

- High enantioselectivity
- Fast run times
- Rugged, long-lived columns
- Easy scale-up to preparative
- Allow direct/indirect resolution of enantiomeric amines, amino acids, hydroxy acids, alcohols, carboxylic acids, ketones, ethers, and esters

Chiral separations are extremely important to the pharmaceutical and biotechnology industries, as well as most other areas of natural products chemistry. Optically active therapeutic drugs require selective and sensitive techniques. Government regulations also continue to spur and require the development of rapid, accurate and reproducible methods for the analysis and purification of enantiomeric compounds.

The challenge is to provide selective yet versatile HPLC columns for both trace analysis and the purification of bulk drug.

Phenomenex meets these challenges with Chirex brand HPLC columns. Chirex is available in 11 different stationary phases. These chemically rugged, versatile columns are used for the direct and indirect resolution of enantiomeric amines, alcohols, carboxylic acids, hydroxy acids, amino acids, ketones, lactones, ethers, esters, and other biologically active compounds.



Hundreds of applications demonstrate the performance of Chirex phases for a multitude of pharmaceutical and agrochemical compounds. For a complete list, please contact your Phenomenex technical consultant.

Which Chirex Stationary Phase?

Stationary phase selection depends on presence/absence of chemical groupings in the chiral molecule.

Chirex Column Selection Guide

Presence of Chemical Groupings in Chiral Molecule							Recommended Columns:		
Class	Aromatic	- N -	- COOH	- OH	Other	Comment	First Choice	Second Choice	Third Choice
Group 1	Y	Y	Y			Aromatic α -amino acids, α -hydroxy acids	3126	3005 or 3001	3011 or 3012
Group 2	Y	Y		Y			3022 or 3020	3014	3018
Group 3	Y	Y			Y		3014 or 3020	3022	3018
Group 4	Y		Y				3005	3010	3001
Group 5	Y			Y			3001 or 3014	3005	3020 or 3022
Group 6	Y				Y		3001	3005	3019 or 3020
Group 7		Y	Y			Aliphatic α -amino acids, α -hydroxy acids and their derivatives	3126		
Group 8			Y				3126	3010	3001
Group 9					Y		3014	3019 or 3020	3001
Group 10					Y	Asymmetric other than carbon. Chiral center at N,S,P,B, etc	3014	3010	3005



For more information on Chirex chiral stationary phase descriptions, contact your Phenomenex technical consultant.

Chirex is a trademark of Chirex, Inc. licensed to Phenomenex.

Chiral HPLC of Amino Acids

- Pirkle-concept and Ligand Exchange type columns
- High enantioselectivity
- Excellent efficiency

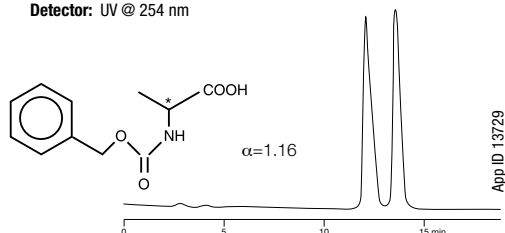
Separations of Amino Acid Derivatives

Compound	Chirex Phase	Separation Factor (α)	App ID No.
t-BOC-Derivatives (Butyloxycarbonyl)			
t-BOC-Leucine	3012	1.09	14064
t-BOC-Phenylalanine	3012	1.09	13784
t-BOC-Valine	3012	1.10	14063
N-FMOC Derivatives (9-Fluorenylmethyloxycarbonyl)			
N-FMOC-Leucine	3011	1.20	13800
N-FMOC-Phenylalanine	3011	1.10	13796
N-FMOC-Valine	3011	1.12	13798
Z-Derivatives (Benzyloxycarbonyl)			
Z-Alanine	3011	1.16	13729
Z-Asparagine	3010	1.12	13760
Z-Leucine	3011	1.17	13731
Z-Norvaline	3011	1.13	13755
Z-Phenylalanine	3012	1.08	13762
Z-Serine	3011	1.09	13758
Z-Valine	3011	1.13	13753
N-Acetyl Derivatives			
N-Acetylalanine	3126	1.17	14052
N-Acetylleucine	3126	1.39	14058
N-Acetylmethionine	3126	1.27	13728
N-Acetylvaline	3126	1.50	14055
N-Formyl Derivatives			
N-Formylvaline	3126	1.37	13721
N-Formylmethionine	3126	1.25	13722
N-Benzoyl Derivatives			
N-Benzoylglutamic acid	3012	1.14	13782
N-Benzoylleucine	3012	1.11	14460
N-Benzoylphenylalanine	3012	1.17	13730
N-Benzoylphenylglycine	3012	1.13	14461
N-Benzoylvaline	3012	1.19	13778
N-Dansyl Derivatives (5-5-Dimethyl-aminonaphthalene-1-sulfonyl derivative)			
N-Dansylnorvaline	3011	1.24	13766
N-Dansylphenylalanine	3011	1.27	13771
N-Dansylthreonine	3012	1.18	13734
N-Dansyltryptophan	3010	1.15	13774
N-Dansylvaline	3011	1.28	13763
PTH Derivatives (Phenylthiohydantoin)			
PTH-Valine	3014	1.12	13921

