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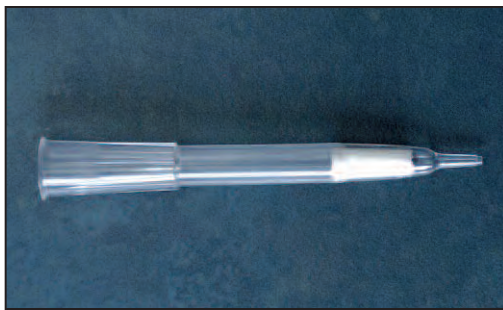
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i.e. Proteins, Nucleic Acids, Carbohydrates	Chromato-graphic	Dialysis	Equilibrium Dialysis	ElectroPrep	Liposomes	CoZap
Acrylamide Removal	•					
Affinity Purification	•					
Antibody Production					•	
Buffer Exchange		•		•		
Cancer Therapy					•	
Carbohydrate Purification	•					
Cell-Cell Interactions					•	
Cosmetics					•	
CsCl Removal				•		
Destaining Gels						•
Detergent Removal	•	•		•		
Diagnostics					•	
DNA Binding Assays			•			
Drug Delivery					•	
Drug Entrapment Studies					•	
Dye Removal	•	•		•		
Electrophoresis				•		
Enzyme Replacement Therapy					•	
Extraction from Gels				•		
Gene Therapy					•	
Glycoprotein/Glycopeptide Purification	•					
Immunoblotting				•		
In Vitro Cell-Liposome Interaction Studies					•	
Ligand Binding Assays			•			
Lipid Purification	•					
Mediated Delivery of Macromolecules					•	
Metal Chelation Therapy					•	
Nick Translation	•					
PCR Cleanup	•			•		
Peptide Removal	•	•		•		
Plasmid Purification	•					
Primer Removal	•			•		
Protein Binding Assays			•			
Protein Purification for HPLC/HPCE/GC	•	•		•		
Protein Purification for Mass Spectroscopy (MALDI, GC/MS, MS-NMR, ESI-MS)	•	•		•		
Protein-Drug Binding Assays			•			
Protein-Protein Interactions			•			
Purification of Samples with Unknown Isoelectric Points				•		
Pyridoxal-5-Phosphate Removal				•		
Radiolabel Removal	•	•				
Radiopharmaceutical Marker Tracing	•	•				
Receptor Binding Assays			•			
Reconstitution Experiments (for Ion Transport)					•	
Salt Removal	•	•		•		
Sample Concentration	•	•		•		
SDS Removal	•	•		•		
Silicate Removal after Chromatography				•		
Size Fractionation	•			•		
Small Molecule Removal	•	•		•		
Time-Dependent Release Studies					•	

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Chromatography Methods (i.e., Tip Columns, PrepTips, ProTips and Spin Columns)

Physical separation methods, such as:

Hydrophilic - Molecules are bound to a functional group on a matrix in the organic phase and eluted in the aqueous phase;

Hydrophobic - Molecules are bound to a functional group on a matrix in the aqueous phase and eluted in the organic phase;

Gel filtration - The smaller molecules diffuse into the pores of the support material making their path and elution time longer than the larger molecules that are excluded on the outside of the particle. Hence the larger molecules elute first and the smaller ones elute later;

Ion Exchange - Molecules are bound to an ionic functional group on a matrix by charge.

Dialysis

A physical separation method in which small molecules pass through the pores of a size selective membrane while the larger molecules are retained in the dialysis bag or chamber. In order to drive the equilibrium mechanism the volume on the outside must be about 200 x the volume of the retained volume and devoid of the small molecules of interest.

Electro Dialysis

A physical separation method in which the movement of the molecules through a semi-permeable membrane is accelerated by an electric field so that molecules can be separated quickly by charge and size. This technique is useful in separation, collection and fractionation of large and small ionic molecules.

Equilibrium Dialysis

A specific application of dialysis which is used to measure the amounts of ligand bound to macromolecules and the free ligand present in two compartments separated by a dialysis membrane. The concentrations of ligand provide information on various binding parameters such as binding constants binding capacity and the number of binding sites.

	Absorption	Size exclusion	Ion exchange			
1 Methods development time	Moderate to Considerable	Minimal	Moderate to Considerable	Minimal	Minimal in dialysis, size only mode; moderate to complex in size and charge mode	Minimal
2 Average time/speed of separation	5 minutes	5 minutes	5 minutes	1 to 24 hrs	3 to 5 minutes	3 to 24 hrs
3 Ability to collect specific sample fractions-small molecules	Excellent	Good	Excellent	Poor	Excellent	Fair
4 Ability to collect specific sample fractions-large molecules	Good	Good	Good	Good	Good	Good
5 Ability to separate more than one set of components simultaneously	Excellent	Fair	Excellent	Poor	Excellent	Poor
6 Sample Volumes (non flow thru versions)	a few microliters to > 1 ml	a few microliters to > 5 ml	a few microliters to > 5 ml	a few microliters to > 5 ml	a few microliters to > 1 ml	96 well 50 to 200 µl
7 Number of Samples run simultaneously	1 to 96	1 to 96	1 to 96	1 to 96	1	1 to 96
8 Materials compatibility for maximum activity recovery	Medium to high	Medium to high	Medium to high	Medium to high	Medium to high	Medium to high
9 Auxiliary equipment	centrifuge, pipettor	centrifuge, pipettor	centrifuge, pipettor	Stirrer, temperature controller	200 VDC, 100 mA power supply, rotator	200 VDC, 100 mA power supply, rotator
10 Sterilizable	CHEMICALLY	CHEMICALLY	CHEMICALLY	CHEMICALLY	CHEMICALLY	CHEMICALLY
11 Suitable for organic & aqueous solutions	YES	YES	YES	YES	YES	YES
12 Suitable for high throughput screening (HTS)	YES	YES	YES	YES	YES	YES

Recommended Literature

Dialysis

James B. Ames, Alexander M. Dizhoor, Mitsuhiro Ikura, Krzysztof Palczewski, and Lubert Stryer, "Three-dimensional Structure of Guanylyl Cyclase Activating Protein-2, a Calcium-sensitive Modulator of Photoreceptor Guanylyl Cyclases", The Journal of Biological Chemistry, Vol. 274, No. 27, pp. 19329-19337, 1999.

Electro Dialysis

1) Zuo, Xun & Speicher, David; "A Method for Global Analysis of Complex Proteoms Using Sample Prefractionation by Solution Isoelectrofocusing Prior to Two-Dimensional Electrophoresis"; Analytical Biochemistry, Vol. 284, pp. 266-278, 2000. 2) ElectroPrep™ User Manual.











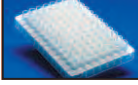
Equilibrium Dialysis

1) Kariv, Hong, & Oldenburg; "Development of a High Throughput Equilibrium Dialysis Method"; Journal of Pharmaceutical Sciences; Vol. 90, No. 5, pp. 580-587, 2001. 2) Guide to Equilibrium Dialysis, ED-96 Users Manual.

Footnote: Membranes are used in Dialysis, Electro Dialysis and Equilibrium Dialysis and can be damaged by high temperature.

Guide to Sample Preparation Products

Guide to Sample Preparation Products

DIALYSIS/ELECTRO DIALYSIS PRODUCTS																										
		Sample Volumes (µl)		Number of Membranes	Materials	Membranes (Da or µm)										Membranes (Da or µm)						Ordering information				
		min	max			Regenerated Cellulose MWCO (Da)					Cellulose Acetate (Aqueous/ organic)					MWCO (Da)		Polycarbonate (Aqueous/organic/ autoclavable) pore size, (µm)								
REUSABLE IMMERSIBLE CHAMBERS						1K	2K	5K	10K	25K	50K															
	DIALYZER Drop-in, re-usable dialysis chamber (Ten chamber sizes available)	10	5,000	1	PTFE	•	•	•	•	•	•															Includes chamber and 1 cap; (membranes, stirrer plate and stir bar sold separately), see page N26
	Fast DIALYZER Drop-in, re-usable two-sided dialysis chamber (8 chamber sizes available)	50	5,000	2	PTFE	•	•	•	•	•	•															Includes chamber and 2 caps; (membranes, stirrer plate and stir bar sold separately), see page N27
	SpinDIALYZER™ Drop-in, re-usable dialysis chamber with built-in magnet (8 chamber sizes available)	10	1,500	1	PTFE	•	•	•	•	•	•															Includes chamber with magnet and cap; (membranes and stirrer plate sold separately), see page N28
	Fast SpinDIALYZER™ Drop-in, re-usable, two-sided dialysis chamber with built-in magnet (6 chamber sizes available)	50	1,500	2	PTFE	•	•	•	•	•	•															Includes chamber with magnet and 2 caps; (membranes and stirrer plate sold separately), see page N28
	ElectroPrep™ (patented) Ultra-fast, single or multi-chambered dialysis system capable of separating by size & charge	25	>1,500	up to six	PTFE	•	•	•	•	•	•															Includes tank with seal and lid with leads; (chambers, membranes and power supply sold separately), see page N29-N31
REUSABLE FLOW-THRU																										
	Flow-Thru Fast DIALYZER Drop-in, continuous flow, single chambered, in-line dialysis system (4 chamber sizes available)	50	>10,000	2	PTFE	•	•	•	•	•	•															Includes chamber, fittings and 2 caps (membranes, tubing and pump sold separately), see page N32
	Flow-Thru DIALYZER Continuous flow, high surface area, in-line dialysis system (5 chamber sizes available)	20	>10,000	1	PTFE	•	•	•	•	•	•															Includes chambers, membranes, fittings, clamp and allen wrench; (sold with or without pump), see page N33
SINGLE USE DIALYSIS PRODUCTS																										
	Ultra-Micro DispoDIALYZER™ (patented)	1	5	1	PC body PP tube	•	•	•	•	•	•															Includes chambers with membrane and 2 sample tubes (1.5 ml) per chamber; (centrifuge recommended, sold separately), see page N34
	Micro DispoDIALYZER™ (patented)	5	100	1	PC body PP head PE cap	•	•	•	•	•	•															Includes chambers with membrane, flotation ring, cap and 2 sample tubes (1.5 ml) per chamber; (stirrer plate and stir bar sold separately), see page N35
	Macro Fast DispoDIALYZER	1,000	10,000	2	PP			•	•																	Includes chamber, 2 locking rings and 2 membranes; (stirrer plate and stir bar sold separately), see page N36
	96-Well DispoDIALYZER	25	300	1/chamber	PP chamber PE cap	•	•	•	•	•																Includes plate with membrane and 12 strip caps; (stirrer plate and stir bar sold separately), see page N37

PTFE=Teflon™; PP=Polypropylene; PE= Polyethylene; PC=Polycarbonate



Guide to Sample Preparation Products



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EQUILIBRIUM DIALYSIS PRODUCTS for binding studies, protein-protein interactions and protein-drug binding assays

