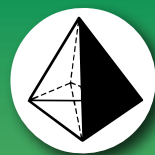


Petroleum Tier 3 ASTM Standards



AccuStandard®

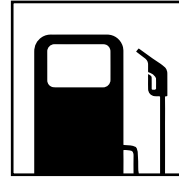
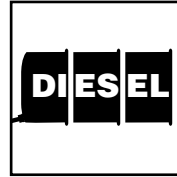
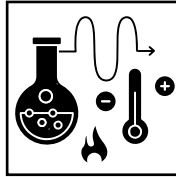
Tier 3 CRMs

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



ASTM Methods applicable for USEPA Tier 3 requirements include:

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



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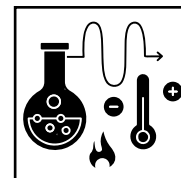


ISO 17034 • 17025 • 9001

Physical Property and Sulfur ASTM Methods

Tier 3 CRMs

AccuStandard is ISO 17034 scope includes Physical Standard methods for Flash Point, Distillation, Cloud Point, Freeze Point, Viscosity, and Water Content in petroleum products by Karl Fischer Titration. As a Reference Material Producer we follow strict guidelines for producing, certifying, labeling, and reporting uncertainty for these standards. Requirements include verifying stability and homogeneity, which goes above and beyond our ISO/IEC 17025 and ISO 17034 requirements.



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.

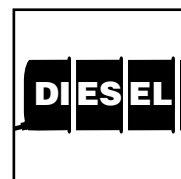
Group 1 and 2 standards cover the boiling range from 129-368°F (54-187°C). Group 4 standard covers the range from 410-670°F (210-355°C).

| 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 |

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

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

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

Sulfur in Light Weight Mineral Oil (20 cSt) Ready-to-Use Sulfur in Heavy Weight Mineral Oil (75 cSt) Ready-to-Use

