

# SRM

NIST Standard Reference Materials® Catalog



Engineering  
Materials



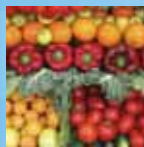
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# Standard Reference Materials® Catalog

January 2011

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**N**IST 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.

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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>.

## ■ Engineering Materials

- 1 SIZING
  - 1 Particle Size
  - 2 Cement Turbidity and Fineness
  - 2 Specific Surface Area of Powders
  - 2 Mercury Porosimetry Standards
  - 3 Particle Count Materials
- 3 SURFACE FINISH
  - 3 Abrasive Wear
  - 3 Surface Roughness
- 3 FIRE RESEARCH
  - 3 Surface Flammability
  - 4 Cigarette Ignition Strength
  - 4 Smoke Density Chamber
  - 4 Smoke Toxicity
  - 5 Flooring Radiant Panel
- 5 NONDESTRUCTIVE EVALUATION
  - 5 Artificial Flaw for Eddy Current NDE
- 5 PERFORMANCE ENGINEERING MATERIALS
  - 5 Fracture Toughness of Steels (Charpy V-Notch Test Blocks)
  - 6 Rockwell Hardness
  - 6 Microindentation Hardness (Knoop and Vickers Test Blocks)
  - 7 Tape Adhesion Testing
  - 7 Bleached Kraft Pulps
  - 7 Secondary Ferrite Number (FN) Materials
  - 7 Fracture Toughness of Ceramics
  - 7 Magnetic Moment Standards

## ■ Food & Agriculture

- 9 Nutrient Composition
- 10 Trace Elements in Food and Agricultural Products
- 10 Dietary Supplement Materials
- 10 Fertilizers
- 11 Wheat Hardness
- 11 Trace Elements in Botanicals
- 11 Biofuels
- 11 Whole Biomass Feedstock

## ■ Health & Clinical

- 13 Pure Crystalline Standards
- 13 Molecular Genetics Testing
- 13 Human Serum and Milk
- 14 Animal Blood Products
- 14 Calibration Solutions
- 15 Human Urine
- 15 Biomaterials
- 15 Miscellaneous Health-Related Materials

## ■ Forensics

- 17 Ethanol Solutions
- 18 Crime Scene Investigations
- 18 DNA Profiling
- 19 Drugs of Abuse in Human Hair and Urine

## ■ Environmental

- 21 CALIBRATION MATERIALS
  - 21 Calibration Solutions, Organic
  - 23 Calibration Solutions, Inorganic
  - 26 Organo-Metallic
- 27 BIOLOGICAL TISSUES
- 28 SOILS, SEDIMENTS, PARTICULATES AND WATER
- 30 GEOLOGICAL MATERIALS AND ORES
  - 30 Ores
  - 30 Ores Bioleaching Substrate
  - 31 Clays
  - 31 Chinese Ores
  - 32 Rocks and Minerals
  - 32 Refractories
- 32 MICROANALYSIS
  - 32 Elements in Metals
  - 32 Elements in Synthetic Glasses
  - 33 High Purity Liquids in Fuel Rating
- 33 FOSSIL FUELS AND RELATED MATERIALS
  - 35 Materials for Sulfur and Mercury
- 36 GASES
- 40 INDUSTRIAL HYGIENE
  - 40 Materials on Filter Media
  - 41 Trace Constituents Elements in Blank Filters
  - 41 Respirable Silica
  - 42 Lead in Paint, Dust, and Soil
  - 43 Asbestos
  - 43 Zeolites

## ■ High Purity Materials

- 45 Elemental Composition in High Purity Metals
- 46 Stoichiometric Standards
- 47 Microchemistry
- 48 Spectrometric Single Element Solutions
- 50 Anion Chromatography Solutions
- 50 Stable Isotopic Materials
- 51 Light Stable Isotopic Materials

## ■ Industrial Materials

- 53 FERROUS METALS
  - 53 Steels
  - 53 Low Alloy Steels
  - 55 Plain Carbon Steels
  - 55 Stainless Steels
  - 56 Special Low Alloy Steels
  - 57 Specialty Steels
  - 57 Tool Steels
  - 57 High Alloy Steels
  - 58 Steelmaking Alloys
  - 58 Cast Irons
  - 59 Cast Steels, White Cast Irons, and Ductile Irons
  - 59 High Temperature Alloys
  - 60 Gases in Metals: Iron and Steel
- 60 NONFERROUS METALS
  - 60 Aluminum Base Alloys
  - 61 Cobalt Base Alloys
  - 61 Copper "Benchmark"
  - 62 Copper Base Alloys
  - 63 Lead Base Alloys
  - 64 Lead Base Materials
  - 64 Solder Thickness
  - 64 Tin Base Alloys
  - 65 Nickel Base Alloys
  - 65 Nickel Oxides
  - 65 Trace Elements in Nickel Base Superalloys
  - 66 Titanium Base Alloys
  - 66 Hydrogen in Titanium
  - 66 Zirconium Base Alloys
  - 67 Zinc Base Alloys
  - 67 Microindentation Hardness
- 68 CERAMICS AND GLASSES
  - 68 Carbides
  - 68 Cemented Tungsten Carbides
  - 68 Trace Elements
  - 69 Glasses
- 69 GLASS
  - 69 Chemical Resistance of Glass
  - 70 Electrical Properties of Glass
  - 70 Viscosity of Glass
  - 70 Glass Liquidus Temperature
  - 71 Viscosity Fixpoints
  - 71 Relative Stress Optical Coefficient
  - 71 Density
- 72 CEMENTS
  - 72 Portland Cements
  - 72 Cement Turbidimetry and Fineness
  - 72 Portland Cement Clinkers
- 73 LUBRICANTS
  - 73 Lubricating Oil Ingredients
  - 73 Wear-Metals in Oil
  - 73 Carbon Modified Silica
  - 73 Used Auto Catalysts

## ■ Physical Properties

- 75 ION ACTIVITY
  - 75 pH Calibration
  - 76 Biological Buffer Systems
  - 76 pD Calibration
  - 76 Ion-Selective Electrode Calibration
  - 77 Electrolytic Conductivity
  - 77 Positive Electrophoretic Mobility
- 78 POLYMERIC PROPERTIES
  - 78 Molar Mass/Molecular Weight
  - 78 Melt Flow Rate
  - 79 Viscosity
  - 79 Biomaterials
- 80 THERMODYNAMIC PROPERTIES
  - 80 Calorimetry - Combustion
  - 80 Calorimetry - Solution
  - 80 Enthalpy and Heat Capacity
  - 81 Differential Scanning Calorimetry
  - 81 Differential Thermal Analysis
  - 81 Defining Fixed Points, International Temperature Scale of 1990, ITS-90
  - 82 Reference Points
  - 82 Freezing Point, Melting Point, and Triple Point Cells
  - 82 Thermal Expansion of Metal and Glass
  - 82 Thermal Resistance of Glass, Silica, and Polystyrene
  - 83 Thermal Conductivity of Graphite and Iron
  - 83 Thermocouple Material, Platinum

- 84 OPTICAL PROPERTIES
  - 84 Molecular Transmittance and Absorbance
  - 85 Transmittance Wavelength Standards
  - 85 Fluorescence
  - 85 Specular Spectral Reflectance
  - 86 Optical Rotation
  - 86 Liquid Refractive Index
  - 86 X-ray and Photographic Imaging
- 87 ELECTRICAL PROPERTIES
  - 87 Electrical Resistivity and Conductivity of Electrolytic Iron and Graphite
  - 87 Electrical Resistivity and Conductivity of Silicon
- 88 OPTOELECTRONICS
- 88 METROLOGY
  - 88 Optical Microscope Linewidth Measurement
  - 88 Microscale Dimensional Measurement Standards
  - 89 Scanning Electron Microscope (SEM)
  - 89 Thin Film for Transmission Electron Microscope
  - 89 Depth Profiling
  - 90 Solder Thickness for X-ray Fluorescence
  - 90 Coating Thickness
  - 91 Superconducting Critical Current
- 91 CERAMICS AND GLASSES
  - 91 Chemical Resistance [Durability]
  - 91 Electrical Properties
  - 92 Viscosity
  - 92 Viscosity Fixpoints
  - 92 Relative Stress Optical Coefficient
  - 92 Density (glass & liquid)
  - 93 Glass Liquidus Temperature
- 93 X-RAY SPECTROMETRY
  - 93 X-ray Diffraction

## ■ Radioactivity

- 95 Alpha Particle Solution Standards
- 96 Beta Particle and Electron Capture Solution Standards
- 97 Gamma Point Source
- 97 Radiopharmaceutical Standards
- 98 Beryllium Isotopic Ratio Standards
- 98 Radiocarbon Dating Contemporary Standards
- 98 Environmental Natural Matrix Standards
- 99 Neutron Density Monitor Wire
- 99 Fission Track Glass

## ■ Industrial Hygiene

- 101 Materials on Filter Media
- 101 Trace Constituent Elements in Blank Filters
- 101 Respirable Silica
- 102 Lead in Paint, Dust, and Soil
- 103 Asbestos

## ■ Subject Index 104

## ■ Numeric Index 118

# ENGINEERING MATERIALS

- 1 Sizing
- 3 Surface Finish
- 3 Fire Research
- 5 Nondestructive Evaluation
- 5 Performance Engineering Materials







## 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 ( $\mu\text{m}/\text{nm}$ )	Unit Size (g)
<b>Glass Beads, Soda Lime</b>		
1021	2 $\mu\text{m}$ to 12 $\mu\text{m}$	4
1003c	20 $\mu\text{m}$ to 50 $\mu\text{m}$ (No. 635 to No. 325)	28
1004b	53 $\mu\text{m}$ to 125 $\mu\text{m}$ (No. 270 to No. 120)	43
1017b	106 $\mu\text{m}$ to 355 $\mu\text{m}$ (No. 140 to No. 45)	70
1018b	250 $\mu\text{m}$ to 710 $\mu\text{m}$ (No. 60 to No. 25)	87
1019b	850 $\mu\text{m}$ to 2000 $\mu\text{m}$ (No. 20 to No. 10)	200
<b>Sand</b>		
RM 8010	(No. 30 to No. 325)	3 $\times$ 150 g
<b>Silicon Nitride (equiaxed)</b>		
659	0.2 $\mu\text{m}$ to 10 $\mu\text{m}$	5 $\times$ 2.5 g
<b>Zirconium Oxide (irregular)</b>		
1978	0.2 $\mu\text{m}$ to 10 $\mu\text{m}$	5
1982	10 $\mu\text{m}$ to 150 $\mu\text{m}$	10
<b>Tungsten Carbide/Cobalt (spheroidal)</b>		
1984	9 $\mu\text{m}$ to 30 $\mu\text{m}$	14
1985	18 $\mu\text{m}$ to 55 $\mu\text{m}$	14
<b>Polystyrene Spheres</b>		
Unit Size: 5 mL vial (unless otherwise noted)		
1690 (0.5 % in H <sub>2</sub> O)	0.895 $\mu\text{m}$	
1691 (0.5 % in H <sub>2</sub> O)	0.269 $\mu\text{m}$	
1961* (0.5 % in H <sub>2</sub> O)	29.64 $\mu\text{m}$	
1963a** (0.5 % in H <sub>2</sub> O)	0.1007 $\mu\text{m}$	
1964 (0.06 $\mu\text{m}$ )	0.0639 $\mu\text{m}$	5 mL vial
1965 (Slide Mounted: 1 slide)	9.94 $\mu\text{m}$ (hexagonal array) 9.89 $\mu\text{m}$ (unordered clusters)	
<b>Gold Nanoparticles</b>		
8011	10 nm	2 ampoules: 5 mL each
8012	30 nm	2 ampoules: 5 mL each
8013	60 nm	2 ampoules: 5 mL each
<b>Titanium Dioxide Powder</b>		
8988	0.1 $\mu\text{m}$ to 0.5 $\mu\text{m}$	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 <sup>2</sup> g <sup>-1</sup>	
		Specific Surface Area (Blaine Air Permeability Apparatus) Particle Size Distribution	3818 cm <sup>2</sup> g <sup>-1</sup> 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 <sup>2</sup> /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 <sub>a</sub> (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 Methods 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		Unit Size
				LC <sub>50</sub>	N-Gas	
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 <sup>2</sup>	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 <sup>2</sup> )
<b>Copper, Bright</b>			
1893	Knoop	0.245, 0.49, 0.98	125
<b>Nickel, Bright</b>			
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
<b>Silicon Nitride, Ceramic</b>			
2830 (22 mm diameter × 9.54 mm)	Knoop	19.6	1500
<b>Tungsten Carbide, Ceramic</b>			
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 · m <sup>1/2</sup> )	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

- 9 Nutrient Composition
- 10 Dietary Supplement Material
- 10 Trace Elements in Food and Agricultural Products
- 10 Fertilizers
- 11 Biofuels
- 11 Wheat Hardness
- 11 Trace Elements in Botanicals
- 11 Whole Biomass Feedstock







## Nutrient Composition

SRM/RM	Description	Certified Constituents	Unit Size (g)
1544	Fatty Acids and Cholesterol in Frozen Diet Composite	Cholesterol, Fatty Acids, Calcium, 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	<i>Ginkgo biloba</i> Leaves	5 × 3 g
3247	<i>Ginkgo biloba</i> 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	<i>Serenoa repens</i> (fruit)	5 × 6 g
3251	<i>Serenoa repens</i> (extract)	5 × 1 g
3254	<i>Camellia sinensis</i> (Green Tea) Leaves	5 packets × 3 g each
3255	<i>Camellia sinensis</i> (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,
8492	Populus Deltoides	Acid-Insoluble Lignin, Total Lignin, Glucuronic Acid,
8493	Monterey Pine	Arabinan, Xylan, Mannan, Galactan, Glucan
8494	Wheat Straw	

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

# HEALTH & CLINICAL

- 13 Pure Crystalline Standards**
- 13 Molecular Genetics Testing**
- 13 Human Serum and Milk**
- 14 Animal Blood Products**
- 14 Calibration Solutions**
- 15 Human Urine**
- 15 Biomaterials**
- 15 Miscellaneous Health-Related Standards**





## 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 <sub>2</sub>	25-hydroxyvitamin D <sub>2</sub>	10 × 1.2 mL	Solution	
	25-Hydroxyvitamin D <sub>3</sub>	25-hydroxyvitamin D <sub>3</sub>	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	Benzoyllecgonine (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

- 17 Ethanol Solutions
- 18 Crime Scene Investigations
- 18 DNA Profiling
- 19 Drugs of Abuse in Human Hair and Urine







## 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 1.2mL
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



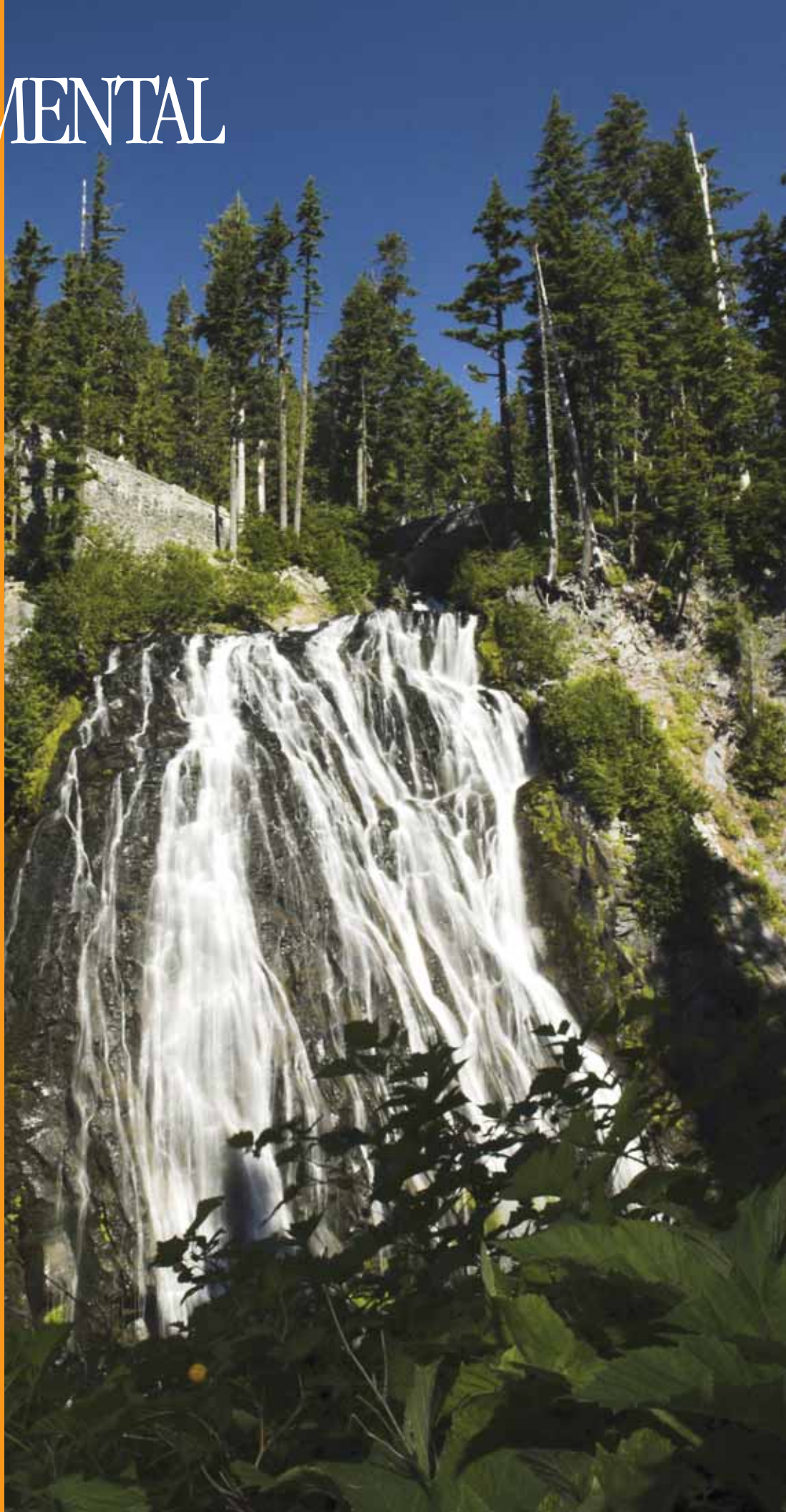
### Drugs of Abuse in Human Hair and Urine

SRM/RM	Description	Certified Constituents	Reference Constituent	Form	Unit Size
1508a	Cocaine Metabolite in Urine	Benzoylcegonine		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

- 21 Calibration Materials
- 27 Biological Tissues
- 28 Soils, Sediments, Particulates and Water
- 30 Geological Materials and Ores
- 32 Microanalysis
- 33 Fossil Fuels and Related Materials
- 36 Gases
- 40 Industrial Hygiene



## CALIBRATION MATERIALS

### 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



ENVIRONMENTAL

## Calibration Solutions, Organic (continued)

For more information, see Table 109.1 on our website [www.nist.gov/srm](http://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	17 $\alpha$ (H)-21 $\beta$ (H)-22R-homohopane 17 $\alpha$ (H)-21 $\beta$ (H)-22S-homohopane $\alpha\beta\beta$ 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)

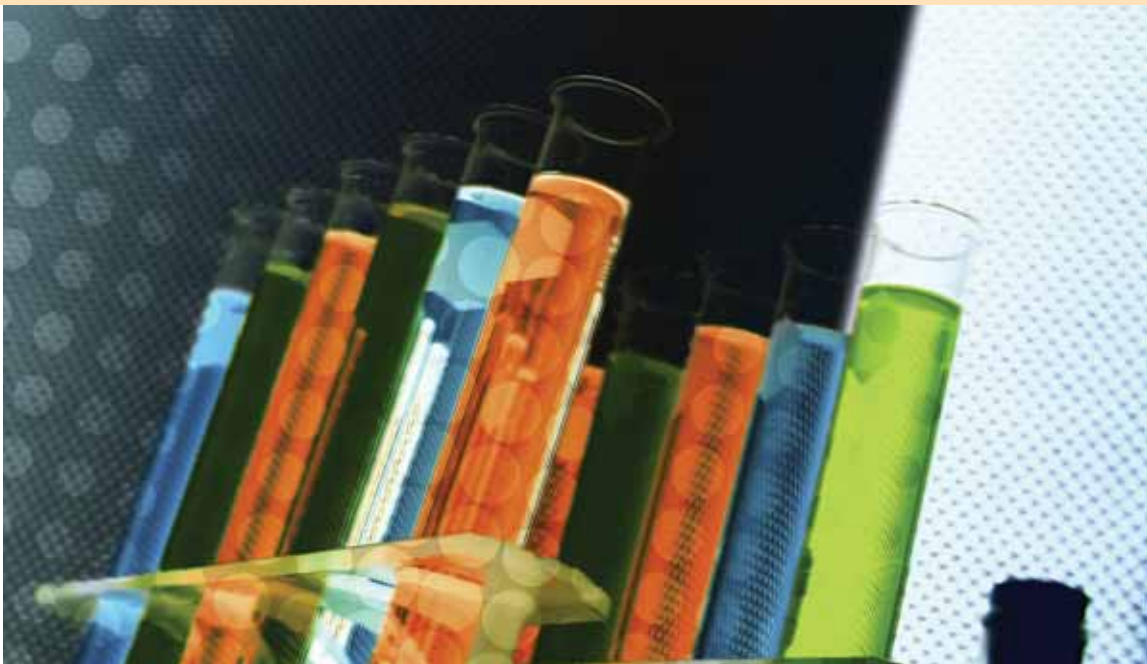
SRM	Description	Certified Constituents	Unit Size
3118a	Gadolinium Standard Solution	Gadolinium	5 x 10 mL
3119a	Gallium Standard Solution	Gallium	5 x 10 mL
3120a	Germanium Standard Solution	Germanium	50 mL
3121	Gold Standard Solution	Gold	5 x 10 mL
3122	Hafnium Standard Solution	Hafnium	50 mL
3123a	Holmium 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	Strontium Standard Solution	Strontium	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, Methylmercury	8 Elements, 8 Fatty Acids, Proximates, Caloric Content	25 g
1974b	Organics in Mussel Tissue ( <i>Mytilus Edulis</i> ) (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, Methylmercury, 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](http://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 Chromium in Contaminated Soil	CrVI, 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)	PAHs (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 (Al <sub>2</sub> O <sub>3</sub> -40 %)	12	75
77a	Burnt Refractory (Al <sub>2</sub> O <sub>3</sub> -60 %)	12	75
78a	Burnt Refractory (Al <sub>2</sub> O <sub>3</sub> -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- <i>n</i> -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 ( $\mu\text{mol/mol}$ )
<b>Ambient Non-Methane Organics in Nitrogen (15 components in large cylinder)</b>	
1800b	5 nmol/mol
<b>Volatile Organics in Nitrogen (30 components)</b>	
1804c	5 nmol/mol
<b>Carbon Dioxide in Air (Certified for <math>\text{CO}_2</math>)</b>	
1676	365
2617	500
<b>Carbon Monoxide in Air (Certified for CO)</b>	
2612a	10
2613a	20
2614a	42





**G A S E S** (continued)

SRM	Nominal Amount of Substance Fraction ( $\mu\text{mol/mol}$ )
<b>Carbon Dioxide in Nitrogen (Certified for CO<sub>2</sub>)</b>	
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 %
<b>Carbon Monoxide in Nitrogen (Certified for CO)</b>	
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 ( $\mu\text{mol/mol}$ )
<b>Carbon Monoxide in Nitrogen (Certified for CO) continued</b>	
2740a	10 mol %
2741a	13 mol %
<b>Hydrogen Sulfide in Nitrogen (Certified for H<sub>2</sub>S)</b>	
2730	5
2731	20
<b>Methane in Air (Certified for CH<sub>4</sub>)</b>	
1658a	1
1659a	10
1660a (also certified for C <sub>3</sub> H <sub>8</sub> )	4 (methane) 1 (propane)
2750	50
2751	100
<b>Nitric Oxide in Nitrogen (Certified for NO)</b>	
1683b*	50
1684b*	100
1685b*	250
1686b*	500
1687b*	1000
2629a*	20
2630*	1500
2631a*	3000
2735	800



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**GASES** (continued)

SRM	Nominal Amount of Substance Fraction ( $\mu\text{mol/mol}$ )
<b>Nitric Oxide in Nitrogen (Certified for NO)</b>	
2627a	5
2628a	10
2737	0.5
2738	1.0
<b>Oxygen in Nitrogen (Certified for O<sub>2</sub>)</b>	
2657a*	2 mol %
2658a*	10 mol %
2659a*	21 mol %
<b>Propane in Air (Certified for CH<sub>4</sub>)</b>	
1660a (also certified for C <sub>3</sub> H <sub>8</sub> )	4 (methane) 1 (propane)
1665b	3
1666b	10
1667b	50
1668b*	100
1669b	500
2764	0.25
2765 (also certified for C <sub>3</sub> H <sub>8</sub> )	100
<b>Propane in Nitrogen (Certified for C<sub>3</sub>H<sub>8</sub>)</b>	
2644a	250
2646a	1000
2647a	2500
<b>Oxides of Nitrogen in Air (Certified for NO<sub>2</sub>)</b>	
2660a*	100

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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.

