

IFRA 57 Allergens in Fragrance Materials Using GC-MS with Hydrogen Carrier Gas

AN186v1; SCION Instruments

Introduction

The International Fragrance Association (IFRA) is the global representative body of the fragrance industry, founded in 1973, IFRA sets the safety standards for fragrance ingredients used in products such as perfumes, cosmetics and candles. IFRA prides itself on promoting the safe use of scents with science and research at the core of its principles.

One of the key ways IFRA sets out to protect consumer health and the environment is through the "IFRA 57 Allergens" which refers to a list of 57 specific suspected fragrance allergens and their isomers. IFRA has developed a method using Gas Chromatography Mass Spectrometry (GC-MS) to detect and quantify these compounds to ensure customer safety and meet regulatory labelling requirements.^[1] In this application note we will demonstrate how the SCION Instruments GC-MS can be used to satisfy the requirements of the IFRA 57 method detecting the potential allergens at concentrations >2 mg/kg as per the method and meeting method validation requirements.

The data within this application note was provided by a customer of our UK distributor, CE Instruments. The customer uses a SCION Instruments GC-MS combined with FFNSC 3 spectral library for screening of fragrances and raw materials and for the certification of in house products for the IFRA 57 allergens.

Along with targeted allergen testing, GC-MS, combined with the flavours and fragrances of natural and synthetic products (FFNSC 3) library, can also be employed for screening and profiling of fragrance products and raw materials, this can be especially useful when developing new products or trying to reverse engineer existing products. For details on fragrance screening and profiling see our [Application Note AN187](#) available on the SCION website.

SCION Instruments extends its utmost thanks to the customer (who wishes to remain anonymous) and to our valued distributor, CE Instruments.^[2]

This application was performed using a SCION Instruments 8300 GC equipped with 8700 MS (SQ) and specialist ionic liquid column SLB IL60i. This system had been converted using the SCION Instruments helium free field kit in order to use hydrogen as carrier gas. Helium has long been the standard carrier gas for GC applications however, due to recent global shortages many companies are keen to find alternatives. Hydrogen can be produced with generators using renewable energy sources and so is a cleaner, greener option as well as avoiding the current issues over helium supply.^[3]

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This application note demonstrates the ability for the SCION Instruments GC-MS to meet stringent regulatory requirements whilst using hydrogen as carrier gas.

Experimental

Fragrance allergen mixes were purchased from a commercially available source. The 2 mixtures (Allergens A1 and A2) contained 64 components in total covering the full range of components required for the IFRA 57 method.

Internal standards were implemented as recommended in section 3.3 (1,4-Dibromobenzene IS_A and 4,4'-Dibromobiphenyl IS_B) these compounds were added to all linearity standards and solutions as described in sections 6.3.3.1 and 7.1.

Calibration standards were prepared as described in section 6.3 of the IFRA method. Solutions C1 – C9 with concentrations ranging from 2 mg/kg (C9) up to 250 mg/kg (C1).

The IFRA method recommends the use of 2 analytical columns (OV-1 and OV-1701) to separate and quantify all the listed components, however, in this application note a single SLB IL60i was employed which gave separation of all the required analytes. This allowed for a much simpler set up (not requiring a 2 column system or lengthy maintenance of the system).



Figure 1 SCION Helium Free GC-MS installed at customer site with FDGSI hydrogen generator (picture provided by SCION Instruments UK distributor CE Instruments).^[2]

Results

Section 6.3.3.2 "plotting of a calibration curve" suggests up to 6 calibration curves (3 for each column used) for each compound and a possible requirement for weighting to be applied to the quadratic fit.

