



# Chromatography: Laboratory and Process Separations

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51 (media), 70 (columns), 94 (systems), 110 (process-scale)	

# Chromatography Overview

## A Range of Options

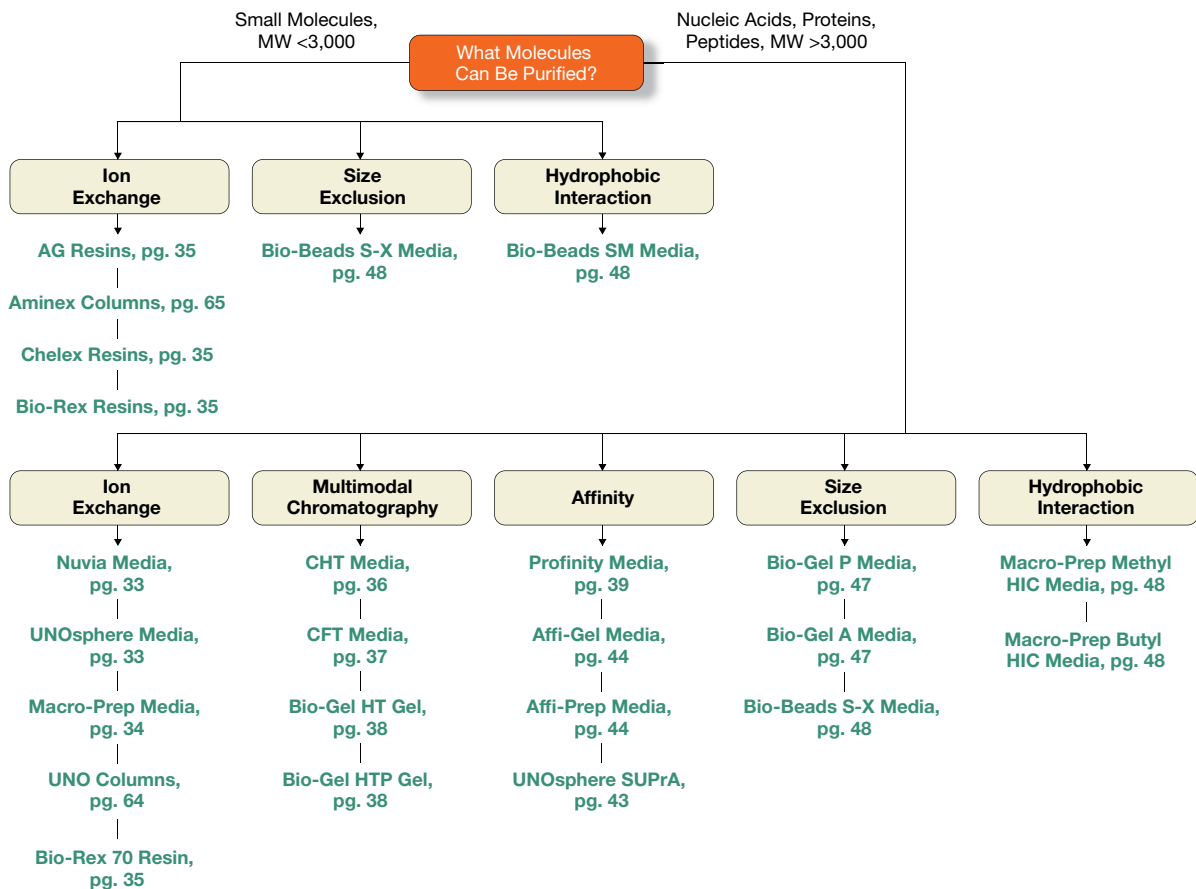
Bio-Rad offers a wide selection of chromatography tools for the life scientist involved in analytical, preparative, or process chromatography. During our 50 year history, we have become known as a quality provider of chromatography media for reagent cleanup and biomolecule purification. We also manufacture flexible and intuitive instrumentation and software, as well as convenient, easy-to-use prepacked and empty columns for sample separations.

Throughput, capacity, selectivity, resolution, and process economics are among the considerations when selecting any chromatography media, column, or instrument. We offer products for each phase of purification — capture, intermediate, or polishing — and manufacture media for any scale, from nanograms to kilograms.

Bio-Rad offers a wide range of lab and process chromatography media for ion exchange, hydroxyapatite, affinity, size exclusion, and hydrophobic interaction chromatography as well as chromatography standards and prepacked and empty chromatography columns. For convenient sample preparation products, see pages 2–12. Bio-Rad’s process chromatography media are used worldwide to manufacture registered biotherapeutics and diagnostics. All of Bio-Rad’s chromatography media are manufactured in an ISO 9001 registered manufacturing facility. The manufacturing processes are audited and registered by National Quality Assurance Limited against the provisions of ANSI/ISO/ASQ 9001:2000.

## Development, Application, and Validation Support

Bio-Rad provides development and application support for large-scale separations. We also offer regulatory assistance and regulatory support files to help validate the chromatography media used in your processes. These files contain information essential to validation, including general product information, specification test procedures, identification tests, and biological safety data. Contact your local Bio-Rad sales representative or office for details.



# Chromatography Media

Bio-Rad offers a selection of media for separation by ion exchange, hydroxyapatite and fluoroapatite, affinity, size exclusion (gel filtration), and hydrophobic interaction chromatography.

## Chromatography Media Selection Guide

Media	Packaging Format*	Suitability**			Application	Page
		Analytical Scale	Pilot/ Preparative Scale	Process Scale		
<b>Anion Exchange</b>						
AG® 1	B, GC	++++	+++	+++	Strong exchanger. Separation of low MW peptides, nucleotides, inorganic ions using different cross-linkages; high selectivity for anions such as chloride; gravity or low-pressure use	35
AG MP-1M	B, GC	++++	++	+	Strong exchanger. Macroporous, equivalent to AG 1 for MW >1,000,000; gravity or low-pressure use	35
Bio-Rex® 5 and AG 4-X4	B, GC	++++	++		Weak exchanger. Used to remove organic acids from sugars; adsorption of mineral acids; gravity or low-pressure use	35
UNO® Q	MPC	++++			Strong exchanger. High-resolution biomolecule separation at high flow rates; pH stability 2–12	64
Macro-Prep® High Q	B, C	+++	++++	+++	Strong exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	34
Macro-Prep 25 Q	B	++++	++++	+	Strong exchanger. Similar to Macro-Prep High Q but 25 µm particle size allows higher-resolution separation; unique surface chemistry allows contaminant removal; pH stability 1–10	34
Macro-Prep DEAE	B, C	+++	++++	+++	Weak exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	34
UNOsphere™ Q	B, C	++++	++++	++++	Strong exchanger. High-productivity, high-capacity biomolecule separation; pH stability 1–14	33
Aminex®	HPLC	++++			High-pressure separation of carbohydrates, sugars, and small organic molecules; delivers industry-standard performance (U.S. Pharmacopeia)	65
Nuvia™ Q	B, C	++++	++++	++++	Strong exchanger. Similar to UNOsphere Q but surface modification allows extremely high-capacity biomolecule separation; pH stability 1–14	33
<b>Cation Exchange</b>						
AG 50W	B, GC	++++	+++	+++	Strong exchanger. Lower cross-linkages useful for peptide and nucleotide separation; higher cross-linkages useful for small peptide and metals separation and removal of cations; gravity or low-pressure use	35
AG MP-50	B, GC	++++	++	+	Strong exchanger. Macroporous equivalent to AG 50W for MW >1,000,000; gravity or low-pressure use	35
Bio-Rex 70	B	++++	++	++	Weak exchanger. High capacity for high MW (>1,000,000) solutes; can be used for purification and fractionation of peptides, proteins, enzymes, and other cationic molecules. Amendable to large-scale purification	35
Chelex® 100	B, GC	++++	+++	+++	Weak exchanger. Chelating resin removes metals and is suitable for PCR applications; can also be used for ultrapurification of buffers and ionic reagents; gravity or low-pressure use. Available in molecular biology and biotechnology grades	35
UNO S	MPC	++++			Strong exchanger. High-resolution biomolecule separation at high flow rates; pH stability 2–12	64
Macro-Prep 25 S	B	++++	++++	+	Strong exchanger. Similar to Macro-Prep High S, but 25 µm particle size allows higher-resolution separation; unique surface chemistry allows contaminant removal; pH stability 1–10	34
Macro-Prep High S	B, C	+++	++++	+++	Strong exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	34
Macro-Prep CM	B	+++	++++	+++	Weak exchanger. High-capacity biomolecule separation; unique surface chemistry allows contaminant removal; pH stability 1–10	34
UNOsphere S	B, C	++++	++++	++++	Strong exchanger. High-capacity biomolecule separation; pH stability 1–14	33
UNOsphere Rapid S	B, C	++++	++++	++++	Strong exchanger. Similar to UNOsphere S but with enhanced chemistries to overcome the pH shift that occurs with conductivity transitions and faster equilibration times; pH stability 1–14	33
Nuvia S	B, C	++++	++++	++++	Strong exchanger. Similar to UNOsphere S but surface modification allows extremely high-capacity biomolecule separation; pH stability 1–14	33

\* B, bottle; C, cartridge (1 ml or 5 ml); GC, gravity column; SC, spin column; HPLC, high-pressure column; MPC, medium-pressure column.

\*\* +, low suitability; ++, moderate suitability; +++, suitable; +++++, high suitability.

continues

## Chromatography Media Selection Guide (cont.)

Media	Packaging Format*	Suitability**			Application	Page
		Analytical Scale	Pilot/Preparative Scale	Process Scale		
<b>Specialty Ion Exchange</b>						
AG 11 A8	B	++++	++	++	Ion retardation — contains cation and anion exchange sites that weakly interact with mobile ions; can be used for desalting of nonionic molecules with water elution; such as, removal of SDS from protein and adsorption of mineral acids	35
AG 501-X8	B	++++	+++	+++	Mixed bed, consists of equivalent amounts of AG 1-X8 and AG 50W-X8. May be used to deionize impure water, urea, formamide, and acrylamide to provide extremely pure reagents	35
Bio-Rex MSZ 501	B	++++	++	++	Mixed bed, consists of equivalent amounts of Bio-Rex MSZ 1 and Bio-Rex MSZ 50 media. Monosized ion exchange; desalting of water and nonelectrolytes. Ideal for large-scale industrial applications	35
<b>Size Exclusion (Gel Filtration)</b>						
Bio-Gel® P	B, C, SC, GC	++++	++++		Separation of molecules by size; desalting and buffer exchange; several particle size ranges available with MW exclusion limits ranging from 100 to 100,000 D; pH stability 2–10	47
Bio-Beads™ S-X	B	++++	++++	++	Fractionation of low MW organic polymers and other hydrophobic substances in nonpolar solvents from 400–14,000 D	48
<b>Affinity</b>						
UNOsphere SUPRA™	B, C	++++	++++	++++	Antibody purification; Fc-fusion purification from large volumes of feed/cell culture; development and commercial-scale mAb purification process applications	43
Affi-Gel® protein A	B, C, GC	++++	++++		IgG purification from ascites, serum, and culture fluid; low-pressure media	44
Affi-Prep® protein A	B, C	++++	++++	++	IgG purification from ascites, serum, and culture fluid; pressure-stable media	44
Affi-Gel Blue	B, C, SC	++++	++++		Albumin removal and enzyme purification; Cibacron Blue F3GA dye covalently attached; purification of proteins with dinucleotide fold	44
DEAE Affi-Gel Blue	B, C, GC	++++	++++		Albumin and protease removal for IgG purification; Cibacron Blue F3GA dye covalently attached to DEAE Bio-Gel A	44
CM Affi-Gel Blue	B	++++	++++		Albumin and protease removal for IgG purification; Cibacron Blue F3GA dye covalently attached to CM Bio-Gel A	45
Affi-Gel heparin	B	++++	++++		Purification of coagulation factors, plasma proteins and enzymes including nucleases, lipases, and proteases; binding specific to a variety of enzymes and other proteins	45
Profinity™ IMAC	B, C	++++	++++	++	His-tagged protein purification	39
Profinity GST	C	++++	++++	++	GST-tagged protein purification	39
Profinity eXact™	B, C, SC	++++	++++	++	One-step affinity tag purification and on-column cleavage	40
Affi-Prep polymyxin	B	++++	++++	++++	Removal of endotoxins; pressure-stable media capable of sanitization procedures with NaOH	45
Affi-Gel boronate	B	++++	++		Affinity for low MW molecules containing <i>cis</i> hydroxyl ( <i>cis</i> -diol) groups; separation of AMP from cyclic AMP	45
Profinity epoxide	B	++++	++++	++++	Affinity coupling; coupling of nucleophiles such as hydroxy (–OH), amino (–NH <sub>2</sub> ), or thiol (–SH) groups; based on UNOsphere base matrix for superb pressure flow characteristics	46
Affi-Gel 10	B	++++	++++		Affinity coupling; immobilization of ligands with –NH <sub>2</sub> groups, coupling of proteins with pI 6.5–11; low-pressure media	46
Affi-Gel 15	B	++++	++++		Affinity coupling; immobilization of ligands with –NH <sub>2</sub> groups, coupling of proteins with pI < 6.5; low-pressure media	46
Affi-Gel Hz	B	++++	++++		Affinity coupling; immobilization of IgG molecules via their Fc region	46
Affi-Gel 102	B	++++	++++		Affinity coupling of ligands with –COOH groups via EDAC coupling chemistry	46
<b>Hydroxyapatite and Fluoroapatite</b>						
CHT™ Type I	B, C, MPC	++++	++++	++++	Antibody purification (higher capacity than Type II); virus purification/removal; DNA purification/removal; aggregate and endotoxin removal; Fab purification	36
CHT Type II	B, C	++++	++++	++++	Antibody purification; removal of albumin from feedstream; Fab purification	36
CFT™ Type II	B, C	++++	++++	++++	Similar properties to CHT but exhibits greater stability in the lower pH range (5.5); suitable for Fab purification	37
Bio-Gel HT	B	++++	+++		Purification of proteins, nucleic acids, and other biomolecules; crystalline hydroxyapatite not as mechanically stable as CHT (ceramic hydroxyapatite)	38
Bio-Gel HTP	B	++++	+++		Similar to Bio-Gel HT but in powder form	38
DNA grade Bio-Gel HTP	B	++++	+++		Similar to Bio-Gel HTP with smaller particle size; selectivity for dsDNA; separation of ss- and dsDNA	38
<b>Hydrophobic Interaction</b>						
Macro-Prep Methyl	B	++++	++++	++	Separation of proteins based on relative hydrophobicity; pH stability 1–10	48
Macro-Prep t-butyl	B	++++	++++	++	Separation of proteins based on relative hydrophobicity; pH stability 1–10	48

\* B, bottle; C, cartridge (1 ml or 5 ml); GC, gravity column; SC, spin column; HPLC, high-pressure column; MPC, medium-pressure column.

