SHIMADZU APPLICATION NEWS

LAAN-A-LC-E030

● HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

No.L328

Determination of Coenzyme Q10 in Food

In Japan, coenzyme Q10 has traditionally been used as a pharmaceutical for improving myocardial metabolism. In accordance with revisions to the Food and Medicine Differentiation List (Pharmaceuticals and Food Safety Bureau, Ministry of Health, Labor and Welfare, Japan) in 2001, coenzyme Q10 was moved to the food section of the list. It is now the focus of attention as a food supplement.

According to the Japanese Pharmacopoeia, which lists coenzyme Q10 under the pharmacological name, “Ubidecarenone”, the recommended analysis method for coenzyme Q10 is the HPLC method.

Here we introduce an analysis of coenzyme Q10 in commercially available food products using the Prominence Photodiode Array UV-Vis detector SPD-M20A.

■ Analysis of Standard Solution

Fig.1 shows the structure of coenzyme Q10. Fig.2 shows the chromatogram obtained by injecting 5μL of the coenzyme Q10 standard solution (5.0mg/L, ethanol). Table 1 lists the analytical conditions.

Due to high fat solubility of coenzyme Q10, non-aqueous mobile phase is used when performing analysis using reversed phase chromatography. Coenzyme Q10 has the maximum absorption wavelength at 275nm, consequently it is easily detected by UV detector.

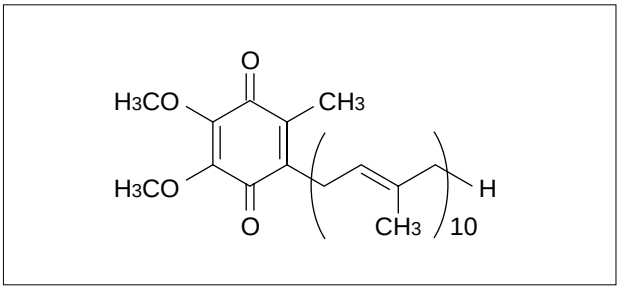

Fig.1 Structure of Coenzyme Q10

Table 1 Analytical Conditions

Column	: Shim-pack FC-ODS (75mmL. × 4.6mm I.D.)
Mobile Phase	: Methanol / Ethanol = 13 / 7 (v / v)
Flow Rate	: 1.5 mL/min
Column Temp.	: 40˚C
Injection Vol.	: 5μL
Detection	: SPD-20AV at 275nm
	Cell Temp. : 40˚C

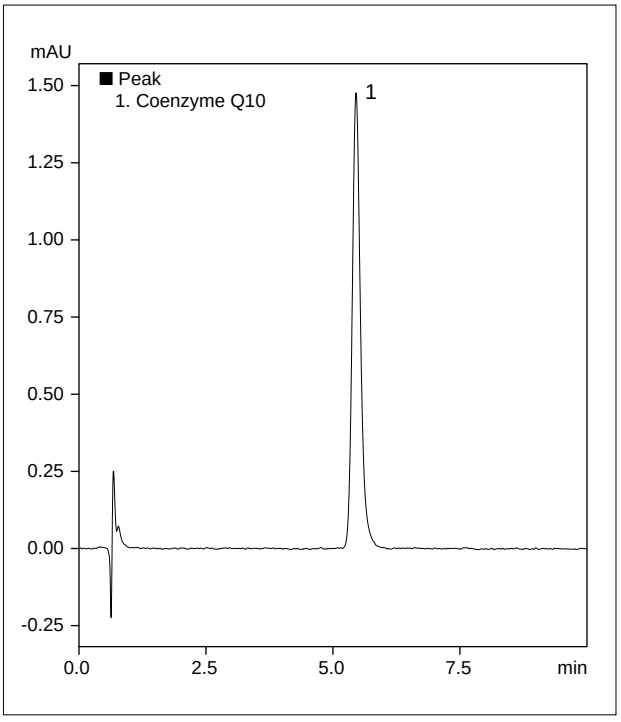

Fig.2 Chromatogram of Coenzyme Q10 (5.0mg/L, 5μL injection)

■ Repeatability

Table 2 shows the repeatability of the peak area and retention time when 5µL of a coenzyme Q10 standard solution is repeatedly injected.

Table 2 Repeatability of Peak Area and Retention Time

	Peak Area	Retention Time
1st	304	5.45
2nd	303	5.46
3rd	309	5.47
4th	298	5.46
5th	313	5.46
6th	297	5.47
CV(%)	1.99	0.14

■ Analysis of Food Sample

Fig.4 shows the resulting chromatogram , using a photodiode array detector, of a food sample (capsule) containing coenzyme Q10. The sample was dissolved* in ethanol (10g/L) and the solution was filtered through a membrane filter (0.45µm) before injection (5µL). Table 3 lists the analytical conditions.