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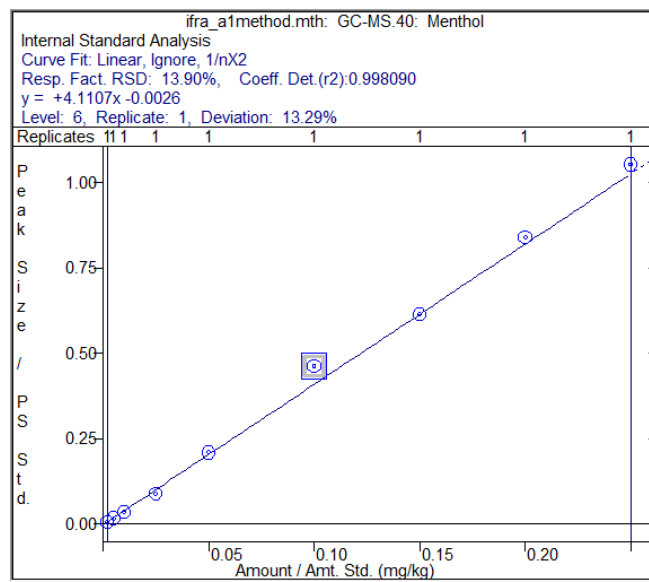
Table 1 Instrument conditions

GC Part	Settings
Injector	250 °C Split 75:1
Injection Volume	1.0 µL
Column	SLB IL60i 30m x 0.25mm x 0.20µm
Carrier Gas	Hydrogen @ 0.7 mL/min
Oven Program	80 °C (hold 1.0 min), 5 °C/min to 135 °C (hold 2.0 min) 3 °C/min to 170 °C (hold 1 min) 10 °C/min to 280 °C (hold 5.0 min)
Run Time	42.7 min
Software	MSWS with FFNSC 3 Spectral Library
MS Part	Settings
MS transfer line temp	250 °C
Ion source temp	250 °C
MS mode	Electron Ionization
Delay collection time	1.50 min
Scan mode	SIM (following Section 5 and Appendix C IFRA 57)

This would result in an extremely complex post processing method, however due to the use of the specialist ionic liquid column which allowed for separation of all compounds along with the extended dynamic range (EDR) of the 8700 MS it was found that a single quadratic fit met the validation specifications within the IFRA 57 method.

This demonstrates the high performance of the SCION Instruments GC-MS for this analysis, all while using hydrogen as a carrier gas. Figure 2 shows an example calibration curve for the allergen menthol. Table 2 shows example linearity results. Due to the large number of compounds in the method a selection have been shown. Full validation data set is available on request.

Figures 3 and 4 show example chromatograms showing the selective ion monitoring (SIM) method quantifier and qualifier ions overlay for menthol and 1,2-dibromobenzene. For more information about SIM methods and their advantages for quantitative analysis by GC-MS see our [knowledge centre](#).

**Figure 2** Calibration curve for Menthol (2 – 250 mg/kg) showing r^2 value 0.9981**Table 2** Example linearity results

Name	Allergens Mix	Correlation Coefficient (r^2)
Alpha Pinene	A1	0.9971
Beta Pinene	A1	0.9981
Limonene	A1	0.9968
Linalool	A1	0.9982
Eugenol	A1	0.9971
Menthol	A1	0.9981
Neral	A2	0.9986
Lilial	A2	0.9983
Iso E Super beta	A2	0.9992
Iso E Super alpha	A2	0.9988
DMBCA	A2	0.9970
Benzyl benzoate	A2	0.9984

Conclusion

In this application note we have demonstrated the effectiveness of the SCION Instruments 8300 GC equipped with 8700 MS for the analysis of the IFRA 57 Allergens method.

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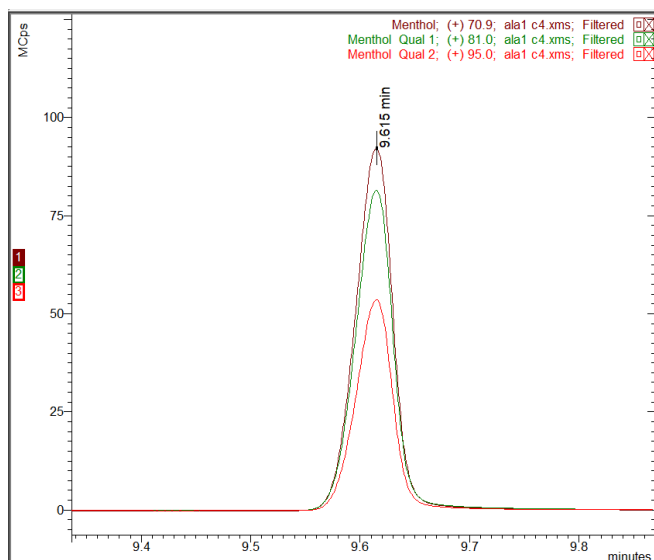


