USEPA TIER 3 CRMs

AccuStandard®

TIER 3 Certified Reference Material

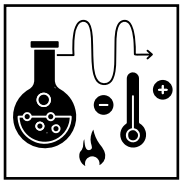
TIER 3 CRMs

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.

AccuStandard offers a wide selection of CRMs that are complaint with ASTM test method to test for these required properties.

This includes testing for:

- Sulfur content
- Benzene and Aromatic content
- Olefins
- Oxygenate



USEPA TIER 3 Test Methods included in this brochure:

- D86
- D1319
- D2622
- D3606
- D4815
- D5453
- D5769
- D5599
- D7039

ISO 17034 • 17025 • 9001

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https://www.accustandard.com/petrochemical-standards

TIER 3 Methods

These calibration standards are designed for the analysis of sulfur in a wide variety petroleum matrices. Sulfur standards are manufactured from the highest quality raw materials, including well characterized starting materials and the lowest sulfur matrices available. These standards are manufactured using balances that are calibrated by an outside ISO 17025 accrediated labortory and verified daily against reference mass standards directly traceable to NIST. The concentration of these working level Sulfur standards have established traceability links to NIST SRM's where available.

ASTM D86 Distillation — TIER 3 STANDARDS

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	Description	Cat. No. ▲	Unit	Group	Description	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

ASTM D2622, D3120, D3246, D4294, D5453, D6334, D6445 Sulfur Analysis — TIER 3 STANDARDS

Sulfur in Light Weight Mineral Oil (20 cSt) — Ready-to-Use

SWMO-LT-CAL-100ML-SET ▲ 19 x 100 mL

Concentration µg/g	Concentration Wt.%	Cat. No. ▲ 100 mL	Cat. No. 5 x 20 mL
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 Heavy Weight Mineral Oil (75 cSt) — Ready-to-Use

SWMO-CAL-100ML-SET ▲ 19 x 100 mL

Concentration µg/g	Concentration Wt.%	Cat. No. ▲ 100 mL	Cat. No. 5 x 20 mL
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

▲ Hazardous fee required for air shipments.

Technical Note

Sulfur introduced using di-*n*-butyl sulfide

Sulfur in #2 Diesel Fuel — Ready-to-Use

SETS: SDF-CAL-100ML-SET ▲ 19 x 100 mL; SDF-CAL-20ML-SET 19 x (5 x 20 mL)

Concentration µg/g	Concentration Wt.%	Cat. No. ▲ 100 mL	Cat. No. 5 x 20 mL
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 Renewable Diesel Fuel #2 — Ready-to-Use

SRD-CAL-SET ▲ 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

Sulfur in Light and Heavy Distillate Kerosene continued on next page

TIER 3 Methods
Sulfur

ASTM D2622, D3120, D3246, D4294, D5453, D6334, D6445 | **Sulfur Analysis (continued)** | **TIER 3 STANDARDS**

Sulfur in Light Distillate Kerosene

SK-CAL-100ML-SET ▲

Ready-to-Use
12 x 100 mL

Concentration µg/g	Concentration Wt.%	Cat. No. ▲ 100 mL	Cat. No. 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

Technical Note

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

Sulfur in Heavy Distillate Kerosene

SK-HD-CAL-100ML-SET ▲

21 x 100 mL

Concentration µg/g	Concentration Wt.%	Cat. No. ▲
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 Calibration** | **TIER 3 STANDARDS**

Sulfur Calibration Standards used on XRF Energy Dispersive or Wavelength Instruments

D-2622-LL-CAL-100ML-SET ▲

Individual bottles in Isooctane:Toluene (75:25)

10 x 100 mL
100 mL

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

Mid Level Additions

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 starting material

ASTM D2622, D4294 | **Sulfur Calibration** | **TIER 3 STANDARDS**

Sulfur Calibration Standards for Gasoline and Reformulated Gasoline Analysis

STP-CAL-100ML-SET ▲

Individual bottles in Isooctane

13 x 100 mL

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

As the matrix may contain some native sulfur, we encourages purchasing sulfur blanks for calibration analysis

Technical Note

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

▲ Hazardous fee required for air shipments.

