

TOTAL PETROLEUM HYDROCARBON

2nd Edition



PATTERN RECOGNITION STANDARDS



TPH Pattern Recognition Standards

Background

Analytical chemists have important decisions to make in determining the boiling range and gross hydrocarbon concentration of a petrochemical product spill. This decision-making process becomes more challenging if the petrochemical product has weathered or multiple products have spilled or leaked at the same site. A common strategy for the identification of a contamination sample is to compare its chromatographic pattern with a known petroleum product.

To assist analysts with this identification process, AccuStandard has selected a group of representative petrochemical products typically found when a spill and/or leak assessment site investigation is conducted.

Project plan for the generation of TPH data

Petrochemical reference standards were analyzed using an optimized set of operating conditions for each product boiling range (see operating conditions section). Objectives considered in the methods development included:

- Generate a uniquely recognizable GC pattern in approximately 30 minutes for each petrochemical product.
- Incorporate a “window defining mix” in the pattern recognition chromatogram that is appropriate for the boiling range of the product.
- Group the pattern recognition standards according to their boiling ranges.

Suggested instructions for use

The “window defining mix” standard is used to determine the beginning and end points of the petrochemical product chromatogram and establish the boiling range(s) of the contaminant(s). This defined alkane window mix is especially useful when dealing with weathered products or multiple products present in contaminated soil or water samples.

AccuStandard offers three hydrocarbon “window defining mixes” that enable the analyst to more accurately determine the boiling range of the unknown sample.

The “window defining mixes” are: C8-C40, Cat. No. **DRH-008S-R2**
C8-C20, Cat. No. **TPH-LOW-01 UPDATED**
C8-C30, Cat. No. **TPH-MID-01 UPDATED**

Single source contamination

By combining a specific petrochemical pattern with a known alkane hydrocarbon range, the analyst can then calculate a gross hydrocarbon concentration using the petrochemical standard pattern that is the closest match. For lab samples where the spill has recently occurred or is from a single point source this identification and concentration calculation is straight-forward.

Weathered or multiple source contamination

This comparison technique is very useful for weathered or mixed fuel patterns such as gasoline and diesel. By defining the window segment for each fuel in a mixed fuel sample (e.g., gasoline portion/diesel portion) and quantifying the defined segment with the same representative portion from the actual petrochemical standard, better inter-laboratory reproducibility can be achieved. Similarly, the alkane range segment from an actual standard can be used to determine the unknown sample boiling range.

Presentation of the data

The chromatogram for each petrochemical standard, with an overlay of the appropriate window defining hydrocarbon mix, can be used for the identification of contamination samples.

Pattern recognition between two similar petrochemical products can easily be achieved through the overlay comparison. The comparison provides both the overall pattern as well as the start and end points of the hydrocarbon range.

All products for TPH analyses are referenced in the Petrochemical section of our Master Catalog, and on our website: www.AccuStandard.com

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#2 Diesel Fuel (FU-009-D-40X)	4
#1 Diesel Fuel (Low sulfur) (FU-0013-D-40X)	4
#2 Diesel Fuel (Extra low sulfur) (FU-017-D-40X)	5
Biodiesel 20 (FU-030-D-40X) <i>Chromatogram not included</i>	
Biodiesel 100 (FU-029-D-40X) (Consumer grade)	5
SAE 30W Motor Oil (FU-018-D-40X)	6
SAE 40W Motor Oil (FU-019-D-40X)	6
SAE 50W Motor Oil (FU-021-D-40X)	7
SAE 5W30 Motor Oil (FU-025-D-40X)	7
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Not part of set

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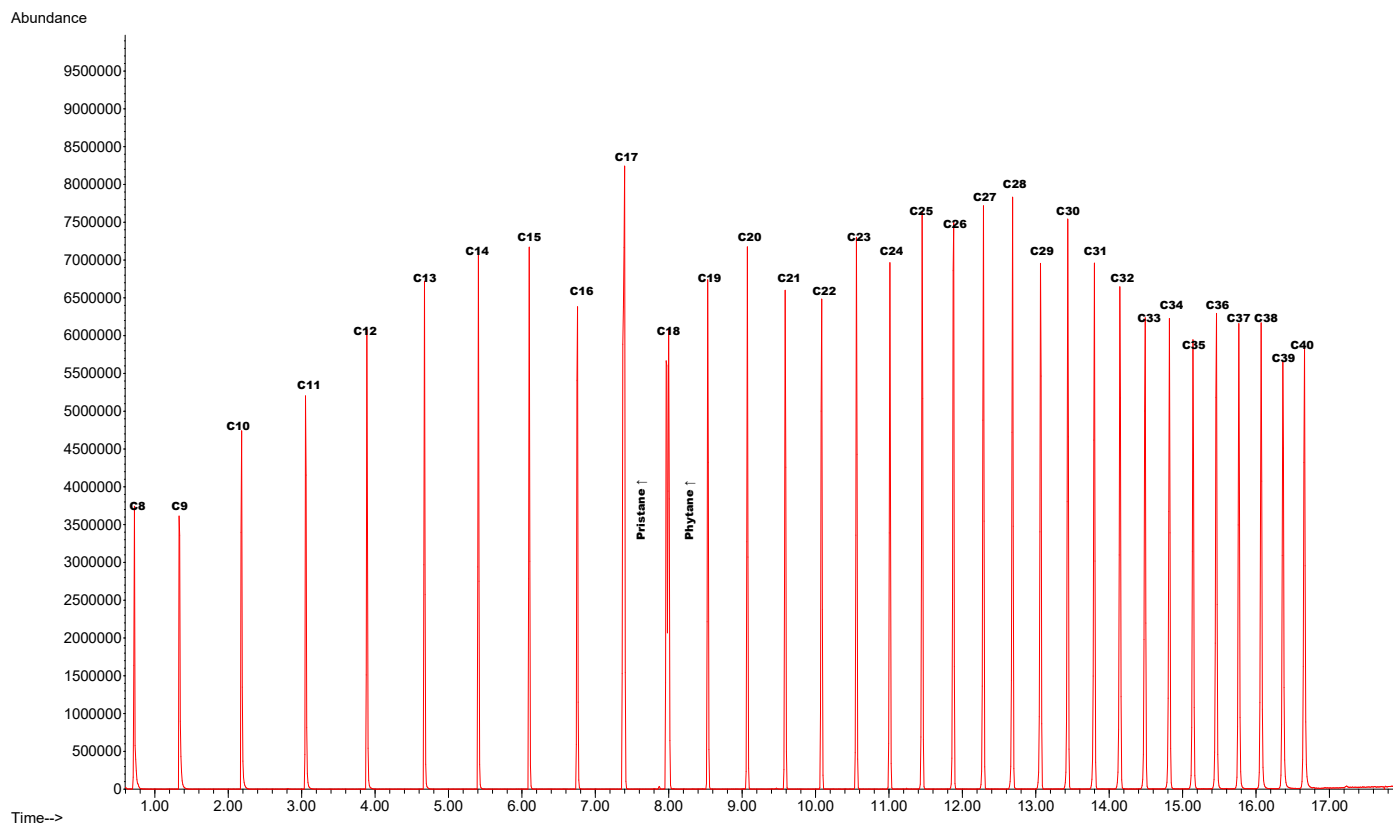
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Multi-State Hydrocarbon Window Defining Standard (C₈-C₄₀)

Hydrocarbon window defining standard with the C₈ to C₄₀ odd and even alkanes also includes pristane and phytane in the formulation. Use of this one standard measuring the C₁₇/pristane and C₁₈/phytane ratio can be used to estimate degradation of fuel oil. Pristane / phytane ratios are used as biomarkers for crude oil sources as recommended by ASTM Methods D5739 and D3328.



- | | | | |
|----------------------------------|-----------------------------------|--------------------------------------|---|
| 1. n-Octane C ₈ | 10. n-Heptadecane C ₁₇ | 19. n-Tetracosane C ₂₄ | 28. n-Tritriacontane C ₃₃ |
| 2. n-Nonane C ₉ | 11. n-Pristane | 20. n-Pentacosane C ₂₅ | 29. n-Tetraatriacontane C ₃₄ |
| 3. n-Decane C ₁₀ | 12. n-Octadecane C ₁₈ | 21. n-Hexacosane C ₂₆ | 30. n-Pentatriacontane C ₃₅ |
| 4. n-Undecane C ₁₁ | 13. n-Phytane | 22. n-Heptacosane C ₂₇ | 31. n-Hexatriacontane C ₃₆ |
| 5. n-Dodecane C ₁₂ | 14. n-Nonadecane C ₁₉ | 23. n-Octacosane C ₂₈ | 32. n-Heptatriacontane C ₃₇ |
| 6. n-Tridecane C ₁₃ | 15. n-Eicosane C ₂₀ | 24. n-Nonacosane C ₂₉ | 33. n-Octatriacontane C ₃₈ |
| 7. n-Tetradecane C ₁₄ | 16. n-Heneicosane C ₂₁ | 25. n-Triacontane C ₃₀ | 34. n-Nonatriacontane C ₃₉ |
| 8. n-Pentadecane C ₁₅ | 17. n-Docosane C ₂₂ | 26. n-Hentriacontane C ₃₁ | 35. n-Tetracontane C ₄₀ |
| 9. n-Hexadecane C ₁₆ | 18. n-Tricosane C ₂₃ | 27. n-Dotriacontane C ₃₂ | |

Instrument Operating Conditions for DRH-008-R2

Analysis Conditions for Hydrocarbon Characterization Standard, Cat. No. DRH-008S-R2:

1 µL injection of 500 ppm hydrocarbon characterization standard (n-C₈ to n-C₄₀ dissolved in 3:1 CS₂/CH₂Cl₂).

Chromatographic conditions: DB-5, 15 m x 0.25 mm i.d., 0.25 µm film thickness; split injector (250°C) with a split ratio of 80:1. MSD detector.

Column temp. program: 50°C (1) - 340°C @ 18°C per minute

Hydrocarbon Window Defining Standard (C₈ - C₄₀)

DRH-008S-R2

1 x 1 mL

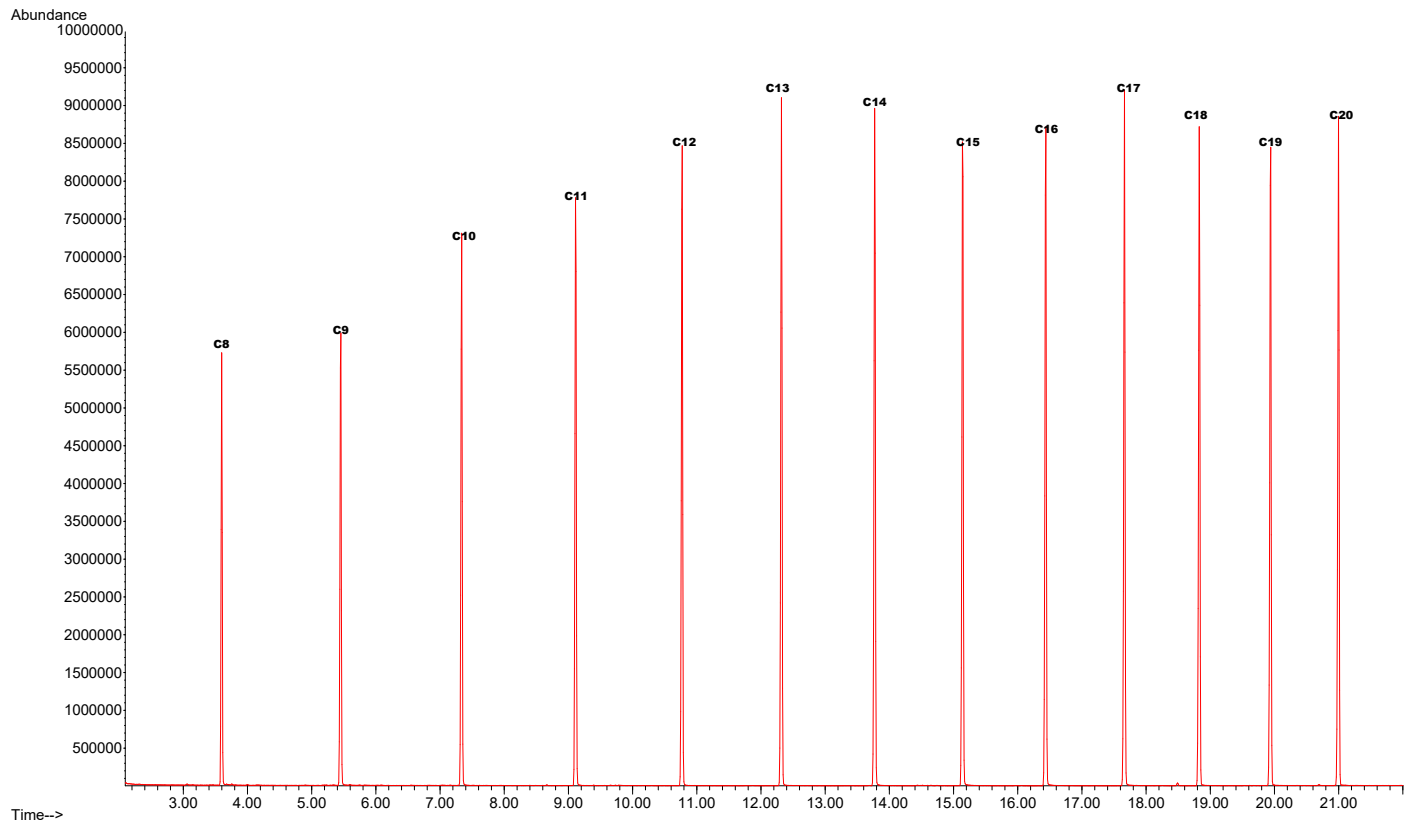
DRH-008S-R2-PAK

5 x 1 mL

500 µg/mL each in Chloroform

35 comps.

Multi-State Hydrocarbon Window Defining Standard (C₈-C₂₀)



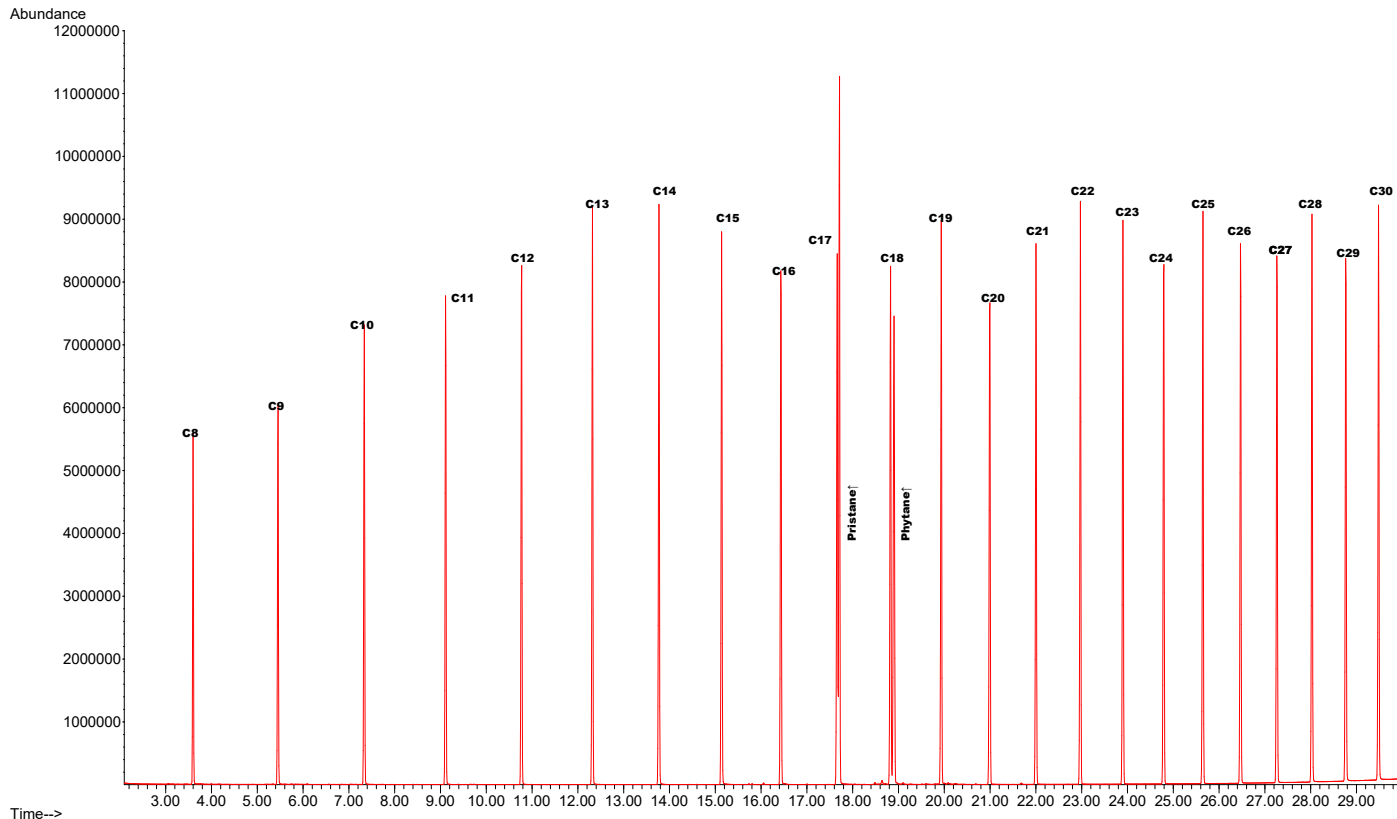
GC/MS operating conditions for TPH Window Defining Standards

Instrument:	Agilent 7890 GC/5975C MSD
Column 1:	30M X 0.25 mm id X 0.25 um DB 5-MS
Column 2:	15M X 0.25 mm id X 0.25 um DB 5-MS
Column temp. program:	40(2)-250°C @ 10/min for low boiling range 40(2)-300°C @ 10/min for mid boiling range 80-340°C @ 18/min for high boiling range (motor oil)
Inlet temp.:	225°C for low/mid boiling range samples 250°C for high boiling range samples
Interface temp.:	300°C
Injection:	1.0 µl, split 80:1

Total Petroleum Hydrocarbons (C₈ - C₂₀)

TPH-LOW-01	1 x 1 mL
TPH-LOW-01-PAK	5 x 1 mL
500 µg/mL each in Chloroform	13 comps.

Multi-State Hydrocarbon Window Defining Standard (C₈-C₃₀)



GC/MS operating conditions for TPH Window Defining Standards

Instrument:	Agilent 7890 GC/5975C MSD
Column 1:	30M X 0.25 mm id X 0.25 um DB 5-MS
Column 2:	15M X 0.25 mm id X 0.25 um DB 5-MS
Column temp. program:	40(2)-250°C @ 10/min for low boiling range 40(2)-300°C @ 10/min for mid boiling range 80-340°C @ 18/min for high boiling range (motor oil)
Inlet temp.:	225°C for low/mid boiling range samples 250°C for high boiling range samples
Interface temp.:	300°C
Injection:	1.0 µl, split 80:1

Total Petroleum Hydrocarbons (C₈ - C₃₀)

TPH-MID-01	1 x 1 mL
TPH-MID-01-PAK	5 x 1 mL
500 µg/mL each in Chloroform	25 comps.

Includes pristane and phytane in the formulation

Chromatograms of Motor Fuels & Lubrication Oils

Motor Fuels & Lubricating Oils Set Chromatography 1-6

Gasoline, Regular Unleaded (GA-001-40X)	2
Gasoline, Regular Leaded (GA-002-40X)	2
Gasoline, Premium (GA-003-40X)	3
RFA Gasoline (Oxygenate-free) (GA-004-40X)	3
#2 Diesel Fuel (FU-009-D-40X)	4
#1 Diesel Fuel (Low sulfur) (FU-0013-D-40X)	4
#2 Diesel Fuel (Extra low sulfur) (FU-017-D-40X)	5
Biodiesel 20 (FU-030-D-40X) <i>Chromatogram not included</i>	
Biodiesel 100 (FU-029-D-40X) (Consumer grade)	5
SAE 30W Motor Oil (FU-018-D-40X)	6
SAE 40W Motor Oil (FU-019-D-40X)	6
SAE 50W Motor Oil (FU-021-D-40X)	7
SAE 5W30 Motor Oil (FU-025-D-40X)	7
SAE 10W30 Motor Oil (FU-026-D-40X)	8
SAE 10W40 Motor Oil (FU-027-D-40X)	8

Motor Fuels & Lubricating Oils Set

TPH-001-R2-SET

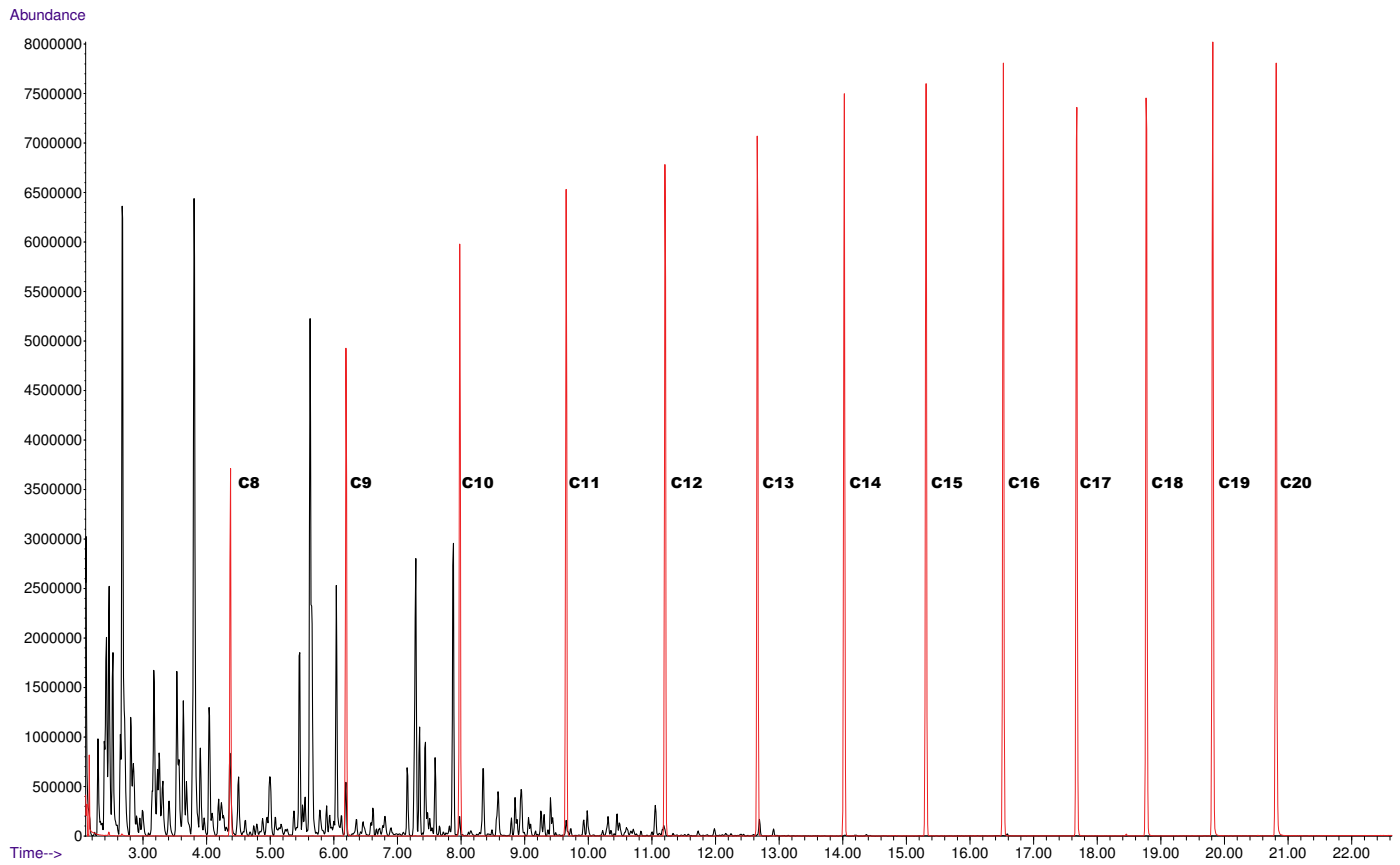
12 x 1 mL

	mg/mL	Solv.	Cat. No.
Gasoline, Regular Unleaded	20	MeOH	GA-001-40X
Gasoline, Regular Leaded	20	MeOH	GA-002-40X
Gasoline, Premium	20	MeOH	GA-003-40X
RFA Gasoline (Oxygenate-free)	20	MeOH	GA-005-40X
#2 Diesel Fuel	20	CH ₂ Cl ₂	FU-009-D-40X
#1 Diesel Fuel (Low sulfur)	20	CH ₂ Cl ₂	FU-013-D-40X
#2 Diesel Fuel (Extra low sulfur)	20	CH ₂ Cl ₂	FU-017-D-40X
Biodiesel 100 (Consumer grade)	20	CH ₂ Cl ₂	FU-029-D-40X
Biodiesel 20 *	20	CH ₂ Cl ₂	FU-030-D-40X
SAE 30W Motor Oil	20	CH ₂ Cl ₂	FU-018-D-40X
SAE 40W Motor Oil	20	CH ₂ Cl ₂	FU-019-D-40X
SAE 50W Motor Oil	20	CH ₂ Cl ₂	FU-021-D-40X

