one module is shut down for operator attention, other units remain operational so that sample throughput is not halted.
- **Accelerated Methods Development and Optimization**
  Utilizing the easy-to-use interface, it is simple to implement a structured, rational strategy for optimum SPE conditions in experiments.
- **Readily Transferable Methods**
  Methods stored in the RapidTrace+ controller can be instantly recalled and transferred to other units with 100% confidence.

- **Positive Pressure Syringe Displacement**
  Positive pressure displacement allows for accurate processing and improves reproducibility in flow rate sensitive methods.
- **Safety and Security**
  Enclosed working parts ensure operator safety and reduced exposure to solvents and hazardous compounds. Additionally, password protected control software limits access to methods ensuring method security. Combined with magnetically encoded racks, run initiation is simplified and the possibility of loading an incorrect procedure is reduced.
- **8 Solvent Inlet Lines**
  Allows for more flexible use of solvents and provides an excellent system for method development.
- **Segregated Waste Lines**
  Four segregated output lines allow for easy separation of aqueous, organic and biological waste. Useful to simplify hazardous waste handling and reduce disposal costs.
- **Simple and Reliable**
  Simple, rugged design with a minimum of moving parts and easily accessible consumables allows for a robust system with minimum "down-time".

Compliance Validation

Each unit includes a Validation Manual that allows operators to walk through the validation process of their RapidTrace+. This ensures that the instrument provides the consistently clean extracts required for today's sophisticated analytical instruments and regulatory bodies. The Validation Plan defines the methods and the documentation utilized in the development, execution and reporting of a validation for a RapidTrace+. It addresses installation, operation and performance qualification. This comprehensive document enables operators to meet GLP, GMP and GOP requirements.

Ordering Information

Description	Quantity	Part number
RapidTrace+ Workstation, 1 mL and 3 mL (10 columns)	1	C50000
RapidTrace+ Workstation, 6 mL (5 columns) 3 mL and 1 mL only, with appropriate plunger (see accessories)	1	C125713
RapidTrace Start-Up Kit with Software	1	C52006
RapidTrace Notebook Controller	1	C52689
Racks (Each RapidTrace+ requires one rack)		
13 x 100 mm Sample Tube 12 x 75 Fraction Tube	1	C50974
13 x 100 mm Sample Tube 12 x 75 Fraction Tube	Pk/5	C50976
13 x 100 mm Sample Tube 13 x 100 mm Fraction Tube	1	C58309
16 x 100 mm Sample Tube 16 x 100 mm Fraction Tube	1	C56786
13 x 100 mm Sample Tube 12 x 75 mm Fraction Tube (9 Position Chilled Rack)	1	C56536
40 mL sample flask (5 position) 16 x 100 Fraction Tube (10 position)	1	C133968

Applications

Application number	Analyte	Matrix	Format	Part number	Industry	Page
AN727	Basic Drugs of Abuse	Biological fluids	RapidTrace and ISOLUTE HCX, 200 mg/3 mL column	902-0020-B	Forensic	46
AN725	Benzoylecgonine	Urine	RapidTrace and ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	Forensic	46
AN744	Catecholamines	Plasma	RapidTrace and EVOLUTE WCX, 50 mg/3 mL column	612-0005-B	Clinical	26
AN728	Cyclosporine	Whole blood	RapidTrace and ISOLUTE SI, 500 mg/3 mL column	460-0050-B	Clinical	60
AN730	Environmental contaminants including Dioxins and Furans	Soil and sediments	RapidTrace and ISOLUTE NH2, 500 mg/3 mL column	470-0050-B	Environmental	52
AN748	Ethyl Glucuronide	Urine	RapidTrace+ and EVOLUTE AX 100 mg/3 mL column	613-0010-B	Forensic	26
AN749	Melamine	Milk	RapidTrace+ and EVOLUTE CX 100 mg/3 mL column	611-0010-B	Food	26
AN729	Morphine and Codeine	Urine	RapidTrace and ISOLUTE HCX, 200 mg/3 mL column	902-0020-B	Forensic	46
AN704	Extractable petroleum hydrocarbons	Soil	RapidTrace and ISOLUTE EPH, 1.45g/3 mL column	928-0145-B	Environmental	138
AN726	Tricyclic Antidepressants	Whole blood	RapidTrace and ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	Clinical	46
AN724	Vitamin D	Plasma	RapidTrace and ISOLUTE C18 (EC), 200 mg/3 mL column	221-0020-B	Clinical	33

Visit the Sample Preparation Application Database at **www.biotage.com/applications**

Evaporation

SPE Dry 96 & 96 Dual
Sample Concentrator System

SPE Dry™ 96

Solvent evaporation prior to analysis is a time consuming process during analytical sample preparation and with the increasing use of high throughput formats and short analytical cycle times, it can become a bottleneck.

The SPE Dry 96 and SPE Dry 96 Dual Sample Concentrator Systems offer fast, efficient solvent evaporation from 96-well plate formats. Both systems deliver heated gas from above and below the plate, ensuring rapid, reproducible evaporation for a range of commonly used solvents. The systems are ideal for solvent evaporation following SPE, supported liquid extraction (SLE) and protein precipitation applications.

SPE Dry 96 and SPE Dry 96 Dual systems are supplied with removable stainless steel needles. For applications that use aggressive solvents and buffers, PTFE coated needles are available.

Features and Advantages

- Fast, efficient solvent evaporation from 96-well plates
- Rapid equilibration and precise temperature control
- Compact size/small footprint
- Single and dual plate options
- Also compatible with 48-well and 384-well formats
- PTFE coated needle options for added solvent resistance
- 384-well heads for use with common plate sizes are available

Ordering Information

SPE Dry 96 Sample Concentrator System

Description	Part number
SPE Dry 96 Sample Concentrator System, 110 V, USA	SD-9600-DHS-NA
SPE Dry 96 Sample Concentrator System, 240 V, UK	SD-9600-DHS-UK
SPE Dry 96 Sample Concentrator System, 240 V, Europe	SD-9600-DHS-EU
SPE Dry 96 Sample Concentrator System, 110 V, Japan	SD-9600-DHS-JP

SPE Dry 96 Dual Sample Concentrator System

Description	Part number
SPE Dry 96 Dual Sample Concentrator System, 110 V, USA	SD2-9600-DHS-NA
SPE Dry 96 Dual Sample Concentrator System, 240 V, UK	SD2-9600-DHS-UK
SPE Dry 96 Dual Sample Concentrator System, 240 V, Europe	SD2-9600-DHS-EU
SPE Dry 96 Dual Sample Concentrator System, 110 V, Japan	SD2-9600-DHS-JP

TurboVap® Product Family

Biotage offers a range of TurboVap Concentration Workstations for sample evaporation. This section is designed to help you select the most suitable TurboVap for your research requirements as well as answer some of the more common questions regarding services, maintenance and applications.

Biotage TurboVap units use a patented vortex evaporation system that increases the speed of evaporation by a factor of 10 compared with other techniques. The combination of gas flow and temperature is used to optimize sample drying. Nitrogen is recommended due to its inert nature which minimizes sample oxidation. Alternatively, clean, oil free compressed air at 60 psi can be used if the sample is stable and nitrogen is not available.

As gas usage can be high, if large numbers of samples are prepared, a nitrogen generator or bulk liquid nitrogen supply is recommended to minimize cylinder handling.

TurboVap LV

Volume Range 1 mL to 60 mL

The TurboVap LV is ideal for sample volumes of 1 mL to 30 mL that need to be evaporated in GC vials, microcentrifuge tubes, conical bottom tubes or test tubes. This instrument offers a high throughput of 50 sample positions using the standard range of racks available. Evaporation is based on a water bath to give an even temperature and a gas flow delivered over a set time period. This combination gives the option to evaporate samples to dryness if required and reconstitute with an alternative solvent. If you need to evaporate acidic solutions, Biotage offer Teflon coated nozzles instead of stainless steel nozzles to prevent corrosion.

Compatible with Dionex ASE

For volumes greater than 30 mL, Biotage offers the ASE version of the TurboVap LV - compatible with Dionex ASE 200 columns. This has 24 sample positions and comes with a rack that has a removable shelf allowing either 40 mL or 60 mL Dionex tubes to be used.

Key Applications

The TurboVap LV can be used in environmental, forensic, clinical chemistry, food and pharmaceutical laboratories for the concentration of solvents following solid phase extraction clean up of drug samples or pesticide extracts. The TurboVap LV can also be used in conjunction with the RapidTrace+ Automated SPE workstation that collects extracts in 12 mm x 75 mm, 13 mm x 100 mm or 16 mm x 100 mm test tubes.

TurboVap II

Volume Range 50 mL to 200 mL

The TurboVap II is ideal for evaporation of large volumes after performing liquid-liquid extractions. The instrument has 6 sample positions and uses special glass tubes with either a 1 mL or 0.5 mL end point. The glassware and optical sensors automatically stop gas flow when evaporation has reached its end-point and allows for concentration of samples without the risk of drying thus preventing the loss of volatile compounds. TurboVap II takes up only a fraction of the bench space used by conventional rotary evaporators and can be used outside a fume cupboard like the TurboVap LV by using the integral vent tube. For solvent extracts in hexane, dichloromethane, acetonitrile and methanol we recommend a temperature of 40 °C as this minimizes thermal degradation and loss of most volatiles by allowing the cool gas to condense components while offering a rapid removal of solvent. Systems are available for 40 mL Dionex tubes with stem endpoint detection. Upgrade kits to adapt your current TurboVap II are also available.

Key Applications

The main application areas for the TurboVap II are food, water, soil and environmental solvent extraction.

TurboVap 500

Volume Range up to 500 mL

The TurboVap 500 has two 500 mL end point vessels and can evaporate solvent to a 1 mL or 0.5 mL end point. A water bath is used to maintain a stable temperature, whilst variable speed fan motors provide for vortex evaporation, enabling the unique ability of the cooled glassware to condense and collect the solvent. This allows for optimal evaporation conditions to prevent losses as the condensed solvent can be analyzed for carry over.

Key Applications

The ability to take a large solvent sample makes the determination of residue on evaporation possible. It can be used in laboratories where access to gas supplies is difficult which makes it ideal for portable installations on marine science boats and use in remote locations. If a laboratory has limited fume hood extraction then this is also an excellent choice.

TurboVap 96

Deep or Shallow 96 Well Plates

The TurboVap 96 has two independent compartments that can accommodate 1 mL or 2 mL standard or deep well plates. Each compartment has independent control of gas flow and temperature. The flow rate of the gas is determined by the volume of solvent in the plate and the temperature values can be set with the help of an evaporation guide supplied. Nozzles are easy to clean and require minimal maintenance.

Key Applications

Genomic and proteomic applications that require concentration of purified extracts. The evaporation of DMSO from plates is a common application in addition to HPLC aqueous solvent mixtures of methanol or acetonitrile. The Turbovap 96 complements automated 96 well SPE workstations that are widely used for drugs of abuse determination and other pharmaceutical SPE methods.

General Maintenance and Useful Tips (not applicable to TurboVap 96)

- The lid should be left open between use to prevent the build-up of condensation.
- De-ionized or distilled water should be used to prevent a limescale build up in the water bath and glassware should be changed at least once a month. If chlorinated solvents are used then frequent water changing is recommended.
- Clear bath solution provided is used to keep the water clear and free from algae.
- The siphon pump provided should be used to empty the water quickly and safely.

Individual brochures and leaflets are available on each of the instruments along with information on the test tube sizes, evaporation rate guides, specifications and some application notes. For further information please visit **www.biotage.com**.

Ordering Information

Description	Part number
TurboVap 500, 100/120V, 50/60Hz	C103202
TurboVap 500, 200/220V, 50/60Hz	C103203
TurboVap 96, 120 VAC	C103263
TurboVap 96, 220 VAC	C103264
TurboVap II, 200 mL with 0.5 mL Endpoint Stem, 120V	C103186
TurboVap II, 200 mL with 1.0 mL Endpoint Stem, 115V	C103187
TurboVap II, 50 mL with 0.5 mL Endpoint Stem, 110V	C103188
TurboVap II, 50 mL with 1.0 mL Endpoint Stem, 110V	C103189
TurboVap II, 200 mL with 0.5 mL Endpoint Stem, 220V	C103190
TurboVap II, 200 mL with 1.0 mL Endpoint Stem, 220V	C103192
TurboVap II, 50 mL with 0.5 mL Endpoint Stem, 220V	C103193
TurboVap II, 50 mL with 1.0 mL Endpoint Stem, 220V	C103194
TurboVap II, 40 mL Dionex ASE Vial Compatible, 110V	C103196
TurboVap II, 40 mL Dionex ASE Vial Compatible, 220V	C103197
TurboVap LV without Racks, 120V	C103198
TurboVap LV without Racks, 230V	C103199
TurboVap LV, ASE, 40/60 mL vial, 110V	C103200
TurboVap LV, ASE, 40/60 mL vial, 230V	C103201
Tube Rack (for 16 x 100 mm tubes P/N C40708) 250 tubes included	C44139
Tube Rack (16 x 100 mm-Prelude compatible, C40708)	C44283
Tube Rack (for 16 x 125 mm tubes P/N C45273) 250 tubes included	C45269
Tube Rack (for 12 x 75 mm tubes P/N C44651) 250 tubes included	C44577
Tube Rack (for 13 x 100 mm tubes P/N C40707) 250 tubes included	C45286
Tube Rack (for 20 x 150 mm tubes P/N C40709) 250 tubes included	C44282
Tube Rack (for 10 x 75 mm tubes P/N C48985) 250 tubes included	C48950
Tube Rack (for 15 mL Conical Centrifuge Tubes P/N C44941) 125 tubes included	C44880
Tube Rack (15 mL Autotrace tubes with conical bottom, C47816)	C47818
Tube Racks (10 mL conical tubes C47811)	C47820
Tube Rack (1.5-2.0 mL flip cap microcentrifuge tubes)	C48928
Tube Rack (1.5-2.0 mL screw cap microcentrifuge tubes)	C48929
Tube Rack (GC vials)	C59546
Tube Rack (IChem Vials)	C61345

Applications and Products for Bioanalysis

Bioanalytical
Applications and Products for Bioanalysis

In today's bioanalytical laboratory, reliable, high throughput sample preparation techniques are essential. IST Sample Preparation Products from Biotage provide a range of solutions matching the throughput requirements and sample clean up needs of the drug development process.

Biotage is dedicated to developing sample preparation products that solve the daily challenges faced by bioanalytical scientists. For example, our product development program is strongly influenced by the need to reduce matrix effects in LC-MS, without compromising speed or simplicity of sample preparation.

Generic methodologies optimized for extraction of small volumes of biological fluids are available for most products, minimizing method development time and enhancing productivity.

With the increasing use of automation in sample preparation, another focus is the development of reliable, easily automated techniques and procedures, which can maximize the use of liquid handling systems. Biotage supplies a range of 96-well and conventional column products, compatible with all commonly used automated systems.

Products for Bioanalytical Sample Preparation

Technique	Products	Analyte functionality	Extract cleanliness	Features/advantages
Protein Precipitation (PPT)	ISOLUTE PPT+ Protein Precipitation Plates	Simultaneous extraction of acidic, basic or neutral compounds	Protein removal only.	A fast and simple technique for removal of proteins from biological fluid samples. Non-selective technique, suitable for extraction of a broad range of compounds; extracts can give relatively high levels of ion suppression.
Supported Liquid Extraction (SLE)	ISOLUTE SLE+ Supported Liquid Extraction Plates	• Acidic, basic and neutral* • Acidic and neutral* • Basic and neutral*	Dependent on choice of extraction solvent.	An easily automated technique, analogous to liquid-liquid extraction. Allows removal of proteins and phospholipids from bioanalytical fluid samples.
Solid Phase Extraction (SPE)	ISOLUTE and EVOLUTE SPE Products	• Simultaneous extraction of acidic, basic or neutral compounds • Acidic only • Basic only • Class fractionation	Dependant on sorbent choice. Improved clean-up compared with protein precipitation.	Depending on sorbent choice, can provide high analyte recoveries of a broad range of compounds, or extremely selective extraction of specific compounds with very clean extracts.
Molecularly Imprinted Polymers (SPE)	AFFINILUTE MIPs	High selectivity based on the structure of the analyte of interest.	Lower detection limits due to cleaner extracts.	Highly selective giving reduced matrix effects and ion suppression as interferences can be washed from the columns using stringent conditions.

*Analytes must be soluble in water immiscible solvents.

ISOLUTE PPT+ Protein Precipitation Plates

ISOLUTE PPT+ Protein Precipitation Plates provide effective, high throughput, protein removal from plasma samples. The simple filtration based procedure is easily automated, and is applicable to a wide range of drugs and metabolites.

See **page 81-83** for more details and ordering information.

ISOLUTE SLE+ Supported Liquid Extraction Plates and Columns

ISOLUTE SLE+ Supported Liquid Extraction Plates are optimized for reliable high throughput extraction of 96 samples simultaneously using liquid handling systems. Up to 400 µL of aqueous sample can be extracted per extraction well.

For applications using ISOLUTE SLE+ relevant to the bioanalytical market please visit:
www.biotage.com/applications
some of the applications you'll find include:

AN 601: Extraction of Tricyclic Antidepressants from Plasma Using ISOLUTE SLE+ Supported Liquid Extraction Plates

AN 602: Extraction of Corticosteroids from Plasma using ISOLUTE SLE+ Supported Liquid Extraction Plates

AN 603: Extraction of Non-steroidal Anti-inflammatory Drugs (NSAIDs) from Plasma using ISOLUTE SLE+ Supported Liquid Extraction Plates

Biotage now offer ISOLUTE SLE+ in column format in order to meet the increasing need for larger sample volumes and automation. The columns perform as well as the 96 well plates but allow for greater flexibility so that you can analyze the samples you need to in a way that best suits your laboratory's existing and future applications.

