

ASTM D-5453

Test to Low ppb

Sulfur



D-1319 to D-2500

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 **ANTEK® INSTRUMENTS, INC.**
Real World Solutions

Low Sulfur Standards on following pages

Sulfur Standards for ASTM Methods D-2622-98, D-3120-96, D-3246-96, D-4294-98, D-5453-00, D-6334-98, D-6445-99 & Proposed ASTM Sulfur Methods

AccuStandard offers the Petroleum Industry the most complete line of calibration standards designed for today's Proposed & Promulgated test methods for Sulfur analysis. These calibration standards are designed specifically for the analysis of Sulfur in a wide variety of matrices such as #2 diesel fuel, white mineral oil, kerosene, gasoline, crude oil & residual oil.

Traceability, Quality and Certification

All Sulfur standards are manufactured from the highest quality raw materials, including well characterized starting materials & the lowest sulfur matrices available from the Petrochemical market. All standards are manufactured on a weight / weight basis using balances which are calibrated and verified daily against reference mass standards directly traceable to NIST under test No. 822/254480. The concentration of these working level Sulfur standards have established traceability links to NIST SRM's where available.

Convenient Packaging

Since applicable concentration ranges will vary based on the instrumentation used & the nature of the sample the standards can be ordered as complete sets, individual bottles, or Ready-to-Aspirate AccuShots.

AccuShots... Packaged to improve analytical standard integrity

AccuStandard is the first standard manufacturer to provide sulfur standards in convenient and Ready-to-Aspirate AccuShot 20 mL sealed ampules. Each 20 mL AccuShot provides the necessary material for calibration curve development or daily QA/QC. By purchasing AccuShots the analytical chemist uses only a small portion of the standard & minimizes contamination or evaporation.

ASTM Methods Sulfur in Mineral Oil

Sulfur in Heavy Weight Mineral Oil (75 cSt)				Sulfur in Light Weight Mineral Oil (20 cSt)			
Concentration		Sulfur in White Mineral Oil	Ready-to-Use Sulfur AccuShots	Concentration		Sulfur in White Mineral Oil	Ready-to-Use Sulfur AccuShots
µg/g	Wt. %	Cat. No.	Cat. No.	µg/g	Wt. %	Cat. No.	Cat. No.
Blank	0.000	SWMO-BL-4	SWMO-BL-SHOT	Blank	0.000	SWMO-LT-BL-4	SWMO-LT-BL-SHOT
100	0.010	SWMO-1X-4	SWMO-1X-SHOT	100	0.010	SWMO-LT-1X-4	SWMO-LT-1X-SHOT
200	0.020	SWMO-2X-4	SWMO-2X-SHOT	200	0.020	SWMO-LT-2X-4	SWMO-LT-2X-SHOT
300	0.030	SWMO-3X-4	SWMO-3X-SHOT	300	0.030	SWMO-LT-3X-4	SWMO-LT-3X-SHOT
400	0.040	SWMO-4X-4	SWMO-4X-SHOT	400	0.040	SWMO-LT-4X-4	SWMO-LT-4X-SHOT
500	0.050	SWMO-5X-4	SWMO-5X-SHOT	500	0.050	SWMO-LT-5X-4	SWMO-LT-5X-SHOT
750	0.075	SWMO-7.5X-4	SWMO-7.5X-SHOT	750	0.075	SWMO-LT-7.5X-4	SWMO-LT-7.5X-SHOT
1,000	0.10	SWMO-10X-4	SWMO-10X-SHOT	1,000	0.10	SWMO-LT-10X-4	SWMO-LT-10X-SHOT
1,500	0.15	SWMO-15X-4	SWMO-15X-SHOT	1,500	0.15	SWMO-LT-15X-4	SWMO-LT-15X-SHOT
2,000	0.20	-----	-----	2,000	0.20	-----	-----
3,000	0.30	SWMO-30X-4	SWMO-30X-SHOT	3,000	0.30	SWMO-LT-30X-4	SWMO-LT-30X-SHOT
4,000	0.40	-----	-----	4,000	0.40	-----	-----
5,000	0.50	SWMO-50X-4	SWMO-50X-SHOT	5,000	0.50	SWMO-LT-50X-4	SWMO-LT-50X-SHOT
7,000	0.70	SWMO-70X-4	SWMO-70X-SHOT	7,000	0.70	SWMO-LT-70X-4	SWMO-LT-70X-SHOT
10,000	1.00	SWMO-100X-4	SWMO-100X-SHOT	10,000	1.00	SWMO-LT-100X-4	SWMO-LT-100X-SHOT
15,000	1.50	SWMO-150X-4	SWMO-150X-SHOT	15,000	1.50	SWMO-LT-150X-4	SWMO-LT-150X-SHOT
20,000	2.00	SWMO-200X-4	SWMO-200X-SHOT	20,000	2.00	SWMO-LT-200X-4	SWMO-LT-200X-SHOT
30,000	3.00	SWMO-300X-4	SWMO-300X-SHOT	30,000	3.00	SWMO-LT-300X-4	SWMO-LT-300X-SHOT
40,000	4.00	SWMO-400X-4	SWMO-400X-SHOT	40,000	4.00	SWMO-LT-400X-4	SWMO-LT-400X-SHOT
50,000	5.00	SWMO-500X-4	SWMO-500X-SHOT	50,000	5.00	SWMO-LT-500X-4	SWMO-LT-500X-SHOT
60,000	6.00	SWMO-600X-4	SWMO-600X-SHOT	60,000	6.00	SWMO-LT-600X-4	SWMO-LT-600X-SHOT
Set of above		SWMO-CAL-SET-4	Each AccuShot product contains 5 x 20 mL ampules at the stated conc. for \$ 60	Set of above		SWMO-LT-CAL-SET-4	Each AccuShot product contains 5 x 20 mL ampules at the stated conc. for \$ 60
Cat. No. #'s		19 x 4 oz. \$ 850		Cat. No. #'s		19 x 4 oz. \$ 850	
Individual Sulfur Standards 4 oz Bottle		1 -10 units \$ 55 ea		Individual Sulfur Standards 4 oz Bottle		1 -10 units \$ 55 ea	
		10 +units \$ 50 ea				10 +units \$ 50 ea	

