predictability

Thermo Scientific LC Columns and Accessories

As a leader in LC column technology including silica manufacturing, bonded phase production and column packing, you can rely on the quality of Thermo Scientific HPLC products. From Hypersil™, one of the first spherical silica chromatography phases, to Hypersil BDS, one of the first base deactivated silica medias, to Hypersil GOLD, the latest innovation for outstanding peaks, we have been at the forefront of chromatography technology for 30 years. The broad selection of Thermo Scientific premier HPLC phases and specialist hardware designs, coupled with expertise and technical support, make us a reliable worldwide source for HPLC columns.

We also supply a range of HPLC equipment such as solvent recyclers and degassers. In addition, a comprehensive range of accessories, connectors, fittings and tubing, including the SLIPFREE™ universal connector, are available to further optimize the performance of your chromatography instruments.

Hypersil GOLD Columns

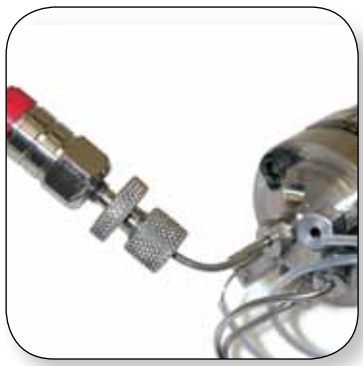
Unleash the productivity of your HPLC.

Go to — PAGE 350

Hypercarb Columns

100% porus graphitic carbon for extended separation capabilities.

Go to — PAGE 382



SLIPFREE Connectors

Universal self-adjusting design for void-free and leak-free connections compatible with all column end-fittings.

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HPLC Column Selection

Information in the following section will help you make an informed decision on the appropriate HPLC column for your application, based on stationary phase use, analyte properties, LC/MS requirements or USP specifications. You will also find a useful table of Thermo Scientific phases with specifications, as well as recommended Thermo Scientific alternatives for other popular columns.

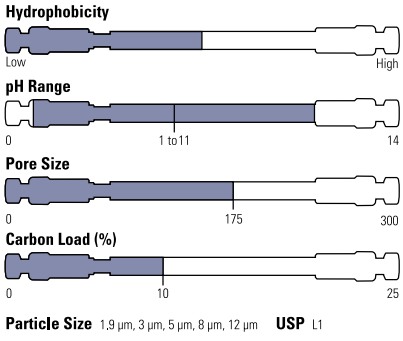
Refer to the Advanced User Graphic (AUG) on the corresponding product page (illustrated to the right) for more help and information on column selection.

The AUG will show you Hydrophobicity which gives the relative retention on the column. Generally, the higher the hydrophobicity, the greater the retention of neutral compounds and the higher the organic content in the mobile phase.

A lower value indicates a need for higher aqueous mobile phases to achieve comparable retention and resolution. The recommended pH Range for the column is illustrated, outside of which column lifetimes will diminish.

The Pore Size is shown, with larger pore size columns being more applicable to larger analytes such as proteins or peptides. The percentage Carbon Load is related to the hydrophobicity. Below the icon, you will see the particle sizes available, as well as the USP code. These graphics are designed to allow you to quickly compare the main characteristics of multiple stationary phases, allowing you to choose quickly the most appropriate stationary phase for your analysis.

For additional help in column selection, please see the back cover to contact our expert Technical Support and tap our expertise to help make the best choice for your application.

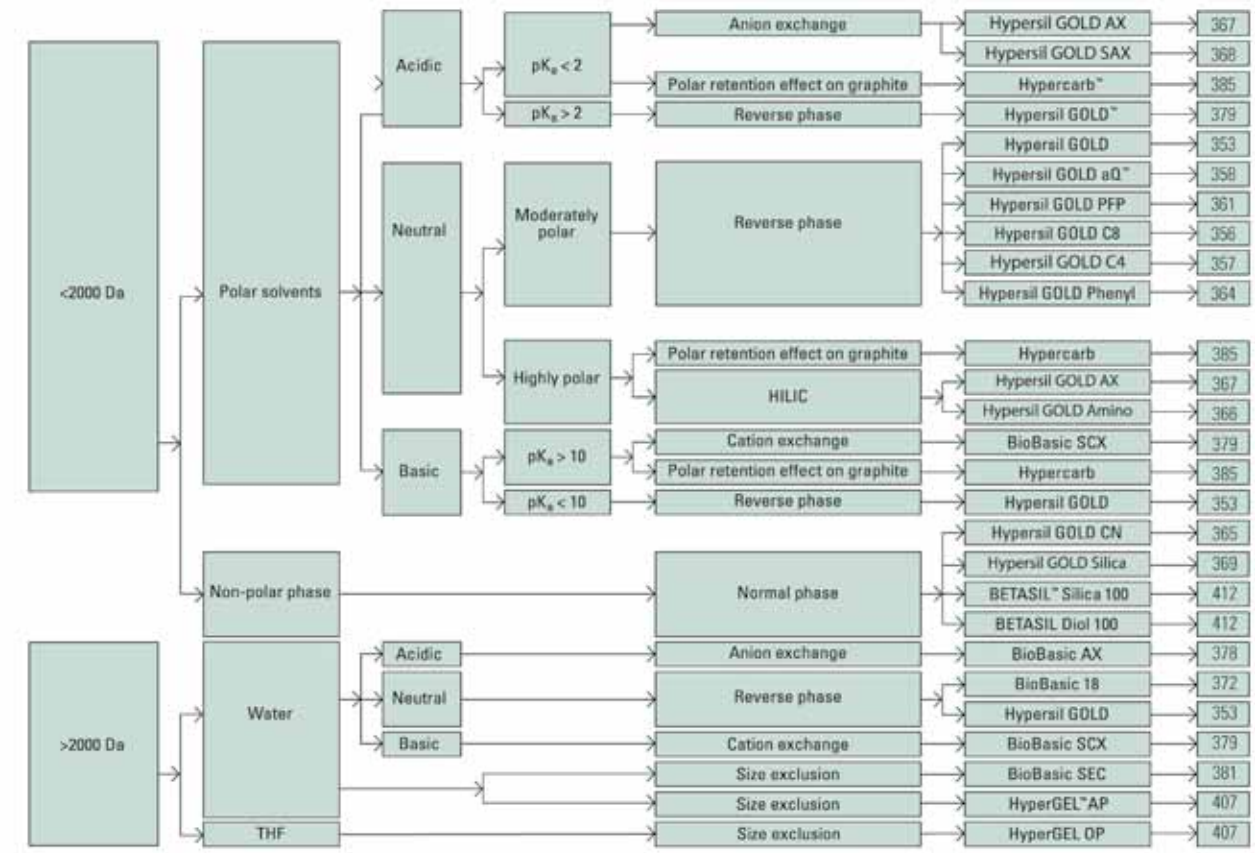


HPLC Phases and Their Uses

Common Name	Alternative Name	Functional Group	Normal Phase	Reverse Phase	Ion Exchange	HILIC	Application
Silica	Silica	-OH	✔			✔	Non-polar and moderately polar organic compounds.
C1	SAS	$-(CH_3)_3$		✔			Least retentive of all alkyl group bonded phases for non-polar solutes. Typically used for moderately polar and multi-functional compounds.
C4	Butyl	$-C_4H_9$		✔			Shorter retention than C8, C18. Separation of peptides and proteins.
C8	MOS	$-C_8H_{17}$		✔			Less retentive than C18; normally used for small peptides and proteins, pharmaceuticals, steroids, environmental samples.
C18	ODS	$-C_{18}H_{37}$		✔			Most retentive of the alkyl-bonded phases. Used widely for pharmaceuticals, steroids, fatty acids, phthalates, environmental etc.
Cyano	CPS, CN	$-(CH_2)_3CN$	✔	✔			Unique selectivity for polar compounds, more suitable than base silica for normal phase gradient separations. When used in reversed phase, the selectivity is different to that of the C8 and C18 phases. Useful for a wide range of pharmaceutical applications and for mixtures of very different solutes.
Amino	APS	$-(CH_2)_3NH_2$	✔	✔	✔	✔	HILIC: Carbohydrate analysis and other polar compounds. Weak anion exchange: anions and organic acids. Normal Phase: Alternative selectivity to silica. Good for aromatics.
Phenyl		$-(CH_3)C_6H_5$		✔			Aromatic compounds and moderately polar compounds.
Pentafluorophenyl	PFP	$-C_6F_5$		✔			Extra selectivity and retention for halogenated, polar compounds and isomers.
Diol		$-(CH_2)_2O$ $CH_2(CH_2OH)_2$	✔	✔		✔	Reversed Phase: Proteins, peptides. Normal Phase: Similar selectivity to silica, but less polar.
SCX	Strong Cation Exchanger	$-RSO_3H^-$			✔		Organic bases.
SAX	Strong Anion Exchanger	$-RN^+(CH_3)_3$			✔		Organic acids, nucleotides and nucleosides.
AX	Anion Exchanger Polyethleneimine (PEI)	$-(CH_2CH_2NH-)_n$			✔	✔	Organic acids, nucleotides and oligonucleotides.
Porous graphitic carbon	PGC	100% carbon	✔	✔			Particularly useful for the separation of highly polar compounds that are difficult to retain using conventional silica based columns; separation of structurally similar compounds (e.g., isomers, diastereoisomers).

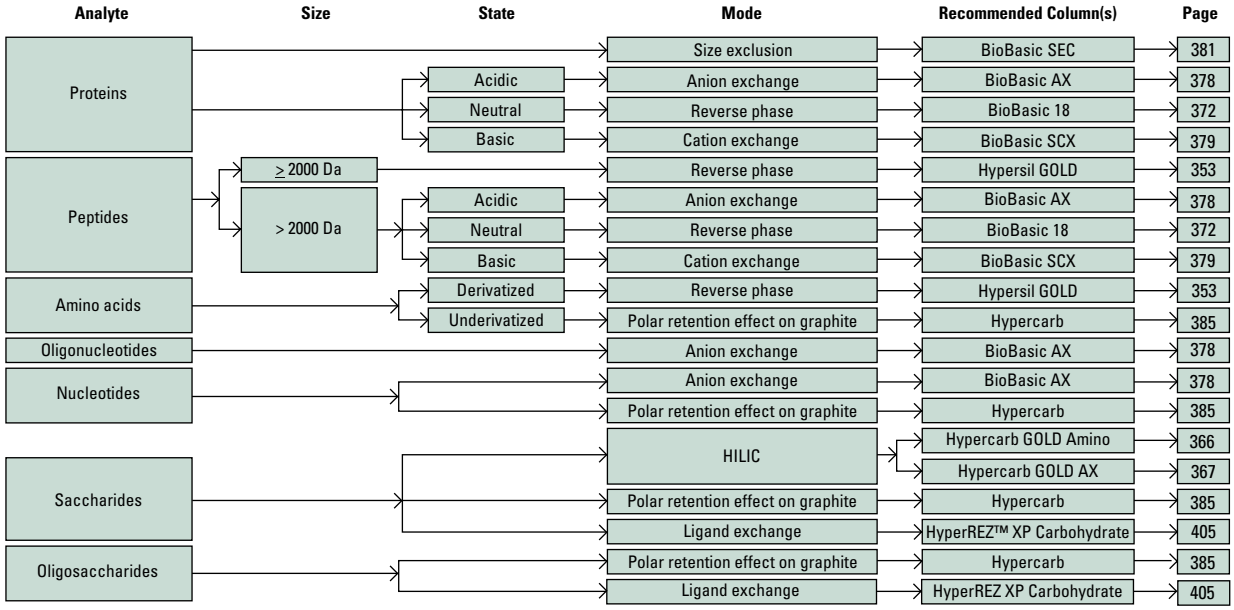
HPLC Column Selection

Before beginning a new analysis, consider the physical and chemical properties of the analyte(s), the mode of analysis and how the analyte(s) will interact with the surface of the chromatographic phase. To aid column selection, the following guide may be useful.



HPLC Column Selection for Biomolecules

Considerations for column selection for biomolecules are a little more complex, due to the size and complexity of many biological analytes. The following can be used for guidance in column selection.



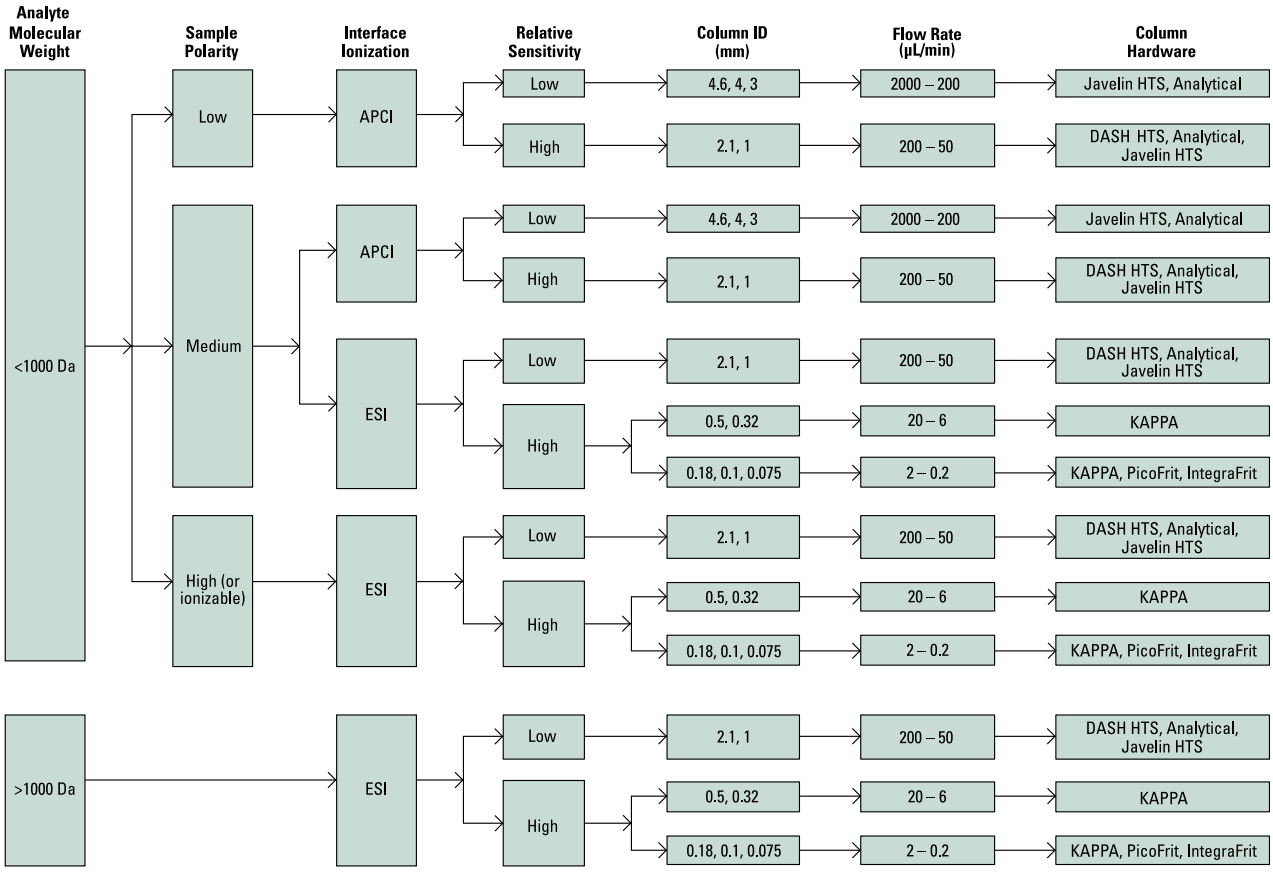
For more information on the HPLC analysis of biomolecules, please request our Technical Guide.

Column Selection for LC/MS

The Thermo Scientific range offers a broad array of column designs and stationary phases optimized for LC/MS applications. Use the following diagram to help you choose your column design, dimensions and stationary phase to best meet your application needs. A variety of HPLC column hardware configurations are available, designed to give superior results for high speed, high sensitivity, high efficiency and convenience. A wide range of stationary phases allows choices for optimized selectivity.

Column Hardware Selection for LC/MS

LC/MS Application	Column Hardware Design	Description
High throughput analysis	DASH™ HTS columns	Short, fast columns 20 x 2.1 mm Labeled and serialized Economical multi-packs
	Javelin™ HTS columns	Direct-connection columns Slim design, 20 mm length 1 mm to 4.6 mm ID
High sensitivity analysis	KAPPA™ capillary columns	Capillary columns 75 µm to 500 µm ID 30 mm to 250 mm lengths
Proteomics analysis	KAPPA capillary columns	Capillary columns 75 µm to 500 µm ID
	PicoFrit™ and IntegraFrit™ nanobore columns	Nanobore columns 75 µm ID Direct nanospray from column tapered-tip



Stationary Phase Selection for LC/MS

Phase	Particle Sizes	Pore Sizes	Stationary Phase Chemistries	General Description	Page
Hypersil GOLD	1.9µm, 3µm, 5µm	175 Å	C18 selectivity	Outstanding peak shape using generic gradients with C18 selectivity, providing increased peak capacity, improved resolution, sensitivity and signal to noise.	353
Hypersil GOLD C8	1.9µm, 3µm, 5µm	175 Å	C8	Offers similar selectivity to Hypersil GOLD but with less retention.	356
Hypersil GOLD C4	1.9µm, 3µm, 5µm	175 Å	C4	Low hydrophobicity for less retention than C8.	357
Hypersil GOLD aQ	1.9µm, 3µm, 5µm	175 Å	C18 polar endcapped	Excellent for polar compounds. Good results with low buffer concentrations. Can be used for challenging reverse phase separations employing highly aqueous mobile phases.	358
Hypersil GOLD PFP	1.9µm, 3µm, 5µm	175 Å	Perfluorinated phenyl	Offers alternative selectivity in reverse phase applications, particularly for halogenated analytes.	361
Hypersil GOLD Phenyl	1.9µm, 3µm, 5µm	175 Å	Phenyl	Offers unique selectivity for the analysis of aromatic and moderately polar compounds.	364
Hypersil GOLD CN	1.9µm, 3µm, 5µm	175 Å	Cyano	Offers alternative selectivity. Can be used for both reversed and normal phase separations.	365
Hypersil GOLD Amino	1.9µm, 3µm, 5µm	175 Å	Amino propyl	Can be used in HILIC mode for retention of polar compounds	366
Hypersil GOLD AX	1.9µm, 3µm, 5µm	175 Å	Polymeric ion exchange ligand	Can be used in HILIC mode for retention of polar compounds	367
Hypersi GOLD Silica	1.9µm, 3µm, 5µm	175 Å	Unmodified Silica	Can be used in HILIC mode for retention of polar compounds	369
BioBasic Reversed Phase	5µm	300 Å	C18, C8, C4, CN, Phenyl	Based on 300 Å pore size silica specifically designed for the separation of protein and peptides with increasing hydrophobicity: cyano and phenyl phases to provide alternative selectivity where required.	372
BioBasic Ion Exchange Phase	5µm	300 Å	SCX, AX	Large pore size for biomolecules. BioBasic SCX and AX stationary phases comprise silica particles coated with polymeric ion exchange ligands, which shield proteins from adsorbing to the silica surface.	378
BioBasic SEC	5µm	60 Å, 120 Å, 300 Å, 1000 Å	SEC	BioBasic SEC columns are available with 60 Å, 120 Å, 300 Å and 1000 Å pore sizes, allowing separation of a wide range of molecular weights.	381
Hypercarb	3µm, 5µm	250 Å	Porous Graphitic Carbon	Unique 100% porous graphitic carbon. Exceptional retention of very polar analytes. Separation of structurally similar substances. pH stable from 0 - 14. Ideal for high temperature applications.	385
BetaBasic	3µm, 5µm	150 Å	C18, C8, C4, CN, Phenyl	General purpose packing. Superb high pH stability.	409
BETASIL	3µm, 5µm 5µm	100 Å	C18, C8, C6, Phenyl/Hexyl, Cyano, Silica C1, Diol	General purpose packing with high surface coverage for strong retention and use with high organic mobile phases.	411

HPLC Column Selection by U.S. Pharmacopeia Specifications*

USP Code	Description	Recommended Phase	Page
L1	Octadecyl silane (C18) chemically bonded to porous or ceramic microparticles, 1.5 -10µm in diameter, or a monolithic rod	Hypersil GOLD	353
		Hypersil GOLD aQ	358
		Hypersil GOLD 1.9µm	353
		Hypersil GOLD aQ 1.9µm	358
		BioBasic 18	372
		Hypersil BDS C18	388
		Hypersil ODS	393
L2	Octadecyl silane chemically bonded to a silica gel of controlled surface porosity bonded to a solid spherical core, 30 -50µm in diameter	Pellicular ODS	Inquire
L3	Porous silica microparticles, 5 -10µm in diameter	Hypersil GOLD silica	369
		BETASIL Silica	412
		Hypersil Silica	400
L4	Silica gel of controlled surface porosity bonded to a solid spherical core, 30 - 50µm in diameter	Pellicular Silica	Inquire
L7	Octyl silane (C8) chemically bonded to totally porous silica particles, 1.5 -10µm in diameter	Hypersil GOLD C8	356
		Hypersil GOLD C8 1.9µm	356
		BioBasic 8	374
		Hypersil BDS C8	389
		Hypersil MOS	395
		Hypersil MOS-2	395
L8	An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, 3 - 10µm in diameter	Hypersil GOLD Amino	366
		Hypersil APS-2	399
L10	Nitrile groups (CN) chemically bonded to porous silica particles, 3 -10µm in diameter	Hypersil GOLD CN	365
		BioBasic CN	377
		Hypersil BDS Cyano	391
		Hypersil CPS	398
		Hypersil CPS-2	398
L11	Phenyl groups chemically bonded to porous silica particles, 1.5 - 10µm in diameter	Hypersil GOLD Phenyl	364
		Hypersil GOLD Phenyl 1.9µm	364
		BioBasic Phenyl	376
		Hypersil BDS Phenyl	390
		Hypersil Phenyl	397
		Hypersil Phenyl-2	397
L13	Trimethylsilane chemically bonded to porous silica particles, 3 - 10µm in diameter	Hypersil SAS	396
		BETASIL C1	411
L14	Silica gel having a chemically bonded, strongly basic quaternary ammonium anion exchange (SAX) coating, 5 - 10µm in diameter	Hypersil GOLD SAX	368
		Hypersil SAX (5µm)	401
L15	Hexylsilane (C6) chemically bonded to totally porous silica particles, 3 -10µm in diameter	BETASIL C6	411
L17	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 -11µm in diameter	HyperREZ XP Carbohydrate H^+	405
		HyperREZ XP Organic Acids	405
L19	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, about 9µm diameter	HyperREZ XP Carbohydrate Ca^{2+}	405
		HyperREZ XP Sugar Alcohols	405
L20	Dihydroxypropane groups chemically bonded to porous silica particles, 5 - 10µm in diameter	BETASIL Diol	412
L21	A rigid spherical styrene-divinylbenzene copolymer, 5 - 10µm in diameter	HyperREZ XP RP100	Inquire
		HyperREZ XP RP300	Inquire
L22	A cation exchange resin made of porous polystyrene gel with sulfonic acid groups, about 10µm in size	HyperREZ XP SCX	Inquire
L25	Packing having the capacity to separate compounds with a molecular weight range 100 - 5000 (as determined by polyethylene oxide) applied to neutral, anionic and cationic water-soluble polymers.	HyperGEL AP	407
L26	Butyl silane (C4) chemically bonded to totally porous silica particles, 3 -10µm in diameter	Hypersil GOLD C4	357
		BioBasic 4	375
		BetaBasic 4	410
L27	Porous silica particles, 30 - 50µm in diameter	HyperPrep™ Silica	Inquire
L33	Packing having the capacity to separate dextrans by molecular size over a range of 4,000 to 500,000 daltons. It is spherical, silica-based, and processed to provide pH stability	BioBasic SEC 120	381
		BioBasic SEC 300	381
		BioBasic SEC 1000	381
L34	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, about 9 µm in diameter	HyperREZ XP Carbohydrate Pb^{2+}	405
L43	Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 5 -10µm in diameter	Hypersil GOLD PFP	361
		Fluophase™ PFP	414
L52	A strong cation exchange resin made of porous silica with sulfopropyl groups by a propyl spacer, 5 - 10µm in diameter	BioBasic SCX	379
L58	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 7 to 11µm in diameter	HyperREZ XP Carbohydrate Na^+	405
L59	Packing having the capacity to separate proteins by molecular weight over the range of 10 to 500 kDa. It is spherical (10µm), silica-based, and processed to provide hydrophilic characteristics and pH stability	BioBasic SEC 300 (5µm)	381
L60	Spherical, porous silica gel, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and endcapped	HyPURITY ADVANCE	Inquire

** These are the recommended Thermo Scientific HPLC columns for various USP categories although other columns for each category are also available.*

Notes

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Thermo Scientific HPLC Phases

The tables below list Thermo Scientific HPLC sorbents offered. Please also refer to the Advanced User Graphic (AUG) for each HPLC phase on the pages indicated.

Phase	Particle Type	Particle Size (µm)	Pore Size (Å)	Nominal Surface Area (m^2/g)	% Carbon	Endcapping	USP Code	Phase Code	Page
AQUASIL									
C18	spherical, silica	3, 5	100	310	12	polar	L1	775	409
BetaBasic									
18	spherical, silica	3, 5	150	200	13	Yes	L1	715	409
8	spherical, silica	3, 5	150	200	7	Yes	L7	714	410
4	spherical, silica	3, 5	150	200	6	Yes	L26	716	410
Phenyl	spherical, silica	3, 5	150	200	7	Yes	L11	718	410
CN	spherical, silica	3, 5	150	200	5	Yes	L10	717	410
BETASIL									
C18	spherical, silica	3, 5,10	100	310	20	Yes	L1	701	411
C8	spherical, silica	3, 5, 10	100	310	12	Yes	L7	702	411
C6	spherical, silica	3, 5	100	310	11	Yes	L15	703	411
C1	spherical, silica	5	100	310	4	Yes	L13	705	411
Phenyl	spherical, silica	3, 5	100	310	11	Yes	L11	706	412
Phenyl-Hexyl	spherical, silica	3, 5	100	310	11	Yes	L11	730	412
CN	spherical, silica	3, 5	100	310	6	Yes	L10	708	412
Silica 100	spherical, silica	3, 5	100	310	–	–	L3	700	412
Diol 100	spherical, silica	5	100	310	6	–	L20	726	412
BioBasic									
18	spherical, silica	5	300	100	9	Yes	L1	721	372
8	spherical, silica	5	300	100	5	Yes	L7	722	374
4	spherical, silica	5	300	100	4	Yes	L26	723	375
Phenyl	spherical, silica	5	300	100	3	Yes	L11	724	376
CN	spherical, silica	5	300	100	3.5	Yes	L10	729	377
AX	spherical, silica	5	300	100	3	No	–	731	378
SCX	spherical, silica	5	300	100	3	–	L52	732	379
DELTABOND™									
Resolution AK	spherical, polymer coated silica	5	300	100	12	No	–	322	Inquire
Fast AK	spherical, polymer coated silica	5	300	100	12	No	–	323	413
Fluophase									
RP	spherical, silica	5	100	310	10	Yes	–	825	414
PFP	spherical, silica	5	100	310	12	Yes	L43	827	414
WP	spherical, silica	5	300	100	5	Yes	–	826	414
Hypercarb									
Hypercarb	spherical, porous graphitic carbon	3, 5, 7	250	120	100	–	–	350	385
HyperREZ XP									
Carbohydrate H^+	spherical, polymer	8	–	–	–	–	L17	690	405
Carbohydrate Pb^{2+}	spherical, polymer	8	–	–	–	–	L34	691	405
Carbohydrate Ca^{2+}	spherical, polymer	8	–	–	–	–	L19	692	405
Carbohydrate Na^+	spherical, polymer	10	–	–	–	–	–	693	405
Organic Acid	spherical, polymer	8	–	–	–	–	L17	696	405
Sugar Alcohol	spherical, polymer	8	–	–	–	–	L19	697	405

Phase	Particle Type	Particle Size (µm)	Pore Size (Å)	Nominal Surface Area (m^2/g)	% Carbon	Endcapping	USP Code	Phase Code	Page
Hypersil									
ODS (C18)	spherical, silica	3, 5, 10	120	170	10	Yes	L1	301	393
ODS-2 (C18)	spherical, silica	3, 5	80	220	11	Yes	L1	316	394
MOS (C8)	spherical, silica	3, 5	120	170	6.5	No	L7	302	395
MOS-2 (C8)	spherical, silica	3, 5	120	170	6.5	Yes	L7	303	395
SAS (C1)	spherical, silica	3, 5	120	170	2.5	Yes	L13	305	396
Phenyl	spherical, silica	3, 5	120	170	5	No	L11	309	397
Phenyl-2	spherical, silica	5	120	170	5	Yes	L11	319	397
CPS	spherical, silica	3, 5	120	170	4	No	L10	308	398
CPS-2	spherical, silica	5	120	170	4	Yes	L10	318	398
APS-2	spherical, silica	3, 5	120	170	1.9	No	L8	307	399
Silica	spherical, silica	3, 5	120	170	–	–	L3	300	400
SAX	spherical, silica	5	120	170	2.5	Yes	L14	341	401
Hypersil BDS									
C18	spherical, silica	2.4, 3, 5	130	170	11	Yes	L1	281	388
C8	spherical, silica	2.4, 3, 5	130	170	7	Yes	L7	282	389
Phenyl	spherical, silica	2.4, 3, 5	130	170	5	Yes	L11	289	390
Cyano	spherical, silica	2.4, 3, 5	130	170	4	Yes	L10	288	391
Hypersil GOLD									
C18 selectivity	spherical, silica	1.9, 3, 5, 8, 12	175	220	10	Yes	L1	250	353
C8	spherical, silica	1.9, 3, 5	175	220	8	Yes	L7	252	356
C4	Spherical, silica	1.9, 3, 5	175	220	5	Yes	L26	255	357
aQ	spherical, silica	1.9, 3, 5, 8, 12	175	220	12	Polar	L1	253	358
PFP	spherical, silica	1.9, 3, 5, 8, 12	175	220	8	Yes	L43	254	361
Phenyl	spherical, silica	1.9, 3, 5	175	220	8.5	Yes	L11	259	364
CN (Cyano)	spherical, silica	1.9, 3, 5	175	220	4	Yes	L10	258	365
Amino	Spherical, silica	1.9, 3, 5	175	220	2	Yes	L8	257	366
AX	Spherical, silica	1.9, 3, 5	175	220	6	No	-	261	367
SAX	Spherical, silica	1.9, 3, 5	175	220	2.5	Yes	L14	263	368
Silica	Spherical, silica	1.9, 3, 5	175	220	-	-	L3	251	369
Hypersil Green									
PAH	spherical, silica	3, 5	120	170	13.5	Yes	–	311	402
HyPURITY™									
C18	spherical, silica	3, 5, 8, 12	190	200	13	Yes	L1	221	415
C8	spherical, silica	5	190	200	8	Yes	L7	222	415
C4	spherical, silica	5	190	200	4.5	Yes	L26	224	415
Cyano	spherical, silica	5	190	200	4	Yes	L10	228	415
AQUASTAR	spherical, silica	3, 5, 8, 12	190	200	10	Polar	L1	225	416

Size Exclusion Chromatography Phases

Phase	Type	Particle Type	Particle Size (µm)	Pore Size (Å)	Exclusion Limit Operating Range	USP Code	Packing Code	Page
HyperGEL								
OP5	organic	PS-DVB polymer	5, 10	50	up to 2,000*	–	430	407
OP10	organic	PS-DVB polymer	5, 10	100	up to 4,000*	–	431	407
OP25	organic	PS-DVB polymer	5, 10	500	500 - 30,000*	–	432	407
OP30	organic	PS-DVB polymer	5, 10	1,000	500 - 60,000*	–	433	407
OP40	organic	PS-DVB polymer	5, 10	10,000	10,000 - 600,000*	–	434	407
OP50	organic	PS-DVB polymer	5, 10	100,000	60,000 - 2,000,000*	–	435	407
OP60	organic	PS-DVB polymer	5, 10	1,000,000	600,000 - 10,000,000*	–	436	407
OP	organic	PS-DVB polymer	5, 10	–	–	–	437	407
BioBasic								
SEC 60	aqueous	silica	5	60	0.1 - 6‡	–	733	381
SEC 120	aqueous	silica	5	120	0.1 - 50‡	L33	734	381
SEC 300	aqueous	silica	5	300	1 - 500‡	L33, L59	735	381
SEC 1000	aqueous	silica	5	1,000	20 - 4,000‡	L33	736	381

** Operating MW range PEO/PEG (g/mol) ‡ Separation range, protein (kDa)*

HPLC Column Selection by Manufacturer

To find a suitable Thermo Scientific alternative to another manufacturer's columns, refer to the selection guide below. The Thermo Scientific alternative phases are selected based on a combination of physical and chemical similarities as well as mode of retention. These alternatives are not guaranteed to provide the same retention or selectivity, but should be suitably similar in character to allow a similar or improved separation to be achieved with some method optimization. The user should refer to the individual phase information to ensure that the characteristics of the alternative match the requirements of their separation.

The following table is not complete in terms of manufacturer or products offered. Although every effort is made to ensure that the product information provided is as accurate as possible, some errors may occur in collation and transcription. We cannot accept any responsibility for the use of the following information.

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% C	Recommended Thermo Scientific Alternative	Page
ACE C18	ACT	100	300	15.5	Hypersil GOLD	353
ACE C8	ACT	100	300	9	Hypersil GOLD C8	356
ACE C4	ACT	100	300	5.5	HyPURITY C4	415
ACE CN	ACT	100	300	5.5	Hypersil GOLD CN	365
ACE Phenyl	ACT	100	300	9.5	Hypersil GOLD Phenyl	364
ACE AQ	ACT	100	300	14	Hypersil GOLD aQ	358
ACE C18-300	ACT	300	100	9	BioBasic 18	372
ACE C8-300	ACT	300	100	5	BioBasic 8	374
ACE C4-300	ACT	300	100	2.6	BioBasic 4	375
ACE CN-300	ACT	300	100	2.6	BioBasic CN	377
ACE Phenyl-300	ACT	300	100	5.3	BioBasic Phenyl	376
ACQUITY UPLC BEH C18	Waters	130	185	-	Hypersil GOLD (1.9µm)	353
ACQUITY UPLC BEH C8	Waters	130	185	-	Hypersil GOLD C8 (1.9µm)	356
ACQUITY UPLC BEH Phenyl	Waters	130	185	-	Hypersil GOLD Phenyl (1.9µm)	364
ACQUITY UPLC HSS T3	Waters	100	230	-	Hypersil GOLD aQ (1.9µm)	358
Alltima™ HP C18	Grace	190	200	12	Hypersil GOLD	353
Alltima HP C18 AQ	Grace	100	450	20	Hypersil GOLD aQ	358
Alltima HP C18 HiLoad	Grace	100	450	24	BETASIL C18	411
Alltima HP C8	Grace	190	200	8	Hypersil GOLD C8	356
Alltima HP CN	Grace	190	200	4	Hypersil GOLD CN	365
Alltima HP Silica	Grace	190	200	–	Hypersil GOLD Silica	369
Aminex™ HPX42C	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate Ca^{2+}	405
Aminex HPX72S	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate H^{+}	405
Aminex HPX87C	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate Ca^{2+}	405
Aminex HPX87H	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate H^{+}	405
Aminex HPX87N	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate Na^{+}	405
Aminex HPX87P	Bio-Rad	–	–	–	HyperREZ XP Carbohydrate Pb^{2+}	405
AQUA™ C18	Phenomenex	125	320	15	Hypersil GOLD aQ	358
Ascentis C18	Supelco	100	450	25	Hypersil GOLD	353
					BETASIL C18	411
Ascentis C8	Supelco	100	450	15	Hypersil GOLD C8	356
					BETASIL C8	411
Ascentis Phenyl	Supelco	100	450	19	Hypersil GOLD Phenyl	364
					BETASIL Phenyl	412
Atlantis™ dC18	Waters	100	330	12	Hypersil GOLD aQ	358
Columbus™ C18	Phenomenex	110	375	19	Hypersil GOLD	353
					BETASIL C18	411
Columbus C8	Phenomenex	110	375	13	Hypersil GOLD C8	356

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% C	Recommended Thermo Scientific Alternative	Page
Discovery BIO Wide Pore C18	Supelco	300	–	–	BioBasic 18	372
Discovery BIO Wide Pore C8	Supelco	300	–	–	BioBasic 8	374
Discovery C18	Supelco	180	200	14	Hypersil GOLD	353
Discovery C8	Supelco	180	200	–	Hypersil GOLD C8	356
Discovery Cyano	Supelco	180	200	–	Hypersil GOLD CN	357
Fluofix™ 120	Neos	120	–	5	Fluophase RP	414
Gemini™ C18	Phenomenex	110	375	14	Hypersil GOLD	353
Genesis™ AQ	Grace	120	300	–	Hypersil GOLD aQ	358
Genesis C4	Grace	120	300	–	Hypersil GOLD C4	357
Genesis C8	Grace	120	300	–	Hypersil GOLD C8	356
Genesis CN	Grace	120	300	7	Hypersil GOLD CN	365
Genesis MOS	Grace	120	300	11	Hypersil GOLD C8	356
Genesis ODS	Grace	120	300	18	Hypersil GOLD	353
Genesis Phenyl	Grace	120	300	–	Hypersil GOLD Phenyl	364
Genesis Silica	Grace	120	300	–	Hypersil GOLD Silica	369
Inertsil™ C4	GL Sciences	150	320	8	Hypersil GOLD C4	357
Inertsil C8	GL Sciences	150	320	11	Hypersil GOLD C8	356
Inertsil ODS3V	GL Sciences	100	450	15	Hypersil GOLD	353
Inertsil Phenyl	GL Sciences	150	320	10	Hypersil GOLD Phenyl	364
Inertsil Silica	GL Sciences	150	320	–	BETASIL Silica	412
Jupiter™ C18	Phenomenex	300	170	13	BioBasic 18	372
Jupiter C4	Phenomenex	300	170	5	BioBasic C4	375
Kromasil™ C1	Akzo-Nobel	100	340	5	BETASIL C1	411
Kromasil C18	Akzo-Nobel	100	340	19	Hypersil GOLD	353
					BETASIL C18	411
Kromasil C4	Akzo-Nobel	100	340	8	Hypersil GOLD C4	357
Kromasil Silica	Akzo-Nobel	100	340	–	BETASIL Silica	412
LiChrospher™ CN	Merck	100	350	7	Hypersil GOLD CN	365
LiChrospher Diol	Merck	100	350	–	BETASIL Diol	412
LiChrospher NH_2	Merck	100	350	5	Hypersil GOLD Amino	366
LiChrospher RP 18	Merck	100	350	21	Hypersil GOLD	353
					BETASIL C18	411
LiChrospher RP-18e	Merck	100	350	22	Hypersil GOLD	353
					BETASIL C18	411
LiChrospher RP-8	Merck	100	350	13	Hypersil GOLD C8	356
LiChrospher RP-8e	Merck	100	350	13	Hypersil GOLD C8	356
Luna™ C18 (2)	Phenomenex	100	400	18	Hypersil GOLD	353
Luna C8 (2)	Phenomenex	100	400	14	Hypersil GOLD C8	356
Luna CN	Phenomenex	100	400	–	Hypersil GOLD CN	365
Luna NH_2	Phenomenex	100	400	10	Hypersil GOLD Amino	366
Luna SCX	Phenomenex	100	400	–	BioBasic SCX	379
Luna Silica (2)	Phenomenex	100	400	–	BETASIL Silica	412
µBondapak™ C18	Waters	125	330	10	Hypersil GOLD	353
µBondapak CN	Waters	125	330	–	Hypersil GOLD CN	365
µBondapak NH_2	Waters	125	330	4	Hypersil APS-2	399
µBondapak Phenyl	Waters	125	330	–	Hypersil GOLD Phenyl	364
Nova-Pak™ (HR) C18	Waters	60	120	7	Hypersil GOLD	353
Nova-Pak C8	Waters	60	120	–	Hypersil GOLD C8	356
Nova-Pak CN	Waters	60	120	–	Hypersil GOLD CN	365
Nova-Pak Phenyl	Waters	60	120	5	Hypersil GOLD Phenyl	364
Nova-Pak Silica	Waters	60	120	–	BETASIL Silica	412
NUCLEODUR™ C18 EC	Macherey-Nagel	110	340	18	Hypersil GOLD	353
NUCLEODUR C18 Gravity	Macherey-Nagel	110	340	18	Hypersil GOLD	353
NUCLEODUR CN	Macherey-Nagel	110	340	7	Hypersil GOLD CN	365

HPLC Column Selection by Manufacturer

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% C	Recommended Thermo Scientific Alternative	Page
NUCLEODUR Pyramid	Macherey-Nagel	110	340	14	Hypersil GOLD aQ	358
Nucleosil™ 100 C18	Macherey-Nagel	100	350	17	Hypersil GOLD	353
Nucleosil 100 C18 AB	Macherey-Nagel	100	350	24	Hypersil GOLD	353
					BETASIL C18	411
Nucleosil 100 C_6H_5	Macherey-Nagel	100	350	–	Hypersil GOLD Phenyl	364
Nucleosil 100 C8	Macherey-Nagel	100	350	9	Hypersil GOLD C8	356
Nucleosil 100 CN	Macherey-Nagel	100	350	–	Hypersil GOLD CN	365
Nucleosil 100 $N(CH_3)_2$	Macherey-Nagel	100	350	–	Hypersil SAX	401
Nucleosil 100 NH_2	Macherey-Nagel	100	350	4	Hypersil GOLD Amino	366
Nucleosil 100 OH	Macherey-Nagel	100	350	–	BETASIL Diol	412
Nucleosil 100 SA	Macherey-Nagel	100	350	7	BioBasic SCX	379
Nucleosil 100 SB	Macherey-Nagel	100	350	10	Hypersil GOLD SAX	368
Nucleosil 300 C18	Macherey-Nagel	300	100	7	BioBasic 18	372
Nucleosil 300 C4	Macherey-Nagel	300	100	–	BioBasic 4	375
Nucleosil 300 C_6H_5	Macherey-Nagel	300	100	–	BioBasic Phenyl	376
Nucleosil 300 C8	Macherey-Nagel	300	100	–	BioBasic 8	374
Nucleosil 300 CN	Macherey-Nagel	300	100	–	BioBasic CN	377
Partisil™ C8	Whatman	85	350	9	Hypersil GOLD C8	356
Partisil ODS	Whatman	85	350	5	Hypersil GOLD	353
Partisil ODS2	Whatman	85	350	16	Hypersil GOLD	353
Partisil ODS-3	Whatman	85	350	11	Hypersil GOLD	353
Partisil SAX	Whatman	85	350	–	Hypersil SAX	401
Partisil SCX	Whatman	85	350	–	BioBasic SCX	379
Partisil Silica	Whatman	85	350	–	BETASIL Silica	412
Pinnacle™ C1	Restek	120	170	2	Hypersil SAS	396
Pinnacle C18	Restek	120	170	10	Hypersil GOLD	353
Pinnacle C4	Restek	120	170	4	Hypersil GOLD C4	357
Pinnacle CN	Restek	120	170	5	Hypersil GOLD CN	365
Pinnacle DB C18	Restek	140	–	11	Hypersil GOLD	353
Pinnacle DB C18 1.9µm	Restek	140	–	11	Hypersil GOLD (1.9 µm)	353
Pinnacle DB C8	Restek	140	–	6	Hypersil GOLD C8	356
Pinnacle DB Cyano	Restek	140	–	4	Hypersil GOLD CN	365
Pinnacle DB Phenyl	Restek	140	–	5	Hypersil GOLD Phenyl	364
Pinnacle IBD	Restek	120	170	–	Hypersil GOLD	353
Pinnacle NH_2	Restek	120	170	2	Hypersil GOLD Amino	366
Pinnacle Phenyl	Restek	120	170	5	Hypersil GOLD Phenyl	364
Pinnacle SAX	Restek	120	170	3	Hypersil GOLD SAX	368
Pinnacle Silica	Restek	120	170	–	Hypersil GOLD Silica	369
Pinnacle Ultra C18	Restek	100	–	20	Hypersil GOLD	353
					BETASIL C18	411
Pinnacle Wide Pore C4	Restek	300	–	2	BioBasic 4	375
Polaris NH_2	Varian	–	–	–	Hypersil GOLD Amino	366
Prodigy™ C8	Phenomenex	150	310	13	Hypersil GOLD C8	356
Prodigy ODS2	Phenomenex	150	310	18	Hypersil GOLD	353
					BETASIL C18	411
Prodigy ODS-3	Phenomenex	100	450	16	Hypersil GOLD	353
Prodigy ODS-3V	Phenomenex	100	450	16	Hypersil GOLD	353
Prodigy Phenyl-3	Phenomenex	100	450	10	BETASIL Phenyl	412
Purospher™ RP-18	Merck	60	500	–	Hypersil GOLD	353
Purospher STAR-8e	Merck	120	300	–	Hypersil GOLD C8	356
Purospher STAR RP-18e	Merck	120	300	–	Hypersil GOLD	353

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% C	Recommended Thermo Scientific Alternative	Page
Purospher RP-18e	Merck	60	500	–	Hypersil GOLD	353
Pursuit™ C18	Varian	–	–	–	Hypersil GOLD	353
Pursuit C8	Varian	–	–	–	Hypersil GOLD C8	356
Pursuit Diphenyl	Varian	–	–	–	BetaBasic Phenyl	410
Pursuit PFP	Varian	–	–	–	Hypersil GOLD PFP	361
Shodex™ OHpak SB802.5	Showa Denko	–	–	–	HyperGEL AP	407
Shodex OHpak SB803	Showa Denko	–	–	–	HyperGEL AP	407
Shodex OHpak SB804	Showa Denko	–	–	–	HyperGEL AP	407
Shodex OHpak SB806	Showa Denko	–	–	–	HyperGEL AP	407
Shodex PH	Showa Denko	100	–	–	Hypersil GOLD Phenyl	364
Shodex SIL	Showa Denko	100	–	–	BETASIL Silica	412
Shodex TMS	Showa Denko	100	–	–	Hypersil SAS	396
Waters™ Spherisorb™ C1	Waters	80	200	2	Hypersil SAS	396
Waters Spherisorb C6	Waters	80	200	5	BETASIL C6	411
Waters Spherisorb C8	Waters	80	200	6	Hypersil GOLD C8	356
Waters Spherisorb CN	Waters	80	200	3	Hypersil GOLD CN	365
Waters Spherisorb NH_2	Waters	80	200	2	Hypersil APS-2	399
Waters Spherisorb ODS1	Waters	80	200	6	Hypersil GOLD	353
Waters Spherisorb ODS2	Waters	80	200	12	Hypersil GOLD	353
Waters Spherisorb ODSB	Waters	80	200	12	Hypersil GOLD	353
Waters Spherisorb Phenyl	Waters	80	200	3	Hypersil GOLD Phenyl	364
Waters Spherisorb SAX	Waters	80	200	–	Hypersil SAX	401
Waters Spherisorb SCX	Waters	80	200	–	BioBasic SCX	379
Waters Spherisorb W (silica)	Waters	80	200	–	BETASIL Silica	412
Styragel™ HR0.5	Waters	50	–	–	HyperGEL OP 5	407
Styragel HR1	Waters	100	–	–	HyperGEL OP 10	407
Styragel HR2	Waters	500	–	–	HyperGEL OP 25	407
Styragel HR3	Waters	1,000	–	–	HyperGEL OP 30	407
Styragel HR4	Waters	10,000	–	–	HyperGEL OP 40	407
Styragel HT3	Waters	1,000	–	–	HyperGEL OP 30	407
Styragel HT4	Waters	10,000	–	–	HyperGEL OP 40	407
SunFire™ C18	Waters	90	340	16	Hypersil GOLD	353
SunFire C8	Waters	90	340	16	Hypersil GOLD C8	356
Supelcosil LC-1	Supelco	120	170	–	Hypersil SAS	396
Supelcosil LC-18	Supelco	120	170	11	Hypersil GOLD	353
Supelcosil LC-18DB	Supelco	120	170	11	Hypersil GOLD	353
Supelcosil LC-8	Supelco	120	170	–	Hypersil GOLD C8	356
Supelcosil LC-CN	Supelco	120	170	–	Hypersil GOLD CN	365
Supelcosil LC-NH_2	Supelco	120	170	–	Hypersil GOLD Amino	366
Supelcosil LC-Si	Supelco	120	170	–	Hypersil GOLD Silica	369
Symmetry C18	Waters	100	335	19	Hypersil GOLD	353
Symmetry C8	Waters	100	335	12	Hypersil GOLD C8	356
Synergi Hydro-RP	Phenomenex	80	475	19	Hypersil GOLD aQ	358
TSKgel™ G2000SW (incl XL)	Tosoh	125	–	–	BioBasic SEC 120	381
TSKgel Octyl-80TS	Tosoh	80	200	11	Hypersil GOLD C8	356
TSKgel ODS-120A	Tosoh	120	200	22	Hypersil GOLD	353
TSKgel ODS-120A	Tosoh	120	200	22	BETASIL C18	409

HPLC Column Selection by Manufacturer

Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% C	Recommended Thermo Scientific Alternative	Page
TSKgel ODS-120T	Tosoh	120	200	22	Hypersil GOLD	353
					BETASIL C18	411
TSKgel ODS-80TM	Tosoh	80	200	15	Hypersil GOLD	353
TSKgel Super Octyl	Tosoh	110	–	5	Hypersil GOLD C8	356
TSKgel Super ODS	Tosoh	110	–	8	Hypersil GOLD	353
TSKgel Super Phenyl	Tosoh	110	–	3	Hypersil GOLD Phenyl	364
TSKgel SuperSW3000	Tosoh	250	–	–	BioBasic SEC 300	381
Ultracarb™ C8	Phenomenex	60	550	14	Hypersil GOLD C8	356
Ultracarb ODS (20)	Phenomenex	90	320	22	Hypersil GOLD	353
					BETASIL C18	411
Ultrahydrogel™ 1000	Waters	1000	–	–	HyperGEL AP 30	407
Ultrastyragel™ 100A	Waters	100	–	–	HyperGEL OP 10	407
Ultrastyragel 103A	Waters	1,000	–	–	HyperGEL OP 30	407
Ultrastyragel 104A	Waters	10,000	–	–	HyperGEL OP 40	407
Ultrastyragel 105A	Waters	100,000	–	–	HyperGEL OP 50	407
Ultrastyragel 106A	Waters	1,000,000	–	–	HyperGEL OP 60	407
Ultrastyragel 500A	Waters	500	–	–	HyperGEL OP 25	407
Viva™ C18	Restek	300	–	9	BioBasic 18	372
Viva C4	Restek	300	–	4	BioBasic 4	375
Viva C8	Restek	300	–	5	BioBasic 8	374
Vydac™ 201SP C18	Grace	90	–	–	Hypersil GOLD	353
Vydac 201SP Selectapore 90M C18	Grace	90	250	–	Hypersil GOLD	353
Vydac 201TP C18	Grace	300	–	–	BioBasic 18	372
Vydac 202TP C18	Grace	300	–	–	BioBasic 18	372
Vydac 208TP C8	Grace	300	–	–	BioBasic 8	374
Vydac 214TP	Grace	300	–	–	BioBasic 4	375
Vydac 218TP	Grace	300	–	–	BioBasic 18	372
Vydac 218WP Selectapore 300M C18	Grace	300	70	–	BioBasic 18	372
Vydac 219TP	Grace	300	–	–	BioBasic Phenyl	376
Vydac 238TP	Grace	300	–	–	BioBasic 18	372
Vydac 259VHP	Grace	300	–	–	HyperREZ XP RP 300	Inquire
Vydac 300VHP	Grace	300	–	–	HyperREZ XP SAX	Inquire
Vydac 301VHP	Grace	300	–	–	HyperREZ XP SAX	Inquire
Vydac 400VHP	Grace	300	–	–	HyperREZ XP SCX	Inquire
XBridge™ C18	Waters	–	–	–	Hypersil GOLD	353
XBridge C8	Waters	–	–	–	Hypersil GOLD C8	356
XBridge Phenyl	Waters	–	–	–	Hypersil GOLD Phenyl	364
XTerra™ MS C18	Waters	125	180	16	Hypersil GOLD	353
XTerra MS C8	Waters	125	180	12	Hypersil GOLD C8	356
YMCbasic™	YMC	–	–	–	Hypersil GOLD C8	356
YMC-Pack™ C4	YMC	120	300	7	HyPURITY C4	415
YMC-Pack C8	YMC	120	300	10	Hypersil GOLD C8	356
YMC-Pack CN	YMC	120	300	7	Hypersil GOLD CN	365
YMC-Pack Diol	YMC	120	300	–	BETASIL Diol	412
YMC-Pack NH_2	YMC	120	–	–	Hypersil GOLD Amino	366
YMC-Pack ODS AQ	YMC	120	300	16	Hypersil GOLD aQ	358
YMC-Pack ODS-A	YMC	120	300	17	Hypersil GOLD	353
YMC-Pack ODS-A	YMC	300	150	6	BioBasic 18	372
YMC-Pack Phenyl	YMC	120	300	9	Hypersil GOLD Phenyl	364
YMC-Pack Phenyl	YMC	300	150	3	BioBasic Phenyl	376

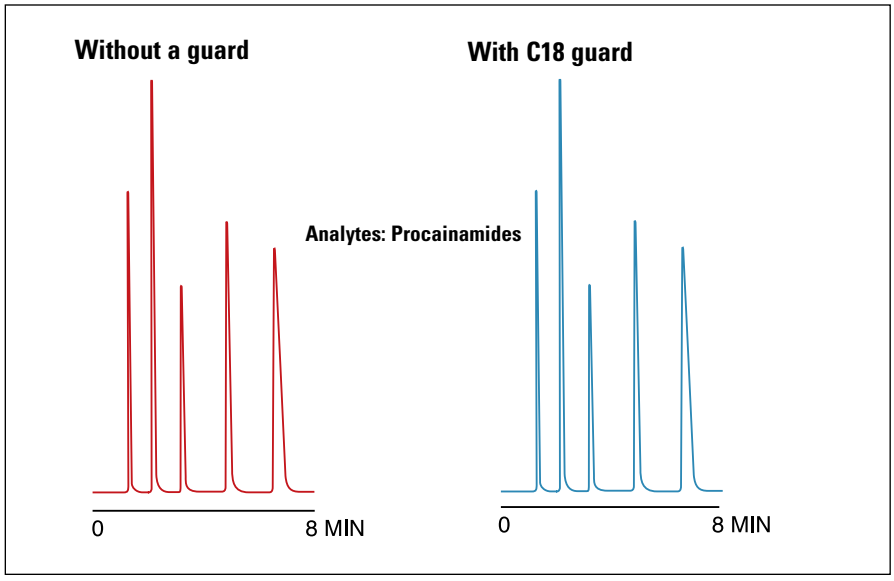
Phase	Manufacturer	Pore Size (Å)	Area (m^2/g)	% C	Recommended Thermo Scientific Alternative	Page
YMC-Pack Polyamine 2	YMC	120	–	–	HyperREZ SAX	inquire
YMC-Pack Polymer C18	YMC	–	–	–	Hypersil GOLD	353
YMC-Pack Pro C18	YMC	120	350	16	Hypersil GOLD	353
YMC-Pack Silica	YMC	120	–	–	BETASIL Silica	412
YMC-Pack TMS (C1)	YMC	120	300	4	BETASIL C1	411
Zorbax Eclipse XDB C18	Agilent	80	180	10	Hypersil GOLD	353
Zorbax Eclipse XDB C8	Agilent	80	180	8	Hypersil GOLD C8	356
Zorbax Eclipse XDB Phenyl	Agilent	80	180	8	Hypersil GOLD Phenyl	364
Zorbax Eclipse Plus C18	Agilent	95	160	8	Hypersil GOLD	353
Zorbax Eclipse Plus C8	Agilent	95	160	6	Hypersil GOLD C8	356
Zorbax RRHT Eclipse Plus C18	Agilent	95	160	8	Hypersil GOLD (1.9µm)	353
Zorbax RRHT Eclipse Plus C8	Agilent	95	160	6	Hypersil GOLD C8 (1.9µm)	356
Zorbax RRHT Eclipse XDB-C18	Agilent	80	180	10	Hypersil GOLD (1.9µm)	353
Zorbax RRHT Eclipse XDB-C8	Agilent	80	180	7.5	Hypersil GOLD C8 (1.9µm)	356
Zorbax RRHT SB-CN	Agilent	80	180	4	Hypersil GOLD CN (1.9µm)	365
Zorbax SB Aq	Agilent	80	180	–	Hypersil GOLD aQ	358
Zorbax SB C18	Agilent	80	180	10	Hypersil GOLD	353
Zorbax SB C18	Agilent	300	45	3	BioBasic 18	372
Zorbax SB C8	Agilent	80	180	6	Hypersil GOLD C8	356
Zorbax SB C8	Agilent	300	45	2	BioBasic 8	374
Zorbax SB CN	Agilent	80	180	4	Hypersil GOLD CN	365
Zorbax SB CN	Agilent	300	45	1	BioBasic CN	377
Zorbax SB Phenyl	Agilent	80	180	6	Hypersil GOLD Phenyl	364

Column Protection

Extend column lifetime and improve performance

- Guards and filters to protect your analytical column
- Economical extension of column lifetime
- Multiple formats for optimum performance and efficiency
- Drop-in designs for quick and easy guard and filter replacement
- UHPLC Filter cartridges and holder to protect Hypersil GOLD 1.9µm columns

To extend the lifetime and performance of your analytical and preparative columns, we recommend that they be protected from contamination by sample and solvent debris and interferences from the sample matrix. The most cost-effective and efficient way of trapping these unwanted system components is by use of filter or packed guards. Column performance should not be affected by adding a guard or filter unit to the HPLC system. The chromatogram shown demonstrates how the column's chromatographic performance is unaffected by the addition of a guard unit during the analysis of procainamides.

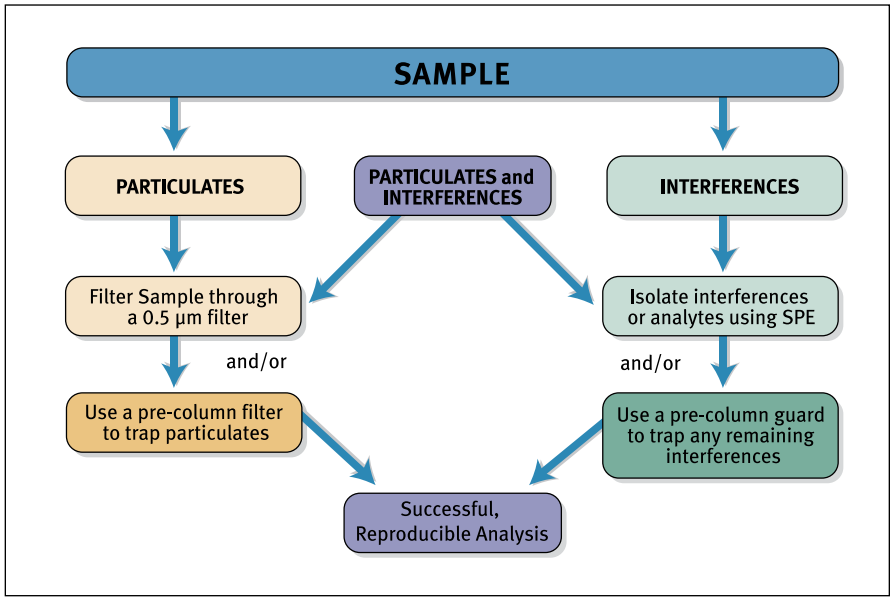


Peak resolution and shape unaffected by the addition of a guard column

Guard and Filter Selection

Guard columns are positioned between the injector and the analytical column, removing strongly adsorbed sample components before the sample reaches the analytical column. The simple rule of thumb in guard selection is to choose one that matches your analytical column. The internal diameters should match as closely as possible, and the packing material should be the same particle size and chemistry as the analytical column. If a guard cartridge system is used, the replacement of the packed cartridges should be simple and fast.

Pre-column filters are positioned between the solvent inlet filter and the column inlet. They are designed to trap particulate matter from the fluid path. They do not remove sample interferences or contaminants that are dissolved in the fluid path. These units are designed to be wholly disposable or have replaceable filters in a re-useable holder.



Choosing a guard or filter based on sample make-up

Replaceable 0.2µm Thermo Scientific UHLPC filter cartridges protect Hypersil GOLD 1.9µm columns against particles, enhancing column lifetime. Its low dead volume design maintains chromatographic performance without degrading peak shape and causes minimal efficiency loss through dispersion. The UHPLC filter adds a minimal increase in backpressure, so can be fitted to any length column.

Drop-in Guard Cartridges

Drop-in guard cartridges offer convenience, economy and effective protection for extending column lifetime

- **The 10mm design offers maximum protection with minimal increase in retention**
- **Fit Thermo Scientific UNIGUARD direct connection and stand alone holders**

Hypersil GOLD Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6/4.0mm ID**	**3.0mm ID**	**2.1mm ID**	**1.0mm ID**	**Quantity**
Hypersil GOLD						
3µm	10mm	**25003-014001**	**25003-013001**	**25003-012101**	**25003-011001**	4 Pack
5µm	10mm	**25005-014001**	**25005-013001**	**25005-012101**	**25005-011001**	4 Pack
Hypersil GOLD C8						
3µm	10mm	**25203-014001**	**25203-013001**	**25203-012101**	**25203-011001**	4 Pack
5µm	10mm	**25205-014001**	**25205-013001**	**25205-012101**	**25205-011001**	4 Pack
Hypersil GOLD aQ						
3µm	10mm	**25303-014001**	**25303-013001**	**25303-012101**	**25303-011001**	4 Pack
5µm	10mm	**25305-014001**	**25305-013001**	**25305-012101**	**25305-011001**	4 Pack
Hypersil GOLD PFP						
3µm	10mm	**25403-014001**	**25403-013001**	**25403-012101**	**25403-011001**	4 Pack
5µm	10mm	**25405-014001**	**25405-013001**	**25405-012101**	**25405-011001**	4 Pack
Hypersil GOLD CN						
3µm	10mm	**25803-014001**	**25803-013001**	**25803-012101**	**25803-011001**	4 Pack
5µm	10mm	**25805-014001**	**25805-013001**	**25805-012101**	**25805-011001**	4 Pack
Hypersil GOLD Phenyl						
3µm	10mm	**25903-014001**	**25903-013001**	**25903-012101**	**25903-011001**	4 Pack
5µm	10mm	**25905-014001**	**25905-013001**	**25905-012101**	**25905-011001**	4 Pack
BioBasic 18 Drop-in Guard Cartridges						
5µm	10mm	**72105-014001**	**72105-013001**	**72105-012101**	**72105-011001**	4 Pack
BioBasic 18 Drop-in Guard Cartridges						
5µm	10mm	**72205-014001**	**72205-013001**	**72205-012101**	**72205-011001**	4 Pack
BioBasic AX Drop-in Guard Cartridges						
5µm	10mm	**73105-014001**	**73105-013001**	**73105-012101**	**73105-011001**	4 Pack
BioBasic AX Drop-in Guard Cartridges						
5µm	10mm	**73205-014001**	**73205-013001**	**73205-012101**	**73205-011001**	4 Pack
Hypersil BDS C18 Drop-in Guard Cartridges						
2.4µm	10mm	**28102-014001**	--	**28102-012101**	--	4 Pack
3µm	10mm	**28103-014001**	**28103-013001**	**28103-012101**	--	4 Pack
5µm	10mm	**28105-014001**	**28105-013001**	**28105-012101**	--	4 Pack
Hypersil BDS C8 Drop-in Guard Cartridges						
2.4µm	10mm	**28202-014001**	--	**28202-012101**	--	4 Pack
3µm	10mm	**28203-014001**	**28203-013001**	**28203-012101**	--	4 Pack
5µm	10mm	**28205-014001**	**28205-013001**	**28205-012101**	--	4 Pack
Hypercarb Drop-in Guard Cartridges						
3µm	10mm	**35003-014001**	**35003-013001**	**35003-012101**	**35003-011001**	2 Pack
5µm	10mm	**35005-014001**	**35005-013001**	**35005-012101**	**35005-011001**	2 Pack
7µm	10mm	**35007-014001**	**35007-013001**	--	--	2 Pack

Drop-in guard cartridges are available in other Thermo Scientific phases. Please contact Customer Services for more information.

UNIGUARD Direct-Connection Guard Cartridge Holders

Reusable, stainless-steel guard cartridge holders that attach directly to the analytical column inlet—eliminating requirement for extra fittings

- **With PEEK 1/16" male outlet that fits many columns**
- **1/16" female inlet tip can be used with various standard fittings**

UNIGUARD Direct-Connection Guard Cartridge Holders

Description	4.6/4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	1.0mm I.D.	Quantity
UNIGUARD Drop-In Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each
Standard Replacement Tip	**850-RT**	**850-RT**	**850-RT**	**850-RT**	1 Each
Waters Columns Replacement Tip	**850-WT**	**850-WT**	**850-WT**	**850-WT**	1 Each

Javelin Direct-Connection Guard Columns

Javelin guard columns offer convenient, easy to use protection for analytical HPLC columns

- **Direct-connection, fingertight design for convenience and maximum efficiency**
- **Patented design requires no holder, allowing quick and easy replacement**

Javelin Direct-Connect Guard HPLC Columns

Brand Name	4.0mm ID	3.0mm ID	2.1mm ID	1.0mm ID	Quantity
Hypersil GOLD	**25005-014006**	**25005-013006**	**25005-012106**	**25005-011006**	4 Pack
Hypersil GOLD C8	**25205-014006**	**25205-013006**	**25205-012106**	**25205-011006**	4 Pack
Hypersil GOLD aQ	**25305-014006**	**25305-013006**	**25305-012106**	**25305-011006**	4 Pack
BioBasic 18	**72105-014006**	**72105-013006**	**72105-012106**	**72105-011006**	4 Pack
BioBasic 8	**72205-014006**	**72205-013006**	**72205-012106**	**72205-011006**	4 Pack
Hypersil BDS C18	**28105-014006**	**28105-013006**	**28105-012106**	**28105-011006**	4 Pack

Javelin guards are available in other Thermo Scientific brand phases. Please call your local Customer Service for more information.

Javelin Direct-Connection Column Filters

One-piece filter protects HPLC systems

- **Direct-connection design for maximum efficiency**
- **Replace entire disposable filter unit for easy changes**
- **Recommended for use as dedicated filters for a column rather than the HPLC system**
- **$^{1}/_{16}$ in. CPI tip attaches directly to HPLC column inlet without tubing or wrenches**
- **0.5µm porosity**

Javelin Direct-Connection Column Filter

Description	4.6mm/4.0mm ID	3.0mm ID	2.1mm ID	Quantity
Javelin Column Filter	88400	88700	88200	4 Pack

ColumnSaver Precolumn Filters

Particle size 0.2µm

ColumnSaver Precolumn Filters

Particle Size	Cat. No.	Quantity
0.2µm	**60140-412**	10 Pack

UNIFILTER Direct-Connection HPLC Filter Systems

Quickly replaced for minimal down time

- **Replaceable 0.5µm drop-in filter enhances column lifetime and improved performance**
- **Holder attached directly to the inlet of your analytical system for maximum convenience**

UNIFILTER Direct-Connection HPLC Filter Systems

Description	4.6mm/4.0mm ID	3.0mm/2.1mm ID	Quantity
UNIFILTER Direct Connection Holder	**27000**	**27002**	1 Each
Replacement Filter, 0.5µm	**22150**	**22016**	1 Each
Replacement Filter, 0.5µm	**22155**	**22017**	5 Pack
Replacement Tip, CPI, Standard	**850-WT**	**850-WT**	1 Each
Replacement Tip, Waters End-fitting	**850-RT**	**850-RT**	1 Each

Hypersil GOLD Columns

Excellent peak shape for all analyte types

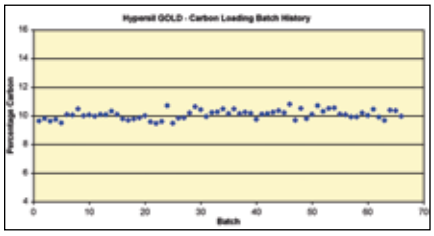
- Excellent peak symmetry
- Narrow peaks for outstanding efficiency
- Increased sensitivity and improved resolution
- Variety of chemistries
- 1.9 to 12µm particles

Thermo Scientific Hypersil GOLD columns are exceptionally reproducible for reliable chromatography, column after column. This allows the user to be confident that assays developed with Hypersil GOLD columns will be robust and stable for the life of the assay, making them an ideal choice for new method development. Built on more than 30 years of experience in product development and manufacturing of HPLC media and columns, we successfully continue to extend the capabilities of this state-of-the-art family of columns, designed for improved chromatography. Hypersil GOLD columns are manufactured in ISO 9001:2000 accredited laboratories under strict protocols using a robust manufacturing procedure and extensive quality control testing.

