Chromatograms, Columns & Guards

Pickering Laboratories columns and guards are intended for specific applications that require post-column derivatization. This technology guarantees detection of certain classes of compounds at very low concentrations—amino acids, carbamate pesticides and polyamines, for example.

Each column is packed and tested to separate the target compounds according to Pickering's chromatographic quality control standards and published analytical method. The following acceptance criteria apply to all of Pickering's columns:

- With guard column installed, produce a specified chromatogram of the compounds in a standard test mixture.
- Separate the compounds in the established order, with specified resolution of critical pairs.
- Operate within the specified range of back pressure.
- Be free of contaminating material which can cause baseline artifacts.
- Only after all criteria have been met can the column's serial number and label be applied.
- Quite simply, the column is guaranteed to produce a chromatogram for its intended application if it is operated according to the conditions and methods prescribed by Pickering Laboratories.

About Guard Columns

While it is true that any of our columns may be run without a guard, the practical consequence is a shorter column lifetime. Pickering Laboratories sells a variety of appropriate guard columns to protect our analytical columns. Additionally, GARD™ provides protection against contamination for cation-exchange applications without affecting column efficiency and it is far less expensive to replace than an analytical column. See page 17 for more information about our GARD™ column protection system.

Cation-Exchange Columns & Guards

Lithium Columns	
Catalog No.	**Description**
0354675T	70-minute High-efficiency Lithium Cation-exchange Column, 4.6 x 75 mm, includes Amino Acid Test Mixture 1700-0070
0354100T	High-efficiency Lithium Cation-exchange Column, 4.0 x 100 mm, includes Amino Acid Test Mixture 1700-0070
0393250	Standard Lithium Cation-exchange Column, 3.0 x 250 mm, includes Amino Acid Test Mixture 1700-0070

Sodium Columns	
Catalog No.	**Description**
1154110T	30-minute High-efficiency Sodium Cation-exchange Column 4.6 x 110 mm, includes Amino Acid Test Mixture 1700-0070
1154150T	High-efficiency Sodium Cation-exchange Column for protein, collagen and oxidized feed hydrolysates, 4.0 x 150 mm, includes Amino Acid Test Mixture 1700-0070
1154150	High-efficiency Sodium Cation-exchange Column for protein and collagen hydrolysates, 4.0 x 150 mm, includes Amino Acid Test Mixture 1700-0070
1193250	Standard Sodium Cation-exchange Column 3.0 x 250 mm, includes Amino Acid Test Mixture 1700-0070

Glyphosate Column	
Catalog No.	**Description**
1954150	Cation-exchange Column for Glyphosate analysis, 4 x 150 mm, including Glyphosate Test Mixture 1700-0080

GARD™ Column Protection System (For use with any cation-exchange column)	
Catalog No.	**Description**
1700-3102	Cation-exchange GARD™ Assembly: Includes holder and 2 replaceable GARDs™
1700-3101	Replacement Cation-exchange GARDs™ (2/PK)
1700-3100	GARD™ Holder

Alkion Column	
Catalog No.	**Description**
9410917	ALKION™ Cation-exchange Column, K^+ form, 4.0 x 150 mm
9493020	ALKION™ Guard Column, K^+ form, 3.0 x 20 mm

Reversed-Phase Columns & Guards

Carbamate Columns	
Catalog No.	**Description**
0846250	Carbamate Column, high resolution/capacity, C8 , 4.6 x 250 mm, includes Carbamate Test Mixture 1700-0063
0840250	Carbamate Column, expanded resolution, C8, 4.0 x 250 mm, includes Carbamate Test Mixture 1700-0063
1846150	Carbamate Column, rapid analysis, C18, 4.6 x 150 mm, includes Carbamate Test Mixture 1700-0063
18ECG001	Guard Cartridge Holder with 3 guard cartridges
18ECG002	Guard Cartridges, 2/pk.

Polyether Antibiotics Column	
Catalog No.	**Description**
2381750	Polyether Reversed-phase Column, 4.6 x 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
18ECG002	Guard Cartridges, 2/pk.

Mycotox Column	
Catalog No.	**Description**
1612124	MYCOTOX™ Reversed-phase Column, 4.6 x 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
18ECG002	Guard Cartridges, 2/pk.

Chromatograms, Columns & Guards

Cation-Exchange GARD™ Column Protection System

Cation-exchange GARD™ uses a proprietary material to prevent matrix compounds from passing through (and thereby protecting the analytical column), but allows the analytes of interest to pass unimpeded through the GARD™ and onto the analytical column.

The GARD™ significantly prolongs column life without band spreading or added pressure. We demonstrated, by means of a performance comparison for Amino Acid Analysis, that the use of a GARD™ will effectively protect the analytical column, will be more cost-effective for the laboratory, is easy to change, is universal to cation-exchange applications, and most importantly has zero band spreading.

With GARD™ Column protection system from Pickering Laboratories the same cation-exchange GARD™ can be used for nearly all cation-exchange applications.

GARD™ Column Protection System (For use with any cation-exchange column)	
Catalog No.	**Description**
1700-3102	Cation-exchange GARD™ Assembly: Includes holder and 2 replaceable GARDs™
1700-3101	Replacement Cation-exchange GARDs™ (2/PK)
1700-3100	GARD™ Holder

Lithium Amino Acid Analysis Columns

Pickering Laboratories specialize in manufacturing of cation-exchange columns for amino acid analysis. No other techniques, including reversed-phase chromatography, have been shown to match post-column ion-exchange methods in quantitation and reproducibility. Advantages of this method, such as absence of matrix interferences, are especially important in the analysis of native samples.

Lithium columns and buffers systems have high selectivity and are perfect for physiological fluids and food analysis.

Post-column Conditions for Amino Acids Analysis:

Reagent: Trione®

Reactor: 130 °C, 0.5 mL

Reagent Flow Rate: 0.3 mL/min

Detection:

UV-Vis Detector: λ=570 nm for primary amino acids
λ=440 nm for secondary amino acids

or

Reagent: 300 mg of OPA, 2 g Thiofluor™, 3 mL of 30 % Brij® 35 solution in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

Reagent Flow Rate: 0.3 mL/min

Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

The recommended gradient conditions are subject to change without notice. This may happen because of lot-specific changes in the columns, or improvements in the overall method.

The recommended gradient for the column will always be included in the column package and it supersedes the information in this catalog. Use the program recommended on the column data sheet for the initial testing.

Column oven temperature programming gives additional flexibility when optimizing methods. Using a temperature gradient allows the user to improve separation, shorten analysis time and fine-tune the method for detecting compounds of interest.

70-Min High-Efficiency Lithium Cation-Exchange Column (4.6 X 75 mm)

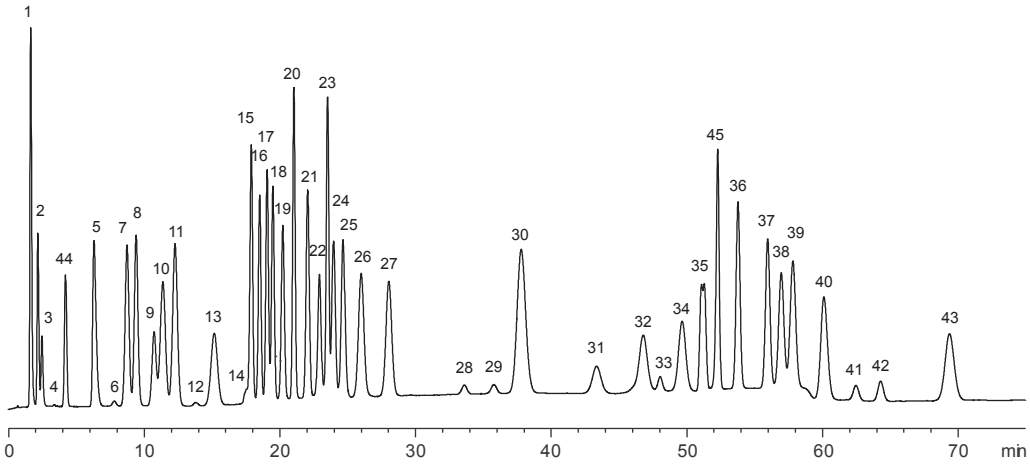
Catalog Number 0354675T
Use With Cation-Exchange Gard™ Column Protection System 1700-3102
Use for Physiological Samples
Temperature Gradient

HPLC Program				
Time	1700-1125 %	Li365 %	Li375 %	RG003 %
0	100	0	0	0
10	100	0	0	0
19	40	60	0	0
32	0	100	0	0
43	0	100	0	0
43.1	0	0	100	0
57	0	0	100	0
57.1	0	0	70	30
72	0	0	70	30
72.1	100	0	0	0

Column Oven Program	
Time	Temp °C
0	34
6	34
17	65
25	70
70	70
71	34

For more information see Method Abstract MA 382 and Pickering Amino Acids Brochure.

HPLC Flow Rate: 0.55 mL/min, Initial Temp.: 34 °C
Injection Volume: 10 µl of 0.25 µmole/ml std.
(P/N 1700-0170 with added Glutamine, AEC, Glucosaminic acid, and Allo-Isoleucine.)



