Selection Guide for BAKERBOND™ Process Chromatography Media

Mallinckrodt Baker is dedicated to delivering high-quality Chromatography Products manufactured in a cGMP environment.

We offer our chromatography expertise to our customers to assist them in the following areas:

- Column packing
- Process applications collaboration/consultation
- Custom made Chromatography media and resins
- Pharmaceutical grade solutions and Clean in Place (CIP) agents

Media Selection Tips	
Particle Size / Distribution	Particle size and particle distribution influence column efficiency, separation ability and operating velocity. Particle size and distribution also impact operating pressure. Smaller particles result in higher column pressure as compared to larger particles. However, larger average particle sizes with wide distribution (higher content of fines) can also cause higher pressure drops. Average particle size of 30 µm or higher with a particle size distribution of less than 1.5 can be used in low pressure columns (less than 6 bar). Average particle size of 15 µm to 30 µm can be used in medium pressure columns while particles of less than 15 µm require high pressure columns. Typically, large particles are employed in the beginning of the purification process where large amounts of product need to be purified. Small particles are found in the final purification or polishing step, where smaller amounts of product are being processed. This requires high pressure columns, but of smaller size. Often closely eluting compounds are removed in this step, calling for high efficiencies and therefore small particles. This has the added advantage of yielding narrow bands with highly concentrated product.
Pore Size	Pores should be matched to the molecules to be separated. Interactions between these molecules and the stationary phase take place on the pore surface. While smaller pores offer higher surface areas and therefore capacity, the surface area has to be completely accessible to be effective. This is of particular importance where good mass transfer needs to be maintained at high linear velocities. If particles are not fully porous, larger beads will limit breakthrough capacity at higher linear velocities. Other-wise the dynamic binding capacity will be limited to low flow rates.
Media Shape	Irregular media include fines which have the potential to clog column frits. It thereby increases column pressure and causes inhomogeneous flow (instead of plug flow) within the column bed. This In turn leads to channeling, peak asymmetry as well as to an overall bed instability and further creation of fines. While irregular media tends to be more economical, it typically has a shorter life time compared to spherical media. Spherical media offers lower bed pressure, longer column life and is easier to pack.
Media Base Matrix	Silica matrix offers superior mechanical strength for column operation at high liner velocity and ease in column packing. In addition, it has unique selectivity's due to secondary silica interactions. It offers the ability to use organic solvents such as alcohols as well as cleaning solutions for hydrophobic proteins. It can be cleaned using dilute acids, salts and chaotropic reagents such as urea and guanidine hydro-chloride. MBI's polymeric (non silica) matrix offers high mechanical strength as compared to other soft polymeric resins. As a result It can be operated at a high liner velocity without generating excessive pressure. In addition, it can be operated over a wide pH range of 2 to 14 and can be cleaned or CIP with all common reagents including organic solvents, acids and bases (NAOH).