| SWMO-LT-CAL-100ML-SET | | | SWMO-CAL-100ML-SET | | | SWMO-CAL-100ML-SET | | |
|-----------------------|-------|--------------------|-----------------------|-----------------------|-------|--------------------|-----------------------|--|
| 19 x 100 mL | | | 19 x 100 mL | | | 19 x 100 mL | | |
| Concentration µg/g | Wt.% | Cat. No. 100 mL | Cat. No. 5 x 20 mL | Concentration µg/g | Wt.% | Cat. No. 100 mL | Cat. No. 5 x 20 mL | |
| Blank | 0.000 | SWMO-LT-BL-100ML | SWMO-LT-BL-20ML-PAK | Blank | 0.000 | SWMO-BL-100ML | SWMO-BL-20ML-PAK | |
| 100 | 0.010 | SWMO-LT-1X-100ML | SWMO-LT-1X-20ML-PAK | 100 | 0.010 | SWMO-1X-100ML | SWMO-1X-20ML-PAK | |
| 200 | 0.020 | SWMO-LT-2X-100ML | SWMO-LT-2X-20ML-PAK | 200 | 0.020 | SWMO-2X-100ML | SWMO-2X-20ML-PAK | |
| 300 | 0.030 | SWMO-LT-3X-100ML | SWMO-LT-3X-20ML-PAK | 300 | 0.030 | SWMO-3X-100ML | SWMO-3X-20ML-PAK | |
| 400 | 0.040 | SWMO-LT-4X-100ML | SWMO-LT-4X-20ML-PAK | 400 | 0.040 | SWMO-4X-100ML | SWMO-4X-20ML-PAK | |
| 500 | 0.050 | SWMO-LT-5X-100ML | SWMO-LT-5X-20ML-PAK | 500 | 0.050 | SWMO-5X-100ML | SWMO-5X-20ML-PAK | |
| 750 | 0.075 | SWMO-LT-7.5X-100ML | SWMO-LT-7.5X-20ML-PAK | 750 | 0.075 | SWMO-7.5X-100ML | SWMO-7.5X-20ML-PAK | |
| 1,000 | 0.10 | SWMO-LT-10X-100ML | SWMO-LT-10X-20ML-PAK | 1,000 | 0.10 | SWMO-10X-100ML | SWMO-10X-20ML-PAK | |
| 1,500 | 0.15 | SWMO-LT-15X-100ML | SWMO-LT-15X-20ML-PAK | 1,500 | 0.15 | SWMO-15X-100ML | SWMO-15X-20ML-PAK | |
| 3,000 | 0.30 | SWMO-LT-30X-100ML | SWMO-LT-30X-20ML-PAK | 3,000 | 0.30 | SWMO-30X-100ML | SWMO-30X-20ML-PAK | |
| 5,000 | 0.50 | SWMO-LT-50X-100ML | SWMO-LT-50X-20ML-PAK | 5,000 | 0.50 | SWMO-50X-100ML | SWMO-50X-20ML-PAK | |
| 7,000 | 0.70 | SWMO-LT-70X-100ML | SWMO-LT-70X-20ML-PAK | 7,000 | 0.70 | SWMO-70X-100ML | SWMO-70X-20ML-PAK | |
| 10,000 | 1.00 | SWMO-LT-100X-100ML | SWMO-LT-100X-20ML-PAK | 10,000 | 1.00 | SWMO-100X-100ML | SWMO-100X-20ML-PAK | |
| 15,000 | 1.50 | SWMO-LT-150X-100ML | SWMO-LT-150X-20ML-PAK | 15,000 | 1.50 | SWMO-150X-100ML | SWMO-150X-20ML-PAK | |
| 20,000 | 2.00 | SWMO-LT-200X-100ML | SWMO-LT-200X-20ML-PAK | 20,000 | 2.00 | SWMO-200X-100ML | SWMO-200X-20ML-PAK | |
| 30,000 | 3.00 | SWMO-LT-300X-100ML | SWMO-LT-300X-20ML-PAK | 30,000 | 3.00 | SWMO-300X-100ML | SWMO-300X-20ML-PAK | |
| 40,000 | 4.00 | SWMO-LT-400X-100ML | SWMO-LT-400X-20ML-PAK | 40,000 | 4.00 | SWMO-400X-100ML | SWMO-400X-20ML-PAK | |
| 50,000 | 5.00 | SWMO-LT-500X-100ML | SWMO-LT-500X-20ML-PAK | 50,000 | 5.00 | SWMO-500X-100ML | SWMO-500X-20ML-PAK | |
| 60,000 | 6.00 | SWMO-LT-600X-100ML | SWMO-LT-600X-20ML-PAK | 60,000 | 6.00 | SWMO-600X-100ML | SWMO-600X-20ML-PAK | |

Sulfur in Diesel Fuel and Distillate Kerosene continued on next page

▲ Hazardous fee required for air shipments

Sulfur ASTM Methods

Tier 3 CRMs

ASTM D2622, D3120, D3246, D4294, D5453, D6334, D6445

Sulfur Analysis (continued)

TIER 3 STANDARDS

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 | | 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 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 Distillate Kerosene

Ready-to-Use

| SK-CAL-100ML-SET ▲ | | 12 x 100 mL | |
|--------------------|-------|----------------------|-----------------------|
| Concentration | | Cat. No. ▲ 100 mL | Cat. No. 5 x 20 mL |
| µg/g | Wt.% | | |
| 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

Sulfur is introduced using di-n-butyl sulfide.

Sulfur in Heavy Distillate Kerosene

SK-HD-CAL-100ML-SET ▲

21 x 100 mL

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

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.

Sulfur ASTM Methods

Tier 3 CRMs

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 ▲

10 x 100 mL

Individual bottles in Isooctane:Toluene (75:25)

Low Level

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

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 ▲

13 x 100 mL

Individual bottles in Isooctane

| 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 |

| Sulfur Conc. | Sulfur Wt.% | Cat. No. ▲ | Unit |
|--------------|-------------|----------------|--------|
| 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 |

Technical Note

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

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.

Available only as sets

ASTM D3120 & D3246

Sulfur Calibration

TIER 3 STANDARDS

Sulfur Calibration Set

D-3120-92-CAL-SET

8 x 1 mL

Individual bottles in Isooctane

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

Available only as a set

▲ Hazardous fee required for air shipments.

