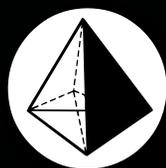


# Petroleum Standards



**AccuStandard®**

## PETROLEUM CRMs

AccuStandard's product portfolio for petroleum Certified Reference Materials (CRMs) offers high quality and cost effective standards for different petroleum testing applications, including: physical property testing, sulfur content in different petroleum matrices, oxygenates in gasoline, biofuel standards plus many other ASTM, EN and IP test methods.

These standards are made in accordance with our ISO17034 quality system which means they are subject to rigorous quality evaluation to provide reliability, quality compliance and accurate test results.

As a long-standing member of ASTM's major committees, D02 and D16, AccuStandard actively contributes to the development of standards for petroleum products, fuels, lubricants, and specialty chemicals. Our work within these technical subcommittees, combined with close collaboration with industry peers, allows us to design products that consistently meet the stringent requirements of numerous ASTM test methods.



## TIER 3 CRMs

The USEPA has developed a Tier 3 Standard as part of their effort to reduce vehicles emissions and improve air quality. This guideline requires federal gasoline to have no more than 10 ppm sulfur content down from 30 ppm. EPA has also required the use of specific ASTM methods to meet the Tier 3 testing and certification guidelines.

This comprehensive selection of CRMs are compliant with ASTM test methods for these required properties.

Tier 3 ASTM methods include: D86, D1319, D2622, D3606, D4815, D5453, D5769, D5599, D7039 for testing for Sulfur, Benzene, and Aromatic content, Olefins and Oxygenates

## 100 + ASTM Methods

ISO 17034 • 17025 • 9001

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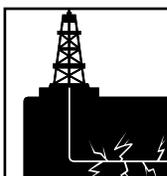
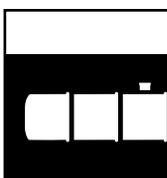
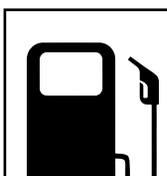
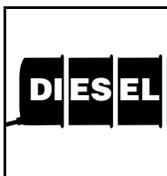
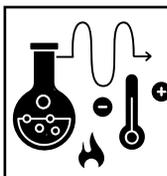
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# Cross-Reference Method Table

## CROSS-REFERENCE INTERNATIONAL METHODS

ANALYSIS	ASTM	IP	ISO	DIN	JIS	AFNOR
Tag Flash Point	D56	36	13736	51755-1	K 2265-1	
Distillation	D86	123	3405	51751	K 2254	M07-002
COC Flash Point	D92	33/35	2592	51376	K 2265-4	T60-118
PMCC Flash Point	D93	170	2719	51758	K 2265-3	M07-019
Kinematic Viscosity	D445		3104	51562	K 2283	
Aniline Point	D611	2	2977	51775		M07-021
Hydrocarbon Types by FID	D1319	156	3837	51791	K 2536-1	M07-024
Water (Karl Fischer)	D1744	438	6296			T60-154
Freezing Point	D2386	16	3013	51421	K 2276	M07-048
Cloud Point	D2500	219	3015	51597	K 2269	T60-105
Sulfur by XRF	D2622			51400T6	K 2541	
Boiling Range By GC	D2887		3924			
Sulfur by Oxidative Microcoulometry	D3120		16591			
Lead by AAS	D3237	428				
Sulfur by Oxidative Microcoulometry	D3246	373				M07-052
Metals by AA	D3605	413	8691	51790T3		
Benzene by GC	D3606	425				
Sulfur by ED-XRF	D4294	336	8754			M07-053
Water (Karl Fischer)	D4377	356	10336			
Metals by AA	D4628	308		51391T1		
Nitrogen by Chemiluminescence Detection	D4629	379				M07-058
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### International Method Abbreviations

ASTM	"American Society for Testing and Materials" U.S
IP	"Institute of Petroleum" - U.K
ISO	"International Organization of Standardization"
DIN	"Deutsches Institut für Normung (German Institute for Standardization)" - Germany
JIS	"Japanese Industrial Standards" - Japan
AFNOR	"Association Française de Normalisation (French Standardization Association)" - France

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TIER 3 Methods (Green Bold)

# Certificate of Analysis and Label

125 Market Street  
New Haven, CT 06513  
USA


**AccuStandard®**

Tel (203)786-5290  
www.AccuStandard.com

## CERTIFICATE OF ANALYSIS

**Catalog No :** BF-D-6584-MIX  
**Description :** ASTM D 6584 Mix  
**Lot :** 224111097-01  
**Solvent :** Pyridine  
**Hazards :** Refer to SDS for complete safety information

**Date Certified :** December 17, 2025  
**Expiration :** January 17, 2028  
**Sample Size :** 5 mL  
**Components :** 6  
**Storage Condition :** Refrig (0-5 °C)



Signal Word: Danger



Certified Reference Material

Component	CAS #	Purity* %	Prepared Concentration <sup>1</sup> (µg/mL)	Certified Analyte Concentration <sup>1</sup> (µg/mL)
Glycerol	56-81-5	98.7	502.4	495.9
Monoolein	111-03-5	100.0	5001	5001
1,3-Diolein	2465-32-9	99.9	5002	4997
Trioctadecenoic (Olein)	122-32-7	99.9	5002	4997
(S)-(-)-1,2,4-Butanetriol	42890-76-6	98.2	1009	990.8
Tricaprin	621-71-6	99.9	8006	7998

This Certified Reference Material was verified in accordance with ISO/IEC 17025 (AT-1339) and ISO 17034 (AR-1463)

<sup>1</sup> Certified Analyte Concentration = Purity x Prepared Concentration

<sup>2</sup> All weights are traceable through NIST, Test No. 684/O-000046697

<sup>3</sup> Purity/identity determined by one or more of the following methods: GC/MS, LC/MS, NMR, FTIR, Melting Point.

A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.

Hazard Information: Please refer to the SDS for information regarding the hazards associated with using this material.

Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.

The information on this certificate may not be reproduced without the express permission of the manufacturer. See reverse side for additional information.

The Uncertainty associated with the certified concentration reported on this certificate is ±2.4% and was determined in accordance with ISO 17034. This value is the combined expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.

This product was prepared according to in-house procedures and is guaranteed to be homogeneous.

Page 1 of 2

AccuStandard is accredited to ISO 17034, ISO/IEC 17025 and certified to ISO 9001

DR-ORGINQ-001  
Rev. 10/25

GHS safety information

CAS Number to easily identify compound

We use only high purity starting materials.

Concentration calculated by using the purity of the starting material

Compounds assembled into a standard based on method requirements and customer formulation request - all reviewed for solubility and coelution potential prior to manufacture.

NIST Traceability

QC management approval

Uncertainty reported for statistical confidence.

Quick access to product information such as SDS and COAs

## 2-Part Labels (ampoules or vials)

**Part One** can be placed into a laboratory journal to document the standard used for the analysis. This label section includes the catalog number, description, lot number, expiration date, safety information, proper storage conditions and documents AccuStandard as the manufacturer.

**Part Two** is the small section on the left that duplicates required information for labeling transfer vial(s).

BF-D-6584-MIX  
 Lot: 224111097  
 Exp: Dec 11, 2026  
 Date Opened


**AccuStandard®**

125 Market St, New Haven, CT 06513  
www.AccuStandard.com

BF-D-6584-MIX

ASTM D 6584 Mix  
 Varied Conc. in Pyridine

Lot: 224111097  
 Exp: Dec 11, 2026

PRODUCT OF THE USA

5 mL

6 comp(s)

Storage: Refrig (0-5 °C)

FOR LABORATORY USE ONLY

H225 H315 H332 H362 P201 P202 P273 P281 P303 P312 P314 P501

Signal Word: Danger





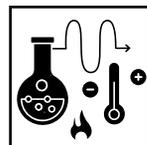


**Label material** is smudgeproof, tear and solvent resistant to common solvents, such as methylene chloride, methanol and acetone.

# Physical Property ASTM

AccuStandard's ISO 17034 scope includes physical standards for methods such as Flash Point, Distillation, Cloud Point, Freeze Point, Viscosity, and Water Content in petroleum products, determined by Karl Fischer Titration.

As a certified Reference Material Producer, we adhere to rigorous protocols for the production, certification, labeling, and reporting of measurement uncertainty for these standards. This includes verifying both the stability and homogeneity of our materials—measures that exceed the requirements of ISO/IEC 17025 and ISO 17034.



## ASTM D56, D92, D93 Flash Point

Flash Point is the lowest temperature at which a liquid produces enough vapor to ignite in the presence of an ignition source. For both heavy oils and light hydrocarbons, we offer a range of certified reference materials (CRMs) for flash point testing, suitable for daily use and routine checks. These CRMs are fully compliant with ASTM D56, D92, and D93 methods.

ASTM No.	Nominal Flash Point	Cat. No.	Unit	ASTM No.	Nominal Flash Point	Cat. No.	Unit
TCC D56	67-70 °C	ASTM-P-133-04	250 mL	PMCC D93	60-63 °C	ASTM-P-132-01	250 mL
COC D92	138-140 °C	ASTM-P-133-03	250 mL	PMCC D93	93-96 °C	ASTM-P-132-02	250 mL
COC D92	200-204 °C	ASTM-P-132-03	250 mL	PMCC D93	65-70 °C	ASTM-P-133-01	250 mL
COC D92	230-235 °C	ASTM-P-132-04	250 mL	PMCC D93	135-140 °C	ASTM-P-133-02	250 mL

## ASTM D86 Distillation TIER 3 CRMs

The automatic distillation apparatus duplicates the distillation conditions of the manual method. The increased reliance on the detectors requires an independent standard to verify that the apparatus is performing correctly. This synthetic blend of hydrocarbons boils in the temperature range specified in ASTM D86 distillation Groups 1 and 2. The fuel oil meets the Group 4 criteria.

Group 1 and 2 standards cover the boiling range from 129-368°F (54-187°C). Group 4 standard covers the range from 410-670°F (210-355°C).

Group	Cat. No.	Unit	Group	Cat. No.	Unit
1, 2 Synthetic Distillation Standard	ASTM-P-126-01 ▲	500 mL	4 Distillation Standard	ASTM-P-127-01 ▲	250 mL
				ASTM-P-127-02 ▲	500 mL

The accuracy of the temperature monitoring device in the distillation apparatus is fundamental to achieve reliable distillation results. These CRMs are designed to help accurately verify the temperature device response time in accordance with ASTM D86. This is particularly important since the response time of the electronic measuring device tends to be different when compared to the conventional mercury thermometers

Low Range Check Standard	Cat. No.	Unit	High Range Check Standard	Cat. No.	Unit
	D-86-LR-250ML	250 mL		D-86-HR-250ML	250 mL
	D-86-LR	500 mL		D-86-HR	500 mL

## ASTM D445 Kinematic Viscosity

Kinematic Viscosity is the measurement of a liquid flow time using a calibrated viscometer tube in a controlled temperature bath. The Kinematic Viscosity of petroleum products is important to determine the quality of the product, the applicability and the suitable storage conditions.

AccuStandard's viscosity CRMs are made in accordance with ASTM Test Method D445 and cover a broad range of viscosity values.

Viscosity @ 40 °C	Cat. No.	Unit	Viscosity	Cat. No.	Unit
4 Cst	ASTM-P-128-01	500 mL	65 cSt @ 40 °C,	D-445-04	500 mL
7 Cst	ASTM-P-128-02	500 mL	180 cSt @ 40 °C		
19 Cst	ASTM-P-128-03	500 mL	9 cSt @ 100 °C	D-445-05	500 mL
400 Cst	ASTM-P-128-07	500 mL	16 cSt @ 100 °C		

## ASTM D611 Aniline Point Not offered as CRMs under our 17034 and 17025 scope

Aniline point is the temperature at which equal volume of Aniline and oil becomes miscible and no phase separation is observed. The measurement of Aniline point is important to determine the aromaticity as well as the aromatic content in oils and heavy hydrocarbons. The percentage of aromatic compounds in such materials directly impacts properties such as viscosity and flash point. In addition to Pure Aniline, we offer a wide range of Aniline Point standards that cover multiple Aniline Point temperatures and complies with both ASTM D611 and ASTM D611E.

Method 611(A) Nominal Aniline Point	Cat. No.	Unit	Method 611(E) Nominal Aniline Point	Cat. No.	Unit
0 °C	D-611-01	20 mL	43 °C	D-611E-01	20 mL
30 °C	D-611-02	20 mL	62 °C	D-611E-02	20 mL
55 °C	D-611-03	20 mL	77 °C	D-611E-03	20 mL
68 °C	D-611-04	20 mL	Pure Aniline	ASTM-P-134-PAK	5 x 20 mL
94 °C	D-611-05	20 mL			

## ASTM D1015, D2386 Freezing Points for Aviation Fuel

Aviation fuel freezing point is known as the lowest temperature at which fuel remains free of solid hydrocarbon crystals.

Nominal Freezing Point	Cat. No.	Unit	Viscosity @ 40°C	Cat. No.	Unit
- 50 to -52 °C	ASTM-P-129-01	250 mL	4 Cst	ASTM-P-128-01	500 mL
- 45 to -47 °C	ASTM-P-129-02	250 mL	7 Cst	ASTM-P-128-02	500 mL
			19 Cst	ASTM-P-128-03	500 mL
			400 Cst	ASTM-P-128-07	500 mL

▲ Hazardous fee required for air shipments

Physical Property  
continued on next page

# Physical Property ASTM

## ASTM D1744, E1064, D6304 Water in Liquid Petroleum Products by Karl Fischer

The Karl Fischer Coulometric titration is used to determine water content in Petroleum, Pharmaceutical as well as Food products. ASTM D6304 Karl Fischer CRMs are available as low as 60 ppm with versatile fill sizes that meet all your lab needs.

Water Content	Cat. No.	Unit	Water Content	Cat. No.	Unit
60 µg/g	KF-0.6X-5ML-VAP	10 x 5 mL	5000 µg/g	KF-50X-2ML-VAP	10 x 2 mL
100 µg/g	KF-1X-2ML-VAP	10 x 2 mL		KF-50X-5ML-VAP	10 x 5 mL
	KF-1X-5ML-VAP	10 x 5 mL		KF-50X-20ML-PAK	5 x 20 mL
	KF-1X-20ML-PAK	5 x 20 mL			
1000 µg/g	KF-10X-2ML-VAP	10 x 2 mL			
	KF-10X-5ML-VAP	10 x 5 mL			
	KF-10X-20ML-PAK	5 x 20 mL			

**Value Added PAKs (VAP)**  
Multiple single units packaged for consistency and cost savings.

## ASTM D2500, D5771, D5772, D5773 Cloud Point

The Cloud Point is known as the lowest temperature when a petroleum product becomes cloudy and hydrocarbon crystals start forming. Cloud Point is an important parameter to measure in order to determine quality and performance of petroleum products. Cloud Point CRMs cover a range from -20 °C up to +5 °C. They are available for immediate dispatch to meet your application needs.

Cloud Point (Approx. Value)	Cat. No.	Unit	Cloud Point (Approx. Value)	Cat. No.	Unit
3-5 °C	ASTM-P-131-01	250 mL	- 15 to -17 °C	ASTM-P-131-04 ▲	250 mL
- 2 to -4 °C	ASTM-P-131-02 ▲	250 mL	- 20 to -22 °C	ASTM-P-131-05 ▲	250 mL
- 10 to -12 °C	ASTM-P-131-03 ▲	250 mL			

## ASTM D97, D5950 Pour Point

The Pour Point of a liquid is defined as the lowest temperature at which a petroleum product can be poured under certain testing criteria. Pour Point is an important characteristic to measure for Refineries and Petroleum Testing Labs to ensure fuel meets the desired specifications.

Pour Point (Approx. Value)	Cat. No.	Unit	Pour Point (Approx. Value)	Cat. No.	Unit
- 50 to -52 °C	ASTM-P-135-01 ▲	250 mL	- 15 to -17 °C	ASTM-P-135-04	250 mL
- 25 to -27 °C	ASTM-P-135-02 ▲	250 mL	- 40 to -42 °C	ASTM-P-135-05 ▲	250 mL
- 5 to -7 °C	ASTM-P-135-03 ▲	250 mL			

## ASTM D4052 Density

Measuring Density (mass per unit volume) accurately is fundamental to convert the unit volume to unit mass in different types of fuel. This is particularly important for quality and compliance purposes for large shipments of fuel when it is not practical to measure the weight of the shipment.

Other physical parameters, such as Dynamic Viscosity, can be calculated for fuels and lubricants using Density. According to ASTM D445, Dynamic Viscosity can be calculated by multiplying the measured kinematic viscosity with Density. Dynamic Viscosity is defined as fuel's resistance to flow under applied external force which is necessary for studying fuel's behavior under different operating conditions.

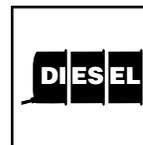
Density	Cat. No.	Unit
0.71-0.78 g/mL	D-4052-01	10 mL
0.80-0.88 g/mL	D-4052-02	10 mL

▲ Hazardous fee required for air shipments



These calibration standards are specifically designed for the analysis of sulfur in a wide range of petroleum distillates. Our Sulfur Certified Reference Materials (CRMs) are produced using the highest quality starting materials, including well-characterized starting compounds and matrices selected for their exceptionally low native sulfur content.

Manufacturing is performed using precision balances calibrated by an external ISO 17025-accredited laboratory, with daily verification against reference mass standards that are directly traceable to NIST. The concentrations of these working-level sulfur standards are traceable to NIST Standard Reference Materials (SRMs), ensuring reliable and consistent analytical performance.



## ASTM D2622, D3120, D3246, D4294, D5453, D6334, D6445 Sulfur in Petroleum Products Analysis **TIER 3 CRMs**

### Sulfur in Light Mineral Oil (20 cSt)

SWMO-LT-CAL-100ML-SET 19 x 100 mL **READY TO USE**

Concentration		Cat. No. 100 mL	Cat. No. 5 x 20 mL
µg/g	Wt.%		
Blank	0.000	SWMO-LT-BL-100ML	SWMO-LT-BL-20ML-PAK
100	0.010	SWMO-LT-1X-100ML	SWMO-LT-1X-20ML-PAK
200	0.020	SWMO-LT-2X-100ML	SWMO-LT-2X-20ML-PAK
300	0.030	SWMO-LT-3X-100ML	SWMO-LT-3X-20ML-PAK
400	0.040	SWMO-LT-4X-100ML	SWMO-LT-4X-20ML-PAK
500	0.050	SWMO-LT-5X-100ML	SWMO-LT-5X-20ML-PAK
750	0.075	SWMO-LT-7.5X-100ML	SWMO-LT-7.5X-20ML-PAK
1,000	0.10	SWMO-LT-10X-100ML	SWMO-LT-10X-20ML-PAK
1,500	0.15	SWMO-LT-15X-100ML	SWMO-LT-15X-20ML-PAK
3,000	0.30	SWMO-LT-30X-100ML	SWMO-LT-30X-20ML-PAK
5,000	0.50	SWMO-LT-50X-100ML	SWMO-LT-50X-20ML-PAK
7,000	0.70	SWMO-LT-70X-100ML	SWMO-LT-70X-20ML-PAK
10,000	1.00	SWMO-LT-100X-100ML	SWMO-LT-100X-20ML-PAK
15,000	1.50	SWMO-LT-150X-100ML	SWMO-LT-150X-20ML-PAK
20,000	2.00	SWMO-LT-200X-100ML	SWMO-LT-200X-20ML-PAK
30,000	3.00	SWMO-LT-300X-100ML	SWMO-LT-300X-20ML-PAK
40,000	4.00	SWMO-LT-400X-100ML	SWMO-LT-400X-20ML-PAK
50,000	5.00	SWMO-LT-500X-100ML	SWMO-LT-500X-20ML-PAK
60,000	6.00	SWMO-LT-600X-100ML	SWMO-LT-600X-20ML-PAK

### Sulfur in #2 Diesel Fuel

**READY TO USE**

Concentration		Cat. No. ▲ 100 mL	Cat. No. 5 x 20 mL
µg/g	Wt.%		
Blank	0.000	SDF-BL-100ML	SDF-BL-20ML-PAK
100	0.010	SDF-1X-100ML	SDF-1X-20ML-PAK
200	0.020	SDF-2X-100ML	SDF-2X-20ML-PAK
300	0.030	SDF-3X-100ML	SDF-3X-20ML-PAK
400	0.040	SDF-4X-100ML	SDF-4X-20ML-PAK
500	0.050	SDF-5X-100ML	SDF-5X-20ML-PAK
750	0.075	SDF-7.5X-100ML	SDF-7.5X-20ML-PAK
1,000	0.10	SDF-10X-100ML	SDF-10X-20ML-PAK
1,500	0.15	SDF-15X-100ML	SDF-15X-20ML-PAK
3,000	0.30	SDF-30X-100ML	SDF-30X-20ML-PAK
5,000	0.50	SDF-50X-100ML	SDF-50X-20ML-PAK
7,000	0.70	SDF-70X-100ML	SDF-70X-20ML-PAK
10,000	1.00	SDF-100X-100ML	SDF-100X-20ML-PAK
15,000	1.50	SDF-150X-100ML	SDF-150X-20ML-PAK
20,000	2.00	SDF-200X-100ML	SDF-200X-20ML-PAK
30,000	3.00	SDF-300X-100ML	SDF-300X-20ML-PAK
40,000	4.00	SDF-400X-100ML	SDF-400X-20ML-PAK
50,000	5.00	SDF-500X-100ML	SDF-500X-20ML-PAK
60,000	6.00	SDF-600X-100ML	SDF-600X-20ML-PAK

### Sulfur in Heavy Mineral Oil (75 cSt)

SWMO-CAL-100ML-SET 19 x 100 mL **READY TO USE**

Concentration		Cat. No. 100 mL	Cat. No. 5 x 20 mL
µg/g	Wt.%		
Blank	0.000	SWMO-BL-100ML	SWMO-BL-20ML-PAK
100	0.010	SWMO-1X-100ML	SWMO-1X-20ML-PAK
200	0.020	SWMO-2X-100ML	SWMO-2X-20ML-PAK
300	0.030	SWMO-3X-100ML	SWMO-3X-20ML-PAK
400	0.040	SWMO-4X-100ML	SWMO-4X-20ML-PAK
500	0.050	SWMO-5X-100ML	SWMO-5X-20ML-PAK
750	0.075	SWMO-7.5X-100ML	SWMO-7.5X-20ML-PAK
1,000	0.10	SWMO-10X-100ML	SWMO-10X-20ML-PAK
1,500	0.15	SWMO-15X-100ML	SWMO-15X-20ML-PAK
3,000	0.30	SWMO-30X-100ML	SWMO-30X-20ML-PAK
5,000	0.50	SWMO-50X-100ML	SWMO-50X-20ML-PAK
7,000	0.70	SWMO-70X-100ML	SWMO-70X-20ML-PAK
10,000	1.00	SWMO-100X-100ML	SWMO-100X-20ML-PAK
15,000	1.50	SWMO-150X-100ML	SWMO-150X-20ML-PAK
20,000	2.00	SWMO-200X-100ML	SWMO-200X-20ML-PAK
30,000	3.00	SWMO-300X-100ML	SWMO-300X-20ML-PAK
40,000	4.00	SWMO-400X-100ML	SWMO-400X-20ML-PAK
50,000	5.00	SWMO-500X-100ML	SWMO-500X-20ML-PAK
60,000	6.00	SWMO-600X-100ML	SWMO-600X-20ML-PAK

### Sulfur in Renewable Diesel Fuel #2

SRD-CAL-SET ▲ **READY TO USE** 21 x 100 mL

µg/g	Cat. No. ▲	Unit
Blank	SRD-BL-100ML	100 mL
5	SRD-0.05X-100ML	100 mL
10	SRD-0.1X-100ML	100 mL
25	SRD-0.25X-100ML	100 mL
50	SRD-0.5X-100ML	100 mL
100	SRD-1X-100ML	100 mL
250	SRD-2.5X-100ML	100 mL
300	SRD-3X-100ML	100 mL
500	SRD-5X-100ML	100 mL
700	SRD-7X-100ML	100 mL
750	SRD-7.5X-100ML	100 mL
1,000	SRD-10X-100ML	100 mL
2,500	SRD-25X-100ML	100 mL
3,000	SRD-30X-100ML	100 mL
5,000	SRD-50X-100ML	100 mL
10,000	SRD-100X-100ML	100 mL
15,000	SRD-150X-100ML	100 mL
20,000	SRD-200X-100ML	100 mL
30,000	SRD-300X-100ML	100 mL
40,000	SRD-400X-100ML	100 mL
50,000	SRD-500X-100ML	100 mL

#### Technical Note

Sulfur is introduced using di-n-butyl sulfide.

#### Product Note

Renewable diesel is a biomass-derived, ultra-low-sulfur fuel that meets ASTM and EPA diesel specifications and directly replaces petroleum diesel. Available as Certified Reference Materials, it supports low-level sulfur testing and improved analysis.

Sulfur continued on next page

▲ Hazardous fee required for air shipments.

# Sulfur ASTM

## ASTM D2622, D3120, D3246, D4294, D5453, D6334, D6445 Sulfurin Petroleum Products Analysis (continued) TIER 3 CRMs

### Sulfur in Light Distillate Kerosene

SK-CAL-100ML-SET ▲

12 x 100 mL

READY TO USE

Concentration		Cat. No. ▲	Cat. No.
µg/g	Wt.%	100 mL	5 x 20 mL
Blank	0.000	SK-BL-100ML	SK-BL-20ML-PAK
100	0.010	SK-1X-100ML	SK-1X-20ML-PAK
300	0.030	SK-3X-100ML	SK-3X-20ML-PAK
500	0.050	SK-5X-100ML	SK-5X-20ML-PAK
750	0.075	SK-7.5X-100ML	SK-7.5X-20ML-PAK
1,000	0.10	SK-10X-100ML	SK-10X-20ML-PAK
2,000	0.20	SK-20X-100ML	SK-20X-20ML-PAK
3,000	0.30	SK-30X-100ML	SK-30X-20ML-PAK
4,000	0.40	SK-40X-100ML	SK-40X-20ML-PAK
5,000	0.50	SK-50X-100ML	SK-50X-20ML-PAK
10,000	1.00	SK-100X-100ML	SK-100X-20ML-PAK
20,000	2.00	SK-200X-100ML	SK-200X-20ML-PAK

### Sulfur in Heavy Distillate Kerosene

SK-HD-CAL-100ML-SET ▲

21 x 100 mL

Concentration		Cat. No. ▲
µg/g	Wt.%	
Blank	0.000	SK-HD-BL-100ML
100	0.010	SK-HD-1X-100ML
200	0.020	SK-HD-2X-100ML
300	0.030	SK-HD-3X-100ML
400	0.040	SK-HD-4X-100ML
500	0.050	SK-HD-5X-100ML
750	0.075	SK-HD-7.5X-100ML
1,000	0.10	SK-HD-10X-100ML
1,500	0.15	SK-HD-15X-100ML
2,000	0.20	SK-HD-20X-100ML
3,000	0.30	SK-HD-30X-100ML
4,000	0.40	SK-HD-40X-100ML
5,000	0.50	SK-HD-50X-100ML
7,000	0.70	SK-HD-70X-100ML
10,000	1.00	SK-HD-100X-100ML
15,000	1.50	SK-HD-150X-100ML
20,000	2.00	SK-HD-200X-100ML
30,000	3.00	SK-HD-300X-100ML
40,000	4.00	SK-HD-400X-100ML
50,000	5.00	SK-HD-500X-100ML
60,000	6.00	SK-HD-600X-100ML

## ASTM D2622, D6334, D6445 Sulfur by X-ray Fluorescence Spectrometry TIER 3 CRMs

### Sulfur Calibration Standards used on XRF Energy Dispersive or Wavelength Instruments

D-2622-LL-CAL-100ML-SET ▲

10 x 100 mL

Individual bottles in Isooctane:Toluene (75:25)

#### Low Level

Sulfur Conc.	Sulfur Wt.%	Cat. No. ▲	Unit
Blank	0.0	D-2622-LL-BL-100ML	100 mL
5 µg/g	0.0005	D-2622-LL-5X-100ML	100 mL
10 µg/g	0.0010	D-2622-LL-10X-100ML	100 mL
30 µg/g	0.0030	D-2622-LL-30X-100ML	100 mL
50 µg/g	0.0050	D-2622-LL-50X-100ML	100 mL
75 µg/g	0.0075	D-2622-LL-75X-100ML	100 mL
100 µg/g	0.010	D-2622-LL-100X-100ML	100 mL
300 µg/g	0.030	D-2622-LL-300X-100ML	100 mL
500 µg/g	0.050	D-2622-LL-500X-100ML	100 mL
1000 µg/g	0.100	D-2622-LL-1000X-100ML	100 mL

#### Individual D2622 Standards

Sulfur Conc.	Sulfur Wt.%	Cat. No. ▲	Unit
200 µg/g	0.020	D-2622-LL-200X-100ML	100 mL
400 µg/g	0.040	D-2622-LL-400X-100ML	100 mL
600 µg/g	0.060	D-2622-LL-600X-100ML	100 mL
700 µg/g	0.070	D-2622-LL-700X-100ML	100 mL
800 µg/g	0.080	D-2622-LL-800X-100ML	100 mL
900 µg/g	0.090	D-2622-LL-900X-100ML	100 mL
1100 µg/g	0.110	D-2622-LL-1100X-100ML	100 mL
1200 µg/g	0.120	D-2622-LL-1200X-100ML	100 mL

#### Technical Note

Thiophene and 2-Methylthiophene are used as a starting material for Sulfur content.

## ASTM D2622 and D4294 Sulfur by X-ray Fluorescence Spectrometry

### Sulfur Calibration Standards for Gasoline and Reformulated Gasoline Analysis

STP-CAL-100ML-SET ▲

13 x 100 mL

Individual bottles in Isooctane

Sulfur Conc.	Sulfur Wt.%	Cat. No. ▲	Unit	Sulfur Conc.	Sulfur Wt.%	Cat. No. ▲	Unit
Blank	0.0	STP-BL-100ML	100 mL	300 µg/g	0.030	STP-30X-100ML	100 mL
10 µg/g	0.001	STP-1X-100ML	100 mL	400 µg/g	0.040	STP-40X-100ML	100 mL
20 µg/g	0.002	STP-2X-100ML	100 mL	600 µg/g	0.060	STP-60X-100ML	100 mL
30 µg/g	0.003	STP-3X-100ML	100 mL	1000 µg/g	0.10	STP-100X-100ML	100 mL
50 µg/g	0.005	STP-5X-100ML	100 mL	2000 µg/g	0.20	STP-200X-100ML	100 mL
100 µg/g	0.010	STP-10X-100ML	100 mL	3000 µg/g	0.30	STP-300X-100ML	100 mL
200 µg/g	0.020	STP-20X-100ML	100 mL				

#### Technical Note

Di-n-butyl sulfide starting material is used with a low sulfur Isooctane matrix for RFG/gasoline sulfur analysis.

▲ Hazardous fee required for air shipments.

## ASTM D2622 and D4294 Sulfur Petroleum Products (continued)

### Sulfur in Crude Oil Standards

Individual bottles in Crude oil

µg/g	Wt.%	Cat. No. ▲	Unit
1,000	0.10	SCO-10X-100ML	100 mL
2,500	0.25	SCO-25X-100ML	100 mL
5,000	0.50	SCO-50X-100ML	100 mL
10,000	1.00	SCO-100X-100ML	100 mL
20,000	2.00	SCO-200X-100ML	100 mL
30,000	3.00	SCO-300X-100ML	100 mL
40,000	4.00	SCO-400X-100ML	100 mL
50,000	5.00	SCO-500X-100ML	100 mL

### Sulfur in Residual Oil Standards

Individual bottles Residual oil

µg/g	Wt.%	Cat. No.	Unit
3,500	0.35	SRO-35X-100ML	100 mL
7,000	0.70	SRO-70X-100ML	100 mL
10,000	1.00	SRO-100X-100ML	100 mL
15,000	1.50	SRO-150X-100ML	100 mL
20,000	2.00	SRO-200X-100ML	100 mL
30,000	3.00	SRO-300X-100ML	100 mL
40,000	4.00	SRO-400X-100ML	100 mL

## ASTM D3120 & D3246 Total Sulfur by Oxidative Microcoulometry

TIER 3 CRMs

### Sulfur Calibration Set

D-3120-92-CAL-SET

8 x 1 mL

Individual bottles in Isooctane

Sulfur Conc.	Sulfur Wt.%	Cat. No.	Unit
Blank	0.0	D-3120-92-BL	1 mL
1 µg/g	0.0001	D-3120-92-1X	1 mL
3 µg/g	0.0003	D-3120-92-3X	1 mL
10 µg/g	0.0010	D-3120-92-10X	1 mL
30 µg/g	0.0030	D-3120-92-30X	1 mL
50 µg/g	0.0050	D-3120-92-50X	1 mL
75 µg/g	0.0075	D-3120-92-75X	1 mL
100 µg/g	0.010	D-3120-92-100X	1 mL

## ASTM D5453 Total Sulfur by Ultraviolet Fluorescence

TIER 3 CRMs

### Low Level Sulfur Set

D-5453-LL-SET

5 x 2 mL

At stated in Isooctane

Sulfur Blank	2 mL
Sulfur @ 0.5 ng/µL	2 mL
Sulfur @ 2.5 ng/µL	2 mL
Sulfur @ 5.0 ng/µL	2 mL
Sulfur @ 10.0 ng/µL	2 mL

### Mid Level Sulfur Set

D-5453-ML-SET

6 x 2 mL

At stated in Isooctane

Sulfur Blank	2 mL
Sulfur @ 5.0 ng/µL	2 mL
Sulfur @ 25 ng/µL	2 mL
Sulfur @ 50 ng/µL	2 mL
Sulfur @ 100 ng/µL	2 mL
Sulfur @ 200 ng/µL	2 mL

### High Level Sulfur Set

D-5453-HL-SET

5 x 2 mL

At stated in Isooctane

Sulfur Blank	2 mL
Sulfur @ 100 ng/µL	2 mL
Sulfur @ 250 ng/µL	2 mL
Sulfur @ 500 ng/µL	2 mL
Sulfur @ 1000 ng/µL	2 mL

### Technical Note

Sulfur standards are prepared by adding well characterized sulfur compounds gravimetrically to the matrix. Since the matrix may contain some native sulfur, a blank must be used for background correction and should be purchased with the standard.

Sulfur continued on next page

# Sulfur ASTM

## ASTM D6212 Sulfur by Hydrogenolysis and Rateometric Colorimetry

### Total Sulfur in Aromatic Compounds by Hydrogenolysis & Rateometric Colorimetry

ASTM-P-0010-PAK

5 x 1 mL

1000 µg/mL in Toluene

Sulfur (as Thiophene)

### Trace Quantities of Sulfur in Liquid Aromatic Hydrocarbons by Oxidative Microcoulometry

ASTM-P-0020-PAK

5 x 1 mL

1000 µg/mL in Xylenes

Sulfur (as Dibenzothiophene)

### Low Level Sulfur Calibration Set

ASTM-SSTDA-B-SET

10 x 2 mL

At stated conc. in Isooctane

µg/g	Cat. No.	Unit	µg/g	Cat. No.	Unit
Blank	ASTM-SSTDA-BL	2 mL	Blank	ASTM-SSTDB-BL	2 mL
0.5	ASTM-SSTDA-01	2 mL	5.0	ASTM-SSTDB-04	2 mL
1.0	ASTM-SSTDA-02	2 mL	10.0	ASTM-SSTDB-05	2 mL
2.5	ASTM-SSTDA-03	2 mL	25.0	ASTM-SSTDB-06	2 mL
5.0	ASTM-SSTDA-04	2 mL	50.0	ASTM-SSTDB-07	2 mL

## ASTM D6428 Sulfur by Oxidative Combustion and Electrochemical Detection

D-6428-R1-100ML-SET

7 x 100 mL

D-6428-R1-SET

7 x 1 mL

Each in Isooctane

	D-6428-R1-100ML-SET	D-6428-R1-SET
Sulfur Blank	D-6428-BL-100ML	D-6428-BL
Sulfur @ 0.1 µg/g	D-6428-0.1X-100ML	D-6428-0.1X
Sulfur @ 0.5 µg/g	D-6428-0.5X-100ML	D-6428-0.5X
Sulfur @ 1.0 µg/g	D-6428-1X-100ML	D-6428-1X
Sulfur @ 2.5 µg/g	D-6428-2.5X-100ML	D-6428-2.5X
Sulfur @ 5.0 µg/g	D-6428-5X-100ML	D-6428-5X
Sulfur @ 10 µg/g	D-6428-10X-100ML	D-6428-10X

D-6428-R2-100ML-SET

6 x 100 mL

D-6428-R2-SET

6 x 1 mL

Each in Isooctane

	D-6428-R2-100ML-SET	D-6428-R2-SET
Sulfur Blank	D-6428-BL-100ML	D-6428-BL
Sulfur @ 10 µg/g	D-6428-10X-100ML	D-6428-10X
Sulfur @ 25 µg/g	D-6428-25X-100ML	D-6428-25X
Sulfur @ 50 µg/g	D-6428-50X-100ML	D-6428-50X
Sulfur @ 75 µg/g	D-6428-75X-100ML	D-6428-75X
Sulfur @ 100 µg/g	D-6428-100X-100ML	D-6428-100X

## ASTM D7039 Sulfur content in fuel by XRF

TIER 3 CRMs

### Low Level Calibration Set

D-7039-LL-SET

6 x 1 mL

in (µg/g) Isooctane:Toluene (75:25)

Blank	Level 1	Level 2	Level 3	Level 4	Level 5
D-7039-LL-BK	-01	-02	-03	-04	-05
	5	10	20	40	50

### High Level Calibration Set

D-7039-HL-SET

6 x 1 mL

in Isooctane:Toluene (75:25)

Blank	Level 1	Level 2	Level 3	Level 4	Level 5
D-7039-HL-BK	-01	-02	-03	-04	-05
	100	200	300	400	500

## ASTM D7220 Sulfur by Monochromatic Energy Dispersive X-Ray Fluorescence Spectrometry

### Sulfur in Renewable Diesel Fuel #2

#### Low Range Calibration Set

D-7220-LR-CAL-SET

5 x 100 mL

Blank	SRD-BL-100ML	100 mL
5 µg/g	SRD-0.05X-100ML	100 mL
10 µg/g	SRD-0.1X-100ML	100 mL
25 µg/g	SRD-0.25X-100ML	100 mL
50 µg/g	SRD-0.5X-100ML	100 mL

### Sulfur in Renewable Diesel Fuel #2

#### High Range Calibration Set

D-7220-HR-CAL-SET

7 x 100 mL

Blank	SRD-BL-100ML	100 mL
50 µg/g	SRD-0.5X-100ML	100 mL
100 µg/g	SRD-1X-100ML	100 mL
250 µg/g	SRD-2.5X-100ML	100 mL
500 µg/g	SRD-5X-100ML	100 mL
750 µg/g	SRD-7.5X-100ML	100 mL
1000 µg/g	SRD-10X-100ML	100 mL

### Product Note

Renewable diesel is a biomass-derived, ultra-low-sulfur fuel that meets ASTM and EPA diesel specifications and directly replaces petroleum diesel. Available as Certified Reference Materials, it supports low-level sulfur testing and improved analysis.