i Separation potential of some other amino acid derivatives: (Recommended columns: Chirex 3010, 3011, 3012, 3014)
 CBZ-Derivatives (carbobenzoyl; benzyloxycarbonyl); IC-Derivatives (phenylisocyanate);
 Dabsyl Derivatives (4-4-dimethylaminoazobenzene-4'-sulfonyl)

Z-Alanine

Column: Chirex 3011
Dimensions: 250 x 4.0 mm
Part No.: 00G-3011-D0
Mobile Phase: 0.01 M Ammonium Acetate in Methanol
Flow Rate: 1.0 mL/min
Detector: UV @ 254 nm



Phenomenex

Chirex HPLC columns are an excellent choice for underivatized and derivatized amino acids.

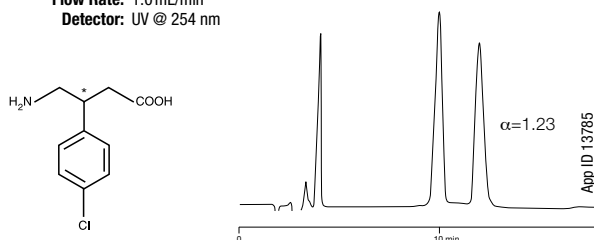
Separations of Underivatized "Free" Amino Acids

Compound	Chirex Phase	Separation Factor (α)	App ID No.
Alanine	3126	1.66	14004
Alanylglycine	3126	2.26	14080
Alanylglycyl-glycine	3126	1.62	14082
Alloisoleucine	3126	1.67	14038
Allothreonine	3126	1.19	14046
Arginine	3126	2.15	14027
Asparagine	3126	1.10	14049
Aspartic acid	3126	1.42	14019
Baclofen	3126	1.23	13785
p-Boronophenylalanine	3126	1.36	13790
2-amino-n-Butyric acid	3126	1.80	14034
Cystine	3126	2.47	14085
2,6-Diaminopimelic acid	3126	2.77	14066
3-(3,4-Dihydroxyphenyl)-alanine (DOPA)	3126	1.22	13750
Glutamic acid	3126	1.11	14047
Glutamine	3126	1.71	14022
Glycylalanine	3126	1.78	14079
Glycylvaline	3126	1.69	14081
Histidine	3126	1.32	13745
Isoleucine	3126	1.70	14035
Leucine	3126	1.56	14009
Leucylglycyl-glycine	3126	1.36	14083
Lysine	3126	1.83	14018
Methionine	3126	1.42	14024
α -Methyl Leucine	3126	1.59	14457
α -Methyl Tryptophan	3126	1.18	14456
Naphthylglycine	3126	1.42	13789
Norvaline	3126	1.95	14029
Ornithine	3126	1.38	14041
Phenylalanine	3126	1.44	13740
Phenylglycine	3126	1.78	13748
Pipecolic acid	3126	1.77	14031
Proline	3126	2.50	14011
Serine	3126	1.17	14016
Threonine	3126	1.20	14043
dl-Threo-3-phenylserine	3126	1.15	13787
Tryptophan	3126	1.11	13737
Tyrosine	3126	1.34	13743
Valine	3126	1.91	14006

i Alpha (α)= Separation Factor = k_2/k_1

Baclofen

Column: Chirex 3126
Dimensions: 150 x 4.6 mm
Part No.: 00F-3126-E0
Mobile Phase: 2 mM Copper (II) sulfate in water / Isopropanol (85:15)
Flow Rate: 1.0 mL/min
Detector: UV @ 254 nm



