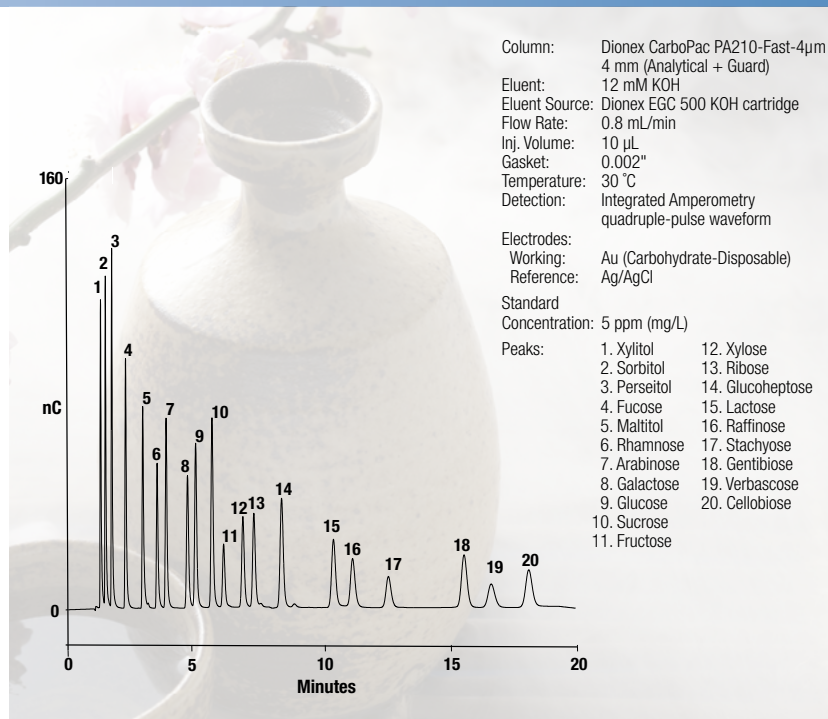


Thermo Scientific Dionex CarboPac PA210-Fast-4 μ m Column

Thermo Scientific™ Dionex™ CarboPac™ columns for high resolution analysis of mono-, di-, tri-, tetra- and pentasaccharides in various types of food samples.

- Predictable, high-resolution, high efficiency separations of food sugars
- Resolve and quantify glucose, galactose, fructose, sucrose, rhamnose, stachyose, raffinose, and verbasucose in food and beverage samples in ≤ 20 minutes



Column: Dionex CarboPac PA210-Fast-4 μ m
4 mm (Analytical + Guard)
Eluent: 12 mM KOH
Eluent Source: Dionex EGC 500 KOH cartridge
Flow Rate: 0.8 mL/min
Inj. Volume: 10 μ L
Gasket: 0.002"
Temperature: 30 $^{\circ}$ C
Detection: Integrated Amperometry
quadruple-pulse waveform

Electrodes:
Working: Au (Carbohydrate-Disposable)
Reference: Ag/AgCl

Standard
Concentration: 5 ppm (mg/L)

Peaks:

1. Xylitol	12. Xylose
2. Sorbitol	13. Ribose
3. Perseitol	14. Glucoheptose
4. Fucose	15. Lactose
5. Maltitol	16. Raffinose
6. Rhamnose	17. Stachyose
7. Arabinose	18. Gentibiose
8. Galactose	19. Verbasucose
9. Glucose	20. Cellobiose
10. Sucrose	
11. Fructose	

Predictable, high-resolution separations of simple sugars in food matrices

The Thermo Scientific™ Dionex™ CarboPac™ PA210-Fast-4 μ m (2 mm and 4 mm) columns are the latest additions to the Dionex CarboPac family of columns for carbohydrate separations. The new column was developed to provide fast, high-resolution separations for most mono- through pentasaccharides in a variety of applications including food and beverage analyses. The columns are packed with a hydrophobic, polymeric, microporous anion exchange resin stable over entire range of pH 0–14. The unique pH-stability of this packing allows eluent compositions that are conducive to anodic oxidation of carbohydrates at gold electrodes.

Increased interest in small oligosaccharides

Numerous oligosaccharides, consisting of 3–5 monosaccharide units, occur in foods. These oligosaccharides are generally considered nondigestible. The raffinose family oligosaccharides (RFOs) include raffinose (a trisaccharide), stachyose (a tetrasaccharide), and verbasucose (a pentasaccharide). They are found in vegetables, such as peas, beans, and lentils. Unlike other sugars, raffinose, stachyose,

and verbasucose are not digested by human gastrointestinal enzymes in the small intestine, and are poorly absorbed by most people. As such, they are referred to as prebiotic carbohydrates. Interest in fructans and raffinose family oligosaccharides (RFOs) has increased during the last decade due to their health-promoting abilities to selectively stimulate beneficial bacteria. Aside from their prebiotic characteristics, fructans and RFOs are also emerging as important immune stimulators in animals and humans.

