CHROMATOGRAM GUIDE

This information guide can be used to compare petroleum products under different gas chromatology conditions. Take caution when using this guide, as the chromatograms are subject to change based on the environment the petroleum is exposed to.

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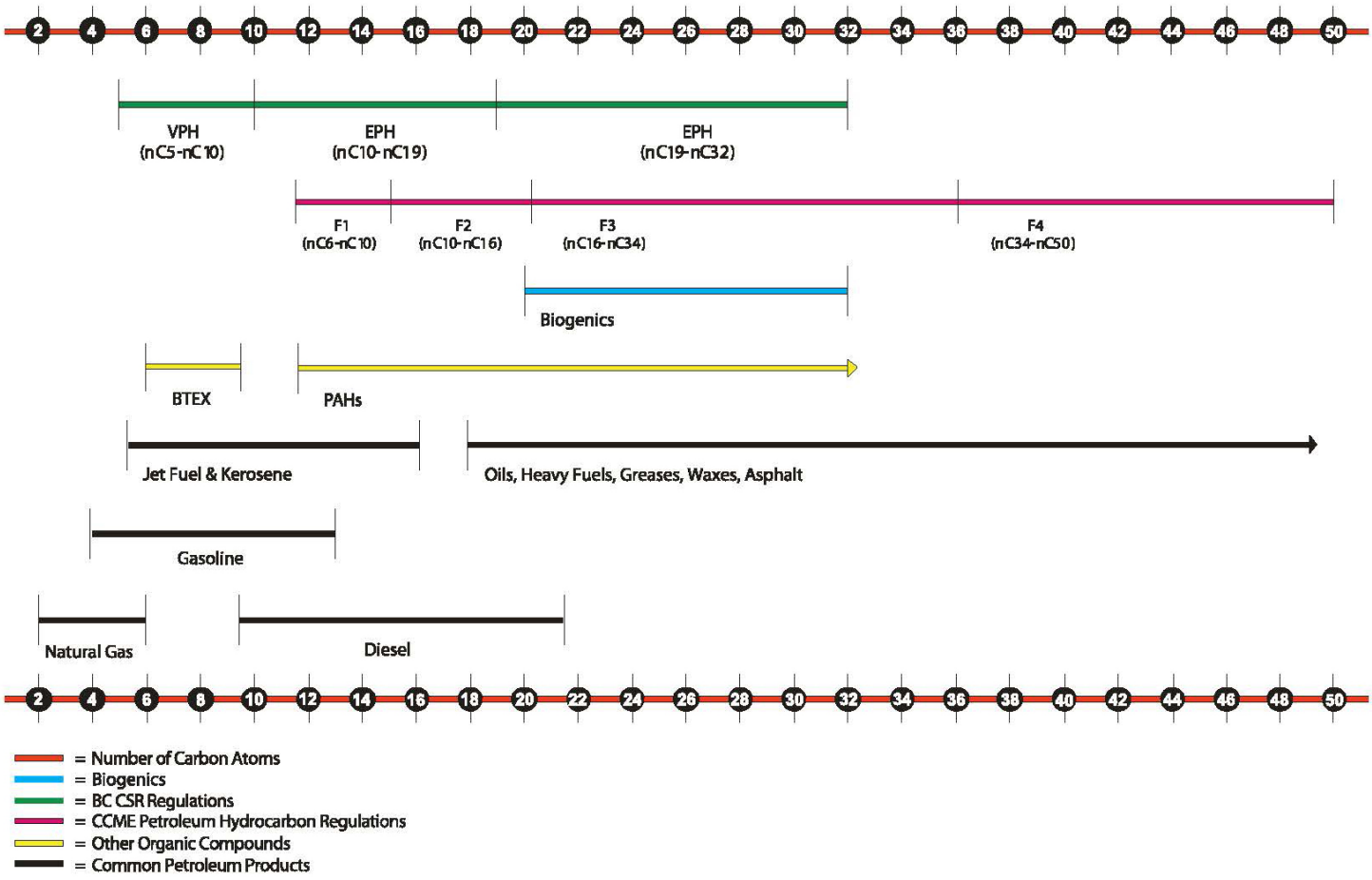
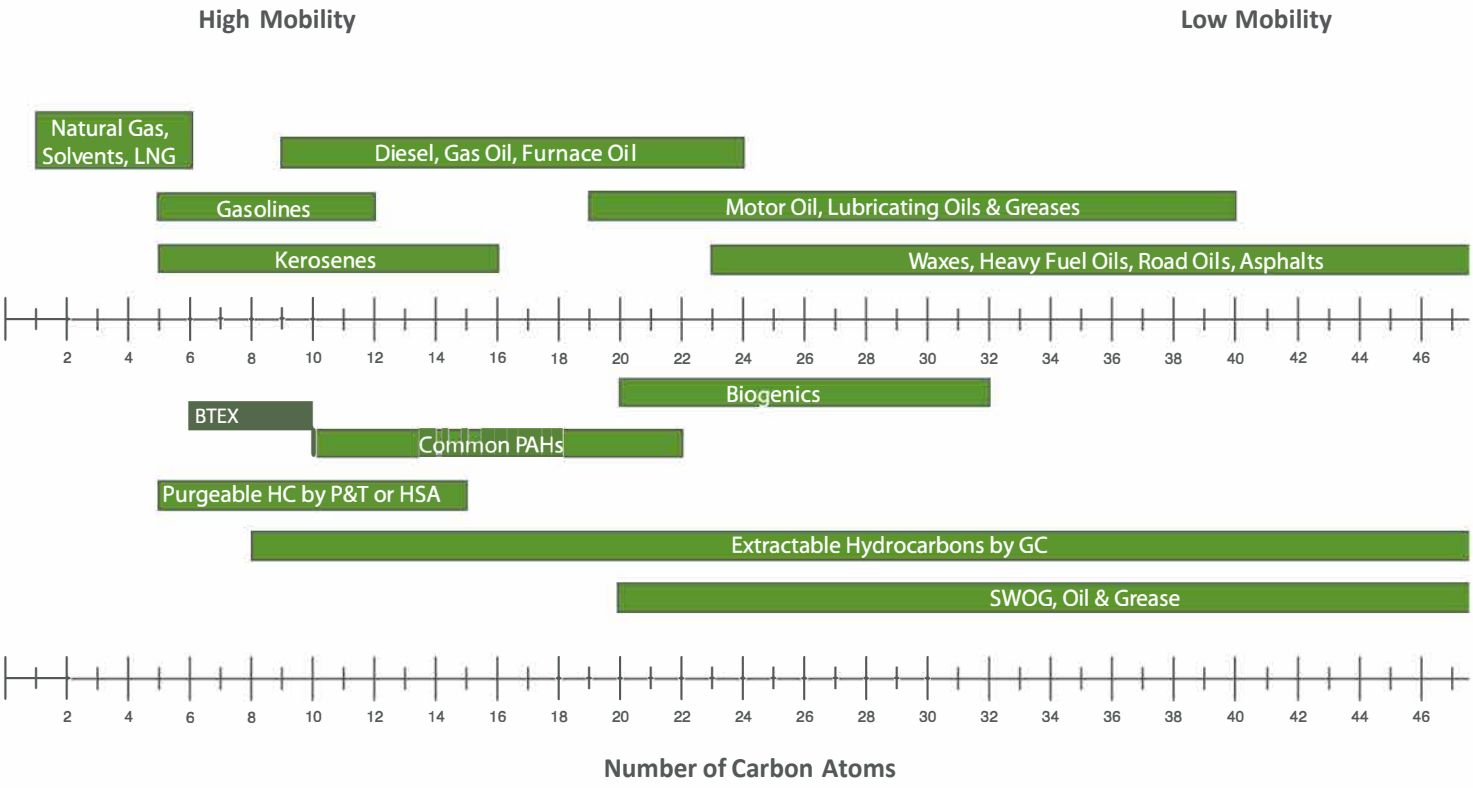
PETROLEUM HYDROCARBON REFERENCE



If you have a sample of the product you are trying to confirm/negate the presence of, please submit it for analysis and comparison.

For more information about Petroleum Hydrocarbon analyses, please contact your project or account manager.

TYPICAL CARBON RANGES



PART A

INDIVIDUAL CHROMATOGRAMS

This section contains representative Gas Chromatograph Flame Ionization Detection (GC/FID) chromatograms of a wide range of petroleum hydrocarbon products plus some naturally occurring organics. These chromatograms were generated in Bureau Veritas Laboratories by dilution of pure product and injection into the GC/FID. For products that contain a significant portion of volatile organic compounds, a chromatogram of a volatile scan (Headspace GC/FID) is included. (These are labelled ”F1 Chromatogram”).

There are usually two chromatograms for each product. In some cases, the first has an extended run time (labelled “Enhanced”) to provide enhanced peak resolution. In others, the first is the Headspace GC/FID scan. The second is always the routine extractable hydrocarbon scan with overlain hydrocarbon markers at C10 C16 C34 and C50. Most of the product descriptions are self-explanatory, however a few less common ones are defined below.

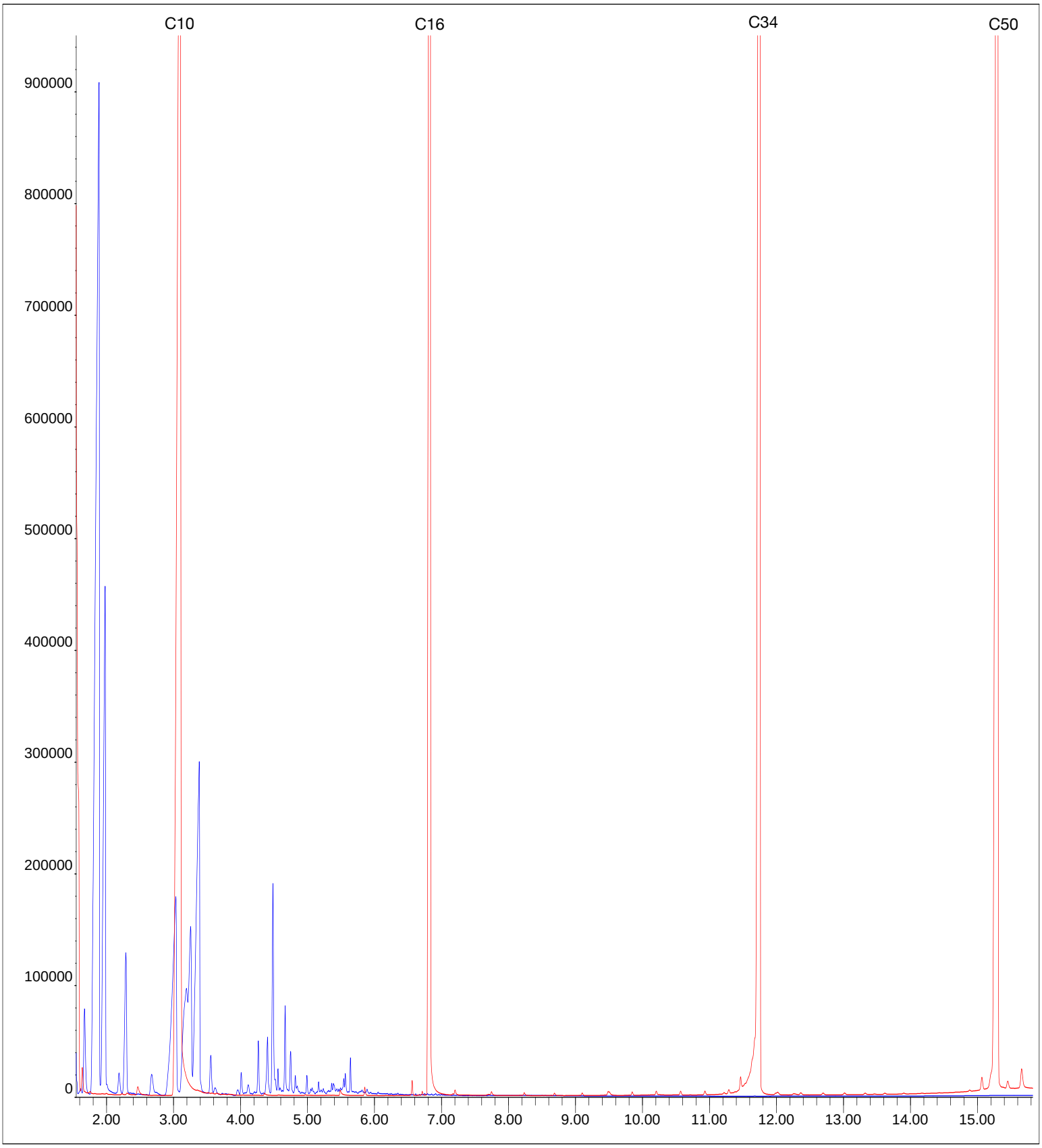
Stoddard Solvent: A petroleum distillate mixture of C7 – C12 hydrocarbons with a boiling range of 150 – 200°C. It is used to thin paints, in coatings, waxes, inks, for dry cleaning, degreasing, industrial cleaning and in herbicides. Stoddard solvent is a type of mineral spirits.

Condensate: In general, gas condensate has a specific gravity ranging from 0.5 – 0.8, and is composed of hydrocarbons such as propane, butane, pentane, hexane, etc. These are separated (condensed) from raw natural gas which is 80% – 90% methane and ethane. A major use of condensate is as a diluent for bitumen to produce diluted bitumen (dilbit) which has a low enough viscosity to be transported through pipelines.

Turpentine: A fluid obtained by the distillation of resin from live trees, mainly pines. It is mainly used as a solvent and as a source of materials for organic synthesis. Turpentine is composed of terpenes, mainly the monoterpenes alpha-pinene and beta-pinene with lesser amounts of carene, camphene, dipentene, and terpinolene.

Varsol: A petroleum-derived clear liquid used as a common organic solvent in painting. A mixture of aliphatic, open-chain or alicyclic C7 – C12 hydrocarbons, Varsol is insoluble in water and is used as an extraction solvent, as a cleaning solvent, as a degreasing solvent and as a solvent in aerosols, paints, wood preservatives, lacquers, varnishes, and asphalt products.

TURPENTINE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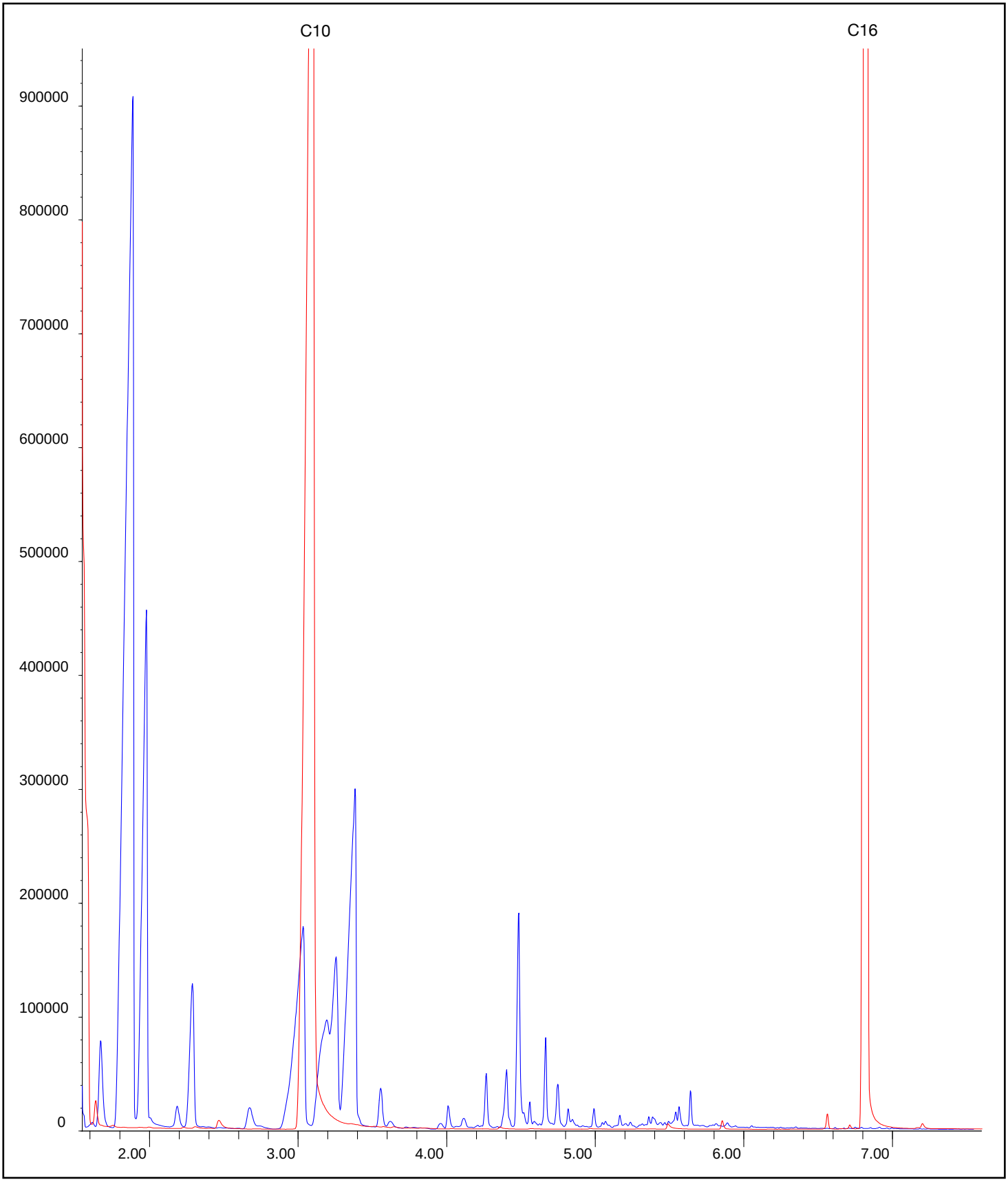
TURPENTINE (ENHANCED)



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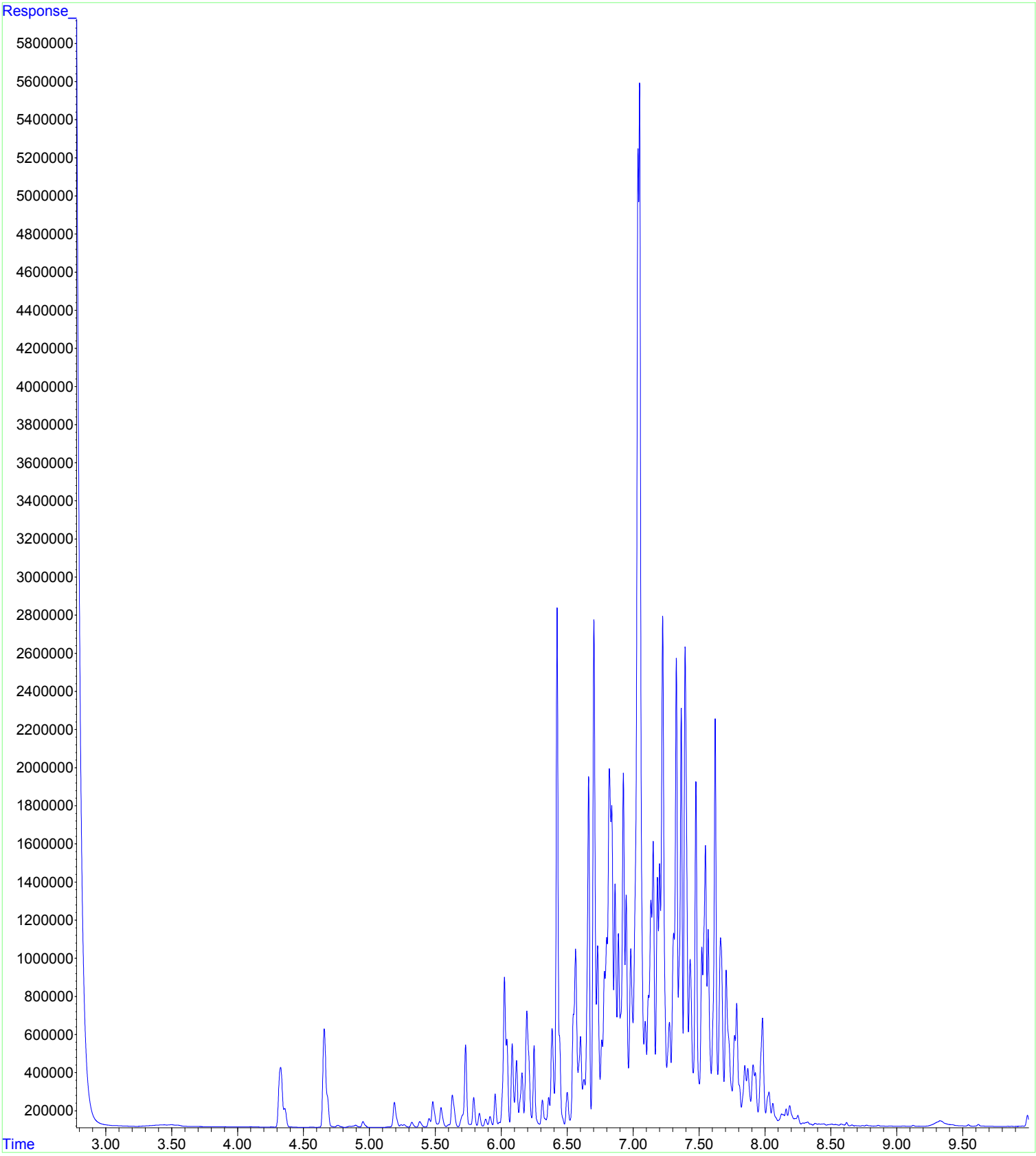

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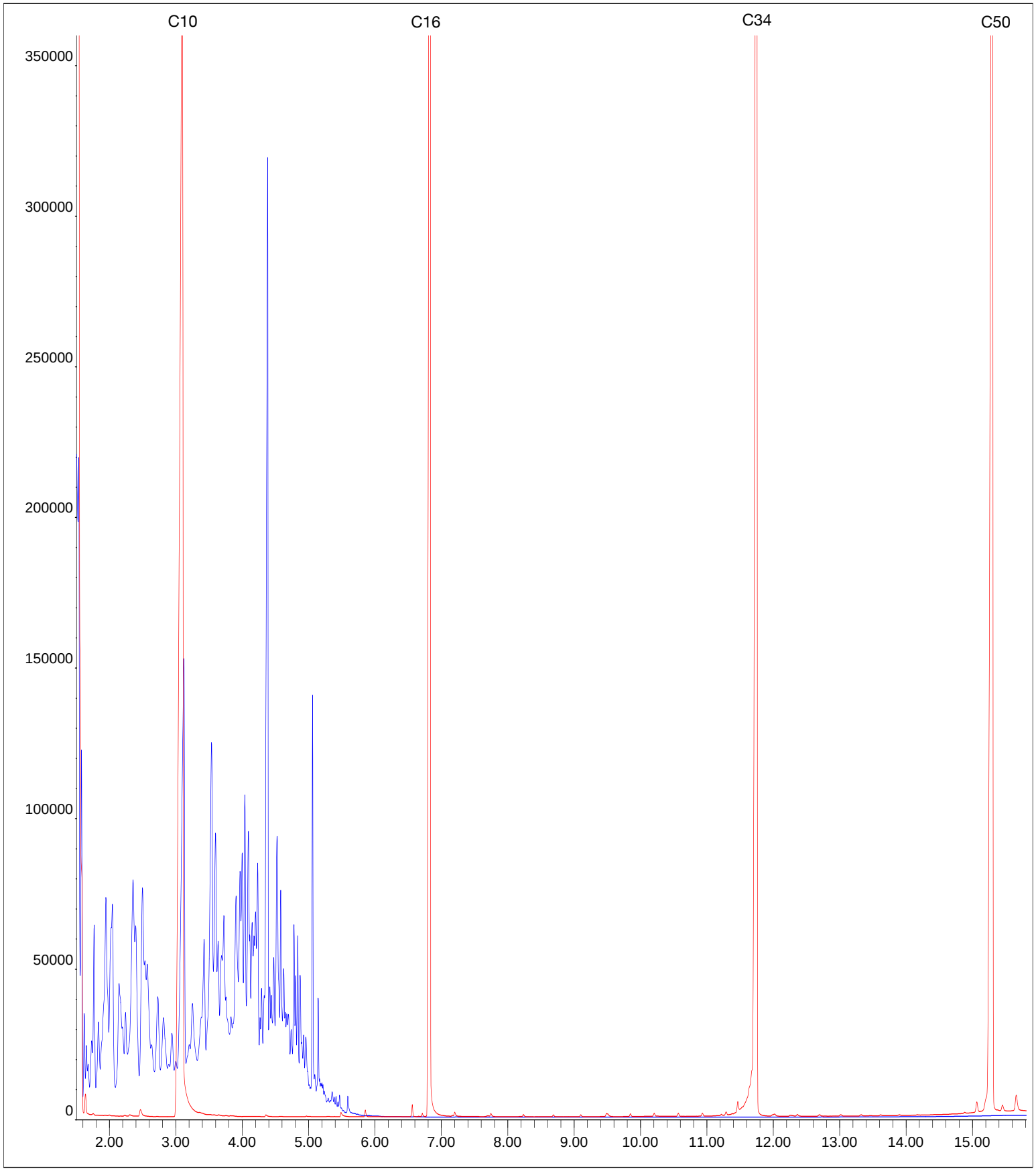

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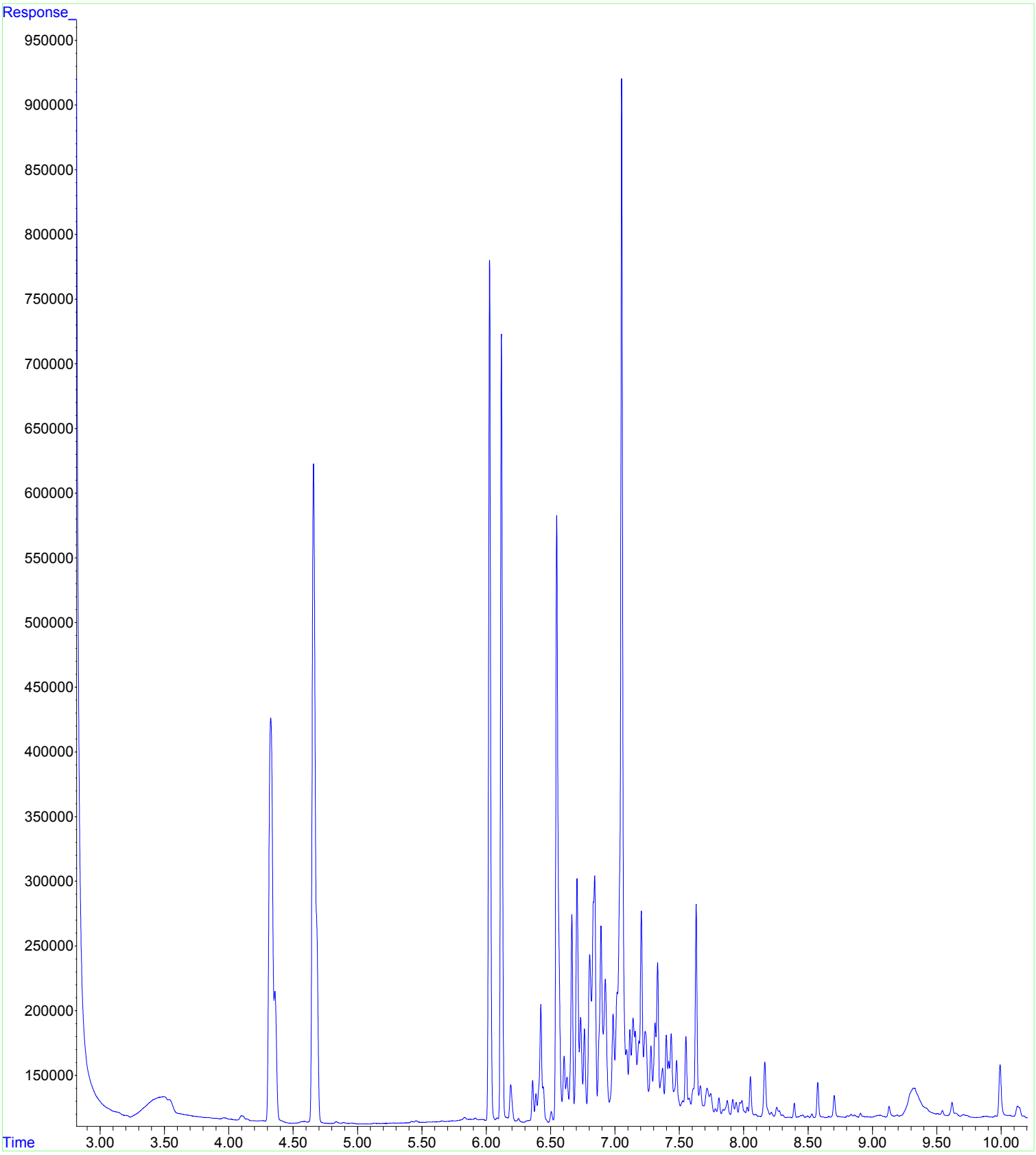

