APPLICATION NOTE

Doubling Throughput in Fatty Acid Methyl Ester Analysis

AN004 v2; SCION Instruments

Introduction

In the constant quest for cost reduction, speed of analysis and sample throughput this application outlines the possibilities of doubling sample throughput with existing equipment. A SCION 456 GC was equipped with two identical channels containing a split/splitless injector, a FAME column and a Flame Ionisation Detector (FID). A single SCION 8400 autosampler was used to inject two samples into the two injection ports.

The advantages of this approach are two-fold. First and foremost, a doubling of sample throughput is obtained. Secondly, this can be done without adding hardware to the autosampler system; for the second simultaneous injection.

This application note focuses on chromatographic performance and system integrity by showing that both channels perform equally well on peak repeatability and peak resolution.

Experimental

The analytical parameters of the SCION GC-FID system can be found in Table 1.

Table 1 GC-FID parameters

Part	Settings
Autosampler	SCION 8400 PRO
Injector	250°C Split ratio 1:20
Injection Volume	1 µL
Column	FAME 100m x 0.25mm x 0.2µm
Carrier Gas	Helium 1.5 mL/min
Oven Program	140°C to 200°C at 5°C/min, 2°C/min to 240°C (3 min)
Detector	FID, 275 °C, Air : 300 mL/min, Hydrogen : 30 mL/min, Make up (N_2): 25 mL/min
Run Time	45
Software	Compass CDS

The standard used throughout this application was a 0.04 to 0.1% (per components) C4 to C24 FAME Mix. Samples included butter and tallow, rendered from animal fats.

Results

The FAME standard was injected on both channels, as shown in Figure 1.

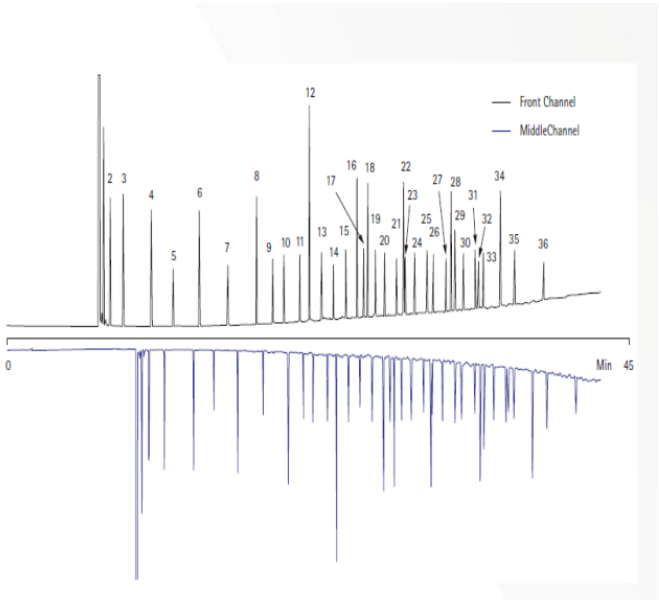

Figure 1 FAME standard on two channels.

Table 2 details peak identification, in relation to Figure 1. To demonstrate that the time delay did not influence system integrity and performance, repetitive injections were done. The peak area average was compared with the internal standard C16:0. The average areas of each channel along with the relative value compared to C16:0 can also be found in Table 2.

Table 2 clearly shows that integrity and performance are not affected by the injection delay; when data is compared, there is virtually no difference observed in relative peak area per component between both channels.

Both butter and tallow samples were then analyzed. Figures 2 and 3 show the chromatograms generated with peak identification the same as Table 2.

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Table 2 Example results, Peak ID, Peak Area ratio Per Channel (N=7) and Normalised Peak Area vs 16:0

Peak	Compound	Channel 1 Peak Area Ratio	Channel 2 Peak Area Ratio
1	C4:0	0.72	0.69
10	C15:0	0.32	0.33
15	C17:1	0.33	0.33
20	C18:2n6c	0.33	0.33
25	C21:0	0.35	0.35
30	C22:1n9	0.34	0.34
35	C24:1	0.34	0.37

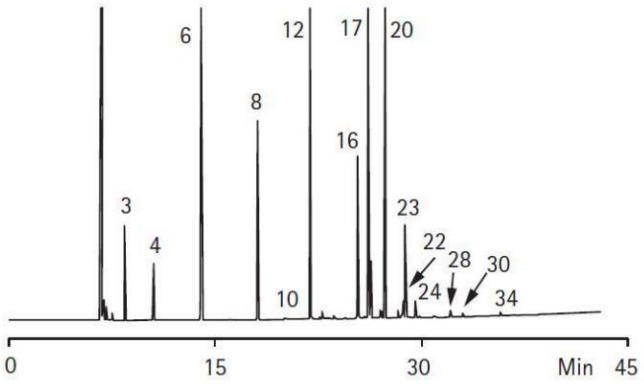

Figure 2 FAMEs in a butter sample, on one channel

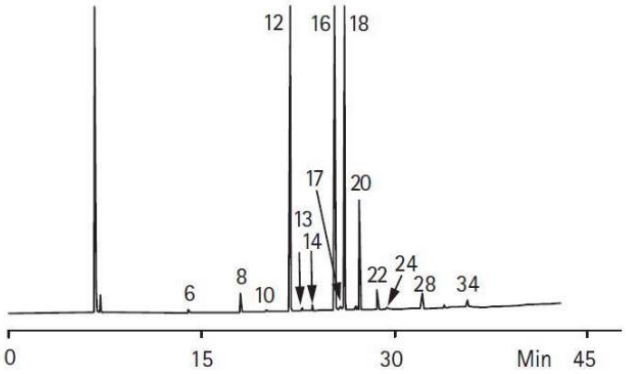

Figure 3 FAMEs in a tallow sample, on one channel

Conclusion

The data presented here clearly shows that a SCION 456-GC equipped with an 8400 autosampler easily handles dual injection. This capability immediately results in doubling throughput of a sample without adjustments to the system.

Ordering Information

Ordering Information for the 8300 GC	
Part	**Part Number**
8300-GC, with S/SL inlet and FID detector (120V)	839001701
8300-GC with S/SL inlet and FID detector (230V)	839001702
8400 PRO Autosampler for 8300 and 8500 GC	840000001
Suggested Consumables	
Part	**Part Number**
15% Graphite/85% Vespel Ferrule 1/16" with 0.4 mm hole pk/10	41312148
BTO Septa 9 mm, pk/50	CR298713
10 µL fixed needle syringe, 5 cm, 0.47 mm OD, 26 g conical needle	41312133
Vial, 9-425 Screw Thread, 2 mL Clear Glass 12 x 32 mm Flat Base with Label, pk/100	41311000

For more information, please contact:

T(UK): +44 (0) 1506 300 200

T(EU): +31 (0) 113 287 600

E: sales-eu@scioninstruments.com

W: www.scioninstruments.com

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