Isocratic separation of mono and disaccharide standards (the 5 most common sugars of interest)

The Dionex CarboPac PA210-Fast-4 μ m column has been designed to provide fast separations of common mono- and disaccharides, and also oligosaccharides up to five hexose units long. Using 12 mM KOH, The five sugars can be separated within 8 min on the 150 mm long columns on both the 2 mm ID and 4 mm ID column formats (Figure 1).

Analysis of Sake

Sake is a product prepared by microbial fermentation of polished rice grains. Eighteen mono- and di-saccharides are reported to be present in Sake. A standard with known concentrations of these 18 sugars was prepared. The bottom panel of Figure 2 shows the separation of the standards. The top panel of Figure 2 shows the separation of a 1000-fold diluted Sake sample. The separation reveals significant amounts of glucose, sucrose, fructose, and maltose, and smaller amounts of kojibiose, gentibiose, cellobiose, and sakebiose.

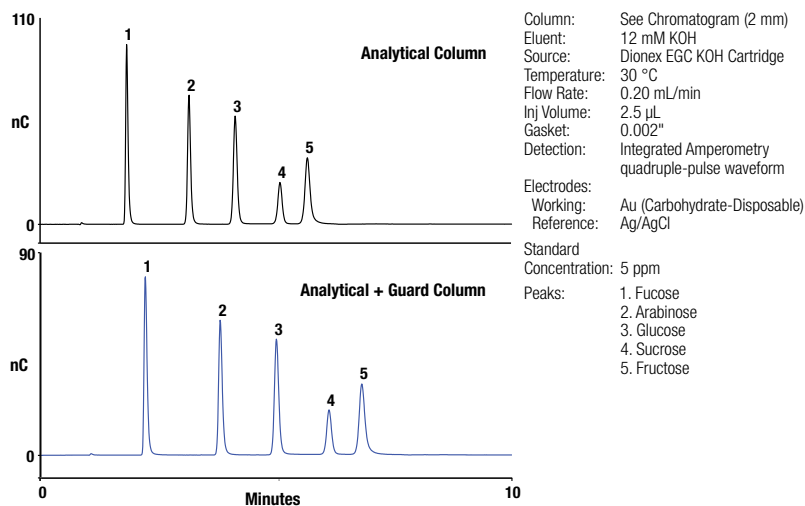


Figure 1. Separation of a five-carbohydrate standard using the Dionex CarboPac PA210-Fast-4 μ m, 2 mm column.

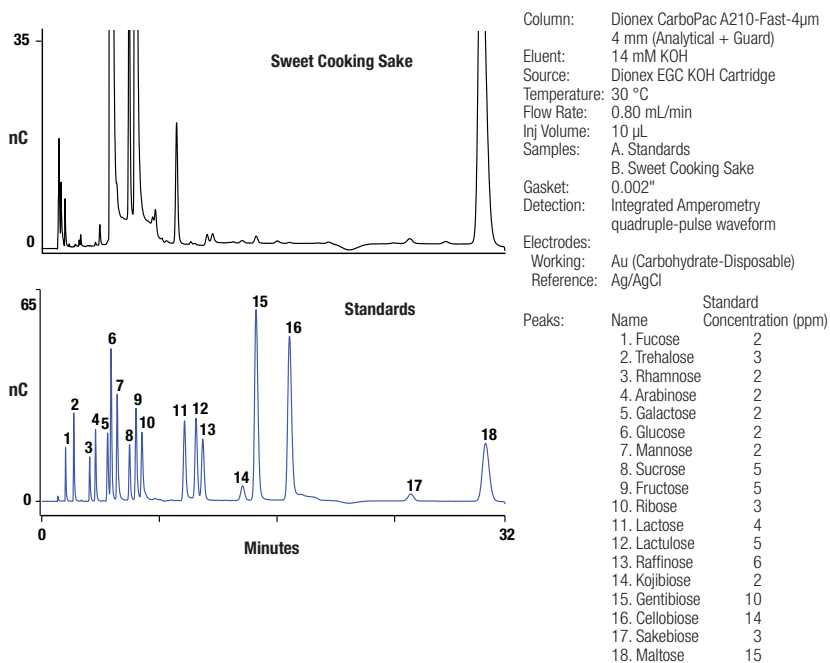


Figure 2. Separation of Sake carbohydrates using the Dionex CarboPac PA210-Fast-4 μ m, 4 mm column.