## GASES (continued)

SRM	Nominal Amount of Substance Fraction ( $\mu\text{mol/mol}$ )
<b>Sulfur Dioxide in Nitrogen (Certified for SO<sub>2</sub>)</b>	
1661a*	500
1662a*	1000
1663a*	1500
1664a*	2500
1689*	5
1693a*	50
1694a*	100
1696a*	3500

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## 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 ( $\mu\text{m}$ )
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  $\mu\text{g}$ ) 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 ( $\mu\text{m}$ )	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% $\pm$ 0.21%	5 g
1879a	Respirable Cristobalite	88.2% $\pm$ 0.4%	5 g
2950	Respirable Alpha Quartz on Filter Media	(10, 20, 50, 100, 250, 500) $\mu\text{g}/\text{filter}$	set SRMs 2952-57
2951	Respirable Alpha Quartz on Filter Media	5 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2952	Respirable Alpha Quartz on Filter Media	10 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2953	Respirable Alpha Quartz on Filter Media	20 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2954	Respirable Alpha Quartz on Filter Media	50 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2955	Respirable Alpha Quartz on Filter Media	100 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2956	Respirable Alpha Quartz on Filter Media	250 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2957	Respirable Alpha Quartz on Filter Media	500 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2958	Respirable Alpha Quartz on Filter Media	1000 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2960	Respirable Alpha Cristobalite on Filter Media	(5, 10, 20, 50, 100, 250) $\mu\text{g}/\text{filter}$	set SRMs 2961-66
2961	Respirable Alpha Cristobalite on Filter Media	5 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2962	Respirable Alpha Cristobalite on Filter Media	10 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2963	Respirable Alpha Cristobalite on Filter Media	20 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2964	Respirable Alpha Cristobalite on Filter Media	50 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2965	Respirable Alpha Cristobalite on Filter Media	100 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2966	Respirable Alpha Cristobalite on Filter Media	250 $\mu\text{g}/\text{filter}$	5 filters (5 blanks)
2967	Respirable Alpha Cristobalite on Filter Media	500 $\mu\text{g}/\text{filter}$	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
<b>Paint Film</b>		
2570	<0.001 mg/cm <sup>2</sup>	1 blank film
2571	3.58 mg/cm <sup>2</sup>	1 film, plus 1 blank
2572	1.527 mg/cm <sup>2</sup>	1 film, plus 1 blank
2573	1.040 mg/cm <sup>2</sup>	1 film, plus 1 blank
2574	0.714 mg/cm <sup>2</sup>	1 film, plus 1 blank
2575	0.307 mg/cm <sup>2</sup>	1 film, plus 1 blank
2576 (High Level)	5.59 mg/cm <sup>2</sup>	1 film, plus 1 blank
2579a (Set of 6: SRMs 2570 to 2575)	0.307 to 3.58 mg/cm <sup>2</sup>	5 films, plus 1 blank
<b>Powdered Paint</b>		
2580	4.34 %	30 g
2581	0.449 %	35 g
2582	209.8 mg/kg	20 g
2589	9.99 %	35 g
<b>Indoor Dust, Trace Elements in (As, Cd, Cr, Hg, Pb)</b>		
2583	85.9 mg/kg	8 g
2584	9761 mg/kg	8 g
<b>Soil, Trace Elements in</b>		
2586	432 mg/kg	50 g
2587	3242 mg/kg	50 g
<b>Paint on Fiberboard</b>		
8680	1 to 2 mg/cm <sup>2</sup>	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

**45 Elemental Composition  
in High Purity Metals**

**46 Stoichiometric Standards**

**47 Microchemistry**

**48 Spectrometric Single  
Element Solutions**

**50 Anion Chromatography Solutions**

**50 Stable Isotopic Materials**

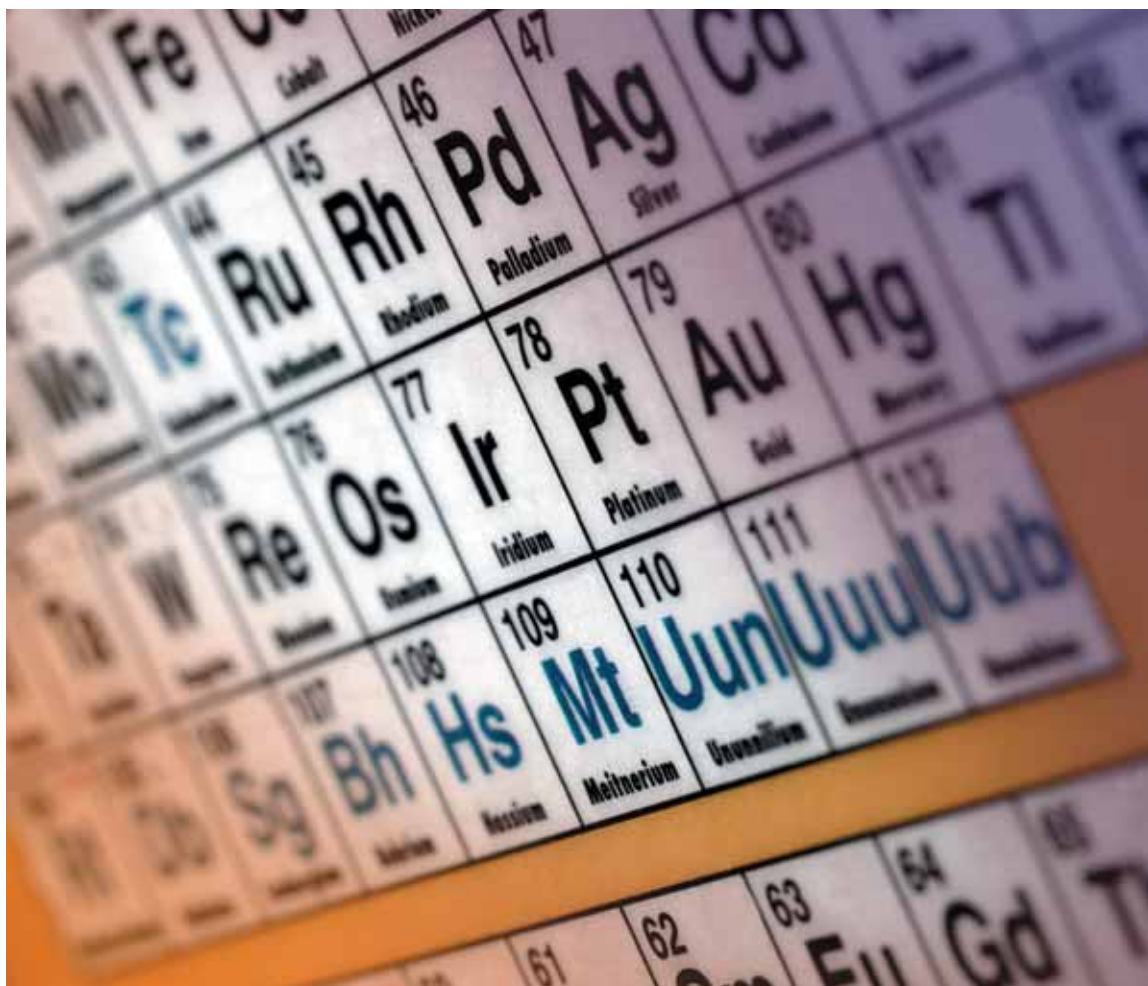
**51 Light Stable Isotopic Materials**





## Elemental Composition in High Purity Metals

For more information, see Table 104.1 High Purity Metals on our website [www.nist.gov/srm](http://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  $100\% \pm 0.02\%$  (Purity  $99.98\pm\%$ )
- Working Standard: a commercially available substance of purity  $100\% \pm 0.05\%$  (Purity  $99.95\pm\%$ )
- 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



HIGH PURITY MATERIALS

SRM	Description	Certified Component
141d	Acetanilide	C, H, N, O
142	Anisic Acid	CH <sub>3</sub> O-
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 <sub>3</sub> 10 %
3102a	Antimony	HNO <sub>3</sub> 10 % + HF 2 %
3103a	Arsenic	HNO <sub>3</sub> 10 %
3104a	Barium	HNO <sub>3</sub> 10 %
3105a	Beryllium	HNO <sub>3</sub> 10 %
3106	Bismuth	HNO <sub>3</sub> 10 %
3107	Boron	H <sub>2</sub> O
3108	Cadmium	HNO <sub>3</sub> 10 %
3109a	Calcium	HNO <sub>3</sub> 10 %
3110	Cerium	HNO <sub>3</sub> 10 %
3111a	Cesium	HNO <sub>3</sub> 1 %
3112a	Chromium	HNO <sub>3</sub> 10 %
3113	Cobalt	HNO <sub>3</sub> 10 %
3114	Copper	HNO <sub>3</sub> 10 %
3115a	Dysprosium	HNO <sub>3</sub> 10 %
3116a	Erbium	HNO <sub>3</sub> 10 %
3117a	Europium	HNO <sub>3</sub> 10 %
3118a	Gadolinium	HNO <sub>3</sub> 10 %
3119a	Gallium	HNO <sub>3</sub> 10 %
3120a	Germanium	HNO <sub>3</sub> 10 % + HF 2 %
3121	Gold	HCl 10 %
3122	Hafnium	HNO <sub>3</sub> 10 % + HF 2 %
3123a	Holmium	HNO <sub>3</sub> 10 %
3124a	Indium	HNO <sub>3</sub> 10 %
3126a	Iron	HNO <sub>3</sub> 10 %
3127a	Lanthanum	HNO <sub>3</sub> 10 %
3128	Lead	HNO <sub>3</sub> 10 %
3129a	Lithium	HNO <sub>3</sub> 1 %
3130a	Lutetium	HNO <sub>3</sub> 10 %
3131a	Magnesium	HNO <sub>3</sub> 10 %
3132	Manganese	HNO <sub>3</sub> 10 %

(continued)





**Spectrometric Single Element Solutions** (continued)

<b>SRM</b>	<b>Element</b>	<b>Nominal Acid Concentration</b>
3133	Mercury	HNO <sub>3</sub> 10 %
3134	Molybdenum	HCl 10 %
3135a	Neodymium	HNO <sub>3</sub> 10 %
3136	Nickel	HNO <sub>3</sub> 10 %
3137	Niobium	HNO <sub>3</sub> 10 % + HF 2 %
3138	Palladium	HCl 10 %
3139a	Phosphorus	HNO <sub>3</sub> 0.8 %
3140	Platinum	HCl 10 %
3141a	Potassium	HNO <sub>3</sub> 1 %
3142a	Praseodymium	HNO <sub>3</sub> 10 %
3143	Rhenium	HNO <sub>3</sub> 10 %
3144	Rhodium	HCl 10 %
3145a	Rubidium	HNO <sub>3</sub> 1 %
3147a	Samarium	HNO <sub>3</sub> 10 %
3148a	Scandium	HNO <sub>3</sub> 10 %
3149	Selenium	HNO <sub>3</sub> 10 %
3150	Silicon	H <sub>2</sub> O
3151	Silver	HNO <sub>3</sub> 10 %
3152a	Sodium	HNO <sub>3</sub> 1 %
3153a	Strontium	HNO <sub>3</sub> 10 %
3154	Sulfur	H <sub>2</sub> SO <sub>4</sub> 0.1 %
3155	Tantalum	HNO <sub>3</sub> 10 % + HF 2 %
3156	Tellurium	HCl 10 %
3157a	Terbium	HNO <sub>3</sub> 10 %
3158	Thallium	HNO <sub>3</sub> 10 %
3159	Thorium	HNO <sub>3</sub> 10 %
3160a	Thulium	HNO <sub>3</sub> 10 %
3161a	Tin	HNO <sub>3</sub> 5 % + HF 1 %
3162a	Titanium	HNO <sub>3</sub> 10 % + HF 2 %
3163	Tungsten	HNO <sub>3</sub> 7 % + HF 4 %
3164	Uranium	HNO <sub>3</sub> 10 %
3165	Vanadium	HNO <sub>3</sub> 10 %
3166a	Ytterbium	HNO <sub>3</sub> 10 %
3167a	Yttrium	HNO <sub>3</sub> 10 %
3168a	Zinc	HNO <sub>3</sub> 10 %
3169	Zirconium	HNO <sub>3</sub> 10 % + HF 2 %
3177	Mercury (II) Chloride	HNO <sub>3</sub> 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 <sup>10</sup> 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, <sup>208</sup> Pb/ <sup>206</sup> 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.  $\delta^2\text{H}_{\text{VSMOW2}}$
2.  $\delta^{18}\text{O}_{\text{VSMOW2}}$
3.  $\delta^{13}\text{C}_{\text{VPDB}}$
4.  $^6\text{Li} / ^7\text{Li}$
5.  $\delta^{30}\text{Si}_{\text{NBS28}}$
6.  $\delta^{15}\text{N}_{\text{AIR}}$
7.  $\delta^{34}\text{S}_{\text{VCDT}}$

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 $\mu\text{mol}$
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 <sub>2</sub> -Heavy, Paleomarine Origin	2,3	2 tubes
8563	CO <sub>2</sub> -Light, Petrochemical Origin	2,3	2 tubes
8564	CO <sub>2</sub> -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

53 Ferrous Metals

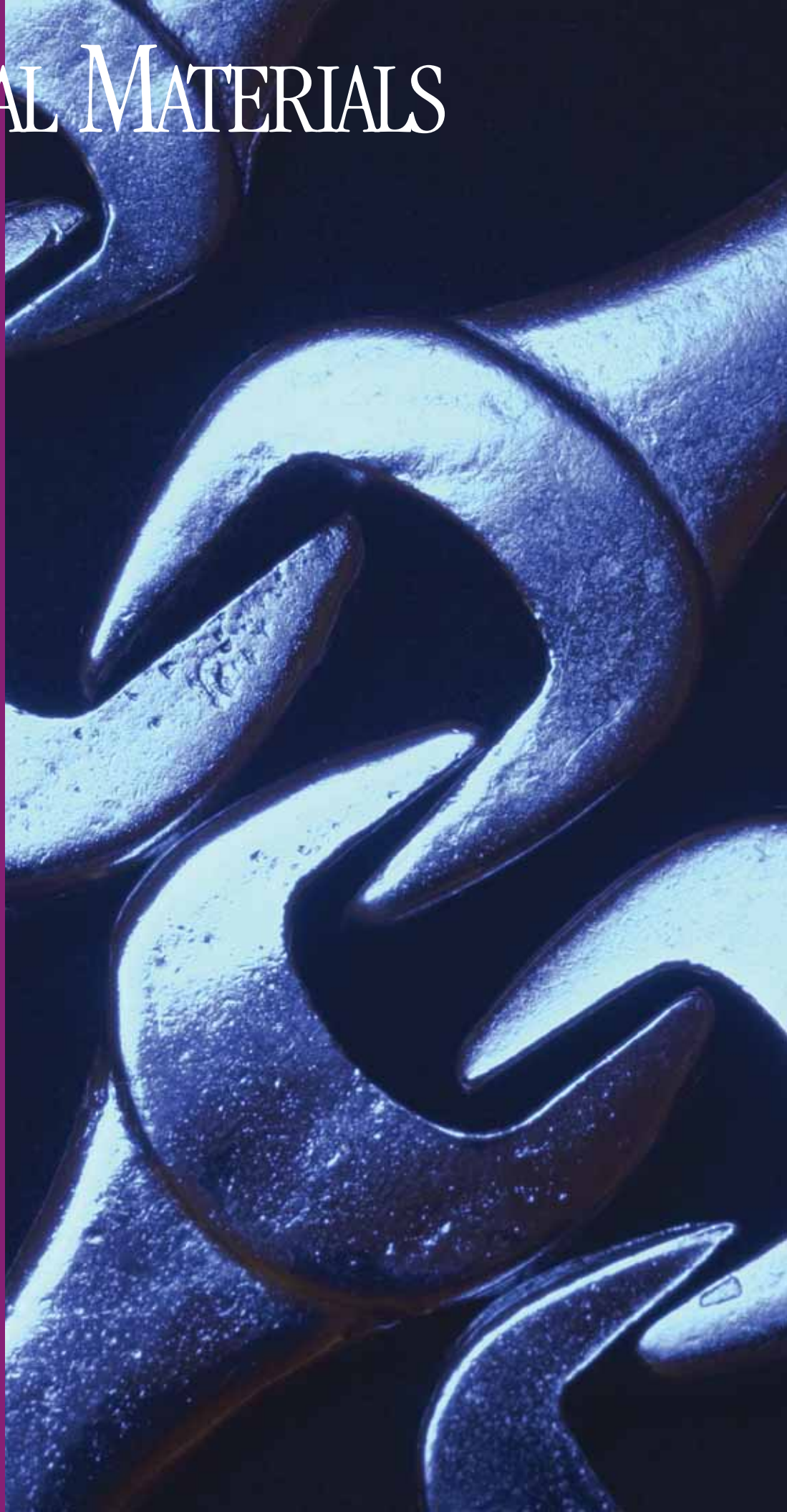
60 Nonferrous Metals

68 Ceramics and Glasses

69 Glass

72 Cements

73 Lubricants





## 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](http://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.

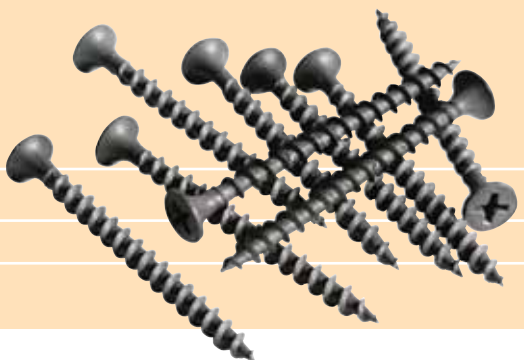
SRM	Description
1270	2-1/4 Chromium - 1 Molybdenum Low Alloy Steel, A 336 (F-22)
C1285	A242, Modified
C1221	AISI 1211, Modified, Resulfurized/Rephosphorized
1269	AISI 1526, Modified (Line Pipe Steel)
1224	Carbon (AISI 1078)
1225	Low Alloy (AISI 4130)
1262b	AISI 94B17 (Modified)
1254	Calcium in Low Alloy 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
<b>Basic Open-Hearth Steel</b>	
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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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](http://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-l	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 <sup>4</sup> 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](http://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 mm × 103 mm

For more information, see Table 102.5 Copper Benchmark (chip and rod) on our website [www.nist.gov/srm](http://www.nist.gov/srm).

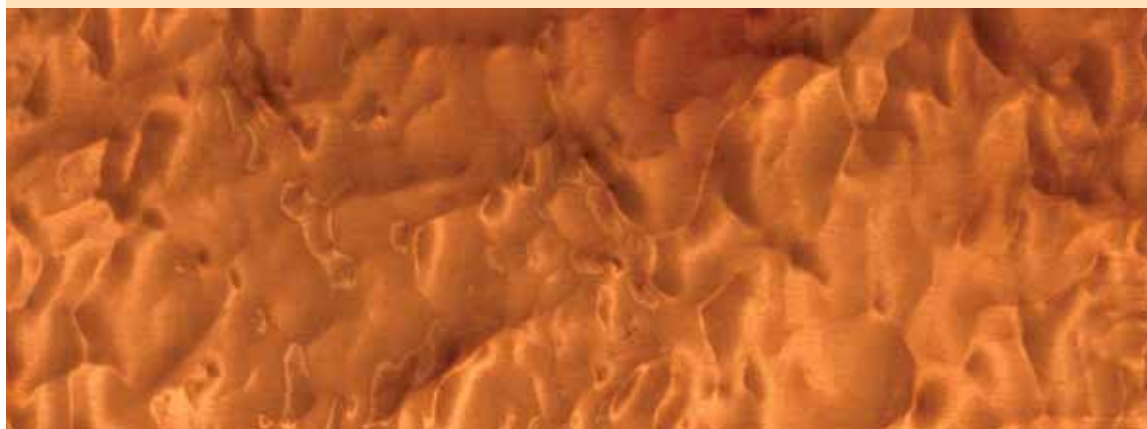
SRM	Description	
	Chip	Rod/Chill Cast
	494	Unalloyed Copper - Cu I
395	495	Unalloyed Copper - Cu II
396	496	Unalloyed Copper - Cu III
	457	Unalloyed Copper - Cu IV
398		Unalloyed Copper - Cu V
	498	Unalloyed Copper - Cu V
399	499	Unalloyed Copper - Cu VI
400	500	Unalloyed Copper - Cu VII
	C1251a	Phosphorus 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](http://www.nist.gov/srm).

SRM	Description	Unit Size (g)
158a	Silicon, Bronze	150
<b>Beryllium-Copper</b>		
458	C-17510	50
459	C-17200	50
460	C-17300	50
<b>Bronze</b>		
871	CDA 521 Phosphor Bronze	100
872	CDA 544 Phosphor Bronze	100
1034	Unalloyed Copper	rod
1035	Leaded-Tin Bronze Alloy	50
<b>Cupro-Nickel</b>		
874	10 % CDA 706, High-Purity	100
875	10 % CDA 706, Doped	100
<b>Nickel-Silver</b>		
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](http://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)		
		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](http://www.nist.gov/srm).

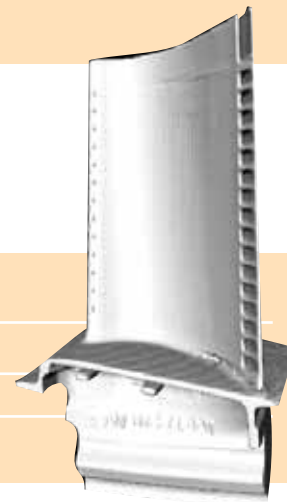
SRM	Description	Unit Size
349a	Waspaloy™	150 g
861	Nickel-Based Superalloy	50 g
864	Inconel™ 600	100 g
865	Inconel™ 625	100 g
882	Nickel-Copper Alloy (65Ni - 31Cu - 3Al)	100 g
1159	Electronic and Magnetic Alloy Ni-Fe	disk: 31 mm diameter × 19 mm
1160	Electronic and Magnetic Alloy Ni-Mo	disk: 31 mm diameter × 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](http://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](http://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](http://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](http://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/mm <sup>2</sup> )
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](http://www.nist.gov/srm).

