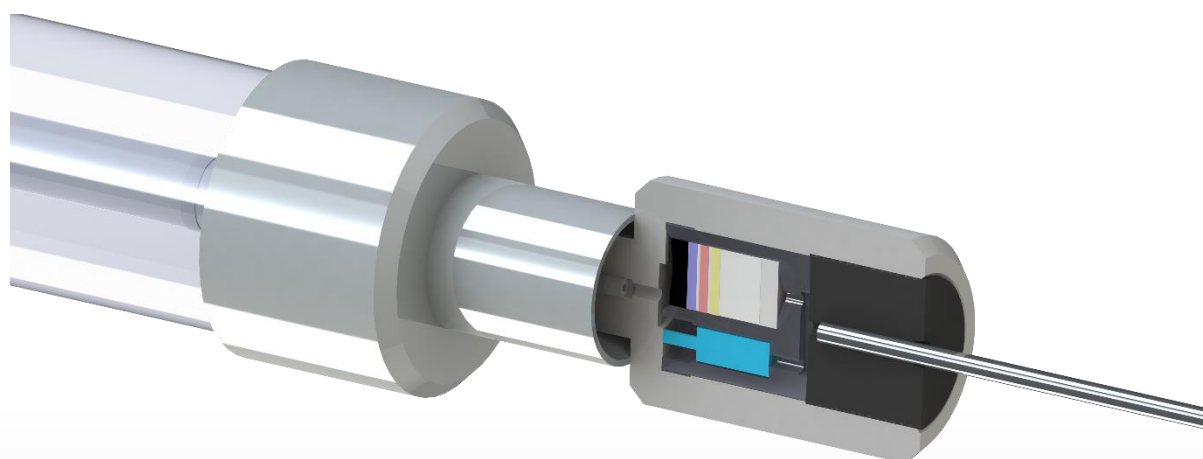


High Resolution MicroSPE Cartridges

Syringe Mounted for Full Automation



μ SPEed[®] Cartridges

E.PREP[®]
automation for every laboratory

μ SPEed[®] are syringe mounted high resolution cartridges for sample preparation

Designed for SPE automation, μ SPEed has a one-way valve and push together high-pressure seal

μ SPEed Advantage



Efficient and Powerful

1000:1 concentration factor can be achieved in minutes, allowing high resolution trap and elute without solvent blowdown



Clean Samples

Small particle sorbents used in μ SPEed enable ultra-clean preparation of even the dirtiest samples. Raw blood can be put through the cartridges



Improved Reproducibility

Controlled sample loading and elution results in highly reproducible preparation using μ SPEed



Cost Efficient and Environmentally Friendly

With very small elution volumes, no solvent blowdown is necessary, resulting in waste reduction and cost saving

μ SPEed Features

High Resolution microSeparations

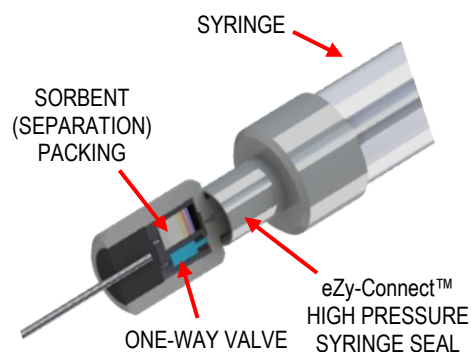
Small particle ($\leq 3 \mu\text{m}$) sorbents boast high efficiency, making fast micro HPLC separations possible

Controlled Kinetics

Stop / flow option allows precise volume and flow control with μ SPEed

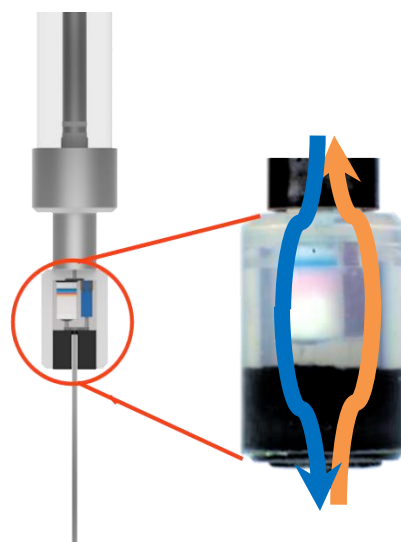
Replaceable

Depending on sample matrix, μ SPEed can be used once or multiple times whilst maintaining maximum activity



μ SPEed cartridges offer a unique opportunity to revolutionise microSPE, microseparations, and microreaction sample preparation. Using a one-way check valve, the sample is aspirated through the cartridge and analytes are focused onto the top of a sorbent bed. Using an analytical syringe, relatively high pressures can be generated, meaning sorbents of $\leq 3 \mu\text{m}$ can be used.