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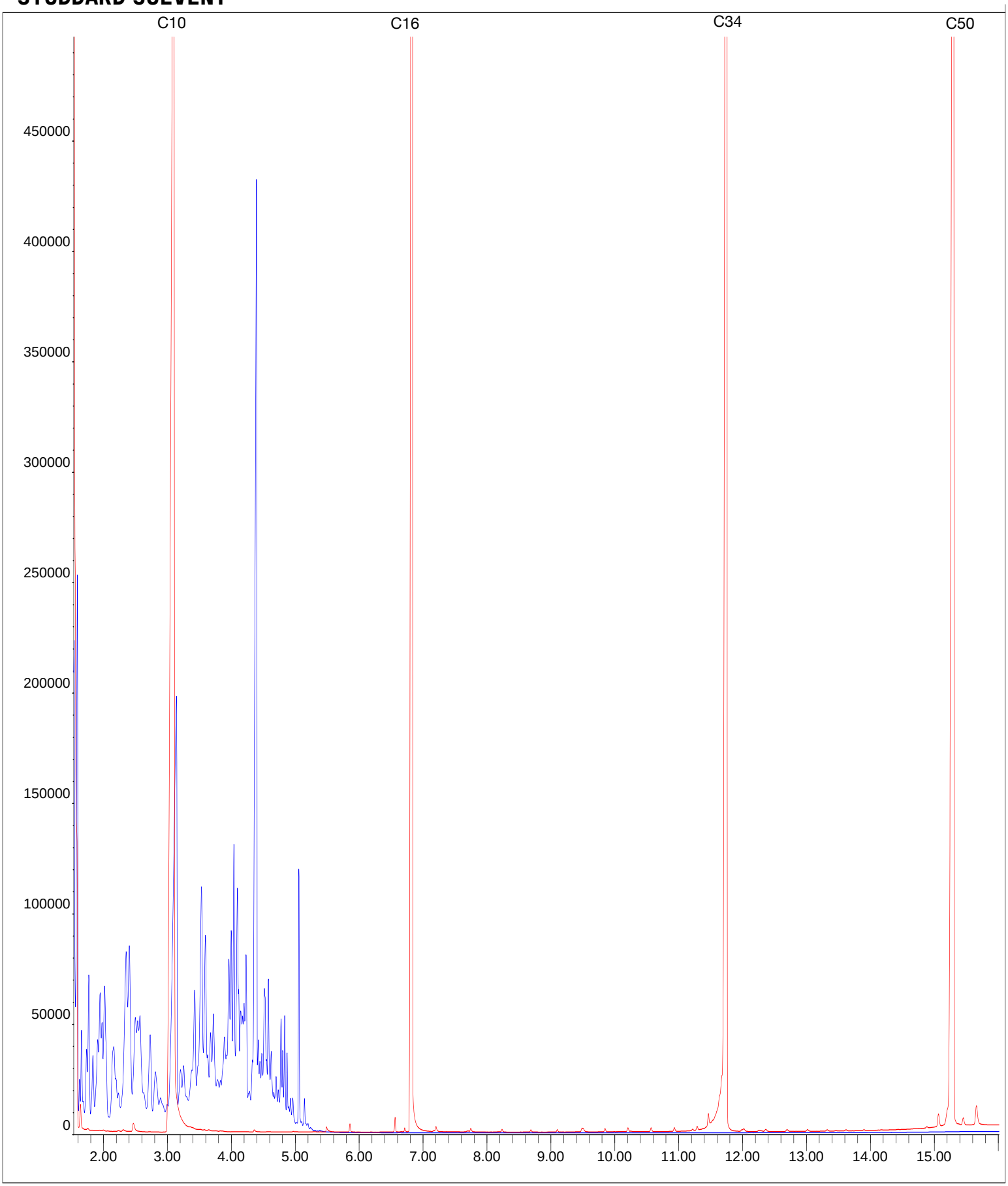

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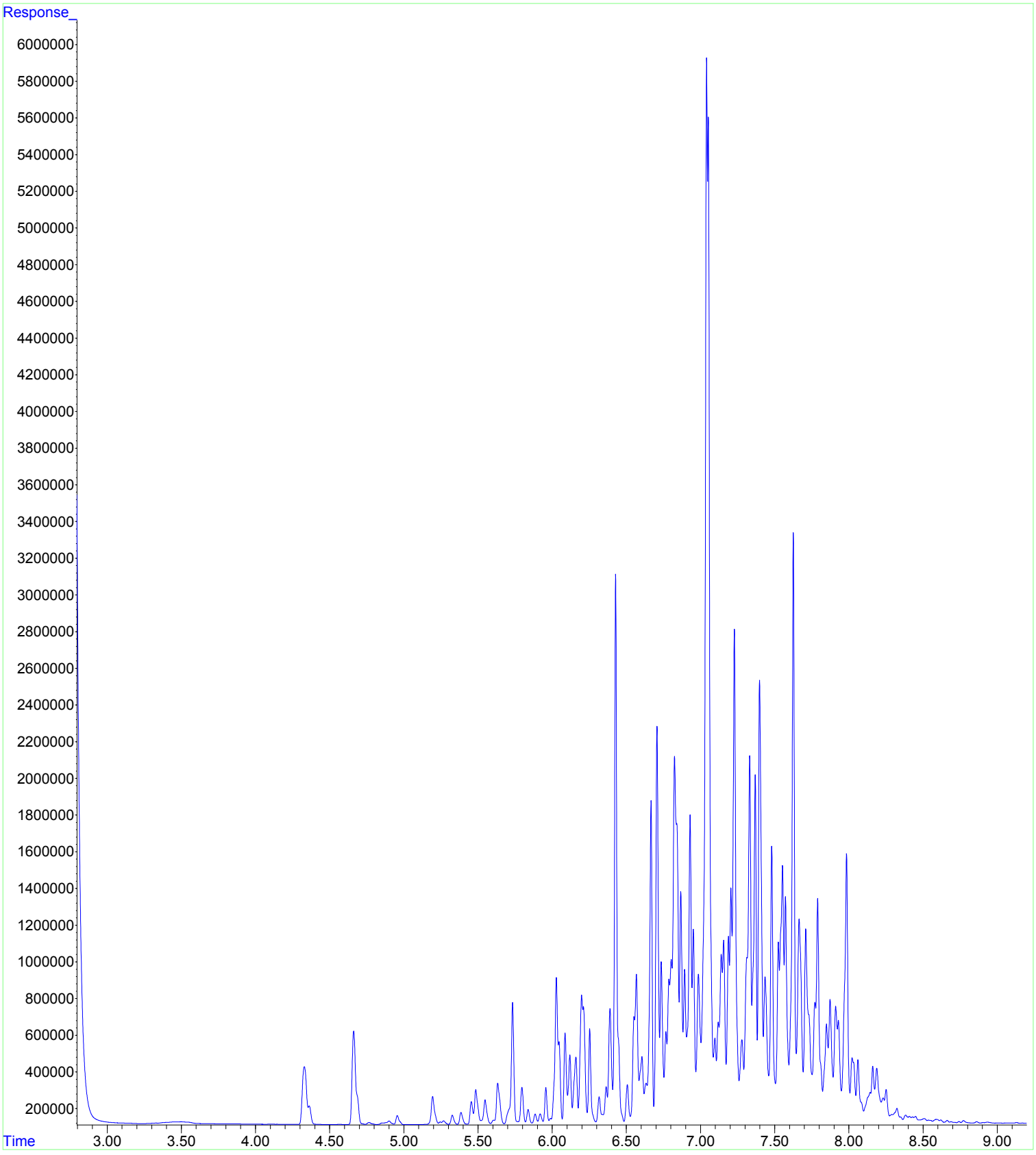
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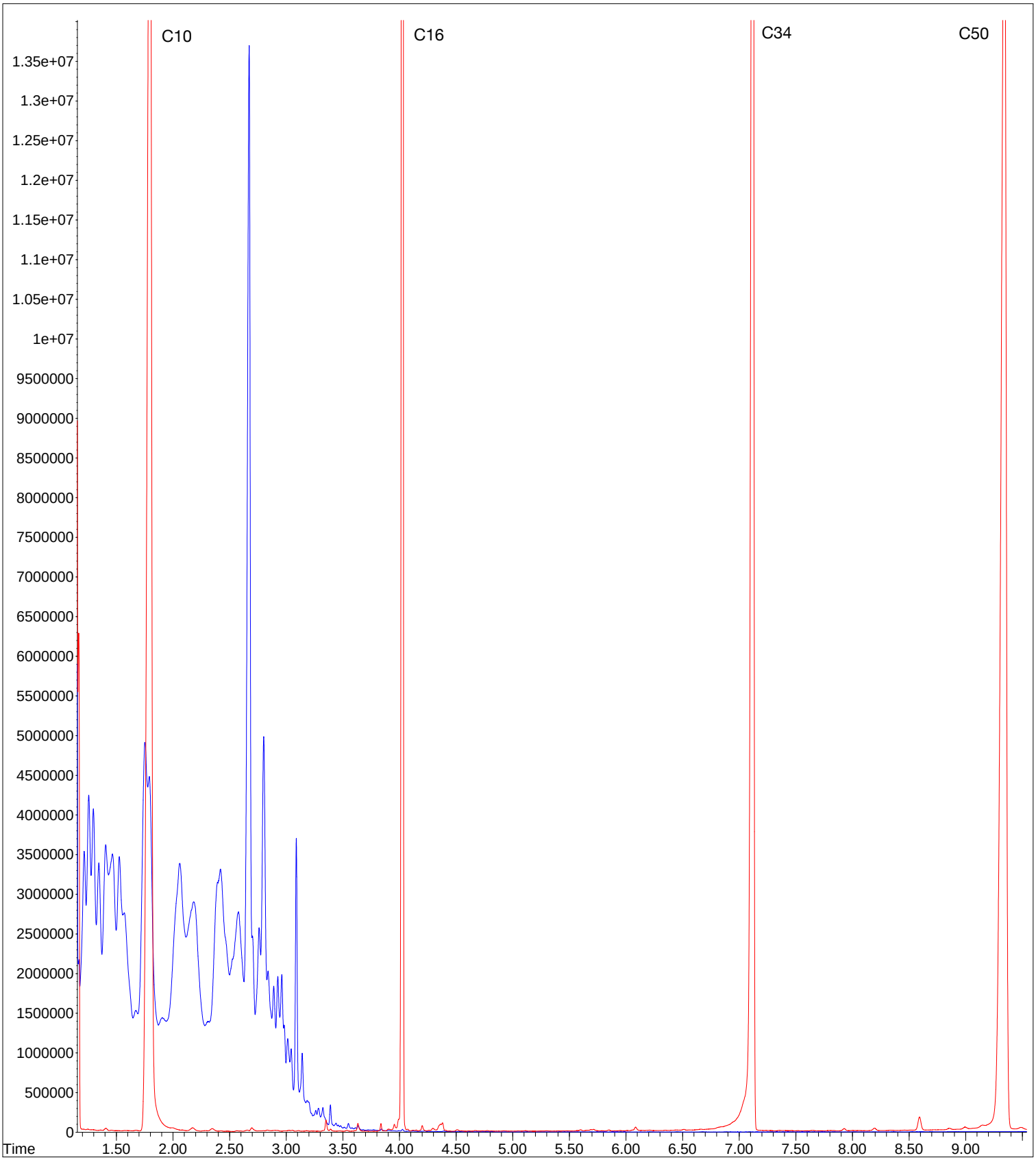
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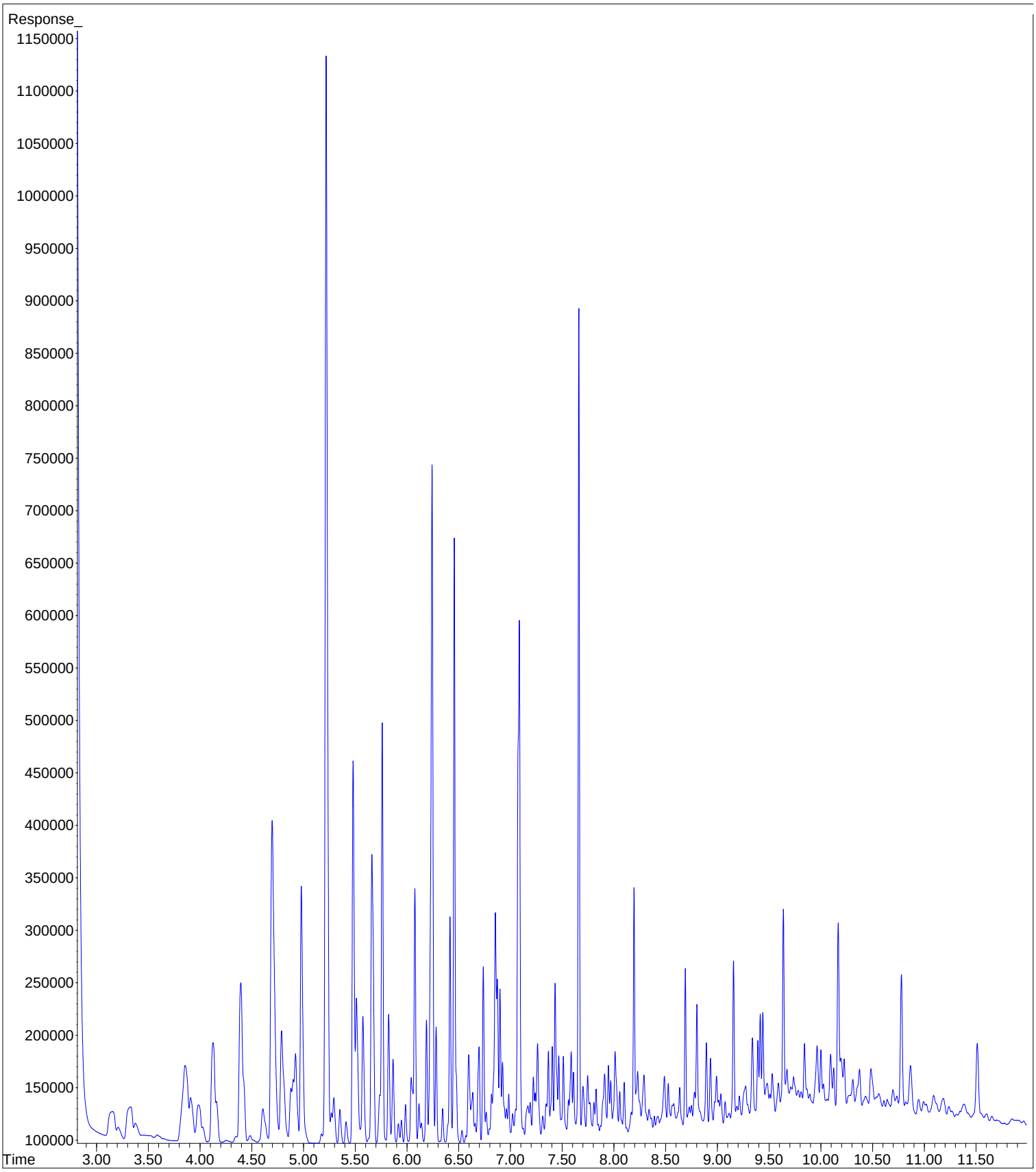
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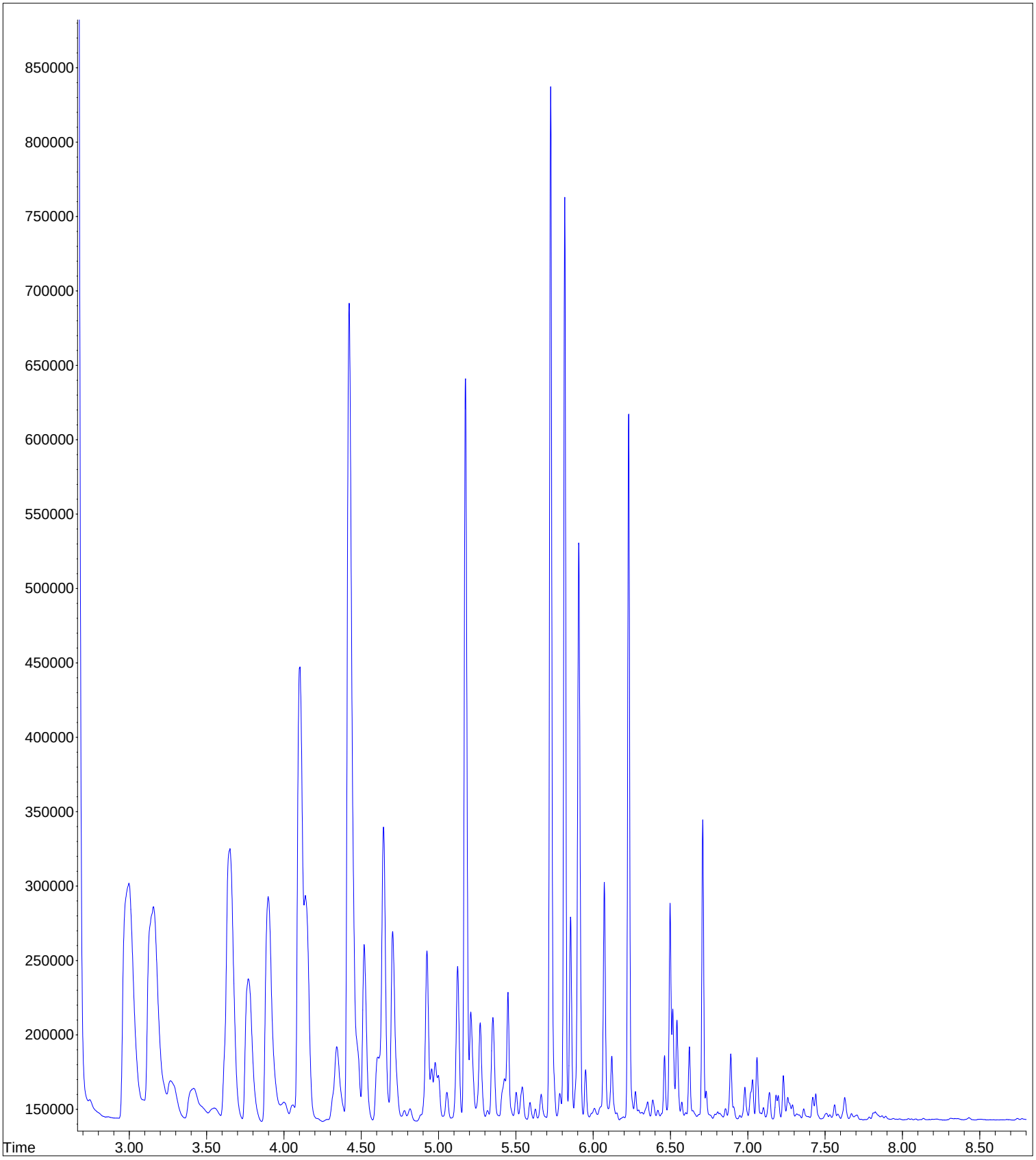

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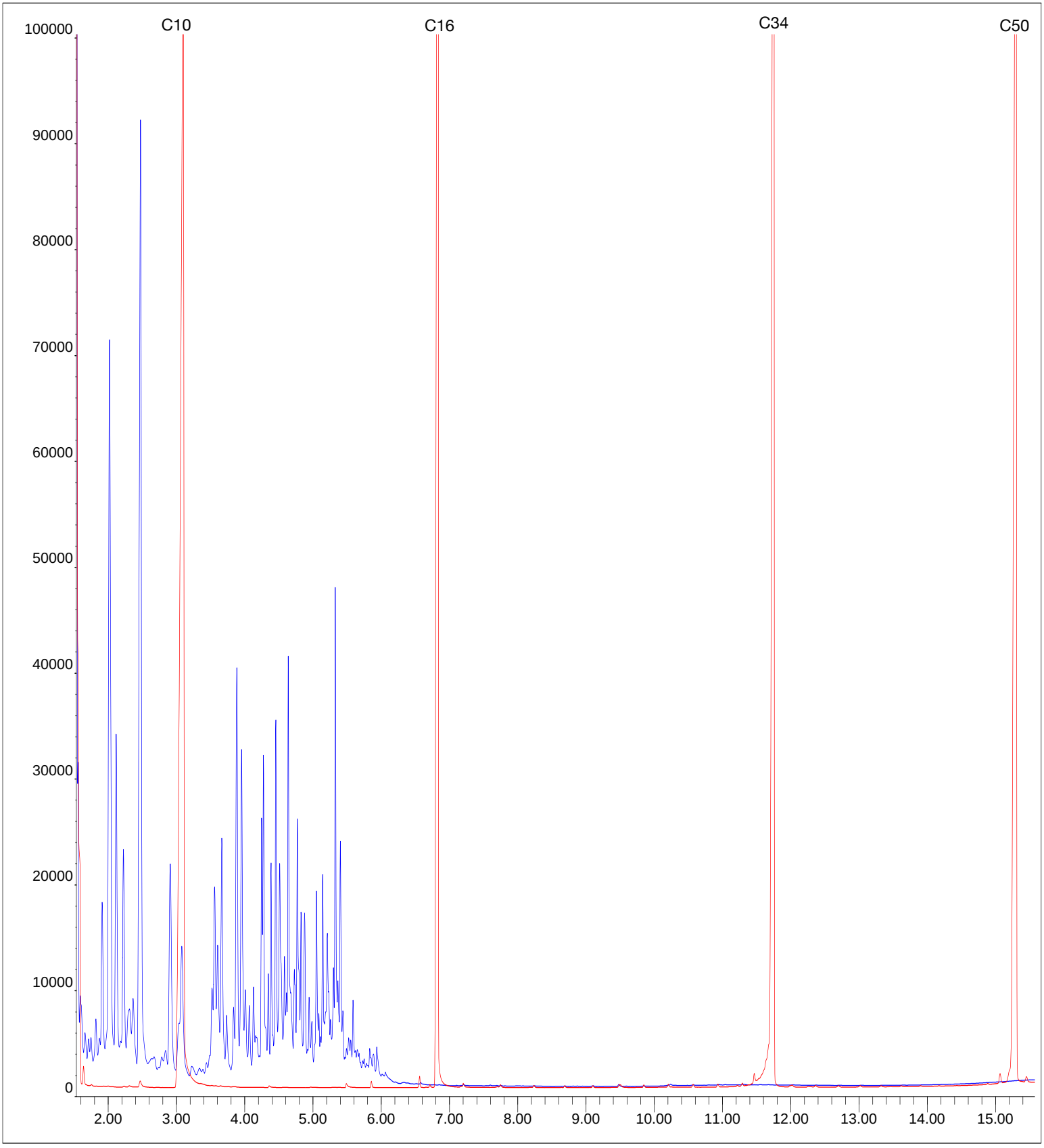

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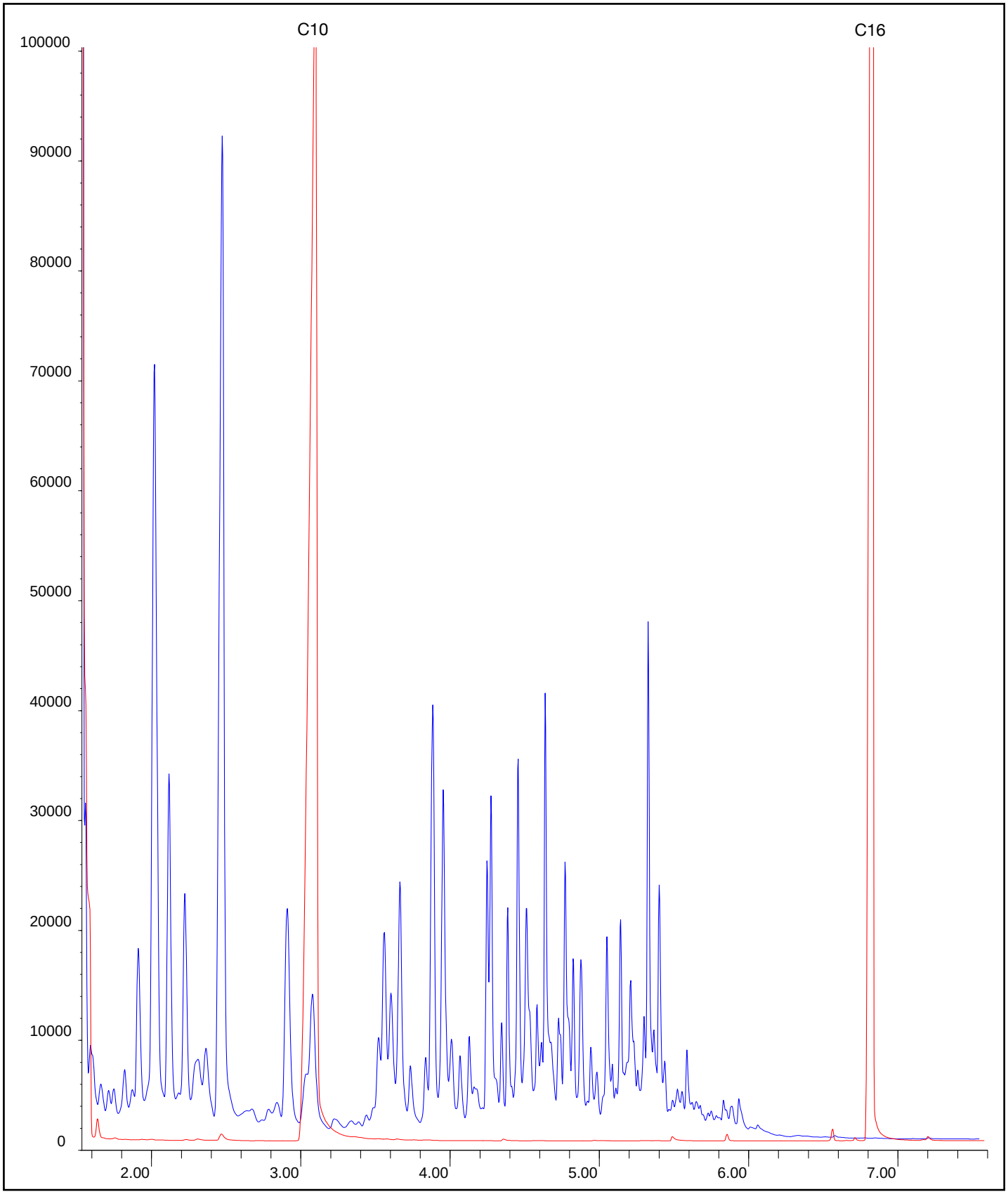

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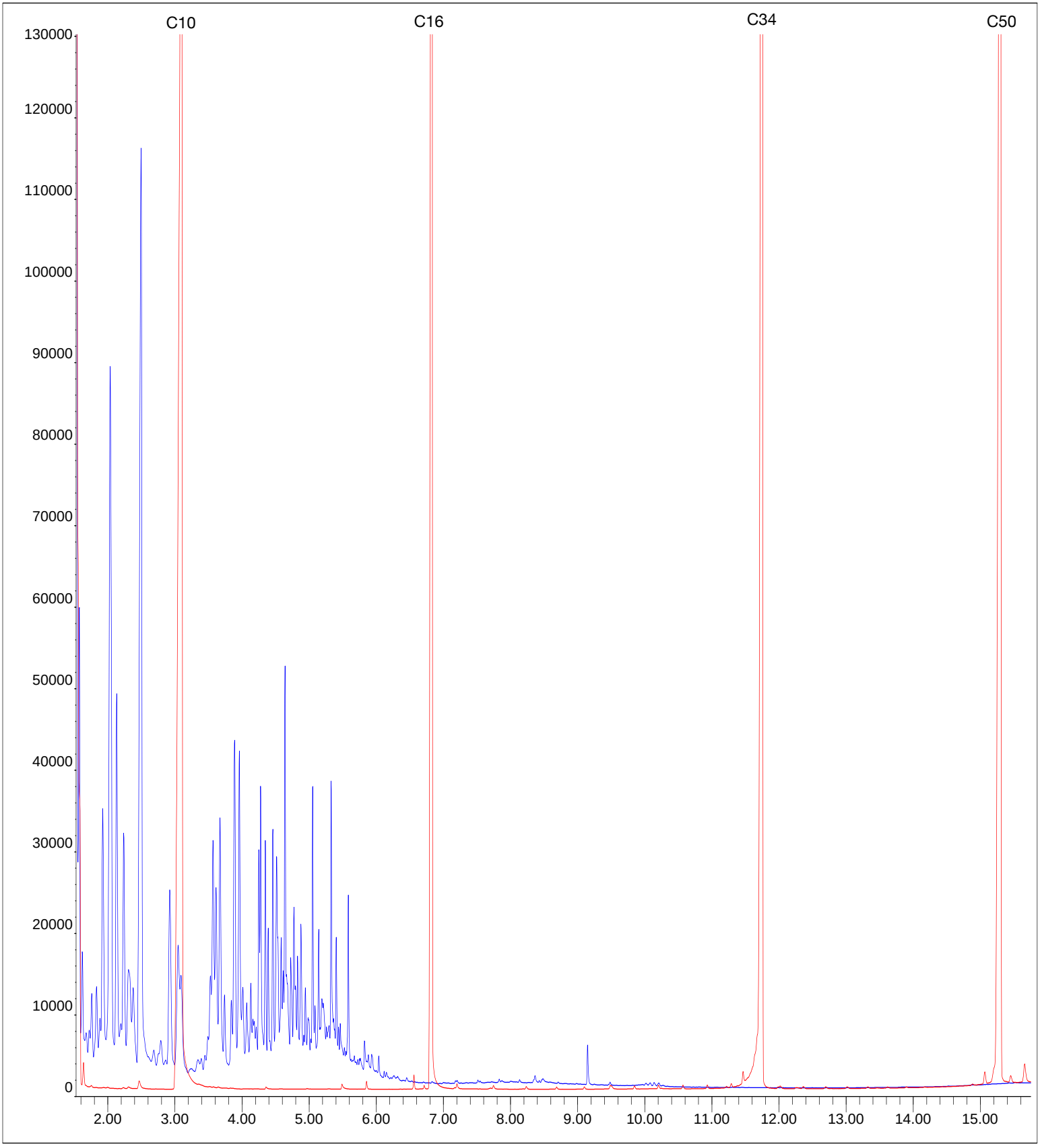

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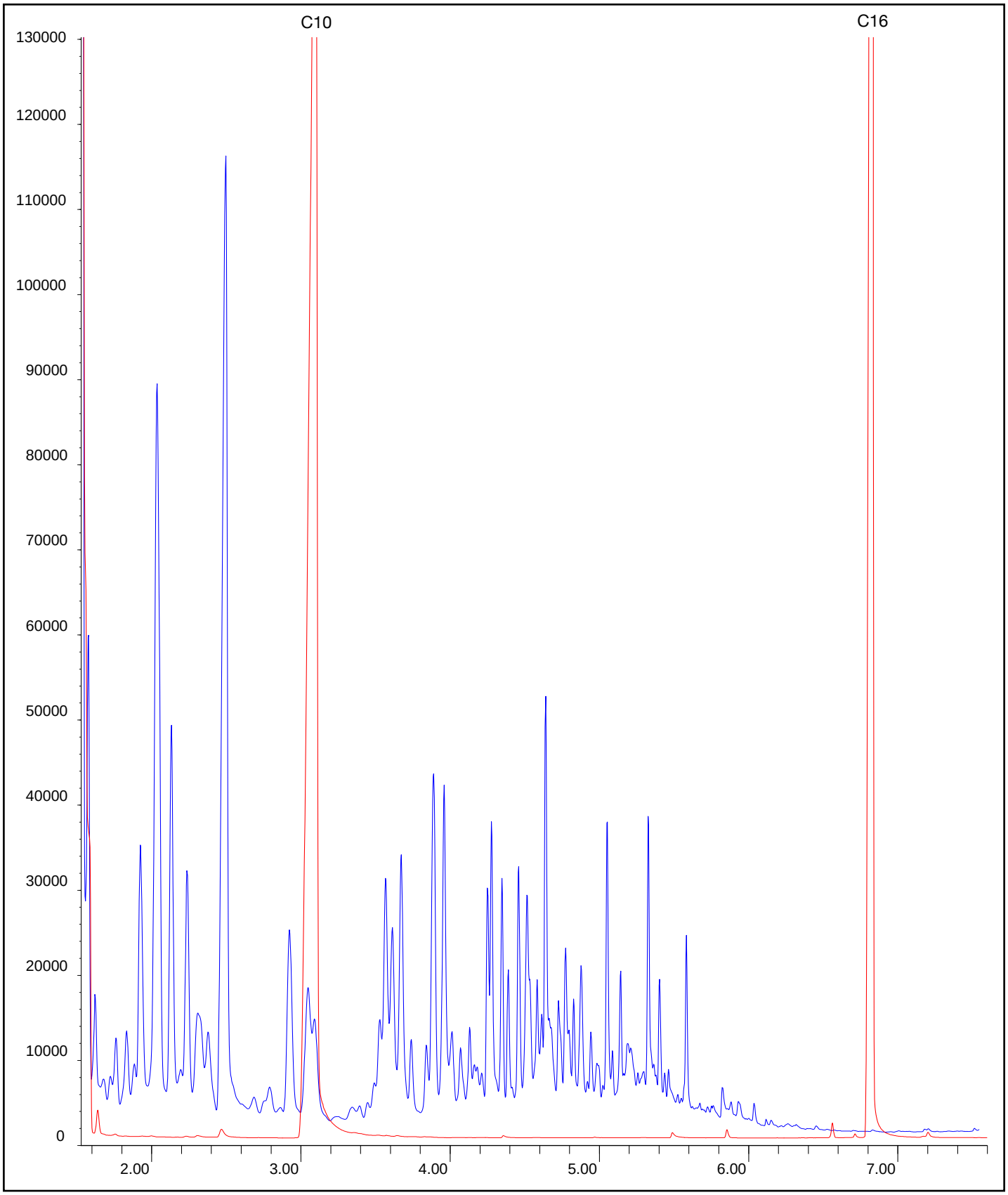

