

The Biomarker Catalogue



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ASTM methods



The collection of reference standards
- 2008 -





ASTM methods

ASTM D 664-07 Acid number of petroleum products by potentiometric titration

Standard test method for acid number of petroleum products by potentiometric titration.

This test method covers procedures for the determination of acidic constituents in petroleum products and lubricants soluble or nearly soluble in mixtures of toluene and 2-propanol. It is applicable for the determination of acids whose dissociation constants in water are larger than 10^{-9} ; extremely weak acids whose dissociation are smaller than 10^{-9} do not interfere.

S-4069-S	Solvent, ASTM D 664-07	
	1 L and 10x1 L	
	Toluene	50.0 %
	Isopropanol	49.5 %
	Water, ionfree	0.5 %

S-4069-T	Titrant for ASTM D 664-07	
	0.1 M solution; units. 5x1, 10x1, 20x1 L	
	KOH in Isopropanol	

ASTM D 1685-05 Thiophene in benzene

Standard test method for traces of thiophene in benzene by spectrophotometry

This test method covers the determination of thiophene in benzene in which the thiophene concentration is between 0.1 and 250 mg/kg.

S-4059	Thiophene in Benzene
	See ASTM D 4735-02

ASTM D 2622-05 Sulfur in petroleum products

Standard test method for sulfur in petroleum products by wavelength dispersive fluorescence X-Ray spectrometry

This test method covers the determination of total sulfur in liquid petroleum products and in solid petroleum products that can be liquefied with moderate heating. Optimum conditions allow the determination of sulfur in paraffinic samples at concentrations exceeding 0.0020 mass % (20 ppm).



S-4051/S-4052

**Calibration Mixtures: Di-n-butyl sulfide in White Oil
(less than 5 mg sulfur/L)**

Unit : 10 mL screw cap bottle

Light White Mineral Oil (20 cSt at 40°C)	Heavy White Mineral Oil (70 cSt at 40°C)	µgS/g (ppm)	Wt.%
S-4052-0-LW	S-4051-0-HW	Blank	0
S-4052-10-LW	S-4051-10-HW	10	0,001
S-4052-50-LW	S-4051-50-HW	50	0.005
S-4052-100-LW	S-4051-100-HW	100	0.010
S-4052-250-LW	S-4051-250-HW	250	0.025
S-4052-500-LW	S-4051-500-HW	500	0.050
S-4052-750-LW	S-4051-750-HW	750	0.075
S-4052-K-LW	S-4051-K-HW	1 000	0.100
S-4052-2.5K-LW	S-4051-2.5K-HW	2 500	0.250
S-4052-5K-LW	S-4051-5K-HW	5 000	0.500
S-4052-10K-LW	S-4051-10K-HW	10 000	1.000
S-4052-20K-LW	S-4051-20K-HW	20 000	2.000
S-4052-30K-LW	S-4051-30K-HW	30 000	3.000
S-4052-40K-LW	S-4051-40K-HW	40 000	4.000
S-4052-50K-LW	S-4051-50K-HW	50 000	5.000
S-4052-Kit	S-4051-Kit	Kit of above solutions	

ASTM D 2887-06a

Boiling range distribution of petroleum fractions

Standard test method for boiling range distribution of petroleum fractions by gas chromatography.

This test method covers the determination of the boiling range distribution of petroleum products. This test method can be used to petroleum products and fractions having a final boiling point of 538 °C (1000 °F) or lower at atmospheric pressure as measured by this test method. This test method is limited to samples having a boiling range greater than 55°C (100°F), and having a vapour pressure sufficiently low to permit sampling at ambient temperature.

S-4112-100-CS

Calibration Mixture C5-C44 (Revised)18 Analytes, each 100µg/mL in CS₂; unit: 1x1mL in Certan® bottle

Use for assessing column resolution as well as for quantitative analyses.

n-Pentane	C5	n-Octadecane	C18
n-Hexane	C6	n-Eicosane	C20
n-Heptane	C7	n-Tetracosane	C24
n-Octane	C8	n-Octacosane	C28
n-Nonane	C9	n-Dotriacontane	C32
n-Decane	C10	n-Hexatriacontane	C36
n-Undecane	C11	n-Tetracontane	C40
n-Dodecane	C12	n-Tetratetracontane	C44
n-Tetradecane	C14		
n-Hexadecane	C16		

**S-4149-500-MX****Hydrocarbon Window Defining Standard C8-C40**35 Analytes, each 500 µg/mL in CS₂:CH₂Cl₂ (3:1); units: 1x1mL, 1x4.5mL in Certan® bottle

Octane	C8	Nonadecane	C19	Triacontane	C30
Nonane	C9	Phytane	C20	n-Hentriacontane	C31
Decane	C10	Eicosane	C20	Dotriacontane	C32
Undecane	C11	Heneicosane	C21	Tritriacontane	C33
Dodecane	C12	Docosane	C22	Tetracontane	C34
Tridecane	C13	Tricosane	C23	Pentatriacontane	C35
Tetradecane	C14	Tetracosane	C24	Hexatriacontane	C36
Pentadecane	C15	Pentacosane	C25	Heptatriacontane	C37
Hexadecane	C16	Hexacosane	C26	Octatriacontane	C38
Heptadecane	C17	Heptacosane	C27	Nonatriacontane	C39
Octadecane	C18	Octacosane	C28	Tetracontane	C40
Pristane	C19	Nonacosane	C29		

S-4151-10K-OC**Column Resolution Test Mix C16-C18**

2 Analytes, each 1 mass % in n-octane; unit: 5x1 mL

n-Hexadecane	C16
n-Octadecane	C18

S-4210-2K-MX**Fuel Oil Degradation/Retention Time Mix C17-C20**4 Analytes, each 2,0 mg/mL in CS₂:CH₂Cl₂ (1:1); unit: 1x4.5mL in Certan®

Use this standard for the quantification of C17/Pristane and C18/Phytane ratios.

Heptadecane	C17
Octadecane	C18
Pristane (2,6,10,14-Tetramethylpentadecane)	C19
Phytane (2,6,10,14-Tetramethylhexadecane)	C20

ASTM D 3120-06e1

Sulfur in light liquid petroleum hydrocarbons

Standard test method for trace quantities of sulfur in light liquid petroleum hydrocarbons by oxidative microcoulometry

This test method covers determination of sulfur in the range 3.0 - 1000 ppm (mg/kg) in light liquid hydrocarbons boiling at 26 to 274 °C (80 to 525 °F).



S-4050-ASS-IO

Calibration Mixtures: Di-n-butyl sulfide in Isooctane

Unit: 1x10mL screw cap bottle

Isooctane	µgS/g (ppm)	Wt.%
S-4050-0-IO	Blank	0
S-4050-1-IO	1	0.0001
S-4050-3-IO	3	0.0003
S-4050-10-IO	10	0.0010
S-4050-20-IO	20	0.0020
S-4050-30-IO	30	0.0030
S-4050-50-IO	50	0.0050
S-4050-75-IO	75	0.0075
S-4050-100-IO	100	0.0100
S-4050-Kit	Kit of above solutions	

ASTM D 3246-05 Sulfur in petroleum

Standard test method for sulfur in petroleum gas by oxidative microcoulometry

This test method covers determination of sulfur in the range from 1.5 to 100 mg/kg (ppm by mass) in hydrocarbon products that are gaseous at normal room temperature and pressure.

Calibration Mixtures: See ASTM D 3120 above (S-4050 di-n-butyl sulfide in isooctane).

ASTM D 3606-06e1 Benzene and toluene in finished motor and aviation gasolines by GC

Standard test method for the determination of benzene and toluene in finished motor and aviation gasoline by gas chromatography.

This test method provides for the determination of benzene and toluene in finished motor and aviation gasolines by gas chromatography.

S-4164-SET

Aromatics Quantitative Calibration Standards

(without Internal Standard)

2 Analytes, each Vol.% as listed in isooctane; unit: 7x25mL, one of each Std.

Analyte	Analyte Calibr. range	Std. 1 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

**S-4206-SET****Aromatics Quantitative Calibration Standards**

(with Internal Standard)

3 Analytes, each Vol.% as listed in isooctane; units: 7x1mL, 7x2mL and 5x(7x2)mL, one of each Std.

Analyte	Analyte Calibr. range	Std. 1 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	0.95	0.48
Isooctane		72.0	79.2	85.2	90.56	93.28	94.93	95.46
Methylethyl ketone (Int. Std.)		4.0	4.0	4.0	4.0	4.0	4.0	4.0

S-4204-ASS-10IO**Dialy Quality Control Standard**

(with Internal Standard)

3 Analytes, each Vol.% as listed in isooctane; units: 1x10 mL, 5x10 mL.

Name	Vol.%
Benzene	0.64
Toluene	4.8
Isooctane	90.56
Methylethylketone (Int.Std.)	4.0

S-4205-ASS-10IO**Dialy Quality Control Standard**

(without Internal Standard)

2 Analytes, each Vol.% as listed in isooctane; units: 1x10 mL, 5x10 mL.

Name	Vol.%
Benzene	0.67
Toluene	5.0
Isooctane	94.33

ASTM D 3710-95(2004) Boiling range distribution of gasoline and gas fractions by GC

Standard test method for boiling range distribution of gasoline and gasoline fractions by gas chromatography

This test method covers the determination of the boiling range distribution of gasoline and gasoline components. This test method is applicable to petroleum products and fractions with a final boiling point of 260 °C (500 °F) or lower as measured by this test method.

S-4147-1ML**Calibration Standard**

16 Analytes, each Wt.% as listed; units: 1x1mL, 5x1mL neat

This standard can be used for qualitative and quantitative analyses.



Name	Wt. %	Name	Wt. %
2-Methylbutane	10.0	p-Xylene	13.0
n-Pentane	8.0	n-Propylbenzene	5.0
2-Methylpentane	6.0	n-Decane	4.0
n-Hexane	6.0	n-Butylbenzene	4.0
2,4-Dimethylpentane	6.0	n-Dodecane	3.5
n-Heptane	10.0	n-Tridecane	2.5
Toluene	11.0	n-Tetradecane	2.5
n-Octane	6.0	n-Pentadecane	2.5

ASTM D 3798-03 p-Xylene by GC

Standard test method for analysis of p-xylene by gas chromatography

This test method covers the determination of known hydrocarbon impurities in, and the purity of p-xylene by gas chromatography. It is generally meant for the analysis of p-xylene of 99% or greater purity. Impurity concentrations can be measured range from 0.001 to 1.000 weight %.

S-4270-1ML

p-Xylene Impurity Standard with Internal Standards

11 Analytes, each Wt.% as listed; units: 1x1mL, 5x1mL + ISTD, neat

Name	Wt. %	Name	Wt. %
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
n-Undecane (ITSD)	0.5 g		

ASTM D 4294-03 Sulfur in petroleum products

Standard test method for sulfur in petroleum and petroleum products by energy-dispersive x-ray fluorescence spectroscopy

This test method covers the measurement of sulfur in hydrocarbons such as naphthas, distillates, fuel oils, residues, lubricating base oils and nonleaded gasoline. The concentration range is from 0.015 to 5.00 mass % (150 to 50 000 ppm) sulfur.

