Application Brief

Food Testing and Agriculture

Agilent

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Fast Analysis of FAMEs on the Agilent Intuvo 9000 GC

Using the Agilent J&W DB-FastFAME GC Column

Introduction

The gas chromatography (GC) analysis of fatty acids as their methyl ester derivatives (FAMEs) is an important tool in the characterization of fats in the determination of total fat and *trans*-fat content in foods[1,2]. The choice of different stationary phases and other column dimensions such as column length, internal diameter, and film thickness depends mainly on the complexity of the fatty acid composition and the requirements in separation detail. To speed up the analysis of simple FAME mixtures, we recently introduced the Agilent J&W DB-FastFAME, a cyanopropyl phase specifically engineered for the fast separation of FAME mixtures, including *cis-trans* isomer separation.

This Application Brief demonstrates that the J&W DB-FastFAME column and Intuvo 9000 GC system, paired together, can easily meet and exceed the requirements for the analysis of FAMEs with very short analysis times, without sacrificing resolution in the case of several key FAME isomers.

Instrumental

Instrument conditions

GC system	Intuvo 9000
Column	Agilent J&W DB-FastFAME, 20 m × 0.18 mm, 0.20 µm, Intuvo module (p/n G3909-63005)
Carrier gas	Hydrogen, 2.7 mL/min
Inlet	250 °C, split ratio 50:1, split, taper, Ultra Inert (p/n 5190-2295)
Oven	50 °C (1 minute), 125°C/min to 175 °C, 10 °C/min to 185 °C (0.5 minutes), 6 °C/min to 230 °C (5 minutes)
Intuvo Guard Chip	Intuvo split/splitless inlet (p/n G4587-60565), oven track mode
FID	280 °C, Hydrogen: 40 mL/min; Air: 400 mL/min; make up gas: 25 mL/min
Injection	1 µL

Results and discussion

For our first test, we used the 37-component FAME standard mixture, a mix designed to mimic the fatty acid composition of many food samples. The chromatogram in Figure 1 shows the analysis of the mixture, using the 20 m × 0.18 mm, 0.20 µm DB-FastFAME column in Intuvo configuration in under eight minutes. All the compounds in the mix were resolved, including key saturated FAMEs (C16:0, C18:0) and omega 3 FAMEs such as C20:5 (EPA) and C22:6 (DHA). Resolution greater than 1 was obtained for critical pairs C18:2 and C18:3, and C20:3 and C20:4, respectively.

In our next experiment, we applied the method developed in the previous experiment, in a real sample. Figure 2 shows the chromatogram of Menhaden oil FAME profile. We highlight how EPA and DHA are fully resolved from common interferences in an analysis that takes a little under eight minutes.

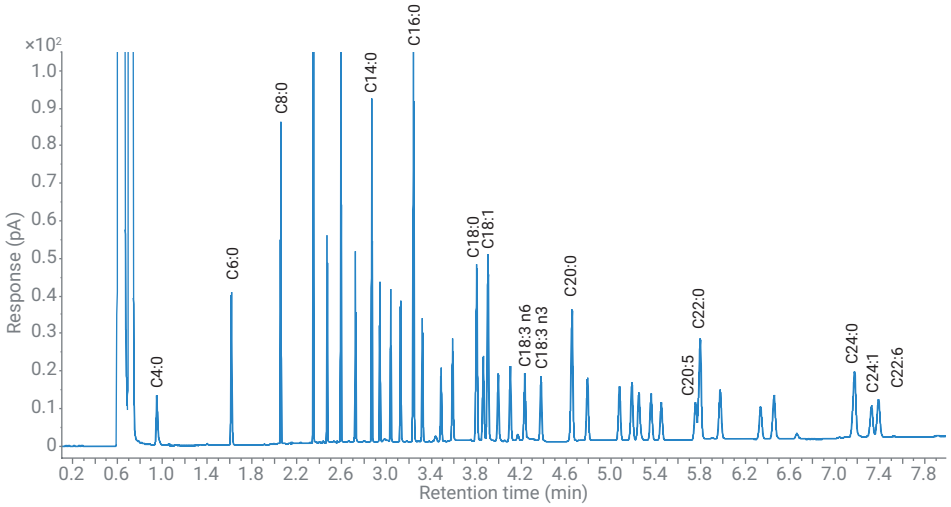

Figure 1. GC/FID chromatogram of a 37 FAME mix on a 20 m × 0.18 mm id, 0.20 µm J&W DB-FastFAME GC column on Intuvo format.

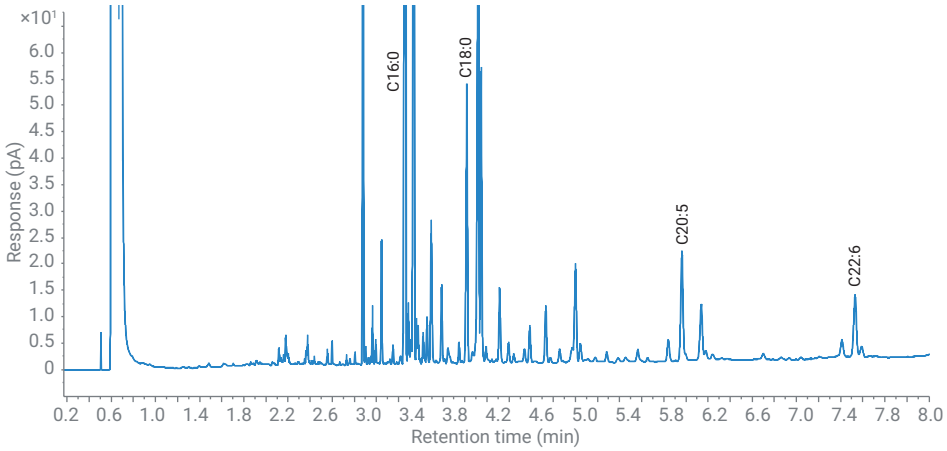

Figure 2. GC/FID chromatogram of Menhaden oil on a 20 m × 0.18 mm id, 0.20 µm J&W DB-FastFAME GC column on Intuvo format.

Conclusion

This Application Brief highlights the benefits of the J&W DB-FastFAME GC column and the Intuvo 9000 GC system for the fast analysis of FAMEs. The DB-FastFAME provides excellent resolution for the analysis of most FAMEs, including the 37-component FAME standard mix. The high-efficiency 0.18 mm id DB-FastFAME can completely resolve all compounds in the standard mix, and reduce run times to under eight minutes. When paired with the Intuvo 9000, it provides the possibility of achieving fast sample throughput without compromising resolution.

References

1. M. Petrovic; N. Kezic; V. Bolanca. Optimization of the GC method for routine analysis of the fatty acid profile in several food samples. *Food Chemistry* **2010**, *122*, 1, 285-291.
2. A. K. Vickers. High efficiency FAMEs analyses using capillary GC. *Agilent Technologies Article Reprint*, publication number 5989-6588EN, **2007**.

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