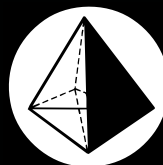


# USEPA TIER 3 CRMs



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# TIER 3 Certified Reference Material

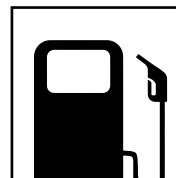
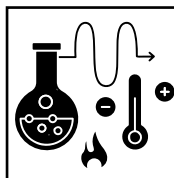
## TIER 3 CRMs

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   | • D3606 | • D5769 |
| • D1319 | • D4815 | • D5599 |
| • D2622 | • D5453 | • D7039 |



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

### Sulfur in #2 Diesel Fuel

Ready-to-Use

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

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

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

Ready-to-Use

SWMO-CAL-100ML-SET ▲ 19 x 100 mL

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

### Sulfur in Renewable Diesel Fuel #2

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

### Technical Note

Sulfur introduced using di-n-butyl sulfide

▲ Hazardous fee required for air shipments.

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		Cat. No. ▲ 100 mL	Cat. No. 5 x 20 mL	Concentration		Cat. No. ▲ 100 mL	Cat. No. 5 x 20 mL
µg/g	Wt.%			µg/g	Wt.%		
Blank	0.000	SK-BL-100ML	SK-BL-20ML-PAK	2,000	0.20	SK-20X-100ML	SK-20X-20ML-PAK
100	0.010	SK-1X-100ML	SK-1X-20ML-PAK	3,000	0.30	SK-30X-100ML	SK-30X-20ML-PAK
300	0.030	SK-3X-100ML	SK-3X-20ML-PAK	4,000	0.40	SK-40X-100ML	SK-40X-20ML-PAK
500	0.050	SK-5X-100ML	SK-5X-20ML-PAK	5,000	0.50	SK-50X-100ML	SK-50X-20ML-PAK
750	0.075	SK-7.5X-100ML	SK-7.5X-20ML-PAK	10,000	1.00	SK-100X-100ML	SK-100X-20ML-PAK
1,000	0.10	SK-10X-100ML	SK-10X-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			Concentration			Concentration		
µg/g	Wt.%	Cat. No. ▲	µg/g	Wt.%	Cat. No. ▲	µg/g	Wt.%	Cat. No. ▲
Blank	0.000	SK-HD-BL-100ML	1,000	0.10	SK-HD-10X-100ML	10,000	1.00	SK-HD-100X-100ML
100	0.010	SK-HD-1X-100ML	1,500	0.15	SK-HD-15X-100ML	15,000	1.50	SK-HD-150X-100ML
200	0.020	SK-HD-2X-100ML	2,000	0.20	SK-HD-20X-100ML	20,000	2.00	SK-HD-200X-100ML
300	0.030	SK-HD-3X-100ML	3,000	0.30	SK-HD-30X-100ML	30,000	3.00	SK-HD-300X-100ML
400	0.040	SK-HD-4X-100ML	4,000	0.40	SK-HD-40X-100ML	40,000	4.00	SK-HD-400X-100ML
500	0.050	SK-HD-5X-100ML	5,000	0.50	SK-HD-50X-100ML	50,000	5.00	SK-HD-500X-100ML
750	0.075	SK-HD-7.5X-100ML	7,000	0.70	SK-HD-70X-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	Sulfur Conc.	Sulfur Wt.%	Cat. No. ▲	Unit
Blank	0.0	STP-BL-100ML	100 mL	300 µg/g	0.030	STP-30X-100ML	100 mL
10 µg/g	0.001	STP-1X-100ML	100 mL	400 µg/g	0.040	STP-40X-100ML	100 mL
20 µg/g	0.002	STP-2X-100ML	100 mL	600 µg/g	0.060	STP-60X-100ML	100 mL
30 µg/g	0.003	STP-3X-100ML	100 mL	1000 µg/g	0.10	STP-100X-100ML	100 mL
50 µg/g	0.005	STP-5X-100ML	100 mL	2000 µg/g	0.20	STP-200X-100ML	100 mL
100 µg/g	0.010	STP-10X-100ML	100 mL	3000 µg/g	0.30	STP-300X-100ML	100 mL
200 µg/g	0.020	STP-20X-100ML	100 mL				

As the matrix may contain some native sulfur, we encourage 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.