Technical Note

Sulfur concentration calculated from % sulfur in di-n-butyl sulfide

Standards of Interest

For the mandatory real world QC samples stipulated in the Method, see page 2

Petrochemical Standards

Sulfur

ASTM

Sulfur Standards for ASTM Methods D-2622-98, D-3120-96, D-3246-96, D-4294-98, D-5453-00, D-6334-98, D-6445-99 & Proposed ASTM Sulfur Methods

ASTM Methods

Sulfur in #2 Diesel Fuel

Concentration		Sulfur in #2 Diesel Fuel	Ready-to-Use Sulfur AccuShots
$\mu\text{g/g}$	Wt. %	Cat. No.	Cat. No.
Blank	0.000	SDF-BL-4	SDF-BL-SHOT
100	0.010	SDF-1X-4	SDF-1X-SHOT
200	0.020	SDF-2X-4	SDF-2X-SHOT
300	0.030	SDF-3X-4	SDF-3X-SHOT
400	0.040	SDF-4X-4	SDF-4X-SHOT
500	0.050	SDF-5X-4	SDF-5X-SHOT
750	0.075	SDF-7.5X-4	SDF-7.5X-SHOT
1,000	0.10	SDF-10X-4	SDF-10X-SHOT
1,500	0.15	SDF-15X-4	SDF-15X-SHOT
2,000	0.20		
3,000	0.30	SDF-30X-4	SDF-30X-SHOT
4,000	0.40		
5,000	0.50	SDF-50X-4	SDF-50X-SHOT
7,000	0.70	SDF-70X-4	SDF-70X-SHOT
10,000	1.00	SDF-100X-4	SDF-100X-SHOT
15,000	1.50	SDF-150X-4	SDF-150X-SHOT
20,000	2.00	SDF-200X-4	SDF-200X-SHOT
30,000	3.00	SDF-300X-4	SDF-300X-SHOT
40,000	4.00	SDF-400X-4	SDF-400X-SHOT
50,000	5.00	SDF-500X-4	SDF-500X-SHOT
60,000	6.00	SDF-600X-4	SDF-600X-SHOT
Set of above Cat. No. #'s		SDF-CAL-SET-4 19 x 4 oz. \$ 850	Each AccuShot product contains 5 x 20 mL ampules at the stated conc. for \$ 60
Individual Sulfur Standards 4 oz Bottle	1 -10 units 10 +units	\$ 55 ea	\$ 50 ea

Ready-to-Use

AccuShots ...Conveniently packaged to improve analytical standard integrity.

