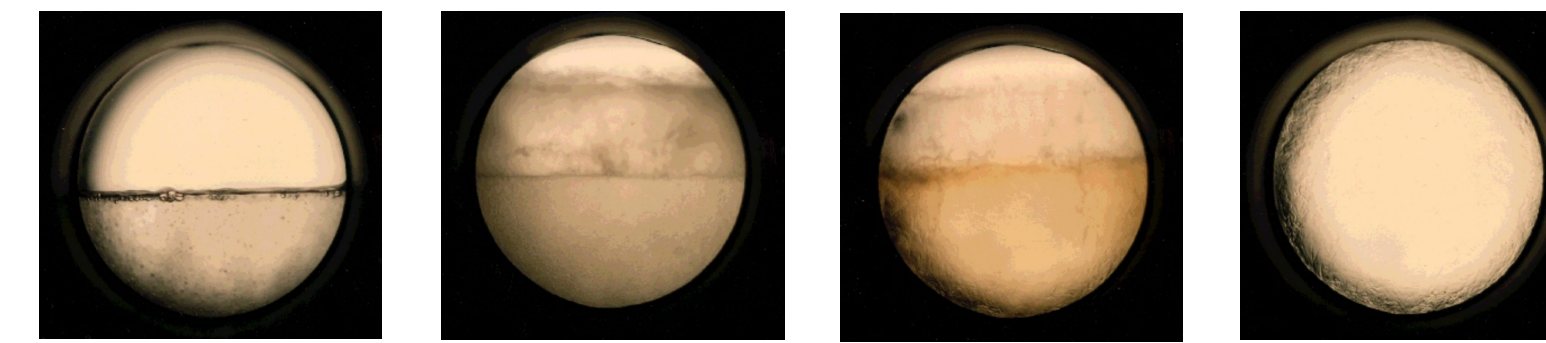


Supercritical Fluid Chromatography – Mass Spectrometry

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Advantages of SFC

Fast solvent evaporation for preparative scale

Can use polar and apolar stationary phases

CO₂ is safe and inexpensive

Reduced solvent consumption

Achieve chiral separations

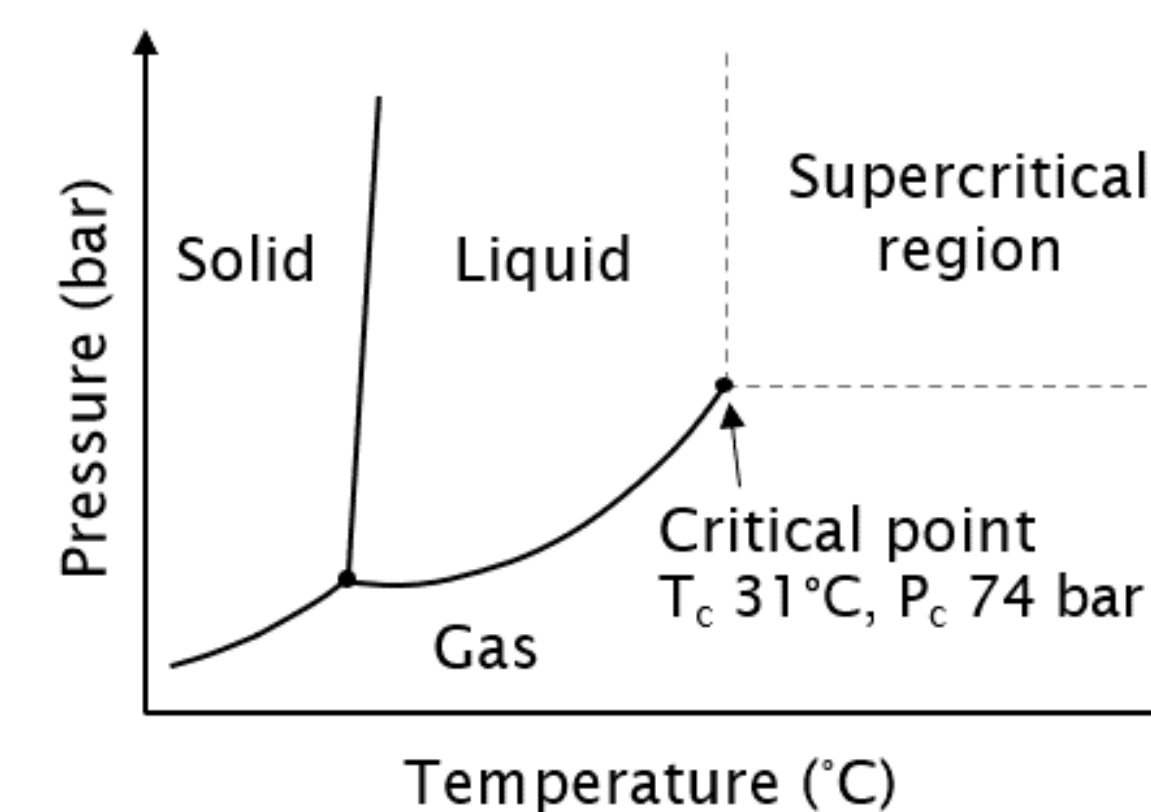
Fast, efficient methods

Green

Easily coupled to MS

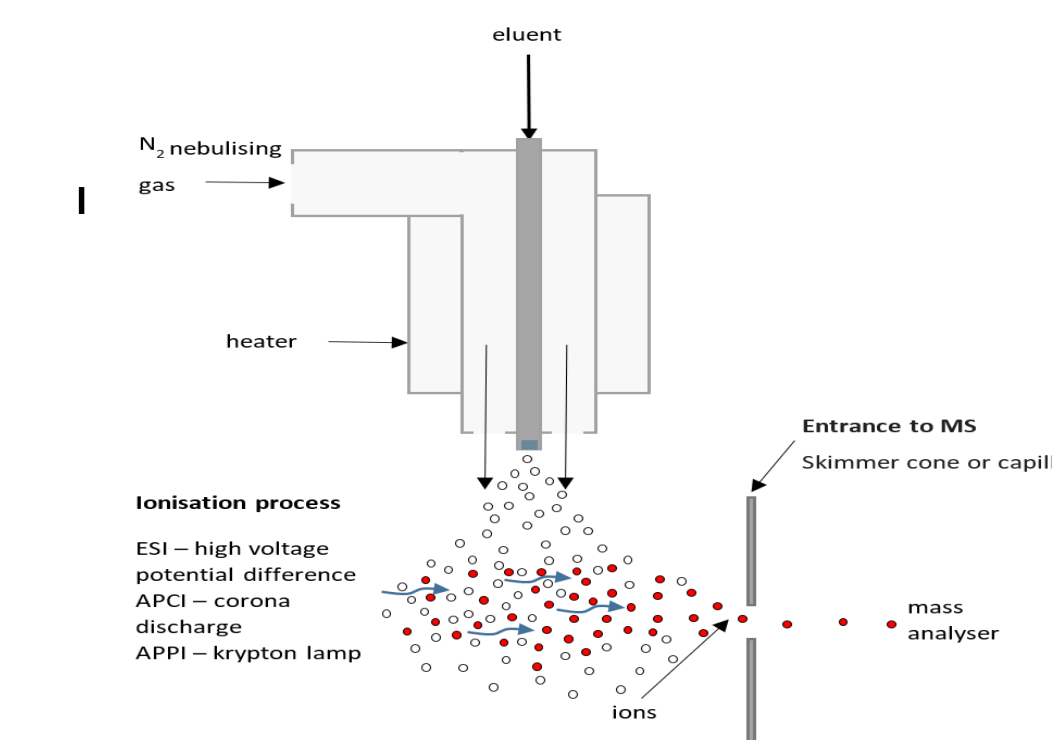
CO₂ Phase Diagram

- scCO₂ is intermediate between a liquid and a gas, with the density of liquids with the diffusivity and viscosity of gases.
- scCO₂ is non-toxic, non-flammable, chemically inert and inexpensive, and hexane like.

