

# CHIREX® CHIRAL COLUMNS



- High enantioselectivity
- Fast run times
- Rugged, long-lived columns
- Easy scale-up to preparative
- Allow direct/indirect resolution of enantiomeric amines, amino acid, 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. New 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.

## 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 $\alpha$ -amino acids, $\alpha$ -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 $\alpha$ -amino acids, $\alpha$ -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

### Chirex Chiral Stationary Phase Descriptions

Phase	Description	Structure
<b>Amide Type</b> 3001	(R)-phenylglycine and 3,5-dinitrobenzoic acid amide linkage, electron acceptor designed for the separation of: • carboxylic acids, alcohols, esters • sulphoxides	
3005	(R)-1-naphthylglycine and 3,5-dinitrobenzoic acid amide linkage, electron acceptor designed for the separation of: • carboxylic acids, alcohols, esters • non-steroidal anti-inflammatory agents	

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# CHIREX® CHIRAL COLUMNS

## Chirex Chiral Stationary Phase Descriptions (continued)

Phase Urea Type	Description	Structure
3010	(S)-valine and 3,5-dinitroaniline urea linkage, electron acceptor designed for the separation of: <ul style="list-style-type: none"> <li>• carboxylic acids, amino acid derivatives</li> <li>• hydroxy acids</li> <li>• Dabsyl and Dansyl derivatives of amino acids</li> </ul>	
3011	(S)-tert-leucine and 3,5-dinitroaniline urea linkage, electron acceptor designed for the separation of: <ul style="list-style-type: none"> <li>• carboxylic acids, amino acid derivatives</li> </ul>	
3012	(R)-phenylglycine and 3,5-dinitroaniline urea linkage, electron acceptor designed for the separation of: <ul style="list-style-type: none"> <li>• carboxylic acids, amino acid derivatives</li> </ul>	
3014	(S)-valine and (R)-1-(α-naphthyl)ethylamine urea linkage, electron donor designed for the separation of: <ul style="list-style-type: none"> <li>• π-acceptor derivatives of amines, carboxylic acids and amino acids</li> <li>• the esters and amides of these acids</li> <li>• underivatized alcohols</li> </ul>	
3018	(S)-proline and (R)-1-(α-naphthyl)ethylamine urea linkage, electron donor designed for the separation of: <ul style="list-style-type: none"> <li>• amines, alcohols and amino acids</li> <li>• underivatized β-blockers</li> <li>• aromatic amines</li> <li>• pesticides</li> </ul>	
3019	(S)-tert-leucine and (S)-1-(α-naphthyl)ethylamine urea linkage, electron donor designed for the separation of: <ul style="list-style-type: none"> <li>• esters, amino alcohols</li> <li>• underivatized β-blockers</li> <li>• aromatic amines</li> <li>• cyano alcohols</li> <li>• pesticides</li> </ul>	
3020	(S)-tert-leucine and (R)-1-(α-naphthyl)ethylamine urea linkage, electron donor designed for the separation of: <ul style="list-style-type: none"> <li>• amines, amino alcohols, alcohols</li> <li>• underivatized β-blockers</li> <li>• aromatic amines</li> <li>• cyano alcohols</li> <li>• pesticides</li> </ul>	
3022	(S)-indoline-2-carboxylic acid and (R)-1-(α-naphthyl)ethylamine urea linkage, electron donor designed for the separation of: <ul style="list-style-type: none"> <li>• amines, amino alcohols, alcohols</li> </ul>	
<b>Ligand Exchange Type</b>		
3126	(D)-penicillamine ligand exchange, electron acceptor designed for the separation of: <ul style="list-style-type: none"> <li>• α-amino acids, their derivatives</li> <li>• α-hydroxy acids, amino alcohols</li> </ul>	

# CHIREX® CHIRAL COLUMNS

HPLC


Chirex Chiral Columns

## Enhanced Column Technology

- Chemically stable
- Virtually no bleed
- Rapid mass transfer gives higher efficiency

All Chirex brand analytical columns are available in 5 µm particle size. Preparative columns and bulk media are also available in 15 and 30 µm particle sizes. Narrow particle size distributions, combined with our advanced column packing methodology, results in highly stable beds and uniformly-packed Chirex columns. Our proprietary bonding process leads to excellent chemical stability. The table below provides additional technical data.