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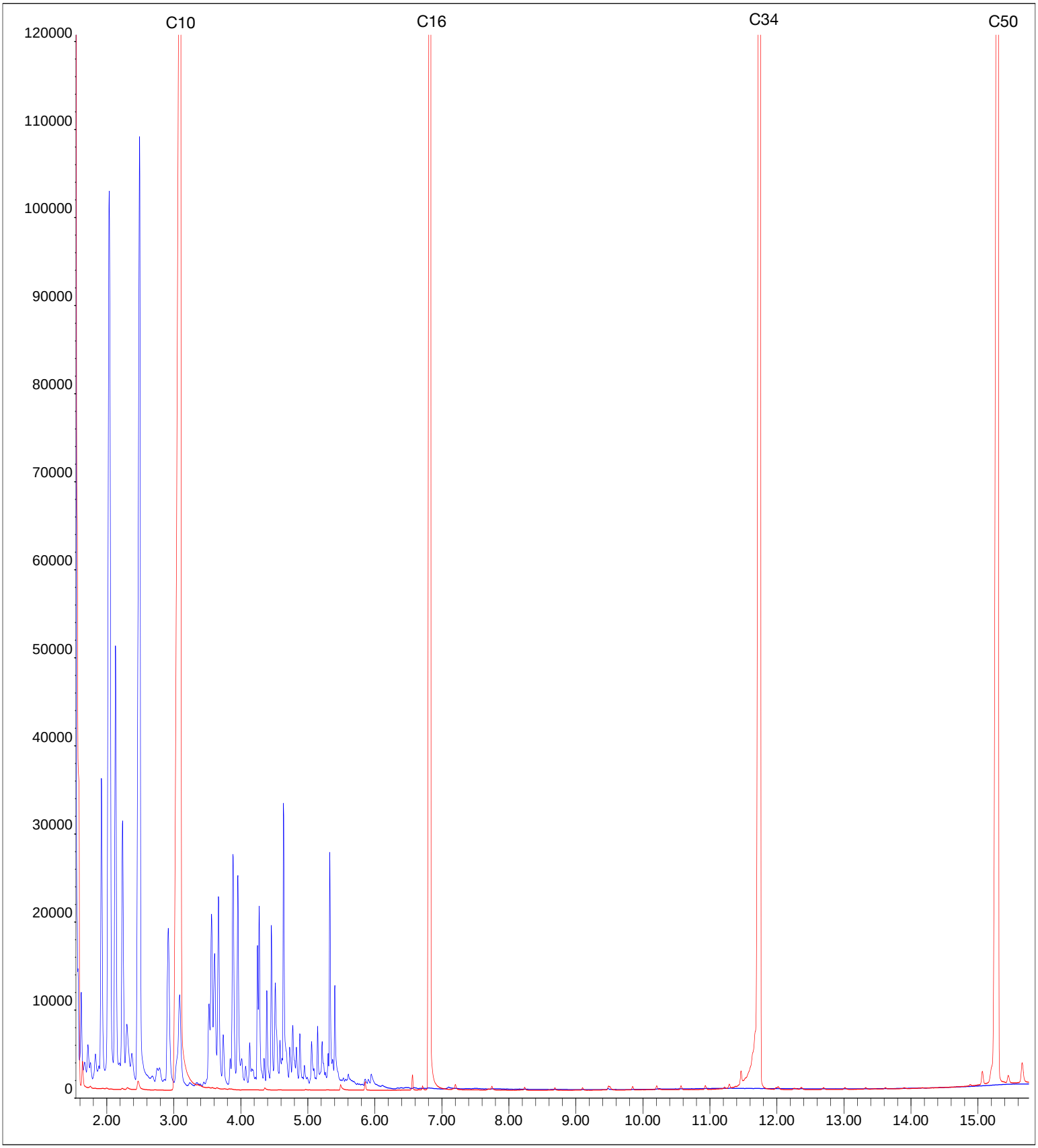

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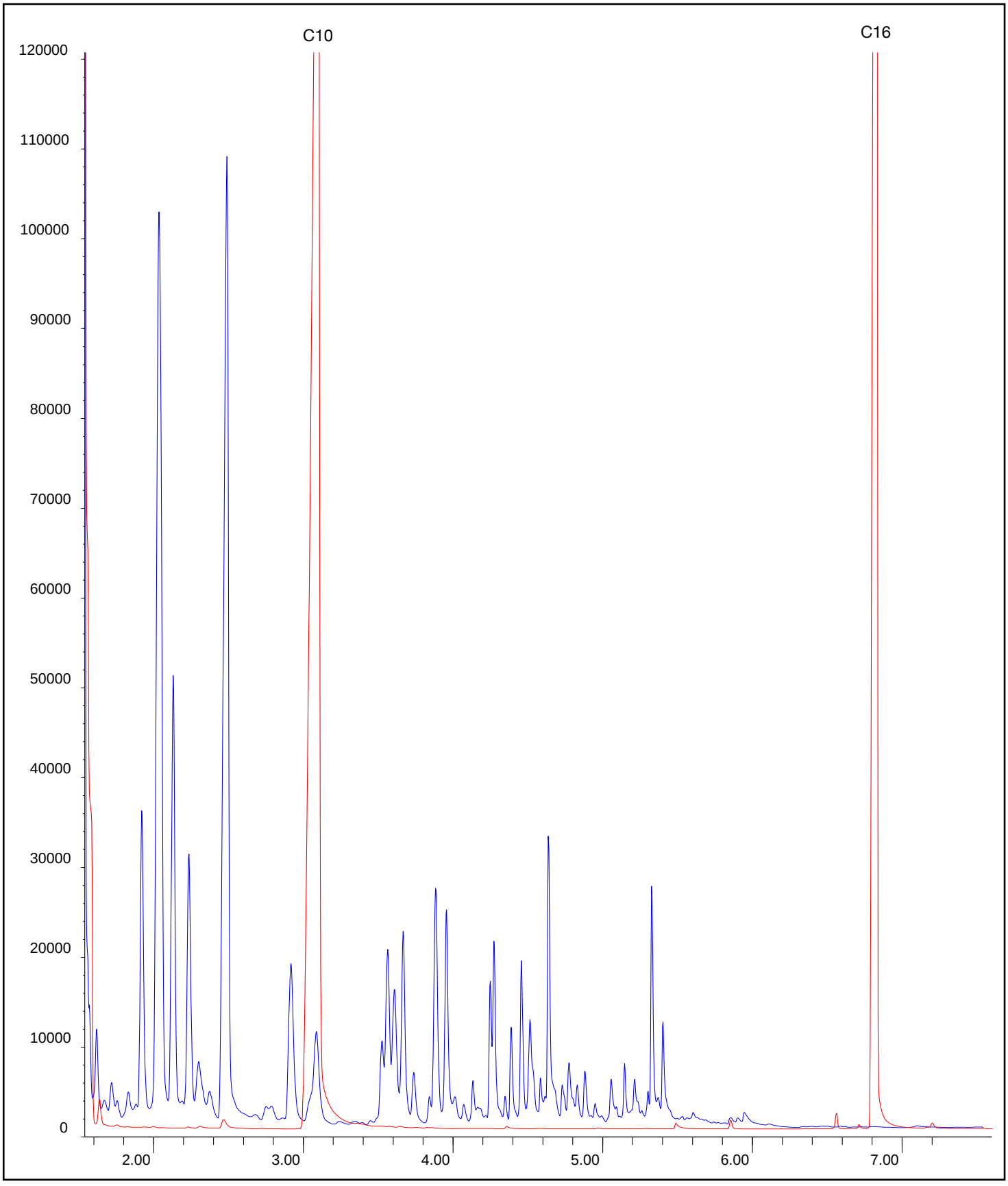

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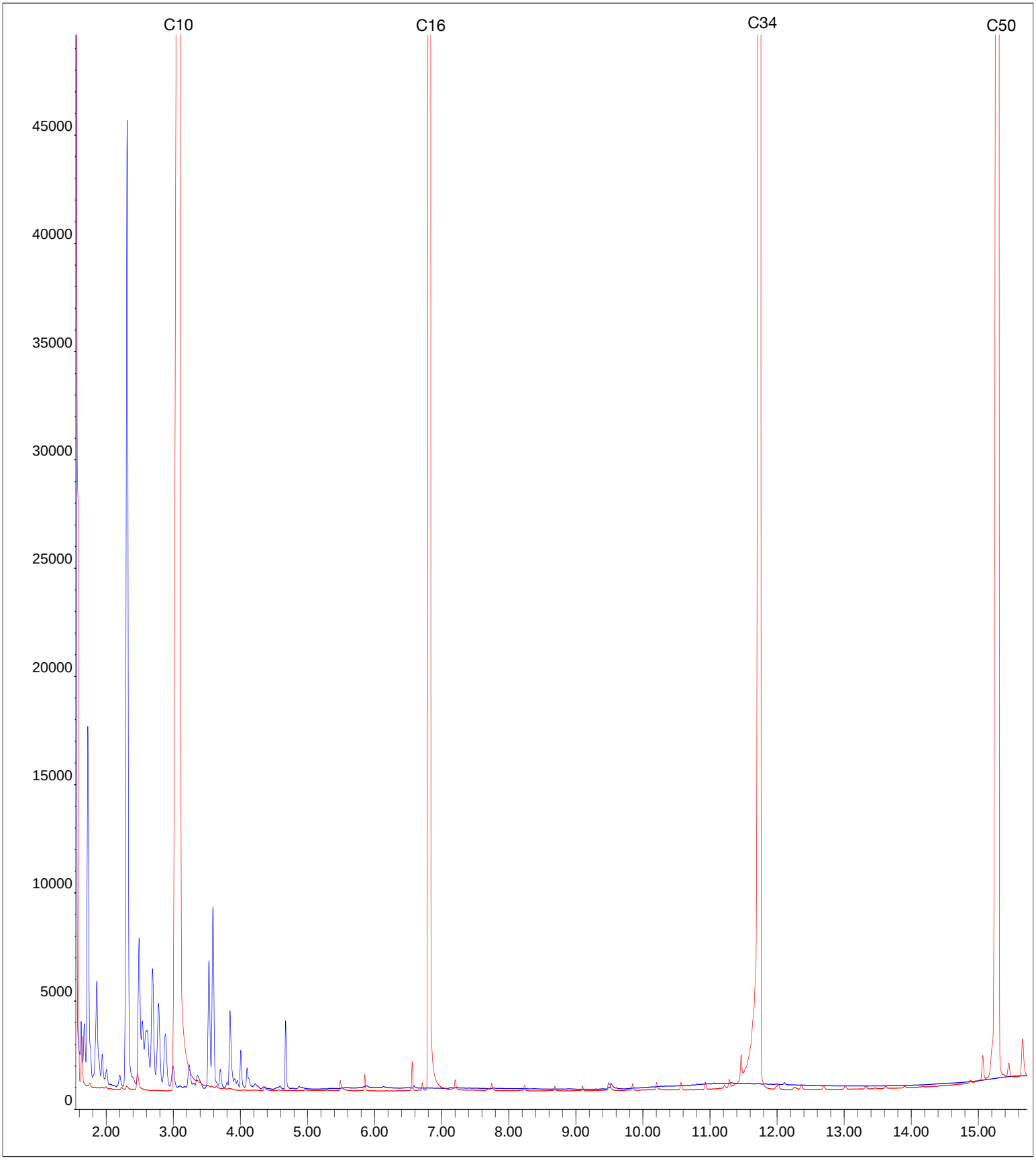

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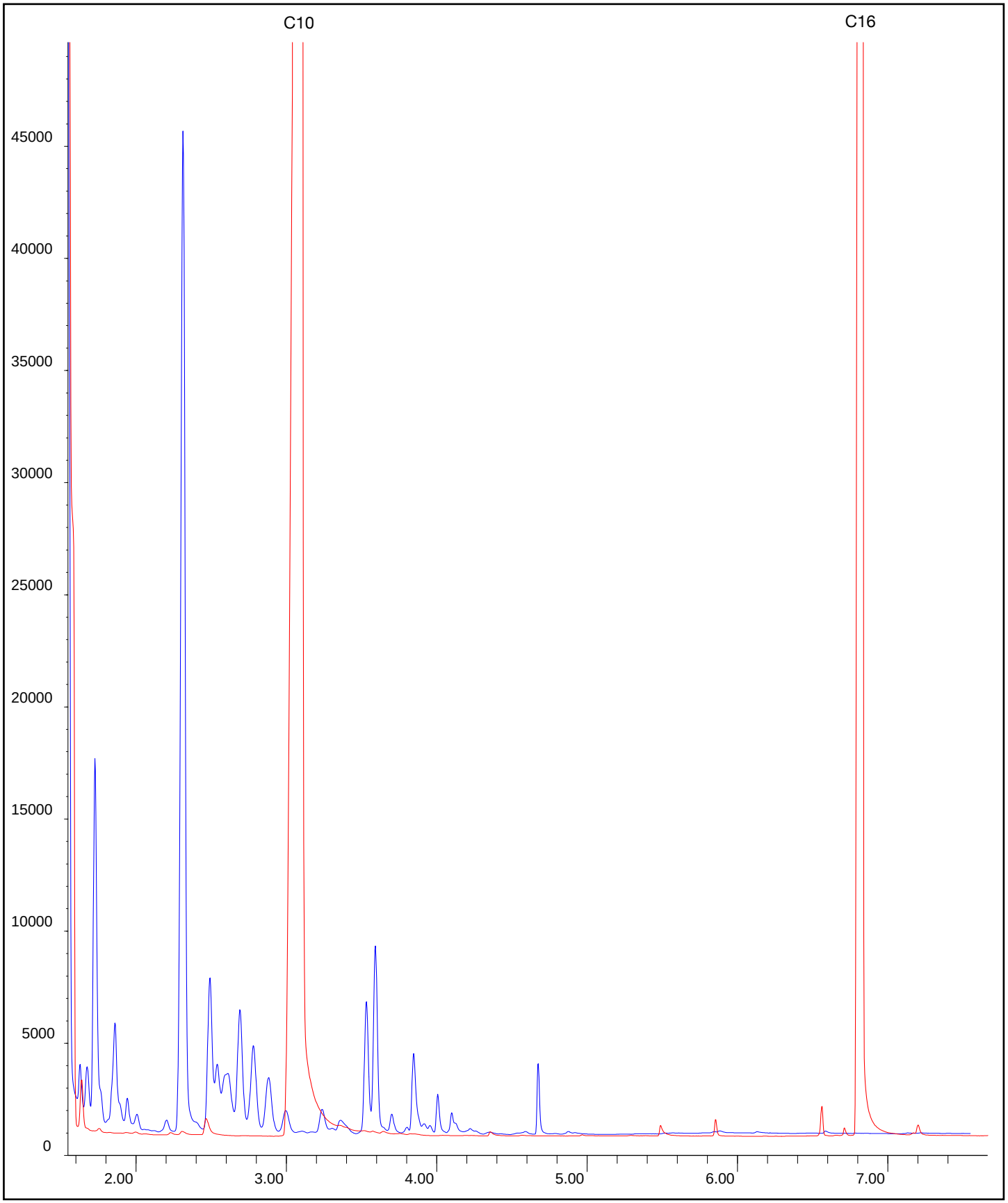

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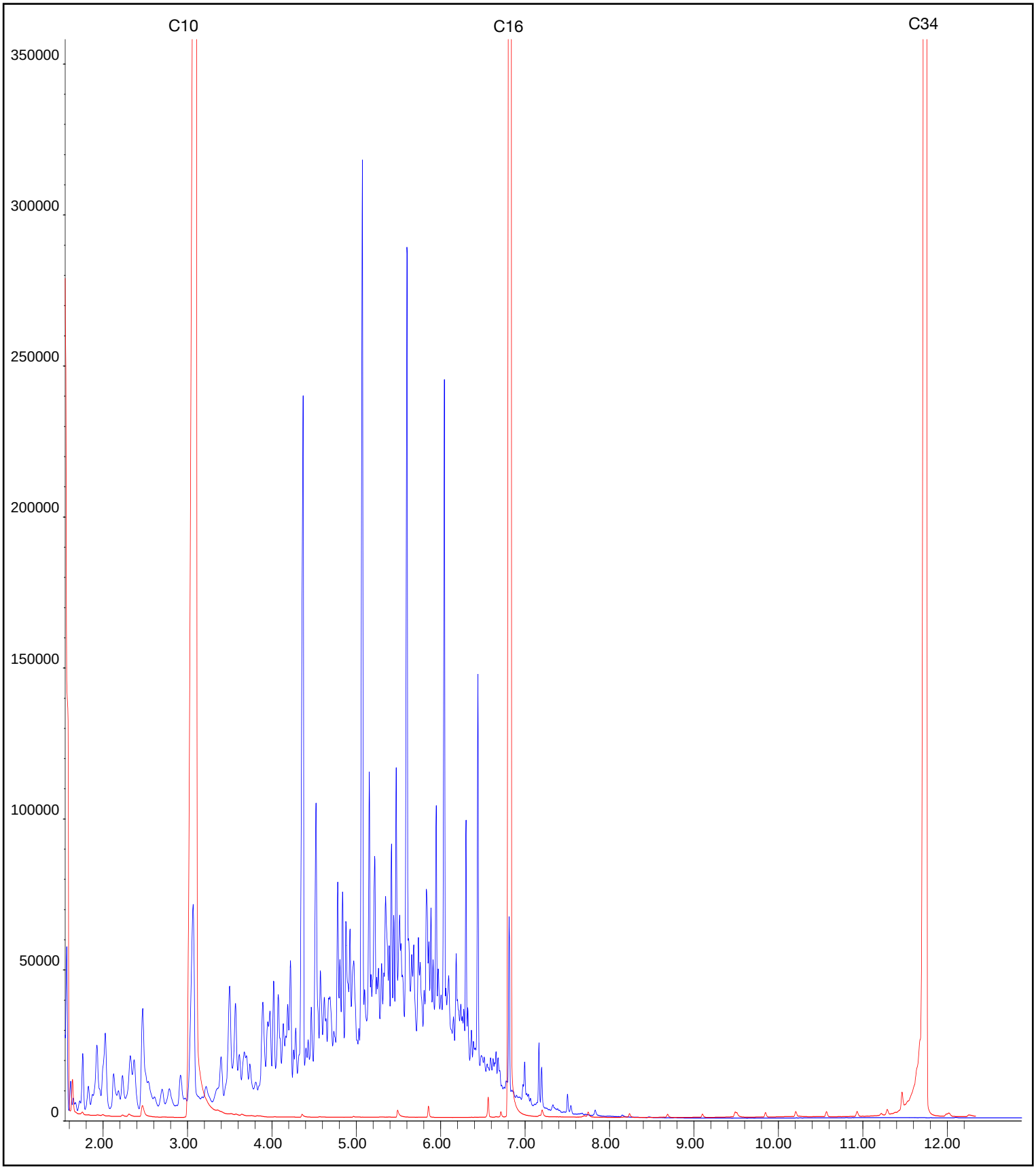
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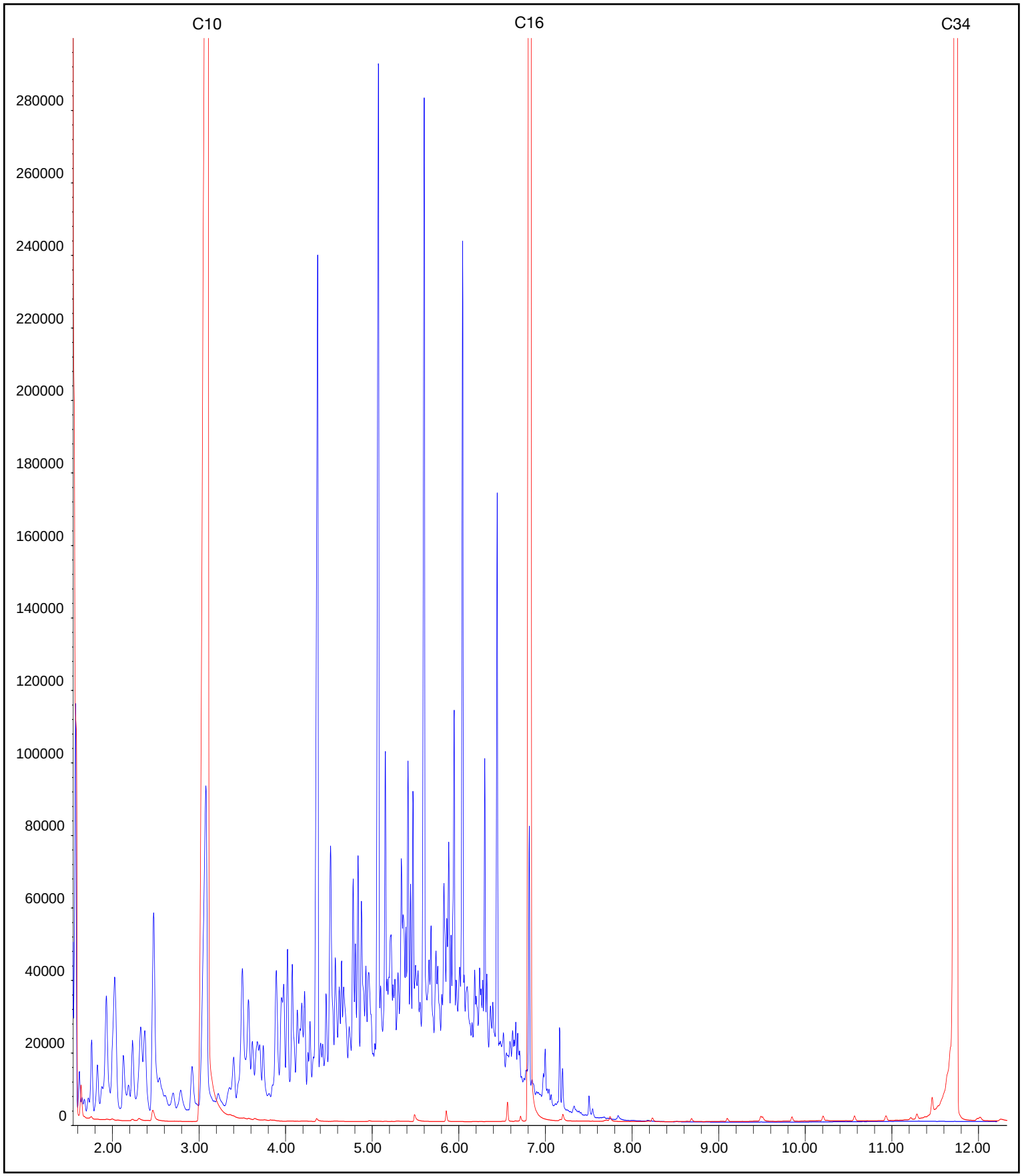

