



CLIEPUS™

CLIEPUS - A “Small Shield” for a Big Job

Phases	C8, C18, Cyano, Phenyl
Particle Sizes	4.5µm
Pore Size	120Å
Pore Volume	0.8mL/gm
Surface Area	330m ² /gm
%Carbon	C18 = 18% (w/w)
Phase type	Extremely well end-capped monofunctional phases
Silica Class	Type B
Hardware	Stainless steel and PEEK columns and cartridges:

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Applications The high purity base silica and thoroughly end capped bonded phases insure that CLIEPUS columns and cartridges will perform well in demanding situations where many other column brands fail. Even polar compounds elute as sharp and symmetrical peaks permitting surprisingly short columns to be used for high speed analysis. In addition to C8 and C18 phases, CLIEPUS columns are available with phenyl or cyano functionality.

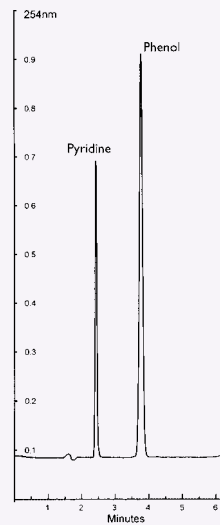
CLIEPUS - A Small Shield

Virgil’s Aeneid gave us a sanguine account of the problems encountered when working without a *Cliepus* – a small shield popularized by the Romans. While arguably a less painful experience, chromatographers 2,000 years later still struggle when they work with inadequately shielded HPLC columns that are the by product of flawed end-capping technology.

Higgins Analytical places a great deal of emphasis on effective silanol end-capping techniques. The bulky size and secondary chemical functionality of the end-capping moiety on *TARGA (a large shield)* HPLC columns and cartridges make them popular choices for researchers developing powerful LC/MS techniques or chromatographers doing routine analysis of difficult polar compounds.

Our CLIEPUS columns are based on the same ultra-pure, Type B silica gel we use for our *TARGA* products, but the end capping is done with the more traditional methodology employing TMS, a small molecule; hence CLIEPUS - “a small shield.” CLIEPUS columns have Higgins Analytical’s characteristically high lot-to-lot reproducibility because our carefully controlled reaction of monofunctional silanes can be driven to completion in a reproducible manner.

This unbuffered Pyridine and Phenol chromatogram illustrates the absence of any undesirable solute/silanol interaction on a CLIEPUS C18 HPLC Column.

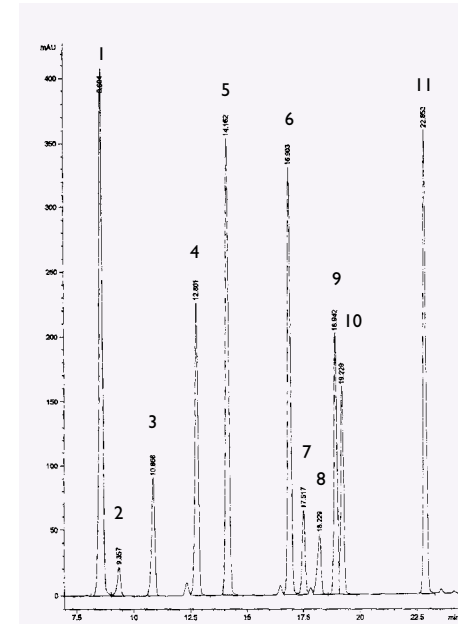


CLIEPUS C18 5µm 150x4.6mm
40% MeOH/water (unbuffered)
1mL/min, 25°C, 254nm
P/N CS-1546-C185

CLIEPUS Offers a Wide Range of Hydrophobicity

The highly pure silica backbone and the thorough end-capping process that are characteristics of CLIEPUS HPLC columns enable a wide choice of column selectivity without compromising chromatographic performance. Not only do the columns with relatively small cyano and phenyl functional groups perform as efficiently as do the longer chain C8 and C18 versions of CLIEPUS, they also produce symmetrical peaks for acidic and basic analytes. This is usually not the case for these types of columns from most HPLC column manufacturers.

