chromatography
products
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<td>DNA, RNA, Oligonucleotides</td>
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Transgenomic Columns for Amino Acid Analysis

Ion-exchange chromatography is a popular technique for the analysis of amino acids because both retention times and quantification are highly reproducible regardless of the sample matrix. This unique matrix insensitivity is important when comparing results from different patients or batches of protein hydrolysate.

Amino acids are zwitterions; at low pH, they are positively-charged and are bound to the resin by their attraction to the negatively-charged ion-exchange sites. Almost all the contaminants, i.e. matrix, are eluted at the void. The amino acids are then selectively eluted by increasing the pH and salt concentration with different buffers. With few exceptions, the order of elution follows the isoelectric point of the amino acids, i.e. acidic amino acids first, then neutral and basic. Because the separation and the ensuing post-column reaction of amino acids are devoid of contaminants, amino acid analyses via ion-exchange chromatography are highly reproducible.

Features

The key features of the Transgenomic cation-exchange columns are:

- Polymeric Substrate
- High efficiency
- High resolution
- Reproducibility lot-to-lot and column-to-column
- Rugged
- Available for both physiological and protein hydrolysate amino acids

Amino acid columns are subjected to many different types of samples (blood, urine, growth media, animal feed, wine, etc.) and often they are introduced with minimum sample preparation. Therefore this variety of matrix challenges all but the most rugged ion-exchange columns. Transgenomic columns use polystyrene/divinylbenzene copolymers and are stable in the pH range of 0 to 14; they are temperature stable and very rugged. The Transgenomic amino acid columns have been shown to last for thousands of runs without cleaning. Because Transgenomic manufacture the polymers and pack the columns, lot-to-lot and column-to-column reproducibility is excellent (retention times vary by less than 1%). Available for both routine hydrolysate analysis as well as complex physiological fluids, Transgenomic amino acid columns have been designed to provide the highest efficiency and highest resolution of any ion-exchange amino acid columns on the market.
**Oxidized Hydrolysate Standards**

**Analysis Conditions:**
- Column: Transgenomic Sodium Column for 6300
- Flow rate: 0.233 mL/min
- Temperature: 48-70-77°C
- Pressure: 655 PSIG
- Detection: Fluorescence
- Injection: 20 µL

Sample:
1. L-Cysteic Acid
2. Methionine Sulfoxide
3. L-Aspartic Acid
4. Methionine Sulfone

**Physiological Fluid Amino Acids**

**Analysis Conditions:**
- Column: Transgenomic Lithium Column for 6300
- Flow rate: 0.333 mL/min
- Temperature: 32.5-63-80°C
- Pressure: 1200 PSIG
- Detection: UV
- Injection: 20 µL

Sample:
1. Phosphoserine
2. Taurine
3. Phosphoethanolamine
4. Urea
5. Glucosaminic Acid
6. Aspartic Acid
7. Hydroxyproline
8. Threonine
9. Serine
10. Asparagine
11. Glutamic Acid
12. Glutamine
13. Sarcosine
14. α-Aminoadipic Acid
15. Proline
16. Glycine
17. Alanine
18. Citrulline
19. α-Amino-η-Butyric Acid

20. Valine
21. Cystine
22. Methionine
23. Cystathionine
24. Isoleucine
25. Leucine
26. Tyrosine
27. Phenylalanine
28. β-Alanine
29. β-Aminoisobutyric Acid
30. Homocystine
31. γ-Aminobutyric Acid
32. Ethanolamine
33. Ammonia
34. L-Arginine
35. 1-Methylhistidine
36. Histidine
37. 3-Methylhistidine
38. Anserine
39. Carnosine
40. Lysine
41. Tryptophan
42. L-Histidine
43. L-Valine
44. L-Methionine
45. L-Leucine
46. L-Threonine
47. L-Alanine
48. L-Asparagine
49. L-Glutamic Acid
50. L-Glutamine
51. Sarcosine
52. L-Proline
53. Glycine
54. L-Alanine
55. L-Threonine
56. L-Serine
57. L-Glutamic Acid
58. L-Glutamine
59. Sarcosine
60. α-Aminoadipic Acid
Amino Acid in Red Wine

Analysis Conditions:
Column: Transgenomic Sodium Column for 6300
Flow rate: 0.233 mL/min
Temperature: 48-70-77°C
Pressure: 575 PSIG
Detection: Fluorescence
Injection: 20 µL

Sample:
1. Cysteic Acid
2. ASP
3. MTO2
4. THR
5. GLU
6. GLY
7. ALA
8. MET
9. Glucosamine
10. Galactosamine
11. HIS
12. LYS
13. N H 3
14. ARG

Amino Acid in Urine

Analysis Conditions:
Column: Transgenomic Lithium Column for 6300
Flow rate: 0.333 mL/min
Temperature: 32.5-63-80°C
Pressure: 1200 PSIG
Detection: Fluorescence
Injection: 20 µL

Sample:
1. PER
2. TAU
3. PETN
4. THR
5. GLU
6. GLY
7. ALA
8. Met
9. CYST
10. ILE
11. LEU
12. TYR
13. PHE
14. BALA
15. BABA
16. TRP
17. E IN
18. N H 3
19. O RN
20. LYS
21. 1 ME-HIS
22. HIS
23. 3 ME-HIS
24. A NS
25. CARN
26. ARG
**Transgenomic Lithium Amino Acid Column**

(4 x 100 mm)
P/N AAA-99-6311
- Designed for use with the Beckman Coulter® 6300 and 7300 Amino Acid Analyzers using either the Beckman or Pickering Lithium buffer systems
- The Lithium column is ideal for Physiological amino acid analysis
- Highly efficient 6 micron particle size

**AMINOSep Lithium Guard Kit**
P/N AAA-99-2311

**AMINOSep Lithium Guard Cartridge – 2/PK**
P/N AAA-99-1311

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**Transgenomic Sodium Amino Acid Column**

(4 x 120 mm)
P/N AAA-99-6312
- Designed for use with the Beckman Coulter 6300 and 7300 Amino Acid Analyzers using either the Beckman Coulter or Pickering Sodium buffer systems
- The Sodium column is ideally suited for routine hydrolysate analysis
- Extremely rugged polymer

**AMINOSep Sodium Guard Kit**
P/N AAA-99-2312

**AMINOSep Sodium Guard Cartridge – 2/PK**
P/N AAA-99-1312

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**Transgenomic Sodium Sodium Amino Acid Column for Use with System Gold**

(4 x 200 mm)
P/N AAA-99-6310
- Designed for use with the Beckman Coulter System Gold Amino Acid Analyzer
- This Sodium cation exchange column is ideal for the separation of hydrolysate amino acids.

**AMINOSep Sodium Guard Kit**
P/N AAA-99-2312

**AMINOSep Sodium Guard Cartridge – 2/PK**
P/N AAA-99-1312
AMINOACID Analysis

AMINOSep AA-911 Sodium Column
(4.6 x 250mm)
P/N AAA-99-8553

AMINOSep GC-911 Guard Kit
P/N AAA-99-2353

AMINOSep GC-911 Guard Cartridge
2/PK P/N AAA-99-1353

AMINOSep AA-511 Sodium Column
(4.6 x 150mm)
P/N AAA-99-7554

AMINOSep GC-511 Guard Kit
P/N AAA-99-2354

AMINOSep GC-511 Guard Cartridge – 2/PK
P/N AAA-99-1354

AMINOSep AA-511
High Speed Sodium Column
(4.6 x 120mm)
P/N AAA-99-6554

AMINOSep GC-511 Guard Kit
P/N AAA-99-2354

AMINOSep GC-511 Guard Cartridge – 2/PK
P/N AAA-99-1354
CARBOHYDRATE Analysis

CARBOSep Columns

Transgenomic manufactures a line of polymeric columns for carbohydrate analysis called CARBOSep columns. CARBOSep columns employ a technique called ligand-exchange chromatography for the separation of monosaccharides, disaccharides and oligosaccharides up to 15 glucose units long.