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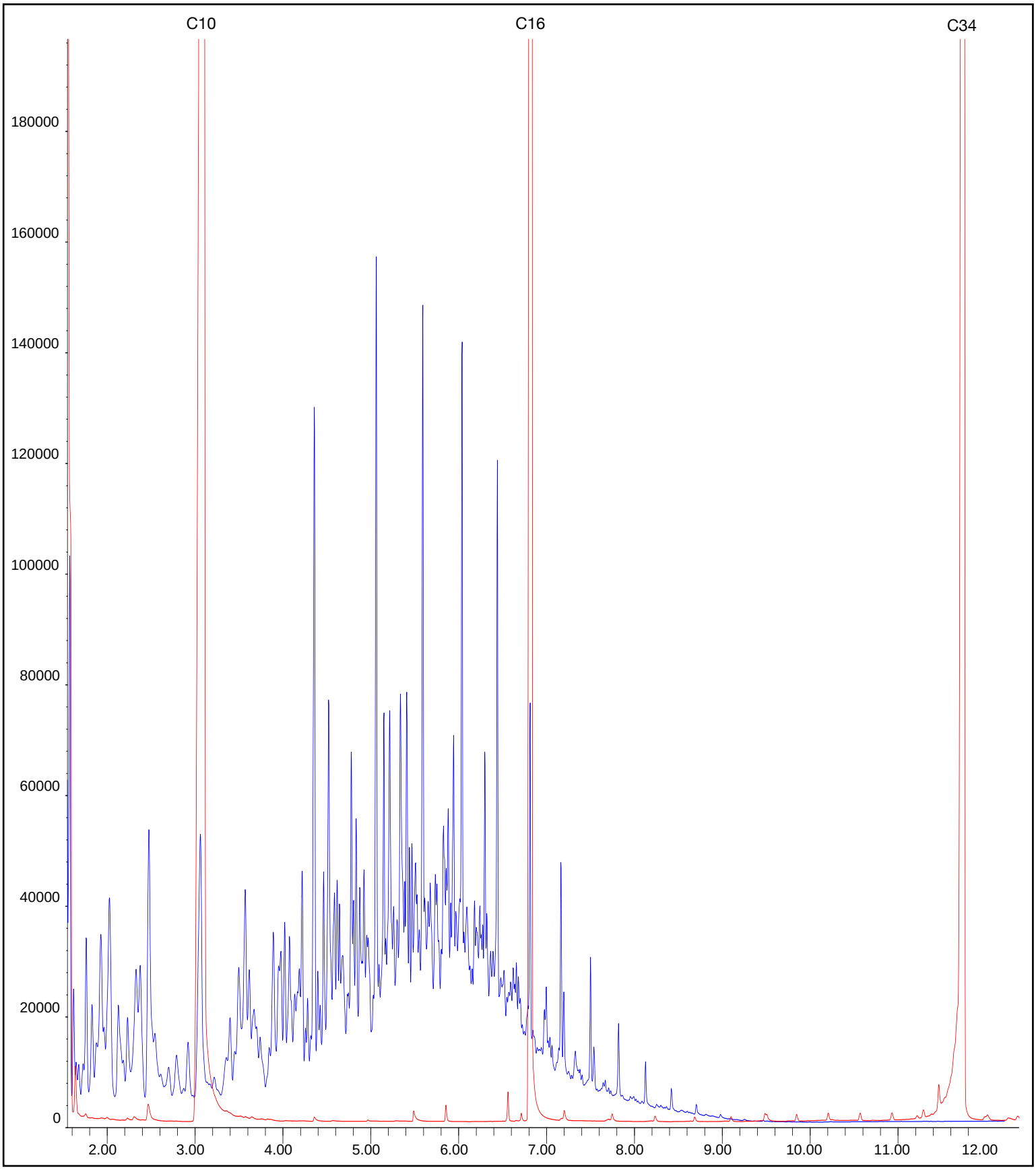
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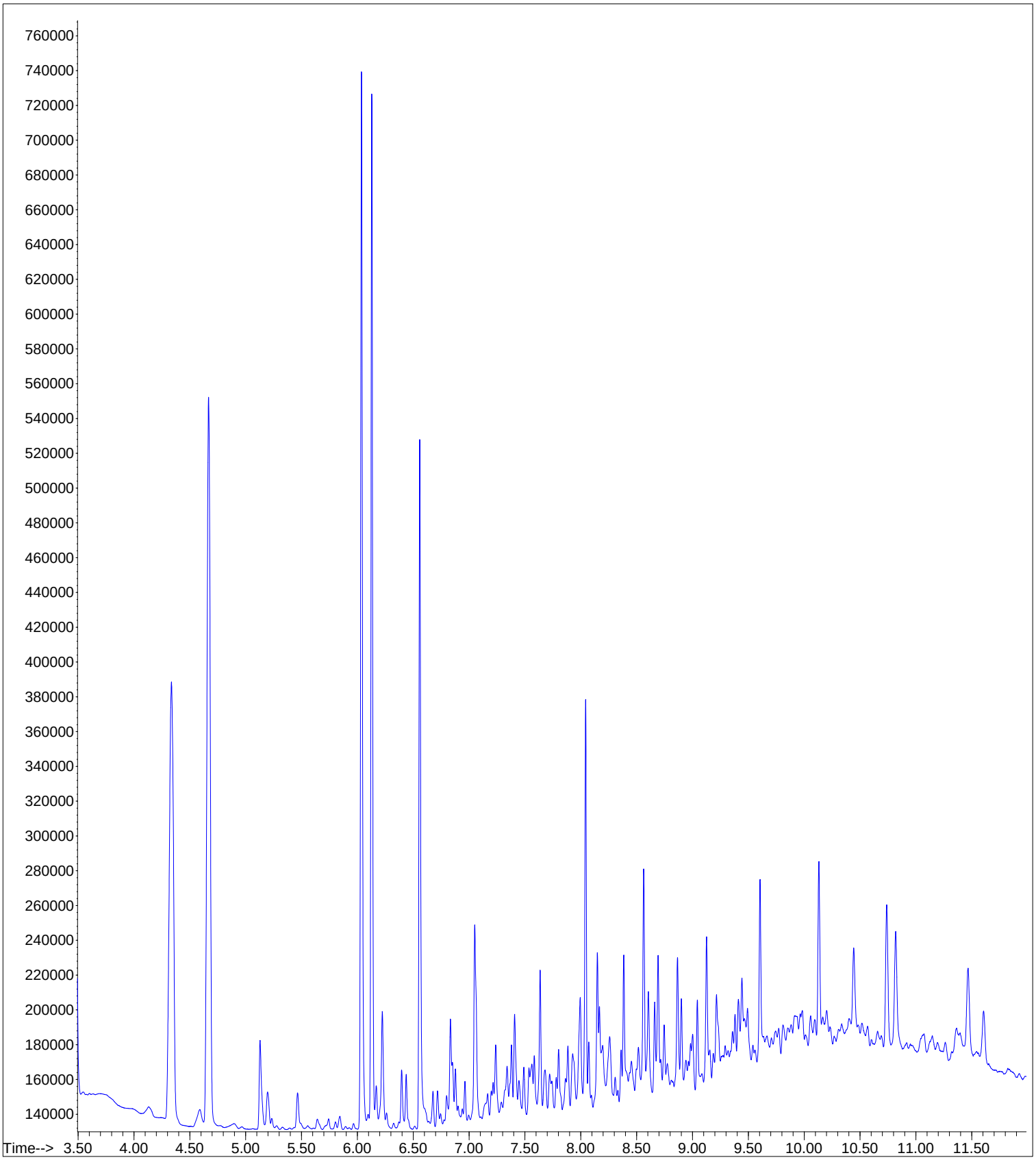
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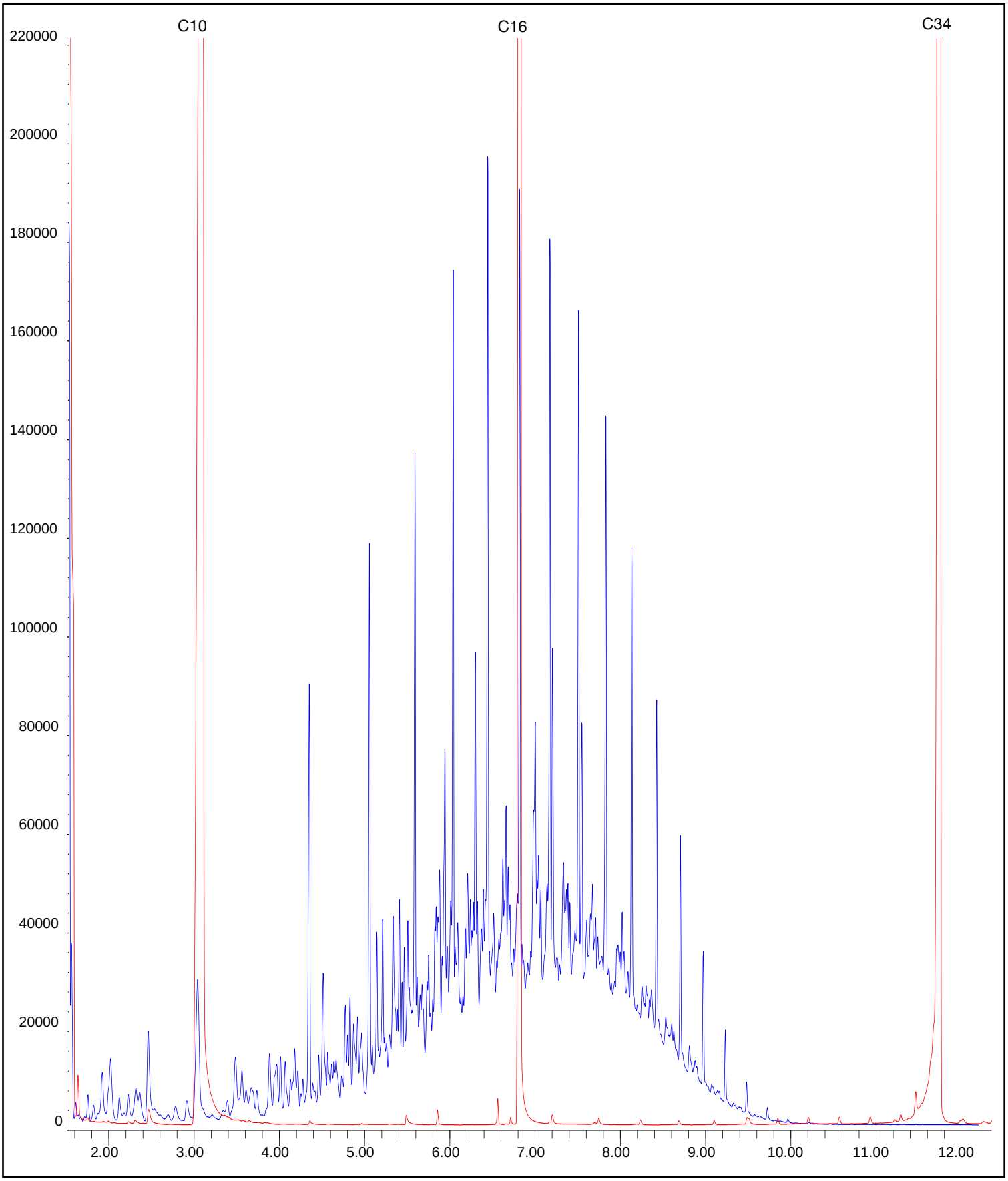
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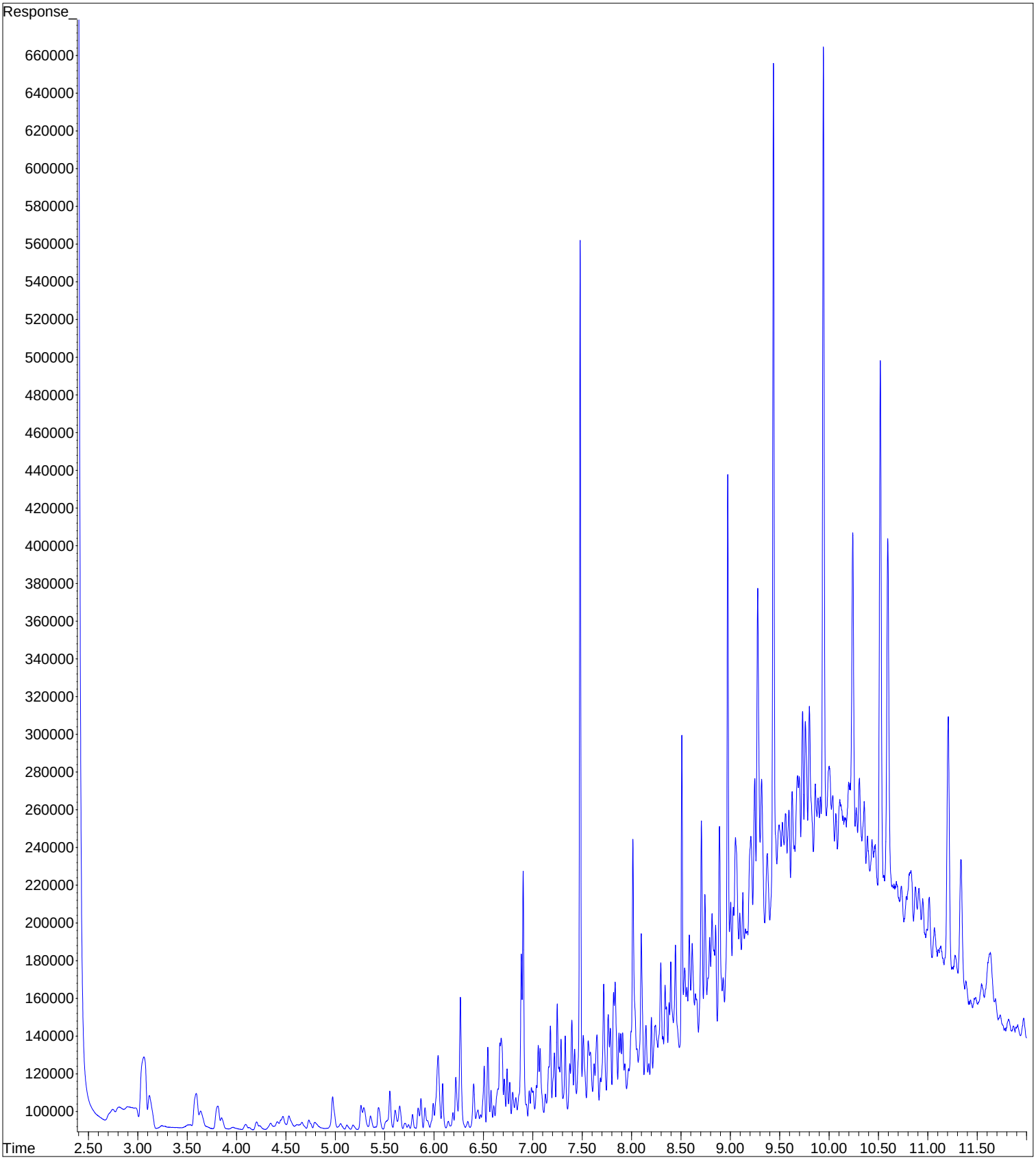

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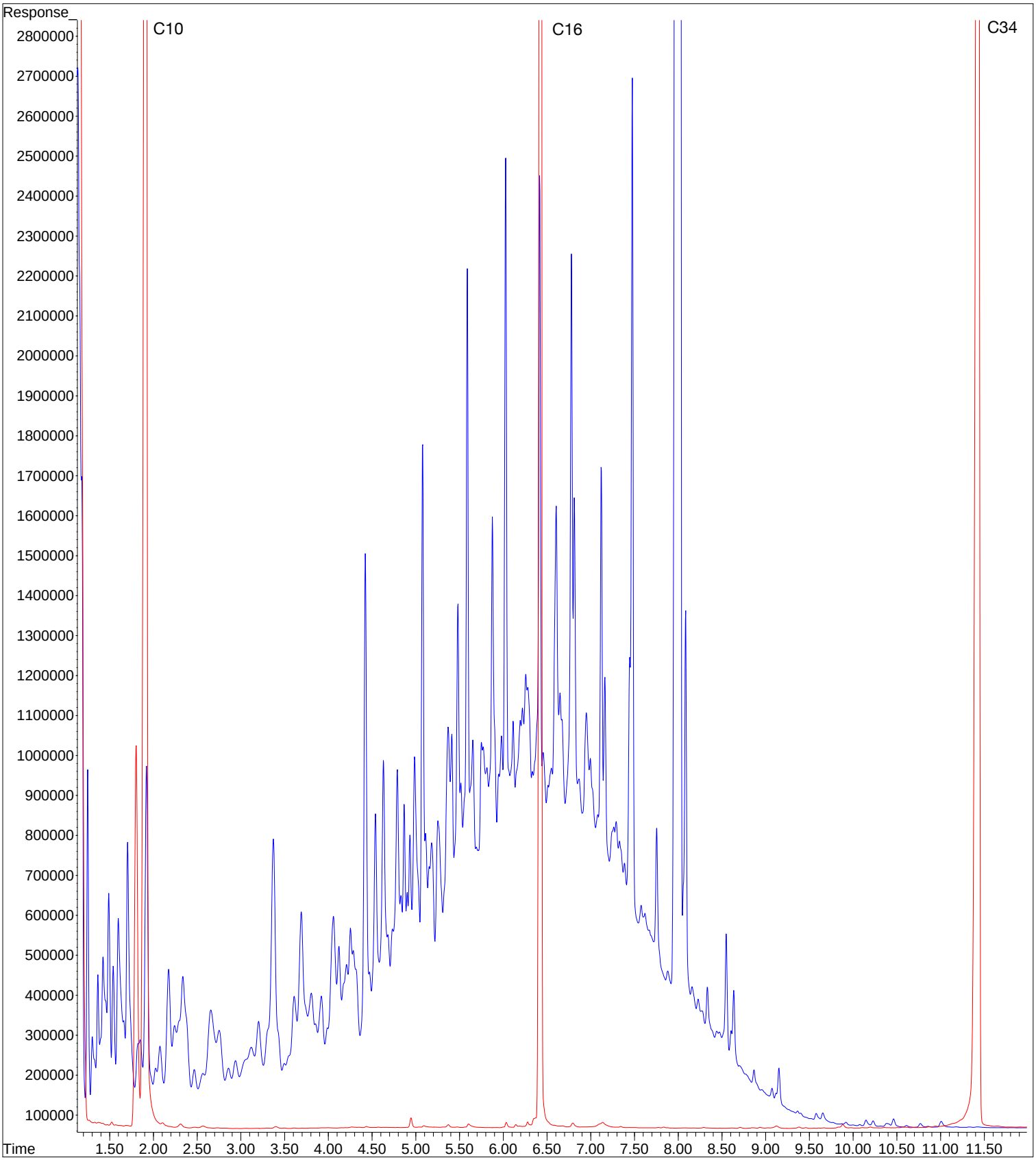

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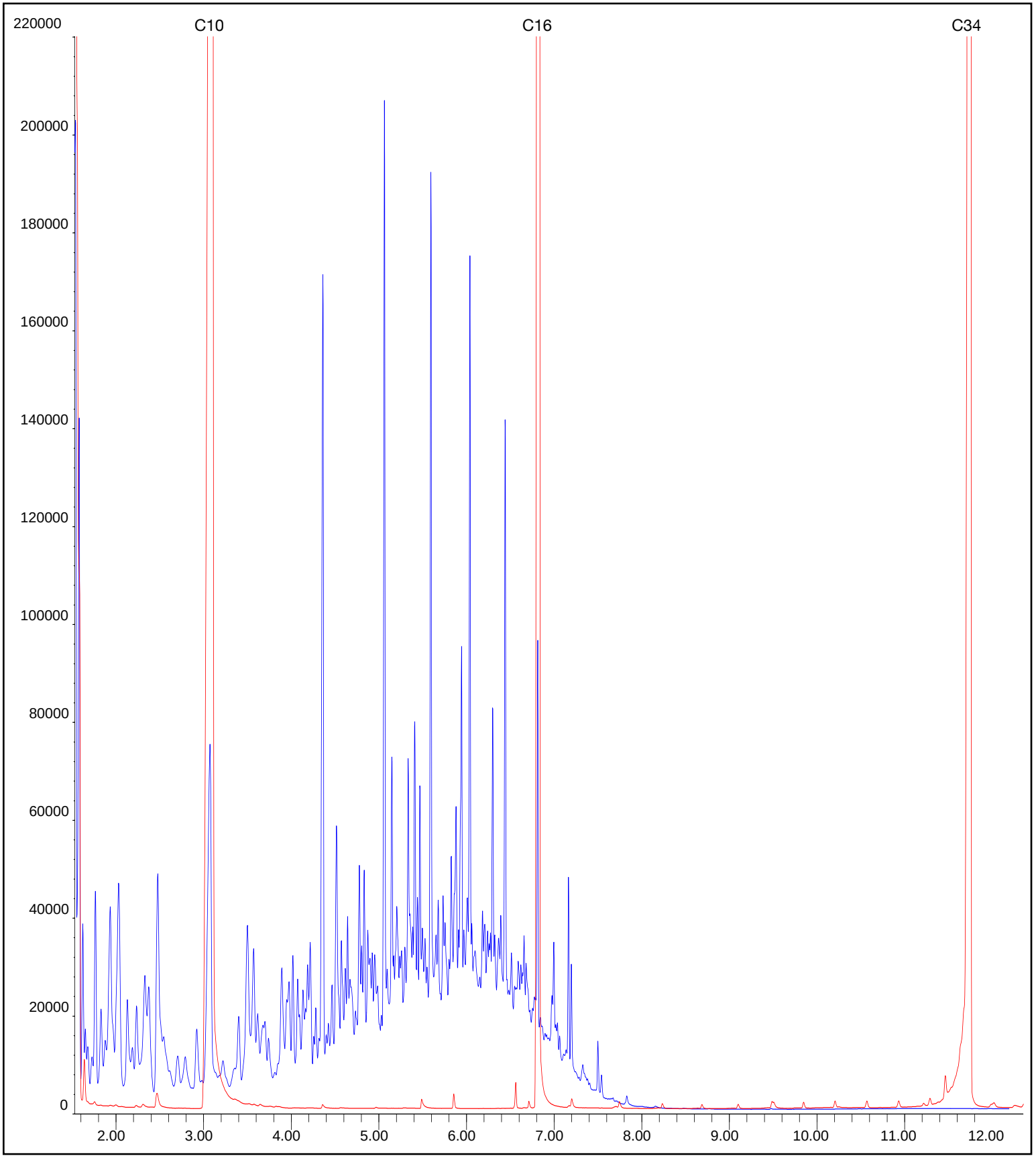

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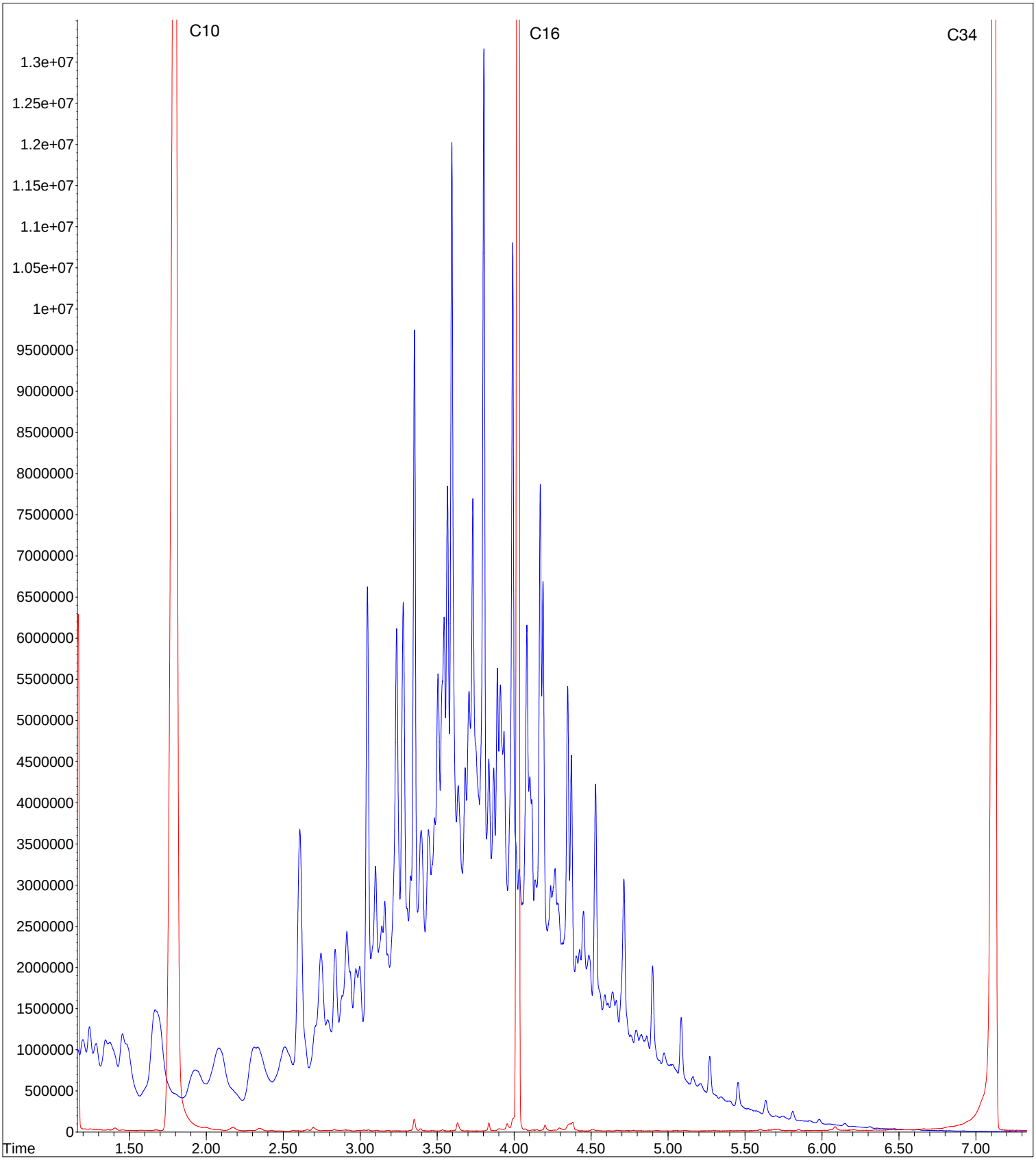
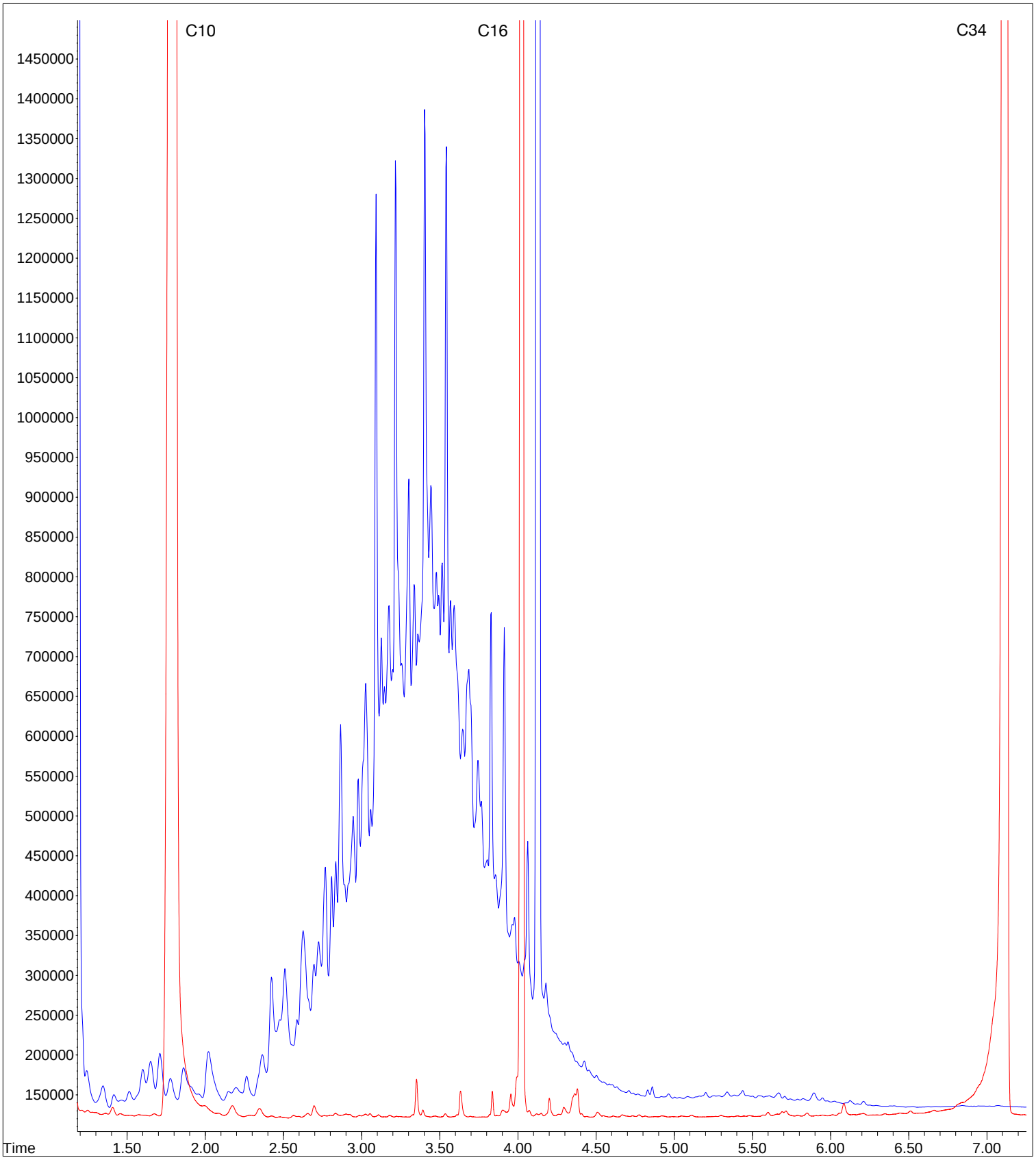