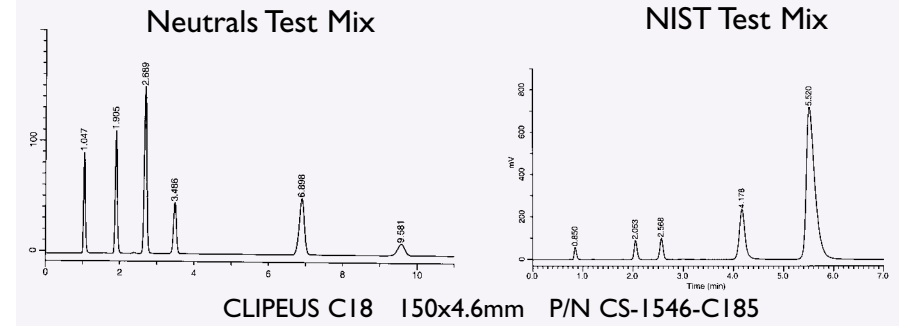
The four CLIEPUS chemistry offerings and the wide variety of column and cartridge formats, with internal diameters ranging more than two orders of magnitude, present a powerful selection to a chromatographer desiring to optimize a difficult separation or to maximize the speed of a high throughput application.



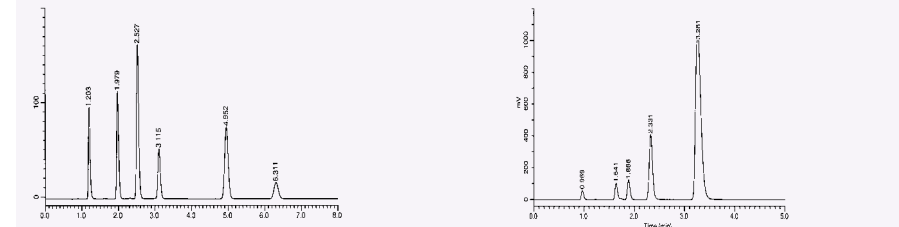
Carbamates and Urea Pesticides
EPA 632A
Industrial and Municipal Waste Water
Column P/N CS-2546-C185

- | | |
|-----------------|----------------|
| 1. Monuron | 2. Propoxur |
| 3. Carbaryl | 4. Protham |
| 5. Diuron | 6. Linuron |
| 7. Methiocarb | 8. Mexacarbate |
| 9. Chlorpropham | |
| 10. Barban | 11. Neburon |

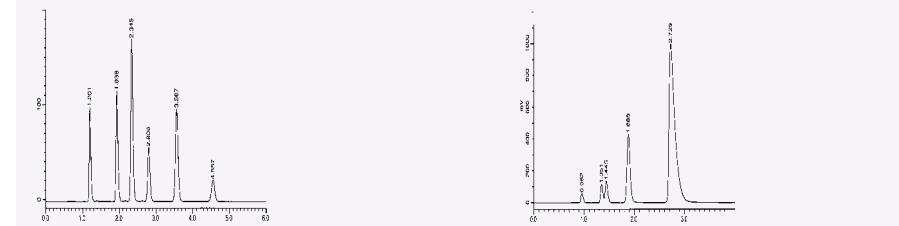
Comparative Selectivity of CLIEPUS HPLC Columns



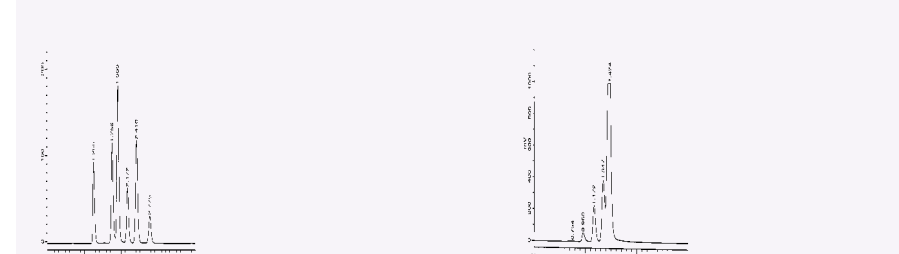
CLIEPUS C18 150x4.6mm P/N CS-1546-C185



CLIEPUS C8 150x4.6mm P/N CS-1546-C085



CLIEPUS Phenyl 150x4.6mm P/N CS-1546-PHN5



CLIEPUS Cyano 150x4.6mm P/N CS-1546-CNP5

- | | |
|----------------------------------|---|
| 50% MeCN/water, 1.5mL/min, 205nm | 80% MeOH/Buffer, 1.5mL/min, 254nm
Buffer: 20mM potassium phosphate |
| 1. Thiourea | 1. Uracil |
| 2. Phenol | 2. Toluene |
| 3. Acetophenone | 3. Ethylbenzene |
| 4. Nitrobenzene | 4. Quinizarin |
| 5. Toluene | 5. Amitriptyline |
| 6. Napthalene | |

No Metal Activity nor Residual Silanols

The data in the chromatograms above clearly illustrate our purity and endcapping claims for the CLIEPUS family of HPLC columns. Quinizarin, a strong

metal chelator, and amitriptyline, a very sensitive solute for residual silanols, both elute as very symmetrical peaks on all four column types making CLIEPUS a reliable choice for even difficult analytes.



