



Certified Reference Materials (CRMs) and Standards for Petroleum Analysis

VHG Brand (Fuels & Lubricants)

Dr. Ehrenstorfer™ Brand (Hydrocarbons)

LGC Quality | ISO 9001:2015 | ISO 17034 | ISO/IEC 17025 | ISO/IEC 17043



Welcome to the LGC catalog of Petroleum Certified Reference Materials (CRMs) and Standards



Section 1 – VHG Brand

VHG has been manufacturing single and multi-element standards (both aqueous and oil-based) for more than 30 years. We specialize in custom blends, should our stock products not suit your specific needs.

- Petroleum standards for analysis by ICP, ICP-MS, XRF, RDE, UVF, physical testing instruments and other oil analysis instruments
- VHG line of analytical reference standards for both new and in-service oil applications
- Two web-based proficiency testing programs: VHG's Immediate Feedback PTP and LGC's traditional style Oil PTP Scheme
- Standards for ASTM, DIN, IP, ISO, JIS and ANFOR methods, including EPA Tier 3 methods



Section 2 – Dr. Ehrenstorfer™ Brand

Dr. Ehrenstorfer™ has been manufacturing GC standards for more than 30 years. We manufacture a wide range of standards for hydrocarbon analysis. Our full product line includes over 7,000 standards for volatile and semi-volatile analysis across multiple industry sectors. We also manufacture custom standards to suit specific needs of your application.

- A comprehensive line of hydrocarbon standards for GC analysis
- Standards for use with multiple ASTM methods including EPA Tier 3 methods
- Standards for aromatics, oxygenates, benzene, ethanol, SIMDIS, PIANO, PONA, MTBE, impurities, and other applications

Section 3 – Instrument Consumables

- Auto-sampler tubes compatible with several instruments
- Auto-sampler beakers for titrators
- Tubing and torches for ICP, ICP-MS
- XRF cups, thin films and accessories

Our Commitment to quality

Our manufacturing facility is certified to ISO 9001:2015 and accredited to ISO 17034. Each product must pass rigorous Quality Control in our laboratory certified to ISO/IEC 17025 and is shipped with a comprehensive Certificate of Analysis (COA) with actual (not nominal) concentrations. Our proficiency testing programs for oil analysis are accredited to ISO/IEC 17043.

Raw materials are assayed and analyzed for trace impurities.

Major constituents are verified both instrumentally, against the appropriate NIST SRM (when available), and/or through classical wet chemistry methods (titrimetry or gravimetry).

Our aqueous standards are prepared in pre-cleaned Teflon or HDPE reactors and our petroleum standards are prepared in pre-cleaned HDPE or glass reactors. Balances and volumetric flasks are calibrated according to NIST procedures.

Thank you to all of our customers. We look forward to supporting your continued success.

The LGC Team.

About LGC Standards

LGC Standards is a leading global producer and distributor of reference materials and proficiency testing schemes.

Headquartered in Teddington, Middlesex, UK, LGC Standards has a network of dedicated sales offices extending across 20 countries in 5 continents. We have an unparalleled breadth of reference materials produced in facilities accredited to ISO 17034 in 4 sites across the UK, US and Germany.

In addition to our petroleum product line, we manufacture CRMs and reference materials for the following sectors: pharmaceutical, forensic, clinical, food, beverage, environmental, pesticides and contaminants sectors.

We provide proficiency testing schemes in support of these sectors, as well as others, to more than 12,000 laboratories worldwide.

About our Webshop

An up-to-date listing of all products is available on the LGC website: lgcstandards.com

Once registered, you can use the website to order products, check delivery times and access a range of resources for a wide variety of sectors.

Prices for the products listed, as well as detailed procedures and transport charges are available from your local sales office, where applicable.

For products requiring special delivery procedures (dangerous goods, etc.), additional charges may be applied.

About LGC

LGC is an international life sciences measurement and testing company, building leading positions in sustainably growing markets.

We provide reference materials, genomics solutions and analytical testing products and services, based on our innovations and own intellectual property.

We work with customers in the pharmaceutical, agricultural, biotechnology, food, environment, oils & petroleum, security and sports sectors, as well as with governments and academia to achieve excellence in investigative, diagnostic and measurement science.

For more information, please visit our website: lgcgroup.com

Scope of Accreditation



Table of Contents

Table of Contents by ASTM Method	7	XRF Standards	
Method Conversion Table	11	Metallo-Organic Concentrates	33
<hr/>		Standards for Sulfur and Metals in Crude and Residual Oils	35
Metallo-Organic Standards		Lubricating Oil Standards	36
V26 Wear Metal Standards	12	Lubricating Oil Calibration Set	37
V-Series Wear Metal Standards	13	Multi-Element Calibration Set	38
Metal Additives Standards	14	Standards for Fuels and Other Petroleum Products	40
Internal Standards for ICP	15	Standards for Lead in Gasoline	41
V-Solv™ ICP Solvent	16	Internal Standards for Lead in Gasoline Analysis	41
Stabilizer for Wear Metal Standards	17	<hr/>	
Matrix Oils and Solvents	17	Sulfur Standards	
Single-Element Metallo-Organic Standards	18	Sulfur in #2 Diesel Fuel Standards	42
D-Series Multi-Element Wear Metal Standards	20	Sulfur in Mineral Oil Standards	43
<hr/>		Sulfur in Kerosene/Jet A-1 Standards	44
Proficiency Testing		Sulfur in Crude Oil and Residual Oil Standards	44
VHG's Instant Feedback Proficiency Testing Program	22	Sulfur in Isooctane Standards	45
LGC's Oil Proficiency Testing Scheme	25	Matrix Oils and Solvents	46
<hr/>		Sulfur Standards made from Polysulfides in Mineral Oil	47
Condition Monitoring Standards		Sulfur QC Standards, Drift Monitors and Calibration Sets	48
Parti-Count™ Particle Count Standards	26	Sulfur in Mineral Oil QC Standards	49
Viscosity Standards	27	Sulfur in #2 Diesel Fuel QC Standards	50
Soot Content Standards	27	Sulfur in Isooctane and Isooctane Blends QC Standards	51
Acid Number and Base Number Standards	28	Sulfur in Petroleum Products (Ampules)	52
Crackle Test Reference Standards	29	Sulfur and Nitrogen Products (Ampules)	54
Karl Fischer Titration Reference Standards	29	<hr/>	
Chlorine in Oil Standards	30	Physical Test Standards	
Fuel Dilution Standards	30	Petroleum Physical Test Standards	55
Glycol in Oil Standards	31	<hr/>	
Multi-Element Coolant Standards	32		

Table of Contents

Table of Contents

Biodiesel Standards

Biodiesel/Diesel Fuel Blends	58
Metals in Biodiesel Standards	58
Sulfur in Biodiesel Standards	59
Biodiesel Blanks	59

EPA Tier 3 Standards

Sulfur in #2 Diesel Fuel QC Standards	60
Sulfur in Mineral Oil QC Standards	61
Sulfur in Isooctane and Isooctane Blends QC Standards	62
Sulfur in #2 Diesel Fuel Standards	63
Sulfur in Mineral Oil Standards	64
Sulfur in Isooctane Standards	65
Sulfur in Isooctane Standards (Ampules)	65
Distillation Standards	66
Reference Gas Oil No. 2	66
Polywax Standards for SIMDIS	67

Dr. Ehrenstorfer™ Hydrocarbon Standards for GC Analysis

Contents	71
EPA Tier 3 Standards	72
D3606, D4815, D5191, D5599, D5769	72
Benzene and Toluene in Gasoline Standards D3606	74
Oxygenate Standards D4815/D5599	76
Reid Vapor Pressure Standards D5191	85
Aromatics in Gasoline Standards	
D4420, D5580, D5769, D5986	86
SIMDIS Standards	
D2887, D3710, D5442, D5443, D6352, D7096, D7169, D7213	93
MTBE Standards D5441	103
PIANO and PONA (DHA) Standards	
D5134, D6296, D6729, D6730, D6733	107
Aroclors in Transformer Oil (PCBs) D4059, D6160	121

Instrument Consumables

Auto-sampler Tubes and Beakers	131
Tubing for Peristaltic Pumps	132
Torches	132
XRF Sample Cups	134
Thin Films	136
Accessories and Tools	138

Reference Information

Conversion Tables for Reference	139
---------------------------------	-----

Table of Contents by ASTM Method

ASTM	Method Description	
D56	Flash Point by Tag Closed Cup Tester	55
D86	Distillation of Petroleum Products at Atmospheric Pressure	66
D92	Flash and Fire Points by Cleveland Open Cup Tester	55
D93	Flash Point by Pensky-Martens Closed Cup Tester	55
D97	Pour Point of Petroleum Products	57
D445	Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)	27,55
D850	Distillation of Industrial Aromatic Hydrocarbons and Related Materials	66
D974	Acid and Base Number by Color-Indicator Titration	28
D2386	Freezing Point of Aviation Fuels	56
D2500	Cloud Point of Petroleum Products and Liquid Fuels	56
D2622	Sulfur in Petroleum Products by Wavelength Dispersive X-Ray Fluorescence Spectrometry	42-45, 47-51, 59-65
D2887	Boiling Range Distribution of Petroleum Fractions by Gas Chromatography	66, 67, 93-97
D2896	Base Number of Petroleum Products by Potentiometric Perchloric Acid Titration	28
D3120	Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry	44, 45, 65
D3227	(Thiol Mercaptan) Sulfur in Gasoline, Kerosene, Aviation Turbine, and Distillate Fuels (Potentiometric Method)	53
D3246	Sulfur in Petroleum Gas by Oxidative Microcoulometry	45, 65
D3524	Diesel Fuel Diluent in Used Diesel Engine Oils by Gas Chromatography	30
D3525	Gasoline Diluent in Used Gasoline Engine Oils by Gas Chromatography	30
D3606	Determination of Benzene and Toluene in Finished Motor and Aviation Gasoline by Gas Chromatography	72, 74, 75, 92
D3710	Boiling Range Distribution of Gasoline and Gasoline Fractions by Gas Chromatography	93, 97, 98
D4045	Sulfur in Petroleum Products by Hydrogenolysis and Rateometric Colorimetry	44, 45, 52, 65
D4059	Analysis of Polychlorinated Biphenyls in Insulating Liquids by Gas Chromatography	121-123

Table of Contents by ASTM Method

D4420	Determination of Aromatics in Finished Gasoline by Gas Chromatography	86-88
D4294	Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-Ray Fluorescence Spectrometry	42-45, 47-51, 59-65
D4629	Trace Nitrogen in Liquid Petroleum Hydrocarbons by Syringe/Inlet Oxidative Combustion and Chemiluminescence Detection	54
D4739	Base Number Determination by Potentiometric Hydrochloric Acid Titration	28
D4815	Determination of MTBE, ETBE, TAME, DIPE, Tertiary-Amyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography	72, 76-79
D4927	Elemental Analysis of Lubricant and Additive Components — Barium, Calcium, Phosphorus, Sulfur, and Zinc by Wavelength-Dispersive X-Ray Fluorescence Spectroscopy	13, 14, 18, 36, 37, 38
D4929	Determination of Organic Chloride Content in Crude Oil	30
D4951	Determination of Additive Elements in Lubricating Oils by Inductively Coupled Plasma Atomic Emission Spectrometry	14, 18
D5059	Lead in Gasoline by X-Ray Spectroscopy	41
D5134	Detailed Analysis of Petroleum Naphthas through n-Nonane by Capillary Gas Chromatography	107, 108-112, 114, 11, 117, 118, 120
D5185	Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)	13, 14, 18
D5191	Vapor Pressure of Petroleum Products	72, 85
D5384	Chlorine in Used Petroleum Products (Field Test Kit Method)	30
D5441	Analysis of Methyl Tert-Butyl Ether (MTBE) by Gas Chromatography	103, 104
D5442	Analysis of Petroleum Waxes by Gas Chromatography	93, 99, 100
D5443	Paraffin, Naphthene, and Aromatic Hydrocarbon Type Analysis in Petroleum Distillates through 200 °C by Multi-Dimensional Gas Chromatography	93, 101, 102
D5453	Determination of Total Sulfur in Light Hydrocarbons, Spark-ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence	42-45, 49-52, 59-65
D5501	Determination of Ethanol and Methanol Content in Fuels Containing Greater than 20% Ethanol by Gas Chromatography	76, 78, 105, 106
D5580	Determination of Benzene, Toluene, Ethylbenzene, p/m-Xylene, o-Xylene, C9 and Heavier Aromatics, and Total Aromatics in Finished Gasoline by Gas Chromatography	86-88, 91, 92
D5599	Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection	72, 76-78, 105

Table of Contents by ASTM Method

D5623	Sulfur Compounds in Light Petroleum Liquids by Gas Chromatography and Sulfur Selective Detection	53
D5708	Determination of Nickel, Vanadium, and Iron in Crude Oils and Residual Fuels by Inductively Coupled Plasma (ICP) Atomic Emission Spectrometry	13, 18
D5769	Determination of Benzene, Toluene, and Total Aromatics in Finished Gasolines by Gas Chromatography/Mass Spectrometry	72, 73, 76, 86-91
D5967	Evaluation of Diesel Engine Oils in T-8 Diesel Engine	27
D5986	Determination of Oxygenates, Benzene, Toluene, C8-C12 Aromatics and Total Aromatics in Finished Gasoline by Gas Chromatography/Fourier Transform Infrared Spectroscopy	86-88
D6160	Determination of Polychlorinated Biphenyls (PCBs) in Waste Materials by Gas Chromatography	121, 123-125
D6296	Total Olefins in Spark-ignition Engine Fuels by Multidimensional Gas Chromatography	107-112, 114-119
D6304	Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration	29
D6334	Sulfur in Gasoline by Wavelength Dispersive X-Ray Fluorescence	45, 65
D6352	Boiling Range Distribution of Petroleum Distillates in Boiling Range from 174 °C to 700 °C by Gas Chromatography	93-97
D6366	Total Trace Nitrogen and its Derivatives in Liquid Aromatic Hydrocarbons by Oxidative Combustion and Electrochemical Detection	54
D6371	Cold Filter Plugging Point of Diesel and Heating Fuels	56
D6443	Determination of Calcium, Chlorine, Copper, Magnesium, Phosphorus, Sulfur, and Zinc in Unused Lubricating Oils and Additives by Wavelength Dispersive X-Ray Fluorescence Spectrometry (Mathematical Correction Procedure)	13, 18, 36
D6445	Sulfur in Gasoline by Energy-Dispersive X-Ray Fluorescence Spectrometry	45, 65
D6481	Determination of Phosphorus, Sulfur, Calcium, and Zinc in Lubrication Oils by Energy Dispersive X-Ray Fluorescence Spectroscopy	18, 36
D6595	Determination of Wear Metals and Contaminants in Used Lubricating Oils or Used Hydraulic Fluids by Rotating Disc Electrode Atomic Emission Spectrometry	13, 18
D6729	Determination of Individual Components in Spark-ignition Engine Fuels by 100-Metre Capillary High-Resolution Gas Chromatography	107-112, 114, 115, 117, 118
D6730	Determination of Individual Components in Spark-ignition Engine Fuels by 100-Metre Capillary (with Precolumn) High-Resolution Gas Chromatography	107-112, 114, 115, 117,118

Table of Contents by ASTM Method

D6733	Determination of Individual Components in Spark-ignition Engine Fuels by 50-Metre Capillary High-Resolution Gas Chromatography	107-112, 114, 115, 117,118
D6751	Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels	58
D7169	Boiling Point Distribution of Samples with Residues such as Crude Oils and Atmospheric and Vacuum Residues by High Temperature Gas Chromatography	93-97
D7213	Boiling Range Distribution of Petroleum Distillates in the Boiling Range from 100°C to 615 °C by Gas Chromatography	93-97
D7371	Determination of Biodiesel (Fatty Acid Methyl Esters) Content in Diesel Fuel Oil using Mid Infrared Spectroscopy (FTIR-ATR-PLS Method)	58
D7423	Determination of Oxygenates in C2, C3, C4, and C5 Hydrocarbon Matrices by Gas Chromatography and Flame Ionization Detection	76, 80-84
D7593	Determination of Fuel Dilution for In-Service Engine Oils by Gas Chromatography	30
D7686	Field-Based Condition Monitoring of Soot in In-Service Lubricants using a Fixed-Filter Infrared (IR) Instrument	27
D7844	Condition Monitoring of Soot in In-Service Lubricants by Trend Analysis using Fourier Transform Infrared (FT-IR) Spectrometry	27
D7922	Determination of Glycol for In-Service Engine Oils by Gas Chromatography	27

Method Conversion Table

ASTM	IP	ISO	DIN	JIS	ANFOR
D56			51411	K 2580	M07-003
D86	123	3405	51751	K 2254	M07-002
D92	36	2592	51376	K 2265	T60-118
D93	34	2719	51758	K 2265	M07-019
D97	15	3016			T60-105
D445	71-1	3104	51562	K 2283	T60-100
D2386	16	3013	51421	K 2276	M07-048
D2500	219	3015	51597	K 2269	T60-105
D2622			51400T6	K 2541	
D2887		3924			
D3120		16591			
D3246	373				M07-052
D3606	425				
D4294	336	8754			M07-053
D4629	379				M07-058
D4927	407		51391T2		
D5059	228				
D5191	394				M07-079
D5453		20546	51551		
D5599	408				
D5901	445				
D5972	435				

V26 Wear Metal Standards

Introducing the newest addition to our V-series metallo-organic standards, the V26 Wear Metal Standard. V26 incorporates five new elements (potassium, antimony, bismuth, indium and lithium) to our standard V21 package which includes silver, aluminum, boron, barium, calcium, cadmium, chromium, copper, iron, magnesium, manganese, molybdenum, sodium, nickel, phosphorus, lead, silicon, tin, titanium, vanadium, and zinc.

Reduce the need for custom metallo-organic standards, and lower your cost and shipping time with our VHG Brand V26 Wear Metal Standards.

The additional elements added to this standard allow for more robust analysis of wear metals, additives, and contaminants required by condition monitoring labs around the globe.

- Specifically formulated for use with ICP and RDE, with minimum impurities and high stability to ensure accurate analysis
- VHG manufactures the highest quality metallo-organic mixes in the industry at our state of the art facility certified to ISO 9001:2015 and accredited to ISO 17034, assuring customers receive the best value and highest consistency available
- Each product must pass rigorous Quality Control in our laboratory certified to ISO/IEC 17025 with concentrates requiring two independent tests to assure the highest quality
- Accompanied by a comprehensive Certificate of Analysis with actual (not nominal) concentrations
- Reduces the need for custom wear metals standards, which means lower costs and more value to you, our customer



V-Series Wear Metal Standards

For ICP, RDE, XRF and Other Techniques

We manufacture the highest quality metallo-organic mixes in the industry at our facility certified to ISO 9001:2015 and accredited to ISO 17034. Customers are assured of getting the best value and consistency available.

- Each product must pass rigorous Quality Control in our laboratory certified to ISO/IEC 17025
- Each product is accompanied by a comprehensive Certificate of Analysis with actual (not nominal) concentrations
- Specially formulated for excellent stability
- Suitable for use with ASTM D4927, D5185, D5708, D6443, D6595, and others
- For optimal performance, use in conjunction with our proprietary V-Solv™
- For wear metals, additives & contaminants

V21 Wear Metal Standards Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, Mg, Mn, Mo, Na, Ni, P, Pb, Si, Sn, Ti, V, Zn combined in hydrocarbon oil			V21+K Wear Metal Standards All of the elements included in V21 plus K	V23 Wear Metal Standards All of the elements included in V21 plus K and Sb	V26 Wear Metal Standards All of the elements included in V23 plus Bi, In, Li
Conc µg/g	Size (grams)	Product No.	Product No.	Product No.	Product No.
10	100	VHG-V21-10-100G	VHG-V21+K-10-100G	VHG-V23-10-100G	VHG-V26-10-100G
	200	VHG-V21-10-200G	VHG-V21+K-10-200G	VHG-V23-10-200G	VHG-V26-10-200G
	400	VHG-V21-10-400G	VHG-V21+K-10-400G	VHG-V23-10-400G	VHG-V26-10-400G
30	100	VHG-V21-30-100G	VHG-V21+K-30-100G	VHG-V23-30-100G	VHG-V26-30-100G
	200	VHG-V21-30-200G	VHG-V21+K-30-200G	VHG-V23-30-200G	VHG-V26-30-200G
	400	VHG-V21-30-400G	VHG-V21+K-30-400G	VHG-V23-30-400G	VHG-V26-30-400G
50	100	VHG-V21-50-100G	VHG-V21+K-50-100G	VHG-V23-50-100G	VHG-V26-50-100G
	200	VHG-V21-50-200G	VHG-V21+K-50-200G	VHG-V23-50-200G	VHG-V26-50-200G
	400	VHG-V21-50-400G	VHG-V21+K-50-400G	VHG-V23-50-400G	VHG-V26-50-400G
100	100	VHG-V21-100-100G	VHG-V21+K-100-100G	VHG-V23-100-100G	VHG-V26-100-100G
	200	VHG-V21-100-200G	VHG-V21+K-100-200G	VHG-V23-100-200G	VHG-V26-100-200G
	400	VHG-V21-100-400G	VHG-V21+K-100-400G	VHG-V23-100-400G	VHG-V26-100-400G
300	100	VHG-V21-300-100G	VHG-V21+K-300-100G	VHG-V23-300-100G	VHG-V26-300-100G
	200	VHG-V21-300-200G	VHG-V21+K-300-200G	VHG-V23-300-200G	VHG-V26-300-200G
	400	VHG-V21-300-400G	VHG-V21+K-300-400G	VHG-V23-300-400G	VHG-V26-300-400G
500	100	VHG-V21-500-100G	VHG-V21+K-500-100G	VHG-V23-500-100G	VHG-V26-500-100G
	200	VHG-V21-500-200G	VHG-V21+K-500-200G	VHG-V23-500-200G	VHG-V26-500-200G
	400	VHG-V21-500-400G	VHG-V21+K-500-400G	VHG-V23-500-400G	VHG-V26-500-400G
900	100	VHG-V21-900-100G	VHG-V21+K-900-100G	VHG-V23-900-100G	VHG-V26-900-100G
	200	VHG-V21-900-200G	VHG-V21+K-900-200G	VHG-V23-900-200G	VHG-V26-900-200G
	400	VHG-V21-900-400G	VHG-V21+K-900-400G	VHG-V23-900-400G	VHG-V26-900-400G

Custom standards available upon request.

Metallo-Organic Standards

Metal Additives Standards

For ICP, RDE, XRF and Other Techniques

Suitable for use with ASTM D4927, D4951, D5185 and others.

Metal Additives Standard MA3 – Ca @ 5000 µg/g; P, Zn @ 1600 µg/g combined in 75 cSt hydrocarbon oil	
Size (grams)	Product No.
100	VHG-MA3-100G
200	VHG-MA3-200G
400	VHG-MA3-400G

Metal Additives Standard MA4 – Ca @ 5000 µg/g; Mg, P, Zn @ 1600 µg/g combined in 75 cSt hydrocarbon oil	
Size (grams)	Product No.
100	VHG-MA4-100G
200	VHG-MA4-200G
400	VHG-MA4-400G

Metal Additives Standard MA5 – Ba, Ca, Mg, P, Zn combined in 75 cSt hydrocarbon oil		
Conc. (µg/g)	Size (grams)	Product No.
900	100	VHG-MA5-900-100G
	200	VHG-MA5-900-200G
	400	VHG-MA5-900-400G
1,000	100	VHG-MA5-1000-100G
	200	VHG-MA5-1000-200G
	400	VHG-MA5-1000-400G
3,000	100	VHG-MA5-3000-100G
	200	VHG-MA5-3000-200G
	400	VHG-MA5-3000-400G
5,000	100	VHG-MA5-5000-100G
	200	VHG-MA5-5000-200G
	400	VHG-MA5-5000-400G

Metal Additives Standard MA6 – B, Ba, Ca, Mg, P, Zn combined in 75 cSt hydrocarbon oil		
Conc. (µg/g)	Size (grams)	Product No.
900	100	VHG-MA6-900-100G
	200	VHG-MA6-900-200G
	400	VHG-MA6-900-400G

Internal Standards for ICP

The use of an internal standard can significantly improve the accuracy of your test results by correcting for wide variations in the viscosity or oil composition of your samples. Internal standards are easy to use when added to the diluent prior to sample preparation. For ease of use we offer premixed V-Solv™ with cobalt, please see page 16.

Element	Matrix	Concentration	Size (grams)	Product No.
Cerium (Ce)	75 cSt Hydrocarbon Oil	5000 µg/g	200	VHG-OCE-5000-200G
Cobalt (Co)	Mineral Spirits	6 wt%	100	VHG-OCO-6PIS-100G
Cobalt (Co)	Mineral Spirits	6 wt%	200	VHG-OCO-6PIS-200G
Cobalt (Co)	Mineral Spirits	6 wt%	400	VHG-OCO-6PIS-400G
Cobalt (Co)	75 cSt Hydrocarbon Oil	5000 µg/g	200	VHG-OCODN-5000-200G
Cobalt (Co)	75 cSt Hydrocarbon Oil	5000 µg/g	800	VHG-OCODN-5000-800G
Lanthanum (La)	75 cSt Hydrocarbon Oil	5000 µg/g	200	VHG-OLA-5000-200G
Yttrium (Y)	75 cSt Hydrocarbon Oil	5000 µg/g	400	VHG-OY-5000-A-400G
Yttrium (Y)	75 cSt Hydrocarbon Oil	2 wt%	100	VHG-OYDN-2P-100G
Yttrium (Y)	75 cSt Hydrocarbon Oil	2 wt%	200	VHG-OYDN-2P-200G



V-Solv™ ICP Solvent

V-Solv™ is a proprietary solvent that is used for diluting oil and other organic liquids for analysis by ICP-OES, ICP-MS, and other analytical techniques that require dilution. Use V-Solv™ as a matrix blank and as a diluent for your calibration standards and samples for outstanding nebulization characteristics.

V-Solv™ offers the following advantages over conventional low odor/odorless kerosene, xylene and other commercial solvents.

- Very high-purity (essentially no trace metals or sulfur) - each bottle is accompanied by a COA that states the trace impurity levels of 36 metals and sulfur
- Makes very stable dilutions of metallo-organic standards and oil samples
- Extremely low odor (no kerosene or aromatic smell), which results in a comfortable work environment and is also VOC-exempt for consumer products applications (EPA Title 40, Volume 5, Parts 53-59)
- Extremely low toxicity compared with kerosene or xylene
- Very competitively priced and non-hazardous to ship (flashpoint of 260 °F)
- One gallon or five gallon size bottles available for ease of use and for shipment via common carrier

V-Solv™ ICP Solvent

High-purity solvents supplied with a Certificate of Analysis that includes trace metal concentrations.

Item	Volume	Product No.
V-Solv™ ICP Solvent	1 gal.	VHG-V-SOLV-1GAL
V-Solv™ ICP Solvent	5 gal.	VHG-V-SOLV-5GAL
V-Solv™ ICP Solvent	55 gal.	VHG-V-SOLV-55GAL
V-Solv™ ICP Solvent + Cobalt	1 gal.	VHG-V-SOLV+CO-1GAL
V-Solv™ ICP Solvent + Cobalt	5 gal.	VHG-V-SOLV+CO-5GAL
V-Solv™ ICP Solvent + Cobalt	55 gal.	VHG-V-SOLV+CO-55GAL

Stabilizer for Wear Metal Standards

Stabilizer to Improve Stability of Mixes or Dilutions

Solvent stabilizer can improve stability of mixes or dilutions of VHG's 1000 µg/g and 5000 µg/g stock metallo-organic standards, as well as multi-element mixes after dilution in solvent.

Product	Application	Product No.	Size (grams)
MO Stabilizer	VHG's wear metal standards. Add to solutions at 0.6 wt%	VHG-STAB-50G	50

Matrix Oils and Solvents

Solvents for the Preparation of Working Standards for Hydrocarbon/Petrochemical Analysis

High-purity solvents supplied with a Certificate of Analysis that includes trace metal concentrations.

Item	Volume	Product No.
75 cSt Hydrocarbon Oil	1 gal.	VHG-OIL-75-500
75 cSt Hydrocarbon Oil	1 gal.	VHG-OIL-75-1GAL
20 cSt Hydrocarbon Oil	1 gal.	VHG-OIL-20-500
20 cSt Hydrocarbon Oil	1 gal.	VHG-OIL-20-1GAL
Kerosene, low odor	1 gal.	VHG-KERO-500
Kerosene, low odor	1 gal.	VHG-KERO-1GAL



Single-Element Metallo-Organic Standards

For ICP, RDE, XRF and Other Techniques

- Metallo-organic compounds in 75 cSt hydrocarbon oil
- Accuracy ensured by Quality Control testing with NIST Standard Reference Materials when available
- Certificate of Analysis includes trace metal concentrations determined by ICP-OES
- Suitable for use with ASTM D4927, D4951, D5185, D5708, D6443, D6481, D6595 and others
- For additional concentrations and/or sizes, please inquire
- Many of these standards are sulfonate-based and thus contain high levels of sulfur

Single-Element in 75 cSt Hydrocarbon Oil (50 g Size)	Concentration (1000 µg/g)	Concentration (5000 µg/g)
Element	Product No.	Product No.
Aluminum (Al)	VHG-OAL-1000-50G	VHG-OAL-5000-50G
Antimony (Sb)	VHG-OSB-1000-50G	VHG-OSB-5000-50G
Arsenic (As)	VHG-OAS-1000-50G	N/A
Barium (Ba)	VHG-OBA-1000-50G	VHG-OBA-5000-50G
Beryllium (Be)	VHG-OBE-1000-50G	Inquire
Bismuth (Bi)	VHG-OBI-1000-50G	Inquire
Boron (B)	VHG-OB-1000-50G	VHG-OB-5000-50G
Cadmium (Cd)	VHG-OCD-1000-50G	VHG-OCD-5000-50G
Calcium (Ca)	VHG-OCA-1000-50G	VHG-OCA-5000-50G
Cerium (Ce)	VHG-OCE-1000-50G	VHG-OCE-5000-50G
Chromium (Cr)	VHG-OCR-1000-A-50G	VHG-OCR-5000-A-50G
Cobalt (Co)	VHG-OCO-1000-A-50G	VHG-OCODN-5000-50G
Copper (Cu)	VHG-OCU-1000-A-50G	VHG-OCU-5000-A-50G
Indium (In)	Inquire	Inquire
Iron (Fe)	VHG-OFE-1000-50G	VHG-OFE-5000-50G
Lanthanum (La)	VHG-OLA-1000-50G	VHG-OLA-5000-50G
Lead (Pb)	VHG-OPB-1000-50G	VHG-OPB-5000-50G
Lithium (Li)	VHG-OLI-1000-50G	VHG-OLI-5000-50G
Magnesium (Mg)	VHG-OMG-1000-50G	VHG-OMG-5000-50G
Manganese (Mn)	VHG-OMN-1000-50G	VHG-OMN-5000-50G
Mercury (Hg)	VHG-OHG-1000-50G	N/A
Molybdenum (Mo)	VHG-OMO-1000-50G	VHG-OMO-5000-50G
Nickel (Ni)	VHG-ONI-1000-50G	VHG-ONI-5000-50G
Phosphorus (P)	VHG-OP-1000-50G	VHG-OP-5000-50G

Table continues on following page.