# TIER 3 Methods

## Sulfur

### 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

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

#### 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

#### 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

#### 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

#### 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

#### 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

# 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
<i>t</i> -Butanol	0.10	3.00	6.00	8.00	12.00
Methyl <i>t</i> -butyl ether (MtBE)	20.0	15.00	10.00	5.00	0.10
<i>t</i> -Pentanol	1.25	5.00	2.50	3.75	0.10
Isooctane/Xylene (65:35)	75.65	76.90	75.50	74.25	75.80

**With Internal Standard**
**D-4815-IS-SET**
**D-4815-IS-SET-PAK**
**5 x 1 mL**
**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
<i>t</i> -Butanol	0.1 - 11.40	0.095	2.85	5.70	7.60	11.40
Methyl <i>t</i> -butyl ether (MtBE)	0.1 - 19.0	19.00	14.25	9.50	4.75	0.095
<i>t</i> -Pentanol	0.1 - 4.79	1.19	4.75	2.38	3.56	0.095
1,2-Dimethoxyethane (DME) (Internal Standard)		5.00	5.00	5.00	5.00	5.00
Isooctane/Xylene (65:35)		71.87	73.06	71.73	70.54	72.01
<b>Total Oxygenates &amp; Internal Standard</b>		<b>28.14</b>	<b>26.95</b>	<b>28.28</b>	<b>29.46</b>	<b>28.00</b>

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

1,2-Dimethoxyethane (neat)

**Oxygenate Free Refinery Gasoline**
**Blank**
**RFA-BLNK-10ML**
**RFA-BLNK-10ML-PAK**
**1 x 10 mL**
**SAVE 5 x 10 mL**

RFA Gasoline (neat)

**Quantitative Peak ID and Retention Time Mixture (Core Mix)**
**D-4815-RT**
**D-4815-RT-PAK**

At stated Wt. %

**1 x 1 mL**
**SAVE 5 x 1 mL**

16 comps.

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

**Valve Timing Mixture**
**D-4815-VT**
**D-4815-VT-PAK**

At stated Wt. %

**1 x 1 mL**
**SAVE 5 x 1 mL**

5 comps.

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

**ASTM D5453**
**Total Sulfur in Light Hydrocarbons, Motor Fuels & Oils by Ultraviolet Fluorescence**
**TIER 3 STANDARDS**
**Low Level Sulfur Set**
**D-5453-LL-SET**

At stated in Isooctane

**5 x 2 mL**

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**

At stated in Isooctane

**6 x 2 mL**

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**

At stated in Isooctane

**5 x 2 mL**

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.

# TIER 3 Method

## D5599

ASTM D5599

Oxygenates in Gas by GC & O-FID

TIER 3 STANDARDS

### Oxygenates Calibration Curves

#### With Internal Standard

M-GRO-CAL-IS-SET

M-GRO-CAL-IS-SET-PAK

8 x 1 mL  
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
<b>Total oxygenates and ISTD</b>		<b>29.8</b>	<b>31.2</b>	<b>31.3</b>	<b>31.5</b>	<b>31.5</b>	<b>31.2</b>	<b>31.6</b>	<b>0</b>

#### With Internal Standard

M-GRO-CAL-IS-R1-SET

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
<b>Total oxygenates and ISTD</b>		<b>28.6</b>	<b>30.0</b>	<b>30.1</b>	<b>30.3</b>	<b>30.3</b>	<b>30.0</b>	<b>30.4</b>	<b>0</b>

#### Technical Note

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

#### Without Internal Standard

M-GRO-CAL-SET

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
<b>Total oxygenates</b>		<b>25.8</b>	<b>27.2</b>	<b>27.3</b>	<b>27.5</b>	<b>27.5</b>	<b>27.2</b>	<b>27.6</b>	<b>0</b>

#### Technical Note

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

# 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
<i>t</i> -Butanol	1	<i>t</i> -Pentanol	1
<i>n</i> -Propanol	1	<i>n</i> -Butanol	1
MtBE	3	TAME	3
<i>sec</i> -Butanol	1	RFA Gasoline	79

## Revised Daily QC Standard

### Without Internal Standard

M-GRO-QC-R-10ML

1 x 10 mL

M-GRO-QC-R-10ML-PAK

SAVE 5 x 10 mL

At stated Wt. %

14 comps.

