Standard Reference Materials

Catalog 2011

NIST SP 260

SRM

NIST Standard Reference Materials® Catalog

Engineering Materials

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NIST SP 260
January 2011
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January 2011

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NIST Standard Reference Materials® (SRMs) are used by industry, government, and academia to ensure the highest quality measurements. This catalog lists over 1200 individual reference materials produced and sold by NIST, each with carefully assigned values for chemical composition and physical properties.

SRMs find use in calibrating instruments and in assuring the long-term integrity of quality assurance programs. They are also key mechanisms for verifying important measurement results and in developing new measurement methods. SRMs provide users with tools to assist in establishing traceability of measurement results to NIST.

Each SRM comes carefully packaged with documentation containing assigned values with stated uncertainties and a material safety data sheet, if applicable. Details on use, stability, and NIST analytical methods are also included.

For further information and prices, contact us at:

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PLEASE NOTE: The tables are presented to facilitate comparisons among a family of materials to help customers select the best SRM for their needs. For specific values and uncertainties, the certificate is the only official source.

The data given in this catalog is constantly being revised. For the most up-to-date information, please consult our website at http://www.nist.gov/srm.

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SIZING

Particle Size

These SRMs are used for particle size measuring instruments, including light scattering, electrical zone flow-through counters, optical and scanning electron microscopes, sedimentation systems, and wire cloth sieving devices.

SRM	Particle Diameter Distribution (µm/nm)	Unit Size (g)
Glass Beads, Soda Lime		
1021	2 µm to 12 µm	4
1003c	20 µm to 50 µm (No. 635 to No. 325)	28
1004b	53 µm to 125 µm (No. 270 to No. 120)	43
1017b	106 µm to 355 µm (No. 140 to No. 45)	70
1018b	250 µm to 710 µm (No. 60 to No. 25)	87
1019b	850 µm to 2000 µm (No. 20 to No. 10)	200
Sand		
RM 8010	(No. 30 to No. 325)	3 × 150 g
Silicon Nitride (equiaxed)		
659	0.2 µm to 10 µm	5 × 2.5 g
Zirconium Oxide (irregular)		
1978	0.2 µm to 10 µm	5
1982	10 µm to 150 µm	10
Tungsten Carbide/Cobalt (spheroidal)		
1984	9 µm to 30 µm	14
1985	18 µm to 55 µm	14
Polystyrene Spheres Unit Size: 5 mL vial (unless otherwise noted)		
1690 (0.5 % in H_2O)	0.895 µm	
1691 (0.5 % in H_2O)	0.269 µm	
1961* (0.5 % in H_2O)	29.64 µm	
1963a** (0.5 % in H_2O)	0.1007 µm	
1964 (0.06 µm)	0.0639 µm	5 mL vial
1965 (Slide Mounted: 1 slide)	9.94 µm (hexagonal array) 9.89 µm (unordered clusters)	
Gold Nanoparticles		
8011	10 nm	2 ampoules: 5 mL each
8012	30 nm	2 ampoules: 5 mL each
8013	60 nm	2 ampoules: 5 mL each
Titanium Dioxide Powder		
8988	0.1 µm to 0.5 µm	6 g

**Developed in cooperation with NASA*
***This SRM is limited to the calibration of electron microscope and surface scanning inspection systems (not suitable for applications where monosize, unagglomerated spheres are necessary).*

Cement Turbidity and Fineness

SRM 46h is only to determine sieve residue according to ASTM C430. Each set consists of 10 sealed vials, each containing approximately 5g of cement.

SRM 114q is for calibrating the Blaine fineness meter according to the latest issue of ASTM C204, to calibrate the Wagner turbidimeter according to ASTM C115, to determine sieve residue according to ASTM C430, and to verify procedure for particle size distribution by a laser diffraction method (no-standard method available). Each set consists of 20 sealed vials, each containing approximately 5g of cement

SRM	Description	Properties Certified	Value	Unit Size
114q	Portland Cement	Residue on 45 µm (No. 325) sieve	0.79 %	set (20)
		Specific Surface Area (Wagner Turbidimeter)	2183 $cm^2\ g^{-1}$	
		Specific Surface Area (Blaine Air Permeability Apparatus) Particle Size Distribution	3818 $cm^2\ g^{-1}$ 1-128 µm	
46h	Portland Cement Fineness Standard	Sieve Residue (45 µm residue) (No. 325)	7.43 %	10 × 5 g

Specific Surface Area (SSA) of Powders (Brunauer, Emmett, and Teller Method)

SRM	Description	Surface Area (m^2/g)			Unit Size (g)
		Multi-point	*Calculated*	*Single Point*	
1897	Specific Surface Area Standard	258.32		253.08	7
1899	Specific Surface Area Standard	10.52		10.67	4
1900	Specific Surface Area Standard	2.85		2.79	4
2696	Silica Fume		(22.92)*		70

**The surface area for 2696 was calculated from a combination of single-point, and multi-point calibrations.*

Mercury Porosimetry Standards

SRM	Description	Unit Size (g)
1917	Mercury Porosimetry Standard (Alumina Beads)	10
1918	Mercury Porosimetry Standard (Extruded Silica-Alumina)	12

Particle Count Materials

These SRMs are suitable for use with particle sizing instrumentation, including optical counters, in accordance with National Fluid Power Association (NFPA) T2.9.6 R2-1998 and ISO/DIS 11171.

SRM	Description	Particle Concentration	Unit Size
2806a	Medium Test Dust in Hydraulic Fluid	2.8 mg/L	400 mL
RM 8631a	Medium Test Dust	1 µm to 50 µm	20 g
RM 8632	Ultrafine Test Dust	1 µm to 20 µm	20 g

SURFACE FINISH

Abrasive Wear

This SRM is suitable for use with ASTM G 65, Procedure A.

SRM	Description	Unit Size
1857	D-2 Tool Steel	2 blocks: 0.78 cm × 2.5 cm × 7.6 cm

Surface Roughness Unit Size: 25 mm × 34 mm × 12 mm

These SRMs are used for calibrating stylus instruments that measure surface roughness. These electroless-nickel coated steel blocks have a sinusoidal roughness profile machined on the top surface.

SRM	Description	Roughness, R_a (µm)	Wavelength, D (µm)
2071b	Sinusoidal Roughness	0.3	100
2072	Sinusoidal Roughness		
2073a	Sinusoidal Roughness	3	100
2074	Sinusoidal Roughness	1	40
2075	Sinusoidal Roughness	1	800

FIRE RESEARCH

Surface Flammability

This SRM is suitable for checking the operation of radiant panel test equipment in accordance with ASTM E 162-78.

SRM	Description	Certification	Unit Size (cm)
1002d	Hardboard Sheet	Flame Spread Index, I = 203 Heat Evolution Factor, Q = 42.0	4 sheets: 15.2 × 45.7 × 0.6

Cigarette Ignition Strength Standard

This SRM is intended for use by test laboratories to access and control their testing of cigarette ignition strength in accordance with ASTM Standard Mehods E 2187-04 (or ASTM E2187-02b). The SRM unit consists of one carton of cigarettes containing 10 packs of 20 cigarettes each.

SRM	Description	Ignition Strength	Unit Size (cm)
1082	Cigarette Ignition Strength Standard	12.6%	10 × 20 cigarettes
1196	Standard Cigarette for Ignition Resistance Testing		10 × 20 cigarettes

Smoke Density Chamber

These SRMs are suitable for use with National Fire Protection Agency (NFPA) 258-1998. SRM 1006d is also suitable for use with ASTM E 662-95.

SRM	Description	Maximum Specific Optical Density (D_m (corr.))	Unit Size (cm)
1006d	Non-Flaming Exposure Condition (paper)	193	9 sheets: 17.2 × 25.4 × 0.165
1007b	Flaming Exposure Condition (plastic)	388 to 512	1 sheet: 25.4 × 25.4 × 0.076

Smoke Toxicity

SRM	Description	Combustion on Mode	Observation Time	Values LC_{50}	Values N-Gas	Unit Size
1048	Cup Furnace Smoke Toxicity Method Standard (ABS copolymer)	Flaming	WE*	27	1.4	8 sheets: (16 × 16 × 0.76) mm
			WE & PE**	25	1.5	
		NonFlaming	WE*	58	1.2	
			WE & PE**	53	1.4	
1049	University of Pittsburgh I Smoke Toxicity Method Standard (Nylon 6/6)		30 min exposure, plus 10 min post-exposure	4.4		150 g

**WE = within 30 minutes*
***WE & PE = 30 minutes + 14 days*

Flooring Radiant Panel

This SRM is suitable for use with ASTM E 648-78 and NFPA 253-1978.

SRM	Description	Critical Radiant Flux	Unit Size (cm)
1012	Flooring Radiant Panel (Kraft Paperboard)	0.36 W/cm^2	3 sheets: 104.1 × 25.4 × 0.305

NONDESTRUCTIVE EVALUATION

Artificial Flaw for Eddy Current NDE

RM	Description	Flaw Size	Unit Size
8458	Artificial Flaw (Aluminum Alloy)	3.0 mm × 0.1 mm	7 cm × 7 cm × 2 cm

PERFORMANCE ENGINEERING MATERIALS

Fracture Toughness of Steels (Charpy V-Notch Test Blocks) and Izod Impact

Unit Size: set of 10 mm × 10 mm × 54 mm specimens

These SRMs are suitable for use with ASTM E 23 and ISO/DIS 12736.

SRM	Description	Energy Range (J)
2092	Low Energy (4340 Alloy Steel)	13 to 20
2096	High Energy (4340 Alloy Steel)	88 to 136
2098	Super High Energy (Maraging Steel)	176 to 244
2115	Low Energy Izod	13 to 25

Rockwell Hardness

Unit size: 60 mm diameter × 15 mm

SRM	Description	Nominal Hardness (HRC)
2810	Rockwell C Scale Hardness - Low Range	25
2811	Rockwell C Scale Hardness - Mid Range	45
2812	Rockwell C Scale Hardness - High Range	63

Microindentation Hardness (Knoop and Vickers Test Blocks)

Unit Size: 1.15 cm × 1.15 cm (unless otherwise noted)

These SRMs are suitable for use with ASTM E 384.

SRM	Description	Load (N)	Hardness (kg/mm^2)
Copper, Bright			
1893	Knoop	0.245, 0.49, 0.98	125
Nickel, Bright			
1894a	Vickers	0.245, 0.49, 0.98	125
1895	Knoop	0.245, 0.49, 0.98	600
1896b	Vickers	0.245, 0.49, 0.98	600
1905	Knoop	2.943	600
1906	Knoop	4.905	600
1907	Knoop	9.81	600
1908	Vickers	2.943	500
1909	Vickers	9.81	500
2798a	Vickers	4.905	600
Silicon Nitride, Ceramic			
2830 (22 mm diameter × 9.54 mm)	Knoop	19.6	1500
Tungsten Carbide, Ceramic			
2831 (25 mm diameter × 9.5 mm)	Vickers	9.8	1530

Tape Adhesion Testing

This SRM is suitable for use with ASTM D 2860 and ASTM D 3654.

SRM	Description	Unit Size
1810a	Linerboard for Tape Adhesion Testing	50 sheets: 21.6 cm × 28 cm

Bleached Kraft Pulps

These RMs are intended primarily for use in fundamental studies on the physical properties of fibers and paper sheets. No extensive property measurements have been made on these materials beyond ensuring that they were within the control limits of the normal production run.

RM	Description	Unit Size
8495*	Northern Softwood	10 standard lap sheets: 0.5 kg each
8496*	Eucalyptus Hardwood	10 standard lap sheets: 0.5 kg each

**Developed in cooperation with the Pulp Material Research Committee*

Secondary Ferrite Number (FN) Materials

The RMs are suitable for use with ANSI/AWS A4.2 and ISO 8249.

RM	Ferrite Number	Unit Size (mm)
8480	0 to 30	10 × 12 × 20
8481	30 to 120	10 × 12 × 20

Fracture Toughness of Ceramics

Unit Size: 3 mm × 4 mm × (45 to 47) mm

SRM	Description	Fracture Toughness ($MPa \cdot m^{1/2}$)	No. of Specimens
2100	Silicon Nitride Flexure Specimens	4.57	5

Magnetic Moment Standards

SRM	Description	Certified Property	Unit Size
762	Nickel Disk	Specific Magnetization	disk: 6 mm diameter × 0.13 mm
764a	Magnetic Susceptibility Standard Platinum	Magnetic Moment	cylinder: 2 mm diameter × 3.42 mmL
772a	Nickel Sphere	Magnetic Moment	sphere: 2.383 mm diameter sphere
2853	Yttrium Garnet Sphere	Magnetic Moment	sphere: 1 mm diameter (2.8 mg)

Food & Agriculture

Nutrient Composition

SRM/RM	Description	Certified Constituents	Unit Size (g)
1544	Fatty Acids and Cholesterol in Frozen Diet Composite	Cholesterol, Fatty Acids, Calcuim, Iron, Sodium	4 × 15 g
1546	Meat Homogenate	Cholesterol, Fatty Acids, Proximates, Minerals	4 × 85 g
1548a	Typical Diet	Minerals, Trace Elements,	2 × 6.5 g
1566b	Oyster Tissue	Trace Elements	25 g
1570a	Trace Elements in Spinach Leaves	Trace Elements, Minerals	60 g
1845	Cholesterol in Whole Egg Powder	Cholesterol	35 g
1849	Infant/Adult Nutritional Formula	Proximates, Fatty Acids, Vitamins, Elements, Amino Acids, Nucleotides	10 × 10 g
1946	Lake Superior Fish Tissue	Fat, Fatty Acid, Pesticides, Polychlorinated Biphenyls (PCBs), Mercury, Methylmercury	5 × 7 g to 9 g
1947	Lake Michigan Fish Tissue	Trace Elements, Mercury, Methylmercury, Polychlorinated Biphenyls (PCBs), Chlorinated Pesticides, Polybrominated Diphenyl Ether (PBDEs)	40 g
2383	Baby Food Composite	Carotenoids, Vitamins	4 × 70 g
2384	Baking Chocolate	Fat, Fatty Acids, Calcium, Iron, Caffeine, Theobromine, Catechins	5 × 91 g
2385	Slurried Spinach	Elements, Carotenoids,	4 × 70 g
2387	Peanut Butter	Fat, Fatty Acids, Elements, Tocopherols	3 × 170 g
3275	Omega-3 and Omega-6 Fatty Acids in Fish Oil		2 × 1.2 mL
3278	Tocopherols in Edible Oils		5 × 1 mL
8642	FDA Saxitoxin Dihydrochloride Solution		10 × 1.2 mL
RM 8445	Spray Dried Whole Egg for Allergen Detection	—	5 g

Trace Elements in Food and Agricultural Products

SRM	Description	Unit Size (g)
1548a	Typical Diet	2 × 6.5 g
1549	Non-fat Milk Powder	100
1566b	Oyster Tissue	25
1567a	Wheat Flour	80
1568a	Rice Flour	80
1570a	Spinach Leaves	60
1577c	Bovine Liver	50

Dietary Supplement Materials

SRM	Description	Unit Size
3246	*Ginkgo biloba* Leaves	5 × 3 g
3247	*Ginkgo biloba* Extract	5 × 1 g
3248	Ginkgo Containing Tablets	5 × 1 g
3249	Ginkgo Dietary Supplement Suite	2 bottles each of SRMs 3246 to 3248
3250	Serenoa repens (fruit)	5 × 6 g
3251	Serenoa repens (extract)	5 × 1 g
3254	*Camellia sinensis* (Green Tea) Leaves	5 packets × 3 g each
3255	*Camellia sinensis* (Green Tea) Extract	5 packets × 1 g each
3256	Green Tea-Containing Solid Oral Dosage Form	5 packets × 2.5 g each
3258	Bitter Orange Plant	5 × 5 g
3259	Bitter Orange Extract	5 × 1.2 g
3260	Orange Finished Product	5 × 2.5 g
3274	Botanical Oils Containing Omega-3 and Omega-6 Fatty Acids	4 ampoules × 1.2 mL
3275	Omega-3 and Omega-6 Fatty Acids in Fish Oil	2 ampoules × 1.2 mL
3276	Carrot Extract Oil	5 × 1 mL
3278	Tocopherols Now Selling in Edible Oils	5 × 1 mL
3280	Multivitamin Tablets	5 bottles × 30 Tablets each
3281	Cranberry (fruit)	5 packets × 6 g each
3282	Low Calorie Cranberry Juice Cocktail	5 ampoules × 1.2 mL each
3283	Cranberry Extract	5 packets × 2.5 g each
3284	Cranberry-Containing Solid Oral Dosage Form	5 packets × 2.5 g each
3285	Mixed Berry-Containing Solid Oral Dosage Form	5 packets × 2.5 g each
3291	Bilberry Extract	5 packets × 1 g each

Fertilizers (powder form)

SRM	Description	Unit Size (g)
120c	Phosphate Rock (Florida)	90
193	Potassium Nitrate	90
194	Ammonium Dihydrogen Phosphate	90
200b	Potassium Dihydrogen Phosphate	90
694	Phosphate Rock (Western)	90
695	Multi-Nutrient Fertilizer	70

Wheat Hardness

This Reference Material (RM) was prepared and analyzed by the Federal Grain Inspection Service (FGIS) program, Grain Inspection Packers and Stockyards Administration of the U.S. Department of Agriculture. It is intended primarily for use in calibrating instruments used for determination of hardness of bulk or single kernel wheat.

RM	Description	Wheat Numbers
8441a*	Wheat Hardness	Hard-1 through Hard-5; 5 × 5 pouches each (20 g/pouch) Soft-1 through Soft-5; 5 × 5 pouches each (20 g/pouch)

** Developed by the U.S. Department of Agriculture*

Trace Elements in Botanicals

These SRMs and RMs are for use in evaluating the reliability of analytical methods for the determination of major, minor, and trace elements in botanical materials, agriculture food products, and materials of similar matrix. The materials can be used for quality assurance when assigning values to in-house control materials.

SRM	Description	Unit Size (g)
1515	Apple Leaves	50
1547	Peach Leaves	50
1570a	Spinach Leaves	60
1573a	Tomato Leaves	50
1575a	Pine Needles	50
2695*	Fluoride in Vegetation	2 × 25 g

** Developed in cooperation with Aluminum Association, Inc.*

Biofuels

SRM	Description	Unit of Issue
2772	B 100 Biodiesel (Soy-Based)	5 ampules × 10 mL each
2773	B 100 Biodiesel (Animal-Based)	5 ampules × 10 mL each

Whole Biomass Feedstock*

These RMs are intended for use in evaluating analytical methods for the determination of summative composition of lignocellulosic materials (hardwood, softwood, herbaceous biomass, and agriculture residues). The RMs can also be used for quality assurance when assigning values to in-house control materials.

RM	Description	Reference Constituents
8491	Sugarcane Bagasse	Ash, Ethanol Extractives, Acid-Soluble Lignin, Acid-Insoluble Lignin, Total Lignin, Glucuronic Acid, Arabinan, Xylan, Mannan, Galactan, Glucan
8492	Populus Deltoides	
8493	Monterey Pine	
8494	Wheat Straw	

** Developed by the International Atomic Energy Agency (IAEA) Biomass Annex, and NIST*

Health & Clinical

Pure Crystalline Standards

SRM/RM	Description	Purity (%)	Unit Size (g)
998	Angiotensin I (Human)	94.1	0.5
916a	Bilirubin	98.3	0.1
915b	Calcium Carbonate	99.9	20
911c	Cholesterol	99.2	2
921	Cortisol (Hydrocortisone)	98.9	1
914a	Creatinine	99.7	10
917c	D-Glucose (Dextrose)	99.7	50
920	D-Mannitol	99.8	50
937	Iron Metal (Clinical)	99.90	50
928	Lead Nitrate	100.00	30
924a	Lithium Carbonate	99.9	30
929a	Magnesium Gluconate Dihydrate	5.403 Mg	5
918b	Potassium Chloride	99.9817	30
919b	Sodium Chloride	99.8	30
1595	Tripalmitin	99.5	2
912a	Urea	99.9	25
913a	Uric Acid	99.6	10
925	VMA (4-hydroxy-3-methoxy-DL-mandelic acid)	99.4	1
8327	Peptide Reference Material for Molecular Mass and Purity Measurements	Amino Acid Residues Range: 11-26	Set of 3 Peptides
8395	Tissue Engineering Reference, Scaffold	1 scaffold	200
8396	Tissue Engineering Reference, Scaffold	1 scaffold	300
8397	Tissue Engineering Reference, Scaffold	1 scaffold	450

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

Molecular Genetics Testing

SRM	Description	Unit Size
2392, 2392-I	Mitochondrial DNA Sequencing	65 µL vial
2399	Fragile X-Human DNA Triplet Repeat	set (9)
2372	Human DNA Quantitation	set (3 × 1 each)

Human Serum and Milk

SRM	Description	Certified Constituents	Reference	Form	No. of Levels
909b	Human Serum	Calcium, Chloride, Cholesterol, Creatinine, Lithium, Magnesium, Potassium, Sodium,Total Glycerides, Triglycerides, Urea, and Uric Acid	Bilirubin	Lyophilized	2

Human Serum and Milk (continued)

SRM/ RM	Description	Certified Constituents	Reference	Form	No. of Levels
900	Antiepilepsy Drug Level Assay	Antiepileptics (4)		Lyophilized	3
956c	Electrolytes in Frozen Human Serum	Total Ca, Li, Mg, K, Na	Ionized Ca	Frozen	3
965b	Glucose in Frozen Human Serum	Glucose		Frozen	3
967a	Creatinine in Frozen Serum	Creatinine		Frozen	2
968d	Fat-Soluble Vitamins, Carotenoids, and Cholesterol in Human Serum	Vitamins (4), Cholesterol, Carotenoids (4)	Carotenoids (8), Vitamin D	Lyophilized	2
970	Ascorbic Acid in Frozen Human Serum	Total Ascorbic Acid		Frozen	2
971	Hormones in Frozen Serum	Cortisol Progesterone (Female)	Progesterone (Male)	Frozen	2
972	Vitamin D in Human Serum	—	—		4
1951b	Lipids in Frozen Human Serum	Total Cholesterol, Total Glycerides, Triglycerides		Frozen	2
1952a	Cholesterol in Human Serum (Freeze-dried)	Cholesterol		Lyophilized	3
1953	Organic Contaminants in Non-Fortified Human Milk	(30)	(44)	Frozen	1
1954	Organic Contaminants in Fortified Human Milk	(64)	(37)	Frozen	1
1955	Homocysteine and Folate in Human Serum	Homocysteine 5-Methyltetrahydrofolic acid	Total Folate, Folic Acid	Frozen	3
1957	Organic Contaminants in Non- Fortified Human Serum	PCB Congeners, Chlorinated Pesticides, PBDE Congeners			
1958	Organic Contaminants in Fortified Human Serum	PFCs, dioxins/furans			
1599	Anticonvulsant Drug Level Assay (valproic acid and carbamazepine)	valproic acid carbamazepine		Lyophilized	1
8323	Yeast Protein Extract	—	Total Protein	Frozen	1

Animal Blood Products

SRM	Description	Certified Constituents	Reference Constituents	Form	No. of Levels
1598a	Inorganic Constituents in Animal Serum	Elements (13)	—	Frozen	1
955c	Lead in Caprine Blood	Pb	—	Frozen	4

Calibration Solutions for Determination of Proteins and Amino Acids

SRM/ RM	Description	Certified Constituents	Reference Values	Form	No. of Levels
927d	Bovine Serum Albumin (7 % Solution)	Protein Concentration	11 values	Solution	1
2389	Amino Acids in HCl	17 Amino Acids	—	Solution	1
2921	Cardiac Troponin Complex	cTnI Concentration	cTnT, cTnC	Solution	1
2972	25-Hydroxyvitamin D_2	25-hydroxyvitamin D_2	10 × 1.2 mL	Solution	
	25-Hydroxyvitamin D_3	25-hydroxyvitamin D_3	10 × 1.2 mL	Solution	
8642	Saxitoxin Dihydrochloride	0.013 Concentration	10 × 12 mL	Solution	

Human Urine

SRM	Description	Unit Size
2669	Arsenic Species in Frozen Human Urine	10 × 2 mL each
2670a	14 Elements	2 × 20 mL
2672a	Mercury	2 × 20 mL
1507b	THC-COOH in Freeze-Dried Urine	set (3)
1508a	Benzoylecgonine (Cocaine Metabolite) in Freeze-Dried Urine	set (4)
1511	Multi Drugs of Abuse in Urine	3 bottles
2381	Morphine and Codeine in Urine	set (4)
2382	Morphine Glucuronide in Urine	set (4)
RM 8444	Cotinine in Freeze-Dried Human Urine	set

Biomaterials

SRM/RM	Description	Certified Properties	Reference Properties	Unit Size
2910a	Calcium Hydroxyapatite	Calcium Phosphorus Specific Surface Area Ca/P Molar Ratio Solubility Product		2 g (powder)
8011	Gold Nanoparticles, Nominal 10 nm Diameter		- Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 × 5 mL ampoules
8012	Gold Nanoparticles, Nominal 30 nm Diameter		- Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 × 5 mL ampoules
8013	Gold Nanoparticles, Nominal 60 nm Diameter		- Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 × 5 mL ampoules
8385	Ultra High Molecular Weight Polyethylene Wear Particles		- Reference Particle Size Populations - Information Values for Diameter of the Packed Rounded UHMWPE Particles - Information Values for Aspect Ratio and Length of the Packed Elongated UHMWPE Particles	5 ml vials
8456	Ultra High Molecular Weight Polyethylene		Young's Modulus Yield Strength Ultimate Strength Elongation	3 in diameter × 60 in (bar) (7.62 cm diameter × 152.4 cm)
8457	Ultra High Molecular Weight Polyethylene		Young's Modulus Yield Strength Ultimate Strength Elongation	10 (0.5 cm) c

Miscellaneous Health-Related Materials

SRM	Description	Certified Constituents	Form	Unit Size
1400	Bone Ash	Elements (8)	Powdered	50 g
1486	Bone Meal	Elements (8)	Powdered	50 g

FORENSICS

Ethanol Solutions

These SRMs are for use in the calibration of instruments and techniques for the determination of ethanol (ethyl alcohol) in breath and blood.