1 Phosphoserine
2 Taurine
3 Phosphoethanolamine
4 Urea
5 Aspartic acid
6 Hydroxyproline
7 Threonine
8 Serine
9 Asparagine
10 Glutamic acid
11 Glutamine
12 Sarcosine
13 α-Aminoadipic acid
14 Proline
15 Glycine
16 Alanine
17 Citrulline
18 α-Amino-n-butyric acid
19 Valine
20 Cystine
21 Methionine
22 Allo-Isoleucine
23 Cystathionine
24 Isoleucine
25 Leucine
26 Tyrosine
27 Phenylalanine
28 β-Alanine
29 β-Amino-i-butyric acid
30 Homocystine
31 γ-Aminobutyric acid
32 Tryptophan
33 Ethanolamine
34 Ammonia
35 Hydroxylysines
36 Ornitine
37 Lysine
38 1-Methylhistidine
39 Histidine
40 3-Methylhistidine
41 Anserine
42 Carnosine
43 Arginine
44 Glucosaminic Acid*
45 2-Aminoethyl-cysteine (AEC)*

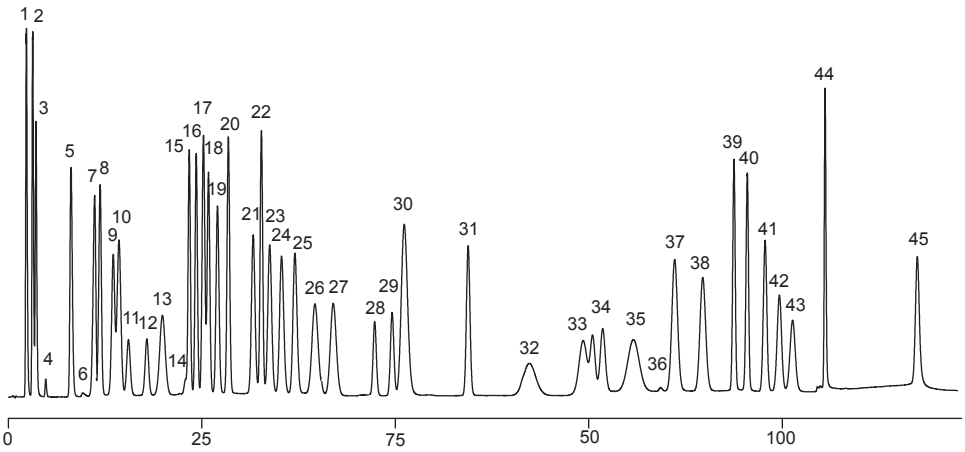
*Internal Standard

NOTE: This method utilizes column temperature gradient. Use Onyx PCX column oven or Pinnacle PCX column oven with temperature gradient capabilities.

Chromatograms, Columns & Guards

High-Efficiency Lithium Cation-Exchange Column (4.0 X 100 mm)

Catalog Number 0354100T
Use With Cation-Exchange Gard™ Column Protection System 1700-3102
Use for Physiological Samples and Complex Matrices
Temperature Isocratic



1 Phosphoserine
2 Taurine
3 Phosphoethanolamine
4 Urea
5 Aspartic acid
6 Hydroxyproline
7 Threonine
8 Serine
9 Asparagine
10 Glutamic acid
11 Glutamine
12 Sarcosine
13 α–Aminoadipic acid
14 Proline
15 Glycine
16 Alanine
17 Citrulline
18 α–Amino-n-butyric acid
19 Valine
20 Cystine
21 Methionine
22 Cystathionine
23 Isoleucine
24 Leucine
25 Norleucine
26 Tyrosine
27 Phenylalanine
28 β–Alanine
29 β–Amino-i-butyric acid
30 Homocystine
31 γ–Aminobutyric acid
32 Tryptophan
33 Ethanolamine
34 Hydroxylysines
35 Ammonia
36 Creatinine
37 Ornithine
38 Lysine
39 Histidine
40 3-Methyl-histidine
41 1-Methyl-histidine
42 Carnosine
43 Anserine
44 α–Amino–β–guanidinopropionic acid
45 Arginine

Conditions					
Step	**Time (Min)**	**Interval**	**Li275 %**	**Li750 %**	**RG003 %**
0	0	0	100	0	0
1	8	8	100	0	0
2	46	38	65	35	0
3	86	40	0	100	0
4	90	4	0	100	0
5	115	25	0	94	6
6	122	2	0	94	6
7	122.1	0.1	100	0	0
8	140	17.9	100	0	0

Flow Rate: 0.35 mL/min, Column Temp: 37 °C,
Injection Volume: 10 µl of 0.25 µmole/ml std.
(P/N 011006P with added Glutamine)

For more information see Pickering Amino Acids Brochure.

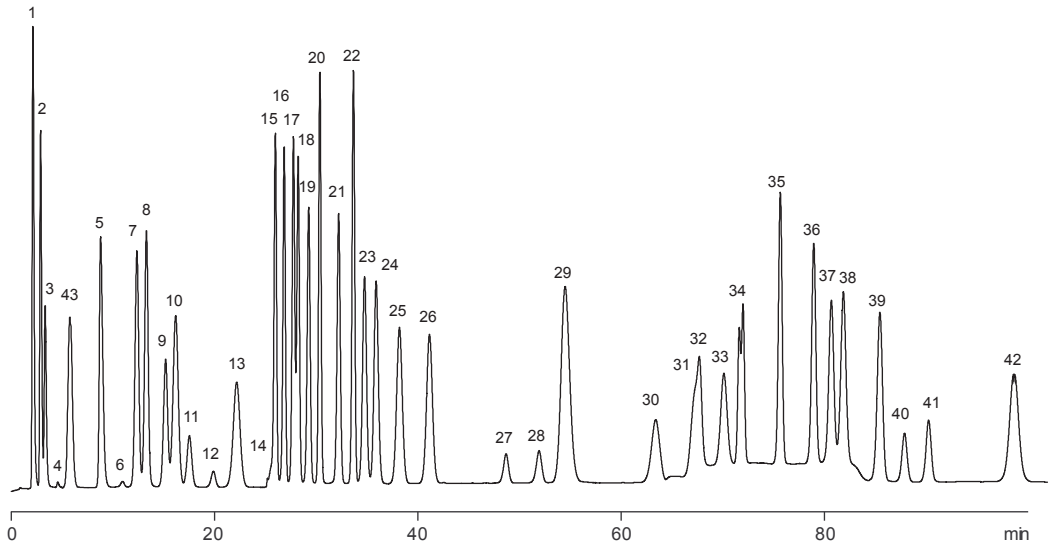
High-Efficiency Lithium Cation-Exchange Column (4.0 X 100 mm)

Catalog Number 0354100T
Use With Cation-Exchange Gard™ Column Protection System 1700-3102
Use for Physiological Fluids
Temperature Gradient

Conditions					
Step	Time (Min)	1700-1125 %	Li365 %	Li375 %	RG003 %
0	0	100	0	0	0
1	15	100	0	0	0
2	27	40	60	0	0
3	45	0	100	0	0
4	60	0	100	0	0
5	60.1	0	0	100	0
6	78	0	0	100	0
7	78.1	0	0	70	30
8	95	0	0	70	30
9	95.1	100	0	0	0
10	115	100	0	0	0

Column Oven Program	
Time (Min)	Temp °C
0	34
13	34
30	65
67	66
80	70
97	70
98	34

HPLC Flow Rate: 0.4 mL/min, Initial Temp.: 34 °C
Injection Volume: 10 µL of 0.25 µmole/mL Std.
(P/N 1700-0170 with added Glutamine and Glucosaminic acid)



For more information see Pickering Amino Acids Brochure.

1 Phosphoserine
2 Taurine
3 Phosphoethanolamine
4 Urea
5 Aspartic acid
6 Hydroxyproline
7 Threonine
8 Serine
9 Asparagine
10 Glutamic acid
11 Glutamine
12 Sarcosine
13 α-Aminoadipic acid
14 Proline
15 Glycine
16 Alanine
17 Citrulline
18 α-Amino-n-butyric acid
19 Valine
20 Cystine
21 Methionine
22 Cystathionine
23 Isoleucine
24 Leucine
25 Tyrosine
26 Phenylalanine
27 β-Alanine
28 β-Amino-i-butyric acid
29 Homocystine
30 γ-Aminobutyric acid
31 Tryptophan
32 Ethanolamine
33 Ammonia
34 Hydroxylysines
35 Ornitine
36 Lysine
37 1-Methylhistidine
38 Histidine
39 3-Methylhistidine
40 Anserine
41 Carnosine
42 Arginine
43 Glucosaminic Acid*