The μ SPEed cartridges perform like a short HPLC column where separation occurs not just during digital extraction but in the sample clean-up. This results in cleaner sample extractions, compound fractionation, high concentration factors and even LC isocratic and stepped elution for direct MS infusion directly from the cartridge. *(Patented)*



Semi-automation on digiVOL





































Full Automation on ePrep

Automation Options

Analytical syringe connection can be fully automated on ePrep and Semi-automated on digiVOL.

μSPEed vs. other SPE Methods

	μSPEed	SPE	MEPS/SPEmx	SPME
Sorbent Size	 ≤3μm	 40-60μm	 40-60μm	 Coated Fibre
Typical Sample Volume	 10μL-10mL	 2-3mL	 50μL-5mL	 2mL
Time/Speed	 Very Fast ¹ .	 Very Slow	 Fast	 Slow
Extraction Efficiency	 Excellent ² .	 Poor	 Very Poor	 Very Poor
Concentration Factor	 Very High(x2-x1000)	 Very Low(x1-x10)	 High	 Low
Price	 <\$1 (multi use)	 \$3-\$5	 <\$1 (multi use)	 \$2
Total Solvent	 200μL	 10mL	 500μL	n/a
Evaporation Step	 Never Required	 Required	 Rarely Required	n/a
Automation	 Yes	 Difficult	 Limited	 Yes

¹ μSPEed is faster than conventional SPE because smaller particle size sorbents are used in μSPEed. It performs like a high resolution HPLC column with elution in a narrow precise band. Resolution of targeted compounds in conventional SPE is very limited due to large particle size and inefficient packing of these sorbents.

² Smaller particle size sorbent gives greater efficiency of extraction, with elution conditions becoming far less critical. Also, the kinetics of the extraction is less critical with the greater efficiency. Where conventional large particle SPE requires precise conditions, μSPEed is far less method critical leading to greater reproducibility.

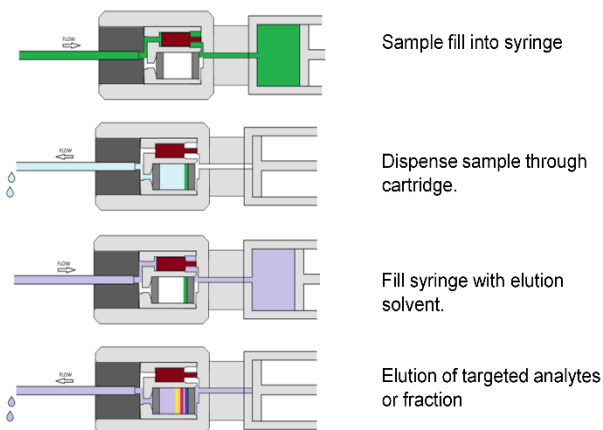


Beyond SPE

Fractionation and microSeparation Functionalities

Despite having SPE in its names, μSPEed can do more than just SPE. With its unique design, μSPEed is able to achieve narrow, low-volume, high concentration elution bands, making high-resolution fractionation possible.

Therefore, μSPEed is especially helpful for fractionating complex samples by compound class prior to mass spectrometry analysis.