SRM	Description
1828b	Ethanol-water Solution (Blood-alcohol Testing: six levels)
1847	Ethanol-water Solution (Breath-alcohol Testing: three levels)
2891	Ethanol-water Solution (nominal 0.02% by mass)
2892	Ethanol-water Solution (nominal 0.04% by mass)
2893	Ethanol-water Solution (nominal 0.08% by mass)
2894	Ethanol-water Solution (nominal 0.1% by mass)
2895	Ethanol-water Solution (nominal 0.2% by mass)
2896	Ethanol-water Solution (nominal 0.3% by mass)
2897	Ethanol-water Solution (nominal 2% by mass)
2898	Ethanol-water Solution (nominal 6% by mass)
2899	Ethanol-water Solution (nominal 25% by mass)
2900	Ethanol-water Solution (nominal 95.6% by mass)

SRM/RMs for Crime Scene Investigations

SRM/RM	Description	Certified/Reference Constituents	Unit Size
2460	Standard Bullet		1 each
RM 8107	Additives in Smokeless Powder	4 components	5 g
2285	Arson Test Mixture in Methylene Chloride	15 components	5 x 1.2 mL
2905	Trace Particle Explosive Simulants		4 bottles x 1 g each

DNA Profiling/Crime Scene Investigations

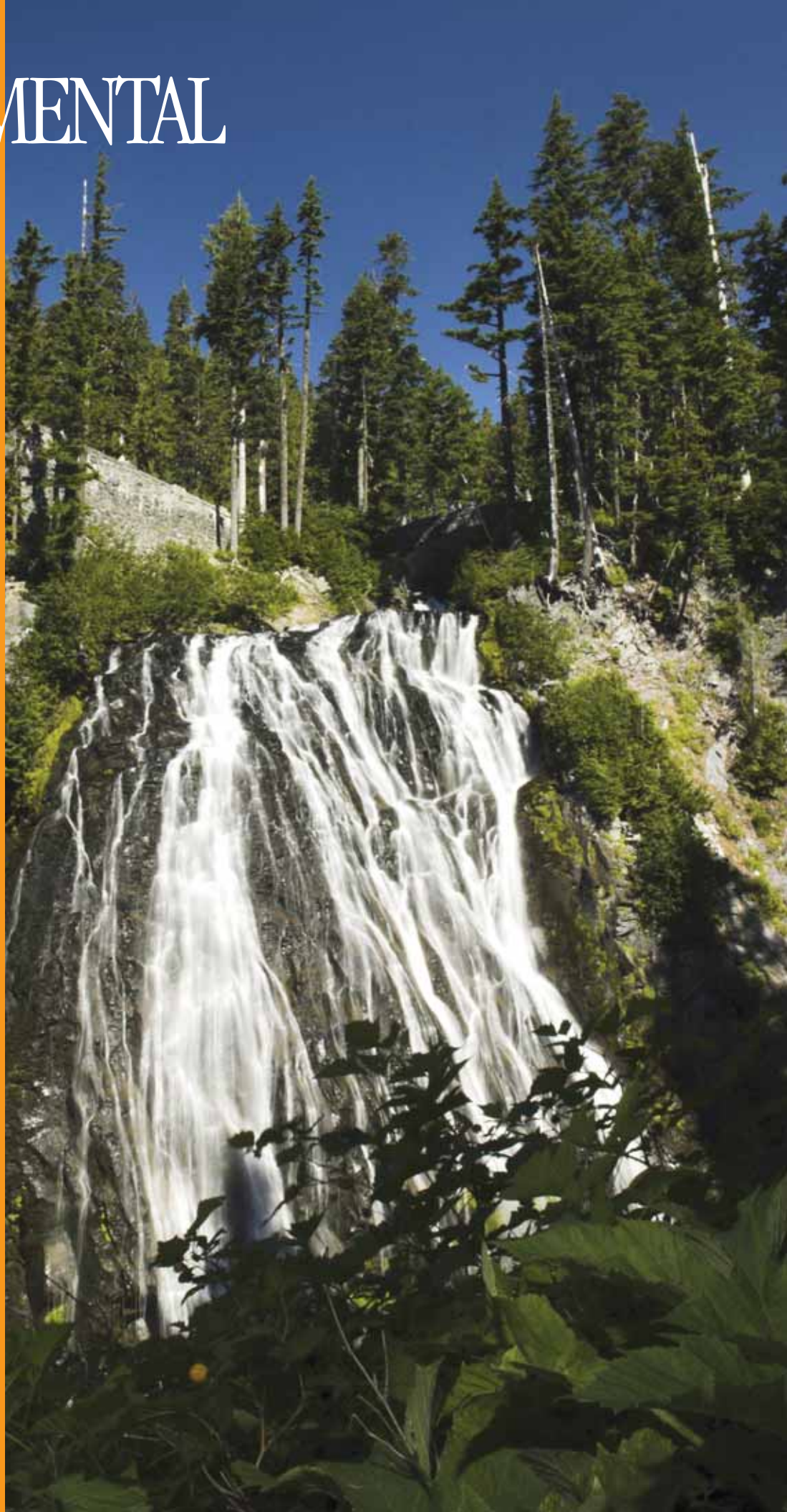
SRMs 2390, and 2391 b are intended for use in the standardization of forensic and paternity quality assurance procedures and instructional law enforcement or non-clinical research purposes.

SRM	Description	Unit Size
2372	Human DNA Quantitation Standard	3 components: 1 box
2390	DNA Profiling Standard - RFLP	20 components
2391b	PCR-Based DNA Profiling Standard	12 components
2392	Human Mitochondrial DNA Sequencing	3 components
2392-I	Human Mitochondrial DNA Sequencing	1 component
2394	Heteroplasmic Mitochondrial DNA Mutation Detection Standard	10 components
2395	Human Y-Chromosome DNA Profiling Standard	6 components
2396	Oxidative DNA Damage Mass Spectrometry Standard	12 components: 1 box
2399	Fragile X Human DNA Triplet Repeat Standard	9 components: 1 box

Drugs of Abuse in Human Hair and Urine

SRM/RM	Description	Certified Constituents	Reference Constituent	Form	Unit Size
1508a	Cocaine Metabolite in Urine	Benzoylecgonine		Lyophilized	3 levels, plus 1 blank
RM 8444	Cotinine in Urine		Cotinine (nicotine metabolite)	Lyophilized	2 levels, plus 1 blank
1507b	Marijuana Metabolite in Urine	THC-9-COOH		Lyophilized	3 levels, plus 1 blank
2379	Drugs of Abuse in Human Hair I	6			100 mg
2380	Drugs of Abuse in Human Hair II	4			100 mg
2381	Morphine and Codeine in Urine	Morphine and Codeine		Lyophilized	3 levels, plus 1 blank
2382	Morphine Glucuronide in Urine	Free Morphine		Lyophilized	3 levels, plus 1 blank
1511	Multi Drugs of Abuse in Urine	Drugs of Abuse (5)		Lyophilized	1 level

ENVIRONMENTAL



Calibration Solutions, Organic

SRM/RM	Description	Certified Constituents	Reference Constituents	Unit Size
3000	Benzene in Methanol	1	—	2 x 2.5 mL
3001	Toluene in Methanol	1	—	2 x 2.5 mL
3002	Ethylbenzene in Methanol	1	—	2 x 2.5 mL
3003	o-Xylene in Methanol	1	—	2 x 2.5 mL
3004	m-Xylene in Methanol	1	—	2 x 2.5 mL
3005	p-Xylene in Methanol	1	—	2 x 2.5 mL
3006	Carbon Tetrachloride in Methanol	1	—	2 x 2.5 mL
3008	Methylene Chloride in Methanol	1	—	2 x 2.5 mL
3009	1,2-Dichloropropane in Methanol	1	—	2 x 2.5 mL
3010	Tetrachloroethene (Tetrachloroethylene) in Methanol	1	—	2 x 2.5 mL
3011	1,1,1-Trichloroethane in Methanol	1	—	2 x 2.5 mL
3012	1,2-Dichloroethane in Methanol	1	—	2 x 2.5 mL
3014	1,2,3-Trichloropropane in Methanol	1	—	2 x 2.5 mL
3015	Isopropylbenzene in Methanol	1	—	2 x 2.5 mL
3016	sec-Butylbenzene in Methanol	1	—	2 x 2.5 mL
3063	2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) in Methanol	1	—	5 x 1.2 mL
3064	Endothall in Water	1	—	5 x 1.2 mL
3067	Toxaphene in Methanol	Total Toxaphene	—	5 x 1.2 mL
3068	Chlordane in Methanol	Total Chlordane	—	5 x 1.2 mL
3071	Glyphosate in Water	1	—	5 x 1.2 mL
3072	Diquat Dibromide Monohydrate in Water	1	—	5 x 1.2 mL
3074	Phalates/Adipate in Methanol	6	1	5 x 1.2 mL
3075	Aroclor 1016 in Transformer Oil	Total Aroclor	—	5 x 1.2 mL
3076	Aroclor 1232 in Transformer Oil	Total Aroclor	—	5 x 1.2 mL
3077	Aroclor 1242 in Transformer Oil	Total Aroclor	—	5 x 1.2 mL
3078	Aroclor 1248 in Transformer Oil	Total Aroclor	—	5 x 1.2 mL
3079	Aroclor 1254 in Transformer Oil	Total Aroclor	—	5 x 1.2 mL
3080	Aroclor 1260 in Transformer Oil	Total Aroclor	—	5 x 1.2 mL
3081	Aroclor 1016 in Methanol	Total Aroclor	—	5 x 1.2 mL
3082	Aroclor 1232 in Methanol	Total Aroclor	—	5 x 1.2 mL
3083	Aroclor 1242 in Methanol	Total Aroclor	—	5 x 1.2 mL
3084	Aroclor 1248 in Methanol	Total Aroclor	—	5 x 1.2 mL
3085	Aroclor 1254 in Methanol	Total Aroclor	—	5 x 1.2 mL
3086	Aroclor 1260 in Methanol	Total Aroclor	—	5 x 1.2 mL
3090	Aroclors in Transformer Oil (set SRMs 3075-3080)	Total Aroclor	—	6 x 1.2 mL
3091	Aroclors in Methanol (set SRMs 3081-3086)	Total Aroclor	—	6 x 1.2 mL
8504	Transformer Oil	(Diluent)	Total Aroclor	1 x 100 mL

Calibration Solutions, Organic (continued)

For more information, see Table 109.1 on our website www.nist.gov/srm

SRM/RM	Description	Certified Constituents	Reference Constituents	Unit Size
1582	Petroleum Crude Oil	PAHs (5), PASH (1)	PAHs (5), Phenols (2), PANH (1)	5 ampoules
1584	Priority Pollutant Phenols in Methanol	Phenols (10)	Phenols (1)	5 x 1.2 mL
1586	Isotopically Labeled and Unlabeled Priority Pollutants in Methanol	Priority pollutants (10)	—	6 x 1.2 mL
1639	Halocarbons (in Methanol) for Water Analysis	Halocarbons (7)	—	5 x 1.2 mL
1494	Aliphatic Hydrocarbons in 2, 2, 4- Trimethylpentane	(20)	—	5 x 1.2 mL
1647e	Priority Pollutant PAHs (in Acetonitrile)	PAHs (16)	—	5 x 1.2 mL
1491a	Methyl-substituted Polycyclic Aromatic Hydrocarbons in Toluene	PAHs (18)	—	5 x 1.2 mL
2260a	Aromatic Hydrocarbons in Toluene	PAHs (36)	—	5 x 1.2 mL
2269	Perdeuterated PAH-I	Perdeuterated PAHs (5)	—	5 x 1.2 mL
2270	Perdeuterated PAH-II	Perdeuterated PAHs (6)	—	5 x 1.2 mL
1596	Dinitropyrene Isomers and 1-Nitropyrene in Methylene Chloride	Nitro-PAHs (4)	—	5 x 1.2 mL
1493	Chlorinated Biphenyl Congeners in 2,2,4 -Trimethylpentane	PCBs (18)	PCBs (2)	5 x 1.2 mL
2262	Chlorinated Biphenyl Congeners in 2,2,4-Trimethylpentane	PCBs (25)	PCBs (4)	5 x 1.2 mL
2274	PCB Congener Solution-II	PCBs (11)	—	5 x 1.2 mL
2276	Three Planar PCBs in Solution	PCBs (3)	—	5 x 1.2 mL
8466	g-HCH (Lindane) (neat)	—	—	Vial: 100 mg
8467	4,4'-DDE (neat)	—	—	Vial: 100 mg
8469	4,4'-DDT (neat)	—	—	Vial: 100 mg
1492	Chlorinated Pesticides in Hexane	Pesticides (15)	—	5 x 1.2 mL
2261	Chlorinated Pesticides in Hexane	Pesticides (15)	—	5 x 1.2 mL
2273	DDTs and Metabolites in Solution	DDTs, Metabolites (7)	—	5 x 1.2 mL
2275	Chlorinated Pesticide Solution-II	Pesticides (9)	—	5 x 1.2 mL
1614	Dioxin (2,3,7,8-TCDD) in Isooctane	Dioxins (2)	Dioxins (2)	6 x 1.2 mL
869b	Column Performance Test Mixture for Liquid Chromatography (PAHs)	Shape Selectivity: PAHs (3)	Acetonitrile	5 x 1.1 mL
2257	PBDE Congers in 2,2,4-Trimethylpentane			
2258	BDE 209 in 2,2,4 2,2,4-Trimethylpentane			
2259	PCB Congers in 2,2,4-Trimethylpentane			

Calibration Solutions, Organic (continued)

SRM/RM	Description	Certified Constituents	Reference Constituents	Unit Size
870	Mixtures for Liquid Chromatography Column Performance Test Mixture for Liquid Chromatography	Silanol Activity,Trace Metal Activity, Hydrophobic Retention, Methylene Selectivity	Methanol	5 × 1.1 mL
877	Chiral Selectivity Test	Various Chiral Components	Ethanol	5 × 1.1 mL
1543	GC/MS System Performance Standard	(20)	—	4 × 1 mL
2264	Nitrated Aromatic Hydrocarbons in Methylene Chloride I	Methylene Chloride II		5 × 1.2 mL
2265	Nitrated Polycyclic Aromatic Hydrocarbons in Methylene Chloride II	Methylene Chloride II	1-Nitrobenzo[e]pyrene 3-Nitrobenzo[e]pyrene	5 × 1.2 mL
2266	Hopanes and Steranes in 2,2,4-Trimethylpentane	2,2,4-Trimethylpentane	17α(H)-21β(H)-22R-homohopane 17α(H)-21β(H)-22S-homohopane αββ 20R-ethylcholestane	5 × 1.2 mL
2267	Deuterated Levoglucosan in Ethyl Acetate	Ethyl Acetate		5 × 1.2 mL
2268	Carbon-13 Labeled Levoglucosan in Ethyl Acetate	Ethyl Acetate		5 × 1.2 mL
2277	Organic Acids in Methanol: Methylene Chloride	Organic Acids	—	5 × 1.2 mL
2278	Deuterated Organic Acids in Methanol: Methylene Chloride	Deuterated Organic Acids	—	5 × 1.2 mL

Calibration Solutions, Inorganic

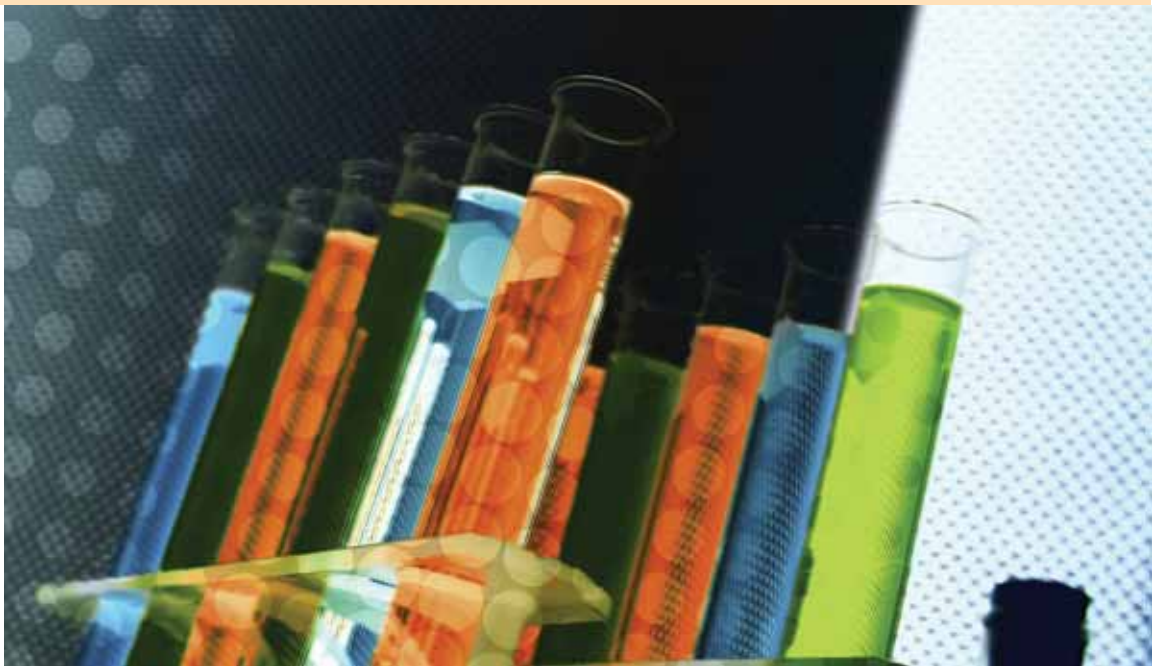
SRM	Description	Certified Constituents	Unit Size
1641d	Mercury in Water	Mercury	10 × 10 mL
3101a	Aluminum Standard Solution	Aluminum	50 mL
3102a	Antimony Standard Solution	Antimony	50 mL
3103a	Arsenic Standard Solution	Arsenic	50 mL
3104a	Barium Standard Solution	Barium	50 mL
3105a	Beryllium Standard Solution	Beryllium	5 × 10 mL
3106	Bismuth Standard Solution	Bismuth	5 × 10 mL
3107	Boron Standard Solution	Boron	50 mL
3108	Cadmium Standard Solution	Cadmium	50 mL
3109a	Calcium Standard Solution	Calcium	50 mL
3110	Cerium Standard Solution	Cerium	5 × 10 mL
3111a	Cesium Standard Solution	Cesium	50 mL
3112a	Chromium Standard Solution	Chromium	5 × 10 mL
3113	Cobalt Standard Solution	Cobalt	5 × 10 mL
3114	Copper Standard Solution	Copper	5 × 10 mL
3115a	Dysprosium Standard Solution	Dysprosium	5 × 10 mL
3116a	Erbium Standard Solution	Erbium	5 × 10 mL
3117a	Europium Standard Solution	Europium	5 × 10 mL

Calibration Solutions, Inorganic (continued)

SRM	Description	Certified Constituents	Unit Size
3118a	Gadolinium Standard Solution	Gadolinium	5 x 10 mL
3119a	Gallium Standard Solution	Gallium	5 x 10 mL
3120a	Germanium Standard Solution	Germanium	50 mL
3121	Gold Standard Solution	Gold	5 x 10 mL
3122	Hafnium Standard Solution	Hafnium	50 mL
3123a	Holmium Standard Solution	Holmium	5 x 10 mL
3124a	Indium Standard Solution	Indium	5 x 10 mL
3126a	Iron Standard Solution	Iron	5 x 10 mL
3127a	Lanthanum Standard Solution	Lanthanum	5 x 10 mL
3128	Lead Standard Solution	Lead	50 mL
3129a	Lithium Standard Solution	Lithium	5 x 10 mL
3130a	Lutetium Standard Solution	Lutetium	5 x 10 mL
3131a	Magnesium Standard Solution	Magnesium	50 mL
3132	Manganese Standard Solution	Manganese	5 x 10 mL
3133	Mercury Standard Solution	Mercury	5 x 10 mL
3134	Molybdenum Standard Solution	Molybdenum	5 x 10 mL
3135a	Neodymium Standard Solution	Neodymium	5 x 10 mL
3136	Nickel Standard Solution	Nickel	5 x 10 mL
3137	Niobium Standard Solution	Niobium	50 mL
3138	Palladium Standard Solution	Palladium	5 x 10 mL
3139a	Phosphorous Standard Solution	Phosphorous	5 x 10 mL
3140	Platinum Standard Solution	Platinum	5 x 10 mL
3141a	Potassium Standard Solution	Potassium	50 mL
3142a	Praseodymium Standard Solution	Praseodymium	5 x 10 mL
3143	Rhenium Standard Solution	Rhenium	50 mL
3144	Rhodium Standard Solution	Rhodium	5 x 10 mL
3145a	Rubidium Standard Solution	Rubidium	5 x 10 mL
3147a	Samarium Standard Solution	Samarium	5 x 10 mL
3148a	Scandium Standard Solution	Scandium	5 x 10 mL
3149	Selenium Standard Solution	Selenium	5 x 10 mL
3150	Silicon Standard Solution	Silicon	5 x 10 mL
3151	Silver Standard Solution	Silver	5 x 10 mL
3152a	Sodium Standard Solution	Sodium	5 x 10 mL
3153a	Stronium Standard Solution	Stronium	5 x 10 mL
3154	Sulfur Standard Solution	Sulfur	5 x 10 mL
3155	Tantalum Standard Solution	Tantalum	50 mL