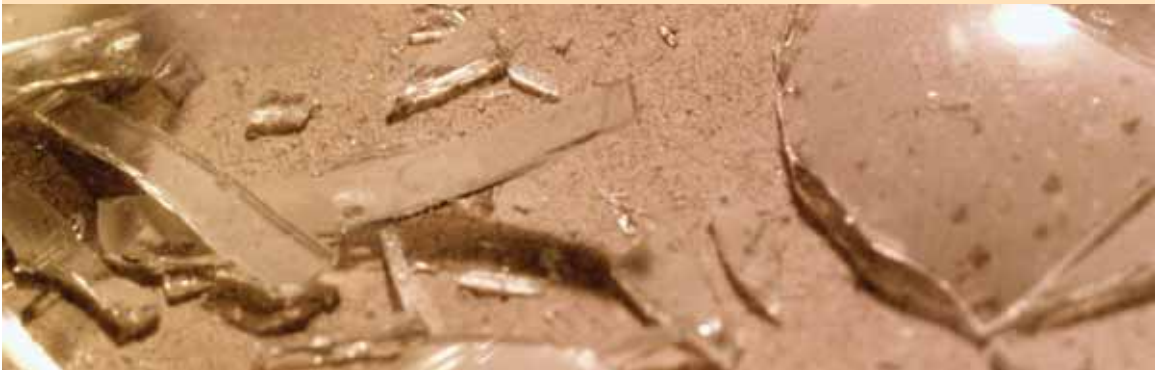
SRM	Description	Unit Size (g)
81a	Glass Sand	75
89	Lead-Barium	45
92	Low-Boron Soda-Lime Powder	45
93a	High-Boron Borosilicate	wafer: 32 mm diameter × 6 mm
165a	Glass Sand (low Iron)	75
620	Soda-Lime, Flat	3 platelets: 35 mm × 35 mm × 3 mm
621	Soda-Lime, Container	3 disks: 38 mm diameter × 5 mm
1411	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

### G L A S S

#### 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
<b>Calcium Aluminate Cement</b>	
1882a	4 × 5 g
1883a	4 × 5 g
<b>Portland Cement</b>	
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
<b>Silica Fume</b>	
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
<b>Portland Cement Clinkers (5 phases certified)</b>	
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	0.70
		II	9.06
		III	17.04

### Used Auto Catalysts

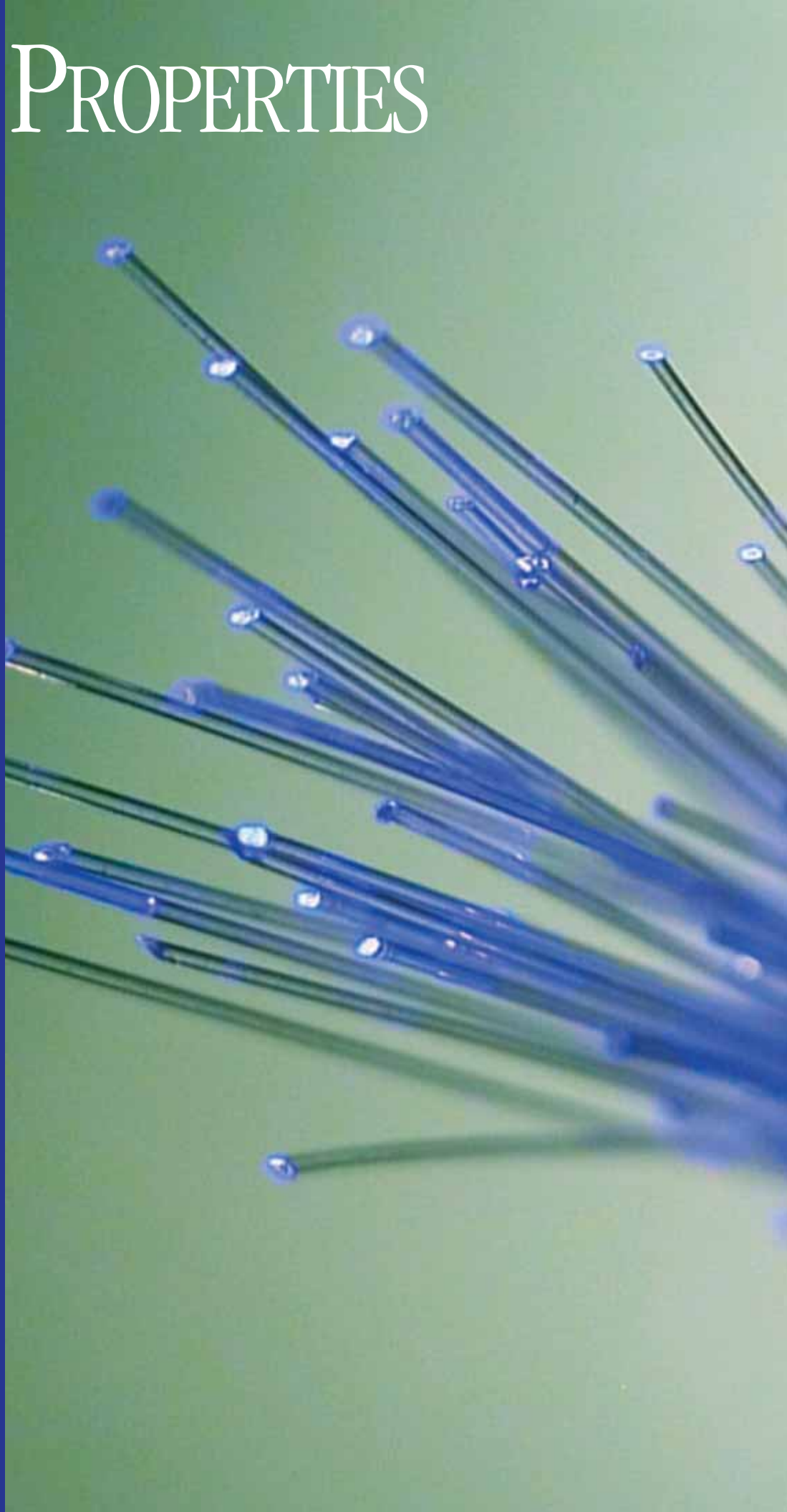
Unit Size: 70 g

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



# PHYSICAL PROPERTIES

- 75 Ion Activity
- 78 Polymeric Properties
- 80 Thermodynamic Properties
- 84 Optical Properties
- 87 Electrical Properties
- 88 Optoelectronics
- 88 Metrology
- 91 Ceramics and Glasses
- 93 X-ray Spectrometry



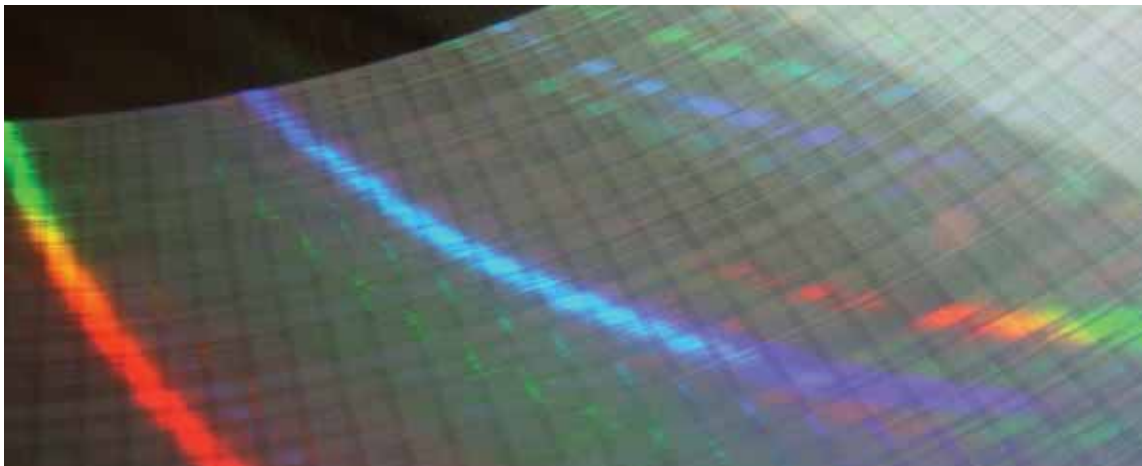


## ION ACTIVITY

### 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
<b>Admixtures</b>			
Unit Size: 30 g (unless otherwise noted)			
186g	pH Standards		Set
191d	Sodium Bicarbonate (25 g)	10.012*	Set
	Sodium Bicarbonate (191-I-c)		25
	Sodium Carbonate (191-II-c)		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	HEPES Free Acid	7.364*	7.373*
2182	NaHEPESate		
2183	MOPSO Free Acid	6.699*	6.694*
2184	NaMOPSOate		



\*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	Potassium Dihydrogen Phosphate	7.428*	30
2186II	Disodium Hydrogen Phosphate		30
2191a	Sodium Bicarbonate	10.732*	30
2192a	Sodium Carbonate		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 ( $\mu\text{S}/\text{cm}$ )
3190	HCl in Deionized Water	25
<b><i>KCl in Deionized Water</i></b>		
3191		100
3192		500
3193		1000
<b><i>KCl in n-Propanol/Deionized Water</i></b>		
3198		5
3199		15



### Positive Electrophoretic Mobility

SRM	Description	Certified Property	Unit Size
1980	Goethite ( $\alpha\text{-FeOOH}$ )	$+\mu_E, 2.53 \mu\text{m} \cdot \text{cm}/\text{V} \cdot \text{s}$	40 mL

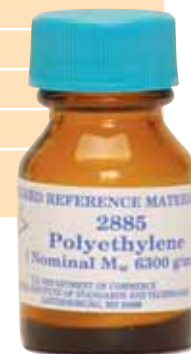
## POLYMERIC PROPERTIES

### Molar Mass

SRM	Molar Mass (g/mol)	Unit Size (g)
<b>Poly(methylmethacrylate)</b>		
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
<b>Polyethylene, linear</b>		
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
<b>Polystyrene, linear, broad molecular mass distribution</b>		
706a	$M_w \approx 285\,000$	18
<b>Polystyrene, linear, narrow molecular mass distribution</b>		
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 <i>Properties:</i> - Calcium - Phosphorus - Ca/P Molar Ratio	2 g (powder)
8011	Gold Nanoparticles, Nominal 10 nm Diameter <i>Properties:</i> - Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 x 5 mL ampoules
8012	Gold Nanoparticles, Nominal 30 nm Diameter <i>Properties:</i> - Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 x 5 mL ampoules
8013	Gold Nanoparticles, Nominal 60 nm Diameter <i>Properties:</i> - Reference Values for Particle Size - Information Values for Chemical and Electrochemical Properties	2 x 5 mL ampoules
8385	Ultra High Molecular Weight Polyethylene Wear Particles <i>Properties:</i> - 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 Polyethylene <i>Properties:</i> - 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 Polyethylene <i>Properties:</i> - 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)
<b>Pure Metals</b>			
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
<b>Devices (semi-open cell)</b>			
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 <sup>2</sup> · K · W <sup>-1</sup> )
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·m <sup>-1</sup> ·K <sup>-1</sup> )
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
<b>Crystalline and Solution Forms</b>			
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
<b>Glass Filters, Transmittance</b>			
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-infrared	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	$1.526132 \pm 1.6 \times 10^{-5}$
		501.7	$1.524468 \pm 1.6 \times 10^{-5}$
		508.7	$1.523971 \pm 1.6 \times 10^{-5}$
		546.2	$1.521629 \pm 1.6 \times 10^{-5}$
		587.7	$1.519535 \pm 1.6 \times 10^{-5}$
		644.0	$1.517277 \pm 1.6 \times 10^{-5}$

## 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
<b>Electrolytic Iron (2 K to 1000 K)</b>		
8420	0.004 to 0.909	0.64 cm diameter × 5.0 cm
<b>Graphite (5 K to 2500 K)</b>		
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
<b>Wavelength Calibration Standards</b>		
2514	Wavelength Calibration Reference for 1560 nm to 1595 nm - Carbon Monoxide ( $^{12}\text{C}^{16}\text{O}$ )	Gas Absorption Cell
2515	Wavelength Calibration Reference for 1595 nm to 1630 nm - Carbon Monoxide ( $^{13}\text{C}^{16}\text{O}$ )	Gas Absorption Cell
2517a	High Resolution Wavelength Calibration Reference for 1510 nm to 1540 nm - Acetylene ( $^{12}\text{C}_2\text{H}_2$ )	Gas Absorption Cell
2519a	Wavelength Reference Absorption Cell for 1530 nm to 1560 nm Hydrogen Cyanide ( $\text{H}^{13}\text{C}^{14}\text{N}$ )	Gas Absorption Cell
<b>Polarization Mode Dispersion Standards</b>		
2518	Polarization Mode Dispersion Standard	1 each
2538	Deterministic Polarization Mode Dispersion Standard	1 each
<b>Fiber and Fiber-Connector Geometry Standards</b>		
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 ( $\mu\text{m}$ )	Pitch ( $\mu\text{m}$ )	Unit Size (cm)
<b>Linewidth Measurement Standards</b>			
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 <sub>x</sub> Ga <sub>1-x</sub> 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	<sup>31</sup> P: 0.04927 μg/cm <sup>2</sup> (9.58 × 10 <sup>14</sup> atoms/cm <sup>2</sup> )	crystal 1 × 1
2134	Arsenic Implant in Silicon Profile Standard	<sup>75</sup> As - 7 × 10 <sup>14</sup> atoms/cm <sup>2</sup>	crystal: 1 × 1
2135c	Nickel-Chromium Thin-Film Depth Profile Standard	Cr: 41.3 μg/cm <sup>2</sup> Ni: 49.4 μg/cm <sup>2</sup>	1 × 2.54 × 0.04
2137	Boron Implant in Silicon Depth Profile Standard	<sup>10</sup> B - 1.018 v 10 <sup>15</sup> atoms/cm <sup>2</sup>	1 × 1

## Solder Thickness for X-ray Fluorescence

Unit Size: plate: 15 mm × 15 mm


SRM	Description	Composition	Coating Mass/Area	Coating Thickness	
				( $\mu\text{m}$ )	( $\mu\text{m}$ )
2321	Tin-Lead Alloy	60 % Sn, 40 % Pb	6.8 mg/cm <sup>2</sup>	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	
	( $\mu\text{m}$ )	(mils)
<b>Chromium over Copper on Steel</b>		
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 <sub>2</sub> SO <sub>4</sub>	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 $\lambda = 546.1$ nm (Value $\times 10^{-12}$ m <sup>2</sup> /N)	Unit Size
709	Extra Dense Lead Silica	C = - 1.359	bar: 4 cm × 4 cm × 5 cm

## Density

SRM	Description	Density (kg/m <sup>3</sup> )	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)	988
			B (perforated plate)	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 $2\theta$ (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 <sub>2</sub> , Cr <sub>2</sub> O <sub>3</sub> , TiO <sub>2</sub> , 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

- 95 Alpha Particle Solution Standards
- 96 Beta Particle and Electron Capture Solution Standards
- 97 Gamma Point Source
- 97 Radiopharmaceutical Standards
- 98 Beryllium Isotopic Ratio Standard
- 98 Radiocarbon Dating Contemporary Standards
- 98 Environmental Natural Matrix Standards
- 99 Neutron Density Monitor Wire
- 99 Fission Track Glass





**TABLE 1: Alpha Particle Solution Standards**

Radionuclide	SRM Number	Approx. Bq·g <sup>-1</sup>	Reference Time	Expanded Uncertainty	Solution Mass	Chemical Form (%)	Solution Composition (g)	Notes
Americium-241*	4322C	100	May 2007	0.3	5	Am(NO <sub>3</sub> ) <sub>3</sub>	1 M HNO <sub>3</sub>	
Americium-243*	4332E	40	#	#	5	Am(NO <sub>3</sub> ) <sub>3</sub>	1 M HNO <sub>3</sub>	
Curium-243*	4329	70	Jun 1984	1.4	5	Cm(NO <sub>3</sub> ) <sub>3</sub>	1 M HNO <sub>3</sub>	
Curium-244*	4320A	35	#	#	5	Cm(NO <sub>3</sub> ) <sub>3</sub>	1 M HNO <sub>3</sub>	
Neptunium-237*	4341	100	Mar 1992	1.3	5	Np(NO <sub>3</sub> ) <sub>3</sub>	2 M HNO <sub>3</sub>	
Plutonium-238*	4323B	30	Feb 1994	0.7	5	Pu(NO <sub>3</sub> ) <sub>6</sub>	3 M HNO <sub>3</sub>	
Plutonium-239*	4330C	40	Dec 1995	0.7	5	Pu(NO <sub>3</sub> ) <sub>6</sub>	3 M HNO <sub>3</sub>	
Plutonium-240*	4338A	40	May 1996	0.8	5	Pu(NO <sub>3</sub> ) <sub>6</sub>	3 M HNO <sub>3</sub>	
Plutonium-242*	4334H	25	Jun 1994	0.8	5	Pu(NO <sub>3</sub> ) <sub>6</sub>	3 M HNO <sub>3</sub>	
Polonium-209**	4326	85	#	#	5	PoCl <sub>4</sub>	2 M HCl	
Radium-226	4969	3	Sep 1998	1.8	5	RaCl <sub>2</sub>	1.5 M HCl	
Radium-226	4965	30	Sep 1991	1.2	5	RaCl <sub>2</sub>	1.4 M HCl	
Radium-226**	4966A	280	Jan 2007	1.3	5	RaCl <sub>2</sub>	1.0 M HCl	
Radium-226**	4967A	2,500	Sep 2003	0.9	5	RaCl <sub>2</sub>	1 M HCl	
Radon-222	4971	4 Total	#	#	0.2	RaCl <sub>2</sub>	1 M HCl	a
Radon-222	4972	40 Total	#	#	0.2	RaCl <sub>2</sub>	1 M HCl	a
Radon-222	4973	400 Total	#	#	0.2	RaCl <sub>2</sub>	1 M HCl	a
Radon-222	4974	5000 Total	May 2005	1.3	0.2	RaCl <sub>2</sub>	1 M HCl	
Thorium-229	4328C	35	Dec 2007	0.6	5	Th(NO <sub>3</sub> ) <sub>4</sub>	1 M HNO <sub>3</sub>	
Thorium-230	4342A	40	April 2007	0.4	5	Th(NO <sub>3</sub> ) <sub>4</sub>	1 M HNO <sub>3</sub>	
Uranium-232	4324B	30	Jul 2002	0.8	5	UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub>	2 M HNO <sub>3</sub>	
Uranium-238 (Natural)	4321C		Jan 1992		5	UO <sub>2</sub> (NO <sub>3</sub> ) <sub>2</sub>	1 M HNO <sub>3</sub>	
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·g <sup>-1</sup>	Reference Time	Expanded Uncertainty	Solution Mass (%)	Chemical Form (g)	Solution Composition	Notes
Barium-133 *	4251C	500,000	Sep 1993	0.5	5	BaCl <sub>2</sub>	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 <sub>2</sub> O	
Cobalt-60 *	4915F	60,000	Nov 2005	0.5	5	CoCl <sub>2</sub>	1 M HCl	
Europium-152*	4370C	90,000	Feb 1987	1.1	5	EuCl <sub>3</sub>	1 M HCl	
Holmium-166m*	4274	20,000	Feb 2006	0.81-2.4	5	HoCl <sub>3</sub>	1 M HCl	
Hydrogen-3†	4361C	2	Sep 1998	1.1	500	H <sub>2</sub> O	H <sub>2</sub> O	
Hydrogen-3	4926E	5,000	Sep 1998	1.1	20	H <sub>2</sub> O	H <sub>2</sub> O	
Hydrogen-3	4927F	600,000	Sep 1998	1.1	5	H <sub>2</sub> O	H <sub>2</sub> O	
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 <sub>3</sub>	1 M HCl	
Lead-210	4337	9,000	June 2006	2.4	5	Pb(NO <sub>3</sub> ) <sub>2</sub>	1 M HNO <sub>3</sub>	
Nickel-63*	4226C	45,000	Nov 2005	0.9	5	NiCl <sub>2</sub>	1 M HCl	
Plutonium-241*	4340B	250	June 2007	3.8	5	Pu(NO <sub>3</sub> ) <sub>6</sub>	3 M HNO <sub>3</sub>	
Radium-228	4339A	200	#	#	5	Ra(NO <sub>3</sub> ) <sub>2</sub>	1 M HNO <sub>3</sub>	
Strontium-90*	4239	50,000	Dec 2006	0.5	5	SrCl <sub>2</sub>	1 M HCl	
Strontium-90*	4919I	4,000	Dec 2006	0.5	5	SrCl <sub>2</sub>	1 M HCl	
Technetium-99	4288B	30,000	May 2008	0.7	5	KTcO <sub>4</sub>	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 <sub>2</sub>	a
Europium-152*	4218F	122 - 1400	60,000 to 140,000	Jan 1999	0.8	EuCl <sub>3</sub>	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·g <sup>-1</sup>	Approx. Half Life	Expanded Uncertainty (%)	Solution Mass (g)	Chemical Form	Solution Composition	Notes
Gallium-67*	4416L	4	3 d	0.6	5	GaCl <sub>3</sub>	2 M HCl	a
Indium-111*	4417L	5	3 d	0.6	5	InCl <sub>3</sub>	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 <sub>2</sub> MoO <sub>4</sub>	3 M HNO <sub>3</sub>	a
Technetium-99m*	4410H	1000	6 h	0.7	5	NaTcO <sub>4</sub>	0.15 M NaCl	a
Thallium-201*	4404L	4	3 d	0.8	5	TlNO <sub>3</sub>	1 M HNO <sub>3</sub>	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 <sub>3</sub>	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·g <sup>-1</sup>	Isotopic Ratio	Reference Time	Expanded Uncertainty (%)	Solution Volume (mL)	Chemical Form	Solution Composition	Beryllium Concentration (mg·mL <sup>-1</sup> )
Beryllium-10/ Beryllium-9†	4325	0.0002	3 x 10 <sup>-11</sup>	Aug 1986	5.1	50	BeCl <sub>2</sub>	1 M HCl	5