S-4051/S-4052

Sulfur Calibration Mixtures: Di-n-butyl sulfide in White Oil (less than 20mg/kg S)

Unit : 10 mL screw cap bottle



Light White Mineral Oil (20 cSt at 40°C)	Heavy White Mineral Oil (70 cSt at 40°C)	mgS/g (ppm)	Wt.%
S-4052-0-LW	S-4051-0-HW	Blank	0
S-4052-100-LW	S-4051-100-HW	100	0.01
S-4052-K-LW	S-4051-K-HW	1 000	0.1
S-4052-5K-LW	S-4051-5K-HW	5 000	0.5
S-4052-10K-LW	S-4051-10K-HW	10 000	1
S-4052-25K-LW	S-4051-25K-HW	25 000	2.5
S-4052-50K-LW	S-4051-50K-HW	50 000	5
S-4052-Kit	S-4051-Kit	Kit of above solutions	

ASTM D 4629-02 Trace nitrogen in petroleum products

Standard test method for trace nitrogen in liquid petroleum hydrocarbons by syringe/inlet oxidative combustion and chemiluminescence detection.

This test method is used to determine trace total nitrogen naturally found in liquid hydrocarbons boiling point from 50 to 400 °C and with viscosities between 0.2 and 10 cSt. Use of this method to monitor feed stocks for nitrogen can prevent the poisoning of some process catalysts when trace nitrogenous materials are present.

S-4140-ASS-IO

Nitrogen Calibration Set-Low Boiling Solvents

Units: 1x1mL ampoules or 10 mL screw cap bottle

Nitrogen introduced using Pyridine

Catalogue No.	Concentration
Matrix: isooctane	mg/kg (ppm)
S-4140-0-IO	Blank
S-4140-03-IO	0.3
S-4140-1-IO	1.0
S-4140-10-IO	10
S-4140-25-IO	25
S-4140-50-IO	50
S-4140-75-IO	75
S-4140-100-IO	100

S-4141-ASS-IO

Nitrogen Calibration Set-High Boiling Solvents

Units: 1x1mL ampoules or 10 mL screw cap bottle

Nitrogen introduced using Carbazole

Catalogue No.	Concentration
Matrix: isooctane	mg/kg (ppm)
S-4141-0-IO	Blank
S-4141-03-IO	0.3
S-4141-1-IO	1.0
S-4141-10-IO	10
S-4141-25-IO	25
S-4141-50-IO	50
S-4141-75-IO	75
S-4141-100-IO	100



S-4142-ASS-IO

Low level Nitrogen Calibration

Units: 1x1mL ampoules or 10mL screw cap bottle
Nitrogen introduced using Aniline

Catalogue No.	Concentration
Matrix: isooctane	mg/kg (ppm)
S-4142-0-IO	Blank
S-4142-05-IO	0.5
S-4142-1-IO	1.0
S-4142-2-IO	2.0
S-4142-5-IO	5.0
S-4142-10-IO	10.0

S-4143-ASS-B

Low level Nitrogen & Sulfur Calibration Set

Units: 1x1mL ampoules or 10mL screw cap bottle
Nitrogen introduced using Aniline / Sulfur introduced using di-n-Butyl Sulfide

Catalogue No.	Concentration
Matrix: Benzene	mg/kg (ppm)
S-4143-0-B	Blank
S-4143-025-B	0.25
S-4143-050-B	0.50
S-4143-1-B	1.00

ASTM D 4735-02 Thiophene in refined benzene by GC

Standard test method for determination of trace thiophene in refined benzene by gas chromatography

This test method covers the determination of thiophene in refined benzene from 0.5 mg/kg to 5.0 mg/kg.

S-4059-ASS-LW

Thiophene in Thiophene-free Benzene

Units: 1x1mL ampoule, 10 mL screw cap bottle

Light White Mineral Oil (20 cSt at 40°C)	µg thiophene/g (ppm)	Wt. %
S-4059-0-LW	Blank	0
S-4059-05-LW	0.5	0.00005
S-4059-1-LW	1.0	0.00010
S-4059-2-LW	2.0	0.00020
S-4059-4-LW	4.0	0.00040
S-4059-Kit	Kit of above solutions	



ASTM D 4815-04 Ethers and alcohols in gasoline by GC

Standard test method for determination of MTBE, ETBE, TAME, DIPE, tertiary-amyl alcohol and C1 to C4 alcohols in gasoline by gas chromatography.

This test method covers the determination of ethers and alcohols in gasolines by gas chromatography. Specific compounds determined are methyl tert-butyl ether (MTBE), ethyl tert-butyl ether (ETBE), tert-amylmethyl ether (TAME), diisopropyl ether (DIPE), methanol, ethanol, isopropanol, n-propanol, isobutanol, tert-butanol, sec-butanol, n-butanol, and tert-pentanol (tert-amylalcohol).

S-4174-SET

Oxygenated Quantitative Calibration Mixtures

(without Internal Standard)

4 Analytes, each Wt.% as listed in isooctane/xylene (65:35); unit: 5x10mL, one of each Std.

Analyte	Analyte Calibration range	Std. 1 Wt. %	Std. 2 Wt. %	Std. 3 Wt. %	Std. 4 Wt. %	Std. 5 Wt. %
Ethanol	0.10-11.40	3.00	0.10	6.00	9.00	12.00
t-Butanol	0.10-11.40	0.10	3.00	6.00	8.00	12.00
Methyl t-butylether	0.10-19.00	20.0	15.0	10.0	5.00	0.10
t-Pentanol	0.10- 4.79	1.25	5.00	2.50	3.75	0.10
Isooctane/Xylene (65:35)	75.65	76.90	75.50	74.25	75.80	

S-4175-SET

Oxygenated Quantitative Calibration Mixtures

(with Internal Standard)

5 Analytes, each Wt.% as listed in isooctane/xylene (65:35); unit: 5x1mL, one of each Std.

Analyte	Analyte Calibration range	Std. 1 Wt. %	Std. 2 Wt. %	Std. 3 Wt. %	Std. 4 Wt. %	Std. 5 Wt. %
Ethanol	0.10-11.40	2.85	0.10	5.70	8.55	11.40
t-Butanol	0.10-11.40	0.10	2.85	5.70	7.60	11.40
Methyl t-butylether	0.10-19.00	19.00	14.25	9.50	4.75	0.10
t-Pentanol	0.10- 4.79	1.19	4.75	2.38	3.56	0.10
1,2-Dimethoxyethane (Int.Std.)		5.00	5.00	5.00	5.00	5.00
Isooctane/Xylene (65:35)		71.87	73.06	71.73	70.54	72.00
Total Oxygenates & Inter. Std.		28.14	26.95	28.28	29.46	28.00

S-4176-1ML

Qualitative Peak ID Mixture

16 Analytes, each Wt.% as listed; units: 1x1 mL and 5x1 mL neat

Name	Wt. %	Name	Wt. %
Methylcyclopentane	4.0	Diisopropyl ether	4.0
Methanol	7.3	Isobutanol	7.3
Ethanol	7.3	Ethyl tert-butyl ether	4.0
Isopropanol	7.3	tert-Pentanol	7.3
tert-Butanol	7.3	1,2-Dimethoxyethane	6.0
n-Propanol	7.3	n-Butanol	7.3
Methyl tert-butyl ether	4.0	Benzene	5.0
sec-Butanol	7.3	tert-Amyl methyl ether	7.3



S-4177-ASS-HX

Valve Timing Mixture

4 Analytes, each Wt.% as listed in n-hexane; units: 1x1mL, 5x1mL

Name	Wt.%
Methylcyclopentane	10.00
Diisopropyl ether	10.00
Ethyl tert-butyl ether	10.00
Methyl tert-butyl ether	10.00
n-Hexane	60.00

2046.4-1ML

Oxygenate Internal Standard mixture

Units : 1x1mL, 5x1mL

1,2-Dimethoxyethane (Neat)

S-4186-10ML

Oxygenate Free Refinery Gasoline

Blank; unit: 1x10mL, 5x10mL

RFA Gasoline (Neat)

ASTM D 4951-06

Additives in lubricating oils

Standard test method for determination of additive elements in lubricating oils by inductively coupled plasma atomic emission spectrometry

This test method covers the quantitative determination of barium, boron, calcium, copper, magnesium, phosphorus, sulfur and zinc in unused lubricating oils. The precision statements are valid for dilutions in which the mass % sample in solvent is held constant in the range 1 to 5 mass % oil.

Sulfur can be determined if the instrument can operate at a wavelength of 180 nm.

Standards:

Di-n-butyl sulfide in solvent of choice (e.g. S-4050, S-4051, S-4052)

See the Applications section for sulfur and phosphorous analysis, pages 195 and 204.

ASTM D 5186-03

Determination of aromatic content & polynuclear aromatic content by SFC

Standard test method for determination of the aromatic content and polynuclear aromatic content of diesel fuels and aviation turbine fuels by supercritical fluid chromatography.

This test method covers the determination of the total amount of monoaromatic and polynuclear aromatic hydrocarbon compounds in motor diesel fuels, aviation turbine fuels, and blend stocks by supercritical fluid chromatography (SFC).

**S-4157-1ML****Performance Control Mixture**

4 Analytes each Wt.% as listed; units: 1x1 mL, 5x1 mL neat

Name	Wt. %	Name	Wt. %
n-Hexadecane	75.0	Tetralin	3.0
Naphthalene	2.0	Toluene	20.0

S-4158-ASS-HD**Detector Linearity Check**

Unit: 2x1mL

25 % w/w # 2 Diesel Fuel in n-Hexadecane

50 % w/w # 2 Diesel Fuel in n-Hexadecane

ASTM D 5307-97(2002)

Boiling range distribution of crude petroleum by GC

Standard test method for determination of boiling range distribution of crude petroleum by gas chromatography

This test method covers the determination of the boiling range distribution of water-free crude petroleum through 538 °C (1000 °F). Material boiling above 538 °C is reported as residue. This test method is applicable to whole crude samples, which can be solubilized in a solvent to permit sampling by means of a microsyringe.