Single-Element Metallo-Organic Standards

For ICP, RDE, XRF and Other Techniques

Continued from previous page.

Single-Element in 75 cSt Hydrocarbon Oil (50 g Size)	Concentration (1000 µg/g)	Concentration (5000 µg/g)
Element	Product No.	Product No.
Potassium (K)	VHG-OK-1000-50G	VHG-OK-5000-50G
Scandium (Sc ^{**})	VHG-OSC-1000-50G	N/A ^{**}
Selenium (Se)	VHG-OSE-1000-50G	VHG-OSE-5000-50G
Silicon (Si)	VHG-OSI-1000-50G	VHG-OSI-5000-50G
Silver (Ag)	VHG-OAG-1000-50G	VHG-OAG-5000-50G
Sodium (Na)	VHG-ONA-1000-50G	VHG-ONA-5000-50G
Strontium (Sr)	VHG-OSR-1000-50G	Inquire
Sulfur (S)	VHG-OS-1000-50G	VHG-OS-5000-50G
Thallium (Tl)	VHG-OTL-1000-50G	N/A
Tin (Sn)	VHG-OSN-1000-50G	VHG-OSN-5000-50G
Titanium (Ti)	VHG-OTI-1000-50G	VHG-OTI-5000-50G
Tungsten (W)	VHG-OW-1000-50G	VHG-OW-5000-50G
Vanadium (V)	VHG-OV-1000-50G	VHG-OV-5000-50G
Yttrium (Y)	VHG-OY-1000-A-50G	VHG-OY-5000-A-50G
Zinc (Zn)	VHG-OZN-1000-50G	VHG-OZN-5000-50G
Zirconium (Zr)	VHG-OZR-1000-50G	VHG-OZR-5000-50G

^{**} Scandium also available at 2000 µg/g (Product No. VHG-OSC-2000-50G)



D-Series Multi-Element Wear Metal Standards

For Military Applications Using RDE

We have supplied single-element concentrated standards to the Joint Oil Analysis Program - Technical Support Center (JOAP-TSC) for making D-Series standards (D3, D12, D19) for almost two decades. Now D-Series standards are available directly from VHG.

- Our D-Series standards are made in our state of the art facility certified to ISO 9001:2015 and accredited to ISO 17034
- Each product must pass rigorous quality control in our laboratory accredited to ISO/IEC 17025
- Each standard is accompanied by a comprehensive Certificate of Analysis
- Each D-Series standard is supplied with a convenient squirt cap

D3 Standards

B, Mo, Zn in Aviation Reference Oil

Conc. (µg/g)	Size	Product No.
0	240 mL	VHG-9150-00-179-5137
100	240 mL	VHG-9150-01-283-0249

D12 Standards

Ag, Al, Cr, Cu, Fe, Mg, Na, Ni, Pb, Si, Sn, Ti in Aviation Reference Oil

Conc. (µg/g)	Size	Product No.
0	240 mL	VHG-9150-00-179-5137
5	240 mL	VHG-9150-01-307-3343
10	240 mL	VHG-9150-00-179-5145
30	240 mL	VHG-9150-00-179-5144
50	240 mL	VHG-9150-00-179-5143
100	240 mL	VHG-9150-00-179-5142
300	240 mL	VHG-9150-00-179-5141

D-Series Multi-Element Wear Metal Standards

For Military Applications Using RDE

D19 Standards		
Ag, Al, B, Ba, Cd, Cr, Cu, Fe, Mg, Mn, Mo, Na, Ni, Pb, Si, Sn, Ti, V, Zn in Aviation Reference Oil		
Conc. (µg/g)	Size	Product No.
0	240 mL	VHG-9150-00-179-5137
5	100 g	VHG-D19-5-100G
10	100 g	VHG-D19-10-100G
30	100 g	VHG-D19-30-100G
50	100 g	VHG-D19-50-100G
80	100 g	VHG-D19-80-100G
100	100 g	VHG-D19-100-100G
120	100 g	VHG-D19-120-100G
300	100 g	VHG-D19-300-100G
500	100 g	VHG-D19-500-100G
700	100 g	VHG-D19-700-100G
900	100 g	VHG-D19-900-100G
KIT*	Various	VHG-9150-01-355-1178

* VHG-9150-01-355-1178 includes: 2x VHG-9150-00-179-5137, 1x VHG-D19-5-100G, 1x VHG-D19-10-100G, 1x VHG-D19-30-100G, 1x VHG-D19-50-100G, 1x VHG-D19-80-100G, 2x VHG-D19-100-100G, 1x VHG-D19-120-100G, 1x VHG-D19-300-100G, 1x VHG-D19-500-100G, 1x VHG-D19-500-100G, 1x VHG-D19-700-100G and 1x VHG-D19-900-100G.

Special sizes, concentrations, and blends available upon request.



Instant Feedback Proficiency Testing Program (PTP)

ISO/IEC 17043 Accredited

Provides an instant response to submitted values

VHG's Proficiency Testing Program (PTP) was specially designed to give analytical laboratories instant validation for measuring metals, sulfur, viscosity, and particle count in new or in-service oils.

The PTP provides participating labs with a superior method of monitoring their analytical performance as measured against Certified Reference Materials (CRMs) in three quick and easy steps:

Web-based, Accurate, Immediate Results:

- 1) Analyze the PTP Sample
- 2) Enter results online
- 3) Check your accuracy and receive your immediate results

VHG Proficiency Testing Program			
Each sample includes a single use log-in code with a 90-day expiration.			
Name	Description	Size	Product No.
Sample for Elemental Analysis of Oils by ICP, RDE or other techniques	Elements: Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Si, Sn, Ti, V, Zn	25 g	VHG-VTPMO-25G
Sample for Viscosity Analysis	Viscosity Test Standard: 40 °C and 100 °C	50 mL	VHG-VTPVISC-50
Sample for Particle Count Analysis (for ISO 11171 only)	Particle Count Standard: 4 µm, 6 µm, 8 µm, 14 µm, 21 µm, 38 µm, 50 µm and 70 µm (c) ranges	125 mL	VHG-VTPPC-125
Set: VTPMO-25G, VTPVISC-50, and VTPPC-125	Elemental Analysis Test Standard, Viscosity Test Standard and Particle Count Standard	1 each	VHG-VTPSET1
Sample for Elemental Analysis of Lube Oil by XRF or other techniques	Elements: Ba, Ca, Cl, Mg, Mo, P, S, Si, Zn	25 mL	VHG-PTPLUBEMO-25
Sample for Sulfur in #2 Diesel Fuel Analysis	Element: S	25 mL	VHG-PTPSDSL-25

Example of PT Report for Metals

Sample: Instant Feedback PTP Report					
Symbol	Element	Analytical Results (µg/g)	Certified Values	Difference	% Difference
Al	Aluminum	22	22	0.0	0.00%
Ba	Barium	–	13.1	0.00	0.00%
B	Boron	–	77	0.00	0.00%
Ca	Calcium	2,180	2,160	20	0.93%
Cr	Chromium	22	21	1.0	4.76%
Cu	Copper	45	44	1.0	2.27%
Fe	Iron	35	33.1	1.9	5.74%
Pb	Lead	850	1,010	160	15.84%
Mg	Magnesium	356	352	4	1.14%
Mn	Manganese	18	22	4.0	18.18%
Mo	Molybdenum	17.5	17.1	0.4	2.34%
Ni	Nickel	32	30.1	1.9	6.31%
P	Phosphorus	870	863	7	0.81%
K	Potassium	–	987	0.00	0.00%
Si	Silicon	39	38	1.0	2.63%
Ag	Silver	–	30.1	0.00	0.00%
Na	Sodium	66	62.1	3.9	6.28%
Sn	Tin	30	41.1	11.1	27.01%
Ti	Titanium	–	12	0.00	0.00%
V	Vanadium	20	25	5.0	20.00%
Zn	Zinc	510	511	1.0	0.20%



OIL PT

Oil and Fuels Proficiency Testing Scheme



LGC is an accredited international provider of proficiency testing (PT) schemes. With more than 30 years of experience, we run more than 1,700 PT exercises each year for more than 12,000 laboratories worldwide.

lgcstandards.com
Science for a safer world

#2 Diesel Fuel

Crude Oil

Engine Oil Lubricants

Simulated In-
Service Engine Oil

LGC's Oil Proficiency Testing Scheme

If your laboratory is performing the analysis of oils and fuels according to ASTM, IP and ISO protocols, participating in the LGC Oil Proficiency Testing Scheme will enable you to monitor performance and compare it with that of other laboratories worldwide. Consistent good performance will allow laboratories to demonstrate to third parties, customers, regulators and accreditation bodies the quality of their results.

- Enables the robust testing of physical and chemical parameters in a range of fuels and other oils according to ASTM, IP and ISO protocols
- Scheme year operates January to December
- 3 distributions annually
- Convenient online result entry
- Traditional report, including Z-score

Matrix	Analytes	Volume	Product No.
#2 Diesel Fuel	Acid number, ash, base number, BP distribution, carbon, carbon residue, cloud point, cold filter plug point, color, copper corrosion, copper filter plugging point, density @15 °C, distillation, flash point, heat content, high temperature stability, hydrocarbon type (aromatics, olefins, saturates), lubricity (HFRR) wear scar diameter @25 °C, nitrogen, particulate contamination by filtration, pour point, sediment, sulfur, viscosity (kinematic @40 °C), water	1 gal.	PT-OL-02
Crude Oil	Acid number (potentiometric), API gravity, asphaltenes, density @15 °C, high temperature simulated distillation, iron, micro carbon residue, nickel, pour point, Reid vapor pressure, relative density, salt, sediment, sulfur, total nitrogen, viscosity (kinematic @40 °C), water	2 X 1,000 mL	PT-OL-04
Engine Oil Lubricants	Acid number (potentiometric), ash, ash sulfated, barium, base number, calcium, color, demulsibility (emulsion, oil, total free water, water), density @15 °C, evaporating loss, flash point (closed cup), flash point (open cup), gelation index, gelation index temp, HTHS viscosity @150 °C, magnesium, molybdenum, nitrogen, phosphorus, potassium, pour point, saponification value, shear stability @100 °C, silicon, sodium, sulfur, viscosity (kinematic @100 °C), viscosity (kinematic @40 °C), low temperature viscosity @-25 °C, low temperature viscosity @ 10,000 mPa*s (cP), low temperature viscosity @ 20,000 mPa*s (cP), low temperature viscosity @ 30,000 mPa*s (cP), low temperature viscosity @ 40,000 mPa*s (cP), low temperature viscosity @ 50,000 mPa*s (cP), tapered bearing viscosity @150 °C, tapered plug viscosity @150 °C, volatility, water (procedure A), water (procedure B), water content, zinc	0.75 gal.	PT-OL-05
Simulated In-Service Engine Oil	Acid number, aluminum, antimony, barium, base number, boron, cadmium, calcium, chromium, copper, flash point (closed cup), flash point (open cup), fuel dilution FTIR, glycol FTIR, nitration (procedure A) FTIR, nitration (procedure B) FTIR, oxidization (procedure A) FTIR, oxidization (procedure B) FTIR, phosphate (procedure A) FTIR, phosphate (procedure B) FTIR, sulfation (procedure A) FTIR, sulfation (procedure B) FTIR, water FTIR, fuel dilution, glycol, iron, lead, magnesium, manganese, molybdenum, nickel, particle count (4, 6, 14, 38, 70 µm (c)), pentane insoluble, phosphorus, potassium, silicon, silver, sodium, sulfur, tin, titanium, vanadium, viscosity (kinematic @100 °C), viscosity (kinematic @40 °C), water content, zinc	250 mL of simulated In-Service Engine Oil and 50 mL of new oil for FTIR reference subtraction	PT-OL-06

Parti-Count™ Particle Count Standards

(Traceable to NIST SRM 2806b)



Particle contamination tends to be the primary source of wear for machines and hydraulic systems.

Analysis of particles in fluids may be the most important way to monitor the condition of your machines. Once wear begins, the rate of wear usually increases rapidly and analyzing trends in your particle count data can yield surprising dividends.

VHG Parti-Count™ particle count standards, compliant with ISO 11171 and traceable to NIST SRM 2806b, are cost-effective secondary standards for the verification of automatic particle counters. These standards consist of 5 mg/L of ISO Medium Test Dust pre-dispersed in hydraulic fluid. VHG particle count standards are available in both 100 g and 400 g sizes. We also offer particle count proficiency test samples of the same high quality as part of our VHG proficiency testing portfolio.

Parti-Count™ Particle Count Standards

VHG Parti-Count™ particle count standards, compliant with ISO 11171 and traceable to NIST SRM 2806b, are cost-effective secondary standards for the verification of automatic particle counters. These standards consist of 5 mg/L of ISO Medium Test Dust pre-dispersed in hydraulic fluid. Suitable for use with ASTM D7647 and ISO 11500.

Matrix	Channels Reported	Size (grams)	Product No.
Hydraulic Fluid	4, 6, 10, 14, 18, 21, 38, 50, and 70 µm (c)	100	VHG-PCMTD-5-125
Hydraulic Fluid	4, 6, 10, 14, 18, 21, 38, 50, and 70 µm (c)	400	VHG-PCMTD-5-500

Viscosity Standards

Viscosity Reference Standards

VHG provides viscosity reference standards, intended for use in accordance with ASTM D445 and others. Each standard is manufactured in our facility certified to ISO 9001:2015 and accredited to ISO 17034. Volume: 500 mL

Nominal Viscosity @40 °C (cSt)	Nominal Viscosity @100 °C (cSt)	Product No.
4.5	1.6	VHG-VISC5-500
10	2.7	VHG-VISC10-500
19	5	VHG-VISC20-500
30	5.3	VHG-VISC30-500
50	7.3	VHG-VISC50-500
60	11.4	VHG-VISC60A-500
73	9	VHG-VISC75-500
100	16.8	VHG-VISC100A-500
120	20	VHG-VISC120-500
180	26	VHG-VISC180-500
360	42	VHG-VISC360-500
500	52	VHG-VISC500-500
930	82	VHG-VISC900-500

Soot Content Standards

Soot Content Standards

Reference standards for use in the determination of soot content in 15W40 diesel motor oil by infrared spectroscopy or other techniques. All values certified by thermogravimetric analysis (TGA). Suitable for use with ASTM D5967, D7686, D7844 and others.

Nominal Soot Content Range (%)	Volume (mL)	Product No.
Blank	50	VHG-SOOT-BLK-50
0.5-2	50	VHG-SOOT-A-50
2-4	50	VHG-SOOT-B-50
4-6	50	VHG-SOOT-C-50
6-9	50	VHG-SOOT-D-50
9-12	50	VHG-SOOT-E-50
Set of all 6	6 x 50	VHG-SOOT-SET

Acid Number and Base Number Standards

Acid Number (AN) Reference Materials

VHG's AN Reference Materials are intended for use in the determination of Acid Number (AN) in petroleum products in accordance with ASTM D664/IP 177 (by potentiometric titration) or ASTM D974 (by color-indicator titration). Each standard is supplied with a full Certificate of Analysis (COA) which states the certified values and uncertainty by both ASTM D664 and D974.

Matrix	Concentration (mg KOH/g)	Size (grams)	Product No.
75 cSt Hydrocarbon Oil	0.1	100	VHG-AN-0.1-100G
75 cSt Hydrocarbon Oil	0.5	100	VHG-AN-0.5-100G
75 cSt Hydrocarbon Oil	1.0	100	VHG-AN-1-100G
75 cSt Hydrocarbon Oil	1.5	100	VHG-AN-1.5-100G
75 cSt Hydrocarbon Oil	2.0	50	VHG-AN-2-50G
75 cSt Hydrocarbon Oil	3.0	50	VHG-AN-3-50G

Base Number (BN) Reference Materials

VHG's BN Reference Materials are intended for use in the determination of Base Number (BN) in petroleum products in accordance with ASTM D2896/IP 276 (by potentiometric perchloric acid titration) or ASTM D4739 (by potentiometric titration). Each standard is supplied with a full Certificate of Analysis (COA) which states the certified values and uncertainty by both ASTM D2896 and D4739.

Matrix	Concentration (mg KOH/g)	Size (grams)	Product No.
75 cSt Hydrocarbon Oil	6	50	VHG-BN-6-50G
75 cSt Hydrocarbon Oil	10	50	VHG-BN-10-50G
75 cSt Hydrocarbon Oil	15	50	VHG-BN-15-50G
75 cSt Hydrocarbon Oil	30	50	VHG-BN-30-50G
75 cSt Hydrocarbon Oil	40	50	VHG-BN-40-50G
75 cSt Hydrocarbon Oil	70	50	VHG-BN-70-50G

Crackle Test Reference Standards

Crackle Test Reference Standards

"Crackle Test" reference standards for determining water in oil (all values nominal). The crackle test is a visual test performed by placing a small drop of oil onto a hot plate (usually around 300° F). The amount of water present in oil samples is estimated by comparison to these standards. All values certified by gravimetric preparation.

Nominal Water Concentration (%)	Volume (mL)	Product No.
Blank	100	VHG-CTR-BLK-100
0.1	100	VHG-CTR-0.1P-100
0.5	100	VHG-CTR-0.5P-100
1.0	100	VHG-CTR-1.0P-100

Karl Fischer Titration Certified Reference Standards

Reformulated for Improved Homogeneity and Stability

Karl Fischer Titration Certified Reference Standards

Karl Fischer Titration certified reference standards for determining water in motor oil (all values certified by Karl Fischer Titration). This test determines the amount of water present in the oil and is the most commonly used test for this type of determination, with a high degree of accuracy. For use with ASTM D6304 Procedure C. Matrix: Water in 10W30 Motor Oil

Nominal Water Concentration (%)	Volume (mL)	Product No.
Blank	100	VHG-KF-BLK-100
0.05	100	VHG-KF-0.05P-100
0.1	100	VHG-KF-0.1P-100
0.5	100	VHG-KF-0.5P-100
1.0	100	VHG-KF-1.0P-100

Condition Monitoring Standards

Chlorine in Oil Standards

For XRF, ICP, and Other Techniques

Chlorine in Oil Standards for XRF

Chlorine Standards in Oil intended for use with ASTM D4929, D5384. Matrix: 75 cSt Heavy Mineral Oil. Volume: 100 mL

Concentration		Volume: 100 mL
($\mu\text{g/g}$)	(wt%)	Product No.
Blank	Blank	VHG-CLOIL-BLK-100
10	0.001	VHG-CLOIL-10-100
100	0.010	VHG-CLOIL-100-100
500	0.050	VHG-CLOIL-500-100
1,000	0.10	VHG-CLOIL-1000-100
10,000	1.00	VHG-CLOIL-1P-100
50,000	5.00	VHG-CLOIL-5P-100

Fuel Dilution Standards

Fuel Dilution Standards

These standards are intended for use in the determination of fuel (diesel fuel or gasoline) in engine oils by GC, IR, or fuel dilution meter (fuel sniffer). They are prepared gravimetrically from well-characterized fuels and hydrocarbon oils, and are verified by GC-FID in accordance with ASTM methods D3524, D3525 and D7593. They come with a Certificate of Analysis certifying both (v/v) and (w/w) concentrations. Matrix: 75 cSt Heavy Mineral Oil. Volume: 100 mL

Description	Product No.
Blank for Diesel Fuel Dilution Standards	VHG-DSLFD-BLK-100
2% (v/v) Devolatilized Diesel Fuel in 75 cSt Hydrocarbon Oil	VHG-DSLFD-2PW-100
5% (v/v) Devolatilized Diesel Fuel in 75 cSt Hydrocarbon Oil	VHG-DSLFD-5PW-100
10% (v/v) Devolatilized Diesel Fuel in 75 cSt Hydrocarbon Oil	VHG-DSLFD-10PW-100
Blank for Gas Fuel Dilution Standards	VHG-GASFD-BLK-100
2% (v/v) Devolatilized Gasoline in 75 cSt Hydrocarbon Oil	VHG-GASFD-2PW-100
5% (v/v) Devolatilized Gasoline in 75 cSt Hydrocarbon Oil	VHG-GASFD-5PW-100
10% (v/v) Devolatilized Gasoline in 75 cSt Hydrocarbon Oil	VHG-GASFD-10PW-100

Glycol in Oil Standards

For ASTM D7922

Ethylene Glycol in Engine Oil Standards

These standards are intended for use in the determination of ethylene glycol in engine oil by gas chromatography (GC). They are intended for use with ASTM D7922. Matrix: Multi-grade Diesel Engine Oil

Description	Volume	Product No.
Ethylene Glycol Blank Standard	80 mL	VHG-EGOIL-BLK-80
100 µg/g Ethylene Glycol Standard	80 mL	VHG-EGOIL-100-80
500 µg/g Ethylene Glycol Standard	80 mL	VHG-EGOIL-500-80
1000 µg/g Ethylene Glycol Standard	80 mL	VHG-EGOIL-1000-80
2000 µg/g Ethylene Glycol Standard	80 mL	VHG-EGOIL-2000-80
600 µg/g Ethylene Glycol QC Check Standard	80 mL	VHG-EGOILCS-600-80
Set of all 6 Standards	6 x 80 mL	VHG-EGOIL-SET-6X80



Multi-Element Coolant Standards

For ICP, ICP-MS

Multi-Element Coolant Standards

Our Multi-Element Coolant Standards are intended for use in the analysis of metals in ethylene glycol or other coolants in accordance with ASTM D6130 and other methods. These standards can be diluted 1:1 with ethylene glycol (for matrix matching) or in dilute nitric acid. Matrix: 1% HNO₃, tr. HF. Volume: 500 mL

Product No. VHG-GLYCOLSTD-500 Matrix: 1% HNO ₃ /tr. HF. Volume: 500 mL	
Element	Conc. (µg/g)
Aluminum (Al)	50
Boron (B)	1,000
Calcium (Ca)	50
Copper (Cu)	50
Iron (Fe)	50
Lead (Pb)	50
Magnesium (Mg)	50
Molybdenum (Mo)	500
Phosphorus (P)	2,500
Potassium (K)	1,000
Silicon (Si)	500
Sodium (Na)	1,000
Zinc (Zn)	50

Product No. VHG-GLYCOL-HIGH-500 High Standard Matrix: 3% HNO ₃ . Volume: 500 mL	
Element	Conc. (µg/g)
Aluminum (Al)	10
Boron (B)	1,000
Calcium (Ca)	32
Copper (Cu)	50
Iron (Fe)	50
Lead (Pb)	50
Magnesium (Mg)	20
Phosphorus (P)	2,000
Potassium (K)	5,000
Sodium (Na)	12,000
Zinc (Zn)	50

Product No. VHG-GLYCOL-LOW-500 Low Standard Matrix: 3% HNO ₃ . Volume: 500 mL	
Element	Conc. (µg/g)
Aluminum (Al)	2
Boron (B)	50
Calcium (Ca)	10
Copper (Cu)	2
Iron (Fe)	5
Lead (Pb)	10
Magnesium (Mg)	4
Phosphorus (P)	400
Potassium (K)	1,000
Sodium (Na)	1,000
Zinc (Zn)	4

Product No. VHG-GLYCOL-QC-500 QC Standard Matrix: 3% HNO ₃ . Volume: 500 mL	
Element	Conc. (µg/g)
Aluminum (Al)	5
Boron (B)	250
Calcium (Ca)	50
Copper (Cu)	5
Iron (Fe)	25
Lead (Pb)	25
Magnesium (Mg)	10
Phosphorus (P)	1,000
Potassium (K)	2,500
Sodium (Na)	5,000
Zinc (Zn)	20

Metallo-Organic Concentrates

Sulfur-Free: Excellent for XRF

Metallo-Organic Concentrates - Single Element

These sulfur-free, metallo-organic concentrates are ideal for X-Ray Fluorescence (XRF). They can be used to prepare single or multi-element standards, individually or as a set. Sulfur can be added for the simultaneous analysis of sulfur and metals. Each product is accompanied by a Certificate of Analysis that documents the certified concentration and any trace impurities.

Element	Nominal Conc. (wt%)	Product No. 25g	Product No. 100g
Aluminum (Al)	3%	VHG-ROSFAL3-25G	VHG-ROSFAL3-100G
Antimony (Sb)	2%	VHG-ROSFBSB2-25G	VHG-ROSFBSB2-100G
Barium (Ba)	7%	VHG-ROSFBA7-25G	VHG-ROSFBA7-100G
Bismuth (Bi)	28%	VHG-ROSFBI28-25G	VHG-ROSFBI28-100G
Boron (B)	3%	VHG-ROSF�3-25G	VHG-ROSF�3-100G
Cadmium (Cd)	7%	VHG-ROSFCD7-25G	VHG-ROSFCD7-100G
Calcium (Ca)	2%	VHG-ROSFCA2-25G	VHGROSFCA2-100G
Cerium (Ce)	12%	VHG-ROSFCE12-25G	VHG-ROSFCE12-100G
Chromium (Cr)	9%	VHG-ROSFCE9-25G	VHG-ROSFCE9-100G
Cobalt (Co)	3%	VHG-ROSFCE3-25G	VHG-ROSFCE3-100G
Copper (Cu)	3%	VHG-ROSFCE3-25G	VHG-ROSFCE3-100G
Iron (Fe)	6%	VHG-ROSFCE6-25G	VHG-ROSFCE6-100G
Lead (Pb)	10%	VHG-ROSFCE10-25G	VHG-ROSFCE10-100G
Lithium (Li)	2%	VHG-ROSFCE2-25G	VHG-ROSFCE2-100G
Magnesium (Mg)	2%	VHG-ROSFCE2-25G	VHG-ROSFCE2-100G
Manganese (Mn)	6%	VHG-ROSFCE6-25G	VHG-ROSFCE6-100G
Molybdenum (Mo)	15%	VHG-ROSFCE15-25G	VHG-ROSFCE15-100G
Nickel (Ni)	8%	VHG-ROSFCE8-25G	VHG-ROSFCE8-100G
Phosphorus (P)	11%	VHG-ROSFCE11-25G	VHG-ROSFCE11-100G
Potassium (K)	4%	VHG-ROSFCE4-25G	VHG-ROSFCE4-100G
Praseodymium (Pr)	3%	VHG-ROSFCE3-25G	VHG-ROSFCE3-100G
Silicon (Si)	18%	VHG-ROSFCE18-25G	VHG-ROSFCE18-100G
Silver (Ag)	1%	VHG-ROSFCE1-25G	VHG-ROSFCE1-100G
Sodium (Na)	3%	VHG-ROSFCE3-25G	VHG-ROSFCE3-100G
Strontium (Sr)	9%	VHG-ROSFCE9-25G	VHG-ROSFCE9-100G
Thallium (Tl)	3%	VHG-ROSFCE3-25G	VHG-ROSFCE3-100G
Tin (Sn)	18%	VHG-ROSFCE18-25G	VHG-ROSFCE18-100G
Titanium (Ti)	7%	VHG-ROSFCE7-25G	VHG-ROSFCE7-100G

Table continues on following page.

Metallo-Organic Concentrates

Sulfur-Free Excellent for XRF

Continued from previous page.

Metallo-Organic Concentrates - Single Element

These sulfur-free, metallo-organic concentrates are ideal for X-Ray Fluorescence (XRF). They can be used to prepare single or multi-element standards, individually or as a set. Sulfur can be added for the simultaneous analysis of sulfur and metals. Each product is accompanied by a Certificate of Analysis that documents the assayed concentration and any trace impurities.

Element	Nominal Conc.	Product No.	Product No.
Vanadium (V)	4%	VHG-ROSFV4-25G	VHG-ROSFV4-100G
Yttrium (Y)	2%	VHG-ROSFY2-25G	VHG-ROSFY2-100G
Zinc (Zn)	18%	VHG-ROSFZN18-25G	VHG-ROSFZN18-100G
Zirconium (Zr)	24%	VHG-ROSFZR24-25G	VHG-ROSFZR24-100G

Stabilizer for Sulfur-Free Standard Preparation

Solvent stabilizer can improve the stability of mixes or dilutions of VHG's 1,000 µg/g and 5,000 µg/g stock metallo-organic standards or concentrates, as well as multi-element mixes.

Product	Product Use	Product No.	Size (grams)
MOSF Stabilizer	VHG's sulfur-free metallo-organic concentrates. Add to solutions at 15-30% (v/v)	VHG-SF-STAB-100G	100



Standards for Sulfur and Metals in Crude and Residual Oils

For XRF

For multi-element XRF analysis, the element concentrations should be spread randomly across the suite of standards in order to best correct for inter-elemental effects. This set is produced in our facility certified to ISO 9001:2015 and accredited to ISO 17034 and meets the requirements of testing laboratories accredited to ISO/IEC 17025.

Sulfur and Metals in Oil

Suitable for sulfur and metals in crude and residual oils. Matrix: 20 cSt Mineral Oil. Volume: 100 mL

Elemental Concentrations

Sulfur (wt%)	Iron (µg/g)	Nickel (µg/g)	Vanadium (µg/g)	Product No.
0.0	0	0	0	VHG-SMOIL1-100
2.5	400	100	250	VHG-SMOIL2-100
0.5	300	10	500	VHG-SMOIL3-100
1.0	0	80	350	VHG-SMOIL4-100
4.5	250	60	100	VHG-SMOIL5-100
4.0	350	30	200	VHG-SMOIL6-100
3.5	200	50	0	VHG-SMOIL7-100
5.5	50	40	400	VHG-SMOIL8-100
2.0	450	20	300	VHG-SMOIL9-100
1.5	500	5	150	VHG-SMOIL10-100
3.0	150	70	25	VHG-SMOIL11-100
5.0	100	0	50	VHG-SMOIL12-100

Product No. VHG-SMOILSET-12X100



Lubricating Oil Standards

For XRF

For multi-element XRF analysis, the element concentrations should be spread randomly across the suite of standards in order to best correct for inter-elemental effects. This set is produced in our facility certified to ISO 9001:2015 and accredited to ISO 17034 and meets the requirements of testing laboratories accredited to ISO/IEC 17025.

