SHIMADZU APPLICATION NEWS

LAAN-A-LC-E022A

● HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

No.L321A

Analysis of Lycopene and β-Carotene in Tomato

Lycopene is a red carotenoid pigment present in large quantities in red tomatoes. It has been reported that lycopene has a strong anti-oxidative effect that is more than 100 times as strong as that of vitamin E and more than twice as strong as that of β-carotene. Thus lycopene is attracting attention for its effects of preventing the so-called lifestyle-related diseases such as cancer and arteriosclerosis, as well retarding aging.

■ Analysis of Standard Solution

Fig.1 shows structural formulas of lycopene and β-carotene.

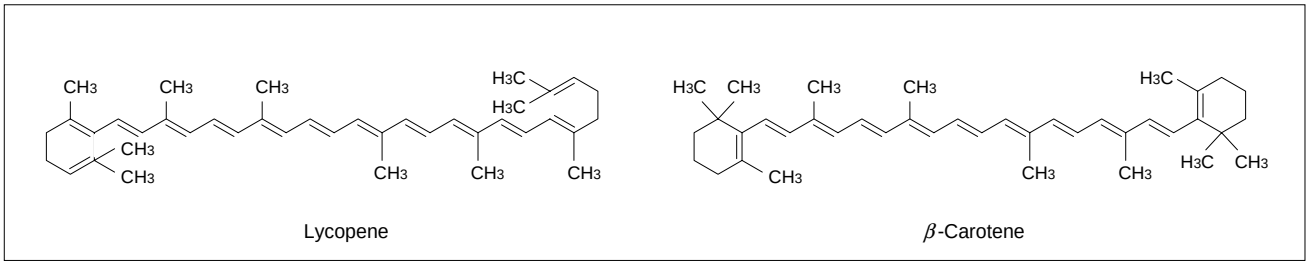

Fig.1 Structure of Lycopene and β-Carotene

Although these compounds have similar structures, they are easily separated using reversed-phase chromatography with a non-aqueous mobile phase.
Fig.2 shows the results of analyzing a standard mixture of lycopene (60mg/L) and β-carotene (6mg/L) using an acetonitrile/ethanol mobile phase. The analytical conditions are shown in Table 1.

Table 1 Analytical Conditions

Column	: Shim-pack VP-ODS(150mmL. × 4.6mm I.D.)
Mobile Phase	: Acetonitrile / Ethanol=4/1(v/v)
Flow rate	: 1.0mL/min
Column Temp.	: 50˚C
Detection	: SPD-M20A at 450nm
	Slit Width : 8nm
	Band Width : 8nm
	Cell Temp. : 50˚C
Injection Vol.	: 5μL

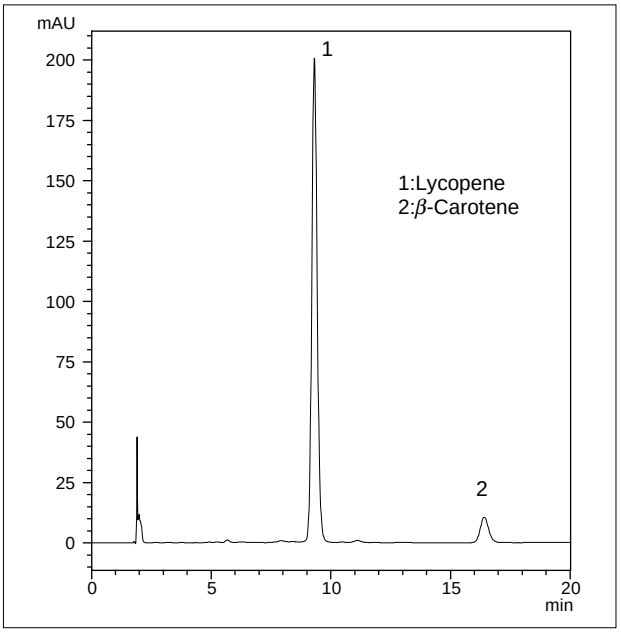

Fig.2 Chromatogram of a Standard Mixture of Lycopene (60mg/L) and β-Carotene (6mg/L) (5μL inj.)

■ Analysis of Tomato

Tomato was analyzed using the conditions of Table 1. The sample was prepared according to the procedure illustrated in Fig.3, and the analysis result is shown in Fig.4. The concentrations of lycopene and β-carotene in this tomato were 25mg/L and 7mg/L, respectively.

