

Sierra Separations

Carbohydrates (H⁺)

- Separation of carbohydrates, organic acids and alcohols
- Dilute acid mobile phase
- Wine and dairy industry, bio-reactions and medical science applications

The SS-100, H⁺ carbohydrate column is similar to the ion exchange (SS/OA-850 Organic acids) column, except for a different degree of cross-linking and sulfonation. The variation in cross-linking and sulfonation optimizes not only the carbohydrates present in the sample but also the organic acids and alcohols which may be present. Only dilute acid is used as the mobile phase at ambient temperatures.

The analysis of organic acids and carbohydrates in wines and fruit juices provide information on fermentation processes and product quality. Control of organic acid peak elution times are affected by eluent pH and temperature; protonated molecular species are better retained by the resin column. A dilute solvent modifier such as acetonitrile, which can result in an increase in backpressure, will reduce the elution time of most sample species.

Typical applications include:

- Wine industry:** sucrose, glucose, fructose, citric, succinic, lactic, and acetic acids, glycerol, ethanol, methanol and butanediol.
- Dairy industry:** malic acid, citric acid, lactic acid, propanoic acid and acetic acid monitoring fermentation products
- Bio-reactions:** monitoring fermentation products
- Medical science:** Krebs cycle acids

Cat. No.	Description
SS-802	SS-100, H ⁺ Carbohydrate, 300 x 7.8mm
SS-802G	SS-100, H ⁺ Guard column

Carbohydrates (Pb⁺⁺)

- Pb⁺⁺ form
- Highest resolution and selectivity for monosaccharide and disaccharide separations
- Water mobile phase
- Dairy and meat products, cereals and plant fibers

The SS-100, Pb⁺⁺ column is packed with a spherical 10µm styrene-divinylbenzene copolymer resin in the lead form to provide the highest resolution and selectivity in monosaccharide and disaccharide separations. These complex sugars are often used as the mobile phase. Pentoses and hexoses found in cellulose products are well separated especially glucose, xylose, galactose, cellobiose, arabinose and mannose.

The lead resin column is quite useful for the separation of xylose, galactose and mannose which are not completely resolved on the calcium column. In addition, the lead column resolves sucrose and lactose well if these two sugars are present in excess in some samples.

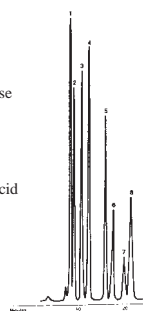
Cat. No.	Description
SS-803	SS-100, Pb ⁺⁺ Carbohydrate 300 x 7.8mm
SS-803G	SS-100, Pb ⁺⁺ Guard column

Carbohydrates and Acids

Operating Conditions:
Dimensions: SS-100, H⁺
300mm x 7.8mm
Detection: RI @ 32 x
Sample volume: 20µL
Flow rate: 0.4mL/min.
Temperature: Ambient
Eluent: 2.5mM H₂SO₄

Standard

- 1: Maltotriose
- 2: Maltose
- 3: Glucose
- 4: Fructose
- 5: Glycerol
- 6: Acetic Acid
- 7: Methanol
- 8: Ethanol



Mono and Disaccharides

Operating Conditions:
Dimensions: SS-100, Pb⁺⁺
300mm x 7.8mm
Detection: RI @ 32 x
Sample volume: 20µL
Flow rate: 0.4mL/min.
Temperature: 90° C
Eluent: H₂O

Standard

- 1: Melezitose
- 2: Sucrose
- 3: Lactose
- 4: Glucose
- 5: Lactulose
- 6: Galactose
- 7: Fucose
- 8: Fructose



Carbohydrates (Ca⁺⁺)

- Monosaccharides and sugar alcohols
- Unequaled peak resolution
- Water mobile phase

The Sierra Separations Ca⁺⁺ carbohydrate column uses a (styrene-divinylbenzene column copolymer) spherical resin in the calcium form. The SS-100, Ca⁺⁺ column requires only water as the mobile phase and can be used in the food industry for the separation of sweeteners in baked goods and sugar alcohols such as sorbitol, mannitol and xylitol which are often used as sweeteners in fruit juices, soft drinks, beer brewing and dairy products.