Improved Selectivity, Resolution and Productivity

Hypersil GOLD columns are available in an array of chemistries to optimize separations and maximize productivity:

- **Hypersil GOLD** offers outstanding peak shape using generic gradients with C18 selectivity
- **Hypersil GOLD C8** offers similar selectivity but with less retention
- **Hypersil GOLD aQ** can be used for challenging reverse phase separations employing highly aqueous mobile phases
- **Hypersil GOLD PFP** can offer alternative selectivity in reverse phase applications
- **Hypersil GOLD Phenyl** offers alternative selectivity and is particularly suitable for aromatic and moderately polar compounds
- **Hypersil GOLD CN** can be used for both reversed and normal phase separations
- **Hypersil GOLD C4** has short alkyl chain length, low hydrophobicity column for less retention
- **Hypersil GOLD Amino** demonstrates excellent chromatographic properties in three modes: weak anion exchange, reversed phase and normal phase.
- **Hypersil GOLD AX** can be used to separate proteins, peptides, other anionic species and polar molecules
- **Hypersil GOLD SAX** is a highly stable silica-based quarternary amine strong anion exchange column, designed for aqueous mobile phase
- **Hypersil GOLD Silica** is a powerful and efficient tool in the chromatography of non-polar and moderately polar organic compounds by normal phase

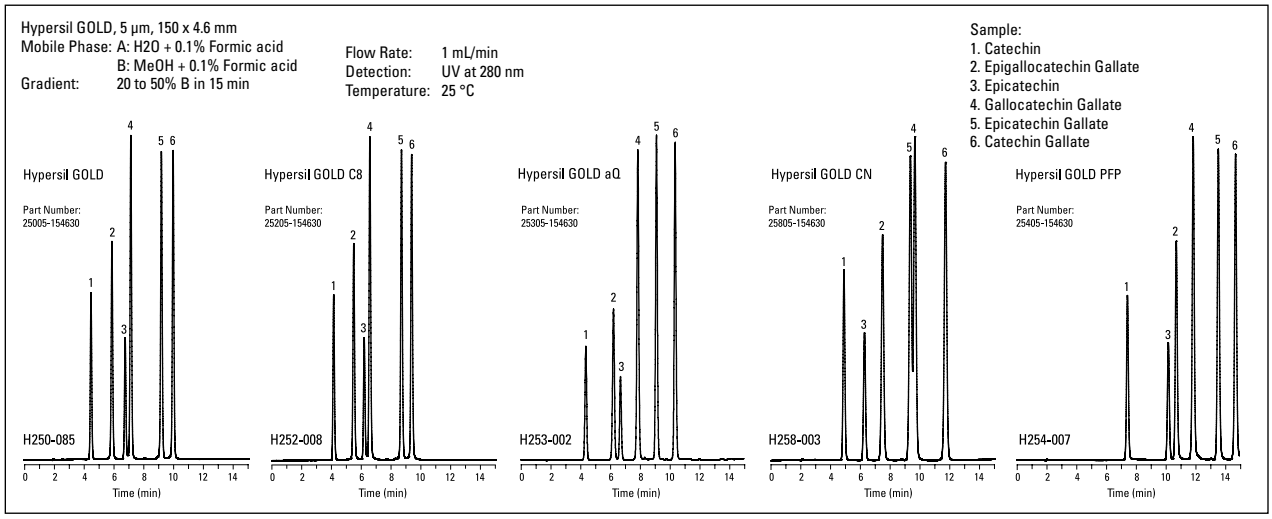


Excellent reproducibility is illustrated with the percent carbon on the Hypersil GOLD media

These chemistries offer alternative selectivities in the same column family, providing enhanced retention or changes in elution order for flexibility in method development. Each phase is made with the same care and attention to quality that defines all Thermo Scientific columns.

Solutions for High Throughput Screening, Capillary to Preparative Analysis

Hypersil GOLD columns are available in particle sizes and column designs to meet all separation needs, including improved resolution, enhanced sensitivity and faster analyses. From 1.9µm to 12µm particles, Hypersil GOLD columns offer chromatographic solutions with consistent separations and performance. Specialized hardware includes KAPPA™ capillary columns, PicoFrit™ and IntegraFrit nanobore columns, Javelin™ HTS direct-connection columns and DASH™ HTS columns, designed for high throughput screening.



1.9µm Hypersil GOLD

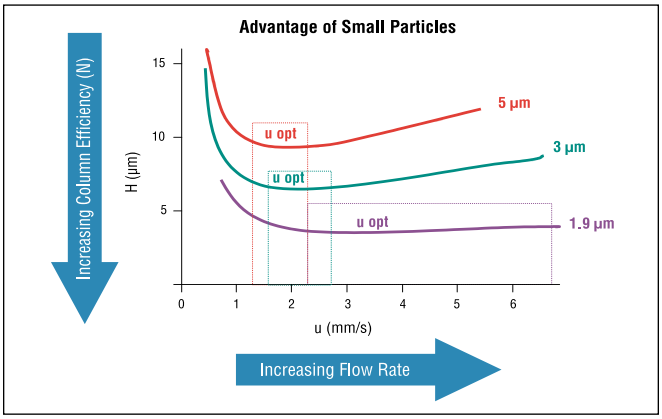
Small particles to improve speed and efficiency

The use of sub-2 µm particles is becoming increasingly popular for applications in either High Throughput Screening (HTS) assays or in Ultra High Pressure Liquid Chromatography (U-HPLC). 1.9µm Hypersil GOLD columns offer advantages over the more traditional columns containing 3 and 5µm particles by delivering a higher efficiency over a wider range of linear velocity. The van Deemter curve (below left) illustrates how the limitations in column efficiency at higher linear velocities can be overcome by employing smaller particles. As the particle size is reduced, the optimum mobile phase velocity (u) is increased and the curve becomes flatter. This means that columns packed with smaller particles can be operated over a wider range of flow rates while maintaining higher efficiencies, enabling considerable improvements in speed of analysis.

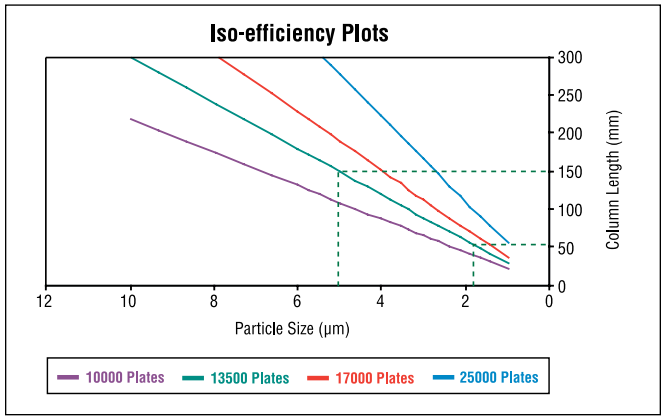
In addition, resolution and analysis time are determined by the ratio of column length to particle size. When particle size is reduced, column length can also be reduced while keeping separation efficiency constant (and therefore resolution if all other experimental conditions remain unchanged). The figure below on the right illustrates this concept. For example, if 13500 plates (green line on graph) are needed to obtain the required resolution, a 150mm column packed with 5µm particles would be required. However, if the particle size is reduced to 1.9µm then only 50mm of column are needed to obtain the same efficiency (13500 plates). For a constant flow rate, analysis time would be reduced approximately 3-fold with this change in particle size and column length.

1.9 µm particles bring increased flexibility to the practice of chromatography. If speed is the most important consideration, it is possible to a use high flow rate and a short (20 to 50mm) column. It is also possible to adjust parameters to increase resolution for difficult separations. Using a longer (100 to 200mm) column will increase efficiency and therefore improve resolution.

It is important when using these columns that the instrument is also optimized for analysis. Full details on how to optimize your separation using 1.9µm Hypersil GOLD columns can be found in the Hypersil GOLD 1.9µm HPLC Columns Technical Guide. Some guidelines for method transfer from standard HPLC to U-HPLC are given on page 475.



The Advantages of 1.9 µm Particles. The van Deemter plot highlights how columns packed with smaller particles can operate over a wider range of linear velocity and maintain higher efficiencies. This allows the use of higher flow rates, resulting in considerable improvements in speed, without loss in performance.



Iso efficiency plots. High throughput, high efficiency separations can be obtained with short columns packed with small particles.

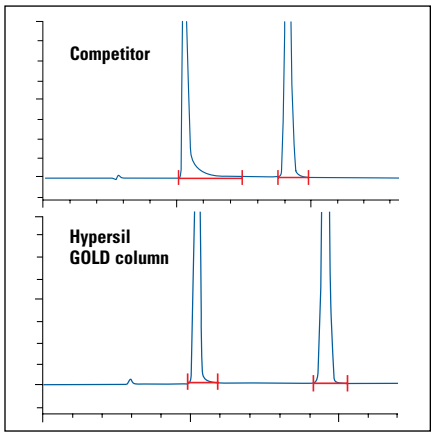
Hypersil GOLD Columns

Excellent peak shape for all analyte types

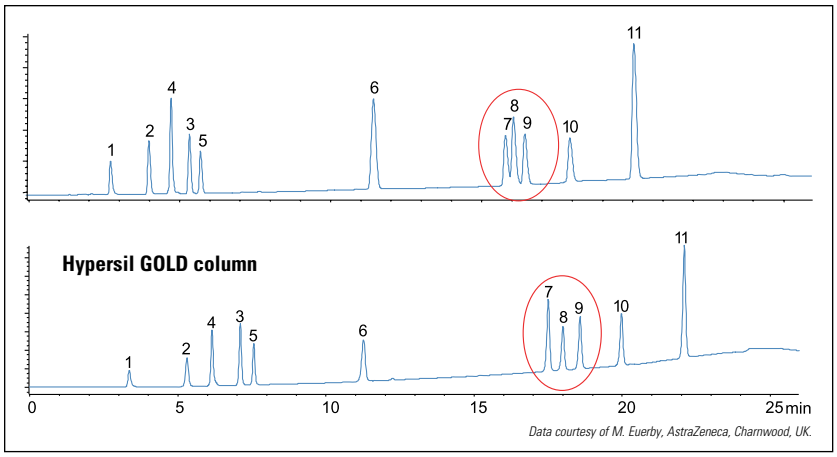
- C18 selectivity
- Excellent peak symmetry
- Increased sensitivity
- Improved resolution

Outstanding Peak Shape

Based on an improved, highly pure silica and a novel proprietary derivatization and endcapping procedure using alkyl chemistry, Hypersil GOLD columns offer next generation silica-based columns with enhanced performance. The manufacturing process was designed to create an even surface which reduces the unwanted secondary and tertiary interactions that can occur between analytes and the acidic silanols of the silica support. This significantly reduces peak tailing while retaining C18 (USP L1) selectivity. This results in improved resolution, efficiency, sensitivity, and confidence in the accuracy and quality of your analytical data.



Hypersil GOLD columns offer improved peak shape, even for basic analytes.



Resolution of analytes is improved using a Hypersil GOLD column.

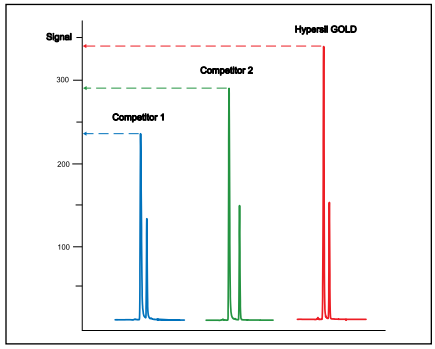
Improved Sensitivity

Good peak shape means greater sensitivity. When peaks exhibit tailing, peak height is reduced causing the sensitivity of the analysis to be compromised. The more symmetrical the chromatographic peaks, the more confidence you derive from your data. Using Hypersil GOLD, peak height is enhanced and peak integration calculations are optimized.

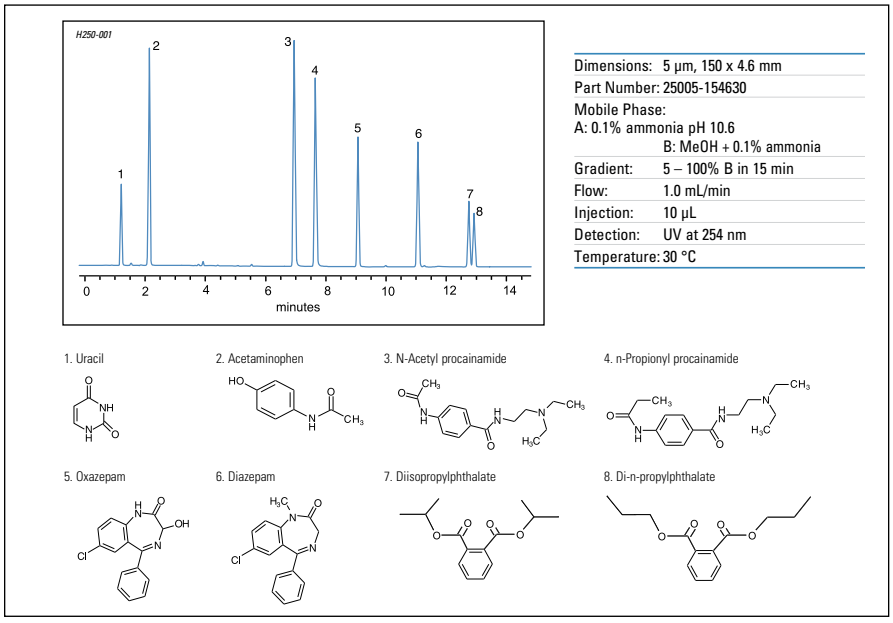
Enhanced peak height can be particularly critical when low concentrations of an analyte are present, for example in an impurity assay. The increase in sensitivity gained with the Hypersil GOLD columns over competitor C18 columns is illustrated above.

Enhanced Resolution

Robust assay development requires a clear definition of resolution expectations. Narrow symmetrical chromatographic peaks ensure that optimum resolution is achieved. Obtaining narrow peak widths is especially challenging for basic pharmaceutical compounds. The figure above shows how Hypersil GOLD columns provide excellent resolution between critical pairs, aiding in separation of closely related species.



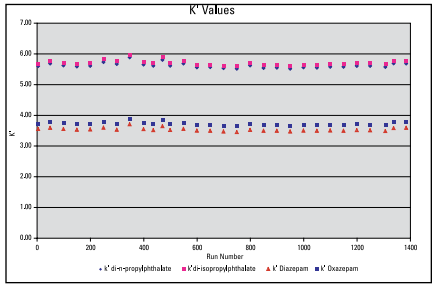
The improved peak symmetry provides additional peak height to increase sensitivity of analysis of trace components.



High pH stability assay (pH 10.6) of Hypersil GOLD columns

pH Stability

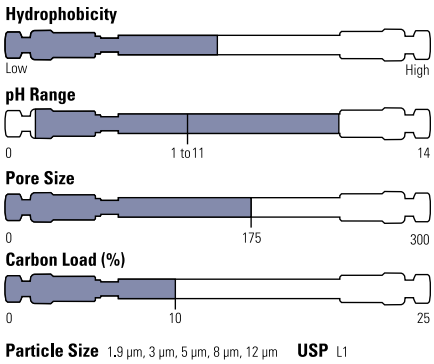
Hypersil GOLD columns are well suited to extended pH applications. Hypersil GOLD columns have been shown to produce robust assays at high pH. At low pH, excellent column stability and reproducibility are illustrated.



Stability of Hypersil GOLD columns at low pH. No loss of retention after 28L of mobile phase in 19.5 days of analysis.

Hypersil GOLD HPLC Columns

Endcapped, ultrapure, silica-based columns with exceptional peak shape and resolution for HPLC and LC/MS



Particle Size 1.9 µm, 3 µm, 5 µm, 8 µm, 12 µm **USP** L1

- **Significant reduction in peak tailing while retaining C18 selectivity**
- **Excellent resolution, efficiency and sensitvity**
- **Confidence in the accuracy and quality of analytical data**
- **1.9µm particle size columns can be used to improve speed and efficiency**

Hypersil GOLD Analytical HPLC Columns

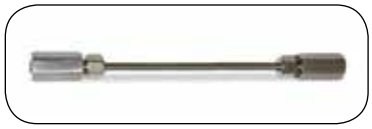
Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 1.9µm					
20mm	**25002-021030**	**25002-022130**	**25002-023030**	--	--
30mm	**25002-031030**	**25002-032130**	**25002-033030**	--	--
50mm	**25002-051030**	**25002-052130**	**25002-053030**	--	**25002-054630**
100mm	**25002-101030**	**25002-102130**	**25002-103030**	--	--
150mm	--	**25002-152130**	--	--	--
200mm	--	**25002-202130**	--	--	--
Particle Size 3µm					
30mm	**25003-031030**	**25003-032130**	**25003-033030**	**25003-034030**	**25003-034630**
50mm	**25003-051030**	**25003-052130**	**25003-053030**	**25003-054030**	**25003-054630**
100mm	**25003-101030**	**25003-102130**	**25003-103030**	**25003-104030**	**25003-104630**
150mm	**25003-151030**	**25003-152130**	**25003-153030**	**25003-154030**	**25003-154630**
Particle Size 5µm					
30mm	**25005-031030**	**25005-032130**	**25005-033030**	**25005-034030**	**25005-034630**
50mm	**25005-051030**	**25005-052130**	**25005-053030**	**25005-054030**	**25005-054630**
100mm	**25005-101030**	**25005-102130**	**25005-103030**	**25005-104030**	**25005-104630**
150mm	**25005-151030**	**25005-152130**	**25005-153030**	**25005-154030**	**25005-154630**
250mm	**25005-251030**	**25005-252130**	**25005-253030**	**25005-254030**	**25005-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD Drop-in Guard Cartridges

Particle Size	Length	1.0mm ID	2.1mm ID	3.0mm ID	4.0/4.6mm ID	Quantity
3µm	10mm	**25003-011001**	**25003-012101**	**25003-013001**	**25003-014001**	4 Pack
5µm	10mm	**25005-011001**	**25005-012101**	**25005-013001**	**25005-014001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypersil GOLD HPLC Columns



Hypersil GOLD KAPPA Capillary HPLC Columns					
Length	**75µm I.D.**	**100µm I.D.**	**180µm I.D.**	**320µm I.D.**	**500µm I.D.**
Particle Size 1.9µm					
50mm	--	--	--	**25002-050365**	--
100mm	--	--	--	**25002-100365**	--
Particle Size 3µm					
50mm	--	--	**25003-050265**	**25003-050365**	**25003-050565**
100mm	--	**--**	**25003-100265**	**25003-100365**	**25003-100565**
150mm	**--**	--	**25003-150265**	**25003-150365**	**25003-150565**
Particle Size 5µm					
50mm	**25005-050065**	**25005-050165**	**25005-050265**	**25005-050365**	**25005-050565**
100mm	**25005-100065**	**25005-100165**	**25005-100265**	**25005-100365**	**25005-100565**
150mm	**25005-150065**	**25005-150165**	**25005-150265**	**25005-150365**	**25005-150565**

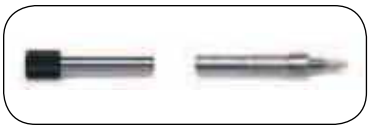
Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD KAPPA Capillary Guard Columns				
Particle Size	**Length**	**180µm I.D.**	**320µm I.D.**	**500µm I.D.**
3µm	30mm	**25003-030215**	**25003-030315**	**25003-030515**
5µm	30mm	**25005-030215**	**25005-030315**	**25005-030515**

Hypersil GOLD Nanobore HPLC Columns							
Particle Size	**Length**	**75µm ID**	**75µm ID Multipack**	**Quantity**	**150µm ID**	**150µm ID Multipack**	**Quantity**
IntegraFrit							
1.9µm	10mm	**25002-017563**	**25002-017564**	4 Pack	**25002-011563**	**25002-011564**	4 Pack
1.9µm	50mm	**25002-057563**	**25002-057564**	3 Pack	**25002-051563**	**25002-051564**	3 Pack
1.9µm	100mm	**25002-107563**	**25002-107564**	3 Pack	**--**	**--**	--
5µm	50mm	**25005-057563**	**25005-057564**	3 Pack	**25005-051563**	**25005-051564**	3 Pack
5µm	100mm	**25005-107563**	**25005-107564**	3 Pack	**25005-101563**	**25005-101564**	3 Pack
PicoFrit, 15µm Tip							
1.9µm	10mm	**25002-017581**	**25002-017583**	4 Pack	--	--	--
1.9µm	50mm	**25002-057581**	**25002-057582**	3 Pack	--	--	--
1.9µm	100mm	**25002-107581**	**25002-107582**	3 Pack	--	--	--
5µm	10mm	**25005-017581**	**25005-017583**	4 Pack	--	--	--
5µm	50mm	**25005-057581**	**25005-057582**	3 Pack	--	--	--
5µm	100mm	**25005-107581**	**25005-107582**	3 Pack	--	--	--

Unless otherwise specified, IntegraFrit and PicoFrit are sold in single-column units

Go to: PAGE 6
See our range of Certified Vials



Hypersil GOLD Javelin HTS HPLC Columns					
Particle Size	**20 x 4.0mm**	**20 x 2.1mm**	**20 x 1.0mm**	**10 x 2.1mm**	**Quantity**
1.9µm	--	--	--	**25002-012135**	3 Pack
5µm	**25005-024035**	**25005-022135**	**25005-021035**	--	3 Pack
5µm	**25005-024036**	**25005-022136**	**25005-021036**	--	10 Pack

Hypersil GOLD DASH HTS HPLC Columns			
Particle Size	**Length**	**2.1mm I.D.**	**Quantity**
5µm	20mm	**25005-022151**	3 Pack
5µm	20mm	**25005-022152**	10 Pack

Hypersil GOLD Preparative HPLC Columns				
Length	**10mm I.D.**	**21mm I.D.**	**30mm I.D.**	**50mm I.D.**
Particle Size 5µm				
50mm	**25005-059070**	**25005-059270**	**25005-059370**	**25005-059570**
100mm	**25005-109070**	**25005-109270**	**25005-109370**	**25005-109570**
150mm	**25005-159070**	**25005-159270**	**25005-159370**	**25005-159570**
250mm	**25005-259070**	**25005-259270**	**25005-259370**	**25005-259570**
Particle Size 8µm				
50mm	**25008-059070**	**25008-059270**	**25008-059370**	**25008-059570**
100mm	**25008-109070**	**25008-109270**	**25008-109370**	**25008-109570**
150mm	**25008-159070**	**25008-159270**	**25008-159370**	**25008-159570**
250mm	**25008-259070**	**25008-259270**	**25008-259370**	**25008-259570**
Particle Size 12µm				
50mm	**25012-059070**	**25012-059270**	**25012-059370**	**25012-059570**
100mm	**25012-109070**	**25012-109270**	**25012-109370**	**25012-109570**
150mm	**25012-159070**	**25012-159270**	**25012-159370**	**25012-159570**
250mm	**25012-259070**	**25012-259270**	**25012-259370**	**25012-259570**

Other custom column dimensions are available. Please call your local Customer Service for more information. Stainless steel internal reducing unions to connect 30 to 50mm ID preparative columns to 1/16" tubing are available.

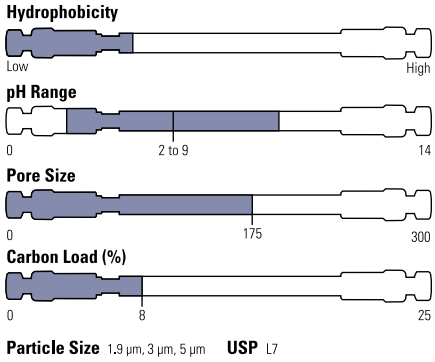
Hypersil GOLD Preparative Guard Cartridge Systems			
Particle Size	**10 x 10mm (I.D. x L)**	**20 x 20mm (I.D. x L)**	**Quantity**
5µm	**25005-019023**	**25005-029223**	3 Pack
8µm	**25008-019023**	**25008-029223**	3 Pack
12µm	**25012-019023**	**25012-029223**	3 Pack
Preparative Guard Holder	**C-1000**	**F1403**	1 Each

Hypersil GOLD Preparative HPLC Guard Columns			
Particle Size	**10mm ID**	**21mm ID**	**Quantity**
5µm	**25005-039022**	**25005-039222**	1 Each
8µm	**25008-039022**	**25008-039222**	1 Each
12µm	**25012-039022**	**25012-039222**	1 Each

Hypersil GOLD C8 HPLC Columns

Recommended for analytes with medium hydrophobicity or when a less hydrophobic phase is required to obtain optimum retention

- **Similar selectivity to C18 columns but with reduced retention**
- **Lower hydrophobicity, allowing compounds to elute quicker**
- **Faster separations**
- **Excellent peak shape**
- **High efficiency**
- **Outstanding sensitivity**
- **1.9µm particle size columns can be used to improve speed and efficiency**



Particle Size 1.9 µm, 3 µm, 5 µm **USP** L7

Hypersil GOLD C8 HPLC Columns

Length (mm)	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 1.9µm					
20mm	**25202-021030**	**25202-022130**	**25202-023030**	--	--
30mm	**25202-031030**	**25202-032130**	**25202-033030**	--	--
50mm	**25202-051030**	**25202-052130**	**25202-053030**	--	**25202-054630**
100mm	**25202-101030**	**25202-102130**	**25202-103030**	--	--
150mm	--	**25202-152130**	--	--	--
200mm	--	**25202-202130**	--	--	--
Particle Size 3µm					
30mm	**25203-031030**	**25203-032130**	**25203-033030**	**25203-034030**	**25203-034630**
50mm	**25203-051030**	**25203-052130**	**25203-053030**	**25203-054030**	**25203-054630**
100mm	**25203-101030**	**25203-102130**	**25203-103030**	**25203-104030**	**25203-104630**
150mm	**25203-151030**	**25203-152130**	**25203-153030**	**25203-154030**	**25203-154630**
Particle Size 5µm					
30mm	**25205-031030**	**25205-032130**	**25205-033030**	**25205-034030**	**25205-034630**
50mm	**25205-051030**	**25205-052130**	**25205-053030**	**25205-054030**	**25205-054630**
100mm	**25205-101030**	**25205-102130**	**25205-103030**	**25205-104030**	**25205-104630**
150mm	**25205-151030**	**25205-152130**	**25205-153030**	**25205-154030**	**25205-154630**
250mm	**25205-251030**	**25205-252130**	**25205-253030**	**25205-254030**	**25205-254630**

Hypersil GOLD C8 Drop-In Guard Cartridges

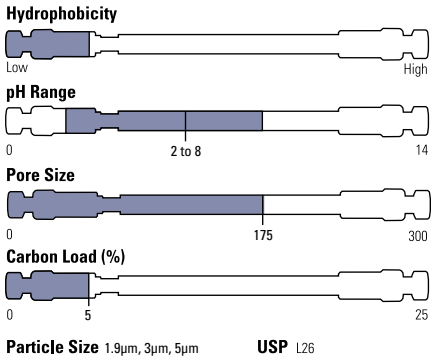
Particle Size	Length	4.6mm/4.0mm ID	3.0mm ID	2.1mm ID	1.0mm ID	Quantity
3µm	10mm	**25203-014001**	**25203-013001**	**25203-012101**	**25203-011001**	4 Pack
5µm	10mm	**25205-014001**	**25205-013001**	**25205-012101**	**25205-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

Hypersil GOLD C8 KAPPA Capillary HPLC Columns

Length	75µm ID	100µm ID	180µm ID	320µm ID	500µm ID
Particle Size 1.9µm					
50mm	--	--	--	**25202-050365**	--
100mm	--	--	--	**25202-100365**	--
Particle Size 3µm					
50mm	--	--	**25203-050265**	**25203-050365**	**25203-050565**
100mm	--	--	**25203-100265**	**25203-100365**	**25203-100565**
150mm	--	--	**25203-150265**	**25203-150365**	**25203-150565**
Particle Size 5µm					
50mm	**25205-050065**	**25205-050165**	**25205-050265**	**25205-050365**	**25205-050565**
100mm	**25205-100065**	**25205-100165**	**25205-100265**	**25205-100365**	**25205-100565**
150mm	**25205-150065**	**25205-150165**	**25205-150265**	**25205-150365**	**25205-150565**

Hypersil GOLD C4 HPLC Columns

Lower hydrophobicity than C18 or C8 recommended for very hydrophobic analytes



Particle Size 1.9µm, 3µm, 5µm **USP** L26

Hypersil GOLD C4 columns provide similar selectivity to C18 and C8 columns but with reduced retention.

- **Lower hydrophobicity**
- **Faster separations**
- **Excellent peak shape**
- **High efficiency**
- **Outstanding sensitivity**
- **1.9µm particle size columns can be used to improve speed and efficiency**

Hypersil GOLD C4 Analytical HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 1.9µm					
20mm	**25502-021030**	**25502-022130**	**25502-023030**	--	--
30mm	**25502-031030**	**25502-032130**	**25502-033030**	--	--
50mm	**25502-051030**	**25502-052130**	**25502-053030**	--	**25502-054630**
100mm	**25502-101030**	**25502-102130**	**25502-103030**	--	--
150mm	--	**25502-152130**	--	--	--
200mm	--	**25502-202130**	--	--	--
Particle Size 3µm					
30mm	**25503-031030**	**25503-032130**	**25503-033030**	**25503-034030**	**25503-034630**
50mm	**25503-051030**	**25503-052130**	**25503-053030**	**25503-054030**	**25503-054630**
100mm	**25503-101030**	**25503-102130**	**25503-103030**	**25503-104030**	**25503-104630**
150mm	**25503-151030**	**25503-152130**	**25503-153030**	**25503-154030**	**25503-154630**
Particle Size 5µm					
30mm	**25505-031030**	**25505-032130**	**25505-033030**	**25505-034030**	**25505-034630**
50mm	**25505-051030**	**25505-052130**	**25505-053030**	**25505-054030**	**25505-054630**
100mm	**25505-101030**	**25505-102130**	**25505-103030**	**25505-104030**	**25505-104630**
150mm	**25505-151030**	**25505-152130**	**25505-153030**	**25505-154030**	**25505-154630**
250mm	**25505-251030**	**25505-252130**	**25505-253030**	**25505-254030**	**25505-254630**

Hypersil GOLD C4 Drop-In Guard Cartridges

Particle Size	Length	4.6mm/ 4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	1.0mm I.D.	Quantity
3µm	10mm	**25503-014001**	**25503-013001**	**25503-012101**	**25505-011001**	4 Pack
5µm	10mm	**25505-014001**	**25505-013001**	**25505-012101**	**25503-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

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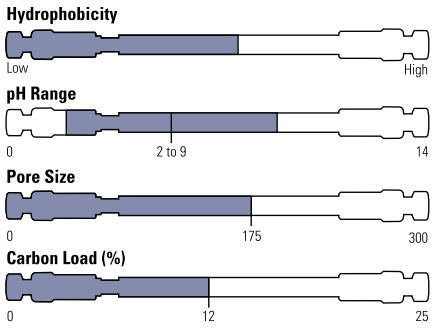
Hypersil GOLD aQ HPLC Columns

Hypersil GOLD aQ polar endcapped C18 columns provide a controlled interaction mechanism by which polar analytes can be retained and resolved



Particle Size 1.9 µm, 3 µm, 5 µm, 8 µm, 12 µm **USP** L1

Hypersil GOLD aQ columns provide enhanced retention and resolution of polar analytes.

- **Polar endcapped C18 phase for alternative selectivity**
- **Retention and resolution of polar analytes**
- **Excellent peak shape**
- **Stable in 100% aqueous mobile phases**
- **1.9µm particle size columns can be used to improve speed and efficiency**

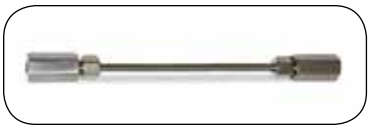
Hypersil GOLD aQ Analytical HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 1.9µm					
20mm	**25302-021030**	**25302-022130**	**25302-023030**	--	--
30mm	**25302-031030**	**25302-032130**	**25302-033030**	--	--
50mm	**25302-051030**	**25302-052130**	**25302-053030**	--	**25302-054630**
100mm	**25302-101030**	**25302-102130**	**25302-103030**	--	--
150mm	--	**25302-152130**	--	--	--
200mm	--	**25302-202130**	--	--	--
Particle Size 3µm					
30mm	**25303-031030**	**25303-032130**	**25303-033030**	**25303-034030**	**25303-034630**
50mm	**25303-051030**	**25303-052130**	**25303-053030**	**25303-054030**	**25303-054630**
100mm	**25303-101030**	**25303-102130**	**25303-103030**	**25303-104030**	**25303-104630**
150mm	**25303-151030**	**25303-152130**	**25303-153030**	**25303-154030**	**25303-154630**
Particle Size 5µm					
30mm	**25305-031030**	**25305-032130**	**25305-033030**	**25305-034030**	**25305-034630**
50mm	**25305-051030**	**25305-052130**	**25305-053030**	**25305-054030**	**25305-054630**
100mm	**25305-101030**	**25305-102130**	**25305-103030**	**25305-104030**	**25305-104630**
150mm	**25305-151030**	**25305-152130**	**25305-153030**	**25305-154030**	**25305-154630**
250mm	**25305-251030**	**25305-252130**	**25305-253030**	**25305-254030**	**25305-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD aQ Drop-In Guard Cartridges

Particle Size	Length	4.6mm/4.0mm ID	3.0mm ID	2.1mm ID	1.0mm ID	Quantity
3µm	10mm	**25303-014001**	**25303-013001**	**25303-012101**	**25303-011001**	4 Pack
5µm	10mm	**25305-014001**	**25305-013001**	**25305-012101**	**25305-011001**	4 Pack
	UNIGUARD Drop-In Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each



Hypersil GOLD aQ KAPPA Capillary HPLC Columns					
Length	**75µm I.D.**	**100µm I.D.**	**180µm I.D.**	**320µm I.D.**	**500µm I.D.**
Particle Size 1.9µm					
50mm	--	--	--	**25302-050365**	--
100mm	--	--	--	**25302-100365**	--
Particle Size 3µm					
50mm	--	--	**25303-050265**	**25303-050365**	**25303-050565**
100mm	--	--	**25303-100265**	**25303-100365**	**25303-100565**
150mm	--	--	**25303-150265**	**25303-150365**	**25303-150565**
Particle Size 5µm					
50mm	**25305-050065**	**25305-050165**	**25305-050265**	**25305-050365**	**25305-050565**
100mm	**25305-100065**	**25305-100165**	**25305-100265**	**25305-100365**	**25305-100565**
150mm	**25305-150065**	**25305-150165**	**25305-150265**	**25305-150365**	**25305-150565**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD aQ KAPPA Capillary Guard HPLC Columns				
Particle Size	**Length**	**180µm ID**	**320µm ID**	**500µm ID**
3µm	30mm	**25303-030215**	**25303-030315**	**25303-030515**
5µm	30mm	**25305-030215**	**25305-030315**	**25305-030515**

Hypersil GOLD aQ Nanobore HPLC Columns							
Particle Size	**Length**	**75µm ID**	**75µm ID Multipack**	**Quantity**	**150µm ID**	**150µm ID Multipack**	**Quantity**
IntegraFrit							
1.9µm	10mm	**25302-017563**	**25302-017564**	4 Pack	**25302-011563**	**25302-011564**	4 Pack
1.9µm	50mm	**25302-057563**	**25302-057564**	3 Pack	**25302-051563**	**25302-051564**	3 Pack
5µm	50mm	**25305-057563**	**25305-057564**	3 Pack	**25305-051563**	**25305-051564**	3 Pack
5µm	100mm	**25305-107563**	**25305-107564**	3 Pack	**25305-101563**	**25305-101564**	3 Pack
PicoFrit, 15µm tip							
1.9µm	10mm	**25302-017581**	**25302-017583**	4 Pack	--	--	
1.9µm	50mm	**25302-057581**	**25302-057582**	3 Pack	--	--	
5µm	50mm	**25305-057581**	**25305-057582**	3 Pack	--	--	
5µm	100mm	**25305-107581**	**25305-107582**	3 Pack	--	--	

Unless otherwise specified, IntegraFrit and PicoFrit are sold in single-column units.

Hypersil GOLD aQ HPLC Columns

Hypersil GOLD aQ Javelin HTS Columns					
Particle Size	**20 x 4.0mm**	**20 x 2.1mm**	**20 x 1.0mm**	**10 x 2.1mm**	**Quantity**
1.9µm	--	--	--	**25302-012135**	3 Pack
5µm	**25305-024035**	**25305-022135**	**25305-021035**	--	3 Pack
5µm	**25305-024036**	**25305-022136**	**25305-021036**	--	10 Pack

Hypersil GOLD aQ DASH HTS Columns			
Particle Size	**Length**	**2.1mm I.D.**	**Quantity**
5µm	20mm	**25305-022151**	3 Pack
5µm	20mm	**25305-022152**	10 Pack

Hypersil GOLD aQ Preparative HPLC Columns				
Length	**10mm I.D.**	**21mm I.D.**	**30mm I.D.**	**50mm I.D.**
Particle Size 5µm				
50mm	**25305-059070**	**25305-059270**	**25305-059370**	**25305-059570**
100mm	**25305-109070**	**25305-109270**	**25305-109370**	**25305-109570**
150mm	**25305-159070**	**25305-159270**	**25305-159370**	**25305-159570**
250mm	**25305-259070**	**25305-259270**	**25305-259370**	**25305-259570**
Particle Size 8µm				
50mm	**25308-059070**	**25308-059270**	**25308-059370**	**25308-059570**
100mm	**25308-109070**	**25308-109270**	**25308-109370**	**25308-109570**
150mm	**25308-159070**	**25308-159270**	**25308-159370**	**25308-159570**
250mm	**25308-259070**	**25308-259270**	**25308-259370**	**25308-259570**
Particle Size 12µm				
50mm	**25312-059070**	**25312-059270**	**25312-059370**	**25312-059570**
100mm	**25312-109070**	**25312-109270**	**25312-109370**	**25312-109570**
150mm	**25312-159070**	**25312-159270**	**25312-159370**	**25312-159570**
250mm	**25312-259070**	**25312-259270**	**25312-259370**	**25312-259570**

Other custom column dimensions are available. Please call your local Customer Service for more information. Stainless steel internal reducing unions to connect 30 to 50mm ID preparative columns to 1/16" tubing are available.

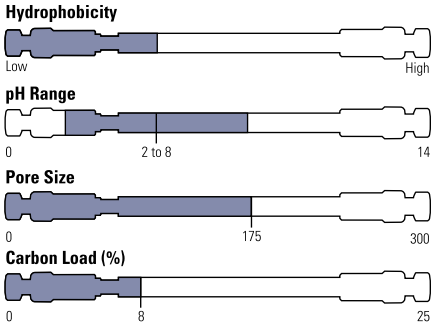
Hypersil GOLD aQ Preparative Guard Cartridge Systems			
Particle Size	**10 x 10mm**	**20 x 20mm**	**Quantity**
5µm	**25305-019023**	**25305-029223**	3 Pack
8µm	**25308-019023**	**25308-029223**	3 Pack
12µm	**25312-019023**	**25312-029223**	3 Pack
Preparative Guard Holder	**C-1000**	**F1403**	1 Each

Hypersil GOLD aQ Preparative Guard HPLC Columns				
Particle Size	**Length**	**10mm I.D.**	**21mm I.D.**	**Quantity**
5µm	30mm	**25305-039022**	**25305-039222**	1 Each
8µm	30mm	**25308-039022**	**25308-039222**	1 Each
12µm	30mm	**25312-039022**	**25312-039222**	1 Each

Hypersil GOLD PFP HPLC Columns

Introduction of a fluorine group into the stationary phase causes significant changes in solute-stationary phase interaction

- **The fluorine atoms around the phenyl ring enhance pi-pi interactions with aromatic molecules**
- **Alternative selectivity to C18**
- **Extra retention for halogenated species**
- **Selectivity for non-halogenated polar compounds**
- **Excellent peak shape and sensitivity**
- **1.9µm particle size columns can be used to improve speed and efficiency**



Particle Size 1.9 µm, 3 µm, 5 µm, 8 µm, 12 µm **USP** L43

Hypersil GOLD PFP HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 1.9µm					
20mm	**25402-021030**	**25402-022130**	**25402-023030**	--	--
30mm	**25402-031030**	**25402-032130**	**25402-033030**	--	--
50mm	**25402-051030**	**25402-052130**	**25402-053030**	--	**25402-054630**
100mm	**25402-101030**	**25402-102130**	**25402-103030**	--	--
150mm	--	**25402-152130**	--	--	--
200mm	--	**25402-202130**	--	--	--
Particle Size 3µm					
30mm	**25403-031030**	**25403-032130**	**25403-033030**	**25403-034030**	**25403-034630**
50mm	**25403-051030**	**25403-052130**	**25403-053030**	**25403-054030**	**25403-054630**
100mm	**25403-101030**	**25403-102130**	**25403-103030**	**25403-104030**	**25403-104630**
150mm	**25403-151030**	**25403-152130**	**25403-153030**	**25403-154030**	**25403-154630**
Particle Size 5µm					
30mm	**25405-031030**	**25405-032130**	**25405-033030**	**25405-034030**	**25405-034630**
50mm	**25405-051030**	**25405-052130**	**25405-053030**	**25405-054030**	**25405-054630**
100mm	**25405-101030**	**25405-102130**	**25405-103030**	**25405-104030**	**25405-104630**
150mm	**25405-151030**	**25405-152130**	**25405-153030**	**25405-154030**	**25405-154630**
250mm	**25405-251030**	**25405-252130**	**25405-253030**	**25405-254030**	**25405-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD PFP Drop-In Guard Cartridges						
Particle Size	**Length**	**4.6mm/4.0mm ID**	**3.0mm ID**	**2.1mm ID**	**1.0mm ID**	**Quantity**
3µm	10mm	**25403-014001**	**25403-013001**	**25403-012101**	**25403-011001**	4 Pack
5µm	10mm	**25405-014001**	**25405-013001**	**25405-012101**	**25405-011001**	4 Pack
		**850-00**	**852-00**	**852-00**	**851-00**	1 Each

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Hypersil GOLD PFP HPLC Columns

Hypersil GOLD PFP KAPPA Capillary Columns					
Length	**75µm I.D.**	**100µm I.D.**	**180µm I.D.**	**320µm I.D.**	**500µm I.D.**
1.9µm Particle Size					
50mm	--	--	--	**25402-050365**	--
100mm	--	--	--	**25402-100365**	--
3µm Particle Size					
50mm	--	--	**25403-050265**	**25403-050365**	**25403-050565**
100mm	--	--	**25403-100265**	**25403-100365**	**25403-100565**
150mm	--	--	**25403-150265**	**25403-150365**	**25403-150565**
5µm Particle Size					
50mm	**25405-050065**	**25405-050165**	**25405-050265**	**25405-050365**	**25405-050565**
100mm	**25405-100065**	**25405-100165**	**25405-100265**	**25405-100365**	**25405-100565**
150mm	**25405-150065**	**25405-150165**	**25405-150265**	**25405-150365**	**25405-150565**

Thermo Scientific Hypersil GOLD PFP KAPPA Capillary Guard Columns				
Particle Size	**Length**	**500µm I.D.**	**320µm I.D.**	**180µm I.D.**
3µm	30mm	**25403-030515**	**25403-030315**	**25403-030215**
5µm	30mm	**25405-030515**	**25405-030315**	**25405-030215**

Hypersil GOLD PFP Nanobore HPLC Columns

Particle Size	Length	75µm ID	75µm ID Multipack	Quantity	150µm ID	150µm ID Multipack	Quantity
IntegraFrit							
1.9µm	10mm	**25402-017563**	**25402-017564**	4 Pack	**25402-011563**	**25402-011564**	4 Pack
1.9µm	50mm	**25402-057563**	**25402-057564**	3 Pack	**25402-051563**	**25402-051564**	3 Pack
5µm	50mm	**25405-057563**	**25405-057564**	3 Pack	**25402-051563**	**25405-051564**	3 Pack
5µm	100mm	**25405-107563**	**25405-107564**	3 Pack	**25405-051563**	**25405-101564**	3 Pack
PicoFrit, 15µm Tip							
1.9µm	10mm	**25402-017581**	**25402-017583**	4 Pack	--	--	--
1.9µm	50mm	**25402-057581**	**25402-057582**	3 Pack	--	--	--
5µm	50mm	**25405-057581**	**25405-057582**	3 Pack	--	--	--
5µm	100mm	**25405-107581**	**25405-107582**	3 Pack	--	--	--

Unless otherwise specified, IntegraFrit and PicoFrit are sold in single-column units.

Hypersil GOLD PFP Javelin HTS HPLC Columns

Particle Size	20 x 1.0mm ID	20 x 2.1mm ID	20 x 4.0mm ID	10 x 2.1mm ID	Quantity
1.9µm	--	--	--	**25402-012135**	3 Pack
5µm	**25405-021035**	**25405-022135**	**25405-024035**	--	3 Pack
5µm	**25405-021036**	**25405-022136**	**25405-024036**	--	10 Pack

Hypersil GOLD PFP DASH HTS HPLC Columns

Particle Size	Length	2.1mm ID	Quantity
5µm	20mm	**25405-022151**	3 Pack
5µm	20mm	**25405-022152**	10 Pack

Hypersil GOLD PFP Preparative HPLC Columns

Length	10mm I.D.	21mm I.D.	30mm I.D.	50mm I.D.
Particle Size 5µm				
50mm	**25405-059070**	**25405-059270**	**25405-059370**	**25405-059570**
100mm	**25405-109070**	**25405-109270**	**25405-109370**	**25405-109570**
150mm	**25405-159070**	**25405-159270**	**25405-159370**	**25405-159570**
250mm	**25405-259070**	**25405-259270**	**25405-259370**	**25405-259570**
Particle Size 8µm				
50mm	**25408-059070**	**25408-059270**	**25408-059370**	**25408-059570**
100mm	**25408-109070**	**25408-109270**	**25408-109370**	**25408-109570**
150mm	**25408-159070**	**25408-159270**	**25408-159370**	**25408-159570**
250mm	**25408-259070**	**25408-259270**	**25408-259370**	**25408-259570**
Particle Size 12µm				
50mm	**25412-059070**	**25412-059270**	**25412-059370**	**25412-059570**
100mm	**25412-109070**	**25412-109270**	**25412-109370**	**25412-109570**
150mm	**25412-159070**	**25412-159270**	**25412-159370**	**25412-159570**
250mm	**25412-259070**	**25412-259270**	**25412-259370**	**25412-259570**

Other custom column dimensions are available. Please call your local Customer Service for more information. Stainless steel internal reducing unions to connect 30 to 50mm ID preparative columns to 1/16" tubing are available.

Hypersil GOLD PFP Preparative Guard Cartridges

Particle Size	10 x 10mm	20 × 20mm	Quantity
5µm	**25405-019023**	**25405-029223**	3 Pack
8µm	**25408-019023**	**25408-029223**	3 Pack
12µm	**25412-019023**	**25412-029223**	3 Pack
Preparative Guard Holder	**C-1000**	**F1403**	1 Each

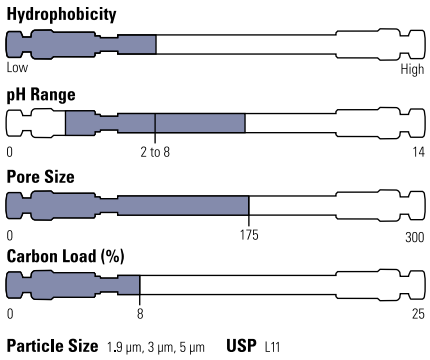
Hypersil GOLD PFP Preparative HPLC Guard Columns

Particle Size	Length	10mm I.D.	21mm I.D.	Quantity
5µm	30mm	**25405-039022**	**25405-039222**	1 Each
8µm	30mm	**25408-039022**	**25408-039222**	1 Each
12µm	30mm	**25412-039022**	**25412-039222**	1 Each

Hypersil GOLD Phenyl HPLC Columns

Contain a C_4 linker which allows for superior alignment of the phenyl ring with aromatic molecules

- **Enhanced pi-pi interactions with aromatics**
- **Moderate hydrophobicity**
- **Outstanding peak shape and sensitivity**
- **1.9µm particle size columns can be used to improve speed and efficiency**



Particle Size 1.9 µm, 3 µm, 5 µm **USP** L11

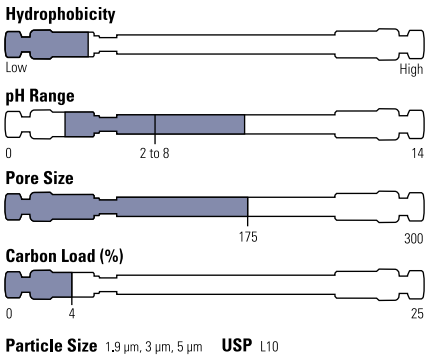
Hypersil GOLD Phenyl Analytical HPLC Columns					
Length (mm)	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 1.9µm					
20mm	**25902-021030**	**25902-022130**	**25902-023030**	--	--
30mm	**25902-031030**	**25902-032130**	**25902-033030**	--	--
50mm	**25902-051030**	**25902-052130**	**25902-053030**	--	**25902-054630**
100mm	**25902-101030**	**25902-102130**	**25902-103030**	--	--
150mm	--	**25902-152130**	--	--	--
200mm	--	**25902-202130**	--	--	--
Particle Size 3µm					
30mm	**25903-031030**	**25903-032130**	**25903-033030**	**25903-034030**	**25903-034630**
50mm	**25903-051030**	**25903-052130**	**25903-053030**	**25903-054030**	**25903-054630**
100mm	**25903-101030**	**25903-102130**	**25903-103030**	**25903-104030**	**25903-104630**
150mm	**25903-151030**	**25903-152130**	**25903-153030**	**25903-154030**	**25903-154630**
Particle Size 5µm					
30mm	**25905-031030**	**25905-032130**	**25905-033030**	**25905-034030**	**25905-034630**
50mm	**25905-051030**	**25905-052130**	**25905-053030**	**25905-054030**	**25905-054630**
100mm	**25905-101030**	**25905-102130**	**25905-103030**	**25905-104030**	**25905-104630**
150mm	**25905-151030**	**25905-152130**	**25905-153030**	**25905-154030**	**25905-154630**
250mm	**25905-251030**	**25905-252130**	**25905-253030**	**25905-254030**	**25905-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD Phenyl Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6/4.0mm ID**	**3.0mm ID**	**2.1mm ID**	**1.0mm ID**	**Quantity**
3µm	10mm	**25903-014001**	**25903-013001**	**25903-012101**	**25905-011001**	4 Pack
5µm	10mm	**25905-014001**	**25905-013001**	**25905-012101**	**25903-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

Hypersil GOLD CN HPLC Columns

Hypersil GOLD CN columns can be used for both normal phase and reversed phase separations



Particle Size 1.9 µm, 3 µm, 5 µm **USP** L10

- **Hypersil GOLD CN columns provide alternative selectivity with lower hydrophobicity**
- **Excellent peak shape**
- **Outstanding senstivity**
- **Less retention for faster analysis**
- **1.9µm particle size columns can be used to improve speed and efficiency**

Hypersil GOLD CN Analytical HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 1.9µm					
20mm	**25802-021030**	**25802-022130**	**25802-023030**	--	--
30mm	**25802-031030**	**25802-032130**	**25802-033030**	--	--
50mm	**25802-051030**	**25802-052130**	**25802-053030**	--	**25802-054630**
100mm	**25802-101030**	**25802-102130**	**25802-103030**	--	--
150mm	--	**25802-152130**	--	--	--
200mm	--	**25802-202130**	--	--	--
Particle Size 3µm					
30mm	**25803-031030**	**25803-032130**	**25803-033030**	**25803-034030**	**25803-034630**
50mm	**25803-051030**	**25803-052130**	**25803-053030**	**25803-054030**	**25803-054630**
100mm	**25803-101030**	**25803-102130**	**25803-103030**	**25803-104030**	**25803-104630**
150mm	**25803-151030**	**25803-152130**	**25803-153030**	**25803-154030**	**25803-154630**
Particle Size 5µm					
30mm	**25805-031030**	**25805-032130**	**25805-033030**	**25805-034030**	**25805-034630**
50mm	**25805-051030**	**25805-052130**	**25805-053030**	**25805-054030**	**25805-054630**
100mm	**25805-101030**	**25805-102130**	**25805-103030**	**25805-104030**	**25805-104630**
150mm	**25805-151030**	**25805-152130**	**25805-153030**	**25805-154030**	**25805-154630**
250mm	**25805-251030**	**25805-252130**	**25805-253030**	**25805-254030**	**25805-254630**

Other custom column dimensions are available. Please call your local Customer Service for more information. Please note that Hypersil GOLD CN columns are shipped in iso-octane:ethanol. For reversed phase applications, flush with ethanol or 2-propanol prior to use.

Hypersil GOLD CN Drop-in Guard Cartridges

Particle Size	Length	4.6/4.0mm ID	3.0mm ID	2.1mm ID	1.0mm ID	Quantity
3µm	10mm	**25803-014001**	**25803-013001**	**25803-012101**	**25803-011001**	4 Pack
5µm	10mm	**25805-014001**	**25805-013001**	**25805-012101**	**25805-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

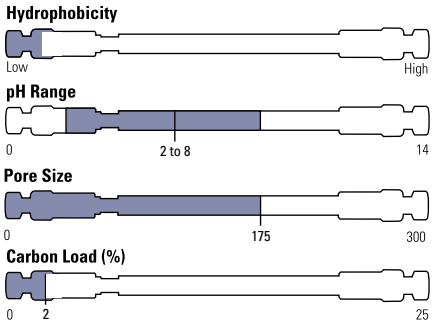
Hypersil GOLD CN Preparative HPLC Columns

Length	10mm I.D.	21mm I.D.	30mm I.D.	50mm I.D.
5µm Particle Size				
50mm	**25805-059070**	**25805-059270**	**25805-059370**	**25805-059570**
100mm	**25805-109070**	**25805-109270**	**25805-109370**	**25805-109570**
150mm	**25805-159070**	**25805-159270**	**25805-159370**	**25805-159570**
250mm	**25805-259070**	**25805-259270**	**25805-259370**	**25805-259570**

Other custom column dimensions are available. Please call your local Customer Service for more information.

Hypersil GOLD Amino HPLC Columns

A high performance aminopropyl phase that gives excellent chromatographic properties in three modes: weak anion exchange, reversed phase and normal phase



Particle Size 1.9µm, 3µm, 5µm **USP** L8

Hypersil GOLD Amino columns have an aminopropyl ligand bonded to highly pure base deactivated silica.

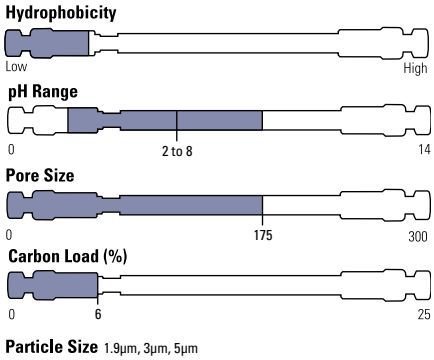
- **Retains anions and organic acids in weak anion exchange**
- **Excellent for carbohydrate analysis in reversed phase**
- **Alternative selectivity to silica columns in normal phase chromatography**
- **Outstanding peak shape and sensitivity**
- **1.9µm particle size columns can be used to improve speed and efficiency**

Hypersil GOLD Amino HPLC Columns					
Length (mm)	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 1.9µm					
20mm	**25702-021030**	**25702-022130**	**25702-023030**	--	--
30mm	**25702-031030**	**25702-032130**	**25702-033030**	--	--
50mm	**25702-051030**	**25702-052130**	**25702-053030**	--	**25702-054630**
100mm	**25702-101030**	**25702-102130**	**25702-103030**	--	--
150mm	--	**25702-152130**	--	--	--
200mm	--	**25702-202130**	--	--	--
Particle Size 3µm					
30mm	**25703-031030**	**25703-032130**	**25703-033030**	**25703-034030**	**25703-034630**
50mm	**25703-051030**	**25703-052130**	**25703-053030**	**25703-054030**	**25703-054630**
100mm	**25703-101030**	**25703-102130**	**25703-103030**	**25703-104030**	**25703-104630**
150mm	**25703-151030**	**25703-152130**	**25703-153030**	**25703-154030**	**25703-154630**
Particle Size 5µm					
30mm	**25705-031030**	**25705-032130**	**25705-033030**	**25705-034030**	**25705-034630**
50mm	**25705-051030**	**25705-052130**	**25705-053030**	**25705-054030**	**25705-054630**
100mm	**25705-101030**	**25705-102130**	**25705-103030**	**25705-104030**	**25705-104630**
150mm	**25705-151030**	**25705-152130**	**25705-153030**	**25705-154030**	**25705-154630**
250mm	**25705-251030**	**25705-252130**	**25705-253030**	**25705-254030**	**25705-254630**

Hypersil GOLD Amino Drop-In Guard Cartridges						
Particle Size	**Length**	**4.6mm/ 4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**1.0mm I.D.**	**Quantity**
3µm	10mm	**25703-014001**	**25703-013001**	**25703-012101**	**25703-011001**	4 Pack
5µm	10mm	**25705-014001**	**25705-013001**	**25705-012101**	**25705-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

Hypersil GOLD AX HPLC Columns

A novel polymeric amine ligand bonded to highly pure base deactivated silica



Particle Size 1.9µm, 3µm, 5µm

Hypersil GOLD AX provides separation of smaller proteins, peptides, anionic species and polar molecules.

- **Weak anion exchange phase for multiple charged species**
- **Suitable for HILIC retention and separation of highly polar molecules**
- **Higher efficiency than polymer based ion exchange columns**
- **Outstanding peak shape and selectivity**
- **1.9µm particle size columns can be used to improve speed and efficiency**

Hypersil GOLD AX HPLC Columns

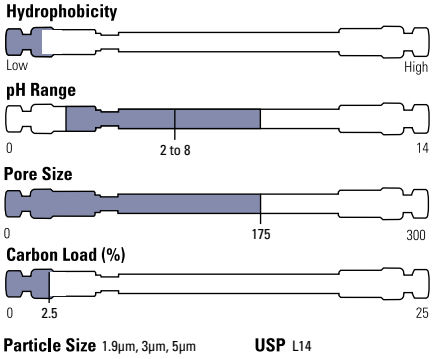
Length (mm)	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 1.9µm					
20mm	**26102-021030**	**26102-022130**	**26102-023030**	--	--
30mm	**26102-031030**	**26102-032130**	**26102-033030**	--	--
50mm	**26102-051030**	**26102-052130**	**26102-053030**	--	**26102-054630**
100mm	**26102-101030**	**26102-102130**	**26102-103030**	--	--
150mm	--	**26102-152130**	--	--	--
200mm	--	**26102-202130**	--	--	--
Particle Size 3µm					
30mm	**26103-031030**	**26103-032130**	**26103-033030**	**26103-034030**	**26103-034630**
50mm	**26103-051030**	**26103-052130**	**26103-053030**	**26103-054030**	**26103-054630**
100mm	**26103-101030**	**26103-102130**	**26103-103030**	**26103-104030**	**26103-104630**
150mm	**26103-151030**	**26103-152130**	**26103-153030**	**26103-154030**	**26103-154630**
Particle Size 5µm					
30mm	**26105-031030**	**26105-032130**	**26105-033030**	**26105-034030**	**26105-034630**
50mm	**26105-051030**	**26105-052130**	**26105-053030**	**26105-054030**	**26105-054630**
100mm	**26105-101030**	**26105-102130**	**26105-103030**	**26105-104030**	**26105-104630**
150mm	**26105-151030**	**26105-152130**	**26105-153030**	**26105-154030**	**26105-154630**
250mm	**26105-251030**	**26105-252130**	**26105-253030**	**26105-254030**	**26105-254630**

Hypersil GOLD AX Drop-In Guard Cartridges

Particle Size	Length	4.6mm/4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	1.0mm I.D.	Quantity
3µm	10mm	**26103-014001**	**26103-013001**	**26103-012101**	**26103-011001**	4 Pack
5µm	10mm	**26105-014001**	**26105-013001**	**26105-012101**	**26105-011001**	4 Pack
	UNIGUARD Drop-In Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

Hypersil GOLD SAX HPLC Columns

A highly stable quaternary amine strong anion exchange column for aqueous and low pH mobile phases



Particle Size 1.9µm, 3µm, 5µm **USP** L14

Hypersil GOLD SAX columns have a quarternary amine ion exchange ligand bonded to highly pure silica.

- **High stability to aqueous and low pH mobile phases**
- **Ideally suited to the analysis of smaller organic molecules including nucleotides and organic acids**
- **Outstanding peak shape and sensitivity**
- **1.9µm particle size columns can be used to improve speed and efficiency**

Hypersil GOLD SAX HPLC Columns

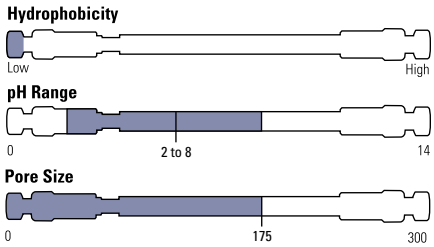
Length	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
Particle Size 1.9µm					
20mm	**26302-021030**	**26302-022130**	**26302-023030**	--	--
30mm	**26302-031030**	**26302-032130**	**26302-033030**	--	--
50mm	**26302-051030**	**26302-052130**	**26302-053030**	--	**26302-054630**
100mm	**26302-101030**	**26302-102130**	**26302-103030**	--	--
150mm	--	**26302-152130**	--	--	--
200mm	--	**26302-202130**	--	--	--
Particle Size 3µm					
30mm	**26303-031030**	**26303-032130**	**26303-033030**	**26303-034030**	**26303-034630**
50mm	**26303-051030**	**26303-052130**	**26303-053030**	**26303-054030**	**26303-054630**
100mm	**26303-101030**	**26303-102130**	**26303-103030**	**26303-104030**	**26303-104630**
150mm	**26303-151030**	**26303-152130**	**26303-153030**	**26303-154030**	**26303-154630**
Particle Size 5µm					
30mm	**26305-031030**	**26305-032130**	**26305-033030**	**26305-034030**	**26305-034630**
50mm	**26305-051030**	**26305-052130**	**26305-053030**	**26305-054030**	**26305-054630**
100mm	**26305-101030**	**26305-102130**	**26305-103030**	**26305-104030**	**26305-104630**
150mm	**26305-151030**	**26305-152130**	**26305-153030**	**26305-154030**	**26305-154630**
250mm	**26305-251030**	**26305-252130**	**26305-253030**	**26305-254030**	**26305-254630**

Hypersil GOLD SAX Drop-In Guard Cartridges

Particle Size	Length	4.6mm/4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	1.0mm I.D.	
3µm	10mm	**26303-014001**	**26303-013001**	**26303-012101**	**26303-011001**	4 Pack
5µm	10mm	**26305-014001**	**26305-013001**	**26305-012101**	**26305-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

Hypersil GOLD Silica HPLC Columns

Unbonded, highly pure base deactivated silica media that is the backbone of the Hypersil GOLD range of columns



Particle Size 1.9µm, 3µm, 5µm **USP** L3

Hypersil GOLD Silica columns are a powerful and efficient tool for the chromatography of nonpolar and moderately polar organic compounds by normal phase chromatography.

- **Highly pure base deactivated silica media**
- **Outstanding peak shape and senstivity**
- **1.9µm particle size columns can be used to improve speed and efficiency**

Hypersil GOLD Silica HPLC Columns

Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
Particle Size 1.9µm					
20mm	**25102-021030**	**25102-022130**	**25102-023030**	--	--
30mm	**25102-031030**	**25102-032130**	**25102-033030**	--	--
50mm	**25102-051030**	**25102-052130**	**25102-053030**	--	**25102-054630**
100mm	**25102-101030**	**25102-102130**	**25102-101030**	--	--
150mm	--	**25102-152130**	--	--	--
200mm	--	**25102-202130**	--	--	--
Particle Size 3µm					
30mm	**25103-031030**	**25103-032130**	**25103-033030**	**25103-034030**	**25103-034630**
50mm	**25103-051030**	**25103-052130**	**25103-053030**	**25103-054030**	**25103-054630**
100mm	**25103-101030**	**25103-102130**	**25103-103030**	**25103-104030**	**25103-104630**
150mm	**25103-151030**	**25103-152130**	**25103-151030**	**25103-154030**	**25103-154630**
Particle Size 5µm					
30mm	**25105-031030**	**25105-032130**	**25105-033030**	**25105-034030**	**25105-034630**
50mm	**25105-051030**	**25105-052130**	**25105-053030**	**25105-054030**	**25105-054630**
100mm	**25105-101030**	**25105-102130**	**25105-103030**	**25105-104030**	**25105-104630**
150mm	**25105-151030**	**25105-152130**	**25105-153030**	**25105-154030**	**25105-154630**
250mm	**25105-251030**	**25105-252130**	**25105-253030**	**25105-254030**	**25105-254630**

Hypersil GOLD Silica Drop-In Guard Cartridges

Particle Size	Length	4.6mm/4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	1.0mm I.D.	Quantity
3µm	10mm	**25103-014001**	**25103-013001**	**25103-012101**	**25103-011001**	4 Pack
5µm	10mm	**25105-014001**	**25105-013001**	**25105-012101**	**25105-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

BioBasic HPLC Columns

Improved performance for peptides, proteins and biomolecules

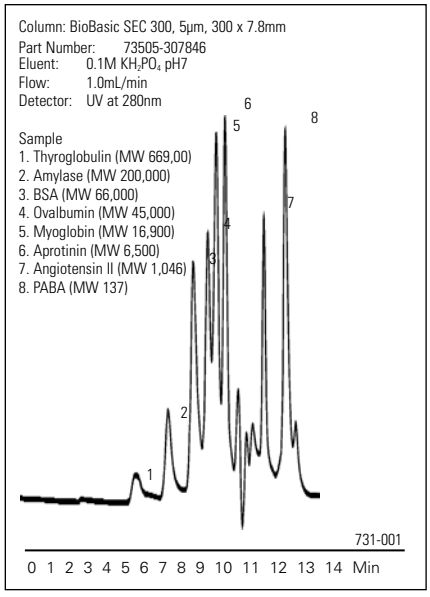
- A range of high performance columns for reversed phase, ion exchange and size exclusion chromatography
- Highly pure silica in tailored pore sizes for superior performance
- Improved resolution, efficiency, reproducibility and column lifetimes
- Hardware options include biocompatible PEEK columns, KAPPA capillary columns, and other designs for LC/MS

BioBasic columns are available in capillary to preparative sizes

The diversity of biological samples in terms of compound structure and properties coupled with matrix complexity demands a range of sample separation modes, column chemistries, column configurations and detection techniques for their effective characterization. The Thermo Scientific BioBasic family of HPLC columns addresses these needs with a range of reversed phase, ion exchange and SEC columns, specifically designed to handle the unique rigors of the analysis of proteins, peptides and other biomolecules. The 300 Å pore size, high purity silica and stable bonding chemistry of BioBasic packings makes them ideal for life science applications.