S-4144-5K-CS**Petrochemical Quantitative Standard C10-C44**16 Analytes, each 5000µg/mL in carbon disulfide (CS₂); units: 1x1,5 mL, 5x1,5mL

Use to determine detector response factors.

n-Decane	C10	n-Eicosane	C20
n-Undecane	C11	n-Tetracosane	C24
n-Dodecane	C12	n-Octacosane	C28
n-Tridecane	C13	n-Dotriacontane	C32
n-Tetradecane	C14	n-Hexatriacontane	C36
n-Pentadecane	C15	n-Tetracontane	C40
n-Hexadecane	C16	n-Tetratetracontane	C44
n-Heptadecane	C17		
n-Octadecane	C18		

S-4145-1ML**Petrochemical Qualitative Standard C5-C9**

5 Analytes, equal Wt.%; unit: 1x1mL neat

Use in combination with Petrochemical Quantitative Standard (S-4144) to prepare a calibration mixture covering C5 to C44 for calibrating retention times for boiling point correlation.

n-Pentane	C5
n-Hexane	C6
n-Heptane	C7
n-Octane	C8
n-Nonane	C9



S-4146-25ML

Petrochemical Internal Standard C14-C17

4 Analytes, equal Wt.%; unit : 25 ml screw-capped bottle

n-Tetradecane	C14	n-Hexadecane	C16
n-Pentadecane	C15	n-Heptadecane	C17

S-4151-10K-OC

Column Resolution Test Mix C16-C18

2 Analytes, each 1,0 Wt.% in n-Octane; unit : 5x1 mL

n-Hexadecane	C16
n-Octadecane	C18

ASTM D 5441-98(2003)e1 Purity of methyl tert-butyl ether by GC

Standard test method for analysis of methyl tert-butyl ether (MTBE) by gas chromatography.

This test method provides for determination of the purity of methyl tert-butyl ether (MtBE) by gas chromatography. It also provides a procedure to measure impurities in MtBE such as C4 to C12 olefins, methyl, isopropyl and tert-butyl alcohols, methyl sec-butyl and methyl tert-amyl ethers, acetone, and methyl ethyl ketone.

S-4180-K-MT

S-4180-K-5MT

MTBE Contaminant Standard

Low Contaminant Mixture

11 Analytes, each 0,1 Wt.% in MTBE; units: 1x1mL, 5x1mL, 1x5mL, 5x5mL

tert-Amyl methyl ether	2-Methylbutane	trans-2-Pentene
tert-Butanol	2-Methyl-2-butene	Triisobutylene
tert-Butyl ethyl ether	Pentane	2,4,4-Trimethyl-1-pentene
Methanol	cis-2-Pentene	

S-4181-10K-MT

S-4181-10K-5MT

MTBE Contaminant Standard

High Contaminant Mixture

11 Analytes, each 1,0 Wt.% in MTBE; units: 1x1mL, 5x1mL, 1x5mL, 5x5mL

tert-Amyl methyl ether	2-Methylbutane	trans-2-Pentene
tert-Butanol	2-Methyl-2-butene	Triisobutylene
tert-Butyl ethyl ether	Pentane	2,4,4-Trimethyl-1-pentene
Methanol	cis-2-Pentene	

S-4182-10K-MT

S-4182-10K-5MT

MTBE Resolution Test Mixture

3 Analytes, each 1,0 Wt.% in MTBE; units: 1x1mL, 5x1mL, 1x5mL, 5x5mL

trans-2-Pentene
tert-Butanol
cis-Pentene

**S-4184-K-DD****Qualitative Standard**

32 Analytes, each 0,1 Wt.% in n-Dodecane; unit: 1x1mL

Methanol	n-Pentane	3-Methylpentane
Isobutylene	trans-2-Pentene	sec-Butyl methyl ether
n-Butane	tert-Butanol	Ethyl tert-butyl ether
trans-2-Butene	cis-2-Pentene	tert-Amyl methyl ether
cis-2-Butene	2-Methyl-2-butene	3,5-Dimethyl-1-hexene
3-Methyl-1-butene	Cyclopentene	2,4,4-Trimethyl-1-pentene
Acetone	Methyl tert-butyl ether	2,4,4-Trimethyl-2-pentene
Isopentane	2,3-Dimethyl-1-butene	3,4,4-Trimethyl-trans-2-pentene
2-Propanol	4-Methyl-cis-2-pentene	2,3,4-Trimethyl-2-pentene
1-Pentene	2-Methylpentane	2,2',4,6,6'-Pentamethyl-3-heptene
2-Methyl-1-butene	Methyl ethyl ketone	

S-4183-K-DD**Quantitative Standard**

28 Analytes, each 0,1 Wt.% in n-Dodecane; unit: 1x1mL

Methanol	cis-2-Pentene	Ethyl tert-butyl ether
3-Methyl-1-butene	2-Methyl-2-butene	tert-Amyl methyl ether
Acetone	Cyclopentene	3,5-Dimethyl-1-hexene
Isopentane	Methyl tert-butyl ether	2,4,4-Trimethyl-1-pentene
2-Propanol	2,3-Dimethyl-1-butene	2,4,4-Trimethyl-2-pentene
1-Pentene	4-Methyl-cis-2-pentene	3,4,4-Trimethyl-trans-2-pentene
2-Methyl-1-butene	2-Methylpentane	2,3,4-Trimethyl-2-pentene
n-Pentane	Methyl ethyl ketone	2,2,4,6,6-Pentamethyl-3-heptene
trans-2-Pentene	3-Methylpentane	
tert-Butanol	sec-Butyl methyl ether	

ASTM D 5442-93(2003)e1 Analysis of petroleum waxes

Standard test method for analysis of petroleum waxes by gas chromatography.

This test method covers the quantitative determination of the carbon number distribution of petroleum waxes in the range from n-C17 through n-C44 by gas chromatography using internal standardization. In addition, the content of linear and non-linear hydrocarbons for each carbon number is also determined.

S-4152-100-CY**Quantitative Linearity Wax Mixture C16-C44**

Each 0.01 Wt. % in Cyclohexane; unit: 1mL, 5x1mL

n-Hexadecane	C16	n-Octacosane	C28
n-Octadecane	C18	n-Triacontane	C30
n-Eicosane	C20	n-Dotriacontane	C32
n-Docosane	C22	n-Hexatriacontane	C36
n-Tetracosane	C24	n-Tetracontane	C40
n-Hexacosane	C26	n-Tetratetracontane	C44

**S-4139-500MG****Retention Time Wax Mixture C16-C44**

12 Analytes, each 8.3 Wt. % in Cyclohexane; unit: 500 mg neat

Use this standard to establishing the retention times from C16 to C44.

n-Hexadecane	C16	n-Octacosane	C28
n-Octadecane	C18	n-Triacontane	C30
n-Eicosane	C20	n-Dotriacontane	C32
n-Docosane	C22	n-Hexatriacontane	C36
n-Tetracosane	C24	n-Tetracontane	C40
n-Hexacosane	C26	n-Tetratetracontane	C44

S-4153-500-CY**Column Resolution Test Mix C20-C24**

2 Analytes, each 0,05 Wt.% in cyclohexane; unit : 5x1mL

n-Eicosane	C20
n-Tetracosane	C24

ASTM D 5443-04 Determination of PNA in distillates

Standard test method for paraffin, naphthene, and aromatic hydrocarbon type analysis in petroleum distillates through 200°C by multi-dimensional gas chromatography

This test method provides for the determination of paraffins, naphthenes, and aromatics by carbon number in low olefinic hydrocarbon streams having final boiling points of 200°C or less. Hydrocarbons with boiling points greater than 200°C and less than 270°C are reported as a single group. Olefins, if present, are hydrogenated and the resultant saturates are included in the paraffin and naphthene distribution. Aromatics with the same or higher boiling points than C9 are reported as a single aromatic group.

S-4128-500MG**Hydrocarbon Test Mixture**

28 Analytes, each Wt.% as listed; unit: 500 mg neat

Name	Wt. %	Name	Wt. %
Cyclopentane	1.0	n-Decane	4.5
n-Pentane	1.0	n-Undecane	3.5
Cyclohexane	2.0	n-Dodecane	3.0
2,3-Dimethylbutane	2.0	Benzene	2.5
n-Hexane	2.0	Toluene	2.0
1-Hexene	1.5	trans-Decahydronaphthalene	4.0
Methylcyclohexane	4.5	n-Tetradecane	4.5
4-Methyl-1-hexene	1.5	Ethylbenzene	4.5
n-Heptane	3.5	o-Xylene	4.0
1,cis-2-Dimethylcyclohexane	5.0	n-Propylbenzene	5.0
Isooctane	5.0	1,2,4-Trimethylbenzene	4.5
n-Octane	5.0	1,2,3-Trimethylbenzene	5.0
1-cis-2-cis-4-Trimethylcyclohexane	4.5	1,2,4,5-Tetramethylbenzene	5.0
n-Nonane	4.5	Pentamethylbenzene	5.0



ASTM D 5453-06

Sulfur in light hydrocarbons, motor fuels and oils

Standard test method for determination of total sulfur in light hydrocarbons, spark ignition engine fuel, diesel engine fuel, and engine oil by ultraviolet fluorescence

This test method covers the determination of total sulfur in liquid hydrocarbons, boiling at 25°C to 400°C, with viscosities between approximately 0.2 and 20 cSt at room temperature. This test method is applicable to naphthas, distillates, oils, and motor fuels, such as: gasoline, oxygen enriched gasoline, diesel, biodiesel and jet fuel. Samples containing 1.0 to 8000 mg/kg total sulfur (1 to 8000 ppm) can be analyzed.

NB! White Oil 3 cSt is similar to diesel fuel.

S-4055	Sulfur Calibr. Mix.	Dibenzothiophene in Isooctane
S-4159	Sulfur Calibr. Mix.	Dibenzothiophene in White oil (3 cSt)
S-4256	Sulfur Calibr. Mix.	Dibenzothiophene in White oil (20 cSt)
S-4254	Sulfur Calibr. Mix.	Dibenzothiophene in Toluene

Unit: 10mL screw cap bottle

Matrix

Matrix		White oil 3 cSt	White Oil 20 cSt	Concentration	
Isooctane	Toluene			µgS/g (ppm)	Wt.%
S-4055-0-IO	S-4254-0-T	S-4159-0-3C	S-4256-0-LW	Blank	0
S-4055-1-IO	S-4254-1-T	S-4159-1-3C	S-4256-1-LW	1	0.0001
S-4055-2.5-IO	S-4254-2.5-T	S-4159-2.5-3C	S-4256-2.5-LW	2.5	0.00025
S-4055-5-IO	S-4254-5-T	S-4159-5-3C	S-4256-5-LW	5	0.0005
S-4055-25-IO	S-4254-25-T	S-4159-25-3C	S-4256-25-LW	25	0.0025
S-4055-50-IO	S-4254-50-T	S-4159-50-3C	S-4256-50-LW	50	0.0050
S-4055-100-IO	S-4254-100-T	S-4159-100-3C	S-4256-100-LW	100	0.0100
S-4055-500-IO	S-4254-500-T	S-4159-500-3C	S-4256-500-LW	500	0.0500
S-4055-K-IO	S-4254-K-T	S-4159-K-3C	S-4256-K-LW	1 000	0.1000
S-4055-2.5K-IO				2 500	0.2500
S-4055-5K-IO				5 000	0.5000
S-4055-10K-IO				10 000	1.0000
S-4055-Kit	S-4254-Kit	S-4159-Kit	S-4256-Kit	Kit of above solutions	

ASTM D 5580-02

Determination aromatics in gasoline by GC

Standard test method for determination of benzene, toluene, ethylbenzene, p/m-xylene, o-xylene, C9 and heavier aromatics, and total aromatics in finished gasoline by gas chromatography.