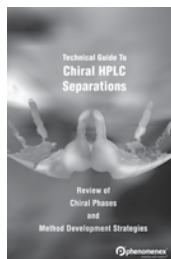
## Chirex Series Technical Data and Specifications Sheet

Chiral Type:	Pirkle or "Brush" type; Type I Classification
Particle Size:	5 µm (Analytical), 15 µm and 30 µm (Preparative)
Phase:	Derivative of optically pure amino acid or carboxylic acid
Bonding:	Covalently bonded to α-aminopropyl silica
Maximum Flow Rate:	1.5 to 2.0 mL/min on 250 x 4.6 mm ID
Maximum Pressure:	3000 psi
Typical Pressure:	700 psi @ 1.0 mL/min on 250 x 4.6 mm ID
Maximum Temp.:	50 °C
pH Range:	2.5 to 7.5
Column Hardware:	316 Stainless Steel or metal-free PEEK (on request)
Shelf Life:	Highly stable at room temperature
Solvent Systems:	Compatible with primarily normal phase systems based on Hexane. Phases 3005, 3010, 3011 and 3012 may also utilize a "reversed phase" system based on Ammonium acetate in Methanol. Only the phase 3126 Ligand exchange column is a true reversed phase column utilizing a water-based mobile phase system.
Typical Solvents:	Hexane; 1,2-Dichloroethane; Chloroform; Tetrahydrofuran; Ethyl Acetate; Isopropanol; Ethanol; Methanol
Typical Modifiers:	0.1 to 0.5 % Acids or Amines e.g., Trifluoroacetic Acid, Acetic Acid, Triethylamine, Tetraethylamine Buffers, Ammonium Acetate, Copper (II) Sulfate (Ionically Bonded Columns and phase 3126 have limitations. See column care and use note provided with column.)
Conditioning Procedure:	Care and Conditioning Guide provided with each column
	
Cleaning Procedure:	Wash thoroughly after the use of mobile phases containing acids, bases or salts (follow column care and use note provided)
Storage Conditions:	In Normal Phase: Hexane/Ethanol (99:1). In Reversed Phase: Methanol, up to 100 % (except for phase 3126, which has organic solvent limitations. See care and use note for details.)
General:	Use of a guard column is recommended for longer column life



## FREE Chiral HPLC Separations Guide

Call your Phenomenex representative.



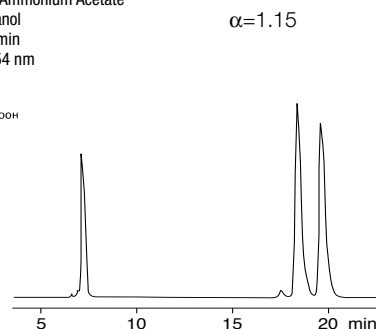
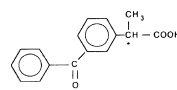
## Chiral HPLC Applications

The applications below are a partial library of the enantiomeric separations performed on Chirex columns. We can provide hundreds more! On pages 114-115, many are listed alphabetically by compound name, including column used and calculated separation factor. For information on other chiral applications or for assistance in developing and improving chiral separations, please contact us.

App ID 5245

### Ketoprofen

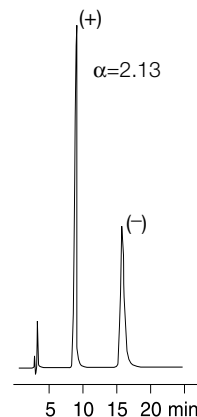
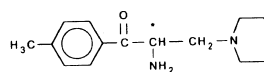
**Column:** Chirex 3005  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3005-D0  
**Mobile Phase:** 0.03 M Ammonium Acetate in Methanol  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



App ID 5250

### Tolperisone

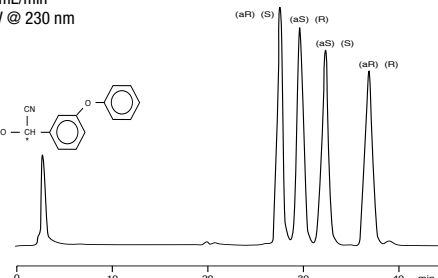
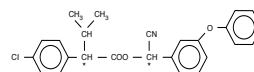
**Column:** Chirex 3018  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3018-D0  
**Mobile Phase:** Hexane/Ethanol/Trifluoroacetic Acid (83.1:16.6:0.2)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



App ID 13995

### Fenvalerate

**Column:** Chirex 3001  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3001-D0  
**Mobile Phase:** Hexane/1,2 - Dichloroethane/Ethanol (94.3:5.7:0.03)  
**Flow Rate:** 1 mL/min  
**Detector:** UV @ 230 nm

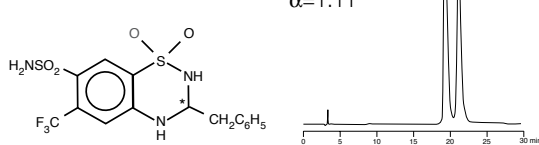


# CHIREX® CHIRAL COLUMNS

App ID 5243

## Bendroflumethazide

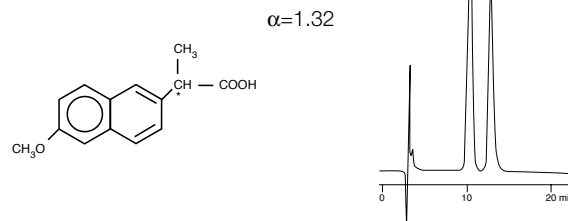
**Column:** Chirex 3001  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3001-D0  
**Mobile Phase:** Hexane/1,2-Dichloroethane/  
 Ethanol-trifluoroacetic acid  
 (55:35:10)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 272 nm



