

## Analysis of Sugars in Food by LC-MS

Sugars not only add sweetness to foods but also help maintain their quality or shape, which could otherwise be adversely affected by water retention and viscosity changes. In the body, sugars are a source of energy, and as they bind to proteins and fats, they also play important roles in the determination of blood types and immunoreactions. When analyzing sugars by HPLC, RI detection (refractive index) is typically used. However, the sensitivity is low and the analysis can be affected by contaminating substances. In this study, an example of the highly selective analysis offered by MS Detector is presented.



5610 MS Detector

### LC-MS Analysis

#### Analytical Conditions

Table 1 MS Detector Settings

Ionization method	ESI
Ionization mode	Negative
Ionization voltage	2100 V
Measurement mode	Scan: $m/z$ 100-600 SIM: $m/z$ 179: Fructose, Glucose $m/z$ 341: Sucrose, Maltose $m/z$ 503: Raffinose

Table 2 Conditions for HPLC Analysis

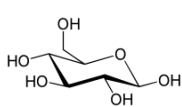
Column	Asahipak NH2P-50 4E, 4.6 x 250 mm
Column temp.	40°C
Motile phase	Water / Acetonitrile = 25 / 75
Flow rate	1.0 mL/min (Split ratio = 1:250)
Injection vol.	10 $\mu$ L

#### Preparation of standard Sample

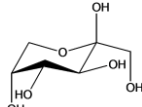
The sample solutions were prepared by dissolving 5 sugar standard samples in water.  
(Scan mode: 100 mg/L, Linearity confirmation: 0.5-10 mg/L)

#### Monosaccharide, MW 180

Glucose

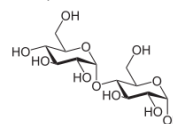


Fructose

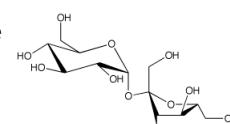


#### Disaccharides, MW 342

Maltose

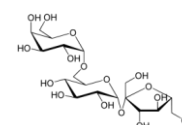


Sucrose



#### Trisaccharide, MW 504

Raffinose



#### Confirmation of Ion Detection by Scan Mode

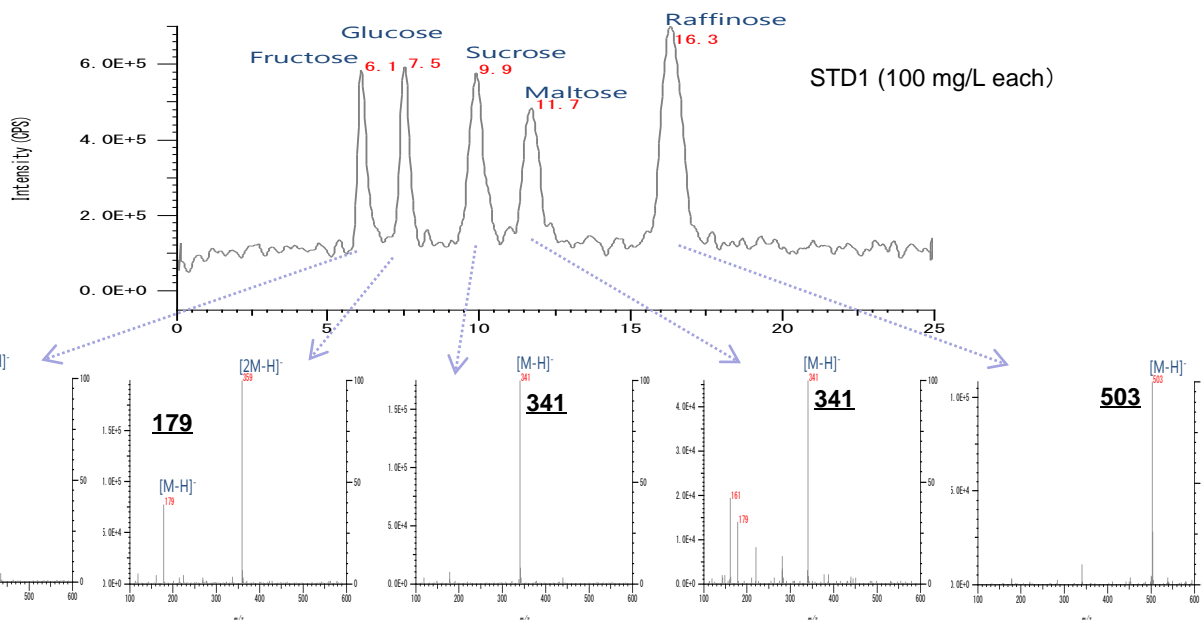


Figure 1 TIC and Mass Spectra of Each Component by Scan Mode ( $m/z$  100-600)