Typical Operation

An Example of How μ SPE Works

STEP 1: [ACTIVATION] Aspirate and Dispense Conditioning Solvent (min 50 μ L)

STEP 2: [CONDITIONING] Aspirate and Dispense (100 μ L) Conditioning Solvent (min 50 μ L)

STEP 3: [SAMPLE LOAD] Aspirate Sample to Trap Analyte(s)

STEP 4: [SAMPLE DISPENSE] Dispense Sample and Needle Wash to Trap Analyte(s)

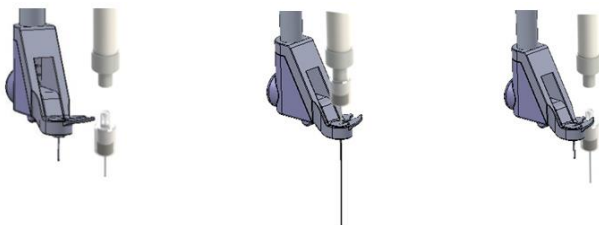
STEP 5: [WASH] Aspirate and Dispense Wash (typically same as Conditioning) Solvent

STEP 6: [ELUTION] Aspirate and Dispense Elution Solvent(s)

Perfect for Automation

μ SPEed is excellent for automation, featuring a high pressure, low dead volume connection for fast attachment and disconnection of the cartridge from the syringe and automated operation.

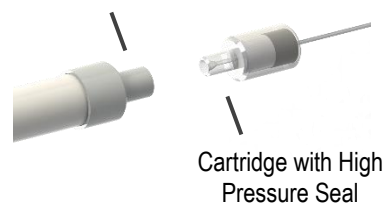
Featuring simple push-pull fittings to connect and disconnect without twisting the parts, the connector is ideal for robotic automation applications. There is no need for complex automation apparatus. During a sequenced workflow operation, multiple fittings can be easily picked up and dropped off at the required stations.



ePrep rotating foot is used to engage and disengage μ SPEed cartridges

Powerful Syringe Connection

eZy-Connect™ Syringe High Pressure Connection



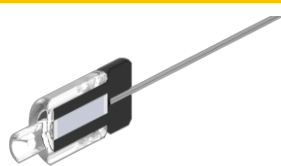
eZy-Connect™, ePrep's automated high-pressure connector allows a seal up to 1500psi. Full sample volume can be delivered from the syringe due to the ultra-low dead volume.

Cartridge Variants

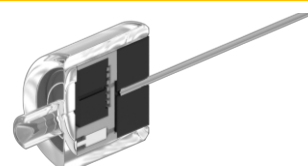
To meet the evolving needs of analytical laboratories, we produce different variations of cartridges. For example, SPEmx cartridges are packed with 40-60 micron sorbents and do not include the one-way check valve. Sample is loaded from the bottom of the sorbent bed making them ideal for "dirty" matrices such as blood, plasma and saliva. Loading mechanism makes the separation process digital as per conventional MEPS/SPE.



2.1mm ID SPEmx (MEPS) – no valve



9mm long SPEmx (MEPS)



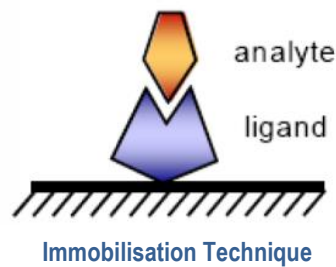
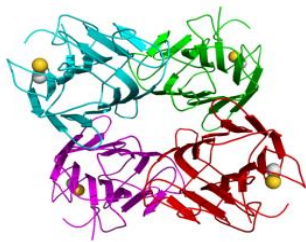
5.5mm ID μ SPEed and filter

Customisable Chemistry Cartridges

Versatile as it is, μ SPEed has a wide range of applications. In the field of biochemistry, μ SPEed Cartridges have proven to be a highly efficient tool for purifying protein samples.

μ SPEed-Cxyl customisable cartridge allows a range of customer selected ligands to be simply and quickly bonded to the μ SPEed cartridge in-situ. This simple and highly selective modification with a selective ligand, such as an antibody or trypsin reactor, permits targeted and very efficient analysis for specific compounds or biological molecules.

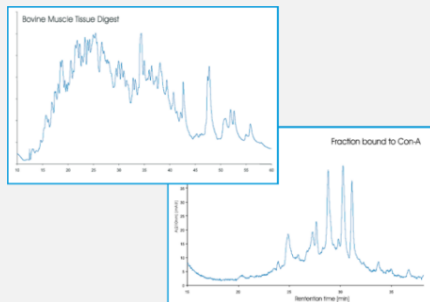
In addition, the attachment of enzymes permits enzymatic reaction functionalities, for example a highly efficient trypsin digest.