BioBasic SEC Columns

BioBasic SEC columns, based on silica with a proprietary polymeric coating, offer the mechanical stability of silica-based size exclusion columns with higher efficiencies than that of polymer-based columns. Four pore sizes are available, making them ideal for molecular weight determination of peptides, proteins and water soluble polymers. They can also be used for sample clean-up prior to other analyses.



Protein separation on a BioBasic SEC 300 column

BioBasic Reversed Phase Columns

BioBasic reversed phase columns provide superior chromatography because the extra dense bonding chemistry used for these packings produce a highly stable, reproducible surface for reliable results. BioBasic reversed phase packings are available in C18, C8, C4, phenyl and cyano chemistries.

BioBasic Ion Exchange Columns

BioBasic AX and BioBasic SCX ion exchange columns demonstrate superior reproducibility, both column-to-column and batch-to-batch because the 5 µm, 300 Å silica provides significantly higher efficiency than typical polymer-based ion exchangers. Both phases provide superior performance for proteins, peptides and nucleic acids using protein-friendly ion exchange conditions.

BioBasic Columns for LC/MS: KAPPA Capillary and Nanobore Columns

The BioBasic KAPPA line meets all the sensitivity needs of demanding LC/MS separations. High efficiency capillaries are available in internal diameters ranging from 500µm all the way down to 75µm ID, and lengths of 50mm to 250mm. The BioBasic KAPPA line is ideal for all LC/MS analyses, especially proteomics separations of typically small sample concentrations.

BioBasic 18, 8, 4 and SCX columns are also available in nanobore formats for nanospray LC/MS applications, particularly proteomics. At flow rates of nL/min versus mL/min, nanobore columns offer higher sensitivity with greater signal-to-noise ratio than traditional electrospray.

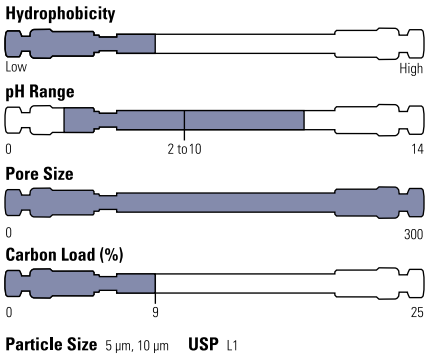
IntegraFrit columns have an integral high-porosity frit, behind which is the packed chromatography bed. The frit end of the fused-silica column is polished flat to ensure a clean connection to the emitter of choice.

PicoFrit columns eliminate post-column performance losses by spraying directly from the column, boosting MS performance compared to that provided by a column attached to a tip.

BioBasic 18 Columns

Outstanding separation of small to medium peptides

- 300 Å pore size for maximum performance with biomolecules
- High peak capacity stationary phase for 2D chromatography
- Outstanding reproducibility, efficiency and column lifetimes
- Ideal for LC/MS applications



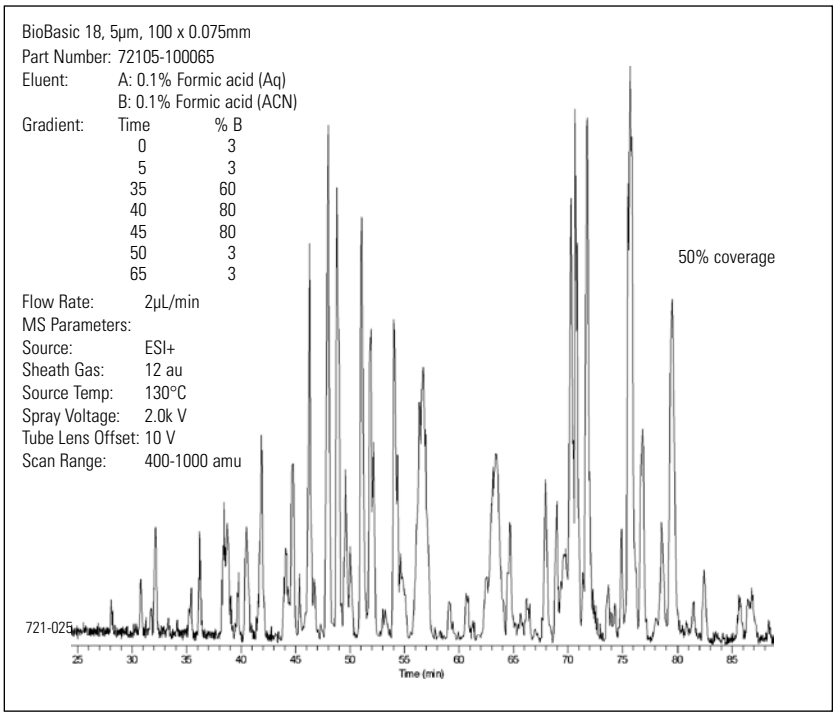
Particle Size 5 µm, 10 µm **USP** L1

BioBasic 18 reversed phase columns are designed to meet the separation requirements for medium to low hydrophobicity peptides, nominally less than 5000 Da. The 300 Å pore size, high purity silica and stable bonding chemistry of BioBasic packings makes them ideal for life science applications, including LC/MS and 2D applications.

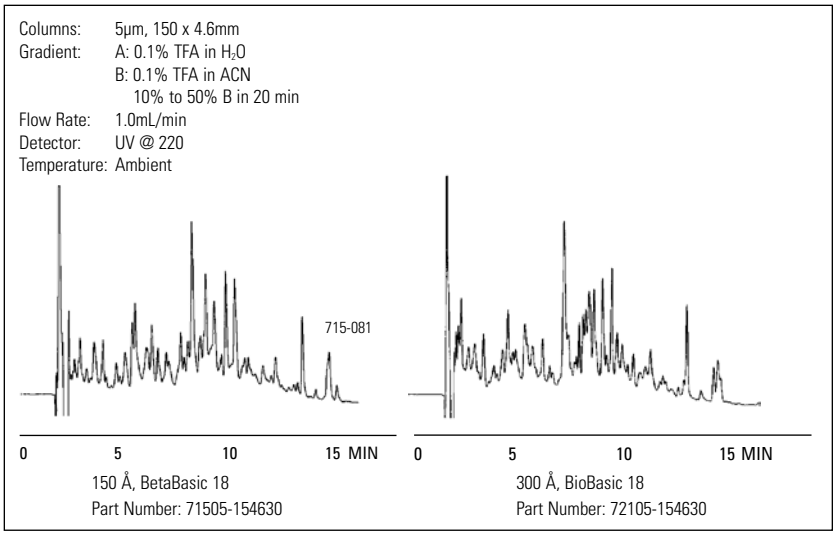
The retention of protein analytes usually occurs through an adsorption/desorption mechanism where the hydrophobic "foot" of the protein reversibly adsorbs to the bonded phase at the head of the column. As the mobile phase conditions change, usually with an increase in organic composition, the protein is desorbed and eluted. Pore size plays an integral role because the majority of the bonded phase is located inside the pores. Due to the larger size of proteins, it is important that the pore size be large enough to accommodate the analyte. The improved resolution achieved with the 300 Å pore size BioBasic column compared to a 150 Å pore size C18 is illustrated for a tryptic digest.

BioBasic 18 provides superior chromatography, run after run, column after column. The extra dense bonding chemistry allied with the novel surface deactivation used for BioBasic reversed phase packing produces a highly stable, reproducible surface and sharp peak shape, ensuring reliable results. When using BioBasic reversed phase columns for protein and peptide applications, the use of a stainless steel column is usually appropriate. However, when sample recovery or trace metal concentrations make stainless steel unsuitable, PEEK column hardware is available as an alternative.

For more information on biomolecule separations and BioBasic columns, please request the *HPLC Analysis of Biomolecules Technical Guide* TG20026.



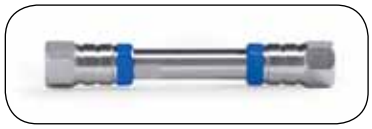
Low level (femtomole) detection of phosphorylase B digest by RP-LC/MS using nano-ESI



Effect of pore size on tryptic digest separation

BioBasic 18 HPLC Columns

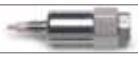
Outstanding separation of small to medium peptides



- **300Å pore size for maximum performance with biomolecules**
- **High peak capacity stationary phase**
- **Outstanding reproducibility, efficiency and column lifetime**
- **Excellent for LC/MS separations**

BioBasic 18 HPLC Columns					
Length	**1.0mm ID**	**2.1mm ID**	**3.0mm ID**	**4.0mm ID**	**4.6mm ID**
Particle Size 5µm					
30mm	**72105-031030**	**72105-032130**	**72105-033030**	**72105-034030**	**72105-034630**
50mm	**72105-051030**	**72105-052130**	**72105-053030**	**72105-054030**	**72105-054630**
100mm	**72105-101030**	**72105-102130**	**72105-103030**	**72105-104030**	**72105-104630**
150mm	**72105-151030**	**72105-152130**	**72105-153030**	**72105-154030**	**72105-154630**
250mm	**72105-251030**	**72105-252130**	**72105-253030**	**72105-254030**	**72105-254630**

Other column dimensions are available in bio-inert column hardware. Please call Customer Service for more information.

BioBasic 18 Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6mm/ 4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**1.0mm I.D.**	**Quantity**
5µm	10mm	**72105-014001**	**72105-013001**	**72105-012101**	**72105-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

BioBasic 18 PEEK Bio-Inert HPLC Columns		
Length	**4.6mm ID**	**2.1mm ID**
Particle Size 5µm		
100mm	**72105-104668**	**72105-102168**
150mm	**72105-154668**	**72105-152168**
250mm	**72105-254668**	**72105-252168**

BioBasic 18 PEEK Guard Cartridges				
Particle Size	**Length**	**4.6mm I.D.**	**2.1mm I.D.**	**Quantity**
5µm	10mm	**72105-014003**	**72105-012103**	3 pack
Bio-inert Guard Holder		**C270-01**	**Inquire**	1 Each

Other column dimensions are available in bio-inert column hardware. Please call Customer Service for more information.

BioBasic 18 KAPPA Capillary HPLC Columns					
Length	**500µm ID**	**320µm ID**	**180µm ID**	**100µm ID**	**75µm ID**
Particle Size 5µm					
50mm	**72105-050565**	**72105-050365**	**72105-050265**	**72105-050165**	**72105-050065**
100mm	**72105-100565**	**72105-100365**	**72105-100265**	**72105-100165**	**72105-100065**
150mm	**72105-150565**	**72105-150365**	**72105-150265**	**72105-150165**	**72105-150065**
250mm	**72105-250565**	**72105-250365**	**72105-250265**	--	--

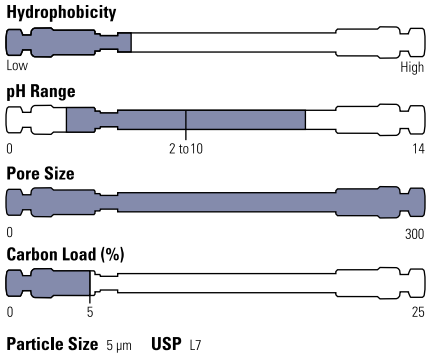
BioBasic 18 KAPPA Capillary Guard Columns				
Particle Size	**Length**	**500µm I.D.**	**320µm I.D.**	**180µm I.D.**
5µm	30mm	**72105-030515**	**72105-030315**	**72105-030215**

BioBasic 18 Nanobore HPLC Columns							
Particle Size	**Length**	**75µm ID**	**75µm ID Multipack**	**Quantity**	**150µm ID**	**150µm ID Multipack**	**Quantity**
IntegraFrit							
5µm	50mm	**72105-057563**	**72105-057564**	3 Pack	**72105-051563**	**72105-051564**	3 Pack
5µm	100mm	**72105-107563**	**72105-107564**	3 Pack	**72105-101563**	**72105-101564**	3 Pack
PicoFrit, 15µm Tip							
5µm	50mm	**72105-057581**	**72105-057582**	3 Pack	--	--	--
5µm	100mm	**72105-107581**	**72105-107582**	3 Pack	--	--	--

BioBasic 8 HPLC Columns

Optimized for the separation of a wide range of peptides

- **300Å pore size for improved biomolecule analysis**
- **An excellent starting column for protein and peptide analysis**
- **Outstanding reproducibility, efficiency and column lifetime**
- **Excellent for LC/MS separations**



Particle Size 5 µm **USP** L7

BioBasic 8 Analytical HPLC Columns

Length (mm)	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
Particle Size 5µm					
50mm	**72205-051030**	**72205-052130**	**72205-053030**	**72205-054030**	**72205-054630**
100mm	**72205-101030**	**72205-102130**	**72205-103030**	**72205-104030**	**72205-104630**
150mm	**72205-151030**	**72205-152130**	**72205-153030**	**72205-154030**	**72205-154630**
250mm	**72205-251030**	**72205-252130**	**72205-253030**	**72205-254030**	**72205-254630**

Other column dimensions are available, including preparative columns. Please call Customer Service for more information.

BioBasic 8 Drop-in Guard Cartridges

Particle Size	Length	4.6/4.0mm ID	3.0mm ID	2.1mm ID	1.0mm ID	Quantity
5µm	10mm	**72205-014001**	**72205-013001**	**72205-012101**	**72205-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	850-00	852-00	852-00	851-00	1 Each

BioBasic 8 PEEK Bio-Inert Columns

Length	4.6mm ID	2.1mm ID
Particle Size 5µm		
100mm	**72205-104668**	**72205-102168**
150mm	**72205-154668**	**72205-152168**
250mm	**72205-254668**	**72205-252168**

BioBasic 8 PEEK Guard Cartridges

Particle Size	Length	4.0/4.6mm ID	2.1mm ID	Quantity
5µm	10mm	**72205-014003**	**72205-012103**	3 Pack
Bio-inert Guard Holder		**C270-01**	--	1 Each

BioBasic 8 KAPPA Capillary HPLC Columns

Length	75µm ID	100µm ID	180µm ID	320µm ID	500µm ID
Particle Size 5µm					
50mm	**72205-050065**	**72205-050165**	**72205-050265**	**72205-050365**	**72205-050565**
100mm	**72205-100065**	**72205-100165**	**72205-100265**	**72205-100365**	**72205-100565**
150mm	**72205-150065**	**72205-150165**	**72205-150265**	**72205-150365**	**72205-150565**

BioBasic 8 KAPPA Capillary Guard Columns

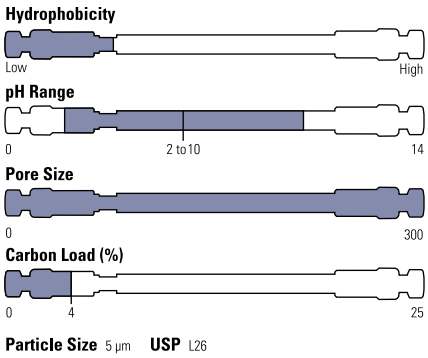
Length	500µm I.D.	320µm I.D.	180µm I.D.	Quantity
Particle Size 5µm				
30mm	**72205-030515**	**72205-030315**	**72205-030215**	1 Each

BioBasic 8 Nanobore HPLC Columns

Particle Size	Length	75µm ID	75µm ID Multipack	Quantity	150µm ID	150µm ID Multipack	Quantity
IntegraFrit							
5µm	50mm	**72205-057563**	**72205-057564**	3 Pack	**72205-051563**	**72205-051564**	3 Pack
5µm	100mm	**72205-107563**	**72205-107564**	3 Pack	**72205-101563**	**72205-101564**	3 Pack
PicoFrit, 15µm Tip							
5µm	50mm	**72205-057581**	**72205-057582**	3 Pack	--	--	--
5µm	100mm	**72205-107581**	**72205-107582**	3 Pack	--	--	--

BioBasic 4 HPLC Columns

- **Based on 300Å silica for outstanding biomolecule performance**
- **Lower carbon load for optimal retention of larger peptides an proteins**
- **Outstanding reproducibility, efficiency and column lifetime**
- **Excellent for LC/MS separations**



Particle Size 5 µm **USP** L26

BioBasic 4 HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 5µm					
50mm	**72305-051030**	**72305-052130**	**72305-053030**	**72305-054030**	**72305-054630**
100mm	**72305-101030**	**72305-102130**	**72305-103030**	**72305-104030**	**72305-104630**
150mm	**72305-151030**	**72305-152130**	**72305-153030**	**72305-154030**	**72305-154630**
250mm	**72305-251030**	**72305-252130**	**72305-253030**	**72305-254030**	**72305-254630**

Other column dimensions are available, including preparative columns. Please call Customer Service for more information.

BioBasic 4 Drop-In Guard Cartridges

Particle Size	Length	4.6mm I.D.	4.0mm ID	3.0mm ID	2.1mm ID	1.0mm ID	Quantity
5µm	10mm	**72305-014003**	**72305-014001**	**72305-013001**	**72305-012101**	**72305-011001**	1 Each
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

BioBasic 4 PEEK Bio-Inert HPLC Columns

Length	2.1mm I.D.	4.6mm I.D.
Particle Size 5.0µm		
100mm	**72305-102168**	**72305-104668**
150mm	**72305-152168**	**72305-154668**
250mm	**72305-252168**	**72305-254668**

BioBasic 4 PEEK Guard Cartridges

Particle Size	Length	2.1mm ID	4.0/4.6mm ID	Quantity
5µm	10mm	**72305-012103**	**72305-014003**	3 pack
Bio-inert Guard Holder	10mm	--	**C270-01**	1 Each

BioBasic 4 KAPPA Capillary HPLC Columns

Length (mm)	75µm I.D.	100µm I.D.	180µm I.D.	320µm I.D.	500µm I.D.
Particle Size 5µm					
50mm	**72305-050065**	**72305-050165**	**72305-050265**	**72305-050365**	**72305-050565**
100mm	**72305-100065**	**72305-100165**	**72305-100265**	**72305-100365**	**72305-100565**
150mm	**72305-150065**	**72305-150165**	**72305-150265**	**72305-150365**	**72305-150565**

BioBasic 4 KAPPA Guard Columns

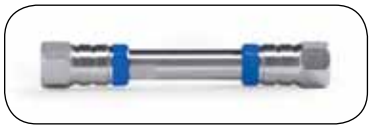
Length	500µm I.D.	320µm I.D.	180µm I.D.	Quantity
30mm	**72305-030515**	**72305-030315**	**72305-030215**	1 Each

BioBasic 4 Nanobore HPLC Columns

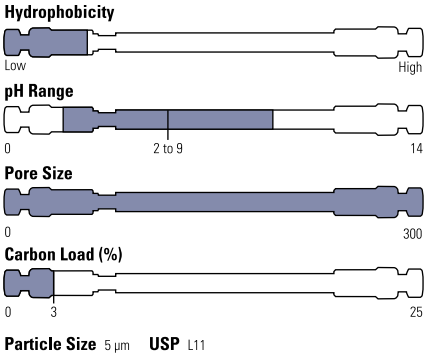
Particle Size	Length	75µm ID	75µm ID Multipack	Quantity	150µm ID	150µm ID Multipack	Quantity
IntegraFrit							
5µm	50mm	**72305-057563**	**72305-057564**	3 Pack	**72305-051563**	**72305-051564**	3 Pack
5µm	100mm	**72305-107563**	**72305-107564**	3 Pack	**72305-101563**	**72305-101564**	3 Pack
PicoFrit, 15µm Tip							
5µm	50mm	**72305-057564**	**72305-057582**	3 Pack	--	--	--
5µm	100mm	**72305-107564**	**72305-107582**	3 Pack	--	--	--

BioBasic Phenyl HPLC Columns

Alternative selectivity of peptides and proteins



- **300Å pore size for maximum performance with biomolecules**
- **Lower carbon load for optimal retention of larger peptides and proteins**
- **Offers different selectivity to alkyl chain chemistires for critical separations**
- **Excellent for LC/MS separations**



Particle Size 5 µm **USP** L11

BioBasic Phenyl HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm					
50mm	**72405-051030**	**72405-052130**	**72405-053030**	**72405-054030**	**72405-054630**
100mm	**72405-101030**	**72405-102130**	**72405-103030**	**72405-104030**	**72405-104630**
150mm	**72405-151030**	**72405-152130**	**72405-153030**	**72405-154030**	**72405-154630**
250mm	**72405-251030**	**72405-252130**	**72405-253030**	**72405-254030**	**72405-254630**

Other column dimensions are available. Please call Customer Service for more information.

BioBasic Phenyl Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6mm/4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**1.0mm I.D.**	**Quantity**
5µm	10mm	**72405-014001**	**72405-013001**	**72405-012101**	**72405-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

BioBasic Phenyl Capillary HPLC Columns					
Length	**75µm I.D.**	**100µm I.D.**	**200µm I.D.**	**320µm I.D.**	**500µm I.D.**
Particle Size 5µm					
100mm	**72405-100065**	**72405-100165**	**72405-100265**	**72405-100365**	**72405-100565**

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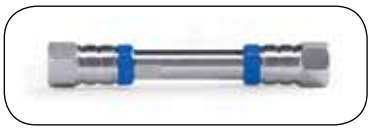
See our range of HyperSep SPE Products

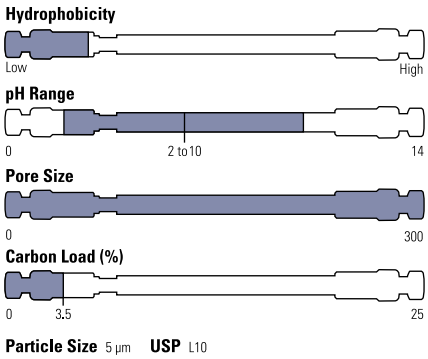
BioBasic CN HPLC Columns

Reversed phase with alternative selectivity for proteins



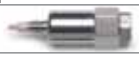
Hydrogen bonding and dipole-dipole interactions lead to alternative selectivity.

- **300Å pore size for improved biomolecule separations**
- **Lower carbon load for optimal retention of larger peptides and proteins**
- **Elution order changes**
- **Outstanding reproducibility, efficiency and column lifetime**



Particle Size 5 µm **USP** L10

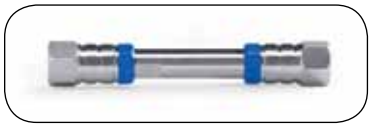
BioBasic CN HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm					
50mm	**72905-051030**	**72905-052130**	**72905-053030**	**72905-054030**	**72905-054630**
100mm	**72905-101030**	**72905-102130**	**72905-103030**	**72905-104030**	**72905-104630**
150mm	**72905-151030**	**72905-152130**	**72905-153030**	**72905-154030**	**72905-154630**
250mm	**72905-251030**	**72905-252130**	**72905-253030**	**72905-254030**	**72905-254630**

BioBasic CN Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6mm/4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**1.0mm I.D.**	**Quantity**
5µm	10mm	**72905-014001**	**72905-013001**	**72905-012101**	**72905-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

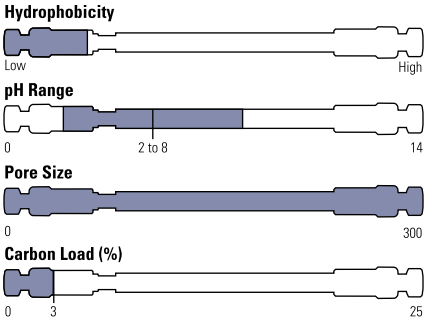
BioBasic CN KAPPA Capillary HPLC Columns					
Length	**75µm I.D.**	**100µm I.D.**	**180µm I.D.**	**320µm I.D.**	**500µm I.D.**
Particle Size 5µm					
100mm	**72905-100065**	**72905-100165**	**72905-100265**	**72905-100365**	**72905-100565**

BioBasic AX HPLC Columns

Optimized for the separation of proteins, peptides, other anionic species and polar molecules



- **Weak anion exchange phase for multiple charged species**
- **300Å pore size for enhanced protein and peptide separations**
- **Suitable for HILIC retention and separation of highly polar molecules**
- **Superb stability under demanding pH conditions**

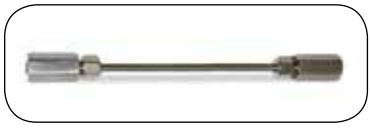


Particle Size 5 µm **USP** N/A

BioBasic AX HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm					
50mm	**73105-051030**	**73105-052130**	**73105-053030**	**73105-054030**	**73105-054630**
100mm	**73105-101030**	**73105-102130**	**73105-103030**	**73105-104030**	**73105-104630**
150mm	**73105-151030**	**73105-152130**	**73105-153030**	**73105-154030**	**73105-154630**
250mm	**73105-251030**	**73105-252130**	**73105-253030**	**73105-254030**	**73105-254630**

Other column dimensions are available. Please call Customer Service for more information.

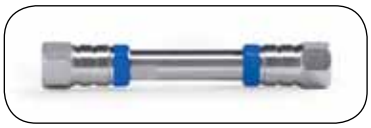
BioBasic AX Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6mm/4.0mm ID**	**3.0mm ID**	**2.1mm ID**	**1.0mm ID**	**Quantity**
5µm	10mm	**73105-014001**	**73105-013001**	**73105-012101**	**73105-011001**	4 Pack
		**850-00**	**852-00**	**852-00**	**851-00**	1 Each



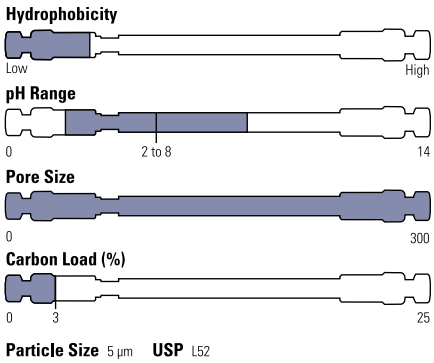
BioBasic AX KAPPA Capillary HPLC Columns					
Length (mm)	**75µm I.D.**	**100µm I.D.**	**180µm I.D.**	**320µm I.D.**	**500µm I.D.**
Particle Size 5µm					
100mm	**73105-100065**	**73105-100165**	**73105-100265**	**73105-100365**	**73105-100565**
150mm	**73105-150065**	**73105-150165**	**73105-150265**	**73105-150365**	**73105-150565**

BioBasic SCX Columns

For the separation of proteins, peptides, and other cationic species



- **Strong cation exchange phase based on sulfonic acid chemistry**
- **Separation and retention of basic and other cationic species**
- **300Å pore size for enhanced protein and peptide separations**
- **Outstanding stability under demanding pH conditions**



Particle Size 5 µm **USP** L52

BioBasic SCX Cation Exchange HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 5µm					
50mm	**73205-051030**	**73205-052130**	**73205-053030**	**73205-054030**	**73205-054630**
100mm	**73205-101030**	**73205-102130**	**73205-103030**	**73205-104030**	**73205-104630**
150mm	**73205-151030**	**73205-152130**	**73205-153030**	**73205-154030**	**73205-154630**
250mm	**73205-251030**	**73205-252130**	**73205-253030**	**73205-254030**	**73205-254630**

Other column dimensions are available. Please call Customer Service for more information.

BioBasic SCX Guard Cartridges

Particle Size	Length	4.0mm ID	3.0mm ID	2.1mm ID	1.0mm ID	Quantity
5µm	10mm	**73205-014001**	**73205-013001**	**73205-012101**	**73205-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

BioBasic SCX KAPPA HPLC Columns

Length	75µm I.D.	100µm I.D.	180µm I.D.	320µm I.D.	500µm I.D.
Particle Size 5µm					
50mm	**73205-050065**	**73205-050165**	**73205-050265**	**73205-050365**	**73205-050565**
100mm	**73205-100065**	**73205-100165**	**73205-100265**	**73205-100365**	**73205-100565**
150mm	**73205-150065**	**73205-150165**	**73205-150265**	**73205-150365**	**73205-150565**

BioBasic SCX KAPPA Guard Columns

Length	180µm I.D.	320µm I.D.	500µm I.D.
Particle Size 5µm			
30mm	**73205-030215**	**73205-030315**	**73205-030515**

BioBasic SCX Nanobore HPLC Columns

Particle Size	Length	75µm ID	75µm ID Multipack	Quantity	150µm ID	150µm ID Multipack	Quantity
IntegraFrit							
5µm	50mm	**73205-057563**	**73205-057564**	3 Pack	**73205-051563**	**73205-051564**	3 Pack
5µm	100mm	**73205-107563**	**73205-107564**	3 Pack	**73205-101563**	**73205-101564**	3 Pack
PicoFrit, 15µm ID Tip							
5µm	50mm	**73205-057581**	**73205-057582**	3 Pack	--	--	--
5µm	100mm	**73205-107581**	**73205-107582**	3 Pack	--	--	--

Unless otherwise specified, IntegraFrit and PicoFrit are sold in single-column units.

BioBasic SEC Columns

Superior separation of water soluble compounds

- Covers separation of analytes over a wide molecular weight range
- Long column life and high column efficiencies
- Simple mechanism of interaction based on molecular size and shape
- Ideal for sample clean-up
- Straightforward method development, simple mobile phases

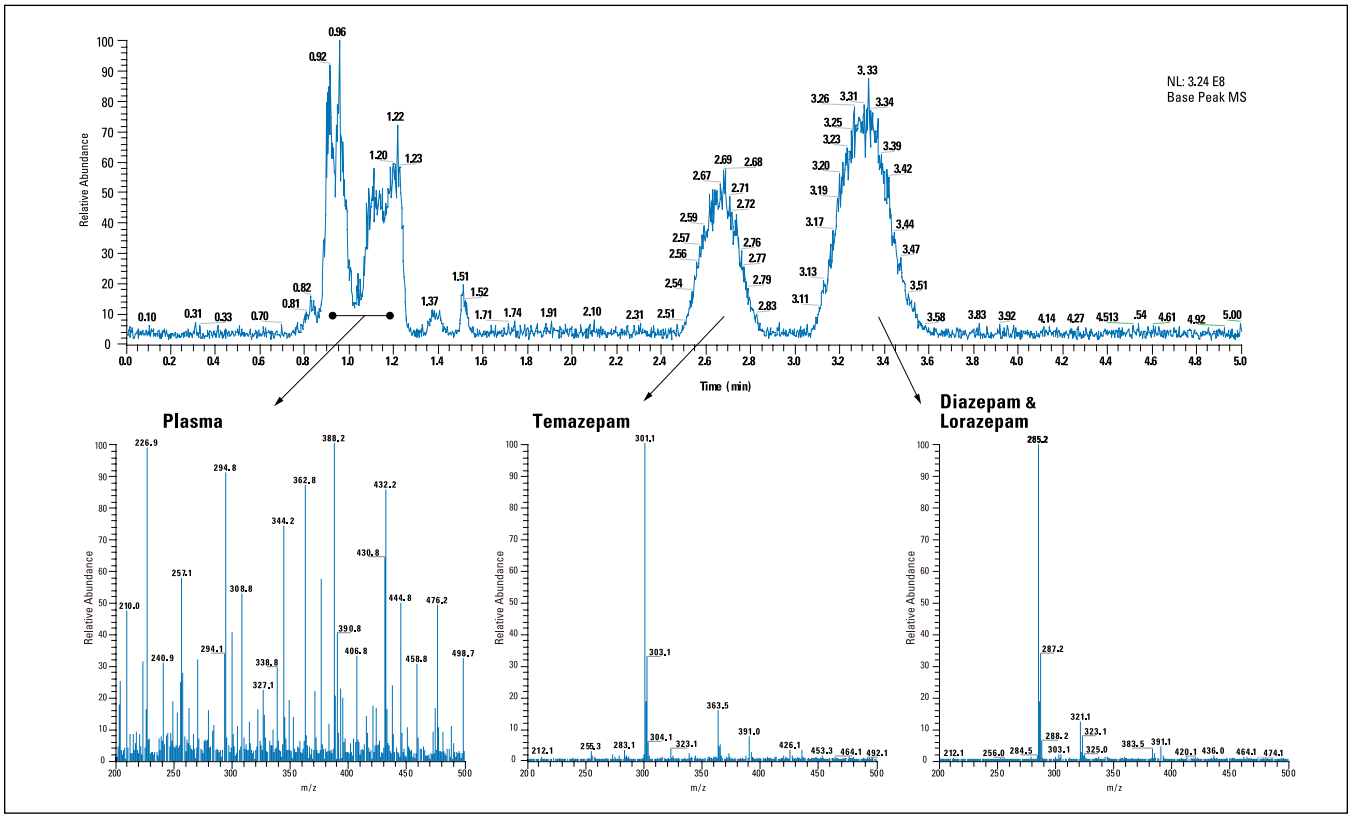
BioBasic Size Exclusion Chromatography (SEC) columns provide high efficiency separations for a wide range of samples from 100 to 10,000,000 molecular weight. The columns come in a range of pore sizes (60, 120, 300 and 1000 Å) and employ proprietary-coated silica to ensure excellent recoveries, the highest efficiency and accurate molecular weight data. BioBasic SEC columns are ideal for high efficiency gel filtration separation of proteins and other biological water soluble molecules where the absence of secondary interactions, such as adsorption, is essential for accurate analysis.

BioBasic SEC columns contain a chromatographic silica which is mechanically rigid, does not swell or shrink with changes in solvent and shows higher efficiencies than polymer-based columns. The proprietary, highly base-deactivated 5µm silica of BioBasic SEC columns is coated with a "hydro-link" polymer to ensure separation occurs only on the basis of molecular size.

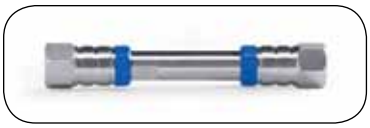
BioBasic SEC columns have been shown to be stable over 6000 to 7000 column volumes using a 0.1M KH_2PO_4 mobile phase at pH 7 before any loss in efficiency is observed. The number of injections performed before column performance deteriorates can be significantly increased with a guard column to protect the analytical column from mobile phase contaminants, as well as sample impurities and particulates.

BioBasic SEC columns are often used as a sample clean-up step before reversed phase analysis. This method allows direct injection of samples such as blood, plasma or urine because matrix interference will be removed before the separation occurs on a reversed phase column such as BioBasic 18 or 8 column.

Every BioBasic SEC silica lot is tested chromatographically with a range of proteins to confirm accuracy of retention volumes. Every column also receives an efficiency test to confirm compliance with efficiency specifications. Each column is shipped with a test certificate containing both the silica lot and column
efficiency test data.

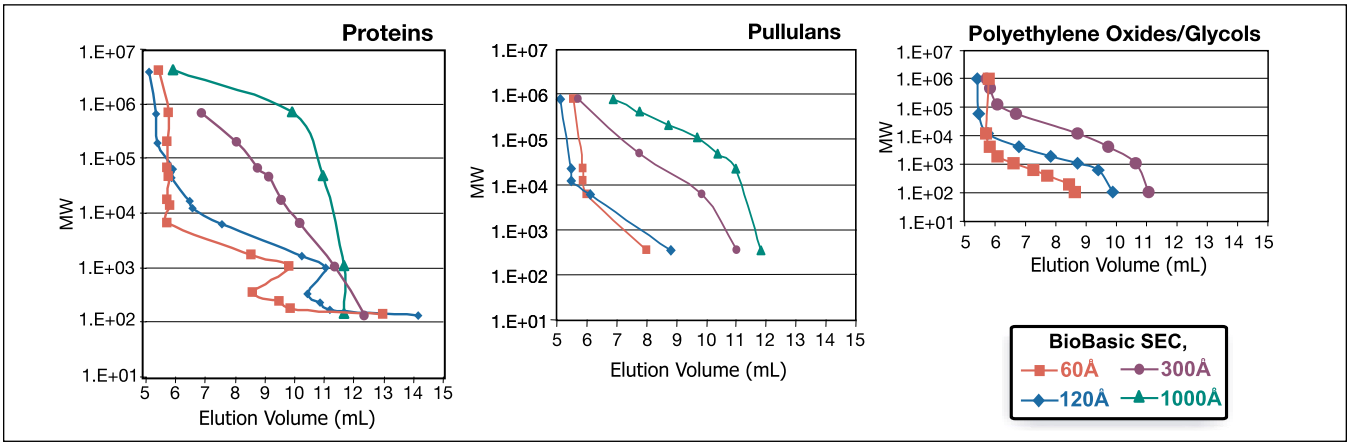


Fractionation of benzodiazepines in plasma using SEC

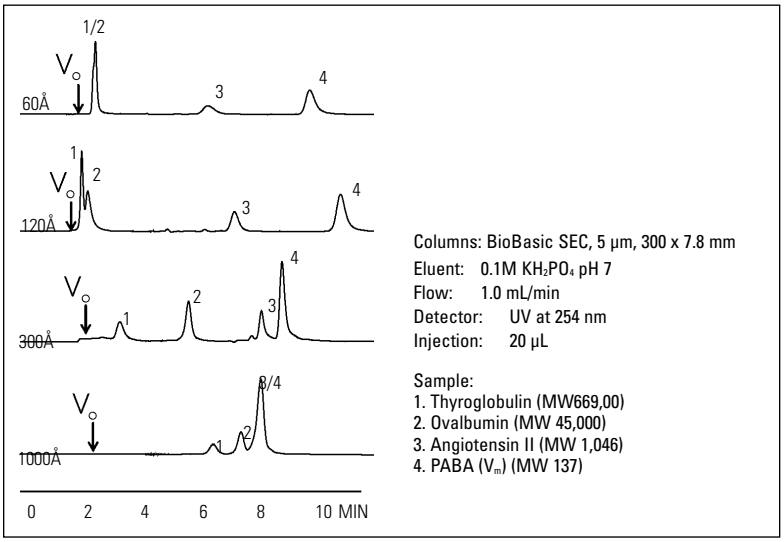


BioBasic SEC Columns				
Description	**Pore Size**	**I.D.**	**Length**	**Cat. No.**
BioBasic SEC 60				
Analytical	60Å	7.8mm	300mm	**73305-307846**
Analytical	60Å	7.8mm	150mm	**73305-157846**
Guard	60Å	7.8mm	30mm	**73305-037821**
BioBasic SEC 120				
Analytical	120Å	7.8mm	300mm	**73405-307846**
Analytical	120Å	7.8mm	150mm	**73405-157846**
Guard	120Å	7.8mm	30mm	**73405-037821**
BioBasic SEC 300				
Analytical	300Å	7.8mm	300mm	**73505-307846**
Analytical	300Å	7.8mm	150mm	**73505-157846**
Guard	300Å	7.8mm	30mm	**73505-037821**
BioBasic SEC 1000				
Analytical	1000Å	7.8mm	300mm	**73605-307846**
Analytical	1000Å	7.8mm	150mm	**73605-157846**
Guard	1000Å	7.8mm	30mm	**73605-037821**

For information on bulk quantities, please inquire.



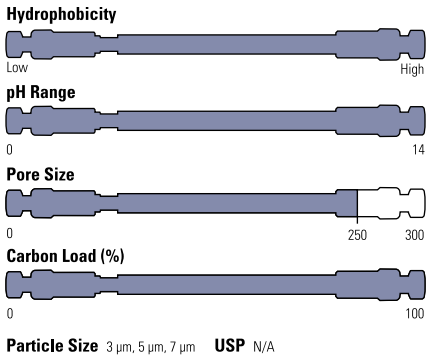
Molecular weight calibration curves



Effect of pore size on SEC resolution

Hypercarb Columns

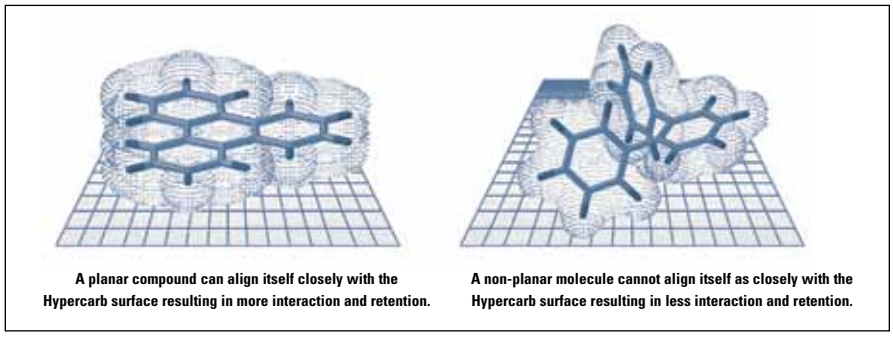
100% porous graphitic carbon for extended separation capabilities



Particle Size 3 µm, 5 µm, 7 µm **USP** N/A

- Exceptional retention of very polar analytes
- Separates structurally related substances
- pH stable from 0 to 14
- Ideal for high temperature applications

Porous Graphitic Carbon (PGC) is a unique stationary phase composed of flat sheets of hexagonally arranged carbon atoms with a satisfied valence, as in a very large polynuclear aromatic molecule. Hypercarb is unlike traditional silica bonded phases in both its structure and retentive properties, allowing for total pH stability and the retention and separation of highly polar species. Hypercarb columns are ideally suited to solve "problem" separations, in both reversed phase and normal phase HPLC and LC/MS applications.

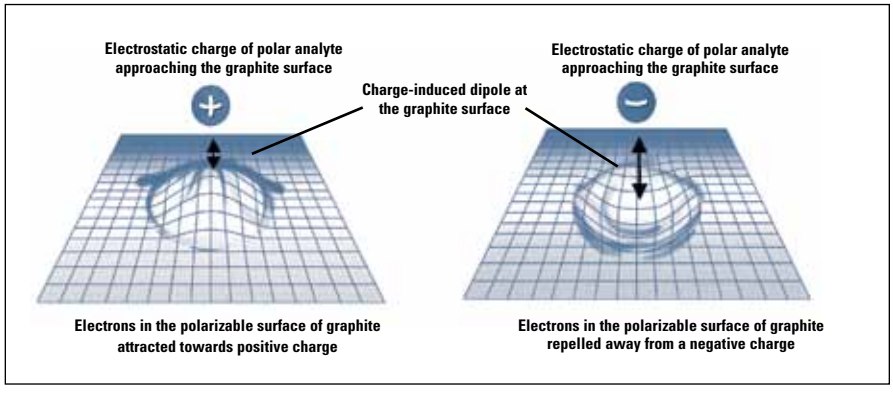


Schematic representation of molecular area of a planar and non-planar molecule interacting with the Hypercarb surface

Retention and Resolution

The mechanism of interaction is very dependent upon both the polarity and planarity (shape) of the solute. These specific interaction mechanisms allow the successful retention and resolution of analytes that cannot be separated by typical reversed phase HPLC. Removal of complex buffering systems or ion-pair reagents, and use of increased organic modifier concentration for polar analytes allows greater compatibility with detection techniques such as MS.

The overall retention on Hypercarb columns is a combination of two mechanisms:



Schematic representation of a point charge approaching the Hypercarb surface

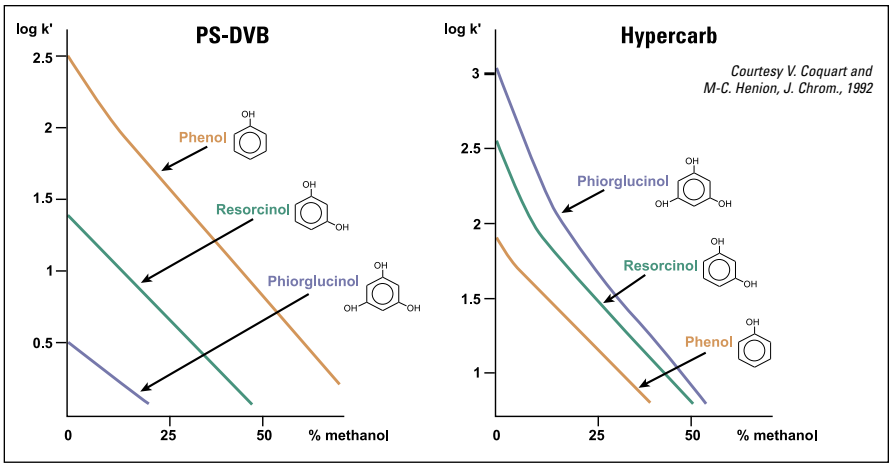
1) Adsorption: The strength of analyte interactions with Hypercarb is largely dependent on the molecular area in contact with the graphite surface, and also on the type and positioning of the functional groups in relation to the graphite surface at the points of contact. The approach of a planar and a non-planar molecule to the Hypercarb surface is shown. The strength of the interaction depends upon the size and orientation of the molecular area that is able to come in contact with the flat graphite surface. More planar molecules will show more retention than rigid molecules with a 3-dimensional spatial arrangement.

2) Charge induced interactions of a polar analyte with the polarizable surface of graphite: The second mechanism, charge-induced dipole, is illustrated above and accounts for the strong retention exhibited by polar analytes. As the polar group with a permanent dipole approaches the surface, an induced dipole is formed, increasing the attraction between the analyte and graphite surface. These charges should not be confused with the overall ionic charge of the molecule, such as a basic compound ionized in acidic pH conditions. The charge-induced dipole mechanism is strictly due to the interaction of the electrostatic charge of the polar molecule with the graphite surface.

The strong mechanisms of interaction with Hypercarb usually allow for shorter columns to be used during the method development process. In most cases, 100mm length columns or shorter are sufficient for a separation.

Increased Retention of Polar Analytes

In typical reversed phase chromatography, the retention of an analyte is directly related to its hydrophobicity: the more hydrophobic the analyte, the longer its retention. Conversely, as the polarity of the analyte increases, analyte-solvent interactions begin to dominate and retention is reduced. This observation holds true for the majority of reversed phase systems. An exception to this rule is Hypercarb, for which retention may in some cases increase as the polarity of the analyte increases, illustrated to the right. This phenomenon is referred to as the "polar retention effect on graphite" (PREG). This property makes Hypercarb columns particularly useful for the separation of highly polar compounds (with logP as low as -4) that are normally difficult to retain and resolve on silica-based alkyl chain phases. The retention of very polar solutes on Hypercarb can be achieved without ion pair reagents or complex mobile phase conditions, as illustrated in the chromatogram below.

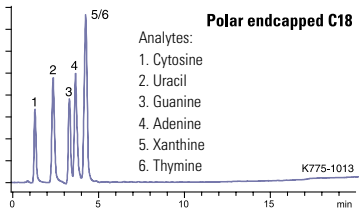


Retention on Hypercarb increases as polarity of the analyte increases, which is the opposite of typical reversed phase materials such as PS-DVB

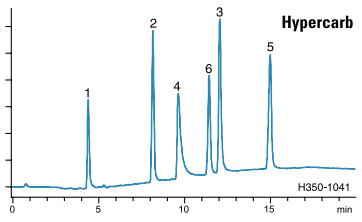
Extended pH Range

One of the other key benefits of Hypercarb columns is the extreme stability of the phase to chemical or physical attack. Due to the unique characteristics of the media, it can withstand chemical attack across the entire pH range of 0 to 14, allowing applications to be run at pH levels that are incompatible with typical silica-based columns. Hypercarb columns offer more choice in buffer selection while handling both high temperature and high pressure.

Mobile Phase: A: H_2O + 0.1% formic acid
B: ACN + 0.1% formic acid
Gradient: 0 to 25% B in 15 minutes
Flow Rate: 8µL/min
Temperature: 25°C
Detection: UV at 254nm



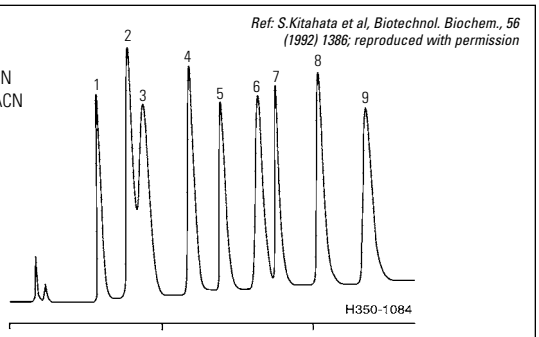
Hypercarb, 5µm, 100 x 0.32mm
Part Number: 35005-100365



Additional retention is achieved for polar compounds using a Hypercarb column compared to a polar end-capped C18. Note also the change in elution order.

Hypercarb, 7µm, 100 x 4.6mm
Part Number: 35007-104630
Mobile Phase: A: 1mM NaOH containing 5% ACN
B: 1mM NaOH containing 1.5% ACN
Gradient: 30 to 100% A in 15 min
Flow rate: 1.0mL/min
Detection: PAD 2

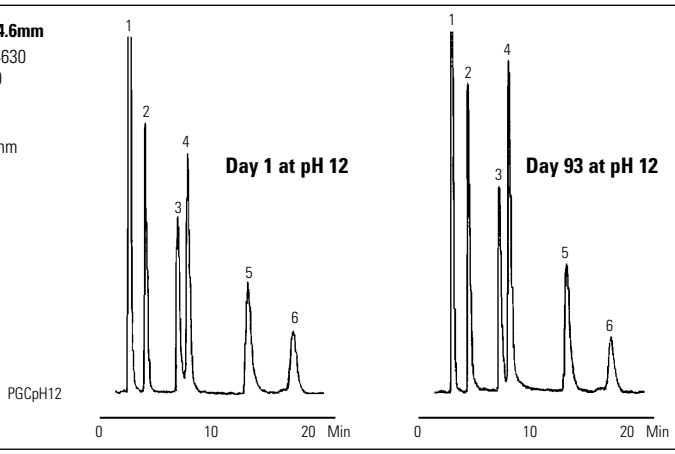
Analytes
1. Trehalose
2. Nigerose
3. Isomaltose
4. Maltose
5. Kojibiose
6. Laminaribiose
7. Gentiobiose
8. Cellobiose
9. Sophorose



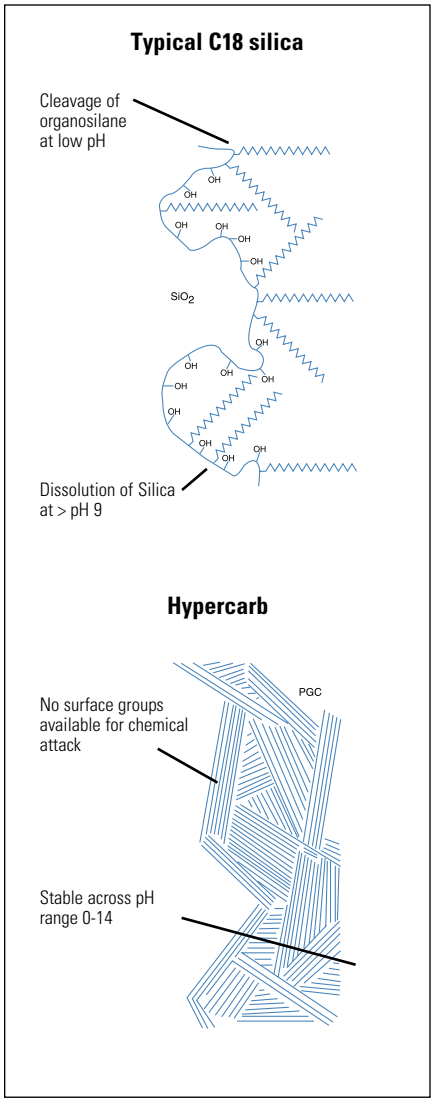
Glucobioses analysis with a mobile phase of NaOH at pH 11

Hypercarb, 5µm, 100 x 4.6mm
Part Number: 35005-104630
Mobile Phase: MeOH:H_2O
Isocratic: 70:30
Flow Rate: 0.7mL/min
Detection: UV at 254nm

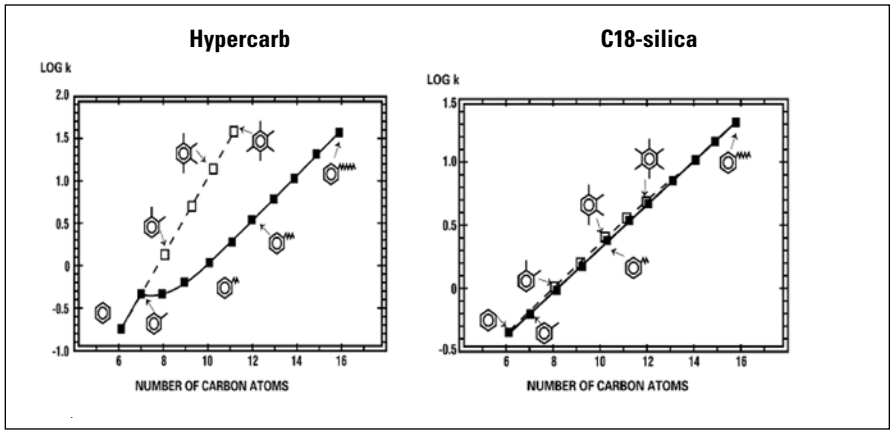
Sample:
1. Acetone
2. Phenol
3. p-Cresol
4. Anisol
5. Phenetole
6. 3,5 -Xylenol



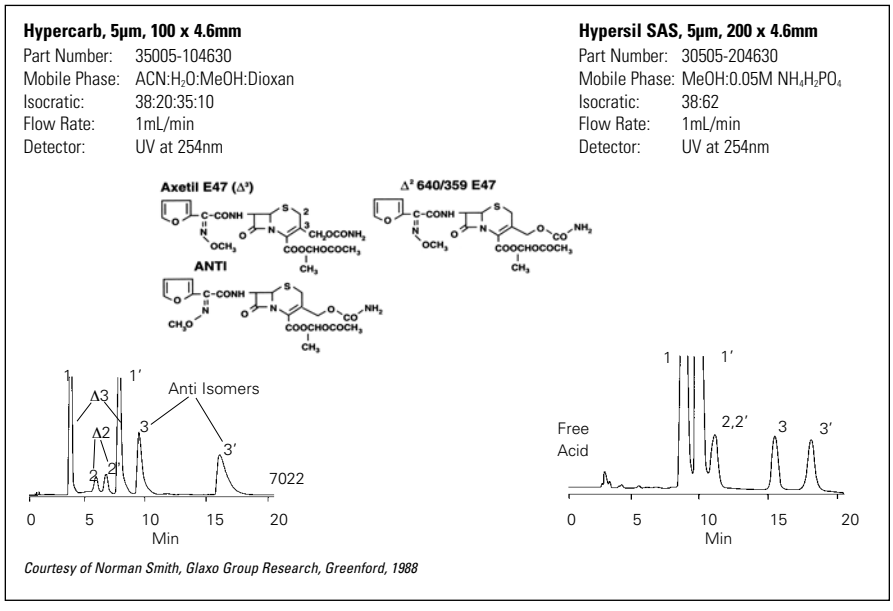
Hypercarb stability at pH 12: retention and selectivity do not change even after 93 days of storage in 0.1M NaOH/MeOH



Surface comparison between C18 bonded silica and Hypercarb porous graphitic carbon



Comparison of methyl and methylene group selectivity on C18 and Hypercarb columns



Courtesy of Norman Smith, Glaxo Group Research, Greenford, 1988

Separation of geometric isomers of Axetil: comparison of a Hypercarb and bonded silica column

Resolution of Structurally Related Compounds

By virtue of the nature of the surface and the way solute shape affects retention, Hypercarb columns can differentiate between closely related analytes such as isomers and homologous series. Where no discrimination between methylene and methyl groups is observed using a traditional C18 column, considerable resolving power is observed with Hypercarb columns, on this page. The differentiation of analytes is based on their fit to the graphite surface,
allowing for the chromatographic resolution of compounds that are very similar in structure as shown with the resolution of diastereomers of the antibiotic Axetil. The Hypercarb column provides both a significant improvement in separation over the silica-based column originally used, as well as a change in elution order.

Ideal for Reversed Phase LC/MS of Polar Compounds

Reversed phase-LC/MS analysis of very polar compounds is challenging because the typical hydrophobic stationary phases when combined with the most suitable mobile phases for MS detection do not provide the necessary retention to resolve and quantitfy these compounds.

Hypercarb overcomes these challenges because it:

- Retains and separates very polar compounds using "MS friendly" mobile phases such as 0.1% formic or acetic acid and low concentrations of volatile buffers such as ammonium acetate or ammonium formate
- Can be used with high concentrations of organic modifiers in the mobile phase, which improves nebulization in atmospheric pressure ionization techniques, improving the sensitivity of the analysis
- Allows shorter column lengths and smaller diameters to be used without compromising peak capacity, often with increased sensitivity. The flow rates used with narrowbore and capillary columns are more compatible with MS techniques.
- Is stable with any mobile phase and produces no phase bleed issues because Hypercarb's porous graphitic surface is not modified.

Hypercarb HPLC Columns				
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm				
30mm	**35003-031030**	**35003-032130**	**35003-033030**	**35003-034630**
50mm	**35003-051030**	**35003-052130**	**35003-053030**	**35003-054630**
100mm	**35003-101030**	**35003-102130**	**35003-103030**	**35003-104630**
150mm	--	**35003-152130**	**35003-153030**	**35003-154630**
Particle Size 5µm				
30mm	**35005-031030**	**35005-032130**	**35005-033030**	**35005-034630**
50mm	**35005-051030**	**35005-052130**	**35005-053030**	**35005-054630**
100mm	**35005-101030**	**35005-102130**	**35005-103030**	**35005-104630**
150mm	**35005-151030**	**35005-152130**	**35005-153030**	**35005-154630**
Particle Size 7µm				
50mm	--	--	**35007-053030**	**35007-054630**
100mm	--	--	**35007-103030**	**35007-104630**

Other column dimensions are also available. Please call Customer Service for more information.

Hypercarb Drop-in Guard Cartridges						
Particle Size	**Length**	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.6mm I.D.**	**Quantity**
3µm	10mm	**35003-011001**	**35003-012101**	**35003-013001**	**35003-014001**	2 Pack
5µm	10mm	**35005-011001**	**35005-012101**	**35005-013001**	**35005-014001**	2 Pack
7µm	10mm	**--**	**--**	**35007-013001**	**35007-014001**	2 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**851-00**	**852-00**	**852-00**	**850-00**	1 Each

Hypercarb KAPPA Capillary HPLC Columns					
Length	**75µm I.D.**	**100µm I.D.**	**180µm I.D.**	**320µm I.D.**	**500µm I.D.**
Particle Size 5µm					
50mm	**35005-050065**	**35005-050165**	**35005-050265**	**35005-050365**	**35005-050565**
100mm	**35005-100065**	**35005-100165**	**35005-100265**	**35005-100365**	**35005-100565**

Hypercarb Nanobore HPLC Columns						
Length	**75µm I.D.**	**75µm I.D. Multipack**	**Quantity**	**150µm I.D.**	**150µm I.D. Multipack**	**Quantity**
IntegraFrit						
10mm	**35005-017563**	**35005-057564**	3 Pack	**35005-011563**	**35005-011564**	4 Pack
50mm	**35005-057563**	**35005-017564**	4 Pack	**35005-051563**	**35005-051564**	3 Pack
PicoFrit, 15µm Tip						
10mm	**35005-017581**	**35005-017583**	4 Pack			
50mm	**35005-057581**	**35005-057582**	3 Pack			

Unless otherwise specified, IntegraFrit and PicoFrit are sold in single-column units.

Hypercarb Javelin HTS HPLC Columns				
Particle Size	**20 x 1.0mm**	**20 x 2.1mm**	**20 x 4.0mm**	**Quantity**
5µm	**35005-021035**	**35005-022135**	**35005-024035**	3 Pack

Hypercarb DASH-HTS HPLC Column		
Particle Size	**20 x 2.1mm**	**Quantity**
5µm	**35005-022151**	3 Pack

Hypercarb Preparative HPLC Columns				
Length	**10mm I.D.**	**21.2mm I.D.**	**30mm I.D.**	**50mm I.D.**
Particle Size 5µm				
50mm	**35005-059070**	**35005-059270**	**35005-059370**	**35005-059570**
100mm	**35005-109070**	**35005-109270**	**35005-109370**	**35005-109570**
150mm	**35005-159070**	**35005-159270**	--	--
Particle Size 7µm				
50mm	**35007-059070**	**35007-059270**	**35007-059370**	**35007-059570**
100mm	**35007-109070**	**35007-109270**	**35007-109370**	**35007-109570**
150mm	**35007-159070**	**35007-159270**	**35007-159370**	**35007-159570**

Hypercarb High Temperature HPLC Columns				
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm				
30mm	**35003-031046**	**35003-032146**	**35003-033046**	**35003-034646**
50mm	**35003-051046**	**35003-052146**	**35003-053046**	**35003-054646**
100mm	**35003-101046**	**35003-102146**	**35003-103046**	**35003-104646**
Particle Size 5µm				
30mm	**35005-031046**	**35005-032146**	**35005-033046**	**35005-034646**
50mm	**35005-051046**	**35005-052146**	**35005-053046**	**35005-054646**
100mm	**35005-101046**	**35005-102146**	**35005-103046**	**35005-104646**

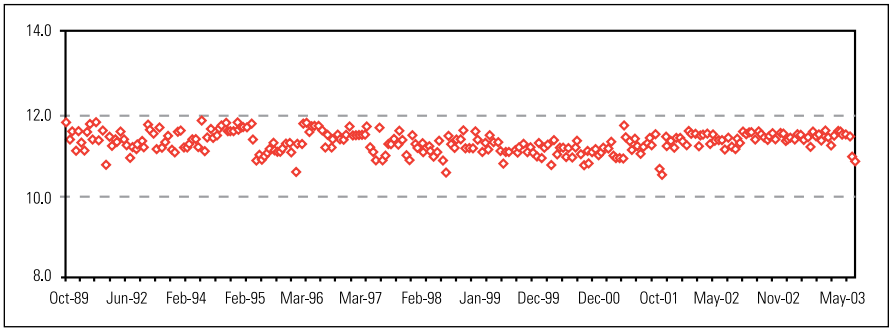
Please note that these columns are for use with elevated temperatures. For other dimensions, please inquire.

Hypersil BDS Columns

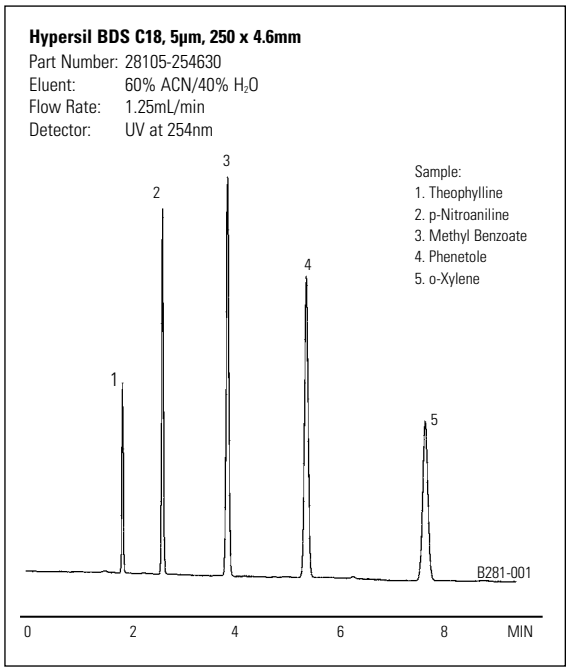
Reproducible, reliable and trusted worldwide

- Base deactivated and endcapped for reduced peak tailing
- Highly reproducible, robust columns with long lifetimes
- Hyper**sil columns directly from the manufacturer for the best quality, service and technical support**
- **Now available with 2.4µm particle size for faster, more efficient separations**

Built on the renowned Hypersil silica backbone, Hypersil BDS (Base Deactivated Silica) is an excellent reversed phase material for a wide range of applications and is one of the most popular packing materials available. Introduced to the chromatography market in 1988 as one of the first base deactivated silicas, Hypersil BDS columns have gained respect worldwide for their quality, reliability, range of applications, robustness, and reproducibility. Hypersil BDS columns are the only Hypersil columns within the marketplace that come with a Certificate of Authenticity. Hypersil BDS media and columns are manufactured to the highest standards and are rigorously quality controlled under fully documented, ISO 9001:2000 certified processes. When you purchase a Thermo Scientific Hypersil BDS column you are assured of consistent and efficient performance, column after column and year after year.



Our 30 years of quality control data demonstrate the excellent batch-to-batch reproducibility of Thermo Scientific Hypersil products

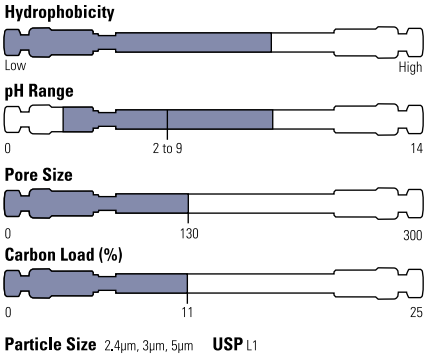


Each Hypersil BDS column is individually tested before it leaves our factory, as illustrated by the column QC test

Hypersil BDS C18 Columns

A good choice for QA/QC labs as a robust, general-purpose column in applications where reproducibility and long column lifetimes are required

- **Original Hypersil columns from the manufacturer**
- **Base deactivated with minimal residual silanol activity**
- **Exceptional reproducibility**
- **Economical, general purpose columns**



Particle Size 2.4µm, 3µm, 5µm **USP** L1

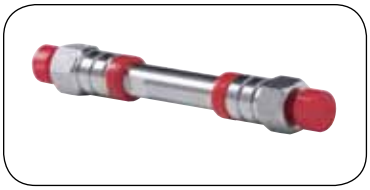
Hypersil BDS C18 HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 2.4µm				
30mm	**28102-032130**	--	--	**28102-034630**
50mm	**28102-052130**	--	--	**28102-054630**
100mm	**28102-102130**	--	--	**28102-104630**
150mm	**28102-152130**	--	--	**28102-154630**
Particle Size 3µm				
30mm	**28103-032130**	**28103-033030**	**28103-034030**	**28103-034630**
50mm	**28103-052130**	**28103-053030**	**28103-054030**	**28103-054630**
100mm	**28103-102130**	**28103-103030**	**28103-104030**	**28103-104630**
150mm	**28103-152130**	**28103-153030**	**28103-154030**	**28103-154630**
Particle Size 5µm				
50mm	**28105-052130**	**28105-053030**	**28105-054030**	**28105-054630**
100mm	**28105-102130**	**28105-103030**	**28105-104030**	**28105-104630**
125mm	**28105-122130**	**28105-123030**	**28105-124030**	**28105-124630**
150mm	**28105-152130**	**28105-153030**	**28105-154030**	**28105-154630**
200mm	**28105-202130**	**28105-203030**	**28105-204030**	**28105-204630**
250mm	**28105-252130**	**28105-253030**	**28105-254030**	**28105-254630**

Other column dimensions are available. Please call Customer Service for more information.

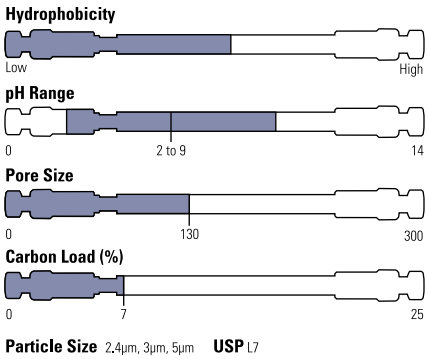
Hypersil BDS C18 Drop-In Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
2.4µm	10mm	**28102-014001**	--	--	**28102-012101**	4 Pack
3µm	10mm	**28103-014001**	**28103-014001**	**28103-013001**	**28103-012101**	4 Pack
5µm	10mm	**28105-014001**	**28105-014001**	**28105-013001**	**28105-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil BDS C8 Columns

High quality base-deactivated, fully endcapped phase with similar selectivity to C18 but slightly less retention



- **Excellent choice for acids, bases and neutral compounds**
- **Less retentive than C18 for faster analyses**
- **Robust columns with long column lifetimes**
- **Very reliable for routine assays**



Particle Size 2.4µm, 3µm, 5µm **USP** L7

Hypersil BDS C8 HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 2.4µm				
30mm	**28202-032130**	--	--	**28202-034630**
50mm	**28202-052130**	--	--	**28202-054630**
100mm	**28202-102130**	--	--	**28202-104630**
150mm	**28202-152130**	--	--	**28202-154630**
Particle Size 3µm				
50mm	**28203-052130**	**28203-053030**	**28203-054030**	**28203-054630**
100mm	**28203-102130**	**28203-103030**	**28203-104030**	**28203-104630**
150mm	**28203-152130**	**28203-153030**	**28203-154030**	**28203-154630**
Particle Size 5µm				
50mm	**28205-052130**	**28205-053030**	**28205-054030**	**28205-054630**
100mm	**28205-102130**	**28205-103030**	**28205-104030**	**28205-104630**
150mm	**28205-152130**	**28205-153030**	**28205-154030**	**28205-154630**
250mm	**28205-252130**	**28205-253030**	**28205-254030**	**28205-254630**

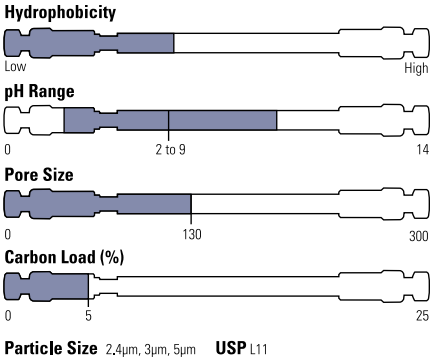
Other column dimensions are available. Please call Customer Service for more information.