	Sample Volumes (µl)		Number of Membranes	Stirring Device	Materials	Membranes MWCO (Da)	Specials Accepted	Ordering Information
	min	max						
REUSABLE EQUILIBRIUM DIALYSIS PRODUCTS								
 <p>Multi-Equilibrium DIALYZER™ Up to 20 parallel equilibrium assays</p>	188	250	1/Chamber	Built-in	PTFE chamber Delrin™ plugs	5,000 or 10,000	Yes	Includes Drive Unit, 1 package of 200 membranes (10,000 MWCO), 20 emptying stoppers, 4 carriers, 120 plugs, 24 spacers, 1 filling clamp and stand; 20 cells; (Tank for temperature control available as an option). see page N39
	750	1,000						
	1,500	2,000						
	3,750	5,000						
 <p>Micro-Equilibrium DIALYZER™ A re-usable equilibrium dialysis 2- or 3-chamber system for studying protein binding assays</p>	19	25	1	No	PTFE body	ULTRA thin 5,000 or 10,000	Yes	Includes 1 or 5 chambers, 1 link and 2 caps in a package for 2-chamber system; (membranes sold separately). Additional links for 3-chamber system and other membrane sizes available. see page N40
	38	50						
	75	100						
	188	250						
	375	500						
 <p>Fast Micro Equilibrium DIALYZER™</p>	19	25	1	No	Acetal Body	ULTRA thin 5,000 or 10,000	Yes	Includes 1 or 5 chambers per package; (membranes sold separately) see page N41
SINGLE USE EQUILIBRIUM DIALYSIS PRODUCTS								
 <p>Dispo Equilibrium DIALYZER™ Single sample, single use product for interaction studies</p>	25	75	1		PP body PE caps	5,000 or 10,000	Yes	Includes chambers with membrane, 2 caps (one black, one white) and 2 sample tubes (0.65 ml) per chamber; 2 special pipette tips included; (centrifuge recommended and sold separately). see page N41
 <p>96-Well Equilibrium DIALYZER™ Single use product for 96 simultaneous assays</p>	50	200	1/Chamber	Rotator	PP body PE caps	5,000 or 10,000	Yes	Includes plates w/ membranes, 12 top strips and 12 bottom strips; (rotator sold separately). see page N42

PTFE=Teflon™; PP=Polypropylene; PE= Polyethylene; PC=Polycarbonate

Sample Prep Pipette Tips

Sample Prep Pipette Tips



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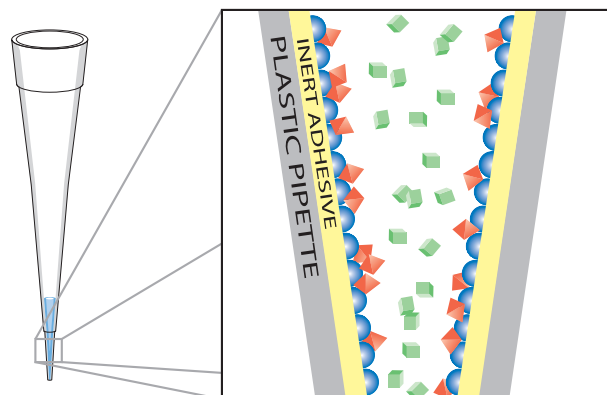
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Sample Prep Pipette Tips are easy to use; simply draw a mixed sample into the pipette tip and a material contained within the tip binds the desired component of the sample. The unbound components of the sample can then be washed away allowing the desired sample component to be eluted, free of contaminants. The speed and simplicity of this method, coupled with the wide-range of available binding materials, have made Harvard Apparatus sample prep tips an extremely popular product for a multitude of applications including:

Applications

- Protein purification
- Peptide purification
- Salt removal
- Detergent removal
- Dye-terminator removal
- Affinity purification
- Oligonucleotide purification
- DNA purification
- Carbohydrate purification
- Glycoprotein purification
- Glycopeptide purification
- Mass spectrometry (MALDI-TOF, ESI-MS)
- HPLC
- High performance capillary electrophoresis (HPCE)

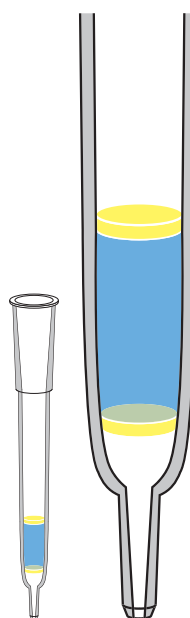
Harvard Apparatus Pipette Tip Family



PrepTip™

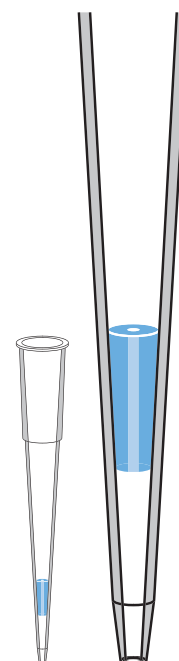
The revolutionary new interior surface coating of PrepTip pipette tip means your sample can flow freely through the tip opening allowing rapid and easy sample prep! see pages N13 to N15

- ◆ RETAINED SAMPLE MOLECULE
- NON-RETAINED MOLECULES
- PACKING MATERIAL



Ultra-Micro and Micro TipColumn™

MicroTipColumn contains a packed column of chromatographic material from a wide selection offered by Harvard Apparatus. Simple, fast and easy to use – a SpinColumn in pipette tip format, see page N11



ProTip™

ProTip pipette tip contains a hydrophilic polymer material which binds 5 to 10 times more protein than silica based materials, see page N16

Key

- Frit
- Purification Media

Sample Prep Pipette Tips

Ultra-Micro and Micro TipColumns™



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Ultra-Micro and Micro TipColumns are a simple and fast way to perform small sample preparation based on the physical properties of the sample. The columns consist of micro-pipette tips containing one of a wide range of available column materials contained by frits and/or cap. The sample can be applied to the top of the column or suctioned through the column using a micro-pipette. The sample is then purified according to size and shape, chemical composition, charge or other physico-chemical properties by selecting the appropriate column material.

Advantages:

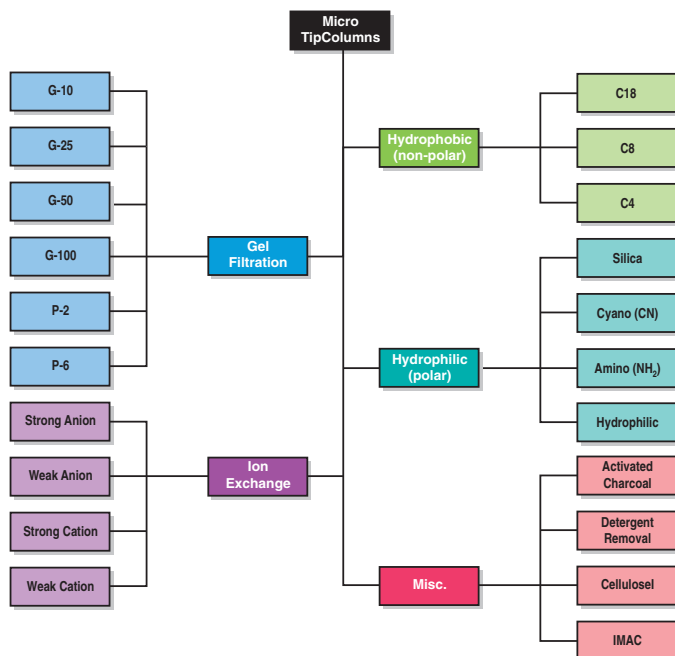
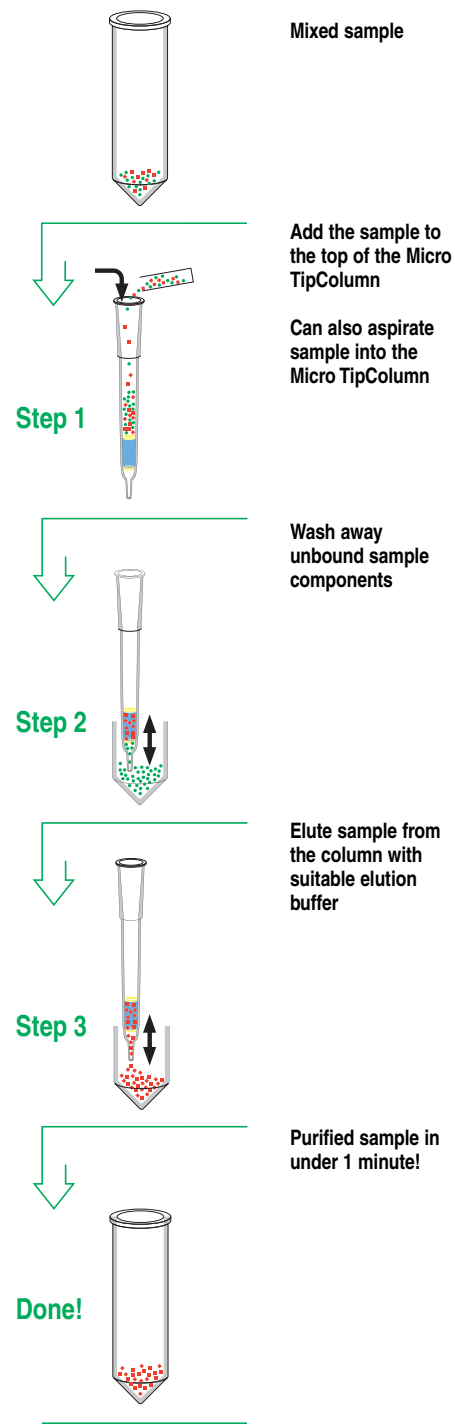
- Fast, simple, easy to use
- Unrivaled range of column materials available
- No special equipment necessary; uses standard pipette
- Suitable for samples from 10 to 25 μ l and 25 to 75 μ l

Applications:

- Sample concentration
- Protein purification
- Peptide purification
- Salt removal
- Buffer exchange
- Radiolabel removal
- Detergent removal
- Dye-terminator removal
- Affinity purification
- Oligonucleotide purification
- DNA purification
- Carbohydrate purification
- Glycoprotein purification
- Glycopeptide purification
- Mass spectrometry (MALDI, ESI-MS)
- HPLC
- High performance capillary electrophoresis (HPCE)

How to Use:

Ultra-Micro and Micro TipColumns



Key	
	Desired Component
	Contaminants
	Frit
	Purification Media

Sample Prep Pipette Tips

Ultra-Micro TipColumn™ - Samples from 10 µl to 25 µl



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Ultra-Micro TipColumns™: Ordering Information										
Packing Material	Package Quantity								\$ for 25	\$ for 100
	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100		
Gel Filtration										
G-10	BS4 74-7120	BS4 74-7100	-	-	-	-	-	-	-	-
G-25	BS4 74-7121	BS4 74-7101	-	-	-	-	-	-	-	-
G-50	BS4 74-7122	BS4 74-7102	-	-	-	-	-	-	-	-
G-100	BS4 74-7123	BS4 74-7103	-	-	-	-	-	-	-	-
P-2 *	BS4 74-7124	BS4 74-7104	-	-	-	-	-	-	-	-
P-6 *	BS4 74-7125	BS4 74-7105	-	-	-	-	-	-	-	-
Hydrophobic										
C18	-	-	BS4 74-7126	BS4 74-7106	-	-	-	-	-	-
C8	-	-	BS4 74-7127	BS4 74-7107	-	-	-	-	-	-
C4	-	-	BS4 74-7128	BS4 74-7108	-	-	-	-	-	-
Hydrophilic										
Silica	-	-	BS4 74-7129	BS4 74-7109	-	-	-	-	-	-
Cyano (CN)	-	-	BS4 74-7130	BS4 74-7110	-	-	-	-	-	-
Amino (NH ₂)	-	-	BS4 74-7131	BS4 74-7111	-	-	-	-	-	-
Hydrophilic	-	-	BS4 74-7132	BS4 74-7112	-	-	-	-	-	-
Ion Exchange										
Strong Anion	-	-	-	-	BS4 74-7133	BS4 74-7113	-	-	-	-
Weak Anion	-	-	-	-	BS4 74-7134	BS4 74-7114	-	-	-	-
Strong Cation	-	-	-	-	BS4 74-7135	BS4 74-7115	-	-	-	-
Weak Cation	-	-	-	-	BS4 74-7136	BS4 74-7116	-	-	-	-
Misc.										
Cellulose	-	-	-	-	-	-	BS4 74-7137	BS4 74-7117	-	-
Detergent Removal	-	-	-	-	-	-	BS4 74-7138	BS4 74-7118	-	-
IMAC **	-	-	-	-	-	-	BS4 74-7139	BS4 74-7119	-	-
Empty Columns										
	Qty. of 25	Qty. of 100							\$ for 25	\$ for 100
5 µm Frit	BS4 74-4921	BS4 74-4920	-	-	-	-	-	-	-	-
20 µm Frit	BS4 74-4901	BS4 74-4900	-	-	-	-	-	-	-	-
40 µm Frit	BS4 74-4931	BS4 74-4930	-	-	-	-	-	-	-	-

