HPLC Bonded Phases

Phase	Description	Structure
Si	Silica Classic normal phase material. Suitable for separating polar non-ionic organic compounds.	—Si— OH
C1	TMS, SAS, Trimethyl Reversed phase material. Unique selectivity for polar and multifunctional compounds.	—Si— CH_3
C2	RP-2, Dimethyl Reversed phase material.	—Si— C_2H_5
C3	Propyl Reversed phase material. Used in Hydrophobic Interaction Chromatography (HIC) of proteins and peptides.	—Si— C_3H_7
C4	Butyl Reversed phase material. Useful for HIC and ion-pairing chromatography. Offers less retention than C8 and C18 phases for non-polar solutes. When bonded to 300 Å silica, it is an ideal phase for analyzing and purifying large proteins and macromolecules.	—Si— C_4H_9
C5	Pentyl Reversed phase material. Useful for reversed phase separation of hydrophobic proteins when bonded to 300 Å silica. More hydrolytically stable than C4.	—Si— C_5H_{11}
C6	Hexyl Reversed phase material. Useful for ion-pairing chromatography.	—Si— C_6H_{13}
C8	MOS, RP-8, LC8, Octyl Reversed phase material. Similar selectivity to C18 but less retentive. Wide applicability (e.g., pharmaceuticals, nucleosides, steroids).	—Si— C_8H_{17}
C12	Dodecyl Reversed phase material. Shorter chain length provides higher bonded phase coverage than most C18 columns for sharp peak shapes of non-polar and moderately polar compounds.	—Si— $C_{12}H_{25}$
C18	ODS, RP-18, LC18, Octadecyl Classic reversed phase material. Most retentive for non-polar solutes. Excellent for ion-pairing chromatography. Wide applicability (e.g., nucleosides, nucleotides, steroids, pharmaceuticals, vitamins, fatty acids, environmental compounds). When bonded to 300 Å silica, this phase is perfect for separating small proteins and macromolecules.	—Si— $C_{18}H_{37}$
CN	CPS, PCN, Cyano, Cyanopropyl, Nitrile Reversed phase or normal phase material. Slightly polar, unique selectivity for polar compounds in both reversed phase and normal phase modes. Equilibrates very rapidly, suitable for gradient separations. Useful for many pharmaceutical applications (e.g., tricyclic antidepressants).	—Si— $CH_2CH_2CH_2CN$

Phase	Description	Structure
NH_2	APS, Amino, Amino Propyl Silyl Reversed phase, normal phase, or weak anion exchange material. **Reversed phase:** useful for separating carbohydrates. **Normal phase:** alternative selectivity to silica, not deactivated by small amounts of water. **Ion exchange:** weak anion-exchanger when used with buffers; separates anions and organic acids.	—Si— $CH_2CH_2CH_2NH_2$
NO_2	Nitro Normal phase material. Separates aromatic compounds and compounds with double bonds.	—Si— NO_2
OH	Diol, Glycerol Reversed phase or normal phase material. Used for Gel Filtration Chromatography (GFC) of proteins and peptides. Normal phase: similar selectivity to silica, not deactivated by small amounts of water.	—Si— $CH_2CH_2CH_2OCH_2CHCH_2$ (OH OH)
Phenyl	C_6H_5 Reversed phase material. Useful for analyzing aromatic compounds. When bonded to 300 Å silica, this phase is useful for HIC.	—Si— $CH_2CH_2CH_2$ 
Phenyl-Ether	$C_6H_5(C_3H_6O$ Linker) Reversed phase material. Used to separate extremely polar aromatic compounds. Alternative selectivity to Phenyl-hexyl and classic phenyl phases.	—Si— $CH_2CH_2CH_2O$ 
Phenyl-Hexyl	C_6H_5 (C_6H_{12} Linker) Reversed phase material. Uses a patented hexyl linker as opposed to traditional propyl. Offers selectivity of a phenyl phase with greatly enhanced stability.	—Si— $CH_2CH_2CH_2CH_2CH_2CH_2$ 
PFP	C_6F_5 Reversed phase material. Useful for analyzing substituted aromatic compounds. Alternative selectivity to phenyl-hexyl, classic phenyl phases, and alkyl phases.	—Si— $CH_2CH_2CH_2$ 
SAX	Q, Quaternary amine, Strong Base Ion-exchange material. Strong anion-exchangers (basic) are useful for separating nucleotides, nucleosides, and organic acids.	—Si— $CH_2CH_2CH_2N^+(CH_3)_3$
SCX	S, Sulfonic Acid, Strong Acid Ion-exchange material. Strong cation-exchangers (acidic) are useful for separating organic bases.	—Si— $CH_2CH_2CH_2SO_2OH$
WAX	DEAE, Diethylaminoethyl, Weak Base, PEI, Polyethyleneimine Ion-exchange material. Weak anion-exchangers (acidic) are useful for analyzing and purifying acidic proteins and peptides.	—Si— $CH_2CH_2N(CH_2CH_3)_2$ —Si— CH_2CH=NH
WCX	CM, Carboxymethyl, Weak Acid Ion-exchange material. Weak cation-exchangers (basic) are useful for analyzing and purifying basic proteins and peptides.	—Si— CH_2COOH

