SHIMADZU

Application Data Sheet

No.12

GCMS
Gas Chromatograph Mass Spectrometer

Analysis of Amino Acids Contained in Soy Sauce

Amino acids contained in soy sauce were treated with EZ:faast™ (Phenomenex, Inc.), which enables easy pretreatment, and then analyzed by GC-MS.

Experiment

Pretreatment
Soy sauce diluted to 1/10 was treated with EZ:faast. Norvaline was added as an internal standard.

Instrument
A GCMS-QP2010 Ultra (with high-power oven) was used for the measurements. The analysis conditions, shown in Table 1, were in conformity with the "Amino Acid Analysis Methods" in the "GC/MS Metabolic Components Database."

Table 1: Analysis Conditions

GC-MS   : GCMS-QP2010 Ultra (with high-power oven)
Column   : ZB-AAA (length: 10 m, 0.25 mm I.D.) (Phenomenex, Inc.)

[GC]
Injection quantity   : 1 μL
Vaporization chamber temperature: 280℃
Column oven temperature: 110℃ → (30 ℃/min) → 320℃
Control mode   : Constant pressure (15 kPa)
Injection mode   : Split
Split ratio   : 15
Carrier gas   : Helium

[MS]
Interface temperature: 280℃
Ion source temperature: 200℃
Solvent elution time : 0.4 min
Data sampling time   : 0.5 min to 7 min
Measurement mode : Scan
Mass range   : m/z 45-450 (3,333u/sec)
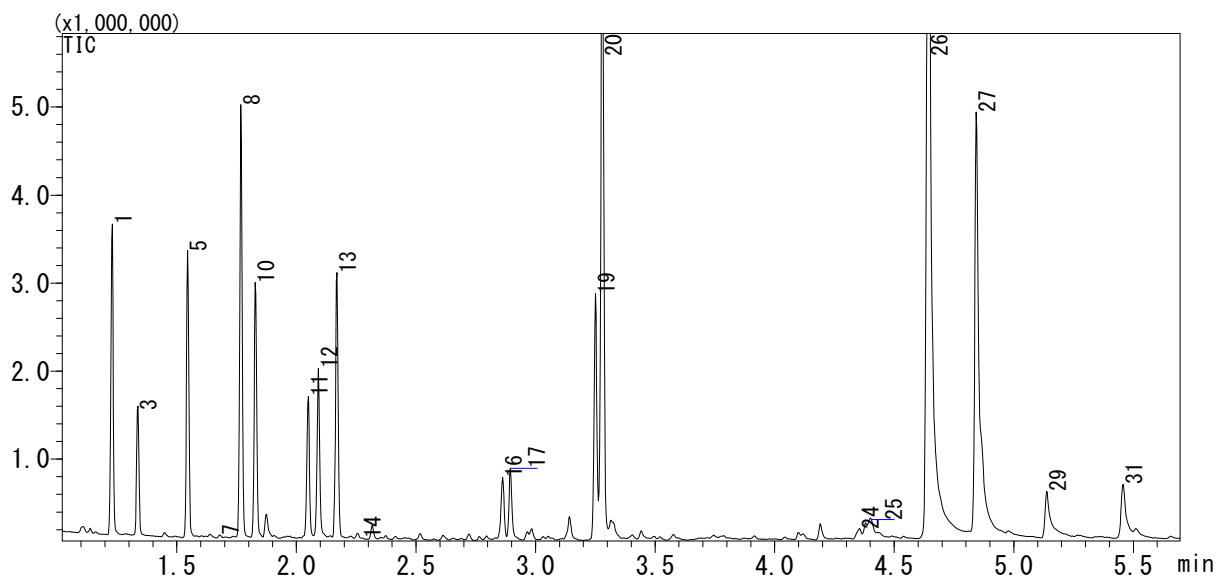Event time   : 0.15 sec

Fig. 1: Total Ion Current Chromatogram (TIC) for Amino Acid Derivatives in Soy Sauce
The numbers for each component follow the serial numbers in the "GC/MS Metabolic Components Database."

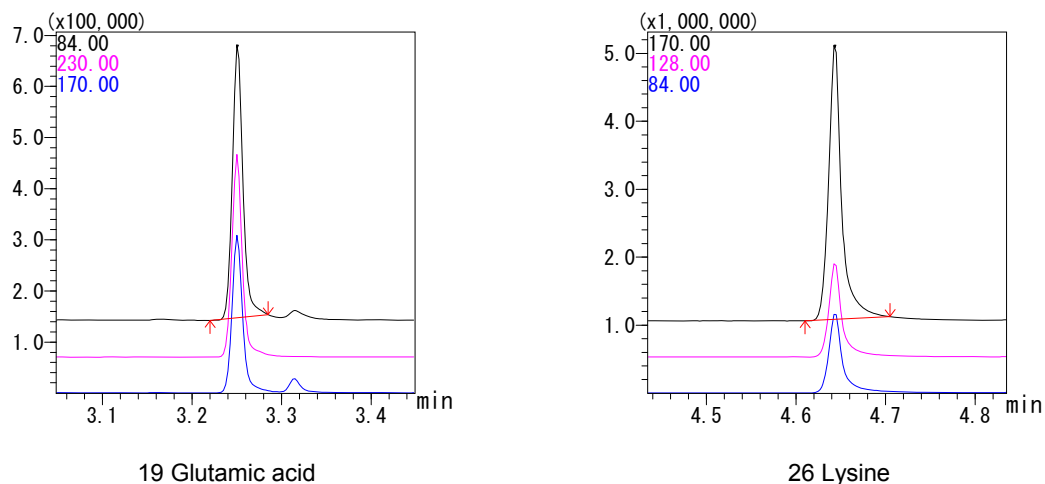|			
1 Alanine	10 Isoleucine	16 Aspartic acid	25 Glycine-proline (dipeptide)
3 Glycine	11 Threonine	17 Methionine	26 Lysine
5 Valine	12 Serine	19 Glutamic acid	27 Histidine
7 Norvaline(I.S.)	13 Proline	20 Phenylalanine	29 Tyrosine
8 Leucine	14 Asparagine	24 Ornithine	31 Tryptophan

19 Glutamic acid

26 Lysine

Fig. 2: Examples of Mass Chromatograms for Amino Acid Derivatives

Summary

Pretreatment using the EZ:faast kit, following by analysis using the GCMS-QP2010 Ultra, which is equipped with a high-speed scanning function, enabled rapid analysis of amino acids. With this combination, it took only 15 minutes per sample from pretreatment to analysis.
(Reference: Shimadzu Application News No. M246 Analysis of Amino Acids Using Fast-GC/MS and Metabolite Database)

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