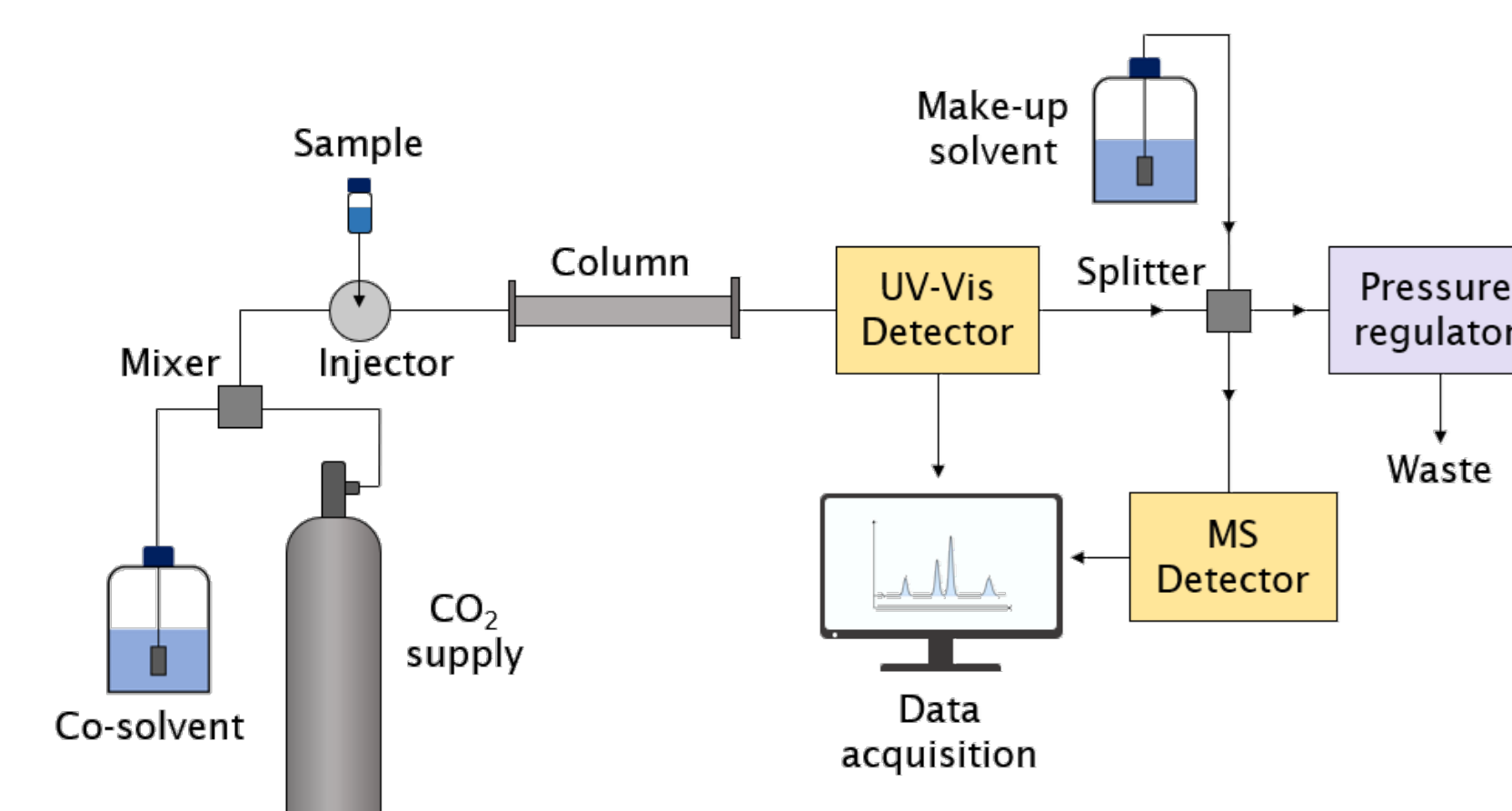


Selective Ionisation

Atmospheric Pressure Ionisation



SFC-MS configuration