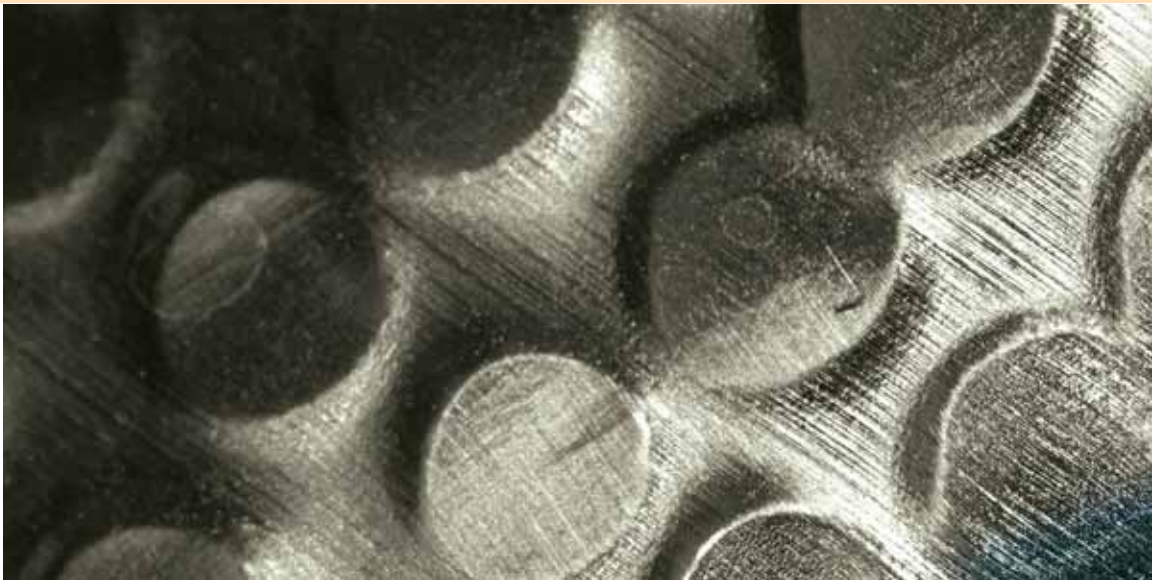
Calibration Solutions, Inorganic (continued)

SRM	Description	Certified Constituents	Unit Size
3156	Tellurium Standard Solution	Tellurium	5 x 10 mL
3157a	Terbium Standard Solution	Terbium	5 x 10 mL
3158	Thallium Standard Solution	Thallium	5 x 10 mL
3159	Thorium Standard Solution	Thorium	50 mL
3160a	Thulium Standard Solution	Thulium	5 x 10 mL
3161a	Tin Standard Solution	Tin	50 mL
3162a	Titanium Standard Solution	Titanium	50 mL
3163	Tungsten Standard Solution	Tungsten	50 mL
3164	Uranium Standard Solution	Uranium	5 x 10 mL
3165	Vanadium Standard Solution	Vanadium	5 x 10 mL
3166a	Ytterbium Standard Solution	Ytterbium	5 x 10 mL
3167a	Ytterium Standard Solution	Ytterium	5 x 10 mL
3168a	Zinc Standard Solution	Zinc	50 mL
3169	Zirconium Standard Solution	Zirconium	50 mL
3177	Mercury (II) Chloride Standard Solution	Mercury	5 x 10 mL
3181	Sulfate Anion Solution	Sulfate	5 x 10 mL
3182	Chloride Anion Solution	Chloride	5 x 10 mL
3183	Fluoride Anion Solution	Fluoride	50 mL
3184	Bromide Anion Solution	Bromide	5 x 10 mL
3185	Nitrate Anion Solution	Nitrate	5 x 10 mL
3186	Phosphate Anion Solution	Phosphate	5 x 10 mL



Organo - Metallic

SRM	Description	Elemental Composition (Percent)	
1075a	Aluminum 2-Ethylhexanoate	8.07	Al
1051b	Barium Cyclohexanebutyrate	28.7	Ba
1080a	Bis (1-phenyl-1,3-butanediono)copper (II)	16.37	Cu
1052b	Bis(1-phenyl-1,3-butanediono)oxovanadium (IV)	13.01	V
1053a	Cadmium Cyclohexanebutyrate	24.8	Cd
1057b	Dibutyltin bis (2-ethylhexanoate) (tin)	22.95	Sn
1065b	Nickel Cyclohexanebutyrate	13.89	Ni
1066a	Octaphenylcyclotetrasiloxane	14.14	Si
1077a	Silver 2-Ethylhexanoate	42.60	Ag
1069b	Sodium Cyclohexanebutyrate	12.0	Na
1078b	Tris (1-phenyl-1,3-butanediono)chromium (III)	9.6	Cr
1079b	Tris (1-phenyl-1,3-butanediono)iron (III)	10.45	Fe
1073b	Zinc Cyclohexanebutyrate	16.66	Zn



BIOLOGICAL TISSUES

SRM	Description	Certified Constituents	Reference Constituents	Unit Size
1566b	Oyster Tissue	22 Elements, Methyl-mercury	8 Elements, 8 Fatty Acids, Proximates, Caloric Content	25 g
1974b	Organics in Mussel Tissue (Mytilus Edulis) (Frozen)	PAHs (22), PCBs (31), Pesticides (7), Total Mercury	Trace Elements (11), PAHs (16), PCBs (8), Pesticides (6), Methylmercury	5 × 8 g
2976	Mussel Tissue	Methylmercury, Total Mercury, Trace Elements (7)	Trace elements (20)	25 g
2977	Mussel Tissue	PAHs (14), PCB Congeners (25), Pesticides (7), Trace Elements (6), Methylmercury	PAHs (16), Trace Elements (9)	10 g
1946	Lake Superior Fish Tissue	PCBs (30), Pesticides (15) Fat and Fatty Acids (14), Total Mercury, Methyl-mercury, Arsenic, Iron	PCBs (12), Pesticides (2), Fatty Acids (12), Proximates, Caloric Content, Trace Elements (9)	5 × 7–9 g
1947	Lake Michigan Fish Tissue	PCBs (32), Pesticides (15), PBDEs (7)	PCBs (13), Pesticides (2), PBDEs (2), Proximates, Caloric Content, Selected Fatty Acids	40 g
1945	Organics in Whale Blubber (Frozen)	PCBs (27), Pesticides (15)	PCBs (2), Pesticides (2)	2 × 10 g
1953	Organic Contaminants in Non-Fortified Human Milk	PCBs (17), Pesticides (7)-PBDEs (5), PBC (1)	PBCs (13), Pesticides (2), PBDEs (5), Elements (10) PCDDs (7), PCDFs (7)	5 vials × 5 mL
1954	Organic Contaminants in Fortified Human Milk	PCBs (37), Pesticides (15)-PBDEs (11), PBC (1)	PBCs (6), Pesticides (2), PBDEs (2), Elements (10) PCDDs (7), PCDFs (10)	5 vials × 5 mL
1955	Homocysteine and Folate in Frozen Human Serum	Homocysteine/Levels (3)-Folate/Levels (3)	Folic Acid/Levels (3)	set (3) (1 each conc)
1957	Organic Contaminants in Non-Fortified Human Serum	PCBs (8), Pesticides (3)-PBDEs (4), PBC (1)	PBCs (16), Pesticides (2), PBDEs (6), PFC Compounds (7) PCDDs (11), PCDFs (11)	5 vials × 10 mL
1958	Organic Contaminants in Fortified Human Milk	PCBs (38), Pesticides (12)-PBDEs (12), PBC (1)	PBCs (3), Pesticides (11), PFC Compounds (4), PCDDs (17), PCDFs (17), non-ortho PCBs (2)	5 vials × 10 mL
1588b	Organics in Cod Liver Oil	PCBs (27), Pesticides (15) Fatty Acids (14)	PCDDs/PCDFs (7), PCBs (47), Pesticides (3), Fatty Acids (6) PBDEs (6), Toxaphene (3)	4 × 1.2 mL
1577c	Bovine Liver	18 Elements	—	50 g
1515	Apple Leaves	Elements (24)	—	50 g
1547	Peach Leaves	Elements (24)	—	50 g
1570a	Trace Elements in Spinach Leaves	Elements (18)	Elements (5), Proximates	60 g
1573a	Tomato Leaves	Elements (21)	—	50 g
1575a	Trace Elements in Pine Needles	Elements (12)	Elements (11)	50 g

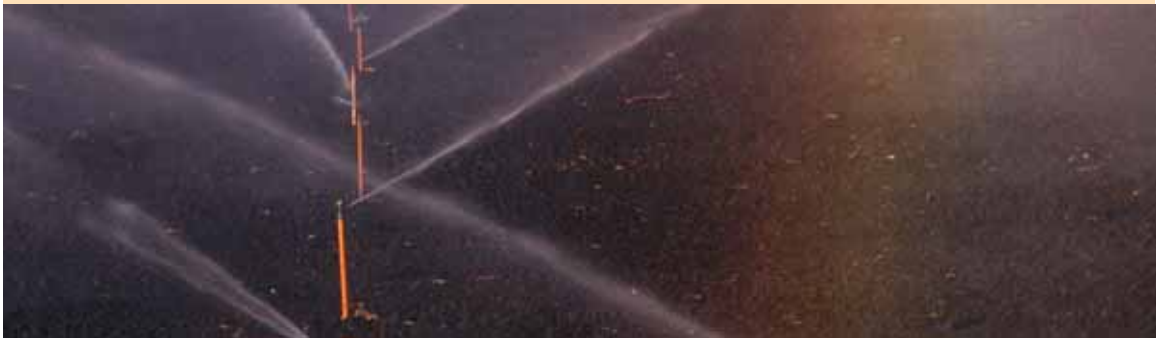
SOILS, SEDIMENTS, PARTICULATES AND WATER

For more information, see Table 111.7 Soils, Sediments and Sludges on our website www.nist.gov/srm

SRM/RM	Description	Certified Constituents	Reference Constituents	Unit Size
1640a	Natural Water	Elements (17)	Elements (10)	250 mL
1643e	Trace Elements in Water	—	Elements (29)	250 mL
2586	Trace Elements in Soil Containing Lead from Paint (Nominal 500 mg/kg Lead)	Elements (4)	Elements (18)	55 g
2587	Trace Elements in Soil Containing Lead from Paint (Nominal 3000 mkg Lead)	Elements (4)	Elements (14)	55 g
2709a	San Joaquin Soil	Elements (27)	Elements (22)	50 g
2710a	Montana Soil Highly Elevated Trace Element Concentrations	Elements (22)	Elements (26)	50 g
2711a	Montana Soil Moderately Elevated Trace Element Concentrations	Elements (25)	Elements (26)	50 g
2780	Hard Rock Mine Waste	Elements (12)	Elements (7)	50 g
2451	Fine Carbon (Activated) - From Cyanide Ore Leaching	Elements (1)	Elements (1)	100 g
2781	Domestic Sludge	Elements (10)	Elements (11)	40 g
2782	Industrial Sludge	Elements (10)	Elements(16)	70 g
2855	Additive Elements in Polyethylene			
1646a	Estuarine Sediment	Elements (19)	Elements (20)	70 g
1939a	PCB (Congeners) in River Sediment	PCBs (20) Pesticides (3)	PCBs (4)	50 g
1941b	Organics in Marine Sediment	PAHs (24), PCBs (29), Pesticides (7)	PAHs (44), PCBs (13), Pesticides (2), TOC	50 g
1944	NY/NJ Waterway Sediment	PAHs(24), PCBs (35), Pesticides(4) Elements (9)	PAHs (32) Pesticides (7), Elements (19), PCDDs/PCDFs(17), TOC, percent extractable, particle-size characteristics	50 g
2701	Hexavalent Chromiumin Contaminated Soil	Cr^{VI}, Cr, Fe,Mn	Elements (8)	75g
2702	Inorganics in Marine Sediment	Elements (25)	Elements (8)	50 g

SOILS, SEDIMENTS, PARTICULATES AND WATER (continued)

SRM/ RM	Description	Certified Constituents	Reference Constituents	Unit Size
2703	Sediment for Solid Sampling (Small Sample) Analytical Techniques	Elements (22)	Elements (7)	5 g
8704	Buffalo River Sediment	—	Reference Values (25)	50 g
1597a	Complex Mixture of PAHs from Coal Tar	PAHs (34)	PAHs (36)	3 × 1.3 mL
1648a	Urban Particulate Matter	Elements (15)	Elements (21)	2 g
1649b	Urban Dust	PAHs (22), PCBs (35), Pesticides (8), Total carbon	PAHs (22), Pesticides (1), PCDDs/PCDFs (17), Elements (32), Mutagenic activity, Particle-size characteristics, Chemical & isotopic carbon	2.5g
2783	Air Particulate on Filter Media	Elements (18)	Elements (9)	2 loaded and 2 blank filters
1650b	Diesel Particulate Matter	PAHs (31), nitro-PAHs (6)	PAHs (20), nitro-PAHs (16), Particle-size distribution	200 mg
1975	Diesel Particulate Extract	PAHs(8)	PAHSs (23), nitro-PAHs (18), mutagenicity	4 × 1.2 mL
2975	Diesel Particulate Matter (Industrial Forklift)	PAHs (11)	PAHs (28) Particle-size distribution, Total extractable mass	1 g
2583	Trace Elements in Indoor Dust (nominal 90 mg/kg lead)	Elements (5)	—	8 g
2584	Trace Elements in Indoor Dust (nominal 1 % lead)	Elements (5)	Elements (10)	8 g
2585	Organic Contaminants in House Dust	PAHs (33), PCBs (30), Pesticides (4), PBDEs (15)	PAHs (33) PCBs (12), Pesticides (10), PBDEs (12)	10 g
8785	Air Particulate Matter on Filter Media for Carbon Composition	—	2	3 filters
8786	Blank Filter for RM 8785	—	—	1 blank filter



GEOLOGICAL MATERIALS AND ORES

Ores

SRM	Description	Certified Constituents	Reference Constituents	Unit Size (g)
699	Alumina (Reduction Grade)	13	—	60
69b	Bauxite, Arkansas	15	3	60
697	Bauxite, Dominican	15	—	60
698	Bauxite, Jamaican	15	—	60
696	Bauxite, Surinam	15	3	60
1835	Borate Ore	15	15	60
330	Copper Ore Mill Heads	3	—	100
331a	Copper Ore Mill Tails	3	—	40
333a	Molybdenum Sulfide Concentrate	2	4	1 pouch x 60 g
423	Molybdenum Oxide Concentrate	2	3	1 pouch x 60 g
79a	Fluorspar, Customs Grade	1	—	120
180	Fluorspar, High Grade	1	—	120
886	Gold Ore, Refractory	2	10	200
670	Iron Ore, Canada	6	—	90
690	Iron Ore, Canada	11	—	100
692	Iron Ore, Labrador	11	—	100
693	Iron Ore, Nimba	11	—	100
691	Iron Oxide, Reduced	9	—	100
182	Lithium Ore (Petalite)	1	—	45
181	Lithium Ore (Spodumene)	1	—	45
183	Lithium Ore (Lepidolite)	1	—	45
25d	Manganese Ore	8	—	60
120c	Phosphate Rock, Florida	8	10	90
694	Phosphate Rock, Western	13	—	90
600	Rutile Ore	16	—	90
2430	Scheelite Ore	6	—	100
277	Tungsten Concentrate	1	—	100
113b	Zinc Concentrate	10	—	100

Ore Bioleaching Substrate

This RM is for use as a bioleaching substrate and for testing bioleaching rates.

RM	Description	Reference Constituents	Unit Size (g)
8455	Pyrite Ore	Rate of bioleaching	100

Clays

SRM	Description	Certified Constituents	Unit Size (g)
679	Brick Clay	12	75
97b	Flint Clay	12	60
98b	Plastic Clay	12	60

Chinese Ores

Unit Size: 100 g

These RMs are a well characterized series of skarn deposit ores developed and certified by the Hubei Geological Research Laboratory, Hubei Province, China.

RM	Description	Reference Constituents
8602	Lead	41 Elements
8603	Lead	56 Elements and Oxides
8607	Tungsten	56 Elements and Oxides

Rocks and Minerals

SRM	Description	Certified Constituents	Reference Constituents	Unit Size (g)
688	Basalt Rock	14	—	60
70a	Feldspar, Potash	10	—	40
99a	Feldspar, Soda	11	—	40
81a	Glass Sand	5	—	75
165a	Glass Sand (Low Iron)	4	—	75
1413	Glass Sand (High Alumina)	9	—	75
1d	Limestone, Argillaceous	12	5	70
88b	Limestone, Dolomite	11	—	75
278	Obsidian Rock	18	—	35
607	Potassium Feldspar	—	—	5

Refractories

SRM	Description	Certified Constituents	Unit Size (g)
76a	Burnt Refractory (Al203-40 %)	12	75
77a	Burnt Refractory (Al203-60 %)	12	75
78a	Burnt Refractory (Al203-70 %)	12	75
198	Silica Brick	12	45
199	Silica Brick	12	45
154c	Titanium Dioxide	1	90

MICROANALYSIS

Elements in Metals

SRM	Description	Certified Constituents	Unit Size (g)
482	Gold-Copper Wires for Microprobe Analysis	2	wires: 6
481	Gold-Silver Wires for Microprobe Analysis	2	wires: 6
480	Tungsten-20 % Molybdenum Alloy Electron Microprobe Standard	2	rod:1
2061	Ti-Al Alloy for Microanalysis	—	—
2062	Ti-Al Alloy for Microanalysis	—	—

Elements in Synthetic Glasses

SRM	Description	Certified Constituents	Unit Size (g)
1873	Barium-Zinc Silicate Glasses for Microanalysis (K-458, K-489, K-963)	2	rod: 2 mm × 2 mm × 20 mm
2066	Glass Microspheres (K-411)	4 certified: 1 reference	glass microspheres: 50 mg
1872	Lead-Germanate Glasses for Microanalysis (K-453, K-491, K-968)	2	rod: 2 mm × 2 mm × 20 mm

FOSSIL FUELS AND RELATED MATERIALS

High Purity Liquids for Fuel Rating

Unit Size: 100 mL

SRM	Description	Purity (%)
1816a	Isooctane (2,2,4-Trimethylpentane)	99.987
1815a	n-Heptane	99.987

SRM	Description/Pb Concentration	Certified Constituents	Reference Constituents	Unit Size
1634c	Trace Elements in Fuel Oil "No. 6" (As, Co, Ni, Pb, S, Se, V)	5	—	100 mL
RM 8505	Vanadium in Crude Oil	—	1	250 mL
RM 8590	High Sulfur Gas Oil Feed	—	1	946 mL
1580	Organics in Shale Oil	9	—	5 × 1.2 mL
1632c	Trace Elements in Coal (Bituminous)	15	26	50 g
1635	Trace Elements in Coal (Subbituminous)	16	—	75 g
1633b	Trace Elements in Coal Fly Ash	23	—	75 g
2689	Coal Fly Ash	13	19	3 × 10 g
2690	Coal Fly Ash	13	19	3 × 10 g
2691	Coal Fly Ash	13	19	3 × 10 g
2718	Green Petroleum Coke	6	2	50 g
2719	Calcined Petroleum Coke	6	2	50 g
2775	Foundry Coke	1	2	50 g
2776	Furnace Coke	1	2	50 g
1829	Alcohols in Reference Fuel	4	—	6 × 20 mL
1837	Methanol (9 volume percent) and t-Butanol (6 volume percent) in Reference Fuel	2	—	5 × 20 mL

FOSSIL FUELS AND RELATED MATERIALS (continued)

SRM/RM	Description/Pb Concentration	Certified Constituents	Reference Constituents	Unit Size
1838	Ethanol (10 volume percent) in Reference Fuel	1	—	5 × 20 mL
1839	Methanol (0.3 volume percent) in Reference Fuel	1	—	5 × 20 mL
2286	Ethanol in Reference Gasoline (Nominal 2.0 weight percent oxygen)	2	—	3 × 20 mL
2287	Ethanol in Reference Gasoline (Nominal 3.5 weight percent oxygen)	2	—	3 × 20 mL
2288	t-Amyl Methyl Ether in Reference Gasoline (Nominal 2.0 weight percent oxygen)	2	—	3 × 20 mL
2289	t-Amyl Methyl Ether in Reference Gasoline (Nominal 2.7 weight percent oxygen)	2	—	3 × 20 mL
2290	Ethyl t-Butyl Ether in Reference Gasoline (Nominal 2.0 weight percent oxygen)	2	—	3 × 20 mL
2291	Ethyl t-Butyl Ether in Reference Gasoline (Nominal 2.7 weight percent oxygen)	2	—	3 × 20 mL
2293	Methyl t-Butyl Ether in Reference Gasoline (Nominal 2.7 weight percent oxygen)	2	—	3 × 20 mL
2294	Reformulated Gasoline (11 % MTBE)	4	26	2 × 20 mL
2295	Reformulated Gasoline (15 % MTBE)	4	26	2 × 20 mL
2296	Reformulated Gasoline (13 % ETBE)	4	26	2 × 20 mL
2297	Reformulated Gasoline (10 % Ethanol)	4	26	2 × 20 mL
2890	Water Saturated 1-Octanol	1	—	5 × 2 mL
8506a	Water in Transformer Oil	—	1	5 × 9.5 mL
8507	Moisture in Mineral Oil	—	1	10 mL
8509	Moisture in Methanol (93 mg/kg)	—	1	5 mL
8510	Moisture in Methanol (325 mg/kg)	—	1	5 mL
2285	Arson Test Mixture in Methylene Chloride	15	—	5 × 1.2 mL

Materials for Sulfur and Mercury

SRM	Description	%S	Hg (µg/kg)	Unit Size
1616b	Sulfur in Kerosine	0.000841	—	100 mL
1617a	Sulfur in Kerosine	0.17307	—	100 mL
1619b	Sulfur in Residual Fuel Oil	0.6960	0.00346	100 mL
1620c	Sulfur in Residual Fuel Oil	4.561	—	100 mL
1621e	Sulfur in Residual Fuel Oil	0.9480	—	100 mL
1622e	Sulfur in Residual Fuel Oil	2.1468	—	100 mL
1623c	Sulfur in Residual Fuel Oil	0.3806	—	100 mL
1624d	Sulfur in Diesel Fuel Oil	0.3882	—	10 × 10 mL
1632c	Trace Elements in Coal Bituminous	1.462	93.8	50 g
1635	Trace Elements in Coal (Subbituminous)	0.3616	10.9	75 g
2294	Reformulated Gasoline (nominal 11 % MTBE)	0.00409	—	2 × 20 mL
2295	Reformulated Gasoline (nominal 15 % MTBE)	0.0308	—	2 × 20 mL
2296	Reformulated Gasoline (nominal 13 % ETBE)	0.00400	—	2 × 20 mL
2297	Reformulated Gasoline (nominal 10 % Ethanol)	0.03037	—	2 × 20 mL
2298	Reformulated Gasoline	0.00047	—	5 × 20 mL
2299	Gasoline (High Octane)	0.00136	—	5 × 20 mL
2682b	Sulfur and Mercury in Coal (Subbituminous)	0.4917	108.8	50 g
2683b	Sulfur and Mercury in Coal	1.955	90.0	50 g
2684b	Sulfur and Mercury in Coal	3.076	97.4	50 g
2685b	Sulfur and Mercury in Coal	4.730	146.2	50 g
2692b	Sulfur and Mercury in Coal	1.170	133.3	50 g
2693	Sulfur and Mercury in Coal	0.4571	37.3	50 g
2717a	Sulfur in Residual Fuel Oil	2.9957	—	100 mL
2718	Trace Elements in Green Petroleum Coke	4.7030	—	50 g
2719	Trace Elements in Calcined Petroleum Coke	0.8877	—	50 g
2720	Sulfur in Di-*n*-Butyl-Sulfide	21.91	—	5 × 10 mL
2721	Crude Oil	1.5832	0.0417	5 × 10 mL
2722	Crude Oil	0.21037	0.1292	5 × 10 mL
2723a	Sulfur in Diesel Fuel Oil	0.00110	—	10 × 10 mL
2724b	Sulfur in Diesel Fuel Oil	0.04265	0.000034	10 × 10 mL
2770	Sulfur in Diesel Fuel Oil	0.004157	—	10 × 10 mL
2771	Sulfur in Diesel Fuel Blend Stock	0.0000102	—	100 mL
2775	Foundry Coke	0.5816	—	50 g
2776	Furnace Coke	0.825	—	50 g

