

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

No. 1228

Analysis of Coffee

With respect to analysis of a sample containing multiple components like coffee, monitoring with the maximum absorption wavelengths of the target substances is desired. But, when multiple components, each of which has different maximum absorption wavelength, are the target, rather complicated pretreatment is required.

Practical methods available for such purpose are 1) analysis by time-course program with monitoring each peak by changing wavelength and 2) simultaneous multi-wavelength monitoring using a photodiode array detector. With respect to 1), the drawback is that if elution time of a certain component is close to those of others, the timing of changing the wavelength is difficult, and with respect to 2), a special device is needed.

The Shimadzu SPD-10A photodiode array UV-VIS detector allows simultaneous monitoring of arbitrary dual wavelengths in addition to the function of wavelength selection by time-course measurement. This dual wavelength simultaneous monitoring function was applied for the analysis of chlorogenic acid, caffeine and caffeic acid.

Among the components contained in coffee beans, chlorogenic acid is said to present the peculiar taste in

the presence of caffeine. In order to measure the extent of roasting of the coffee beans, the ratio of its content in contrast with caffeine which is thermally stable is measured by making use of decomposition of chlorogenic acid by heat into quinic acid or caffeic acid. Figure 1 shows an example of analysis of a standard sample. Its analytical conditions are shown in Table 1. As regards wavelength, 325nm which is close to the maximum absorption wavelength of chlorogenic acid and caffeic acid and 275nm which is close to the maximum absorption wavelength of caffeine were selected.

Furthermore, shown in Figure 1-2 to Figure 1-4 are spectra of components of respective peaks by the wavelength scan function of the SPD-10A.

Shown in Figure 2 to Figure 4 are the results of analyzing commercial coffee beans after sample treatment shown in Table 2.

As the content of caffeic acid was low and its peak was small, an expanded part of the spectrum is shown.

Shown in Figure 2-2 to Figure 2-4 are the results of measurement of the spectrum for each peak. It is comprehended that the peaks are quite consistent with those of the standard sample.