See page 73-78, 185 for more details and ordering information.

Supported Liquid Extraction User Guide

ISOLUTE SLE+ supported liquid extraction is a quick, easy and cost effective sample preparation solution for analytical chemistry. The Biotage SLE+ User Guide provides a simple 4-step method development guide and outlines the simple and efficient 3-step sample processing procedure of load your sample, wait 5 minutes and elute. To request a copy please visit **www.biotage.com**.

AFFINILUTE MIPs

Biotage AFFINILUTE MIPs are a range of SPE phases that offer bioanalytical chemists ultimate selectivity compared with standard solid phase extraction techniques. The molecularly imprinted technology allows specific analytes to be extracted at much lower detection limits than previously possible and has been developed to target analytes that have traditionally been difficult to clean up at low levels. **See page 15-19** for more details.

Solid Phase Extraction (SPE) Products

Biotage manufactures a comprehensive range of solid phase extraction products. These include both EVOLUTE and ISOLUTE polymer based and silica based sorbents which have different but complementary extraction characteristics. The range includes sorbents offering a choice of non-polar, mixed-mode and ion exchange retention mechanisms for extraction of drugs and metabolites from biological fluids. Depending on the assay requirements, the SPE method can be tailored to deliver high recoveries of a range of acidic, basic and neutral drugs using a single generic method, or highly selective extraction of a single drug with a very clean extract that exhibits minimal ion suppression.

EVOLUTE Sample Preparation Products

EVOLUTE SPE columns and plates are ideal for extraction of drugs and metabolites from biological fluid samples. EVOLUTE sorbents have a uniquely modified surface structure that is water wettable, to promote robust, reliable sample preparation. They also have an optimized pore structure that minimizes the retention of high molecular weight endogenous materials present in complex sample matrices. The result is cleaner extracts, compared to other leading polymer based SPE products.

EVOLUTE ABN: a hydrophobic/hydrophilic balanced sorbent for simultaneous extraction and clean up of acidic, basic and neutral analytes.

EVOLUTE CX: a mixed-mode strong cation exchange sorbent for selective extraction of basic analytes.

EVOLUTE WCX: a mixed-mode weak cation exchange sorbent for selective extraction of basic analytes including quaternary amines, using acidic elution conditions.

EVOLUTE AX: a mixed-mode strong anion exchange sorbent for selective extraction of acidic analytes.

EVOLUTE WAX: a mixed-mode weak anion exchange sorbent for selective extraction of acidic analytes including phosphates and sulphonic acids.

See **page 21-27** for more details and ordering information.
Application notes for EVOLUTE products are available through **www.biotage.com/applications**

ISOLUTE ENV+

ISOLUTE ENV+ SPE columns and plates are ideal for extraction of extremely polar compounds which are not retained on EVOLUTE ABN. The sorbent is suitable for extraction of polar acidic, basic and neutral drugs and metabolites from biological fluids.

See **page 30** for more details and ordering information.

ISOLUTE Non-polar SPE Products

Available in a range of column and plate formats, ISOLUTE non-polar sorbents offer a range of choices for the extraction of acidic, basic and/or neutral compounds from biological fluid samples.

The hydrophobic character of the non-polar sorbent decreases with chain length. C18 and C8 are commonly used non-polar sorbents, capable of extracting compounds of wide ranging polarity. Extract cleanliness can be enhanced for compounds with significant non-polar character by using a shorter chain length non-polar sorbent (e.g. ISOLUTE C2). This will allow more polar interferences to be removed from the column prior to analyte elution. Request Chemistry Data Sheet **TN126** for more details.

The secondary interactions provided by non-endcapped non-polar sorbents can enhance the extraction of basic drugs from biological fluids, giving higher recoveries and cleaner extracts than endcapped non-polar sorbents. Request Chemistry Data Sheet **TN112** for more details.

See page 30-37, 156-159 for more details and ordering information.

ISOLUTE Mixed-mode SPE Products

A range of ISOLUTE mixed-mode SPE sorbents are available, providing mixed-mode retention mechanisms suitable for extraction of most drug(s) and metabolites.

Selection of mixed-mode generic SPE sorbent by analyte class

Drug/Analyte Class	ISOLUTE HAX	ISOLUTE HCX	ISOLUTE HCX-3	ISOLUTE HCX-5	ISOLUTE HCX-Q[a]
Acidic	✓				
Basic		✓	✓	✓	
Basic / lipophilic		✓		✓	
Basic (pK > 11)					✓
Polybasic					✓
Quaternary amine					✓

[a]Optimum sorbent for basic drugs where it is difficult or impossible to eliminate positive charge(s) using pH.

See **pages 46-51, 160-163** for more details and ordering information.

ISOLUTE Ion Exchange Sorbents

- ISOLUTE cation exchange sorbents for extraction of basic drugs
- ISOLUTE anion exchange sorbents for extraction of acidic drugs

For very polar, ionizable compounds that cannot be retained using a non-polar retention mechanism, ISOLUTE ion exchange sorbents offer an alternative that can provide selective extraction with very clean extracts.

See **pages 52-59, 164-167** for more details and ordering information.

The QuickStart Guide at the back of this catalog provides methodology details for these sorbents. Chemistry Data Sheets are also available, see relevant sorbent ordering pages.

Formats for High Throughout Sample Preparation

96-well plates from Biotage are available in two formats: fixed well plates for routine high throughput applications and the modular Array format for routine processing of fewer than 96 samples and method development. Both formats are processed on the VacMaster-96 Sample Processing Manifold and are compatible with commonly used liquid handling systems. See **page 11-13** for more details.

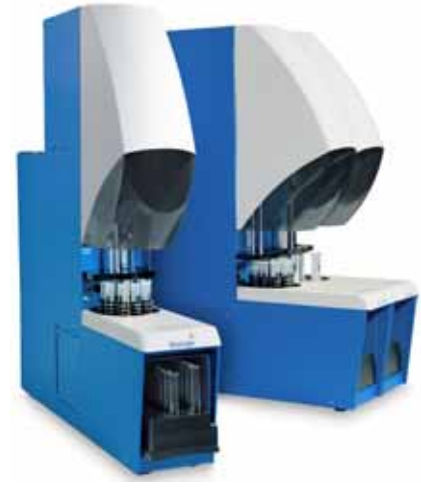
Tabless and standard SPE columns

Standard 1 and 3 mL SPE columns can be processed on liquid handling systems for automated sample preparation. Some systems, including the Gilson SPE 215, require tab-less columns held in a rack system that allows a microplate footprint. Tabless columns are available from Biotage at the same price as the 'tabbed' equivalent. Contact Biotage for details.

Ordering information for high throughput formats can be found on the relevant sorbent page.

RapidTrace®+ SPE Workstation

The RapidTrace+ SPE Workstation is a modular, highly scalable, automated sample preparation platform designed for high throughput. Units are available to accommodate 1 mL, 3 mL, or 6 mL industry standard SPE cartridges and can process up to 100 samples in less than two hours. Analysis of samples can then be effectively performed using either LC-MS/MS or GC/MS.



Application note AN 1081A Extraction of NIDA-5 (SAMHSA-5) Analytes using RapidTrace, as well as many other applications are available to download from **www.biotage.com/applications**

Bioanalytical Applications

Application number	Analyte	Matrix	Format	Part number	Page
IST1044A	Acidic, Neutral and Basic Drugs	Urine	ISOLUTE HCX, 130 mg/10 mL column	902-0013-H	46, 128
AN702	Basic Drugs	Plasma	EVOLUTE CX, 25 mg Array fixed-well plate	601-0025-P01	25
AN707	β-Blockers	Biological Fluids	AFFINILUTE MIP, 25 mg/3 mL or 25 mg/10 mL column	M18-0002-B M18-0002-G	17, 127, 137 17, 127, 137
AN603	Non-steroidal Anti-inflammatory Drugs (NSAIDs)	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN721	Tamoxifen	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN722	Tamoxifen	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN731	Therapeutic and Illicit Drugs of Abuse	Biological Fluids	ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	46, 128
AN601	Tricyclic Antidepressants	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN726	Tricyclic Antidepressants	Whole Blood	RapidTrace and ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	46, 128
AN734	Warfarin	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76

Visit the Sample Preparation Application Database at **www.biotage.com/applications**

Applications and Products for Forensic and Clinical Analysis

Forensic and Clinical

Applications and Products for Forensic and Clinical Analysis

Biotage manufactures a wide range of products for use in the area of forensic toxicology and doping control in animal and human sports.

EVOLUTE® SPE Columns

Developed specifically for analyte quantification by LC-MS/MS, EVOLUTE products provide a highly effective solution to the problems of ion suppression and matrix effects from dirty extracts. All EVOLUTE sorbents are now available in 50 µm large format columns that allow for the larger volume and more viscous sample matrices encountered in forensic analysis.

EVOLUTE ABN is an advanced water-wettable polymer-based sorbent that extracts acidic, basic and neutral analytes from biological fluids and other aqueous matrices. A generic approach can be adopted to extract a wide range of compounds from a range of matrices, thus reducing method development time while producing super clean extracts.

EVOLUTE CX is a mixed-mode polymer-based SPE sorbent for the isolation of basic drugs from biological fluids; ideal for the extraction of forensically significant drugs of abuse from urine, saliva or blood. Optimized sorbents provide clean extracts with minimal problematic LC-MS/MS matrix effects due to proteins, salts and phospholipids.

See **www.biotage.com/applications** for application note AN702 Extraction of Basic Drugs from Plasma using EVOLUTE CX.

EVOLUTE WCX is a weak cation exchange mixed-mode polymer-based SPE sorbent for extraction of basic drugs including quaternary amines, using acidic elution conditions.

EVOLUTE AX: a mixed-mode strong anion exchange sorbent for selective extraction of acidic analytes.

EVOLUTE WAX: a mixed-mode weak anion exchange sorbent for selective extraction of acidic analytes including phosphates and sulphonic acids.

See **page 21-26** for ordering information

ISOLUTE® SLE+ Supported Liquid Extraction

ISOLUTE SLE+ Supported Liquid Extraction plates and columns offer an efficient alternative to traditional liquid-liquid extraction (LLE) and can cut sample preparation time in half. Utilizing a generic and simple methodology it is possible to extract a range of drugs from a variety of biological fluids. It is possible to adapt your current liquid-liquid methods to SLE+, improving efficiency and allowing for automation and higher throughput.

Application note AN723 for THC and metabolites from Plasma using Supported Liquid Extraction (SLE) prior to LC-MS/MS Analysis available at **www.biotage.com/applications**

Application note AN720 for the extraction of Vitamin D and Metabolites: Evaluation of Supported Liquid Extraction (SLE) prior to LC-MS/MS Analysis available at **www.biotage.com/applications**

Application notes AN721 and AN722 for the extraction of Tamoxifen and metabolites from urine and plasma respectively are available at **www.biotage.com/applications**

AFFINILUTE® MIP

Biotage AFFINILUTE MIPs are a range of SPE phases based on molecularly imprinted polymers that offer analytical chemists the ultimate in selectivity compared with standard solid phase extraction techniques. The selectivity of the molecularly imprinted polymers can be effective in the extraction of drugs that are traditionally difficult to extract due to matrix complexities or analyte structure.

Description	Quantity	Part number
AFFINILUTE MIP Amphetamines 25 mg/3 mL	50	M28-0002-B
AFFINILUTE MIP β-blockers 25 mg/10 mL	50	M18-0002-G
AFFINILUTE MIP β-blockers 25 mg/3 mL	50	M18-0002-B
AFFINILUTE MIP NNAL 25 mg/10 mL	50	M06-0002-G
AFFINILUTE MIP NNAL 25 mg/3 mL	50	M06-0002-B
AFFINILUTE MIP TSNAs 50 mg/10 mL	50	M10-0002-G
AFFINILUTE MIP TSNAs 50 mg/3 mL	50	M10-0002-B

Products for Doping Control Applications

ISOLUTE C8, C18 and ENV+ columns are ideal for applications in doping control in sport such as the extraction of steroids and their glucuronide and sulphate metabolites from human urine. For example, ISOLUTE C8 is used to extract 5 α–dihydrotestosterone from athlete's urine (ref. Kicman et al, Clinical Chemistry, 1995, 41/11, 1617-1627).

For ISOLUTE non-polar sorbents ordering information, see **pages 30-45, 156-159**.

ISOLUTE HCX Columns for High Extract Purity

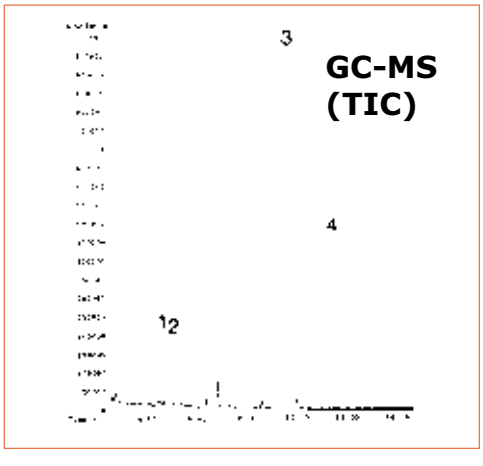


Figure 1. Chromatogram (GC-MS in TIC mode) was obtained by extracting 5 mL urine spiked at the NIDA cut-off level of 100 ng/mL with:
1. Amphetamine 2. Methamphetamine
3. Phencyclidine 4. Cocaine

Extract basic drugs from biological fluids with ISOLUTE HCX mixed-mode SPE columns that provide two primary retention mechanisms, non-polar (C8) and strong cation exchange.

This dual retention mechanism allows a rigorous interference elution regime to be used without reducing recovery of the analytes of interest compared with non-selective LLE, resin or C18 based methodologies. ISOLUTE HCX columns provide extremely high purity extracts of drugs of abuse from biological fluids such as urine, plasma and whole blood (see **Figure 1**).

Biotage's range of reservoirs and sorbent bed mass options ensure automation compatibility and capacity requirement of diverse sample matrices such as hydrolyzed hair, equine urine and whole blood. Improved flow characteristics for more viscous samples, reducing the possibility of column plugging, is provided by wider column diameters.

Ordering Information

Description	Quantity	Part number
ISOLUTE HCX 25 mg/1 mL [1,2]	100	902-0002-A
ISOLUTE HCX 50 mg/1 mL [2]	100	902-0005-A
ISOLUTE HCX 130 mg/1 mL [3]	100	902-0013-A
ISOLUTE HCX 130 mg/3 mL [3]	50	902-0013-B
ISOLUTE HCX 130 mg/6 mL [4,5]	30	902-0013-C
ISOLUTE HCX 130 mg/10 mL [3]	50	902-0013-H
ISOLUTE HCX 300 mg/6 mL [5]	30	902-0030-C
ISOLUTE HCX 300 mg/10 mL [6]	50	902-0030-H

[1] Configuration optimized to achieve minimum elution volumes (< 100 µL) with optimized elution solvent
[2] Suitable for hydrolysed hair extraction/clean-up
[3] Standard configurations for drugs of abuse confirmation testing (up to 5 mL urine sample size)
[4] Optimized for gravity loading of solvents and urine samples onto the column
[5] Suitable for equine urine extraction
[6] Used to extract 5 - 10 mL urine when screening for drugs of abuse

See page 46 for the complete range of ISOLUTE Confirm HCX SPE products

Sample Preparation Methods for Drugs of Abuse

A series of well defined protocols using industry standard 130 mg ISOLUTE HCX columns is available. Based on extraction of 5 mL urine samples, high recoveries (> 90%) of the main DOA classes are ensured. Extracts are suitable for TLC screening and GC-MS confirmation at the NIDA specified cut-off levels.

Application Notes for ISOLUTE HCX columns

Analyte	Application Note
Amphetamine and methamphetamine	IST1034
Barbiturates	IST1032
Cocaine and benzoylecgonine	IST1002
Opiates (codeine and morphine)	IST1050
LSD	IST1041
Phencyclidine	IST1039
Fractionation of basic, neutral and acidic drugs of abuse	IST1044

All Application notes are available to download from **www.biotage.com/applications**

Simplified Single Column Methodology for Automated Drugs of Abuse Testing

Based on the robust chemistry of ISOLUTE HCX, Biotage has developed a simple, single column approach that can be used for the extraction of all NIDA-5 (SAMHSA-5) drugs of abuse classes. The SPE methodology, designed for use with the Biotage RapidTrace+ uses only eight solvents in total.

Request Application Note **IST1081** for more information.

Toxicological Screening Using ISOLUTE 101 SPE Columns

ISOLUTE 101 is a non-selective polymeric sorbent used in toxicological screening for a wide range of drug classes from biological fluids. The 500 mg/6 mL column configuration (part number 101-0050-C) has been successfully applied to screening more complex samples such as post-mortem blood and tissue (ref. Stimpfl et al, J. Anal. Toxicol., 2001, 25 (2): 125-129).

See Application Note **IST1069** for more information available at **www.biotage.com/applications**
See page 31 for ISOLUTE 101 SPE column ordering information.

ISOLUTE THC SPE Columns for the extraction of 11 Nor-Δ^9-THC-9-carboxylic acid from urine

ISOLUTE THC columns are designed for the rapid, cost effective extraction of the THC carboxylic acid metabolite from urine prior to confirmation analysis by GC-MS. The robust procedure, based on a non-polar retention mechanism, has been shown to be most effective for THC metabolite confirmation testing.

Application Note **IST1001** describes the extraction of the THC metabolite from urine.