The principle behind ligand exchange is that each of the hydroxyls on a sugar molecule carry a very slight negative charge. The hydroxyl group on the anomeric carbon can be deprotonated and have a strong negative charge. It is the interaction between these negative charges on the sugar molecule and the positive charge contributed by the metal ion secured to the resin surface that causes the sugars to be retained and thus separated.

Ligand exchange resins are highly sulfonated cation exchange resins that have group 1, 2 or transition series metals loaded on. The sulfonic acid groups on the resin tightly hold the metal ions via an ionic attraction so that it is not released during analysis or through the life of the column. It is this metal ion that provides the positive charge that interacts with the negative charge on the sugar.

During analysis, the carbohydrates are introduced onto the column. The sugars are attracted to the metals via an ionic interaction thus they become weakly bound to the metal ion on the resin. Water will also have a weak ionic interaction with the metals on the column, so the water will exchange with the sugars on the metal sites. This ionic adsorption and desorption occurs for the sugars through the column. Since the ionic charge is different for every sugar, separation of the sugars occurs.

Selectivity is easily controlled by resin type, metal selected, and other factors such as temperature and mobile phase. CARBOSep columns are provided in a large variety of resin types and metals to provide selectivities that meet your separation needs.
Selectivity Chart for Carbohydrate Columns

<table>
<thead>
<tr>
<th>Compound</th>
<th>CHO-620 (units in minutes)</th>
<th>CHO-611 (units in minutes)</th>
<th>CHO-682 (units in minutes)</th>
<th>COREGEL 87H (units in minutes)</th>
<th>COREGEL 87P (units in minutes)</th>
<th>COREGEL 87N (units in minutes)</th>
<th>COREGEL 87K (units in minutes)</th>
<th>COREGEL 87C (units in minutes)</th>
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<td>10.64</td>
<td>11.08</td>
<td>23.95</td>
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<td>16.32</td>
<td>12.64</td>
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<td>10.96</td>
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<td>10.52</td>
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<td>Nitrates</td>
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<td>5.70</td>
<td>6.40</td>
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*Mobile Phase: 100% water. • Flow rate: 0.5 mL/minute. • Temperature: 90°C

Carbohydrate Columns Specifications Chart

<table>
<thead>
<tr>
<th>Column Application</th>
<th>Form</th>
<th>Typical Mobile Phase</th>
<th>Recom'd Flow (mL/min)</th>
<th>Recom'd Temp (°C)</th>
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<tbody>
<tr>
<td>CARBOSep CHO-411</td>
<td>oligosaccharides up to DP10, corn syrup, molasses</td>
<td>sodium</td>
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<td>water</td>
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<td>CARBOSep CHO-611</td>
<td>oligosaccharides up to DP5</td>
<td>sodium</td>
<td>10</td>
<td>water</td>
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<tr>
<td>CARBOSep CHO-611OH</td>
<td>mono and oligosaccharides w/ PAD detection</td>
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<td>sodium hydroxide</td>
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<td>CARBOSep CHO-620</td>
<td>high fructose corn syrup, mono-, di-, trisaccharides and sugar alcohols</td>
<td>calcium</td>
<td>10</td>
<td>water</td>
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<td>CARBOSep CHO-682</td>
<td>mono and disaccharides, sucrose, maltose lactose</td>
<td>lead</td>
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<td>CARBOSep CHO-820</td>
<td>simple sugars, sugar alcohols</td>
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<td>CARBOSep COREGEL 87C</td>
<td>mono and disaccharides</td>
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<td>water</td>
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<td>CARBOSep COREGEL 87H</td>
<td>fast analysis of organic acids, alcohols, sugar mixtures</td>
<td>hydrogen</td>
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<td>sulfuric acid</td>
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<td>ICSep COREGEL 87H3</td>
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<td>CARBOSep USP L19</td>
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<td>grape must analysis</td>
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**Separation of Carbohydrates with PAD**

**Analysis Conditions:**
- Column: CHO-611OH
- Eluent: 0.015N NaOH
- Flow rate: 0.6 mL/min
- Temperature: 85°C
- Detection: PAD
- Injection: 5 µL

**Sample:**
1. Sucrose (500 ppm)
2. Glucose (250 ppm)
3. Arabinose (250 ppm)

**Separation of Blocked Carbohydrates**

**Analysis Conditions:**
- Column: CHO-611OH
- Eluent: 0.01 N NaOH
- Flow rate: 0.5 mL/min
- Temperature: 85°C
- Detection: RI
- Injection: 10 µL

**Sample:**
- Monoacetone xylofuranose
- Diacetone xylofuranose

**Separation of Carbohydrate Standards**

**Analysis Conditions:**
- Column: CHO-820
- Eluent: Distilled Water
- Flow rate: 0.5 mL/min
- Temperature: 90°C
- Detection: DRI

**Sample:**
1. Raffinose
2. Sucrose
3. Glucose
4. Galactose
5. Fructose
6. Mannitol
7. Sorbitol

**Separation of Mannitol and Sorbitol for USP-L-19**

**Analysis Conditions:**
- Column: CHO-820 L-19
- Eluent: Distilled Water
- Flow rate: 0.2 mL/min
- Temperature: 30°C
- Detection: RI

**Sample:**
1. Mannitol
2. Sorbitol
Separation of Sugars in Apple Juice

**Analysis Conditions:**
Column: CHO-820 (7.8 mm x 300)
Eluent: Distilled Water
Flow rate: 0.5 mL/min
Temperature: 90°C
Pressure: 50 Bar
Detection: RI Range 16x
Injection: 20 µL

**Sample:**
Apple Juice Diluted 1:9 with DI Water
1. Sucrose
2. Glucose
3. Fructose
4. Sorbitol

---

Apple Juice

**Analysis Conditions:**
Column: CHO-620
Eluent: H₂O
Flow rate: 0.5 mL/min
Temperature: 90°C
Detection: DRI
Injection: 20 µL

**Sample:**
1. Sucrose
2. Glucose
3. Fructose

---

Separation of Various Sugars and Sugar Alcohols on a Coregel-87C Column

**Analysis Conditions:**
Column: Coregel-87C (7.8 mm x 300)
Eluent: Distilled Water
Flow rate: 0.6 mL/min
Temperature: 85°C
Pressure: 425 psig
Detection: RI Range 18x
Injection: 20 µL

**Sample:**
1. Raffinose
2. Sucrose
3. Lactulose
4. Glucose
5. Galactose
6. Fructose
7. Ribitol
8. Mannitol
9. Sorbitol

---

Analysis of Honey on a Coregel-87C Column

**Analysis Conditions:**
Column: Coregel-87C
Eluent: Distilled Water
Flow rate: 0.6 mL/min
Temperature: 85°C
Pressure: 425 psig
Detection: RI Range 16x
Injection: 20 µL

**Sample:**
1. DP3
2. DP2
3. Glucose
4. Fructose
**Carbohydrate Analysis**

**Sugar Separation on CARBOSep CHO-820**

**Analysis Conditions:**
- Column: CHO-820
- Eluent: Distilled Water
- Flow rate: 0.5 mL/min
- Temperature: 90°C
- Detection: RI
- Injection: 20 mL

**Sample:**
1. Melezitose (2.4 mg/mL)
2. Maltose (2.4 mg/mL)
3. Glucose (2.4 mg/mL)
4. Maltitol (3.2 mg/mL)
5. Fucose (2.4 mg/mL)
6. Ribose (2.4 mg/mL)

**Corn Syrup**

**Analysis Conditions:**
- Column: CHO-411
- Eluent: H₂O
- Flow rate: 0.5 mL/min
- Temperature: 75°C
- Detection: DRI
- Injection: 20 µL of diluted dark corn syrup

