

LC Phase Specifications according to USP

- L 1** Octadecyl silane chemically bonded to porous silica or ceramic micro-particles, 3 – 10 µm in diameter, or a monolithic rod.
Available Phases: MultoHigh RP18, Multospher RP18, Multospher RP18-HP, Multohyp ODS, Multohyp BDS-C18, MultoHigh-Bio C18, MultoKrom C18, MultoKrom BDS C18, MultoWorb ODS 1, MultoWorb ODS 2, CS-ODS, ProntoSIL 120-C18 ace EPS
- L 2** Octadecyl silane chemically bonded to silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 – 50 µm in diameter.
- L 3** Porous silica particles, 3 – 10 µm in diameter.
Available Phases: MultoHigh Si, Multospher Si, MultoKrom Si, MultoWorb Si
- L 4** Silica gel of a controlled surface porosity that has been bonded to a solid spherical core, 30 – 50 µm in diameter.
- L 5** Alumina of a controlled surface porosity that has been bonded to a solid spherical core, 30 – 50 µm in diameter.
- L 6** Strong cation-exchange packing –sulfonated fluorocarbon polymer coated on a solid spherical core, 30 – 50 µm diameter.
- L 7** Octyl silane chemically bonded to porous silica or ceramic micro-particles, 3 – 10 µm in diameter.
Available Phases: MultoHigh RP8, Multospher RP8, MultoHigh-Bio-C8, LiChrospher RP8
- L 8** An essentially monomolecular layer of aminopropylsilane chemically bonded to a totally porous silica gel, 3 – 10 µm in diameter.
Available Phases: Multospher APS-HP, MultoWorb NH2, LiChrospher NH2, ProntoSIL Amino
- L 9** 10 µm irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 – 10 µm in diameter.
Available Phases: MultoWorb SCX
- L 10** Nitrile groups bonded to porous silica particles, 3 – 10 µm in diameter.
Available Phases: MultoHigh CN, MultoWorb CN, LiChrospher CN, ProntoSIL CN
- L 11** Phenyl groups chemically bonded to porous silica particles, 3 – 10 µm in diameter.
Available Phases: MultoHigh Phenyl, MultoWorb Phe, ProntoSIL Phenyl
- L 12** A strong anion-exchange packing made by chemically bonding a quaternary amine to a solid silica spherical core, 30 – 50 µm in diameter.
- L 13** Trimethylsilane chemically bonded to porous silica particles, 3 – 10 µm in diameter.
- L 14** Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5 – 10 µm in diameter.
Available Phases: MultoWorb SAX
- L 15** Hexyl silane chemically bonded to totally porous silica particles, 3 – 10 µm in diameter.
Available Phases: MultoWorb C6
- L 16** Dimethylsilane chemically bonded to porous silica particles 5 – 10 µm in diameter.

- L 17** Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 7 – 11 µm in diameter.
Available Phases: Organic Acid-Resin, Hamilton PRP-X200, Hamilton PRP-X300
- L 18** Amino and cyano groups chemically bonded to porous silica particles, 3 – 10 µm in diameter.
- L 19** Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, about 9 µm in diameter.
Available Phases: Carbohydrate Ca²⁺, Hamilton HC 75 Ca, Hamilton HC 40
- L 20** Dihydroxypropane groups chemically bonded to porous silica particles, 5 – 10 µm in diameter.
Available Phases: MultoHigh DIOL, LiChrospher Diol, ProntoSIL Diol
- L 21** A rigid, spherical styrene-divinylbenzene copolymer, 5 – 10 µm in diameter.
Available Phases: CS-RPC, Hamilton PRP-1
- L 22** A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups about 10 µm in size.
- L 23** An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, about 10 µm in size.
- L 24** A semi-rigid hydrophilic gel consisting of vinyl polymers with numerous hydroxyl groups on the matrix surface, 32 – 60 µm in diameter.
- L 25** Packing having the capacity to separate compounds with 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.
- L 26** Butyl silane chemically bonded to totally porous silica particles, 3 – 10 µm in diameter.
Available Phases: MultoKrom C4, MultoHigh-Bio C4
- L 27** Porous silica particles, 30 – 50 µm in diameter.
- L 28** A multifunctional support, which consists of a high purity, 100 Å, spherical silica substrate that has been bonded with anionic exchanger, amine functionality in addition to a conventional reversed phase C8 functionality.
- L 29** Gamma alumina, reversed phase, low carbon percentage by weight, alumina-based polybutadiene spherical particles, 5 µm in diameter with a pore volume of 80 Å.
- L 30** Ethyl silane chemically bonded to totally porous silica particles, 3 – 10 µm in diameter
- L 31** A hydroxide-selective strong anion-exchange resin quaternary amine bonded on latex particles attached to a core of 8.5 µm macroporous particles having a pore size of 2000 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene.
- L 32** A chiral ligand-exchange resin packing-L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 – 10 µm in diameter.
- L 33** Packing having the capacity to separate dextrans by molecular size over a range of 4.000 – 500.000 daltons. It is spherical, silica-based and processed to provide pH

