SweetSep™ Columns

The New Benchmark for Carbohydrate Analysis

- New columns for reliable HPAEC-PAD and MS
- Superior and fast separations
- Works for all classes of carbohydrates

High-Performance Anion Exchange (HPAE) columns for the separation of mono-, oligo- and polysaccharides using PAD or MS detection.

Antec® Scientific

Why HPAEC?

High Performance Anion-Exchange Chromatography (HPAEC) is the most powerful analytical technique for carbohydrate analysis due to its ability to separate all classes of alditols (polyols), aminosugars, mono-, oligo- and polysaccharides including glycans, according to structural features such as size, composition, anomericity and linkage isomerism.

Highly Monodisperse Particles

Antec Scientific developed a novel pellicular anion-exchange stationary phase called SweetSep AEX. The phase is based on highly uniform monodisperse 5 µm resin particles of crosslinked poly(divinylbenzene-co-ethylvinylbenzene) copolymer. The particles are furthermore coated with quaternary amine functionalized nanoparticles.

SEM image of 5 µm SweetSep particles

High Efficiency with Low Backpressure

The resin particles packed in inert PEEK columns result in exceptional column efficiencies with typical reduced plate height close to 2.0 with only moderate column back pressure. SweetSep AEX columns allow for rapid, high-resolution separations of carbohydrates that rival the performance of existing phases based on smaller particle size but operates with significantly lower system back pressures. The size and exchange capacity of the latex nanoparticles is optimized to enable the analysis of a wide variety of carbohydrates samples ranging from monosaccharides present in food, plants and glycoproteins up to oligosaccharides such as FOS (fructo-oligosaccharides) and N-linked glycans.

Instrumental Requirements

1. HPAEC-PAD

SweetSep columns can be used with any High Performance Anion Exchange Chromatography (HPAEC) system such as the IC systems of Metrohm or Thermo Fisher Scientific. Several bioinert HPLC systems are also suitable for use with HPAEC when equipped with a Pulsed Amperometric Detector (PAD) such as the Decade™ Elite (Antec Scientfic). For consistent results, ease of use, and highest reproducibility, the Antec Scientific ALEXYS™ Carbohydrate Analyzer is the best choice.

2. Borate Ion Trap

The use of a Borate Ion Trap (BIT) column installed between the pump and the autosampler is highly recommended. For more information about the BIT column, see page 4.

3. HPAEC-MS

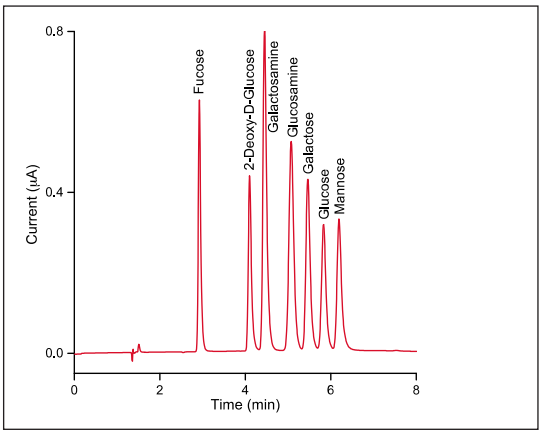
Depending on the volatility of the buffer systems used, for the on-line coupling with MS, the installation of a desalter (ion suppressor) becomes necessary. Basically, any type of (ESI)-MS can be used for detection.

4. HPAEC/(PAD)-MS

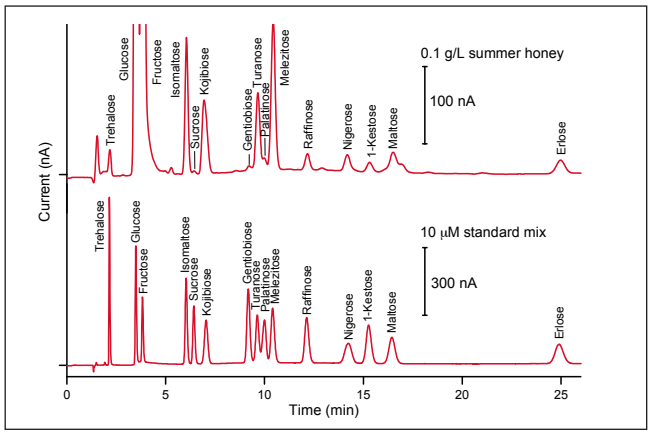
Parallel detection by PAD and MS to allow simultaneous identification and quantification of the carbohydrates can be done easily by using a simple T-piece flow split after the SweetSep column.

