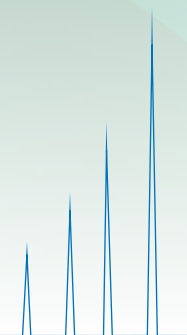




Product information
YMC Alternatives to Existing BioLC Columns



YMC Alternatives to Existing BioLC Columns



IEX

Manufacturer	Phase	Base Particle	Mode	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC alternative	YMC recommended alternative	Base Particle	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC advantage
Agilent	Bio-SCX	polymer	SCX	non-porous	1.7; 3; 5; 10	80	BioPro IEX SF	–	polymer	non-porous	3; 5	60	high efficiency
	Bio-SAX	polymer	SAX	non-porous	1.7; 3; 5; 10	80	BioPro IEX QF	–	polymer	non-porous	3; 5	60	high resolution
	Bio-WCX	polymer	WCX	non-porous	1.7; 3; 5; 10	80	–	BioPro IEX SF	polymer	non-porous	3; 5	60	high resolution
	Bio-WAX	polymer	WAX	non-porous	1.7; 3; 5; 10	80	–	BioPro IEX QF	polymer	non-porous	3; 5	60	high resolution
	Bio Mab NP	polymer	WCX	non-porous	1.7; 3; 5; 10	80	–	BioPro IEX SF	polymer	non-porous	3; 5	60	high resolution
GE Healthcare	Mono Q	polymer	SAX	porous	10	40	–	BioPro IEX QA	polymer	1,000	5	60	higher recovery
	Mono S	polymer	SCX	porous	10	40	–	BioPro IEX SP	polymer	1,000	5	60	high resolution
Phenomenex	Clarity Oligo-SAX	silica	SAX	non-porous	5	60	BioPro IEX QF	–	polymer	non-porous	3; 5	60	high resolution
	bioZen WCX	polymer	WCX	non-porous	6	60	–	BioPro IEX SF	polymer	non-porous	3; 5	60	high resolution
Thermo Scientific	ProPac SCX-10	polymer	SCX	non-porous	10	60	BioPro IEX SF	–	polymer	non-porous	3; 5	60	high efficiency, high reproducibility
	ProPac SAX-10	polymer	SAX	non-porous	10	60	BioPro IEX QF	–	polymer	non-porous	3; 5	60	high resolution, high reproducibility
	ProPac WAX-10	polymer	WAX	non-porous	10	60	–	BioPro IEX QF	polymer	non-porous	3; 5	60	high resolution, high reproducibility
	ProPac WCX-10	polymer	WCX	non-porous	10	60	–	BioPro IEX SF	polymer	non-porous	3; 5	60	high resolution, high reproducibility
	ProPac SCX-20	polymer	SCX	non-porous	10	60	BioPro IEX SF	–	polymer	non-porous	3; 5	60	high efficiency, high reproducibility
	ProPac PA1	polymer	AEX	non-porous	10	N/A	–	BioPro IEX QF	polymer	non-porous	3; 5	60	high resolution with 3, 5 µm, high reproducibility
	ProPac Elite	polymer	WCX	non-porous	5	60	–	BioPro IEX SF	polymer	non-porous	3; 5	60	high resolution, high reproducibility
	BioBasic AX	silica- polymer coating	WAX	300	5	60	–	BioPro IEX QA	polymer	1,000	5	60	high resolution, high reproducibility
	BioBasic SCX	silica- polymer coating	SCX	300	5	60	–	BioPro IEX SP	polymer	1,000	5	60	high resolution, high reproducibility
	MabPac SCX-10	polymer	SCX	non-porous	3; 5; 10	60	–	BioPro IEX SF	polymer	non-porous	3; 5	60	high resolution, high reproducibility
DNAPac 200 (RS)	polymer	SAX	non-porous	8 (4)	85	–	BioPro IEX QF	polymer	non-porous	3; 5	60	excellent batch-to-batch reproducibility	
Tosoh	TSKgel BioAssist Q	polymer	SAX	4,000	10	60	BioPro IEX QA	–	polymer	1,000	5	60	high recovery, high resolution
	TSKgel BioAssist S	polymer	SCX	1,300	7	60	BioPro IEX SP	–	polymer	1,000	5	60	superior resolution
	TSKgel SP-NPR	polymer	SCX	non-porous	2.5	60	BioPro IEX SF	–	polymer	non-porous	3; 5	60	high resolution
	TSKgel DNA-NPR	polymer	SAX	non-porous	2.5	60	BioPro IEX SF	–	polymer	non-porous	3; 5	60	high resolution
Waters	Protein-Pak Hi Res SP	polymer	SCX	non-porous	7	60	BioPro IEX SF	–	polymer	non-porous	3; 5	60	increased selectivity
	Protein-Pak Hi Res Q	polymer	SAX	non-porous	5	60	BioPro IEX QF	–	polymer	non-porous	3; 5	60	high resolution
	BioSuite Cation-exchange	polymer	WCX	non-porous	2.5; 7	40	–	BioPro IEX SF	polymer	non-porous	3; 5	60	high resolution
	BioSuite Anion-exchange	polymer	WAX	non-porous	2.5; 7	40	–	BioPro IEX QF	polymer	non-porous	3; 5	60	high resolution
	BioResolve SCX mab	polymer	SCX	non-porous	3	60	BioPro IEX SF	–	polymer	non-porous	3; 5	60	high resolution