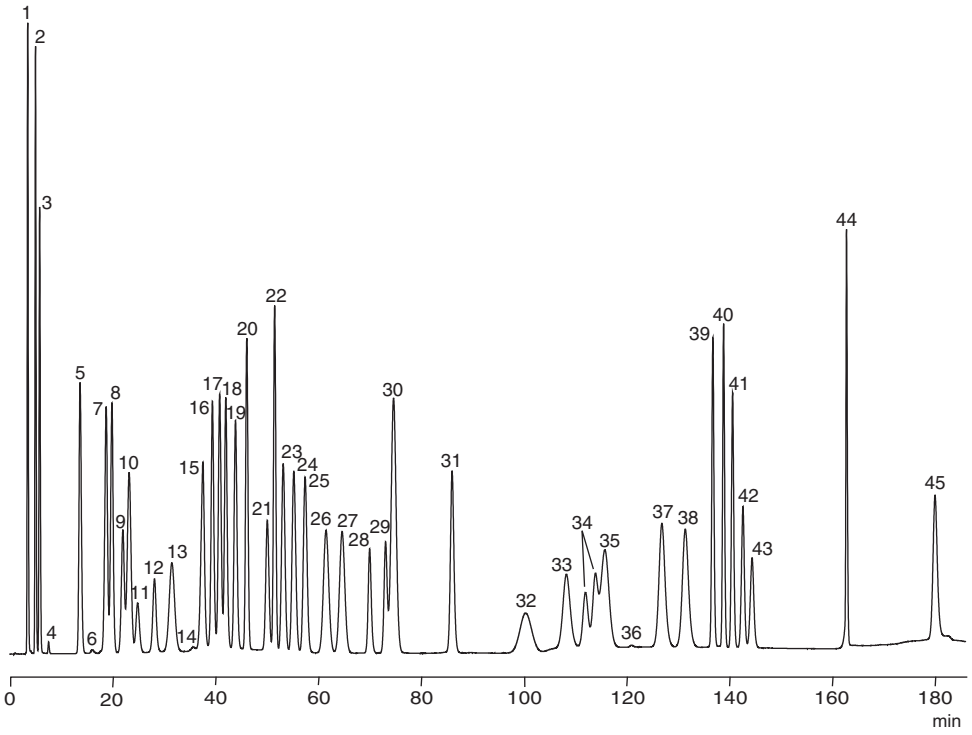
**Internal Standard*

NOTE: This method utilizes column temperature gradient. Use Onyx PCX column oven or Pinnacle PCX column oven with temperature gradient capabilities.

Chromatograms, Columns & Guards

Standard Lithium Cation-Exchange Column 0393250 (3.0 X 250 mm)

Catalog Number 0393250
Use With Cation-Exchange Gard™ Column Protection System 1700-3102
Use for Physiological Fluids, Complex Matrices
Temperature Isocratic



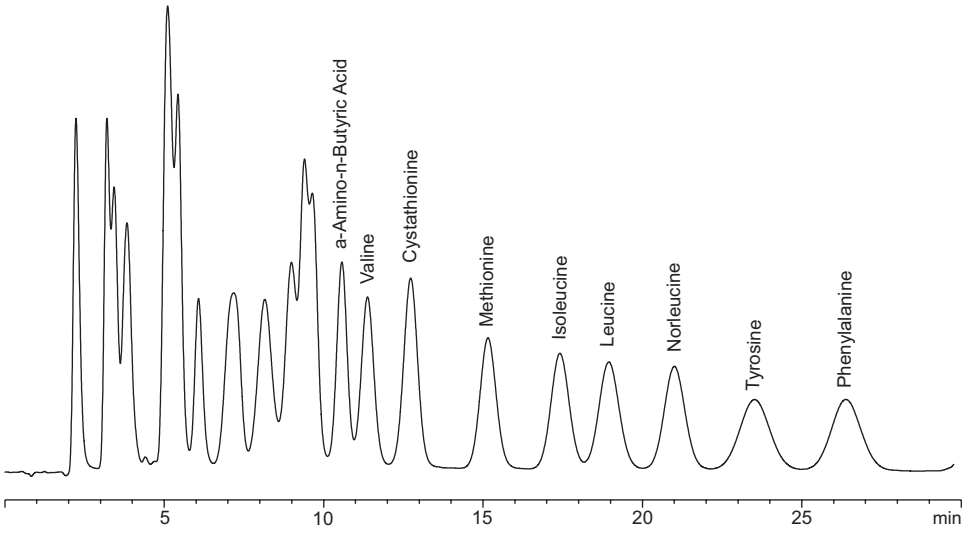
1 Phosphoserine
2 Taurine
3 Phosphoethanolamine
4 Urea
5 Aspartic acid
6 Hydroxyproline
7 Threonine
8 Serine
9 Asparagine
10 Glutamic acid
11 Glutamine
12 Sarcosine
13 α-Aminoadipic acid
14 Proline
15 Glycine
16 Alanine
17 Citrulline
18 α-Amino-n-butyric acid
19 Valine
20 Cystine
21 Methionine
22 Cystathionine
23 Isoleucine
24 Leucine
25 Norleucine
26 Tyrosine
27 Phenylalanine
28 β-Alanine
29 β-Amino-i-butyric acid
30 Homocystine
31 γ-Aminobutyric acid
32 Tryptophan
33 Ethanolamine
34 Hydroxylysines
35 Ammonia
36 Creatinine
37 Ornithine
38 Lysine
39 Histidine
40 3-Methyl-histidine
41 1-Methyl-histidine
42 Carnosine
43 Anserine
44 α-Amino-β-guanidino propionic acid
45 Arginine

Conditions			
Time (Min)	**Li275 %**	**Li750 %**	**RG003 %**
0	100	0	0
17	100	0	0
65	65	35	0
128	0	100	0
145	0	100	0
185	0	94	6
185.1	100	0	0
210	100	0	0

Flow Rate: 0.3 mL/min, Column Temp.: 40 °C,
Injection Volume: 10 µL of 0.25 µmole/mL Std.
(P/N 011006P with added Glutamine)

High-Efficiency Lithium Cation-Exchange Column (4.0 x 100 mm)

Catalog Number 0354100T
Use With Cation-Exchange Gard™ Column Protection System 1700-3102
Use for PKU/MSUD Screening of Physiological Fluids
Temperature Isocratic



Conditions					
Step	Time (Min)	Interval	Li275 %	Li750 %	RG003 %
0	0	0	86	14	0
1	25	11	73	27	0
3	25.1	0.1	0	0	100
4	30	16.9	0	0	100
7	30.1	0.1	86	14	0
8	42	14.9	86	14	0

HPLC Flow Rate: 0.35 mL/Min, Column Temp.: 38 °C
Injection Volume: 10 µl of 0.25 µmole/mL Std.

Lithium Columns	
Catalog No.	Description
0354675T	70-minute High-efficiency Lithium Cation-exchange Column, 4.6 x 75 mm, includes Amino Acid Test Mixture 1700-0070
0354100T	High-efficiency Lithium Cation-exchange Column, 4.0 x 100 mm, includes Amino Acid Test Mixture 1700-0070
0393250	Standard Lithium Cation-exchange Column, 3.0 x 250 mm, includes Amino Acid Test Mixture 1700-0070

GARD™ Column Protection System (For use with any cation-exchange column)	
Catalog No.	Description
1700-3102	Cation-exchange GARD™ Assembly: Includes holder and 2 replaceable GARDs™
1700-3101	Replacement Cation-exchange GARDs™ (2/PK)
1700-3100	GARD™ Holder

Chromatograms, Columns & Guards

Sodium Amino Acid Analysis Columns

Ion-exchange chromatography followed by post-column derivatization has been a method of choice for amino acid analysis for many years. Pickering Laboratories' ion-exchange columns allow you to obtain consistent results with sensitivity, stability, selectivity and speed.

Sodium columns and buffers systems are designed for amino acids analysis of hydrolyzed samples.

Post-column Conditions For Amino Acids Analysis:

Reagent: Trione®

Reactor: 130 °C, 0.5 mL

Reagent Flow Rate: 0.3 mL/min

Detection:

UV-Vis Detector: λ=570 nm for primary amino acids
λ=440 nm for secondary amino acids

or

Reagent: 300 mg of OPA, 2 g Thiofluor™, 3 mL of 30 % Brij® 35 solution in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

Reagent Flow Rate: 0.3 mL/min

Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

The recommended gradient conditions are subject to change without notice. This may happen because of lot-specific changes in the columns, or improvements in the overall method.

The recommended gradient for the column will always be included in the column package, and it supersedes the information in this catalog. Use the program recommended on the column data sheet for the initial testing.

The column oven temperature programming gives additional flexibility when optimizing methods. Using a temperature gradient allows the user to improve separation, shorten analysis time and fine-tune the method for detecting compounds of interest.

30-min High-Efficiency Sodium Cation-Exchange Column (4.6 x 110 mm)

Catalog Number 1154110T
Use With Cation-Exchange Gard™ Column Protection System 1700-3102
Use for Protein and Oxidized Feeds Hydrolysate
Temperature Gradient

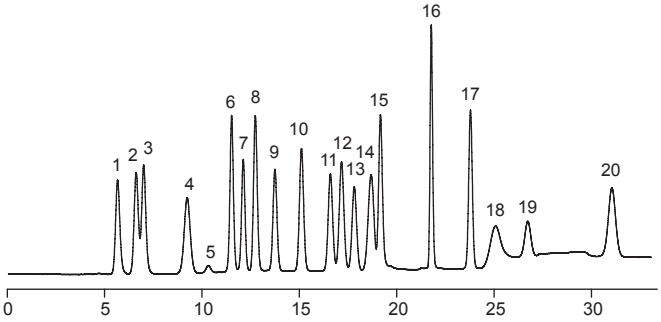


Fig 1. Chromatogram of protein hydrolysate standard

1	Aspartic Acid	**9**	Valine	**17**	Lysine
2	Threonine	**10**	Methionine	**18**	Tryptophan
3	Serine	**11**	Isoleucine	**19**	Ammonia
4	Glutamic Acid	**12**	Leucine	**20**	Arginine
5	Proline	**13**	Norleucine	**21**	Cysteic Acid
6	Glycine	**14**	Tyrosine	**22**	Methionine
7	Alanine	**15**	Phenylalanine		Sulfone
8	Cystine	**16**	Histidine		

Method for Protein Hydrolysate Samples				
TIME	Na315 %	Na425 %	Na640 %	RG011 %
0	100	0	0	0
4.0	100	0	0	0
15.0	0	100	0	0
16.0	0	0	100	0
31.0	0	0	100	0
31.1	0	0	0	100
33.0	0	0	0	100
33.1	100	0	0	0
40	100	0	0	0

Column Oven Program	
Time	Temp °C
0	46
4	46
9	70
32	70
33	46

HPLC Flow Rate: 0.6 mL/Min
Initial Temp.: 46 °C
Injection Volume: 10 µL of 0.25 µmole/mL Std.
(P/N 012506H with added Norleucine)

For more information see Method Abstract 380.1 (page 76) and Pickering Amino Acids Brochure.