a selection of
HPLC Material Sorbent Characteristics

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Phenomenex Sorbents *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping	pH Range	USP Packing
PolymerX RP-1	Spher. 3, 5, 7, 10, 15	100	—	410	0	N/A	No	0-14	L21
PrimeSphere Si	Spher. 5, 10, 15	110	—	—	0	0	No	—	L3
PrimeSphere C8	Spher. 5, 10, 15	110	—	—	10, Monomeric	—	Yes	2.5-7.5	L7
PrimeSphere C18-MC	Spher. 5, 10	110	—	—	13, Monomeric	—	Yes	2.5-7.5	L1
PrimeSphere C18-HC	Spher. 5, 10, 15	110	—	—	20, Monomeric	—	Yes	2.5-7.5	L1
PrimeSphere C4	Spher. 5, 10	300	—	110	2, Monomeric	2.61	Yes	2.5-7.5	L26
PrimeSphere C18-MC	Spher. 5, 10	300	—	110	7, Monomeric	2.93	Yes	2.5-7.5	L1
Prodigy ODS(2)	Spher. 5	150	1.1	310	18.5, Monomeric	3.50	Yes	2.0-9.0	L1
Prodigy C8	Spher. 5	150	1.1	310	12.6, Monomeric	5.00	Yes	2.0-9.0	L7
Prodigy ODS (3)	Spher. 3, 5, 10	100	1.0	450	15.5, Monomeric	—	Yes	2.0-9.0	L1
Prodigy Phenyl (PH-3)	Spher. 5	100	—	450	10.0, Polymeric	—	No	2.0-9.0	L11
SphereClone Silica	Spher. 3, 5, 10	80	—	200	-	—	No	—	L3
SphereClone C6	Spher. 3, 5, 10	80	—	200	6	—	Yes	2.5-7.5	L15
SphereClone C8	Spher. 3, 5, 10	80	—	200	6	—	Yes	2.5-7.5	L7
SphereClone ODS (1)	Spher. 3, 5, 10	80	—	200	7	—	Partial	2.5-7.5	L1
SphereClone ODS (2)	Spher. 3, 5, 10	80	—	200	12	—	Yes	2.5-7.5	L1
SphereClone NH_2	Spher. 3, 5, 10	80	—	200	2	—	No	2.5-7.5	L8
SphereClone Phenyl	Spher. 3, 5, 10	80	—	200	3	—	Partial	2.5-7.5	L11
SphereClone SAX	Spher. 3, 5, 10	80	—	200	—	—	No	2.5-7.5	—
Synergi Fusion-RP	Spher. 2.5	100	—	400	12	—	Yes	1.5-10.0	L1
Synergi Max-RP	Spher. 2.5	100	—	400	17	—	Yes	1.5-10.0	—
Synergi Hydro-RP	Spher. 2.5	100	—	400	19	—	Proprietary	1.5-7.5	L1
Synergi Polar-RP	Spher. 2.5	100	—	400	11	—	Proprietary	1.5-7.0	—
Synergi Fusion-RP	Spher. 4, 10	80	1.05	475	12	—	Yes	1.5-10.0	L1
Synergi Max-RP	Spher. 4, 10	80	1.05	475	17	3.21	Yes	1.5-10.0	—
Synergi Hydro-RP	Spher. 4, 10	80	1.05	475	19	2.45	Proprietary	1.5-7.5	L1
Synergi Polar-RP	Spher. 4, 10	80	1.05	475	11	3.15	Proprietary	1.5-7.0	L11
Ultracarb C8	Spher. 5	60	0.80	550	14, Monomeric	2.71	Yes	2.5-7.5	L7
Ultracarb ODS (20)	Spher. 3, 5, 7	90	0.75	370	22, Monomeric	3.53	Yes	2.5-7.5	L1
Ultracarb ODS (30)	Spher. 5, 7	60	0.80	550	31, Monomeric	4.06	Yes	2.5-9.0	L1

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Other Sorbents

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping
Agilent Technologies (HP)							
Zorbax ODS	Spher. 3,5,7	70	—	300	20	—	Yes
Zorbax C8	Spher. 3,5,7	70	—	300	12	—	Yes
Zorbax CN	Spher. 3,5,7	70	—	300	7	—	Yes
Zorbax Phenyl	Spher. 3,5,7	70	—	300	12	—	Yes
Zorbax TMS	Spher. 5	70	—	300	4	—	n/a
Zorbax NH_2	Spher. 5,7	70	—	300	4	—	No
Zorbax Eclipse Plus C18	Spher. 1.8, 3.5, 5	95	—	160	8	—	Yes, double
Zorbax Eclipse Plus C8	Spher. 1.8, 3.5, 5	95	—	160	8	—	Yes, double
Zorbax Eclipse XDB-C18	Spher. 1.8, 3.5, 5, 7	80	—	180	10	—	Yes, double
Zorbax Eclipse XDB-C8	Spher. 1.8, 3.5, 5, 7	80	—	180	7.6	—	Yes, double
Zorbax Eclipse XDB-Phenyl	Spher. 1.8, 3.5, 5, 7	80	—	180	7.2	—	Yes, double
Zorbax Eclipse XDB-CN	Spher. 1.8, 3.5, 5, 7	80	—	180	4.3	—	Yes, double
Zorbax SB-C18	Spher. 1.8, 3.5, 5	80	—	180	10	—	No
Zorbax SB-C8	Spher. 1.8, 3.5, 5	80	—	180	5.5	—	No
Zorbax SB-C3	Spher. 1.8, 3.5, 5	80	—	180	4	—	No
Zorbax SB-Phenyl	Spher. 1.8, 3.5, 5	80	—	180	5.5	—	No
Zorbax SB-CN	Spher. 1.8, 3.5, 5	80	—	180	4	—	No
Zorbax SB-Aq	Spher. 1.8, 3.5, 5	80	—	180	proprietary	—	No
Zorbax 300SB-C18	Spher. 3.5, 5, 7	300	—	45	2.8	—	No
Zorbax 300SB-C8	Spher. 3.5, 5, 7	300	—	45	1.5	—	No
Zorbax 300SB-C3	Spher. 3.5, 5, 7	300	—	45	1.1	—	No
Zorbax 300SB-CN	Spher. 3.5, 5, 7	300	—	45	1.2	—	No
Zorbax Bonus-RP	Spher. 3.5, 5, 7	80	—	180	9.5	—	Yes, triple
Zorbax Extend-C18	Spher. 1.8, 3.5, 5	80	—	180	12.5	—	Yes, double
Zorbax 300 Extend-C18	Spher. 3.5, 5	80	—	180	4	—	Yes, double
Zorbax Rx-C18	Spher. 3.5, 5, 7	80	—	180	12	—	No
Zorbax Rx-C8	Spher. 3.5, 5, 7	80	—	180	5.5	—	No