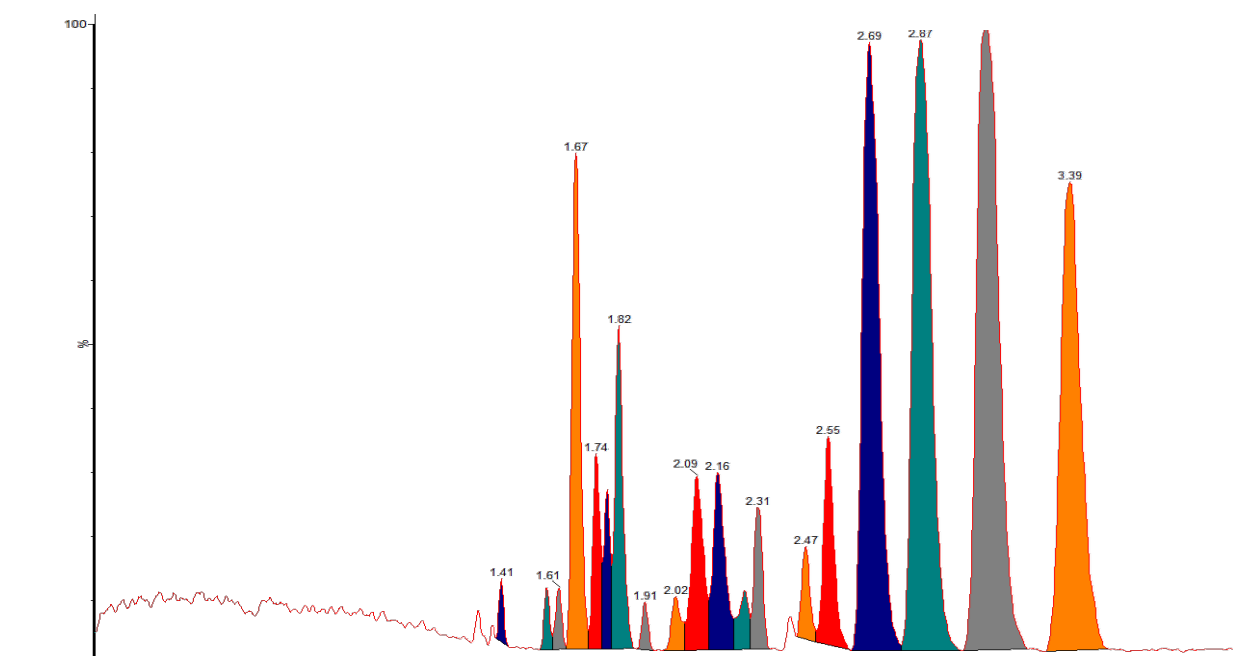
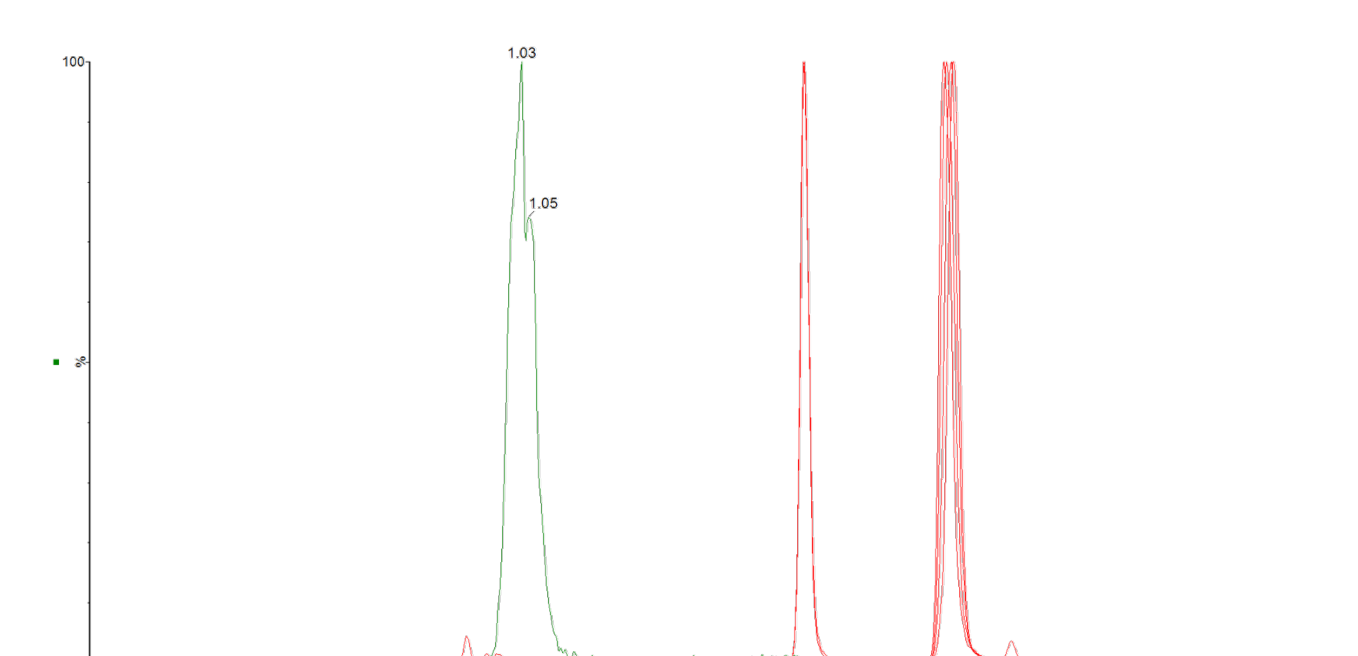
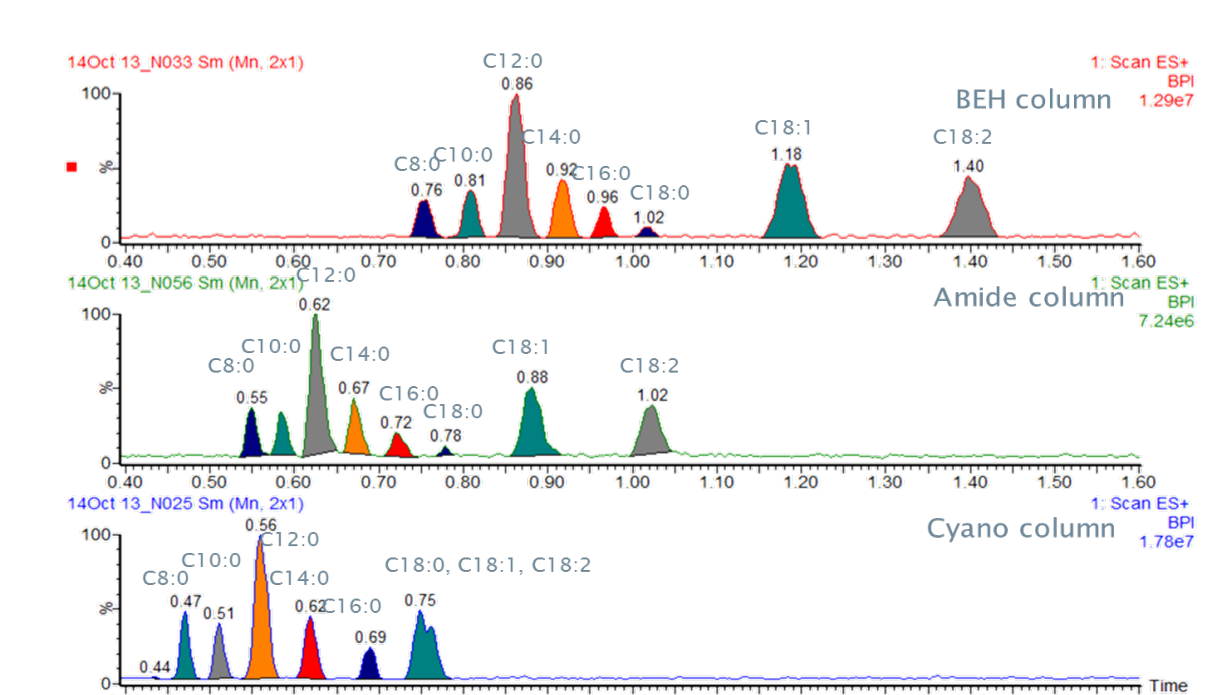