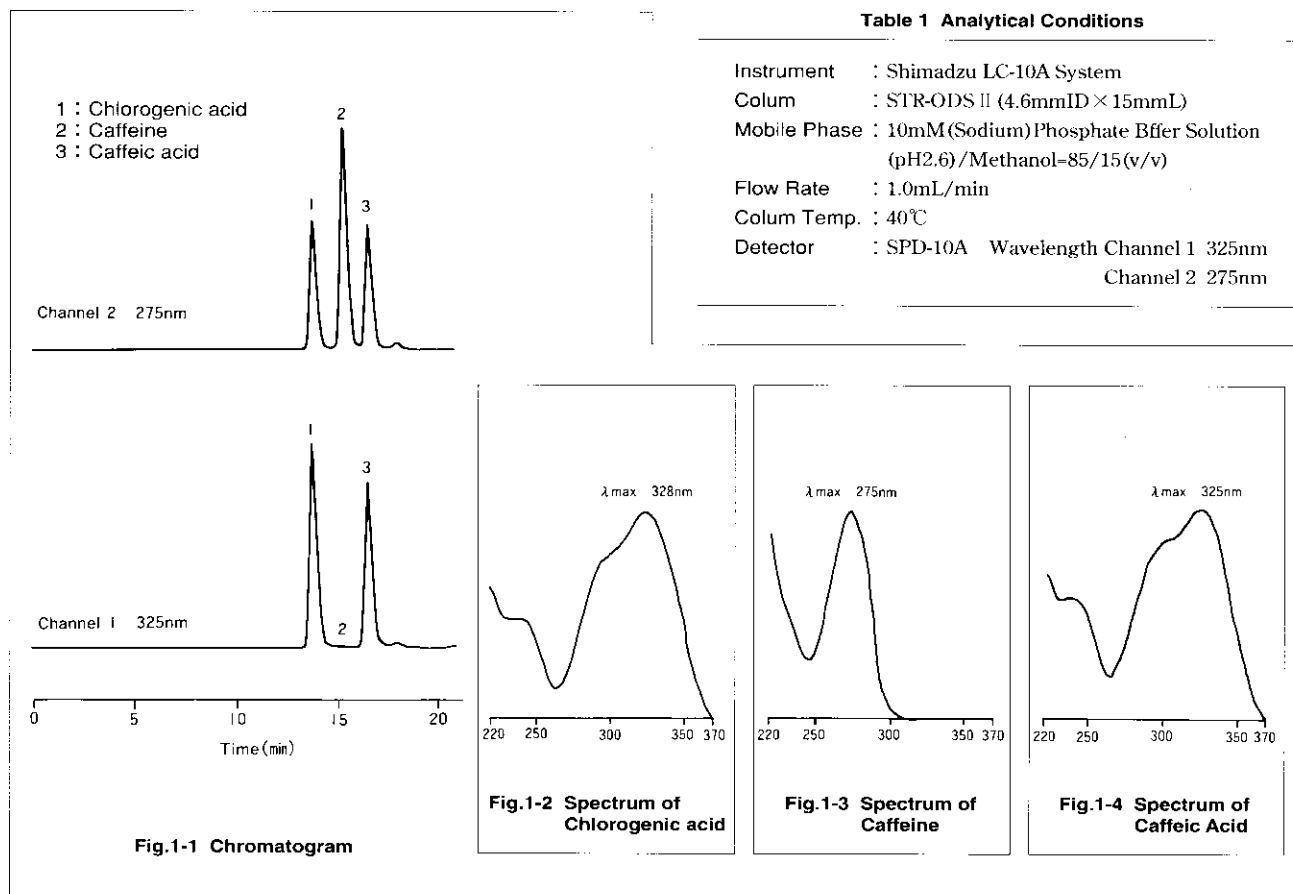


Fig.1 Analysis of Standard Solution

■ Analysis of Commercial Coffee Beans

Table 2 Pretreatment

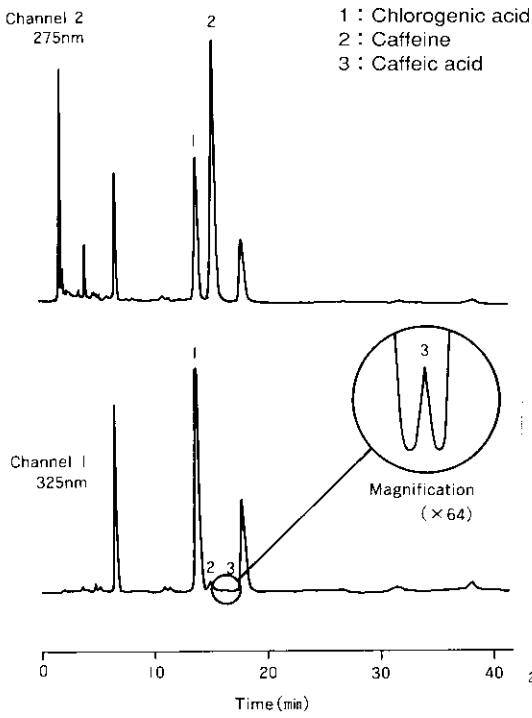
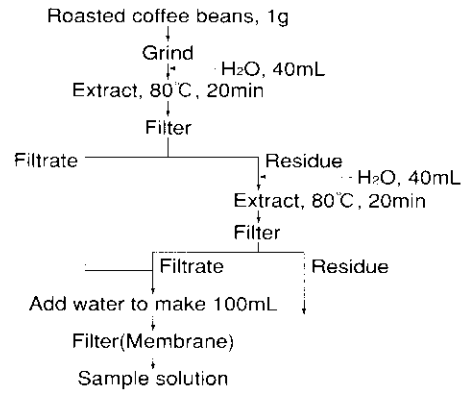