GASES

SRM	Nominal Amount-of-Substance (µmol/mol)
Ambient Non-Methane Organics in Nitrogen (15 components in large cylinder)	
1800b	5 nmol/mol
Volatile Organics in Nitrogen (30 components)	
1804c	5 nmol/mol
Carbon Dioxide in Air (Certified for CO_2)	
1676	365
2617	500
Carbon Monoxide in Air (Certified for CO)	
2612a	10
2613a	20
2614a	42

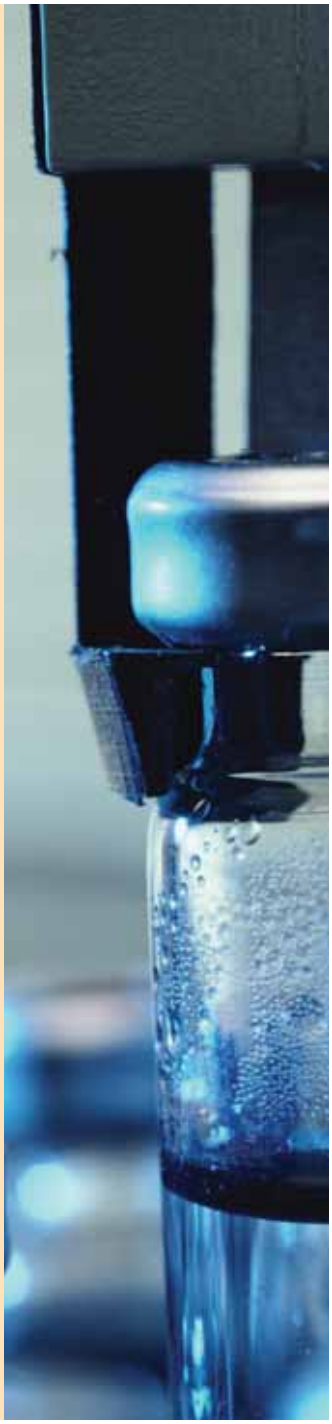
GASES (continued)

SRM	Nominal Amount of Substance Fraction (µmol/mol)
Carbon Dioxide in Nitrogen (Certified for CO_2)	
1674b*	7 mol %
2619a	0.5 mol %
2620a	1.0 mol %
2621a	1.5 mol %
2622a	2.0 mol %
2623a	2.5 mol %
2624a	3.0 mol %
2625a*	3.5 mol %
2745*	16 mol %
Carbon Monoxide in Nitrogen (Certified for CO)	
1677c*	10
1678c*	50
1679c*	100
1680b*	500
1681b*	1000
2635a*	25
2636a*	250
2637a*	2500
2638a*	5000
2639a	1 mol %
2640a	2 mol %
2641a	4 mol %
2642a*	8 mol %

**Available as a NIST Traceable Reference Material (NTRM); from commercial suppliers. A suppliers list is available on our website.*

GASES (continued)

SRM	Nominal Amount of Substance Fraction (µmol/mol)
Carbon Monoxide in Nitrogen (Certified for CO) *continued*	
2740a	10 mol %
2741a	13 mol %
Hydrogen Sulfide in Nitrogen (Certified for H_2S)	
2730	5
2731	20
Methane in Air (Certified for CH_4)	
1658a	1
1659a	10
1660a (also certified for C_3H_8)	4 (methane) 1 (propane)
2750	50
2751	100
Nitric Oxide in Nitrogen (Certified for NO)	
1683b*	50
1684b*	100
1685b*	250
1686b*	500
1687b*	1000
2629a*	20
2630*	1500
2631a*	3000
2735	800



**Available as a NIST Traceable Reference Material (NTRM); from commercial suppliers. A suppliers list is available on our website.*

GASES (continued)

SRM	Nominal Amount of Substance Fraction (µmol/mol)
Nitric Oxide in Nitrogen (Certified for NO)	
2627a	5
2628a	10
2737	0.5
2738	1.0
Oxygen in Nitrogen (Certified for O_2)	
2657a*	2 mol %
2658a*	10 mol %
2659a*	21 mol %
Propane in Air (Certified for CH_4)	
1660a (also certified for C_3H_8)	4 (methane) 1 (propane)
1665b	3
1666b	10
1667b	50
1668b*	100
1669b	500
2764	0.25
2765 (also certified for C_3H_8)	100
Propane in Nitrogen (Certified for C_3H_8)	
2644a	250
2646a	1000
2647a	2500
Oxides of Nitrogen in Air (Certified for NO_2)	
2660a*	100

**Available as a NIST Traceable Reference Material (NTRM); from commercial suppliers. A suppliers list is available on our website.*

The gas NTRM program was established in 1992 in partnership with the U.S. EPA and specialty gas companies as a means for providing end users with the wide variety of certified gas standards needed to implement the Emissions Trading Provision of the 1990 Clean Air Act.

GASES (continued)

SRM	Nominal Amount of Substance Fraction (µmol/mol)
Sulfur Dioxide in Nitrogen (Certified for SO_2)	
1661a*	500
1662a*	1000
1663a*	1500
1664a*	2500
1689*	5
1693a*	50
1694a*	100
1696a*	3500

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The gas NTRM program was established in 1992 in partnership with the U.S. EPA and specialty gas companies as a means for providing end users with the wide variety of certified gas standards needed to implement the Emissions Trading Provision of the 1990 Clean Air Act.

INDUSTRIAL HYGIENE

Materials on Filter Media

These SRMs consist of potentially hazardous materials deposited on filters to be used to determine the levels of these materials in industrial atmospheres.

SRM/RM	Description	Set Size	Elemental Composition	Diameter (mm)	Pore Size (µm)
2783	Air Particulate on Filter	2 filters, plus 2 blanks	18 certified values 9 reference values	47	0.4
8785	Particulate Matter on Filters	3 filters	1 reference value 2 information values	37	—
8786	Filter Blank for RM 8785	2 filters,	1 blank filter	37	—

Trace Constituent Elements in Blank Filters

SRMs 2678 and 2681 are for use in evaluating the performance of air sampling filter methods with either certified values (in µg) or limits of detection (X_D) for each of 30 constituent elements, as well as six leachable anions and cations.

SRM	Description	Diameter (mm)	Pore Size (µm)	Filter Weight (g)
2678	Cellulose Acetate Membrane	47	0.45	0.09
2681	Ashless Blank Filter	42.5	—	0.14

Respirable Silica

These SRMs are intended for use in determining, by X-ray diffraction, the levels of respirable silica in an industrial atmosphere according to the National Institute for Occupational Safety and Health (NIOSH) Analytical Method 7500 or equivalent methods.

SRM	Description	Mass Fraction/Mass Loading	Unit Size
1878a	Respirable Alpha Quartz	93.7% ± 0.21%	5 g
1879a	Respirable Cristobalite	88.2% ± 0.4%	5 g
2950	Respirable Alpha Quartz on Filter Media	(10, 20, 50, 100, 250, 500) µg/filter	set SRMs 2952-57
2951	Respirable Alpha Quartz on Filter Media	5 µg/filter	5 filters (5 blanks)
2952	Respirable Alpha Quartz on Filter Media	10 µg/filter	5 filters (5 blanks)
2953	Respirable Alpha Quartz on Filter Media	20 µg/filter	5 filters (5 blanks)
2954	Respirable Alpha Quartz on Filter Media	50 µg/filter	5 filters (5 blanks)
2955	Respirable Alpha Quartz on Filter Media	100 µg/filter	5 filters (5 blanks)
2956	Respirable Alpha Quartz on Filter Media	250 µg/filter	5 filters (5 blanks)
2957	Respirable Alpha Quartz on Filter Media	500 µg/filter	5 filters (5 blanks)
2958	Respirable Alpha Quartz on Filter Media	1000 µg/filter	5 filters (5 blanks)
2960	Respirable Alpha Cristobalite on Filter Media	(5, 10, 20, 50, 100, 250) µg/filter	set SRMs 2961-66
2961	Respirable Alpha Cristobalite on Filter Media	5 µg/filter	5 filters (5 blanks)
2962	Respirable Alpha Cristobalite on Filter Media	10 µg/filter	5 filters (5 blanks)
2963	Respirable Alpha Cristobalite on Filter Media	20 µg/filter	5 filters (5 blanks)
2964	Respirable Alpha Cristobalite on Filter Media	50 µg/filter	5 filters (5 blanks)
2965	Respirable Alpha Cristobalite on Filter Media	100 µg/filter	5 filters (5 blanks)
2966	Respirable Alpha Cristobalite on Filter Media	250 µg/filter	5 filters (5 blanks)
2967	Respirable Alpha Cristobalite on Filter Media	500 µg/filter	5 filters (5 blanks)

Lead in Paint, Dust, and Soil

These SRMs and RM have been developed in conjunction with the U.S. EPA to monitor paint, dust, and soil sources of lead.

SRM/RM	Lead Concentration	Unit Size
Paint Film		
2570	<0.001 mg/cm^2	1 blank film
2571	3.58 mg/cm^2	1 film, plus 1 blank
2572	1.527 mg/cm^2	1 film, plus 1 blank
2573	1.040 mg/cm^2	1 film, plus 1 blank
2574	0.714 mg/cm^2	1 film, plus 1 blank
2575	0.307 mg/cm^2	1 film, plus 1 blank
2576 (High Level)	5.59 mg/cm^2	1 film, plus 1 blank
2579a (Set of 6: SRMs 2570 to 2575)	0.307 to 3.58 mg/cm^2	5 films, plus 1 blank
Powdered Paint		
2580	4.34 %	30 g
2581	0.449 %	35 g
2582	209.8 mg/kg	20 g
2589	9.99 %	35 g
Indoor Dust, Trace Elements in (As, Cd, Cr, Hg, Pb)		
2583	85.9 mg/kg	8 g
2584	9761 mg/kg	8 g
Soil, Trace Elements in		
2586	432 mg/kg	50 g
2587	3242 mg/kg	50 g
Paint on Fiberboard		
8680	1 to 2 mg/cm^2	1 sheet: (10.2 × 15.2 × 1.3) cm

Asbestos

SRM	Description	Asbestos Type	Unit Size
1866b	Common Commercial Asbestos	chrysotile grunerite (Amosite) riebeckite (Crocidolite)	set (3) 1 to 3 g each

Zeolites (powder form)

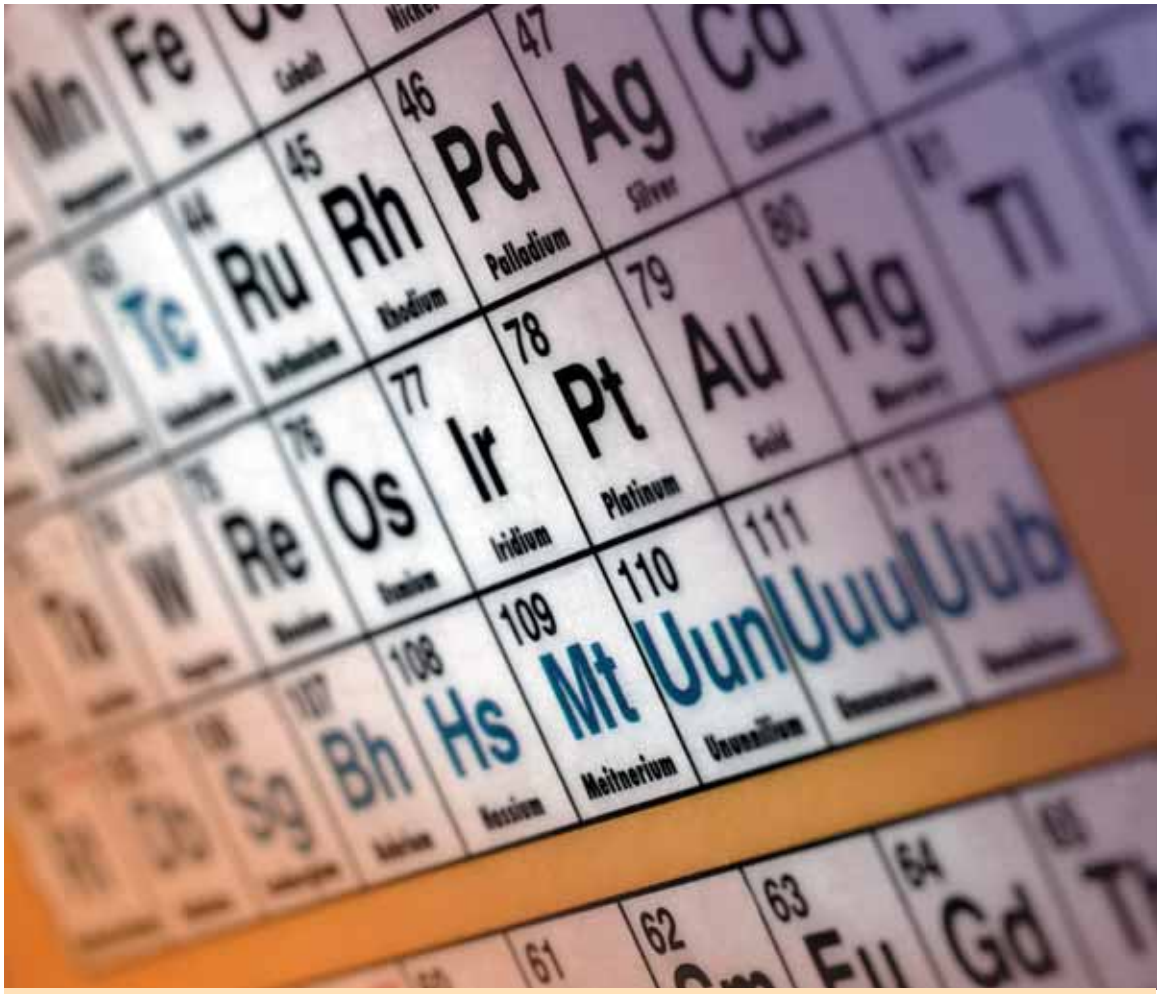
RM	Type	Unit Size (in g)	Na	Al	Si**	Si***	LOI	LOF
8850	Zeolite Y	35 - 40	7.225	8.49	22.52	30.336	25.679	25.37
8851	Zeolite A	35 - 40	12.732	14.766	15.27	19.541	21.464	22.1
8852	Ammonium ZSM-5	35 - 40	-	1.396	41.18	45.19	8.5	8.47

**See current certificate of analysis for exact assigned values and estimates of uncertainty.*
***Value relative to the hydrated sample mass.*
****Value relative to sample mass ignited at 1000 °C*

High Purity Materials

Elemental Composition in High Purity Metals

For more information, see Table 104.1 High Purity Metals on our website www.nist.gov/srm



SRM/RM	Description	Unit Size	
680a(L1)	High Purity Platinum	wire:	0.51 mm diameter × 10 cm
682	High Purity Zinc	semicirc:	57 mm
683	Zinc Metal	semicirc:	57 mm
685R	High Purity Gold	rod:	5.9 mm diameter × 25 mm
726	Selenium, Intermediate Purity	shot:	450 g
728	Zinc, Intermediate Purity	shot:	450 g
885	Refined Copper	pin:	200 g
8011	Gold Nanoparticle RMs	2 × 5 mL ampoules	
8012	Gold Nanoparticle RMs	2 × 5 mL ampoules	
8013	Gold Nanoparticle RMs	2 × 5 mL ampoules	

Stoichiometric Standards

These SRMs are defined as primary, working, and secondary standards in accordance with recommendations of the Analytical Chemistry Section of the International Union of Pure and Applied Chemistry [Ref. Analyst 90, 251 (1965)]. These definitions are as follows:

- Primary Standard: a commercially available substance of purity 100 % ± 0.02 % (Purity 99.98± %)
- Working Standard: a commercially available substance of purity 100 % ± 0.05 % (Purity 99. 95± %)
- Secondary Standard: a substance of lower purity which can be standardized against a primary grade standard

SRM/RM	Description	Certified Use [mass fraction, in %]	Stoichiometric Purity	Unit Size (g)
17f	Sucrose	Purity Polarimetric Standard	99.950	60
84l	Potassium Hydrogen Phthalate	Acidimetric Standard	99.9911	60
136f	Potassium Dichromate	Oxidimetric Standard	99.9954	60
350b	Benzoic Acid	Acidimetric Standard	99.9978	30
351a	Sodium Carbonate	Acidimetric Standard	99.970	50
723d	Tris(hydroxymethyl)aminomethane	Acidimetric Standard	99.901	50
917c	D-Glucose (Dextrose)	Purity Polarimetric Standard	99.7	50
973	Boric Acid	Acidimetric Value	100.009	100
999b	Potassium Chloride	Assay Values for: 1. Potassium Chloride 2. Potassium 3. Chloride	 99.977 52.4379 47.5519	60
8040	Sodium Oxalate	Reductometric Standard	99.951	60

Microchemistry

Unit Size: 2 g

SRM	Description	Certified Component
141d	Acetanilide	C, H, N, O
142	Anisic Acid	CH_3O-
143d	Cystine	C, H, N, S, O
148	Nicotinic Acid	C, H, N
2141	Urea	N
2143	p-Fluorobenzoic Acid	F
2144	m-Chlorobenzoic Acid	Cl

Spectrometric Single Element Solutions

Unit Size: 50 mL

These SRMs are intended as standard solutions for calibrating instruments used in atomic spectrometry, including atomic absorption spectrophotometry, inductively coupled plasma optical emission spectrometry, and inductively coupled plasma mass spectrometry.

SRM	Element	Nominal Acid Concentration
3101a	Aluminum	HNO_3 10 %
3102a	Antimony	HNO_3 10 % + HF 2 %
3103a	Arsenic	HNO_3 10 %
3104a	Barium	HNO_3 10 %
3105a	Beryllium	HNO_3 10 %
3106	Bismuth	HNO_3 10 %
3107	Boron	H_2O
3108	Cadmium	HNO_3 10 %
3109a	Calcium	HNO_3 10 %
3110	Cerium	HNO_3 10 %
3111a	Cesium	HNO_3 1 %
3112a	Chromium	HNO_3 10 %
3113	Cobalt	HNO_3 10 %
3114	Copper	HNO_3 10 %
3115a	Dysprosium	HNO_3 10 %
3116a	Erbium	HNO_3 10 %
3117a	Europium	HNO_3 10 %
3118a	Gadolinium	HNO_3 10 %
3119a	Gallium	HNO_3 10 %
3120a	Germanium	HNO_3 10 % + HF 2 %
3121	Gold	HCl 10 %
3122	Hafnium	HNO_3 10 % + HF 2 %
3123a	Holmium	HNO_3 10 %
3124a	Indium	HNO_3 10 %
3126a	Iron	HNO_3 10 %
3127a	Lanthanum	HNO_3 10 %
3128	Lead	HNO_3 10 %
3129a	Lithium	HNO_3 1 %
3130a	Lutetium	HNO_3 10 %
3131a	Magnesium	HNO_3 10 %
3132	Manganese	HNO_3 10 %

(continued)

Spectrometric Single Element Solutions (continued)

SRM	Element	Nominal Acid Concentration
3133	Mercury	HNO_3 10 %
3134	Molybdenum	HCl 10 %
3135a	Neodymium	HNO_3 10 %
3136	Nickel	HNO_3 10 %
3137	Niobium	HNO_3 10 % + HF 2 %
3138	Palladium	HCl 10 %
3139a	Phosphorus	HNO_3 0.8 %
3140	Platinum	HCl 10 %
3141a	Potassium	HNO_3 1 %
3142a	Praseodymium	HNO_3 10 %
3143	Rhenium	HNO_3 10 %
3144	Rhodium	HCl 10 %
3145a	Rubidium	HNO_3 1 %
3147a	Samarium	HNO_3 10 %
3148a	Scandium	HNO_3 10 %
3149	Selenium	HNO_3 10 %
3150	Silicon	H_2O
3151	Silver	HNO_3 10 %
3152a	Sodium	HNO_3 1 %
3153a	Strontium	HNO_3 10 %
3154	Sulfur	H_2SO_4 0.1 %
3155	Tantalum	HNO_3 10 % + HF 2 %
3156	Tellurium	HCl 10 %
3157a	Terbium	HNO_3 10 %
3158	Thallium	HNO_3 10 %
3159	Thorium	HNO_3 10 %
3160a	Thulium	HNO_3 10 %
3161a	Tin	HNO_3 5 % + HF 1 %
3162a	Titanium	HNO_3 10 % + HF 2 %
3163	Tungsten	HNO_3 7 % + HF 4 %
3164	Uranium	HNO_3 10 %
3165	Vanadium	HNO_3 10 %
3166a	Ytterbium	HNO_3 10 %
3167a	Yttrium	HNO_3 10 %
3168a	Zinc	HNO_3 10 %
3169	Zirconium	HNO_3 10 % + HF 2 %
3177	Mercury (II) Chloride	HNO_3 3 % + HCl 4 %

Anion Chromatography Solutions

Unit Size: 50 mL

These SRMs are single component solutions prepared gravimetrically for use in anion chromatography or any other technique that requires aqueous standard solutions for calibration or control materials.