\*\* +, low suitability; ++, moderate suitability; +++, suitable; +++++, high suitability.

## Ion Exchange

### UNOsphere™ and Nuvia™ Ion Exchange Media

Order Info: Pg 51

Bio-Rad's ion exchange media are scalable and fast. They are designed to meet the needs of the biopharmaceutical industry for capture, intermediate, and polishing stages of purification. UNOsphere and Nuvia media are bioprocess compatible and may also be used at laboratory scales for high-performance applications. Benefits include:

- Efficient capture from crude feedstreams
- Optimization to operate under 2 bar at 1,200 cm/hr
- Large pore design results in ultrahigh binding capacities at fast linear velocities
- Fully supported for regulatory information

#### UNOsphere Q, S, and Rapid S Media

UNOsphere Q and S media are strong anion and cation exchange resins respectively, and may be used at any stage of the purification process. The Rapid S media have enhanced chemistries that overcome the pH shifts that occur with conductivity transitions.

#### For More Information

Web: [www.bio-rad.com/unosphere](http://www.bio-rad.com/unosphere)

Request or download bulletins: UNOsphere Q media — 2724 and 2729; UNOsphere S media — 2669 and 2678

#### Nuvia Ion Exchange Media

Nuvia ion exchange media is an ultra high-capacity, next-generation ion exchange media built on an industry-proven proprietary base matrix technology. Nuvia media provides very high capture and exceptional flow properties designed to meet current and future process needs. Nuvia media is a flexible alternative that may be used as a capture and polishing solution.

- Use less media to purify a given amount of product
- Reduce cycle time and increase productivity by operating at higher flow rates
- Reduce costs and space requirements by decreasing buffer consumption
- Reduce capital and operating expenses by using smaller columns
- Chemical stability for repetitive clean-in-place cycles
- Flexibility in use for capture or polish steps
- Fully supported for regulatory submission

#### For More Information

Web: [www.bio-rad.com/nuvia](http://www.bio-rad.com/nuvia)

Request or download bulletins: 5984, 5987, 6129, and 6128

#### See Also

Chromatography systems: pages 76–101.  
Prepacked columns: pages 61–65.  
AEX and CEX standards: page 50.  
Sample preparation products: pages 2–12.

#### Specifications

	UNOsphere Q	UNOsphere S	UNOsphere Rapid S	Nuvia Q	Nuvia S
Type of ion exchanger	Strong anion	Strong cation	Strong cation	Strong anion	Strong cation
Functional group	$-\text{N}^+(\text{CH}_3)_3$	$-\text{SO}_3^-$	$\text{SO}_3^-$	$-\text{N}(\text{CH}_3)_3^+$	$-\text{SO}_3^-$
Total ionic capacity	75–163 $\mu\text{eq/ml}$	219–315 $\mu\text{eq/ml}$	110–170 $\mu\text{eq/ml}$	100–170 $\mu\text{eq/ml}$	90–150 $\mu\text{eq/ml}$
Median particle size	120 $\pm$ 15 $\mu\text{m}$	80 $\pm$ 10 $\mu\text{m}$	100 $\pm$ 10 $\mu\text{m}$	85 $\pm$ 15 $\mu\text{m}$	85 $\pm$ 15 $\mu\text{m}$
Dynamic binding capacity*					
At 150 cm/hr	180 mg BSA/ml	60 mg IgG/ml	60 mg IgG/ml	—	—
At 300 cm/hr	—	—	—	>170 mg/ml	>110 mg/ml
At 600 cm/hr	125 mg BSA/ml	30 mg IgG/ml	30 mg IgG/ml	—	—
Recommended linear flow rate range	50–1,200 cm/hr	50–1,200 cm/hr	50–1,200 cm/hr	50–600 cm/hr	50–600 cm/hr
pH stability (accelerated, 60° C)	1–14	1–14	1–14	2–14 short term 4–12 long term	2–14 short term 4–13 long term
Sanitation	0.5–1.0 M NaOH	0.5–1.0 M NaOH	0.5–1.0 M NaOH	0.5–1.0 M NaOH	0.5–1.0 M NaOH

\* 10% breakthrough capacity determined with a 5.0 mg/ml human IgG and 5.0 mg/ml BSA in a 1.1 x 20 cm column.

#### See Also

Media sampler packs: page 49.  
Bio-Scale Mini cartridges: page 62.

### See Also

Bio-Scale Mini, UNOsphere Q and S, Macro-Prep High Q and S, affinity, P-6 cartridges: page 62.

### Macro-Prep® Ion Exchange Media

Order Info: Pg 51

Macro-Prep ion exchange media are designed to provide high resolution and high capacity for preparative separations. The rigid methacrylate beads exhibit little shrinkage and swelling, making them suitable for both low- and medium-pressure chromatography. The macroporous media allow both small and large molecules to access exchange sites located throughout the chromatography bed. The physical structure of the media permits high flow rates at low backpressure. Depending on the media, pH conditions, and samples, the media can act in mixed mode.



Macro-Prep Media

Bio-Scale™ Mini Macro-Prep® Cartridges

Benefits include:

- High capacity for biomolecules
- High resolution of complex biological mixtures
- Rigid methacrylate polymer matrix that allows high flow rates at modest pressures

#### Macro-Prep High Q, DEAE, High S, and CM Media

For maximum flexibility, the product offering includes Macro-Prep High Q strong anion exchange media, Macro-Prep DEAE weak anion exchange media, Macro-Prep High S strong cation exchange media, and Macro-Prep CM weak cation exchange media.

#### For More Information

Web: [www.bio-rad.com/macroprep](http://www.bio-rad.com/macroprep)

Request or download bulletins: Macro-Prep High Q, DEAE, High S, and CM media — 1840; Macro-Prep DEAE media — 1942; High S and High Q media — 5643 and 5644

#### Macro-Prep 25 S and Q Media

Macro-Prep 25 S strong cation exchange media and Macro-Prep 25 Q strong anion exchange media offer high-resolution separations at high flow rates with medium pressures. Both media possess the same rigid, macroporous, and hydrophilic properties of 50 µm Macro-Prep High Q and High S media, but in a 25 µm bead that offers higher resolution.

#### For More Information

Web: [www.bio-rad.com/macroprepSandQ](http://www.bio-rad.com/macroprepSandQ)

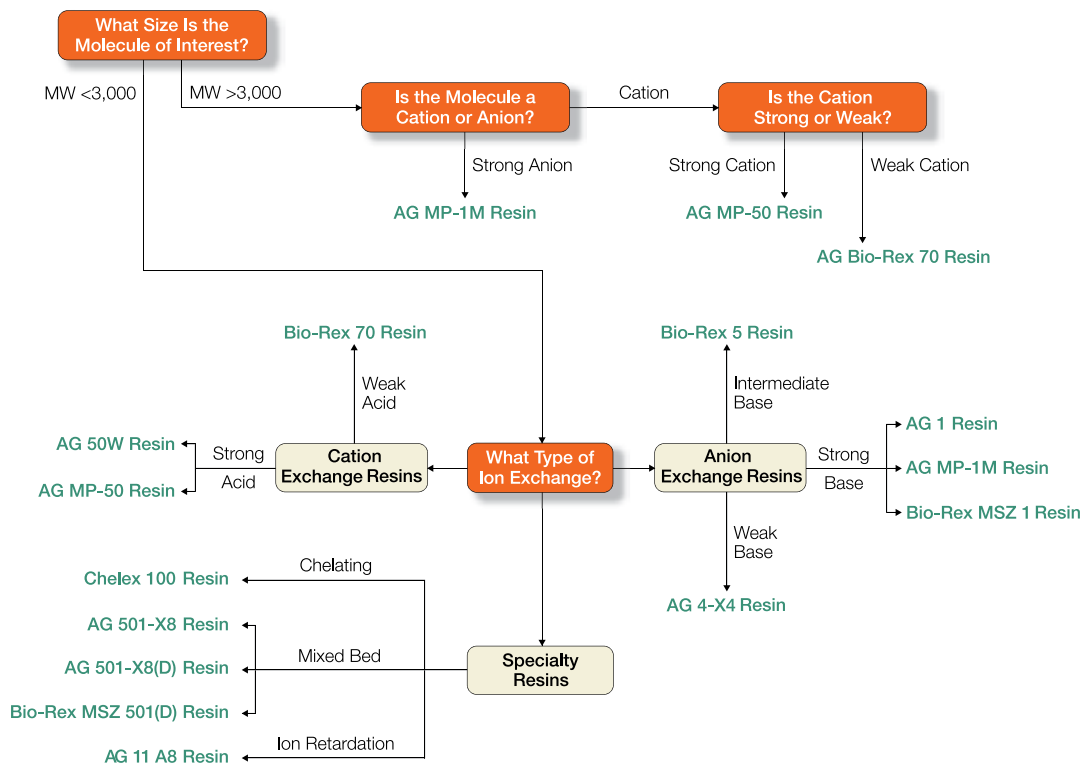
Request or download bulletin: 2292

#### Specifications

Property	High Q	DEAE	High S	CM	25 Q*	25 S
Type of media	Strong anion	Weak anion	Strong cation	Weak cation	Strong anion	Strong cation
Functional ligand	-N <sup>+</sup> (CH <sub>3</sub> ) <sub>3</sub>	-N <sup>+</sup> (C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub>	-SO <sub>3</sub> <sup>-</sup>	-COO <sup>-</sup>	-N <sup>+</sup> (CH <sub>3</sub> ) <sub>3</sub>	-SO <sub>3</sub> <sup>-</sup>
Ionic capacity	400 ± 75 µeq/ml	175 ± 75 µeq/ml	160 ± 40 µeq/ml	210 ± 40 µeq/ml	220 ± 40 µeq/ml	110 ± 30 µeq/ml
Typical binding capacity	40 mg BSA/ml	35 mg BSA/ml	70 mg IgG/ml	35 mg hemoglobin/ml	>30 mg/ml BSA	>40 mg/ml BSA
Counter ion	Cl <sup>-</sup>	Cl <sup>-</sup>	Na <sup>+</sup>	Na <sup>+</sup>	Cl <sup>-</sup>	Na <sup>+</sup>
Nominal particle size	50 µm	50 µm	50 µm	50 µm	25 µm	25 µm
Nominal pore size	1,000 Å	1,000 Å	1,000 Å	1,000 Å	725 Å	725 Å
Recommended linear flow rate range	—	—	—	—	50–300 cm/hr	50–300 cm/hr
Maximum recommended linear flow rate	3,000 cm/hr	3,000 cm/hr	3,000 cm/hr	3,000 cm/hr	3,000 cm/hr	3,000 cm/hr
Chemical stability						
1% SDS, 24 hr	•	•	•	•	•	•
6 M guanidine-HCl, 24 hr	•	•	•	•	•	•
Volume changes						
pH 4–10	<1%	<1%	<3%	<1%	<1%	<1%
0.1–1.0 M NaCl	<5%	<5%	<9%	<4%	<5%	<5%
Autoclavability (121°C, 80 min)	•	•	•	•	•	•
pH stability	1–10	1–10	1–10	1–10	1–10	1–10
Storage conditions	20% ethanol	20% ethanol	20% ethanol	20% ethanol	20% ethanol	20% ethanol

\* Do not autoclave the OH<sup>-</sup> form.

## Analytical Grade Ion Exchange Resins



### AG®, Bio-Rex®, and Chelex® Resins

Order Info: Pg 52

**AG (analytical grade) resins** — AG resins are primarily used for the separation of low MW compounds such as inorganic ions, organic acids, nucleic acids, or carbohydrates. They are available as both strong and weak cation and anion exchangers and as mixed-bed ion exchangers. Many are available in several ionic forms and can be converted from one form to another.

**Bio-Rex resin** — These resins are available as weak anion and cation exchangers, and as monosized mixed-bed ion exchangers. Bio-Rex 70 resins are

macroreticular resins with a high capacity for high molecular weight compounds, used for the purification and fractionation of proteins and peptides.

**Chelex resin** — These resins contain paired iminodiacetate ions coupled to a styrene divinylbenzene support. They are unique chelating resins that bind polyvalent cations with high selectivity and are used to remove metal ions from samples and buffers.

#### Analytical Grade Resin Wet Mesh and Equivalent Diameters

Wet mesh (U.S. standard)	16	20	40	50	80	100	140	200	270	325	400
Diameter, µm	1,180	850	425	300	180	150	106	75	53	45	38

For More Information  
Web: [www.bio-rad.com/agresins](http://www.bio-rad.com/agresins)

### Molecular Biology and Biotechnology Grade Resins

Order Info: Pg 53

Molecular biology grade resins, chemically identical to the equivalent analytical grade resins, are certified to be free of endo- and exonuclease activities and ligase inhibitors.

- **AG® 50W-X8 strong cation exchanger** — particularly useful for the removal of ethidium bromide and propidium iodide from DNA samples
- **AG 501-X8 mixed-bed resins** — useful for deionization of water and nonelectrolyte solutions

- **Chelex® 100 molecular biology grade resins** — offered in 200–400 mesh range for easy transfer after resuspension. Packaged in 50 g quantities for the small-scale reagent user and accompanied by a certificate of analysis
- **Biotechnology grade resins** — have undergone special processing and contain fewer than 100 microorganisms/gram

**For More Information**

Web: [www.bio-rad.com/agresins](http://www.bio-rad.com/agresins)

### Technical and Reactor Grade Resins

Order Info: Pg 54

Bio-Rad offers reactor grade Bio-Rex® RG 501 X-8 resins for power plant deionization systems and large-scale cleanup of metals from waste water.

**For More Information**

Web: [www.bio-rad.com/agresins](http://www.bio-rad.com/agresins)

## Multimodal Media

Hydroxyapatite,  $(\text{Ca}_5(\text{PO}_4)_3\text{OH})_2$ , and fluoroapatite,  $\text{Ca}_{10}(\text{PO}_4)_6\text{F}_2$ , are forms of calcium phosphate, which offer unique selectivities and often separate biomolecules that appear homogeneous using other chromatographic and electrophoretic techniques. Hydroxyapatite and fluoroapatite chromatography can be used at any stage, from initial capture to final polishing.

#### See Also

Media sampler pack:  
page 49.

Bio-Scale Mini CHT  
cartridges: page 62.

Bio-Scale CHT Type I  
columns: page 64.

### CHT™ Ceramic Hydroxyapatite

Order Info: Pg 54

CHT ceramic hydroxyapatite is a spherical macroporous form of hydroxyapatite that overcomes the limitations of the crystalline material for use in process- and laboratory-scale columns. Crystalline hydroxyapatite protocols can be transferred directly to the ceramic material with little or no modification. CHT retains the unique separation properties of crystalline hydroxyapatite, but it can be used reproducibly for hundreds of cycles at high flow rates and in large columns.