Hypersil BDS C8 Drop-In Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
2.4µm	10mm	**28202-014001**	--	--	**28202-012101**	4 Pack
3µm	10mm	**28203-014001**	**28203-014001**	**28203-013001**	**28203-012101**	4 Pack
5µm	10mm	**28205-014001**	**28205-014001**	**28205-013001**	**28205-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil BDS Phenyl Columns

Exceptional stability and alternative selectivity to C18 and C8 columns

- **High quality, base deactivated columns**
- **Unique selectivity for aromatic and slightly polar compounds**
- **Manufactured under ISO 9001:2000 conditions**



Particle Size 2.4µm, 3µm, 5µm **USP** L11

Hypersil BDS Phenyl HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 2.4µm				
30mm	**28902-032130**	--	--	**28902-034630**
50mm	**28902-052130**	--	--	**28902-054630**
100mm	**28902-102130**	--	--	**28902-104630**
150mm	**28902-152130**	--	--	**28902-154630**
Particle Size 3µm				
50mm	**28903-052130**	**28903-053030**	**28903-054030**	**28903-054630**
100mm	**28903-102130**	**28903-103030**	**28903-104030**	**28903-104630**
150mm	**28903-152130**	**28903-153030**	**28903-154030**	**28903-154630**
Particle Size 5µm				
50mm	**28905-052130**	**28905-053030**	**28905-054030**	**28905-054630**
100mm	**28905-102130**	**28905-103030**	**28905-104030**	**28905-104630**
150mm	**28905-152130**	**28905-153030**	**28905-154030**	**28905-154630**
250mm	**28905-252130**	**28905-253030**	**28905-254030**	**28905-254630**

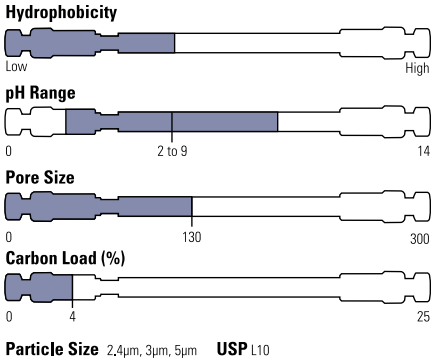
Other column dimensions are available. Please call Customer Service for more information.

Hypersil BDS Phenyl Drop-In Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**Quantity**
2.4µm	10mm	**28902-014001**	**--**	--	**28902-012101**	4 Each
3µm	10mm	**28903-014001**	**28903-014001**	**28903-013001**	**28903-012101**	4 Each
5µm	10mm	**28905-014001**	**28905-014001**	**28905-013001**	**28905-012101**	4 Each
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil BDS Cyano Columns

May be used for reversed or normal phase applications

- **In reversed phase, they offer different selectivity compared to C18 or C8 phases**
- **In normal phase, they are less retentive than silica columns**
- **Reliable cyano columns with long lifetimes**



Particle Size 2.4µm, 3µm, 5µm **USP** L10

Hypersil BDS Cyano HPLC Columns

Length	2.1mm I.D.	3.0mm I.D..	4.0mm I.D.	4.6mm I.D.
Particle Size 2.4µm				
30mm	**28802-032130**	--	--	**28802-034630**
50mm	**28802-052130**	--	--	**28802-054630**
100mm	**28802-102130**	--	--	**28802-104630**
150mm	**28802-152130**	--	--	**28802-154630**
Particle Size 3µm				
50mm	**28803-052130**	**28803-053030**	**28803-054030**	**28803-054630**
100mm	**28803-102130**	**28803-103030**	**28803-104030**	**28803-104630**
150mm	**28803-152130**	**28803-153030**	**28803-154030**	**28803-154630**
Particle Size 5µm				
50mm	**28805-052130**	**28805-053030**	**28805-054030**	**28805-054630**
100mm	**28805-102130**	**28805-103030**	**28805-104030**	**28805-104630**
150mm	**28805-152130**	**28805-153030**	**28805-154030**	**28805-154630**
250mm	**28805-252130**	**28805-253030**	**28805-254030**	**28805-254630**

Other column dimensions are available. Please call Customer Service for more information. Please note that Hypersil BDS Cyano columns are shipped in isooctane:ethanol. For reversed phase applications, flush with ethanol or 2-propanol prior to use.

Hypersil BDS Cyano Drop-In Guard Cartridges

Particle Size	Length	4.6mm I.D.	4mm I.D.	3mm I.D.	2.1mm I.D.	Quantity
2.4µm	10mm	**28802-014001**	--	--	**28802-012101**	4 Pack
3µm	10mm	**28803-014001**	**28803-014001**	**28803-013001**	**28803-012101**	4 Pack
5µm	10mm	**28805-014001**	**28805-014001**	**28805-013001**	**28805-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil Classical Columns

The columns trusted for over 30 years

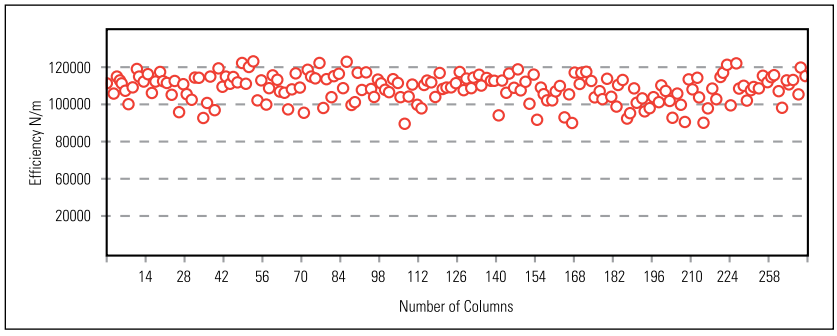
- **Wide range of excellent phases used for many existing methods**
- **High efficiency, proven reproducibility and long column lifetimes**
- **Hypersil™ columns direct from the manufacturer for the best quality, service, and technical support**

Reliable and Reproducible

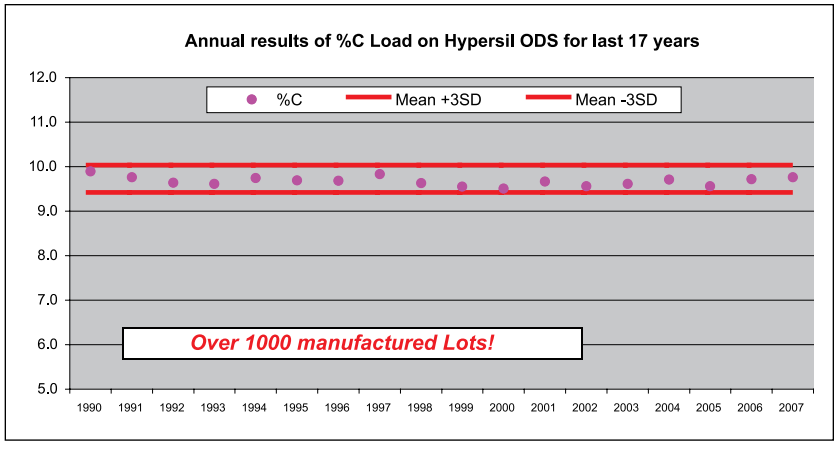
Classical Hypersil stationary phases have global recognition as an industry standard in HPLC, providing an effective analytical tool. Introduced in 1976, Hypersil phases are well-established and are referenced in many HPLC methods worldwide. We are the only manufacturer of Hypersil silica and bonded phases and are well known for quality and reproducibility of HPLC columns. For the base silica and each bonded phase manufactured, care is taken to ensure that media performance is reproducible. We conduct multiple quality control tests on every batch of silica and bonded phase produced, to ensure that the media manufactured today gives the same separation as previous batches. You can have confidence that Hypersil columns offer the highest levels of efficiency and reliability, combined with the best available customer service and technical support, as shown by our quality control data.

Wide Range of Phases and Hardware Options

Classical Hypersil columns are available in a wide range of phases, offering selectivities to match your application. Available in 3, 5 and 10 µm particle sizes as well as a variety of column dimensions, Hypersil columns offer choices in efficiency, resolution, and sensitivity. With many unique hardware configurations available, we offer the best choice of columns to meet your HPLC separation requirements.



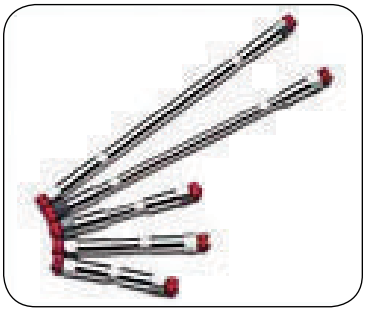
Column-to-column reproducibility is monitored and illustrated by the consistent efficiency shown here for recent 5 µm Hypersil silica columns



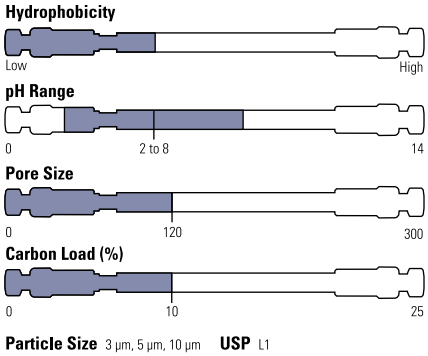
Carbon load on Hypersil ODS media since 1990 illustrates batch-to-batch reproducibility

Hypersil ODS (C18) Columns

Provide an excellent C18 phase for a broad range of applications and global standard for many existing methods



- **High efficiency and proven reproducibility**
- **Exceptionally reliable**
- **Separation of a wide range of compounds including nonpolar, moderately polar and lipophilic compounds like triglycerides**



Particle Size 3 µm, 5 µm, 10 µm **USP** L1

Hypersil ODS (C18) HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm				
50mm	**30103-052130**	**30103-053030**	**30103-054030**	**30103-054630**
100mm	**30103-102130**	**30103-103030**	**30103-104030**	**30103-104630**
125mm	**30103-122130**	**30103-123030**	**30103-124030**	**30103-124630**
150mm	**30103-152130**	**30103-153030**	**30103-154030**	**30103-154630**
250mm	**30103-252130**	**30103-253030**	**30103-254030**	**30103-254630**
Particle Size 5µm				
50mm	**30105-052130**	**30105-053030**	**30105-054030**	**30105-054630**
100mm	**30105-102130**	**30105-103030**	**30105-104030**	**30105-104630**
125mm	**30105-122130**	**30105-123030**	**30105-124030**	**30105-124630**
150mm	**30105-152130**	**30105-153030**	**30105-154030**	**30105-154630**
200mm	**30105-202130**	**30105-203030**	**30105-204030**	**30105-204630**
250mm	**30105-252130**	**30105-253030**	**30105-254030**	**30105-254630**

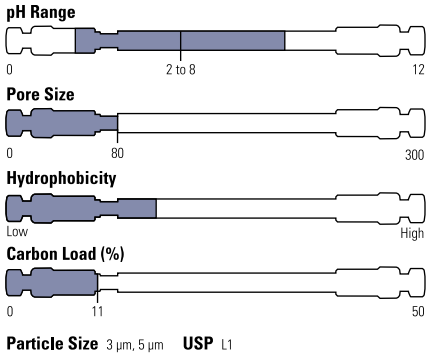
Other column dimensions including preparative columns are available. Please call Customer Service for more information.

Hypersil ODS (C18) Drop-In Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.0mm I.D.**	**Quantity**
3µm	10mm	**30103-014001**	**30103-014001**	**30103-013001**	**30103-012101**	4 Pack
5µm	10mm	**30105-014001**	**30105-014001**	**30105-013001**	**30105-012101**	4 Pack
	UNIGUARD Drop-In Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil ODS-2 (C18) Columns

Offer a well tested, dependable L1 alternative to many older column brands commonly referenced in validated methods

- **Based on type A silica**
- **Excellent reproducibility**
- **Selectivity over wide range of applications**
- **Manufactured under ISO 9001:2000 quality guidelines**



Particle Size 3 µm, 5 µm **USP** L1

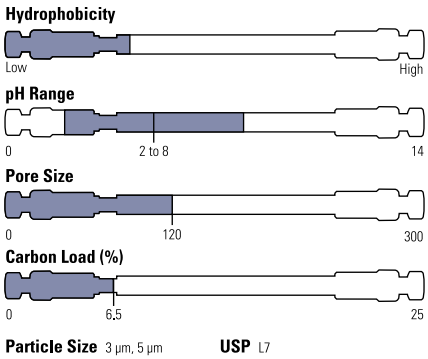
Hypersil ODS-2 (C18) HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm				
50mm	**31603-052130**	**31603-153030**	**31603-054030**	**31603-054630**
100mm	**31603-102130**	**31603-103030**	**31603-104030**	**31603-104630**
150mm	**31603-152130**	**31603-153030**	**31603-154030**	**31603-154630**
Particle Size 5µm				
50mm	**31605-052130**	**31603-053030**	**31605-054030**	**31605-054630**
100mm	**31605-102130**	**31605-103030**	**31605-104030**	**31605-104630**
150mm	**31605-152130**	**31605-153030**	**31605-154030**	**31605-154630**
250mm	**31605-252130**	**31605-253030**	**31605-254030**	**31605-254630**

Other column dimensions are available. Please call Customer Service for more information.

Hypersil ODS-2 (C18) Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
3µm	10mm	**31603-014001**	**31603-014001**	**31603-013001**	**31603-012101**	4 Pack
5µm	10mm	**31605-014001**	**31605-014001**	**31605-013001**	**31605-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil MOS and MOS-2 (C8) Columns

Have a monolayer coverage of C8 alkyl chain chemically bonded onto the silica surface for a reproducible and efficient stationary phase



Particle Size 3 µm, 5 µm **USP** L7

- **Reliable, less retentive phase**
- **Long column lifetimes, even under basic conditions**
- **Manufactured under ISO 9001-2000 quality guidelines**
- **Affordable**
- **Hypersil MOS-2 is endcapped**

Hypersil MOS (C8) HPLC Columns

Length	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm				
50mm	**30203-052130**	**30203-053030**	**30203-054030**	**30203-054630**
100mm	**30203-102130**	**30203-103030**	**30203-104030**	**30203-104630**
150mm	**30203-152130**	**30203-153030**	**30203-154030**	**30203-154630**
Particle Size 5µm				
50mm	**30205-052130**	**30205-053030**	**30205-054030**	**30205-054630**
100mm	**30205-102130**	**30205-103030**	**30205-104030**	**30205-104630**
150mm	**30205-152130**	**30205-153030**	**30205-154030**	**30205-154630**
250mm	**30205-252130**	**30205-253030**	**30205-254030**	**30205-254630**

Other column dimensions are available. Also available in 10µm. Please call Customer Service for more information.

Hypersil MOS Drop-in Guard Cartridges

Particle Size	Length	4.6mm I.D.	4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	Quantity
3µm	10mm	**30203-014001**	**30203-014001**	**30203-013001**	**30203-012101**	4 Pack
5µm	10mm	**30205-014001**	**30205-014001**	**30205-013001**	**30205-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil MOS-2 (C8) HPLC Columns

Length	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm				
50mm	**30303-052130**	**30303-053030**	**30303-054030**	**30303-054630**
100mm	**30303-102130**	**30303-103030**	**30303-104030**	**30305-159070**
150mm	**30303-152130**	**30303-153030**	**30303-154030**	**30303-104630**
Particle Size 5µm				
50mm	**30305-052130**	**30303-053030**	**30303-054030**	**30305-054630**
100mm	**30305-102130**	**30305-103030**	**30305-104030**	**30305-104630**
150mm	**30305-152130**	**30303-153030**	**30305-154030**	**30305-154630**
250mm	**30305-252130**	**30305-253030**	**30305-254030**	**30305-254630**

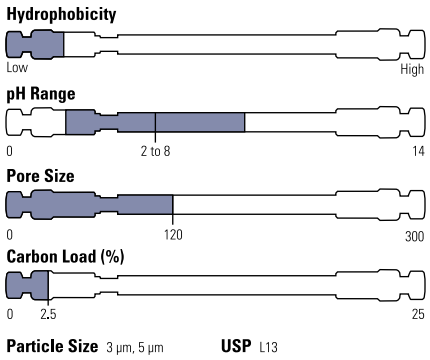
Hypersil MOS-2 (C8) Guard Cartridges

Particle Size	Length	4.6mm I.D.	4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	Quantity
3µm	10mm	**30303-014001**	**30303-014001**	**30303-013001**	**30303-012101**	4 Pack
5µm	10mm	**30305-014001**	**30305-014001**	**30305-013001**	**30305-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil SAS (C1) Columns

The least retentive of the Hypersil alkyl bonded phases

- **Selectivity for polar and multifunctional compounds**
- **A short alkyl chain reversed phase material**
- **Useful for ion-pair separations**



Particle Size 3 µm, 5 µm **USP** L13

Hypersil SAS (C1) HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm				
50mm	**30503-052130**	**30503-053030**	**30503-054030**	**30503-054630**
100mm	**30503-102130**	**30503-103030**	**30503-104030**	**30503-104630**
150mm	**30503-152130**	**30503-153030**	**30503-154030**	**30503-154630**
Particle Size 5µm				
50mm	**30505-052130**	**30505-053030**	**30505-054030**	**30505-054630**
100mm	**30505-102130**	**30505-103030**	**30505-104030**	**30505-104630**
150mm	**30505-152130**	**30505-153030**	**30505-154030**	**30505-154630**
250mm	**30505-252130**	**30505-253030**	**30505-254030**	**30505-254630**

Other column dimensions are available. Please call Customer Service for more information.

Hypersil SAS Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
3µm	10mm	**30503-014001**	**30503-014001**	**30503-013001**	**30503-012101**	4 Pack
5µm	10mm	**30505-014001**	**30505-014001**	**30505-013001**	**30505-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

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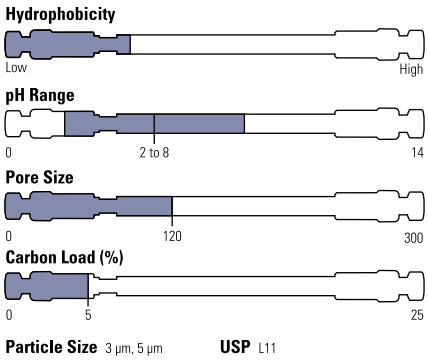
See our range of HyperSep SPE Products

Hypersil Phenyl and Phenyl-2 Columns

Reversed phase materials with selectivity for the analysis of aromatic and moderately polar compounds

- **For the separation of certain aromatic compounds and moderately polar compounds**
- **Retention characteristics similar to Hypersil MOS**
- **Alternative selectivity to C8**
- **Hypersil Phenyl-2 is endcapped**



Particle Size 3 µm, 5 µm **USP** L11

Hypersil Phenyl HPLC Columns

Length	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm				
50mm	**30903-052130**	**30903-053030**	**30903-054030**	**30903-054630**
100mm	**30903-102130**	**30903-103030**	**30903-104030**	**30903-104630**
150mm	**30903-152130**	**30903-153030**	**30903-154030**	**30903-154630**
Particle Size 5µm				
50mm	**30905-052130**	**30905-053030**	**30905-054030**	**30905-054630**
100mm	**30905-102130**	**30905-103030**	**30905-104030**	**30905-104630**
150mm	**30905-152130**	**30905-153030**	**30905-154030**	**30905-154630**
250mm	**30905-252130**	**30905-253030**	**30905-254030**	**30905-254630**

Other column dimensions are available. Please call Customer Service for more information.

Hypersil Phenyl Drop-in Guard Cartridges

Particle Size	Length	4.6mm I.D.	4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	Quantity
3µm	10mm	**30903-014001**	**30903-014001**	**30903-013001**	**30903-012101**	4 Pack
5µm	10mm	**30905-014001**	**30905-014001**	**30905-013001**	**30905-012101**	1 Each
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil Phenyl-2 HPLC Columns

Length (mm)	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 5µm				
50mm	**31905-052130**	**31905-053030**	**31905-054030**	**31905-054630**
100mm	**31905-102130**	**31905-103030**	**31905-104030**	**31905-104630**
150mm	**31905-152130**	**31905-153030**	**31905-154030**	**31905-154630**
250mm	**31905-252130**	**31905-253030**	**31905-254030**	**31905-254630**

Other column dimensions are available. Please call Customer Service for more information.

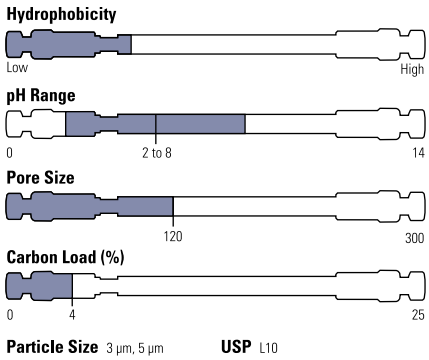
Hypersil Phenyl-2 Drop-in Guard Cartridges

Particle Size	Length	4.6mm I.D.	4mm I.D.	3mm I.D.	2.1mm I.D.	Quantity
5µm	10mm	**31905-014001**	**31905-014001**	**31905-013001**	**31905-012101**	4 Pack
	UNIGUARD Drop-In Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil CPS and CPS-2 (Cyano) Columns

A cyanopropyl phase for both normal and reversed phase HPLC

- **More rapid mobile phase equilibration compared with silica in normal phase**
- **Not deactivated by traces of water in normal phase**
- **One of the least retentive of reversed phase materials and, therefore, useful to separate polar compounds**
- **Hypersil CPS-2 is endcapped**



Particle Size 3 µm, 5 µm **USP** L10

Hypersil CPS (Cyano) HPLC Columns				
Length	**2.1mm ID**	**3.0mm ID**	**4.0mm ID**	**4.6mm ID**
Particle Size 3µm				
50mm	**30803-052130**	**30803-053030**	**30803-054030**	**30803-054630**
100mm	**30803-102130**	**30803-103030**	**30803-104030**	**30803-104630**
150mm	**30803-152130**	**30803-153030**	**30803-154030**	**30803-154630**
Particle Size 5µm				
50mm	**30805-052130**	**30805-053030**	**30805-054030**	**30805-054630**
100mm	**30805-102130**	**30805-103030**	**30805-104030**	**30805-104630**
150mm	**30805-152130**	**30805-153030**	**30805-154030**	**30805-154630**
250mm	**30805-252130**	**30805-253030**	**30805-254030**	**30805-254630**

Other column dimensions are available. Please call Customer Service for more information.
Please note that Hypersil CPS and CPS-2 columns are shipped in isooctane:ethanol. For reversed-phase applications, flush with ethanol or 2-propanol prior to use.

Hypersil CPS Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
3µm	10mm	**30803-014001**	**30803-014001**	**30803-013001**	**30803-012101**	4 Pack
5µm	10mm	**30805-014001**	**30805-014001**	**30805-013001**	**30805-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

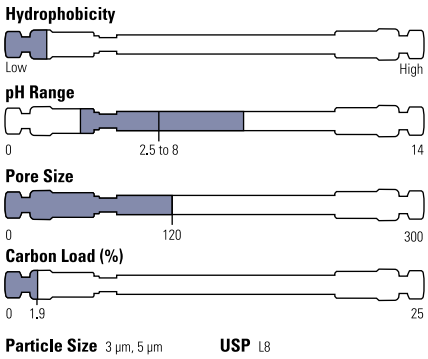
Hypersil CPS-2 (Cyano) HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm				
50mm	**31805-052130**	**31805-053030**	**31805-054030**	**31805-054630**
100mm	**31805-102130**	**31805-103030**	**31805-104030**	**31805-104630**
150mm	**31805-152130**	**31805-153030**	**31805-154030**	**31805-154630**
250mm	**31805-252130**	**31805-253030**	**31805-254030**	**31805-254630**

Hypersil CPS-2 (Cyano) Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
5µm	10mm	**31805-014001**	**31805-014001**	**31805-013001**	**31805-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil APS-2 Columns

Versatile amino propyl phase

- **In reversed phase mode, Hypersil APS-2 columns are excellent for carbohydrate analysis: extra sensitivity for sugars**
- **Alternative selectivity to silica when used in normal phase**



Particle Size 3 µm, 5 µm **USP** L8

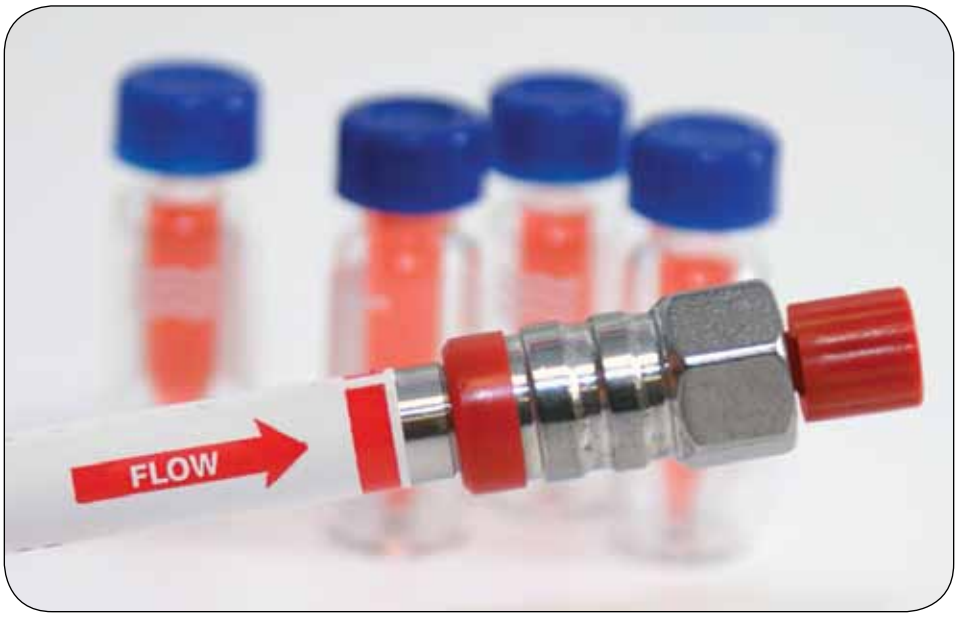
Hypersil APS-2 HPLC Columns

Length	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm				
50mm	**30703-052130**	**30703-053030**	**30703-054030**	**30703-054630**
100mm	**30703-102130**	**30703-103030**	**30703-104030**	**30703-104630**
150mm	**30703-152130**	**30703-153030**	**30703-154030**	**30703-154630**
Particle Size 5µm				
50mm	**30705-052130**	**30705-053030**	**30705-054030**	**30705-054630**
100mm	**30705-102130**	**30705-103030**	**30705-104030**	**30705-104630**
150mm	**30705-152130**	**30705-153030**	**30705-154030**	**30705-154630**
250mm	**30705-252130**	**30705-253030**	**30705-254030**	**30705-254630**

Other column dimensions are available. Please call Customer Service for more information.

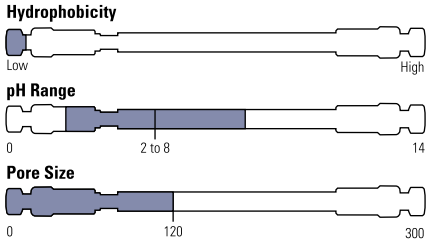
Hypersil APS-2 Drop-in Guard Cartridges

Particle Size	Length	4.6mm I.D.	4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	Quantity
3µm	10mm	**30703-014001**	**30703-014001**	**30703-013001**	**30703-012101**	4 Pack
5µm	10mm	**30705-014001**	**30705-014001**	**30705-013001**	**30705-012101**	4 Each
	UNIGUARD Drop-In Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each



Hypersil Silica Columns

An unbonded media serves as an efficient tool for normal phase chromatography of nonpolar and moderately polar organic compounds



Particle Size 3 µm, 5 µm **USP** L3

- **Excellent batch-to-batch reproducibility**
- **Spherical particle with narrow particle size distribution**
- **Long column lifetime**
- **High performance and column efficiency**

Hypersil Silica HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm				
50mm	**30003-052130**	**30003-053030**	**30003-054030**	**30003-054630**
100mm	**30003-102130**	**30003-103030**	**30003-104030**	**30003-104630**
150mm	**30003-152130**	**30003-153030**	**30003-154030**	**30003-154630**
Particle Size 5µm				
50mm	**30005-052130**	**30005-053030**	**30005-054030**	**30005-054630**
100mm	**30005-102130**	**30005-103030**	**30005-104030**	**30005-104630**
150mm	**30005-152130**	**30005-153030**	**30005-154030**	**30005-154630**
250mm	**30005-252130**	**30005-253030**	**30005-254030**	**30005-254630**

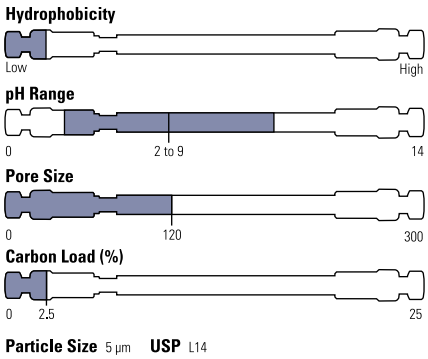
Other column dimensions are available. Please call Customer Service for more information.

Hypersil Silica Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
3µm	10mm	**30003-014001**	**30003-014001**	**30003-013001**	**30003-012101**	4 Pack
5µm	10mm	**30005-014001**	**30005-014001**	**30005-013001**	**30005-012101**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil SAX Columns

Highly stable silica-based quarternary amine strong anion exchange columns, designed for aqueous and low pH mobile phases

- **High stability to aqueous and low pH mobile phases**
- **Suited to the analysis of smaller organic molecules including nucleotides and organic acids**
- **Quarternary amine ion exchange ligand**



Particle Size 5 µm **USP** L14

Hypersil SAX HPLC Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm				
50mm	**34105-052130**	**34105-053030**	**34105-054030**	**34105-054630**
100mm	**34105-102130**	**34105-103030**	**34105-104030**	**34105-104630**
150mm	**34105-152130**	**34105-153030**	**34105-154030**	**34105-154630**
250mm	**34105-252130**	**34105-253030**	**34105-254030**	**34105-254630**

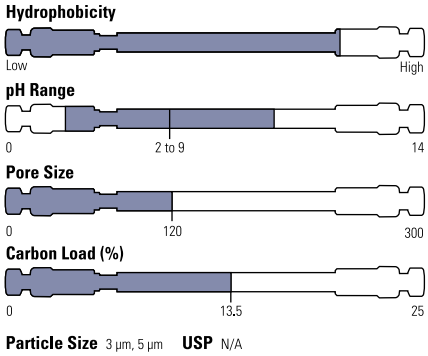
Other column dimensions are available. Please call Customer Service for more information.

Hypersil SAX Drop-In Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
5µm	10mm	**34105-014001**	**34105-014001**	**34105-013001**	**34105-012101**	4 Pack
	UNIGUARD Drop-In Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Hypersil Green PAH Columns

Specially tailored alkyl bonded silica with a high carbon loading, designed specifically for the analysis of polyaromatic hydrocarbons (PAHs)

- **Optimized for EPA Method 610**
- **Rapid analysis of 16 PAHs in 4 minutes using short, fast columns**
- **Available in 3µm and 5µm particle size and variety of column dimensions**



Particle Size 3 µm, 5 µm **USP** N/A

Hypersil Green PAH Columns				
Length	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm				
50mm	**31103-052130**	**31103-053030**	**31103-054030**	**31103-054630**
100mm	**31103-102130**	**31103-103030**	**31103-104030**	**31103-104630**
150mm	**31103-152130**	**31103-153030**	**31103-154030**	**31103-154630**
Particle Size 5µm				
100mm	**31105-102130**	**31105-103030**	**31105-104030**	**31105-104630**
150mm	**31105-152130**	**31105-153030**	**31105-154030**	**31105-154630**
250mm	**31105-252130**	**31105-253030**	**31105-254030**	**31105-254630**

Other column dimensions are available. Please call Customer Service for more information.

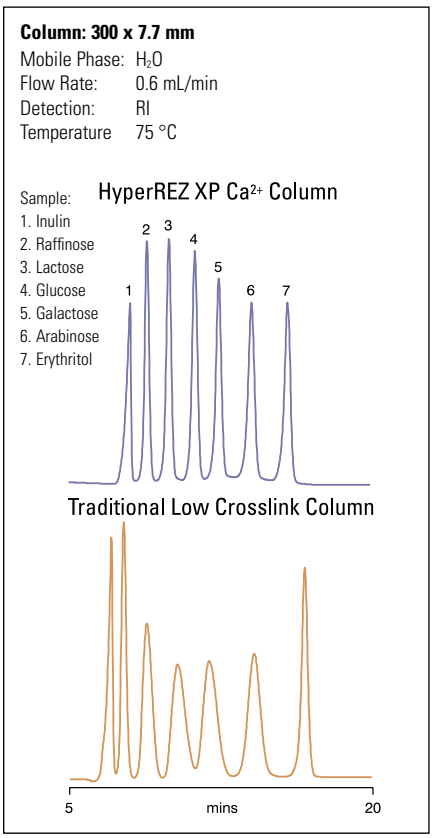
Hypersil Green PAH Guard Cartridges						
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**Quantity**
3µm	10mm	**31103-014001**	**31103-014001**	**31103-013001**	**31103-012101**	4 Each
5µm	10mm	**31105-014001**	**31105-014001**	**31105-013001**	**31105-012101**	4 Each
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	1 Each

Polymeric HPLC Columns

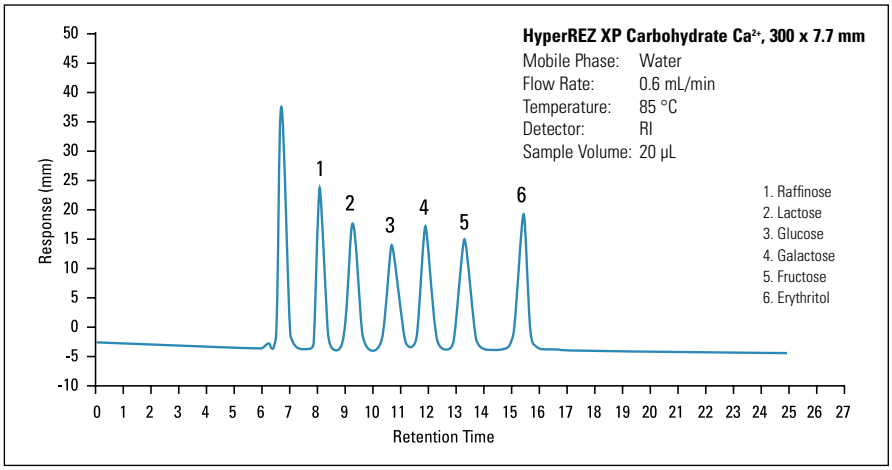
HyperREZ XP carbohydrate and HyperGEL size exclusion columns

- **Outstanding temperature and pH stability**
- **Extended solvent compatibility**
- **High mechanical stability – SEC columns**
- **Organic and aqueous size exclusion – HyperGEL™ columns**
- **Efficient and reproducible monodispersive particles – HyperREZ™ XP columns**

Two types of polymer-based Thermo Scientific columns are available that complement our extensive range of silica-based columns: HyperREZ XP Carbohydrate columns for carbohydrates, alcohols and organic acids analysis, and HyperGEL columns for organic and aqueous size exclusion applications. Polymer columns offer benefits to the chromatographer including temperature and pH stability, enhanced solvent choices and long column lifetimes. Manufactured with a proprietary process and subjected to stringent quality control procedures, each column is individually tested to ensure column-to-column reproducibility.



Comparison of HyperREZ monodisperse and traditional soft microporous sulfonated particles



Chromatographic QC test for HyperREZ XP Carbohydrate Ca^{2+} columns

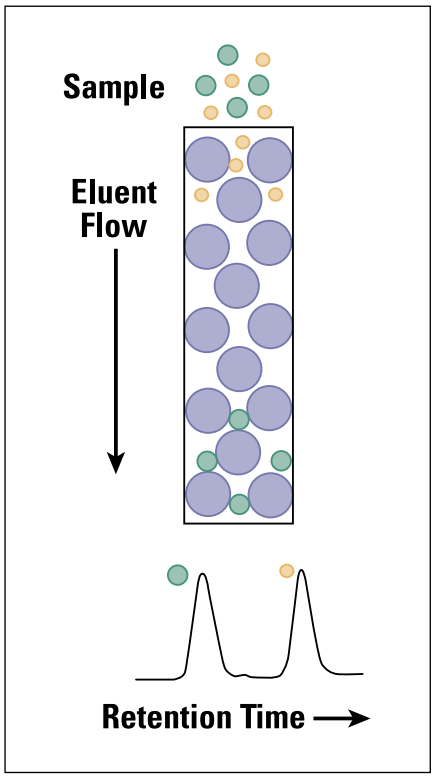
Carbohydrate Analysis

HyperREZ XP columns for the analysis of carbohydrates, organic acids and sugar alcohols are based on monodisperse sulfonated particles, for enhanced performance over soft microporous sulfonated resins typically used for these types of analyses. Due to the uniformity of particle size and cross-linking density, HyperREZ XP columns offer higher efficiencies and lower backpressures.

SEC and GPC Columns

Size Exclusion Chromatography (SEC) or Gel Permeation Chromatography (GPC) is a non-interactive technique used to separate solutes according to their molecular size in solution. The HyperGEL AP columns, based on a macroporous hydrophilic polymer, minimize ionic and hydrophobic interactions to provide a neutral surface for high performance separations. These versatile columns can be used for molecular weight determination of a wide range of water soluble polymers.

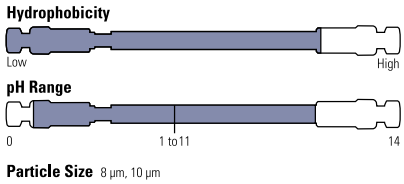
HyperGEL OP columns are based on polystyrene/divinyl benzene which offers high efficiency separations with high mechanical stability, even at elevated temperatures, and can tolerate a wide range of solvents. This choice allows minimization of analyte-column interactions, unwanted in SEC and GPC.



Schematic of separation by molecular size

HyperREZ XP Columns

Polymer-based columns for carbohydrate analysis

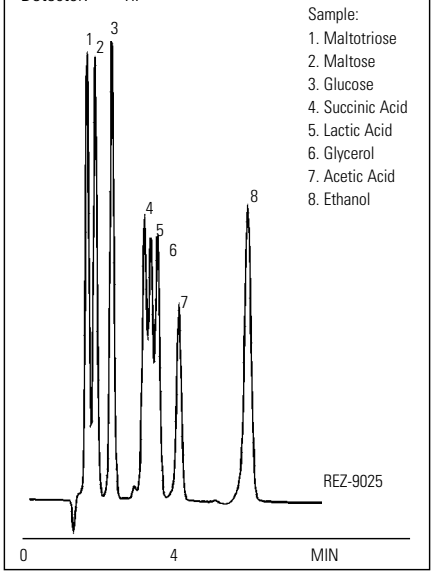


Particle Size 8 µm, 10 µm

- **Designed for the determination of carbohydrates, saccharides, organic acids, and alcohols**
- **Efficient and reproducible monodisperse particles**
- **Stable for long column lifetimes even at low pH and high temperatures**

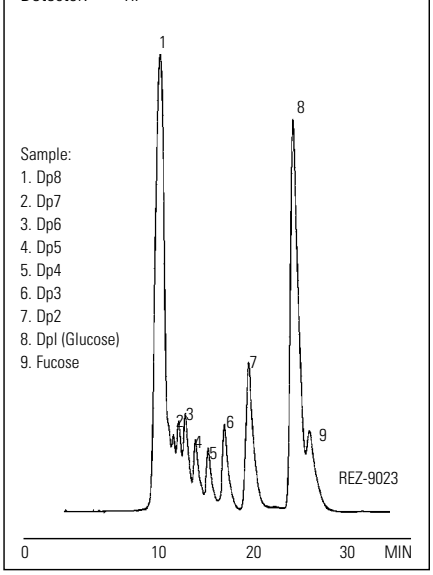
HyperREZ XP Carbohydrate columns are based on a monodisperse resin with a 4 or 8% divinylbenzene content, and provide an ideal medium for the analysis of carbohydrates and organic acids. Unlike silica based columns they are stable at low pH, allowing the use of dilute acid as a mobile phase. The columns can also be run at elevated temperatures, for faster analysis and improved resolution of some closely eluting analytes. The columns can easily be regenerated for increased column lifetime. Control of the degree of cross-linking of the gel provides a size exclusion mode of operation in addition to the ligand exchange interactions with the metal ion associated with the sulfonated resin. Selectivity differences arise from the interactions of the different counter-ion forms with the hydroxyl groups on the analyte molecules. HyperREZ XP columns are available in H^+, Ca^{2+}, Pb^{2+}, and Na^+ forms, enabling you to choose the appropriate counter-ion to meet your application requirements. Refer to the tables below to help choose the best column based on application area or retention times. HyperREZ XP columns are also available in dedicated organic acid and sugar alcohol forms.

HyperREZ XP Organic Acids, 8µm, 100 x 7.7mm
Part Number: 69608-107780
Eluent: 0.0001 mM H_2SO_4
Flow Rate: 0.7mL/min
Temperature: 57°C
Detector: RI



Products of fermentation, including organic acids, sugars and alcohols, can be separated using a HyperREZ XP Organic Acids column

HyperREZ XP Carbohydrate Na^+, 10µm, 300 x 7.7mm
Part Number: 69310-307780
Eluent: H_2O
Flow Rate: 0.3mL/min
Temperature: 80°C
Detector: RI



Analysis of sports drink using a HyperREZ XP Carbohydrate Na^+ column

Phase	Particle Size	Porosity
HyperREZ XP Carbohydrate H^+ Counter-ion	8µm	8% cross linkage
HyperREZ XP Carbohydrate Pb^{2+} Counter-ion	8µm	8% cross linkage
HyperREZ XP Carbohydrate Ca^{2+} Counter-ion	8µm	8% cross linkage
HyperREZ XP Carbohydrate Na^+ Counter-ion	10µm	4% cross linkage
HyperREZ XP Organic Acids	8µm	8% cross linkage
HyperREZ XP Sugar Alcohols	8µm	8% cross linkage

Column Type	Application Areas
HyperREZ XP Ca^{2+}	Adulteration of food & beverages, confectionary, disaccharides, food additives
	Alcohols, dairy products, fermentation, wine
	Anomer separation
HyperREZ XP Pb^{2+}	Fruit juice, monosaccharides
HyperREZ XP H^+	Alcohols, dairy products, fermentation, wine
	Oligosaccharides, glycoprotein constituents, organic acids, fermentation products
HyperREZ XP Na^+	Corn syrup

HyperREZ XP HPLC Columns

		Analytical Column		Guard Column		Guard Cartridge (2/pk)	
Description	**Particle Size**	**Size**	**Cat. No.**	**Size**	**Cat. No.**	**Size**	**Cat. No.**
HyperREZ XP Carbohydrate H^+	8µm	300 × 7.7mm	**69008-307780**	50 × 7.7mm	**69008-057726**	5.0 × 3.0mm	**69008-903027**
HyperREZ XP Carbohydrate Ca^{2+}	8µm	300 × 7.7mm	**69208-307780**	50 × 7.7mm	**69208-057726**	5.0 × 3.0mm	**69208-903027**
HyperREZ XP Carbohydrate Pb^{2+}	8µm	300 × 7.7mm	**69108-307780**	50 × 7.7mm	**69108-057726**	5.0 × 3.0mm	**69108-903027**
HyperREZ XP Carbohydrate Na^+	10µm	300 × 7.7mm	**69310-307780**	50 × 7.7mm	**69310-057726**	5.0 × 3.0mm	**69310-903027**
HyperREZ XP Organic Acids	8µm	100 × 7.7mm	**69608-107780**	--	**Inquire**	--	**Inquire**
HyperREZ XP Sugar Alcohols	8µm	250 × 4.0mm	**69708-254080**	--	**--**	5.0 × 3.0mm	**69208-903027**
Guard Cartridge Holder for HyperREZ XP 3.0 × 5.0mm Guard Cartridges							**60002-354**

Retention Times of Common Saccharides

Conditions:

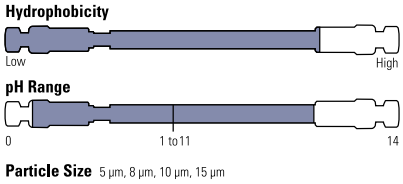
Column:	300 x 7.7 mm
Mobile Phase:	H_2O
Flow Rate:	0.6 mL/min
Detection:	RI
Temperature:	75 °C (H^+)
	85 °C (Ca^{2+})
	80 °C (Pb^{2+})

Note: partial hydrolysis may occur with some saccharides using H^+.

	Retention Time (min)		
Saccharide	H^+	Ca^{2+}	Pb^{2+}
Adonitol	11.5	14.9	20.4
Arabinose	11.4	13.6	19.4
Erythritol	12.7	15.6	20.3
Fructose	10.6	13.5	19.3
Fucose	12.2	13.7	17.1
Galactose	1.07	12.2	15.6
Glucose	9.9	11.1	13.9
Glycerol	14.1	16.1	19.5
Lactose	8.6	9.7	12.8
Maltose	8.4	9.5	12.5
Maltotriose	7.7	8.7	11.9
Mannitol	11.0	17.3	28.9
Mannose	1.5	12.5	16.7
Raffinose	8.2	8.6	11.4
Sorbitol	11.1	20.7	N/A
Sucrose	9.8	9.4	11.9
Xylose	10.6	12.0	15.0

HyperGEL Columns

Size exclusion chromatography with organic and aqueous solvents



Particle Size 5 µm, 8 µm, 10 µm, 15 µm

- **Large pore volumes for high efficiency and excellent resolution**
- **Mechanical and temperature stability for long column lifetimes**
- **Guard columns and cartridges also available**

HyperGEL OP Columns for Organic Size Exclusion Chromatography

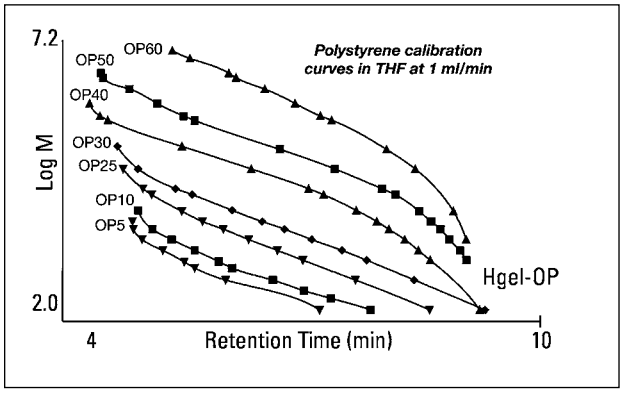
HyperGEL OP columns are designed for SEC using organic solvents. High quality polystyrene/divinylbenzene provides mechanical stability up to 2,200 psi and temperature stability up to 150°C. HyperGEL OP columns are available in 7 pore sizes and 2 particle sizes. The 5µm columns provide a minimum efficiency of 50,000 N/m and are ideal for high resolution separations whereas the 10µm columns are designed for higher molecular weight samples, or demanding solvent or temperature conditions.

HyperGEL AP Columns for Aqueous Size Exclusion Chromatography

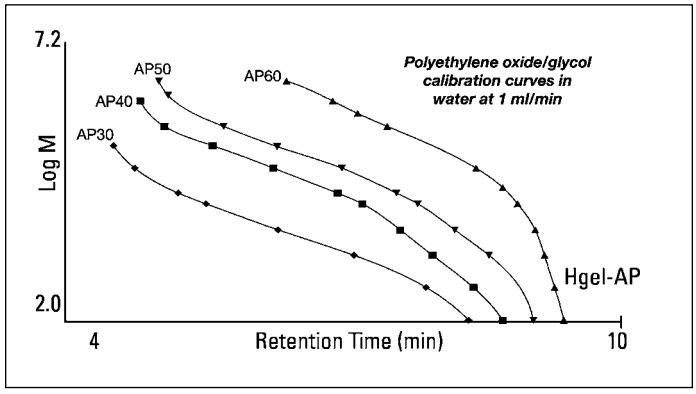
HyperGEL AP columns are designed for size exclusion chromatography of water soluble polymers, although they are not recommended for proteins (please refer to BioBasic SEC columns on page 380 for size exclusion chromatography of proteins). The columns are packed with macroporous hydrophilic polymer materials providing minimal surface interactions, as well as excellent mechanical and chemical stability.

Polymer Calibration Standards for SEC

HyperGEL calibrations kits each contain sixteen polymer standards. Polystyrene standards are for the calibration of HyperGEL OP columns. Polyethylene oxide/glycol standards are used to create the calibration curve for HyperGEL OP columns in organic solvents, or HyperGEL AP columns in aqueous solvents as shown in the figures below.



HyperGEL OP calibration curve: polystyrene standards in THF



HyperGEL AP calibration curve: polyethylene oxide and polyethylene glycol in H_2O

Column Type	Application Range	Pore Size	Operating MW Range
HyperGEL OP5	Low molecular weight solutes, prepolymers and resins	50	up to 2,000g/mol PS
HyperGEL OP10	Low molecular weight solutes, prepolymers and resins; Use two columns in series	100	up to 4,000g/mol PS
HyperGEL OP25	Low molecular weight solutes, prepolymers and resins; Use two columns in series	500	500-30,000g/mol PS
HyperGEL OP30	Resins and condensation polymers; Use two columns in series.	10^3	500-60,000g/mol PS
HyperGEL OP40	Resins and condensation polymers; Use with OP25 in series	10^4	10,000-600,000g/mol PS
HyperGEL OP50	Medium molecular weight polymers; Use with OP30 and OP5 in series	10^5	60,000-2,000,000g/mol PS
HyperGEL OP60	High molecular weight and polydisperse polymers; Use with OP40 and OP25 in series	10^6	600,000-10,000,000g/mol PS
HyperGEL AP30	Low molecular weight polymers; Use two columns in series	N/A	100-30,000g/mol PEO/PEG
HyperGEL AP40	Resins and condensation polymers; Use with AP30 in series	N/A	10,000-200,000g/mol PEO/PEG
HyperGEL AP50	General polydisperse polymers; Use with AP60 and AP40 in series	N/A	50,000-1,000,000g/mol PEO/PEG
HyperGEL AP60	Very high molecular weight and polydisperse polymers; Use with other pore size columns in series	N/A	200,000-10,000,000g/mol PEO/PEG

HyperGEL OP Columns

Phase	Particle Size	Size	Cat. No.
HyperGEL OP5	5µm	300 x 7.7mm	**43005-307780**
HyperGEL OP5	10µm	300 x 7.7mm	**43010-307780**
HyperGEL OP10	5µm	300 x 7.7mm	**43105-307780**
HyperGEL OP10	10µm	300 x 7.7mm	**43110-307780**
HyperGEL OP25	5µm	300 x 7.7mm	**43205-307780**
HyperGEL OP25	10µm	300 x 7.7mm	**43210-307780**
HyperGEL OP30	5µm	300 x 7.7mm	**43305-307780**
HyperGEL OP30	10µm	300 x 7.7mm	**43310-307780**
HyperGEL OP40	5µm	300 x 7.7mm	**43405-307780**
HyperGEL OP40	10µm	300 x 7.7mm	**43410-307780**
HyperGEL OP50	5µm	300 x 7.7mm	**43505-307780**
HyperGEL OP50	10µm	300 x 7.7mm	**43510-307780**
HyperGEL OP60	10µm	300 x 7.7mm	**43610-307780**
HyperGEL OP Guard	5µm	50 x 7.7mm	**43705-057726**
HyperGEL OP Guard	10µm	50 x 7.7mm	**43710-057726**
HyperGEL OP Repair Gel	5µm	1pk	**60004-321**
HyperGEL OP Repair Gel	10µm	1pk	**60004-322**

HyperGEL AP Columns

Phase	Particle Size	Size	Cat. No.
HyperGEL AP30	8µm	300 x 7.7mm	**44008-307780**
HyperGEL AP40	8µm	300 x 7.7mm	**44108-307780**
HyperGEL AP40	15µm	300 x 7.7mm	**44115-307780**
HyperGEL AP50	8µm	300 x 7.7mm	**44208-307780**
HyperGEL AP50	15µm	300 x 7.7mm	**44215-307780**
HyperGEL AP60	8µm	300 x 7.7mm	**44308-307780**
HyperGEL AP60	15µm	300 x 7.7mm	**44315-307780**
HyperGEL AP Guard	8µm	50 x 7.7mm	**44408-057726**
HyperGEL AP Guard	15µm	50 x 7.7mm	**44415-057726**
HyperGEL AP Repair Gel	8µm	--	**60004-336**
HyperGEL AP Repair Gel	15µm	--	**60004-337**

HyperGEL Accessories

Description	Cat. No.	Quantity
HyperGEL Frit Kit, 2µm Particle Size	**60002-361**	5 Pack
HyperGEL Frit Kit, 5µm Particle Size	**60002-360**	5 Pack
Two-piece End Fitting	**60170-391**	1 Each
Connecting Tubing, Stainless steel, 0.0625 in. ID, 5cm length	**60170-390**	10 Pack
Connecting Tubing, Stainless steel, 0.0625 in. ID, 10cm length	**60170-392**	10 Pack
Connecting Nuts	**60170-393**	5 Pack
Ferrules	**60170-394**	5 Pack

HyperGEL Calibration Kits

Description	For Use with	Cat. No.	Quantity
Polyethylene Oxide/Glycol Calibration Kit, 10 x 0.5g	HyperGEL OP columns	**60004-341**	1 Each
Polystyrene Calibration Kit, 10 x 0.5g	HyperGEL AP columns	**60004-340**	1 Each

Additional Columns

A reliable global source

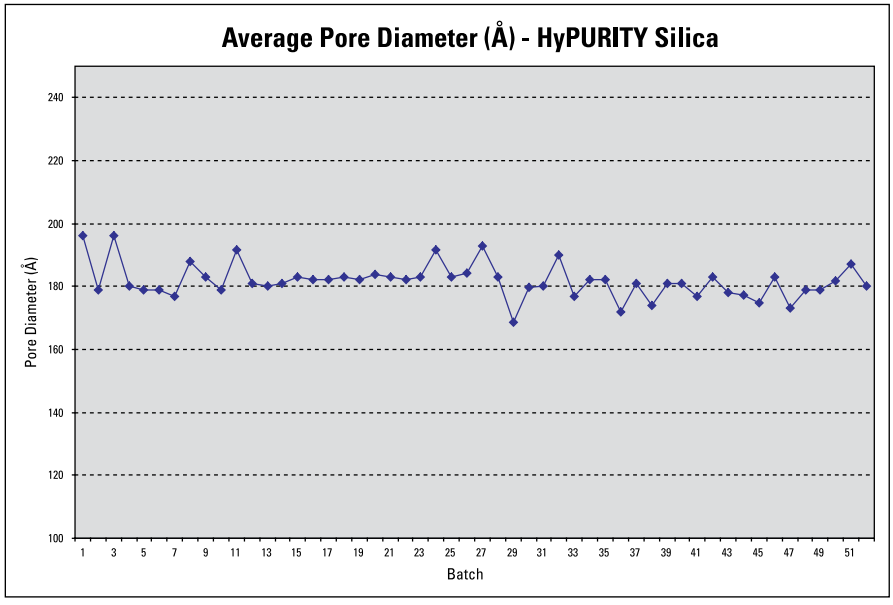
- **Wide range of high quality phases**
- **High efficiency columns packed with other manufacturers' phases**
- **Manufactured and packed under ISO 9001:2000 standards**
- **Strict quality testing of media and columns**

We are leaders in HPLC column technology, including silica manufacturing, bonded phase production and column packing, all supported by superior customer and technical service. With one of the broadest selections of premier HPLC phases and innovative hardware designs available, coupled with experience and technical support, we are a reliable world-wide source of HPLC columns.

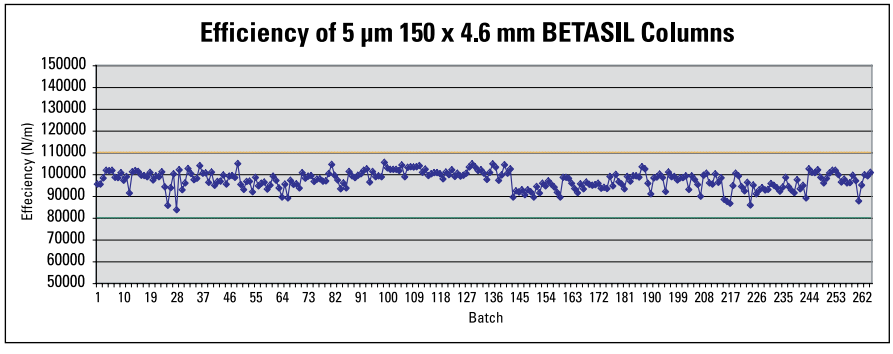
High Quality Media and Columns

We have been manufacturing HPLC silica and columns for over 30 years beginning with Hypersil and continue to be at the forefront of new product advancements. In addition to the premier phases, we produce many popular names such as HyPURITY™, BetaBasic, BETASIL, and more. These are manufactured under strict ISO 9001:2000 procedures, and every batch of silica and bonded phase is thoroughly tested for physical and chromatographic characteristics, ensuring that stringent standards are met to provide reliable and reproducible media for columns. This data is available to customers.

Every column packed in our facilities, whether made from Thermo Scientific brand or other manufacturers' phases, receives a unique serial number; fully traceable from raw materials to manufacture of silica and bonded phase or from purchased media, to the finished column. Specific production protocols, test procedures and specifications have to be adhered to before any column is shipped to the customer. Every column is shipped with the test report included, and backed by experienced technical support chemists.



Outstanding reproducibility shown for 5 µm HyPURITY C18 media batch testing of average pore size



Excellent column-to-column reproducibility is shown for BETASIL C18 columns

Aquasil C18 HPLC Columns

Greater retention than C18 for polar molecules

- **Polar endcapped C18 phase**
- **Alternative selectively compared to conventional C18 phases**
- **Compatible with 100% aqueous mobile phases**

Aquasil C18 HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm					
30mm	**77503-031030**	**77503-032130**	**77503-033030**	**77503-034030**	**77503-034630**
50mm	**77503-051030**	**77503-052130**	**77503-053030**	**77503-054030**	**77503-054630**
100mm	**77503-101030**	**77503-102130**	**77503-103030**	**77503-104030**	**77503-104630**
150mm	**77503-151030**	**77503-152130**	**77503-153030**	**77503-154030**	**77503-154630**
Particle Size 5µm					
30mm	**77505-031030**	**77505-032130**	**77505-033030**	**77505-034030**	**77505-034630**
50mm	**77505-051030**	**77505-052130**	**77505-053030**	**77505-054030**	**77505-054630**
100mm	**77505-101030**	**77505-102130**	**77505-103030**	**77505-104030**	**77505-104630**
125mm	**77505-121030**	**77505-122130**	**77505-123030**	**77505-124030**	**77505-124630**
150mm	**77505-151030**	**77505-152130**	**77505-153030**	**77505-154030**	**77505-154630**
250mm	**77505-251030**	**77505-252130**	**77505-253030**	**77505-254030**	**77505-254630**

Other column dimensions are also available. Please call Customer Service for more information.

Aquasil C18 Guard Cartridges							
Particle Size	**Length**	**4.6mm I.D.**	**4.0mm I.D.**	**3.0mm I.D.**	**2.1mm I.D.**	**1.0mm I.D.**	**Quantity**
3µm	10mm	**77503-014001**	**77503-014001**	**77503-013001**	**77503-012101**	**77503-011001**	4 Each
5µm	10mm	**77505-014001**	**77505-014001**	**77505-013001**	**77505-012101**	**77505-011001**	4 Each
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

BetaBasic HPLC Columns

Highly efficient and reproducible columns

- **Pore size suitable for small molecules, peptides and protein digests**
- **Superb pH stability**

BetaBasic 18 HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm					
30mm	**71503-031030**	**71503-032130**	**71503-033030**	**71503-034030**	**71503-034630**
50mm	**71503-051030**	**71503-052130**	**71503-053030**	**71503-054030**	**71503-054630**
100mm	**71503-101030**	**71503-102130**	**71503-103030**	**71503-104030**	**71503-104630**
150mm	**71503-151030**	**71503-152130**	**71503-153030**	**71503-154030**	**71503-154630**
Particle Size 5µm					
30mm	**71505-031030**	**71505-032130**	**71505-033030**	**71505-034030**	**71505-034630**
50mm	**71505-051030**	**71505-052130**	**71505-053030**	**71505-054030**	**71505-054630**
100mm	**71505-101030**	**71505-102130**	**71505-103030**	**71505-104030**	**71505-104630**
150mm	**71505-151030**	**71505-152130**	**71505-153030**	**71505-154030**	**71505-154630**
250mm	**71505-251030**	**71505-252130**	**71505-253030**	**71505-254030**	**71505-254630**

BetaBasic 8 HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm					
50mm	**71403-051030**	**71403-052130**	**71403-053030**	**71403-054030**	**71403-054630**
150mm	**71403-151030**	**71403-152130**	**71403-153030**	**71403-154030**	**71403-154630**
Particle Size 5µm					
50mm	**71405-051030**	**71405-052130**	**71405-053030**	**71405-054030**	**71405-054630**
100mm	**71405-101030**	**71405-102130**	**71405-103030**	**71405-104030**	**71405-104630**
150mm	**71405-151030**	**71405-152130**	**71405-153030**	**71405-154030**	**71405-154630**

BetaBasic 4 HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm					
50mm	**71603-051030**	**71603-052130**	**71603-053030**	**71603-054030**	**71603-054630**
100mm	**71603-101030**	**71603-102130**	**71603-103030**	**71603-104030**	**71603-104630**
Particle Size 5µm					
50mm	**71605-051030**	**71605-052130**	**71605-053030**	**71605-054030**	**71605-054630**
150mm	**71605-151030**	**71605-152130**	**71605-153030**	**71605-154030**	**71603-154630**
250mm	**71605-251030**	**71605-252130**	**71605-253030**	**71605-254030**	**71605-254630**

BetaBasic CN HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm					
50mm	**71703-051030**	**71703-052130**	**71703-053030**	**71703-054030**	**71703-054630**
100mm	**71703-101030**	**71703-102130**	**71703-103030**	**71703-104030**	**71703-104630**
150mm	**71703-151030**	**71703-152130**	**71703-153030**	**71703-154030**	**71703-154630**
Particle Size 5µm					
50mm	**71705-051030**	**71705-052130**	**71705-053030**	**71705-054030**	**71705-054630**
100mm	**71705-101030**	**71705-102130**	**71705-103030**	**71705-104030**	**71705-104630**
150mm	**71705-151030**	**71705-152130**	**71705-153030**	**71705-154030**	**71705-154630**
250mm	**71705-251030**	**71705-252130**	**71705-253030**	**71705-254030**	**71705-254630**

BetaBasic Phenyl HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm					
50mm	**71803-051030**	**71803-052130**	**71803-053030**	**71803-054030**	**71803-054630**
150mm	**71803-151030**	**71803-152130**	**71803-153030**	**71803-154030**	**71803-154630**
Particle Size 5µm					
50mm	**71805-051030**	**71805-052130**	**71805-053030**	**71805-054030**	**71805-054630**
150mm	**71805-151030**	**71805-152130**	**71805-153030**	**71805-154030**	**71805-154630**
250mm	**71805-251030**	**71805-252130**	**71805-253030**	**71805-254030**	**71805-254630**

Other column dimensions are also available. Please call Customer Service for more information.