ASTM Methods

Tier 3 CRMs

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

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

Daily Gasoline Refinery Quality Control Standards

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 | Std. 1 Vol. % | Std. 2 Vol. % | Std. 3 Vol. % | Std. 4 Vol. % | Std. 5 Vol. % | Std. 6 Vol. % | Std. 7 Vol. % |
|----------------------------|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Benzene | 0.06 - 5.0 | 4.8 | | 2.4 | 1.2 | 0.64 | 0.32 | 0.12 | 0.06 |
| Toluene | 0.5 - 20 | 19.2 | | 14.4 | 9.6 | 4.80 | 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 |

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: sec-Butanol

D-3606-IS2-SET

7 x 1 mL

| Analyte | Calibration Range | Std. 1 Target | Std. 1 Vol. % | Std. 2 Vol. % | Std. 3 Vol. % | Std. 4 Vol. % | Std. 5 Vol. % | Std. 6 Vol. % | Std. 7 Vol. % |
|--------------------|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Benzene | 0.06 - 5.0 | 4.8 | | 2.4 | 1.2 | 0.64 | 0.32 | 0.12 | 0.06 |
| Toluene | 0.5 - 20 | 19.2 | | 14.4 | 9.6 | 4.80 | 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 | Std. 1 Vol. % | Std. 2 Vol. % | Std. 3 Vol. % | Std. 4 Vol. % | Std. 5 Vol. % | Std. 6 Vol. % | Std. 7 Vol. % |
|--------------------|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Benzene | 0.06 - 5.0 | 5 | | 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 | Std. 1 Vol. % | Std. 2 Vol. % | Std. 3 Vol. % | Std. 4 Vol. % | Std. 5 Vol. % | Std. 6 Vol. % | Std. 7 Vol. % |
|--------------------|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Benzene | 0.06 - 5.0 | 4.8 | | 2.4 | 1.2 | 0.64 | 0.32 | 0.12 | 0.06 |
| Toluene | 0.5 - 20 | 19.2 | | 14.4 | 9.6 | 4.8 | 2.4 | 0.96 | 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-SET

7 x 2 mL

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

ASTM Methods

Tier 3 CRMs

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

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

Valve Timing Mixture

D-4815-VT

1 x 1 mL

D-4815-VT-PAK

SAVE 5 x 1 mL

At stated Wt. %

5 comps.

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



Oxygenates Calibration Curves

With Internal Standard

M-GRO-CAL-IS-SET

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

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

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

ASTM Methods

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

Revised Daily QC Standard

Without Internal Standard

M-GRO-QC-R-10ML

1 x 10 mL

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

SAVE 5 x 10 mL

At stated Wt. %

14 comps.

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

Daily QC Standard

With Internal Standard

M-GRO-QC-IS-5ML

1 x 5 mL

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

SAVE 5 x 5 mL

At stated Wt. %

15 comps.

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

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

Revised Daily QC Standard

With Internal Standard

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

1 x 5 mL

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

SAVE 5 x 5 mL

At stated Wt. %

15 comps.

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

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

Gasoline Refinery Blank

With Internal Standard

M-GRO-BLNK-IS-10ML

1 x 10 mL

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

SAVE 5 x 10 mL

At stated Wt. %

2 comps.

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

O-FID/EPA Gasoline Refinery

Internal Standard

M-GRO-IS-5ML

1 x 5 mL

M-GRO-IS-5ML-PAK

SAVE 5 x 5 mL

1,2-Dimethoxyethane (neat)

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.

O-FID Gasoline Refinery Blank

RFA-BLNK-10ML

1 x 10 mL

RFA-BLNK-10ML-PAK

SAVE 5 x 10 mL

RFA Gasoline (neat)

Save 20% on a pack of 5



ASTM Methods

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)

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

D-5769-CAL-10ML-SET

5 x 5 mL (Std. 1 - 5)

5 x 10 mL (Std. 1 - 5)

Additional Calibration Level Without Internal Standard

D-5769-ADD-5ML

D-5769-ADD-10ML

1 x 5 mL (Std. 6)

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

D-5769-QC-15ML-PAK

1 x 15 mL

5 x 15 mL

D-5769-QC-10ML

D-5769-QC-10ML-PAK

1 x 10 mL

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

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

1 x 10 mL

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

M-GRA-IS-5ML-PAK

1 x 5 mL

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

Internal Standard

| 3 Comps. | Target Wt.% | Wt.% | Wt.% | Wt.% | Wt.% | Wt.% |
|------------------------------|-------------|------|------|------|------|------|
| Benzene-d 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 |

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 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

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.

