

Application News

No. C109

Liquid Chromatography Mass Spectrometry

Application of Direct Analysis in Real Time (Part 2) Rapid Analysis of Triglycerides and Fatty Acids in Food Oil Using LCMS-2020

DART (Direct Analysis in Real Time), when used with a mass spectrometer, permits quick analysis of analyte compounds without the need for sample pretreatment. Application News C108 introduced an analysis of free fatty acids and amino acids in food products using the LCMS-2020 equipped with DART as the ion source.

Fatty acids present in foods are often bound to triglycerides, and when people ingest these triglycerides, not only do they serve as a source of energy, people acquire the physiological functions of the various fatty acids. Therefore, there is interest in research associated with triglyceride molecular species. Generally, LC and GC are used for triglyceride analysis, but these methods are known to have such drawbacks as complicated sample preparation, long analysis time and carryover.

Here, using the same system as that used for the previous Application News, No. C108, we introduce an example of analysis of lipids in food containing triglycerides, without conducting any sample preparation.

■ DART-MS Analytical Conditions

The analytical system used consisted of the DART SVP ion source (IonSense, Inc., MA, USA), and the LCMS-2020 single quadrupole mass spectrometer. The LCMS-2020, with its maximum 15,000 u/sec high-speed scanning and 15 msec ultra-high-speed polarity switching, permits one-second multiple scanning over the range of m/z 50 to 1500 using dual, positive – negative polarity. These features made it possible to simultaneously detect a spectrum of triglycerides (positive ion detection) and fatty acids (negative ion detection). And, since analysis can be conducted by simply exposing the sample to the gas discharged from the DART ion source, measurement time was kept to about ten seconds per sample, thereby achieving high-throughput analysis.

Table 1 Analytical Conditions

DART Heater Temperature	: 400 °C
Scan Type	: m/z 50-1500 (Positive / Negative)
Neburizing Gas Flow	: 1.5 L/min.
Drying Gas Flow	: 5.0 L/min.
DL Temperature	: 250 °C
Block Heater Temperature	: 400 °C

■ Analysis of Triglycerides and Fatty Acids in Various Food Oils

The mass spectra of food product oils and fats (shortening and lard) with known fatty acid composition are shown in Fig. 1 and Fig. 2, respectively. The monoglycerides, diglycerides and triglycerides were detected in the positive ion mass spectra of both samples. As for the negative ions, linoleic acid and oleic acid were primarily detected in the shortening, while oleic acid was primarily detected in the lard.

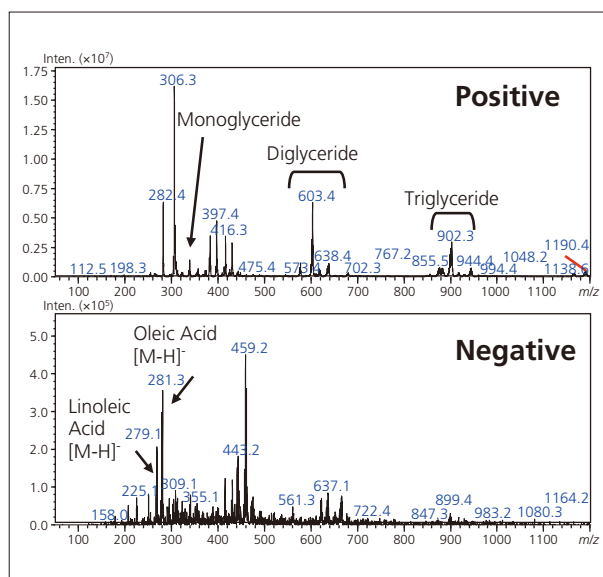


Fig. 1 Mass Spectra for Shortening

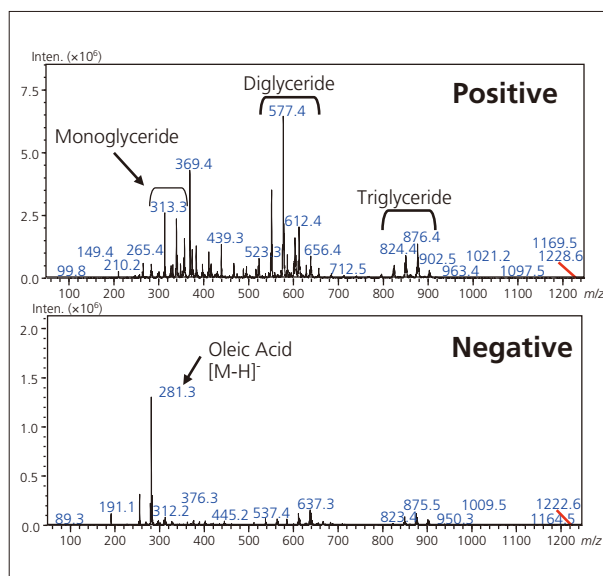


Fig. 2 Mass Spectra for Lard

