

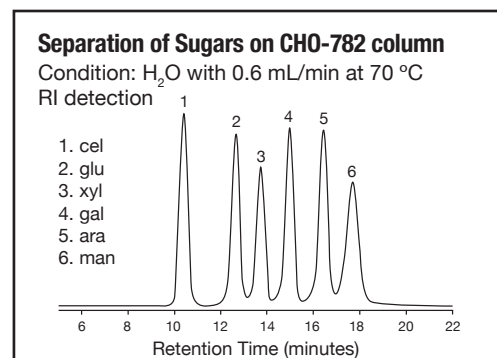
Concise Separations CARBOSep Columns for Carbohydrate Analysis

- ➔ Stable at temperatures up to 95 °C
- ➔ Consistent from column to column, and polymer batch to polymer batch
- ➔ The simplest and safest eluent of all—water
- ➔ More choices of columns utilizing combinations of cross-linkage (porosity) particle size, metal ligands and column formats to maximize your separation

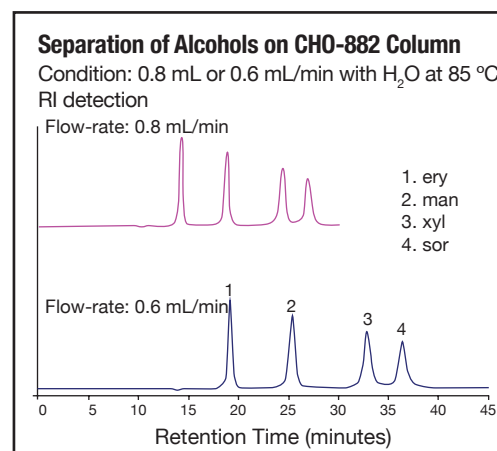
Ligand exchange is the preferred method for the separation of many sugars and sugar alcohols due to the simple water eluent. In ligand exchange, the negatively charged hydroxyl groups on the carbohydrate molecule interact with the positively charged metal loaded groups on the chromatography substrates. The carbohydrates are eluted by the polar water eluent mobile phase which competes for the sites on the metal ion. Besides the ligand exchange mechanism, several secondary mechanisms' processes are also involved in the separation of the carbohydrates including size exclusion and normal phase partitioning. HPLC columns packed with low cross-linked polymers (gels) serve as the primary packings for carbohydrate analysis columns, and are available from a number of suppliers. In order to maximize the separation of a wide variety of samples, Concise Separations has developed the most complete line of carbohydrate analysis columns available on the market by combining ligand exchange (metals), size exclusion and partitioning (cross-linkage of polymer), particle size (column efficiency) and column size (speed versus resolution).

Since polymers are chemically stable, as long as the columns are used within the operating parameters, they last a long time. The key to long column lifetime when using polymeric gels to keep the column at all times below the pressure maximum. Since temperature is a key component of pressure along with flow rate, it is extremely important to allow the column to reach temperature before starting the flow. The columns are also sensitive to water quality, so water purity is essential (minimum purity requirements 18 Mohm). Sample preparation as well as the use of guard columns and in-line filters reduce contaminants from entering the column and will extend a column's lifetime. In general, the higher the cross-linkage of the polymer and the larger the particle size, the greater the flow rate that can be used before reaching the maximum allowable pressure.

NEW CARBOSep Column Applications



Biomass Analysis



Sugar Alcohols Analysis

Tips on Maintaining the Performance of Concise Separations Columns

The most important fact to remember when using Concise Separations columns is that the polystyrene-divinylbenzene copolymer is a low cross-linked material. This polymeric packing has a limited resistance to flow rate and pressure and will irreversibly compact and overpressure the resin at a certain level. Unlike polymers, silica based materials are not flow rate sensitive and the relation between pressure and flow rate remains relatively constant. Therefore, the columns should be carefully monitored for pressure and should be operated within the recommended flow rates and pressure specifications.

- ➔ Use column ovens to serve the dual purpose of increasing efficiency and lowering back pressure.
- ➔ Set the pressure shut off for the analytical test system at or slightly below the recommended column pressure maximum to prevent irreversible damage.
- ➔ When installing, allow the column to warm up in the column oven for 15 minutes, and then start the flow rate below your target flow rate. After 15 minutes, increase the flow rate to the target flow rate and confirm that the column is operating at the expected back pressure.
- ➔ To increase the lifetime of your analytical column, we recommend the proper use of guard columns or cartridges. How frequently you change your guard column depends on pretreatment or sample purity.
- ➔ Filter and remove potentially harmful organics from the samples to decrease the need to change guard columns. Carefully monitor them for pressure increase and the chromatograms for changes in retention and efficiency to determine the approximate useful lifetime of the guard columns.

Concise Separations CARBOSEP Columns for Carbohydrate Analysis (cont.)

Retention Chart

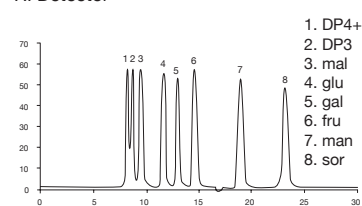
Another useful tool in choosing the best column for your sample is the use of retention charts. Compounds with at least one minute difference in retention time should be adequately separated. However, the wide variety of carbohydrates precludes developing a comprehensive chart for all compounds. Also, by using different temperature and flow rates, the selectivity of the column can be altered to enhance the separation of the compounds. If your compound does not appear in a retention chart, or the ability of a column to separate your compounds is in question, please contact Chrom Tech technical support.