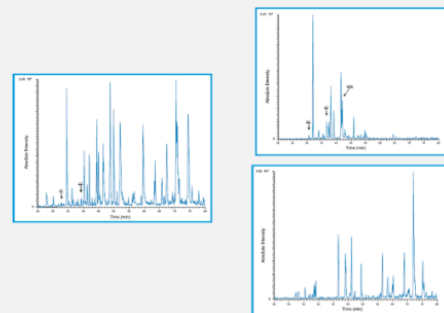
Affinity

A highly specific tool can facilitate biological recognition for the enrichment of sample components of interest

Glycoprotein Enrichment – Concanavalin-A, Affinity



Phosphorylate Peptides – Imino Diacetic Acid (IDA)

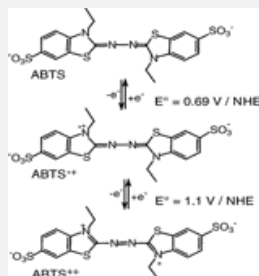
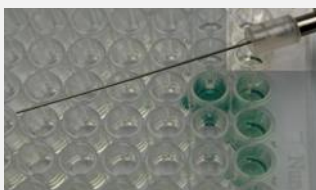


Trap Columns for Enrichment of Phosphorylated Peptides

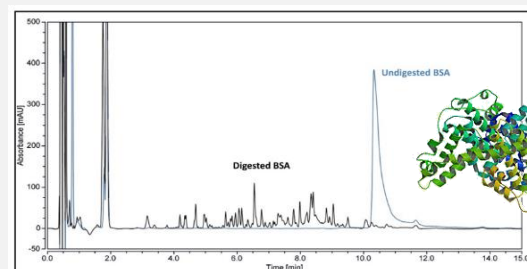
In-situ Reaction

Immobilised enzymes on the μ SPEed Cartridge can perform selective reactions to transfer the sample into a desired form (for example, in-line tryptic digests)