This test method covers the determination of benzene, toluene, ethylbenzene, the xylene, C9 and heavier aromatics, and total aromatics in finished motor gasoline by gas chromatography.

S-4165-SET
Aromatics Quantitative Calibration Mixes
(without Internal Standard)

5 Analytes, each Wt% as listed in isooctane; unit: 5x10mL, one of each Std.



Analyte	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
o-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

S-4166-SET**Aromatics Quantitative Calibration Mixes**

(with Internal Standard)

5 Analytes + 2-hexanone as internal standard, each Wt.% as listed in isooctane; unit: 5x1mL one of each Std.

Analyte	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
o-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 (ISTD)		10.00	10.00	10.00	10.00	10.00
Isooctane		74.16	68.40	72.90	72.45	72.90

S-4167-ASS-10IO**Valve Timing Calibration Mix**

(without Internal Standard)

4 Analytes, each Wt.% as listed in isooctane; units: 1x10mL, 5x10 mL

Name	Wt.%	Name	Wt.%
Benzene	5.0	o-Xylene	10.0
Toluene	5.0	Isooctane	70.0
Ethylbenzene	10.0		

S-4168-ASS-10IO**Valve Timing Calibration Mix**

(with Internal Standard)

5 Analytes, each Wt.% as listed in isooctane; units: 1x10 mL and 5x10 mL

Name	Wt.%	Name	Wt.%
Benzene	4.5	o-Xylene	9.0
Toluene	4.5	2-Hexanone (ISTD)	10.0
Ethylbenzene	9.0	Isooctane	63.0

2045.6-5ML**Internal Standard**

2-Hexanone; units: 1x5ml, 5x5ml neat

1132-12-15K-IO**Selectivity Check Standard**

n-Dodecane, 1,5 Wt.% in isooctane; units: 1x1mL, 5x1mL



S-4171-10ML

Daily Quality Control Standard

(without Internal Standard)

14 Analytes, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
n-Hexane	12	Toluene	9
n-Heptane	20	Ethylbenzene	2
n-Octane	15	p-Xylene	3
n-Decane	10	o-Xylene	2
n-Dodecane	1	1,2,4-Trimethylbenzene	3
Isooctane	20	1,2,4,5-Tetramethylbenzene	1
Benzene	1	Naphthalene	1

S-4172-10ML

Daily Quality Control Standard

(with Internal Standard)

15 Analytes, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
n-Hexane	11	Ethylbenzene	1
n-Heptane	19	p-Xylene	2
n-Octane	14	o-Xylene	1
n-Decane	9	1,2,4-Trimethylbenzene	2
n-Triadecane	1	1,2,4,5-Tetramethylbenzene	1
Isooctane	19	Naphthalene	1
Benzene	1	2-Hexanone (ISTD)	10
Toluene	8		

ASTM D 5599-00(2005) Quantitative determination of oxygenates in gasoline by GC

Standard test method for determination of oxygenates in gasoline by gas chromatography and oxygen selective flame ionization detection.

This test method covers the quantitative determination of organic oxygenated compounds in gasoline having a final boiling point not greater than 220 °C and oxygenates having a boiling point limit of 130 °C.

S-4202-SET

Oxygenates Calibration Curve

(with Internal Standard)

14 Analytes, each Wt.% as listed in RFA Gasoline; units: 8x1mL, 5x(8x1)mL, one of each Std.



Analyte Calibration range	Std.1	Std.2	Std.3	Std.4	Std.5	Std.6	Std.7	Std.8
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	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	—	—
iso-Butanol 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
Total oxygenates & ISTD	29.8	31.2	31.3	31.5	31.5	31.2	31.6	0

S-4201-SET

Oxygenates Calibration Curve

(without Internal Standard)

13 Analytes, each Wt.% as listed in RFA Gasoline; unit: 8x10mL, one of each Std.

Analyte Calibration range	Std.1	Std.2	Std.3	Std.4	Std.5	Std.6	Std.7	Std.8
	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	Wt. %	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	—	—
iso-Butanol 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	64.8	64.7	64.5	64.5	64.8	64.4	100
Total oxygenates	25.8	27.2	27.3	27.5	27.5	27.2	27.6	0

S-4194-ASS-10RF

Oxygenate Quality Control Standard

(without Internal Standard)

13 Analytes, each Wt.% as listed in RFA Gasoline; units: 1x10 mL, 5x10 mL

Name	Wt. %	Name	Wt. %
Methanol	1	Di-isopropyl ether	3
Ethanol	1	iso-Butanol	1
Isopropanol	1	EtBE	3
t-Butanol	1	t-Pentanol	1
Propanol	1	Butanol	1
MtBE	3	TAME	3
sec-Butanol	1	RFA Gasoline	79



S-4196-ASS-10RF

**Revised Oxygenate Quality Control Standard
(without Internal Standard)**

13 Analytes, each Wt.% as listed in RFA Gasoline; units: 1x10mL, 5x10mL

Name	Wt.%	Name	Wt.%
Methanol	1	Di-isopropyl ether	1
Ethanol	1	iso-Butanol	1
Isopropanol	1	EtBE	3
t-Butanol	1	t-Pentanol	1
Propanol	1	Butanol	1
MtBE	3	TAME	3
sec-Butanol	1	RFA Gasoline	81

S-4195-ASS-5RF

Oxygenate Quality Control Standard

(with Internal Standard)

14 Analytes, each Wt.% as listed in RFA Gasoline; units: 1x5mL, 5x5mL

Name	Wt.%	Name	Wt.%
Methanol	1	Di-isopropyl ether	3
Ethanol	1	iso-Butanol	1
Isopropanol	1	EtBE	3
t-Butanol	1	t-Pentanol	1
Propanol	1	Butanol	1
MtBE	3	TAME	3
sec-Butanol	1	RFA Gasoline	79

1,2-Dimethoxyethane (ISTD) combined with the above 14 compounds in a 4 to 100 weight ratio.

S-4197-ASS-10RF

Revised Oxygenate Quality Control Standard

(with Internal Standard)

14 Analytes, each Wt.% as listed in RFA Gasoline; units: 1x10mL, 5x10mL

Name	Wt.%	Name	Wt.%
Methanol	1	Di-isopropyl ether	1
Ethanol	1	iso-Butanol	1
Isopropanol	1	EtBE	3
t-Butanol	1	t-Pentanol	1
Propanol	1	Butanol	1
MtBE	3	TAME	3
sec-Butanol	1	RFA Gasoline	81

1,2-Dimethoxyethane (ISTD) combined with the above 14 compounds in a 4 to 100 weight ratio.

2046.4-40K-10RF

Gasoline Refinery Blank

2046.4-1ML

(with Internal Standard)

1,2-Dimethoxyethane (ISTD), 4 Wt.% in RFA Gasoline or neat; units: 1x10mL, 5x10mL, 1mL neat

**S-4187-SET****EPA O-FID Quantitative Calibration Mixes**

(without Internal Standard)

4 Analytes, each Wt.% as listed in RFA Gasoline; unit: 5x10mL, one of each Std.

	Analyte	Std. 1	Std. 2	Std. 3	Std. 4	Std. 5
	Calibr. range	Wt. %	Wt. %	Wt. %	Wt. %	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
t-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

S-4188-SET**EPA O-FID Quantitative Calibration Mixes**

(with Internal Standard)

5 Analytes, each Wt.% as listed in RFA Gasoline; unit: 5x1mL, one of each Std.

	Analyte	Std. 1	Std. 2	Std. 3	Std. 4	Std. 5
	Calibr. range	Wt. %	Wt. %	Wt. %	Wt. %	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
t-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

S-4189-ASS-10RF**EPA O-FID Quantitative Calibration Check Standard**

(without Internal Standard)

4 Analytes, each Wt.% as listed in RFA Gasoline; units: 1x10mL, 5x10mL

Name	Wt.%	Name	Wt.%
Methanol	4.0	Methyl tert-butyl ether	12.0
Ethanol	8.0	RFA Gasoline	71.0
tert-Butanol	5.0		

S-4190-ASS-5RF**EPA O-FID Quantitative Calibration Check Standard**

(with Internal Standard)

5 Analytes, each Wt.% as listed in RFA Gasoline; units: 1x5mL, 5x5mL

Name	Wt.%	Name	Wt.%
Methanol	3.80	Methyl tert-butyl ether	11.40
Ethanol	7.60	1,2-Dimethoxyethane (ISTD)	5.00
tert-Butanol	4.75	RFA Gasoline	67.45

S-4192-5ML**EPA O-FID Spiking Solution**

4 Analytes, each Wt.% as listed; units: 1x5ml, 5x5ml neat

Name	Wt.%	Name	Wt.%
Methanol	14.3	tert-Butanol	14.3
Ethanol	28.6	Methyl tert-butyl ether	42.8



3961-10ML

Gasoline Refinery Blank

RFA Gasoline; units: 1x10mL, 5x10mL neat

ASTM D 5622-95(2005) Total oxygen in gasoline and methanol by reductive pyrolysis

Standard test method for determination of total oxygen in gasoline and methanol fuels by reductive pyrolysis.

This test method covers the quantitative determination of total oxygen in gasoline and methanol fuels by reductive pyrolysis.

S-4185

Standards for Total Oxygen in Gasoline & MeOH Fuels by Reductive Pyrolysis

9 Analytes + an RFA gasoline blank, each Oxygenate Wt.% as listed; units: (2+1)x10mL

Cat.No.	Description (2x10 mL, + an RFA gasoline blank)	Oxygenate Wt. %	Unit
S-4185-1	Ethanol in Oxygenate free RFA gasoline	5.0	3x10ml
S-4185-2	Ethanol in Oxygenate free RFA gasoline	10.0	3x10ml
S-4185-3	t-Amyl methyl ether in Oxygenate free RFA gasoline	10.0	3x10ml
S-4185-4	t-Amyl methyl ether in Oxygenate free RFA gasoline	15.0	3x10ml
S-4185-5	Ethyl t-butyl ether in Oxygenate free RFA gasoline	10.0	3x10ml
S-4185-6	Ethyl t-butyl ether in Oxygenate free RFA gasoline	15.00	3x10ml
S-4185-7	Methyl t-butyl ether in Oxygenate free RFA gasoline	10.00	3x10ml
S-4185-8	Methyl t-butyl ether in Oxygenate free RFA gasoline	15.00	3x10ml
S-4185-9	Methanol & t-Butanol in Oxygenate free RFA gasoline	10.0 & 5.0	3x10ml

3961-10ML

Oxygenate Free Gasoline Refinery Blank

RFA Gasoline; unit : 1x10mL neat

ASTM D 5623-94(2004)e1 Sulfur in light petroleum products by GC

Standard test method for sulfur compounds in light petroleum liquids by gas chromatography and sulfur selective detection

This test method covers the determination of volatile sulfur-containing compounds in light petroleum liquids. The method is applicable to distillates, gasoline motor fuels (including oxygenates) and other petroleum liquids with a final boiling point of approximately 230 °C or lower. The test method is applicable to the determination of individual sulfur species at levels of 0.1 to 100 mg/kg (0.1 to 100 ppm).