Fig.2-1 Chromatogram

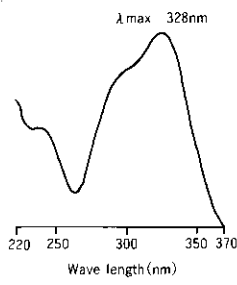


Fig.2-2 Spectrum of Chlorogenic Acid

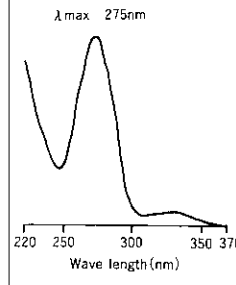


Fig.2-3 Spectrum of Caffeine

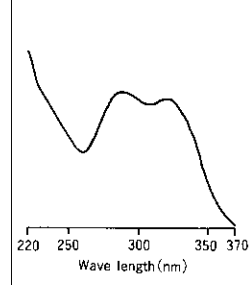


Fig.2-4 Spectrum of Caffeic Acid

Fig.2 Analysis of Commercial Coffee Beans

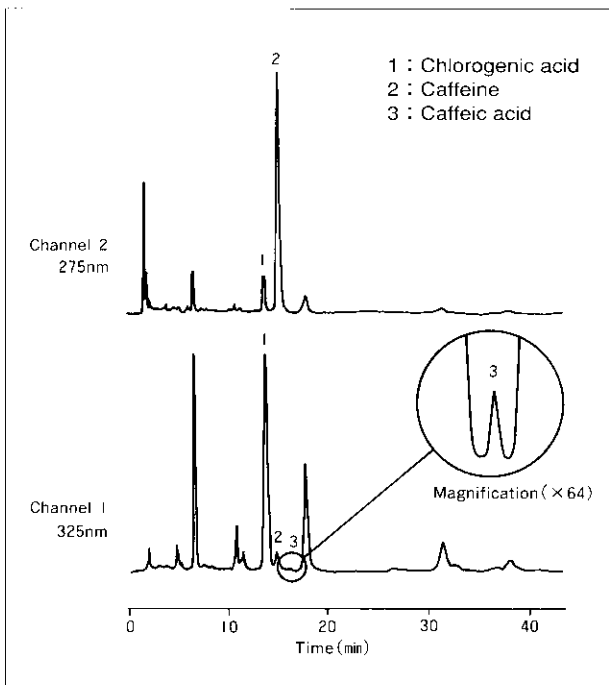


Fig.3 Analysis of Commercial Coffee Beans

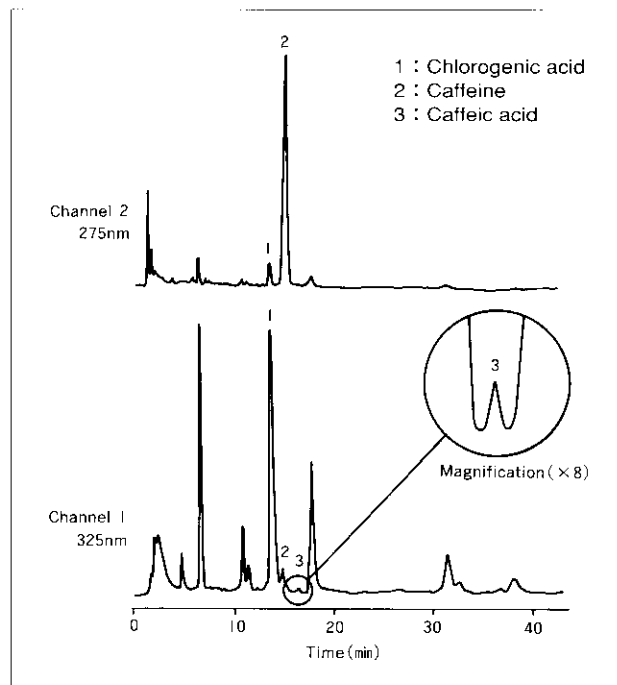


Fig.4 Analysis of Commercial Coffee Beans

