

# Analysis of Aliphatic Hydrocarbons in Diesel and Gasoline Range Organics in Ground and Surface Water by GC/MS

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## Key Words

- US EPA 8015
- Aliphatic Hydrocarbons
- Diesel Range Organics (DRO)
- Gasoline Range Organics (GRO)
- TG-5SiIMS
- 5% Phenyl

## Introduction

US EPA method 8015 is an analytical GC/MS methods used for determining certain aliphatic hydrocarbons in diesel range organics (DROs) and gasoline range organics (GROs) in ground and surface water. This method was developed by the US Environmental Protection Agency to monitor industrial and municipal discharges under 40 CFR 136.1

EPA method 8015 was performed using a splitless injection mode on a Thermo Scientific TRACE GC coupled to a Thermo Scientific Ion Trap Mass Spectrometer.

The Thermo Scientific TraceGOLD TG-5SiIMS column provides excellent performance for the analysis of DROs and GROs, in accordance with EPA method 8015.

## Goal

To demonstrate the suitability and performance of TraceGOLD™ TG-5SiIMS for the analysis of EPA method 8015; DROs and GROs in ground and surface water.

## Experimental details

The DROs and GROs stated in the EPA methods 8015 were run on a TRACE™ GC fitted with a TriPlus autosampler. The ion trap mass spectrometer was used in a segmented mode to allow precise control of groups of ions for improved ion statistics and ion ratios. The column used for analyses was a low polarity silarylene phase, with selectivity comparable to a 5% diphenyl/95% dimethyl polysiloxane phase. The data was acquired and processed using Thermo Scientific Xcalibur data handling software.

## Sample preparation

A pre-mixed 1 ng/μL of alkane standard solution corresponding to DROs prepared in hexane was used for the analysis.

Column	Part Number
TraceGOLD TG-5SiIMS, 30 m × 0.25 mm × 0.25 μm,	26096-1420
Guard Column 2 m × 0.32 mm	260RG497
Press-Fit Union	64000-001



## Thermo Scientific TriPlus Autosampler

Sample volume	1 μL
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## TRACE GC Ultra

Oven Program	60 °C (5 min), 8 °C/min, 300 °C (10 min)
Equilibration Time	0.5 min
Injector	275 °C, Splitless (1 min)
Split Flow	30 mL/min
Column Flow	Helium, 1.5 mL/min (constant flow)
Transfer Line Temperature	300 °C

## Thermo Scientific Ion Trap MS

MS Type	ITD 230 LT (250 L turbo pump)
MS Source Temperature	225 °C
MS Source Current	250 μA
Electron Energy	70 eV
Filament Delay	5 min
MS Acquisition Mode	El+, 45-450 amu Segmented Scan

## Consumables

Consumables	Part Number
BTO 17 mm septa	31303211
3 mm ID Focus Liner, 105 mm long	45350032
Liner graphite seal	29033406
10 μL, 80 mm Syringe	36502019
Graphite ferrules to fit 0.32 mm id columns	29053487
Graphite/vespel 0.25 mm ID ferrules for GC/MS interface	29033496
2 mL clear vial and Si/PTFE seal	60180-599

## Results

The requirements for the EPA methods 8015 were achieved with separation of all of the DROs using the TraceGOLD TG-5SilMS on a GC/MS system. The EPA method 8015 states the use of a GC/FID instead of GC/MS, however the excellent separation provided by the TraceGOLD TG-5SilMS column would also be applicable to FID detection. Figure 1 shows the TIC chromatogram for 1 ng/μL of DROs, including pristane and phytane in hexane obtained using a TraceGOLD TG-5SilMS column. Table 1 shows the peak identification of compounds according to the retention times on the TraceGOLD TG-5SilMS column.

## Conclusions

The TraceGOLD TG-5SilMS column demonstrated excellent performance for the analysis of DROs with no

peak tailing of analytes. The chromatogram illustrates the superior performance of the TraceGOLD TG-5SilMS for the analysis of DROs and GROs in accordance with the EPA method 8015.

## References

1. EPA method 8105:  
[www.epa.gov/osw/hazard/testmethods/sw846/pdfs/8015c.pdf](http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/8015c.pdf)

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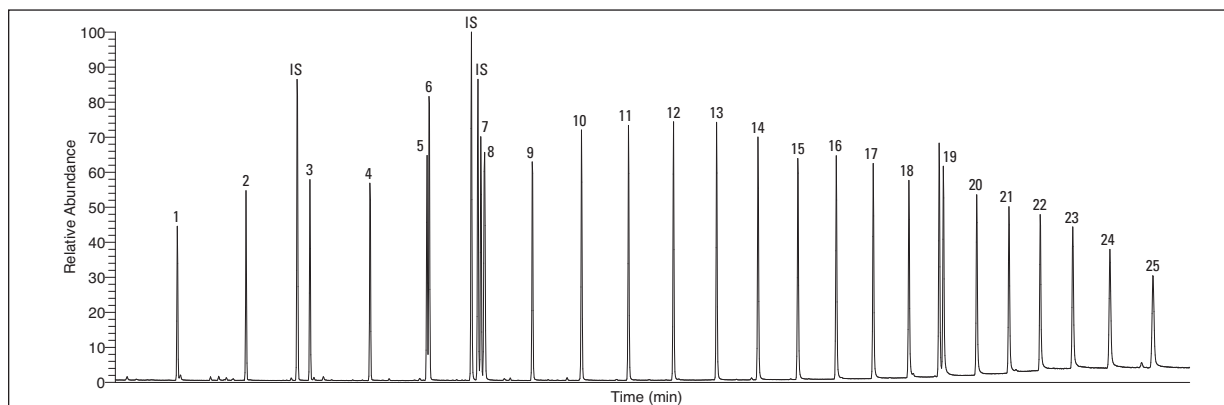


Figure 1: TIC chromatogram of 1 ng/μL of DROs in hexane separated on a TG-5SilMS column

Aliphatic Hydrocarbons	Peak No.	Aliphatic Hydrocarbons	Peak No.
C13	1	C22	12
C14	2	C23	13
Internal Standard	IS	C24	14
C15	3	C25	15
C16	4	C26	16
C17	5	C27	17
Pry	6	C28	18
Internal Standard	IS	C29	19
Internal Standard	IS	C30	20
C18	7	C31	21
Phy	8	C32	22
C19	9	C33	23
C20	10	C34	24
C21	11	C35	25

Table 1: List of Aliphatic Hydrocarbons according to retention times

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