**TABLE 6: Radiocarbon Dating Contemporary Standard**

Radionuclide	SRM Number	Approx. Bq·g <sup>-1</sup>	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	<sup>60</sup> Co, <sup>137</sup> Cs, <sup>152</sup> Eu, <sup>154</sup> Eu, <sup>226</sup> Ra, <sup>238</sup> Pu, <sup>239+240</sup> Pu, <sup>241</sup> Am	<sup>40</sup> K, <sup>55</sup> Fe, <sup>90</sup> Sr, <sup>228</sup> Th, <sup>230</sup> Th, <sup>232</sup> Th, <sup>234</sup> U, <sup>235</sup> U, <sup>238</sup> U	a, b, c
4351	Human Lung†	45	<sup>232</sup> Th, <sup>234</sup> U, <sup>238</sup> U, <sup>239+240</sup> Pu, <sup>238</sup> Pu/( <sup>239+240</sup> Pu)	<sup>228</sup> Th, <sup>230</sup> Th, <sup>241</sup> Am	c
4352	Human Liver†	45	<sup>238</sup> Pu, <sup>239+240</sup> Pu, <sup>241</sup> Am	<sup>228</sup> Th, <sup>230</sup> Th, <sup>232</sup> Th, <sup>234</sup> U, <sup>235</sup> U, <sup>238</sup> 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	<sup>238</sup> Pu, <sup>239,240</sup> Pu, <sup>238</sup> U, <sup>234</sup> U, <sup>235</sup> U, <sup>90</sup> Sr, <sup>137</sup> Cs, <sup>228</sup> Ra, <sup>210</sup> Pb, <sup>228</sup> Th/ <sup>232</sup> Th, <sup>230</sup> Th/ <sup>232</sup> Th	<sup>228</sup> Th, <sup>230</sup> Th, <sup>232</sup> Th, <sup>234</sup> Th, <sup>226</sup> Ra, <sup>214</sup> Pb, <sup>214</sup> Bi, <sup>212</sup> Pb, <sup>212</sup> Bi, <sup>208</sup> Tl, <sup>40</sup> K, <sup>241</sup> Pu, <sup>241</sup> Am, <sup>240</sup> Pu/ <sup>239</sup> Pu, <sup>241</sup> Pu/ <sup>239</sup> Pu, <sup>241</sup> Pu/ <sup>240</sup> Pu	
4354	Lake Sediment†	25	<sup>60</sup> Co, <sup>90</sup> Sr, <sup>137</sup> Cs, <sup>228</sup> Th, <sup>232</sup> Th, <sup>235</sup> U, <sup>238</sup> U, <sup>238</sup> Pu, <sup>239+240</sup> Pu, <sup>241</sup> Am	<sup>210</sup> Pb, <sup>226</sup> Ra, <sup>230</sup> Th, <sup>234</sup> U	a, c
4355	Peruvian Soil †	75	<sup>137</sup> Cs, <sup>228</sup> Th, <sup>230</sup> Th, <sup>232</sup> Th, <sup>239+240</sup> Pu, <sup>241</sup> Am, Upper limits on: <sup>60</sup> Co, <sup>125</sup> Sb, <sup>152</sup> Eu, <sup>154</sup> Eu, <sup>155</sup> Eu	<sup>40</sup> K, <sup>55</sup> Fe, <sup>90</sup> Sr, <sup>208</sup> Tl, <sup>214</sup> Bi, <sup>238</sup> Pu	c
4356	Ashed Bone†	15	<sup>90</sup> Sr, <sup>226</sup> Ra, <sup>230</sup> Th, <sup>232</sup> Th, <sup>234</sup> U, <sup>238</sup> U, <sup>238</sup> Pu, <sup>239+240</sup> Pu, <sup>243+244</sup> Cm	<sup>40</sup> K, <sup>210</sup> Pb, <sup>210</sup> Po, <sup>228</sup> Ac, <sup>228</sup> Ra, <sup>228</sup> Th, <sup>238</sup> U, <sup>241</sup> Am	
4357	Ocean Sediment†	85	<sup>40</sup> K, <sup>90</sup> Sr, <sup>137</sup> Cs, <sup>226</sup> Ra, <sup>228</sup> Th, <sup>230</sup> Th, <sup>232</sup> Th, <sup>238</sup> Pu, <sup>239+240</sup> Pu	<sup>129</sup> I, <sup>155</sup> Eu, <sup>210</sup> Pb, <sup>228</sup> Ra, <sup>234</sup> U, <sup>235</sup> U, <sup>238</sup> U, <sup>237</sup> Np, <sup>241</sup> Am	a, c
4359	Seaweed Radionuclide		<sup>40</sup> K, <sup>137</sup> Cs, <sup>210</sup> Pb, <sup>210</sup> Po, <sup>228</sup> Ra, <sup>232</sup> Th, <sup>234</sup> U, <sup>235</sup> U, <sup>238</sup> U, <sup>238</sup> Pu, <sup>239</sup> Pu, <sup>239,240</sup> Pu, <sup>241</sup> Am	<sup>3</sup> H, <sup>14</sup> C, <sup>90</sup> Sr, <sup>99</sup> Tc, <sup>129</sup> I, <sup>208</sup> Tl, <sup>212</sup> Bi, <sup>212</sup> Pb, <sup>224</sup> Ra, <sup>226</sup> Ra, <sup>228</sup> Th, <sup>230</sup> Th, <sup>234</sup> Th, <sup>237</sup> Np, <sup>240</sup> 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 (× 10 <sup>24</sup> n/cm <sup>2</sup> )	
				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 <sup>-1</sup> )	Time of Calibration (month/year)	Volume of Solution (mL)
4325	Beryllium-10/Beryllium-9	3 × 10 <sup>-11</sup>	5	08/86	2 × 25

# INDUSTRIAL HYGIENE

**101 Materials on Filter Media**

**101 Trace Constituent Elements  
in Blank Filters**

**101 Respirable Silica**

**102 Lead in Paint, Dust,  
and Soil**

**103 Asbestos**



## 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 ( $X_{i0}$ ) 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
<b>Paint Film</b>		
2570	<0.001 mg/cm <sup>2</sup>	1 blank film
2571	3.58 mg/cm <sup>2</sup>	1 film, plus 1 blank
2572	1.527 mg/cm <sup>2</sup>	1 film, plus 1 blank
2573	1.040 mg/cm <sup>2</sup>	1 film, plus 1 blank
2574	0.714 mg/cm <sup>2</sup>	1 film, plus 1 blank
2575	0.307 mg/cm <sup>2</sup>	1 film, plus 1 blank
2579a (Set of 6: SRMs 2570 to 2575)	0.307 to 3.58 mg/cm <sup>2</sup>	5 films, plus 1 blank
2576 (High Level)	5.59 mg/cm <sup>2</sup>	1 film, plus 1 blank
<b>Powdered Paint</b>		
2580	4.34 %	30 g
2581	0.449 %	35 g
2582	209.8 mg/kg	20 g
2589	9.99 %	35 g
<b>Indoor Dust, Trace Elements in (As, Cd, Cr, Hg, Pb)</b>		
2583	85.9 mg/kg	8 g
2584	9761 mg/kg	8 g
<b>Soil, Trace Elements in</b>		
2586	432 mg/kg	50 g
2587	3242 mg/kg	50 g
<b>Paint on Fiberboard</b>		
8680	1 to 2 mg/cm <sup>2</sup>	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



ASBESTOS TESTING

# SUBJECT INDEX

## A

### ABSORBANCE

- 84 See MOLECULAR SPECTROMETRY

### ACETANILIDE

- 47 use in MICROCHEMISTRY

### ACIDIMETRIC VALUE (STOICHIOMETRY)

- 46 of Benzoic Acid
- 46 of Boric Acid
- 75,76 of Potassium Hydrogen Phthalate

### ADHESION (TAPE ADHESION TESTING)

- 7 Linerboard for ADVANCED MATERIALS

### AGRICULTURAL MATERIALS

- 11 Apple Leaves
- 11 Fluoride in Vegetation
- 11 Peach Leaves
- 9 Peanut Butter
- 10,11 Spinach Leaves
- 11 Tomato Leaves
- 9 Slurried Spinach

### AIR PARTICULATE

- 101 See MATERIALS

### ALCOHOL

- 17 Ethanol Solutions

### ALCOHOLS (FOSSIL FUELS)

- 34 Alcohol in Gasoline
- 34 Ethanol
- 34 Methanol
- 34 Methanol and t-Butanol
- 34 Arson Test Mixture

### ALLOYS (FERROUS)

- 53 See FERROUS METALS

### ALLOYS (NONFERROUS)

- 60 See NONFERROUS METALS

### ALPHA PARTICLE SOLUTION STANDARDS 95

### ALUMINA

- 30 as Bauxite (ORES)
- 32 as Burnt REFRACTORIES
- 82 REFERENCE POINTS
- 93 X-RAY SPECTROMETRY

### ALUMINUM

- 81 Freezing Point of (DEFINING FIXED POINT, ITS-90)
- 26 as a ORGANO-METALLIC COMPOUND
- 48 SPECTROMETRY Solution

### ALUMINUM BASE ALLOYS

- 60 See NONFERROUS METALS

### AMERICIUM (RADIOACTIVITY)

- 95 Americium-241
- 95 Americium-243
- 98 River Sediment
- 98 Human Liver
- 98 Human Lung
- 99 Peruvian Soil

### AMMONIUM DIHYDROGEN PHOSPHATE

- 10 See FERTILIZERS

### ANALYZED GASES

- 36 See PRIMARY GAS MIXTURES

### ANGIOTENSIN I

- 13 See HEALTH & CLINICAL

### ANISIC ACID

- 47 use in MICROCHEMISTRY

### ANION CHROMATOGRAPHY

- 50 Bromide Solution
- 50 Chloride Solution
- 50 Fluoride Solution
- 50 Nitrate Solution
- 50 Phosphate Solution
- 50 Sulfate Solution

### ANTICONSULSANT DRUG LEVEL ASSAY

- 14 See HEALTH & CLINICAL

### ANTIPILEPSY DRUG LEVEL ASSAY

- 14 See HEALTH & CLINICAL

### ANTIMONY

- 48 SPECTROMETRY Solution

### ARGILLACEOUS LIMESTONE

- 32 See ROCKS AND MINERALS

### ARSENIC

- 89 Implant in Silicon (DEPTH PROFILING)
- 48 SPECTROMETRY Solution

### ASBESTOS

- 103 Common Commercial

### ASHED BONE (RADIOACTIVITY)

- 99 NATURAL MATRIX

### ATOMIC ABSORPTION SPECTROMETRY

- 48 See SPECTROMETRIC

### SINGLE ELEMENTS AUTO CATALYSTS

- 73 Recycled Monolith
- 73 Recycled Pellet

## B

### BARIUM

- 96 as Barium-133 (RADIOACTIVITY)
- 96 as Cesium-137 Burn-up Standard
- 26 as a ORGANO-METALLIC COMPOUND
- 48 SPECTROMETRY Solution

### BASALT ROCK

- 32 See ROCKS AND MINERALS

### BASIMETRIC VALUE (STOICHIOMETRY)

- 46 of Tris(hydroxymethyl)-aminomethane

### BAUXITE (ORES)

- 30 from Arkansas
- 30 from the Dominican Republic
- 30 from Jamaica
- 30 from Surinam

### BEARING METAL (PB-SB-SN)

- 63 See LEAD BASE ALLOYS

### BENZOIC ACID

- 46 Acidimetric Value (STOICHIOMETRY)
- 80 Calorimetric Value (CALORIMETRY COMBUSTION)

### BERRIES

- 10 Cranberry
- 10 Mixed Berries
- 10 Bilberry

### BERYLLIUM

- 62 in COPPER BASE ALLOYS
- 48 SPECTROMETRY Solution

### BET

- abbr. for Brunauer, Emmett, and Teller (method)



**BETA PARTICLE AND ELECTRON CAPTURE SOLUTION STANDARDS** 96

**BET SURFACE AREA**  
2 See SURFACE AREA OF

**BILIRUBIN POWDERS**  
13 See HEALTH & CLINICAL

**BIOLOGICAL**  
9 See FOOD & AGRICULTURE  
13 See HEALTH & CLINICAL  
27 See ENVIRONMENTAL (Biological Tissues)

**BIOLOGICAL BUFFER SYSTEMS (ION ACTIVITY)**  
76 HEPES Free Acid  
76 MOPSO Free Acid  
76 NaHEPESate  
76 NaMOPSOate

**BIOMATERIALS** 15

**BISMUTH**  
48 SPECTROMETRY Solution

**BLEACHED KRAFT PULPS**  
7 Northern Softwood  
7 Eucalyptus Hardwood

**BLOOD**  
14 Animal Blood Products  
14 Lead in Bovine Blood  
14 Toxic Metals in Caprine

**BONE ASH**  
15 See HEALTH & CLINICAL  
99 See NATURAL MATRIX MATERIALS

**BONE MEAL**  
15 See HEALTH & CLINICAL

**BORATE ORE**  
30 See ORES

**BORON**  
89 Implant in Silicon (DEPTH PROFILING)  
48 SPECTROMETRY Solution

**BORIC ACID**  
46 Acidimetric/Assay Values of (STOICHIOMETRY)  
50 Enriched in Boron-10 (STABLE ISOTOPIC MATERIALS)

**BOTANICAL**  
11 See FOOD & AGRICULTURE

**BOVINE**  
10 Liver (FOOD & AGRICULTURE)  
14 Serum Albumin (HEALTH & CLINICAL)

**BRASS**  
63 See NONFERROUS METALS

**BROMIDE**  
50 ANION CHROMATOGRAPHY Solution  
50 Sodium Bromide (STABLE ISOTOPICS)

**BRONZE**  
62 See COPPER BASE ALLOYS

**BUFFERS**  
76 See ION ACTIVITY

**BURNT REFRACTORIES (ALUMINUM OXIDE)**  
32 See REFRACTORIES

## C

**CADMIUM**  
26 Cadmium  
Cyclohexanebutyrate  
48 SPECTROMETRY Solution  
83 VAPOR PRESSURE OF METALS

**CALCIUM**  
13 Calcium Carbonate (HEALTH & CLINICAL)  
15 Calcium Hydroxyapatite (BIOMATERIALS)  
48 SPECTROMETRY Solution  
80 CALORIMETRY COMBUSTION  
81 DIFFERENTIAL SCANNING CALORIMETRY  
81 DIFFERENTIAL THERMAL ANALYSIS  
80 ENTHALPY AND HEAT CAPACITY  
80 CALORIMETRY SOLUTION  
68 Silicon CARBIDE  
68 Tungsten CARBIDE  
68 See CEMENTED TUNGSTON CARBIDES

**CALIBRATION SOLUTIONS (ORGANIC)** 21

**CALIBRATION SOLUTIONS (INORGANIC)** 23

**CARBON**  
73 Carbon Modified Silica (INORGANICS)  
98 Carbon-14 Dating  
55 in PLAIN CARBON STEELS

**CARBON DIOXIDE (PRIMARY GAS MIXTURES)**  
37 Carbon Dioxide in Nitrogen

**CARBON MONOXIDE (PRIMARY GAS MIXTURES)**  
36 Carbon Monoxide in Air  
37 Carbon Monoxide in Nitrogen

**B-CAROTENE (FAT SOLUBLE VITAMINS)**  
14 in Human Serum (HEALTH & CLINICAL)

**CAST IRON**  
58 See FERROUS METALS

**CAST STEEL**  
59 See FERROUS METALS

**CATALYST MATERIALS**  
33 High Sulfur Gas Oil Feed (CATALYST CHARACTERIZATION MATERIAL)  
73 Used Auto Catalysts

**CEMENTS**  
2 CEMENT TURBIDIMETRY AND FINENESS (SIZING)  
72 PORTLAND CEMENT CLINKERS  
72 PORTLAND CEMENTS

**CERAMICS AND GLASSES** 91

**CERAMIC MATERIALS**  
68 CARBIDES  
68 CEMENTED TUNGSTON

**CARBIDES**  
69 GLASSES  
32 See REFRACTORIES  
32 See ROCKS AND MINERALS  
85 See SPECULAR SPECTRAL REFLECTANCE

**CERIUM**  
48 SPECTROMETRY Solution

**CESIUM (RADIOACTIVITY)**  
96 as Cesium-137 Burn-up Standard

**CHARPY**  
5 V-NOTCH TEST BLOCKS

**CHEMICAL**  
45 See HIGH PURITY MATERIALS

**CHLORIDE**  
50 ANION ION CHROMATOGRAPHY Solution

**CHLORINE**  
96 as Chlorine-36 (RADIOACTIVITY)  
73 in LUBRICATING OIL INGREDIENTS  
50 STABLE ISOTOPIC MATERIAL

## CHLORO COMPOUNDS (ORGANIC CONSTITUENTS)

- 22 in Biphenyls
- 27 in Cod Liver Oil
- 22 in Halocarbons
- 47 m-Chlorobenzoic Acid (MICROCHEMISTRY)
- 22 in Pesticides
- 22 in Phenols
- 22 in Pollutants

## CHOLESTEROL (HEALTH & CLINICAL)

- 9 in Coconut Oil
- 14 in freeze-dried Human Serum
- 14 in frozen Human Serum

## CHROMIUM

- 50 as Chromium Nitrate (STABLE ISOTOPIC MATERIALS)
- 31 in CLAYS
- 89 Cr/CrO Thin Film Depth Profile
- 26 Tris (1-phenyl-1,3-butane diono) chromium (III)
- 48 SPECTROMETRY Solution
- 55 in Steels (FERROUS METALS)

## CHRYSOTILE

- 103 in ASBESTOS (INDUSTRIAL HYGIENE)

## CLAYS

- 31 Brick
- 31 Flint
- 31 Plastic

## CLINICAL LABORATORY MATERIALS

- 14 Amino Acids in HCl
- 13 Angiotensin I (Human)
- 14 Anticonvulsant Drug Level Assay
- 14 Antiepilepsy Drug Level Assay
- 13 Bilirubin
- 15 Bone Ash
- 15 Bone Meal
- 14 Bovine Serum Albumin
- 14 Bovine Serum (Inorganic)
- 13 Calcium Carbonate
- 13 Cholesterol
- 14 Cholesterol in Freeze-dried Human Serum
- 13 Cortisol (Hydrocortisone)
- 13 Creatinine
- 14 Electrolytes in Frozen Human Serum
- 13 d-Glucose (Dextrose)
- 14 Glucose in Frozen Human Serum
- 13 Iron Metal
- 14 Human Serum and Milk

## (SERUM MATERIALS)

- 13 Lead Nitrate
- 14 Lead in Caprine Blood
- 14 Lipids in Frozen Human Serum
- 13 Lithium Carbonate
- 13 Magnesium Gluconate Dihydrate
- 13 d-Mannitol
- 13 Potassium Chloride
- 13 Sodium Chloride
- 13 Tripalmitin
- 13 Urea
- 13 Uric Acid
- 14 Vitamins (Fat-Soluble) and Cholesterol in Human Serum
- 13 VMA (4-hydroxy-3-methoxy-DL-mandelic acid)
- 14 Cardiac Troponin

## COAL

- 80 for COMBUSTION

## COAL FLY ASH

- 33 TRACE ELEMENTS in

## COATING THICKNESS

- 90 Nonmagnetic CHROMIUM AND COPPER ON STEEL
- 90 Tin-Lead Alloy (SOLDER THICKNESS)

## COBALT

- 96 as Cobalt-60 (RADIOACTIVITY)
- 48 SPECTROMETRY Solution

## COBALT BASE ALLOYS

- 61 NONFERROUS METALS

## COCAINE METABOLITE

- 19 See FREEZE-DRIED URINE

## COCONUT OIL

- 9 Cholesterol in (FOOD & AGRICULTURE)

## COD LIVER OIL

- 27 Organics in (ORGANIC CONSTITUENTS)

## CONDUCTIVITY

- 83 of Electrolytic Iron
- 77 Hydrochloric Acid in Water
- 76 Potassium Chloride in Water
- 76 Sodium Chloride in Water
- 83 of Graphite

## COPPER

- 26 Bis(1-phenyl-1,3-butane diono)copper (II) (ORGANO-METALLIC COMPOUNDS)
- 63 Brass (COPPER BASE ALLOYS)

## 63Bronze (COPPER BASE ALLOYS)

- 62 Cupro-Nickel (COPPER BASE ALLOYS)
- 80 ENTHALPY AND HEAT CAPACITY of
- 53 in FERROUS METALS
- 82 Freezing Point of (SECONDARY REFERENCE POINTS)
- 45 High-Purity METALS (MICROANALYSIS)
- 62 Nickel Silver (COPPER BASE ALLOYS) in NONFERROUS METALS
- 30 in ORES
- 48 SPECTROMETRY Solution
- 62 as Unalloyed Copper (COPPER BENCHMARK)

## COPPER BASE ALLOYS

- 62 See NONFERROUS METALS

## CORROSION

- 3 Tool Steel (ABRASIVE WEAR)

## CORTISOL (HYDROCORTISONE)

- 13 See PURE CRYSTALLINE STANDARDS

## CRIME SCENE INVESTIGATIONS

- 18 Arson Test Mixture

## CRUDE OIL

- 33 Vanadium in (METAL CONSTITUENTS)

## CRYSTALLINE STANDARDS 13

## CUP FURNACE (FIRE RESEARCH)

- 4 See SMOKE TOXICITY

## CURIUM (RADIOACTIVITY)

- 95 as Curium-243
- 95 as Curium-244

## CYSTINE

- 47 See MICROCHEMISTRY

# D

## DENSITY

- 92 of Lead Silica Glass
- 99 Neutron Density Monitor Wire (RADIATION DOSIMETRY)
- 4 of Smoke (SMOKE DENSITY CHAMBER)

## DEPTH PROFILING

- 89 Nickel/Chromium Thin Film
- 89 Arsenic Implant in Silicon
- 89 Boron Implant in Silicon

## DEXTROSE (D-GLUCOSE)

- 13 See HEALTH & CLINICAL

## DIETARY SUPPLEMENT MATERIALS 10

## DIFFERENTIAL SCANNING CALORIMETRY

- 81 Bismuth
- 81 Gallium
- 81 Indium
- 81 Mercury
- 8 Thermal Analysis Purity Set
- 81 Tin

## DIFFERENTIAL THERMAL ANALYSIS 81

## DIFFRACTION (X-RAY) 93

## DIOXIN (IN ISOCTANE)

- 22 See CALIBRATION SOLUTIONS, ORGANIC

## DISODIUM HYDROGEN PHOSPHATE

- 76 for pD CALIBRATION

## DNA PROFILING

- 18 See FORENSICS/DNA Profiling
- 18 PCR-Based DNA Profiling
- 18 DNA Mitochondrial Sequencing

## DOLOMITIC LIMESTONE

- 32 See ROCKS AND MINERALS

## DOSIMETRY (RADIOACTIVITY)

- 99 Neutron Density Monitor Wire

## DRUG LEVEL ASSAY (ANTIEPILEPSY)

- 14 See HEALTH & CLINICAL

## DRUGS OF ABUSE

- 19 in FREEZE-DRIED URINE

## DSC

- 81 abbr. for Differential Scanning Calorimetry

## DTA

- 81 abbr. for Differential Thermal Analysis

## DUST

- 102 Indoor (TRACE ELEMENTS)
- 29 Urban (ORGANIC CONSTITUENTS)

## DYSPROSIUM

- 48 SPECTROMETRY Solution

# E

## EDDY CURRENT

- 5 ARTIFICIAL FLAW FOR NDE ELECTRICAL PROPERTIES
- 87 See ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF ELECTROLYTIC IRON & GRAPHITE
- 87 See ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF SILICON
- 91 See SUPERCONDUCTING CRITICAL CURRENT
- 91 of GLASS (CERAMICS AND GLASSES)

## ELECTRICAL PROPERTIES 87

## ELECTROLYTIC CONDUCTIVITY

- 77 Hydrochloric Acid Solutions for
- 76 Potassium Chloride Solutions for
- 76 Sodium Chloride Solutions for

## ELECTRON MICROSCOPE

- 89 THIN FILM FOR TRANSMISSION ELECTRON MICROSCOPE
- 77 ELECTROPHORETIC MOBILITY

## ENVIRONMENTAL MATRICES

- 98 See NATURAL MATRIX MATERIALS (RADIOACTIVITY)
- 22 See CALIBRATION SOLUTIONS, ORGANIC
- 23 See CALIBRATION SOLUTIONS, INORGANIC
- 33 See TRACE ELEMENTS IN COALS & COKE

## ERBIUM

- 48 SPECTROMETRY Solution

## ESTUARINE SEDIMENT

- 28 See (SOILS, SEDIMENTS, AND SLUDGES)