PRODUCT INFORMATION

SELECTION GUIDE FOR BAKERBOND™ PROCESS CHROMATOGRAPHY MEDIA

Media Selection Tips

Ligand Functionality

	Binding Group	Particle Sizes	Capacity [1, 2] (mg protein/ g packing)	pH Operating Range	pH Stability	Suggested Binding Mobile Phase (A Buffer)	Suggested Elution Mobile Phase (B Buffer)
ABx	COOH, N	5 m, 15 m, 40 m	150–200	4.5–10	2–10	25 mM MES, pH 5.6	500 mM $(NH_4)_2SO_4$ plus 20 mM KH_2PO_4, pH 7.0 or 1M NaOAc, pH 7.0
ABx Plus	COOH, N	40 m	150–200	4.5–10	2–10	25 mM MES, pH 5.6	500 mM $(NH_4)_2SO_4$ plus 20 mM KH_2PO_4, pH 7.0 or 1M NaOAc, pH 7.0
PEI	CH_2CH_2NH	5 m, 15 m, 40 m	150–200	2–7.5	2–10	10 mM KH_2PO_4, pH 6.5 or 25 mM Tris-QAc pH 6.5	500 mM KH_2PO_4, pH 6.0 or 2M NaOAc, ph 6.0
DEAM	$-CH_2-CH_2-N(CH_3)-CH_2-CH_2-$	5 m, 15 m, 40 m	150–200	2–9.0	2–10	25 mM Tris-OAc, pH 5-9	25 mM Tris-OAc, pH 5-9 plus 1M NaCl
QUAT	$-CH_2-CH_2-N^+(CH_3)_2-CH_2-CH_2-$	5 m, 15 m, 40 m	150–200	2–10	2–10	25 mM Tris-OAc, pH 5-8 or 25 mM CAPS, pH 8-10	25 mM Tris-OAc, pH 5-8 plus 1M NaCl or 25 mM CAPS, pH 8-10 plus 1 M NaCl
CBX	COOH	5 m, 15 m, 40 m	150–200	4.5–10	2–10	25 mM MES, pH 5.6 or 10 mM KH_2PO_4, pH 5.6	500 mM $(NH_4)_2SO_4$ plus 20 mM KH_2PO_4, pH 7.0 or 1 MNaOAc, pH 7.0 or 500 mM KH_2PO_4, pH 6.0
CARBOXY-SULFON	COOH, SO_3H	5 m, 15 m, 40 m	150–200	4.5–10	2–10	25 mM MES, pH 5.6 or 10 mM KH_2PO_4, pH 5.6	500 mM $(NH_4)_2SO_4$ plus 20 mM KH_2PO_4, pH 7.0 or 1 MNaOAc, pH 7.0 or 500 mM KH_2PO_4, pH 6.0
Sulfonic	$-SO_3H$	5 m, 15 m, 40 m	150–200	2–10	2–10	25 mM MES, pH 5.6 or 10 mM KH_2PO_4, pH 5.6	500 mM $(NH_4)_2SO_4$ plus 20 mM KH_2PO_4, pH 7.0 or 1 MNaOAc, pH 7.0 or 500 mM KH_2PO_4, pH 6.0
HI-Propyl	C_3	5 m, 15 m, 40 m	150–200	2–10	2–10	2M $(NH_4)_2SO_4$ plus 25 mM KH_2PO_4, pH 7.0	25 mM KH_2PO_4, pH 7.0
HI-Phenyl	$-CH_2CH(OH)CH_2O-C_6H_5$	40 m	100	2–10	2–10	2M $(NH_4)_2SO_4$ plus 25 mM KH_2PO_4, pH 7.0	25 mM KH_2PO_4, pH 7.0
Glutaraldehyde-P	$C(CHO)=C$	40 m	70–100 (Con A)	2–10	2–10	Variable	Variable
WP C_4, C_8, C_{18}	C_4, C_8, C_{18}	5 m, 15 m, 40 m	150 (MW>15,000) 50 (MW<15,000)	2–8	2–8	0.1% TFA in water	0.1% TFA in acetonitrile

1. Capacity by frontal analysis at 50% breakthrough
2. To convert grams to ml packed bed volume: 5 m, 1 g = 1.6 ml packed bed volume; 15 m, 1 g = 2.0 ml packed bed volume; 40 m, 1 g = 3.0 ml packed bed volume

Silica Reverse Phase Process Media with ordered polymeric bonding highly stable over an ex-tended pH range