WCX: weak cation exchange; SCX: strong cation exchange; WAX: weak anion exchange; SAX: strong anion exchange

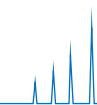
YMC Alternatives to Existing BioLC Columns



SEC

Manufacturer	Phase	Base Particle / Modification	MW Range / kDa	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC alternative	Base Particle / Modification	MW Range / kDa	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC advantage
Agilent	AdvanceBio SEC	polymer	0.1–120	130	1.9; 2.7	80	YMC-Pack Diol-120	silica / diol	1–100	120	3; 5	40	reproducibility, minimal secondary interactions
	AdvanceBio SEC	polymer	2–700	200	1.9, 2.7	80	YMC-Pack Diol-200 YMC-SEC MAB*	silica / diol	5–300 10–700	200 250	2; 3; 5 3	40	reproducibility, minimal secondary interactions
	AdvanceBio SEC	polymer	5–1.250	300	1.9, 2.7	80	YMC-Pack Diol-300 YMC-SEC MAB*	silica / diol	20–1,000 10–700	300 250	2; 3; 5 3	40	reproducibility, minimal secondary interactions
	ProSEC 300S	silica / N/A	1.5–800	300	5	40	YMC-Pack Diol-300	silica / diol	20–1,000	300	2; 3; 5	40	reproducibility, minimal secondary interactions
	ZORBAX GF-250	silica / diol	4–400	150	4	40	YMC-Pack Diol-200	silica / diol	5–300	200	2; 3; 5	40	reproducibility, minimal secondary interactions
	ZORBAX GF-450	silica / diol	10–900	300	6	40	YMC-Pack Diol-300	silica / diol	20–1,000	300	2; 3; 5	40	reproducibility, minimal secondary interactions
Phenomenex	Yarra SEC-2000	silica / N/A	1–300	145	3	50	YMC-Pack Diol-200	silica / diol	5–300	200	2; 3; 5	40	reproducibility, minimal secondary interactions
	Yarra SEC-3000	silica / N/A	5–700	290	3	50	YMC-SEC MAB*	silica / diol	10–700	250	3	40	reproducibility, minimal secondary interactions
	Yarra SEC-4000	silica / N/A	15–1,500	500	3	50	YMC-Pack Diol-300	silica / diol	20–1,000	300	2; 3; 5	40	reproducibility, minimal secondary interactions
	Yarra SEC-X150	silica / N/A	1–450	150	1.8	50	YMC-Pack Diol-200	silica / diol	5–300	200	2; 3; 5	40	reproducibility, minimal secondary interactions
	Yarra SEC-X300	silica / N/A	10–700	300	1.8	50	YMC-SEC MAB*	silica / diol	10–700	250	3	40	reproducibility, minimal secondary interactions
	bioZen 1.8 µm SEC-2	silica / N/A	1–450	150	1.8	50	YMC-Pack Diol-200	silica / diol	5–300	200	2; 3; 5	40	reproducibility, minimal secondary interactions
	bioZen 1.8 µm SEC-3	silica / N/A	10–700	300	1.8	50	YMC-SEC MAB*	silica / diol	10–700	250	3	40	phase dedicated for mAbs
	BioSep-SEC-s2000	silica / N/A	1–300	145	5	50	YMC-Pack Diol-200	silica / diol	5–300	200	2; 3; 5	40	reproducibility, minimal secondary interactions
	BioSep-SEC-s3000	silica / N/A	5–700	290	5	50	YMC-SEC MAB*	silica / diol	10–700	250	3	40	phase dedicated for mAbs
BioSep-SEC-s4000	silica / N/A	15–1,500	500	5	50	YMC-Pack Diol-300	silica / diol	20–1,000	300	2; 3; 5	40	reproducibility, minimal secondary interactions	