NOTE: This method utilizes column temperature gradient. Use Onyx PCX column oven or Pinnacle PCX column oven with temperature gradient capabilities.

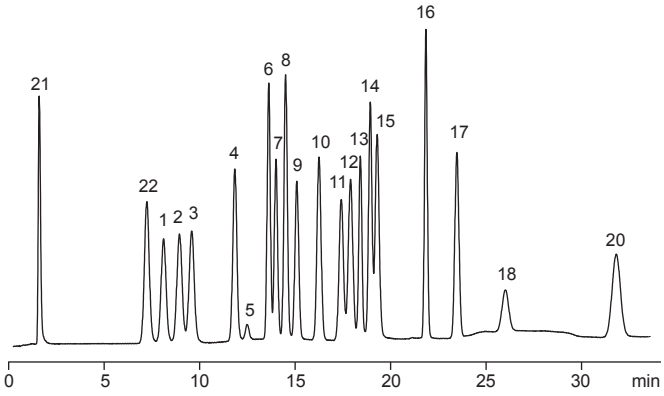


Fig 2. Chromatogram of oxidized feeds hydrolysate standard

1	Aspartic Acid	**9**	Valine	**17**	Lysine
2	Threonine	**10**	Methionine	**18**	Tryptophan
3	Serine	**11**	Isoleucine	**19**	Ammonia
4	Glutamic Acid	**12**	Leucine	**20**	Arginine
5	Proline	**13**	Norleucine	**21**	Cysteic Acid
6	Glycine	**14**	Tyrosine	**22**	Methionine
7	Alanine	**15**	Phenylalanine		Sulfone
8	Cystine	**16**	Histidine		

Method for Oxidized Feeds Hydrolysate Samples				
TIME	Na270 %	Na425 %	Na640 %	RG011 %
0	100	0	0	0
4.0	100	0	0	0
15.0	0	100	0	0
16.0	0	0	100	0
31.0	0	0	100	0
31.1	0	0	0	100
33.0	0	0	0	100
33.1	100	0	0	0
40	100	0	0	0

Column Oven Program	
Time	Temp °C
0	55
12	55
17	70
32	70
33	55

HPLC Flow Rate: 0.6 mL/min
Initial Temp.: 55 °C
Injection Volume: 10 µL OF 0.25 µmole/mL Std.

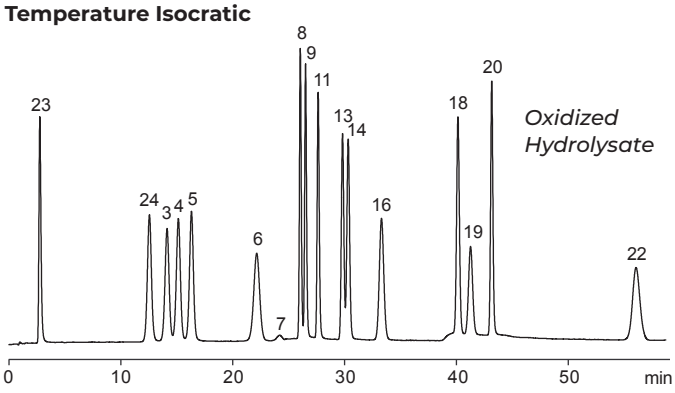
For more information see Method Abstract 380.1 and Pickering Amino Acids Brochure.

NOTE: This method utilizes a column temperature gradient. Use Onyx PCX column oven or Pinnacle PCX column oven with temperature gradient capabilities.

Chromatograms, Columns & Guards

High-Efficiency Cation-Exchange Column (4.0 X 150 mm)

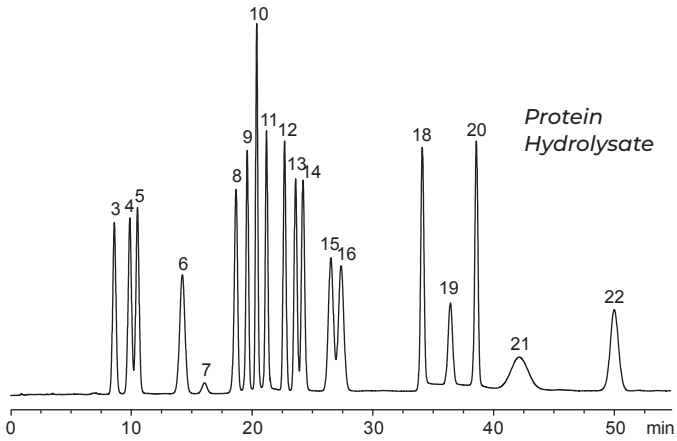
Catalog Number 1154150T
Use With Gard™ Column Protection System 1700-3102
Use for Oxidized Hydrolysate, Protein Hydrolysate, Collagen Hydrolysate
Temperature Isocratic

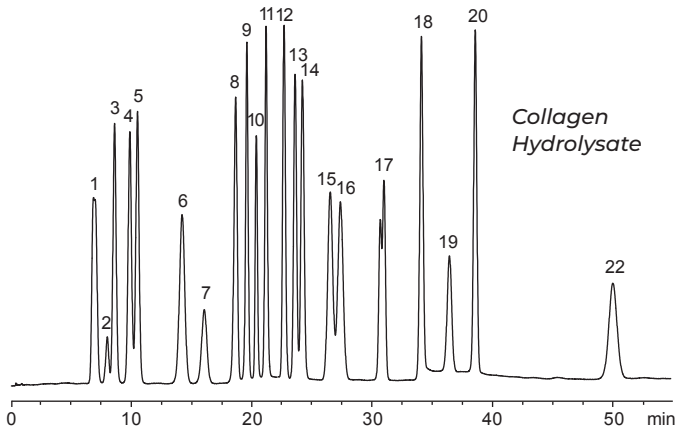


3	Aspartic Acid	**14**	Leucine
4	Threonine	**16**	Phenylalanine
5	Serine	**18**	Lysine
6	Glutamic Acid	**19**	Ammonia
7	Proline	**20**	Histidine
8	Glycine	**22**	Arginine
9	Alanine	**23**	Cysteic Acid
11	Valine	**24**	Methionine Sulfone
13	Isoleucine		

Conditions for Oxidized Samples 1154150T			
Time (Min)	**Na270 %**	**Na740 %**	**RG011 %**
0	100	0	0
14	100	0	0
32	20	80	0
32.1	0	100	0
56	0	100	0
56.1	0	0	100
58	0	0	100
58.1	100	0	0
70	100	0	0

Flow Rate: 0.4 mL/Min, Column Temp.: 50 °C,
Injection Volume: 10 µL of 0.25 µmole/mL Std.
(P/N 1700-0155)





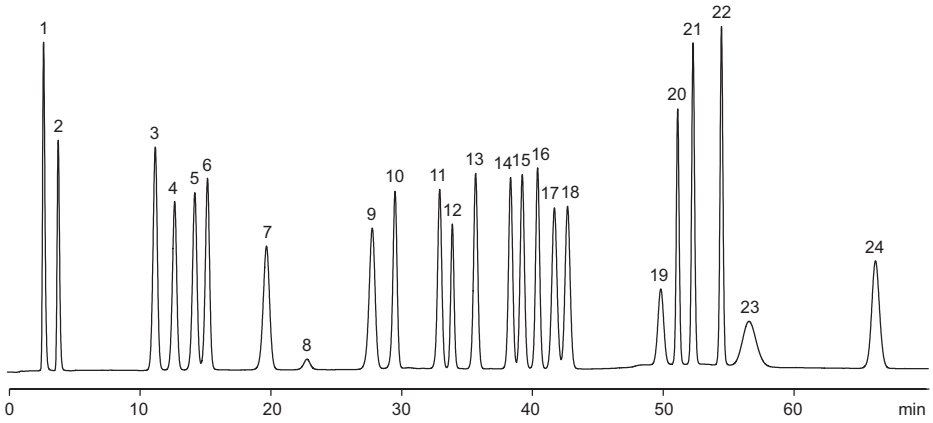
1	Methionine-D,L,-Sulfoxide	**13**	Isoleucine
2	trans-4-Hydroxy-L-Proline	**14**	Leucine
3	Aspartic Acid	**15**	Tyrosine
4	Threonine	**16**	Phenylalanine
5	Serine	**17**	D,L & allo-Hydroxylysine
6	Glutamic Acid	**18**	Lysine
7	Proline	**19**	Ammonia
8	Glycine	**20**	Histidine
9	Alanine	**21**	Tryptophan
10	Cystine	**22**	Arginine
11	Valine		
12	Methionine		