Lubricating Oil Standards				
Suitable for ASTM D4927, D6481, D6443. Matrix: Lubricating Oil. Volume: 100 mL				
Elemental Concentrations				
Sulfur (wt%)	Calcium (wt%)	Phosphorus (wt%)	Zinc (wt%)	Product No.
0.000	0.000	0.000	0.000	VHG-LOIL1-100
0.050	0.600	0.005	0.080	VHG-LOIL2-100
0.300	0.000	0.020	0.175	VHG-LOIL3-100
0.150	0.500	0.030	0.070	VHG-LOIL4-100
0.100	0.300	0.060	0.130	VHG-LOIL5-100
0.175	0.400	0.200	0.050	VHG-LOIL6-100
0.075	0.200	0.080	0.120	VHG-LOIL7-100
0.125	0.250	0.050	0.000	VHG-LOIL8-100
0.400	0.350	0.040	0.110	VHG-LOIL9-100
0.500	0.075	0.225	0.150	VHG-LOIL10-100
0.200	0.050	0.150	0.200	VHG-LOIL11-100
0.550	0.005	0.000	0.140	VHG-LOIL12-100
0.450	0.100	0.010	0.250	VHG-LOIL13-100
0.600	0.010	0.125	0.060	VHG-LOIL14-100
0.250	0.150	0.100	0.090	VHG-LOIL15-100
0.350	0.025	0.175	0.100	VHG-LOIL16-100
Set Product No. VHG-LOILSET-16x100				

Custom standards available upon request

Lubricating Oil Calibration Set

For XRF

For multi-element XRF analysis, the element concentrations should be spread randomly across the suite of standards in order to best correct for inter-elemental effects. This set is produced in our facility certified to ISO 9001:2015 and accredited to ISO 17034 and meets the requirements of testing laboratories accredited to ISO/IEC 17025.

Lubricating Oil for Calibration Set								
Suitable for ASTM D4927. Matrix: Lubricating Oil. Volume: 50 mL								
Elemental Concentrations (ug/g)								
Barium	Calcium	Chlorine	Magnesium	Molybdenum	Phosphorus	Sulfur	Silicon	Zinc
10	10	1,000	400	250	2,000	5,000	400	50
200	5,000	0	350	100	1	10,000	380	250
30	0	400	100	0	1,750	0	25	750
0	4,500	2,000	0	200	1,500	500	340	1,250
50	0	200	300	250	20	1,250	0	1,750
30	0	1,800	0	30	100	500	0	2,250
100	3,500	0	250	150	1	12,500	300	10
140	20	10	800	0	1,250	0	450	20
300	3,000	60	120	500	3	0	210	0
0	2,000	1,600	20	300	1,000	15,000	400	50
0	2,500	10	50	20	1,750	22,500	225	0
180	500	100	0	10	0	17,500	220	100
400	2,000	600	30	150	750	0	180	0
220	2	800	0	50	0	10,000	140	2
340	1,500	100	2	0	10	1,250	100	1,200
260	4,000	4	700	0	500	0	250	120
0	1,000	1,800	0	350	50	20,000	25	2,500
380	500	2	400	5	250	0	10	2,000
300	50	1,000	0	400	2,250	2,500	0	1,500
0	250	1,000	500	0	1,250	17,500	0	1,000
0	100	1,200	600	0	2,500	25,000	0	500
340	1	1,400	10	450	10	22,500	0	125
0	0	0	0	0	0	0	0	0

Product No. VHG-LUBESET-23X50

Multi-Element Calibration Set

For XRF

For multi-element XRF analysis, the element concentrations should be spread randomly across the suite of standards in order to best correct for inter-elemental effects. This set is produced in our facility certified to ISO 9001:2015 and accredited to ISO 17034 and meets the requirements of testing laboratories accredited to ISO/IEC 17025.

Multi-Element Calibration Set

Set of 17 standards with concentrations randomly arranged across the set to correct for inter-elemental effects. For use with wear metals and additive analysis, ASTM D4927, and other applications. See Page 39 for exact concentrations. Matrix: 75 cSt Hydrocarbon Oil. Size: 50 g each.

Element	Concentration Range (µg/g)
Aluminum (Al)	0-500
Antimony (Sb)	0-500
Barium (Ba)	0-2,000
Cadmium (Cd)	0-5,000
Calcium (Ca)	0-500
Chromium (Cr)	0-500
Copper (Cu)	0-500
Iron (Fe)	0-500
Lead (Pb)	0-500
Magnesium (Mg)	0-3,000
Manganese (Mn)	0-500
Molybdenum (Mo)	0-500
Nickel (Ni)	0-500
Phosphorous (P)	0-500
Potassium (K)	0-2,000
Silicon (Si)	0-500
Silver (Ag)	0-500
Sodium (Na)	0-500
Tin (Sn)	0-500
Titanium (Ti)	0-500
Vanadium (V)	0-500
Zinc (Zn)	0-2,000
Product No. VHG-WRMTLSET-17X50G	

Multi-Element Calibration Set

For XRF

This table shows the distribution of elements and concentrations in the Multi-Element Calibration Set.

Multi-Element Calibration Set VHG-WRMTLSET-17X50G																	
Standards not available for individual sale. See set information on Page 38. Concentration (µg/g)																	
Element	Standard #																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Aluminum (Al)	0	300	0	500	100	10	0	20	0	50	0	200	30	0	400	40	0
Antimony (Sb)	100	0	400	200	50	0	0	40	30	10	20	300	0	500	0	0	0
Barium (Ba)	0	0	300	30	500	1,500	1,000	50	1,250	0	2,000	10	700	0	100	0	0
Cadmium (Cd)	0	30	0	0	200	0	50	100	300	20	10	40	400	0	500	0	0
Calcium (Ca)	5,000	500	3,000	50	0	1,000	700	100	2,000	10	30	300	0	1,500	4,000	0	0
Chromium (Cr)	0	500	0	0	0	50	300	400	20	200	100	0	40	30	10	0	0
Copper (Cu)	300	0	40	0	20	0	10	400	0	500	0	0	200	50	100	30	0
Iron (Fe)	20	0	500	400	0	200	0	30	100	0	300	0	10	40	50	0	0
Lead (Pb)	200	10	20	40	30	0	500	50	300	0	0	100	0	400	0	0	0
Magnesium (Mg)	50	10	0	500	30	0	1,250	2,000	1,500	100	0	700	3,000	300	0	1,000	0
Manganese (Mn)	0	0	10	50	0	300	100	500	400	0	40	20	30	0	0	200	0
Molybdenum (Mo)	0	0	0	30	0	50	0	40	10	400	200	500	300	100	0	20	0
Nickel (Ni)	10	40	100	20	300	500	0	0	0	30	0	400	50	0	200	0	0
Phosphorous (P)	0	1,000	0	700	10	100	1,500	0	50	2,000	300	1,250	0	0	500	30	0
Potassium (K)	0	0	0	50	0	40	30	10	0	300	500	200	100	0	20	400	0
Silicon (Si)	400	50	300	0	500	100	0	20	40	0	0	0	0	200	30	10	0
Silver (Ag)	0	0	0	0	10	20	200	300	50	100	30	40	400	500	0	0	0
Sodium (Na)	40	100	0	0	0	30	400	0	200	0	0	10	500	20	300	50	0
Tin (Sn)	50	20	30	300	0	400	0	0	0	10	100	200	0	0	40	500	0
Titanium (Ti)	500	400	200	0	40	0	20	0	0	50	10	30	0	300	0	100	0
Vanadium (V)	30	0	50	100	0	0	40	200	500	0	0	400	20	10	0	300	0
Zinc (Zn)	500	700	10	100	300	1,250	50	0	0	0	1,000	2,000	1,500	30	0	0	0

Standards for Fuels and other Petroleum Products

- Wide range of products for analysis of ultra-low sulfur diesel fuel (ULSD), gasoline and other matrices
- Standards are manufactured in accordance with applicable ASTM methods in our facility certified to ISO 9001:2015 and accredited to ISO 17034
- Certificate of Analysis showing NIST traceability of standard provided from our laboratory accredited to ISO/IEC 17025
- Blank standards include ppb-level sulfur concentration on Certificate of Analysis



Standards for Lead in Gasoline

Standards for Lead in Gasoline		
Lead In Isooctane Standards for XRF (ASTM D5059). Matrix: Isooctane. Volume: 100 g		
Method	Conc. (g/gal)*	Product No.
ASTM D5059 Pt. A	0.0	VHG-PBISO-BLK-100G
ASTM D5059 Pt. A	0.1	VHG-PBISO-0.1-100G
ASTM D5059 Pt. A	1.0	VHG-PBISO-1-100G
ASTM D5059 Pt. A	2.0	VHG-PBISO-2-100G
ASTM D5059 Pt. A	3.0	VHG-PBISO-3-100G
ASTM D5059 Pt. A	4.0	VHG-PBISO-4-100G
ASTM D5059 Pt. A	5.0	VHG-PBISO-5-100G
ASTM D5059 Pt. A	Set	VHG-PBISOSETA-7X100G
ASTM D5059 Pt. C	0.000	VHG-PBISO-BLK-100G
ASTM D5059 Pt. C	0.001	VHG-PBISO-0.001-100G
ASTM D5059 Pt. C	0.005	VHG-PBISO-0.005-100G
ASTM D5059 Pt. C	0.010	VHG-PBISO-0.010-100G
ASTM D5059 Pt. C	0.050	VHG-PBISO-0.050-100G
ASTM D5059 Pt. C	0.100	VHG-PBISO-0.100-100G
ASTM D5059 Pt. C	0.300	VHG-PBISO-0.300-100G
ASTM D5059 Pt. C	Set	VHG-PBISOSETC-7X100G

* For approximate conversion from g/gal to µg/g (ppm), multiply by 380 i.e., 0.1 g/gal=38 µg/g.

Internal Standards for Lead in Gasoline Analysis

For XRF

Bismuth internal standard for lead in gasoline analysis. ASTM D5059			
Matrix: 75 cSt Mineral Oil			
Method	Conc. (Bismuth)	Size (grams)	Product No.
ASTM D5059 Pt. A and C	0.793 g/L	100	VHG-BIIS-100G
ASTM D5059 Pt. A and C	0.793 g/L	400	VHG-BIIS-400G

Sulfur Standards

Sulfur in #2 Diesel Fuel Standards

For XRF

Sulfur in #2 Diesel Fuel Standards		
VHG offers a full range of Sulfur Standards in #2 Diesel Fuel. Suitable for XRF use with ASTM D2622, D4294, D5453, D7039, D7212, D7220 and others. Matrix: #2 Diesel Fuel		
Concentrations		Volume: 100 mL
(µg/g)	(wt%)	Product No.
Blank	Blank	VHG-SDSL-BLK-100
5	0.0005	VHG-SDSL-5-100
10	0.0010	VHG-SDSL-10-100
15	0.0015	VHG-SDSL-15-100
20	0.0020	VHG-SDSL-20-100
25	0.0025	VHG-SDSL-25-100
50	0.0050	VHG-SDSL-50-100
75	0.0075	VHG-SDSL-75-100
100	0.0100	VHG-SDSL-100-100
200	0.0200	VHG-SDSL-200-100
300	0.0300	VHG-SDSL-300-100
400	0.0400	VHG-SDSL-400-100
500	0.0500	VHG-SDSL-500-100
750	0.0750	VHG-SDSL-750-100
1,000	0.100	VHG-SDSL-1000-100
1,500	0.150	VHG-SDSL-1500-100
3,000	0.300	VHG-SDSL-3000-100
5,000	0.500	VHG-SDSL-5000-100
7,500	0.750	VHG-SDSL-7500-100
10,000	1.00	VHG-SDSL-1P-100
20,000	2.00	VHG-SDSL-2P-100
30,000	3.00	VHG-SDSL-3P-100
40,000	4.00	VHG-SDSL-4P-100
50,000	5.00	VHG-SDSL-5P-100

Sulfur in Mineral Oil Standards

For XRF

Standards for the analysis of sulfur in #2 Diesel Fuel and other matrices

Full range of Sulfur Standards for XRF. Suitable for use with ASTM Methods D2622, D4294, D5453, D7039, D7212, D7220 and others. Matrix: See below

Concentrations		NDBS in 20 cSt Oil Volume: 100 mL	Polysulfides in 13 cSt Oil Volume: 100 mL	NDBS in 75 cSt Oil Volume: 100 mL
(µg/g)	(wt%)	Product No.	Product No.	Product No.
Blank	Blank	VHG-S20MIN-BLK-100	VHG-PS13M-BLK-100	VHG-SMIN-BLK-100
5	0.0005	VHG-S20MIN-5-100	VHG-PS13M-5-100	VHG-SMIN-5-100
10	0.0010	VHG-S20MIN-10-100	VHG-PS13M-10-100	VHG-SMIN-10-100
15	0.0015	VHG-S20MIN-15-100	VHG-PS13M-15-100	VHG-SMIN-15-100
20	0.0020	VHG-S20MIN-20-100	VHG-PS13M-20-100	VHG-SMIN-20-100
25	0.0025	VHG-S20MIN-25-100	VHG-PS13M-25-100	VHG-SMIN-25-100
50	0.0050	VHG-S20MIN-50-100	VHG-PS13M-50-100	VHG-SMIN-50-100
75	0.0075	VHG-S20MIN-75-100	VHG-PS13M-75-100	VHG-SMIN-75-100
100	0.0100	VHG-S20MIN-100-100	VHG-PS13M-100-100	VHG-SMIN-100-100
200	0.0200	VHG-S20MIN-200-100	VHG-PS13M-200-100	VHG-SMIN-200-100
300	0.0300	VHG-S20MIN-300-100	VHG-PS13M-300-100	VHG-SMIN-300-100
400	0.0400	VHG-S20MIN-400-100	VHG-PS13M-400-100	VHG-SMIN-400-100
500	0.0500	VHG-S20MIN-500-100	VHG-PS13M-500-100	VHG-SMIN-500-100
750	0.0750	VHG-S20MIN-750-100	VHG-PS13M-750-100	VHG-SMIN-750-100
1,000	0.100	VHG-S20MIN-1000-100	VHG-PS13M-1000-100	VHG-SMIN-1000-100
1,500	0.150	VHG-S20MIN-1500-100	VHG-PS13M-1500-100	VHG-SMIN-1500-100
3,000	0.300	VHG-S20MIN-3000-100	VHG-PS13M-3000-100	VHG-SMIN-3000-100
5,000	0.500	VHG-S20MIN-5000-100	VHG-PS13M-5000-100	VHG-SMIN-5000-100
7,500	0.750	VHG-S20MIN-7500-100	VHG-PS13M-7500-100	VHG-SMIN-7500-100
10,000	1.00	VHG-S20MIN-1P-100	VHG-PS13M-1P-100	VHG-SMIN-1P-100
20,000	2.00	VHG-S20MIN-2P-100	VHG-PS13M-2P-100	VHG-SMIN-2P-100
30,000	3.00	VHG-S20MIN-3P-100	VHG-PS13M-3P-100	VHG-SMIN-3P-100
40,000	4.00	VHG-S20MIN-4P-100	VHG-PS13M-4P-100	VHG-SMIN-4P-100
50,000	5.00	VHG-S20MIN-5P-100	VHG-PS13M-5P-100	VHG-SMIN-5P-100

Sulfur Standards

Sulfur in Kerosene/Jet A-1 Standards

For XRF

Sulfur in Kerosene/Jet A-1 Standards

Sulfur in Kerosene Standards suitable for use with ASTM D2622, D3120, D4045, D4294, D5453, and others. Matrix: Kerosene. Volume: 100 mL

Concentrations		Volume: 100 mL
($\mu\text{g/g}$)	(wt%)	Product No.
Blank	Blank	VHG-SKERO-BLK-100
10	0.0010	VHG-SKERO-10-100
50	0.0050	VHG-SKERO-50-100
100	0.0100	VHG-SKERO-100-100
300	0.0300	VHG-SKERO-300-100
500	0.0500	VHG-SKERO-500-100
750	0.0750	VHG-SKERO-750-100
1,000	0.100	VHG-SKERO-1000-100

Sulfur in Crude Oil and Sulfur in Residual Oil Standards

For XRF

Sulfur in Crude and Residual Oil Standards

Sulfur in Crude Oil and Sulfur in Residual Oil Standards that are suitable for use with ASTM D2622, D4294, and others. Matrix: See Below. Volume: 100 mL

Concentrations		Crude Oil Volume: 100 mL	Residual Oil Volume: 100 mL
($\mu\text{g/g}$)	(wt%)	Product No.	Product No.
Unspiked	Matrix Blank	VHG-CRUDE-100	–
1,000	0.100	VHG-SCRD-1000-100	–
2,500	0.250	VHG-SCRD-2500-100	VHG-SRES-2500-100
5,000	0.500	VHG-SCRD-5000-100	VHG-SRES-5000-100
10,000	1.00	VHG-SCRD-1P-100	VHG-SRES-1P-100
20,000	2.00	VHG-SCRD-2P-100	VHG-SRES-2P-100
30,000	3.00	VHG-SCRD-3P-100	VHG-SRES-3P-100
40,000	4.00	VHG-SCRD-4P-100	VHG-SRES-4P-100
50,000	5.00	VHG-SCRD-5P-100	VHG-SRES-5P-100

Sulfur in Isooctane Standards

For XRF or UVF

Standards for analysis of sulfur in gasoline and other matrices

Sulfur in Isooctane Standards that are ideal for use with the following ASTM methods: D2622, D3120, D3246, D4045, D4294, D5453, D6334, D6445, D7039, D7212, D7220, and others. Matrix: Isooctane. Volume: 100 mL

Concentrations		Volume: 100 mL
(µg/g)	(wt%)	Product No.
Blank	Blank	VHG-SISO-BLK-100
5	0.0005	VHG-SISO-5-100
10	0.0010	VHG-SISO-10-100
15	0.0015	VHG-SISO-15-100
20	0.0020	VHG-SISO-20-100
25	0.0025	VHG-SISO-25-100
50	0.0050	VHG-SISO-50-100
75	0.0075	VHG-SISO-75-100
100	0.0100	VHG-SISO-100-100
200	0.0200	VHG-SISO-200-100
300	0.0300	VHG-SISO-300-100
400	0.0400	VHG-SISO-400-100
500	0.0500	VHG-SISO-500-100
750	0.0750	VHG-SISO-750-100
1,000	0.100	VHG-SISO-1000-100
3,000	0.300	VHG-SISO-3000-100

Matrix Oils and Solvents

Matrix Oils and Solvents

High-purity Matrix Oils and Solvents (<1ppm Sulfur) for the preparation of working standards for petroleum analysis. Supplied with a Certificate of Analysis that includes trace sulfur and metal concentrations.

Method	Volume	Product No.
20 cSt Mineral Oil	500 mL	VHG-OIL-20-500
20 cSt Mineral Oil	0.5 gal.	VHG-OIL-20-1GAL
75 cSt Mineral Oil	500 mL	VHG-OIL-75-500
75 cSt Mineral Oil	0.5 gal.	VHG-OIL-75-1GAL
#2 Diesel Fuel	500 mL	VHG-ULSDSL-500
#2 Diesel Fuel	0.5 gal.	VHG-ULSDSL-1/2GAL
Isooctane	500 mL	VHG-ISO-500
Isooctane	0.5 gal.	VHG-ISO-1/2GAL
Kerosene, low odor	500 mL	VHG-KERO-500
Kerosene, low odor	0.5 gal.	VHG-KERO-1/2GAL
13 cSt Mineral Oil	1 L	VHG-OIL-13-1L

Sulfur Standards made from Polysulfides in Mineral Oil

Our sulfur standards made from polysulfides in 13 cSt mineral oil have been formulated to have a long shelf life and optimal stability even when exposed to X-Rays from modern high-wattage XRF spectrometers.

We offer a broad line of sulfur QC samples, drift monitors and calibration sets made from high-purity polysulfide oil. These standards are superior to those made with n-dibutyl sulfide because they have very minimal odor and offer a three year shelf life. They are an ideal choice for instrument drift correction and quality control monitoring, especially when measuring ultra-low sulfur levels. ASTM D2622 and D4294 specify the use of sulfur standards made from polysulfides for these applications.

- Sulfur standards made from polysulfides are also ideal for preparation of instrument calibration standard sets for use with ASTM methods D2622, D4294, D7039, D7212 and D7220
- Our manufacturing facility is certified to ISO 9001:2015 and accredited to ISO 17034. Each VHG sulfur standard made from polysulfides is analyzed and certified with traceability to NIST SRM 2724b
- The refined polysulfide oil used in the preparation of these standards was selected for its purity, low odor, low viscosity and complete solubility in a wide variety of petroleum matrices
- These sulfur calibration sets are prepared by serial mass dilution of the polysulfide oil with sulfur-free matrices. They feature low volatility, minimal diffusion through sample films, optimal stability even when exposed to X-Rays from modern high-wattage spectrometers and extended shelf life. They are fully guaranteed for three years



Sulfur Standards

Sulfur QC Standards, Drift Monitors, and Calibration Sets

Made from Polysulfides in Mineral Oil

Sulfur QC Standards, Drift Monitors, and Calibration Sets made from polysulfides in 13 cSt mineral oil for XRF

Our sulfur standards made from polysulfides have been formulated for long shelf life and optimal stability even when exposed to X-Rays from modern high-wattage XRF spectrometers. In addition, our sulfur standards made from polysulfides offer high-purity, low volatility, and minimal diffusion through sample films. These standards are well suited to ultra-low level sulfur analysis, quality control, drift correction, blank measurement and calibration standards for XRF and other sulfur analysis techniques. Our polysulfide sulfur standards are in 13 cSt oil and are intended for use in accordance with ASTM D2622, D4294, D7039, D7212, D7220 and others.

Description	Product No.
QC Samples	
Sulfur @ 5 µg/g, Made from Polysulfides in 13 cSt Mineral Oil, 1 L	VHG-PS13M-5-1L
Sulfur @ 10 µg/g, Made from Polysulfides in 13 cSt Mineral Oil, 1 L	VHG-PS13M-10-1L
Sulfur @ 25 µg/g, Made from Polysulfides in 13 cSt Mineral Oil, 1 L	VHG-PS13M-25-1L
Drift Monitors	
Sulfur @ 100 µg/g, Made from Polysulfides in 13 cSt Mineral Oil, 1 L	VHG-PS13M-100-1L
Sulfur @ 500 µg/g, Made from Polysulfides in 13 cSt Mineral Oil, 1 L	VHG-PS13M-500-1L
Sulfur @ 1,000 µg/g, Made from Polysulfides in 13 cSt Mineral Oil, 1 L	VHG-PS13M-1000-1L
Blank	
13 cSt Mineral Oil Blank	VHG-OIL-13-1L
Calibration Sets	
Sulfur Standard Set (low concentrations). 50 mL each. Set of 13 Calibration Standards with Sulfur @ 0, 1, 2.5, 5, 10, 25, 50, 75, 100, 250, 500, 750, and 1,000 µg/g made from high-purity polysulfide oil.	VHG-PS13M-SET1-13X50
Sulfur Standard Set (high concentrations). 50 mL each. Set of 12 Calibration Standards with Sulfur @ 0, 0.1, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5 and 5 wt%, made from high-purity polysulfide oil.	VHG-PS13M-SET2-12X50
Sulfur Standard Set (low concentrations). 50 mL each. Set of 6 Calibration Standards with Sulfur @ 0, 10, 25, 50, 100 and 250 µg/g, made from high-purity polysulfide oil.	VHG-PS13M-SET3A-6X50

Sulfur in Mineral Oil QC Standards

For Ultra-Low Sulfur Diesel (ULSD) Analysis

Sulfur in Mineral Oil QC Standards

Full range of Sulfur Standards for XRF suitable for use with ASTM D2622, D4294, D5453, D7039, D7212, D7220 and others.
Matrix: See Below

Concentrations		Intended Use	Volume	NDBS in 20 cSt Mineral Oil	Polysulfides in 13 cSt Mineral Oil
($\mu\text{g/g}$)	(wt%)			Product No.	Product No.
Blank	Blank	Blank	500 mL	VHG-S20MIN-BLK-500	VHG-PS13M-BLK-500
Blank	Blank	Blank	1 L	VHG-S20MIN-BLK-1L	VHG-PS13M-BLK-1L
Blank	Blank	Blank	1 gal.	VHG-S20MIN-BLK-1GAL	VHG-PS13M-BLK-1GAL
5	0.0005	Accuracy Low Range	500 mL	VHG-S20MIN-5-500	VHG-PS13M-5-500
5	0.0005	Accuracy Low Range	1 L	VHG-S20MIN-5-1L	VHG-PS13M-5-1L
5	0.0005	Accuracy Low Range	1 gal.	VHG-S20MIN-5-1GAL	VHG-PS13M-5-1GAL
7	0.0007	Precision	500 mL	VHG-S20MIN-7-500	VHG-PS13M-7-500
7	0.0007	Precision	1 L	VHG-S20MIN-7-1L	VHG-PS13M-7-1L
7	0.0007	Precision	1 gal.	VHG-S20MIN-7-1GAL	VHG-PS13M-7-1GAL
15	0.0015	Accuracy High Range	500 mL	VHG-S20MIN-15-500	VHG-PS13M-15-500
15	0.0015	Accuracy High Range	1 L	VHG-S20MIN-15-1L	VHG-PS13M-15-1L
15	0.0015	Accuracy High Range	1 gal.	VHG-S20MIN-15-1GAL	VHG-PS13M-15-1GAL

Sulfur in #2 Diesel Fuel QC Standards

For Ultra-Low Sulfur Diesel (ULSD) Analysis

Standards for Sulfur in Diesel Fuel Analysis for XRF

Full range of Sulfur Standards for XRF suitable for use with ASTM Methods D2622, D4294, D5453, D7039, D7212, D7220 and others.
Matrix: See below

Concentrations		Intended Use	Volume	NDBS in #2 Diesel Fuel
(µg/g)	(wt%)			Product No.
Blank	Blank	Blank	500 mL	VHG-SDSL-BLK-500
Blank	Blank	Blank	1 L	VHG-SDSL-BLK-1L
Blank	Blank	Blank	1 gal.	VHG-SDSL-BLK-1GAL
5	0.0005	Accuracy Low Range	500 mL	VHG-SDSL-5-500
5	0.0005	Accuracy Low Range	1 L	VHG-SDSL-5-1L
5	0.0005	Accuracy Low Range	1 gal.	VHG-SDSL-5-1GAL
7	0.0007	Precision	500 mL	VHG-SDSL-7-500
7	0.0007	Precision	1 L	VHG-SDSL-7-1L
7	0.0007	Precision	1 gal.	VHG-SDSL-7-1GAL
15	0.0015	Accuracy High Range	500 mL	VHG-SDSL-15-500
15	0.0015	Accuracy High Range	1 L	VHG-SDSL-15-1L
15	0.0015	Accuracy High Range	1 gal.	VHG-SDSL-15-1GAL

Sulfur in Isooctane and Isooctane Blends QC Standards

For Gasoline Analysis

Sulfur in Isooctane and Isooctane Blends QC Standards for XRF

Full range of Sulfur Standards for XRF suitable for use with ASTM D2622, D4294, D5453, D7039, D7212, D7220 and others.
Matrix: See Below

Concentrations		Intended Use	Volume	NDBS in Isooctane	NDBS in 75% Isooctane / 25% Toluene	NDBS in 90% Isooctane / 10% Ethanol
(µg/g)	(wt%)			Product No.	Product No.	Product No.
Blank	Blank	Blank	500 mL	VHG-SISO-BLK-500	VHG-SISO75TOL25-BLK-500	VHG-SISO-ETOH-BLK-500
Blank	Blank	Blank	1 L	VHG-SISO-BLK-1L	VHG-SISO75TOL25-BLK-1L	VHG-SISO-ETOH-BLK-1L
Blank	Blank	Blank	1 gal.	VHG-SISO-BLK-1GAL	VHG-SISO75TOL25-BLK-1GAL	VHG-SISO-ETOH-BLK-1GAL
9	0.0009	Accuracy Low Range	500 mL	VHG-SISO-9-500	VHG-SISO75TOL25-9-500	VHG-SISO-ETOH-9-500
9	0.0009	Accuracy Low Range	1 L	VHG-SISO-9-1L	VHG-SISO75TOL25-9-1L	VHG-SISO-ETOH-9-1L
9	0.0009	Accuracy Low Range	1 gal.	VHG-SISO-9-1GAL	VHG-SISO75TOL25-9-1GAL	VHG-SISO-ETOH-9-1GAL
10	0.0010	Precision	500 mL	VHG-SISO-10-500	VHG-SISO75TOL25-10-500	VHG-SISO-ETOH-10-500
10	0.0010	Precision	1 L	VHG-SISO-10-1L	VHG-SISO75TOL25-10-1L	VHG-SISO-ETOH-10-1L
10	0.0010	Precision	1 gal.	VHG-SISO-10-1GAL	VHG-SISO75TOL25-10-1GAL	VHG-SISO-ETOH-10-1GAL
19	0.0019	Accuracy High Range	500 mL	VHG-SISO-19-500	VHG-SISO75TOL25-19-500	VHG-SISO-ETOH-19-500
19	0.0019	Accuracy High Range	1 L	VHG-SISO-19-1L	VHG-SISO75TOL25-19-1L	VHG-SISO-ETOH-19-1L
19	0.0019	Accuracy High Range	1 gal.	VHG-SISO-19-1GAL	VHG-SISO75TOL25-19-1GAL	VHG-SISO-ETOH-19-1GAL

Sulfur in Petroleum Products (Ampules)

For Low-Level Sulfur Analytical Techniques

Total Sulfur by UV Fluorescence

Calibration Set for ASTM Method D5453 - Total Sulfur in Liquid Petroleum Hydrocarbons by Ultraviolet Fluorescence. Matrix: Sulfur in isooctane. Offered only as a single set of 6 x 2 mL ampules. Sets also available in toluene upon request.

Concentration (ng/ μ L)	Matrix	Size	Product No.
0, 1.0, 2.5, 5, 7.5, 10	Isooctane	6 x 2 mL	VHG-SUVF-SET1
0, 5, 25, 50, 100, 200	Isooctane	6 x 2 mL	VHG-SUVF-SET2
0, 100, 250, 500, 750, 1,000	Isooctane	6 x 2 mL	VHG-SUVF-SET3

Sulfur by Hydrogenolysis and Rateometric Colorimetry

Calibration Set for ASTM D4045 - Sulfur in Petroleum Products by Hydrogenolysis and Rateometric Colorimetry. Matrix: Sulfur (from n-dibutyl sulfide) in isooctane. Offered only as a single set of 7 x 2 mL ampules.

