QUANTITATIVE ANALYSIS OF TRACES OF FAMES IN AVIATION JET FUEL

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Introduction

Increasing quantities of biodiesel and aviation turbine fuel are being transported in multiproduct pipelines. Using this transportation technique, trace amounts of FAME can be found in jet fuel parcels following biodiesel parcels. Commercial aircraft OEMs gave approval of limits of 5 mg/kg total FAME in jet fuel.
Following the IP 585/10 regulation, a GC/MS method was developed for determination of the total FAME content in jet fuel in the range of 0.5 mg/kg to 100 mg/kg. Due to the natural background of high end naphtha components present in some samples, complete separation is not possible and a multiple Selective Ion Monitoring (SIM) is performed. The most important FAMES to be measured are C16:0, C17:0, C18:0, C18:1, C18:2 and C18:3. Their distribution is in function of the original vegetable. We have developed a method following IP 585/10 that uses a single column GC/MS in full scan/SIM mode to separate, identify and quantify total FAMES in aviation jet fuel.

Method

Thermo Trace GC 1600

Column	:	Stabilwax, 60 m × 0.25 mm, 0.5 µm (Restek, # 10641)
Oven	:	150°C (1.00 min) - 250°C (10.00 min) @ 12°C/min.
Inlet	:	S/SL @ 250°C
Injection	:	Hot splitless, 1.00 min
Carrier	:	Helium, constant flow @ 1 ml/min.

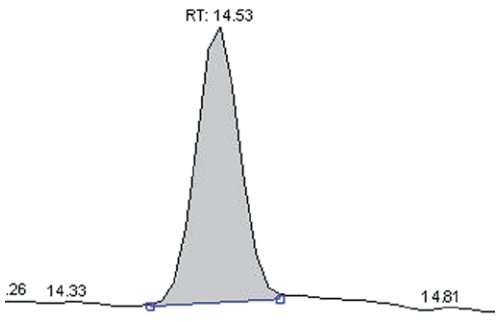
Thermo ISQ:

Source	:	250°C
Ion vol.	:	half open
Mode	:	Combined Full scan/SIM, SIM in optimized dwell mode

Chromatogram depicts the 0.032 mg/kg contribution of C18:0 in the total FAME standard of 1 mg/kg. Calibration curve of C18:0 between 0.5 and 100 mg/kg for total FAME.

Table 1. Contribution of the different FAMES in the 1 mg/kg standard

Compound	mg/kg
Palmitic acid (C16:0)	0.114
Margaric acid (C17:0)	N/A
Stearic acid (C18:0)	0.032
Oleic acid (C18:1)	0.323
Linoleic acid (C18:2)	0.560
Linolenic acid (C18:3)	0.063
Sum	1.092



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