Enzyme Immobilisation – Horseradish peroxidase



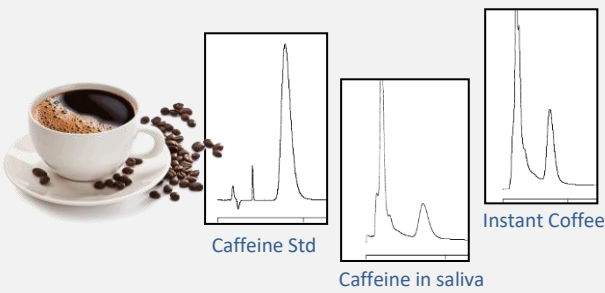
Tryptic Digest – BSA in 2 minutes



Rapid Tryptic Digest via μ SPEed Cartridge

μSPEed Example Applications

μSPEed Direct Analysis of Caffeine in Saliva



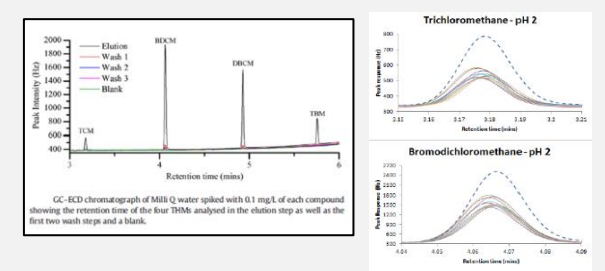
Caffeine Std

Caffeine in saliva

Instant Coffee

Direct μSPEed Cartridge to UV analysis of caffeine

Water Disinfection By-Product (DBP) Concentration

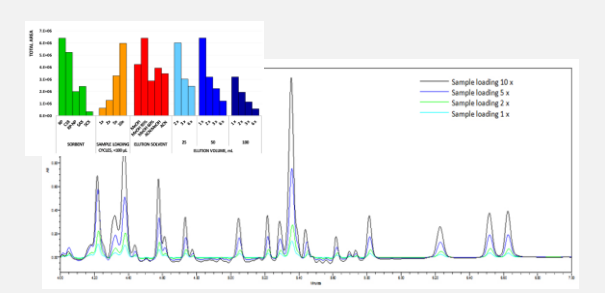


Trichloromethane - pH 2

Bromodichloromethane - pH 2

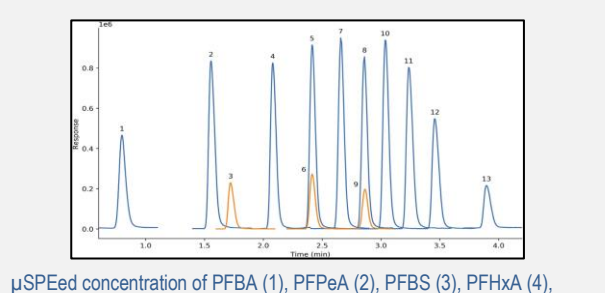
μSPEed DBP concentration from water

Fast microExtraction of Polyphenols in Teas



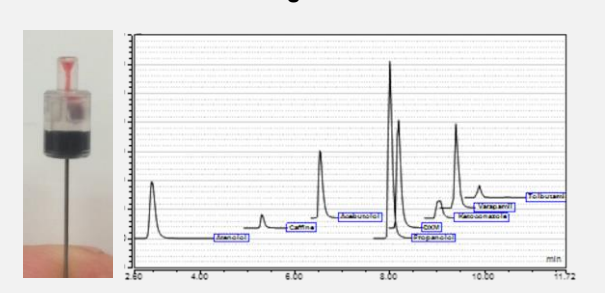
Linear μSPEed extraction recovery over 10-fold concentration

PFAS Concentration by Automated μSPEed



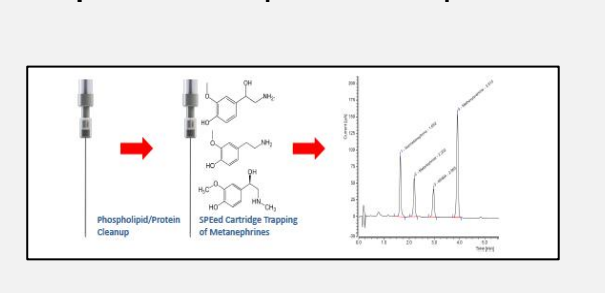
μSPEed concentration of PFBA (1), PFPeA (2), PFBS (3), PFHxA (4), PFHpA (5), PFHxS (6), PFOA (7), PFNA (8), PFOS (9), PFDA (10), PFUnA (11), PFDaA (12), PFTeDA (13).

microExtraction of Drugs from Serum and Blood



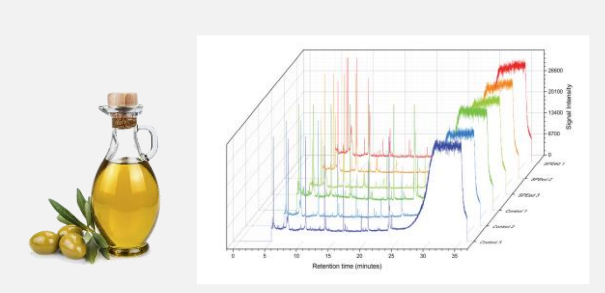
μSPEed trap and LCMS analysis of 0.02ppm drug pharmaceutical panel from serum and blood

μSPEed Clean-up Blood Metanephries



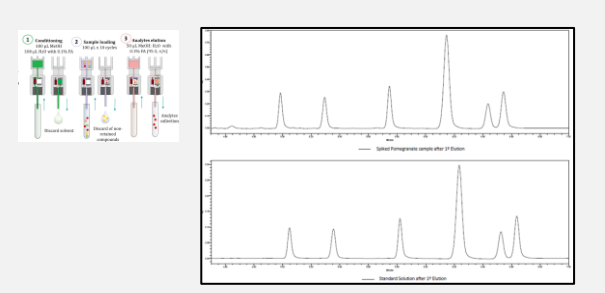
Extraction of Metanephries in plasma using μSPEed