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

## 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
<i>t</i> -Butanol	1	<i>t</i> -Pentanol	1
<i>n</i> -Propanol	1	<i>n</i> -Butanol	1
MtBE	3	TAME	3
<i>sec</i> -Butanol	1	RFA Gasoline	79

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

## Revised Daily QC Standard

### With Internal Standard

M-GRO-QC-R-IS-5ML

1 x 5 mL

M-GRO-QC-R-IS-5ML-PAK

SAVE 5 x 5 mL

At stated Wt. %

15 comps.

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

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

## Gasoline Refinery Blank

### With Internal Standard

M-GRO-BLNK-IS-10ML

1 x 10 mL

M-GRO-BLNK-IS-10ML-PAK

SAVE 5 x 10 mL

At stated Wt. %

2 comps.

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

## O-FID/EPA Gasoline Refinery

### Internal Standard

M-GRO-IS-5ML

1 x 5 mL

M-GRO-IS-5ML-PAK

SAVE 5 x 5 mL

1,2-Dimethoxyethane (neat)

## O-FID Gasoline Refinery Blank

RFA-BLNK-10ML

1 x 10 mL

RFA-BLNK-10ML-PAK

SAVE 5 x 10 mL

RFA Gasoline (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.





# TIER 3 Method

## D5599

ASTM D5599

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

TIER 3 STANDARDS

### EPA O-FID Quantitative Calibration Mixes

#### Without Internal Standard

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

5 x 10 mL

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

#### Technical Note

##### EPA O-FID Oxygenate Petrochemical Standards

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

#### With Internal Standard

M-GRO-CAL-IS-EPA-SET

5 x 1 mL

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

### EPA O-FID Quantitative Calibration Check Standard

#### Without Internal Standard

M-GRO-EPA-CC-10ML

1 x 10 mL

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

SAVE 5 x 10 mL

At stated Wt. %

5 comps.

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

### EPA O-FID Quantitative Calibration Check Standard

#### With Internal Standard

M-GRO-EPACC-IS-5ML

1 x 5 mL

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

SAVE 5 x 5 mL

At stated Wt. %

6 comps.

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

### EPA O-FID Spiking Solution

M-GRO-EPA-SP-5ML

1 x 5 mL

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

SAVE 5 x 5 mL

At stated Wt. %

4 comps.

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

### Oxygenate Free Gasoline Refinery Blank

RFA-BLNK-10ML

1 x 10 mL

RFA-BLNK-10ML-PAK

SAVE 5 x 10 mL

RFA Gasoline (neat)

### Internal Standard

M-GRO-IS-5ML

1 x 10 mL

M-GRO-IS-5ML-PAK

SAVE 5 x 10 mL

1,2-Dimethoxyethane (neat)

## Custom Formulations

Custom CRMs are a fast and economical way to meet your specific laboratory needs. We have decades of experience to formulate stable, reliable, and quality custom standards.

**Talk to one of our  
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# 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

D-5769-CAL6-10ML-SET

6 x 5 mL

6 x 10 mL

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

### Five Level Calibration Curve Without Internal Standard

D-5769-CAL-5ML-SET

5 x 5 mL (Std. 1 - 5)

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.

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

### 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 <sub>6</sub>	16.67
Ethylbenzene-d <sub>10</sub>	16.65
Naphthalene-d <sub>8</sub>	8.77
Toluene-d <sub>8</sub>	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 <sub>6</sub>	40
Ethylbenzene-d <sub>10</sub>	40
Naphthalene-d <sub>8</sub>	20