App ID 13944

## Naproxen

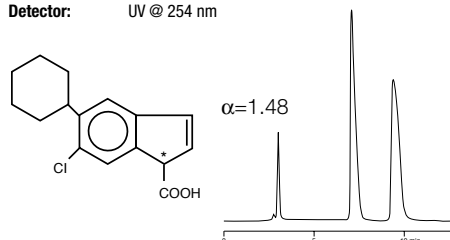
**Column:** Chirex 3005  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3005-D0  
**Mobile Phase:** 0.03 M Ammonium acetate in methanol  
**Flow Rate:** 0.8 mL/min  
**Detector:** UV @ 254 nm



App ID 13930

## Clidanac

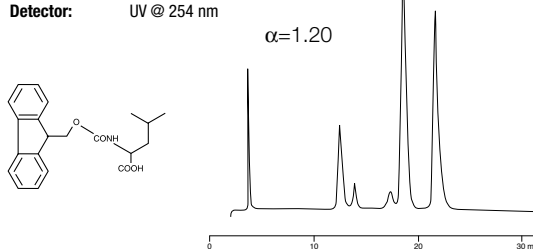
**Column:** Chirex 3010  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3010-D0  
**Mobile Phase:** 0.1 M Ammonium acetate in methanol  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



App ID 13800

## N-FMOC-leucine

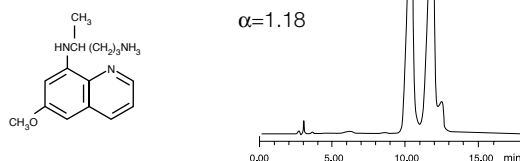
**Column:** Chirex 3011  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** 00G-3011-E0  
**Mobile Phase:** 0.01 M Ammonium acetate in methanol  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



App ID 5248

## Primaquine

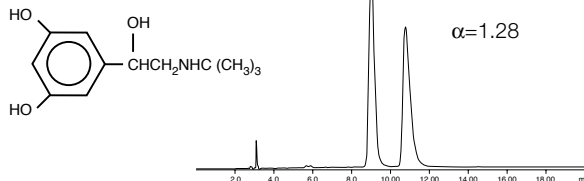
**Column:** Chirex 3014  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** 00G-3014-E0  
**Mobile Phase:** Hexane/Dichloroethane/  
 Ethanol-TFA (55:35:10),  
 w/ Ethanol-TFA (20:1)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 268 nm



App ID 13701

## Terbutaline

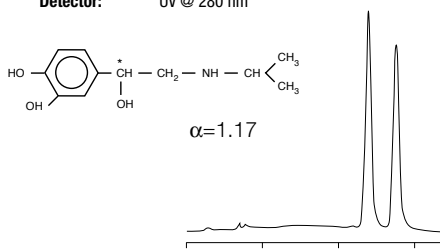
**Column:** Chirex 3020  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** 00G-3020-E0  
**Mobile Phase:** Hexane/Dichloroethane/Ethanol-TFA  
 (55:35:10), w/ethanol-TFA 20:1  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 278 nm



App ID 13817

## Isoproterenol

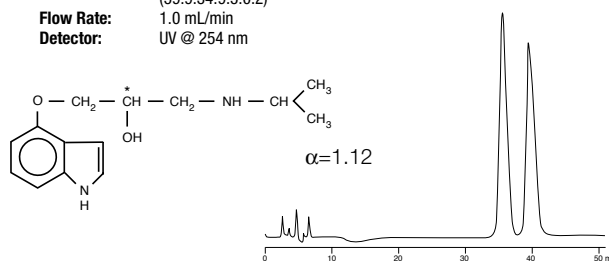
**Column:** Chirex 3022  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3022-D0  
**Mobile Phase:** Hexane/1,2-Dichloroethane/  
 Methanol/Trifluoroacetic Acid  
 (59.9:34.9:5:0.2)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 280 nm



App ID 13831

## Pindolol

**Column:** Chirex 3022  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3022-D0  
**Mobile Phase:** Hexane/1,2-Dichloroethane/  
 Ethanol/Trifluoroacetic Acid  
 (59.9:34.9:5:0.2)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



# CHIREX® CHIRAL COLUMNS

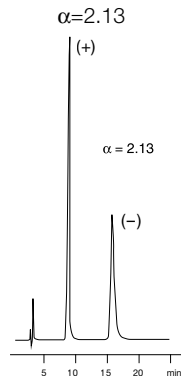
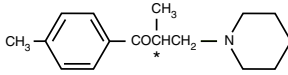
HPLC

Chirex Chiral Columns

App ID 13894

## Tolperisone

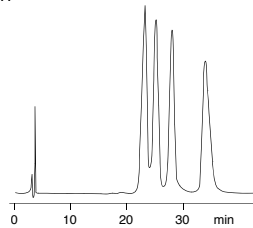
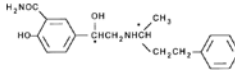
**Column:** Chirex 3018  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3018-D0  
**Mobile Phase:** Hexane/Ethanol/  
 Trifluoroacetic acid (83.1:16.6:0.2)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