CHT is available as Type I, sintered at 400°C, and Type II, sintered at 700°C for durability. Type I has a high protein binding capacity and higher capacity for acidic proteins. Type II has a lower protein binding capacity and gives better resolution of nucleic acids and of proteins that elute early. Type II also has very low affinity for albumin, so it is often more suitable for purification of many species and classes of immunoglobulins. The three particle sizes, 20, 40, and 80 µm, make it easy to scale up from analytical to process-scale manufacturing. Prepacked Bio-Scale™ Mini CHT™ cartridges are available in a 5 ml format.

#### Specifications

Functional groups	Ca <sup>2+</sup> , PO <sub>4</sub> <sup>3-</sup> , OH <sup>-</sup>	
Nominal mean particle size	20, 40, and 80 µm	
Recommended linear flow rate	50–1,000 cm/hr	
Operating pH range	6.5–14	
Chemical compatibility (>24 hr)	1 M NaOH, 8 M urea, 6 M guanidine-HCl, ethanol, methanol, 100% acetonitrile	
Sanitization	1–2 M NaOH	
	<b>Type I</b>	<b>Type II</b>
Dynamic binding capacity, lysozyme	≥25 mg	≥12.5
Typical IgG binding capacities at 500 cm/hr	25–60 mg/ml	15–25 mg/ml
Maximum operating pressure	100 bar (1,500 psi)	100 bar (1,500 psi)

**For More Information**

Web: [www.bio-rad.com/CHT](http://www.bio-rad.com/CHT)

Request or download bulletins: 2849, 2940, 5667, 5709, and 5853



**CFT™ Ceramic Fluoroapatite**

Order Info: Pg 55

CFT ceramic fluoroapatite ( $\text{Ca}_{10}(\text{PO}_4)_6\text{F}_2$ ) is a rigid spherical macroporous media used in the purification of biologically significant compounds. CFT is a composite of fluoroapatite and hydroxyapatite prepared by chemically converting hydroxyapatite nanocrystals to fluoroapatite with a fluorine reagent.

CFT possesses separation characteristics similar to those of CHT™ ceramic hydroxyapatite. However, when CFT is used, purification can be performed across a range of lower pH values to obtain optimal results for the targeted biomolecule. CFT Type II is available in a 40 µm size and is sintered at high temperature to produce physically and chemically stable media.

CFT can be used under stringent chromatography conditions to separate acidic proteins requiring buffered conditions as low as pH 5, with minimal compromise to the solubility or lifespan of the media.

CFT has high binding capacity and may be used reproducibly over an extended number of chromatography runs. Its increased tensile strength, chemical durability, and density provide excellent throughput and consistent performance for all separations, including biopharmaceutical process-scale manufacturing.

Features of CFT include:

- Acidic protein separation for applications requiring pH as low as 5.5
- High-density particles for fast, simple column packing
- Sintering at high temperatures for heavy-duty, durable media
- Rigid particles for fast cleaning and equilibration
- Inorganic calcium phosphate for distinct selectivities

**For More Information**

Web: [www.bio-rad.com/CFT](http://www.bio-rad.com/CFT)

Request or download bulletins: 3111 and 5853

**Specifications**

Functional groups	$\text{Ca}^{2+}$ , $\text{PO}_4^{3-}$ , $\text{F}^-$
Particle sizes	$40 \pm 4 \mu\text{m}$
Recommended linear flow rate	300 cm/hr
Operating pH range	5–14
Chemical compatibility	2 M NaOH, 6 M guanidine-HCl, 8 M urea, 0.1 M sodium acetate, pH 5.7
Regeneration	
Normal conditions	400 mM sodium phosphate, pH 7.4
Difficult conditions	400–1,000 mM sodium phosphate, pH 11–12
Sanitization	1–2 M NaOH or KOH
Autoclavability (121°C, 20 min)	Yes
Packing density (g/ml packed bed)	0.86 g/ml
Dynamic binding capacity	14–21.5 mg lysozyme/g
Typical IgG binding capacities at 300 cm/hr	33 mg/ml
Nominal pore diameter	600–800 Å
Maximum operating pressure	55 bar (800 psi)

Note: A small amount (up to 5 mM) of sodium phosphate should be added to all unbuffered solutions as a counterion.

## See Also

CHT ceramic hydroxyapatite: page 36.  
Bio-Scale Mini CHT cartridges: page 62.  
Bio-Scale CHT Type I columns: page 64.

## Bio-Gel® Hydroxyapatite HT and HTP Media

Order Info: Pg 55

Hydroxyapatite ( $\text{Ca}_5(\text{PO}_4)_3\text{OH}$ )<sub>2</sub> is a form of calcium phosphate used in the chromatographic separation of biomolecules. Bio-Gel crystalline hydroxyapatite media is compatible with a wide range of aqueous buffers and organic modifiers and can be sanitized in up to 1 M NaOH. Typical pH tolerance is >6.8, however it can be used at 5.5 in single-use applications. Bio-Gel hydroxyapatite can be autoclaved in buffers that maintain the pH above 7 during the autoclaving cycle.

- **Bio-Gel HT media** — shipped in 10 mM sodium phosphate, pH 6.8 buffer containing 0.02%  $\text{NaN}_3$ . The flow rate range is 25–100 cm/hr at 10 cm bed height gravity packed column. Bio-Gel HT media has a shelf life of at least 1 year when stored at 4°C in the shipping buffer
- **Bio-Gel HTP powder** — the dry form of Bio-Gel HT media. When hydrated, it should be stored similarly to Bio-Gel HT media; the flow rate range is similar to Bio-Gel HT media
- **DNA grade Bio-Gel HTP powder** — a smaller particle size version of Bio-Gel HTP powder, and exhibits higher capacity for biomolecules. It is generally used for single- and double-stranded DNA separations. It has an increased capacity for RNA, making it useful for DNA-RNA hybridization studies. Its flow rate is limited in gravity feed columns, however it can be used in medium-pressure columns to enhance flow rate



## Specifications

	Bio-Gel HT	Bio-Gel HTP	Bio-Gel HTP (DNA Grade)
Flow rate* (cm/hr)	>25	>25	>5
BSA adsorbed** (mg per dry gram)	10	10	10
Calf thymus DNA adsorbed (mg per dry gram)	>500	>500	>800
Hydrated volume	—	2–3 ml/g	2–3 ml/g

\* Flow rate determined on a 1.5 x 10 cm column with 40 cm hydrostatic pressure.

\*\* Batchwise uptake.

## For More Information

Web: [www.bio-rad.com/biogelHTandHTP](http://www.bio-rad.com/biogelHTandHTP)

Request or download bulletin: LIT 217

## Recombinant-Tagged Affinity Purification

### Profinity™ IMAC Cartridges and Media

Order Info: Pg 55

### See Also

Affinity media selection guide: page 32.

Bio-Scale Mini cartridges: page 62.

Profinity IMAC resins are an affinity chromatography support for the purification of recombinant polyhistidine (His)-tagged proteins. Profinity IMAC resins, based on UNOsphere™ beads, contain iminodiacetic acid (IDA) as the chelating ligand for di- or trivalent metal ions. Its chemical structure allows highly selective binding of recombinant His-tagged proteins when charged with Ni<sup>2+</sup> or other transition metals such as Zn<sup>2+</sup> or Cu<sup>2+</sup>. They offer high capacity at high flow rates and can be used under either non-denaturing or denaturing conditions. The resins are suitable for purification using liquid chromatographic instrumentation, gravity-flow columns, or spin columns. The resin is available in two forms: uncharged and precharged with Ni<sup>2+</sup>. The uncharged form can be charged with the metal ion of your choice for even greater purification flexibility.

Features of Profinity IMAC resin include:

- Optimal ligand density for higher purity of target protein
- Superb mechanical strength
- Excellent pressure-flow properties, for high maximum operating pressures and flow rates, allowing rapid purification, column cleaning, and re-equilibration
- Stability from pH 1 to 14
- Compatibility with denaturing agents, detergents, and reducing agents

#### For More Information

Web: [www.bio-rad.com/profinityIMAC](http://www.bio-rad.com/profinityIMAC)



Profinity IMAC Resin



Bio-Scale™ Mini Profinity™ IMAC Cartridges

### Profinity™ GST Cartridges and Kits

Order Info: Pg 55

Profinity GST resins are an affinity chromatography support for the purification of recombinant GST-tagged proteins. Bio-Scale™ Mini Profinity™ GST cartridges are 1 ml and 5 ml Bio-Scale Mini cartridges filled with Profinity GST support.

#### For More Information

Web: [www.bio-rad.com/profinityGST](http://www.bio-rad.com/profinityGST)

## See Also

Bio-Scale Mini cartridges: page 62.

## Profinity eXact™ Cartridges and Media

Order Info: Pg 56

### Profinity eXact Purification Resin, Prepacked Cartridges, and Mini Spin Columns

The Profinity eXact purification resin consists of a highly engineered subtilisin protease conjugated to an agarose-based matrix. Purity of the eluted protein using this purification is typically higher than that for other affinity-tag systems due to the specific recognition of subtilisin for its prodomain sequence ( $K_D < 100$  pm).

The resin can be packed into different column formats, including low- to medium-pressure columns, gravity-flow columns, and mini spin columns, offering added purification flexibility. Bio-Scale™ Mini cartridges are available in 1 and 5 ml volumes. Mini spin columns contain 0.1 ml resin. Additional advantages of Profinity eXact purification resin include:

- Purification and processing of fusion-tagged proteins in a single step
- On-column cleavage in as little as 30 min
- No protease addition is required
- Precise cleavage at N-terminus to generate native protein sequence

Resin is supplied in 100 mM sodium phosphate (pH 7.2) containing 0.02% sodium azide. It is also available prepacked in 1 and 5 ml cartridges and in mini spin columns.

#### For More Information

Web: [www.bio-rad.com/profinityexact](http://www.bio-rad.com/profinityexact)  
Request or download bulletin: 5655

### Profinity eXact Expression and Purification Starter Kit

The Profinity eXact expression and purification starter kit can be used to easily evaluate Profinity eXact fusion-tag technology. It is suitable for new purifications requiring tag removal and for purifications where cleavage has resulted in inferior results. The Profinity eXact expression and purification starter kit includes two kits:

- **Profinity eXact cloning and expression starter kit** — for the cloning and expression of a target gene using pPAL vectors and competent cells
- **Profinity eXact mini spin purification starter kit** — for single-step purification and on-column cleavage of the tagged protein; also includes a lyophilized lysate to ensure that preliminary purifications are a success



Profinity eXact Media Available in Cartridges, Spin Columns, and Bottles



Profinity eXact Expression and Purification Starter Kit

#### Media Specifications

Functional ligand	Subtilisin protease, 27.8 kD
Base bead	6% agarose bead
Form	50% suspension in 100 mM sodium phosphate (pH 7.2), 0.02% sodium azide
Particle size range	60–160 μm
Dynamic binding capacity*	>3 mg tag-free protein/ml resin
Recommended linear flow rate	1,000 cm/hr at 25°C
pH stability	2–13
Chemical compatibility	Common reagents including detergents, reducing agents, buffering agents, and additives
Storage	4°C
Shelf life in 20% ethanol	>1 year at 4°C
Operational temperature	4–40°C

\* Dynamic binding capacity determination of a 40 kD maltose binding protein.

Note: Dynamic binding capacity is protein dependent.

### Profinity eXact™ System

Order Info: Pg 56

The Profinity eXact fusion-tag system is a family of expression, detection, purification, and on-column cleavage products, consisting of expression vectors, competent cells, SOC growth media, loose and prepacked purification resin, and detection reagents. Key benefits include:

- Rapid purification and on-column cleavage
- Reduced operating costs, purification steps, and reagent use
- High purity of tag-free target protein

#### For More Information

Web: [www.bio-rad.com/profinityexact](http://www.bio-rad.com/profinityexact)

Request or download bulletins: 5646, 5652, 5655, 5656, 5668, 5811, and 5813



Profinity eXact system family of products.

### Profinity eXact Expression Vector Kits and Cloning Products

Two pPAL expression vector kits are available. Both kits contain a 5901 bp pPAL7 vector — one kit contains a versatile predigested form for restriction enzyme-free cloning of any target gene regardless of internal restriction sites. The other contains a supercoiled plasmid. The pPAL vectors are derived from a T7-based expression plasmid and utilize the T7 lac promoter and terminator and a T7 RNA polymerase expression host for inducible protein production. The plasmids confer ampicillin resistance, constitutively express the *lacI* repressor for tight control of target gene transcription, and have a pMB1-derived ColE1 origin of replication. Gene targets cloned into Profinity eXact pPAL vectors express the subtilisin prodomain as their fusion partner or tag.

#### Profinity eXact pPAL7 RIC-Ready Expression Vector Kit

The pPAL7 restriction-independent cloning (RIC)-ready expression vector is predigested with Sapl and EcoRI and is then dephosphorylated to reduce postligation background transformants.

#### Profinity eXact pPAL7 Supercoiled Expression Vector Kit

The pPAL7 supercoiled plasmid expression vector is used for routine cloning of target DNA sequences using a conventional restriction digest cloning strategy.

#### BL21 (DE3) Chemi-Competent Expression Cells

BL21 (DE3) *E. coli* cells\* are the preferred host for T7 vector-based protein expression. The cells are DE3  $\lambda$  lysogens with the T7 RNA polymerase gene under the control of the lacUV5 promoter. Induction with IPTG allows production of T7 RNA polymerase, which then directs the expression of the target gene located downstream of the T7 lac promoter in the expression vector. The strain is deficient in *ompT* and *lon* proteases, which provides improved recombinant protein stability.

#### Profinity eXact Antibody Reagent

The Profinity eXact antibody reagent is a mouse monoclonal antibody used to detect expression of the target protein. The Profinity eXact antibody specifically recognizes the prodomain of the subtilisin protease, which is fused to the protein of interest. For convenient western blot detection of the fusion protein, Bio-Rad offers colorimetric detection kits.

\* Genotype: *E. coli* B F<sup>-</sup> *dcm ompT hsdS*(r<sub>B</sub><sup>-</sup>, m<sub>B</sub><sup>-</sup>) *gal*  $\gamma$ (DE3).

### Profinia™ System Reagents and Kits

Order Info: Pg 56

#### Buffers

Bio-Rad premade affinity buffer kits for recombinant tagged protein purification come with concentrated formula sufficient for 10 purifications for a 1 ml affinity cartridge. These kits provide easy and fast purification for His-tagged (native IMAC buffer) proteins.

- Denaturing IMAC purification can be performed with native buffer IMAC kits with addition of urea in the purification buffers
- Kits for desalting and cartridge cleaning after affinity purification are also available
- Purification kits containing both buffer kits and appropriate cartridges are provided, if purification cartridges are desired

#### For More Information

Request or download bulletins: 3193, 5283, 5444, and 5456

#### Kits

Buffer and starter kits can be used with any instrument, gravity-flow, or spin-column purification procedure.