Ordering Information

Description	Quantity	Part number
ISOLUTE THC 100 mg/1 mL	100	292-0010-A
ISOLUTE THC 50 mg/10 mL	50	292-0005-G
ISOLUTE THC 100 mg/3 mL	50	292-0010-B

ISOLUTE HAX SPE columns

Ideal for high purity extraction of acidic drugs from biological fluids, ISOLUTE HAX SPE columns contain both non-polar (C8) and strong anion exchange ($-NR_3^+$) functional groups.

Application Note **IST1035** describes the use of the ISOLUTE Confirm HAX column for the extraction of the THC metabolite from urine.

Ordering information for ISOLUTE HAX SPE columns can be found on **page 50**.

RapidTrace®+ SPE Workstation

The RapidTrace+ SPE Workstation is a modular, highly scalable, automated Sample Prep platform designed for high throughput. Units are available to accommodate 1 mL, 3 mL, and 6 mL industry standard SPE cartridges and can process up to 100 samples in less than two hours.

The RapidTrace+ excels in automating low volume solid phase extractions and has proven to be highly effective in high throughput forensic laboratories for the extraction of drugs of abuse from various biological matrices including urine and oral fluid. Analysis of samples can then be effectively performed through either LC-MS/MS or GC/MS.

For more details of RapidTrace+ application for the forensic and clinical market, please refer to the sample prep data base on **www.biotage.com/applications.**

Forensic Applications

Application number	Analyte	Matrix	Format	Part number	Page
IST1044A	Acidic, Neutral and Basic Drugs	Urine	ISOLUTE HCX, 130 mg/10 mL column	902-0013-H	46, 128
IST1034A	Amphetamine and Methamphetamine	Urine	ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	46, 128
AN708	Amphetamines	Urine	AFFINILUTE MIP, 25 mg/3 mL column	M28-0002-B	17, 127
AN742	Amphetamines	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN746	Amphetamines	Urine	ISOLUTE SLE+, 1 mL column	820-0140-C	76
IST1032A	Barbiturates	Urine	ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	46, 128
AN727	Basic Drugs of Abuse	Biological fluids	RapidTrace and ISOLUTE HCX, 200 mg/3 mL column	902-0020-B	46
AN725	Benzoylecgonine	Urine	RapidTrace and ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	46, 128
IST1002A	Cocaine and Benzoylecgonine	Urine	ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	46, 128
AN736	Cocaine, Benzoylecgonine and Cocaethylene	Whole blood and human tissue	ISOLUTE HCX, 130 mg/10 mL column	902-0013-H	46, 128
AN719	Cocaine and metabolites	Biological fluids	EVOLUTE CX, 25 mg fixed well plate	601-0025-P01	25

Forensic Applications continued

Application number	Analyte	Matrix	Format	Part number	Page
AN718	Ethyl Glucuronide (EtG)	Urine	EVOLUTE AX, 25 mg Array fixed well plate and other formats	603-0025-P01	25
AN748	Ethyl Glucuronide (EtG)	Urine	RapidTrace and EVOLUTE AX, 100 mg/3 mL column	613-0010-B	26
IST1041A	LSD	Whole Blood	ISOLUTE HCX, 130 mg/10 mL column	902-0013-H	46, 128
AN743	Mephedrone	Biological fluids	EVOLUTE CX, 25 mg Array fixed well plate	601-0025-P01	25
AN729	Morphine and Codeine	Urine	RapidTrace and ISOLUTE HCX, 200 mg/3 mL column	902-0020-B	46
IST1081	NIDA-5 (SAMHSA-5)	Urine	ISOLUTE HCX, 130 mg/1 mL column	902-0013-A	46, 128
AN741	Opiates	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate and ISOLUTE SLE +, 1 mL column	820-0200-P01 820-0140-C	76 76
IST1019A	Phencyclidine	Meconium	ISOLUTE HCX, 200 mg/10 mL column	902-0020-H	46
IST1039A	Phencyclidine	Urine	ISOLUTE HCX, 130 mg/1 g or 3 mL columns	902-0013-A 902-0013-B	46, 128 46, 128
IST1001A	THC-COOH	Urine	ISOLUTE THC, 100 mg/3 mL column	292-0010-B	129
IST1015S	THC-COOH	Urine	ISOLUTE C8, 100 mg/1 mL column	290-0010-A	35
IST1024A	THC-COOH	Urine	ISOLUTE THC, 100 mg/1 mL column	292-0010-A	129
IST1035A	THC-COOH	Urine	ISOLUTE HAX, 200 mg/10 mL column	903-0020-H	50
AN720	THC-COOH	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN731	Therapeutic and Illicit Drugs of Abuse	Biological Fluids	ISOLUTE HCX, 130 mg/3 mL columns	902-0013-B	46, 128
IST1069A	Toxicology Screening	Postmortem Samples	ISOLUTE 101, 500 mg/6 mL columns	101-0050-C	31

Visit the Sample Preparation Application Database at **www.biotage.com/applications**

Clinical Applications

Application number	Analyte	Matrix	Format	Part number	Page
AN751	Benzodiazepines	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate or ISOLUTE SLE+ 1 mL column	820-0200-P01 820-0140-C	76 76
AN707	β-Blockers	Biological Fluids	AFFINILUTE MIP, 25 mg/ 3 mL or 25 mg/ 10 mL column	M18-0002-B M18-0002-G	17,127,137 17,127,137
AN739	Catecholamines	Plasma	EVOLUTE WCX, 50 mg/3 mL column	612-0005-B	26
AN744	Catecholamines	Plasma	RapidTrace and EVOLUTE WCX, 50 mg/3 mL column	612-0005-B	26
AN745	Catecholamines	Plasma	EVOLUTE WCX, 25 mg Array fixed well plate	602-0025-P01	25
IST1071A	Catecholamines	Urine	ISOLUTE MFC18, 100 mg/10 mL column For automation compatibility, ISOLUTE MFC18, 100 mg/1 mL column	240-0010-G 240-0010-A	34 34
AN602	Corticosteroids	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN728	Cyclosporine	Whole blood	RapidTrace and ISOLUTE SI, 500 mg/3 mL column	460-0050-B	60
AN700	Diuretics	Urine	EVOLUTE ABN 50 µm, 100 mg/10 mL column	610-0010-H	26
AN733	Melamine	Biological fluids	EVOLUTE CX, 50 mg/3 mL column	611-0005-B	26
AN713	NNAL	Urine	AFFINILUTE MIP, 25 mg/ 3 mL or 25 mg/ 10 mL column	M06-0002-B M06-0002-G	19, 127 19, 127
AN603	Non-steroidal Anti-inflammatory Drugs (NSAIDs)	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
IST1008S	Pyroxidine, Riboflavin and Thiamine	Biological matrices	ISOLUTE CBA, 200 mg/3 mL column	520-0020-B	56

Clinical Applications continued

Application number	Analyte	Matrix	Format	Part number	Page
AN721	Tamoxifen	Urine	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN722	Tamoxifen	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN740	Testosterone and other steroid hormones	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN601	Tricyclic Antidepressants	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN726	Tricyclic Antidepressants	Whole blood	RapidTrace and ISOLUTE HCX, 130 mg/3 mL column	902-0013-B	46, 128
AN712	TSNAs	Urine	AFFINILUTE MIP, 50 mg/3 mL or 50 mg/10 mL column	M21-0005-B M21-0005-G	19 19
AN724	Vitamin D	Plasma	RapidTrace and ISOLUTE C18 (EC), 200 mg/3 mL column	221-0020-B	33
AN735	Vitamin D and metabolites	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76
AN734	Warfarin	Plasma	ISOLUTE SLE+ 200, Supported Liquid Extraction plate	820-0200-P01	76

Visit the Sample Preparation Application Database at **www.biotage.com/applications**

Applications and Products for Environmental Analysis

Environmental
Applications and Products for Environmental Analysis

Extract purity is essential for reliable analyte quantification at trace levels for environmental applications. These very demanding requirements are met by ISOLUTE and EVOLUTE SPE column components (sorbents, columns and frits) and VacMaster Sample Processing Manifolds. All column components are cleaned to a high standard and quality controlled for purity using both GC and LC techniques. VacMaster Sample Processing Stations, constructed from inert materials, avoiding sample interference, also provide productivity enhancements for the environmental laboratory.

Biotage's range of products including analyte specific columns and methodologies and innovative accessories designed specifically to solve environmental sample handling problems are highlighted in this section.

ISOLUTE ENV+ SPE columns

Efficiently extract polar analytes from water samples using ISOLUTE ENV+ SPE columns. This hyper-crosslinked polystyrene-divinylbenzene polymer based sorbent has a wettable, hydroxyl modified surface with an extremely high area (>1000 m^2/g). The sorbent is optimized for loading large volume samples, and high analyte recoveries are achieved when loading at fast flow rates of 60 mL/min.

Please request Chemistry Data Sheet **TN109** for method development guidelines using ISOLUTE ENV+ SPE columns. Ordering information for ISOLUTE ENV+ SPE columns can be found on **page 30**.

EVOLUTE SPE columns

EVOLUTE polymer based SPE products are now available in formats optimized for extraction of environmental samples. Compared with other polymer based SPE products, EVOLUTE extracts give lower ion suppression in LC-MS/MS.

EVOLUTE ABN: a hydrophobic/hydrophilic balanced sorbent for simultaneous extraction and clean up of acidic, basic and neutral analytes.
EVOLUTE CX: a mixed-mode strong cation exchange sorbent for selective extraction of basic analytes.
EVOLUTE WCX: a mixed-mode weak cation exchange sorbent for selective extraction of basic analytes including quaternary amines, using acidic elution conditions.
EVOLUTE AX: a mixed-mode strong anion exchange sorbent for selective extraction of acidic analytes.
EVOLUTE WAX: a mixed-mode weak anion exchange sorbent for selective extraction of acidic analytes including phosphates and sulphonic acids.

Ordering information for EVOLUTE products can be found on **pages 21-27**.

AFFINILUTE MIP

Due to the complex nature of environmental samples like waste water, clean up may require a higher level of selectivity to allow for the trace levels of detection required. AFFINILUTE MIPs offer this selectivity for a number of environmentally significant compounds through their unique molecularly imprinted technology.

Description	Quantity	Part number
AFFINILUTE MIP β-blockers 25 mg/10 mL	50	M18-0002-G
AFFINILUTE MIP β-blockers 25 mg/3 mL	50	M18-0002-B
AFFINILUTE MIP NSAIDs 25 mg/3 mL	50	M72-0002-B
AFFINILUTE MIP NSAIDs 25 mg/10 mL	50	M72-0002-G
AFFINILUTE MIP Triazines 25 mg/10 mL	50	M08-0002-G

For specific methods please see **www.biotage.com**

ISOLUTE Layered SPE Columns for Extracting Multiple Analyte Suites

Ideal for applications where analytes with a broad range of polarity are to be extracted from a single sample. ISOLUTE layered SPE columns extend the range of analytes extracted using a single column. Extract a range of endocrine disrupters or combined suite of organochlorine, triazine and organophosphorus pesticides simultaneously with layered columns. Costs can be reduced and productivity improved as fewer samples need to be prepared for each assay.

Ordering Information

Description	Quantity	Part number
ISOLUTE C2/C18(EC) 500 mg/3 mL	50	933-0050-B
ISOLUTE C2/C18(EC) 1 g/6 mL	30	933-0100-C
ISOLUTE C8/ENV+ 400 mg/6 mL	30	934-0040-C
ISOLUTE C18/ENV+ 400 mg/6 mL	30	935-0040-C

ISOLUTE EPH SPE Columns

ISOLUTE EPH SPE columns have been optimized for the fractionation of extractable petroleum hydrocarbons in soil extracts prior to analysis by GC. The columns and methodologies have been optimized to provide a clean fractionation of the aliphatic and aromatic fractions in soil extracts, with no breakthrough of the lower MW polycyclic aromatic hydrocarbons into the aliphatic fraction. The columns are quality controlled to ensure consistent fractionation from batch-to-batch.

Application Note **AN704** RapidTrace+ Procedure for the Automated Fractionation of Extractable Petroleum Hydrocarbons (EPH) in Soil using ISOLUTE EPH SPE Columns. Application Note **AN703** ASPEC Procedure for the Automated Fractionation of Extractable Petroleum Hydrocarbons (EPH) in Soil using ISOLUTE EPH SPE Columns.

Ordering Information

Description	Quantity	Part number
Columns for automated method ISOLUTE EPH 1.45 g/3 mL	50	928-0145-B
Columns for manual method ISOLUTE EPH-M 5 g/25 mL	20	928-0500-E

ISOLUTE PAH SPE Columns

ISOLUTE PAH SPE columns are designed to extract PAHs from water samples containing polar interferences such as humic acids. The layered column contains a NH2 layer above a C18 sorbent bed. Polar interferences are retained on the NH2 layer during extraction, but are not eluted with the PAHs, giving a pure extract for analysis.

Request Application Note **IST1025** for more information.

Ordering Information

Description	Quantity	Part number
ISOLUTE PAH 1.5 g/6 mL	30	927-0150-C

ISOLUTE Triazine SPE Columns

ISOLUTE Triazine SPE columns are optimized for reliable, reproducible extraction of triazine pesticides and their polar metabolites from water samples. Each batch of ISOLUTE Triazine is quality controlled for recoveries of the atrazine–desethyl and –desisopropyl metabolites.

Request Application Note **IST1046** for more information.

Ordering Information

Description	Quantity	Part number
ISOLUTE Triazine 1g /6 mL	30	222-0100-C

ISOLUTE TPH SPE Columns

Extract total petroleum hydrocarbons from water samples with ISOLUTE TPH SPE columns. The simple method eliminates tedious sample shaking and emulsion formation problems associated with liquid-liquid extraction. Manual and automated methodologies are available, request Application Notes **IST1042** and **IST1018** respectively for more information.

Ordering Information

Description	Quantity	Part number
ISOLUTE TPH 1 g/6 mL	30	752-0100-C

ISOLUTE O&G SPE Columns

ISOLUTE O&G columns are designed for extraction of total Oil & Grease from water samples and allow fractionation of the sample into hexane extractable material (HEM) and silica gel treated hexane extracted material (SGT-HEM). This eliminates the need for separate liquid-liquid extraction and silica column fractionation steps. The representative procedure in Application Note **IST1005** meets U.S EPA 1664 guidelines. AutoTrace compatible versions are available.

Request Application Note **IST1005** for more information.

Ordering Information

Description	Quantity	Part number
ISOLUTE O&G 1 g/6 mL	30	753-0100-CD
ISOLUTE O&G 3 g/70 mL	16	753-0300-FD

ISOLUTE Na_2SO_4/FL SPE Columns

Clean-up mineral oil extracts with ISOLUTE Na_2SO_4/FL SPE columns. Designed to remove such interferences as halogenated hydrocarbons, Application Note **IST1077** complies with the ISO 9377-2:200 method.

Ordering Information

Description	Quantity	Part number
ISOLUTE Na_2SO_4/FL 4 g/6 mL	30	976-0400-C

ISOLUTE SPE Columns with Integral Depth Filters

Designed to trap particulate material during sample loading, integral depth filters are available fitted into selected ISOLUTE SPE columns. The depth filter can be left in place during analyte elution, enabling recovery of particulate bound analytes. The depth filter material is highly solvent resistant and will not contaminate the final extract.

Ordering Information

Description	Quantity	Part number
ISOLUTE C18 500 mg/6 mL with integral depth filter	30	220-0050-CD
ISOLUTE C18 1 g/6 mL with integral depth filter	30	220-0100-CD
ISOLUTE C18(EC) 1 g/6 mL with integral depth filter	30	221-0100-CD
ISOLUTE ENV+ 200 mg/6 mL with integral depth filter	30	915-0020-CD

ISOLUTE Depth Filter Reservoirs for connecting to a standard ISOLUTE SPE column are also available, ***see page 86*** *for ordering information.*

Custom Manufacturing Options

Your application may require alternative product configurations to those listed in this section. Through our **Custom Manufacturing Service**, we can supply alternative configurations including:

- SPE columns fitted with stainless steel frits for additional extract purity
- Glass SPE columns with PTFE frits
- SPE columns fitted with integral depth filters

Please see **pages 187-189** for details of our **Custom Manufacturing Service.**

VacMaster LVE Kit

Designed for use with VacMaster Sample Processing Manifolds, the Large Volume Extraction (LVE) kit enables up to ten large volume samples to be loaded simultaneously. Constructed from PTFE components the VacMaster Kit will not contaminate samples.

For ordering information, **see page 102.**

PTFE Extraction Caps

Directly connect screw top sample bottles to 6 or 70 mL ISOLUTE SPE columns with PTFE caps. Available in two sizes to fit standard European (ISO45) or US (33/400) style threads and ideal for use in Oil & Grease determination, where minimal sample transfer is beneficial.

Ordering Information

Description	Quantity	Part number
PTFE Extraction Cap, ISO45 thread	5	121-2085
PTFE Extraction Cap, 33/400 thread	5	121-2086

VacMaster Drying Adapter

During environmental sample preparation applications, it is often necessary to elute analytes with a water immiscible solvent. It is important to thoroughly dry the sorbent bed before elution, to obtain high, reproducible analyte recoveries.

The VacMaster Drying Adapter significantly reduces drying times compared with vacuum aspirated air flow. Use with any suitable gas (e.g. nitrogen, air) for fast efficient SPE column drying.