Analytical Columns (AEX20 and AEX200 2.1 and 4.0 mm ID x 200 mm)

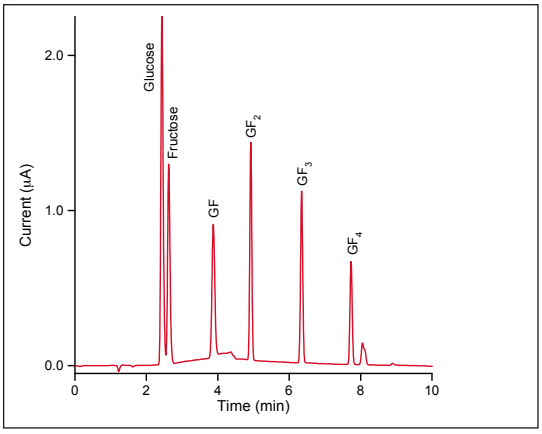
Mono- up to Pentasaccharides



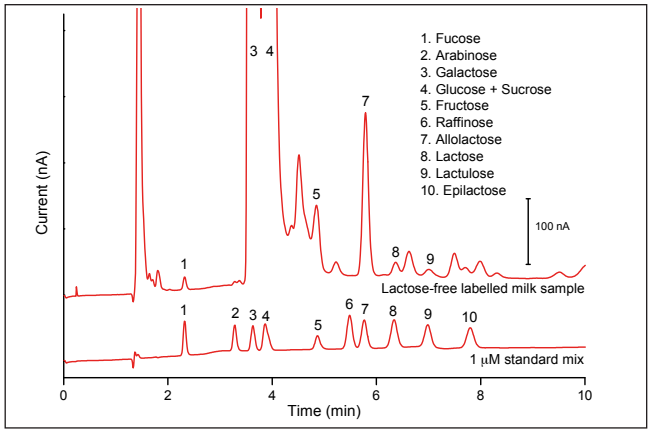
Isocratic separation of monosaccharides on a SweetSep™ AEX20 column, 4.0 mm ID × 200 mm. 10 µL inj. of a 10 µM mixtures of monosaccharides std in water (HPAEC-PAD).



HPAEC-PAD of honey on a SweetSep™ AEX200 column, 2.1 mm ID × 200 mm. Top: 10 µL inj. of a 0.1 g/L Swiss summer honey sample. Bottom: 10 µL inj. of a 10 µM standard of 15 sugars present in honey.

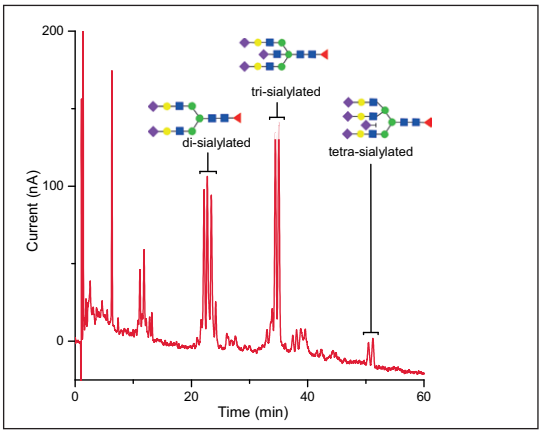


Separation of short-chain fructooligosaccharides up to DP5 by HPAEC-PAD. SweetSep™ AEX200 column, 4.0 mm ID × 200 mm. 10 µL inj. of 10 ppm mixtures GFs.