Concentration (ng/ μ L)	Matrix	Size	Product No.
0, 0.1, 0.5, 1.0, 2.5, 5.0, 10	Isooctane	7 x 2 mL	VHG-SRC-SET1A



Sulfur in Petroleum Products (Ampules)

For Low-Level Sulfur Analytical Techniques

Sulfur Compounds by Selective Detection (100 µg/g)

Calibration Standard for ASTM D5623 - Sulfur compounds in Light Hydrocarbon Liquids by Selective Detection. Matrix: Multi-component mixture that contains fourteen (14) sulfur species in base fuel (40% LV isooctane/40% LV hexane/20% LV toluene). Sulfur species include: methanethiol, ethanethiol, dimethylsulfide, 2-propanethiol, 2-methylpropane-2-thiol, 1-propanethiol, thiophene, diethylsulfide, 1-butanethiol, diethyl disulfide, thiophenol, benzothiophene, bromothiophene (as internal standard), and phenyl sulfide. Offered as a single 2 mL ampule.

Concentration (ng/µL)	Matrix	Size	Product No.
100 µg/g (as Sulfur)	Base Fuel	2 mL	VHG-MSX14-2

Sulfur Compounds by Selective Detection (50 µg/g)

Calibration Standard for ASTM D5623 - Sulfur Compounds in Light Hydrocarbon Liquids by Selective Detection. Matrix: Multi-component mixture containing twenty-two (22) sulfur species in base fuel (40% LV isooctane/40% LV hexane/20% LV toluene). Sulfur species include: 2-methyl-1-propanethiol, 2-methylthiophene, 3-methylthiophene, 1,2-ethane dithiol, 1-pentanethiol, 2-ethylthiophene, propylsulfide, tert-butyl disulfide, 1,5-pentanedithiol, 1-nonanethiol, 1-decanethiol, propanethiol, tert-butyl disulfide, 1-heptanethiol, 1,4-butanedithiol, methyl ethylsulfide, propyl disulfide, 1-octanethiol, benzothiophene, 1-hexanethiol, carbon disulfide, and methyl sulfide. Offered as a single 2 mL ampule.

Concentration (ng/µL)	Matrix	Size	Product No.
50 µg/g (as component)	Base Fuel	2 mL	VHG-MSX22-2

Determination of Mercaptan Sulfur

Calibration Standards for UOP 163 and ASTM D3227 - Mercaptan Sulfur in Hydrocarbon Liquids by Potentiometric Titration. Matrix: Sulfur (from 1-octanethiol) in isooctane/toluene. Offered only as a single set of 6 x 20 mL ampules.

Concentration (ng/µL)	Matrix	Size	Product No.
30	80% Isooctane/20% Toluene	6 x 20 mL	VHG-UOP163-30-6X20

Sulfur and Nitrogen Products (Ampules)

For Low-Level Analytical Techniques

Sulfur and Nitrogen Combined

Calibration set for instruments designed for simultaneous determination of sulfur and nitrogen. Matrix: Sulfur and nitrogen in isooctane. Offered only as a single set of 6 x 2 mL ampules. Also available in toluene upon request.

Concentration (ng/ μ L)	Matrix	Size	Product No.
S @ 0, 1, 5, 10, 15, 20 N @ 0, 1, 5, 20, 35, 50	Isooctane	6 x 2 mL	VHG-SN-SET1

Trace Nitrogen by Chemiluminescence

Calibration Set for ASTM Method D4629 - Trace Nitrogen in Liquid Petroleum Hydrocarbons by Chemiluminescence Detection. Matrix: Nitrogen (from pyridine) in isooctane. Offered only as a single set of 9 x 2 mL ampules. Also available in toluene upon request.

Concentration (ng/ μ L)	Matrix	Size	Product No.
N @ 0, 1, 2, 10, 20, 50, 100, 200, 500, 1,000	Isooctane	10 x 2 mL	VHG-NCH-SET1

Trace Nitrogen by Oxidative Combustion and Electrochemical Detection

Calibration Set for ASTM D6366 - Total Trace Nitrogen and its Derivatives in Liquid Aromatic Hydrocarbons by Oxidative Combustion and Electrochemical Detection. Matrix: Nitrogen (from pyridine) in p-xylene [Set 1B] or isooctane [Set 2]. Offered only as single sets of 2 mL ampules. Set also available in toluene upon request (with nitrogen from carbazole).

Concentration (ng/ μ L)	Matrix	Size	Product No.
N @ 0.1, 0.5, 1.0, 2.5, 5.0, 10	p-xylene	6 x 2 mL	VHG-NCED-SET1B
N @ 10, 25, 50, 75, 100	Isooctane	5 x 2 mL	VHG-NCED-SET2

Petroleum Physical Test Standards

Flash Point Reference Materials

VHG brand Flash Point Reference Materials are suitable for use with ASTM D56, D92, D93. Each standard is verified by consensus analysis, and is supplied with a full Certificate of Analysis (COA) that states the assigned value. Volume: 250 mL

Specification	Apparatus	Typical Flash Point Range (°C)	Product No.
ASTM D93 (Flash Point)	Pensky-Martens Closed-Cup Tester	55-65 60-70 90-100 130-140	VHG-FPPM60-250 VHG-FP65-250 VHG-FP93-250 VHG-FP134-250
ASTM D92 (Flash and Fire Point)	Cleveland Open Cup Tester	130-150 220-240	VHG-FP138-250 VHG-FP230-250
ASTM D56 (Flash Point)	Tag Closed Cup Tester	60-75	VHG-FPTC67-250

Viscosity Reference Standards

VHG manufactures viscosity reference standards suitable for use with ASTM D445. Each standard is manufactured in our state of the art facility certified to ISO 9001:2015 and accredited to ISO 17034 and our laboratory accredited to ISO/IEC 17025. Volume: 500 mL

Nominal Viscosity @40 °C (cSt)	Nominal Viscosity @100 °C (cSt)	Product No.
4.5	1.6	VHG-VISC5-500
10	2.7	VHG-VISC10-500
19	5	VHG-VISC20-500
30	5.3	VHG-VISC30-500
50	7.3	VHG-VISC50-500
60	11.4	VHG-VISC60A-500
73	9	VHG-VISC75-500
100	16.8	VHG-VISC100A-500
120	20	VHG-VISC120-500
180	26	VHG-VISC180-500
360	42	VHG-VISC360-500
500	52	VHG-VISC500-500
930	82	VHG-VISC900-500

Petroleum Physical Test Standards

Intended for use with all brands of physical test instruments except Phase instruments.

ASTM D2500 Cloud Point Reference Materials

VHG brand Cloud Point Reference Materials are intended for use in accordance with ASTM D2500 for the determination of the cloud point of petroleum products. The cloud point of a petroleum product is an index of the lowest temperature of their utility for certain applications. Each standard is verified by consensus analysis and is supplied with a full Certificate of Analysis (COA) that states the assigned value. Volume: 250 mL

Typical Cloud Point Range (°C)	Product No.
+3 to +9	VHG-C5-250
-4 to 0	VHG-C2-250
-12 to -8	VHG-C10-250
-17 to -13	VHG-C15-250
-22 to -18	VHG-C20-250

ASTM D2386 Freezing Point Reference Materials

VHG brand Freezing Point Reference Materials are intended for use in accordance with ASTM Method D2386 for determination of the freezing point of aviation fuels. Each standard is verified by consensus analysis and is supplied with a full Certificate of Analysis (COA) that states the assigned value. Volume: 250 mL

Typical Freezing Point Range (°C)	Product No.
-47 to -42	VHG-F45-250
-52 to -48	VHG-F50-250

ASTM D6371 Cold Filter Plug Point Reference Materials

VHG brand Cold Filter Plug Point Standards are intended for use in accordance with ASTM Method D6371/IP309 for determination of the cold filter plug point of diesel and heating fuels. Each standard is verified by consensus analysis and is supplied with a full Certificate of Analysis (COA) that states the assigned value. Volume: 250 mL

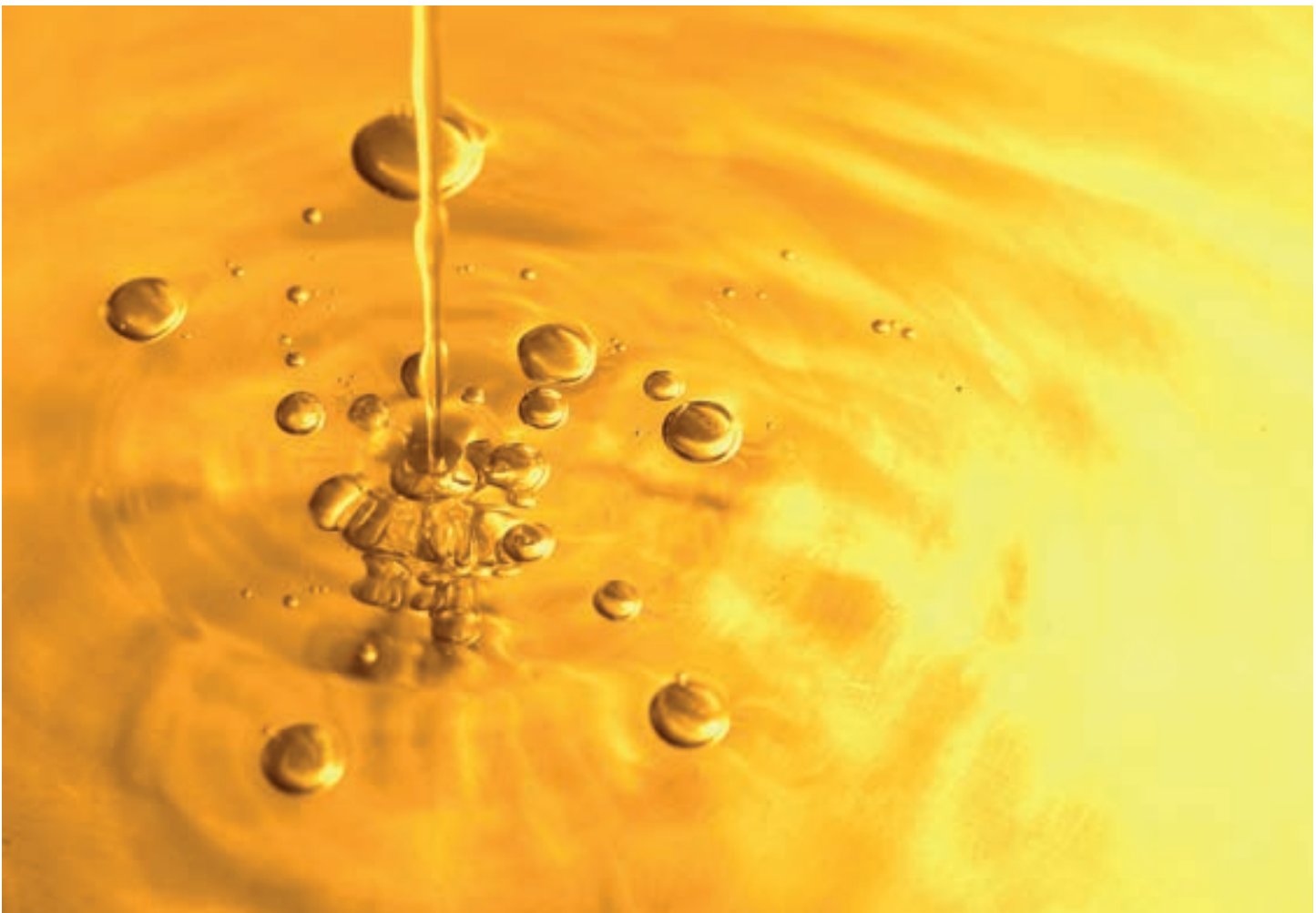
Typical Plug Point Range (°C)	Product No.
-20 to -17	VHG-CF1-250

Intended for use with all brands of physical test instruments except Phase instruments.

ASTM D97 Pour Point Reference Materials

VHG brand Pour Point Reference Materials are intended for use in accordance with ASTM D97 only, for determination of the pour point of petroleum products. Each standard is verified by consensus analysis and is supplied with a full Certificate of Analysis (COA) that states the assigned value. Volume: 250 mL

Typical Pour Point Range (°C)	Product No.
-7 to -3	VHG-P5-250
-12 to -8	VHG-P10-250
-17 to -13	VHG-P15-250
-22 to -18	VHG-P20-250
-42 to -36	VHG-P40-250
-53 to -47	VHG-P50-250



Biodiesel Standards

As the demand for biofuels continues to rise, the need to reliably analyze these products has become a necessity for the petroleum industry.

Most biodiesel fuels are comprised of a blend of traditional refined diesel combined with biodiesel fuel. The percentage of biodiesel in the blend is generally 5%, 10%, or 15%, and is labeled B5, B10, or B15 respectively. Pure biodiesel (100%) is labeled B100. All of our elements in biodiesel standards have a matrix of 100% biodiesel. This is important in the analysis of materials by ICP and other methods because the analysis can often be encumbered by the variance of matrices from standards to samples.

Our biodiesel standards have been formulated specifically for the analysis of metals and sulfur in biodiesel fuel. Our B100 is made from soybean oil and is an excellent matrix match for almost all biodiesel fuel analysis.

Biodiesel/Diesel Fuel Blends

These standards are intended for use as calibration or reference standards for the determination of fatty acid methyl esters (FAME) biodiesel content in diesel fuel by infrared (IR) spectroscopy. They are formulated specifically for use with ASTM Method D7371 or EN 14078.

Description	Product No.
100% High Cetane Diesel Fuel, 20 mL	VHG-BDBLEND-BLK-20
2% (v/v) Biodiesel in High Cetane Diesel Fuel, 20 mL	VHG-BDBLEND-2P-20
5% (v/v) Biodiesel in High Cetane Diesel Fuel, 20 mL	VHG-BDBLEND-5P-20
10% (v/v) Biodiesel in High Cetane Diesel Fuel, 20 mL	VHG-BDBLEND-10P-20
15% (v/v) Biodiesel in High Cetane Diesel Fuel, 20 mL	VHG-BDBLEND-15P-20

Metals in Biodiesel Standards

These standards have been formulated specifically for the analysis of metals in biodiesel fuel in accordance with ASTM D6751, EN 14107, EN 14108, EN 14109, EN 14214, or EN 14538.

Description	Product No.
B100 Biodiesel Blank, 100 mL	VHG-B100-BLK-100
Ca, K, Mg, Na, P @ 5 µg/g, B100 Biodiesel, 100 g	VHG-B100M5-5-100G
Ca, K, Mg, Na, P @ 10 µg/g, B100 Biodiesel, 100 g	VHG-B100M5-10-100G
Ca, K, Mg, Na, P @ 20 µg/g, B100 Biodiesel, 100 g	VHG-B100M5-20-100G

Sulfur in Biodiesel Standards

These standards have been formulated specifically for the analysis of sulfur in biodiesel fuel in accordance with ASTM D2622, D4294, or D5453.

Description	Product No.
B100 Biodiesel, 500 mL	VHG-B100-BLK-500
Sulfur @ 5 µg/g, B100 Biodiesel, 100 mL	VHG-SB100-5-100
Sulfur @ 10 µg/g, B100 Biodiesel, 100 mL	VHG-SB100-10-100
Sulfur @ 15 µg/g, B100 Biodiesel, 100 mL	VHG-SB100-15-100
Sulfur @ 20 µg/g, B100 Biodiesel, 100 mL	VHG-SB100-20-100
Sulfur @ 25 µg/g, B100 Biodiesel, 100 mL	VHG-SB100-25-100
Sulfur @ 50 µg/g, B100 Biodiesel, 100 mL	VHG-SB100-50-100
Sulfur @ 100 µg/g, B100 Biodiesel, 100 mL	VHG-SB100-100-100
Sulfur @ 500 µg/g, B100 Biodiesel, 100 mL	VHG-SB100-500-100

Biodiesel Blanks

These solutions are intended for use as calibration blanks for analysis of metals or sulfur in biodiesel. Each is supplied with a Certificate of Analysis (COA) that includes relevant trace metal and sulfur concentrations.

Description	Product No.
B100 Biodiesel Blank, 100 mL	VHG-B100-BLK-100
B100 Biodiesel Blank, 500 mL	VHG-B100-BLK-500



Sulfur in #2 Diesel Fuel QC Standards

For Ultra-Low Sulfur Diesel (ULSD) Analysis

Effective in 2017 the US EPA set new vehicle emissions standards and a lower maximum for sulfur content in gasoline. LGC can help you meet this challenge. Our portfolio of ISO 17034 hydrocarbon standards includes a spectrum of standards that will help you ensure your equipment is compliant.

Standards for Sulfur in #2 Diesel Fuel Analysis for XRF

Full range of Sulfur Standards for XRF suitable for use with ASTM Methods D2622, D4294, D5453, D7039, D7212, D7220 and others. Matrix: See below

Concentrations		Intended Use	Volume	NDBS in #2 Diesel Fuel
(µg/g)	(wt%)			Product No.
Blank	Blank	Blank	500 mL	VHG-SDSL-BLK-500
Blank	Blank	Blank	1 L	VHG-SDSL-BLK-1L
Blank	Blank	Blank	1 gal.	VHG-SDSL-BLK-1GAL
5	0.0005	Accuracy Low Range	500 mL	VHG-SDSL-5-500
5	0.0005	Accuracy Low Range	1 L	VHG-SDSL-5-1L
5	0.0005	Accuracy Low Range	1 gal.	VHG-SDSL-5-1GAL
7	0.0007	Precision	500 mL	VHG-SDSL-7-500
7	0.0007	Precision	1 L	VHG-SDSL-7-1L
7	0.0007	Precision	1 gal.	VHG-SDSL-7-1GAL
15	0.0015	Accuracy High Range	500 mL	VHG-SDSL-15-500
15	0.0015	Accuracy High Range	1 L	VHG-SDSL-15-1L
15	0.0015	Accuracy High Range	1 gal.	VHG-SDSL-15-1GAL

Sulfur in Mineral Oil QC Standards

For Ultra-Low Sulfur Diesel (ULSD) Analysis

Sulfur in Mineral Oil QC Standards

Full range of Sulfur Standards for XRF suitable for use with ASTM D2622, D4294, D5453, D7039, D7212, D7220 and others.
Matrix: See Below

Concentrations		Intended Use	Volume	NDBS in 20 cSt Mineral Oil	Polysulfides in 13 cSt Mineral Oil
(µg/g)	(wt%)			Product No.	Product No.
Blank	Blank	Blank	500 mL	VHG-S20MIN-BLK-500	VHG-PS13M-BLK-500
Blank	Blank	Blank	1 L	VHG-S20MIN-BLK-1L	VHG-PS13M-BLK-1L
Blank	Blank	Blank	1 gal.	VHG-S20MIN-BLK-1GAL	VHG-PS13M-BLK-1GAL
5	0.0005	Accuracy Low Range	500 mL	VHG-S20MIN-5-500	VHG-PS13M-5-500
5	0.0005	Accuracy Low Range	1 L	VHG-S20MIN-5-1L	VHG-PS13M-5-1L
5	0.0005	Accuracy Low Range	1 gal.	VHG-S20MIN-5-1GAL	VHG-PS13M-5-1GAL
7	0.0007	Precision	500 mL	VHG-S20MIN-7-500	VHG-PS13M-7-500
7	0.0007	Precision	1 L	VHG-S20MIN-7-1L	VHG-PS13M-7-1L
7	0.0007	Precision	1 gal.	VHG-S20MIN-7-1GAL	VHG-PS13M-7-1GAL
15	0.0015	Accuracy High Range	500 mL	VHG-S20MIN-15-500	VHG-PS13M-15-500
15	0.0015	Accuracy High Range	1 L	VHG-S20MIN-15-1L	VHG-PS13M-15-1L
15	0.0015	Accuracy High Range	1 gal.	VHG-S20MIN-15-1GAL	VHG-PS13M-15-1GAL

Sulfur in Isooctane and Isooctane Blends QC Standards

For Gasoline Analysis

Sulfur in Isooctane and Isooctane Blends QC Standards for XRF

Full range of Sulfur Standards for XRF suitable for use with ASTM D2622, D4294, D5453, D7039, D7212, D7220 and others.
Matrix: See Below

Concentrations		Intended Use	Volume	NDBS in Isooctane	NDBS in 75% Isooctane / 25% Toluene	NDBS in 90% Isooctane / 10% Ethanol
(µg/g)	(wt%)			Product No.	Product No.	Product No.
Blank	Blank	Blank	500 mL	VHG-SISO-BLK-500	VHG-SISO75TOL25-BLK-500	VHG-SISO-ETOH-BLK-500
Blank	Blank	Blank	1 L	VHG-SISO-BLK-1L	VHG-SISO75TOL25-BLK-1L	VHG-SISO-ETOH-BLK-1L
Blank	Blank	Blank	1 gal.	VHG-SISO-BLK-1GAL	VHG-SISO75TOL25-BLK-1GAL	VHG-SISO-ETOH-BLK-1GAL
9	0.0009	Accuracy Low Range	500 mL	VHG-SISO-9-500	VHG-SISO75TOL25-9-500	VHG-SISO-ETOH-9-500
9	0.0009	Accuracy Low Range	1 L	VHG-SISO-9-1L	VHG-SISO75TOL25-9-1L	VHG-SISO-ETOH-9-1L
9	0.0009	Accuracy Low Range	1 gal.	VHG-SISO-9-1GAL	VHG-SISO75TOL25-9-1GAL	VHG-SISO-ETOH-9-1GAL
10	0.0010	Precision	500 mL	VHG-SISO-10-500	VHG-SISO75TOL25-10-500	VHG-SISO-ETOH-10-500
10	0.0010	Precision	1 L	VHG-SISO-10-1L	VHG-SISO75TOL25-10-1L	VHG-SISO-ETOH-10-1L
10	0.0010	Precision	1 gal.	VHG-SISO-10-1GAL	VHG-SISO75TOL25-10-1GAL	VHG-SISO-ETOH-10-1GAL
19	0.0019	Accuracy High Range	500 mL	VHG-SISO-19-500	VHG-SISO75TOL25-19-500	VHG-SISO-ETOH-19-500
19	0.0019	Accuracy High Range	1 L	VHG-SISO-19-1L	VHG-SISO75TOL25-19-1L	VHG-SISO-ETOH-19-1L
19	0.0019	Accuracy High Range	1 gal.	VHG-SISO-19-1GAL	VHG-SISO75TOL25-19-1GAL	VHG-SISO-ETOH-19-1GAL

Sulfur in #2 Diesel Fuel Standards

For XRF

Standards for Sulfur in #2 Diesel Fuel

Full range of Sulfur Standards in diesel fuel for XRF suitable for use with ASTM D2622, D4294, D5453, D7039, D7212, D7220 and others. Matrix: #2 Diesel Fuel

Concentrations		Volume: 100 mL
(µg/g)	(wt%)	Product No.
Blank	Blank	VHG-SDSL-BLK-100
5	0.0005	VHG-SDSL-5-100
10	0.0010	VHG-SDSL-10-100
15	0.0015	VHG-SDSL-15-100
20	0.0020	VHG-SDSL-20-100
25	0.0025	VHG-SDSL-25-100
50	0.0050	VHG-SDSL-50-100
75	0.0075	VHG-SDSL-75-100
100	0.0100	VHG-SDSL-100-100
200	0.0200	VHG-SDSL-200-100
300	0.0300	VHG-SDSL-300-100
400	0.0400	VHG-SDSL-400-100
500	0.0500	VHG-SDSL-500-100
750	0.0750	VHG-SDSL-750-100
1,000	0.100	VHG-SDSL-1000-100
1,500	0.150	VHG-SDSL-1500-100
3,000	0.300	VHG-SDSL-3000-100
5,000	0.500	VHG-SDSL-5000-100
7,500	0.750	VHG-SDSL-7500-100
10,000	1.00	VHG-SDSL-1P-100
20,000	2.00	VHG-SDSL-2P-100
30,000	3.00	VHG-SDSL-3P-100
40,000	4.00	VHG-SDSL-4P-100
50,000	5.00	VHG-SDSL-5P-100

Sulfur in Mineral Oil Standards

For XRF

Standards for analysis of #2 Diesel Fuel and other matrices

Full range of Sulfur Standards for XRF suitable for use with ASTM Methods D2622, D4294, D5453, D7039, D7212, D7220 and others. Matrix: See below

Concentrations		NDBS in 20 cSt Oil Volume: 100 mL	Polysulfides in 13 cSt Oil Volume: 100 mL	NDBS in 75 cSt Oil Volume: 100 mL
(µg/g)	(wt%)	Product No.	Product No.	Product No.
Blank	Blank	VHG-S20MIN-BLK-100	VHG-PS13M-BLK-100	VHG-SMIN-BLK-100
5	0.0005	VHG-S20MIN-5-100	VHG-PS13M-5-100	VHG-SMIN-5-100
10	0.0010	VHG-S20MIN-10-100	VHG-PS13M-10-100	VHG-SMIN-10-100
15	0.0015	VHG-S20MIN-15-100	VHG-PS13M-15-100	VHG-SMIN-15-100
20	0.0020	VHG-S20MIN-20-100	VHG-PS13M-20-100	VHG-SMIN-20-100
25	0.0025	VHG-S20MIN-25-100	VHG-PS13M-25-100	VHG-SMIN-25-100
50	0.0050	VHG-S20MIN-50-100	VHG-PS13M-50-100	VHG-SMIN-50-100
75	0.0075	VHG-S20MIN-75-100	VHG-PS13M-75-100	VHG-SMIN-75-100
100	0.0100	VHG-S20MIN-100-100	VHG-PS13M-100-100	VHG-SMIN-100-100
200	0.0200	VHG-S20MIN-200-100	VHG-PS13M-200-100	VHG-SMIN-200-100
300	0.0300	VHG-S20MIN-300-100	VHG-PS13M-300-100	VHG-SMIN-300-100
400	0.0400	VHG-S20MIN-400-100	VHG-PS13M-400-100	VHG-SMIN-400-100
500	0.0500	VHG-S20MIN-500-100	VHG-PS13M-500-100	VHG-SMIN-500-100
750	0.0750	VHG-S20MIN-750-100	VHG-PS13M-750-100	VHG-SMIN-750-100
1,000	0.100	VHG-S20MIN-1000-100	VHG-PS13M-1000-100	VHG-SMIN-1000-100
1,500	0.150	VHG-S20MIN-1500-100	VHG-PS13M-1500-100	VHG-SMIN-1500-100
3,000	0.300	VHG-S20MIN-3000-100	VHG-PS13M-3000-100	VHG-SMIN-3000-100
5,000	0.500	VHG-S20MIN-5000-100	VHG-PS13M-5000-100	VHG-SMIN-5000-100
7,500	0.750	VHG-S20MIN-7500-100	VHG-PS13M-7500-100	VHG-SMIN-7500-100
10,000	1.00	VHG-S20MIN-1P-100	VHG-PS13M-1P-100	VHG-SMIN-1P-100
20,000	2.00	VHG-S20MIN-2P-100	VHG-PS13M-2P-100	VHG-SMIN-2P-100
30,000	3.00	VHG-S20MIN-3P-100	VHG-PS13M-3P-100	VHG-SMIN-3P-100
40,000	4.00	VHG-S20MIN-4P-100	VHG-PS13M-4P-100	VHG-SMIN-4P-100
50,000	5.00	VHG-S20MIN-5P-100	VHG-PS13M-5P-100	VHG-SMIN-5P-100

Sulfur in Isooctane Standards

For XRF or UVF

Standards for analysis of gasoline and other matrices

Sulfur in Isooctane Standards that are ideal for use with the following ASTM methods: D2622, D3120, D3246, D4045, D4294, D5453, D6334, D6445, D7039, D7212, D7220, and others. Matrix: Isooctane. Volume: 100 mL

Concentrations		Volume: 100 mL
(µg/g)	(wt%)	Product No.
Blank	Blank	VHG-SISO-BLK-100
5	0.0005	VHG-SISO-5-100
10	0.0010	VHG-SISO-10-100
15	0.0015	VHG-SISO-15-100
20	0.0020	VHG-SISO-20-100
25	0.0025	VHG-SISO-25-100
50	0.0050	VHG-SISO-50-100
75	0.0075	VHG-SISO-75-100
100	0.0100	VHG-SISO-100-100
200	0.0200	VHG-SISO-200-100
300	0.0300	VHG-SISO-300-100
400	0.0400	VHG-SISO-400-100
500	0.0500	VHG-SISO-500-100
750	0.0750	VHG-SISO-750-100
1,000	0.100	VHG-SISO-1000-100
3,000	0.300	VHG-SISO-3000-100

Sulfur in Isooctane Standards (Ampules)

Total Sulfur by UV Fluorescence

Calibration Set for ASTM Method D5453 - Total Sulfur in Liquid Petroleum Hydrocarbons by Ultraviolet Fluorescence. Matrix: Sulfur in isooctane. Offered only as a single set of 6 x 2 mL ampules. Sets also available in toluene upon request.

Concentration (ng/µL)	Matrix	Size	Product No.
0, 1.0, 2.5, 5, 7.5, 10	Isooctane	6 x 2 mL	VHG-SUVF-SET1
0, 5, 25, 50, 100, 200	Isooctane	6 x 2 mL	VHG-SUVF-SET2

Custom sets available upon request.

Distillation Standards

ASTM D86 Groups 1 and 2 Synthetic Distillation Standard

VHG's Distillation Standard is intended for use in accordance with ASTM Method D86 Distillation Groups 1 and 2 and ASTM D850, for distillation of petroleum products at atmospheric pressure. This standard is a synthetic blend of hydrocarbons that boil in the temperature range specified in ASTM D86 Distillation Groups 1 and 2. It covers the boiling range 129 °F to 368 °F (54 °C to 187 °C), and was verified by consensus analysis. Volume: 500 mL

Description	Product No.
Synthetic Distillation Standard	VHG-D86-500

ASTM D86 Group 4 Distillation Standard

VHG's Group 4 Distillation Standard is intended for use in accordance with ASTM Method D86 Distillation Group 4 for distillation of petroleum products at atmospheric pressure. This standard is a diesel fuel oil whose distillation range is specified in ASTM D86 Distillation Group 4. It covers the boiling range 379 °F to 700 °F (193 ° to 371 °C) and was verified by consensus analysis. Volume: 500 mL

Description	Product No.
Distillation Standard	VHG-D86-4-500

Reference Gas Oil No. 2

For ASTM D2887 (for other SIMDIS standards see page 71)

Reference Gas Oil No. 2 for ASTM D2887

This reference standard is intended for use in the determination of boiling range distribution of petroleum fractions by gas chromatography (GC), in accordance with ASTM Method D2887 Simulated Distillation.

Description	Volume	Product No.
Reference Gas Oil No. 2	10 x 1 mL ampules	VHG-RGO-10X1
Reference Gas Oil No. 2	2 oz.	VHG-RGO-2OZ

Polywax Standards for SIMDIS

Polywax Standards

This reference standard is intended for use in the determination of boiling range distribution of petroleum fractions by gas chromatography (GC), in accordance with ASTM Method D2887 Simulated Distillation.