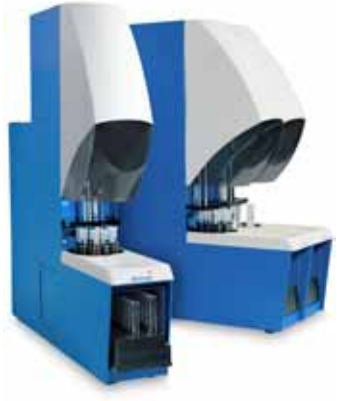
For ordering information, see **page 101**.

RapidTrace®+ SPE Workstation

The RapidTrace+ SPE Workstation is a modular, highly scalable, automated sample preparation platform designed for high throughput. Units are available to accommodate 1 mL and 3 mL, or 6 mL industry standard SPE cartridges, and can process up to 100 samples in less than two hours, unattended. Each unit can support 1 mL and 3 mL (with 10 positions) or 6 mL (with 5 positions). Up to 10 units can be connected together and controlled through a simple, easy-to-use software package.

See **www.biotage.com/applications** for Application Note **AN704** RapidTrace Procedure for the Automated Fractionation of Extractable Petroleum Hydrocarbons (EPH) in Soil using ISOLUTE EPH SPE Columns.

For ordering information, see **page 106-109**.



For up-to-date application notes please check **www.biotage.com/applications**

Environmental Applications

Application number	Analyte	Matrix	Format	Part number	Page
IST1102A	Brominated Flame Retardants	Plasma	ISOLUTE ENV+, 200 mg/6 mL column	915-0020-C	30
IST1064	β-Blockers	Biological fluids	ISOLUTE C2, 100 mg/3 mL column	320-0010-B	39
AN730	Environmental Contaminants Including Dioxins and Furans	Soil and sediments	RapidTrace and ISOLUTE NH2, 500 mg/3 mL column	470-0050-B	52
AN703	Extractable Petroleum Hydrocarbons	Soil	ISOLUTE EPH, 1.45g/3 mL column	928-0145-B	138
AN704	Extractable Petroleum Hydrocarbons	Soil	RapidTrace and ISOLUTE EPH, 1.45g/3 mL	928-0145-B	138
IST1077	Mineral Oil	Water	ISOLUTE Na_2SO_4/FL, 4 g/6 mL column	976-0400-C	139
AN737	Organophosphate Pesticide Metabolites	Urine	EVOLUTE WAX, 25 mg Array fixed well plate	604-0025-P01	25
IST1025A	PAHs	Water	ISOLUTE PAH, 1.5 g/6 mL column	927-0150-C	138
AN701	Pharmaceuticals	Water	EVOLUTE ABN, 200 mg/6 mL column	610-0020-C	26
IST1005A	TPH/Total Oil and Grease	Water	ISOLUTE O & G, 1 g/6 mL column 3 g/70 mL column	 753-0100-CD 753-0300-FD	 139 139
IST1046A	Triazine Herbicides	Water	ISOLUTE Triazine, 1 g/6 mL column	222-0100-C	138
AN716	Triazines	Water	AFFINILUTE MIP Triazine, 25 mg/10 mL column	M08-0002-G	19, 137, 147

Visit the Sample Preparation Application Database at **www.biotage.com/applications**

VacMaster-10 shown using PTFE extraction caps

Applications and Products for Agrochemical and Food Analysis

Agrochemical and Food

Applications and Products for Agrochemical and Food Analysis

Sample preparation in food and agrochemical applications is often complicated by the nature of the original sample matrix. In residue analysis, common sample types such as fruit, vegetables, soil or tissue are solid or semi-solid, and need specific sample pre-treatment methods to allow extraction of analytes. Some liquid samples, such as milk, have high fat concentrations, making them difficult to handle using traditional methods.

In addition, the complexity of these matrices requires additional clean-up to remove interferences prior to analysis, particularly for low level residue work.

This section highlights a range of products and techniques for simplifying sample handling and clean-up of these difficult samples.

EVOLUTE SPE Columns

EVOLUTE polymer based SPE products offer a simple, robust, generic approach to the isolation and clean up of small molecules from a variety of matrices including foodstuffs and water.

EVOLUTE ABN: a hydrophobic/hydrophilic balanced sorbent for simultaneous extraction and clean up of acidic, basic and neutral analytes
EVOLUTE CX: a mixed-mode strong cation exchange sorbent for selective extraction of basic analytes. EVOLUTE CX columns have been shown to be produce significant results in the extraction of melamine from a variety of matrices including plasma and milk. See www.biotage.com for the latest applications and posters.
EVOLUTE WCX: a mixed-mode weak cation exchange sorbent for selective extraction of basic analytes including quaternary amines, using acidic elution conditions
EVOLUTE AX: a mixed-mode strong anion exchange sorbent for selective extraction of acidic analytes
EVOLUTE WAX: a mixed-mode weak anion exchange sorbent for selective extraction of acidic analytes including phosphates and sulphonic acids

Ordering information for EVOLUTE products can be found on **pages 21-27**

ISOLUTE HM-N Columns for Supported Liquid Extraction

ISOLUTE HM-N Supported Liquid Extraction columns provide a simple alternative to traditional liquid-liquid extraction for complex aqueous matrices such as milk. The columns contain a modified form of diatomaceous earth, which acts as an inert support for the extraction process. The aqueous sample is loaded under gravity, and is absorbed onto the support. When a suitable water immiscible solvent is passed through the column, the analytes are efficiently desorbed, and the extract is collected. As the aqueous and solvent phases are never in direct contact, emulsion formation, a particular problem for fat laden samples, is eliminated.

Ordering information for ISOLUTE HM-N columns can be found on **page 79**

ISOLUTE SAX/PSA SPE Columns for Interference Removal

Remove polar interferences and pigments from plant extracts prior to pesticide residue analysis with ISOLUTE SAX/PSA columns.

Ordering Information

ISOLUTE SAX/PSA

Description	Quantity	Part number
ISOLUTE SAX/PSA 1 g/6 mL	30	924-0100-C

See Application Note **IST1027** for more information.
Visit **www.biotage.com/applications** to download.

AFFINILUTE MIP

Biotage now offers AFFINULTE MIPs which use molecularly imprinted technology to selectively clean up food products that have previously been difficult to separate. With increasingly low maximum tolerance levels for harmful compounds in food production, this selectivity has never been more essential.

Description	Quantity	Part number
AFFINILUTE MIP Clenbuterol 25 mg/10 mL	50	M01-0002-G
AFFINILUTE MIP Full β-agonist 25 mg/10 mL	50	M02-0002-G
AFFINILUTE MIP Full β-agonist 25 mg/3 mL	50	M02-0002-B
AFFINILUTE MIP Triazines 25 mg/10 mL	50	M08-0002-G
AFFINILUTE MIP Chloramphenicol 25 mg/10 mL	50	M10-0002-G
AFFINILUTE MIP Chloramphenicol 25 mg/3 mL	50	M10-0002-B
AFFINILUTE MIP Fluoroquinolones 25 mg/3 mL	50	M69-0002-B
AFFINILUTE MIP Nitroimidazoles 50 mg/3 mL	50	M34-0005-B
AFFINILUTE MIP PAH 25 mg/3 mL	50	M73-0002-B

Ordering information for AFFINILUTE MIPs can be found on **pages 15-19**

ISOLUTE QuEChERS

QuEChERS are products specifically designed for the effective clean up of samples from complex matrices. QuEChERS stands for **Qu**ick, **E**asy, **Ch**eap, **E**ffective, **R**ugged, and **S**afe, which is exactly how they work, offering the food scientist a quick and easy way to clean up samples. Biotage supplies pre-weighed extraction and clean up tubes that conform to the published methods from the AOAC and the European Union.

QuEcHERS Extraction Tubes available	Quantity	Part number
15 g QUECHERS AOAC 15 mL Extraction Tube	25	Q0010-15V
10 g QUECHERS EN 15 mL Extraction Tube	25	Q0020-15V
Clean Up Tubes		
AOAC Fruit and Vegetable Clean up Tube	25	Q0030-15V
EN Fruit and Vegetable Clean up Tube	25	Q0035-15V
AOAC Waxed Fruit and Vegetable Clean up Tube	25	Q0050-15V
EN Waxed Fruit and Vegetable Clean up Tube	25	Q0060-15V
AOAC Pigmented Fruit and Vegetable Clean up Tube	25	Q0070-15V
EN Pigmented Fruit and Vegetable Clean Up Tube	25	Q0080-15V

More information for ISOLUTE QuEChERS can be found on **pages 69-71.**

ISOLUTE Products for Matrix Solid Phase Dispersion (MSPD)

Matrix Solid Phase Dispersion (MSPD) is a technique designed for extraction of solid or semi-solid samples such as meat or vegetable material. The sample and MSPD sorbent are ground together in a pestle and mortar, forming a blend which is added to a fritted extraction column. A top frit is inserted, and a series of solvents are used to sequentially elute interference compounds and the analytes of interest.

ISOLUTE MSPD sorbents have been optimized to rapidly produce a homogenous, reproducible sorbent-sample blend compared with traditional SPE or preparative grade sorbents.

Ordering Information

ISOLUTE MSPD sorbents

Description	Quantity	Part number
ISOLUTE MSPD Grade C18	100 g	9370-0100
ISOLUTE MSPD Grade C18(EC)	100 g	9371-0100

ISOLUTE MSPD accessories

Description	Quantity	Part number
Frit inserter, 6 mL (C) columns	5	120-1151-C
Frit inserter, 15 mL (D) columns	5	120-1151-D

For ordering information for empty columns and frits, **see pages 87-88.**
For more information, request Chemistry Data Sheet **TN111.**

ISOLUTE Multimode SPE Columns for Acrylamide Clean-up

Determination of acrylamide in cooked foodstuffs such as fried potato products can be problematic due to the highly polar, water soluble nature of the analyte and the complexity of the sample matrix. ISOLUTE Multimode SPE columns provide for extremely effective clean up of aqueous food extracts, allowing acrylamide determination by LC-MS.

See Application Note **IST1076** Extraction of Acrylamide from Cooked Foods.
Visit **www.biotage.com/applications** to download.

Ordering Information

ISOLUTE Multimode

Description	Quantity	Part number
ISOLUTE Multimode 300 mg/3 mL	50	904-0030-B

ISOLUTE ENV+ SPE Columns for Extraction of Highly Polar Compounds

ISOLUTE ENV+ is an extremely retentive SPE sorbent used for extraction of highly polar pesticides and herbicides from aqueous samples. Unlike other polymeric SPE sorbents, it is able to retain highly water soluble compounds such as acrylamide from aqueous food extracts.

Ordering information for ISOLUTE ENV+ SPE columns can be found on **page 30**.

See Application Note **IST1082** Extraction and Clean up of Acrylamide from Foodstuffs.

ISOLUTE Filtration Columns and Depth Filter Reservoirs

When extracting samples containing particulate material, it is often necessary to pre-filter the sample prior to SPE. This prevents blocking of the SPE column. ISOLUTE Filtration Columns contain two 20 µm polyethylene frits and can be connected directly above the extraction column for direct sample loading and in-line removal of suspended solids.

For samples containing higher levels of suspended solids, ISOLUTE Depth Filter Reservoirs should be used.

Ordering information for ISOLUTE Filtration Columns can be found on **page 88**.
Ordering information for ISOLUTE Depth Filter Reservoirs can be found on **page 86.**

ISOLUTE Sodium Sulfate Drying Cartridges

Prior to analyte derivatization or analysis, it is often necessary to dry SPE elution solvents using loose sodium sulfate. ISOLUTE Sodium Sulfate Drying Cartridges can be connected to the outlet of the SPE columns for in-line solvent drying, eliminating this time consuming step.

Ordering information for ISOLUTE Sodium Sulfate Drying Cartridges can be found on **page 89**.

Custom Manufacturing Options

Your application may require alternative product configurations to those listed in this section. Through our **Custom Manufacturing Service**, we can supply alternative configurations including:

- SPE columns fitted with stainless steel frits for additional extract purity
- Glass SPE columns with PTFE frits
- SPE columns fitted with integral depth filters

Please see **pages 187-189** for details of our **Custom Manufacturing Service**.

For up-to-date application notes please check **www.biotage.com/applications.**

Food Applications

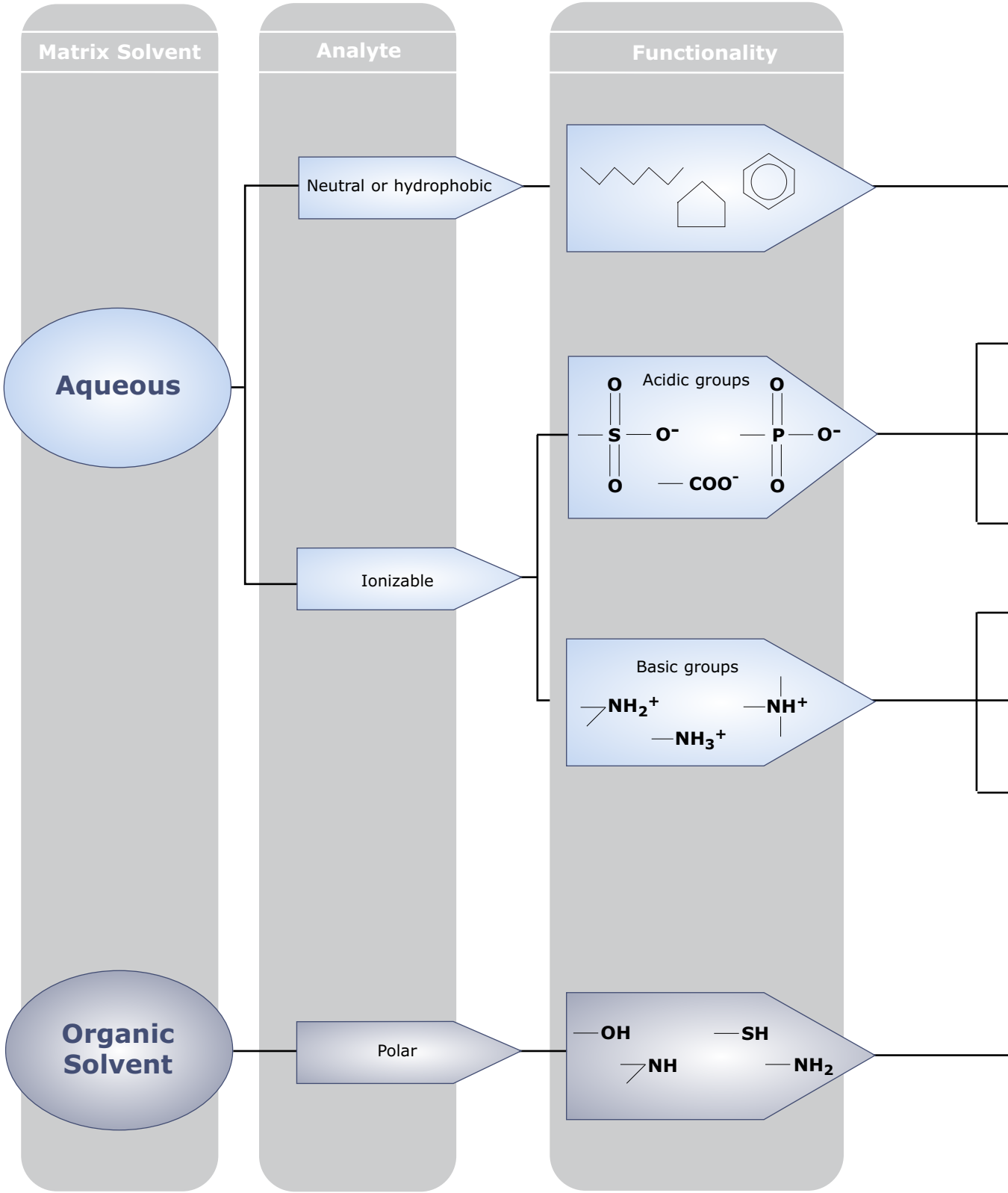
Application number	Analyte	Matrix	Format	Part number	Page
IST1076A	Acrylamide	Cooked Foodstuffs	ISOLUTE Multimode, 300 mg/3 mL column	904-0030-B	51, 149
IST1082	Acrylamide	Foodstuffs	ISOLUTE Multimode, 1 g/3 mL and ISOLUTE ENV+, 1 g/6 mL column	904-0100-C 915-0100-C	51 30
AN706	β-Agonists	Biological Matrices	AFFINILUTE MIP β-agonists, 25 mg/3 mL or 25 mg/10 mL column	M02-0002-B M02-0002-G	17, 147 17, 147
AN711	Chloramphenicol	Biological Matrices	AFFINILUTE MIP Chloramphenicol, 25 mg/3 mL or 25 mg/10 mL column	M10-0002-B M10-0002-G	18,127,147 18,127,147
AN709	Clenbuterol	Urine	AFFINILUTE MIP Clenbuterol, 25 mg/10 mL column	M01-0002-G	17, 147
AN714	Fluoroquinolones	Biological Matrices	AFFINILUTE MIP, Fluoroquinolones 25 mg/3 mL column	M69-0002-B	19, 147
AN732	Melamine	Milk	EVOLUTE CX, 50 mg/3 mL column	611-0005-B	26
AN749	Melamine	Milk	RapidTrace+ and EVOLUTE CX, 100 mg/3 mL column	611-0010-B	26
AN710	Nitroimidazoles	Biological Matrices	AFFINILUTE MIP Nitroimidazoles, 50 mg/3 mL column	M34-0005-B	18, 147
AN715	PAHs	Olive Oil	AFFINILUTE MIP PAH, 25 mg/3 mL column	M73-0002-B	18, 147
IST1027A	Pesticides	Vegetables	ISOLUTE SAX/PSA, 1 g/6 mL column	924-0100-C	147
IST1097	Pesticides	Vegetables and Fruits	ISOLUTE ENV+, 200 mg/3 mL column	915-0020-B	30
AN716	Triazines	Water	AFFINILUTE MIP Triazine, 25 mg/10 mL column	M08-0002-G	19,137,147