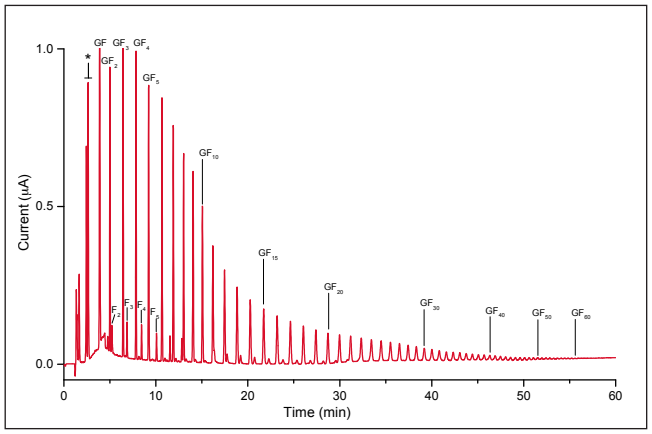


Lactose intolerance: Analysis of milk on a SweetSep™ AEX200 column, 4.0 mm ID × 200 mm. Top: 10 µL inj. of a 10 g/L lactose-free labelled milk. Bottom: 10 µL inj. of a 10 µM standard of 11 sugars commonly found in milk.

Oligosaccharides & N-Glycans



Separation of N-glycans standard containing di-, tri-, and tetra sialylated oligosaccharides by HPAEC-PAD on a SweetSep™ AEX200 column, 2.1 mm ID × 200 mm.



Gradient separation of inulin from chicory. 10 µL inj, 200 ppm. SweetSep™ AEX200 column, 4.0 mm ID × 200 mm using HPAEC-PAD.

Trap Columns

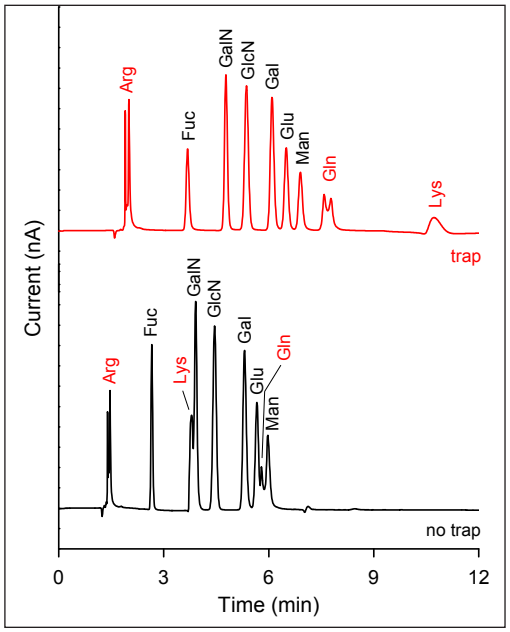
Amino Acid Trap (AAT)

- Efficient trapping of amino acids/small peptides
- Easy installation as precolumn
- 4 x 50 mm column, 5 µm resin

In compositional analysis of monosaccharides from glycoproteins using HPAEC-PAD, amino acids and small peptides co-elute with the carbohydrates of interest making proper quantification impossible.These amino acids and small peptides are generated during the acid hydrolysis of glycoproteins. Moreover, amino acids can contaminate the Au electrode surface, which might lead to fouling and loss of response even under PAD conditions.

To eliminate the interference of amino acids and to assure accurate quantification of the monosaccharides the use of an Amino Acid Trap (AAT) column is highly recommended.

For specifications/ordering information, see page 5.



Analysis of monosaccharides with and without trap column. Interfering peaks of Glutamine (Gln) and Lysine (Lys) are efficiently trapped (upper trace) and elute later during the wash step. In both cases the amino acid Arginine (Arg) elutes in the void volume (t_0) of the column.

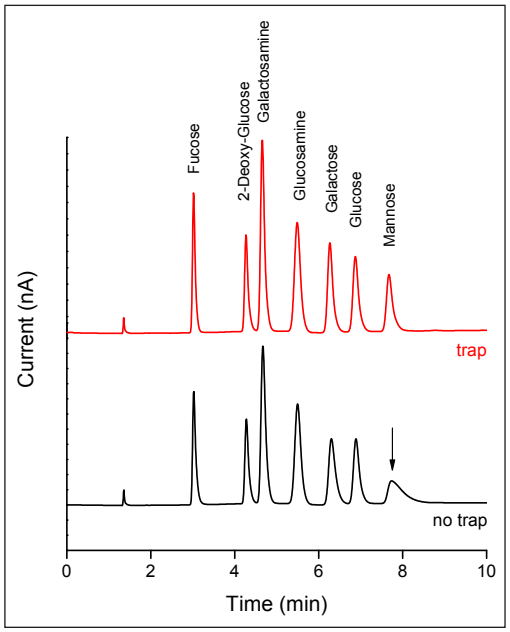
Borate Ion Trap (BIT)

- High borate trapping capacity
- Easy installation between pump and injector
- 4 x 50 mm column, 10 µm resin

In carbohydrate analysis, the peak shape of certain sugars, such as mannose, fructose and sugar alcohols, are deteriorated when traces of borate are in the solvent. These borate contaminants can come from the laboratory deionized (DI) water system.