SRM	Description	Nominal Mass Fraction (mg/kg)
3181	Sulfate	1000
3182	Chloride	1000
3183	Fluoride	1000
3184	Bromide	1000
3185	Nitrate	1000
3186	Phosphate	1000

Stable Isotopic Materials

SRM	Description	Element for which Isotopic Composition is Certified	Unit Size and Form
951a	Boric Acid	Boron	2 g powder
952	Boric Acid, 95% enriched ^{10}B	Boron	0.25 g powder
973	Boric Acid	Boron	100 g powder
975a	Sodium Chloride	Chlorine	0.25 g powder
977	Sodium Bromide	Bromide	0.25 g powder
978a	Silver Nitrate	Silver	0.25 g powder
979	Chromium Nitrate	Chromium	0.25 g powder
980	Magnesium Metal	Magnesium	0.25 g chips
981	Lead Metal, Natural	Lead	1.0 g wire
982	Lead Metal, $^{208}Pb/^{206}Pb$ Equal Atom	Lead	1.0 g wire
983	Lead Metal, Radiogenic	Lead	1.0 g wire
984	Rubidium Chloride, Assay and Isotopic	Rubidium	0.25 g powder
986	Nickel Metal	Nickel	0.5 g powder
987	Strontium Carbonate	Strontium	1.0 g powder
994	Gallium Metal	Gallium	0.25 g disk
997	Thallium Metal	Thallium	0.25 g rod
3231	Iodine-129 (high level)	Iodine	5 × 5 mL (plus blank)

Light Stable Isotopic Materials

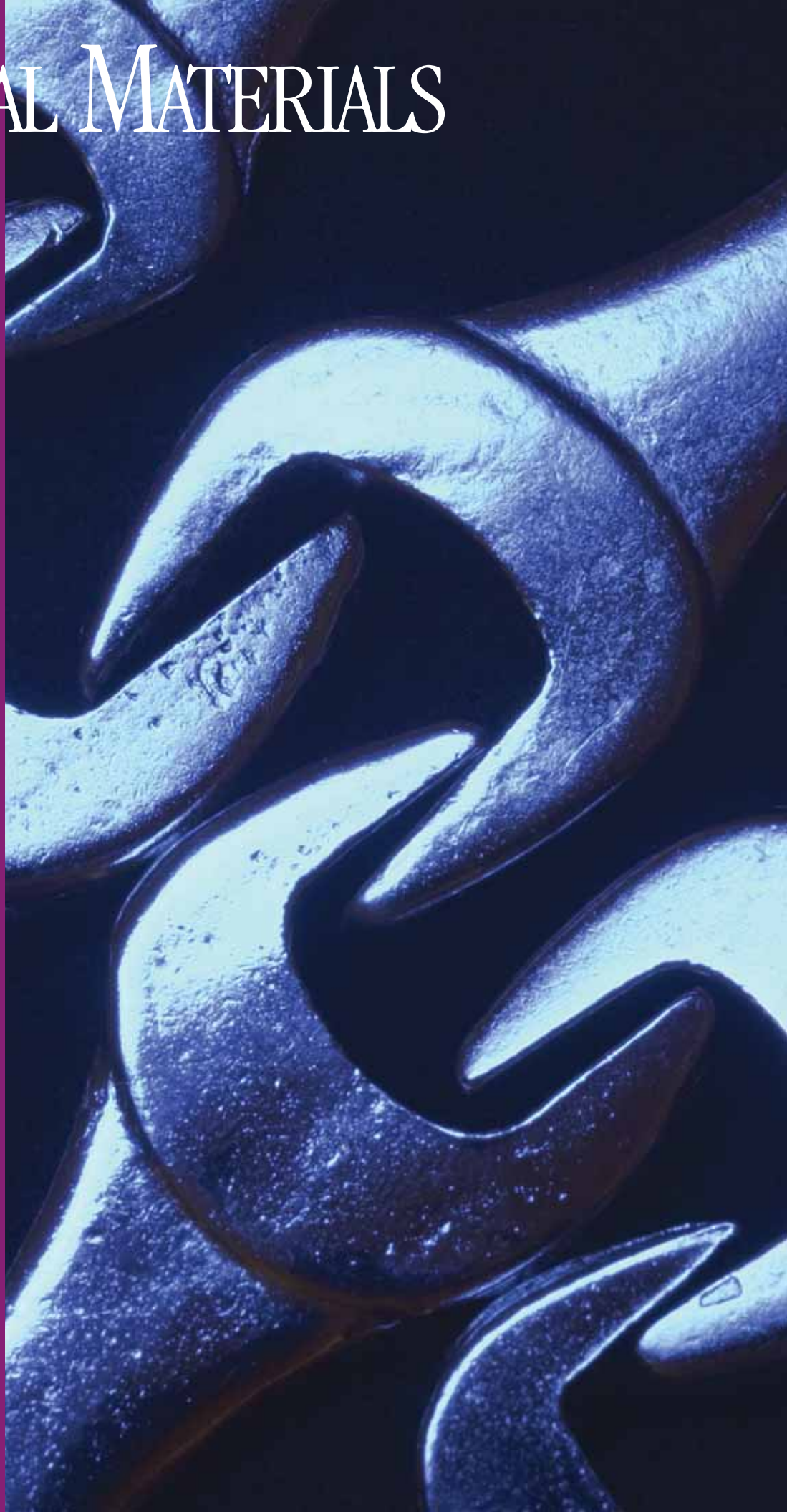
These RMs are for calibration of isotope-ratio mass spectrometers and associated sample preparation systems. They are distributed by NIST on behalf of the International Atomic Energy Agency (IAEA). At the request of the IAEA, quantities of these materials are limited to one unit of each RM per laboratory every 3 years.

Isotopic Ratio Legend:

1. $\delta^{2}H_{VSMOW2}$
2. $\delta^{18}O_{VSMOW2}$
3. $\delta^{13}C_{VPDB}$
4. $^{6}Li / ^{7}Li$
5. $\delta^{30}Si_{NBS28}$
6. $\delta^{15}N_{AIR}$
7. $\delta^{34}S_{VCDT}$

RM	Description	Isotopic Systems	Unit Size
8535	VSMOW2-Water	1,2	20 mL
8536	GISP-Water	1,2	20 mL
8537	SLAP2-Water	1,2	20 mL
8538	NBS30-Biotite	1,2	2 g
8539	NBS22-Oil	1,3	1 mL
8540	PEFI-Polyethylene	1,3	~2 mg
8541	USGS24-Graphite	3	0.8 g
8542	Sucrose ANU-Sucrose	3	1 g
8543	NBS18-Carbonatite	2,3	0.4 g
8544	NBS19-Limestone	2,3	0.4 g
8545	LSVEC-Lithium Carbonate	2,3	0.4 g
8546	NBS28-Silica Sand (Optical)	2,5	0.4 g
8547	IAEA-N1-Ammonium Sulfate	6	0.4 g
8548	IAEA-N2-Ammonium Sulfate	6	0.4 g
8549	IAEA-N3-Potassium Nitrate	6	0.4 g
8550	USGS25-Ammonium Sulfate	6	0.4 g
8551	USGS26-Ammonium Sulfate	6	0.4 g
8552	NSVEC-Gaseous Nitrogen	6	300 µmol
8553	Soufre de Lacq - Elemental Sulfur	7	0.5 g
8554	IAEA-S1-Silver Sulfide	7	0.5 g
8555	IAEA-S2-Silver Sulfide	7	0.5 g
8556	NBS123-Sphalerite	7	0.5 g
8557	NBS127-Barium Sulfate	2,7	0.5 g
8558	USGS32-Potassium Nitrate	2,6	0.5 g
8559	Natural Gas Isotopic	1,3	1 cylinder (0.1 mole)
8561	Natural Gas Isotopic	1,3	1 cylinder (0.1 mole)
8562	CO_2-Heavy, Paleomarine Origin	2,3	2 tubes
8563	CO_2-Light, Petrochemical Origin	2,3	2 tubes
8564	CO_2-Biogenic, Modern Biomass Origin	2,3	2 tubes
8568	USGS34 Potassium nitrate	2,6	0.9 g
8569	USGS35 Sodium nitrate	2,6	0.9 g
8573	USGS40 L-glutamic acid	3,6	1 g
8574	USGS41 L-glutamic acid	3,6	0.5 g

Industrial Materials



FERROUS METALS

Steels

These SRMs consist of selected steel alloys that provide a wide range of analytical values for relevant elements. Please visit our website to view the relevant certificate or report of investigation for all available certified, reference and information values.

Low Alloy Steels (chip)

Unit Size: 150 g (unless otherwise noted)

SRM	Description
72g	AISI 4130
293	AISI 8620 (Cr - Ni - Mo)
139b	AISI 8640 (Cr - Ni - Mo)
291	ASTM A213 (Cr - Mo)
163	Chromium Steel (100 g)
36b	Chromium-Molybdenum Steel
155	Chromium-Tungsten Steel
129c	SAE 112 High Sulfur
2171	HSLA 100 (6Ni - Cr - Cr - Cu - Mo)
106b	Nitralloy™ G (Cr - Mo - Al)
32e	SAE 3140 (Ni - Cr)
100b	SAE 340 (Mn)
33e	SAE 4820 (Ni)
30f	SAE 6150 (Cr - V)
Silicon Steels	
179	High Silicon Steel
125b	High Silicon Steel, Calcium-Bearing
131g	Low Carbon Silicon Steel

Low Alloy Steels (disk and rod)

For more information, see Table 101.8 Low Alloy Steels on our website www.nist.gov/srm.
Nominal Sizes for Solid Steel SRMs:

600 Series: 3.2 mm diameter × 51 mm
1100 and 1200 Series: 31 mm diameter × 19 mm
1700 Series: 34 mm diameter × 19 mm

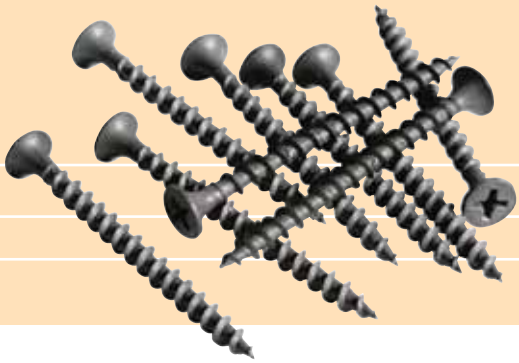
A "C" preceding the SRM number indicates a chill cast sample; 31 mm diameter × 19 mm.

SRM	Description
1270	2-1/4 Chromium - 1 Molybdenum Low Alloy Steel, A 336 (F-22)
C1285	A242, Modified
C1221	AISI 1211, Modified, Resulfurized/Rephosphorized
1269	AISI 1526, Modified (Line Pipe Steel)
1224	Carbon (AISI 1078)
1225	Low Alloy (AISI 4130)
1262b	AISI 94B17 (Modified)
1254	Calcium in Low Alloy Silicon Steel
663	Chromium-Vanadium Steel, Modified
665	Electrolytic Iron
1265a	Electrolytic Iron
1264a	High Carbon Steel, Modified
1135	High Silicon Steel
1134	High Silicon Steel
1226	HY 130
1286	HY 80
1228	Basic Open Hearth Steel (0.1 % Carbon)
1227	Basic Open Hearth Steel (1 % Carbon)
1761a	Low Alloy Steel
1762a	Low Alloy Steel
1763a	Low Alloy Steel
1764a	Low Alloy Steel
1765	Low Alloy Steel
1766	Low Alloy Steel
1767	Low Alloy Steel
1768	High Purity Iron
1218	Low Carbon & Sulfur Silicon Steel
1271	Ni-Cr-Cu-Mo (HSLA100)

Plain Carbon Steels (chip)

Unit Size: 150 g (unless otherwise noted)

SRM	Description
8k	Bessemer Steel (Simulated), 0.1% Carbon
178	0.4C Basic Oxygen Furnace Steel
13g	0.6 % Carbon Steel
20g	AISI 1045 Steel
14g	AISI 1078 Carbon Steel
368	AISI 1211 Steel
19h	Basic Electric Steel, 0.2 % Carbon
16f	Basic Open Hearth Steel, 1 % Carbon
Basic Open-Hearth Steel	
15h	0.1 % Carbon
12h	0.4 % Carbon
152a	0.5 % Carbon (Tin-Bearing)



Stainless Steels (disk)

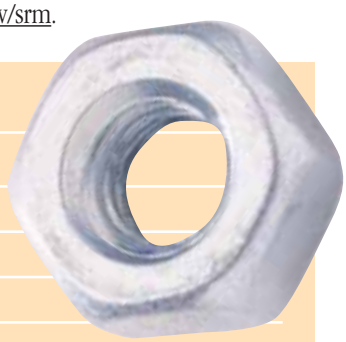
Unit Size: 32 mm diameter × 19 mm

For more information, see Table 101.10 Stainless Steels (disk) on our website www.nist.gov/srm.

SRM	Description
1219	AISI 431 (16Cr - 2Ni)
1172	AISI 348 (17Cr - 11Ni - 0.6Nb)
1223	Chromium Steel
1297	SAE 201
1295	SAE 405
C1296	SAE 460
C1153a	(17Cr - 9Ni)
C1152a	(18Cr - 11Ni)
1155	AISI 316 (18Cr - 12Ni - 2Mo)
C1154a	Stainless Steel, (19Cr - 13Ni)
C1151a	Stainless Steel, (23Cr - 7Ni)
1171	AISI 321 (17 Cr - 11Ni - 0.3Ti)

Stainless Steels (chip)

Unit Size: 150 g (unless otherwise noted)
For more information, see Table 101.6 Stainless Steels (chip) on our website www.nist.gov/srm.



SRM	Description
339	SAE 303Se (17Cr - 9Ni - 0.2Se)
101g	AISI 304 L (18Cr - 10Ni)
343a	AISI 431 (16Cr - 2Ni)
123c	AISI 348 (17Cr - 11Ni - 0.6Nb)
121d	AISI 321 (17Cr - 11Ni - 0.3Ti)
160b	AISI 316 (18Cr - 12Ni - 2Mo)
166c	AISI 316L Low Carbon Stainless Steel (100 g)
893	SAE 405 (Cr)
895	SAE 201 (Cr-Mn)
73c	SAE 420 (13 % Cr)
133b	Cr–Mo

Special Low Alloy Steels (chip and pin)

Unit Size: 150 g (unless otherwise noted)
For more information, see Table 101.3 Special Low Alloy Steels (chip and pin) on our website www.nist.gov/srm.

SRM	Description
2159	Low Alloy Steel (pin - 200 g)
2160	Low Alloy Steel (pin - 200 g)
2165	Low Alloy Steel
2166	Low Alloy Steel
2167	Low Alloy Steel
361	AISI 4340 Steel
363	Chromium-Vanadium Steel, Modified
364	High Carbon Steel, Modified
2168	High Purity Iron

Specialty Steels (disk)

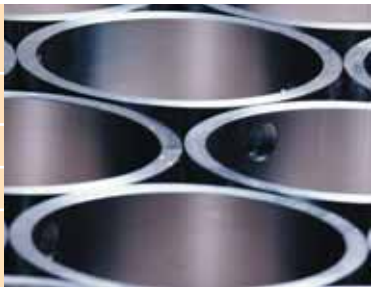
For more information, see Table 101.11 Specialty Steels (disk) on our website www.nist.gov/srm.

SRM	Description	Unit Size
1158	High Nickel Steel, 36 % Nickel	32 mm diameter × 19 mm
1772	S-7 Tool Steel	34 mm diameter × 19 mm
1157	AISI M2, Tool Steel	32 mm diameter × 19 mm
1233	Valve Steel	35 mm diameter × 19 mm

Tool Steels (chip)

Unit Size: 150 g
For more information, see Table 101.7 Tool Steels (chip form) on our website www.nist.gov/srm.

SRM	Description
134a	Molybdenum - Tungsten - Chromium - Vanadium Steel
2172	S-7 Tool Steel
132b	AISI M2, Tool Steel
50c	Tungsten - Chromium - Vanadium Steel



High Alloy Steels (chip)

Unit Size: 150 g (unless otherwise noted)
For more information, see Table 101.4 High Alloy Steels on our website www.nist.gov/srm.

SRM	Description
345a	Cu Precipitation Hardening Steel (15Cr - 4Ni)
344	Mo Precipitation Hardening Steel (15Cr - 7Ni)
126c	High Nickel Steel (36 % Ni)
868	High Temperature Alloy (Fe-Ni-Co) (100 g)
348a	High Temperature Alloy A286 (Ni-Cr)
862	High Temperature Alloy L605 (100 g)
346a	Valve Steel

Steelmaking Alloys (fine powder)

For more information, see Table 101.12 Steelmaking Alloys on our website www.nist.gov/srm.

SRM	Description
57b	Silicon Metal
58a	Ferrosilicon (73 % Silicon-Regular Grade)
59a	Ferrosilicon
195	Ferrosilicon (75 % Silicon High Purity Grade)
196	Low Carbon Ferrochromium
64c	High Carbon Ferrochromium
68c	High Carbon Ferromanganese
90	Ferrophosphorus
347	Magnesium Ferrosilicon
689	Silicon Ferrochromium

Cast Irons (chip)

For more information, see Table 101.13 Cast Irons (chip) on our website www.nist.gov/srm.

SRM	Title
4L	Cast Iron
5m	Cast Iron
6g	Cast Iron
122i	Cast Iron
115a	Copper-Nickel-Chromium Cast Iron
341	Ductile Cast Iron
334	Gray Cast Iron (Carbon and Sulfur)
890	High-Alloy White Cast Iron, HC 250+V
891	High-Alloy White Cast Iron, Nickel-Hard, Type I
892	High-Alloy White Cast Iron, Nickel-Hard, Type IV
82b	Nickel Chromium Cast Iron
107c	Nickel-Chromium-Molybdenum Cast Iron
342a	Nodular Cast Iron
338	White Cast Iron, Carbon and Sulfur

Cast Steels, White Cast Irons, and Ductile Irons (disk)

Unit Size: 32 mm diameter × 19 mm
For more information, see Table 101.14 Cast Steels, White Cast Irons, and Ductile Irons on our website www.nist.gov/srm.

SRM	Description
1138a	Cast Steel (No. 1)
1139a	Cast Steel (No. 2)
C1173	Cast Steel (No. 3)
C2423a	Ductile Iron B
C2424	Ductile Iron C
C1291	High Alloy White Cast Iron, Ni-Hard, Type I
C1292	High Alloy White Cast Iron, Ni-Hard, Type IV
C1290	High Alloy White Cast Iron, HC-250+V
1173	Nickel-Chromium-Molybdenum-Vanadium Steel
C1137a	White Cast Iron
C1145a	White Cast Iron

High Temperature Alloys (chip and disk)

For more information, see Table 101.9 High Temperature Alloys (chip and disk) on our website www.nist.gov/srm.

SRM	Description	Unit Size
866	Incoloy™ 800	100 g
867	Incoloy™ 825	100 g
1230	High Temperature Alloy A286	disk: 32 mm diameter × 19 mm
1246	Incoloy™ 800	disk: 35 mm diameter × 19 mm
1247	Incoloy™ 825	disk: 35 mm diameter × 19 mm
1250	High Temperature Alloy (Fe - Ni - Co)	disk: 32 mm diameter × 19 mm
C2400	High Alloy Steel, ACI 17/4 PH	disk: 32 mm diameter × 19 mm
C2401	High Alloy Steel ACI-CD-4M Cu	disk: 32 mm diameter × 19 mm

Gases in Metals: Iron and Steel (rod)

These SRMs are certified for oxygen content. Materials certified for nitrogen are noted.

SRM	Description	Rod Size (mm)
1089*	Gasometric Standard, set includes:	
	SRM 1095 AISI 4340 Steel	6.4 × 102
	SRM 1096 AISI 94B17 Steel, Modified**	6.4 × 102
	SRM 1097 Cr-V Steel, Modified	6.4 × 102
	SRM 1098 High Carbon Steel**	6.4 × 102
	SRM 1099 Electrolytic Iron	6.4 × 102
1754	AISI 4320 Oxygen in Low Alloy Steel,**	9.5 × 9.5 × 102
1755	Nitrogen in Low Alloy Steel	1.38 × 19
1090	Oxygen in Ingot Iron	6.35 × 102
1094	Oxygen in Maraging Steel	0.6 × 82
1091a	AISI 431 Oxygen in Stainless Steel	7.9 × 102
1093	Oxygen in Valve Steel	0.6 × 82

** These SRMs are sold only as a set designated SRM 1089.*
*** In addition to being certified for oxygen, these SRMs are also certified for nitrogen.*

NONFERROUS METALS

Aluminum Base Alloys (chip and disk)

SRMs 1710 through 1715 are specially prepared to include low levels of cadmium and lead encountered in the analysis of recycled aluminum.
For more information, see Table 102.1 Aluminum Base Alloys (chip and disk) on our website www.nist.gov/srm.

SRM	Description	Unit Size
87a	Silicon - Aluminum Alloy	75 g
853a	Aluminum Alloy 3004	40 g
854a	Aluminum Alloy 5182	40 g
855a	Aluminum Casting Alloy 356	30 g
856a	Aluminum Casting Alloy 380, Fine Millings	30 g
858	Alloy 6011, Modified	35 g
1241c	Aluminum Alloy 5182	disk: 63 mm diameter × 1.9 cm
1255b	Aluminum Alloy 356	disk: 63 mm diameter × 1.9 cm
1256b	Aluminum Alloy 380	disk: 63 mm diameter × 1.9 cm
1258-I	Alloy 6011, Modified	disk: 35 mm diameter × 19 mm
1240C	Aluminum Alloy 3004	disk: 63 mm diameter × 19 mm
1259	Alloy 7075	disk: 35 mm diameter × 19 mm

(continued)

Aluminum Base Alloys (chip and disk) (continued)

SRM	Description	Unit Size
1710	Alloy 3004	disk: 63 mm diameter × 19 mm
1711	Alloy 3004	disk: 63 mm diameter × 19 mm
1712	Alloy 3004	disk: 63 mm diameter × 19 mm
1713	Alloy 5182	disk: 63 mm diameter × 19 mm
1714	Alloy 5182	disk: 63 mm diameter × 19 mm
1715	Alloy 5182	disk: 63 mm diameter × 19 mm
2426	55% Aluminum Zinc Alloy	chip: 31 mm diameter 2 × 10^4 kg - 31 mm diameter

Cobalt Base Alloys (chip and disk)

For more information, see Table 102.2 Cobalt Base Alloys (chip and disk) on our website www.nist.gov/srm.

SRM	Description	Unit Size
862	High Temperature Alloy L605	chip: 100 g
1242	High Temperature Alloy L605	disk: 35 mm diameter × 19 mm
1775	Refractory Alloy MP 35 N	disk: 35 mm diameter × 19 mm
2175	Refractory Alloy MP 35 N	chip: 50 g

Copper "Benchmark" (chip and rod)

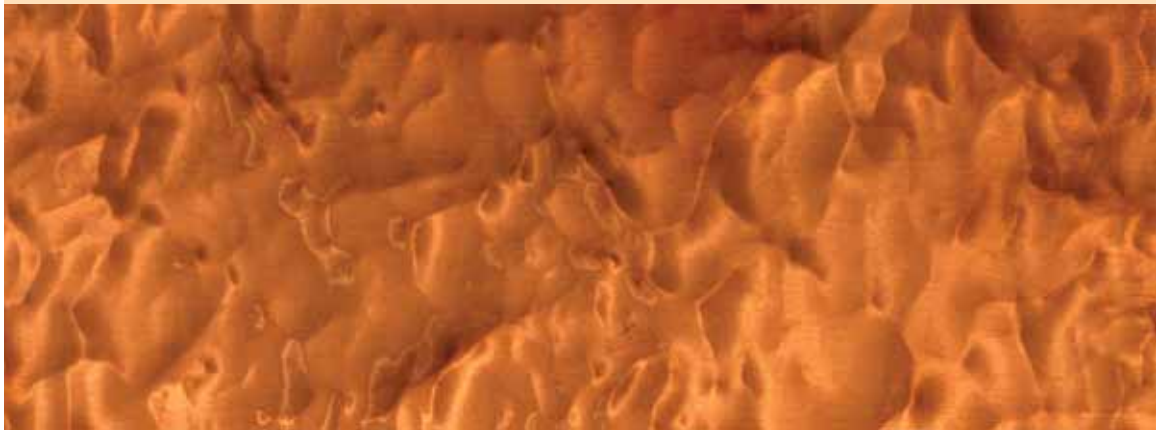
Unit Size: Chip: 50 g Rod: 6.4 min × 103 mm
For more information, see Table 102.5 Copper Benchmark (chip and rod) on our website www.nist.gov/srm.