Description	Volume	Product No.
Polywax 655 for Simulated Distillation	1 mL	VHG-POLYW-655-1ML
Polywax 1000 for Simulated Distillation	1 mL	VHG-POLYW-1000-1ML



HYDROCARBON STANDARDS FOR GC ANALYSIS

For petroleum and environmental applications

lgcstandards.com

LGC Quality | ISO 9001 | ISO/IEC 17025 | ISO 17034

FOR PETROLEUM AND ENVIRONMENTAL TESTING

Dr. Ehrenstorfer™ has developed a range of standards to help provide accurate and consistent calibrations and analytes with gas chromatography instrumentation.

We offer standards for many EPA Tier 3 methods. These standards are well suited for use with multiple ASTM methods for aromatics, oxygenates, benzene, ethanol, impurities, PIANO, PONA and other applications.

The latest additions to our portfolio include MTBE, and an expanded line of SIMDIS products. All of our standards for GC analysis are manufactured in our facility accredited to ISO 17034 from the highest quality starting materials available. New products are regularly added to this range.

In addition to providing stock standards, we manufacture custom ISO 17034 standards to your specifications.

Please let us know if you have questions or would like to discuss your specific requirements.

We are here to help.



lgcstandards.com

QUALITY AND ACCREDITATION

1 Certification

Dr. Ehrenstorfer™ uses a quality management system certified to **ISO 9001** and methodology certified to **ISO/IEC 17025** to manufacture products. Traceability back to the SI unit is demonstrated by using accredited procedures measuring weight, volume and temperature.

2 Gravimetric certification

Dr. Ehrenstorfer™ solution standards are designed for calibration or recalibration of chromatographic or other analytical systems used for quantitative or qualitative purposes. The products may also be used as reference standards for interlaboratory studies and to validate analytical procedures.

All raw materials used to prepare the multicomponent mixtures are of the highest purity. After our production process, each material is checked using several of the following methods, if applicable: UV, IR spectroscopy, elemental analysis, chromatographic properties (GC/FID, GC/ECD, HPLC/DAD, TLC) and physical properties (phase, color, odor, melting point) and Karl Fischer titration for detection of water content.

3 Measurement uncertainty

In accordance with the Guide to the Expression of Uncertainty in Measurement (GUM), our Certificates of Analysis list the expanded concentration uncertainty at the 95% confidence level, using a coverage factor of **k = 2**. The expanded uncertainty is based on the combination of uncertainties associated with the individual steps involved in the preparation of the product e.g. purity, material density and weighing technique.

4 ISO 17034 / ISO Guide 34

All of these standards are produced under Dr. Ehrenstorfer™'s **ISO 17034 / ISO Guide 34** scope of accreditation. This range is constantly increasing, therefore if you are unable to find the product that you require, please contact your local sales office or email us at dr.ehrenstorfer@lgcgroup.com.

The main difference between products produced under **ISO 17034 / ISO Guide 34** scope of accreditation and other products, is that the homogeneity testing and the calculation of the measurement uncertainties are performed strictly according to **ISO 17034 / ISO Guide 34** and **ISO Guide 35**. These products are provided with a Certificate of Analysis, which fulfills the requirements of **ISO 17034 / ISO Guide 34** and **ISO Guide 31**.

5 Expiration dates

All materials are supplied with an assigned expiration date which is printed either on the Certificate of Analysis or the product label.

6 Storage and transportation

Every reference material is stored under controlled conditions as stated on the certificate. These conditions are for the long term storage of the material. Normally products are not shipped under controlled conditions as shipping times are generally **<72 hours** and therefore short term. One sample of each lot is kept aside to enable checks on the specific lot to be undertaken if required.

CONTENTS

EPA Tier 3 Standards D3606, D4815, D5191, D5599, D5769	72
Benzene and Toluene in Gasoline ISO 17034 Standards D3606	74
Oxygenate ISO 17034 Standards D4815, D5501, D5599, D7423	76
Reid Vapor Pressure Standards D5191	85
Aromatics in Gasoline Standards D4420, D5580, D5769, D5986	86
SIMDIS ISO 17034 Standards D2887, D3710, D5442, D5443, D6352, D7096, D7169, D7213	93
MTBE ISO 17034 Standards D5441	103
Ethanol in Fuel ISO 17034 Standards D5501, D5599	105
PIANO and PONA (DHA) D5134, D6296, D6729, D6730, D6733	107
Aroclors in Transformer Oil (PCBs) D4059, D6160	121

See pages 60-67 for ASTM Method descriptions



Order from us securely online

Check our website for an up-to-date product list. Register for an account to order, check delivery times and access a range of resources.

Our technical staff are always happy to advise on the suitability of a specific product, and how to use it. Simply contact your local office if you require assistance with the use or application of a particular reference standard.

You can find a full list of all our local offices on the inside back cover of this catalog.

ASTM Methods D3606, D4815, D5191, D5599, D5769

For additional EPA Tier 3 Standards see page 60

ASTM D3606 Benzene & Toluene in Gasoline		page 74
Product No.	Description	Size
DRE-GK09000100IO	Benzene in Gasoline Calibration Kit with IS	7 x 2 mL
DRE-GK09000108IO	Benzene in Gasoline Calibration Kit with 10% ETOH and IS	7 x 2 mL
DRE-GA09000109IO	Check Standard A with 4% 2-butanol	10 x 2 mL
DRE-GA09000110IO	Check Standard B with 4% 2-butanol	10 x 2 mL
DRE-GA09010059	2-butanol IS Neat	1 x 2 mL
DRE-GS09010059	2-butanol IS Neat	5 x 2 mL

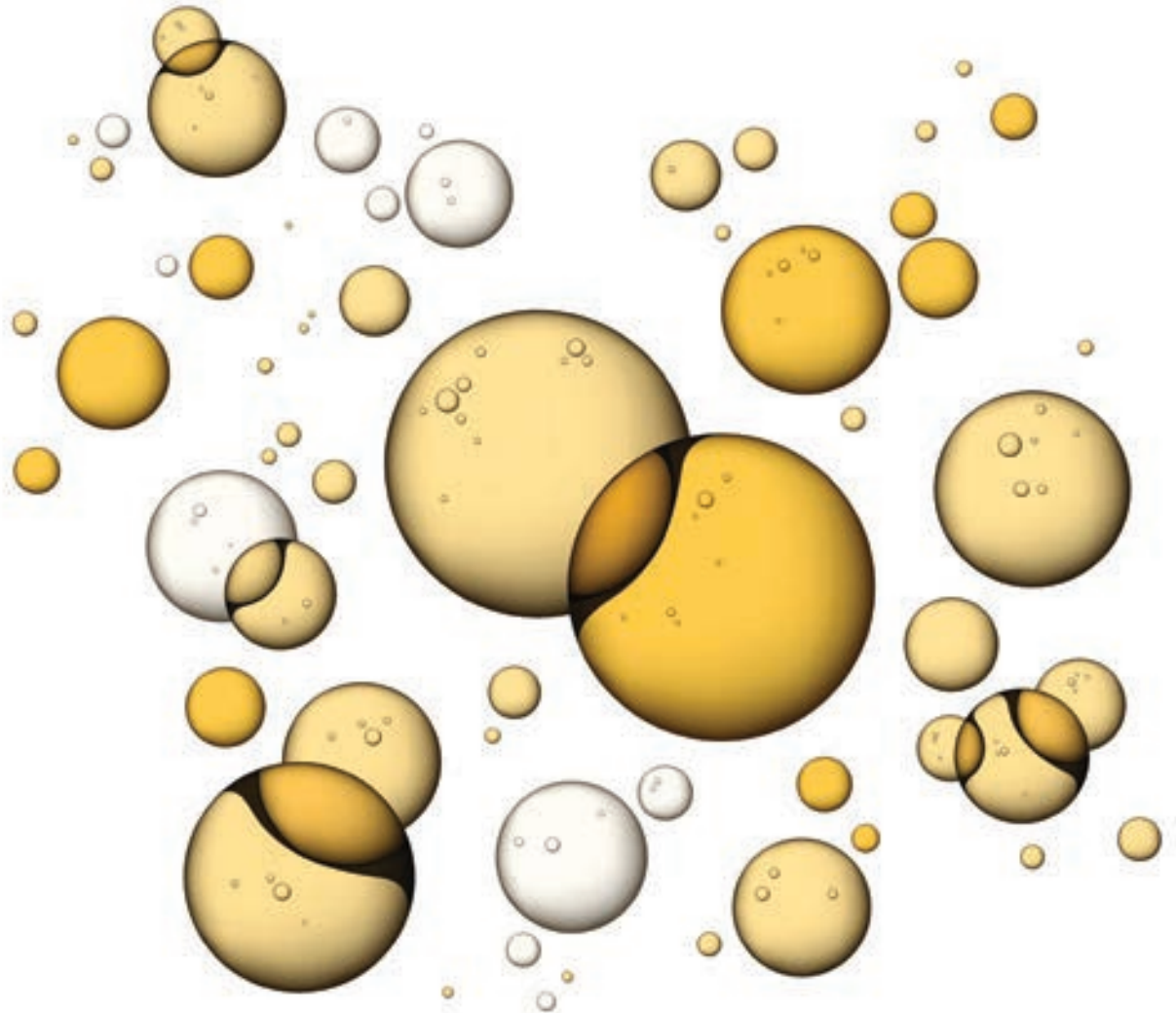
ASTM D4815/D5599 Oxygenates		page 76
Product No.	Description	Size
DRE-GK09000122OG	Oxygenates in Gasoline Calibration Kit with IS (14 components)	11 x 2 mL
DRE-GK09000131OG	Oxygenates in Gasoline Calibration Kit with IS (8 components)	8 x 2 mL
DRE-GH09000168HE	Low Level Oxygenates Mix, 10 mg/L	10 x 2 mL
DRE-GS09000186	D4815 Quantitative Peak Mix	5 x 1 mL
DRE-GA09000135	D4815 Valve Timing Mix	1 x 1 mL
DRE-GS09000135	D4815 Valve Timing Mix	5 x 1 mL
DRE-GS09000849	D4815 Retention Time Mixture	5 x 1 mL

ASTM D5191 Reid Vapor Pressure		page 85
Product No.	Description	Size
DRE-GS09010490	D5191 Reid Vapor Pressure-7.1 kPa (6.77 psi)	10 x 1 mL
DRE-GS09010491	D5191 Reid Vapor Pressure-22.5 kPa (3.26 psi)	10 x 1 mL
DRE-GS09010492	D5191 Reid Vapor Pressure-46.7 kPa (6.77 psi)	10 x 1 mL
DRE-GS09010493	D5191 Reid Vapor Pressure-51.1 kPa (7.41 psi)	10 x 1 mL
DRE-GS09010494	D5191 Reid Vapor Pressure-68.3 kPa (9.91 psi)	10 x 1 mL

ASTM D5769 Aromatics

page 86

Product No.	Description	Size
DRE-GK09000071IO	Aromatics in Finished Gasoline Calibration Kit with IS	6 x 1 mL
DRE-GK09000085IO	Aromatics in Finished Gasoline Calibration Kit without IS	6 x 10 mL
DRE-GA09000132IO	Aromatic Quality Control Reference Material for Gasoline with 3 IS	10 x 2 mL
DRE-GA09000133IO	Aromatic Quality Control Reference Material for Gasoline without 3 IS	10 x 2 mL
DRE-GA09000134IO	Aromatic Quality Control Reference Material for Gasoline with 4 IS	10 x 2 mL
DRE-GA09000136	3 Component IS Mix	1 x 5 mL
DRE-GS09000136	3 Component IS Mix	5 x 5 mL
DRE-GA09000137	4 Component IS Mix	1 x 10 mL
DRE-GS09000137	4 Component IS Mix	5 x 10 mL



Benzene and Toluene in Gasoline ISO 17034 Standards

ASTM Method D3606

D3606 Benzene in Gasoline Calibration Standard Set with IS									
Product No.		Solvent		UoM			Size		
DRE-GK09000100IO		isooctane		Vol%			7 x 2 mL		
		Standard							
		1	2	3	4	5	6	7	
Compound	CAS No.	DRE-GA 090000 93IO	DRE-GA 090000 94IO	DRE-GA 090000 95IO	DRE-GA 090000 96IO	DRE-GA 090000 97IO	DRE-GA 090000 98IO	DRE-GA 090000 99IO	Conc. Range
2-butanol	78-92-2	0.04	0.04	0.04	0.04	0.04	0.04	4.00	IS 0.04-4.00
benzene	71-43-2	0.05	0.025	0.01	0.006	0.003	0.001	0.0006	0.0006-0.025
toluene	108-88-3	0.20	0.15	0.10	0.50	0.025	0.01	0.005	0.005-0.50

D3606 Benzene in Gasoline Kit with Ethanol and IS in Isooctane									
Product No.		Solvent		UoM			Size		
DRE-GK09000108IO		isooctane		Vol%			7 x 2 mL		
		Standard							
		1	2	3	4	5	6	7	
Compound	CAS No.	DRE-GA 090001 01IO	DRE-GA 090001 02IO	DRE-GA 090001 03IO	DRE-GA 090001 04IO	DRE-GA 090001 05IO	DRE-GA 090001 06IO	DRE-GA 090001 07IO	Conc. Range
2-butanol	78-92-2	0.04	0.04	0.04	0.04	0.04	0.04	4.00	IS 0.04-4.00
benzene	71-43-2	0.05	0.025	0.01	0.006	0.003	0.001	0.0006	0.0006-0.025
ethanol	64-17-5	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
toluene	108-88-3	0.20	0.15	0.10	0.50	0.025	0.01	0.005	0.005-0.1

Benzene and Toluene in Gasoline ISO 17034 Standards

D3606 Check Standard A with 4% 2-butanol IS			
Product No.	Solvent	UoM	Size
DRE-GA09000109IO	isooctane	2 mL Ampule	10 x 2 mL
Compound		CAS No.	Concentration
benzene		71-43-2	10 mL/L
<i>2-butanol</i>		<i>78-92-2</i>	<i>IS 40 mL/L</i>
ethanol		64-17-5	100 mL/L
toluene		108-88-3	50 mL/L

D3606 Check Standard B with 4% 2-butanol IS			
Product No.	Solvent	UoM	Size
DRE-GA09000110IO	isooctane	2 mL Ampule	10 x 2 mL
Compound		CAS No.	Concentration
benzene		71-43-2	10 mL/L
<i>2-butanol</i>		<i>78-92-2</i>	<i>IS 40 mL/L</i>
ethanol		64-17-5	0 mL/L
toluene		108-88-3	50 mL/L

D3606 2-butanol IS			
Product No.	Solvent	UoM	Size
DRE-GS09010059	isooctane	2 mL Ampule	5 x 2 mL
Compound		CAS No.	Concentration
2-butanol		78-92-2	1,000,000 mg/L

ASTM Methods D4815, D5501, D5599, D7423

ASTM methods D4815, D5501, D5599, D7423														
Product No.		Solvent				UoM				Size				
DRE-GK09000071IO		oxygenate free gasoline				Wt%				11 x 2 mL				
Compound	CAS No.	Standard											Conc. Range	
		1	2	3	4	5	6	7	8	9	10	11		
<i>1,2-dimethoxyethane</i>	110-71-4	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	<i>IS 5.00</i>
1-butanol	71-36-3	0.25	0.50	---	---	---	---	---	1.25	5.00	---	2.50	0.00-5.00	
1-propanol	71-23-8	0.25	0.50	---	---	---	---	---	2.50	1.50	5.00	-	0.00-5.00	
2-butanol	78-92-2	---	2.50	---	---	0.25	---	---	---	0.50	1.50	50.00	0.00-5.00	
2-methyl-2propanol	75-65-0	---	9.00	5.00	---	0.50	---	---	15.00	---	---	1.25	0.00-15.00	
ethanol	64-17-5	1.25	0.25	---	5.00	10.00	---	15.00	---	---	---	---	0.00-15.00	
isobutyl alcohol	78-83-1	0.25	0.50	---	---	---	---	---	---	2.50	1.50	5.00	0.00-5.00	
isopropyl alcohol	67-63-0	0.50	0.25	---	---	---	2.50	---	1.50	---	5.00	---	0.00-5.00	
isopropyl ether	108-20-3	---	0.25	---	3.50	1.50	---	---	---	0.50	---	5.00	0.00-5.00	
methanol	67-56-1	1.25	5.00	9.00	0.50	---	15.00	---	---	---	---	---	0.00-15.00	
methyl t-butyl ether	1634-04-4	16.00	5.00	---	1.00	10.00	7.00	---	---	---	---	---	0.00-16.00	
oxygenate free gasoline, premium	8006-61-9	70.00	69.75	70.00	70.00	71.00	70.50	70.00	69.75	69.50	70.00	73.75	69.5-73.75	
tert-amyl alcohol	75-85-4	0.25	1.50	0.75	---	---	---	---	---	0.50	---	2.50	0.00-2.50	
tert-amyl methyl ether (TAME)	994-05-8	---	---	1.25	---	0.50	---	10.00	5.00	15.00	---	---	0.00-15.00	
tert-butyl ethyl ether (ETBE)	637-92-3	5.00	---	9.00	15.00	1.25	----	---	---	---	12.00	---	0.00-15.00	
Standard No.	Product No.	Standard No.	Product No.	Standard No.	Product No.	Standard No.	Product No.	Standard No.	Product No.	Standard No.	Product No.	Standard No.	Product No.	
Standard 1	DRE-GA 09000111OG	Standard 7	DRE-GA 09000117OG	Standard 2	DRE-GA 09000112OG	Standard 8	DRE-GA 09000118OG	Standard 3	DRE-GA 09000113OG	Standard 9	DRE-GA 09000119OG	Standard 4	DRE-GA 09000114OG	
Standard 5	DRE-GA 09000115OG	Standard 10	DRE-GA 09000120OG	Standard 6	DRE-GA 09000116OG	Standard 11	DRE-GA 09000121OG							

ASTM Method D5599 Oxygenates in Gasoline Calibration Kit with IS in Oxygenate Free Gasoline

Product No.		Solvent		UoM		Size				
DRE-GK09000131OG		oxygenate free gasoline		Wt%		7 x 2 mL				
		Standard								
		1	2	3	4	5	6	7	8	
Compound	CAS No.	DRE-GA 090001 23OG	DRE-GA 090001 24OG	DRE-GA 090001 25OG	DRE-GA 090001 26OG	DRE-GA 090001 27OG	DRE-GA 090001 28OG	DRE-GA 090001 29OG	DRE-GA 090001 30OG	Conc. Range
<i>1,2-dimethoxyethane</i>	<i>110-71-4</i>	<i>5.00</i>	<i>5.00</i>	<i>5.00</i>	<i>5.00</i>	<i>5.00</i>	<i>5.00</i>	<i>5.00</i>	<i>5.00</i>	<i>IS 5.00</i>
2-methyl-2propanol	75-65-0	---	12.50	5.00	9.00	0.25	---	---	---	0.00-12.50
ethanol	64-17-5	1.36	0.25	---	5.00	9.00	---	12.50	---	0.00-12.50
isopropyl ether	108-20-3	2.00	0.25	---	1.00	0.50	2.50	---	---	0.00-2.50
methanol	67-56-1	1.30	5.00	9.00	2.50	---	15.00	---	---	0.00-15.00
methyl t-butyl ether	1634-04-4	15.50	5.00	11.00	---	---	7.00	1.25	---	0.00-15.50
oxygenate free gasoline, premium	8006-61-9	71.84	71.00	69.50	68.50	71.25	70.50	76.25	77.00	68.5-77.00
tert-amyl methyl ether (TAME)	994-05-8	2.00	1.00	0.50	---	1.50	---	---	---	0.00-2.00
tert-butyl ethyl ether (ETBE)	637-92-3	1.00	---	---	9.00	12.50	---	5.00	18.00	0.00-18.00

D4815/D5599 1,2-Dimethoxyethane IS – EPA Tier 3

Product No.	Solvent	UoM	Size
DRE-GA09010060	neat mixture	2 mL Ampule	1 x 2 mL
DRE-GS09010060	neat mixture	2 mL Ampule	5 x 2 mL
Compound	CAS No.	Concentration Wt%	
1,2-dimethoxyethane	110-71-4	100.00	

Oxygenate ISO 17034 Standards

Low Level Oxygenates Mix, 10 mg/L ASTM methods D4815, D5501, D5599 – EPA Tier 3			
Product No.	Solvent	UoM	Size
DRE-GH09000168HE	hexane	2 mL Ampule	10 x 2 mL
Compound	CAS No.	Concentration	
1-butanol	71-36-3	10 mg/L	
1-propanol	71-23-8	10 mg/L	
2-butanone (MEK)	78-93-3	10 mg/L	
acetaldehyde	75-07-0	10 mg/L	
acetone	67-64-1	10 mg/L	
allyl alcohol	107-18-6	10 mg/L	
butyraldehyde	123-72-8	10 mg/L	
dimethyl ether	115-10-6	10 mg/L	
ethanol	64-17-5	10 mg/L	
ethyl ether	60-29-7	10 mg/L	
ethyl tert-butyl ether (ETBE)	637-92-3	10 mg/L	
isobutyl alcohol	78-83-1	10 mg/L	
isopropyl alcohol	67-63-0	10 mg/L	
isopropyl ether	108-20-3	10 mg/L	
isobutyraldehyde	78-84-2	10 mg/L	
methanol	67-56-1	10 mg/L	
methyl tert-butyl ether (MTBE)	1634-04-4	10 mg/L	
propionaldehyde	123-38-6	10 mg/L	
propyl ether	111-43-3	10 mg/L	
tert-amyl methyl ether (TAME)	994-05-8	10 mg/L	
tert-butyl alcohol (TBA)	75-65-0	10 mg/L	
valeraldehyde	110-62-3	10 mg/L	

D4815 Quantitative Peak Mix – EPA Tier 3			
Product No.	Solvent	UoM	Size
DRE-GS09000186	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
1,2-dimethoxyethane	110-71-4		6.00
1-butanol	71-36-3		7.30
1-propanol	71-23-8		7.30
2-butanol	78-92-2		7.30
benzene	71-43-2		5.00
ethanol	64-17-5		7.30
ethyl tert-butyl ether (ETBE)	637-92-3		4.00
isobutyl alcohol	78-83-1		7.30
isopropyl alcohol	67-63-0		7.30
isopropyl ether (DIPE)	108-20-3		4.00
methanol	67-56-1		7.30
methylcyclopentane	96-37-7		4.00
methyl tert-butyl ether (MTBE)	1634-04-4		4.00
tert-amyl alcohol	75-85-4		7.30
tert-amyl methyl ether (TAME)	994-05-8		7.30
tert-butyl alcohol (TBA)	75-65-0		7.30

D4815 Valve Timing Solution – EPA Tier 3			
Product No.	Solvent	UoM	Size
DRE-GA09000135	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS09000135	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
ethyl tert-butyl ether (ETBE)	637-92-3		10.00
hexane (C6)	110-54-3		60.00
isopropyl ether	108-20-3		10.00
methyl tert-butyl ether (MTBE)	1634-04-4		10.00
methylcyclopentane	96-37-7		10.00

Oxygenate ISO 17034 Standards

D7423 Oxygenates Calibration Level 1			
Product No.	Solvent	UoM	Size
DRE-GA09000624HE	hexane	2 mL Ampule	1 x 2 mL
Compound	CAS No.	Concentration	
1-butanol	71-36-3	1 mg/Kg	
1-propanol	71-23-8	1 mg/Kg	
2-butanol	78-92-2	1 mg/Kg	
2-butanone (MEK)	78-93-3	1 mg/Kg	
acetaldehyde	75-07-0	1 mg/Kg	
acetone	67-64-1	1 mg/Kg	
allyl alcohol	107-18-6	1 mg/Kg	
butyraldehyde	123-72-8	1 mg/Kg	
dimethyl ether	115-10-6	1 mg/Kg	
ethanol	64-17-5	1 mg/Kg	
ethyl ether	60-29-7	1 mg/Kg	
ethyl tert-butyl ether (ETBE)	637-92-3	1 mg/Kg	
isobutyl alcohol	78-83-1	1 mg/Kg	
isobutyraldehyde	78-84-2	1 mg/Kg	
isopropyl alcohol	67-63-0	1 mg/Kg	
isopropyl ether	108-20-3	1 mg/Kg	
isovaleraldehyde	590-86-3	1 mg/Kg	
methanol	67-56-1	1 mg/Kg	
methyl tert-butyl ether (MTBE)	1634-04-4	1 mg/Kg	
propionaldehyde	123-38-6	1 mg/Kg	
propyl ether	111-43-3	1 mg/Kg	
tert-amyl methyl ether (TAME)	994-05-8	1 mg/Kg	
tert-butyl alcohol (TBA)	75-65-0	1 mg/Kg	
valeraldehyde	110-62-3	1 mg/Kg	

D7423 Oxygenates Calibration Level 2			
Product No.	Solvent	UoM	Size
DRE-GA09000625HE	hexane	2 mL Ampule	1 x 2 mL
Compound	CAS No.		Concentration
1-butanol	71-36-3		5 mg/Kg
1-propanol	71-23-8		5 mg/Kg
2-butanol	78-92-2		5 mg/Kg
2-butanone (MEK)	78-93-3		5 mg/Kg
acetaldehyde	75-07-0		5 mg/Kg
acetone	67-64-1		5 mg/Kg
allyl alcohol	107-18-6		5 mg/Kg
ethyl tert-butyl ether (ETBE)	637-92-3		5 mg/Kg
butyraldehyde	123-72-8		5 mg/Kg
dimethyl ether	115-10-6		5 mg/Kg
ethanol	64-17-5		5 mg/Kg
ethyl ether	60-29-7		5 mg/Kg
isobutyl alcohol	78-83-1		5 mg/Kg
isobutyraldehyde	78-84-2		5 mg/Kg
isopropyl alcohol	67-63-0		5 mg/Kg
isopropyl ether	108-20-3		5 mg/Kg
isovaleraldehyde	590-86-3		5 mg/Kg
methanol	67-56-1		5 mg/Kg
methyl tert-butyl ether (MTBE)	1634-04-4		5 mg/Kg
propionaldehyde	123-38-6		5 mg/Kg
propyl ether	111-43-3		5 mg/Kg
tert-amyl methyl ether (TAME)	994-05-8		5 mg/Kg
tert-butyl alcohol (TBA)	75-65-0		5 mg/Kg
valeraldehyde	110-62-3		5 mg/Kg

Oxygenate ISO 17034 Standards

D7423 Oxygenates Calibration Level 3			
Product No.	Solvent	UoM	Size
DRE-GA09000626HE	hexane	2 mL Ampule	1 x 2 mL
Compound	CAS No.		Concentration
1-butanol	71-36-3		10 mg/Kg
1-propanol	71-23-8		10 mg/Kg
2-butanol	78-92-2		10 mg/Kg
2-butanone (MEK)	78-93-3		10 mg/Kg
acetaldehyde	75-07-0		10 mg/Kg
acetone	67-64-1		10 mg/Kg
allyl alcohol	107-18-6		10 mg/Kg
ethyl tert-butyl ether (ETBE)	637-92-3		10 mg/Kg
butyraldehyde	123-72-8		10 mg/Kg
dimethyl ether	115-10-6		10 mg/Kg
ethanol	64-17-5		10 mg/Kg
ethyl ether	60-29-7		10 mg/Kg
isobutyl alcohol	78-83-1		10 mg/Kg
isobutyraldehyde	78-84-2		10 mg/Kg
isopropyl alcohol	67-63-0		10 mg/Kg
isopropyl ether	108-20-3		10 mg/Kg
isovaleraldehyde	590-86-3		10 mg/Kg
methanol	67-56-1		10 mg/Kg
methyl tert-butyl ether (MTBE)	1634-04-4		10 mg/Kg
propionaldehyde	123-38-6		10 mg/Kg
propyl ether	111-43-3		10 mg/Kg
tert-amyl methyl ether (TAME)	994-05-8		10 mg/Kg
tert-butyl alcohol (TBA)	75-65-0		10 mg/Kg
valeraldehyde	110-62-3		10 mg/Kg

D7423 Oxygenates Calibration Level 4			
Product No.	Solvent	UoM	Size
DRE-GA09000627HE	hexane	2 mL Ampule	1 x 2 mL
Compound	CAS No.		Concentration
1-butanol	71-36-3		50 mg/Kg
1-propanol	71-23-8		50 mg/Kg
2-butanol	78-92-2		50 mg/Kg
2-butanone (MEK)	78-93-3		50 mg/Kg
acetaldehyde	75-07-0		50 mg/Kg
acetone	67-64-1		50 mg/Kg
allyl alcohol	107-18-6		50 mg/Kg
ethyl tert-butyl ether (ETBE)	637-92-3		50 mg/Kg
butyraldehyde	123-72-8		50 mg/Kg
dimethyl ether	115-10-6		50 mg/Kg
ethanol	64-17-5		50 mg/Kg
ethyl ether	60-29-7		50 mg/Kg
isobutyl alcohol	78-83-1		50 mg/Kg
isobutyraldehyde	78-84-2		50 mg/Kg
isopropyl alcohol	67-63-0		50 mg/Kg
isopropyl ether	108-20-3		50 mg/Kg
isovaleraldehyde	590-86-3		50 mg/Kg
methanol	67-56-1		50 mg/Kg
methyl tert-butyl ether (MTBE)	1634-04-4		50 mg/Kg
propionaldehyde	123-38-6		50 mg/Kg
propyl ether	111-43-3		50 mg/Kg
tert-amyl methyl ether (TAME)	994-05-8		50 mg/Kg
tert-butyl alcohol (TBA)	75-65-0		50 mg/Kg
valeraldehyde	110-62-3		50 mg/Kg

D7423 Oxygenates Calibration Level 5			
Product No.	Solvent	UoM	Size
DRE-GA09000628HE	hexane	2 mL Ampule	1 x 2 mL
Compound	CAS No.		Concentration
1-butanol	71-36-3		100 mg/Kg
2-butanol	78-92-2		100 mg/Kg

Table continues on following page.

Oxygenate ISO 17034 Standards

Continued from previous page.