To eliminate the presence of borate ions and to assure optimal performance Antec Scientific introduced the Borate Ion Trap (BIT) column. The trap column is available as 4.0 mm ID x 50 mm column and is installed inline between pump and injector of the HPAEC-PAD system.

For specifications/ordering information, see page 5.



Analysis of carbohydrates with and without Borate Ion Trap (BIT) column. Without trap, the mannose peaks shows significant tailing, see arrow in lower trace.

Specifications / Ordering Information

Specifications SweetSep™ Anion Exchange Columns

Parameter		AEX200	AEX20
Type		agglomerated pellicular resin	
Particle	Material	ethylvinylbenzene-divinylbenzene copolymer	
	Diameter (µm)	5	
	Functionality	surface sulfonated	
Latex	Material	vinylbenzylchloride-divinylbenzene	
	Functionality	quaternary amine	bifunctional quaternary and tertiary amine
Organic solvent limit		0-100% ACN or MeOH for cleaning	
T operating range (°C)		10-40	
pH range		0-14	
max (psi/bar)		4350/300	

Specifications Trap columns

Parameter		Borate ion trap	Amino acid trap
Type		Chemically derivatized polymeric resin	Polymer grafted film on porous polymeric resin
Particle	Material	Polyvinylbenzyl chloride	ethylvinylbenzene-divinylbenzene copolymer
	Diameter (µm)	10	5
	Pore size (Å)	n.d.	Macro-porous, 300
	Crosslinking (%)	12%	55%
	Functionality	polyol	hydroxyethyl quaternary ammonium
Organic solvent limit		0-90% ACN or MeOH for cleaning	0-80% ACN or MeOH for cleaning
T operating range (°C)		10-40	10-40
pH range		0-14	0-14
max (psi/bar)		4350/300	4000/280

Ordering Information

Part no.	Description	Additional info
Analytical columns (2.1 and 4.0 mm ID x 200 mm)		
260.0010	SweetSep™ AEX200, 4.0 mm ID x 200 mm, 5 µm	Universal column for separation of mono- to polysaccharides in F&B, plants and glycans.
260.0011	SweetSep™ AEX200, 2.1 mm ID x 200 mm, 5 µm	
260.0020	SweetSep™ AEX20 , 4.0 mm ID x 200 mm, 5 µm	Fast, high-resolution separation of monosaccharides from food samples, incl. monosaccharides from glycoproteins, FDG, Heparin, etc.
260.0021	SweetSep™ AEX20 , 2.1 mm ID x 200 mm, 5 µm	
Pre-columns (2.1 and 4.0 mm ID x 50 mm)		
260.0015	SweetSep™ AEX200, 4.0 mm ID x 50 mm, 5 µm	For use with the AEX200 analytical column.
260.0016	SweetSep™ AEX200, 2.1 mm ID x 50 mm, 5 µm	
260.0025	SweetSep™ AEX20, 4.0 mm ID x 50 mm, 5 µm	For use with the AEX20 analytical column.
260.0026	SweetSep™ AEX20, 2.1 mm ID x 50 mm, 5 µm	
Trap-columns (4.0 mm ID x 50mm)		
260.0040	Amino acid trap, 5 µm	Traps amino acids present in the sample that interfere with the monosaccharide separation.
260.0030	Borate ion trap, 10 µm	Traps borate contaminants from mobile phase.
Accessories		
260.0100	Pre-column inlet filter PEEK, 0.5 µm	With replaceable PEEK frits 0.5 µm porosity, for direct connection into the analytical or pre-column.
260.0110	Replacement filters PEEK, 0.5 µm, 1 pcs	Replacement filters for Pre-column inlet filter.

SweetSep columns with other chemistries and dimension are currently under development and will be released shortly. For further information, please contact info@AntecScientific.com

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