Internal standards

The internal standard should not be an original compound in the sample and should be resolved from sulfur compounds in the sample. The following alternative sulfur compounds are recommended and are available as stock solutions from Chiron. An internal standard stock solution should be in the range 0.1 - 1 g S/kg. Typical GC-purities are given.



S-4035
S-4037
S-4036

Diphenylsulfide (99.3 %) in isooctane
2-Bromothiophene (99.7 %) in isooctane
3-Chlorothiophene (99.1 %) in isooctane
Units: 5x1mL ampoules or 10 mL screw-capped bottle

Catalogue No.			Concentration	
Matrix: Isooctane				
Diphenyl sulfide	2-Bromothiophene	3-Chlorothiophene	mgS/g (ppm)	Wt. %
S-4035-0-IO	S-4037-0-IO	S-4036-0-IO	Blank	0
S-4035-K-IO	S-4037-K-IO	S-4036-K-IO	1 000	0.1
S-4035-5K-IO	S-4037-5K-IO	S-4036-5K-IO	5 000	0.5
S-4035-10K-IO	S-4037-10K-IO	S-4036-10K-IO	10 000	1.0

System test mixture

The system test mixture covers the volatility range of interest for the analysis and is made according to ASTM D 4307.

S-4038

Sulfur System Test Mixture, 10 mL in Toluene/Isooctane (1:9)

S-4038-1	S-4038-2	
100 ppm	0.1 ppm	Dimethyl sulfide
100 ppm	0.1 ppm	2-Propanethiol
10 000 ppm	10 ppm	Dimethyl disulfide
100 000 ppm	100 ppm	3-Methylthiophene
10 000 ppm	10 ppm	Benzothiophene

Sulfur compounds standards

The sulfur standards are available as test mixtures, neat or as a 1000µg/mL solution of each analyte in isooctane.

S-4039-1ML

ASTM D 5623 Sulfur Compounds Standard I

14 Analytes, approximately 7,14 % of each (by weight); unit: 1x1mL neat

Prod.nr	Compounds	Prod.nr	Compounds
0184.2	Ethanethiol	0192.4	2-Methyl-1-propanethiol
0185.2	Dimethyl sulfide	0193.4	Diethyl sulfide
0186.1	Carbon disulfide	0194.4	1-Butanethiol
0188.4	2-Methyl-2-propanethiol	0195.5	Dimethyl disulfide
0189.3	1-Propanethiol	0934.5	2-Methylthiophene
0190.3	Ethylmethyl sulfide	0935.5	3-Methylthiophene
0933.4	Thiophene	0196.4	Diethyl disulfide

S-4040-K-IO

ASTM D 5623 Sulfur Compounds Standard II

7 Analytes, each 1000µg /mL in isooctane; unit: 1x1mL

Prod.nr	Compounds	Prod.nr	Compounds
0946.9	2-Methylbenzothiophene	0199.9	6-Methylbenzothiophene
0947.9	3-Methylbenzothiophene	0951.9	7-Methylbenzothiophene
0198.9	4-Methylbenzothiophene	0907.12	Diphenyl sulfide
0356.9	5-Methylbenzothiophene		



S-4474-500-IO

ASTM D 5623 Sulfur Compounds Standard III, Dimethylbenzothiophenes

5 Analytes, each approximately 500µg/mL in isooctane; unit: 1x1mL

0952.10	2,3-Dimethylbenzothiophene
0953.10	2,4-Dimethylbenzothiophene
0954.10	2,5-Dimethylbenzothiophene
0953.10	2,6-Dimethylbenzothiophene
0957.10	3,5-Dimethylbenzothiophene

ASTM D 5739-06 Oil spill analysis by GC

NEW

Standard practice for oil spill source – Identification by gas chromatography and positive ion electron impact low resolution mass spectrometry

The scope of the method is to use GC-MS to analyse and compare petroleum oil spills and suspected sources.

Naphthalenes (C2-C4), dibenzothiophenes (C0-C3), phenanthrenes/anthracene (C0-C3), steranes (14α(H) and 14β(H)), triterpanes, and alkanes are identified.

The following products are recommended and are carried by Chiron:

1027.12-500MG

Perfluorotri-n-butylamine (PFTBA, “Heptacosa”)

for tuning the mass spectrometer

Mass spec. grade 500 mg

S-4041-015-10CY

Resolution Test Mixture for ASTM D 5739

150 ng/mL of each in pesticide grade cyclohexane, 10mL

Pristane
Phytane
n-Heptadecane
n-Octane

S-4042-015-10CY

Mass Discrimination Test Mixture for ASTM D 5739

150 ng/mL in pesticide grade cyclohexane, 10mL

Naphthalene
Fluoranthene
Benzo[ghi]perylene



Reference compounds for ASTM D 5739

Compound Group	m/z	Available from Chiron, see the Compounds section
Naphthalenes, C2	156	All possible dimethyl- and ethyl- isomers are available
Naphthalenes, C3	170	16 Isomers available
Naphthalenes, C4	184	4 Isomers available: 2-Butylnaphthalene Eudalene 1,4,6,7-Tetramethylnaphthalene 1,2,5,6-Tetramethylnaphthalene
Dibenzothiophene, C0	184	Dibenzothiophene
Dibenzothiophenes, C1	198	All monomethyl-isomers available
Dibenzothiophenes, C2	212	11 Isomers of dimethyl- and ethyldibenzothiophenes
Dibenzothiophenes, C3	226	8 Isomers of trimethyl- and propyldibenzothiophenes
Phenanthrene, C0	178	Phenanthrene
Phenanthrenes, C1	192	All four possible monomethyl-isomers available
Phenanthrenes, C2	206	All dimethyl and two ethylphenanthrenes available
Phenanthrenes, C3	220	9 Trimethyl and ethyl-methyl isomers available
Anthracene, C0	178	Anthracene
Anthracene, C1	192	All three possible monomethyl-isomers available
Anthracene, C2	206	8 Isomers available
Anthracene, C3	220	1,2,4-Trimethylanthracene
Steranes, 14 α (H)	217	5 α (H),14 α (H),17 α (H),(20S)-Cholestane (C27) 5 α (H),14 α (H),17 α (H),(20R)-Cholestane (C27) 24-Methyl-5 α (H),14 β (H),17 β (H),(20R)-cholestane(C28) 24-Ethyl-5 α (H),14 α (H),17 α (H),(20S)-cholestane (C29) 24-Ethyl-5 α (H),14 α (H),17 α (H),(20R)-cholestane (C29)
Steranes, 14 β (H)	218	5 α (H),14 β (H),17 β (H),(20R)-Cholestane (C27) 24-Ethyl-5 α (H),14 β (H),17 β (H),(20R)-cholestane (C29)
Triterpanes	191	17 α (H),21 β (H)-Hopane (C30) 17 β (H),21 α (H)-Hopane (C30) 17 β (H),21 β (H)-Hopane (C30) (Several others are available, see the “hopane” sections)
Alkanes	85	Available from C5 to C60
Alkanes and		
Acyclic isoprenoids	183	See “head to tail” and “tail to tail” isoprenoids
Benzonaphthothiophenes	234	11 Isomers available
Tri-aromatic steranes	231	6 compounds available
Norhopanes	177	6 Trisnor-, 2 bisnor- and 6 norhopanes are available
Methylhopanes	205	NEW: 2- and 3-methylhopanes available
Pyrene/Fluoranthene	202	Both available
Methylpyrenes	216	8 alkylpyrene from C01 to C4
Fluorenes	166	Fluorene and 8 alkylfluorenes available
Bicyclonaphthalenes	208	

Mixes are available on request



ASTM D 5769-04

Benzene, toluene, and total aromatics in finished gasolines by GC-MS

Standard test method for determination of benzene, toluene, and total aromatics in finished gasolines by gas chromatography/mass spectrometry

This test method covers the determination of benzene, toluene, other specified individual aromatic compounds, and total aromatics in finished motor gasoline, including gasolines containing oxygenated blending components, by gas chromatography-mass spectrometry (GC-MS).

Chiron AS offers different versions for the standard for calibration and identification.

S-4120-10ML

Daily Quality Control Standard

(without Internal Standard)

14 Analytes, each Wt.% as listed; units: 1x10 mL, 5x10 mL neat

Name	Wt.%	Name	Wt.%
n-Hexane	12	Toluene	9
n-Heptane	17	m-Xylene	3
n-Octane	17	o-Xylene	3
n-Decane	12	Ethylbenzene	3
n-Dodecane	5	1,2,4-Trimethylbenzene	3
2,2,4-Trimethylpentane	12	1,2,4,5-Tetramethylbenzene	2
Benzene	1	Naphthalene	1

The Daily Quality Control Standard is also available with different Internal Standard compositions added. Those options are listed further on in this section.

1502.10-100-IO

Sensitivity Test Solution

1,4-Diethyl benzene, 100 µg/mL in isooctane; units: 1x1mL, 5x1mL

1269.9-30K-IO

Fragmentation Pattern Standard

1,2,3-Trimethylbenzene, 3,0 Wt.% in isooctane; units: 1x1mL, 5x1mL

S-4199-30K-IO

Resolution Standard

2 Analytes, each 3,0 Wt.% in isooctane; units: 1x1mL, 5x1mL

1,3,5-Trimethylbenzene
1-Methyl-2-ethylbenzene

1264.7-30K-IO

Mass Scan Range Standard

Toluene 3,0 Wt.% in isooctane; units: 1x1mL, 5x1mL

S-4178 / S-4179

Aromatics Calibration Standards Kit

(without Internal Standard)

24 Analytes, each Vol.% as listed in isooctane; units: 5x10mL Set, one of each Std. 1-5 + opt. 1x1 mL (Std. 6)



Standard 6 of the calibration set is optional. It has been added in order to improve the linearity of the calibration curve. Use of the sixth standard provides an additional calibration point that is desirable when the calibration curve is developed using a quadratic fit.

Analyte	S-4178 (Std. 1-5)					S-4179
	Std. 1	Std. 2	Std. 3	Std. 4	Std. 5	Std. 6
	Vol. %	Vol. %	Vol. %	Vol. %	Vol. %	Vol. %
Benzene	3	1.50	0.75	0.375	0.1875	2.25
Toluene	19	9.50	4.75	2.375	1.1875	15
Ethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
m-Xylene	6	3.00	1.50	0.750	0.3750	4.50
p-Xylene	6	3.00	1.50	0.750	0.3750	4.50
o-Xylene	6	3.00	1.50	0.750	0.3750	4.50
Isopropylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Propylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-3-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-4-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,3,5-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-2-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2,4-Trimethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
1,2,3-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
Indan	3	1.50	0.75	0.375	0.1875	2.25
1,4-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Butylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2,4,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	4.0
1,2,3,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
Naphthalene	2	1.00	0.50	0.250	0.1250	1.5
Pentamethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
1-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5
2-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5

The calibration set is supplied with a datasheet listing the weight% for each component in the formulation.

