Simultaneous Analysis of Monosaccharides and Oligosaccharides in Beers (VG-50 4E)

The Shodex **HILICpak VG-50 4E** column, a polymer-based amino column for HILIC mode, provides effective separation of both monosaccharides and oligosaccharides in beer samples. Sugars in beers are primarily generated through the saccharification of starch in malt and other raw materials. By coupling VG-50 4E with ELSD detection, this application demonstrates simultaneous analysis of saccharides in different types of beers, including regular, low-malt, sugar-free, and alcohol-free varieties.

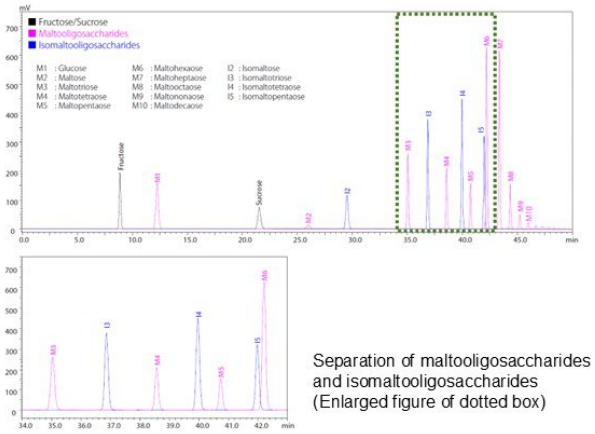
Preparation:

1. Degas beers to remove carbonation.
2. Dilute **1+19** with a 1:1 mixture of water and acetonitrile.
3. Filter through a 0.2-µm membrane filter and inject.
4. **Sample injection volume**: 20 µL
5. **Mixed standard solutions** (50 mg/L each in water/acetonitrile 3:7):

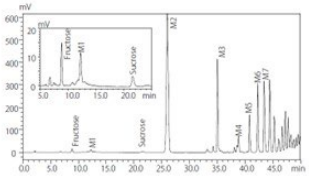
- Monosaccharides: Glucose, Fructose, Sucrose, Maltose
- Maltooligosaccharides (M1–M10): Maltotriose to Maltodecaose
- Isomaltooligosaccharides (I2–I5): Isomaltose to Isomaltopentaose

Chromatographic Conditions:

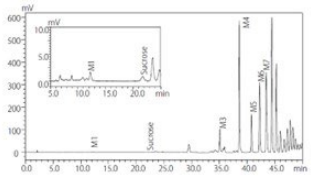
- **Instrument**: i-Series LC-2050C + ELSD-LT III
- **Column**: Shodex HILICpak VG-50 4E (4.6 mm I.D. × 250 mm)
- **Eluent**:
  - Water
  - Acetonitrile
- **Gradient:** 88% B (0–12 min) → 83.5% B (25 min) → 50% B (50 min) → 88% B (50.1–60 min)
- **Flow rate**: 1.0 mL/min
- **Detector**: ELSD
- **Column temp.**: 45 ℃



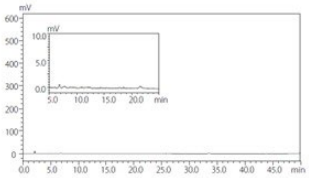
Separation of maltooligosaccharides and isomaltooligosaccharides (Enlarged figure of dotted box)



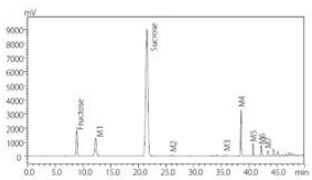
Chromatogram of beer G



Chromatogram of low-malt beer I



Chromatogram of sugar-free beer H



Chromatogram of alcohol-free beer J

Applications / Industries:

- **Food & Beverage Industry**: Characterization and comparison of sugar content in beers and related beverages.
- **Quality Control & Product Development**: Verification of sugar-free or reduced-sugar product formulations.
- **Research in Fermentation & Brewing**: Monitoring saccharide composition during beer brewing and fermentation.

Using the VG-50 4E column, mono- and oligosaccharides in different beers were clearly separated and detected. Chromatograms confirmed that sugar profiles vary significantly across beer types, with sugar-free and alcohol-free beers showing reduced saccharide levels compared to standard beer.