## ETHANOL SOLUTIONS 17 (FORENSICS)

## ETHANOL

- 34 Ethanol

## ETHERS IN REFERENCE FUELS

- 17 Ethanol-Water (ETHANOL

## SOLUTIONS)

## ETHERS (ALCOHOLS AND ETHERS IN REFERENCE FUELS

- 34 t-Amyl Methyl Ether
- 34 Ethyl t-Butyl Ether
- 34 Methyl t-Butyl Ether

## EUCALYPTUS HARDWOOD

- 7 BLEACHED KRAFT PULPS

## EUROPIUM

- 96 as Europium-152 (RADIOACTIVITY)
- 48 SPECTROMETRY Solution

# F

## FATTY ACIDS (FOOD & AGRICULTURE)

- 10 Typical Diet

## FELDSPAR (ROCKS AND MINERALS)

- 32 in Potash
- 32 in Soda

## FERROUS MATERIALS 53

## FERTILIZERS (FOOD & AGRICULTURE)

- 10 Ammonium Dihydrogen Phosphate
- 10 Phosphate Rock (Florida & Western)
- 10 Potassium Dihydrogen Phosphate
- 10 Potassium Nitrate

## FIBROUS GLASS BOARD

- 82 See THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE FILTER MEDIA (MATERIALS ON FILTER MEDIA)
- 101 Air Particulate on Filter
- 101 Quartz on

## FILTERS, OPTICAL 84

## FINENESS (SIZING)

- 2 of Portland Cement (CEMENT TURBIDIMETRY AND FINENESS)

## FIRE RESEARCH

- 5 FLOORING RADIANT PANEL
- 4 SMOKE DENSITY
- 4 SMOKE TOXICITY
- 3 SURFACE FLAMMABILITY

## FISSION TRACK GLASS 99

### FLAMMABILITY

- 3 SURFACE FLAMMABILITY (FIRE RESEARCH)
- 5 FLOORING RADIANT PANEL
- 3 See FIRE RESEARCH

### FLOUR

- 10 Rice
- 10 Spinach Leaves
- 11 Wheat Hardness

### FLUORESCENCE

- 85 Quinine Sulfate Dihydrate
- 85 Raman Spectroscopy

### FLUORIDE

- 50 ANION CHROMATOGRAPHY Solution
- 15 in FREEZE-DRIED URINE
- 11 in Vegetation

### FLUORO COMPOUNDS

- 47 p-Fluorobenzoic Acid (MICROCHEMISTRY)

### FLUORSPAR (ORES)

- 30 Customs Grade
- 30 High Grade

### FLY ASH COAL

- 33 Coal Fly Ash (FOSSIL FUELS)

## FOOD/BOTANICALS 11

## FORENSICS 17

### FOSSIL FUELS

- 33 Alcohols & Ethers in Reference Fuels
- 80 Coal Heat of Combustion (CALORIMETRY COMBUSTION )
- 33 Ethanol
- 33 Isooctane
- 33 n-Heptane
- 33 METAL CONSTITUENTS in Fossil Fuels
- 35 METAL CONSTITUENTS in Residual Fuel Oil
- 34 Methanol
- 35 Sulfur in Coal
- 35 Sulfur in Kerosine
- 35 Sulfur in Residual Fuel Oil
- 80 Synthetic Refuse Derived Oil (CALORIMETRY COMBUSTION )
- 35 TRACE ELEMENTS in Coal
- 33 TRACE ELEMENTS in Coal Fly Ash
- 33 TRACE ELEMENTS in Fuel Oil
- 33 Vanadium in Crude Oil (METAL CONSTITUENTS IN FOSSIL FUELS)

## FRESHWATER LAKE SEDIMENT (RADIOACTIVITY)

- 99 Freshwater Lake Sediment (NATURAL MATRIX MATERIALS)

### FREEZING POINT (THERMODYNAMIC PROPERTIES)

- 81 of Aluminum (DEFINING FIXED POINT, ITS-90)
- 82 of Copper (SECONDARY REFERENCE POINTS)
- 81 of Indium (DEFINING FIXED POINT, ITS-90)
- 82 of Lead (REFERENCE POINTS)
- 81 of Silver (DEFINING FIXED POINT, ITS-90)
- 81 of Tin (DEFINING FIXED POINT, ITS-90)
- 81 of Zinc (DEFINING FIXED POINT, ITS-90)

### FSV

- 14 abbr. for Fat Soluble Vitamins

### FUELS

- 33 See FOSSIL FUELS

### FUMED SILICA BOARD

- 82 See THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE

## G

### GADOLINIUM

- 48 SPECTROMETRY Solution

### GAMMA POINT SOURCE 97

### GALLIUM

- 28 in Buffalo River Sediment (SOILS, SEDIMENTS, PARTICULATES AND WATER)
- 33 in Coal (TRACE ELEMENTS)
- 33 in Coal Fly Ash (TRACE ELEMENTS)
- 97 as Gallium-67 (RADIO PHARMACEUTICALS)
- 68 in Glass (TRACE ELEMENTS)
- 82 Melting Point (THERMODYNAMIC PROPERTIES)
- 50 Metal (STABLE ISOTOPIC MATERIALS)
- 48 SPECTROMETRY Solution

### GAS CHROMATOGRAPHY (ORGANIC CONSTITUENTS)

- 23 GC/MS System Performance
- 23 LC Selectivity

### GASES (PRIMARY GAS MIXTURES)

- 36 See PRIMARY GAS MIXTURES

## GASES IN METALS

- 60 in Irons (FERROUS METALS)
- 60 in Steels (FERROUS METALS)

### GASOLINE

- 33 See FOSSIL FUELS

### GEOLOGICAL

- 30 See GEOLOGICAL MATERIALS AND ORES

### GERMANIUM

- 48 SPECTROMETRY Solution

### GILDING METAL

- 63 See NONFERROUS METALS

### GINKGO

- 10 SEE DIETARY SUPPLEMENT MATERIALS

### GLASS BEADS

- 1 See SIZING

### GLASSES

- 92 Borosilicate (VISCOSITY OF GLASS)
- 69,91 Chemical Resistance
- 69 Fused Ore Glass
- 93 GLASS LIQUIDUS TEMPERATURE
- 69 High-Boron Borosilicate
- 69 Lead-Barium
- 70 Lead-Silica (ELECTRICAL PROPERTIES OF GLASS)
- 69 Low-Boron Soda-Lime Powder
- 83 LABORATORY THERMOMETER (MERCURY IN GLASS)
- 69 MultiComponent
- 92 RELATIVE STRESS OPTICAL COEFFICIENT of
- 69 Soda-Lime Container
- 69 Soda-Lime Flat
- 69 Soda-Lime Float
- 69 Soda-Lime Sheet
- 91 Soda-Lime-Silica
- 69 Soft Borosilicate
- 82 THERMAL EXPANSION OF METAL & GLASS
- 82 THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE
- 92 VISCOSITY FIXPOINTS of

### GLASS SAND

- 32 See ROCKS AND MINERALS

### GLASS SPHERES

- 1 PARTICLE SIZE (SIZING)

### D-GLUCOSE

- 13 D-GLUCOSE aka. Dextrose (HEALTH & CLINICAL)
- 46 Polarimetric Value of (STOICHIOMETRY)

## GOETHITE

- 77 Aka. A-FeOOH  
(ELECTROPHORETIC MOBILITY)

## GOLD

- 45 METALS (HIGH PURITY METALS)
- 30 Ore Refractories
- 48 SPECTROMETRY Solution
- 83 VAPOR PRESSURE OF METALS

## GRAPHITE

- 83 THERMAL CONDUCTIVITY OF GRAPHITE AND IRON

# H

## HAFNIUM

- 48 SPECTROMETRY Solution
- 66 in Zircaloy (ZIRCONIUM BASE ALLOYS)

## HARDNESS (FOOD AND AGRICULTURE)

- 11 WHEAT HARDNESS
- 6 of Bright Copper (MICRO HARDNESS)
- 6 of Bright Nickel (MICROHARDNESS)
- 6 of Ceramic (MICROHARDNESS)
- 6 ROCKWELL HARDNESS

## HASTELLOY

- 65 NICKEL BASE ALLOYS

## HEAT (THERMODYNAMIC PROPERTIES)

- 80 CALORIMETRY COMBUSTION
- 81 DEFINING FIXED POINT, ITS-90
- 81 DIFFERENTIAL SCANNING CALORIMETRY
- 81 DIFFERENTIAL THERMAL ANALYSIS
- 80 ENTHALPY AND HEAT CAPACITY
- 82 FREEZING POINT, MELTING POINT, AND TRIPLE POINT CELLS
- 82 REFERENCE POINTS
- 80 CALORIMETRY SOLUTION
- 83 THERMAL CONDUCTIVITY OF GRAPHITE AND IRON
- 82 THERMAL EXPANSION OF METAL & GLASS
- 82 THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE
- 83 THERMOCOUPLE MATERIAL, PLATINUM
- 83 VAPOR PRESSURE OF METALS

## HEPES (BIOLOGICAL BUFFERS)

- 76 HEPES Free Acid
- 76 NaHEPESate n-HEPTANE

## HIGH PURITY METALS

- 45 High Purity Gold
- 45 High Purity Platinum
- 45 High Purity Zinc
- 45 Refined Copper
- 45 Selenium Intermediate Purity
- 45 Zinc Intermediate Purity
- 45 Zinc Metal

## HIGH TEMPERATURE ALLOYS

- 53 See FERROUS METALS

## HOLMIUM

- 48 SPECTROMETRY Solution
- 98 LIVER (NATURAL MATRIX MATERIALS) (RADIOACTIVITY)
- 98 LUNG (NATURAL MATRIX MATERIALS) (RADIOACTIVITY)

## HUMAN SERUM AND MILK (HEALTH & CLINICAL)

- 14 Cholesterol in Human Serum
- 14 Electrolytes in (SERUM MATERIALS)
- 14 Fat Soluble Vitamins in
- 14 Glucose in Frozen (SERUM MATERIALS)
- 14 Lipids in Frozen (SERUM MATERIALS)
- 14 Vitamin D

## HYDROGEN

- 96 as Hydrogen-3 (RADIOACTIVITY SOLUTIONS)

## HYDROXYAPATITE

- 15 See Calcium Hydroxyapatite

## 4-HYDROXY-3-METHOXY-DL-MANDELIC ACID (VMA) 13

# I

## ICTAC

- 81 abbr. for International Confederation of Thermal Analysis and Calorimetry
- 86 X-RAY AND PHOTOGRAPHIC IMAGING

## INCONEL

- 65 NICKEL BASE ALLOYS (NONFERROUS METALS)

## INDIUM

- 97 as Indium-111 (RADIOPHARMACEUTICALS)
- 81 DEFINED FIXED POINT, ITS-90
- 82 FREEZING POINT, MELTING POINT, AND TRIPLE POINT CELLS
- 48 SPECTROMETRY Solution

## INDUSTRIAL HYGIENE

- 101 See INDUSTRIAL HYGIENE
- 40 See ENVIRONMENTAL

## INFANT/ADULT NUTRITIONAL FORMULA 9

## INFRARED, NEAR

- 85 INFRARED REFLECTANCE

## INORGANIC CALIBRATION SOLUTIONS 23

## IODINE (RADIOACTIVITY)

- 97 as Iodine-125 (RADIOPHARMACEUTICALS)
- 50 Iodine, Isotopic
- 97 as Iodine-131 (RADIOPHARMACEUTICALS)

## ION ACTIVITY

- 76 BIOLOGICAL BUFFER SYSTEMS
- 77 ELECTROLYTIC CONDUCTIVITY
- 76 ION-SELECTIVE ELECTRODE CALIBRATION
- 76 pD CALIBRATION
- 75 pH CALIBRATION

## IRON

- 83 Electrolytic Iron (THERMAL CONDUCTIVITY OF GRAPHITE AND IRON)
- 53 See FERROUS METALS
- 13 Iron Metal (HEALTH & CLINICAL)
- 48 SPECTROMETRY Solution
- 26 Tris(1-phenyl-1-3 butaine diono)-iron(III) (ORGANO-METALLIC COMPOUNDS)

## ISOTOPE(S)

- 51 See LIGHT STABLE ISOTOPIC MATERIALS
- 98 See RADIOACTIVITY

# K

## KEROSINE

- 35 Sulfur in (SULFUR IN FOSSIL FUELS)

## KNOOP MICROHARDNESS (SURFACE FINISH)

- 6 Bright Copper
- 6 Bright Nickel
- 6 Silicon Nitride

# L

## LANTHANUM

- 48 SPECTROMETRY Solution

## LAKE SEDIMENT (RADIOACTIVITY)

- 99 Freshwater Lake Sediment (NATURAL MATRIX MATERIALS)

## LEAD

- 14 Lead in Caprine Blood (HEALTH & CLINICAL)
- 13 Lead Nitrate (HEALTH & CLINICAL)
- 50 Metal Equal Atom (STABLE ISOTOPIC MATERIALS)
- 50 Metal, Natural (STABLE ISOTOPIC MATERIALS)
- 50 Metal, Radiogenic (STABLE ISOTOPIC MATERIALS)
- 102 In Paint Film
- 102 In Powdered Paint
- 102 In Indoor Dust, Trace Elements
- 102 In Paint on Fiberboard
- 102 In Soil, Trace Elements
  - 60 See NONFERROUS METALS
- 102 Powdered Lead Base Paint (LEAD IN PAINT, DUST AND SOIL)
- 33 in Reference Fuel (METAL CONSTITUENTS IN FOSSIL FUELS)
- 48 SPECTROMETRY Solution

## LEAD BASE ALLOYS/ MATERIALS

- 63 See NONFERROUS METALS

## LEAVES (FOOD & AGRICULTURE)

- 11,27 Apple
- 11,27 Peach
  - 27 Pine Needles
- 11,27 Spinach
- 11,27 Tomato

## LIMESTONE (ROCKS AND MINERALS)

- 32 Argillaceous
- 32 Dolomitic

## LINERBOARD

- 7 for TAPE ADHESION TESTING

## LINEWIDTH (METROLOGY)

- 88 OPTICAL MICROSCOPE LINEWIDTH MEASUREMENT

## LIPIDS

- 14 in Human Serum (SERUM MATERIALS)

## LIQUID CHROMATOGRAPHY

- 23 GS/MS AND LC SYSTEM PERFORMANCE

## LIQUIDUS TEMPERATURE

- 93 Soda-Lime Silica
- 93 Aluminosilicate

## LITHIUM

- 51 Carbonate (LIGHT STABLE ISOTOPIC MATERIALS)
- 13 Carbonate (HEALTH & CLINICAL)
- 30 Ore, Lepidolite
- 30 Ore, Petalite (ORES)
- 30 Ore, Spodumene (ORES)
- 48 SPECTROMETRY Solution

## LIVER

- 10 Bovine (FOODS AND BEVERAGES)
- 98 Human (NATURAL MATRIX MATERIALS) (RADIOACTIVITY)

## LUBRICATING BASE OIL

- 73 Total Chlorine
- 73 Total Sulfur
- 73 WEAR-METALS IN OIL

## LUNG (RADIOACTIVITY)

- 98 Human (NATURAL MATRIX MATERIALS)

## LUTETIUM

- 48 SPECTROMETRY Solution

# M

## MAGNETIC MOMENT

- 7 Nickel Disk
- 7 Nickel Sphere
- 7 Yttrium Garnet Sphere

## MAGNESIUM

- 13 Magnesium Gluconate Dihydrate (HEALTH & CLINICAL)
- 50 Magnesium Metal (STABLE ISOTOPIC MATERIALS)
- 48 SPECTROMETRY Solution

## MAGNIFICATION

- 89 SCANNING ELECTRON MICROSCOPE (SEM)
- 89 SEM Performance Standard
- 89 SEM Sharpness Standard

## MANGANESE

- 48 SPECTROMETRY Solution

## D-MANNITOL (HEALTH & CLINICAL) 13

## MARIJUANA METABOLITE

- 19 THC-9-COOH (DRUGS OF

## ABUSE IN URINE)

## MARINE MATERIALS

- 28 Buffalo River Sediment (METAL CONSTITUENTS IN NATURAL MATRICES)
- 28 Estuarine Sediment (METAL CONSTITUENTS IN NATURAL MATRICES)
- 28 Marine Sediment
- 32 Limestone Argillaceous
- 32 Limestone Dolomitic (ROCKS AND MINERALS)
- 28 Organics in Marine Sediment (ORGANIC CONSTITUENTS)
- 27 Organics in Mussel Tissue (ORGANIC CONSTITUENTS)
- 27 Organics in Whale Blubber (ORGANIC CONSTITUENTS)
- 10 Oyster Tissue (FOOD & AGRICULTURE)
- 28 Polychlorinated Biphenyls (Congeners) in River Sediment A (ORGANIC CONSTITUENTS)
- 28 Sediment for Solid Sampling

## MASS SPECTROMETRY

- 23 GC/MS AND LC SYSTEM PERFORMANCE (ORGANICS)
- 23 GC/MS SYSTEM
- 23 LC Chiral Selectivity
- 23 LC Performance
- 23 LC Selectivity
- 51 See LIGHT STABLE ISOTOPIC MATERIALS
- 95 See RADIOACTIVITY
- 50 See STABLE ISOTOPIC MATERIALS

## MATERIALS ON FILTER MEDIA

- 101 Quartz on Filter Media
- 101 Air Particulate on Filter
- 101 Cellulose Acetate Membrane
- 101 Ashless Blank Filter
- 101 Respirable Alpha Quartz
- 101 Respirable Cristobalite

## MELTING POINT AND TRIPLE POINT (THERMODYNAMIC PROPERTIES) 82

## MERCURY

- 15 Mercury (HUMAN URINE)
- 82 Mercury (Triple Point) (DEFINING FIXED POINT ITS-90)
- 49 SPECTROMETRY Solution
- 33 TRACE ELEMENTS (FOSSIL FUELS)
- 33 Trace Mercury in Coal (TRACE ELEMENTS)
- 23 in Water (METAL CONSTITUENTS IN NATURAL MATRICES)

## METAL ALLOYS 54

## METALS 53

## METALS ON FILTER MEDIA

- 101 See MATERIALS ON FILTER MEDIA

## METHANE (PRIMARY GAS MIXTURES) 38

## METROLOGY 88

## MICROANALYSIS 32

## MICROCHEMISTRY (HIGH PURITY MATERIALS)

- 47 Acetanilide
- 47 Anisic Acid
- 47 m-Chlorobenzoic Acid
- 47 Cystine
- 47 p-Fluorobenzoic Acid
- 47 Nicotinic Acid
- 47 Urea

## MICROCOPY

- 86 Microcopy Resolution Test Chart (X-RAY AND PHOTOGRAPHY)

## MICROHARDNESS (SURFACE FINISH)

- 6 of Bright Copper
- 6 of Bright Nickel
- 6 of Ceramic

## MICROSCOPY (METROLOGY)

- 89 DEPTH PROFILING
- 88 OPTICAL MICROSCOPE LINEWIDTH MEASUREMENT
- 89 SCANNING ELECTRON MICROSCOPE (SEM)

## MICROSPHERE (SIZING) BEADS

- 1 Glass Beads (PARTICLE SIZE)
- 1 Polystyrene Spheres (PARTICLE SIZE)

## MILK (FOOD AND AGRICULTURE)

- 9 Infant/Adult Nutritional Formula
- 10 Non-fat Milk Powder
- 14,27 Organic Contaminants in Fortified Human Milk
- 14,27 Organic Contaminants in Non-Fortified Human Milk
- 14 Vitamin D in Human Serum

## MINERALS

- 32 See ROCKS AND MINERALS

## MIXTURES AND POLLUTANTS (PRIMARY GAS MIXTURES)

- 36 Ambient Non-Methane

- Organics in Nitrogen
- 37 Carbon Dioxide in Nitrogen
- 36 Carbon Monoxide in Air
- 37 Carbon Monoxide in Nitrogen
- 38 Hydrogen Sulfide in Nitrogen
- 38 Methane in Air
- 38 Nitric Oxide in Nitrogen
- 39 Oxides of Nitrogen in Air
- 39 Oxygen in Nitrogen
- 39 Propane in Air
- 40 Sulfur Dioxide in Nitrogen

## MOLECULAR WEIGHT AND MELT FLOW (POLYMERIC PROPERTIES)

- 79 Polyethylene Gas Pipe Resin
- 78 Polyethylene Linear
- 79 Polyethylene Resin
- 78 Poly(methylmethacrylate)
- 78 Polystyrene

## MOLYBDENUM

- 80 ENTHALPY AND HEAT CAPACITY
- 97 as Molybdenum-99-Technetium-99m (RADIO PHARMACEUTICALS)
- 49 SPECTROMETRY Solution

# N

## NAVAL BRASS

- 63 See NONFERROUS METALS

## NDE

- 5 abbr. for Nondestructive Evaluation

## NEODYMIUM

- 49 SPECTROMETRY Solution

## NEUTRON MONITOR (RADIOACTIVITY)

- 99 Neutron Density Monitor Wire (RADIATION DOSIMETRY)

## NICKEL

- 96 as Nickel-63 (RADIOACTIVE SOLUTION)
- 26 Nickel Cyclohexanebutyrate (ORGANO-METALLIC COMPOUNDS)
- 50 Nickel (STABLE ISOTOPIC MATERIALS)
- 89 Nickel-Chromium Thin Film (DEPTH PROFILING)
- 65 NICKEL BASE ALLOYS (NONFERROUS METALS)
- 65 NICKEL OXIDES (NONFERROUS METALS)
- 7 Nickel Disk (MAGNETIC MOMENT)

- 7 Nickel Sphere (MAGNETIC MOMENT)
- 49 SPECTROMETRY Solution

## NICOTINIC ACID

- 47 MICROCHEMISTRY (HIGH PURITY MATERIALS)

## NIObIUM

- 97 as Niobium-94 (GAMMA RAY POINT SOURCES)
- 49 SPECTROMETRY Solution

## NITRATE

- 50 ANION CHROMATOGRAPHY Solution

## NITRIC OXIDE (PRIMARY GAS MIXTURES)

- 38 Nitric Oxide in Nitrogen

## NITRIDE

- 1 Silicon Nitride (SURFACE AREA OF POWDERS)

## NONDESTRUCTIVE EVALUATION

- 5 ARTIFICIAL FLAW FOR EDDY CURRENT NDE

## NONFERROUS METALS 60

## NORTHERN SOFTWOOD

- 7 BLEACHED KRAFT PULPS

## NUCLEAR MATERIALS (RADIOACTIVITY)

- 98 Carbon-14 DATING
- 99 FISSION TRACK GLASS
- 98 NATURAL MATRIX MATERIALS
- 95 RADIOACTIVE SOLUTIONS
- 97 RADIOPHARMACEUTICALS

## NUTRIENT COMPOSITION

- 9 See FOOD & AGRICULTURE

# O

## OBSDIAN ROCK

- 32 ROCKS AND MINERALS

## OCEAN MATERIALS (RADIOACTIVITY) (NATURAL MATRIX MATERIALS)

- 99 Ocean Sediment

## OIL

- 73 Chlorine in (LUBRICATING BASE OILS)
- 33 Fuel Oil (FOSSIL FUELS)
- 33 High Sulfur Gas Oil Feed (CATALYST CHARACTERIZATION MATERIALS)
- 34 Moisture in Oils (FOSSIL

- FUELS)
- 27 Organics in Cod Liver Oil (ORGANIC CONSTITUENTS)
- 28 Polychlorinated Biphenyls in (ORGANIC CONSTITUENTS)
- 33 Shale Oil (ORGANIC CONSTITUENTS)
- 73 Sulfur in (LUBRICATING BASE OILS)
- 35 Sulfur in Residual Fuel Oil (SULFUR IN FOSSIL FUELS)
- 33 Vanadium in Crude Oil (METAL CONSTITUENTS IN FOSSIL FUELS)
- 73 WEAR-METALS IN OIL (ENGINE WEAR MATERIALS)