S-4129-10ML

3 Deuterated Compounds Internal Standard Mix

3 Analytes, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt. %	Name	Wt. %
Benzene-d6	39.7	Naphthalene-d8	20.9
Ethylbenzene-d10	39.3		

S-4161-10ML

4 Deuterated Compounds Internal Standard Mix

4 Analytes, each Wt.% as listed; units: 1x10 mL, 5x10mL neat

Name	Wt. %	Name	Wt. %
Benzene-d6	16.7	Naphthalene-d8	8.8
Ethylbenzene-d10	16.5	Toluene-d8	57.9



S-4251/ S-4252

Aromatics Calibration Standards Kit

(3 Internal Standard Version)

24 Analytes + 3 ISTD, each Vol.% as listed in isooctane; units: 5x1mL Set, one of each Std. 1-5 + opt. 1x1mL (Std. 6)

To these calibration standards are 3 deuterated Internal Standards added. Standard 6 of the calibration set is optional. It has been added in order to improve the linearity of the calibration curve. Use of the sixth standard provides an additional calibration point that is desirable when the calibration curve is developed using a quadric fit.

Analyte	S-4251 (Std.1-5)					S-4252
	Std. 1 Vol.%	Std. 2 Vol.%	Std. 3 Vol.%	Std. 4 Vol.%	Std. 5 Vol.%	Std. 6 Vol.%
Benzene	3	1.50	0.75	0.375	0.1875	2.25
Toluene	19	9.50	4.75	2.375	1.1875	15
Ethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
m-Xylene	6	3.00	1.50	0.750	0.3750	4.50
p-Xylene	6	3.00	1.50	0.750	0.3750	4.50
o-Xylene	6	3.00	1.50	0.750	0.3750	4.50
Isopropylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Propylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-3-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-4-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,3,5-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-2-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2,4-Trimethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
1,2,3-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
Indan	3	1.50	0.75	0.375	0.1875	2.25
1,4-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Butylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2,4,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	4.0
1,2,3,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
Naphthalene	2	1.00	0.50	0.250	0.1250	1.5
Pentamethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
1-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5
2-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5

(S-4129)

3 Deuterated Compounds, Internal Standard Mixture

Benzene-d6	2	2	2	2	2	2
Ethylbenzene-d10	2	2	2	2	2	2
Naphthalene-d8	1	1	1	1	1	1

The calibration set is supplied with a datasheet listing the weight% for each component in the formulation.

**S-4130-10ML****Daily Quality Control Standard**

(with 3 Deuterated Compounds Internal Standard)

14 Analytes + 3 ISTD, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
n-Hexane	12	Toluene	9
n-Heptane	17	m-Xylene	3
n-Octane	17	o-Xylene	3
n-Decane	12	Ethylbenzene	3
n-Dodecane	5	1,2,4-Trimethylbenzene	3
2,2,4-Trimethylpentane	12	1,2,4,5-Tetramethylbenzene	2
Benzene	1	Naphthalene	1

The 3 Deuterated Compounds Internal Standard Mixture S-4129 is mixed with the 14 Analytes Daily Quality Control Standard S-4130 in a 5 to 100 weight ratio.

S-4258/ S-4259**Aromatics Calibration Standards Kit**

(4 Internal Standard Version)

24 Analytes + 4 ISTD, each Vol.% as listed in isooctane; units: 5x1mL Set, one of each Std. 1-5 + opt. 1x1mL (Std. 6)

To these calibration standards are 4 deuterated Internal Standards added. ASTM D 5769-98 recommends the use of a fourth internal standard toluene-d8. The use of toluene-d8 improves the analytical results for toluene. Standard 6 of the calibration set is optional. It has been added in order to improve the linearity of the calibration curve. Use of the sixth standard provides an additional calibration point that is desirable when the calibration curve is developed using a quadratic fit.

Analyte	S-4258 (Std. 1-5)					S-4259
	Std. 1 Vol.%	Std. 2 Vol.%	Std. 3 Vol.%	Std. 4 Vol.%	Std. 5 Vol.%	Std. 6 Vol.%
Benzene	3	1.50	0.75	0.375	0.1875	2.25
Toluene	19	9.50	4.75	2.375	1.1875	15
Ethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
m-Xylene	6	3.00	1.50	0.750	0.3750	4.50
p-Xylene	6	3.00	1.50	0.750	0.3750	4.50
o-Xylene	6	3.00	1.50	0.750	0.3750	4.50
Isopropylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Propylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-3-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-4-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,3,5-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-2-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2,4-Trimethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
1,2,3-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
Indan	3	1.50	0.75	0.375	0.1875	2.25
1,4-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Butylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2,4,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	4.0
1.2.3.5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
Naphthalene	2	1.00	0.50	0.250	0.1250	1.5
Pentamethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
1-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5
2-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5



(S-4161)

4 Deuterated Compounds, Internal Standard Mixture

Benzene-d6	2	2	2	2	2	2
Ethylbenzene-d10	2	2	2	2	2	2
Naphthalene-d8	1	1	1	1	1	1
Toluene-d8	7	7	7	7	7	7

The calibration set is supplied with a datasheet listing the weight% for each component in the formulation.

S-4249-10ML

Daily Quality Control Standard

(with 4 Deuterated Compounds Internal Standard)

14 Analytes + 4 ISTD, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
n-Hexane	12	Toluene	9
n-Heptane	17	m-Xylene	3
n-Octane	17	o-Xylene	3
n-Decane	12	Ethylbenzene	3
n-Dodecane	5	1,2,4-Trimethylbenzene	3
2,2,4-Trimethylpentane	12	1,2,4,5-Tetramethylbenzene	2
Benzene	1	Naphthalene	1

The 4 Deuterated Compounds Internal Standard Mixture S-4161 is mixed with the 14 Analytes Daily Quality Control Standard S-4120 in a 12 to 100 weight ratio.

S-4228-10ML

4 Fluorinated Internal Standard Mix

4 Analytes, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
Fluorobenzene	16.7	1-Fluoronaphthalene	8.8
4-Ethyl-1-fluorobenzene	16.5	3-Fluorotoluene	57.9

S-4269-10ML

3 Fluorinated Internal Standard Mix

3 Analytes, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
Fluorobenzene	39.7	1-Fluoronaphthalene	20.9
4-Ethyl-1-fluorobenzene	39.3		

S-4260/ S-4261

Aromatics Calibration Standards Kit

(3 Internal Standard Version)

24 Analytes + 3 ISTD, each Vol.% as listed in isooctane; unit: 5x1mL Set, one of each Std. 1-5 + opt. 1x1mL (Std. 6)

To these calibration standards are 3 fluorinated Internal Standards added. Standard 6 of the calibration set is optional. It has been added in order to improve the linearity of the calibration curve. Use of the sixth standard provides an additional calibration point that is desirable when the calibration curve is developed using a quadric fit.



Analyte	S-4260 (Std. 1-5)					S-4261
	Std. 1	Std. 2	Std. 3	Std. 4	Std. 5	Std. 6
	Vol.%	Vol.%	Vol.%	Vol.%	Vol.%	Vol.%
Benzene	3	1.50	0.75	0.375	0.1875	2.25
Toluene	19	9.50	4.75	2.375	1.1875	15
Ethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
m-Xylene	6	3.00	1.50	0.750	0.3750	4.50
p-Xylene	6	3.00	1.50	0.750	0.3750	4.50
o-Xylene	6	3.00	1.50	0.750	0.3750	4.50
Isopropylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Propylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-3-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-4-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,3,5-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-2-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2,4-Trimethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
1,2,3-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
Indan	3	1.50	0.75	0.375	0.1875	2.25
1,4-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Butylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1,2,4,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	4.0
1,2,3,5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
Naphthalene	2	1.00	0.50	0.250	0.1250	1.5
Pentamethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
1-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5
2-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5

(S-4269)

3 Fluorinated Compounds, Internal Standard Mixture

Fluorobenzene	2	2	2	2	2	2
4-Ethyl-1-fluorobenzene	2	2	2	2	2	2
1-Fluoronaphthalene	1	1	1	1	1	1

The calibration set is supplied with a datasheet listing the weight% for each component in the formulation.

S-4150-10ML

Daily Quality Control Standard

(with 3 Fluorinated Compounds Internal Standard)

14 Analytes + 3 ISTD, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
n-Hexane	12	Toluene	9
n-Heptane	17	m-Xylene	3
n-Octane	17	o-Xylene	3
n-Decane	12	Ethylbenzene	3
n-Dodecane	5	1,2,4-Trimethylbenzene	3
2,2,4-Trimethylpentane	12	1,2,4,5-Tetramethylbenzene	2
Benzene	1		
Naphthalene	1		

The 3 Fluorinated Compounds Internal Standard Mixture S-4269 is mixed with the 14 Analytes Daily Quality Control S-4120 in a 5 to 100 weight ratio.



S-4262/ S-4263

Aromatics Calibration Standards Kit

(4 Internal Standard Version)

24 Analytes + 4 ISTD, each Vol.% as listed in isooctane; units: 5x1 mL Set, one of each Std.

1-5 + opt. 1x1 mL (Std. 6)

To these calibration standards are 4 fluorinated Internal Standards added.

ASTM D5769-98 recommends the use of a fourth internal standard. The use of an extra internal standard with physical properties similar to toluene improves the analytical results for toluene.

Standard 6 of the calibration set is optional. It has been added in order to improve the linearity of the calibration curve. Use of the 6th standard provides an additional calibration point that is desirable when the calibration curve is developed using a quadratic fit.