Ordering Information

5 µm Starter™ Columns (mm)				
Phase	Chirex Phase Description	Bond Type	Linkage Type	50 x 4.6
3001	(R)-PGLY and DNB	Covalent	Amide	00B-3001-E0
3010	(S)-VAL and DNAn	Covalent	Urea	00B-3010-E0
3011	(S)-LEU and DNAn	Covalent	Urea	00B-3011-E0
3014	(S)-VAL and (R)-NEA	Covalent	Urea	00B-3014-E0
3018	(S)-PRO and (R)-NEA	Covalent	Urea	00B-3018-E0
3020	(S)-LEU and (R)-NEA	Covalent	Urea	00B-3020-E0
3022	(S)-ICA and (R)-NEA	Covalent	Urea	00B-3022-E0
3005	(R)-NGLY and DNB	Covalent	Amide	00B-3005-E0
3126	(D)-Penicillamine	Ion-Metal	Lig Exchange	00B-3126-E0
3012	(R)-PGLY and DNAn	Covalent	Urea	00B-3012-E0



Preparative Columns and Bulk Media are available in 15 and 30 µm particle sizes. Call for information on pricing and availability. Detailed notes on Care and Use, as well as performance testing, are provided with each column.



For Chiral Column Performance Check Standards, see p. 373.



For In-line Filters specifically designed to protect your chiral column investment, see p. 331.



For HPLC Column Heater System (25-90 °C), see p. 366.

5 µm Analytical and Guard Columns (mm)				Analytical				Guards
Phase	Chirex Phase Description	Bond Type	Linkage Type	150 x 2.0	250 x 2.0	150 x 4.6	250 x 4.6	30 x 4.6
3001	(R)-PGLY and DNB	Covalent	Amide	—	00G-3001-B0	00F-3001-E0	00G-3001-E0	03A-3001-E0
3010	(S)-VAL and DNAn	Covalent	Urea	—	—	—	00G-3010-E0	03A-3010-E0
3011	(S)-LEU and DNAn	Covalent	Urea	—	—	00F-3011-E0	00G-3011-E0	03A-3011-E0
3012	(R)-PGLY and DNAn	Covalent	Urea	—	—	00F-3012-E0	00G-3012-E0	03A-3012-E0
3014	(S)-VAL and (R)-NEA	Covalent	Urea	—	—	—	00G-3014-E0	03A-3014-E0
3018	(S)-PRO and (R)-NEA	Covalent	Urea	—	—	—	00G-3018-E0	03A-3018-E0
3019	(S)-LEU and (S)-NEA	Covalent	Urea	—	—	—	00G-3019-E0	03A-3019-E0
3020	(S)-LEU and (R)-NEA	Covalent	Urea	00F-3020-B0	—	00F-3020-E0	00G-3020-E0	03A-3020-E0
3022	(S)-ICA and (R)-NEA	Covalent	Urea	—	—	00F-3022-E0	00G-3022-E0	03A-3022-E0
3005	(R)-NGLY and DNB	Covalent	Amide	—	00G-3005-B0	00F-3005-E0	00G-3005-E0	03A-3005-E0
3126	(D)-Penicillamine	Ion-Metal	Lig Ex	00F-3126-B0	00G-3126-B0	00F-3126-E0	00G-3126-E0	03A-3126-E0

Chiral Method Development Kits

Kit A. For Pharmaceuticals, Agrochemicals

The broad range of Pirkle-concept (Type I, or brush type) columns carefully chosen for this Kit will enable the chiral chromatographer to quickly and easily survey stationary phase utility and separation conditions for a wide variety of enantiomeric compounds. Used with normal phase solvent systems, these chiral columns are highly efficient tools particularly well-suited for enantiomeric separations of pharmaceuticals and agrochemicals.