Conditions for Protein & Collagen Hydrolysate Samples			
Time (Min)	**Na315 %**	**Na740 %**	**RG011 %**
0	100	0	0
10	100	0	0
30	0	100	0
53	0	100	0
53.1	0	0	100
55	0	0	100
55.1	100	0	0
67	100	0	0

Flow Rate: 0.4 mL/Min, Column Temp.: 48 °C,
Injection Volume: 10 µL of 0.25 µmole/mL Std.
(P/N 012506H and 012506C)

Expanded Amino Acid Analysis of Hydrolyzed Samples

Catalog Number 1154150T
Use With Cation-Exchange Gard™ Column Protection System 1700-3102
Use for Oxidized and Non-oxidized Samples
Temperature Gradient



1	Cysteic Acid	**7**	Glutamic Acid	**13**	Methionine	**19**	Ammonia
2	Taurine	**8**	Proline	**14**	Isoleucine	**20**	Ornithine
3	Methionine Sulfone	**9**	Glycine	**15**	Leucine	**21**	Lysine
4	Aspartic Acid	**10**	Alanine	**16**	Norleucine	**22**	Histidine
5	Threonine	**11**	Valine	**17**	Tyrosine	**23**	Tryptophan
6	Serine	**12**	Cystine	**18**	Phenylalanine	**24**	Arginine

Conditions for Oxidized and Non-Oxidized Samples			
Time (Min)	Na270 %	Na740 %	RG011 %
0	100	0	0
16	100	0	0
40	54	46	0
45	0	100	0
66	0	100	0
66.1	0	0	100
70	0	0	100
70.1	100	0	0
80	100	0	0

Flow Rate: 0.4 mL/min, Initial Temp.: 55 °C, Injection Volume: 10 uL of 0.25 µmole/mL Std. (P/N 1700-0165 with added Ornithine)

Column Oven Program	
Time	Temp °C
0	55
32	55
33	65
41	65
42	55

Sodium Columns	
Catalog No.	Description
1154110T	30-minute High-efficiency Sodium Cation-exchange Column 4.6 x 110 mm, includes Amino Acid Test Mixture 1700-0070
1154150T	High-efficiency Sodium Cation-exchange Column for protein, collagen and oxidized feed hydrolysates, 4.0 x 150 mm, includes Amino Acid Test Mixture 1700-0070
1154150	High-efficiency Sodium Cation-exchange Column for protein and collagen hydrolysates, 4.0 x 150 mm, includes Amino Acid Test Mixture 1700-0070
1193250	Standard Sodium Cation-exchange Column 3.0 x 250 mm, includes Amino Acid Test Mixture 1700-0070

GARD™ Column Protection System (For use with any cation-exchange column)	
Catalog No.	Description
1700-3102	Cation-exchange GARD™ Assembly: Includes holder and 2 replaceable GARDs™
1700-3101	Replacement Cation-exchange GARDs™ (2/PK)
1700-3100	GARD™ Holder

Chromatograms, Columns & Guards

Carbamate Pesticide Analysis Columns

Pickering Laboratories carbamate columns are guaranteed to produce the separation of carbamate residues, specified by EPA 531.1, EPA 531.2 and AOAC 985.23 methods.

Post-column conditions for pesticide analysis:

Reagent 1: Hydrolysis reagent CB130 or CB130.2

Reagent 2: 100 mg of OPA, 2 g Thiofluor™ in 950 mL of CB910

Reactor 1: 100 °C, 0.5 mL

Reactor 2: Ambient, 0.1 mL

Reagents Flow Rate: 0.3 mL/min

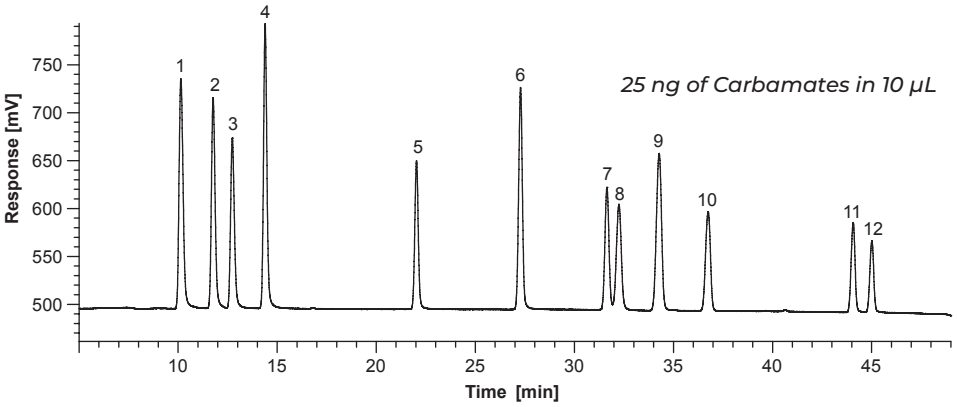
Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

The recommended gradient conditions are subject to change without notice. This may happen because of lot-specific changes in the columns, or improvements in the overall method.

The recommended gradient for the column will always be included in the column package, and it supersedes the information in this catalog.

High Resolution / Capacity Carbamate Column 0846250 (4.6 x 250 mm), C_8, 5 µm



1	Aldicarb sulfoxide	**5**	3-Hydroxycarbofuran	**9**	Carbaryl
2	Aldicarb sulfone	**6**	Aldicarb	**10**	1-Naphthol
3	Oxamyl	**7**	Propoxur	**11**	Methiocarb
4	Methomyl	**8**	Carbofuran	**12**	BDMC

Conditions for Aqueous Samples		
Time (Min)	Water %	MeOH %
0	100	0
1	100	0
1.1	82	18
36	30	70
39	30	70
39.1	0	100
41	0	100
41.1	100	0
55	100	0

Flow Rate: 1 mL/min,
Column Temp.: 42 °C,
Injection Volume: Up to 400 mL

Conditions for Methanolic Samples		
Time (Min)	Water %	MeOH %
0	85	15
1	85	15
44	25	75
44.1	0	100
49	0	100
49.1	85	15
57	85	15

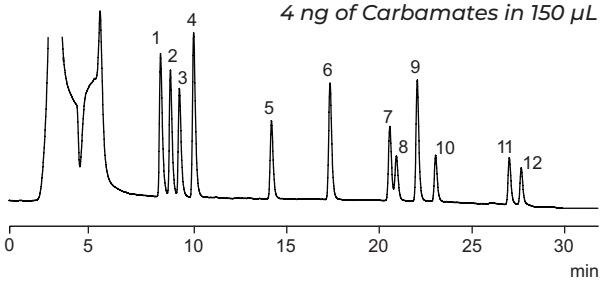
Flow Rate: 1 mL/min,
Column Temp.: 42 °C,
Injection Volume: 10 mL

Rapid Analysis Carbamate Column 1846150 (4.6 x 150 mm), 5 µm

Conditions for Aqueous Samples		
Time (Min)	Water %	MeOH %
0	100	0
1	100	0
1.1	88	12
26	30	70
26.1	0	100
28	0	100
28.1	100	0
38	100	0

Flow Rate: 1 mL/Min,
Column Temp.: 42 °C,
Injection Volume: Up To 250 mL

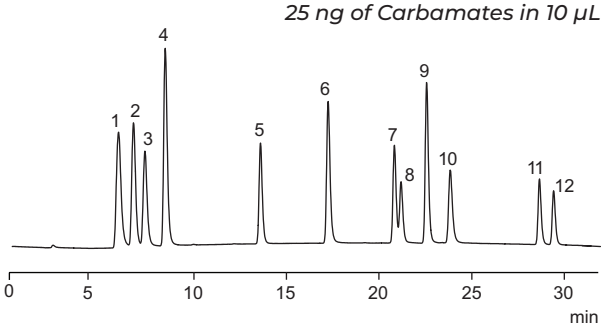
4 ng of Carbamates in 150 µL



Conditions for Methanolic Samples		
Time (Min)	Water %	MeOH %
0	85	15
0.5	85	15
28.5	30	70
28.6	0	100
33.5	0	100
33.6	85	15
41	85	15

Flow Rate: 1 mL/min,
Column Temp.: 42 °C,
Injection volume: 10 mL

25 ng of Carbamates in 10 µL



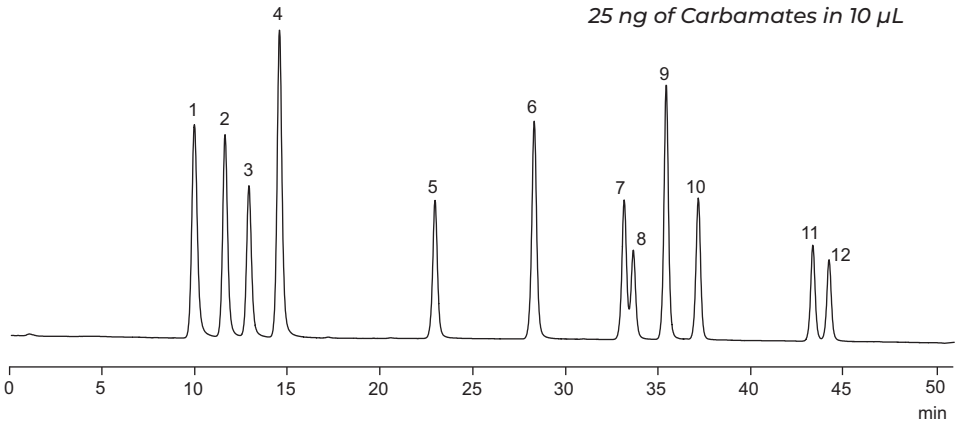
1 Aldicarb sulfoxide
2 Aldicarb sulfone
3 Oxamyl
4 Methomyl
5 3-Hydroxycarbofuran
6 Aldicarb
7 Propoxur
8 Carbofuran
9 Carbaryl
10 1-Naphthol
11 Methiocarb
12 BDMC (internal standard)