Other applications include rapid analysis of high fructose corn syrups, sugar beets, cane sugars and sugar alcohols in body fluids such as blood serum, urine and saliva. Sugar substitutes such as mannitol, sorbitol, maltitol, xylitol, lactitol and platinitol are well resolved.

Typical applications include:

- Fruit juices:** sucrose, glucose, fructose and sorbitol
- Soft drinks:** sucrose, glucose, fructose, sugar substitutes
- Dairy products:** sucrose, lactose, lactulose, glucose, galactose and fructose
- Vegetables:** sucrose, glucose, fructose, mannitol, stachyose and raffinose
- Medical source:** sugar and sugar alcohols

Cat. No.	Description
SS-800	SS-100, Ca ⁺⁺ Carbohydrate, 300 x 7.8mm
SS-800G	SS-100, Ca ⁺⁺ Guard column

Monosaccharides and Sugar Alcohols

Operating Conditions:
Dimensions: SS-100 Ca⁺⁺
300mm x 7.8mm
Detection: RI @ 32 x
Sample volume: 20µL
Flow rate: 0.4mL/min.
Temperature: 85° C
Eluent: H₂O
Chart speed: 15 cm/hr

Standard 1

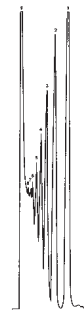
- 1: Maltotriose
- 2: Maltose
- 3: Lactulose
- 4: Glucose
- 5: Xylose
- 6: Arabinose
- 7: Ribitol
- 8: Arabitol
- 9: Xylitol



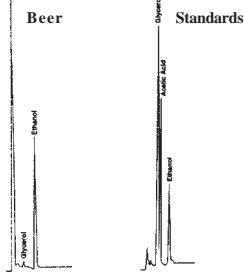
Corn Syrup Analysis**Operating Conditions:**

Dimensions: SS-200 Ca⁺⁺
300mm x 7.8mm
Detection: RI @ 32 x
Sample volume: 20µL
Flow rate: 0.4mL/min.
Temperature: 85° C
Eluent: H₂O

Corn Syrup
1. Glucose
2. Maltose
3. Maltotriose
4. DP 4
5. DP 5
6. DP 6
7. DP 7
8. DP 8
9. DP 9

**Rapid Alcohols****Operating Conditions:**

Column: SS-875, H⁺
100mm x 7.8mm
Detection: RI @ 32 x
Sample volume: 20µL
Flow rate: 0.7mL/min.
Temperature: 50° C
Eluent: 0.003N H₂SO₄

**Carbohydrates (Ca⁺⁺)**• **Oligosaccharides; Corn syrup and brewing industries**

The SS-200, Ca⁺⁺ column uses a low cross-linked cation exchange resin in the calcium form. The large pores of the resin resolve oligosaccharides as large as DP-8. This resin also resolves mono and disaccharides in samples such as starch hydrolyzates.

This column operates at lower back pressures to prevent any bed compression. Water is used as the mobile phase. This column finds wide use in the corn syrup industry and is useful for the analysis of malt liquors and those syrups specifically prepared for the beer brewing industry.

Cat. No.	Description
SS-812	SS-200, Ca ⁺⁺ Carbohydrate, 300 x 7.8mm
SS-812G	SS-200, Ca ⁺⁺ Guard column

Rapid Alcohols (H⁺)

The SS-875 column has been designed for the analysis of alcohols in less than 6 minutes using only a dilute sulfuric acid eluent. The column is packed with a spherical sulfonated styrene-divinylbenzene copolymer which is stable from pH 0 to 14. The hydrogen form of the resin is packed in a 100mm x 7.8mm column for the rapid, non-destructive determination of alcohols, glycols and the hydrophobic organic acids found in alcoholic beverages, foods, pharmaceuticals and biochemicals.