Kit A. For Pharmaceuticals, Agrochemicals

This kit contains five columns, 50 x 4.6 mm:

Column 1:	Chirex 3001: 3,5-dinitrobenzoic acid derivative of (R)-phenylglycine
Column 2:	Chirex 3005: 3,5-dinitrobenzoic acid derivative of (R)-1-naphthylphenylglycine
Column 3:	Chirex 3010: 3,5-dinitroaniline derivative of (S)-valine
Column 4:	Chirex 3014: (R)-1-(α -naphthyl)ethylamine derivative of (S)-valine
Column 5:	Chirex 3020: (R)-1-(α -naphthyl)ethylamine derivative of (S)-tert-leucine

Kit B. For α -Amino Acids, α -Hydroxy Acids, Carboxylic Acids, Aromatic Amines, Alcohols and Amino Alcohols

This Kit contains a collection of chiral columns for method development of enantiomeric α -amino acids, α -hydroxy acids, dipeptides, and aromatic amines, alcohols and amino alcohols. The kit includes four Pirkle-concept columns and one ligand-exchange type column. The Pirkle-concept columns are chosen for their high utility/versatility in separating derivatized amino acids, whereas the ligand-exchange column confers excellent enantioselectivity for underivatized α -amino acids, and α -hydroxy acids.

Kit B. For α -Amino Acids, α -Hydroxy Acids, Carboxylic Acids, Aromatic Amines, Alcohols and Amino Alcohols

This kit contains five columns, 50 x 4.6 mm:

Column 1:*	Chirex 3010: 3,5-dinitroaniline derivative of (S)-valine
Column 2:*	Chirex 3011: 3,5-dinitroaniline derivative of (S)-tert-leucine
Column 3:*	Chirex 3012: 3,5-dinitroaniline derivative of (R) phenylglycine
Column 4:	Chirex 3014: (R)-1-(α -naphthyl)ethylamine derivative of (S)-valine
Column 5:	Chirex 3126: Ligand-Exchange type based on (N,S) diocetyl-(D)-penicillamine complexed with copper(II)

* Especially useful for derivatized amino acid analysis (see p. 329)

Chiral Method Development Kits

Part No.	Description	Unit	Price
KHO-1892	Chiral Method Development (Kit A)	ea	

Chiral Method Development Kits

Part No.	Description	Unit	Price
KHO-1893	Chiral Method Development (Kit B)	ea	

Chiral Column Protection Systems

The following in-line filters are recommended to protect your valuable Chiral HPLC column investment from damaging microparticulates. Select the appropriate in-line filter by matching to your column's diameter as indicated.

Ordering Information

Chiral Column Protection Systems

Part No.	In-Line Filter Description	Comment	Column Diameter Range	Unit	Price
AF0-8497	HPLC KrudKatcher Ultra Column In-Line Filter, 0.5 µm Porosity x 0.004 in. ID	Direct connect	1 - 4.6 mm ID	3/pk	
AF0-8420	HPLC SemiPrep Column In-Line Filter, 2.0 µm Porosity x 10 mm dia., Biocompatible	Requires column coupler AQ0-1393	6.0 - 16.0 mm ID	ea	
AF0-7866	HPLC PREP Column In-Line Filter, S.S., 2.0 µm Porosity x 21.2 mm dia.	Requires column coupler AQ0-8374	18.0 - 30.0 mm ID	ea	



If you need assistance selecting the appropriate In-Line Filter, please contact your Phenomenex Technical Consultant.



For Column Couplers, see p. 370

Hypercarb™ ★

Material Characteristics

Packing Material*	Particle Shape/Size* (µm)	Pore Size* (Å)	Pore Volume (mL/g)	Surface Area* (m²/g)	Carbon Load* %	Calculated Bonded Phase Coverage (µmole/m²)	End Capping*
Hypercarb	Spher. 3, 5, 7	250	0.7	120	100	n/a	—

* Specifications above taken from 2006-2007 (then) Thermo Electron Corporation catalog and 2012/2013 Thermo Scientific Chromatography Columns catalog.

Ordering Information

5 µm Columns (mm)

Part No.	Mfr. No.	Description	Size (mm)	Price
CH0-3301	35005-104630	Hypercarb	100 x 4.6	
CH0-3302	35005-103030	Hypercarb	100 x 3.0	
CH0-3303	35005-102130	Hypercarb	100 x 2.1	

7 µm Columns (mm)

Part No.	Mfr. No.	Description	Size (mm)	Price
CH0-3305	35007-104630	Hypercarb	100 x 4.6	
CH0-3309	35007-054630	Hypercarb PCB	50 x 4.6	

* Hypercarb is a trademark of Thermo Fisher Scientific. Phenomenex is not associated with Thermo Fisher Scientific.



For a complete list of applications contact your Phenomenex representative.



For additional chiral separations, see Lux columns on pp. 332-337.