Chromatographic Selectivity

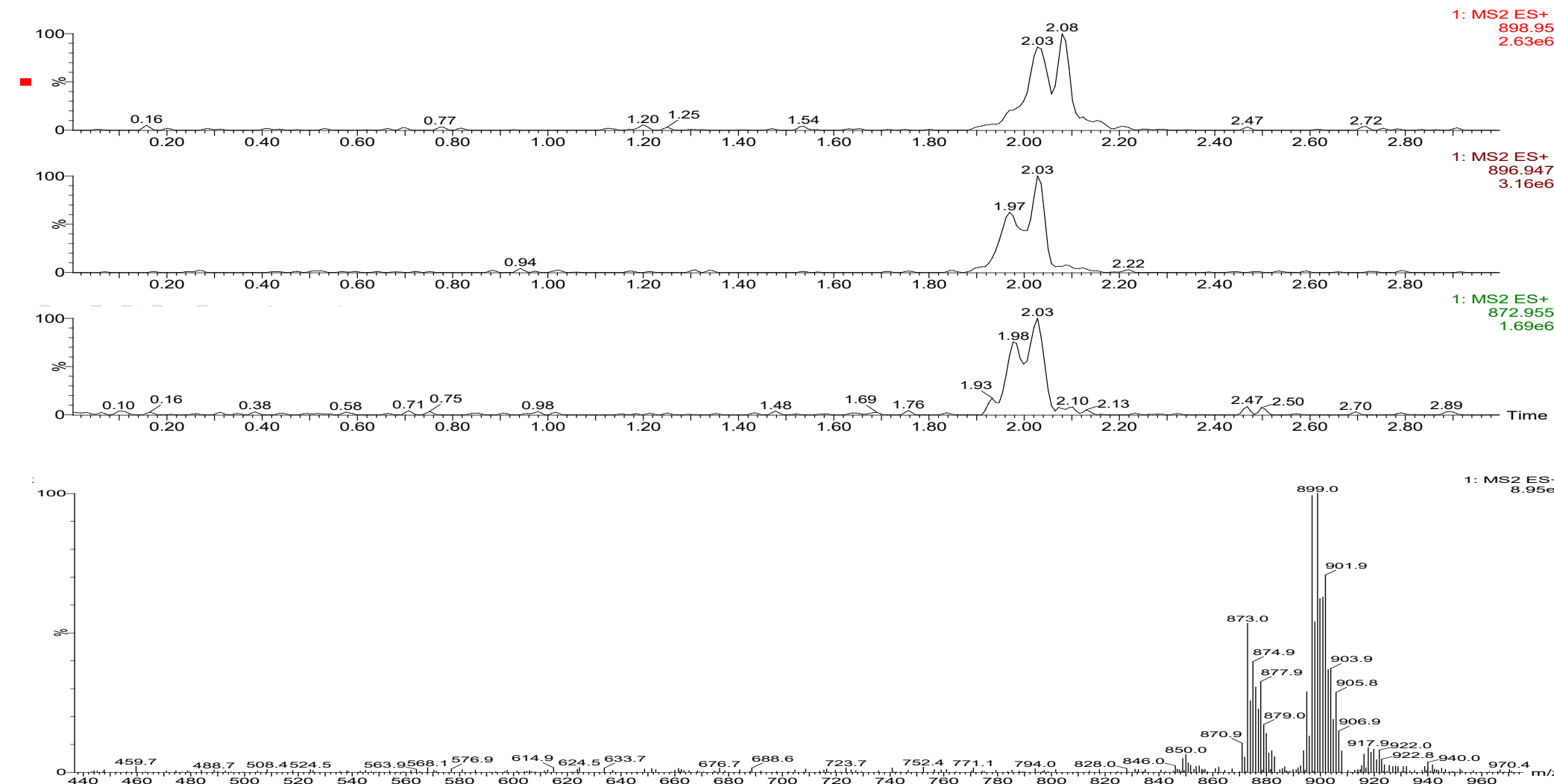
Column Selectivity

Class Separation (Corrosion Inhibitors)

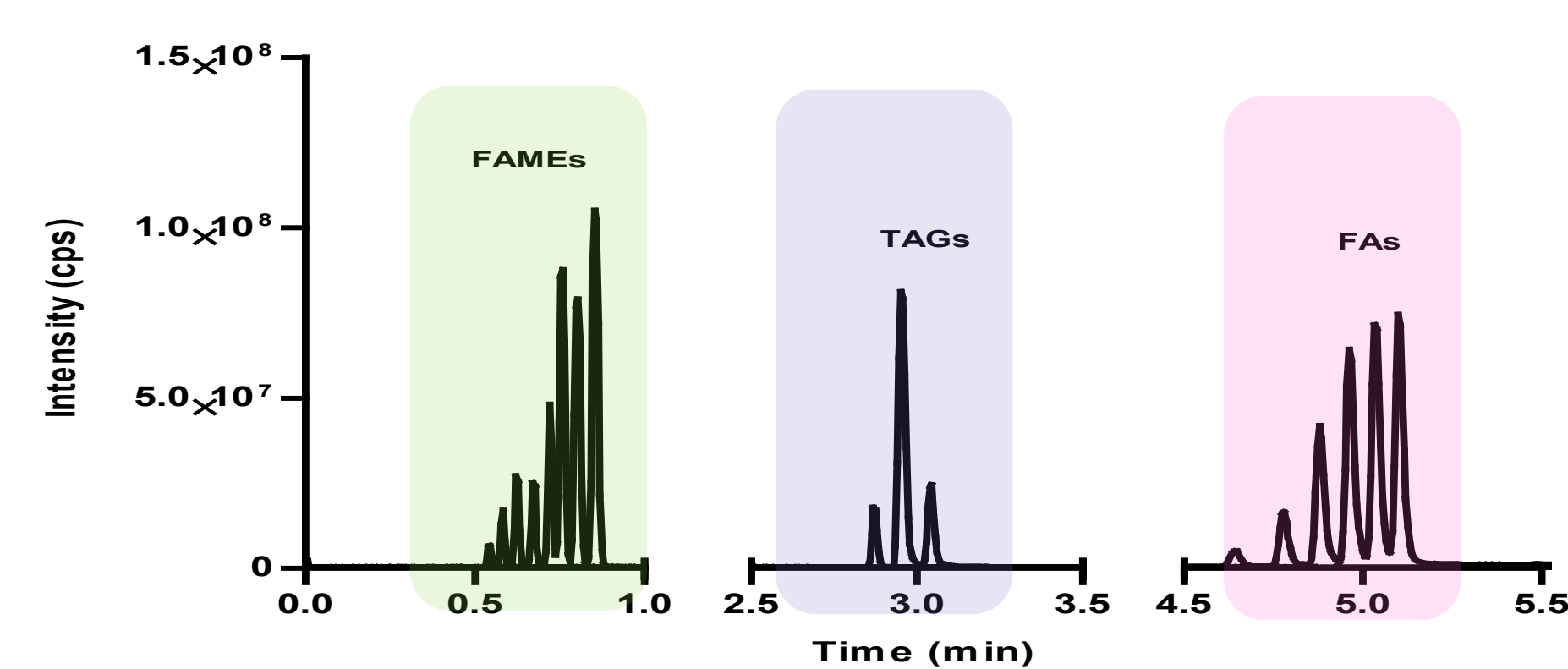
Component Separation (CIs)