μSPEed In-situ Derivatisation of Fatty Acids



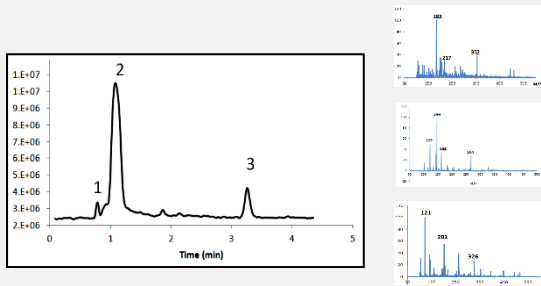
Stacked chromatograms of μSPEed derivatised FAMES in olive oil

microExtraction of Polyphenyls in Pomegranate



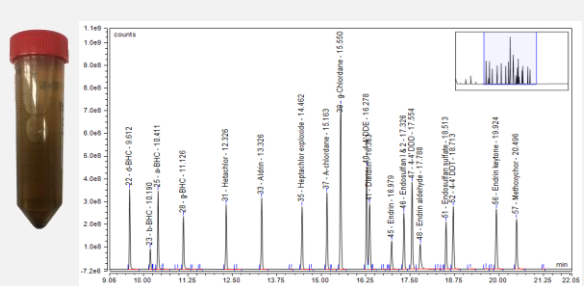
μSPEed recovery spiked fruit vs standard

μSPEed Plasma Opiate Standard Separation



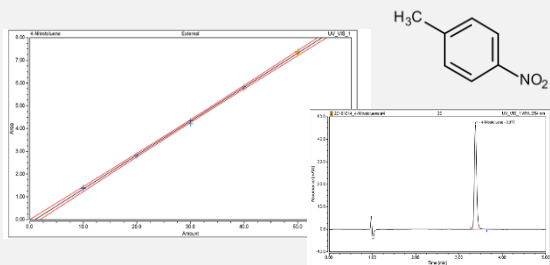
Direct μSPEed-MS - Opiate Standards

microExtraction Trace Pesticide Analysis



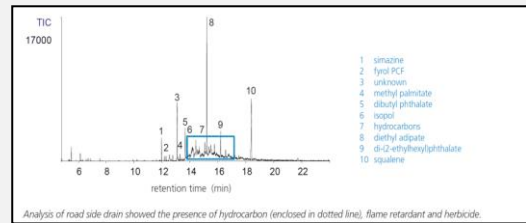
Direct shoot trap of pesticides in sedimentary water

μSPEed Recovery of Trace 4-Nitrotoluene



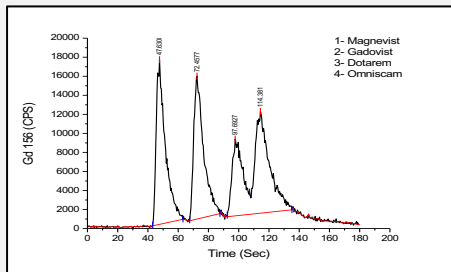
μSPEed recoveries of 4-nitrotoluene in water from 101-110%

Field Sample Collection Using μSPEed Cartridges



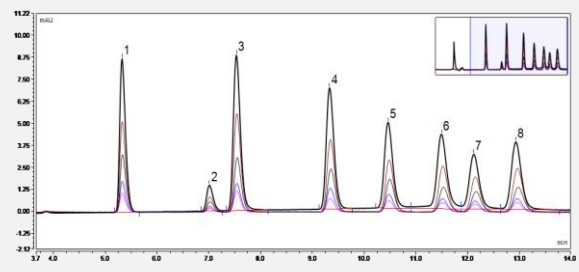
Herbicide Residue in Roadside Drain extraction/cleanup

Micro Concentration and Speciation of Gd Contrast



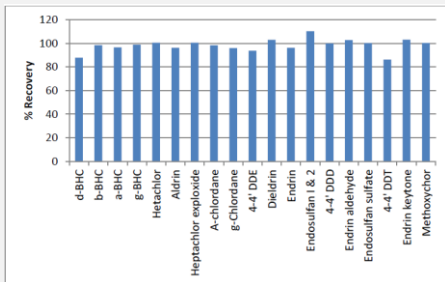
Cleanup and Preconcentration of ppb Trace Galolinium in Environmental Water using μCarb, μSPEed Cartridges for HILIC-ICP-MS Analysis