Capillary Columns

CLIEPUS C8 5µm 30x0.15mm CC-0315-C085	150µm I.D. 50x0.15mm CC-0515-C085	100x0.15mm CC-1015-C085
CLIEPUS C18 5µm 30x0.15mm CC-0315-C185	150µm I.D. 50x0.15mm CC-0515-C185	100x0.15mm CC-1015-C185
CLIEPUS Cyano 5µm 30x0.15mm CC-0315-CNP5	150µm I.D. 50x0.15mm CC-0515-CNP5	100x0.15mm CC-1015-CNP5
CLIEPUS Phenyl 5µm 30x0.15mm CC-0315-PHN5	150µm I.D. 50x0.15mm CC-0515-PHN5	100x0.15mm CC-1015-PHN5

Microbore Columns

CLIEPUS C8 5µm 30x1.0mm CS-0301-C085	1.0mm - 0.5mm - 0.3mm I.D. 50x1.0mm CS-0501-C085	100x1.0mm CS-1001-C085	150x1.0mm CS-1501-C085	250x1.0mm CS-2501-C085
30x0.5mm CS-03M5-C085	50x0.5mm CS-05M5-C085	100x0.5mm CS-10M5-C085	150x0.5mm CS-15M5-C085	
30x0.3mm CS-03M3-C085	50x0.3mm CS-05M3-C085	100x0.3mm CS-10M3-C085		
CLIEPUS C18 5µm 30x1.0mm CS-0301-C185	1.0mm - 0.5mm - 0.3mm I.D. 50x1.0mm CS-0501-C185	100x1.0mm CS-1001-C185	150x1.0mm CS-1501-C185	250x1.0mm CS-2501-C185
30x0.5mm CS-03M5-C185	50x0.5mm CS-05M5-C185	100x0.5mm CS-10M5-C185	150x0.5mm CS-15M5-C185	\$350
30x0.3mm CS-03M3-C185	50x0.3mm CS-05M3-C185	100x0.3mm CS-10M3-C185		
CLIEPUS Cyano 5µm 30x1.0mm CS-0301-CNP5	1.0mm - 0.5mm - 0.3mm I.D. 50x1.0mm CS-0501-CNP5	100x1.0mm CS-1001-CNP5	150x1.0mm CS-1501-CNP5	250x1.0mm CS-2501-CNP5
30x0.5mm CS-03M5-CNP5	50x0.5mm CS-05M5-CNP5	100x0.5mm CS-10M5-CNP5	150x0.5mm CS-15M5-CNP5	
30x0.3mm CS-03M3-CNP5	50x0.3mm CS-05M3-CNP5	100x0.3mm CS-10M3-CNP5		
CLIEPUS Phenyl 5µm 30x1.0mm CS-0301-PHN5	1.0mm - 0.5mm - 0.3mm I.D. 50x1.0mm CS-0501-PHN5	100x1.0mm CS-1001-PHN5	150x1.0mm CS-1501-PHN5	250x1.0mm CS-2501-PHN5
30x0.5mm CS-03M5-PHN5	50x0.5mm CS-05M5-PHN5	100x0.5mm CS-10M5-PHN5	150x0.5mm CS-15M5-PHN5	
30x0.3mm CS-03M3-PHN5	50x0.3mm CS-05M3-PHN5	100x0.3mm CS-10M3-PHN5		