- **Minimize Contamination**
- **Minimize Evaporation**

Each 20 mL AccuShot provides the necessary material for calibration curve development or daily QA/QC. By purchasing AccuShots the analytical chemist uses only a small portion of the standard & minimizes contamination and evaporation.

Technical Note

Sulfur concentration calculated from % sulfur in di-*n*-butyl sulfide

ASTM Methods

Sulfur in Kerosene

Sulfur in Light Distillate Kerosene			Sulfur in Heavy Distillate Kerosene			
Concentration		Sulfur in Light Distillate Kerosene	Ready-to-Use Sulfur AccuShots	Concentration		Sulfur in Heavy Distillate Kerosene
$\mu\text{g/g}$	wt. %	Cat. No.	Cat. No.	$\mu\text{g/g}$	wt. %	Cat. No.
Blank	0.000	SK-BL-4	SK-BL-SHOT	Blank	0.000	SK-HD-BL-4
100	0.010	SK-1X-4	SK-1X-SHOT	100	0.010	SK-HD-1X-4
200	0.020	-----		200	0.020	SK-HD-2X-4
300	0.030	SK-3X-4	SK-3X-SHOT	300	0.030	SK-HD-3X-4
400	0.040	-----		400	0.040	SK-HD-4X-4
500	0.050	SK-5X-4	SK-5X-SHOT	500	0.050	SK-HD-5X-4
750	0.075	SK-7.5X-4	SK-7.5X-SHOT	750	0.075	SK-HD-7.5X-4
1,000	0.10	SK-10X-4	SK-10X-SHOT	1,000	0.10	SK-HD-10X-4
1,500	0.15	-----		1,500	0.15	SK-HD-15X-4
2,000	0.20	SK-20X-4	SK-20X-SHOT	2,000	0.20	SK-HD-20X-4
3,000	0.30	SK-30X-4	SK-30X-SHOT	3,000	0.30	SK-HD-30X-4
4,000	0.40	SK-40X-4	SK-40X-SHOT	4,000	0.40	SK-HD-40X-4
5,000	0.50	SK-50X-4	SK-50X-SHOT	5,000	0.50	SK-HD-50X-4
7,000	0.70	-----		7,000	0.70	SK-HD-70X-4
10,000	1.00	SK-100X-4	SK-100X-SHOT	10,000	1.00	SK-HD-100X-4
15,000	1.50	-----		15,000	1.50	SK-HD-150X-4
20,000	2.00	SK-200X-4	SK-200X-SHOT	20,000	2.00	SK-HD-200X-4
30,000	3.00	-----		30,000	3.00	SK-HD-300X-4
40,000	4.00	-----		40,000	4.00	SK-HD-400X-4
50,000	5.00	-----		50,000	5.00	SK-HD-500X-4
60,000	6.00	-----		60,000	6.00	SK-HD-600X-4
Set of above Cat. No. #'s		SK-CAL-SET-4 12 x 4 oz. \$ 500	Each AccuShot product contains 5 x 20 mL ampules at the stated conc. for \$ 60	Set of above Cat. No. #'s		SK-HD-CAL-SET-4 21 x 4 oz. \$ 950
Individual Sulfur Standards 4 oz Bottle	1 -10 units 10 +units	\$ 55 ea	\$ 50 ea	Individual Sulfur Standards 4 oz Bottle	1 -10 units 10 +units	\$ 55 ea
						\$ 50 ea

Technical Note

Sulfur concentration calculated from % sulfur in di-*n*-butyl sulfide

Sulfur Methods

Sulfur Standards for ASTM Methods D-2622-98, D-3120-96, D-3246-96, D-4294-98, D-5453-00, D-6334-98, D-6445-99 & Proposed ASTM Sulfur Methods

ASTM D-2622-98, D-4294-98 Sulfur Calibration Standards

Sulfur Calibration Standards in Isooctane for Gasoline & Reformulated Gasoline Analysis

Standards can be mixed for quantity discounts

1 to 4 units \$ 60 each per Sulfur Standard
 5 to 10 units \$ 55 each per Sulfur Standard
 more than 10 units \$ 50 each per Sulfur Standard

Cat. No.	Sulfur Conc.	Sulfur Wt. %	Unit
STP-BL-4	Blank	0.0	4 oz.
STP-1X-4	10 µg/g	0.001	4 oz.
STP-2X-4	20 µg/g	0.002	4 oz.
STP-3X-4	30 µg/g	0.003	4 oz.
STP-5X-4	50 µg/g	0.005	4 oz.
STP-10X-4	100 µg/g	0.010	4 oz.
STP-20X-4	200 µg/g	0.020	4 oz.
STP-30X-4	300 µg/g	0.030	4 oz.
STP-40X-4	400 µg/g	0.040	4 oz.
STP-60X-4	600 µg/g	0.060	4 oz.
STP-100X-4	1000 µg/g	0.10	4 oz.
STP-200X-4	2000 µg/g	0.20	4 oz.
STP-300X-4	3000 µg/g	0.30	4 oz.