**Sample:**
1. DP7
2. DP6
3. DP5
4. DP4
5. DP3
6. Maltose
7. Glucose

**Orange Juice**

**Analysis Conditions:**
- Column: CHO-620
- Eluent: H₂O
- Flow rate: 0.5 mL/min
- Temperature: 90°C
- Detection: DRI
- Injection: 20 µL

**Sample:**
1. Oligosaccharides
2. Sucrose
3. Glucose
4. Fructose

**Brand A**
- RI at 8x

**Brand B**
- RI at 32x
**Domestic Beer**

**Analysis Conditions:**
- Column: CHO-682
- Eluent: H₂O
- Flow rate: 0.4 mL/min
- Temperature: 80°C
- Detection: DRI
- Injection: 20 µL

**Sample:**
1. Higher oligosaccharides
2. DP6
3. DP5
4. DP3
5. DP4
6. Maltose
7. Glucose
8. Ethanol

**Determination of Sugars in Ale**

**Analysis Conditions:**
- Column: CHO-682
- Eluent: H₂O
- Flow rate: 0.4 mL/min
- Temperature: 80°C
- Detection: DRI
- Injection: 20 µL

**Sample:**
1. Maltose
2. Glucose
3. Ethanol

**Non-alcoholic Malt Liquor**

**Analysis Conditions:**
- Column: CHO-411
- Eluent: H₂O
- Flow rate: 0.5 mL/min
- Temperature: 75°C
- Detection: DRI
- Injection: 20 µL

**Sample:**
1. DP6
2. DP5
3. DP4
4. DP3
5. Maltose
6. Glucose
7. Ethanol

**Malted Milk Candy**

**Analysis Conditions:**
- Column: CHO-411
- Eluent: H₂O
- Flow rate: 0.5 mL/min
- Temperature: 75°C
- Detection: DRI
- Injection: 20 µL of pretreated sample with POLYSorb™ ACT-1

**Sample:**
1. DP7
2. DP6
3. DP5
4. DP4
5. DP3
6. Maltose
7. Glucose
**Mono- and Disaccharides**

**Analysis Conditions:**
- Column: CHO-682
- Eluent: H₂O
- Flow rate: 0.4 mL/min
- Temperature: 80°C
- Detection: Refractometry

**Sample:**
1. Sucrose
2. Maltose
3. Glucose
4. Xylose
5. Galactose
6. Arabinose
7. Mannose

**Standard Sugar Mixture On CHO-620 Column**

**Analysis Conditions:**
- Column: CHO-620
- Eluent: H₂O
- Flow rate: 0.5 mL/min
- Temperature: 90°C
- Detection: RI
- Injection: 20 µL

**Sample:**
1. Maltotriose
2. Sucrose
3. Glucose
4. Galactose
5. Fructose
6. Mannitol
7. Arabinol
8. Sorbitol

**Saccharides and Sugar Alcohol Separation on CARBOSep CHO-820**

**Analysis Conditions:**
- Column: CHO-820
- Eluent: Distilled Water
- Flow rate: 0.5 mL/min
- Temperature: 90°C
- Detection: RI
- Injection: 20µL

**Sample:**
1. Maltotriose
2. Cellobiose
3. Glucose
4. Mannose
5. Arabinose
6. Adonitol
7. Arabitol
8. Xylitol

**Separation of Carbohydrate Standard**

**Analysis Conditions:**
- Column: CHO-820
- Eluent: H₂O
- Flow rate: 0.5 mL/min
- Temperature: 90°C
- Detection: DRI

**Sample:**
1. Rafinose
2. Sucrose
3. Glucose
4. Galactose
5. Fructose
6. Mannitol
7. Sorbitol
**Standards**

**Analysis Conditions:**
Column: CHO-611
Eluent: H₂O
Flow rate: 0.5 mL/min
Temperature: 90°C
Detection: DRI
Injection: 20 µL

**Sample:**
1. Maltose
2. Glucose
3. Fructose (7 mg/mL each)

---

**CARBOSep COREGEL-87MM Column**

**Analysis Conditions:**
Eluent: H₂O
Flow Rate: 0.6 mL/min
Detector: RI
Temperature: 85°C

**Sample:**
1. DP4+
2. DP4
3. DP3
4. Maltose
5. Glucose
6. Galactose
7. Fructose
8. Mannitol
9. Sorbitol

---

**CARBOSep COREGEL-42Ag Column**

**Analysis Conditions:**
Eluent: H₂O
Flow Rate: 0.4 mL/min
Detector: RI
Temperature: 75°C

**Sample:**
Corn Syrup
CARBOHYDRATE Analysis

**CARBOSep CHO-620**

(6.5 x 300mm)
P/N CHO-99-9753
- Calcium form ligand-exchange column
- Ideal for the separation of monosaccharides and sugar alcohols
- Very reproducible

**CARBOSep CHO-620 Guard Kit**
P/N CHO-99-2353

**CARBOSep CHO-620 Guard Cartridge – 2/PK**
P/N CHO-99-1353

**CARBOSep CHO-682 Lead**

(7.8 x 200mm)
P/N CHO-99-8854
(7.8 x 300mm)
P/N CHO-99-9854
- Lead form ligand-exchange column
- Ideal for the separation of mono and disaccharides as well as alcohols
- High capacity

**CARBOSep CHO-682 Guard Kit**
P/N CHO-99-2354

**CARBOSep CHO-682 Guard Cartridge – 2/PK**
P/N CHO-99-1354

**CARBOSep CHO-820 Calcium**

(7.8 x 200mm)
P/N CHO-99-8855
(7.8 x 300mm)
P/N CHO-99-9855
- Calcium form ligand-exchange column
- Designed with balance of resolution and ruggedness

**CARBOSep CHO-820 Guard Kit**
P/N CHO-99-2355

**CARBOSep CHO-820 Guard Cartridge – 2/PK**
P/N CHO-99-1355
CARBOSep CHO-611 OH
(6.5 x 150mm)
P/N CHO-99-7752
• Sodium form ligand-exchange column
• Designed for use with Sodium Hydroxide eluant
• Compatible with amperometric detection

CARBOSep CHO-611 OH Guard Kit
P/N CHO-99-2352

CARBOSep CHO-611 OH Guard Cartridge – 2/PK
P/N CH0-99-1352

CARBOSep CHO-411
(7.8 x 300mm)
P/N CHO-99-9850
• Sodium form mixed-mode column
• Separates by both ligand exchange and size exclusion
• Designed for the separation of oligosaccharides up to DP10
• Reproducible separation of corn syrup

CARBOSep CHO-611 Guard Kit
P/N CHO-99-2351

CARBOSep CHO-611 Guard Cartridge – 2/PK
P/N CH0-99-1351

CARBOSep CHO-611
(6.5 x 300mm)
P/N CHO-99-9751
• Sodium form mixed-mode column
• Separates by both ligand exchange and size exclusion
• Designed for the separation of oligosaccharides up to DP5
• Reproducible separation of corn syrup

CARBOSep CHO-611 Guard Kit
P/N CHO-99-2351

CARBOSep CHO-611 Guard Cartridge – 2/PK
P/N CH0-99-1351
CARBOSep USP L19 CA-FORM
(4.0 x 250mm)
P/N CHO-99-8453
- Calcium form ligand-exchange column
- Complies with USP L-19 specifications for the separation of sorbitol and mannitol
- Can also separate a wide number of other carbohydrates

CARBOSep CHO-820 Guard Kit
P/N CHO-99-2355

CARBOSep CHO-820 Guard Cartridge – 2/PK
P/N CHO-99-1355

CARBOSep COREGEL-87C
(7.8 x 300)
P/N CHO-99-9860
- Calcium form 9µm ligand exchange resin with 8% cross-linking
- Compatible replacement for the Bio-Rad Aminex HPX 87C
- Designed for the analysis of sugars and sugar alcohols