Chromatograms, Columns & Guards

Expanded Resolution Carbamate Column 0840250 (4.0 x 250 mm), 5 µm

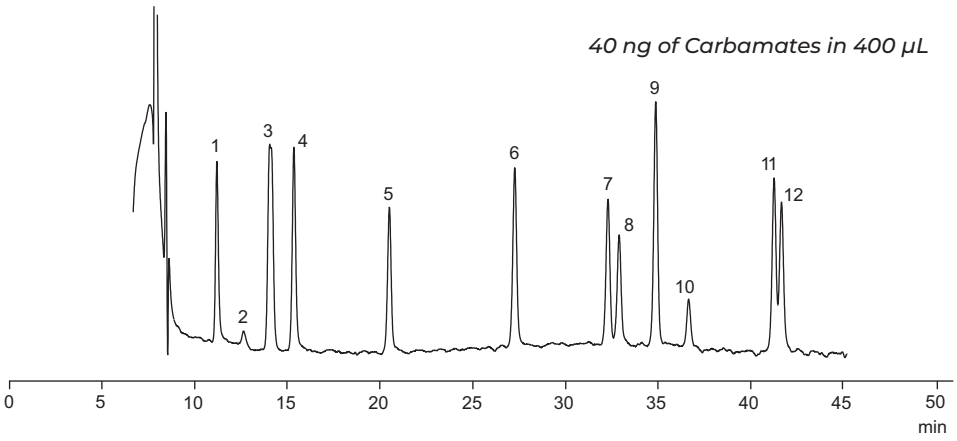
Conditions for Water/Methanol Gradient		
Time (Min)	**Water %**	**MeOH %**
0	85	15
2	85	15
42	30	70
46	30	70
46.1	0	100
51	0	100
51.1	85	15
59	85	15

Flow Rate: 0.8 mL/min,
Column Temp.: 50 °C,
Injection Volume: 10 mL for methanolic and up to 400 mL for aqueous samples



Conditions for Water/Acetonitrile Gradient		
Time (Min)	**Water %**	**ACN %**
0	90	10
2	90	10
46	49	51
46.1	30	70
49	30	70
49.1	90	10
59	90	10

Flow Rate: 0.8 mL/min,
Column Temp.: 50 °C,
Injection Volume: 10 mL for methanolic and up to 400 mL for aqueous samples

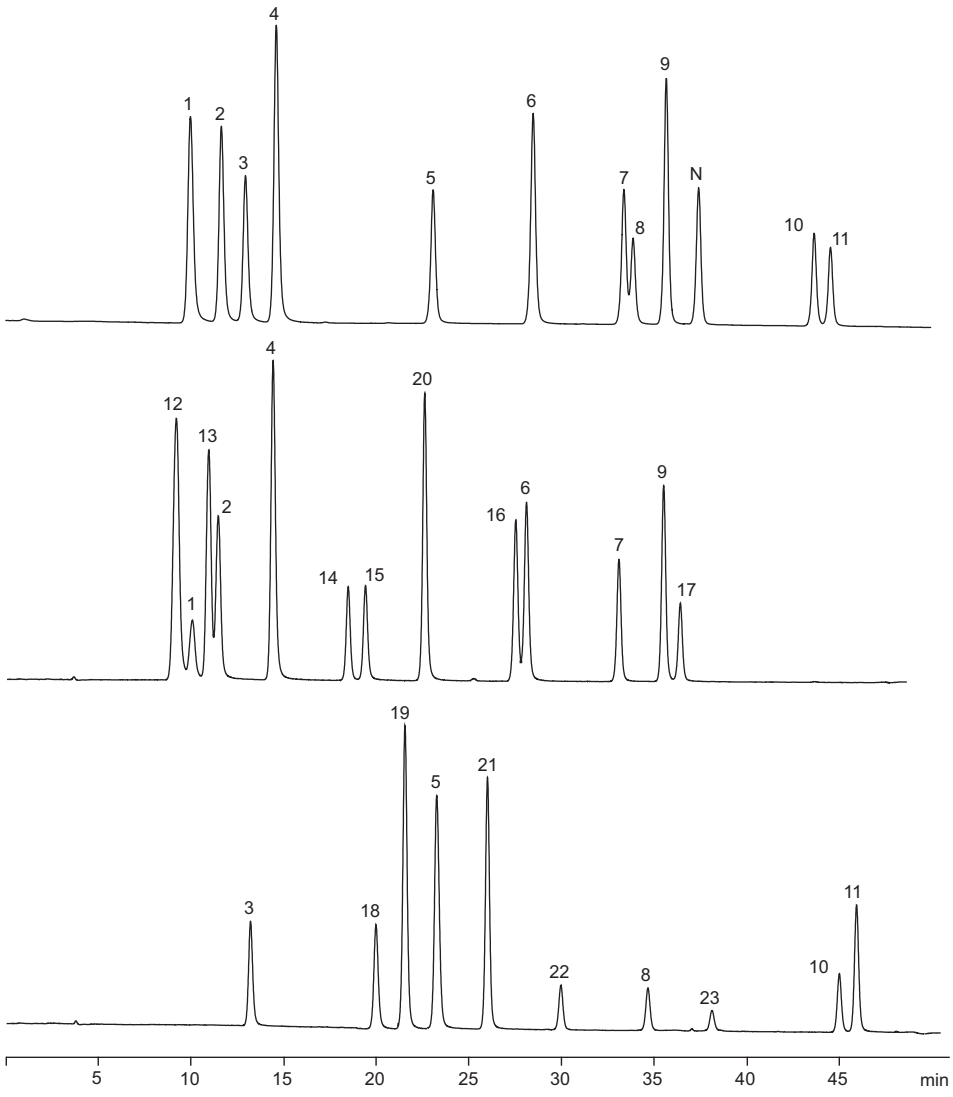


1 Aldicarb sulfoxide
2 Aldicarb sulfone
3 Oxamyl
4 Methomyl
5 3-Hydroxycarbofuran
6 Aldicarb
7 Propoxur
8 Carbofuran
9 Carbaryl
10 1-Naphthol
11 Methiocarb
12 BDMC (internal standard)

Separation of 23 Carbamates Using 0840250 Column (4.0 x 250 mm)

Conditions for Water/Methanol Gradient		
Time (Min)	**Water %**	**MeOH %**
0	85	15
2	85	15
42	30	70
46	30	70
46.1	0	100
51	0	100
51.1	85	15
59	85	15

Flow Rate: 0.8 mL/min,
Column Temp.: 50 °C,
Injection Volume: 10 mL for methanolic and up to 400 mL for aqueous samples



1 Aldicarb sulfoxide
2 Aldicarb sulfone
3 Oxamyl
4 Methomyl
5 3-Hydroxy
6 Aldicarb
7 Propoxur
8 Carbofuran
9 Carbaryl
10 Methiocarb
11 BDMC internal standard
12 Butocarboxim sulfoxide
13 Butocarboxim sulfone
14 Ethiofencarb sulfoxide
15 Ethiofencarb sulfone
16 Butocarboxim
17 Ethiofencarb
18 Thiofanox sulfoxide
19 Thiofanox sulfone
20 Methiocarb sulfoxide
21 Methiocarb sulfone
22 3-Ketocarbofuran
23 Thiofanox
N 1-Naphthol

Carbamate Columns	
Catalog No.	**Description**
0846250	Carbamate Column, high resolution/capacity, C8 , 4.6 x 250 mm, includes Carbamate Test Mixture 1700-0063
0840250	Carbamate Column, expanded resolution, C8, 4.0 x 250 mm, includes Carbamate Test Mixture 1700-0063
1846150	Carbamate Column, rapid analysis, C18, 4.6 x 150 mm, includes Carbamate Test Mixture 1700-0063
18ECG001	Guard Cartridge Holder with 3 guard cartridges
18ECG002	Guard Cartridges, 2/pk.

Chromatograms, Columns & Guards

Glyphosate Herbicide Analysis Column

Pickering Laboratories cation-exchange Glyphosate column is designed and tested for analysis of Glyphosate and its primary metabolite Aminomethyl-phosphonic acid (AMPA). This short, isocratic method provides separation of the peaks of interest. Repro-ducible performance is guaranteed run-to-run and column-to-column.