a selection of

HPLC Material Sorbent Characteristics

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Other Sorbents *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %		Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping
Alltech Associates, Inc. / Vydac (Grace Davison Discovery Sciences)								
Adsorbosphere C18	Spher. 3, 5, 10	80	—	200	12.0,	Monomeric	2.99	Yes
Adsorbosphere HS	Spher. 3, 5, 7	60	—	350	20.0,	Monomeric	3.27	Yes
Alltima AQ	Spher. 3, 5	100	—	—	15,	Polymeric	—	Yes
Alltima C18	Spher. 5, 10	100	—	—	16,	Monomeric	—	Yes
Alltima C8	Spher. 5, 10	100	—	—	9,	Monomeric	—	Yes
Alltima HP C18	Spher. 3, 5, 10	190	—	200	12		—	Yes
Alltima HP C18 AQ	Spher. 3, 5, 10	100	—	450	20		—	Yes
Alltima HP EPS C18	Spher. 3, 5, 10	190	—	200	4		—	No
Alltima HP C18 HiLoad	Spher. 3, 5, 10	100	—	450	24		—	Yes
Alltima HP C18 Amide	Spher. 3, 5, 10	190	—	200	12		—	Yes
Alltima HP C8	Spher. 3, 5, 10	190	—	200	8		—	Yes
Alltime HP Cyano	Spher. 3, 5, 10	190	—	200	4		—	Yes
Alltima HP Silica	Spher. 3, 5, 10	100	—	450	—		—	n/a
Alltima HP HILIC	Spher. 3, 5, 10	120	—	230	—		—	n/a
Apex C2	Spher. 3, 5, 10	100	0.77	170	2		3.43	—
Apex C8	Spher. 3, 5, 10	100	0.77	170	7		3.84	Yes
Apex C8e	Spher. 3, 5, 10	100	0.77	170	8		4.47	Yes
Apex CN	Spher. 3, 5, 10	100	0.77	170	4		3.57	—
Apex ODS-1	Spher. 3, 5, 10	100	0.77	170	10		2.83	Yes
Apex ODS-2	Spher. 3, 5, 10	100	0.77	170	10.5		3	Yes
Apex Phenyl	Spher. 3, 5, 10	100	0.77	170	9		4.61	—
Apollo C18	Spher. 5	100	—	340	15		—	Yes
Apollo Phenyl	Spher. 5	100	—	340	8		—	Yes
Denali	—	120	—	—	—	Monomeric	—	—
Everest	—	300	—	—	—	Monomeric	—	—
Platinum C18	Spher. 1.5, 3, 5,10	100	0.51	200	6,	Monomeric	—	Yes
Platinum C18 EPS	Spher. 1.5, 3, 5,10	100	0.78	200	5,	Monomeric	—	No
Platinum C18-300	Spher. 5,10	300	0.78	100	—	Monomeric	—	Yes
Platinum C4-300	Spher. 5,10	300	0.78	100	—	Monomeric	—	Yes
Platinum C8	Spher. 3, 5,10	100	0.51	200	4,	Monomeric	—	Yes
Platinum C8 EPS	Spher. 3, 5,10	100	0.51	200	2.5,	Monomeric	—	No
Platinum C8-300	Spher. 5,10	300	0.78	100	—	Monomeric	—	Yes
Platinum/Platinum EPS	Spher. 3,5,10	300	0.78	100	—		—	—
Prevail C18	Spher. 3, 5	110	—	350	15,	Monomeric	—	Yes
Prevail C8	Spher. 3, 5	110	—	350	8,	Monomeric	—	Yes
Prevail Phenyl	Spher. 3, 5	110	—	350	7,	Monomeric	—	Yes
Vydac 201SP (C18)	Spher. 5, 10	90	0.8	450	13.5		1.53	Yes
Vydac 201TP (C18)	Spher. 5, 10	300	0.6	90	8,	Polymeric	4.16	Yes
Vydac 208TP (C8)	Spher. 3, 5, 10	300	0.6	90	—	Polymeric	—	—
Vydac 214TP (C4)	Spher. 3, 5, 10	300	0.6	90	3,	Polymeric	4.89	Yes
Vydac 218TP (C18)	Spher. 3, 5, 10	300	0.6	90	8,	Polymeric	4.16	Yes
Vydac 219 TP (Phenyl)	Spher. 3, 5, 10	300	0.6	90	5		4.53	—
Vydac 238 TP (C18)	Spher. 3, 5, 10	300	0.6	90	—	Monomeric		—
Beckman Coulter								
Ultrasphere	Spher. 3, 5	80	—	—	—		—	Yes
Eka Chemicals								
Kromasil Si	Spher. 3.5, 5, 7, 10, 13, 16	100	0.9	340	0		0	No
Kromasil C1	Spher. 5, 7, 10, 13, 16	100	0.9	340	4.7,	Monomeric	4.3	Yes
Kromasil C4	Spher. 3.5, 5, 7, 10, 13, 16	100	0.9	340	8,	Monomeric	3.8	Yes
Kromasil C8	Spher. 3.5, 5, 7, 10, 13, 16	100	0.9	340	12,	Monomeric	3.6	Yes
Kromasil C18	Spher. 3.5, 5, 7, 10, 13, 16	100	0.9	340	19,	Monomeric	3.1	Yes
Kromasil NH2	Spher. 3.5, 5, 7, 10, 13, 16	100	0.9	340	—		—	Yes
G.L. Science								
Inertsil C8	Spher. 5	150	—	320	10.5		3.26	Yes
Inertsil Phenyl	Spher. 5	150	—	320	10.0		2.77	Yes
Inertsil C4	Spher. 5	150	—	320	7.5		3.76	Yes
Inertsil Si	Spher. 5	150	—	320	0		0	
Inertsil ODS	Spher. 5	80	—	450	17.5		—	Yes
Inertsil ODS Prep	Spher. 10	100	—	350	14		—	Yes
Inertsil ODS (2)	Spher. 5	150	—	320	18.5		3.22	Yes
Inertsil ODS (3)	Spher. 3, 5	100	—	450	15		—	Yes