# Gasoline and Other Petroleum ASTM

## ASTM D1319 (IP 156/95) Hydrocarbon Types by FIA

D1319 Meets EPA Guidelines for RFG Analysis

### Olefin FIA Calibration Curve

FIA-CAL-SET

	Level 1		Level 2		Level 3		Level 4		Level 5		Level 6		Level 7	
	Target	Vol. %	Vol. %	Vol. %										
Total Olefins	2.0		4.0		5.0		6.0		8.0		10.0		12.0	
Total Paraffins	57.0		55.0		52.0		51.0		45.0		45.0		40.0	
Total Aromatics	23.0		24.0		25.0		26.0		29.0		28.0		30.0	
Total Oxygenate	18.0		17.0		18.0		17.0		18.0		17.0		18.0	

Level	Cat. No.	Unit
1	FIA-CAL-01	1 mL
2	FIA-CAL-02	1 mL
3	FIA-CAL-03	1 mL
4	FIA-CAL-04	1 mL
5	FIA-CAL-05	1 mL
6	FIA-CAL-06	1 mL
7	FIA-CAL-07	1 mL

### FIA Olefin Standard

	Unit
FIA-OLE	1 x 1 mL
FIA-OLE-5ML	1 x 5 mL
At stated Vol. %	3 comps.
1-Pentene	33.3
2,3-Dimethyl-2-butene	33.3
1-Heptene	33.3

### FIA Paraffin Standard

	Unit
FIA-PAR	1 x 1 mL
FIA-PAR-5ML	1 x 5 mL
At stated Vol. %	8 comps.
<i>n</i> -Pentane	8
<i>n</i> -Hexane	9
Cyclohexane	15
<i>n</i> -Heptane	14
2,3-Dimethylpentane	14
Isooctane	19
<i>n</i> -Octane	14
<i>n</i> -Decane	7

### FIA Aromatic Standard

	Unit
FIA-ARO	1 x 1 mL
FIA-ARO-5ML	1 x 5 mL
At stated Vol. %	10 comps.
Benzene	4
Toluene	32
Ethylbenzene	8
<i>p</i> -Xylene	8
<i>o</i> -Xylene	8
<i>m</i> -Xylene	16
1,2,4-Trimethylbenzene	8
1,3,5-Trimethylbenzene	8
1,2,4,5-Tetramethylbenzene	4
Naphthalene	4

### Technical Note

These standards are intended for determining aromatics, olefins, oxygenates, and saturates in petroleum fractions by Fluorescent Indicator Adsorption (FIA). Each certificate reports both volume and weight percent values for hydrocarbon types, along with individual analyte percentages within each group.

## ASTM D2789 Hydrocarbon Types in Low Olefinic Gasoline by MS

### Hydrocarbon Mix

D-2789-CTM

D-2789-CTM-PAK

At stated Vol. %

	Unit
2-Methylpentane	7.2
2,4-Dimethylpentane	9.4
<i>n</i> -Octane	16.6
Methylcyclopentane	7.1
Methylcyclohexane	10
<i>cis</i> -1,2-Dimethylcyclohexane	15.5
Benzene	7.7
Toluene	10
<i>p</i> -Xylene	16.5

## ASTM D3230 Determination of Salts in Crude Oil

### Mixed Salt Solution

D-3230-89-1

D-3230-89-5

At stated conc. (µg/mL) in Alcohol Solution (1-Butanol : MeOH) (ratio 63:37)

	Unit
Calcium chloride	10
Magnesium chloride	20
Sodium chloride	70

## ASTM D3237 Lead in Gasoline by AA Spectroscopy

D3237 Meets EPA Guidelines for RFG Analysis

### Lead Standard Calibration Curve

D-3237-CAL-SET

D-3237-01, D-3237-02, D-3237-03, D-3237-04

	Cat. No.	Unit
Blank 1% Aliquot 336/MIBK	D-3237-01	100 mL
0.02 g Pb / gal ( 5.3 mg Pb/ L) in 1% Aliquat 336 / MIBK	D-3237-02	100 mL
0.05 g Pb / gal ( 13.2 mg Pb/ L) in 1% Aliquat 336 / MIBK	D-3237-03	100 mL
0.10 g Pb / gal ( 26.4 mg Pb/ L) in 1% Aliquat 336 / MIBK	D-3237-04	100 mL

## ASTM D3524 Diesel Fuel Diluent in Used Diesel Engine Oils by GC

### Calibration Curve

D-3524-CAL-5ML-SET

D-3524-CAL-10ML-SET

Analyte	Target	Std. 1		Std. 2		Std. 3		Std. 4		Std. 5		Std. 6	
		Wt. %	Wt. %										
# 2 Diesel	10	7.5	5.0	2.5	1.0	0							
SAE 30W Motor oil	90	92.5	95	97.5	99	100							

### Column Resolution Mix

D-3524-CR

D-3524-CR-PAK

1.0 each %v/v in *n*-Heptane

	Unit
# 2 Diesel	5.0
SAE 30W Motor oil	95.0

### Mid Level Daily QC Solution

D-3524-QC-10ML

At stated Wt. %

	Unit
# 2 Diesel	5.0
SAE 30W Motor oil	95.0

### Internal Standard

D-3524-IS-10ML

D-3524-IS-10ML-PAK

At stated Wt. % in *n*-Heptane

	Unit
<i>n</i> -Decane	1.0
<i>n</i> -Octadecane	0.2

# Gasoline and Other Petroleum

## ASTM

### ASTM D3606 Benzene and Toluene in Finished Motor & Aviation Gasoline by GC TIER 3 CRMs

ASTM Method D3606 was developed to quantify benzene and toluene in finished motor and aviation spark ignition fuels. An additional updated standard is provided for the 7 level calibration set which includes ethanol at approximately 10% v/v for all 7 levels.

#### Aromatics Calibration Set without Internal Standards

D-3606-25ML-SET

Analyte	Calibration Range	7 x 25 mL						
		Std. 1 Target Vol. %	Std. 2 Vol. %	Std. 3 Vol. %	Std. 4 Vol. %	Std. 5 Vol. %	Std. 6 Vol. %	Std. 7 Vol. %
Benzene	0.06 - 5.0	5.00	2.50	1.25	0.67	0.33	0.12	0.06
Toluene	0.5 - 20	20.00	15.00	10.00	5.00	2.50	1.00	0.50
Isooctane		75.00	82.50	88.75	94.33	97.17	98.88	99.44

#### Calibration Set with Internal Standard: MEK

D-3606-IS-SET

D-3606-IS-2ML-SET

Analyte	Calibration Range	7 x 1 mL 7 x 2 mL						
		Std. 1 Target Vol. %	Std. 2 Vol. %	Std. 3 Vol. %	Std. 4 Vol. %	Std. 5 Vol. %	Std. 6 Vol. %	Std. 7 Vol. %
Benzene	0.06 - 5.0	4.8	2.4	1.2	0.64	0.32	0.12	0.06
Toluene	0.5 - 20	19.2	14.4	9.6	4.80	2.40	0.96	0.48
Methyl ethyl ketone (ISTD)		4.0	4.0	4.0	4.0	4.0	4.0	4.0
Isooctane		72.0	79.2	85.2	90.56	93.28	94.92	95.46

#### Calibration Set with Internal Standard: sec-Butanol

D-3606-IS2-SET

Analyte	Calibration Range	7 x 1 mL						
		Std. 1 Target Vol. %	Std. 2 Vol. %	Std. 3 Vol. %	Std. 4 Vol. %	Std. 5 Vol. %	Std. 6 Vol. %	Std. 7 Vol. %
Benzene	0.06 - 5.0	4.8	2.4	1.2	0.64	0.32	0.12	0.06
Toluene	0.5 - 20	19.2	14.4	9.6	4.80	2.40	0.96	0.48
sec-Butanol (ISTD)		4.0	4.0	4.0	4.0	4.0	4.0	4.0
Isooctane		72.0	79.2	85.2	90.56	93.28	94.92	95.46

#### Calibration Set with Internal Standard: sec-Butanol

D-3606-IS2-R1-SET

Analyte	Calibration Range	7 x 1 mL						
		Std. 1 Target Vol. %	Std. 2 Vol. %	Std. 3 Vol. %	Std. 4 Vol. %	Std. 5 Vol. %	Std. 6 Vol. %	Std. 7 Vol. %
Benzene	0.06 - 5.0	5	4.2	3.4	2.6	1.7	0.9	0.1
Toluene	0.5 - 20	20	17	14	11	8	5	2
Isooctane		75	78.8	82.6	86.4	90.3	94.1	97.9
sec-Butanol (ISTD)		4	4	4	4	4	4	4

#### Calibration Set with Internal Standard: sec-Butanol

D-3606-IS2-R2-SET

Analyte	Calibration Range	7 x 1 mL						
		Std. 1 Target Vol. %	Std. 2 Vol. %	Std. 3 Vol. %	Std. 4 Vol. %	Std. 5 Vol. %	Std. 6 Vol. %	Std. 7 Vol. %
Benzene	0.06 - 5.0	4.8	2.4	1.2	0.64	0.32	0.12	0.06
Toluene	0.5 - 20	19.2	14.4	9.6	4.8	2.4	0.96	2.48
Ethanol		9.6	9.6	9.6	9.6	9.6	9.6	9.6
sec-Butanol (ISTD)		4.0	4.0	4.0	4.0	4.0	4.0	4.0
Isooctane		62.4	69.6	75.6	80.96	83.68	85.32	85.86

#### Calibration Set with Internal Standard: MIBK

D-3606-IS3-2ML-SET

Analyte	Calibration Range	7 x 2 mL						
		Std. 1 Target Vol. %	Std. 2 Vol. %	Std. 3 Vol. %	Std. 4 Vol. %	Std. 5 Vol. %	Std. 6 Vol. %	Std. 7 Vol. %
Benzene	0.06 - 5.0	5	2.5	1.3	0.67	0.33	0.12	0.06
Toluene	0.5 - 20	20	15.0	10.0	5.0	2.5	1.0	0.5
MIBK (ISTD)		4	4.0	4.0	4.0	4.0	4.0	4.0
Isooctane		71	75.8	84.7	90.33	93.17	94.88	95.44

#### Without Internal Standard

Standard	Volume	Components
D-3606-QC-25ML	1 x 25 mL	
D-3606-QC-25ML-PAK	5 x 25 mL	3 comps.
Each at stated Vol. %		
Benzene		0.67
Toluene		5.00
Isooctane		94.33
		100

#### With Internal Standard:

##### MEK

Standard	Volume	Components
D-3606-QC-IS-10ML	1 x 10 mL	
D-3606-QC-IS-10ML-PAK	5 x 10 mL	4 comps.
Each at stated Vol. %		
Benzene		0.64
Toluene		4.80
Methyl ethyl ketone (ISTD)		4.0
Isooctane		90.56
		100

#### With Internal Standard:

##### sec-Butanol

Standard	Volume	Components
D-3606-QC-IS2-25ML	1 x 25 mL	
D-3606-QC-IS2-25ML-PAK	5 x 25 mL	4 comps.
Each at stated Vol. %		
Benzene		0.64
Toluene		4.80
sec-Butanol (Internal Std.)		4.0
Isooctane		90.56
		100

These are target concentrations, actual analytical values will be reported on the COA.

# Gasoline and Other Petroleum

## ASTM

### ASTM D3798 Analysis of p-Xylene by GC

#### p-Xylene Impurity Standards

##### With Internal Standard

D-3798-IS		1 x 1 mL	
D-3798-IS-PAK		SAVE 5 x 1 mL	
At stated Wt. %		11 comps.	
n-Pentane	0.15	o-Xylene	0.15
n-Octane	0.15	Cumene	0.15
Benzene	0.15	Propylbenzene	0.15
Toluene	0.15	Total Analytes	100
Ethylbenzene	0.15	p-Xylene	98.65
		plus n-Undecane* (ISTD) 0.500	
m-Xylene	0.15		

##### Without Internal Standard

D-3798-10ML		1 x 10 mL	
D-3798-10ML-PAK		SAVE 5 x 10 mL	
At stated Wt. %		10 comps.	
n-Pentane	0.15	p-Xylene	98.65
n-Octane	0.15	m-Xylene	0.15
Benzene	0.15	o-Xylene	0.15
Toluene	0.15	Cumene	0.15
Ethylbenzene	0.15	Propylbenzene	0.15

#### Technical Note

Other internal standards are also available to use in conjunction with the bulk packaged D-3798 (1 x 10 mL) to meet your specific application. Contact Technical Service for a custom formulation.

### ASTM D3831 Manganese in Gasoline by AA Spectroscopy

#### Manganese Stock Solutions

D-3831-1	1 x 100 mL	D-3831-R1-1	1 x 100 mL
1.0 g Mn / gal (264.2 mg Mn / L) in Methyl isobutyl ketone		400 mg/L in Methyl isobutyl ketone	
Manganese		Manganese	

### ASTM D4291 Trace Ethylene Glycol in Used Engine Oil

D-4291-93	1 x 1 mL
D-4291-93-PAK	SAVE 5 x 1 mL
2000 µg/mL in water	
Ethylene glycol	

### ASTM D4420 Aromatics in Finished Gasoline by GC

#### Aromatics in Gasoline by GC/TC

Analyte	D-4420-CAL-SET							D-4420-94 D-4420-94-PAK At stated Vol. %	1 x 1 mL SAVE 5 x 1 mL 5 comps.
	Std. 1 Target Vol. %	Std. 2 Target Vol. %	Std. 3 Target Vol. %	Std. 4 Target Vol. %	Std. 5 Target Vol. %	Std. 6 Target Vol. %	Std. 7 Target Vol. %		
Benzene	0.05	0.10	0.25	0.75	1.25	2.50	5.00	Benzene	3.00
Toluene	0.5	1.00	2.50	5.00	10.00	15.00	25.00	Toluene	10.00
Total Xylenes (C <sub>8</sub> aromatics)	5	10.00	15.00	20.00	25.00	1.00	3.00	Total Xylenes (C <sub>8</sub> aromatics)	15.00
n-Butylbenzene (C <sub>9</sub> + aromatics)	30.00	25.00	20.00	10.00	5.00	15.00	2.50	n-Butylbenzene (C <sub>9</sub> + aromatics)	15.00
Isooctane	64.45	63.90	62.25	64.25	58.75	66.50	64.50	Isooctane	57.00

### ASTM D4629 Trace Nitrogen in Liquid Petroleum Hydrocarbons

D4629 is used to determine trace total nitrogen naturally found in liquid hydrocarbons boiling from 50 to 400°C with viscosities 0.2-10 cSt. This method monitors feed stocks for nitrogen to prevent the poisoning of some process catalysts when trace nitrogenous materials are present.

#### Nitrogen Calibration Set - Low Boiling Solvents

D-4629-LB-CAL-R1-SET			8 x 1 mL		
Each in Isooctane	Cat. No.	Unit	Each in Isooctane	Cat. No.	Unit
Isooctane Blank	D-4629-91-LB-BL	1 mL	Nitrogen @ 25 µg/mL	D-4629-91-LB-25X	1 mL
Nitrogen @ 0.3 µg/mL	D-4629-91-LB-0.3X	1 mL	Nitrogen @ 50 µg/mL	D-4629-91-LB-50X	1 mL
Nitrogen @ 1 µg/mL	D-4629-91-LB-1X	1 mL	Nitrogen @ 75 µg/mL	D-4629-91-LB-75X	1 mL
Nitrogen @ 10 µg/mL	D-4629-91-LB-10X	1 mL	Nitrogen @ 100 µg/mL	D-4629-91-LB-100X	1 mL

#### Stock Nitrogen Solution Low Boiling Solvents

D-4629-91-LB-CON	1 x 1 mL
D-4629-91-LB-CON-PAK	SAVE 5 x 1 mL
1000 µg/mL in Isooctane	

Nitrogen introduced using Pyridine

#### Nitrogen Calibration Set - High Boiling Solvents

D-4629-HB-CAL-R1-SET			8 x 1 mL		
Each in Toluene	Cat. No.	Unit	Each in Toluene	Cat. No.	Unit
Toluene Blank	D-4629-91-HB-BL	1 mL	Nitrogen @ 25 µg/mL	D-4629-91-HB-25X	1 mL
Nitrogen @ 0.3 µg/mL	D-4629-91-HB-0.3X	1 mL	Nitrogen @ 50 µg/mL	D-4629-91-HB-50X	1 mL
Nitrogen @ 1 µg/mL	D-4629-91-HB-1X	1 mL	Nitrogen @ 75 µg/mL	D-4629-91-HB-75X	1 mL
Nitrogen @ 10 µg/mL	D-4629-91-HB-10X	1 mL	Nitrogen @ 100 µg/mL	D-4629-91-HB-100X	1 mL

#### Stock Nitrogen Solution High Boiling Solvents

D-4629-91-HB-CON	1 x 1 mL
D-4629-91-HB-CON-PAK	SAVE 5 x 1 mL
1000 µg/mL in Toluene:Acetone (9:1)	

Nitrogen introduced using Carbazole

ASTM D4629 continued on next page

# Gasoline and Other Petroleum ASTM

## ASTM D4629 Trace Nitrogen in Liquid Petroleum Hydrocarbons (continued)

### Nitrogen Calibration Set - Low Level

ASTM-P-0070-SET

6 x 1 mL

Nitrogen introduced using Aniline

Each in Isooctane	Cat. No.	Each in Isooctane	Cat. No.
Isooctane Blank	ASTM-P-0070-BL	Nitrogen @ 2.0 µg/g	ASTM-P-0070-4X
Nitrogen @ 0.5 µg/g	ASTM-P-0070-1X	Nitrogen @ 5.0 µg/g	ASTM-P-0070-10X
Nitrogen @ 1.0 µg/g	ASTM-P-0070-2X	Nitrogen @ 10.0 µg/g	ASTM-P-0070-20X

### Low Level Nitrogen and Sulfur Calibration Set

ASTM-P-0071-SET

4 x 1 mL

The Nitrogen is introduced using Aniline and the Sulfur is introduced using di-n-butyl sulfide

Concentration in Benzene	Cat. No.	Unit
Benzene Blank	ASTM-P-0071-BL	1 mL
Nitrogen @ 0.25 µg/g & Sulfur @ 0.25 µg/g	ASTM-P-0071-01	1 mL
Nitrogen @ 0.50 µg/g & Sulfur @ 0.50 µg/g	ASTM-P-0071-02	1 mL
Nitrogen @ 1.00 µg/g & Sulfur @ 1.00 µg/g	ASTM-P-0071-03	1 mL

### Technical Note

Standards are prepared by adding well characterized nitrogen compounds gravimetrically to the matrix. Since the matrix may contain some native nitrogen, a blank must be used for background correction and should be purchased with the standard.

## ASTM D4815 MtBE, EtBE, TAME, DIPE, Tertiary-amyl & C1 to C4 Alcohols in Gasoline by GC

TIER 3 CRMs

### Oxygenate Quantitative Calibration Mixtures

#### Without Internal Standard

D-4815-10ML-SET

5 x 10 mL

Analyte	Target Concentrations				
	Std. 1 Wt. %	Std. 2 Wt. %	Std. 3 Wt. %	Std. 4 Wt. %	Std. 5 Wt. %
Ethanol	3.00	0.10	6.00	9.00	12.00
<i>t</i> -Butanol	0.10	3.00	6.00	8.00	12.00
Methyl <i>t</i> -butyl ether (MtBE)	20.0	15.00	10.00	5.00	0.10
<i>t</i> -Pentanol	1.25	5.00	2.50	3.75	0.10
Isooctane/Xylene (65:35)	75.65	76.90	75.50	74.25	75.80

#### With Internal Standard

D-4815-IS-SET

5 x 1 mL

Analyte	Calibration Range	Target Concentrations				
		Std. 1 Wt. %	Std. 2 Wt. %	Std. 3 Wt. %	Std. 4 Wt. %	Std. 5 Wt. %
Ethanol	0.1 - 11.40	2.85	0.095	5.70	8.55	11.40
<i>t</i> -Butanol	0.1 - 11.40	0.095	2.85	5.70	7.60	11.40
Methyl <i>t</i> -butyl ether (MtBE)	0.1 - 19.0	19.00	14.25	9.50	4.75	0.095
<i>t</i> -Pentanol	0.1 - 4.79	1.19	4.75	2.38	3.56	0.095
1,2-Dimethoxyethane (DME) (Internal Standard)		5.00	5.00	5.00	5.00	5.00
Isooctane/Xylene (65:35)		71.87	73.06	71.73	70.54	72.01
<b>Total Oxygenates &amp; Internal Standard</b>		<b>28.14</b>	<b>26.95</b>	<b>28.28</b>	<b>29.46</b>	<b>28.00</b>

### Oxygenate Internal Standard

M-GRO-IS-5ML

1 x 5 mL

M-GRO-IS-5ML-PAK

SAVE 5 x 5 mL

1,2-Dimethoxyethane (neat)

### Oxygenate Free Refinery Gasoline Blank

RFA-BLNK-10ML

1 x 10 mL

RFA-BLNK-10ML-PAK

SAVE 5 x 10 mL

RFA Gasoline (neat)

### Quantitative Peak ID & Retention Time Mixture (Core Mix)

D-4815-RT

1 x 1 mL

D-4815-RT-PAK

SAVE 5 x 1 mL

At stated Wt. %

16 comps.

Methylcyclopentane	4.00
Methanol	7.30
Ethanol	7.30
Isopropanol	7.30
<i>tert</i> -Butanol	7.30
<i>n</i> -Propanol	7.30
Methyl <i>tert</i> -butyl ether (MtBE)	4.00
<i>sec</i> -Butanol	7.30
Isopropyl ether	4.00
Isobutanol	7.30
Ethyl <i>tert</i> -butyl ether (EtBE)	4.00
<i>tert</i> -Pentanol	7.30
1,2-Dimethoxyethane (ISTD)	6.00
<i>n</i> -Butanol	7.30
Benzene	5.00
<i>tert</i> -Amyl methyl ether (TAME)	7.30
	100

### Valve Timing Mixture

D-4815-VT

1 x 1 mL

D-4815-VT-PAK

SAVE 5 x 1 mL

At stated Wt. %

5 comps.

Methylcyclopentane	10.00
Isopropyl ether	10.00
Ethyl <i>tert</i> -butyl ether (EtBE)	10.00
Methyl <i>tert</i> -butyl ether (MtBE)	10.00
<i>n</i> -Hexane	60.00

## ASTM D4929 Organic Chloride Content in Crude Oil

### Working Level Chlorine Std.

D-4929-94

1 x 5 mL

D-4929-94-PAK

SAVE 5 x 5 mL

10 µg/mL in Isooctane

Chlorine

### Stock Chlorine Standard

D-4929-94-100X

1 x 5 mL

D-4929-94-100X-PAK

SAVE 5 x 5 mL

1000 µg/mL in Isooctane

Chlorine

### Chlorine in Lube Oils

ASTM-P-0092-100ML-SET

7 x 100 mL

Each in 75 cSt Mineral oil

Cat. No.	Chlorine Wt. %	Chlorine µg/g	Unit
ASTM-P-0092-BL-100ML	Blank	Blank	100 mL
ASTM-P-0092-0.1X-100ML	0.001	10	100 mL
ASTM-P-0092-1X-100ML	0.01	100	100 mL
ASTM-P-0092-5X-100ML	0.05	500	100 mL
ASTM-P-0092-10X-100ML	0.1	1,000	100 mL
ASTM-P-0092-100X-100ML	1	10,000	100 mL
ASTM-P-0092-500X-100ML	5	50,000	100 mL

# Gasoline and Other Petroleum ASTM

## ASTM D5059 Lead in Gasoline by X-Ray Spectroscopy

D5059 Meets EPA Guidelines for RFG Analysis

### Part A - Lead in Gasoline Standards

D-5059-A-CAL-100ML-SET ▲

7 x 100 mL

At stated conc. (g/gal) in Isooctane

Lead Concentration			Cat. No. ▲	Unit
g Pb / US gal	g Pb / UK gal	mg Pb / mL		
0.0000	0.000	0.000	D-5059-A-01-100ML	100 mL
0.1000	0.120	0.026	D-5059-A-02-100ML	100 mL
1.0000	1.200	0.264	D-5059-A-03-100ML	100 mL
2.0000	2.400	0.528	D-5059-A-04-100ML	100 mL
3.0000	3.600	0.793	D-5059-A-05-100ML	100 mL
4.0000	4.800	1.057	D-5059-A-06-100ML	100 mL
5.0000	6.000	1.321	D-5059-A-07-100ML	100 mL

### Part C - Lead in Gasoline Standards

D-5059-C-CAL-100ML-SET ▲

7 x 100 mL

At stated conc. (g/gal) in Isooctane

Lead Concentration			Cat. No. ▲	Unit
g Pb / US gal	g Pb / UK gal	mg Pb / mL		
0.0000	0.000	0.000	D-5059-C-01-100ML	100 mL
0.0010	0.001	0.264	D-5059-C-02-100ML	100 mL
0.0050	0.006	1.321	D-5059-C-03-100ML	100 mL
0.0100	0.012	2.642	D-5059-C-04-100ML	100 mL
0.0500	0.060	13.209	D-5059-C-05-100ML	100 mL
0.1000	0.120	26.417	D-5059-C-06-100ML	100 mL
0.3000	0.360	79.252	D-5059-C-07-100ML	100 mL

### Internal Standard

D-5059-IS-100ML

1 x 100 mL

0.793 mg/mL in Mineral Oil

Bismuth

### Technical Note

Other internal standards are also available to use in conjunction with the bulk packaged D-3798 (1 x 10 mL) to meet your specific application. Contact Technical Service for a custom formulation.

## ASTM D5184 Aluminum and Silicon in Fuel Oils by Ashing, Fusion, ICP-AES Spectrometry & AA Spectrometry

### Tartaric Acid / Hydrochloric Acid Solution

D-5184-91-TA-5 ▲

1 x 500 mL

Tartaric acid @ 0.5% w/v in 4% HCl

### Aluminum Standard Solution

D-5184-91-AL-1 ▲

1 x 100 mL

D-5184-91-AL-5 ▲

1 x 500 mL

Aluminum @ 1000 µg/mL in 5% HCl tr. HNO<sub>3</sub>

### Silicon Standard Solution

D-5184-91-SI-1

1 x 100 mL

D-5184-91-SI-5

1 x 500 mL

Silicon @ 1000 µg/mL in water tr. NaOH tr. HF

## ASTM D5186 Aromatic Content & Polynuclear Aromatic Content of Diesel Fuels by SFC

### Performance Solution

D-5186-96-PM

1 x 1 mL

D-5186-96-PM-PAK

SAVE 5 x 1 mL

At stated Wt. %

4 comps.

n-Hexadecane	75	Tetralin	3.0
Naphthalene	2.0	Toluene	20

### Detector Linearity Check Set

D-5186-96-DLC-SET

2 x 1 mL

#2 Diesel Fuel in n-Hexadecane

25% w/w	D-5186-96-DLC-25X	1 mL
50% w/w	D-5186-96-DLC-50X	1 mL

### Docosane

D-5186-91-PM-0.4X

1 x 1 mL

20 Wt. % in Toluene

## ASTM D5188 Vapor-Liquid Ratio Temperature

### Performance Check Samples

Volume / Liquid Temp	Cat. No.	Set
36.1°C (96.9°F)	ASTM-P-125-01-VAP	5 x 20 mL
68.7°C (155.7°F)	ASTM-P-125-02-VAP	5 x 20 mL

▲ Hazardous fee required for air shipments.

# Gasoline and Other Petroleum

## ASTM

### ASTM D5191 & D5482 Vapor Pressure

#### Vapor Pressure Quality Control Samples

Vapor Pressure	Cat. No.	Set	Vapor Pressure	Cat. No.	Set
68.3kPa (9.91 psi)	ASTM-P-124-01-VAP	10 x 10 mL	22.5kPa (3.26 psi)	ASTM-P-124-05-VAP	10 x 10 mL
51.1kPa (7.41 psi)	ASTM-P-124-03-VAP	10 x 10 mL	7.1kPa (1.03 psi)	ASTM-P-124-06-VAP	10 x 10 mL
46.7kPa (6.77 psi)	ASTM-P-124-04-VAP	10 x 10 mL			

**Value Added PAK (VAP)**  
Packaged in ready to use quantities.

**Technical Note**  
Consists of pure solvents with known vapor pressures values.

### ASTM D5441 Analysis of Methyl tert-Butyl Ether (MtBE) by GC

Developed by ASTM Committee D02, Test Method D5441 outlines a gas chromatography procedure for determining the purity of methyl tert-butyl ether (MtBE). This method enables the quantification of impurities such as C<sub>4</sub> to C<sub>12</sub> olefins; alcohols including methyl, isopropyl, and tert-butyl; ethers like methyl sec-butyl and methyl tert-amyl; and ketones such as acetone and methyl ethyl ketone. The presence of these impurities can significantly impact the performance of MtBE as a gasoline additive. To support compliance with the method's specifications, a range of reference standards has been developed. These standards are available in various packaging sizes to accommodate different testing volumes.

#### MtBE Contaminant Standard

##### Low Concentration

D-5441	1 x 1 mL
D-5441-PAK	SAVE 5 x 1 mL
D-5441-5ML	1 x 5 mL
D-5441-5ML-PAK	SAVE 5 x 5 mL
0.1 Wt.% each in MtBE	12 comps

TAME  
t-Butanol  
EtBE  
4,4-Dimethyl-2-neopentyl-1-pentene  
Methanol  
2-Methylbutane  
2-Methyl-2-butene  
2,2',4,6,6'-Pentamethyl-3-heptene  
n-Pentane  
cis-2-Pentene  
trans-2-Pentene  
2,4,4-Trimethyl-1-pentene

#### MtBE Contaminant Standard

##### High Concentration

D-5441-10X	1 x 1 mL
D-5441-10X-PAK	SAVE 5 x 1 mL
D-5441-10X-5ML	1 x 5 mL
D-5441-10X-5ML-PAK	SAVE 5 x 5 mL
1 Wt.% each in MtBE	12 comps.

TAME  
t-Butanol  
EtBE  
4,4-Dimethyl-2-neopentyl-1-pentene  
Methanol  
2-Methylbutane  
2-Methyl-2-butene  
2,2',4,6,6'-Pentamethyl-3-heptene  
n-Pentane  
cis-2-Pentene  
trans-2-Pentene  
2,4,4-Trimethyl-1-pentene

#### MtBE Resolution Test Mixes

D-5441-RES	1 x 1 mL
D-5441-RES-PAK	SAVE 5 x 1 mL
D-5441-RES-5ML	1 x 5 mL
D-5441-RES-5ML-PAK	SAVE 5 x 5 mL
1 Wt.% each in MtBE	3 comps.

t-Butanol  
cis-Pentene  
trans-2-Pentene

### ASTM D5443 Paraffin, Naphthene & Aromatic Hydrocarbon Type Analysis in Petro Distillates 200°C by Multi-Dimensional GC

#### Hydrocarbon Test Mix

##### D-5443-93-HTM

At stated Wt. %

Cyclopentane	1.00	1,2-Dimethylcyclohexane	5.00	trans-Decahydronaphthelene	4.25
n-Pentane	1.00	Isooctane	5.00	n-Tetradecane	4.50
Cyclohexane	2.00	n-Octane	5.00	Ethylbenzene	4.50
2,3-Dimethylbutane	2.00	1,2,4-Trimethylcyclohexane	4.25	o-Xylene	4.25
n-Hexane	2.00	n-Nonane	4.50	n-Propylbenzene	5.00
n-Hexene	1.50	n-Decane	4.25	1,2,4-Trimethylbenzene	4.50
Methylcyclohexane	4.25	n-Undecane	3.50	1,2,3-Trimethylbenzene	5.00
4-Methyl-1-hexene	1.50	n-Dodecane	3.25	1,2,4,5-Tetramethylbenzene	5.00
n-Heptane	3.50	Benzene	2.25	Pentamethylbenzene	5.00
		Toluene	2.25		

1 x 1 mL  
28 comps.

### ASTM D5501 Ethanol and Methanol Content in Fuel by GC

#### Denatured Fuel Ethanol Calibration Set

##### D-5501-94-SET

Analyte	7 x 1 mL						
	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6	LEVEL 7
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
Ethanol	92	93	94	95	96	97	98
Methanol	0.6	0.5	0.4	0.3	0.2	0.1	0.05
Heptane	7.4	6.5	5.6	4.7	3.8	2.9	1.95

#### Linearity Mix

##### D-5501-LM

At stated Wt. %

2,4-Dimethylpentane	8.5	n-Decane	13.25
Isooctane	9.5	n-Nonane	9.5
2,2-Dimethylbutane	9.5	n-Octane	11
3-Methylhexane	10	n-Heptane	11.5
n-Undecane	10.25	n-Pentane	7

#### ASTM Method D5501-12

##### D-5501-12-SET

Analyte	5 x 1 mL				
	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %
Ethanol	20	50	75	90	99.4
Methanol	0.6	0.5	0.3	0.2	0.1
Heptane	10	10	10	4	0.5
Isooctane	69.4	39.5	14.8	5.8	0

# Gasoline and Other Petroleum

## ASTM

### ASTM D5580 Aromatics and Total Aromatics in Finished Gasoline by GC

#### Aromatics Quantitative Calibration Mixes

##### Without Internal Standard

D-5580-95-CAL-10ML-SET

5 x 10 mL

Analyte	Calibration range	Std. 1 Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%
Benzene	0.10 - 5.00	0.10	0.50	1.00	2.00	5.00
Toluene	1.00 - 15.00	15.00	10.00	5.00	2.50	1.00
Ethylbenzene	0.50 - 10.00	0.50	1.00	2.50	5.00	10.00
<i>o</i> -Xylene	0.50 - 10.00	1.00	2.50	10.00	5.00	0.50
1,2,4-Trimethylbenzene	0.50 - 10.00	1.00	10.00	0.50	5.00	2.50
Isooctane		82.40	76.00	81.00	80.50	81.00

##### With Internal Standard

D-5580-95-CAL-IS-SET

5 x 1 mL

Analyte	Calibration range	Std. 1 Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%
Benzene	0.09 - 4.50	0.09	0.45	0.90	1.80	4.50
Toluene	0.90 - 13.50	13.50	9.00	4.50	2.25	0.90
Ethylbenzene	0.45 - 9.00	0.45	0.90	2.25	4.50	9.00
<i>o</i> -Xylene	0.45 - 9.00	0.90	2.25	9.00	4.50	0.45
1,2,4-Trimethylbenzene	0.45 - 9.00	0.90	9.00	0.45	4.50	2.25
2-Hexanone (Internal Standard)		10.00	10.00	10.00	10.00	10.00
Isooctane		74.16	68.40	72.90	72.45	72.90

Standard 2 D-5580-95-CAL-IS-2 1 mL

#### Valve Timing Calibration Mixes

##### With Internal Standard

M-GRA-VT-IS-AS

1 x 1 mL

M-GRA-VT-IS-AS-PAK

SAVE 5 x 1 mL

At stated Wt. %

6 comps.

Benzene	4.5	<i>o</i> -Xylene	9.0
Toluene	4.5	2-Hexanone (ISTD)	10.0
Ethylbenzene	9.0	Isooctane	63.0

##### Without Internal Standard

M-GRA-VT-AS-10ML

1 x 10 mL

M-GRA-VT-AS-10ML-PAK

SAVE 5 x 10 mL

At stated Wt. %

5 comps.

Benzene	5.0	<i>o</i> -Xylene	10.0
Toluene	5.0	Isooctane	70.0
Ethylbenzene	10.0		

#### Daily Quality Control Standards

##### Without Internal Standard

D-5580-QC-R1-10ML

1 x 10 mL

D-5580-QC-R1-10ML-PAK

SAVE 5 x 10 mL

At stated Wt. %

14 comps.

<i>n</i> -Hexane	12	Toluene	9
<i>n</i> -Heptane	20	Ethylbenzene	2
<i>n</i> -Octane	15	<i>p</i> -Xylene	3
<i>n</i> -Decane	10	<i>o</i> -Xylene	2
<i>n</i> -Dodecane	1	1,2,4-Trimethylbenzene	3
Isooctane	20	1,2,4,5-Tetramethylbenzene	1
Benzene	1	Naphthalene	1

##### Without Internal Standard

D-5580-QC-10ML

1 x 10 mL

D-5580-QC-10ML-PAK

SAVE 5 x 10 mL

At stated Wt. %

14 comps.

<i>n</i> -Hexane	12	Toluene	9
<i>n</i> -Heptane	20	Ethylbenzene	2
<i>n</i> -Octane	15	<i>p</i> -Xylene	3
<i>n</i> -Decane	10	<i>o</i> -Xylene	2
<i>n</i> -Tridecane	1	1,2,4-Trimethylbenzene	3
Isooctane	20	1,2,4,5-Tetramethylbenzene	1
Benzene	1	Naphthalene	1

#### Technical Note

The instrument valve timing, switching, and pre-column setup determine which QA/QC standard performs best for analyzing gasoline samples using Method D5580. Using D5580 standards alongside real-world gasoline standards helps ensure reproducible results and proper system performance.

#### Valve Timing Mix

D-5580-VT

1 x 1 mL

At stated Wt. %

5 comps.

Benzene	2-Hexanone
Ethylbenzene	Isooctane
<i>o</i> -Xylene	

#### Internal Standard

M-GRA-IS-AS-5ML

1 x 5 mL

M-GRA-IS-AS-5ML-PAK

SAVE 5 x 5 mL

2-Hexanone (neat)

#### Selectivity Check Standard

M-GRA-SCS-AS

1 x 1 mL

M-GRA-SCS-AS-PAK

SAVE 5 x 1 mL

1.5 Wt. % in Isooctane

*n*-Dodecane

# Gasoline and Other Petroleum ASTM

## ASTM D5599 Oxygenates in Gasoline by GC & O-FID TIER 3 CRMs

### Oxygenates Calibration Curves

#### With Internal Standard

##### M-GRO-CAL-IS-SET

Analyte	Calibration Range	8 x 1 mL							
		Std. 1 Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%	Std. 6 Wt.%	Std. 7 Wt.%	Std. 8 Wt.%
Methanol	0.1 - 5.0	---	0.1	2.5	---	5	0.5	1	---
Ethanol	1.0 - 12.0	12	---	3	---	8	5	1	---
Isopropanol	0.1 - 2.0	2	1	---	0.1	0.3	---	0.5	---
t-Butanol	0.1 - 2.0	0.5	0.1	1	---	2	0.3	---	---
Propanol	0.2 - 2.0	2	---	0.7	0.2	1	---	0.4	---
MtBE	1.0 - 17.0	5	17	---	---	1	2.5	10	---
sec-Butanol	0.1 - 2.5	1	---	0.5	0.1	---	2.5	0.7	---
Diisopropyl ether	0.1 - 2.0	---	0.5	0.3	0.1	2	1	---	---
Isobutanol	0.1 - 2.0	2	0.5	---	1	0.1	0.3	---	---
EtBE	1.0 - 18.0	---	3.5	18	7.5	---	1	12	---
t-Pentanol	0.1 - 2.0	0.3	1	---	0.5	0.1	2	---	---
Butanol	0.1 - 2.0	1	---	0.3	---	0.5	0.1	2	---
TAME	1.0 - 18.0	---	3.5	1	18	7.5	12	---	---
1,2-Dimethoxyethane (ISTD)		4	4	4	4	4	4	4	---
RFA Gasoline		70.2	68.8	68.7	68.5	68.5	68.8	68.4	100
<b>Total oxygenates and ISTD</b>		<b>29.8</b>	<b>31.2</b>	<b>31.3</b>	<b>31.5</b>	<b>31.5</b>	<b>31.2</b>	<b>31.6</b>	<b>0</b>

#### With Internal Standard

##### M-GRO-CAL-IS-R1-SET

Analyte	Calibration Range	8 x 1 mL							
		Std. 1 Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%	Std. 6 Wt.%	Std. 7 Wt.%	Std. 8 Wt.%
Methanol	0.1 - 5.0	---	0.1	2.5	---	5	0.5	1	---
Ethanol	1.0 - 12.0	12	---	3	---	8	5	1	---
Isopropanol	0.1 - 2.0	2	1	---	0.1	0.3	---	0.5	---
t-Butanol	0.1 - 2.0	0.5	0.1	1	---	2	0.3	---	---
Propanol	0.2 - 2.0	2	---	0.7	0.2	1	---	0.4	---
MtBE	1.0 - 17.0	5	17	---	---	1	2.5	10	---
sec-Butanol	0.1 - 2.5	1	---	0.5	0.1	---	2.5	0.7	---
Diisopropyl ether	0.1 - 2.0	---	0.5	0.3	0.1	2	1	---	---
Isobutanol	0.1 - 2.0	2	0.5	---	1	0.1	0.3	---	---
EtBE	1.0 - 18.0	---	3.5	18	7.5	---	1	12	---
t-Pentanol	0.1 - 2.0	0.3	1	---	0.5	0.1	2	---	---
Butanol	0.1 - 2.0	1	---	0.3	---	0.5	0.1	2	---
TAME	1.0 - 18.0	---	3.5	1	18	7.5	12	---	---
1,2-Dimethoxyethane (ISTD)		4	4	4	4	4	4	4	---
RFA Gasoline		74.2	72.8	72.7	72.5	72.5	72.8	72.4	100
<b>Total oxygenates and ISTD</b>		<b>28.6</b>	<b>30.0</b>	<b>30.1</b>	<b>30.3</b>	<b>30.3</b>	<b>30.0</b>	<b>30.4</b>	<b>0</b>

#### Technical Note

The revised set formulation is made by adding all the oxygenates, RFA Gasoline and the Internal Standard.