## Confirmation of Linearity

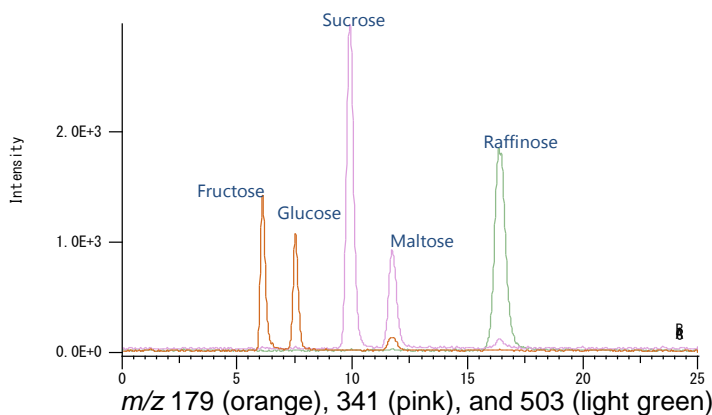


Figure 3 Overlay of SIM

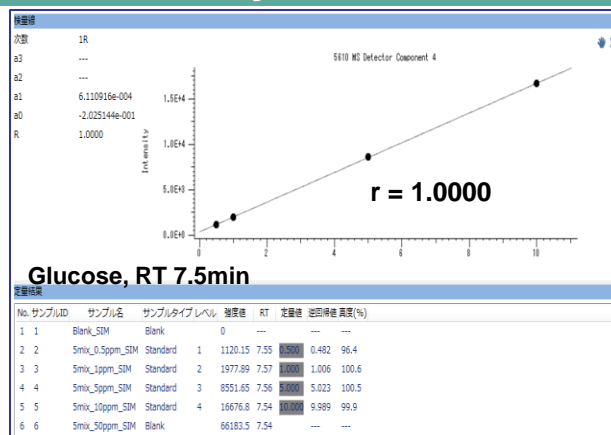
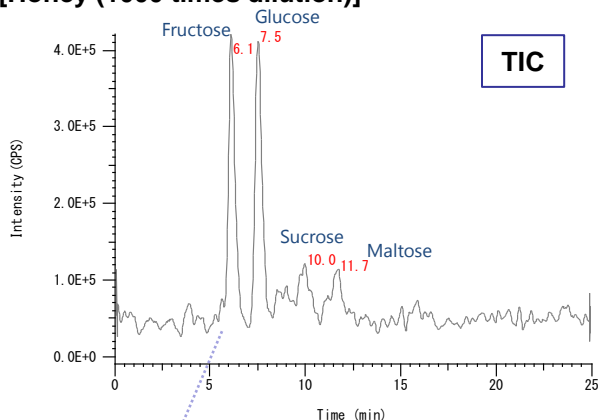


Figure 4 Example of Calibration Curve  
(Concentration range: 0.5 - 10 mg/L)

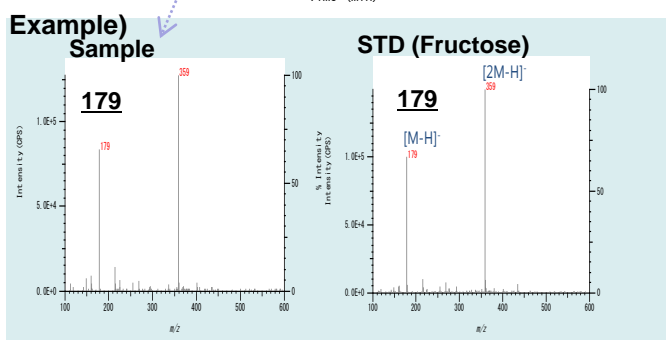
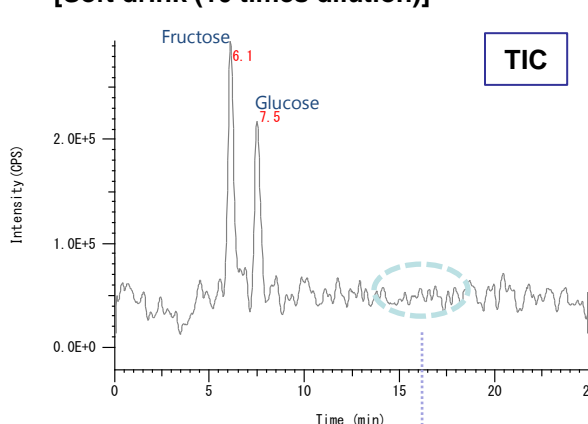
The calibration curves generated by SIM mode show good linearity of  $r=0.9994$  for fructose,  $r=1.0000$  for glucose,  $r=1.0000$  for sucrose,  $r=0.9997$  for maltose, and  $r=0.9991$  for raffinose over the concentration range of 0.5-10 mg/L.

## Example of Sample Analysis

[Honey (1000 times dilution)]

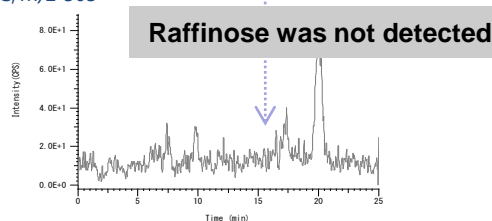


[Soft drink (10 times dilution)]



Comparison with STD Mass Spectrum

EIC, m/z 503



As described above, by comparing sample spectra to mass spectra from standards, or by monitoring the ions specific to target components by EIC (extraction chromatograph), the elution of the target component can be confirmed.

<Main system configuration> Chromaster 5110 Pump, 5210 Autosampler, 5310 Column Oven, 5610 MS Detector

NOTE: These data are an example of measurement; the individual values cannot be guaranteed.