Figure 3 Quantifier and Qualifier ions for Menthol

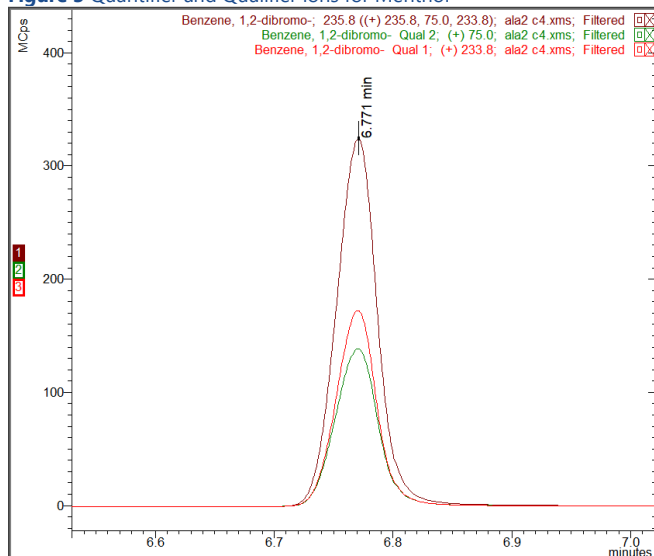


Figure 4 Quantifier and Qualifier ions for 1,2-Dibromobenzene

The data presented in this application note was provided by a UK customer using the SCION Instruments GC-MS for both the compliance testing of products for IFRA 57 allergens and for the screening and profiling of fragrance products and raw materials.

By using the SCION Instruments Helium Free conversion kit the customer performs their analysis with hydrogen as a carrier gas. Enabling a more environmentally friendly and economical analysis.

The functionality of our MSWS software to run both full scan and SIM simultaneously was shown, allowing for profiling/screening of unknowns as well as targeted analysis of the IFRA 57 compounds.

SCION instruments recommends checking with local regulatory authorities to ensure all testing and reporting requirements are met, or contact the SCION Instruments applications team for assistance.

Special thanks to our UK distributor CE Instruments and their customer for providing the data presented in this application note.

References

1. IFRA, https://d3t14p1xronwr0.cloudfront.net/docs/Analytical-methods/23754_gd_2017_04_11_ifra_analytical_method_to_quantify_57_suspected_allergens_and_isomers_in_ready_to_inject_fragrance_materials_by_gc-ms-3.pdf, (accessed Feb 2026)
2. CE Instruments, <https://www.ceinstruments.co.uk/post/scion-gc-ms-installation>, (accessed Feb 2026)
3. Innovation News Network, Helium Shortage 4.0 <https://www.innovationnewsnetwork.com/helium-shortage-4-0-what-caused-it-and-when-will-it-end/29255/>, (accessed Feb 2026)

Order Information

Ordering Information for the 8300 GC	
Part	Part Number
8300 GC with 8700-MS-SQ EI Select, with S/SL inlet (120V)	SCIONSQ83SEL311
8300 GC with 8700-MS-SQ EI Select, with S/SL inlet (230V)	SCIONSQ83SEL312
8400 PRO Autosampler for 8300 GC and 8500 GC	840000001
FFNSC 3.0 – Mass Spectral Database	394105201
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
10µL fixed needle syringe, 5 cm, 0.47 mm OD, 26 g conical needle	41312133
SLB IL60i GC Column for IFRA 57 Allergens 30 m x 0.25 mm x 0.20 µm	41312690
LINER 1177 78.5 L x 6.3 OD x 4MM ID S/SL FOCUS PK/5	41312101

SCION offers other MS options such as the 8700 SQ Premium and 8900 TQ, as well as additional spectral libraries such as NIST, Designer Drugs, and Wiley, please contact your local SCION sales representative to discuss your needs.

For more information, please contact:

E: sales-eu@scioninstruments.com

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