#### Without Internal Standard

##### M-GRO-CAL-SET

Analyte	Calibration Range	8 x 10 mL							
		Std. 1 Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%	Std. 6 Wt.%	Std. 7 Wt.%	Std. 8 Wt.%
Methanol	0.1 - 5.0	---	0.1	2.5	---	5	0.5	1	---
Ethanol	1.0 - 12.0	12	---	3	---	8	5	1	---
Isopropanol	0.1 - 2.0	2	1	---	0.1	0.3	---	0.5	---
t-Butanol	0.1 - 2.0	0.5	0.1	1	---	2	0.3	---	---
Propanol	0.2 - 2.0	2	---	0.7	0.2	1	---	0.4	---
MtBE	1.0 - 17.0	5	17	---	---	1	2.5	10	---
sec-Butanol	0.1 - 2.5	1	---	0.5	0.1	---	2.5	0.7	---
Diisopropyl ether	0.1 - 2.0	---	0.5	0.3	0.1	2	1	---	---
Isobutanol	0.1 - 2.0	2	0.5	---	1	0.1	0.3	---	---
EtBE	1.0 - 18.0	---	3.5	18	7.5	---	1	12	---
t-Pentanol	0.1 - 2.0	0.3	1	---	0.5	0.1	2	---	---
Butanol	0.1 - 2.0	1	---	0.3	---	0.5	0.1	2	---
TAME	1.0 - 18.0	---	3.5	1	18	7.5	12	---	---
RFA Gasoline		74.2	72.8	72.7	72.5	72.5	72.8	72.4	100
<b>Total oxygenates</b>		<b>25.8</b>	<b>27.2</b>	<b>27.3</b>	<b>27.5</b>	<b>27.5</b>	<b>27.2</b>	<b>27.6</b>	<b>0</b>

#### Technical Note

This certified oxygenate calibration curve can be used in combination with other aromatic standards for combined oxygenate/aromatic analysis to change the amount of internal standard added, or to incorporate alternative internal standard analytes.

# Gasoline and Other Petroleum ASTM

## ASTM D5599 Oxygenates in Gas by GC & O-FID (continued) TIER 3 CRMs

### Daily QC Standard

#### Without Internal Standard

M-GRO-QC-10ML 1 x 10 mL  
M-GRO-QC-10ML-PAK **SAVE** 5 x 10 mL  
At stated Wt.% 14 comps.

Methanol	1	Isopropyl ether	3
Ethanol	1	Isobutanol	1
Isopropanol	1	EtBE	3
<i>t</i> -Butanol	1	<i>t</i> -Amyl alcohol	1
<i>n</i> -Propanol	1	<i>n</i> -Butanol	1
MtBE	3	TAME	3
<i>sec</i> -Butanol	1	RFA Gasoline	79

### Revised Daily QC Standard

#### Without Internal Standard

M-GRO-QC-R-10ML 1 x 10 mL  
M-GRO-QC-R-10ML-PAK **SAVE** 5 x 10 mL  
At stated Wt.% 14 comps.

Methanol	1	Isopropyl ether	1
Ethanol	1	Isobutanol	1
Isopropanol	1	EtBE	3
<i>t</i> -Butanol	1	<i>t</i> -Amyl alcohol	1
<i>n</i> -Propanol	1	<i>n</i> -Butanol	1
MtBE	3	TAME	3
<i>sec</i> -Butanol	1	RFA Gasoline	81

### Daily QC Standard

#### With Internal Standard

M-GRO-QC-IS-5ML 1 x 5 mL  
M-GRO-QC-IS-5ML-PAK **SAVE** 5 x 5 mL  
At stated Wt.% 15 comps.

Methanol	1	Isopropyl ether	3
Ethanol	1	Isobutanol	1
Isopropanol	1	EtBE	3
<i>t</i> -Butanol	1	<i>t</i> -Amyl alcohol	1
<i>n</i> -Propanol	1	<i>n</i> -Butanol	1
MtBE	3	TAME	3
<i>sec</i> -Butanol	1	RFA Gasoline	79

1,2-Dimethoxyethane (Internal Std.) is combined in a 4 to 100 Wt. ratio

### Revised Daily QC Standard

#### With Internal Standard

M-GRO-QC-R-IS-5ML 1 x 5 mL  
M-GRO-QC-R-IS-5ML-PAK **SAVE** 5 x 5 mL  
At stated Wt.% 15 comps.

Methanol	1	Diisopropyl ether	1
Ethanol	1	Isobutanol	1
Isopropanol	1	EtBE	3
<i>t</i> -Butanol	1	<i>t</i> -Pentanol	1
<i>n</i> -Propanol	1	<i>n</i> -Butanol	1
MtBE	3	TAME	3
<i>sec</i> -Butanol	1	RFA Gasoline	81

1,2-Dimethoxyethane (Internal Std.) is combined in a 4 to 100 Wt. ratio

### Gasoline Refinery Blank

#### With Internal Standard

M-GRO-BLNK-IS-10ML 1 x 10 mL  
M-GRO-BLNK-IS-10ML-PAK **SAVE** 5 x 10 mL  
At stated Wt.% 2 comps.

1,2-Dimethoxyethane (ISTD)	4
RFA Gasoline	96

### O-FID/EPA Gasoline Refinery

#### Internal Standard

M-GRO-IS-5ML 1 x 5 mL  
M-GRO-IS-5ML-PAK **SAVE** 5 x 5 mL

1,2-Dimethoxyethane (neat)

ASTM D5599 Oxygenates in Gas  
continued on next page

### O-FID Gasoline Refinery Blank

RFA-BLNK-10ML 1 x 10 mL  
RFA-BLNK-10ML-PAK **SAVE** 5 x 10 mL

RFA Gasoline (neat)

## SAVE on Packs!



# Gasoline and Other Petroleum ASTM

ASTM D5599 Oxygenates in Gas by GC & O-FID (continued)

TIER 3 CRMs

## EPA O-FID Quantitative Calibration Mixes

### Without Internal Standard

M-GRO-CAL-EPA-10ML-SET

5 x 10 mL

	Calibration Range	Std. 1 Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%
Methanol	0.30 - 12.00	6.00	12.00	3.00	0.30	9.00
Ethanol	0.30 - 12.00	0.30	3.00	6.00	9.00	12.00
<i>t</i> -Butanol	0.30 - 12.00	0.30	6.00	9.00	12.00	3.00
MtBE	0.30 - 15.00	15.00	7.50	11.25	3.75	0.30
RFA Gasoline		78.40	71.50	70.75	74.95	75.70

### Technical Note

#### EPA O-FID Oxygenate Petrochemical Standards

This second oxygenate version has been formulated to meet the specific analyte requirements of the EPA methodology.

### With Internal Standard

M-GRO-CAL-IS-EPA-SET

5 x 1 mL

	Calibration Range	Std. 1 Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%
Methanol	0.29 - 11.40	5.70	11.40	2.85	0.29	8.55
Ethanol	0.29 - 11.40	0.29	2.85	5.70	8.55	11.40
<i>t</i> -Butanol	0.29 - 11.40	0.29	5.70	8.55	11.40	2.85
MtBE	0.29 - 14.29	14.25	7.13	10.69	3.56	0.29
1,2-Dimethoxyethane (ISTD)		5.00	5.00	5.00	5.00	5.00
RFA Gasoline		74.48	67.93	67.31	71.20	71.92

## EPA O-FID Quantitative Calibration

### Check Standard

#### Without Internal Standard

M-GRO-EPA-CC-10ML

1 x 10 mL

M-GRO-EPA-CC-10ML-PAK

SAVE 5 x 10 mL

At stated Wt. %

5 comps.

Methanol	4.0	MtBE	12.0
Ethanol	8.0	RFA gasoline	71.0
<i>t</i> -Butanol	5.0		

## EPA O-FID Quantitative Calibration

### Check Standard

#### With Internal Standard

M-GRO-EPACC-IS-5ML

1 x 5 mL

M-GRO-EPACC-IS-5ML-PAK

SAVE 5 x 5 mL

At stated Wt. %

6 comps.

Methanol	3.80	RFA gasoline	67.45
Ethanol	7.60	1,2-Dimethoxyethane	5.0
<i>tert</i> -Butanol	4.75	(Internal Standard)	
MtBE	11.40		

## EPA O-FID Spiking Solution

M-GRO-EPA-SP-5ML

1 x 5 mL

M-GRO-EPA-SP-5ML-PAK

SAVE 5 x 5 mL

At stated Wt. %

4 comps.

Methanol	14.3	<i>t</i> -Butanol	14.3
Ethanol	28.6	MtBE	42.8

## Oxygenate Free Gasoline Refinery

### Blank

RFA-BLNK-10ML

1 x 10 mL

RFA-BLNK-10ML-PAK

SAVE 5 x 10 mL

RFA Gasoline (neat)

## Internal Standard

M-GRO-IS-5ML

1 x 10 mL

M-GRO-IS-5ML-PAK

SAVE 5 x 10 mL

1,2-Dimethoxyethane (neat)



# Gasoline and Other Petroleum ASTM

## ASTM D5622 Total Oxygen in Gasoline and MeOH Fuels by Reductive Pyrolysis

Description (2 x 10 mL, plus an RFA gasoline blank)	Oxygenate Wt.%	Cat. No.	Unit
Ethanol in Oxygenate free RFA gasoline	5.0	ASTM-P-0061-SET	3 x 10 mL
Ethanol in Oxygenate free RFA gasoline	10.0	ASTM-P-0062-SET	3 x 10 mL
TAME in Oxygenate free RFA gasoline	10.0	ASTM-P-0063-SET	3 x 10 mL
TAME in Oxygenate free RFA gasoline	15.0	ASTM-P-0064-SET	3 x 10 mL
EtBE in Oxygenate free RFA gasoline	10.0	ASTM-P-0065-SET	3 x 10 mL
EtBE in Oxygenate free RFA gasoline	15.0	ASTM-P-0066-SET	3 x 10 mL
MtBE in Oxygenate free RFA gasoline	10.0	ASTM-P-0067-SET	3 x 10 mL
MtBE in Oxygenate free RFA gasoline	15.0	ASTM-P-0068-SET	3 x 10 mL
Methanol & t-Butanol in Oxygenate free RFA gasoline	10.0 & 5.0	ASTM-P-0069-SET	3 x 10 mL

## Oxygenate Free Gasoline Refinery Blank

RFA-BLNK-10ML

1 x 10 mL

RFA Gasoline (neat)

## ASTM D5623 Sulfur Compounds in Light Petroleum Liquids by GC & Sulfur Selective Detection

ASTM-P-0091-10X-SET

22 x 1 mL

Approx. 2.0 mg/mL each in Toluene

Compound	Cat. No.	Unit	Compound	Cat. No.	Unit
Hydrogen sulfide	ASTM-P-0091-01-10X	1 mL	Thiophene	ASTM-P-0091-12-10X	1 mL
Carbonyl sulfide (Carbon oxysulfide)	ASTM-P-0091-02-10X	1 mL	2-Methyl-1-propanethiol (Isobutyl mercaptan)	ASTM-P-0091-13-10X	1 mL
Methyl mercaptan (Methanethiol)	ASTM-P-0091-03-10X	1 mL	Diethyl sulfide	ASTM-P-0091-14-10X	1 mL
Ethyl mercaptan (Ethanethiol)	ASTM-P-0091-04-10X	1 mL	1-Butanethiol (Butyl mercaptan)	ASTM-P-0091-15-10X	1 mL
Methyl sulfide (Dimethyl sulfide)	ASTM-P-0091-05-10X	1 mL	Methyl disulfide (Dimethyl disulfide)	ASTM-P-0091-16-10X	1 mL
Carbon disulfide	ASTM-P-0091-06-10X	1 mL	2-Methylthiophene	ASTM-P-0091-17-10X	1 mL
2-Propanethiol (Isopropyl mercaptan)	ASTM-P-0091-07-10X	1 mL	3-Methylthiophene	ASTM-P-0091-18-10X	1 mL
2-Methyl-2-propanethiol (t-butyl mercaptan)	ASTM-P-0091-08-10X	1 mL	Diethyl disulfide (Ethyl disulfide)	ASTM-P-0091-19-10X	1 mL
1-Propanethiol (Propyl mercaptan)	ASTM-P-0091-09-10X	1 mL	3-Methylbenzo[b]thiophene	ASTM-P-0091-20-10X	1 mL
Ethyl methyl sulfide	ASTM-P-0091-10-10X	1 mL	5-Methylbenzo[b]thiophene	ASTM-P-0091-21-10X	1 mL
1-Methyl-1-propanethiol (2-butanethiol)	ASTM-P-0091-11-10X	1 mL	Diphenyl sulfide	ASTM-P-0091-22-10X	1 mL

### Technical Note

This set of qualitative Sulfur Standards is formulated for research evaluation of the presence of the sulfur analytes or their breakdown products.

## ASTM D5762 Nitrogen in Liquid Hydrocarbons, Petroleum and Petroleum Products by Boat-Inlet Chemiluminescence

### Nitrogen Calibration Set

D-5762-95-CAL-SET

6 x 1 mL

Nitrogen introduced using Acridine

Description	Cat. No.	Unit
Xylene Blank	D-5762-95-BL	1 mL
Nitrogen @ 1.0 µg/mL in Xylene	D-5762-95-1X	1 mL
Nitrogen @ 5.0 µg/mL in Xylene	D-5762-95-5X	1 mL
Nitrogen @ 10 µg/mL in Xylene	D-5762-95-10X	1 mL
Nitrogen @ 50 µg/mL in Xylene	D-5762-95-50X	1 mL
Nitrogen @ 100 µg/mL in Xylene	D-5762-95-100X	1 mL

### Low Level Nitrogen & Sulfur Calibration Set

ASTM-P-0071-SET

4 x 1 mL

The Nitrogen is introduced using Aniline, the Sulfur is introduced using di-n-butyl sulfide

Description	Cat. No.	Unit
Benzene Blank	ASTM-P-0071-BL	1 mL
Nitrogen @ 0.25 µg/g & Sulfur @ 0.25 µg/g in Benzene	ASTM-P-0071-01	1 mL
Nitrogen @ 0.50 µg/g & Sulfur @ 0.50 µg/g in Benzene	ASTM-P-0071-02	1 mL
Nitrogen @ 1.00 µg/g & Sulfur @ 1.00 µg/g in Benzene	ASTM-P-0071-03	1 mL

### Stock Nitrogen Standard

D-5762-95-500X-PAK

5 x 1 mL

Nitrogen @ 500 µg/mL in Xylene (Acridine @ 6397 µg/mL)

### Nitrogen Calibration Set - Low Level

ASTM-P-0070-SET

6 x 1 mL

Nitrogen introduced using Aniline

Description	Cat. No.	Unit
Isooctane Blank	ASTM-P-0070-BL	1 mL
Nitrogen @ 0.5 µg/g in Isooctane	ASTM-P-0070-1X	1 mL
Nitrogen @ 1.0 µg/g in Isooctane	ASTM-P-0070-2X	1 mL
Nitrogen @ 2.0 µg/g in Isooctane	ASTM-P-0070-4X	1 mL
Nitrogen @ 5.0 µg/g in Isooctane	ASTM-P-0070-10X	1 mL
Nitrogen @ 10.0 µg/g in Isooctane	ASTM-P-0070-20X	1 mL

### Technical Note

Standards are prepared by adding well characterized nitrogen and/or sulfur compounds gravimetrically to the matrix. Since the matrix may contain some native nitrogen and/or sulfur, a blank must be used for background correction and should be purchased with the standard.

# Gasoline and Other Petroleum

## ASTM

ASTM D5769 Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS

TIER 3 CRMs

### Calibration Curves

#### Six Level Calibration Curve

##### Without Internal Standard

D-5769-CAL6-5ML-SET  
D-5769-CAL6-10ML-SET

6 x 5 mL  
6 x 10 mL

Core Calibration Mix 24 comps.	Std. 1 Target Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%	Std. 6 Wt.%
Benzene	5.25	2.95	1.575	0.8144	0.4143	4.16
Toluene	19.67	11.06	5.898	3.0505	1.5519	16.41
Ethylbenzene	5.18	2.91	1.552	0.8026	0.4083	4.10
<i>m</i> -Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91
<i>p</i> -Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91
<i>o</i> -Xylene	6.30	3.54	1.890	0.9776	0.4973	5.00
Isopropylbenzene	3.09	1.74	0.925	0.4786	0.2435	2.45
<i>n</i> -Propylbenzene	3.09	1.74	0.926	0.4787	0.2435	2.45
3-Ethyltoluene	3.10	1.74	0.928	0.4801	0.2442	2.45
4-Ethyltoluene	3.08	1.73	0.925	0.4782	0.2433	2.44
1,3,5-Trimethylbenzene	3.10	1.74	0.929	0.4804	0.2444	2.46
2-Ethyltoluene	3.15	1.77	0.945	0.4890	0.2488	2.50
1,2,4-Trimethylbenzene	5.23	2.94	1.567	0.8104	0.4123	4.14
1,2,3-Trimethylbenzene	3.20	1.80	0.960	0.4965	0.2526	2.54
Indan	3.45	1.94	1.034	0.5350	0.2722	2.73
1,4-Diethylbenzene	3.09	1.74	0.925	0.4786	0.2435	2.45
<i>n</i> -Butylbenzene	3.08	1.73	0.923	0.4776	0.2430	2.44
1,2-Diethylbenzene	3.15	1.77	0.945	0.4885	0.2485	2.50
1,2,4,5-Tetramethylbenzene	2.12	1.19	0.635	0.3284	0.1671	1.68
1,2,3,5-Tetramethylbenzene	2.12	1.19	0.637	0.3295	0.1676	1.68
Naphthalene	2.37	1.34	0.712	0.3683	0.1874	1.88
1-Methylnaphthalene	2.37	1.34	0.712	0.3683	0.1874	1.88
2-Methylnaphthalene	2.43	1.37	0.730	0.3773	0.1919	1.93
Isooctane	-----	43.77	70.015	84.4922	92.1105	19.92

#### Five Level Calibration Curve Without Internal Standard

D-5769-CAL-5ML-SET 5 x 5 mL (Std. 1-5)

#### Additional Calibration Level Without Internal Standard

D-5769-ADD-5ML 1 x 5 mL (Std. 6)  
D-5769-ADD-10ML 1 x 10 mL (Std. 6)

#### Technical Note

A sixth standard has been formulated to improve the linearity at the high end of the calibration curve. This can be helpful in the quantification of gasoline containing high levels of toluene.

#### Six Level Calibration Curve

##### With 3 Component Internal Standard

D-5769-CAL6-IS-SET

6 x 1 mL

Core Calibration Mix 24 Comps.	Std. 1 Target Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%	Std. 6 Wt.%
Benzene	5.25	2.95	1.575	0.8144	0.4143	4.16
Toluene	19.67	11.06	5.898	3.0505	1.5519	16.41
Ethylbenzene	5.18	2.91	1.552	0.8026	0.4083	4.10
<i>m</i> -Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91
<i>p</i> -Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91
<i>o</i> -Xylene	6.30	3.54	1.890	0.9776	0.4973	5.00
Isopropylbenzene	3.09	1.74	0.925	0.4786	0.2435	2.45
<i>n</i> -Propylbenzene	3.09	1.74	0.926	0.4787	0.2435	2.45
3-Ethyltoluene	3.10	1.74	0.928	0.4801	0.2442	2.45
4-Ethyltoluene	3.08	1.73	0.925	0.4782	0.2433	2.44
1,3,5-Trimethylbenzene	3.10	1.74	0.929	0.4804	0.2444	2.46
2-Ethyltoluene	3.15	1.77	0.945	0.4890	0.2488	2.50
1,2,4-Trimethylbenzene	5.23	2.94	1.567	0.8104	0.4123	4.14
1,2,3-Trimethylbenzene	3.20	1.80	0.960	0.4965	0.2526	2.54
Indan	3.45	1.94	1.034	0.5350	0.2722	2.73
1,4-Diethylbenzene	3.09	1.74	0.925	0.4786	0.2435	2.45
<i>n</i> -Butylbenzene	3.08	1.73	0.923	0.4776	0.2430	2.44
1,2-Diethylbenzene	3.15	1.77	0.945	0.4885	0.2485	2.50
1,2,4,5-Tetramethylbenzene	2.12	1.19	0.635	0.3284	0.1671	1.68
1,2,3,5-Tetramethylbenzene	2.12	1.19	0.637	0.3295	0.1676	1.68
Naphthalene	2.37	1.34	0.712	0.3683	0.1874	1.88
1-Methylnaphthalene	2.37	1.34	0.712	0.3683	0.1874	1.88
2-Methylnaphthalene	2.43	1.37	0.730	0.3773	0.1919	1.93
Isooctane	-----	43.77	70.015	84.4922	92.1105	19.92

#### Internal Standard

3 Comps.	Target Wt.%	Wt.%	Wt.%	Wt.%	Wt.%	Wt.%
Benzene-d <sub>6</sub>	2	2	2	2	2	2
Ethylbenzene-d <sub>10</sub>	2	2	2	2	2	2
Naphthalene-d <sub>8</sub>	1	1	1	1	1	1

#### Five Level Calibration Curve with ISTD

D-5769-CAL-IS-SET 5 x 1 mL (Std. 1 to Std. 5)

#### Additional Calibration Level with ISTD

D-5769-ADD-IS 1 x 1 mL (Std. 6)

#### Technical Note

A sixth standard has been formulated to improve the linearity at the high end of the calibration curve. This can be helpful in the quantification of gasoline containing high levels of toluene.

The M-GRA-IS Internal Standard mix is added on top of the 24 core components to formulate a complete calibration solution containing 27 components.

# Gasoline and Other Petroleum ASTM

ASTM D5769 Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS (continued)

TIER 3 CRMs

## Six Level Calibration Curve with Deuterated Toluene

With 4 Component Internal Standard (includes Toluene-d<sub>8</sub>)

D-5769-CAL6-IS-R-SET

6 x 1 mL

Core Calibration Mix 24 Comps.	Std. 1 Target Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%	Std. 6 Wt.%
Benzene	5.25	2.95	1.575	0.8144	0.4143	4.16
Toluene	19.67	11.06	5.898	3.0505	1.5519	16.41
Ethylbenzene	5.18	2.91	1.552	0.8026	0.4083	4.10
<i>m</i> -Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91
<i>p</i> -Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91
<i>o</i> -Xylene	6.30	3.54	1.890	0.9776	0.4973	5.00
Isopropylbenzene	3.09	1.74	0.925	0.4786	0.2435	2.45
<i>n</i> -Propylbenzene	3.09	1.74	0.926	0.4787	0.2435	2.45
3-Ethyltoluene	3.10	1.74	0.928	0.4801	0.2442	2.45
4-Ethyltoluene	3.08	1.73	0.925	0.4782	0.2433	2.44
1,3,5-Trimethylbenzene	3.10	1.74	0.929	0.4804	0.2444	2.46
2-Ethyltoluene	3.15	1.77	0.945	0.4890	0.2488	2.50
1,2,4-Trimethylbenzene	5.23	2.94	1.567	0.8104	0.4123	4.14
1,2,3-Trimethylbenzene	3.20	1.80	0.960	0.4965	0.2526	2.54
Indan	3.45	1.94	1.034	0.5350	0.2722	2.73
1,4-Diethylbenzene	3.09	1.74	0.925	0.4786	0.2435	2.45
<i>n</i> -Butylbenzene	3.08	1.73	0.923	0.4776	0.2430	2.44
1,2-Diethylbenzene	3.15	1.77	0.945	0.4885	0.2485	2.50
1,2,4,5-Tetramethylbenzene	2.12	1.19	0.635	0.3284	0.1671	1.68
1,2,3,5-Tetramethylbenzene	2.12	1.19	0.637	0.3295	0.1676	1.68
Naphthalene	2.37	1.34	0.712	0.3683	0.1874	1.88
1-Methylnaphthalene	2.37	1.34	0.712	0.3683	0.1874	1.88
2-Methylnaphthalene	2.43	1.37	0.730	0.3773	0.1919	1.93
Isooctane	----	43.77	70.015	84.4922	92.1105	19.92

### Internal Standard

4 Comps.	Target Wt.%	Wt.%	Wt.%	Wt.%	Wt.%	Wt.%
Benzene-d <sub>6</sub>	2	2	2	2	2	2
Ethylbenzene-d <sub>10</sub>	2	2	2	2	2	2
Naphthalene-d <sub>8</sub>	1	1	1	1	1	1
Toluene-d <sub>8</sub>	7	7	7	7	7	7

## Five Level Calibration Curve with ISTD

D-5769-CAL-IS-R-SET

5 x 1 mL (Std. 1 to Std 5)

## Additional Calibration Level with ISTD

D-5769-ADD-IS-R

1 x 1 mL (Std. 6)

### Technical Note

A sixth standard has been formulated to improve the linearity at the high end of the calibration curve. This can be helpful in the quantification of gasoline containing high levels of toluene.

The M-GRA-IS-R Internal Standard mix is added on top of the 24 core components to formulate a complete calibration solution containing 28 components.

## Calibration Curve with 3 Component Deuterated Internal Standard Added

### Aromatics Calibration Standards Kit

Internal Standard Version

M-GRA-CAL-IS-SET

5 x 1 mL

Core Calibration Mix 24 Comps.	Std. 1 Target Vol. %	Std. 2 Vol. %	Std. 3 Vol. %	Std. 4 Vol. %	Std. 5 Vol. %
Benzene	3	1.50	0.75	0.375	0.1875
Toluene	19	9.50	4.75	2.375	1.1875
Ethylbenzene	5	2.50	1.25	0.625	0.3125
<i>m</i> -Xylene	6	3.00	1.50	0.750	0.3750
<i>p</i> -Xylene	6	3.00	1.50	0.750	0.3750
<i>o</i> -Xylene	6	3.00	1.50	0.750	0.3750
Isopropylbenzene	3	1.50	0.75	0.375	0.1875
<i>n</i> -Propylbenzene	3	1.50	0.75	0.375	0.1875
3-Ethyltoluene	3	1.50	0.75	0.375	0.1875
4-Ethyltoluene	3	1.50	0.75	0.375	0.1875
1,3,5-Trimethylbenzene	3	1.50	0.75	0.375	0.1875
2-Ethyltoluene	3	1.50	0.75	0.375	0.1875
1,2,4-Trimethylbenzene	5	2.50	1.25	0.625	0.3125
1,2,3-Trimethylbenzene	3	1.50	0.75	0.375	0.1875
Indan	3	1.50	0.75	0.375	0.1875
1,4-Diethylbenzene	3	1.50	0.75	0.375	0.1875
<i>n</i> -Butylbenzene	3	1.50	0.75	0.375	0.1875
1,2-Diethylbenzene	3	1.50	0.75	0.375	0.1875
1,2,4,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250
1,2,3,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250
Naphthalene	2	1.00	0.50	0.250	0.1250
Pentamethylbenzene	2	1.00	0.50	0.250	0.1250
1-Methylnaphthalene	2	1.00	0.50	0.250	0.1250
2-Methylnaphthalene	2	1.00	0.50	0.250	0.1250
Isooctane	--	47.5	71.25	83.15	89.05

### Internal Standard

Benzene-d <sub>6</sub>	2	2	2	2	2
Ethylbenzene-d <sub>10</sub>	2	2	2	2	2
Naphthalene-d <sub>8</sub>	1	1	1	1	1

### Optional Sixth Standard

Internal Standard Added

M-GRA-ADD-IS

1 x 1 mL

Core Calibr. Mix 24 Comps.	Optional Std. 6 Target Vol. %
Benzene	2.25
Toluene	15
Ethylbenzene	3.75
<i>m</i> -Xylene	4.50
<i>p</i> -Xylene	4.50
<i>o</i> -Xylene	4.50
Isopropylbenzene	2.25
<i>n</i> -Propylbenzene	2.25
3-Ethyltoluene	2.25
4-Ethyltoluene	2.25
1,3,5-Trimethylbenzene	2.25
2-Ethyltoluene	2.25
1,2,4-Trimethylbenzene	3.75
1,2,3-Trimethylbenzene	2.25
Indan	2.25
1,4-Diethylbenzene	2.25
<i>n</i> -Butylbenzene	2.25
1,2-Diethylbenzene	2.25
1,2,4,5-Tetramethylbenzene	4.0
1,2,3,5-Tetramethylbenzene	1.5
Naphthalene	1.5
Pentamethylbenzene	1.5
1-Methylnaphthalene	1.5
2-Methylnaphthalene	1.5
Isooctane	20.5

### Internal Standard

Benzene-d <sub>6</sub>	2
Ethylbenzene-d <sub>10</sub>	2
Naphthalene-d <sub>8</sub>	1

## Aromatics for Analysis by GC-MS (Daily QC Standards) Sets

### Original Formulations

M-GRA-K1-SET

Set

#### Set includes:

Units

M-GRA-CAL-IS-SET	5 x 1 mL
M-GRA-QC-IS-5ML	1 x 5 mL
M-GRA-IS-5ML	1 x 5 mL
M-GRA-ST	1 x 1 mL

### Revision 5 F

M-GRA-K2-SET

Set

#### Set includes:

Units

M-GRA-CAL-IS-SET	5 x 1 mL
M-GRA-ADD-IS	1 x 1 mL
M-GRA-QC-IS-5ML	1 x 5 mL
M-GRA-IS-5ML	1 x 5 mL
M-GRA-ST	1 x 1 mL

The M-GRA-IS Internal Std. mix is added on top of the 24 core components to formulate a complete calibration solution containing 27 components.

# Gasoline and Other Petroleum ASTM

ASTM D5769 Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS (continued)

TIER 3 CRMs

## Calibration Curve with 4 Component Deuterated Internal Standard Added

### Aromatics Calibration Standards Kit

#### With Internal Standard

M-GRA-CAL-R-IS-R-SET

5 x 1 mL

Core Calibration Mix 24 comps.	Std. 1 Target Wt.%	Std. 2 Wt.%	Std. 3 Wt.%	Std. 4 Wt.%	Std. 5 Wt.%
Benzene	3.13	1.78	0.95	0.490	0.2490
Toluene	19.65	11.11	5.90	3.058	1.5547
Ethylbenzene	5.12	2.92	1.55	0.805	0.4090
<i>m</i> -Xylene	6.27	3.50	1.86	0.962	0.4891
<i>p</i> -Xylene	6.33	3.50	1.86	0.962	0.4891
<i>o</i> -Xylene	6.51	3.56	1.89	0.980	0.4891
Isopropylbenzene	3.06	1.74	0.93	0.480	0.2439
<i>n</i> -Propylbenzene	3.04	1.74	0.93	0.480	0.2440
3-Ethyltoluene	3.08	1.75	0.93	0.481	0.2446
4-Ethyltoluene	3.05	1.74	0.93	0.479	0.2437
1,3,5-Trimethylbenzene	3.07	1.75	0.93	0.481	0.2448
2-Ethyltoluene	3.14	1.78	0.95	0.490	0.2492
1,2,4-Trimethylbenzene	5.18	2.95	1.57	0.812	0.4130
1,2,3-Trimethylbenzene	3.19	1.81	0.96	0.498	0.2530
Indan	3.46	1.95	1.04	0.536	0.2726
1,4-Diethylbenzene	3.04	1.74	0.93	0.480	0.2439
<i>n</i> -Butylbenzene	3.05	1.74	0.92	0.479	0.2434
1,2-Diethylbenzene	3.22	1.78	0.95	0.490	0.2489
1,2,4,5-Tetramethylbenzene	2.10	1.20	0.64	0.329	0.1674
1,2,3,5-Tetramethylbenzene	2.09	1.20	0.64	0.330	0.1679
Naphthalene	2.35	1.34	0.71	0.369	0.1877
Pentamethylbenzene	2.16	1.23	0.66	0.340	0.1727
1-Methylnaphthalene	2.23	1.34	0.71	0.369	0.1877
2-Methylnaphthalene	2.41	1.37	0.73	0.378	0.1922
Isooctane	----	43.47	69.96	84.441	92.0905
Internal Standard	At stated Wt. %				
Benzene-d <sub>6</sub>	16.57	16.57	16.57	16.57	16.57
Ethylbenzene-d <sub>10</sub>	16.76	16.76	16.76	16.76	16.76
Naphthalene-d <sub>8</sub>	8.78	8.78	8.78	8.78	8.78
Toluene-d <sub>8</sub>	57.88	57.88	57.88	57.88	57.88

### Optional Sixth Standard

#### With Internal Standard

M-GRA-ADD-IS-R

1 x 1 mL

Core Calibr. Mix 24 comps.	Optional Std. 6 Target Wt.%
Benzene	2.48
Toluene	16.29
Ethylbenzene	4.07
<i>m</i> -Xylene	4.87
<i>p</i> -Xylene	4.87
<i>o</i> -Xylene	4.96
Isopropylbenzene	2.43
<i>n</i> -Propylbenzene	2.43
3-Ethyltoluene	2.44
4-Ethyltoluene	2.43
1,3,5-Trimethylbenzene	2.44
2-Ethyltoluene	2.48
1,2,4-Trimethylbenzene	4.11
1,2,3-Trimethylbenzene	2.52
Indan	2.71
1,4-Diethylbenzene	2.43
<i>n</i> -Butylbenzene	2.42
1,2-Diethylbenzene	2.48
1,2,4,5-Tetramethylbenzene	4.44
1,2,3,5-Tetramethylbenzene	1.67
Naphthalene	1.87
Pentamethylbenzene	1.72
1-Methylnaphthalene	1.87
2-Methylnaphthalene	1.91
Isooctane	17.67
M-GRA-IS-R (ISTD)	At stated Wt. %
Benzene-d <sub>6</sub>	16.57
Ethylbenzene-d <sub>10</sub>	16.76
Naphthalene-d <sub>8</sub>	8.78
Toluene-d <sub>8</sub>	57.88

### Technical Note

This set of calibration solutions was formulated to improve the quantification of toluene by using toluene-d<sub>8</sub> as an additional Internal Std.

The M-GRA-IS-R Internal Std. mix is added on top of the 24 core component to formulate a complete calibration solution containing 28 comps.

## Aromatics for Analysis by GC-MS (Daily QC Standards) Set

### 4 Component ISTD Formulations

M-GRA-K4-SET

Set

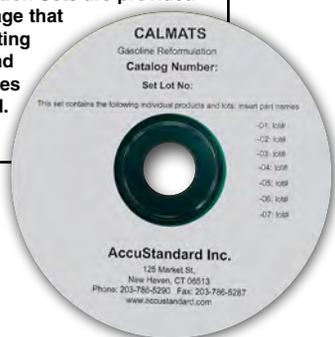
#### Set includes:

#### Units

M-GRA-CAL-R-IS-R-SET	5 x 1 mL
M-GRA-ADD-IS-R	1 x 1 mL
M-GRA-QCR-IS-R-5ML	1 x 5 mL
M-GRA-IS-R-10ML	1 x 10 mL
M-GRA-ST	1 x 1 mL

## Calibration Amounts

All D5769 Calibration Sets are provided with a data package that includes a CD listing actual weights and weight percentages for each standard.



# Gasoline and Other Petroleum

## ASTM

ASTM D5769 Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS (continued)

TIER 3 CRMs

### Daily Quality Control Standard

#### With Internal Standard

D-5769-QC-IS-15ML 1 x 15 mL  
D-5769-QC-IS-15ML-PAK SAVE 5 x 15 mL

D-5769-QC-IS-5ML 1 x 5 mL  
D-5769-QC-IS-5ML-PAK SAVE 5 x 5 mL

At stated Wt.% 17 comps.

<i>n</i> -Hexane	12	Toluene	9
<i>n</i> -Heptane	17	Ethylbenzene	3
<i>n</i> -Octane	17	<i>m</i> -Xylene	3
<i>n</i> -Decane	12	<i>o</i> -Xylene	3
<i>n</i> -Dodecane	5	1,2,4-Trimethylbenzene	3
Isooctane	12	1,2,4,5-Tetramethylbenzene	2
Benzene	1	Naphthalene	1

#### Includes

M-GRA-IS (3 comp. mix) added in 5 to 100 weight ratio

### Daily Quality Control Standard

#### Without Internal Standard

D-5769-QC-15ML 1 x 15 mL  
D-5769-QC-15ML-PAK 5 x 15 mL

D-5769-QC-10ML 1 x 10 mL  
D-5769-QC-10ML-PAK SAVE 5 x 10 mL

At stated Wt.% 14 comps.

<i>n</i> -Hexane	12	Toluene	9
<i>n</i> -Heptane	17	Ethylbenzene	3
<i>n</i> -Octane	17	<i>m</i> -Xylene	3
<i>n</i> -Decane	12	<i>o</i> -Xylene	3
<i>n</i> -Dodecane	5	1,2,4-Trimethylbenzene	3
Isooctane	12	1,2,4,5-Tetramethylbenzene	2
Benzene	1	Naphthalene	1

### Daily Quality Control Standard

#### With Internal Standard

M-GRA-QCR-IS-R-5ML 1 x 5 mL  
M-GRA-QCR-IS-R-5ML-PAK SAVE 5 x 5 mL

At stated Wt.% 19 comps.

<i>n</i> -Hexane	12	Ethylbenzene	3
<i>n</i> -Heptane	17	<i>m</i> -Xylene	3
<i>n</i> -Octane	17	<i>o</i> -Xylene	3
<i>n</i> -Decane	12	1,2,4-Trimethylbenzene	3
<i>n</i> -Dodecane	5	1,2,4,5-Tetramethylbenzene	1
Isooctane	12	Pentamethylbenzene	1
Benzene	1	1-Methylnaphthalene	1
Toluene	9		

Includes M-GRA-IS-R (4 comp.) combined with the Core Mix (15 comp.) in a 12 to 100 weight ratio.

### Daily Quality Control Standard (15 comps.)

#### Without Internal Standard

M-GRA-QC-R-10ML 1 x 10 mL  
M-GRA-QC-R-10ML-PAK SAVE 5 x 10 mL

At stated Wt.% 15 comps.

<i>n</i> -Hexane	12	Ethylbenzene	3
<i>n</i> -Heptane	17	<i>m</i> -Xylene	3
<i>n</i> -Octane	17	<i>o</i> -Xylene	3
<i>n</i> -Decane	12	1,2,4-Trimethylbenzene	3
<i>n</i> -Dodecane	5	1,2,4,5-Tetramethylbenzene	1
Isooctane	12	Pentamethylbenzene	1
Benzene	1	1-Methylnaphthalene	1
Toluene	9		

Includes Pentamethylbenzene and 1-Methylnaphthalene

### Daily Quality Control Standard (13 comps.)

#### Without Internal Standard

M-GRA-QC-10ML 1 x 10 mL  
M-GRA-QC-10ML-PAK SAVE 5 x 10 mL

At stated Wt.% 13 comps.

<i>n</i> -Hexane	12	Ethylbenzene	3
<i>n</i> -Heptane	17	<i>m</i> -Xylene	3
<i>n</i> -Octane	17	<i>o</i> -Xylene	3
<i>n</i> -Decane	12	1,2,4-Trimethylbenzene	3
<i>n</i> -Dodecane	5	1,2,4,5-Tetramethylbenzene	3
Isooctane	12		
Benzene	1		
Toluene	9		

#### Technical Note

Quality Control Standards to determine benzene, toluene, and total aromatics in finished gasoline, including gasolines containing oxygenated blending components by GC-MS.