STP-CAL-SET \$ 650 / set of 13 x 4 oz.
 In Isooctane Set contains the above 13 individual bottles

Technical Note

A well characterized di-*n*-butyl sulfide starting material is used with a low sulfur Isooctane matrix for the RFG/gasoline sulfur standards.

ASTM D-2622-98, D-6334-98, D-6445-99 Low Level Sulfur Calibration Standards

Low Level Sulfur Calibration Standards for use on XRF Energy Dispersive or Wavelength Instruments

Standards can be mixed for quantity discounts

1 to 4 units \$ 60 each per Sulfur Standard
 5 to 10 units \$ 55 each per Sulfur Standard
 more than 10 units \$ 50 each per Sulfur Standard

Cat. No.	Sulfur Conc.	Sulfur Wt. %	Unit
D-2622-LL-BL-4	Blank	0.0	4 oz.
D-2622-LL-5X-4	5 µg/g	0.0005	4 oz.
D-2622-LL-10X-4	10 µg/g	0.0010	4 oz.
D-2622-LL-30X-4	30 µg/g	0.0030	4 oz.
D-2622-LL-50X-4	50 µg/g	0.0050	4 oz.
D-2622-LL-75X-4	75 µg/g	0.0075	4 oz.
D-2622-LL-100X-4	100 µg/g	0.010	4 oz.
D-2622-LL-300X-4	300 µg/g	0.030	4 oz.
D-2622-LL-500X-4	500 µg/g	0.050	4 oz.
D-2622-LL-1000X-4	1000 µg/g	0.100	4 oz.

D-2622-LL-CAL-SET \$ 450 / 10 x 4 oz.
 In Isooctane : Toluene (3:1)
 Set contains the above 10 individual bottles

Technical Note

Well characterized Thiophene & 2-Methyl thiophene are used in a low sulfur Isooctane/Toluene matrix for this calibration set.

ASTM D-3120-96, D-3246-96 Sulfur Calibration Set

Sulfur Calibration Set

D-3120-92-CAL-SET \$ 75 / set of 8 x 1 mL
 In Isooctane

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

Technical Note

Well characterized di-*n*-butyl sulfide is used in a low sulfur Isooctane matrix for this calibration set.

Standards of Interest

For the mandatory real world QC samples stipulated in many ASTM Sulfur Methods, see page 2

ASTM D-2622-98, D-6334-98, D-6445-99 Mid Level Sulfur Calibration Standards

New Requested Additions for use on XRF Energy Dispersive or Wavelength Instruments

Standards can be mixed for quantity discounts

1 to 4 units \$ 60 each per Sulfur Standard
 5 to 10 units \$ 55 each per Sulfur Standard
 more than 10 units \$ 50 each per Sulfur Standard

Cat. No.	Sulfur Conc.	Sulfur Wt. %	Unit
D-2622-LL-200X-4	200 µg/g	0.020	4 oz.
D-2622-LL-400X-4	400 µg/g	0.040	4 oz.
D-2622-LL-600X-4	600 µg/g	0.060	4 oz.
D-2622-LL-700X-4	700 µg/g	0.070	4 oz.
D-2622-LL-800X-4	800 µg/g	0.080	4 oz.
D-2622-LL-900X-4	900 µg/g	0.090	4 oz.
D-2622-LL-1100X-4	1100 µg/g	0.110	4 oz.
D-2622-LL-1200X-4	1200 µg/g	0.120	4 oz.

Technical Note

Well characterized Thiophene & 2-Methyl thiophene are used in a low sulfur Isooctane/Toluene matrix for this calibration set.