a selection of
HPLC Material Sorbent Characteristics

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Other Sorbents *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping
Hamilton							
PRP-1	Spher. 3, 5, 7, 10	100	—	415	0	N/A	No
PRP-3	Spher. 10	300	—	—	0	N/A	No
PRP X-100	Spher. 3, 5,10	—	—	—	—	0.19 meq/g	—
PRP X-200	Spher. 3,10	—	—	—	—	4 eq/g	—
PRP X-300	Spher. 3, 7	—	—	—	—	0.17 meq/g	—
PRP X-400	Spher. 7	N/A	—	—	—	—	—
PRP X-500	Spher. 7	N/A	—	—	—	—	—
PRP X-600	Spher. 7	N/A	—	—	—	—	—
HC-40	Spher. 10, 15	—	—	—	—	5 meq/g	—
HC-75	Spher. 9	—	—	—	—	5 meq/g	No
Macherey-Nagel							
Nucleodur Gravity C18	Spher. 3, 5	110	0.9	340	18	—	Yes
Nucleodur Gravity C8	Spher. 5	110	0.9	340	11	—	Yes
Nucleodur Pyramid C18	Spher. 5	110	0.9	340	14	—	Yes
Nucleodur CN	Spher. 5	110	0.9	—	7, Monomeric	—	—
Nucleodur C18 ec	Spher. 5	100	—	—	17.5	—	Yes
Nautilus C18	Spher. 3, 5	100	—	—	16, Monomeric	—	Yes
Protect I	Spher. 3, 5	100	—	—	11, Monomeric	—	Yes
Nucleosil C18 HD	Spher. 3, 5, 7	100	—	—	20, Monomeric	—	Yes
Nucleosil C8 HD	Spher. 3, 5	100	—	—	13, Monomeric	—	Yes
Nucleosil C18 AB	Spher. 5	100	—	—	25, Monomeric	—	Yes
Nucleosil Si	Spher. 5, 7, 10	50	0.8	420	0	0	No
Nucleosil 100 Si	Spher. 5, 10	100	1.0	350	0	0	No
Nucleosil C8	Spher. 3, 5, 10	100	1.0	350	9	2.49	No
Nucleosil C18	Spher. 3, 5, 10	100	1.0	350	15	2.06	Yes
Nucleosil CN	Spher. 5, 10	100	1.0	350	4	1.73	No
Nucleosil NH_2	Spher. 5, 10	100	1.0	350	—	—	No
Nucleosil SA	Spher. 5, 10	100	1.0	350	1meq/g	N/A	No
Nucleosil SB	Spher. 5, 10	100	1.0	350	1meq/g	N/A	No
Nucleosil Si	Spher. 3, 5, 7, 10	120	0.65	200	0	0	No
Nucleosil C4	Spher. 5	120	0.65	200	2	—	Yes
Nucleosil C8	Spher. 3, 5, 7, 10	120	0.65	200	6.5	3.27	No
Nucleosil C18	Spher. 3, 5, 7, 10	120	0.65	200	11	2.69	Yes
Nucleosil Si	Spher. 3, 5, 7, 10	300	0.8	100	0	0	No
Nucleosil C4	Spher. 3, 5, 7, 10	300	0.8	100	2	1.41	Yes
Nucleosil C8	Spher. 3, 5, 7, 10	300	0.8	100	3	1.72	Yes
Nucleosil C18	Spher. 3, 5, 7, 10	300	0.8	100	6.5	2.72	Yes
Merck KGaA, Darmstadt, Germany							
Chromolith RP-18 EC	Monolithic	130	1.0	300	18	—	Yes
Chromolith RP-8 EC	Monolithic	130	1.0	300	11	—	Yes
Chromolith Si	Monolithic	130	1.0	300	—	—	—
LiChrosorb RP-sel B	Irreg. 5, 10	60	0.7	550	12	2.5	Yes
LiChrosorb CN	Irreg. 5, 10	100	1.0	300	6.5	5.3	No
LiChrosorb NH_2	Irreg. 5, 10	100	1.0	300	4.2	4.2	No
LiChrosorb DIOL	Irreg. 5, 10	100	1.0	300	7.5	4.2	No
LiChrospher Si 60	Spher. 4, 5, 10	60	0.95	650	0	0	No
LiChrospher Si 100	Spher. 5, 10	100	1.25	420	0	0	No
LiChrospher RP-8	Spher. 4, 5, 10	100	1.25	350	12.5	4.1	No
LiChrospher RP-18	Spher. 4, 5, 10	100	1.25	350	21.4	3.9	No
LiChrospher RP-8e	Spher. 4, 5, 10	100	1.25	350	13	4.2	Yes
LiChrospher RP-18e	Spher. 4, 5, 10	100	1.25	350	21.5	—	Yes
LiChrospher CN	Spher. 4, 5, 10	100	1.25	350	—	—	—
LiChrospher NH_2	Spher. 4, 5, 10	100	1.25	350	4.5	3.8	—
LiChrospher Diol	Spher. 4, 5, 10	100	1.25	350	8.3	4.0	—
LiChrospher RP-sel B	Spher. 4, 5	60	0.9	360	11.5	3.5	Yes
Purospher	Spher. 5	80	—	500	—	—	Yes

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Other Sorbents *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping
Polymer Labs							
PLRP-S 100	Spher. 5, 8, 10	100	—	550	0	0	0
PLRP-S 300	Spher. 8, 10	300	—	—	0	0	0
PL-SAX 1000	Spher. 5, 8	1000	—	—	—	—	—
PL-SCX 1000	Spher. 5, 8	1000	—	—	0	—	—
Restek							
Allure C18	Spher. 3, 5	60	—	—	27	—	Yes
Allure Acidix	Spher. 3, 5	60	—	—	9	—	No
Allure Basix	Spher. 3, 5	60	—	—	12	—	Yes
Allure PFP Propyl	Spher. 3, 5	60	—	—	17	—	Yes
Ultra C18	Spher. 3, 5	100	—	—	20	—	Yes
Ultra Aqueous C18	Spher. 3, 5	100	—	—	—	—	No
Ultra C8	Spher. 3, 5	100	—	—	12	—	Yes
Ultra C4	Spher. 3, 5	100	—	—	9	—	Yes
Ultra Phenyl	Spher. 3, 5	100	—	—	10	—	Yes
Ultra Cyano	Spher. 3, 5	100	—	—	8	—	Yes
Ultra Amino	Spher. 3, 5	100	—	—	2	—	—
Ultra PFP	Spher. 3, 5	100	—	—	7	—	Yes
Pinnacle II C18	Spher. 3, 5	110	—	—	13	—	Yes
Pinnacle II C8	Spher. 3, 5	110	—	—	7	—	Yes
Pinnacle II Phenyl	Spher. 3, 5	110	—	—	6	—	Yes
Pinnacle II Cyano	Spher. 3, 5	110	—	—	4	—	Yes
Pinnacle II Amino	Spher. 3, 5	110	—	—	2	—	—
Supelco							
ABZ	Spher. 5	120	—	170	12	3.4	Yes
ABZ+plus	Spher. 5	120	—	170	12	3.4	Yes
Ascentis C18	Spher. 3, 5	100	—	450	25	—	—
Ascentis RP-Amide	Spher. 3, 5	100	—	450	19.5	—	Yes
Supelcosil LC-18-DB	Spher. 3, 5	120	0.6	170	11	3.1	Yes
Supelcosil LC-8-DB	Spher. 3, 5	120	0.6	170	6	3.2	Yes
Supelcosil LC-18-S	Spher. 5	120	0.6	170	11	—	Yes
Supelcosil LC-18-T	Spher. 3, 5	120	0.6	170	12.3	—	Yes
Supelcosil LC-DP	Spher. 5	120	0.6	170	6	2.4	Yes
Supelcosil LC-CN	Spher. 3, 5	120	0.6	170	4	3.5	Yes
Supelcosil LC-NH_2	Spher. 3, 5	120	0.6	170	3	5.1	Yes
Supelcosil LC-SAX1	Spher. 5	120	0.6	170	—	—	—
Supelcosil LC-SCX	Spher. 5	120	0.6	170	—	—	—
Supelcosil LC-PAH	Spher. 3, 5	120	0.6	170	—	—	—
Supelcosil LC-318	Spher. 5	300	0.5	75	6	3.6	Yes
Supelcosil LC-308	Spher. 5	300	0.5	75	3.5	4.1	Yes
Supelcosil LC-304	Spher. 5	300	0.5	75	2.7	5.2	Yes
Supelcosil LC-3DP	Spher. 5	300	0.5	75	4	3.6	Yes
Suplex pKB-100	Spher. 5	120	0.6	170	12.5	—	Yes
Discovery C18	Spher. 5	180	1.0	200	12	3.0	Yes
Discovery HS C18	Spher. 3, 5, 10	120	—	300	20	3.8	Yes
Discovery RP-Amide (C16)	Spher. 5	180	1.0	200	11	2.6	Yes
Discovery C8	Spher. 5	180	1.0	200	7.5	3.4	Yes
Discovery CN	Spher. 5	180	1.0	200	4.5	3.5	Yes
Discovery HS F5	Spher. 3, 5, 10	120	—	300	12	4	Yes
Discovery HS PEG	Spher. 3, 5, 10	120	—	300	12	3.8	No
Discovery Bio Wide Pore C18	Spher. 3, 5, 10	300	—	100	9.2	4	Yes
Discovery Bio Wide Pore C8	Spher. 3, 5, 10	300	—	100	5	4	Yes
Discovery Bio Wide Pore C5	Spher. 3, 5, 10	300	—	100	3.5	4	Yes