RETENTION TABLE FOR CARBOSEP COLUMNS

COMPOUND	CHO-620	COREGel-87N	COREGel-87C & CHO-820	COREGel-87P & CHO-882	CHO-682	COREGel-87K
Nitrate	4.50	5.70	7.37	8.40	10.37	6.40
Maltoheptose	4.66	5.84	7.35	8.52	11.81	6.61
Maltohexose	4.78	5.94	7.45	8.80	13.31	6.74
Maltotriose	5.00	6.11	7.60	9.34	13.15	7.02
Amiprylose	-	5.74	7.75	9.46	-	6.42
Stachyose	5.94	6.33	7.85	11.84	13.48	6.32
Maltotetraose	5.37	6.42	7.87	9.84	14.14	7.02
Melezitose	5.78	6.81	8.27	13.08	13.92	7.82
Raffinose	6.56	6.88	8.31	10.22	14.47	7.92
Maltotriose	6.68	6.98	8.35	10.54	15.24	8.16
Cellobiose	7.36	7.90	9.01	10.98	15.65	9.26
Trehalose	7.32	7.85	9.14	11.20	16.05	9.02
Sucrose	7.48	7.99	9.18	11.10	15.77	9.11
Maltose	7.59	8.08	9.24	11.54	16.68	9.48
Melibiose	7.67	8.19	9.43	11.74	17.70	9.72
Lactose	7.84	8.18	9.51	11.84	17.44	9.63
Lactulose	8.53	8.48	10.24	13.24	20.77	10.08
Glucose	9.36	10.72	11.24	13.38	19.21	12.55
Lactitol	9.16	8.45	12.24	19.50	33.30	9.34
Xylose	10.31	11.77	12.39	14.42	20.71	13.69
Maltitol	9.15	8.28	12.29	17.76	30.45	9.06
Galactose	10.29	11.44	13.89	15.16	22.39	13.36
Sorbose	10.22	11.08	12.93	15.24	22.45	12.66
Mannose	10.51	11.57	12.83	16.76	25.57	13.74
Rhamnose	10.41	11.08	12.93	15.26	22.63	12.83
Fructose	11.40	11.61	13.70	16.96	25.91	13.31
Fucose	11.33	12.34	13.89	16.44	24.23	14.39
Arabinose	11.63	12.64	14.00	16.32	24.02	14.72
Myo-inositol	11.83	12.48	14.34	20.06	35.65	14.08
Digitoxose	-	12.41	14.27	-	21.02	-
Ribitol	11.95	11.26	15.62	20.44	30.79	11.84
Tagatose	-	11.86	16.53	-	-	-
Mannitol	12.76	10.81	17.89	24.98	40.10	11.42
Arabitol	13.23	11.64	18.43	25.24	39.89	12.10
Xylitol	14.61	12.16	22.00	31.10	51.22	12.64
Galactitol	14.41	11.15	20.53	31.60	52.50	11.61
Sorbitol	14.91	11.32	21.41	33.40	56.63	11.86
Ribose	46.46	11.52	21.99	28.59	55.00	14.16

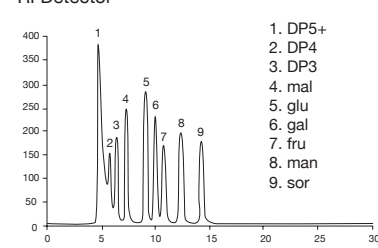
COREGel-87C-8%

Condition: 0.6 mL/min with H₂O at 85 °C, RI Detector



CHO-620-6% XL

Condition: 0.5 mL/min with H₂O at 90 °C, RI Detector



Resolution and Cross-linkage Effect

The lower the cross-linkage, the larger the pore size. For samples containing larger sugar polymers, the industry standard 8% cross-linked polymer may not adequately resolve your sample.

Concise Separations CARBOsep Columns for Carbohydrate Analysis (cont.)

CONCISE SEPARATIONS CARBOSEP COLUMN COMPARISON CHART						
PHASE	CROSS-LINKAGE	IONIC FORM	PARTICLE SIZE (µm)	KEY SAMPLES	COMMENTS	
CHO-411 Na	4	Sodium	20	Oligosaccharides through DP10	Easier to regenerate than Ag+ form	
CHO-611 Na	6	Sodium	10	Oligosaccharides through DP5, reproducible separation of corn syrup	Separates by both ligand exchange and size exclusion	
CHO-611 OH Na	6	Sodium	10	Fast analysis of simple sugars	PAD detector compatible	
CHO-682 Pb	6	Lead	7	High resolution column, including sucrose/maltose/lactose	Pressure sensitive, low flow rates	
CHO-620 Ca	6	Calcium	10	Versatile analysis of corn syrup, sugars, sugar alcohols	Concise Separation's most popular carbohydrate column	
CHO-782 Pb	7	Lead	7	Biomass sugar analysis, great for samples containing carbohydrates and sugar alcohols	Excellent selectivity with faster flow rate than the CHO682	
CHO-820 Ca	8	Calcium	9	General sugar analysis	Higher efficiency version of COREGel 87C	
USP L19 Ca	8	Calcium	8	Mannitol and Sorbitol - USP approved	Very rugged USP column	
CHO-882 Pb	8	Lead	7	Monosaccharides and cellulose products	Higher speed, lower resolution than CHO682	
CHO-882 Pb Fast	8	Lead	7	Fast analysis of monosaccharides	Quick analysis	
COREGel 87C Ca	8	Calcium	9	Industry standard for analysis of general sweeteners	Compatible replacement for the Bio-Rad Aminex HPX 87C	
COREGel 87C Fast	8	Calcium	9	Fast analysis of simple sugars	Quick analysis with a rugged column	
COREGel 87MM Ca Na	8	Sodium/Calcium	8	Fast analysis of sugar alcohols	Easily cleaned with EDTACaNa2	
COREGel 87K K	8	Potassium	9	Target application corn syrup and molasses. Sugar samples such as brewing wort, betaine analysis	Use with samples containing potassium, Compatible replacement for the Bio-Rad Aminex HPX 87K	
COREGel 87N Na	8	Sodium	9	Molasses and other sugars high salt samples	Easy to regenerate, low selectivity. Compatible replacement for the Bio-Rad Aminex HPX 87N	
COREGel 87P Pb	8	Lead	9	Monosaccharides and cellulose products	Less resolution than CHO882, high flow rate. Compatible replacement for the Bio-Rad Aminex HPX 87P	