Analyte	S-4260 (Std. 1-5)					S-4261
	Std. 1 Vol.%	Std. 2 Vol.%	Std. 3 Vol.%	Std. 4 Vol.%	Std. 5 Vol.%	Std. 6 Vol.%
Benzene	3	1.50	0.75	0.375	0.1875	2.25
Toluene	19	9.50	4.75	2.375	1.1875	15
Ethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
m-Xylene	6	3.00	1.50	0.750	0.3750	4.50
p-Xylene	6	3.00	1.50	0.750	0.3750	4.50
o-Xylene	6	3.00	1.50	0.750	0.3750	4.50
Isopropylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Propylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-3-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-4-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1.3.5-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1-Methyl-2-ethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1.2.4-Trimethylbenzene	5	2.50	1.25	0.625	0.3125	3.75
1.2.3-Trimethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
Indan	3	1.50	0.75	0.375	0.1875	2.25
1.4-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
n-Butylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1.2-Diethylbenzene	3	1.50	0.75	0.375	0.1875	2.25
1.2.4.5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	4.0
1.2.3.5-Tetramethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
Naphthalene	2	1.00	0.50	0.250	0.1250	1.5
Pentamethylbenzene	2	1.00	0.50	0.250	0.1250	1.5
1-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5
2-Methylnaphthalene	2	1.00	0.50	0.250	0.1250	1.5

(S-4228)

4 Fluorinated Compounds, Internal Standard Mixture

Fluorobenzene	2	2	2	2	2	2
4-Ethyl-1-fluorobenzene	2	2	2	2	2	2
1-Fluoronaphthalene	1	1	1	1	1	1
3-Fluorotoluene	7	7	7	7	7	7

The calibration set is supplied with a datasheet listing the weight% for each component in the formulation.

**S-4248-10ML****Daily Quality Control Standard**

(with 4 Fluorinated Compounds Internal Standard)

14 Analytes + 4 ISTD, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
n-Hexane	12	Toluene	9
n-Heptane	17	m-Xylene	3
n-Octane	17	o-Xylene	3
n-Decane	12	Ethylbenzene	3
n-Dodecane	5	1,2,4-Trimethylbenzene	3
2,2,4-Trimethylpentane	12	1,2,4,5-Tetramethylbenzene	2
Benzene	1	Naphthalene	1

The 4 Fluorinated Compounds Internal Standard Mixture S-4228 is mixed with the 14 Analytes Daily Quality Control Standard S-4120 in a 12 to 100 weight ratio.

ASTM D 5986-96(2006) Oxygenates, benzene, toluene, C8-C12 aromatics and total aromatics in gasoline

Standard test method for determination of oxygenates, benzene, toluene, C8-C12 aromatics and total aromatics in finished gasoline by gas chromatography/fourier transform infrared spectroscopy.

This test method covers the quantitative determination of oxygenates: methyl-t-butyl ether (MTBE), di-isopropyl ether (DIPE), ethyl-t-butyl ether (ETBE), t-amylmethyl ether (TAME), methanol (MeOH), ethanol (EtOH), 2-propanol (2-PrOH), t-butanol (t-BuOH), i-propanol (i-PrOH), 2-butanol (2-BuOH), i-butanol (i-BuOH), 1-butanol (1-BuOH), benzene, toluene and C8-C12 aromatics, and total aromatics in finished motor gasoline by gas chromatography/Fourier Transform infrared spectroscopy (GC/FTIR).

S-4162-10ML**Daily Quality Control Standard**

(without Internal Standard)

13 Analytes, each Wt.% as listed; units: 1x10mL, 5x10mL neat

Name	Wt.%	Name	Wt.%
n-Hexane	12	Toluene	9
n-Heptane	17	m-Xylene	3
n-Octane	17	o-Xylene	3
n-Decane	12	Ethylbenzene	3
n-Dodecane	5	1,2,4-Trimethylbenzene	3
2,2,4-Trimethylpentane	12	1,2,4,5-Tetramethylbenzene	3
Benzene	1		



ASTM D 6293-98(2003)e1

O-PONA in low-olefin spark ignition engine fuels

Standard test method for oxygenates and paraffin, olefin, naphthene, aromatic (O-PONA) hydrocarbon types in low-olefin spark ignition engine fuels by gas chromatography.

This test method provides for the quantitative determination of oxygenates, paraffins, olefins, naphthenes, and aromatics in low-olefin spark-ignition engine fuels by multidimensional gas chromatography.

S-4131-1ML

Validation mixture for oxygenates and PONA

33 Analytes, each Wt.% as listed; units: 1x1mL, 5x1mL neat

Use this standard to monitor and make adjustments to the total operation of the system.

Name	Wt.%	Name	Wt.%
Cyclopentane	1.5	Benzene	2.5
n-Pentane	1.5	Toluene	2.5
Cyclohexane	2.0	trans-Decahydronaphtalene	3.5
2,3-Dimethylbutane	2.0	n-Tetradecane	2.0
n-Hexane	2.0	Ethylbenzene	3.5
1-Hexene	1.5	o-Xylene	3.0
Methylcyclohexane	3.5	n-Propylbenzene	3.5
4-Methyl-1-hexene	1.5	1,2,4-Trimethylbenzene	3.0
n-Heptane	3.0	1,2,3-Trimethylbenzene	2.0
cis-1,2-Dimethylcyclohexane	4.5	1,2,4,5-Tetramethylbenzene	2.0
2,2,4-trimethylpentane	4.0	Pentamethylbenzene	2.5
n-Octane	4.0	Ethanol	5.0
cis.cis-1,2,4-Trimethylcyclohexane	3.5	tert-Butanol	4.0
n-Nonane	3.0	MTBE (methyl tert-butyl ether)	8.0
n-Decane	3.5	ETBE (ethyl tert-butyl ether)	3.0
n-Undecane	2.0	TAME (tert-amyl methyl ether)	5.0
n-Dodecane	2.0		

S-4132-ASS-MX

Olefin mixture

5 Analytes, each Wt.% as listed in n-hexane/n-heptane = 1:1; units: 1x1mL, 5x1mL

Use this standard to adjust the olefin and Ether-Alcohol-Aromatic (EAA) trap temperatures so that C5 through C9 olefins are quantitative determined.

Name	Wt.%
1-Pentene	5.0
1-Hexene	2.0
1-Heptene	2.0
1-Octene	2.0
1-Nonene	3.0



S-4133-30K-MX

Paraffin mixture

2 Analytes, each 3 Wt.% in n-Hexane/n-Heptane = 1:1; units: 1x1mL, 5x1mL

Use this standard to adjust the olefin and Ether-Alcohol-Aromatic (EAA) trap temperatures.

Name	Wt.%
n-Nonane	3.0
n-Decane	3.0

ASTM D 6296-98(2003)e1

Quantitative determination of olefins

Standard test method for total olefins in spark-ignition engine fuels by multidimensional gas chromatography.

This test method provides for the quantitative determination of total olefins in the C4 to C10 range in spark-ignition engine fuels or related hydrocarbons streams, such as naphthas and cracked naphthas.

2151.5-50K-IO

Set Up Mixture 1

MTBE (Methyl tert-butyl ether), 5 Wt.% in isooctane; unit: 1x1mL

Use this standard to verify that all instrument components, temperatures, and cut times are accurate.

2141.6-50K-IO

Set Up Mixture 2

ETBE (Ethyl tert-butyl ether), 5 Wt.% in isooctane; unit: 1x1mL

Use this standard to verify that all instrument components, temperatures, and cut times are accurate.

S-4154-ASS-IO

Calibration standard with MTBE

9 Analytes, each Wt.% as listed in isooctane; units: 1x1mL, 5x1mL

Name	Wt.%	Name	Wt.%
Pentene	1.0	Decene	1.0
Hexene	1.0	Undecane	1.0
Heptene	1.0	Dodecane	1.0
Octene	1.0	Isooctane	87.0
Nonene	1.0	MTBE	5.0

S-4155-ASS-IO

Calibration standard with ETBE

10 Analytes, each Wt.% as listed in isooctane; units: 1x1mL, 5x1mL

Name	Wt.%	Name	Wt.%
Pentene	1.0	Decane	1.0
Hexene	1.0	Undecane	1.0
Heptene	1.0	Dodecane	1.0
Octene	1.0	Isooctane	86.0
Nonene	1.0	ETBE	5.
Decene	1.0		



ASTM D 6313-99 Sulfur in aromatic compounds

Standard test method for total sulfur in aromatic compounds by hydrogenolysis and sulfur specific difference photometry

This test method covers the determination of sulfur in aromatic hydrocarbons and related chemicals having typical sulfur concentrations from 0.005 to 10 mg/kg (0.05 to 100 ppm).

S-4057-K-IO

Sulfur Calibration Stock Solution

Thiophene, 1000 µg/mL in Toluene; unit: 5x1mL ampoules

Please request for diluted samples in the range 1 to 1000 ng/mL.

ASTM D 6352-04e1 Boiling range distribution of petroleum distillate fractions by GC

Standard test method for boiling range distribution of petroleum distillates in boiling range from 174 °C to 700 °C by gas chromatography.

This test method covers the determination of the boiling range distribution of petroleum distillate fractions. The test method is applicable to petroleum distillates fractions having an initial boiling point greater than 174 °C (345 °F) and a final boiling point of less than 700 °C (1292 °F) (C10 – C90) at atmospheric pressure as measured by this method.

S-4112

Petrochemical Calibration Mixture C6-C44

17 Analytes, each 6,25 Wt.% in carbon disulfide (CS₂); units: 100mg, 1g neat

Use for assessing column resolution as well as for quantitative analyses.

n-Hexane	C6	n-Octadecane	C18
n-Heptane	C7	n-Eicosane	C20
n-Octane	C8	n-Tetracosane	C24
n-Nonane	C9	n-Octacosane	C28
n-Decane	C10	n-Dotriacotane	C32
n-Undecane	C11	n-Hexatriacontane	C36
n-Dodecane	C12	n-Tetracontane	C40
n-Tetradecane	C14	n-Tetratetracontane	C44
n-Hexadecane	C16		



S-4149-500-MX
S-4149-500-5MX

Hydrocarbon Window Defining Standard C8-C40

35 Analytes, each 500 µg/mL in CS₂:CH₂Cl₂ (3:1); units: 1x1mL, 1x5mL

Octane	C8	Nonadecane	C19	Triacontane	C30
Nonane	C9	Phytane	C20	Hentriacontane	C31
Decane	C10	Eicosane	C20	Dotriacontane	C32
Undecane	C11	Heneicosane	C21	Tritriacontane	C33
Dodecane	C12	Docosane	C22	Tetracontane	C34
Tridecane	C13	Tricosane	C23	Pentatriacontane	C35
Tetradecane	C14	Tetracosane	C24	Hexatriacontane	C36
Pentadecane	C15	Pentacosane	C25	Heptatriacontane	C37
Hexadecane	C16	Hexacosane	C26	Octatriacontane	C38
Heptadecane	C17	Heptacosane	C27	Nonatriacontane	C39
Octadecane	C18	Octacosane	C28	Tetracontane	C40
Pristane	C19	Nonacosane	C29		

S-4151

Column Resolution Test Mix C16-C18

2 Analytes, each 1 % v/v in n-Octane; unit : 5x1mL

n-Hexadecane	C16
n-Octadecane	C18

ASTM D 6379-04

Aromatic hydrocarbon types in aviation fuels and petroleum distillates by HPLC refractive index

Standard test method for determination of aromatic hydrocarbon types in aviation fuels and petroleum distillates – high performance liquid chromatography method with refractive index detection.

This test method covers a high performance liquid chromatographic test method for the determination of mono-aromatic and di-aromatic hydrocarbon contents in aviation kerosenes and petroleum distillates boiling in the range from 50 °C to 300 °C, such as Jet A or Jet A-1 fuels.