With 4 Component Internal Standard (includes Toluene-d₈)

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

Internal Standard

| 4 Comps. | Target Wt.% | Wt.% | Wt.% | Wt.% | Wt.% | Wt.% |
|------------------------------|-------------|------|------|------|------|------|
| Benzene-d 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 |
| Toluene-d ₈ | 7 | 7 | 7 | 7 | 7 | 7 |

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 ₆ | 16.67 | Naphthalene-d ₈ | 8.77 |
| Ethylbenzene-d ₁₀ | 16.65 | Toluene-d ₈ | 57.91 |

Five Level Calibration Curve with ISTD

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

Additional Calibration Level with ISTD

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

Technical Note

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

Calibration Amounts

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



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

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

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

Internal Standard

| | | | | | |
|------------------------------|---|---|---|---|---|
| Benzene-d 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

| Core Calibr. Mix 24 Comps. | Optional Std. 6 Target Vol. % | 1 x 1 mL | |
|-------------------------------|----------------------------------|----------|----------|
| | | Vol. % | Weight % |
| 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 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
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-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 ₆ | 2 |
| Ethylbenzene-d ₁₀ | 2 |
| Naphthalene-d ₈ | 1 |

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

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 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 |

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

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

| Core Calibr. Mix 24 comps. | 1 x 1 mL | |
|-------------------------------|--------------------------------|--|
| | Optional Std. 6 Target Wt.% | |
| Benzene | 2.48 | |
| Toluene | 16.29 | |
| Ethylbenzene | 4.07 | |
| <i>m</i> -Xylene | 4.87 | |
| <i>p</i> -Xylene | 4.87 | |
| <i>o</i> -Xylene | 4.96 | |
| Isopropylbenzene | 2.43 | |
| <i>n</i> -Propylbenzene | 2.43 | |
| 3-Ethyltoluene | 2.44 | |
| 4-Ethyltoluene | 2.43 | |
| 1,3,5-Trimethylbenzene | 2.44 | |
| 2-Ethyltoluene | 2.48 | |
| 1,2,4-Trimethylbenzene | 4.11 | |
| 1,2,3-Trimethylbenzene | 2.52 | |
| Indan | 2.71 | |
| 1,4-Diethylbenzene | 2.43 | |
| <i>n</i> -Butylbenzene | 2.42 | |
| 1,2-Diethylbenzene | 2.48 | |
| 1,2,4,5-Tetramethylbenzene | 4.44 | |
| 1,2,3,5-Tetramethylbenzene | 1.67 | |
| Naphthalene | 1.87 | |
| Pentamethylbenzene | 1.72 | |
| 1-Methylnaphthalene | 1.87 | |
| 2-Methylnaphthalene | 1.91 | |
| Isooctane | 17.67 | |
| M-GRA-IS-R (ISTD) | <i>At stated Wt. %</i> | |
| 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-d₈ 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.

| | | | |
|--------------------|----|----------------------------|---|
| <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 | | |

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.

| | | | |
|--------------------|----|----------------------------|-----|
| <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 |

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 Methods

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 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

3 Component Deuterated ISTD

ASTM-P-0140-IS 1 x 10 mL
ASTM-P-0140-IS-PAK SAVE 5 x 10 mL
 At stated Wt.% in Isooctane 3 comps.

| | | | |
|------------------------------|---|----------------------------|---|
| Benzene-d ₆ | 2 | Naphthalene-d ₈ | 1 |
| Ethylbenzene-d ₁₀ | 2 | | |

Deuterated Internal Standard

ASTM-P-0140-IS2 1 x 10 mL
ASTM-P-0140-IS2-PAK SAVE 5 x 10 mL
 At stated Wt.% in Isooctane 4 comps.

| | | | |
|------------------------------|---|------------------------|---|
| Benzene-d ₆ | 2 | Toluene-d ₈ | 7 |
| Ethylbenzene-d ₁₀ | 2 | | |
| Naphthalene-d ₈ | 1 | | |