App ID 5255

## Labetalol

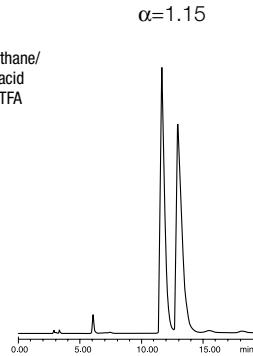
**Column:** Chirex 3020  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** 00G-3020-E0  
**Mobile Phase:** Hexane/1,2 - Dichloroethane/  
 Ethanol-trifluoroacetic acid  
 (60:35:5, with ethanol-TFA  
 premixed 20:1)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 308 nm



App ID 5256

## Brompheniramine

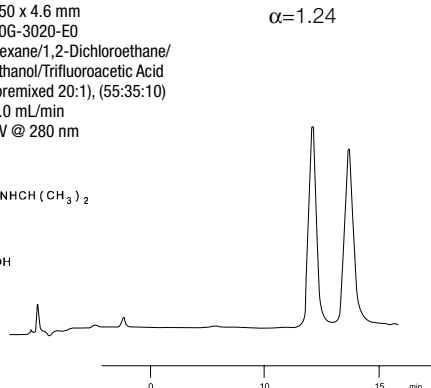
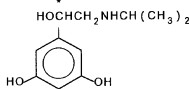
**Column:** Chirex 3020  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** 00G-3020-E0  
**Mobile Phase:** Hexane/1,2 - Dichloroethane/  
 Ethanol-trifluoroacetic acid  
 (60:35:5, with ethanol-TFA  
 premixed 20:1)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 264 nm



App ID 5257

## Metaproterenol

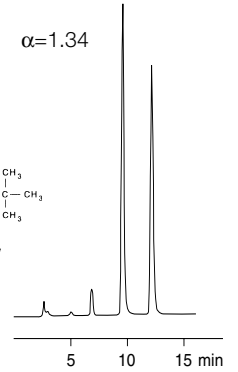
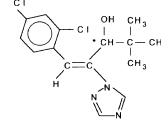
**Column:** Chirex 3020  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** 00G-3020-E0  
**Mobile Phase:** Hexane/1,2-Dichloroethane/  
 Ethanol/Trifluoroacetic Acid  
 (premixed 20:1), (55:35:10)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 280 nm



App ID 5261

## Diniconazole

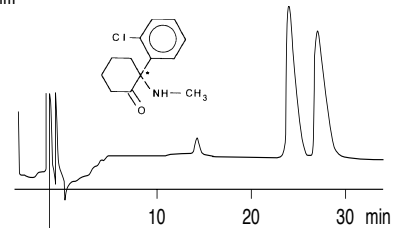
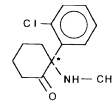
**Column:** Chirex 3020  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3020-D0  
**Mobile Phase:** Hexane/1,2-Dichloroethane/  
 Ethanol (82.6:16.5:0.8)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 254 nm



App ID 5262

## Ketamine

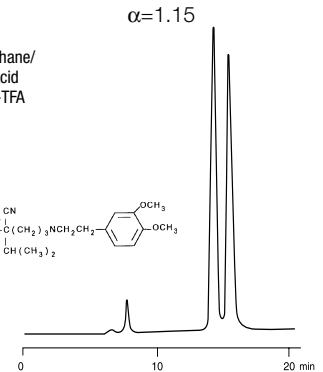
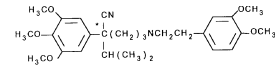
**Column:** Chirex 3022  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** 00G-3022-E0  
**Mobile Phase:** Hexane/Ethanol /  
 Trifluoroacetic acid (83.1:16.6:0.2)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 230 nm



App ID 5263

## Methoxyverapamil

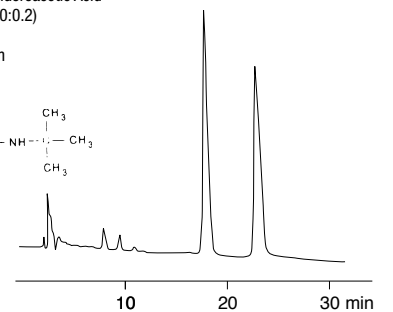
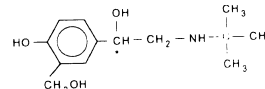
**Column:** Chirex 3022  
**Dimensions:** 250 x 4.6 mm  
**Part No.:** 00G-3022-E0  
**Mobile Phase:** Hexane/1,2 - Dichloroethane/  
 Ethanol-trifluoroacetic acid  
 (55:35:10, with ethanol-TFA  
 premixed 20:1)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 278 nm