BetaBasic Guard Cartridges

Particle Size	Length	4.6mm I.D.	4.0mm I.D.	3.0mm I.D.	2.1mm I.D.	1.0mm I.D.	Quantity
Betabasic 18							
3µm	10mm	**71503-014001**	**71503-014001**	**71503-013001**	**71503-012101**	**71503-011001**	4 Pack
5µm	10mm	**71505-014001**	**71505-014001**	**71505-013001**	**71505-012101**	**71505-011001**	4 Pack
BetaBasic 8							
3µm	10mm	**71403-014001**	**71403-014001**	**71403-013001**	**71403-012101**	**71403-011001**	4 Pack
5µm	10mm	**71405-014001**	**71405-014001**	**71405-013001**	**71405-012101**	**71405-011001**	4 Pack
BetaBasic 4							
3µm	10mm	**71603-014001**	**71603-014001**	**71603-013001**	**71603-012101**	**71603-011001**	4 Pack
5µm	10mm	**71605-014001**	**71605-014001**	**71605-013001**	**71605-012101**	**71605-011001**	4 Pack
BetaBasic CN							
3µm	10mm	**71703-014001**	**71703-014001**	**71703-013001**	**71703-012101**	**71703-011001**	4 Pack
5µm	10mm	**71705-014001**	**71705-014001**	**71705-013001**	**71705-012101**	**71705-011001**	4 Pack
BetaBasic Phenyl							
3µm	10mm	**71803-014001**	**71803-014001**	**71803-013001**	**71803-012101**	**71803-011001**	4 Pack
5µm	10mm	**71805-014001**	**71805-014001**	**71805-013001**	**71805-012101**	**71805-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

BETASIL HPLC Columns

High surface area with high bonded phase coverage

- **BETASIL Phenyl/Hexyl columns offer unique selectivity**

BETASIL C18 HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm					
30mm	**70103-031030**	**70103-032130**	**70103-033030**	**70103-034030**	**70103-034630**
50mm	**70103-051030**	**70103-052130**	**70103-053030**	**70103-054030**	**70103-054630**
100mm	**70103-101030**	**70103-102130**	**70103-103030**	**70103-104030**	**70103-104630**
150mm	**70103-151030**	**70103-152130**	**70103-153030**	**70103-154030**	**70103-154630**
Particle Size 5µm					
30mm	**70105-031030**	**70105-032130**	**70105-033030**	**70105-034030**	**70105-034630**
50mm	**70105-051030**	**70105-052130**	**70105-053030**	**70105-054030**	**70105-054630**
100mm	**70105-101030**	**70105-102130**	**70105-103030**	**70105-104030**	**70105-104630**
125mm	**70105-121030**	**70105-122130**	**70105-123030**	**70105-124030**	**70105-124630**
150mm	**70105-151030**	**70105-152130**	**70105-153030**	**70105-154030**	**70105-154630**
250mm	**70105-251030**	**70105-252130**	**70105-253030**	**70105-254030**	**70105-254630**

BETASIL C8 HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm					
50mm	**70203-051030**	**70203-052130**	**70203-053030**	**70203-054030**	**70203-054630**
150mm	**70203-151030**	**70203-152130**	**70203-153030**	**70203-154030**	**70203-154630**
Particle Size 5µm					
50mm	**70205-051030**	**70205-052130**	**70205-053030**	**70205-054030**	**70205-054630**
100mm	**70205-101030**	**70205-102130**	**70205-103030**	**70205-104030**	**70205-104630**
150mm	**70205-151030**	**70205-152130**	**70205-153030**	**70205-154030**	**70205-154630**
250mm	**70205-251030**	**70205-252130**	**70205-253030**	**70205-254030**	**70205-254630**

BETASIL C6 HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 3µm					
50mm	**70303-051030**	**70303-052130**	**70303-053030**	**70303-054030**	**70303-054630**
150mm	**70303-151030**	**70303-152130**	**70303-153030**	**70303-154030**	**70303-154630**
Particle Size 5µm					
100mm	**70305-101030**	**70305-102130**	**70305-103030**	**70305-104030**	**70305-104630**
150mm	**70305-151030**	**70305-152130**	**70305-153030**	**70305-154030**	**70305-154630**
250mm	**70305-251030**	**70305-252130**	**70305-253030**	**70305-254030**	**70305-254630**

BETASIL C1 HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm					
100mm	**70505-101030**	**70505-102130**	**70505-103030**	**70505-104030**	**70505-104630**
150mm	**70505-151030**	**70505-152130**	**70505-153030**	**70505-154030**	**70505-154630**
250mm	**70505-251030**	**70505-252130**	**70505-253030**	**70505-254030**	**70505-254630**

BETASIL Phenyl HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 3µm					
50mm	**70603-051030**	**70603-052130**	**70603-053030**	**70603-054030**	**70603-054630**
150mm	**70603-151030**	**70603-152130**	**70603-153030**	**70603-154030**	**70603-154630**
Particle Size 5µm					
50mm	**70605-051030**	**70605-052130**	**70605-053030**	**70605-054030**	**70605-054630**
100mm	**70605-101030**	**70605-102130**	**70605-103030**	**70605-104030**	**70605-104630**
150mm	**70605-151030**	**70605-152130**	**70605-153030**	**70605-154030**	**70605-154630**
250mm	**70605-251030**	**70605-252130**	**70605-253030**	**70605-254030**	**70605-254630**

BETASIL Phenyl/Hexyl HPLC Columns

Length (mm)	1.0mm ID	2.1mm ID.	3.0mm ID	4.0mm ID	4.6mm ID
Particle Size 3µm					
50mm	**73003-051030**	**73003-052130**	**73003-053030**	**73003-054030**	**73003-054630**
100mm	**73003-101030**	**73003-102130**	**73003-103030**	**73003-104030**	**73003-104630**
150mm	**73003-151030**	**73003-152130**	**73003-153030**	**73003-154030**	**73003-154630**
Particle Size 5µm					
100mm	**73005-101030**	**73005-102130**	**73005-103030**	**73005-104030**	**73005-104630**
150mm	**73005-151030**	**73005-152130**	**73005-153030**	**73005-154030**	**73005-154630**
250mm	**73005-251030**	**73005-252130**	**73005-253030**	**73005-254030**	**73005-254630**

BETASIL CN HPLC Columns

Length	1.0mm ID	2.1mm ID	3.0mm ID	4.0mm ID	4.6mm ID
Particle Size 5µm					
50mm	**70805-051030**	**70805-052130**	**70805-053030**	**70805-054030**	**70805-054630**
100mm	**70805-101030**	**70805-102130**	**70805-103030**	**70805-104030**	**70805-104630**
150mm	**70805-151030**	**70805-152130**	**70805-153030**	**70805-154030**	**70805-154630**
250mm	**70805-251030**	**70805-252130**	**70805-253030**	**70805-254030**	**70805-254630**

BETASIL Silica HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 5µm					
50mm	**70005-051030**	**70005-052130**	**70005-053030**	**70005-054030**	**70005-054630**
100mm	**70005-101030**	**70005-102130**	**70005-103030**	**70005-104030**	**70005-104630**
150mm	**70005-151030**	**70005-152130**	**70005-153030**	**70005-154030**	**70005-154630**
250mm	**70005-251030**	**70005-252130**	**70005-253030**	**70005-254030**	**70005-254630**

BETASIL Diol HPLC Columns

Length	1.0mm I.D.	2.1mm I.D.	3.0mm I.D.	4.0mm I.D.	4.6mm I.D.
Particle Size 5µm					
50mm	**72605-051030**	**72605-052130**	**72605-053030**	**72605-054030**	**72605-054630**
100mm	**72605-101030**	**72605-102130**	**72605-103030**	**72605-104030**	**72605-104630**
150mm	**72605-151030**	**72605-152130**	**72605-153030**	**72605-154030**	**72605-154630**
250mm	**72605-251030**	**72605-252130**	**72605-253030**	**72605-254030**	**72605-254630**

Other column dimensions including preparative scale are available. Please call Customer Service for more information.

BETASIL Guard Cartridges							
Particle Size	**Length**	**4.6mm I.D.**	**4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**	**Quantity**
BETASIL C18							
3µm	10mm	**70103-014001**	**70103-014001**	**70103-013001**	**70103-012101**	**70103-011001**	4 Pack
5µm	10mm	**70105-014001**	**70105-014001**	**70105-013001**	**70105-012101**	**70105-011001**	4 Pack
BETASIL C8							
3µm	10mm	**70203-014001**	**70203-014001**	**70203-013001**	**70203-012101**	**70203-011001**	4 Pack
5µm	10mm	**70205-014001**	**70205-014001**	**70205-013001**	**70205-012101**	**70205-011001**	4 Pack
BETASIL C6							
3µm	10mm	**70303-014001**	**70303-014001**	**70303-013001**	**70303-012101**	**70303-011001**	4 Pack
5µm	10mm	**70305-014001**	**70305-014001**	**70305-013001**	**70305-012101**	**70305-011001**	4 Pack
BETASIL C1							
5µm	10mm	**70505-014001**	**70505-014001**	**70505-013001**	**70505-012101**	**70505-011001**	4 Pack
BETASIL Phenyl							
5µm	10mm	**70605-014001**	**70605-014001**	**70605-013001**	**70605-012101**	**70605-011001**	4 Pack
BETASIL Phenyl/Hexyl							
3µm	10mm	**73003-014001**	**73003-014001**	**73003-013001**	**73003-012101**	**73003-011001**	4 Pack
5µm	10mm	**73005-014001**	**73005-014001**	**73005-013001**	**73005-012101**	**73005-011001**	4 Pack
BETASIL CN							
5µm	10mm	**70805-014001**	**70805-014001**	**70805-013001**	**70805-012101**	**70805-011001**	4 Pack
BETASIL Silica							
5µm	10mm	**70005-014001**	**70005-014001**	**70005-013001**	**70005-012101**	**70005-011001**	4 Pack
BETASIL Diol							
5µm	10mm	**72605-014001**	**72605-014001**	**72605-013001**	**72605-012101**	**72605-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

DELTABOND Fast AK Columns

Columns dedicated to aldehyde and ketone analysis

- **Ideal for auto emissions separations**
- **For high throughput analysis of simple mixtures**

DELTABOND Fast AK HPLC Columns					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm					
100mm	**32305-101030**	**32305-102130**	**32305-103030**	**32305-104030**	**32305-104630**

DELTABOND Fast AK Drop-In Guard Cartridges						
Particle Size	**Length**	**4.6/4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**	**Quantity**
5µm	10mm	**32305-014001**	**32305-013001**	**32305-012101**	**32305-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

Please note that a guard is recommend for aldehyde and ketone applications.

Fluophase Columns

Perfluorinated phases provide unique selectivity

- **Extra retention and selectivity for halogenated compounds**
- **Excellent for taxane analysis**

Fluophase RP HPLC Column					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm					
50mm	**82505-051030**	**82505-052130**	**82505-053030**	**82505-054030**	**82505-054630**
100mm	**82505-101030**	**82505-102130**	**82505-103030**	**82505-104030**	**82505-104630**
150mm	**82505-151030**	**82505-152130**	**82505-153030**	**82505-154030**	**82505-154630**
250mm	**82505-251030**	**82505-252130**	**82505-253030**	**82505-254030**	**82505-254630**

Fluophase WP HPLC Column					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm					
50mm	**82605-051030**	**82605-052130**	**82605-053030**	**82605-054030**	**82605-054630**
100mm	**82605-101030**	**82605-102130**	**82605-103030**	**82605-104030**	**82605-104630**
150mm	**82605-151030**	**82605-152130**	**82605-153030**	**82605-154030**	**82605-154630**
250mm	**82605-251030**	**82605-252130**	**82605-253030**	**82605-254030**	**82605-254630**

Fluophase PFP HPLC Column					
Length	**1.0mm I.D.**	**2.1mm I.D.**	**3.0mm I.D.**	**4.0mm I.D.**	**4.6mm I.D.**
Particle Size 5µm					
50mm	**82705-051030**	**82705-052130**	**82705-053030**	**82705-054030**	**82705-054630**
100mm	**82705-101030**	**82705-102130**	**82705-103030**	**82705-104030**	**82705-104630**
150mm	**82705-151030**	**82705-152130**	**82705-153030**	**82705-154030**	**82705-154630**
250mm	**82705-251030**	**82705-252130**	**82705-253030**	**82705-254030**	**82705-254630**

Other column dimensions are available. Please call Customer Service for more information.

Fluophase RP Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6/4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**	**Quantity**
5µm	10mm	**82505-014001**	**82505-013001**	**82505-012101**	**82505-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

Fluophase WP Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6/4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**	**Quantity**
5µm	10mm	**82605-014001**	**82605-013001**	**82605-012101**	**82605-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

Fluophase PFP Drop-in Guard Cartridges						
Particle Size	**Length**	**4.6/4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**	**Quantity**
5µm	10mm	**82705-014001**	**82705-013001**	**82705-012101**	**82705-011001**	4 Pack
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**	1 Each

HyPURITY Columns

High quality, highly pure silica columns

HyPURITY C18 HPLC Columns					
Length	**1.0mm ID**	**2.1mm ID**	**3.0mm ID**	**4.0mm ID**	**4.6mm ID**
Particle Size 3µm					
30mm	**22103-031030**	**22103-032130**	**22103-033030**	**22103-034030**	**22103-034630**
50mm	**22103-051030**	**22103-052130**	**22103-053030**	**22103-054030**	**22103-054630**
100mm	**22103-101030**	**22103-102130**	**22103-101030**	**22103-104030**	**22103-104630**
150mm	**22103-151030**	**22103-152130**	**22103-153030**	**22103-154030**	**22103-154630**
Particle Size 5µm					
30mm	**22105-031030**	**22105-032130**	**22105-033030**	**22105-034030**	**22105-034630**
50mm	**22105-051030**	**22105-052130**	**22105-053030**	**22105-054030**	**22105-054630**
100mm	**22105-101030**	**22105-102130**	**22105-103030**	**22105-104030**	**22105-104630**
150mm	**22105-151030**	**22105-152130**	**22105-153030**	**22105-154030**	**22105-154630**
250mm	**22105-251030**	**22105-252130**	**22105-253030**	**22105-254030**	**22105-254630**

HyPURITY C8 HPLC Column					
Length	**1.0mm ID**	**2.1mm ID**	**3.0mm ID**	**4.0mm ID**	**4.6mm ID**
Particle Size 5µm					
50mm	**22205-051030**	**22205052130**	**22205-053030**	**22205-054030**	**22205-054630**
100mm	**22205-101030**	**22205102130**	**22205-103030**	**22205-104030**	**22205-104630**
150mm	**22205-151030**	**22205152130**	**22205-153030**	**22205-154030**	**22205-154630**
250mm	**22205-251030**	**22205-252130**	**22205-253030**	**22205-254030**	**22205-254630**

HyPURITY C4 HPLC Columns					
Length	**1.0mm ID**	**2.1mm ID**	**3.0mm ID**	**4.0mm ID**	**4.6mm ID**
Particle Size 5µm					
50mm	**22405-051030**	**22405-052130**	**22405-053030**	**22405-054030**	**22405-054630**
100mm	**22405-101030**	**22405-102130**	**22405-103030**	**22405-104030**	**22405-104630**
150mm	**22405-151030**	**22405-152130**	**22405-153030**	**22405-154030**	**22405-154630**
250mm	**22405-251030**	**22405-252130**	**22405-253030**	**22405-254030**	**22405-254630**

HyPURITY Cyano HPLC Column					
Length	**1.0mm ID**	**2.1mm ID**	**3.0mm ID**	**4.0mm ID**	**4.6mm ID**
Particle Size 5µm					
50mm	**22805-051030**	**22805-052130**	**22805-053030**	**22805-054030**	**22805-054630**
100mm	**22805-101030**	**22805-102130**	**22805-103030**	**22805-104030**	**22805-104630**
150mm	**22805-151030**	**22805-152130**	**22805-153030**	**22805-154030**	**22805-154630**
250mm	**22805-251030**	**22805-252130**	**22805-253030**	**22805-254030**	**22805-254630**

HyPURITY Aquastar HPLC Column					
Length	**1.0mm ID**	**2.1mm ID**	**3.0mm ID**	**4.0mm ID**	**4.6mm ID**
Particla Size 3µm					
30mm	**22503-031030**	**22503-032130**	**22503-033030**	**22503-034030**	**22503-034630**
50mm	**22503-051030**	**22503-052130**	**22503-053030**	**22503-054030**	**22503-054630**
100mm	**22503-101030**	**22503-102130**	**22503-103030**	**22503-104030**	**22503-104630**
150mm	**22503-151030**	**22503-152130**	**22503-153030**	**22503-154030**	**22503-154630**
Particla Size 5µm					
50mm	**22505-051030**	**22505-052130**	**22505-053030**	**22505-054030**	**22505-054630**
100mm	**22505-101030**	**22505-102130**	**22505-103030**	**22505-104030**	**22505-104630**
150mm	**22505-151030**	**22505-152130**	**22505-153030**	**22505-154030**	**22505-154630**
250mm	**22505-251030**	**22505-252130**	**22505-253030**	**22505-254030**	**22505-254630**

HyPURITY C18 Guard Cartridges					
Particle Size	**Length**	**4.6/4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**
3µm	10mm	**22103-014001**	**22103-013001**	**22103-012101**	**22103-011001**
5µm	10mm	**22105-014001**	**22105-013001**	**22105-012101**	**22105-011001**

HyPURITY C8 Guard Cartridges					
Particle Size	**Length**	**4.6/4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**
5µm	10mm	**22205-014001**	**22205-013001**	**22205-012101**	**22205-011001**

HyPURITY C4 Guard Cartridges					
Particle Size	**Length**	**4.6/4mm I.D..**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**
5µm	10mm	**22405-014001**	**22405-013001**	**22405-012101**	**22405-011001**

HyPURITY Cyano Guard Cartridges					
Particle Size	**Length**	**4.6/4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**
5µm	10mm	**22805-014001**	**22805-013001**	**22805-012101**	**22805-011001**

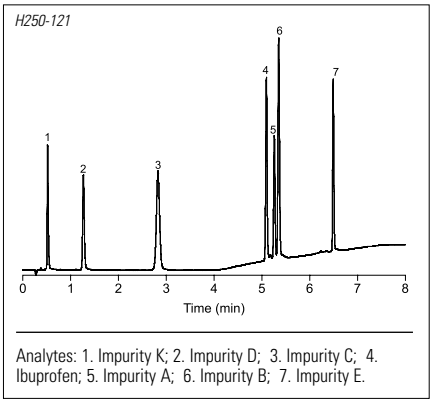
HyPURITY AQUASTAR Guard Cartridges					
Particle Size	**Length**	**4.6/4mm I.D.**	**3mm I.D.**	**2.1mm I.D.**	**1mm I.D.**
3µm	10mm	**22503-014001**	**22503-013001**	**22503-012101**	**22503-011001**
5µm	10mm	**22505-014001**	**22505-013001**	**22505-012101**	**22505-011001**
	UNIGUARD Drop-in Guard Cartridge Holder	**850-00**	**852-00**	**852-00**	**851-00**

HyPurity ADVANCE polar embedded columns and other column dimensions are also available. Please call Customer Service for more information.

PHARMACEUTICAL / BIOCHEMICAL

Hundreds of applications can also be found in our chromatography resource center, visit www.thermoscientific.com/chromatography

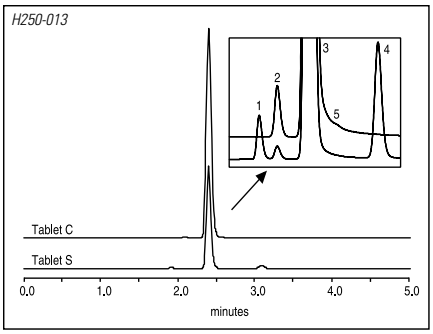
Ibuprofen and Impurities



Analytes: 1. Impurity K; 2. Impurity D; 3. Impurity C; 4. Ibuprofen; 5. Impurity A; 6. Impurity B; 7. Impurity E.

Instrument:	Accela U-HPLC system
Column:	Hypersil GOLD, 1.9µm, 50 x 2.1mm
Part Number:	25002-052130
Mobile Phase:	A: 0.05% H_3PO_4 in H_2O/ACN (66:34) B: ACN
Gradient:	Time (min) % B 0 0 3.2 0 7.1 85 8.9 85
Flow Rate:	0.55mL/min.
Injection Volume:	0.7µL
Detection:	UV at 214nm (0.1s rise time; 20 Hz)
Temperature:	30°C

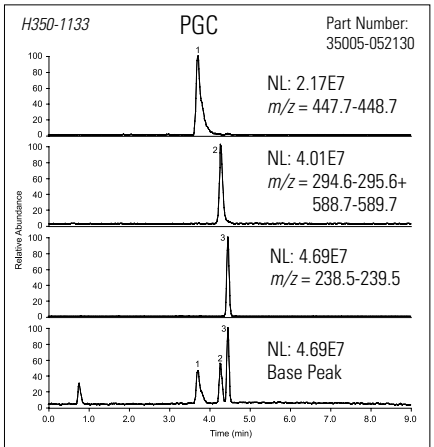
Analgesic Tablet



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 10mM NaH_2PO_4 at pH 2.5 B: MeOH
Isocratic:	65:35
Flow Rate:	1mL/min.
Detection:	UV at 230nm
Temperature:	25°C

1. Tablet component
2. Codeine
3. Acetaminophen
4. Caffeine
5. Tablet component

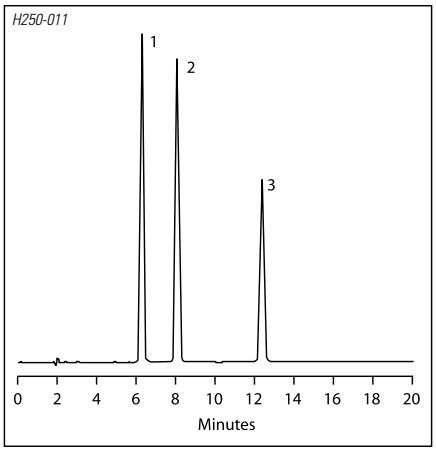
Hydrophilic Peptides



Analytes: 1. Arg-Gly-Glu-Ser (RGES); 2. Asp-Ser-Asp-Pro-Arg (DSDPR); 3. Gly-Tyr (GY)

Instrument:	Surveyor™ and LCQ™ Deca
Columns:	Hypercarb™ 5µm, 50 x 2.1mm
Part Numbers:	35005-052130
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	5 - 100% B in 10 min.
Flow Rate:	0.2mL/min.
Injection Volume:	10µL
Detection:	+ ESI
Temperature:	30°C

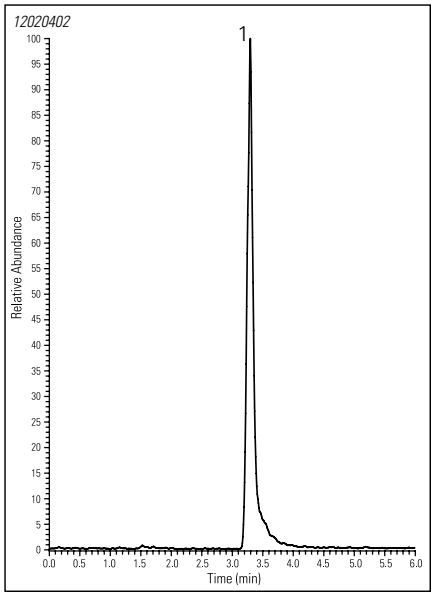
Steroids



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% Formic acid B: MeOH + 0.1% Formic acid
Gradient:	50 - 60% B in 20 min.
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25°C

1. Prednisone
2. Prednisolone
3. Hydrocortisone-21-acetate

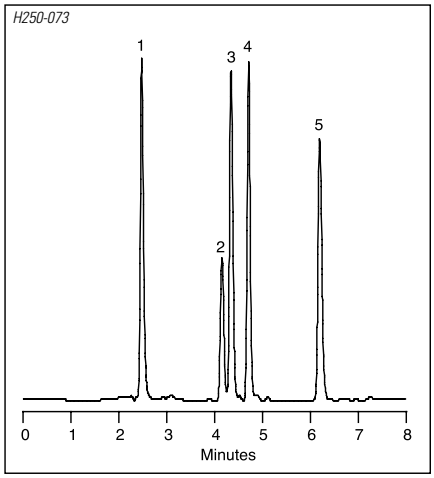
Acyclovir



Column:	Hypercarb, 3µm, 100 x 2.1mm
Part Number:	35003-102130
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	30 - 100% B in 10 min.
Flow Rate:	0.2mL/min.
Detection:	+ ESI
Temperature:	40°C

Acyclovir

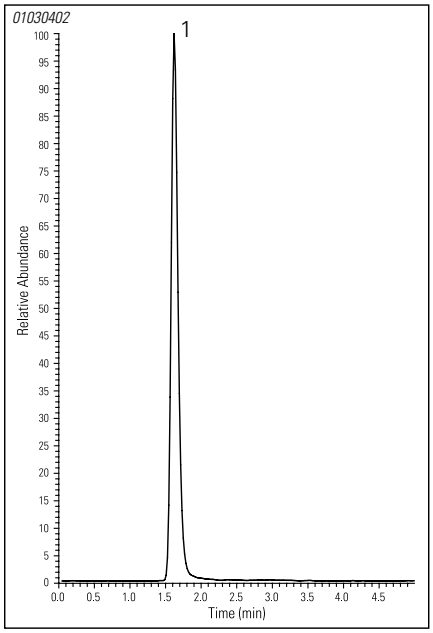
Cepha Antibiotics



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% Acetic acid B: ACN
Gradient:	20-70% B in 10 min.
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25°C

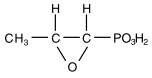
1. Cefadroxil
2. Cefaclor
3. Cephalexin
4. Cephradine
5. Cefazolin

Fosfomycin

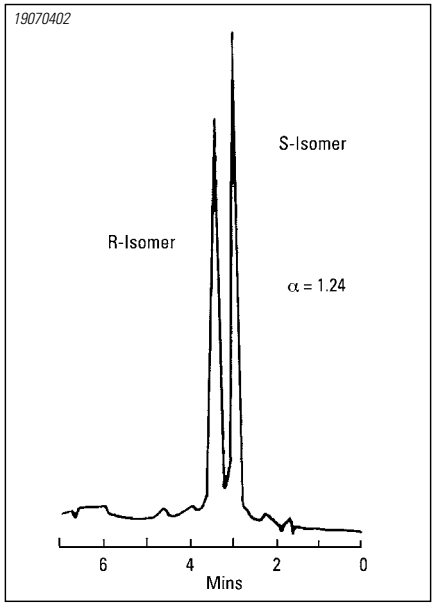


Column:	Hypercarb, 3µm, 100 x 2.1mm
Part Number:	35003-102130
Mobile Phase:	A: 0.1% NH_3 (aq) B: ACN
Isocratic:	90:10
Flow Rate:	0.15mL/min.
Detection:	- ESI
Temperature:	30°C

1. Fosfomycin (phosphomycin)



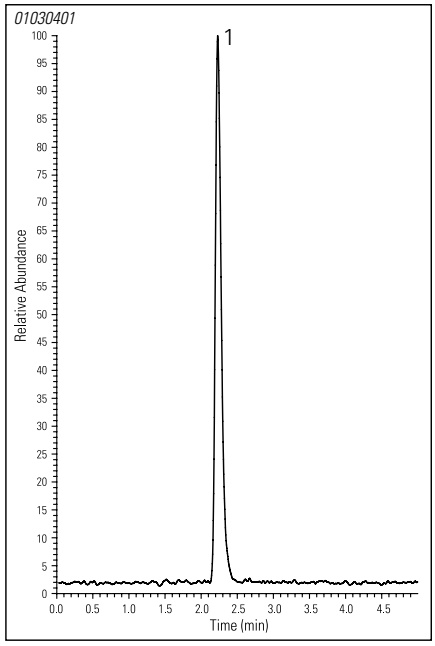
Metoprolol Tartrate



Column:	Hypercarb, 7µm, 100 x 4.6mm
Part Number:	35007-104630
Mobile Phase:	2.5mM L-ZGP + 0.4mM TEA in CH_2Cl_2
Flow Rate:	1mL/min.
Detection:	UV at 278nm
Source:	Dr. C. Petterson, University of Uppsala, Sweden

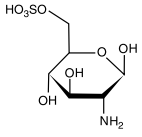
1. R-Metoprolol tartrate
2. S-Metoprolol tartrate

Glucosamine Sulfate

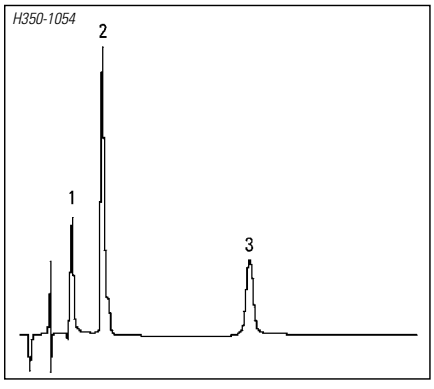


Column:	Hypercarb, 3µm, 100 x 2.1mm
Part Number:	35003-102130
Mobile Phase:	A: 0.1% NH_3 (aq) B: ACN
Isocratic:	50:50
Flow Rate:	0.2mL/min.
Detection:	- ESI
Temperature:	60°C

1. Glucosamine sulfate



Creatine in Serum

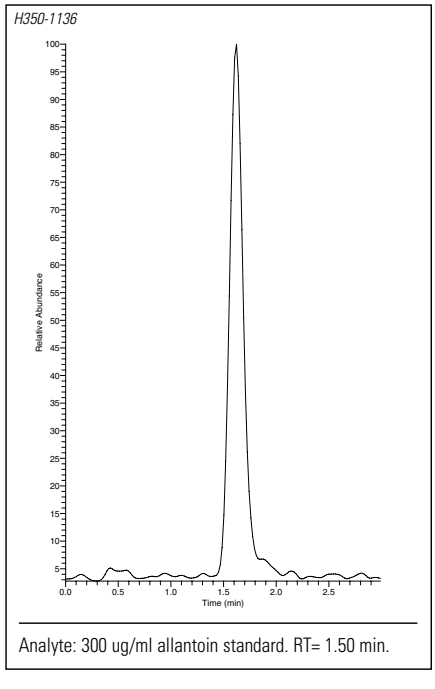


Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: ACN B: TFA C: H_2O
Isocratic:	3:0.1:96.9
Flow Rate:	1mL/min.
Detection:	UV at 210nm
Source:	C. Lim, IRC, Centre for Mechanism of Human Toxicity, Leicester, UK

1. Oxalic acid
2. Creatine
3. Creatinine

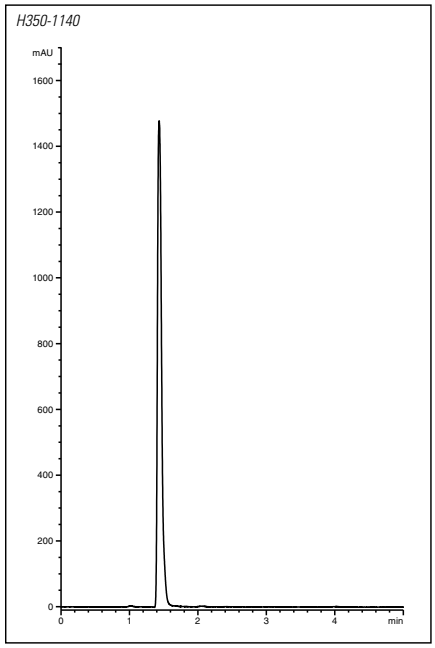
Allantoin (Reverse Phase Conditions)

Column:	Hypercarb, 3µm, 50 x 2.1mm
Part Number:	35003-052130
Mobile Phase:	A: H_2O+ 0.1 % formic acid; B: MeCN+ 0.1 % formic acid.
Isocratic:	95% A+5% B, run for 5 min.
Flow rate:	0.3mL/min.
Detection:	UV at 205nm; MS: ESI –ve, Cone V= 70, Probe T= 450, Needle V= 2.5 kV.
Temperature:	30°C
Injection volume:	5µL



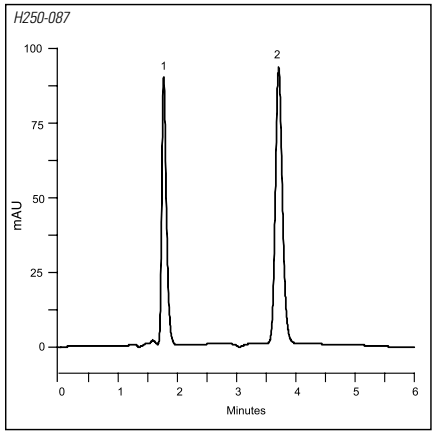
Analyte: 300 ug/ml allantoin standard. RT= 1.50 min.

Allantoin (HILIC Conditions)



Column:	Hypercarb, 5µm, 100 x 4.6mm
Eluent:	85% MeCN 15% water + 0.1% formic acid
Flow rate:	0.9mL/min.
Detection:	UV at 205nm
Temperature:	30°C
Injection volume:	20µL

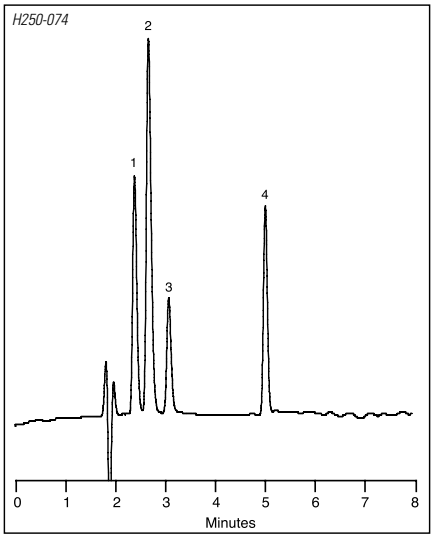
Antibacterials



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 20mM NH_4OAc pH 6 B: MeOH
Isocratic:	60:40
Flow Rate:	1.5mL/min.
Detection:	UV at 240nm
Temperature:	25°C

1. Chloramphenicol
2. Thiamphenicol

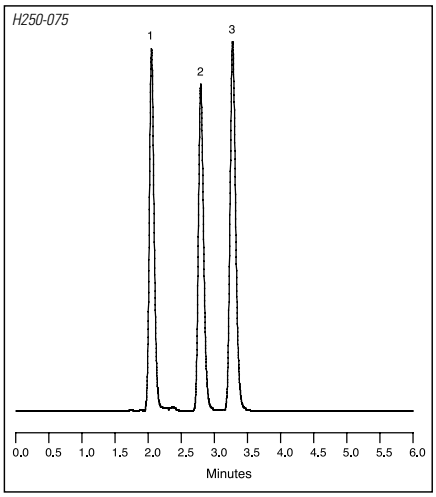
Anti-Inflammatory/ Analgesics



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% Formic acid B: ACN
Gradient:	55-100% B in 5 min.
Flow Rate:	1mL/min.
Detection:	UV at 220nm
Temperature:	25°C

1. Aspirin
2. Piroxicam
3. Sulindac
4. Ibuprofen

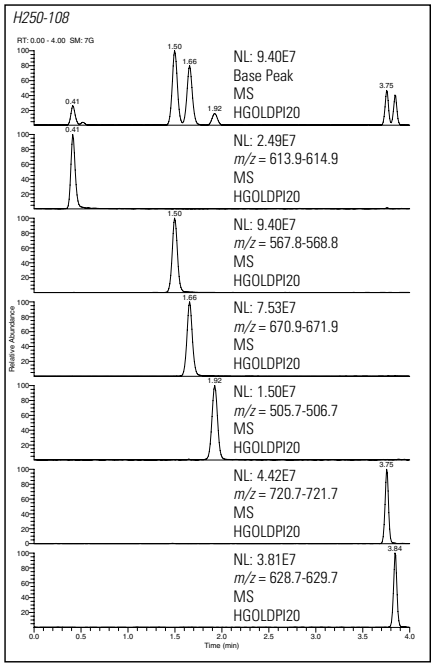
Estrogens



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% Formic acid B: ACN
Isocratic:	40:60
Flow Rate:	1mL/min.
Detection:	UV at 280nm
Temperature:	40°C

1. Estriol
2. Estradiol
3. Estrone

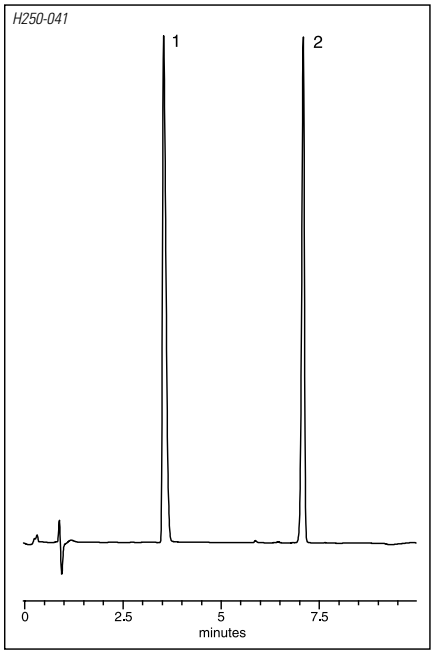
Protease Inhibitors



Column:	Hypersil GOLD, 1.9µm, 50 x 2.1mm
Part Number:	25002-052130
Mobile Phase:	A: H_2O+0.1% Formic Acid B: ACN+ 0.1% Formic Acid
Gradient:	0 – 2.2 min. at 35% then to 100% at 4mins
Flow Rate:	0.5 mL/min.
Temperature:	30°C
Detection:	+ ESI-MS
Instrumentation	- Finnigan™ Surveyor™ and Finnigan LCQ™ Deca

1. Indinavir
2. Nelfinavir
3. Saquinavir
4. Amprenavir
5. Ritonavir
6. Lopinavir

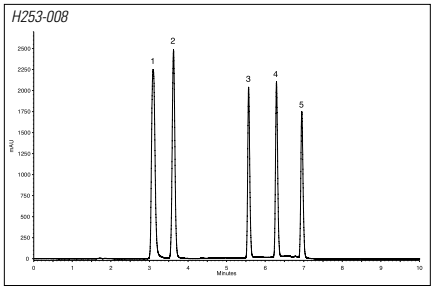
Platelet Aggregation Inhibitors



Column:	Hypersil GOLD, 5µm, 150 x 3.0mm
Part Number:	25005-153030
Mobile Phase:	A: 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	15 - 80% B in 10 min.
Flow Rate:	1mL/min.
Detection:	UV at 240nm
Temperature:	30°C

1. Ticlopidine hydrochloride
2. Clopidogrel hydrogensulphate

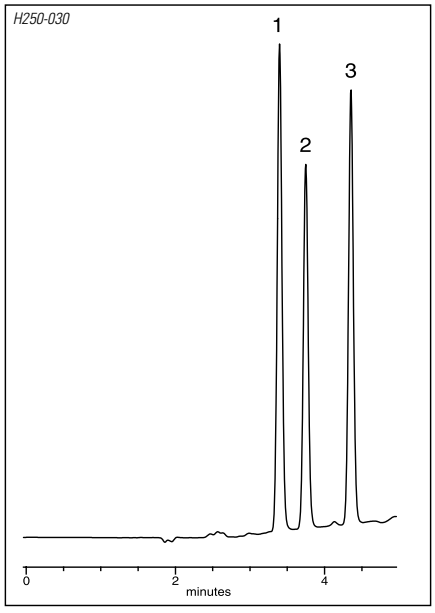
Xanthines



Column:	Hypersil GOLD aQ, 5µm, 150 x 4.6mm
Part Number:	25305-154630
Mobile Phase:	A: 50mM NaH_2PO_4 pH 2.5 B: MeOH
Gradient:	1 - 100% B in 10 min.
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	30°C

1. Hypoxanthine
2. Xanthine
3. Theobromine
4. Theophylline
5. Caffeine

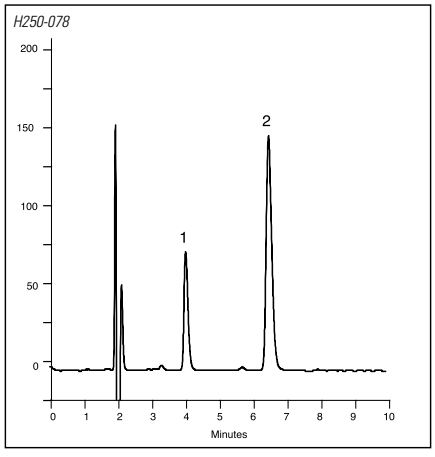
Anti-Infectives



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	50 - 100% B in 10 min.
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	30°C

1. Oxacillin
2. Cloxacillin
3. Dicloxacillin

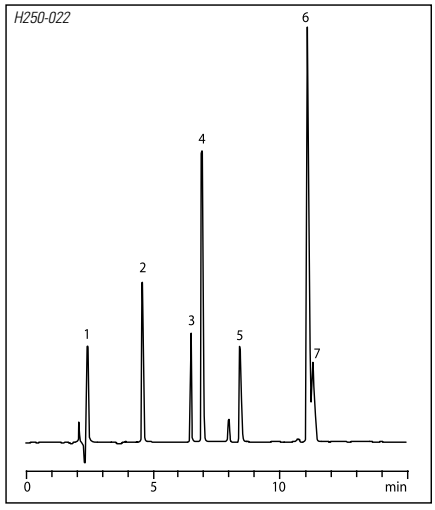
Antihistamines



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 20mM NH_4COOH, pH 3 B: ACN
Isocratic:	65:35
Flow Rate:	1mL/min.
Detection:	UV at 240nm
Temperature:	25°C

1. Cyclizine
2. Chlorocyclizine

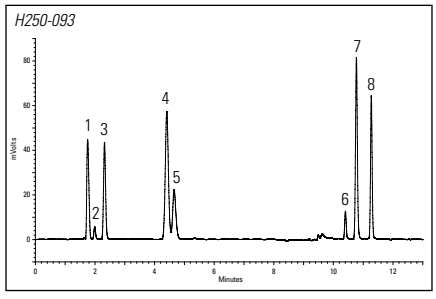
Beta Blockers



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	5 - 55% B in 15 min
Flow Rate:	1mL/min.
Detection:	UV at 220nm
Temperature:	25°C

1. Timolol
2. Atenolol
3. Nadolol
4. Pindolol
5. Metoprolol
6. Propranolol
7. Alprenolol

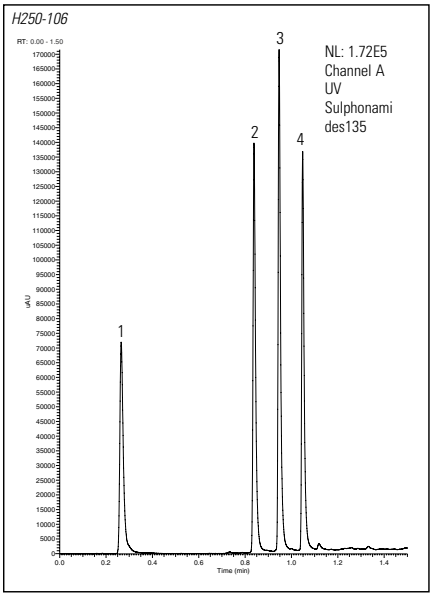
Cough and Cold Formulation



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm	
Part Number:	25005-154630	
Mobile Phase:	A: 20mM NH_4COOH at pH 3.0 B: MeOH	
Gradient:	Time (min)	% B
	0	10
	5	10
	10	70
Flow Rate:	1.5mL/min.	
Detection:	UV at 270nm	
Temperature:	25°C	

1. 4-Amino phenol
2. (chlorpheniramine) maleate
3. Phenylephrine
4. Acetaminophen
5. Saccharin
6. Impurity from 4-Amino phenol
7. 4-Nitro phenol
8. Chlorpheniramine

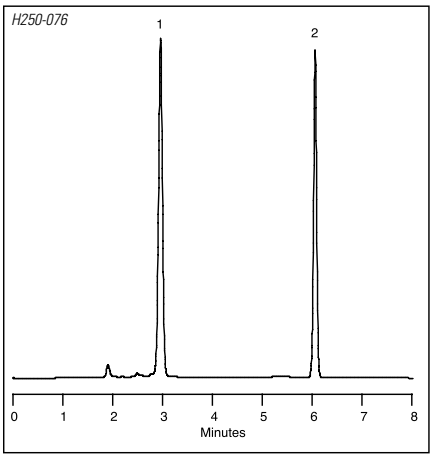
Sulfonamides



Column:	Hypersil GOLD, 1.9µm, 30 x 2.1mm
Part Number:	25002-032130
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	5 - 100% B in 1 min.
Flow Rate:	0.7mL/min.
Detection:	UV at 270nm
Temperature:	25°C
Injection volume:	0.5µL

1. Sulphaguanidine
2. Sulphamerazine
3. Sulphamonomethoxine
4. Sulphaquinoxaline

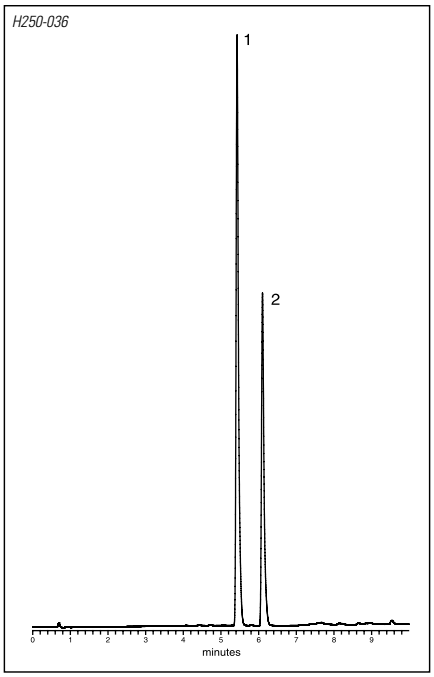
Cephalosporin C



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 20mM NH_4COOH, pH 3 B: ACN
Gradient:	5 - 90% B in 15 min.
Flow Rate:	1.25mL/min.
Detection:	UV at 254nm
Temperature:	25°C

1. Cephalosporin C
2. Cephaloridine

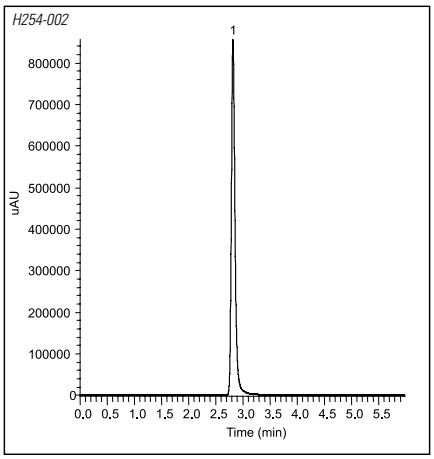
Prazoles



Column:	Hypersil GOLD, 5µm, 50 x 2.1mm
Part Number:	25005-052130
Mobile Phase:	A: 50mM NH_4OAc at pH 9.0 B: ACN
Gradient:	5 - 100% B in 10 min
Flow Rate:	0.2mL/min
Detection:	UV at 254nm
Temperature:	30°C

1. Omeprazole
2. Lansoprazole

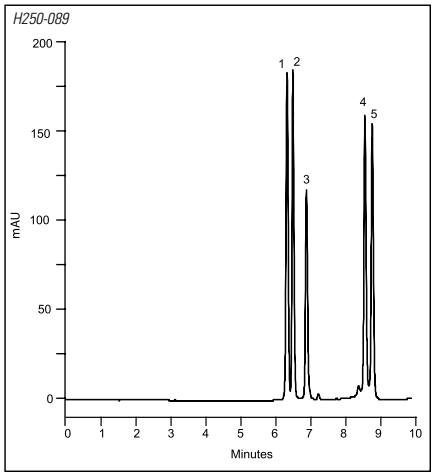
Metformin



Column:	Hypersil GOLD PFP, 5µm, 150 x 4.6mm
Part Number:	25405-154630
Mobile Phase:	A: 20mM NH_4OAc at pH 8.0 B: ACN
Isocratic:	90:10
Flow Rate:	1mL/min.
Detection:	UV at 236nm
Temperature:	40°C

1. Metformin (1,1-Dimethylbiguanide hydrochloride)

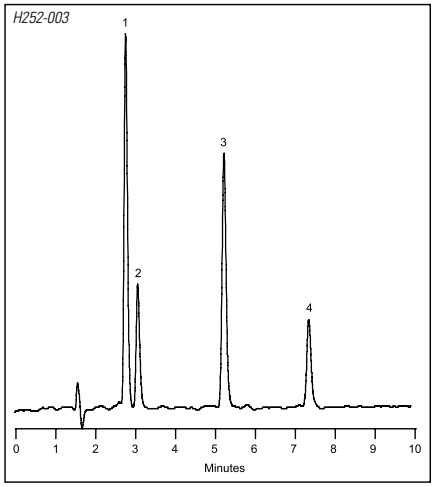
Tetracyclines



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% Formic acid B: ACN
Gradient:	10 - 40% B in 10 min.
Flow Rate:	1.5mL/min.
Detection:	UV at 350nm
Temperature:	25°C

1. Oxytetracycline
2. Epi-tetracycline
3. Tetracycline
4. Methacycline
5. Doxycycline

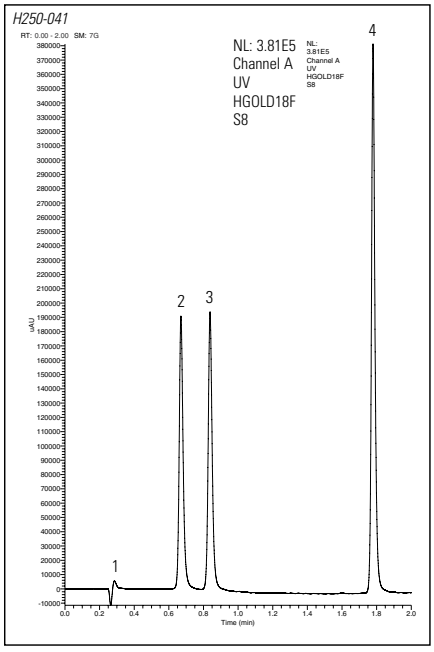
Carbamazepines



Column:	Hypersil GOLD C8, 5µm, 150 x 4.6mm
Part Number:	25205-154630
Mobile Phase:	A: 20 mM NH_4OAc pH 4 B: MeOH
Gradient:	60-80% B in 10 min.
Flow Rate:	1.25mL/min.
Detection:	UV at 230nm
Temperature:	25°C

1. Carbamazepine
2. 10,11-Dihydrocarbamazepine
3. Iminostilbene
4. Iminodibenzyl

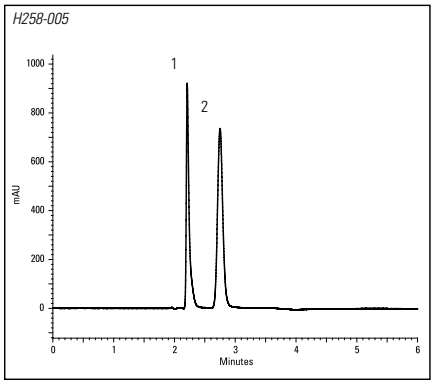
Fluorinated Steroids



Column:	Hypersil GOLD, 1.9µm, 50 x 2.1mm
Part Number:	25002-052130
Mobile Phase:	A: H_2O B: ACN
Gradient:	40 - 80% B in 2 mins.
Flow Rate:	0.5mL/min.
Detection:	UV at 254nm (2µL Flow Cell)
Temperature:	25°C
Injection volume:	0.5µL

1. Fluoxymesterone
2. Fluorometholone
3. Fluticasone Propionate

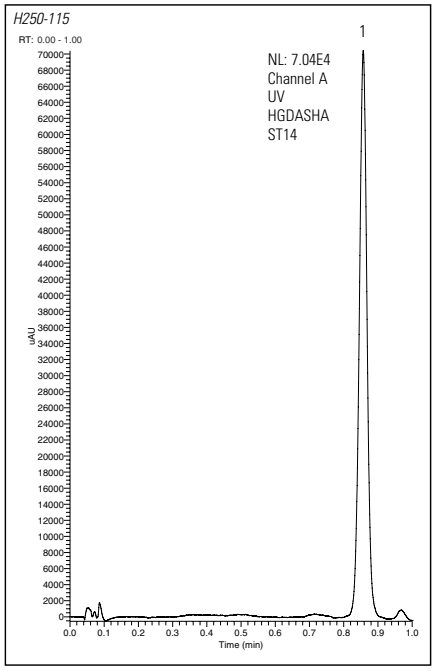
Tuberculostatics



Column:	Hypersil GOLD CN, 5µm, 150 x 4.6mm
Part Number:	25805-154630
Mobile Phase:	A: 20mM NH_4COOH at pH 3 B: ACN
Gradient:	0 - 20% B in 15 min.
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25 °C

1. Isoniazid
2. Pyrazinamide

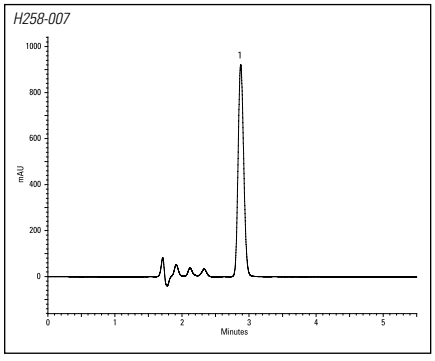
Astaxanthin



Column:	DASH HTS, Hypersil GOLD, 5µm, 20 x 2.1mm
Part Number:	25005-022151
Mobile Phase:	A: H_2O B: MeOH
Gradient:	75 - 100% B in 1 min.
Flow Rate:	1mL/min.
Detection:	UV at 472nm (2µL Flow Cell)
Temperature:	30°C
Injection volume:	10µL

1. Astaxanthin

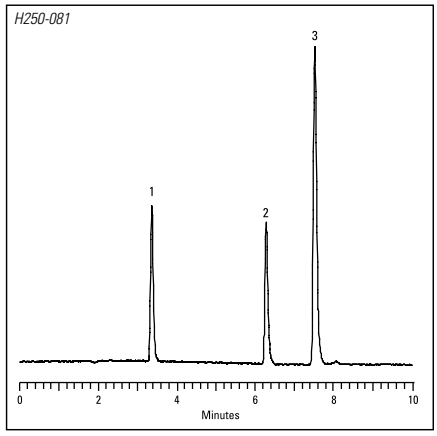
Penicillin V Tablet



Column:	Hypersil GOLD CN, 5µm, 150 x 4.6mm
Part Number:	25805-154630
Mobile Phase:	A: 10 mM KH_2PO_4 at pH 3 B: ACN
Isocratic:	70:30
Flow Rate:	1.25mL/min.
Detection:	UV at 220nm
Temperature:	25°C

1. Penicillin V

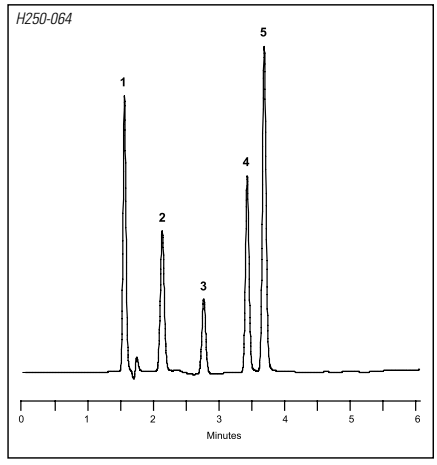
Analgesics



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: H_2O/MeOH (70:30) + 0.1% Formic acid B: H_2O/MeOH (20:80) + 0.1% Formic acid
Gradient:	0-100% B in 15 min.
Flow Rate:	1.5mL/min.
Detection:	UV at 220nm
Temperature:	40°C

1. Caffeine
2. Acetylsalicylic Acid
3. Bucetin

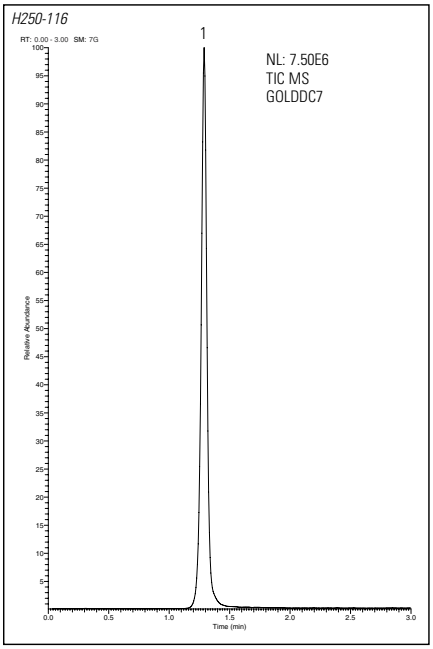
Procainamides



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.05 M NH_4COOH, pH 3.5 B: ACN
Gradient:	10 - 50% B in 10 min.
Flow Rate:	1.5mL/min.
Detection:	UV at 254nm
Temperature:	25°C

1. Uracil
2. Procainamide
3. Acetyl-Procainamide
4. Caffeine
5. Propionyl Procainamide

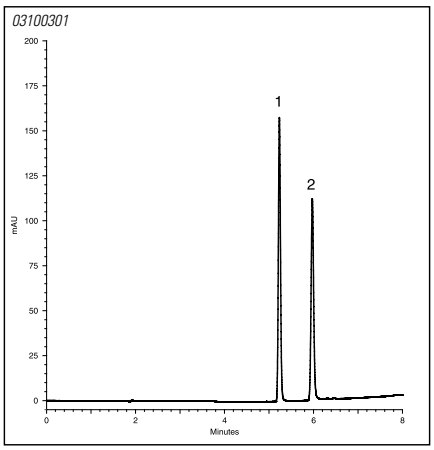
Dequalinium Chloride



Column:	Hypersil GOLD, 5µm, 50 x 2.1mm
Part Number:	25005-052130
Mobile Phase:	A: H_2O + 0.1% TFA B: MeCN + 0.1% TFA
Gradient:	30 - 80% B in 3 min.
Flow Rate:	500mL/min.
Detection:	+ve ESI, SIM
Temperature:	45°C
Injection volume:	1µL

1. Dequalinium Chloride

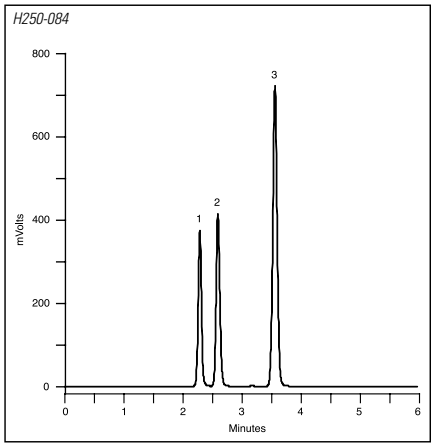
5-Fluorouracil



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	10 - 100% B in 10 min.
Flow Rate:	0.8mL/min.
Detection:	UV at 260nm
Temperature:	30°C

1. Uracil
2. 5-Fluorouracil

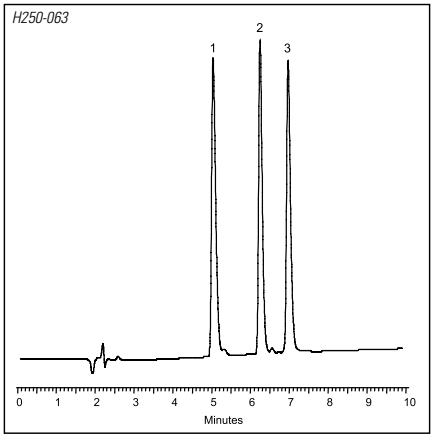
Anaesthetics



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.05M KH_2PO_4, pH 3 B: ACN
Isocratic:	50:50
Flow Rate:	1.25mL/min.
Detection:	UV at 220nm
Temperature:	25°C

1. Lidocaine
2. Tetracaine
3. Benzocaine

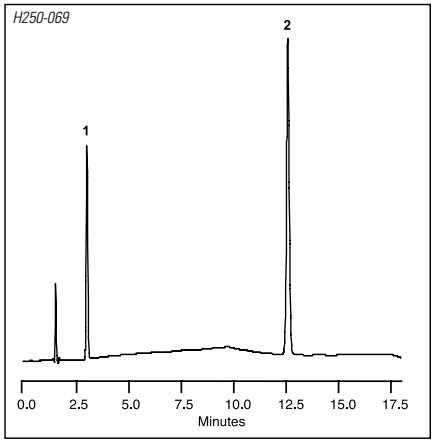
Angiotensins



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.01% TFA B: 0.01% TFA in ACN
Gradient:	15 - 70% B in 20 min.
Flow Rate:	1mL/min.
Detection:	UV at 230nm
Temperature:	25°C

1. Angiotensin III
2. Angiotensin II
3. Angiotensin I

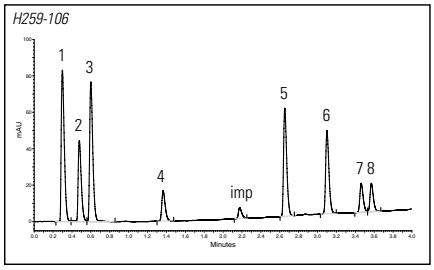
Antihistamines



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm	
Part Number:	25005-154630	
Mobile Phase:	A: 0.05M NH_4COOH, pH 3 B: ACN	
Gradient:	Time (min)	%B
	0	10
	15	25
	20	10
Flow Rate:	1.2mL/min.	
Detection:	UV at 260nm	
Temperature:	25°C	

1. Pseudoephedrine HCl
2. Chlorpheniramine Maleate

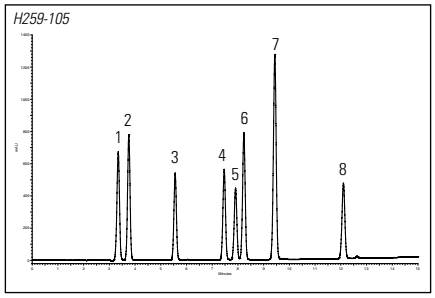
Antidepressants



Column:	Hypersil GOLD Phenyl, 1.9µm, 50 x 2.1mm
Part Number:	25902-052130
Mobile Phase:	A: 0.1% Formic acid B: 0.1% Formic acid in MeCN
Gradient:	10 - 60% B in 3.4 min. 60 - 90% B in 0.24 min.
Flow Rate:	0.5mL/min.
Detection:	UV at 225 and 254nm
Temperature:	60°C
Injection volume:	0.7µL

1. Uracil
2. Acetaminophen
3. p-Hydroxybenzoic acid
4. o-Hydroxybenzoic acid
5. Oxazepam
6. Diazepam
7. Di-isopropyl phthalate
8. Di-n-propyl phthalate

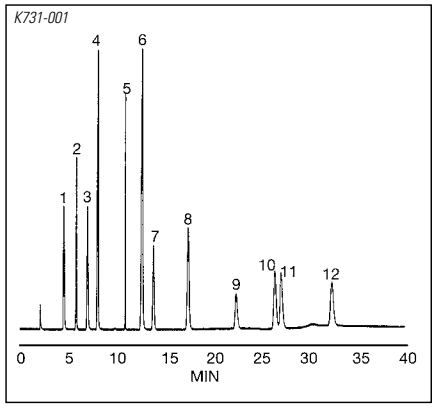
Antibacterials



Column:	Hypersil GOLD Phenyl, 5µm, 150 x 4.6mm
Part Number:	25905-154630
Mobile Phase:	A: 20mM KH2PO4, pH 2.5 B: MeCN
Gradient:	20 - 50% B in 15min.
Flow Rate:	1mL/min.
Detection:	UV at 225nm
Temperature:	30°C
Injection volume:	5µL

1. Carbadox
2. Thiamphenicol
3. Furazolidone
4. Oxolinic Acid
5. Sulfadimethoxine
6. Sulfaquinoxaline
7. Nalidixic Acid
8. Piromidic Acid

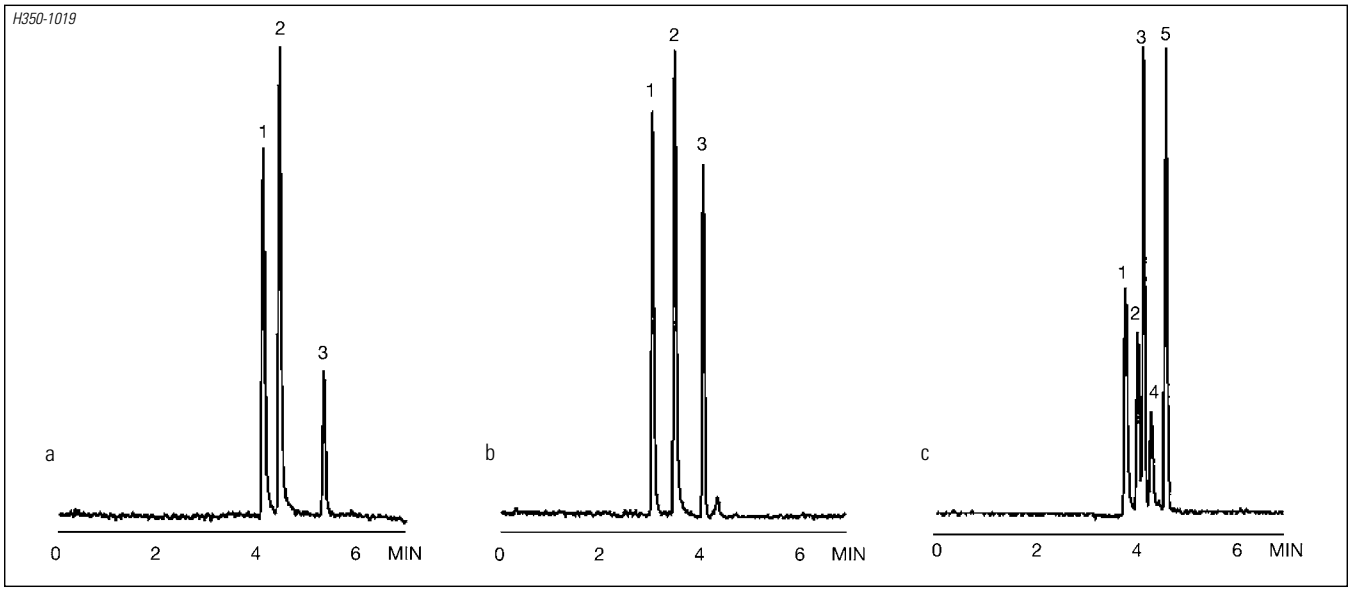
Nucleotides



Column:	BioBasic AX, 5µm, 150 x 4.6mm
Part Number:	73105-154630
Mobile Phase:	A: 5mM KH_2PO_4 at pH 3.2 B: 750mM KH_2PO_4 at pH 3.2
Gradient:	0 - 100% B in 30 min.
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25°C

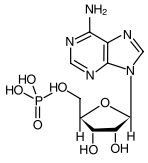
1. Cytidine-3-monophosphate
2. Uridine-5-monophosphate
3. Adenosine-5-monophosphate
4. Guanosine-5-monophosphate
5. Cytidine-5-diphosphate
6. Adenosine-5-diphosphate
7. Uridine-5-diphosphate
8. Guanosine-5-diphosphate
9. Cytidine-5-triphosphate
10. Adensosine-5-triphosphate
11. Uridine-5-triphosphate
12. Guanosine-5-triphosphate

Ribonucleotides

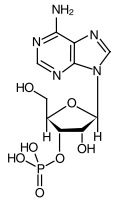


Column:	Hypercarb, 5µm, 30 x 3.0mm
Part Number:	35005-033030
Mobile Phase:	A: 50mM NH_4OAc at pH 6.0 B: ACN
Gradient:	5 t- 70% B in 7 min.
Flow Rate:	0.5mL/min.
Detection:	+ ESI

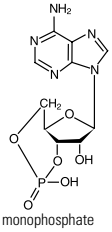
a 1. Adenosine 5'- monophosphate



2. Adenosine 3'- monophosphate



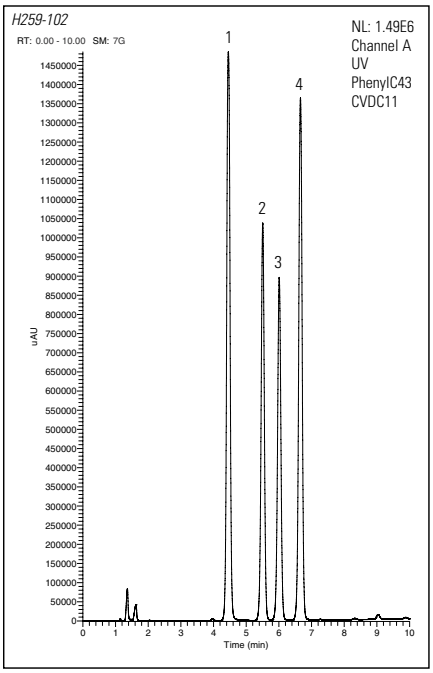
3. Adenosine 3', 5'- cyclic monophosphate



b 1. Cytidine 5'- monophosphate
2. Cytidine 3'- monophosphate
3. Cytidine 3', 5'- cyclic monophosphate

c 1. Guanosine 5'- monophosphate
2. Guanosine 3'- monophosphate
3. Guanosine 2',3'- cyclic monophosphate
4. Guanosine 2'- monophosphate
5. Guanosine 3', 5'- cyclic monophosphate

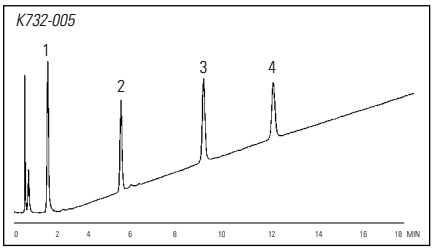
Veterinary Drug Coccidiostats



Column:	Hypersil GOLD Phenyl, 5µm, 150 x 4.6mm
Part Number:	25905-154630
Mobile Phase:	A: H2O B: MeOH
Gradient:	40 - 70% B in 10mins.
Flow Rate:	1mL/min.
Detection:	UV at 260 and 254nm
Temperature:	25°C
Injection volume:	5µL

1. 4-amino-3,5-dinitrobenzamide
2. Zoalene (3,5-nitro-o-toluamide)
3. Nitromid (3,5-dinitrobenzamide)
4. Ethopabate

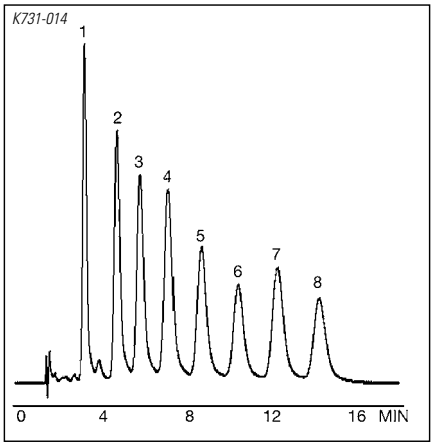
Substituted Peptides



Column:	BioBasic SCX, 5µm, 50 x 4.6mm
Part Number:	73205-054630
Mobile Phase:	A: 10mM KH_2PO_4 in 25% ACN at pH 4.8 (phosphoric acid) B: A + 0.5M NaCl
Gradient:	0 - 50% B in 20 min.
Flow Rate:	1mL/min.
Detection:	UV at 210nm

1. Ac-G-G-G-L-G-G-A-G-G-L-K-amide
2. Ac-K-Y-G-L-G-G-A-G-G-L-K-amide
3. Ac-G-G-A-L-K-A-L-K-G-L-K-amide
4. Ac-K-Y-A-L-K-A-L-K-G-L-K-amide

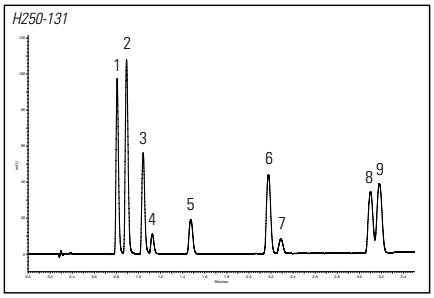
Oligonucleotides



Column:	BioBasic AX, 5µm, 50 x 4.6mm
Part Number:	73105-054630
Mobile Phase:	A: 5mM KH_2PO_4 at pH 7.2 B: 150mM KH_2PO_4 at pH 7.2
Gradient:	75 - 100% B in 15 min.
Flow Rate:	0.4mL/min.
Detection:	UV at 265nm

1. 10-mer
2. 12-mer
3. 13-mer
4. 14-mer
5. 15-mer
6. 16-mer
7. 17-mer
8. 18-mer

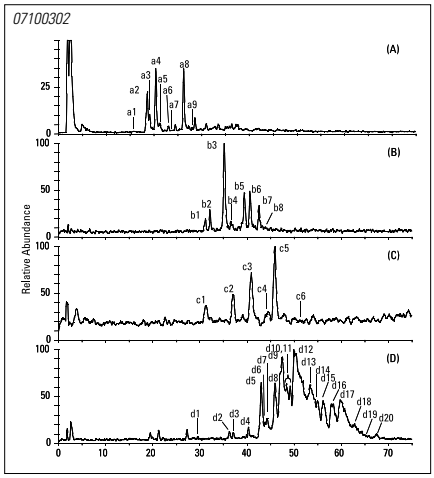
Preservatives



Column:	Hypersil Gold, 1.9µm, 100 x 2.1mm	
Part Number:	25002-102130	
Mobile Phase:	A: 0.05% Phosphoric Acid (Aqueous) B: Acetonitrile	
Gradient:	Time (min)	% B
	0	25
	0.2	25
	2.5	40
	4	44
Flow Rate:	1000mL/min.	
Detection:	UV at 280nm	
Temperature:	40ºC	
Injection volume:	0.5µl	

1.Phenoxyethanol
2.Methylparaben
3.Dehydroacetate,
4.Chlorphenesin
5.Ethylparaben
6.Isopropylparaben,
7.Propylparaben
8.Isobutylparaben
9.Butylparaben.