ASTM D3606 | **Benzene and Toluene in Finished Motor & Aviation Gasoline by GC** | **TIER 3 STANDARDS**

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 — 7 x 25 mL

Analyte	Calibration Range	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 — 7 x 1 mL
D-3606-IS-2ML-SET — 7 x 2 mL

Analyte	Calibration Range	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 — 7 x 1 mL
D-3606-IS2-2ML-SET — 7 x 2 mL

Analyte	Calibration Range	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 — 7 x 1 mL

Analyte	Calibration Range	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 — 7 x 1 mL

Analyte	Calibration Range	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 — 7 x 2 mL

Analyte	Calibration Range	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	10	5	2.5	1	0.5
MIBK (ISTD)		4	4	4	4	4	4	4
Isooctane		71	78.5	84.7	90.33	93.17	94.88	95.44

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

Daily Gasoline Refinery Quality Control Standards

With Internal Standard: MEK

D-3606-QC-IS-10ML — 1 x 10 mL
D-3606-QC-IS-10ML-PAK — 5 x 10 mL

Each at stated Vol.%	4 comps.
Benzene	0.64
Toluene	4.80
Methyl ethyl ketone (ISTD)	4.0
Isooctane	90.56
	100

With Internal Standard: *sec*-Butanol

D-3606-QC-IS2-25ML — 1 x 25 mL
D-3606-QC-IS2-25ML-PAK — 5 x 25 mL

Each at stated Vol.%	4 comps.
Benzene	0.64
Toluene	4.80
sec-Butanol (Internal Std.)	4.0
Isooctane	90.56
	100

Without Internal Standard

D-3606-QC-25ML — 1 x 25 mL
D-3606-QC-25ML-PAK — 5 x 25 mL

Each at stated Vol.%	3 comps.
Benzene	0.67
Toluene	5.00
Isooctane	94.33
	100

TIER 3 Methods
D4815 & D5453

ASTM D4815 | **MtBE, EtBE, TAME, DIPE, Tertiary-amyl & C1 to C4 Alcohols in Gasoline by GC** | **TIER 3 STANDARDS**

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
t-Butanol	0.10	3.00	6.00	8.00	12.00
Methyl *t*-butyl ether (MtBE)	20.0	15.00	10.00	5.00	0.10
t-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
D-4815-IS-SET-PAK — *SAVE* 5 x (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
t-Butanol	0.1 - 11.40	0.095	2.85	5.70	7.60	11.40
Methyl *t*-butyl ether (MtBE)	0.1 - 19.0	19.00	14.25	9.50	4.75	0.095
t-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
Total Oxgenates & Internal Standard		**28.14**	**26.95**	**28.28**	**29.46**	**28.00**

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 and 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
tert-Butanol	7.30
n-Propanol	7.30
Methyl *tert*-butyl ether (MtBE)	4.00
sec-Butanol	7.30
Diisopropyl ether (DIPE)	4.00
Isobutanol	7.30
Ethyl *tert*-butyl ether (EtBE)	4.00
tert-Pentanol	7.30
1,2-Dimethoxyethane (ISTD)	6.00
n-Butanol	7.30
Benzene	5.00
tert-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
Diisopropyl ether (DIPE)	10.00
Ethyl *tert*-butyl ether (EtBE)	10.00
Methyl *tert*-butyl ether (MtBE)	10.00
n-Hexane	60.00

ASTM D5453 | **Total Sulfur in Light Hydrocarbons, Motor Fuels & Oils by Ultraviolet Fluorescence** | **TIER 3 STANDARDS**

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

As the matrix may contain some native sulfur, we encourage purchasing sulfur blanks for calibration.