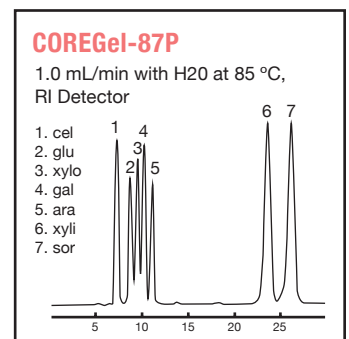
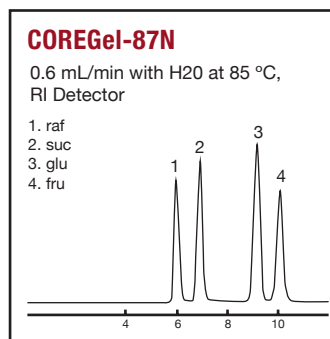
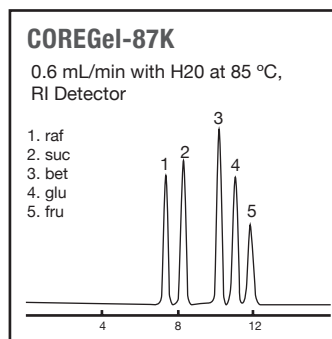
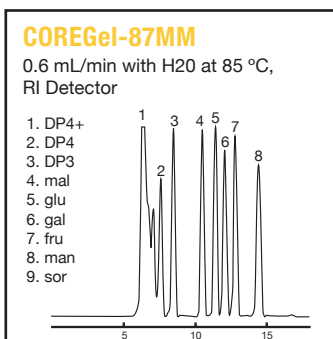
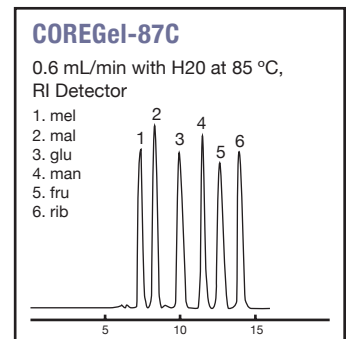
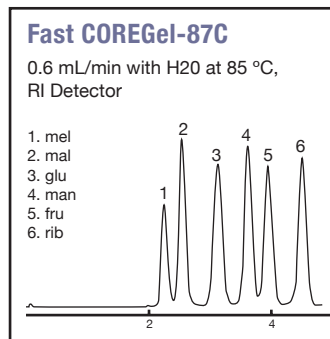
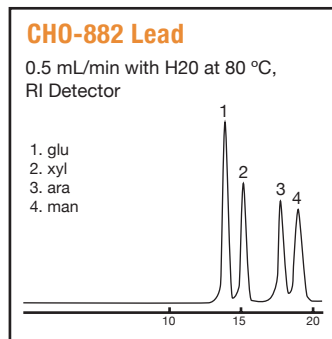
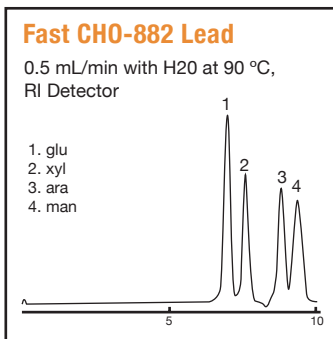
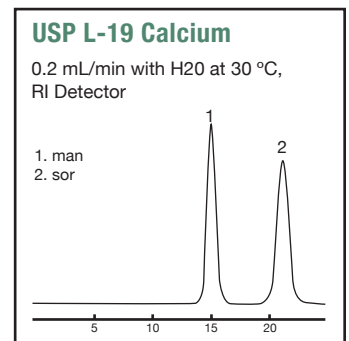
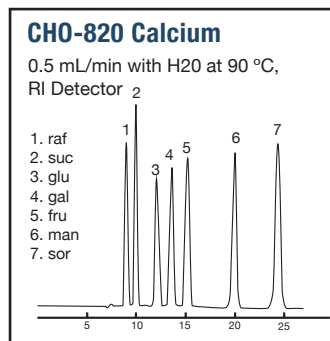
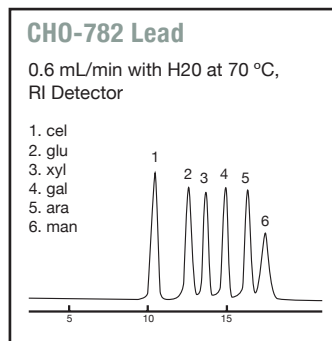
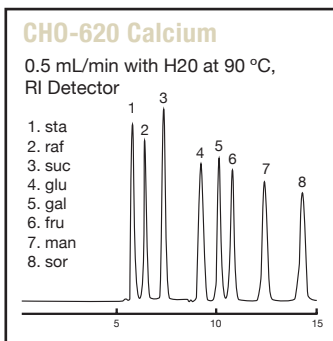
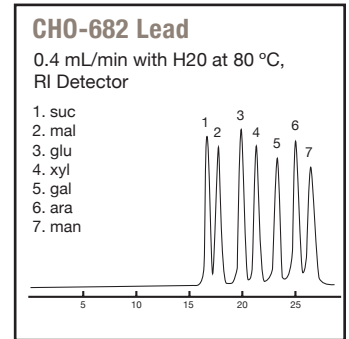
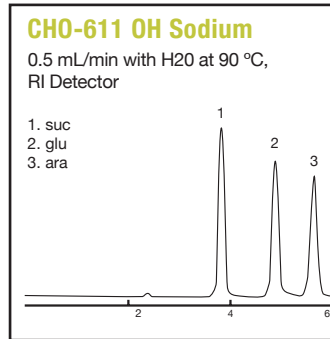
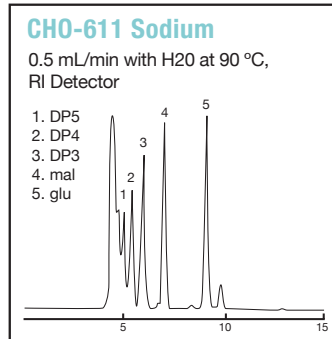
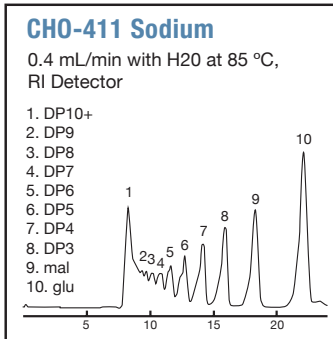
DESCRIPTION	SIZE	CHO-411 Na	CHO-611 Na Corn Syrup	CHO-611 OH Na	CHO-682 Pb	CHO-620 Ca	CHO-782 Pb Carbo & Biomass	CHO-820 Ca
Column	7.8 x 300 mm	CHO-99-9850	—	—	CHO-99-9854	—	CHO-99-7770	CHO-99-9855
Column	7.8 x 200 mm	—	—	—	CHO-99-8854	—	—	CHO-99-8855
Column	7.8 x 150 mm	—	—	—	CHO-99-9853	—	—	—
Column Column (Waters)	6.5 x 300 mm	—	CHO-99-9751	—	—	CHO-99-9753 CHO-99-9753W	—	—
Column	6.5 x 150 mm	—	—	CHO-99-7752	—	—	—	—
Guard Kit (1 holder, 2/pk cartridges)		CHO-99-2371	CHO-99-2351	CHO-99-2352	CHO-99-2354	CHO-99-2353	CHO-99-2372	CHO-99-2355
Guard Cartridges (2/pk)		CHO-99-1371	CHO-99-1351	CHO-99-1352	CHO-99-1354	CHO-99-1353	CHO-99-1372	CHO-99-1355

DESCRIPTION	SIZE	USP L-19 Ca	CHO-882 Pb	COREGel-87C Ca	COREGel-87MM Ca/Na	COREGel-87K	COREGel-87N Na	COREGel-87P Pb
Column	7.8 x 300 mm	—	CHO-99-8770	CHO-99-9860	CHO-99-9865	CHO-99-9862	CHO-99-9863	CHO-99-9864
Column (Fast)	7.8 x 150 mm	—	CHO-99-5882	—	—	—	—	—
Column (Fast)	7.8 x 100 mm	—	—	CHO-99-5860	—	—	—	—
Column	4.0 x 250 mm	CHO-99-8453	—	—	—	—	—	—
Guard Kit (1 holder, 2/pk cartridges)		CHO-99-2367	CHO-99-2373	CHO-99-2360	CHO-99-2365	CHO-99-2362	CHO-99-2363	CHO-99-2364
Guard Cartridges (2/pk)		CHO-99-1367	CHO-99-1373	CHO-99-1360	CHO-99-1365	CHO-99-1362	CHO-99-1363	CHO-99-1364

TECH TIP | Alltech 700CH

The popular Alltech 700CH (P/N: 70057) is the Concise CarboSep CHO 620 Ca (P/N: CHO-99-9753) column.