Performance Evaluation

ASTM-P-0140-PES 1 x 1 mL
ASTM-P-0140-PES-PAK SAVE 5 x 1 mL
 At stated Wt.% Isooctane:Toluene (50:50) 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 |

Daily QC Standard

ASTM-P-0140-QC 1 x 10 mL
ASTM-P-0140-QC-PAK SAVE 5 x 10 mL
 At stated Wt.% in Isooctane 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 |

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 |

Certification of Analysis

125 Market Street
New Haven, CT 06513
USA



Tel (203)786-5290
Fax (203)786-5287
www.AccuStandard.com

CERTIFICATE OF ANALYSIS

Catalog No: D-5769-QC-10ML
Description: Daily Quality Control Standard
Lot: 222111036
Solvent: N/A
Hazards: Refer to SDS for complete safety information

Date Certified: Nov 4, 2022
Expiration: Nov 4, 2032
Sample Size: 10 mL
Components: 14
Storage Condition: Ambient (>5 °C)

GHS safety information



Certified Reference Material



| Component | CAS # | Purity ³ % | Prepared Concentration ¹ (%w/w) | Certified Analyte Concentration ¹ (%w/w) |
|----------------------------|----------|-----------------------|--|---|
| n-Hexane | 110-54-3 | 99.9 | 12.00 | 11.99 |
| n-Heptane | 142-82-5 | 99.9 | 17.00 | 16.98 |
| n-Octane | 111-65-9 | 99.8 | 17.00 | 16.97 |
| n-Decane | 124-18-5 | 100.0 | 12.00 | 12.00 |
| n-Dodecane | 112-40-3 | 99.4 | 5.000 | 4.970 |
| Isooctane | 540-84-1 | 99.4 | 12.00 | 11.93 |
| Benzene | 71-43-2 | 100.0 | 1.000 | 1.000 |
| Toluene | 108-88-3 | 100.0 | 9.000 | 9.000 |
| Ethylbenzene | 100-41-4 | 100.0 | 3.000 | 3.000 |
| m-Xylene | 108-38-3 | 99.2 | 3.000 | 2.976 |
| o-Xylene | 95-47-6 | 99.4 | 3.000 | 2.982 |
| 1,2,4-Trimethylbenzene | 95-63-6 | 97.5 | 3.000 | 2.925 |
| 1,2,4,5-Tetramethylbenzene | 95-93-2 | 99.9 | 2.000 | 1.998 |
| Naphthalene | 91-20-3 | 100.0 | 1.000 | 1.000 |

CAS Number to easily identify compound

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

We use only high purity starting materials.

Concentration calculated by using the purity of the starting material

Uncertainty reported for statistical confidence.

This Certified Reference Material was verified in accordance with ISO/IEC 17025 (AT-1339) and ISO 17034 (AR-1463)
Density @ 60 degrees F per method D-4052 0.73506 g/mL
A product with a suffix (-1A, -2B, etc. or -01, -02, etc.) on its lot number has had its expiration date extended and is identical to the same lot number without the suffix.
¹ Certified Analyte Concentration = Purity x Prepared Concentration.
The Uncertainty associated with the certified concentration reported on this certificate is ±2.4%. This value is the combined expanded uncertainty and represents an estimated standard deviation equal to the positive square root of the total variation of the uncertainty of components. A normal distribution is assumed and a coverage factor of K=2 is chosen using approximately a 95% confidence level.
² All weights are traceable through NIST, Test No. 684/291344-18 & 684/292805-19
³ Purity/identity determined by one or more of the following methods: GC/MS, LC/MS, NMR, FTIR, Melting Point.
Labels and certificates follow U.S. Conventions in reporting numerical values: A comma (,) is used to separate units of one-thousand or greater. A period (.) is used as a decimal place marker.
The information on this certificate may not be reproduced without the express permission of the manufacturer. See reverse side for additional information
Hazard Information: Please refer to the SDS for information regarding the hazards associated with using this material.
This product was prepared according to in-house procedures and is guaranteed to be homogeneous.

QC management approval

NIST Traceability

Certified By:
Larry Decker, Organic QC Manager



125 Market St, New Haven, CT 06513 USA

ISO 17034 • 17025 • 9001