Analysis of Honey

Honey is natural product, and tends to contain carbohydrates found in the nectar retrieved from the source flowers by the hive. Honey preparations from a local supermarket, a local beekeeper and from New Zealand were analysed along with a known standard in Figure 3.

All the honey types were diluted 1000-fold in water and compared against a known standard of 13 sugars.

All the honey types namely supermarket clover honey, beekeeper's honey, and the manuka honey contain glucose and fructose as the most abundant sugars, and sucrose, maltose, nigerose and kojibiose are present at lower concentrations.

The carbohydrate profiles of each of the honeys is a little different which can be valuable in determining the source of the honey.

Guaranteed Performance

The unique pellicular resin of the Dionex CarboPac PA210-Fast-4 μ m columns offers exceptional selectivity and stability over the entire pH range. Its highly cross-linked structure ensures long column life and easy cleanup. The entire manufacturing process (resin synthesis, amination, and packing and testing of the chromatographic columns) is carefully controlled to ensure that every Dionex CarboPac PA210-Fast-4 μ m column delivers reproducible performance.

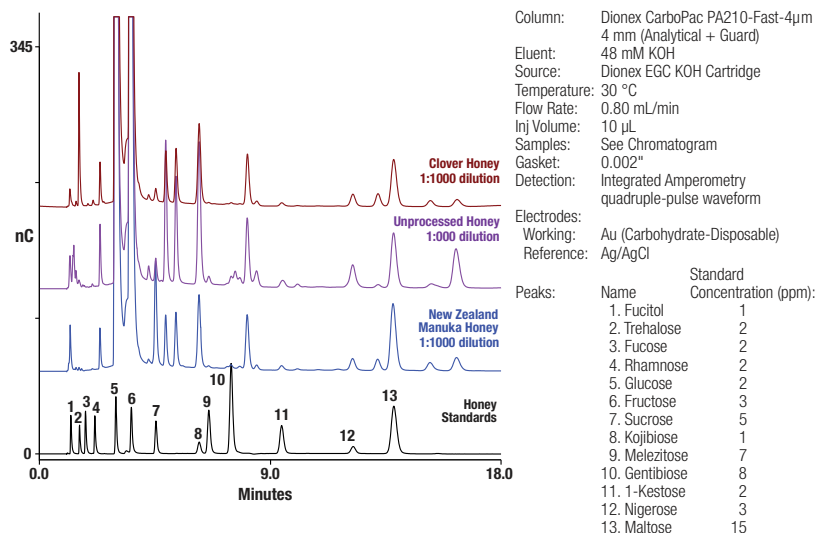


Figure 3. Comparison of honey carbohydrates on a Dionex CarboPac PA210-Fast-4 μ m, 4 mm column.

SPECIFICATIONS

Resin Composition:	4.0 μ m diameter ethylvinylbenzene/divinylbenzene substrate (55% cross-linking) agglomerated with 43 nm MicroBead 6% cross-linked quaternary amine-functionalized latex
Anion Exchange Capacity:	66 μ eq/column
Chemical Compatibility:	pH 0-14, 80% compatible with common HPLC Solvents
Temperature Limit:	60 $^{\circ}$ C
Typical Operating Conditions:	4,000 psi at 0.2 mL/0.8 mL per minute (guard and analytical) 2 mm/4 mm \times 150 mm
Recommended Operating Temperature:	30 $^{\circ}$ C
Recommended Flow Rate:	0.2 mL/min 2 mm; 0.8 mL/min 4 mm
Ionic Forms Eluents:	Potassium or Sodium Hydroxide

Ordering Information

For more information or to place an order, contact the Thermo Scientific Dionex Products office nearest you or your local distributor. Phone numbers and addresses for worldwide subsidiaries can be found in the About Us section of www.thermoscientific.com.

Description	Part Number
Dionex CarboPac PA210-Fast-4 μ m Analytical Column (4 \times 150 mm)	088953
Dionex CarboPac PA210-Fast-4 μ m Analytical Column (2 \times 150 mm)	088954
Dionex CarboPac PA210-Fast-4 μ m Guard Column (4 \times 30 mm)	088955
Dionex CarboPac PA210-Fast-4 μ m Guard Column (2 \times 30 mm)	088956

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