



MATERIAUX DE REFERENCE CERTIFIES

Huiles & Fuels

INDEX COPRODUITS ET MATIERES PREMIERES INDUSTRIELLES - HUILES § FUELS

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SULFUR IN FOSSIL FUELS (Liquid and Solid Forms)

REFERENCE	Description	Unit size	Sulfur (in Wt.%)	Mercury in µg/kg	Heat of combustion (in MJ/kg)	Furnace Ash (in Wt.%)
SRM2721	Crude oil (light sour)	5 x 10 ml	1.5832	0.053		
SRM2722	Crude oil (heavy sweet)	5 x 10 ml	0.21037	0.144		
SRM2294	Reformulated gasoline (nominal 11% MTBE, S= 35 mg/kg)	2 x 20 ml	0.00409			
SRM2295	Reformulated gasoline (nominal 11% MTBE, S= 300 mg/kg)	2 x 20 ml	0.0308			
SRM2296	Reformulated gasoline (nominal 13% ETBE, S= 35 mg/kg)	2 x 20 ml	0.00400			
SRM2297	Reformulated gasoline (nominal 11% MTBE, S= 300 mg/kg)	2 x 20 ml	0.03037			
SRM2298	Sulfur in gasoline (high octane)	5 x 20 ml	0.00047			
SRM2299	Sulfur in gasoline (reformulated)	5 x 20 ml	0.00136			
SRM2723A	Sulfur in Diesel Fuel	10 x 10 ml	0.00110			
SRM2724A	Sulfur in Diesel Fuel	10 x 10 ml	0.04282			
SRM1616A	Sulfur in Kerosine	100mL	0.01462		(41.46)	Gravity*(36.9)
SRM1617A	Sulfur in Kerosine	100mL	0.17307			
SRM1619B	Sulfur in Residual Fuel Oil	100mL	0.6960			
SRM1620c	Sulfur in Residual Fuel Oil	100mL	4.561			
SRM1621E	Sulfur in Residual Fuel Oil	100mL	0.9480			
SRM1622E	Sulfur in Residual Fuel Oil	100mL	2.1468			
SRM1623c	Sulfur in Residual Fuel Oil	100mL	0.3806			
SRM1624B	Sulfur in Distillate Fuel Oil	100mL	0.332			
SRM2717A	Sulfur in Residual Fuel Oil	100mL	2.9957			
SRM8532	Diesel Fuel Oil	100mL	(S= 276 /294 g/kg)			

*API Gravity at 15.6 ° C. Total nitrogen aromatics and PAHs also available

Reference	DESCRIPTION	Unit size	S	Flash pint	H2O	N	Viscosité à (100° C) CSt
R002	Sulfur in Residual Fuel Oil	1 x 25 g	3.794	(162)	(0.04)	(0.23)	42.1
R003	Sulfur in Residual Fuel Oil	1 x 25 g	1.950	(116)	(0.11)	(0.33)	32.7
R004 épuisé	Sulfur in Residual Fuel Oil	1 x 25 g	0.907	(140)	(0.04)	(0.26)	19.1
R005	Sulfur in Residual Fuel Oil	1 x 25 g	0.841	(142)	(0.04)	(0.27)	13.4

SULPHUR IN GASOIL AND MINERAL OIL

In addition to national regulations, a Council Directive (93/12/EEC) specifies the maximum permissible sulphur content of gas oils intended for combustion. The following reference materials provide a means of checking analytical processes and of calibrating automatic equipment in the range 0.09 to 1.0 % in gasoil.

	Description	S content (mass %)	
ERM-EF672	Gasoil	0.0203	±0.0006
ERM-EF671	Gasoil	0.0452	±0.0009
ERM-EF104	Gasoil	0.1019	±0.0019
BCR-105	Gasoil	0.363	± 0.010
BCR-106	Gasoil	0.502	± 0.008
BCR-107	Gasoil	1.040	± 0.015

Availability: The materials are available in dark glass ampoules sealed under nitrogen. ERM-EF104, -671 and -672 contain 8 mL, BCR-105, -106 and -107 contain 25 g.