D7423 Oxygenates Calibration Level 5			
Product No.	Solvent	UoM	Size
DRE-GA09000628HE	hexane	2 mL Ampule	1 x 2 mL
Compound	CAS No.	Concentration	
1-propanol	71-23-8	100 mg/Kg	
2-butanone (MEK)	78-93-3	100 mg/Kg	
acetaldehyde	75-07-0	100 mg/Kg	
acetone	67-64-1	100 mg/Kg	
allyl alcohol	107-18-6	100 mg/Kg	
ethyl tert-butyl ether (ETBE)	637-92-3	100 mg/Kg	
butyraldehyde	123-72-8	100 mg/Kg	
dimethyl ether	115-10-6	100 mg/Kg	
ethanol	64-17-5	100 mg/Kg	
ethyl ether	60-29-7	100 mg/Kg	
isobutyl alcohol	78-83-1	100 mg/Kg	
isobutyraldehyde	78-84-2	100 mg/Kg	
isopropyl alcohol	67-63-0	100 mg/Kg	
isopropyl ether	108-20-3	100 mg/Kg	
isovaleraldehyde	590-86-3	100 mg/Kg	
methanol	67-56-1	100 mg/Kg	
methyl tert-butyl ether (MTBE)	1634-04-4	100 mg/Kg	
propionaldehyde	123-38-6	100 mg/Kg	
propyl ether	111-43-3	100 mg/Kg	
tert-amyl methyl ether (TAME)	994-05-8	100 mg/Kg	
tert-butyl alcohol (TBA)	75-65-0	100 mg/Kg	
valeraldehyde	110-62-3	100 mg/Kg	

D7423 Oxygenates Calibration Set				
Product No.	Solvent	UoM		
DRE-K0000037	hexane	2 mL Ampule		
Contents	Description	Concentration	Size	Qty
DRE-A50000038HE	D7423 Oxygenates Calibration Level 1	1 mg/Kg	1 x 2 mL Ampule	1
DRE-A50000039HE	D7423 Oxygenates Calibration Level 2	5 mg/Kg	1 x 2 mL Ampule	1
DRE-A50000040HE	D7423 Oxygenates Calibration Level 3	10 mg/Kg	1 x 2 mL Ampule	1
DRE-A50000041HE	D7423 Oxygenates Calibration Level 4	50 mg/Kg	1 x 2 mL Ampule	1
DRE-A50000042HE	D7423 Oxygenates Calibration Level 5	100 mg/Kg	1 x 2 mL Ampule	1

ASTM Method D5191

D5191 Reid Vapor Pressure-22.5 kPa (3.26 psi) – EPA Tier 3

Product No.	Solvent	UoM	Size
DRE-GS09010491	neat mixture	10 mL Ampule	10 x 10 mL
Compound	CAS No.		Concentration Wt%
cyclohexane	110-82-7		100.00

D5191 Reid Vapor Pressure-46.7 kPa (6.77 psi) – EPA Tier 3

Product No.	Solvent	UoM	Size
DRE-GS09010492	neat mixture	10 mL Ampule	10 x 10 mL
Compound	CAS No.		Concentration Wt%
2-methylpentane	107-83-5		100.00

D5191 Reid Vapor Pressure-7.1 kPa (1.03 psi) – EPA Tier 3

Product No.	Solvent	UoM	Size
DRE-GS09010490	neat mixture	10 mL Ampule	10 x 10 mL
Compound	CAS No.		Concentration Wt%
toluene	108-88-3		100.00

D5191 Reid Vapor Pressure - 51.1 kPa (7.41 psi) – EPA Tier 3

Product No.	Solvent	UoM	Size
DRE-GS09010493	neat mixture	10 mL Ampule	10 x 10 mL
Compound	CAS No.		Concentration Wt%
2,3-dimethylbutane	79-29-8		100.00

D5191 Reid Vapor Pressure - 68.3 kPa (9.91 psi) – EPA Tier 3

Product No.	Solvent	UoM	Size
DRE-GS09010494	neat mixture	10 mL Ampule	10 x 10 mL
Compound	CAS No.		Concentration Wt%
cyclopentane	287-92-3		100.00

ASTM Methods D4420, D5580, D5769, D5986

ASTM Method D5769 Aromatics in Finished Gasoline Calibration Kit with IS in Isooctane								
Product No.		Solvent			UoM		Size	
DRE-GK09000071IO		isooctane			Wt%		6 x 1 mL	
		Standard						
		1	2	3	4	5	6	
Compound	CAS No.	DRE-GA 090000 65IO	DRE-GA 090000 66IO	DRE-GA 090000 67IO	DRE-GA 090000 68IO	DRE-GA 090000 69IO	DRE-GA 090000 70IO	Conc. Range
1,2,3,5-tetramethylbenzene	527-53-7	2.00	1.64	1.00	0.62	0.31	0.16	0.16-2.00
1,2,3-trimethylbenzene	526-73-8	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
1,2,4,5-tetramethylbenzene	95-93-2	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
1,2,4-trimethylbenzene	95-63-6	5.00	4.00	2.59	1.56	0.78	0.39	0.39-5.00
1,2-diethylbenzene	135-01-3	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
1,3,5-trimethylbenzene	108-67-8	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
1,4-diethylbenzene	105-05-5	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
1-methylnaphthalene	90-12-0	2.00	1.65	1.00	0.62	0.31	0.16	0.16-2.00
2-ethyltoluene	611-14-3	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
2-methylnaphthalene	91-57-6	2.00	1.65	1.00	0.62	0.31	0.16	0.16-2.00
3-ethyltoluene	620-14-4	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
4-ethyltoluene	622-96-8	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
benzene	71-43-2	5.00	4.00	2.59	1.56	0.78	0.39	0.39-5.00
<i>benzene-d6</i>	<i>1076-43-3</i>	<i>1.89</i>	<i>1.89</i>	<i>1.89</i>	<i>1.89</i>	<i>1.89</i>	<i>1.89</i>	<i>IS 1.89</i>
ethylbenzene	100-41-4	5.00	4.10	2.59	1.56	0.78	0.39	0.39-5.00
<i>ethylbenzene-d10</i>	<i>25837-05-2</i>	<i>1.89</i>	<i>1.89</i>	<i>1.89</i>	<i>1.89</i>	<i>1.89</i>	<i>1.89</i>	<i>IS 1.89</i>
indane	496-11-7	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
isooctane	540-84-1	0.00	20.00	49.79	69.72	84.82	92.31	0.00-92.31
isopropylbenzene	98-82-8	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
m-xylene	108-38-3	6.00	5.00	3.00	1.88	0.94	0.47	0.47-6.00
naphthalene	91-20-3	2.00	1.65	1.00	0.62	0.31	0.16	0.16-2.00
<i>naphthalene-d8</i>	<i>1146-65-2</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>1.00</i>	<i>IS 1.00</i>
n-butylbenzene	104-51-8	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
n-propylbenzene	103-65-1	3.00	2.50	1.56	0.94	0.47	0.24	0.24-3.00
o-xylene	95-47-6	6.00	5.00	3.00	1.87	0.94	0.47	0.47-6.00
p-xylene	106-42-3	6.00	5.00	3.00	1.88	0.94	0.47	0.47-6.00
toluene	108-88-3	19.65	15.73	9.86	5.93	2.97	1.49	1.49-19.65
<i>toluene-d8</i>	<i>2037-26-5</i>	<i>6.50</i>	<i>6.50</i>	<i>6.50</i>	<i>6.50</i>	<i>6.50</i>	<i>6.50</i>	<i>IS 6.50</i>

Aromatics in Gasoline ISO 17034 Standards

Aromatics in Finished Gasoline Calibration Standard Set with IS ASTM methods D4420, D5580, D5769, D5986 – EPA Tier 3

Set Product No.	Solvent	UoM		Size			
DRE-GK09000071IO	isooctane	1 mL Ampule		6 x 1 mL			
Compound							Range Wt%
o-xylene	6.25	5.00	3.125	1.875	0.938	0.469	0.469-6.25
p-xylene	6.25	5.00	3.125	1.875	0.938	0.469	0.469-6.25

Aromatics in Finished Gasoline Calibration Standard Set without IS ASTM methods D4420, D5580, D5769, D5986 – EPA Tier 3

Set Product No.	Solvent		UoM			Size		
DRE-GK09000085IO	isooctane		10 mL Ampule			6 x 10 mL		
Compound	DRE-GA 090000 79IO	DRE-GA 090000 80IO	DRE-GA 090000 81IO	DRE-GA 090000 82IO	DRE-GA 090000 83IO	DRE-GA 090000 84IO	Range Wt%	Conc. Range
1,2,3,5-tetramethylbenzene	2.07	1.656	1.20	0.62	0.311	0.155	0.155-2.00	0.155-2.07
1,2,4,5-tetramethylbenzene	3.13	1.656	1.20	0.94	0.47	0.235	0.235-3.13	0.235-3.13
1,2,3-trimethylbenzene	3.13	2.50	1.80	0.94	0.47	0.235	0.235-3.13	0.235-3.13
1,2,4-trimethylbenzene	5.20	4.16	2.90	1.56	0.78	0.39	0.39-5.20	0.39-5.20
1,3,5-trimethylbenzene	3.13	2.50	1.70	0.94	0.47	0.235	0.235-3.13	0.235-3.13
1,2-diethylbenzene	3.13	2.50	1.80	0.94	0.47	0.235	0.235-3.13	0.235-3.13
1,4-diethylbenzene	3.13	2.50	1.70	0.94	0.47	0.235	0.235-3.13	0.235-3.13
2-ethyltoluene	3.13	2.50	1.70	0.94	0.47	0.235	0.235-3.13	0.235-3.13
3-ethyltoluene	3.13	2.50	1.70	0.94	0.47	0.235	0.235-3.13	0.235-3.13
4-ethyltoluene	3.13	2.50	1.70	0.94	0.47	0.235	0.235-3.13	0.235-3.13
1-methylnaphthalene	2.08	1.656	2.00	0.62	0.312	0.156	0.156-2.08	0.156-2.08
2-methylnaphthalene	2.07	1.656	2.00	0.62	0.311	0.155	0.155-2.07	0.155-2.07
benzene	5.20	4.16	2.90	1.56	0.78	0.39	0.39-5.20	0.39-5.20
butylbenzene	3.13	2.50	1.70	0.94	0.47	0.235	0.235-3.13	0.235-3.13
ethylbenzene	5.20	4.16	2.90	1.56	0.78	0.39	0.39-5.20	0.39-5.20
indan	3.13	2.50	1.00	0.94	0.47	0.235	0.235-3.13	0.235-3.13
isopropylbenzene	3.13	2.50	1.70	0.94	0.47	0.235	0.235-3.13	0.235-3.13
naphthalene	2.07	1.664	1.30	0.62	0.311	0.155	0.155-2.07	0.155-2.07
propylbenzene	3.13	2.50	1.70	0.94	0.47	0.235	0.235-3.13	0.235-3.13
toluene	19.80	15.84	11.00	5.94	2.97	1.485	1.485-19.80	1.485-19.80
m-xylene	6.25	5.00	3.50	1.88	0.938	0.469	0.469-6.25	0.469-6.25
o-xylene	6.25	5.00	3.50	1.88	0.938	0.469	0.469-6.25	0.469-6.25

Table continues on following page.

Aromatics in Gasoline ISO 17034 Standards

Continued from previous page.

Aromatics in Finished Gasoline Calibration Standard Set without IS ASTM methods D4420, D5580, D5769, D5986 – EPA Tier 3

p-xylene	6.25	5.00	3.50	1.88	0.938	0.469	0.469-6.25	0.469-6.25
----------	------	------	------	------	-------	-------	------------	------------

D4420 Aromatics in Gasoline

Product No.	Solvent	UoM	Size
DRE-GS09000619	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration
benzene	71-43-2		30 mL/L
butylbenzene	104-51-8		150 mL/L
isooctane	540-84-1		570 mL/L
toluene	108-88-3		100 mL/L
xylene (total)	1330-20-7		150 mL/L

D5580 Aromatics Quantitative Calibration Set with IS

Set Product No.	Solvent	UoM					Size	
DRE-GS0900074	neat mixture	1 mL Ampule					5 x 1 mL	
Compound	CAS No.	DRE-GA 0900069	DRE-GA 0900070	DRE-GA 0900071	DRE-GA 0900072	DRE-GA 0900073	Range Wt%	Conc. Range
1,2,4-trimethylbenzene	95-63-6	0.90	9.00	0.45	4.50	2.25	0.90-9.00	0.90-9.00
<i>2-hexanone</i>	<i>591-78-6</i>	<i>10.00</i>	<i>10.00</i>	<i>10.00</i>	<i>10.00</i>	<i>10.00</i>	<i>10.00</i>	<i>IS 10.00</i>
benzene	71-43-2	0.09	0.45	0.90	1.80	4.50	0.09-4.50	0.09-4.50
ethylbenzene	100-41-4	0.45	0.90	2.25	4.50	9.00	0.45-9.00	0.45-9.00
isooctane	540-84-1	74.16	68.40	72.90	72.50	72.90	68.40-74.16	68.40-74.16
toluene	108-88-3	13.50	9.00	4.50	2.25	0.90	0.90-13.50	0.90-13.50
o-xylene	95-47-6	0.90	2.25	9.00	4.50	0.45	0.90-9.00	0.45-9.00

D5769 Quality Control Reference Material with 3 ISs – EPA Tier 3

Product No.	Solvent	UoM	Size
DRE-GA09000132IO	isooctane	2 mL Ampule	10 x 2 mL
Compound	CAS No.		Concentration Wt%
1,2,4,5-tetramethylbenzene	95-93-2		2.00
1,2,4-trimethylbenzene	95-63-6		3.00
benzene	71-43-2		1.00
<i>benzene-d6</i>	<i>1076-43-3</i>		<i>IS 2.00</i>
decane (C10)	124-18-5		12.00

Table continues on following page.

Aromatics in Gasoline ISO 17034 Standards

Continued from previous page.

D5769 Quality Control Reference Material with 3 ISs – EPA Tier 3		
dodecane (C12)	112-40-3	5.00
ethylbenzene	100-41-4	3.00
<i>ethylbenzene-d10</i>	<i>25837-05-2</i>	<i>IS 2.00</i>
heptane (C7)	142-82-5	17.00
hexane (C6)	110-54-3	12.00
<i>naphthalene</i>	<i>91-20-3</i>	<i>IS 1.00</i>
naphthalene-d8	1146-65-2	1.00
octane (C8)	111-65-9	17.00
toluene	108-88-3	9.00
m-xylene	108-38-3	3.00
o-xylene	95-47-6	3.00

D5769 Quality Control Reference Material without IS – EPA Tier 3			
Product No.	Solvent	UoM	Size
DRE-GA09000133IO	isooctane	2 mL Ampule	10 x 2 mL
Compound	CAS No.	Concentration Wt%	
1,2,4,5-tetramethylbenzene	95-93-2	2.00	
1,2,4-trimethylbenzene	95-63-6	3.00	
benzene	71-43-2	1.00	
decane (C10)	124-18-5	12.00	
dodecane (C12)	112-40-3	5.00	
ethylbenzene	100-41-4	3.00	
heptane (C7)	142-82-5	17.00	
hexane (C6)	110-54-3	12.00	
naphthalene	91-20-3	1.00	
octane (C8)	111-65-9	17.00	
toluene	108-88-3	9.00	
m-xylene	108-38-3	3.00	
o-xylene	95-47-6	3.00	

Aromatics in Gasoline ISO 17034 Standards

D5769 Quality Control Reference Material with 4 ISs – EPA Tier 3			
Product No.	Solvent	UoM	Size
DRE-GA09000134IO	isooctane	2 mL Ampule	10 x 2 mL
Compound	CAS No.	Concentration Wt%	
1,2,4,5-tetramethylbenzene	95-93-2	2.00	
1,2,4-trimethylbenzene	95-63-6	3.00	
benzene	71-43-2	1.00	
<i>benzene-d6</i>	<i>1076-43-3</i>	<i>IS 2.00</i>	
decane (C10)	124-18-5	12.00	
dodecane (C12)	112-40-3	5.00	
ethylbenzene	100-41-4	3.00	
<i>ethylbenzene-d10</i>	<i>25837-05-2</i>	<i>IS 2.00</i>	
heptane (C7)	142-82-5	17.00	
hexane (C6)	110-54-3	12.00	
naphthalene	91-20-3	1.00	
<i>naphthalene-d8</i>	<i>1146-65-2</i>	<i>IS 1.00</i>	
octane (C8)	111-65-9	17.00	
toluene	108-88-3	9.00	
<i>toluene d8</i>	<i>2037-26-5</i>	<i>IS 9.00</i>	
m-xylene	108-38-3	3.00	
o-xylene	95-47-6	3.00	

D5769 3 IS Mix – EPA Tier 3			
Product No.	Solvent	UoM	Size
DRE-GA09000136	isooctane	5 mL Ampule	1 x 5 mL
DRE-GS09000136	isooctane	5 mL Ampule	5 x 5 mL
Compound	CAS No.	Concentration Wt%	
benzene-d6	1076-43-3	2.00	
ethylbenzene-d10	25837-05-2	2.00	
naphthalene-d8	1146-65-2	1.00	

Aromatics in Gasoline ISO 17034 Standards

D5769 4 IS Mix – EPA Tier 3			
Product No.	Solvent	UoM	Size
DRE-GA09000137	isooctane	10 mL ampule	1 x 10 mL
DRE-GS09000137	isooctane	10 mL ampule	5 x 10 mL
Compound	CAS No.		Concentration Wt%
benzene-d6	1076-43-3		2.00
ethylbenzene-d10	25837-05-2		2.00
naphthalene-d8	1146-65-2		1.00
toluene-d8	2037-26-5		7.00

D5580 Valve Timing Calibration Mix with IS			
Product No.	Solvent	UoM	Size
DRE-GA0900060	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
<i>2-hexanone</i>	<i>591-78-6</i>		<i>IS 10.00</i>
benzene	71-43-2		4.50
ethylbenzene	100-41-4		9.00
isooctane	540-84-1		63.00
toluene	108-88-3		4.50
o-xylene	95-47-6		9.00

D5580 Daily Quality Control Standard without IS (contains dodecane (C12))			
Product No.	Solvent	UoM	Size
DRE-GS0900076	neat mixture	10 mL Ampule	5 x 10 mL
Compound	CAS No.		Concentration Wt%
1,2,4,5-tetramethylbenzene	95-93-2		1.00
1,2,4-trimethylbenzene	95-63-6		3.00
benzene	71-43-2		1.00
decane (C10)	124-18-5		10.00
dodecane (C12)	112-40-3		1.00
ethylbenzene	100-41-4		2.00
heptane (C7)	142-82-5		20.00
hexane (C6)	110-54-3		12.00
isooctane	540-84-1		20.00

Table continues on following page.

Aromatics in Gasoline ISO 17034 Standards

Continued from previous page.

D5580 Daily Quality Control Standard without IS (contains dodecane (C12))		
naphthalene	91-20-3	1.00
octane (C8)	111-65-9	15.00
toluene	108-88-3	9.00
o-xylene	95-47-6	2.00
p-xylene	106-42-3	3.00

ASTM Method D3606 Benzene in Gasoline Kit with Ethanol and IS in Isooctane									
Product No.		Solvent		UoM			Size		
DRE-GK09000108IO		isooctane		Vol%			7 x 2 mL		
		Standard							
		1	2	3	4	5	6	7	
Compound	CAS No.	DRE-GA 090001 23OG	DRE-GA 090001 24OG	DRE-GA 090001 25OG	DRE-GA 090001 26OG	DRE-GA 090001 27OG	DRE-GA 090001 28OG	DRE-GA 090001 29OG	Conc. Range
<i>2-butanol</i>	<i>78-92-2</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>IS 0.04</i>
benzene	71-43-2	0.05	0.025	0.01	0.006	0.003	0.001	0.0006	0.0006-0.01
ethanol	64-17-5	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
toluene	108-88-3	0.20	0.15	0.10	0.50	0.025	0.01	0.005	0.005-0.10

ASTM Methods D2887, D3710, D5442, D5443, D6352, D7096, D7169, D7213

D2887 SIMDIS Stock Paraffin Solution			
Product No.	Solvent	UoM	Size
DRE-GA0900079	neat mixture	5 mL Ampule	1 x 5 mL
Compound	CAS No.		Concentration Wt%
decane (C10)	124-18-5		6.66
dodecane (C12)	112-40-3		13.33
heptadecane (C17)	629-78-7		6.66
heptane (C7)	142-82-5		6.66
hexadecane (C16)	544-76-3		6.66
hexane (C6)	110-54-3		6.66
icosane (C20)	112-95-8		6.66
nonane (C9)	111-84-2		6.66
octadecane (C18)	593-45-3		6.66
octane (C8)	111-65-9		6.66
pentadecane (C15)	629-62-9		6.66
pentane (C5)	109-66-0		6.66
tetradecane (C14)	629-59-4		6.66
undecane (C11)	1120-21-4		6.66

D2887 Calibration Solution (also applicable for D6352, D7169, D7213)			
Product No.	Solvent	UoM	Size
DRE-GA0900055CH	chloroform	1 mL Ampule	1 x 1 mL
DRE-GS0900056CH	chloroform	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
dodecane (C12)	112-40-3		0.10
heptadecane (C17)	629-78-7		0.10
hexadecane (C16)	544-76-3		0.10
nonane (C9)	111-84-2		0.10
octacosane (C28)	630-02-4		0.10

Table continues on following page.

SIMDIS ISO 17034 Standards

Continued from previous page.

D2887 Calibration Solution (also applicable for D6352, D7169, D7213)		
octadecane (C18)	593-45-3	0.10
octane (C8)	111-65-9	0.10
pentadecane (C15)	629-62-9	0.10
pentane (C5)	109-66-0	0.10
tetracontane (C40)	4181-95-7	0.10
tetracosane (C24)	646-31-1	0.10
tetradecane (C14)	629-59-4	0.10
tetratetracontane (C44)	7098-22-8	0.10
undecane (C11)	1120-21-4	0.10

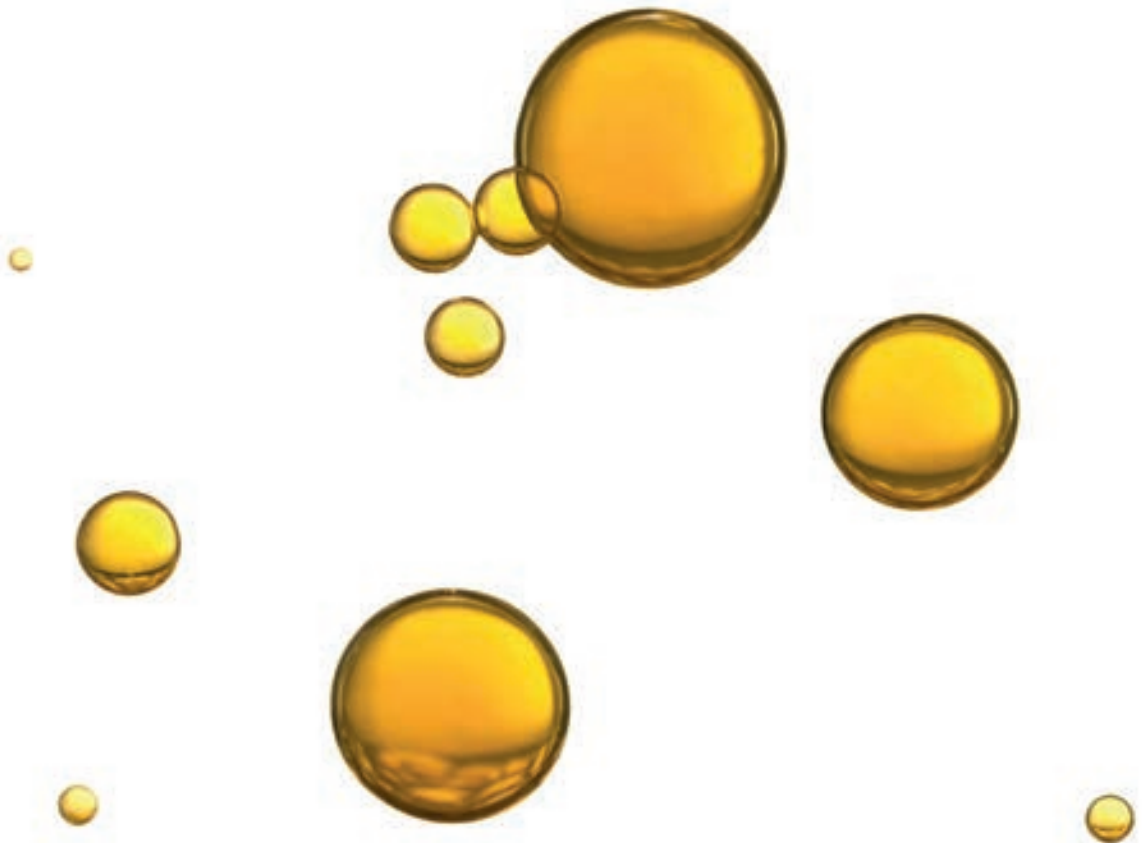
D2887 Hydrocarbon Window Defining Solution (also applicable for D6352, D7169, D7213)			
Product No.	Solvent	UoM	Size
DRE-GA0900053CH	chloroform	1 mL Ampule	1 x 1 mL
DRE-GS0900054CH	chloroform	1 mL Ampule	5 x 1 mL
Compound	CAS No.	Concentration	
decane (C10)	124-18-5	500 mg/L	
docosane (C22)	629-97-0	500 mg/L	
dodecane (C12)	112-40-3	500 mg/L	
dotriacontane (C32)	544-85-4	500 mg/L	
hencicosane (C21)	629-94-7	500 mg/L	
heptacosane (C27)	593-49-7	500 mg/L	
heptadecane (C17)	629-78-7	500 mg/L	
heptatriacontane (C37)	7194-84-5	500 mg/L	
hentriacontane (C31)	630-04-6	500 mg/L	
hexacosane (C26)	630-01-3	500 mg/L	
hexadecane (C16)	544-76-3	500 mg/L	
hexatriacontane (C36)	630-06-8	500 mg/L	
icosane (C20)	112-95-8	500 mg/L	
nonacosane (C29)	630-03-5	500 mg/L	
nonadecane (C19)	629-92-5	500 mg/L	
nonane (C9)	111-84-2	500 mg/L	
nonatriacontane (C39)	7194-86-7	500 mg/L	
octacosane (C28)	630-02-4	500 mg/L	
octadecane (C18)	593-45-3	500 mg/L	
octane (C8)	111-65-9	500 mg/L	

Table continues on following page.

Continued from previous page.

D2887 Hydrocarbon Window Defining Solution (also applicable for D6352, D7169, D7213)		
pentadecane (C15)	629-62-9	500 mg/L
phytane	638-36-8	500 mg/L
pristane	1921-70-6	500 mg/L
tricosane (C23)	638-67-5	500 mg/L
tridecane (C13)	629-50-5	500 mg/L
tritriacontane (C33)	630-05-7	500 mg/L
undecane (C11)	1120-21-4	500 mg/L
tetracontane (C40)	4181-95-7	500 mg/L

D2887 Column Test Mixture (also applicable for D6352, D7169, D7213)			
Product No.	Solvent	UoM	Size
DRE-GA0900100NO	octane	1 mL Ampule	1 x 1 mL
Compound	CAS No.	Concentration	
hexadecane (C16)	544-76-3	10,000 mg/L	
octadecane (C18)	593-45-3	10,000 mg/L	



SIMDIS ISO 17034 Standards

D2887 Calibration Solution (also applicable for D6352, D7169, D7213)			
Product No.	Solvent	UoM	Size
DRE-GA0900101CH	chloroform	1 mL Ampule	1 x 1 mL
DRE-GS0900102CH	chloroform	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration
decane (C10)	124-18-5		1,200 mg/L
dodecane (C12)	112-40-3		1,200 mg/L
dotriacontane (C32)	544-85-4		100 mg/L
icosane (C20)	112-95-8		200 mg/L
heptane (C7)	142-82-5		600 mg/L
hexadecane (C16)	544-76-3		1,000 mg/L
hexane (C6)	110-54-3		600 mg/L
hexatriacontane (C36)	630-06-8		100 mg/L
nonane (C9)	111-84-2		800 mg/L
octacosane (C28)	630-02-4		100 mg/L
octadecane (C18)	593-45-3		500 mg/L
octane (C8)	111-65-9		800 mg/L
tetracontane (C40)	4181-95-7		100 mg/L
tetracosane (C24)	646-31-1		200 mg/L
tetradecane (C14)	629-59-4		1,200 mg/L
tetratetracontane (C44)	7098-22-8		100 mg/L
undecane (C11)	1120-21-4		1,200 mg/L

D2887 Calibration Mixture (also applicable for D6352, D7169, D7213)			
Product No.	Solvent	UoM	Size
DRE-GA0900103	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS0900104	neat mixture	1 mL Ampule	1 x 1 mL
Compound	CAS No.		Concentration Wt%
decane (C10)	124-18-5		12.00
dodecane (C12)	112-40-3		12.00
dotriacontane (C32)	544-85-4		1.00
heptane (C7)	142-82-5		6.00
hexane (C6)	110-54-3		6.00
hexatriacontane (C36)	630-06-8		1.00
hexadecane (C16)	544-76-3		10.00
icosane (C20)	112-95-8		2.00

Table continues on following page.

Continued from previous page.

D2887 Calibration Mixture (also applicable for D6352, D7169, D7213)		
nonane (C9)	111-84-2	8.00
octacosane (C28)	630-02-4	1.00
octadecane (C18)	593-45-3	5.00
octane (C8)	111-65-9	8.00
tetracontane (C40)	4181-95-7	1.00
tetracosane (C24)	646-31-1	2.00
tetradecane (C14)	629-59-4	12.00
tetratetracontane (C44)	7098-22-8	1.00
undecane (C11)	1120-21-4	12.00

D3710 Quantitative Calibration Standard			
Product No.	Solvent	UoM	Size
DRE-GA0900105	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS0900106	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
2,4-dimethylpentane	108-08-7		5.80
2-methylbutane	78-78-4		10.50
2-methylpentane	107-83-5		5.80
butylbenzene	104-51-8		3.50
decane (C10)	124-18-5		3.50
dodecane (C12)	112-40-3		3.50
heptane (C7)	142-82-5		10.50
hexane (C6)	110-54-3		5.80

D3710 Quantitative Calibration Standard			
Product No.	Solvent	UoM	Size
DRE-GA0900105	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS0900106	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
octane (C8)	111-65-9		5.80
pentadecane (C15)	629-62-9		2.30
pentane (C5)	109-66-0		8.10
propylbenzene	103-65-1		4.70
tetradecane (C14)	629-59-4		2.30

Table continues on following page.

SIMDIS ISO 17034 Standards

Continued from previous page.