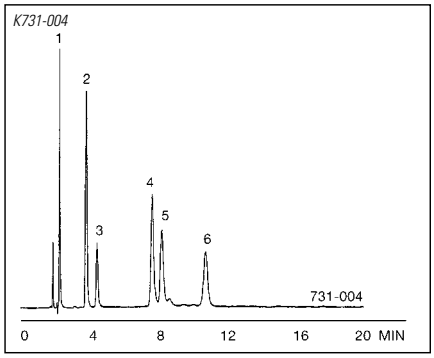
Oligosaccharides from a Glycoprotein



Column:	Hypercarb, 5m, 100 x 1.0m
Part Number:	35005-101030
Mobile Phase:	A: 5mM NH_4OAc at pH 9.6 + 2% ACN B: 5mM NH_4OAc at pH 9.6 + 80% ACN
Gradient:	5 - 40% B in 80 min.
Flow Rate:	50µL/min.
Detection:	+ ESI
Source:	Nana Kawasaki, National Institute of Health Science, Tokyo, Japan

Reduced N-linked oligosaccharides from:
(A) RNase B
(B) Desialylated rhEPO
(C) Fetuin
(D) Sialylated rhEPO

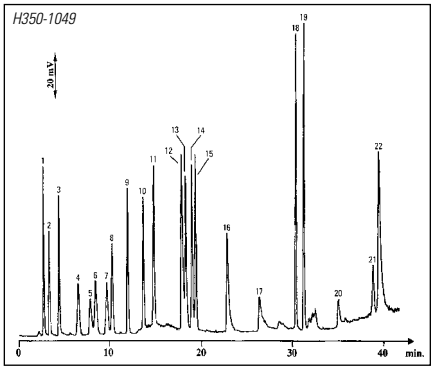
Antibiotics



Column:	BioBasic AX, 5µm, 150 x 4.6mm
Part Number:	73105-154630
Mobile Phase:	A: 10mM NH_4OAc B: ACN
Isocratic:	90:10
Flow Rate:	1mL/min
Detection:	UV at 220nm
Temperature:	35°C

1. Cephaloridine
2. Amoxicillin
3. Ampicillin
4. Cephalosporin C
5. N-acetylpenicillamine
6. Penicillin G

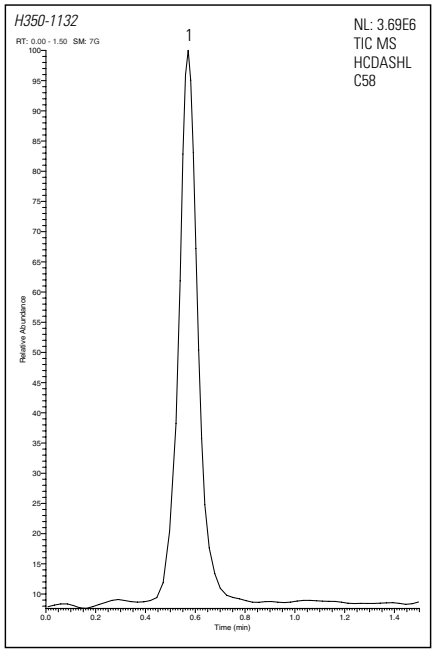
Underivatized Amino Acids



Column:	Hypercarb, 5µm, 100 x 2.1mm
Part Number:	35005-102130
Mobile Phase:	A: 20mM Nonafluoropentanoic acid (NFPA) (aq) B: ACN
Gradient:	Time (min) % B 0 0 10 15 20 26 30 50
Flow Rate:	0.2mL/min.
Detection:	ELSD (55 °C, 2.2 bar)
Temperature:	10°C
Source:	Prof. Dreux, Univ. D'Orleans, France

1. Glycine
2. Serine
3. Alanine
4. Threonine
5. Cysteine
6. Asparagine
7. Aspartic acid
8. Proline
9. Glutamine
10. Glutamic acid
11. Valine
12. Lysine
13. Leucine
14. Methionine
15. Isoleucine
16. Histidine
17. Arginine
18. Phenylalanine
19. Tyrosine
20. Impurity
21. Impurity
22. Tryptophan

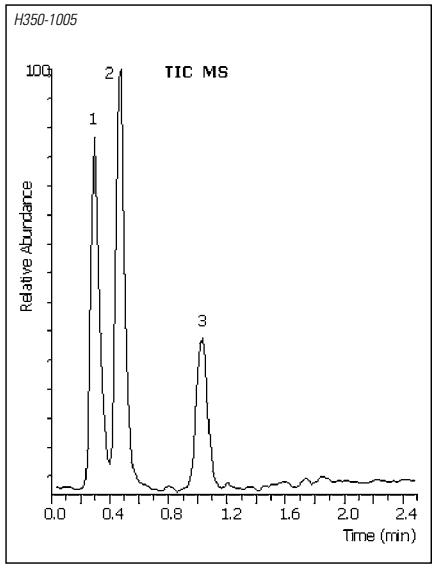
L-Carnitine



Column:	Hypercarb DASH HTS, 5µm, 20 x 2.1mm
Part Number:	35005-022150
Mobile Phase:	H_2O + 0.1% TFA
Gradient:	0 - 100% B in 60 min.
Flow Rate:	0.5mL/min.
Detection:	MS, +ve ESI
Temperature:	30°C
Injection volume:	0.5µL

1. L-Carnitnine

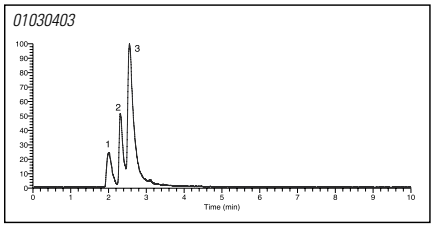
Catecholamines



Column:	Hypercarb, 5µm, 50 x 2.1mm
Part Number:	35005-052130
Mobile Phase:	A: H_2O + 0.5% Formic acid B: ACN + 0.5% Formic acid
Gradient:	13 - 50% B in 2 min.
Flow Rate:	0.4mL/min.
Detection:	+ ESI
Temperature:	25°C

1. Adrenaline
2. Dopamine
3. L-Dopa

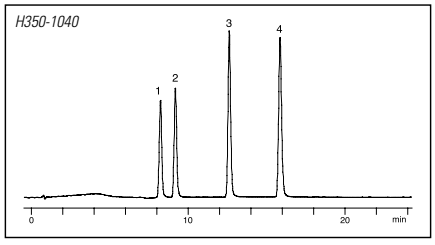
Arginine and Methylated Arginines



Column:	Hypercarb, 3µm, 100 x 2.1mm
Part Number:	35003-102130
Mobile Phase:	A: 10mM NH_4COOH at pH 3.5 B: ACN
Gradient:	10 t- 50% B in 10 min.
Flow Rate:	150µL/min.
Detection:	+ ESI
Temperature:	40°C

1. L-arginine
2. Methyl-L-arginine
3. Asymmetrical dimethyl arginine

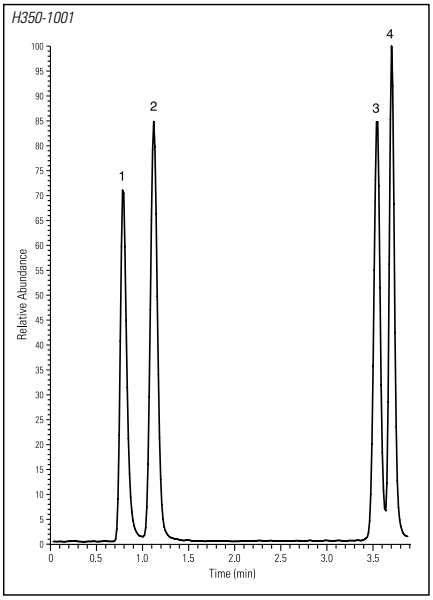
Nucleoside 3', 5'-Cyclic Monophosphates



Column:	Hypercarb, 5µm, 100 x 0.32mm
Part Number:	35005-100365
Mobile Phase:	A: 20mM NH_4OAc pH 5.5 B: ACN
Gradient:	10 - 30% B in 15 min.
Flow Rate:	6µL/min.
Detection:	UV at 254nm

1. 3',5'-cCMP
2. 3',5'-cUMP
3. 3',5'-cGMP
4. 3',5'-cAMP

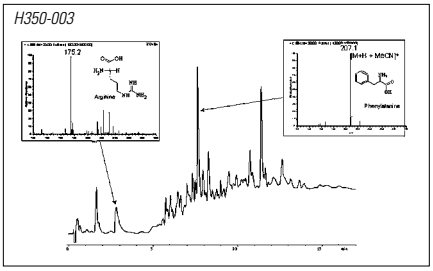
Nucleosides



Column:	Hypercarb, 5µm, 50 x 2.1mm
Part Number:	35005-052130
Mobile Phase:	A: H_2O B: ACN
Gradient:	15 - 100% B in 2 min.
Flow Rate:	0.4mL/min.
Detection:	- ESI
Temperature:	25°C

1. Cytidine
2. Uridine
3. Guanosine
4. Adenosine

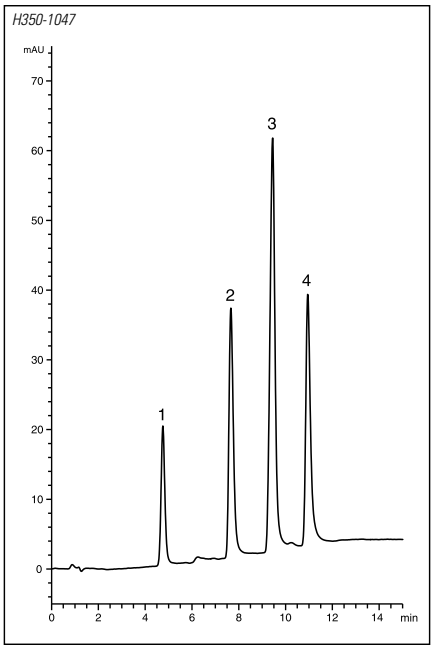
Tryptic Digest of Casein



Column:	Hypercarb, 5µm, 50 x 2.1mm
Part Number:	35005-052130
Mobile Phase:	A: H_2O + 0.05% TFA B: ACN:H_2O (9:1) + 0.035% TFA
Gradient:	Time (min) % B 0 0 3 0 23 90
Flow Rate:	0.7mL/min.
Detection:	UV at 195nm; +ESI
Temperature:	25°C

Casein Tryptic Digest

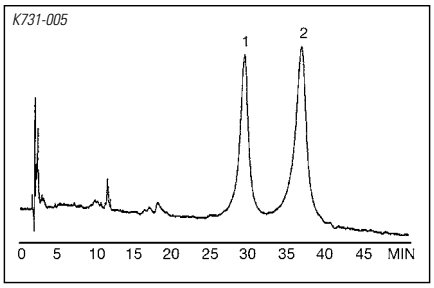
2'-Deoxynucleoside 5'-Monophosphates



Column:	Hypercarb, 5µm, 100 x 0.32mm
Part Number:	35005-100365
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	10 - 30% B in 10 min.
Flow Rate:	6µL/min.
Detection:	UV at 254nm
Temperature:	25°C

1. dCMP
2. dUMP
3. dAMP
4. dGMP

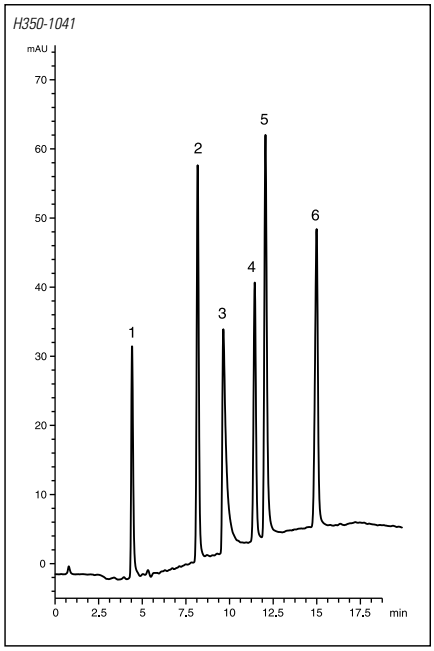
Proteins



Column:	BioBasic AX, 5µm, 150 x 4.6mm
Part Number:	73105-154630
Mobile Phase:	A: 20mM Tris buffer at pH 6 B: A + 1M NaOAc at pH 6
Gradient:	0 - 100% B in 40 min.
Flow Rate:	1mL/min.
Detection:	UV at 280nm

1. β-lactoglobulin B
2. β-lactoglobulin A

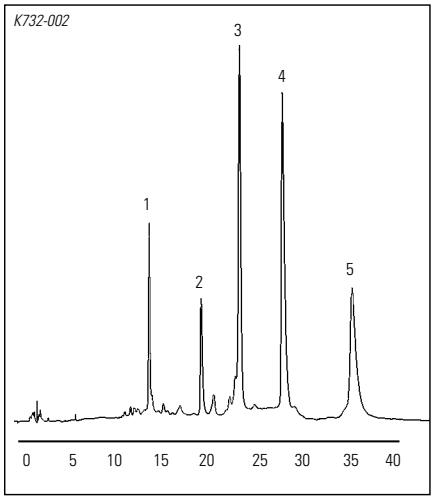
Purines and Pyrimidines



Column:	Hypercarb, 5µm, 100 x 0.32mm
Part Number:	35005-100365
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	0 - 25% B in 15 min.
Flow Rate:	8µL/min.
Detection:	UV at 254nm

1. Cytosine
2. Uracil
3. Guanine
4. Adenine
5. Xanthine
6. Thymine

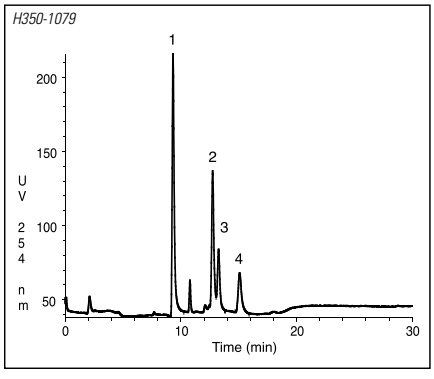
Proteins



Column:	BioBasic SCX, 5µm, 150 x 4.6mm
Part Number:	73205-154630
Mobile Phase:	A: 20mM Tris buffer at pH 6 B: A + 1.0M sodium acetate at pH 6
Gradient:	0 - 100% B in 60 min.
Flow Rate:	1mL/min.
Detection:	UV at 280nm

1. Trypsinogen
2. Ribonuclease A
3. Chymptrypsinogen A
4. Cytochrome C
5. Lysozyme

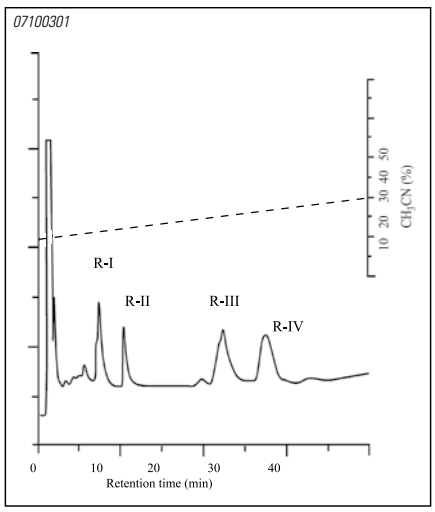
Choline Derivatized Nucleotides



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: H_2O + 0.1% TFA B: H_2O:ACN (20:80) + 0.085% TFA
Gradient:	0 - 100% B in 30 min.
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	37°C
Source:	Günter Lochnit, Institute de Biochimie, Université de Justus-Liebig, Giessen

1. CDP-choline
2. GDP-choline
3. UDP-choline
4. ADP-choline

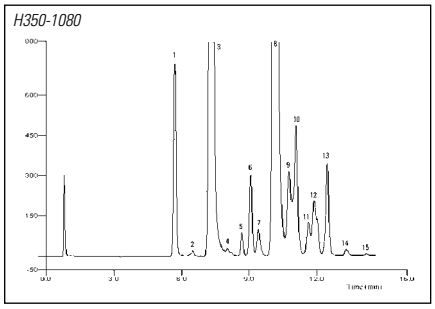
RNB-Glycopeptides



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: H_2O B: ACN
Gradient:	10 - 50% B in 50 min.
Flow Rate:	1mL/min.
Detection:	UV at 210nm
Temperature:	40°C
Source:	J. Fan and A. Kondo, Anal. Biochem. 219, 224 (1994). Reproduced with permission

1. R-I ($Man_6GlcNAc_2Asn$)
2. R-II ($Man_5GlcNAc_2Asn$)
3. R-III ($Man_5GlcNAc_2AsnLeu$)
4. R-IV ($Man_5GlcNAc_2AsnLeu$)

Ceramides

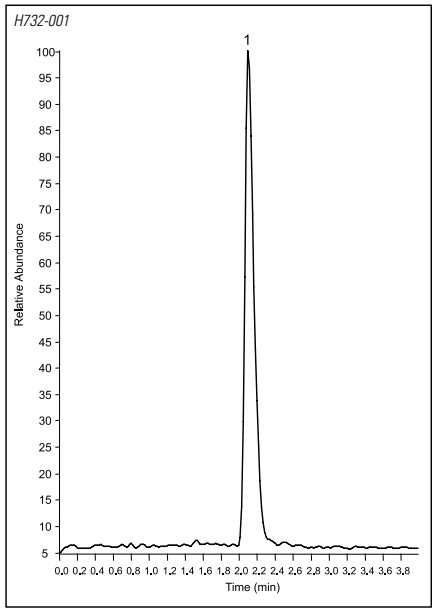


Column:	Hypercarb, 5µm, 100 x 2.1mm
Part Number:	35005-102130
Mobile Phase:	A: MeOH B: $CHCl_3$
Gradient:	45 - 80% B in 15 min.
Flow Rate:	0.4mL/min.
Detection:	ELSD
Temperature:	50°C
Source:	K. Gaudin, Laboratoire de Chimie Analytique, Université Paris Sud, France

Ceramides:

1. d18:1c16:0
2. d18:0c16:0
3. d18:1c18:0
4. d18:0c18:0
5. d18:1c22:1
6. d18:1c20:0
7. d18:1c23:1
8. d18:1c24:1
9. d18:1c22:0
10. d18:1c25:1
11. d18:1c23:0
12. d18:1c26:1
13. d18:1c24:0
14. d18:1c25:0
15. d18:1c26:0

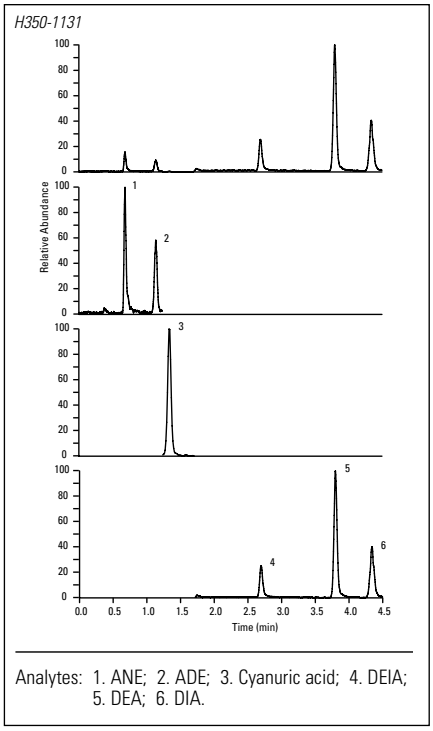
Betaine – A Hepatosupressant



Column:	BioBasic SCX, 5µm, 150 x 4.6mm
Part Number:	73205-154630
Mobile Phase:	A: 100mM ammonium acetate, pH 4.0 B: ACN
Isocratic:	98:2
Flow Rate:	1.0mL/min.
Detection:	MS +ESI
Temperature:	25°C

1. Betaine

Polar Micro Pollutants in Environmental Waters



Analytes: 1. ANE; 2. ADE; 3. Cyanuric acid; 4. DEIA; 5. DEA; 6. DIA.

Figure 1: LC/ESI/MS trace for standard solution containing the six pollutants.

SPE

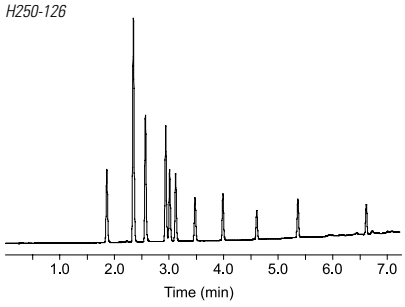
Compounds:	ANE, ADE, DEIA, DEA, DIA, Cyanuric acid
Phase:	HyperSep Hypercarb
Part Number:	60106-402
Volume:	6mL
Bed Weight:	500mg
Conditioning:	10mL MeOH followed by 10mL H_2O, vacuum at 3mm Hg
Application:	500mL, vacuum at 10mm Hg
Elution:	6mL (MeOH/THF, 1:1) + 0.1% TFA (stand for 1 min, vacuum at 3mm Hg), 6mL (MeOH/THF, 1:1) + 0.1% TFA (vacuum at 3mm Hg).

The sample was dried under nitrogen and re-dissolved in 1 mL of H_2O.

LC/ESI/MS

Column:	Hypercarb 5µm, 100 x 2.1mm
Part Number:	35005-102130
Instruments:	Surveyor HPLC and LCQ Deca MS
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	10 - 100% B in 10 min.
Flow Rate:	0.2mL/min.
Injection Volume:	10µL
Detection:	+ ESI (SIM MS ([M + H]+) for ANE, ADE, DEIA, DEA, DIA; - ESI ([M - H]-) for cyanuric acid
Temperature:	68°C

Priority Phenolic Pollutants

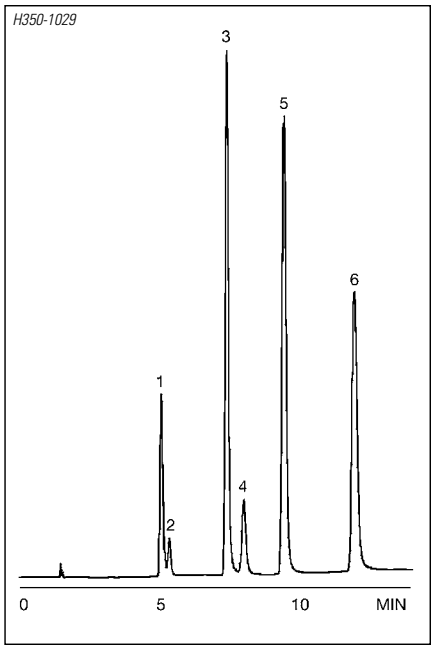


Analytes:
1. Phenol
2. 4-Nitrophenol
3. 2,4-Dinitrophenol
4. 2-Nitrophenol
5. 4-Methylphenol
6. 4-Chlorophenol
7. 2-Chlorophenol
8. 2,4-Dimethylphenol
9. 2,4-Dichlorophenol
10. 2,4,6-Trimethylphenol
11. Pentachlorophenol.

Prepared in Water: Methanol (95:5) at approx. 5 ppm.

Instrument:	Accela High Speed LC
Column:	Hypersil GOLD 1.9µm, 100 x 2.1mm
Part Number:	25002-102130
Mobile Phase:	A: H_2O + 0.1% acetic acid B: MeOH + 0.1% acetic acid
Gradient:	5% B (Hold for 0.6 min.) to 95%B on 7.8 min. (Hold for 0.6 min.)
Flow Rate:	1.0mL/min.
Injection Volume:	1µL
Detection:	UV diode array (270-320nm)
Temperature:	60°C

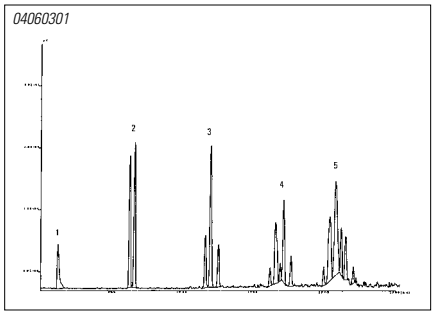
Triazines



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: H_2O B: ACN:IPA (1:3)
Gradient:	35- 95% B in 10 min.
Flow Rate:	1mL/min.
Detection:	UV at 240nm
Temperature:	60°C

1. Prometon
2. Propazine
3. Prometryn
4. Simazine
5. Ametryn
6. Simetryn

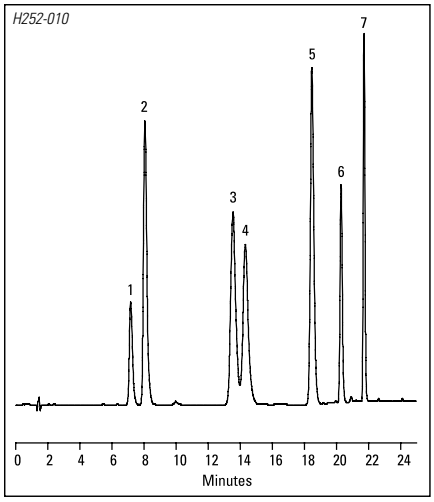
Linear Oligoglycerols



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: H_2O
	B: ACN
Gradient:	0 - 30% B in 30 min.
Flow Rate:	1mL/min.
Detection:	ELSD
Source:	Mr. Lafosse, ICOA Orléans, and Mme. Debaig, ENSCR Rennes, France

1. NaCl
2. Diglycerols
3. Triglycerols
4. Tetraglycerols
5. Pentaglycerols

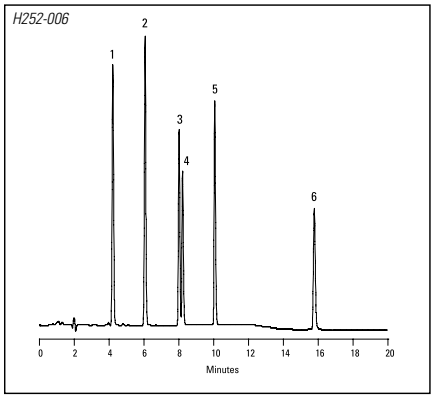
Triazine and Uron Herbicides



Column:	Hypersil GOLD C8, 5µm, 150 x 4.6mm
Part Number:	25205-154630
Mobile Phase:	A: H_2O B: ACN
Gradient:	Time (min) % B 0 20 15 23 25 75
Flow Rate:	1.5mL/min.
Detection:	UV at 240nm
Temperature:	25°C

1. Simazine
2. Monuron
3. Chlorotoluron
4. Atrazine
5. Diuron
6. Propazine
7. Linuron

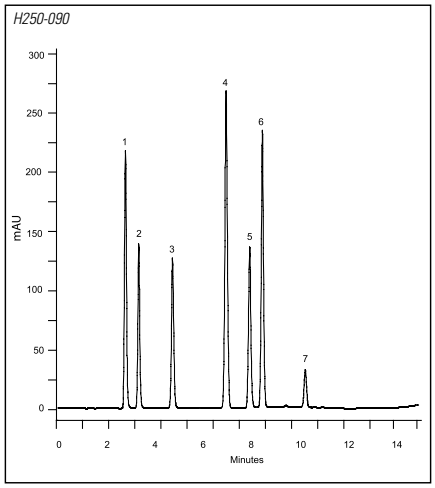
Phthalates



Column:	Hypersil GOLD C8, 5µm, 150 x 4.6mm
Part Number:	25205-154630
Mobile Phase:	A: H_2O B: ACN
Gradient:	60 to 90% B in 10 min; hold 10 min.
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25°C

1. Dimethyl phthalate
2. Diethyl phthalate
3. Dipropyl phthalate
4. Diisopropyl phthalate
5. Di-n-butyl phthalate
6. Di-n-octyl phthalate

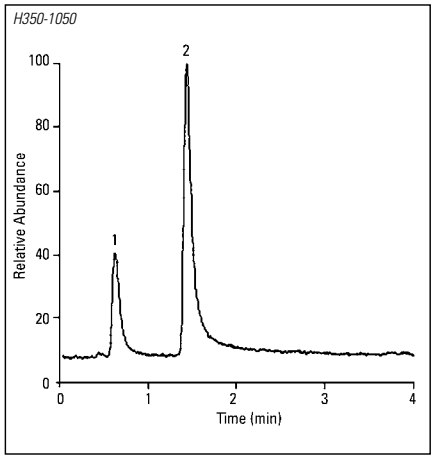
Endocrine Disrupters



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: H_2O B: ACN
Gradient:	25-70% B in 20 min.
Flow Rate:	1.5mL/min.
Detection:	UV at 220nm
Temperature:	25°C

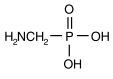
1. Desethyl atrazine
2. Estriol
3. Simazine
4. Atrazine
5. Diuron
6. Bisphenol A
7. Estrone

Glyphosate and AMPA

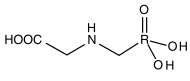


Column:	Hypercarb, 5µm, 50 x 2.1mm
Part Number:	35005-052130
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	5 to 100% B in 10 min.
Flow Rate:	0.3mL/min.
Detection:	+ ESI

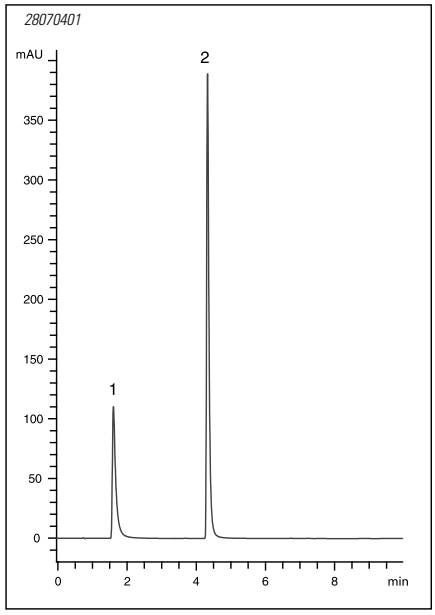
1. Aminomethylphosphonic acid (AMPA)



2. Glyphosate

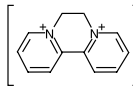


Quaternary Ammonium Salts

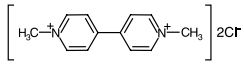


Column:	Hypercarb, 5µm, 50 x 4.0mm
Part Number:	35005-054030
Mobile Phase:	A: H_2O + 0.05% TFA B: ACN + 0.05% TFA
Gradient:	5 to 35% B in 10 min.
Flow Rate:	0.8mL/min.
Detection:	UV at 295nm to 3 min, 245nm from 3 to 10 min.
Temperature:	25°C

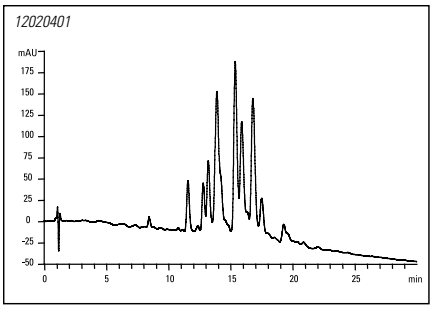
1. Diquat



2. Paraquat

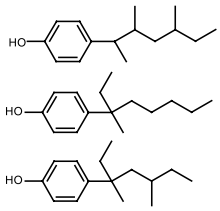


Nonylphenol Isomers

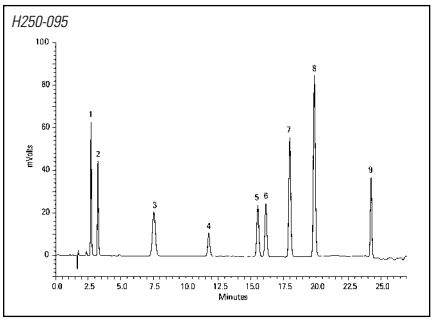


Column:	Hypercarb, 3µm, 100 x 0.32mm
Part Number:	35003-100365
Mobile Phase:	A: 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	50 to 70% B in 30 min.
Flow Rate:	6µL/min.
Detection:	UV at 204nm

Sample: p-Nonylphenol (some of the possible isomer structures represented below)



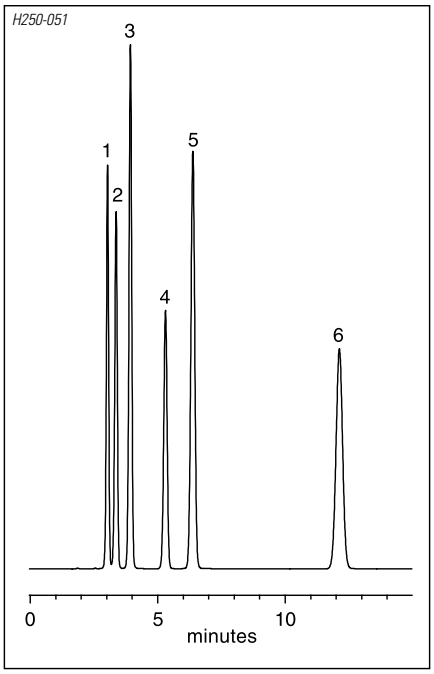
Carbamates



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm	
Part Number:	25005-154630	
Mobile Phase:	A: H_2O B: MeOH	
Gradient:	Time (min)	% B
	0	25
	5	25
	20	55
	30	90
Flow Rate:	1.5mL/min.	
Detection:	UV at 220nm	
Temperature:	25°C	

1. Oxamyl
2. Methomyl
3. Hydroxy carbofuran
4. Aldicarb
5. Propoxur
6. Carbofuran
7. Carbaryl
8. Naphthol
9. Methiocarb

Uron Herbicides



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: H_2O B: ACN
Isocratic:	60:40
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25°C

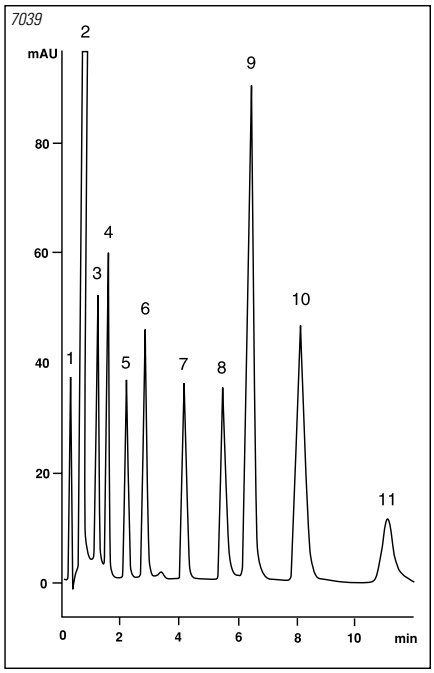
1. Tebuthiuron
2. Monuron
3. Metoxuron
4. Chlortoluron
5. Diuron
6. Linuron

Contaminants in Soil

Column:	Hypersil GOLD C8, 5µm, 150 x 4.6mm
Part Number:	25205-154630
Mobile Phase:	A: 0.1% Formic acid in MeOH B: 0.1% Formic acid in H_2O
Isocratic:	50:50
Flow Rate:	1mL/min.
Detection:	UV at 220nm
Temperature:	25°C

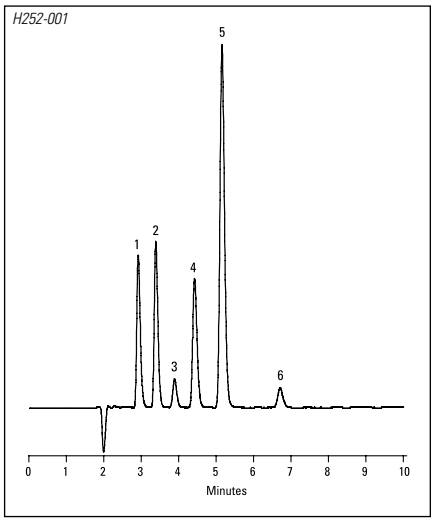
1. p-Hydroxybenzaldehyde
2. Benzyl Alcohol
3. Impurity
4. Benzoic Acid
5. Nitrobenzene
6. Benzene

Phenoxy Acids

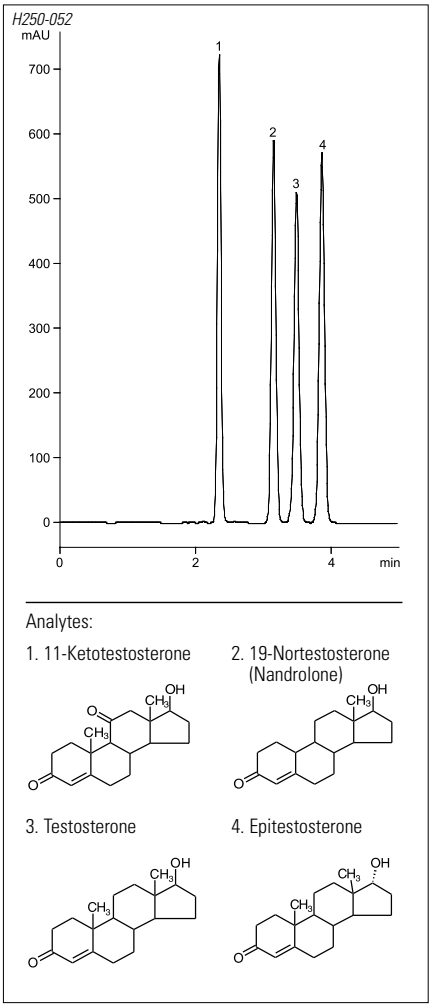


Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: ACN + 1% TFA B: H_2O + 1% TFA
Isocratic:	85:15
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	40°C
Source:	A. Gravel, National Rivers Authority, Llanelli, UK

1. Solvent
2. Bentazone
3. Dicamba
4. MCPP
5. MCPA
6. 2,4-D
7. MCPB
8. 2,4-DB
9. Benazolin
10. Fluroxypyr
11. 2,4,5,-T

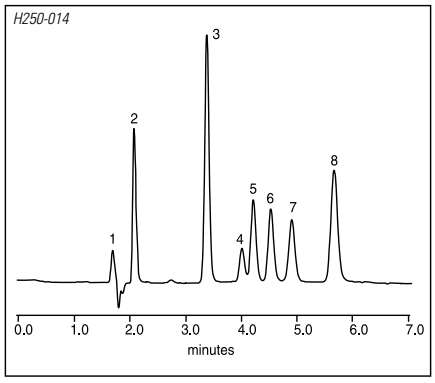


Nandrolone



Column:	Hypersil GOLD 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: H_2O B: ACN
Isocratic:	43:57
Flow Rate:	1.0mL/min.
Detection:	UV at 254nm
Temperature:	25°C

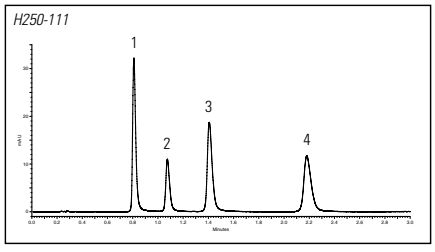
Benzodiazepines



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% Formic acid B: MeOH + 0.1% Formic acid
Isocratic:	35:65
Flow Rate:	1mL/min.
Detection:	UV at 235nm
Temperature:	25°C

1. Cloxazolam
2. Medazepam
3. Nitrazepam
4. Lorazepam
5. Oxazepam
6. Temazepam
7. Nordiazepam
8. Diazepam

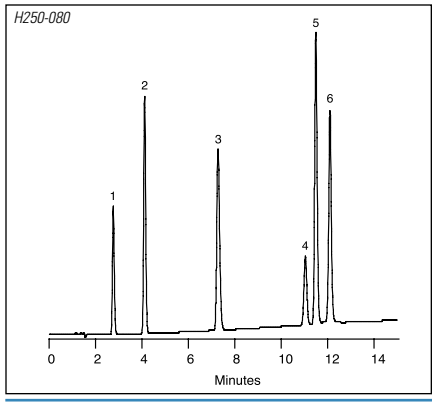
Anti-Psychotics



Column:	Hypersil GOLD, 1.9µm, 50 x 2.1mm
Part Number:	25002-052130
Mobile Phase:	A: 0.1% Formic acid B: ACN + 0.1% Formic acid
Gradient:	35 to 80% B in 5 min.
Flow Rate:	0.5mL/min.
Detection:	UV at 254nm (2µL Flow Cell)
Temperature:	30°C
Injection volume:	60nL

1. Promazine
2. Propionylpromazine
3. Chlorpromazine
4. Trifluprom azine

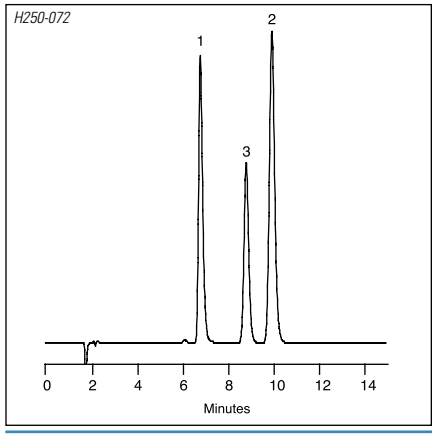
Anticonvulsants



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: H_2O B: ACN
Gradient:	15-45% B in 20 min.
Flow Rate:	1.5mL/min.
Detection:	UV at 205nm
Temperature:	25°C

1. 2-Ethyl-2-phenylmalonamide
2. Primidone
3. Phenobarbital
4. Hexobarbital
5. Carbamazepine
6. 5,5-Dipenylhydantoin

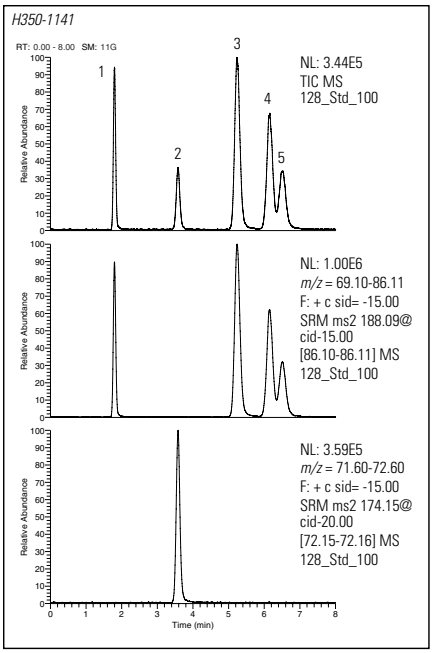
Anxiolytics



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 25mM NH_4OAc pH 6 B: ACN
Isocratic:	70:30
Flow Rate:	1mL/min.
Detection:	UV at 230nm
Temperature:	25°C

1. Nordoxepin
2. Chlordiazepoxide
3. Oxazepam

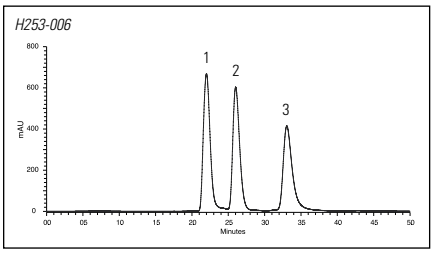
Leucine and Isomers



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A:H_2O+ 20mM nonafluoropentanoic acid / MeCN (75:25)
Flow Rate:	1.5mL/min. (split 1/10)
Detection:	+ESI (SRM)
Injection volume:	10µL

1. Hydroxy-proline
2. Valine
3. Leucine
4. Allo-leucine
5. Isoleucine

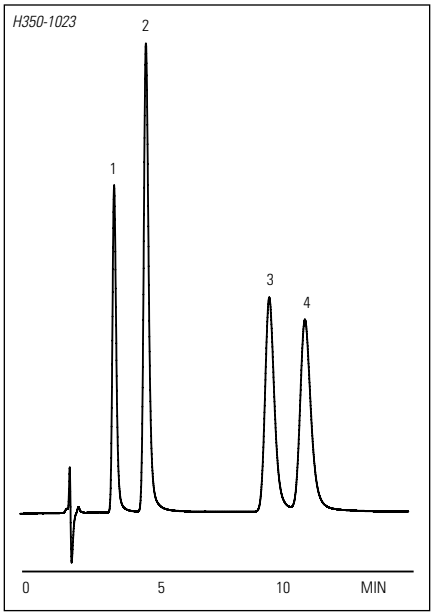
Alkaloids



Column:	Hypersil GOLD aQ, 5µm, 150 x 4.6mm
Part Number:	25305-154630
Mobile Phase:	A: 50mM NaH_2PO_4, pH 2.0 B: MeOH
Isocratic:	99:1
Flow Rate:	1mL/min.
Detection:	UV at 260nm
Temperature:	30°C

1. Nicotine
2. Anabasine
3. Cotinine

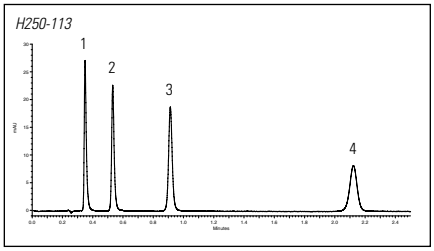
Hippuric Acid Isomers



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: H_2O + 0.1% TFA B: ACN:2-Propanol (1:3) + 0.1% TFA
Gradient:	5 to 100% B in 10 min.
Flow Rate:	1mL/min.
Detection:	UV at 225nm
Temperature:	25 °C

1. 2-Methylhippuric acid
2. Hippuric acid
3. 3-Methylhippuric acid
4. 4-Methylhippuric acid

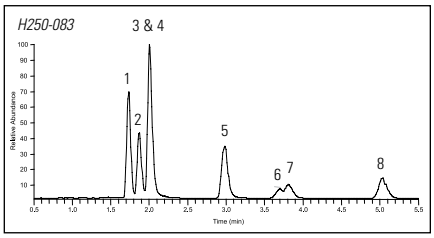
Anabolic Steroids



Column:	Hypersil GOLD, 1.9µm, 50 x 2.1mm
Part Number:	25002-052130
Mobile Phase:	A: H_2O + 0.1% Formic Acid B: ACN + 0.1% Formic Acid, 50/50
Flow rate:	0.5mL/min.
Detection:	UV at 244nm (2µL Flow Cell)
Temperature:	25°C
Injection volume:	60nL

1. Cortisone
2. 11-alpha-hydroxyprogesterone
3. 17-alpha-hydroxyprogesterone
4. Progesterone

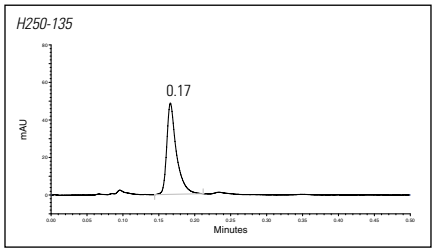
Cannabinoids



Column:	Hypersil GOLD, 1.9µm, 50 x 2.1mm
Part Number:	25002-052130
Mobile Phase:	A: 0.1% Formic acid B: ACN
Isocratic:	33:67
Flow Rate:	0.3mL/min.
Detection:	MS at TSQ Quantum™ Discovery™ MAX HESI +
Temperature:	Ambient
Source:	Robert Huls & Wim Van Duinkerken, Thermo Fisher Scientific, NL

1. Cannabidiol acid
2. Cannabigerol acid
3. Cannabigerol
4. Cannabidiol
5. Cannabinol
6. Δ-9-Tetrahydrocannabinol
7. Cannabichromene
8. Δ-9-Tetrahydrocannabinol acid

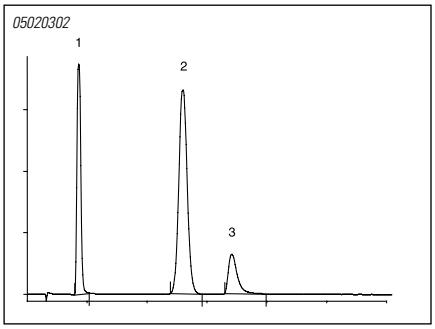
Nandrolone – sub 1 minute analysis



Column:	Hypersil GOLD, 1.9µm, 10 x 2.1mm
Part Number:	25002-012135
Mobile Phase:	H_2O/MeCN, 40/60+ 0.1 % TFA, isocratic
Flow rate:	0.4mL/min.
Detection:	UV at 254nm
Temperature:	5°C
Injection volume:	0.5nL

1. Nandrolone

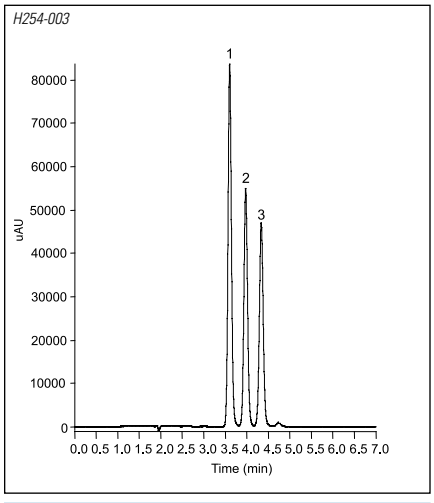
Furanones, Furfurals and Pyrones



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: ACN B: H_2O
Isocratic:	10:90
Flow Rate:	1mL/min.
Detection:	UV at 288nm
Source:	Mr. Valleix, CEA Saclay, « Laboratoire des Molécules Marquées », France

1. 2,5-Dimethyl-4-hydroxy-3(2H)furanone
2. 5-(Hydroxymethyl)furfural
3. 3-Hydroxy-2-methyl-4-pyrone

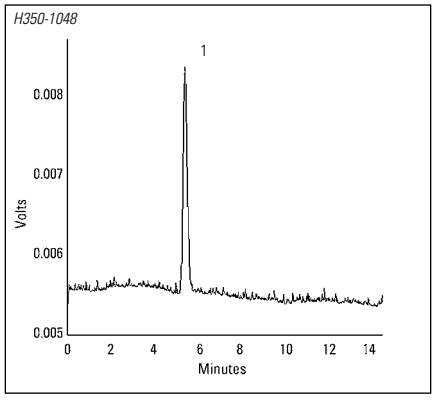
Nitroaromatics



Column:	Hypersil GOLD PFP, 5µm, 150 x 4.6mm
Part Number:	25405-154630
Mobile Phase:	A: H_2O B: MeOH
Isocratic:	70:30
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25°C

1. 2,4,6-Trinitrotoluene
2. 2,6-Dinitrotoluene
3. 4-Nitrotoluene

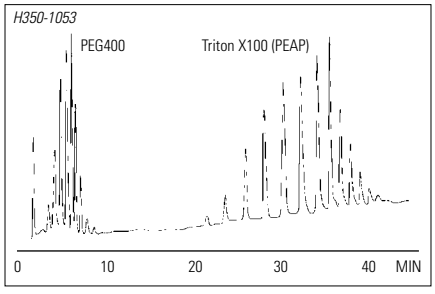
Hydrazine



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	0.1% NH_3 (aq)+ 0.1% DEA
Flow Rate:	1mL/min.
Detection:	ELSD (120°C, 3.5 L/min. N_2)

1. Hydrazine

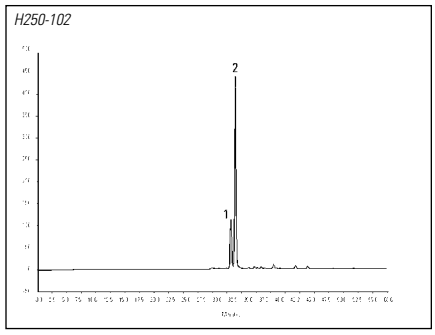
Non-Ionic Surfactants



Column:	Hypercarb, 7µm, 100 x 4.6mm
Part Number:	35007-104630
Mobile Phase:	A: H_2O B: ACN C: CH_2Cl_2
Gradient:	Time (min) % A % B % C 0 80 20 0 15 0 100 0 40 0 20 80
Flow Rate:	1mL/min.
Detection:	ELSD
Source:	P. Chaimbault, Journal of Chromatography A, 797, 83-91 (1998)

PEG 400 and Triton X-100

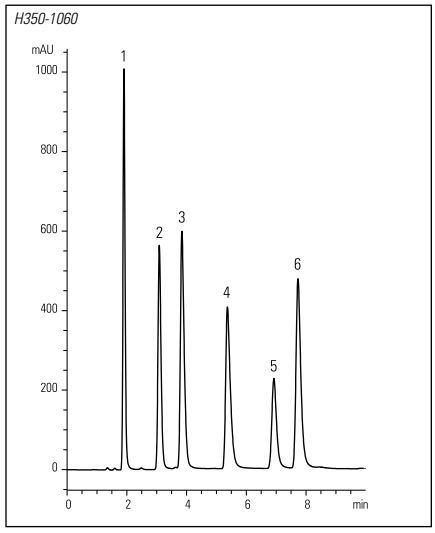
Cyanine Dyes



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 0.1% trifluoroacetic acid B: acetonitrile
Gradient:	100% A for 5 min., then to 15% B by 7.5 min., then to 39% B
Flow Rate:	1.0mL/min.
Detection:	UV-VIS
Temperature:	25°C
Source:	A Romieu, IRCOF, University of Rouen

1. Symmetrical cyanine dye
2. Asymmetrical cyanine dye

Anilines



Column:	Hypercarb, 5µm, 100 x 4.6mm
Part Number:	35005-104630
Mobile Phase:	A: 10mM 1-methylpiperidine at pH 10.5 B: ACN/IPA (1:1)
Gradient:	50 - 90% B in 10 min.
Flow Rate:	1mL/min.
Detection:	UV at 270nm
Temperature:	25°C

1. Aniline
2. 3-ethylaniline
3. 2-ethylaniline
4. N-ethylaniline
5. N,N-dimethylaniline
6. N,N-diethylaniline

Acrylamide in Cooked Food

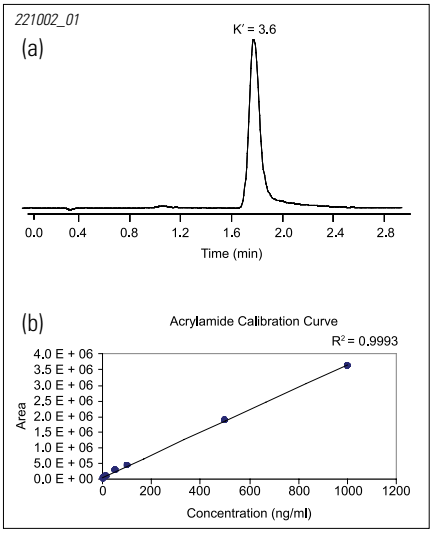
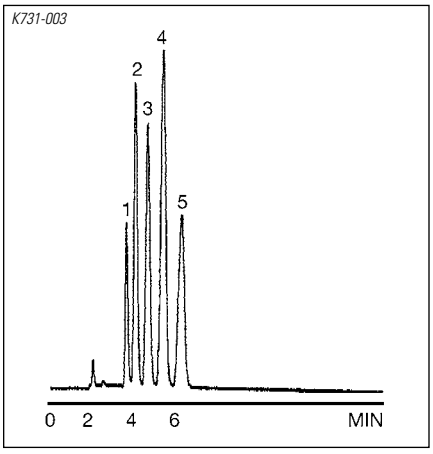


Figure 1: Retention of acrylamide on Hypercarb and linearity range. The method gives a linear response enabling accurate quantitation.

Column:	Hypercarb, 5µm, 50 x 2.1mm
Part Number:	35005-052130
Mobile Phase:	H_2O
Gradient:	Isocratic
Injection Volume:	10µL
Flow Rate:	0.4mL/min.
Detection:	+ ESI SIM ([M + H]$^+$, *m/z* = 72)

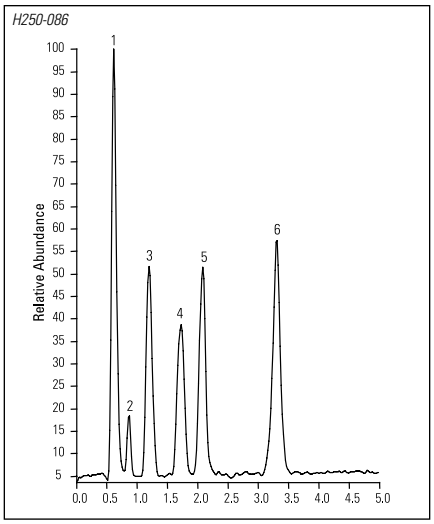
Sugars in HILIC Mode



Column:	BioBasic AX, 5µm, 150 x 4.6mm
Part Number:	73105-154630
Mobile Phase:	A: ACN B: H_2O
Isocratic:	75:25
Flow Rate:	1mL/min.
Detection:	ELS

1. Glucose
2. Maltose
3. Maltotriose
4. Maltotetraose
5. Maltopentaose

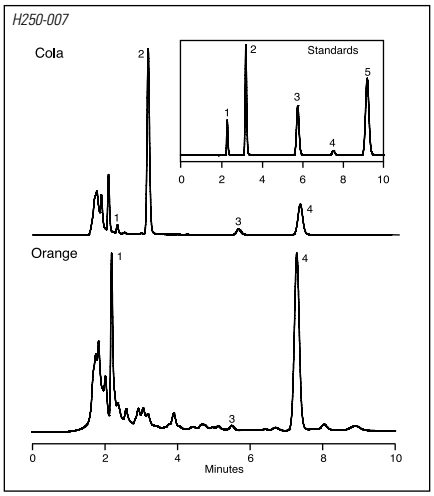
Sudan Dyes



Column:	Hypersil GOLD, 1.9µm, 20 x 2.1mm
Part Number:	25002-022130
Mobile Phase:	A: 0.1% Formic acid B: ACN + 0.1% Formic acid
Isocratic:	12:88
Flow Rate:	0.1mL/min.
Detection:	+ESI
Temperature:	25°C

1. Impurity from Sudan II
2. Impurity from Sudan IV
3. Sudan I
4. Sudan II
5. Sudan III
6. Sudan IV

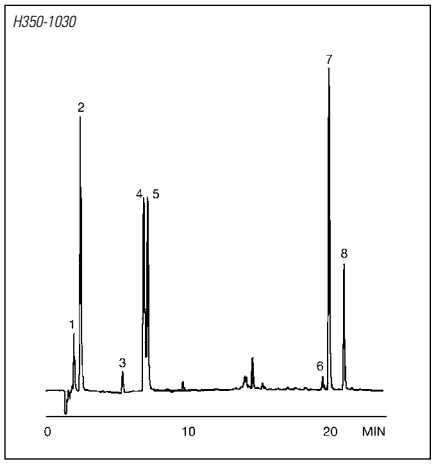
Soft Drink Additives



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: 20mM NH_4OAc at pH 4.1 B: MeOH
Isocratic:	65:35
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25°C

1. Saccharin
2. Caffeine
3. Aspartame
4. Benzoic acid
5. Sorbic acid

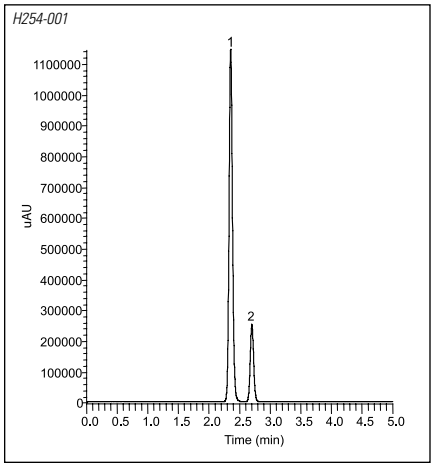
Water and Fat Soluble Vitamins



Column:	Hypercarb, 5µm, 100 x 4.6mm		
Part Number:	35005-104630		
Mobile Phase:	A: 50mM NH_4OAc at pH 6.0 B: ACN:IPA (1:1) C: THF		
Gradient:	Time (min)	% B	% C
	0	7	0
	10	60	0
	12	95	5
	25	0	100
Flow Rate:	1mL/min.		
Detection:	UV at 215nm; 275nm at 10 min.		
Temperature:	25°C		

1. Vitamin B5
2. Vitamin B3
3. Vitamin H
4. Vitamin B12
5. Vitamin B6
6. Vitamin A
7. Vitamin D3
8. Vitamin D2

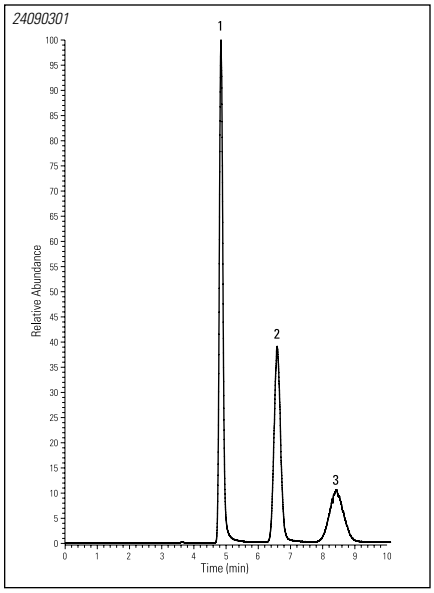
Vitamin C



Column:	Hypersil GOLD PFP, 5µm, 150 x 4.6mm
Part Number:	25405-154630
Mobile Phase:	A: H_2O + 0.1% Formic acid B: ACN + 0.1% Formic acid
Isocratic:	99:1
Flow Rate:	1mL/min.
Detection:	UV at 254nm
Temperature:	25°C

1. Vitamin C (ascorbic acid)
2. Uracil

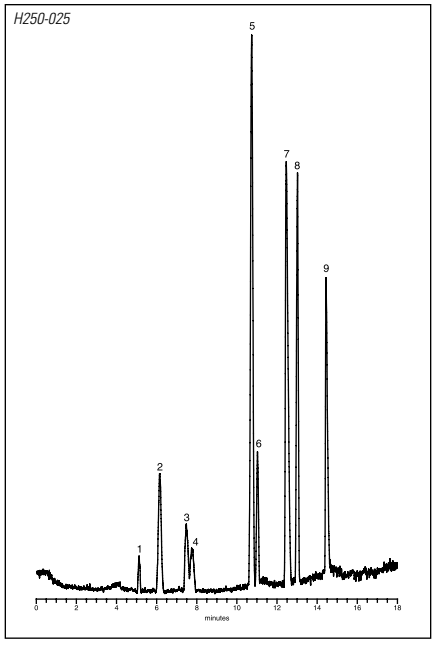
Disaccharides



Column:	Hypercarb, 3µm, 100 x 2.1mm
Part Number:	35003-102130
Mobile Phase:	A: 0.1% NH_3 (aq) at pH 10.3 B: ACN
Isocratic:	96:4
Flow Rate:	0.2mL/min.
Detection:	- ESI
Temperature:	60°C

1. Sucrose
2. Maltose
3. Lactose

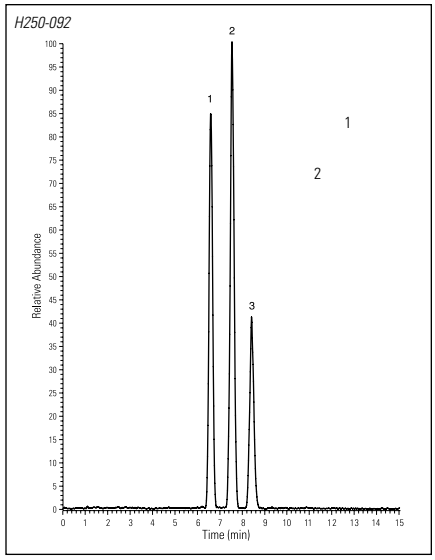
Biogenic Amines



Column:	Hypersil GOLD, 5µm, 150 x 2.1mm
Part Number:	25005-152130
Mobile Phase:	A: H_2O + 0.1% HFBA (heptafluorobutyric acid) B: MeOH + 0.1% HFBA
Gradient:	30 - 100% B in 15 mi.
Flow Rate:	0.2mL/min.
Detection:	+ ESI
Temperature:	30°C

1. Serotonin
2. Butylamine
3. Cadaverine
4. Histamine
5. Phenylethylamine
6. Tryptamine
7. Spermidine
8. Hexylamine
9. Spermine

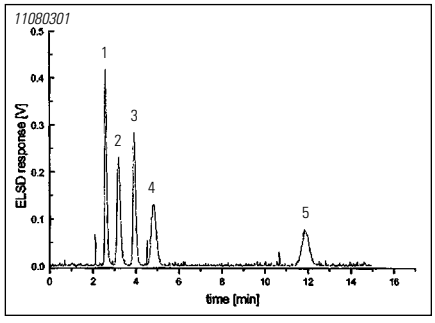
Tocopherols



Column:	Hypersil GOLD, 5µm, 150 x 4.6mm
Part Number:	25005-154630
Mobile Phase:	A: H_2O B: MeOH
Isocratic:	5:95
Flow Rate:	1mL/min.
Detection:	- ESI
Temperature:	30°C

1. δ-Tocopherol
2. γ-Tocopherol
3. α-Tocopherol

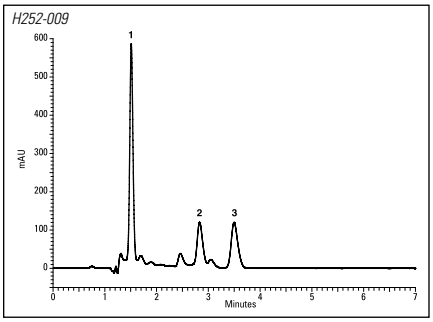
Carbohydrates



Column:	Hypercarb, 5µm, 100 x 4.0mm
Part Number:	35005-104030
Mobile Phase:	A: ACN B: NH_3 (aq) at pH 11
Isocratic:	4:96 (v/v)
Flow Rate:	1mL/min.
Detection:	ELSD
Temperature:	60°C

1. Isomaltose
2. Melibiose
3. Maltose
4. Lactose
5. Cellobiose

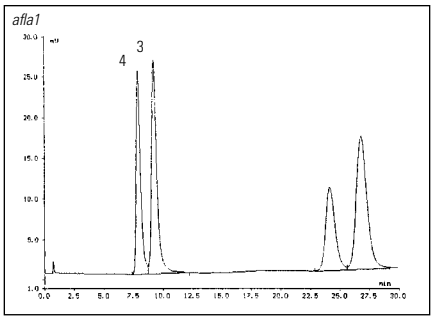
β-Carotene



Column:	Hypersil GOLD C8, 5µm, 150 x 4.6mm
Part Number:	25205-154630
Mobile Phase:	MeOH
Flow Rate:	1.5mL/min.
Detection:	UV at 450nm
Temperature:	25°C

1. Lutein
2. Lycopene
3. β-Carotene

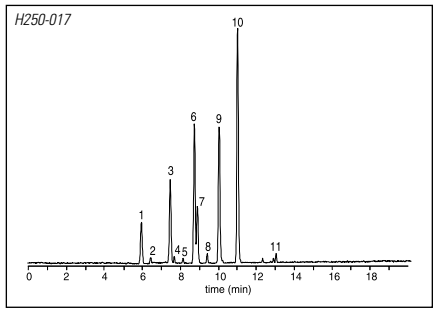
Aflatoxins



Column:	Hypercarb, 5µm, 100 x 3.0mm
Part Number:	35005-103030
Mobile Phase:	A: Dioxane B: $CHCl_3$
Isocratic:	10:90
Flow Rate:	0.8mL/min.
Detection:	Fluorescence (exc 365nm, em 418nm)
Source:	Rhemrev-Boom, M.M, Amro Emmen

1. Aflatoxin B_1
2. Aflatoxin B_2
3. Aflatoxin G_1
4. Aflatoxin G_2

Ginkgo Biloba



Column:	Hypersil GOLD, 5µm, 50 x 2.1mm
Part Number:	25005-052130
Mobile Phase:	A: 0.1% Formic acid B: MeOH + 0.1% Formic acid
Gradient:	5 - 100% B in 15 min.
Flow Rate:	0.3mL/min.
Detection:	- ESI
Temperature:	30°C

1. Bilobalide
2. Unknown (bilobalide)
3. Ginkgolide C
4. Unknown (ginkgolide C)
5. Unknown (ginkgolide A)
6. Ginkgolide A
7. Ginkgolide B
8. Unknown (ginkgolide A)
9. Quercetin
10. Kaempferol
11. Unknown (kaempferol)

SLIPFREE HPLC Column Connectors

Universal self-adjusting connections

- Unique self-adjusting design for void-free and leak-free connections
- Universal connectors compatible with all column end-fittings
- Stainless steel threads eliminate particle generation from PEEK™ fittings
- Fingertight connections to 10,000 psi – excellent for SFC
- Convenient SLIPFREE™ sample loop design

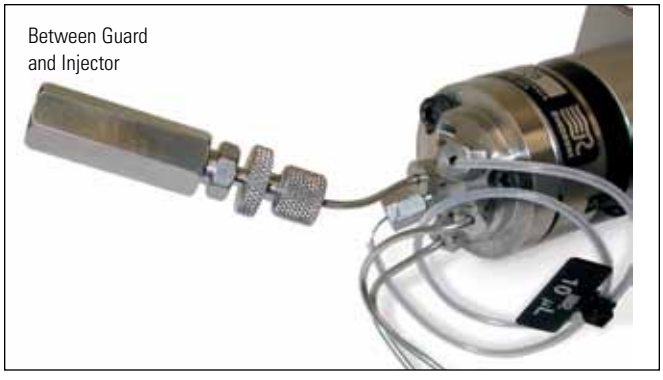
Unique Self-Adjusting Design

Thermo Scientific SLIPFREE connectors offer a rugged and easy way to ensure good column connections. The SLIPFREE connector design provides a void-free connection because it actually pushes the tubing and ferrule into the end-fitting. The separate tube holding and connection-sealing functions provide a better connection and better hardware lifetime. Because pressure is applied to the tubing rather than the ferrule, when the SLIPFREE connector is removed, the ferrule will not become lodged in the end-fitting. The movable Vespel™ front ferrule allows the SLIPFREE connector to easily adjust to any commercially available HPLC or SFC column end-fitting. Used over and over again, the SLIPFREE connector readjusts to fit each new column connection. Even when different column brands are used on a single HPLC system, SLIPFREE connectors provide all the same benefits.