Concise Separations CARBOSep Columns for Carbohydrate Analysis (cont.)



Concise Separations Columns for Organic Acid Analysis

- ➔ Stable in the pH range of 0 to 14
- ➔ Stable at high temperatures up to 90° C
- ➔ Consistent performance through numerous sample injections (depending on sample preparation, instrument maintenance, and the use of guard systems)
- ➔ No need for gradients for sample analysis due to the use of simple dilute acid — allowing use of universal detectors such as RI detectors
- ➔ Eliminates the need for high cost solvents (including waste disposal)
- ➔ Eluent serves as a self regenerating cleaning solution and does not degrade the column

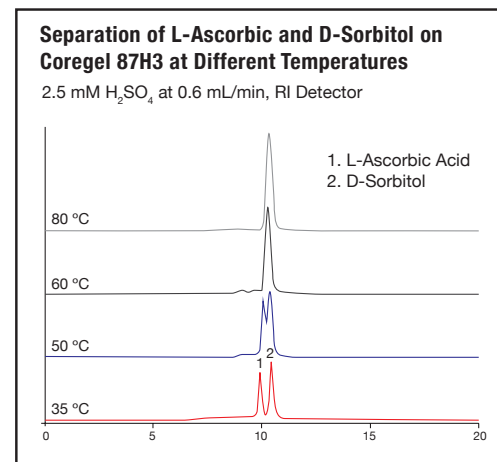
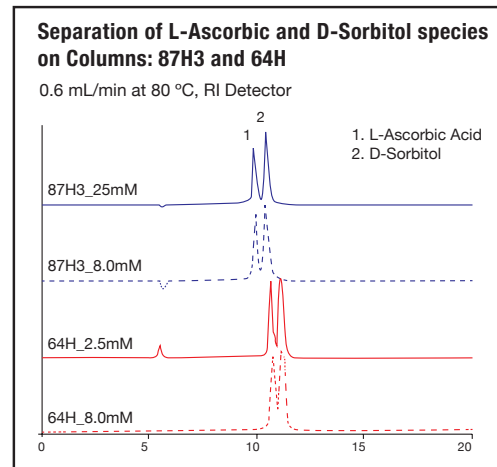
Retention Chart

Another useful tool in choosing the best column for your sample is the use of retention charts of many common organic acids. If your compound does not appear in a retention chart, or the ability of a column to separate your compounds is in question, please contact Chrom Tech technical support.

RETENTION TABLE FOR ORGANIC ACID COLUMNS					
COMPOUND	COREGEL ION300	COREGEL ORH801	COREGEL 64H	COREGEL 107H	COREGEL 87H3
Malic	12.0	7.5	11.5	10.2	10.0
Malonic	11.1	7.4	10.8	9.8	9.8
cis-Aconitic	7.5	7.4	11.2	9.9	9.6
Adipic	21.8	13.7	21.9	17.5	16.5
Formic	17.1	11.1	16.5	15.0	14.6
Maleic	8.1	5.2	7.7	7.6	7.8
Ascorbic	7.8	5.0	7.5	7.4	10.5
Butyric	—	18.5	—	24.1	—
Glycolic	15.4	9.9	14.8	13.4	12.8
Glycoxilic	11.5	7.4	11.1	10.1	9.8
Citric	9.5	6.3	9.1	8.4	8.3
Tartaric	10.0	6.4	9.6	8.9	8.7
Nicotinic	—	—	—	—	26.4
Propionic	20.1	15.2	21.7	19.3	18.6
Succinic	9.2	9.8	8.8	12.7	8.7
Oxalic	6.6	4.5	6.5	6.7	6.9
Sorbic	18.7	12.0	17.9	16.0	15.3
Acrylic	23.3	—	22.5	19.9	19.4
Isobutyric	—	—	—	21.8	21.4
Lactic	16.0	10.3	15.5	13.6	13.1
Shikimic	15.5	9.7	14.7	12.5	12.1
Fumaric	16.4	10.3	15.7	14.0	13.1
Glutaric	18.2	11.3	17.2	14.7	14.0
Pyruvic	9.3	6.0	9.0	8.6	8.7
Acetic	—	12.4	18.4	16.6	—
Proponal	28.7	28.9	—	—	—
Quinic	12.6	7.9	12.1	10.7	10.4

Eluent Effect

By controlling the true strength of the acidic eluent, the retention times of the compounds can be influenced. The stronger (more acidic) the eluent, the longer the retention times in relation to the pKa. The eluent strength can be used by the analyst to enhance the separation of compounds.



TECH TIP | Temperature Effect

Temperature is by far the most powerful tool used to influence relative retention of compounds on Concise Separations ion-exclusion columns. By manipulating temperature, in combination with eluent strength and column types (polymer cross-linkage), an analyst can greatly enhance species separation.

CONCISE SEPARATIONS ORGANIC ACID ANALYSIS COLUMN COMPARISON CHART					
PHASE	CROSS-LINKAGE	IONIC FORM	PARTICLE SIZE (µm)	KEY SAMPLES	COMMENTS
COREGEL-87H1	8	H	10	Short bed length allows for fast analysis of simple acid samples	Ruggedness combined with fast analysis
COREGEL-87H3	8	H	9	Good resolution of many common organic acids	High durability
COREGEL ION-300	6	H	7	Separates organic acids, alcohols and carbohydrates all on the same column	Popular column. Select when high resolution is the primary concern
COREGEL-107H	10	H	8	Improved resolution for organic acids	New higher cross-linked column
COREGEL ORH-801	7	H	9	Versatile column for organic acids, alcohols and carbohydrates	Popular column. Provides good balance of high efficiency and ruggedness
COREGEL ORH-801FA	7	H	8	Fast analysis for fermentation monitoring, versatile column for organic acids, alcohols and carbohydrates	Popular column. Provides good balance of high efficiency and ruggedness
COREGEL WA-1 Wine Analysis	8	H	8	Rugged design allows for little sample prep High resolution makes the WA1 excellent for QA	Higher efficiency but as robust as the work horse 87H3 column
COREGEL ION-310	8	H	11	Designed for fast analysis of organic acids and alcohols	Ideal for the analysis of borate and bicarbonate
COREGEL ARH-601	6	H	8	Designed for the separation of aromatic organic acids	Uses aqueous mobile phases
COREGEL-64H	6	H	10	Versatile column for organic acids, alcohols and carbohydrates	Provides good balance of high efficiency and ruggedness
COREGEL USP L-17	8	H	8	Complies with USP L-17 specifications for the separation of citric, lactic, and acetic acid, can also separate a wide number of other organic acids	Hydrogen form ion-exclusion column