EPA 8330, 3535A Explosives Residue



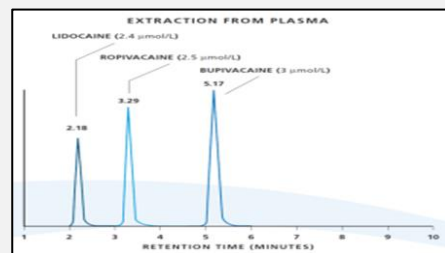
Explosive residues (2-10ppm) in sedimentary river water by μSPEed/ePrep

Sample Preparation without Surrogate Standard



microSPE of Calibration Standards and Samples without the need for surrogate standards (μSPEed/ePrep)

“Dirty” Plasma and Urine Extraction - SPEmx



Local anesthetics spiked into rat plasma samples and then extracted using SPEmx C18 cartridge

Note: Please visit our website www.eprep-analytical.com for additional information on these and other applications

μSPEed Cartridges (valve)

Ordering Information

Part No	Code	Sorbent Description
Silica Based		
01-10105	μSPEed, C4-3 μm / 300Å (Pkt 10)	3μm/ 120Å C4 spherical silica packing for general application
01-10106	μSPEed, C8- 3 μm / 120Å (Pkt 10)	3μm/ 120Å C8 spherical silica packing for general application
01-10110	μSPEed, C18RPS-3μm/120Å (Pkt 10)	3μm/ 120Å ODS spherical silica packing with high acidic resistance suitable for general organic compound applications
01-10111	μSPEed, C18RPS-3μm/120Å (Pkt 50)	
01-10115	μSPEed, Silica-3μm/120Å (Pkt 10)	3μm/120Å spherical bare silica packing. High purity silica for normal and HILIC applications
01-10116	μSPEed, Silica-3μm/120Å (Pkt 50)	
Speciality Silica Based		
01-10117	μSPEed, WAX (APS)-3μm/120Å (Pkt 10)	3μm/120Å APS spherical silica packing
01-10118	μSPEed, PFAS-50-3μm/120Å (Pkt 10)	3μm/120Å (50% WAX) PFAS spherical silica packing
01-10119	μSPEed, PFAS-75-3μm/120Å (Pkt 10)	3μm/120Å (75% WAX) PFAS spherical silica packing
01-10124	μSPEed, C18/Hydrophilic- 3 μm / 120Å (Pkt 10)	3μm/ 120Å ODS for use with High Water Volume
01-10125	μSPEed, C18/Hydrophilic- 3 μm / 120Å (Pkt 50)	
Porous Carbon		
01-10135	μSPEed, 3μm/250Å μCARB (Pkt 10)	3μm/250Å glassy carbon packing, similar to Hypercarb®
Customisable Chemistry (silica)		
01-10185	μSPEed, Cxyl-3μm (Pkt 10)	3μm customisable spherical inert silica packing
Polymer Based		
01-10149	μSPEed, PS/DVB -3μm/ 300Å (Pkt 50)	μSPEed, 3μm/ 300Å spherical, crosslinked polystyrene divinyl benzene
01-10150	μSPEed, PS/DVB -3μm/ 300Å (Pkt 10)	
01-10151	μSPEed, PS/DVB Phenyl RP-3μm/ 300Å (Pkt 10)	μSPEed, 3μm/ 300Å Phenyl (RP) spherical, crosslinked polystyrene divinyl benzene
01-10155	μSPEed, PS/DVB SAX-3μm/ NP (Pkt 10)	μSPEed, 3μm/Non-Porous SAX spherical, crosslinked polystyrene divinyl benzene
01-10156	μSPEed, PS/DVB SCX-3μm/ NP (Pkt 10)	μSPEed, 3μm/Non-Porous SCX spherical, crosslinked polystyrene divinyl benzene

SPEmx Cartridges (without valve)

Ordering Information

Part No	Code	Sorbent Description
01-10205	SPEmx, C4-Silica/SPE (Pkt 10)	40-60μm C4 spherical silica
01-10209	SPEmx, C18-Silica/SPE (Pkt 10)	40-60μm C18 spherical silica
Carbon		
01-10275	SPEmx, 10μm Activated Carbon (Pkt 10)	10μm Activated Porous Carbon (Nitrosamine Analysis)



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