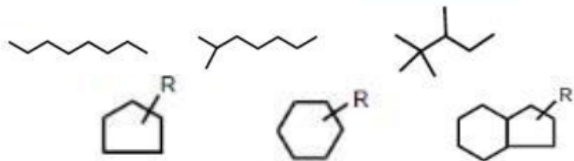# Robust quantitation of MOSH/MOAH contamination in palm oil by GC×GC–FID and TOF-MS
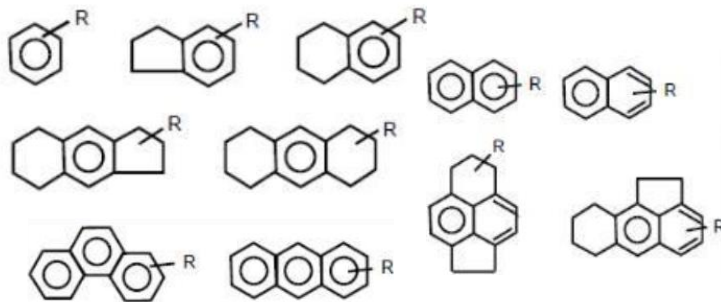
What is MOSH / MOAH?
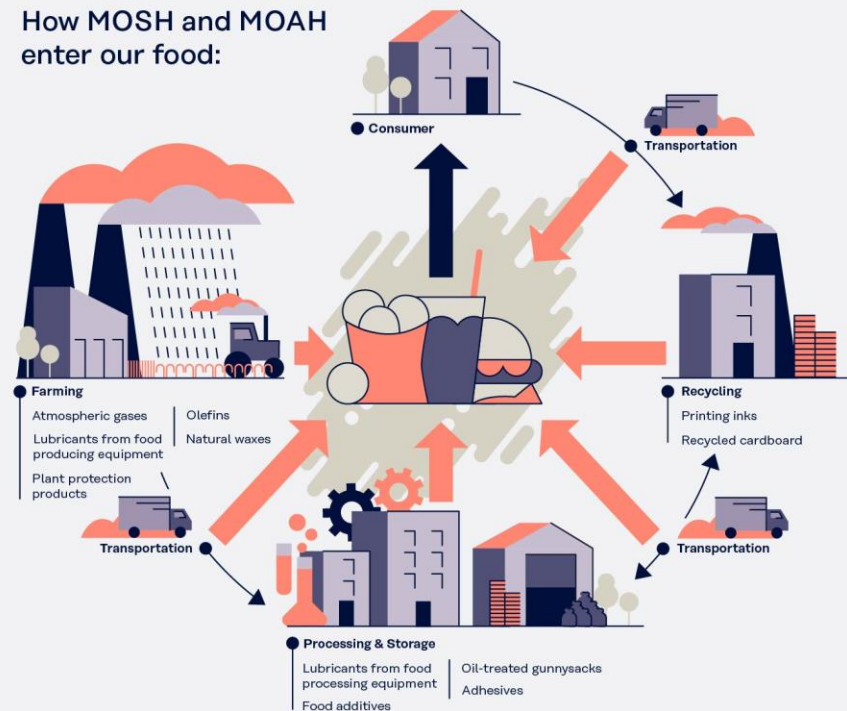
- **M**ineral **O**il **S**aturated **H**ydrocarbons
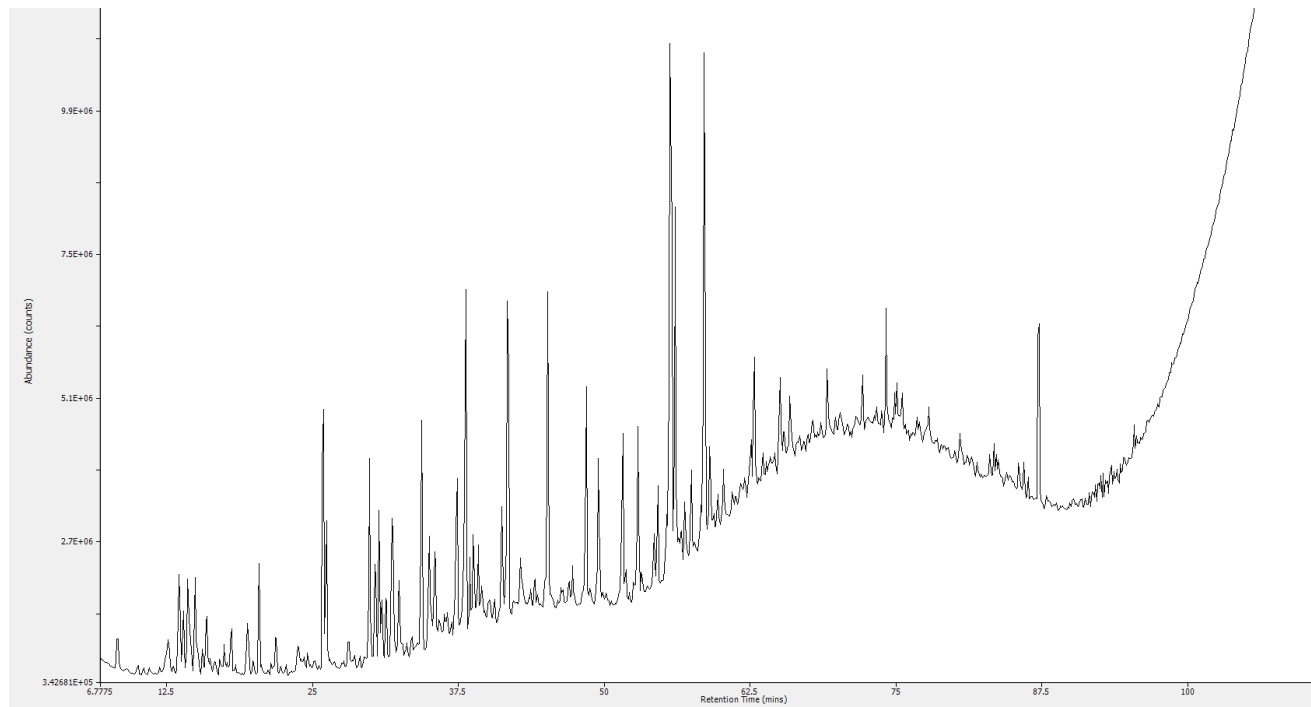