WEATHERED DIESEL / FUEL OIL



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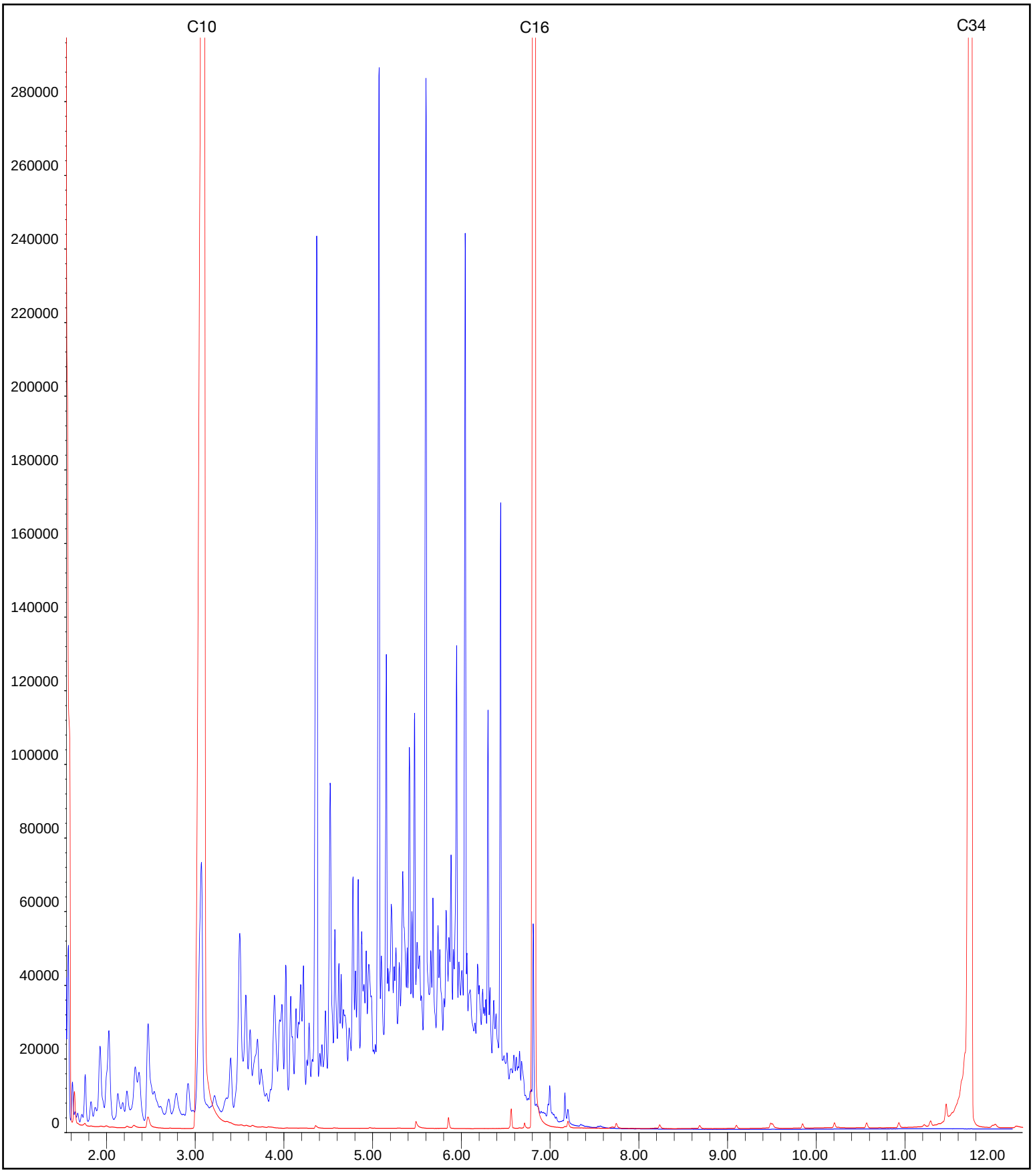
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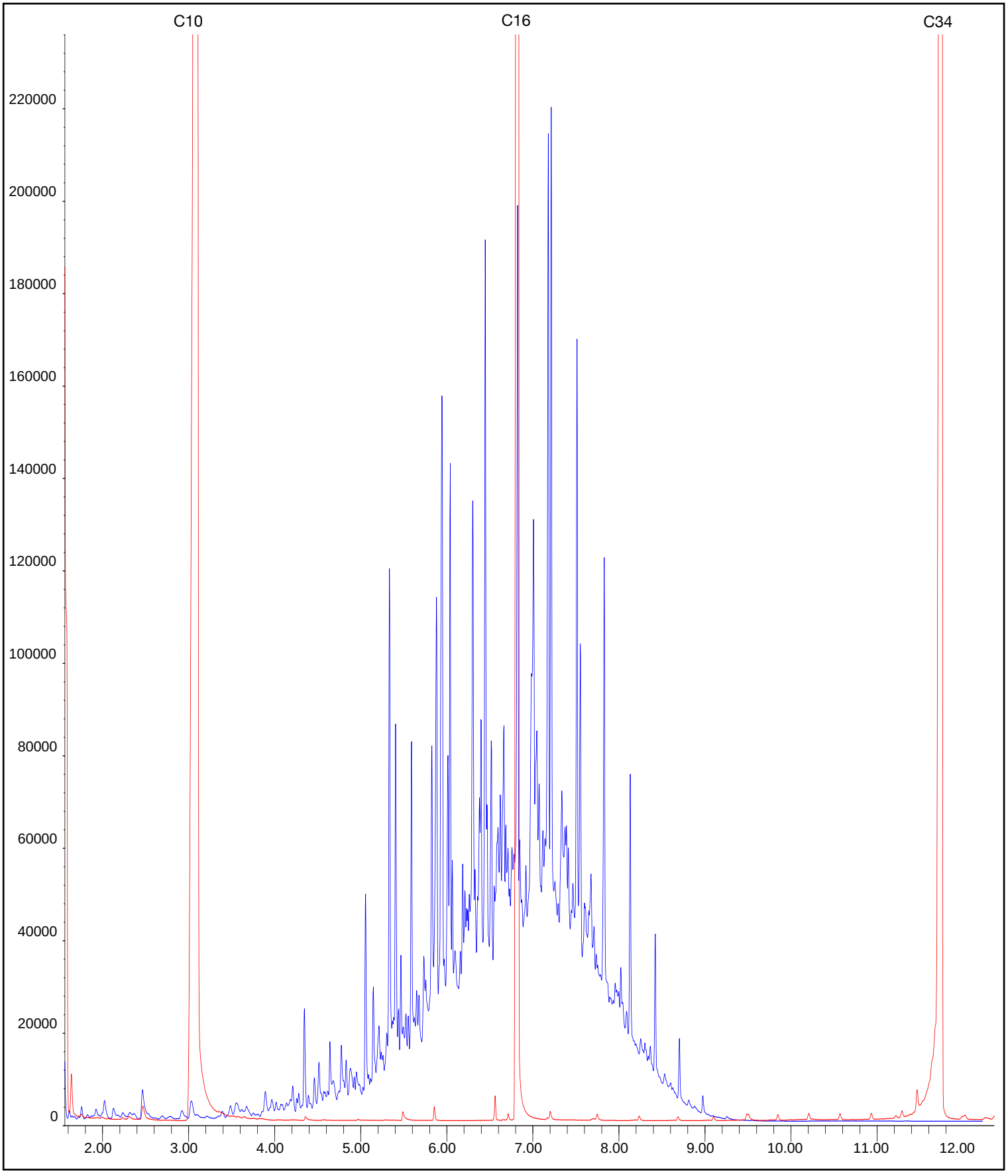
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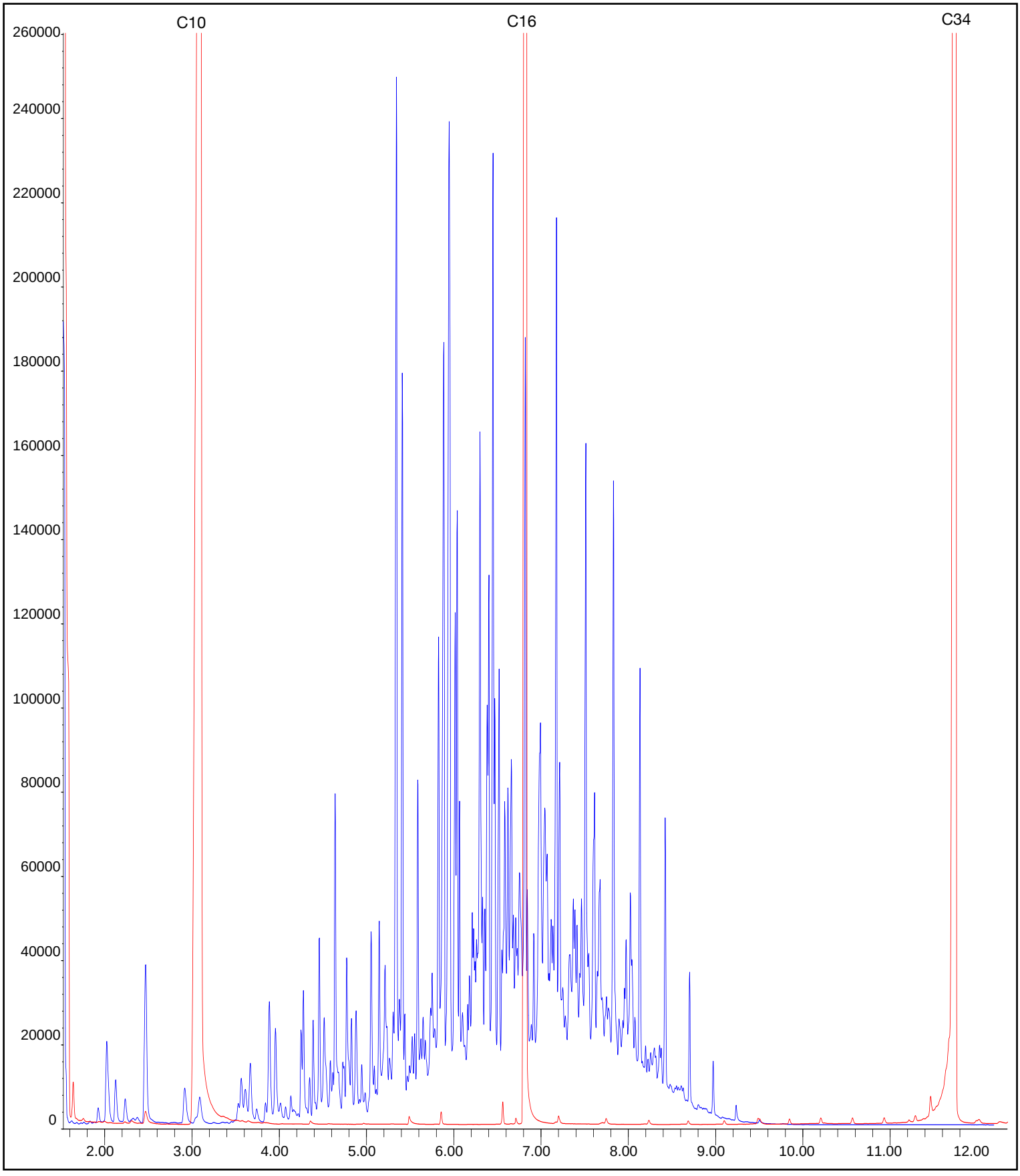
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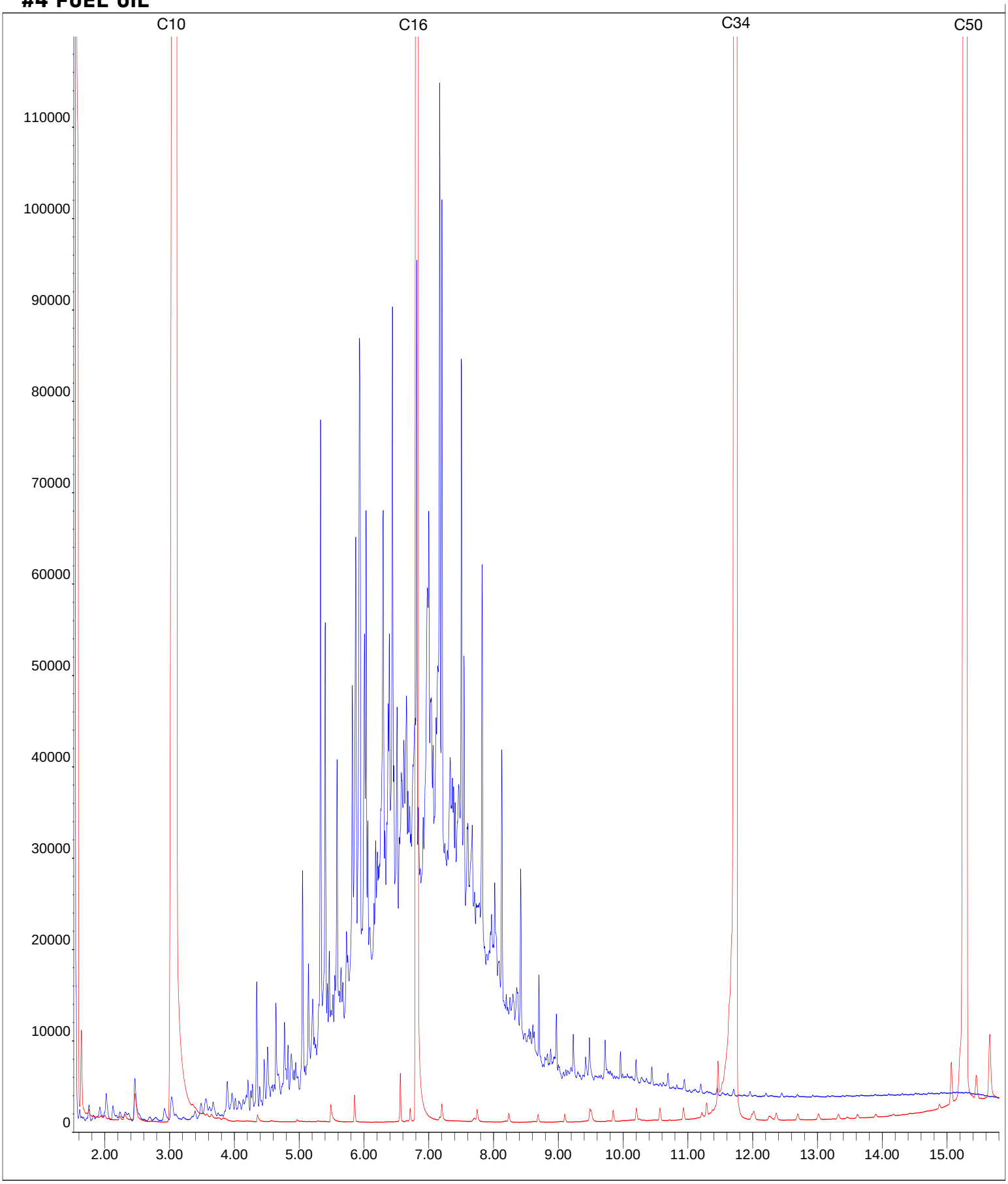
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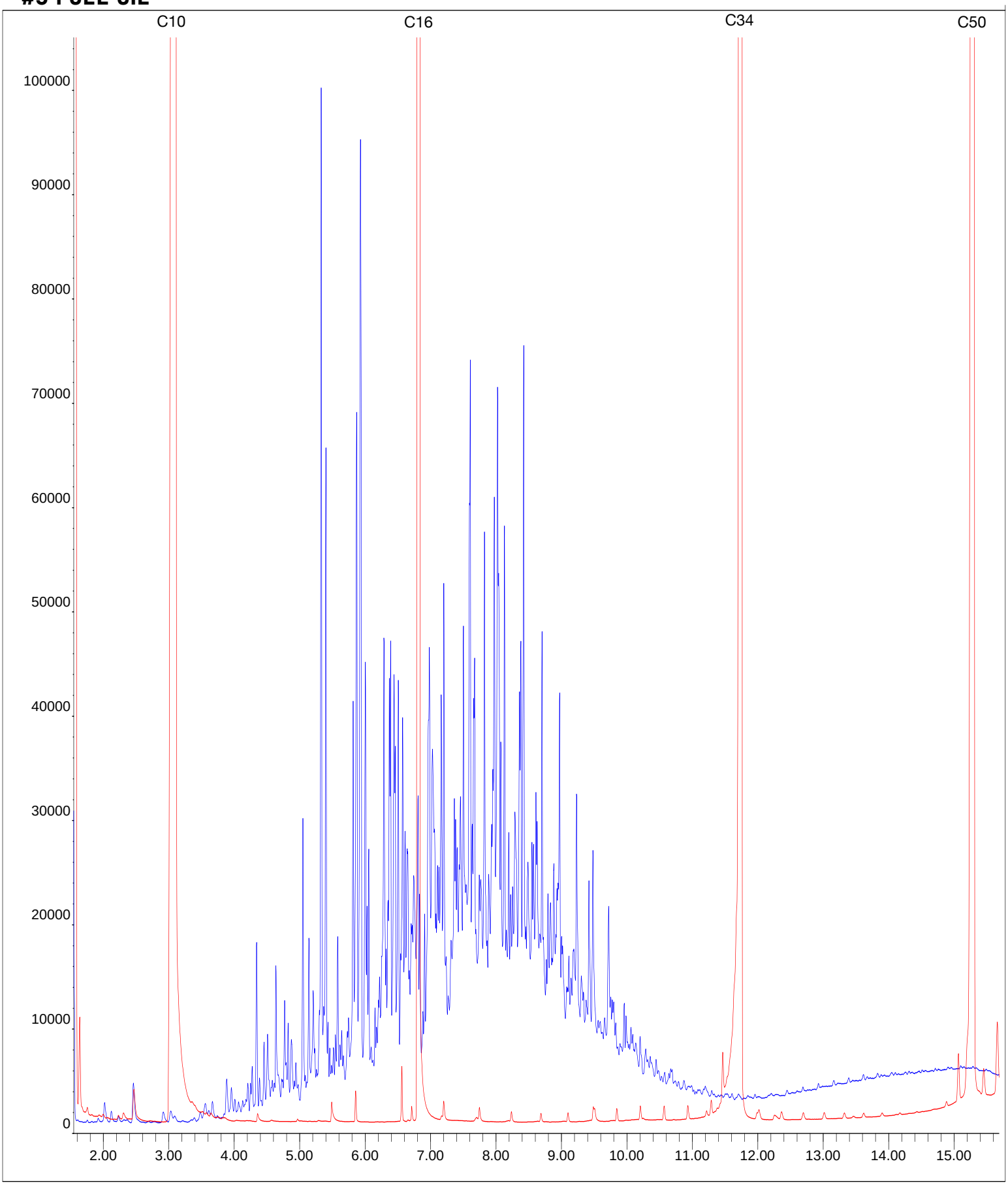
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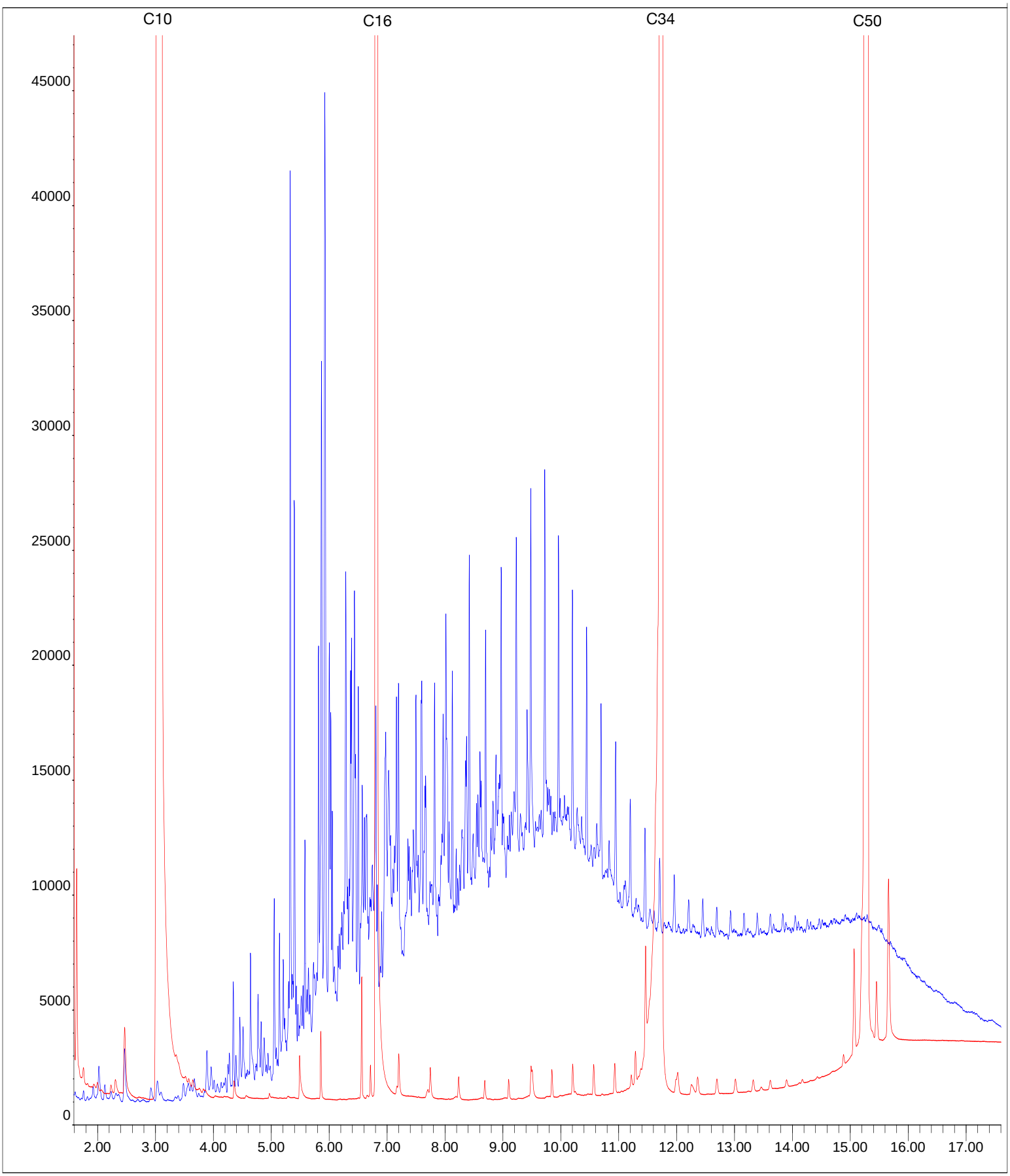
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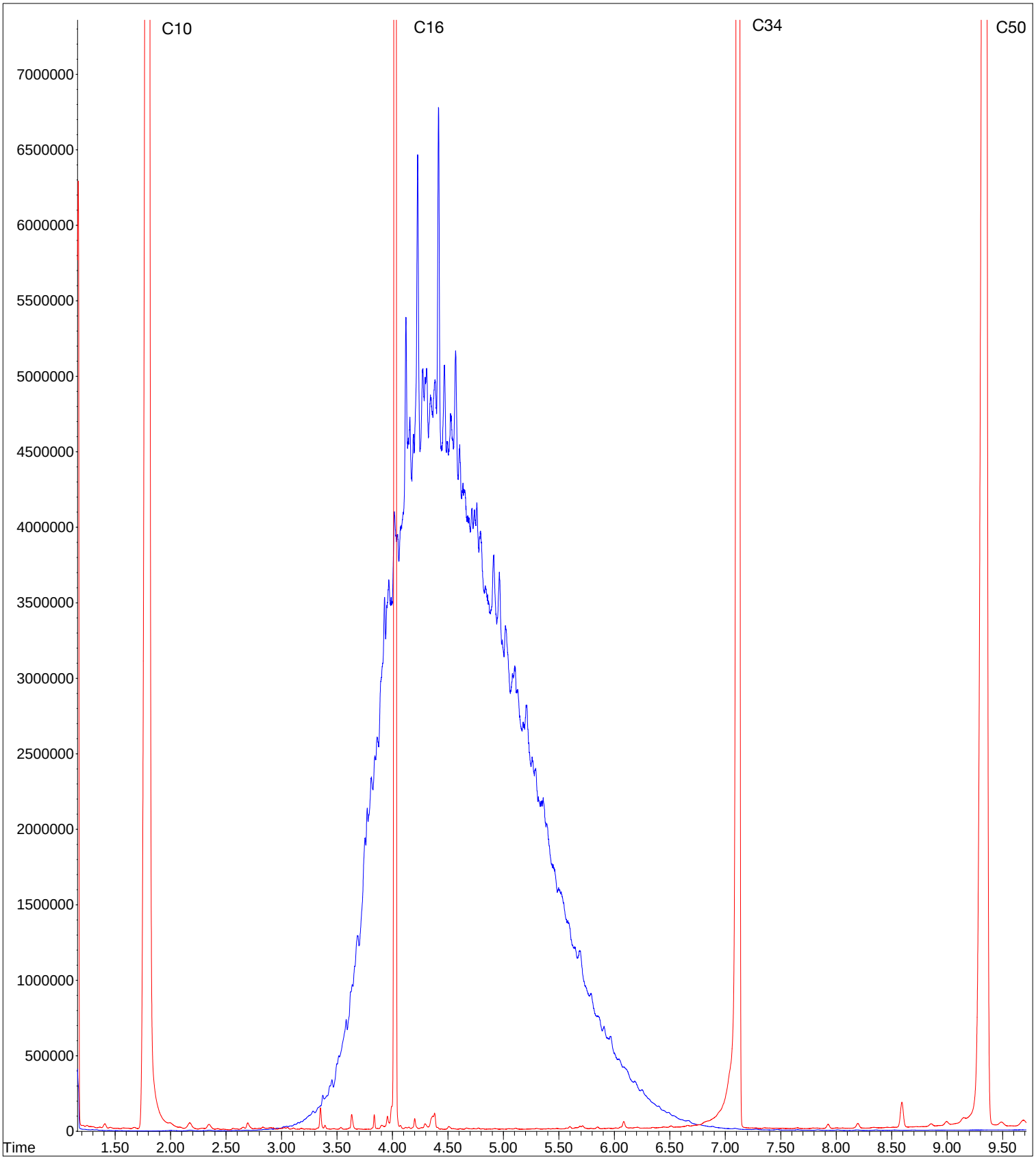
TRANSFORMER OIL



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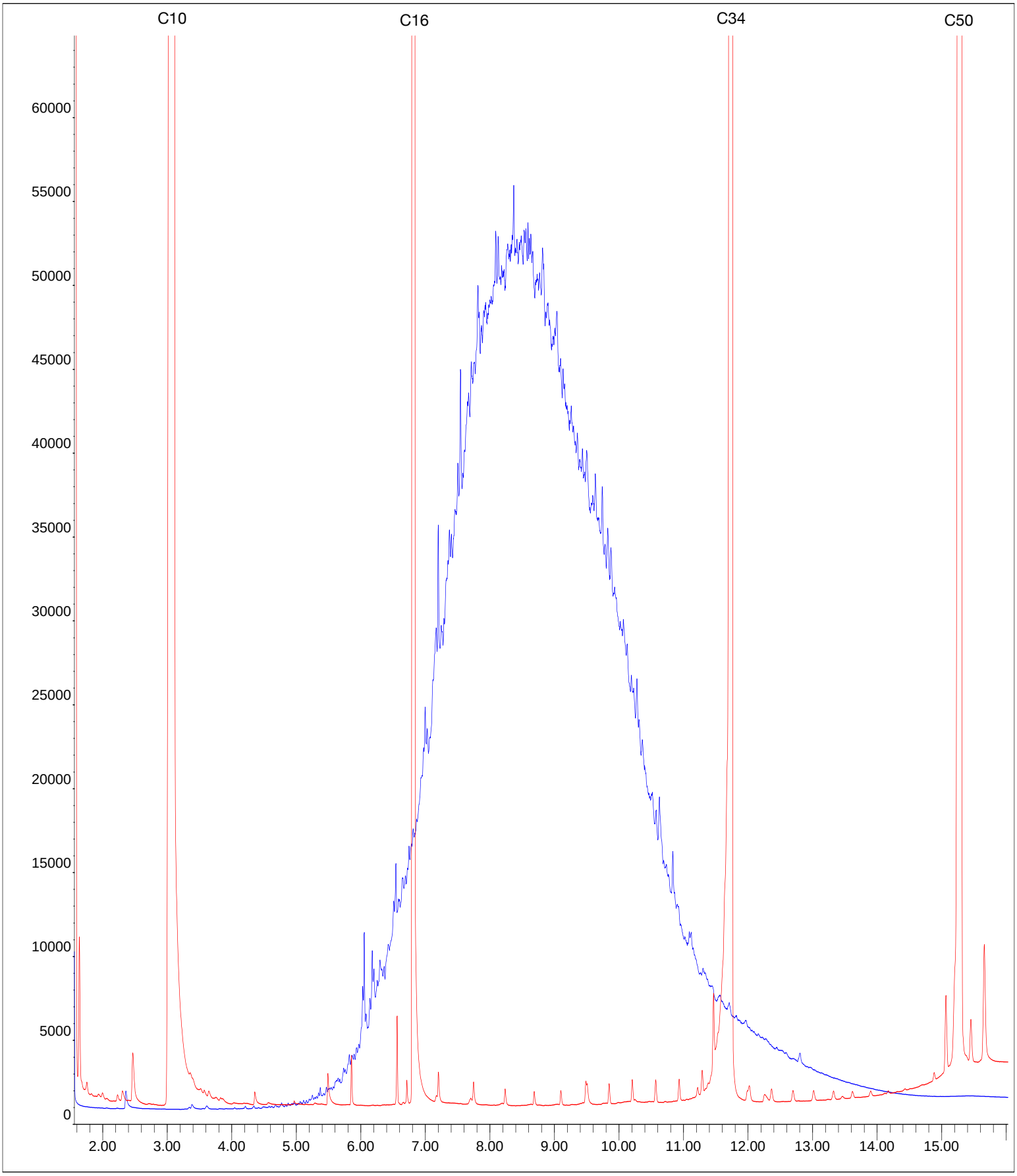
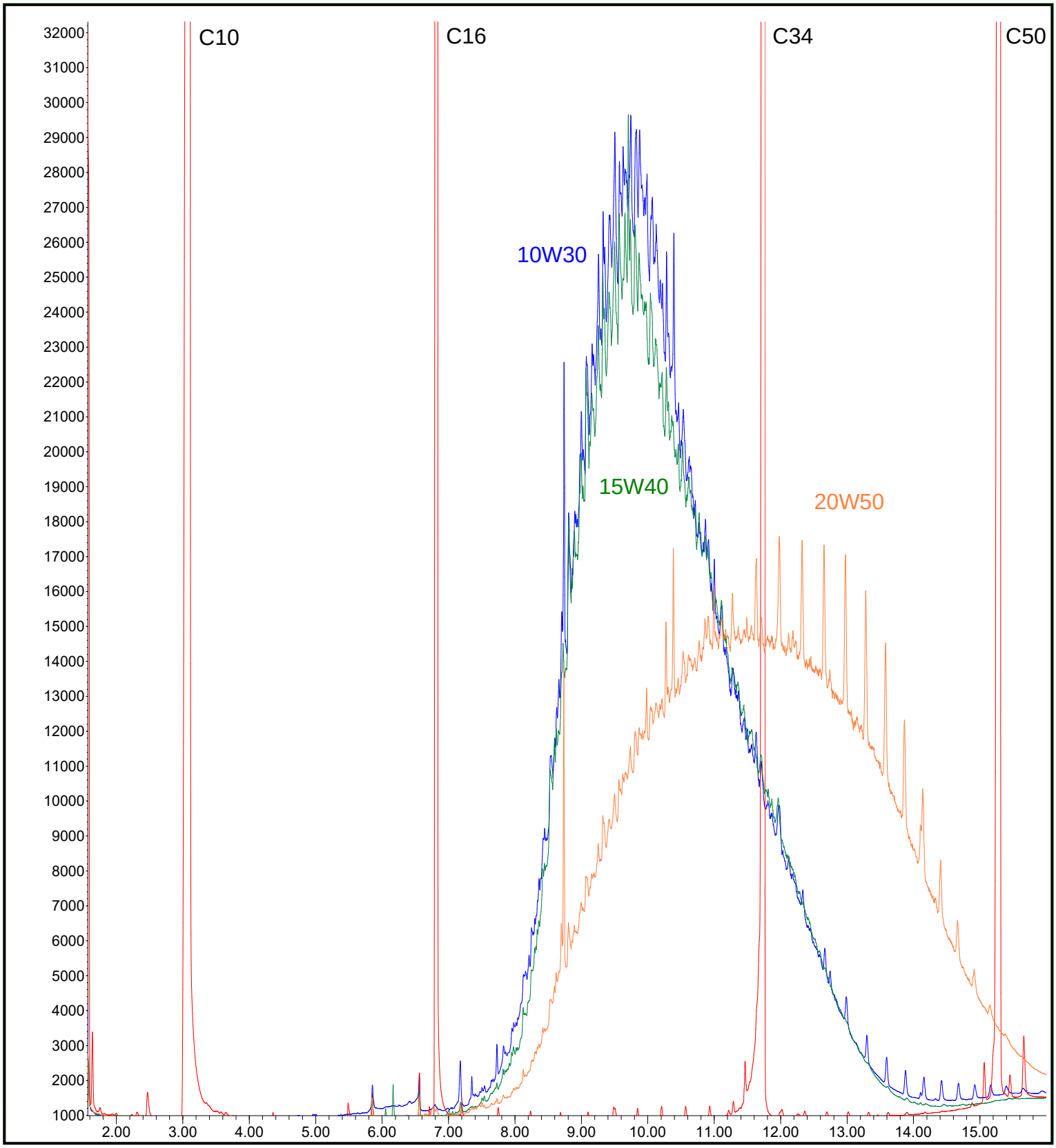
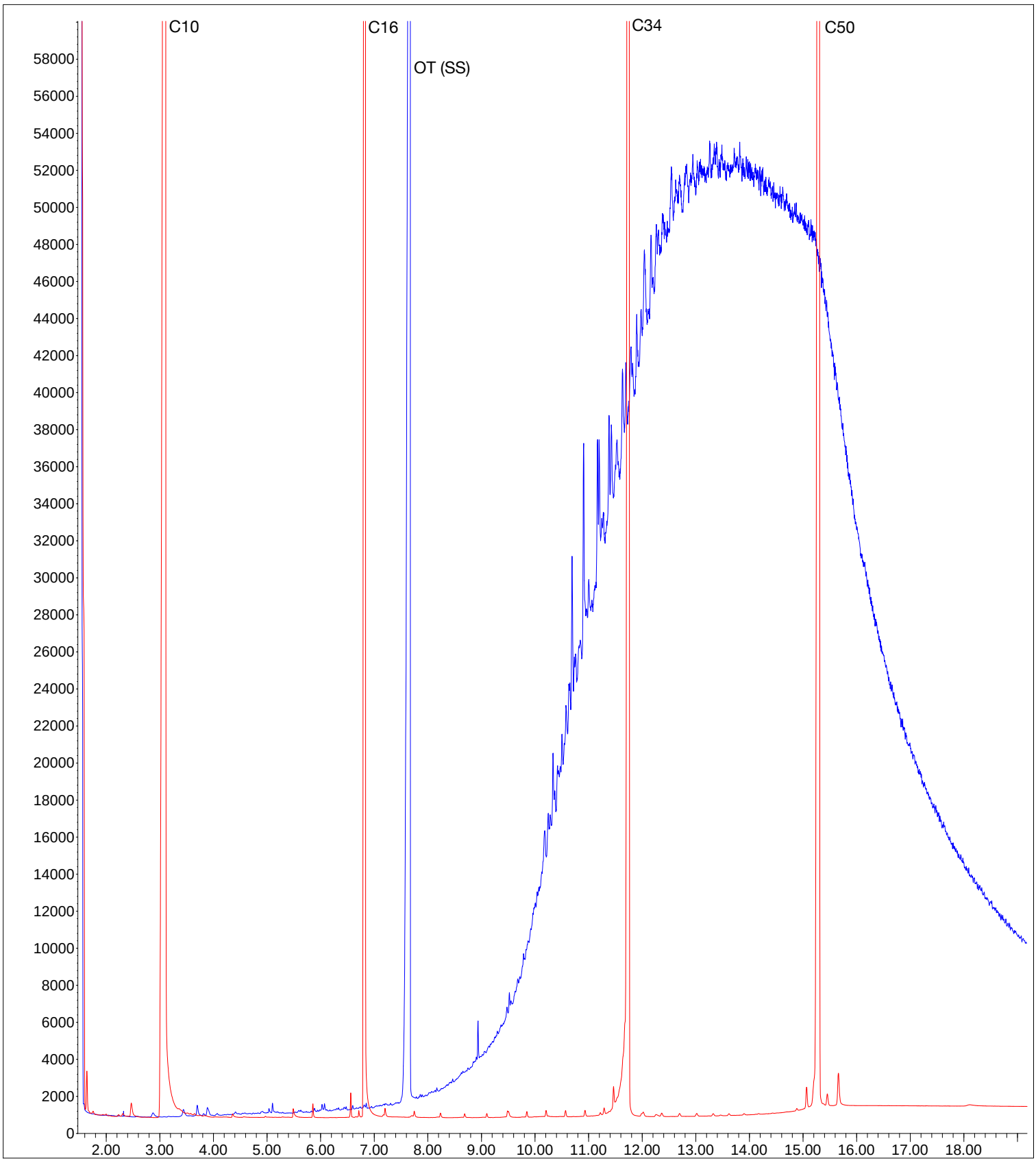