For use with any M-GRA Calibration Curve

# Gasoline and Other Petroleum

## ASTM

ASTM D5769 Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS (continued)

TIER 3 CRMs

### Resolution Standard

M-GRA-RES			1 x 1 mL
M-GRA-RES-PAK			SAVE 5 x 1 mL
At stated Wt. %			
			3 comps.
1,3,5-Trimethylbenzene	3	Isooctane	94
1-Methyl-2-ethylbenzene	3		

### Sensitivity Test Solution

M-GRA-ST			1 x 1 mL
M-GRA-ST-PAK			SAVE 5 x 1 mL
100 µg/mL in Isooctane			
1,4-Diethylbenzene			

### Fragmentation Pattern Standard

M-GRA-FP			1 x 1 mL
M-GRA-FP-PAK			SAVE 5 x 1 mL
3.0 Wt. % in Isooctane			
1,2,3-Trimethylbenzene			

### Mass Scan Range Standard

M-GRA-MSR			1 x 1 mL
M-GRA-MSR-PAK			SAVE 5 x 1 mL
3.0 Wt. % in Isooctane			
Toluene			



### Deuterated Internal Standard

M-GRA-IS-R-10ML			1 x 10 mL
M-GRA-IS-R-10ML-PAK			SAVE 5 x 10 mL
At stated Wt. %			
			4 comps.
Benzene-d <sub>6</sub>	16.67	Naphthalene-d <sub>8</sub>	8.77
Ethylbenzene-d <sub>10</sub>	16.65	Toluene-d <sub>8</sub>	57.91

### Deuterated Internal Standard

M-GRA-IS-5ML			1 x 5 mL
M-GRA-IS-5ML-PAK			SAVE 5 x 5 mL
At stated Wt. %			
			3 comps.
Benzene-d <sub>6</sub>	40	Naphthalene-d <sub>8</sub>	20
Ethylbenzene-d <sub>10</sub>	40		

### Deuterated Internal Standard

ASTM-P-0140-IS			1 x 10 mL
ASTM-P-0140-IS-PAK			SAVE 5 x 10 mL
At stated Wt. %			
			4 comps.
Benzene-d <sub>6</sub>	2	Naphthalene-d <sub>8</sub>	1
Ethylbenzene-d <sub>10</sub>	2	Isooctane	balance

### Deuterated Internal Standard

ASTM-P-0140-IS2			1 x 10 mL
ASTM-P-0140-IS2-PAK			SAVE 5 x 10 mL
At stated Wt. %			
			5 comps.
Benzene-d <sub>6</sub>	2	Toluene-d <sub>8</sub>	7
Ethylbenzene-d <sub>10</sub>	2	Isooctane	balance
Naphthalene-d <sub>8</sub>	1		

### Performance Evaluation Standard

ASTM-P-0140-PES			1 x 1 mL
ASTM-P-0140-PES-PAK			SAVE 5 x 1 mL
At stated Wt. %			
			11 comps.
Benzene	1		
1,2-Diethylbenzene	0.005		
1,3,5-Trimethylbenzene	1		
1-Methyl-2-ethylbenzene	1		
Styrene	0.1		
Indene	0.1		
Biphenyl	0.1		
1,2,4,5-Tetramethylbenzene	1		
1,2,3,5-Tetramethylbenzene	1		
Hexadecane	1		
Isooctane:Toluene (50:50)	balance		

### Composition of Daily QC Standard

ASTM-P-0140-QC			1 x 10 mL
ASTM-P-0140-QC-PAK			SAVE 5 x 10 mL
At stated Wt. %			
			9 comps.
Benzene	1		
Toluene	10		
Ethylbenzene	3		
1,3-Dimethylbenzene	6		
1,2-Dimethylbenzene	3		
1,2,4-Trimethylbenzene	3		
1,2-Diethylbenzene	0.02		
Naphthalene	1		
Isooctane	balance		

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# Gasoline and Other Petroleum

## ASTM

### ASTM D5986 Oxygenates, Benzene, Toluene, C8-C12, Aromatics & Total Aromatics in Finished Gasolines by GC-FTIR

#### Daily QC Standard without Internal Standard

M-GRA-QC-10ML

M-GRA-QC-10ML-PAK

At stated Wt. %

1 x 10 mL  
SAVE 5 x 10 mL  
13 comps.

<i>n</i> -Hexane	12	<i>n</i> -Decane	12	Benzene	1	<i>m</i> -Xylene	3	1,2,4-Trimethylbenzene	3
<i>n</i> -Heptane	17	<i>n</i> -Dodecane	5	Toluene	9	<i>o</i> -Xylene	3	1,2,4,5-Tetramethylbenzene	3
<i>n</i> -Octane	17	Isooctane	12	Ethylbenzene	3				

### ASTM D6258 Solvent Red 164 Dye Concentration in Diesel Fuels

#### Stock Solvent Red 26 Standard

D-6258-CONC-5ML

1 x 5 mL

Solvent Red 26 @ 300 µg/mL in Xylene

#### D-6258 Calibration Curve

D-6258-5ML-SET

6 x 5 mL

#### Technical Note

Although Solvent Red 164 is the dye used in fuel, Solvent Red 26 has an identical spectrum profile.

	Cat. No	Unit
Xylene Blank	D-6258-BL	1 x 5 mL
Solvent Red 26 Dye @ 3 µg/mL in Xylene	D-6258-01	1 x 5 mL
Solvent Red 26 Dye @ 6 µg/mL in Xylene	D-6258-02	1 x 5 mL
Solvent Red 26 Dye @ 9 µg/mL in Xylene	D-6258-03	1 x 5 mL
Solvent Red 26 Dye @ 12 µg/mL in Xylene	D-6258-04	1 x 5 mL
Solvent Red 26 Dye @ 15 µg/mL in Xylene	D-6258-05	1 x 5 mL

### ASTM D6379 Aromatic Hydrocarbon Types in Aviation Fuels & Petroleum Distillates - HPLC method with Refractive Index

#### System Resolution Standards

D-6379-SRS

1 x 1 mL

D-6379-SRS-PAK

SAVE 5 x 1 mL

At stated conc. (mg/mL) in *n*-Heptane 3 comps.

Cyclohexane	10	1-Methylnaphthalene	0.05
<i>o</i> -Xylene	0.5		

D-6379-SRS-R1

1 x 1 mL

D-6379-SRS-R1-PAK

SAVE 5 x 1 mL

At stated conc. (mg/mL) in *n*-Heptane 3 comps.

Cyclohexane	10	1-Methylnaphthalene	0.5
<i>o</i> -Xylene	5		

#### Calibration Curves (Alternative Conc.)

D-6379-SET

4 x 1 mL

At stated conc. (mg/mL) in *n*-Heptane

D-6379-10X-SET

4 x 1 mL

At stated conc. (mg/mL) in *n*-Heptane

Analyte	Std. 1	Std. 2	Std. 3	Std. 4	Analyte	Std. 1	Std. 2	Std. 3	Std. 4
Cyclohexane	5	2	0.5	0.1	Cyclohexane	50	20	5	1
<i>o</i> -Xylene	15	5	1.0	0.1	<i>o</i> -Xylene	150	50	10	1
1-Methylnaphthalene	5	1.0	0.2	0.05	1-Methylnaphthalene	50	10	2	0.5

### ASTM D6550 Olefin Content of Gasolines by SFC

TIER 3 CRMs

#### Stock Olefin Calibration Standard

D-6550-CONC

D-6550-CONC-5ML

At stated Wt. %

1 x 1 mL  
1 x 5 mL  
15 comps.

1-Nonene	2.5	1-Octene	5	4-Methyl-1-pentene	5	2-Methyl-1-butene	25	2-Methyl-1-octene	2.5
Cyclohexene	5	1-Decene	5	1,5-Hexadiene	3	2-Methyl-2-pentene	10	2-Methyl-1-heptene	5
1-Hexene	5	2-Methyl-1,3-butadiene	5	3-Methyl-1,3-pentadiene	2	1-Heptene	10	5-Methyl-1-hexene	10

### ASTM D6591 (IP 391) Aromatic Hydrocarbon Types in Middle Distillates - HPLC method with Refractive Index Detection

#### System Performance Standard

D-6591-SPS

1 x 1 mL

At stated conc. (µg/mL) in Heptane

4 comps.

Cyclohexane	10,000
<i>o</i> -Xylene	5,000
Dibenzothiophene	500
9-Methylanthracene	500

#### Calibration Set

D-6591-SET

4 x 1 mL

At stated conc. (mg/mL) in *n*-Heptane

	Std. 1	Std. 2	Std. 3	Std. 4
Cyclohexane	50	20	5	1
<i>o</i> -Xylene	40	10	2.5	0.5
1-Methylnaphthalene	40	10	2.5	0.2
Phenanthrene	4	2	0.5	0.1

# Gasoline and Other Petroleum ASTM

## ASTM D6839 Hydrocarbon Types, Oxygenated Compounds, Benzene, and Toluene in Spark Ignition Engine Fuels by GC

### Non-oxygenated Spark Ignition Engine Fuel Standard

D-6839

At stated conc. by Wt. %

				1 mL	
				28 comps.	
Cyclopentane	1.1	Isooctane	5	Ethylbenzene	4.5
Pentane	1.1	Octane	5	1,2-Dimethylbenzene	4
Cyclohexane	2.1	Nonane	4.5	Propylbenzene	5
2,3-Dimethylbutane	2.1	Decane	4.5	1,2,4-Trimethylbenzene	4.5
Hexane	2.1	Undecane	3.5	1,2,3-Trimethylbenzene	5
1-Hexene	1.5	Dodecane	3.5	1,2,4,5-Tetramethylbenzene	5
Methylcyclohexane	4	Benzene	2.2	Pentamethylbenzene	5
4-Methyl-1-hexene	1.6	Toluene	2.2	cis-1-trans-2-trans-4-Trimethylcyclohexane	4
Heptane	3.5	trans-Decahydronaphthalene	4		
cis-1,2-Dimethylcyclohexane	5	Tetradecane	4.5		

## ASTM D7096 Gasoline Boiling Range Distribution by GC

D-7096-01

At stated conc. Wt. %

		1 x 1 mL	
		17 comps.	
2-Methylbutane	2.5	n-Propylbenzene	6.5
n-Pentane	3	n-Decane	4.5
2-Methylpentane	4	n-Butylbenzene	6
n-Hexane	3	n-Dodecane	3.5
2,4-Dimethylpentane	5.5	n-Tridecane	4.5
n-Heptane	7.5	n-Tetradecane	3
Toluene	15.5	n-Pentadecane	5
n-Octane	7	n-Hexadecane	3
p-Xylene	16		

### Gasoline Boiling Range Distribution Set

D-7096-SET 2 x 1 mL  
D-7096-01, D-7096-02

D-7096-02

100 µg/mL in Isooctane:Ethanol (97:3)

n-Propane n-Butane  
2-Methylpropane

### Response Factor Standard

D-7096-RFS

At stated conc. (%w/w).

		1 x 1 mL	
		18 comps.	
2-Methylbutane	4.8	n-Propylbenzene	5.5
n-Pentane	6.2	n-Decane	3.8
2-Methylpentane	6.8	n-Butylbenzene	4.4
n-Hexane	6.8	n-Dodecane	3.9
2,4-Dimethylpentane	7	n-Tridecane	3
n-Heptane	8	n-Tetradecane	3.1
Toluene	11.2	n-Pentadecane	3.1
n-Octane	6.3	n-Hexadecane	3.2
p-Xylene	9.7	n-Heptadecane	3.2

## ASTM D7359 Total Fluorine, Chlorine and Sulfur in Aromatic Hydrocarbons by CIC

### Stock Solution

D-7359

At stated conc. (µg/mL) in MeOH

		1 mL	
		3 comps.	
Dibenzothiophene	5747	4-Fluorobenzoic acid	7380
2,4,5-Trichlorophenol	1854		

## ASTM D7423 Oxygenates and Hydrocarbons by GC-FID

### D7423 Calibration Standard

D-7423-TP-CAL-SET

At stated conc. (µg/g) in Isooctane

Blank		D-7423-TP-BL						D-7423-TP-CAL								
		-01	-02	-03	-04	-05	-06	-01	-02	-03	-04	-05	-06			
Acetaldehyde	10	25	50	75	100	200	Isobutyraldehyde	10	25	50	75	100	200			
Acetone	10	25	50	75	100	200	Isopropanol	10	25	50	75	100	200			
Allyl alcohol	10	25	50	75	100	200	Isopropyl ether	10	25	50	75	100	200			
Butanal	10	25	50	75	100	200	Isovaleraldehyde	10	25	50	75	100	200			
1-Butanol	10	25	50	75	100	200	Methanol	10	25	50	75	100	200			
t-Butanol	10	25	50	75	100	200	Methyl ethyl ketone	10	25	50	75	100	200			
sec-Butanol	10	25	50	75	100	200	MtBE	10	25	50	75	100	200			
Diethyl ether	10	25	50	75	100	200	Pentanal	10	25	50	75	100	200			
Dimethyl ether	10	25	50	75	100	200	Propanal	10	25	50	75	100	200			
EtBE	10	25	50	75	100	200	1-Propanol	10	25	50	75	100	200			
Ethanol	10	25	50	75	100	200	Propyl ether	10	25	50	75	100	200			
Isobutanol	10	25	50	75	100	200	TAME	10	25	50	75	100	200			

### D7423 Oxygenate Standard

D-7423

Equal w/w%

		1 x 1 mL	
		24 comps.	
Acetaldehyde	Isobutyraldehyde		
Acetone	Isopropanol		
Allyl alcohol	Isopropyl ether		
Butanal	Isovaleraldehyde		
1-Butanol	Methanol		
t-Butanol	Methyl ethyl ketone		
sec-Butanol	MtBE		
Diethyl ether	Pentanal		
Dimethyl ether	Propanal		
EtBE	1-Propanol		
Ethanol	Propyl ether		
Isobutanol	TAME		

# Gasoline and Other Petroleum ASTM

## ASTM D7576 Total Aromatics in Denatured Ethanol by GC

### D-7576-SET

At stated Wt.% (Prepared by weight)

5 x 1 mL

Compounds	D-7576-01	-02	-03	-04	-05
Benzene	0.02	0.04	0.06	0.08	0.1
Toluene	0.05	0.1	0.2	0.4	0.6
Ethylbenzene	0.02	0.05	0.1	0.15	0.2
o-Xylene	0.02	0.05	0.1	0.15	0.2
1,2,4-Trimethylbenzene	0.05	0.1	0.2	0.4	0.6
2-Hexanone	1.0	1.0	1.0	1.0	1.0
Ethanol	98.8	98.7	98.3	97.8	97.3

### D-7576-R1-SET

At state % v/v (Prepared by volume)

5 x 1 mL

Compounds	D-7576-01-R1	-02-R1	-03-R1	-04-R1	-05-R1
Benzene	0.02	0.04	0.06	0.08	0.1
Toluene	0.05	0.1	0.2	0.4	0.6
Ethylbenzene	0.02	0.05	0.1	0.15	0.2
o-Xylene	0.02	0.05	0.1	0.15	0.2
1,2,4-Trimethylbenzene	0.05	0.1	0.2	0.4	0.6
2-Hexanone	1.0	1.0	1.0	1.0	1.0
Ethanol	98.8	98.7	98.3	97.8	97.3

## ASTM D7591 Free and Total Glycerin in Biodiesel by Anion Exchange Chromatography

### Glycerin Stock Solution

#### D-7591

1 mL

1000 µg/mL in Water

Glycerin

## ASTM D7753 Hydrocarbon Types and Benzene in Light Petroleum Distillates by GC

### Aromatics Mix

#### D-7753-ARO

1 mL

At stated conc. by Wt. %

7 comps.

Benzene	3.03	n-Propylbenzene	12.12
Toluene	15.15	1,3,5-Trimethylbenzene	18.18
p-Xylene	24.24	1,2,3,4-Tetramethylbenzene	12.12
Ethylbenzene	15.15		

### Saturates Mix

#### D-7753-SAT

1 mL

At stated conc. by Wt. %

11 comps.

n-Pentane	11.91	Methylcyclohexane	9.52	n-Nonane	7.14
n-Hexane	10.71	n-Octane	9.52	n-Decane	5.96
Cyclohexane	9.52	Isooctane	14.29	n-Undecane	3.58
n-Heptane	10.71	1,2-Dimethylcyclohexane	7.14		

### Olefins Mix

#### D-7753-OLE

1 mL

At stated conc. by Wt. %

7 comps.

1-Pentene	20	1-Octene	14	1-Decene	8
1-Hexene	24	1-Nonene	10	1-Undecene	4
1-Heptene	20				

### System Validation Mix

#### D-7753-SVM

1 mL

At stated conc. by Wt. %

25 comps.

n-Pentane	5	n-Decane	2.5	1-Undecene	1
n-Hexane	4.5	n-Undecane	1.5	Benzene	1
Cyclohexane	4	1-Pentene	5	Toluene	5
n-Heptane	4.5	1-Hexene	6	p-Xylene	8
Methylcyclohexane	4	1-Heptene	5	Ethylbenzene	5
n-Octane	4	1-Octene	3.5	n-Propylbenzene	4
Isooctane	6	1-Nonene	2.5	1,3,5-Trimethylbenzene	6
1,2-Dimethylcyclohexane	3	1-Decene	2	1,2,3,4-Tetramethylbenzene	4
n-Nonane	3				

## ASTM D8071 Hydrocarbon Analysis by GC-VUV

### Hydrocarbon Analysis

#### ASTM-P-VUV-01-SVM

At stated conc. by %w/w

1 mL

28 comps.

Cyclopentane	1.1	4-Methyl-1-hexene	1.6	n-Decane	4.5	Ethylbenzene	4.5
n-Pentane	1.1	n-Heptane	3.5	n-Undecane	3.5	o-Xylene	4
Cyclohexane	2.1	1,2-Dimethylcyclohexane	5	n-Dodecane	3.5	n-Propylbenzene	5
2,3-Dimethylbutane	2.1	Isooctane	5	Benzene	2.2	1,2,4-Trimethylbenzene	4.5
n-Hexane	2.1	n-Octane	5	Toluene	2.2	1,2,3-Trimethylbenzene	5
1-Hexene	1.5	1,2,4-Trimethylcyclohexane	4	trans-Decahydronaphthalene	4	1,2,4,5-Tetramethylbenzene	5
Methylcyclohexane	4	n-Nonane	4.5	n-Tetradecane	4.5	Pentamethylbenzene	5

## ASTM D8305 Aromatic Hydrocarbons and Polynuclear Aromatic Hydrocarbons in Aviation Fuel

### Performance Mix

#### D-8305-PM

1 mL

At stated conc. (%w/w)

4 comps.

n-Hexadecane	75	Tetralin	3
Toluene	20	Naphthalene	2

## ASTM D8564 Phenolic Antioxidants and Fuel System Icing Inhibitors in Aviation Turbine Fuels

### Antioxidants in Jet fuel

	Conc. (µg/mL)	Matrix	Cat. No.	Unit
N,N'-di-2-Butyl-1,4-phenylenediamine	100	Cyclohexane	AO-JF-01S	1 mL
2,6-di-tert-Butylphenol	100	Cyclohexane	AO-JF-02S	1 mL
2-tert-Butyl-4,6-dimethylphenol	100	Cyclohexane	AO-JF-03S	1 mL
2-tert-Butyl-4-methylphenol	100	Cyclohexane	AO-JF-04S	1 mL
2-tert-Butylphenol	100	Cyclohexane	AO-JF-05S	1 mL
2,6-di-tert-Butyl-p-cresol	100	Cyclohexane	AO-JF-07S	1 mL
2,4,6-tri-tert-Butylphenol	100	Cyclohexane	AO-JF-08S	1 mL

### Internal Standard

4-Methoxy-benzenemethanol	2000	CH <sub>2</sub> Cl <sub>2</sub>	AO-JF-IS	1 mL
			AO-JF-IS-PAK	5 x 1 mL

### Antioxidants in Jet fuel Reference Standard

#### AO-JF-MIX-01S

At stated conc. (µg/mL) in Cyclohexane

1 x 1 mL

10 comps.

2-Methoxyethanol	20,000
2-Ethoxyethanol	20,000
2-(2-Methoxyethoxy)ethanol	20,000
2,6-Di-tert-butylphenol	100
2,4,6-Tri-tert-butylphenol	100
2,6-Di-tert-butyl-p-cresol	100
4-sec-Butyl-2,6-di-tert-butylphenol	100
2-tert-Butyl-4,6-dimethylphenol	100
2-tert-Butylphenol	100
2-tert-Butyl-4-methylphenol	100

# Simulated Distillation ASTM

Simulated Distillation (SIM DIS) standards are utilized to meet both normal and high-temperature analytical requirements when generating boiling point versus retention time calibration curves. Because normal paraffins above n-alkane C60 are not readily available, Polywax 500, 655, 850, and 1000 standards are used to enable SIM DIS analysis of heavy petroleum fractions with boiling points reaching up to 1350°F.

This SIM DIS method (also known as Simulated Distillation or Gas Chromatographic Distillation – GCD) is commonly employed to determine the boiling range distribution of gasoline and its components. For example, ASTM D3710 is applied to petroleum products and fractions with final boiling points of 500°F (260°C) or below.

By understanding the composition of the gasoline blend, critical data can be obtained to calculate vapor pressure and to predict the ASTM D86 distillation curve, aiding in product characterization and process optimization.

## ASTM D2887 Boiling Range Distribution of Petroleum Fractions by GC

### Calibration Mix

<b>DRH-002N</b>		<b>100 mg</b>	
<b>DRH-002N-10X</b>		<b>1 gm</b>	
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		

### Column Test Mix

<b>D-2887</b>		<b>1 x 1 mL</b>	
10 mg/mL in <i>n</i> -Octane		2 comps.	
<i>n</i> -Hexadecane		<i>n</i> -Octadecane	

### Reference Gas Oil Sample Lot #2

<b>D-2887-REFOIL</b>	<b>1 x 1 mL</b>
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### Hydrocarbon Window Defining Standard

<b>DRH-008S-R2</b>		<b>1 x 1 mL</b>	
<b>DRH-008S-R2-PAK</b>		<b>SAVE 5 x 1 mL</b>	
500 µg/mL each in Chloroform			
35 comps.			
<i>n</i> -Octane		<i>n</i> -Tetracosane	
<i>n</i> -Nonane		<i>n</i> -Pentacosane	
<i>n</i> -Decane		<i>n</i> -Hexacosane	
<i>n</i> -Undecane		<i>n</i> -Heptacosane	
<i>n</i> -Dodecane		<i>n</i> -Octacosane	
<i>n</i> -Tridecane		<i>n</i> -Nonacosane	
<i>n</i> -Tetradecane		<i>n</i> -Triacontane	
<i>n</i> -Pentadecane		<i>n</i> -Hentriacontane	
<i>n</i> -Hexadecane		<i>n</i> -Dotriacontane	
<i>n</i> -Heptadecane		<i>n</i> -Tritriacontane	
<i>n</i> -Octadecane		<i>n</i> -Tetracontane	
Pristane		<i>n</i> -Pentatriacontane	
<i>n</i> -Nonadecane		<i>n</i> -Hexatriacontane	
Phytane		<i>n</i> -Heptatriacontane	
<i>n</i> -Eicosane		<i>n</i> -Octatriacontane	
<i>n</i> -Heneicosane		<i>n</i> -Nonatriacontane	
<i>n</i> -Docosane		<i>n</i> -Tetracontane	
<i>n</i> -Tricosane			

### Fuel Oil Degradation/Retention Time Mix for Quantification of

<b>C<sub>17</sub>/Pristane &amp; C<sub>18</sub>/Phytane ratios</b>		
<b>DRH-005S-10X</b>		<b>1 x 1 mL</b>
2.0 mg/mL each in CH <sub>2</sub> Cl <sub>2</sub> :CS <sub>2</sub> (1:1)		4 comps.
<b>DRH-005S-R1-10X</b>		<b>1 x 1 mL</b>
<b>DRH-005S-R1-10X-PAK</b>		<b>SAVE 5 x 1 mL</b>
2.0 mg/mL each in Chloroform		4 comps.
Heptadecane		
Octadecane		
Phytane (2,6,10,14-Tetramethylhexadecane)		
Pristane (2,6,10,14-Tetramethylpentadecane)		

### Technical Note

Pristane and phytane are included in the hydrocarbon window defining standard with C<sub>8</sub> to C<sub>40</sub> odd and even alkanes. Measuring the C<sub>17</sub>/pristane and C<sub>18</sub>/phytane ratios can be used to estimate fuel oil degradation. Fuel oil degradation mix containing just the four required analytes to determine the C<sub>17</sub>/pristane and C<sub>18</sub>/phytane ratio (DRH-005S-10X).

## Calibration Solutions

### DRH-002S-R1 DRH-002S-R1-PAK

At stated conc. (µg/mL) in Chloroform

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

**1 x 1 mL**  
**SAVE 5 x 1 mL**  
17 comps.

<i>n</i> -Octacosane	100
<i>n</i> -Dotriacontane	100
<i>n</i> -Hexatriacontane	100
<i>n</i> -Tetracontane	100
<i>n</i> -Tetratetracontane	100

### DRH-002S-R2 DRH-002S-R2-PAK

0.1 Wt.% each in Chloroform

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

**1 x 1 gram**  
**SAVE 5 x 1 gram**  
20 comps.

### Reference Oil - Batch 3

<b>D-2887-REFOIL-B3</b>	<b>1 mL</b>
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Gasoline

### Technical Note

Due to the difference in consensus values between Batch 2 and Batch 3, it is highly recommended to update your method using the current Round Robin consensus analysis provided with this batch.

### Wisconsin Diesel Range Hydrocarbons

#### DRH-003S

0.2 mg/mL each in Hexane

<i>n</i> -Decane (C <sub>10</sub> )	<i>n</i> -Tetradecane (C <sub>14</sub> )	<i>n</i> -Octadecane (C <sub>18</sub> )
<i>n</i> -Undecane (C <sub>11</sub> )	<i>n</i> -Pentadecane (C <sub>15</sub> )	<i>n</i> -Nonadecane (C <sub>19</sub> )
<i>n</i> -Dodecane (C <sub>12</sub> )	<i>n</i> -Hexadecane (C <sub>16</sub> )	<i>n</i> -Eicosane (C <sub>20</sub> )
<i>n</i> -Tridecane (C <sub>13</sub> )	<i>n</i> -Heptadecane (C <sub>17</sub> )	

**1 x 1 mL**  
11 comps.

### Stock SIM DIS Paraffin Solution

#### ASTM-P-0050

At stated Wt. %

<i>n</i> -Pentane	6.66	<i>n</i> -Dodecane	13.33
<i>n</i> -Hexane	6.66	<i>n</i> -Tetradecane	6.66
<i>n</i> -Heptane	6.66	<i>n</i> -Pentadecane	6.66
<i>n</i> -Octane	6.66	<i>n</i> -Hexadecane	6.66
<i>n</i> -Nonane	6.66	<i>n</i> -Heptadecane	6.66
<i>n</i> -Decane	6.66	<i>n</i> -Octadecane	6.66
<i>n</i> -Undecane	6.66	<i>n</i> -Eicosane	6.66

### Working Level SIM DIS Paraffin Solution with Polywax 500

#### ASTM-P-0052

#### ASTM-P-0052-PAK

At stated Wt. % in Carbon disulfide

<i>n</i> -Pentane	0.0333	<i>n</i> -Nonane	0.0333	<i>n</i> -Tetradecane	0.0333	<i>n</i> -Octadecane	0.0333
<i>n</i> -Hexane	0.0333	<i>n</i> -Decane	0.0333	<i>n</i> -Pentadecane	0.0333	<i>n</i> -Eicosane	0.0333
<i>n</i> -Heptane	0.0333	<i>n</i> -Undecane	0.0333	<i>n</i> -Hexadecane	0.0333	Polywax 500	0.5
<i>n</i> -Octane	0.0333	<i>n</i> -Dodecane	0.0666	<i>n</i> -Heptadecane	0.0333		

**1 x 1 mL**  
**SAVE 5 x 1 mL**  
15 comps.

### Polywax®

Polywax 500	ASTM-P-0051N-2G	2 grams
Polywax 655	ASTM-P-0053N-2G	2 grams
Polywax 850	ASTM-P-0137N-2G	2 grams
Polywax 1000	ASTM-P-0138N-2G	2 grams

 Reformulated to ship by Air

# Simulated Distillation

## ASTM

### ASTM D3710 Boiling Range Distribution of Gasoline & Gasoline Fractions by GC

#### Qualitative Calibration Standard

D-3710-QUAL  
D-3710-QUAL-PAK  
At stated Wt. %

1 x 1 mL  
SAVE 5 x 1 mL  
19 comps.

<i>n</i> -Butane	4.5	2-Methylbutane	9.7	<i>n</i> -Propane	1.5
<i>n</i> -Butylbenzene	3.2	2-Methylpentane	5.4	<i>n</i> -Propylbenzene	4.3
<i>n</i> -Decane	3.2	2-Methylpropane	1.5	<i>n</i> -Tetradecane	2.2
2,4-Dimethylpentane	5.4	<i>n</i> -Octane	5.4	Toluene	10.8
<i>n</i> -Dodecane	3.2	<i>n</i> -Pentadecane	2.2	<i>n</i> -Tridecane	2.2
<i>n</i> -Heptane	9.7	<i>n</i> -Pentane	7.6	<i>p</i> -Xylene	13
<i>n</i> -Hexane	5.4				

#### Quantitative Calibration Standard

D-3710  
D-3710-PAK  
At stated Wt. %

1 x 1 mL  
SAVE 5 x 1 mL  
16 comps.

<i>n</i> -Butylbenzene	3.5	2-Methylbutane	10.5	<i>n</i> -Propylbenzene	4.7
<i>n</i> -Decane	3.5	2-Methylpentane	5.8	<i>n</i> -Tetradecane	2.3
2,4-Dimethylpentane	5.8	<i>n</i> -Octane	5.8	Toluene	11.6
<i>n</i> -Dodecane	3.5	<i>n</i> -Pentadecane	2.3	<i>n</i> -Tridecane	2.3
<i>n</i> -Heptane	10.5	<i>n</i> -Pentane	8.1	<i>p</i> -Xylene	14.0
<i>n</i> -Hexane	5.8				

### ASTM D5134 DHA of Petroleum Naphthas through *n*-Nonane by Capillary GC

#### Qualitative Reference Petroleum Set

D-5134-92-R1-SET

2 x 1 mL

Qualitative Reference Standards	Cat. No.	Unit
Alkylate Standard neat fraction approx. 30 comps. identified	D-5134-92-ALK	1 mL
Reformate Standard neat fraction approx. 100 comps. identified	D-5134-92-REF	1 mL

#### Linearity Check Mix

D-5134-92-LCM-PAK  
10 Wt. % each

5 x 50 mg  
10 comps.

Benzene  
2,4-Dimethylheptane  
2,4-Dimethylhexane  
*n*-Heptane  
*n*-Hexane  
2-Methylheptane  
2-Methylhexane  
*n*-Nonane  
*n*-Octane  
Toluene

#### Column Evaluation Mix

D-5134-92-CEM

At stated Wt. %

1 x 1 mL  
7 comps.

Toluene	0.5	2,3,3-Trimethylpentane	1.0	4-Methylheptane	1.0	2-Methylpentane	94.5
<i>n</i> -Heptane	1.0	2-Methylheptane	1.0	<i>n</i> -Octane	1.0		

### ASTM D5307 Boiling Range Distribution of Crude Petroleum by GC

#### Quantitative Paraffins Standard

D-5307-QUANT  
D-5307-QUANT-PAK  
Equal Wt. %

1 x 2 mL  
SAVE 5 x 2 mL  
16 comps.

<i>n</i> -Decane	<i>n</i> -Hexadecane	<i>n</i> -Octacosane
<i>n</i> -Undecane	<i>n</i> -Heptadecane	<i>n</i> -Dotriacontane
<i>n</i> -Dodecane	<i>n</i> -Octadecane	<i>n</i> -Hexatriacontane
<i>n</i> -Tridecane	<i>n</i> -Eicosane	<i>n</i> -Tetracontane
<i>n</i> -Tetradecane	<i>n</i> -Tetracosane	<i>n</i> -Tetratetracontane
<i>n</i> -Pentadecane		

#### Internal Standard

D-5307-IS-10ML  
D-5307-IS-10ML-PAK  
At stated Wt. %

1 x 10 mL  
SAVE 5 x 10 mL  
4 comps.

<i>n</i> -Tetradecane	25	<i>n</i> -Hexadecane	25	<i>n</i> -Heptadecane	25
<i>n</i> -Pentadecane	25				

#### Column Resolution Mix

D-5307-CR  
D-5307-CR-PAK  
At stated Wt. %

1 x 1 mL  
SAVE 5 x 1 mL  
3 comps.

<i>n</i> -Hexadecane	1.0	<i>n</i> -Octadecane	1.0	<i>n</i> -Octane	98.0
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#### Qualitative Paraffins Standard

D-5307-QUAL  
D-5307-QUAL-PAK  
At stated Wt. %

1 x 1 mL  
SAVE 5 x 1 mL  
7 comps.

### ASTM D5442 Analysis of Petroleum Waxes by GC

#### Quantitative Wax Standard

D-5442  
D-5442-PAK  
At stated Wt. % in Cyclohexane

1 x 1 mL  
SAVE 5 x 1 mL  
16 comps.

<i>n</i> -Dodecane	0.02	<i>n</i> -Octacosane	0.12
<i>n</i> -Tetradecane	0.03	<i>n</i> -Triacontane	0.10
<i>n</i> -Hexadecane	0.04	<i>n</i> -Dotriacontane	0.08
<i>n</i> -Octadecane	0.05	<i>n</i> -Hexatriacontane	0.06
<i>n</i> -Eicosane	0.06	<i>n</i> -Tetracontane	0.05
<i>n</i> -Docosane	0.08	<i>n</i> -Tetratetracontane	0.04
<i>n</i> -Tetracosane	0.10	<i>n</i> -Pentacontane	0.03
<i>n</i> -Hexacosane	0.12	<i>n</i> -Hexacontane	0.02

#### Column Resolution Standard

D-5442-CR-PAK  
At stated Wt. % in Cyclohexane

5 x 1 mL  
2 comps.

<i>n</i> -Eicosane	0.05
<i>n</i> -Tetracontane	0.05

#### Hydrocarbon Standard Brownfield Regulation

D-5442-R1  
100 µg/mL each in Cyclohexane

1 x 1 mL  
18 comps.

<i>n</i> -Decane	<i>n</i> -Octacosane
<i>n</i> -Dodecane	<i>n</i> -Triacontane
<i>n</i> -Tetradecane	<i>n</i> -Dotriacontane
<i>n</i> -Hexadecane	<i>n</i> -Tetracontane
<i>n</i> -Octadecane	<i>n</i> -Hexatriacontane
<i>n</i> -Eicosane	<i>n</i> -Octatriacontane
<i>n</i> -Docosane	<i>n</i> -Tetracontane
<i>n</i> -Tetracosane	<i>n</i> -Tetratetracontane
<i>n</i> -Hexacosane	<i>n</i> -Pentacontane

#### Retention Time Standard Mix 1

D-5442-RT1  
Equal Wt. %

500 mg  
12 comps.

<i>n</i> -Hexadecane (c16)	<i>n</i> -Octacosane (c28)
<i>n</i> -Octadecane (c18)	<i>n</i> -Triacontane (c30)
<i>n</i> -Eicosane (c20)	<i>n</i> -Dotriacontane (c32)
<i>n</i> -Docosane (c22)	<i>n</i> -Hexatriacontane (c36)
<i>n</i> -Tetracosane (c24)	<i>n</i> -Tetracontane (c40)
<i>n</i> -Hexacosane (c26)	<i>n</i> -Tetratetracontane (c44)

#### Retention Time Standard Mix 2

D-5442-RT2  
Equal Wt. %

500 mg  
16 comps.

<i>n</i> -Dodecane (c12)	<i>n</i> -Octacosane (c28)
<i>n</i> -Tetradecane (c14)	<i>n</i> -Triacontane (c30)
<i>n</i> -Hexadecane (c16)	<i>n</i> -Dotriacontane (c32)
<i>n</i> -Octadecane (c18)	<i>n</i> -Hexatriacontane (c36)
<i>n</i> -Eicosane (c20)	<i>n</i> -Tetracontane (c40)
<i>n</i> -Docosane (c22)	<i>n</i> -Tetratetracontane (c44)
<i>n</i> -Tetracosane (c24)	<i>n</i> -Pentacontane (c50)
<i>n</i> -Hexacosane (c26)	<i>n</i> -Hexacontane (c60)

# Simulated Distillation

## ASTM

### ASTM D6352 Boiling Range Distribution of Petroleum Distillates from 174 to 700°C by GC

#### Hydrocarbon Window Defining Std.

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

<i>n</i> -Octane	<i>n</i> -Nonadecane	<i>n</i> -Triacontane
<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> -Tetraatriacontane
<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 Mix

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		

#### Column Test Mixture

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

#### Polywax 500®

ASTM-P-0051N-2G 2 gm  
 Polywax 500

#### Polywax 655®

ASTM-P-0053N-2G 2 gm  
 Polywax 655

#### Polywax 850®

ASTM-P-0137N-2G 2 gm  
 Polywax 850

#### Polywax 1000®

ASTM-P-0138N-2G 2 gm  
 Polywax 1000

### ASTM D7169 Boiling Point Distribution by High Temperature by GC

#### Relative Response Mix

D-7169-RRM 100 mg  
 Each at 12.5 Wt.% 8 comps.

<i>n</i> -Decane	<i>n</i> -Octacosane
<i>n</i> -Tetradecane	<i>n</i> -Dotriacontane
<i>n</i> -Octadecane	<i>n</i> -Tetracontane
<i>n</i> -Eicosane	<i>n</i> -Pentacontane

#### Retention Time Mix

D-7169-RT-R1  
 At stated conc. by Wt.%

<i>n</i> -Pentane	7	<i>n</i> -Decane	7	<i>n</i> -Tetradecane	7
<i>n</i> -Hexane	7	<i>n</i> -Undecane	7	<i>n</i> -Pentadecane	7
<i>n</i> -Heptane	7	<i>n</i> -Dodecane	7	<i>n</i> -Hexadecane	7
<i>n</i> -Octane	7	<i>n</i> -Tridecane	7	<i>n</i> -Heptadecane	7
<i>n</i> -Nonane	7				

500 mg  
 17 comps.

<i>n</i> -Octadecane	2
<i>n</i> -Nonadecane	2
<i>n</i> -Eicosane	2
<i>n</i> -Tetracontane	2

# Detailed Hydrocarbon Analysis

## ASTM

Petroleum naphtha-based PIANO mix is used to determine hydrocarbon components in spark-ignition engine fuels, including oxygenated blends of ethanol and *tert*-butyl methyl ether, with boiling ranges to 225°C in accordance with ASTM Methods D6729, D6730, D6733 and D8071.

Two hundred and ten (210) individual hydrocarbons have been identified with a total of 263 compounds separated into the appropriate chemical class within the PIANO designation. These compounds comprise the master list. Each entry contains the Total Ion Chromatogram peak number, retention time, percent of the total and compound name.

To simplify component identification, all compounds have been grouped into chemical classes with the paraffin and isoparaffin classes combined to optimize the format. Each entry contains the same information as the master list. The identified components in each chemical class include: 62 paraffins/isoparaffins, 54 aromatics, 51 naphthenes, and 43 olefins

The master list is further categorized via extracted ion plots utilizing key ions for each chemical class. The retention time of each component in the extracted ion plot can be compared to the master list for identification.

The analysis of the mix was performed on a 100 meter methyl siloxane phase capillary column with a 1.0 µm film (QuadRex Corporation, Bethany, CT) in an attempt to improve low boiling range component separation.

As in other published analyses, the complexity of the petroleum product resulted in a number of co-elutions and chromatographic peaks that cannot be identified with an acceptable degree of certainty. Consequently, the analysis and data are subject to the same disclaimers enumerated in ASTM Method D6729 regarding the estimation of bulk hydrocarbon group-type composition. The chromatograms provided have been integrated to optimize the usefulness of the analysis and reduce the number of unidentified components present on the chromatogram.

The identification of each hydrocarbon was based on the following: 1. Mass spectrum library search of NIST08 and Wiley WN08 libraries 2. Mass spectrum library search of an in-house generated library, 3. Comparison of elution data from ASTM Methods D6729 and 6730, 4. Analysis of individual standards, 5. Interpretation of mass spectra target ions

### ASTM D6729, D6730, D6733, D8071 Paraffins, Isoparaffins, Aromatics, Napthenes, Olefins (PIANO)

#### PIANO Gasoline

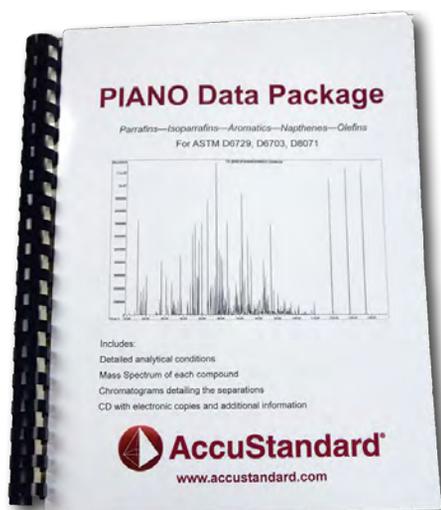
PIANO 1 x 0.5 mL  
PIANO-PAK SAVE 5 x 0.5 mL

#### PIANO Gasoline (with Ethanol)

PIANO-ETOH 1 x 0.5 mL  
PIANO-ETOH-PAK SAVE 5 x 0.5 mL

#### PIANO Gasoline (with MtBE)

PIANO-MTBE 1 x 0.5 mL  
PIANO-MTBE-PAK SAVE 5 x 0.5 mL



Data Package of the PIANO Mix is provided with each order.