App ID 5264

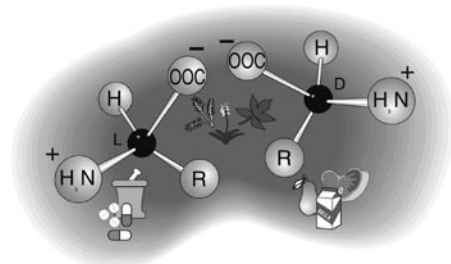
## Salbutamol (Albuterol)

**Column:** Chirex 3022  
**Dimensions:** 250 x 4.0 mm  
**Part No.:** 00G-3022-D0  
**Mobile Phase:** Hexane/1,2-Dichloroethane/  
 Methanol/Trifluoroacetic Acid  
 (59.8:34.9:5.0:0.2)  
**Flow Rate:** 1.0 mL/min  
**Detector:** UV @ 280 nm



Phenomenex

# CHIREX® CHIRAL COLUMNS



## Chiral HPLC of Amino Acids

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

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

## Separations of Amino Acid Derivatives

Compound	Chirex Phase	Separation Factor ( $\alpha$ )	App ID No.
<b>t-BOC-Derivatives (Butyloxycarbonyl)</b>			
t-BOC-Leucine	3012	1.09	14064
t-BOC-Phenylalanine	3012	1.09	13784
t-BOC-Valine	3012	1.10	14063
<b>N-FMOC Derivatives (9-Fluorenylmethyloxycarbonyl)</b>			
N-FMOC-Leucine	3011	1.20	13800
N-FMOC-Phenylalanine	3011	1.10	13796
N-FMOC-Valine	3011	1.12	13798
<b>Z-Derivatives (Benzyloxycarbonyl)</b>			
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
<b>N-Acetyl Derivatives</b>			
N-Acetylalanine	3126	1.17	14052
N-Acetylleucine	3126	1.39	14058
N-Acetylmethionine	3126	1.27	13728
N-Acetylvaline	3126	1.50	14055
<b>N-Formyl Derivatives</b>			
N-Formylvaline	3126	1.37	13721
N-Formylmethionine	3126	1.25	13722
<b>N-Benzoyl Derivatives</b>			
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
<b>N-Dansyl Derivatives (5-5-Dimethyl-aminonaphthalene-1-sulfonyl derivative)</b>			
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
<b>PTH Derivatives (Phenylthiohydantoin)</b>			
PTH-Valine	3014	1.12	13921

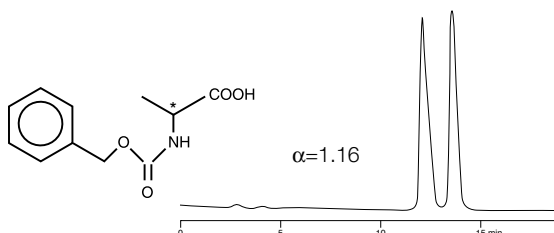
**i** Separation potential of some other amino acid derivatives:  
 (Recommended columns: Chirex 3010, 3011, 3012, 3014)  
 CBZ-Derivatives (carbobenzoxy; benzyloxycarbonyl)  
 IC-Derivatives (phenylisocyanate)  
 Dabsyl Derivatives (4-4-dimethylaminoazobenzene-4'-sulfonyl)  
 Alpha ( $\alpha$ ) = Separation Factor =  $k_2/k_1$

## Separations of Underivatized "FREE" Amino Acids

Compound	Chirex Phase	Separation Factor ( $\alpha$ )	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
$\alpha$ -Methyl Leucine	3126	1.59	14457
$\alpha$ -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

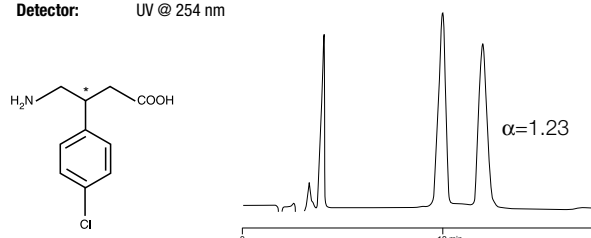
### App ID 13729 Z-Alanine

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



### App ID 13785 Baclofen

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



# CHIREX® CHIRAL COLUMNS

## Chirex Chiral HPLC Applications

This is only a partial list of applications. Many other applications are available.