Profinia purification, buffer, and starter kits are designed specifically for use on the Profinia protein purification system for time savings and highly-reproducible results. These kits are directly installed on the system; manual dilution of the concentrated buffers provided in the kits is not required.

#### For More Information

Request or download bulletin: 5574

#### Reagents

Individually packaged reagents are available for use with the Profinia system. While designed specifically to work with the Profinia system, these reagents also have general applicability within all stages of an affinity purification workflow, from sample preparation to protein detection.

#### His and GST Purification *E. coli* Control Lysate

The His and GST purification *E. coli* control lysate is a lyophilized, dual-tagged 51 kD target protein that is meant to eliminate concerns over variability in purification buffer solutions or in the purification matrix itself. The control lysate facilitates system setup and initial purification; it is included in every Profinia IMAC and GST starter kit.

#### Glutathione Reagent

Powdered glutathione reagents are available for use with GST applications. The glutathione pack is essential for eluting GST fusion proteins from immobilized glutathione resins.

#### His and GST Antibodies

(His)-tagged and GST-tagged monoclonal antibodies are used to detect target protein expression of overexpressed 6x His and GST fusion proteins. They are supplied at a concentration of 1 mg/ml in phosphate buffered saline (pH 7.4) with 0.05% NaN<sub>3</sub>.



His and GST Purification *E. Coli* Control Lysate

Glutathione

His and GST Antibodies

#### Affinity Purification Kit Selection Guide

	Buffer Sets		Bio-Scale Mini Cartridges*	
	Lysis, Wash, and Elution	Desalting and Cartridge Cleaning	Affinity	Desalting
<b>IMAC Kits</b>				
Native IMAC buffer kit	•			
Native IMAC purification kits (1 and 5 ml)	•		•	
Profinia native IMAC buffer kit	•	•		
Profinia native IMAC purification kits (1 and 5 ml)	•	•	•	•
Profinia native IMAC starter kit	•	•	•	•
<b>GST Kits</b>				
GST buffer kit	•			
GST purification kits (1 and 5 ml)	•		•	
Profinia GST buffer kit	•	•		
Profinia GST purification kits (1 and 5 ml)	•	•	•	•
Profinia GST starter kit	•	•	•	•
<b>Desalting and Cartridge Cleaning Kits</b>				
Desalting and cartridge cleaning buffer kit		•		
Profinia desalting purification kits (10 and 50 ml)		•		•

\* Starter kits include His and GST control lysate, one 1 ml affinity cartridge, and one 10 ml desalting cartridge.

See Also

Bio-Scale Mini cartridges: page 62.

## Affinity Antibody Purification

### UNOsphere SUPra™ rProtein A Media

Order Info: Pg 57

Developed for monoclonal antibody capture chromatography, UNOsphere SUPra media provides an ideal balance between dynamic binding capacity, flow properties, and stability. The UNOsphere™ hydrophilic polymeric support provides high-quality purifications and batch-to-batch reproducibility. As part of the proven UNOsphere media platform, UNOsphere SUPra media offer flexibility and a predictable scale-up path.

Key features include:

- Built on robust polymeric beads engineered for high mechanical stability, low backpressures, and resistance to repeated clean-in-place cycles
- Designed with large pores that result in high dynamic binding capacities at fast flow rates
- Optimized to operate under a wide range of flow rates up to 600 cm/hr
- Available in prepacked Bio-Scale™ Mini cartridges for evaluation and method development; also available in manufacturing-scale quantities
- Regulatory support file and application notes are available

**For More Information**

Web: [www.bio-rad.com/unospheresupra](http://www.bio-rad.com/unospheresupra) and [/processsupra](http://www.bio-rad.com/processsupra)  
Request or download bulletins: 5728 and 5729

#### Specifications

<b>Composition</b>	Highly cross-linked polymer	<b>Working pH range</b>	3–11
<b>Particle size range</b>	53–61 µm	<b>Cleaning-in-place (CIP) solutions</b>	6 M guanidine hydrochloride 10 mM hydrochloric acid 0.1 M sodium hydroxide 1 M acetic acid/20% ethanol
<b>Ligand</b>	Recombinant protein A	<b>Recommended mobile phase velocity range</b>	100–600 cm/hr
<b>Coupling chemistry</b>	Epoxy	<b>Temperature stability</b>	2–40°C
<b>Dynamic binding capacity*</b>	30 ± 3 mg/ml at 150 cm/hour 25 ± 2 mg/ml at 300 cm/hour 20 ± 2 mg/ml at 450 cm/hour (Minimum spec: 20 mg/ml at 300 cm/hour)	<b>Delivery conditions</b>	50% slurry in 20% ethanol
<b>Chemical stability**</b>	10 mM hydrochloric acid 6 M guanidine hydrochloride 0.1 M arginine (pH 2.8) 0.1 M citrate (pH 2.8) 0.1 M glycine (pH 2.8)	<b>Storage conditions</b>	2–8°C

\* 10% breakthrough capacity determined with 1.0 mg/ml polyclonal human IgG in 1.1 x 10 cm column.

\*\* No significant change in chromatographic performance after storage for 24 hr at room temperature.

**Affi-Gel® and Affi-Prep® Protein A Media**

Order Info: Pg 57

Chromatography on Affi-Gel and Affi-Prep protein A media yields highly purified immunoglobulins (IgG), selectively removes IgG prior to analysis of other IgG classes, or adsorbs immune complexes for antigen purification. Protein A binds to the Fc region of immunoglobulins, especially IgG from mammalian species. Advantages include:

- High purity of IgGs
- High affinity for mammalian IgG
- High capacities for mouse IgG<sub>1</sub> as well as other subclasses with MAPS™ optimized buffer

In addition, Affi-Prep media offer high linear flow rates up to 2,000 cm/hr, pressure stability up to 1,000 psi (70 bar), and high chemical stability, which allows sanitization with 0.1 M NaOH.

With Affi-Gel and Affi-Prep protein A media and MAPS II buffer, you can purify up to 10 mg of IgG<sub>1</sub>/ml of media. This is 8–10 times higher than with standard methods. In addition, the MAPS process and Affi-Gel protein A permit greater binding of mouse IgG<sub>1</sub> than do immobilized protein G media.

**For More Information**

Web: [www.bio-rad.com/affigelproteina](http://www.bio-rad.com/affigelproteina)

**Capacities of Protein A Media**

Immunoglobulin	Affi-Gel Protein A Capacity (mg/ml)	Affi-Prep Protein A Capacity (mg/ml)
Mouse IgG <sub>1</sub>	6–10	7–9
Mouse IgG <sub>2a</sub>	6–10	7–9
Mouse IgG <sub>2b</sub>	6–10	7–9
Mouse IgG <sub>3</sub>	6–10	7–9
Mouse IgM*	6–10	7–9
Human IgG	15	10–12
Sheep, cow, horse, goat, rabbit, dog, pig IgG	8–10	7–9

\* Approximately 50% of all mouse IgMs bind using the MAPS buffer system.

## Ready-to-Use Affinity Media

**Affi-Gel® Blue Media**

Order Info: Pg 58

Affi-Gel Blue media is a cross-linked agarose bead with covalently attached Cibacron Blue F3GA dye. The blue dye functions as an ionic, hydrophobic, aromatic, or sterically active binding site in various applications. Affi-Gel Blue media is ideally suited for albumin removal (using 50–100 mesh) and enzyme purification (using 100–200 mesh). Proteins and peptides are bound and released with a high degree of specificity by manipulating the composition of the eluent buffers.

The media is available in bottle and cartridge form.

**For More Information**

Web: [www.bio-rad.com/affigelblue](http://www.bio-rad.com/affigelblue)

**DEAE Affi-Gel® Blue Media**

Order Info: Pg 58

DEAE Affi-Gel Blue media is a bifunctional affinity gel containing Cibacron Blue F3GA dye covalently attached to DEAE Bio-Gel® A media. The dye binds albumin, proteases, and other complement proteins; the DEAE group binds remaining acidic proteins. Features of DEAE Affi-Gel Blue media include:

- Single-step IgG purification from serum; the eluted IgG contains a small amount of transferrin (samples are diluted approximately 5-fold)
- No detectable proteolytic activity in the eluted IgG fraction
- Economical alternative to protein A affinity chromatography
- Available in bottle and cartridge form

**For More Information**

Web: [www.bio-rad.com/affigelDEAE](http://www.bio-rad.com/affigelDEAE)



**CM Affi-Gel® Blue Media**

Order Info: Pg 58

CM Affi-Gel Blue media contain Cibacron Blue F3GA dye covalently coupled to CM Bio-Gel® A media. This bifunctional gel binds both albumin and serum proteases. CM Affi-Gel Blue chromatography provides a convenient initial step in the purification of serum proteins. Features of CM Affi-Gel Blue media include:

- Rapid removal of ≥90% of albumin and all plasminogen in serum samples
- No prior sample preparation needed
- ≥80% yield of stable antiserum, free of albumin and protease activity

**For More Information**

Web: [www.bio-rad.com/affigelcm](http://www.bio-rad.com/affigelcm)

**Affi-Gel® Boronate Media**

Order Info: Pg 58

Affi-Gel boronate-derivatized polyacrylamide media has affinity for coplanar adjacent *cis*-hydroxyl groups (*cis*-diols) and a high binding capacity, which provides highly efficient separation of low MW molecules such as nucleotides, nucleosides, catecholamines, and sugars. It has a sorbitol capacity of 130 μmol/ml.

**For More Information**

Web: [www.bio-rad.com/affigelboronate](http://www.bio-rad.com/affigelboronate)

Request or download bulletin: 1066

**Affi-Prep® Polymyxin Media**

Order Info: Pg 58

Affi-Prep polymyxin media consists of 2–4 mg of USP-grade polymyxin per ml of the macroporous polymeric Affi-Prep support. Affi-Prep polymyxin media binds endotoxins from a number of different strains of gram-negative bacteria including *E. coli*, *Salmonella abortus*, *Salmonella minnesota*, and *Serratia marcescens*. Features of Affi-Prep polymyxin media include:

- Endotoxin removal in research and process-scale applications
- Linear flow rates to 2,000 cm/hr
- Pressure stability to 1,000 psi (70 bar)
- High chemical stability (withstands sanitization with 0.1 M NaOH)

**For More Information**

Web: [www.bio-rad.com/affigelpolymyxin](http://www.bio-rad.com/affigelpolymyxin)



Affi-Prep Polymyxin Media

**Affi-Gel® Heparin Media**

Order Info: Pg 58

Affi-Gel heparin media is a ready-to-use support for the purification of a range of proteins such as coagulation factors, other plasma proteins, polynucleotide polymerases, nucleases, lipases, lipoproteins, and proteases. Heparin binds a variety of enzymes and other proteins, either ionically or by other specific enzyme-inhibitor (or enzyme-activator) interactions. Features of Affi-Gel heparin media include:

- Heparin content ≥0.6 mg/ml
- Human antithrombin III binding capacity ≥1.2 mg/ml
- Linear flow rates of 10–20 cm/hr

**For More Information**

Web: [www.bio-rad.com/affigelheparin](http://www.bio-rad.com/affigelheparin)



Affi-Gel Heparin Media

## Activated Affinity Media

### Profinity™ Epoxide Media

Order Info: Pg 58

Profinity epoxide media are activated affinity chromatography support for the immobilization of biomolecules. Profinity epoxide is a useful support for the immobilization of ligands that contain nucleophiles such as amino, thiol, or hydroxyl groups. These groups couple to the epoxy groups on the media, which is then used for the purification of proteins, carbohydrates, or DNA.

Profinity epoxide media are based on UNOsphere™ beads, which have an open pore structure. The open pore structure allows coupling of large ligands for the purification of large targets such as protein A, recombinant proteins containing MBP, and calmodulin. It is supplied as a dry powder (1 g of powder gives ~8 ml final volume).

**For More Information**

Web: [www.bio-rad.com/profinityepoxide](http://www.bio-rad.com/profinityepoxide)



### Affi-Gel® 10 and Affi-Gel 15 Media

Order Info: Pg 58

Affi-Gel 10 and Affi-Gel 15 activated affinity media provide spontaneous, rapid, and highly efficient coupling of ligands via primary amines. Affi-Gel 10 media is most efficient for coupling neutral or basic proteins with pI from 6.5 to 11. Affi-Gel 15 media is recommended for coupling acidic proteins with pI <6.5. Affi-Gel 10 and 15 media offer:

- Aqueous or anhydrous coupling conditions
- Complete protein coupling within 4 hr at 4°C
- Protein coupling capacity up to 35 mg/ml of media

**For More Information**

Web: [www.bio-rad.com/affigel10and15](http://www.bio-rad.com/affigel10and15)

Request or download bulletin: 1085

### Affi-Gel® Hz Hydrazide Media

Order Info: Pg 58

Affi-Gel Hz hydrazide activated media couple immunoglobulin G (IgG) molecules via carbohydrate moieties on the Fc region of antibody molecules. Fc attachment results in a more specific antigen-antibody interaction and 100–300% higher antigen binding capacity than other media. Affi-Gel Hz media advantages include:

- Stable covalent hydrazone bonds
- Mild oxidation without alteration of antibody activity
- High antigen binding capacity
- pH stability

**For More Information**

Web: [www.bio-rad.com/affigelhydrazide](http://www.bio-rad.com/affigelhydrazide)

**See Also**

Affinity media selection guide: page 32.

### Carbodiimide Activated Media

Order Info: Pg 58

Affi-Gel® 102 media is for use with 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride (EDAC or EDC) carbodiimide coupling reagent, which immobilizes ligands that contain primary or terminal carboxyl groups. The media offers flexible alternative chemistries and economy.

Affi-Gel 102 amino-terminal cross-linked agarose media, with a 6-atom hydrophilic arm, feature:

- EDAC carbodiimide coupling reagent
- Compatibility with carboxyl-containing ligands

**For More Information**

Web: [www.bio-rad.com/carbodiimide](http://www.bio-rad.com/carbodiimide)

## Size Exclusion Chromatography

### Bio-Gel® P Media

Order Info: Pg 59

Bio-Gel P polyacrylamide media, for high-resolution gel filtration, are prepared by copolymerization of acrylamide and N,N'-methylene-bis-acrylamide. Bio-Gel P media:

- Are available in several particle size ranges with molecular weight exclusion limits ranging from 100 to 100,000
- Are extremely hydrophilic and essentially nonionic
- Provide efficient, gentle gel filtration of sensitive compounds
- Do not support microbial growth or leach carbohydrates (due to their synthetic composition) as dextrose and agarose gels can

Bio-Gel P media are autoclavable at pH 5.5–6.5 and operate over a pH range of 2–10 at room temperature. Flow rate and resolution increase with increasing temperature in the range of 4–80°C.

