

Empore Disks



Oil and Grease Extraction Disks

The 3M Empore Oil and Grease Disk was specifically designed for EPA Method 1664 (N-Hexane Extractable Materials (HEM) and Silica Gel Treated N-Hexane Extractable Material (SGT-HEM) by Extraction and Gravimetry). This method was promulgated in May 1999 by the U.S. EPA Office of Water to replace Method 413.1 Oil and Grease Analysis.

C8 and C18 Extraction Disks

Bonded silica sorbents are commonly used for the solid phase extraction of analytes from complex sample matrices. A variety of functional groups, such as octyl (C8) and octadecyl (C18) can be bonded to the silica surface to provide non-polar interactions. Empore's new Fast Flow C18 extraction disks provide an extraction solution for large volume sample preparation. A large disk format provides a large surface area for sorbent/sample contact. Faster flow rates and higher throughput are realized compared to liquid-liquid extraction or traditional packed column technology.

EPA Approved Methods for C8:

- Safe Drinking Water Act 549.1

EPA Approved Methods for C18:

- Safe Drinking Water Act 506, 508.1, 525.2, 550.1, 1613B
- Comprehensive and Environmental Response, Compensation, and Liability Act (CERCLA)
- Quick Turnaround Method: Organochlorine Pesticides & PCBs
- Clean Water Act 608 Nationwide APT*
- Clean Water Act – Effluent Guidelines for Pesticide Manufacturing Methods 508.1, 515.2, 525.2, 548.1, 608
- Contact Chrom Tech for additional technical information

*Empore disks are an approved alternative to method 608 for PCBs and pesticides in wastewater.

SDB-XC Extraction Disks

SDB-XC is a poly(styrenedivinylbenzene) copolymer that is used for reversed-phase extractions. SDB-XC offers reversed-phase performance without the secondary interactions and pH limitations common to bonded silica. The structure of SDB-XC provides for unique selectivity, especially in the retention of moderately polar, water-soluble analytes.

Approved for use in the following EPA Methods:

- Safe Drinking Water Act Method 515.2
- Comprehensive and Environmental Response
- Compensation and Liability Act (CERCLA)
- Quick Turnaround Method (QTM) for Phenols
- Clean Water Act – Methods 515.2

Anion Exchange Extraction Disks

Anion-SR is a 100% copolymer particle that is spherical, porous and cross-linked. The functional group imparts unique selectivity for anionic analytes, such as Endothall, Dalapon and haloacetic acids. Approved for use in **EPA Methods 548.1 and 552.1**

SDB-RPS Extraction Disks

SDB-RPS is a poly(styrenedivinylbenzene) copolymer that has been modified with sulfonic acid groups to make it hydrophilic. The SDB-RPS is a 100% copolymer particle that is spherical, porous and cross-linked. The sulfonation imparts unique selectivity for organic analytes that are polar in nature, such as drugs and drug metabolites, and water-soluble pesticides and pesticide metabolites. Typical applications include: Drugs and metabolites, polar organic compounds, pesticides and metabolites, explosives, amine containing analytes.

Chelating Extraction Disks

Empore Chelating Disk is a poly(styrenedivinylbenzene) copolymer that has been modified with iminodiacetic acid. Note that the Chelating Disk is a 100% copolymer particle that is spherical, porous and cross-linked. The functional group imparts unique selectivity for multivalent metal cations which complex with transition metals. Typical applications include multivalent metal ions, order of selectivity within each group: Cu>Cd>Co>Mn>Ba>Ca>Sr; Zn>Al>Cr>Sn; Pb>Fe>Ni>Mg

Carbon Extraction Disks

Activated carbon disks are designed for the solid phase extraction of highly polar compounds, such as N-nitrosodimethylamine, which are very water soluble: and volatile compounds, such as trihalomethanes, that are not easily captured by other solid phase adsorbents. Activated carbon provides one of the most aggressive adsorbents available for SPE. The carbon surface is a complex combination of characteristics, which includes positive and negative charges.

Cation Extraction Disks

Effective for the extraction and recovery of primary, secondary and some tertiary amines as well as most metal cations from both aqueous and solvent-based solutions.