#### Includes:

- Detailed analytical conditions
- Mass Spectrum of each compound
- Chromatograms detailing separations
- Flash drive containing data package

# Detailed Hydrocarbon Analysis

## ASTM

### ASTM D6293 Oxygenates & Paraffin, Olefin, Naphthene, Aromatics (O-PONA) Hydrocarbon types in Low-Olefin SI Fuels by GC

#### O-PONA System Validation Mixture

ASTM-P-0080

ASTM-P-0080-PAK

At stated Wt. %

Cyclopentane	1.5	<i>n</i> -Octane	4.0	<i>o</i> -Xylene	3.0
<i>n</i> -Pentane	1.5	1,2,4-Trimethylcyclohexane	3.5	<i>n</i> -Propylbenzene	3.5
Cyclohexane	2.0	<i>n</i> -Nonane	3.0	1,2,4-Trimethylbenzene	3.0
2,3-Dimethylbutane	2.0	<i>n</i> -Decane	3.5	1,2,3-Trimethylbenzene	2.0
<i>n</i> -Hexane	2.0	<i>n</i> -Undecane	2.0	1,2,4,5-Tetramethylbenzene	2.0
1-Hexene	1.5	<i>n</i> -Dodecane	2.0	Pentamethylbenzene	2.5
Methylcyclohexane	3.5	Benzene	2.5	Ethanol	5.0
4-Methyl-1-hexene	1.5	Toluene	2.5	<i>t</i> -Butanol	4.0
<i>n</i> -Heptane	3.0	<i>trans</i> -Decahydronaphthelene	3.5	MtBE	8.0
1,2-Dimethylcyclohexane	4.5	<i>n</i> -Tetradecane	2.0	ETBE	3.0
Isooctane	4.0	Ethylbenzene	3.5	TAME	5.0

1 x 1 mL

SAVE 5 x 1 mL

33 comps.

#### O-PONA Olefin Mix

ASTM-P-0081

ASTM-P-0081-PAK

At stated Wt. % in Hexane:Heptane (50:50)

1-Pentene	5.0	1-Heptene	2.0	1-Nonene	3.0
1-Hexene	2.0	1-Octene	2.0		

1 x 1 mL

SAVE 5 x 1 mL

5 comps.

#### O-PONA Paraffin Mixes

ASTM-P-0082

ASTM-P-0082-PAK

At stated Wt. % in Hexane:Heptane (50:50)

<i>n</i> -Nonane	5.0	<i>n</i> -Decane	2.0
------------------	-----	------------------	-----

1 x 1 mL

SAVE 5 x 1 mL

2 comps.

ASTM-P-0082-R1

ASTM-P-0082-R1-PAK

At stated Wt. % in Hexane:Heptane (50:50)

<i>n</i> -Nonane	3.0	<i>n</i> -Decane	3.0
------------------	-----	------------------	-----

1 x 1 mL

SAVE 5 x 1 mL

2 comps.

### ASTM D6296 Total Olefins in Spark-Ignition Engine Fuels by Multidimensional GC

#### System Setup & Verification Standard Set

D-6296-VER-SET

D-6296-VER1, D-6296-VER2  
2 x 1 mL

<b>D-6296-VER1</b>	<b>1 x 1 mL</b>	<b>D-6296-VER2</b>	<b>1 x 1 mL</b>
At stated Wt. %	2 comps.	At stated Wt. %	2 comps.
MtBE 5	Isooctane 95	EtBE 5	Isooctane 95

#### Calibration Standard w/MtBE

D-6296-CAL1

D-6296-CAL1-PAK

At stated Wt. %

1 x 1 mL

SAVE 5 x 1 mL

10 comps.

1-Pentene	1	1-Decene	1
1-Hexene	1	<i>n</i> -Undecane	1
1-Heptene	1	<i>n</i> -Dodecane	1
1-Octene	1	Isooctane	87
1-Nonene	1	MtBE	5

#### Calibration Standard w/EtBE

D-6296-CAL2

D-6296-CAL2-PAK

At stated Wt. %

1 x 1 mL

SAVE 5 x 1 mL

11 comps.

1-Pentene	1	<i>n</i> -Decane	1
1-Hexene	1	<i>n</i> -Undecane	1
1-Heptene	1	<i>n</i> -Dodecane	1
1-Octene	1	Isooctane	86
1-Nonene	1	EtBE	5
1-Decene	1		

#### Isooctane Blank

#### Compensation Standard

D-6296-BL

1 x 5 mL

Isooctane (neat)

### ASTM D6730 Individual Component in Spark Ignition Engine Fuel by GC

#### System Evaluation Mix

D-6730-SEM

At stated conc. by Wt. %

Ethanol	8.0	Benzene	1.0	<i>n</i> -Octane	2.0	<i>n</i> -Decane	1.0
<i>n</i> -Pentane	2.0	Cyclohexane	28.9	Ethylbenzene	25	<i>n</i> -Undecane	0.5
<i>t</i> -Butanol	0.5	3-Ethylpentane	0.2	<i>p</i> -Xylene	1.0	1,2,3,5-Tetramethylbenzene	0.25
2-Methyl-2-butene	2.5	<i>trans</i> -1,2-Dimethylcyclopentane	0.5	2,3-Dimethylheptane	0.2	Naphthalene	0.5
2,3-Dimethylbutane	0.5	<i>n</i> -Heptane	2.0	<i>n</i> -Nonane	2.0	<i>n</i> -Dodecane	0.25
MtBE	10.0	2,3,3-Trimethylpentane	0.5	5-Methylnonane	0.2	1-Methylnaphthalene	0.25
<i>n</i> -Hexane	2.0	Toluene	7.0	<i>o</i> -Ethyltoluene	0.5	<i>n</i> -Tridecane	0.25
1-Methylcyclopentene	0.5						

1 mL

29 comps.

### ASTM D6733 Spark ignition Engine Individual Components by GC

#### ASTM D6733 System Performance Mix

D-6733-SPM

2% each by weight in Hexane

1 x 1 mL

7 comps.

<i>n</i> -Pentane	<i>n</i> -Dodecane	4-Methylheptane
<i>n</i> -Heptane	2-Methylheptane	Toluene
<i>n</i> -Octane		

# Detailed Hydrocarbon Analysis

## ASTM

### ASTM D7900 Light Hydrocarbons in Crude Oil by GC

#### ASTM D7900 Valve Timing Mix

D-7900-VTM

At stated conc. (%w/w).

				1 mL	
				7 comps.	
n-Pentane	1	n-Octane	1	n-Decane	1
n-Hexane	1	n-Nonane	1	n-Hexadecane	94
n-Heptane	1				

### ASTM D8267 Total Aromatic, Monoaromatic and Diaromatic Content of Aviation Turbine Fuels by GC-VUV

#### System Validation Mix

D-8267-SVM

0.25 Wt.% in Dichloromethane

				1 mL
				19 comps.
n-Hexane	n-Undecane	n-Hexadecane	n-Heneicosane	
n-Heptane	n-Dodecane	n-Heptadecane	Naphthalene	
n-Octane	n-Tridecane	n-Octadecane	2-Methylnaphthalene	
n-Nonane	n-Tetradecane	n-Nonadecane	1,2,4-Trimethylbenzene	
n-Decane	n-Pentadecane	n-Eicosane		

### ASTM D8368 Total Aromatics, Polyaromatics and FAME in Diesel by GC-VUV

#### FAME in Diesel

ASTM-P-VUV-02-SVM

2500 µg/g in Dichloromethane

			1 mL
			28 comps.
n-Heptane	Methyl hexadecanoate	n-Tetracosane	
n-Octane	n-Heptadecane	n-Pentacosane	
n-Nonane	n-Octadecane	n-Hexacosane	
n-Decane	Linoleic acid methyl ester	n-Heptacosane	
n-Undecane	n-Nonadecane	n-Octacosane	
n-Dodecane	n-Eicosane	Naphthalene	
n-Tridecane	n-Heneicosane	2-Methylnaphthalene	
n-Tetradecane	n-Docosane	1,2,4-Trimethylbenzene	
n-Pentadecane	n-Tricosane	Phenanthrene	
n-Hexadecane			

#### System Validation Mix by GC-VUV - FAME in Diesel

D-8368-SVM

2500 µg/g in Dichloromethane

			1 mL
			31 comps.
n-Hexane	Palmitic acid methyl ester	n-Pentacosane	
n-Heptane	n-Heptadecane	n-Hexacosane	
n-Octane	n-Octadecane	n-Heptacosane	
n-Nonane	Linoleic acid methyl ester	n-Octacosane	
n-Decane	n-Nonadecane	n-Nonacosane	
n-Undecane	n-Eicosane	n-Triacontane	
n-Dodecane	n-Heneicosane	Naphthalene	
n-Tridecane	n-Docosane	2-Methylnaphthalene	
n-Tetradecane	n-Tricosane	1,2,4-Trimethylbenzene	
n-Pentadecane	n-Tetracosane	Phenanthrene	
n-Hexadecane			

### ASTM D8519 Hydrocarbon Types by GC-VUV

#### Hydrocarbons in Waste Processing Plastic Oil (WPPO)

D-8519

At stated conc. by Wt. %

			1 mL
			12 comps.
1-Hexene	n-Octane	cis-Decahydronaphthalene	
1,3-Cyclohexadiene	Styrene	Naphthalene	
Isooctane	Isopropylcyclohexane	n-Pentadecane	
Methylcyclohexane	1,2,4-Trimethylbenzene	Phenanthrene	



# Miscellaneous Petroleum

## Skinner List for Refinery Waste

The EPA's Office of Solid Waste developed a list of Appendix VIII Hazardous Constituents applicable to refinery wastes. This list became known as the "Skinner List" and has been used as the basis for many RCRA Facility Investigations (RFI) at refineries. The EPA's Office of Solid Waste later updated the Skinner List by removing some constituents and adding others to the original version. Region 5's Waste Management Branch subsequently reviewed both versions of the Skinner List, combined them, and established a broader list of refinery process waste constituents—referred to as the Region 5 Skinner List—for use in RFI investigations at refineries in Region 5.

### Semi-Volatiles

#### Base/Neutral Extractables

##### M-005B

0.2 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

##### M-005B-10X

##### M-005B-10X-PAK

2.0 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

1 x 1 mL

1 x 1 mL  
SAVE 5 x 1 mL  
27 comps.

Anthracene	7,12-Dimethylbenz[a]anthracene
Benz[a]anthracene	Dimethyl phthalate
Benzo[b]fluoranthene	Di- <i>n</i> -butyl phthalate
Benzo[k]fluoranthene	Di- <i>n</i> -octyl phthalate
Benz[a]pyrene	Indene
bis(2-Ethylhexyl)phthalate	Fluoranthene
Butyl benzyl phthalate	6-Methylchrysene
Chrysene	1-Methylnaphthalene
Dibenz[a,h]acridine	Naphthalene
Dibenz[a,h]anthracene	Phenanthrene
<i>o</i> -Dichlorobenzene	Pyrene
<i>m</i> -Dichlorobenzene	Pyridine
<i>p</i> -Dichlorobenzene	Quinoline
Diethyl phthalate	

### Acid Extractables

##### M-005A

##### M-005A-PAK

0.2 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

##### M-005A-10X

##### M-005A-10X-PAK

2.0 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

<i>o</i> -Cresol	2,4-Dimethylphenol	Phenol
<i>m</i> -Cresol	2,4-Dinitrophenol	Thiophenol
<i>p</i> -Cresol	4-Nitrophenol	

1 x 1 mL  
SAVE 5 x 1 mL

1 x 1 mL  
SAVE 5 x 1 mL  
8 comps.

### Volatiles

##### M-005V

##### M-005V-PAK

0.2 mg/mL each in MeOH

##### M-005V-10X

##### M-005V-10X-PAK

2.0 mg/mL each in MeOH

Benzene	1,4-Dioxane	Toluene
Carbon disulfide	Ethyl benzene	<i>o</i> -Xylene
Chlorobenzene	Ethylene dibromide	<i>m</i> -Xylene
Chloroform	Methyl ethyl ketone	<i>p</i> -Xylene
1,2-Dichloroethane	Styrene	

1 x 1 mL  
SAVE 5 x 1 mL

1 x 1 mL  
SAVE 5 x 1 mL  
14 comps.

## UOP Method Analyzing Refinery Products and Processes for Chemical Properties

UOP (Universal Oil Products) methods were developed to assist the refining industry in analyzing refinery feeds, products and process streams for composition, purity and physical and chemical properties. In addition, we can custom formulate products to fit your exact needs.

### Method 543 Standard

Non-Aromatic Hydrocarbons in High-Purity

Aromatics by GC.

##### UOP-M-543-PAK

At stated Wt. %

5 x 1 mL  
2 comps.

<i>n</i> -Dodecane	70	Toluene	30
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### Method 551 Standard

Hexanes and Lower-Boiling Hydrocarbons in Olefin-Free Gasolines by GC. May also be used for UOP Method 690 - Octanes and Lower Boiling Hydrocarbons in Olefin-Free Gasolines by GC.

##### UOP-M-551-PAK

Equal Wt. %

5 x 1 mL  
7 comps.

<i>n</i> -Hexane	<i>o</i> -Xylene
Benzene	<i>m</i> -Xylene
Toluene	<i>p</i> -Xylene
Ethylbenzene	

### Method 660 Standard

##### UOP-M-660-PAK

1% in Water

5 x 1 mL

##### UOP-M-660-10X-PAK

10% in Water

5 x 1 mL

##### UOP-M-660-0.1X-PAK

0.1% in Water

5 x 1 mL

Tetramethylene sulfone

### Method 720 Standard

Impurities in High Purity *p*-Xylene by GC.

##### UOP-M-720-PAK

At stated Wt. %

5 x 1 mL  
5 comps.

<i>o</i> -Xylene	0.1	<i>n</i> -Undecane	1.0
<i>m</i> -Xylene	0.1	<i>p</i> -Xylene	98.7
Ethylbenzene	0.1		

### Method 744 Standard

Aromatics in Hydrocarbons by GC.

##### UOP-M-744-PAK

At stated Wt. %

5 x 1 mL  
8 comps.

<i>n</i> -Heptane	25	<i>o</i> -Xylene	6.6
Benzene	15	<i>p</i> -Xylene	6.7
Toluene	20	<i>o</i> -Ethyltoluene	10
<i>m</i> -Xylene	6.7	1,2,3,4-Tetramethylbenzene	10

### Method 831 Standard

##### UOP-M-831-PAK

10 µg/g each in Sulfolane

5 x 1 mL  
5 comps.

Benzene	Isopropylbenzene
Toluene	<i>n</i> -Nonane
Ethylbenzene	

### Method 868 Standard

Trace Saturates in High Purity Aromatics by GC.

##### UOP-M-868-PAK

Stated conc. (µg/g) in Toluene

5 x 1 mL  
10 comps.

<i>n</i> -Butylcyclohexane	500
<i>n</i> -Propylcyclohexane	400
<i>n</i> -Decane	500
<i>n</i> -Nonane	500
<i>n</i> -Octane	300
<i>n</i> -Hexane	100
Ethylcyclohexane	300
Cyclohexane	100
<i>n</i> -Heptane	200
Methylcyclohexane	200

### Method 931 Standard

Trace Impurities in Mixed Xylenes by GC.

##### UOP-M-931-PAK

At stated Wt. %

5 x 1 mL  
5 comps.

Benzene	2.0	<i>n</i> -Undecane	2.0
Toluene	2.0	<i>n</i> -Heptane	92.0
<i>o</i> -Ethyltoluene	2.0		

## ISO 22854 Tuning Method

### ISO22854 Tuning Standard

##### ISO22854-TS

At stated Vol. % in RFA Gasoline

1 x 1 mL  
2 comps.

Ethanol	0.87 %v/v	EtBE	0.87 %v/v
MtBE	0.87 %v/v	Benzene	1 %v/v

# Biofuels



ASTM, EN and IP standard test methods have been developed to monitor the properties of chemical impurities and physical properties for the application of testing biofuels and biofuel blends. The source materials used to produce these fuels include plant oils, ethyl alcohol (usually from corn) and vegetable waste products.

- Physical properties such as viscosity and flash point
- Chemical classes such as Glycerins, FAMES, and Hydrocarbon fraction

## Refinery and Consumer Grade Biofuels

Compound	Conc.	Matrix	Cat. No.	Unit	Compound	Conc.	Matrix	Cat. No.	Unit
Biofuel 20	0.5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	BF-FU-030-D	2 mL	Biofuel 100 (Refinery grade)	0.5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	BF-FU-032-D	2 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	BF-FU-030-D-40X	2 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	BF-FU-032-D-40X	2 mL
Biofuel 100 (Consumer grade)	0.5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	BF-FU-029-D	2 mL					
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	BF-FU-029-D-40X	2 mL					

## ASTM D5453 & D6751 Sulfur as Di-n-butyl sulfide in Biodiesel

### Sulfur in Biodiesel 5%

ppm (µg/g)	% Wt.	Cat. No. ▲	Unit
0	0	BF-5453-B5-BL	Blank 100 mL
5	0.0005	BF-5453-B5-5X-SET	w/ Blank 2 x 100 mL
10	0.001	BF-5453-B5-10X-SET	w/ Blank 2 x 100 mL
15	0.0015	BF-5453-B5-15X-SET	w/ Blank 2 x 100 mL
30	0.003	BF-5453-B5-30X	100 mL
50	0.005	BF-5453-B5-50X	100 mL
100	0.01	BF-5453-B5-100X	100 mL
200	0.02	BF-5453-B5-200X	100 mL
500	0.05	BF-5453-B5-500X	100 mL

### Sulfur in Biodiesel 20%

ppm (µg/g)	% Wt.	Cat. No. ▲	Unit
0	0	BF-5453-B20-BL	Blank 100 mL
5	0.0005	BF-5453-B20-5X-SET	w/ Blank 2 x 100 mL
10	0.001	BF-5453-B20-10X-SET	w/ Blank 2 x 100 mL
15	0.0015	BF-5453-B20-15X-SET	w/ Blank 2 x 100 mL
30	0.003	BF-5453-B20-30X	100 mL
50	0.005	BF-5453-B20-50X	100 mL
75	0.0075	BF-5453-B20-75X	100 mL
100	0.01	BF-5453-B20-100X	100 mL
200	0.02	BF-5453-B20-200X	100 mL
500	0.05	BF-5453-B20-500X	100 mL

### Sulfur in Biodiesel 100%

ppm (µg/g)	% Wt.	Cat. No. ▲	Unit
0	0	BF-5453-B100-BL	Blank 100 mL
5	0.0005	BF-5453-B100-5X-SET	w/ Blank 2 x 100 mL
10	0.001	BF-5453-B100-10X-SET	w/ Blank 2 x 100 mL
15	0.0015	BF-5453-B100-15X-SET	w/ Blank 2 x 100 mL
30	0.003	BF-5453-B100-30X	100 mL
50	0.005	BF-5453-B100-50X	100 mL
75	0.0075	BF-5453-B100-75X	100 mL
100	0.01	BF-5453-B100-100X	100 mL
200	0.02	BF-5453-B100-200X	100 mL
500	0.05	BF-5453-B100-500X	100 mL

### Technical Note

The 5, 10 and 15 ppm sulfurs are supplied as a set including a blank. We recommend using the blank for analysis to compensate for matrix interferences, such as low levels of native sulfur.

## ASTM D6584 / EN14105 Free and Total Glycerin in Biodiesel by GC

Compound	Conc.	Matrix	Cat. No.	Unit
Glycerin	0.5 mg/mL	Pyridine	BF-D-6584-01	2 mL
Monoolein	5 mg/mL	Pyridine	BF-D-6584-02	2 mL
1,3-Diolein	5 mg/mL	Pyridine	BF-D-6584-03	2 mL
Triolein	5 mg/mL	Pyridine	BF-D-6584-04	2 mL
(S)-(-)-1,2,4-Butanetriol	1 mg/mL	Pyridine	BF-D-6584-05-IS	5 mL
Tricaprin	8 mg/mL	Pyridine	BF-D-6584-06	5 mL
MSTFA		NEAT	BF-D-6584-07N	5 mL
		<b>SET</b>	<b>BF-D-6584-SET</b>	<b>7 units</b>

## ASTM Standard D6584 SET (without IS)

### GLYC-FT-SET

At stated conc. (µg/mL) in Pyridine

	Level 1	Level 2	Level 3	Level 4	Level 5
	GLYC-FT-01	GLYC-FT-02	GLYC-FT-03	GLYC-FT-04	GLYC-FT-05
1,3-Diolein	50	100	200	350	500
Triolein	50	100	200	350	500
Glycerol	5	15	25	35	50
Monoolein	100	250	500	750	1000

## ASTM D6584 Mix

### BF-D-6584-MIX

At stated conc. (mg/mL) in Pyridine

1 x 5 mL

6 comps.

Glycerol	0.5	Trioctadecenoic (Olein)	5
Monoolein	5	(S)-(-)-1,2,4-Butanetriol	1
1,3-Diolein	5	Tricaprin	8



## EN 14105 Biofuel Glyceride Solutions

### Solution I

EN-14105-01 1 mL

At stated conc. (µg/mL) in Pyridine

(s)-(-)-1,2,4-Butanetriol	80
Monoolein	250
Diolein	50
Triolein	50
Glycerol	5
Tricaprin	800

### Solution II

EN-14105-02 1 mL

At stated conc. (µg/mL) in Pyridine

(s)-(-)-1,2,4-Butanetriol	80
Monoolein	600
Diolein	200
Triolein	150
Glycerol	20
Tricaprin	800

### Solution III

EN-14105-03 1 mL

At stated conc. (µg/mL) in Pyridine

(s)-(-)-1,2,4-Butanetriol	80
Monoolein	950
Diolein	350
Triolein	300
Glycerol	35
Tricaprin	800

### Solution IV

EN-14105-04 1 mL

At stated conc. (µg/mL) in Pyridine

(s)-(-)-1,2,4-Butanetriol	80
Monoolein	1250
Diolein	500
Triolein	400
Glycerol	50
Tricaprin	800

## EN 12916 Hydrocarbons in Biofuel

### Calibration Standard Set

#### EN-12916-SET

At stated conc. (mg/mL) in Heptane

4 x 1 mL

3 comps.

	EN-12916-01	EN-12916-02	EN-12916-03	EN-12916-04
o-Xylene (1,2-Dimethylbenzene)	40	10	2.5	0.5
Fluorene	20	10	2.5	0.2
Phenanthrene	4.0	2.0	0.5	0.1

## EN 14103 Fatty Acid Methyl Esters (FAMES)

The methyl esters in the mixture are those derived from typical glycerides present in biomass sources.

### Soy and Corn

BF-SOY-ME	100 mg
At stated Wt. %	6 comps.
16:0 Methyl palmitate	6
18:0 Methyl stearate	3
20:0 Methyl arachidate	3
18:1 Methyl oleate	35
18:2 Methyl linoleate	50
18:3 Methyl linolenate	3

### Palm Kernel

BF-PALM-ME	100 mg
At stated Wt. %	8 comps.
8:0 Methyl palmylate	7
10:0 Methyl caprate	5
12:0 Methyl laurate	48
14:0 Methyl myristate	15
16:0 Methyl palmitate	7
18:0 Methyl stearate	3
18:1 Methyl oleate	12
18:2 Methyl linoleate	3

### Rapeseed Oil

BF-RAP-ME	100 mg
At stated Wt. %	11 comps.
14:0 Methyl myristate	1
16:0 Methyl palmitate	4
18:0 Methyl stearate	3
20:0 Methyl arachidate	3
22:0 Methyl behenate	3
24:0 Methyl lignocerate	3
18:1 Methyl oleate	60
22:1 Methyl erucate	5
18:2 Methyl linoleate	12
18:3 Methyl linolenate	5
20:1 Methyl eicosenoate	1

### Beef Tallow & Palm Oil

BF-BT-ME	100 mg
At stated Wt. %	7 comps.
14:0 Methyl myristate	2
16:0 Methyl palmitate	30
16:1 Methyl palmitoleate	3
18:0 Methyl stearate	14
18:1 Methyl oleate	41
18:2 Methyl linoleate	7
18:3 Methyl linolenate	3

### Technical Note

Individual mixes packaged under nitrogen for stability.

### Percent Methanol Calibration Standard Set (EN14110)

BF-MEOH-SET	5 x 1 mL
At stated conc. (µg/g)	
BF-MEOH-1X 100	BF-MEOH-25X 2500
BF-MEOH-5X 500	BF-MEOH-50X 5000
BF-MEOH-10X 1000	
Methanol in water	

## IP391/07 Aromatic Hydrocarbon / FAME Test Method for Diesel and Petro / Biodiesel

### IP391/07

#### Test Method Set

IP-391-07-SET	2 x 5 mL
IP-391-07-01	IP-391-07-02

### Aromatic Hydrocarbon

IP-391-07-01	5 mL
At stated conc. (µg/mL) in <i>n</i> -Heptane	7 comps.
Cyclohexane 10,000	Naphthalene 1,000
Dodecylbenzene 1,000	Dibenzothiophene 500
<i>o</i> -Xylene 5,000	9-Methylanthracene 500
Hexamethylbenzene 1,000	

### FAME Test Method

IP-391-07-02	5 mL
At stated conc. (µg/mL) in <i>n</i> -Heptane	6 comps.
Methyl palmitate	800
Methyl stearate	800
Methyl <i>cis</i> -9-octadecenoate	800
Methyl linoleate	800
Chrysene	400
Methyl linolenate	800

## IP585 Fatty Acid Methyl Esters (FAMES) in Aviation Turbine Fuel

### FAME in Aviation Turbine Fuel

IP-585-BCS	1 mL
1000 µg/g each in <i>n</i> -Dodecane	6 comps.

Methyl palmitate	Methyl stearate	Methyl linoleate
Methyl heptadecanoate	Methyl oleate	Methyl linolenate

### Internal Standard

IP-585-IS	1 mL
1000 µg/g in <i>n</i> -Dodecane	Methyl heptadecanoate-d <sub>33</sub>

## EN 15721 Ethanol Impurities

### EN15721 Solution A Set

EN-15721-A-SET	2 x 1 mL
EN-15721-A	EN-15721-A-IS

### Ethanol Impurities Solution A

EN-15721-A	1 mL	
1 Wt.% each in Ethanol	10 comps.	
Methanol	2-Methyl-1-butanol	<i>n</i> -Butanol
Acetaldehyde	2-Methyl-1-propanol	<i>n</i> -Propanol
3-Methyl-1-butanol	sec-Butanol	Ethyl acetate
		Acetal

### Internal Standard

EN-15721-A-IS	1 mL
1 Wt.% in Ethanol	3-Pentanol

## EN 15779 Polyunsaturated Fatty Acid Methyl Esters (PUFAMES)

### PUFAMES

EN-15779-R1	1 mL
0.25% w/v in <i>n</i> -Heptane	4 comps.

cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester	Arachidonic acid methyl ester
cis-7,10,13,16,19-Docosapentaenoic acid methyl ester	Eicosapentaenoic acid methyl ester

### Internal Standard

EN-15779-IS	1 mL
1.0 mg/mL in Heptane	Methyl tricosanoate

# Biofuels

## Fatty Acid Ethyl Esters (FAEEs)

Compound	Cat. No.	Unit	Compound	Cat. No.	Unit	Compound	Cat. No.	Unit
Ethyl palmitate (16:0)	FAEE-006N	100 mg	Ethyl myristate (14:0)	FAEE-005N	100 mg	Ethyl laurate (12:0)	FAEE-004N	100 mg
	FAEE-006S	1 mL		FAEE-005S	1 mL		FAEE-004S	1 mL
Ethyl stearate (18:0)	FAEE-007N	100 mg	Ethyl behenate (22:0)	FAEE-009N	100 mg	Ethyl palmitoleate (16:1)	FAEE-001N	100 mg
	FAEE-007S	1 mL		FAEE-009S	1 mL		FAEE-001S	1 mL
Ethyl arachidate (20:0)	FAEE-008N	100 mg	Ethyl lignocerate (24:0)	FAEE-010N	100 mg	Ethyl nervonate (24:1)	FAEE-013N	100 mg
	FAEE-008S	1 mL		FAEE-010S	1 mL		FAEE-013S	1 mL
Ethyl oleate (18:1)	FAEE-014N	100 mg	Ethyl erucate (22:1)	FAEE-011N	100 mg	Ethyl heptadecanoate (17:0)	FAEE-015N	100 mg
	FAEE-014S	1 mL		FAEE-011S	1 mL		FAEE-015S	1 mL
Ethyl linoleate (18:2)	FAEE-012N	100 mg	Ethyl caprylate (8:0)	FAEE-002N	100 mg	Ethyl linolenate (gamma) (18:3)	FAEE-020N	100 mg
	FAEE-012S	1 mL		FAEE-002S	1 mL		FAEE-020S	1 mL
Ethyl linolenate (18:3)	FAEE-016N	100 mg	Ethyl caprate (10:0)	FAEE-003N	100 mg			
	FAEE-016S	1 mL		FAEE-003S	1 mL			

### Ethyl Esters in

#### Soy & Corn

##### BF-SOY-EE

At stated Wt. %

100 mg  
6 comps.

16:0 Ethyl palmitate	6
18:0 Ethyl stearate	3
20:0 Ethyl arachidate	3
18:1 Ethyl oleate	35
18:2 Ethyl linoleate	50
18:3 Ethyl linolenate	3

### Ethyl Esters in

#### Rapeseed Oil

##### BF-RAP-EE

At stated Wt. %

100 mg  
10 comps.

14:0 Ethyl myristate	1
16:0 Ethyl palmitate	4
18:0 Ethyl stearate	3
20:0 Ethyl arachidate	3
22:0 Ethyl behenate	3
24:0 Ethyl lignocerate	3
18:1 Ethyl oleate	45
22:1 Ethyl erucate	20
18:2 Ethyl linoleate	15
18:3 Ethyl linolenate	3

### Ethyl Esters in

#### Palm Kernel Oil

##### BF-PALM-EE

At stated Wt. %

100 mg  
8 comps.

8:0 Ethyl caprylate	7
10:0 Ethyl caprate	5
12:0 Ethyl laurate	48
14:0 Ethyl myristate	15
16:0 Ethyl palmitate	7
18:0 Ethyl stearate	3
18:1 Ethyl oleate	12
18:2 Ethyl linoleate	3

### Ethyl Esters in

#### Beef Tallow

##### BF-BT-EE

At stated Wt. %

100 mg  
7 comps.

14:0 Ethyl myristate	2
16:0 Ethyl palmitate	30
16:1 Ethyl palmitoleate	3
18:0 Ethyl stearate	14
18:1 Ethyl oleate	41
18:2 Ethyl linoleate	7
18:3 Ethyl linolenate	3

## Physical Standards

Method	Temp.	Matrix	Cat. No.	Unit
<b>ASTM D2500</b>				
Cloud Point	-16 °C *	B5	BF-D-2500-B5-250ML ▲	250 mL
	-14 °C *	B20	BF-D-2500-B20-250ML	250 mL
	-1 °C *	B100	BF-D-2500-B100-250ML	250 mL
<b>ASTM D93 / EN-ISO 3679</b>				
Flash Point	60-63 °C *		BF-D-93-60C-250ML	250 mL
	65-70 °C *		BF-D-93-65C-250ML	250 mL
	134-137 °C *		BF-D-93-140C-250ML	250 mL
<b>ASTM D6304 / EN ISO 12937</b>				
(KF) Water Content		60 µg/g *	BF-KF-0.6X-5ML-VAP	10 x 5 mL
		100 µg/g *	BF-KF-1X-5ML-VAP	10 x 5 mL
		1000 µg/g *	BF-KF-10X-5ML-VAP	10 x 5 mL
		5000 µg/g *	BF-KF-50X-5ML-VAP	10 x 5 mL

\* These are nominal values and the actual value will be recorded on the certificate.

▲ Hazardous fee required for air shipments.



# TPH, Fuel and Hydrocarbons

Petroleum is a broadly defined class of liquid hydrocarbon mixtures that are used in a large variety of products for many different uses. 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 among others.

Most analytical methods for petroleum products focus on the level of benzene, toluene, ethyl benzene and xylene (BTEX), the total petroleum hydrocarbon number (TPH) and the finger print of the petroleum product.



## Individual Fuel and Hydrocarbons

Compound	Conc.	Matrix	Cat. No.	Unit	Compound	Conc.	Matrix	Cat. No.	Unit	
<b>5-alpha Androstane</b> 438-22-2	1 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	GRH-IS	1 mL	<b>Gasoline</b> Regular, unleaded	0.5 mg/mL	MeOH	GA-001	1 mL	
	10 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	GRH-IS-10X	1 mL		5 mg/mL	MeOH	GA-001-10X	1 mL	
<b>Aviation (gas)</b> (grade 100-LL)	0.5 mg/mL	MeOH	GA-004	1 mL		5 x 1 mL		GA-001-10X-PAK		
	20 mg/mL	MeOH	GA-004-40X	1 mL			20 mg/mL	MeOH	GA-001-40X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	GA-004-D-40X	1 mL			20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	GA-001-D-40X	1 mL
<b>Biodiesel 20</b>	0.5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-030-D	1 mL	<b>Gasoline</b> Premium	0.5 mg/mL	MeOH	GA-003	1 mL	
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-030-D-40X	1 mL		20 mg/mL	MeOH	GA-003-40X	1 mL	
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-030-D-40X	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	GA-003-D-40X	1 mL	
<b>Biodiesel 100</b> (consumer grade)	0.5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-029-D	1 mL	<b>RFA Gasoline</b> (oxygenate-free)	0.5 mg/mL	MeOH	GA-005	1 mL	
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-029-D-40X	1 mL			20 mg/mL	MeOH	GA-005-40X	1 mL
<b>Biodiesel 100</b> (refinery grade)	0.5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-032-D	1 mL			20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	GA-005-D-40X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-032-D-40X	1 mL	<b>Regular Leaded Gasoline</b>	0.5 mg/mL	MeOH	GA-002	1 mL	
<b>p-Bromofluorobenzene</b> 460-00-4	2.5 mg/mL	Acetone	GARH-SS	1 mL			20 mg/mL	MeOH	GA-002-40X	1 mL
							20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	GA-002-D-40X	1 mL
<b>1-Chloro-4-fluorobenzene</b> 352-33-0	2 mg/mL	MeOH	AK-101-IS-10X	1 mL		5 mg/mL	MeOH	GA-W25-10X	1 mL	
<b>1-Chlorooctadecane</b> 3386-33-2	1 mg/mL	Hexane	DRH-007-SS	1 mL	<b>Unleaded Gasoline</b> 25% Weathered					
<b>1-Chloro-4-fluorobenzene</b> 352-33-0	1 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	GARH-IS	1 mL	<b>Unleaded Gasoline</b> 50% Weathered	5 mg/mL	MeOH	GA-W50-10X	1 mL	
<b>2,5-Dibromotoluene</b> 615-59-8	50 µg/mL	MeOH	GRH-004-SS	1 mL	<b>Unleaded Gasoline</b> 75% Weathered	5 mg/mL	MeOH	GA-W75-10X	1 mL	
	500 µg/mL	MeOH	GRH-004-SS-10X	1 mL	<b>Hydraulic Fluid</b> 64742-54-7	0.5 mg/mL	Hexane	FU-020-H	1 mL	
	5 mg/mL	MeOH	GRH-004-SS-100X	1 mL		20 mg/mL	Hexane	FU-020-H-40X	1 mL	
<b>Diesel</b>	0.5 mg/mL	MeOH	FU-009	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-020-D-40X	1 mL	
	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-009-D-10X	1 mL	<b>Jet Reference Fuel</b> Type I	0.5 mg/mL	MeOH	FU-011	1 mL	
	20 mg/mL	MeOH	FU-009-40X	1 mL			20 mg/mL	MeOH	FU-011-40X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-009-D-40X	1 mL			20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-011-D-40X	1 mL
0.5 mg/mL	MeOH	FU-013	1 mL	<b>JP-4 Jet Fuel</b> 50815-00-4		0.5 mg/mL	MeOH	FU-010	1 mL	
<b>#1 Diesel</b> (Low Sulfur)	20 mg/mL	MeOH	FU-013-40X	1 mL		20 mg/mL	MeOH	FU-010-40X	1 mL	
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-013-D-40X	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-010-D-40X	1 mL	
					<b>JP-5 Fuel</b>	0.5 mg/mL	MeOH	FU-012	1 mL	
<b>#2 Diesel</b> 68334-30-5	50 mg/mL	Acetone	DRO-AK-102-LCS-10X-R1	1 mL		20 mg/mL	MeOH	FU-012-40X	1 mL	
<b>#2 Diesel</b> (Extra Low Sulfur) 68476-43-6	0.5 mg/mL	MeOH	FU-017	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-012-D-40X	1 mL	
	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-017-D-10X	1 mL	<b>JP-7 Fuel</b>	0.5 mg/mL	MeOH	FU-014	1 mL	
	5 mg/mL	Acetone	DRO-AK-102-LCS	1 mL			20 mg/mL	MeOH	FU-014-40X	1 mL
	50 mg/mL	Acetone	DRO-AK-102-LCS-10X	1 mL			20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-014-D-40X	1 mL
		20 mg/mL	MeOH	FU-017-40X	1 mL	<b>JP-8 Fuel</b>	0.5 mg/mL	MeOH	FU-015	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-017-D-40X	1 mL			20 mg/mL	MeOH	FU-015-40X	1 mL
	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FD2-W25-10X	1 mL			20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-015-D-40X	1 mL
<b>#2 Diesel</b> (Low Sulfur) 25% Weathered	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FD2-W50-10X	1 mL	<b>JP-TS Aviation Fuel</b> 64742-47-8	0.5 mg/mL	MeOH	FU-016	1 mL	
<b>#2 Diesel</b> (Low Sulfur) 50% Weathered	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FD2-W50-10X	1 mL		20 mg/mL	MeOH	FU-016-40X	1 mL	
<b>#2 Diesel</b> (Low Sulfur) 75% Weathered	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FD2-W75-10X	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-016-D-40X	1 mL	
<b>#2 Diesel</b> 25% Weathered	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FD2-W25-R1-10X	1 mL	<b>JP-10 Aviation Fuel</b>	0.5 mg/mL	MeOH	FU-022	1 mL	
<b>#2 Diesel</b> 50% Weathered	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FD2-W50-R1-10X	1 mL			20 mg/mL	MeOH	FU-022-40X	1 mL
<b>#2 Diesel</b> 75% Weathered	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FD2-W75-R1-10X	1 mL			20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-022-D-40X	1 mL
<b>Renewable Diesel Fuel#2</b>	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-033-D-40X	1 mL		5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FK-W25-10X	1 mL	
<b>Docosane</b> 629-97-0	20 Wt. %	Toluene	D-5186-91-PM-0.4X	1 mL	<b>Kerosene</b> 25% Weathered					
<b>n-Dodecane</b> 112-40-3	5 mg/mL	MeOH	AS-E0238	1 mL	<b>Kerosene</b> 50% Weathered	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FK-W50-10X	1 mL	
	1.5 Wt. %	Isooctane	M-GRA-SCS-AS	1 mL	<b>Kerosene</b> 75% Weathered	5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FK-W75-10X	1 mL	
<b>#1 Fuel oil</b> 70892-10-3	0.5 mg/mL	MeOH	FU-001	1 mL	<b>Kerosene</b> 8008-20-6	0.5 mg/mL	MeOH	FU-005	1 mL	
	20 mg/mL	MeOH	FU-001-40X	1 mL		20 mg/mL	MeOH	FU-005-40X	1 mL	
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-001-D-40X	1 mL		5 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-005-D-10X	1 mL	
<b>#2 Fuel oil</b> 68476-30-2	0.5 mg/mL	MeOH	FU-002	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-005-D-40X	1 mL	
	20 mg/mL	MeOH	FU-002-40X	1 mL	<b>Lacquer Thinner</b>	1 gram	Neat	HS-001N	1 mL	
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-002-D-40X	1 mL			0.5 mg/mL	MeOH	HS-001S	1 mL
						20 mg/mL	MeOH	HS-001S-40X	1 mL	
						20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	HS-001S-D-40X	1 mL	
<b>#4 Fuel oil</b> 68476-31-3	0.5 mg/mL	Hexane	FU-004	1 mL	<b>Mineral Spirits</b> 8030-30-6	1 gram	Neat	HS-002N	1 mL	
	20 mg/mL	Hexane	FU-004-40X	1 mL			0.5 mg/mL	MeOH	HS-002S	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-004-D-40X	1 mL			20 mg/mL	MeOH	HS-002S-40X	1 mL
						20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	HS-002S-D-40X	1 mL	
<b>#6 Fuel oil</b> 68553-00-4	0.5 mg/mL	Hexane	FU-008	1 mL	<b>Naphtha</b> 64742-89-8	1 gram	Neat	HS-003N	1 mL	
	20 mg/mL	Hexane	FU-008-40X	1 mL			0.5 mg/mL	MeOH	HS-003S	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-008-D-40X	1 mL			20 mg/mL	MeOH	HS-003S-40X	1 mL
						20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	HS-003S-D-40X	1 mL	
					<b>n-Nonatriacontane</b> 7194-86-7	750 µg/mL	Chloroform	DRH-FL-SS-R1	1 mL	
						1 mg/mL	CS <sub>2</sub>	DRH-FL-SS	1 mL	
						3 mg/mL	CS <sub>2</sub>	DRH-FL-SS-3X	1 mL	
					<b>n-Pentadecane</b> 629-62-9	5 mg/mL	MeOH	AS-E0241	1 mL	

Fuels and Hydrocarbons continued on next page

# TPH, Fuel and Hydrocarbons

## Individual Fuel and Hydrocarbons (continued)

Compound	Conc.	Matrix	Cat. No.	Unit	Compound	Conc.	Matrix	Cat. No.	Unit
SAE 5W30 Motor oil	0.5 mg/mL	Hexane	FU-025-H	1 mL	Stoddard solvent 8052-41-3	1 gram	Neat	HS-005N	1 mL
	20 mg/mL	Hexane	FU-025-H-40X	1 mL		0.5 mg/mL	MeOH	HS-005S	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-025-D-40X	1 mL		5 mg/mL	MeOH	HS-005S-10X	1 mL
SAE 10W30 Motor oil	0.5 mg/mL	Hexane	FU-026-H	1 mL		20 mg/mL	MeOH	HS-005S-40X	1 mL
	20 mg/mL	Hexane	FU-026-H-40X	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	HS-005S-D-40X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-026-D-40X	1 mL		o-Terphenyl 84-15-1	200 µg/mL	Acetone	DRO-AK-102-SS
SAE 10W40 Motor oil	0.5 mg/mL	Hexane	FU-027-H	1 mL	1 mg/mL		CH <sub>2</sub> Cl <sub>2</sub>	DRH-006-SS	1 mL
	20 mg/mL	Hexane	FU-027-H-40X	1 mL	2 mg/mL		Acetone	DRO-AK-102-SS-10X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-027-D-40X	1 mL	2 mg/mL		Acetone	GRH-SS	1 mL
SAE 20W50 Motor oil	0.5 mg/mL	Hexane	FU-028-H	1 mL	n-Tetradecane 629-59-4	5 mg/mL	MeOH	AS-E0240	1 mL
	20 mg/mL	Hexane	FU-028-H-40X	1 mL	Tetracosane 646-31-1	500 µg/mL	CS <sub>2</sub>	D-5480-C40-5ML	5 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-028-D-40X	1 mL		500 µg/mL	Chloroform	D-5480-C40-R1-5ML	5 mL
SAE 30W Motor oil	0.5 mg/mL	Hexane	FU-018-H	1 mL	n-Tridecane 629-50-5	5 mg/mL	MeOH	AS-E0239	1 mL
	20 mg/mL	Hexane	FU-018-H-40X	1 mL	1,2,3-Trimethylbenzene 526-73-8	1 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	V-028S-D-10X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-018-D-40X	1 mL		n-Triacontane-d <sub>62</sub> 93952-07-9	500 µg/mL	Acetone	RRO-AK-103-SS
SAE 40W Motor oil	0.5 mg/mL	Hexane	FU-019-H	1 mL			5 mg/mL	THF	RRO-AK-103-SS2
	20 mg/mL	Hexane	FU-019-H-40X	1 mL	5 mg/mL		THF	DRH-SS	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-019-D-40X	1 mL	Turbine (Jet) fuel	0.5 mg/mL	MeOH	FU-006	1 mL
SAE 50W Motor oil	0.5 mg/mL	Hexane	FU-021-H	1 mL		20 mg/mL	MeOH	FU-006-40X	1 mL
	20 mg/mL	Hexane	FU-021-H-40X	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-006-D-40X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-021-D-40X	1 mL	Turpentine 8006-64-2	NEAT	HS-004N	1 gram	
Motor Oil Composite Standard 5000 µg/mL each in CH <sub>2</sub> Cl <sub>2</sub> MO-COMP-D-40X SAE 5W30 SAE 10W30 SAE 10W40 SAE 20W50	0.5 mg/mL	Hexane	FU-018-H	1 mL		0.5 mg/mL	MeOH	HS-004S	1 mL
	20 mg/mL	Hexane	FU-018-H-40X	1 mL		20 mg/mL	MeOH	HS-004S-40X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-018-D-40X	1 mL		20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	HS-004S-D-40X	1 mL
	20 mg/mL	CH <sub>2</sub> Cl <sub>2</sub>	FU-021-D-40X	1 mL					

### Motor Oil Composite Standard

5000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

MO-COMP-D-40X

4 comps.