Analytical Columns - Stainless Steel

CLIEPUS C8 5µm 30x4.6mm CS-0346-C085	4.6, 3.0, and 2.1mm I.D. s.s. columns 50x4.6mm CS-0546-C085	100x4.6mm CS-1046-C085	150x4.6mm CS-1546-C085	250x4.6mm CS-2546-C085
30x3.0mm CS-0330-C085	50x3.0mm CS-0530-C085	100x3.0mm CS-1030-C085	150x3.0mm CS-1530-C085	250x3.0mm CS-2530-C085
30x2.1mm CS-0321-C085	50x2.1mm CS-0521-C085	100x2.1mm CS-1021-C085	150x2.1mm CS-1521-C085	250x2.1mm CS-2521-C085
CLIEPUS C18 10µm 30x4.6mm CS-0346-C181	4.6mm I.D. s.s. columns 50x4.6mm CS-0546-C181	100x4.6mm CS-1046-C181	150x4.6mm CS-1546-C181	250x4.6mm CS-2546-C181
CLIEPUS C18 5µm 30x4.6mm CS-0346-C185	4.6, 3.0, and 2.1mm I.D. s.s. columns 50x4.6mm CS-0546-C185	100x4.6mm CS-1046-C185	150x4.6mm CS-1546-C185	250x4.6mm CS-2546-C185
30x3.0mm CS-0330-C185	50x3.0mm CS-0530-C185	100x3.0mm CS-1030-C185	150x3.0mm CS-1530-C185	250x3.0mm CS-2530-C185
30x2.1mm CS-0321-C185	50x2.1mm CS-0521-C185	100x2.1mm CS-1021-C185	150x2.1mm CS-1521-C185	250x2.1mm CS-2521-C185
CLIEPUS Cyano 5µm 30x4.6mm CS-0346-CNP5	4.6, 3.0, and 2.1mm I.D. s.s. columns 50x4.6mm CS-0546-CNP5	100x4.6mm CS-1046-CNP5	150x4.6mm CS-1546-CNP5	250x4.6mm CS-2546-CNP5
30x3.0mm CS-0330-CNP5	50x3.0mm CS-0530-CNP5	100x3.0mm CS-1030-CNP5	150x3.0mm CS-1530-CNP5	250x3.0mm CS-2530-CNP5
30x2.1mm CS-0321-CNP5	50x2.1mm CS-0521-CNP5	100x2.1mm CS-1021-CNP5	150x2.1mm CS-1521-CNP5	250x2.1mm CS-2521-CNP5
CLIEPUS Phenyl 5µm 30x4.6mm CS-0346-PHN5	4.6, 3.0, and 2.1mm I.D. s.s. columns 50x4.6mm CS-0546-PHN5	100x4.6mm CS-1046-PHN5	150x4.6mm CS-1546-PHN5	250x4.6mm CS-2546-PHN5
30x3.0mm CS-0330-PHN5	50x3.0mm CS-0530-PHN5	100x3.0mm CS-1030-PHN5	150x3.0mm CS-1530-PHN5	250x3.0mm CS-2530-PHN5
30x2.1mm CS-0321-PHN5	50x2.1mm CS-0521-PHN5	100x2.1mm CS-1021-PHN5	150x2.1mm CS-1521-PHN5	250x2.1mm CS-2521-PHN5

Semi-Prep and Prep Columns

CLIEPUS C8 5µm 50x10mm CS-0510-C085	10 and 20mm I.D. s.s. columns 100x10mm CS-1010-C085	150x10mm CS-1510-C085	250x10mm CS-2510-C085
50x20mm CS-0520-C085	100x20mm CS-1020-C085	150x20mm CS-1520-C085	250x20mm CS-2520-C085
CLIEPUS C18 10µm 50x10mm CS-0510-C181	10 and 20mm I.D. s.s. columns 100x10mm CS-1010-C181	150x10mm CS-1510-C181	250x10mm CS-2510-C181
50x20mm CS-0520-C181	100x20mm CS-1020-C181	150x20mm CS-1520-C181	250x20mm CS-2520-C181
CLIEPUS C18 5µm 50x10mm CS-0510-C185	10 and 20mm I.D. s.s. columns 100x10mm CS-1010-C185	150x10mm CS-1510-C185	250x10mm CS-2510-C185
50x20mm CS-0520-C185	100x20mm CS-1020-C185	150x20mm CS-1520-C185	250x20mm CS-2520-C185



HAICART - Stainless Steel Analytical Cartridge Columns

CLIQUEUS C8 5µm	4.6 and 3.2mm I.D. s.s. Analytical Cartridges
40x4.6mm 2/pkg	50x4.6mm 2/pkg 100x4.6mm 1/pkg
CF-0446-C085	CF-0546-C085 CF-1046-C085
40x3.2mm 2/pkg	50x3.2mm 2/pkg 100x3.2mm 1/pkg
CF-0432-C085	CF-0532-C085 CF-1032-C085



