

## Analysis of $\alpha$ -Lipoic Acid in Dietary Supplement

Lipoic acid, also referred to as thioctic acid, exists as (+)- $\alpha$ -lipoic acid in the natural world. In the body, it acts as a coenzyme for various enzymes, in particular, it is receiving attention for its activity as a coenzyme for enzymes that exist in mitochondria. Moreover, in recent years, it has found extensive use as a dietary

supplement.

This Application News introduces an example of analysis of  $\alpha$ -lipoic acid in a food supplement product using the Shimadzu SPD-M20A Photodiode Array Detector.

### ■ Analysis of Standard Solution

Fig.1 shows the structural formula for  $\alpha$ -lipoic acid. In addition, Fig.2 shows a spectrum of an  $\alpha$ -lipoic acid standard, in which the maximum absorption peak is evident in the vicinity of 333 nm.

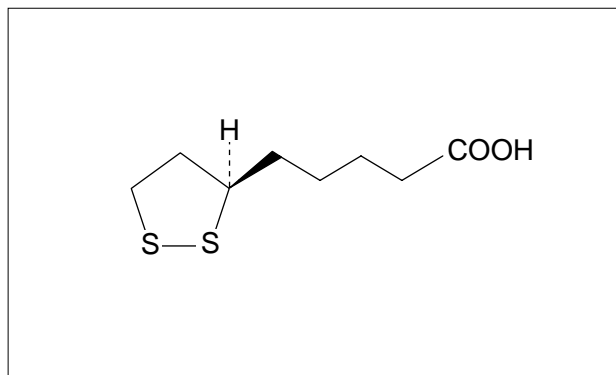


Fig.1 Structure of  $\alpha$ -Lipoic Acid

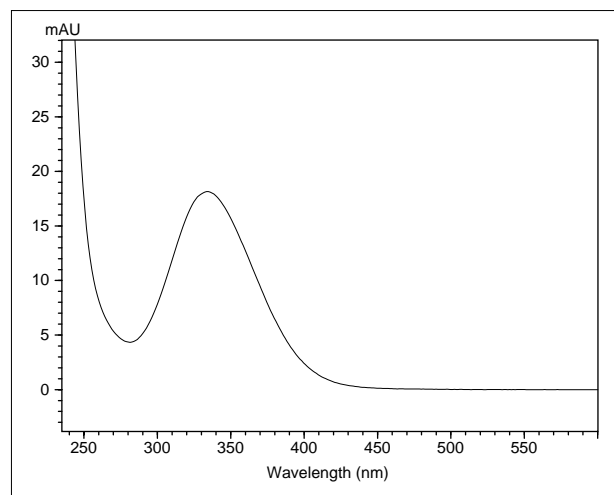


Fig.2 Spectrum of  $\alpha$ -Lipoic Acid

Fig.3 shows the results of analysis of a 500 mg/L standard solution. After preparing a standard source solution consisting of 1000 mg/L of acetonitrile, the standard solution was prepared by diluting with water. The analytical conditions are shown in Table 1.

Table 1 Analytical Conditions

Column	: Shim-pack VP-ODS (150 mmL. $\times$ 4.6 mmI.D.)
Guard Column	: Shim-pack GVP-ODS (10 mmL. $\times$ 4.6 mmI.D.)
Mobile Phase	: 10 mmol/L (Sodium) phosphate buffer (pH 2.6) / Acetonitrile = 6 / 4 (v/v)
Flow Rate	: 1.0 mL/min
Column Temp.	: 40 $^{\circ}$ C
Detection	: SPD-M20A at 333 nm (Slit width : 8 nm)

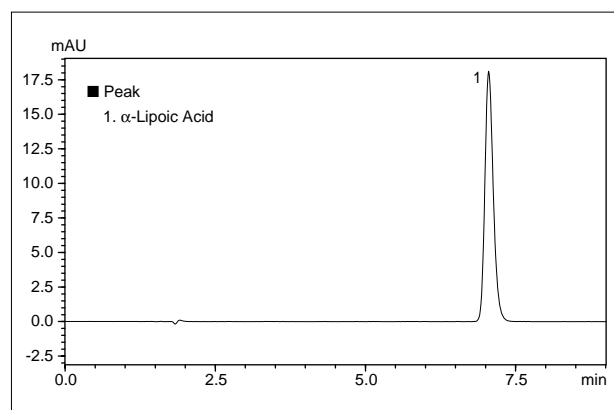


Fig.3 Chromatogram of  $\alpha$ -Lipoic Acid (500 mg/L, 10  $\mu$ L injection)

### ■ High Sensitivity Analysis

Fig.4 shows the chromatogram obtained using a 10  $\mu$ L injection of 2.0 mg/L of standard solution. The peak area repeatability for  $\alpha$ -lipoic acid in this standard solution was calculated as RSD=3.26 % (n=6).

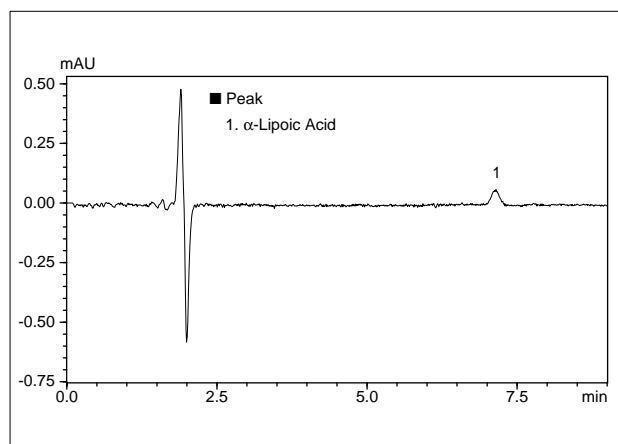


Fig.4 Chromatogram of  $\alpha$ -Lipoic Acid (2.0 mg/L, 10  $\mu$ L injection)

### ■ Linearity

Fig.5 shows the calibration curve of  $\alpha$ -lipoic acid generated at 333 nm, using standard solution concentrations from 2.0 to 500 mg/L (10  $\mu$ L injections). Good linearity is evident within this concentration range.