This rapid alcohol (and carbohydrate) analysis column will separate the more hydrophobic components in the sample giving an accurate determination of the ethanol present. In most cases only minimal sample preparation is required; the undiluted or diluted sample need only be filtered and injected on the column. Use of a short, large diameter, column give vastly improved peak resolution resulting in high narrow peaks which improve detection limits.

Cat. No.	Description
SS-875	SS-875, H ⁺ Alcohol, 100mm x 7.8mm
SS-875G	SS-875 Guard column

Organic Acids (H⁺)

The SS/OA-850 column is packed with a 10µm spherical sulfonated styrene-divinylbenzene resin which is stable from pH 0 to 14. The resin is used in the H⁺ form and is being regenerated with the use of the dilute sulphuric acid eluent. The 300mm x 7.8mm column is used for determining the anions of weak organic and inorganic acids. Anions of organic acids include acetate, formate, oxalate and others. Anions of inorganic acids include fluoride, bicarbonate, borate, silicate and others. Water or dilute acid can be used as the eluent.

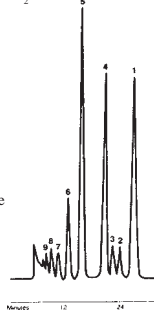
Conductivity, UV or RI detection may be used depending on the properties of the sample being analyzed. Acids are eluted usually in order of acid strength with the stronger acids eluting last (in order of increasing pKa values). Retention times of the organic acids may be controlled through adjustment of the eluent pH. The separation of these organic acids may be found in biological fluids, foods, industrial chemicals and fermentation process.

Cat. No.	Description
SS-850	SS/OA-850 H ⁺ Organic acid, 300 x 7.8mm
SS-850G	SS/OA-850 Guard column
SS-851	SS/OA-851 H ⁺ Organic acid, 250 x 4.6mm
SS-852	SS/OA-852 H ⁺ Organic acid, 100 x 7.8mm

Carbohydrates**Operating Conditions:**

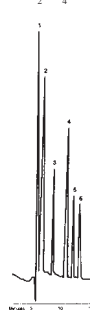
Dimensions: SS-100 Ag⁺
300mm x 7.8mm
Detection: RI @ 32 x
Sample volume: 20µL
Flow rate: 0.3mL/min.
Temperature: 90° C
Eluent: H₂O

Corn Syrup
1: Ethanol
2: Glycerol
3: Fructose
4: Glucose
5: Maltose
6: Maltotriose
7: DP 4
8: DP 5
9: DP 6

**Organic Acids****Operating Conditions:**

Dimensions: SS/OA-850 H⁺
300mm x 7.8mm
Detection: Conductivity
Sample volume: 20µL
Flow rate: 0.6mL/min.
Temperature: Ambient
Eluent: 0.003N H₂SO₄

Corn Syrup
1: Oxalic Acid
2: Maleic Acid
3: Malic Acid
4: Succinic Acid
5: Formic Acid
6: Acetic Acid

**Carbohydrates (Ag⁺)**

- **Oligosaccharides**
- **Resolves saccharides as high as DP-7 (SS-100 Ag⁺) and DP-12 (SS-200 Ag⁺)**
- **Applications include brewing and corn syrup industries**

The SS-100 Ag⁺ column provides rapid oligosaccharide separations. This high cross-linked styrene-divinylbenzene copolymer resin in the silver form is stable and can resolve saccharides as large as DP-7.

It was developed specifically for the separation of those saccharides found in beer and corn syrup and can be used to monitor starch hydrolysis. Note that glycerol, fructose and DP-4, DP-5 and DP-6 are well resolved in a sample of domestic beer.

For separation of oligosaccharides as large as DP-12 use the SS-200 Ag⁺ column. This column is useful in the carbohydrate industry to determine hydrolyzates in the conversion of corn syrup to fermentable carbohydrates.

Cat. No.	Description
SS-806	SS-100, Ag ⁺ Column 300 x 7.8mm
SS-806G	SS-100, Ag ⁺ Guard column
SS-807	SS-200, Ag ⁺ Column 300 x 7.8mm
SS-807G	SS-200, Ag ⁺ Guard column