Bio-Gel P polyacrylamide media are available as bottled media or as prepacked spin columns and cartridges. Cartridges are packed with Bio-Gel P-6 media, while spin columns come prepacked with both P-6 and P-30 media in either Tris or SSC buffer.

**For More Information**  
Web: [www.bio-rad.com/biogelp](http://www.bio-rad.com/biogelp)  
Request or download bulletin: 2068



Bio-Gel P Media



Bio-Scale™ Mini Bio-Gel™ Cartridges

#### Bio-Gel P Polyacrylamide Media Selection Guide

	MW Fractionation Range
Bio-Gel P-2 media	100–1,800
Bio-Gel P-4 media	800–4,000
Bio-Gel P-6 media	1,000–6,000
Bio-Gel P-6 media	1,000–6,000
Bio-Gel P-6DG media	1,000–6,000
Bio-Gel P-10 media	1,500–20,000
Bio-Gel P-30 media	2,500–40,000
Bio-Gel P-60 media	3,000–60,000
Bio-Gel P-100 media	5,000–100,000

#### See Also

Sample preparation products: pages 2–12.  
Gel filtration chromatography standard: page 50.  
Bio-Spin and Micro Bio-Spin prepacked columns: page 63.  
Empty Econo-Pac columns: page 66.

### Bio-Gel® A 1.5 m Media

Order Info: Pg 59

Bio-Gel A 1.5 m media, ideal for purification of antibodies and aggregates, consists of agarose beads in which the pore size is controlled by the percentage of agarose in the gel. It is compatible with all commonly used buffers and can be used with high-salt buffers without significantly changing the bed volume. Bio-Gel A 1.5 m media may be used at pH 4–13 and at temperatures 2–30°C. The fractionation range is from 10,000 to 1,500,000.

**For More Information**  
Web: [www.bio-rad.com/biogela](http://www.bio-rad.com/biogela)

## See Also

Media sampler pack: page 49.

**Bio-Beads™ S-X Media**

Order Info: Pg 59

Bio-Beads S-X media are neutral, porous styrene divinylbenzene beads for size exclusion chromatography of lipophilic polymers and other solutes that require organic eluents. MW exclusion limits range from 400 to 14,000. This range is useful for fractionation of low MW organic polymers and other hydrophobic substances. Exclusion limits are influenced by the eluent used. Bio-Beads S-X media require an eluent that is mobile; therefore, the beads must be used in a column. The beads are compatible with benzene, toluene, xylene, carbon tetrachloride, dimethylformamide, ketones, aromatics, methylene chloride, *o*-dichlorobenzene, perchloroethylene, tetrahydrofuran, and trichlorobenzene.

Recommended flow rates depend upon the cross-linkage:

- 1% cross-linked media are used only with gravity flow
- 3% cross-linked media can withstand a flow of 5 ml/min with a backpressure of 20 bar or 300 psi
- 8% and 12% cross-linked media can withstand up to 33 bar or 500 psi

**For More Information**

Web: [www.bio-rad.com/biobeads](http://www.bio-rad.com/biobeads)

## Hydrophobic Interaction Chromatography

**Macro-Prep® HIC Media**

Order Info: Pg 60

Macro-Prep HIC media are methacrylate-based 50 µm beads for protein, polypeptide, enzyme, and nucleic acid purification. They are autoclavable and can withstand treatment in acid, base (pH up to 10), chaotropic agents, or detergents while retaining high protein binding capacities. They are available in two functional forms: a weakly hydrophobic methyl support for purification of compounds

with strong hydrophobic regions and a mildly hydrophobic *t*-butyl support for purification of compounds with few or weakly hydrophobic regions. Both media are chemically and thermally stable. They can be cleaned in place with ethanol or sodium hydroxide.

**For More Information**

Web: [www.bio-rad.com/macroprepHIC](http://www.bio-rad.com/macroprepHIC)  
Request or download bulletin: 1841

**Bio-Beads™ SM-2 Adsorbents**

Order Info: Pg 60

Bio-Beads SM-2 nonpolar polystyrene adsorbents are analytical-grade neutral macroporous polymeric beads with a high surface area for adsorbing organics of MW <2,000. These beads can be used in aqueous solution, with solvents, or solvent mixtures, including alcohols, petroleum ether, diethyl ether, and hexane, without expansion or contraction of the beads.

Common applications of Bio-Beads SM-2 adsorbents include the removal of detergents such as Triton X-100, the removal of organics such as polyaromatic hydrocarbons from water, cleanup of drugs from plasma and urine, clean up of biological metabolites and pesticides, and clean up of dyes and mycotoxins from food products.

**For More Information**

Web: [www.bio-rad.com/biobeads\\_SM2](http://www.bio-rad.com/biobeads_SM2)  
Request or download bulletin: 1461

## Media and Cartridge Sampler Packs, Kits, and Standards

### Sampler Packs

Order Info: Pg 60

Bio-Rad offers its most popular media in a variety of convenient sampler packs:

- **Media sampler pack** — includes 25 ml each of UNOsphere™ Q, S, and Rapid S, Macro-Prep® DEAE, High Q, and High S; 5 ml of UNOsphere SUPrA™; 10 g each of CHT™ ceramic hydroxyapatite Types I and II, 40 µm; and 10 g of CFT™ ceramic fluoroapatite Type II media
- **Deluxe media sampler pack** — includes 100 ml bottles of the media in the media sampler pack
- **Bio-Scale™ Mini ion exchange sampler pack** — includes one 1 ml cartridge each of UNOsphere Q and S, and Macro-Prep High Q, High S, and DEAE media
- **Bio-Scale Mini affinity sampler pack** — includes one 1 ml cartridge each of IMAC and Affi-Prep® protein A media and one 5 ml cartridge each of DEAE Affi-Gel® Blue and Affi-Gel Blue media

#### For More Information

Web: [www.bio-rad.com/mediasampling](http://www.bio-rad.com/mediasampling)



Media Sampler and Deluxe Media Sampler Packs



Bio-Scale Mini Cartridges



Bio-Scale Mini Ion Exchange and Affinity Sampler Packs

### See Also

Ion exchange media:

pages 33–36.

Macro-Prep ion exchange media:

page 34.

UNOsphere and Nuvia ion exchange media:

page 33.

CHT ceramic hydroxyapatite:

page 36.

CFT ceramic fluoroapatite:

page 37.

Macro-Prep HIC media:

page 48.

Bio-Scale Mini cartridges:

page 62.

### Bio-Scale™ Mini Kits

Order Info: Pg 60

#### Bio-Scale Mini Apatite Purification Kit

CHT™ ceramic hydroxyapatite and CFT™ ceramic fluoroapatite have comparable biomolecule separation characteristics, differing mostly in the pH buffer range in which they optimally perform. Ceramic hydroxyapatite exhibits pH stability as low as 6.5, whereas the fluorine substitution in ceramic fluoroapatite extends pH stability to values as low as 5.6. The Bio-Scale Mini apatite purification kit is designed as a convenient way to evaluate which apatite material provides optimal chromatographic performance for your application.

- Prepacked cartridges with CHT Type II ceramic hydroxyapatite and CFT Type II ceramic fluoroapatite for convenient process development
- Low bed volume allowing minimum requirements for sample and buffer
- Luer fitting for convenient connection to any chromatographic system
- Distinct selectivity and different pH ranges

#### Bio-Scale Mini mAb Purification Kit

Maximize method optimization and parameter screening for monoclonal antibodies with the Bio-Scale Mini mAb purification kit. This convenient process development workflow-based kit contains UNOsphere SUPrA™ affinity media, UNOsphere™ Q media, and CHT Type I ceramic hydroxyapatite to address the entire range of needs for monoclonal antibody capture, intermediate contaminant removal, and final polishing.

- Convenient prepacked columns with a simple luer fitting for easy connection to any chromatography system
- Ideal for screening and optimization of purification protocols
- Reproducible and scalable results

#### For More Information

Web: [www.bio-rad.com/mediasampling](http://www.bio-rad.com/mediasampling)

**Chromatography Standards**

Order Info: Pg 60

**Ion Exchange Chromatography Standards**

Bio-Rad offers two protein standards for ion exchange chromatography that are suitable for use with bulk media, cartridges, or columns. Each standard is supplied as a set of six vials of lyophilized protein mixture for qualitative analysis only.

**Organic Acid Standard**

Bio-Rad's organic acid standard is supplied as a set of six vials of lyophilized mixture for qualitative analysis only.

**Carbohydrate Standard**

Bio-Rad's carbohydrate standard is supplied as a set of six vials of lyophilized mixture for qualitative analysis only. The standards can be used for column testing or semiquantitative determination.

**Gel Filtration Chromatography Standard**

Bio-Rad's gel filtration standard is a calibration standard for size exclusion columns used in protein purification. The mixture includes vitamin B<sub>12</sub> and myoglobin, which are visible when eluting from glass or clear plastic columns to ensure that the column is properly packed and the sample is eluting evenly. The standard can be used with most size exclusion HPLC columns. The standard is supplied as a set of six vials of lyophilized protein mixture.

**For More Information**

Web: [www.bio-rad.com/chromstandards](http://www.bio-rad.com/chromstandards)

**Standard Specifications**

Description	Contents	MW	pI	For Use With
<b>Protein Standard for Anion Exchange Chromatography</b>	Equine myoglobin	17,000	6.9	UNO Q columns; Bio-Scale Mini UNOsphere Q cartridges; Macro-Prep High Q and DEAE media; UNOsphere Q media
	Conalbumin	77,000	4.9	
	Chicken ovalbumin	45,000	4.6	
	Soybean trypsin inhibitor	21,500	4.5	
<b>Protein Standard for Cation Exchange Chromatography</b>	Equine myoglobin	17,000	6.9	UNO S columns; Bio-Scale Mini UNOsphere S cartridges; Macro-Prep High S and CM media; UNOsphere S media
	Ribonuclease A	13,500	8.7	
	Cytochrome c	12,000	10.7	
<b>Organic Acid Analysis Standard</b>	Sodium oxalate	134		Aminex HPX-87H column; organic acid analysis kit
	Sodium citrate	294		
	Sodium malate	196		
	Sodium succinate	270		
	Sodium formate	69		
	Sodium acetate	82		
<b>Carbohydrate Analysis Standard</b>	Melezitose	504		Aminex HPX-87C column; carbohydrate analysis kit
	Maltose	360		
	Glucose	180		
	Mannose	180		
	Fructose	180		
	Adonitol (ribitol)	152		
<b>Gel Filtration Standard</b>	Thyroglobulin	670,000	4.5	Bio-Sil and Bio-Silect SEC columns; Bio-Gel P media
	Bovine $\gamma$ -globulin	158,000	5.1	
	Chicken ovalbumin	44,000	4.6	
	Equine myoglobin	17,000	6.9	
	Vitamin B <sub>12</sub>	1,350	4.5	

## Chromatography Media

### Ion Exchange

UNOsphere and Nuvia Ion Exchange Media		Pg 33			
Catalog #	Description	Comments			
156-0311	<b>Nuvia S Media</b> , 25 ml	Ultra high-capacity strong cation process media			
156-0313	<b>Nuvia S Media</b> , 100 ml				
156-0315	<b>Nuvia S Media</b> , 500 ml				
156-0317	<b>Nuvia S Media</b> , 10 L				
156-0411	<b>Nuvia Q Media</b> , 25 ml	Ultra high-capacity strong anion process media			
156-0413	<b>Nuvia Q Media</b> , 100 ml				
156-0415	<b>Nuvia Q Media</b> , 500 ml				
156-0417	<b>Nuvia Q Media</b> , 10 L				
156-0101	<b>UNOsphere Q Media</b> , 25 ml	High-capacity strong anion media			
156-0103	<b>UNOsphere Q Media</b> , 100 ml				
156-0105	<b>UNOsphere Q Media</b> , 500 ml				
156-0107	<b>UNOsphere Q Media</b> , 10 L				
156-0111	<b>UNOsphere S Media</b> , 25 ml	High-capacity strong cation media0			
156-0113	<b>UNOsphere S Media</b> , 100 ml				
156-0115	<b>UNOsphere S Media</b> , 500 ml				
156-0117	<b>UNOsphere S Media</b> , 10 L				
156-0211	<b>UNOsphere Rapid S Media</b> , 25 ml	High-capacity strong cation fast equilibration media			
156-0213	<b>UNOsphere Rapid S Media</b> , 100 ml				
156-0215	<b>UNOsphere Rapid S Media</b> , 500 ml				
156-0217	<b>UNOsphere Rapid S Media</b> , 10 L				
Description	1 x 1 ml	5 x 1 ml	1 x 5 ml	5 x 5 ml	
<b>Prepacked Bio-Scale Mini Cartridges</b>					
Nuvia S Media	732-4420	732-4421	732-4422	732-4423	
UNOsphere Q Media	—	732-4100	732-4102	732-4104	
UNOsphere S Media	—	732-4110	732-4112	732-4114	
UNOsphere Rapid S Media	—	732-4400	732-4401	732-4402	
<b>Adaptor Fittings for Bio-Scale Mini Cartridges</b>					
732-0111	<b>Luer to M6 Adaptor Fittings Kit</b> , includes luer to M6 fittings to connect 1 cartridge to a BioLogic LP or FPLC system				
732-0112	<b>Luer to 10-32 Adaptor Fittings Kit</b> , includes luer to 10-32 fittings to connect 1 cartridge to a BioLogic DuoFlow or HPLC system				
732-0113	<b>Luer to BioLogic System Fittings Kit</b> , includes 1/4-28 female to male luer and 1/4-28 female to female luer to connect 1 cartridge to a BioLogic DuoFlow system				
Macro-Prep Ion Exchange Media		Pg 34			
Catalog #	Description	Comments			
<b>Macro-Prep High Q Media</b>					
158-0040	<b>Macro-Prep High Q Media</b> , 25 ml	High-capacity strong anion exchange media; very high flow rates and resolution			
156-0040	<b>Macro-Prep High Q Media</b> , 100 ml				
156-0041	<b>Macro-Prep High Q Media</b> , 500 ml				
156-0042	<b>Macro-Prep High Q Media</b> , 5 L				
156-0043	<b>Macro-Prep High Q Media</b> , 10 L				
<b>Macro-Prep DEAE Media</b>					
158-0020	<b>Macro-Prep DEAE Media</b> , 25 ml	High-capacity weak anion exchange media; very high flow rates and resolution			
156-0020	<b>Macro-Prep DEAE Media</b> , 100 ml				
156-0021	<b>Macro-Prep DEAE Media</b> , 500 ml				
156-0022	<b>Macro-Prep DEAE Media</b> , 5 L				
156-0023	<b>Macro-Prep DEAE Media</b> , 10 L				
<b>Macro-Prep High S Media</b>					
158-0030	<b>Macro-Prep High S Media</b> , 25 ml	High-capacity strong cation exchange media; very high flow rates and resolution			
156-0030	<b>Macro-Prep High S Media</b> , 100 ml				
156-0031	<b>Macro-Prep High S Media</b> , 500 ml				
156-0032	<b>Macro-Prep High S Media</b> , 5 L				
156-0033	<b>Macro-Prep High S Media</b> , 10 L				
<b>Macro-Prep CM Media</b>					
158-0070	<b>Macro-Prep CM Media</b> , 25 ml	High-capacity weak cation exchange media; high flow rates and resolution			
156-0070	<b>Macro-Prep CM Media</b> , 100 ml				
156-0071	<b>Macro-Prep CM Media</b> , 500 ml				
156-0072	<b>Macro-Prep CM Media</b> , 5 L				
156-0073	<b>Macro-Prep CM Media</b> , 10 L				