* Polyacrylamide-based gel filtration

**IMAC (immobilized metal affinity chromatography - for purification of Histidine tagged proteins and other phospho proteins/peptides)

How Ultra-Micro TipColumns are Used				
Mechanism of Binding	Type of Functional Groups Bound	Sample Solvents Bound from...	Elute Bound Compounds with...	Types of Packing Material Available
Reverse Phase Extraction	Nonpolar groups (e.g. aromatic and alkyl groups)	Polar solutions (e.g. aqueous buffers)	Less polar solvents (e.g. acetonitrile, methanol and water)	C4, C8, C18, Hydrophobic polymer
Normal Phase Extraction	Polar groups (e.g. hydroxyl and amine groups)	Nonpolar solvents	Polar solvent mixtures	Silica, Amino, Cyano, Hydrophilic
Cation Exchange	Positively charged groups (e.g. amines)	Low ionic strength aqueous solutions	Ionic buffers (e.g. acetate, citrate and phosphate)	Weak cation exchanger, Strong cation exchanger
Anion Exchange	Negatively charged groups (e.g. organic acids)	Low ionic strength aqueous solutions	Ionic buffers (e.g. phosphate and acetate)	Weak anion exchanger, Strong anion exchanger

Sample Prep Pipette Tips

Micro TipColumn™ - Samples from 25 µl to 75 µl



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Micro TipColumns: Ordering Information

Packing Material	Gel Filtration		Silica Based		Ion Exchange		Miscellaneous		\$ for 25	\$ for 100
	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100		
Gel Filtration										
G-10	BS4 74-5104	BS4 74-5100	-	-	-	-	-	-	-	-
G-25	BS4 74-5105	BS4 74-5101	-	-	-	-	-	-	-	-
G-50	BS4 74-5106	BS4 74-5102	-	-	-	-	-	-	-	-
G-100	BS4 74-5107	BS4 74-5103	-	-	-	-	-	-	-	-
P-2 *	BS4 74-5408	BS4 74-5402	-	-	-	-	-	-	-	-
P-6 *	BS4 74-5409	BS4 74-5403	-	-	-	-	-	-	-	-
Hydrophobic (non-polar)										
C18	-	-	BS4 74-5207	BS4 74-5201	-	-	-	-	-	-
C8	-	-	BS4 74-5208	BS4 74-5202	-	-	-	-	-	-
C4	-	-	BS4 74-5209	BS4 74-5203	-	-	-	-	-	-
Hydrophilic (polar)										
Silica	-	-	BS4 74-5206	BS4 74-5200	-	-	-	-	-	-
Cyano (CN)	-	-	BS4 74-5210	BS4 74-5204	-	-	-	-	-	-
Amino (NH ₂)	-	-	BS4 74-5211	BS4 74-5205	-	-	-	-	-	-
Hydrophilic	-	-	BS4 74-5411	BS4 74-5405	-	-	-	-	-	-
Ion Exchange										
Strong Anion	-	-	-	-	BS4 74-5304	BS4 74-5300	-	-	-	-
Weak Anion	-	-	-	-	BS4 74-5305	BS4 74-5301	-	-	-	-
Strong Cation	-	-	-	-	BS4 74-5306	BS4 74-5302	-	-	-	-
Weak Cation	-	-	-	-	BS4 74-5307	BS4 74-5303	-	-	-	-
Misc.										
Active Charcoal	-	-	-	-	-	-	BS4 74-5406	BS4 74-5400	-	-
Cellulose	-	-	-	-	-	-	BS4 74-5407	BS4 74-5401	-	-
Detergent Removal	-	-	-	-	-	-	BS4 74-5410	BS4 74-5404	-	-
IMAC **	-	-	-	-	-	-	BS4 74-5412	BS4 74-5413	-	-
Empty Columns										
	Qty. of 25	Qty. of 100							\$ for 25	\$ for 100
5 µm Frit	BS4 74-4921	BS4 74-4920	-	-	-	-	-	-	-	-
20 µm Frit	BS4 74-4901	BS4 74-4900	-	-	-	-	-	-	-	-
40 µm Frit	BS4 74-4931	BS4 74-4930	-	-	-	-	-	-	-	-

* Polyacrylamide-based gel filtration

**IMAC (immobilized metal affinity chromatography - for purification of Histidine tagged proteins and other phospho proteins/peptides)

How Micro TipColumns are Used

Mechanism of Binding	Type of Functional Groups Bound	Sample Solvents Bound from...	Elute Bound Compounds with...	Types of Packing Material Available
Reverse Phase Extraction	Nonpolar groups (e.g. aromatic and alkyl groups)	Polar solutions (e.g. aqueous buffers)	Less polar solvents (e.g. acetonitrile, methanol and water)	C4, C8, C18, Hydrophobic polymer
Normal Phase Extraction	Polar groups (e.g. hydroxyl and amine groups)	Nonpolar solvents	Polar solvent mixtures	Silica, Amino, Cyano, Hydrophilic
Cation Exchange	Positively charged groups (e.g. amines)	Low ionic strength aqueous solutions	Ionic buffers (e.g. acetate, citrate and phosphate)	Weak cation exchanger, Strong cation exchanger
Anion Exchange	Negatively charged groups (e.g. organic acids)	Low ionic strength aqueous solutions	Ionic buffers (e.g. phosphate and acetate)	Weak anion exchanger, Strong anion exchanger

Sample Prep Pipette Tips

PrepTip™



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PrepTip is a revolutionary new method for cleaning and concentrating proteins and other biological samples for further instrumental analysis. PrepTip's unique, patented feature is that the interior walls of the tip are coated with the sample-binding material. This interior coating technology makes PrepTip the only such product on the market, providing both speed and reliability. Since the tip opening is not plugged by the interior coating process, the sample can flow freely through the opening without back pressure. PrepTip can be used to clean or concentrate any biological sample since the interior walls of the tip can be coated with your choice of binding media. Different binding materials are offered by Harvard Apparatus. Due to its unique features, sample preparation with PrepTip is very fast, simple and highly effective. PrepTip is well suited for a range of applications including mass spectrometry, HPLC and automated sample preparation methods.

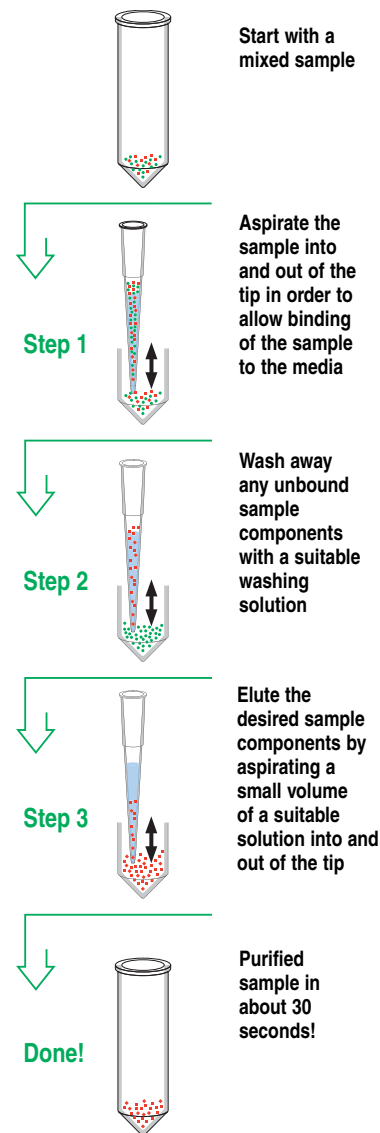
Advantages:

- Patented
- Protein or peptide purification
- Salt removal
- Detergent removal
- Mass spectrometry
- Affinity purification
- Glycoprotein and glycopeptide purification
- MALDI-TOF
- HPLC
- High Performance Capillary Electrophoresis (HPCE)

Applications:

- Unique patented interior coating matrix means no more plugging of the tip opening
- Easy, rapid flow of sample due to the unobstructed tip opening of PrepTip
- Different sample binding media to suit many sample types
- Effective for small samples (even with volumes less than 1 µl)
- No special equipment necessary - uses standard micro-pipette tip format
- Suitable for use with single or multi-channel pipetting devices
- Virtually ANY sample-binding media can be used in the solid matrix
- Fast, simple, easy to use

How to Use: PrepTip



Key

- Desired Component
- Contaminants
- Purification Media

Sample Prep Pipette Tips

PrepTip™



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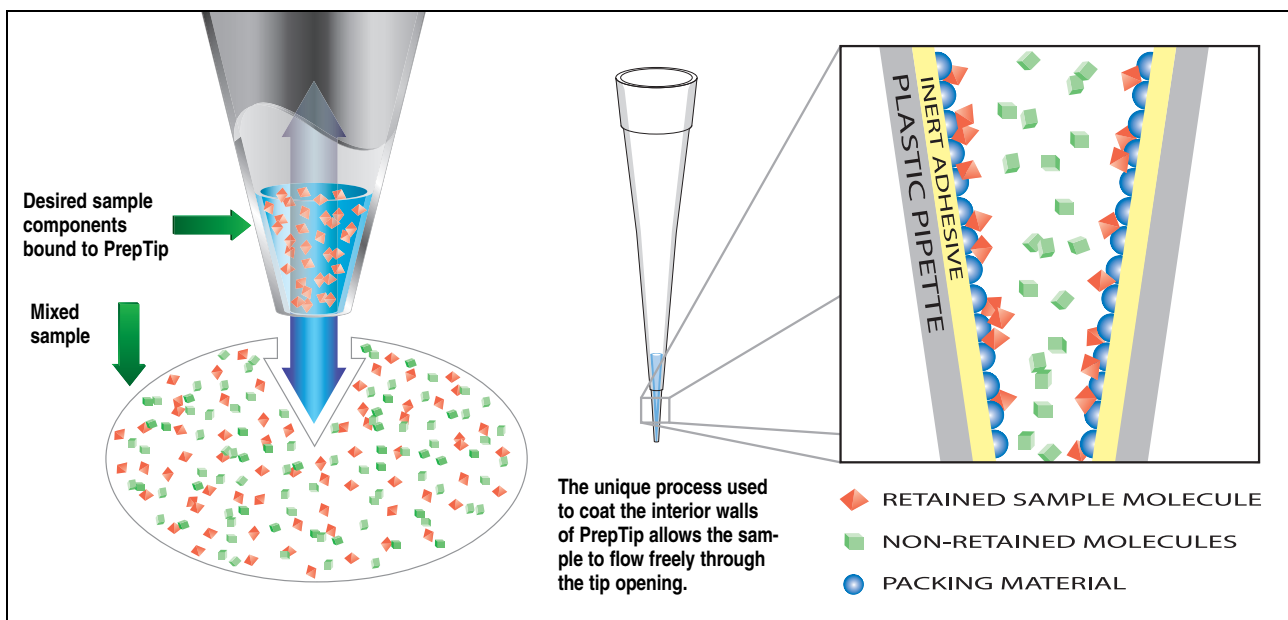
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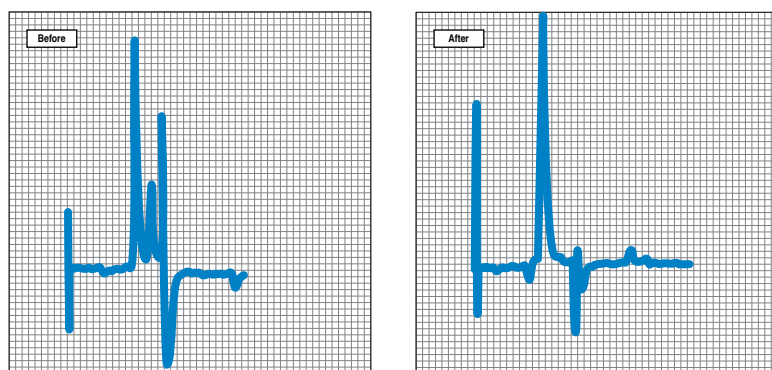
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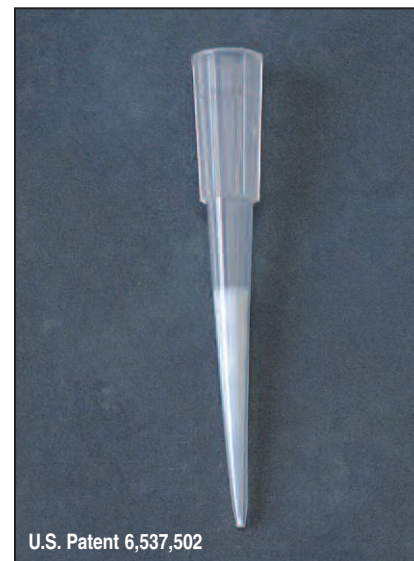
How PrepTips are Used

