HPLC COLUMNS BY USP L-CODE

The United States Pharmacopeia (USP) maintains a list of codes to specify generic GC or HPLC stationary phases. The phase definitions are broad, and many columns fit into the more popular categories. Columns within a category will have subtle to not-so-subtle differences in performance. For instance, a sub-2µm double endcapped C18 on ultra-pure type B spherical silica and a 10 µm non-endcapped C18 on original type A irregular silica are both L1 phases. They will not produce the same results.

The following list provides an overview of the columns that CSI can provide for each USP code. This is not an exhaustive list. These are columns recommended for new method development, along with some columns that we have recently gained access to for older methods.

USP L-classes are very broad. It is still vital to match your column to your analyte and analysis conditions.

Phase	USP Specifications	Suggested Column
L1	Octadecylsilane chemically bonded to totally porous or superficially porous silica particles 1.5 to 10 µm in diameter, or a monolithic rod.	NUCLEODUR®: C18ec, Gravity C18, C18 HTec, ISIS, PolarTec, Pyramid NUCLEOSHELL®: RP-18, RP-18plus Pinnacle® DB: C18, Aqueous C18 Raptor™ : C18, ARC-18 Ultra C18, Aqueous C18 Viva C18 YMC-Meteoric Core C18 YMC-Triart C18, ExRS YMC-Pack Pro & YMC UltraHT Pro: C18, Hydrosphere C18, C18 RS Genesis® C18, APEX C18 Alltima™ HP C18, WP C18, C18 EPS, C18 HiLoad, C18 Amide VisionHT™ C18, C18-B, C18-P, C18-HL Prevail™: C18, C18 Select BlueOrchid C18 Hypersil: C18, Elite C18, BDS C18, GOLD, GOLD aQ, Green PAH, ODS-2 Accucore: C18, aQ, XL C18
L2	Octadecylsilane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core 30 to 50 µm in diameter.	Pellicular C18
L3	Porous silica particles, 1.5 - 10 µm in diameter, or a monolithic rod.	NUCLEODUR® Pinnacle® DB Silica, Ultra Silica, Viva Silica YMC-Pack SIL Alltima™ HP, Prevail, VisionHT™Genesis® Silica, APEX Silica Hypersil: Silica, GOLD Silica Accucore HILIC
L4	Silica gel of controlled surface porosity bonded to a solid spherical core, 30 to 50 µm in diameter.	Pellicular Silica
L6	Strong cation-exchange packing- sulfonated fluorocarbon polymer coated on a solid spherical core 30 to 50 µm in diameter.	Adsorbosphere XL SCX Partisil SCX
L7	Octylsilane chemically bonded to totally porous or superficially porous silica particles 1.5 to 10 µm in diameter, or a monolithic rod.	NUCLEODUR®: C8 ec, Gravity C8 Pinnacle™ DB C8, Ultra C8, Viva C8 YMC-Pack Pro C8, Meteoric Core C8, Triart C8 Alltima™, Prevail™, Genesis® C8, APEX C8, Accucore: C8, XL C8 Hypersil: GOLD C8, BDS C8, MOS, MOS-2 HS C8 HyPurity C8
L8	An essentially monomolecular layer of aminopropylsilane chemically bonded to totally porous silica gel support, 1.5 to 10 µm in diameter.	NUCLEODUR® NH2 / NH2-RP Ultra Amino YMC-Pack NH2 APEX NH2 Alltima™- Amino columns

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L9	Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter.	NUCLEOSIL® 100 SA Partisphere SCX SiliaChrom SCX
L10	Nitrile groups chemically bonded to porous silica particles, 1.5-10 µm in diameter.	NUCLEODUR® CN / CN-RP Pinnacle® DB Cyano, Ultra Cyano YMC-Pack CN Alltima™ HP CN, Prevail™ CN, Genesis CN, Apex CN Hypersil: BDS CN, CPS, CPS-2, HyPURITY CN BlueOrchid Cyano
L11	Phenyl groups chemically bonded to porous silica particles, 1.5-10 µm in diameter	Nucleodur®: Sphinx RP, Phenyl-Hexyl, Nucleoshell® Phenyl-Hexyl Ultra: Aromax, Phenyl Pinnacle® DB Biphenyl, Viva Biphenyl, Ultra® Biphenyl, Raptor® Biphenyl YMC-Pack Phenyl Triart Phenyl Alltima™ Phenyl, Prevail™ Phenyl Accucore Phenyl-Hexyl Hypersil: CPS-1, GOLD Phenyl, BDS Phenyl, Phenyl, Phenyl-2 BlueOrchid Phenyl
L12	A strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 to 50 µm in diameter.	Pellicular SAX
L13	Trimethylsilane chemically bonded to porous silica particles, 3-10 µm in diameter.	Ultra® C1 YMC-Pack TMS APEX C1 Hypersil SAS (C1)
L14	Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5-10 µm diameter.	NUCLEOSIL® 100 SB Hypersil GOLD SAX, Hypersil SAX Vydac 3021C, Adsorbosphere SAX, Allsphere SAX
L15	Hexylsilane chemically bonded to totally porous silica particles, 3 - 10 µm in diameter	Allsphere™ C6 BETASIL C6
L16	Dimethylsilane chemically bonded to porous silica particles, 5-10 µm diameter.	NUCLEOSIL® C2
L17	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6-12 µm diameter	Hamilton HC-75 H+, PRP®-X200, PRP®-X300 NUCLEOGEL® ION 300 OA, SUGAR 810 H HyperREZ XP Carbohydrate H, HyperREZ XP Organic Acids
L18	Amino and cyano groups chemically bonded to porous silica particles, 3-10 µm diameter	Partisil PAC Adsorbosphere PAC
L19	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, about 9 µm diameter	Hamilton HC-75 Ca2+, HC-40 NUCLEOGEL® Sugar Ca, SUGAR 810 Ca HyperREZ XP Carbohydrate Ca, HyperREZ XP Sugar Alcohols
L20	Dihydroxypropane groups chemically bonded to porous silica particles, 1.5-10 µm in diameter	NUCLEOSIL® OH YMC-Pack Diol-NP Triart Diol-HILIC APEX Diol BETASIL Diol Macrosphere GPC
L21	A rigid spherical styrene-divinylbenzene copolymer, 3-30 µm diameter	Hamilton PRP®-1, PRP®-3 NUCLEOGEL® RP HyperREZ XP RP 100
L22	A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, about 10 µm size	Hamilton PRP®-X200, PRP®-X300 NUCLEOGEL® SCX HyperREZ XP SCX
L23	An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, 7-12 µm in size	Hamilton PRP®-X500 NUCLEOGEL® SAX
L24	Polyvinylalcohol chemically bonded to porous silica particle, 5 µm in diameter.	YMC-Pack PVA-Sil
L25	Packing having the capacity to separate compounds with a molecular weight range from 100 - 5000 (as determined by polyethylene oxide), applied to neutral, anionic, and cationic water-soluble polymers. A polymethacrylate resin base, cross-linked with polyhydroxylated ether (surface contained some residual carboxyl functional groups) was found suitable.	HyperGel AP
L26	Butyl silane chemically bonded to totally porous or superficially porous silica particles, 1.5-10 µm diameter	NUCLEODUR® C4 Ultra C4, Viva C4 YMC-Pack Pro C4, YMC-Pack C4, YMC-Pack PROTEIN-RP Vydac® :214TP, 214MS, 214 ATP, C4 Genesis® C4 Accucore 150-C4 Hypersil GOLD C4, HyPURITY C4

