



## Empore™ SPE Catalog

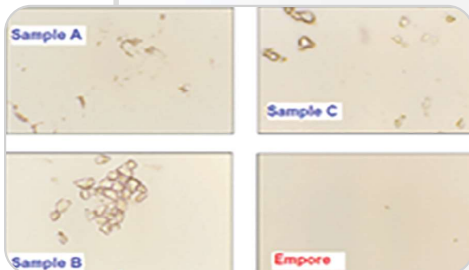
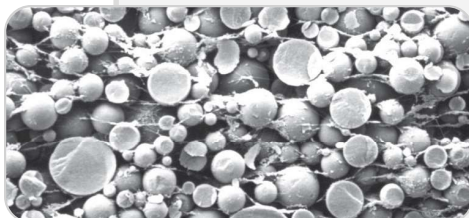
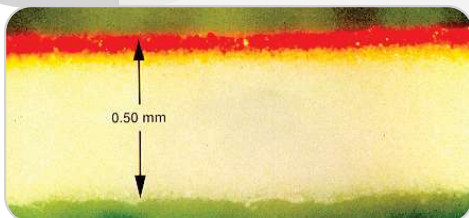
- **Solid Phase Extraction** Disks, Cartridges, 96-Well Plates, and EZ-Trace Workstation

## Introduction

Empore solid phase extraction (SPE) products were originally developed in 1989 by the 3M Company 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.

**MADE IN THE USA**



ISO-9 Clean Room

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

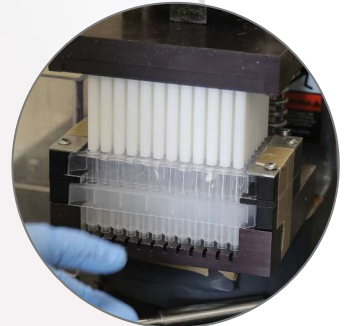
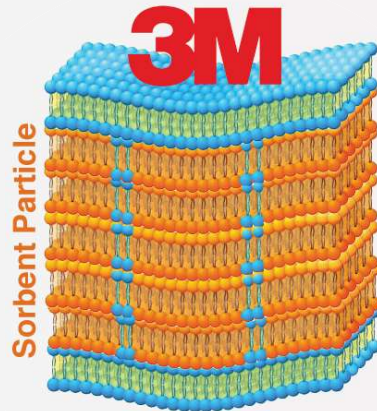
Our facility is equipped with the cutting-edge instruments needed to perform quality control and assurance to ensure that each product maintains the historic high quality of the Empore line.