Mechanism of Binding	Type of Functional Groups Bound	Sample Solvents Bound from...	Elute Bound Compounds with...	Types of Tip Coating Available
Reverse Phase Extraction	Nonpolar groups (e.g. aromatic and alkyl groups)	Polar solutions (e.g. aqueous buffers)	Less polar solvents (e.g. acetonitrile, methanol and water)	C4, C8, C18, Hydrophobic polymer
Normal Phase Extraction	Polar groups (e.g. hydroxyl and amine groups)	Nonpolar solvents	Polar solvent mixtures (e.g. hexane, methylene chloride)	Silica, Amino, Cyano

Sample Preparation for HPLC Using C-18 PrepTip



Sample Mixture: Aprotinin (MW 6,500) in 100mM phosphate/acetate buffer



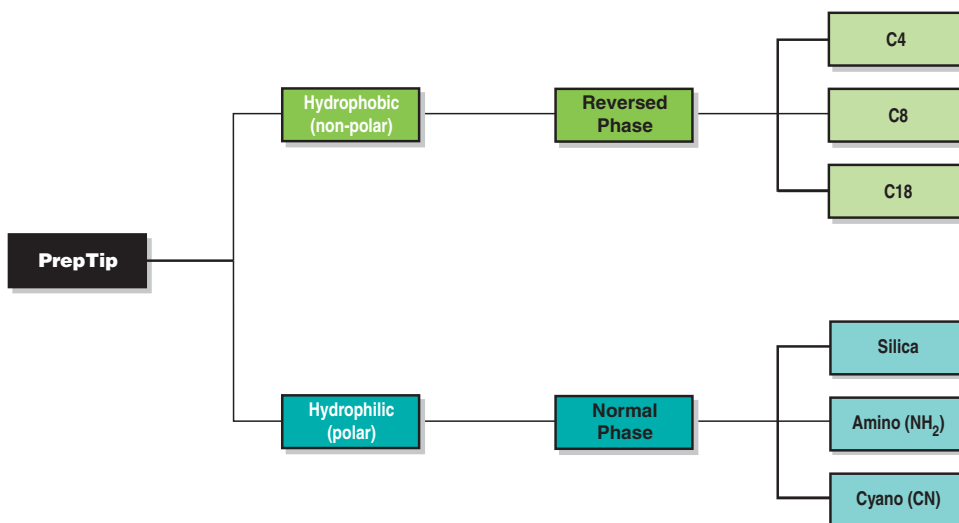
Sample Prep Pipette Tips

PrepTip™

Harvard Apparatus offers three sizes of PrepTips to fit your specific applications:

- **Ultra-Micro PrepTip™**
For sample volumes from 1 µl to 10 µl, binding capacity 0.5 µg/tip
- **Micro PrepTip™**
For sample volumes from 10 µl to 100 µl, binding capacity 1.0 µg/tip
- **Macro PrepTip™**
For sample volumes from 100 µl to 500 µl, binding capacity 5.0 µg/tip

PrepTips are supplied in package of either 24 or 96 tips.



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PrepTip™: Ordering Information

Coating Material	Ultra-Micro PrepTips 1 to 10 µl Tips		Micro PrepTips 10 to 100 µl Tips		Macro PrepTips 100 to 500 µl Tips	
	Qty. of 24	Qty. of 96	Qty. of 24	Qty. of 96	Qty. of 24	Qty. of 96
Hydrophobic (non-polar)						
C4	BS4 74-3406	BS4 74-3407	BS4 74-3506	BS4 74-3507	BS4 74-3606	BS4 74-3607
\$						
C8	BS4 74-3404	BS4 74-3405	BS4 74-3504	BS4 74-3505	BS4 74-3604	BS4 74-3605
\$						
C18	BS4 74-3402	BS4 74-3403	BS4 74-3502	BS4 74-3503	BS4 74-3602	BS4 74-3603
\$						
Hydrophilic (polar)						
Silica	BS4 74-3400	BS4 74-3401	BS4 74-3500	BS4 74-3501	BS4 74-3600	BS4 74-3601
\$						
Amino (NH ₂)	BS4 74-3408	BS4 74-3409	BS4 74-3508	BS4 74-3509	BS4 74-3608	BS4 74-3609
\$						
Cyano (CN)	BS4 74-3410	BS4 74-3411	BS4 74-3510	BS4 74-3511	BS4 74-3610	BS4 74-3611
\$						

Sample Prep Pipette Tips

ProTip™



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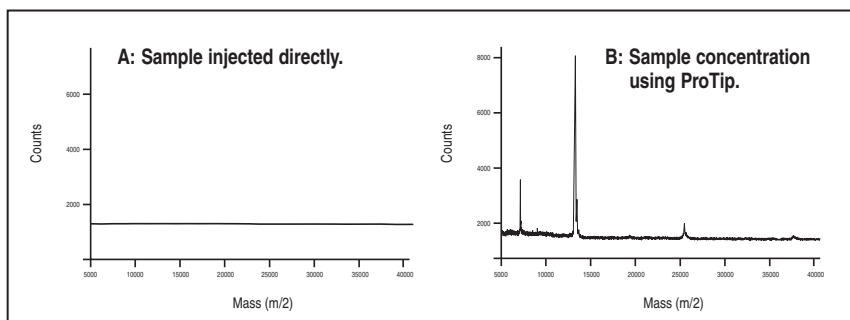
ProTip, one of Harvard Apparatus' latest patent-pending technologies, is a new method for cleaning and concentrating protein samples for further instrumental analysis. ProTip offers the same easy sample flow of our PrepTip, but contains a small quantity of a highly effective hydrophilic polymer material. The binding capacity of the polymer used in ProTip is 5 to 10 times higher than that of silica-based materials. This polymer binds proteins in the presence of organic solvents but does not bind impurities, such as salts and detergents, in the sample. After the protein is bound to the polymer it can easily be eluted in an aqueous solution, making purification and concentration of biological samples with ProTip fast, simple, and highly effective. Three sizes are offered to meet your specific application. The Ultra-Micro ProTip includes one micro pipettor.

Advantages:

- Fast, simple, easy to use
- Highly effective, non-silica based hydrophilic polymer material
- Easy, rapid flow of sample due to the unobstructed tip opening of ProTip
- Effective for small samples (even with volumes less than 1 μ l)
- Tip sizes available to suit a range of sample volumes
- No special equipment necessary - uses standard micro-pipette tips
- Suitable for use with single or multi-channel pipetting devices

Applications:

- Protein purification
- Peptide purification
- Salt removal
- Detergent removal
- Mass spectrometry
- MALDI
- High performance liquid chromatography (HPLC)
- High performance capillary electrophoresis (HPCE)
- ESI-MS

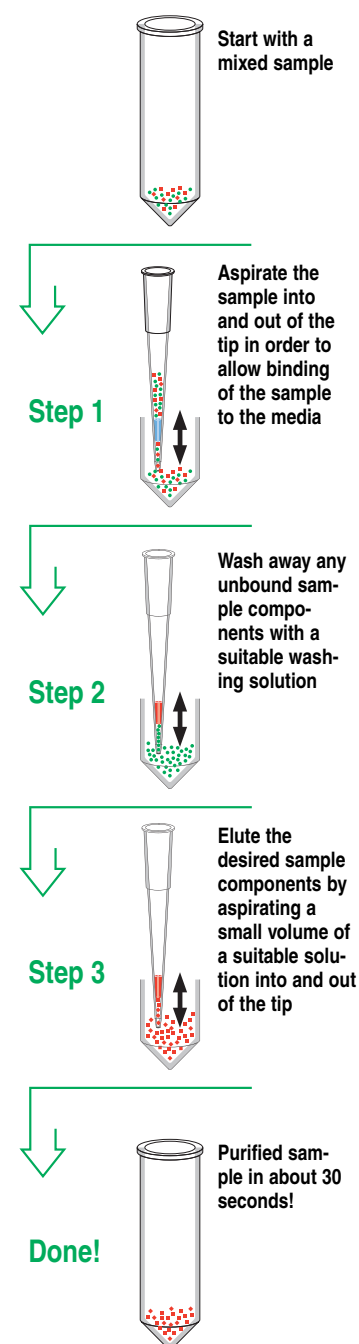


Purification of Cytochrome-C in SDS-Tris-Glycine for MALDI-TOF Mass Spectrometry using ProTip

Catalog No. \$ Product

BS4 74-3700		Ultra-Micro ProTip™ 1 to 10 μ l, pkg. of 24
BS4 74-3701		Ultra-Micro ProTip™ 1 to 10 μ l, pkg. of 96
BS4 74-3702		Micro ProTip™ 10 to 100 μ l, pkg. of 24
BS4 74-3703		Micro ProTip™ 10 to 100 μ l, pkg. of 96
BS4 74-3704		Macro ProTip™ 100 to 500 μ l, pkg. of 24
BS4 74-3705		Macro ProTip™ 100 to 500 μ l, pkg. of 96

How to Use: ProTip



Key

- Desired Component
- Contaminants
- Purification Media

Introduction to SpinColumns™



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Advantages

- Easy to use
- Multiple formats available – from single 10 µl sample volumes to high-throughput 96-well format
- Unrivaled selection of column packing materials
- Single use, disposable centrifuge tube formats
- Quick high sample recovery
- Rapid sample preparation time
- Custom packed columns are available on request

Applications

- Protein purification
- Peptide purification
- DNA purification
- Small molecule, carbohydrate removal
- Radiolabel removal
- Nick translation
- Affinity separation
- Salt removal
- Buffer exchange

Harvard Apparatus offers four sizes of SpinColumns to fit your specific applications:

- **Ultra-Micro SpinColumns**
For sample volumes from 10 µl to 25 µl
- **Micro SpinColumns**
For sample volumes 25 µl to 75 µl
- **Macro SpinColumns**
For sample volumes from 75 µl to 150 µl
- **96-Well SpinColumns**
For high throughput applications with sample volumes from 25 µl to 100 µl

Harvard Apparatus SpinColumn Family



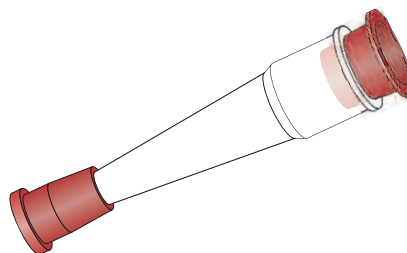
Ultra-Micro SpinColumn

Volumes from 10 µl to 25 µl, see page N18.