S-4266-ASS-HP

IP 436-98 Resolution Standard

3 Analytes, each Wt.% as listed in n-Heptane; units: 1x5mL, 5x5mL

Cyclohexane	10.0 mg/mL
o-Xylene	5.0 mg/mL
1-Methylnaphthalene	0.5 mg/mL

S-4267-SET

IP 436-98 Calibration Curve

4 Analytes, each Wt.% as listed in n-Heptane; unit: 4x1mL, one of each Std.

Analyte	Std. 1 (mg/mL)	Std.2 (mg/mL)	Std.3 (mg/mL)	Std.4 (mg/mL)
Cyclohexane	50	20	5	1
o-Xylene	150	50	10	1
1-Methylnaphthalene	50	10	2	0.5



ASTM D 6550-05 Olefin content of gasoline by SFC

Standard test method for determination of olefin content of gasolines by supercritical-fluid chromatography.

This test method is used for the determination of the total amount of olefins in blended motor gasolines and gasoline blending stocks by supercritical-fluid chromatography (SFC).

S-4138-1ML

Calibration mixture for olefines

15 Analytes, each Wt. % as listed; units: 1x1ml, 5x1ml

Name:	Wt. %
1-Nonene	2.5
Cyclohexene	5.0
1-Hexene	5.0
1-Octene	5.0
1-Decene	5.0
2-Methyl-1,3-butadiene	5.0
4-Methyl-1-pentene	5.0
1,5-Hexadiene	3.0
3-Methyl-1,3-pentadiene	2.0
2-Methyl-1-butene	25.0
2-Methyl-2-pentene	10.0
1-Heptene	10.0
2-Methyl-1-octene	2.5
2-Methyl-1-heptene	5.0
5-Methyl-1-hexene	10.0

ASTM D 6584-07 Glycerine content by GC

NEW

Test method for determination of free and total glycerine in B-100 biodiesel methyl esters by gas chromatography

This test method provides for the quantitative determination of free and total glycerine in B-100 methyl esters by gas chromatography. The range of the detection for free glycerine is 0.005 to 0.05 mass %, and total glycerine from 0.05 to 0.5 mass %.

Reference: EN 14105:2003, page 42.

Derivatizing agent

1941.6-1ML

1941.6-5G

N-methyl-N-trimethylsilyltrifluoroacetamide (MSTFA)

[10416-59-6]

1 mL, 5g neat



Stock solutions

3644.3-500-10PY	Glycerine (Glycerol, [56-81-5]) stock solution 0.5mg/ml in dry pyridine	10 mL
3645.21-5K-10PY	1-Monooleoylglycerol (monoolein, [111-03-5]) stock solution 5 mg/mL in dry pyridine	10 mL
3646.39-5K-10PY	1,3-Dioleoylglycerol (diolein, [2465-32-9]) stock solution 5 mg/mL in dry pyridine	10 mL
3647.57-5K-10PY	1,2,3-Trioleoylglycerol (triolein, [122-32-7]) stock solution 5 mg/mL each in dry pyridine	10 mL

Internal standards

3642.4-K-10PY	Internal Standard No. 1 ((S)-(-)-1,2,4-Butanetriol, [42890-76-6]) stock solution 1 mg/mL in dry pyridine	10 mL
3643.33-8K-10PY	Internal Standard No. 2 (1,2,3-Tridecanolyglycerol) (tricaprin, [621-71-6]) stock solution 8 mg/mL in dry pyridine	10 mL

Calibration solutions

Calibration solution	1	2	3	4	Syringe, μL
μL of glycerol solution	10	30	50	70	100
μL of monoolein solution	20	50	100	150	200
μL of diolein solution	10	20	40	70	100
μL of triolein solution	10	20	40	70	100
μL of internal standard sol. No.1	100	100	100	100	100
μL of internal standard sol. No.2	100	100	100	100	100

To be prepared daily from the above solutions

Monoglycerides

S-4475-10K-10PY	Monoglycerides 4 analytes, each 10 mg/mL in dry pyridine; unit: 1x10 mL	
3648.19	Monopalmitoylglycerol (monopalmitin)	[542-44-9]
3649.21	Monostearoylglycerol (monostearin)	[123-94-4]
3650.21	Monooleoylglycerol (monoolein)	[111-03-5]
3833.21	Monolinoylglycerol (monolinolein)	[2277-28-3]



ASTM D 6591-06 Aromatic hydrocarbon types in middle distillates by HPLC

Standard test method for determination of aromatic hydrocarbon types in middle distillates - high performance liquid chromatography with refractive index detection.

This test method is used for the determination of monoaromatic, diaromatic and polyaromatic hydrocarbon contents in diesel fuels and petroleum distillates boiling in the range of 150 – 400 °C using HPLC with refractive index detection.

S-4268-ASS-5HP

IP 391-95 Performance Standard

4 Analytes, each Wt.% as listed in n-Heptane; units: 1x5mL, 5x5mL

Cyclohexane	10.0 mg/mL
o-Xylene	5.0 mg/mL
Dibenzothiophene	0.5 mg/mL
9-Methylanthracene	0.5 mg/mL

S-4269-SET

IP 391-95 Calibration Curve

4 Analytes, each Wt.% as listed in n-Heptane; unit: 4x1mL, one of each Std.

Analyte	Std. 1 (mg/mL)	Std.2 (mg/mL)	Std.3 (mg/mL)	Std.4 (mg/mL)
Cyclohexane	50	20	5	1
o-Xylene	40	10	2.5	0.5
Methylnaphthalene	40	10	2.5	0.2
Phenanthrene	4	2	0.5	0.1

ASTM D 6729-04 Hydrocarbon compounds in spark ignition engine fuels by GC

Standard test method for determination of individual compounds in spark ignition engine fuels by 100 meter capillary high resolution gas chromatography

This test method provides procedures for the determination of individual hydrocarbon components of spark-ignition engine fuels and their mixtures containing oxygenate blends (MTBE, ETBE, ethanol, and so forth) with boiling ranges up to 225 °C.

S-4476

D 6729 Calibration Standard Mixtures

Reference sample ARC96OX from Alberta Research Council, Edmonton, Canada
Spark ignition engine fuel standard of known composition and concentration by mass.

Individual and mixed components reference materials

See the compounds section for individual compounds and the petroleum section for mixed components.

Custom mixes are available on order. Please inquire for a quote.



ASTM D 6730-01(2006)e1 Hydrocarbon compounds in spark ignition engine fuels by GC

Standard test method for determination of individual components in spark ignition engine fuels by 100-metre capillary (with precolumn) high resolution gas chromatography

This test method provides procedures for the determination of individual hydrocarbon components of spark-ignition engine fuels and their mixtures containing oxygenate blends (MTBE, ETBE, ethanol, and so forth) with boiling ranges up to 225 °C.

S-4477

D6730 Calibration Standard Mixtures

Reference sample ARC96OX available from Alberta Research Council, Edmonton, Canada
Spark ignition engine fuel standard of known composition and concentration by mass.

Individual and mixed components reference materials

See the compounds section for individual compounds and the petroleum section for mixed components.

Custom mixes are available on order. Please inquire for a quote.

ASTM D 6751-07a Biodiesel fuel blend stock for distillate fuels

Standard specification for biodiesel fuel blend stock (B100) for middle distillate fuels

This specification covers biodiesel (B100) Grades S15 and S500 for use as a blend component with middle distillate fuels.

D 6751 Requirements

Property	Method	Limits	Units
Flash Point	D 93	130.0 min	°C
Water and sediment	D 2709	0.050 max	% volume
Kinematic viscosity	D 445	1.9-6.0	mm ² /s
Sulfated ash	D 874	0.020 max	% mass
Sulfur	D 5453	0.05 max	% mass
Copper strip corrosion	D 130	No. 3 max	
Cetane number	D 613	47 min	
Cloud point	D 2500	Report	°C
Carbon residue	D 4530	0.050 max	% mass
Acid number	D 664	0.80 max	mg KOH/g
Free glycerine	D 6584	0.020	% mass
Total glycerine	D 6584	0.240	% mass
Phosphorous content	D 4951	0.001 max	% mass
Distillation temperature	D 1160	340 max	°C
Atmospheric equivalent temperature, 90 % recovered			



New ASTM standards in development

ASTM D 5504-01 (2006)

Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence

ASTM D 6228-98 (2203)

Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Flame Ionization Detection

ASTM D 6920-03

Standard Test Method for Total Sulfur in Naphthas, Distillates, Reformulated Gasolines, Diesels, Biodiesels, and Motor Fuels by Oxidative Combustion and Electrochemical Detection

ASTM D 6968-03

Standard Test Method for Simultaneous Measurement of Sulfur Compounds and Minor Hydrocarbons in Natural Gas and Gaseous Fuels by Gas Chromatography and Atomic Emission Detection.

ASTM D 7165-06

Standard Practice for Gas Chromatograph Based On-line/At-line Analysis for Sulfur Content of Gaseous Fuels

ASTM D-7166-05

Standard Practice for Total Sulfur Analyzer Based On-line/At-line for Sulfur Content of Gaseous Fuels.



UOP 741-86 (ASTM method)

Paraffin and naphthene distribution by carbon number of saturated petroleum distillates by GC

This method is for determining the distribution of paraffins and naphthenes by carbon number, in hydrocarbon samples having an end-point of 200°C or less (C3-C11). C12 at concentrations less than 3% can be determined. Olefins and aromatics interfere and must be removed prior to analysis by ASTM method D 2002, D 2003 or suitable techniques.

S-4478-SET

UOP 741 High Naphthene sample

1.5mL neat in Certan® bottle.

Components	PNA High	PNA Low	Aromatics
	Naphthenes S-4479-1.5ML	Naphthenes S-4480-1.5ML	in PNA S-4481-1.5ML
C5 Naphthenes Cyclopentane,	1	1	1
C5 Paraffins n-Pentane	1	4	1
C6 Naphthenes Cyclohexane	8	4	4
C6 Paraffins n-Hexane	8	18	6
C7 Naphthenes Methylcyclohexane	11	4	8
C7 Paraffins n-Heptane	11	20	15
C8 Naphthenes Ethylcyclohexane	9	4	6
C8 Paraffins n-Octane	9	20	15
C9 Naphthenes Isopropylcyclohexane	8	2	6
C9 Paraffins n-Nonane	8	12	10
C10 Naphthenes n-Butylcyclohexane	7	2	4
C10 Paraffins n-Decane	7	7	8
C11 Naphthenes n-Pentylcyclohexane	4	0.5	1
C11 Paraffins n-Undecane	4	1	2
C12 Naphthenes n-Hexylcyclohexane	2	0	1
C12 Paraffins n-Dodecane	2	0.5	1
Aromatics			
Benzene	0	0	1
Toluene	0	0	5
Xylenes	0	0	2
Ethyl benzene	0	0	3