Fig.5 shows comparison of the spectra of coenzyme Q10 in the standard solution and that of corresponding peak in the sample solution. We can see that the spectra closely match. Using a photodiode array detector makes it easy to obtain qualitative information from the UV absorption spectrum.

✻A high concentration sample was used in this measurement. However, dilution by a factor of 100 is recommended for routine analysis in order to reduce load on the column.

■ Linearity

Fig.3 shows the linearity between concentration and peak area of coenzyme Q10 (between 0.1 and 5.0mg/L). The linearity (R^2) is 0.9999 or more.

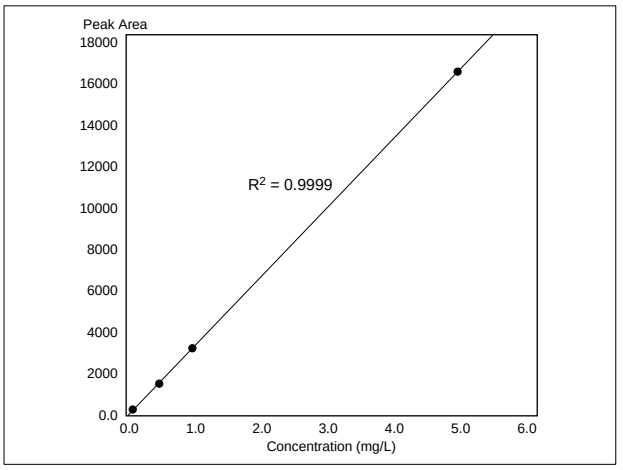

Fig.3 Linearity (between 0.1 and 5.0mg/L)

Table 3 Analytical Conditions

Column	: Shim-pack FC-ODS (75mmL. × 4.6mm I.D.)
Mobile Phase	: Methanol / Ethanol = 13 / 7 (v / v)
Flow Rate	: 1.5 mL/min
Column Temp.	: 40˚C
Injection Vol.	: 5µL
Detection	: SPD-M20A at 275nm
	Slit Width : 8nm
	Cell Temp. : 40˚C

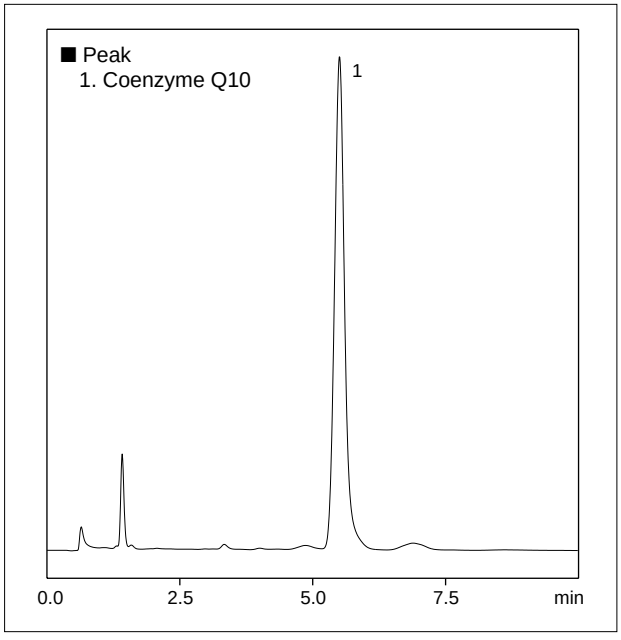

Fig.4 Chromatogram of Food Sample (Capsule)

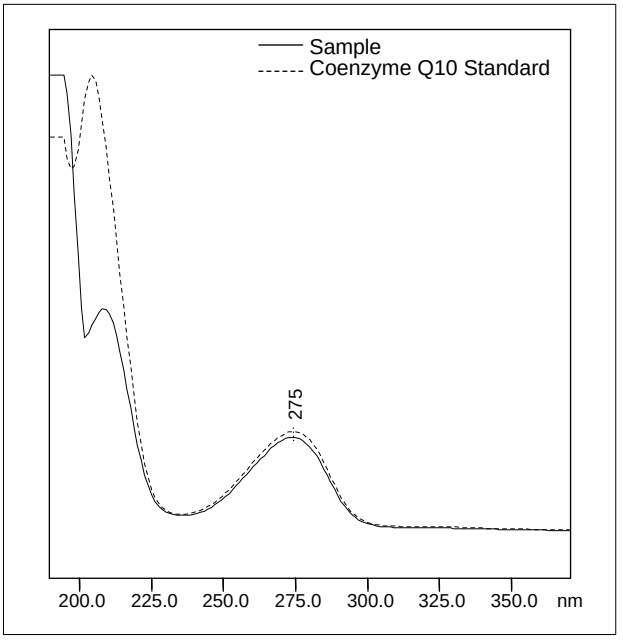

Fig.5 UV Spectra of Coenzyme Q10

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