Micro SpinColumn™

Handles volumes from 25 µl to 75 µl, see page N19.



Macro SpinColumn™

Handles volumes from 75 µl to 150 µl, see pages N20 and N21.



96-Well SpinColumn™

High throughput sample prep applications, volumes 25 µl to 100 µl, see page N22.

Harvard Apparatus new generation of SpinColumns are designed for the purification of small samples (10 µl to 150 µl) in either single column or high-throughput 96-well format with a standard centrifuge

Our SpinColumns are pre-filled with a wide selection of chromatographic materials including gel-filtration, ion-exchange, silica-based reverse- and normal-phase materials, as well as specific materials, such as charcoal or cellulose contained by frits and/or caps. The columns can also be pre-filled with custom materials based on customer requests.

Simply place the SpinColumn in a centrifuge tube and centrifuge the tube briefly to separate your sample. The column material binds and purifies the sample according to size and shape, chemical composition, charge or other physiochemical properties.

Ultra-Micro SpinColumns™ - Samples from 10 µl to 25 µl



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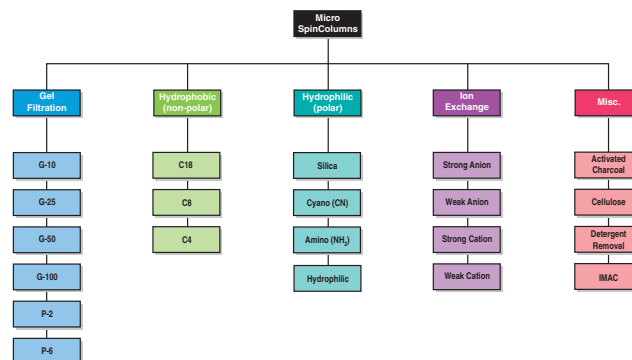
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Advantages:

- Rapid sample preparation time
- Micro sample sizes
- Unrivaled selection of column packing materials; custom packed columns are available on request
- High sample recovery

Applications:

- DNA, protein and peptide purification
- Small molecule, carbohydrate, salt and radiolabel removal
- Nick translation
- Affinity separation
- Buffer exchange



Ultra-Micro SpinColumns are best suited for sample volumes from 10 µl to 25 µl. Centrifugation or filtration under vacuum or pressure can be used to run the sample through the columns. Results obtained from the Micro SpinColumns are highly reproducible and there is minimal sample loss. Each column includes two 2 ml centrifuge tubes plus top caps (for Gel Filtration) or frit.

Cat. No.

\$ Product

BS4 74-4421	Empty Columns, 5 µm Frit, Qty. of 25
BS4 74-4420	Empty Columns, 5 µm Frit, Qty. of 100
BS4 74-4401	Empty Columns, 20 µm Frit, Qty. of 25
BS4 74-4400	Empty Columns, 20 µm Frit, Qty. of 100
BS4 74-4431	Empty Columns, 40 µm Frit, Qty. of 25
BS4 74-4430	Empty Columns, 40 µm Frit, Qty. of 100

Ultra-Micro SpinColumns: Ordering Information

Packing Material	Gel Filtration		Silica Based		Ion Exchange		Miscellaneous		\$ for 25	\$ for 100
	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100		
Gel Filtration										
G-10	BS4 74-7220	BS4 74-7200	-	-	-	-	-	-	-	-
G-25	BS4 74-7221	BS4 74-7201	-	-	-	-	-	-	-	-
G-50	BS4 74-7222	BS4 74-7202	-	-	-	-	-	-	-	-
G-100	BS4 74-7223	BS4 74-7203	-	-	-	-	-	-	-	-
P-2 *	BS4 74-7224	BS4 74-7204	-	-	-	-	-	-	-	-
P-6 *	BS4 74-7225	BS4 74-7205	-	-	-	-	-	-	-	-
Hydrophobic (non-polar)										
C18	-	-	BS4 74-7226	BS4 74-7206	-	-	-	-	-	-
C8	-	-	BS4 74-7227	BS4 74-7207	-	-	-	-	-	-
C4	-	-	BS4 74-7228	BS4 74-7208	-	-	-	-	-	-
Hydrophilic (polar)										
Silica	-	-	BS4 74-7229	BS4 74-7209	-	-	-	-	-	-
Cyano (CN)	-	-	BS4 74-7230	BS4 74-7210	-	-	-	-	-	-
Amino (NH ₂)	-	-	BS4 74-7231	BS4 74-7211	-	-	-	-	-	-
Hydrophilic	-	-	BS4 74-7232	BS4 74-7212	-	-	-	-	-	-
Ion Exchange										
Strong Anion	-	-	-	-	BS4 74-7233	BS4 74-7213	-	-	-	-
Weak Anion	-	-	-	-	BS4 74-7234	BS4 74-7214	-	-	-	-
Strong Cation	-	-	-	-	BS4 74-7235	BS4 74-7215	-	-	-	-
Weak Cation	-	-	-	-	BS4 74-7236	BS4 74-7216	-	-	-	-
Misc.										
Cellulose	-	-	-	-	-	-	BS4 74-7237	BS4 74-7217	-	-
Detergent Removal	-	-	-	-	-	-	BS4 74-7238	BS4 74-7218	-	-
IMAC **	-	-	-	-	-	-	BS4 74-7239	BS4 74-7219	-	-

* Polyacrylamide-based gel filtration ** IMAC (immobilized metal affinity chromatography - for purification of histidine tagged proteins)

Micro SpinColumns™ - Samples from 25 µl to 75 µl



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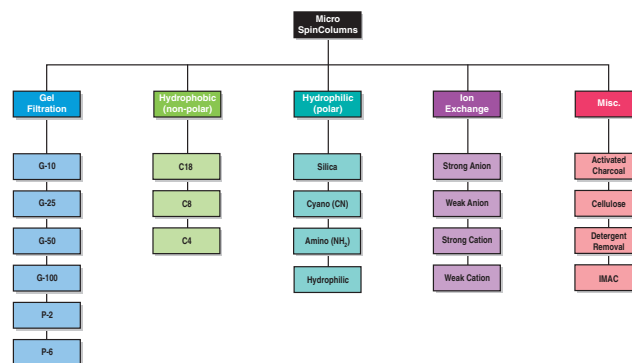
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Advantages:

- Rapid sample preparation time
- Small sample sizes
- Unrivaled selection of column packing materials; custom packed columns are available on request
- High sample recovery

Applications:

- DNA, protein and peptide purification
- Small molecule, carbohydrate, salt and radiolabel removal
- Nick translation
- Affinity separation
- Buffer exchange



Micro SpinColumns are best suited for sample volumes from 25 to 75 µl. Centrifugation or filtration under vacuum or pressure can be used to run the sample through the columns. Results obtained from the Micro SpinColumns are highly reproducible and there is minimal sample loss. Each column includes two 2 ml centrifuge tubes plus top cap (for Gel Filtration) or frit.

Cat. No.

\$ Product

BS4 74-4421	Empty Columns, 5 µm Frit, Qty. of 25
BS4 74-4420	Empty Columns, 5 µm Frit, Qty. of 100
BS4 74-4401	Empty Columns, 20 µm Frit, Qty. of 25
BS4 74-4400	Empty Columns, 20 µm Frit, Qty. of 100
BS4 74-4431	Empty Columns, 40 µm Frit, Qty. of 25
BS4 74-4430	Empty Columns, 40 µm Frit, Qty. of 100

Micro SpinColumns: Ordering Information

Packing Material	Gel Filtration		Silica Based		Ion Exchange		Miscellaneous		\$ for 25	\$ for 100
	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100		
Gel Filtration										
G-10	BS4 74-4504	BS4 74-4500	-	-	-	-	-	-	-	-
G-25	BS4 74-4505	BS4 74-4501	-	-	-	-	-	-	-	-
G-50	BS4 74-4506	BS4 74-4502	-	-	-	-	-	-	-	-
G-100	BS4 74-4507	BS4 74-4503	-	-	-	-	-	-	-	-
P-2 *	BS4 74-4808	BS4 74-4802	-	-	-	-	-	-	-	-
P-6 *	BS4 74-4809	BS4 74-4803	-	-	-	-	-	-	-	-
Hydrophobic (non-polar)										
C18	-	-	BS4 74-4607	BS4 74-4601	-	-	-	-	-	-
C8	-	-	BS4 74-4608	BS4 74-4602	-	-	-	-	-	-
C4	-	-	BS4 74-4609	BS4 74-4603	-	-	-	-	-	-
Hydrophilic (polar)										
Silica	-	-	BS4 74-4606	BS4 74-4600	-	-	-	-	-	-
Cyano (CN)	-	-	BS4 74-4610	BS4 74-4604	-	-	-	-	-	-
Amino (NH ₂)	-	-	BS4 74-4611	BS4 74-4605	-	-	-	-	-	-
Hydrophilic	-	-	BS4 74-4811	BS4 74-4805	-	-	-	-	-	-
Ion Exchange										
Strong Anion	-	-	-	-	BS4 74-4704	BS4 74-4700	-	-	-	-
Weak Anion	-	-	-	-	BS4 74-4705	BS4 74-4701	-	-	-	-
Strong Cation	-	-	-	-	BS4 74-4706	BS4 74-4702	-	-	-	-
Weak Cation	-	-	-	-	BS4 74-4707	BS4 74-4703	-	-	-	-
Misc.										
Active Charcoal	-	-	-	-	-	-	BS4 74-4806	BS4 74-4800	-	-
Cellulose	-	-	-	-	-	-	BS4 74-4807	BS4 74-4801	-	-
Detergent Removal	-	-	-	-	-	-	BS4 74-4810	BS4 74-4804	-	-
IMAC **	-	-	-	-	-	-	BS4 74-4812	BS4 74-4813	-	-

* Polyacrylamide-based gel filtration ** IMAC (immobilized metal affinity chromatography - for purification of histidine tagged proteins)

Macro SpinColumn™ - Samples from 75 µl to 150 µl



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Advantages:

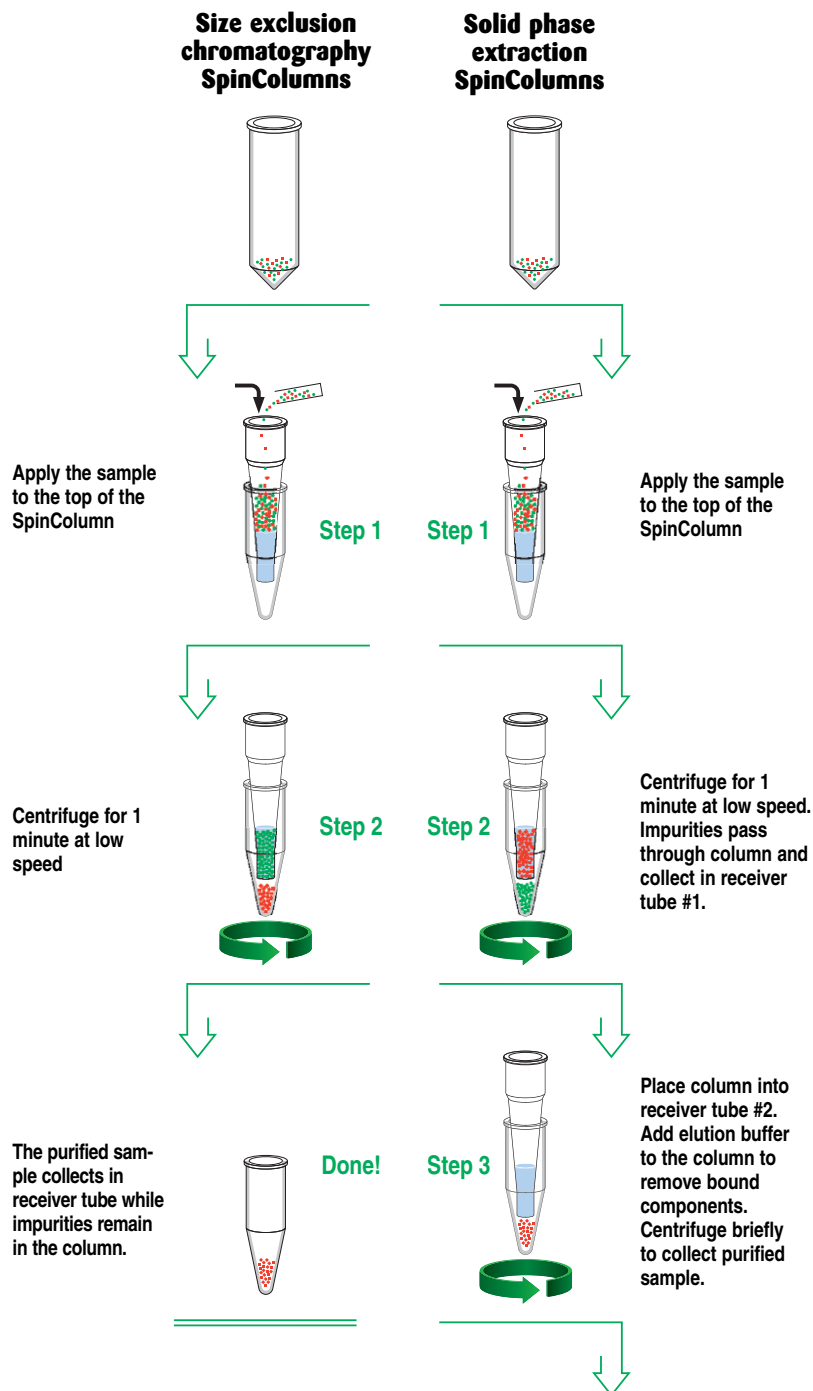
- Easy to use
- Unrivaled selection of column packing materials
- High sample recovery
- Rapid sample preparation time
- Custom packed columns are available on request

Applications:

- DNA purification
- Protein purification
- Peptide purification
- Small molecule, carbohydrate removal
- Radiolabel removal
- Nick translation
- Affinity separation
- Salt removal
- Buffer exchange

Simply place the SpinColumn in a centrifuge tube and centrifuge the tube briefly to separate your sample. The column material binds and purifies the sample according to size and shape, chemical composition, charge or other physiochemical properties.

How to Use: Macro SpinColumns



Macro SpinColumn™ - Samples from 75 µl to 150 µl



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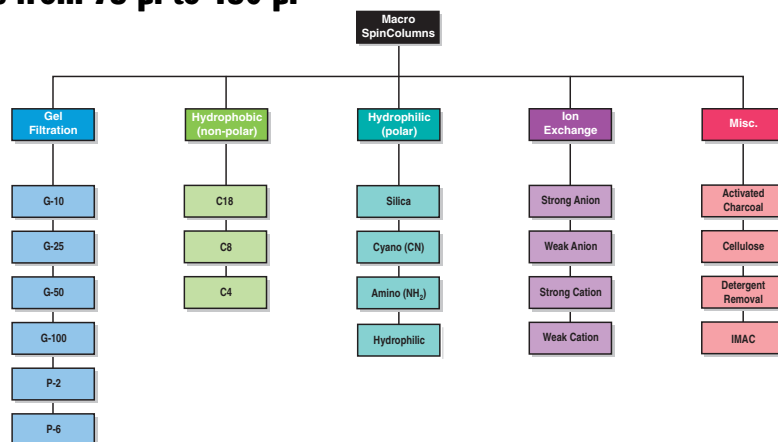


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Macro SpinColumns are best suited for samples with volumes from 75 to 150 µl. In addition to the standard packing materials described in the ordering information, Macro SpinColumns can be filled with custom packing materials as desired. Each column includes two 2 ml centrifuge tubes and top and bottom caps.



Macro SpinColumns: Ordering Information

Packing Material	Gel Filtration		Silica Based		Ion Exchange		Miscellaneous		\$ for 25	\$ for 100
	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100	Qty. of 25	Qty. of 100		
Gel Filtration										
G-10	BS4 74-3904	BS4 74-3900	-	-	-	-	-	-	-	-
G-25	BS4 74-3905	BS4 74-3901	-	-	-	-	-	-	-	-
G-50	BS4 74-3906	BS4 74-3902	-	-	-	-	-	-	-	-
G-100	BS4 74-3907	BS4 74-3903	-	-	-	-	-	-	-	-
P-2 *	BS4 74-4308	BS4 74-4302	-	-	-	-	-	-	-	-
P-6 *	BS4 74-4309	BS4 74-4303	-	-	-	-	-	-	-	-
Hydrophobic (non-polar)										
C18	-	-	BS4 74-4107	BS4 74-4101	-	-	-	-	-	-
C8	-	-	BS4 74-4108	BS4 74-4102	-	-	-	-	-	-
C4	-	-	BS4 74-4109	BS4 74-4103	-	-	-	-	-	-
Hydrophilic (polar)										
Silica	-	-	BS4 74-4105	BS4 74-4100	-	-	-	-	-	-
Cyano (CN)	-	-	BS4 74-4110	BS4 74-4106	-	-	-	-	-	-
Amino (NH ₂)	-	-	BS4 74-4111	BS4 74-4104	-	-	-	-	-	-
Hydrophilic	-	-	BS4 74-4311	BS4 74-4305	-	-	-	-	-	-
Ion Exchange										
Strong Anion	-	-	-	-	BS4 74-4204	BS4 74-4200	-	-	-	-
Weak Anion	-	-	-	-	BS4 74-4205	BS4 74-4201	-	-	-	-
Strong Cation	-	-	-	-	BS4 74-4206	BS4 74-4202	-	-	-	-
Weak Cation	-	-	-	-	BS4 74-4207	BS4 74-4203	-	-	-	-
Misc.										
Active Charcoal	-	-	-	-	-	-	BS4 74-4306	BS4 74-4300	-	-
Cellulose	-	-	-	-	-	-	BS4 74-4307	BS4 74-4301	-	-
Detergent Removal	-	-	-	-	-	-	BS4 74-4310	BS4 74-4304	-	-
IMAC **	-	-	-	-	-	-	BS4 74-4312	BS4 74-4313	-	-
Empty Columns										
	Qty. of 25	Qty. of 100							\$ for 25	\$ for 100
5 µm Frit	BS4 74-3821	BS4 74-3820	-	-	-	-	-	-	-	-
20 µm Frit	BS4 74-3841	BS4 74-3840	-	-	-	-	-	-	-	-
40 µm Frit	BS4 74-3801	BS4 74-3800	-	-	-	-	-	-	-	-

* Polyacrylamide-based gel filtration

**IMAC (immobilized metal affinity chromatography - for purification of histidine tagged proteins and other phospho proteins/peptides)

96-Well SpinColumns™ - Samples from 25 µl to 100 µl



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Advantages:

- Easy to use
- Unrivaled selection of column packing materials
- High sample recovery
- Rapid sample preparation time
- Custom packed columns are available on request

Applications:

- DNA purification
- Protein purification
- Peptide purification
- Small molecule, carbohydrate removal
- Radiolabel removal
- Nick translation
- Affinity separation
- Salt removal
- Buffer exchange

Our 96-well SpinColumn brings speed and simplicity to high-throughput micro-sample preparation. The 96-well SpinColumn is for 25 to 100 µl sample sizes and includes two 96-well collection plates (1.5 ml per well).

The 96-well SpinColumns are available with our complete range of packing materials or can be pre-packed with custom requested materials.

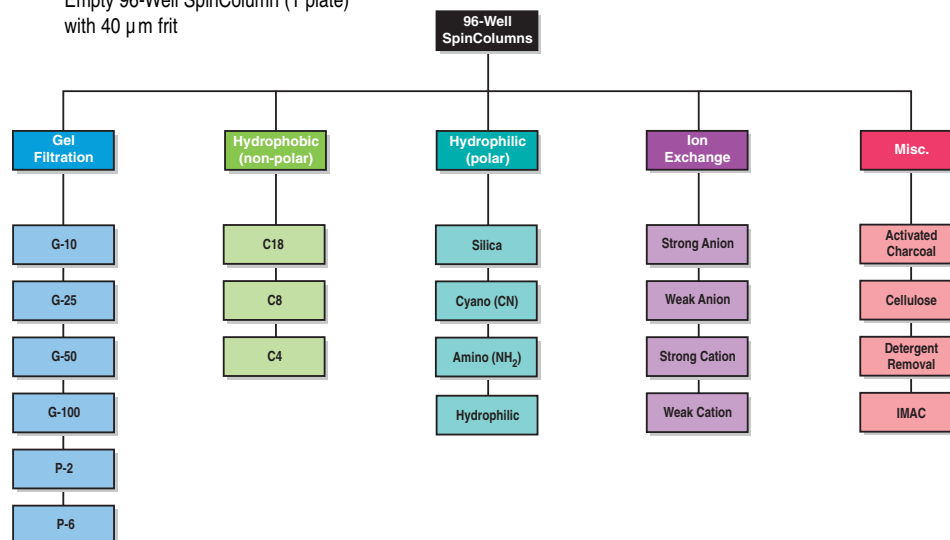
Catalog No.	\$	Product
BS4 74-5502		Empty 96-Well SpinColumn (1 plate) with 5 µm frit
BS4 74-5500		Empty 96-Well SpinColumn (1 plate) with 20 µm frit
BS4 74-5501		Empty 96-Well SpinColumn (1 plate) with 40 µm frit

96-Well SpinColumns: Ordering Information

Packing Material	Gel Filtration (1 plate)	Silica Based (1 plate)	Ion Exchange (1 plate)	Misc. (1 plate)	\$
Gel Filtration					
G-10	BS4 74-5600	-	-	-	
G-25	BS4 74-5601	-	-	-	
G-50	BS4 74-5602	-	-	-	
G-100	BS4 74-5603	-	-	-	
P-2 *	BS4 74-5902	-	-	-	
P-6 *	BS4 74-5903	-	-	-	
Hydrophobic (non-polar)					
C18	-	BS4 74-5701	-	-	
C8	-	BS4 74-5702	-	-	
C4	-	BS4 74-5703	-	-	
Hydrophilic (polar)					
Silica	-	BS4 74-5700	-	-	
Cyano (CN)	-	BS4 74-5704	-	-	
Amino (NH ₂)	-	BS4 74-5705	-	-	
Hydrophilic	-	BS4 74-5905	-	-	
Ion Exchange					
Strong Anion	-	-	BS4 74-5800	-	
Weak Anion	-	-	BS4 74-5801	-	
Strong Cation	-	-	BS4 74-5802	-	
Weak Cation	-	-	BS4 74-5803	-	
Misc.					
Active Charcoal	-	-	-	BS4 74-5900	
Cellulose	-	-	-	BS4 74-5901	
Detergent Removal	-	-	-	BS4 74-5904	
IMAC **	-	-	-	BS4 74-5906	

* Polyacrylamide-based gel filtration

**IMAC (immobilized metal affinity chromatography - for purification of histidine tagged proteins and other phospho proteins/peptides)



