

High Speed, High Resolution Analytical Applications (Part 2) Analysis of Isoflavones in Soy

Soy isoflavones are a group of compounds that are present in large quantity in soybeans, and especially in the soy germ. Recently, these compounds are receiving much attention due to the similarity of their activity with the female hormone estrogen.

This Application News introduces an example of the simultaneous analysis of seven isoflavones using the high-performance "Shim-pack XR-ODS" column, highlighting the high-speed and high-resolution performance of this column.

■ Analysis of Standard Solution

We analyzed a standard solution containing seven isoflavones (daidzin, genistin, malonyldaidzin, malonylglycitin, malonylgenistin, daidzein, and genistein) (each 35 mg/L) using the Shim-pack XR-ODS (upper chromatogram) and the Shim-pack VP-ODS column (lower chromatogram), with the results shown in Fig.1, and the Analytical Conditions shown in Table 1.

With the Shim-pack XR-ODS, analysis was conducted with mobile phase linear velocity increased to about 3.5 times that with the Shim-pack VP-ODS, thereby shortening the analysis time of one cycle to about one-seventh, while maintaining high resolution. The structural formulas of these isoflavones are shown on the following page.

Table 1 Analytical Conditions

Column	: Shim-pack XR-ODS (50 mmL. × 3.0 mmI.D., 2.2 μm) Shim-pack VP-ODS (150 mmL. × 4.6 mmI.D., 4.6 μm)
Mobile Phase	: A; 0.1 % Formic acid -Water : B; Acetonitrile
Time Program	: [XR-ODS] B Conc. 15 % (0 min) → 23 % (2 min) → 75 % (2.3-2.5 min) → 15 % (2.51-4 min) [VP-ODS] B Conc. 17 % (0 min) → 20 % (7 min) → 70 % (18 min) → 17 % (18.01-28 min)
Flow Rate	: 1.5 mL/min (XR-ODS) 1.0 mL/min (VP-ODS)
Column Temp.	: 40 °C
Injection Vol.	: 4 μL (XR-ODS) 10 μL (VP-ODS)
Detection	: SPD-20A at 254 nm
Flow Cell	: Semi-micro cell (XR-ODS) Conventional cell (VP-ODS)

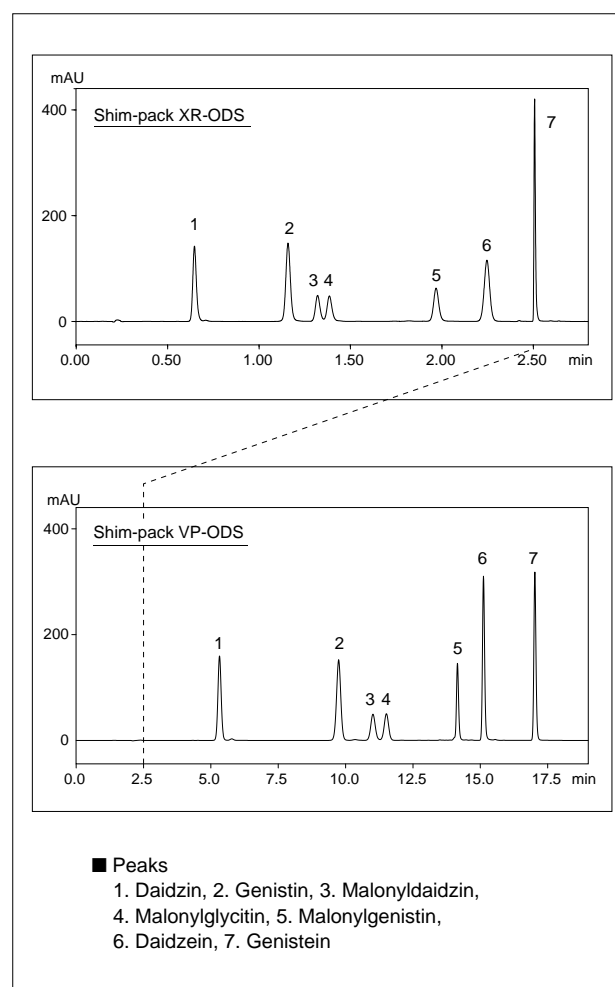


Fig.1 Chromatograms of a Standard Solution of Seven Isoflavones (35 mg/L each)