1 x 1 mL

SAE 5W30 SAE 10W30 SAE 10W40 SAE 20W50

## Complete Set of Total Petroleum Hydrocarbon (TPH) Pattern Recognition Standards

### Total Petroleum Hydrocarbon Reference Set

TPH-R4-SET

32 x 1 mL

TPH-001-R2-SET, TPH-002-R2-SET, TPH-003-SET, TPH-004-SET

### Motor Fuels & Lubricating Oils Set

TPH-001-R2-SET

12 x 1 mL

	mg/mL	Solvent
Gasoline, regular unleaded	20	MeOH
Gasoline, regular leaded	20	MeOH
Gasoline, premium	20	MeOH
RFA Gasoline (Oxygenate free)	20	MeOH
#2 Diesel	20	CH <sub>2</sub> Cl <sub>2</sub>
#1 Diesel (Low sulfur)	20	CH <sub>2</sub> Cl <sub>2</sub>
#2 Diesel (Extra low sulfur)	20	CH <sub>2</sub> Cl <sub>2</sub>
SAE 30W Motor oil	20	CH <sub>2</sub> Cl <sub>2</sub>
SAE 40W Motor oil	20	CH <sub>2</sub> Cl <sub>2</sub>
SAE 50W Motor oil	20	CH <sub>2</sub> Cl <sub>2</sub>
Biodiesel 20	20	CH <sub>2</sub> Cl <sub>2</sub>
Biodiesel 100 (consumer grade)	20	CH <sub>2</sub> Cl <sub>2</sub>

### Aviation Fuels & Oils Set

TPH-003-SET

10 x 1 mL

	mg/mL	Solvent
Aviation (Gas) Grade 100 LL	20	CH <sub>2</sub> Cl <sub>2</sub>
JP-4 Fuel	20	CH <sub>2</sub> Cl <sub>2</sub>
JP-5 Fuel	20	CH <sub>2</sub> Cl <sub>2</sub>
JP-7 Fuel	20	CH <sub>2</sub> Cl <sub>2</sub>
JP-8 Fuel	20	CH <sub>2</sub> Cl <sub>2</sub>
JP-10 Aviation Fuel	20	CH <sub>2</sub> Cl <sub>2</sub>
JP-TS Aviation	20	CH <sub>2</sub> Cl <sub>2</sub>
Jet Fuel (Type 1)	20	CH <sub>2</sub> Cl <sub>2</sub>
Turbine (Jet A) Fuel	20	CH <sub>2</sub> Cl <sub>2</sub>
Hydraulic fluid	20	CH <sub>2</sub> Cl <sub>2</sub>

### Heating Fuel Oils Set

TPH-002-R2-SET

5 x 1 mL

	mg/mL	Solvent
#1 Fuel oil	20	CH <sub>2</sub> Cl <sub>2</sub>
#2 Fuel oil	20	CH <sub>2</sub> Cl <sub>2</sub>
#4 Fuel oil	20	CH <sub>2</sub> Cl <sub>2</sub>
#6 Fuel oil	20	CH <sub>2</sub> Cl <sub>2</sub>
Kerosene	20	CH <sub>2</sub> Cl <sub>2</sub>

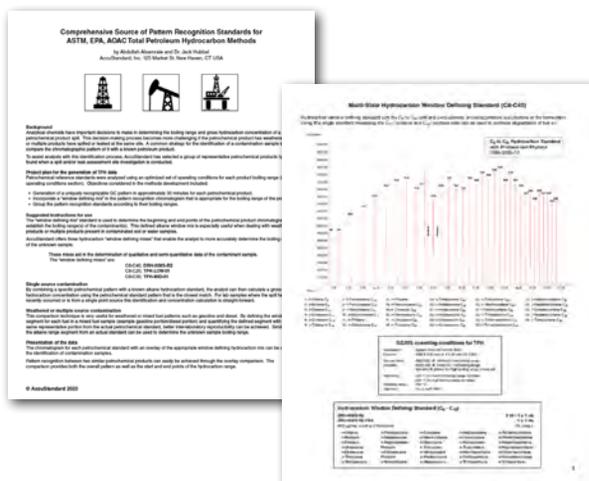
### Household & Industrial Solvent Set

TPH-004-SET

5 x 1 mL

	mg/mL	Solvent
Lacquer Thinner	20	CH <sub>2</sub> Cl <sub>2</sub>
Mineral Spirits	20	CH <sub>2</sub> Cl <sub>2</sub>
Naphtha	20	CH <sub>2</sub> Cl <sub>2</sub>
Turpentine	20	CH <sub>2</sub> Cl <sub>2</sub>
Stoddard solvent	20	CH <sub>2</sub> Cl <sub>2</sub>

## Comprehensive Source of Pattern Recognition Standards for ASTM, EPA, AOAC Total Petroleum Hydrocarbon Methods



This paper presents chromatograms of various petroleum products commonly encountered during LUFT/LUST site investigations. The chromatograms illustrate characteristic fuel patterns obtained over a 25-minute analytical run, encompassing early-eluting petroleum products such as gasoline through late-eluting products such as motor oil. Additionally, an n-alkane standard (DRH-008S-R2), analyzed under identical conditions, has been overlaid on each petroleum product chromatogram. This overlay serves as a reference to assist chemists in fuel identification through pattern recognition.

The n-alkane standard (DRH-008S-R2) overlay provides defined n-alkane reference points that can be directly compared between the standard and unknown samples. These beginning and ending n-alkane markers are used to establish gross hydrocarbon concentration ranges. By comparing the n-alkane range of the closest matching petroleum standard to that of the unknown sample, a consistent and reproducible gross hydrocarbon value can be determined.

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# TPH, Fuel and Hydrocarbons

## Brownfield Regulation, ISO/DIS 9377, ISO 16703

### Petroleum Brownfield Regulation

#### Light Petroleum Fraction

##### CCME-LPF-SET

At stated conc. ( $\mu\text{g/mL}$ ) in MeOH

5 x 1 mL  
8 comps.

	CCME-LPF-0.05X	CCME-LPF-0.1X	CCME-LPF-0.2X	CCME-LPF-0.5X	CCME-LPF
<i>n</i> -Decane	12.5	25	50	125	250
<i>n</i> -Hexane	12.5	25	50	125	250
Toluene	12.5	25	50	125	250
Benzene	12.5	25	50	125	250
<i>o</i> -Xylene	12.5	25	50	125	250
<i>m</i> -Xylene	6.25	12.5	25	62.5	125
<i>p</i> -Xylene	6.25	12.5	25	62.5	125
Ethylbenzene	12.5	25	50	125	250

#### Medium & Heavy Petroleum Fraction

##### CCME-MHPF-SET

At stated conc. ( $\mu\text{g/mL}$ ) in *n*-Hexane

3 x 1 mL  
3 comps.

	CCME-MHPF-0.1X	CCME-MHPF-0.5X	CCME-MHPF
<i>n</i> -Decane	40	200	400
<i>n</i> -Hexadecane	40	200	400
<i>n</i> -Tetracontane	40	200	400

#### Performance Check Standard

##### CCME-QC

1 x 1 mL

##### CCME-QC-PAK

SAVE 5 x 1 mL

40  $\mu\text{g/mL}$  each in *n*-Hexane:Cyclohexane (50:50)  
2 comps.

*n*-Pentacontane      *n*-Tetracontane

#### Spike Standard

##### CCME-SPIKE

1 x 1 mL

2500  $\mu\text{g/mL}$  each in *n*-Hexane

2 comps.

SAE 30W Motor Oil - Non-Detergent Formula  
#2 Diesel - 50% Weathered

#### Hydrocarbon Standard

##### D-5442-R1

1 x 1 mL

100  $\mu\text{g/mL}$  each in Cyclohexane

18 comps.

*n*-Decane                      *n*-Octacosane  
*n*-Dodecane                *n*-Triacontane  
*n*-Tetradecane              *n*-Dotriacontane  
*n*-Hexadecane              *n*-Tetracontane  
*n*-Octadecane               *n*-Hexatriacontane  
*n*-Eicosane                  *n*-Octatriacontane  
*n*-Docosane                 *n*-Tetracontane  
*n*-Tetracosane              *n*-Tetratetracontane  
*n*-Hexacosane              *n*-Pentacontane

#### Canadian Atlantic RBCA EPH Mix

##### CCME-EPH

1 x 1 mL

1000  $\mu\text{g/mL}$  each in Hexane: $\text{CH}_2\text{Cl}_2$  (85:15)

11 comps.

Acenaphthene              *n*-Dotriacontane  
Anthracene                 *n*-Heneicosane  
Benz[a]pyrene              *n*-Hexadecane  
Chrysene                    *n*-Octacosane  
*n*-Decane                    Naphthalene  
*n*-Dodecane

#### Surrogate Standard

##### CCME-EPH-SS

1 x 1 mL

1000  $\mu\text{g/mL}$  each in  $\text{CH}_2\text{Cl}_2$

2 comps.

*n*-Dotriacontane              Isobutylbenzene

#### Canadian Atlantic RBCA VPH Mix

##### CCME-VPH

1 x 1 mL

1000  $\mu\text{g/mL}$  each in MeOH

12 comps.

Benzene                      *n*-Octane  
*n*-Decane                    Toluene  
Ethylbenzene                1,2,4-Trimethylbenzene  
*n*-Heptane                   1,3,5-Trimethylbenzene  
*n*-Hexane                    *o*-Xylene  
1-Methyl-3-ethylbenzene   *p*-Xylene

#### Surrogate Standard

##### CCME-VPH-SS

1 x 1 mL

1000  $\mu\text{g/mL}$  in MeOH

Isobutylbenzene

### ISO / DIS 9377 Hydrocarbon Oil Index

#### Diesel #2/Mineral Oil Standard

##### ENISO9377-2-1

1 x 1 mL

5000  $\mu\text{g/mL}$  each in Hexane

2 comps.

#2 Diesel                    Heavy mineral oil

#### Quality Control Standard Mix

##### ISO-DIS9377-4-1

1 x 1 mL

1000  $\mu\text{g/mL}$  total hydrocarbons in Acetone

2 comps.

#2 Diesel                    Mineral oil

#### Extraction Solvent Stock Soln.

##### ENISO9377-2-3

1 x 5 mL

At stated conc. ( $\mu\text{g/mL}$ ) in Hexane

2 comps.

*n*-Decane 14.5      *n*-Tetracontane 20

#### Stearyl Stearate Test Solution

##### ISO-DIS9377-4-2

1 x 10 mL

2000  $\mu\text{g/mL}$  in Cyclohexane

Stearyl stearate

#### Florisol Cartridge QC Std. Mix

##### ENISO9377-2-4

1 x 10 mL

1000  $\mu\text{g/mL}$  each in Hexane

2 comps.

#2 Diesel                    Heavy mineral oil

#### System Performance Mix of

##### *n*-alkanes

##### ENISO9377-2-2

1 x 1 mL

50  $\mu\text{g/mL}$  each in Hexane

16 comps.

*n*-Decane                      *n*-Hexacosane  
*n*-Dodecane                 *n*-Octacosane  
*n*-Tetradecane              *n*-Triacontane  
*n*-Hexadecane              *n*-Dotriacontane  
*n*-Octadecane               *n*-Tetracontane  
*n*-Eicosane                  *n*-Hexatriacontane  
*n*-Docosane                 *n*-Octatriacontane  
*n*-Tetracosane              *n*-Tetracontane

#### ISO/DIS 9377-4 Standard Mix

##### Stock Solution

##### TPH-006-10X

1 x 1 mL

##### TPH-006-10X-PAK

SAVE 5 x 1 mL

5000  $\mu\text{g/mL}$  each in Cyclohexane

2 comps.

#2 Diesel                    Mineral oil

### ISO 16703 Hydrocarbon Mix

#### ISO 16703 C10 to C40 Hydrocarbons Mix

##### ISO16703

500  $\mu\text{g/mL}$  each in *n*-Heptane

1 x 1 mL  
16 comps.

*n*-Decane                      *n*-Docosane                      *n*-Dotriacontane  
*n*-Dodecane                 *n*-Tetracosane                 *n*-Tetracontane  
*n*-Tetradecane              *n*-Hexacosane                 *n*-Hexatriacontane  
*n*-Hexadecane              *n*-Octacosane                 *n*-Octatriacontane  
*n*-Octadecane               *n*-Triacontane                 *n*-Tetracontane  
*n*-Eicosane

#### ISO 16703 Retention Time Window Standard (RTW)

##### ISO16703-RTW

500  $\mu\text{g/mL}$  each in *n*-Heptane

1 x 1 mL

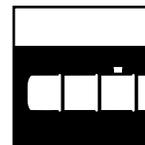
2 comps.

*n*-Decane                      *n*-Tetracontane

# UST (LUFT/LUST)

## U.S. State Methods

According to the USEPA, there are many underground storage tanks across the nation that store petroleum or hazardous substances capable of harming the environment and human health if their contents are released. In the past, 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, which is the source of drinking water for nearly all Americans. Other health and environmental risks, including the potential for fire and explosion, also exist. The standards listed in this section are designed to meet federal and state monitoring and testing regulations for underground storage tanks (UST).



### UST (Underground Storage Tank)

#### Leaking Underground Fuel / Storage Tank (LUFT / LUST)

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### Multi-State Method Hydrocarbon Window Defining

**DRH-008S-R2**  
**DRH-008S-R2-PAK**  
500 µg/mL each in Chloroform

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

1 x 1 mL  
SAVE 5 x 1 mL  
35 comps.

<i>n</i> -Triacontane
<i>n</i> -Tetracontane
<i>n</i> -Pentatriacontane
<i>n</i> -Hexatriacontane
<i>n</i> -Heptatriacontane
<i>n</i> -Octatriacontane
<i>n</i> -Nonatriacontane
<i>n</i> -Tetracontane

#### Technical Note

This Hydrocarbon window defining standard with the C<sub>8</sub> to C<sub>40</sub> odd and even alkanes should meet the numerous state-to-state variations for hydrocarbon validation and reporting. Many LUFT/LUST programs require the use of the C<sub>17</sub> (Pristane) and C<sub>18</sub> (Phytane) ratio to estimate subsurface degradation of fuel oil spills. These compounds are included in the formulation.

### Arizona Method 8015AZ Determination of Diesel Range Hydrocarbons in Soil

#### Diesel & Oil Range Standard

**DRO-ORO-AZ-8015**  
**DRO-ORO-AZ-8015-PAK**  
2000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

<i>n</i> -Decane	<i>n</i> -Eicosane	<i>n</i> -Octadecane
<i>n</i> -Dodecane	<i>n</i> -Hexacosane	<i>n</i> -Tetracosane
<i>n</i> -Docosane	<i>n</i> -Hexadecane	<i>n</i> -Tetradecane
<i>n</i> -Dotriacontane	<i>n</i> -Octacosane	<i>n</i> -Triacosane

#### Surrogate Standards

**DRO-AK-102-SS-10X**  
**DRO-AK-102-SS-10X-PAK**  
2.0 mg/mL in Acetone

*o*-Terphenyl

1 x 1 mL  
SAVE 5 x 1 mL

#### Retention Time Verification Standard

**DRO-ORO-AZ-8015-RTV**  
**DRO-ORO-AZ-8015-RTV-PAK**  
1000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

<i>n</i> -Decane	<i>n</i> -Dotriacontane	<i>n</i> -Docosane
------------------	-------------------------	--------------------

1 x 1 mL  
SAVE 5 x 1 mL  
3 comps.

#### Stock Calibration Standard

**DRO-ORO-AZ-8015-SCS**  
**DRO-ORO-AZ-8015-SCS-PAK**  
10,000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

#2 Diesel	SAE 10W30 Motor Oil
-----------	---------------------

1 x 1 mL  
SAVE 5 x 1 mL  
2 comps.

## Alaska GRO / DRO Methods

### Method 101 Determination of Gasoline Range Organic (GRO) Hydrocarbons

#### Normal Alkane Standard - GRO Defining Mix

GRO-AK-101-NAS-10X	1 x 1 mL
GRO-AK-101-NAS-10X-PAK	SAVE 5 x 1 mL
2.0 mg/mL each in MeOH	
<i>n</i> -Hexane	<i>n</i> -Octane
<i>n</i> -Heptane	<i>n</i> -Nonane
	<i>n</i> -Decane

#### Laboratory Control Standard

GRO-AK-101-LCS	1 x 1 mL
GRO-AK-101-LCS-PAK	SAVE 5 x 1 mL
5.0 mg/mL in MeOH	
Gasoline-Regular, unleaded	

#### Internal Standard

GRO-AK-101-IS-10X	1 x 1 mL
GRO-AK-101-IS-10X-PAK	SAVE 5 x 1 mL
2.0 mg/mL in MeOH	
1-Chloro-4-fluorobenzene	

#### Surrogate Control Standards

GRO-AK-101-SS	1 x 1 mL
GRO-AK-101-SS-PAK	SAVE 5 x 1 mL
50 µg/mL each in MeOH	
GRO-AK-101-SS-10X	1 x 1 mL
GRO-AK-101-SS-10X-PAK	SAVE 5 x 1 mL
500 µg/mL each in MeOH	
GRO-AK-101-SS-100X	1 x 1 mL
GRO-AK-101-SS-100X-PAK	SAVE 5 x 1 mL
5,000 µg/mL each in MeOH	
<i>p</i> -Bromofluorobenzene	a,a,a-Trifluorotoluene

#### Certified BTEX in Unleaded Gasoline

GA-001-20X-BTEX	1 x 1 mL
10.0 mg/mL in MeOH	
Gasoline-Regular, unleaded (includes certified concentration of)	
Benzene	Toluene
Ethylbenzene	<i>m,p</i> -Xylene
	<i>o</i> -Xylene

#### Certified BTEX in Gasoline Composite (Multi Source)

GRO-AK-101-GCS-BTEX	1 x 1 mL
At stated conc. (mg/mL) in MeOH	
Gasoline-Premium, unleaded	1.66
Gasoline-Regular, unleaded	1.67
Gasoline-Regular, leaded	1.67

#### Gasoline Calibration Composite Mix

GRO-AK-101-GCS	1 x 1 mL
GRO-AK-101-GCS-PAK	SAVE 5 x 1 mL
At stated conc. (mg/mL) in MeOH	
Gasoline-Premium, unleaded	1.66
Gasoline-Regular, unleaded	1.67
Gasoline-Regular, leaded	1.67

#### Gasoline Calibration Mix Version

GRO-AK-101-GSC-R1	1 x 1 mL
Equal Wt. %	
Gasoline-Premium, unleaded	Gasoline-Regular, unleaded
Gasoline-Regular, leaded	

### Method 101 & Method 101AA Determination of Aromatic and Aliphatic Hydrocarbons in GRO

#### AK101AA Aromatics Mix

GRO-AK-101AA-ARO	1 x 1 mL
GRO-AK-101AA-ARO-PAK	SAVE 5 x 1 mL
2000 µg/mL each in MeOH	
Benzene	<i>o</i> -Xylene
Toluene	1,2,3-Trimethylbenzene
Ethylbenzene	1,2,4-Trimethylbenzene
<i>m</i> -Xylene	1,3,5-Trimethylbenzene
<i>p</i> -Xylene	Isopropylbenzene
	<i>m</i> -Ethyltoluene
	<i>p</i> -Ethyltoluene
	<i>o</i> -Ethyltoluene
	<i>n</i> -Propylbenzene

## Alaska DRO / RRO Methods (continued)

### Method 102/103AA Determination of Aromatic & Aliphatic Hydrocarbons in Diesel Range Organic (DRO) & Residual Range Organic (RRO)

#### Laboratory Control Standard

**DRO-AK-102-LCS-10X-R1** 1 x 1 mL  
**DRO-AK-102-LCS-10X-R1-PAK** SAVE 5 x 1 mL  
 50.0 mg/mL in Acetone  
 #2 Diesel (Conventional)

#### Normal Alkane Standard - DRO Defining Mix

**DRO-AK-102-NAS-10X** 1 x 1 mL  
**DRO-AK-102-NAS-10X-PAK** SAVE 5 x 1 mL  
 2.0 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub> 16 comps.

<i>n</i> -Decane	<i>n</i> -Hexadecane	<i>n</i> -Heneicosane
<i>n</i> -Undecane	<i>n</i> -Heptadecane	<i>n</i> -Docosane
<i>n</i> -Dodecane	<i>n</i> -Octadecane	<i>n</i> -Tricosane
<i>n</i> -Tridecane	<i>n</i> -Nonadecane	<i>n</i> -Tetracosane
<i>n</i> -Tetradecane	<i>n</i> -Eicosane	<i>n</i> -Pentacosane
<i>n</i> -Pentadecane		

#### Diesel Range Standard

**DRO-AK-102AA** 1 x 1 mL  
**DRO-AK-102AA-PAK** SAVE 5 x 1 mL  
 2000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub> 10 comps.

<i>n</i> -Undecane	<i>n</i> -Tetracosane	Fluorene
<i>n</i> -Pentadecane	Naphthalene	Pyrene
<i>n</i> -Heptadecane	Acenaphthene	Anthracene
<i>n</i> -Octadecane		

#### Residual Composite Mixtures

**RRO-AK-103-RCS** 1 x 1 mL  
**RRO-AK-103-RCS-PAK** SAVE 5 x 1 mL  
 At stated conc. (mg/mL) in CH<sub>2</sub>Cl<sub>2</sub> 3 comps.

SAE 30W Motor oil	1.66	SAE 50W Motor Oil	1.67
SAE 40W Motor oil	1.67		

**RRO-AK-103-RCS-10X** 1 x 1 mL  
**RRO-AK-103-RCS-10X-PAK** SAVE 5 x 1 mL  
 At stated conc. (mg/mL) in CH<sub>2</sub>Cl<sub>2</sub> 3 comps.

SAE 30W Motor oil	16.6	SAE 50W Motor Oil	16.7
SAE 40W Motor oil	16.7		

#### Residual Standard

**RRO-AK-103AA** 1 x 1 mL  
**RRO-AK-103AA-PAK** SAVE 5 x 1 mL  
 2000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub> 9 comps.

<i>n</i> -Hexacosane	Benzo[b]fluoranthene
<i>n</i> -Octacosane	Benz[a]pyrene
<i>n</i> -Triacotane	Benzo[g,h,i]perylene
<i>n</i> -Dotriacontane	Dibenz[a,h]anthracene
<i>n</i> -Tetracontane	

#### Surrogate Standards

**DRO-AK-102-SS** 1 x 1 mL  
**DRO-AK-102-SS-PAK** SAVE 5 x 1 mL  
 200 µg/mL in Acetone

**DRO-AK-102-SS-10X** 1 x 1 mL  
**DRO-AK-102-SS-10X-PAK** SAVE 5 x 1 mL  
 2.0 mg/mL in Acetone

*o*-Terphenyl

#### Internal Standard

**DRO-AK-102-IS** 1 x 1 mL  
**DRO-AK-102-IS-PAK** SAVE 5 x 1 mL  
 1.0 mg/mL in CH<sub>2</sub>Cl<sub>2</sub>

5- $\alpha$  Androstane

#### Surrogate Standard

**DRO-AK-102-103AA-SS** 1 x 1 mL  
**DRO-AK-102-103AA-SS-PAK** SAVE 5 x 1 mL  
 1000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub> 3 comps.

Squalane 5,6,7,8-Tetrahydro-1-naphthol  
*o*-Terphenyl

#### Retention Time Marker Standard

**DRO-AK-102-103AA-RT** 1 x 1 mL  
**DRO-AK-102-103AA-RT-PAK** SAVE 5 x 1 mL  
 50 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub> 3 comps.

*n*-Decane *n*-Hexatriacontane  
*n*-Pentacosane

#### Laboratory Control Standards

**RRO-AK-103-LCS** 1 x 1 mL  
**RRO-AK-103-LCS-PAK** SAVE 5 x 1 mL  
 5.0 mg/mL in Acetone

**RRO-AK-103-LCS-5X** 1 x 1 mL  
 25.0 mg/mL in Acetone:CH<sub>2</sub>Cl<sub>2</sub> (50:50)

SAE 40W Motor oil

#### Surrogate Control Standards

**RRO-AK-103-SS** 1 x 1 mL  
**RRO-AK-103-SS-PAK** SAVE 5 x 1 mL  
 500 µg/mL in Acetone:THF (90:10)

**RRO-AK-103-SS2** 1 x 1 mL  
**RRO-AK-103-SS2-PAK** SAVE 5 x 1 mL  
 5.0 mg/mL in THF:Acetone (75:25)

*n*-Triacotane-d<sub>62</sub>

## California Methods

### Gasoline Range Hydrocarbons

S-603A-10X

S-603A-10X-PAK

2.0 mg/mL each in MeOH

1 x 1 mL  
SAVE 5 x 1 mL  
7 comps.

Benzene	Toluene	<i>m</i> -Xylene
Ethylbenzene	<i>o</i> -Xylene	<i>p</i> -Xylene
MtBE		

### Purgeable Aromatics - Gasoline ID

M-602-GAS-10X

M-602-GAS-10X-PAK

2.0 mg/mL each in MeOH

1 x 1 mL  
SAVE 5 x 1 mL  
11 comps.

Benzene	1,4-Dichlorobenzene	<i>p</i> -Xylene
Chlorobenzene	Ethylbenzene	<i>m</i> -Xylene
1,2-Dichlorobenzene	Toluene	MtBE
1,3-Dichlorobenzene	<i>o</i> -Xylene	

### Oxygenate Gasoline Additive Standard

OGAD-001

OGAD-001-PAK

At stated conc. (µg/mL) in MeOH

1 x 1 mL  
SAVE 5 x 1 mL  
5 comps.

MtBE	2000	TAME	2000
EtBE	2000	<i>t</i> -Butanol	10000
Isopropyl ether	2000		

### Ethanol

M-8015B-5031-11

10 mg/mL in Water

1 x 1 mL

### Methanol

M-8015B-5031-17

10 mg/mL in Water

1 x 1 mL

## Connecticut Extractable TPHs

### CT ETPH Alkane Standard

DRH-009S

DRH-009S-PAK

1000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

1 x 1 mL  
SAVE 5 x 1 mL  
15 comps.

<i>n</i> -Nonane	<i>n</i> -Octadecane	<i>n</i> -Octacosane
<i>n</i> -Decane	<i>n</i> -Eicosane	<i>n</i> -Triacontane
<i>n</i> -Dodecane	<i>n</i> -Docosane	<i>n</i> -Dotriacontane
<i>n</i> -Tetradecane	<i>n</i> -Tetracosane	<i>n</i> -Tetratriacontane
<i>n</i> -Hexadecane	<i>n</i> -Hexacosane	<i>n</i> -Hexatriacontane

### Internal Standard

GRH-IS

GRH-IS-PAK

1.0 mg/mL in CH<sub>2</sub>Cl<sub>2</sub>

1 x 1 mL  
SAVE 5 x 1 mL

5- $\alpha$  Androstane

### Surrogate Standard

GRH-SS

GRH-SS-PAK

2.0 mg/mL in Acetone

1 x 1 mL  
SAVE 5 x 1 mL

*o*-Terphenyl (OTP)

### Method 1004 Carbonyl Compounds as DNPH Derivatives by HPLC

M-1004

At stated conc. (µg/mL) in ACN

1 x 1 mL  
13 comps.

M-1004-10X

At 10 times the stated conc. in ACN

1 x 1 mL  
13 comps.

Acetaldehyde-DNPH	15.3	Formaldehyde-DNPH	21.0
Acetone-DNPH	12.3	Hexanal-DNPH	8.4
Acrolein-DNPH	12.7	Methacrolein-DNPH	10.7
Benzaldehyde-DNPH	8.1	Propionaldehyde-DNPH	12.3
2-Butanone-DNPH (MEK)	10.5	<i>m</i> -Tolualdehyde-DNPH	7.5
<i>n</i> -Butyraldehyde-DNPH	10.5	Valeraldehyde-DNPH	9.3
Crotonaldehyde-DNPH	10.7		

CAR-DNPH

At stated conc. (µg/mL) in ACN

1 x 1 mL  
7 comps.

Acetaldehyde-DNPH	1000	Butyraldehyde-DNPH	500
Acetone-DNPH	500	Formaldehyde-DNPH	1500
Acrolein-DNPH	500	Propionaldehyde-DNPH	500
Benzaldehyde-DNPH	500		

### Technical Note

**Alcohol Oxidation Products in Automotive Engine Exhaust by HPLC of DNPH Derivatives.** The California Air Resources Board, in conjunction with some of the larger automobile manufacturers, has developed an HPLC method in which the 2,4-Dinitrophenylhydrazine derivatives of the by-products are quantitated.

## Florida Total Recoverable Petroleum Hydrocarbon (FTRPH) Standard and Surrogates

### Calibration / Window Defining Hydrocarbon

DRH-004S-R1-5X **1 x 1 mL**  
 DRH-004S-R1-5X-PAK **SAVE 5 x 1 mL**  
 1.0 mg/mL each in Chloroform 17 comps.

<i>n</i> -Octane (C <sub>8</sub> )	<i>n</i> -Eicosane (C <sub>20</sub> )	<i>n</i> -Dotriacontane (C <sub>32</sub> )
<i>n</i> -Decane (C <sub>10</sub> )	<i>n</i> -Docosane (C <sub>22</sub> )	<i>n</i> -Tetraatriacontane (C <sub>34</sub> )
<i>n</i> -Dodecane (C <sub>12</sub> )	<i>n</i> -Tetracosane (C <sub>24</sub> )	<i>n</i> -Hexatriacontane (C <sub>36</sub> )
<i>n</i> -Tetradecane (C <sub>14</sub> )	<i>n</i> -Hexacosane (C <sub>26</sub> )	<i>n</i> -Octatriacontane (C <sub>38</sub> )
<i>n</i> -Hexadecane (C <sub>16</sub> )	<i>n</i> -Octacosane (C <sub>28</sub> )	<i>n</i> -Tetracontane (C <sub>40</sub> )
<i>n</i> -Octadecane (C <sub>18</sub> )	<i>n</i> -Triacontane (C <sub>30</sub> )	

#### Technical Note

FTRPH Calibration/Window Defining Standard was formulated at a lower concentration to insure solubility of the analytes and eliminate the use of carbon disulfide as a cosolvent.

### Internal Standards

GRH-IS **1 x 1 mL**  
 GRH-IS-PAK **SAVE 5 x 1 mL**  
 1.0 mg/mL in CH<sub>2</sub>Cl<sub>2</sub>

GRH-IS-10X **1 x 1 mL**  
 10 mg/mL in CH<sub>2</sub>Cl<sub>2</sub>  
 5-alpha Androstane

### Surrogate Standards

DRH-SS **1 x 1 mL**  
 DRH-SS-PAK **SAVE 5 x 1 mL**  
 5.0 mg/mL in THF  
*n*-Triacontane-d<sub>62</sub>

GRH-SS **1 x 1 mL**  
 GRH-SS-PAK **SAVE 5 x 1 mL**  
 2.0 mg/mL in Acetone  
*o*-Terphenyl (OTP)

### FTRPH Calibration / Window Defining Standards

DRH-FTRPH **1 x 1 mL**  
 DRH-FTRPH-PAK **SAVE 5 x 1 mL**  
 500 µg/mL each in Hexane 17 comps.

DRH-FTRPH-0.1X **1 x 1 mL**  
 50 µg/mL each in Hexane 17 comps.

<i>n</i> -Octane	<i>n</i> -Eicosane	<i>n</i> -Dotriacontane
<i>n</i> -Decane	<i>n</i> -Docosane	<i>n</i> -Tetraatriacontane
<i>n</i> -Dodecane	<i>n</i> -Tetracosane	<i>n</i> -Hexatriacontane
<i>n</i> -Tetradecane	<i>n</i> -Hexacosane	<i>n</i> -Octatriacontane
<i>n</i> -Hexadecane	<i>n</i> -Octacosane	<i>n</i> -Tetracontane
<i>n</i> -Octadecane	<i>n</i> -Triacontane	

### FTRPH Surrogate Standards

DRH-FL-SS-3X **1 x 1 mL**  
 DRH-FL-SS-3X-PAK **SAVE 5 x 1 mL**  
 3.0 mg/mL in Carbon disulfide

DRH-FL-SS **1 x 1 mL**  
 DRH-FL-SS-PAK **SAVE 5 x 1 mL**  
 1.0 mg/mL in Carbon disulfide  
*n*-Nonatriacontane

### FTRPH Combined Surrogate Standards

DRH-GRH-FL-SS **1 x 1 mL**  
 DRH-GRH-FL-SS-PAK **SAVE 5 x 1 mL**  
 5.0 mg/mL each in Carbon disulfide 2 comps.  
*n*-Nonatriacontane *o*-Terphenyl (OTP)

DRH-GRH-FL-SS-R2 **1 x 1**  
 At stated conc. (µg/mL) in Carbon disulfide 2 comps.  
*n*-Nonatriacontane 6000 *o*-Terphenyl (OTP) 1500

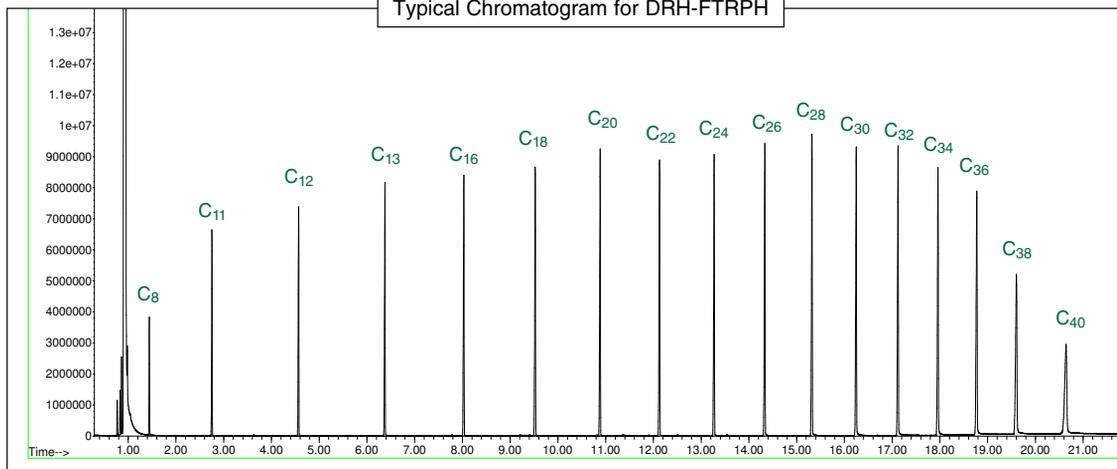
#### Technical Note

FTRPH Surrogate Standard was formulated at a higher concentration for combined DRH and GRH analysis, and has proven useful for those laboratories performing gasoline & diesel analysis simultaneously.



Carbon disulfide can not ship by air. When possible alternate solvents can be used. Please contact our Technical Service Department for other options.