Sulfur Standards for ASTM Methods D-2622-98, D-3120-96, D-3246-96, D-4294-98, D-5453-00, D-6334-98, D-6445-99 & Proposed ASTM Sulfur Methods


ASTM Methods Sulfur Calibration Standards

Sulfur in Crude Oil Standards			Sulfur in Residual Oil Standards		
Concentration		Sulfur in Crude Oil	Concentration		Sulfur in Crude Oil
$\mu\text{g/g}$	Wt. %	Cat. No.	$\mu\text{g/g}$	Wt. %	Cat. No.
1,000	0.10	SCO-10X-4	3,500	0.35	SRO-35X-4
2,500	0.25	SCO-25X-4	7,000	0.70	SRO-70X-4
5,000	0.50	SCO-50X-4	10,000	1.00	SRO-100X-4
10,000	1.00	SCO-100X-4	15,000	1.50	SRO-150X-4
20,000	2.00	SCO-200X-4	20,000	2.00	SRO-200X-4
30,000	3.00	SCO-300X-4	30,000	3.00	SRO-300X-4
40,000	4.00	SCO-400X-4	40,000	4.00	SRO-400X-4
50,000	5.00	SCO-500X-4			
Set of above		SCO-CAL-SET-4	Set of above		SRO-CAL-SET-4
Cat. No.'s		8 x 4 oz. \$ 500	Cat. No.'s		7 x 4 oz. \$ 450
Individual Sulfur 1 -10 units		10 +units	Individual Sulfur 1 -10 units		10 +units
Standards 4 oz Bottle \$ 75 ea		\$ 65 ea	Standards 4 oz Bottle \$ 75 ea		\$ 65 ea

Technical Note

AccuStandard's Technical Service Dept. can provide **Ready-to-Inject** working level calibration standards to meet unique laboratory applications call or fax us your standard requirements.

ASTM Methods Sulfur Standards

Total Sulfur in Aromatic Compounds by Hydrogenolysis & Rateometric Colorimetry ASTM-P-0010-PAK \$ 75 / 5 x 1 mL <i>1000 $\mu\text{g/mL}$ in Toluene</i> Sulfur (as Thiophene)	Trace Quantities of Sulfur in Liquid Aromatic Hydrocarbons by Oxidative Microcoulometry ASTM-P-0020-PAK \$ 75 / 5 x 1 mL <i>1000 $\mu\text{g/mL}$ in Xylenes</i> Sulfur (as Dibenzothiophene)	
ASTM-SSTD-A/B-SET \$ 100 / 10 x 2 mL  The set contains the following 10 standards in isooctane		
Cat. No.	Description	Unit
ASTM-SSTD-A-BL	Sulfur Blank	2 mL
ASTM-SSTD-A-01	Sulfur @ 0.5 $\mu\text{g/g}$ in Isooctane	2 mL
ASTM-SSTD-A-02	Sulfur @ 1.0 $\mu\text{g/g}$ in Isooctane	2 mL
ASTM-SSTD-A-03	Sulfur @ 2.5 $\mu\text{g/g}$ in Isooctane	2 mL
ASTM-SSTD-A-04	Sulfur @ 5.0 $\mu\text{g/g}$ in Isooctane	2 mL
ASTM-SSTD-B-BL	Sulfur Blank	2 mL
ASTM-SSTD-B-04	Sulfur @ 5.0 $\mu\text{g/g}$ in Isooctane	2 mL
ASTM-SSTD-B-05	Sulfur @ 10.0 $\mu\text{g/g}$ in Isooctane	2 mL
ASTM-SSTD-B-06	Sulfur @ 25.0 $\mu\text{g/g}$ in Isooctane	2 mL
ASTM-SSTD-B-07	Sulfur @ 50.0 $\mu\text{g/g}$ in Isooctane	2 mL

ASTM D-2789-95 Hydrocarbon Types in Low Olefinic Gasoline by MS

Composition Test Mix D-2789-CTM \$ 40 / 1 x 1 mL D-2789-CTM-PAK SAVE 20% \$ 160 / 5 x 1 mL 9 comps.		Custom Formulations AccuStandard can formulate customer specific standards for this method. Fax AccuStandards' Technical Department (1-203-786-5287) or check out our website for custom requests.
(Vol. %)		(Vol. %)
2-Methylpentane 7.2	<i>cis</i> -1,2-Dimethylcyclohexane	15.5
2,4-Dimethylpentane 9.4	Benzene	7.7
<i>n</i> -Octane 16.6	Toluene	10
Methylcyclopentane 7.1	<i>p</i> -Xylene	16.5
Methylcyclohexane 10		
Technical Note Both the actual volume % ratio and the final weight fractions for each analyte will be listed on the certificate.		