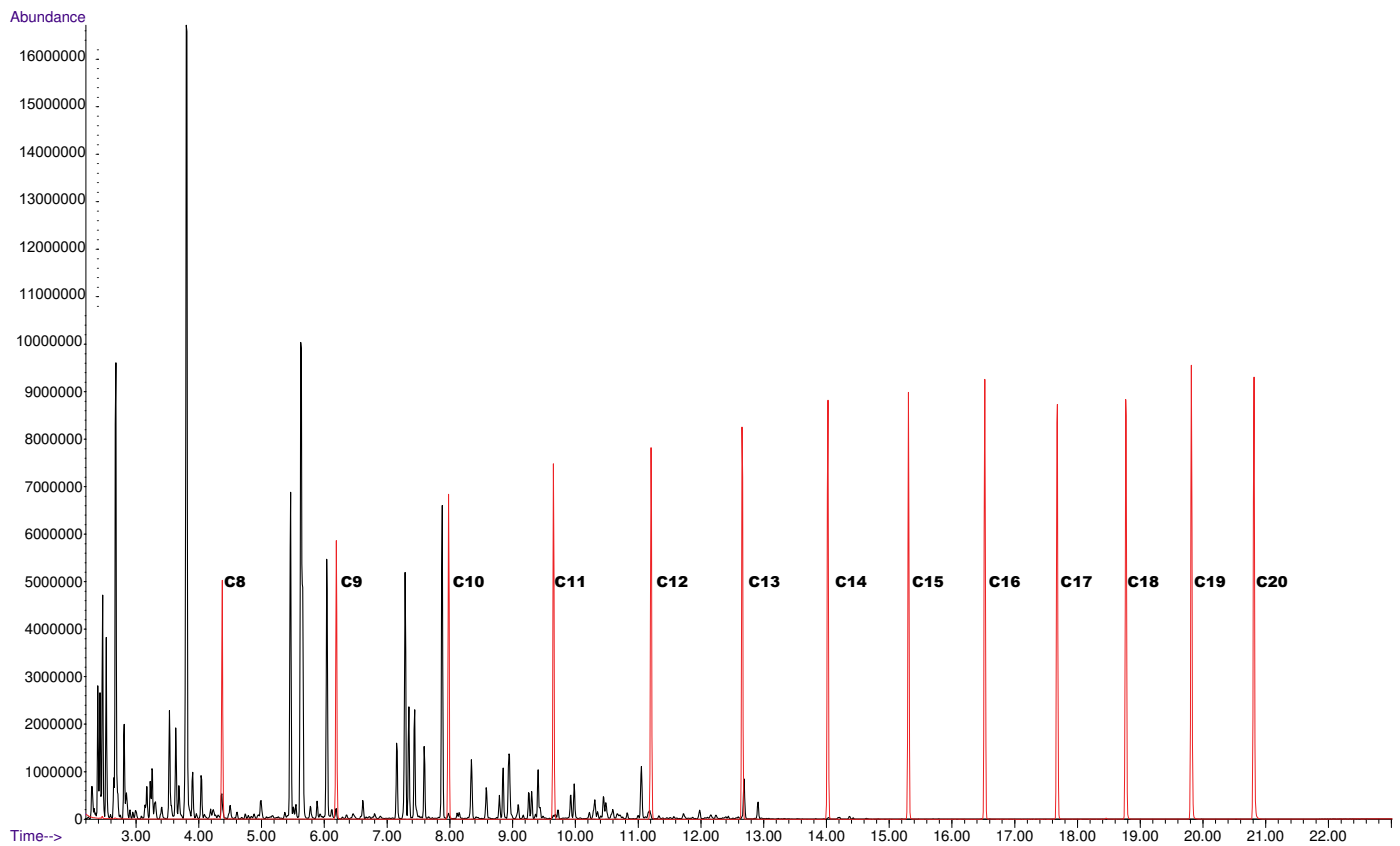
* Chromatogram not included

Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

Gasoline, Regular Unleaded (Cat. No. GA-001-40X)

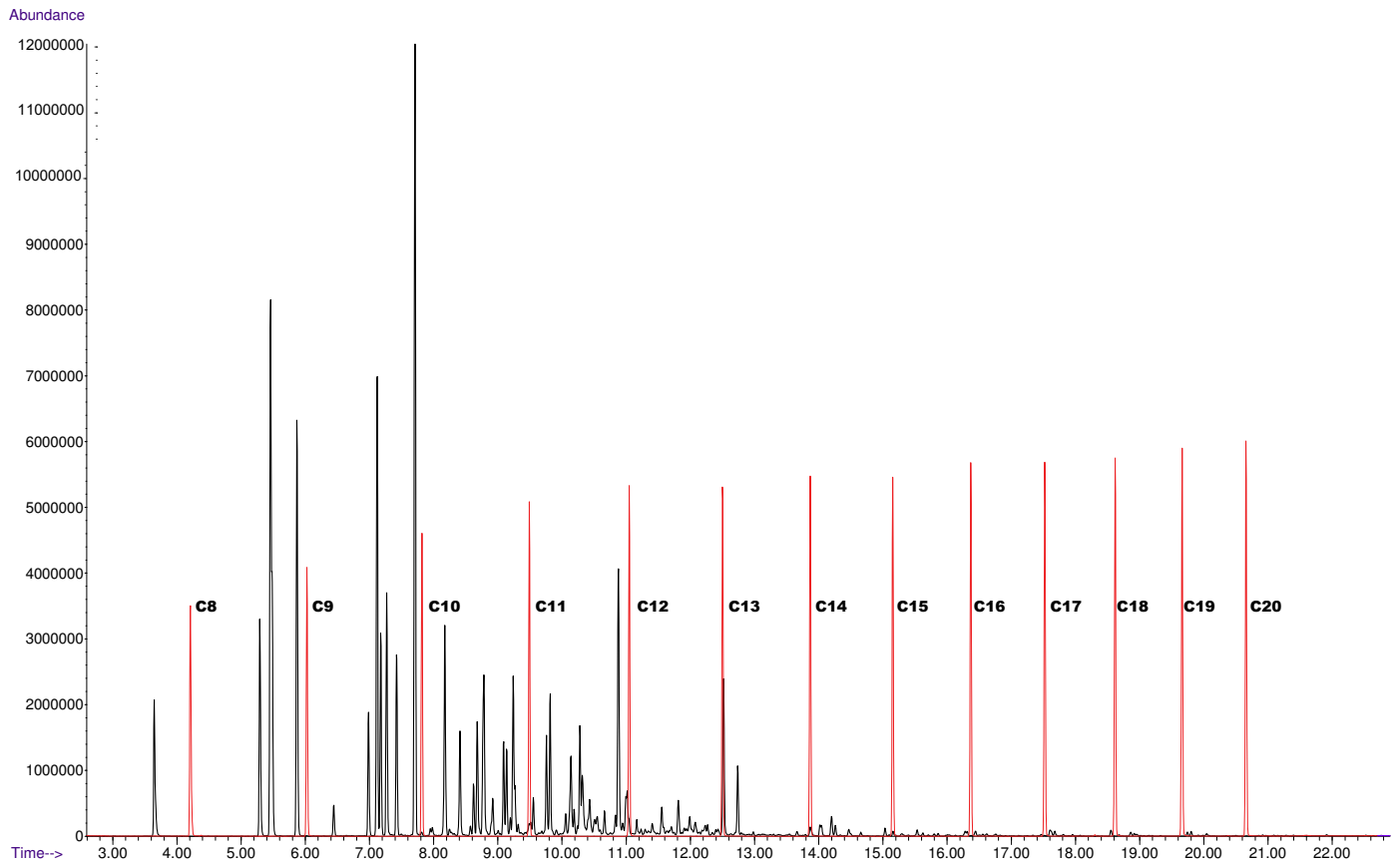


Gasoline, Regular Leaded (Cat. No. GA-002-40X)

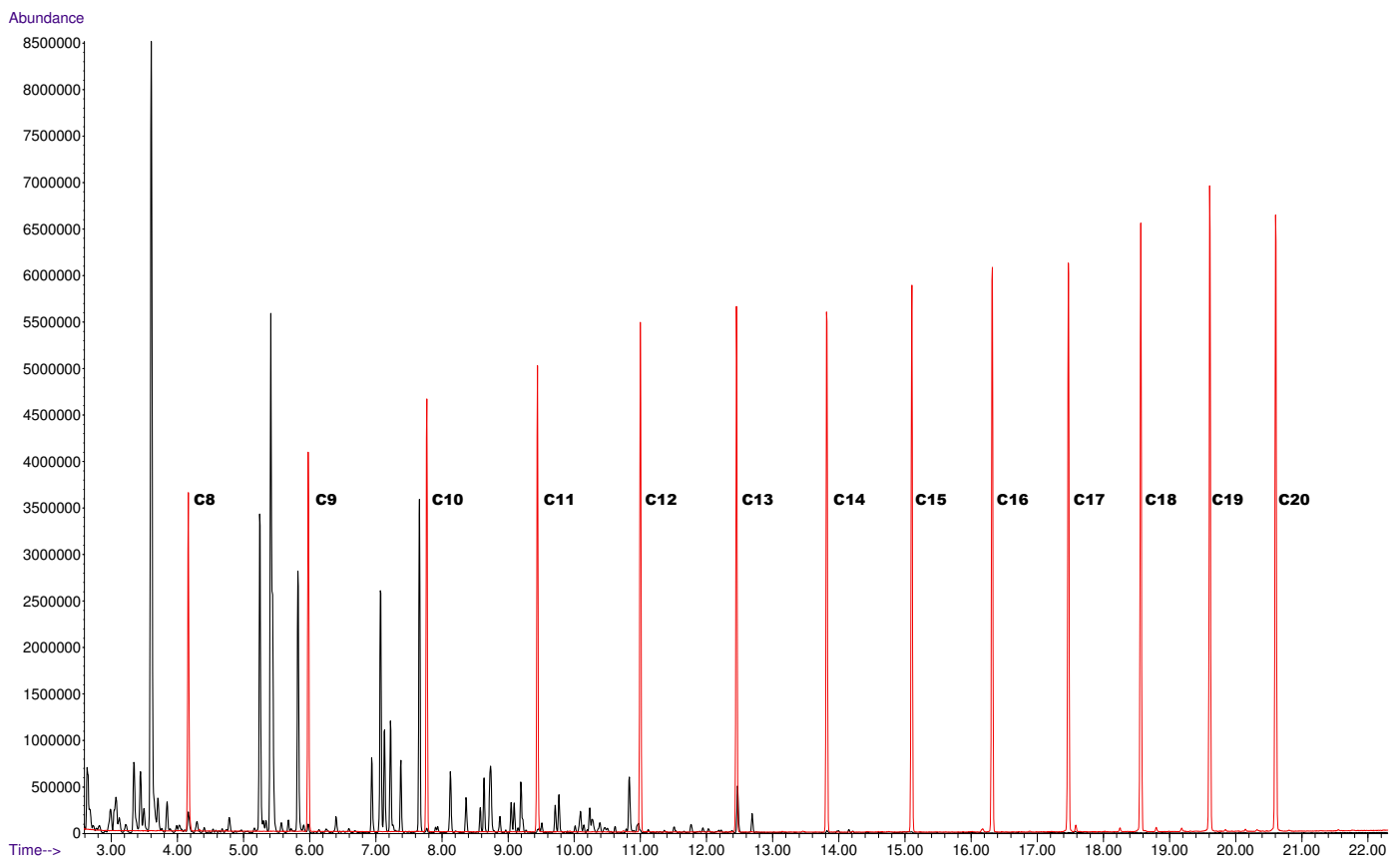


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

Gasoline, Premium (Cat. No. GA-003-40X)

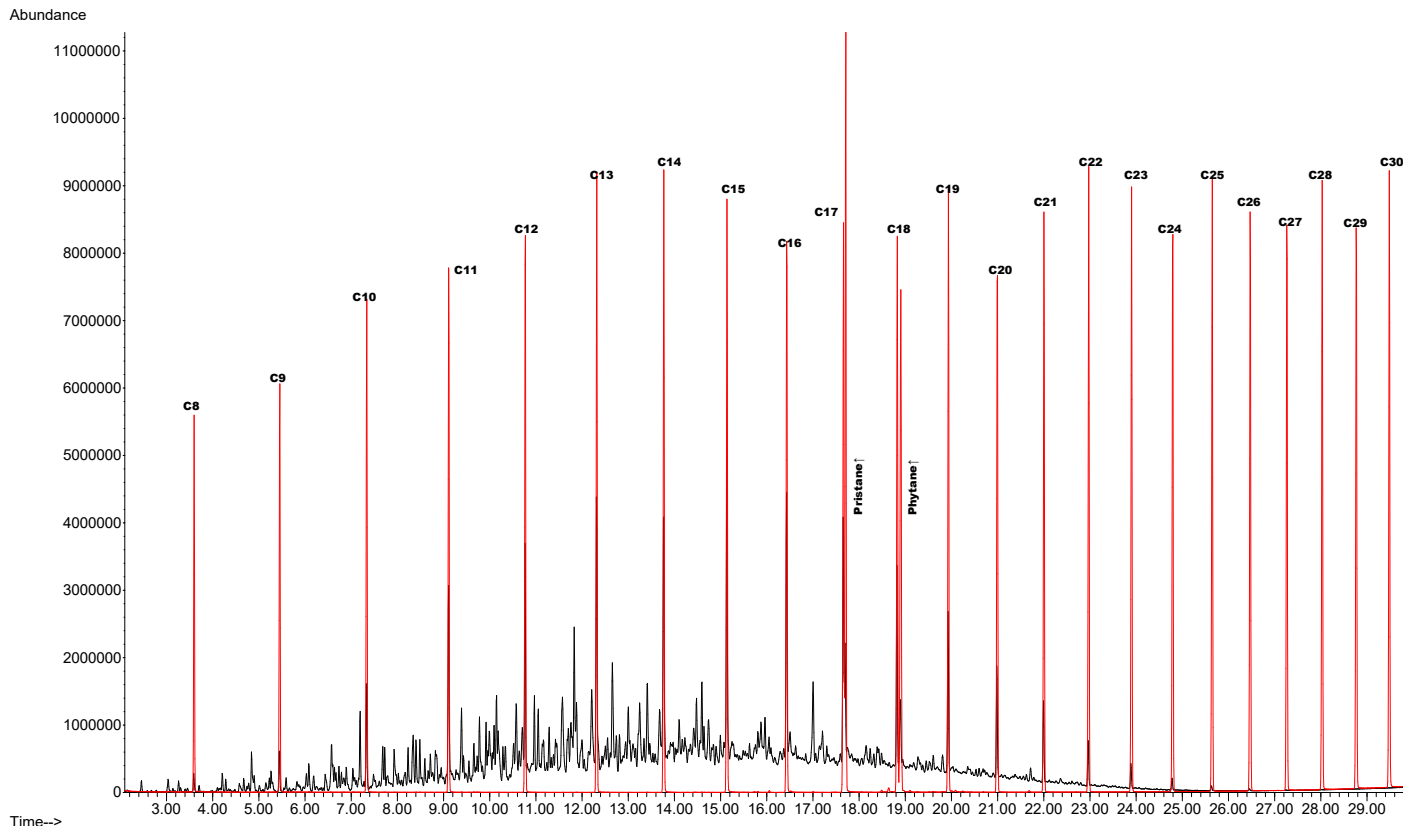


RFA Gasoline (Cat. No. GA-005-40X)

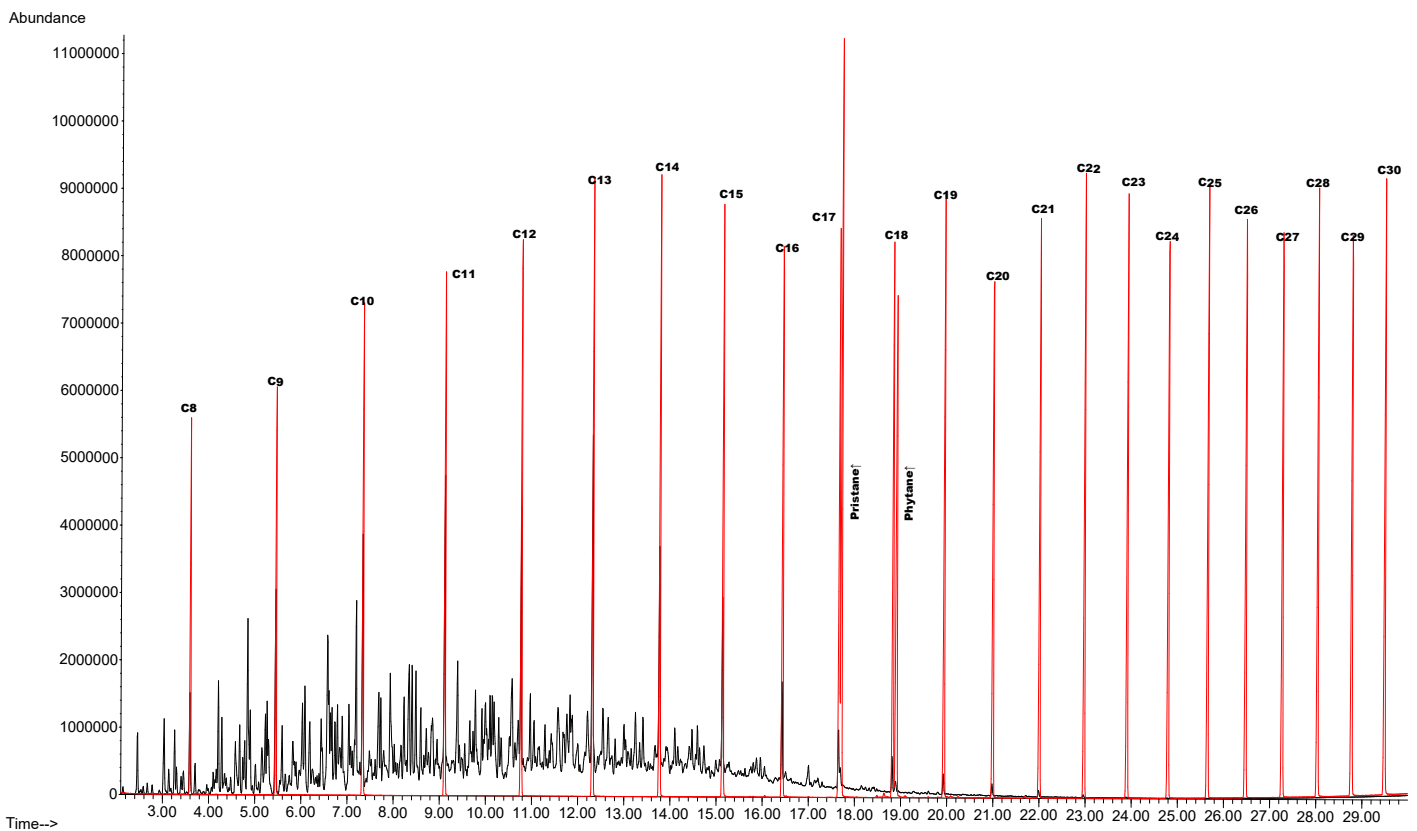


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

#2 Diesel Fuel (Cat. No. FU-009-D-40X)

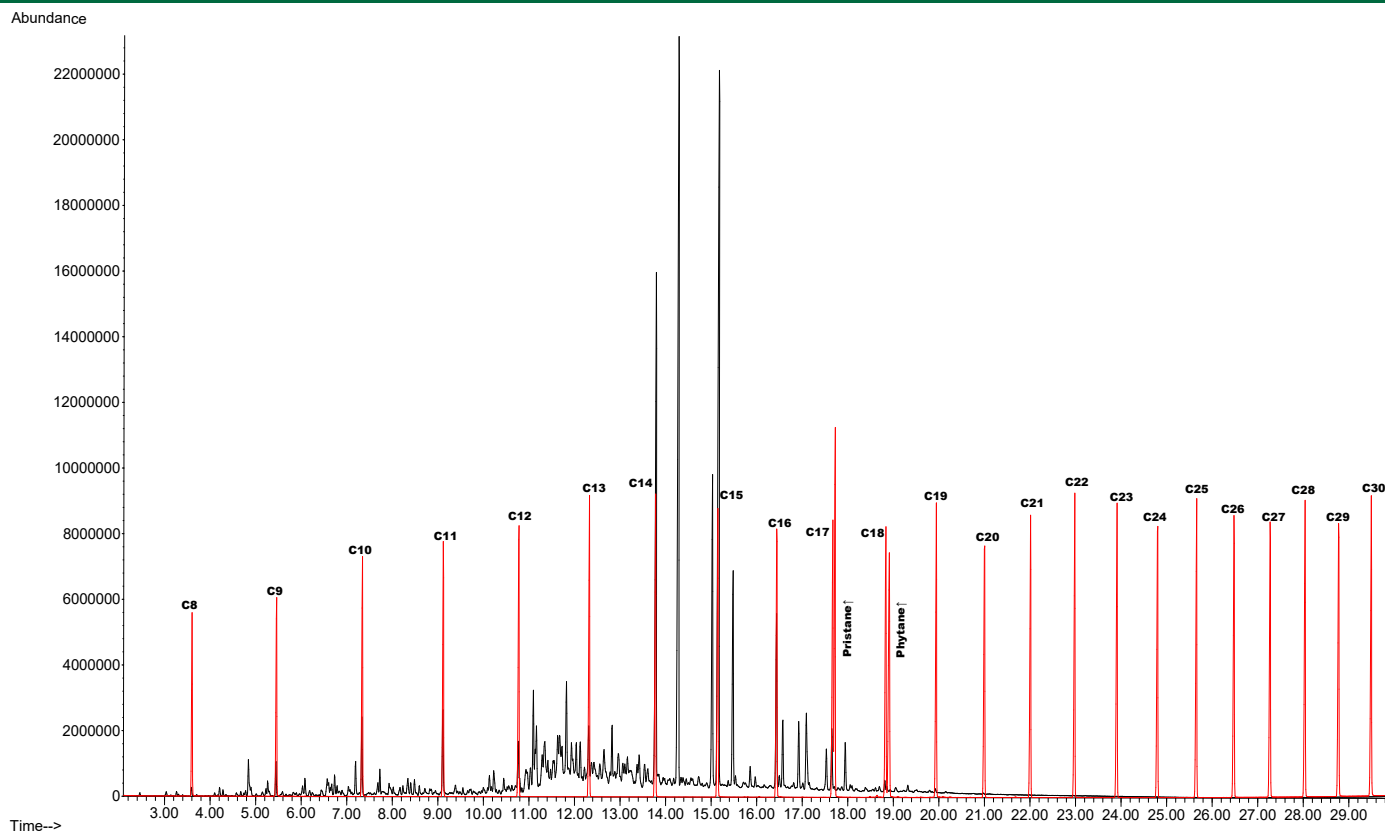


#1 Diesel Fuel (Low sulfur) (Cat. No. FU-013-D-40X)