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L27	Porous silica particles, 30 - 50 µm in diameter.	NUCLEODUR® SiOH POLYGOPREP SiOH YMC-Pack Silica (S50)
L28	A multifunctional support, which consists of a high purity, 100 angstroms, spherical silica substrate that has been bonded with anionic exchanger, amine functionality in addition to a conventional reversed phase C8 functionality.	Alltech mixed mode C8/anion
L30	Ethyl silane chemically bonded to a totally porous silica particle, 3-10 µm diameter	APEX Prepsil C2 NUCLEOSIL® C2
L32	A chiral ligand-exchange resin packing, L-proline copper complex covalently bonded to irregular shaped silica particles, 5-10 µm diameter	NUCLEOSIL® CHIRAL-1
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 1000, SEC 120, SEC 300 Macrosphere 150 D YMC-Pack Diol
L34	Strong cation exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, 7- 9 µm in diameter	Hamilton HC-75 Pb2+ NUCLEOGEL® Sugar Pb HyperREZ XP Carbohydrate Pb
L36	A 3,5-dinitrobenzoyl derivative of L-phenylglycine covalently bonded to 5 µm aminopropyl silica	NUCLEOSIL® CHIRAL-3
L40	Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 5-20 µm diameter	NUCLEOCEL DELTA YMC Chiral Cellulose-C SiliaChrom Chiral Cellulose T-DPC
L42	Octylsilane and octadecylsilane groups chemically bonded to porous silica particles, 5 µm in diameter.	SiliaChrom C18/C8
L43	Pentafluorphenyl groups chemically bonded to silica particles by a propyl spacer, 1.5-10 µm diameter	NUCLEODUR® PFP, NUCLEOSHELL® PFP Triart PFP Pinnacle® DB PFP Propyl, Ultra PFP Propyl, Viva PFP Propyl Accucore PFP, Hypersil GOLD PFP
L45	Beta clyclodextrin, R,S-hydroxypropyl ether derivative, bonded to porous silica particles 5-10 µm diameter	NUCLEODEX B-OH YMC CHIRAL β-CD BR
L47	High capacity anion-exchange microporous substrate, fully functionalized with trimethylamine groups, 8 µm in diameter.	PRP-X100, PRP-X110, RCX-10, RCX-30
L49	A reversed-phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter.	Zirchrom PBD
L51	Amylose tris-3,5-dimethylphenylcarbamate coated porous, spherical silica particles, 5-10 µm in diameter	CHIRAL ART Amylose-C SiliaChrom Chiral Amylose T-DPC
L52	A strong cation exchange resin made of porous silica with sulfopropyl groups, 5 to 10 µ in diameter.	BioBasic SCX
L55	A strong cation exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer, about 5 µ in diameter.	Universal Cation, Universal Cation HR
L58	Strong cation-exchange resin consisting of sulfonated cross-linked PS/DVB copolymer in the Na form, 6-30 µm diameter	NUCLEOGEL® SUGAR NaHyperREZ Carbohydrate XP Na
L59	Packing having the capacity to separate proteins by molecular weight over the range of 5 to 7000 kDa. The packing is spherical 1.5 - 10 µm silica or hybrid packing with a hydrophilic coating.	YMC-Pack Diol
L60	Spherical porous silica gel, 10µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and endcapped	NUCLEOSIL® C18 Nautilus NUCLEODUR® PolarTec Accucore Polar Premium
L62	C30 silane bonded phase on a fully porous spherical silica, 3 to 15 µm in diameter	Accucore C30 YMC-Pack C30
L68	Spherical, porous silica, 10 µm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped.	Ultra IBD
L75	A chiral-recognition protein, bovine serum albumin (BSA), chemically bonded to silica particles, about 7 µm in diameter, with a pore size of 300Â.	Resolvosil BSA