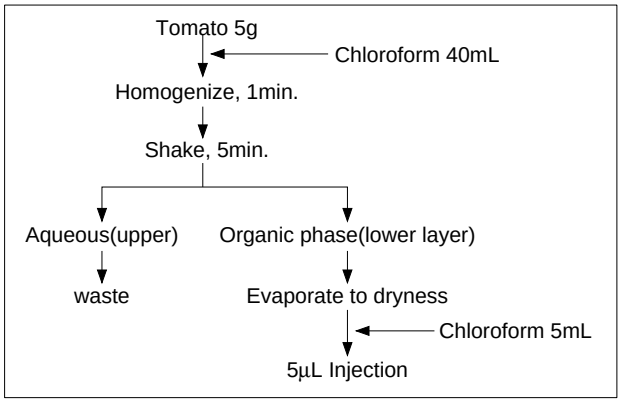

Fig.3 Sample Preparation

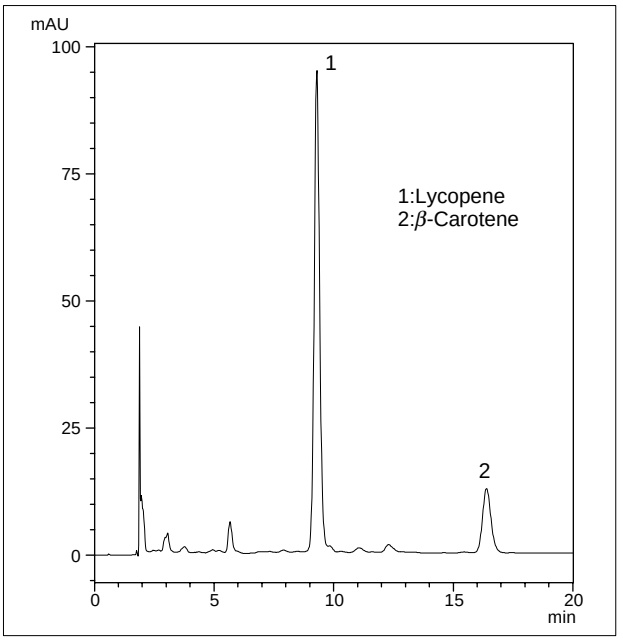

Fig.4 Chromatogram of Tomato

By using a photodiode array detector, spectral information for different components can be obtained from a single analysis, allowing for processing the obtained result in various ways.
Fig.5 shows an overlay of the lycopene spectra obtained by analyzing a tomato sample and a standard. Fig.6 similarly shows the results for β-carotene.
Fig.7 and 8 show the 3-D and contour chromatograms of tomato, respectively. An overall image of the sample can easily be seen from the data.

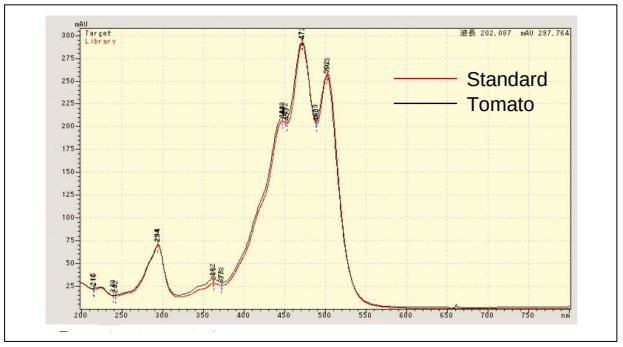

Fig.5 Spectra of Lycopene

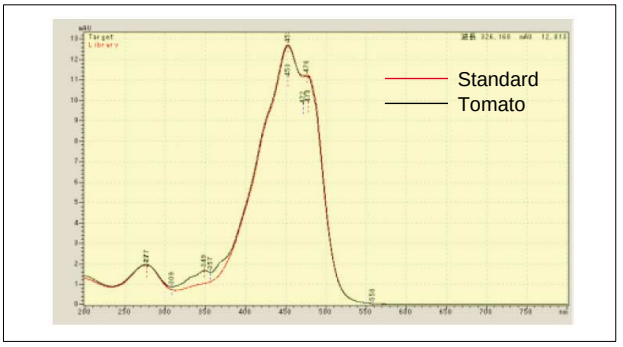

Fig.6 Spectra of β-carotene

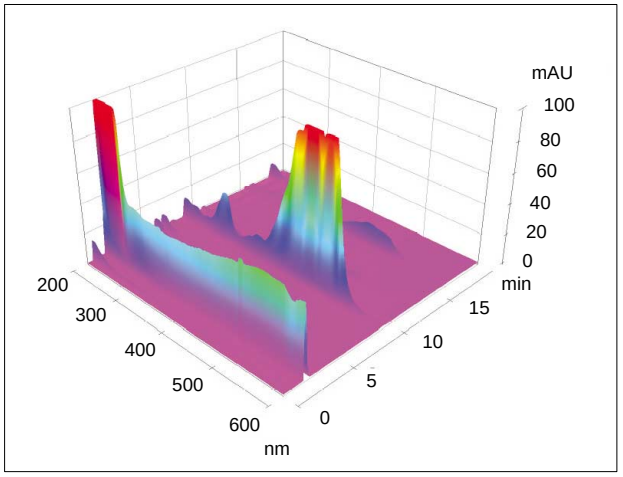

Fig.7 3D Chromatogram of Tomato

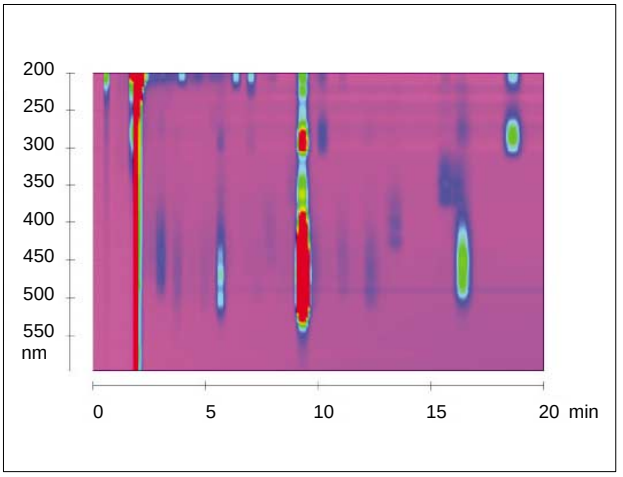

Fig.8 Contour Chromatogram of Tomato

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