Chirex Phase	Separation Factor ( $\alpha$ )	Compound	App ID No.
3020	1.05	Abscisic acid	14115
3022	1.09	Acebutolol	13584
3020	1.06	o-Acetylmandelic acid	13946
3126	1.66	Alanine	14004
3126	2.26	Alanylglycine	14080
3126	1.62	Alanylglycyl-glycine	14082
3020	1.12	Allethrolone	14129
3126	1.67	Alloisoleucine	14038
3126	1.19	Allothreonine	14046
3126	1.30	1-Aminoethylphosphonic acid	14089
3126	1.80	2-Amino-n-butyrac acid	14034
3126	1.31	2-Amino-4-phosphonobutyric acid	14087
3126	1.30	3-Amino-e-caprolactam	14070
3011	1.28	o-Anthraccene-1-carbonyl lactic acid	13960
3011	1.57	o-Anthraccene-1-carbonyl mandelic acid	13963
3011	1.55	o-Anthraccene-9-carbonyl lactic acid	13965
3126	2.15	Arginine	14027
3126	1.10	Asparagine	14049
3126	1.42	Aspartic acid	14019
3022	1.10	Atenolol	13824
3018	1.06	Atropine	13839
3126	1.23	Baclofen	13785
3001	1.11	Bendroflumethiazide	5243
3011	1.10	1-Benzocyclobutenecarboxylic acid	13967
3022	1.07	Benzoin	13978
3014	1.22	Bepridil	13593
3010	1.56	1,1'-Bi-2-naphthol	14143
3010	2.66	1,1'-Binaphthyl-2,2'- diylhydrogen phosphate	14152
3012	1.09	t-BOC-leucine	14065
3012	1.09	t-BOC-phenylalanine	13784
3012	1.10	t-BOC-valine	14063
3126	1.36	p-Boronophenylalanine	13790
3005	1.11	$\alpha$ -Bromophenylacetic acid	13969
3126	1.05	2-Bromopropionic acid	14116
3020	1.15	Brompheniramine	5256
3018	1.19	Carbinoxamine	13905
3010	1.06	2-(4-Chlorophenyl)-3-methylbutyric acid	13934
3020	1.21	Chloroquine	13604
3014	1.24	Chlorpheniramine	13889
3020	1.08	Chlorthalidone	13608
3010	—	Chrysanthemic acid	5246
3022	1.27	Clenbuterol	13615
3010	1.48	Clidanac	13930
3014	1.09	Cyclopentolate	13840
3019	—	Cypermethrin	5252
3020	—	Cypermethrin	5252
3126	2.47	Cystine	14085
3126	2.77	2,6-Diaminopimelic acid	14066
3022	1.23	Dichloroisoproterenol	13621
3010	—	3-(2,2-Dichlorovinyl)-2,2-dimethyl-cyclopropanecarboxylic acid	14095
3005	1.09	cis-3-(2,2-Dichlorovinyl)-2,2-dimethyl-cyclopropanecarboxylic acid	
3005	1.10	trans-3-(2,2-Dichlorovinyl)-2,2-dimethyl-cyclopropanecarboxylic acid	
3019	1.06	2,3-Dihydroflavone	
3011	1.07	3,4-Dihydro-2H-pyran-2-carboxylic acid	14114
3126	1.09	3,4-Dihydro-2H-pyran-2-carboxylic acid	14113
3020	1.34	Diniconazole	5261
3010	1.79	o-(3,5-Dinitrophenyl) aminocarbonyl lactic acid	13791
3011	1.77	o-(3,5-Dinitrophenyl) aminocarbonyl lactic acid	13792
3010	1.36	o-(3,5-Dinitrophenyl) aminocarbonyl mandelic acid	13794

Chirex Phase	Separation Factor ( $\alpha$ )	Compound	App ID No.
3011	1.35	o-(3,5-Dinitrophenyl) aminocarbonyl mandelic acid	13795
3014	1.20	Diperodon	5249
3020	1.06	1,2-Diphenylethylamine	13882
3126	1.09	1,2-Diphenylethylene diamine	13916
3126	1.15	dl-Threo-3-phenylserine	13787
3126	1.22	DOPA [3-(3,4-Dihydroxyphenyl) alanine]	13750
3020	1.07	Doxylamine	13627
3022	1.10	Epinephrine	5260
3020	1.25	o-Ethyl o-2,4-dichlorophenyl-isopropylphosphoramidothioate	5258
3022	1.11	Etilefrine hydrochloride	13867
3005	1.10	Fenoprofen	13923
3022	1.12	Fenoterol	13848
3019	1.15	Fenpropathrin	13988
3001	—	Fenvalerate	13995
3019	1.06	Flavanone (2,3-Dihydroflavone)	14002
3014	1.09	Floctafenine	13874
3005	1.09	Flurbiprofen	13925
3001	—	Furamethrin	13998
3126	1.11	Glutamic acid	14047
3126	1.71	Glutamine	14022
3126	1.78	Glycylalanine	14079
3126	1.69	Glycylvaline	14081
3020	1.08	Hexobarbital	14051
3126	1.32	Histidine	13745
3022	1.08	Homochlorcyclizine	13909
3126	1.14	Homocysteine thiolactone	14072
3126	1.61	2-Hydroxybutyric acid	14098
3126	1.53	2-Hydroxyhexanoic acid	14108
3126	1.43	p-Hydroxynorephedrine	13862
3020	1.11	Hydroxy-phenyl-5-phenyl-hydantoin	13635
3005	1.05	Ibuprofen	13928
3022	1.08	Indapamide	13638
3005	1.08	Indoprofen	13639
3020	1.21	Isoetharine	13640
3022	1.17	Isoproterenol	5259
3020	1.37	Isosuprine	13646
3022	1.12	Ketamine	5262
3005	1.15	Ketoprofen	5245
3020	—	Labetalol	5255
3126	1.32	Lactic acid	14094
3126	1.56	Leucine	14009
3126	1.36	Leucylglycyl-glycine	14083
3010	1.11	Lorazepam	
3126	1.83	Lysine	14018
3126	3.60	Malic acid	14099
3126	1.24	Mandelic acid	14942
3022	1.12	Metanephrine	13651
3020	1.24	Metaproterenol	5257
3022	1.13	Metaproterenol	13873
3005	1.11	$\alpha$ -Methamphetamine-3,3-dinitrobenzoyl amide	
3005	1.19	$\alpha$ -Methamphetamine-2-naphthyl amide	
3005	1.03	$\alpha$ -Methamphetamine-2-naphthyl amide	
3005	1.16	$\alpha$ -Methamphetamine-1-naphthyl uride	
3126	1.42	Methionine	14024
3020	1.09	Methocarbamol	13655
3022	1.10	Methoxamine	13657
3005	1.15	$\alpha$ -Methoxyphenylacetic acid	13947
3022	1.15	Methoxyverapamil (Gallopamil)	5263
3005	1.27	$\alpha$ -Methylbenzylamine-2-naphthyl amide	
3005	1.24	$\alpha$ -Methylbenzylamine-3,5-dinitrophenyl uride	
3005	1.30	$\alpha$ -Methylbenzylamine-1-naphthyl uride	
3126	1.59	$\alpha$ -Methyl leucine	