SRM		Description
Chip	Rod/Chill Cast	
	494	Unalloyed Copper - Cu I
395	495	Unalloyed Copper - Cu II
396	496	Unalloyed Copper - Cu III
	457	Unalloyed Copper - Cu IV
398		Unalloyed Copper - Cu V
	498	Unalloyed Copper - Cu V
399	499	Unalloyed Copper - Cu VI
400	500	Unalloyed Copper - Cu VII
	C1251a	Phosphorus Deoxidized Copper VIII
	C1252a	Phosphorus Deoxidized Copper IX
	C1253a	Phosphorus Deoxidized Copper X
454 (35 g)		Unalloyed Copper - Cu XI

Copper Base Alloys (chip and rod)

For more information, see Table 102.3 Copper Base Alloys (chip and rod) on our website www.nist.gov/srm.

SRM	Description	Unit Size (g)
158a	Silicon, Bronze	150
Beryllium-Copper		
458	C-17510	50
459	C-17200	50
460	C-17300	50
Bronze		
871	CDA 521 Phosphor Bronze	100
872	CDA 544 Phosphor Bronze	100
1034	Unalloyed Copper	rod
1035	Leaded-Tin Bronze Alloy	50
Cupro-Nickel		
874	10 % CDA 706, High-Purity	100
875	10 % CDA 706, Doped	100
Nickel-Silver		
879	CDA 762	100
880	CDA 770	100



Copper Base Alloys (block and disk)

For more information, see Table 102.4 Copper Base Alloys (block and disk) on our website www.nist.gov/srm. The 1100 series SRMs are wrought disks 32 mm diameter × 19 mm. The C1100 series SRMs are chill cast blocks 32 mm square × 19 mm. Both forms have nearly identical elemental compositions.

SRM		Description
Disk	Block	
1107		Naval Brass B
1110		Red Brass B
1111		Red Brass C
1112	C1112	Gilding Metal A
1113	C1113	Gilding Metal B
1114	C1114	Gilding Metal C
1115	C1115	Commercial Bronze A
1116		Commercial Bronze B
1117	C1117	Commercial Bronze C
1276a		CDA 715 Cupro-Nickel

Lead Base Alloys (disk and powder forms)

SRM		Description	Unit Size (g)	
Powder	Disk		Powder	Disk
1129		Solder 63Sn - 37Pb	200	
127b	1131	Solder 40Sn - 60Pb	150	32 mm diameter × 19 mm
53e	1132	Lead Base Bearing Metal (84Pb - 10Sb - 6Sn)	150	32 mm diameter × 19 mm
	1727	Anode Tin (block form)		(30 × 30 × 30 mm)

Lead Base Materials (disk)

Unit Size: 50 mm diameter × 16 mm

SRM	Description
C2415	Battery Lead
C2416	Bullet Lead
C2417	Lead Base Alloy
C2418	High Purity Lead

Solder Thickness (plate form)

SRM	Description	Unit Size (g)		
Disk		*Powder*	*Disk*	
2321	Tin-Lead Sn: 60 Alloy Pb: 40	6.8	295	7.5

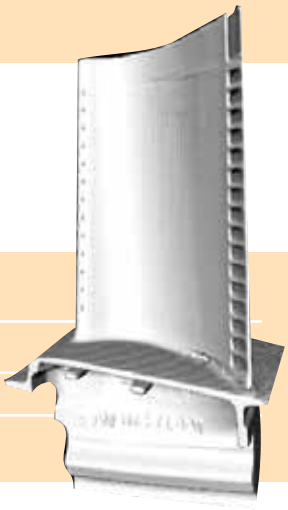
Tin Base Alloys (chip)

SRM	Description	Unit Size
54d	Tin Base Bearing Metal	170 g
1727	Anode Tin	30 × 30 × 30 mm
1729	Tin Alloy	1 disc

Nickel Base Alloys (chip and disk)

For more information, see Table 102.12 Nickel Base Alloys (chip and disk) on our website www.nist.gov/srm.

SRM	Description	Unit Size
349a	Waspaloy™	150 g
861	Nickel-Based Superalloy	50 g
864	Inconel™ 600	100 g
865	Inconel™ 625	100 g
882	Nickel-Copper Alloy (65Ni - 31Cu - 3Al)	100 g
1159	Electronic and Magnetic Alloy Ni-Fe	disk: 31 mm diameter × 19 mm
1160	Electronic and Magnetic Alloy Ni-Mo	disk: 31 mm diameter × 19 mm
1243	Waspaloy™	disk: 34 mm diameter × 19 mm
1244	Inconel™ 600	disk: 35 mm diameter × 19 mm
C1248	Nickel-Copper Alloy (66Ni - 30Cu)	disk: 32 mm diameter × 19 mm
1249	Inconel™ 718	disk: 41 mm diameter × 19 mm
C2402	Hastelloy™ C	disk: 32 mm diameter × 19 mm
1775	Refractory Alloy MP 35N	disk
2175	Refractory Alloy MP 35N	chip 50 g



Nickel Oxides (powder)

Unit Size: 25 g
For more information, see Table 102.14 Nickel Oxides on our website www.nist.gov/srm.

SRM	Description
671	Nickel Oxide No. 1
672	Nickel Oxide No. 2
673	Nickel Oxide No. 3

Trace Elements in Nickel Base Superalloys (chip)

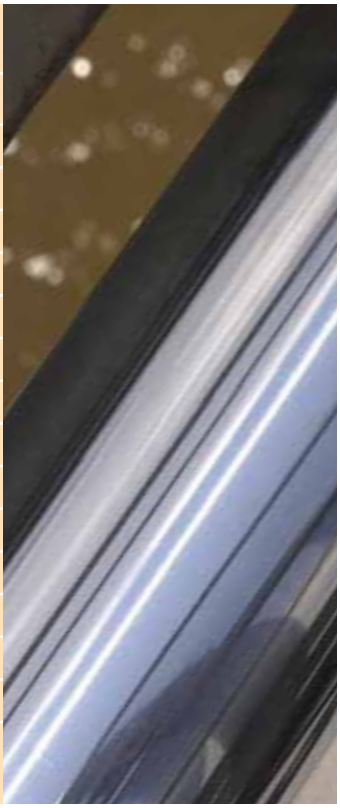
Unit Size: 35 g
For more information, see Table 102.13 Trace Elements in Nickel Base Superalloys (chip) on our website www.nist.gov/srm.

SRM	Description	Unit Size (g)
897	"Tracealloy" A	35
898	"Tracealloy" B	35
899	"Tracealloy" C	35

Titanium Base Alloys (chip and disk)

For more information, see Table 102.16 Titanium Base Alloys (chip and disk) on our website www.nist.gov/srm.

SRM	Description	Unit Size (g)
641	8 Mn (A)	disk: 32 mm diameter × 19 mm
642	8 Mn (B)	disk: 32 mm diameter × 19 mm
643	8 Mn (C)	disk: 32 mm diameter × 19 mm
647	6Al - 2Mo - 2Sn - 4Zr	50
648	5Al - 2Sn - 2Cr - 4Mo	50
649	15V - 3Al - 2Cr - 3Sn	50
650	Unalloyed Titanium A	30
651	Unalloyed Titanium B	30
654b	6Al - 4V	disk: 31 mm diameter × 19 mm
1128	15V - 3Al - 3Cr - 3Sn	disk: 35 mm diameter × 19 mm
2061	TiAl (NbW) Alloy	cube, 2 mm × 2 mm × 2 mm
2062	TiAl (NbW) Alloy	disk, 2.4 cm diameter
2431	6Al - 2Sn - 4Zr - 6Mo	50
2432	10V - 2Fe - 3Al	50
2433	8Al - 1Mo - 1V	50
173c	6Al - 4V	50



Hydrogen in Titanium (platelet)

SRM	Description	Unit Size
2452	Hydrogen in Titanium Alloy	10 g
2453	Hydrogen in Titanium Alloy	10 g
2454	Hydrogen in Titanium Alloy	10 g

Zirconium Base Alloys (chip)

SRM	Description	Unit Size
360b	Zirconium (Sn-Fe-Cr) Alloy	100 g

Zinc Base Alloys (chip and disk)

For more information, see Table 102.17 Zinc Base Alloys (chip and disk) on our website www.nist.gov/srm.

SRM	Description	Unit Size
94c	Die Casting Alloy	chip: 150 g
625	ASTM AG 40A Die Casting Alloy A	disk: 44 mm diameter × 19 mm
626	ASTM AG 40A Die Casting Alloy B	disk: 44 mm diameter × 19 mm
627	ASTM AG 40A Die Casting Alloy C	disk: 44 mm diameter × 19 mm
628	ASTM AC 41A Die Casting Alloy D	disk: 44 mm diameter × 19 mm
629	ASTM AC 41A Die Casting Alloy E	disk: 44 mm diameter × 19 mm
630	ASTM AC 41A Die Casting Alloy F	disk: 44 mm diameter × 19 mm
631	Zinc spelter, Modified	disk: 45 mm diameter × 19 mm
1736	Zinc-Aluminum (0.31 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1737	Zinc-Aluminum (0.63 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1738	Zinc-Aluminum (0.10 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1739	Zinc-Aluminum (0.21 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1740	Zinc-Aluminum (0.42 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1741	Zinc-Aluminum (0.52 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1742	Zinc-Aluminum (0.79 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
2139	Zinc-Aluminum (0.80 % Al) Die Casting Alloy	chip: 100 g
2426	Zinc-Aluminum	chip: 40 g

Microindentation Hardness (block form)

SRM	Description	Hardness Nominal (kgf/mm²)
1893	Bright Copper (Knoop)	125
1894a	Bright Copper (Vickers)	125
1895	Bright Nickel (Knoop)	600
1896b	Bright Nickel (Vickers)	600
1905	Bright Nickel (Knoop)	600
1906	Bright Nickel (Knoop)	600
1907	Bright Nickel (Knoop)	600
1908	Bright Nickel (Vickers)	600
1909	Bright Nickel (Vickers)	600
2798a	Bright Nickel (Vickers)	600
2830	Ceramic, Silicon Nitride (Knoop)	1500
2831	Ceramic, Tungsten Carbide (Vickers)	1530

CERAMICS AND GLASSES

Carbides (powder)

SRM/RM	Description	Unit Size (g)
112b	Silicon Carbide	80
276b	Tungsten Carbide	75
8983	Silicon Nitride Powder	4.5

Cemented Tungsten Carbides (powder)

Unit Size: 100 g

SRM	Description
887	Cemented Carbide (83W - 10Co)
888	Cemented Carbide (64W - 25Co - 5Ta)
889	Cemented Carbide (75W - 9Co - 5Ta - 4Ti)

Trace Elements (wafer)

These SRMs are for calibrating instruments and evaluating analytical techniques used to determine trace elements in inorganic matrices. SRMs 610 through 617 come in units of 6 wafers with wafer thicknesses of 3 mm for even numbered SRMs and 1 mm for odd numbered SRMs.

SRM	Description		
610/611	Nominal 500 mg/kg per element,	8 certified,	9 information values
612/613	Nominal 50 mg/kg per element,	8 certified,	18 information values
614/615	Nominal 1 mg/kg per element,	8 certified,	13 information values
616/617	Nominal 0.2 mg/kg per element,	5 certified,	11 information values

Glasses (powder and solid)

For more information, see Table 112.3 Glasses (powder and solid) on our website www.nist.gov/srm.

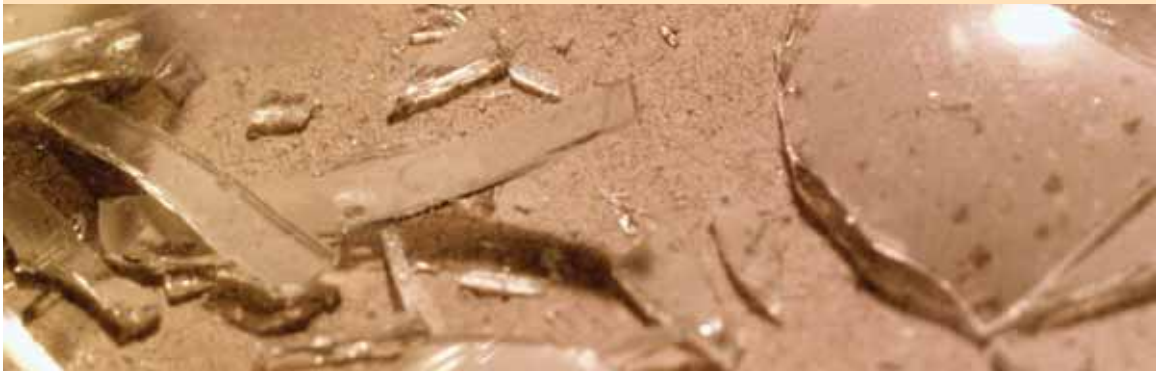
SRM	Description	Unit Size (g)
81a	Glass Sand	75
89	Lead-Barium	45
92	Low-Boron Soda-Lime Powder	45
93a	High-Boron Borosilicate	wafer: 32 mm diameter × 6 mm
165a	Glass Sand (low Iron)	75
620	Soda-Lime, Flat	3 platelets: 35 mm × 35 mm × 3 mm
621	Soda-Lime, Container	3 disks: 38 mm diameter × 5 mm
1411	Soft Borosilicate	10 platelets: 32 mm × 32 mm × 3 mm
1412	Multicomponent	8 platelets: 32 mm × 32 mm × 3 mm
1413	Glass Sand (high alumina)	75
1830	Soda-Lime, Float	3 platelets: 32 mm × 32 mm × 6 mm
1831	Soda-Lime, Sheet	3 platelets: 37 mm × 37 mm × 3 mm
1834	Fused Ore Glass	disk: 30 mm diameter × 3 mm
2696	Silica Fume	70

GLASS

Chemical and Physical Properties

Chemical Resistance [Durability] of Glass (solid form)

SRM	Description	Unit Size
622	Soda-Lime Silica	2.2 kg
623	Borosilicate	2.2 kg



Electrical Properties of Glass (bar form)

SRM	Description	Unit Size (cm)
624	Lead-Silica, for DC Resistivity	5 × 5 × 0.5
774	Lead-Silica, for Dielectric Constant	5 × 5 × 2.5
2870	Cross Linked Polystyrene	10 × 60

Viscosity of Glass (bar form)

SRM	Description	Unit Size
717a	Borosilicate	450 g

Glass Liquidus Temperature (solid form)

SRM	Description	Unit Size
773	Soda-Lime-Silica	2.5 cm × 2.5 cm × 0.6 cm
1416	Aluminosilicate	22 lengths of 12.7 cm tube (250 g)

Viscosity Fixpoints (solid forms)

SRM	Description	Unit Size
709	Extra Dense Lead Silica	4 cm × 4 cm × 5 cm
714	Alkaline Earth Alumina Silicate	.6 cm × 15.2 cm
717a	Borosilicate	4.2 cm × 4.2 cm × 12.5 cm

Relative Stress Optical Coefficient (bar form)

SRM	Description	Unit Size
709	Extra Dense Lead Silica	4 cm × 4 cm × 5 cm

CEMENTS

Portland Cements (powder)

SRM	Unit Size
Calcium Aluminate Cement	
1882a	4 × 5 g
1883a	4 × 5 g
Portland Cement	
634a	1 × 100g
1880b	4 × 5 g
1881a	4 × 5 g
1884b	4 × 5 g
1885a	4 × 5 g
1886a	4 × 5 g
1887a	4 × 5 g
1888a	4 × 5 g
1889a	4 × 5 g
Silica Fume	
2696	1 × 70 g

Cement Turbidimetry and Fineness

SRM	Description	Unit Size
114q	Portland Cement	set (20)
46h	Portland Cement Fineness Standard	10 × 5 g

Portland Cement Clinkers (solid)

SRM	Unit Size
Portland Cement Clinkers (5 phases certified)	
2686a	3 × 10 g
2687	3 × 10 g
2688	3 × 10 g

LUBRICANTS

Lubricating Oil Ingredients

These SRMs are for determining the concentrations of a single element in lubricating base oil. SRMs 1818a and 1819a consist of five bottles, approximately 20 g of liquid each; SRM 1836 consists of four sets of four ampoules, each ampoule containing approximately 4 g of liquid.

SRM	Description	Elemental Composition (mg/kg)				
		I	II	III	IV	V
1818a	Total Chlorine	31.6	60.0	78.2	154.4	234.0
1819a	Total Sulfur	423.5	741.1	4022	4689	6135

Wear-Metals in Oil

SRM	Description	Unit Size
1083	Wear-Metals (Base Oil)	150 mL
1084a	Wear-Metals	5 × 1.6 g
1085b	Wear Metals in Lubricating Oil	set of 5 ampoules: 1.2 g each plus 5 blanks
1848	Lubricating Oil Additive Package	100 mL

Carbon Modified Silica

Unit Size: 3 × 1 g

This SRM is chemically modified microparticulate silica intended for the calibration of instruments used to measure total carbon.

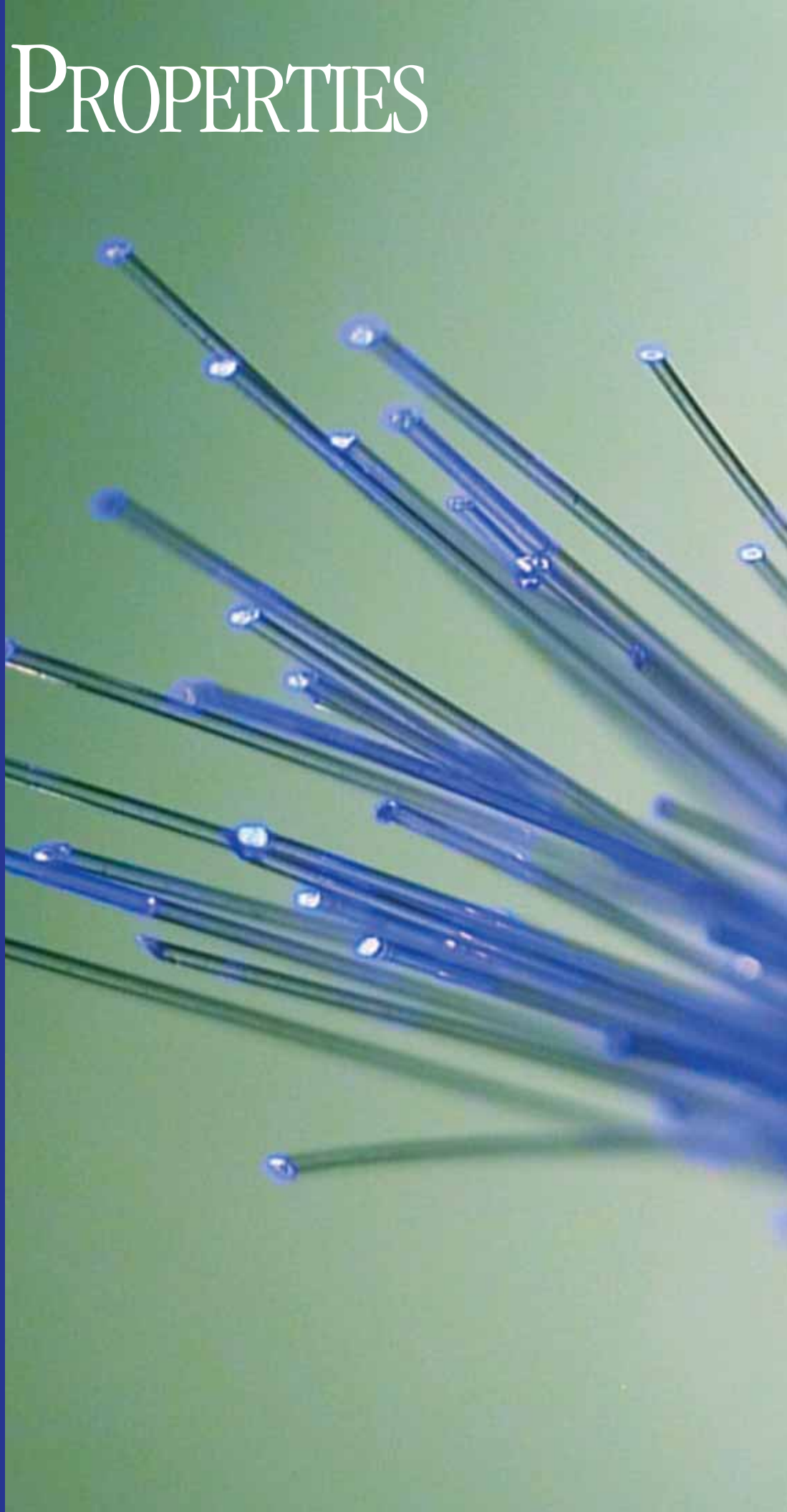
SRM	Description	Bottle	Mass Fraction (%)
1216	Carbon Modified Silica	I II III	0.70 9.06 17.04

Used Auto Catalysts

Unit Size: 70 g

SRM	Description	Elemental Composition
2557	Recycled Monolith	Pt, Pd, Rh, Pb
2556	Recycled Pellet	

Physical Properties

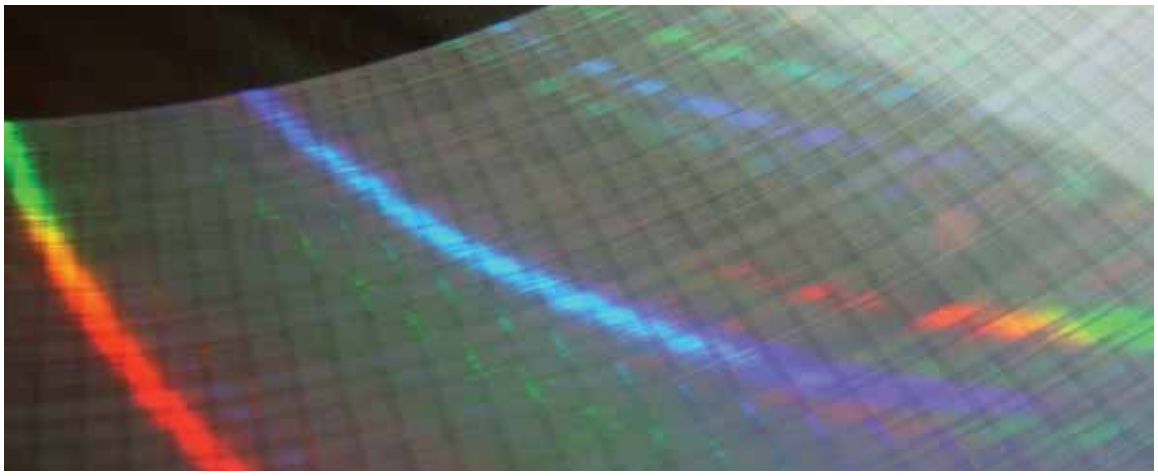


ION ACTIVITY

pH Calibration

SRM	Description	pH(S) Values (at 25 °C)	Unit Size (g)
2193a	Calcium Carbonate	12.469	30
185h	Potassium Hydrogen Phthalate	4.008	60
188	Potassium Hydrogen Tartrate	3.557	60
189c	Potassium Tetroxalate	1.719	65
187e	Sodium Tetraborate Decahydrate (Borax)	9.182	30
Admixtures Unit Size: 30 g (unless otherwise noted)			
186g	pH Standards		Set
191d	Sodium Bicarbonate (25 g) Sodium Bicarbonate (191-I-c) Sodium Carbonate (191-II-c)	10.012*	Set 25 30

**This pH results only when the two SRMs listed are used as an admixture in solution.*



Biological Buffer Systems

Unit Size: 60 g

SRM	Description	pH(S) Values (at 37 °C)	
		0.05 molal	0.08 molal
2181 2182	HEPES Free Acid NaHEPESate	7.364*	7.373*
2183 2184	MOPSO Free Acid NaMOPSOate	6.699*	6.694*