	Product Number	Product Name/ Description	Bead Properties	pH Range	Available Pack Sizes
High performance purification of peptides and other small organic molecules based on hydrophobic characteristics and molecular shapes.	**7484**	C_{18}, ordered polymeric, end-capped	10 µ, 120 Å, spherical silica	2–8.5	100 g (7484-00); 1 kg (7484-01)
	7485	C_{18}, ordered polymeric, end-capped	15-30 µ, 120 Å, spherical silica	2–8.5	10 g (7485-02); 1 kg (7485-01)
Economic purification of hydrophilic peptides and proteins.	**7025**	C_{18}, ordered polymeric, end-capped	40 µ, 60 Å, irregular silica	2–8.5	100 g (7025-00); 1 kg (7025-01); 2 kg 7025-02); 10 kg (7025-10)
Economic purification of hydrophilic organic molecules.	**7579**	C_{18}, ordered polymeric, non end-capped	50 µ, 120 Å, spherical silica	2–8.5	1 kg (7579-01); 15 kg (7579-15)
	7636	C_{18}, ordered polymeric, end-capped	50 µ, 120 Å, spherical silica	2–8.5	100 g (7636-00); 1 kg (7636-01); 15 kg (7636-15)
High performance purification of strongly hydrophilic peptides and proteins based on hydrophobic characteristics and molecular shapes.	**7191**	C_{18}, ordered polymeric, end-capped	15 µ, 300 Å, spherical silica	2–8.5	500 g (7191-05); 5 kg (7191-07); Other sizes available
	7207	C_{18}, ordered polymeric, end-capped	15-30 µ, 300 Å, spherical silica	2–8.5	500 g (7207-05); 5 kg (7207-07); 10 kg (7207-08); Other sizes available
Economic purification of hydrophilic peptides and proteins.	**7247**	C_{18}, ordered polymeric, end-capped	50 µ, 300 Å, spherical silica	2–8.5	100 g (7247-03); 1 kg (7247-01); Other sizes available
Economic purification of moderately hydrophobic organic molecules.	**7901**	C_8, ordered polymeric, end-capped	50 µ, 120 Å, spherical silica	2–8.5	1 kg (7901-01); 4 kg (7901-04); 5 kg (7901-05);15 kg (7901-15)
High performance purification of moderately hydrophobic proteins and peptides.	**7190**	C_8, ordered polymeric, end-capped	15 µ, 300 Å, spherical silica	2–8.5	10 g (7190-02); 500 g (7190-05)
High performance purification of strongly hydrophobic proteins and peptides.	**7179**	C_4, ordered polymeric, end-capped	15 µ, 300 Å, spherical silica	2–8.5	500 g (7179-05); 5 kg (7179-07); 10 kg (7179-08); Other sizes available

Note: Typical applications for 300 Å media include: Ribonuclease, Lysozyme, cytochrome-C, Erythropoietin* (EPO), Insulin, Interferon, hGh, Interleukin-2, removal of endotoxins & viruses.

PRODUCT INFORMATION
SELECTION GUIDE FOR BAKERBOND™ PROCESS CHROMATOGRAPHY MEDIA

J.T.Baker®

Silica Based Hydrophobic Interaction (HIC) Media

	Product Number	Product Name/ Description	Bead Properties	pH Range	Available Pack Sizes
Purification of proteins based on differential salt induced hydrophobicity	**7182**	Hi-Propyl™	15 µ, 300 Å, spherical silica	2–9.0	10 g (7182-02); 500 g (7182-05)
	7285	Hi-Propyl	40 µ, 275 Å, irregular silica	2–9.0	500 g (7285-05); 1 kg (7285-01); 5 kg (7285-05) Other sizes available

Note: Typical applications for 300 Å media include: Ribonuclease, Lysozyme, cytochrome-C, Erythropoietin* (EPO), Insulin, Interferon, hGh, Interleukin-2, removal of endotoxins & viruses.

Polymeric Based Hydrophobic Interaction (HIC) Media

	Product Number	Product Name/ Description	Bead Properties	pH Range	Available Pack Sizes
Purification of proteins based on differential salt induced hydrophobicity	**7688**	Poly HI-Propyl	35 µ, 500 Å, spherical polymer	4.5–14.0	50 mL (7688-01); 100 mL (7288-02); 500 mL (7688-03); 5 L (7688-05)

Note: Typical applications for 500 Å media include: Monoclonal antibodies, proteins and larger target molecules. Polymeric resin offers both mechanical stability and CIP with standard solutions such as NaOH

Silica Based Ion Exchangers with hydrophilic PEI chemistry, mixed mode, high linear velocities and ion exchange capacity