stability.

- L 34** Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, about 9 µm in diameter.
Available Phases: Carbohydrate Pb²⁺, Hamilton HC 75 Pb form
- L 35** A zirconium-stabilized spherical silica packing with a hydrophilic (diol-type) molecular monolayer bonded phase having a pore size of 150 Å.
- L 36** A 3,5-dinitrobenzoyl derivative of *L*-phenylglycine covalently bonded to 5 µm aminopropyl silica.
- L 37** Packing having the capacity to separate proteins by molecular size over a range of 2.000 to 40.000 daltons. It is a polymethacrylate gel.
- L 38** A methacrylate-based size-exclusion packing for water-soluble samples.
- L 39** A hydrophilic polyhydroxymethacrylate gel of totally porous spherical resin.
- L 40** Cellulose *tris*-3,5-dimethylphenylcarbamate coated porous silica particles, 5 to 20 µm in diameter.
Available Phases: Chiral OM, CHIRALPAK OD
- L 41** Immobilized a1-acid glycoprotein on spherical silica particles, 5 µm in diameter.
- L 42** Octyl silane and octadecyl silane groups chemically bonded to porous silica particles, 5 µm in diameter.
- L 43** Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 5 to 10 µm in diameter.
- L 44** A multifunctional support, which consists of a high purity, 60 Å, spherical silica substrate that has been bonded with a cationic exchanger, sulfonic acid functionality in addition to a conventional reversed-phase C8 functionality.
- L 45** Beta cyclodextrin bonded to porous silica particles, 5 to 10 µm in diameter.
- L 46** Polystyrene-divinylbenzene substrate agglomerated with quaternary amine-functionalised latex beads, about 10 µm in diameter.
- L 47** High capacity anion-exchange microporous substrate, fully functionalized with a trimethylamine group, 8 µm in diameter.
- L 48** Sulfonated, cross-linked polystyrene with an outer layer of submicron, porous, anion exchange microbeads, 15 µm in diameter.
- L 49** A reversed-phase packing made by coating a thin layer of polybutadiene on to spherical porous zirconia particles, 3 to 10 µm in diameter.
- L 50** Multifunction resin with reversed-phase retention and strong anion-exchange functionalities. The resin consists of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 3 to 15 µm in diameter, and a surface area of not less than 350 m²/g. Substrate is coated with quaternary ammonium-functionalized latex particles consisting of styrene cross-linked with divinylbenzene.
- L 51** Amylose *tris*-3,5-dimethylphenylcarbamate coated, porous, spherical, silica particles, 5 to 10 µm in diameter.
Available Phases: MultoHigh Chiral-AM, CHIRALPAK AD