**This pH results only when the two SRMs listed are used as an admixture in solution.*

pD Calibration

SRM	Description	pD(S) Values (at 25 °C)	Unit Size (g)
2185	Potassium Hydrogen Phthalate	4.518	60
2186I 2186II	Potassium Dihydrogen Phosphate Disodium Hydrogen Phosphate	7.428*	30 30
2191a 2192a	Sodium Bicarbonate Sodium Carbonate	10.732*	30 30

**This pD results only when the two SRMs listed are used as an admixture in solution.*

Ion-Selective Electrode Calibration

SRM	Description	Certified Property	Unit Size (g)
2201	Sodium Chloride	pNa, pCl	125
2202	Potassium Chloride	pK, pCl	160
2203	Potassium Fluoride	pF	125

Electrolytic Conductivity

SRM	Description	Nominal Conductivity (µS/cm)
3190	HCl in Deionized Water	25
KCl in Deionized Water		
3191		100
3192		500
3193		1000
KCl in n-Propanol/Deionized Water		
3198		5
3199		15

Positive Electrophoretic Mobility

SRM	Description	Certified Property	Unit Size
1980	Goethite (α-FeOOH)	$+\mu_E$, 2.53 µm • cm/V • s	40 mL

POLYMERIC PROPERTIES

Molar Mass

SRM	Molar Mass (g/mol)	Unit Size (g)
Poly(methylmethacrylate)		
1489*	$M_n \approx 115\,000$ ($M_w/M_n \leq 1.1$)	1.1
1488*	$M_n \approx 29\,300$ ($M_w/M_n \leq 1.1$)	2
1487*	$M_w \approx 6300$	2
Polyethylene, linear		
2887*	$M_w \approx 196\,400$	0.3
2885*	$M_w \approx 6280$	0.3
2886*	$M_w \approx 87\,000$	0.3
1475a*	$M_w \approx 52\,000$ ($M_w/M_n \approx 2.90$) (see also melt flow)	50
1484a*	$M_w \approx 119\,600$ ($M_w/M_n \approx 1.19$)	0.3
1482a*	$M_w \approx 13\,600$ ($M_w/M_n \approx 1.19$)	0.3
1483a*	$M_w \approx 32\,100$ ($M_w/M_n \approx 1.11$)	1
Polystyrene, linear, broad molecular mass distribution		
706a	$M_w \approx 285\,000$	18
Polystyrene, linear, narrow molecular mass distribution		
1478*	$M_w \approx 37\,400$ ($M_w/M_n \approx 1.04$)	2
705a*	$M_w \approx 179\,300$ ($M_w/M_n \approx 1.07$)	5
1479	$M_w \approx 1\,050\,000$	2
2881**	$M_n \approx 9100$	0.3
2888	$M_w \approx 7190$	0.3

** Also certified for viscosity*
*** Certified for absolute molecular mass distribution*

Melt Flow Rate

SRM	Description	Melt Flow Rate (g/10 min)	Unit Size (g)
1473b	Polyethylene Resin, Low Density	1.13	60
1474a	Polyethylene Resin	5.10	60
1475a	Polyethylene, Linear	2.02	50
1476a	Branched Polyethylene Resin	1.23	12
1496	Polyethylene Gas Pipe Resin, Unpigmented	0.26	908
1497	Polyethylene Gas Pipe Resin, Pigmented	0.186	9080

Viscosity

SRM	Description	Unit Size (mL)
2490	Non-Newtonian Polymer Solution for Rheology (Polyisobutylene Dissolved in 2,6,10,14-Tetramethylpentadecane)	100
2491	Non-Newtonian Polymer Melt for Rheology	100

Biomaterials

SRM/RM	Description	Unit Size
2910a	Calcium Hydroxyapatite *Properties:* - Calcium - Phosphorus - Ca/P Molar Ratio	2 g (powder)
8011	Gold Nanoparticles, Nominal 10 nm Diameter *Properties:* - Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 x 5 mL ampoules
8012	Gold Nanoparticles, Nominal 30 nm Diameter *Properties:* - Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 x 5 mL ampoules
8013	Gold Nanoparticles, Nominal 60 nm Diameter *Properties:* - Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 x 5 mL ampoules
8385	Ultra High Molecular Weight Polythylene Wear Particles *Properties:* - Reference Particle Size Populations - Information Values for Diameter of the Packed Rounded UHMWPE Particles - Information Values for Aspect Ratio and Length of the Packed Elongated UHMWPE Particles	5 ml vials
8395	Tissue Engineering Reference, Scaffold	1 scaffold
8396	Tissue Engineering Reference, Scaffold	1 scaffold
8397	Tissue Engineering Reference, Scaffold	1 scaffold
8456	Ultra High Molecular Weight Polythylene *Properties:* - Young's Modulus - Yield Strength - Ultimate Strength - Elongation	bar: 7.62 cm diameter x 152.4 cm (3 in diameter x 60 in)
8457	Ultra High Molecular Weight Polythylene *Properties:* - Young's Modulus - Yield Strength - Ultimate Strength - Elongation	10 (0.5 cm) cubes

THERMODYNAMIC PROPERTIES

Calorimetry - Combustion

SRM	Description	Heat of Combustion (MJ/kg)*	Unit Size (g)
39j	Benzoic Acid	26.434	30
2692b	Coal, Bituminous: % S = 1.170	(32.81)**	50
2685b	Coal, Bituminous: % S = 4.730	(26.94)**	50
2682b	Coal, Sub-Bituminous: % S = 0.4917	(25.66)**	50
2151	Nicotinic Acid	22.184	25
2684b	Coal, Bituminous, Sulfur and Mercury: % S = 3.08; Hg = 97.4 µg/kg	28.56**	50
1657	Synthetic Refuse-Derived Fuel	13.87**	100
2683b	Sulfur and Mercury in Coal: % S = 1.955, Hg = 90.0 µg/kg	30.62	50
1656	Thianthrene	33.480	30
2152	Urea	10.536	25

** The calorific values (MJ/kg) may decrease upon the aging or normal oxidation of the coals. NIST will continue to monitor these calorific values and report any substantive change to the purchaser.*

*** Gross calorific value or HHV (Higher Heating Value).*

Calorimetry - Solution

SRM	Description	Heat of Solution	Unit Size
1655	Potassium Chloride (Water Solution Calorimetry)	Absorbed (235.86 J/g)	30 g

Enthalpy and Heat Capacity

SRM	Description	Unit Size	Temperature Range (K)
781D2	Molybdenum	0.64 cm diameter 10 cm	273.15 to 2800
705a	Polystyrene (Molecular Weight: 170 900 g/mol)	5 g	10 to 350
720	Synthetic Sapphire	15 g	10 to 2250

Differential Scanning Calorimetry

SRM	Description	Melting Temperature (K)	Enthalpy of Fusion (J/g)	Unit Size
2232	Indium (99.9999 %)	156.5985 °C	28.51	1 g
2234	Gallium for Thermal Analysis	302.9146	80.097	Approx. 2 g
2235	Bismuth for Thermal Analysis	544.556	53.146	1.5 g
2225	Mercury	234.30	11.469	2.5 g
2220	Tin (99.9995 %)	505.10	60.22	(2.5 × 2.5 × 0.0127) cm
1514	Thermal Analysis Purity Set	4 levels of p-ABA (0.0 mol % to 5.0 mol %)	—	4 × 0.5 g

Defining Fixed Points, International Temperature Scale of 1990, ITS-90

SRM	Description	Temperature (°C)	Unit Size (g)
Pure Metals			
743	Mercury (Triple Point)	-38.8344	ampoule: 680
1745	Indium (Freezing Point)	156.5985	ingot: 20 × 10 g
741a	Tin (Freezing Point)	231.928	shot: 200
740a	Zinc (Freezing Point)	419.527	shot: 200
1744	Aluminum (Freezing Point)	660.323	ingot: 200
1746	Silver (Freezing Point)	961.780	shot: 300
1751	Gallium Melting Point	29.7646	200
Devices (semi-open cell)			
1747	Tin (Freezing Point), 99.9999+ %	231.928	1071
1748	Zinc (Freezing Point), 99.9999+ %	419.527	1031

Reference Points

SRM	Description	Temperature (°C)	Unit Size (g)
45d	Copper (Freezing Point)	1084.6	bar: 450
49e	Lead (Freezing Point)	327.453	bar: 600
742	Alumina, 99.9+ % (Melting Point)	2052	powder: 10

Freezing Point, Melting Point, and Triple Point Cells (sealed cell)

SRM	Description	Temperature (°C)	Unit Size (g)
1968	Gallium (Melting Point), 99.9999+ %	29.7646	25
1969	Rubidium (Triple Point), 99.9+ %	39.30	154
1970	Succinonitrile (Triple Point), 99.999+ %	58.0642	60
1971	Indium (Freezing Point), 99.9999+ %	156.598	100
1972	1,3-Dioxolan-2-one (Ethylene Carbonate) (Triple Point), 99.999+ %	36.3143	60

Thermal Expansion of Metal and Glass

SRM	Description	Temperature Range (K)	Unit Size (cm)
731L1	Borosilicate Glass	80 to 680	0.64 × 5.1
731L2	Borosilicate Glass	80 to 680	0.64 × 10.2
731L3	Borosilicate Glass	80 to 680	0.64 × 15.2
738	AISI 446 Stainless Steel	293 to 780	0.64 × 5.1

Thermal Resistance of Glass, Silica, and Polystyrene

SRM	Description	Unit Size (cm)	Temperature Range (K)	Thermal Resistance at ($m^2 \cdot K \cdot W^{-1}$)
1449	Fumed Silica Board	60 × 60 × 2.54	297.1	1.2
1450c	Fibrous Glass Board	61 × 61 × 2.54	280 to 340	0.78
1452	Fibrous Glass Blanket	60 × 60 × 2.54	297.1	0.6
1453	Expanded Polystyrene Board	66 × 93 × 1.34	285 to 310	0.4
1459	Fumed Silica Board	30 × 30 × 2.54	297.1	1.2

Thermal Conductivity of Graphite and Iron

RM	Description	Unit Size	Conductivity at 293 K ($W \cdot m^{-1} \cdot k^{-1}$)
8420	Electrolytic Iron	0.64D × 5.0	77.9
8424	Graphite	0.64D × 5.0	90.9

Thermocouple Material, Platinum

Unit Size: 1 each

SRM	Description	Temperature Range
1749	Gold vs. Platinum Thermocouple Thermometer	0 °C to 1000 °C
1967	Platinum Wire, High Purity (99.999+ %)	-197 °C to 1768 °C
1750	Standard Platinum Resistance Thermometer	14 K to 430 K

OPTICAL PROPERTIES

Molecular Transmittance and Absorbance

SRM	Description	Wavelength Range	Unit Size
Crystalline and Solution Forms			
935a	Crystalline Potassium Dichromate, UV Absorbance	235 nm to 350 nm	15 g
1935a	Potassium Dichromate Solution, UV Absorbance	235 nm to 350 nm	10 ampoules: 5 samples, plus 5 blanks
931g	Liquid Filters, Absorbance	302 nm to 678 nm	12 ampoules: 3 × 3 levels, plus 3 blanks
Glass Filters, Transmittance			
930e	10 %, 20 %, 30 % Transmittance	440 nm to 635 nm	3 filters, plus 1 blank
2031a	Metal-on-Quartz Filters 10 %, 30 %, 90 % Transmittance	250 nm to 635 nm	3 filters, plus 1 blank
2055	77 nm Cu-Ni Film on Silica	2 µm to 25 µm	25 mm diameter × 250 µm

Transmittance Wavelength Standards

SRM	Description	Wavelength Range	Unit Size
2035	Near-IR Transmission	971 nm to 1949 nm	25 mm diameter × 1.5 mm
2036	Near-IR Wavelength/Wavenumber Reflection Standard	975 nm to 1946 nm	25 mm diameter × 1.5 mm
2037	Red Diesel Dye	—	100 mg
2065	Transmission Wavelength/Vacuum Wavenumber	ultraviolet–visible–near-infared	25 mm diameter × 1.5 mm
1921b	Infrared Transmission	3.2 µm to 18.5 µm	1 polystyrene film

Fluorescence

SRM	Description	Wavelength Range	Unit Size
936a	Quinine Sulfate Dihydrate	375 nm to to 675 nm	1 g
1932	Fluorescein	488 nm to 491 nm	3 × 2 mL
2242	Relative Intensity Correction Standard, Raman Spectroscopy	532	1 artifact
2241	Relative Intensity Correction Standard, Raman Spectroscopy	785 nm	each
2243	Relative Intensity Correction Standard, Raman Spectroscopy	488 nm to 514.5 nm	each
2940	Relative Intensity Correction Standard, Fluorescence Spectroscopy (Orange Emission) 412 nm	500 to 800	each
2941	Relative Intensity Correction Standard, Fluorescence Spectroscopy (Green Emission) 427 nm	450 to 650	each
2942	Relative Intensity Correction Standard, Fluorescence Spectroscopy (Ultraviolet Emission) 310.1 nm	320 to 430	each
2943	Relative Intensity Correction Standard, Fluorescence Spectroscopy (Blue Emission) 330.3 nm	350 to 640	each

Specular Spectral Reflectance

SRM	Description	Wavelength Range (nm)
2017	Multi-Angle White Reflectance Standard	400 to 700

Optical Rotation

SRM	Description	Wavelength Range	Unit Size
17f	Sucrose	546 nm to 633 nm	60 g

Liquid Refractive Index

SRM	Description	Wavelength Range	Unit Size
1922	Mineral Oil	468 nm to 589 nm	30 mL

Solid Refractive Index

SRM	Description	Wavelength Range (nm)	n (at 22 °C)
1822a	Refractive Index Standard	480.1	1.526132 ± 1.6 x 10
		501.7	1.524468 ± 1.6 x 10
		508.7	1.523971 ± 1.6 x 10
		546.2	1.521629 ± 1.6 x 10
		587.7	1.519535 ± 1.6 x 10
		644.0	1.517277 ± 1.6 x 10

X-ray and Photographic Imaging

SRM	Description	Unit Size
1010a	Microcopy Resolution Test Chart	5 charts

ELECTRICAL PROPERTIES

Electrical Resistivity and Conductivity of Electrolytic Iron and Graphite

Unit Size: rod: 0.64 cm diameter × 5.0 cm

RM	Resistivity Range ($\mu\Omega \cdot m$)	Unit Size
Electrolytic Iron (2 K to 1000 K)		
8420	0.004 to 0.909	0.64 cm diameter × 5.0 cm
Graphite (5 K to 2500 K)		
8424	28.78 to 12.59	0.64 cm diameter × 5.0 cm

Electrical Resistivity and Conductivity of Silicon

SRM	Resistivity ($\Omega \cdot cm$)	Type	Unit Size (mm)
2541	Silicon Resistivity	0.01	100D x 0.625
2543	Silicon Resistivity	1	100D x 0.625
2546	Silicon Resistivity	100	100D x 0.625

OPTOELECTRONICS

SRM	Description	Unit Size
	Wavelength Calibration Standards	
2514	Wavelength Calibration Reference for 1560 nm to 1595 nm - Carbon Monoxide ($^{12}C^{16}O$)	Gas Absorption Cell
2515	Wavelength Calibration Reference for 1595 nm to 1630 nm - Carbon Monoxide ($^{13}C^{16}O$)	Gas Absorption Cell
2517a	High Resolution Wavelength Calibration Reference for 1510 nm to 1540 nm - Acetylene ($^{12}C_2H_2$)	Gas Absorption Cell
2519a	Wavelength Reference Absorption Cell for 1530 nm to 1560 nm Hydrogen Cyanide ($H^{13}C^{14}N$)	Gas Absorption Cell
	Polarization Mode Dispersion Standards	
2518	Polarization Mode Dispersion Standard	1 each
2538	Deterministic Polarization Mode Dispersion Standard	1 each
	Fiber and Fiber-Connector Geometry Standards	
2520	Optical Fiber Diameter Standard	1 each
2522	Pin Gauge Standard for Optical Fiber Ferrules	1 wire-sizing bore
2523	Optical Fiber Ferrule Geometry Standard	1 ceramic connector ferrule

METROLOGY

Optical Microscope Linewidth Measurement (Photomask)

SRM	Linewidth (µm)	Pitch (µm)	Unit Size (cm)
	Linewidth Measurement Standards		
2059	0.25 to 32.0	0.5 to 250	15.24 × 15.24 × .635

Microscale Dimensional Measurement Standards

SRM/RM	Description	Unit Size (cm)
2800	Microscope Magnification Standard	25 mm × 75 mm × 2.3 mm
5000	Overlay Wafer Standard	17.6 mm × 16.0 mm
5001	Two-Dimensional Grid Photomask Standard	6.0 in × 6.0 in × 0.25 in
8820	Scanning Electron Microscope Scale Calibration Artifact	20 mm × 20 mm

Scanning Electron Microscope (SEM)

SRM/RM	Description	Spacings	Unit Size (mm)
2069b	SEM Performance Standard	2 mm to 4 mm	12 mm diameter with 3 mm peg
8091	SEM Sharpness Standard		semiconductor chip: 2 mm × 2 mm
8820	Scanning Electron Microscope Scale Calibration Artifact		20 mm × 20 mm
9951	Aluminum Wafer Drop-In Sample Holder		6in
9952	Aluminum Wafer Drop-In Sample Holder		6in
2800	Microscope Magnification Standard	1 µm to 5 mm	25 × 75 × 2.3

Thin Film for Transmission Electron Microscope

SRM	Description	Certified Element	Unit Size
2063a	Microanalysis Thin Film Mineral Glass	Ar, Ca, Fe, Mg, O, Si	1 glass film

Semiconductor Thin Film for the Composition of Thin Films

SRM	Description	Nominal Elemental Composition (group III mole fraction)
		Al (x in $Al_xGa_{1-x}As$)
2841	Epitaxial Layer	0.20
2842	Epitaxial Layers	0.30

Depth Profiling

SRM	Description	Value	Unit Size (cm)
2133	Phosphorus Implant in Silicon Depth Profile Standard	^{31}P: 0.04927 µg/cm^2 (9.58×10^{14} atoms/cm^2)	crystal 1 × 1
2134	Arsenic Implant in Silicon Profile Standard	^{75}As - 7×10^{14} atoms/cm^2	crystal: 1 × 1
2135c	Nickel-Chromium Thin-Film Depth Profile Standard	Cr: 41.3 µg/cm^2 Ni: 49.4 µg/cm^2	1 × 2.54 × 0.04
2137	Boron Implant in Silicon Depth Profile Standard	^{10}B - 1.018 v 10^{15} atoms/cm^2	1 × 1

Solder Thickness for X-ray Fluorescense

Unit Size: plate: 15 mm × 15 mm

SRM	Description	Composition	Coating Mass/Area	Coating Thickness	
				(µm)	(µm)
2321	Tin-Lead Alloy	60 % Sn, 40 % Pb	6.8 mg/cm^2	295	7.5

Coating Thickness

Unit Size: 45 mm × 45 mm

These SRMs are suitable for calibrating instruments based on magnetic induction and magnetic pull-off techniques used in the measurement of organic and non-magnetic inorganic coatings over steel.

SRM	Nominal Coating Thickness	
	(µm)	(mils)
Chromium over Copper on Steel		
1358b	20, 80, 255, 1000	0.8, 3.1, 9.8, 39
1359b	48, 140, 505, 800	2.0, 5.5, 20, 32
1361b	6, 12, 25, 48	0.2, 0.5, 1.0, 2.0
1362b	40, 80, 140, 205	1.6, 3.1, 5.5, 7.9
1363b	255, 385, 505, 635	9.8, 16, 20, 26
1364b	800, 1000, 1525, 1935	32, 39, 59, 79

Superconducting Critical Current (wire form)

Unit Size: wire: 8.7 cm diameter × 2.2 m

SRM	Description	Magnetic Field Range (T)	Critical Current Range (A)
1457	Niobium-Titanium Wire	2.000 to 8.000	293.30 to 69.72

CERAMICS AND GLASSES

Chemical Resistance [Durability] of Glass

SRM	Description	mL of N/50 H_2SO_4	Unit Size (kg)
623	Borosilicate	0.34	2.2
622	Soda-Lime Silica	7.67	2.2

Electrical Properties of Dielectrics

Unit Size: 5 cm × 5 cm × 2.5 cm

SRM 624 is suitable for use with ASTM C 657. SRM 774 is suitable for use with ASTM D 150.

SRM	Description	Geometry and Unit Size	Parameter(s)
624	Lead-SilicaGlass	Block 5 cm square 2.5 cm thick	DC Volume Resistivity
774	Lead-SilicaGlass	Block 5 cm square 2.5 cm thick	Dielectric Constant Dissipation Factor
2870	Cross-linked Polystyrene	Circular-Cylindrical Puck 60 mm diameter 10 mm thick	Relative Permittivity Loss Tangent

Viscosity of Glass

SRM	Description	Unit Size (mm)
717a	Borosilicate Glass	block: 40 × 40 × 150

Viscosity Fixpoints of Glass

These SRMs are for the calibration of equipment for the determination of the softening, annealing, and strain points of glass.

SRM	Description	Unit Size
714	Alkaline Earth Alumina Silicate	225 g
717a	Borosilicate	40 mm × 40 mm × 150 mm
709	Extra Dense Lead Silica	4 cm × 4 cm × 5 cm

Relative Stress Optical Coefficient

SRM	Description	Relative Stress Optical Coefficient (C) at λ = 546.1 nm (Value × 10^{-12} m^2/N)	Unit Size
709	Extra Dense Lead Silica	C = – 1.359	bar: 4 cm × 4 cm × 5 cm

Density

SRM	Description	Density (kg/m^3)	Unit Size
211d	Toluene	871.476 at 15 °C	4 × 5 mL
2214	Isooctane	695.969 at 15 °C	4 × 5 mL

Glass Liquidus Temperature

SRM	Description	Unit Size	Method	Temperature (°C)
773	Soda-Lime-Silica	2.5 cm × 2.5 cm × 0.6 cm	A (boat) B (perforated plate)	988 991
1416	Aluminosilicate	22 lengths of 12.7 cm tube (250 g)		1147

X-RAY SPECTROMETRY

X-ray Diffraction

SRM	Description	XRD Application	Unit Size (g)
676a	Alumina (Corundum Structure)	Quantitative Analysis	20
1976a	Alumina Plate, Sintered	Instrument Response	45 mm × 45 mm × 1.6 mm
660a	Lanthanum Hexaboride Powder	Line Position, Line Shape	6
675	Mica	Low 2θ (Large d-Spacing)	7.5
1879a	Respirable Cristobalite	Quantitative Analysis	5
1878a	Respirable Quartz	Quantitative Analysis	5
656	Silicon Nitride	Quantitative Analysis	2 × 10 g
640d	Silicon Powder 2~/d-Spacing	Line Position, Line Shape	7.5
674b	X-ray Powder Diffraction Intensity Set (CeO_2, Cr_2O_3, TiO_2, ZnO)	Quantitative Analysis	—
1990	Single Crystal Diffractometer Alignment Standard	Quantitative Analysis	3 spheres
1994	Standard Silicon Single Crystal Wafer for Crystalline Orientation	Crystalline Orientation	100-mm wafer
1995	Standard Sapphire Single Crystal Wafer for Crystalline Orientation	Crystalline Orientation	50-mm wafer
2000	Calibration Standard for High-Resolution X-Ray Diffraction	Line Position	25 mm × 25 mm × 0.725 mm

Radioactivity

TABLE 1: Alpha Particle Solution Standards

Radionuclide	SRM Number	Approx. Bq·g^{-1}	Reference Time	Expanded Uncertainty	Solution Mass	Chemical Form (%)	Solution Composition (g)	Notes
Americium-241*	4322C	100	May 2007	0.3	5	$Am(NO_3)_3$	1 M HNO_3	
Americium-243*	4332E	40	#	#	5	$Am(NO_3)_3$	1 M HNO_3	
Curium-243*	4329	70	Jun 1984	1.4	5	$Cm(NO_3)_3$	1 M HNO_3	
Curium-244*	4320A	35	#	#	5	$Cm(NO_3)_3$	1 M HNO_3	
Neptunium-237*	4341	100	Mar 1992	1.3	5	$Np(NO_3)_3$	2 M HNO_3	
Plutonium-238*	4323B	30	Feb 1994	0.7	5	$Pu(NO_3)_6$	3 M HNO_3	
Plutonium-239*	4330C	40	Dec 1995	0.7	5	$Pu(NO_3)_6$	3 M HNO_3	
Plutonium-240*	4338A	40	May 1996	0.8	5	$Pu(NO_3)_6$	3 M HNO_3	
Plutonium-242*	4334H	25	Jun 1994	0.8	5	$Pu(NO_3)_6$	3 M HNO_3	
Polonium-209**	4326	85	#	#	5	$PoCl_4$	2 M HCl	
Radium-226	4969	3	Sep 1998	1.8	5	$RaCl_2$	1.5 M HCl	
Radium-226	4965	30	Sep 1991	1.2	5	$RaCl_2$	1.4 M HCl	
Radium-226**	4966A	280	Jan 2007	1.3	5	$RaCl_2$	1.0 M HCl	
Radium-226**	4967A	2,500	Sep 2003	0.9	5	$RaCl_2$	1 M HCl	
Radon-222	4971	4 Total	#	#	0.2	$RaCl_2$	1 M HCl	a
Radon-222	4972	40 Total	#	#	0.2	$RaCl_2$	1 M HCl	a
Radon-222	4973	400 Total	#	#	0.2	$RaCl_2$	1 M HCl	a
Radon-222	4974	5000 Total	May 2005	1.3	0.2	$RaCl_2$	1 M HCl	
Thorium-229	4328C	35	Dec 2007	0.6	5	$Th(NO_3)_4$	1 M HNO_3	
Thorium-230	4342A	40	April 2007	0.4	5	$Th(NO_3)_4$	1 M HNO_3	
Uranium-232	4324B	30	Jul 2002	0.8	5	$UO_2(NO_3)_2$	2 M HNO_3	
Uranium-238 (Natural)	4321C		Jan 1992		5	$UO_2(NO_3)_2$	1 M HNO_3	
Uranium-238		250		0.9				
Uranium-235		11		1.0				
Uranium-234		240		1.9				

* **License Certification** is required by NIST for this material.