a selection of

HPLC Material Sorbent Characteristics

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Other Sorbents *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping
Thermo Fisher Scientific Inc.							
Hypersil GOLD C18	Spher. 3, 5, 7	175	—	220	10	—	Yes
Hypersil BDS C8	Spher. 3, 5	130	0.65	170	7.0, Monomeric	3.6	Yes
Hypersil BDS C18	Spher. 3, 5	130	0.65	170	11.0, Monomeric	3.6	Yes
Hypersil BDS Phenyl	Spher. 3, 5	130	0.65	170	5.0, Monomeric	2.5	Yes
Hypersil BDS CN	Spher. 3, 5	130	0.65	170	4.0, Monomeric	2.5	Yes
Hypersil C1 (SAS)	Spher. 3, 5, 10	120	0.7	170	2.5, Monomeric	5.29	Yes
Hypersil C8 (MOS)	Spher. 3, 5, 10	120	0.7	170	6.5, Monomeric	3.85	No
Hypersil C8 (MOS-2)	Spher. 3, 5, 10	120	0.7	170	6.5, Monomeric	3.85	Yes
Hypersil C18 (ODS)	Spher. 3, 5, 10	120	0.7	170	10.0, Monomeric	2.84	Yes
Hypersil (ODS-2)	Spher. 3, 5, 10	80	—	220	11	—	Yes
Hypersil Phenyl	Spher. 3, 5, 10	120	0.7	170	5.0, Monomeric	2.40	No
Hypersil Phenyl-2	Spher. 5, 10	120	0.7	170	5.0, Monomeric	2.40	Yes
Hypersil CN (CPS)	Spher. 3, 5, 10	120	0.7	170	4.0, Monomeric	3.55	No
Hypersil CN (CPS-2)	Spher. 5, 10	120	0.7	170	4.0, Monomeric	3.55	Yes
Hypersil NH_2 (APS-2)	Spher. 3, 5, 10	120	0.7	170	1.9, Monomeric	2.05	No
Hypersil SAX	Spher. 5	120	0.7	170	2.5, Monomeric	1.56	Yes
Hypersil Green PAH	Spher. 3, 5	120	0.7	170	13.5, Polymeric	3.2	Yes
Hypersil Green ENV	Spher. 3, 5	120	0.7	170	7.0, Monomeric	3.5	Yes
Hypersil C4 (Butyl)	Spher. 5	300	0.6	80	2.0, Monomeric	4.8	Yes
Hypersil C8 (Octyl)	Spher. 5, 10	300	0.6	80	3.3, Monomeric	5.24	Yes
Hypercarb	Spher. 5, 7	250	-	120	100	—	—
HyperPrep HS Silica	Spher. 8, 12, 15	100	0.7	300	—	—	No
HyperPrep HS C8	Spher. 8, 12, 15	100	0.7	300	16.0	—	Yes
HyperPrep HS C18	Spher. 8, 12, 15	100	0.7	300	10.0	—	Yes
HyPURITY C18	Spher. 5	190	1.0	200	13	3.2	Yes
Aquasil C18	Spher. 3, 5	100	—	310	12	—	—
BetaBasic C18	Spher. 3, 5	150	—	200	13	—	Yes
BetaBasic C8	Spher. 3, 5	150	—	200	7	—	Yes
BetaBasic C4	Spher. 3, 5	150	—	200	6	—	Yes
BetaBasic Phenyl	Spher. 3, 5	150	—	200	7	—	Yes
BetaBasic CN	Spher. 3, 5	150	—	200	5	—	Yes
Betasil C18	Spher. 3, 5	100	—	310	20	—	Yes
Betasil C8	Spher. 3, 5	100	—	310	12	—	Yes
BioBasic C18	Spher. 5	300	—	100	9	—	Yes
BioBasic C5	Spher. 5	300	—	100	5	—	Yes
BioBasic C4	Spher. 5	300	—	100	4	—	Yes
Prism RP	Spher. 3, 5	100	—	—	12	—	Yes
Tosoh Corporation							
TSKgel® Phenyl-5PW	Spher. 10	1000	—	—	—	—	—
TSKgel DEAE-5PW	Spher. 10	1000	—	—	0.3 meq/g	—	—
TSKgel SP-5PW	Spher. 10	1000	—	—	0.3 meq/g	—	
TSKgel ODS-80T_S	Spher. 5, 10, 20	80	—	—	15, Polymeric	—	Yes
TSKgel ODS-80T_m	Spher. 5, 10, 20	80	—	—	15, Monomeric	—	Yes
TSKgel ODS-120T	Spher. 5, 10, 20	80	—	—	22, Polymeric	—	Yes
TSKgel ODS-120A	Spher. 5, 10	80	—	—	22, Polymeric	—	No
TSKgel TMS-250	Spher. 10	250	—	—	5, Monomeric	—	Yes
Varian							
MetaSil C8	Spher. 3, 5	80	0.5	220	6	2.51	Yes
MetaSil ODS	Spher. 3, 5	80	0.5	220	12	2.52	Yes
MetaSil Phenyl	Spher. 3, 5	80	0.5	220	3	1.08	Yes
MetaSil AQ	Spher. 3, 5, 10	100	1.0	320	—	—	Yes, polar
MetaSil Basic	Spher. 3, 5, 10	100	1.0	320	— Monomeric	—	Yes
Polaris C18-A	Spher. 3, 5, 10	180	1.0	180	—	—	Yes
Polaris C8-A	Spher. 3, 5, 10	180	1.0	180	—	—	Yes
Polaris Amide C18	Spher. 3, 5, 10	180	1.0	180	—	—	Yes
Polaris C8-Ether	Spher. 3, 5, 10	180	1.0	180	—	—	Yes
Polaris NH_2	Spher. 3, 5, 10	180	1.0	180	—	—	Yes
Polaris Si-A	Spher. 3, 5, 10	180	1.0	180	—	—	Yes
Taxsil	Spher. 3, 5	80	0.5	220	7	—	—
Pursuit C18	Spher. 3, 5, 10	—	—	—	—	—	—
Pursuit C8	Spher. 3, 5, 10	—	—	—	—	—	—