Choice of Configurations

The SLIPFREE connector is available in both single and double configurations. The double SLIPFREE is useful when frequent connections and disconnections will be made between HPLC columns and injectors or detectors. The single SLIPFREE connector is useful when only the column is changed. SLIPFREE connectors are available in flexible 1/32" OD tubing as well as standard 1/16" OD tubing, in various lengths. SLIPFREE connectors come in 0.010" ID for routine work, 0.005" ID for use with small-bore and microbore columns, and 0.020" ID for semi preparative and preparative connections, or for connections ahead of the injector. PEEK-collared SLIPFREE connectors are ideal for higher temperature applications such as SFC. Long-neck SLIPFREE connectors have an extra long nut on the end which allows improved reach into tight spaces. SLIPFREE connectors come standard with Vespel ferrules. SLIPFREE sample loops are compatible with Rheodyne™ and Valco™ injectors. PEEK and Kel-F ferrules are available for applications where Vespel is not suitable, such as with strong acids or bases.

Where to use a SLIPFREE Connector



SLIPFREE Connectors

Universal self-adjusting connections

- **Void-free and leak-free by pushing tubing and ferrule into the end-fitting**
- **Compatible with all column end-fittings**
- **Stainless-steel threads**
- **Fingertight connections to 10,000 psi**

SLIPFREE Connectors, Single

	Length	0.005 in. ID	0.010 in. ID	0.020 in. ID
Single				
	6cm	**30106**	**31106**	**32106**
	10cm	**30110**	**31110**	**32110**
	20cm	**30120**	**31120**	**32120**
	30cm	**30130**	**31130**	**32130**
Single Flexible				
	10.5cm	**30111-FLEX**	**39111-FLEX**	--
	15cm	**30115-FLEX**	**39115-FLEX**	--
	28cm	**30128-FLEX**	**39128-FLEX**	--
	40cm	**30140-FLEX**	**39140-FLEX**	--
Single PEEK Collared				
	6cm	**30306**	**31306**	**32306**
	10cm	**30310**	**31310**	**32310**
	20cm	**30320**	**31320**	**32320**
Single Long-neck				
	10cm	**30510**	**31510**	--
	20cm	**30520**	**31520**	--

SLIPFREE Connectors, Double

	Length	0.005 in. ID	0.010 in. ID	0.020 in. ID
Double				
	6cm	**30206**	**31206**	**32206**
	10cm	**30210**	**31210**	**32210**
	20cm	**30220**	**31220**	**32220**
	30cm	**30230**	**31230**	**32230**
Double Flexible				
	10.5cm	**30211-FLEX**	**39211-FLEX**	--
	15cm	**30215-FLEX**	**39215-FLEX**	--
	28cm	**30228-FLEX**	**39228-FLEX**	--
	40cm	**30240-FLEX**	**39240-FLEX**	--
Double PEEK Collared				
	6cm	**30406**	**31406**	**32406**
	10cm	**30410**	**31410**	**32410**
	20cm	**30420**	**31420**	**32420**
Double Long-neck				
	10cm	**31710**	**32710**	--
	20cm	**31720**	**32720**	--

SLIPFREE Sample Loops

Feature a self-adjusting, leak-free design

- **Compatible with Rheodyne™ and Valco™ injectors**
- **Long-neck design**

SLIPFREE Sample Loops				
Description	**Length**	**ID**	**Cat. No.**	**Quantity**
10µL, Long-neck	20cm	0.10 in.	**31620**	1 Each
20µL, Long-neck	40cm	0.10 in.	**31640**	1 Each
50µL, Long-neck	25cm	0.20 in.	**32625**	1 Each
100µL, Long-neck	50cm	0.20 in.	**32650**	1 Each
250µL, Long-neck	125cm	0.20 in.	**32699**	1 Each

SLIPFREE Ferrules

For use with SLIPFREE connectors for HPLC columns

- **Vespel ferrules replace the standard Vespel ferrules supplied with SLIPFREE column connectors**
- **Kel-F and PEEK are offered for applications in which Vespel is not suitable**

SLIPFREE Ferrules		
Material	**Cat. No.**	**Quantity**
PEEK	**36023**	1 Each
Vespel	**36024**	1 Each
Kel-F	**36025**	1 Each

PTFE One-Piece Column Connector

Excellent for high-throughput screening and quick connection

- **Fingertight, leak-free connection of analytical and guard columns with 10-32 threads**
- **Minimizes dead volume**
- **Inert and biocompatible material**

PEEK One-Piece Column Connector

Description	Cat. No.	Quantity
One Piece Coupler	**60170-370**	1 Each

Solvent Inlet Filters

Feature a large surface area for a long lifetime

- **Stainless steel 10µm inlet filters for longer lifetime**
- **No tools required for replacement**

Bottom-of-the-Bottle solvent filters:

- **Efficient draw**
- **100% PTFE polymer, including 2µm filters**
- **Built-in helium sparge port and frit**

Solvent Inlet Filters for HPLC Systems

	Type	For Use with	Cat. No.	Quantity
	Stainless Steel	Fit 1/16" OD tube to 1/8" OD plastic tubing	**A-302**	1 Each
	Stainless Steel	Fit to 1/8" OD plastic tubing using 1/8" PP nut	**A-302A**	1 Each
	Bottom-of-the-Bottle	3/16" OD plastic tubing	**A-436**	1 Each
	Bottom-of-the-Bottle	1/8" OD tubing	**A-437**	1 Each

High Pressure Stainless Steel Nuts and Ferrules

Accommodate a wide range of configurations

Designed for 10-32 port configurations

Burr and contaminant free

Thermo Scientific High Pressure Stainless Steel Nuts and Ferrules			
	Type	**Cat. No.**	**Quantity**
	10-32 thread nut with ferrule	**F-190**	1 Each
	Replacement PEEK Ferrules	**F-192x**	10 Pack
	Male hex nut	**U-400x**	10 Pack
	Universal ferrules, 0.625 in.	**U-401x**	10 Pack
	Valco male hex nut, 10-32 thread	**U-320x**	10 Pack
	Valco ferrules, 0.625 in.	**U-321x**	10 Pack
	Male hex nut, Waters compatible	**U-410X**	10 Pack

RheFlex High Pressure Fittings

Precision machined from 316 stainless steel

RheFlex High Pressure Fittings			
	Type	**Cat. No.**	**Quantity**
	Short Fittings Set	**6000-109**	5 Pack
	Short Fittings Set	**6000-209**	10 Pack
	Long Fittings Set	**6000-111**	5 Pack
	Long Fittings Set	**6000-211**	10 Pack
	Extra Long Fittings Set	**6000-162**	5 Pack
	Extra Long Fittings Set	**6000-262**	10 Pack
	$^{1}/_{16}$ in. Ferrule	**6000-110**	5 Pack
	$^{1}/_{16}$ in. Ferrule	**6000-210**	10 Pack
	0.5mm Ferrule for Model 8125	**8125-084**	1 Each

Reducing Union for Preparative Columns

Connects 30 to 50mm ID preparative columns to $^{1}/_{16}$ in. tubing

- **Stainless steel construction**
- **1.0mm bore**
- **Without frit**

Reducing Union for Preparative Column		
Description	**Cat. No.**	**Quantity**
$^{1}/_{8}$ in. to $^{1}/_{16}$ in. Reducing Union for Preparative Column	**60182-357**	1 Each

PEEK Fingertight Fittings

Machined for reliability and ease of use

- **Resist cracking, breaking, thread stripping and leaking in both low and high pressure applications**
- **Biocompatible for a broad range of applications**

PEEK Fingertight Fittings

	Type	Cat. No.	Quantity
	One-piece Fingertight Fitting, 1/16 in., 0.37 in. head	**F-120x**	10 Pack
	One-Piece Long Fingertight Fitting, 1/16 in., 0.37 in. head	**F-130x**	10 Pack
	One-Piece PEEK Fingertight Fitting, 1/32 in., 0.25 in. head	**M-645x**	10 Pack
	Two-Piece Fingertight Wing Nut with Ferrule, 1/16 in.	**F-300x**	10 Pack
	Replacement PEEK Ferrules	**F-142x**	10 Pack
	Column End Plugs, 1/16 in., 10-32 coned, Delrin, Black	**U-467BLKx**	10 Pack
	Column End Plugs, 1/16 in., 10-32 coned, Delrin, Red	**U-467Rx**	10 Pack

Stainless Steel Unions, Tees and Crosses

Well-suited to high pressure applications

- **Absolute zero or low dead volume formats**
- **Includes two stainless steel nuts and ferrules**

Stainless Steel Unions, Tees and Crosses

	Description	Through Hole	Swept Volume	Cat. No.	Quantity
	Union, stainless steel, Upchurch Scientific/ Parker fittings compatible, includes 2 stainless steel nuts and ferrules	0.010 in.	0.025µL	**U-435**	1 Each
	Union, stainless steel, Upchurch Scientific/ Parker fittings compatible, includes 2 stainless steel nuts and ferrules	0.020 in.	0.134µL	**U-402**	1 Each
	Union, stainless steel, Upchurch Scientific/ Parker fittings compatible, includes 2 stainless steel nuts and ferrules	0.050 in.	0.836µL	**U-437**	1 Each
	Union, stainless steel, Upchurch Scientific/ Parker fittings compatible, includes 2 stainless steel nuts and ferrules	0.062 in.	~0.0µL	**U-438**	1 Each
	Union, stainless steel, Waters fittings compatible, includes 2 stainless steel nuts and ferrules	0.020 in.	0.129µL	**U-412**	1 Each
	Union, stainless steel, Valco fittings compatible, includes 2 stainless steel nuts and ferrules	0.020 in.	0.103µL	**U-322**	1 Each
	Tee, stainless steel, 10-32 fittings for use with 1/16 in. OD tubing	0.020 in.	0.57µL	**U-428**	1 Each
	Cross, stainless steel, 10-32 fittings for use with 1/16 in. OD tubing	0.020 in.	<0.72µL	**U-430**	1 Each

PEEK Unions, Tees and Crosses

Well-suited to high pressure applications

- **Absolute zero or low dead volume formats**
- **Biocompatible**

PEEK and PEEK Lined Unions, Tees and Crosses

	Description	Through Hole	Swept Volume	Cat. No.	Quantity
	Union, PEEK polymer, includes two PEEK 2-piece fittings	0.010 in.	0.070µL	**P-742**	1 Each
	Union, PEEK polymer, includes two PEEK 2-piece fittings	0.020 in.	0.28µL	**P-704**	1 Each
	Tee, PEEK, 10-32 fittings for use with 1/16" OD tubing, includes three 10-32 PEEK double-winged nuts	0.020 in.	<0.57µL	**P-727**	1 Each
	PEEK, 10-32 fittings for use with 1/16" OD tubing, includes four 10-32 PEEK double-winged nuts	0.020 in.	<0.72µL	**P-729**	1 Each

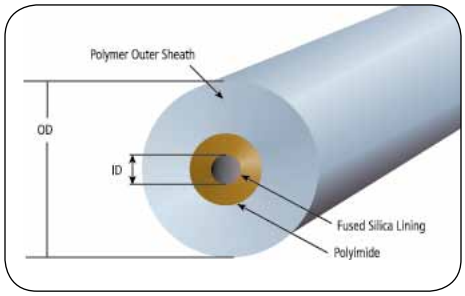
PEEKsil Capillary Tubing

Excellent chemical compatibility and very low carryover

Applications:

- HPLC
- LC/MS

- **Precision-bore fused silica tubing coated with 1/16 in. OD PEEK covering**
- **Usable in most standard chromatography systems**
- **Withstands high pressures**
- **Smooth internal surface for excellent flow characteristics**
- **Tubing is stiff: not recommended for uses requiring tubing bends**
- **Precut lengths only: cutting in the lab may damage tubing**



PEEKsil Capillary Tubing

I.D.	Length	Cat. No.	Quantity
0.002 in. (50µm)	10cm	**60182-500**	5 Pack
	20cm	**60182-501**	5 Pack
	50cm	**60182-502**	2 Pack
0.004 in. (100µm)	10cm	**60182-503**	5 Pack
	20cm	**60182-504**	5 Pack
	50cm	**60182-505**	2 Pack
0.007 in. (175µm)	10cm	**60182-506**	5 Pack
	20cm	**60182-507**	5 Pack
	50cm	**60182-508**	2 Pack

PEEK Sleeves for Fused Silica Capillary Tubing

Withstands high pressures

1/16 in. O.D. PEEK Sleeves for Fused Silica Capillary Tubing

Sleeve I.D.	Color	Cat. No.	Quantity
0.008 in. (0.203mm)	Yellow	**F-227**	1 Each
0.010 in. (0.254mm)	Blue	**F-228**	1 Each
0.012 in. (0.305mm)	Natural	**F-229**	1 Each
0.015 in. (0.381mm)	Orange	**F-230**	1 Each
0.021 in. (0.530mm)	Natural	**F-231**	1 Each
0.030 in. (0.762mm)	Natural	**F-232**	1 Each

316 Stainless Steel Capillary Tubing

Cleaned, polished, passivated and ready-to-use

- **Suitable for ultra high pressure applications**
- **Wide chemical compatibilty**
- **Prefinished, square, burr-free ends and interiors to minimize dead volume connections**
- **Not recommended for biological samples**
- **Rough internal surface may lead to sample carryover**

316 Stainless Steel Capillary Tubing

I.D.	Length	Color	Cat. No.	Quantity
1/16 in. OD Precut Tubing				
0.005 in.	5cm	Red	**U-152**	1 Each
	10cm	Red	**U-153**	1 Each
	20cm	Red	**U-154**	1 Each
	30cm	Red	**U-155**	1 Each
	50cm	Red	**U-156**	1 Each
	100cm	Red	**U-157**	1 Each
0.007 in.	5cm	Black	**U-126**	1 Each
	10cm	Black	**U-127**	1 Each
	20cm	Black	**U-128**	1 Each
	30cm	Black	**U-129**	1 Each
	50cm	Black	**U-130**	1 Each
	100cm	Black	**U-131**	1 Each
0.010 in.	5cm	Blue	**U-111**	1 Each
	10cm	Blue	**U-112**	1 Each
	20cm	Blue	**U-113**	1 Each
	30cm	Blue	**U-114**	1 Each
	50cm	Blue	**U-132**	1 Each
	100cm	Blue	**U-133**	1 Each
1/32 in. OD Precut Tubing with 1/16 in. Sleeves				
0.005 in.	10.5cm	Red	**30011-FLEX**	1 Each
	15cm	Red	**30015-FLEX**	1 Each
	28cm	Red	**30028-FLEX**	1 Each
	40cm	Red	**30040-FLEX**	1 Each
0.007 in.	10.5cm	Yellow	**39011-FLEX**	1 Each
	15cm	Yellow	**39015-FLEX**	1 Each
	28cm	Yellow	**39028-FLEX**	1 Each
	40cm	Yellow	**39040-FLEX**	1 Each

$^{1}/_{16}$ in. 316 Stainless Steel Tubing, 5-Foot Coil

I.D.	Cat. No.	Quantity
0.005 in.	**U-158**	1 Each
0.007 in.	**U-108**	1 Each
0.010 in.	**U-106**	1 Each
0.020 in.	**U-105**	1 Each
0.030 in.	**U-107**	1 Each
0.040 in.	**U-144**	1 Each
0.046 in.	**U-151**	1 Each

PEEK Capillary Tubing

Pre-cut and color-coded for easy identification and use

- **Broad chemical compatibility**
- **Biocompatible**
- **Easily cut to desired length**
- **Appropriate for many HPLC applications**
- **Resistant to most organic solvents, but nitric acid, sulfuric acid, dichloromethane, THF and DMSO are not recommended**

1/16 in. O.D. Precut PEEK Tubing

I.D.	Length	Color	Cat. No.	Quantity
0.003 in.	5cm	Natural	**37003-5**	1 Each
	10cm	Natural	**37003-10**	1 Each
	20cm	Natural	**37003-20**	1 Each
	30cm	Natural	**37003-30**	1 Each
	50cm	Natural	**37003-50**	1 Each
	100cm	Natural	**37003-100**	1 Each
0.005 in.	5cm	Red	**37005-5**	1 Each
	10cm	Red	**37005-10**	1 Each
	20cm	Red	**37005-20**	1 Each
	30cm	Red	**37005-30**	1 Each
	50cm	Red	**37005-50**	1 Each
	100cm	Red	**37005-100**	1 Each
0.007 in.	5cm	Yellow	**37007-5**	1 Each
	10cm	Yellow	**37007-10**	1 Each
	20cm	Yellow	**37007-20**	1 Each
	30cm	Yellow	**37007-30**	1 Each
	50cm	Yellow	**37007-50**	1 Each
	100cm	Yellow	**37007-100**	1 Each
0.010 in.	5cm	Blue	**37010-5**	1 Each
	10cm	Blue	**37010-10**	1 Each
	20cm	Blue	**37010-20**	1 Each
	30cm	Blue	**37010-30**	1 Each
	50cm	Blue	**37010-50**	1 Each
	100cm	Blue	**37010-100**	1 Each
0.020 in.	5cm	Orange	**37020-5**	1 Each
	10cm	Orange	**37020-10**	1 Each
	20cm	Orange	**37020-20**	1 Each
	30cm	Orange	**37020-30**	1 Each
	50cm	Orange	**37020-50**	1 Each
	100cm	Orange	**37020-100**	1 Each

1/16 in. O.D. PEEK Tubing, 5-Foot Coil

I.D.	Cat. No.	Quantity
0.020 in.	**37020**	1 Each
0.003 in.	**37003**	1 Each
0.005 in.	**37005**	1 Each
0.007 in.	**37007**	1 Each
0.010 in.	**37010**	1 Each
0.030 in.	**37030**	1 Each
0.040 in.	**37040**	1 Each

Polymer Tubing Cutter

Produces a flat, 90°, burr-free end

- **Compatible with rigid polymeric tubing**
- **Guide holes for 1/16 in. and 1/8 in. tubing**

Polymer Tubing Cutter		
Description	**Cat. No.**	**Quantity**
Polymeric Tubing Cutter	**A-327**	1 Each
Replacement blades	**A-328**	5 Pack

Terry Tool Tubing Cutters

Produce clean, 90° cuts of stainless steel tubing

Terry Tool Tubing Cutters		
Description	**Cat. No.**	**Quantity**
1/16 in. stainless steel tubing	**60182-509**	1 Each
1/8 in. stainless steel tubing	**60182-510**	1 Each

Rheodyne 7725 and 7725i Sample Injectors

Allow continuous flow between the load and inject positions to protect against pressure shock

- **Stainless steel construction**
- **Make-Before-Break (MBB) design**
- **Can use partial filling for zero sample waste or complete filling for better reproducibility**
- **Inject 1µL to 5mL with high accuracy and precision**
- **7725i features a position sensing switch for a reproducible start signal**

Rheodyne 7725 and 7725i Sample Injectors

Model	Mode	Features	Cat. No.	Quantity
7725	Dual	Continuous flow	**7725**	1 Each
7725i	Dual	Continuous flow, position sensing switch	**7725i**	1 Each

Rheodyne 9725 and 9725i Sample Injectors

Allow continuous flow between the load and inject positions to protect against pressure shock

- **Biocompatible PEEK construction**
- **Make-Before-Break (MBB) design**
- **Can use partial filling for zero sample waste or complete filling for better reproducibility**
- **Inject 1µL to 5mL with high accuracy and precision**
- **9725i features a position sensing switch for a reproducible start signal**

Rheodyne 9725 and 9725i Sample Injectors

Model	Mode	Features	Cat. No.	Quantity
9725	Dual	Continuous flow	**9725**	1 Each
9725i	Dual	Continuous flow, Position Sensing Switch	**9725i**	1 Each

Rheodyne 8125 Low-dispersion Microscale Injector

Designed for use with 1 and 2mm ID HPLC columns

- **Can use partial filling for zero sample waste or complete filling for better reproducibility**
- **Position sensing switch provides reproducible start signal**
- **Suitable for use with 5 to 50µL sample loops**

Rheodyne 8125 Low-dispersion Microscale Injector

Model	Mode	Features	Cat. No.	Quantity
8125	Dual	Continuous flow	**8125**	1 Each

Rheodyne 7010 Sample Injector

Single-mode sample injector designed for the complete filling method

- **Compatible with sample loop sizes 5µL to 20mL**

Rheodyne 7010 Sample Injector				
Model	**Mode**	**Features**	**Cat. No.**	**Quantity**
7010	Single	Complete filling method	**7010**	1 Each

Rheodyne 9010 Sample Injector

Single-mode sample injector designed for the complete filling method

- **Compatible with sample loop sizes 5µL to 10mL**
- **PEEK stator**
- **Position sensing switch provides a reproducible start signal**

Rheodyne 9010 Sample Injector				
Model	**Mode**	**Features**	**Cat. No.**	**Quantity**
9010	Single	Continuous flow, Position sensing switch	**9010**	1 Each

Rheodyne Ports for Injectors

Suitable for popular Rheodyne injector models

Rheodyne Ports for Rheodyne Injectors Models 7010 and 9010		
For Use with Rheodyne Model	**Cat. No.**	**Quantity**
7010 Filler Port, Stainless Steel	**7012**	1 Each
9010 Filler Port, PEEK	**9012**	1 Each
9010 Needle Port, PEEK	**9013**	1 Each

Rheodyne Sample Loops

For Rheodyne sample injectors in stainless steel or biocompatible PEEK

Rheodyne Sample Loops

Volume	I.D.	Cat. No.	Quantity
Sample loops for 7010 and 7125 injectors			
5µL	0.18mm (0.007 in.)	**7020**	1 Each
10µL	0.30mm (0.012 in.)	**7021**	1 Each
20µL	0.30mm (0.012 in.)	**7022**	1 Each
50µL	0.51mm (0.020 in.)	**7023**	1 Each
100µL	0.51mm (0.020 in.)	**7024**	1 Each
200µL	0.76mm (0.030 in.)	**7025**	1 Each
500µL	0.76mm (0.030 in.)	**7026**	1 Each
1mL	0.76mm (0.030 in.)	**7027**	1 Each
5mL	1.0mm (0.040 in.)	**7029**	1 Each
Sample loops for 7725 and 7725i injectors			
5µL	0.18mm (0.007 in.)	**7755-020**	1 Each
10µL	0.30mm (0.012 in.)	**7755-021**	1 Each
20µL	0.30mm (0.012 in.)	**7755-022**	1 Each
50µL	0.51mm (0.020 in.)	**7755-023**	1 Each
Sample loops for 8125 injectors			
5µL	0.20mm (0.008 in.)	**8020**	1 Each
10µL	0.20mm (0.008 in.)	**8021**	1 Each
20µL	0.25mm (0.010 in.)	**8022**	1 Each
50µL	0.30mm (0.012 in.)	**8023**	1 Each
Sample loops for 9010 and 9725 injectors			
5µL	0.18mm (0.007 in.)	**9055-020**	1 Each
10µL	0.25mm (0.010 in.)	**9055-021**	1 Each
20µL	0.25mm (0.010 in.)	**9055-022**	1 Each
50µL	0.51mm (0.020 in.)	**9055-023**	1 Each
100µL	0.51mm (0.020 in.)	**9055-024**	1 Each
200µL	0.51mm (0.020 in.)	**9055-025**	1 Each
500µL	0.76mm (0.030 in.)	**9055-026**	1 Each
1mL	0.76mm (0.030 in.)	**9055-027**	1 Each
5mL	0.76mm (0.030 in.)	**9055-029**	1 Each
Sample loops for 9725 and 9725i injectors			
2µL	Internal	**7755-015**	1 Each
5µL	0.18mm (0.007 in.)	**9055-020**	1 Each
10µL	0.25mm (0.010 in.)	**9055-021**	1 Each
20µL	0.25mm (0.010 in.)	**9055-022**	1 Each
50µL	0.51mm (0.020 in.)	**9055-023**	1 Each

RheBuild Kits

Maintain Rheodyne valves and injectors

RheBuild Kits

For Use with Rheodyne Models	Cat. No.	Quantity
3725/3725i/3725-038/3725i-038	**3725-999**	1 Each
7010/7000	**7010-999**	1 Each
7125/7126	**7125-999**	1 Each
7410	**7410-999**	1 Each
7520/7526	**7520-999**	1 Each
7725/7725i/7726	**7725-999**	1 Each
8125/8126	**8125-999**	1 Each
9125/9126	**9125-999**	1 Each

Rheodyne Suction Needle Adapter

For use with Rheodyne sample injectors

Rheodyne Suction Needle Adapter		
For Use with	**Cat. No.**	**Quantity**
Rheodyne Injector Models 9725 and 9725i	**9125-076**	1 Each

Rheodyne Replacement Rotor Seals for Injectors

Suitable for popular Rheodyne injector models

Rheodyne Replacement Rotor Seals for Injectors		
For Use with Rheodyne Models	**Cat. No.**	**Quantity**
Vespel Seals		
7000/7010/7040/7067	**7010-039**	1 Each
7030	**7030-003**	1 Each
7060/7066	**7060-070**	1 Each
7125/7126	**7125-047**	1 Each
7410	**7410-038**	1 Each
7413	**7413-013**	1 Each
8125/8126	**8125-038**	1 Each
Tefzel Seals		
7000/7010/7040	**7010-071**	1 Each
7030	**7030-015**	1 Each
7060/7066/9060	**7060-074**	1 Each
7410	**7410-075**	1 Each
7125/7126	**7125-079**	1 Each
8125	**8125-097**	1 Each
9010	**9010-051**	1 Each
9125	**9125-082**	1 Each
PEEK Seals		
3725/3725i/3725-038/3725i-038	**3725-018**	1 Each

Rheodyne Stators

Suitable for popular Rheodyne injector models

Rheodyne Stators		
For Use with Rheodyne Models	**Cat. No.**	**Quantity**
7000/7010/7030/7040/7125	**7010-040**	1 Each
7010-087/7125-081	**7010-066**	1 Each
7060/7066	**7060-039**	1 Each
7410/7413	**7410-041**	1 Each
9010/9030/9125	**9125-043**	1 Each
9060	**9060-016**	1 Each
7725	**7725-010**	1 Each
8125/8126	**8125-098**	1 Each

Rheodyne Stator Face Assemblies		
For Use with Rheodyne Models	**Cat. No.**	**Quantity**
3725/3725i/3725-038/3725i-038	**3725-039**	1 Each
7125	**7125-067**	1 Each
8125	**8125-074**	1 Each
9125/9010/9030	**8125-094**	1 Each
9060	**9060-015**	1 Each
9725	**7725-026**	1 Each

Rheodyne Injection Port Needle Cleaner

For use with Rheodyne sample injectors

Rheodyne Injection Port Needle Cleaner		
For Use with	**Cat. No.**	**Quantity**
Rheodyne injectors	**7125-054**	1 Each

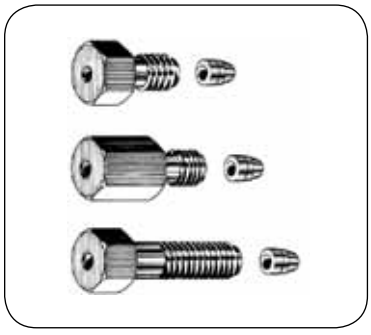
Rheodyne Valve Mounting Brackets

For use with Rheodyne sample injectors

Rheodyne Valve Mounting Brackets		
Type	**Cat. No.**	**Quantity**
Angle bracket	**7160-010**	1 Each
Mouting panel	**7160**	1 Each

RheFlex High Pressure Fittings

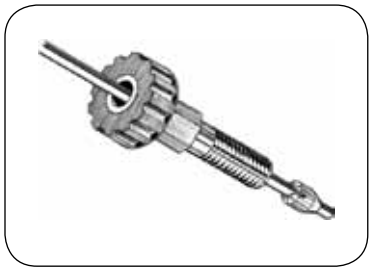
Precision machined from 316 stainless steel



RheFlex High Pressure Fittings			
	Type	**Cat. No.**	**Quantity**
	Short Fittings Set	**6000-109**	5 Pack
	Short Fittings Set	**6000-209**	10 Pack
	Long Fittings Set	**6000-111**	5 Pack
	Long Fittings Set	**6000-211**	10 Pack
	Extra Long Fittings Set	**6000-162**	5 Pack
	Extra Long Fittings Set	**6000-262**	10 Pack
	$^{1}/_{16}$ in. Ferrule	**6000-110**	5 Pack
	$^{1}/_{16}$ in. Ferrule	**6000-210**	10 Pack
	0.5mm Ferrule for Model 8125	**8125-084**	1 Each

RheFlex Two-Piece PEEK Fittings

Provide inert, metal-free connections



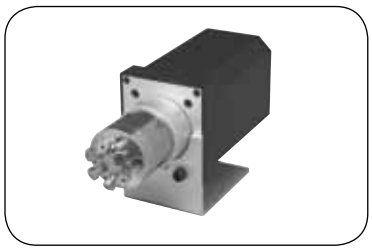
- **Slotted back-side of the ferrule is squeezed down onto the tube by the mating conical surface of the nut**
- **May be used on 1/16 in. metal or plastic tubing reliably up to 5000 psi**
- **Reusable ferrule and nut**

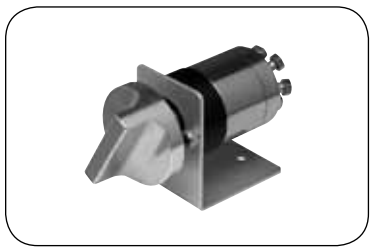
RheFlex Two-Piece PEEK Fittings

Type	Cat. No.	Quantity
Fitting set, standard length	**6000-054**	5 Pack
Fitting set, short	**6000-055**	5 Pack
Fitting set, X-long	**6000-066**	1 Each
Replacement ferrules	**6000-051**	5 Pack

Cheminert Model C4 Internal Sample Injector

High Quality Manual & Actuated Valves & Injectors





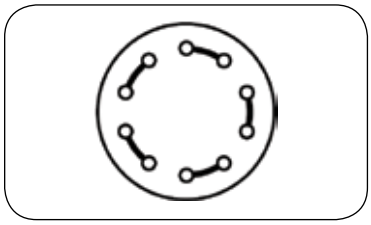
- **Sample volumes 0.1 to 0.5µL**
- **Stainless steel, alloy and polymer composites to meet most system requirements**
- **1/16 in. fittings**
- **0.010 in. ports**
- **Available with manual or microelectric actuation**

Cheminert Model C4 Internal Sample Injector

Description	Sample Volume	Cat. No.	Quantity
Model C4 injector, N60 stainless stator, manual	0.1µL	**60182-400**	1 Each
	0.2µL	**60182-402**	1 Each
	0.5µL	**60182-404**	1 Each
Model C4 injector, PAEK stator, manual	0.1µL	**60182-406**	1 Each
	0.2µL	**60182-408**	1 Each
	0.5µL	**60182-410**	1 Each
Model C4 injector, N60 stainless stator, microelectric actuator	0.1µL	**60182-401**	1 Each
	0.2µL	**60182-403**	1 Each
	0.5µL	**60182-405**	1 Each
Model C4 injector, PAEK stator, microelectric actuator	0.1µL	**60182-407**	1 Each
	0.2µL	**60182-409**	1 Each
	0.5µL	**60182-411**	1 Each

Cheminert Model C2 Microbore Injector

Can be used as an injector or switching valve



- **1/16 in. fittings**
- **0.010 in. ports**
- **Available in 6-port or 10-port configurations**
- **Available with manual or microelectric actuator**

Cheminert Model C2 Microbore Injector			
Description	**Sample Volume**	**Cat. No.**	**Quantity**
Model C2 injector, N60 stainless stator, 5µLloop, manual	6 ports	**C2-1006**	1 Each
	10 ports	**C2-1000**	1 Each
Model C2 injector, N60 stainless stator, 5µL loop, microelectric actuator	6 ports	**C2-1006EH**	1 Each
	10 ports	**C2-1000EP**	1 Each
Sample injector loops, stainless steel	2µL	**CSL2**	1 Each
	5µL	**CSL5**	1 Each
	10µL	**CSL10**	1 Each
	20µL	**CSL20**	1 Each
	50µL	**CSL50**	1 Each
	100µL	**CSL100**	1 Each
Model C4 injector, PAEK stator, 5µL loop, microelectric actuator	6 ports	**C2-1346EH**	1 Each
	10 ports	**C2-1340EP**	1 Each
Sample injector loops, PAEK	5µL	**CZSL5PK**	1 Each
	10µL	**CZSL10PK**	1 Each
	50µL	**CZSL50PK**	1 Each
	100µL	**CZSL100PK**	1 Each

Valco Injector Model C6W

Valco Injector Model C6W			
Description	**Volume**	**Cat. No.**	**Quantity**
Model C6W injector, six 0.016" ports, manual	20µL loop	**C6W**	1 Each
Model EPC6W injector, six 0.016" ports, microelectric actuator	20µL loop	**EPC6W**	1 Each
Replacement rotor	----	**SSAC6W**	1 Each
Sample injector loops, stainless steel	2µL	**SL2CW**	1 Each
Sample injector loop, stainless steel	5µL	**SL5CW**	1 Each
Sample injector loop, stainless steel	10µL	**SL10CW**	1 Each
Sample injector loop, stainless steel	20µL	**SL20CW**	1 Each
Sample injector loop, stainless steel	50µL	**SL50CW**	1 Each
Sample injector loop, stainless steel	100µL	**SL100CW**	1 Each

Valco Accessories

Valco Accessories			
Description	**Volume**	**Cat. No.**	**Quantity**
Valco syringe ports	22 ga. needles; 1/16" fittings	**VISF-1**	1 Each
Valco syringe ports	22 ga. 2" needles	**VISF-2**	1 Each
Valco Nuts and Ferrules	1/16" standard nut	**ZN1-10**	10 Pack
Valco Nuts and Ferrules	1/16" long nut	**LZN1-10**	10 Pack
Valco Nuts and Ferrules	1/16" SS ferrule	**ZF1-10**	10 Pack

Thermo Scientific HPLC Syringes

Easy, accurate and reproducible manual injection

- **Square tip to prevent damage to the injector**
- **Wide range of volumes**
- **Precision made from borosilicate glass and stainless steel**
- **Robust design and easy-to-read markings**

Standard Fixed Needle Syringes for Rheodyne/Valco Injectors

Volume	Needle Gauge	Needle Length	Cat. No.	Quantity
5µL	22	2 in.	**365CL221**	1 Each
10µL	22	2 in.	**365DL231**	1 Each
25µL	22	2 in.	**365FL241**	1 Each
50µL	22	2 in.	**365GL251**	1 Each
100µL	22	2 in.	**365HL261**	1 Each
250µL	22	2 in.	**365IL271**	1 Each
500µL	22	2 in.	**365JL281**	1 Each

Standard PTFE Tipped Removable Needle HPLC Syringes

Volume	Length	Needle Gauge	Cat. No.	Quantity
10µL	2 in.	22	**365DLG21**	1 Each
25µL	2 in.	22	**365FLG31**	1 Each
50µL	2 in.	22	**365GLG41**	1 Each
100µL	2 in.	22	**365HLG51**	1 Each
250µL	2 in.	22	**365ILG61**	1 Each
500µL	2 in.	22	**365JLG71**	1 Each

Syringes for Thermo Scientific HPLC Instruments

Thermo Scientific HPLC Instruments	Volume	Needle Gauge	Needle Length	Needle Type	Thermo Scientific Instrument Part No.	Cat. No.	Quantity
LCQ	250µL	22	2 in.	Removable	00301-19015	**365ILT21**	1 Each
LCQ	500µL	22	2 in.	Removable	00301-19016	**365JLT41**	1 Each
AS1000, AS3000	500µL	----	----	----	A3588-010	**365JLT61**	1 Each
AS3000, AS3500	2.5mL	----	----	----	A3587-020	**365LLT81**	1 Each
AS1000, AS3000	250µL	----	----	----	A3588-020	**365ILT91**	1 Each

Male Luer-LOK Priming Syringes

Volume	Cat. No.	Quantity
1mL	**365KL531**	1 Each
2.5mL	**365LL541**	1 Each
5mL	**365ML551**	1 Each
10mL	**365NL561**	1 Each
25mL	**365PL571**	1 Each
50mL	**365RL581**	1 Each

Syringes for CTC Instruments

Volume	Needle Length	Gauge	Needle Type	Cat. No.	Quantity
10µL	51mm	22	Fixed	**365DL710**	1 Each
25µL	51mm	22	Fixed	**365FL984**	1 Each
Gas Tight					
10µL	51mm	22	Fixed	**365DL991**	1 Each
25µL	51mm	22	Fixed	**365FL715**	1 Each
50µL	51mm	22	Fixed	**365GL810**	1 Each
100µL	51mm	22	Fixed	**365HL331**	1 Each
25µL	51mm	22	Removable	**365FL985**	1 Each
100µL	51mm	22	Removable	**365HL330**	1 Each
250µL	51mm	22	Removable	**365IL330**	1 Each
Gas Tight (0.41)					
100µL	51mm	22	Fixed	**365HL720**	1 Each
250µL	51mm	22	Fixed	**365IL720**	1 Each
500µL	51mm	22	Fixed	**365JL720**	1 Each

Replacement Needles for LC Syringes

Available for syringes with removable needles

Replacement Needles for LC Syringes				
Replacement for	**Needle length**	**Gauge**	**Cat. No.**	**Quantity**
PTFE-tipped needle for Mfr. No. 365DLG21	2 in.	22	**365RNL15**	5 Pack
25 to 500µL PTFE tipped needles; 365FL985, 365HL330, 365IL330	2 in.	22	**365RNL25**	5 Pack

Needles for Luer-LOK Priming Syringes				
For Use With	**Needle Length**	**Gauge**	**Cat. No.**	**Quantity**
All Thermo Scientific Luer-LOK Priming Syringes	2 in.	22	**365RNL22**	2 Pack

Mass Spectrometry Replacement ESI Probe Needles			
For Instrument	**Thermo Scientific Instrument Part No.**	**Cat. No.**	**Quantity**
Thermo Scientific LCQ XP, DECA, Advantage	00950-00990	**365RNLT1**	1 Each
Thermo Scientific LCQ MS	00950-00951	**365RNLT2**	1 Each
Thermo Scientific LCQ XSQ	00950-00975	**365RNLT3**	1 Each

Replacement Plungers for CTC Syringes		
For Use with	**Cat. No.**	**Quantity**
365DL991	**365RP532**	1 Each
365FL715	**365RP922**	1 Each
365GL810	**365RP821**	1 Each
365HL331, 365HL720 & 365IL330	**365RP471**	1 Each
365IL720	**365RP926**	1 Each
365JL720	**365RP928**	1 Each
365FL985	**365RP816**	1 Each

National Scientific Target Precision Glass Syringes

Configurations to fit every autosampler

Glass Syringes

Designed for accurate sampling of very small volumes of liquid; ideal for measuring sensitive biological samples

- **Precision-bored Duran* borosilicate-glass syringes**
- **Chromium-plated stainless-steel plungers eliminate leaching of metal ions into the sample solutions**
- **Syringes with microvolume Zero Dead Volume (ZDV) plunger in needle offer minimal sample waste**

National Scientific Target Precision Glass Syringes

Volume	Needle Length	Gauge	Needle Type	Cat. No.	Quantity
1µL	70mm	26s	Bevel	**NS200101**	1 Each
1µL	70mm	26s	90° Blunt End	**NS200102**	1 Each
2µL	80mm	22s	Bevel	**NS200201**	1 Each
2µL	80mm	22s	90° Blunt End	**NS200202**	1 Each
5µL	70mm	25s	Bevel	**NS200301**	1 Each
5µL	70mm	25s	90° Blunt End	**NS200302**	1 Each

Extended Handle Syringes for Waters Manual Injection Valves

Extended handle prevents heat transfer from hands to syringe barrel

- **50mm needle length provides accurate injections without damage to valve rotor**

National Scientific Extended Handle Syringes for Waters* Manual Injection Valves

Volume	Needle Length	Gauge	Needle Type	Cat. No.	Quantity
5µL	50mm	25	90° Blunt End	**NS502304**	1 Each
10µL	50mm	25	90° Blunt End	**NS502404**	1 Each
25µL	50mm	25	90° Blunt End	**NS502504**	1 Each
50µL	50mm	25	90° Blunt End	**NS502604**	1 Each
100µL	50mm	25	90° Blunt End	**NS502704**	1 Each
250µL	50mm	25	90° Blunt End	**NS502804**	1 Each

Replacement Removable Needles

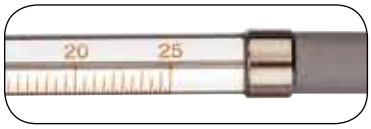
50mm blunt tip needles are compatible with manual injection valves

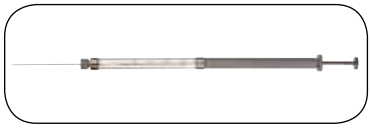
Replacement Removable Needles

Volume	Needle Length	Gauge	NeedleType	Cat. No.	Quantity
5µL	50mm	25	90° Blunt End	**NS832306**	3 Pack
10µL	50mm	25	90° Blunt End	**NS832406**	3 Pack
25 to 100µL	50mm	25	90° Blunt End	**NS832506**	3 Pack

Extended Handle Syringes

Gas- and liquid-tight syringes for micro volume sampling



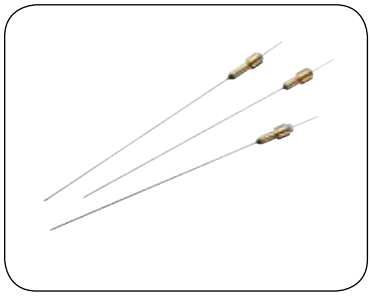


- **Extended metal handle prevents sensitive samples from thermal transfer from operator to syringe; also protects precision-machined plunger from bending**
- **PTFE-tipped to prevent plunger freeze-up for longer syringe life**
- **Removable needle syringes permit easy removal of bent needles for replacement; same syringe can be used with different gauge needles to meet specific application needs**

National Scientific Target Precision Extended Handle Syringes

Volume	Needle Length	Gauge	Needle Type	Cat. No.	Quantity
5µL	51mm	26s	Bevel	**NS506305**	1 Each
5µL	51mm	26s	90° Blunt End	**NS506306**	1 Each
10µL	51mm	26s	Bevel	**NS506405**	1 Each
10µL	51mm	26s	90° Blunt End	**NS506406**	1 Each
25µL	51mm	22s	Bevel	**NS506505**	1 Each
25µL	51mm	22s	90° Blunt End	**NS506506**	1 Each
50µL	51mm	22s	Bevel	**NS506605**	1 Each
50µL	51mm	22s	90° Blunt End	**NS506606**	1 Each

Replacement Needles for Extended Handle Syringes



Syringes for Manual, On-Column and Septum Injection, Replacement Needles, Bevel

Volume	Length	Gauge	Needle Type	Cat. No.	Quantity
5µL	51mm	26s	Bevel	**NS832301**	3 Pack
5µL	2"/51mm	26s	90° Blunt End	**NS832302**	3 Pack
10µL	51mm	26s	Bevel	**NS832401**	3 Pack
10µL	2"/51mm	26s	90° Blunt End	**NS832402**	3 Pack
25-100µL	2"/51mm	22s	Bevel	**NS832501**	3 Pack
25-100uL	2"/51mm	22s	90° Blunt End	**NS832502**	3 Pack

LC Syringes for Agilent Technologies

Use with 1090A or 1100 needle assembly

National Scientific Target Precision LC Syringes for Agilent Technologies			
Volume	**Agilent No.**	**Cat. No.**	**Quantity**
25µL	9301-0633	**NS606500**	1 Each
250µL	9301-0678	**NS606800**	1 Each

LC Syringe for PerkinElmer

Use with PerkinElmer Series 200 needle assembly

National Scientific Target Precision LC Syringe for PerkinElmer			
Volume	**PerkinElmer No.**	**Cat. No.**	**Quantity**
25µL	09923304	**NS606615**	1 Each
250µL	09923270	**NS606815**	1 Each
500µL	09923306	**NS606915**	1 Each
1mL	09923307	**NS606015**	1 Each
2.5mL	09923219	**NS606035**	1 Each

LC Syringe for Thermo Scientific

Use with SpectraSYSTEM AS-100/300/1000/3000/3500

National Scientific Target Precision LC Syringe for Thermo Scientific			
Volume	**Thermo Scientific No.**	**Cat. No.**	**Quantity**
250µL	A3587-020	**NS606814**	1 Each
500µL	A3588-010	**NS606914**	1 Each
1mL	A3587-030	**NS606015**	1 Each
2.5mL	A3588-020	**NS606035**	1 Each

LC Syringes for CTC/Leap

Use with A200LC, HTS, and HTC PAL models

- **For use with CTC/Leap needle assemblies**
- **Fixed needle syringes feature a proprietary process that eliminates cement or epoxy for error-free injections**
- **PTFE-tip on stainless-steel plungers prevent plunger freeze-up for longer syringe life**
- **22 gauge needle, 51mm length with 90° blunt end point style**

National Scientific Target Precision LC Syringes for CTC/Leap

Volume	Needle Length	Gauge	Needle Type	Cat. No.	Quantity
25µL	51mm	22s	90° Blunt End	**NS620502**	1 Each
50µL	51mm	22s	90° Blunt End	**NS620605**	1 Each
100µL	51mm	22s	90° Blunt End	**NS620702**	1 Each
250µL	51mm	22s	90° Blunt End	**NS620805**	1 Each

LC Syringes for Waters WISP

Use with 710, 712, and 715 models.

- **1/4-28UNF front-fitting syringe for use with Waters WISP needle assemblies.**

National Scientific Target Precision LC Syringes for Waters WISP

Volume	Waters No.	Cat. No.	Quantity
25µL	9301-0633	**NS663514**	1 Each
250µL	9301-0678	**NS663814**	1 Each

LC Syringes for Water's Injection Valves—Removable Needle

- **25s Gauge needles**
- **PTFE-tipped stainless-steel plungers**
- **Use with U6K manual injector**

National Scientific Target Precision Manual Injector Syringe—Removable Needle

Volume	Needle Length	Gauge	Needle Type	Cat. No.	Quantity
10µL	51mm	25s	90° Blunt End	**NS602406**	1 Each
25µL	51mm	25s	90° Blunt End	**NS602506**	1 Each
50µL	51mm	25s	90° Blunt End	**NS602606**	1 Each
100µL	51mm	25s	90° Blunt End	**NS602706**	1 Each
250µL	51mm	25s	90° Blunt End	**NS602806**	1 Each

LC Syringes for Manual Injection Valves—Replacement Needle

National Scientific Target Precision Replacement Needles				
For Use with	**Needle Length**	**Gauge**	**Cat. No.**	**Quantity**
For NS602806	32mm	25	**NS852606**	3 Pack
For NS602806	38mm	25	**NS862606**	3 Pack
For NS602806	51mm	25	**NS842606**	3 Pack

LC Syringes for Manual Injection Valves

- **22s Gauge needles**
- **Stainless-steel plungers**
- **Use with Rheodyne*, Altex*, Valco*, SSI*, Knauer***

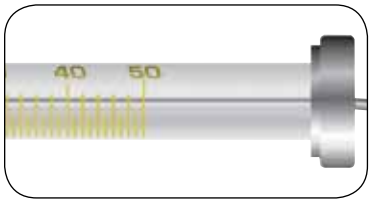
National Scientific Target Precision Manual Injector Syringe - Fixed Needle, Stainless-steel Plunger					
Volume	**Needle Length**	**Gauge**	**NeedleType**	**Cat. No.**	**Quantity**
5µL	51mm	22s	90° Blunt End	**NS101302**	1 Each
10.0uL	51mm	22s	90° Blunt End	**NS101402**	1 Each
25µL	51mm	22s	90° Blunt End	**NS101502**	1 Each
50µL	51mm	22s	90° Blunt End	**NS101602**	1 Each
100µL	51mm	22s	90° Blunt End	**NS101702**	1 Each
250µL	51mm	22s	90° Blunt End	**NS101802**	1 Each
500µL	51mm	22s	90° Blunt End	**NS101902**	1 Each

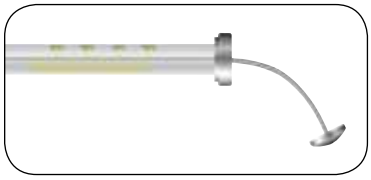
LC Syringes for Rheodyne Style Valves

Gas tight with fixed needles

National Scientific Target Precision Glass Syringes, Rheodyne Style Valves				
Volume	**Needle Length**	**Needle Type**	**Cat. No.**	**Quantity**
5µL	51mm	90° Blunt End	**NS601302**	1 Each
10µL	51mm	90° Blunt End	**NS601402**	1 Each
25µL	51mm	90° Blunt End	**NS601502**	1 Each
50µL	51mm	90° Blunt End	**NS601602**	1 Each
100µL	51mm	90° Blunt End	**NS601702**	1 Each
250µL	51mm	90° Blunt End	**NS601802**	1 Each
500µL	51mm	90° Blunt End	**NS601902**	1 Each

LC Syringes for Manual Injection Valves





- **22s Gauge needles**
- **Super Elastic plunger**
- **Use with Rheodyne*, Altex*, Valco*, SSI*, Knauer***

Manual Injector Syringe - Fixed Needle, Super Elastic Plunger					
Volume	**Needle Length**	**Gauge**	**Needle Type**	**Cat. No.**	**Quantity**
5µL	51mm	22s	90° Blunt End	**NS161302**	1 Each
10µL	51mm	22s	90° Blunt End	**NS161402**	1 Each

LC Syringes for Manual Injection Valves

- **22s Gauge needles**
- **PTFE-tipped stainless-steel plungers**
- **Use with Rheodyne*, Altex*, Valco*, SSI*, Knauer***

Manual Injector Syringe - Removable Needle, PTFE-tipped Stainless steel Plunger					
Volume	**Needle Length**	**Gauge**	**Needle Type**	**Cat. No.**	**Quantity**
5µL	51mm	22s	90° Blunt End	**NS601306**	1 Each
10µL	51mm	22s	90° Blunt End	**NS601406**	1 Each
25µL	51mm	22s	90° Blunt End	**NS601506**	1 Each
50µL	51mm	22s	90° Blunt End	**NS601606**	1 Each
100µL	51mm	22s	90° Blunt End	**NS601706**	1 Each
250µL	51mm	22s	90° Blunt End	**NS601806**	1 Each
500µL	51mm	22s	90° Blunt End	**NS601906**	1 Each

Replacement Needles

Replacement Needles					
Volume	**Needle Length**	**Gauge**	**Needle Type**	**Cat. No.**	**Quantity**
5µL	51mm	22s	90° Blunt End	**NS831305**	3 Pack
10µL	51mm	22s	90° Blunt End	**NS831405**	3 Pack
25µL	51mm	22s	90° Blunt End	**NS831505**	3 Pack
250µL	51mm	22s	90° Blunt End	**NS832602**	3 Pack

LC Syringes for Macro Volume Sampling

22s Gauge needles with PTFE tipped stainless-steel plungers

National Scientific Target Precision Large Volume Syringe					
Volume	**Length**	**Gauge**	**Needle Type**	**Cat. No.**	**Quantity**
Fixed Needle					
1.0mL	51mm	22s	Bevel	**NS600000**	1 Each
2.5mL	51mm	22s	Bevel	**NS600020**	1 Each
5.0mL	51mm	22s	Bevel	**NS600040**	1 Each
10.0mL	51mm	22s	Bevel	**NS600060**	1 Each
Removable Needle					
1.0mL	51mm	22s	Bevel	**NS600005**	1 Each
2.5mL	51mm	22s	Bevel	**NS600025**	1 Each
5.0mL	51mm	22s	Bevel	**NS600045**	1 Each
10.0mL	51mm	22s	Bevel	**NS600065**	1 Each

National Scientific Target Precision Large Volume Syringe—PTFE Luer-Lok					
Volume	**Length**	**Gauge**	**Needle Type**	**Cat. No.**	**Quantity**
1.0mL	----	----	----	**NS607011**	1 Each
2.5mL	----	----	----	**NS607031**	1 Each
2.5mL	----	----	----	**NS607051**	1 Each
10mL	----	----	----	**NS607071**	1 Each
25mL	----	----	----	**NS607091**	1 Each

Gas Tight Syringes for Macro Volume Sampling Replacement Needles

Suitable for liquid or gas samples

- **PTFE-tipped stainless-steel plunger tip prevents plunger freeze-up for longer syringe life**

National Scientific Target Precision Gas Tight Syringe Replacement Needles					
Volume	**Length**	**Gauge**	**Needle Type**	**Cat. No.**	**Quantity**
For Removable Needle Syringe					
250µL to 10mL	51mm	22s	90° Blunt End	**NS841014**	3 Pack
250µL to 10mL	51mm	22s	Side Hole	**NS841015**	2 Pack
250µL to 10mL	51mm	22s	Bevel	**NS841013**	3 Pack
Metal Luer-Screw for PTFE Luer-Lok					
--	51mm	26s	90° Blunt End	**NS842047**	3 Pack
--	51mm	26s	Bevel	**NS840047**	3 Pack
--	51mm	22s	90° Blunt End	**NS842070**	3 Pack
--	51mm	22s	Bevel	**NS840070**	3 Pack

Syringe Accessories

Syringe storage, cleaning, and dispensing aids

- ***Syringe Rack*** **holds up to three glass syringes, 500uL or smaller to prevent breakage and contact with lab surfaces; made of anodized aluminium**
- ***Needle Cleaning Wires*** **remove blockages from syringe needle; promote longer syringe life and prevent contamination in subsequent syringe use**
- ***Syringe Guide Chaney Adapter*** **is fitted to manually operated syringes 100uL or smaller to increase precision and reproducibility; made of stainless steel and anodized aluminium**

National Scientific Target Precision Syringe Accessories

Type	Cat. No.	Quantity
Three-position Syringe Rack	**NS700002**	1 Each
Needle Cleaning Wire for 26s gauge needles	**NS1018300**	12 Pack
Needle Cleaning Wire for 22s and 25s gauge needles	**NS1018301**	12 Pack
Syringe Guide Chaney Adapter	**NS700001**	1 Each

Detector Lamps for Thermo Scientific Instruments

Detector Lamps for Thermo Scientific Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	SP8400/SP8430/SP8440/SP8450/SP8480/SP8490	**DSP-901**	1 Each
Deuterium Lamp	SP8480XR/SP8773XR	**DSP-907**	1 Each
Deuterium Lamp	Linear UV100/UV200/UV1000/UV2000/UV3000/Focus/Spectrochrom	**DSP-908**	1 Each

Detector Lamps for Agilent Instruments

Detector Lamps for Agilent Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	Agilent HP1040/HP1050 (G1306A) DAD/HP 1050 DA (1050 MWD)/ HP MW (79854A) / HP 1090 (75880A) DAD	**DHP-901**	1 Each
Deuterium Lamp	HP 1080/HP 1081/HP1081B/HP1082B/HP1084/HP1084B	**DHP-902**	1 Each
Deuterium Lamp	HP 1050 VW (79853C)	**DHP-903**	1 Each
Xenon Lamp	HP 1046/HP1046A	**DHP-906**	1 Each
Deuterium Lamp	HP 8450/8450A	**DHP-909**	1 Each
Deuterium Lamp	HP 1100 (G1314) VW	**DHP-910**	1 Each
LL Deuterium Lamp	Agilent 1100 VWD long life	**DHP-910LL**	1 Each
Deuterium Lamp	HP 1100 (G1315A) DAD	**DHP-911**	1 Each
LL Deuterium Lamp	Agilent 1100 DAD long life	**DHP-911LL**	1 Each
Deuterium Lamp	HP 8453	**DHP-912**	1 Each
Deuterium Lamp	HP 8452 A DAD/HP 8452A Opt 002	**DHP-913**	1 Each

Detector Lamps for Merck-Hitachi Instruments

Detector Lamps for Merck-Hitachi Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	101/102/111	**DHI-901**	1 Each
Deuterium Lamp	100-10/100-40/100-50/100-60	**DHI-902**	1 Each
Deuterium Lamp	150-20/200/220/300/330/340/2000/3000/4000/L2500/L3000/L4000/L-4500	**DHI-903**	1 Each
Deuterium Lamp	L4200/L4250/L4500	**DHI-908**	1 Each
Deuterium Lamp	LaChrom L4720/L4520/L7400/L450	**DHI-910**	1 Each
Xenon Lamp	Hitachi fluorescence detectors F1000/2000/4000 Series	**DHI-911**	1 Each

Detector Lamps for PerkinElmer Instruments

Detector Lamps for Perkin-Elmer Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	Lambda 3/7/9	**DPE-903**	1 Each
Deuterium Lamp	360/460/560	**DPE-906**	1 Each
Deuterium Lamp	Integral 2000/Integral 4000/LC55/LC65/LC85/LC95	**DPE-911**	1 Each
Deuterium Lamp	LC-90/LC-290	**DPE-913**	1 Each
Deuterium Lamp	Lambda 2/2S/10/11 and others	**DPE-914**	1 Each
Deuterium Lamp	Series 200 DAD	**DPE-915**	1 Each
Tungsten Lamp	Lambda 2/2S/10/11 and others	**DPE-908**	1 Each

Detector Lamps for Shimadzu Instruments

Detector Lamps for Shimadzu Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	UV120/UV160/UV160A/UV240/UV260/UV265	**DSH-901**	1 Each
Deuterium Lamp	SPD-2A/SPD-3/SPD-4	**DSH-902**	1 Each
Deuterium Lamp	D300L/UV200S	**DSH-903**	1 Each
Xenon Lamp	Shimadzu RF530/RF510	**DSH-912**	1 Each
Xenon Lamp	Shimadzu RF540/RF535/RF551/RF500	**DSH-913**	1 Each
Xenon Lamp	Shimadzu RF1501.5301/5000	**DSH-914**	1 Each
Xenon Lamp	RF10A RF10AX	**DSH-915**	1 Each
Deuterium Lamp	SPD 6A/SPD-6AV	**DSH-916**	1 Each
Deuterium Lamp	SPD 10A/SPD 10AS/SPD-10AV/SPD-10AVP	**DSH-917**	1 Each
Deuterium Lamp	SPD-M10AVP PDA	**DSH-918**	1 Each
LL Deuterium Lamp	Shimadzu SPD-10 Series long life	**DSH-918LL**	1 Each

Detector Lamps for Varian Instruments

Detector Lamps for Varian Instruments

Description	Model	Cat. No.	Quantity
Deuterium Lamp	UV 2050	**DVA-901**	1 Each
Deuterium Lamp	UV 50/Varichrom	**DVA-903**	1 Each
Deuterium Lamp	UV100/UV200	**DVA-904**	1 Each
Deuterium Lamp	UV5/2550	**DVA-905**	1 Each
Deuterium Lamp	LC5000/LC5500	**DVA-906**	1 Each
Deuterium Lamp	Star 9050	**DVA-907**	1 Each
Deuterium Lamp	ProStar 340/345 UV/Vis	**DVA-909**	1 Each

Detector Lamps for Waters Instruments

Detector Lamps for Waters Instruments

Description	Model	Cat. No.	Quantity
Mercury Lamp	440/441/490	**DWA-901**	1 Each
Deuterium Lamp	480/481/480LC/481LC/Lambda Max/LC1	**DWA-910**	1 Each
Tungsten Lamp	RI/R401/R403/R404	**DWA-911**	1 Each
Cadmium Lamp	440/441/490	**DWA-912**	1 Each
Zinc Lamp	440/441/490	**DWA-913**	1 Each
Deuterium Lamp	484	**DWA-915**	1 Each
Deuterium Lamp	486	**DWA-918**	1 Each
Deuterium Lamp	2486	**DWA-918LC**	1 Each
Deuterium Lamp	996 PDA/2996	**DWA-921**	1 Each
LL Deuterium Lamp	Waters 996	**DWA-921LL**	1 Each
Xenon Lamp	470/475/2475 lamp only	**DWA-923**	1 Each
Deuterium Lamp	990/991/994 PDA	**DWA-926**	1 Each
Xenon Lamp	474	**DWA-929**	1 Each
Deuterium Lamp	2487 Dual Wavelength/2488	**DWA-930**	1 Each
LL Deuterium Lamp	Waters Alliance 2487/2488	**DWA-930LL**	1 Each

Pump Spares for Thermo Scientific Instruments

Pump Spares for Thermo Scientific Instruments			
Description	**Model**	**Cat. No.**	**Quantity**
Piston Seal			
Piston Seal Black	Surveyor LC	**SFS-220**	1 Each
Piston Seal Yellow	Surveyor LC	**SFS-220G**	1 Each
Wash Seal White	Surveyor LC	**SFS-230**	1 Each
Piston Seal Black	Surveyor MS	**SFS-320**	1 Each
Piston Seal Clear	Surveyor MS	**SFS-320U**	1 Each
Wash Seal clear	Surveyor MS	**SFS-330**	1 Each
Check Valves			
Inlet Check Valve Assembly - Cartridge Type	Surveyor LC	**SFS-3001**	1 Each
Outlet Check Valve Assembly - Cartridge Type	Surveyor LC	**SFS-3002**	1 Each
Inlet/Outlet Check Valve Cartridge	Surveyor MS	**SFS-6001C**	1 Each

Pump Spares for Agilent Instruments

Pump Spares for Agilent Instruments			
Description	**Model**	**Cat. No.**	**Quantity**
Pistons			
Piston Assembly Sapphire	1090	**SHP-200**	1 Each
Piston Assembly Sapphire	1050 and 1100	**SHP-400**	1 Each
Piston Seals			
Piston Seal Yellow	1050, 1090 and 1100	**SHP-220G**	1 Each
Piston Seal Black	1050 and 1100	**SHP-420K**	1 Each
Check Valves and Spares			
Replacement Inlet/Outlet Check Valve Cartridge	1090	**SHP-5002**	1 Each
Inlet/Outlet Check Valve Assembly	1090	**SHP-5001**	1 Each

Pump Spares for PerkinElmer Instruments

Pump Spares for PerkinElmer Instruments			
Description	**Model**	**Cat. No.**	**Quantity**
Pistons			
HP Piston Assembly Sapphire	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE600**	1 Each
HP Piston Assembly Sapphire	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE500**	1 Each
Piston Seals			
HP Piston Seal Grey	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE220**	1 Each
HP Piston Seal Yellow	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE220G**	1 Each
LP Piston Seal Black	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE320**	1 Each
LP Piston Seal Yellow	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE320G**	1 Each
Check Valves and Spares			
Inlet/Intermediate Check Valve Assembly	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE3001**	1 Each
Outlet Check Valve Assembly	SERIES 200, 400, 410, 620, Model 250, Integral 4000	**SOT-PE3002**	1 Each

Pump Spares for Shimadzu Instruments

Pump Spares for Shimadzu Instruments			
Description	**Model**	**Cat. No.**	**Quantity**
Pistons			
Piston Assembly Sapphire	LC-10 AS, LC-6, LC-6A	**SOT-SH200**	1 Each
Piston Assembly Sapphire	LC-9, LC-10AD, LC-600	**SOT-SH202**	1 Each
Piston Seals			
Piston Seal Yellow	LC-10 AT	**SOT-SH-100-01**	1 Each
Wash Seal White	LC-10 AT	**SOT-SH-100-02**	1 Each
Piston Seal Grey	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SH220**	1 Each
Wash Seal White	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SH220G**	1 Each
Piston Seal Yellow	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SH520G**	1 Each
Piston Seal Grey	LC-9, LC-10AD, LC-600	**SOT-SH420**	1 Each
Piston Seal Black	LC-10 ATvp	**SOT-SH520**	1 Each
Check Valves and Spares			
Inlet Check Valve Assembly	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SSH3001**	1 Each
Outlet Check Valve Assembly	LC-3, LC-4, LC-5, LC-6, LC-6A, LC-10 AS	**SOT-SSH3002**	1 Each
Inlet Check Valve Assembly - Cartridge Type	LC-9, LC-10AD, LC-600	**SSH-6001**	1 Each
Outlet Check Valve Assembly - Cartridge Type	LC-9, LC-10AD, LC-600	**SSH-6002**	1 Each

Pump Spares for Varian Instruments

Pump Spares for Varian Instruments			
Description	**Model**	**Cat. No.**	**Quantity**
Pistons			
Piston Assembly Sapphire	5000, 5500, 5600	**SOT-VA200**	1 Each
Piston Assembly Sapphire	2010, 2210, 2510	**SOT-VA400**	1 Each
Piston Seals			
Piston Seal Black	5000, 5500, 5600	**SOT-VA220**	1 Each
Piston Seal Black	2010, 2210, 2510	**SOT-VA320**	1 Each
Piston Seal Yellow	2010, 2210, 2510	**SOT-VA320G**	1 Each
Check Valves and Spares			
Inlet Check Valve Assembly	2010, 2210, 2510	**SVA-3001**	1 Each
Outlet Check Valve Assembly	2010, 2210, 2510	**SVA-3002**	1 Each

Pump Spares for Waters Instruments

Pump Spares for Waters Instruments			
Description	**Model**	**Cat. No.**	**Quantity**
Pistons			
Piston Assembly Sapphire	M510, M590, M600, M610 M6000	**SWA-WA200**	1 Each
Piston Assembly Ruby	M510, M590, M600, M610 M6000	**SWA-WA200R**	1 Each
Piston Assembly Sapphire	M45, M501	**SWA-WA205**	1 Each
Piston Assembly Sapphire	M515	**SWA-WA800**	1 Each
Piston Assembly Sapphire	Alliance 2690	**SWA-WA900**	1 Each
Piston Seals			
Piston Seal Black	M45, M501, M510, M590, M600, M610 M6000	**SWA-WA220**	1 Each
Piston Seal Yellow	M45, M501, M510, M590, M600, M610 M6000	**SWA-WA220G**	1 Each
Piston Seal Grey	M510EF, M590EF, M600EF, M610EF, M6000EF	**SWA-WA600S**	1 Each
Piston Seal Black	M515	**SWA-WA820**	1 Each
Piston Seal Yellow	M515	**SWA-WA820G**	1 Each
Piston Seal Black	Alliance 2690	**SWA-WA920**	1 Each
Piston Seal Yellow	Alliance 2690	**SWA-WA920G**	1 Each
Check Valves and Spares			
Inlet Check Valve Assembly	M45, M501, M510, M590, M600, M610 M6000	**SWA-3201**	1 Each
Outlet Check Valve Assembly Actuator Type	M45, M501, M510, M590, M600, M610 M6000	**SWA-3202**	1 Each
Outlet Check Valve	M45, M501, M510, M590, M600, M610 M6000	**SWA-3202B**	1 Each
Inlet Check Valve Repair Kit	M510, M590, M600, M610 M6000	**SWA-3212**	1 Each
Outlet Check Valve Assembly Actuator Type	M45, M501, M510, M590, M600, M610 M6000	**SWA-3402**	1 Each
Outlet Check Valve Assembly Ball & Seat Type	M45, M501, M510, M590, M600, M610 M6000	**SWA-3402B**	1 Each
Inlet Check Valve Assembly	M510EF, M590EF, M600EF, M610EF, M6000EF	**SWA-4107**	1 Each
Inlet Check Valve Repair Kit	M510EF, M590EF, M600EF, M610EF, M6000EF	**SWA-4123**	1 Each
Inlet Check Valve Assembly	M515	**SWA-8001**	1 Each
Outlet Check Valve Assembly	M515	**SWA-8002**	1 Each
Check Valve Cartridge	Alliance 2690	**SWA-9001**	1 Each

HOT POCKET and COOL POCKET Column Temperature Controllers

Wrap-around column temperature control systems

- Easy to install and use with a variety of column lengths
- Dual display of both actual and set point temperature
- HOT POCKET™ range from just above ambient to 85°C
- COOL POCKET™ range from 5°C to 55°C
- Explore sample selectivity and stability on both sides of ambient

Column Heating and Cooling in an Efficient, Compact Design

The HOT POCKET and COOL POCKET Column Temperature Controllers have a unique, space saving design for the efficient control of HPLC column temperature using a novel, soft, wrap-around sealing mantle. The mantle is wrapped directly onto the column, in situ, in horizontal, vertical, or slant position. The standard size accepts column lengths up to 300 mm, and columns up to 150 mm can be used with the short HOT POCKET model. The inserts also allow the use of guard columns or the optional eluent pre-heater. The inserts are modular, allowing them to be easily removed or rearranged for your specific column configuration. Special inserts are available for larger or smaller diameter columns. The temperature is set on the Temperature Controller Unit, which is permanently attached to the heater/cooler. Both the actual temperature and the user selected set point are simultaneously displayed on the LED controller display.