- L 52** A strong cation-exchange resin made of porous silica with sulfopropyl group, 5 to 10 μm in diameter.
- L 53** Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 3 to 15 μm diameter. Substrate is surface-grafted with carboxylic acid and /or phosphoric acid functionalized monomers. Capacity not less than 500 $\mu\text{Eq}/\text{column}$.
- L 54** A size exclusion medium made of covalent bonding of dextran to highly cross-linked porous agarose beads, about 13 μm in diameter.
- L 55** A strong cation-exchange resin made of porous silica coated with polybutadiene-maleic acid copolymer, about 5 μm in diameter.
- L 56** Propyl silane chemically bonded to totally porous silica particles, 3 to 10 μm in diameter.
- L 57** A chiral-recognition protein, ovomucoid, chemically bonded to silica particles, about 5 μm in diameter, with a pore size of 120 angstroms.
- L 58** Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the sodium form, about 6 to 30 μm diameter.
- L 59** Packing having the capacity to separate proteins by molecular weight over the range of 5 to 7000 kDa. It is spherical (5 – 10 μm), silica-based, and processed to provide hydrophilic characteristics and pH stability.
- L 60** Spherical, porous silica gel, 10 μm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and endcapped.
- L 61** A hydroxide -selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 μm microporous particles having a pore size less than 10 Angstrom units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 85 nm diameter microbeads bonded with alkanol quaternary ammonium ions (6 %).
- L 62** C30 silane bonded phase on a fully porous spherical silica, 3 to 15 μm in diameter.
Available Phases: MultoHigh RP30
- L 63** Glycopeptide teicoplanin linked through multiple covalent bonds to a 100 A units spherical silica.
- L 64** Strongly basic anion exchange resin consisting of 8 % cross-linked styrene-divinylbenzene copolymer with a quaternary ammonium group in the chloride form, 45 to 180 μm in diameter.
- L 65** Strongly acidic cation-exchange resin consisting of 8 % sulfonated cross-linked styrene-divinylbenzene copolymer with a sulfonic acid group in the hydrogen form, 63 to 250 μm in diameter.
- L 66** A crown ether coated on 5 μm particle size gel substrate. The active site is (S)-18-crown-6 ether.
- L 67** Porous vinyl alcohol copolymer with a C18 alkyl group attached to the hydroxyl group of the polymer, 2 to 10 μm in diameter.
- L 68** Spherical, porous silica, 10 μm or less in diameter, the surface of which has been

covalently modified with alkyl amide groups and not endcapped.

- L 69** Ethylvinylbenzene/divinylbenzene substrate agglomerated with quaternary amine functionalized 130 nm latex beads, about 6.5 μm in diameter.
- L 70** Cellulose tris(phenyl carbamate) coated on 5 μm silica.
- L 71** A rigid, spherical polymethacrylate, 4 to 6 μm in diameter.
- L 72** (S)-Phenylglycine and 3,5-dinitroaniline urea linkage covalently bonded to silica.
- L 73** A rigid, spherical polydivinylbenzene particle, 5 to 10 μm in diameter.
- L 74** A strong anion-exchange resin consisting of a highly cross-linked core of 7 μm microporous particles having a 100 Å average pore size and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkyl quaternary ammonium ions.
- L 75** A chiral-recognition protein, bovine serum albumin (BSA), chemically bonded to silica particles, about 7 μm in diameter, with a pore size of 300 Å.
- L 76** Silica based weak cation-exchange material, 5 μm in diameter. Substrate is surface polymerized polybutadiene-maleic acid to provide carboxylic acid functionalities. Capacity not less than 29 μEq /column.
Available Phases: Multospher Kation
- L 77** Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinyl benzene copolymer, 6 to 9 μm diameter. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 500 μEq /column (4 mm x 25 cm).
- L 78** A silane ligand that consists of both reversed-phase (an alkyl chain longer than C8) and anion-exchange (primary, secondary, or tertiary amino groups) functional groups chemically bonded to porous or non-porous or ceramic microparticles, 1.0 to 50 μm in diameter or a monolithic rod.
- L 79** A chiral-recognition protein, human serum albumin (HSA), chemically bonded to silica particles, about 5 μm in diameter.
- L 80** Cellulose tris(4-methylbenzoate)-coated, porous spherical, silica particles, 5 μm in diameter.
- L 81** A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 9 μm porous particles having a pore size of 2000 Å units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 70 nm diameter microbeads (6 % cross-linked) bonded with alkanol quaternary ammonium ions.
- L 82** Polyamine chemically bonded to cross-linked polyvinyl alcohol polymer, 4 – 5 μm in diameter.
- L 83** A hydroxide-selective, strong anion-exchange resin – quaternary amine bonded on latex particles attached to a core of 10.5 μm microporous particles having a pore size of 10 Å and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene.
- L 84** Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 5 μm diameter. Substrate is surface grafted with carboxylic

acid functionalized groups. Capacity not less than 8400 $\mu\text{Eq}/\text{column}$ (5 mm x 25 cm).