CARBOSep COREGEL-87C Guard Kit
P/N CHO-99-2360

CARBOSep COREGEL-87C Guard Cartridge – 2/PK
P/N CHO-99-1360

CARBOSep COREGEL-87K
(7.8 x 300)
P/N CHO-99-9862
- Potassium form 8µm ligand exchange resin with 8% cross-linking
- Compatible replacement for the Bio-Rad Aminex HPX 87K
- Target application corn syrup and molasses

CARBOSep COREGEL-87K Guard Cartridge – 2/PK
P/N CHO-99-1362

Universal Guard Cartridge Holder
P/N AXC-99-1300
CARBOSep COREGEL-87N
(7.8 x 300mm)
P/N CHO-99-9863
• Sodium form 8µm ligand exchange resin with 8% cross-linking
• Compatible replacement for the Bio-Rad Aminex HPX 87N
• Designed for the fast separation of monosaccharides and sugar alcohols

CARBOSep COREGEL-87N Guard Cartridge – 2/PK
P/N CHO-99-1363

Universal Guard Cartridge Holder
P/N AXC-99-1300

CARBOSep COREGEL-87P
(7.8 x 300mm)
P/N CHO-99-9864
• Lead form 8µm ligand exchange resin with 8% cross-linking
• Compatible replacement for the Bio-Rad Aminex HPX 87P
• Optimized for the analysis of cellulose hydrolysates

CARBOSep COREGEL-87P Guard Cartridge – 2/PK
P/N CHO-99-1364

Universal Guard Cartridge Holder
P/N AXC-99-1300
**CARBOSep COREGEL-87MM**
(7.8 x 300mm)
P/N CHO-99-9865
• Mixed calcium/sodium form ligand-exchange column
• Increased efficiency of glucose, fructose, and sugar alcohols
• Easily cleaned with EDTA CaNa$_2$

**CARBOSep COREGEL-87MM Guard Cartridge 2/PK**
P/N CHO-99-1365

**Universal Guard Cartridge Holder**
P/N AXC-99-1300

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**CARBOSep COREGEL-42Ag**
(7.8 x 300mm)
P/N CHO-99-9851
• Silver form ligand-exchange column
• Separate oligosaccharides up to DP11
• Compatible replacement for the Bio-Rad Aminex
  HPX-42A column

**CARBOSep COREGEL-42Ag Guard Cartridge 2/PK**
P/N CHO-99-1366

**Universal Guard Cartridge Holder**
P/N AXC-99-1300

---

**Analysis Conditions:**
Eluent: Water
Flow rate: 0.6 mL/min
Detector: RI

**Sample:**
1. Sucrose
2. Glucose
3. Fructose
4. Arabinose

---

**Analysis Conditions:**
Eluent: H$_2$O
Flow rate: 0.4 mL/min
Detector: RI

**Sample:**
Maltoooligosaccharides
ICSep Columns for Organic Acid Analysis

Ion exclusion is the preferred method for the separation of weakly ionizable species such as organic acids and alcohols. Transgenomic provides a broad range of columns that provide varying efficiencies and selectivities for the separation of weak acids by ion exclusion.

The packings employed with ion exclusion are totally sulfonated polystyrene divinylbenzene (PS/DVB) copolymers. By totally sulfonating the polymer, the bead behaves as though it were a negatively charged sphere. This charged sphere is referred to as a Donnan membrane. Species that have a negative charge are repelled from the negatively charged membrane, while uncharged species are allowed to enter the sphere and adsorb onto the beads. The mobile phases employed with ion exclusion are low concentration acids, such as 5mM sulfuric acid.

\[ \text{R-COO}^- + \text{H}^+ \leftrightarrow \text{R-COOH} \]

This equilibrium is regulated by the acidic dissociation constant (pKa) of the organic acid or alcohol. Therefore, species are analyzed by ion exclusion and elute according to their pKa.

Features

The key features of the ICSep ion exclusion columns are:

- Polymeric Substrate
- High efficiency
- High resolution
- Separates organic acids, carbohydrates, and alcohols on the same column
- Very Rugged Design which provides long life

Since ICSep columns are based on a polymeric substrate consisting of polystyrene/divinylbenzene copolymers they are stable in the pH range of 0 to 14, temperature stable, and very rugged. The ICSep organic acid columns have been shown to last for thousands of runs without cleaning. They show very good lot-to-lot and column-to-column reproducibility with retention times varying by less than 1%.

Transgenomic offers ICSep organic acid columns to meet your analytical needs. ICSep columns are available that focus on speed or efficiency and there are ICSep ion exclusion columns that focus on ruggedness and the ability to handle dirty samples. There are even ICSep columns for aromatic organic acids. Transgenomic is sure to have an ion exclusion column to meet your needs.
## Selectivity Chart for Ion Exclusion Columns

<table>
<thead>
<tr>
<th>Compound</th>
<th>Coregel 87H @ 85°C (units in minutes)</th>
<th>Coregel 64H @ 65°C (units in minutes)</th>
<th>ION-300 @ 65°C (units in minutes)</th>
<th>ORH-801 @ 45°C (units in minutes)</th>
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<tbody>
<tr>
<td>Acetic acid</td>
<td>13.8</td>
<td>15.0</td>
<td>14.9</td>
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<tr>
<td>Acratoenic acid</td>
<td>nd</td>
<td>nd</td>
<td>nd</td>
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<tr>
<td>Acetic acid</td>
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<td>10.7</td>
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<td>15.9</td>
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<td>nd</td>
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<td>nd</td>
<td>nd</td>
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<td>Tartaric acid</td>
<td>8.0</td>
<td>8.6</td>
<td>9.5</td>
<td>5.9</td>
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</tbody>
</table>

Flow rate: 0.6 mL/minute. nd = not determined
Standard Mixture of Sugars and Acids

Analysis Conditions:
Column: ION-300
Eluent: 0.0085 \( N \) \( \text{H}_2\text{SO}_4 \)
Flow rate: 0.4 mL/min
Temperature: 70°C
Detection: DRI

Sample:
1. Citric Acid
2. Tartaric Acid
3. Glucose
4. Malic Acid
5. Fructose
6. Lactic Acid
7. Glycerol
8. Acetic Acid
9. Methanol
10. Ethanol

Krebs Tricarboxylic Acid Cycle Intermediates

Analysis Conditions:
Column: ION-300
Eluent: 0.01 \( N \) \( \text{H}_2\text{SO}_4 \)
Flow rate: 0.4 mL/min
Temperature: 42°C
Detection: DRI

Sample:
1. Cis-Aconitic Acid
2. Oxaloacetic Acid
3. Citric Acid
4. \( \alpha \)-ketoglutaric Acid
5. Pyruvic Acid
6. Malic Acid
7. Lactic Acid
8. Succinic Acid
9. Fumaric Acid

Comparison of Organic Acids Retention on Ion-exclusion Columns

Analysis Conditions:
Column: ION-310 (6.5 x 150 mm), ORH-801 (6.5 x 300 mm), ION-300 (7.8 x 300 mm)
Eluent: 0.002 \( N \) \( \text{H}_2\text{SO}_4 \)
Flow rate: 0.5 mL/min
Temperature: 35°C
Detection: UV at 210 nm
Injection: 20 \( \mu \)L

Sample:
1. Maleic Acid (2 ppm)
2. Malic Acid (100 ppm)
3. Fumaric Acid (5 ppm)
Borate and Bicarbonate
Analysis Conditions:
Column: ION-310
Eluent: 0.05 M H₂SO₄
Flow rate: 0.5 mL/min
Temperature: Ambient
Detection: Conductivity
Injection: 20 µL

Sample:
1. Borate (11 ppm)
2. Bicarbonate (60 ppm)

Wine Analysis by High Resolution Ion Exclusion
Analysis Conditions:
Column: ION-300
Eluent: 0.005 N H₂SO₄
Flow rate: 0.3 mL/min
Temperature: 60°C
Detection: DRI

Sample:
1. Citric Acid
2. Tartaric Acid
3. Glucose
4. Malic Acid
5. Fructose
6. Acetic Acid
7. Glycerol
8. Lactic Acid
9. Methanol
10. Ethanol