CLIQUEUS C18 5µm	4.6 and 3.2mm I.D. s.s. Analytical Cartridges
40x4.6mm 2/pkg	50x4.6mm 2/pkg 100x4.6mm 1/pkg
CF-0446-C185	CF-0546-C185 CF-1046-C185
40x3.2mm 2/pkg	50x3.2mm 2/pkg 100x3.2mm 1/pkg
CF-0432-C185	CF-0532-C185 CF-1032-C185

CLIQUEUS Cyano 5µm	4.6 and 3.2mm I.D. s.s. Analytical Cartridges
40x4.6mm 2/pkg	50x4.6mm 2/pkg 100x4.6mm 1/pkg
CF-0446-CNP5	CF-0546-CNP5 CF-1046-CNP5
40x3.2mm 2/pkg	50x3.2mm 2/pkg 100x3.2mm 1/pkg
CF-0432-CNP5	CF-0532-CNP5 CF-1032-CNP5

CLIQUEUS Phenyl 5µm	4.6 and 3.2mm I.D. s.s. Analytical Cartridges
40x4.6mm 2/pkg	50x4.6mm 2/pkg 100x4.6mm 1/pkg
CF-0446-PHN5	CF-0546-PHN5 \$300 CF-1046-PHN5 \$295
40x3.2mm 2/pkg	50x3.2mm 2/pkg 100x3.2mm 1/pkg
CF-0432-PHN5	CF-0532-PHN5 CF-1032-PHN5

HAIPEEK - PEEK Analytical Cartridge Columns

CLIQUEUS C8 5µm	2.1mm I.D. PEEK Analytical Cartridges
40x2.1mm 2/pkg	50x2.1mm 2/pkg
CK-0421-C085	CK-0521-C085

CLIQUEUS C18 5µm	2.1mm I.D. PEEK Analytical Cartridges
40x2.1mm 2/pkg	50x2.1mm 2/pkg
CK-0421-C185	CK-0521-C185

CLIQUEUS Cyano 5µm	2.1mm I.D. PEEK Analytical Cartridges
40x2.1mm 2/pkg	50x2.1mm 2/pkg
CK-0421-CNP5	CK-0521-CNP5

CLIQUEUS Phenyl 5µm	2.1mm I.D. PEEK Analytical Cartridges
40x2.1mm 2/pkg	50x2.1mm 2/pkg
CK-0421-PHN5	CK-0521-PHN5



HAI Speed10 - 10mm I.D. Stainless Steel Cartridge Columns

CLIQUEUS C8 5µm	10mm I.D. s.s. Analytical / Semi-Prep Cartridges
30x10mm 1/pkg	50x10mm 1/pkg 100x10mm 1/pkg
CF-0310-C085	CF-0510-C085 CF-1010-C085 \$370

CLIQUEUS C18 10µm	10mm I.D. s.s. Analytical / Semi-Prep Cartridges
30x10mm 1/pkg	50x10mm 1/pkg 100x10mm 1/pkg
CF-0310-C181	CF-0510-C181 CF-1010-C181 \$250

CLIQUEUS C18 5µm	10mm I.D. s.s. Analytical / Semi-Prep Cartridges
30x10mm 1/pkg	50x10mm 1/pkg 100x10mm 1/pkg
CF-0310-C185	CF-0510-C185 CF-1010-C185 \$370

CLIQUEUS Cyano 5µm	10mm I.D. s.s. Analytical / Semi-Prep Cartridges
30x10mm 1/pkg	50x10mm 1/pkg 100x10mm 1/pkg
CF-0310-CNP5	CF-0510-CNP5 CF-1010-CNP5 \$385

CLIQUEUS Phenyl 5µm	10mm I.D. s.s. Analytical / Semi-Prep Cartridges
30x10mm 1/pkg	50x10mm 1/pkg 100x10mm 1/pkg
CF-0310-PHN5	CF-0510-PHN5 CF-1010-PHN5 \$385



HAI Speed20 - 20mm I.D. Prep Guard Cartridges

CLIQUEUS C18 10µm	20mm I.D. s.s. Prep Guard Cartridges
25x20mm 2/pkg	CF-0220-C181