TECH TIP | Popular Grace/Alltech Columns

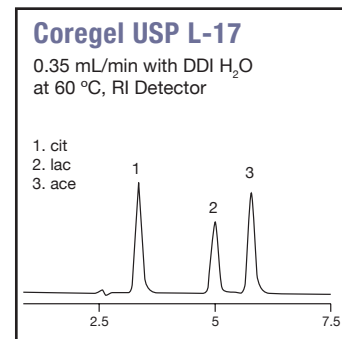
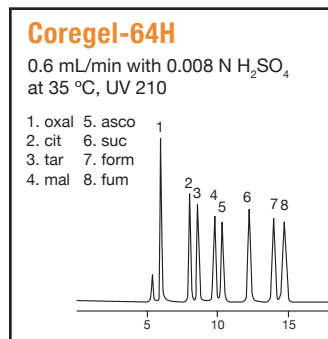
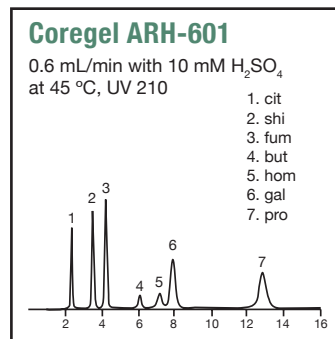
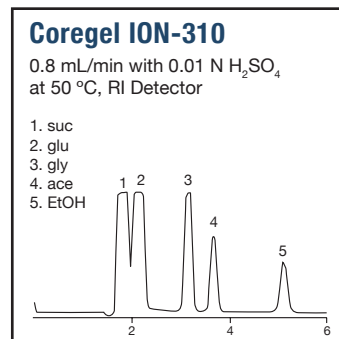
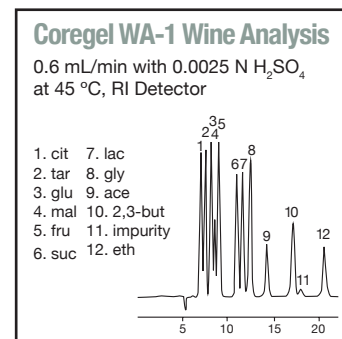
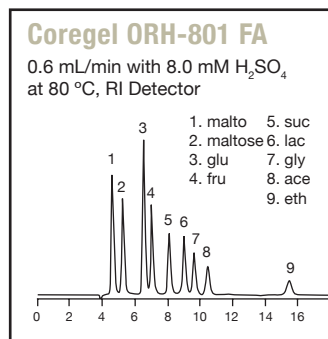
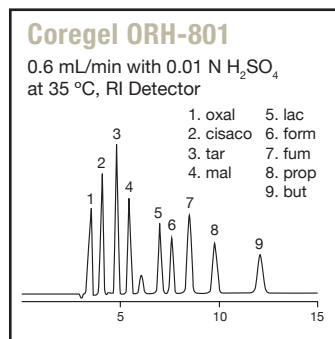
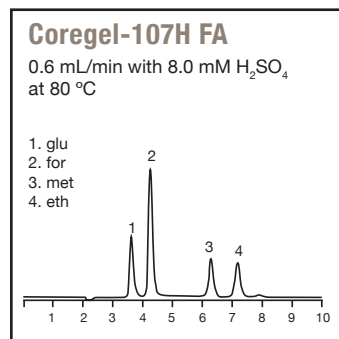
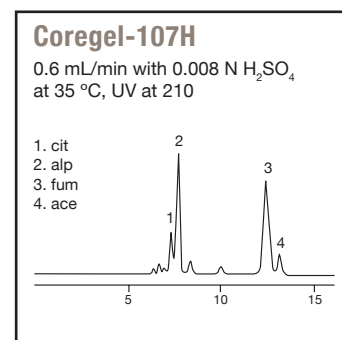
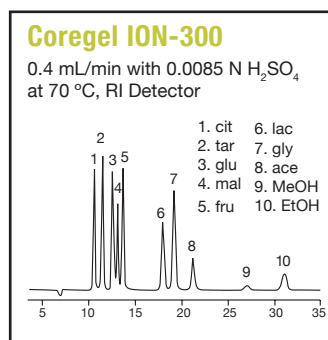
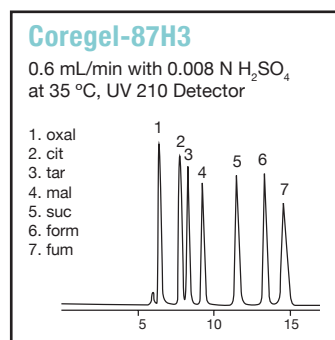
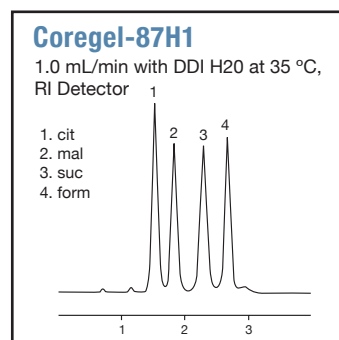
The IOA 2000 Column, (P/N: 9648) is the ION 310 column.
 The OA 2000 Column, (P/N: 9048) is the ARH 601 column.
 The IOA 1000 Columns, (P/N: 9046) is the ION 300 column.
 The OA 1000 Column, (P/N: 9046) is the ORH 801 column.

See ordering chart on page 100

Concise Separations Columns for Organic Acid Analysis (cont.)

DESCRIPTION	SIZE	COREGEL-87H1	COREGEL-87H3	COREGEL ION-300	COREGEL-107H	COREGEL ORH-801
Column	7.8 x 300 mm	—	ICE-99-9861	ICE-99-9850	ICE-99-9866	—
Column (Fast)	7.8 x 200 mm	—	—	—	—	ICE-99-9753
Column	7.8 x 150 mm	—	ICE-99-9865	—	—	—
Column	7.8 x 100 mm	ICE-99-5861	—	—	—	—
Column	6.5 x 300 mm	—	ICE-99-9871	—	—	ICE-99-9754
Column (Fast)	6.5 x 150 mm	—	—	—	ICE-99-9867	—
Guard Kit (1 holder, 2/pk cartridges)		ICE-99-2355	ICE-99-2361	ICE-99-2358	ICE-99-2356	ICE-99-2354
Guard Cartridges (2/pk)		—	ICE-99-2371	ICE-99-2368	ICE-99-2366	ICE-99-2364

