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50 Year Innovation CDS Analytical

Empore™ SPE Catalog

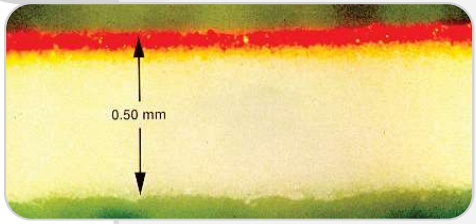
- **Solid Phase Extraction** Disks, Cartridges, 96-Well Plates, and EZ-Trace Workstation

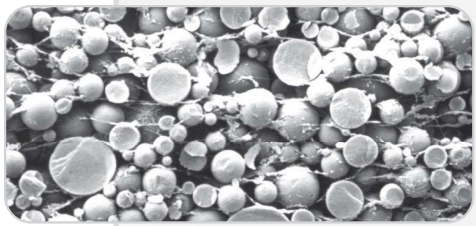
Introduction

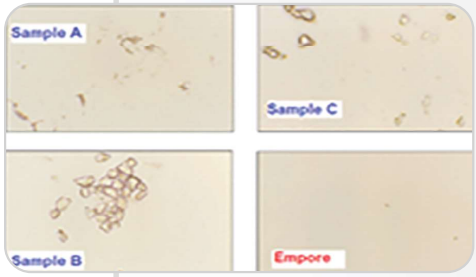
Empore solid phase extraction (SPE) products were originally developed in 1989 by the 3M Comapny producing high quality disks, cartridges, and 96-well plates. As of 2019, CDS Analytical has become the proud new home of the Empore product line. With a new clean room at our facility in Oxford, PA, CDS Analytical continues to use the same formula and manufacturing process that brought users the historic quality of Empore products for more than 30 years.

Empore solid phase extraction products are produced by trapping sorbent particles within an inert matrix of an engineered polymer. The resulting particle loaded membrane, featuring sorbent particles in either a silica- or resin-based format, yields a more uniform and more densely packed particle bed than traditional loosely packed SPE products.

The resulting Empore product developed from our unique manufacturing process brings increased efficiency and reproducibility to SPE sample preparation methods.







Greatest Uniformity

Sorbent particles are packed uniformly in the Empore membrane providing superior extraction at high flow rates, making Empore excellent for high-throughput applications.

Highest Density

The high packing density of the Empore membrane reduces the distance between sorbent particles greatly improving extraction efficiency by eliminating the channeling effect.

Low Elution Volume

Sorbent particles are confined with the thin Empore membrane, which means less solvent is required for extraction, reducing or eliminating evaporation steps and reducing total solvent usage.

Less Fine Particles

The densely packed Empore membrane greatly reduces free fine particles resulting in a clean extract for analysis.

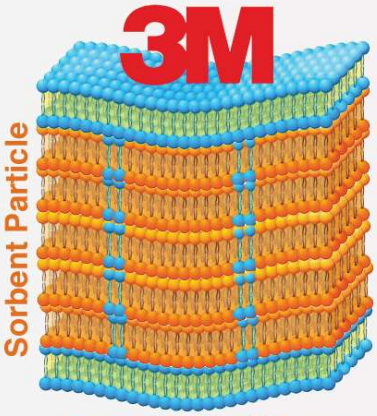
ISO-9 Clean Room

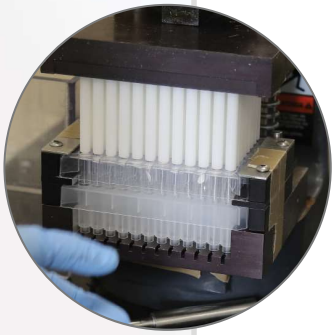
Empore products are manufactured at our brand new, GMP-compliant clean room at our facility in Oxford, Pennsylvania.

Our facility is equipped with the cutting-edge instruments needed to perform quality control and assurance to ensure that each product maintains the historic high quality of the Empore line.