## Ordering Information

### Chromatography Media

www.bio-rad.com

Catalog #	Description	Comments	
<b>Macro-Prep 25 Q Media</b>			
153-0021	Macro-Prep 25 Q Media, 50 ml	Strong anion exchange media; 25 µm bead that offers higher resolution	
153-0022	Macro-Prep 25 Q Media, 200 ml		
153-0023	Macro-Prep 25 Q Media, 1 L		
153-0024	Macro-Prep 25 Q Media, 5 L		
<b>Macro-Prep 25 S Media</b>			
153-0031	Macro-Prep 25 S Media, 50 ml	Strong cation exchange media; 25 µm bead that offers higher resolution	
153-0032	Macro-Prep 25 S Media, 200 ml		
153-0033	Macro-Prep 25 S Media, 1 L		
153-0034	Macro-Prep 25 S Media, 5 L		
Description	5 x 1 ml	1 x 5 ml	5 x 5 ml
<b>Prepacked Bio-Scale Mini Cartridges</b>			
Macro-Prep High Q Media	732-4120	732-4122	732-4124
Macro-Prep High S Media	732-4130	732-4132	732-4134
Macro-Prep DEAE Media	732-4140	732-4142	732-4144
Catalog #	Description		
<b>Adaptor Fittings for Bio-Scale Mini Cartridges</b>			
732-0111	Luer to M6 Adaptor Fittings Kit, includes luer to M6 fittings to connect 1 cartridge to a BioLogic LP or FPLC system		
732-0112	Luer to 10-32 Adaptor Fittings Kit, includes luer to 10-32 fittings to connect 1 cartridge to a BioLogic DuoFlow or HPLC system		
732-0113	Luer to BioLogic System Fittings Kit, includes 1/4-28 female to male luer and 1/4-28 female to female luer to connect 1 cartridge to a BioLogic DuoFlow system		

Larger volumes and special packaging for industrial applications are available on request.

## Analytical Grade Ion Exchange Resins

### AG, Bio-Rex, and Chelex Resins

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Catalog #	Description	Ionic Form	Dry Mesh Size	Wet Bead Size, µm	Nominal Shipping % Water
<b>AG Resins</b>					
140-1231	AG 1-X2 Resin, 500 g	Chloride	50-100	180-500	70-78
140-1241	AG 1-X2 Resin, 500 g	Chloride	100-200	106-250	70-78
140-1251	AG 1-X2 Resin, 500 g	Chloride	200-400	75-180	70-78
140-1253	AG 1-X2 Resin, 500 g	Acetate	200-400	75-180	70-78
140-1331	AG 1-X4 Resin, 500 g	Chloride	50-100	180-425	59-65
140-1341	AG 1-X4 Resin, 500 g	Chloride	100-200	106-250	59-65
140-1351	AG 1-X4 Resin, 500 g	Chloride	200-400	63-150	59-65
140-1421	AG 1-X8 Resin, 500 g	Chloride	20-50	300-1,180	39-45
140-1431	AG 1-X8 Resin, 500 g	Chloride	50-100	180-425	39-45
140-1441*	AG 1-X8 Resin, 500 g	Chloride	100-200	106-180	39-45
140-1451*	AG 1-X8 Resin, 500 g	Chloride	200-400	45-106	39-45
140-1422	AG 1-X8 Resin, 500 g	Hydroxide	20-50	300-1,180	39-45
140-1443	AG 1-X8 Resin, 500 g	Acetate	100-200	106-180	39-45
140-1453	AG 1-X8 Resin, 500 g	Acetate	200-400	45-106	39-45
140-1444	AG 1-X8 Resin, 500 g	Formate	100-200	106-180	39-45
140-1454	AG 1-X8 Resin, 500 g	Formate	200-400	45-106	39-45
142-1231	AG 50W-X2 Resin, 500 g	Hydrogen	50-100	300-1,180	75-83
142-1241*	AG 50W-X2 Resin, 500 g	Hydrogen	100-200	106-300	75-83
142-1251	AG 50W-X2 Resin, 500 g	Hydrogen	200-400	75-180	75-83
142-1331	AG 50W-X4 Resin, 500 g	Hydrogen	50-100	180-425	64-72
142-1341	AG 50W-X4 Resin, 500 g	Hydrogen	100-200	106-250	64-72
142-1351*	AG 50W-X4 Resin, 500 g	Hydrogen	200-400	63-150	64-72
142-1421	AG 50W-X8 Resin, 500 g	Hydrogen	20-50	300-1,180	50-56
142-1431	AG 50W-X8 Resin, 500 g	Hydrogen	50-100	180-425	50-56
142-1441***	AG 50W-X8 Resin, 500 g	Hydrogen	100-200	106-250	50-56
142-1451***	AG 50W-X8 Resin, 500 g	Hydrogen	200-400	63-150	50-56
142-1641	AG 50W-X12 Resin, 500 g	Hydrogen	100-200	106-250	42-48
142-1651	AG 50W-X12 Resin, 500 g	Hydrogen	200-400	53-106	42-48
141-1831	AG MP-1M Resin, 500 g	Chloride	50-100	150-300	56-64
141-1841	AG MP-1M Resin, 500 g	Chloride	100-200	75-150	56-64
141-1851	AG MP-1M Resin, 500 g	Chloride	200-400	38-75	56-64
143-0841	AG MP-50 Resin, 500 g	Hydrogen	100-200	75-150	46-52
140-4341*	AG 4-X4 Resin, 500 g	Free base	100-200	75-150	—
142-6424*****	AG 501-X8 Resin, 500 g	H <sup>+</sup> + OH <sup>-</sup>	20-50	300-1,180	43-55
142-6425***	AG 501-X8(D) Resin, 500 g	H <sup>+</sup> + OH <sup>-</sup>	20-50	300-1,180	43-55
142-7834*	AG 11 A8 Resin, 500 g	Self-adsorbed	50-100	180-425	—



Catalog #	Description	Ionic Form	Dry Mesh Size	Wet Bead Size, $\mu\text{m}$	Nominal Shipping % Water
<b>Bio-Rex Resins</b>					
140-7841	Bio-Rex 5 Resin, 500 g	Chloride	100–200	75–150	50–58
140-7851	Bio-Rex 5 Resin, 500 g	Chloride	200–400	45–75	50–58
142-5822	Bio-Rex 70 Resin, 500 g	Sodium	20–50	300–1,180	65–74
142-5832*	Bio-Rex 70 Resin, 500 g	Sodium	50–100	150–300	65–74
142-5842	Bio-Rex 70 Resin, 500 g	Sodium	100–200	75–150	65–74
142-5852*	Bio-Rex 70 Resin, 500 g	Sodium	200–400	45–75	65–74
142-7425*	Bio-Rex MSZ 501(D) Resin, 500 g	H <sup>+</sup> + OH <sup>-</sup>	25–35	500–700	—

Larger volumes and special packaging for industrial applications are available on request.

<b>Chelex Resins</b>					
142-2822	Chelex 100 Resin, 500 g	Sodium	50–100	300–1,180	68–76
142-2832*	Chelex 100 Resin, 500 g	Sodium	100–200	150–300	68–76
142-2842**	Chelex 100 Resin, 500 g	Sodium	200–400	75–150	68–76
142-2825	Chelex 100 Resin, 100 g	Iron	100–200	150–300	—

Catalog #	Description
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**AG Resins in Larger Volumes and Special Packaging for Industrial Applications**

140-1255	AG 1-X2 Resin, acetate, 200–400 mesh, 10 kg
140-1342	AG 1-X4 Resin, chloride, 100–200 mesh, 10 kg
140-1445	AG 1-X8 Resin, chloride, 100–200 mesh, 10 kg
140-1424	AG 1-X8 Resin, hydroxide, 20–50 mesh, 10 kg
140-2341	AG 4-X4 Resin, free base, 100–200 mesh, 5 kg
142-1424	AG 50W-X8 Resin, ultrapure, hydrogen, 20–50 mesh, 10 kg
142-1423	AG 50W-X8 Resin, hydrogen, 20–50 mesh, 10 kg
142-1442	AG 50W-X8 Resin, hydrogen, 100–200 mesh, 10 kg
142-1254	AG 50W-X12 Resin, hydrogen, 200–400 mesh, 1 kg
141-1842	AG MP-1M Resin, chloride, 100–200 mesh, 10 kg
141-1853	AG MP-1M Resin, nitrate, 200–400 mesh, 10 kg
143-7428*	AG 501-X8 Resin, H <sup>+</sup> + OH <sup>-</sup> , 20–50 mesh, 10 kg
143-6427**	AG 501-X8(D) Resin, H <sup>+</sup> + OH <sup>-</sup> , 20–50 mesh, 10 kg

Catalog #	Description	Particle Size, $\mu\text{m}$	Ionic Form	Application
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**Prepacked Poly-Prep Ion Exchange Columns**

731-6211	Poly-Prep Columns, AG 1-X8 resin, 100–200 mesh, 50	106–180	Chloride	Separation of low molecular weight inorganic anions
731-6212	Poly-Prep Columns, AG 1-X8 resin, 200–400 mesh, 50	45–106	Chloride	For high-resolution general purpose separations
731-6221	Poly-Prep Columns, AG 1-X8 resin, 200–400 mesh, 50	45–106	Formate	Separation of low molecular weight biological compounds such as nucleotides, peptides, and carboxylic acids
731-6213	Poly-Prep Columns, AG 50W-X8 resin, 100–200 mesh, 50	106–250	Hydrogen	Separation and concentration of low molecular weight cations such as small peptides and amino acids
731-6214	Poly-Prep Columns, AG 50W-X8 resin, 200–400 mesh, 50	63–150	Hydrogen	For high-resolution general purpose separations

\* Also available as biotechnology grade resin.

\*\* Also available as molecular biology grade resin.

\*\*\* Also available as reactor grade resin.

**Molecular Biology and Biotechnology Grade Resins**

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Catalog #	Description	Dry Mesh Ionic Form	Wed Bead Size	Size, $\mu\text{m}$	Application
<b>Molecular Biology Grade Resins</b>					
143-6424	AG 501-X8 Resin, molecular biology grade, 100 g	H <sup>+</sup> + OH <sup>-</sup>	20–50	300–1,180	Deionization
143-6425	AG 501-X8(D) Resin, molecular biology grade, 100 g	H <sup>+</sup> + OH <sup>-</sup>	20–50	300–1,180	
142-1253	Chelex 100 Resin, molecular biology grade, 50 g	Sodium	200–400	75–150	DNA extraction for PCR sample preparation
<b>Biotechnology Grade Resins</b>					
143-1255	AG 1-X2 Resin, biotechnology grade, 100 g	Hydroxide	200–400	75–180	Separation of small peptides, nucleotides, and large metal complexes
143-1345	AG 1-X4 Resin, biotechnology grade, 100 g	Hydroxide	100–200	63–150	Separation of organic acids, nucleotides, phosphoinositides, and other anions
143-2445	AG 1-X8 Resin, biotechnology grade, 100 g	Hydroxide	100–200	106–180	Separation of inorganic and organic anions with MW <1,000

Catalog #	Description	Dry Mesh Ionic Form	Wed Bead Size	Size, $\mu\text{m}$	Application
<b>Biotechnology Grade Resins (cont.)</b>					
143-2446	<b>AG 1-X8 Resin</b> , biotechnology grade, 100 g	Hydroxide	200–400	45–106	
143-5241	<b>AG 50W-X2 Resin</b> , biotechnology grade, 100 g	Hydrogen	100–200	106–300	Separation of peptides, nucleotides, and cations
143-5341	<b>AG 50W-X4 Resin</b> , biotechnology grade, 100 g	Hydrogen	200–400	75–150	Separation of amino acids, nucleotides, and cations
143-5441	<b>AG 50W-X8 Resin</b> , biotechnology grade, 100 g	Hydrogen	100–200	106–250	Separation of amino acid and cations
143-5451	<b>AG 50W-X8 Resin</b> , biotechnology grade, 100 g	Hydrogen	200–400	63–150	
143-7834	<b>AG 11 A8 Resin</b> , biotechnology grade, 100 g	Self-adsorbed	50–100	180–425	Removal of ionic compounds
143-7424	<b>AG 501-X8 Resin</b> , biotechnology grade, 100 g	H <sup>+</sup> + OH <sup>-</sup>	20–50	300–1,180	Deionization
143-7425	<b>AG 501-X8(D) Resin</b> , biotechnology grade, 100 g	H <sup>+</sup> + OH <sup>-</sup>	20–50	300–1,180	
143-2832	<b>Chelex 100 Resin</b> , biotechnology grade, 100 g	Sodium	100–200	150–300	PCR sample preparation
143-5832	<b>Bio-Rex 70 Resin</b> , biotechnology grade, 100 g	Sodium	50–100	150–300	Separation of cationic proteins and amines
143-5852	<b>Bio-Rex 70 Resin</b> , biotechnology grade, 100 g	Sodium	200–400	45–75	

### Technical and Reactor Grade Resins

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Catalog #	Description	Ionic Form	Dry Mesh Size	MW Exclusion
<b>Molecular Biology Grade Resins</b>				
444-9998*	<b>Bio-Rex RG 501-X8 Resin</b> , 1 ft <sup>3</sup> , for water purification and GE stator systems	H <sup>+</sup> + OH <sup>-</sup>	20–50	1,000
444-9999	<b>Bio-Rex RG 501-X8 Resin</b> , 500 g	H <sup>+</sup> + OH <sup>-</sup>	20–50	1,000

\* 1 ft<sup>3</sup> corresponds to approximately 20 kg. Larger volumes and special packaging are available on request.