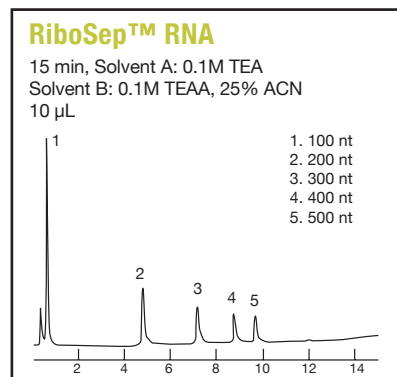
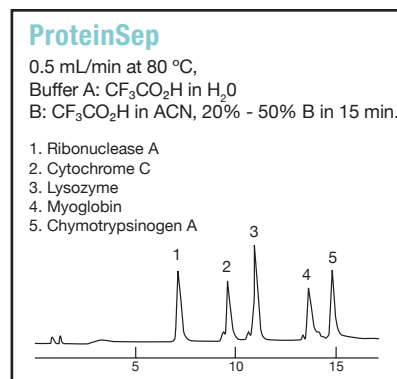
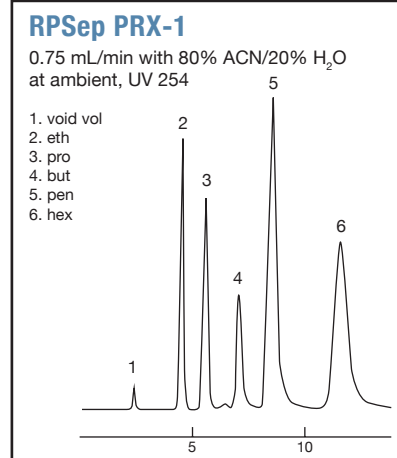
DESCRIPTION	SIZE	COREGEL WA-1 Wine	COREGEL ION-310	COREGEL ARH-601	COREGEL-64H	COREGEL USP L-17
Column	7.8 x 300 mm	ICE-99-9810	—	—	ICE-99-9860	—
Column (Fast)	6.5 x 100 mm	—	ICE-99-7752	ICE-99-5753	—	—
Column	4.1 x 250 mm	—	—	—	—	ICE-99-8461
Guard Kit (1 holder, 2/pk cartridges)		ICE-99-3510	ICE-99-2357	ICE-99-2353	ICE-99-2360	ICE-99-2352
Guard Cartridges (2/pk)		ICE-99-1310	ICE-99-2367	ICE-99-2363	ICE-99-2370	ICE-99-2362



Concise Separations Columns for RNA, Protein & Peptides

- ➔ Stable in the pH range of 0 to 14
- ➔ Completely stable under high temperature conditions which eliminate or reduce secondary tertiary effects of analytes
- ➔ Chemically stable which permits a variety of cleaning solutions for effective column cleaning
- ➔ Flow reversibility to facilitate the removal of contaminants on the inlet end of the column bed
- ➔ High efficiency, mono-dispersed beads
- ➔ Pure hydrophobic properties provided by proprietary and patented C18 functionality chemistry

Concise Separations ProteinSep columns offer unique characteristics to provide the protein chemist another valuable tool for the many varieties of samples in the proteomics field. The proprietary and highly rugged polymeric based columns will provide long lasting, reproducible results for a wide variety of samples. The Concise Separations protein analysis columns are packed with durable and high efficiency polymers that perform well even under the most extreme test conditions.



CONCISE SEPARATION COLUMNS FOR ANION ANALYSIS (STRONG ANION EXCHANGE COLUMNS)	
COLUMN	APPLICATION
RPSep PRX-1	Porous PS/DVB Polymer. Ideal for the separation of peptides and small molecules, pH stable from 0 – 14
ProteinSep	Non-porous PS-DVB Polymer with C18 Functional Group, monodispersed 2µm bead. High temperatures allowed, pH stable from 0 – 14
RiboSep™ RNA	Polymeric column, excellent for identification and purity assays for RNA fragments that are 100 to > 6,000 nt. Can be used with or without a column oven.

DESCRIPTION	SIZE	RPsep PRX-1	Protein Sep	RiboSep™ RNA
Column	7.8 x 50 mm	–	–	RPC-99-3810
Column	4.6 x 250 mm	RPC-99-8514	–	–
Column	4.6 x 150 mm	RPC-99-7514	–	–
Column	4.6 x 50 mm	–	PRO-99-4650	–
Guard Cartridges (2/pk)		RPC-99-1314	ANX-99-0010	–

Concise Separations Columns for Amino Acid Analysis

- ➔ Rugged polymeric substrate, stable in pH range of 0 to 14
- ➔ High efficiency and resolution
- ➔ Reproducibility lot-to-lot and column-to-column
- ➔ Available for both physiological samples (Li⁺ format) and protein hydrolysate samples (Na⁺ form)
- ➔ Post column derivitization detection

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.

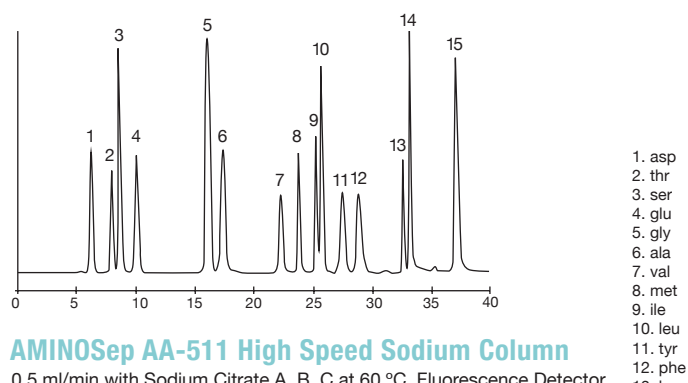
CONCISE SEPARATIONS AMINO ACID ANALYSIS COLUMN COMPARISON CHART					
PHASE	CROSS-LINKAGE	IONIC FORM	PARTICLE SIZE (µm)	KEY SAMPLES	COMMENTS
AMINOSep AA-911	8	Sodium	9	Designed for complicated samples from protein hydrolysates. Increased polymer bed yields better resolving power	Popular column—Higher capacity than the Beckman columns
AMINOSep AA-511	10	Sodium	5	Designed for faster analysis than the AA-911 but still gives high resolution	Most popular AA column
Lithium Amino Acid (6300 & 7300 systems)	10	Lithium	6	Designed for use with the Beckman Coulter® 6300 and 7300 Amino Acid Analyzers using either the Beckman or Pickering Lithium buffer systems	Ideal for Physiological amino acid analysis
Sodium Amino Acid (6300 & 7300 systems)	10	Sodium	5	Designed for use with the Beckman Coulter® 6300 and 7300 Amino Acid Analyzers using either the Beckman Coulter or Pickering Sodium buffer systems	Ideally suited for routine hydrolysate analysis, Extremely rugged polymer
Sodium Amino Acid (for System Gold)	10	Sodium	5	Designed for use with the Beckman Coulter® System Gold Amino Acid Analyzer	Ideal for the separation of hydrolysate amino acids.

