

Supercritical Fluid Extraction of Coffee Beans

Supercritical fluid extraction is one method of effectively decaffeinating coffee beans. This is a good example of putting supercritical fluid extraction to practical use in a quick safe procedure. The purpose of this extraction is to produce decaffeinated coffee, and the extraction process of decaffeination was measured in real time by using IR. The measurement results suggest that the extraction process and extraction time depend on the various components of the sample.

Figure 1 shows the IR spectra data of the extraction process. The spectrum at the starting point differs from spectra after a few minutes. Figure 2 shows the IR spectra at extraction times of 4, 5 and 10 minutes, respectively. Each spectral profile is different. Figure 3 shows the time course data of each extraction time (4, 5 and 10 minutes) at specified peak wavenumbers. These extraction patterns suggest that at least two components were extracted. By using the IR Search Program, we were able to determine that caffeine was extracted first, followed by triglyceride. Figures 4 and 5 show a comparison between the standard and extraction spectra. It takes 4 to 7 minutes to extract the caffeine. Conversely, fats and oils are still being extracted even after 20 minutes.

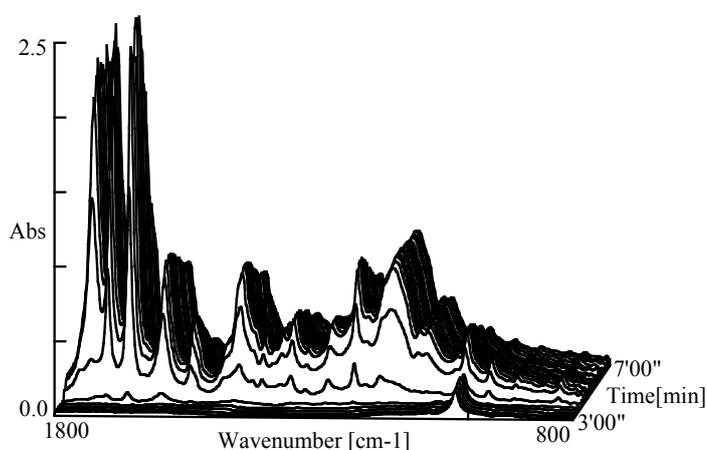


Fig.1 Spectra for supercritical fluid extraction of coffee beans

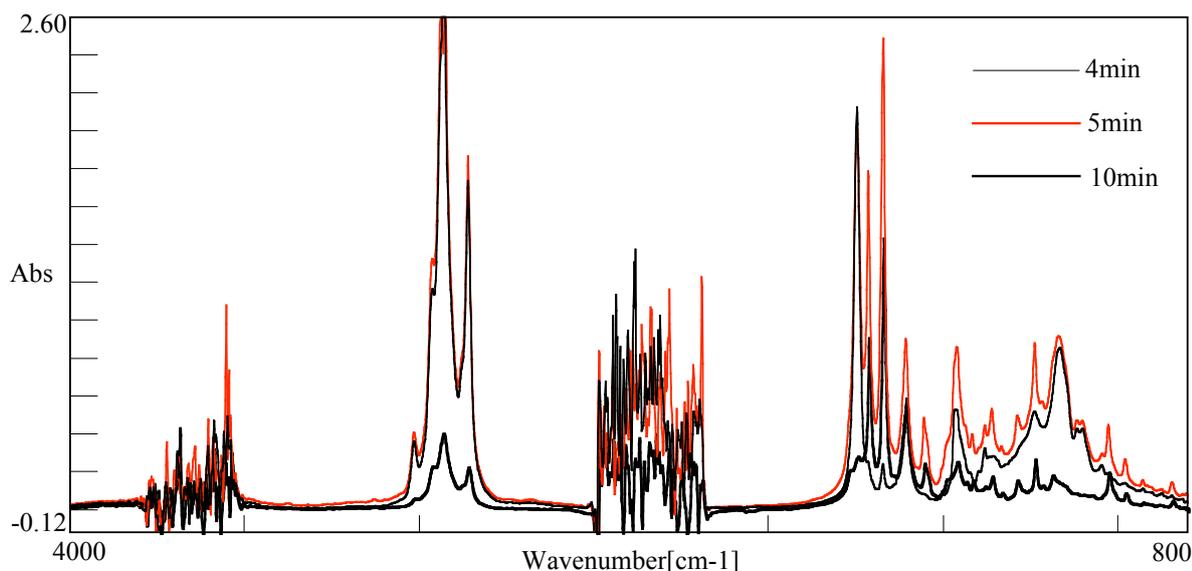


Fig.2 IR spectra at specified extraction times

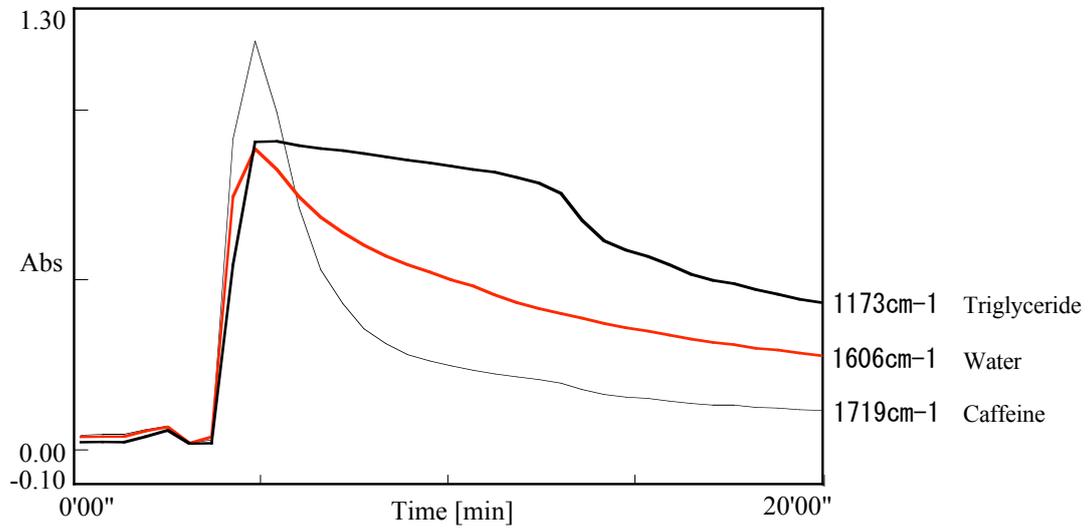


Fig.3 Time course data at specified wavenumbers

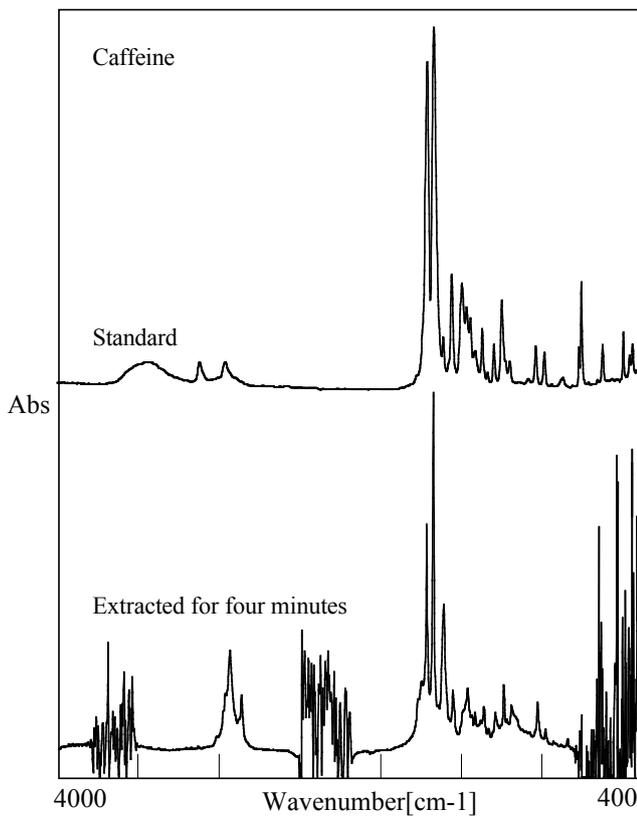


Fig.4 Comparing extracted spectrum with standard spectrum (for caffeine)

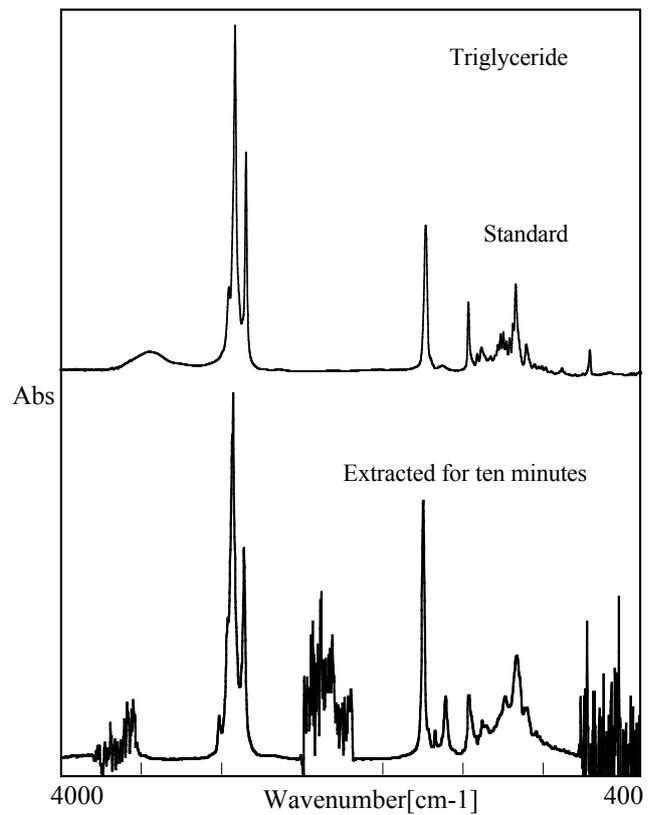


Fig.5 Comparing extracted spectrum with standard spectrum (for triglyceride)