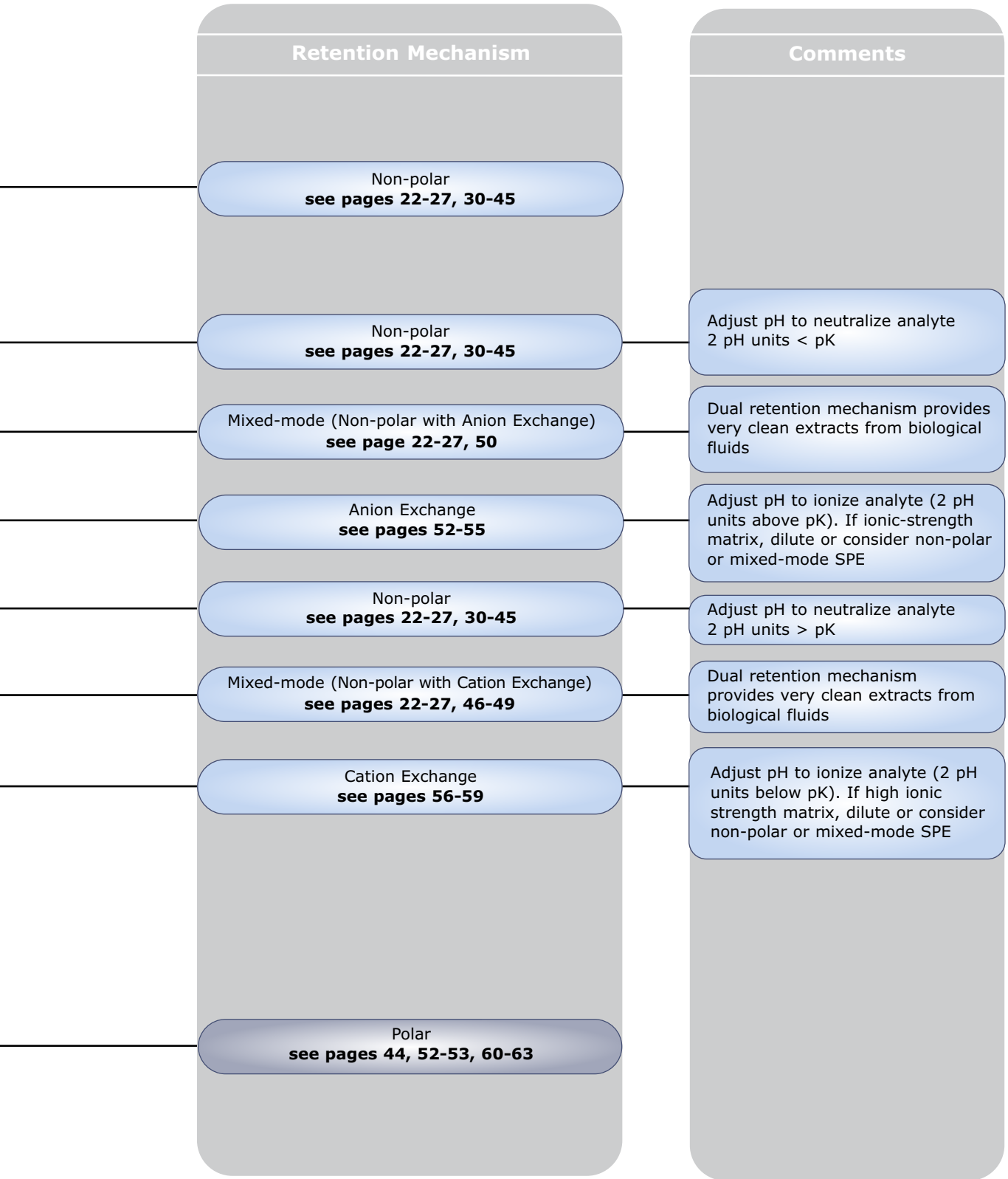
Visit the Sample Preparation Application Database at **www.biotage.com/applications**

Technical Section

Select a SPE Sorbent

Analyte and Matrix Considerations




Retention Mechanism
Comments
Non-polar
see pages 22-27, 30-45
Non-polar
see pages 22-27, 30-45
Adjust pH to neutralize analyte
2 pH units < pK
Mixed-mode (Non-polar with Anion Exchange)
see page 22-27, 50
Dual retention mechanism provides very clean extracts from biological fluids
Anion Exchange
see pages 52-55
Adjust pH to ionize analyte (2 pH units above pK). If ionic-strength matrix, dilute or consider non-polar or mixed-mode SPE
Non-polar
see pages 22-27, 30-45
Adjust pH to neutralize analyte
2 pH units > pK
Mixed-mode (Non-polar with Cation Exchange)
see pages 22-27, 46-49
Dual retention mechanism provides very clean extracts from biological fluids
Cation Exchange
see pages 56-59
Adjust pH to ionize analyte (2 pH units below pK). If high ionic strength matrix, dilute or consider non-polar or mixed-mode SPE
Polar
see pages 44, 52-53, 60-63

Non-Polar Sorbents

Isolate analytes from aqueous or partially aqueous sample matrices prior to analysis using non-polar hydrophobic retention mechanisms. Technical information for Biotage's range of non-polar sorbents is summarized on these pages.

Non-Polar Sorbents

Sorbent	Description	Structure	Average Particle Size (µm)	Pore Diameter (Å)
EVOLUTE Polymer-Based Non-Polar Sorbents				
ABN	Surface modified polystyrene divinylbenezene	-	30, 50	40
ISOLUTE Polymer-Based Non-Polar Sorbents				
ENV+	Hydroxylated polystyrene divinylbenzene	-	90	800
101	Polystyrene divinylbenzene	-	65	100
ISOLUTE Silica-Based Non-Polar Sorbents				
C18	Octadecyl (non-endcapped)	-Si-$C_{18}H_{37}$	50	60
C18(EC)[a]	Octadecyl (endcapped)	-	50	60
MFC18	Octadecyl, monofunctional (non-endcapped)	-Si-$C_{18}H_{37}$	50	125
C8	Octyl (non-endcapped)	-Si-C_8H_{17}	50	60
C8(EC)[a]	Octyl (endcapped)	-	50	60
C6	Hexyl (non-endcapped)	-Si-C_6H_{13}	50	60

[a](EC) - endcapped, a chemical process to reduce the concentration of silica surface silanol groups that provide polar and weak cation exchange secondary interactions.

Non-Polar Sorbents

EVOLUTE Sample Preparation Products are a new generation of advanced water wettable polymeric SPE sorbents for extraction of drugs from biological fluid samples. Supported by a generic method, EVOLUTE ABN is optimized for the extraction of acidic, basic and neutral drugs for bioanalytical sample preparation. 50 µm EVOLUTE ABN is ideal for extraction of multi-analyte suites from aqueous samples.

ISOLUTE ENV+ is a hydroxylated polystyrene divinylbenzene polymer that can extract very polar compounds from a variety of aqueous or partially aqueous sample matrices. The high capacity polymer retains polar drugs and metabolites from biological fluid samples and polar pesticides and herbicides from environmental matrices.

Application	Chemistry Data Sheets	Ordering Information Page
Extraction of acidic, neutral and basic drugs from biological fluids using generic method. Extraction of acidic, neutral and basic compounds from aqueous samples using generic method.	TN131 TN138	22-27
Extraction of very polar compounds that are not retained by C8 and C18 non-polar silica based sorbents.	TN109	30
Extraction of polar compounds from aqueous sample matrices.	TN119	31
Most commonly used C18 sorbent for the extraction of acidic, neutral and basic compounds from aqueous matrices. Secondary silanol or ionic interactions can be used to enhance extract purity and method robustness for basic compounds.	TN101, 112 & 126	32
Extraction from aqueous matrix using non-polar interactions (for acidic, neutral and basic compounds).	TN101	33
Extraction from aqueous matrix using both non-polar interactions (for acidic, neutral and basic compounds) and readily accessible secondary silanol or ionic interactions (for basic compounds only). Not the ideal choice when working at extreme pH , C18 is the preferred option for these methods.	TN101 & 112	34
Most commonly used C8 sorbent for the extraction of acidic, neutral and basic compounds from aqueous matrices. Secondary silanol or ionic interactions can be used to enhance extract purity and method robustness for basic compounds.	TN101, 112 & 126	35
Extraction from aqueous matrix using non-polar interactions (for acidic, neutral and basic compounds).	TN101	36
Extraction from aqueous matrix using non-polar interactions (for acidic, neutral and basic compounds). Secondary silanol or ionic interactions can be used to enhance extract purity and method robustness for basic compounds.	TN101 & 112	37

For more information on non-polar SPE procedures, see the QuickStart Guide (**page 173-185**)

For in depth technical information on the use of non-polar sorbents, refer to the Chemistry Data Sheets listed in the table above.

Non-Polar Sorbents

ISOLUTE non-polar silica based sorbents provide hydrophobic interactions, from the highly retentive ISOLUTE C18 to the less retentive ISOLUTE C2. The non-polar sorbents can retain a range of compounds that vary in hydrophobic character. The sorbents are available in both non-endcapped and (in certain cases) endcapped versions to meet the needs of particular applications. Non-endcapped sorbents are particularly useful when utilizing secondary silanol interactions for extraction of basic drugs compounds (**see pages 174-184** [QuickStart Guide] for more information on utilizing secondary silanol interactions).

ISOLUTE Silica-Based Non-Polar Sorbents

Sorbent	Description	Structure	Average Particle Size (µm)	Pore Diameter (Å)
C4	Butyl (non-endcapped)	-Si-C_4H_9	50	60
C2	Ethyl (non-endcapped)	-Si-C_2H_5	50	60
C2(EC)[a]	Ethyl (endcapped)	-	50	60
CH(EC)[a]	Cyclohexyl (endcapped)	-Si- 	50	60
PH	Phenyl (non-endcapped)	-Si- 	50	60
PH(EC)[a]	Phenyl (endcapped)	-	50	60
CN	Cyanopropyl (non-endcapped)	-Si-$(CH_2)_3CN$	50	60
CN(EC)[a]	Cyanopropyl (endcapped)	-	50	60

[a](EC) - endcapped, a chemical process to reduce the concentration of silica surface silanol groups that provide polar and weak cation exchange secondary interactions.

Non-Polar Sorbents

Application	Chemistry Data Sheets	Ordering Information Page
Extraction from aqueous matrix using non-polar interactions (for acidic, neutral and basic compounds). Secondary silanol or ionic interactions can be used to enhance extract purity and method robustness for basic compounds.	TN101 & 112	38
Most commonly used C2 sorbent for the extraction of acidic, neutral and basic compounds from aqueous matrices. Secondary silanol or ionic interactions can be used to enhance extract purity and method robustness for basic compounds.	TN101, 112 & 126	39
Extraction from aqueous matrix using non-polar interactions (for acidic, neutral and basic compounds).	TN101	40
Extraction from aqueous matrix using non-polar interactions (for acidic, neutral and basic compounds).	TN101	41
Extraction from aqueous matrix using both non-polar interactions (for acidic, neutral and basic compounds) and secondary silanol or ionic interactions (for basic compounds only). This sorbent exhibits a different selectivity compared with C18 and C8 phases when both aromatic and non-aromatic compounds are being extracted.	TN101, 112	42
Extraction from aqueous matrix using non-polar interactions (for acidic, neutral and basic compounds). This sorbent exhibits a different selectivity compared with C18 and C8 phases when both aromatic and non-aromatic compounds are being extracted.	TN101	43
Extraction from aqueous matrix using both non-polar interactions (for acidic, neutral and basic compounds) and secondary silanol or ionic interactions (for basic compounds only).	TN101 & 112	44
Extraction from aqueous matrix using non-polar interactions (for acidic, neutral and basic compounds).	TN101	45

For more information on non-polar SPE procedures, see the QuickStart Guide (**page 173-185**).

For in depth technical information on the use of non-polar sorbents, refer to the Chemistry Data Sheets listed in the table above.

Mixed-Mode Sorbents

Isolate acidic and basic analytes from biological fluids and other complex matrices with Biotage's range of mixed-mode sorbents. The sorbents, both silica and polymer based, provide two primary retention mechanisms, non-polar (hydrophobic) and ion exchange (anion or cation). The dual retention mechanisms allow the use of rigorous interference elution regimes, providing extremely clean extracts and reducing matrix effects in LC-MS analysis. Technical information for EVOLUTE and ISOLUTE mixed-mode sorbents are summarized on these pages.

Mixed-mode SPE

Analytes are initially retained by a non-polar retention mechanism, with inorganic salts, polar interferences and high molecular weight peptides and proteins passing directly through the sorbent bed. The pH is then adjusted to allow an ion exchange retention mechanism to retain the analyte. Non-polar interferences are removed using an organic solvent or organic solvent/water wash as shown in **Figure 1**.

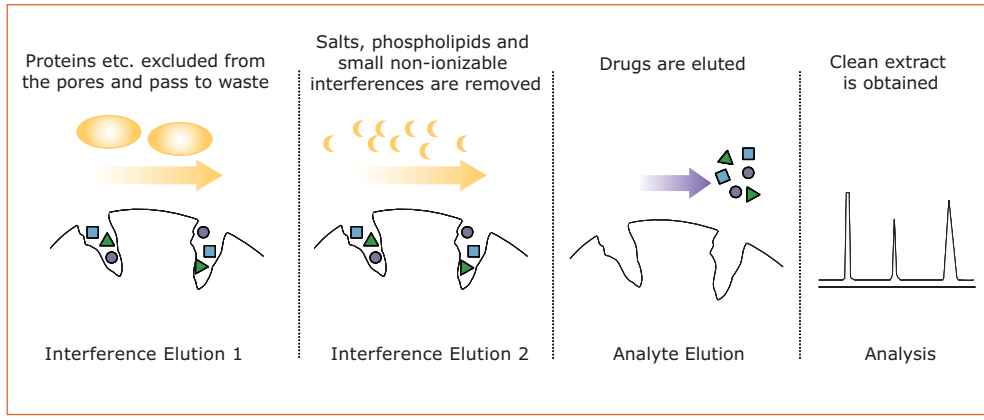


Figure 1.

EVOLUTE Mixed-mode polymer based SPE products

For a full review of mixed mode SPE using the EVOLUTE family of polymer based SPE products, please request a copy of the EVOLUTE User's guide or download from **www.biotage.com**

ISOLUTE Mixed-mode silica based SPE products

ISOLUTE HCX, HCX-3 & HCX-5: Silica-based mixed-mode SPE for Basic Drugs

Biotage offers three silica-based mixed-mode sorbents for extraction of basic drugs. Compared to resin based mixed-mode sorbents, these have reduced non-polar character, and may lead to cleaner extracts. ISOLUTE HCX, HCX-3 and HCX-5 differ only in their degree of non-polar character, and can be screened in parallel for optimum extract cleanliness and analyte recovery. For extraction of very polar basic drugs, EVOLUTE CX is recommended.

ISOLUTE HAX: Mixed-mode SPE for Acidic Drugs

ISOLUTE HAX is a mixed-mode sorbent for acidic analytes. The combination of non-polar (C8) and strong anion exchange functionalities make ISOLUTE HAX ideal for the extraction of a wide range of acidic analytes. The generic method includes interference elution steps to remove interferences, providing a very clean extract for analysis.

Selection of ISOLUTE mixed-mode SPE sorbents by analyte class

Drug/Analyte Class	ISOLUTE HAX	ISOLUTE HCX	ISOLUTE HCX-3	ISOLUTE HCX-5	ISOLUTE HCX-Q[C]
Acidic	✓				
Basic		✓	✓	✓	
Basic (pK > 11)					✓
Polybasic					✓
Quaternary amine					✓

[C]Optimum sorbent for basic drugs where it is difficult or impossible to eliminate positive charge(s) using pH.

Mixed-mode Sorbents

Sorbent	Description	Average Particle Size (µm)	Pore Diameter (Å)
EVOLUTE Polymer-Based Mixed-Mode Sorbents			
EVOLUTE CX	Surface modified polystyrene-divinylbenzene & strong cation exchange (SO_3^-)	30, 50	40
EVOLUTE WCX	Surface modified polystyrene-divinylbenzene & weak cation exchange COOH/COO^-	30, 50	40
EVOLUTE AX	Surface modified polystyrene-divinylbenzene & strong anion exchange ($-NR_3^+$)	30, 50	40
EVOLUTE WAX	Surface modified polystyrene-divinylbenzene & weak anion exchange ($-NR_2$/$-NR_3^+$)	30, 50	40
ISOLUTE Silica-Based Mixed-Mode Sorbents			
ISOLUTE HCX	Octyl (C8, non-endcapped) and strong cation exchange (SO_3^-)	50	60
ISOLUTE HCX-3	Octadecyl (C18, non-endcapped) and strong cation exchange (SO_3^-)	50	60
ISOLUTE HCX-5	Butyl (C4, non-endcapped) and strong cation exchange (SO_3^-)	50	60
ISOLUTE HCX-Q	Octyl (C8, non-end-capped) and weak cation exchange	50	60
ISOLUTE HAX	Octyl (C8, non-endcapped) and strong cation exchange ($-NR_3^+$)	50	60
ISOLUTE Multimode	Octadecyl (C18, non-endcapped), strong cation exchange (SO_3^-) and strong cation exchange ($-NR_3^+$)	50	60

Application	Chemistry Data Sheets	Ordering Information Page
Extraction of basic analytes from biological fluids and other aqueous samples using a generic method. Can also be used to fractionate basic, neutral and acidic compounds.	TN139 & 141	22-27
Extraction of basic analytes from biological fluids and other aqueous samples. Acidic elution conditions can be used. Also suitable for quaternary amines and other strongly basic analytes.	TN145	22-27
Extraction of acidic analytes from biological fluids and other aqueous samples using a generic method.	TN144	22-27
Extraction of strongly acidic analytes (e.g. phosphates, sulphates) from biological fluids and other aqueous samples using a generic method.	TN146	22-27
The first choice sorbent for extracting drugs of abuse from biological fluid samples.	TN116 & 125	46
Extraction of basic analytes from aqueous matrix using dual non-polar and strong cation exchange interactions. A good alternative to HCX for basic compounds that require more retentive non-polar character from the mixed-mode sorbent.	TN116	47
HCX-5 provides the cleanest extract of all the mixed-mode sorbents. Ideal choice where the basic analyte to be extracted has sufficient non-polar character to be well retained by the C4 non-polar component of the mixed-mode sorbent.	TN116	48
Extraction of quaternary amine and polybasic analytes from aqueous matrix using dual non-polar and weak cation exchange interactions.	TN129	49
Extraction of acidic analytes from aqueous matrix using dual non-polar and strong anion exchange interactions. Suitable for a broad range of acidic compounds.	TN127	50
Isolation of compounds from complex mixtures. Can also be used for fractionation of acidic, basic and neutral compounds from aqueous sample matrix using non-polar, strong cation and strong anion retention mechanisms.	-	51

For more information on mixed-mode SPE procedures, see the QuickStart Guide (**page 174-184**).