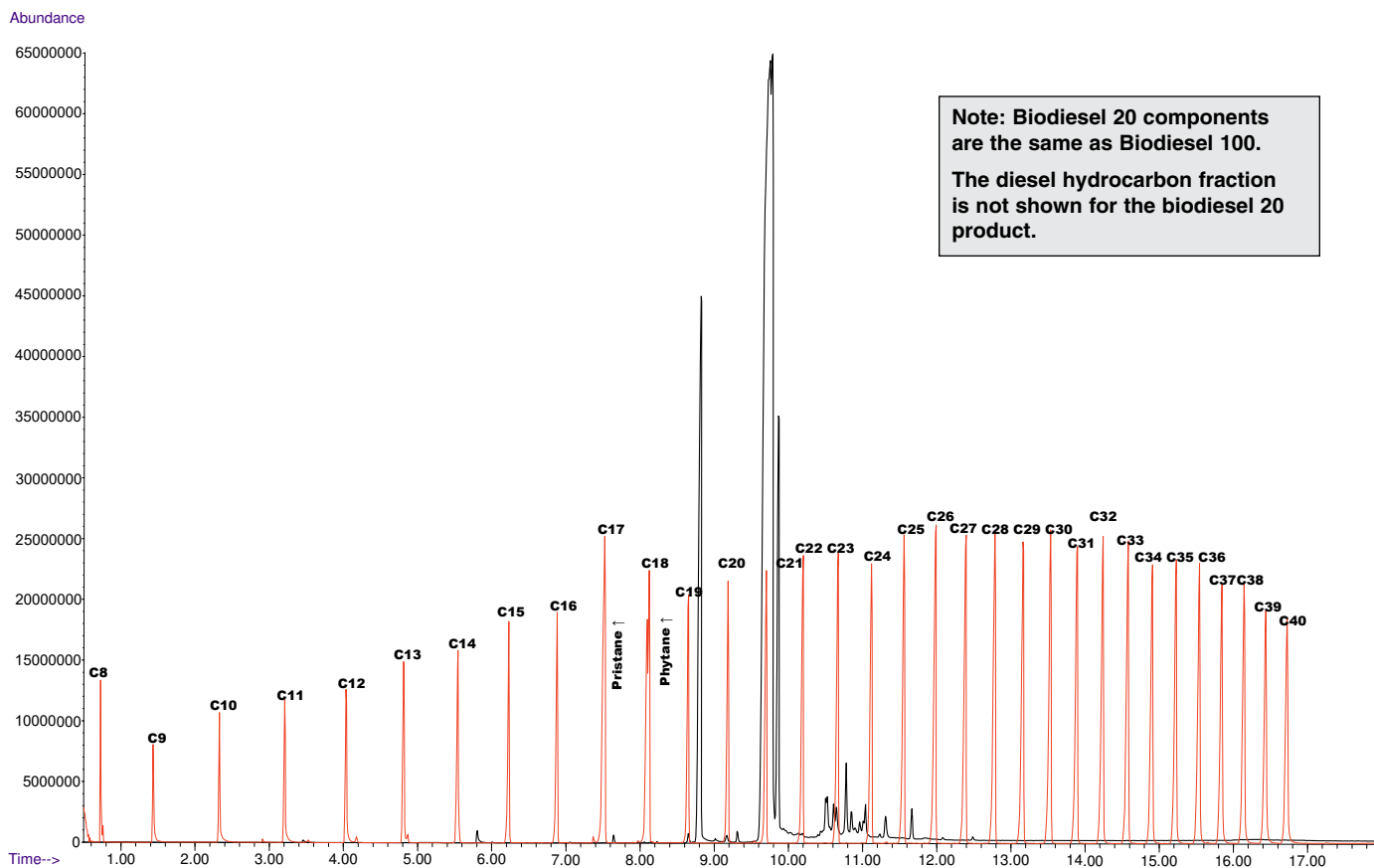


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

#2 Diesel Fuel (Extra low sulfur) (Cat. No. FU-017-D-40X)



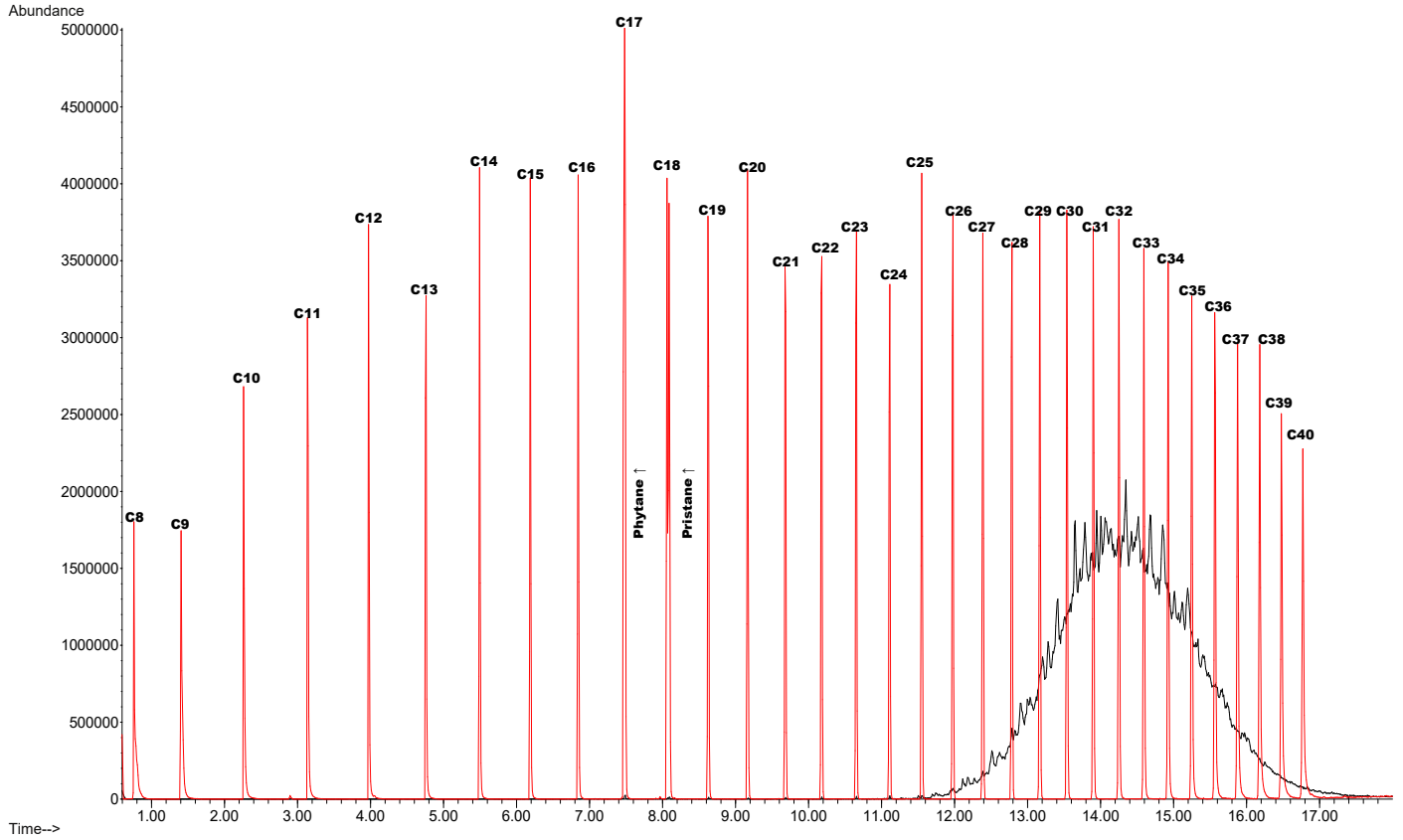
Biodiesel 100 (Cat. No. FU-029-D-40X)



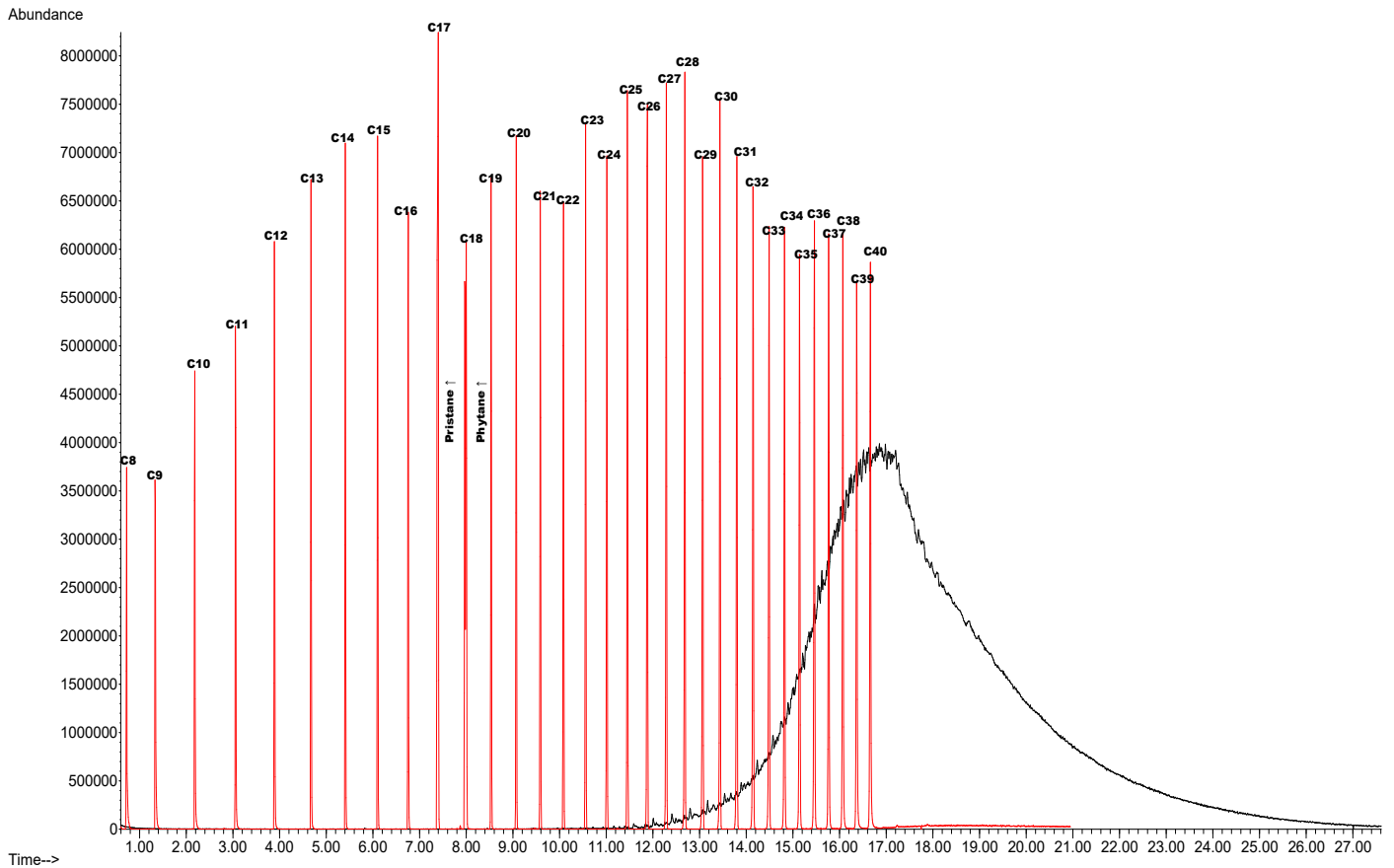
Note: Biodiesel 20 components are the same as Biodiesel 100. The diesel hydrocarbon fraction is not shown for the biodiesel 20 product.

Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

SAE 30W Motor oil (Cat. No. FU-018-D-40X)



SAE 40W Motor oil (Cat. No. FU-019-D-40X)

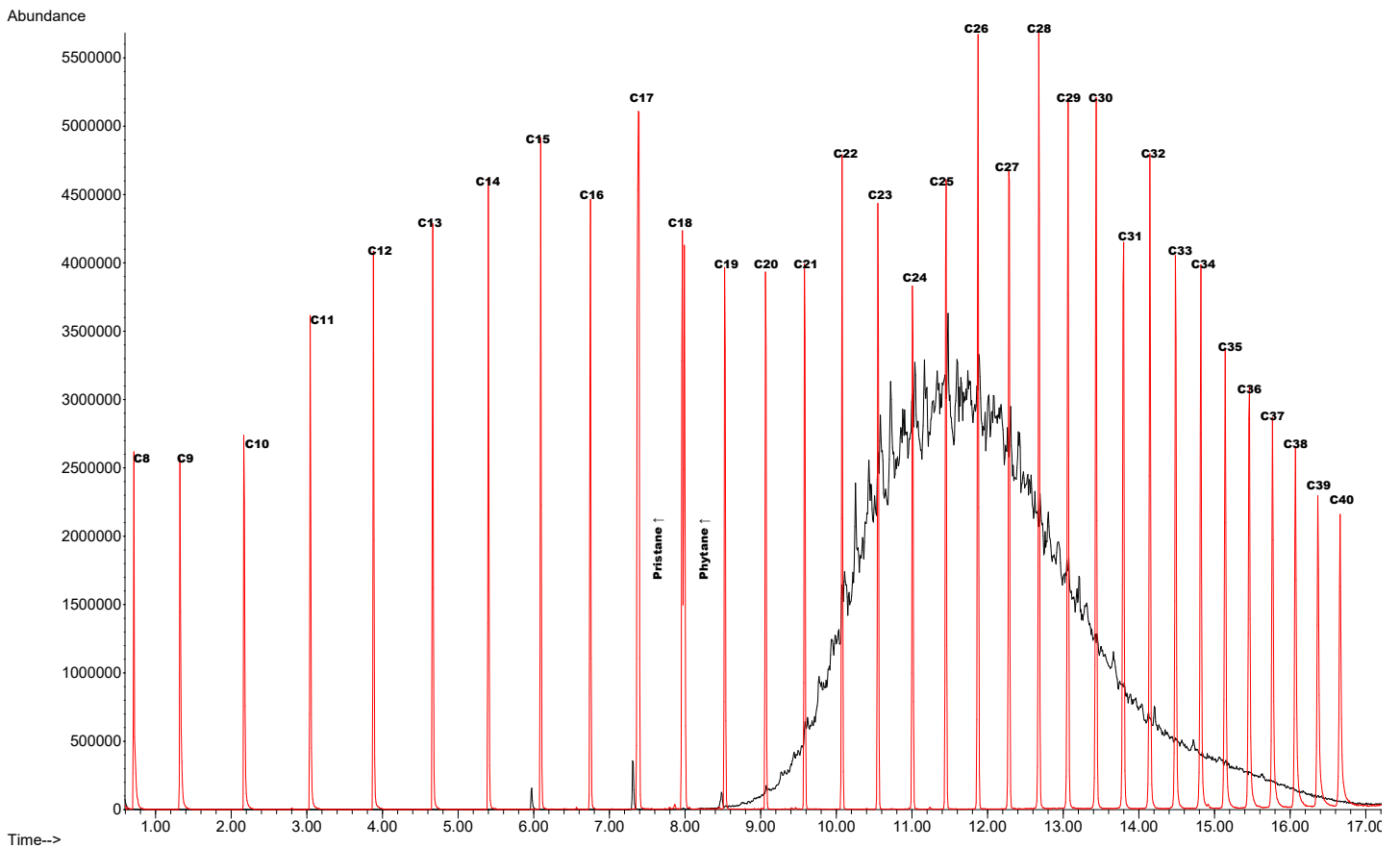


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

SAE 50W Motor oil (Cat. No. FU-021-D-40X)

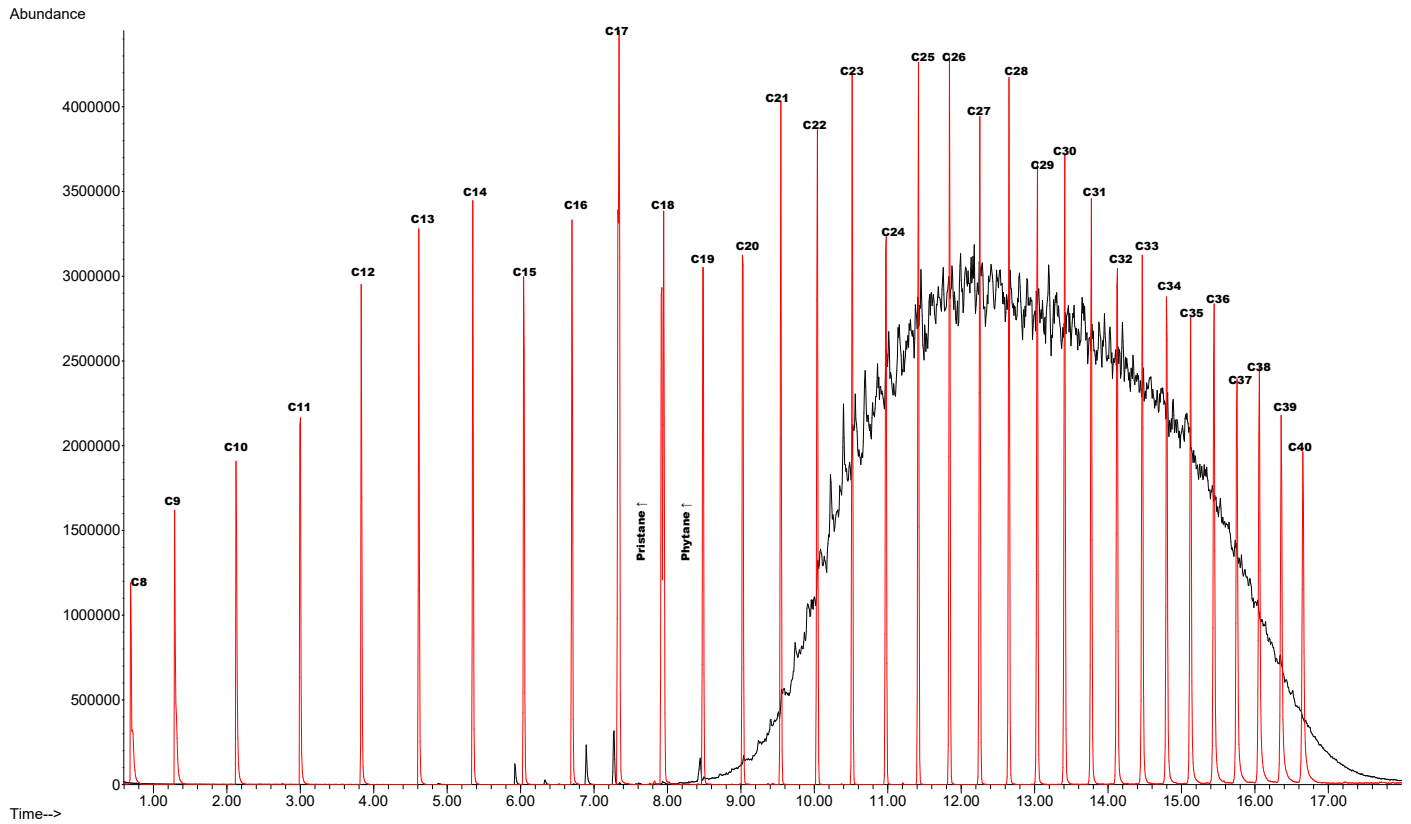


SAE 5W30 Motor oil (Cat. No. FU-025-D-40X)

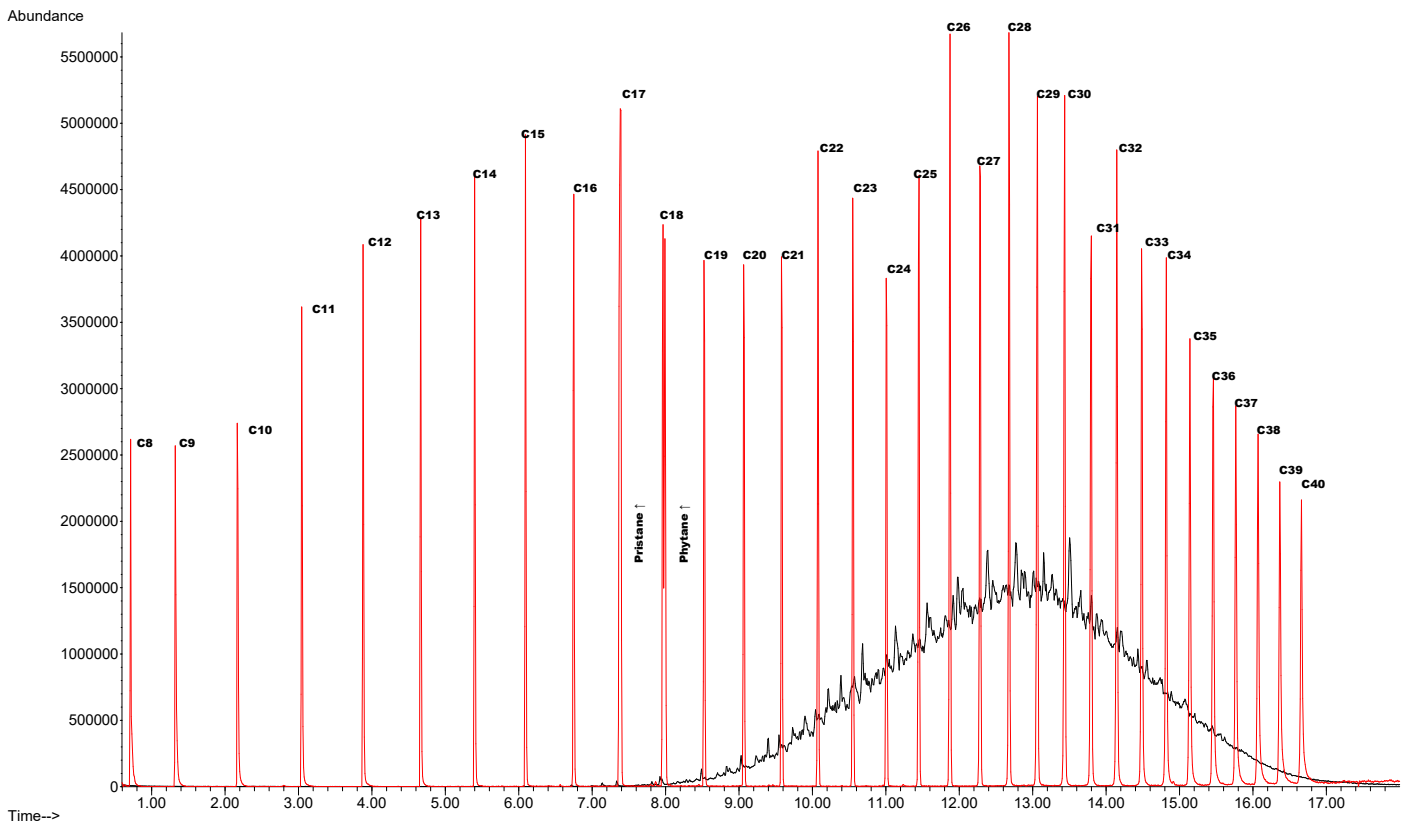


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

SAE 10W30 Motor oil (Cat. No. FU-026-D-40X)