Reference	Material	Mass Content (%)	
		Média	Incerteza
IPT 109	Mineral Oil	0,67	± 0,02
IPT 110	Mineral Oil	1,01	± 0,06
IPT 111	Mineral Oil	2,07	± 0,05
IPT 112	Mineral Oil	4,09	± 0,02
IPT 136	Diesel Fuel Oil	(0,03)	(± 0,04)
IPT 137	Diesel Fuel Oil	(0,10)	(± 0,04)
IPT 138	Diesel Fuel Oil	(0,50)	(± 0,04)
IPT 139	Diesel Fuel Oil	(1,00)	(± 0,04)

Values in parentheses indicate that the material is under certification process.

METAL CONSTITUENTS (Lead, Vanadium) IN FOSSIL FUELS (Liquid and Solis Forms)

These SRMs are for analysis of metal trace elements in fuel oil, coal and reference fuels.

Reference	Description	Unit size	Elemental Composition			
			Pb mg / kg	Ni mg / kg	S	V mg / kg
SRM1618	Vanadium and Nickel in Residual Fuel Oil	100mL		75	(4.3 %)	423
SRM2712	Lead in Reference Fuel	6 x 20 mL	11.4			
SRM2713	Lead in Reference Fuel	6 x 20 mL	19.4			
SRM2714	Lead in Reference Fuel	6 x 20 mL	28.1			
SRM2715	Lead in Reference Fuel	6 x 20 mL	784			
SRM8505	Vanadium in Crude Oil	250 mL				(390)

BROMINE

Description	g / l Pb	g / l Br	Unit size
MG202-306G	0.150	0.400	118 mL
MG202-311G	0.150	0.650	
MG203-306G	0.300	0.400	
MG203-311G	0.300	0.650	
MG204-306G	0.500	0.400	
MG204-311G	0.500	0.650	
MG205-306G	0.650	0.400	
MG205-311G	0.650	0.650	
MG206-302G	0.850	0.100	
MG206-303G	0.850	0.250	
MG206-306G	0.850	0.400	
MG206-308G	0.850	0.500	
MG206-311G	0.850	0.650	

Description	g / l (20°) Br	ppm Br	UNIT SIZE
MG301G	0.000	0.0	118 ml
MG302G	0.10	144.6	
MG303G	0.25	361.5	
MG304G	0.30	433.8	
MG305G	0.35	506.1	
MG306G	0.40	578.4	
MG307G	0.45	650.7	
MG308G	0.50	723.0	
MG309G	0.55	795.3	
MG310G	0.60	867.6	
MG311G	0.65	939.9	
MG312G	0.70	1012.2	
MG313G	0.75	1084.5	

ALCOHOLS AND ETHERS (Oxygenates) IN GASOLINE AND IN FUEL

SRMs 1829, 1837, 1838 and 1839 are for calibrating instruments and validating methods used to determine various alcohols in gasoline.

SRMs 2286 through 2293 are for determining the oxygen content of gasoline and were produced in response to the U.S. EPA Final Rule on Reformulated Gasoline aimed at reducing the volatile organic compounds emitted from gasoline. They consist of varying quantities of alcohol and ether (Oxygenate) solutions in gasoline and are certified for constituent oxygenate concentration and resultant oxygen concentration in gasoline. Each SRM is issued as a set of three (3) sealed 20 mL ampules - two ampules contain oxygenate and one ampule contains base reference gasoline. SRM2294 through 2297 are certified for oxygenate, sulfur, benzene, and toluene, with reference values for olefins and aromatics. Each SRM unit is issued as a set of two sealed 20 ml ampules.