For in depth technical information on how to use ISOLUTE mixed-mode sorbents, refer to the Chemistry Data Sheets in the table above.

Ion Exchange Sorbents

Isolate ionizable (acidic or basic) analytes from aqueous or partially aqueous sample matrices using ion exchange retention mechanisms. The technical information for Biotage's range of ISOLUTE ion exchange sorbents is summarized on these pages.

ISOLUTE Anion Exchange Sorbents

ISOLUTE anion exchange sorbents are used for the extraction of acidic compounds. Weak anion exchange sorbents (ISOLUTE NH2 and PSA) are suitable for the isolation of strongly acidic analytes (e.g. those containing sulfonic acid groups) or analytes that are unstable under acidic conditions. The sorbents' positive charge can be eliminated by pH control, for analyte elution.

ISOLUTE Anion Exchange Sorbents

Sorbent	Description	Structure	Average Particle Size (µm)	Pore Diameter (Å)
NH2	Aminopropyl	$-Si-(CH_2)_3NH_2$	50	60
PSA	Ethylenediamine-N-propyl (non-endcapped)	$-Si-(CH_2)_3NH(CH_2)_2NH_2$	50	60
SAX	Quaternary amine (chloride counter ion)	$-Si-(CH_2)_3N^+(CH_3)_3\ Cl^-$	50	60
PE-AX	Quaternary amine (acetate counter ion)	$-Si-(CH_2)_3N^+(CH_3)_3\ OAc^-$	50	60

Strong anion exchange sorbents (ISOLUTE SAX and PE-AX) are more suited to the extraction of weakly acidic compounds, as they retain a permanent positive charge across the pH range. Analytes are eluted from strong anion exchange sorbents by eliminating the charge on the analyte.

ISOLUTE PE-AX is supplied with an acetate counter ion. This has a weaker affinity with the sorbent's quaternary amine functional group compared to the chloride counter ion used in ISOLUTE SAX. ISOLUTE PE-AX may therefore provide more efficient extraction of some acidic analytes than SAX.

Sorbent Class	Exchange Capacity (meq/g)	Application	Chemistry Data Sheets	Ordering Information Page
Weak anion exchanger, pK 9.8	0.6	Extraction of strong acids and polyacidic compounds from aqueous sample matrix. Analyte elution can be performed by neutralizing charge on the sorbent. Sorbent supplied as the free base.	TN104	52
Weak anion exchanger, pK 10.1 & 10.9	0.4	Extraction of strong acids and polyacidic compounds from aqueous sample matrix. Analyte elution can be performed by neutralizing charge on the sorbent. Sorbent will complex with certain metal ions. Supplied as the free base.	TN105	53
Strong anion exchanger	0.6	Extraction of acidic analytes from aqueous sample matrix. Supplied with chloride counter ion.	TN103	54
Strong anion exchanger	0.6	Extraction of acidic analytes from aqueous sample matrix. Supplied with acetate counter ion for more efficient extraction of acidic analytes including those with polar/water soluble characteristics.	TN103	55

For more information on ion exchange SPE procedures, see the QuickStart Guide (**page 174-184**).

For in depth technical information on the use of ISOLUTE ion exchange sorbents, refer to the Chemistry Data Sheets listed in the table above.

ISOLUTE Cation Exchange Sorbents

ISOLUTE cation exchange sorbents are used for extraction of basic compounds. The weak cation exchange sorbent, ISOLUTE CBA, is suitable for the extraction of strongly basic analytes (e.g. quaternary amines) or analytes that are unstable under basic conditions. The sorbent's negative charge can be eliminated by pH control, for analyte elution.

Strong cation exchange sorbents (ISOLUTE SCX-2 and SCX-3) are used for extraction of weakly basic compounds, as they retain a permanent negative charge across the pH range. Analytes are eluted from strong cation exchange sorbents by eliminating the charge on the analyte.

ISOLUTE Cation Exchange Sorbents

Sorbent	Description	Structure	Average Particle Size (µm)	Pore Diameter (Å)
CBA	Propylcarboxylic acid	-Si-$(CH_2)_3COOH$	50	60
SCX-2	Propylsulfonic acid	-Si-$(CH_2)_3SO_3^-H^+$	50	60
SCX-3	Ethylbenzene sulfonic acid	-Si-$(CH_2)_2$-  -$SO_3^-H^+$	50	60

ISOLUTE SCX-2 contains a propylsulfonic acid group. This sorbent exhibits minimal non-polar secondary interactions, and analytes can often be eluted using purely aqueous conditions.

ISOLUTE SCX-3 contains an ethylbenzene sulfonic acid group. This exhibits significant non-polar secondary interactions, and may be more suitable for extraction of analytes with low hydrophobic character. Elution solvents should contain some organic component, along with the appropriate base.

Sorbent Class	Exchange Capacity (meq/g)	Application	Chemistry Data Sheets	Ordering Information Page
Weak cation exchanger, pK 4.8	0.7	Extraction of strong bases and polybasic compounds from aqueous sample matrix. Analyte elution can be performed by neutralizing charge on the sorbent.	TN108	56
Strong cation exchanger	0.6	Extraction of basic analytes from aqueous or partially aqueous sample matrix. Supplied in the protonated form. Sorbent of choice if strong cation exchange is primary retention mechanism, or, if aqueous conditions required for analyte elution. For methods listing PRS as the SPE sorbent, SCX-2 is a direct replacement.	TN107	58
Strong cation exchanger	0.6	Extraction of basic analytes from aqueous or partially aqueous sample matrix. Supplied in the protonated form. Sorbent of choice where significant non-polar secondary interactions are required.	TN106	59

For more information on ion exchange SPE procedures, see the QuickStart Guide (**page 174-184**).

For in depth technical information on the use of ISOLUTE ion exchange sorbents, refer to the Chemistry Data Sheets listed in the table above.

Polar Sorbents

Isolate analytes or remove interferences from non-polar sample matrices using polar retention mechanisms. The technical information for Biotage's range of polar sorbents for SPE and sample clean-up is summarized on these pages.

ISOLUTE Silica-Based Polar Sorbents

ISOLUTE polar silica-based sorbent used to isolate analytes from non-polar samples using a variety of polar interactions. Silica is the most retentive sorbent, exhibiting hydrogen bonding interactions with the analyte. The moisture content of ISOLUTE SI is controlled to 7 ±1% to aid method robustness. ISOLUTE DIOL, NH2 and PSA also retain analytes using hydrogen bonding. However, the analyte is not so strongly retained on these sorbents and maybe eluted using less polar solvents. ISOLUTE CN typically retains analytes using dipole-dipole interactions.

ISOLUTE Silica-Based Polar Sorbents

Sorbent	Description	Structure	Average Particle Size (µm)	Pore Diameter (Å)
CN	Cyanopropyl (non-endcapped)	-Si-$(CH_2)_3CN$	50	60
SI	Silica	-Si-OH	50	60
DIOL	2,3-dihydroxypropoxypropyl (non-end-capped)	-Si-$(CH_2)_3$-$OCH_2CH(OH)CH_2OH$	50	60
NH2	Aminopropyl (non-endcapped)	-Si-$(CH_2)_3NH_2$	50	60
PSA	Ethylenediamine-N-propyl (non-end-capped)	-Si-$(CH_2)_3NH(CH_2)_2NH_2$	50	60

Polar Sorbents

Nominal Moisture Content	Application	Chemistry Data Sheets	Ordering Information Page
-	Extraction of polar compounds from a non-polar sample matrix. Retains analytes using dipole-dipole interactions. Can also be used as a non-polar sorbent with aqueous sample matrices.	TN102	44
7%	Extraction of polar compounds from a non-polar sample matrix using hydrogen bonding retention mechanism.	TN102	60
-	Extraction of polar compounds from a non-polar sample matrix using hydrogen bonding retention mechanism. Less retentive sorbent than SI. Can also be used as a non-polar sorbent with aqueous sample matrices.	TN102	61
-	Extraction of polar compounds from a non-polar sample matrix using hydrogen bonding retention mechanism. Less retentive sorbent than SI. Can also be used as a weak anion exchange sorbent in aqueous and non-polar sample matrices.	TN102	52
-	Extraction of polar compounds from a non-polar sample matrix using hydrogen bonding retention mechanism. Less retentive sorbent than SI. Can also be used as a weak anion exchange sorbent in aqueous and non-polar sample matrices.	TN102	53

For more information on polar SPE procedures, see the QuickStart Guide (**page 174-184)**.

For in depth technical information on the use of ISOLUTE polar sorbents, refer to the Chemistry Data Sheets listed in the table above.

Polar Sorbents

ISOLUTE FL

ISOLUTE FL is generally used to clean up non-polar solvent extracts containing non-polar analytes, e.g. chlorinated pesticides. Polar interferences are retained on the column, while analytes are eluted.

ISOLUTE AL-A, AL-N & AL-B

A high activity, 50 – 200 µm particle size range of aluminas, available in acidic, neutral and basic surface pH. options.

ISOLUTE Polar Sorbents

Sorbent	Description	Structure	Average Particle Size (µm)	Pore Diameter (Å)
FL	Florisil PR	$MgO \bullet 3.6\ SiO_2 \bullet 0.1\ OH$	150 - 250	60
AL-A	Alumina - acidic	-	50 - 200	120
AL-N	Alumina - neutral	-	50 - 200	120
AL-B	Alumina - basic	-	50 - 200	120

The surface of the alumina can absorb molecules by interaction with the aluminium metal center, hydrogen bonding with surface hydroxyl groups, or by ion exchange if the surface carries a charge. The extent of these different interactions can be enhanced by control of the surface pH by treatment with acidic, basic or neutral solutions.

Nominal Moisture Content	pH	Application	Chemistry Data Sheets	Ordering Information Page
< 2%	8.5	Extraction of polar compounds from a non-polar sample matrix. Alternative to silica based polar sorbents. Minimal retention of basic compounds. Activated for separation of chlorinated pesticides.	-	62
< 0.1%	4.5	Extraction of polar compounds from a non-polar sample matrix. Alternative to silica based polar sorbents.	-	63
< 0.1%	7.5	Extraction of polar compounds from a non-polar sample matrix. Particularly retentive for electronegative analytes. Alternative to silica based polar sorbents.	-	63
< 0.1%	10	Extraction of polar compounds from a non-polar sample matrix. Has negative surface for specific retention of cations. Alternative to silica based polar sorbents.	-	63

For more information on polar SPE procedures, see the QuickStart Guide (**page 174-184**).

QuickStart Guide

Introduction

Sample preparation prior to analysis is as important to the success of an assay as the analytical technique itself. This is especially true when low levels of detection are required, or for analytes in complex matrices, such as biological fluids, tissue, foodstuffs, agricultural products and environmental samples.

Solid Phase Extraction (SPE) is a powerful technique for rapid, selective sample preparation. The versatility of SPE allows it to be used for a variety of purposes, such as:

- Purification
- Trace enrichment
- Solvent exchange (analytes are transferred from one matrix to another e.g. from aqueous to organic solvent)
- Desalting
- Derivatization (analytes are retained on a sorbent, derivatized, then eluted)
- Class fractionation (sample is separated into different compound groups that share common properties)

SPE offers many benefits and advantages over other sample preparation techniques such as liquid-liquid extraction, including:

- High, reproducible analyte recovery
- Concentration of analytes
- Highly purified extracts
- Ease of automation
- Compatibility with instrumental analysis
- Productivity enhancement
- Reduction of organic solvent consumption

SPE is a very simple technique to use, employing disposable extraction columns or microplates (see **Figure 1**) which are available in a wide range of reservoir volumes, formats and sorbents, as described on **pages 15-63** of this catalog.

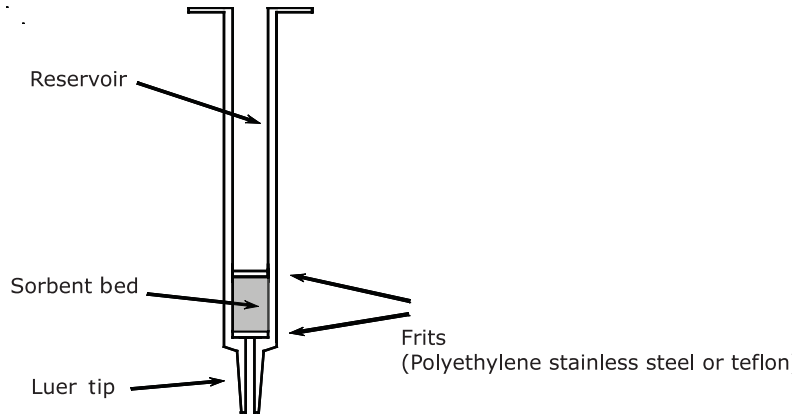


Figure 1. Components of an SPE column or well (microplate format)

In principle, SPE is analogous to liquid-liquid extraction (LLE). As a liquid sample passes through the SPE column, compounds are 'extracted' from the sample and adsorbed onto the support or sorbent material in the column. Interferences can then be selectively removed from the column using the correct choice of wash or interference elution solvents. Finally, the desired analytes may be selectively recovered from the column by an elution solvent, resulting in a highly purified extract. The analyte concentration in this extract is often higher than in the original sample.

Alternatively, an extraction column may be selected that retains the interferences present in the sample, but allows the analytes to pass through un-retained, providing clean-up but not analyte trace enrichment.

SPE sorbents have a typical mean particle size of 30-50 µm. Many organic solvents can flow through SPE columns or plates under gravity, but for aqueous samples and more viscous solvents, liquids must be passed through the sorbent bed using vacuum applied to the column outlet, positive pressure applied to the column inlet, or centrifugation (see **Figure 2**).

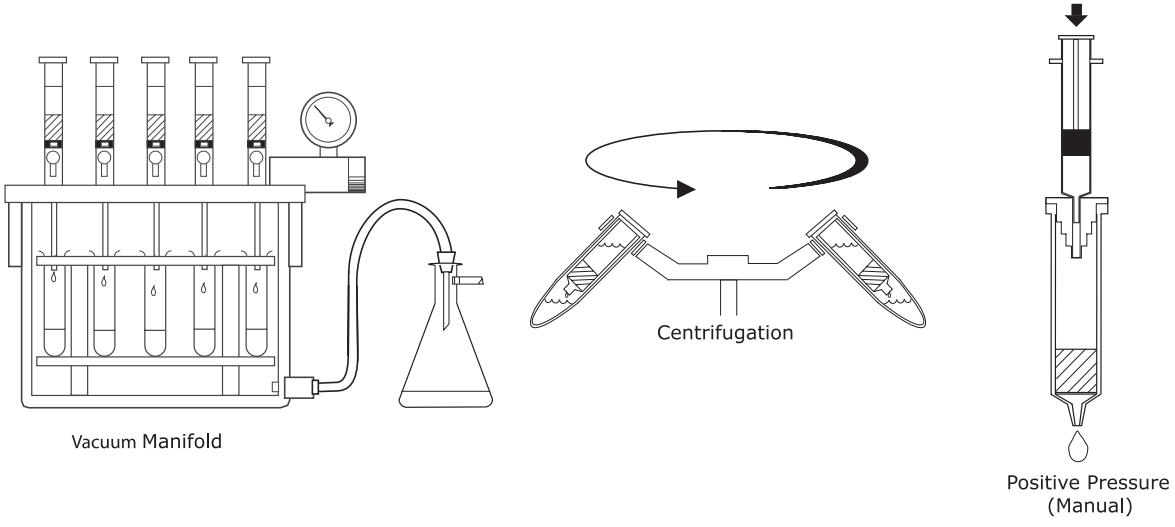


Figure 2. Techniques for processing ISOLUTE SPE columns

SPE Sorbent / Mechanism Selection

SPE columns are available in a wide range of sorbent chemistries. Each exhibits unique properties for retention of analytes through a variety of molecular interactions (referred to as retention mechanisms).

The most common retention mechanisms in SPE are:

- Non-polar (based on Van der Waals forces)
- Polar (based on hydrogen bonding, dipole-dipole or pi-pi interactions)
- Ion exchange (interactions between cations (positively charged species) and anions (negatively charged species))
- Mixed-mode (combination of non-polar and ion exchange interactions)

SPE sorbents in this catalog are classified by retention mechanism. Each sorbent offers a unique combination of these properties which can be applied to a wide variety of specific extraction problems.

