BEYOND MEASURE

SCION INSTRUMENTS

Doubling Throughput in Fatty Acid Methyl Ester Analysis

Application Note

AN0004

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. Analytical conditions of the GC-FID

S/SL	250°C, 1:20
Column	FAME 100m x 0.25mm x 0.2µm
Carrier	Helium, 1.5mL/min
Oven	140°C to 200°C at 5°C/min, 2°C/min to 240°C (3 min)
FID	275°C

The standard used throughout this application was a 0.04 to 0.1% (per components) C_4 to C_{24} 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.

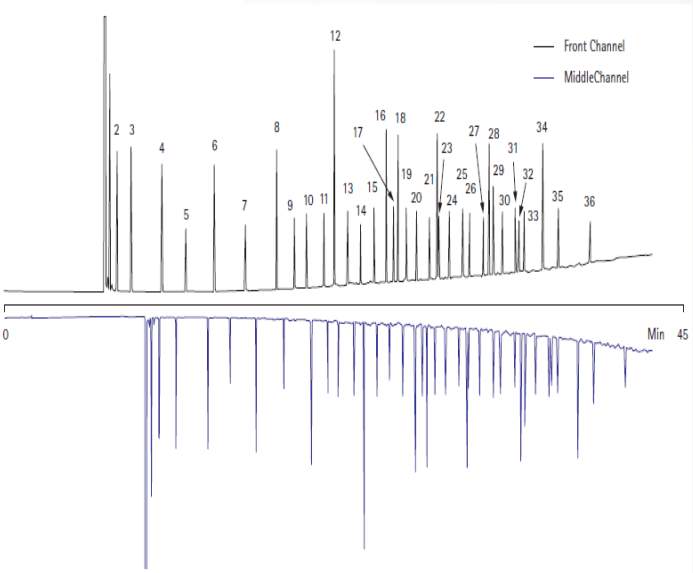

Figure 1. FAME standard on two channels.

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 analysed. Figures 2 and 3 show the chromatograms generated with peak identification the same as Table 2.

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

Peak #	Compound	Channel 1	Channel 2	Channel 1	Channel 2
1	C4:0	234.4.	205.6	0.72	0.69
2	C6:0	155.2	138.3	0.48	0.46
3	C8:0	179.8	161.0	0.48	0.46
4	C10:0	194.2	175.1	0.60	0.59
5	C11:0	97.5	89.1	0.30	0.30
6	C12:0	201.4	184.6	0.62	0.62
7	C13:0	103.5	94.3	0.32	0.32
8	C14:0	209.2	193.0	0.64	0.65
9	C14:1	104.4	95.8	0.32	0.32
10	C15:0	105.5	97.1	0.32	0.33
11	C15:1	104.9	97.5	0.32	0.33
12	C16:0	325.1	297.8	1.00	1.00
13	C16:1	104.4	97.9	0.32	0.33
14	C17:0	84.2	76.0	0.26	0.26
15	C17:1	107.9	98.1	0.33	0.33
16	C18:0	223.3	205.7	0.69	0.69
17	C18:1n9t	109.7	100.7	0.34	0.34
18	C18:1n9c	219.7	208.8	0.68	0.70
19	C18:2n6t	108.1	97.1	0.33	0.33
20	C18:2n6c	106.3	98.7	0.33	0.33
21	C18:3n6	97.6	90.2	0.30	0.30
22	C20:0	225.9	212.6	0.69	0.71
23	C18:3n3	101.4	94.1	0.31	0.32
24	C20:1	109.8	105.7	0.34	0.35
25	C21:0	112.5	105.5	0.35	0.35
26	C20:2	106.9	98.2	0.33	0.33
27	C20:3n6	100.2	93.4	0.31	0.31
28	C22:0	225.7	214.0	0.69	0.72
29	C20:3n3 & C20:4n6	191.7	180.7	0.59	0.61
30	C22:1n9	109.9	102.6	0.34	0.34
31	C23:0	112.8	107.1	0.35	0.36
32	C20:5n3	91.7	88.5	0.28	0.30
33	C22:2	106.4	100.1	0.33	0.34
34	C24:0	232.1	213.0	0.71	0.71
35	C24:1	112.1	110.4	0.34	0.37
36	C22:6n3	78.2	74.3	0.24	0.25

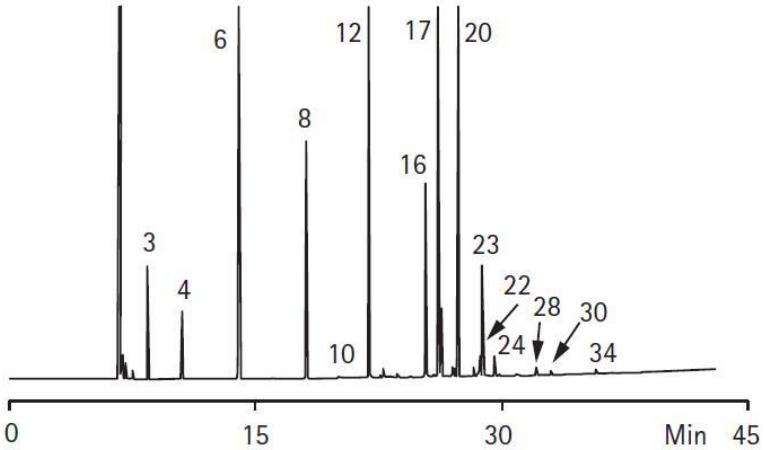

Figure 2. FAMEs in a butter sample, on one channel

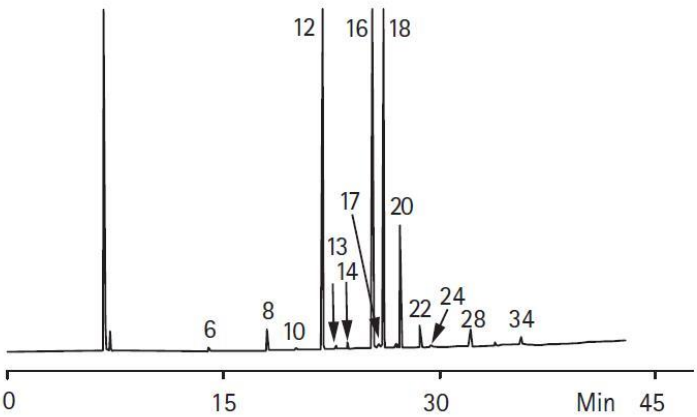

Figure 3. FAMEs in a tallow sample, on one channel

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.

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