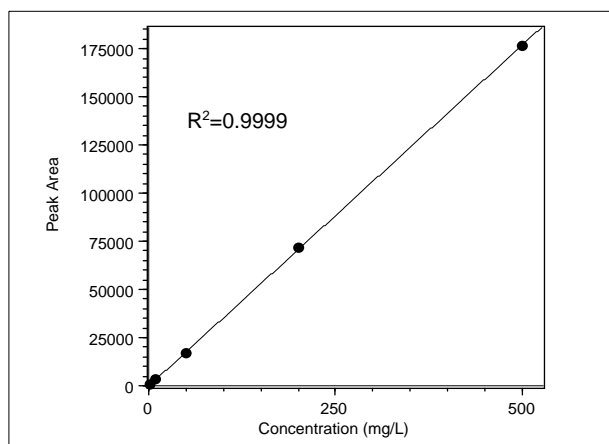


Fig.5 Linearity (2.0 to 500 mg/L, 10  $\mu$ L injection)

### ■ Analysis of Dietary Supplement

Fig.6 and Fig.7 show the chromatograms obtained from analysis of commercial capsule-type dietary supplements, in addition to the respective 3-dimensional plots of the results. The contents of one each of the supplements was dissolved in 10 mL of acetonitrile, and after 10 minutes of ultrasonic

extraction, the supernatant was filtered through a 0.45  $\mu$ m membrane filter. Then, after diluting the filtrate with pure water (dilution factor: 20), 10  $\mu$ L was injected.

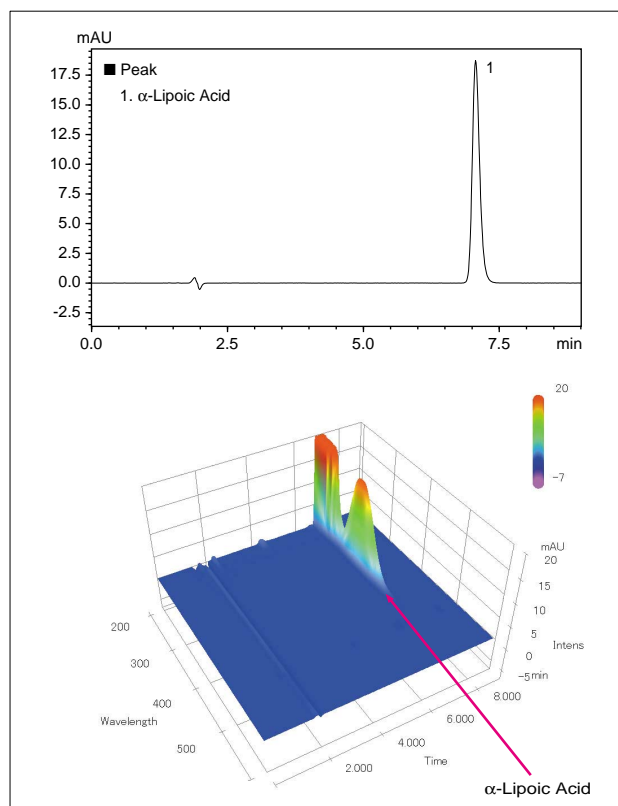


Fig.6 Chromatogram and 3-D Plot of Dietary Supplement A

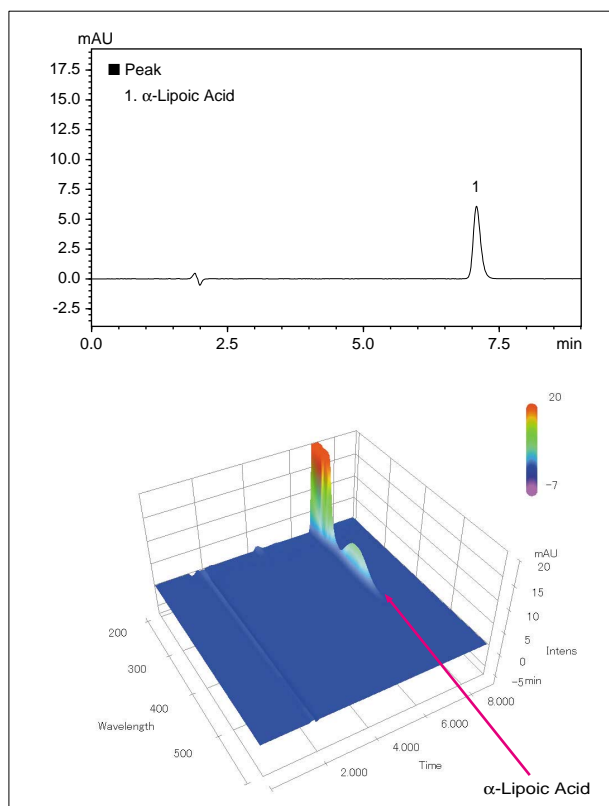


Fig.7 Chromatogram and 3-D Plot of Dietary Supplement B

#### 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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