- **M**ineral **O**il **A**romatic **H**ydrocarbons

How MOSH and MOAH enter our food:

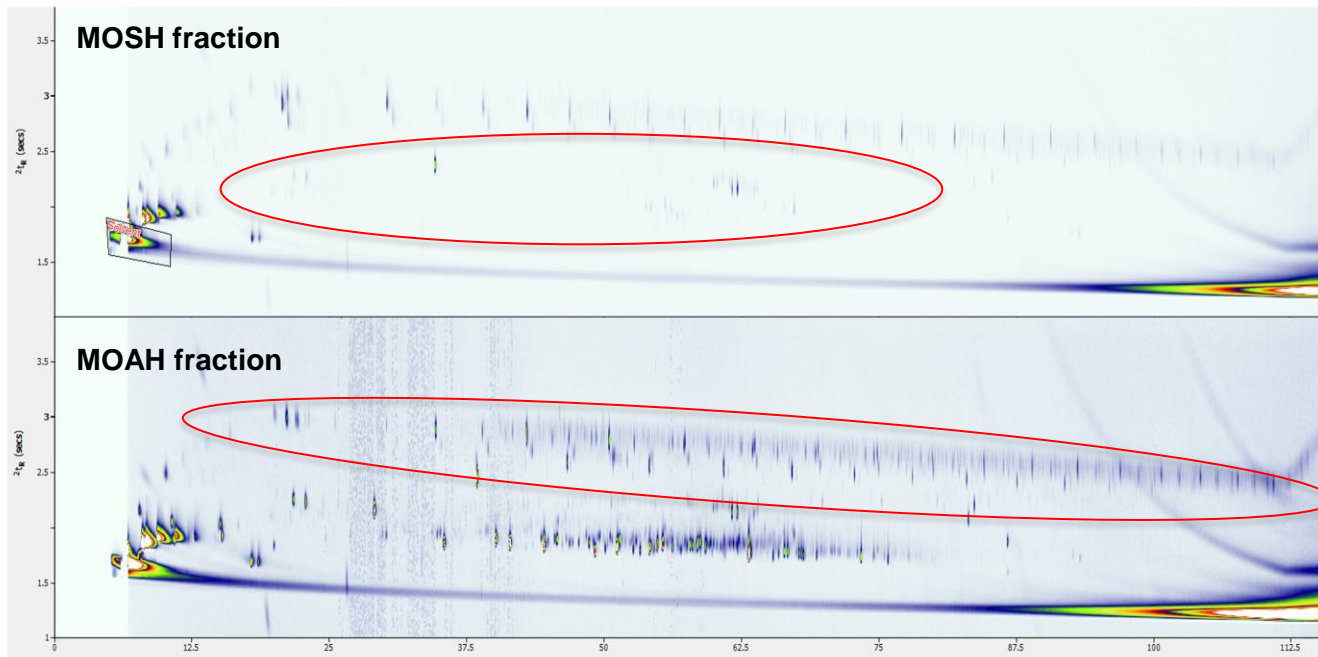Source: https://www.packaging.kuraray.eu/blog/mosh-moah/