100% Visual Inspection



QA/QC Analytical Lab

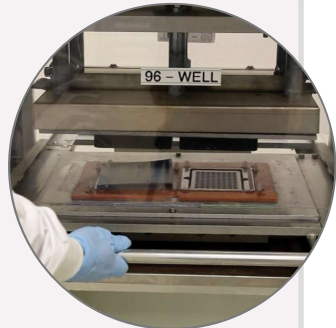


Automated Production



Highest Quality Chemicals

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

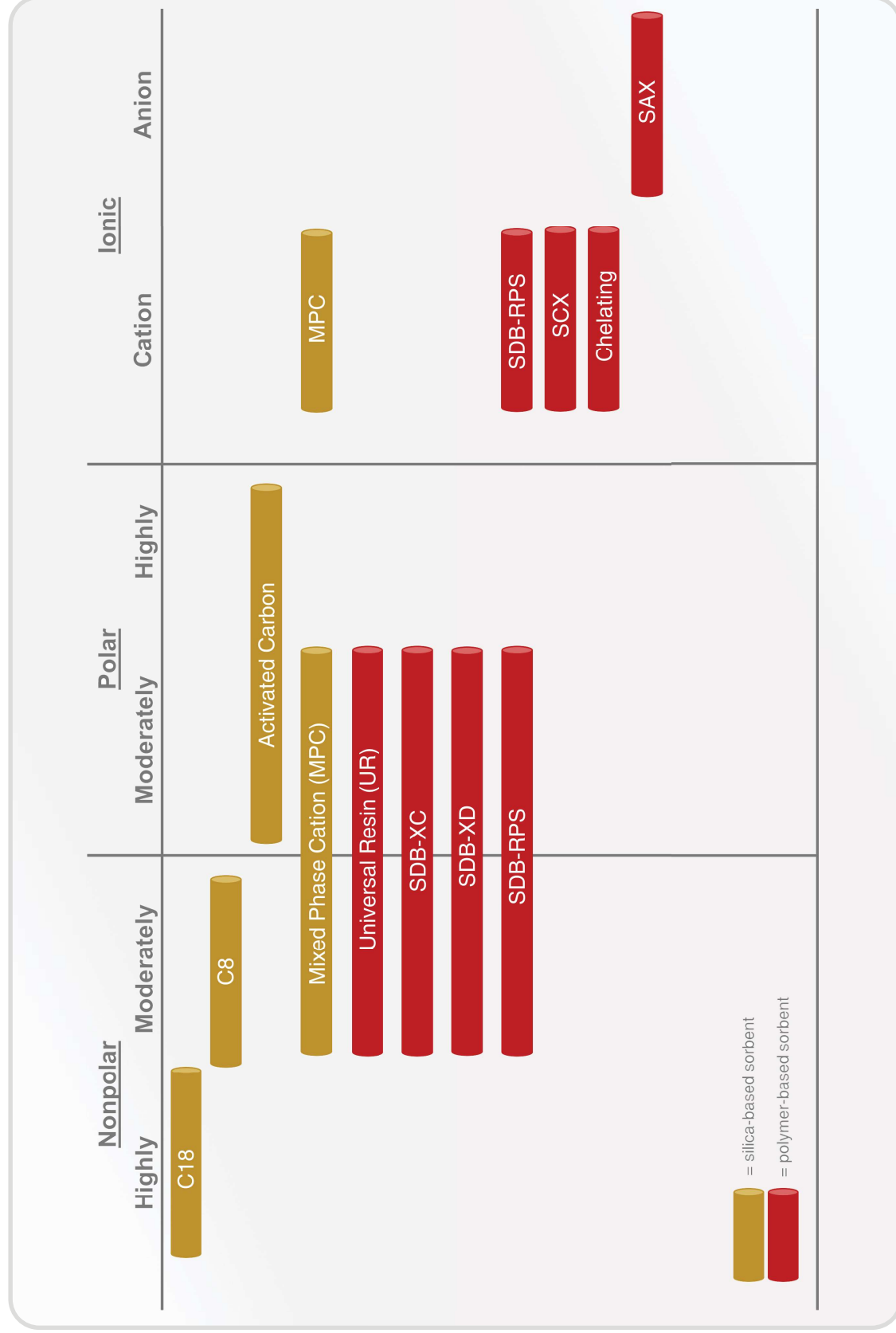


Precision Tooling



100% Flow Rate Testing

# Sorbent Chemistry Selection Guide





## Product Specifications:

<b>Compositions</b>	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
<b>Thickness</b>	0.50 ± 0.05 mm	
<b>SPE Flow Rate</b>	< 10 min L <sup>-1</sup> DI H <sub>2</sub> O @ 25°C @ 20 inHg (47mm disk)	
<b>Particle Size</b>	12 μm (nominal) for HD, 50 μm (nominal) for SD	
<b>Solvents</b>	Compatible with all organic solvents	
<b>pH Range</b>	Silica-based sorbents	2-12 under normal conditions
	Resin-based sorbents	1-14 under normal conditions

## Filter Aid Disk Accessory:

<b>Size</b>	1.5kg / bottle with dispensing scoop
<b>Use</b>	To cover disk 1cm deep, use 40g for 90mm disk and 15g for 47mm disk
<b>Material</b>	Glass beads; average diameter 40 μm
<b>Product Number</b>	98-0503-0076-7
<b>Catalog Number</b>	FAID400



# 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.



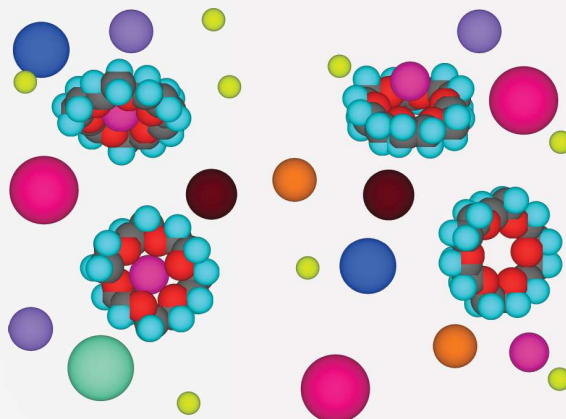
## Product Listings and Applications:

Sorbent		Suggested Application	Product Number	Catalog Number
Strontium	Sr-90	DOE method RP515	98-0405-0064-1	3290
Radium	Ra-228 Ra-226	903.1, 904.0, RA-195, RA-295, RA-395	98-0405-0065-8	3291
Technetium	Tc-99	TC-196	98-0405-0066-6	3292

\*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 recognition technology. Concentration, separation, and sample counting preparation 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	Product Number	Catalog Number
C8-SD	Moderately nonpolar analytes	4 mm / 1 mL	100 / 300	98-0604-0191-0	4114SD
C8-HD	Moderately nonpolar analytes	4 mm / 1 mL	100 / 300	98-0604-0188-6	4114HD
C18-SD	Strongly nonpolar analytes	4 mm / 1 mL	100 / 300	98-0604-0197-7	4115SD
C8-SD	Moderately nonpolar analytes	7 mm / 3 mL	100 / 300	98-0604-0192-8	4214SD
C18-SD	Strongly nonpolar analytes	7 mm / 3 mL	50 / 150	98-0604-0198-5	4215SD
C18-SD	Strongly nonpolar analytes	10 mm / 6 mL	30 / 90	98-0604-0199-3	4315SD
SDB-XC	Moderately nonpolar analytes plus pi-pi interactions	10 mm / 6 mL	30 / 90	98-0604-0203-3	4340HD
SDB-XC (2-layer)	Moderately nonpolar analytes plus pi-pi interactions	10 mm / 6 mL	30 / 90	98-0604-0204-1	4340HD2
SDB-RPS	moderately nonpolar and cation exchange	10 mm / 6 mL	30 / 90	98-0604-0207-2	4341HD
SDB-RPS (2-layer)	moderately nonpolar and cation exchange	10 mm / 6 mL	30 / 90	98-0604-0208-0	4341HD2
Anion-SR (2-layer)	chromium, arsenic, selenium, carboxylic acids, etc.	10 mm / 6 mL	30 / 90	98-0604-0504-4	4352HD2
Cation-SR (2-layer)	metals, amines	10 mm / 6 mL	30 / 90	98-0604-0508-1	4351HD2
Universal Resin (UR)	A range of basic, neutral, and acid compounds	7 mm / 3 mL	50 / 150	98-0503-0153-4	4245SD
Chelating	divalent metals and other divalent cations	7 mm / 3 mL	50 / 150	98-0604-0701-6	4371HD

HD = High Density  
SD = Standard Density



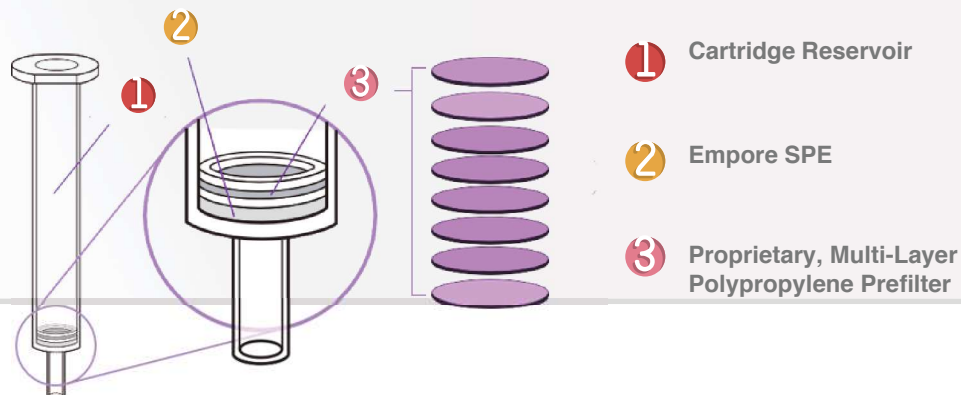
## Cartridge Applications:

Extraction Disk Cartridge	General Cartridge Selection Guide	
4mm / 1mL	<ul style="list-style-type: none"> <li>•Miniaturizes SPE</li> <li>•Ideal for 0.05 to 0.5 mL sample volumes</li> <li>•Fast throughput using automation</li> </ul>	<ul style="list-style-type: none"> <li>•Elution volumes are small and range from 100-200 <math>\mu\text{L}^*</math></li> <li>•Small disk surface area results in slow flow characteristics if using vacuum</li> <li>•Centrifugation recommended as processing method</li> </ul>
7mm / 3mL	<ul style="list-style-type: none"> <li>•Most commonly used and versatile in size</li> <li>•Typically used for 0.5 to 2 mL sample volumes</li> <li>•Fast throughput using automation</li> </ul>	<ul style="list-style-type: none"> <li>•Elution volumes range from 200-400 <math>\mu\text{L}^*</math></li> <li>•Interchangeable with 100mg/1mL packed SPE columns</li> </ul>
10mm / 6mL	<ul style="list-style-type: none"> <li>•Used for larger sample volumes of several milliliters</li> <li>•Higher capacity</li> </ul>	<ul style="list-style-type: none"> <li>•Elution volumes range from 600-1000 <math>\mu\text{L}^*</math></li> <li>•Faster flow characteristics due to larger disk surface area</li> </ul>

## 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.



# 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 placed above the prefilter to secure the layers in each well.

### Product Listings:

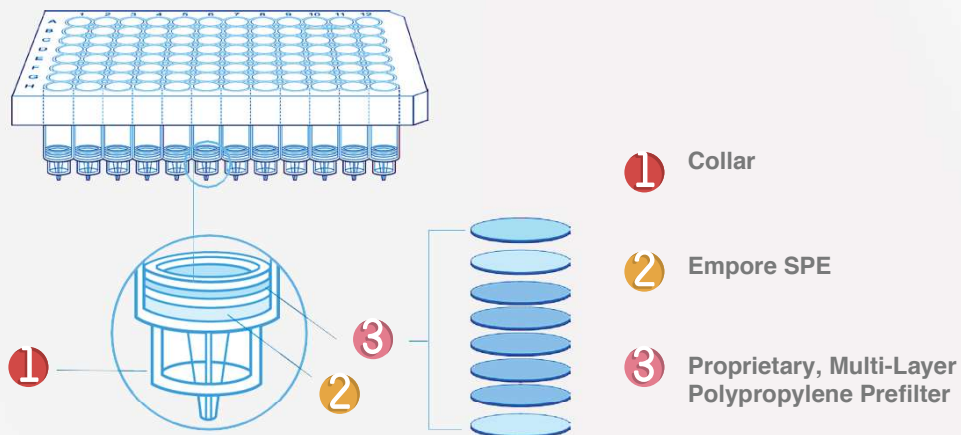
Sorbent	Suggested Application	Size (mL)	Quantity	Product Number	Catalog Number
C8-SD	Moderately nonpolar analytes	1.2	1 / 12	70-2007-3981-4	6014SD
		2.5		70-2007-3986-3	6314SD
C18-SD	Strongly nonpolar analytes	1.2	1 / 12	70-2007-3982-2	6015SD
		2.5		70-2007-3987-1	6315SD
MPC-SD	Moderately nonpolar and ionized analytes	1.2	1 / 12	70-2007-3983-0	6030SD
		2.5		70-2007-3980-6	6330SD
SDB-XC	Water soluble, polar analytes	1.2	1 / 12	98-0405-0081-4	6040
		2.5		98-0405-0086-7	6340
SDB-RPS	moderately nonpolar and cation exchange	1.2	1 / 12	98-0405-0080-6	6041
		2.5		98-0405-0085-9	6341
Cation-SR Exchange	Metal, amines, positively charged analytes	1.2	1 / 12	98-0405-0082-2	6051
		2.5		98-0405-0087-5	6351
Anion-SR Exchange	chromium, arsenic, selenium, carboxylic acids, etc	1.2	1 / 12	98-0405-0083-0	6052
		2.5		98-0405-0088-3	6352
UR (Universal Resin)	Mixed phase suitable for hydrophilic (acidic or basic) and moderately hydrophobic analytes	1.2	1 / 12	98-0405-0075-7	6045SD
		2.5		98-0405-0077-3	6345SD
Filter Plate	Removal of visible particulates	1.2	1 / 12	DI-1000-1042-7	6065
		2.5		70-2007-3988-9	6360