Concise Separations Amino Acids HPLC COLUMNS

DESCRIPTION	SIZE	AMINOSep AA-911	AMINOSep AA-511	LITHIUM AMINO ACID (6300/7300)	SODIUM AMINO ACID (6300/7300)	SODIUM AMINO ACID (System Gold)
Column	4.6 x 250 mm	AAA-99-8553	—	—	—	—
Column (Waters)	4.6 x 250 mm	AAA-99-8553W	—	—	—	—
Column	4.6 x 150 mm	—	AAA-99-7554	—	—	—
Column	4.6 x 120 mm	—	AAA-99-6554	—	—	—
Column	4.0 x 200 mm	—	—	—	—	AAA-99-6310
Column	4.0 x 120 mm	—	—	—	AAA-99-6312	—
Column	4.0 x 100 mm	—	—	AAA-99-6311	—	—
Guard Kit (1 holder, 2/pk cartridges)		AAA-99-2353	AAA-99-2354	AAA-99-2311	AAA-99-2312	AAA-99-2312
Guard Cartridges (2/pk)		AAA-99-1353	AAA-99-1354	AAA-99-1311	AAA-99-1312	AAA-99-1312

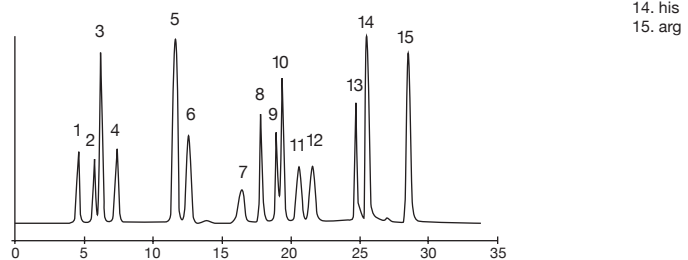
AMINOSep AA-511 Sodium Column

0.5 ml/min with Sodium Citrate A, B, C at 82 °C, Fluorescence Detector



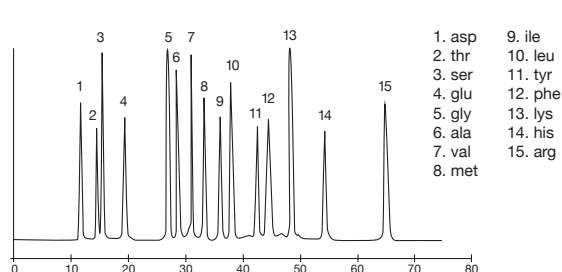
AMINOSep AA-511 High Speed Sodium Column

0.5 ml/min with Sodium Citrate A, B, C at 60 °C, Fluorescence Detector



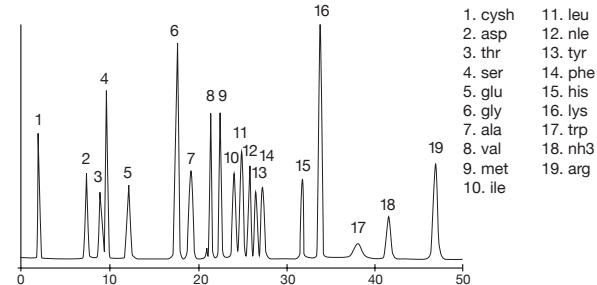
AMINOSep AA-911 Sodium Column

0.5 ml/min with Sodium Citrate A, B, C at 82 °C, Fluorescence Detector



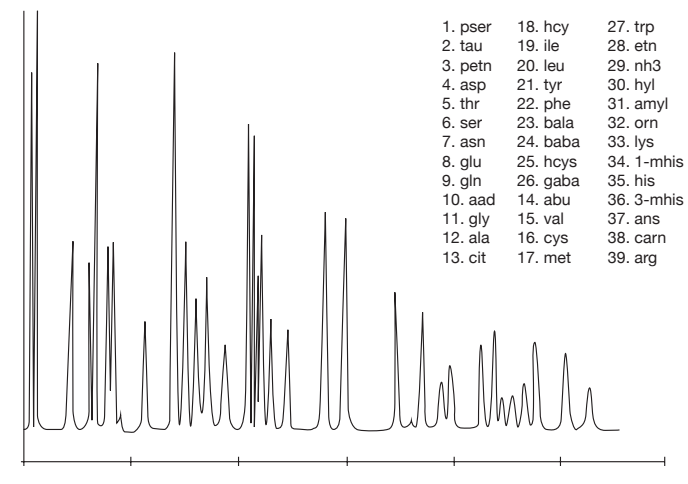
Sodium Amino Acid Column (System Gold)

26 ml/hr with NaE, NaF, NaD at 50-65-77°C, Fluorescence Detector



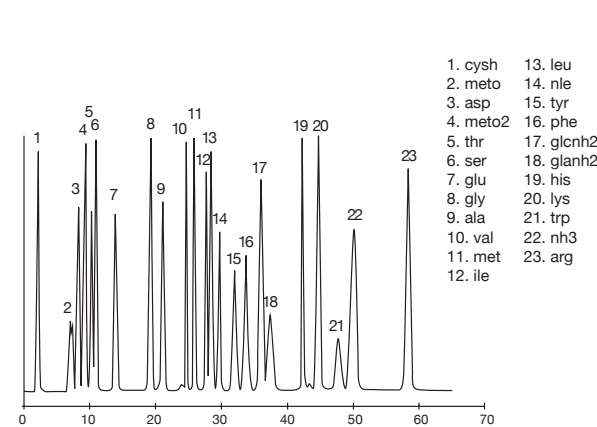
Lithium Amino Acid Column

20 ml/hr with LiA, LiB, LiC at 33-60-77°C, Fluorescence Detector



Sodium Amino Acid Column (6300/7300 systems)

26 ml/hr with NaE, NaF, NaD at 50-65-77°C, Fluorescence Detector



Concise Separations ICSep Column for Ion Analysis

- ➔ Rugged polymeric substrate, stable in pH range of 0 to 14
- ➔ Solvent compatibility
- ➔ High efficiency
- ➔ Reproducibility
- ➔ Anion analysis with strong anion exchange columns

Concise Separations Ion Chromatography (IC) columns have been designed to run on a variety of systems. They are tested to be compatible with Ion Chromatographs from: Metrohm, 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 .

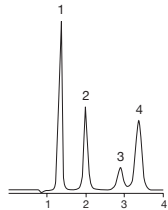
CONCISE SEPARATION COLUMNS FOR ANION ANALYSIS (STRONG ANION EXCHANGE COLUMNS)