- L 85** A silane ligand that consists of both reversed-phase (an alkyl chain longer than C8) and weak cation-exchange (carboxyl groups) functional groups chemically bonded to porous or non-porous particles, 1.0 to 50 μm in diameter.
- L 86** A 5 μm fused core particle with a highly polar ligand possessing 5 hydroxyl groups tethered to the silica gel outer layer.
- L 87** Dodecyl silane chemically bonded to porous silica particles, 1.5 to 10 μm in diameter.
- L 88** Glycopeptide vancomycin linked through multiple covalent bonds to 100 \AA spherical silica.
- L 89** Packing having the capacity to separate compounds with a molecular weight range from 100-3000 (as determined by polyethylene oxide), applied to neutral and anionic water-soluble polymers. A polymethacrylate resin base, cross-linked with polyhydroxylated ether (surface contains some residual cationic functional groups).
- L 90** Amylose tris[(S)-alpha-methylbenzylcarbamate] coated on porous, spherical silica particles, 3 to 10 μm in diameter.
- L 91** Strong anion-exchange resin consisting of monodispersed porous polystyrene/divinylbenzene beads coupled with quaternary amine. Bead size is 10 μm .
- L 92** A strong anion-exchange resin consisting of a highly cross-linked core of 5 to 9 μm microporous particles having a 100 \AA average pore size and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene and an anion-exchange layer grafted to the surface, which is functionalized with alkanol quaternary ammonium ions.
- L 93** Cellulose tris(3,5-dimethylphenylcarbamate) reversed-phase chiral stationary phase coated on 3 or 5 μm silica gel particles.
- L 94** A strong anion-exchange resin consisting of highly cross-linked 15 μm microporous particles functionalized with very low cross-linked latex (0.5 %) to provide alkanol quaternary ammonium ion exchange sites.
- L 95** Highly polar alkyl ligand comprising five hydroxyl groups that are chemically bonded to totally porous or superficially porous silica or a monolithic silica rod.
- L 96** Alkyl chain, reversed-phase bonded totally or superficially porous silica designed to retain hydrophilic and other polar compounds when using highly aqueous mobile phases, including 100 % aqueous, 1.5 μm to 10 μm in diameter.
Available Phases: Multospher RP18-AQ, MultoKrom C18 AQ
- L 97** Weak cation-exchange resin consisting of a highly cross-linked core of 5.5 μm porous particles having a pore size of 2000 \AA units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 2400 $\mu\text{Eq}/\text{column}$ (4 mm x 25 cm).
- L 98** Weak cation-exchange resin consisting of a highly cross-linked core of 8 μm microporous particles having a pore size of 10 \AA units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene. Substrate is surface grafted with carboxylic acid functionalized groups. Capacity not less than 46 $\mu\text{Eq}/\text{column}$ (4 mm x 5 cm).