Analysis of Corn Mash Fermentation Sample
Analysis Conditions:
Column: ION-300
Eluent: 0.005 N H₂SO₄
Flow rate: 0.4 mL/min
Temperature: 60°C
Detection: UV at 210
Injection: 20 µL filtered corn mash fermentation broth

Sample:
1. Citric, isocitric
2. Pyruvic
3. Succinic
4. Fumaric
5. Ethanol
**Fermentation Broth**

**Analysis Conditions:**
- Column: ORH-801
- Eluent: 0.0025 $N$ H$_2$SO$_4$
- Flow rate: 0.6 mL/min
- Temperature: 65°C
- Detection: RI
- Injection: 20 µL

**Sample:**
1. Maltotriose
2. Maltose
3. Glucose
4. Fructose
5. Lactic Acid
6. Glycerol
7. Acetic Acid
8. Methanol
9. Ethanol

---

**Preservatives in Container Citrus Juice**

**Analysis Conditions:**
- Column: ARH-601
- Eluent: 0.01 $N$ H$_2$SO$_4$
- Flow rate: 0.6 mL/min
- Temperature: 45°C
- Detection: UV at 228 nm

**Sample:**
1. Citric Acid
2. Ascorbic Acid
3. Sorbic Acid
4. Benzoic Acid

---

**Fast Acid Analysis**

**Analysis Conditions:**
- Column: ORH-801
- Eluent: 0.01 $N$ H$_2$SO$_4$
- Flow rate: 0.5 mL/min
- Detection: Conductivity

**Sample:**
1. Acetic Acid
2. Glycerol

---

**Fluoride in Dental Rinse**

**Analysis Conditions:**
- Column: ION-310
- Eluent: 0.01 $N$ H$_2$SO$_4$
- Flow rate: 1.0 mL/min
- Temperature: 50°C
- Detection: DRI

**Sample:**
Dental rinse diluted 1/10 with eluent, 20 µL
1. Phosphate
2. Saccharin
3. Glycerol
4. Ethanol
**Separation of Organic Acids**

**Analysis Conditions:**
- Column: ORH-801
- Eluent: 0.01 N H₂SO₄
- Flow rate: 0.8 mL/min
- Temperature: 35°C
- Detection: DRI
- Injection: 20 µL

**Sample:**
1. Oxalic
2. cis-aconitic
3. Tartaric
4. Malic
5. Lactic
6. Formic
7. Fumaric
8. Propionic
9. Butyric

---

**Determination of Chemical Markers for Thermal Processing of Ground Meat**

**Analysis Conditions:**
- Column: Coregel-87H (100 x 7.8 mm)
- Eluent: 0.005 N H₂SO₄
- Flow rate: 1.0 mL/min
- Temperature: 35°C
- Detection: UV at 285 nm
- Injection: 20 µL

**Sample:**
1. M1
2. M2
3. M3

---

**USP-NF Malic Acid Method, Fumaric and Maleic Acids**

**Analysis Conditions:**
- Column: ORH-801
- Packing L17 specification
- Eluent: 0.01 N H₂SO₄
- Flow rate: 0.6 mL/min
- Temperature: 37°C
- Detection: UV at 210 nm
- Injection: 20 µL

**Sample:** USP Malic Acid
(100 mg in 100 mL volumetric flask, made up with 0.01 N H₂SO₄)
1. Maleic Acid
2. Malic Acid
3. Fumaric Acid
Organic Acid Separation on COREGEL-87H1

Analysis Conditions:
Column: COREGEL-87H1
Eluent: 0.008M Sulfuric Acid
Flow rate: 0.6 mL/min
Temperature: 35°C
Detection: UV @ 210nm
Injection: 20µL

Sample:
1. Lactic Acid
2. Formic Acid
3. Acetic Acid
4. Propionic Acid
5. Butyric Acid

Organic Acid Separation on COREGEL-87H3

Analysis Conditions:
Column: COREGEL-87H3
Eluent: 5mM Sulfuric Acid
Flow rate: 1.0 mL/min
Temperature: 35°C
Detection: UV @ 210nm
Injection: 20µL

Sample:
1. Lactic Acid
2. Formic Acid
3. Acetic Acid
4. Propionic Acid
5. Butyric Acid
**ICSep ION-300**

(7.8 x 300mm)
P/N ICE-99-9850
- Select when high resolution is the primary concern
- Separates Organic Acids, Alcohols and Carbohydrates all on the same column

**ICSep GC-801 Guard Kit**
P/N ICE-99-2354

**ICSep GC-801 Guard Cartridge – 2/PK**
P/N ICE-99-2364

![Organic Acid Analysis Graph](image)
ICSep COREGEL-107H (7.8 x 300mm)  
P/N ICE-99-9866  
- New Higher Cross-linked Column  
- Improved Resolution for Organic Acids

ICSep COREGEL-107H Guard Cartridge – 2/PK  
P/N ICE-99-2366

Universal Guard Cartridge Holder  
P/N AXC-99-1300

Organic Acid Separation Comparison on the NEW ICSep COREGEL-107H and Competitive Organic Acid Column

Analysis Conditions:  
Column: COREGEL-107H and Competitive Organic Acid Column  
Eluent: 0.008N Sulfuric Acid  
Flow rate: 0.6 mL/min  
Temperature: 35°C  
Detection: UV @ 210nm  
Injection: 20µL

Sample:  
1. Citric Acid  
2. Alpha Ketoglutaric Acid  
3. Fumaric Acid  
4. Acetic Acid

---

ICSep COREGEL-107H

Competitive Organic Acid Column
ICSep ORH-801

(6.5 x 300mm)
P/N ICE-99-9754
- Provides good balance of high efficiency and ruggedness
- Versatile column for Organic Acids, Alcohols and Carbohydrates

ICSep GC-801 Guard Kit
P/N ICE-99-2354

ICSep GC-801 Guard Cartridge – 2/PK
P/N ICE-99-2364

Sugar and Organic Acid Separation on ICSep Wine Analysis WA-1

Analysis Conditions:
Column: Wine Analysis WA-1
Eluent: 0.0025N Sulfuric Acid
Flow rate: 0.6 mL/min
Temperature: 45°C
Detection: RI
Injection: 20µL

Sample:
1. Citric Acid (0.5 mg/mL)
2. Tartaric Acid (2.0 mg/mL)
3. Glucose (2.0 mg/mL)
4. Malic Acid (1.0 mg/mL)
5. Fructose (2.0 mg/mL)
6. Succinic Acid (0.5 mg/mL)
7. Lactic Acid (2.0 mg/mL)
8. Glycerine (5.0 mg/mL)
9. Acetic Acid (0.5 mg/mL)
10. 2,3-Butanediol (0.5 mg/mL)
11. Isomer Impurity
12. Ethanol (10.0 mg/mL)

ICSep WA-1 Wine Analysis Column

(7.8 x 300mm)
P/N ICE-99-9810

ICSep WA-1 Wine Guard Kit
P/N ICE-99-3510

ICSep WA-1 Wine Guard Cartridge 2/PK
P/N ICE-99-1310
ICSep ION-310
(6.5 x 150mm)
P/N ICE-99-7752
• Designed for fast analysis of organic acids and alcohols
• Ideal for the analysis of borate and bicarbonate

ICSep GC-801 Guard Kit
P/N ICE-99-2354

ICSep GC-801 Guard Cartridge – 2/PK
P/N ICE-99-2364

ICSep ARH-601
(6.5 x 100mm)
P/N ICE-99-5753
• Designed for the separation of Aromatic organic acids
• Uses aqueous mobile phases

ICSep GC-601 Guard Kit
P/N ICE-99-2353

ICSep GC-601 Guard Cartridge – 2/PK
P/N ICE-99-2363

ICSep COREGEL-64H
(7.8 x 300mm)
P/N ICE-99-9860

ICSep COREGEL 64H Guard Kit
P/N ICE-99-2360

ICSep COREGEL 64H Guard Cartridge – 2/PK
P/N ICE-99-2370
Reversed phase is commonly referred to as adsorption chromatography. Reversed phase works by taking advantage of the hydrophobic interactions between molecules and a hydrophobic stationary phase.