Oxygenates Calibration Curves

With Internal Standard

M-GRO-CAL-IS-SET — 8 x 1 mL
M-GRO-CAL-IS-SET-PAK — *SAVE* 5 x (8 x 1 mL)

Analyte	Calibration Range	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
Total oxygenates and ISTD		**29.8**	**31.2**	**31.3**	**31.5**	**31.5**	**31.2**	**31.6**	**0**

With Internal Standard

M-GRO-CAL-IS-R1-SET — 8 x 1 mL

Analyte	Calibration Range	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
Total oxygenates and ISTD		**28.6**	**30.0**	**30.1**	**30.3**	**30.3**	**30.0**	**30.4**	**0**

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 — 8 x 10 mL

Analyte	Calibration Range	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
Total oxygenates		**25.8**	**27.2**	**27.3**	**27.5**	**27.5**	**27.2**	**27.6**	**0**

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.

TIER 3 Method
D5599

ASTM D5599 | **Oxygenates in Gas by GC & O-FID (continued)** | **TIER 3 STANDARDS**

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	Diisopropyl ether	3
Ethanol	1	Isobutanol	1
Isopropanol	1	EtBE	3
t-Butanol	1	*t*-Pentanol	1
n-Propanol	1	*n*-Butanol	1
MtBE	3	TAME	3
sec-Butanol	1	RFA Gasoline	79

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	Diisopropyl ether	3
Ethanol	1	Isobutanol	1
Isopropanol	1	EtBE	3
t-Butanol	1	*t*-Pentanol	1
n-Propanol	1	*n*-Butanol	1
MtBE	3	TAME	3
sec-Butanol	1	RFA Gasoline	79

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 Gasoline Refinery Blank

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

RFA Gasoline (neat)

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	Diisopropyl ether	1
Ethanol	1	Isobutanol	1
Isopropanol	1	EtBE	3
t-Butanol	1	*t*-Pentanol	1
n-Propanol	1	*n*-Butanol	1
MtBE	3	TAME	3
sec-Butanol	1	RFA Gasoline	81

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
t-Butanol	1	*t*-Pentanol	1
n-Propanol	1	*n*-Butanol	1
MtBE	3	TAME	3
sec-Butanol	1	RFA Gasoline	81

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

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)

Standards of Interest

Additional Oxygenate calibration, check standards, and independent reference standards can be found in ASTM method D4815 or D5622. The required QA/QC procedures in EPA methods stipulate a calibration check standard be used once per analytical batch or per 10 sample set. We have bulk packaged check standards to meet this increased usage.

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
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

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
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

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
t-Butanol	5.0		

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	*t*-Butanol	14.3
Ethanol	28.6	MtBE	42.8

Internal Standard

M-GRO-IS-5ML — 1 x 10 mL
M-GRO-IS-5ML-PAK — *SAVE* 5 x 10 mL

1,2-Dimethoxyethane (neat)

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
tert-Butanol	4.75	(Internal Standard)	
MtBE	11.40		

Oxygenate Free Gasoline Refinery Blank

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

RFA Gasoline (neat)

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.

TIER 3 Method
D5769

ASTM D5769 | **Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS** | **TIER 3 STANDARDS**

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

Calibration Curve with No Internal Standard

Six Level Calibration Curve without Internal Standard

D-5769-CAL6-5ML-SET — 6 x 5 mL
D-5769-CAL6-10ML-SET — 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
m-Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91
p-Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91
o-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
n-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
n-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)
D-5769-CAL-10ML-SET — 5 x 10 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.

Calibration Amounts

Each analyte is weighed. Actual weights and weight percents are provided on CD.

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.

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

4 component 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_6	16.67
Ethylbenzene-d_{10}	16.65
Naphthalene-d_8	8.77
Toluene-d_8	57.91

3 component 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_6	40
Ethylbenzene-d_{10}	40
Naphthalene-d_8	20

Calibration Curve with 3 Component Internal Standard

Six Level Calibration Curve with Internal Standard

D-5769-CAL6-IS-SET — 6 x 1 mL

Core Calibration Mix 24 Comps.	Target Wt.%	Std. 1 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
m-Xylene		6.19	3.48	1.856	0.9598	0.4883	4.91
p-Xylene		6.19	3.48	1.856	0.9598	0.4883	4.91
o-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
n-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
n-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.%	Wt.%
Benzene-d_6		2	2	2	2	2	2
Ethylbenzene-d_{10}		2	2	2	2	2	2
Naphthalene-d_8		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.