100% Visual Inspection

QA/QC Analytical Lab

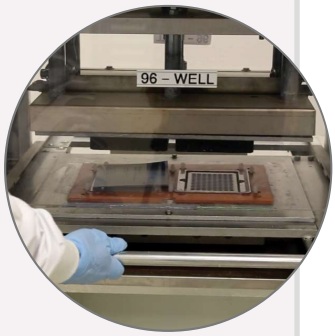




Automated Production

Highest Quality Chemicals

Application testing of Empore SPE products is peformed in our state-of-the-art GC-MS intrument facility.



Precision Tooling

100% Flow Rate Testing

Sorbent Chemistry Selection Guide

Disks

Empore™ Extraction Disks

Empore SPE disks provide a sample preparation solution for large volume aqueous samples. The disk format provides a large surface area for enhanced sorbent/sample contact. Fast flow rates and high throughput may be realized with use of an Empore solid phase extraction disk.

Product Listings and Applications:

Sorbent	Suggested Application	EPA Method	Disk Size (mm)	Quantity	VWR Cat. No.
C8 HD	moderately nonpolar	549.1	47 90	20 / 60 10 / 30	**76333-128** **76333-130**
C18 HD	highly nonpolar	506, 508..1, 525.2, 550.1, 608, 1613B	47 90	20 / 60 10 / 30	**76333-132** **76333-134**
SDB-XC	water soluble, moderately polar analytes	515.2, 525.3	47 90	20 / 60 10 / 30	**76333-136** **76333-138**
SDB-RPS	moderately nonpolar and cation exchange	--	47 90	20 / 60 10 / 30	**76333-140** **76333-142**
SDB-XD	non-ionic surfactants	--	47	20 / 60	**76333-162**
Cation-SR Exchange	metals, amines	--	47	20 / 60	**76333-148**
Anion-SR Exchange	chromium, arsenic, selenium, carboxylic acids, etc.	548.1, 552.1	47 90	20 / 60 10 / 30	**76333-144** **76333-146**
Oil & Grease	nonpolar, dirty samples	1664	47 90	20 / 60 10 / 30	**76333-102** **76333-104**
Chelating	divalent metals and other cations	--	47	20 / 60	**76333-154**
Activated Carbon	water soluble and volatile organic compounds	--	47 90	20 / 60 10 / 30	**76333-150** **76333-152**

HD = High Density
SD = Standard Density

Product Specifications:

Compositions	C8, C18, Anion, Cation, MPC, SDP-RPS, SDB-XC, Chelator, SDB-XD	≥ 90% sorbent particles ≤ 10% inert polymer matrix
	Carbon	≥ 80% sorbent particles ≤ 20% inert polymer matrix
Thickness	0.50 ± 0.05 mm	
SPE Flow Rate	< 10 min L^{-1} DI H_2O @ 25°C @ 20 inHg (47mm disk)	
Particle Size	12 µm (nominal) for HD, 50 µm (nominal) for SD	
Solvents	Compatible with all organic solvents	
pH Range	Silica-based sorbents	2-12 under normal conditions
	Resin-based sorbents	1-14 under normal conditions

Filter Aid Disk Accessory:

Size	1.5kg / bottle with dispensing scoop
Use	To cover disk 1cm deep, use 40g for 90mm disk and 15g for 47mm disk
Material	Glass beads; average diameter 40 µm
VWR Cat. No.	**76333-114**

RAD Disks

Empore™ Extraction RAD Disks

Empore RAD SPE disks provide a sample prep solution for large volume aqueous samples for the extraction of radiochemical species. RAD disks form convenient direct counting sources when used in applicable test methods.