## Multimodal Media

### CHT Ceramic Hydroxyapatite

Pg 36

Description	Type I	Type II
<b>CHT Ceramic Hydroxyapatite, 20 <math>\mu\text{m}</math></b>		
20 $\mu\text{m}$ particle size, 10 g	158-2000	158-2200
20 $\mu\text{m}$ particle size, 100 g	157-0020	157-2000
20 $\mu\text{m}$ particle size, 1 kg (1.6 L)	157-0021	157-2100
20 $\mu\text{m}$ particle size, 5 kg (7.9 L)	157-0025	157-2500
<b>CHT Ceramic Hydroxyapatite, 40 <math>\mu\text{m}</math></b>		
40 $\mu\text{m}$ particle size, 10 g	158-4000	158-4200
40 $\mu\text{m}$ particle size, 100 g	157-0040	157-4000
40 $\mu\text{m}$ particle size, 1 kg (1.6 L)	157-0041	157-4100
40 $\mu\text{m}$ particle size, 5 kg (7.9 L)	157-0045	157-4500
<b>CHT Ceramic Hydroxyapatite, 80 <math>\mu\text{m}</math></b>		
80 $\mu\text{m}$ particle size, 10 g	158-8000	158-8200
80 $\mu\text{m}$ particle size, 100 g	157-0080	157-8000
80 $\mu\text{m}$ particle size, 1 kg (1.6 L)	157-0081	157-8100
80 $\mu\text{m}$ particle size, 5 kg (7.9 L)	157-0085	157-8500
Description	<b>1 x 5 ml</b>	<b>5 x 5 ml</b>
<b>Prepacked Bio-Scale Mini Cartridges</b>		
CHT Type I Ceramic Hydroxyapatite	732-4322	732-4324
CHT Type II Ceramic Hydroxyapatite	732-4332	732-4334

Catalog # Description

### Bio-Scale Mini Cartridge Kits

732-4407	<b>Bio-Scale Mini Apatite Purification Kit</b> , CHT Type II cartridge, CFT Type II cartridge, 1 x 5 ml each
732-4408	<b>Bio-Scale Mini mAb Purification Kit</b> , UNOsphere SUPrA affinity cartridge, UNOsphere Q cartridge, CHT Type I cartridge, 1 x 5 ml each

Larger volumes and special packaging for industrial applications are available on request.

Catalog # Description

**CFT Ceramic Fluoroapatite**

Pg 37

**CFT Ceramic Fluoroapatite, Type II, 40 µm**

158-5200 40 µm particle size, 10 g  
157-5000 40 µm particle size, 100 g  
157-5100 40 µm particle size, 1 kg (1.2 L)  
157-5500 40 µm particle size, 5 kg (5.8 L)

Description	1 x 5 ml	5 x 5 ml
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**Prepacked Bio-Scale Mini Cartridges**

CFT Type II Ceramic Fluoroapatite	732-4405	732-4406
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Catalog # Description

**Bio-Scale Mini Cartridge Kits**

732-4407 **Bio-Scale Mini Apatite Purification Kit**, CHT Type II cartridge, CFT Type II cartridge, 1 x 5 ml each  
732-4408 **Bio-Scale Mini mAb Purification Kit**, UNOsphere SUPra affinity cartridge, UNOsphere Q cartridge, CHT Type I cartridge, 1 x 5 ml each

**Bio-Gel Hydroxyapatite HT and HTP Media**

Pg 38

**Bio-Gel Hydroxyapatite**

130-0150 **Bio-Gel HT Hydroxyapatite**, hydrated, 250 ml  
130-0151 **Bio-Gel HT Hydroxyapatite**, hydrated, 500 ml  
130-0420 **Bio-Gel HTP Hydroxyapatite**, powder, 100 g  
130-0421 **Bio-Gel HTP Hydroxyapatite**, powder, 1 kg  
130-0425 **Bio-Gel HTP Hydroxyapatite**, powder, 5 kg  
130-0520 **Bio-Gel HTP Hydroxyapatite**, DNA grade, 100 g

**Accessories**

737-6201 **Econo-Column Open-Ended Jacketed Chromatography Column**, 1 x 30 cm, includes 2 flow adaptors for DNA hydroxyapatite chromatography, 25 ml

## Recombinant-Tagged Affinity Purification

**Profinity IMAC Cartridges and Media**

Pg 39

**Ready-to-Use Affinity Media**

156-0121 **Profinity IMAC Uncharged Resin**, 10 ml  
156-0123 **Profinity IMAC Uncharged Resin**, 50 ml  
156-0125 **Profinity IMAC Uncharged Resin**, 500 ml  
156-0127 **Profinity IMAC Uncharged Resin**, 1 L  
156-0131 **Profinity IMAC Ni-Charged Resin**, 10 ml  
156-0133 **Profinity IMAC Ni-Charged Resin**, 25 ml  
156-0135 **Profinity IMAC Ni-Charged Resin**, 100 ml  
156-0137 **Profinity IMAC Ni-Charged Resin**, 500 ml

Description	5 x 1 ml	1 x 5 ml	5 x 5 ml
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**Prepacked Bio-Scale Mini Cartridges**

Profinity IMAC Ni-Charged Resin	732-4610	732-4612	732-4614
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Larger volumes and special packaging for industrial applications are available on request.

Catalog # Description

**Profinity GST Cartridges and Media**

Pg 39

732-4620 **Bio-Scale Mini Profinity GST Cartridges**, 5 x 1 ml  
732-4622 **Bio-Scale Mini Profinity GST Cartridge**, 1 x 5 ml  
732-4624 **Bio-Scale Mini Profinity GST Cartridges**, 5 x 5 ml  
620-0240 **GST Buffer Kit**, includes GST lysis, wash, and elution buffers  
620-0223 **Profinia GST Buffer Kit**, includes lysis, wash, and elution buffers, cleaning and storage solutions, glutathione reagent; sufficient for 10 applications  
620-0243 **GST Purification Kit**, 1 ml, includes GST purification buffer kit and 2 x 1 ml GST cartridges  
620-0244 **GST Purification Kit**, 5 ml, includes 2 GST purification buffer kits and 1 x 5 ml GST cartridge  
620-0226 **Profinia GST Purification Kit**, 1 ml, includes Profinia GST buffer kit, 2 x 1 ml GST and 2 x 10 ml desalting cartridges  
620-0236 **Profinia GST Purification Kit**, 5 ml, includes 2 Profinia GST buffer kits, 1 x 5 ml GST and 1 x 50 ml desalting cartridge  
620-0230 **Profinia GST Starter Kit**, includes Profinia GST buffer kit, 1 x 1 ml GST and 1 x 10 ml desalting cartridge, *E. coli* lysate, glutathione reagent

Catalog #	Description	
<b>Profinity eXact Cartridges and Media</b>		<b>Pg 40</b>
156-3004	<b>Profinity eXact Monoclonal Antibody</b> , 100 µl, 1 mg/ml	
156-3005	<b>Profinity eXact Purification Resin</b> , 10 ml	
156-3007	<b>Profinity eXact Mini Spin Columns</b> , includes 10 spin columns, ten 2 ml capped tubes, and ten 2 ml capless tubes	
732-4646	<b>Bio-Scale Mini Profinity eXact Cartridges</b> , 2 x 1 ml	
732-4647	<b>Bio-Scale Mini Profinity eXact Cartridges</b> , 4 x 1 ml	
732-4648	<b>Bio-Scale Mini Profinity eXact Cartridge</b> , 1 x 5 ml	
156-3000	<b>Profinity eXact Cloning and Expression Starter Kit</b> , includes 25 µl of 20 ng/µl RIC-ready pPAL vector, 100 µl of 100 ng/µl supercoiled pPAL vector, chemi-competent cells, SOC growth media, 20 reactions	
156-3008	<b>Profinity eXact Expression and Purification Starter Kit</b> , includes 1 Profinity eXact cloning and expression starter kit (20 reactions) and 1 Profinity eXact mini spin purification starter kit (10 spin columns)	
156-3006	<b>Profinity eXact Mini Spin Purification Starter Kit</b> , includes 10 prepacked spin columns, 50 x 2 ml collection tubes, lyophilized control protein lysate, bacterial lysis reagent, 50 ml bind/wash buffer, 20 ml elution buffer	
<b>Profinity eXact System</b>		<b>Pg 41</b>
156-3001	<b>Profinity eXact pPAL RIC-Ready Expression Vector Kit</b> , includes 25 µl of 20 ng/µl vector, 20 reactions	
156-3002	<b>Profinity eXact pPAL Supercoiled Expression Vector Kit</b> , includes 100 µl of 100 ng/µl vector, 20 reactions	
156-3003	<b>BL21 (DE3) Chemi-Competent Expression Cells</b> , includes 10 x 0.05 ml BL21 (DE3) cells, pUC19 control plasmid, 10 ml vial of SOC growth media	
156-3004	<b>Profinity eXact Monoclonal Antibody</b> , 100 µl, 1 mg/ml	
156-3005	<b>Profinity eXact Purification Resin</b> , 10 ml	
156-3007	<b>Profinity eXact Mini Spin Columns</b> , includes 10 spin columns, ten 2 ml capped tubes, and ten 2 ml capless tubes	
732-4646	<b>Bio-Scale Mini Profinity eXact Cartridges</b> , 2 x 1 ml	
732-4647	<b>Bio-Scale Mini Profinity eXact Cartridges</b> , 4 x 1 ml	
732-4648	<b>Bio-Scale Mini Profinity eXact Cartridge</b> , 1 x 5 ml	
156-3000	<b>Profinity eXact Cloning and Expression Starter Kit</b> , includes 25 µl of 20 ng/µl RIC-ready pPAL vector, 100 µl of 100 ng/µl supercoiled pPAL vector, chemi-competent cells, SOC growth media, 20 reactions	
156-3008	<b>Profinity eXact Expression and Purification Starter Kit</b> , includes 1 Profinity eXact cloning and expression starter kit (20 reactions) and 1 Profinity eXact mini spin purification starter kit (10 spin columns)	
156-3006	<b>Profinity eXact Mini Spin Purification Starter Kit</b> , includes 10 prepacked spin columns, 50 x 2 ml collection tubes, lyophilized control protein lysate, bacterial lysis reagent, 50 ml bind/wash buffer, 20 ml elution buffer	
<b>Profinia System Reagents and Kits</b>		<b>Pg 42</b>
<b>Affinity Buffer Kits</b>		
620-0239	<b>Native IMAC Buffer Kit</b> , includes native IMAC lysis, wash, and elution buffers	
620-0240	<b>GST Buffer Kit</b> , includes GST lysis, wash, and elution buffers	
620-0224	<b>Desalting and Cartridge Cleaning Buffer Kit</b> , includes desalting buffer, cleaning buffers, and cartridge storage buffer	
<b>Affinity Purification Kits</b>		
620-0241	<b>Native IMAC Purification Kit</b> , 1 ml, includes IMAC purification buffer kit and 2 x 1ml IMAC cartridges	
620-0242	<b>Native IMAC Purification Kit</b> , 5 ml, includes 2 IMAC purification buffer kits and 1 x 5 ml IMAC cartridge	
620-0243	<b>GST Purification Kit</b> , 1 ml, includes GST purification buffer kit and 2 x 1 ml GST cartridges	
620-0244	<b>GST Purification Kit</b> , 5 ml, includes 2 GST purification buffer kits and 1 x 5 ml GST cartridge	
<b>Profinia Buffer Kits</b>		
620-0221	<b>Profinia Native IMAC Buffer Kit</b> , includes lysis, wash, and elution buffers, cleaning and storage solutions; sufficient for 10 applications	
620-0223	<b>Profinia GST Buffer Kit</b> , includes lysis, wash, and elution buffers, cleaning and storage solutions, glutathione reagent; sufficient for 10 applications	
<b>Profinia Purification Kits</b>		
620-0225	<b>Profinia Native IMAC Purification Kit</b> , 1 ml, includes Profinia native IMAC buffer kit, 2 x 1 ml IMAC and 2 x 10 ml desalting cartridges	
620-0235	<b>Profinia Native IMAC Purification Kit</b> , 5 ml, includes 2 Profinia native IMAC buffer kits, 1 x 5 ml IMAC and 1 x 50 ml desalting cartridge	
620-0226	<b>Profinia GST Purification Kit</b> , 1 ml, includes Profinia GST buffer kit, 2 x 1 ml GST and 2 x 10 ml desalting cartridges	
620-0236	<b>Profinia GST Purification Kit</b> , 5 ml, includes 2 Profinia GST buffer kits, 1 x 5 ml GST and 1 x 50 ml desalting cartridge	
620-0228	<b>Profinia Desalting Purification Kit</b> , 10 ml, includes desalting and cartridge cleaning buffer kit, 2 x 10 ml desalting cartridges	
620-0238	<b>Profinia Desalting Purification Kit</b> , 50 ml, includes 2 desalting and cartridge cleaning buffer kits, 1 x 50 ml desalting cartridge	

Catalog # Description

**Profinia Starter Kits**

620-0229 **Profinia Native IMAC Starter Kit**, includes Profinia native IMAC buffer kit, 1 x 1 ml IMAC and 1 x 10 ml desalting cartridge, *E. coli* lysate  
620-0230 **Profinia GST Starter Kit**, includes Profinia GST buffer kit, 1 x 1 ml GST and 1 x 10 ml desalting cartridge, *E. coli* lysate, glutathione reagent

**Bio-Scale Mini Affinity and Desalting Cartridges**

732-4610 **Bio-Scale Mini Profinity IMAC Cartridges**, 5 x 1 ml  
732-4612 **Bio-Scale Mini Profinity IMAC Cartridge**, 1 x 5 ml  
732-4614 **Bio-Scale Mini Profinity IMAC Cartridges**, 5 x 5 ml  
732-4620 **Bio-Scale Mini Profinity GST Cartridges**, 5 x 1 ml  
732-4622 **Bio-Scale Mini Profinity GST Cartridge**, 1 x 5 ml  
732-4624 **Bio-Scale Mini Profinity GST Cartridges**, 5 x 5 ml  
732-5304 **Bio-Scale Mini Bio-Gel P-6 Desalting Cartridges**, 5 x 10 ml  
732-5312 **Bio-Scale Mini Bio-Gel P-6 Desalting Cartridge**, 1 x 50 ml  
732-5314 **Bio-Scale Mini Bio-Gel P-6 Desalting Cartridges**, 5 x 50 ml

Catalog # Description

**Individual Affinity Buffers**

620-0205 **2x Native IMAC Lysis Buffer**, 125 ml  
620-0206 **2x Native IMAC Wash Buffer 1**, 125 ml  
620-0207 **2x Native IMAC Wash Buffer 2**, 100 ml  
620-0208 **2x Native IMAC Elution Buffer**, 100 ml  
620-0213 **2x GST Lysis Buffer**, 100 ml  
620-0214 **2x GST Wash Buffer**, 200 ml  
620-0215 **2x GST Elution Buffer**, 100 ml  
620-0216 **5x Desalting Buffer**, 200 ml  
620-0217 **2x Cleaning Solution 1**, 125 ml  
620-0218 **4x Cleaning Solution 2**, 125 ml  
620-0219 **2x Storage Solution**, 200 ml