*will be available soon in <2 µm



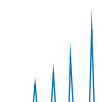
YMC Alternatives to Existing BioLC Columns



SEC

Manufacturer	Phase	Base Particle / Modification	MW Range / kDa	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC alternative	Base Particle / Modification	MW Range / kDa	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC advantage
Thermo Scientific	MABPac SEC-1	silica / diol	10–1,000	300	5	30	YMC-Pack Diol-300	silica / diol	20–1,000	300	2; 3; 5	40	higher temp. and pressure range
	BioBasic SEC 60	silica / diol	0.1–6	60	5	HT** / N/A	YMC-Pack Diol-60	silica / diol	< 10	60	3; 5	40	reproducibility
	BioBasic SEC 120	silica / diol	0.3–100	120	5	HT** / N/A	YMC-Pack Diol-120	silica / diol	1–100	120	3; 5	40	reproducibility
	BioBasic SEC 300	silica / diol	1–500	300	5	HT** / N/A	YMC-SEC MAB*	silica / diol	10–700	250	3	40	reproducibility
Tosoh	TSKgel UP-SW2000/ Super SW2000	silica / diol	5–150	125	2; 4	30	YMC-Pack Diol-120	silica / diol	1–100	120	3; 5	40	higher temp. range
	TSKgel UP-SW3000/ Super SW3000	silica / diol	10–500	250	2; 4	30	YMC-SEC MAB*	silica / diol	10–700	250	3	40	higher temp. range
	TSKgel SuperSWmab HR /HTP	silica / diol	10–500	250	2; 4	30	YMC-SEC MAB*	silica / diol	10–700	250	3	40	higher temp. range
	TSKgel G2000SWXL/ G2000SW	silica / diol	5–100/150	125	5; 10; 13	30	YMC-Pack Diol-120	silica / diol	1–100	120	3; 5	40	higher temp. range
	TSKgel BioAssist G2SWXL	silica / diol	5–150	125	8	30	YMC-Pack Diol-120	silica / diol	1–100	120	3; 5	40	higher temp. range
	TSKgel G3000SWXL/ G3000SW	silica / diol	10–500	250	5; 10; 13	30	YMC-SEC MAB*	silica / diol	10–700	250	3	40	higher temp. range
	TSKgel BioAssist G3SWXL	silica / diol	10–500	250	8	30	YMC-SEC MAB*	silica / diol	10–700	250	3	40	higher temp. range
Waters	Protein-Pak SEC 60	silica / diol	0.5–20	60	10	N/A	YMC-Pack Diol-60	silica / diol	< 10	60	3; 5	40	smaller particle sizes available
	Protein-Pak SEC 125	silica / diol	2–80	125	10	N/A	YMC-Pack Diol-120	silica / diol	1–100	120	3; 5	40	smaller particle sizes available
	Protein-Pak SEC 300	silica / diol	10–500	300	10	N/A	YMC-SEC MAB*	silica / diol	10–700	250	3	40	smaller particle sizes available
	XBridge Protein BEH SEC 125	hybrid / diol	1–80	125	2.5; 3.5	60	YMC-Pack Diol-120	silica / diol	1–100	120	3; 5	40	reproducibility, no sec. interactions
	XBridge Protein BEH SEC 200	hybrid / diol	10–450	200	2.5; 3.5	60	YMC-SEC MAB*	silica / diol	10–700	250	3	40	reproducibility, no sec. interactions
	XBridge Protein BEH SEC 450	hybrid / diol	100–1,500	450	2.5; 3.5	60	YMC-Pack Diol-300	silica / diol	20–1,000	300	2; 3; 5	40	reproducibility, no sec. interactions
	Acquity UPLC Protein BEH SEC 125	hybrid / diol	1–80	125	1.7	60	YMC-Pack Diol-120	silica / diol	1–100	120	3; 5	40	reproducibility, no sec. interactions
	Acquity UPLC Protein BEH SEC 200	hybrid / diol	10–450	200	1.7	60	YMC-SEC MAB*	silica / diol	10–700	250	3	40	reproducibility, no sec. interactions
	Acquity UPLC Protein BEH SEC 450	hybrid / diol	100–1,500	450	1.7	60	YMC-Pack Diol-300	silica / diol	20–1,000	300	2; 3; 5	40	reproducibility, no sec. interactions