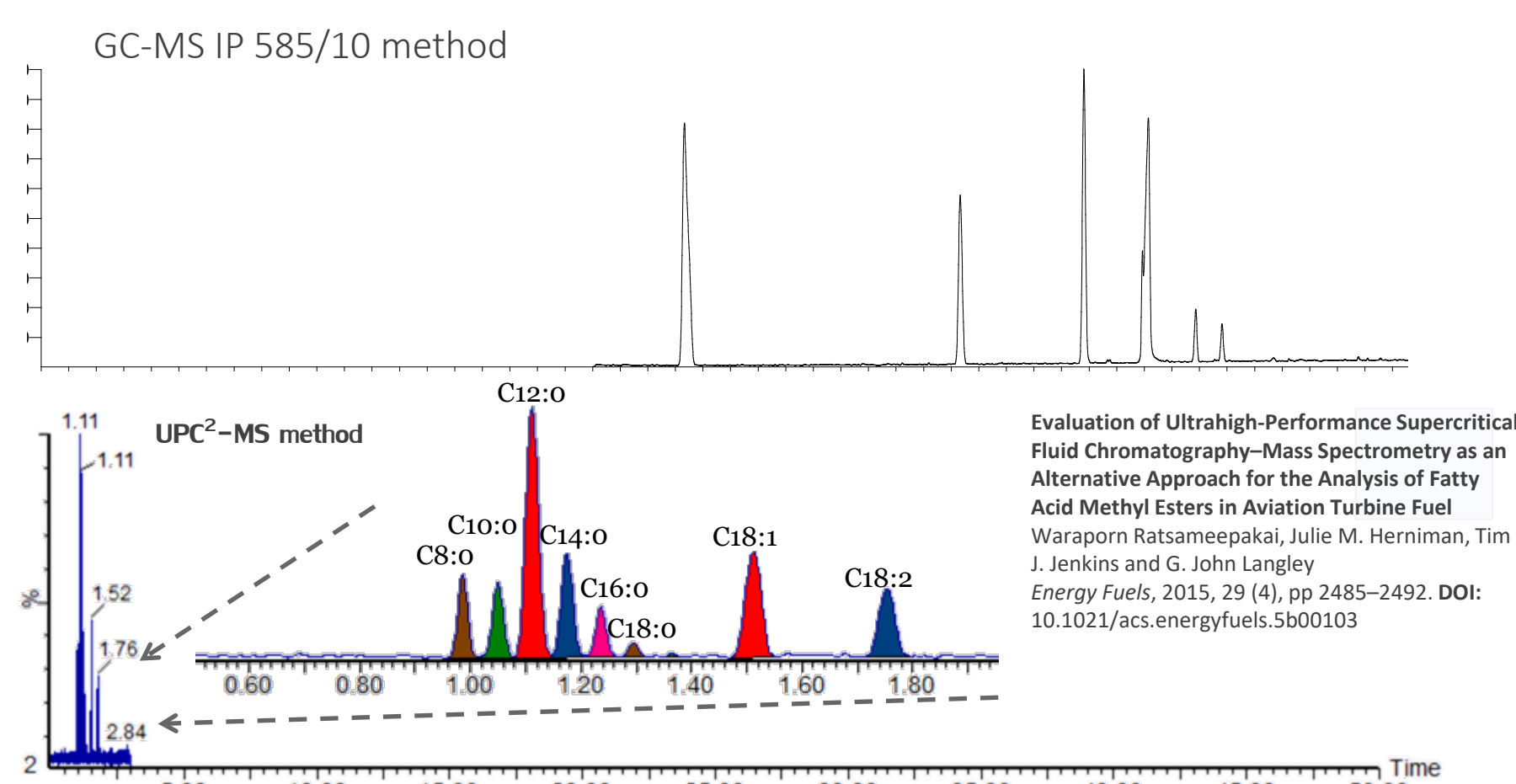
High Molecular Mass > C50 (O6)