Post-column Conditions For Glyphosate Analysis:

Reagent 1: Oxidizing reagent—100 µL of 5 % Sodium Hypochlorite in 950 mL of GA116

Reagent 2: 100 mg of OPA, 2 g Thiofluor™ in 950 mL of GA104

Reactor 1: 36 °C, 0.5 mL

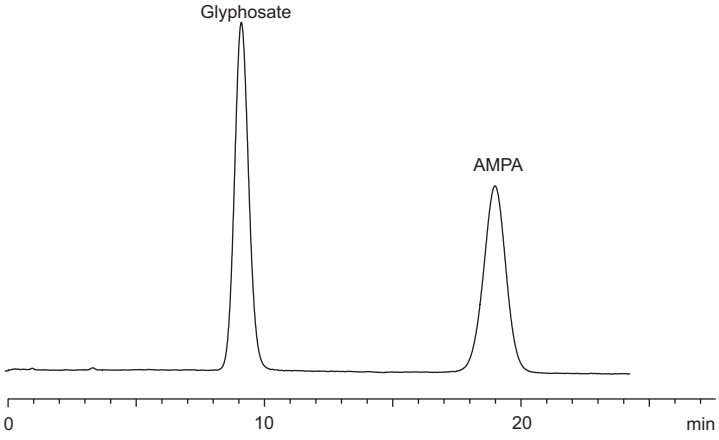
Reactor 2: Ambient, 0.1 mL

Reagents Flow Rate: 0.3 mL/min

Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

Glyphosate Column 1954150 (4.0 x 150 mm) K+ Cation-Exchange. To be Used With Cation-Exchange GARD™ Column Protection System 1700-3102



Glyphosate Test Mixture, 2.5 µg/mL

Conditions		
TIME (Min)	K200 %	RG019 %
0	100	0
15	100	0
15.1	0	100
17	0	100
17.1	100	0
27	100	0

Flow Rate: 0.4 mL/min,
Column Temp.: 55 °C,
Injection Volume: 10 mL

For more information see Method Abstract MA 206 and MA 207 (pages 93 and 95).

Glyphosate Column	
Catalog No.	Description
1954150	Cation-exchange Column for Glyphosate analysis, 4 x 150 mm, including Glyphosate Test Mixture 1700-0080

GARD™ Column Protection System (For use with any cation-exchange column)	
Catalog No.	Description
1700-3102	Cation-exchange GARD™ Assembly: Includes holder and 2 replaceable GARDs™
1700-3101	Replacement Cation-exchange GARDs™ (2/PK)
1700-3100	GARD™ Holder

Alkion™ Column

The stationary phase in the ALKION™ column is a rigid, non-porous polymeric phase that is surface sulfonated. The two modes of separation are ion-exchange and moderate partitioning. The low capacity of the ion-exchange resin makes it an ideal phase for the separation of strongly basic and positively charged compounds. The reversed-phase character allows for discrimination between closely related species.

The unique properties of this column allow for its use in a wide range of applications.

Alkion™ Column Analysis of Biogenic Amines

Post-column Conditions:

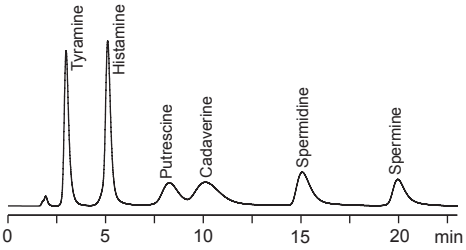
Reagent: 300 mg of OPA, 2 g Thiofluor™, 3 mL of 30 % Brij® 35 in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

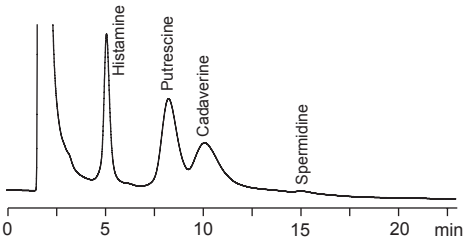
Reagent Flow Rate: 0.3 mL/min

Detection:

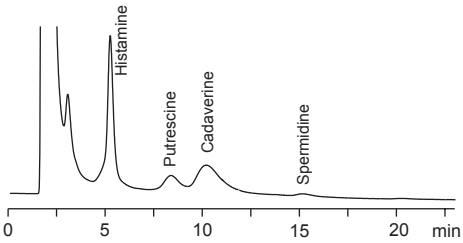
Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm



Chromatogram of calibration standard, 100 µM



Chromatogram of fish sample



Chromatogram of fish sauce sample

Conditions			
Time (Min)	**K600 %**	**K563 %**	**K130 %**
0	100	0	0
6	100	0	0
15	0	100	0
21	0	100	0
21.1	0	0	100
23	0	0	100
23.1	100	0	0
29	100	0	0

Flow Rate: 0.8 mL/min,
Column Temp.: 45 °C,
Injection Volume: 10 mL

Chromatograms, Columns & Guards

Alkion™ Column Analysis of Aminoglycoside Antibiotics in Feeds

Post-column Conditions:

Reagent: 300 mg of OPA, 2 g Thiofluor™, 3 mL of 30 % Brij® 35 in 950 mL of OD104

Reactor: 45 °C, 0.15 mL

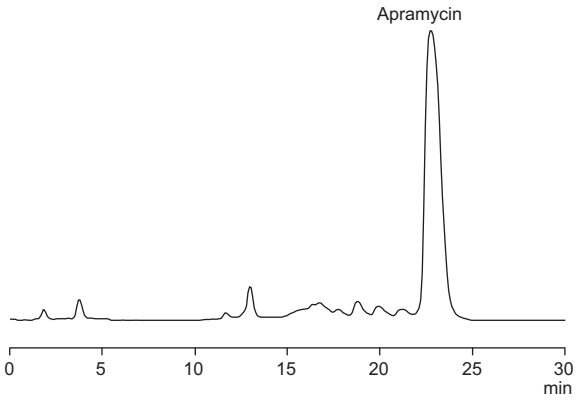
Reagent Flow Rate: 0.3 mL/min

Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm

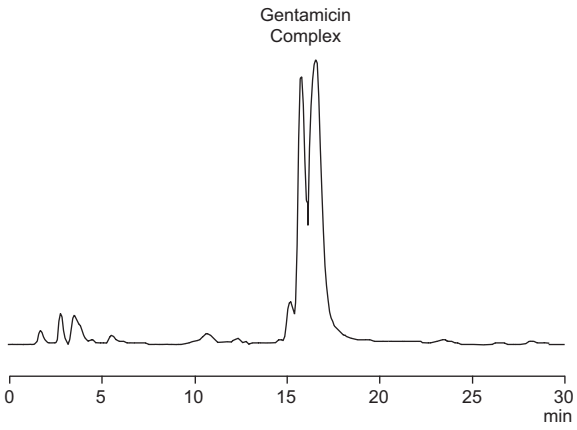
Conditions for Apramycin Analysis			
Time (Min)	**1700-1101 %**	**1700-1102 %**	**1700-1103 %**
0	67	33	0
5	67	33	0
15	14.7	7.3	78
20	14.7	7.3	78
20.1	0	22	78
21	0	22	78
21.1	67	33	0
28	67	33	0

Flow Rate: 0.8 mL/min,
Column Temp.: 40 °C,
Injection Volume: 10 mL



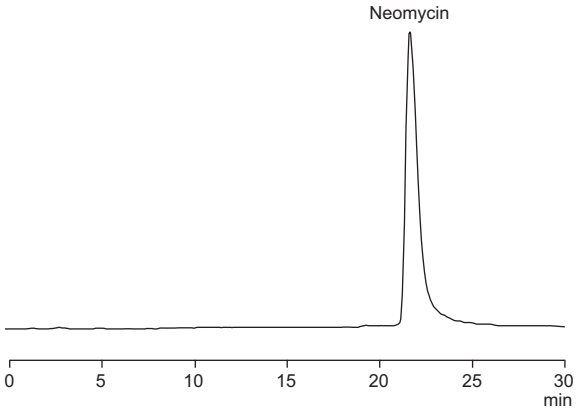
Conditions for Gentamicin Analysis			
Time (Min)	**1700-1101 %**	**1700-1102 %**	**1700-1103 %**
0	43	31	26
20	9	13	78
30	9	13	78
30.1	0	22	78
31	0	22	78
31.1	43	31	26
38	43	31	26

Flow Rate: 0.8 mL/min,
Column Temp.: 40 °C,
Injection Volume: 10 mL

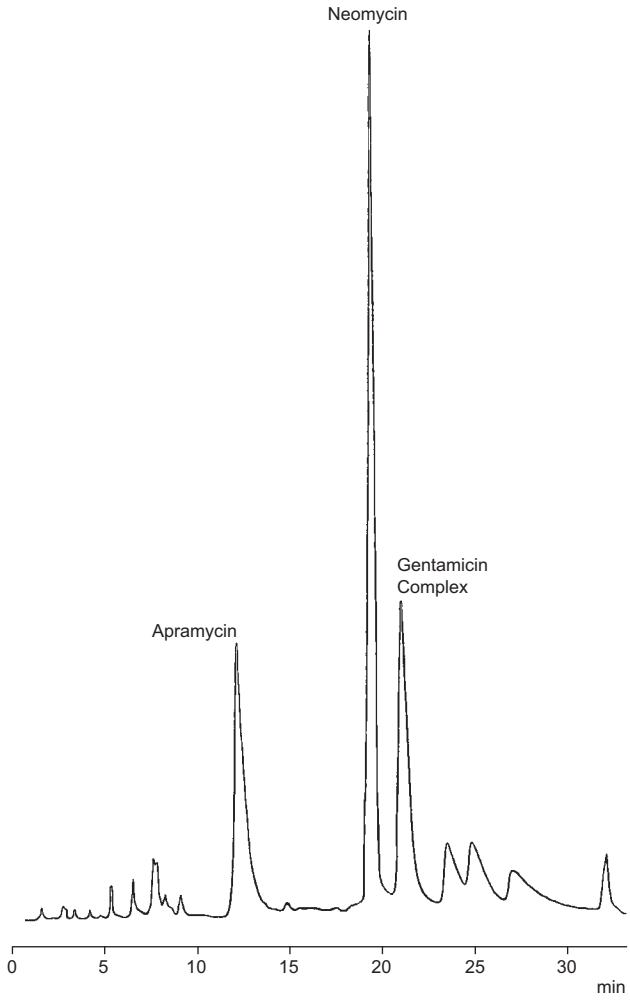


Conditions for Neomycin Analysis			
Time (Min)	**1700-1101 %**	**1700-1102 %**	**1700-1103 %**
0	60	40	0
15	13.2	8.8	78
25	11	11	78
25.1	0	22	78
26	0	22	78
26.1	60	40	0
32	60	40	0