Reference	Description	Concentration (in Wt.%)				
		Methanol	Ethanol	Methanol and t-Butano	Oxygenate	Oxygen
SRM1829	Alcohols in Reference Fuel	0.335	11.39	10.33+6.63		
SRM1837	Methanol and t-Butanol			10.33+6.63		
SRM1838	Ethanol		11.39			
SRM1839	Methanol	0.335				
SRM2286	Ethanol in Gasoline				5.73	2.02
SRM2287	Ethanol in Gasoline				10.07	3.53
SRM2288	t-Amyl Methyl Ether in Gasoline				12.78	2.02
SRM2289	t-Amyl Methyl Ether in Gasoline				17.30	2.73
SRM2290	Ethyl t-Butyl Ether in Gasoline				12.78	2.01
SRM2291	Ethyl t-Butyl Ether in Gasoline				17.18	2.70
SRM2292	Methyl t-Butyl Ether in Gasoline				10.96	2.00
SRM2293	Methyl t-Butyl Ether in Gasoline				14.86	2.71

Reference	Description	Concentration (in Wt.%)			
		Toluene	Benzene	Oxygenate	Oxygen
SRM2294	Reformulated gasoline (nominal 11% MTBE, S= 35 mg/kg)	8.29	1.03	10.97	2.01
SRM2295	Reformulated gasoline (nominal 11% MTBE, S= 300 mg/kg)	7.89	0.99	14.54	2.66
SRM2296	Reformulated gasoline (nominal 13% ETBE, S= 35 mg/kg)	8.02	1.01	13.02	2.06
SRM2297	Reformulated gasoline (nominal 11% MTBE, S= 300 mg/kg)	8.27	1.04	9.91	3.50

REFERENCE LIQUIDS FOR EVALUATING FUELS

SRMs 1815a and 1816a are high, purity liquids intended for use in maintaining the integrity of the octane rating of motor and aviation fuels as specified in the ASTM Manual for Rating Motor, Diesel, and Aviation Fuels.

REFERENCE	Description	Purity (in Wt.%)	Unit size
SRM1815a	n-Heptane	99.987	100mL
SRM1816a	Iso octane (2,2,4-Trimethylpentane)	99.987	100mL

MATERIAUX DE REFERENCE PRIMAIRES POUR DETERMINATION DE L'INDICE D'OCTANE, ISOCTANE OU HEPTANE.

Analyses des impuretés organiques par CPG

Dosage du plomb par spectrophotométrie d'absorption moléculaire.

Dosage de l'eau par la méthode de Karl Fischer.

FOURNIS PAR AMPOULE SCHELLEE

Description	R016-1	R016-2	Unit size
n-heptane	99.987	0.002	Ampoules de 100 ml scellées
Isooctane	0.007	99.987	
Autres impuretés organiques	0.004	0.008	
Eau	0.002	0.003	
Plomb	<10 µg / l	< 10 µg / l	

MOISTURE IN OILS AND ALCOHOLS (Liquid Form)

SRM2890, water saturated 1-octanol, is certified for water content and is intended for use in calibrating instruments and validating the accuracy of analytical methods. The reference materials (RMs 8506a to 8510) are intended for use in developing and validating methods for the determination of moisture in oil and similar matrices. The water concentration values are shown in parentheses because they are not certified, but represent the "best estimate" of the moisture content based on inter-laboratory round robin studies and confirmed by NIST.

Reference	Description	Unit size	Water Concentration (in mg / kg)
SRM8506a	Transformer Oil	Set of 5 ampules:(9.5 ml each)	34.5 volumetric (22.5) (coulometric)
SRM8507	Mineral Oil	Set of 5 ampules:(10 ml each)	76.8
SRM8509	Methanol	Set of 5 ampules:(5 ml each)	93
SRM8510	Methanol	Set of 5 ampules:(5 ml each)	325
SRM2721	Crude oil	5 x 10 ml	134
SRM2722	Crude oil	5 x 10 ml	99
SRM2890	Water saturated 1-octanol	Set of 5 ampules:(2 ml each)	47.3 +/-1 mg/g

Values in parentheses are not certified and are given for information only

WEAR METALS IN OILS

Reference	Size	As	Co	Ni	S	Se	V
SRM1634C	100 ml	0.1426	0.1510	17.54	(2)	0.1020	28.19

Reference	Description	Unit size	Ag	Al	As	B	Ba	Ca	Cd
SRM1083	Wear metal (base oil)	150 ml	304.6	(<0.5)					
SRM1084a	Wear metal	Set of 5 ampoules (1.6 g each)		(104)					
SRM1085b	Wear metal	Set of 5 ampoules (1.2 g each) + 5 blank	304.6	300.4	51.3	(300)	300.1	(298)	302.9
SRM1848	Lubricating oil additive package	100 ml				0.137%		0.359%	