SAE 10W40 Motor oil (Cat. No. FU-027-D-40X)



Chromatograms of Heating Fuel Oils

Heating Fuel Oils Set Chromatography 9-12

#1 Fuel Oil (FU-001-D-40X)	10
#2 Fuel Oil (FU-002-D-40X)	10
#3 Fuel Oil (FU-003-D-40X)	11
#4 Fuel Oil (FU-004-D-40X)	11
#6 Fuel Oil (FU-008-D-40X)	12
Kerosene (FU-005-D-40X)	12

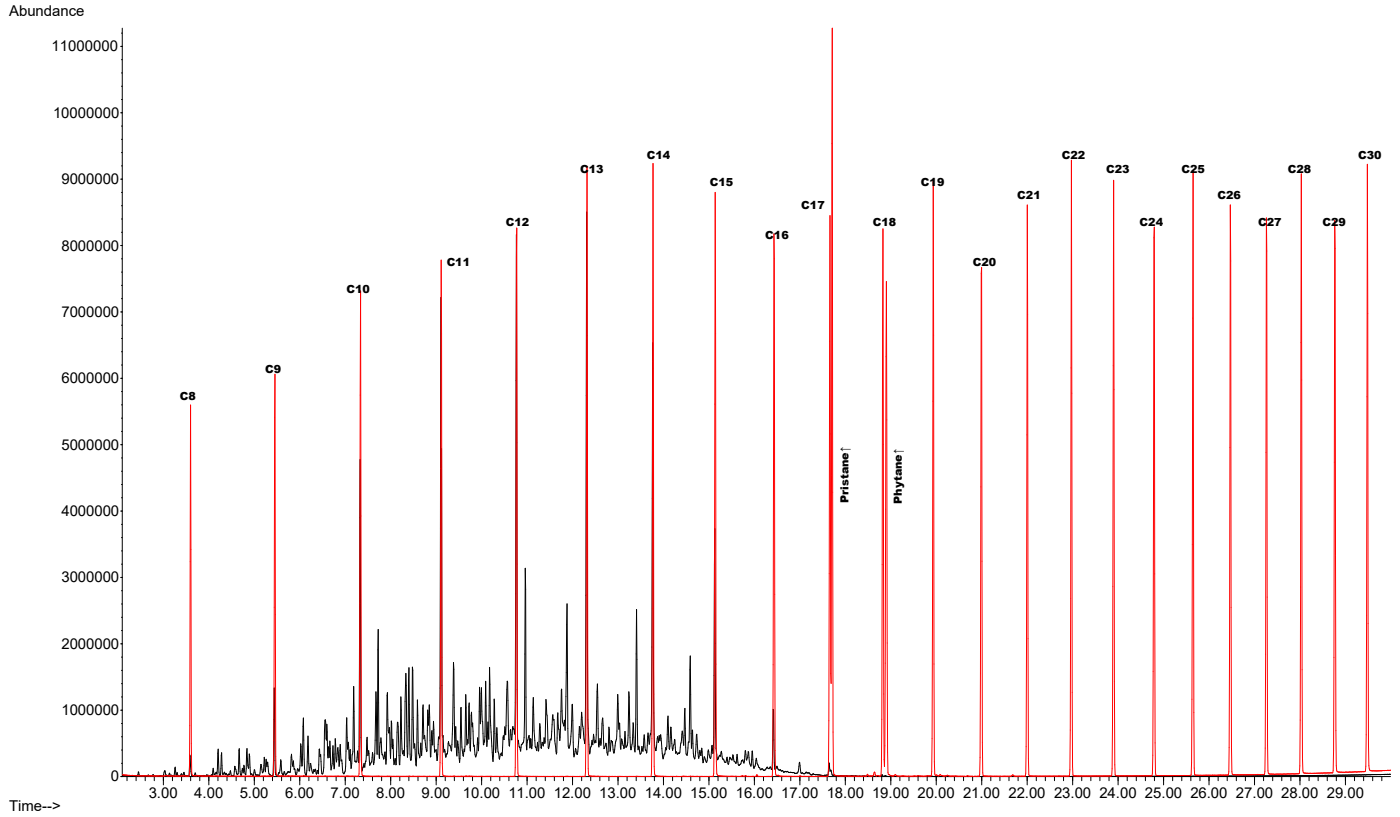
Heating Fuel Oils Set TPH-002-R1-SET

6 x 1 mL

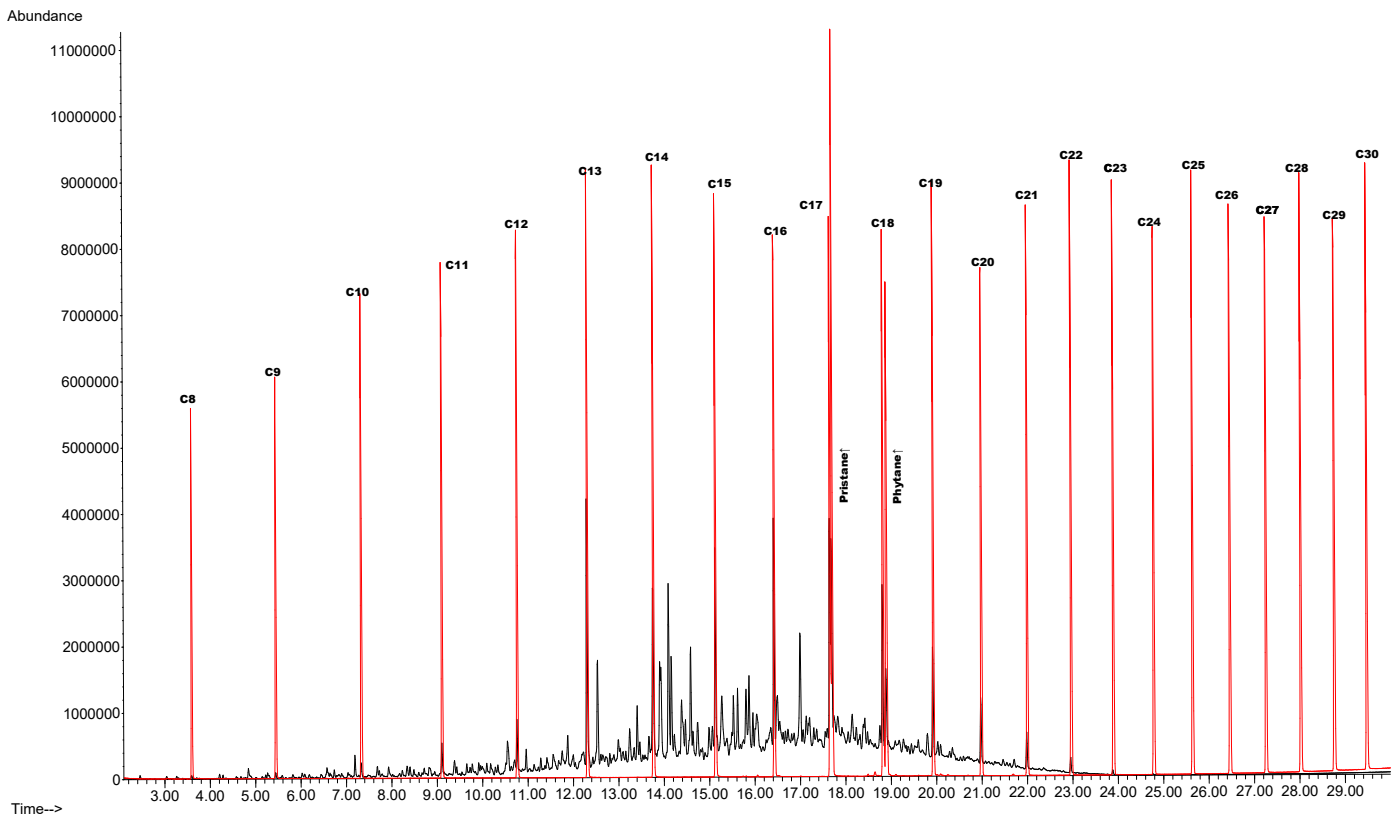
	mg/mL	Solv.	Cat. No.
#1 Fuel Oil	20	CH ₂ Cl ₂	FU-001-D-40X
#2 Fuel Oil	20	CH ₂ Cl ₂	FU-002-D-40X
#3 Fuel Oil	20	CH ₂ Cl ₂	FU-003-D-40X
#4 Fuel Oil	20	CH ₂ Cl ₂	FU-004-D-40X
#6 Fuel Oil	20	CH ₂ Cl ₂	FU-008-D-40X
Kerosene	20	CH ₂ Cl ₂	FU-005-D-40X

Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

#1 Fuel oil (Cat. No. FU-001-D-40X)

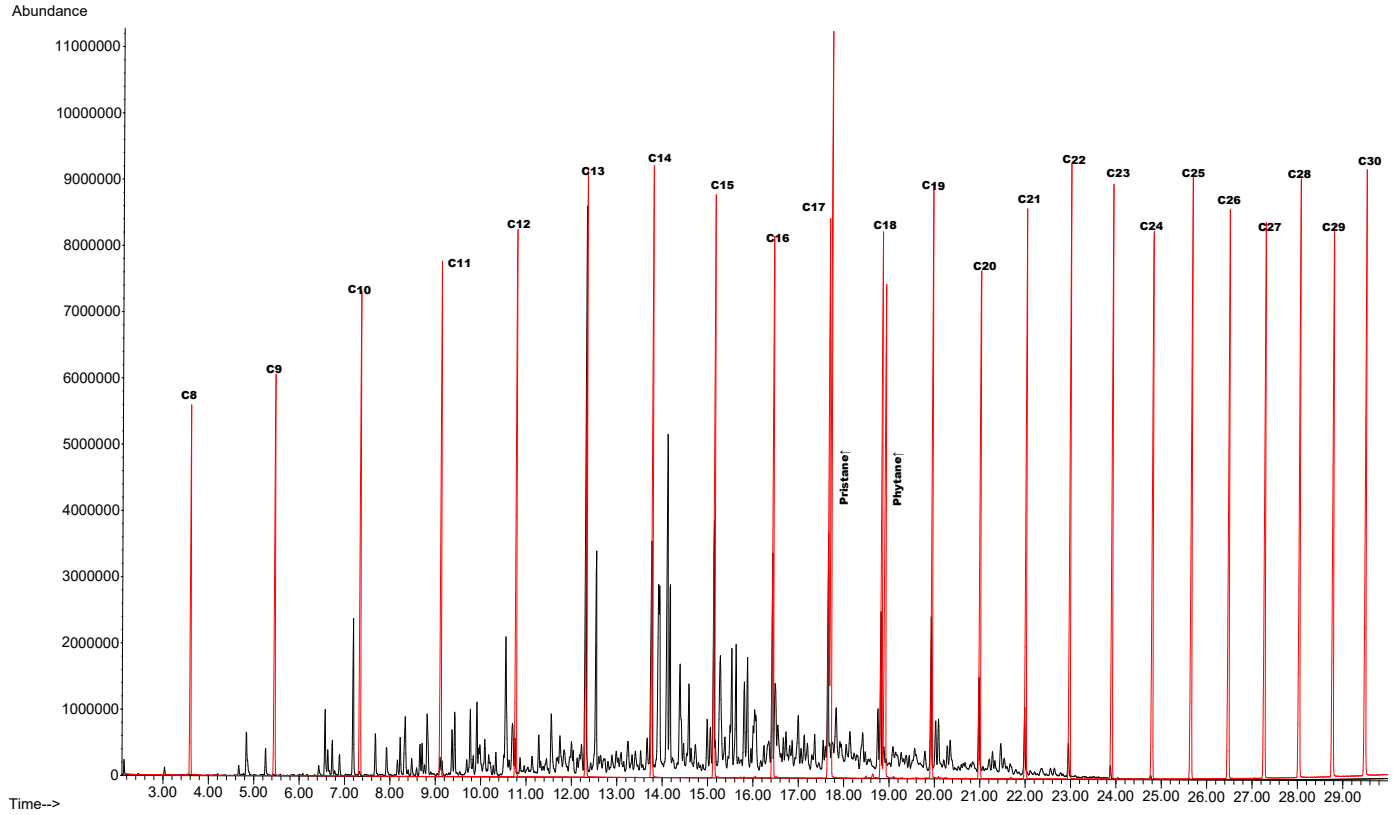


#2 Fuel oil (Cat. No. FU-002-D-40X)

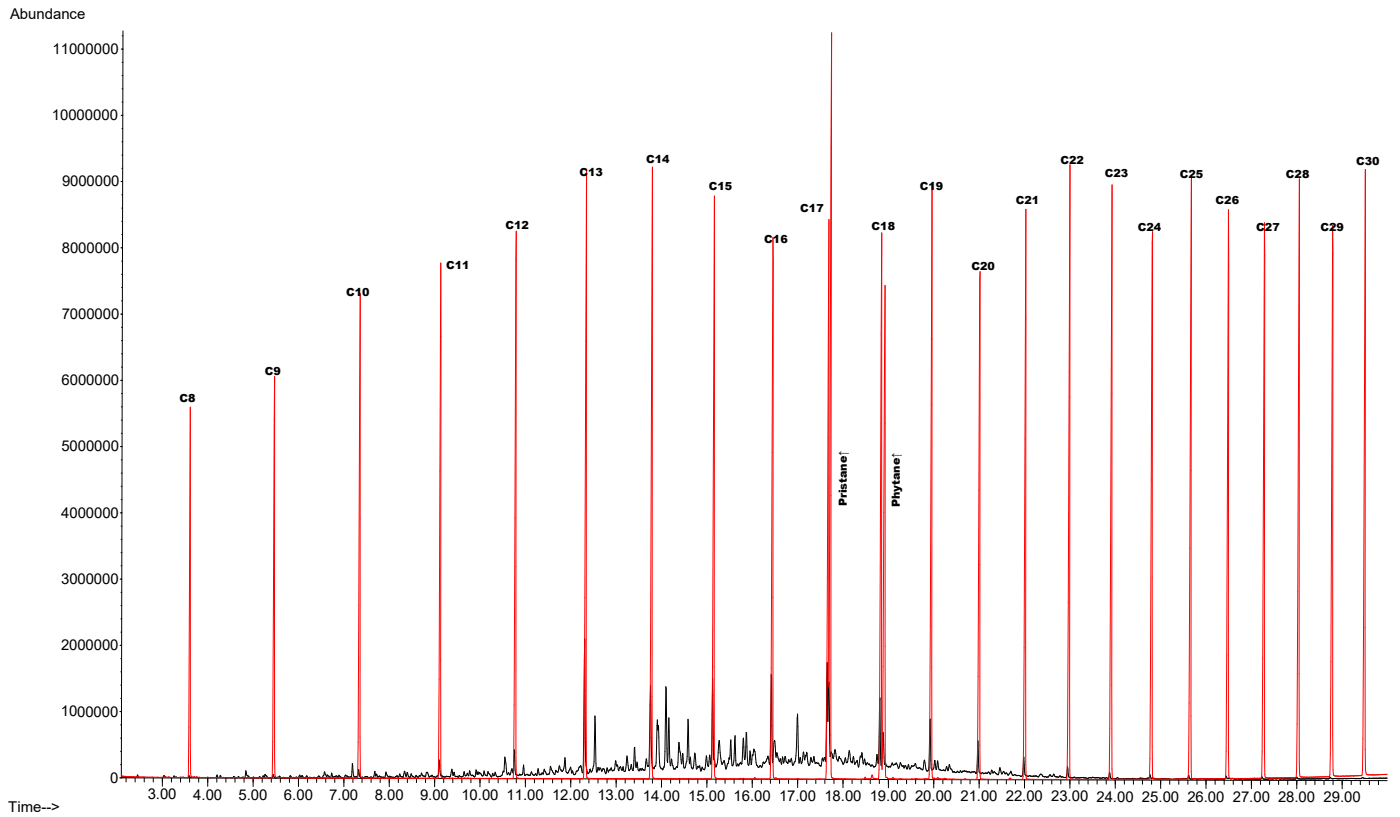


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

#3 Fuel oil (Cat. No. FU-003-D-40X)

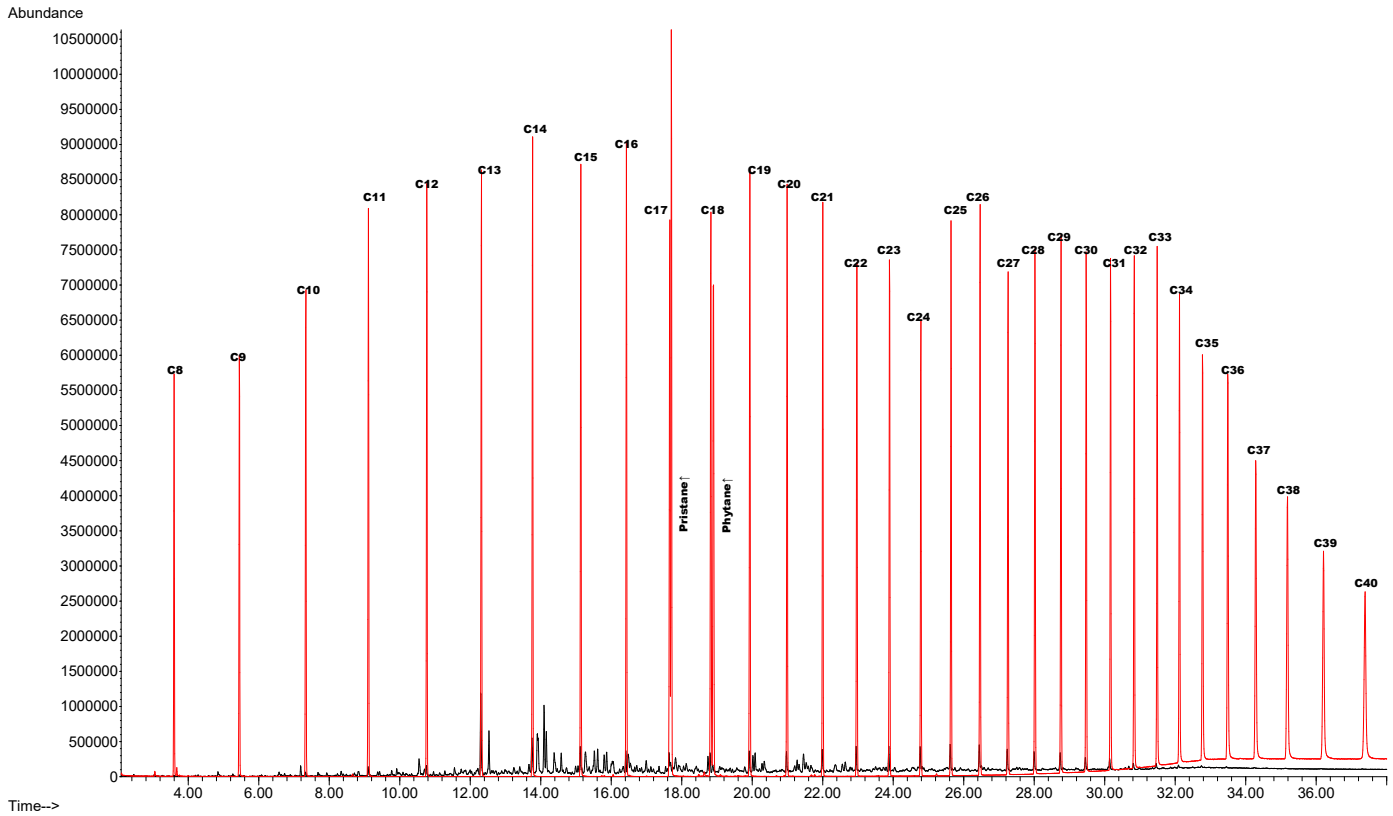


#4 Fuel oil (Cat. No. FU-004-D-40X)

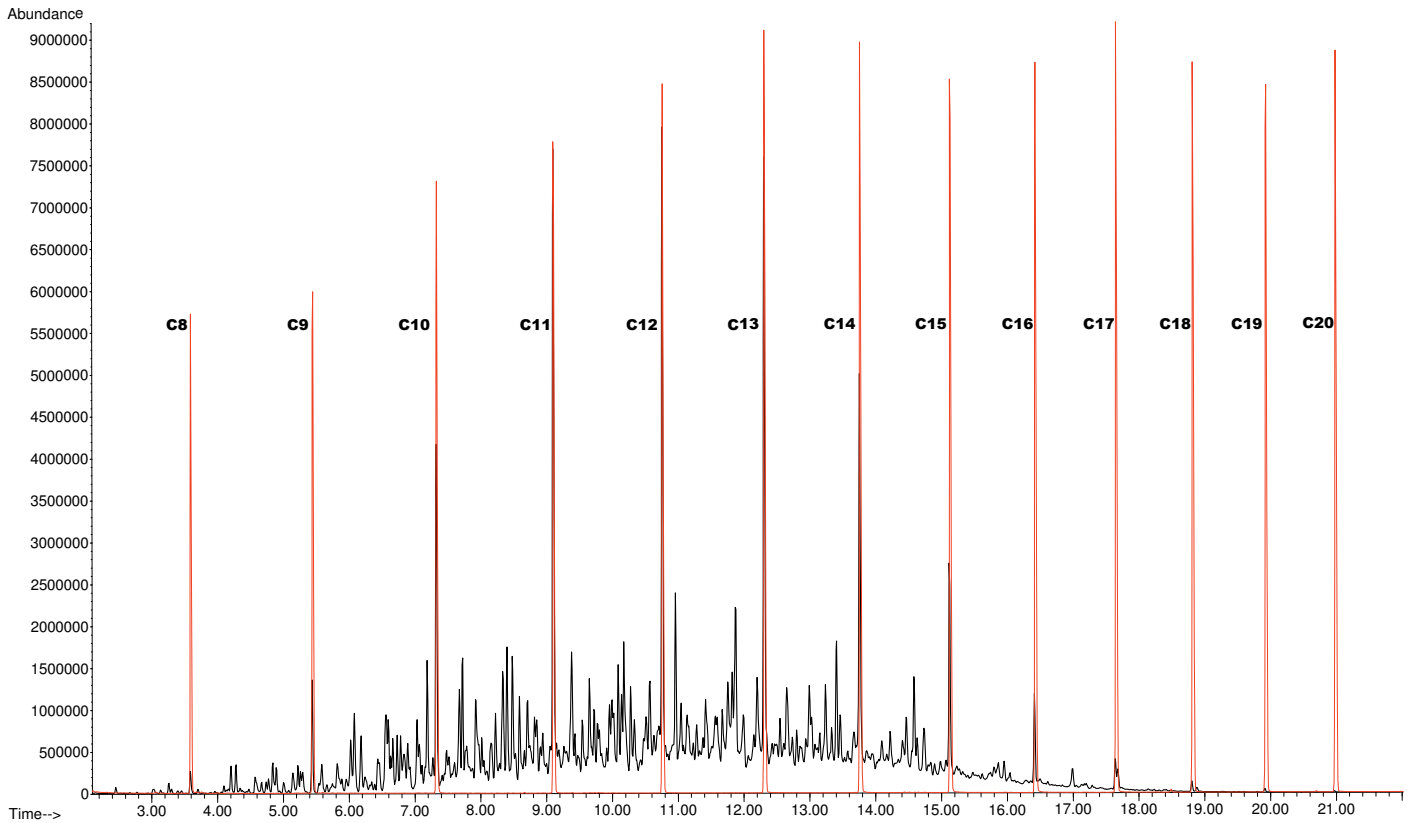


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

#6 Fuel oil (Cat. No. FU-008-D-40X)