D3710 Quantitative Calibration Standard		
toluene	108-88-3	11.60
tridecane (C13)	629-50-5	2.30
p-xylene	106-42-3	14.00

D3710 Qualitative Calibration Standard			
Product No.	Solvent	UoM	Size
DRE-GA0900057	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS0900058	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.	Concentration Wt%	
2,4-dimethylpentane	108-08-7	5.40	
2-methylbutane	78-78-4	9.70	
2-methylpentane	107-83-5	5.40	
butane	106-97-8	4.50	
butylbenzene	104-51-8	3.20	
decane (C10)	124-18-5	3.20	
dodecane (C12)	112-40-3	3.20	
hexane (C6)	110-54-3	5.40	
isobutane	75-28-5	1.50	
octane (C8)	111-65-9	5.40	
pentane (C5)	109-66-0	7.60	
propane	74-98-6	1.50	
propylbenzene	103-65-1	4.30	
tetradecane (C14)	629-59-4	2.20	
toluene	108-88-3	10.80	
tridecane (C13)	629-50-5	2.20	
p-xylene	106-42-3	13.00	

D3710 Qualitative Calibration Standard			
Product No.	Solvent	UoM	Size
DRE-GA0900057	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS0900058	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.	Concentration Wt%	
heptane (7))	142-82-5	9.70	
pentadecane (C15)	629-62-9	2.20	

D5442 Column Resolution Standard

Product No.	Solvent	UoM	Size
DRE-GS09000600	cyclohexane	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
icosane (C20)	112-95-8		0.05
tetracontane (C40)	4181-95-7		0.05

D5442 Quantitative Wax Standard

Product No.	Solvent	UoM	Size
DRE-GA09000616CY	cyclohexane	1 mL Ampule	1 x 1 mL
DRE-GS09000617CY	cyclohexane	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
docosane (C22)	629-97-0		0.08
dodecane (C12)	112-40-3		0.02
dotriacontane (C32)	544-85-4		0.08
hexacontane (C60)	7667-80-3		0.02
hexacosane (C26)	630-01-3		0.12
hexadecane (C16)	544-76-3		0.04
hexatriacontane (C36)	630-06-8		0.06
icosane (C20)	112-95-8		0.06
octacosane (C28)	630-02-4		0.12
octadecane (C18)	593-45-3		0.05
pentacontane (C50)	6596-40-3		0.03
tetracontane (C40)	4181-95-7		0.05
tetracosane (C24)	646-31-1		0.10
tetratetracontane (C44)	7098-22-8		0.04
triacontane (C30)	638-68-6		0.10

D5442 Quantitative Wax Standard

Product No.	Solvent	UoM	Size
DRE-GA09000616CY	cyclohexane	1 mL Ampule	1 x 1 mL
DRE-GS09000617CY	cyclohexane	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
docosane (C22)	629-97-0		8.33

SIMDIS ISO 17034 Standards

D5442 Retention Time Standard 1			
Product No.	Solvent	UoM	Size
DRE-GA09000645	neat mixture	1 mL Ampule	1 x 1 mL
Compound	CAS No.		Concentration Wt%
dotriacontane (C32)	544-85-4		8.33
hexacosane (C26)	630-01-3		8.33
hexadecane (C16)	544-76-3		8.33
hexatriacontane (C36)	630-06-8		8.33
icosane (C20)	112-95-8		8.33
octacosane (C28)	630-02-4		8.33
octadecane (C18)	593-45-3		8.33
tetracontane (C40)	4181-95-7		8.33
tetracosane (C24)	646-31-1		8.33
tetradecane (C14)	629-59-4		0.03
tetratetracontane (C44)	7098-22-8		8.33
triacontane (C30)	638-68-6		8.33

D5442 Retention Time Standard 2			
Product No.	Solvent	UoM	Size
DRE-GA09000657	neat mixture	1 mL Ampule	1 x 1 mL
Compound	CAS No.		Concentration Wt%
docosane (C22)	629-97-0		6.25
dodecane (C12)	112-40-3		6.25
dotriacontane (C32)	544-85-4		6.25
hexacontane (C60)	7667-80-3		6.25
hexacosane (C26)	630-01-3		6.25
hexatriacontane (C36)	630-06-8		6.25
hexadecane (C16)	544-76-3		6.25
icosane (C20)	112-95-8		6.25
octacosane (C28)	630-02-4		6.25
octadecane (C18)	593-45-3		6.25
pentacontane (C50)	6596-40-3		6.25
tetracontane (C40)	4181-95-7		6.25
tetratetracontane (C44)	7098-22-8		6.25
triacontane (C30)	638-68-6		6.25
tetracosane (C24)	646-31-1		6.25
tetradecane (C14)	629-59-4		6.25

D5443 Test Mixture			
Product No.	Solvent	UoM	Size
DRE-GA09000601	neat mixture	1 mL Ampule	1 x 1 mL
Compound	CAS No.	Concentration Wt%	
1,2,4,5-tetramethylbenzene	95-93-2	5.00	
1,2,3-trimethylbenzene	526-73-8	5.00	
1,2,4-trimethylbenzene	95-63-6	4.50	
1,2,4-trimethylcyclohexane	2234-75-5	4.25	
1,2-dimethylcyclohexane	583-57-3	5.00	
2,3-dimethylbutane	79-29-8	2.00	
4-methyl-1-hexene	3769-23-1	1.50	
1-hexene	592-41-6	1.50	
benzene	71-43-2	2.25	
cyclohexane	110-82-7	2.00	
cyclopentane	287-92-3	1.00	
decane (C10)	124-18-5	4.25	
dodecane (C12)	112-40-3	3.25	
ethylbenzene	100-41-4	4.50	
heptane (C7)	142-82-5	3.50	
hexane (C6)	110-54-3	2.00	
isooctane	540-84-1	5.00	
methylcyclohexane	108-87-2	4.25	
nonane (C9)	111-84-2	4.50	
octane (C8)	111-65-9	5.00	
pentamethylbenzene	700-12-9	5.00	
pentane (C5)	109-66-0	1.00	
propylbenzene	103-65-1	5.00	
tetradecane (C14)	629-59-4	4.50	
toluene	108-88-3	2.25	
trans-decalin	493-02-7	4.25	

SIMDIS ISO 17034 Standards

D5443 Hydrocarbon Test Mixture			
Product No.	Solvent	UoM	Size
DRE-GA09000601	neat mixture	1 mL Ampule	1 x 1 mL
Compound	CAS No.		Concentration Wt%
undecane (C11)	1120-21-4		3.50
o-xylene	95-47-6		4.25

D7096 Qualitative Calibration Standard			
Product No.	Solvent	UoM	Size
DRE-GS09000835	neat mixture	2 mL Ampule	5 x 2 mL
Compound	CAS No.		Concentration Wt%
2,4-dimethylpentane	108-08-7		5.50
2-methylbutane	78-78-4		2.50
2-methylpentane	107-83-5		4.00
butane	106-97-8		0.20
butylbenzene	104-51-8		6.00
decane (C10)	124-18-5		4.50
dodecane (C12)	112-40-3		3.50
heptane (7)	142-82-5		7.20
hexadecane (C16)	544-76-3		3.00
hexane (C6)	110-54-3		3.00
isobutane	75-28-5		2.00
octane (C8)	111-65-9		7.00
pentadecane (C15)	629-62-9		5.00
pentane (C5)	109-66-0		3.00
propane	74-98-6		0.20
propylbenzene	103-65-1		6.50
tetradecane (C14)	629-59-4		3.00
toluene	108-88-3		15.30
tridecane (C13)	629-50-5		4.50
p-xylene	106-42-3		15.80

ASTM Method D5441

ASTM D5441 MTBE Low Concentration Calibration Kit

Product No.	Solvent	UoM	Size	Compound
DRE-K50000019IO	isooctane	mg/Kg	8 x 2 mL	methyl tert-butyl ether (MTBE)
Standard	Product No.		mg/kg	
Standard 1	DRE-A50000020IO		0	
Standard 2	DRE-A50000021IO		1	
Standard 3	DRE-A50000022IO		5	
Standard 4	DRE-A50000023IO		10	
Standard 5	DRE-A50000024IO		50	
Standard 6	DRE-A50000025IO		100	
Standard 7	DRE-A50000026IO		500	
Standard 8	DRE-A50000027IO		1,000	

ASTM D5441 MTBE High Concentration Calibration Kit

Product No.	Solvent	UoM	Size	Compound
DRE-K50000012EL	ethanol	mg/Kg	6 x 2 mL	methyl tert-butyl ether (MTBE)
Standard	Product No.		mg/kg	
Standard 1	DRE-A50000013EL		0	
Standard 2	DRE-A50000014EL		100	
Standard 3	DRE-A50000015EL		250	
Standard 4	DRE-A50000016EL		500	
Standard 5	DRE-A50000017EL		750	
Standard 6	DRE-A50000018EL		1,000	

MTBE ISO 17034 Standards

ASTM Method D5441 MTBE Impurity Mixture with IS			
Product No.	Solvent	UoM	Size
DRE-S50000028MB	MTBE	5 mL Ampule	10 x 2 mL
Compound	CAS No.	Concentration Wt%	
2,4,4-trimethyl-1-pentene	75-07-0	0.50	
<i>1,2-dimethoxyethane</i>	<i>110-62-3</i>	<i>IS 0.50</i>	
2-methyl-2-propanol	637-92-3	0.50	
2-methylbutane	78-93-3	0.25	
cis-2-pentene	107-18-6	0.25	
heptane (C7)	994-05-8	0.50	
methanol	71-36-3	0.50	
sec butyl methyl ether	111-43-3	0.25	
tert-amyl methyl ether (TAME)	67-64-1	0.50	
trans-2-pentene	115-10-6	0.25	
triisobutylene (mixture of branched chain isomers)	78-84-2	0.50	
n-pentane (C5)	123-72-8	0.25	



ASTM Methods D5501, D5599

Ethanol in Fuel Calibration Standard Set ASTM methods D5501, D5599 – EPA Tier 3

Set Product No.	Solvent		UoM			Size		
DRE-GK09000092HP	heptane		2 mL Ampule			6 x 2 mL		
Compound	DRE-GA 090000 86HP	DRE-GA 090000 87HP	DRE-GA 090000 88HP	DRE-GA 090000 89HP	DRE-GA 090000 90HP	DRE-GA 090000 91HP	Range Wt%	Conc. Range
ethanol	10.00	15.00	20.00	50.00	75.00	85.00	10.00-85.00	10.00-85.00
methanol	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30

Ethanol in Fuel Calibration Standard Set ASTM methods D5501, D5599 – EPA Tier 3

Set Product No.	Solvent		UoM		Size		
DRE-GK090000174	heptane		2 mL Ampule		5 x 2 mL		
Compound	DRE-GA 09000180	DRE-GA 09000181	DRE-GA 09000182	DRE-GA 09000183	DRE-GA 09000184	Range Wt%	Conc. Range
ethanol	20.00	50.00	75.00	90.00	99.40	20.00-99.40	20.00-99.40
heptane	10.00	10.00	10.00	4.00	0.50	0.50-10.00	0.50-10.00
isooctane	69.40	39.50	14.80	5.80	0.00	balance	0.00-69.40
methanol	0.60	0.50	0.30	0.20	0.10	0.10-0.60	0.10-0.60

Ethanol in Fuel ISO 17034 Standards

ASTM D5501-12 Ethanol and Methanol in Fuels Calibration Kit						
Product No.	Solvent		UoM		Size	
DRE-KS0000006IO	isooctane		Vol%		5 x 1 mL	
Compound	Standard					Conc. Range
	1	2	3	4	5	
Compound	DRE-A5 0000007IO	DRE-A5 0000008IO	DRE-A5 0000009IO	DRE-A5 0000010IO	DRE-A5 000000011	Conc. Range
ethanol	20.00	50.00	75.00	90.00	99.40	20.00-99.40
heptane (C7)	10.00	10.00	10.00	4.00	0.50	0.50-10.00
isooctane	69.40	39.50	14.80	5.80	0.00	0.00-69.40
methanol	0.60	0.50	0.30	0.20	0.10	0.10-0.60

D5501 96% Ethanol QC Check Mix			
Product No.	Solvent	UoM	Size
DRE-GA09000173EL	ethanol	2 mL Ampule	1 x 2 mL
Compound	CAS No.		Concentration
ethanol	64-17-5		960,000 mg/Kg
heptane	142-82-5		39,000 mg/Kg
methanol	67-56-1		1,000 mg/Kg

ASTM Methods D5134, D6296, D6729, D6730, D6733

PIANO (DHA) Standard Detailed Hydrocarbon Analysis ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-DHA-1	neat mixture	1 mL Ampule	1 x 1 mL
VHG-PIANO-DHA-10x1	neat mixture	1 mL Ampule	10 x 1 mL
Compound	CAS No.	Concentration Wt%	
1,2,4,5-tetramethylbenzene	95-93-2	1.25	
1,2,4-trimethylbenzene	95-63-6	1.71	
1,3,5-trimethylbenzene	108-67-8	1.47	
2,2,4-trimethylpentane	540-84-1	2.21	
2,3,3-trimethyl-1-butene	594-56-9	1.06	
2,2-dimethylpentane	590-35-2	1.56	
2,3-dimethyl-2-butene	563-79-1	2.01	
2,3-dimethylpentane	565-59-3	2.81	
2,4-dimethylpentane	108-08-7	1.77	
2-methyl-1-heptene	15870-10-7	1.30	
1-decene	872-05-9	2.32	
1-dodecene	112-41-4	2.38	
1-heptene	592-76-7	2.33	
1-nonene	124-11-8	2.36	
1-octene	111-66-0	2.37	
1-undecene	821-95-4	2.31	
3-methylpentane	96-14-0	1.72	
3-ethyltoluene	620-14-4	1.93	
benzene	71-43-2	2.34	
butylbenzene	104-51-8	2.42	
decane (C10)	124-18-5	3.32	
dodecane (C12)	112-40-3	2.33	
ethylbenzene	100-41-4	2.39	
heptane (C7)	142-82-5	2.31	
hexane (C6)	110-54-3	2.33	
isopentane	78-78-4	1.88	

Table continues on following page.

PIANO and PONA Standards

Continued from previous page.

PIANO (DHA) Standard Detailed Hydrocarbon Analysis ASTM methods D5134, D6296, D6729, D6730 and D6733		
isopropylbenzene	98-82-8	1.81
nonane (C9)	111-84-2	2.33
octane (C8)	111-65-9	2.31
pentane (C5)	109-66-0	2.32
propylbenzene	103-65-1	2.34
toluene	108-88-3	2.45
undecane (C11)	1120-21-4	2.31
p-xylene	106-42-3	3.27

PIANO (DHA) Standard Detailed Hydrocarbon Analysis ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-DHA-1	neat mixture	1 mL Ampule	1 x 1 mL
VHG-PIANO-DHA-10x1	neat mixture	1 mL Ampule	10 x 1 mL
Compound	CAS No.		Concentration Wt%
butylcyclohexane	1678-93-9		2.30
cyclohexane	110-82-7		2.35
decalin	91-17-8		1.93
ethylcyclohexane	1678-91-7		2.38
isobutylbenzene	538-93-2		2.19
methylcyclohexane	108-87-2		2.35
propylcyclohexane	1678-92-8		2.35
pentene	646-04-8		2.18
pentylbenzene	538-68-1		2.34
pentylcyclohexane	4292-92-6		2.32

PIANO Combinations ASTM methods D5134, D6296, D6729, D6730 and D6733 PIANO Standards Set		
Product No.	Product	Size
VHG-PIANO-COM-0.1	Combined PIANO Standard: All components of the 5 PIANO Standards are combined into one ampule	0.1 mL
VHG-PIANO-SET	PIANO Standards Set: This set contains one each of the following standards: VHG-PIANO-PAR-1, VHG-PIANO-ISO-0.1, VHG-PIANO-ARO-0.1, VHG-PIANO-NAP-0.1, VHG-PIANO-OLE-0.1, and VHG-PIANO-COM-0.1.	1 x 1 mL and 5 x 0.1 mL

PIANO Isoparaffins Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-ISO-0.1	neat mixture	1 mL Ampule	1 x 0.1 mL
Compound	CAS No.		Concentration Wt%
2,2,3-trimethylbutane	464-06-2		3.87
2,2,3-trimethylpentane	564-02-3		1.70
2,2-dimethylhexane	590-73-8		1.30
2,2-dimethyloctane	15869-87-1		3.22
2,2-dimethylpentane	590-35-2		1.76
2,3-dimethylbutane	79-29-8		0.44
2,3-dimethylheptane	3074-71-3		1.47
2,3-dimethylhexane	584-94-1		1.60
2,3-dimethyloctane	7146-60-3		3.80
2,3-dimethylpentane	565-59-3		1.76
2,4-dimethylhexane	589-43-5		1.63
2,4-dimethylpentane	108-08-7		3.64
2,5-dimethylhexane	592-13-2		3.67
2,5-dimethylheptane	2216-30-0		5.56
3,3-diethylpentane	1067-20-5		1.55
3,3-dimethyloctane	4110-44-5		3.14
3,3-dimethylpentane	562-49-2		1.84
3,4-dimethylheptane	922-28-1		3.63
3,5-dimethylheptane	926-82-9		0.75
2-methylheptane	592-27-8		4.32
2-methylhexane	591-76-4		2.33
2-methylnonane	871-83-0		3.67
2-methyloctane	3221-61-2		3.71
2-methylpentane	107-83-5		3.22
3-ethylhexane	589-34-4		0.75
3-ethyloctane	5881-17-4		3.64
3-ethylpentane	617-78-7		0.52
3-methylheptane	589-81-1		5.439
3-methylhexane	589-34-4		1.59
3-methylnonane	5911-04-6		5.69
3-methyloctane	2216-33-3		5.54
3-methylpentane	96-14-0		5.30
4-methylheptane	589-53-7		3.16

Table continues on following page.

PIANO and PONA Standards

Continued from previous page.

PIANO Isoparaffins Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-ISO-0.1	neat mixture	1 mL Ampule	1 x 0.1 mL
Compound		CAS No.	Concentration Wt%
isopentane		78-78-4	2.16

PIANO Aromatics Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-ARO-0.1	neat mixture	1 mL Ampule	1 x 0.1 mL
Compound		CAS No.	Concentration Wt%
1,2,4,5-tetramethylbenzene		95-93-2	0.24
1,2,4-triethylbenzene		877-44-1	2.01
1,2,4-trimethylbenzene		95-63-6	2.50
1,3,5-triethylbenzene		102-25-0	4.48
1,3,5-trimethylbenzene		108-67-8	1.11
1,2-diethylbenzene		135-01-3	1.08
1,2-dimethyl-4-ethylbenzene		934-80-5	2.22
1,2-dimethyl-3-ethylbenzene		933-98-2	2.15
1,3-dimethyl-5-ethylbenzene		934-74-7	2.17
1,3-dimethyl-2-ethylbenzene		2870-04-4	1.13
1,4-dimethyl-2-ethylbenzene		1758-88-9	2.25
1-methyl-2-ethylbenzene		611-14-3	2.22
1-methyl-2-isopropylbenzene		527-84-4	1.11
1-methyl-2-propylbenzene		1074-17-5	2.21
1-methyl-3-ethylbenzene		620-14-4	2.17
1-methyl-3-isopropylbenzene		535-77-3	1.09
1-methyl-3-propylbenzene		1074-43-7	2.08
1-methyl-4-ethylbenzene		622-96-8	2.14
1-methyl-4-isopropylbenzene		99-87-6	1.05
1-methyl-4-propylbenzene		1074-55-1	2.19
2-methylbutylbenzene		3968-85-2	1.13
2-tert-butyltoluene		1074-92-6	0.76
5-tert-butyl-m-xylene		98-19-1	2.13
benzene		71-43-2	7.03
butylbenzene		104-51-8	2.17
ethylbenzene		100-41-4	6.66

Table continues on following page.

PIANO and PONA Standards

Continued from previous page.

PIANO Aromatics Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-ARO-0.1	neat mixture	1 mL Ampule	1 x 0.1 mL
Compound	CAS No.		Concentration Wt%
hexylbenzene	1077-16-3		4.42
pentylbenzene	538-68-1		4.40
toluene	108-88-3		4.51
m-xylene	108-38-3		2.23
o-xylene	95-47-6		2.22
p-tert-butylethylbenzene	7364-19-4		2.20
p-xylene	106-42-3		4.74

PIANO Naphthalene Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-NAP-0.1	neat mixture	1 mL Ampule	1 x 0.1 mL
Compound	CAS No.		Concentration Wt%
(1 α ,2 α ,3 α)-1,2,3-trimethylcyclopentane	2613-69-6		0.79
(1 α ,2 α ,4 α)-1,2,4-trimethylcyclopentane	2613-72-1		3.70
(1 α ,2 β ,3 α)-1,2,3-trimethylcyclopentane	19374-46-0		1.56
(1 α ,2 β ,4 α)-1,2,4-trimethylcyclohexane	7667-59-6		3.48
(1 α ,2 β ,4 α)-1,2,4-trimethylcyclopentane	16883-48-0		1.65
(1 α ,2 β ,4 β)-1,2,4-trimethylcyclohexane	7667-60-9		3.57
(1 α ,3 α ,5 α)-1,2,4-trimethylcyclohexane	1795-27-3		3.50
1,1,2-trimethylcyclohexane	7094-26-0		3.31
1,1,4-trimethylcyclohexane	7094-27-1		3.62
1,1-dimethylcyclopentane	168-26-2		3.43
1-ethyl-1-methylcyclopentane	16747-50-5		1.05
butylcyclopentane	2040-95-1		3.66
cis-1,2-dimethylcyclohexane	2207-01-4		3.66
cis-1,3-dimethylcyclopentane	2532-58-3		0.59
cyclohexane	110-82-7		5.31
cyclopentane	287-92-3		4.89
ethylcyclopentane	1640-89-7		3.52
isobutylcyclohexane	1678-98-4		5.54
isobutylcyclopentane	3788-32-7		3.67

Table continues on following page.

PIANO and PONA Standards

Continued from previous page.

PIANO Naphthalene Standard ASTM methods D5134, D6296, D6729, D6730 and D6733		
isopropylcyclohexane	696-29-7	5.68
isopropylcyclopentane	3875-51-2	3.45
methylcyclohexane	108-87-2	5.62
methylcyclopentane	96-37-7	3.22
propylcyclopentane	2040-96-2	3.62
trans-1,2-dimethylcyclohexane	6876-23-9	1.64
trans-1,2-dimethylcyclopentane	2452-99-5	1.44
trans-1,3-dimethylcyclopentane	2453-00-1	2.70
trans-1-methyl-2-(4-methylpentyl)cyclopentane	66553-50-2	3.73
trans-1-methyl-2-propylcyclohexane	42806-77-9	3.81

O-PONA System Validation Mixture D6293			
Product No.	Solvent	UoM	Size
DRE-GA09000604	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS09000605	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.	Concentration Wt%	
1,2,4,5-tetramethylbenzene	95-93-2	2.00	
1,2,3-trimethylbenzene	526-73-8	2.00	
1,2,4-trimethylbenzene	95-63-6	3.00	
1,2,4-trimethylcyclohexane	2234-75-5	3.50	
1,2-dimethylcyclohexane	583-57-3	4.50	
2,3-dimethylbutane	79-29-8	2.00	
1-hexene	592-41-6	1.50	
4-methyl-1-hexene	3769-23-1	1.50	
benzene	71-43-2	2.50	
ethyl tert-butyl ether (ETBE)	637-92-3	3.0	
cyclohexane	110-82-7	2.0	
cyclopentane	287-92-3	1.50	
decane (C10)	124-18-5	3.50	
dodecane (C12)	112-40-3	2.00	
ethanol	64-17-5	5.00	
ethylbenzene	100-41-4	3.50	
heptane (C7)	142-82-5	3.00	
hexane (C6)	110-54-3	2.00	

Table continues on following page.

Continued from previous page.

O-PONA System Validation Mixture D6293			
Product No.	Solvent	UoM	Size
DRE-GA09000604	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS09000605	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
isooctane	540-84-1		4.00
methyl cyclohexane	108-87-2		3.50
methyl tert-butyl ether (MTBE)	1634-04-4		8.00
nonane (C9)	111-84-2		3.00
octane (C8)	111-65-9		4.00
pentamethylbenzene	700-12-9		2.50
pentane (C5)	109-66-0		1.50
propylbenzene	103-65-1		3.50
tetradecane (C14)	629-59-4		2.00
tert-amyl methyl ether (TAME)	994-05-8		5.00
tert-butyl alcohol (TBA)	75-65-0		4.00
toluene	108-88-3		2.50
trans-decalin	493-02-7		3.50
undecane (C11)	1120-21-4		2.00
o-xylene	95-47-6		3.00

PIANO and PONA Standards

PONA Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PONA-1	neat mixture	1 mL Ampule	1 x 1 mL
VHG-PONA-10X1	neat mixture	1 mL Ampule	10 x 1 mL
Compound	CAS No.	Concentration Wt%	
1-butene	106-98-9	2.70	
1-decene	872-05-9	2.70	
1-dodecene	112-41-4	2.70	
1-heptene	592-76-7	2.70	
1-hexene	592-41-6	2.70	
1-nonene	124-11-8	2.70	
1-octene	111-66-0	2.70	
1-pentene	109-67-1	2.50	
1-undecene	821-95-4	2.70	
benzene	71-43-2	2.70	
butane	106-97-8	2.50	
butylbenzene	104-51-8	2.70	
butylcyclohexane	1678-93-9	2.70	
cyclohexane	110-82-7	2.70	
cyclopentane	287-92-3	2.80	
decane (C10)	124-18-5	2.70	
dodecane (C12)	112-40-3	2.70	
ethanol	64-17-5	2.70	
ethylbenzene	100-41-4	2.70	
ethylcyclohexane	1678-91-7	2.70	
ethyl tert-butyl ether (ETBE)	637-92-3	2.70	
hexane (C6)	110-54-3	2.70	
heptane (C7)	142-82-5	2.70	
octane (C8)	111-65-9	2.70	
nonane (C9)	111-84-2	2.70	
methanol	67-56-1	2.70	
methylcyclohexane	108-87-2	2.70	
methyl tert-butyl ether (MTBE)	1634-04-4	2.70	
pentane (C5)	109-66-0	2.70	
pentylbenzene	538-68-1	2.70	
pentylcyclohexane	4292-92-6	2.70	

Table continues on following page.

Continued from previous page.

PONA Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PONA-1	neat mixture	1 mL Ampule	1 x 1 mL
VHG-PONA-10X1	neat mixture	1 mL Ampule	10 x 1 mL
Compound	CAS No.	Concentration Wt%	
propane	74-98-6	0.50	
propylbenzene	103-65-1	2.70	
propylcyclohexane	1678-92-8	2.70	
toluene	108-88-3	2.80	
tert-amyl methyl ether (TAME)	994-05-8	2.70	
tert-butyl alcohol (TBA)	75-65-0	2.70	
undecane (C11)	1120-21-4	2.70	

D6296 System Setup and Verification Set			
Product No.	Solvent	UoM	Size
DRE-GA09000621	neat mixture	1 mL Ampule	2 x 1 mL
Compound	CAS No.	Concentration Wt% Ampule (1)	Concentration Wt% Ampule (2)
ethyl tert-butyl ether (ETBE)	637-92-3	5.00	0.00
isooctane	540-84-1	95.00	95.00
methyl tert-butyl ether (MTBE)	1634-04-4	0.00	5.00



PIANO and PONA Standards

D6296 Calibration Standard with MTBE			
Product No.	Solvent	UoM	Size
DRE-GA09000612	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS09000613	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.	Concentration Wt%	
1-decene	872-05-9	1.00	
1-heptene	592-76-7	1.00	
1-hexene	592-41-6	1.00	
1-nonene	124-11-8	1.00	
1-octene	111-66-0	1.00	
1-pentene	109-67-1	1.00	
dodecane (C12)	112-40-3	1.00	
isooctane	540-84-1	87.00	
methyl tert-butyl ether (MTBE)	1634-04-4	5.00	
undecane (C11)	1120-21-4	1.00	

D6296 Calibration Standard with ETBE			
Product No.	Solvent	UoM	Size
DRE-GA09000614	neat mixture	1 mL Ampule	1 x 1 mL
DRE-GS09000615	neat mixture	1 mL Ampule	5 x 1 mL
Compound	CAS No.	Concentration Wt%	
1-decene	872-05-9	1.00	
1-heptene	592-76-7	1.00	
1-hexene	592-41-6	1.00	
1-nonene	124-11-8	1.00	
1-octene	111-66-0	1.00	
1-pentene	109-67-1	1.00	
dodecane (C12)	112-40-3	1.00	
ethyl tert-butyl ether (ETBE)	637-92-3	5.00	
isooctane	540-84-1	87.00	
undecane (C11)	1120-21-4	1.00	

PIANO Olefins Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-OLE-0.1	neat mixture	1 mL Ampule	1 x 0.1 mL
Compound	CAS No.		Concentration Wt%
2-methyl-2-pentene	625-27-4		3.31
3-methyl-1-butene	563-45-1		1.96
4-methyl-1-pentene	691-37-2		3.38
1-decene	872-05-9		8.08
1-heptene	592-76-7		7.49
1-hexene	592-41-6		6.95
1-octene	111-66-0		7.59
1-pentene	109-67-1		4.10
cis-2-heptene	6443-92-1		5.66
cis-2-hexene	7688-21-3		3.86
cis-2-nonene	6434-77-1		2.70
cis-2-octene	7642-04-8		3.87
cis-2-pentene	627-20-3		1.96
cis-3-heptene	7642-10-6		5.76
cis-3-nonene	20237-46-1		3.96
trans-2-heptene	14686-13-6		3.67
trans-2-hexene	4050-45-7		1.73
trans-2-nonene	6434-78-2		1.83
trans-2-octene	13389-42-9		1.94
trans-2-pentene	646-04-8		1.80
trans-3-heptene	14686-14-7		3.62

PIANO and PONA Standards

PIANO Paraffins Standard ASTM methods D5134, D6296, D6729, D6730 and D6733			
Product No.	Solvent	UoM	Size
VHG-PIANO-PAR-1	neat mixture	1 mL Ampule	1 x 1 mL
Compound	CAS No.		Concentration Wt%
decane (C10)	124-18-5		9.25
dodecane (C12)	112-40-3		9.40
heptane (C7)	142-82-5		9.77
hexane (C6)	110-54-3		9.51
nonane (C9)	111-84-2		9.04
octane (C8)	111-65-9		9.54
pentadecane (C15)	629-62-9		7.09
pentane (C5)	109-66-0		9.38
tetradecane (C14)	629-59-4		8.79
tridecane (C13)	629-50-5		8.91
undecane (C11)	1120-21-4		9.31

O-PONA Olefin Mixture D6293			
Product No.	Solvent	UoM	Size
DRE-GA09000606HH	hexane:heptane 50:50	1 mL Ampule	1 x 1 mL
DRE-GS09000607HH	hexane:heptane 50:50	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
1-heptene	592-76-7		2.00
1-hexene	592-41-6		2.00
1-nonene	124-11-8		3.00
1-octene	111-66-0		2.00
1-pentene	109-67-1		5.00

O-PONA Paraffin Mixture D6293			
Product No.	Solvent	UoM	Size
DRE-GA09000608HH	hexane:heptane 50:50	1 mL Ampule	1 x 1 mL
DRE-GS09000609HH	hexane:heptane 50:50	1 mL Ampule	5 x 1 mL
Compound	CAS No.		Concentration Wt%
decane (C10)	124-18-5		2.00
nonane (C9)	111-84-2		5.00