*will be available soon in <2 µm · HT**: High temperature

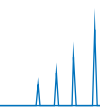


YMC Alternatives to Existing BioLC Columns



RP RP < 5 kDa

Manufacturer	Phase	Base Particle	Modification	End-capped	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC alternative	YMC recommended alternative	Base Particle	Modification	End-capped	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC advantage
Agilent	AdvanceBio Amino Acid Analysis	core-shell silica	C18	yes	100	2.7	60	–	Meteoric Core C18	core-shell silica	C18	yes	80	2.7	<pH 7: 70 >pH 7: 50	reproducibility
	Zorbax 300Å Extend-C18	silica	C18	yes	300	2.7	60	–	YMC-Triart Bio C18	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
Phenomenex	Aeris PEPTIDE XB-C18	core-shell silica	C18	yes	100	1.7; 2.6; 3.6; 5	90	Meteoric Core C18	YMC-Triart C18	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	Aeris WIDEPORÉ XB-C18	core-shell silica	C18	yes	200	3.6	90	–	YMC-Triart Bio C18	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	Synergi Hydro-RP	silica	C18	Yes	80; 100	2.5; 4; 10	60	Hydrosphere C18	YMC-Triart C18	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	high pH and temp. range
	Clarity Oligo-MS	core-shell silica	C18	N/A	100	1.7; 2.6	60	Meteoric Core C18	YMC-Triart C18	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	Clarity Oligo-RP	silica organic	C18	N/A	110	3; 5; 10	60	YMC-Triart C18	–	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	Clarity Oligo-XT	core-shell silica	C18	N/A	100	1.7; 2.6; 5	60	Meteoric Core C18	YMC-Triart C18	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	higher loadability, reproducibility
	bioZen Peptide PS-C18	core-shell silica	pos. charged surface with C18	Yes	100	1.6; 3	90	–	YMC-Triart C18 (metal-free)	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	higher loadability, reproducibility
bioZen Peptide XB-C18	core-shell silica	di-isobutyl side chains with C18	N/A	100	1.7; 2.6	90	Meteoric Core C18	YMC-Triart C18 (metal-free)	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	higher loadability, reproducibility	
Thermo Scientific	ProSwift RP-4H	polymer	phenyl	N/A	non-porous	monolithic	70	–	YMC-Triart Phenyl	hybrid	phenyl	yes	120	1.9; 3; 5	50	reproducibility
	BioBasic 18	silica	C18	yes	300	5	60	–	YMC-Triart Bio C18	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
Waters	Acquity UPLC / XBridge Oligo BEH C18	BEH	C18	proprietary	130	1.7; 2.5	65	YMC-Triart C18	–	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	Acquity UPLC / XBridge Peptide BEH C18	BEH	C18	proprietary	130	1.7; 3.5; 5; 10	65	YMC-Triart C18	–	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	higher loadability
	XSelect Peptide CSH	hybrid	C18	N/A	130	3.5	80	YMC-Triart C18	–	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	higher loadability
	XSelect Peptide HSS T3	hybrid	C18	yes	100	2.5	60	YMC-Triart C18	–	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	method flexibility
	BioSuite C18	silica	C18	N/A	100	3	50	–	YMC-Triart C18	hybrid	C18	yes	120	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility

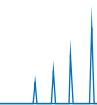


YMC Alternatives to Existing BioLC Columns



RP RP > 5 kDa

Manufacturer	Phase	Base Particle	Modification	End-capped	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC alternative	YMC recommended alternative	Base Particle	Modification	End-capped	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC advantage
Agilent	AdvanceBio RP-mAb SB-C8	core-shell silica	C8	N/A	450	3.5	90	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	AdvanceBio RP-mAb C4	core-shell silica	C4	N/A	450	3.5	90	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available
	AdvanceBio RP-mAb diphenyl	core-shell silica	diphenyl	N/A	450	3.5	90	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available
	Poroshell 300SB-C3	core-shell silica	C3	no	300	5	90	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available, reproducibility
	Poroshell 300SB-C8	core-shell silica	C8	no	300	5	90	–	YMC-Pack C8	silica	C8	yes	300	5	50	reproducibility
	Poroshell 300SB-C18	core-shell silica	C18	no	300	5	90	–	YMC-Triart Bio C18	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	Poroshell 300 Extend-C18	core-shell silica	C18	no	300	5	90	–	YMC-Triart Bio C18	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
Phenomenex	bioZen Intact XB-C8	core-shell silica	C8 (di-isobutyl side chains)	N/A	200	3.6	90	–	YMC-Triart Bio C4 (metal-free)	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available
	bioZen Intact C4	core-shell silica	C4	N/A	200	3.6	90	–	YMC-Triart Bio C4 (metal-free)	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available
	Aeris WIDEPORE C4	core-shell silica	C4	yes	200	3.6	90	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available
	Aeris WIDEPORE XB-C8	core-shell silica	C8	yes	200	3.6	90	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available
	Jupiter C4	silica	C4	yes	300	3; 5	60	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	Jupiter C18	silica	C18	yes	300	3; 5	60	–	YMC-Triart Bio C18	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
Thermo Scientific	Acclaim 300-C18	silica	C18	yes	300	3	60	–	YMC-Triart Bio C18	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	method flexibility
	BioBasic 4	silica	C4	yes	300	5	60	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available
	BioBasic 8	silica	C8	yes	300	5	60	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	(U) HPLC available
Tosoh	Oligo DNA RP	silica	C18	no	250	5	50	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	higher pH range
Waters	Acquity UPLC / XBridge Peptide BEH C18	hybrid	C18	yes	300	1.7; 3.5	90	YMC-Triart Bio C18	–	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	higher pH range
	Acquity UPLC / XBridge Peptide BEH C4	hybrid	C18	N/A	300	1.7; 3.6	90	YMC-Triart Bio C4	–	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	BioSuite C18 300	silica	C18	N/A	300	3.6	50	–	YMC-Triart Bio C18	hybrid	C18	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	reproducibility
	BioResolve RP mAb	core-shell silica	polyphenyl	N/A	450	2.7	90	–	YMC-Triart Bio C4	hybrid	C4	yes	300	1.9; 3; 5	<pH 7: 90 >pH 7: 50	scalability



YMC Alternatives to Existing BioLC Columns



HIC

Manufacturer	Phase	Base Particle	Modification	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC alternative	YMC recommended alternative	Base Particle	Modification	Pore Size / Å	Particle Size / µm	Max. Temperature / °C	YMC advantage
Agilent	AdvanceBio HIC	silica	flexion	450	3.5	60	–	BioPro HIC HT	polymer	C4	non-porous	2.3	60	high throughput at high resolution
Thermo Scientific	MABPac HIC-Butyl	polymer	C4	non-porous	5	60	BioPro HIC HT	–	polymer	C4	non-porous	2.3	60	high throughput at high resolution
	MABPac HIC-10	silica	alkyl amide groups	1,000	5	60	–	BioPro HIC HT	polymer	C4	non-porous	2.3	60	high throughput at high resolution
	MABPac HIC-20	silica	alkyl amide groups	1,000	5	60	–	BioPro HIC HT	polymer	C4	non-porous	2.3	60	high throughput at high resolution
Tosoh	TSKgel Butyl-NPR	polymer	C4	non-porous	2.5	60	BioPro HIC HT	–	polymer	C4	non-porous	2.3	60	high throughput at high resolution
Waters	ProteinPak Hi Res HIC	polymer	C4	non-porous	2.5	60	BioPro HIC HT	–	polymer	C4	non-porous	2.3	60	high throughput at high resolution