Cat. No.	Sorbent Phase	Disk Diam	Qty per Pack
EM-2270	Oil and Grease	47mm	20
EM-2370	Oil and Grease	90mm	10
EM-2215FF	C18 Fast Flow	47mm	20
EM-2315FF	C18 Fast Flow	90mm	10
EM-2215	C18	47mm	20
EM-2315	C18	90mm	10
EM-2214	C8	47mm	20
EM-2314	C8	90mm	10
EM-2240	SDB-XC	47mm	20
EM-2340	SDB-XC	90mm	10
EM-2241	SDB-RPS	47mm	20
EM-2341	SDB-RPS	90mm	10
EM-2271	Chelating	47mm	20
EM-2371	Chelating	90mm	10
EM-2252	Anion Exchange	47mm	20
EM-2352	Anion Exchange	90mm	10
EM-2272	Carbon	47mm	20
EM-2372	Carbon	90mm	10
EM-2251	Cation	47mm	20

Empore SPE Glassware and Manifolds



- Saves time and money
- Sample contacts glass and PTFE

Get the most out of using extraction disks with our line of SPE Glassware and Manifolds. They have been specially designed for use with solid phase extraction disks to give you the highest possible recoveries of extracted analytes from your drinking water, surface water and waste water samples. Using the SPE glassware with extraction disks saves you time, saves you money and helps save our environment.

The SPE funnels have a sharp edge on the bottom inside diameter that, combined with the stronger spring in our aluminum clamps, minimizes any horizontal capillary action of the sample and solvent into the disk. SPE manifolds are manufactured from corrosion resistant stainless steel. Valves have stainless steel bodies with PTFE plugs.

Extracted samples can be collected directly into K-D concentrator tubes, EPA water analysis vials, sample vials and test tubes.

PTFE-coated stainless steel support screen reduces the possibility of sample-to-sample cross contamination compared to the traditional glass frit. The PTFE coating also protects the support screen from corrosion caused by acid preserved samples.

The SPE support bases have a specially designed internal surface that reduces dead volume and minimizes holdback of the extracted analyte.

All SPE Manifolds are supplied with three-way valves that allow the venting to atmosphere of each station without affecting the vacuum in the rest of the system.

Water samples and extracted analytes contact only Type I, Class A borosilicate glass and PTFE, eliminating extractable contamination sources.

SPE manifold and glassware sets are available for both 47mm and 90mm diameter extraction disks.

SPE Manifold Set

Cat. No.	Description
7100-1047	One 47mm glassware set, one 1-place Manifold
7100-3047	Three 47mm glassware sets, one 3-place manifold
7100-6047	Six 47mm glassware sets, one 6-place manifold
7100-1090	One 90mm glassware sets, one 1-place manifold
7100-3090	Three 90mm glassware sets, one 3-place manifold

Replacement Components

7110-0047	SPE Glassware set, 47mm (funnel, support base, support Screen, PTFE gaskets and clamp)
7110-0090	SPE Glassware set, 90mm (funnel, support base & screen, and clamp)
7111-0347	SPE Funnel, 47mm, 300mL capacity
7111-1090	SPE Funnel, 90mm, 1,000mL capacity
7112-0047	SPE Support base, 47mm
7112-0090	SPE Support base, 90mm
7113-0047	SPE Support screen, 47mm, PTFE-coated SS
7113-0097	SPE Support screen, 90mm PTFE-coated SS
7114-0047	Anodized Aluminum clamp, 47mm
7114-0090	Anodized Aluminum clamp, 90mm
5381-0000	PTFE Gasket, 47mm, 25/pk (5 included with glassware set)
7120-1000	SPE Stainless Steel manifold, 1-place
7120-3000	SPE Stainless Steel manifold, 3-place
7120-6000	SPE Stainless Steel manifold, 6-place

Accessories

7111-1047	SPE Funnel, 47mm, 1,000mL capacity
7113-4247	SPE Support screen, 47mm, Kel-F®
7113-4290	SPE Support screen, 90mm, Kel-F®
7601-4305	PTFE Joint sleeves, for 40/35 joint, 6/package
5380-0000	Glass cap for 40/35 inner joint of manifolds
2390-0115	Diaphragm vacuum pump, 110/115 VAC, 50/60 Hz
EM-FA400	Filter Aid—Empore glass beads, 1.5 kg bottle

Empore Filter Aid 400-Glass Beads



Empore Filter Aid 400 is comprised of 40 micron mean particle size, non-porous, inert glass beads which are designed to act as a depth filtration material when placed on top of Empore Extraction Disks. Approximately one centimeter of Filter Aid 400 successfully inhibits the migration of suspended solids to the surface of the disk, dramatically reducing sample extraction time. In addition, the improved flow characteristics have been shown to significantly improve both extraction efficiency and reproducibility of resultant data.

Empore Disk Cartridges



The Empore disk concept has been extended to handle smaller samples such as those encountered in clinical, pharmaceutical and environmental labs by combining disks with SPE cartridges. These cartridges are designed to use reduced volumes of sample and extraction solvents. The combination of high performance sorbents with 3M's patented Empore membrane technology assures high recovery, superior clean-up, and cartridge-to-cartridge reproducibility.