Selectivity

This extensive range of sorbent chemistries provides one of the most powerful aspects of SPE, high selectivity. Selectivity is the degree to which an extraction technique can separate the analyte of interest from the interferences in the original sample. The highly selective nature of SPE is due to two factors. First, each extraction sorbent chemistry offers unique and distinctive retention properties, to address a wide range of analyte characteristics. The second factor is best understood by comparison with liquid-liquid extraction. In liquid-liquid extraction, the two liquids (phases) must be immiscible with each other. Clearly, an aqueous sample cannot be extracted with methanol. In SPE however, one phase is a solid support or sorbent, and is therefore by definition immiscible with any extraction solvent used. This results in a huge variety of possible sorbent/solvent combinations, with potential to achieve highly selective extractions.

Capacity

The capacity of a the sorbent is defined as the total mass of strongly retained analyte that can be retained by a given sorbent mass under optimum conditions. When determining the amount of sorbent required for an extraction, it is essential to consider not only the capacity requirement for the analyte, but also for any undesired sample components (interferences) which may be co-extracted with the analyte using the same retention mechanism. Choosing a more selective retention mechanism will increase the relative capacity of the SPE bed, in effect reducing the amount of sorbent required for a given extraction. This has benefits in reducing the amounts of solvent used, and increasing the final concentration of analyte in the extract. Maximum selectivity (and therefore capacity) is achieved when the selected sorbent interacts with functional groups present on the analyte, but not other sample components.

Typically, non-polar and polar SPE sorbents have a capacity of between 1 and 5% of the sorbent mass (i.e. 100 mg of sorbent can retain up to 5 mg of strongly retained analyte under optimum conditions).

Ion exchange sorbent capacity is measured in milli-equivalents per gram of sorbent (meq/g), based on the number of available ionic groups on the sorbent. For example, ISOLUTE SAX has an exchange capacity of 0.6 meq/g. This means a 1 g ISOLUTE SAX column can retain up to 0.6 mmol of an anionic (acidic) compound.

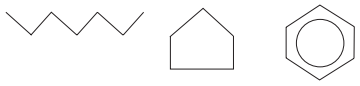
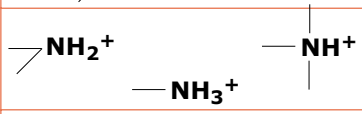
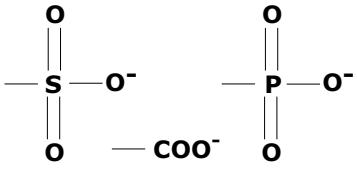
Guide to SPE Sorbent Selection

Proper choice of SPE sorbent is critical to the success of the SPE procedure. There are many aspects of the application that should be considered as part of sorbent selection, including:

- Nature of the analytes (functionality, etc.)
- Nature of the sample matrix
- Degree of purity required
- Nature of major contaminants in the sample
- Analytical procedure

The first factor affecting the choice of a sorbent type or retention mechanism is based on the properties of the analyte (i.e. functional groups of the analyte which can be used for retention on the sorbent). There may be a number of different possibilities depending on the analyte characteristics (see **Table 1**).

Table 1. Retention mechanism options for various analyte functional groups

Analyte functional group	Example	Retention mechanism option
Hydrophobic, non-polar, alkyl, aromatic		Non-polar
Polar, hydroxyls, amines, dipoles		Polar
Basic groups, cations		Cation exchange
Acidic groups, anions		Anion exchange

The choice of sorbent is also influenced by the nature of the sample, since certain sample matrices promote analyte retention better by one retention mechanism than another. (**see Table 2**)

Table 2. Retention mechanism options for various sample types

Sample matrix type	Example	Retention mechanism option
Aqueous, low ionic strength	River water, diluted biological fluids	Non-polar, ion exchange
Aqueous, high ionic strength	Sea water, biological fluid*	Non-polar
Non-polar	Hexane or olive oil	Polar

* For extraction of basic or acidic compounds from complex biological fluid samples such as plasma or urine, mixed-mode SPE columns can provide additional clean-up.

Practical Aspects of SPE Method Development

Once an appropriate sorbent type/retention mechanism has been selected, this guide provides a summary of the more important points to consider during method development. The table on **page 180-182** summarizes this information for non-polar, polar, ion exchange and mixed-mode retention mechanisms.

An SPE procedure typically consists of 6 steps: (see **Figure 3**).

1. Sample pre-treatment
2. SPE column solvation
3. SPE column equilibration
4. Sample application
5. SPE column washing (interference elution step)
6. Analyte elution from the SPE column

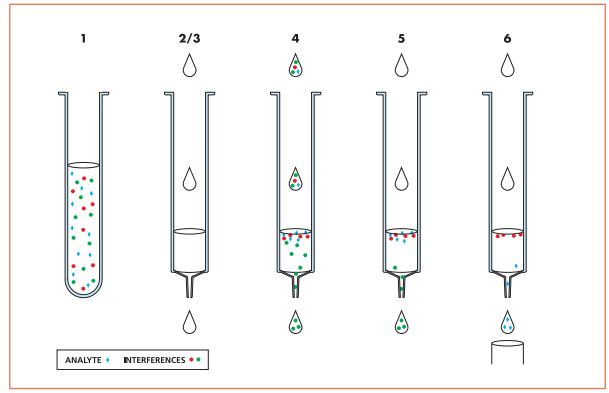


Figure 3. Typical SPE procedure

If using the SPE column to retain interferences while allowing analytes to pass straight through, follow the same guidelines, but use conditions to promote retention of interferences, rather than analytes, during steps 1 - 4. Collect the sample once it has passed through the SPE column, as this will contain the analytes.

Flow rate control

Flow rate control during sample loading, interference and analyte elution steps is important. Too fast a flow rate can result in low recoveries due to breakthrough during the analyte retention (sample loading) step, or inadequate elution during the elution step. Too high a flow rate during the interference elution step can result in dirty extracts. Flow rates should be specified in all protocols to ensure trouble free transfer from one analyst or laboratory to another.

See **Table 4** (**page 183**) for typical flow rates used during method development.

Step 1:

Sample pre-treatment

Sample pre-treatment may simply be a dilution of the sample with an appropriate solvent in order to reduce viscosity, or it could involve addition of a buffer to control the pH of the sample prior to retention by non-polar, mixed-mode or ion exchange sorbents.

a) Ensure analytes are in solution and available for interaction with the sorbent. If the sample contains particulate matter to which the analytes absorb, it is essential to first desorb the analytes from the particulates before applying the sample to the SPE column. Similarly, if analytes are bound to large molecules in the sample (e.g. drugs bound to proteins present in biological fluids), this binding must be disrupted to achieve high extraction efficiencies. This can usually be achieved by the addition of a small percentage organic solvent, or pH adjustment of the sample.

b) Filter or otherwise remove (e.g. centrifuge) sample particulates to prevent column blockage.

c) Non-polar sorbents:

(i) Enhance retention of ionizable analytes by adjusting sample pH to suppress ionization of the analyte.
For acidic analytes: adjust pH to 2 pH units below the pK of the analyte
For basic analytes: adjust pH to 2 pH units above the pK of the analyte

(ii) Use of non-polar, non-endcapped silica based sorbents (C18, C8, C6, C4, C2, PH, CN) for extraction of basic analytes:
The retention of basic analytes by non-polar sorbents can often be enhanced using the secondary interaction with silanol ($Si\text{-}O^-$) groups present on the surface of the silica particle. To use this approach, the pH of the sample should be adjusted to ionize the silanol groups ($Si\text{-}O^-$) and protonate the analyte. A pH range between 3 and 8 is normally evaluated.

d) For ion exchange interactions, pH must be adjusted to ensure complete ionization of the analyte, and in the case of weak ion exchange sorbents (e.g. CBA, NH2 and PSA), the sorbent functional group.

Analyte ionization conditions

i) For basic analytes: adjust pH to 2 pH units below the pK of the analyte
ii) For acidic analytes: adjust pH to 2 pH units above the pK of the analyte

Sorbent ionization conditions

(i) For ISOLUTE CBA, sample pH must be greater than 6.8
(ii) For ISOLUTE NH2, sample pH must be less than 7.8 (or 8.1 for ISOLUTE PSA)

It is important to ensure that the ionic strength of the sample is not so high as to weaken the ionic interactions. To overcome this, dilute with low ionic strength buffer. Failure to deal with high and variable ionic strength samples can result in low or variable recoveries when using ion exchange sorbents.

e) For extraction of large volume aqueous samples (>25 mL) using non-polar silica based sorbents, it is necessary to add 0.5-5 % methanol or iso-propanol to the sample in order to maintain solvation of the sorbent bed during sample loading, and ensure high analyte recovery.

Step 2:
Column solvation

In order for a proper phase interface to exist between the sorbent and the sample, most ISOLUTE SPE columns should be solvated prior to sample loading. Typical solvents are listed in **Table 3 (page 180)**. A typical volume of solvation solvent is 1 mL/100 mg sorbent.

Step 3:
Column equilibration

Prior to sample loading, the SPE column should be 'normalized' to match the conditions of the pre-treated sample. This will ensure maximum analyte recovery.

For example, if the sample is pH adjusted to suppress/ensure ionization of the analyte, equilibrate the column with a buffer of the same pH and ionic strength.

For weak ion exchange sorbents, use buffer pH to also ensure ionization of sorbent for maximum capacity (see **Table 3** for guidelines for specific sorbents).

Step 4:
Sample loading

Extraction efficiency is flow rate dependent, so evaluation of the extraction efficiency vs. flow rate is a useful part of the method development process. See **Table 4 (page 183)** for suggested flow rates.

Step 5:
Interference elution

Table 3 provides useful guidelines on the choice of interference elution solvents. N.B. for maximum analyte recovery, analyte retention conditions (e.g. pH and ionic strength) should be maintained during this step.

Step 6:

Analyte Elution

A good elution solvent should elute the analyte in as low a volume as possible. Choose a solvent or solvent mixture in which the analyte is highly soluble. Elution solvents should overcome both primary and any secondary interactions by which the analyte is retained.

Table 3 provides some useful guidelines on the choice of analyte elution solvents.

During method development, it is important to evaluate the effect of different flow rates on the efficiency of analyte elution, and specify the optimum flow rate range in the protocol. Lower flow rates are often required for ion exchange sorbents. It is sometimes useful to elute the analyte with two aliquots of X/2 mL of solvent, rather than a single elution step with X mL solvent.

Where basic analytes have been extracted using a non-polar, non-endcapped sorbent, the elution solvent should be optimized to also overcome secondary interactions between surface silanol groups and the positively charged (or protonated) analyte. This can be achieved by acidifying the elution solvent to suppress silanol ionization or increasing the pH to eliminate the positive charge on the basic analyte. Alternatively, elute with solvent containing 1% 1M ammonium acetate.

Table 3
Suggestions for the use of EVOLUTE and ISOLUTE Non-polar, Polar, Ion Exchange and Mixed-mode Sorbents

Sorbent	Conditioning	Equilibration	Sample pH	Interference Elution	Analyte Elution
Non-polar polymer-based sorbents, see page 22-27, 30-31, 156-159					
EVOLUTE ABN	Methanol	Aqueous formic acid (0.1%, v/v)	Dilute with aqueous formic acid (1%, 1:3, v/v). pH control may be required to suppress ionization of acidic and basic analytes.	Water:methanol (95:5, v/v)	Methanol
ISOLUTE ENV+ Hydroxylated polystyrene-divinylbenzene (water-wettable sorbent)	Methanol or acetonitrile, although not necessary.	Water and/or 20-50 mM buffer, the same pH as the sample.	pH control required to suppress ionization of acidic and basic compounds.	Water or buffer; add up to 40 % methanol or acetonitrile to remove more polar interferences; ensure no analyte breakthrough. Maintain pH control.	Methanol. Evaluate other solvents (e.g. hexane*, acetone, ethyl acetate* etc.) if additional selectivity is required. Addition of acid or base may be necessary to break ionic secondary interactions.
ISOLUTE 101 Unmodified polystyrene-divinylbenzene (non-wettable sorbent).	Methanol or acetonitrile.	Water and/or 20-50 mM buffer, the same pH as the sample.	pH control required to suppress ionization of acidic and basic compounds.	Water or buffer; add up to 40% methanol or acetonitrile to remove more polar interferences, ensure no analyte breakthrough. Maintain pH control.	Methanol. Evaluate other solvents (e.g. hexane*, acetone, ethyl acetate* etc.) if additional selectivity is required.

* If using a water immiscible elution solvent, the column should first be thoroughly dried using centrifugation or aspirating air, N_2 or CO_2 for at least 15-20 mins using vacuum or positive pressure.

Sorbent	Conditioning	Equilibration	Sample pH	Interference Elution	Analyte Elution
Mixed-mode polymer-based sorbents, see page 22-27, 160-163					
EVOLUTE CX	Methanol	Ammonium acetate (0.05M, pH 6)	Dilute with ammonium acetate (0.05M, pH 6, 1:3, v/v).	1. Ammonium acetate (0.05M, pH 6) followed by 2. Methanol	Methanol: ammonium hydroxide (95:5, v/v)
EVOLUTE WCX (A) (Quats and strong bases only)	Methanol	Ammonium hydroxide (5%, v/v)	Dilute with ammonium hydroxide (5%, 1:3, v/v).	1. Ammonium hydroxide (5%, v/v) followed by 2. Methanol	Methanol: formic acid (98:2, v/v)
EVOLUTE WCX (B) (combined weak and strong bases)	Methanol	Ammonium acetate (0.05M, pH 7)	Dilute with ammonium acetate (0.05M, pH 7, 1:3, v/v).	1. Ammonium acetate (0.05M, pH 7) followed by 2. Methanol	Methanol: formic acid (98:2, v/v)
EVOLUTE AX (A) (plasma samples)	Methanol	Ammonium hydroxide (2%, v/v)	Plasma. Dilute with ammonium hydroxide (2%, 1:3, v/v).	1. Ammonium acetate (0.05M, pH 7): methanol (95:5, v/v) followed by 2. Methanol	Methanol: formic acid (98:2, v/v)
EVOLUTE AX (B) (urine or other high ionic strength matrix)	Methanol	Water	Urine. Dilute with ammonium acetate (0.05M, pH 7, 1:3, v/v).	1. Ammonium acetate (0.05M, pH 7): methanol (95:5, v/v) followed by 2. Methanol	Methanol: formic acid (98:2, v/v)
EVOLUTE WAX	Methanol	Formic acid (2%, v/v)	Dilute with formic acid (2%, 1:3, v/v)	1. Formic acid (2%, v/v) followed by 2. Methanol	Methanol: ammonium hydroxide (95:5, v/v)
Mixed-mode silica-based sorbents, see page 46-50, 160-163					
ISOLUTE HAX	Methanol	Formic acid (pH 2, 2% v/v)	Dilute with formic acid (pH 2, 2%, 1:1, v/v)	1. Ammonium acetate (0.1M, pH 7.0) followed by 2) methanol: water (1:1, v/v)	Methanol: acetic acid (98:2, v/v)
ISOLUTE HCX, HCX-3, HCX-5	Methanol	Ammonium acetate (0.05M, pH 6)	Dilute with ammonium acetate (0.05M, pH 6, 1:1, v/v).	1. Ammonium acetate (0.05M, pH 6) followed by 2. Acetic acid (1 M) followed by 3. Methanol	Methanol: ammonium hydroxide (95:5, v/v)
ISOLUTE HCX-Q	Methanol	Ammonium acetate (0.05M, pH 7)	Dilute with ammonium acetate (0.05M, pH 7, 1:4, v/v).	Methanol: ammonium acetate (0.05M, pH7.0) (20:80, v/v)	0.2M monochloroacetic acid in methanol
Non-polar silica-based sorbents, see page 32-45, 156-159					
ISOLUTE C18 C18(EC), MFC18, C8, C8(EC), C6, C4, C2, C2(EC), PH, PH(EC), CH(EC) CN, CN(EC)	Methanol or Acetonitrile.	Water and/or 20-50 mM buffer, the same pH as the sample.	pH control required to suppress ionization of acidic and basic compounds. See previous section of Guide on extraction of basic compounds.	Water or buffer; add up to 40% methanol or acetonitrile to remove more polar interferences. Check for analyte breakthrough. Maintain pH control.	Methanol. Evaluate other solvents (e.g. hexane*, acetone, ethyl acetate* etc.) if additional selectivity is required. See previous section for additional information for elution of basic compounds using non-polar SPE.