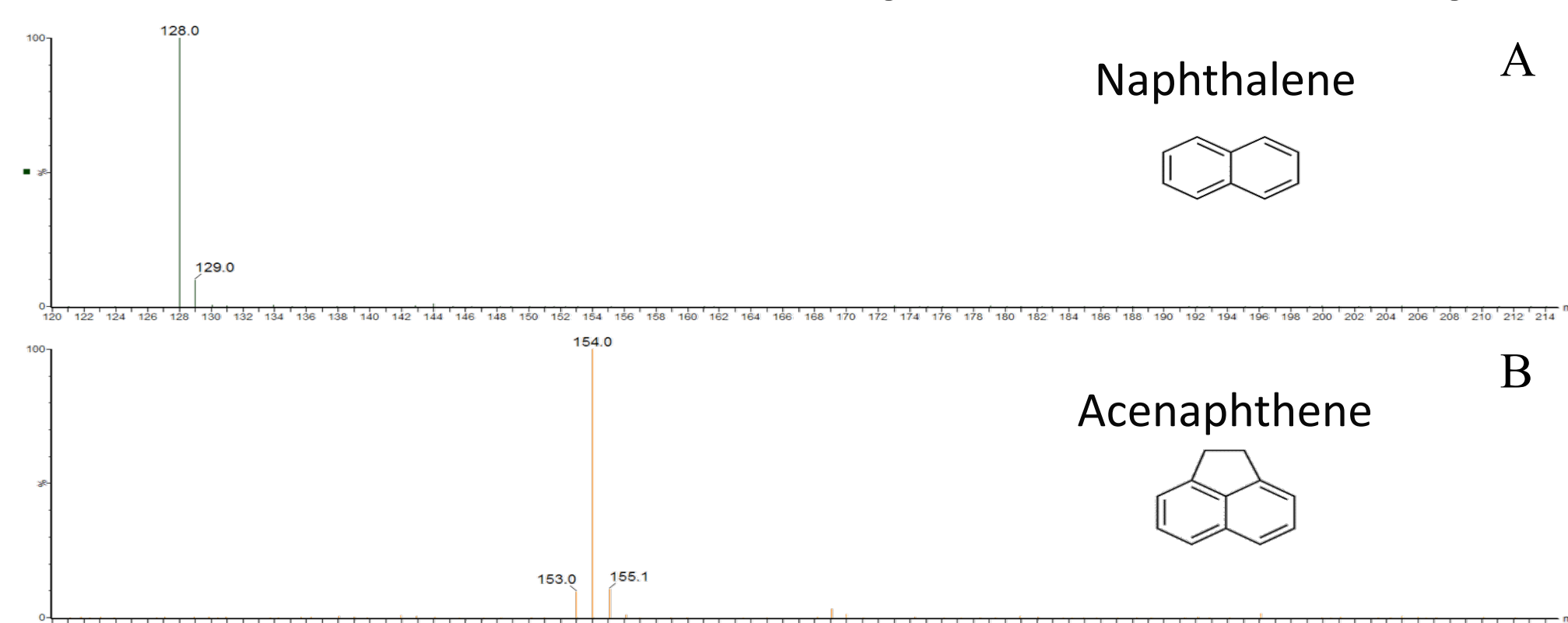
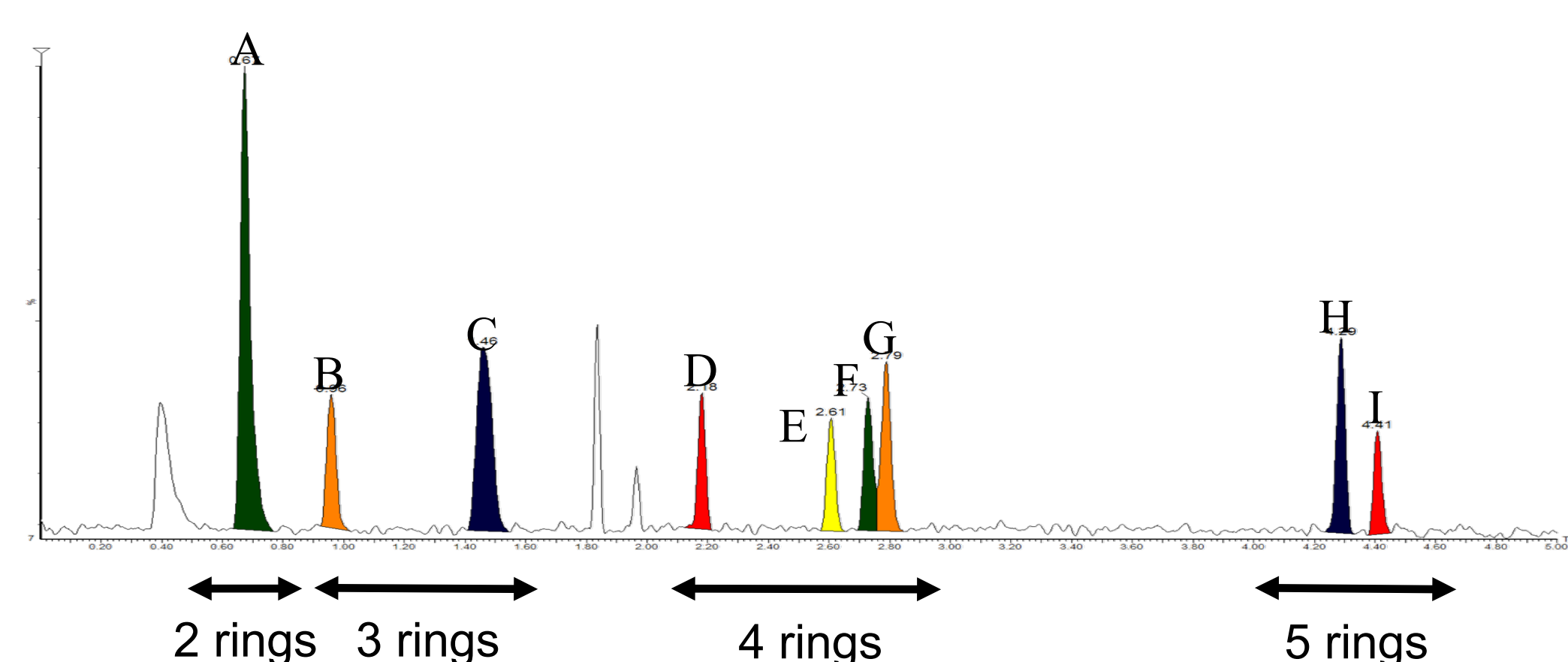
Biodiesel and Impurities