Flow Rate: 0.8 mL/min,
Column Temp.: 40 °C,
Injection Volume: 10 mL



Chromatograms, Columns & Guards



Conditions for Separation of Apramycin Gentamicin and Neomycin			
Time (Min)	**1700-1101 %**	**1700-1102 %**	**1700-1103 %**
0	60	40	0
15	13.2	8.8	78
15.1	12	10	78
30	12	10	78
30.1	0	22	78
31	0	22	78
31.1	60	40	0
37	60	40	0

Flow Rate: 0.8 mL/min,
Column Temp.: 40 °C,
Injection Volume: 10 mL

Chromatograms, Columns & Guards

Alkion™ Column Analysis of Streptomycin

Post-column Conditions:

Reagent 1: 0.75 N Sodium Hydroxide

Reactor 1: ambient, 0.1 mL

Reagent 2: 0.6 % Ninhydrin

Reactor 2: 60 °C, 0.5 mL

Reagents Flow Rate: 0.3 mL/min

Detection:

Fluorometer: λ_{ex} 395 nm, λ_{em} 500 nm

or

Reagent 1: Oxidizing Reagent: 100 µL of 5 % Sodium Hypochlorite in GA116

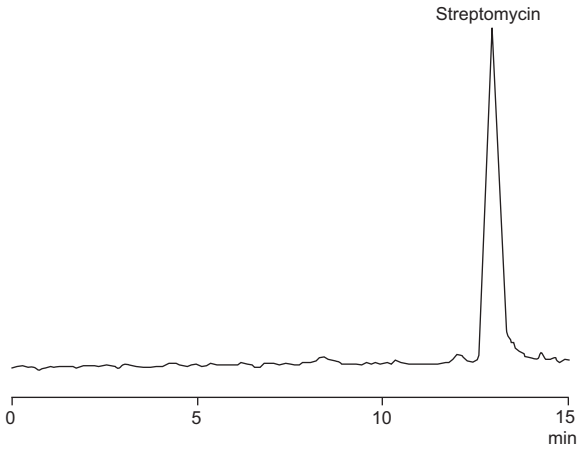
Reactor 1: 50 °C, 0.5 mL

Reagent 2: 300 mg of OPA, 2 g Thiofluor™, 3 mL of 30 % Brij® 35 solution in 950 mL of OD104

Reactor 2: Ambient, 0.1 mL

Detection:

Fluorometer: λ_{ex} 330 nm, λ_{em} 465 nm



Conditions			
Time (Min)	**1700-1101 %**	**1700-1102 %**	**1700-1103 %**
0	60	40	0
10	60	40	0
10.1	48	48	4
15	48	48	4
15.1	60	40	0
21	60	40	0

Flow Rate: 0.8 mL/min,
Column Temp.: 40 °C,
Injection Volume: Up to several mL

Alkion Column	
Catalog No.	**Description**
9410917	ALKION™ Cation-exchange Column, K^+ form, 4.0 x 150 mm
9493020	ALKION™ Guard Column, K^+ form, 3.0 x 20 mm

Mycotox™ Reversed-phase Column for Mycotoxins Analysis

Aflatoxins Analysis

Aflatoxins are naturally occurring toxins belonging to the class Mycotoxins. They are produced by fungi and occur in peanuts, peanut meal, cotton-seed meal, wheat, milk and many other foods and feeds.

The most important feature of the post-column method described below is that all six Aflatoxins are detectable at the same fluorescence emission wavelength in a single isocratic HPLC analysis.

LC Conditions:

Flow Rate: 1.0 mL/min, column temperature 42 °C, injection volume 10 µL

Mobile Phase: Methanol/acetonitrile/water: (22:22:56), isocratic

Injection: 10 µL in Methanol
5 ng B_1 & G_1
1.5 ng B_2 & G_2
1.25 ng M_1 & M_2

Post-column Conditions:

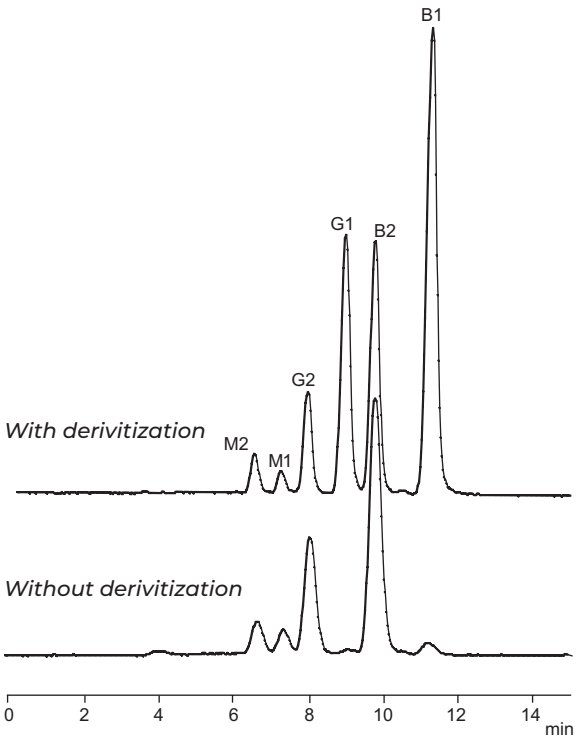
Reagent: I_2 100 mg/L in water

Reactor: 90 °C, 1.4 mL

Reagent Flow Rate: 0.4 mL/min

Detection:

Fluorometer: λ_{ex} 365 nm, λ_{em} 430 nm



For more information see Method Abstract MA 215, MA 208, MA 203.1 and MA 218

Mycotox Column	
Catalog No.	**Description**
1612124	MYCOTOX™ Reversed-phase Column, 4.6 x 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
18ECG002	Guard Cartridges, 2/pk.

Chromatograms, Columns & Guards

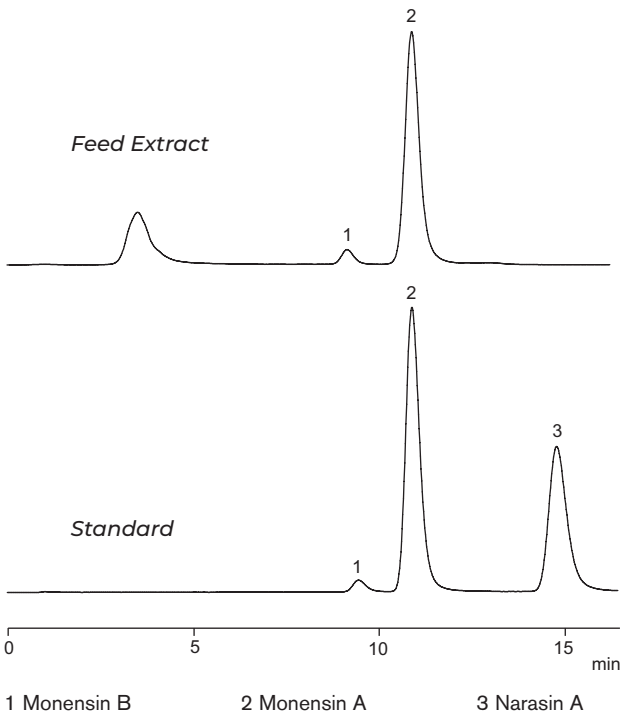
Polyether Antibiotics Analysis Column

Polyether antibiotics, such as Monensin, Narasin and Salinomycin, found in raw material, premix, liquid supplements and final feeds, are best quantified using HPLC with post-column derivatization. Because of the selectivity of the post-column reaction, almost no sample clean-up is needed.

LC Conditions:

Flow Rate: 0.7 mL/min, column temperature 40 °C, injection volume 10 µL

Mobile Phase: 90:10 of Methanol / 5 % Acetic Acid in water, isocratic



1 Monensin B 2 Monensin A 3 Narasin A

Post-column Conditions

(non-metallic post-column derivatization system is required):

Reagent 1: Concentrated Sulfuric acid / Methanol (4:96 v/v)

Reactor 1: Ambient, 0.1 mL

Reagent 2: 60 g of Vanillin (or *p*-dimethylaminobenz-aldehyde) in 950 mL of Methanol

Reactor 2: 90 °C, 1.4 mL

Reagents Flow Rate: 0.3 mL/min

NOTE: Using 2-reagent system for this application greatly extends life of reagents.

One-reagent method and post-column derivatization system are also available.

Detection:

UV-Vis Detector: Vanillin λ=520 nm, DMAB λ=450 nm

Polyether Antibiotics Column	
Catalog No.	**Description**
2381750	Polyether Reversed-phase Column, 4.6 x 250 mm
18ECG001	Guard Cartridge Holder with 3 cartridges
18ECG002	Guard Cartridges, 2/pk.