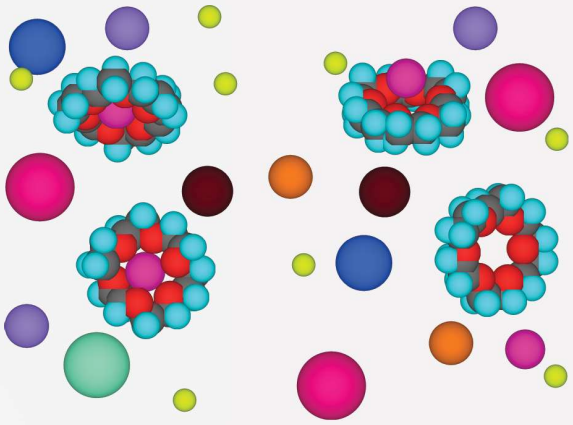
Product Listings and Applications:

Sorbent		Suggested Application	VWR Cat. No.
Strontium	Sr-90	DOE method RP515	**76333-106**
Radium	Ra-228 Ra-226	903.1, 904.0, RA-195, RA-295, RA-395	**76333-108**
Technetium	Tc-99	TC-196	**76333-110**

*47 mm disks are available in a pack of 20 or case of 60 disks.

Molecular Recognition Technology

Empore RAD SPE disks trap radiochemical species by molecular reognition technology. Concentration, separation, and sample counting preparartion are all easily combined into a single step.



Cartridges

Empore™ Extraction Disk Cartridges

The cartridge is molded from a polypropylene resin. An Empore extraction disk is secured in place at the bottom of each cartridge with a sealing ring. A proprietary prefilter is placed above the Empore disk. This prefilter aids in preventing particulates and macromolecules from reaching the underlying membrane and improves the flow of biological samples, such as serum and plasma, through the cartridge.

Product Listings:

Sorbent	Suggested Application	Size	Quantity	VWR Cat. No.
C8-SD	Moderately nonpolar analytes	4 mm / 1 mL	100 / 300	**76333-116**
C8-HD	Moderately nonpolar analytes	4 mm / 1 mL	100 / 300	**76333-118**
C18-SD	Strongly nonpolar analytes	4 mm / 1 mL	100 / 300	**76333-120**
C18-SD	Strongly nonpolar analytes	7 mm / 3 mL	50 / 150	**76333-122**
C18-SD	Strongly nonpolar analytes	10 mm / 6 mL	30 / 90	**76333-124**
SDB-XC	Moderately nonpolar analytes plus pi-pi interactions	10 mm / 6 mL	30 / 90	**76333-126**

HD = High Density
SD = Standard Density

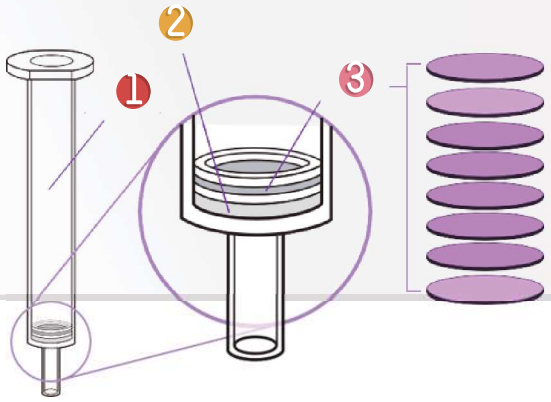
Cartridge Applications:

Extraction Disk Cartridge	General Cartridge Selection Guide	
4mm / 1mL	•Miniaturizes SPE •Ideal for 0.05 to 0.5 mL sample volumes •Fast throughput using automation	•Elution volumes are small and range from 100-200 µL* •Small disk surface area results in slow flow characteristics if using vacuum •Centrifugation recommended as processing method
7mm / 3mL	•Most commonly used and versatile in size •Typically used for 0.5 to 2 mL sample volumes •Fast throughput using automation	•Elution volumes range from 200-400 µL* •Interchangeable with 100mg/1mL packed SPE columns
10mm / 6mL	•Used for larger sample volumes of several milliliters •Higher capacity	•Elution volumes range from 600-1000 µL* •Faster flow characteristics due to larger disk surface area

Cartridge Average Bed Mass:

Effective Membrane Diameter	Cartridge Volume	SD Sorbent Mass	HD Sorbent Mass	
		Silica	Silica	Resin
4 mm	1 mL	5.5 mg	4 mg	2.2 mg
7mm	3 mL	17 mg	12 mg	7.5 mg
10 mm	6 mL	35 mg	24 mg	15.0 mg

The prefilter is composed of polypropylene microfiber layers of graded densities. Three different densities are used, with the coarsest one on top and the finest at the bottom. The top two microfiber layers are individual layers of material. The third microfiber layer, having the smallest effective pore size, is on the bottom of the prefilter and contains five individual layers of material. A porous polypropylene support membrane comprises the final layer.



1. Cartridge Reservoir
2. Empore SPE
3. Proprietary, Multi-Layer Polypropylene Prefilter

Well Plates

Empore™ 96-Well Plates

Empore 96-Well Solid Phase Extraction Plates are designed for high throughput solid phase extraction (SPE). 96 samples can be processed with a standard 8 row by 12 column microliter plate format. One disk plate can replace four separate runs on a conventional SPE manifold handling 24 individual cartridges per run. The 96-well format is ideal for sample preparation prior to LC/MS/MS or other high throughput analytical techniques.

The plate is molded from a polypropylene resin. An Empore extraction disk is secured in place at the bottom of each well with a sealing ring. A proprietary prefilter is placed above the Empore disk. This prefilter aids in preventing particulates and macromolecules from reaching the underlying membrane and improves the flow of biological samples, such as serum and plasma, through the plate. A second sealing ring is place above the prefilter to secure the layers in each well.

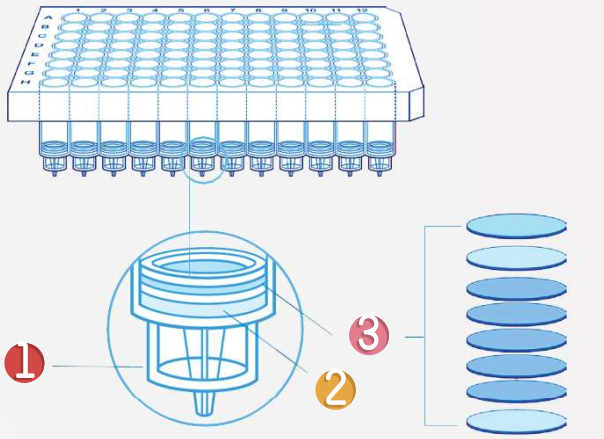
Product Listings:

Sorbent	Suggested Application	Size (mL)	Quantity	VWR Cat. No.
C8-SD	Moderately nonpolar analytes	1.2	1 / 12	**76333-250**
C18-SD	Strongly nonpolar analytes	1.2	1 / 12	**76333-248**
MPC-SD	Moderately nonpolar and ionized analytes	1.2	1 / 12	**76333-252**
Filter Plate	Removal of visible particulates	1.2 2.5	1 / 12	**76333-156** **76333-158**

HD = High Density
SD = Standard Density

Typical Extraction Plate Specifications

Membrane Diameter	5.5 mm
Well Volume	1.2 and 2.5 mL
Membrane Thickness	0.75 mm
Membrane Type	High Density (HD), Standard Density (SD)
Prefilter Composition	Graded Density Polypropylene
Bed Volume	18 µL
Bonded Silica Sorbent Mass	10 mg (C8 and C18, nominal); 15 mg (MPC, nominal)
Polymer Sorbent Mass	5 mg (nominal) both HD and SD
Mean Particle Size	50 µm (C8 and C18), 32 µm (MPC), 44 µm (universal resin), 16 µm (other polymers)
Membrane Composition	≥ 90% or greater sorbent particles ≤ 10% inert polymer matrix



1. Collar
2. Empore SPE
3. Proprietary, Multi-Layer Polypropylene Prefilter

96-Well Plate Accessories

Accessory	Quantity	VWR Cat. No.
Sealing Tape Pad	10 / 60	**76333-160**

EZ-Trace

Empore™ EZ-Trace

When multiple extractions need to be performed, it is often cumbersome and time consuming to run them one-at-a-time. The Empore EZ-Trace eliminates this problem by allowing researchers to perform up to four extractions simultaneously. The unique, independent channel design ensures that each extraction is precisely controlled, preventing cross-contamination between channels. High-throughput flow path switches provide a unique, environmentally friendly extraction by collecting organic and aqueous wastes in separate reservoirs.

