Novel Stationary Phase for the Separation of all Classes of Carbohydrates

J.-P. Chervet[1], *C. Marvelous*[1], *H.-J. Brouwer*[1], *M. Eysberg*[1], *A. Reeder*[2]
[1]Antec Scientific, Alpen a/d Rijn, Netherlands, [2]Verulam Scientific, Unit 6, Appley Court, Bedfordshire, United Kingdom

Type selection
Preferred Presentation Type: Oral

General data
Topic: Food
Technique: HPLC

Abstract text
Description: 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.
We 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.
The resin particles packed in inert, metal-free HPLC 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.
Examples will be presented using HPAEC-PAD for the ultra-sensitive analysis of oligo– and polysaccharides as fraud markers in honey down to 1%, though in practice common honey fraud in the range of 40 to 60 %. In another application new limits in the separation of oligosaccharides with a degree of polymerization (DP) up to 90 will be shown using this new stationary phase. Finally the separation of the 13 most commonly observed N-glycans on therapeutic monoclonal antibodies (mAbs) using HPAEC(PAD)-MS will be highlighted, enabling both quantification and identification of individual glycans, without the need for derivatization.
References: C. Marvelous, T. Mulder, J-P. Chervet, N.J. Reinhoud, H.-J. Brouwer; Journal of Chromatography A 1716 (2024) 464661; https://doi.org/10.1016/j.chroma.2024.464661
Keywords: Analysis of all classes of carbohydrates, mono-, di-, tri-, tetra-saccharides, oligo-, polysaccharides, N-glycans, HPAEC(PAD)-MS

Conflict of Interest Declaration
Conflict of Interest Declaration: I confirm the authors have no Conflict of Interest.

General
1. I confirm that the abstract and that all information is correct.: Yes
2. I confirm that I submit this abstract on behalf of all authors.: Yes