## ORGANO-METALLIC COMPOUNDS 26

## ORGANIC CALIBRATION SOLUTIONS 21

## OPTICAL PROPERTIES 84

## OPTOELECTRONICS

- 88 Optical Fiber Coating
- 88 Optical Fiber Diameter
- 88 Optical Fiber Ferrule Geometry
- 88 Pin Gauge for Optical Fiber Ferrules
- 88 Polarization Mode Dispersion
- 88 Wavelength Reference Absorption Cell

## ORES (GEOLOGICAL MATERIALS AND ORES)

- 30 Alumina (Reduction Grade)
- 30 Bauxite, Arkansas
- 30 Bauxite, Dominican
- 30 Bauxite, Jamaican
- 30 Bauxite, Surinam
- 30 Borate Ore
- 31 Chinese Ores
- 30 Copper Ore Mill Heads
- 30 Copper Ore Mill Tails
- 30 Fluorspar, Customs Grade
- 30 Fluorspar, High Grade
- 30 Gold Ore, Refractory
- 30 Iron Ore, Canada
- 30 Iron Ore, Labrador
- 30 Iron Ore, Nimba
- 30 Iron Oxide Reduced
- 30 Lithium Ore (Petalite)
- 30 Lithium Ore (Spodumene)
- 30 Lithium Ore (Lepidolite)
- 30 Manganese Ore
- 30 Phosphate Rock Florida
- 30 Phosphate Rock Western
- 30 Pyrite Ore (ORE BIO-LEACHING SUBSTRATE)
- 30 Rutile Ore
- 30 Scheelite Ore
- 30 Tungsten Concentrate

30 Zinc

## ORGANICS

- 21 EPA: ORGANIC COMPOUNDS RELATED TO (WATER ANALYSIS)
- 21 ORGANIC CONSTITUENTS
- 23 GC/MS AND LC SYSTEM PERFORMANCE

## OXALIC ACID (RADIOACTIVITY)

- 98 Carbon-14 Dating

## OXYGEN (PRIMARY GAS MIXTURES)

- 39 Oxygen in Nitrogen

## OXYGENATES

- 34 ALCOHOLS...IN REFERENCE FUELS

## OYSTER TISSUE

- 9 FOOD & AGRICULTURE

# P

## PAINT

- 102 LEAD IN PAINT, DUST AND SOIL

## PALLADIUM

- 49 SPECTROMETRY Solution

## PARTICLE COUNT MATERIALS

- 3 For suspensions

## PARTICLE SIZE (SIZING)

- 1 Glass Beads
- 1 Polystyrene Spheres
- 1 Silicon Nitride
- 1 Zirconium Oxide

## PARTICULATES

- 29 Diesel Particulate Matter (ORGANIC CONSTITUENTS)
- 101 MATERIALS ON FILTER MEDIA
- 29 Urban Dust/Organics (ORGANIC CONSTITUENTS)
- 29 Urban Particulate Matter (INORGANICS)
- 76 pD CALIBRATION (ION ACTIVITY)
- 76 Disodium Hydrogen Phosphate
- 76 Potassium Dihydrogen Phosphate
- 76 Potassium Hydrogen Phthalate
- 76 Sodium Bicarbonate
- 76 Sodium Carbonate

PEANUT BUTTER 9

## PERFORMANCE ENGINEERING MATERIALS 5

## PERUVIAN SOIL (RADIOACTIVITY) 99

## PESTICIDES (ORGANIC CONSTITUENTS)

- 22 Chlorinated Pesticides in Hexane
- 22 Chlorinated Pesticides in Isooctane

## PETROLEUM 33

## PH CALIBRATION (ION ACTIVITY)

- 75 Calcium Carbonate
- 75 Potassium Hydrogen Phthalate
- 75 Potassium Hydrogen Tartrate
- 75 Potassium Tetroxalate
- 75 Sodium Bicarbonate
- 75 Sodium Carbonate
- 75 Sodium Tetraborate Decahydrate
- 76 See BIOLOGICAL BUFFER SYSTEMS

## PHOSPHATE

- 76 See pD CALIBRATION
- 75 See pH CALIBRATION
- 50 ANION CHROMATOGRAPHY Solution
- 30 Phosphate Rock (ORES)

## PHOSPHORUS

- 49 SPECTROMETRY Solution

## PHOTOGRAPHY

- 86 See X-RAY AND PHOTOGRAPHY

## PINE NEEDLES

- 27 See ENVIRONMENTAL BIOLOGICAL TISSUES

## PLASTIC

- 78 See POLYMERIC PROPERTIES

## PLATINUM (HIGH PURITY METALS)

- 45 High Purity Platinum
- 49 SPECTROMETRY Solution

## PLUTONIUM (RADIOACTIVITY)

- 99 Ashed Bone
- 98 River Sediment
- 99 Human Liver
- 99 Human Lung
- 99 Ocean Sediment
- 99 Peruvian Soil
- 95 Plutonium-238



- 95 Plutonium-239
- 95 Plutonium-240
- 96 Plutonium-241
- 95 Plutonium-242

## POLLUTANTS

- 33 METAL CONSTITUENTS IN FOSSIL FUELS
- 36 PRIMARY GAS MIXTURES
- 21 ORGANIC CONSTITUENTS (ORGANICS)

## POLONIUM (RADIOACTIVITY)

- 95 Polonium-209 (RADIOACTIVE SOLUTIONS)

## POLYCHLORINATED BIPHENYLS PCBs

- 22 Chlorinated Biphenyls
- 22 Chlorinated Biphenyl Congeners in Isooctane
- 22 Polychlorinated Biphenyl Congeners in Isooctane
- 28 Polychlorinated Biphenyls in River Sediment

## POLYETHYLENE (MOLECULAR WEIGHT AND MELT FLOW)

- 79 Polyethylene Gas Pipe Resin
- 78 Polyethylene Linear
- 78 Poly(ethylene Oxide)
- 79 Polyethylene Resin

## POLYMER

- 78 See POLYMERIC PROPERTIES

## POLY(METHYLMETHACRYLATE) (POLYMERIC PROPERTIES)

- 78 MOLECULAR WEIGHT AND MELT FLOW

## POLYSTYRENE

- 80 ENTHALPY AND HEAT CAPACITY
- 80 (THERMODYNAMIC PROPERTIES)
- 78 MOLECULAR WEIGHT AND MELT FLOW

## POTASSIUM

- 49 SPECTROMETRY Solution

## POTASSIUM CHLORIDE

- 13 See PURE CRYSTALLINE STANDARDS
- 77 ELECTROLYTIC CONDUCTIVITY
- 76 ION-SELECTIVE ELECTRODE CALIBRATION
- 50 STABLE ISOTOPIC MATERIALS
- 80 SOLUTION CALORIMETRY
- 46 STOICHIOMETRY

## POTASSIUM DICHROMATE

- 84 MOLECULAR ABSORPTION
- 46 STOICHIOMETRY

## POTASSIUM DIHYDROGEN PHOSPHATE

- 10 FERTILIZERS
- 76 pD CALIBRATION
- 75 pH CALIBRATION

## POTASSIUM FLUORIDE

- 76 ION-SELECTIVE ELECTRODE CALIBRATION

## POTASSIUM HYDROGEN PHTHALATE

- 76 pD CALIBRATION
- 75 pH CALIBRATION
- 46 STOICHIOMETRY

## POTASSIUM HYDROGEN TARTRATE

- 75 pH CALIBRATION

## POTASSIUM NITRATE

- 10 FERTILIZERS
- 51 LIGHT STABLE ISOTOPIC MATERIALS

## POTASSIUM TETROXALATE

- 75 pH CALIBRATION

## POWDERED LEAD BASE PAINT

- 102 LEAD IN PAINT, DUST, AND SOIL

## PRASEODYMIUM

- 49 SPECTROMETRY Solution

## PRIMARY CHEMICALS

- 46 STOICHIOMETRY

## PRIORITY POLLUTANT PAH

- 22 ORGANIC CONTAMINENTS

## PYRITE ORE

- 30 ORE BIOLEACHING SUBSTRATE

## Q

## QUARTZ

- 101 MATERIALS ON FILTER MEDIA

## R

## RADIOACTIVITY

- 99 FISSION TRACK GLASS
- 98 NATURAL MATRIX MATERIALS
- 95 RADIOACTIVE SOLUTIONS
- 97 RADIOPHARMACEUTICALS
- 98 Carbon-14 DATING

## RADIUM (RADIOACTIVITY)

- 95 Radium-226 (RADIOACTIVE SOLUTIONS)

## REFERENCE FUELS

- 33 See FOSSIL FUELS

## REFLECTANCE (OPTICAL PROPERTIES)

- 85 INFRARED REFLECTANCE
- 85 SPECULAR SPECTRAL REFLECTANCE

## REFRACTORIES (GEOLOGICAL MATERIALS AND ORES)

- 32 Burnt Refractory

## REFORMULATED GASOLINES

- 33 See FOSSIL FUELS

## RESIDUAL RESISTIVITY RATIO (ELECTRICAL PROPERTIES) 87

## RESISTANCE (THERMODYNAMIC PROPERTIES)

- 82 THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE

## RESISTIVITY (ELECTRICAL PROPERTIES)

- 87 ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF METALS
- 87 ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF SILICON

## RESPIRABLE SILICA 101

## RHENIUM

- 49 SPECTROMETRY Solution

## RHODIUM

- 49 SPECTROMETRY Solution

## RICE FLOUR (FOOD & AGRICULTURE) 10

## RIVER SEDIMENT (INORGANICS)

- 28 SOILS, SEDIMENTS, PARTICULATES AND WATER
- 29 Buffalo River Sediment
- 28 Estuarine Sediment

## RIVER SEDIMENT (ORGANICS)

- 28 Polychlorinated Biphenyls in River Sediment A

## RIVER SEDIMENT (RADIOACTIVITY)

- 98 River Sediment (NATURAL MATRIX MATERIALS)

## ROCKS

- 32 Basalt Rock (ROCKS AND MINERALS)
- 32 Obsidian Rock (ROCKS AND MINERALS)
- 10,30 Phosphate Rock (Florida) (FERTILIZERS)
- 10,30 Phosphate Rock (Western) (FERTILIZERS)

## RUBIDIUM

- 82 Rubidium (FREEZING POINT, MELTING POINT AND TRIPLE POINT CELLS)
- 50 Rubidium Chloride (STABLE ISOTOPIC MATERIALS)
- 49 SPECTROMETRY Solution

# S

## SAMARIUM

- 49 SPECTROMETRY Solution

## SAND (GLASS)

- 32 See ROCKS AND MINERALS

## SCANDIUM

- 49 SPECTROMETRY Solution

## SCANNING ELECTRON MICROSCOPE (METROLOGY)

- 89 SEM Performance Standard
- 89 SEM Sharpness Standard

## SCHEELITE ORE

- 30 ORES

## SEDIMENT

- 28 METAL CONSTITUENTS IN NATURAL MATRICES
- 98 NATURAL MATRIX MATERIALS (RADIOACTIVITY)

## SELENIUM

- 45 Selenium Intermediate Purity (HIGH PURITY METALS)
- 49 SPECTROMETRY Solution

## SERUM MATERIALS

- 14 Bovine Serum Albumin
- 14 Electrolytes in Frozen Human Serum
- 14 Glucose in Frozen Human Serum
- 14 Human Serum and Milk
- 14 Lipids in Frozen Human Serum

## SHELLFISH

- 27 Mussel Tissue (ORGANIC CONSTITUENTS)
- 9 Oyster Tissue (FOOD & AGRICULTURE)

## SILICA

- 73 Carbon Modified Silica (INORGANICS)
- 82 Fumed Silica Board (THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE)
- 82 THERMAL EXPANSION OF METAL AND GLASS)
- 92 Lead Silica Glass
- 101 Respirable Alpha Quartz (RESPIRABLE SILICA)
- 101 Respirable Cristobalite (RESPIRABLE SILICA)
- 32 Silica Brick (REFRACTORIES)

## SILICON

- 87 ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF SILICON
- 26 Octaphenylcyclotetrasiloxane (ORGANO-METALLIC COMPOUNDS)
- 58 Silicon Metal (STEELMAKING ALLOYS)
- 93 Silicon Powder (X-RAY DIFFRACTION)
- 49 SPECTROMETRY Solution
- 58 See STEELMAKING ALLOYS

## SILICON NITRIDE (SIZING) (SURFACE FINISH)

- 1 PARTICLE SIZE
- 2 SURFACE AREA OF POWDERS
- 6 MICROHARDNESS

## SILVER

- 32 Alloy (METALS) (MICROANALYSIS)
- 26 Silver 2-ethylhexanoate (ORGANO-METALLIC COMPOUNDS)

- 50 Silver Nitrate (STABLE ISOTOPIC MATERIALS)
- 49 SPECTROMETRY Solution

## SINUSOIDAL ROUGHNESS

- 3 SURFACE ROUGHNESS (SURFACE FINISH)

## SIZING CEMENT TURBIDIMETRY AND FINENESS

- 2 SURFACE AREA OF POWDERS

## SLUDGE

- 28 Domestic Sludge (METAL CONSTITUENTS IN NATURAL MATRICES)
- 28 Industrial Sludge (METAL CONSTITUENTS IN NATURAL MATRICES)
- 28 SOILS, SEDIMENTS, PARTICULATES AND WATER

## SMOKE (FIRE RESEARCH)

- 4 SMOKE DENSITY CHAMBER
- 4 SMOKE TOXICITY

## SODA LIME GLASS (CERAMICS AND GLASSES)

- 69 Soda-Lime, Container (GLASSES)
- 69 Soda-Lime, Flat (GLASSES)
- 69 Soda-Lime, Float (GLASSES)
- 69 Soda-Lime, Sheet (GLASSES)

## SODIUM

- 76 Disodium Hydrogen Phosphate
- 75,76 Sodium Bicarbonate (ION ACTIVITY)
- 46 Sodium Carbonate (STOICHIOMETRY)
- 75,76 Sodium Carbonate (ION ACTIVITY)
- 13 Sodium Chloride (HEALTH & CLINICAL)
- 26 Sodium Cyclohexanebutyrate (ORGANO-METALLIC COMPOUNDS)
- 46 Sodium Oxalate (STOICHIOMETRY)
- 75 Sodium Tetraborate Decahydrate
- 49 SPECTROMETRY Solution

## SOILS

- 28 METAL CONSTITUENTS IN NATURAL MATRICES
- 28 SOILS, SEDIMENTS, AND SLUDGES

## SOLDER (METROLOGY)

- 90 Tin-Lead Alloy (SOLDER THICKNESS)

## SPECTRAL REFLECTANCE (OPTICAL PROPERTIES)

- 85 SPECULAR SPECTRAL REFLECTANCE

## SPHERES (SIZING)

- 1 PARTICLE SIZE

## SPINACH

- 9,10,11 Trace Elements in Spinach Leave
- 9,10 Slurried Spinach

## SPECTROMETRY

- 48 SINGLE ELEMENT Solutions
- 84 See MOLECULAR ABSORPTION

## STAINLESS STEEL

- 53 See FERROUS METALS

## STEEL COATINGS

- 90 CHROMIUM OVER COPPER ON STEEL

## STEELS (FERROUS METALS) 53

## STOICHIOMETRIC STANDARDS 46

## STRONTIUM

- 96 Strontium-90 (RADIOACTIVITY)
- 50 Strontium Carbonate (STABLE ISOTOPIIC MATERIALS)
- 49 SPECTROMETRY Solution
- 82 SUCCINONITRILE (THERMODYNAMIC PROPERTIES)

## SUCROSE

- 86 OPTICAL ROTATION
- 46 STOICHIOMETRY

## SULFATE

- 50 ANION CHROMATOGRAPHY Solution

## SULFIDE (PRIMARY GAS MIXTURES)

- 38 Hydrogen Sulfide in Nitrogen

## SULFUR

- 49 SPECTROMETRY Solution
- 33 SULFUR IN FOSSIL FUELS
- 73 WEAR-METALS IN OIL

## SULFUR DIOXIDE (PRIMARY GAS MIXTURES)

- 40 Sulfur Dioxide in Nitrogen
- 3 SURFACE FINISH
- 3 ABRASIVE WEAR
- 6 MICROHARDNESS
- 3 SURFACE ROUGHNESS

## SURFACE FINISH

- 3 Abrasive Wear
- 3 Surface Roughness

## SURFACE FLAMMABILITY (FIRE RESEARCH)

- 3 Hardboard Sheet

# T

## TANTALUM

- 49 SPECTROMETRY Solution

## TAPE ADHESION TESTING

- 7 Linerboard for Tape Adhesion Testing

## TEA

- 10 Camellia sinensis (Green Tea) Leaves
- 10 Camellia sinensis (Green Tea) Extract
- 10 Green Tea-Containing Solid Oral Dosage Form

## TECHNETIUM

- 96 Technetium-99 (RADIO-ACTIVE SOLUTIONS)
- 97 Technetium-99m (RADIO-PHARMACEUTICALS)

## TELLURIUM

- 49 SPECTROMETRY Solution

## TERBIUM

- 49 SPECTROMETRY Solution
- 19 TETRAHYDROCANNABIONOL (Marijuana Metabolite)
- 19 DRUGS OF ABUSE IN URINE, SINGLE ANALYTE
- 19 DRUGS OF ABUSE IN URINE, MULTIANALYTE

## THALLIUM

- 49 SPECTROMETRY Solution
- 97 Thallium-201 (RADIOPHARMACEUTICALS)

## THERMAL ANALYSIS (THERMODYNAMIC PROPERTIES)

- 80 CALORIMETRY COMBUSTION
- 81 DIFFERENTIAL SCANNING CALORIMETRY
- 81 DIFFERENTIAL THERMAL ANALYSIS
- 80 ENTHALPY AND HEAT CAPACITY
- 80 CALORIMETRY SOLUTION

## THERMAL CONDUCTIVITY OF GRAPHITE AND METALS

- 83 Electrolytic Iron
- 83 Graphite

## THERMAL EXPANSION OF METAL GLASS AND SILICA

- 82 Borosilicate Glass
- 82 Copper
- 82 Stainless Steel (AISI 446)

## THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE

- 82 Expanded Polystyrene Board
- 82 Fibrous Glass Board
- 82 Fumed Silica Board

## THERMODYNAMIC PROPERTIES 80

## THERMOMETRIC FIXED POINTS (THERMODYNAMIC PROPERTIES)

- 81 DEFINING FIXED POINT, ITS-90
- 82 FREEZING POINT, MELTING POINT AND TRIPLE POINT

## THIANTHRENE

- 80 CALORIMETRY COMBUSTION

## THICKNESS (METROLOGY)

- 90 CHROMIUM OVER COPPER ON STEEL
- 64,90 SOLDER THICKNESS

## THORIUM

- 49 SPECTROMETRY Solution

## THORIUM (RADIOACTIVITY)

- 95 RADIOACTIVE SOLUTIONS

## THULIUM

- 49 SPECTROMETRY Solution

## TIN

- 81 DEFINING FIXED POINT,

## ITS-90

- 81 DEFINING FIXED POINT CELLS, ITS-90
- 26 Dibutyltin bis (2-ethylhexanoate) (ORGANO-METALLIC COMPOUNDS)
- 81 DIFFERENTIAL SCANNING CALORIMETRY

## TIN BASE ALLOYS

- 64 See NONFERROUS METALS

## TITANIUM

- 66 GASES IN METALS (NONFERROUS METALS)
- 49 SPECTROMETRY Solution

66 TITANIUM BASE ALLOYS  
(NONFERROUS METALS)

#### TITANIUM DIOXIDE

32 REFRACTORIES

#### TOXIC METALS

19 TOXIC SUBSTANCES IN  
URINE

#### TRACE CONSTITUENT ELEMENTS IN BLANK FILTERS 101

#### TRACE ELEMENTS

68 See CERAMICS AND  
GLASSES  
33 See FOSSIL FUELS  
65 See TRACE ELEMENTS IN  
NICKEL BASE SUPERALLOYS  
10 See FOOD AND  
AGRICULTURAL PRODUCTS  
11 See BOTANICALS

#### TRANSMISSION ELECTRON MICROSCOPE

89 See THIN FILM FOR  
TRANSMISSION  
103 See ASBESTOS

#### TRANSMITTANCE

84 See MOLECULAR  
ABSORPTION

#### TRIPLE POINT

82 (THERMODYNAMIC  
PROPERTIES)  
33 REFERENCE LIQUIDS FOR  
RATING FUELS

#### TRIPALMITIN

13 HEALTH & CLINICAL  
46 TRIS (HYDROXYMETHYL)-  
AMINOMETHANE  
46 STOICHIOMETRY

#### TUNGSTEN

49 SPECTROMETRY Solution  
68 Tungsten Carbide (CARBIDES)  
6 Tungsten Carbide  
(MICROHARDNESS)  
30 Tungsten Concentrate (ORES)

#### TURBIDIMETRY (SIZING)

2 Portland Cement  
(CEMENT TURBIDIMETRY  
AND FINENESS)

## U

#### URANIUM

49 SPECTROMETRY Solution

#### URANIUM (RADIOACTIVITY)

99 Fission Track Glass  
95 RADIOACTIVE SOLUTIONS  
98 NATURAL MATRIX MATERIALS

#### UREA

13 HEALTH & CLINICAL  
80 CALORIMETRY COMBUSTION  
(THERMODYNAMIC  
PROPERTIES)  
47 MICROCHEMISTRY

#### URIC ACID

13 HEALTH & CLINICAL

#### URINE FREEZE-DRIED (FORENSICS)

19 Cocaine and Metabolites in  
19 Cotinine in  
15 Fluoride in  
15 Mercury in  
19 Morphine and Codeine in  
19 Morphine and Glucuronide in  
19 Multi-drugs of Abuse in  
19 THC (Marijuana Metabolite) in  
15 Toxic Elements in

## V

#### VANADIUM

26 Bis(1-phenyl-1,3-butane  
diono)oxovanadium (IV)  
(ORGANO-METALLIC  
COMPOUNDS)  
49 SPECTROMETRY Solution  
33 Vanadium in Crude Oil  
(METAL CONSTITUENTS IN  
FOSSIL FUELS)

#### VAPOR PRESSURE OF METALS (THERMODYNAMIC PROPERTIES)

83 Cadmium

#### VICKERS (MICROHARDNESS) (SURFACE FINISH)

6 Bright Copper  
6 Bright Nickel  
6 Tungsten Carbide

#### VISCOSITY OF GLASS (CERAMICS AND GLASSES)

92 VISCOSITY FIXPOINTS  
92 VISCOSITY OF GLASS  
79 VISCOSITY OF POLYMERS

#### VITAMINS

9 Baby Food Composite  
(NUTRITION COMPOSITION)  
9 Cholesterol and FSV in  
Coconut Oil  
14 Fat Soluble Vitamins in  
Human Serum (HEALTH &  
CLINICAL)  
9 Infant/Adult Nutritional  
Formula  
10 Multivitamin/Multielement  
Tablets  
14 Vitamin D in Human Serum

## VMA

- 13 aka. 4-hydroxy-3-methoxymandelic acid

## W

### WASPALLOY

- 65 NICKEL BASE ALLOYS (NONFERROUS METALS)

### WATER

- 21 WATER ANALYSIS (ORGANICS)
- 23 Mercury in Water (METAL CONSTITUENTS IN NATURAL MATRICES)
- 28 Natural Water (METAL CONSTITUENTS IN NATURAL MATRICES)
- 28 Trace Elements in Water (METAL CONSTITUENTS IN NATURAL MATRICES)

### WAVELENGTH STANDARDS 85

### WEAR (SURFACE FINISH)

- 3 D-2 Tool Steel (ABRASIVE WEAR)