- L 99** Amylose tris-(3,5-dimethylphenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 μm in diameter.
- L 100** A 55 % crosslinked, microporous, hydrophobic resin core (9 μm microporous particles having a pore size of 10 \AA units) that consists of a bilayer of anion and cation exchange latex. The first layer is fully sulfonated (140 nm) and the second layer is fully aminated (76 nm).
- L 101** Cholesteryl groups chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 μm in diameter, or a monolithic rod.
- L 102** (Naproxen, (S,S)Whelk-O 1) 1-(3,5-dinitrobenzamido)-1,2,3,4-tetrahydrophenanthrene covalently bonded to porous spherical silica particles, 5 to 10 μm in diameter.
- L 103** A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 μm porous particles having a pore size of 2000 \AA units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.
- L 104** Triazole groups chemically bonded to porous silica particles, 1.5 to 10 μm in diameter.
- L 105** A strong anion-exchange resin consisting of a highly cross-linked 9 μm supermacroporous (2000 \AA) particles functionalized with very low cross-linked latex (0.2 %) to provide alkyl quaternary ammonium ion sites.
- L 106** Weak cation-exchange resin consisting of ethylvinylbenzene, 55 % cross-linked with divinylbenzene copolymer, 5-8 μm diameter, macroporous particles having an average pore size of 100 \AA units. Substrate is surface grafted with carboxylic acid and phosphonic acid functional groups. Capacity not less than 2800 $\mu\text{Eq}/\text{column}$ (4 mm x 25 cm).
- L 107** Cellulose tris(4-methylbenzoate)-coated porous spherical particles, 3 to 5 μm in diameter, for use with reversed phase mobile phases.
- L 108** A chiral-recognition protein, cellobiohydrolase (CBH), chemically bonded to silica particles, about 5 μm in diameter.
- L 109** Spherical particles of porous graphitic carbon, 3 to 30 μm in diameter.
- L 110** A strong anion-exchange resin consisting of a highly cross-linked 13 μm microporous (less than 10 \AA) particles coated with very low cross-linked latex (0.5 %) to provide alkanol quaternary ammonium ion exchange sites.
- L 111** Polyamine chemically bonded to porous spherical silica particles, 5 μm in diameter.
- L 112** A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 8.5 μm porous particles having a pore size of 2000 \AA units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5 % crosslinked) bonded with alkanol quaternary ammonium ions.
- L 113** A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 7.5 μm porous particles having a pore size of 2000 \AA units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 65 nm diameter microbeads (5 %) crosslinked bonded with alkanol

quaternary ammonium ions.

- L 114** Sulfobetaine graft-polymerized to totally or superficially porous silica, 1.5 to 10 μm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.
- L 115** Ethylvinylbenzene/divinylbenzene substrate (55 % cross-linked) agglomerated with quaternary amine functionalized 275 nm latex microbeads (6 % cross-linked), about 8.5 μm in diameter.
- L 116** Sulfonated ethylvinylbenzene/divinylbenzene substrate approximately 12 to 14 μm in diameter agglomerated with hydrophilic quaternary amine functionalized glycidyl-derivative methacrylate microbeads.
- L 117** A crown ether coated on a 5 μm particle size silica gel substrate. The active site is (R)-18-crown-6-ether.
- L 118** Aqueous polymerized C18 groups on silica particles, 1.2 to 5 μm in diameter.
Available Phases: Multospher PAH-III
- L 119** Cellulose tris-(3,5-dichlorophenylcarbamate), immobilized on porous, spherical, silica particles, 3 to 5 μm in diameter.
- L 120** A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 13 μm microporous particles having a pore size of <10 Å units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene with a latex coating composed of 65 nm diameter microbeads (8 % crosslinked) bonded with alkanol quaternary ammonium ions. Capacity not less than 10 $\mu\text{Eq}/\text{column}$ (4 mm x 5 cm).
- L 121** A hydroxide-selective, strong anion-exchange resin consisting of a highly cross-linked core of 11 μm porous particles having a pore size of less than 10 Å units and consisting of ethylvinylbenzene cross-linked with 55 % divinylbenzene electrostatically bonded with hyperbranched alkanol quaternary ammonium ions.
- L 122** Sulfobetaine graft-polymerized to totally or superficially porous hydrophilic polymer particles, 1.0 to 10 μm in diameter, or a monolithic rod. Packing having densely bonded zwitterionic groups with 1:1 charge balance.
- L 123** Cellulose tris-(3-chloro-4-methylphenylcarbamate) coated porous silica particles, 3 to 20 μm in diameter.
- L 124** Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the silver form, average 9 μm in diameter.
- L 125** Polyvinyl alcohol polymer gel weak cation-exchange packing material, 5 μm porous particles. The surface is polymerized with polybutadiene-maleic acid to provide carboxylic acid functionalities. The capacity is not less than 1 mEq/column .