Reference	Cl	Cr	Cu	Fe	H	P	Pb	Mg	Mn	
SRM1083	(0.17)	(<0.02)	(<0.05)	(<1)			(<0.04)	(<0.1)	(<0.005)	
SRM1084a		98.3	100.0	98.9			101.1	99.5		
SRM1085a	57.6	302.9	295.6	301.2			297.7	297.3	300.7	
SRM1848	927				12.3%	0.788%		0.821%		
Reference	Mo	N	Ni	Si	Na	Sn	S	Ti	V	Zn
SRM1083	(<0.01)		(<0.4)	(<1)	(<0.06)	(<0.4)	(980)	(<5)	(<0.3)	(<0.08)
SRM1084a	100.3		99.7	(103)		97.2	(1700)	100.4	95.9	
SRM1085a	300.6		295.9	300.2	305.2	299.4		301.1	297.8	296.8
SRM1848		0.57%		50			2.3270%			0.873 %

ENGINE OIL (118 ml)

Reference	Zn	Ca	Mg	P	ASTM Viscosity (centistokes)				
					S	Ash	D2896	100°C	40°C
AR6301	0.001	0.001	0.001	0.001	0.29	0.05	2.42	12.25	119.20
AR6302	0.122	0.0005	0.0005	0.103	0.22	0.22	2.83	12.56	124.87
AR6303	0.101	0.009	0.105	0.084	0.40	0.83	5.42	11.44	102.70
AR6304	0.119	0.058	0.087	0.095	0.56	0.81	6.27	12.81	73.51
AR6305	0.155	0.168	0.052	0.126	0.57	0.78	7.07	11.52	98.74
AR6306	0.001	0.841	0.001	0.001	0.46	2.35	19.01	15.76	172.22
118 ml (Engine Oil)									

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V IN CRUDE OIL

Reference	ppmV	250ml
SRM8505	(390)	

PETROLEUM CRUDE OIL

Reference SRM1582		Set of 5 ampoules / 2.5 ml
Benzo (a) anthracence		3.0ppm
Benzo (a) pyrene		10.14 ppm
Fluoranthene		2.5 ppm
Perylene		31 ppm
Phenanthrene		101 ppm
Dibenzothiophene		33 ppm

ENGINE WEAR MATERIALS

Metallo-Organic Compounds (solid form)

These SRMs are for preparing solutions in oils of known and reproducible concentrations of metals. Each SRM unit consists of 5g of material.

Reference	Type	Elemental Composition (mass fraction, in %)	
SRM1051b	Barium cyclohexanebutyrate	Barium	28.7
SRM1052b	Bis (1-phenyl-1, 3-butanediono) oxovanadium (IV)	Vanadium	13.01
SRM1053a	Cadmium cyclohexanebutyrate	Cadmium	24.8
SRM1057b	Dibutyltin bis (2-ethylhexanoate)	Tin	22.95
SRM1059c	Lead cyclohexanebutyrate	Lead	37.5
SRM1060a	Lithium cyclohexanebutyrate	Lithium	4.1
SRM1065b	Nickel cyclohexanebutyrate	Nickel	13.89
SRM1066a	Octaphenylcyclotetrasiloxane	Silicon	14.14
SRM1069b	Sodium cyclohexanebutyrate	Sodium	12.0
SRM1070a	Strontium cyclohexanebutyrate	Strontium	20.7
SRM1071b	Triphenyl phosphate	Phosphorus	9.48
SRM1073b	Zinc cyclohexanebutyrate	Zinc	16.66
SRM1075a	Aluminium 2-ethylhexanoate	Aluminium	8.07
SRM1077a	Silver 2-ethylhexanoate	Silver	42.60
SRM1078b	Tris (1-phenyl-1, 3-butanediono) chromium (III)	Chromium	9.6
SRM1079b	Tris (1-phenyl-1, 3-butanediono) iron (III)	Iron	10.45
SRM1080a	Tris (1-phenyl-1, 3-butanediono) copper (II)	Copper	16.37

LUBRICATING BASE OILS (liquid form)

These SRMs are for determining the concentrations of a single element in lubricating base oil. SRMs 1818a and 1819a consist of five bottles, approximately 20g of liquid each; SRM1836 consists of four sets of four ampules, each ampule containing approximately 4g of liquid.