In reversed phase, molecules are adsorbed onto a hydrophobic stationary phase. Then, the molecules are desorbed by changing the hydrophobic character of the mobile phase such that the molecules will selectively partition into the mobile phase and elute from the column.

Traditionally, silica-based packings have been the most commonly used sorbants. However, as samples become more challenging, as with biological samples, supports are required that have broader pH ranges, are more rugged, and can be cleaned. Transgenomic provides a family of products all based on polystyrene-divinylbenzene sorbants that utilize our patented alkylation technology.

**RPSep Columns**

**Features**

The key features of RPSep polymeric reversed phase columns are:

- pH stable from 0 – 14
- temperature stable
- very rugged, long lasting materials
- very tight particle size range (± 0.5µm) for high efficiency
- very high efficiency for polymeric resins
- both alkylated and non alkylated PS/DVB available
- all resins available in both analytical and bulk for scalability

And, as with all Transgenomic Chromatography products, RPSep columns provide excellent column-to-column and lot-to-lot reproducibility.
**Aspirin and Salicylic Acid on Poly-RP C0**

**Analysis Conditions:**
Column: Poly-RP C0  
Eluent: 1% H₃PO₄ (28%) in 50:50 ACN:H₂O  
Flow rate: 0.75 mL/min  
Temperature: Ambient  
Detection: UV at 254 nm

**Sample:**
1. Aspirin (2-(acetyloxy)-benzoic acid)  
2. Benzoic Acid  
3. Salicylic Acid

---

**Separation of Sulfonamides on Poly-RP C0**

**Analysis Conditions:**
Column: Poly-RP C0  
Eluent: 0.01 M KH₂PO₄ in 25:75 ACN:H₂O  
Flow rate: 0.75 mL/min  
Detection: UV at 254 nm

**Sample:**
1. Sulfanilic Acid (10 µg/mL)  
2. Sulfanilamide (10 µg/mL)  
3. Sulfathiazole (20 µg/mL)  
4. Sulfamethizole (20 µg/mL)  
5. Sulfamerazine (30 µg/mL)  
6. Sulfamethazine (30 µg/mL)  
7. Sulfisoxazole (30 µg/mL)  
8. Sulfamethoxazole (30 µg/mL)
Separation of PGRs and Herbicides

**Analysis Conditions:**
Column: Poly-RP C0  
Eluent: 30:70 ACB:1% acetic acid, B: 100% ACN  
Gradient: 100% A for 4 min,  
100% A to 50% A in 8 min,  
hold for 4 min  
Flow rate: 0.6 mL/min  
Temperature: Ambient  
Detection: UV at 280 nm  
Injection: 20 µL

**Sample:**
1. Maleic Acid Hydrazide  
2. Kinetin  
3. 6-benzylaminopurine riboside  
4. Colchicine  
5. Indole-3-Acetic-Acid  
6. α-naphthaleneacetamide  
7. Indole-3-Propanoic Acid  
8. p-Chlorophenoxy-Acetic Acid  
9. Indole-3-Butyric Acid  
10. α-naphthaleneacetic Acid  
11. β-naphthalene-Acetic Acid  
12. 2,4,5-trichlorophenoxyacetic Acid  
13. Indole-3-Acetic Ethyl Ester

Separation of Triazine Herbicides on Poly-RP-C0

**Analysis Conditions:**
Column: Poly-RP C0  
Eluent: 60:40 ACN:H2O  
Flow rate: 0.75 mL/min  
Temperature: Ambient  
Pressure: 107 Bar  
Detection: UV at 254 nm

**Sample:**
1. Aminotriazole  
2. Simazine  
3. Amazine  
4. Propazine  
5. Ametryne  
6. Prometryne

Carbamates

**Analysis Conditions:**
Column: ACT-1  
Eluent: 70:30 ACN:H2O  
Flow rate: 0.5 mL/min  
Temperature: Ambient  
Detection: UV at 240 nm  
Injection: 20 µL

**Sample:**
1. Oxamyl (5 µg/mL)  
2. Aldicarb (30 µg/mL)  
3. Carbofuran (30 µg/mL)  
4. Carbaryl (30 µg/mL)  
5. Propham (2.5 µg/mL)  
6. Methiocarb (12.5 µg/mL)  
7. Ferbam (9 µg/mL)  
8. ChloroPC (9 µg/mL)  
9. EPTC (87.5 µg/mL)
Separation of polar and Non-polar Compounds

**Analysis Conditions:**
- **Column:** ACT-1
- **Eluent:** 60:40 ACN:H₂O
- **Flow rate:** 0.3 mL/min
- **Temperature:** Ambient
- **Detection:** UV at 254 nm

**Sample:**
1. Unknown
2. Phenol
3. Aniline
4. Acetophenone
5. Nitrobenzene
6. Toluene

Tertiary Amines on Poly-RP C0

**Analysis Conditions:**
- **Column:** Poly-RP C0
- **Eluent:** 0.1 M Ammonia in 80:20 ACN:H₂O
- **Flow rate:** 0.75 mL/min
- **Temperature:** Ambient
- **Detection:** UV at 210 nm

**Sample: 0.05 µL/mL of**
1. Trimethylamine
2. Triethylamine
3. Diisopropylethylamine
4. Tripropylamine
5. Tributylamine
Comparison of ACT-1 with PRP-type Column

Analysis Conditions:
Column: ACT-1
Eluent: 80:20 Methanol: Water
Linear Velocity: 4.2 cm/min
Temperature: Ambient
Detection: UV at 254 nm

Sample:
1. Methylphenone
2. Ethylphenone
3. Propylphenone
4. Butylphenone
5. Pentylphenone
**RPSep PRX-1 Column**

(2.1 x 50mm)
P/N RPC-99-3014
(4.6 x 150mm)
P/N RPC-99-7514
(4.6 x 250mm)
P/N RPC-99-8514

- Porous PS/DVB Polymer
- Ideal for the separation of peptides and small molecules
- Works in entire pH range

**RPSep PRX-1 Guard Kit**
P/N RPC-99-2324

**RPSep PRX-1 Guard Cartridge – 2/PK**
P/N RPC-99-1314

---

**RPSep ACT-1 C18 Column**

(2.1 x 50mm)
P/N RPC-99-3150
(2.1 x 150mm)
P/N RPC-99-7150
(4.6 x 150mm)
P/N RPC-99-7550
(4.6 x 50mm)
P/N RPC-99-3550

- Employs proprietary alkylation technology
- Very stable, highly efficient C18 adsorbant
- Can be used in pH range of 2-14

**RPSep ACT-1 C18 Guard Kit**
P/N RPC-99-2350

**RPSep ACT-1 C18 Guard Cartridge – 2/PK**
P/N RPC-99-2360

---

**RPSep Poly-RP Column**

(4.6 x 150mm)
P/N RPC-99-7551

- Non-alkylated PS/DVB sorbant
- 4 micron particle size for highest efficiency

**RPSep Poly-RP Column Guard Kit**
P/N RPC-99-2351

**RPSep Poly-RP Column Guard Cartridge – 2/PK**
P/N RPC-99-2361
**Introduction**

Ion Chromatography (IC) is the separation of inorganic and organic ionic species by ion exchange chromatography followed by suppressed conductivity detection. The technique was pioneered by Dow Chemical Company in 1974 and has grown in popularity since.

The species analyzed by IC include both anions and cations. The separation of anions is accomplished via anion exchange chromatography. The separations of cations are accomplished via cation exchange chromatography. Transgenomic provides a broad range of columns for the separation of both anions and cations.