	Product Number	Product Name/ Description	Bead Properties	pH Range	Available Pack Sizes
Weak cation exchanger with capacity of 0.12 meq/ml.	**7157**	PEI & carboxylic acid	15 µ, 300 Å, spherical silica	2–9.0	500 g (7157-05); 5 kg (7157-07); 10 kg (7157-10); Other sizes available
Weak anion exchanger with capacity of 0.25 meq/ml.	**7180**	Polyethylene imine (PEI)	15 µ, 300 Å, spherical silica	2–9.0	10 g (7180-02); 100 g (7180-00); 500 g (7180-05); Other sizes available
Strong anion exchanger for separation of acidic proteins. Cap. of 0.25 meq/ml.	**7183**	PEI & quaternary amine	15 µ, 300 Å, spherical silica	2–9.0	10 g (7183-02); Other sizes available
Strong cation and weak cation and weak anion exchanger for separation of weakly to highly basic proteins with close isoelectric point. Cap. of 0.2 meq/ml.	**7184**	Carboxy-Sulfon	15 µ, 300 Å, spherical silica	2–9.0	10 g (7184-02); 500 g (7184-05); Other sizes available
	7252	Carboxy-Sulfon	40 µ, 275 Å, irregular silica	2–9.0	10 g (7252-02); 100 g (7252-00); 500 g (7252-05); 1 kg (7252-00); Other sizes available
Strong anion exchanger for separation of acidic proteins with anion exchange capacity of 0.25 meq/ml.	**7472**	DEAM	15 µ, 300 Å, spherical silica	2–9.0	10 g (7472-02); 1 kg (7472-00); Other sizes available

Note: Typical applications for 300 Å media include: Ribonuclease, Lysozyme, cytochrome-C, Erythropoietin* (EPO), Insulin, Interferon, hGh, Interleukin-2, removal of endotoxins and viruses.

PRODUCT INFORMATION

SELECTION GUIDE FOR BAKERBOND™ PROCESS CHROMATOGRAPHY MEDIA

J.T.Baker®

Polymeric Ion Exchangers with hydrophilic PEI chemistry, mixed mode, high linear velocities and ion exchange capacity

	Product Number	Product Name/ Description	Bead Properties	pH Range	Available Pack Sizes
Poly ABx weak cation and weak anion exchanger for selective purification of proteins and antibodies	**7586**	Poly ABx (PEI & carboxylic acid)	35µ, 500 Å, spherical polymer	2–14.0	50 mL (7586-01); 100 mL (7586-02); 500 mL (7586-03); 5 L (7586-05)
PolyPEI, weak anion exchanger for purification of acidic proteins and peptides, endotoxins, DNA	**7585**	Poly PEI (Polyethylene imine)	35 µ, 500 Å, spherical polymer	2–14.0	50 mL (7585-01); 100 mL (7585-02); 500 mL (7585-03); 5 L (7585-05)
PolyCSx, primary strong cation plus weak cation and weak anion exchanger for purification of basic proteins	**7587**	Poly CSX (PEI & carboxylic acid and sulfonic acid)	35 µ, 500 Å, spherical polymer	2–14.0	50 mL (7587-01); 100 mL (7587-02); 500 mL (7587-03); 5 L (7587-05)
PolyQuat, strong anion exchanger for purification of acidic proteins, endotoxins and DNA	**7603**	PolyQuat (PEI & quaternary amine)	35 µ, 500 Å, spherical polymer	2–14.0	50 mL (7603-01); 100 mL (7603-02); 500 mL (7603-03); 5 L (7603-05)

Note: Typical applications for 500 Å media include: Monoclonal antibodies, proteins and larger target molecules. Polymeric resin offers both me-chanical stability and CIP with standard solutions such as NaOH

PRODUCT INFORMATION
SELECTION GUIDE FOR BAKERBOND™ PROCESS CHROMATOGRAPHY MEDIA

Mallinckrodt Baker, Inc.
222 Red School Lane • Phillipsburg, NJ 08865
Tel: 800-582-2537 • FAX: 908-859-6905
www.mallbaker.com • E-mail: mbi@covidien.com

 Lit #1002 10/08

J.T.Baker®