Standard density (SD), 40µm particle size membranes for all silica based sorbent chemistries allow reliable sample preparation for difficult sample matrices. The original high density (HD), 12µm particle size membrane formulation is still available when optimal extraction efficiency is required. Patented Empore membranes efficiently extract samples with no channeling. The small bed volume allows compound elution off Empore cartridges in as little as 100–300µL of mobile phase or mobile phase compatible solutions. Efficient extraction followed by direct injection of these solutions eliminates the need for time-consuming sample dry-down and reconstitution.

4mm/1mL Extraction Disk Cartridge

- Miniaturizes SPE
- Ideal for 0.05 to 0.5mL sample volumes
- Fast throughput with automation
- Elution volumes of approximately 0.15mL

7mm/3mL Extraction Disk Cartridge

- Most versatile size
- Sample volumes < 3mL
- Fast throughput with automation
- Elution volumes of approximately 0.25mL

10mm/6mL Extraction Disk Cartridge

- Sample volumes < 6mL
- Higher capacity
- Fast flow rate
- Elution volumes of approximately 0.5mL

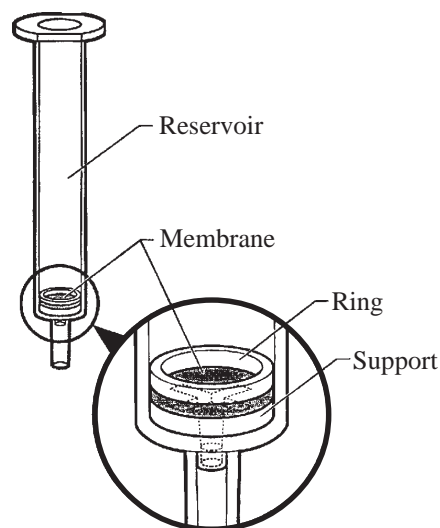
20mm/40mL Extraction Disk Cartridge

- Sample volumes < 40mL
- Highest capacity
- Smaller elution volumes
- No channeling

Specifications:

Effective Diameter	Cartridge Volume	Sorbent Silica	Mass Copolymer	Elution Volume*
4mm	1mL	4mg	2.2mg	0.1mL
7mm	3mL	12mg	7.5mg	0.25mL
10mm	6mL	24mg	15.0mg	0.4mL

*Suggested volume using methanol elution from C18 HD Sorbent.



URP (Universal Resin)

Cat. No.	Sorbent Phase	Disk Diam./ Volume	Qty per Pack
EM-4245SD	C18 HD	7mm/3mL	50

C18

EM-4115HD	C18 HD	4mm/1mL	100
EM-4215HD	C18 HD	7mm/3mL	50
EM-4315HD	C18 HD	10mm/6mL	30
EM-4115SD	C18 SD	4mm/1mL	100
EM-4215SD	C18 SD	7mm/3mL	50
EM-4315SD	C18 SD	10mm/6mL	30
EM-4415SD	C18 SD	20mm/40mL	20

C8

EM-4114HD	C8 HD	4mm/1mL	100
EM-4214HD	C8 HD	7mm/3mL	50
EM-4314HD	C8 HD	10mm/6mL	30
EM-4114SD	C8 SD	4mm/1mL	100
EM-4214SD	C8 SD	7mm/3mL	50
EM-4314SD	C8 SD	10mm/6mL	30

C2

EM-4111HD	C2 HD	4mm/1mL	100
EM-4211HD	C2 HD	7mm/3mL	50
EM-4311HD	C2 HD	10mm/6mL	30
EM-4111SD	C2 SD	4mm/1mL	100
EM-4211SD	C2 SD	7mm/3mL	50
EM-4311SD	C2 SD	10mm/6mL	30

MPC-Mixed Phase Cation

EM-4130HD	MPC HD	4mm/1mL	100
EM-4230HD	MPC HD	7mm/3mL	50
EM-4330HD	MPC HD	10mm/6mL	30
EM-4130SD	MPC SD	4mm/1mL	100
EM-4230SD	MPC SD	7mm/3mL	50
EM-4330SD	MPC SD	10mm/6mL	30

SDB-RPS (Reversed Phase Sulfonate)

EM-4141HD	SDB-RPS	4mm/1mL	100
EM-4241HD	SDB-RPS	7mm/3mL	50
EM-4341HD	SDB-RPS	10mm/6mL	30

SDB-XC

EM-4140HD	SDB-XC	4mm/1mL	100
EM-4240HD	SDB-XC	7mm/3mL	50
EM-4340HD	SDB-XC	10mm/6mL	30

96 Well Plate Empore Disk Technology



Empore Disk Plates

Empore high performance extraction disk plates provide a means of high throughput solid phase extraction (SPE) by processing 96 samples in a standard 8x12 plate format. This is compatible with standard microtiter liquid handling technologies and injection systems. Parallel sample processing allows 96 samples to be extracted in approximately one hour. Each well of the plate contains the patented standard density (SD) Empore particle-loaded membrane for efficient sample extraction followed by elution in as little as 100µL with mobile phase or mobile phase compatible solutions which can be injected directly onto chromatographic systems. SPE disk plates are ideal for sample preparation prior to LC/MS and other high throughput applications.