O-PONA Paraffin Mixture 2 D6293

Product No.	Solvent	UoM	Size
DRE-GA09000610HH	hexane:heptane 50:50	1 mL Ampule	1 x 1 mL
DRE-GS09000611HH	hexane:heptane 50:50	1 mL Ampule	5 x 1 mL
Compound	CAS No.	Concentration Wt%	
decane (C10)	124-18-5	3.00	
nonane (C9)	111-84-2	3.00	

D6296 Calibration Standard with ETBE

Product No.	Solvent	UoM	Size
DRE-GA09000614IO	isooctane	1 mL Ampule	1 x 1 mL
DRE-GS09000615IO	isooctane	1 mL Ampule	5 x 1 mL
Compound	CAS No.	Concentration Wt%	
1-decene	872-05-9	1.00	
1-heptene	592-76-7	1.00	
1-hexene	592-41-6	1.00	
1-nonene	124-11-8	1.00	
1-octene	111-66-0	1.00	
1-pentene	109-67-1	1.00	
decane (C10)	124-18-5	1.00	
dodecane (C12)	112-40-3	1.00	
ethyl tert-butyl ether (ETBE)	637-92-3	5.00	
isooctane	540-84-1	86.00	
undecane (C11)	1120-21-4	1.00	

PIANO and PONA Standards

D5134 Column Evaluation Mixture			
Product No.	Solvent	UoM	Size
DRE-GA0900088	neat mixture	1 mL Ampule	1 x 1 mL
Compound	CAS No.		Concentration Wt%
2,3,3-trimethylpentane	560-21-4		1.00
2-methylheptane	592-27-8		1.00
2-methylpentane	107-83-5		94.50
4-methylheptane	589-53-7		1.00
heptane (C7)	142-82-5		1.00
octane (C8)	111-65-9		1.00
toluene	108-88-3		0.50

D5134 Linearity Check Mixture			
Product No.	Solvent	UoM	Size
DRE-GS0900107	neat mixture	25 mL Ampule	10 x 25 mL
Compound	CAS No.		Concentration Wt%
2,4-dimethylheptane	2213-23-2		10.00
2,4-dimethylhexane	589-43-5		10.00
2-methylheptane	592-27-8		10.00
2-methylhexane	591-76-4		10.00
benzene	71-43-2		10.00
heptane (C7)	142-82-5		10.00
hexane (C6)	110-54-3		10.00
nonane (C9)	111-84-2		10.00
octane (C8)	111-65-9		10.00
toluene	108-88-3		10.00

ASTM Methods D4059, D6160

D4059 Aroclor 1016

Compound	Solvent	UoM	
Aroclor 1016	transformer oil	1 mL Ampule	
Product No.	Size	CAS No.	Concentration
DRE-GA09010425TR	1 x 1 mL	12674-11-2	50 mg/Kg
DRE-GS09010426TR	5 x 1 mL	12674-11-2	50 mg/Kg
DRE-GA09010427TR	1 x 1 mL	12674-11-2	500 mg/Kg
DRE-GS09010428TR	5 x 1 mL	12674-11-2	500 mg/Kg

D4059 Aroclor 1221

Compound	Solvent	UoM	
Aroclor 1221	transformer oil	1 mL Ampule	
Product No.	Size	CAS No.	Concentration
DRE-GA09010429TR	1 x 1 mL	11104-28-2	500 mg/Kg
DRE-GS09010430TR	5 x 1 mL	11104-28-2	500 mg/Kg
DRE-GA09010431TR	1 x 1 mL	11104-28-2	50 mg/Kg
DRE-GS09010432TR	5 x 1 mL	11104-28-2	50 mg/Kg

D4059 Aroclor 1232

Compound	Solvent	UoM	
Aroclor 1232	transformer oil	1 mL Ampule	
Product No.	Size	CAS No.	Concentration
DRE-09010433TR	1 x 1 mL	11141-16-5	500 mg/Kg
DRE-09010434TR	5 x 1 mL	11141-16-5	500 mg/Kg
DRE-09010435TR	1 x 1 mL	11141-16-5	50 mg/Kg
DRE-09010436TR	5 x 1 mL	11141-16-5	50 mg/Kg

Aroclors in Transformer Oil ISO 17034 Standards

D4059 Aroclor 1242			
Compound		Solvent	UoM
Aroclor 1242		transformer oil	1 mL Ampule
Product No.	Size	CAS No.	Concentration
DRE-GA09010437TR	1 x 1 mL	53469-21-9	500 mg/Kg
DRE-GS09010438TR	5 x 1 mL	53469-21-9	500 mg/Kg
DRE-GA09010439TR	1 x 1 mL	53469-21-9	50 mg/Kg
DRE-GS09010440TR	5 x 1 mL	53469-21-9	50 mg/Kg

D4059 Aroclor 1248			
Compound		Solvent	UoM
Aroclor 1248		transformer oil	1 mL Ampule
Product No.	Size	CAS No.	Concentration
DRE-GA09010439TR	1 x 1 mL	12672-29-6	500 mg/Kg
DRE-GS09010440TR	5 x 1 mL	12672-29-6	500 mg/Kg
DRE-GA09010443TR	1 x 1 mL	12672-29-6	50 mg/Kg
DRE-GS09010444TR	5 x 1 mL	12672-29-6	50 mg/Kg

D4059 Aroclor 1254			
Compound		Solvent	UoM
Aroclor 1254		transformer oil	1 mL Ampule
Product No.	Size	CAS No.	Concentration
DRE-GA09010445TR	1 x 1 mL	11097-69-1	50 mg/Kg
DRE-GS09010446TR	5 x 1 mL	11097-69-1	50 mg/Kg
DRE-GA09010447TR	1 x 1 mL	11097-69-1	500 mg/Kg
DRE-GS09010448TR	5 x 1 mL	11097-69-1	500 mg/Kg

D4059 Aroclor 1260			
Compound		Solvent	UoM
Aroclor 1260		transformer oil	1 mL Ampule
Product No.	Size	CAS No.	Concentration
DRE-GA09010449TR	1 x 1 mL	11096-82-5	500 mg/Kg
DRE-GS09010450TR	5 x 1 mL	11096-82-5	500 mg/Kg
DRE-GA09010451TR	1 x 1 mL	11096-82-5	50 mg/Kg
DRE-GS09010452TR	5 x 1 mL	11096-82-5	50 mg/Kg

Aroclors in Transformer Oil ISO 17034 Standards

D4059 Aroclor 1262			
Compound		Solvent	UoM
Aroclor 1262		transformer oil	1 mL Ampule
Product No.	Size	CAS No.	Concentration
DRE-GA09010482TR	1 x 1 mL	37324-23-5	500 mg/Kg
DRE-GS09010483TR	5 x 1 mL	37324-23-5	500 mg/Kg
DRE-GA09010480TR	1 x 1 mL	37324-23-5	50 mg/Kg
DRE-GS09010481TR	5 x 1 mL	37324-23-5	50 mg/Kg

D4059 Aroclor 1268			
Compound		Solvent	UoM
Aroclor 1268		transformer oil	1 mL Ampule
Product No.	Size	CAS No.	Concentration
DRE-GA09010486TR	1 x 1 mL	11100-14-4	500 mg/Kg
DRE-GS09010487TR	5 x 1 mL	11100-14-4	500 mg/Kg
DRE-GA09010484TR	1 x 1 mL	11100-14-4	50 mg/Kg
DRE-GS09010485TR	5 x 1 mL	11100-14-4	50 mg/Kg

D6160 Aroclor 1016			
Compound		CAS No.	UoM
Aroclor 1016		12674-11-2	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010455HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010454ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010453IO	1 x 1 mL	isooctane	35 mg/L

D6160 Aroclor 1221			
Compound		CAS No.	UoM
Aroclor 1221		11104-28-2	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010458HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010457ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010456IO	1 x 1 mL	isooctane	35 mg/L

Aroclors in Transformer Oil ISO 17034 Standards

D6160 Aroclor 1232			
Compound		CAS No.	UoM
Aroclor 1232		11141-16-5	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010461HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010460ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010459IO	1 x 1 mL	isooctane	35 mg/L

D6160 Aroclor 1242			
Compound		CAS No.	UoM
Aroclor 1242		53469-21-9	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010464HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010463ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010462IO	1 x 1 mL	isooctane	35 mg/L

D6160 Aroclor 1248			
Compound		CAS No.	UoM
Aroclor 1248		12672-29-6	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010467HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010466ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010465IO	1 x 1 mL	isooctane	35 mg/L

D6160 Aroclor 1254			
Compound		CAS No.	UoM
Aroclor 1254		11097-69-1	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010470HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010469ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010468IO	1 x 1 mL	isooctane	35 mg/L

Aroclors in Transformer Oil ISO 17034 Standards

D6160 Aroclor 1260			
Compound		CAS No.	UoM
Aroclor 1260		11096-82-5	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010473HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010472ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010471IO	1 x 1 mL	isooctane	35 mg/L

D6160 Aroclor 1262			
Compound		CAS No.	UoM
Aroclor 1262		37324-23-5	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010476HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010475ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010474IO	1 x 1 mL	isooctane	35 mg/L

D6160 Aroclor 1268			
Compound		CAS No.	UoM
Aroclor 1268		11100-14-4	1 mL Ampule
Product No.	Size	Solvent	Concentration
DRE-GA09010479HE	1 x 1 mL	hexane	1,000 mg/L
DRE-GA09010478ME	1 x 1 mL	methanol	35 mg/L
DRE-GA09010477IO	1 x 1 mL	isooctane	35 mg/L



Reference standards for residue and environmental testing

Over 8000 pesticide and other organic reference materials. The Dr. Ehrenstorfer™ range of neat, solutions and mixes includes:

- PAHs
- Dyes
- Phthalates
- Toxaphene single components
- Pharmaceutical and veterinary compounds



+1 603 622 7660
+1 888 622 7660
lcgstandards.com

Valentin Wagner,
Head of RM Manufacturing



Instrument Consumables for ICP, ICP-MS, XRF, Viscometers and Titrators

lgcstandards.com

Science for a safer world



Auto-sampler Tubes and Beakers

For ICP, ICP-MS, Viscometers, Titrators

VHG brand Auto-sampler tubes are standard sizes and fit many manufacturers' Auto-samplers including Cetac and Gilson as well as systems by PerkinElmer, Varian, Unicam, TJA/Thermo Fisher Scientific, Mettler-Toledo™, Metrohm™ and others.

Sample Tubes for ICP, ICP-MS Auto-samplers			
Size	Material	Bottom	Product No.
13 x 100 mm (~8 mL)	Polypropylene	Round	VHG-FPSC4-MP
17 x 100 mm (~15 mL)	Polypropylene	Round	VHG-FPSC1-MP
Plug for FPSC1-MP	Polyethylene	Round	VHG-FPSC1-MP-PLUG
Plug for FPSC4-MP	Polyethylene	Round	VHG-FPSC4-MP-PLUG

Sample Tubes for Viscometer Auto-samplers			
Size	Material	Bottom	Product No.
2.3 x 6 cm (15 mL)	Polypropylene	Cylindrical	VHG-FVISC-MPA

Sample Beakers for Titrator Auto-samplers				
VHG brand sample beakers for titration/TAN/TBN have excellent visibility and good resistance to acids.				
Size	Material	For Use With	Quantity Per Pack	Product No.
53.6 x 90.5 mm (100 mL)	Polypropylene	Mettler-Toledo™	450	VHG-FSB1-MP
43.3 x 113 mm (120 mL)	Polypropylene	Metrohm™	300	VHG-FSB2-MP



Consumables

Tubing for Peristaltic Pumps

For ICP and ICP-MS

Solvent Flex tubing, made of solvent flex PVC (yellow tint), is recommended for use with oils and many organic solvents, it is resistant to cracking, swelling and hardening. For additional tubing materials or sizes please inquire.

"2 Bridge" Peri-Pump Solvent Flex Tubing

I.D. mm (in.) / Color	Length (in.)	No. of Bridges	Bridge Interval	Quantity Per Pack	Product No.
0.76 (0.03") - black/black	17.9	2	5.5	12	VHG-D180209
1.14 (0.045") - red/red	17.9	2	5.5	12	VHG-D180207

"3 Bridge" Peri-Pump Solvent Flex Tubing

I.D. mm (in.) / Color	Length (in.)	No. of Bridges	Bridge Interval	Quantity Per Pack	Product No.
0.76 (0.03") - black/black	17	3	3.2	12	VHG-D180279
1.14 (0.045") - red/red	17	3	3.2	12	VHG-D180278

Flaring Tool For Peri-Pump Tubing

The ends of peristaltic pump tubing almost always need to be stretched to get a secure connection. Our flaring tool will work for all sizes, is rugged, and will not contaminate or corrode.

Product No.

VHG-D180AWLP

Torches

For ICP and ICP-MS

VHG offers torches for a wide variety of ICP and ICP-MS instruments. Most torches are available as "wear metals" type, which minimizes cracking and extends torch life.

Agilent (Varian)

Description	Mfg. No.	Product No.
Low Flow Torch, One Piece, Radial, Wear Metals	-	VHG-AG800-05W

Torches

For ICP and ICP-MS

Leeman		
Description	Mfg. No.	Product No.
1 Piece Torch with Ball Joint, Organics/Wear Metals	–	VHG-LE550-22W

PerkinElmer		
Description	Mfg. No.	Product No.
Torch Tube, Type II, Wear Metals - Plasma Series	N0681690	VHG-PE310-03W
Torch Body, Wear Metals - Optima 3000 Radial	–	VHG-PE310-04W
Torch Body, Wear Metals - Optima 3000 Axial	–	VHG-PE310-11W
Torch Body, 2 Slot, Wear Metals - Optima 3000 DV	N0691669	VHG-PE310-12W
Torch Body, 1 Slot, Wear Metals - Optima 3000 DV	–	VHG-PE310-14W
Torch Body, Wear Metals - Optima 2x00/4x00/5x00/7x00 DV	–	VHG-PE310-16W
Torch Body, 3 Slot, Wear Metals - Optima 2x00/4x00/5x00/7x00 DV	N0772008	VHG-PE310-3SW
Torch Body, Wear Metals - Optima 4300V/5300V/7300V Radial	–	VHG-PE310-17W
Torch Body, Extended Life - Optima 4300V/5300V/7300V Radial	N0771561	VHG-PE310-17EL
Torch Body, 1 Slot, Wear Metals - Optima 8x00	–	VHG-PE310-51W
Torch Body, 1 Slot, Extended Life - Optima 8x00	–	VHG-PE310-51EL
Torch Body, 3 Slot, Wear Metals - Optima 8x00	–	VHG-PE310-3SW
Torch Body, 3 Slot, Extended Life - Optima 8x00	–	VHG-PE310-3SEL

Spectro (Suitable for CIROS, Genesis & ARCOS)		
Description	Mfg. No.	Product No.
Torch, Fixed SOP 1.8 mm, Organics	–	VHG-SP750-05W
Torch, Fixed SOP 1.8 mm, Organics, with fittings	75360521	VHG-SP750-05WF

Thermo iCAP		
Description	Mfg. No.	Product No.
iCAP Radial EMT Extended Life	–	VHG-TM450-73EL

XRF Sample Cups

VHG's XRF cups feature a unique Tri-Lock Taut Film™ design that ensures a wrinkle-free, leak resistant and taut window film.

Double Open-End Cups

VHG's double open-end cups come with open or vented caps with a proprietary lift tab feature that enables more reliable sample handling of full sample cups. Samples are top loaded for maximum ease and are self-nesting. These cups support thin film and microporous sheets for sealing.

Double Open-End Cup with Open Cap (consists of 3 parts)				
O.D. (mm)	I.D. (mm)	Height (mm)	Vol. (cc)	Product No.
25	17	24	4.6	VHG-CUP11-25S
31	25	24	8.4	VHG-CUP11-31S
40	31	24	14.0	VHG-CUP11-40S
40	31	34	22.0	VHG-CUP11-40T

Double Open-End Cup with Vented Cap (consists of 3 parts)				
O.D. (mm)	I.D. (mm)	Height (mm)	Vol. (cc)	Product No.
25	17	24	4.6	VHG-CUP22-25S
31	25	24	8.4	VHG-CUP22-31S
40	31	24	14.0	VHG-CUP22-40S
45	39	34	36.7	VHG-CUP22-45T

Double Open-End Cup with Baffle Plus™ Cap (consists of 3 parts)				
O.D. (mm)	I.D. (mm)	Height (mm)	Vol. (cc)	Product No.
31	25	29	6.8	VHG-CUP69-31S
40	31	29	11.3	VHG-CUP69-40S
45	39	39	31.0	VHG-CUP69-45T

Oxford Analyzers (consists of 2 parts)				
Double Open-End Cup for Oxford Analyzers. A standard replacement cup that fits directly into aluminum sample sleeve (supplied with instrument) to form a taut-film sample support with respect to the integrated o-ring. Each cup supplied with a vented cap.				
O.D. (mm)	I.D. (mm)	Height (mm)	Vol. (cc)	Product No.
32	28	36	206	VHG-CUPOX-35

XRF Sample Cups

Closed-End Cups

Bottom loaded to handle liquids, slurries, powders, and many volatiles or foaming liquids, where user wishes immediate back pressure of closed cell conditions. Cups are ventable for pressure equalization.

Standard Closed-End Cups (consists of 2 parts)				
O.D. (mm)	I.D. (mm)	Height (mm)	Vol. (cc)	Product No.
25	17	24	4.6	VHG-CUP77-25S
31	25	24	8.4	VHG-CUP77-31S
40	31	24	14.7	VHG-CUP77-40S
45	39	34	29.0	VHG-CUP77-45T

HORIBA Analyzers (consists of 2 parts)				
Closed-End Cups for HORIBA Analyzers. Designed for special needs of Horiba Instruments and applications requiring low-profile cups. Feature Taut Film Ring™ and Lift Tab™.				
O.D. (mm)	I.D. (mm)	Height (mm)	Vol. (cc)	Product No.
43	47	18.4	17	VHG-CUPH-43



Consumables

XRF Thin Films

For XRF Sample Cups

XRF sample cup films allow liquids, powders, and slurries to be analyzed by X-Ray Fluorescence. VHG provides a range of special films of the highest quality. For selection of the ideal film, consider the material's transmission (especially important for "light elements"), purity and physical strength.

Kapton® (Polyimide)

Features high strength, high purity, chemical robustness, and withstands prolonged X-Ray irradiation.

Thickness (microns)	Film Size and Shape	Product No.
7.6 µm	3" x 50' Roll	VHG-FKP30-R15
12.7 µm	3" x 50' Roll	VHG-KP50-R15

Mylar®

Mylar® (polyethylene-terphthalate) film is economical, strong and offers good chemical resistance. It is well suited for light element analysis (Note: may contain Ca, Fe, P, Sb, Zn).

Thickness (microns)	Film Size and Shape	Product No.
2.5 µm	3" x 300' Roll	VHG-FMY10-R3
3.6 µm	3" x 300' Roll	VHG-FMY15-R3
6 µm	3" x 300' Roll	VHG-FMY25-R3
6 µm	3" x 3" Squares	VHG-FMY25-33
6 µm	2.5" Diameter Circles	VHG-FMY25-C64

Optilene-XF™

Highest grade, proprietary film featuring optimal transmission, purity, strength, chemical resistance, and thermal stability. Good for full range of XRF analytes, including light elements.

Thickness (microns)	Film Size and Shape	Product No.
4 µm	3" x 300' Roll	VHG-FOL04-R3
4 µm	3" x 3" Squares	VHG-FOL04-33
4 µm	2.5" Dia. Circles	VHG-FOL04-S64
6 µm	3" x 300' Roll	VHG-FOL06-R3
6 µm	3" x 3" Squares	VHG-FOL06-33

Polycarbonate

Features excellent X-Ray transmission characteristics and good chemical resistance.

Thickness (microns)	Film Size and Shape	Product No.
2 µm	3" x 300' Roll	VHG-FPC02-R3

XRF Thin Films

For XRF Sample Cups

Polypropylene

General purpose film with good transmission and chemical resistance (Note: may contain Al, Ca, Cu, Fe, P, Ti, Zn, Zr).

Thickness (microns)	Film Size and Shape	Product No.
4 µm	3" x 300' Roll	VHG-FPP16-R3
5 µm	2.5" Dia. Circles	VHG-FPP20-C64
6 µm	3" x 300' Roll	VHG-FPP25-R3

Teflon® Microporous

Gas permeable Microporous Teflon® allows pressure or gas equalization between the sample cell and instrument.

Film Size and Shape	Product No.
2.5" x 200' Roll	VHG-FPTFE-R64

Accessories and Tools

For XRF

Cup Press Plates (consists of 2 parts)

Easy to use, 3" diameter tool made of polyethylene that simplifies the task of XRF sample cup assembly and makes simple work of setting Tri-Lock Taut Film™ sample support windows. The assembly consists of two parts, base and top plate.

Cup Size (mm)	Product No.
25	VHG-CPP25
31	VHG-CPP31
40	VHG-CPP40
43/45	VHG-CPP45

Cup Positioning Guides

Convenient and reusable guides that achieve secured and centered positioning of smaller sample cups in larger sample holders.

Cup Size (mm)	Product No.
25	VHG-CPG25
31	VHG-CPG31
40	VHG-CPG40
45	VHG-CPG45

Sample Cup Trays

Chemical resistant polyethylene trays for holding, transporting or storing XRF sample cups. Made to protect Thin-Film windows from damage or contamination in either single or stacked mode.

Cup Size (mm)	No. Cups Per Tray	Product No.
31	15	VHG-CT31
40	15	VHG-CT40
43	8	VHG-CT45
45	8	VHG-CT45
50/52	6	VHG-CT50

Conversion Tables for Reference

Viscosity Conversion		
Centipoise (cp)	Centistoke (cSt)	Examples
1	1	water
16.5	20.635	lotion
40	43.2	veg oil
88	110	latex paint
176	220	maple syrup
352	440	SAE 30 oil

Volume Conversion				
cc (cm ³)	mL	Liter	Fl. Oz.	Gallon
1.0	1.0	0.001	0.0338	2.64E-04
10	10	0.01	0.338	0.00264
29.57	29.57	0.0296	1.0	0.00781
3785	3785	3.785	128	1.0

Weight Conversion			
Pound (lb)	Ounce (oz)	Gram (g)	Kilogram (kg)
0.00220	0.0352	1.0	0.001
0.0625	1.0	28.38	0.0284
1.0	16	454	0.454
2.203	35.24	1000	1.0

Flow Rate Conversion			
L/min.	L/sec.	Gal./min.	Gal./sec.
3.785	0.0631	1.0	0.0167
227.1	3.785	60	1.0
1.0	0.0167	0.264	0.00440
60	1.0	15.85	0.264

Dimension Conversion		
USA Fractional Inches	Metric	USA Decimal Inches
1/32	0.794 mm	0.0313
n/a	1.00 mm	0.0394
1/16	1.59 mm	0.0625
1/8	3.18 mm	0.125
1/4	6.35 mm	0.250
5/16	7.94 mm	0.313
3/8	9.53 mm	0.375
n/a	10 mm (1 cm)	0.394
7/16	1.11 cm	0.438
1/2	1.27 cm	0.500
9/16	1.43 cm	0.563
5/8	1.59 cm	0.625
11/16	1.75 cm	0.688
3/4	1.91 cm	0.750
13/16	2.06 cm	0.813
7/8	2.22 cm	0.875
15/16	2.38 cm	0.938
1	2.54 cm	1.00
2	5.08 cm	2.00
n/a	10.0 cm	3.94
5	12.7 cm	5.00
n/a	50.0 cm	19.7
n/a	100 cm (1 m)	39.4

Reference Information

Conversion Tables for Reference

Dilution Table (1000 ppm standard)

Those shown with * or () are not recommended due to overly ambitious dilution factor and small aliquot.

Desired Content:	Volumetric Size (mL) (Aliquot Volume)				
	10	25	50	100	250
100 ppm	1.0 mL	2.5 mL	5.0 mL	10.0 mL	25.0 mL
10 ppm	100 µL	250 µL	500 µL	1 mL	2.5 mL
1 ppm	(10 µL)	25 µL	50 µL	100 µL	250 µL
100 ppb	*	(2.5 µL)	(5 µL)	(10 µL)	25 µL
10 ppb	*	*	*	*	(2.5 µL)
1 ppb	*	*	*	*	*

Pressure Conversion

psi	bar	Pa (N/m ²)	Torr	atm
1.45E-014	1.00E-05	1.0	0.00750	9.87E-06
0.0145	0.001	100	0.750	9.87E-04
0.0193	0.00133	133	1.0	0.00132
1.0	0.0689	6,894	51.72	0.0680
10.0	0.689	68,940	517	0.680
14.7	1.013	101,325	760	1.0
25.0	1.724	172,350	1,293	1.701
50.0	3.447	344,700	2,586	3.402
100	6.894	689,400	5,172	6.805



The ultimate online source for reference materials



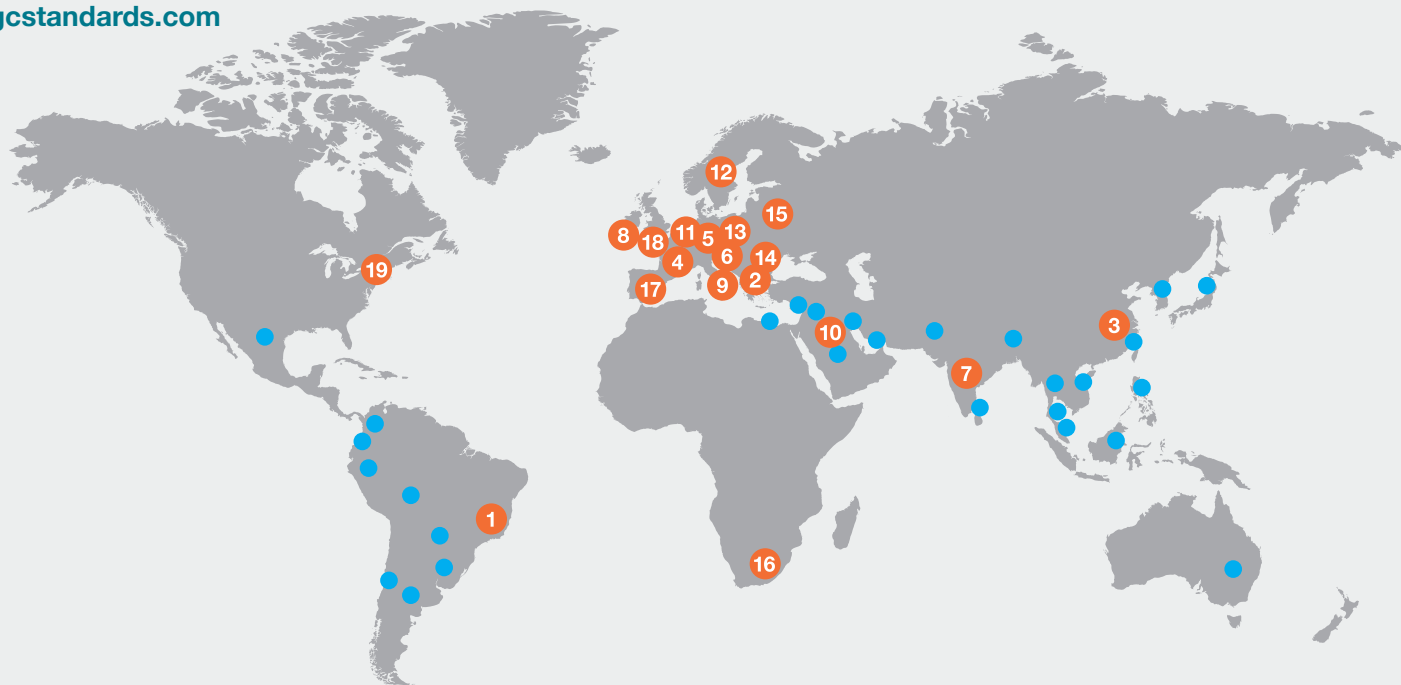
Our website offers the most comprehensive source of reference materials – now available for ordering.

100,000 reference materials
+
your search criteria
=
your petroleum standards

lgcstandards.com
Science for a safer world

Science for a safer world

lgcstandards.com



Buy online at [lgcstandards.com](https://www.lgcstandards.com) or contact your local sales office.

1 Brazil

Tel: +55 12 3302 5880
Email: bz@lgcgroup.com

2 Bulgaria

Tel: +359 (0)2 971 4955
Email: bg@lgcgroup.com

3 China

Tel: +86 400 9216156
Email: info.china@lgcgroup.com

4 France

Tel: +33 (0)3 88 04 82 82
Email: fr@lgcgroup.com

5 Germany

Tel: +49 (0)281 9887 0
Email: de@lgcgroup.com

6 Hungary

Tel: +49 (0)281 9887 0
Email: de@lgcgroup.com

6 India

Tel: +91 (0)90 8297 4025
Email: india@lgcgroup.com

8 Ireland

Tel: +44 (0) 208 943 8480
Email: uksales@lgcgroup.com

9 Italy

Tel: +39 02 22476412
Email: it@lgcgroup.com

10 Middle East

Tel: +49 (0)281 9887 0
Email: global.sales@lgcgroup.com

11 Netherlands

Tel: +49 (0)281 9887 0
Email: nl@lgcgroup.com

12 Nordic Countries

Tel: +49 (0)281 9887 0
Email: de@lgcgroup.com

13 Poland

Tel: +48 22 751 31 40
Email: pl@lgcgroup.com

14 Romania

Tel: +40 364 116890
Email: ro@lgcgroup.com

15 Russia

Tel: +7 812 777 04 88
Email: ru@lgcgroup.com

16 South Africa

Tel: +27 (0)11 466 4321
Email: sales.za@lgcgroup.com

17 Spain

Tel: +34 (0)93 308 4181
Email: es@lgcgroup.com

18 UK Reference Materials

Tel: +44 (0)208 943 8480
Email: uksales@lgcgroup.com

Proficiency Testing

Tel: +44 (0)161 762 2500
Email: ptcustomerservices@lgcgroup.com

19 USA + Canada

Tel: +1 603 622 7660
Email: lgcusa@lgcgroup.com

● Export Queries

Tel: +49 (0)281 9887 0
Email: global.sales@lgcgroup.com

While every effort has been made to ensure the accuracy of the information in this catalog, customers are directed to their local sales office or the LGC Standards website for further details and to verify product information. Specifications, terms and pricing are subject to change. LGC does not guarantee availability and reserves the right to discontinue any product. LGC does not accept liability for any loss that is caused by inaccurate product information, customer selection or inappropriate use of a product. Unless otherwise stated all trademarks are the property of LGC or its affiliated group companies. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or any retrieval system, without the written permission of the copyright holder. © LGC Limited, 2019. All rights reserved.