Continued on next page



A dash ("—") under separation factor indicates the compound has more than one chiral center. Separation involves more than one enantiomeric pair.



# CHIREX® CHIRAL COLUMNS

## Chirex Chiral HPLC Applications (cont'd)

This is only a partial list of applications. Many other applications are available.

Chirex Phase	Separation Factor ( $\alpha$ )	Compound	App ID No.	Chirex Phase	Separation Factor ( $\alpha$ )	Compound	App ID No.
3001	1.06	Methylmandelate	13984	3022	1.11	Propranolol	13813
3020	1.10	2-Methyl-4-oxo-3-(2-propynyl)-cyclopent-2-enyl alcohol	14134	3011	1.52	o-Pyrene-1-carbonyl lactic acid	13952
3126	1.18	$\alpha$ -Methyltryptophan		3011	1.97	o-Pyrene-1-carbonyl mandelic acid	13955
3014	1.06	Metoprolol	13663	3011	1.72	o-Pyrene-1-carbonyl 2-hydroxybutyric acid	13958
3001	1.09	Midodrine	13664	3011	1.55	o-Pyrene-1-carbonyl leucic acid	13959
3126	1.17	N-Acetylalanine	14052	3014	1.12	PTH-valine	13733
3126	1.39	N-Acetylleucine	14058	3022	1.33	Quinacrine	13695
3126	1.27	N-Acetylmethionine	13728	3001	—	Resmethrin	13994
3020	1.37	N-Acetylphenylalanine	13804	3022	1.33	Salbutamol (Albuterol)	5264
3126	1.50	N-Acetylvaline	14055	3126	1.17	Serine	14016
3020	1.16	1-(1-Naphthyl)ethylamine	13878	3022	1.10	Synephrine	13700
3126	1.42	Naphthylglycine	13789	3126	1.19	Synephrine	13871
3012	1.09	Naproxen	13945	3126	6.44	Tartaric acid	14100
3012	1.14	N-Benzoylglutamic acid	13782	3019	1.18	Terallethrin	14123
3012	1.11	N-Benzoylleucine		3020	1.16	Terbutaline	13852
3012	1.17	N-Benzoylphenylalanine	13730	3126	1.81	tert-Leucine	14074
3012	1.13	N-Benzoylphenylglycine		3126	1.06	Tetrahydro-2-furancarboxylic acid	14110
3012	1.19	N-Benzoylvaline	13778	3001	—	Tetramethrin	13852
3011	1.24	N-Dansylnorvaline	13732	3022	1.10	Thioridazine	13711
3011	1.27	N-Dansylphenylalanine	13771	3126	1.20	Threonine	14043
3012	1.18	N-Dansylthreonine	13734	3018	2.13	Tolperisone	13894
3010	1.16	N-Dansyltryptophan	13774	3126	1.10	trans-1,2-Diaminocyclohexane	14067
3011	1.28	N-Dansylvaline	13763	3001	1.41	2,2,2-Trifluoro-1-(9-anthryl)ethanol	13973
3126	1.25	N-Dansylmethionine		3020	1.11	Trimepramine	
3018	1.14	Nefopam	5254	3020	1.17	Trimeprazine	
3011	1.19	N-FMOC-Alanine		3022	1.10	Tropicamide	13715
3011	1.20	N-FMOC-Leucine	13800	3126	1.11	Tryptophan	13737
3011	1.10	N-FMOC-Phenylalanine	13796	3126	1.34	Tyrosine	13743
3011	1.12	N-FMOC-Valine	13798	3020	1.29	Uniconazole	5242
3126	1.25	N-Formylmethionine	13722	3126	1.91	Valine	14006
3020	1.12	N-Formylphenylalanine	13802	3022	1.15	Verapamil	13910
3126	1.37	N-Formylvaline	13721	3022	1.03	Warfarin	13720
3018	1.05	Nicardipine	13904	3012	1.16	Z-Alanine	13752
3014	1.10	Nicotine	13673	3010	1.12	Z-Asparagine	13759
3126	1.23	Normetanephrine	14160	3011	1.17	Z-Leucine	13731
3126	1.95	Norvaline	14029	3011	1.13	Z-Norvaline	13755
3126	1.28	Octopamine	13857	3012	1.08	Z-Phenylalanine	13761
3126	1.38	Ornithine	14041	3011	1.09	Z-Serine	13758
3014	1.08	Oxprenolol	13826	3012	1.07	Z-Valine	13754
3126	1.63	Pantoic acid	14117				
3014	1.11	Pantolactone	14118				
3012	1.13	2-Phenylbutyric acid	13949				
3126	1.26	3-Phenylactic acid	13943				
3001	—	Phenothrin	13992				
3010	1.08	2-Phenoxypropionic acid	13939				
3126	1.26	Phenylalanine	13740				
3001	1.12	2-Phenylbutyrophenone	13999				
3001	1.14	2-Phenylcyclohexanone	13986				
3005	1.08	trans-2-Phenyl-1-cyclopropanecarboxylic acid					
3014	1.08	1-Phenylethylamine	13875				
3126	1.78	Phenylglycine	13748				
3126	1.26	3-Phenylactic acid					
3001	1.05	2-Phenylpropionic acid	13933				
3014	1.06	1-Phenyl-2-(p-tolyl)ethylamine	13888				
3022	1.12	Pindolol	13831				
3126	1.80	Pipecolic acid	14031				
3019	—	Prallethrin	14127				
3005	1.13	Pranoprofen	5244				
3020	1.17	Prilocaine	13680				
3014	1.18	Primaquine	5248				
3005	1.45	Proglumide	13685				
3126	2.50	Proline	14011				
3020	1.12	Promethazine	13688				