a selection of

HPLC Material Sorbent Characteristics

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Other Sorbents *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping
Waters							
AccQ_Tag Ultra C18	Spher. 1.7	135	0.7	185	17	—	Yes
ACQUITY UPLC BEH C18	Spher. 1.7	135	0.7	185	17	—	Yes
ACQUITY UPLC BEH C8	Spher. 1.7	135	0.7	185	13	—	Yes
ACQUITY UPLC BEH Shield RP18	Spher. 1.7	135	0.7	185	17	Yes	—
ACQUITY UPLC BEH Phenyl	Spher. 1.7	135	0.7	185	15	—	Yes
ACQUITY UPLC BEH HILIC	Spher. 1.7	135	0.7	185	0	—	n/a
nanoACQUITY BEH130 C18	Spher. 1.7	135	0.7	185	17	—	Yes
nanoACQUITY BEH300 C18	Spher. 1.7	300	—	—	—	—	—
ACQUITY UPLC HSS T3 C18	Spher. 1.8	100	0.7	230	11	—	Yes
Atlantis T3 C18	Spher. 3,5,10	100	1.0	330	14	—	Yes
Atlantis dC18	Spher. 3,5,10	100	1.0	330	12	—	Yes
Atlantis HILIC Silica	Spher. 3,5	100	1.0	330	—	—	n/a
µBondapak C18	Irreg. 10	125	1.0	330	9.8	—	Yes
µBondapak Phenyl	Irreg. 10	125	1.0	330	9.3	—	Yes
µBondapak CN	Irreg. 10	125	1.0	330	6.0	—	Yes
µBondapak NH_2	Irreg. 10	125	1.0	330	4.0	—	No
Bondapak C18	Irreg. 15-20	125	1.0	330	10.0	—	Yes
Bondapak C8	Irreg. 15-20	300	1.0	100	6.0	—	Yes
Bondapak C18	Irreg. 15-20	300	1.0	100	3.5	—	Yes
Delta-Pak C4	Spher. 5, 15	100	1.0	300	7.3	—	Yes
Delta-Pak C18	Spher. 5, 15	100	1.0	300	17.0	—	Yes
Delta-Pak C4	Spher. 5, 15	300	1.0	125	2.6	—	Yes
Delta-Pak C18	Spher. 5, 15	300	1.0	125	6.8	—	Yes
Nova-Pak C18	Spher. 4, 6	60	0.3	120	7.3	—	Yes
Nova-Pak C8	Spher. 4	60	0.3	120	4.0	—	Yes
Nova-Pak Phenyl	Spher. 4	60	0.3	120	4.6	—	Yes
Nova-Pak CN HP	Spher. 4	60	0.3	120	3.0	—	Yes
Nova-Pak Silica	Spher. 4, 6	60	0.3	120	—	—	n/a
µPorasil Silica	Irreg. 10	125	1.0	330	—	—	n/a
Porasil Silica	Irreg. 15-20	125	1.0	330	n/a	—	n/a
Resolve C18	Spher. 5, 10	90	0.5	200	10.2	—	No
Resolve C8	Spher. 5	90	0.5	200	5.1	—	No
Resolve CN	Spher. 10	90	0.5	200	3.0	—	No
Resolve Silica	Spher. 5, 10	90	0.5	200	—	—	n/a
Spherisorb Silica	Spher. 3, 5, 10	80	0.5	200	—	—	n/a
Spherisorb ODS2	Spher. 3, 5, 10	80	0.5	200	11.5	2.98	Yes
Spherisorb ODS	Spher. 3, 5, 10	80	0.5	200	6.2	1.49	No
Spherisorb ODSB	Spher. 5	80	0.5	200	11.5	2.98	Yes
Spherisorb C8	Spher. 3, 5, 10	80	0.5	200	5.8	3.12	Yes
Spherisorb C6	Spher. 3, 5, 10	80	0.5	200	4.7	3.36	Yes
Spherisorb C1	Spher. 3, 5, 10	80	0.5	200	2.2	2.97	No
Spherisorb Nitrile	Spher. 3, 5, 10	80	0.5	200	3.1	3.29	No
Spherisorb Amino	Spher. 3, 5, 10	80	0.5	200	1.9	2.64	No
Spherisorb Phenyl	Spher. 3, 5, 10	80	0.5	200	2.5	1.72	No
Spherisorb OD/CN	Spher. 5	80	0.5	200	5.0	1.15	Yes
Spherisorb SAX, SAX	Spher. 5, 10	80	0.5	200	4.0	—	No
Sunfire C18	Spher. 2.5, 3.5, 5, 10	100	0.9	340	16	—	Yes
Sunfire C8	Spher. 2.5, 3.5, 5, 10	100	0.9	340	11.5	—	Yes
Sunfire Silica	Spher. 5, 10	100	0.9	340	—	—	n/a
Symmetry C18	Spher. 3.5, 5	100	0.9	335	19.1	—	Yes
Symmetry C8	Spher. 3.5, 5	100	0.9	335	11.7	—	Yes
Symmetry Shield RP8	Spher. 3.5, 5	100	0.9	335	15.0	—	Yes
Symmetry Shield RP18	Spher. 5	100	0.9	335	17.0	—	Yes
SymmetryPrep C18	Spher. 7	100	0.9	335	19.1	—	Yes
SymmetryPrep C8	Spher. 7	100	0.9	335	11.7	—	Yes
Symmetry300 C18	Spher. 3.5, 5	300	0.8	110	8.5	—	Yes
Symmetry300 C4	Spher. 3.5, 5	300	0.8	110	2.8	—	Yes
XBridge C18	Spher. 2.5, 3.5, 5, 10	135	0.7	185	18	3.1	Yes
XBridge C8	Spher. 2.5, 3.5, 5	135	0.7	185	13	3.2	Yes
XBridge Shield RP18	Spher. 2.5, 3.5, 5	135	0.7	185	17.5	3.3	Yes
XBridge C6 Phenyl	Spher. 2.5, 3.5, 5	135	0.7	185	15	3.0	Yes
XBridge BEH130 C18	Spher. 3.5, 5, 10	135	0.7	185	17.5	—	Yes
XBridge BEH300 C18	Spher. 3.5, 5, 10	300	—	—	—	—	—
XTerra RP18	Spher. 3.5, 5, 10	125	0.7	175	15.0	—	Yes
XTerra RP8	Spher. 3.5, 5, 10	125	0.7	175	13.5	—	Yes