Calibration Amounts

Each analyte is weighed. Actual weights and weight percents are provided on CD.

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

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.

n-Hexane	12	Toluene	9
n-Heptane	17	Ethylbenzene	3
n-Octane	17	*m*-Xylene	3
n-Decane	12	*o*-Xylene	3
n-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

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	3.0
1-Methyl-2-ethylbenzene	3.0
Isooctane	94.0

Deuterated Internal Standard Mix

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_6	40	Naphthalene-d_8	20
Ethylbenzene-d_{10}	40		

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

With 4 Component Internal Standard (includes Toluene-d_8)

Six Level Calibration Curve with Deuterated Toluene

With Internal Standard

D-5769-CAL6-IS-R-SET — 6 x 1 mL

Core Calibration Mix 24 Comps.	Target Wt.%	Std. 1 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	
m-Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91	
p-Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91	
o-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	
n-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	
n-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.%	Wt.%
Benzene-d_6	2	2	2	2	2	2	
Ethylbenzene-d_{10}	2	2	2	2	2	2	
Naphthalene-d_8	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.

Calibration Amounts

Each analyte is weighed. Actual weights and weight percents are provided on CD.

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

Daily Quality Control Standard

With Internal Standard

D-5769-QC-IS-R-5ML — 1 x 5 mL

D-5769-QC-IS-R-5ML-PAK — *SAVE* 5 x 5 mL

D-5769-QC-IS-15ML — 1 x 15 mL

At stated Wt.% — 18 comps.

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

Includes M-GRA-IS-R (4 comp.) added in 12 to 100 weight ratio

Deuterated Internal Standard Mix

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_6	16.67	Naphthalene-d_8	8.77
Ethylbenzene-d_{10}	16.65	Toluene-d_8	57.91

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

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	3.0
1-Methyl-2-ethylbenzene	3.0
Isooctane	94.0

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

TIER 3 Method
D5769

ASTM D5769 | **Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS (continued)** | **TIER 3 STANDARDS**

These standards and methods are used in the monitoring of total aromatics according to the methods and amendments to the US Clean Air Act. Amendments containing more stringent specifications are in effect and can be found listed under this method.

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
m-Xylene	6	3.00	1.50	0.750	0.3750
p-Xylene	6	3.00	1.50	0.750	0.3750
o-Xylene	6	3.00	1.50	0.750	0.3750
Isopropylbenzene	3	1.50	0.75	0.375	0.1875
n-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
n-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_6	2	2	2	2	2
Ethylbenzene-d_{10}	2	2	2	2	2
Naphthalene-d_8	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
m-Xylene	4.50
p-Xylene	4.50
o-Xylene	4.50
Isopropylbenzene	2.25
n-Proplylbenzene	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
n-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_6	2
Ethylbenzene-d_{10}	2
Naphthalene-d_8	1

Calibration Amounts
Each analyte is weighed. Actual weights and weight percents are provided on CD.

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

Daily Quality Control Standard
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.

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

Daily Quality Control Standard
With Internal Standard

M-GRA-QC-IS-5ML — **1 x 5 mL**
M-GRA-QC-IS-5ML-PAK — ***SAVE*** **5 x 5 mL**
At stated Wt.% — 16 comps.

n-Hexane	12	Toluene	9
n-Heptane	17	Ethylbenzene	3
n-Octane	17	*m*-Xylene	3
n-Decane	12	*o*-Xylene	3
n-Dodecane	5	1,2,4-Trimethylbenzene	3
Isooctane	12	1,2,4,5-Tetramethylbenzene	3
Benzene	1	13 comp. Core Mix	100

Internal Standard

Benzene-d_6	2
Ethylbenzene-d_{10}	2
Naphthalene-d_8	1

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

ASTM/EPA 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

3 Comp. Deuterated Internal Std. Mix
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_6	40	Naphthalene-d_8	20
Ethylbenzene-d_{10}	40		

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

TIER 3 Method
D5769

ASTM D5769 | **Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS (continued)** | **TIER 3 STANDARDS**