Kerosene (Cat. No. FU-005-D-40X)



Chromatograms of Aviation Fuel Oils

Aviation Fuel Oils Set Chromatography 13-18

Aviation Gasoline (Grade 100-LL) (GA-004-D-40X)	14
JP-4 Fuel (FU-010-D-40X)	14
JP-5 Fuel (FU-012-D-40X)	15
JP-7 Fuel (FU-014-D-40X)	15
JP-8 Fuel (FU-015-D-40X)	16
JP-10 Aviation Fuel (FU-022-D-40X)	16
JP-TS Aviation Fuel (FU-016-D-40X)	17
Jet Reference Fuel (Type 1) (FU-011-D-40X)	17
Turbine (Jet A) Fuel (FU-006-D-40X)	18
Hydraulic Fluid (FU-020-D-40X)	18

Aviation Fuels & Oils Set

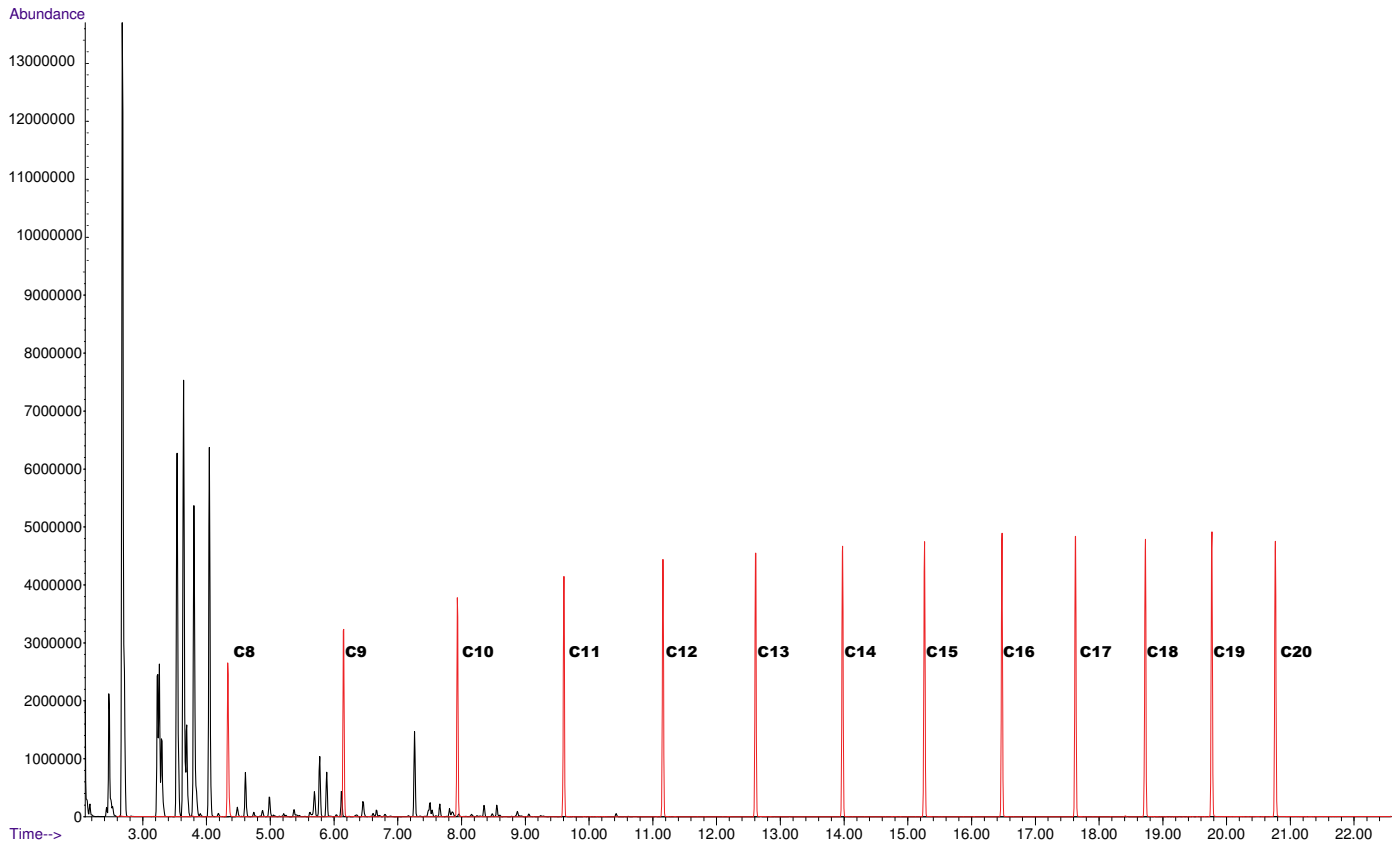
TPH-003-SET

10 x 1 mL

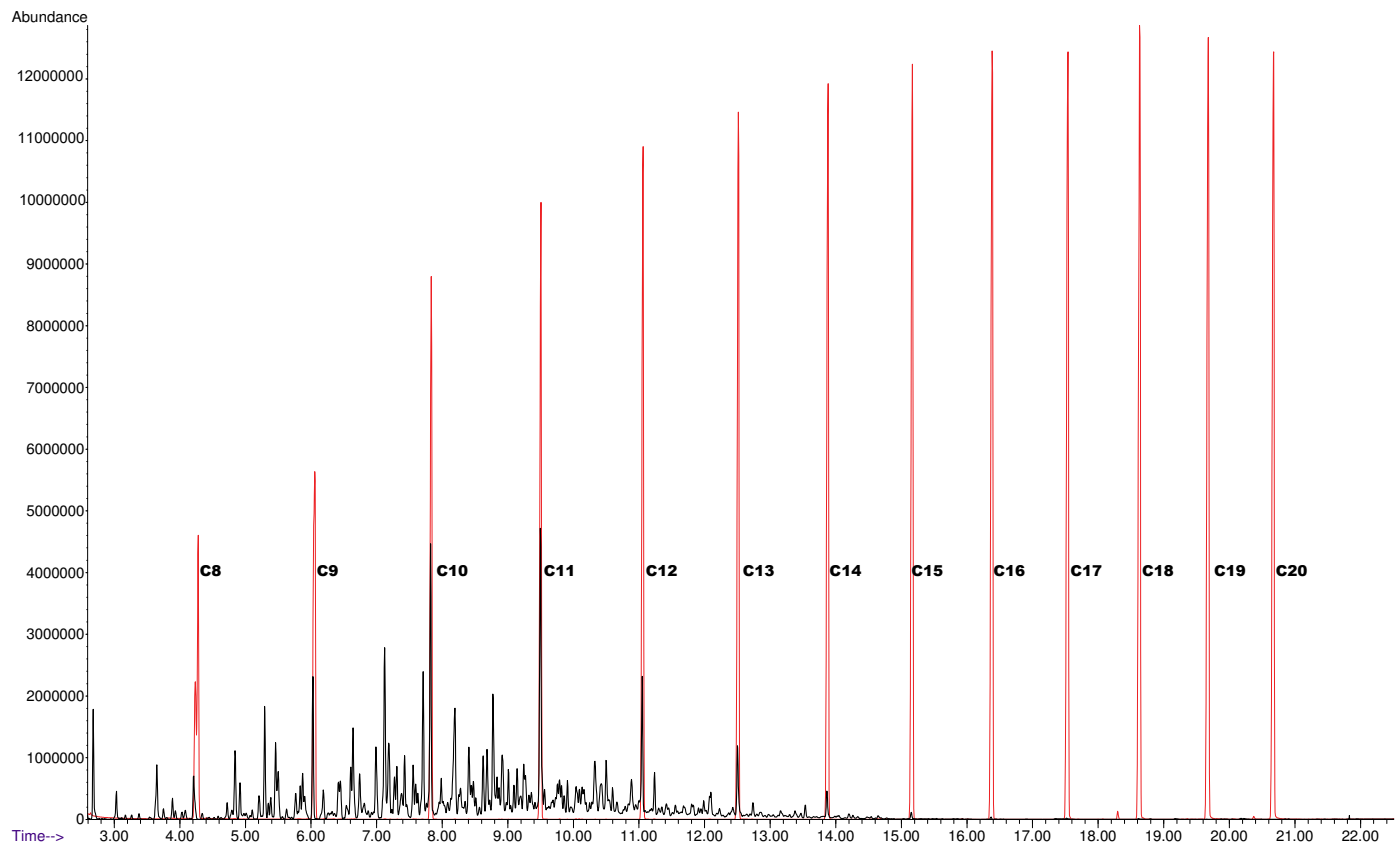
	mg/mL	Solv.	Cat. No.
Aviation Gasoline (Grade 100-LL)	20	CH ₂ Cl ₂	GA-004-D-40X
JP-4 Fuel	20	CH ₂ Cl ₂	FU-010-D-40X
JP-5 Fuel	20	CH ₂ Cl ₂	FU-012-D-40X
JP-7 Fuel	20	CH ₂ Cl ₂	FU-014-D-40X
JP-8 Fuel	20	CH ₂ Cl ₂	FU-015-D-40X
JP-10 Aviation Fuel	20	CH ₂ Cl ₂	FU-022-D-40X
JP-TS Aviation Fuel	20	CH ₂ Cl ₂	FU-016-D-40X
Jet Fuel (Type 1)	20	CH ₂ Cl ₂	FU-011-D-40X
Turbine (Jet A) Fuel	20	CH ₂ Cl ₂	FU-006-D-40X
Hydraulic Fluid	20	CH ₂ Cl ₂	FU-020-D-40X

Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

Aviation gasoline Grade 100 LL (Cat. No. GA-004-D-40X)

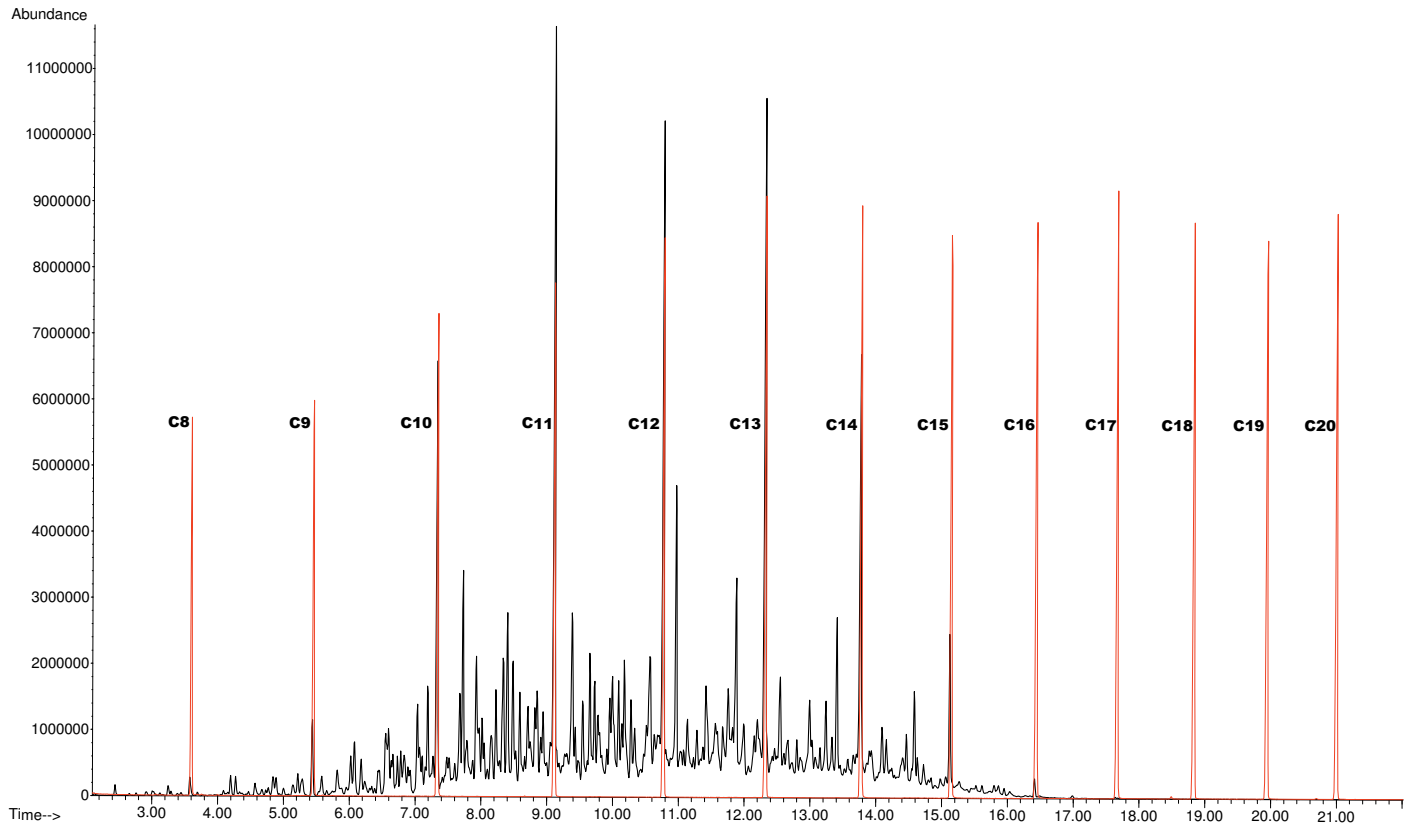


JP-4 fuel (Cat. No. FU-010-D-40X)

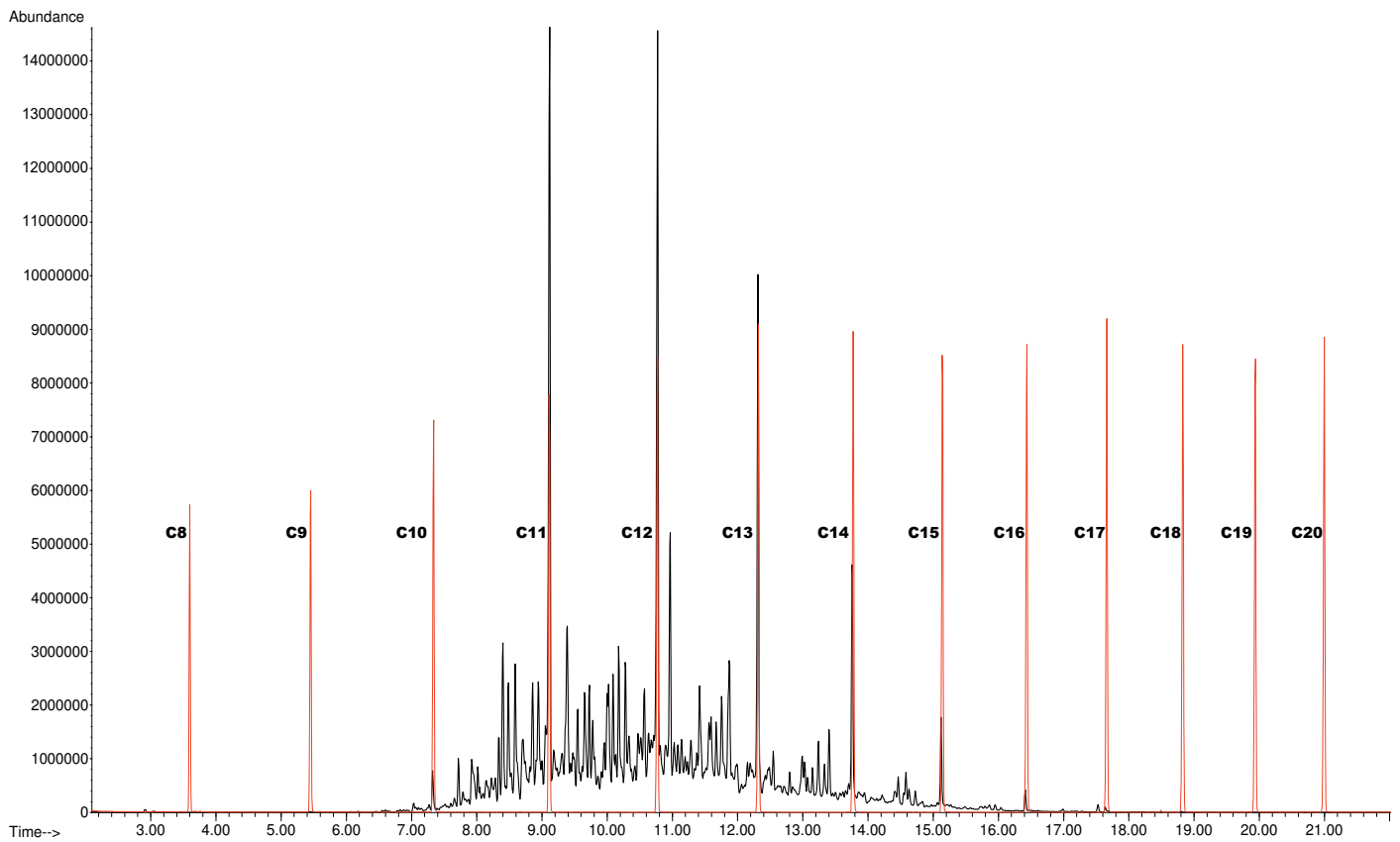


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

JP-5 fuel (Cat. No. FU-012-D-40X)

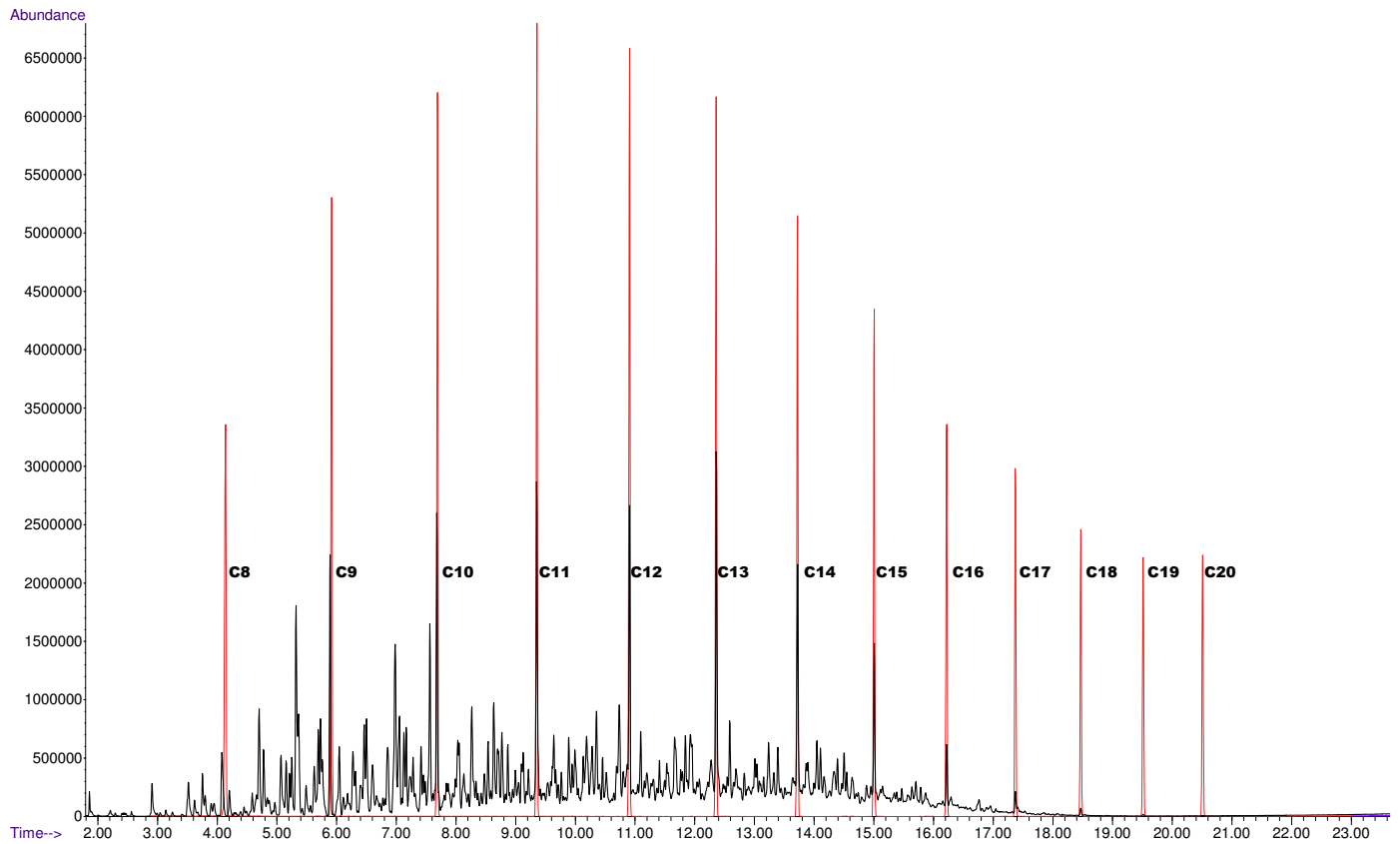


JP-7 fuel (Cat. No. FU-014-D-40X)