**Affinity Antibody Purification**

**UNOsphere SUPra rProtein A Media**

Pg 43

**UNOsphere SUPra rProtein A Media**

156-0250 **UNOsphere SUPra rProtein A Media**, 5 ml  
156-0218 **UNOsphere SUPra rProtein A Media**, 25 ml  
156-0219 **UNOsphere SUPra rProtein A Media**, 100 ml  
156-0220 **UNOsphere SUPra rProtein A Media**, 500 ml  
156-0221 **UNOsphere SUPra rProtein A Media**, 5 L  
156-0222 **UNOsphere SUPra rProtein A Media**, 10 L

Description	1 x 1 ml	5 x 1 ml	1 x 5 ml
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**Prepacked Bio-Scale Mini Cartridges**

UNOsphere SUPra Affinity Media	732-4200	732-4201	732-4202
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Catalog # Description

**Affi-Gel and Affi-Prep Protein A Media**

Pg 44

**Affi-Prep Protein A Media**

156-0006 **Affi-Prep Protein A Media**, 5 ml  
156-0005 **Affi-Prep Protein A Media**, 25 ml  
153-6153 **Affi-Gel Protein A Media**, 5 ml  
153-6154 **Affi-Gel Protein A Media**, 50 ml  
153-6159 **Affi-Gel Protein A MAPS II Kit**, includes 5 ml Affi-Gel protein A media, Affi-Gel protein A MAPS II buffers, 1 x 10 cm Econo-Column column; enough to purify 500 mg of mouse IgG<sub>1</sub>  
153-6161 **Protein A MAPS II Binding Buffer**, makes 5 L

**Prepacked Econo-Pac Columns**

732-2022 **Econo-Pac Protein A Columns**, prefilled with Affi-Gel protein A media, 5  
732-2020 **Econo-Pac Protein A Kit**, 1 x 2 ml Affi-Gel protein A column, 1 x 10 ml 10DG column, buffers

Description	5 x 1 ml	1 x 5 ml
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**Prepacked Bio-Scale Mini Cartridges**

Affi-Prep Protein A media	732-4600	732-4602
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## Ready-To-Use Affinity Media

Catalog #	Description		
<b>Affi-Gel Blue Media</b>		<b>Pg 44</b>	
153-7301	<b>Affi-Gel Blue Media</b> , 100 ml, 50–100 mesh		
153-7302	<b>Affi-Gel Blue Media</b> , 100 ml, 100–200 mesh		
732-4642	<b>Bio-Scale Mini Affi-Gel Blue Cartridge</b> , 1 x 5 ml		
732-4644	<b>Bio-Scale Mini Affi-Gel Blue Cartridges</b> , 5 x 5 ml		
<b>DEAE Affi-Gel Blue Media</b>		<b>Pg 44</b>	
153-7307*	<b>DEAE Affi-Gel Blue Media</b> , 100 ml		
732-4632	<b>Bio-Scale Mini DEAE Affi-Gel Blue Cartridge</b> , 1 x 5 ml		
732-4634	<b>Bio-Scale Mini DEAE Affi-Gel Blue Cartridges</b> , 5 x 5 ml		
Description		<b>1 x 5 ml</b>	<b>5 x 5 ml</b>
<b>Prepacked Bio-Scale Mini Cartridges</b>			
DEAE Affi-Gel Blue Media, 5 ml		732-4632	732-4634
Affi-Gel Blue Media, 5 ml		732-4642	732-4644

Catalog #	Description		
<b>CM Affi-Gel Blue Media</b>		<b>Pg 45</b>	
153-7304	<b>CM Affi-Gel Blue Media</b> , 100 ml		
<b>Affi-Prep Polymyxin Media</b>		<b>Pg 45</b>	
156-0010	<b>Affi-Prep Polymyxin Media</b> , 25 ml		
<b>Affi-Gel Heparin Media</b>		<b>Pg 45</b>	
153-6173	<b>Affi-Gel Heparin Media</b> , 40 ml		
<b>Affi-Gel Boronate Media</b>		<b>Pg 45</b>	
153-6103	<b>Affi-Gel Boronate Media</b> , 5 g		
153-6104	<b>Affi-Gel Boronate Media</b> , 50 g		

\* The DEAE Affi-Gel Blue media is available prepacked in Econo-Pac columns (catalog #732-2026).

## Activated Affinity Media

<b>Profinity Epoxide Media</b>		<b>Pg 46</b>	
156-0200	<b>Profinity Epoxide Media</b> , 5 g		
156-0201	<b>Profinity Epoxide Media</b> , 25 g		
<b>Affi-Gel 10 and Affi-Gel 15 Media</b>		<b>Pg 46</b>	
153-6099	<b>Affi-Gel 10 Media</b> , 25 ml		
153-6046	<b>Affi-Gel 10 Media</b> , 4 x 25 ml		
153-1000	<b>Affi-Gel 10 Media</b> , 1 L		
153-6051	<b>Affi-Gel 15 Media</b> , 25 ml		
153-6052	<b>Affi-Gel 15 Media</b> , 4 x 25 ml		
153-1500	<b>Affi-Gel 15 Media</b> , 1 L		
153-6098	<b>Affi-Gel 10/15 Combination</b> , includes 2 x 25 ml Affi-Gel 10 media and 2 x 25 ml Affi-Gel 15 media		
<b>Affi-Gel Hz Hydrazide Media</b>		<b>Pg 46</b>	
153-6047	<b>Affi-Gel Hz Hydrazide Media</b> , 25 ml		
153-6060	<b>Affi-Gel Hz Immunoaffinity Kit</b> , includes 5 ml Affi-Gel Hz media, 2 x 25 mg Affi-Gel Hz oxidizer, 25 ml Affi-Gel Hz coupling buffer concentrate, 2 Econo-Pac 10DG desalting columns, 1 x 10 cm Econo-Column column		
153-6054	<b>Affi-Gel Hz 10x Coupling Buffer Concentrate</b> , 500 ml		
153-6055	<b>Affi-Gel Oxidizer</b> , 250 mg sodium periodate for use with Affi-Gel Hz media or Affi-Prep Hz media		
<b>Carbodiimide Activated Media</b>		<b>Pg 46</b>	
153-2401	<b>Affi-Gel 102 Media</b> , 50 ml		
153-0990	<b>EDAC</b> , 5 g		

## Size Exclusion Chromatography

Catalog #	Description	Comments
<b>Bio-Gel P Polyacrylamide Media</b> <span style="float: right;">Pg 47</span>		
150-4114	<b>Bio-Gel P-2 Media</b> , fine, 100 g	Rapid carbohydrate, peptide, and protein desalting
150-4115	<b>Bio-Gel P-2 Media</b> , fine, 500 g	
150-4118	<b>Bio-Gel P-2 Media</b> , extra fine, 100 g	
150-4120	<b>Bio-Gel P-4 Media</b> , medium, 100 g	Carbohydrate and peptide separations, protein desalting
150-4124	<b>Bio-Gel P-4 Media</b> , fine, 100 g	
150-4128	<b>Bio-Gel P-4 Media</b> , extra fine, 100 g	
150-4130	<b>Bio-Gel P-6 Media</b> , medium, 100 g	Purification of proteins and polypeptides
150-4134	<b>Bio-Gel P-6 Media</b> , fine, 100 g	
150-4138	<b>Bio-Gel P-6 Media</b> , extra fine, 100 g	
150-0738	<b>Bio-Gel P-6DG Media</b> , 100 g	Rapid carbohydrate, peptide, and protein desalting;
150-0739	<b>Bio-Gel P-6DG Media</b> , 1 kg	also available in prepacked columns and cartridges
150-4140	<b>Bio-Gel P-10 Media</b> , medium, 100 g	Purification of proteins and polypeptides
150-4144	<b>Bio-Gel P-10 Media</b> , fine, 100 g	
150-4150	<b>Bio-Gel P-30 Media</b> , medium, 100 g	
150-4154	<b>Bio-Gel P-30 Media</b> , fine, 100 g	
150-4160	<b>Bio-Gel P-60 Media</b> , medium, 100 g	
150-4164	<b>Bio-Gel P-60 Media</b> , fine, 100 g	
150-4170	<b>Bio-Gel P-100 Media</b> , medium, 100 g	
150-4174	<b>Bio-Gel P-100 Media</b> , fine, 100 g	

Catalog #	Description	Individual	Pack of 5
<b>Prepacked Econo-Pac Columns</b>			
732-2010	<b>Econo-Pac 10DG Desalting Columns</b> , 30		
<b>Prepacked Bio-Scale Mini Cartridges</b>			
	Bio-Gel P-6 Media (Desalting), 5 ml	732-4502	732-4504
	Bio-Gel P-6 Media, 10 ml	—	732-5304
	Bio-Gel P-6 Media, 50 ml	732-5312	732-5314

Catalog #	Description
<b>Adaptor Fittings</b>	
732-0111	<b>Luer to M6 Adaptor Fittings Kit</b> , includes luer to M6 fittings to connect 1 cartridge to a BioLogic LP or FPLC system
732-0112	<b>Luer to 10-32 Adaptor Fittings Kit</b> , includes luer to 10-32 fittings to connect 1 cartridge to a BioLogic DuoFlow or HPLC system
732-0113	<b>Luer to BioLogic System Fittings Kit</b> , includes 1/4-28 female to male luer and 1/4-28 female to female luer to connect 1 cartridge to a BioLogic DuoFlow system

<b>Bio-Gel A 1.5 m Media</b> <span style="float: right;">Pg 47</span>	
151-0450	<b>Bio-Gel A 1.5 m Media</b> , fine

<b>Bio-Beads S-X Media</b> <span style="float: right;">Pg 48</span>				
Catalog #	Description	Size, $\mu\text{m}$	ml/dry g*	Application**
152-2150	<b>Bio-Beads S-X1 Media</b> , 100 g	40–80	7.5	1% crosslinked; for lipophilic polymers of MW 600–14,000
152-2151	<b>Bio-Beads S-X1 Media</b> , 1 kg			
152-2750	<b>Bio-Beads S-X3 Media</b> , 100 g	40–80	4.75	3% crosslinked; for organic compounds of MW $\leq 2,000$
152-3350	<b>Bio-Beads S-X8 Media</b> , 100 g	40–80	3.1	8% crosslinked; for organic compounds of MW $\leq 1,000$
152-3650	<b>Bio-Beads S-X12 Media</b> , 100 g	40–80	2.5	12% crosslinked; for organic compounds of MW $\leq 400$

\* Swollen in benzene.

\*\* MW range is for beads fully swollen in benzene.

Larger volumes and special packaging for industrial applications are available on request.

## Hydrophobic Interaction Chromatography

## Macro-Prep HIC Media

Pg 48

Description	Methyl HIC	t-Butyl HIC
Macro-Prep HIC Media, 25 ml	158-0080	158-0090
Macro-Prep HIC Media, 100 ml	156-0080	156-0090
Macro-Prep HIC Media, 500 ml	156-0081	156-0091
Macro-Prep HIC Media, 5 L	156-0082	156-0092
Macro-Prep HIC Media, 10 L	156-0083	156-0093

Catalog # Description

## Bio-Beads SM-2 Adsorbents

Pg 48

152-3920	Bio-Beads SM-2 Adsorbents, 100 g
152-8920	Bio-Beads SM-2 Adsorbents, biotechnology grade, 25 g

## Media and Cartridge Sampler Packs, Kits, and Standards

## Sampler Packs

Pg 49

158-0100	<b>Media Sampler Pack</b> , includes 25 ml each of Macro-Prep DEAE, Macro-Prep High Q, Macro-Prep High S, UNOsphere Q, UNOsphere S, UNOsphere Rapid S, 5 ml of UNOsphere SuPrA, 10 g each of CHT ceramic hydroxyapatite Types I and II, 40 µm, 10 g of CFT ceramic fluoroapatite Type II
158-0150	<b>Deluxe Media Sampler Pack</b> , includes 100 ml each of Macro-Prep DEAE, Macro-Prep High Q, Macro-Prep High S, 100 ml each of UNOsphere Q, UNOsphere S, UNOsphere Rapid S, 5 ml of UNOsphere SuPrA, 100 g each of CHT ceramic hydroxyapatite Types I and II, 40 µm, CFT ceramic fluoroapatite Type II
732-4650	<b>Bio-Scale Mini Ion Exchange Sampler Pack</b> , includes one 1 ml cartridge each of UNOsphere S, UNOsphere Q, Macro-Prep High Q, Macro-Prep High S, Macro-Prep DEAE
732-4651	<b>Bio-Scale Mini Affinity Sampler Pack</b> , includes one 1 ml cartridge each of IMAC and Affi-Prep protein A, one 5 ml cartridge each of EAE Affi-Gel Blue and Affi-Gel Blue

## Bio-Scale Mini Purification Kits

Pg 49

732-4407	<b>Bio-Scale Mini Apatite Purification Cartridge Kit</b> , includes one each, 5 ml, prepacked, CFT ceramic fluoroapatite Type II, 40 µm and CHT ceramic hydroxyapatite Type I, 40 µm multimodal chromatography media cartridges
732-4408	<b>Bio-Scale Mini mAb Purification Cartridge Kit</b> , includes one each, 5 ml, prepacked, UNOsphere SUPrA affinity media, UNOsphere Q media, and CHT ceramic hydroxyapatite Type I, 40 µm cartridges

## Chromatography Standards

Pg 50

Catalog #	Description	Contents	MW	pI	For Use With
125-0561	<b>Protein Standard for Anion Exchange Chromatography</b> , 6 vials	Equine myoglobin	17,000	6.9	UNO Q columns; Bio-Scale Mini00 UNOsphere Q cartridges; Macro-Prep High Q and DEAE media; UNOsphere Q media
		Conalbumin	77,000	4.9	
		Chicken ovalbumin	45,000	4.6	
		Soybean trypsin inhibitor	21,500	4.5	
125-0562	<b>Protein Standard for Cation Exchange Chromatography</b> , 6 vials	Equine myoglobin	17,000	6.9	UNO S columns; Bio-Scale Mini UNOsphere S cartridges; Macro-Prep High S and CM media; UNOsphere S media
		Ribonuclease A	13,500	8.7	
		Cytochrome c	12,000	10.7	
125-0586	<b>Organic Acid Analysis Standard</b> , 6 vials	Sodium oxalate	134		Aminex HPX-87H column; organic acid analysis kit
		Sodium citrate	294		
		Sodium malate	196		
		Sodium succinate	270		
		Sodium formate	69		
125-0585	<b>Carbohydrate Analysis Standard</b> , 6 vials	Melezitose	504		Aminex HPX-87C column; carbohydrate analysis kit
		Maltose	360		
		Glucose	180		
		Mannose	180		
		Fructose	180		
		Adonitol (ribitol)	152		
151-1901	<b>Gel Filtration Standard</b> , 6 vials	Thyroglobulin	670,000	4.5	Bio-Sil and Bio-Silect SEC columns; Bio-Gel P media
		Bovine γ-globulin	158,000	5.1	
		Chicken ovalbumin	44,000	4.6	
		Equine myoglobin	17,000	6.9	
		Vitamin B <sub>12</sub>	1,350	4.5	