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HPLC Material Sorbent Characteristics

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Other Sorbents *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size (Å)	Pore Volume (mL/g)	Surface Area (m^2/g)	Carbon Load %	Calculated* Bonded Phase Coverage (µmole/m^2)	End Capping
Waters (continued)							
XTerra MS C18	Spher. 2.5, 3.5, 5, 10	125	0.7	175	15.5	—	Yes
XTerra MS C8	Spher. 2.5, 3.5, 5, 10	125	0.7	175	12.0	—	Yes
XTerra Phenyl	Spher. 3.5, 5	125	0.7	175	12.0	—	Yes
YMC							
Hydrosphere C18	Spher. 3, 5	120	—	—	12	—	Yes, polar
J'sphere ODS-H80	Spher. 4	80	—	510	22, Monomeric	—	Yes
J'sphere ODS-M80	Spher. 4	80	—	510	14, Monomeric	—	Yes
J'sphere ODS-L80	Spher. 4	80	—	510	9, Monomeric	—	Yes
ODS-A	Spher. 3, 5, 7, 10	120	1.1	335	17, Monomeric	—	Yes
ODS-A	Spher. 3, 5	200	1.0	175	12, Monomeric	—	Yes
ODS-A	Spher. 3, 5	300	0.9	100	7, Monomeric	—	Yes
ODS-AL	Spher. 5	120	1.1	335	17, Monomeric	—	No
ODS-AM	Spher. 3, 5, 10, 15	120	1.1	335	17, Monomeric	—	Yes
ODS-AQ	Spher. 3, 5, 7, 10	120	1.0	300	14, Monomeric	—	Yes, polar
ODS-AQ	Spher. 3, 5, 7, 10	200	1.1	200	10, Monomeric	—	Yes, polar
Pro C18	Spher. 3, 5, 10	120	1.1	335	16, Monomeric	—	Yes
Pro C8	Spher. 3, 5	120	1.1	335	10, Monomeric	—	Yes
Pro C4	Spher. 3, 5	120	1.1	335	7, Monomeric	—	Yes
Pro C18 RS	Spher. 5	80	—	—	22, Polymeric	—	Yes
YMC-Basic	Spher. 3, 5, 10, 15	120	—	300	7, Monomeric	—	Yes

*As per Sander, L.C., and Wise, S.A., Anal. Chem. 1984, 56, 504-510,

where $N(\mu mol/m^2) = \frac{10^6 P_c}{1200 n_c - P_c(M-1)} \bullet \frac{1}{S}$

and P_c = percent carbon of bonded phase, n_c is the number of carbon atoms in the bonded silane molecule,
M is the molecular weight of the bonded silane molecule, and S is the specific surface area of the bonded silica in m^2/g.
NOTE: Phenomenex has not verified above values experimentally, and does not guarantee their accuracy. Above specifications subject to change without prior notice.

Non-Aqueous SEC/GPC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Phenomenex			
Phenogel 50 Å	Spher. 5, 10, 20	50	3 x 103
Phenogel 100 Å	Spher. 5, 10, 20	100	6 x 103
Phenogel 500 Å	Spher. 5, 10, 20	500	1 x 104
Phenogel 103 Å	Spher. 5, 10, 20	103	7 x 104
Phenogel 104 Å	Spher. 5, 10, 20	104	5 x 105
Phenogel 105 Å	Spher. 5, 10, 20	105	1 x 106
Phenogel 106 Å	Spher. 5, 10, 20	106	1 x 107
Phenogel Linear	Spher. 5, 10, 20	Mixed	1 x 107
Phenogel MXL	Spher. 5, 10	Mixed	1 x 105
Phenogel MXM	Spher. 5, 10	Mixed	5 x 105
Phenogel MXH	Spher. 5, 10	Mixed	1 x 107
UT-103 Å	Spher. N/A	103	2 x 104
UT-106 Å	Spher. N/A	106	2 x 107
UT-107 Å	Spher. N/A	107	2 x 108
Polymer Labs			
PL-Gel 50 Å	Spher. 5, 10	50	1 x 103
PL-Gel 100 Å	Spher. 5, 10	100	4 x 103
PL-Gel 500 Å	Spher. 5, 10	500	3 x 104
PL-Gel 103 Å	Spher. 5, 10	103	6 x 104
PL-Gel 104 Å	Spher. 5, 10	104	6 x 105
PL-Gel 105 Å	Spher. 5, 10	105	6 x 106
PL-Gel 106 Å	Spher. 5, 10	106	1 x 107
PL-Gel Mixed	Spher. 5, 10	Mixed	6 x 107
Showa Denko			
KF-801	Spher.	50	1.5 x 103
KF-802	Spher.	100	5 x 103
KF-802.5	Spher.	500	2 x 104
KF-803	Spher.	103	7 x 104
KF-804	Spher.	104	4 x 105
KF-805	Spher.	105	4 x 106
KF-806	Spher.	106	2 x 107
KF-807	Spher.	107	2 x 108

Non-Aqueous SEC/GPC Materials *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Showa Denko *(cont'd)*			
KF-806M	Spher.	Mixed	2 x 107
HT-803	Spher.	N/A	7 x 104
HT-804	Spher.	N/A	4 x 105
HT-805	Spher.	N/A	4 x 106
HT-806	Spher.	N/A	2 x 107
HT-806M	Spher.	Mixed	2 x 107
UT-802.5	Spher.	N/A	2 x 104
UT-806M	Spher.	N/A	2 x 107
UT-806MS	Spher.	N/A	5 x 107
UT-807	Spher.	N/A	2 x 108
UT-807	Spher.	N/A	2 x 108
Tosoh Corporation			
TSKgel® 1000H	Spher. 5, 10	40	1 x 103
TSKgel 2000H	Spher. 5, 10	250	1 x 104
TSKgel 2500H	Spher. 5, 10	500	2 x 104
TSKgel 3000H	Spher. 5, 10	1500	6 x 104
TSKgel 4000H	Spher. 5, 13	104	4 x 105
TSKgel 5000H	Spher. 14, 17	105	4 x 106
TSKgel 6000H	Spher. 14, 17	106	4 x 107
TSKgel 7000H	Spher. 14, 17	107	4 x 108
TSKgel GMH6	Spher. 14, 17	Mixed	4 x 108
Waters			
Ultrastyragel 103 Å	Spher. 7	103	3 x 104
Ultrastyragel 104 Å	Spher. 7	104	6 x 105
Ultrastyragel 105 Å	Spher. 7	105	4 x 106
Ultrastyragel 106 Å	Spher. 7	106	1 x 107
Ultrastyragel Linear	Spher. 7	Mixed	4 x 106
µStyragel 100 Å	Spher. 10	100Å	1.5 x 103
µStyragel 500 Å	Spher. 10	500Å	1 x 104
µStyragel 1 x 103 Å	Spher. 10	1 x 103	3 x 104
µStyragel 1 x 104 Å	Spher. 10	1 x 104	6 x 105
µStyragel 1 x 105 Å	Spher. 10	1 x 105	4 x 106
µStyragel 1 x 106 Å	Spher. 10	1 x 106	1 x 107