HAICART GUARDS - Stainless Steel Guard Cartridges

CLIQUEUS C8 5µm	3.2mm I.D. s.s. Guard Cartridges
20x3.2mm 5/pkg	C108

CLIQUEUS C18 5µm	3.2mm I.D. s.s. Guard Cartridges
20x3.2mm 5/pkg	C118

CLIQUEUS Cyano 5µm	3.2mm I.D. s.s. Guard Cartridges
20x3.2mm 5/pkg	C1CN

CLIQUEUS Phenyl 5µm	3.2mm I.D. s.s. Guard Cartridges
20x3.2mm 5/pkg	C1PH



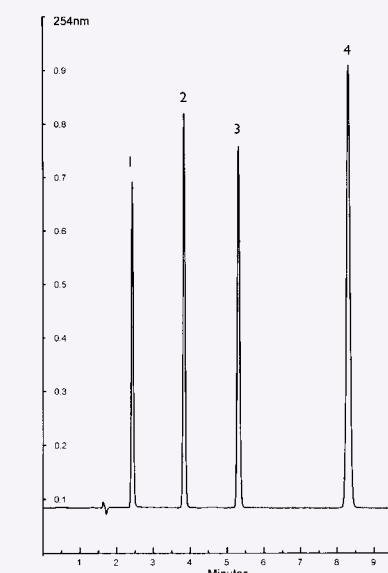
HAIPEEK GUARDS - PEEK Guard Cartridges

CLIQUEUS C8 5µm	2.1mm I.D. PEEK Guard Cartridges
20x2.1mm 5/pkg	CK-0221-C085

CLIQUEUS C18 5µm	2.1mm I.D. PEEK Guard Cartridges
20x2.1mm 5/pkg	CK-0221-C185

CLIQUEUS Cyano 5µm	2.1mm I.D. PEEK Guard Cartridges
20x2.1mm 5/pkg	CK-0221-CNP5

CLIQUEUS Phenyl 5µm	2.1mm I.D. PEEK Guard Cartridges
20x2.1mm 5/pkg	CK-0221-PHN5



Methylxanthines

1. Theobromine 2. Theophylline
3. Caffeine 4. Phenol
CLIQUEUS C18 150x4.6mm
P/N CS-1546-C185
25% MeOH/water (unbuffered)
1mL/min, 30°C, 254nm

We Violate the 80:20 Rule

This catalog contains hundreds of parts and it would probably be no surprise to you if we pointed out that only about 20% of them are manufactured 80% of the time. But what you would not know is that another 20% of the products we manufacture are not even listed in this catalog!

We stock tubing with a wide variety of internal diameters, and since we machine the columns and cartridges ourselves, custom length and I.D. columns are almost as easy for us to provide as are the standard sizes listed in this catalog. Since our part numbering system has an easy to understand pattern, customers routinely compose and order custom configurations.

Easy to Understand Part Numbers

Except for HAICART Guard Cartridges, all Higgins Analytical HPLC column product part numbers are based on a 2-4-4 character pattern. While we will not manufacture every combination and permutation devisable with this scheme, this page will serve as a guide to assist you in defining a product that you believe would better address your needs than one of the hundreds of formats we routinely manufacture.

The two character prefix indicates *sorbent and hardware type*. Standard configurations are **highlighted**.

Prefix Character 1 (Sorbent)

X-XXXX-XXXX
C = CLIPEUS
H = HAISIL 100 or HAISIL 300
K = Kromasil
L = HAISIL HL
T = TARGA

Prefix Character 2 (Hardware)

X-XXXX-XXXX
S = Stainless steel HPLC Column
P = PEEK HPLC column
F = Stainless steel cartridge column
K = PEEK cartridge column
N = Nano Scale column (150µm)

The four center characters indicate the column or cartridge *length (cm) and internal diameter (mm)*.

Center Characters 1 and 2 (Length)

XX-**■**XX-XXX
03 = 3cm **04** = 4cm
05 = 5cm **07** = 7.5cm
10 = 10cm **12** = 12.5cm
15 = 15cm **20** = 20cm
22 = 22cm **25** = 25cm
30 = 30cm **50** = 50cm

Center Characters 3 and 4 (I.D.)

XX-XX-**■**■-XXXX
15 = 150µm **M3** = 300µm
M5 = 500µm **M8** = 800µm
01 = 1.0mm **21** = 2.1mm
30 = 3.0mm **32** = 3.2mm
40 = 4.0mm **46** = 4.6mm
10 = 10mm **20** = 20mm

The four character suffix indicates *sorbent chemistry and particle size*.