The resins used for anion and cation exchange chromatography in IC employ a functionalized, macroporous polystyrene/divinyl benzene copolymer. Resins functionalized with quaternary alkyl or alkenyl ammonium groups are used with hydroxide or carbonate-based eluents for anion exchange IC. Resins functionalized with sulfonic acid or carboxylic acid groups are used with acidic eluents for cation exchange IC.

**Features**

The key features of the Transgenomic IC columns are:

- Polymeric substrate
- Solvent compatibility
- High efficiency
- Reproducibility
- pH Stability from 0 to 14

**Column Selection**

Transgenomic IC columns have been designed to run on a variety of systems. They are tested to be compatible with Ion Chromatographs from: Metrohm-Peak, Dionex, Hach-Lachat, and Alltech. The selectivities have been optimized to be compatible with many of the common IC columns currently available. This includes columns that meet the requirements of E.P.A. methods 300 parts a and b, and E.P.A. method 300.1.
## Column Equivalents Guide

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<th>TRANSGENOMIC COLUMN</th>
<th>COMPETITIVE COLUMNS</th>
<th>APPLICATION</th>
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</thead>
<tbody>
<tr>
<td>ICSep AN300</td>
<td>Dionex AS4A</td>
<td>F⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, HPO₄²⁻, SO₄²⁻, By E.P.A. Method 300.0(a)</td>
</tr>
<tr>
<td>ICSep AN1</td>
<td>Dionex AS9-HC</td>
<td>F⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, HPO₄²⁻, SO₄²⁻, Low molecular weight, Organic acids in medium to high ionic strength matrices</td>
</tr>
<tr>
<td>ICSep ANSC</td>
<td>Dionex AS4A-SC</td>
<td>Polyvalent Phosphates, Arsentate, Sulfite Selenate, Arsenite, Selenite, F⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, HPO₄²⁻, SO₄²⁻, Low molecular weight, Organic acids</td>
</tr>
<tr>
<td>ICSep AN1SC</td>
<td>Dionex AS9-HC</td>
<td>F⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, HPO₄²⁻, SO₄²⁻, Low molecular weight, Organic acids in medium to high ionic strength matrices</td>
</tr>
<tr>
<td>ICSep AN2</td>
<td>Dionex AS14</td>
<td>Arsenate, Sulfite, Selenate, Arsenite, Selenite F⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, HPO₄²⁻, SO₄²⁻, Low molecular weight Organic acids</td>
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<tr>
<td>ICSep AN300B</td>
<td>Dionex AS9</td>
<td>F⁻, Cl⁻, NO₂⁻, Br⁻, NO₃⁻, HPO₄²⁻, SO₄²⁻, ClO₂⁻, ClO₃⁻, BrO₃⁻</td>
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<tr>
<td>ICSep CN2</td>
<td>Dionex CS15</td>
<td>Li⁺, Na⁺, K⁺, Rb⁺, Cs⁺, Mg²⁺, Ca²⁺, NH₄⁺, Cu²⁺, Ni²⁺, Zn²⁺, Co²⁺, Pb²⁺, Mn²⁺, Fe²⁺, Fe³⁺</td>
</tr>
</tbody>
</table>

### Anions by E.P.A. Method 300.0(a)

**Conditions**
- Column: ICSep AN300
- Eluent: 1.7mM Sodium Carbonate, 1.8mM Sodium Bicarbonate
- Flow rate: 2.0 mL/min
- Detection: suppressed conductivity

**Sample:**
1. Fluoride
2. Chloride
3. Nitrite
4. Bromide
5. Nitrate
6. Phosphate
7. Sulfate

### Anions by E.P.A. Method 300.1

**Conditions**
- Column: ICSep AN300B
- Eluent: 3.5mM Sodium Carbonate
- Flow rate: 1.0 mL/min
- Detection: conductivity

**Sample:**
1. Fluoride
2. Chlorite
3. Bromate
4. Dichloroacetate
5. Chloride
6. Nitrite
7. Chlorate
8. Nitrate
9. Bromide
10. Phosphate
11. Sulfate
**Anion Separation using ICSep ANSC**

**Conditions**
Column: ICSep ANSC  
Eluent: 1.8mM Sodium Carbonate, 1.7mM Sodium Bicarbonate  
Flow rate: 1.2 mL/min  
Detection: suppressed conductivity  

**Sample:**  
1. Fluoride  
2. Chloride  
3. Nitrite  
4. Bromide  
5. Nitrate  
6. Phosphate  
7. Sulfate

**Determination of Perchlorate using ICSep ANSC**

**Conditions**
Column: ICSep ANSC with guard  
Eluent: 30mM Sodium Hydroxide, 10mM Cyanophenol  
Flow rate: 1.2 mL/min  
Detection: suppressed conductivity  

**Sample:**  
1. 4ppb ClO₄⁻

**Cations using ICSep CN2**

**Conditions**
Column: ICSep CN2  
Eluent: 0.1mM Ce (III)  
Flow rate: 1.0 mL/min  
Detection: UV @ 254nm

**Sample:**  
1. 3ppm sodium  
2. 3ppm ammonium  
3. 5ppm potassium  
4. 30ppm rubidium  
5. 30ppm cesium  
6. 10ppm magnesium  
7. 10ppm calcium
**Ordering Information**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
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<tbody>
<tr>
<td>ICSep AN2, 4.6mm x 250mm</td>
<td>ANX-99-8515</td>
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<tr>
<td>ICSep AN2 Guard Column, 4.6mm x 50mm</td>
<td>ANX-99-3515</td>
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<td>ICSep AN2 Guard Cartridges, 3/pk, 3.0mm x 10mm</td>
<td>ANX-99-0015</td>
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<td>ICSep AN1, 4.6mm x 250mm</td>
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<td>ICSep AN1-SC, 4.6mm x 250mm</td>
<td>ANX-99-8514</td>
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<td>ICSep AN300, 5.5mm x 150mm</td>
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<td>ICSep AN300B, 4.6mm x 250mm</td>
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<td>ICSep ANSC, 4.6mm x 250mm</td>
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<td>ICSep ION-120, 4.6mm x 120mm</td>
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<td>ICSep ION-120 Guard Kit, 4.0mm x 24mm</td>
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<td>ICSep CN2, 3.2mm x 100mm</td>
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<td>ICSep CN2 Guard Cartridges, 2/pk, 3.0mm x 10mm</td>
<td>CTX-99-1350</td>
</tr>
</tbody>
</table>
Guard-Disc System

The Transgenomic Guard-Disc System is a patented column protection system that is designed to provide the protection capabilities of a guard column without adding any extra volume that might interfere with chromatographic separation.

The Guard-Disc System is comprised of a disc, which is available in a variety of functionalities, and a disc holder that couples directly to the column.

The disc is a PEEK ring that contains a functionalized chromatographic membrane. This chromatographic membrane is available in a variety of stationary phases for both HPLC and Ion Chromatography applications.

Phases

The stationary phases that Guard-Discs Systems are available in include:

• C18
• C8
• Styrene/DVB
• Anion Exchange
• Cation Exchange

It is these functional groups that bind the contaminants that would otherwise be trapped on your analytical column.