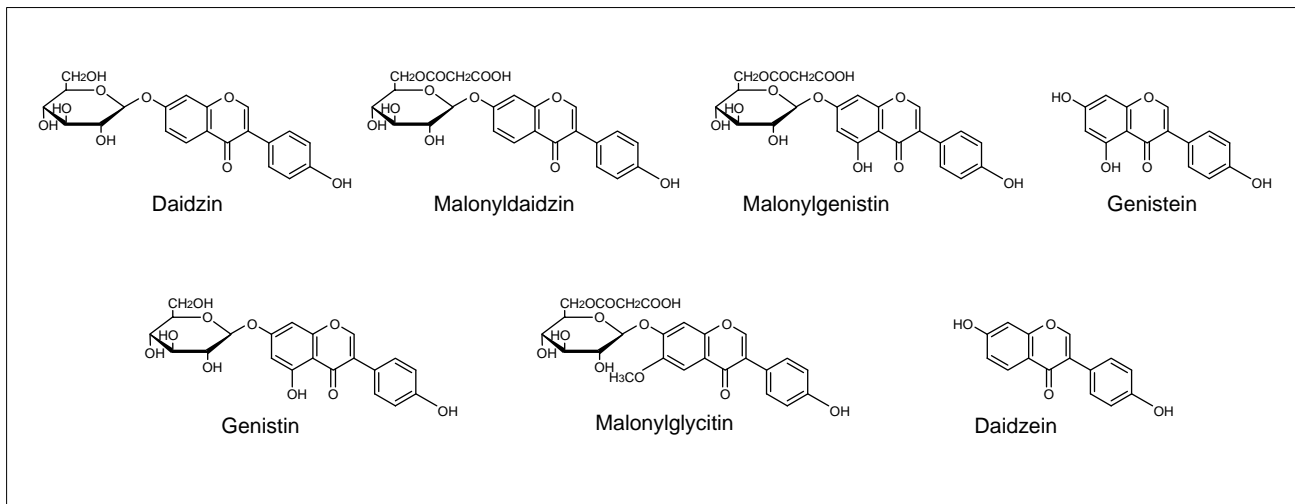


Fig.2 Structural Formulas of Seven Isoflavones

■ Analysis of Foods

Soy food products (soybean flour, miso, soymilk) were prepared according to the procedure shown in Fig.3, and high-speed, high-resolution analysis was conducted using the Shim-pack XR-ODS, as shown in Fig.4 through 6. The analytical conditions were the same as those shown in Table 1.

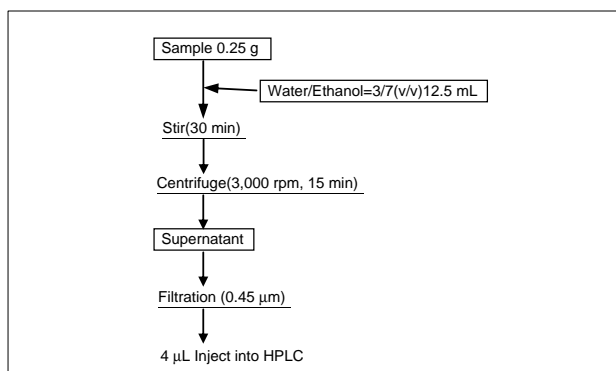


Fig.3 Sample Preparation

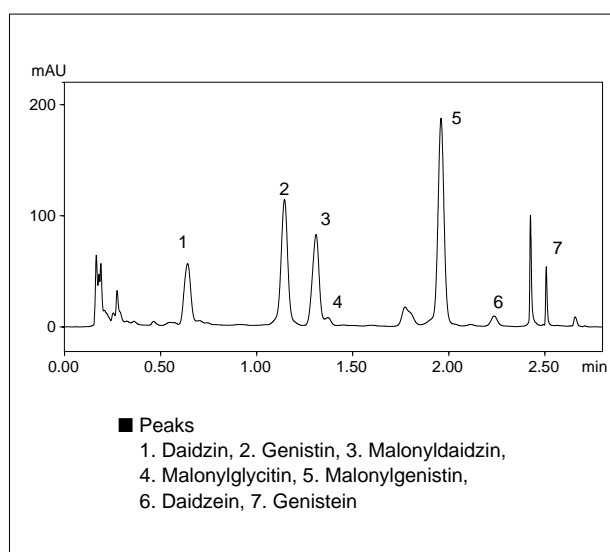


Fig.4 Chromatogram of Soybean Flour

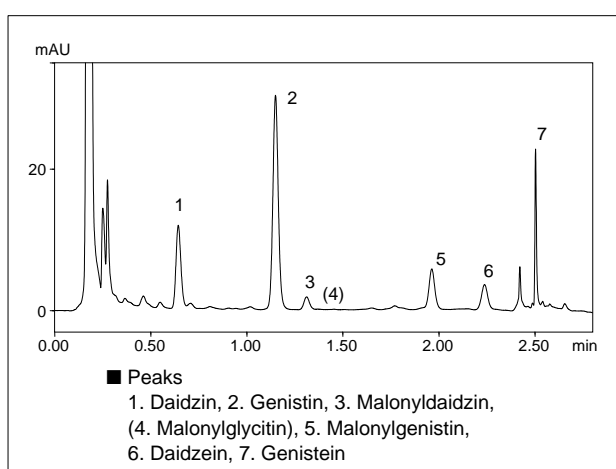


Fig.5 Chromatogram of Miso (Soybean Paste)

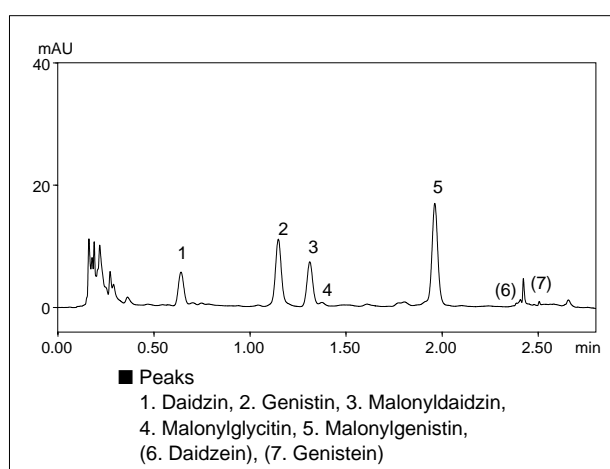


Fig.6 Chromatogram of Soymilk

NOTES:

*This Application News has been produced and edited using information that was available when the data was acquired for each article. This Application News is subject to revision without prior notice.



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