A dash ("—") under separation factor indicates the compound has more than one chiral center. Separation involves more than one enantiomeric pair.



# CHIREX<sup>®</sup> CHIRAL COLUMNS

## 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
3019	(S)-LEU and (S)-NEA	Covalent	Urea	00B-3019-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.



See p. 88 for Chiral Column Performance Check Standards.



See p. 90 for Chiral Method Development Kits.



See p. 345 for HPLC Column Chiller/Heater System (8-70 °C).

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	—	—	00F-3010-E0	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-B0	—	00G-3014-E0	03A-3014-E0
3018	(S)-PRO and (R)-NEA	Covalent	Urea	—	—	00F-3018-E0	00G-3018-E0	03A-3018-E0
3019	(S)-LEU and (S)-NEA	Covalent	Urea	—	—	00F-3019-E0	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-B0	00G-3022-B0	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

## COLUMBUS™

- For new methods, we recommend Gemini HPLC columns p. 126

### Material Characteristics

Packing Material	Particle Shape/size (µm)	Pore size (Å)	Surface Area (m <sup>2</sup> /g)	Carbon Load (%)	End Capping
Columbus C8	Spher. 5	110	375	13	Double
Columbus C18	Spher. 5	110	375	19	Double

## ORDERING INFORMATION

SecurityGuard™ Analytical Cartridges require universal holder Part No.: KJO-4282

5 µm Microbore and LC/MS Columns (mm)					SecurityGuard™ Cartridges
Phases	30 x 2.0	50 x 2.0	100 x 2.0	150 x 2.0	4 x 2.0 mm /10pk
C8	00A-4187-B0	00B-4187-B0	00D-4187-B0	—	AJO-4289
C18	00A-4108-B0	00B-4108-B0	00D-4108-B0	00F-4108-B0	AJO-4286 for ID: 2.0 – 3.0 mm

5 µm Solvent Saving Columns (mm)					SecurityGuard™ Cartridges
Phases	50 x 3.2	100 x 3.2	150 x 3.2	250 x 3.2	4 x 3.0 mm /10pk
C18	00B-4108-R0	00D-4108-R0	00F-4108-R0	00G-4108-R0	AJO-4287 for ID: 3.2 – 8.0 mm

5 µm Analytical Columns (mm)						SecurityGuard™ Cartridges
Phases	30 x 4.6	50 x 4.6	100 x 4.6	150 x 4.6	250 x 4.6	4 x 3.0 mm /10pk
C8	—	—	00D-4187-E0	00F-4187-E0	00G-4187-E0	AJO-4290
C18	00A-4108-E0	00B-4108-E0	00D-4108-E0	00F-4108-E0	00G-4108-E0	AJO-4287 for ID: 3.2 – 8.0 mm