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.	Target Wt.%	Std. 1 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	
m-Xylene	6.27	3.50	1.86	0.962	0.4891	
p-Xylene	6.33	3.50	1.86	0.962	0.4891	
o-Xylene	6.51	3.56	1.89	0.980	0.4891	
Isopropylbenzene	3.06	1.74	0.93	0.480	0.2439	
n-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	
n-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_6	16.57	16.57	16.57	16.57	16.57	
Ethylbenzene-d_{10}	16.76	16.76	16.76	16.76	16.76	
Naphthalene-d_8	8.78	8.78	8.78	8.78	8.78	
Toluene-d_8	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
m-Xylene	4.87
p-Xylene	4.87
o-Xylene	4.96
Isopropylbenzene	2.43
n-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
n-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_6	16.57
Ethylbenzene-d_{10}	16.76
Naphthalene-d_8	8.78
Toluene-d_8	57.88

Technical Note

This set of calibration solutions was formulated to improve the quantification of toluene by using toluene-d_8 as an additional ISTD.

The M-GRA-IS-R ISTD mix is add ton top of the 24 core comps. to formulate a complete calibration solution containing 28 comps.

Daily Quality Control Standard
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.

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

Deuterated Internal Standard Mix

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_6	16.67	Naphthalene-d_8	8.77
Ethylbenzene-d_{10}	16.65	Toluene-d_8	57.91

ASTM/EPA 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

Daily Quality Control Standard
With Internal Standard

M-GRA-QC-IS-R-5ML — **1 x 5 mL**
M-GRA-QC-IS-R-5ML-PAK — ***SAVE*** **5 x 5 mL**
At stated Wt.% — 17 comps.

n-Hexane	12	Toluene	9
n-Heptane	17	Ethylbenzene	3
n-Octane	17	*m*-Xylene	3
n-Decane	12	*o*-Xylene	3
n-Dodecane	5	1,2,4-Trimethylbenzene	3
Isooctane	12	1,2,4,5-Tetramethylbenzene	3
Benzene	1	Core Mix (13 comps.)	100

Internal Standard

Benzene-d_6	2
Ethylbenzene-d_{10}	2
Naphthalene-d_8	1
Toluene-d_8	7

The M-GRA-IS-R ISTD mix is added on top of the 13 core comp to formulate a 17 comp QC-IS-R solution.

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

ASTM D5769 | **Benzene, Toluene & Total Aromatics in Finished Gasoline by GC-MS (continued)** | **TIER 3 STANDARDS**

Special QA/QC Formulations

Daily QC Standard
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.

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

For use with any M-GRA Calibration Curve

Daily QC Standard
With Internal Standard M-GRA-IS-R

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.

n-Hexane	12	Ethylbenzene	3
n-Heptane	17	*m*-Xylene	3
n-Octane	17	*o*-Xylene	3
n-Decane	12	1,2,4-Trimethylbenzene	3
n-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 above Core Mix (15 comp.) in a 12 to 100 weight ratio.

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_6	16.67
Ethylbenzene-d_{10}	16.65
Naphthalene-d_8	8.77
Toluene-d_8	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_6	40	Naphthalene-d_8	20
Ethylbenzene-d_{10}	40		

ASTM D5769 | **Additional Internal, Deuterated and Quality Control** | **TIER 3 STANDARDS**

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_6	2	Naphthalene-d_8	1
Ethylbenzene-d_{10}	2	Isooctane	balance

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

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_6	2	Toluene-d_8	7
Ethylbenzene-d_{10}	2	Isooctane	balance
Naphthalene-d_8	1		

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

TIER 3 Methods
D6550 & D7039

ASTM D6550 | **Olefin Content of Gasolines by SFC** | **TIER 3 STANDARDS**

Stock Olefin Calibration Standard

D-6550-CONC — **1 x 1 mL**
D-6550-CONC-5ML — **1 x 5 mL**
At stated Wt.% — 15 comps.

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

ASTM D7039 | **Sulfur Content in Fuel by XRF** | **TIER 3 STANDARDS**

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

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