Typical Chromatogram for DRH-FTRPH



## Massachusetts Determination of Extractable Petroleum Hydrocarbons (EPH)

### Aliphatic Hydrocarbons Calibration Set

DRH-007-CAL-R1-SET

At stated conc. ( $\mu\text{g/mL}$ ) in  $\text{CH}_2\text{Cl}_2$ :*n*-Hexane (50:50)

Components	5 x 1 mL 15 comps.				
	Level 1 (1X)	Level 2 (4X)	Level 3 (10X)	Level 4 (20X)	Level 5 (40X)
<i>n</i> -Nonane	5	20	50	100	200
<i>n</i> -Decane	5	20	50	100	200
<i>n</i> -Dodecane	5	20	50	100	200
<i>n</i> -Tetradecane	5	20	50	100	200
<i>n</i> -Hexadecane	5	20	50	100	200
<i>n</i> -Octadecane	5	20	50	100	200
<i>n</i> -Nonadecane	5	20	50	100	200
<i>n</i> -Eicosane	5	20	50	100	200
<i>n</i> -Docosane	5	20	50	100	200
<i>n</i> -Tetracosane	5	20	50	100	200
<i>n</i> -Hexacosane	5	20	50	100	200
<i>n</i> -Octacosane	5	20	50	100	200
<i>n</i> -Triacotane	5	20	50	100	200
<i>n</i> -Hexatriacontane	5	20	50	100	200
1-Chlorooctadecane (Surrogate)	5	20	50	100	200

### Combined Aromatic/Aliphatic Matrix Spike Standard

DRH-MS-ASL

DRH-MS-ASL-PAK

25  $\mu\text{g/mL}$  each in Hexane: $\text{CH}_2\text{Cl}_2$  (95:5)

1 x 1 mL  
SAVE 5 x 1 mL  
31 comps.

Acenaphthene	<i>n</i> -Docosane	Naphthalene
Acenaphthylene	<i>n</i> -Dodecane	<i>n</i> -Nonadecane
Anthracene	<i>n</i> -Eicosane	<i>n</i> -Nonane
Benz[a]anthracene	Fluoranthene	<i>n</i> -Octacosane
Benz[a]pyrene	Fluorene	<i>n</i> -Octadecane
Benz[b]fluoranthene	<i>n</i> -Hexacosane	Phenanthrene
Benzo[g,h,i]perylene	<i>n</i> -Hexadecane	Pyrene
Benzo[k]fluoranthene	<i>n</i> -Hexatriacontane	<i>n</i> -Tetracosane
Chrysene	Indeno[1,2,3-cd]pyrene	<i>n</i> -Tetradecane
<i>n</i> -Decane	2-Methylnaphthalene	<i>n</i> -Triacotane
Dibenz[a,h]anthracene		

### DEP (MA) - Fractionation Surrogate Spike

DRH-MA-FSS-10ML

40  $\mu\text{g/mL}$  each in Hexane

1 x 10 mL

DRH-MA-FSS-50X

2.0 mg/mL each in Hexane

1 x 1 mL

DRH-MA-FSS-50X-PAK

2.0 mg/mL each in Hexane

SAVE 5 x 1 mL  
2 comps.

2-Fluorobiphenyl	2-Bromonaphthalene
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### Aromatic Surrogate Standard

DRH-006-SS

DRH-006-SS-PAK

1.0 mg/mL in  $\text{CH}_2\text{Cl}_2$

*o*-Terphenyl

1 x 1 mL  
SAVE 5 x 1 mL

### DEP (MA) - Aromatic Hydrocarbons

DRH-006S

DRH-006S-PAK

1.0 mg/mL each in  $\text{CH}_2\text{Cl}_2$

1 x 1 mL  
SAVE 5 x 1 mL  
17 comps.

Acenaphthene	Benzo[g,h,i]perylene	Indeno[1,2,3-cd]pyrene
Acenaphthylene	Benzo[k]fluoranthene	2-Methylnaphthalene
Anthracene	Chrysene	Naphthalene
Benz[a]anthracene	Dibenz[a,h]anthracene	Phenanthrene
Benz[a]pyrene	Fluoranthene	Pyrene
Benzo[b]fluoranthene	Fluorene	

#### Technical Note

Two high concentration EPH stocks for laboratories that prepare in-house working level solutions and Ready-to-Use working level aromatic and aliphatic calibration sets are available. Larger volumes of daily calibration solutions can be purchased by contacting our Technical Department.

### DEP (MA) - Aliphatic Hydrocarbons

DRH-007S

DRH-007S-PAK

1.0 mg/mL each in  $\text{CH}_2\text{Cl}_2$  : Hexane (50:50)

1 x 1 mL  
SAVE 5 x 1 mL  
14 comps.

<i>n</i> -Nonane	<i>n</i> -Octadecane	<i>n</i> -Hexacosane
<i>n</i> -Decane	<i>n</i> -Nonadecane	<i>n</i> -Octacosane
<i>n</i> -Dodecane	<i>n</i> -Eicosane	<i>n</i> -Triacotane
<i>n</i> -Tetradecane	<i>n</i> -Docosane	<i>n</i> -Hexatriacontane
<i>n</i> -Hexadecane	<i>n</i> -Tetracosane	

### Aliphatic Surrogate Standard

DRH-007-SS

DRH-007-SS-PAK

1.0 mg/mL in Hexane

1 x 1 mL  
SAVE 5 x 1 mL

1-Chlorooctadecane

### EPH Surrogate Spikes

DRH-MA-SS

20  $\mu\text{g/mL}$  each in Acetone

1 x 1 mL  
2 comps.

DRH-MA-SS-10X

200  $\mu\text{g/mL}$  each in Acetone

1 x 1 mL  
2 comps.

DRH-MA-SS-100X

DRH-MA-SS-100X-PAK

2,000  $\mu\text{g/mL}$  each in Acetone

1 x 1 mL  
SAVE 5 x 1 mL  
2 comps.

1-Chlorooctadecane

*o*-Terphenyl

### EPH Matrix Spikes

DRH-MA-MS

25  $\mu\text{g/mL}$  each in Acetone

1 x 1 mL  
10 comps.

DRH-MA-MS-10X

250  $\mu\text{g/mL}$  each in Acetone

1 x 1 mL  
10 comps.

DRH-MA-MS-40X

DRH-MA-MS-40X-PAK

1,000  $\mu\text{g/mL}$  each in Acetone

1 x 1 mL  
SAVE 5 x 1 mL  
10 comps.

Acenaphthene  
Anthracene  
Chrysene  
*n*-Eicosane

Naphthalene  
*n*-Nonadecane  
*n*-Nonane

*n*-Octacosane  
Pyrene  
*n*-Tetradecane

### Internal Standards

GRH-IS

GRH-IS-PAK

1,000  $\mu\text{g/mL}$  in  $\text{CH}_2\text{Cl}_2$

1 x 1 mL  
SAVE 5 x 1 mL

GRH-IS-10X

10.0 mg/mL in  $\text{CH}_2\text{Cl}_2$

1 x 1 mL

5-alpha Androstane

UST Massachusetts Method continued on next page

## Massachusetts Determination of Volatile Petroleum Hydrocarbons (VPH)

### Stock Concentrate

#### Volatile Petroleum Hydrocarbon Mix

<b>GRH-004S-10X</b>				<b>1 x 1 mL</b>	
<b>GRH-004S-10X-PAK</b>				<b>SAVE 5 x 1 mL</b>	
At stated conc. (mg/mL) in MeOH				13 comps.	
Benzene	5	Naphthalene	10	1,2,4-Trimethylbenzene	10
Ethylbenzene	5	<i>n</i> -Nonane	10	<i>o</i> -Xylene	10
Isooctane	15	<i>n</i> -Pentane	10	<i>m</i> -Xylene	10
2-Methylpentane	15	Toluene	15	<i>p</i> -Xylene	10
MtBE	15				

### DEP (MA) - VPH Surrogate Standards

<b>GRH-004-SS</b>		<b>1 x 1 mL</b>
50 µg/mL in MeOH		
<b>GRH-004-SS-10X</b>		<b>1 x 1 mL</b>
<b>GRH-004-SS-10X-PAK</b>		<b>SAVE 5 x 1 mL</b>
500 µg/mL in MeOH		
<b>GRH-004-SS-100X</b>		<b>1 x 1 mL</b>
<b>GRH-004-SS-100X-PAK</b>		<b>SAVE 5 x 1 mL</b>
5,000 µg/mL in MeOH		
2,5-Dibromotoluene		

### MA VPH Matrix Spike Mix with Surrogate

<b>GRH-004-MS-SS</b>			<b>1 x 1 mL</b>
50 µg/mL each in MeOH			14 comps.
Benzene	2-Methylpentane	Toluene	
<i>n</i> -Butylcyclohexane	MtBE	1,2,4-Trimethylbenzene	
<i>n</i> -Decane	Naphthalene	Isooctane	
2,5-Dibromotoluene	<i>n</i> -Nonane	<i>m</i> -Xylene	
Ethylbenzene	<i>n</i> -Pentane		

### VPH Matrix Spikes

<b>GRH-004-MS</b>		<b>1 x 1 mL</b>
<b>GRH-004-MS-PAK</b>		<b>SAVE 5 x 1 mL</b>
50 µg/mL each in MeOH		
<b>GRH-004-MS-10X</b>		<b>1 x 1 mL</b>
<b>GRH-004-MS-10X-PAK</b>		<b>SAVE 5 x 1 mL</b>
500 µg/mL each in MeOH		
<b>GRH-004-MS-100X</b>		<b>1 x 1 mL</b>
<b>GRH-004-MS-100X-PAK</b>		<b>SAVE 5 x 1 mL</b>
5,000 µg/mL each in MeOH		8 comps.
Benzene	Naphthalene	<i>m</i> -Xylene
Ethylbenzene	Toluene	<i>p</i> -Xylene
MtBE	<i>o</i> -Xylene	

### Certified BTEX in Unleaded Gasoline

<b>GA-001-20X-BTEX</b>		<b>1 x 1 mL</b>
10.0 mg/mL in MeOH		
Gasoline-Regular, unleaded		
includes certified concentration of:		
Benzene	Toluene	<i>o</i> -Xylene
Ethylbenzene	<i>m,p</i> -Xylene	

### Volatile Petroleum Hydrocarbons without Surrogate

<b>GRH-004S-R1-10X</b>		<b>1 x 1 mL</b>	
At stated conc. (mg/mL) in MeOH		15 comps.	
Benzene	5	Toluene	15
Ethylbenzene	5	1,2,4-Trimethylbenzene	10
Isooctane	15	<i>o</i> -Xylene	10
2-Methylpentane	15	<i>m</i> -Xylene	10
MtBE	15	<i>p</i> -Xylene	10
Naphthalene	10	<i>n</i> -Butylcyclohexane	10
<i>n</i> -Nonane	10	<i>n</i> -Decane	10
<i>n</i> -Pentane	10		

<b>GRH-004S-R2</b>		<b>1 x 1 mL</b>
10 mg/mL each in MeOH		15 comps.
Benzene		Toluene
Ethylbenzene		1,2,4-Trimethylbenzene
Isooctane		<i>o</i> -Xylene
2-Methylpentane		<i>m</i> -Xylene
MtBE		<i>p</i> -Xylene
Naphthalene		<i>n</i> -Butylcyclohexane
<i>n</i> -Nonane		<i>n</i> -Decane
<i>n</i> -Pentane		

### Volatile Petroleum Hydrocarbons with Surrogate

<b>GRH-004S-SS</b>		<b>1 x 1 mL</b>	
At stated conc. (µg/mL) in MeOH		14 comps.	
Benzene	500	<i>n</i> -Nonane	1000
2,5-Dibromotoluene (Surrogate)	1000	<i>n</i> -Pentane	1000
Ethylbenzene	500	Toluene	1500
Isooctane	1500	1,2,4-Trimethylbenzene	1000
2-Methylpentane	1500	<i>o</i> -Xylene	1000
MtBE	1500	<i>m</i> -Xylene	1000
Naphthalene	1000	<i>p</i> -Xylene	1000

<b>GRH-004S-SS-R1</b>		<b>1 x 1 mL</b>	
At stated conc. (µg/mL) in MeOH		16 comps.	
Benzene	500	<i>n</i> -Pentane	1000
2,5-Dibromotoluene (Surrogate)	1000	Toluene	1500
Ethylbenzene	500	1,2,4-Trimethylbenzene	1000
Isooctane	1500	<i>o</i> -Xylene	1000
2-Methylpentane	1500	<i>m</i> -Xylene	1000
MtBE	1500	<i>p</i> -Xylene	1000
Naphthalene	1000	<i>n</i> -Butylcyclohexane	1000
<i>n</i> -Nonane	1000	<i>n</i> -Decane	1000

<b>GRH-004S-SS-R2</b>		<b>1 x 1 mL</b>
10.0 mg/mL each in MeOH		16 comps.
Benzene		<i>n</i> -Pentane
2,5-Dibromotoluene (Surrogate)		Toluene
Ethylbenzene		1,2,4-Trimethylbenzene
Isooctane		<i>o</i> -Xylene
2-Methylpentane		<i>m</i> -Xylene
MtBE		<i>p</i> -Xylene
Naphthalene		<i>n</i> -Butylcyclohexane
<i>n</i> -Nonane		<i>n</i> -Decane

## Mississippi DRO Defining

### DRO Defining Mix

<b>DRO-AK-102-NAS-10X</b>			<b>1 x 1 mL</b>
<b>DRO-AK-102-NAS-10X-PAK</b>			<b>SAVE 5 x 1 mL</b>
2.0 mg/mL each in CH <sub>2</sub> Cl <sub>2</sub>			16 comps.
<i>n</i> -Decane	<i>n</i> -Hexadecane	<i>n</i> -Heneicosane	
<i>n</i> -Undecane	<i>n</i> -Heptadecane	<i>n</i> -Docosane	
<i>n</i> -Dodecane	<i>n</i> -Octadecane	<i>n</i> -Tricosane	
<i>n</i> -Tridecane	<i>n</i> -Nonadecane	<i>n</i> -Tetracosane	
<i>n</i> -Tetradecane	<i>n</i> -Eicosane	<i>n</i> -Pentacosane	
<i>n</i> -Pentadecane			

# UST (LUFT/LUST)

## New Jersey DEP

### DEP (NJ) Aliphatic Hydrocarbon Standard

DRH-NJ-001S

1.0 mg/mL each in Hexane

1 x 1 mL

20 comps.

<i>n</i> -Nonane	<i>n</i> -Heneicosane	<i>n</i> -Tetraatriacontane
<i>n</i> -Decane	<i>n</i> -Docosane	<i>n</i> -Hexatriacontane
<i>n</i> -Dodecane	<i>n</i> -Tetracosane	<i>n</i> -Octatriacontane
<i>n</i> -Tetradecane	<i>n</i> -Hexacosane	<i>n</i> -Tetracontane
<i>n</i> -Hexadecane	<i>n</i> -Octacosane	Naphthalene
<i>n</i> -Octadecane	<i>n</i> -Triaccontane	2-Methylnaphthalene
<i>n</i> -Eicosane	<i>n</i> -Dotriacontane	

### DEP (NJ) Aromatic Hydrocarbon Standard

DRH-NJ-002S

DRH-NJ-002S-PAK

2.0 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

1 x 1 mL

5 x 1 mL

18 comps.

Acenaphthene	Benzo[g,h,i]perylene	Indeno[1,2,3-cd]pyrene
Acenaphthylene	Benzo[k]fluoranthene	2-Methylnaphthalene
Anthracene	Chrysene	Naphthalene
Benzo[a]anthracene	Dibenz[a,h]anthracene	Phenanthrene
Benz[a]pyrene	Fluoranthene	Pyrene
Benzo(b)fluoranthene	Fluorene	1,2,3-Trimethylbenzene

## Pennsylvania Storage Tank Site Closure & Monitoring

### PA Extractable PAH Standard

DRH-PA-001

DRH-PA-001-PAK

2000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

1 x 1 mL

SAVE 5 x 1 mL

5 comps.

Benz[a]anthracene	Fluorene	Phenanthrene
Benz[a]pyrene	Naphthalene	

### PA Volatile Petroleum Standard

GRH-PA-001

GRH-PA-001-PAK

At stated conc. (µg/mL) in MeOH

1 x 1 mL

SAVE 5 x 1 mL

9 comps.

Benzene	1000	Naphthalene	1000	<i>m</i> -Xylene	1000
Ethylbenzene	1000	Toluene	1000	<i>p</i> -Xylene	1000
MtBE	2000	<i>o</i> -Xylene	1000	Isopropylbenzene	1000

## Tennessee DRO Defining

### DRO Defining Mix

DRO-AK-102-NAS-10X

DRO-AK-102-NAS-10X-PAK

2.0 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

1 x 1 mL

SAVE 5 x 1 mL

16 comps.

<i>n</i> -Decane	<i>n</i> -Hexadecane	<i>n</i> -Heneicosane
<i>n</i> -Undecane	<i>n</i> -Heptadecane	<i>n</i> -Docosane
<i>n</i> -Dodecane	<i>n</i> -Octadecane	<i>n</i> -Tricosane
<i>n</i> -Tridecane	<i>n</i> -Nonadecane	<i>n</i> -Tetracosane
<i>n</i> -Tetradecane	<i>n</i> -Eicosane	<i>n</i> -Pentacosane
<i>n</i> -Pentadecane		

## Texas Petroleum Storage Tanks (PST)

Texas Commission on Environmental Quality (TCEQ) has developed method 1005 and 1006 in response to notifications of leaking petroleum storage tanks that have contaminated ground water. These methods govern the testing of Total Petroleum Hydrocarbon (TPH) concentrations.

### Stock Hydrocarbon Calibration Standard

DRH-TX-001-10X

DRH-TX-001-10X-PAK

2000 µg/mL each in *n*-Pentane

1 x 1 mL

SAVE 5 x 1 mL

12 comps.

<i>n</i> -Hexane	<i>n</i> -Dodecane	<i>n</i> -Octadecane	<i>n</i> -Tetracosane
<i>n</i> -Octane	<i>n</i> -Tetradecane	<i>n</i> -Eicosane	<i>n</i> -Hexacosane
<i>n</i> -Decane	<i>n</i> -Hexadecane	<i>n</i> -Docosane	<i>n</i> -Octacosane

### Gasoline/Diesel Continuing Calibration Standard

DRH-TX-002-D-0.4X-10ML

200 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

1 x 10ML

2 comps.

Gasoline-Regular, unleaded #2 Diesel Fuel

### Gasoline/Diesel Calibration/Matrix Spike Standard

DRH-TX-002-10X

DRH-TX-002-10X-PAK

5000 µg/mL each in MeOH

1 x 1 mL

SAVE 5 x 1 mL

2 comps.

Gasoline-Regular, unleaded #2 Diesel Fuel

### Stock Gasoline/Diesel Calibration Standard

DRH-TX-002-D-40X

DRH-TX-002-D-40X-PAK

20,000 µg/mL each in CH<sub>2</sub>Cl<sub>2</sub>

1 x 1 mL

SAVE 5 x 1 mL

2 comps.

Gasoline-Regular, unleaded #2 Diesel Fuel

### Gasoline / Diesel Calibration Set

DRH-TX-002-D-SET

At stated conc. (µg/mL) in CH<sub>2</sub>Cl<sub>2</sub>

8 x 1 mL

2 comps.

	.01X	.04X	.1X	.20X	.40X	1X	2X	10X
Gasoline-Regular (unleaded)	5	20	50	100	200	500	1000	5000
#2 Diesel Fuel	5	20	50	100	200	500	1000	5000

Each set contains 8 concentrations

UST Texas Method continued on next page

## Texas Petroleum Storage Tanks (PST) (continued)

### Gasoline / Diesel Calibration Curve Set

<b>DRH-TX-003-SET</b>	<b>8 x 1 mL</b>							
Each at stated conc. in Pentane	2 comps.							
	<b>.04X</b>	<b>.2X</b>	<b>0.5X</b>	<b>1X</b>	<b>1.5X</b>	<b>2X</b>	<b>10X</b>	<b>20X</b>
Gasoline-Regular (unleaded)	20	100	250	500	750	1000	5000	10,000
#2 Diesel Fuel	20	100	250	500	750	1000	5000	10,000
Each set contains 8 concentrations								

### Gasoline and Diesel Standard

<b>DRH-TX-003-20X</b>	<b>1 x 5 mL</b>
<b>DRH-TX-003-20X-PAK</b>	<b>SAVE 5 x 5 mL</b>
10,000 µg/mL each in Pentane	2 comps.
Gasoline-Regular, unleaded	#2 Diesel Fuel

### Surrogate Standard

<b>DRH-TX-003-SS1</b>	<b>1 x 5 mL</b>
<b>DRH-TX-003-SS1-PAK</b>	<b>SAVE 5 x 5 mL</b>
10 mg/mL each in Pentane	2 comps.
1-Chlorooctadecane	1-Chlorooctane

### Carbon Number Distribution Maker

<b>DRH-TX-003-CNM</b>	<b>1 x 1 mL</b>	
<b>DRH-TX-003-CNM-PAK</b>	<b>SAVE 5 x 1 mL</b>	
2000 µg/mL each in Pentane	9 comps.	
<i>n</i> -Decane	<i>n</i> -Heptane	<i>n</i> -Octacosane
<i>n</i> -Dodecane	<i>n</i> -Hexadecane	<i>n</i> -Octane
<i>n</i> -Heneicosane	<i>n</i> -Hexane	<i>n</i> -Pentatriacontane

### Aromatic Fractionation Check Standard

<b>DRH-TX-003-FCS</b>	<b>1 x 10 mL</b>	
<b>DRH-TX-003-FCS-PAK</b>	<b>SAVE 5 x 10 mL</b>	
20 µg/mL each in Pentane	24 comps.	
Acenaphthene	Benz[e]pyrene	Naphthalene
Acenaphthylene	Benzo[g,h,i]perylene	Phenanthrene
Anthracene	Chrysene	Pyrene
Benzene	Dibenz[a,h]anthracene	Toluene
Benzo[a]anthracene	Ethylbenzene	1,2,3-Trimethylbenzene
Benzo[b]fluoranthene	Fluoranthene	<i>m</i> -Xylene
Benzo[k]fluoranthene	Fluorene	<i>p</i> -Xylene
Benzo[a]pyrene	Indeno[1,2,3-cd]pyrene	<i>o</i> -Xylene

## Washington Determination of Volatile Petroleum Hydrocarbons (VPH)

### VPH Standard

<b>VPH-WA</b>	<b>1 x 1 mL</b>	
<b>VPH-WA-PAK</b>	<b>SAVE 5 x 1 mL</b>	
200 µg/mL each in MeOH	15 comps.	
Benzene	<i>p</i> -Xylene	<i>n</i> -Decane
Ethylbenzene	MtBE	<i>n</i> -Dodecane
Toluene	<i>n</i> -Pentane	1-Methylnaphthalene
<i>o</i> -Xylene	<i>n</i> -Hexane	Naphthalene
<i>m</i> -Xylene	<i>n</i> -Octane	1,2,3-Trimethylbenzene

### VPH Primary Dilution Standard with Surrogate

<b>VPH-WA-SS-10X</b>	<b>1 x 1 mL</b>	
<b>VPH-WA-SS-10X-PAK</b>	<b>SAVE 5 x 1 mL</b>	
2,000 µg/mL each in MeOH	16 comps.	
Benzene	MtBE	<i>n</i> -Dodecane
Ethylbenzene	<i>n</i> -Pentane	1-Methylnaphthalene
Toluene	<i>n</i> -Hexane	Naphthalene
<i>o</i> -Xylene	<i>n</i> -Octane	1,2,3-Trimethylbenzene
<i>m</i> -Xylene	<i>n</i> -Decane	2,5-Dibromotoluene (surrogate)
<i>p</i> -Xylene		

### Stock Concentrate VPH Standards

<b>VPH-WA-10X</b>	<b>1 x 1 mL</b>	
<b>VPH-WA-10X-PAK</b>	<b>SAVE 5 x 1 mL</b>	
2,000 µg/mL each in MeOH	15 comps.	
<b>VPH-WA-100X</b>	<b>1 x 1 mL</b>	
<b>VPH-WA-100X-PAK</b>	<b>SAVE 5 x 1 mL</b>	
20.0 mg/mL each in MeOH	15 comps.	
Benzene	<i>p</i> -Xylene	<i>n</i> -Decane
Ethylbenzene	MtBE	<i>n</i> -Dodecane
Toluene	<i>n</i> -Pentane	1-Methylnaphthalene
<i>o</i> -Xylene	<i>n</i> -Hexane	Naphthalene
<i>m</i> -Xylene	<i>n</i> -Octane	1,2,3-Trimethylbenzene

### Certified BTEX in Unleaded Gasoline

<b>GA-001-20X-BTEX</b>	<b>1 x 1 mL</b>
10.0 mg/mL in MeOH	
Gasoline-Regular, unleaded	
includes certified concentration of: Benzene, Ethylbenzene, Toluene, <i>m,p</i> -Xylene, <i>o</i> -Xylene	

### VPH Matrix Spike

<b>VPH-WA-MS</b>	<b>1 x 1 mL</b>	
<b>VPH-WA-MS-PAK</b>	<b>SAVE 5 x 1 mL</b>	
At stated conc. (µg/mL) in MeOH	11 comps.	
Benzene 60	<i>n</i> -Nonane 200	<i>m</i> -Xylene 60
Ethylbenzene 60	<i>n</i> -Pentane 600	<i>p</i> -Xylene 60
MtBE 180	Toluene 60	<i>o</i> -Xylene 60
Naphthalene 360	1,2,3-Trimethylbenzene 60	

### VPH Surrogate Standard

<b>GRH-004-SS</b>	<b>1 x 1 mL</b>
50 µg/mL in MeOH	
<b>GRH-004-SS-10X</b>	<b>1 x 1 mL</b>
<b>GRH-004-SS-10X-PAK</b>	<b>SAVE 5 x 1 mL</b>
500 µg/mL in MeOH	
<b>GRH-004-SS-100X</b>	<b>1 x 1 mL</b>
<b>GRH-004-SS-100X-PAK</b>	<b>SAVE 5 x 1 mL</b>
5,000 µg/mL in MeOH	
2,5-Dibromotoluene	

### VPH Retention Time Marker

<b>VPH-WA-RT</b>	<b>1 x 1 mL</b>	
<b>VPH-WA-RT-PAK</b>	<b>SAVE 5 x 1 mL</b>	
2,000 µg/mL each in MeOH	6 comps.	
<i>n</i> -Pentane	<i>n</i> -Octane	<i>n</i> -Dodecane
<i>n</i> -Hexane	<i>n</i> -Decane	<i>n</i> -Tridecane

### 1,2,3-Trimethylbenzene Standard

<b>V-028S-D-10X</b>	<b>1 x 1 mL</b>
<b>V-028S-D-10X-PAK</b>	<b>SAVE 5 x 1 mL</b>
1000 µg/mL each in CH <sub>2</sub> Cl <sub>2</sub>	
1,2,3-Trimethylbenzene	

### Certified BTEX in Gasoline Composite (Multi Source)

<b>GRO-AK-101-GCS-BTEX</b>	<b>1 x 1 mL</b>
At stated conc. (mg/mL) in MeOH	3 comps.
Gasoline-Premium, unleaded 1.66	Gasoline-Regular, unleaded 1.67
Gasoline-Regular, leaded 1.67	

## Washington Determination of Extractable Petroleum Hydrocarbons (EPH)

### EPH Aromatic/PAH Standard

<b>EPH-WA-10X</b>	1 x 1 mL	
<b>EPH-WA-10X-PAK</b>	SAVE 5 x 1 mL	
1.0 mg/mL each in CH <sub>2</sub> Cl <sub>2</sub>	18 comps.	
Acenaphthene	Benzo[g,h,i]perylene	Indeno[1,2,3-cd]pyrene
Acenaphthylene	Benzo[k]fluoranthene	2-Methylnaphthalene
Anthracene	Chrysene	Naphthalene
Benz[a]anthracene	Dibenz[a,h]anthracene	Phenanthrene
Benz[a]pyrene	Fluoranthene	Pyrene
Benzo[b]fluoranthene	Fluorene	1,2,3-Trimethylbenzene

### Internal Standards

<b>GRH-IS</b>	1 x 1 mL
<b>GRH-IS-PAK</b>	SAVE 5 x 1 mL
1000 µg/mL in CH <sub>2</sub> Cl <sub>2</sub>	
<b>GRH-IS-10X</b>	1 x 1 mL
10.0 mg/mL in CH <sub>2</sub> Cl <sub>2</sub>	
5-alpha Androstane	

### EPH Surrogate Spikes

<b>DRH-MA-SS</b>	1 x 1 mL
20 µg/mL each in Acetone	2 comps.
<b>DRH-MA-SS-10X</b>	1 x 1 mL
200 µg/mL each in Acetone	2 comps.
<b>DRH-MA-SS-100X</b>	1 x 1 mL
<b>DRH-MA-SS-100X-PAK</b>	SAVE 5 x 1 mL
2,000 µg/mL each in Acetone	2 comps.
1-Chlorooctadecane	o-Terphenyl

### EPH Matrix Spike

<b>EPH-WA-MS2-20ML</b>	1 x 20 mL	
<b>EPH-WA-MS2-20ML-PAK</b>	SAVE 5 x 20 mL	
25 µg/mL each in Acetone	10 comps.	
Acenaphthene	n-Decane	n-Heneicosane
Anthracene	n-Dodecane	Naphthalene
Benzo[g,h,i]perylene	n-Hexadecane	Pyrene
Benz[a]pyrene		

### EPH Aliphatic Check Mix

<b>EPH-WA-ALI</b>	1 x 1 mL	
<b>EPH-WA-ALI-PAK</b>	SAVE 5 x 1 mL	
1.0 mg/mL each in CH <sub>2</sub> Cl <sub>2</sub>	5 comps.	
n-Octane	n-Dodecane	n-Heneicosane
n-Decane	n-Hexadecane	

### EPH Aromatic Check Mix

<b>EPH-WA-ARO</b>	1 x 1 mL	
<b>EPH-WA-ARO-PAK</b>	SAVE 5 x 1 mL	
1.0 mg/mL each in CH <sub>2</sub> Cl <sub>2</sub>	5 comps.	
Acenaphthene	Naphthalene	1,2,3-Trimethylbenzene
Benzo[g,h,i]perylene	Pyrene	

### Revised EPH Aliphatic Check Mix

<b>EPH-WA-ALI-R1</b>	1 x 1 mL	
<b>EPH-WA-ALI-R1-PAK</b>	SAVE 5 x 1 mL	
1.0 mg/mL each in CH <sub>2</sub> Cl <sub>2</sub>	6 comps.	
n-Octane	n-Dodecane	n-Heneicosane
n-Decane	n-Hexadecane	n-Tetatriacontane

### EPH Fractionation Check Standard

<b>EPH-WA-FCS</b>	1 x 1 mL	
<b>EPH-WA-FCS-PAK</b>	SAVE 5 x 1 mL	
25 µg/mL each in Hexane	24 comps.	
Acenaphthene	Chrysene	Pyrene
Acenaphthylene	Dibenz[a,h]anthracene	n-Decane
Anthracene	Fluoranthene	n-Dodecane
Benz[a]anthracene	Fluorene	n-Tetradecane
Benz[a]pyrene	Indeno[1,2,3-cd]pyrene	n-Hexadecane
Benzo[b]fluoranthene	2-Methylnaphthalene	n-Octadecane
Benzo[g,h,i]perylene	Naphthalene	n-Eicosane
Benzo[k]fluoranthene	Phenanthrene	n-Heneicosane

### Revised EPH Fractionation Check Standard

<b>EPH-WA-FCS-R1</b>	1 x 1 mL	
<b>EPH-WA-FCS-R1-PAK</b>	SAVE 5 x 1 mL	
25 µg/mL each in Hexane	23 comps.	
Acenaphthene	Chrysene	Pyrene
Acenaphthylene	Dibenz[a,h]anthracene	n-Octane
Anthracene	Fluoranthene	n-Decane
Benz[a]anthracene	Fluorene	n-Dodecane
Benz[a]pyrene	Indeno[1,2,3-cd]pyrene	n-Hexadecane
Benzo[b]fluoranthene	2-Methylnaphthalene	n-Heneicosane
Benzo[g,h,i]perylene	Naphthalene	n-Tetatriacontane
Benzo[k]fluoranthene	Phenanthrene	

### 1,2,3-Trimethylbenzene Standard

<b>V-028S-D-10X</b>	1 x 1 mL	
<b>V-028S-D-10X-PAK</b>	SAVE 5 x 1 mL	
1000 µg/mL each in CH <sub>2</sub> Cl <sub>2</sub>		
1,2,3-Trimethylbenzene		

### Revised EPH Aromatic Check Mix

<b>EPH-WA-ARO-R1</b>	1 x 1 mL	
<b>EPH-WA-ARO-R1-PAK</b>	SAVE 5 x 1 mL	
1.0 mg/mL each in CH <sub>2</sub> Cl <sub>2</sub>	6 comps.	
Acenaphthene	Naphthalene	1,2,3-Trimethylbenzene
Benzo[g,h,i]perylene	Pyrene	Toluene

### Aliphatic Surrogate

<b>DRH-007-SS</b>	1 x 1 mL	
<b>DRH-007-SS-PAK</b>	SAVE 5 x 1 mL	
1.0 mg/mL in Hexane		
1-Chlorooctadecane		

### Aromatic Surrogate

<b>DRH-006-SS</b>	1 x 1 mL	
<b>DRH-006-SS-PAK</b>	SAVE 5 x 1 mL	
1.0 mg/mL in CH <sub>2</sub> Cl <sub>2</sub>		
o-Terphenyl		

## Wisconsin DNR - GRH

### Wisconsin DNR - Diesel Range Hydrocarbons

<b>DRH-003S</b>	1 x 1 mL	
0.2 mg/mL each in Hexane	11 comps.	
Decane	n-Tetradecane	n-Octadecane
Undecane	n-Pentadecane	n-Nonadecane
Dodecane	Hexadecane	Eicosane
Tridecane	Heptadecane	

### Wisconsin DNR - Gasoline Range Hydrocarbons

<b>GRH-003S</b>	1 x 1 mL	
<b>GRH-003S-PAK</b>	SAVE 5 x 1 mL	
2.0 mg/mL each in MeOH	10 comps.	
Benzene	Toluene	o-Xylene
Ethylbenzene	1,2,4-Trimethylbenzene	m-Xylene
MtBE	1,3,5-Trimethylbenzene	p-Xylene
Naphthalene		

# UST (LUFT/LUST)

## Gasoline Range Hydrocarbon (GRH)

### Gasoline Range Hydrocarbon Analysis

#### EPA Method - Gasoline Range Hydrocarbons

##### Gasoline Standard

GRH-002S 1 x 1 mL  
 GRH-002S-10X 1 x 1 mL  
 At stated conc. (mg/mL) in MeOH 10 comps.

	GRH-002S	GRH-002-10X
2-Methylpentane	1.5	15
2,2,4-Trimethylpentane	1.5	15
n-Heptane	0.5	5
Benzene	0.5	5
Toluene	1.5	15
Ethylbenzene	0.5	5
m-Xylene	1.0	10
p-Xylene	1.0	10
o-Xylene	1.0	10
1,2,4-Trimethylbenzene	1.0	10

##### Internal Standard

GARH-IS 1 x 1 mL  
 1.0 mg/mL in CH<sub>2</sub>Cl<sub>2</sub>  
 1-Chloro-4-fluorobenzene

##### Surrogate Standard

GARH-SS 1 x 1 mL  
 2.5 mg/mL in Acetone  
 4-Bromofluorobenzene

##### Gasoline Additives

GAD-001 1 x 1 mL  
 GAD-001-PAK SAVE 5 x 1 mL  
 0.2 mg/mL each in MeOH 4 comps.

Dibromomethane	1,2-Dichloroethane
1,2-Dibromoethane	MtBE

##### Certified BTEX in Unleaded Gasoline

GA-001-20X-BTEX 1 x 1 mL  
 10.0 mg/mL in MeOH

Gasoline-Regular, unleaded

includes certified concentration of:

Benzene	Toluene	o-Xylene
Ethylbenzene	m,p-Xylene	

##### Hexadecane Extraction Volatiles

CLP-BTEX 1 x 1 mL  
 CLP-BTEX-PAK SAVE 5 x 1 mL  
 0.2 mg/mL each in MeOH 6 comps.

CLP-BTEX-10X 1 x 1 mL  
 CLP-BTEX-10X-PAK SAVE 5 x 1 mL  
 2.0 mg/mL each in MeOH 6 comps.

Benzene	o-Xylene
Ethyl benzene	m-Xylene
Toluene	p-Xylene

#### California - Gasoline Range Hydrocarbons

S-603A-10X 1 x 1 mL  
 S-603A-10X-PAK SAVE 5 x 1 mL  
 2.0 mg/mL each in MeOH 7 comps.

Benzene	Toluene	m-Xylene
Ethylbenzene	o-Xylene	p-Xylene
MtBE		

#### LA County Well Investigation & Monitoring Program

##### Purgeable Aromatics - Gasoline ID

M-602-GAS-10X 1 x 1 mL  
 M-602-GAS-10X-PAK 5 x 1 mL  
 2.0 mg/mL each in MeOH 11 comps.

Benzene	Toluene
Chlorobenzene	o-Xylene
1,2-Dichlorobenzene	p-Xylene
1,3-Dichlorobenzene	m-Xylene
1,4-Dichlorobenzene	MtBE
Ethylbenzene	

##### Oxygenate Gasoline Additive Standard

OGAD-001 1 x 1 mL  
 OGAD-001-PAK SAVE 5 x 1 mL  
 At stated conc. (µg/mL) in MeOH 5 comps.

MtBE	2000	TAME	2000
EtBE	2000	t-Butanol	10000
Isopropyl ether	2000		

##### Ethanol

M-8015B-5031-11 1 x 1 mL  
 10 mg/mL in Water

##### Methanol

M-8015B-5031-17 1 x 1 mL  
 10 mg/mL in Water

#### Pennsylvania DER - Gasoline Range Hydrocarbons

GRH-001S 1 x 1 mL  
 GRH-001S-PAK SAVE 5 x 1 mL  
 1.0 mg/mL each in MeOH 10 comps.

Benzene	1,2,4-Trimethylbenzene
Ethylbenzene	2,2,4-Trimethylpentane
n-Heptane	o-Xylene
2-Methyl pentane	m-Xylene
Toluene	p-Xylene

#### Wisconsin DNR - Gasoline Range Hydrocarbons

GRH-003S 1 x 1 mL  
 GRH-003S-PAK SAVE 5 x 1 mL  
 2.0 mg/mL each in MeOH 10 comps.