Technical Specifications:

Compatibility	Empore 47/90mm disks and cartridges and other vendors' disks and cartridges
Number of Extraction Channels	4
Dimensions (L×W×H; mm)	520×290×440
Weight (kg)	12
VWR Cat. No.	76449-580
Optional Accessories	Aqueous waste tank Vacuum pump

1. Designed to have 4 independently operated extraction channels.
2. Adapters are compatible with Empore 47/90mm disks and cartridges.
3. Elution and waste collection switching valve.
4. Organic and aqueous waste collection switching valve.
5. Needle valves for precision flow control.
6. Separate reservoirs for organic and aqueous waste collection.
7. Vacuum pump controlled extraction (sold separately).

Disks

Cross Reference Table - Extraction Disks

Empore Extraction Disks

VWR Cat. No.	Description	JT Baker SKU	Affinisep SKU	Horizon SKU
76333-102	**O&G 47mm**	8060-06	SPE-Disks-OIL-47. T1.20	1664-47-HT
76333-104	**O&G 90mm**			1664-90-HT
76333-132	**C18-HD 47mm**	8055-06	SPE-Disks-C18-47. T1.20	47-2346-02
76333-134	**C18-HD 90mm**		SPE-Disks-C18-90. T1.10	
76333-136	**SDB-XC 47mm**	8068-06	SPE-Disks-DVB-47. T1.20	47-2346-06
76333-138	**SDB-XC 90mm**		SPE-Disks-DVB-90. T1.10	
76333-140	**SDB-RPS 47mm**	8072-06	SPE-Disks-RPS-47. T1.20	47-2346-08
76333-142	**SDB-RPS 90mm**		SPE-Disks-RPS-90. T1.10	
76333-144	**Anion 47mm**	8058-06	SPE-Disks-AN-47.T1.20	
76333-146	**Anion 90mm**		SPE-Disks-AN-90.T1.10	
76333-148	**Cation 47mm**		SPE-Disks-CAT-47. T1.20	
76333-154	**Chelator 47mm**		SPE-Disks-MET-47. T1.20	
76333-128	**C8 47mm**			
76333-130	**C8 90mm**			
76333-150	**Carbon 47mm**			
76333-152	**Carbon 90mm**			
76333-162	**SDB-XD 47mm**			
76333-106	**Strontium 47mm**			
76333-108	**Radium 47mm**			
76333-110	**Technetium 47mm**			

Cartridges

Cross-Reference Table - Cartridges

Empore Extraction Disk Cartridges

VWR Cat. No.	Description	Waters SKU
76333-116	C8-HD 1mL	
76333-118	C8-SD 1mL	WAT054965
76333-120	C18-SD 1mL	WAT054955
76333-122	C18-SD 3mL	WAT054944
76333-124	C18-SD 6mL	WAT043395
76333-126	SDB-XC 6mL	

Well Plates

Cross-Reference Table - 96-Well Plates, EZ-Trace, and Other Accessories

Empore Extraction 96-Well Plates

VWR Cat. No.	Description	Waters SKU
76333-156	Filter Plate 1.2mL	186005837
76333-158	Filter Plate 2.5mL	
76333-248	C18-SD 1.2mL	186003966
76333-250	C8-SD 1.2mL	
76333-252	MPC-SD 1.2mL	

EZ-Trace

Empore Extraction Accessories

VWR Cat. No.	Description
76333-114	Filter Aid
76333-160	Sealing Tape Pad
76449-580	EZ-Trace

CDS Analytical

Empore

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