Filtration Plates

NEW Membrane-Bottom Filter Plates - Samples from 50 µl to 5 ml



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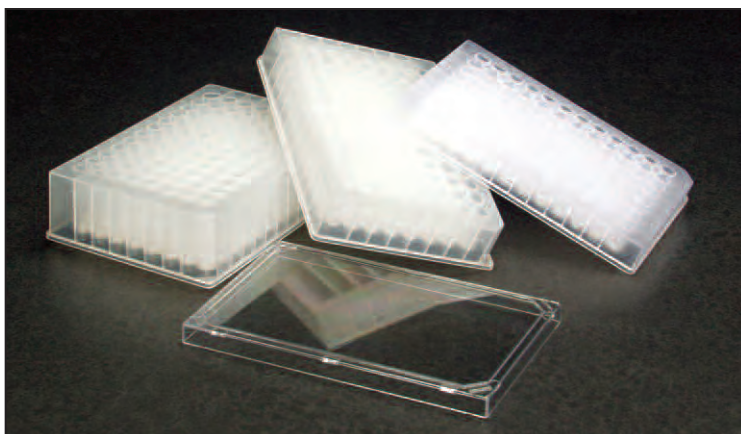
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Advantages:

- High recoveries of both filtrates and particulate retentates
- Multi-well format for simultaneous filtration of 96 or 384 different samples
- Individual filter membranes to avoid cross-talk between adjacent wells
- High well-to-well reproducibility
- Membrane pore sizes of 0.45 – 25 µm (other pore sizes available on request)
- Suitable for vacuum manifold filtration or centrifugal filtration

Harvard Apparatus' new 96-WELL and 384-WELL FILTER PLATES bring speed and high throughput to sample filtration on a microliter to milliliter scale. The membrane-bottom individual sample wells or chambers have separate high-strength single or dual filter membranes to provide rapid filtration rates and to eliminate leakage or cross-talk between adjacent wells.

All Filter Plates feature rigid polypropylene construction for chemical resistance and low binding and meet SBS footprint for use in robotic systems. Standard filter media include: glass fiber, PVDF polypropylene, polyethylene and polyether sulfone. Patent pending sealing process guarantees no well-to-well cross talk and weeping and allows superior recovery performance.

96-Well Ultra-Filtration Plates with 6.24mm well size and 19.35 sq mm filter area are good for size exclusion, to concentrate, purify and desalt proteins, peptides, oligos, DNA and RNA and also to recover proteins, oligos and RNA from polyacrylamide gels. Plates comply with industry standard for automation and are available with 10,000 and 30,000 MWCO membranes.

96-Well 2 ml Filter Plates with 8.23 mm well size come with Polypropylene membrane for organic synthesis and with UHMW Polyethylene membrane good for solid phase extraction.

Distinctively constructed 384-Well Filter Plates have short drip directors, square to round wells for maximum working volumes and variety of filtration media and can also be used robotically as well as for vacuum or centrifuge filtrations.

Application specific Filter Plates and Filtration Devices to the Biopharmaceutical industry can be custom ordered. Other package sizes and bar-coding are available.

Applications:

- Nucleic Acid Binding
- DNA Binding
- DNA/RNA Purification
- Purification of PCR Products
- High-Throughput Preparation of YAC DNA
- High-Throughput Synthesis of Drugs
- Bead/Resin Based Assays
- Cell-Based Receptor Binding Assays
- Size exclusion
- Concentrate, purify and desalt proteins, peptides, oligos, DNA and RNA
- Recover proteins, oligos and RNA from polyacrylamide gels
- Filtration and Filtrate Collection

Catalog No.	\$	Product
Filter Plates		
BS4 74-5551		96-Well, Ultra Filtration, PES membrane, 10K MWCO, pkg. of 5
BS4 74-5552		96-Well, Ultra Filtration, PES membrane, 30K MWCO, pkg. of 5
BS4 74-5553		96-Well, 300 µl, GF 1.2 µm, Short drip, pkg. of 10
BS4 74-5554		96-Well, 300 µl, Hydrophilic PVDF 0.45 µm, Short drip, pkg. of 10
BS4 74-5555		96-Well, 400 µl, Hydrophilic PVDF 0.45 µm, Long drip, pkg. of 5
BS4 74-5556		96-Well, 800 µl, Hydrophilic PVDF 0.45 µm, Long drip, pkg. of 5
BS4 74-5557		96-Well, 2 ml, PP 0.45 µm, Long drip, pkg. of 5
BS4 74-5558		96-Well, 2 ml, UHMW PE 25 µm, Long drip, pkg. of 5
BS4 74-5559		48-Well, 5 ml, PE frit 25 µm, Long drip, pkg. of 5
BS4 74-5560		384-Well, 35 µl, 0.45 µm, Short drip, pkg. of 5

How to use 96-Well or 384-Well Filter Plate

Step 1

Fill the wells of Filter Plate with the samples.

Step 2

Place a Filter Storage/Collection Plate inside the Manifold Filtration unit and then insert the filled Filter Plate.

Step 3

Apply vacuum to collect the filtrates in the Storage Plate wells.

Step 4

Remove the filtrates and/or re-suspend. Recover the retentate from the membranes for further analysis. Or use collected filtrate in appropriate applications.

Filtration Plates

NEW Filter Plate Accessories



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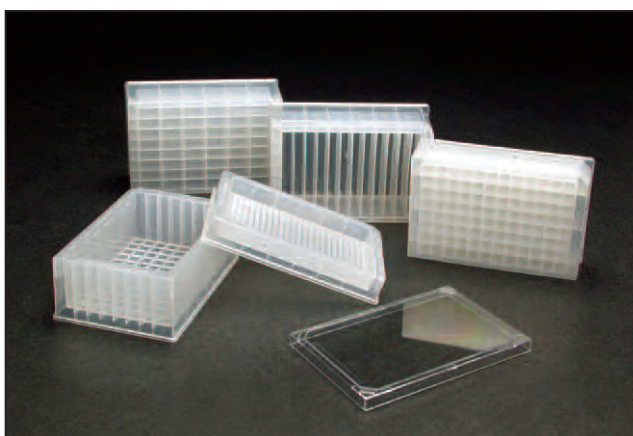
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Reservoirs, Storage Plates and Lid

Reservoirs and Storage/Collection Plates constructed of natural polypropylene are low binding, resistant to heat, chemicals and biological materials and robotic friendly with industry standard dimensions. Pyramid or V-bottom format is for maximum recovery. Plate Seals and Seal Strips for every format are available.

Filtration is generally done in a custom-designed Manifold Filtration System (Catalog # BS4 74-5572) allowing both collection of the filtrates in a Filter Bottom Plate and retention of the particulates on the membrane. Optionally, low-speed centrifugation in microplate baskets may be used instead of vacuum filtration. Both the filtrates and the retentates are recovered at high recoveries and with high well-to-well reproducibility for further analysis.

A complete system includes Filter Plate, Storage/Collection Plate, Lid and Vacuum Manifold.

Catalog No.	\$	Product
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Reservoirs

BS4 74-5561		96 Well, Pyramid Bottom, pkg. of 5
BS4 74-5562		384 Well, Low Profile, Pyramid Bottom, pkg. of 5
BS4 74-5563		12 Partitioned, Pyramid Bottom, pkg. of 5
BS4 74-5564		8 Row, Partitioned, Pyramid Bottom, pkg. of 5

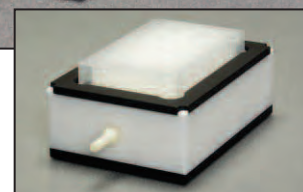
Storage/Collection Plates

BS4 74-5565		96 Well, 1.1 ml, Square Well, "V" Bottom, pkg. of 5
BS4 74-5566		96 Well, 2 ml, Square Well, Pyramid Bottom, pkg. of 5
BS4 74-5567		48 well, 5 ml, Rectangle Well, Pyramid Bottom, pkg. of 5
BS4 74-5568		384 Well, 35 µl, Square Well, Conical Bottom, pkg. of 10

Accessories

BS4 74-5569		Universal Lid, Polystyrene, Clear, pkg. of 10
BS4 74-5570		96 Well, Pierceable Plate Seal for 2 ml Storage Plate, pkg. of 10
BS4 74-5571		96 Well, Solid Plate Seal for 2 ml Storage Plate, pkg. of 10

Note: Other configurations for Plates and accessories are also available upon request.



Advantages:

- Collect into 2 ml storage plates
- Spacer included to collect into SBS standard microplates
- Robot compatible
- Cross talk prevention due to minimal distance between filter plate and collection plate
- Compatible with most filter plates
- Touch free start up

Applications:

- Combinatorial chemistry cleavage
- Final filtration for SPE
- High throughput screening preparation
- Sample preparation
- DNA purification
- Receptor binding assays
- Plasmid lysate cleaning

Manifold Filtration System

Manifold Filtration System fits all standard filter plates, collects into any storage plate and is adaptable for robot handling. The Manifold System is for adjustable vacuum and easy access to filtrate and comes with easy to remove seals.

Specifications

Materials of Construction:

Top and Bottom	Anodized Aluminum
Middle Section	Natural Delrin
Gaskets and O-rings	Viton
Outlet Port	Polypropylene

Dimensions:

L x W x H	158.75 x 117.48 x 60.43 mm
Filtration Gap	1.5 mm

Catalog No.	\$	Product
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BS4 74-5572		Manifold Filtration System, Aluminum + Delrin
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Introduction to DIALYZERS



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Harvard Apparatus DIALYZER Family

REUSABLE DIALYZERS

DIALYZER™

For routine dialysis of volumes from 10 μ l to 5 ml, see page N26.

Fast DIALYZER™

Routine dialysis at higher speeds due to an additional dialysis port, see page N27.

SpinDIALYZER™ and Fast SpinDIALYZER™

These are our DIALYZER and Fast DIALYZER with an internal magnet that allows the entire unit to rotate on a magnetic stirrer for even faster dialysis, see page N28.

ElectroPrep™

The ElectroPrep is an electrophoresis based dialysis system. It can be configured for a number of applications including the elution of biomolecules from gels as well as sample concentration. Flow-Thru ElectroPrep™ (pat) is used with the single or multi Fast DIALYZER system for ultra-fast pumping, see pages N29 to N31.

Flow-Thru Fast DIALYZER™

Used with the ElectroPrep system supporting continuous online sample detection, see page N32.

Flow-Thru DIALYZER™

Larger Membrane for rapid dialysis of volumes up to 10 ml, see page N33.

DISPOSABLE DIALYZERS

Ultra-Micro DispoDIALYZER™

Disposable, single use DIALYZERS for sample sizes from 1 μ l to 5 μ l, see page N34.

Micro DispoDIALYZER™

Disposable, single use DIALYZERS for sample sizes from 5 μ l to 100 μ l, see page N35.

Macro Fast DispoDIALYZER™

Disposable, single use DIALYZERS for sample sizes from 1 ml to 10 ml, see page N36.

96-Well DispoDIALYZER™

Disposable, single use DIALYZERS that utilize a 96-well format for high throughput applications and are for samples sizes from 25 μ l to 300 μ l, see page N37.

EQUILIBRIUM DIALYZERS

Multi-Equilibrium DIALYZER™ - Reusable

For simultaneous and highly reproducible equilibrium dialysis of up to 20 samples with volumes up to 5 ml, see page N39.

Micro-Equilibrium DIALYZER™ - Reusable

The Micro-Equilibrium DIALYZER is available as 2- or 3-chamber systems. It is used to study interactions between biomolecules such as the binding of a ligand to a protein, see page N40.

Fast Micro-Equilibrium DIALYZER - Reusable

A reusable Micro-Equilibrium DIALYZER suitable for 25 μ l samples for quicker equilibration times using membranes with larger surface areas, see page N41.