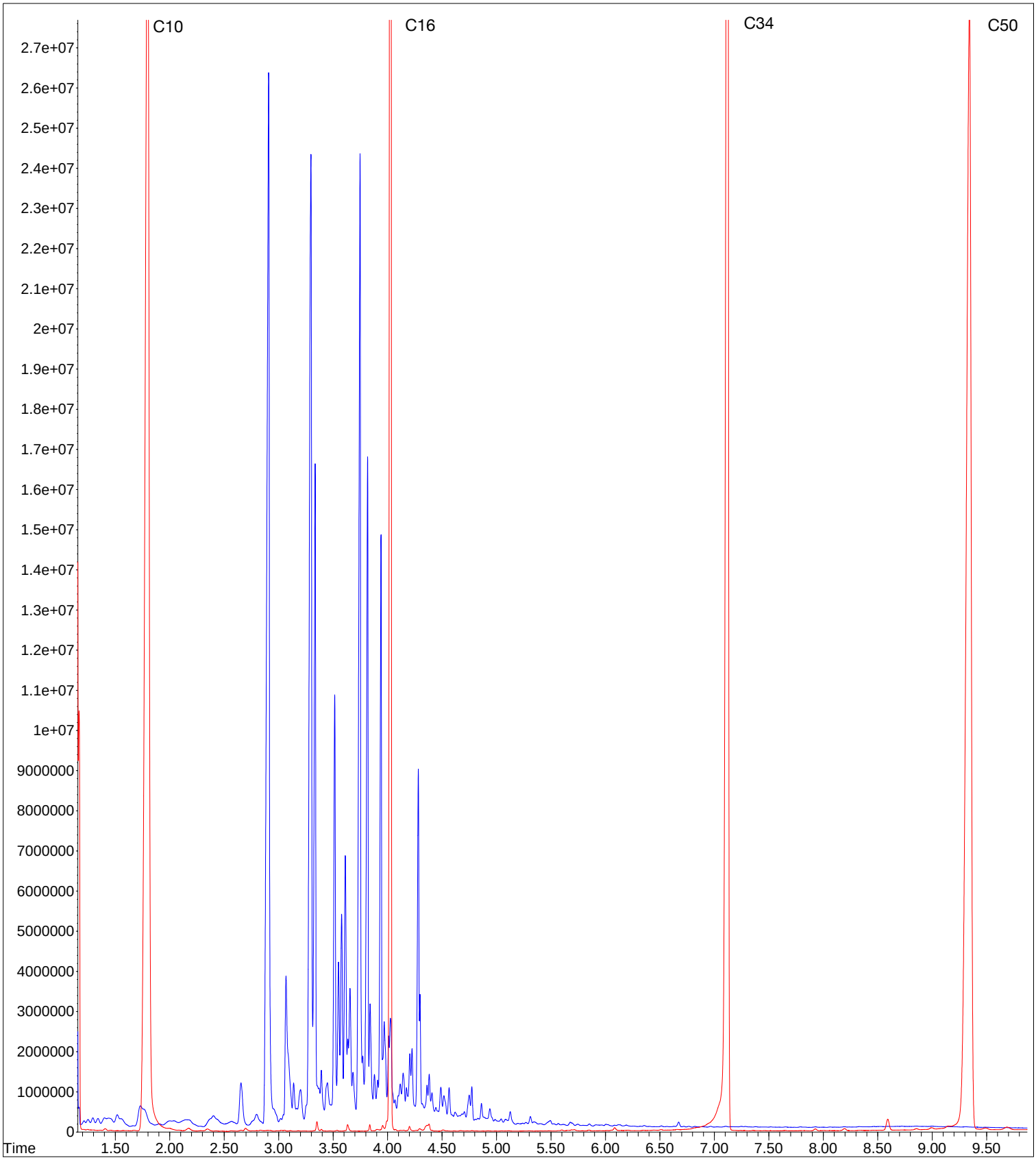
MOTOR OILS, VARIOUS GRADES



ASPHALT


C10
C16
OT (SS)
C34
C50
58000
56000
54000
52000
50000
48000
46000
44000
42000
40000
38000
36000
34000
32000
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00
14.00
15.00
16.00
17.00
18.00

CREOSOTE


C10
C16
C34
C50
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2.6e+07
2.5e+07
2.4e+07
2.3e+07
2.2e+07
2.1e+07
2e+07
1.9e+07
1.8e+07
1.7e+07
1.6e+07
1.5e+07
1.4e+07
1.3e+07
1.2e+07
1.1e+07
1e+07
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
Time
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
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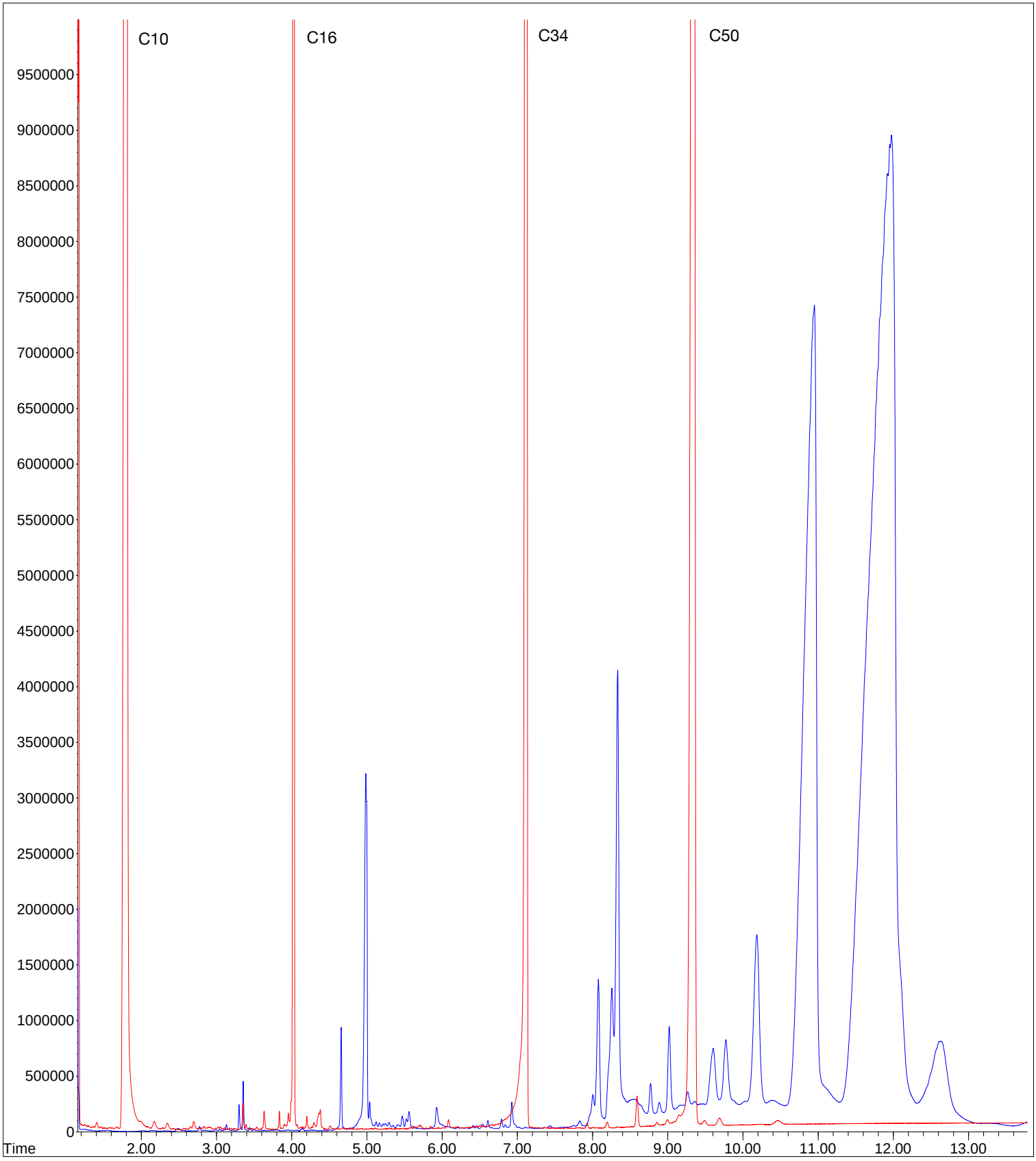
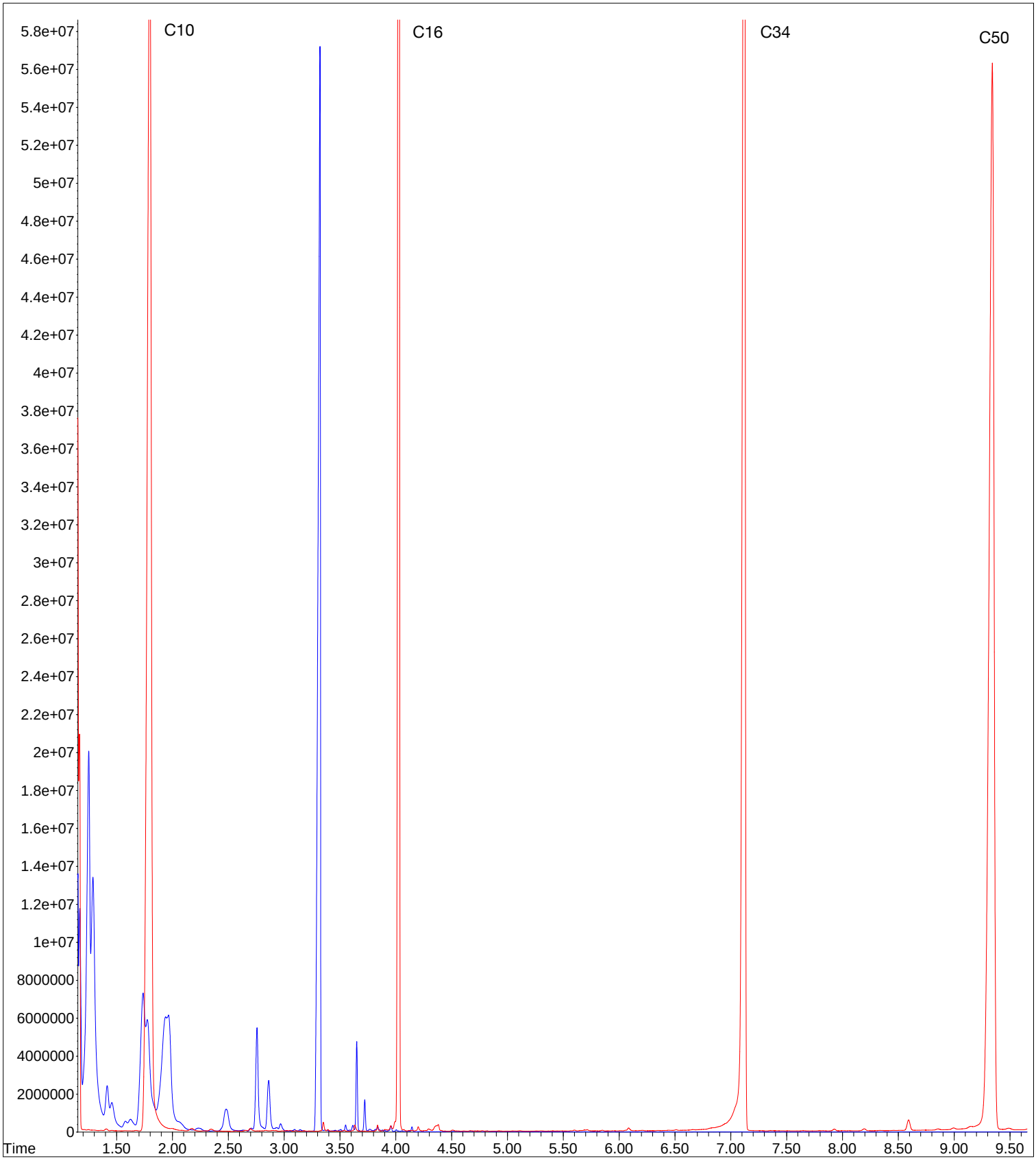
6.00
6.50
7.00
7.50
8.00
8.50
9.00
9.50

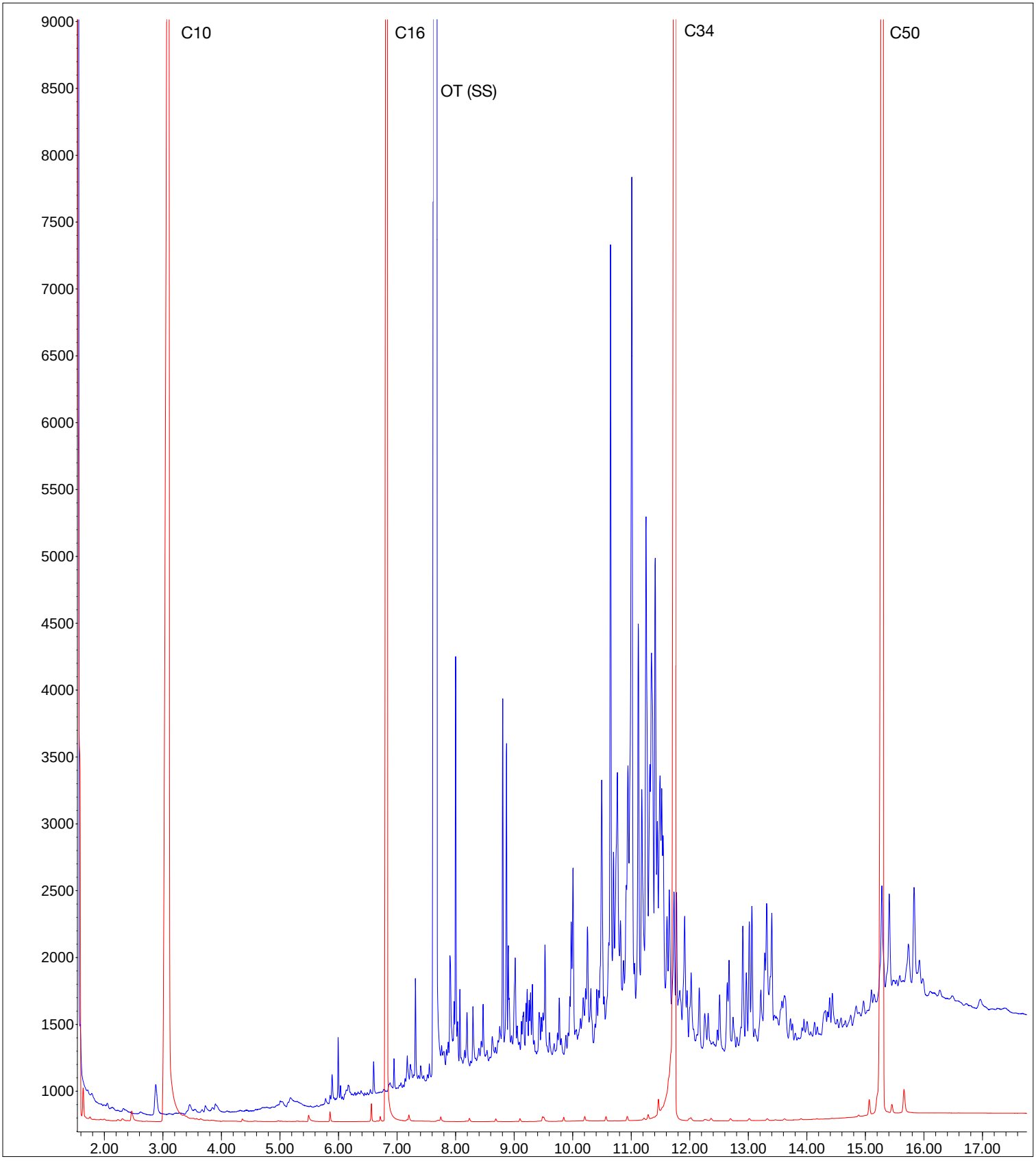
CORN OIL


C10
C16
C34
C50
9500000
9000000
8500000
8000000
7500000
7000000
6500000
6000000
5500000
5000000
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
Time
2.00
3.00
4.00
5.00
6.00
7.00
8.00
9.00
10.00
11.00
12.00
13.00

PINE NEEDLE OIL



PEAT


C10
C16
OT (SS)
C34
C50
9000
8500
8000
7500
7000
6500
6000
5500
5000
4500
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3000
2500
2000
1500
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7.00
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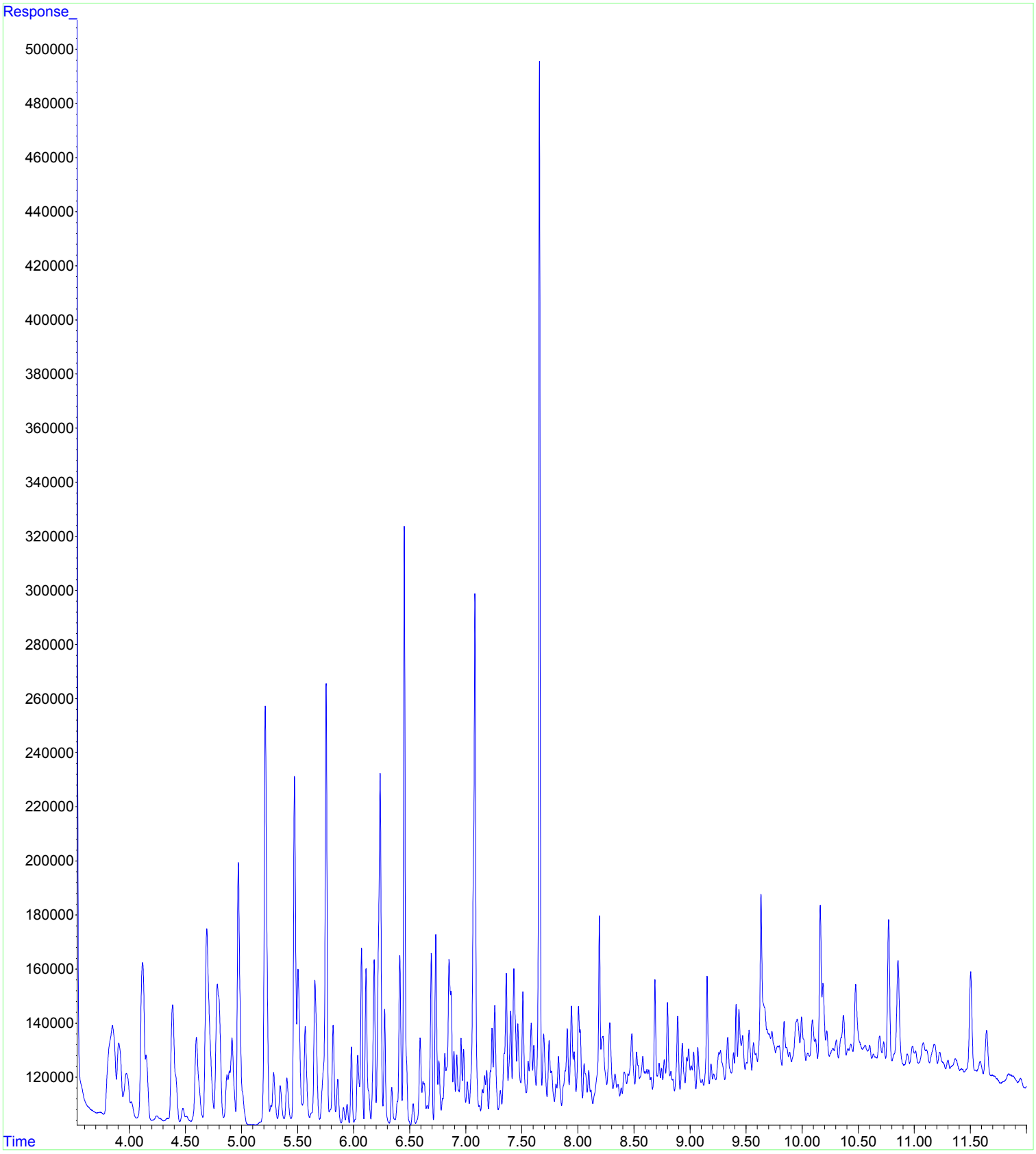
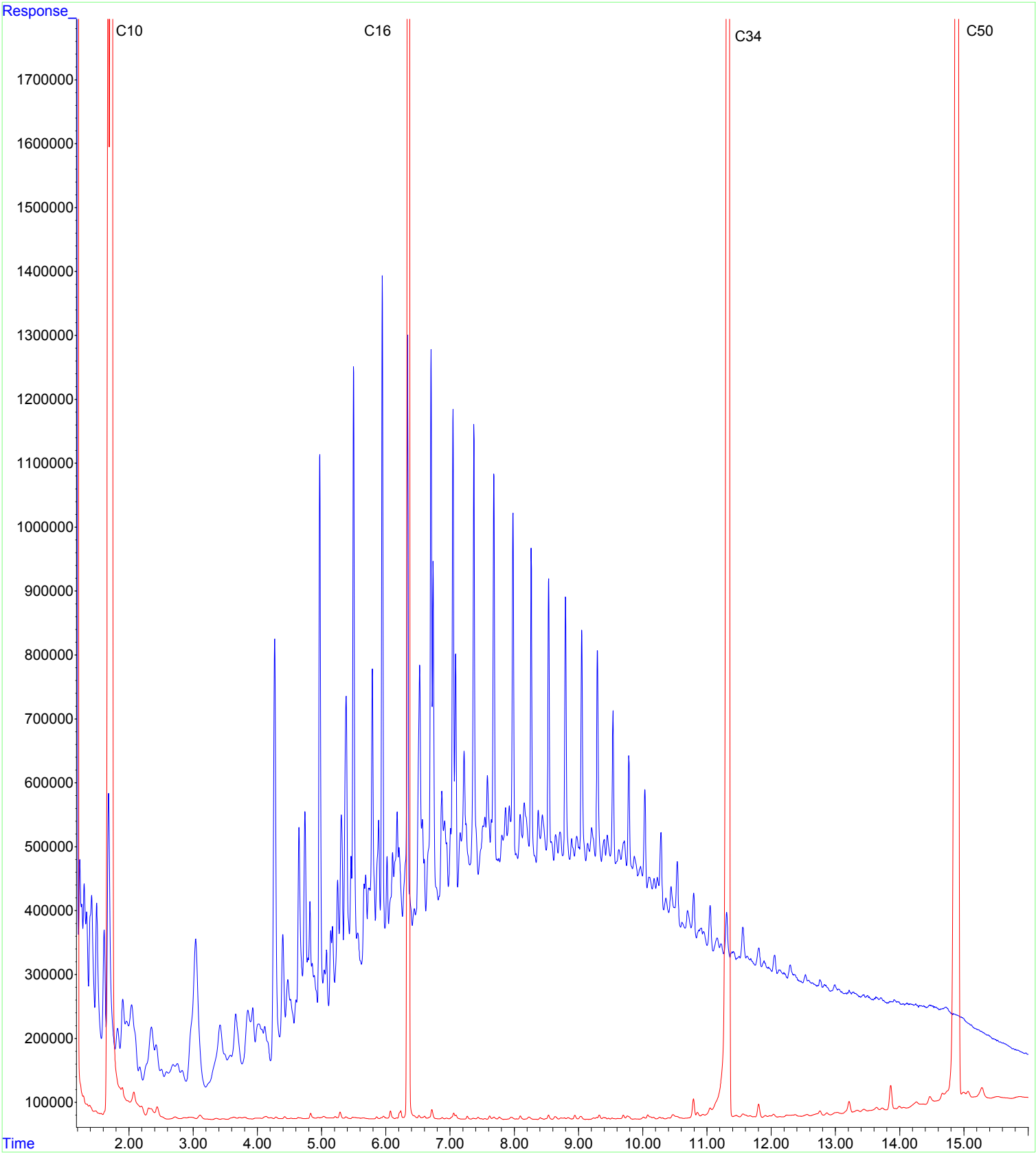
15.00
16.00
17.00