Suffix Characters 1 to 3 (Phase)

XX-XXXX-**■**■**■**X
C04 = Butyl or C4
C08 = Octyl or C8
C18 = ODS or C18
CNP = Cyano or Nitrile
M08 = HAISIL 100 C8
M18 = HAISIL 100 C18
NH2 = Amino
PHN = Phenyl
SIL = Silica Gel
W04 = 300Å C4
W08 = 300Å C8
W18 = 300Å C18

Suffix Character 4 (Particle Size)

XX-XXXX-XXX**■**
1 = 10µm
2 = 10 - 15µm
3 = 3 or 3.5µm
5 = 4.5 or 5µm
7 = 15 - 20µm

Custom HPLC Columns

Let us or The Nest Group, Inc. know if you have particular needs or are interested in formats or chemistries not listed in this catalog. Higgins Analytical is continuously developing new products and would be interested in discussing your individual requirements.

We are also able to pack your own sorbents into analytical or semiprep columns enabling you to conduct selectivity tests and separation optimization work before you commit your sample to very large scale columns packed with the same material.

Higgins is grateful to the following individuals for permission to share their data in this catalog:

Jane Cooper, Lilly Research, Erl Wood Manor, Windlesham, Surrey UK
In Vivo Microdialysis Samples from Rat Hypothalamus. Page 27

Larry David, Oregon Health Sciences University, School of Dentistry, Portland, OR
Human Ocular Lens Protein (Beta A1 Crystallin and Gamma S Crystallin) Analysis by LC/MS. Page 29

Chris Gong and Chulani Karunatilake, Genentech, Inc., South San Francisco, CA
Fast Peptide map of rhGH on a 5cm column. Page 17

Elizabeth Harris, Emisphere Technologies, Inc., Hawthorne, NY
Fast Analysis a Drug Delivery System. Page 17

David Hawke, Perseptive Biosystems, Western Technical Center, South San Francisco, CA
Fast Tryptic Map of Cytochrome-C. Page 17

Ted Holman, University of California, Santa Cruz, CA
Large Competitive Kinetic Isotope Effects in Human 15-Lipoxygenase Catalysis Measured by a Novel HPLC Method. Page 11

David Isom, Analytical Sales and Service, Pompton Plains, NJ
Fat-Soluble Vitamin Assay. Page 27
Antibacterials. Page 27
Antihypertensives. Page 29

Krishna Kalghatgi, NeoGenesis, Cambridge, MA
RPC of Basic Compounds in Combinatorial Mixtures. Page 23

Kamlesh Patel, University of North Carolina, Department of Chemistry, Charlottesville, VA
Analysis of Basic Peptides and Peptide Mapping without TFA. Page 27

Mark Ross, Argonex, Inc., Charlottesville, VA
Micropreparative Chromatography and Reanalysis of Peptides from Tumor Cells. Page 17

Steve Sharp, Roche Products, Welwyn Garden City, UK
LC/MS of Serum Samples. Page 23

Lorne Vandermark, Pharmco, Titusville, FL
Analysis of Cat's Claw Extract. Page 11

Expert and Responsive Technical Support

As a Higgins Analytical Customer seeking technical support or product information, you will eliminate long waits and expensive phone calls, and you will never be transferred from one person to another only to end up in someone's phone mail! By simply faxing (1-508-485-5736) or e-mailing (sales@nestgrp.com) your question to The Nest Group's **Technical Support**, you will receive a prompt written response. If we don't know the answer, they will tell you so – but, that doesn't happen very often. Additional up-to-date product and application information can be found by pointing your browser at <http://www.higanalyt.com> or <http://www.nestgrp.com>

Easy Ordering and Rapid Delivery

Our worldwide network of qualified distributors can provide expert support and prompt delivery from their local inventory. Our catalog-listed items are generally shipped from the factory within a day of receiving the order. In the event that we have not provided you with a near by distributor, we can ship an order to you directly from the factory by a variety of carriers.

In order to further simplify the process for you and your purchasing department, The Nest Group, one of our many distributors accepts credit card orders.



Payment terms for all other orders are net 30 days from date of invoice.

Product Availability

Higgins Analytical products are available worldwide through a network of responsive distributors. These organizations can provide qualified technical support and prompt product delivery. The Nest Group, Inc. 508-481-6223 or 800-347-6378 is an excellent distributor (U.S & Canada), that offers excellent technical support as well as inventory of our products. E-mail them at info@nestgrp.com or use www.nestgrp.com



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