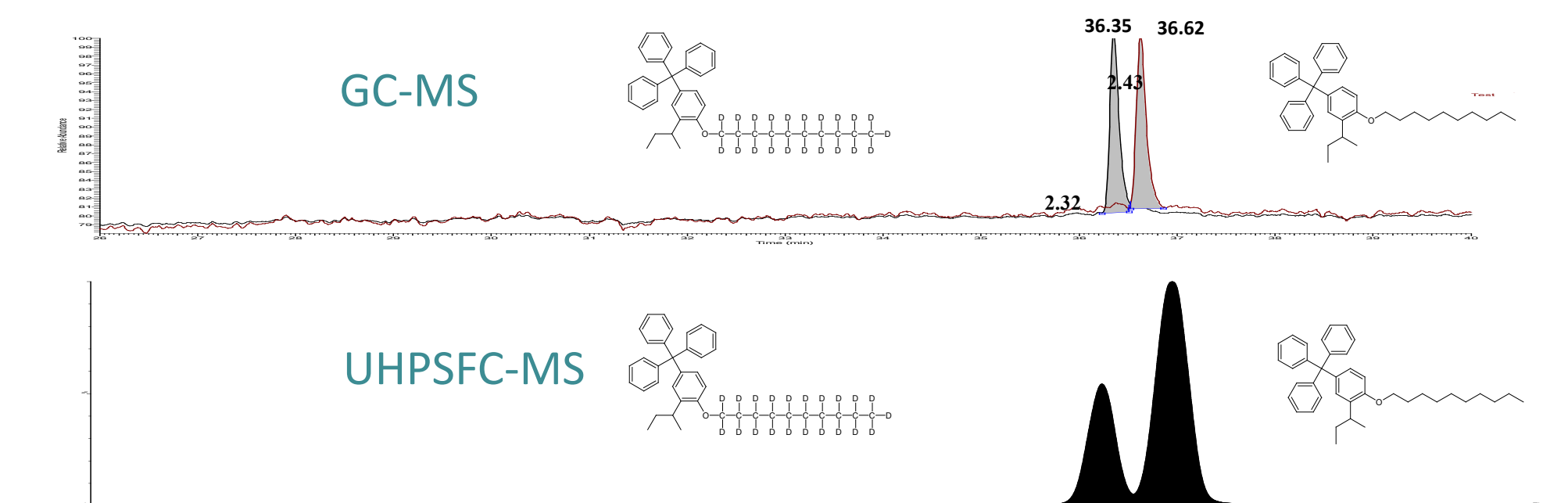
FAME in JET



PAHs



Larger molecules

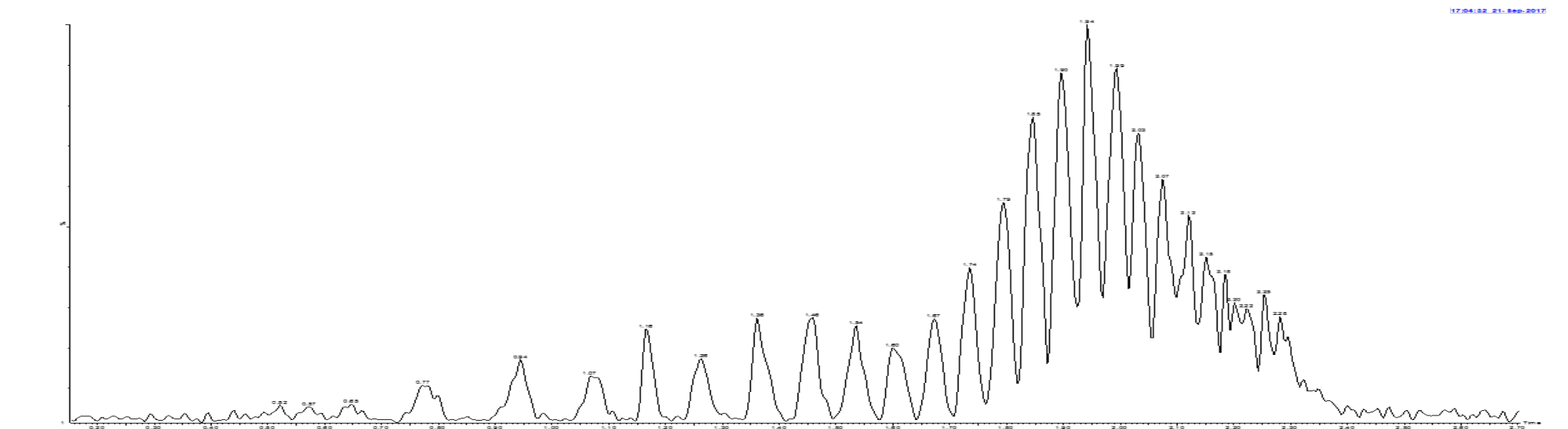


energy&fuels

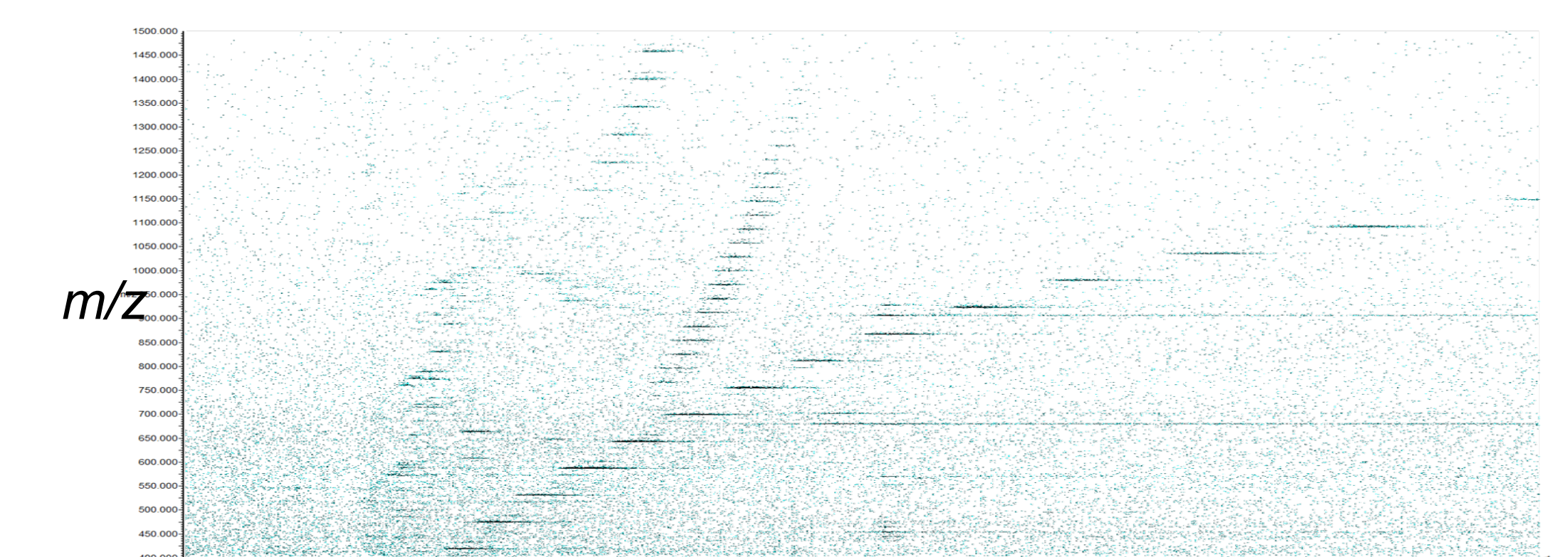
Detection and Quantitation of ACCUTRACE S10, a New Fiscal Marker Used in Low-Duty Fuels, Using a Novel Ultrahigh-Performance Supercritical Fluid Chromatography–Mass Spectrometry Approach
G. John Langley,^{1,2} Julie Herriman,¹ Anastasia Carter,¹ Edward Wilmot,¹ Maria Ashe,¹ and Jim Barker^{1,3}

Polymeric

Simple Ethoxylate



Polymeric in Gasoline



Time (minutes)

SFC-FID (Selerity)

- No organic modifier used
- Compatible with FID, giving uniform detector response across compound types
- ASTM methods already in place, e.g.,
 - ASTM D5186-Total aromatics and polyaromatics in Diesel Fuels
 - ASTM D6650-Total Olefins in Gasoline
 - ASTM D8305-Total Aromatics and polyaromatics (naphthalenes) in aviation fuels
- Analysis of compounds > C30 routine/trivial
- Largest compound detected so far C138

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