### WEAR-METALS (ENGINE WEAR MATERIALS)

- 73 WEAR METALS IN OIL

### WHALE BLUBBER (ORGANICS) 27

### WHEAT FLOUR (FOOD AND AGRICULTURE)

- 10 USA/CANADA COLLABORATIVE MATERIALS

### WHOLE BIOMASS FEEDSTOCK 11

## X

### XENON (RADIOACTIVITY)

- 97 as Xenon-133 (RADIO-PHARMACEUTICALS)

### X-RAY

- 93 X-RAY DIFFRACTION

### X-RAY FILM

- 86 X-Ray Film Step Tablet (X-RAY AND PHOTOGRAPHY)

## Y

### YEAST

- 14 Protein Extract

### YTTERBIUM

- 49 SPECTROMETRY Solution

### YTTRIUM

- 49 SPECTROMETRY Solution

## Z

### ZINC

- 81 DEFINING FIXED POINT, ITS-90
- 45 METALS (HIGH PURITY METALS)
- 101 Metals on Filter Media (MATERIALS ON FILTER MEDIA)
- 49 SPECTROMETRY Solution
- 26 Zinc Cyclohexanebutyrate (ORGANO-METALLIC COMPOUNDS)
- 30 Zinc Concentrate (ORES)

### ZIRCONIUM

- 49 SPECTROMETRY Solution
- 66 Zircaloy-4 (ZIRCONIUM BASE ALLOY)

# NUMERIC INDEX

SRM	Descriptor	Page	SRM	Descriptor	Page
1d	Limestone, Argillaceous	32	87a	Aluminum-Silicon Alloy	60
4l	Cast Iron	58	88b	Dolomitic Limestone	32
5m	Cast Iron	58	89	Glass, Lead Barium	69
6g	Cast Iron	58	90	Ferrophosphorus	58
8k	Bessemer Steel	55	92	Low-Boron, Soda-Lime Powder	69
12h	Carbon Steel, 0.4 C	55	93a	High-Boron Borosilicate	69
13g	Carbon Steel, 0.6 C	55	94c	Zinc-Base Die Casting Alloy	67
14g	Carbon Steel, 0.8 C	55	97b	Flint Clay	31
15h	Carbon Steel, 0.1 C	55	98b	Plastic Clay	31
16f	Basic Open Hearth Steel, 0.1 C	55	99a	Feldspar, Soda	32
17f	Sucrose (Polarimetric)	46, 86	100b	LA Steel, Manganese (SAE T340)	53
19h	Carbon Steel, 0.2 C	55	101g	Stainless Steel (AISI 304L)	56
20g	Carbon Steel	55	106b	LA Steel, Cr-Mo-Al (Nitalloy rG)	53
25d	Manganese Ore	30	107c	Cast Iron (Ni-Cr-Mo)	58
30f	LA Steel, Cr-V (SAE 6150)	53	112b	Silicon Carbide	68
32e	LA Steel, Ni-Cr (SAE 3140)	53	113b	Zinc Concentrate	30
33e	LA Steel, Ni-Mo (SAE 4820)	53	114q	Portland Cement Fineness Standard	2, 72
36b	LA Steel, Cr-Mo	53	115a	Cast Iron (Cu-Ni-Cr)	58
39j	Benzoic Acid (Calorimetric Standard)	80	120c	Phosphate Rock (Florida)	10, 30
45d	Cu Freezing Point	82	121d	Stainless Steel Cr-Ni-Ti (AISI 321)	56
46h	Portland Cement Fineness Standard	2, 72	122i	Cast Iron	58
49e	Lead Freezing Point	82	123c	Stainless Steel Cr-Ni-Nb (AISI 348)	56
50c	Tungsten-Chromium-Vanadium Steel	57	125b	High Silicon Steel - Calcium Bearing	53
53e	Bearing Metal (84Pb-10Sb-6Sn)	63	126c	High Alloy Steel, High Nickel	57
54d	Bearing Metal (Tin Base)	64	127b	Solder, 40Sn-60Pb	63
57b	Silicon Metal	58	129c	LA Steel, High Sulfur (SAE 112)	53
58a	Ferrosilicon (73 % Si)	58	131g	LA Steel, High Silicon	53
59a	Ferrosilicon	58	132b	Tool Steel (AISI M2)	57
64c	Ferrochromium, High Carbon	58	133b	Chromium-Molybdenum Steel	56
68c	Ferromanganese, High Carbon	58	134a	Molybdenum-Tungsten-Chromium-Vanadium Steel	57
69b	Bauxite (Arkansas)	30	136f	Potassium Dichromate (oxidimetric standard)	46
70a	Feldspar, Potash	32	139b	LA Steel, Cr-Ni-Mo (AISI 8640)	53
72g	LA Steel (AISI 4130)	53	141d	Acetanilide	47
73c	Stainless Steel, Cr (SAE 420)	56	142	Anisic Acid	47
76a	Burnt Refractory (Al2O3-40 %)	32	143d	Cystine	47
77a	Burnt Refractory, (Al2O3-60 %)	32	148	Nicotinic Acid	47
78a	Burnt Refractory, (Al2O3-70 %)	32	152a	Carbon Steel, 0.5 C	55
79a	Fluorspar, Customs Grade	30	154c	Titanium Dioxide	32
81a	Glass Sand	32, 69	155	LA Steel, Cr-W	53
82b	Cast Iron (Ni-Cr)	58			
84l	Potassium Hydrogen Phthalate	46			

SRM	Descriptor	Page	SRM	Descriptor	Page
158a	Bronze, Silicon	62	350b	Benzoic Acid	46
160b	Stainless Steel Cr-Ni-Mo (AISI 316)	56	351a	Sodium Carbonate	46
163	LA Steel, 1.0 C	53	360b	Zircaloy 4, Zr-Base Alloy	66
165a	Glass Sand (Low Iron)	32, 69	361	LA Steel (AISI 4340)	56
166c	Stainless Steel, Carbon Only	56	363	LA Steel, Cr-V (mod.)	56
173c	Titanium-Base Alloy	66	364	LA Steel, High C (mod.)	56
178	Carbon Steel, 0.4 C	55	368	Carbon Steel (AISI 1211)	55
179	LA Steel, High Silicon	53	395	Unalloyed Copper II (chips)	61
180	Fluorspar, High Grade	30	396	Unalloyed Copper III (chips)	61
181	Lithium Ore (Spodumene)	30	398	Unalloyed Copper V (chips)	61
182	Lithium Ore (Petalite)	30	399	Unalloyed Copper VI (chips)	61
183	Lithium Ore (Lepidolite)	30	400	Unalloyed Copper VII (chips)	61
185h	Potassium Hydrogen Phthalate, pH	75	423	Molybdenum Oxide Concentrate	30
186g	pH Standards	75	454	Unalloyed Copper XI (chips)	61
187e	Sodium Tetraborate (Borax), pH	75	457	Unalloyed Copper	61
188	Potassium Hydrogen Tartrate, pH	75	458	Beryllium-Copper (17510)	62
189c	Potassium Tetroxalate, pH	75	459	Beryllium-Copper (17200)	62
191d	pH Standard	75	460	Beryllium-Copper (17300)	62
193	Potassium Nitrate	10	480	Tungsten-Molybdenum EPMA	32
194	Ammonium Dihydrogen Phosphate	10	481	Gold-Silver EPMA	32
195	Ferrosilicon (75 % Si-HP Grade)	58	482	Gold-Copper EPMA	32
196	Ferrochromium, Low Carbon	58	494	Unalloyed Copper I (solid)	61
198	Silica Brick	32	495	Unalloyed Copper II (solid)	61
199	Silica Brick	32	496	Unalloyed Copper III (solid)	61
200b	Potassium Dihydrogen Phosphate	10	498	Unalloyed Copper V (solid)	61
211d	Toluene Liquid Density	91, 92	499	Unalloyed Copper VI (solid)	61
276b	Tungsten Carbide	68	500	Unalloyed Copper VII (solid)	61
277	Tungsten Concentrate	30	600	Bauxite, Australian	30
278	Obsidian Rock	32	607	Potassium Feldspar	32
291	LA Steel, Cr-Mo (ASTM A 213)	53	610	Trace Elements in Glass	68
293	LA Steel, Cr-Ni-Mo (AISI 8620)	53	611	Trace Elements in Glass	68
330	Copper Ore Mill Heads	30	612	Trace Elements in Glass	68
331a	Copper Ore Mill Tails	30	613	Trace Elements in Glass	68
333a	Molybdenum Sulfide Concentrate	30	614	Trace Elements in Glass	68
334	Gray Cast Iron (Carbon & Sulfur)	58	615	Trace Elements in Glass	68
338	White Cast Iron (Carbon & Sulfur)	58	616	Trace Elements in Glass	68
339	Stainless Steel, Cr-Ni-Se (SAE 30)	56	617	Trace Elements in Glass	68
341	Ductile Cast Iron	58	620	Soda Lime, Flat	69
342a	Nodular Cast Iron	58	621	Soda-Lime Container	69
343a	Stainless Steel (AISI 431)	56	622	Soda-Lime Silica (Durability)	69, 91
344	HA Steel, (Mo Precipitation Hardening)	57	623	Borosilicate (Durability)	69, 91
345a	HA Steel, (Cu Precipitation Hardening)	57	624	Lead-Silica Glass for dc Resistivity	70, 91
346a	Valve Steel	57	625	Zinc-Base A	67
347	Magnesium Ferrosilicon	58	626	Zinc-Base B	67
348a	Hi Temp. Alloy, (A286) Ni-Cr	57	627	Zinc-Base C	67
349a	Waspalloy	65	628	Zinc-Base D	67

SRM	Descriptor	Page	SRM	Descriptor	Page
629	Zinc-Base E-ASTM AC 41A	67	714	Alumina Glass Anneal Pt	71, 92
630	Zinc-Base F	67	717a	Hi Boron Glass Viscosity	71, 92
631	Zinc Spelter (mod)	67	720	Sapphire Heat Capacity	80
634a	Portland Cement	72	723d	Tris (hydroxymethy) amionmethane	46, 75
640d	Silicon Line Position (XRD)	93	726	Selenium, Inter-Purity	45
641	Titanium Alloy, 8 Mn (A)	66	728	Zinc, Intermediate Purity	45
642	Titanium Alloy, 8 Mn (B)	66	731L1	Borosilicate Glass - Thermal Expansion	82
643	Titanium Alloy, 8 Mn (C)	66	731L2	Borosilicate Glass - Thermal Expansion	82
647	Titanium Alloy, Al-Mo-Sn-Zr	66	731L3	Borosilicate Glass - Thermal Expansion	82
648	Titanium Alloy, Al-Sn-Zr-Cr-Mo	66	738	Stainless Steel - Thermal Expansion	82
649	Titanium Alloy V-Al-Cr-Sn	66	740a	Zinc (Freezing Point)	81
650	Unalloyed Titanium A	66	741a	Tin (Freezing Point)	81
651	Unalloyed Titanium B	66	742	Alumina (Reference Point)	82
654b	Titanium Alloy, Al-V	66	743	Mercury (Triple Point)	81
656	Silicon Nitride Quantitative Analysis	93	762	Magnetic Moment Standard Nickel Disk	7
659	Silicon Nitride, Particle Size	1	764a	Magnetic Susceptibility Standard	7
660a	Line Profile LaB6	93	772a	Nickel Sphere for Magnetic Moment	7
663	LA Steel, Cr-V (mod.)	54	773	Soda-Lime Silica (Glass Liquidus)	70, 93
665	Electrolytic Iron	54	774	Lead-Silica (Dielectric Constant)	70, 91
670	Rutile Ore	30	781D2	Molybdenum (Heat Capacity)	80
671	Nickel Oxide 1	65	853a	Alloy 3004	60
672	Nickel Oxide 2	65	854a	Alloy 5182	60
673	Nickel Oxide 3	65	855a	Aluminum Casting Alloy 356	60
674b	X-Ray Powder Diffraction Intensity, set	93	856a	Aluminum Casting Alloy 380	60
675	Line Position, Mica (XRD)	93	858	Aluminum Alloy 6011	60
676a	Quantitative Analysis, Alumina (XRD)	93	861	Nickel-based Superalloy	65
679	Brick Clay	31	862	High Temperature Alloy L-605	57, 61
680L1a	High Purity Platinum	45	864	Inconel 600	65
682	High Purity Zinc	45	865	Inconel 625	65
683	Zinc, Metal	45	866	Incoloy, 800	59
685R	High Purity Gold	45	867	Incoloy, 825	59
688	Basalt Rock	32	868	High Temp Alloy Fe-Ni-Co	57
689	Ferrochromium Silicon	58	869b	LC Column Selectivity	22
690	Iron Ore (Canada)	30	870	LC Column Performance	23
691	Iron Oxide, Reduced	30	871	Bronze, Phosphor (CDA521)	62
692	Iron Ore, Labrador	30	872	Bronze, Phosphor (CDA 544)	62
693	Iron Ore, Nimba	30	874	Cupro-Nickel, 10 % (CDA 706) "H-P"	62
694	Phosphate Rock, Western	10, 30	875	Cupro-Nickel, 10 % (CDA 706)	62
695	Trace Elements in Multi-Nutrient Fert.	10	877	LC Chiral Selectivity	23
696	Bauxite, Surinam	30	879	Nickel Silver (CDA 762)	62
697	Bauxite, Dominican	30	880	Nickel Silver (CDA 770)	62
698	Bauxite, Jamaican	30	882	Alloy Ni-Cu-Al	65
699	Alumina (Reduction Grade)	30	885	Refined Copper	45
705a	Polystyrene 179k Mol/Wt	78, 80	886	Gold, Ore Refractory	30
706a	Polystyrene 258k mol/wt	78	887	Cemented Carbide (W-83,Co-10)	68
709	Extra Dense Lead	71, 92	888	Cemented Carbide (W-64,Co-25,Ta-5)	68



SRM	Descriptor	Page	SRM	Descriptor	Page
889	Cemented Carbide(W-75,Co-9,Ta-5,Ti-4)	68	977	Bromine (Isotopic)	50
890	Cast Iron HC250+V	58	978a	Silver (Isotopic)	50
891	Cast Iron, Ni-Hard Type 1	58	979	Chromium (Isotopic)	50
892	Cast Iron, Ni-Hard, Type IV	58	980	Magnesium (Isotopic)	50
893	Stainless Steel (SAE 405)	56	981	Natural Lead (Isotopic)	50
895	Stainless Steel (SAE 201)	56	982	Equal Atom Lead (Isotopic)	50
897	Tracealloy A	65	983	Radiogenic Lead (Isotopic)	50
898	Tracealloy B	65	984	Rubidium Assay (Isotopic)	50
899	Tracealloy C	65	986	Nickel (Isotopic)	50
900	Antiepilepsy Drug (4) Level	14	987	Strontium Assay and Isotopic	50
909b	Human Serum	13	994	Gallium (Isotopic)	50
911c	Cholesterol	13	997	Thallium (Isotopic)	50
912a	Urea	13	998	Angiotensin I (Human)	13
913a	Uric Acid	13	999b	Potassium Chloride(Assay)	46
914a	Creatinine	13	1002d	Hard Board (Surface Flammability)	3
915b	Calcium Carbonate (Clinical)	13	1003c	Glass Spheres (Particle Size)	1
916a	Bilirubin	13	1004b	Glass Beads - Particle Size Distribution	1
917c	D-Glucose (Dextrose-Clinical)	13, 46	1006d	Smoke Density, Cellulose	4
918b	Potassium Chloride (Clinical)	13	1007b	Plastic (Smoke Density)	4
919b	Sodium Chloride (Clinical)	13	1010a	Microcopy Test Chart	86
920	D-Mannitol	13	1012	Flooring Radiant Panel	5
921	Cortisol (Hydrocortisone)	13	1017b	Glass (Particle Size)	1
924a	Lithium Carbonate (Clinical)	13	1018b	Glass (Particle Size)	1
925	VMA (Clinical)	13	1019b	Glass (Particle Size)	1
927d	Bovine Serum Albumin (7% solution)	14	1021	Glass Beads, Soda Lime	1
928	Lead Nitrate (Clinical)	13	1034	Unalloyed Copper	62
929a	Magnesium Glutonate Dihydrate	13	1035	Leaded-Tin Bronze Alloy	62
930e	Glass Filters Transmittance	84	1048	Smoke Toxicity (Cup Furnace)	4
931g	Liquid Absorbance Filters UV-VIS	84	1049	Smoke Toxicity (Univ of Pittsburgh)	4
935a	Potassium Dichromate, UV Absorbance	84	1051b	Barium (Metallo-Organic)	26
936a	Quinine Sulfate	85	1052b	Vanadium (Metallo-Organic)	26
937	Iron Metal Clinical	13	1053a	Cadmium (Metallo-Organic)	26
951a	Boric Acid, Assay and Isotopic	46, 50	1057b	Tin (Metallo-Organic)	26
952	Boric Acid 95 % enr 10B	50	1065b	Nickel (Metallo-Organic)	26
953	Cobalt in Aluminum Wire	99	1066a	Silicon (Metallo-Organic)	26
955c	Lead in Caprine Blood	14	1069b	Sodium (Metallo-Organic)	26
956c	Electrolytes in Frozen Human Serum	14	1073b	Zinc (Metallo-Organic)	26
963a	Fission Track Glass U-1 mg/g	99	1075a	Aluminum (Metallo-Organic)	26
965b	Glucose in Human Serum	14	1077a	Silver (Metallo-Organic)	26
967a	Creatinine in Frozen Human Serum	14	1078b	Chromium (Metallo-Organic)	26
968d	Fat-Sol Vit,Caroten,Cholest in Hum Serum	14	1079b	Iron (Metallo-Organic)	26
970	Ascorbic Acid in Frozen Human Serum	14	1080a	Copper (Metallo-Organic)	26
971	Hormones in Frozen Human Serum	14	1082	Cigarette Ignition Strength	4
972	Vitamin D in Human Serum	14	1083	Wear Metals (Base Oil)	73
973	Boric Acid	46,50	1084a	Wear Metals in Oil, 100 mg/kg	73
975a	Chlorine (Isotopic)	50	1085b	Wear Metals in Lubricating Oil	73

SRM	Descriptor	Page	SRM	Descriptor	Page
1089	Steels, Set (consists of SRMs 1095-1099)	60	1219	Stainless Steel Cr-Ni (AISI 431)	55
1090	Ingot Iron, Oxygen	60	C1221	Carbon Steel	54
1091a	Stainless Steel (AISI 431)	60	1223	Chromium Steel	55
1093	Valve Steel, Oxygen	60	1224	Carbon (AISI 1078)	54
1094	Maraging Steel	60	1225	LA Steel AISI 4130	54
1107	Naval Brass B	63	1226	LA Steel	54
1110	Red Brass B	63	1227	LA Steel, Basic Open Hearth, 1 %C	54
1111	Red Brass C	63	1228	LA Steel 0.1 % C	54
1112	Gilding Metal A (disk)	63	1230	High Temp Alloy A286	59
C1112	Gilding Metal A (block)	63	1233	Specialty Steel, Valve Steel	57
1113	Gilding Metal B (disk)	63	1240c	Alloy 3004	60
C1113	Gilding Metal B (block)	63	1241c	Alloy 5182	60
1114	Gilding Metal C (disk)	63	1242	High Temp Alloy L-605	61
C1114	Gilding Metal C (block)	63	1243	Waspalloy	65
1115	Commercial Bronze A (disk)	63	1244	Inconel 600	65
C1115	Commercial Bronze A (block)	63	1246	Incoloy 800	59
1116	Commercial Bronze B (disk)	63	1247	Incoloy 825	59
1117	Commercial Bronze C (disk)	63	C1248	Nickel-Copper Alloy	65
C1117	Commercial Bronze C (block)	63	1249	Inconel 718	65
1128	Ti Alloy (15V-3AL-3CR-3SN)	66	1250	High Temp Alloy Fe-Ni-Co	59
1129	Solder (63Sn-37Pb)	63	C1251a	Phosphorous Deoxidized Copper VII	61
1131	Solder Sn-60Pb	63	C1252a	Phosphorous Deoxidized Copper IX	61
1132	Lead Base Wearing Metal	63	C1253a	Phosphorous Deoxidized Copper X	61
1134	LA Steel, High Silicon	54	1254	LA Steel (Ca only)	54
1135	LA Steel, High Silicon	54	1255b	Alloy 6356	60
C1137a	White Cast Iron	59	1256b	Aluminum Alloy 380	60
1138a	Cast Steel (No 1)	59	1258-l	Aluminum Alloy 6011	60
1139a	Cast Steel (No 2)	59	1259	Aluminum Alloy 7075	60
C1145a	White Cast Iron	59	1262b	LA Steel (AISI 94B17)	54
C1151a	Stainless Steel 23Cr-7Ni	55	1264a	LA Steel, High Carbon (mod)	54
C1152a	Stainless Steel 18Cr-11Ni	55	1265a	Electrolytic Iron	54
C1153a	Stainless Steel 17Cr-9Ni	55	1269	Line Pipe (AISI 1521 mod)	54
C1154a	Stainless Steel 19Cr-13Ni	55	1270	LA Steel, Cr-Mo (A336) (F-22)	54
1155	Stainless Steel Cr18-Ni12-Mo2 (AISI 316)	55	1271	LA Steel (HSLA-100)	54
1157	Specialty Steel, Tool (AISI M2)	57	1276a	Cupro-Nickel (CDA 715)	63
1158	Specialty Steel, High Nickel (36 % Ni)	57	C1285	LA Steel (A242) (mod)	54
1159	Elec/Mag Ni-Fe	65	1286	Low Alloy Steel (HY 80)	54
1160	Elec/Mag Ni-Mo-Fe	65	C1290	High Alloy (HC-250 + V)	59
1171	Stainless Steel Cr17-Ni11-Ti0.3 AISI 321	55	C1291	High Alloy (Ni-Hard, Type I)	59
1172	Stainless Steel, Cr17-Ni11-Nb.6 AISI 34855	55	C1292	High Alloy (Ni-Hard, Type IV)	59
1173	Ni-Cr-Mo-V Steel	59	1295	Stainless Steel (SAE 405)	55
C1173	Cast Steel 3	59	C1296	Stainless Steel	55
1196	Standard Cigarette for Ignition	4	1297	Stainless Steel (SAE 201)	55
1216	Carbon Modified Silica	73	1358b	Cu & Cr Coating on Steel	90
1218	Low Carbon & Sulfur Silicon Steel	54	1359b	Cu & Cr Coating on Steel	90
			1361b	Cu & Cr Coating on Steel	90