Reference	Type	Elemental Composition (in mg/kg)				
		I	II	III	IV	V
SRM1818a	Total Chlorine	31.6	60.0	78.2	154.4	234.0
SRM1819a	Total Sulfur	423.5	741.1	4022	4689	6135
SRM1836	Total Nitrogen	9.0	50.9	113.3	166.2	-

CATALYST CHARACTERIZATION MATERIAL (liquid form)

This RM is for determining the activity of FCC Catalysts by Microactivity Test. It is distributed by NIST in cooperation with the ASTM.

Reference	Type	Unit size
SRM8590	High Sulfur Gas Oil Feed	946 mL

CATALYST PACKAGE FOR LUBRICANT OXIDATION (liquid form)

These SRMs and RM are for evaluating the oxidation stability of lubricating oils, i.e., automotive crankcase lubricants. SRM1817c consists of a set of five ampules of each of three materials. The fuel fraction and the metal mixture are sealed under inert atmosphere. SRM2567 consists of a set of five ampules of each of five materials. RM8501 consists of a set of five ampules of each of four materials. The fuel fraction, model compound, and metal mixture in SRM2567 and RM8501 are also sealed under inert atmosphere.

Reference	Type	Consisting of	Unit size
SRM1817c	Catalyst Package IIID	1) an Oxidized/Nitrated Fuel Fraction 2) a Metal Naphthenate Mixture, and 3) Distilled Water	5 x 0.15 g 5 x 0.3 g 5 x 1.0 g
SRM2567	Catalyst Package IIIE	1) an Oxidized/Nitrated Fuel Fraction, 2) a Nitro-Paraffin Model Compound, 3) a Nitro-Aromatic Model Compound, 4) a Metal Naphthenate Mixture, and 5) Distilled Water	5 x 0.15 g 5 x 0.008 g 5 x 0.0075 g 5 x 0.16 g 5 x 0.03 g
RM8501	Catalyst Package IIIE	1) an Oxidized/Nitrated Fuel Fraction, 2) a Nitro-Paraffin Model Compound, 3) a Metal Naphthenate Mixture, and 4) Distilled Water	5 x 0.15 g 5 x 0.15 g 5 x 0.3 g 5 x 1.0 g

FLASH POINT

FLASH POINT

Reference	Material	Methods	Flash Point (°C)	Uncertainty (°C)
IPT 104	Mineral Oil	Cleveland	198	± 3
IPT 119	Hydrocarbons	Pensky Martens; TAG	(64)	(± 1,2)

Values in parentheses indicate that the material is under certification process.

OTHER PROPERTIES

Reference°	Material	Pour Point	Cold Filter Plugging Point
		(°C)	(°C)
IPT 140	Certified CFPP and Pour Point	(+6°C)	(+3°C)
IPT 141	Certified CFPP and Pour Point	(-4°C)	(-6°C)
BCR 395	Gazoil		-5.8 ± 0.4

Values in parentheses indicate that the material is under certification process.

Reference	Material	SPECIFIC GRAVITY (g/cm ³)	
		Mean (at 20°C)	Uncertainty
IPT 113	Mineral Oil	0,770	0,003

CERTIFIED FOR COMPOSITION

Certified Parameter	IRMM-441 n-Heptane		IRMM-442 Isooctane	
	(%)		(%)	
Isooctane, purity by difference			99.985	± 0.005
n-Heptane, purity by difference	99.985	± 0.005		
Impurities				
Total organics (other than isooctane)			0.011	± 0.004
Total organics (other than n-Heptane)	0.012	± 0.005		
Isooctane	0.007	± 0.002		
n-Heptane			0.002	± 0.002
Water	0.003	± 0.002	0.004	± 0.002
Lead		< 0.5 µg/L		<1 µg/L

Availability: IRMM-441 and -442 are supplied in ampoules of 100 mL