HD = High Density  
SD = Standard Density



## Typical Extraction Plate Specifications

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



## 96-Well Plate Accessories

Accessory	Quantity	Product Number	Catalog Number
Sealing Tape Pad	10 / 60	98-0604-0472-4	660



# 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
SKU	98-0604-0801-7
Empore Catalog #	8000
Optional Accessories	Aqueous waste tank (PN 98-0604-0803-3) Vacuum pump (PN 98-0604-0802-5)



- 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

Empore SKU	Description	JT Baker SKU	Affinisep SKU	Horizon SKU
98-0405-0062-5	O&G 47mm	8060-06	SPE-Disks-OIL-47.T1.20	1664-47-HT
98-0405-0063-3	O&G 90mm			1664-90-HT
98-0604-0217-3	C18-HD 47mm	8055-06	SPE-Disks-C18-47.T1.20	47-2346-02
98-0604-0218-1	C18-HD 90mm		SPE-Disks-C18-90.T1.10	
98-0604-0223-1	SDB-XC 47mm	8068-06	SPE-Disks-DVB-47.T1.20	47-2346-06
98-0604-0224-9	SDB-XC 90mm		SPE-Disks-DVB-90.T1.10	
98-0604-0226-4	SDB-RPS 47mm	8072-06	SPE-Disks-RPS-47.T1.20	47-2346-08
98-0604-0227-2	SDB-RPS 90mm		SPE-Disks-RPS-90.T1.10	
98-0604-0229-8	Anion 47mm	8058-06	SPE-Disks-AN-47.T1.20	
98-0604-0230-6	Anion 90mm		SPE-Disks-AN-90.T1.10	
98-0604-0232-2	Cation 47mm		SPE-Disks-CAT-47.T1.20	
98-0604-0238-9	Chelator 47mm		SPE-Disks-MET-47.T1.20	
98-0604-0214-0	C8 47mm			
98-0604-0215-7	C8 90mm			
98-0604-0220-7	C18 (FF) 47mm			
98-0604-0221-5	C18 (FF) 90mm			
98-0604-0235-5	Carbon 47mm			
98-0604-0236-3	Carbon 90mm			
98-0604-0240-5	SDB-XD 47mm			
98-0405-0064-1	Strontium 47mm			
98-0405-0065-8	Radium 47mm			
98-0405-0066-6	Technetium 47mm			

# Cartridges

## Cross-Reference Table - Cartridges

### Empore Extraction Disk Cartridges

Empore SKU	Description	Waters SKU
98-0604-0188-6	C8-HD 1mL	
98-0604-0191-0	C8-SD 1mL	WAT054965
98-0604-0197-7	C18-SD 1mL	WAT054955
98-0604-0198-5	C18-SD 3mL	WAT054944
98-0604-0199-3	C18-SD 6mL	WAT043395
98-0604-0203-3	SDB-XC 6mL	
98-0604-0207-2	SDB-RPS 6mL	
98-0604-0208-0	SDB-RPS (2-layer) 6mL	
98-0604-0504-4	Anion-SR (2-layer) 6mL	
98-0604-0508-1	Cation-SR (2-layer) 6mL	
98-0604-0701-6	Chelating 6mL	
98-0503-0153-4	Universal Resin 3mL	

# Well Plates

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

### Empore Extraction 96-Well Plates

Empore SKU	Description	Waters SKU
DI-1000-1042-7	Filter Plate 1.2mL	186005837
70-2007-3988-9	Filter Plate 2.5mL	
70-2007-3982-2	C18-SD 1.2mL	186003966
70-2007-3981-4	C8-SD 1.2mL	
70-2007-3983-0	MPC-SD 1.2mL	
98-0405-0081-4	SDB-XC 1.2mL	
98-0405-0080-6	SDB-RPS 1.2mL	186000309
98-0405-0082-2	Cation-SR 1.2mL	186000259
98-0405-0083-0	Anion-SR 1.2mL	186000375
98-0405-0076-7	UR 1.2mL	

# EZ-Trace

### Empore Extraction Accessories

Empore SKU	Description
98-0503-0076-7	Filter Aid
98-0604-0472-4	Sealing Tape Pad
98-0604-0801-7	EZ-Trace

ASAP Analytical