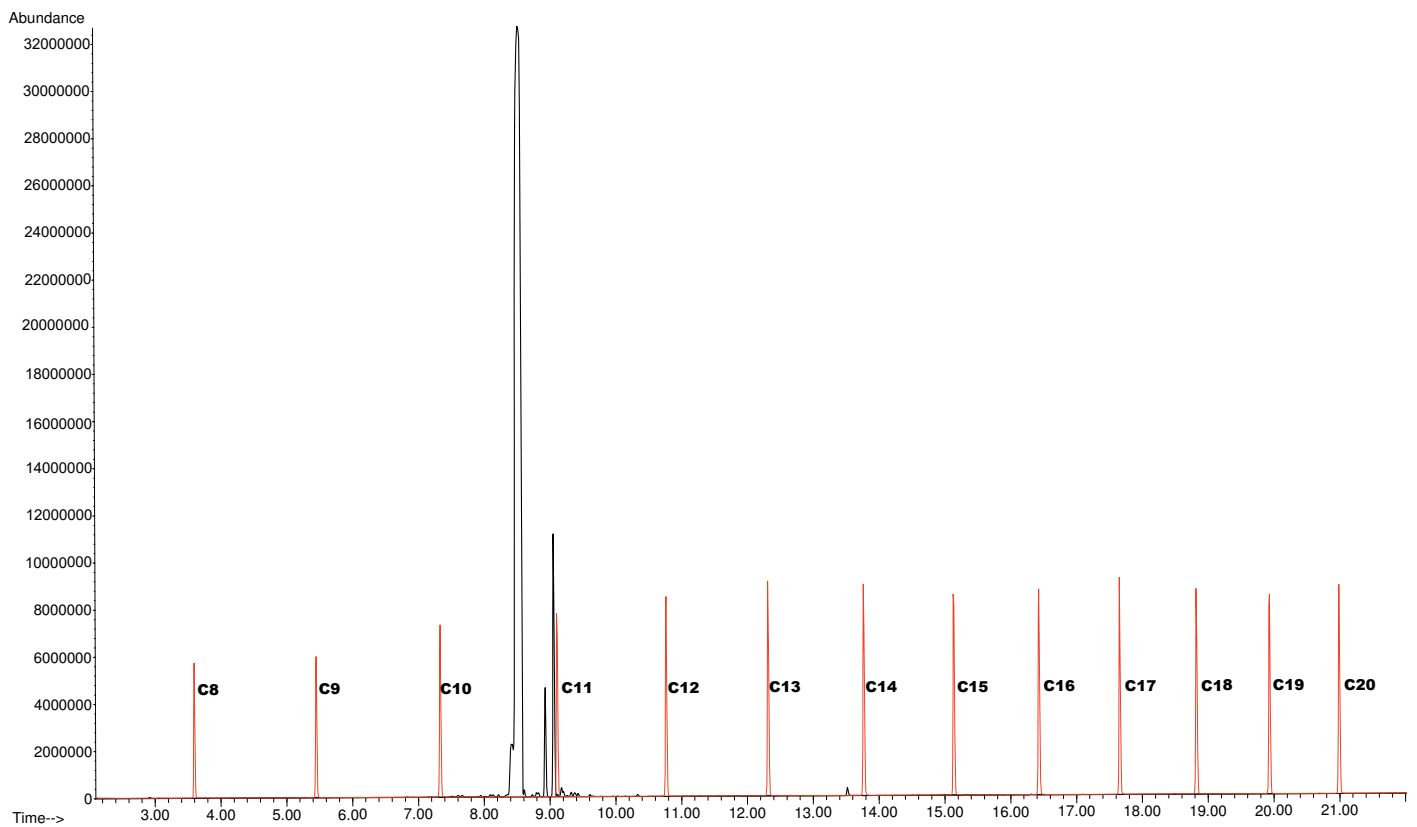


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

JP-8 fuel (Cat. No. FU-015-D-40X)

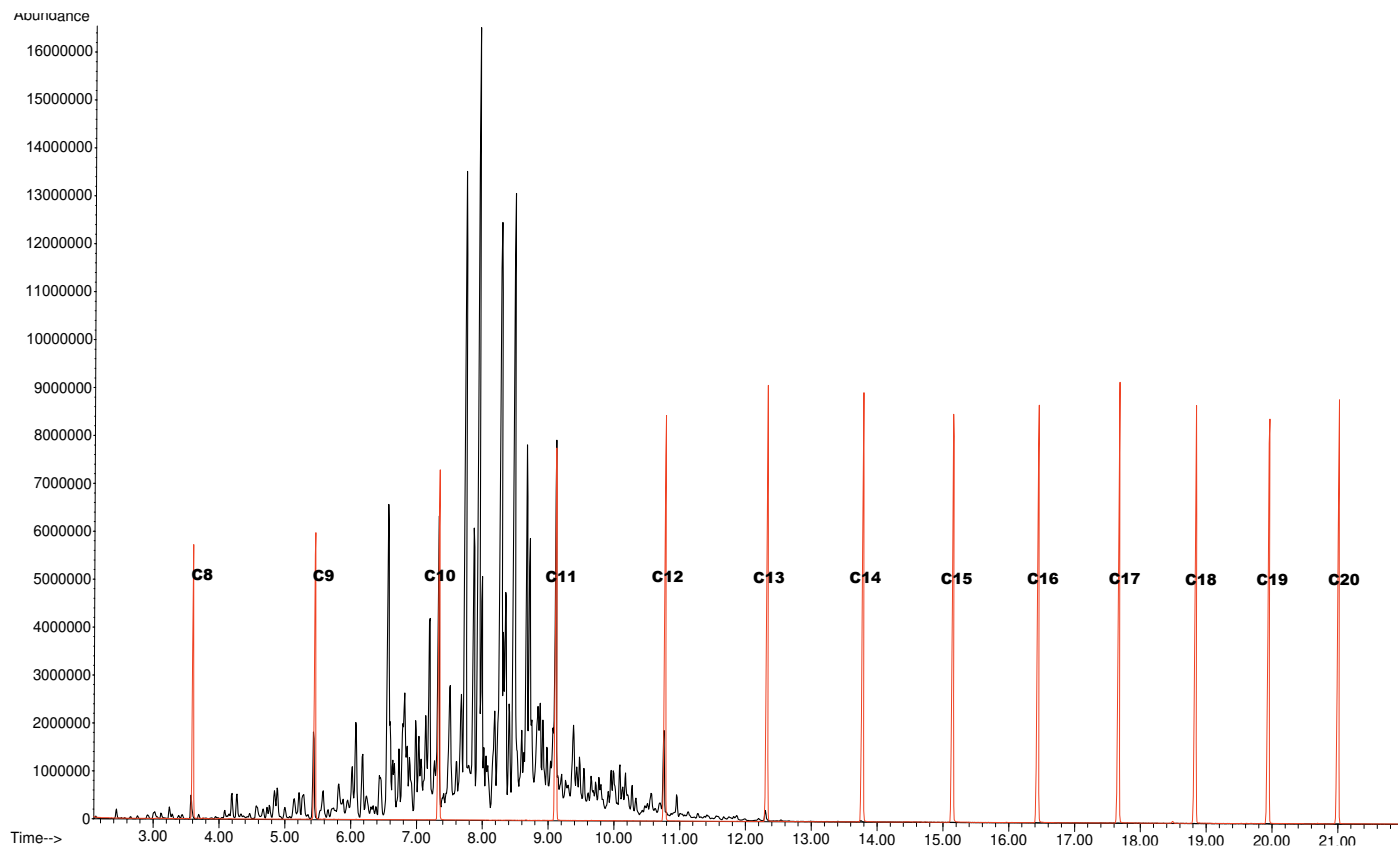


JP-10 Aviation fuel (Cat. No. FU-022-D-40X)

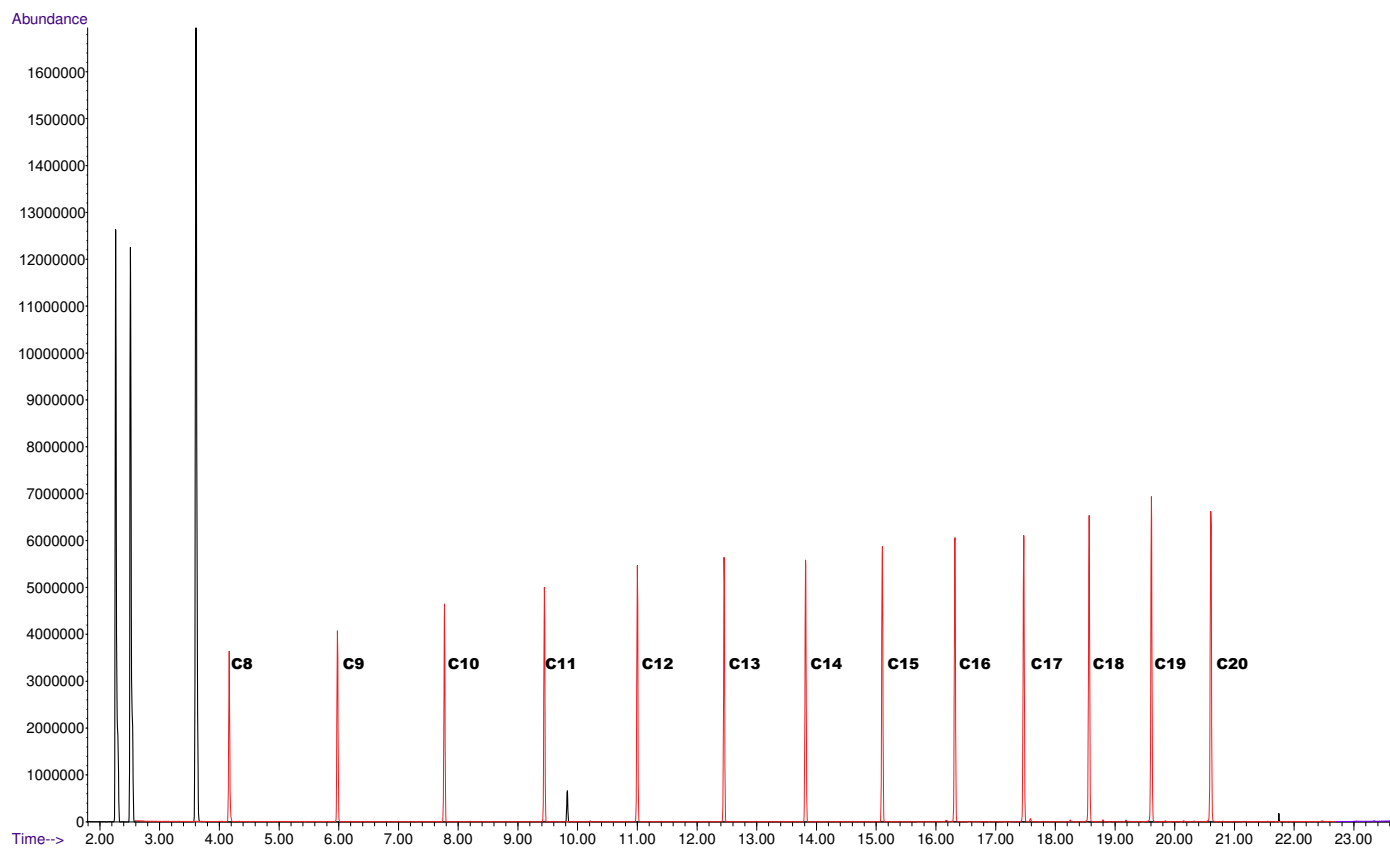


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

JP-TS Aviation fuel (Cat. No. FU-016-D-40X)

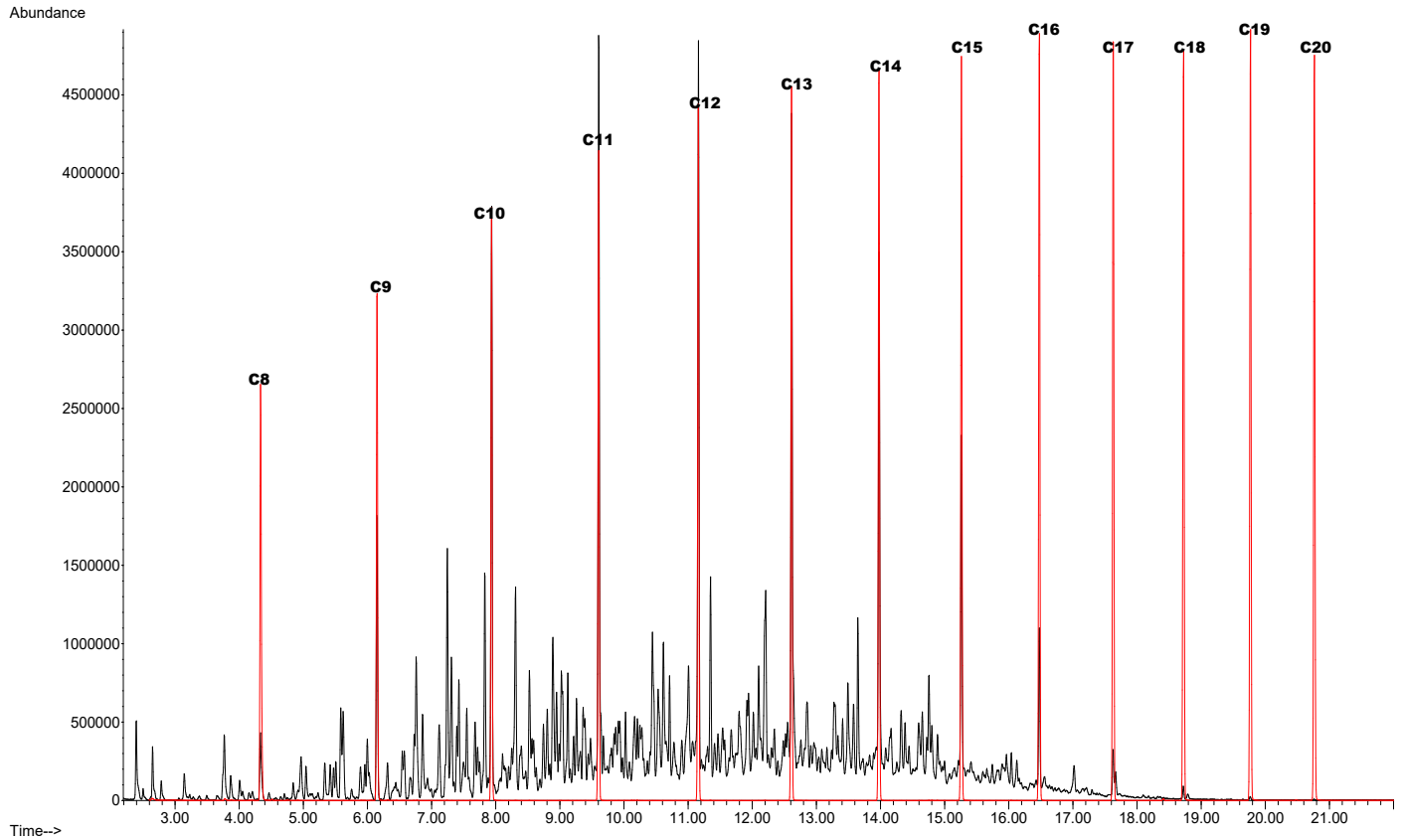


Jet Reference fuel (Type 1) (Cat. No. FU-011-D-40X)

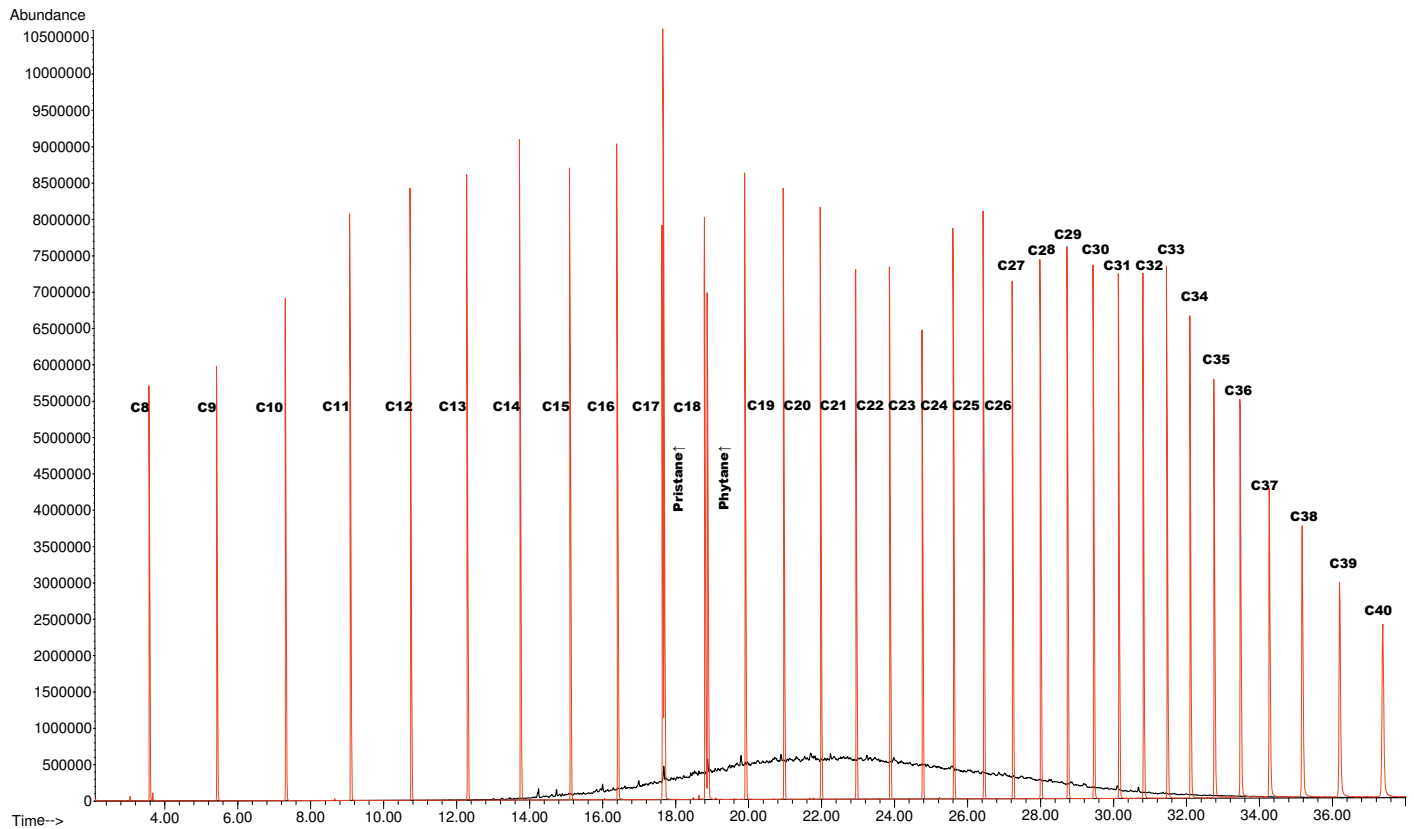


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

Turbine (Jet A) fuel (Cat. No. FU-006-D-40X)



Hydraulic fluid (Cat. No. FU-020-D-40X)



Chromatograms of Household & Industrial Solvents

Household & Industrial Solvents 19-22 Set Chromatography

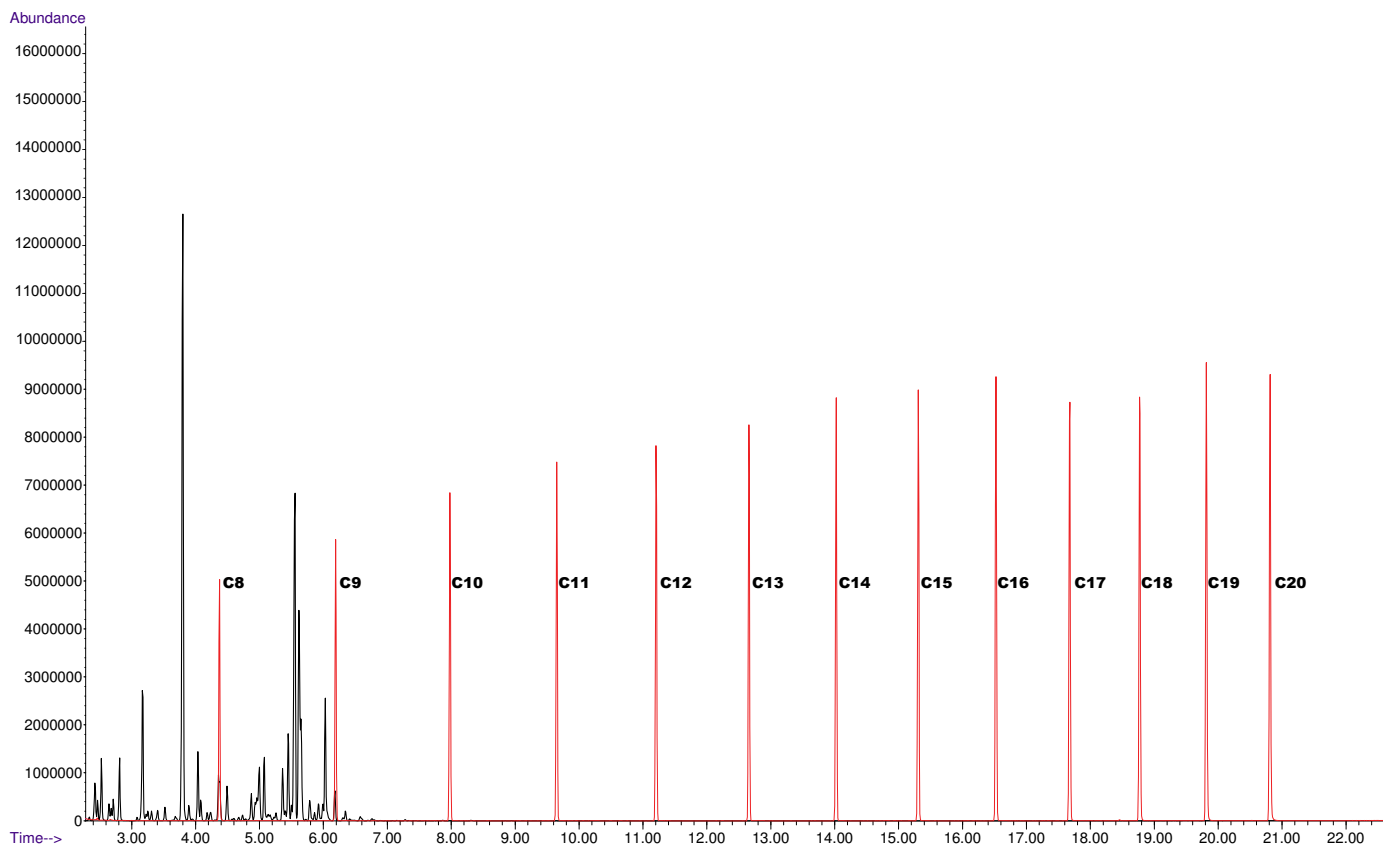
Lacquer Thinner (HS-001S-D-40X)	20
Mineral Spirits (HS-002S-D-40X)	20
Naphtha (HS-003S-D-40X)	21
Turpentine (HS-004S-D-40X)	21
Stoddard Solvent (HS-005S-D-40X)	22