HOT POCKET Column Heater

The HOT POCKET Column Heater has a temperature range of just above ambient to 85 °C with excellent control, allowing validation of HPLC methods at accurate temperatures. HPLC method ruggedness can be investigated by exploring the sensitivity of a separation to temperature changes. The HOT POCKET is available in a standard size to accommodate column combinations up to 300 mm in length, and a short version for columns up to 150 mm.

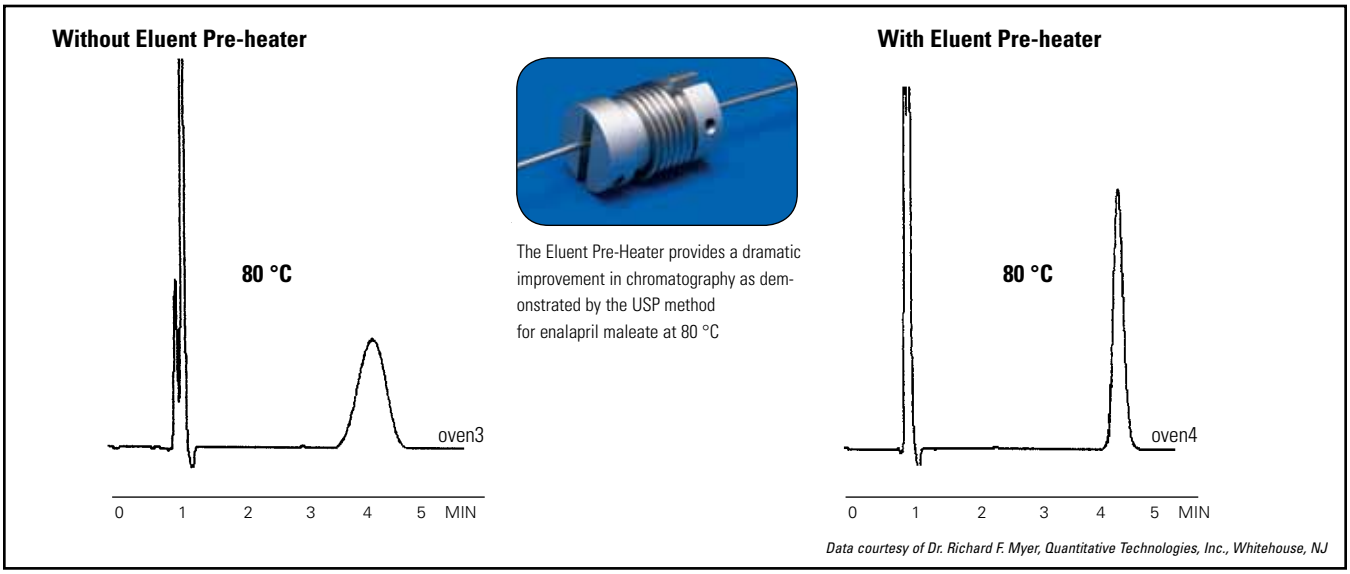
It is easy to install a column into the HOT POCKET or COOL POCKET. Depending upon column length and auxiliary fixtures such as a guard column or eluent pre-heater, some of the inserts may have to be rearranged or removed through the special slot at one end. Rotate the inserts so that the groove in each is positioned in the open part of the channel. Columns are simply placed into the inserts, which are then rotated to lock the column into the channel. The insulated mantle is wrapped around the column with a Velcro™ closure.

COOL POCKET Temperature Controller

The COOL POCKET Temperature Controller provides efficient control of the temperature of HPLC columns both above and below ambient, with an operational temperature range of 5 °C to 55 °C. The COOL POCKET Temperature Controller is ideal for chiral applications where a lower temperature may give better separation of enantiomers or other closely related compounds. It also allows you to validate HPLC methods at accurate temperatures near ambient and check HPLC method ruggedness by exploring the sensitivity of your separation to temperature changes on both sides of ambient.

HOT POCKET Column Heaters, Eluent Preheater/Precooler and COOL POCKET Chiller

Column heating or cooling in a compact, efficient design



Effect of eluent pre-heater on efficiency

	HOT POCKET	COOL POCKET
Operating Range	5 °C above ambient to 85 °C	5 °C to 55 °C
Display	Dual LED displays of actual and set point temperatures in °C	
Temperature Accuracy	± 2 °C over entire range	
Temperature Repeatability	± 1 °C	
Temperature Stability	± 0.1 °C	
Time to Stabilization (from ambient)	85 °C in less than 30 minutes	55 °C in 25 minutes 5 °C in 20 minutes
Column Capacity	Standard: up to 3/8" OD and up to 300 mm in length and end-fittings up to 19 mm OD (250 mm length column with guard or eluent pre-heater in addition to column) Short (HOT POCKET only): up to 150 mm total length (100 mm column plus guard or pre-heater)	
Controller Dimensions	2.8 x 4.0 x 6.5 inches	
Mantle Dimensions	Standard: 1.5 x 1.5 x 17 inches Short: 1.5 x 1.5 x 12 inches	Standard: 1.5 x 4.0 x 17 inches
Power Cord	3 foot retractable coil cord	
Weight	1 lb. enclosure (3 lb. total with power supply)	2 lbs. enclosure (4 lb. total with power supply)
Power	24 VAC, 25 Watts maximum	15 VDC, 20 Watts maximum

Eluent Preheater/Precooler

- **For preheating or precooling Mobile Phase before it enters column**
- **Use in temperatures above 50°C or below 15°C**
- **0.005" I.D.**

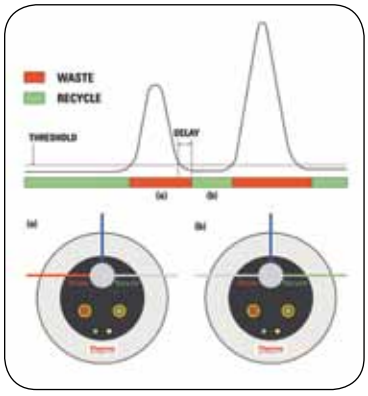
HOT POCKET Column Heaters, Eluent Preheater/Precooler and COOL POCKET Chiller

Description	Cat. No.	Quantity
HOT POCKET Column Heater	**92016**	1 Each
HOT POCKET Column Heater	**92016-150**	1 Each
COOL POCKET Column Chiller	**92017**	1 Each
Eluent Preheater/Precooler	**92018**	1 Each

SRS Pro Solvent Recycling System

Reduce mobile phase consumption by up to 90%

Compatible with:
Any HPLC detector



- **Continuously monitors the output signal of the chromatographic detector, recycling the mobile phase to the solvent reservoir when the baseline is below a certain preset threshold**
- **Easy-to-use software is provided to configure system parameters, perform on-line monitoring and audit trail facilities**
- **No power adapter is required as the solvent saver is powered directly from the chromatography data system PC through a USB connection**
- **Recycles the mobile phase only if switched on: in case of power failure the valve remains in the waste position and the mobile phase in the reservoir remains uncontaminated**
- **Analog input allows unipolar or bipolar operation of the device within a range of ±1V with an analog-to-digital converter**
- **TTL/contact closure for the device can be configured as start, auto-zero or valve position control input**

Operational Principle

- **If the input signal level exceeds this threshold value, the SRS Pro redirects the eluent flow to waste (1), taking account of the transport time from the detector to the switching valve**
- **When the signal returns below the threshold (2), the SRS Pro again waits for the transport delay and then switches the mobile phase back to the reservoir**
- **Autosampler injection marker connected to the SRS Pro zeroes signal input at the moment of injection**

Data Rate	1 Hz
Wetted Material	PEEK
Power Source	USB port of PC
Max. Pressure	30 psi/0.2MPa
Requires	1 free USB port, MS-Windows XP/2000/Vista

SRS Pro Solvent Recycling System

Description	Cat. No.	Quantity
SRS Pro solvent recycling system	**66001-001**	1 Each

SDG Pro Solvent Degasser

For gas-free HPLC Solvents

- **High efficiency in-line system**
- **Reliable, continuous operation**
- **Quick equilibration and short startup times**
- **Removes dissolved gases from solvents**
- **Used to degas the mobile phase for HPLC and can be employed in other applications where gases may interfere with the use of the system (such as an autotitrator)**

Product Specifications

General	
Channels	4 independent
Mode of Degassing	Gas permeation through a fluoropolymer tube
Maximum Flow Rate	10 mL/min.
Degassing Capacity	~2 ppm at 1 mL/min.
Dead Volume	~480 µL per channel for standard channel
Materials Contacting Solvents	PEEK™, Glass-filled PTFE, Teflon AF

Power	
Power Requirement if using supplied AC Adapter	100 to 240 VAC (±10%), 1A, 50 to 60 Hz (±3 Hz)
Power Requirement if not using supplied AC Adapter	15 to 24 VDC at 0.85 A maximum (0.5 A typical)
Wall Sockets	4 supplied with AC adapter, interchangeable: North America/Japan, U.K., Continental Europe, Australia
Installation Over-Voltage Category	II

Validation Output	
Signal	5 mVDC / 1 mm Hg absolute from 20 to 800 mm Hg
	(0.100 VDC at 20 mm Hg; 4.000 VDC at 800 mm Hg)
Accuracy	±1.0% of reading ±0.010 VDC from 20 to 800 mm Hg

Operating Conditions	
Ambient Temperature	10 to 35 °C
Ambient Relative Humidity (RH)	20 to 80 % RH (without condensation)
Altitude	0 to 2000 Meters
Indoor vs. Outdoor Use	Indoor
Pollution Degree	2

Storage Conditions	
Ambient Temperature	-20 to +60 °C
Ambient Relative Humidity	20 to 80% RH (without condensation)
Altitude	0 to 12000 M

Physical	
Dimensions	Height: 127 mm (5.0")
	Width: 73 mm (2.8")
	Depth: 250 mm (9.8")
Weight	2.7 kg (6 lb).

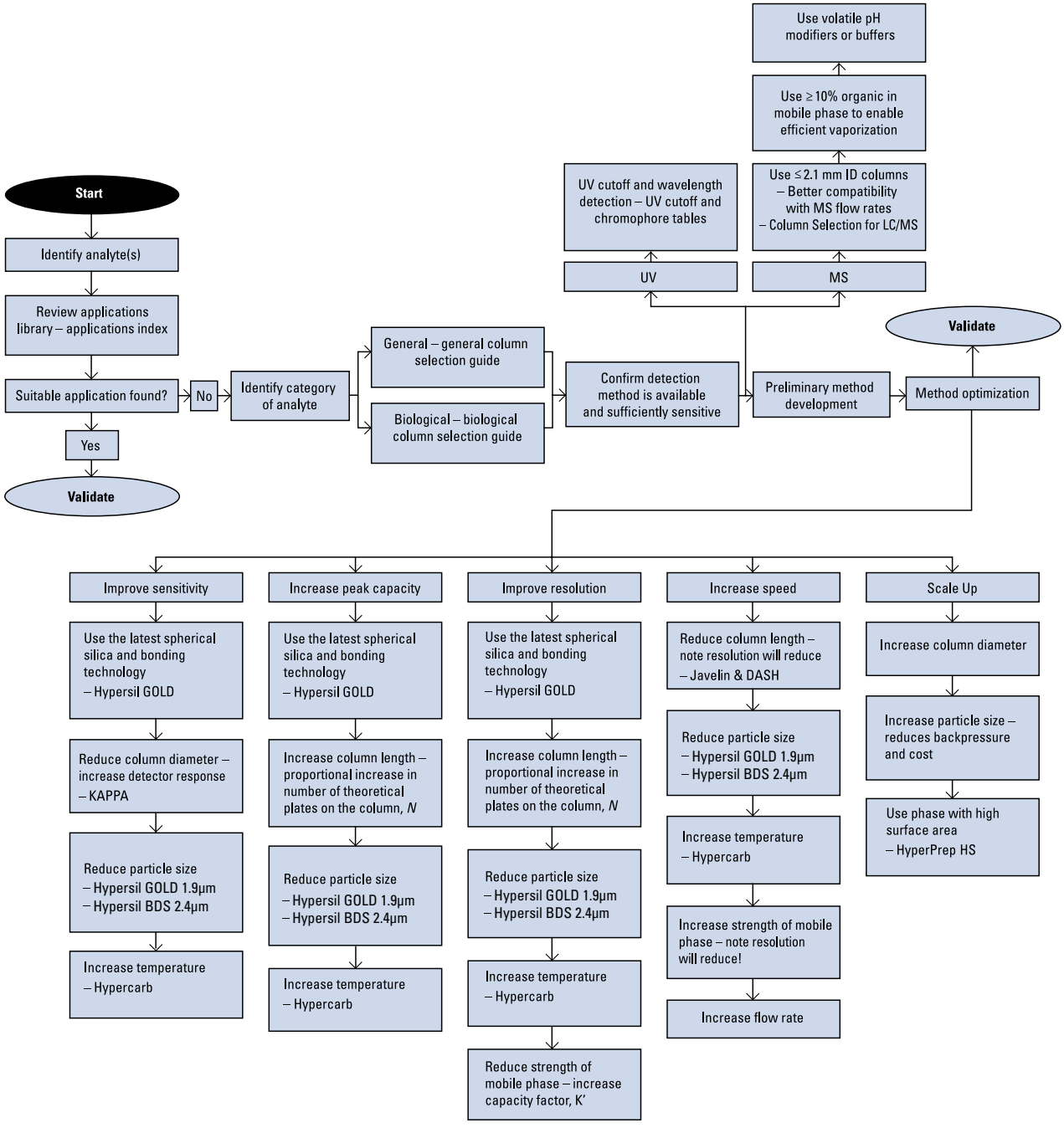
SDG Pro

Description	Cat. No.	Quantity
SDG Pro degasser	**66001-010**	1 Each

HPLC Method Selection and Optimization

The following flow chart briefly describes the common steps in HPLC method development and optimization. Where appropriate, other catalog pages that contain useful information for this process are referenced.

HPLC Method Selection and Optimization Overview



Method Transfer to Sub-2µm Columns

The use of sub-2µm particles is becoming increasingly popular for applications in either High Throughput Screening (HTS) assays or in Ultra-High Pressure Liquid Chromatography (U-HPLC). Hypersil GOLD columns packed with 1.9µm particles offer advantages over the more traditional systems containing 3 and 5µm particles by allowing operation at higher flow rates without compromising efficiency. This results in shorter analysis times and improvements in resolving power, sensitivity and peak capacity.

When transferring methods from HPLC to U-HPLC several approaches can be taken, depending on the analytical needs. If column dimensions are maintained and only particle size is reduced then an improvement in efficiency and, therefore, resolution and peak capacity is obtained. A second approach is to reduce not only particle size but also column dimensions, which has the benefit of further reducing analysis time.

An understanding of some practical calculations can help to achieve the correct scaling and maintain a consistent assay profile between the original and transferred method.

There are three main considerations when transferring a method to a shorter column using small particles: Scaling the flow rate, adjusting the injection volume and adjusting the gradient profile. These are discussed in more detail below.*

1. Scale the Flow Rate

To maintain an equivalent separation when transferring a method it is important to keep the linear velocity constant between the original and new method. The linear velocity is related to the flow rate, internal diameter of the column and particle size. A simple equation can be derived to calculate the flow rate (F_2) required for the new method. This is shown below, normalized for particle size.

$$F_2 = F_1 \times (d_{c2}^2 / d_{c1}^2) \times (d_{p1} / d_{p2})$$

F_1 – original flow rate (mL/min)
d_{c1} – original column internal diameter (mm)
d_{p1} – original column particle size (µm)
d_{c2} – new column internal diameter (mm)
d_{p2} – new column particle size (µm)

2. Adjust the Injection Volume

Because sub-2 µm-based methods are most often transferred to smaller volume columns, the same injection volume will take up a larger proportion of the new column, possibly leading to band broadening or potentially overloading the column. It is therefore important to scale down the injection volume to match the change in column volume. Once again, a simple equation can be used to calculate the injection volume (V_{i2}) required for the new method.

$$V_{i2} = V_{i1} \times (d_{c2}^2 \times L_2 / d_{c1}^2 \times L_1)$$

V_{i1} – original injection volume (µL)
d_{c1} – original column internal diameter (mm)
L_1 – original column length (mm)
V_{i2} – new injection volume (µL)
d_{c2} – new column internal diameter (mm)
L_2 – new column length (mm)

3. Adjust the Gradient Profile

Geometrical transfer of the gradient requires calculation of the number of column volumes of mobile phase in each segment (time interval) of the gradient in the original method to ensure that the new calculated gradient takes place over the same number of column volumes, for the new column.

The following calculation should be performed for each time segment of the gradient, including column re-equilibration. It takes into consideration the void volume of each column (V_c, calculation described below), the flow rate in the original method and the flow rate in the new method (calculated in step 1 above) and the time segment in the original method.

$$t_{g2} = t_{g1} \times (V_{c2}/V_{c1}) \times (F_1/F_2)$$

t_{g1} – Time segment in original gradient (min)
t_{g2} – Time segment in new gradient (min)
V_{c1} – Original column void volume (mL)
V_{c2} – New column void volume (mL)
F_1 – Original flow rate (mL/min)
F_2 – New flow rate (mL/min)

The void volume of the column is the volume that is not taken up by the stationary phase (approximately 68% of the column volume):

$$V_c = 0.68 \times \pi \times r^2 \times L$$

V_c – column volume (mL);
L – column length (cm);
r – column radius (cm)

An example of a method transferred following steps 1 to 3 above is illustrated in the following table:

Original method **Column I: 150 x 4.6mm, 5µm** **Flow rate – 1mL/min** **(Column volume – 1.7mL)** **Injection volume – 10µL**		**U-HPLC** **Column II: 100 x 2.1mm, 1.9µm** **Flow rate – 0.55 mL/min** **(Column volume – 0.24mL)** **Injection volume – 1.4µL**		**U-HPLC** **Column III: 50 x 2.1mm, 1.9µm** **Flow rate – 0.55mL/min** **(Column volume – 0.12mL)** **Injection volume – 0.7µL**	
Gradient time (min)	%B	Gradient time (min)	%B	Gradient time (min)	%B
0	0	0	0	0	0
25	0	6.4	0	3.2	0
55	85	14.1	85	7.1	85
70	85	17.9	85	8.9	85

Method transfer conditions from HPLC (150 x 4.6mm, 5µm columns) to U-HPLC (100 x 2.1mm, 1.9µm and 50 x 2.1mm, 1.9µm columns).

**We also offer a convenient method transfer calculator at the Chromatography Resource Center (www.thermo.com/columns)*

	Column Length (mm)	
Particle size (µm)	**Conventional Hypersil GOLD**	**1.9µm Hypersil GOLD**
5	250	100
	150	50
	100	30
	50	20
3	250	150
	150	100
	100	50
	50	30
	30	20

Column length equivalency to maintain resolution (match column chemistry and transfer method geometrically)

Optimized Method Transfer

The table above lists the equivalent 1.9µm particle packed columns for the most commonly encountered columns packed with 5 and 3µm particles. Perhaps the most significant advantage of 1.9µm particle packed columns is that they allow the chromatographer not only to select the equivalent column for direct method transfer, but also to optimize the column length and flow rate to achieve increased efficiency and speed of separation.

If the analyte peaks are well separated and high throughput is the most important consideration for a method, it is possible to increase the chromatographic speed by further reducing the column length and increasing the flow rate. On the other hand, if it is necessary to further increase resolution for difficult separations in complex matrices, a longer column can be used to increase the efficiency of the separation.

System Considerations

To obtain the best data using fast chromatography it is critical that the LC instrument system is optimized to operate under these conditions. All system components for the assay should be considered. System volume (connecting tubing ID and length, injection volume, flow cell volume in UV) must be minimized, detector time constant and sampling rate need to be carefully selected, and when running fast gradients pump dwell volume needs to be minimal.

Minimizing System Volume

Excess system volume gives rise to band broadening, which has a detrimental effect on the chromatographic performance. This can arise from the column, the autosampler, the tubing connecting the column to injector and detector and in the detector flow cell. The extra column effects become more significant for scaled down separations because of the smaller column volumes and for less retained peaks which have a lower peak volume making it even more critical to minimize extra column dispersion.

Detector Sampling Rate

With 1.9 µm particles, operating parameters can be optimized to give fast analysis. This results in narrow chromatographic peaks which may be of the order of 1-2 seconds or less in width. It is important to scan the detector (whether it is UV or MS) fast enough to achieve optimum peak definition, otherwise resolution, efficiency and analytical accuracy will be compromised.

Dwell Volume

The HPLC pump dwell volume is particularly important when running high speed applications using fast gradients, typical of high throughput separations on small particle packed columns. This is because the pump dwell volume affects the time it takes for the gradient to reach the head of the column. If we consider a method using a flow rate of 0.4mL/min and a fast gradient of 1 minute, the theoretical gradient reaches the column immediately. A pump with a 65µL dwell volume (such as used in the Thermo Scientific Accela™ HPLC high speed LC system) will get the gradient onto the column in 9.75 seconds. A traditional quaternary pump with a dwell volume of 800µL will take 2 minutes to get the gradient to the column. When running rapid gradients this is too slow and it may become necessary to introduce an isocratic hold at the end of the gradient to allow elution of the analytes.

Further details on method optimization using 1.9µm Hypersil GOLD columns can be found in Technical Guide TG20338. We also offer a convenient method transfer calculator at the Chromatography Resource Center (*www.thermoscientific.com/chromatography*)

Scaling Down a Method

Reasons to Scale Down a HPLC or LC/MS Method

There are applications where it is desirable to scale down a method without transferring the method to U-HPLC. These reasons may be to:

- Maximize sensitivity when small amounts of sample are available
- Make flow rate compatible with ionization technique in MS detection
- Reduce costs by reducing solvent consumption

Transfer Method to a Narrower Column

Reducing the scale of a separation by reducing the column internal diameter may be necessary when transferring a method from UV to MS detection, or when only very small amounts of sample are available, such as in drug discovery or proteomics. In the first case ionization technique or source design determines the best flow rate range (see table above) and in the latter case, method sensitivity is maximized because solutes elute in more concentrated chromatographic bands.

If all other method parameters (column length and particle size, column chemistry, mobile phase composition, gradient range and time, separation temperature) are kept unchanged, the change to a narrower column only requires adjustment of the flow rate.

$$F_2 = F_1 \times (d_{c2}/d_{c1})^2$$

where F_1 – original flow rate (to be reduced)
F_2 – new flow rate
d_{c1} – original column internal diameter
d_{c2} – new column internal diameter

This is applicable to both isocratic and gradient methods. The new method should produce a chromatogram with identical resolution and identical run time. If small changes in retention times and resolution are observed this is generally caused by system dwell volume (discussed below).

Typical Flow Rates for Analytical, Narrowbore, Capillary and Nanobore Columns (5 µm Particles)

Column ID (mm)	Flow Rate Range (µL/min)	Optimum Flow Rate[1] (µL/min)	Recommended Injection Volume[2] (µL)	API Source
4.6	1000 – 1500	1250	30	APCI or High flow ESI
3.0	400 – 600	500	10	APCI or High flow ESI
2.1	200 – 300	250	5	APCI or Micro-ESI
1.0	40 – 60	50	1	Micro-ESI
0.5	10 – 25	12	0.35	Micro-ESI
0.32	4 – 10	5	0.15	Micro-ESI
0.18	1 – 3	2	0.05	Micro-ESI
0.1	0.4 – 1	0.5	0.015	Nanospray
0.075	0.2 – 0.5	0.3	0.01	Nanospray

1. Recommended for good efficiency and moderate pressure. Higher flow rates may lead to column voids. Lower flow rates are recommended for washing column bed or changing solvents.

2. Estimates based on negligible loss of efficiency and isocratic elution with sample solvent identical to mobile phase. Larger volumes can be introduced under gradient conditions or using weaker sample solvent.

Transfer Method to a Shorter Column

In gradient elution, the simplest way to reduce the method cycle time is to reduce the column length. If all other method parameters (column ID and particle size, column chemistry, mobile phase composition, gradient range, flow rate, separation temperature) are kept unchanged the only requirement is to change the gradient time using the equation below, where gradient time is reduced by the same factor as the reduction in column volume.

$$t_{g1}/V_{c1} = t_{g2}/V_{c2}$$

where t_{g1} – gradient time in original method (min)
t_{g2} – gradient time in new method (min)
V_{c1} – original column volume (mL)
V_{c2} – new column volume (mL)

Column volume V_c (mL) can be estimated using:

$$V_c = 0.68 \times \pi \times r^2 \times L$$

V_c – column volume (mL);
L – column length (cm);
r – column radius (cm)

Dwell Volume

Dwell volume is just as important when scaling down a method as for method transfer to U-HPLC. The effect of dwell volume on the separation is more significant when narrow columns are used at low flow rates. For instance, if the system has a dwell volume of 2.0mL and a 4.6mm ID column is run at 1mL/min, it takes 2 minutes for the gradient to reach the head of the column; however, if a 2.1mm ID column is used with a 0.4mL/min flow rate it will take 5 minutes for the gradient to reach the column. In high throughput gradient separations using small volume columns, dwell volume causes an increase in run times and longer re-equilibration time between runs.

Several approaches can be taken to minimize these effects:

- Select a pump with a small gradient delay volume (e.g., Thermo Scientific Accela high speed LC system has a delay volume of only 65µL);
- Delay sample injection until gradient has reached the head of the column;
- Set the pump at a higher flow rate and split the flow before the column.

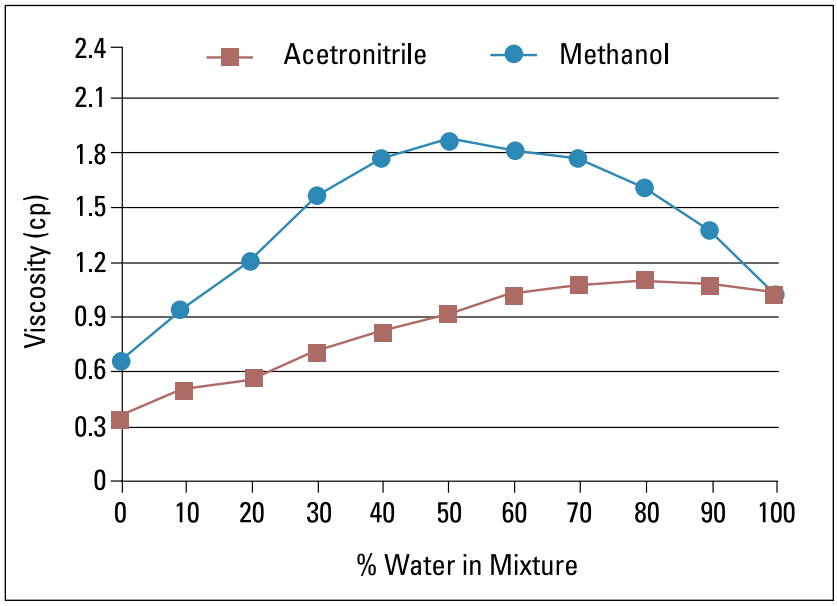
Scaling Up a Method

Reasons to Scale Up an HPLC Method

- Increase method capacity
- Isolation and purification of target compounds
- Increase sample throughput

Analytical methods may require scale up to preparative sizes to isolate and purify compounds from mixtures. In choosing the best column and packing material for your preparative application, consider the selectivity and loadability of the media as well as column dimensions, to give the results you need most quickly or economically. We have established a strong reputation for the manufacture and supply of high quality preparative silicas and bonded phases, designed to give the same levels of performance and reproducibility as our popular analytical silica ranges such as the Thermo Scientific Hypersil phases.

Scale up is easiest when starting from an analytical column packed with smaller particle size media offering the same selectivity as the larger particle size preparative media. The leading families of Thermo Scientific phases are offered in various sizes to complement lab scale operations and facilitate the scale up to preparative chromatography. Scout columns, typically 250 x 4.6mm packed with the media of interest can also be used to develop the separation. Once the method is finalized on the smaller column, a scaling factor can be applied.



Mobile phase viscosity changes with composition

Scaling Up to a Preparative Column

Flow rate and column load scaling are only required when changing the internal diameter of the column. The scaling of flow rates allows peak retention times to remain relatively constant between columns with different internal diameters. The typical solvent flow rate through a column is dependent on its internal diameter and the particle size of the column packing material. This scaling factor can also be used to estimate the loading capacity of a given column. Assuming column length is a constant, the scale factor can be calculated using the following formula:

$$\text{Scale Factor} = d_{c2}^2/d_{c1}^2$$

where d_{c1} – original column internal diameter (mm)

and d_{c2} – new column internal diameter (mm)

The column loading capacity and flow rate required for the new larger ID columns can be calculated using this factor.

Column Backpressure

Column operating backpressure is affected by column length, internal diameter, media particle size, temperature, solvent properties and solvent flow rate. It can also be affected by the use of gradients, where the pressure may vary with solvent composition. Typical operating backpressure for columns or cartridges can be calculated using the following equation:

$$\text{Pressure (atm)} = \frac{2.1 \times \Phi \times L \times \eta}{d_p^2 \times d^2}$$

where Φ = column impedance *(1000 for 4.6 mm ID columns)*
L = column length *(mm)*
d_p = particle diameter *(µm)*
d = column diameter *(mm)*
η = mobile phase viscosity *(centipoises)*

The mobile phase viscosity varies with composition. As an example, the figure above shows how water viscosity varies with the addition of methanol or acetonitrile. This variability is a critical component in maximizing throughput with respect to the chromatography instrumentation being used.

Selecting the Media

Media selection for your preparative separation is important. Choose media that has a narrow particle size distribution which will provide high efficiency columns with a low back pressure, since there are no 'fines' to block frits or impede flow. The uniformly spherical particles, with narrow pore size distribution, apparent in Thermo Scientific preparative columns, provide reproducible performance and a longer column life. Media that is available in a range of particle sizes offers choice for scale up applications with controlled selectivity. We offers a range of choices for preparative media in several particle sizes to tailor the media to your application.

High Load and High Retention – HyperPrep HS

Materials with higher surface area can offer increased loadability. This drive to maximize surface area must be undertaken in a considered manner particularly with regard to particle pore diameter and pore volume. Too high a pore volume will compromise stability and robustness of the bed and too small a pore diameter will influence mass transfer at the expense of efficiency. The high surface area provides enhanced retention of polar compounds. A high carbon loading gives a robust, stable phase. Please contact Technical Support for more information on Thermo Scientific HyperPrep columns and media.

Peak Shape – Hypersil GOLD

In analytical HPLC, the use of packings based on highly pure silica has been shown to improve peak shape. Our highly developed and reproducible manufacturing processes ensure that our leading analytical brand of Hypersil GOLD media is also available in a range of particle sizes suitable for preparative LC without compromise on performance.

Polar Compounds and Isomers – Hypercarb, Hypersil GOLD aQ

Often when dealing with very polar compounds, achieving sufficient retention can be a challenge. We are able to offer a variety of choices to overcome this common problem: The polar endcapping on Hypersil GOLD aQ provides a controlled interaction mechanism by which moderately polar compounds can be retained. Hypersil GOLD AX can be used in HILIC mode to provide retention of polar compounds. Hypercarb offers truly orthogonal selectivity to C18 in reversed phase LC and can be used to retain highly polar compounds. Hypercarb columns can also be used to differentiate between very closely related compounds including geometric and positional isomers.

Peptides and Proteins – BioBasic, Hypersil GOLD

When it comes to the analysis of peptides, the correct selection of packing material becomes ever more important. When deciding on which pore size of packing material to use in the analysis of a polypeptide mix, molecular weight and hydrophobicity of the peptides must be taken into account. Our breadth of silica offerings allow the chromatographer to obtain the best resolution using materials with pore diameters in the 100 to 300 Å range. A general rule is that hydrophilic peptides with a molecular weight of less than 2000 daltons can be analyzed using a lower pore volume media, such as Hypersil GOLD media. Above this molecular weight, access to small pores is restricted, and separations tend to be inefficient. For hydrophobic peptides with a molecular weight greater than 2000, a 300 Å media such as Thermo Scientific BioBasic is recommended. For the separation of small or hydrophilic peptides, a 100 Å material such as HyperPrep HS may give better resolution.

HPLC Troubleshooting

Before you start any troubleshooting, it is essential to observe safe laboratory practices. Know the chemical and physical properties of any solvents used and have the appropriate Material Safety Data Sheets (MSDSs) readily available. All electrically powered instruments should be shut down and unplugged before starting. Eye protection should also be worn.

The following table lists common HPLC problems encountered, the possible causes and solutions for your quick reference.

Symptom	Cause	Action
Pressure Related Problems		
Low Pressure	Low viscosity mobile phase.	Confirm expected pressure using the Kozeny-Carmen or similar equation.
	Piston seals leaking.	Check for evidence of leaking or wear and replace where necessary.
	Leak in system.	Check for and replace any leaking tubing or fittings.
	Air in solvent lines or pump.	Ensure that the reservoirs and solvent lines are fully primed and the purge valve is fully closed.
High Pressure	High viscosity mobile phase.	Confirm expected pressure using the Kozeny-Carmen or similar equation.
	Pump flow-rate malfunction.	Contact manufacturer.
	Tubing blocked.	Working backwards from detector outlet, check source of blockage and replace item as necessary.
	Guard blocked.	Replace guard cartridge.
	Sample precipitation.	Consider sample clarification steps such as filtration or SPE.
	Detector blockage.	Clean the flow cell according to the manufacturer's instructions.
Baseline Related Problems		
Fluctuating Baseline	System not equilibrated.	Equilibrate the column with 10 volumes of mobile phase.
	Bubbles in flow cell.	Degas the mobile phase and pass degassed solvent through the flow-cell. Do not exceed the cell's pressure limit.
	Contaminated guard.	Replace the guard cartridge.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Detector contamination.	Clean the flow cell according to the manufacturer's instructions.
	Contaminated solvents.	Use freshly prepared solvents of HPLC grade.
	Old detector lamp.	Replace the lamp, particularly when this has been in use for > 2000 hours.
Sloping Baseline	Contaminated solvents.	Use freshly prepared solvents of HPLC grade.
	Gradient mobile phase.	Consider purer solvents or higher wavelengths. Otherwise, this is normal.
	System not equilibrated.	Equilibrate the column with 10 volumes of mobile phase.
	Leak in system.	Check for and replace any leaking tubing or fittings.
	Temperature fluctuations.	Use a thermostatically controlled column oven.
	Contaminated column.	Wash the column using an appropriate solvent. Ensure that a gradient method has a wash period at the end.
	Pump not mixing solvents properly.	Where being used, ensure that the proportioning valve is mixing the solvents correctly. If the method is isocratic, blend the solvents manually.
	Blocked solvent reservoir frits.	Ultrasonicate the reservoir frits in water and then methanol.
	Old detector lamp.	Replace the lamp, particularly when this has been in use for > 2000 hours.
Peak Shape Problems		
Broad Peaks	System not equilibrated.	Equilibrate the column with 10 volumes of mobile phase.
	Injection solvent too strong.	Ensure that the injection solvent is the same or weaker strength than the mobile phase.
	Injection volume too high.	Reduce the injection volume to avoid overload. Typically injection volumes of < 40% of the expected peak width should be used.
	Injected mass too high.	Reduce the sample concentration to avoid mass overload.
	Extra column volume too high.	Reduce diameter and length of connecting tubing. Reduce the volume of the flow cell where possible.
	Temperature fluctuations.	Use a thermostatically controlled column oven. Higher temperatures will produce sharper peaks.
	Old guard cartridge.	Replace the guard cartridge.
	Old column.	Do not use columns that have been used with ion-pair reagents for reverse-phase methods. Old columns give much lower efficiencies than new columns. Replace the column if necessary.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Voided column.	Replace the column. Do not use outside the recommended pH range.
Double Peaks	Old guard cartridge.	Replace the guard cartridge.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Voided column.	Replace the column. Do not use outside the recommended pH range.
Negative Peaks	Contaminated solvents.	Use freshly prepared solvents of HPLC grade.
	Wrongly wired detector.	Check the signal polarity from the detector to the recording device.
	Unbalanced RI detector optics.	Refer to manufacturer's instructions.
	Ion pair method.	Inject the sample in the mobile phase.

Symptom	Cause	Action
Peak Shape Problems		
Flat topped Peaks	Detector overload.	Reduce the sample concentration.
	Detector set-up.	Check the detector attenuation and re-zero.
Tailing Peaks	Old guard cartridge.	Replace the guard cartridge.
	Injection solvent too strong.	Ensure that the injection solvent is the same or weaker strength than the mobile phase.
	Injection volume too high.	Reduce the injection volume to avoid overload. Typically injection volumes of < 40% of the expected peak width should be used.
	Injected mass too high.	Reduce the sample concentration to avoid mass overload.
	Old column.	Do not use columns that have been used with ion-pair reagents for reversed phase methods. Old columns give much lower efficiencies than new columns. Replace the column if necessary.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Voided column.	Replace the column. Do not use outside the recommended pH range.
Fronting Peaks	Old or damaged column.	Replace the column.
Peak Size and Retention Problems		
Small Peaks	Degraded sample.	Inject a fresh sample.
	Low analyte concentration.	Increase the analyte concentration.
	Detector set-up.	Check the detector attenuation and re-zero.
	No wash solvent.	Check that the solvent wash reservoir is filled with a miscible solvent and that the injector is set to wash between injections.
	Damaged or blocked syringe.	Replace the syringe.
	Incorrect amount injected.	Check injector loop size and that no more than 50% of this volume is used for partial loop injections.
	Viscous injection solvent.	Reduce syringe draw-time.
	Old detector lamp.	Replace the lamp, particularly when this has been in use for > 2000 hours.
No Peaks	Sample vial empty.	Fill sample vial.
	Leak in system.	Check for and replace any leaking tubing or fittings.
	Pump not mixing solvents properly.	Where being used, ensure that the proportioning valve is mixing the solvents correctly. If the method is isocratic, blend the solvents manually.
	Damaged or blocked syringe.	Replace the syringe.
	Different dwell volume.	For gradient methods, check that the dwell volume of any new system is not very different from any previous system. Apply a final hold time if necessary.
	Old detector lamp.	Replace the lamp, particularly when this has been in use for > 2000 hours.
Missing Peaks	Degraded sample.	Inject a fresh sample.
	Immiscible mobile phase.	Check that any solvent already in the column is miscible with the mobile phase. Flush with propan-2-ol or ethanol where necessary.
	Fluctuations in pH.	Buffer the mobile phase so that retention of ionizable compounds is controlled.
Extra Peaks	Degraded sample.	Inject a fresh sample.
	Contaminated solvents.	Use freshly prepared solvents of HPLC grade. Gradient methods often show 'ghost-peaks'.
	Immiscible mobile phase.	Check that any solvent already in the column is miscible with the mobile phase. Flush with propan-2-ol or ethanol where necessary.
	Fluctuations in pH.	Buffer the mobile phase so that retention of ionizable compounds is controlled.
	Contaminated guard cartridge.	Replace the guard cartridge.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem , replace the column.
Varying Retention	System not equilibrated.	Equilibrate the column with 10 volumes of mobile phase.
	Leak in system.	Check for and replace any leaking tubing or fittings.
	Temperature fluctuations.	Use a thermostatically controlled column oven.
	Contaminated column.	Wash the column using an appropriate solvent. If this does not resolve the problem, replace the column.
	Blocked solvent reservoir frits.	Ultrasonicate the reservoir frits in water and then methanol.
	Pump not mixing solvents properly.	Where being used, ensure that the proportioning valve is mixing the solvents correctly. If the method is isocratic, blend the solvents manually.
	Contaminated solvents.	Use freshly prepared solvents of HPLC grade.
	Different dwell volume.	For gradient methods, check that the dwell volume of any new system is not very different from any previous system. Apply a final hold time if necessary.
	Piston seals leaking.	Check for evidence of leaking or wear and replace where necessary.
	Air in solvent lines or pump.	Ensure that the reservoirs and solvent lines are fully primed and that the purge valve is fully closed.

For more information, please request Successful HPLC Operation – A Troubleshooting Guide, TG20094.

HPLC Definitions and Equations

Backpressure

The pressure required to pump the mobile phase through the column. It is related to mobile phase viscosity (η), flow rate (F), column length (L) and diameter (d_c), and particle size (d_p) by the following equation:

$$\text{Pressure Drop (psi)} = \frac{250\, L \eta F}{d_p^2 d_c^2}$$

where L = column length (cm)
η = viscosity
F = flow rate (mL/min)
d_p = particle diameter (µm)
d_c = column internal diameter (cm)

Capacity Factor (k)

Expression that measures the degree of retention of an analyte relative to an unretained peak, where t_R is the retention time for the sample peak and t_0 is the retention time for an unretained peak. A measurement of capacity will help determine whether retention shifts are due to the column (capacity factor is changing with retention time changes) or the system (capacity factor remains constant with retention time changes).

$$k = \frac{t_R - t_0}{t_0}$$

Efficiency (N)

Also number of theoretical plates. A measure of peak band spreading determined by various methods, some of which are sensitive to peak asymmetry. The most common are shown here, with the ones most sensitive to peak shape shown first:

5-Sigma $N = 25(t_R/W)^2$
W = peak width at 4.4% peak height

4-Sigma or Tangential $N = 16(t_R/W)^2$
W = tangential peak width or 13.4% peak height

Half-Height $N = 5.54(t_R/W)^2$
W = peak width at 50% peak height

Elution Volume (V_R)

Refers to the volume of mobile phase required to elute a solute from the column at maximum concentration (apex).

$$V_R = F \bullet t_R$$

where F is flow rate in volume/time and t_R is the retention time for the peak of interest.

HETP

Height equivalent to a theoretical plate. A carryover from distillation theory: a measure of a column's efficiency. For a typical well-packed HPLC column with 5 µm particles, HETP (or *H*) values are usually between 0.01 and 0.03 mm.

$$\text{HETP} = L/N$$

where L is column length in millimeters and *N* is the number of theoretical plates.

Linear Velocity

The flow rate normalized by the column cross section. This effects column performance and is directly related to column pressure. Linear velocity is given by the following equation where L is column length and t_0 is the breakthrough time of an unretained peak:

$$\mu = \frac{L}{t_0}$$

Resolution (R_s)

The ability of a column to separate chromatographic peaks. Resolution can be improved by increasing column length, decreasing particle size, changing temperature, changing the eluent or stationary phase.

$$R_s = \frac{1}{4}\sqrt{N}\left(\frac{k}{1+k}\right)\left(\frac{\alpha-1}{\alpha}\right)$$

It can also be expressed in terms of the separation of the apex of two peaks divided by the tangential width average of the peaks:

$$R_s = \frac{(t_2 - t_1)}{0.5(W_1 + W_2)}$$

Selectivity (α)

A thermodynamic factor that is a measure of relative retention of two substances, fixed by a certain stationary phase and mobile phase composition. Where k_1 and k_2 are the respective capacity factors.

$$\alpha = \frac{k_2}{k_1}$$

Tailing Factor (T)

A measure of the symmetry of a peak, given by the following equation where $W_{0.05}$ is the peak width at 5% height and f is the distance from peak front to apex point at 5% height. Ideally, peaks should be Gaussian in shape or totally symmetrical.

$$T = W_{0.05}/2f$$

van Deemter Equation

An equation used to explain band broadening in chromatography. The equation represents the height equivalent of a theoretical plate (H) and has three terms. The A term is used to describe eddy diffusion, which allows for the different paths a solute may follow when passing over particles of different sizes.

The B term is for the contribution caused by molecular diffusion or longitudinal diffusion of the solute while passing through the column. The C term is the contribution of mass transfer and allows for the finite rate of transfer of the solute between the stationary phase and mobile phase. u is the linear velocity of the mobile phase as it passes through the column.

$$H = A + \frac{B}{u} + Cu$$

Selecting the Right Buffer

A partial list of common buffers and their corresponding pH values is shown in the Common Buffer Systems table. Perhaps the most common HPLC buffer is some form of phosphoric acid. Remember that a true buffer should have the ability to resist pH change when a sample is introduced at a different pH, and that buffer capacity is only 100% at the pK value of the acid or base. At pH 4, phosphate is a poor buffer and would change rapidly toward one of its pK_a values if a more acidic or basic sample were introduced.

As a rule, one should work within ±1 pH unit of the buffer pK_a value for good pH control of the mobile phase. Adequate buffer concentrations for HPLC tend to be in the 10 - 100 millimolar level depending on the size and nature of the sample, as well as the column packing material. Phases based on highly pure silica with robust bondings such as the Hypersil GOLD range, are often more compatible with dilute buffers than traditional packings.

When control at a lower pH (2 - 3) is desired, phosphate, or stronger organic acids such as TFA or acetic acid, are commonly used. If control at pH 4 - 5 is desired, an organic acid buffer such as acetate or citrate should be considered in place of phosphate.

The figure to the right shows the importance of choosing the correct pH for a separation. Even slight changes in pH, either from measuring errors, mixing complications with the pump, or atmospheric water adsorption into the mobile phase, can alter any method if not properly buffered.

Care should be taken when choosing a buffer and organic modifier mixture to ensure that a solution of the two does not produce a solid salt which could cause blockages and system contamination.

Buffers should always be flushed from the analytical column and instrument after use to avoid salts being deposited on delicate frits etc.

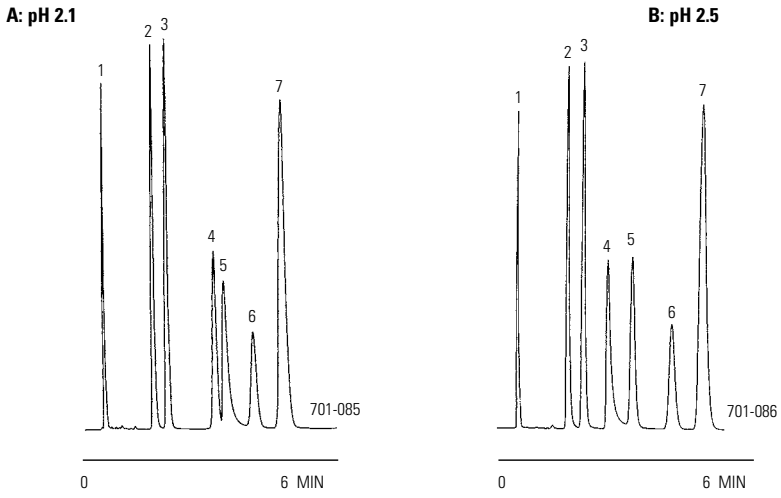
Common Buffer Systems

Buffer		pK_a	Useful pH Range	MS-Compatible?
TFA		0.30		Yes
Phosphate	pK_1	2.1	1.1 – 3.1	No
	pK_2	7.2	6.2 – 8.2	No
	pK_3	12.3	11.3 – 13.3	No
Citrate	pK_1	3.1	2.1 – 4.1	No
	pK_2	4.7	3.7 – 5.7	No
	pK_3	5.4	4.4 – 6.4	No
Formate		3.8	2.8 – 4.8	Yes
Acetate		4.8	3.8 – 5.8	Yes
Tris Base (Trizma, THAM)		8.3	7.3 – 9.3	Yes
Ammonia		9.2	8.2 – 10.2	Yes
Borate		9.2	8.2 – 10.2	No
Diethylamine		10.5	9.5 – 11.5	Yes
Carbonate	pK_1	6.4	5.4 – 7.4	Yes
	pK_2	10.3	9.3 – 11.3	Yes
Triethanolamine		7.80		Yes

BETASIL™ C18, 5 µm, 50 x 4.6 mm

Part Number: 70105-054630
Eluent: 50% ACN / 50% 25 mM KH_3PO_4 at pH indicated
Flow Rate: 0.8 mL/min
Detector: UV @ 220nm

Sample:
1. Uracil
2. Tolmetin
3. Naproxin
4. Fenoprofen
5. Diflunisal
6. Indometacin
7. Ibruprofen



Effect of small changes in pH on the separation of mildly ionizable compounds

Buffer Selection for LC/MS

Buffer choice will be very dependent on the analyte and the instrumentation used. Ideally, LC/MS applications should use a volatile buffer as this will not form a contaminating deposit on the source. Inorganic acids, involatile buffers and ion-pair reagents should all be avoided. Typical LC/MS buffers include:

- Ammonium acetate/formate/hydrogen carbonate (< 50mM)
- Formic/acetic acid (0.01 – 1% v/v)
- Trifluoroacetic acid (< 0.1% v/v)
- Trialkylamine (< 0.1% v/v) and aqueous ammonia type bases
- TRIS
- BIS-TRIS propane

Note: *There are LC/MS instruments available, for example the Thermo Scientific Surveyor MSQ LC/MS, which incorporate a self-cleaning mechanism to reduce the build up of inorganic buffers on the source during routine use. Care should still be taken not to purposefully over-contaminate the instrument source as this will lead to operating difficulties.*

Preparation of Mobile Phases

Correct solvent preparation is very important. It can save vast amounts of time spent troubleshooting spurious peaks, baseline noise etc.

Quality

All reagents and solvents should be of the highest quality. HPLC grade reagents may cost slightly more than lower grade reagents, but the difference in purity is marked. HPLC grade reagents contain no impurities to produce spurious peaks in a chromatogram baseline whereas lower grade reagents do contain trace levels of impurities, which may produce spurious baseline peaks.

Ensure that any water used in buffer preparation is of the highest purity. Deionized water often contains trace levels of organic compounds and therefore is not recommended for HPLC use. Ultra pure HPLC water (18 MΩ resistivity) is generated by passing deionized water through an ion exchange bed. Modern water purification instruments use this mechanism to produce water of suitable quality in high volumes. Preferably, HPLC grade water can be purchased from solvent suppliers.

Important: *Do not store HPLC grade water in plastic containers. Additives in the plastic may leach into the water and contaminate it. Always store HPLC grade water in glass containers.*

Buffers

All buffers should be prepared freshly on the day required. This practice ensures that the buffer pH is unaffected by prolonged storage and that there is no microbial growth present. Changes in pH and microbial growth will affect chromatography.

If buffer solutions are stored, be aware that they have a finite lifetime. Refer to pharmacopoeia monographs or similar for further guidance on buffer shelf life.

Buffer reagents can contain a stabilizing agent, for example, sodium metabisulphite. These stabilizing agents often affect the optical and chromatographic behavior of buffer solutions, so it is often worth buying reagents that contain no stabilizer. Containers of solid reagent are easily contaminated by repeated use. For this reason, we recommend that reagents be purchased in low container weights.

Filtration

Ideally, all HPLC solvents should be filtered through a 0.45 µm filter before use This removes any particulate matter that may cause blockages. After filtration, the solvents should be stored in a covered reservoir to prevent re-contamination with dust etc. Filtering HPLC solvents will benefit both your chromatography and the wear and tear of the HPLC system. Pump plungers, seals and check valves will perform better and lifetimes will be maximized.

Degassing

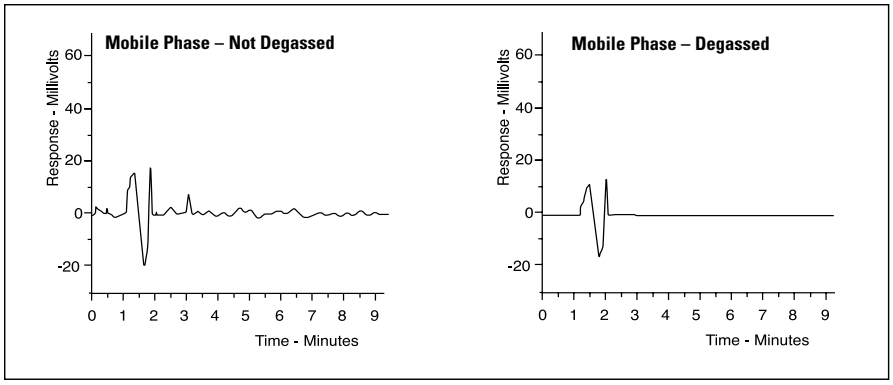
Before the freshly prepared mobile phase is pumped around the HPLC system, it should be thoroughly degassed to remove all dissolved gasses. Dissolved gas can be removed from solution by:

- Bubbling with helium
- Sonication
- Vacuum filtration

If the mobile phase is not degassed, air bubbles can form in the low pressure of the detector cell resulting in problems with system instability, spurious baseline peaks etc.

The most efficient form of degassing is bubbling with helium or another low solubility gas. If this method is available, we recommend that the mobile phase is continually degassed at very low levels throughout the analysis. This will inhibit the re-adsorption of gases over the analysis time.

Note: *Ensure that the solvent reservoir has a vent to the atmosphere to prevent the build up of pressure inside the reservoir.*



Baseline noise from gas in mobile phase

Solvent Properties (vs Silica Gel) and Miscibility

Solvent Properties and Miscibility

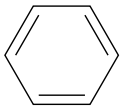
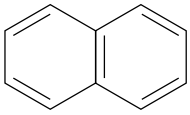
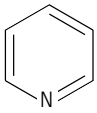
Solvent Strength	Polarity Index	UV Cutoff (nm)	Refractive index	Viscosity (cP, 20°C)	Boiling point (°C)	Water solubility (W/W%)	Solvent
0.01	0.1	215	1.391	0.50	99	0.0002	**Isooctane**
0.04	0.0	200	1.410	0.92	174	0.01	**n-Decane**
0.05	0.1	200	1.407	0.44	49	0.01	**Cyclopentane**
0.1	1.0	220	1.402	0.45	78	0.11	**1-Chlorobutane**
0.21	2.1	220	1.397	0.64	142	0.19	**n-Butyl Ether**
0.28	2.4	220	1.368	0.37	68	0.62	**Isopropyl Ether**
0.42	3.1	233	1.424	0.44	40	1.6	**Methylene Chloride**
0.43	4.2	334	1.396	0.51	117	-	**Methyl Butyl Ketone**
0.47	4.7	320	1.451	2.00	156	-	**Cyclohexanone**
0.55	5.5	210	1.402	1.72	125	Miscible	**Methoxyethanol**
0.6	4.5	260	1.362	0.37	57	-	**Methyl Acetate**
0.64	6.0	380	1.344	0.67	101	2.1	**Nitromethane**
0.65	6.5	268	1.438	0.84	166	Miscible	**N,N'-Dimethylacetamide**
0.69	6.0	265	1.447	1.65	192	-	**N-Methylformamide**
1.11	6.9	210	1.432	19.9	198	Miscible	**Ethylene Glycol**
2	6.0	260	1.372	1.26	118	Miscible	**Acetic acid**
0.56	5.1	330	1.359	0.36	56	Miscible	**Acetone**
0.65	5.8	190	1.344	0.38	82	Miscible	**Acetonitrile**
-	2.7	238	1.501	0.65	80	0.18	**Benzene**
0.39	3.9	215	1.399	2.98	117	7.8	**n-Butanol**
-	4.0	254	1.394	0.73	126	0.43	**Butyl Acetate**
-	1.6	263	1.460	0.97	77	0.08	**Carbon Tetrachloride**
0.4	4.1	245	1.446	0.57	61	0.815	**Chloroform**
0.04	0.2	200	1.427	1.00	81	0.01	**Cyclohexane**
-	3.5	228	1.445	0.79	83	0.81	**1,2-Dichloroethane**
-	3.1	233	1.424	0.44	40	1.3	**Dichloromethane**
0.64	6.4	268	1.431	0.92	153	Miscible	**N-N' Dimethylformamide**
0.62	7.2	268	1.478	2.24	189	Miscible	**Dimethyl Sulphoxide**
0.56	4.8	215	1.422	1.37	101	Miscible	**Dioxane**
0.88	4.3	210	1.361	1.20	79	Miscible	**Ethanol**
0.58	4.4	256	1.372	0.45	77	8.7	**Ethyl Acetate**
-	2.8	218	1.352	0.23	35	6.89	**Diethyl Ether**
0.01	0.1	200	1.388	0.40	98	0.0004	**n-Heptane**
0.01	0.1	200	1.375	0.31	69	0.0012	**n-Hexane**
0.95	5.1	205	1.329	0.55	65	Miscible	**Methanol**
0.35	2.5	210	1.369	0.27	55	4.8	**Methyl-t-Butyl Ether**
0.51	4.7	329	1.379	0.43	80	24	**Methyl Ethyl Ketone**
-	0.0	190	1.358	0.23	36	0.004	**Pentane**
0.82	4.0	210	1.385	2.30	97	Miscible	**n-Propanol**
0.82	3.9	205	1.378	2.40	82	Miscible	**Iso-Propanol**
-	2.2	220	1.368	0.37	68	-	**Di-iso-Propyl Ether**
0.45	4.0	212	1.407	0.55	66	Miscible	**Tetrahydrofuran**
0.29	2.4	284	1.496	0.59	111	0.05	**Toluene**
-	1.0	273	1.477	0.57	87	0.11	**Trichloroethylene**
2	10.2	190	1.000	1.00	100	-	**Water**
0.26	2.5	288	1.506	0.81	144	0.018	**o-Xylene**

Immiscible
Those squares shaded as "immiscible" refer to solvent mixes where, in some proportions, two phases will be produced

Data Sourced from:
CRC Handbook of Chemistry and Physics - 73rd Edition
The Merck Index - 12th Edition
High Purity Solvent Guide, Burdick & Jackson Laboratories, Inc.
The HPLC Solvent Guide, 2nd Edition, Paul C Sadek
HPLC Columns, Theory, Technology & Practice, Uwe D Neue
Fisher Solvent Table

Chromophore Detection Wavelengths

Chromophores are light absorbing groups. Their behavior is used to allow the detection of analytes. They have one or more detection wavelengths, each of which has a molar adsorbtivity associated with it. The information contained in the following table is intended as a guide to common chromophores. It is not an exhaustive list.

Chromophore		λmax (nm)	εmax (L/m/cm)
Acetylide	-C≡C-	175 – 180	6,000
Aldehyde	-CHO	210	Strong
		280 – 300	11 – 18
Amine	$-NH_2$	195	2,800
Azidin	> C=N-	190	5,000
Azo	-N=N-	285 – 400	3 – 25
Benzene		184	46,700
		202	6,900
		255	170
Carboxyl	-COOH	200 – 210	50 – 70
Ester	-COOR	205	50
Ether	-O-	185	1,000
Ethylene	-C=C-	190	8,000
Ketone	> C=O	195	1,000
		270 – 285	18 – 30
Napthalene		220	112,000
		275	175
		312	5,600
Nitrate	$-ONO_2$	270	12
	$-(C=C)_{-2}$ acyclic	210 – 230	21,000
	$-(C=C)_3$	260	35,000
	C=C-C=C	219	6,500
	C=C-C=N	220	23,000
	C=C-C=O	210 – 250	10,000 – 20,000
	$C=C-NO_2$	300 – 350	Weak
Nitrile	-C≡N	160	
	-ONO	220 – 230	1,000 – 2,000
		300 – 400	10
Nitro	$-NO_2$	210	Strong
Nitroso	-N=O	302	100
Oxime	-NOH	190	5,000
Pyridine		174	80,000
		195	6,000
		251	1,700
Sulfone	$-SO_2-$	180	
Sulfoxide	> S-O	210	1,500
Thioether	-S-	194	4,600
		215	1,600
Thiol	-SH	195	1,400

Column Cleaning and Regeneration

Testing of column performance can be undertaken using the experimental conditions in the test certificate provided with the column. The column efficiency, capacity factor, etc. should be measured at the start and end of the clean-up procedure to ensure that it has been performed successfully and has improved the column performance.

In all instances, the volume of solvent used is 40 – 60 column volumes unless otherwise stated. Ensure that no buffers or samples are present on the column and that the solvent used prior to the clean up is miscible with the first wash solvent. After the clean up, ensure that the test mobile phase is miscible with the last solvent in the column.

Normal Phase Media

1. Flush with tetrahydrofuran
2. Flush with methanol
3. Flush with tetrahydrofuran
4. Flush with methylene chloride
5. Flush with benzene-free n-hexane

Reversed Phase Media

1. Flush with HPLC grade water; inject 4 aliquots of 200µL DMSO during this flush
2. Flush with methanol
3. Flush with chloroform
4. Flush with methanol

Anion Exchange Media

1. Flush with HPLC grade water
2. Flush with gradient of 50mM to 1M appropriate buffer solution
3. Flush with HPLC grade water
4. Flush with methanol
5. Flush with chloroform

Cation Exchange Media

1. Flush with HPLC grade water; inject 4 aliquots of 200µL DMSO during this flush
2. Flush with tetrahydrofuran

Protein Size Exclusion Media

There are two wash/regeneration procedures associated with the removal of contaminants from protein size exclusion media.

Weakly Retained Proteins

1. Flush with 30mL 0.1M pH 3.0 phosphate buffer

Strongly Retained Proteins

1. Flush for 60 minutes using a 100% water to 100% acetonitrile gradient

Porous Graphitic Carbon

There are four wash or regeneration procedures associated with porous graphitic carbon. The one(s) used will depend on the analytes and solvents that have been used with the column

Acid/Base Regeneration

Suitable for ionized species analyzed in strongly aqueous mobile phases.

1. Invert the column
2. Flush with 50mL tetrahydrofuran:water (1:1) containing 0.1% trifluoroacetic acid
3. Flush with 50mL tetrahydrofuran:water (1:1) containing 0.1% triethylamine or sodium hydroxide
4. Flush with 50mL tetrahydrofuran:water (1:1) containing 0.1% trifluoroacetic acid
5. Flush column with 70 column volumes of THF
6. Flush with methanol/water (95:5) to re-equilibrate
7. Re-invert the column

Author: R. Plumb – Glaxo, UK

Strong Organic Regeneration

Suitable for applications involving polar and/ or ionized species analyzed in aqueous mobile phases.

1. Flush with 50mL acetone
2. Flush with 120mL dibutylether
3. Flush with 50mL acetone
4. Flush with aqueous mobile phase until equilibrated

Normal Phase Regeneration

Suitable for applications running predominantly in normal phase mobile phases.

1. Flush with 50mL dichloromethane
2. Flush with 50mL methanol
3. Flush with 50mL water
4. Flush with 50mL 0.1M hydrochloric acid
5. Flush with 50mL water
6. Flush with 50mL methanol
7. Flush with 50mL dichloromethane
8. Flush with mobile phase until equilibrated

Author: A. Karlsson – Uppsala, Sweden

Removal of TFA and DEA

TFA and DEA have the potential to adsorb to the surface of porous graphitic carbon; after using these additives in the mobile phase, regeneration of the column should be undertaken to ensure the original Hypercarb selectivity and optimum performance will always be achieved. The regeneration is as follows:

1. Removal of TFA: Flush column with 70 column volumes of THF.
2. Removal of DEA: Set column oven to 75 °C and flush column with 120 column volumes of ACN.

Polymeric Media with Metallic Counter Ions

There are three types of regeneration available for polymeric columns with metal counter ion. Details of each procedure are listed in the following table.

Column Type	Metal Contamination	Organic Contamination	Column Cleaning
Hydrogen Counter Ion	Pump in reverse flow mode at 0.1mL/min with 0.1M H_2SO_4 @ 25 °C for 4 to 16 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN: H_2O @ 25 °C for 4 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN: 0.01M H_2SO_4 @ 65 °C for 4 hr
Calcium Counter Ion	Pump in reverse flow mode at 0.1mL/min with 0.1M $Ca(NO_3)_2$ @ pH 6.3 and 85 °C for 4 to 16 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN:H_2O @ 25 °C for 4 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN:H_2O @ 25 °C for 4 hr
Sodium Counter Ion	Pump in reverse flow mode at 0.1mL/min with 0.1M $NaNO_3$ @ 85 °C for 4 to 16 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN:H_2O @ 25 °C for 4 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN:H_2O @ 25 °C for 4 hr
Lead Counter Ion	Pump in reverse flow mode at 0.1mL/min with 0.1M $Pb(NO_3)_2$ @ pH 5.3 and 85 °C for 4 to 16 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN: H_2O @ 25 °C for 4 hr	Pump in reverse flow mode at 0.1mL/min with 20:80 ACN: H_2O @ 25 °C for 4 hr