Challenges in MOSH/MOAH analysis

- Sample complexity can result in quantitative errors *despite* LC fractionation when using 1D GC

Challenges in MOSH/MOAH analysis

MOSH fraction

Breakthrough of MOAH into MOSH fraction from LC-GC coupling

MOAH fraction

Carryover of MOSH into MOAH fraction from LC-GC coupling

- GC×GC reveals the carryover of aromatics/aliphatics that can occur during fractionation, which results in quantitative errors when using 1D GC

Experimental

- **Sampling and injection:** Neat injections (2 µL) of analytical standards and MOSH/MOAH fractions using a split/splitless inlet. 750µg/µL internal standards of bicyclohexyl (CyCy) and TBB added for single point calibration of MOSH and MOAH respectively.

- **GC×GC:** INSIGHT®-Thermal modulator; Modulation period (P_M) = 8 s

- **Detection:** Flame ionization detector (FID)

- **Software:** Full instrument control and data analysis using ChromSpace®
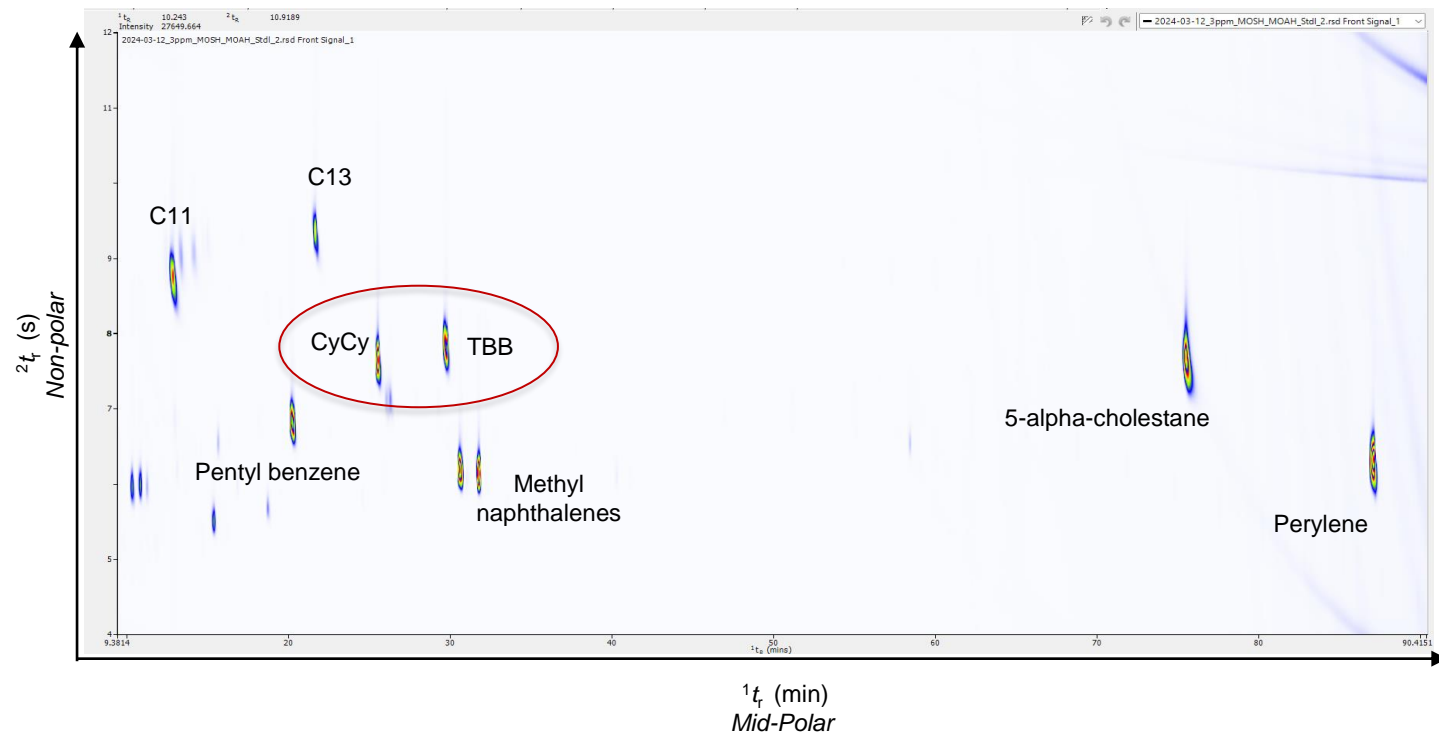
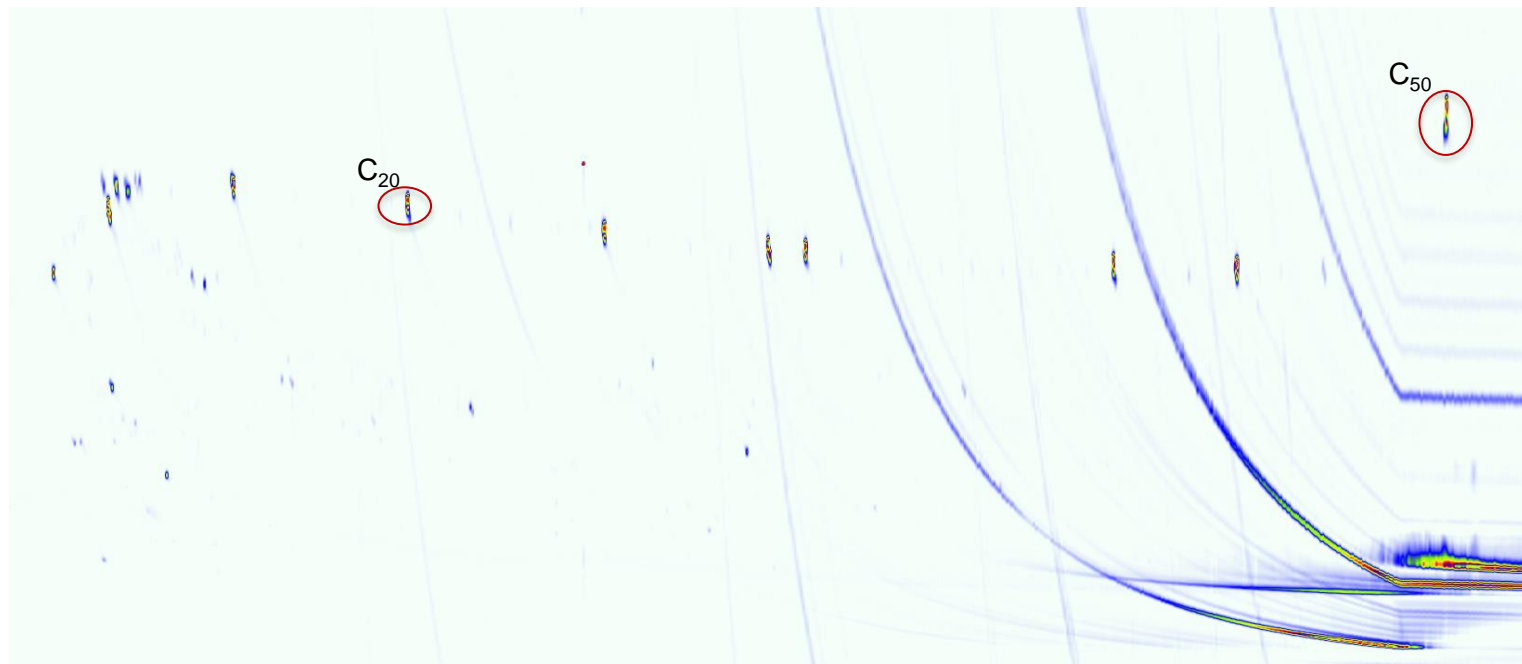# Internal Standard Markers for Stencil Placement
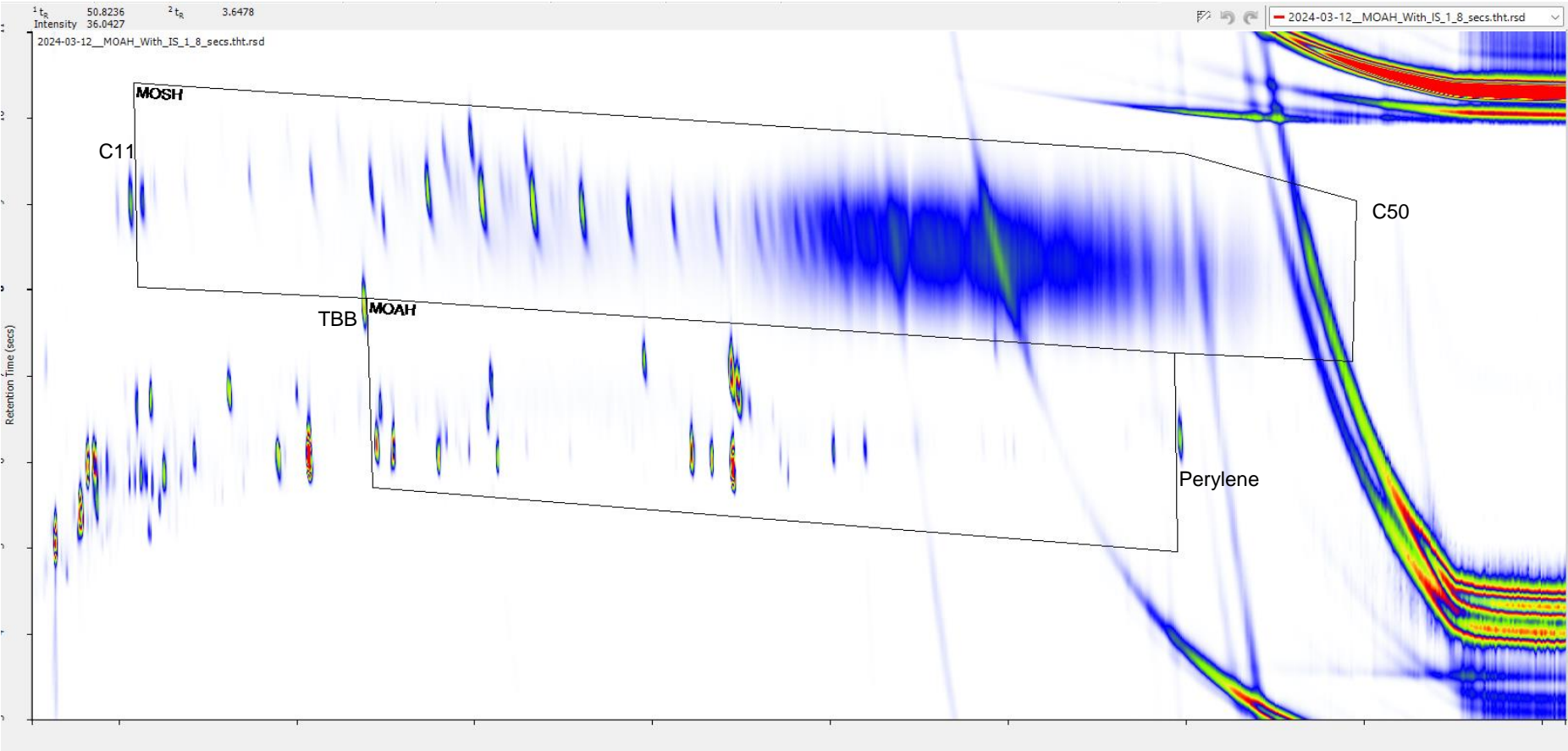
System suitability