Household & Industrial Solvent Set TPH-004-SET 5 x 1 mL

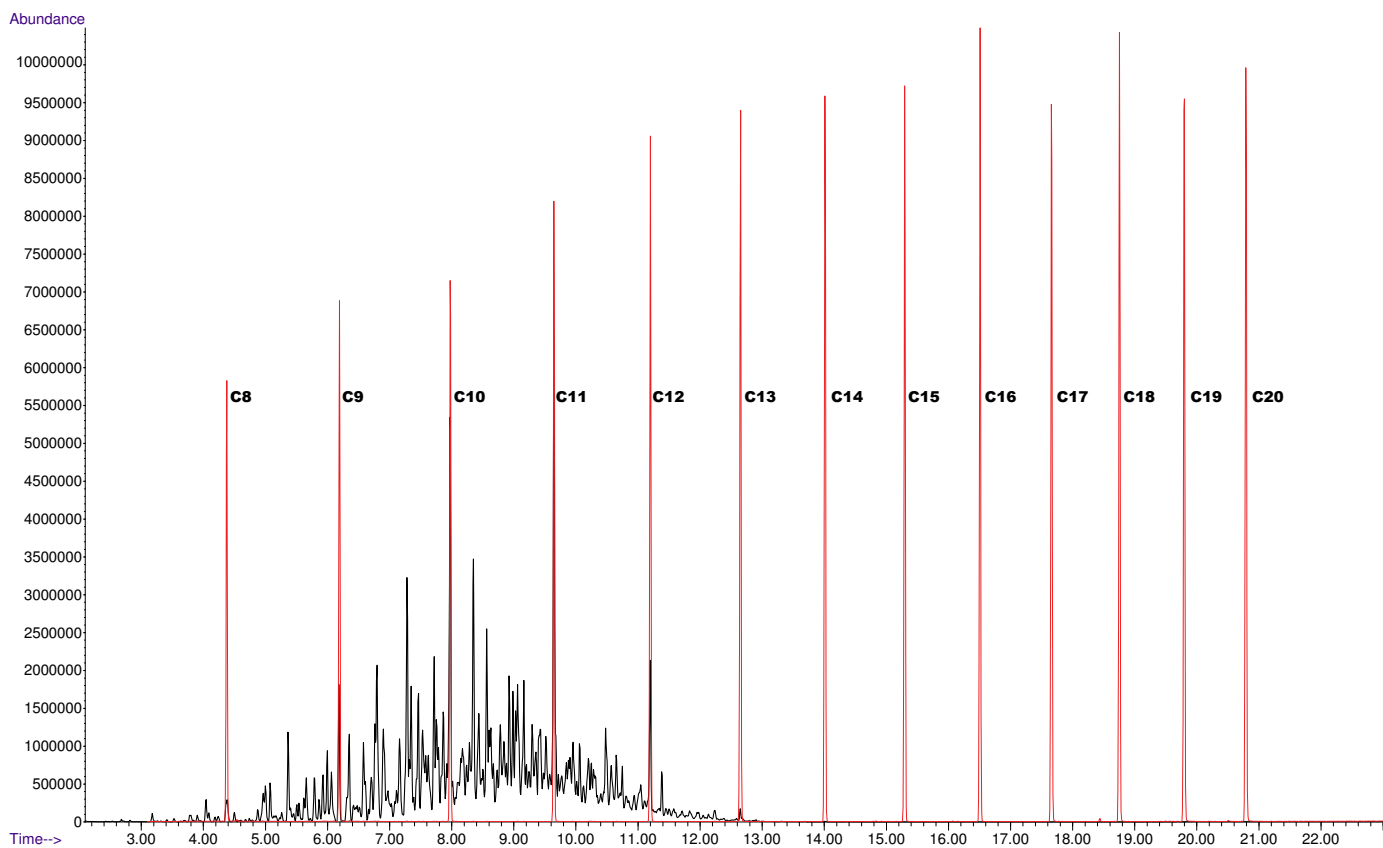
	mg/mL	Solv.	Cat. No.
Lacquer Thinner	20	CH ₂ Cl ₂	HS-001S-D-40X
Mineral Spirits	20	CH ₂ Cl ₂	HS-002S-D-40X
Naphtha	20	CH ₂ Cl ₂	HS-003S-D-40X
Turpentine	20	CH ₂ Cl ₂	HS-004S-D-40X
Stoddard Solvent	20	CH ₂ Cl ₂	HS-005S-D-40X

Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

Lacquer Thinner (Cat. No. HS-001S-D-40X)

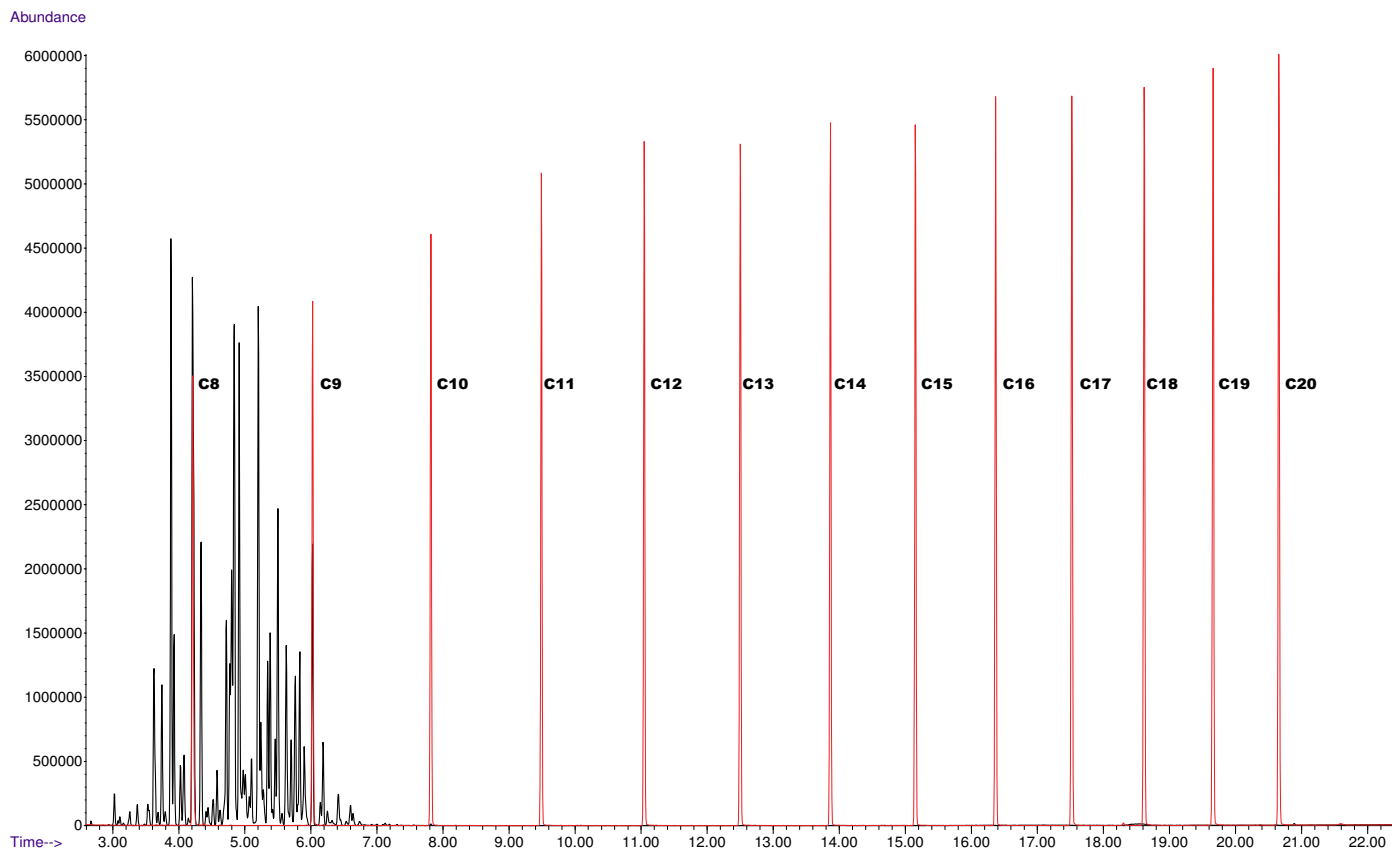


Mineral Spirits (Cat. No. HS-002S-D-40X)

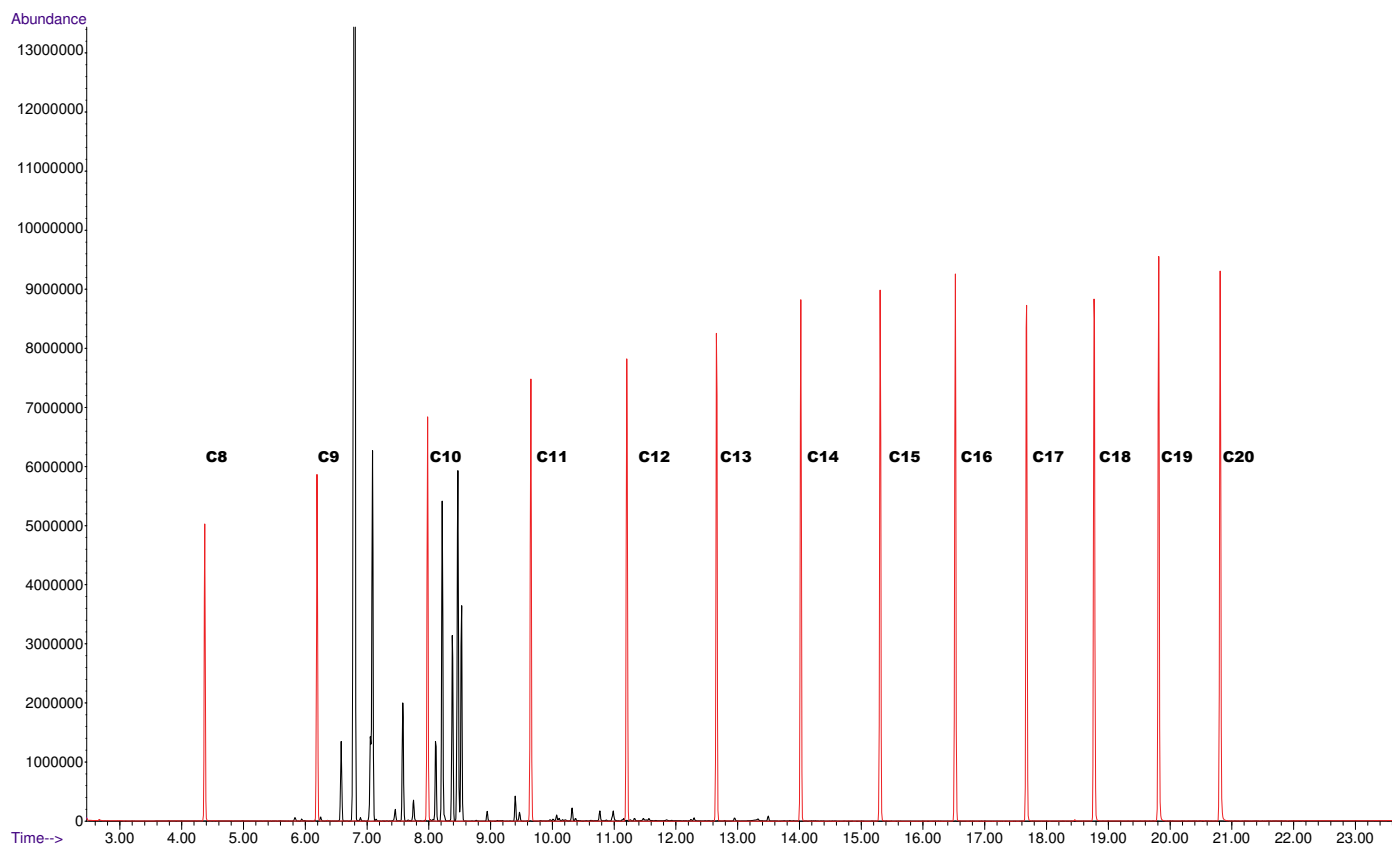


Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

Naphtha (Cat. No. HS-003S-D-40X)

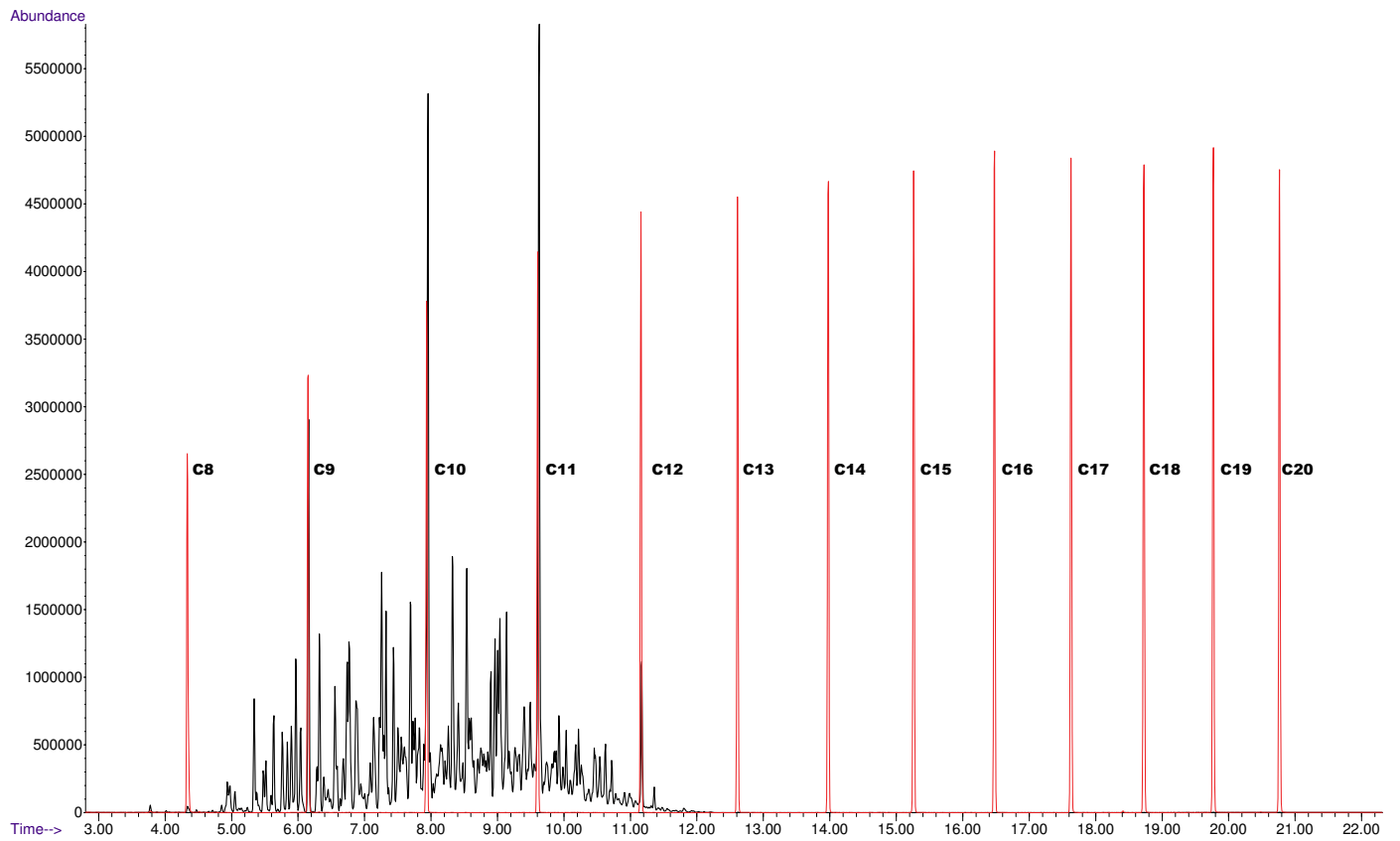


Turpentine (Cat. No. HS-004S-D-40X)



Red Peaks are a n-alkane overlay used as a marker. Not included in the sample

Stoddard Solvent (Cat. No. HS-005S-D-40X)



ASTM D2887 Boiling Range Distribution of Petroleum Fractions by GC

Total Petroleum Hydrocarbons (C₈ - C₂₀)

TPH-LOW-01 1 x 1 mL
TPH-LOW-01-PAK 5 x 1 mL
 500 µg/mL each in Chloroform 13 comps.

<i>n</i> -Octane	<i>n</i> -Pentadecane
<i>n</i> -Nonane	<i>n</i> -Hexadecane
<i>n</i> -Decane	<i>n</i> -Heptadecane
<i>n</i> -Undecane	<i>n</i> -Octadecane
<i>n</i> -Dodecane	<i>n</i> -Nonadecane
<i>n</i> -Tridecane	<i>n</i> -Eicosane
<i>n</i> -Tetradecane	

UPDATED

Total Petroleum Hydrocarbons (C₈ - C₃₀)

TPH-MID-01 1 x 1 mL
TPH-MID-01-PAK 5 x 1 mL
 500 µg/mL each in Chloroform 25 comps.

<i>n</i> -Octane	<i>n</i> -Heptadecane	<i>n</i> -Tricosane
<i>n</i> -Nonane	<i>n</i> -Octadecane	<i>n</i> -Tetracosane
<i>n</i> -Decane	Pristane	<i>n</i> -Pentacosane
<i>n</i> -Undecane	<i>n</i> -Nonadecane	<i>n</i> -Hexacosane
<i>n</i> -Dodecane	Phytane	<i>n</i> -Heptacosane
<i>n</i> -Tridecane	<i>n</i> -Eicosane	<i>n</i> -Octacosane
<i>n</i> -Tetradecane	<i>n</i> -Heneicosane	<i>n</i> -Nonacosane
<i>n</i> -Pentadecane	<i>n</i> -Docosane	<i>n</i> -Triacosane
<i>n</i> -Hexadecane		

UPDATED

Calibration Mixture (C₆ - C₄₄)

DRH-002N 100 mg
DRH-002N-10X 1 gm
 At stated Wt. % 17 comps.

<i>n</i> -Hexane	6	<i>n</i> -Octadecane	5
<i>n</i> -Heptane	6	<i>n</i> -Eicosane	2
<i>n</i> -Octane	8	<i>n</i> -Tetracosane	2
<i>n</i> -Nonane	8	<i>n</i> -Octacosane	1
<i>n</i> -Decane	12	<i>n</i> -Dotriacontane	1
<i>n</i> -Undecane	12	<i>n</i> -Hexatriacontane	1
<i>n</i> -Dodecane	12	<i>n</i> -Tetracontane	1
<i>n</i> -Tetradecane	12	<i>n</i> -Tetratetracontane	1
<i>n</i> -Hexadecane	10		

Hydrocarbon Window Defining Standard (C₈ - C₄₀)

DRH-008S-R2 1 x 1 mL
DRH-008S-R2-PAK 5 x 1 mL
 500 µg/mL each in Chloroform 35 comps.

<i>n</i> -Octane	<i>n</i> -Nonadecane	<i>n</i> -Triacosane
<i>n</i> -Nonane	Phytane	<i>n</i> -Hentriacontane
<i>n</i> -Decane	<i>n</i> -Eicosane	<i>n</i> -Dotriacontane
<i>n</i> -Undecane	<i>n</i> -Heneicosane	<i>n</i> -Tritriacontane
<i>n</i> -Dodecane	<i>n</i> -Docosane	<i>n</i> -Tetracontane
<i>n</i> -Tridecane	<i>n</i> -Tricosane	<i>n</i> -Pentatriacontane
<i>n</i> -Tetradecane	<i>n</i> -Tetracosane	<i>n</i> -Hexatriacontane
<i>n</i> -Pentadecane	<i>n</i> -Pentacosane	<i>n</i> -Heptatriacontane
<i>n</i> -Hexadecane	<i>n</i> -Hexacosane	<i>n</i> -Octatriacontane
<i>n</i> -Heptadecane	<i>n</i> -Heptacosane	<i>n</i> -Nonatriacontane
<i>n</i> -Octadecane	<i>n</i> -Octacosane	<i>n</i> -Tetracontane
Pristane	<i>n</i> -Nonacosane	

Calibration Solution (C₆ - C₄₄)

DRH-002S-R1 1 x 1 mL
DRH-002S-R1-PAK 5 x 1 mL
 At stated conc. (µg/mL) in Chloroform 17 comps.

<i>n</i> -Hexane	600	<i>n</i> -Octadecane	500
<i>n</i> -Heptane	600	<i>n</i> -Eicosane	200
<i>n</i> -Octane	800	<i>n</i> -Tetracosane	200
<i>n</i> -Nonane	800	<i>n</i> -Octacosane	100
<i>n</i> -Decane	1200	<i>n</i> -Dotriacontane	100
<i>n</i> -Undecane	1200	<i>n</i> -Hexatriacontane	100
<i>n</i> -Dodecane	1200	<i>n</i> -Tetracontane	100
<i>n</i> -Tetradecane	1200	<i>n</i> -Tetratetracontane	100
<i>n</i> -Hexadecane	1000		

Fuel Oil Degradation / Retention Time Mix for Quantification of C₁₇/Pristane & C₁₈/Phytane ratios

DRH-005S-10X 1 x 1 mL
 2.0 mg/mL each in CH₂Cl₂:CS₂ (50:50) 4 comps.

DRH-005S-R1-10X 5 x 1 mL
 2.0 mg/mL each in Chloroform 4 comps.

Heptadecane	Phytane (2,6,10,14-Tetramethylhexadecane)
Octadecane	Pristane (2,6,10,14-Tetramethylpentadecane)

Calibration Solution (C₅ - C₄₄)

DRH-002S-R2 1 x 1 gm
DRH-002S-R2-PAK 5 x 1 gm
 0.1 Wt. % each in Chloroform 20 comps.

<i>n</i> -Pentane	<i>n</i> -Hexadecane
<i>n</i> -Hexane	<i>n</i> -Heptadecane
<i>n</i> -Heptane	<i>n</i> -Octadecane
<i>n</i> -Octane	<i>n</i> -Eicosane
<i>n</i> -Nonane	<i>n</i> -Tetracosane
<i>n</i> -Decane	<i>n</i> -Octacosane
<i>n</i> -Undecane	<i>n</i> -Hexatriacontane
<i>n</i> -Dodecane	<i>n</i> -Tetracontane
<i>n</i> -Tetradecane	<i>n</i> -Dotriacontane
<i>n</i> -Pentadecane	<i>n</i> -Tetratetracontane

Technical Note

Pristane and phytane are included in the hydrocarbon window defining standard with C₈ - C₄₀ odd and even alkanes. The C₁₇/pristane and C₁₈/phytane ratios can be used to estimate fuel oil degradation. Fuel oil degradation mix containing four required analytes to determine the C₁₇/pristane and C₁₈/phytane ratio is (DRH-005S-10X).

Column Test Mixture

D-2887 1 x 1 mL
 10 mg/mL in *n*-Octane 2 comps.

<i>n</i> -Hexadecane	<i>n</i> -Octadecane
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Reference Gas Oil Sample Lot #2

D-2887-REFOIL 1 x 1 mL

Complete Set TPH Pattern Recognition Standards

Total Petroleum Hydrocarbon Reference Set

TPH-R3-SET **33 x 1 mL**
(TPH-001-R2-SET, TPH-002-R1-SET, TPH-003-SET, TPH-004-SET)

Technical Note

These sets can be used to identify specific petroleum product types found during LUFT/LUST investigations and available also individually.

Motor Fuels & Lubricating Oils Set

TPH-001-R2-SET **12 x 1 mL**

	mg/mL	Matrix	Cat. No.	Unit
Gasoline, regular unleaded	20	MeOH	GA-001-40X	1 mL
Gasoline, regular leaded	20	MeOH	GA-002-40X	1 mL
Gasoline, premium	20	MeOH	GA-003-40X	1 mL
RFA Gasoline (Oxygenate free)	20	MeOH	GA-005-40X	1 mL
#2 Diesel (Conventional)	20	CH ₂ Cl ₂	FU-009-D-40X	1 mL
#1 Diesel (Low sulfur)	20	CH ₂ Cl ₂	FU-013-D-40X	1 mL
#2 Diesel (Extra low sulfur)	20	CH ₂ Cl ₂	FU-017-D-40X	1 mL
Biodiesel 20	20	CH ₂ Cl ₂	FU-030-D-40X	1 mL
Biodiesel 100 (Consumer grade)	20	CH ₂ Cl ₂	FU-029-D-40X	1 mL
SAE 30W Motor oil	20	CH ₂ Cl ₂	FU-018-D-40X	1 mL
SAE 40W Motor oil	20	CH ₂ Cl ₂	FU-019-D-40X	1 mL
SAE 50W Motor oil	20	CH ₂ Cl ₂	FU-021-D-40X	1 mL

Petroleum is a broadly defined class of liquid hydrocarbon mixtures that are used in a large variety of products for many different applications. In general, they are oil-based products that can be obtained by distillation and are normally used outside the refining industry. Petroleum products include aviation gasoline, motor gasoline, jet fuels, kerosene, gas/diesel oil, heavy fuel oil, naphtha, and lubricants.

Most analytical methods for petroleum products focus on the levels of benzene, toluene, ethylbenzene and xylene (BTEX), the total petroleum hydrocarbon number (TPH) and the fingerprint of the petroleum product.