Double Protection

Transgenomic Guard-Disc Systems are porous as well. Not only do they bind species that may contaminate your analytical column, they also filter out particulates that would otherwise be trapped on your analytical column. The Transgenomic Guard-Disc System provides double protection for your chromatographic column.
Guard-Disc System Characteristics

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<tr>
<th>Membrane Functionality</th>
<th>Application</th>
<th>Porosity (µm)</th>
<th>Solvent Compatibility</th>
<th>pH Range</th>
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<tr>
<td>C18-A</td>
<td>Reversed Phase</td>
<td>0.2</td>
<td>All</td>
<td>2-8</td>
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<tr>
<td>C18-B</td>
<td>Reversed Phase</td>
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<td>Acetonitrile Methanol</td>
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<td>C8</td>
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<td>All</td>
<td>2-8</td>
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<tr>
<td>S/DVB</td>
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<td>Anion Exchange</td>
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<td>All</td>
<td>1-13</td>
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<tr>
<td>CATEX</td>
<td>Anion Exchange</td>
<td>0.2</td>
<td>All</td>
<td>1-13</td>
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</tbody>
</table>

TRANSGENOMIC GUARD Discs®

**Ion Exchangers**

- **ANEX Guard-Disc – (10/pk)**
  - P/N GRD-99-0704
  - CATEX Guard-Disc – (10/pk)
    - P/N GRD-99-0705

**Adsorbants**

- **C18A Guard-Disc (10/pk)**
  - P/N GRD-99-0701
- **C18B Guard-Disc (10/pk)**
  - P/N GRD-99-0731
- **C8 Guard-Disc (10/pk)**
  - P/N GRD-99-0702
- **S/DVB Guard-Disc (10/pk)**
  - P/N GRD-99-0706

TRANSGENOMIC GUARD Disc® Holders

**Guard-Disc Direct Holder 1**

(Parker Type)
- P/N AXC-99-0002

**Guard-Disc Direct Holder 2**

(Waters Type)
- P/N AXC-99-0003

**Guard-Disc Universal Holder 1N**

(Universal)
- P/N AXC-99-0004
SOLID PHASE Extraction

Transgenomic POLYSorb™ Products for Solid Phase Extraction

Solid Phase Extraction (SPE) is a sample preparation technique that is employed to clean up or concentrate samples prior to analysis. SPE can be used to clean-up samples by removing interferences that would otherwise compromise analysis. It can be used to concentrate by allowing a large volume of sample to be reduced into a small elution volume. Compared to other sample preparation techniques, such as liquid-liquid extraction, SPE provides cleaner extracts with high recoveries. SPE is also faster and uses less solvent which saves money.

Modes

SPE tubes can be used in two modes:

1. In the flow-through mode the sample can be passed through the tube. While passing through the tube, the contaminants present are retained while the analyte of interest is allowed to pass through. The steps for this mode are 1) Load the sample into the tube 2) Wash to elute the analyte of interest.

2. In the selective elution mode the sample is passed through the tube. But in this mode, the analyte of interest is retained while contaminants pass through. After the sample is loaded onto the column, the analyte of interest is selectively eluted by choosing elution conditions that will elute the analyte from the column while retaining interfering components. The steps used with this mode are 1) Load the sample onto the column 2) Wash through weakly retained or unretained contaminants 3) Elute the analyte of interest.

The most common SPE packing are polar adsorbants. These adsorbants are used to remove organic interferences from samples. Also, commonly used are ion exchangers to remove charged species as interferences. Transgenomic offers products for both adsorption and ion exchange.

Key Features of Transgenomic SPE products

As with all of Transgenomic’s chromatography products, the SPE products are all based on polymeric resins. Polymer-based resins are used because of the broad pH range available and the chemical and physical stability of the materials. These cartridges are ideally suited for cleaning up samples in tough matrices.

Transgenomic POLYSorb cartridges provide very high loading capacities to accommodate for concentrated samples. POLYSorb cartridges also provide excellent selectivity even for trace level analysis.

POLYSorb Cartridges in the format you need

Transgenomic POLYSorb cartridges are provided in three stationary phase formats:

- Unmodified Poly-[styrene/divinylbenzene] (PS/DVB)
- Alkylated (C18) PS/DVB
- Sulfonated PS/DVB

Transgenomic offers each of these cartridges in either 100mg or 400mg tubes, or we can custom pack in sizes to meet your specific needs.

POLYSorb tubes are compatible with off-the-shelf SPE vacuum manifolds, automated workstations or other commonly used accessories.
Extraction of Organic Acids from Burgundy Wine with ACT-1

Sample Preparation:
Dilute wine 1:10 with distilled water

Conditioning Step:
Wet tube with 1 mL of methonal followed by 1 mL of 10:90 methonal:water

Sample Addition:
Load 500 µL of dilute wine

Wash Step:
1.0 mL of water

Elution Step:
1.0 mL of 0.05 N H₂SO₄

Analysis Conditions:
Column: ION-300
Eluent: 0.01 N H₂SO₄
Flow rate: 0.5 mL/min
Temperature: 60°C
Detection: UV at 214 nm
Injection: 20 µL

Sample:
1. Citric Acid
2. Tartaric Acid
3. Glucose
4. Malic Acid
5. Fructose
6. Glycerol
7. Succinic Acid
8. Acetic Acid

POLYSorb ACT-1, C18, 100mg
(100/box)
P/N SPE-99-0100

POLYSorb ACT-1, C18, 400mg
(50/box)
P/N SPE-99-0101
• Patented, Octadecyl-Alkylated PS/DVB
• Ideal for removal of polar compounds
• Stable over pH 0-14, very rugged

POLYSorb MP-3, Highly Sulfonated, 400mg
(50/box)
P/N SPE-99-0105
• pH stable cation exchange resin
• Ideal for removing amines
• Remove cations from ICP analysis

POLYSorb, MP-DVB, PS/DVB 100mg
(100/box)
P/N SPE-99-0108

POLYSorb, MP-DVB, PS/DVB 400mg
(50/box)
P/N SPE-99-0109
• Non-functionalized styrene-divinylbenzene
• Ideal for removing polar compounds
• pH stable from 0-14
• Also available in bulk
Transgenomic has scale-up in mind every time we develop a new resin. The resin in any column discussed in this catalogue is also available in bulk. This allows you to pack your own analytical columns, then quickly and easily scale your analytical application to semi-prep and preparative scales without redevelopment.

If we do not have the resin or particle size that you need, simply call. We have over 20 years experience in the development of polymer materials for analytical and preparative chromatography applications; allow us to put our expertise to work for you.
BUFFERS and SOLVENTS FOR HPLC

Buffers and Solvents for Reversed Phase Chromatography

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<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Size</th>
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<tr>
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<td>Acetonitrile, HPLC Grade</td>
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<tr>
<td>700002</td>
<td>Water, HPLC Grade</td>
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<tr>
<td>553303</td>
<td>Triethlammonium acetate solution, 2M</td>
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<td>SP5890</td>
<td>Triethlammonium acetate solution, 2M</td>
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Amino Acid Analysis Buffers

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<td>Sodium Diluent Na200</td>
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<td>Sodium Regenerant RG011</td>
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Custom Amino Acid Buffers are available for your analysis, please contact Transgenomic for further information.
**Column Coupler**

The patented Column Coupler was developed for the demanding constraints of high efficiency HPLC columns. The Column Coupler permits the quick and easy connection of two analytical HPLC columns in series, or direct connection between a Valco injection valve and an analytical column. Seals are rated to 5,000psi.

The unit is a precision-machined, double-ended PEEK connector with 10-32 threads and a non-wetted Delrin® knurled body. The inert composition and the large knurled handle allow easy, finger-tight connections and leakproof seal to 5,000psi. The 0.010” through-hole minimizes extra column volume effects and is compatible with the demanding constraints imposed with use of 3µm packing and microbore HPLC. These couplers are not capable of universal applications since the tip sizes are fixed.

---

**Guard Cartridge Holder**

The Universal Guard Cartridge Holder was designed for use with Transgenomic guard cartridges.

**Ordering Information:**

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<tr>
<td>282013</td>
<td>Column Coupler, PEEK</td>
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<tr>
<td>AXC-99-1300</td>
<td>Universal Guard Cartridge Holder, 4.0mm x 24mm</td>
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The unit is a stainless steel body with dimensions of 4.0mm x 24mm.
# COLUMN Index

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<td>Transgenomic Li +</td>
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<td>Transgenic Na + Column for System Gold</td>
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<td>AMINOSep AA-911</td>
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<td>AMINOSep AA-511</td>
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<td>AMINOSep AA-511 High Speed</td>
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<td>ICSep COREGEL-107H</td>
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**Notes:**
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- Delrin is a registered trademark of E.I. du Pont Nemours and Company.
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