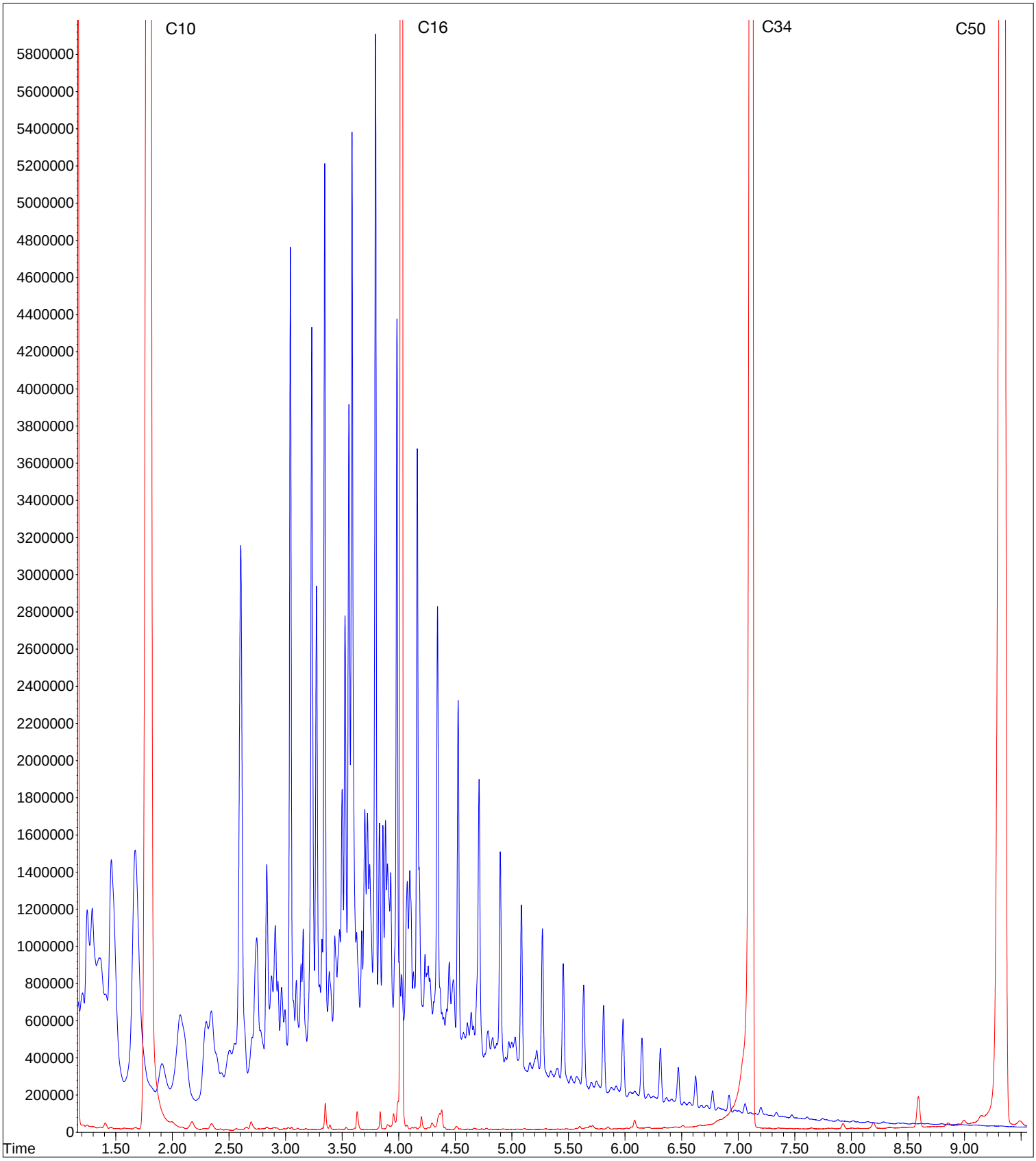
PRUDHOE BAY CRUDE



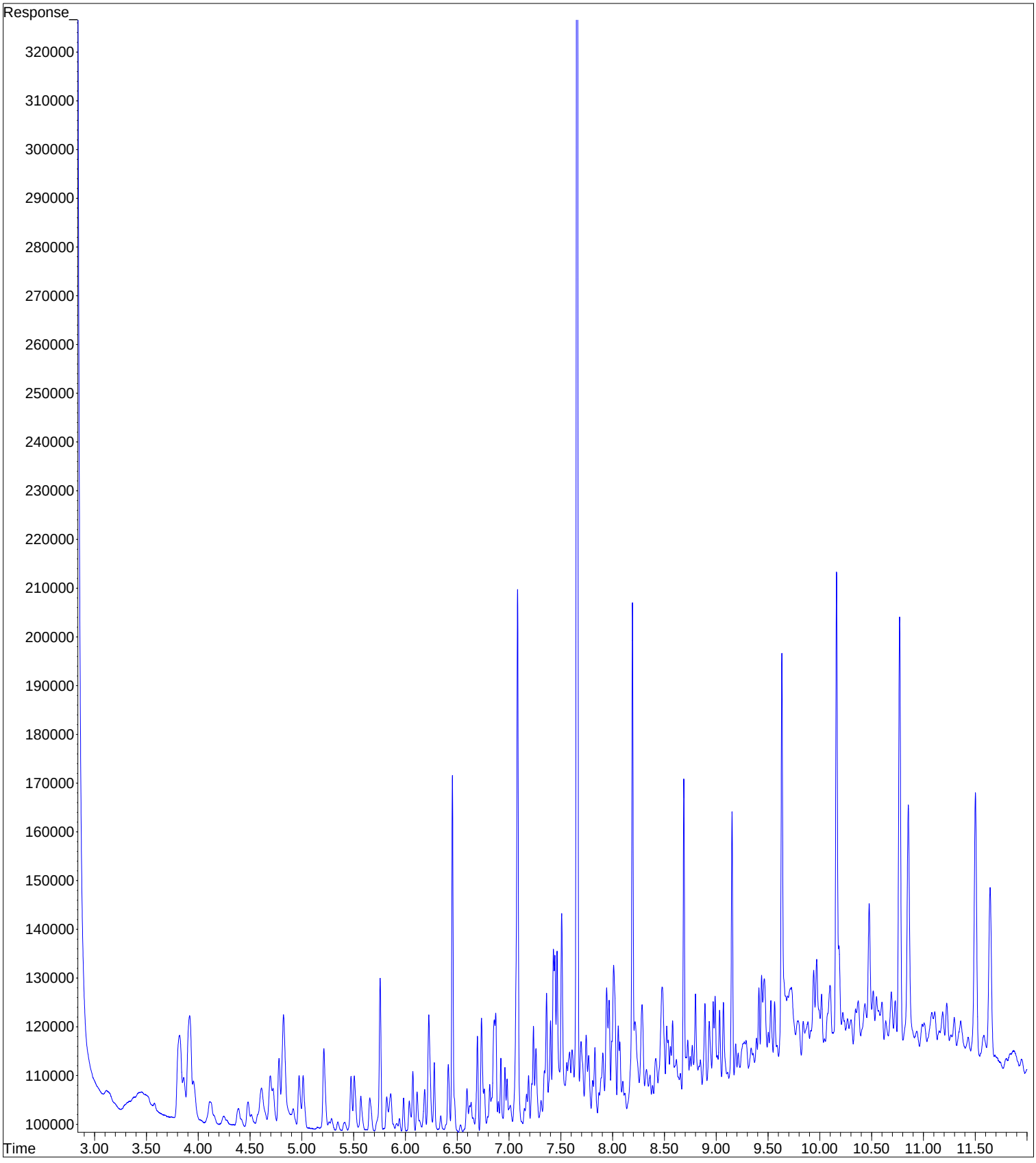
PRUDHOE BAY CRUDE



EXXON MOBIL SOUTH VENTURE CRUDE



HIBERNIA CRUDE OIL



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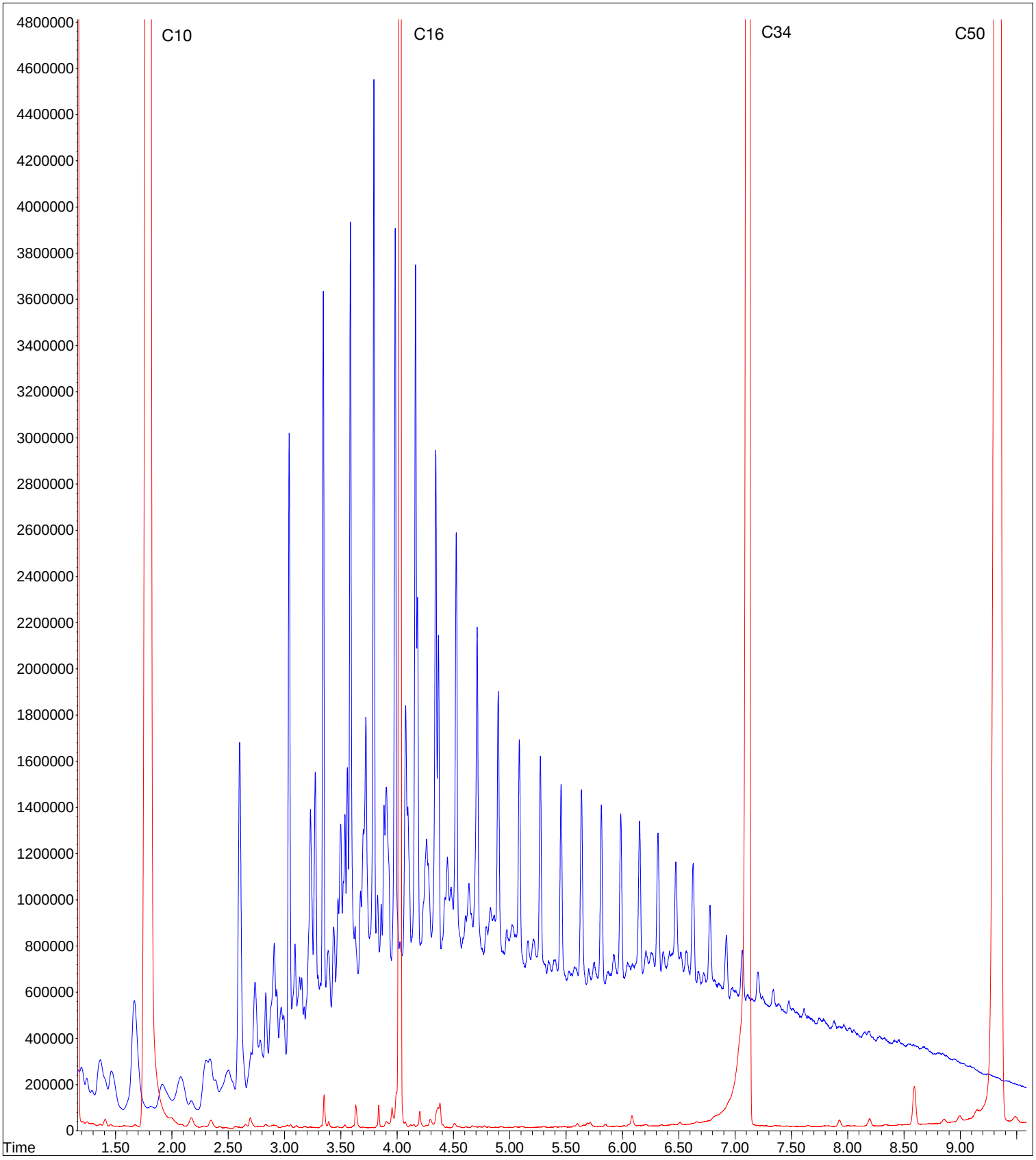
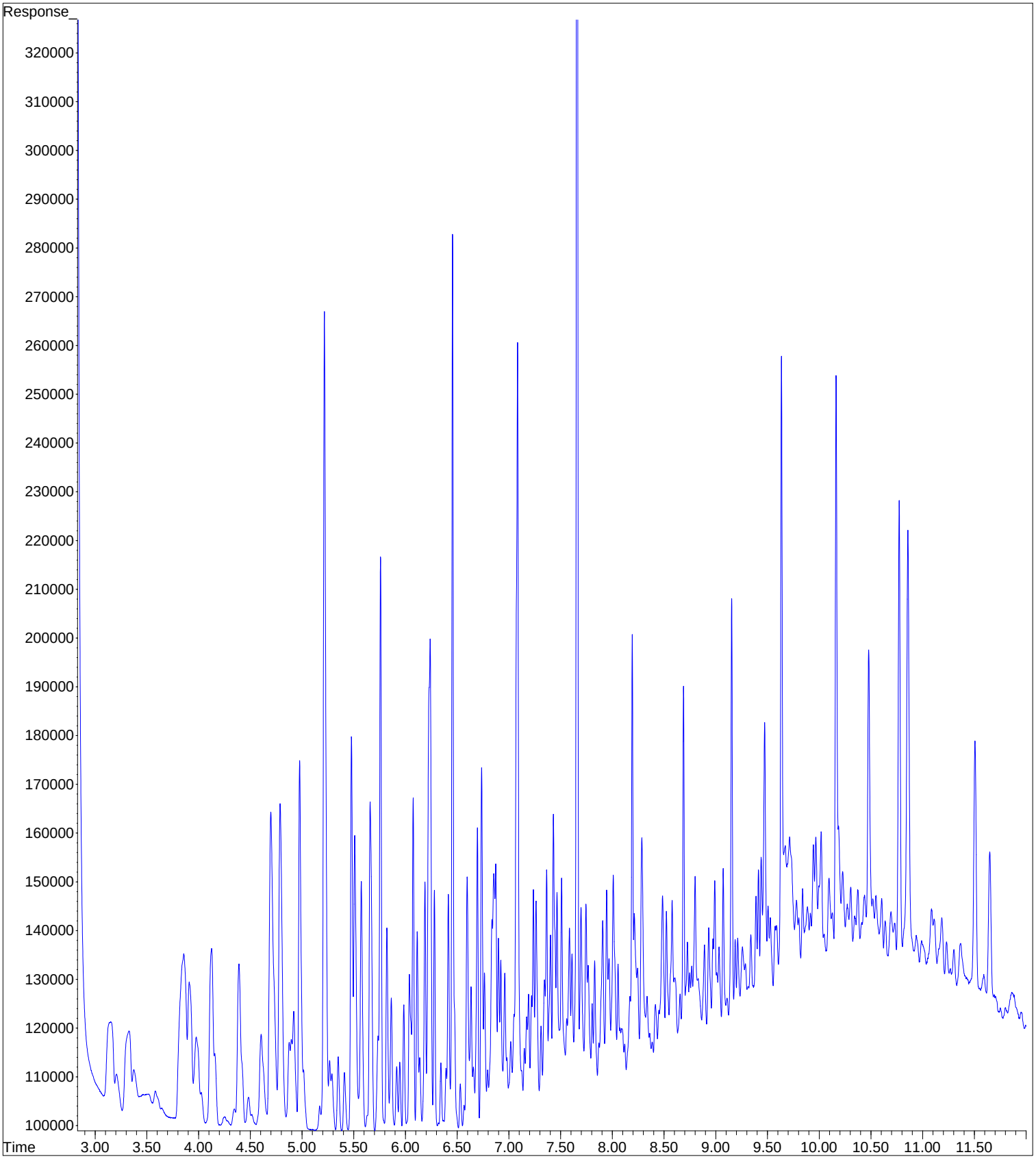
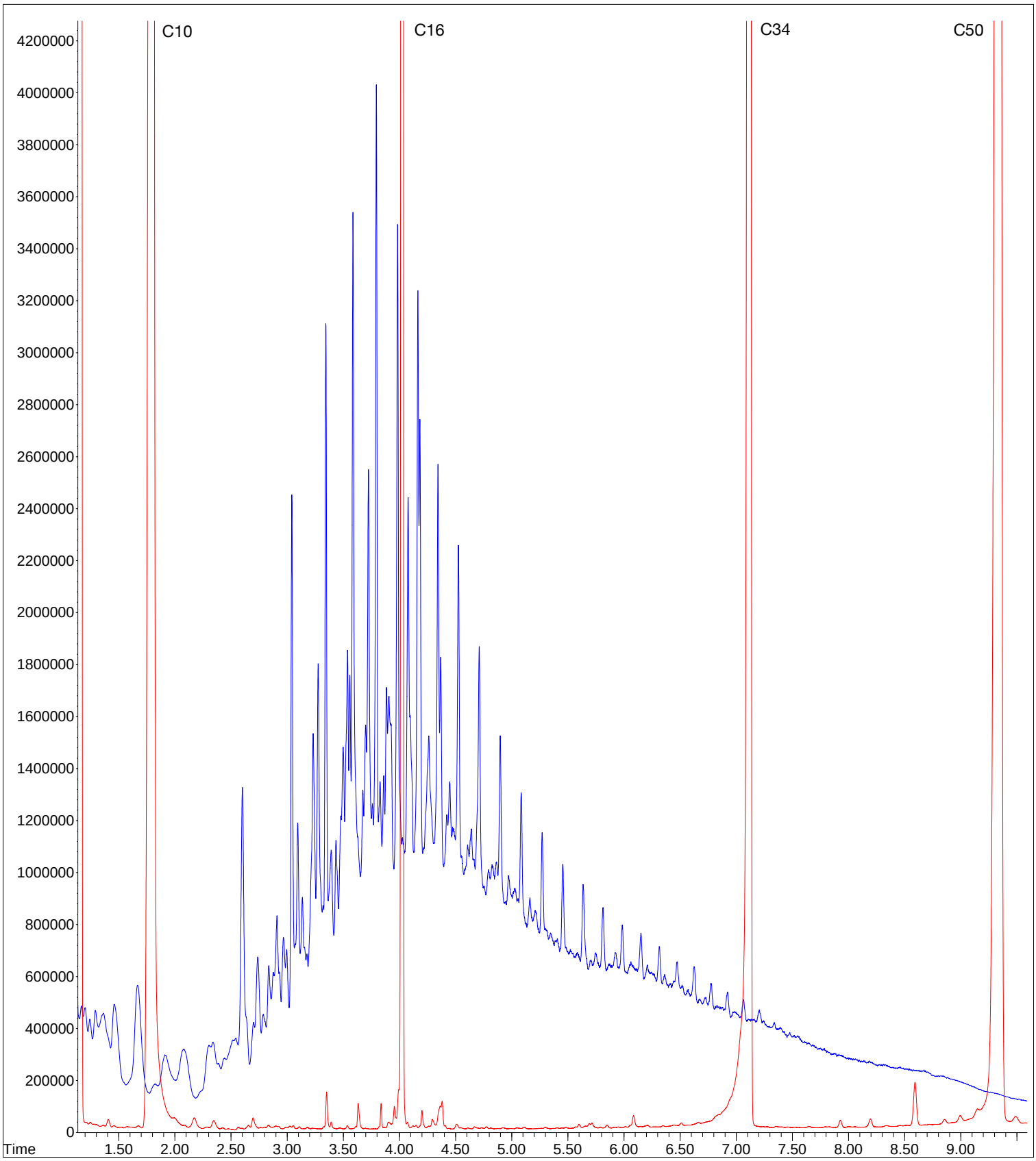


SOUTH LOUISIANA CRUDE OIL



SOUTH LOUISIANA CRUDE OIL

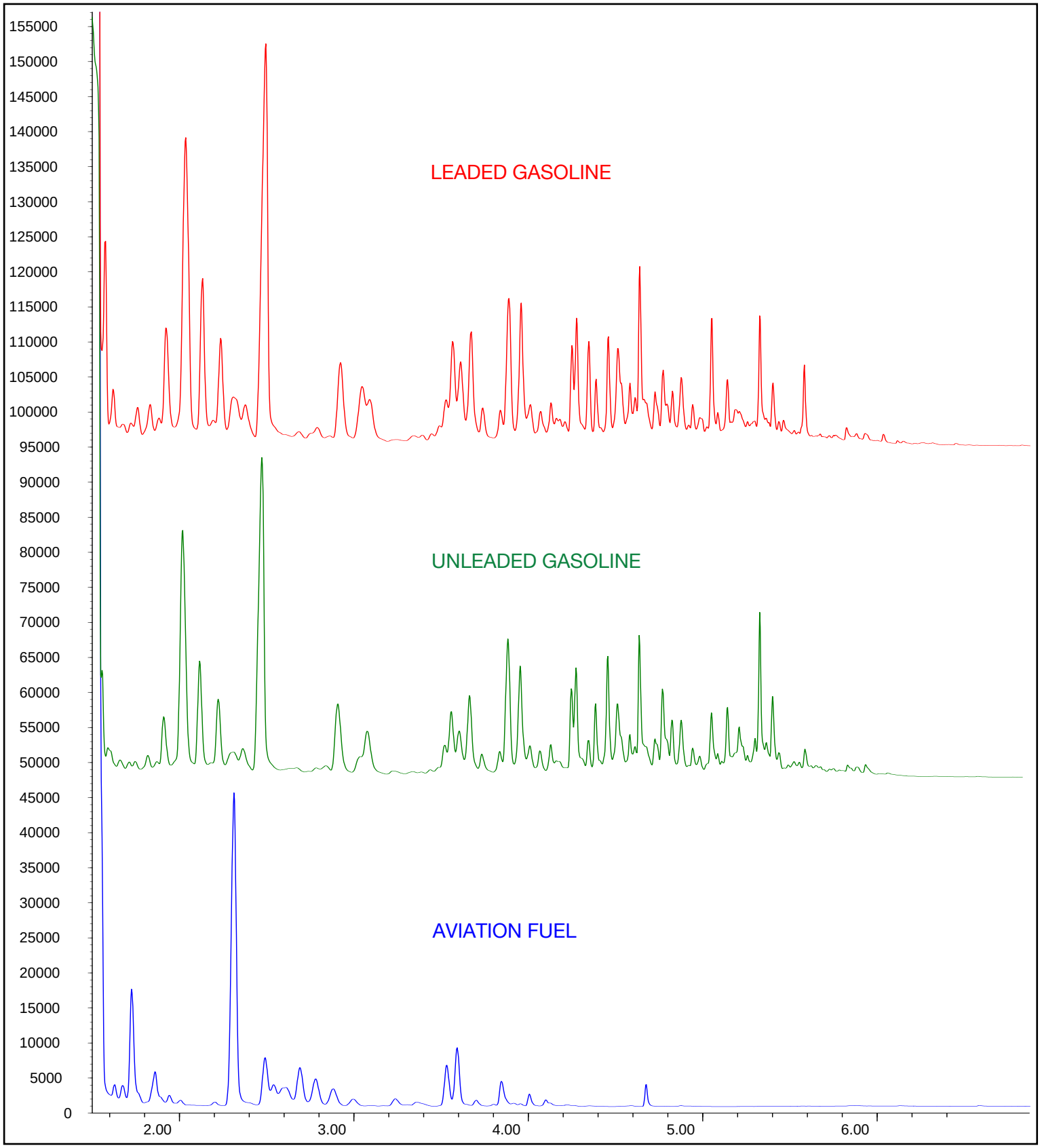


PART B

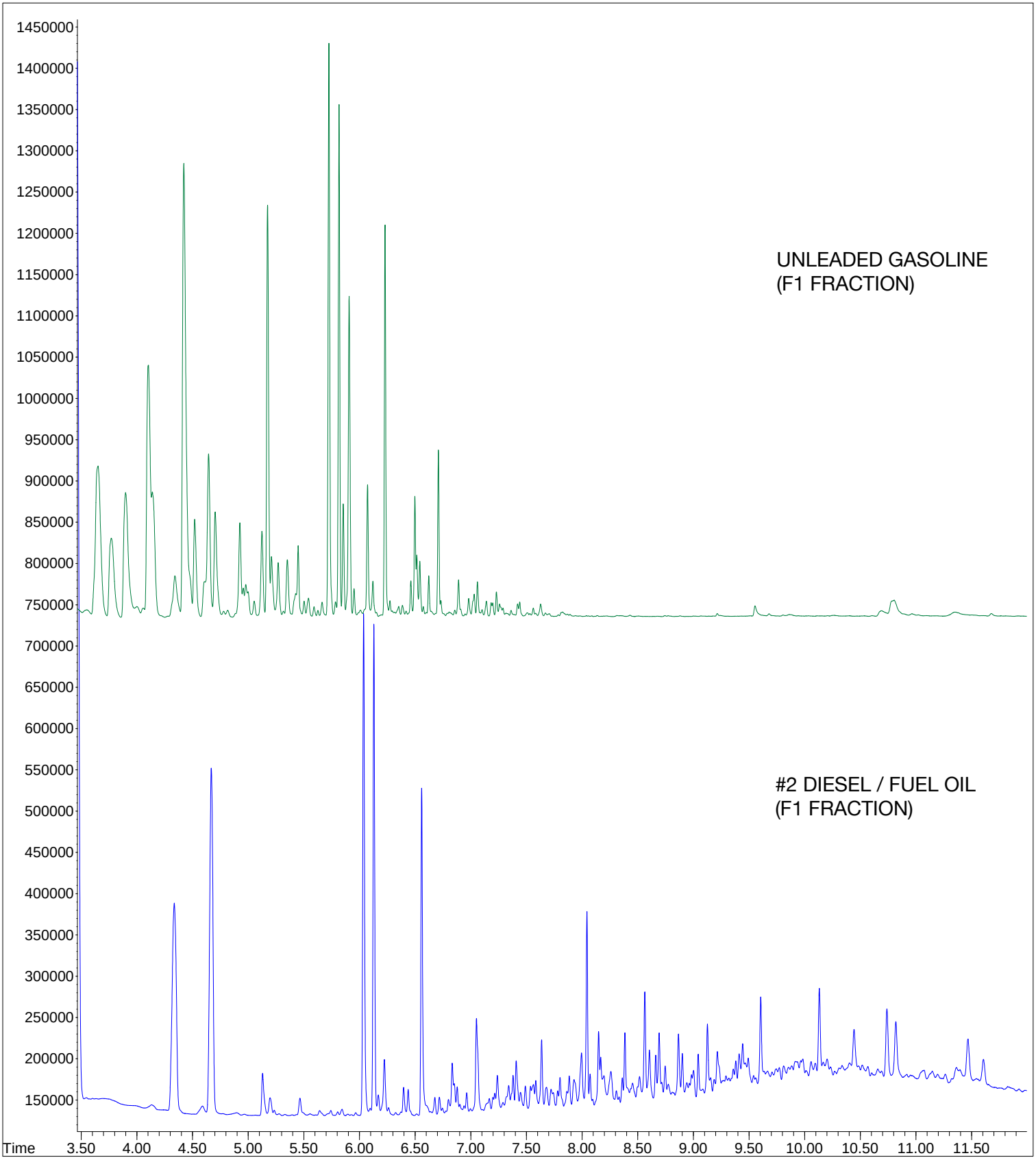
CHROMATOGRAM OVERLAYS AND COMPARISONS

This section contains overlays of selected individual chromatograms from Part A.

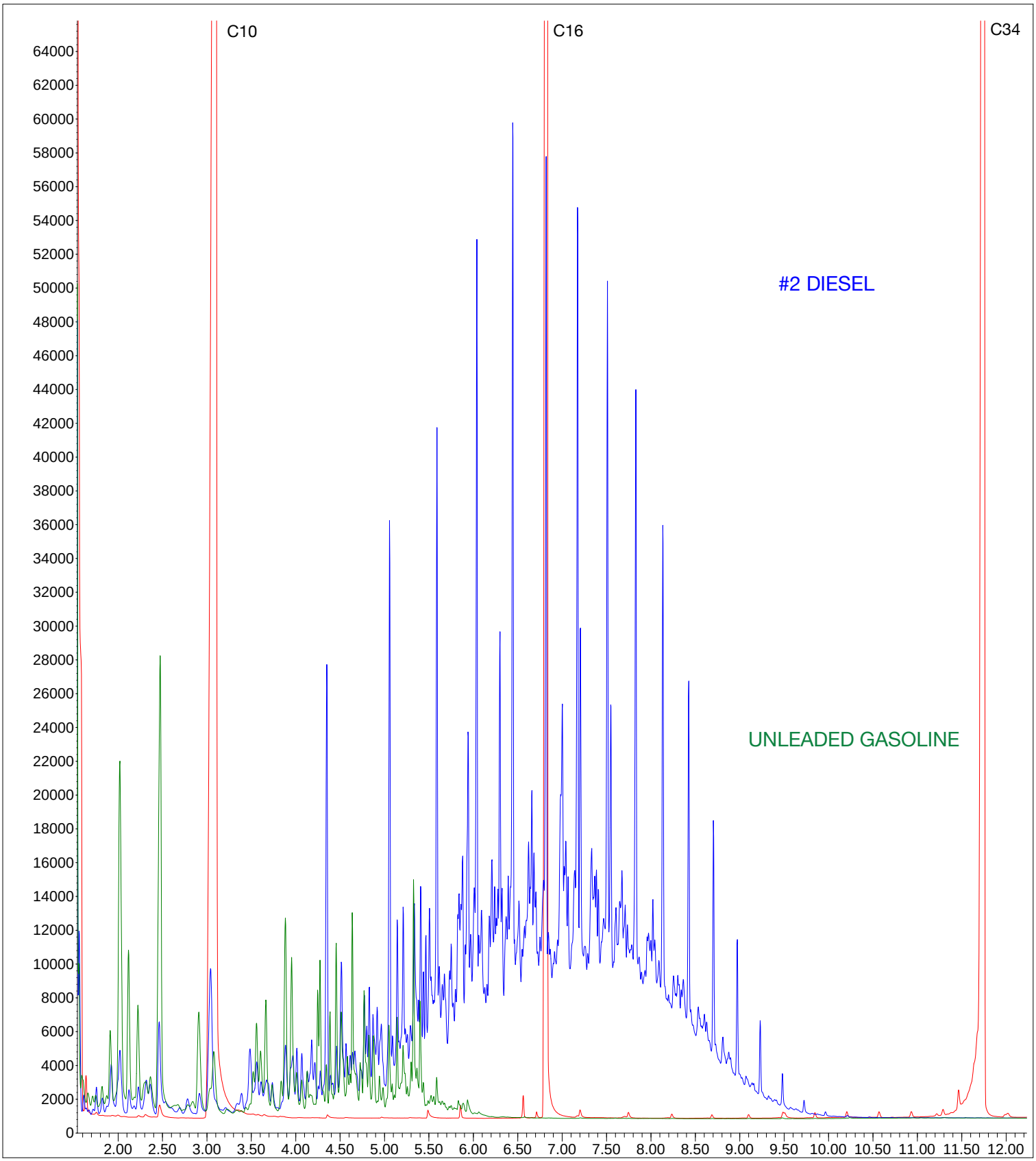
COMPARING LEADED, UNLEADED & AVIATION GASOLINE