COLUMN	COMPETITIVE COLUMNS	APPLICATION	RECOMMENDED ELUENTS	COMMENTS
ICSep AN300	Dionex AS4A	F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , By E.P.A. Method 300.0(a)	Carbonate	Good for drinking water method, EPA 300.0 a or 300.1. Superb fluoride separation from water dip and other anions. Fast analysis times (under 9 min for 7 std anions)
ICSep AN1	Dionex AS9-HC	F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , Low molecular weight, Organic acids in medium to high ionic strength matrices, Cr(III), Cr(VI) as CrO ₃ -, CrO ₄ ²⁻	Carbonate	Can be used with non-suppressed conductivity detection. Very good fluoride separation from water dip, great for toothpaste analysis. Great for trace anion work.
ICSep AN1SC	Dionex AS9-HC	F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , Low molecular weight, Organic acids in medium to high ionic strength matrices	Solvent compatible	Similar selectivity as the AN1 column but is solvent compatible for easy cleanup
ICSep AN2	Dionex AS14	Arsenate, Sulfite, Selenate, Arsenite, Selenite, F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , Low molecular weight Organic acids	Sodium hydroxide eluents	Superb fluoride, acetate & chloride resolution
ICSep AN300B	Dionex AS9	F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , ClO ₂ -, ClO ₃ -, BrO ₃ -	Solvent compatible	Good for drinking water method, EPA 300.0 b for oxyhalides. High capacity and unique selectivity
ICSep ION-120		F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , Low molecular weight, Organic acids in medium to high ionic strength matrices, Cr(III), Cr(VI) as CrO ₃ -, CrO ₄ ²⁻	Salicylic Acid	Very good for non-suppressed detection Fast analysis times. No conductivity cell needed (UV)
ICSep AN-SDA		F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , Low molecular weight, Organic acids in medium to high ionic strength matrices, Cr(III), Cr(VI) as CrO ₃ -, CrO ₄ ²⁻	Solvent compatible	Created for phosphate & other anions in soft drinks, no need to dilute or pre-treat soft drink. Unlike other anion columns, colorings and additives will not foul column.
AN1-SS	Alltech A-2	F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , By E.P.A. Method 300.0(a)	Solvent compatible	Designed to replace Alltech A-2 anion column
AN1-HS		F, Cl, NO ₂ , Br, PO ₄ , SO ₄	Carbonate	Fast AN1 column with sulfate detection under four minutes
AN2-HC		All inorganic anions including oxyhalides and low mw organic acids	Solvent compatible	Ideal for tough separations as extra capacity gives improved resolution capabilities. Superb fluoride, acetate & chloride resolution
AN300BHS		For simple samples containing oxyhalides	Solvent compatible	Fast AN300B column with sulfate under six minutes. Can resolve oxyhalides. Good for fast analysis times & high throughput
ICSep AN300H		F-, Cl-, NO ₂ -, Br-, NO ₃ -, HPO ₄ ²⁻ , SO ₄ ²⁻ , By E.P.A. Method 300.0(a)	Carbonate	Very high capacity AN300 column. Ideal for tough anion separations as extra capacity gives improved resolution capabilities. Superb anion resolution even with quick retention times. Good for drinking water method, EPA 300.0 a or 300.1 . Designed for trace anion analysis along with large amounts of Cl or NO ₃ .

AN1-HS

1.0 mL/min with 1.7 mM Na₂CO₃/
1.8 mM NaHCO₃ at ambient,
suppressed conductivity

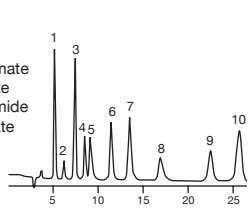
1. chl
2. nitrate
3. pho
4. sul



AN2-HC

1.0 mL/min with 3.0 mM Na₂CO₃/
3.5 mM NaHCO₃ at ambient,
suppressed conductivity

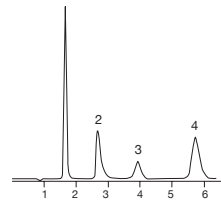
1. flu
2. ace
3. chl
4. bromate
5. nitrite
6. bromide
7. nitrate
8. chl
9. pho
10. sul



AN300BHS

1.0 mL/min with 3.0 mM Na₂CO₃ at
ambient, suppressed conductivity

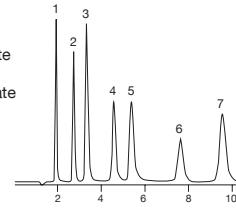
1. chl
2. nitrate
3. pho
4. sul



IC Sep AN300H

2.0 mL/min with 2.8 mM Na₂CO₃/
2.2 mM NaHCO₃ at ambient,
suppressed conductivity

1. flu
2. chl
3. nitrite
4. bro
5. nitrate
6. pho
7. sul



DESCRIPTION	SIZE	AN2	AN1	AN1-SC	AN300	AN300B	ION-120
PEEK Column	5.5 x 150 mm	—	—	—	ANX-99-7620	—	—
PEEK Column	4.6 x 250 mm	ANX-99-8515	ANX-99-8511	ANX-99-8514	—	ANX-99-8516	—
PEEK Column	4.6 x 150 mm	—	—	—	—	—	ANX-99-6650
PEEK Column (Fast)	4.6 x 100 mm	—	ANX-99-5511	—	—	—	—
SS Column	4.6 x 120 mm	—	—	—	—	—	ANX-99-6550
Guard Cartridges (3/pk)		ANX-99-0015	ANX-99-0010	ANX-99-0014	ANX-99-0010	ANX-99-0016	ANX-99-0090
Guard Cartridge Holder		ANX-99-0050	ANX-99-0050	ANX-99-0050	ANX-99-0050	ANX-99-0050	AXC-99-1300
Guard Column		ANX-99-3515	ANX-99-3510	ANX-99-3514	ANX-99-3510	ANX-99-3516	—
Replacement Frits (5/pk)		AXC-99-0012	AXC-99-0012	AXC-99-0012	AXC-99-0012	AXC-99-0012	—
Guard Disc® (5/pk)		GRD-99-0703	GRD-99-0703	GRD-99-0703	GRD-99-0703	GRD-99-0703	—
Cartridge Kit (Column, Guard Cartridges (3/pk), Column Coupler & Guard Cartridge Holder)		ANX-99-8545K	ANX-99-8541K	ANX-99-8544K	ANX-99-7643	ANX-99-8546K	—
Column Kit (Column, Guard Column & Column Coupler)		ANX-99-8535K	ANX-99-8531K	ANX-99-8534K	ANX-99-7633	ANX-99-8536K	—
Guard Kit (Universal Holder, Guard Cartridges (3/pk))		—	—	—	—	—	ANX-99-2350

DESCRIPTION	SIZE	AN-SDA	AN1-SS	AN1-HS	AN2-HC	AN300BHS	AN300H
PEEK Column	4.6 x 200 mm	—	—	—	ANX-99-8518	—	—
PEEK Column	4.6 x 150 mm	—	—	—	—	—	ANX-99-4650
PEEK Column	4.6 x 50 mm	ANX-99-4650	—	ANX-99-3518	—	ANX-99-3566	—
SS Column	4.6 x 100 mm	—	ANX-99-5518S	—	—	—	—
Guard Cartridges (3/pk)		—	—	—	ANX-99-0018	—	ANX-99-0010
Guard Cartridge Holder		—	—	—	ANX-99-0050	—	ANX-99-0050
Guard Column		—	—	—	ANX-99-3517	—	ANX-99-3510
Replacement Frits (5/pk)		—	—	AXC-99-0012	AXC-99-0012	AXC-99-0012	AXC-99-0012
Guard Disc® (5/pk)		—	—	GRD-99-0703	GRD-99-0703	GRD-99-0703	GRD-99-0703
Cartridge Kit (Column, Guard Cartridges (3/pk), Column Coupler & Guard Cartridge Holder)		—	—	—	ANX-99-8548K	—	—
Column Kit (Column, Guard Column & Column Coupler)		—	—	—	ANX-99-8538K	—	—