Sorbent	Conditioning	Equilibration	Sample pH	Interference Elution	Analyte Elution
Polar silica-based sorbents, see page 44, 52-53, 60-61 168-171					
ISOLUTE SI, NH2, CN, DIOL, PSA	Non-polar solvent e.g. hexane (preferably the same solvent as the sample).	N/A	N/A	Non-polar solvent which may contain a low concentration of a polar modifier that will not elute the analyte (e.g. hexane and ethyl acetate or iso-propanol).	Semi-polar solvent mixture e.g. hexane:ethyl acetate. For a non-selective elution use a polar solvent such as methanol.
Ion exchange silica-based sorbents, see page 52-59, 164-167					
SCX-2 Strong cation exchange.	Methanol or Acetonitrile.	20-50 mM buffer, the same pH as the sample.	At least 2 pH units below the pK of the analyte.	Maintain the same pH as the sample and evaluate the addition of 20-40 % methanol to elute non-polar interferences. % methanol can be increased for additional extract cleanliness. Check for analyte break-through.	Elute with buffer at least 2 pH units above the pK of the basic analyte. Alternatively use high ionic strength buffer (>0.1 M). Elution with methanol containing 2-5 % ammonia or other volatile base is common.
SCX-3 Strong cation exchange with significant non-polar secondary interactions	Methanol or Acetonitrile.	20-50 mM buffer, the same pH as the sample	At least 2 pH units below the pK of the analyte.	Maintain the same pH as the sample and evaluate the addition of 20-70 % methanol to elute non-polar interferences. % methanol can be increased for additional extract cleanliness. Check for analyte breakthough.	Elute with buffer at least 2 pH units above the pK of the basic analyte. This should contain at least 25-50 % organic solvent to overcome secondary interactions. Alternatively use high ionic strength buffer (>0.1 M). Elution with methanol containing 2-5 % ammonia or other volatile base is common.
CBA Weak cation exchange (sorbent pK 4.8)	Methanol or Acetonitrile.	20-50 mM buffer, the same pH as the sample.	pH≥6.8 and 2 pH units below the analyte pK.	Maintain the same pH as the sample and evaluate the addition of 20-50 % methanol to elute non-polar interferences.	Buffer at pH <2.8 will to eliminate the charge on the sorbent. Alternatively use high ionic strength buffer (>0.1M), or acidified solvent.
PE-AX Strong anion exchange (acetate counter ion)	Methanol or Acetonitrile.	20-50 mM buffer, the same pH as the sample. Acetate, formate or hydroxide buffers are recommended.	At least 2 pH units above the pK of the analyte.	Maintain the same pH as the sample and evaluate the addition of 20-50 % methanol to elute non-polar interferences.	Elute with buffer at least 2 pH units below the pK of the acidic analyte. Alternatively use high ionic strength buffer (>0.1M), or acidified methanol.
SAX Strong anion exchange (chloride counter ion)	Methanol or Acetonitrile.	20-50 mM buffer, the same pH as the sample	At least 2 pH units above the pK of the analyte.	Maintain the same pH as the sample and evaluate the addition of 20-50 % methanol to elute non-polar interferences.	Elute with buffer at least 2 pH units below the pK of the acidic analyte. Evaluate addition of 10 % methanol to reduce elution volume. Alternatively use high ionic strength buffer (>0.1M), or acidified methanol.
NH2 Weak anion exchange (sorbent pK 9.8)	Methanol or Acetonitrile.	20-50 mM buffer, the same pH as the sample	≤7.8 and 2 pH units above the analyte pK.	Maintain the same pH as the sample and evaluate the addition of 20-50 % methanol to elute non-polar interferences.	Elute with buffer or methanol at pH>11.8 to eliminate the charge on the sorbent. Alternatively use high ionic strength buffer (>0.1M), or acidified methanol.

Table 4
Recommended flow rates for method development

Column size	1 mL (A)	3 mL (B)	6 mL (C)
Flow rate	1 mL/min	3 mL/min	7 mL/min

Once the optimum chemistry has been established, optimize flow rate to maximize productivity. Increase flow until breakthrough is observed. The final flow rate should be set at 10 - 20 % lower than the breakthrough limit.

Table 5
Recommended volumes for method development

Step	Volume/100 mg sorbent
Column solvation	250 – 500 µL
Column equilibration	250 - 500 µL
Sample application	Application specific, based on sorbent capacity and analyte concentration in sample
Interference elution	250 - 500 µL
Analyte elution	250 µL - 1 mL – dependEnt on choice of elution solvent. To minimize elution volume, apply 2 x X/2 mL aliquots, including a soak step, rather than 1 x X mL aliquot.

Note: 1 bed volume is approximately 120 µL/100 mg sorbent

Method optimization process

In order to optimize an SPE method, the following steps should be followed.

1. Select desired retention mechanism
    - Non-polar
    - Polar
    - Ion exchange
    - Mixed-mode
2. Using the above guidelines, screen sorbents with the selected retention mechanism for retention of standards from a 'clean' matrix similar to the sample type. For example, if assay is to be developed for extraction of drugs from an aqueous biological fluid, first evaluate retention of standards from aqueous buffer.
3. Screen a range of elution solvents for elution of standards. Using the guidelines above, identify the elution solvent giving highest analyte recovery. Note that full recovery should be achieved using 2-10 bed volumes. If larger volumes are necessary, it is likely that a less retentive sorbent or alternative solvent is required.
4. Evaluate the initial procedure established in steps 1 - 3 for a spiked sample of 'real' sample matrix. For example, if assay is to be developed for a biological fluid matrix, and good recovery of analytes has been achieved from spiked buffer samples, move to 'blank' biological fluid, spiked with analytes.
5. Optimize interference elution solvents to achieve cleanest possible extract without loss of analyte.
6. Optimize flow rates for each step to maximize productivity.
7. Optimize sorbent bed mass. If this can be reduced without loss of analyte, benefits in reduction of solvent usage will result. This can be particularly important when working with low volume biological fluid samples.
8. Validate final method.

Troubleshooting SPE methods

The information in this guide provides a starting point for SPE method development. However, if low or variable analyte recoveries are still a problem once a method has been developed using these guidelines, this section outlines some simple strategies for identifying the nature of the problem.

The most common reasons for low analyte recovery in SPE are:

- Poor analyte retention, or
- Poor analyte elution

To identify inadequate retention, use one of the following methods

a) Stack two pre-conditioned and equilibrated columns together using an adaptor (see **page 86**) and load the sample. Separate the columns, and elute analyte from the lower column.

b) Alternatively, collect the eluent during sample load from a single SPE column, and re-extract using a known method (e.g. liquid-liquid extraction).

If analyte is present on the second SPE column (a) or in the liquid-liquid extraction solvent (b), the analyte is not sufficiently retained on the SPE column.

To identify inadequate elution

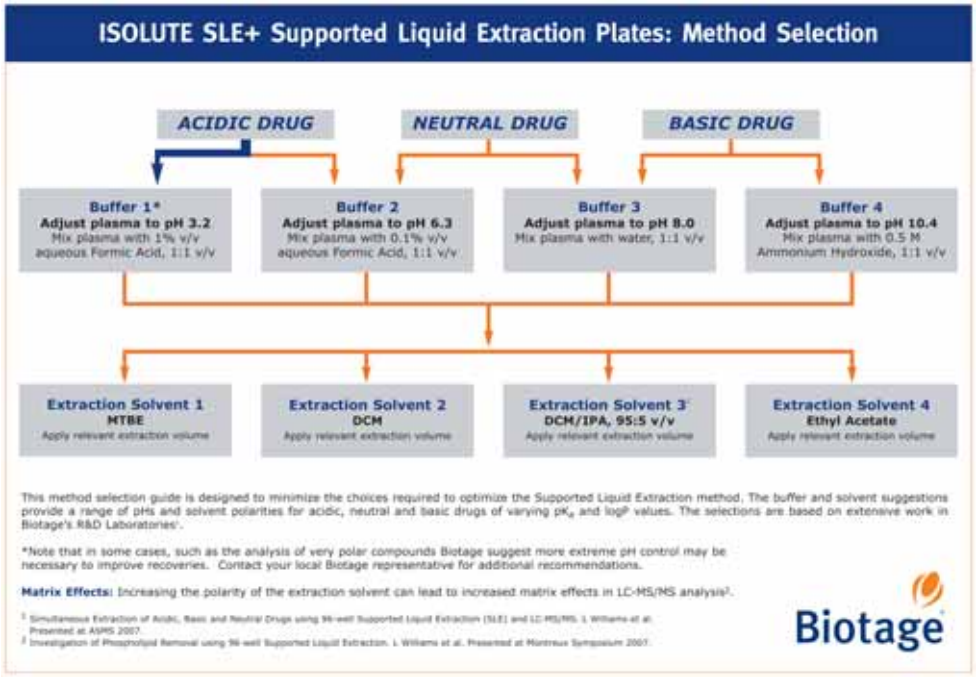
a) Elute analyte with up to 10 bed volumes of chosen elution solvent. Repeat. If a significant amount of analyte is present in the second elution, the analyte is not being eluted efficiently from the column.

Please don't hesitate to contact 1-Point Support for further assistance in SPE method development or troubleshooting.

Detailed Chemistry Data Sheets for all the sorbents mentioned in this QuickStart Guide are available – see sorbent ordering pages for details.

ISOLUTE SLE+ Method Development Guide

Biotage has examined a variety of acidic, basic and neutral compounds to determine recovery levels utilizing ISOLUTE SLE+. By screening four different loading pH's and four different extraction solvents, we were able to determine that recoveries were optimum when the pH was near the pK_a of the analyte. Through these experiments there was no universal "best" solvent for elution discovered. While MTBE is widely used, ethyl acetate, DCM and mixed solvents also perform well. Depending on the drug's functionality, by simply screening two pHs, combined with 4 extraction solvents, you can develop a method in minutes.



NOTE: A full sized copy of the **SLE+ Method Selection Guide** can be downloaded from our website at www.biotage.com

	SLE+200 µL	SLE+ 400 µL	SLE+ 1 mL	SLE+2 mL	SLE+ 5 mL	SLE+10 mL
1	Dispense pre-buffered sample 200 µL	Dispense pre-buffered sample 400 µL	Dispense pre-buffered sample 1 mL	Dispense pre-buffered sample 2 mL	Dispense pre-buffered sample 5 mL	Dispense pre-buffered sample 10 mL
2	Apply vacuum (-15"Hg/-0.5 bar) for 2-10 seconds to initiate loading	Apply vacuum (-15"Hg/-0.5 bar) for 2-10 seconds to initiate loading	Apply vacuum (-15"Hg/-0.5 bar) for 2-10 seconds to initiate loading	Apply vacuum (-15"Hg/-0.5 bar) for 2-10 seconds to initiate loading	Apply vacuum (-15"Hg/-0.5 bar) for 2-10 seconds to initiate loading	Apply vacuum (-15"Hg/-0.5 bar) for 2-10 seconds to initiate loading
3	Wait 5 minutes for sample to absorb	Wait 5 minutes for sample to absorb	Wait 5 minutes for sample to absorb	Wait 5 minutes for sample to absorb	Wait 5 minutes for sample to absorb	Wait 5 minutes for sample to absorb
3	Apply extraction solvent 2 x 500 µL	Apply extraction solvent 2 x 1 mL	Apply extraction solvent 2 x 2.5 mL	Apply extraction solvent 2 x 5 mL	Apply extraction solvent 2 x 10 mL	Apply extraction solvent 2 x 1 mL
5	Apply vacuum (-15"Hg/-0.5 bar) for 2 mins to complete elution	Apply vacuum (-15"Hg/-0.5 bar) for 2 mins to complete elution	Apply vacuum (-15"Hg/-0.5 bar) for 2 mins to complete elution	Apply vacuum (-15"Hg/-0.5 bar) for 2 mins to complete elution	Apply vacuum (-15"Hg/-0.5 bar) for 2 mins to complete elution	Apply vacuum (-15"Hg/-0.5 bar) for 2 mins to complete elution
6	Evaporate to dryness and reconstitute in mobile phase prior to analysis	Evaporate to dryness and reconstitute in mobile phase prior to analysis	Evaporate to dryness and reconstitute in mobile phase prior to analysis	Evaporate to dryness and reconstitute in mobile phase prior to analysis	Evaporate to dryness and reconstitute in mobile phase prior to analysis	Evaporate to dryness and reconstitute in mobile phase prior to analysis

NOTES

1. ***Sample Pre-treatment:***
   Dilute sample 1:1 with buffer depending on nature of analyte.
   a. *For highly acidic analytes dilute sample 1:1 with 1% aqueous formic acid to pH 3.2*
   b. *For neutral to mildly acidic analytes, dilute sample 1:1 with 0.1% aqueous formic acid to pH 6.3*
   c. *For neutral to mildly basic analytes, dilute sample 1:1 with water to pH8.0*
   d. *For strongly basic analytes, dilute sample with 0.5M ammonium hydroxide to pH 10.4*
2. *Viscous samples may require additional dilution*
3. *Analyte Elution: Organic solvents (MTBE, DCM, DCM/IPA (95:5 v/v) and ethyl acetate are all suitable as elution solvents depending on the nature of the anlayte.*

Custom Manufacturing Service

Custom Manufacturing Service

Biotage supply a comprehensive range of products for bioanalytical, environmental, forensic, clinical, food and agrochemical sample preparation, many of which are listed in this catalog. However, we know that some applications might require a different product or alternative configuration.

If your application requires a sample preparation product which is not listed in this catalog, we can supply an alternative under our **Custom Manufacturing Service**.

Some of the options are described here. As with all custom manufacturing, minimum order quantities may apply.

Typical SPE Column Configurations

The SPE sorbents listed in this catalog can be packed into non-standard column or plate formats. As a guide, this table lists the typical sorbent bed mass for each reservoir volume.
Note: not all sorbents are available in all sizes.

Reservoir volume	Bed mass										
	10 mg	25 mg	50 mg	100 mg	200 mg	500 mg	1 g	2 g	5 g	10 g	20 g
Fixed well plate	✓	✓	✓	✓							
Array 1 mL	✓	✓	✓								
Array 2 mL				✓							
1 mL (+XL*)	✓	✓	✓	✓							
3 mL (+XL*)				✓	✓	✓					
6 mL					✓	✓	✓	✓			
15 mL								✓			
25 mL									✓		
70 mL										✓	✓

* Biotage's XL columns have the same sorbent bed dimensions as 1 or 3 mL column, but have an integral 10 mL reservoir

Tabless Columns

1, 3 and 6 mL columns are available in tab-less format for use in PRESSURE+ positive pressure manifolds and with other liquid handling systems such as Gilson™ 215 systems. Simply add a "G" suffix to the part number for tab-less formats. There is no extra charge for tabless cartridges.

ASPEC Caps

1, 3 and 6 mL columns (standard or tabless) can be supplied pre-fitted with ASPEC caps for processing on Gilson ASPEC™ and 215 systems.

Filtration Options

The standard frit material used in the majority of our sample preparation products is sintered polyethylene with 10 or 20 µm nominal porosity. We can also supply sintered stainless steel or PTFE frits with various porosities.

Columns with Integral Depth Filters

All 3 mL to 70 mL SPE columns can be supplied pre-fitted with high purity ISOLUTE depth filters for 'in-line' removal of particulate material.

Custom Manufacturing Service

High Sensitivity Applications

Biotage's high purity standards allow the majority of applications to use our standard polypropylene columns or 96-well plates and polyethylene frits. However, we can custom manufacture SPE or filtration products with the following options if required.

- Polypropylene columns (1,3 or 6 mL) fitted with stainless steel frits
- Glass columns (6 mL) with PTFE frits

Glass SPE Columns

6 mL glass ISOLUTE SPE columns fitted with PTFE frits are available for high sensitivity work. These glass columns have the same dimensions as standard polypropylene 6 mL columns, and are compatible with the AutoTrace® SPE Work Station.

Customer Supplied Sorbents

We can pack SPE columns or plates with a sorbent of your choice. Contact us to discuss your requirements in detail.

Quotations

To request a quote for any sample preparation product that you cannot find in this catalog, or to discuss your custom packing requirements, contact our order processing department, or your local Biotage Distributor.

See **page 8** for How to Place Your Order.

Please be ready to provide details about your requirements:

- Format: column or 96-well plate
- Column size:
    - polypropylene: 1 mL, 3 mL, 6 mL, 10 mL, 15 mL, 25 mL, 70 mL
    - glass: 6 mL
- 96-well plate type:
    - fixed well plate
    - Array format wells: 1 mL, 2 mL
    - Array format plate: 1 mL, 2 mL
- Sorbent type
- Bed mass
- Frit type: material and porosity
- Quantity required
- Any special packaging requirements (we can supply bulk packs)

Sample processing equipment and accessories can also be supplied under our **Custom Manufacturing Service**.

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Limited Warranty

Biotage warrants that Biotage Consumables, including all FLASH®, FLASH+®, ISOLUTE®, EVOLUTE™ and Samplet™ purification cartridges, scavenger resins, solid-bound reagents and microwave vials, will be of good quality and workmanship, and will meet the applicable product specification. This warranty applies only to the initial test performed at the Customer's facility upon the initial start-up of the consumables and expires at the time the user applies an actual sample to the consumable. If the cartridge is packed with media provided by the Customer, the Biotage warranty applies only to the plastic tube, frits, and labor required for packing and testing the cartridge. Biotage will not be liable for any damage to media provided by the Customer that may be caused when Biotage packs such media in accordance with Biotage's standard operating procedures.

Should any Biotage consumable fail to meet the limited warranty above after being tested in accordance with the applicable Biotage standard operating procedures, Biotage will provide, at its sole option, either a replacement cartridge or reaction vial. If a cartridge, it will be packed with the original media, or packed with new media, at no cost to the Purchaser. If such failed cartridge is packed with media provided by the Purchaser, Biotage will make a reasonable effort to re-pack the original media, or pack a replacement cartridge with new media provided by the Purchaser.

Returns of any Consumable must be authorized in advance. Please contact Biotage for a Return Authorization (RA) number and shipping instructions. All claims must be made within thirty (30) days of shipment from Biotage, or after the initial test of the cartridge at the Customer's facility, whichever is first.

BIOTAGE MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING MERCHANTABILITY OR SUITABILITY FOR ANY PURPOSE.

BIOTAGE WILL NOT BE LIABLE IN ANY EVENT FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES WHETHER ARISING IN TORT, UNDER ANY WARRANTY OR OTHERWISE.

Trademark Acknowledgements

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To locate a distributor
please visit our web site
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CAT1006.0112-NP