# TIER 3 Method

## D5769

ASTM D5769

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

TIER 3 STANDARDS

### 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	
<i>m</i> -Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91	
<i>p</i> -Xylene	6.19	3.48	1.856	0.9598	0.4883	4.91	
<i>o</i> -Xylene	6.30	3.54	1.890	0.9776	0.4973	5.00	
Isopropylbenzene	3.09	1.74	0.925	0.4786	0.2435	2.45	
<i>n</i> -Propylbenzene	3.09	1.74	0.926	0.4787	0.2435	2.45	
3-Ethyltoluene	3.10	1.74	0.928	0.4801	0.2442	2.45	
4-Ethyltoluene	3.08	1.73	0.925	0.4782	0.2433	2.44	
1,3,5-Trimethylbenzene	3.10	1.74	0.929	0.4804	0.2444	2.46	
2-Ethyltoluene	3.15	1.77	0.945	0.4890	0.2488	2.50	
1,2,4-Trimethylbenzene	5.23	2.94	1.567	0.8104	0.4123	4.14	
1,2,3-Trimethylbenzene	3.20	1.80	0.960	0.4965	0.2526	2.54	
Indan	3.45	1.94	1.034	0.5350	0.2722	2.73	
1,4-Diethylbenzene	3.09	1.74	0.925	0.4786	0.2435	2.45	
<i>n</i> -Butylbenzene	3.08	1.73	0.923	0.4776	0.2430	2.44	
1,2-Diethylbenzene	3.15	1.77	0.945	0.4885	0.2485	2.50	
1,2,4,5-Tetramethylbenzene	2.12	1.19	0.635	0.3284	0.1671	1.68	
1,2,3,5-Tetramethylbenzene	2.12	1.19	0.637	0.3295	0.1676	1.68	
Naphthalene	2.37	1.34	0.712	0.3683	0.1874	1.88	
1-Methylnaphthalene	2.37	1.34	0.712	0.3683	0.1874	1.88	
2-Methylnaphthalene	2.43	1.37	0.730	0.3773	0.1919	1.93	
Isooctane	-----	43.77	70.015	84.4922	92.1105	19.92	

#### Internal Standard

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

### Daily Quality Control Standard

#### With Internal Standard

D-5769-QC-IS-15ML

1 x 15 mL

D-5769-QC-IS-15ML-PAK

SAVE 5 x 15 mL

D-5769-QC-IS-5ML

1 x 5 mL

D-5769-QC-IS-5ML-PAK

SAVE 5 x 5 mL

At stated Wt. %

17 comps.

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

#### Includes

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

### 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 <sub>6</sub>	40	Naphthalene-d <sub>8</sub>	20
Ethylbenzene-d <sub>10</sub>	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

### 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.

# TIER 3 Method

## D5769

ASTM D5769

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

TIER 3 STANDARDS

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

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

##### Internal Standard

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

#### 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.

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

Includes M-GRA-IS-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 <sub>6</sub>	16.67	Naphthalene-d <sub>8</sub>	8.77
Ethylbenzene-d <sub>10</sub>	16.65	Toluene-d <sub>8</sub>	57.91

#### 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.

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

##### Internal Standard

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

#### Optional Sixth Standard

##### Internal Standard Added

M-GRA-ADD-IS

1 x 1 mL

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

##### Internal Standard

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

#### 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

M-GRA-QC-10ML-PAK

At stated Wt. %

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

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

#### ASTM/EPA Sensitivity Test Solution

M-GRA-ST

M-GRA-ST-PAK

100 µg/mL in Isooctane

1,4-Diethylbenzene

1 x 1 mL  
SAVE 5 x 1 mL

#### 3 Comp. Deuterated Internal Std. Mix

M-GRA-IS-5ML

M-GRA-IS-5ML-PAK

At stated Wt. %

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

Benzene-d <sub>6</sub>	40	Naphthalene-d <sub>8</sub>	20
Ethylbenzene-d <sub>10</sub>	40		

#### Daily Quality Control Standard

##### With Internal Standard

M-GRA-QC-IS-5ML

M-GRA-QC-IS-5ML-PAK

At stated Wt. %

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

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

##### Internal Standard

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

#### 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

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

#### Optional Sixth Standard

##### With Internal Standard

M-GRA-ADD-IS-R

1 x 1 mL

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

#### Technical Note

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

M-GRA-QC-10ML-PAK

At stated Wt.%

1 x 10 mL

SAVE 5 x 10 mL

13 comps.