Empore disk plates are available with the following sorbent phases: URP (Universal Resin), C18, C8, C2, MPC (Mixed Phase Cation) and PPT (Filter Plate).

New! Universal Resin (URP)

Current 3M Empore sorbents are highly specific to certain type of analytes. The new 3M Empore Universal Resin High Performance Extraction Disk Plate is a terpolymer based on a styrenedivinylbenzene (SDB) backbone that contains polar functional groups. This sorbent offers high retention of a wide range of analytes (acid, base and neutral), reducing method development time and facilitating a generic approach to sample preparation. It also provides better retention of polar compounds. The universal resin contained in the membrane promotes high retention of a wide range of analytes, reducing method development and sorbent selection time. The low elution volume required saves time by eliminating the need for time-consuming dry down and reconstitution steps prior to injection.

The new URP plate utilizes the unique 3M particle-loaded membrane technology, as do all of 3M 96 well plate products. The URP particles are enmeshed within an inert matrix of PTFE. It incorporates the proprietary 3M polypropylene pre-filter that improves flow with challenging matrices.

Empore Filter Plates (PPT)

3M Empore filter plates facilitate the preparation of samples by protein precipitation. This filter plate removes precipitated proteins as effectively as centrifugation separation techniques. It is designed for sample volumes of 1.2mL or less for the standard well plate or up to 2.5mL for the deep well filter plate. These innovative filter plates feature a patented graded-density filter composed of polypropylene for use in bioanalytical applications.

Both the Empore disk plate and filter plates have been tested on:

- Tecan Genesis
- TomTec Quadra 96
- Gilson ASPEC
- Zinsser Analytic Speedy System
- Packard MultiProbe
- Beckman Biomek 2000



Deep Well Disk Plates (2.5mL Well Volume)

Cat. No.	Sorbent Phase
EM-6345SD-1	URP
EM-6315SD-1	C18 SD
EM-6314SD-1	C8 SD
EM-6311SD-1	C2 SD
EM-6330SD-1	MPC SD
EM-6360-1	PPT

Standard Well Disk Plates (1.2mL Well Volume)

EM-6045SD-1	URP
EM-6015SD-1	C18 SD
EM-6014SD-1	C8 SD
EM-6011SD-1	C2 SD
EM-6030SD-1	MPC SD
EM-6065-1	PPT

Empore Disk Plate Manifold

Cat. No.	Description
EM-610	Empore Disk 96-Well plate vacuum manifold, complete manifold

Empore Disk Plate Accessories

EM-660-10	Empore sealing tape pad, 10/pk
EM-615	Replacement gasket manifold, 30/pk



Comparison of Universal Resin Generic Method with Current Empore SPE Method*

URP Plate Generic Method

Step 1: Condition

Add 100µL of methanol to each well and wait 30 seconds before applying the rinse. (No vacuum necessary)

Step 2: Rinse

Add 250µL of water or buffer to each well. Apply vacuum until all wells have drained.

Step 3: Load

Add a minimum of 100µL sample (maximum 1mL for standard-well and 2mL for deep-well) to each well.

Step 4: Wash

Add a minimum of 500µL water or buffer to each well (use at least twice the sample load volume for cleaner eluates). Apply vacuum until all wells have drained. (A pH modified organic wash may be used to enhance specificity).

Step 5: Elute

Add 100 to 200µL of ACN to each well. Wait 30 seconds. Apply vacuum until all wells have drained.

Current Empore SPE Method

Step 1: Condition

Add 100µL of methanol or ACN to each well, wait 15 seconds. (No vacuum necessary)

Step 2: Rinse

Add 300µL of water or buffer to each well. Extract under vacuum.

Step 3: Load

Add samples into the disk plate

Step 4: Wash

Add 300 to 500µL (750-1000µL for deep well) water or buffer. Extract under vacuum. Load same amounts of organic solutions for second wash.

Step 5: Elute

Add 125 to 300µL of an appropriate elution solvent. Extract under vacuum.

*Not intended as method instruction. Consult the Instructions for Use for a comprehensive discussion of methods and method optimization.