Heating Fuel Oils Set

TPH-002-R1-SET **6 x 1 mL**

	mg/mL	Matrix	Cat. No.	Unit
#1 Fuel oil	20	CH ₂ Cl ₂	FU-001-D-40X	1 mL
#2 Fuel oil	20	CH ₂ Cl ₂	FU-002-D-40X	1 mL
#3 Fuel oil	20	CH ₂ Cl ₂	FU-003-D-40X	1 mL
#4 Fuel oil	20	CH ₂ Cl ₂	FU-004-D-40X	1 mL
#6 Fuel oil	20	CH ₂ Cl ₂	FU-008-D-40X	1 mL
Kerosene	20	CH ₂ Cl ₂	FU-005-D-40X	1 mL

Aviation Fuels & Oils Set

TPH-003-SET **10 x 1 mL**

	mg/mL	Matrix	Cat. No.	Unit
Aviation gasoline Grade 100 LL	20	CH ₂ Cl ₂	GA-004-D-40X	1 mL
JP-4 Fuel	20	CH ₂ Cl ₂	FU-010-D-40X	1 mL
JP-5 Fuel	20	CH ₂ Cl ₂	FU-012-D-40X	1 mL
JP-7 Fuel	20	CH ₂ Cl ₂	FU-014-D-40X	1 mL
JP-8 Fuel	20	CH ₂ Cl ₂	FU-015-D-40X	1 mL
JP-10 Fuel	20	CH ₂ Cl ₂	FU-022-D-40X	1 mL
JP-TS	20	CH ₂ Cl ₂	FU-016-D-40X	1 mL
Jet Fuel (Type 1)	20	CH ₂ Cl ₂	FU-011-D-40X	1 mL
Turbine (Jet A) Fuel	20	CH ₂ Cl ₂	FU-006-D-40X	1 mL
Hydraulic Fluid	20	CH ₂ Cl ₂	FU-020-D-40X	1 mL

Household & Industrial Solvent Set

TPH-004-SET **5 x 1 mL**

	mg/mL	Matrix	Cat. No.	Unit
Lacquer Thinner	20	CH ₂ Cl ₂	HS-001S-D-40X	1 mL
Mineral Spirits	20	CH ₂ Cl ₂	HS-002S-D-40X	1 mL
Naphtha	20	CH ₂ Cl ₂	HS-003S-D-40X	1 mL
Turpentine	20	CH ₂ Cl ₂	HS-004S-D-40X	1 mL
Stoddard solvent	20	CH ₂ Cl ₂	HS-005S-D-40X	1 mL

TPH, Fuel and Hydrocarbon Standards

Individual Fuel and Hydrocarbons

Compound	Conc.	Matrix	Cat. No.	1 mL	Compound	Conc.	Matrix	Cat. No.	1 mL	
5-alpha Androstane 438-22-2	1 mg/mL	CH ₂ Cl ₂	GRH-IS		Gasoline Regular, unleaded	0.5 mg/mL	MeOH	GA-001		
	10 mg/mL	CH ₂ Cl ₂	GRH-IS-10X			5 mg/mL	MeOH	GA-001-10X		
Aviation (gas) (grade 100-LL)	0.5 mg/mL	MeOH	GA-004		Gasoline Premium	20 mg/mL	MeOH	GA-001-40X		
	20 mg/mL	MeOH	GA-004-40X			20 mg/mL	CH ₂ Cl ₂	GA-001-D-40X		
	20 mg/mL	CH ₂ Cl ₂	GA-004-D-40X			0.5 mg/mL	MeOH	GA-003		
Biodiesel 20	0.5 mg/mL	CH ₂ Cl ₂	FU-030-D		Hydraulic Fluid 64742-54-7	20 mg/mL	MeOH	GA-003-40X		
	20 mg/mL	CH ₂ Cl ₂	FU-030-D-40X			20 mg/mL	CH ₂ Cl ₂	GA-003-D-40X		
Biodiesel 100	0.5 mg/mL	CH ₂ Cl ₂	FU-029-D			0.5 mg/mL	Hexane	FU-020-H		
	20 mg/mL	CH ₂ Cl ₂	FU-029-D-40X		20 mg/mL	Hexane	FU-020-H-40X			
Biodiesel 100 (refinery grade)	0.5 mg/mL	CH ₂ Cl ₂	FU-032-D		20 mg/mL	CH ₂ Cl ₂	FU-020-D-40X			
	20 mg/mL	CH ₂ Cl ₂	FU-032-D-40X		Jet Reference Fuel Type I	0.5 mg/mL	MeOH	FU-011		
p-Bromofluorobenzene 460-00-4	2.5 mg/mL	Acetone	GARH-SS			20 mg/mL	MeOH	FU-011-40X		
						20 mg/mL	CH ₂ Cl ₂	FU-011-D-40X		
1-Chloro-4-fluorobenzene 352-33-0	2 mg/mL	MeOH	AK-101-IS-10X		JP-4 Jet Fuel 50815-00-4	0.5 mg/mL	MeOH	FU-010		
						20 mg/mL	MeOH	FU-010-40X		
1-Chlorooctadecane 3386-33-2	1 mg/mL	Hexane	DRH-007-SS			20 mg/mL	CH ₂ Cl ₂	FU-010-D-40X		
	1-Chloro-4-fluorobenzene 352-33-0	1 mg/mL	CH ₂ Cl ₂	GARH-IS		JP-5 Fuel	0.5 mg/mL	MeOH	FU-012	
					20 mg/mL		MeOH	FU-012-40X		
					20 mg/mL		CH ₂ Cl ₂	FU-012-D-40X		
2,5-Dibromotoluene 615-59-8	50 µg/mL	MeOH	GRH-004-SS		JP-7 Fuel	0.5 mg/mL	MeOH	FU-014		
	500 µg/mL	MeOH	GRH-004-SS-10X			20 mg/mL	MeOH	FU-014-40X		
	5 mg/mL	MeOH	GRH-004-SS-100X			20 mg/mL	CH ₂ Cl ₂	FU-014-D-40X		
Diesel	0.5 mg/mL	MeOH	FU-009		JP-8 Fuel	0.5 mg/mL	MeOH	FU-015		
	5 mg/mL	CH ₂ Cl ₂	FU-009-D-10X			20 mg/mL	MeOH	FU-015-40X		
	20 mg/mL	MeOH	FU-009-40X			20 mg/mL	CH ₂ Cl ₂	FU-015-D-40X		
	20 mg/mL	CH ₂ Cl ₂	FU-009-D-40X			JP-TS Aviation Fuel 64742-47-8	0.5 mg/mL	MeOH	FU-016	
#1 Diesel (Low Sulfur)	0.5 mg/mL	MeOH	FU-013		20 mg/mL		MeOH	FU-016-40X		
	20 mg/mL	MeOH	FU-013-40X		20 mg/mL		CH ₂ Cl ₂	FU-016-D-40X		
	20 mg/mL	CH ₂ Cl ₂	FU-013-D-40X		JP-10 Aviation Fuel	0.5 mg/mL	MeOH	FU-022		
#2 Diesel 68334-30-5	50 mg/mL	Acetone	DRO-AK-102-LCS-10X-R1			20 mg/mL	MeOH	FU-022-40X		
						20 mg/mL	CH ₂ Cl ₂	FU-022-D-40X		
#2 Diesel (Extra Low Sulfur) 68476-43-6	0.5 mg/mL	MeOH	FU-017		Kerosene 25% Weathered	5 mg/mL	CH ₂ Cl ₂	FK-W25-10X		
	5 mg/mL	CH ₂ Cl ₂	FU-017-D-10X			Kerosene 50% Weathered	5 mg/mL	CH ₂ Cl ₂	FK-W50-10X	
	5 mg/mL	Acetone	DRO-AK-102-LCS				Kerosene 75% Weathered	5 mg/mL	CH ₂ Cl ₂	FK-W75-10X
	50 mg/mL	Acetone	DRO-AK-102-LCS-10X		Kerosene 8008-20-6	0.5 mg/mL		MeOH	FU-005	
	20 mg/mL	MeOH	FU-017-40X			20 mg/mL	MeOH	FU-005-40X		
20 mg/mL	CH ₂ Cl ₂	FU-017-D-40X		5 mg/mL		CH ₂ Cl ₂	FU-005-D-10X			
#2 Diesel (Low Sulfur) 25% Weathered	5 mg/mL	CH ₂ Cl ₂	FD2-W25-10X			20 mg/mL	CH ₂ Cl ₂	FU-005-D-40X		
	#2 Diesel (Low Sulfur) 50% Weathered	5 mg/mL	CH ₂ Cl ₂	FD2-W50-10X			Lacquer Thinner	1 gram	Neat	HS-001N
#2 Diesel (Low Sulfur) 75% Weathered		5 mg/mL	CH ₂ Cl ₂	FD2-W75-10X		0.5 mg/mL		MeOH	HS-001S	
	#2 Diesel 25% Weathered	5 mg/mL	CH ₂ Cl ₂	FD2-W25-R1-10X		20 mg/mL		MeOH	HS-001S-40X	
#2 Diesel 50% Weathered		5 mg/mL	CH ₂ Cl ₂	FD2-W50-R1-10X		20 mg/mL		CH ₂ Cl ₂	HS-001S-D-40X	
	#2 Diesel 75% Weathered	5 mg/mL	CH ₂ Cl ₂	FD2-W75-R1-10X		Mineral Spirits 8030-30-6		1 gram	Neat	HS-002N
Docosane 629-97-0		20 Wt. %	Toluene	D-5186-91-PM-0.4X			0.5 mg/mL	MeOH	HS-002S	
	n-Dodecane 112-40-3	5 mg/mL	MeOH	AS-E0238			20 mg/mL	MeOH	HS-002S-40X	
		1.5 Wt. %	Isooctane	M-GRA-SCS-AS			20 mg/mL	CH ₂ Cl ₂	HS-002S-D-40X	
	#1 Fuel oil 70892-10-3	0.5 mg/mL	MeOH	FU-001			Naphtha 64742-89-8	1 gram	Neat	HS-003N
		20 mg/mL	MeOH	FU-001-40X		0.5 mg/mL		MeOH	HS-003S	
20 mg/mL		CH ₂ Cl ₂	FU-001-D-40X		20 mg/mL	MeOH		HS-003S-40X		
#2 Fuel oil 68476-30-2	0.5 mg/mL	MeOH	FU-002		Nonatriacontane 7194-86-7	750 µg/mL	Chloroform	DRH-FL-SS-R1		
	20 mg/mL	MeOH	FU-002-40X			1 mg/mL	CS ₂	DRH-FL-SS		
	20 mg/mL	CH ₂ Cl ₂	FU-002-D-40X			3 mg/mL	CS ₂	DRH-FL-SS-3X		
#3 Fuel oil	0.5 mg/mL	Hexane	FU-003		n-Pentadecane 629-62-9	5 mg/mL	MeOH	AS-E0241		
	20 mg/mL	Hexane	FU-003-40X			RFA Gasoline (oxygenate-free)	0.5 mg/mL	MeOH	GA-005	
	20 mg/mL	CH ₂ Cl ₂	FU-003-D-40X		20 mg/mL		MeOH	GA-005-40X		
#4 Fuel oil 68476-31-3	0.5 mg/mL	Hexane	FU-004		20 mg/mL		CH ₂ Cl ₂	GA-005-D-40X		
	20 mg/mL	Hexane	FU-004-40X		Regular Leaded Gasoline	0.5 mg/mL	MeOH	GA-002		
	20 mg/mL	CH ₂ Cl ₂	FU-004-D-40X			20 mg/mL	MeOH	GA-002-40X		
#6 Fuel oil 68553-00-4	0.5 mg/mL	Hexane	FU-008			20 mg/mL	CH ₂ Cl ₂	GA-002-D-40X		
	20 mg/mL	Hexane	FU-008-40X							
	20 mg/mL	CH ₂ Cl ₂	FU-008-D-40X							

continued on next page

TPH, Fuel, Hydrocarbon and UST Standards

Individual Fuel and Hydrocarbons (continued)

Compound	Conc.	Matrix	Cat. No.	1 mL	Compound	Conc.	Matrix	Cat. No.	1 mL	
SAE 5W30 Motor oil	0.5 mg/mL	Hexane	FU-025-H		o-Terphenyl 84-15-1	200 µg/mL	Acetone	DRO-AK-102-SS		
	20 mg/mL	Hexane	FU-025-H-40X			1 mg/mL	CH ₂ Cl ₂	DRH-006-SS		
	20 mg/mL	CH ₂ Cl ₂	FU-025-D-40X			2 mg/mL	Acetone	DRO-AK-102-SS-10X		
SAE 10W30 Motor oil	0.5 mg/mL	Hexane	FU-026-H		n-Tetradecane 629-59-4	2 mg/mL	Acetone	GRH-SS		
	20 mg/mL	Hexane	FU-026-H-40X			5 mg/mL	MeOH	AS-E0240		
	20 mg/mL	CH ₂ Cl ₂	FU-026-D-40X							
SAE 10W40 Motor oil	0.5 mg/mL	Hexane	FU-027-H		Tetracosane (5 mL) 646-31-1	500 µg/mL	CS ₂	D-5480-C40-5ML		
	20 mg/mL	Hexane	FU-027-H-40X			500 µg/mL	Chloroform	D-5480-C40-R1-5ML		
	20 mg/mL	CH ₂ Cl ₂	FU-027-D-40X			5 mg/mL	MeOH	AS-E0239		
SAE 20W50 Motor oil	0.5 mg/mL	Hexane	FU-028-H		n-Tridecane 629-50-5	1 mg/mL	CH ₂ Cl ₂	V-028S-D-10X		
	20 mg/mL	Hexane	FU-028-H-40X							
	20 mg/mL	CH ₂ Cl ₂	FU-028-D-40X							
SAE 30W Motor oil	0.5 mg/mL	Hexane	FU-018-H		n-Triacontane-d ₆₂ 93952-07-9	500 µg/mL	Acetone:THFRRO-AK-103-SS			
	20 mg/mL	Hexane	FU-018-H-40X			5 mg/mL	Acetone:THFRRO-AK-103-SS2			
	20 mg/mL	CH ₂ Cl ₂	FU-018-D-40X			5 mg/mL	THF	DRH-SS		
SAE 40W Motor oil	0.5 mg/mL	Hexane	FU-019-H		Turbine (Jet) fuel	0.5 mg/mL	MeOH	FU-006		
	5 mg/mL	Acetone:CH ₂ Cl ₂	RRO-AK-103-LCS			20 mg/mL	MeOH	FU-006-40X		
	20 mg/mL	Hexane	FU-019-H-40X			20 mg/mL	CH ₂ Cl ₂	FU-006-D-40X		
	20 mg/mL	CH ₂ Cl ₂	FU-019-D-40X							
	25 mg/mL	Acetone:CH ₂ Cl ₂	RRO-AK-103-LCS-5X							
SAE 50W Motor oil	20 mg/mL	CH ₂ Cl ₂	FU-021-D-40X		Turpentine 8006-64-2	1 gram	Neat	HS-004N		
	20 mg/mL	CH ₂ Cl ₂	FU-021-D-40X			0.5 mg/mL	MeOH	HS-004S		
Stoddard solvent 8052-41-3	1 gram	Neat	HS-005N		Unleaded Gasoline 25% Weathered	20 mg/mL	MeOH	HS-004S-40X		
	0.5 mg/mL	MeOH	HS-005S			20 mg/mL	CH ₂ Cl ₂	HS-004S-D-40X		
	5 mg/mL	MeOH	HS-005S-10X			5 mg/mL	MeOH	GA-W25-10X		
	20 mg/mL	MeOH	HS-005S-40X			Unleaded Gasoline 50% Weathered	5 mg/mL	MeOH	GA-W50-10X	
	20 mg/mL	CH ₂ Cl ₂	HS-005S-D-40X				Unleaded Gasoline 75% Weathered	5 mg/mL	MeOH	GA-W75-10X

LUFT/LUST (UST) Standards

There are approximately 571,000 underground storage tanks nationwide that store petroleum or hazardous substances that can harm the environment and human health if their contents are released. Until the mid-1980s, most tanks were made of bare steel. Over time, these tanks would corrode and their contents would leak into the environment. Leaking could also occur due to faulty installation or inadequate maintenance procedures. The greatest potential hazard from a leaking underground storage tank is contaminated groundwater, the source of drinking water for nearly half of all Americans. Other health and environmental risks, including the potential for fire and explosion, also exist.

These standards are designed to meet federal and state monitoring and testing regulations for underground storage tanks.



Multi-State Hydrocarbon Window Defining

Arizona Diesel Range
California Gasoline
Connecticut Extractable TPH
Mississippi DRO
New Jersey
Pennsylvania Storage Tank Monitoring Standards
Tennessee DRO
Wisconsin Gasoline Range Hydrocarbons
Alaska
GRO, DRO Hydrocarbons, RRO, DRO Hydrocarbons (Fuel), DRO Hydrocarbons (Standards)
Florida FTRPH
Massachusetts EPH, VPH
Texas Method 1005 (PST)
Washington VPH, EPH
Gasoline Range Hydrocarbons (GRH)
Diesel Range Hydrocarbons (DRH)
Oil, Grease and TPH (Method 1664, 413.2/418.1 and 8440)
Automotive Engine Exhaust
Refinery Waste (Method 1664, ASTM E1387, E1618, Skinner List)

Request our master catalog or visit our website for complete listing of these standards, including over 100 ASTM Methods

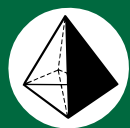
Additional ASTM Methods

ASTM	Method Description	ASTM	Method Description
D56	Flash Point by TAG Closed Cup	D6042	Plastic Packaging Testing
D86	Synthetic Distillation Standard	D6160	PCBs by GC
D92	Flash Point Standards (COC)	D6258	Solvent Red 164 Dye Concentration in Diesel Fuels
D93	Flash Point Standards (PMCC)	D6293	Oxygenates (O-PONA) in Engine Fuels by GC
D445	Viscosity Calibration Standard	D6296	Total Olefins in Spark Ignition Engine Fuels by GC
D611	Aniline Point Standard	D6304	Water in Liquid Petro Products
D1015	Freezing Point Standards	D6334	Sulfur in Gasoline by Wavelength WD-XRF
D1319	Olefin Analysis by FIA	D6352	Boiling Range Distribution of Petroleum
D1744	Water in Liquid Petroleum Products	D6378	Vapor Pressure
D2386	Freezing Point Calibration Standards	D6379	Aromatic Hydrocarbon by HPLC
D2500	Cloud Point Calibration Standards	D6417	Engine Oil by GC
D2622	Sulfur by XRF	D6428	Sulfur by ECD
D2789	Hydrocarbon Analysis in Gasoline by GC/MS	D6443	Metals in Oil
D2887	Boiling Range by GC Simulated Distillation (SIM DIS) by GC	D6445	Sulfur in Gasoline by ED-XRF
D3120	Sulfur by Oxidative Microcoulometry	D6481	Lube Oils by ED-XRF
D3230	Salts in Crude Oil	D6550	Olefin Content of Gasoline by SFC
D3231	Phosphorus in Gasoline	D6584	(EN14105) Free and Total Glycerin
D3237	Lead in Gasoline by AA	D6591	(IP 391) Aromatic Hydrocarbon by HPLC
D3246	Sulfur in Petroleum Gas by Oxidative Microcoulometry	D6751	Sulfur in Biodiesel
D3524	Diesel Fuel Diluent in Used Diesel Engine Oils by GC	D7065	Nonylphenol and Octylphenol
D3605	Trace Metal in Gas Turbine Fuels by AA	D7096	Estimates the Conc. of n-Pentane & Light saturated Hydrocarbons
D3606	Benzene & Toluene in Finished Motor & Aviation Gas by GC	D7419	Total Aromatics & Total Saturated in Additive-free Lube Base Stocks
D3710	Boiling Range by GC	D7845	Chemical Speciation in Marine Full Oil
D3798	p-Xylene Analysis by GC	D7751	Lube Oils by ED-XRF
D3831	Manganese in Gasoline by AA	D7485	Nonylphenol and Octylphenol
D4059	PCB Analysis by GC	D7598	Thiodiglycol by LC/MS/MS
D4291	Ethylene Glycol by GC	D7599	Ethanolamines by LC/MS/MS
D4294	Sulfur by ED-XRF	D7600	Carbamates by LC/MS/MS
D4377	Water in Liquid Petroleum Products	D7645	Carbamates by LC/MS/MS
D4420	Aromatics in Gasoline by GC	D8083	Nitrogen in Water
D4628	Wear Metals in Lube Oil	E1064	Water in Petroleum
D4629	Nitrogen by Chemiluminescence	E1387	Fire Debris Analysis
D4815	Oxygenates in Gasoline by GC	E1618	Fire Debris Analysis
D4927	Wear Metals and Additives by WD-XRF		
D4928	Water in Liquid Petroleum Products		
D4929	Organic Chloride Content in Crude Oil		
D4951	Wear Metals and Additives by ICP		
D5056	Trace Metals in Petroleum Coke by AA		
D5059	Lead in Gasoline by X-Ray Spectroscopy		
D5134	Petroleum Naphthas through n-Nonane by GC		
D5184	Al and Si by ICP-AES and AA		
D5185	Wear Metals and Additives by ICP		
D5186	Aromatics by SFC		
D5188	Vapor - Liquid Ratio Temperature		
D5191	Vapor Pressure Standards		
D5307	Boiling Range Distribution of Crude Petroleum by GC		
D5441	MtBE Analysis by GC		
D5442	Petroleum Waxes by GC		
D5443	PNA Analysis by Multidimensional GC		
D5453	Sulfur by Ultra Violet Fluorescence		
D5482	Vapor Pressure Standards		
D5501	Ethanol Analysis by GC		
D5580	Aromatics by GC		
D5599	Oxygenates by OFID		
D5622	Oxygenates by Reductive Pyrolysis		
D5623	Sulfur Compounds by Sulfur Selective Detection		
D5708	Trace Metals by ICP		
D5762	Nitrogen by Chemiluminescence		
D5769	Aromatics by GC/MS		
D5771	Cloud Point of Petro Products		
D5772	Cloud Point of Petro Products (Linear Cooling Rate)		
D5773	Cloud Point of Petro Products (Constant Cooling Rate)		
D5836	Diisocyanates		
D5837	Furanic Compounds in Electrical Insulation (HPLC)		
D5863	Ni, V, Fe & Na in Crude Oils and Residual Fuels by AA		
D5917	Chemical compounds, Toluene, mixed Xylenes & p-Xylenes		
D5972	Freezing Point Aviation Fuels		
D5986	Oxygenates and Aromatics by GC/FTIR		

Wear Metals Group	
D3605	Trace Metals in Gas Turbine Fuel by AA
D4628	Wear Metals in Lube Oil
D4927	Wear Metals and Additives by WDXRF
D4951	Wear Metals and Additives by ICP
D5185	Wear Metals and Additives by ICP
D5708	Trace Metals by ICP
D5863	Trace Metals by AA
D6443	Metals in Oil
D6481	Lube Oils by ED-XRF

Sulfur Standards Group	
D2622	Sulfur by XRF
D3120	Sulfur by Oxidative Microcoulometry
D3246	Sulfur in Petro Gas by Oxidative Microcoulometry
D4294	Sulfur by ED-XRF
D5453	Sulfur by Ultra Violet Fluorescence
D5623	Sulfur Compounds by Sulfur Selective Detection
D6334	Sulfur in Gasoline by Wavelength WD-XRF
D6445	Sulfur in Gasoline by ED-XRF

Additional Methods	
Motor Oil Standards	
Chlorine in Lube Oil	
Method 1664, Oil, Grease and TPH	
Method 413.2, 418.1 and TPH Analysis	
Method 8440 TPH Analysis	
Method 1004 Alcohol Oxidation Products in Engine Exhaust	



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