** **License Certification** is not required by NIST for this material but a state-issued license may be required for possession. Contact your state Office of Radiation Safety for further information.

\# Material in preparation.

a) SRMs 4971, 4972, and 4973 are intended for the calibration of radon-222 measuring instruments. They consist of small heat-sealed polyethylene cylinders containing approximately 0.2 g of radium-226 solution. These SRMs are calibrated in terms of radium-226 activity and in terms of the emanation fraction of the radon-222 under specified conditions.

TABLE 2: Beta Particle and Electron Capture Solution Standards

Radionuclide	SRM Number	Approx. $Bq \cdot g^{-1}$	Reference Time	Expanded Uncertainty	Solution Mass (%)	Chemical Form (g)	Solution Composition	Notes
Barium-133 *	4251C	500,000	Sep 1993	0.5	5	$BaCl_2$	1 M HCl	
Carbon-14	4222C	50,000	Sep 1990	0.8	5	n-Hexadecane	n-Hexadecane	
Cesium-137 *	4233E	300,000	Sep 2005	0.7	5	CsCl	1 M HCl	
Chlorine-36	4943	10,000	Dec 1984	0.8	3	NaCl	H_2O	
Cobalt-60 *	4915F	60,000	Nov 2005	0.5	5	$CoCl_2$	1 M HCl	
Europium-152*	4370C	90,000	Feb 1987	1.1	5	$EuCl_3$	1 M HCl	
Holmium-166m*	4274	20,000	Feb 2006	0.81-2.4	5	$HoCl_3$	1 M HCl	
Hydrogen-3†	4361C	2	Sep 1998	1.1	500	H_2O	H_2O	
Hydrogen-3	4926E	5,000	Sep 1998	1.1	20	H_2O	H_2O	
Hydrogen-3	4927F	600,000	Sep 1998	1.1	5	H_2O	H_2O	
Hydrogen-3	4947C	300,000	Mar 1987	1.2	4	Toluene	Toluene	
Iodine-129*	4949C	3,500	Mar 1993	0.7	5	NaI	0.01 M NaOH	
Iron-55	4929F	50,000	Nov 2005	1.7	5	$FeCl_3$	1 M HCl	
Lead-210	4337	9,000	June 2006	2.4	5	$Pb(NO_3)_2$	1 M HNO_3	
Nickel-63*	4226C	45,000	Nov 2005	0.9	5	$NiCl_2$	1 M HCl	
Plutonium-241*	4340B	250	June 2007	3.8	5	$Pu(NO_3)_6$	3 M HNO_3	
Radium-228	4339A	200	#	#	5	$Ra(NO_3)_2$	1 M HNO_3	
Strontium-90*	4239	50,000	Dec 2006	0.5	5	$SrCl_2$	1 M HCl	
Strontium-90*	4919I	4,000	Dec 2006	0.5	5	$SrCl_2$	1 M HCl	
Technetium-99	4288B	30,000	May 2008	0.7	5	$KTcO_4$	0.001 M KOH	

* **License Certification** is required by NIST for this material.

\# Material in preparation.

† This standard is **not** radioactive material for licensing or shipping purposes.

TABLE 3: Gamma Ray Point Source Standards

Radionuclide	SRM Number	Principal Photon Energies (keV)	Approx. Activity (Bq)	Reference Time	Expanded Uncertainty	Chemical Form (%)	Notes
Barium-133	4241C	81 - 384	60,000 to 140,000	Jan 1999	0.6	$BaCl_2$	a
Europium-152*	4218F	122 - 1400	60,000 to 140,000	Jan 1999	0.8	$EuCl_3$	a
Niobium-94*	4201B	702, 871	4,000	Apr 1970	1.5	NbO	a

* **License Certification** is required by NIST for this material.

a) These standards consists of a dried deposit, usually with a diameter of less than 0.5 cm, of the radionuclide sealed between two layers of 0.006 cm thick polyester tape that are supported on an aluminum annulus. The annulus has an outside diameter of 5.4 cm, an inside diameter of 3.8 cm, and a thickness of 0.05 cm.

TABLE 4: Radiopharmaceutical Standards

Radionuclide	SRM Number	Approx. $MBq \cdot g^{-1}$	Approx. Half Life	Expanded Uncertainty (%)	Solution Mass (g)	Chemical Form	Solution Composition	Notes
Gallium-67*	4416L	4	3 d	0.6	5	$GaCl_3$	2 M HCl	a
Indium-111*	4417L	5	3 d	0.6	5	$InCl_3$	3 M HCl	a
Iodine-125*	4407L	1	60 d	0.8	5	KI	0.01 M LiOH	a
Iodine-131*	4401L	5	8 d	0.7	5	KI	0.01 M LiOH	a
Molybdenum-99*	4412L	10	3 d	0.8	5	Na_2MoO_4	3 M HNO_3	a
Technetium-99m*	4410H	1000	6 h	0.7	5	$NaTcO_4$	0.15 M NaCl	a
Thallium-201*	4404L	4	3 d	0.8	5	$TlNO_3$	1 M HNO_3	a
Xenon-133*	4415L	500 Total	5 d	0.8	5 mL	Xe	Xe gas	a, b
Yttrium-90*	4427L	1	3 d	0.8	5	YCl_3	1 M HCl	a

* **License Certification** is required by NIST for this material.

a) Orders for these radionuclides must be received by the third day of the month in which the distribution is scheduled. For further information contact the NIST Radioactivity Group.

b) SRM 4415 consists of xenon-133 plus non-radioactive xenon, uncompressed, in a flame-sealed borosilicate glass ampoule. The ampoule has an outside diameter of 1.5 cm and a length of 4.5 cm.

TABLE 5: Beryllium Isotopic Ratio Standard

Nuclides	SRM Number	Approx. $Bq \cdot g^{-1}$	Isotopic Ratio	Reference Time	Expanded Uncertainty (%)	Solution Volume (mL)	Chemical Form	Solution Composition	Beryllium Concentration ($mg \cdot mL^{-1}$)
Beryllium-10/ Beryllium-9†	4325	0.0002	3×10^{-11}	Aug 1986	5.1	50	$BeCl_2$	1 M HCl	5

† This standard is not radioactive material for licensing or shipping purposes.

TABLE 6: Radiocarbon Dating Contemporary Standard

Radionuclide	SRM Number	Approx. $Bq \cdot g^{-1}$	Reference Time	Expanded Uncertainty (%)	Mass (g)	Chemical Form	Physical Form	Notes
Carbon-14†	4990C	0.08	1980	1.6	225 (8 x 28)	Oxalic Acid	Crystalline Powder	a

† This standard is **not** radioactive material for licensing or shipping purposes

a) This SRM replaces SRM 4990, which has been in use in radiocarbon-dating laboratories since 1958. The material is part of a 450 kg lot of oxalic acid that was prepared by fermentation of French beet molasses from the 1977 spring, summer, and fall harvests. The ratio of the massic activity of SRM 4990C to that of SRM 4990, and the mass spectrometric ratios of carbon-13 to carbon-12 in each, were measured by eleven international carbon-dating laboratories in an intercomparison organized by L.M. Cavallo and W.B. Mann. See Proceedings of the 11th International Radiocarbon Dating Conference, M. Stuiver and R. Kra, Editors, *Radiocarbon* **25**, No. 2 (1983).

TABLE 7: Environmental Natural Matrix Standards

SRM Number	Name	Mass (g)	Activity Certified	Activity Given But Not Certified	Other Data
4350B	River Sediment†	85	^{60}Co, ^{137}Cs, ^{152}Eu, ^{154}Eu, ^{226}Ra, ^{238}Pu, $^{239+240}Pu$, ^{241}Am	^{40}K, ^{55}Fe, ^{90}Sr, ^{228}Th, ^{230}Th, ^{232}Th, ^{234}U, ^{235}U, ^{238}U	a, b, c
4351	Human Lung†	45	^{232}Th, ^{234}U, ^{238}U, $^{239+240}Pu$, $^{238}Pu/(^{239+240}Pu)$	^{228}Th, ^{230}Th, ^{241}Am	c
4352	Human Liver†	45	^{238}Pu, $^{239+240}Pu$, ^{241}Am	^{228}Th, ^{230}Th, ^{232}Th, ^{234}U, ^{235}U, ^{238}U	c

TABLE 7 continued

SRM Number	Name	Mass (g)	Activity Certified	Activity Given But Not Certified	Other Data
4353A	Rocky Flats Soil II†	85	^{238}Pu, ^{239,240}Pu, ^{238}U, ^{234}U, ^{235}U, ^{90}Sr, ^{137}Cs, ^{228}Ra, ^{210}Pb, ^{228}Th/^{232}Th, ^{230}Th/^{232}Th	^{228}Th, ^{230}Th, ^{232}Th, ^{234}Th, ^{226}Ra, ^{214}Pb, ^{214}Bi, ^{212}Pb, ^{212}Bi, ^{208}Tl, ^{40}K, ^{241}Pu, ^{241}Am ^{240}Pu/^{239}Pu, ^{241}Pu/^{239}Pu, ^{241}Pu/^{240}Pu	
4354	Lake Sediment†	25	^{60}Co, ^{90}Sr, ^{137}Cs, ^{228}Th, ^{232}Th, ^{235}U, ^{238}U, ^{238}Pu, $^{239+240}$Pu, ^{241}Am	^{210}Pb, ^{226}Ra, ^{230}Th, ^{234}U	a, c
4355	Peruvian Soil †	75	^{137}Cs, ^{228}Th, ^{230}Th, ^{232}Th, $^{239+240}$Pu, ^{241}Am, Upper limits on: ^{60}Co, ^{125}Sb, ^{152}Eu, ^{154}Eu, ^{155}Eu	^{40}K, ^{55}Fe, ^{90}Sr, ^{208}Tl, ^{214}Bi, ^{238}Pu	c
4356	Ashed Bone†	15	^{90}Sr, ^{226}Ra, ^{230}Th, ^{232}Th, ^{234}U, ^{238}U, ^{238}Pu, $^{239+240}$Pu, $^{243+244}$Cm	^{40}K, ^{210}Pb, ^{210}Po, ^{228}Ac, ^{228}Ra, ^{228}Th, ^{238}U, ^{241}Am	
4357	Ocean Sediment†	85	^{40}K, ^{90}Sr, ^{137}Cs, ^{226}Ra, ^{228}Th, ^{230}Th, ^{232}Th, ^{238}Pu, $^{239+240}$Pu	^{129}I, ^{155}Eu, ^{210}Pb, ^{228}Ra, ^{234}U, ^{235}U, ^{238}U, ^{237}Np, ^{241}Am	a, c
4359	Seaweed Radionuclide		^{40}K, ^{137}Cs, ^{210}Pb, ^{210}Po, ^{228}Ra, ^{232}Th, ^{234}U, ^{235}U, ^{238}U, ^{238}Pu, ^{239}Pu, ^{239,240}Pu, ^{241}Am	^{3}H, ^{14}C, ^{90}Sr, ^{99}Tc, ^{129}I, ^{208}Tl, ^{212}Bi, ^{212}Pb, ^{224}Ra, ^{226}Ra, ^{228}Th, ^{230}Th, ^{234}Th, ^{237}Np, ^{240}Pu	

† This standard is **not** radioactive material for licensing or shipping purposes.

a) Semi-quantitative elemental analysis by emission spectrographic measurements. b) Analysis of plutonium isotopes by mass spectrometry. c) Particle size distribution.

TABLE 8: Neutron Density Monitor Wire

SRM	Description	Cobalt Composition (weight %)	Unit Size
953	Cobalt in Aluminum Wire	0.116	0.5 mm diameter × 1 m

TABLE 9: Fission Track Glass

Each unit consists of four unirradiated glass wafers and two irradiated wafers.

SRM	Uranium Composition (µg/g)	Uranium-235 (Atom %)	Reactor Position	Neutron Fluence ($\times 10^{14}$ n/cm^2)	
				Copper Foil	*Gold Foil*
963a	0.823	0.2792	RT-4	39.5	43.0
			RT-3	41.2	45.8

TABLE 10: Accelerator Mass Spectrometry (solution form)

SRM	Radionuclide	Isotopic Ratio	Total Nuclide Concentration (mg g^{-1})	Time of Calibration (month/year)	Volume of Solution (mL)
4325	Beryllium-10/Beryllium-9	3 x 10^{-11}	5	08/86	2 x 25

Industrial Hygiene

Materials on Filter Media

These SRMs consist of potentially hazardous materials deposited on filters to be used to determine the levels of these materials in industrial atmospheres.

SRM/RM	Description	Set Size	Elemental Composition	Diameter (mm)	Pore Size (µm)
2783	Air Particulate on Filter	2 filters, plus 2 blanks	18 certified values 9 reference values	47	0.4
8785	Particulate Matter on Filters	3 filters	1 reference value 2 information values	37	—
8786	Filter Blank for RM 8785	1 blank filter		37	—

Trace Constituent Elements in Blank Filters

SRMs 2678 and 2681 are for use in evaluating the performance of air sampling filter methods with either certified values (in µg) or limits of detection (X_D) for each of 30 constituent elements, as well as six leachable anions and cations.

SRM	Description	Diameter (mm)	Pore Size (µm)	Filter Weight (g)
2678	Cellulose Acetate Membrane	47	0.45	0.09
2681	Ashless Blank Filter	42.5	—	0.14

Respirable Silica

These SRMs are intended for use in determining, by X-ray diffraction, the levels of respirable silica in an industrial atmosphere according to the National Institute for Occupational Safety and Health (NIOSH) Analytical Method 7500 or equivalent methods.

SRM	Description	Mass Fraction/Mass Loading	Unit Size
1878a	Respirable Alpha Quartz	100.00% ± 0.21%	5 g
1879a	Respirable Cristobalite	95.6% ± 0.4%	5 g
2950	Respirable Alpha Quartz on Filter Media	(10, 20, 50, 100, 250, 500) µg/filter	set SRMs 2952-57
2951	Respirable Alpha Quartz on Filter Media	5 µg/filter	5 filters (5 blanks)
2952	Respirable Alpha Quartz on Filter Media	10 µg/filter	5 filters (5 blanks)
2953	Respirable Alpha Quartz on Filter Media	20 µg/filter	5 filters (5 blanks)
2954	Respirable Alpha Quartz on Filter Media	50 µg/filter	5 filters (5 blanks)
2955	Respirable Alpha Quartz on Filter Media	100 µg/filter	5 filters (5 blanks)
2956	Respirable Alpha Quartz on Filter Media	250 µg/filter	5 filters (5 blanks)
2957	Respirable Alpha Quartz on Filter Media	500 µg/filter	5 filters (5 blanks)
2958	Respirable Alpha Quartz on Filter Media	1000 µg/filter	5 filters (5 blanks)
2960	Respirable Alpha Cristobalite on Filter Media	(5, 10, 20, 50, 100, 250) µg/filter	set SRMs 2961-66
2961	Respirable Alpha Cristobalite on Filter Media	5 µg/filter	5 filters (5 blanks)

(continued)

Respirable Silica (continued)

SRM	Description	Mass Loading	Unit Size
2962	Respirable Alpha Cristobalite on Filter Media	10 µg/filter	5 filters (5 blanks)
2963	Respirable Alpha Cristobalite on Filter Media	20 µg/filter	5 filters (5 blanks)
2964	Respirable Alpha Cristobalite on Filter Media	50 µg/filter	5 filters (5 blanks)
2965	Respirable Alpha Cristobalite on Filter Media	100 µg/filter	5 filters (5 blanks)
2966	Respirable Alpha Cristobalite on Filter Media	250 µg/filter	5 filters (5 blanks)
2967	Respirable Alpha Cristobalite on Filter Media	500 µg/filter	5 filters (5 blanks)

Lead in Paint, Dust, and Soil

These SRMs and RM have been developed in conjunction with the U.S. EPA to monitor paint, dust, and soil sources of lead.

SRM/RM	Lead Concentration	Unit Size
Paint Film		
2570	<0.001 mg/cm^2	1 blank film
2571	3.58 mg/cm^2	1 film, plus 1 blank
2572	1.527 mg/cm^2	1 film, plus 1 blank
2573	1.040 mg/cm^2	1 film, plus 1 blank
2574	0.714 mg/cm^2	1 film, plus 1 blank
2575	0.307 mg/cm^2	1 film, plus 1 blank
2579a (Set of 6: SRMs 2570 to 2575)	0.307 to 3.58 mg/cm^2	5 films, plus 1 blank
2576 (High Level)	5.59 mg/cm^2	1 film, plus 1 blank
Powdered Paint		
2580	4.34 %	30 g
2581	0.449 %	35 g
2582	209.8 mg/kg	20 g
2589	9.99 %	35 g
Indoor Dust, Trace Elements in (As, Cd, Cr, Hg, Pb)		
2583	85.9 mg/kg	8 g
2584	9761 mg/kg	8 g
Soil, Trace Elements in		
2586	432 mg/kg	50 g
2587	3242 mg/kg	50 g
Paint on Fiberboard		
8680	1 to 2 mg/cm^2	1 sheet: (10.2 × 15.2 × 1.3) cm

Asbestos

SRM	Description	Asbestos Type	Unit Size
1866b	Common Commercial Asbestos	chrysotile grunerite (Amosite) riebeckite (Crocidolite)	3 × 4 g

SRM	Description	Mass Fraction	Unit Size
1877	Beryllium Oxide Powder	Be	20 g

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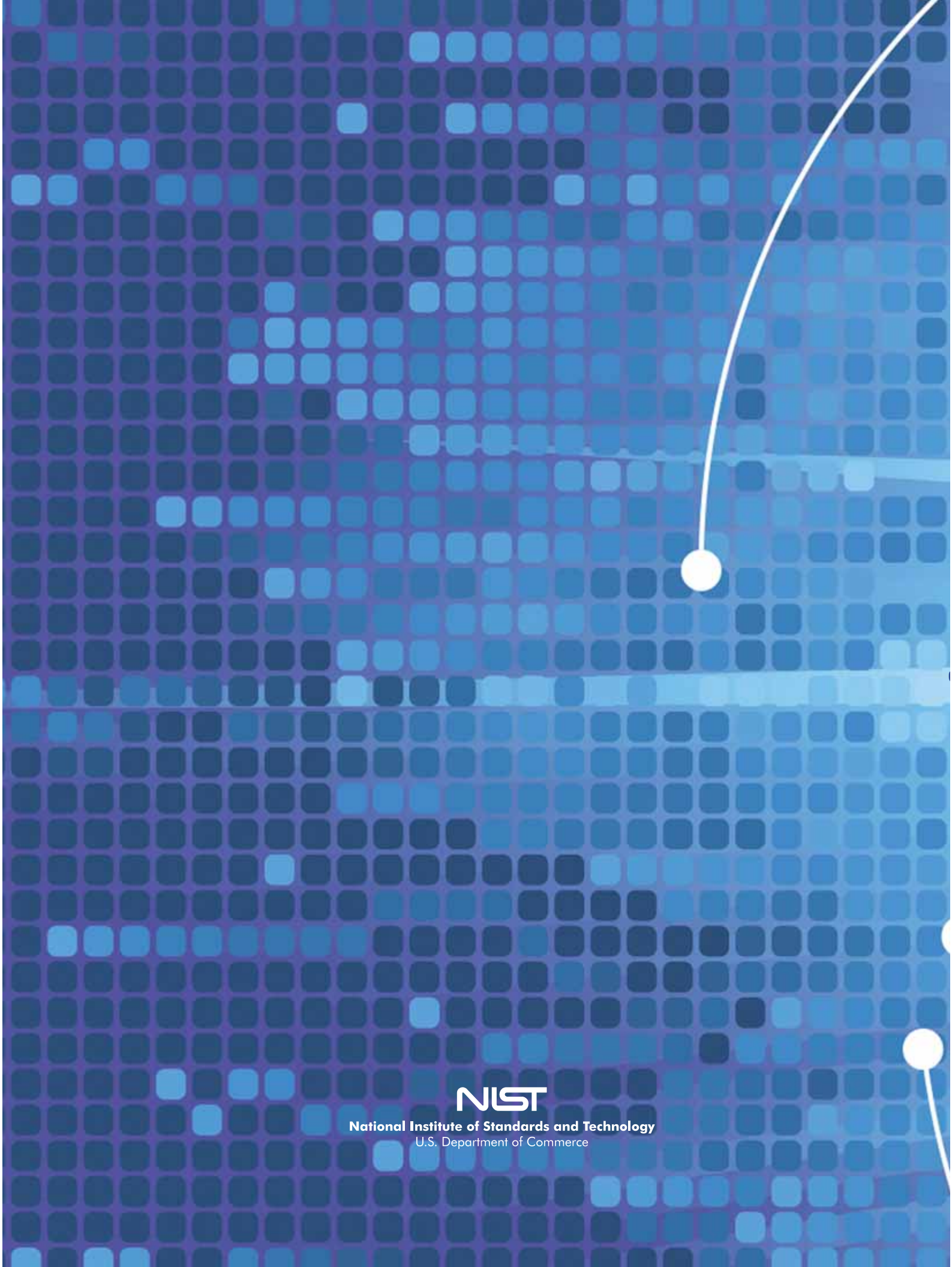
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