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

#### Daily Quality Control Standard

##### With Internal Standard

M-GRA-QC-IS-R-5ML

M-GRA-QC-IS-R-5ML-PAK

At stated Wt.%

1 x 5 mL

SAVE 5 x 5 mL

17 comps.

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

#### Deuterated Internal Standard Mix

M-GRA-IS-R-10ML

M-GRA-IS-R-10ML-PAK

At stated Wt.%

1 x 10 mL

SAVE 5 x 10 mL

4 comps.

Benzene-d <sub>6</sub>	16.67	Naphthalene-d <sub>8</sub>	8.77
Ethylbenzene-d <sub>10</sub>	16.65	Toluene-d <sub>8</sub>	57.91

#### Internal Standard

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

#### ASTM/EPA Sensitivity Test Solution

M-GRA-ST

M-GRA-ST-PAK

100 µg/mL in Isooctane

1 x 1 mL

SAVE 5 x 1 mL

1,4-Diethylbenzene

#### 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

# TIER 3 Methods

## D5769

**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.

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

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.

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

Includes M-GRA-IS-R (4 comp.) combined with the 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 <sub>6</sub>	16.67
Ethylbenzene-d <sub>10</sub>	16.65
Naphthalene-d <sub>8</sub>	8.77
Toluene-d <sub>8</sub>	57.91

#### Deuterated Internal Standard

**M-GRA-IS-5ML** 1 x 5 mL  
**M-GRA-IS-5ML-PAK** SAVE 5 x 5 mL  
 At stated Wt.% 3 comps.

Benzene-d <sub>6</sub>	40	Naphthalene-d <sub>8</sub>	20
Ethylbenzene-d <sub>10</sub>	40		

**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 <sub>6</sub>	2	Naphthalene-d <sub>8</sub>	1
Ethylbenzene-d <sub>10</sub>	2	Isooctane	balance

#### Deuterated Internal Standard

**ASTM-P-0140-IS2** 1 x 10 mL  
**ASTM-P-0140-IS2-PAK** SAVE 5 x 10 mL  
 At stated Wt.% 5 comps.

Benzene-d <sub>6</sub>	2	Toluene-d <sub>8</sub>	7
Ethylbenzene-d <sub>10</sub>	2	Isooctane	balance
Naphthalene-d <sub>8</sub>	1		

#### Performance Evaluation Standard

**ASTM-P-0140-PES** 1 x 1 mL  
**ASTM-P-0140-PES-PAK** SAVE 5 x 1 mL  
 At stated Wt.% 11 comps.

Benzene	1
1,2-Diethylbenzene	0.005
1,3,5-Trimethylbenzene	1
1-Methyl-2-ethylbenzene	1
Styrene	0.1
Indene	0.1
Biphenyl	0.1
1,2,4,5-Tetramethylbenzene	1
1,2,3,5-Tetramethylbenzene	1
Hexadecane	1
Isooctane:Toluene (50:50)	balance

#### Composition of Daily QC Standard

**ASTM-P-0140-QC** 1 x 10 mL  
**ASTM-P-0140-QC-PAK** SAVE 5 x 10 mL  
 At stated Wt.% 9 comps.

Benzene	1
Toluene	10
Ethylbenzene	3
1,3-Dimethylbenzene	6
1,2-Dimethylbenzene	3
1,2,4-Trimethylbenzene	3
1,2-Diethylbenzene	0.02
Naphthalene	1
Isooctane	balance

# TIER 3 Methods

## D6550 & D7039

**ASTM D6550**

**Olefin Content of Gasolines by SFC**

**TIER 3 STANDARDS**

### Stock Olefin Calibration Standard

D-6550-CONC

D-6550-CONC-5ML

At stated Wt. %

1 x 1 mL

1 x 5 mL

15 comps.

1-Nonene	2.5	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

in (µg/g) Isooctane:Toluene (75:25)

6 x 1 mL

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

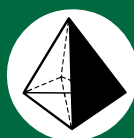
### High Level Calibration Set

D-7039-HL-SET

in Isooctane:Toluene (75:25)

6 x 1 mL

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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