Benzene	1,2,4-Trimethylbenzene
Ethylbenzene	1,3,5-Trimethylbenzene
MtBE	o-Xylene
Naphthalene	m-Xylene
Toluene	p-Xylene

# UST (LUFT/LUST)

## Diesel Range Hydrocarbons (DRH)

### Diesel Range Hydrocarbon Analysis

#### EPA Method - Diesel Range Hydrocarbons

**DRH-001S** 1 x 1 mL  
0.2 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub>: Hexane (50:50) 10 comps.

**DRH-001S-10X** 1 x 1 mL  
2.0 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub>: Hexane (50:50) 10 comps.

<i>n</i> -Decane (C <sub>10</sub> )	<i>n</i> -Octadecane (C <sub>18</sub> )	<i>n</i> -Tetracosane (C <sub>24</sub> )
<i>n</i> -Dodecane (C <sub>12</sub> )	<i>n</i> -Eicosane (C <sub>20</sub> )	<i>n</i> -Hexacosane (C <sub>26</sub> )
<i>n</i> -Tetradecane (C <sub>14</sub> )	<i>n</i> -Docosane (C <sub>22</sub> )	<i>n</i> -Octacosane (C <sub>28</sub> )
<i>n</i> -Hexadecane (C <sub>16</sub> )		

#### Surrogate Standard

**GRH-SS** 1 x 1 mL  
**GRH-SS-PAK** SAVE 5 x 1 mL  
2.0 mg/mL in Acetone

*o*-Terphenyl (OTP)

#### Internal Standard

**GRH-IS** 1 x 1 mL  
**GRH-IS-PAK** SAVE 5 x 1 mL  
1.0 mg/mL in CH<sub>2</sub>Cl<sub>2</sub>

5- $\alpha$  Androstane

#### Calibration / Window Defining Hydrocarbons

**DRH-004S-R1-5X** 1 x 1 mL  
**DRH-004S-R1-5X-PAK** SAVE 5 x 1 mL  
1.0 mg/mL each in Chloroform 17 comps.

<i>n</i> -Octane (C <sub>8</sub> )	<i>n</i> -Eicosane (C <sub>20</sub> )	<i>n</i> -Dotriacontane (C <sub>32</sub> )
<i>n</i> -Decane (C <sub>10</sub> )	<i>n</i> -Docosane (C <sub>22</sub> )	<i>n</i> -Tetraatriacontane (C <sub>34</sub> )
<i>n</i> -Dodecane (C <sub>12</sub> )	<i>n</i> -Tetracosane (C <sub>24</sub> )	<i>n</i> -Hexatriacontane (C <sub>36</sub> )
<i>n</i> -Tetradecane (C <sub>14</sub> )	<i>n</i> -Hexacosane (C <sub>26</sub> )	<i>n</i> -Octatriacontane (C <sub>38</sub> )
<i>n</i> -Hexadecane (C <sub>16</sub> )	<i>n</i> -Octacosane (C <sub>28</sub> )	<i>n</i> -Tetracontane (C <sub>40</sub> )
<i>n</i> -Octadecane (C <sub>18</sub> )	<i>n</i> -Triacontane (C <sub>30</sub> )	

#### Surrogate Standard

**DRH-SS** 1 x 1 mL  
**DRH-SS-PAK** SAVE 5 x 1 mL  
5.0 mg/mL in THF

*n*-Triacontane-d<sub>62</sub>

#### Hydrocarbon Window Defining Standard Set

**DRH-FTRPH-SET** 2 x 1 mL  
DRH-FTRPH, DRH-FTRPH2

#### FTRPH Calibration/Window Defining Standard

**DRH-FTRPH** 1 x 1 mL  
**DRH-FTRPH-PAK** SAVE 5 x 1 mL  
500  $\mu$ g/mL each in Hexane 17 comps.

<i>n</i> -Octane	<i>n</i> -Eicosane	<i>n</i> -Dotriacontane
<i>n</i> -Decane	<i>n</i> -Docosane	<i>n</i> -Tetraatriacontane
<i>n</i> -Dodecane	<i>n</i> -Tetracosane	<i>n</i> -Hexatriacontane
<i>n</i> -Tetradecane	<i>n</i> -Hexacosane	<i>n</i> -Octatriacontane
<i>n</i> -Hexadecane	<i>n</i> -Octacosane	<i>n</i> -Tetracontane
<i>n</i> -Octadecane	<i>n</i> -Triacontane	

### Complete Hydrocarbon Analysis

#### Multi-State Hydrocarbon Window Defining Standard

**DRH-008S-R2** 1 x 1 mL  
**DRH-008S-R2-PAK** SAVE 5 x 1 mL  
500  $\mu$ g/mL each in Chloroform 35 comps.

<i>n</i> -Octane	Phytane	<i>n</i> -Triacontane
<i>n</i> -Nonane	<i>n</i> -Nonadecane	<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> -Triacontane
<i>n</i> -Dodecane	<i>n</i> -Docosane	<i>n</i> -Tetraatriacontane
<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
Pristane	<i>n</i> -Octacosane	<i>n</i> -Tetracontane
<i>n</i> -Octadecane	<i>n</i> -Nonacosane	

#### Technical Note

We offer a hydrocarbon window defining standard with the C<sub>8</sub> - C<sub>40</sub> odd and even Alkanes. Use of this one standard should meet the numerous state to state variations for hydrocarbon validation and reporting. As an added benefit pristane and phytane are included in the formulation. This one standard can meet numerous LUFT/LUST programs requiring that the C<sub>17</sub> / Pristane and C<sub>18</sub> / Phytane ratio be used to estimate subsurface degradation of fuel oil spills.

Also available, a fuel oil degradation mix containing just 4 required analytes to determine the C<sub>17</sub> / Pristane and C<sub>18</sub> / Phytane ratio (DRH-005S-10X)

#### Fuel Oil Degradation/Retention Time Mixture for Quantification of C<sub>17</sub>/Pristane & C<sub>18</sub>/Phytane Ratios

**DRH-005S-10X** 1 x 1 mL  
2.0 mg/mL each in CH<sub>2</sub>Cl<sub>2</sub> : CS<sub>2</sub> (50:50) 4 comps.

<i>n</i> -Heptadecane	Phytane	Pristane
<i>n</i> -Octadecane		

#### Hydrocarbon Window Defining Standard

**DRH-FTRPH2** 1 x 1 mL  
**DRH-FTRPH2-PAK** SAVE 5 x 1 mL  
500  $\mu$ g/mL each in Hexane 18 comps.

<i>n</i> -Nonane	Phytane	<i>n</i> -Nonacosane
<i>n</i> -Undecane	<i>n</i> -Nonadecane	<i>n</i> -Hentriacontane
<i>n</i> -Tridecane	<i>n</i> -Heneicosane	<i>n</i> -Triacontane
<i>n</i> -Pentadecane	<i>n</i> -Tricosane	<i>n</i> -Pentatriacontane
<i>n</i> -Heptadecane	<i>n</i> -Pentacosane	<i>n</i> -Heptatriacontane
Pristane	<i>n</i> -Heptacosane	<i>n</i> -Nonatriacontane

# UST (LUFT/LUST)

## Weathered Fuel

### Weathered LUFT/LUST Fuel Sets

The weathered fuel mimics the weathering, evaporation, and migration process. These standards can assist in the identification of the fuel type if it has been present in the ground for some time, in a sandy type soil with possible evaporation loss, or has migrated from the plume point of origin.

#### Weathered Gasoline Set

<b>WGA-SET</b>	Each in 5.0 mg/mL in MeOH	<b>Cat. No.</b>	<b>4 x 1 mL</b>
Gasoline, regular unleaded		<a href="#">GA-001-10X</a>	1 mL
Gasoline, regular unleaded (25% Weathered)		<a href="#">GA-W25-10X</a>	1 mL
Gasoline, regular unleaded (50% Weathered)		<a href="#">GA-W50-10X</a>	1 mL
Gasoline, regular unleaded (75% Weathered)		<a href="#">GA-W75-10X</a>	1 mL

#### Weathered Kerosene Set

<b>WFK-SET</b>	Each in 5.0 mg/mL in CH <sub>2</sub> Cl <sub>2</sub>		<b>4 x 1 mL</b>
Kerosene		<a href="#">FU-005-D-10X</a>	1 mL
Kerosene (25% Weathered)		<a href="#">FK-W25-10X</a>	1 mL
Kerosene (50% Weathered)		<a href="#">FK-W50-10X</a>	1 mL
Kerosene (75% Weathered)		<a href="#">FK-W75-10X</a>	1 mL

#### Weathered #2 Diesel (extra Low Sulfur Content) Set

<b>WFD2-SET</b>	Each in 5.0 mg/mL in CH <sub>2</sub> Cl <sub>2</sub>		<b>4 x 1 mL</b>
#2 Diesel (Extra Low Sulfur)		<a href="#">FU-017-D-10X</a>	1 mL
#2 Diesel (Extra Low Sulfur) (25% Weathered)		<a href="#">FD2-W25-10X</a>	1 mL
#2 Diesel (Extra Low Sulfur) (50% Weathered)		<a href="#">FD2-W50-10X</a>	1 mL
#2 Diesel (Extra Low Sulfur) (75% Weathered)		<a href="#">FD2-W75-10X</a>	1 mL

#### Weathered #2 Diesel (Conventional) Set

<b>WFD2-R1-SET</b>	Each in 5.0 mg/mL in CH <sub>2</sub> Cl <sub>2</sub>		<b>4 x 1 mL</b>
#2 Diesel (Conventional)		<a href="#">FU-009-D-10X</a>	1 mL
#2 Diesel (Conventional) (25% Weathered)		<a href="#">FD2-W25-R1-10X</a>	1 mL
#2 Diesel (Conventional) (50% Weathered)		<a href="#">FD2-W50-R1-10X</a>	1 mL
#2 Diesel (Conventional) (75% Weathered)		<a href="#">FD2-W75-R1-10X</a>	1 mL

#### Technical Note

Petroleum Products contain many different chemicals, plus synthetic product additives. Typically, these petroleum products are subdivided into two groups based on their volatility: [a] gasoline related products (more volatile) and [b] fuel related products (less volatile such as kerosene, aviation fuels, diesel fuels and heating oils).

Most analytical methods for petroleum products focus on several items: the level of BTEX, the total petroleum hydrocarbon number (TPH), and the fingerprint of the petroleum product. Depending on the volatility of the petroleum product, the nature of the contaminated soil, and the age of the spill, analysis can be more difficult. Weathering, evaporation, and the migration of the lighter volatiles at the contamination site can affect the fingerprint identification portion of the fuel products analysis.



# Oil, Grease, TPH, Fracking Fluids

## EPA Methods and EU Regulation

### Method 413.2 & 418.1 TPH Analysis by IR

#### Oil, Grease & Petroleum Hydrocarbon Conc. Mix

<b>M-418-CON</b>			<b>1 x 1 mL</b>
At stated Vol.%			3 comps.
Chlorobenzene	25.0	<i>n</i> -Hexadecane	37.5
Isooctane	37.5		

#### Oil, Grease & Petroleum Hydrocarbon Mix

<b>M-418-R1</b>			<b>1 x 1 mL</b>
<b>M-418-R1-PAK</b>			<b>SAVE 5 x 1 mL</b>
4.13 mg/mL in Freon 113			
Total Oil, Grease & Petroleum Hydrocarbons			

### Method 1664 Oil, Grease & TPH Determination

#### Precision and Recovery (PAR) Spiking Solution

<b>M-1664-5ML</b>			<b>1 x 5 mL</b>
<b>M-1664-5ML-PAK</b>			<b>SAVE 5 x 5 mL</b>
4.0 mg/mL each in Acetone			

<b>M-1664-20ML</b>			<b>1 x 20 mL</b>
<b>M-1664-20ML-PAK</b>			<b>SAVE 5 x 20 mL</b>
4.0 mg/mL each in Acetone			2 comps.

<i>n</i> -Hexadecane	Stearic acid
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#### Silica Gel Hexane Extraction Material

<b>SGT-HEM</b>			<b>1 x 1 mL</b>
20 µg/mL each in Acetone			2 comps.
Stearic acid	<i>n</i> -Hexadecane		

#### Technical Note

Precision and Recovery (PAR) Spiking Solution was developed for EPA Method 1664, a performance-based method designed to replace earlier gravimetric procedures that used Freon-113 as the extraction solvent for the determination of Oil and Grease (HEM) and Total Petroleum Hydrocarbons (SGT-HEM). Each standard is packaged in a flame-sealed ampule, conveniently sized for quality control of the analytical batch.

### Method 8440 Total Petroleum Hydrocarbon Analysis

#### Total Recoverable Petroleum Hydrocarbon Mix

<b>M-8440</b>			<b>1 x 1 mL</b>
<b>M-8440-PAK</b>			<b>SAVE 5 x 1 mL</b>
At stated Wt.% in Tetrachloroethene			3 comps.
Chlorobenzene	0.10	Isooctane	0.15
<i>n</i> -Hexadecane	0.15		

#### Silica Gel Cleanup Calibration Solution

<b>M-8440-SGC</b>			<b>1 x 1 mL</b>
<b>M-8440-SGC-PAK</b>			<b>SAVE 5 x 1 mL</b>
10.0 mg/mL in Tetrachloroethene			
Corn Oil			

#### Total Petroleum Hydrocarbon Concentrate Mix

<b>M-8440-CON</b>			<b>1 x 1 mL</b>
<b>M-8440-CON-PAK</b>			<b>SAVE 5 x 1 mL</b>
At stated Vol.%			3 comps.
Chlorobenzene	25.0	Isooctane	37.5
<i>n</i> -Hexadecane	37.5		

#### Retention Time Standard

<b>DRH-010S</b>			<b>1 x 1 mL</b>
25 µg/mL each in CH <sub>2</sub> Cl <sub>2</sub>			7 comps.
<i>n</i> -Hexane	<i>n</i> -Tetracosane	<i>n</i> -Triacontane	
<i>n</i> -Decane	<i>n</i> -Octacosane	<i>n</i> -Tetracontane	
<i>n</i> -Dodecane			

#### Technical Note

A sample showing peaks in the C<sub>6</sub>-C<sub>10</sub> range generally indicates a gasoline spill. Samples with the peaks in the C<sub>12</sub>-C<sub>24</sub> range are indicative of a diesel spill while samples with the higher carbon numbers above C<sub>24</sub> are typically oils or lubricants. Once the initial screen is complete, more detailed work can be done to further identify the contaminant.

### EU REG 528/2012 Biocides in Fracking Fluids

The underground gas and petroleum production enhancement process of fracking has generated much attention. There is concern about potential short and long-term adverse health effects and environmental contamination associated with the process. Biocides are important fracking fluid additives used to kill microbes that might produce corrosive acids or form well-clogging biofilms. Since biocides are inherently toxic, there is a growing concern over the environmental fate and impact on groundwater contamination.

These biocides are part of our 217 biocide product line that was developed for the EU Biocides Regulation 528/2012. This legislation classifies biocides into 22 product types grouped into four main areas.

Compound	CAS	Cat. No.	Unit
Glutaraldehyde Solution (~50% Water)	111-30-8	FRACK-001N	1 mL
2,2-Dibromo-2-cyanoacetamide	10222-01-2	FRACK-002N	100 mg
Tetrakis(hydroxymethyl)phosphonium sulfate	55566-30-8	FRACK-003N	100 mg
Didecyltrimethylammonium chloride	7173-51-5	FRACK-004N-10MG	10 mg
Tributyltetradecylphosphonium chloride	81741-28-8	FRACK-005N	100 mg
2-Methyl-2H-isothiazol-3-one	2682-20-4	FRACK-006N-10MG	10 mg
Dazomet	533-74-4	FRACK-007N-10MG	10 mg
2-Bromo-2-nitropropane-1,3-diol	52-51-7	FRACK-009N-25MG	25 mg
N-Bromosuccinimide	128-08-5	FRACK-011N	100 mg

# Wear Metals

## AA, ICP, DCP & XRF Analysis

These Standards were formulated for the analysis of metals in oils and other organic matrices. These Standards and curves provide a convenient way to analyze for metals (wear metals, additives and contaminants) in lubricating oils, gasolines, residual oils, crude oils, turbine fuels and environmental samples. Organometallic Standards listed on this page may contain sulfur which can be introduced by possible sulfonate starting materials used to formulate the actual organometallic standard.



- Single & Multi Element Standards
- Prepared Calibration Curves
- Formulated from Ultra High Purity Organometallic starting materials & matrices
- Certificate of Analysis

**Wear Metal Products are NOT on our ISO scope of accreditation.**

Premium Sulfur-Free  
Sulfur below detection limits for most elements  
No Metallic Sulfonates

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### Single Element Wear Metals

Element	1,000 µg/g in 75 cSt base oil		5,000 µg/g in 75 cSt base oil	
	Cat. No.	Unit	Cat. No.	Unit
Aluminum (Al)	WM-75CST-01	50 grams	WM-75CST-01-5X	50 grams
Antimony (Sb)	WM-75CST-02	50 grams	WM-75CST-02-5X	50 grams
Arsenic (As)	WM-75CST-03	50 grams	-----	----
Barium (Ba)	WM-75CST-04	50 grams	WM-75CST-04-5X	50 grams
Beryllium (Be)	WM-75CST-05	50 grams	-----	----
Bismuth (Bi)	WM-75CST-06	50 grams	-----	----
Boron (B)	WM-75CST-07	50 grams	WM-75CST-07-5X	50 grams
Cadmium (Cd)	WM-75CST-08	50 grams	WM-75CST-08-5X	50 grams
Calcium (Ca)	WM-75CST-09	50 grams	WM-75CST-09-5X	50 grams
Cerium (Ce)	WM-75CST-11	50 grams	WM-75CST-11-5X	50 grams
Chromium (Cr)	WM-75CST-13	50 grams	WM-75CST-13-5X	50 grams
Cobalt (Co)	WM-75CST-14	50 grams	WM-75CST-14-5X	50 grams
Copper (Cu)	WM-75CST-15	50 grams	WM-75CST-15-5X	50 grams
Indium (In)	WM-75CST-25	50 grams	WM-75CST-25-5X	50 grams
Iron (Fe)	WM-75CST-27	50 grams	WM-75CST-27-5X	50 grams
Lanthanum (La)	-----	----	WM-75CST-28-5X	50 grams
Lead (Pb)	WM-75CST-29	50 grams	WM-75CST-29-5X	50 grams
Lithium (Li)	WM-75CST-30	50 grams	WM-75CST-30-5X	50 grams
Magnesium (Mg)	WM-75CST-32	50 grams	WM-75CST-32-5X	50 grams
Manganese (Mn)	WM-75CST-33	50 grams	WM-75CST-33-5X	50 grams
Mercury (Hg)	WM-75CST-34	50 grams	-----	----
Molybdenum (Mo)	WM-75CST-35	50 grams	WM-75CST-35-5X	50 grams
Nickel (Ni)	WM-75CST-37	50 grams	WM-75CST-37-5X	50 grams
Phosphorus (P)	WM-75CST-41	50 grams	WM-75CST-41-5X	50 grams
Potassium (K)	WM-75CST-43	50 grams	WM-75CST-43-5X	50 grams
Scandium (Sc)	WM-75CST-50	50 grams	-----	----
Selenium (Se)	WM-75CST-51	50 grams	-----	----
Silicon (Si)	WM-75CST-52	50 grams	WM-75CST-52-5X	50 grams
Silver (Ag)	WM-75CST-53	50 grams	WM-75CST-53-5X	50 grams
Sodium (Na)	WM-75CST-54	50 grams	WM-75CST-54-5X	50 grams
Strontium (Sr)	WM-75CST-55	50 grams	WM-75CST-55-5X	50 grams
Sulfur (S)	WM-75CST-56	50 grams	WM-75CST-56-5X	50 grams
Thallium (Tl)	WM-75CST-60	50 grams	-----	----
Tin (Sn)	WM-75CST-63	50 grams	WM-75CST-63-5X	50 grams
Titanium (Ti)	WM-75CST-64	50 grams	WM-75CST-64-5X	50 grams
Tungsten (W)	WM-75CST-65	50 grams	WM-75CST-65-5X	50 grams
Vanadium (V)	WM-75CST-67	50 grams	WM-75CST-67-5X	50 grams
Yttrium (Y)	WM-75CST-69	50 grams	WM-75CST-69-5X	50 grams
Zinc (Zn)	WM-75CST-70	50 grams	WM-75CST-70-5X	50 grams
Zirconium (Zr)	WM-75CST-71	50 grams	WM-75CST-71-5X	50 grams

See our Table of Contents for complete list of Organometallic standards containing < 1 ppm sulfur or phosphorus.

### Matrix Oil and Stabilizer

**75 cSt Oil**  
MOSOL-75 500 mL

**Stabilizer**  
WM-STAB 1 x 50 grams

**Technical Note**

Used to improve the stability of Organo-metallic Standards when diluting into solvents such as Kerosene. Add 0.6% by weight.

### Metals Additives

MA-900-100G 100 grams  
 MA-900-200G 200 grams  
 900 µg/g in 75 cSt in Base oil 5 comps.

Barium (Ba)	Phosphorus (P)
Calcium (Ca)	Zinc (Zn)
Magnesium (Mg)	

# Wear Metals

## AA, ICP, DCP & XRF Analysis

### Organometallic Single Element Stock (Premium Sulfur-Free)

Element	1000 µg/g		5000 µg/g	
	Cat. No.	Unit	Cat. No.	Unit
Aluminum (Al)	WM-NMS-01	50 mL	WM-NMS-01-5X	50 mL
Antimony (Sb)	WM-NMS-02	50 mL	WM-NMS-02-5X	50 mL
Arsenic (As)	WM-NMS-03	50 mL	WM-NMS-03-5X	50 mL
Barium (Ba)	WM-NMS-04	50 mL	WM-NMS-04-5X	50 mL
Beryllium (Be)	WM-NMS-05	50 mL	WM-NMS-05-5X	50 mL
Cadmium (Cd)	WM-NMS-08	50 mL	WM-NMS-08-5X	50 mL
Calcium (Ca)	WM-NMS-09	50 mL	WM-NMS-09-5X	50 mL
Cerium (Ce)	WM-NMS-11	50 mL	WM-NMS-11-5X	50 mL
Chromium (Cr)	WM-NMS-13	50 mL	WM-NMS-13-5X	50 mL
Cobalt (Co)	WM-NMS-14	50 mL	WM-NMS-14-5X	50 mL
Copper (Cu)	WM-NMS-15	50 mL	WM-NMS-15-5X	50 mL
Gold (Au)	WM-NMS-22	50 mL	-----	----
Iron (Fe)	WM-NMS-27	50 mL	WM-NMS-27-5X	50 mL
Lead (Pb)	WM-NMS-29	50 mL	WM-NMS-29-5X	50 mL
Lithium (Li)	WM-NMS-30	50 mL	WM-NMS-30-5X	50 mL
Magnesium (Mg)	WM-NMS-32	50 mL	WM-NMS-32-5X	50 mL
Manganese (Mn)	WM-NMS-33	50 mL	WM-NMS-33-5X	50 mL
Mercury (Hg)	WM-NMS-34	50 mL	WM-NMS-34-5X	50 mL
Molybdenum (Mo)	WM-NMS-35	50 mL	WM-NMS-35-5X	50 mL
Palladium (Pd)	WM-NMS-40	50 mL	WM-NMS-40-5X	50 mL
Phosphorus (P)	WM-NMS-41	50 mL	WM-NMS-41-5X	50 mL
Platinum (Pt)	WM-NMS-42	50 mL	WM-NMS-42-5X	50 mL
Potassium (K)	WM-NMS-43	50 mL	WM-NMS-43-5X	50 mL
Selenium (Se)	WM-NMS-51	50 mL	WM-NMS-51-5X	50 mL
Silicon (Si)	WM-NMS-52	50 mL	WM-NMS-52-5X	50 mL
Silver (Ag)	WM-NMS-53	50 mL	WM-NMS-53-5X	50 mL
Sodium (Na)	WM-NMS-54	50 mL	WM-NMS-54-5X	50 mL
Strontium (Sr)	WM-NMS-55	50 mL	WM-NMS-55-5X	50 mL
Thallium (Tl)	WM-NMS-60	50 mL	WM-NMS-60-5X	50 mL
Tin (Sn)	WM-NMS-63	50 mL	WM-NMS-63-5X	50 mL
Titanium (Ti)	WM-NMS-64	50 mL	WM-NMS-64-5X	50 mL
Vanadium (V)	WM-NMS-67	50 mL	WM-NMS-67-5X	50 mL
Yttrium (Y)	WM-NMS-69	50 mL	WM-NMS-69-5X	50 mL
Zinc (Zn)	WM-NMS-70	50 mL	WM-NMS-70-5X	50 mL
Zirconium (Zr)	WM-NMS-71	50 mL	WM-NMS-71-5X	50 mL

Premium Sulfur-Free  
Sulfur below detection  
limits for most elements  
No Metallic Sulfonates

All elements are provided in mineral oil except for Mercury, Palladium and Platinum which are provided in xylene.

**Technical Note**

Sulfur below detection limits for most elements. Sulfur content otherwise noted on certificate. For use with X-ray fluorescence (XRF), plasma emission (ICP or DCP), rotating disk (RDE), or atomic absorption (AA) spectroscopy. May be blended together to prepare multi-element standards. Solutions are stabilized with proprietary chelation and stabilization solution and are ready for use.

### Recommended Internal Standard

<b>Organometallic (Internal Standard)</b>		
WM-NMS-14	1000 µg/g	50 mL
WM-NMS-14-5X	5000 µg/g	50 mL
Cobalt (Sulfur-free)		

### ASTM D4927, D6443, D6481 Lubricating Oil Calibration Curve

Cat. No.	17 x 100 mL				
	Ba	Ca	P	S	Zn
Nominal Value	(Wt.%)	(Wt.%)	(Wt.%)	(Wt.%)	(Wt.%)
ASTM-P-0110-01	0.100	0.600	0.005	0.175	0.060
ASTM-P-0110-02	0.175	0.500	0.200	0.050	0.080
ASTM-P-0110-03	0.000	0.400	0.150	0.300	0.180
ASTM-P-0110-04	0.025	0.260	0.250	0.150	0.120
ASTM-P-0110-05	0.150	0.005	0.005	0.450	0.070
ASTM-P-0110-06	0.000	0.400	0.025	0.350	0.100
ASTM-P-0110-07	0.200	0.300	0.060	0.250	0.120
ASTM-P-0110-08	0.000	0.200	0.100	0.450	0.100
ASTM-P-0110-09	0.100	0.060	0.080	0.300	0.130
ASTM-P-0110-10	0.050	0.060	0.050	0.200	0.050
ASTM-P-0110-11	0.075	0.050	0.120	0.100	0.075
ASTM-P-0110-12	0.010	0.025	0.150	0.200	0.130
ASTM-P-0110-13	0.005	0.005	0.200	0.400	0.150
ASTM-P-0110-14	0.000	0.170	0.250	0.550	0.110
ASTM-P-0110-15	0.000	0.100	0.100	0.200	0.200
ASTM-P-0110-16	0.005	0.010	0.010	0.600	0.250
ASTM-P-0110-17	0.000	0.000	0.000	0.000	0.000

### ASTM D6443 Lubricating Oil Calibration Curve

Cat. No.	10 x 100 mL						
	Ca	Cl	Cu	Mg	P	S	Zn
Nominal Value	(Wt.%)	(Wt.%)	(Wt.%)	(Wt.%)	(Wt.%)	(Wt.%)	(Wt.%)
ASTM-P-0117-01	0.020	0.030	0.010	0.200	0.250	1.000	0.020
ASTM-P-0117-02	0.020	0.020	0.050	0.200	0.020	0.020	0.250
ASTM-P-0117-03	0.020	0.200	0.010	0.040	0.250	0.150	0.250
ASTM-P-0117-04	0.020	0.200	0.050	0.040	0.020	1.000	0.020
ASTM-P-0117-05	0.400	0.020	0.010	0.040	0.020	1.000	0.250
ASTM-P-0117-06	0.400	0.020	0.050	0.040	0.250	0.020	0.020
ASTM-P-0117-07	0.400	0.200	0.010	0.200	0.020	0.020	0.050
ASTM-P-0117-08	0.400	0.200	0.050	0.200	0.250	1.000	0.250
ASTM-P-0117-09	0.200	0.100	0.025	0.080	0.150	0.500	0.100
ASTM-P-0117-10	0.000	0.000	0.000	0.000	0.000	0.000	0.000

# Quality System

AccuStandard delivers trusted analytical solutions backed by state-of-the-art instrumentations, including GC, GC/MS, LC-MS, LC-MS/MS, FTIR, NMR, IC, ICP, and ICP/MS. Every product is rigorously analyzed using internal calibration standards and advanced statistical methods, and is accompanied by a comprehensive Certificate of Analysis (COA) prepared in full compliance with ISO 17034.

Serving customers worldwide, AccuStandard provides high-quality Certified Reference Materials (CRMs) and Reference Materials (RMs) that meet exact specifications and conform to the latest ISO 17034, ISO/IEC 17025, and ISO 9001 standards.

With over 40 years of industry leadership, deep technical expertise, and a culture of collaboration, we continue to innovate and deliver breakthrough products. Our commitment to continuous, data-driven quality improvement ensures our customers receive the most reliable reference standards available.

**Certificates of Analysis are prepared in accordance with ISO 17034 and include information such as:**

- Prepared and certified analyte concentration
- Chemical purity
- FTIR and NMR
- Expiration date
- Certification date
- Uncertainty and traceability information and statements
- Neat material identity (For neat products)
- CAS number (if available). It is a unique identifier assigned to a chemical by the Chemical Abstracts Service. This number is used worldwide.

**ISO 17034 • 17025 • 9001**

**Download the latest ISO Certification Of Accreditation visit**  
<https://www.accustandard.com/quality-accreditations>



## Custom Formulations

**Custom Standards** provide an efficient and cost-effective solution when you need to meet specific testing requirements. With decades of experience in manufacturing Certified Reference Materials (CRMs), AccuStandard formulates high-quality custom standards tailored precisely to your specifications. All custom CRMs are produced in accordance with ISO 17034 quality guidelines, ensuring convenience, reliability, and confidence. Our commitment to quality goes even further by including shelf-life extension testing with every custom CRM as part of our custom standards service.

Why buy AccuStandard's Custom Standards?

- Fast and knowledgeable quotations
- Experienced technical support to answer your questions
- Formulation is carefully evaluated for stability and compatibility
- Concentrations are certified gravimetrically and verified analytically
- Balances used are calibrated daily against NIST traceable weights
- Certificate of Analysis (COA) provided as well as chromatograms (when requested)

**To request a custom formulation visit our website at:**

**<https://www.accustandard.com/custom-quote-request>**  
**or call to talk with a quotation specialist.**



# Technical Information

## Solvent Miscibility Table, Density and Boiling Point

Acetic acid (1.049 g/mL) (117-118°C)									
Acetone (0.791 g/mL) (56°C)									
Acetonitrile (AcCN) (0.786 g/mL) (81-82°C)									
Benzene (0.874 g/mL) (80°C)									
2-Butanol (0.808 g/mL) (98°C)									
Butyl alcohol (0.81 g/mL) (116-118°C)									
tert-Butylmethyl ether (MtBE) (0.74 g/mL) (55-56°C)									
Carbon tetrachloride (1.594 g/mL) (76-77°C)									
Chloroform (1.492 g/mL) (60.5-61.5°C)									
Cyclohexane (0.779 g/mL) (80.7°C)									
Cyclopentane (0.751 g/mL) (50°C)									
Dichloroethane (1.256 g/mL) (83°C)									
N,N-Dimethylformamide (DMF) (0.944 g/mL) (153°C)									
1,4-Dioxane (1.034 g/mL) (100-102°C)									
Dipropyl ether (0.736 g/mL) (88-90°C)									
Ethyl acetate (EtOAc) (0.902 g/mL) (76.5-77.5°C)									
Ethyl alcohol (EtOH) (0.789 g/mL) (78°C)									
Ethyl ether (0.706 g/mL) (34.6°C)									
n-Heptane (0.684 g/mL) (98°C)									
n-Hexane (0.659 g/mL) (69°C)									
Isooctane (0.692 g/mL) (98-99°C)									
Isopropyl alcohol (0.785 g/mL) (82°C)									
Methanol (MeOH) (0.791 g/mL) (64.7°C)									
Methylene chloride (CH <sub>2</sub> Cl <sub>2</sub> ) (1.325 g/mL) (39.8-40°C)									
Methyl sulfoxide (DMSO) (1.10 g/mL) (189°C)									
n-Pentane (0.626 g/mL) (35-36°C)									
1,1,1,2-Tetrachloroethane (1.586 g/mL) (147°C)									
Tetrahydrofuran (THF) (0.889 g/mL) (65-67°C)									
Toluene (0.865 g/mL) (110-111°C)									
Trichloroethane (1.336 g/mL) (74-76°C)									
Water (1 g/mL) (100°C)									
Xylene (0.868 g/mL) (138-139°C)									

Miscible

Immiscible

Read down column and across for solvent miscibility

Density @ 25°C  
Boiling Point

### Instrumentation Abbreviations

AA	Atomic Absorption
FTIR	Fourier Transform Infrared
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectroscopy
GC/FID	Gas Chromatography/Flame Ionization Detector
GC/PID	Gas Chromatography/Photoionization Detector
GC/ECD	Gas Chromatography/Electron Capture Detector
GC/ELCD	Gas Chromatography/Electrolytic Conductivity Detector
GC/NPD	Gas Chromatography/Nitrogen phosphorus Detector
GLC	Gas Liquid Chromatography
HPLC	High Performance Liquid Chromatography
HRGC/LRMS	High Resolution Gas Chromatography/Low Resolution Mass Spectrometry
ICP	Inductively Coupled Plasma
ICP-MS	Inductively Coupled Plasma Mass Spectrometry
NPD/TEA	Nitrogen-Phosphorus Detector/Thermal Energy Analyzer with the reductive Hall detector
NPD/AFD/TSD	Nitrogen-Phosphorus Detector/Alkali-Flame Detector/Thermionic Specific Detector
NPA/ELCD/FPD	Nitrogen-Phosphorus Detector/Electrolytic Conductivity Detector/Flame Photometric Detector
TCD/FID	Thermal Conductivity Detector/Flame Ionization Detector

# Usage, Handling, Storage, and Safety Information

## Solutions (Usage, Handling)

Check label for proper storage and if it needs to be sonicated prior to use. Gently tap ampule before opening to ensure no product is in the head. Transfer the required amount using a pipet or clean gastight syringe. Excess solution can be stored in a tightly capped vial.

## Neats (Usage, Handling)

Small amounts (5-10 mg) of powder often are spread over the surface of the vial and cap. If the chemical is a liquid, it may coat the walls as a thin layer invisible to the eye. To recover all of the contents contained in a vial of neat material, carefully transfer the contents to a volumetric flask using a suitable solvent.

Rinse the cap and vial several times to assure a complete transfer.

## Storage

All products come with storage conditions listed on the label of the ampule. It is imperative that these conditions are followed to preserve the integrity of the material.

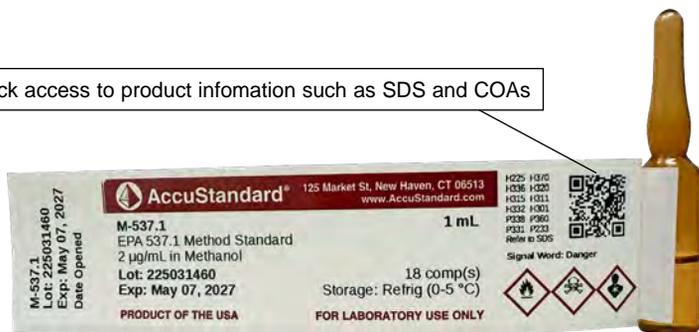
Note: Cold Packs may be recommended or required with certain temperature sensitive products. Some standards are susceptible to change at room temperature or higher. In some of these cases, we may recommend or require that these products ship in a Cold Pack (a styrofoam container that has an ice pack). The purpose is to delay the exposure of the product to higher temperatures, NOT to keep the product frozen. It simply delays exposure to higher temperatures. The product will not immediately go out of specification when the Cold Pack melts or when the product reaches room temperature.

## 2-Part Labels (ampules or vials)

**Part One** can be placed into a laboratory journal to document the standard used for the analysis. This label section includes the catalog number, description, lot number, expiration date, safety information, proper storage conditions and documents AccuStandard as the manufacturer.

**Part Two** is the small section on the left that duplicates required information for labeling transfer vial(s).

Quick access to product information such as SDS and COAs



## Safety Information

All products include Safety Data Sheets (SDSs) available on our website. Products are designed to be used by trained laboratory personnel.

**SDSs contains information about a chemical's properties, hazards, and how to handle it safely:**

1. Chemical properties: Physical data like melting point, boiling point, and flash point
2. Hazards: Physical, health, and environmental hazards, including toxicity, reactivity, and flammability
3. Safety precautions: How to handle, store, and transport the chemical, including protective equipment and spill procedures
4. First aid: Potential symptoms and first aid measures for exposure to the chemical
5. Exposure limits: The maximum airborne concentration of a hazardous substance that is considered safe
6. Disposal: How to dispose of the chemical, including following applicable laws and regulations
7. Ecological information: Whether the product contains heavy metals or other substances that could harm the environment

## GHS Symbols:



GHS-07

- Irritant
- Skin Sensitizer
- Acute toxicity (harmful)
- Narcotic Effects
- Respiratory Tract Irritant



GHS-02

- Flammables
- Self Reactives
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Organic Peroxides



GHS-03

- Oxidizers



GHS-05

- Corrosives
- Skin corrosion/burns
- Eye Damage
- Corrosive to Metals



GHS-06

- Acute Toxicity (fatal or toxic)



GHS-08

- Carcinogen
- Respiratory Sensitizer
- Reproductive Toxicity
- Mutagenicity
- Aspiration Toxicity

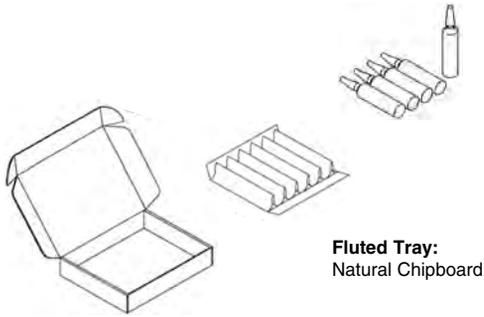


GHS-09

- Aquatic Toxicity

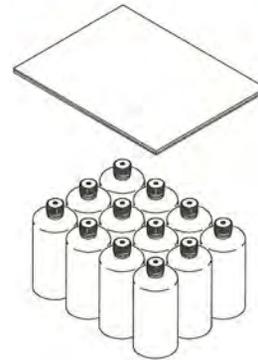
# Packaging and Shipping

Packaging can be for both Organic and Inorganic products

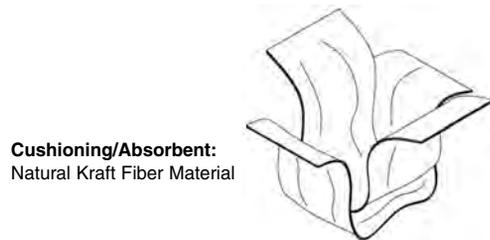


**Fluted Tray:**  
Natural Chipboard

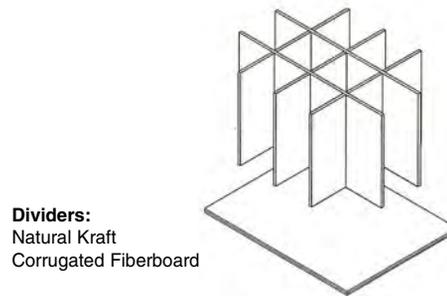
  
**Made with recyclable and biogradable materials.**



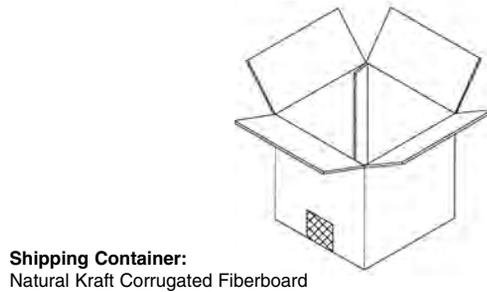
**Inside Container:**  
Corrugated Fiberboard



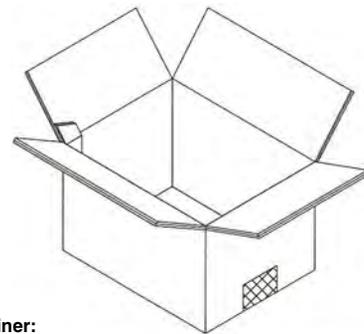
**Cushioning/Absorbent:**  
Natural Kraft Fiber Material



**Dividers:**  
Natural Kraft  
Corrugated Fiberboard



**Shipping Container:**  
Natural Kraft Corrugated Fiberboard



**Shipping Container:**  
Natural Kraft Corrugated Fiberboard

## Shipping

We have many years of experience shipping worldwide, and offer the best and most efficient options available.

- Multiple shipping options available for delivery.
- Packaging maximizes space and keeps dimensions and weight down to minimize shipping charges.
- Designed and tested to meet DOT and IATA shipping regulations.

# Contact / Order Information

AccuStandard ships products to over 135 countries and territories worldwide. Choose your country to find a distributor in your area. If you cannot find a distributor in your country, please contact us directly for pricing and shipping information.



For the most current distributors location visit <https://www.accustandard.com/distributors>

Visit: [www.accustandard.com](http://www.accustandard.com)

#### Find Products by:

- Chemical name
- Catalog number
- CAS number
- Method
- Category
- New products

#### Filter search results by:

- Concentration
- Component count
- Unit Size



#### Product Documentation

- COAs
- SDSs

#### Resources

- FAQs
- News and updates
- Literature
- Methods
- Publications and Presentations
- Video library

#### Shipping

- Order status

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<https://www.accustandard.com/terms-and-conditions>



#### Website

AccuStandard.com

#### Phone:

800-442-5290 (USA)  
203-786-5290 (International)

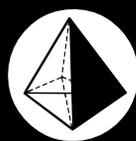
Monday through Friday  
8:00am - 5:30pm (EST)

#### Email:

orders@accustandard.com

#### Mail:

AccuStandard, Inc.  
125 Market Street  
New Haven, CT 06513  
USA



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