DispoEquilibrium DIALYZER™ - Single Use

A disposable version of the Micro-Equilibrium DIALYZER suitable for samples up to 75 μ l, see page N41.

96-Well Equilibrium DIALYZER™ - Single Use

A 96-well disposable equilibrium DIALYZER for high throughput interaction studies. Suitable for samples up to 200 μ l, see page N42.

Dialysis is a physical separation method in which small molecules pass through the pores of a selective membrane while larger molecules are retained in the dialysis chamber. Our DIALYZER portfolio is a unique family of products for the dialysis of small sample volumes of proteins, peptides, nucleic acids, and other biomolecules. The system is suited for sample volumes from 10 μ l to 10 ml or higher. The DIALYZER family consists of over 50 different components that can be joined together to create hundreds of combinations for various applications.

Advantages:

- Easy to use
- Leak-proof
- Low protein binding
- High sample recovery
- Rapid dialysis/purification

Applications:

- Exchange of buffers
- Equilibrium dialysis
- Protein binding assays
- Removal of detergents
- Concentration of samples
- Sample prep for HPLC, HPCE
- Electro-concentration
- Immunoblotting
- Purification of proteins, DNA/RNA
- Electrophoresis, electro-elution, electro-dialysis
- Removal of excess radiolabel or PCR-primers
- GC, GC-MS, NMR
- Elution of proteins and nucleic acids from gels
- Removal of CsCl, agarose, pyridoxal-5-phosphate
- Removal of silicates after chromatography
- Complex carbohydrate purification
- On-Line concentration, on-line dialysis, dynamic dialysis
- Serum protein binding
- Protein, receptor, and ligand binding assays
- Protein-drug binding assays
- Protein-protein interactions
- Protein-DNA interactions

DIALYZER™ (Reusable)



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Advantages:

- Easy to use
- Reusable
- Autoclaveable
- Available for wide range of sample sizes - 10 μ l to 5 ml
- High sample recovery
- Rapid dialysis/purification
- Made of Teflon - totally inert
- Low protein binding
- Membranes available with MWCO's to suit almost any application
- Leak-proof

Applications:

- Purification of biomolecules
- Exchange of buffers
- Removal of detergents
- Sample concentration
- HPLC, HPCE
- Removal of excess radiolabel
- Post-PCR clean-up
- GC, GC-MS, NMR

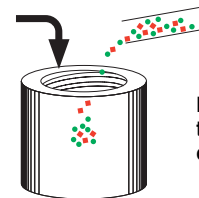
The DIALYZER is a simple single-sided device for dialysis of biological samples. A broad range of DIALYZER sizes are available to accommodate sample volumes ranging from as little as 10 μ l up to 5 ml. Pre-cut dialysis membranes are available for the DIALYZER with Molecular Weight Cut-Off ranges from 100 to 300,000 Daltons. The entire unit is constructed of Teflon, a virtually unreactive material, which will not interfere with your valuable samples. Once assembled a Teflon-Teflon seal ensures that the DIALYZER is 100% leak-proof. The DIALYZER is ideal for the simple dialysis of salts, for the exchange of buffers, and for the concentration of samples. Includes chamber with cap.

DIALYZERS: Ordering Information

Chamber Volume (μ l)	Qty. of 1	\$	Qty. of 5	\$
10	BS4 74-0210		BS4 74-0200	
20	BS4 74-0211		BS4 74-0201	
50	BS4 74-0212		BS4 74-0202	
100	BS4 74-0213		BS4 74-0203	
200	BS4 74-0214		BS4 74-0204	
500	BS4 74-0215		BS4 74-0205	
1000	BS4 74-0216		BS4 74-0206	
1500	BS4 74-0217		BS4 74-0207	
3000	BS4 74-0218		BS4 74-0208	
5000	BS4 74-0219		BS4 74-0209	

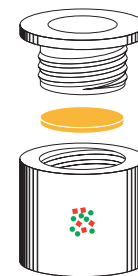
How to Use: DIALYZERS™

Step 1



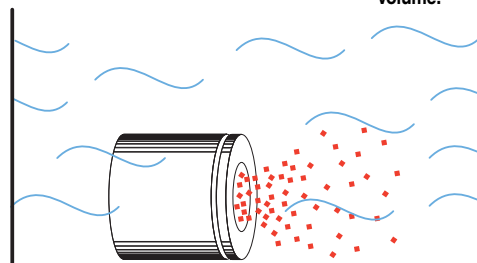
Place the sample in the sample chamber of the DIALYZER

Step 2



Choose a suitable membrane and clamp into place with the DIALYZER cap

Step 3



Place the entire unit into a large beaker of dialysis buffer. Dialysis time is 3 hours to overnight depending upon sample and buffer chemistry, temperature and volume.

Key

- Desired Component
- Contaminants
- Dialysis Buffer
- Membrane

For Membrane ordering information, see page N44.

The membrane ordering information is color coded to assist you in selecting the appropriate membrane:

Pink shaded membranes are for products with sample sizes up to 200 μ l

Purple shaded membranes are for products with sample sizes ranging from 250 μ l to 1,500 μ l

Green shaded membranes are for products with sample sizes ranging from 3,000 μ l to 5,000 μ l

Fast DIALYZER™ (Reusable)



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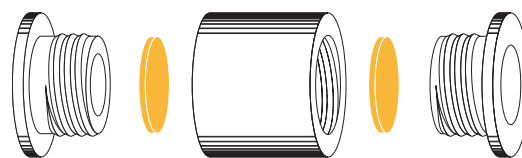
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The Fast DIALYZER boasts all the features of the original DIALYZER plus an additional dialysis port. The Fast double-sided DIALYZER thus has two dialysis membranes, one on either side of the sample chamber. The increased membrane surface area results in greater sample exposure and an enhanced rate of dialysis. The Fast DIALYZER includes chamber and two caps.

The Fast DIALYZER is also suited for a wide spectrum of additional applications including:

- Electro-Elution
- Elution of Proteins and Nucleic Acids from Gels
- Electro-Concentration
- Electro-Dialysis, see page N29

Advantages:

- Twice as quick
- Reusable
- Available for most sample sizes - large or small
- Membranes available with MWCO's to suit almost any application
- Easy to use
- Leak-proof
- Autoclaveable
- Low protein binding
- High sample recovery
- Rapid dialysis/purification
- Made of Teflon - totally inert

Applications:

- Exchange of buffers
- Removal of detergents
- Concentration of samples
- HPLC, HPCE
- Immunoblotting*
- Purification of proteins, DNA and RNA
- Removal of excess radiolabel
- Post-PCR clean-up
- GC, GC-MS, NMR
- Removal of CsCl, agarose, pyridoxal-5-phosphate*
- Removal of silicates after chromatography*
- Complex carbohydrate purification*
- Equilibrium dialysis
- Protein binding assays

* When used in conjunction with the Harvard Apparatus ElectroPrep system.

Fast DIALYZERS: Ordering Information				
Chamber Volume (µl)	Qty. of 1	\$	Qty. of 5	\$
50	BS4 74-0408		BS4 74-0400	
100	BS4 74-0409		BS4 74-0401	
200	BS4 74-0410		BS4 74-0402	
500	BS4 74-0411		BS4 74-0403	
1000	BS4 74-0412		BS4 74-0404	
1500	BS4 74-0413		BS4 74-0405	
3000	BS4 74-0414		BS4 74-0406	
5000	BS4 74-0415		BS4 74-0407	

The membrane ordering information is color coded to assist you in selecting the appropriate membrane:

Pink shaded membranes are for products with sample sizes up to 200 µl

Purple shaded membranes are for products with sample sizes ranging from 250 µl to 1,500 µl

Green shaded membranes are for products with sample sizes ranging from 3,000 µl to 5,000 µl

For Membrane ordering information, see page N44.

SpinDIALYZER™ and Fast SpinDIALYZER™ (Reusable)



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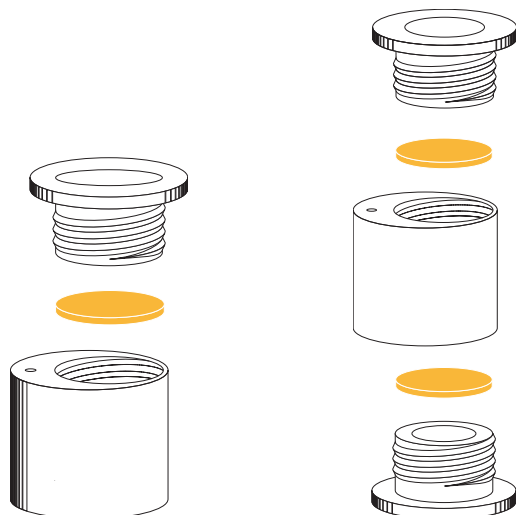


SpinDIALYZER™

The SpinDIALYZER is our high-quality DIALYZER with a magnetic feature incorporated internally and does not require an external stir bar. This enables the entire SpinDIALYZER unit to be rotated during dialysis using a magnetic stir plate (Catalog No. BS4 72-1975). The constant motion of the sample results in dialysis times that are 50 to 100% faster than with the Dialyzer. SpinDIALYZER includes chamber plus cap.

Fast SpinDIALYZER™

The Fast SpinDIALYZER is our high-quality Fast DIALYZER with a magnetic feature incorporated internally. This enables the entire Fast SpinDIALYZER unit to be rotated during dialysis using a magnetic stir plate (Catalog No. BS4 72-1975). The constant motion of the sample results in dialysis times that are 50 to 100% faster than with the Fast DIALYZER. As with the Fast DIALYZER, the Fast SpinDIALYZER has two dialysis ports and includes chamber plus two caps.



Advantages:

- Faster dialysis times due to an internal magnet
- Reusable
- Available for most sample sizes- large or small
- Membranes available with MWCO's to suit almost any application
- Easy to use
- Leak-proof
- Autoclaveable
- Low protein binding
- High sample recovery
- Rapid dialysis/purification
- Made of Teflon - totally inert

Applications:

- Exchange of buffers
- Removal of detergents
- Concentration of samples
- HPLC, HPCE
- Immunoblotting*
- Purification of proteins, DNA and RNA
- Removal of excess radiolabel
- GC, GC-MS, NMR
- Removal of CsCl, agarose, pyridoxal-5-phosphate*
- Removal of silicates after Chromatography*
- Complex carbohydrate purification*

*When used in conjunction with the Harvard Apparatus ElectroPrep system.

SpinDIALYZERS and Fast SpinDIALYZERS: Ordering Information

Chamber Volume (µl)	SpinDIALYZER Qty. of 1	SpinDIALYZER Qty. of 5	Fast SpinDIALYZER Qty. of 1	Fast SpinDIALYZER Qty. of 5
10 \$	BS4 74-0308	BS4 74-0300	—	—
20 \$	BS4 74-0309	BS4 74-0301	—	—
50 \$	BS4 74-0310	BS4 74-0302	BS4 74-0506	BS4 74-0500
100 \$	BS4 74-0311	BS4 74-0303	BS4 74-0507	BS4 74-0501
200 \$	BS4 74-0312	BS4 74-0304	BS4 74-0508	BS4 74-0502
500 \$	BS4 74-0313	BS4 74-0305	BS4 74-0509	BS4 74-0503
1000 \$	BS4 74-0314	BS4 74-0306	BS4 74-0510	BS4 74-0504
1500 \$	BS4 74-0315	BS4 74-0307	BS4 74-0511	BS4 74-0505

The membrane ordering information on page N44 is color coded to assist you in selecting the appropriate membrane:

Pink shaded membranes are for products with sample sizes up to 200 µl

Purple shaded membranes are for products with sample sizes ranging from 250 µl to 1,500 µl

Green shaded membranes are for products with sample sizes ranging from 3,000 µl to 5,000 µl