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HPLC Material Sorbent Characteristics

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Aqueous SEC/GFC Materials

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Phenomenex			
BioSep-SEC-S 2000	Spher. 5	145	3 x 105
BioSep-SEC-S 3000	Spher. 5	290	7 x 105
BioSep-SEC-S 4000	Spher. 5	500	1 x 106
PolySep-GFC-P 1000	Spher.	N/A	2 x 103 (PEG)
PolySep-GFC-P 2000	Spher.	N/A	9 x 103 (PEG)
PolySep-GFC-P 3000	Spher.	N/A	50 x 103 (PEG)
PolySep-GFC-P 4000	Spher.	N/A	20 x 104 (PEG)
PolySep-GFC-P 5000	Spher.	N/A	20 x 105 (PEG)
PolySep-GFC-P 6000	Spher.	N/A	10 x 106 (PEG)
PolySep-GFC-P Linear	Spher.	N/A	10 x 107 (PEG)
Polymer Labs			
PL aquagel OH 40	Spher. 10	N/A	1 x 105
PL aquagel OH 50	Spher. 10	N/A	1 x 106
PL aquagel OH 60	Spher. 10	N/A	2 x 107
Showa Denko			
OHpak SB-802	Spher.	N/A	4 x 103
OHpak SB-802.5	Spher.	N/A	1 x 104
OHpak SB-803	Spher.	N/A	1 x 105
OHpak SB-804	Spher.	N/A	4 x 105
OHpak SB-805	Spher.	N/A	4 x 106
OHpak SB-806	Spher.	N/A	2 x 107
OHpak SB-80M	Spher.	Mixed	2 x 107
OHpak Q-801	Spher.	N/A	1.8 x 103
OHpak Q-802	Spher.	N/A	5 x 103

Aqueous SEC/GFC Materials *(cont'd)*

Packing Material	Particle Shape/Size (µm)	Pore Size** (Å)	Exclusion Limit***
Tosoh Corporation			
TSKgel SW2000	Spher. 10	130	1 x 105 (Protein)
TSKgel SW3000	Spher. 10	240	5 x 105 (Protein)
TSKgel SW4000	Spher. 10	450	7 x 106 (Protein)
TSKgel Super SW2000	Spher. 4	125	1.5 x 105 (Protein)
TSKgel Super SW3000	Spher. 4	250	5 x 105 (Protein)
TSKgel G2000SWXL	Spher. 5	125	1.5 x 105 (Protein)
TSKgel G3000SWXL	Spher. 5	250	5 x 105 (Protein)
TSKgel G4000SWXL	Spher. 8	450	7 x 106 (Protein)
TSKgel PW2000	Spher. 10	125	2 x 103 (PEG)
TSKgel PW2500	Spher. 6, 13	<200	3 x 103 (PEG)
TSKgel PW3000	Spher. 6, 13	200	5 x 104 (PEG)
TSKgel PW4000	Spher. 10, 13	500	3 x 105 (PEG)
TSKgel PW5000	Spher. 10, 17	1000	1 x 106 (PEG)
TSKgel PW6000	Spher. 13, 25	>1000	8 x 106 (PEG)
TSKgel GMPW	Spher. 13, 17	Mixed	8 x 106 (PEG)
TSKgel G-DNA-PW	Spher. 10	4000	5 x 107 (PEG)
TSKgel G-OLIGO-PW	Spher. 6	125	3 x 103 (PEO)
Waters			
Ultrahydrogel 120	Spher. 8-10	120	5 x 103 (PEO)
Ultrahydrogel 250	Spher. 8-10	250	8 x 104 (PEO)
Ultrahydrogel 500	Spher. 8-10	500	4 x 105 (PEO)
Ultrahydrogel 1000	Spher. 8-10	1000	1 x 106 (PEO)
Ultrahydrogel 2000	Spher. 8-10	2000	7 x 106 (PEO)
Ultrahydrogel Linear	Spher. 8-10	Blend	7 x 106 (PEO)
Ultrahydrogel DP	Spher. 8-10	120	5 x 103 (PEO)

**Pore Size is expressed in Angstroms (10^{-10} meters). This is actually a convention used by manufacturers to indicate the approximate molecular weight of compounds that can be separated on a given SEC packing; these values do not indicate the actual size (diameter) of the pores on the surface of the particle. Refer to Table 1 for a cross reference of pore size values with separated molecular weight range.

***Exclusion Limit is expressed in daltons (the molecular weight) of the specified compound excluded from the pores of the base material. Practically speaking however, the exclusion limit is more accurately a reflection of the hydrodynamic volume occupied by the solvated compound.

Table 1.
Pore Size vs. Separated Molecular Weight Range

Pore Size (Å)	MW Range (daltons)	Compound Classification
50	1-100	monomers (small MW)
100	50-1000	small polymers
500	500-10,000	polymers (small MW)
10^3	5000-40,000	polymers (medium MW)
10^4	20,000-300,000	polymers (high MW)
10^5	100,000-10^6	polymers (very high MW)
10^6	10^6-10^7	polymers (very high MW)

Table 2. Dilution of Polymer Sample to Compensate for Viscosity Effect

Molecular Weight (daltons)	Sample Concentration (percent)
50 K	0.25
50-500 K	0.1
500 K to 2.5 M	0.05
>2.5 M	0.01

Note: As the viscosity of a polymer increases with molecular weight, its retention time in SEC will increase to bias the calculated result toward a lower molecular weight. To minimize the effects of viscosity, there are two possible options: Either increase the running temperature to between 40 and 80 °C, or more reliably, reduce the sample concentration as given in Table 2.