MOSH/MOAH internal standard mix

# System suitability

Analysis of C_{10} to C_{50} alkane standard

- % Recovery of C_{20} compared to C_{50} was 107%

Spiked alkane and PAH mix

| Fraction	Spiked amount (µg/mL)	Calculated amount (µg/mL)
MOSH – Using CyCy	145	137
MOAH – Using TBB	60	60
MOSH 1:10 Dilution – Using CyCy	14.5	14.18
MOAH 1:10 Dilution – Using TBB	6	5.16

- Close alignment of the spiked and calculated amounts

Optimised separation run via FID

2024-03-20__MOAH_With_IS_Final Separation_20_secs.tht.rsd
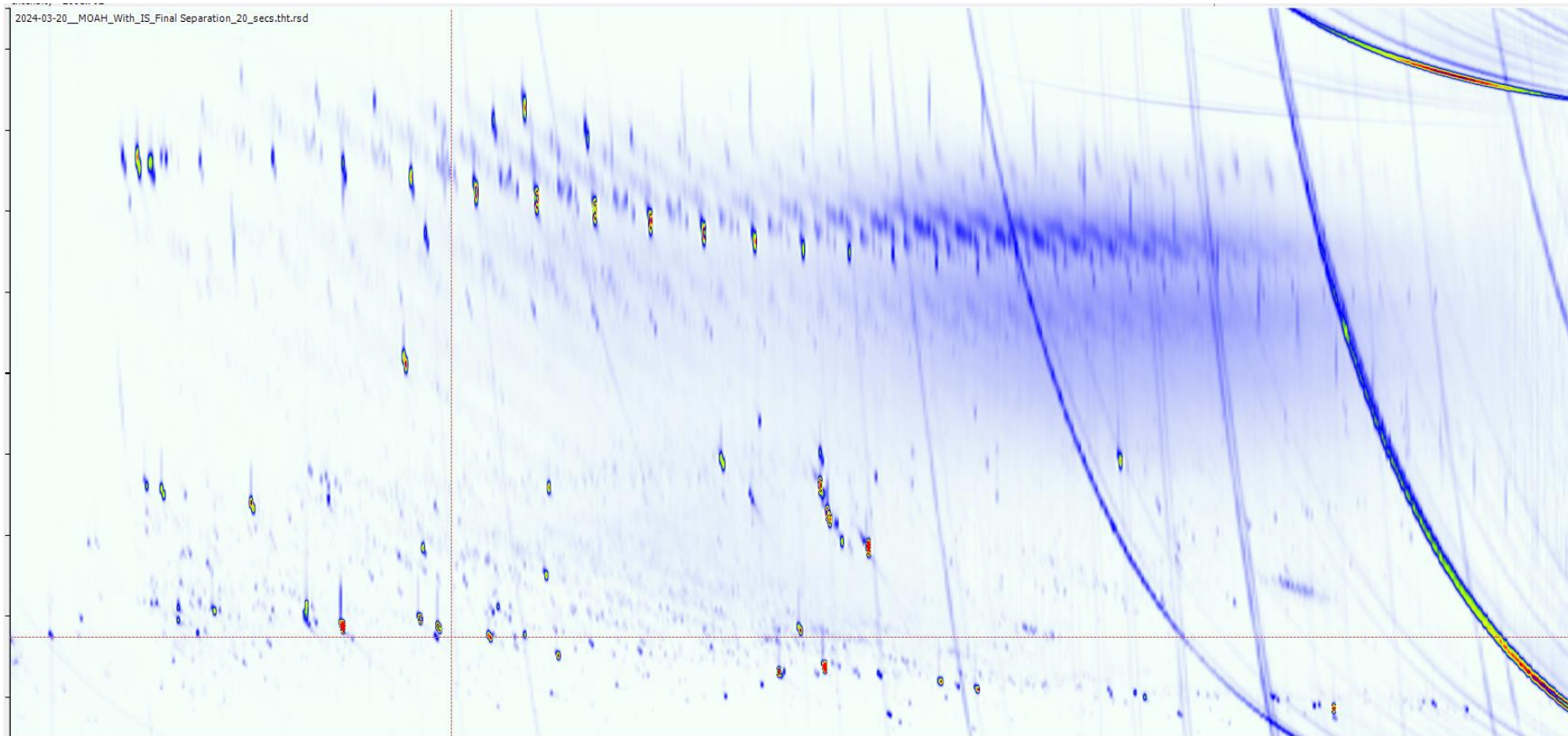
MOSH/MOAH fractions via TOF-MS
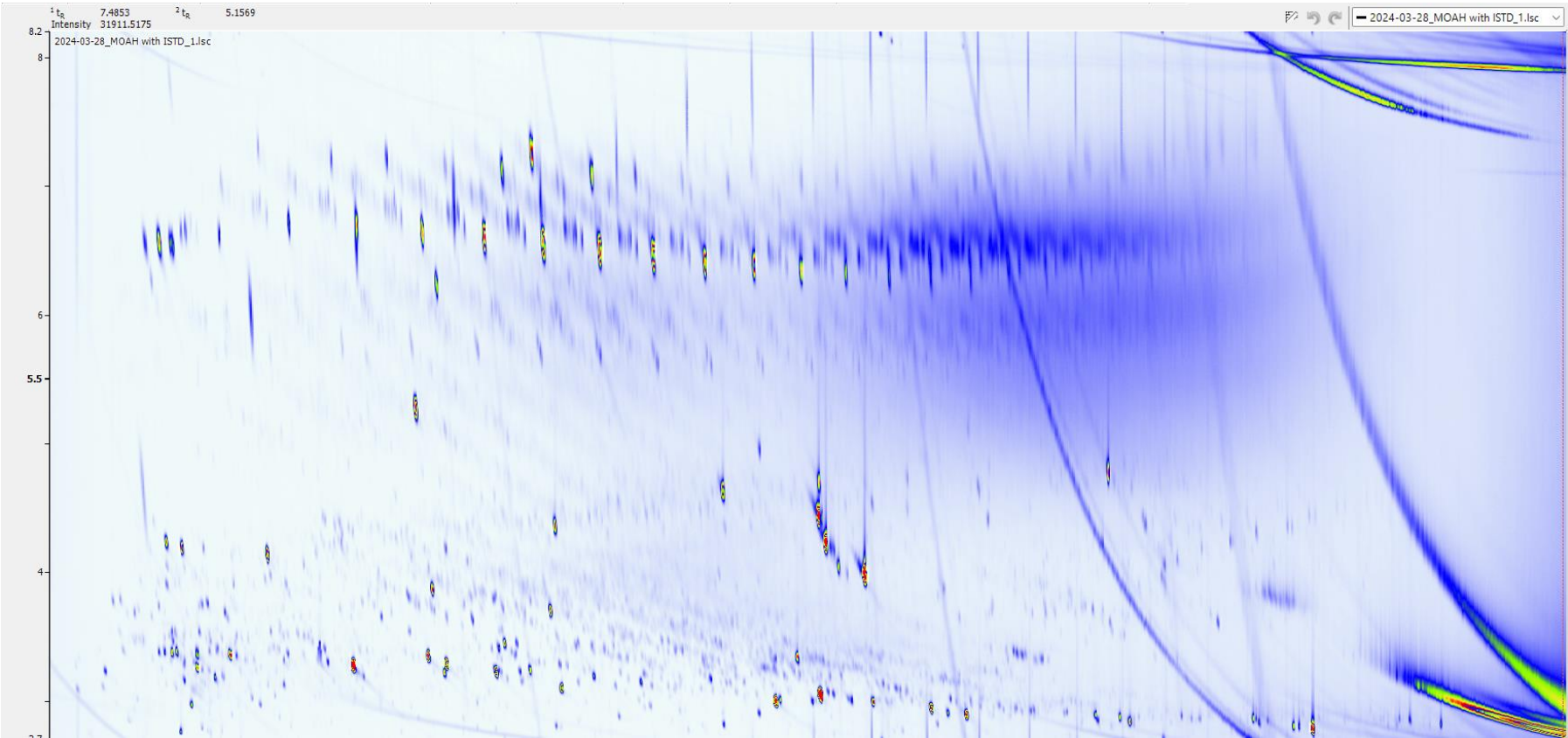
<50ppm Mass Accuracy to assist with class identification
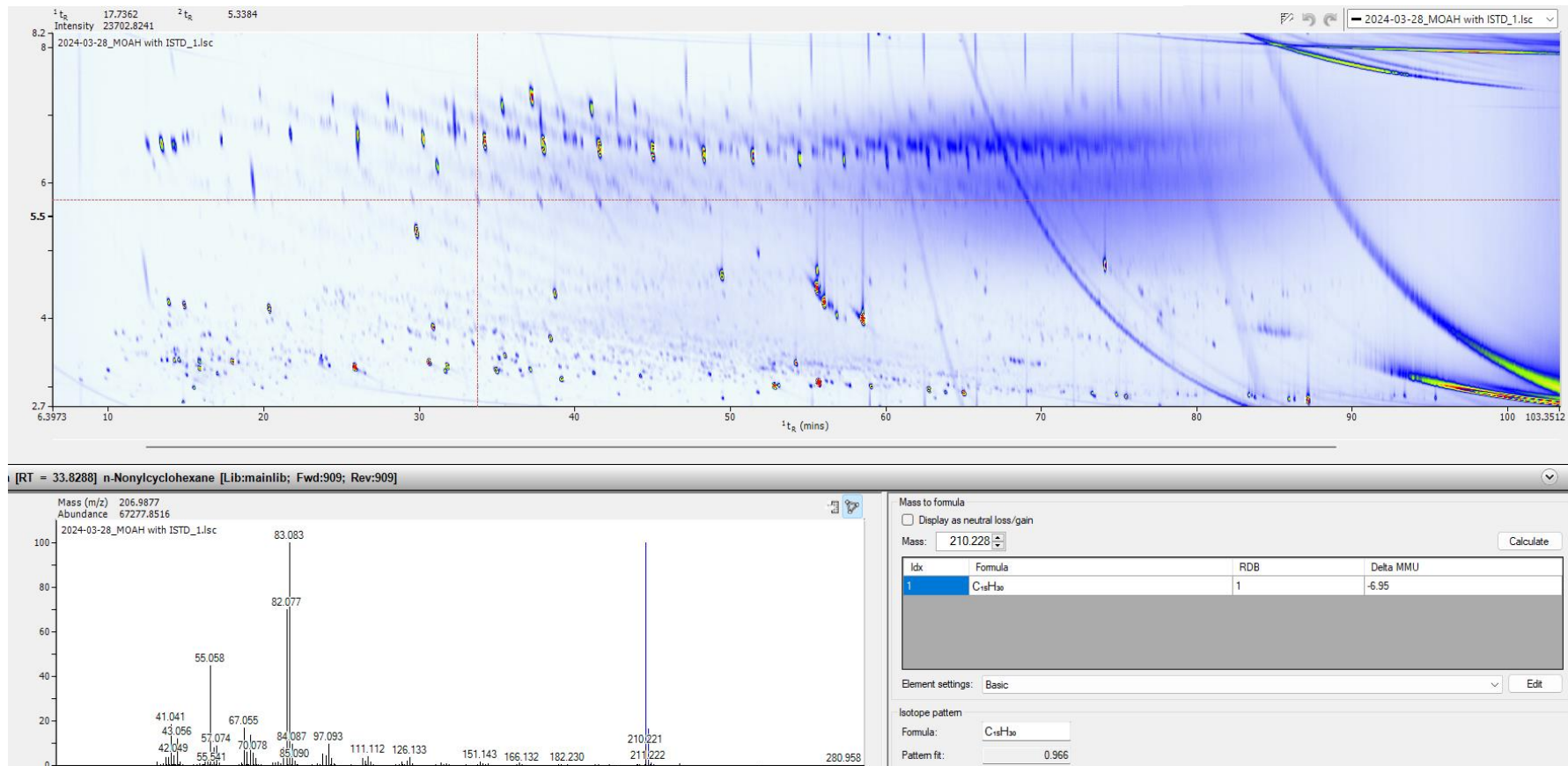
Summary

- MOAH limits of <2ppm may be introduced for palm oil, making robust analysis even more important

- GC×GC reveals the carryover of aromatics/aliphatics that can occur during fractionation, for improved quantitative precision

- INSIGHT-Thermal modulator provides sharp peaks across a wide volatility range (C_{50+}) for high sensitivity and excellent peak capacity

- Work is on-going to optimise the separation and develop a step-by-step analysis protocol

SepSolve
Analytical

Thanks for listening!

Any questions?