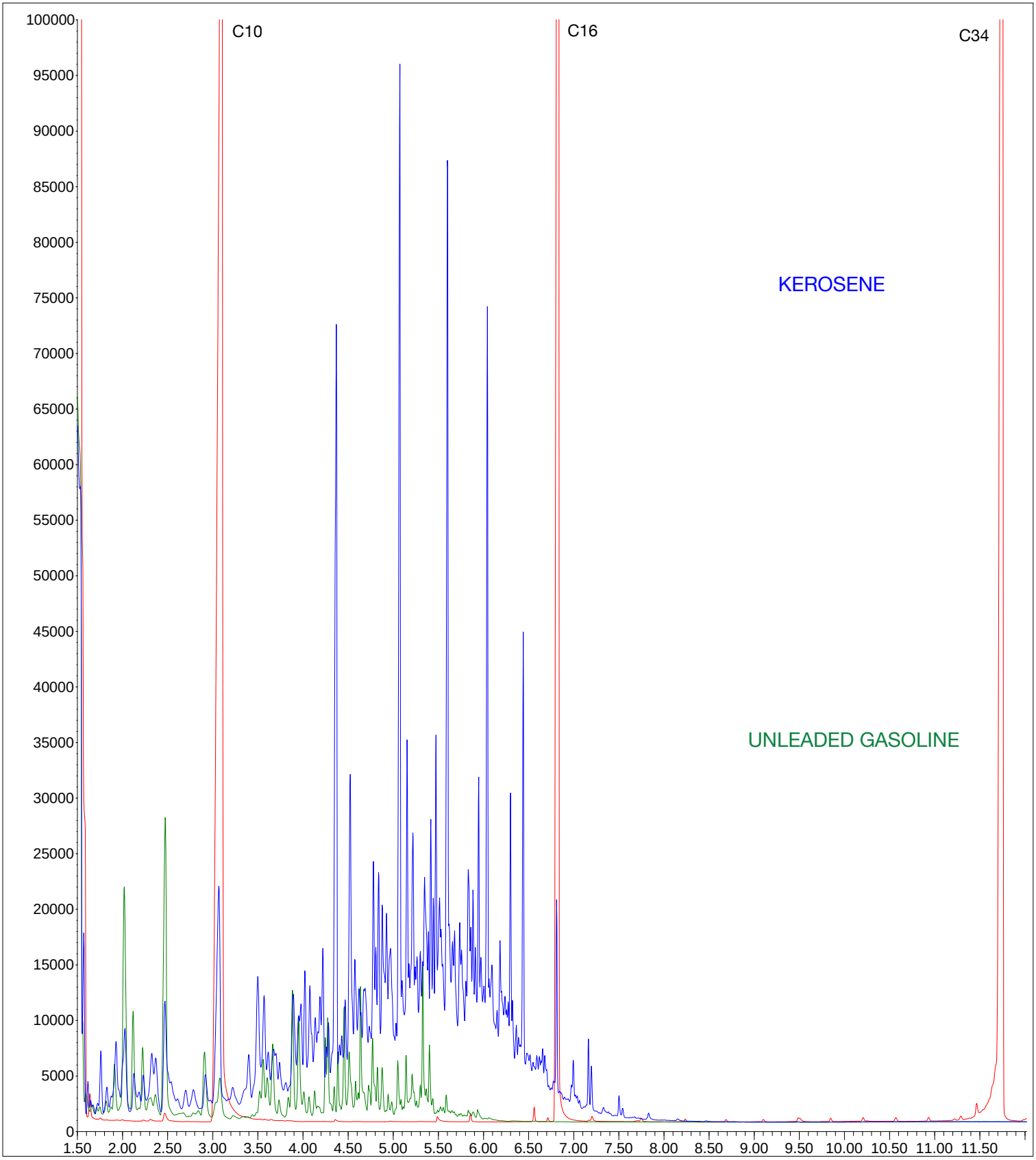
COMPARING UNLEADED GASOLINE & #2 DIESEL



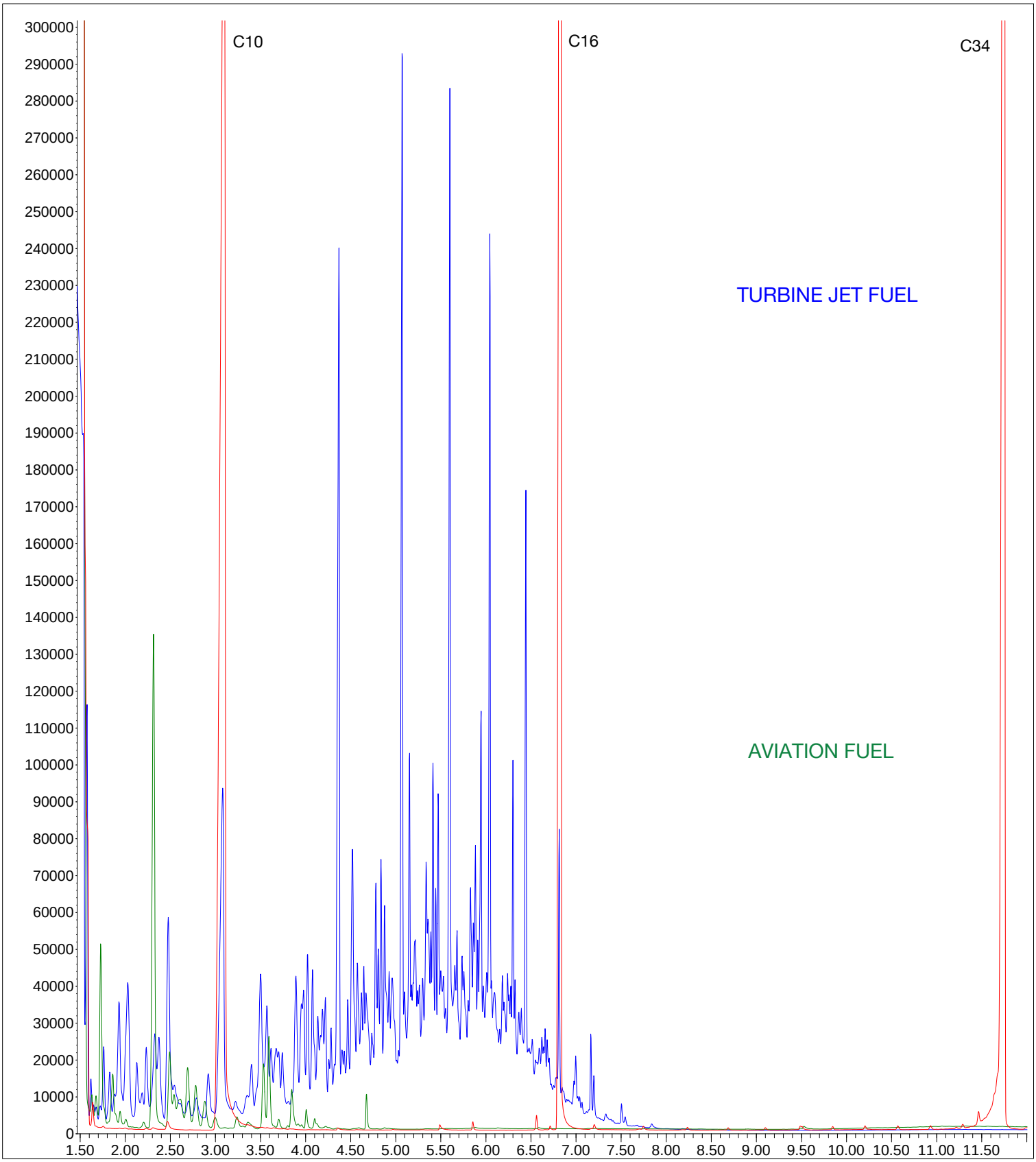
COMPARING UNLEADED GASOLINE & #2 DIESEL



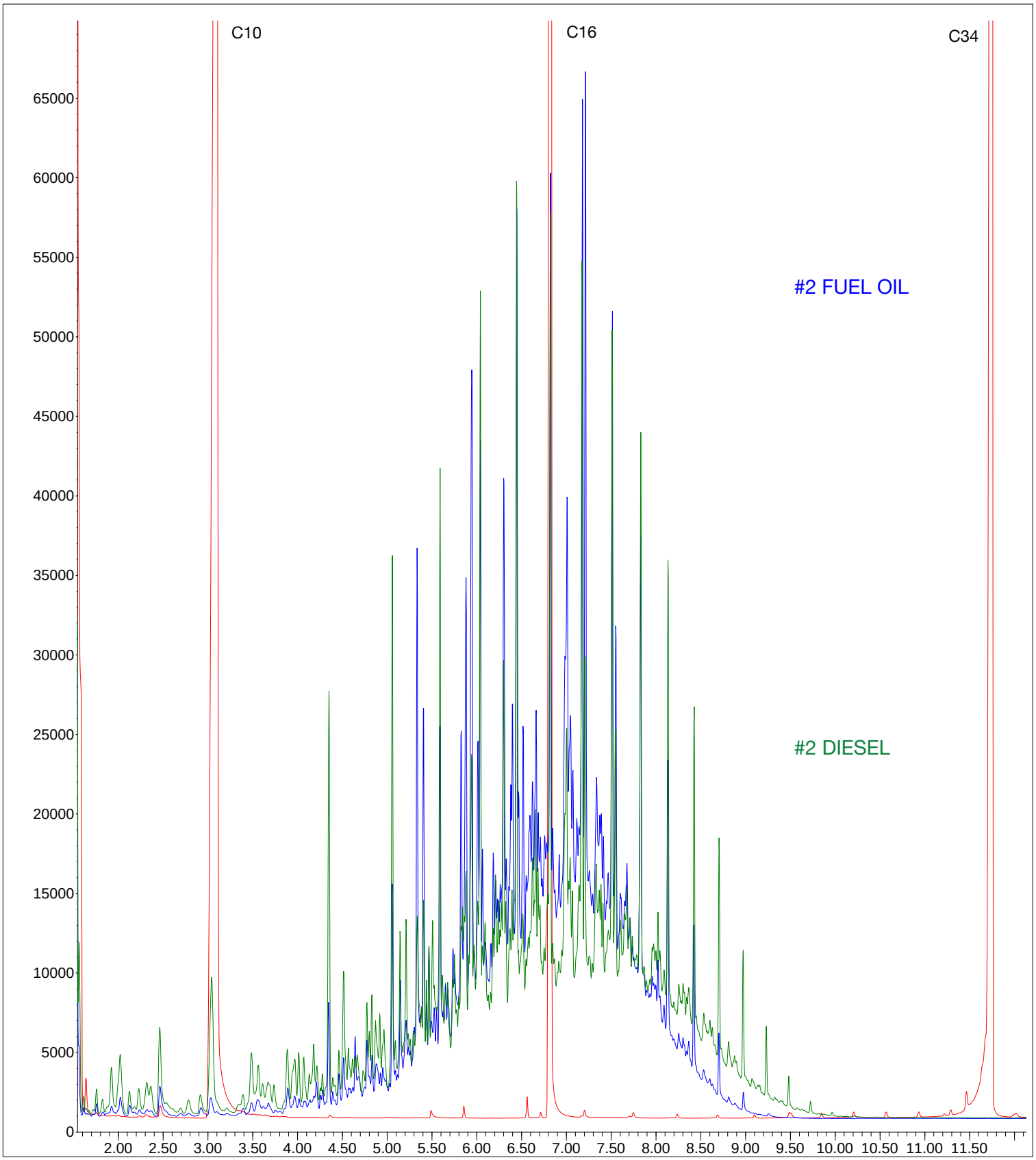
COMPARING KEROSENE & UNLEADED GASOLINE



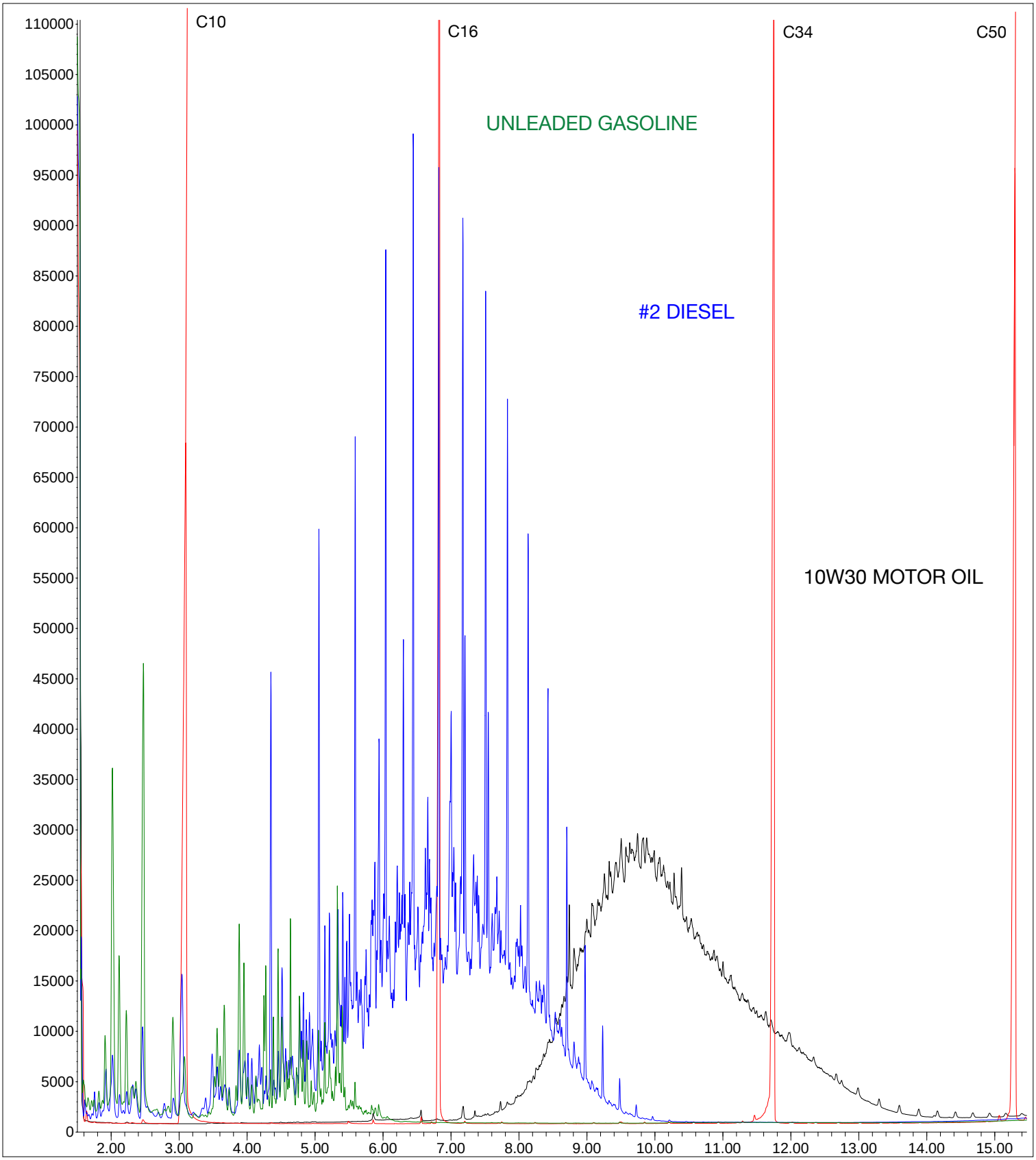
COMPARING AVIATION FUEL & TURBINE JET FUEL



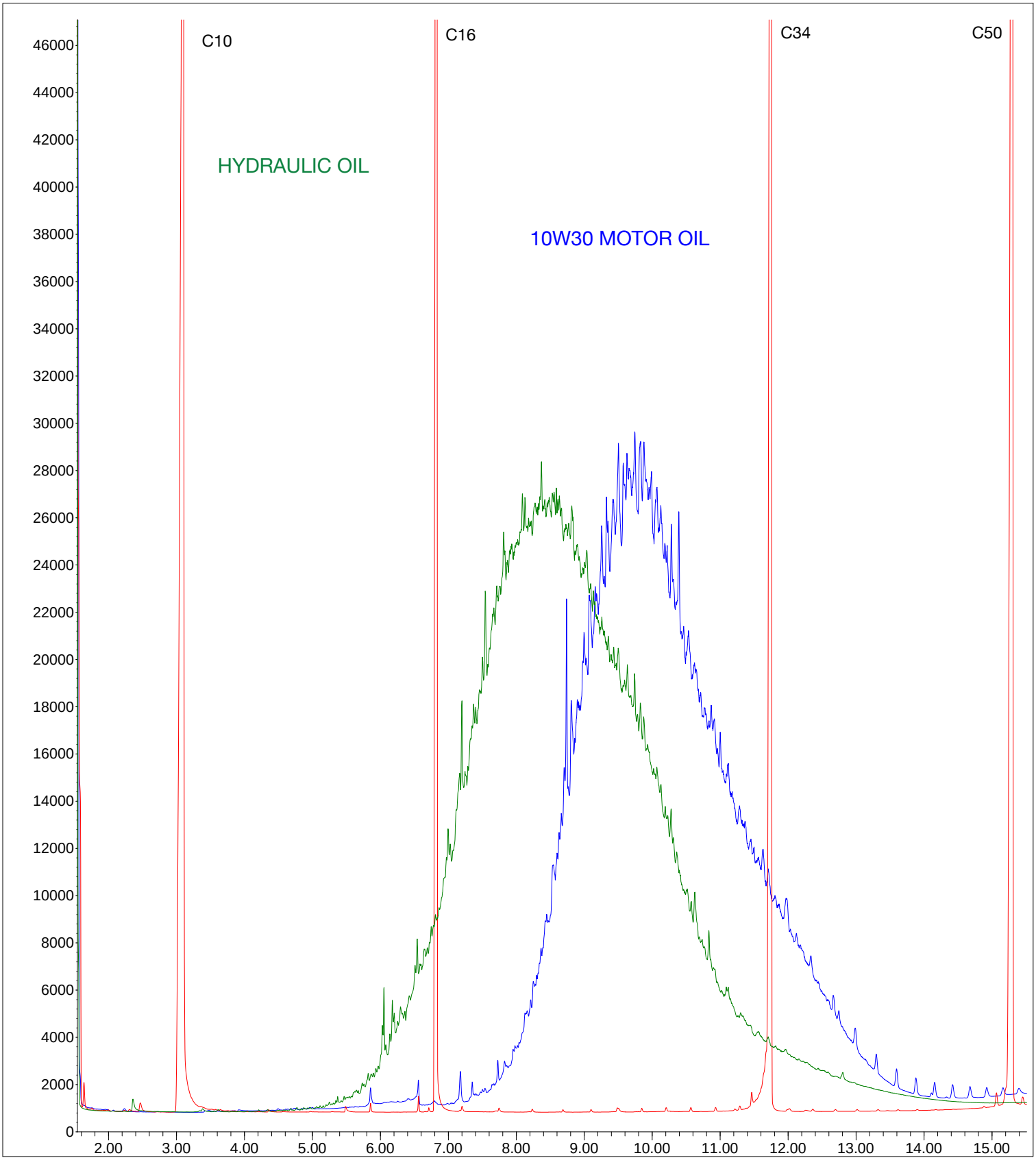
COMPARING #2 DIESEL & #2 FUEL OIL



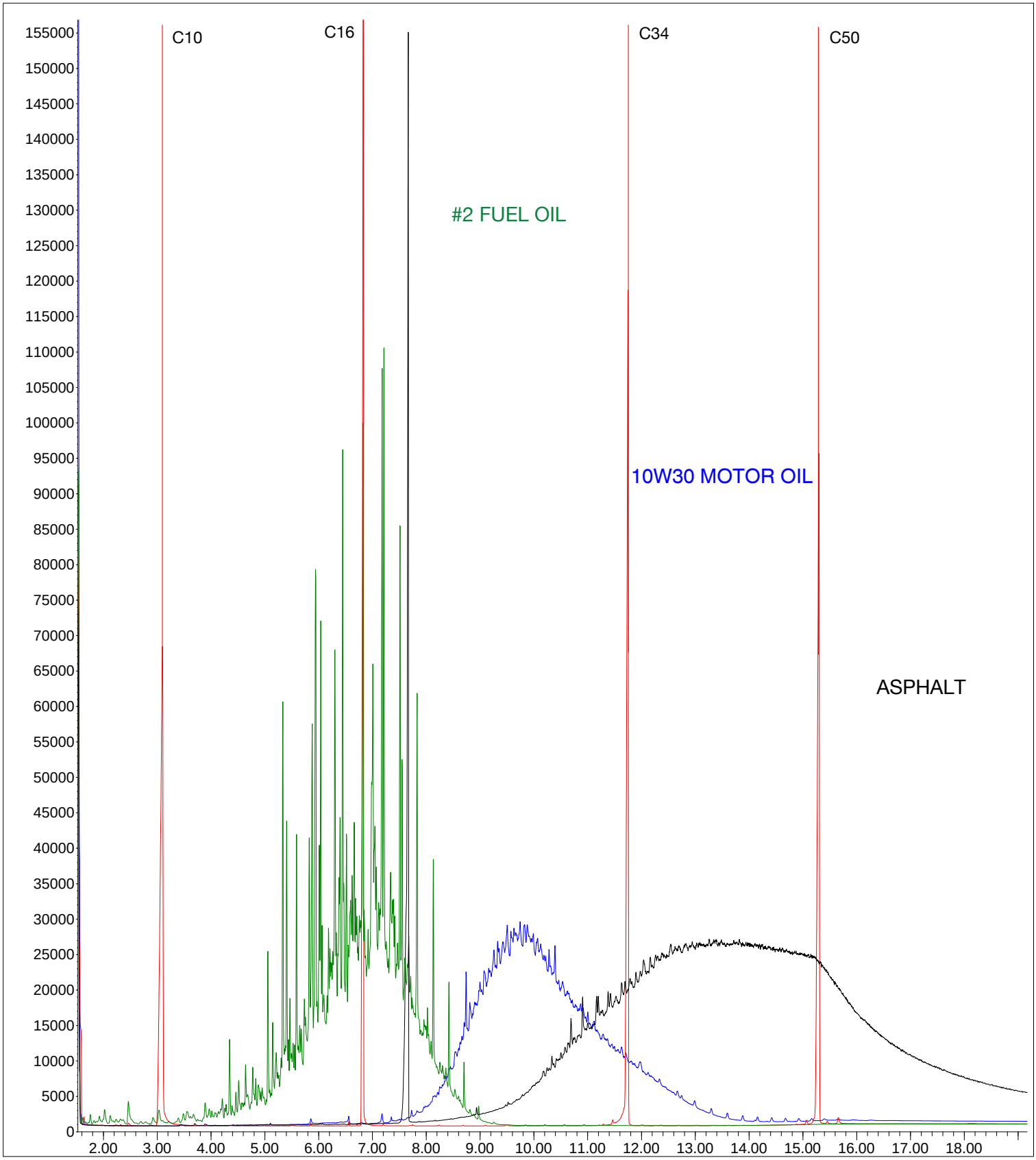
COMPARING UNLEADED GASOLINE, #2 DIESEL & 10W30 MOTOR OIL



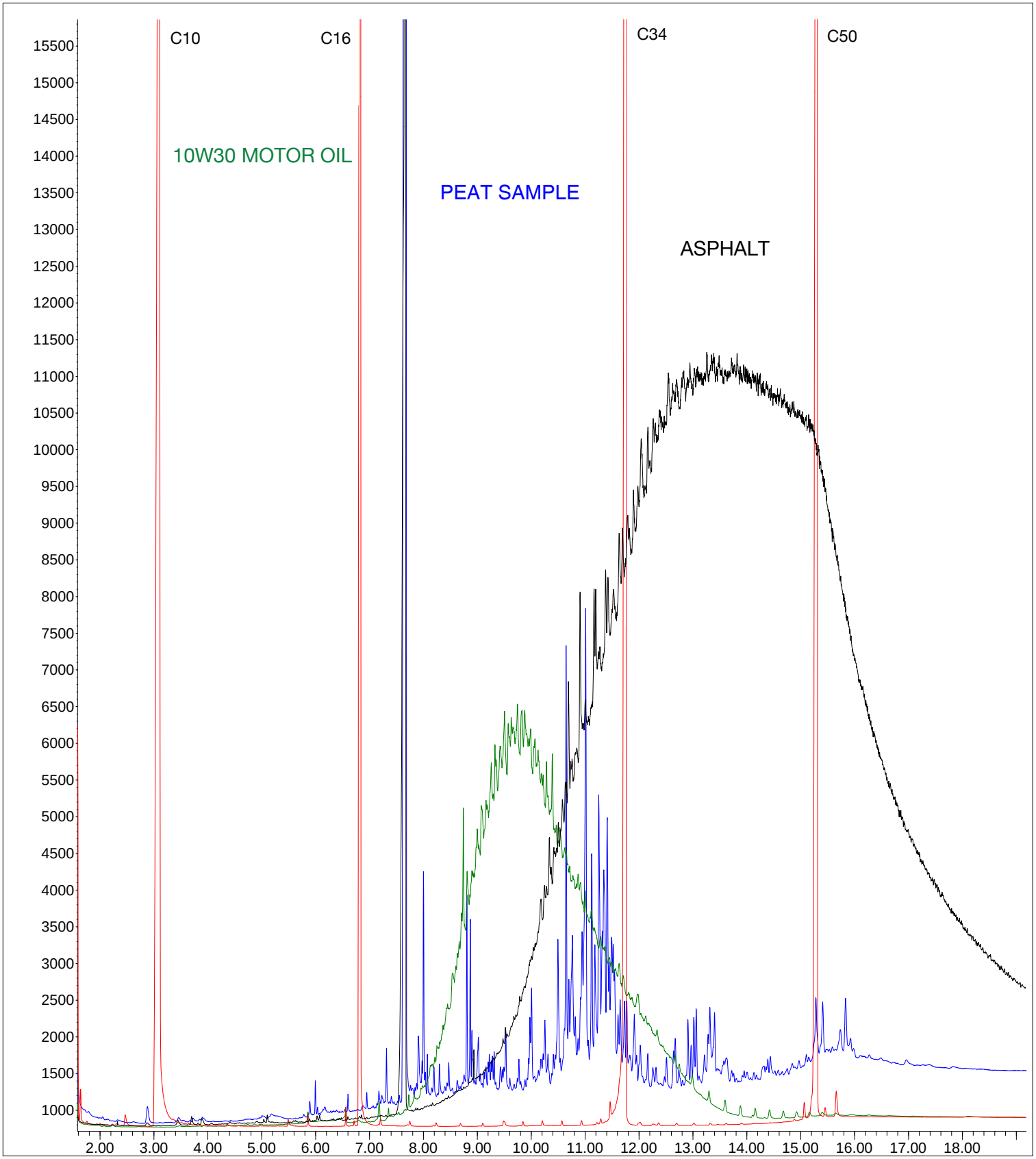
COMPARING HYDRAULIC & 10W30 MOTOR OIL



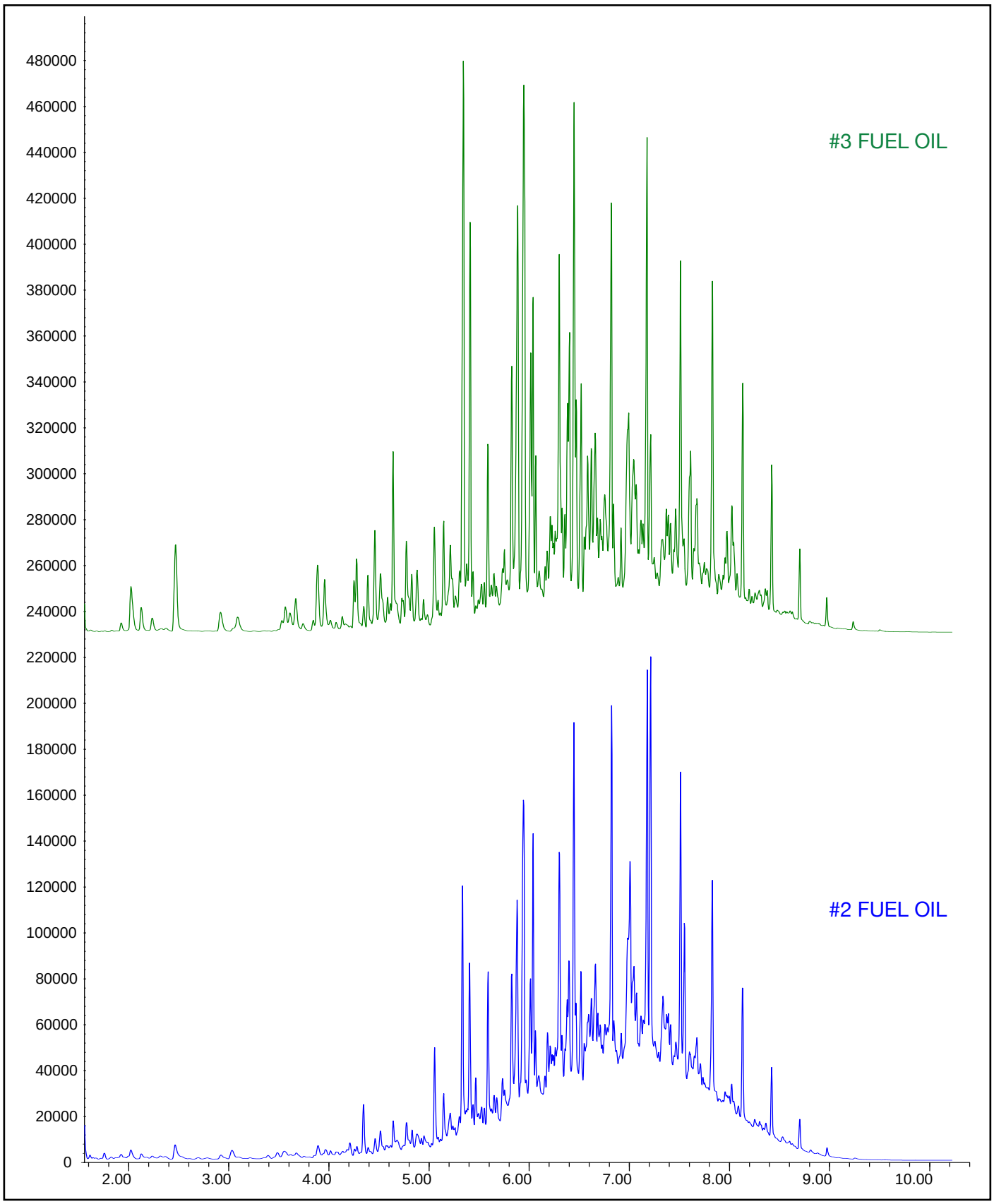
COMPARING #2 DIESEL, 10W30 MOTOR OIL & ASPHALT



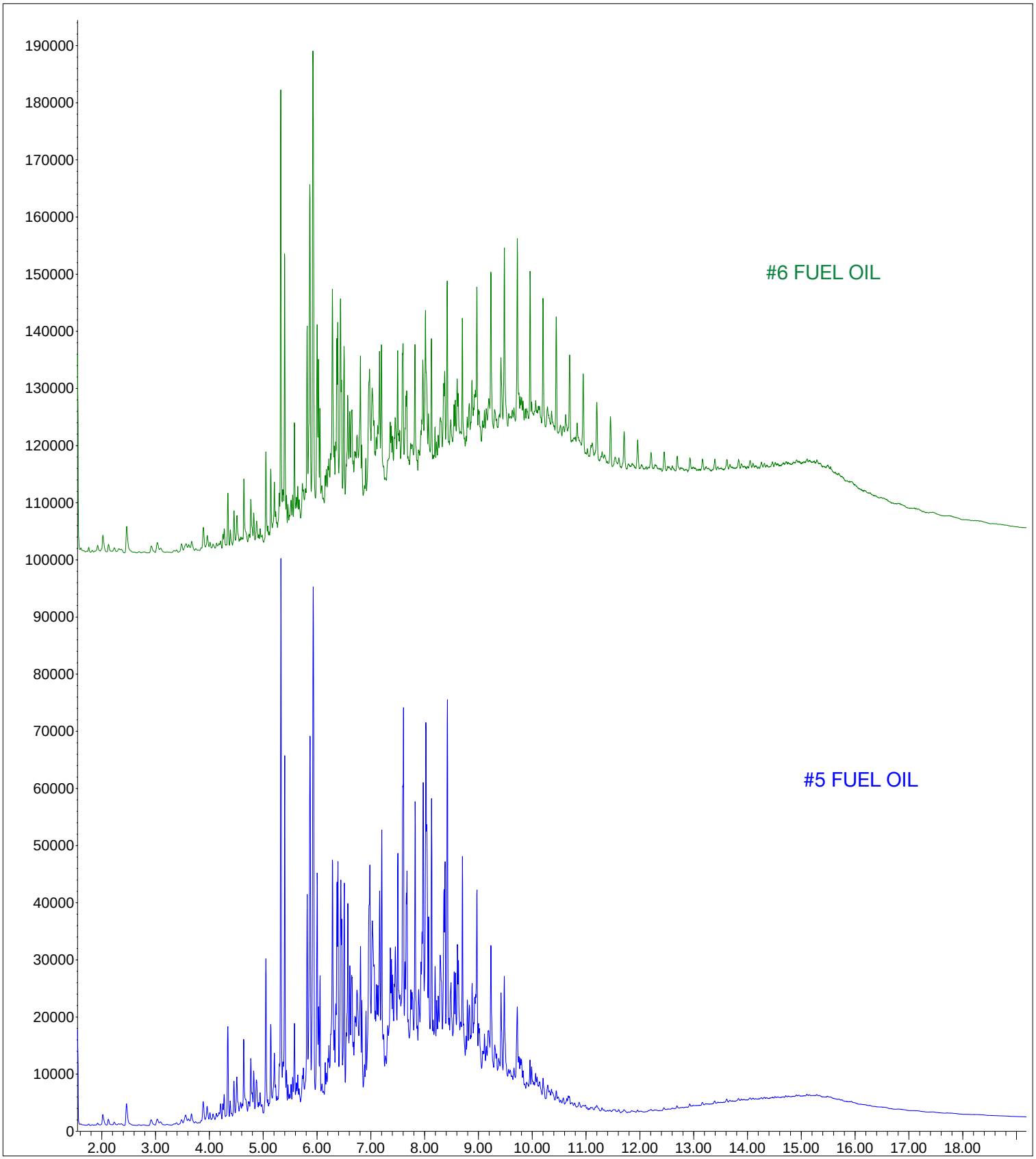
COMPARING 10W30 MOTOR OIL, ASPHALT & PEAT



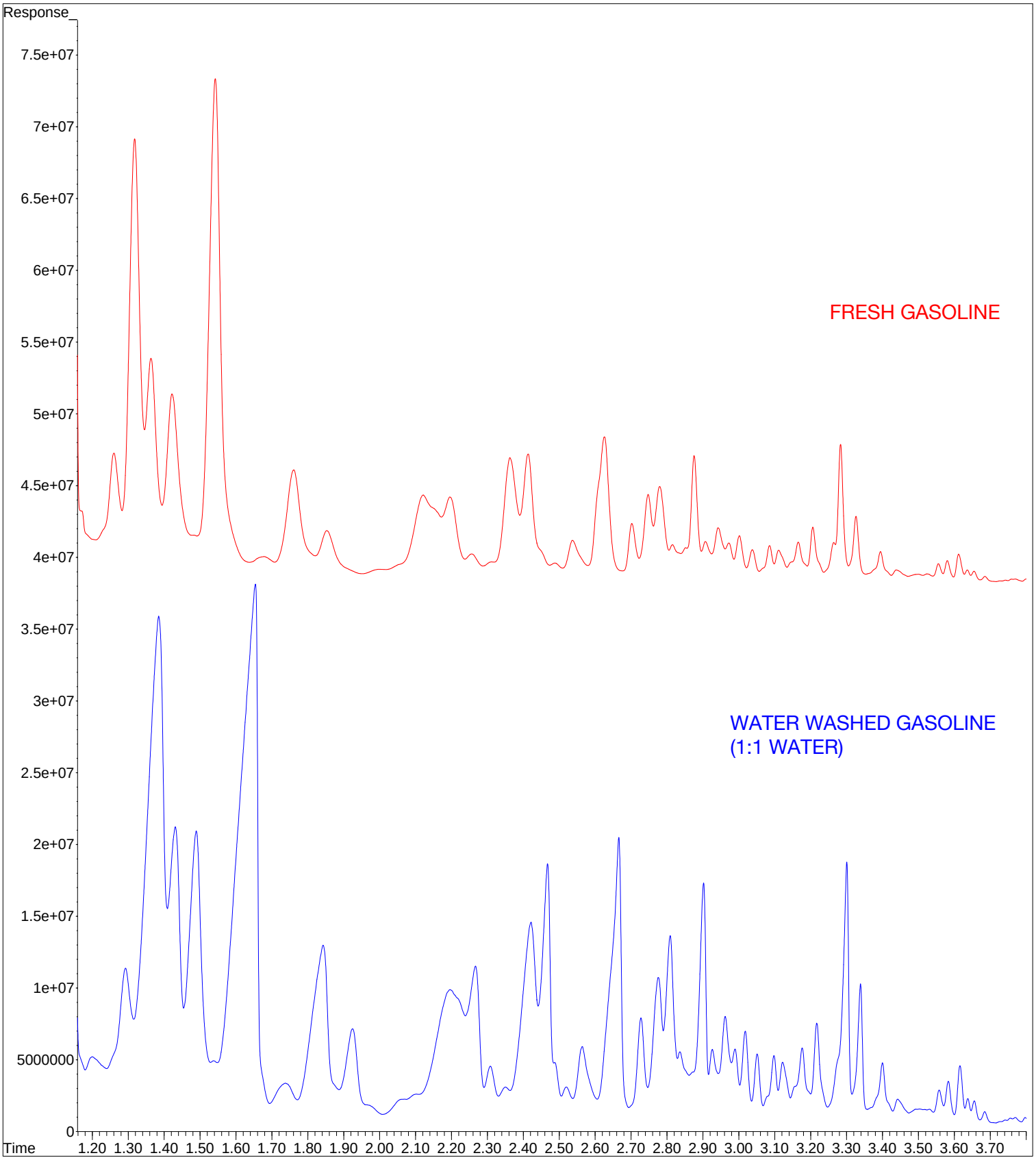
COMPARING #2 & #3 FUEL OIL



COMPARING #5 & #6 FUEL OIL



COMPARING FRESH TO WATER-WASHED GASOLINE



COMPARING FRESH TO WATER-WASHED DIESEL