SRM	Descriptor	Page	SRM	Descriptor	Page
1362b	Cu & Cr Coating on Steel	90	1547	Peach Leaves	11, 27
1363b	Cu & Cr Coating on Steel	90	1548a	Typical Diet	9, 10
1364b	Cu & Cr Coating on Steel	90	1549	Non-Fat Milk Powder	10
1400	Bone Ash	15	1566b	Oyster Tissue	9,10, 27
1411	Soft Borosilicate Glass	69	1567a	Wheat Flour	10
1412	Multicomponent Glass	69	1568a	Rice Flour	10
1413	Glass Sand (High Alumina)	32, 69	1570a	Trace Elements in Spinach Leaves	9,10, 11, 27
1416	Aluminosilicate Glass for Liquidus Temp	70, 93	1573a	Tomato Leaves	11, 27
1449	Fumed Silica Board	82	1575a	Trace Elements in Pine Needles	11, 27
1450c	Fibrous Glass Board	82	1577c	Bovine Liver	10, 27
1452	Fibrous Glass Blanket	82	1580	Shale Oil	33
1453	Thermal Resis Expanded Polystyrene Board	82	1582	Petroleum Crude Oil	22
1457	Superconducting Nb-Ti Wire	91	1584	Phenols in Methanol	22
1459	Fumed Silica Board	82	1586	Isotope Label Pollutants	22
1473b	Low Density Polyethylene Resin	78	1588b	Organics in Cod Liver Oil	27
1474a	Polyethylene Resin	78	1595	Tripalmitin	13
1475a	Polyethylene, Linear	78, 79	1596	Dinitropyrene Imrs,1Nitropyrene Meth-Chl	22
1476a	Branched Polyethylene Resin	78	1597a	Complex PAH Mix	29
1478	Polystyrene Narrow Mol Wt	78	1598a	Inorganic Constituents in Bovine Serum	14
1479	Polystyrene, Narrow Mol Wt	78	1599	2 Anticonvulsant Drugs	14
1482a	Polyethylene, 14K Molecular Weight	78	1614	Dioxin in Isooctane	22
1483a	Polyethylene, Linear	78	1616b	Sulfur in Kerosene	35
1484a	Polyethylene, Linear	78	1617a	Sulfur in Kerosene	35
1486	Bone Meal	15	1619b	Sulfur in Residual Fuel Oil 0.7 %	35
1487	Poly (methyl methacrylate)	78	1620c	Sulfur in Residual Fuel Oil 4 %	35
1488	Poly (methyl methacrylate)	78	1621e	Sulfur in Residual Fuel Oil 1 %	35
1489	Poly (methyl methacrylate)	78	1622e	Sulfur in Residual Fuel Oil 2 %	35
1491a	Arom Hydro/Hexane Toluene	22	1623c	Sulfur in Residual Fuel Oil 0.3 %	35
1492	Chlor Pesticides/Hexane	22	1624d	Sulfur in Distillate Fuel Oil	35
1493	PCB Congeners	22	1632c	Trace Elements in Coal	33, 35
1494	Aliphatic Hydrocarbons in 2, 2, 4-Trimethylpentane	22	1633b	Trace Elements in Coal Fly Ash	33
1496	Polyethylene Gas Pipe Resin	78	1634c	Trace Elements in Fuel Oil	33
1497	Polyethylene Gas Pipe Resin	78	1635	Trace Elements in Coal (Subbitumimous)	33, 35
1507b	THC-COOH in Freeze-Dried Urine	15,19	1639	Halocarbons (in Methanol)	22
1508a	Benzoyllecgonine(Cocaine Meta) Freeze-Dried Urine	15,19	1640a	Natural Water	28
1511	Multi Drugs of Abuse in Freeze-Dried Urine	15,19	1641d	Mercury in Water	23
1514	Thermal Analysis Purity Set (DSC)	81	1643e	Trace Elements in Water	28
1515	Apple Leaves	11, 27	1646a	Estuarine Sediment	28
1543	GC/MS System Performance	23	1647e	Priority Pollutant PAHs	22
1544	Fatty Acids & Cholest in Frozen Diet Composite	9	1648a	Urban Particulate Matter	29
1546	Meat Homogenate	9	1649b	Urban Dust/Organics	29
			1650b	Diesel Particulate Matter	29
			1655	KCl Solution Calorimetry	80
			1656	Thianthrene Combustion Calorimeter	80
			1657	Synthetic Refuse Derived Fuel	80

SRM	Descriptor	Page	SRM	Descriptor	Page
1658a	CH4/Air, 1umol/mol	38	1745	Indium (Freezing Point)	81
1659a	CH4/Air, 10 umol/mol	38	1746	Silver (Freezing Point)	81
1660a	CH4/C3H8/Air 1 umol/mol	38, 39	1747	Tin Freezing Point Cell	81
1661a	SO2/N2 500 umol/mol	40	1748	Zinc Freezing Point Cell	81
1662a	SO2/N2 1000 umol/mol	40	1749	Gold vs. Platinum Thermocouple Thermometer	83
1663a	SO2/N2 1500 umol/mol	40	1750	Standard Platinum Resistance Thermometer	83
1664a	SO2/N2 2500 umol/mol	40	1751	Gallium Melting Point	81
1665b	C3H8/Air 3 umol/mol	39	1754	Steel (AISI 4320)	60
1666b	Propane in Air 10 umol/mol	39	1755	Low Alloy Steel	60
1667b	Propane in Air 50 umol/mol	39	1761a	Low Alloy Steel	54
1668b	Propane in Air 100 umol/mol	39	1762a	Low Alloy Steel	54
1669b	Propane in Air 500 umol/mol	39	1763a	Low Alloy Steel	54
1674b	CO2/N2 mol 7%	37	1764a	Low Alloy Steel	54
1676	CO2/Air, 365 umol/mol	36	1765	Low Alloy Steel	54
1677c	CO/N2 10 ppm	37	1766	Low Alloy Steel	54
1678c	CO/N2 50 umol/mol	37	1767	Low Alloy Steel	54
1679c	CO/N2 100 umol/mol	37	1768	High-Purity Iron	54
1680b	CO/N2 500 umol/mol	37	1772	Tool Steel (S-7)	57
1681b	CO/N2 1000 umol/mol	37	1775	MP 35N Refractory Alloy	61, 65
1683b	NO/N2 50 umol/mol	38	1800b	Organic Compounds/N2	36
1684b	NO/N2 100 umol/mol	38	1804c	Organic Compounds/N2	36
1685b	NO/N2 250 umol/mol	38	1810a	Linerboard	6
1686b	NO/N2 500 umol/mol	38	1815a	n-Heptane (Fuel Rating)	33
1687b	NO/N2 1000 umol/mol	38	1816a	Isooctane (Fuel Rating)	33
1689	Sulfur Dioxide in Nitrogen	40	1818a	Chlorine in Lub Base Oil	73
1690	Polystyrene (Particle Size)	1	1819a	Sulfur in Lub Base Oil	73
1691	Polystyrene (Particle Size)	1	1822a	Refractive Index Standard	86
1693a	SO2/N2 50 umol/mol	40	1828b	Ethanol-Water Solution	17
1694a	SO2/N2 100 umol/mol	40	1829	Alcohols in Reference Fuel	33
1696a	SO2/N2, 3500 umol/mol	40	1830	Soda Lime Float (Glass)	69
1710	Aluminum Alloy 3004	61	1831	Soda Lime Sheet (Glass)	69
1711	Aluminum Alloy 3004	61	1834	Fused Ore (Glass)	69
1712	Aluminum Alloy 3004	61	1835	Borate Ore	30
1713	Aluminum Alloy 5182	61	1837	Methanol and Butanol (in Gasoline)	33
1714	Aluminum Alloy 5182	61	1838	Ethanol (in Gasoline)	34
1715	Aluminum Alloy 5182	61	1839	Methanol (in Gasoline)	34
1727	Anode Tin	63, 64	1845	Whole Egg Powder	9
1729	Tin Alloy (97Sn-3Pb)	63,64	1847	Ethanol-Water Solutions	17
1736	Zinc-Aluminum Alloy	67	1848	Lubricating Oil Additive Pkg	73
1737	Zinc-Aluminum Alloy	67	1849	Infant/Adult Nutritional Formula	9
1738	Zinc-Aluminum Alloy	67	1857	Tool Steel for Abrasive Wear	3
1739	Zinc-Aluminum Alloy	67	1866b	Common Commercial Asbestos	43, 103
1740	Zinc-Aluminum Alloy	67	1872	Synthetic Glass	32
1741	Zinc-Aluminum Alloy	67	1873	Synthetic Glass	32
1742	Zinc-Aluminum Alloy	67			
1744	Aluminum (Freezing Point)	81			

SRM	Descriptor	Page	SRM	Descriptor	Page
1877	Beryllium Powder Oxide	103	1955	Homocysteine and Folate in Human Serum	14, 27
1878a	Respirable Alpha Quartz	41, 93, 101	1957	Organic Contaminants in Non-Fortified Human Serum	14, 27
1879a	Respirable Cristobalite	41, 93 101	1958	Organic Contaminants in Fortified Human Serum	14, 27
1880b	Portland Cement (Formerly Black)	72	1961	Polystyrene (30 um)	1
1881a	Portland Cement	72	1963a	Polystyrene Spheres	1
1882a	Calcium Aluminate Cement	72	1964	Nominal 60nm Diameter Polystyrene	1
1883a	Calcium Aluminate Cement	72	1965	Polystyrene (on Slide) (Particle Size)	1
1884b	Portland Cement	72	1967	PT Thermocouple Wire	83
1885a	Portland Cement	72	1968	Gallium Melting Point	82
1886a	Portland Cement	72	1969	Rubidium Triple Point	82
1887a	Portland Cement	72	1970	Succinonitrile Triple Point	82
1888a	Portland Cement	72	1971	Indium Freezing Point	82
1889a	Portland Cement	72	1972	1, 3-Dioxolan-2-one Triple Point	82
1893	Microhardness Cu-Knoop	6, 67	1974b	Organics-Mussel Tissue (Mytilus edulis)	27
1894a	Microhardness Ni-Vickers	6, 67	1975	Diesel Particulate Extract	29
1895	Microhardness Ni-Knoop	6, 67	1976a	Instrument Sens.for Xray Powder Diffraction	93
1896b	Microhardness Ni-Vickers	6, 67	1978	Zirconium Oxide (Particle Size)	1
1897	Specific Surface Area	2	1980	Geothite	77
1899	Specific Surface Area for BET	2	1982	Zirconia Thermal Spray Powder	1
1900	Specific Surface Area for BET	2	1984	Thermal Spray Pwder Particle Size Distribution	1
1905	Microhardness, Ni-Knoop	6, 67	1985	Thermal Spray Pwder Particle Size Distribution	1
1906	Microhardness, Ni-Knoop	6, 67	1990	Single Crystal Diffractometer Alignment	93
1907	Microhardness, Ni-Knoop	6, 67	1994	Silicon Single Crystal Wafer	93
1908	Microhardness, Ni-Vickers	6, 67	1995	Sapphire Single Crystal Wafer	93
1909	Microhardness, Ni-Vickers	6, 67	2000	Calibration Standard for High Resolution X-ray Diffraction	93
1917	Mercury Porosimeter Instrusion	2	2017	Multi-Angle White Reflectance	85
1918	Mercury Porosimeter Instrusion	2	2031a	Metal-on-Quartz Filters	84
1921b	IR Transmiss Wavelength Polystyrene film	85	2035	Near Infrared Transmission Wavelength	85
1922	Liquid Refractive Index - Mineral Oil	86	2036	Near-IR Wavelength/Wavenumber Reflection	85
1932	Fluorescein	85	2037	Red Diesel Dye	85
1935a	Potassium Dichromate Soln/ UV Absorbance	84	2055	IR Transmission Filter	84
1939a	PCBs in River Sediment A	28	2059	Photomask Linewidth Calibration Std.	88
1941b	Organics in Marine Sediment	28	2061	TiAl Ally for Microanalysis/XRF	32, 66
1944	New York/New Jersey Waterway Sediment	28	2062	TiAl Ally for Microanalysis/XRF	32, 66
1945	Organics in Whale Blubber	27	2063a	Mineral Glass (Thin Film)	89
1946	Lake Superior Fish Tissue	9, 27	2065	UV-Vis-NIR Transmission Wavelength	85
1947	Lake Michigan Fish Tissue	9,27	2066	K-411 Glass Microspheres	32
1951b	Lipids in Frozen (Liquid) Human Serum	14			
1952a	Cholesterol in Human Serum	14			
1953	Organic Contaiminants in Non-Fortified Human Milk	14, 27			
1954	Organic Contaminants in Fortified Human Milk	14, 27			

SRM	Descriptor	Page	SRM	Descriptor	Page
2069b	SEM Performance	89	2214	Isooctane Liquid Density	92
2071b	Sinusoidal Roughness	3	2220	Tin (99.9995%)	81
2072	Sinusoidal Roughness	3	2225	Mercury (Differen Scanning Calorimeter)	81
2073a	Sinusoidal Roughness	3	2232	Indium DSC Calibr Std Temp & Enth	81
2074	Sinusoidal Roughness	3	2234	Gallium for Thermal Analysis	81
2075	Sinusoidal Roughness	3	2235	Bismuth for Thermal Analysis	81
2092	Low-Energy Charpy V-Notch	5	2241	Relative Intensity Correction Standard	85
2096	High-Energy Charpy V-Notch	5	2242	Relative Intensity Correction Standard	85
2098	Super High-Energy Charpy V-Notch	5	2243	Relative Intensity Correction Standard	85
2100	Fracture Toughness of Ceramic	7	2257	PBDE Congeners in 2,2,4-Trimethylpentane	22
2115	Low Energy Izod	5	2258	BDE 209 in 2,2,4-Trimethylpentane	22
2133	Phosphorus Implant in Silicon Depth Profile	89	2259	PCB Congeners in 2,2,4-Trimethylpentane	22
2134	Arsenic in Silicon	89	2260a	Aromatic Hydrocarbon in Toluene	22
2135c	Ni-Cr Thin Film Depth Profile	89	2261	Chlorinated Pesticides in Hexane	22
2137	B Implant in Si Depth Profile	89	2262	Chlorinated Biphenyls in Isooctane	22
2139	Zinc-Aluminum Alloy	67	2264	Nitrated Aromatic Hydrocarbons	23
2141	Urea	47	2265	Nitrated Polycyclic Hydrocarbons	23
2143	p-Fluorobenzoic Acid	47	2266	Hopanes and Steranes	23
2144	m-Chlorobenzoic Acid	47	2267	Deuterated Levoglucosan	23
2151	Nicotinic Acid (Combus Calorimetric Standard)	80	2268	Carbon-13 Labeled Levoglucosan	23
2152	Urea (Combustion & Calorimetric Standard)	80	2269	Perdeuterated PAH I	22
2159	LA Steel, Carbon & Sulfur Only	56	2270	Perdeuterated PAH II	22
2160	LA Steel, Carbon & Sulfur only	56	2273	DDT and Metabolites	22
2165	LA Steel	56	2274	PCB Congeners II	22
2166	LA Steel, F	56	2275	Chlorinated Pesticide II	22
2167	LA Steel, G	56	2276	Coplanar PCBs	22
2168	High Purity Iron	56	2277	Organic Acids in Methanol: Methylene Chloride	23
2171	LA Steel, (HSLA-100)	53	2278	Deuterated Organic Acids in Methanol: Methylene Chloride	23
2172	S-7 Tool Steel	57	2285	Arson Test Mixture	18, 34
2175	MP 35N Refractory Alloy	61, 65	2286	Ethanol (in Gasoline)	34
2181	HEPES Free Acid	76	2287	Ethanol (in Gasoline)	34
2182	NaHEPESate	76	2288	t-Amyl-methyl-Ether (in Gasoline)	34
2183	MOPSO Free Acid	76	2289	t-Amyl-methyl-Ether (in Gasoline)	34
2184	NaMOPSOate	76	2290	Ethyl-t-butyl Ether (in Gasoline)	34
2185	Pot. Hydrogen Phthalate	76	2291	Ethyl-t-butyl Ether (in Gasoline)	34
2186I	Potassium Dihydrogen Phosphate	76	2293	Methyl-t-Butyl Ether (in Gasoline)	34
2186II	Disodium Hydrogen Phosphate	76	2294	Reformulated Fuels (Nominal 11 % MTBE)	34, 35
2191a	Sodium Bicarbonate	76	2295	Reformulated Fuel (Nominal 15 % MTBE)	34, 35
2192a	Sodium Carbonate	76	2296	Reformulated Fuel (Nominal 13 % ETBE)	34, 35
2193a	Calcium Carbonate	75	2297	Reformulated Fuel (Nominal 10 % ETOH)	34, 35
2201	Sodium Chloride (Ion-Selective)	76			
2202	Potassium Chloride (Ion-Selective Electr)	76			
2203	Potassium Fluoride (Ion-Selective Electr)	76			

SRM	Descriptor	Page	SRM	Descriptor	Page
2298	Sulfur in Gasoline	35		Solution/Rheology	79
2299	Sulfur in Gasoline	35	2491	Non-Newtonian Polymer Melt for Rheology	79
2321	Sn-Pb Alloy Coating	64, 90	2514	Wavelength Reference Absorption Cell-12CO	88
2372	Human DNA Quantitation Stand.	13, 18	2515	Wavelength Reference Absorption Cell-13CO	88
2379	Cocaine in Human Hair Segments I	19	2517a	Wavelength Reference Absorption Cell	88
2380	Codeine in Human Hair Segments II	19	2518	Polarization Mode Dispersion	88
2381	Morphine and Codeine in Urine	15, 19	2519a	Wavelength Reference Absorption	88
2382	Morphine Glucuronide in Urine	15, 19	2520	Optical Fiber Geometry Standard	88
2383	Baby Food Composite	9	2522	Pin Gage for Optical Fiber Ferrules	88
2384	Baking Chocolate	9	2523	Optical Fiber Ferrule Geometry	88
2385	Slurried Spinach	9	2538	Deterministic Polarization Mode Dispersion	88
2387	Peanut Butter	9	2541	Silicon Resistivity	87
2389	Amino Acids in 0.1 mol/L Hydrochloric Acid	14, 19	2543	Silicon Resistivity	87
2390	DNA Profiling	18	2546	Silicon Resistivity	87
2391b	PCR-Based DNA Profiling	18	2556	Recycled Pellet (Autocatalyst)	73
2392	DNA Mitochondrial Sequencing	13, 18	2557	Recycled Monolith (Autocatalyst)	73
2392-I	Mitochondrial Sequencing	13, 18	2570	Lead Paint Film White/Blank .001 mg/cm <sup>2</sup>	42, 102
2394	Heteroplasmic Mitochondrial DNA Mutation Detection	18	2571	Lead Paint Film (Yellow) Nominal 3.5 mg/cm <sup>2</sup>	42, 102
2395	Human Y-Chromosome DNA Profiling Standard	18	2572	Lead Paint Film (Orange) Nominal 1.6 mg/cm <sup>2</sup>	42, 102
2396	Oxidative DNA Damage/Mass Spec	18	2573	Lead Paint Film (Red) Nominal 1.0 mg/cm <sup>2</sup>	42, 102
2399	Fragile X Human DNA Triplet Repeat Standard	13, 18	2574	Lead Paint Film (Gold) Nominal .7 mg/cm <sup>2</sup>	42, 102
C2400	HA Steel ACI (17/4 PH)	59	2575	Lead Paint Film (Green) Nominal .3 mg/cm <sup>2</sup>	42, 102
C2401	HA Steel (ACI-C-4M-Cu)	59	2576	Lead Paint Film, High Level	42, 102
C2402	Hastelloy 7C	65	2579a	Lead Paint Films for Portable XRF Analyz	42, 102
C2415	Battery Lead	64	2580	Powdered Paint Nominal 4 % Lead	42, 102
C2416	Bullet Lead	64	2581	Powdered Paint Nominal 0.5 % Lead	42, 102
C2417	Lead-Base Alloy	64	2582	Powdered Paint Nominal 200 mg/kg L	42, 102
C2418	High-Purity Lead	64	2583	Trace Elements in Indoor Dust	29, 42, 102
C2423a	Ductile Iron B	59	2584	Trace Element in Indoor Dust	29, 42, 102
C2424	Ductile Iron C	59	2585	Organic Contaminants in House Dust	29
2426	55% Aluminum Zinc	61, 67	2586	Trace Elements in Soil w/lead from paint	28, 42, 102
2430	Scheelite Ore	30	2587	Trace Elements in Soil w/Lead	
2431	Titanium Base Alloy	66			
2432	Titanium Base Alloy	66			
2433	Titanium Alloy	66			
2451	Fine Carbon (Activated)	28			
2452	Hydrogen in Titanium Alloys	66			
2453	Hydrogen in Titanium Alloys	66			
2454	Hydrogen in Titanium Alloys	66			
2460	Standard Bullet	18			
2490	Non-Newtonian Polymer				

SRM	Descriptor	Page	SRM	Descriptor	Page
	from Paint	28, 42, 102	2682b	Sulfur & Mercury in Coal	35, 80
2589	Powdered Paint Nominal 10 % Lead	42, 102	2683b	Sulfur in Coal, 2 %	35, 80
2612a	CO/Air 10 umol/mol	36	2684b	Sulfur & Mercury in Coal	35,80
2613a	CO/Air 20 umol/mol	36	2685b	Sulfur & Mercury in Coal	35, 80
2614a	CO/Air 45 umol/mol	36	2686a	Portland Cement Clinker	72
2617	Carbon Dioxide in Nitrogen	36	2687	Portland Cement Clinker	72
2619a	Carbon Dioxide in Nitrogen .5 % mol/mol	37	2688	Portland Cement Clinker	72
2620a	Carbon Dioxide in Nitrogen 1.0 % mol/mol	37	2689	Coal Fly Ash	33
2621a	Carbon Dioxide in Nitrogen 5 % mol/mol	37	2690	Coal Fly Ash	33
2622a	Carbon Dioxide in Nitrogen 2.0 % mol/mol	37	2691	Coal Fly Ash	33
2623a	Carbon Dioxide in Nitrogen 2.5 % mol/mol	37	2692b	Sulfur & Mercury in Coal	35, 80
2624a	Carbon Dioxide in Nitrogen 3.0 % mol/mol	37	2693	Low Sulfur/Mercury Coal	35
2625a	Carbon Dioxide in Nitrogen 3.5 % umol/mol	37	2695	Fluoride in Vegetation	11
2627a	Nitric Oxide in Nitrogen	39	2696	Silica Fume	2, 69, 72
2628a	NO/N2	39	2701	Hexavalent Chromium in Contaminated Soil	28
2629a	NO/N2, 20 umol/mol	38	2702	Marine Sediment	28
2630	NO/N2, 1500 umol/mol	38	2703	Sediment for Solid Sampling	29
2631a	NO/N2, 3,000 umol/mol	38	2709a	San Joaquin Soil	28
2635a	CO/N2 25 umol/mol	37	2710a	Montana I Soil	28
2636a	CO/N2 250 umol/mol	37	2711a	Montana II Soil	28
2637a	CO/N2 2500 umol/mol	37	2717a	Sulfur in Residual Fuel Oil	35
2638a	CO/N2 5000 umol/mol	37	2718	Green Petroleum Coke	33, 35
2639a	CO/N2 1.0 % mol/mol	37	2719	Calcined Petroleum Coke	33, 35
2640a	CO/N2 2.0 % mol/mol	37	2720	Sulfur in Di-n-Butyl Sulfide	35
2641a	CO/N2 4 % mol/mol	37	2721	Moisture & Sulfur in Crude Oil (Light Sour)	35
2642a	CO/N2 8 % mol/mol	37	2722	Moisture & Sulfur in Crude Oil (Heavy Sweet)	35
2644a	Propane in Nitrogen 250 umol/mol	39	2723a	Sulfur in Diesel Fuel Oil	35
2646a	C3H8/N2, 1000 umol/mol	39	2724b	Sulfur in Diesel Fuel Oil, 0.04 %	35
2647a	C3H8/N2, 2500 umol/mol	39	2730	H2S/N2, 5 umol/mol	38
2657a	O2/N2 2 % mol/mol	39	2731	H2S/N2, 20 umol/mol	38
2658a	O2/N2 10 % mol/mol	39	2735	NO/N2, 800 umol/mol	38
2659a	O2/N2, 21 % mol/mol	39	2737	NO/N2	39
2660a	Total Oxides of Nitr in Air 100 umol/mol	39	2738	NO/N2	39
2669	Arsenic Species in Frozen Human Urine	15	2740a	CO/N2, 10 % mol/mol	38
2670a	Toxic Elements in Urine	15	2741a	CO/N2, 13 % mol/mol	38
2672a	Mercury in Urine	15	2745	CO2/N2, 16 % mol/mol	37
2678	Membrane Blank Filter	41,101	2750	CH4/Air 50 umol/mol	38
2681	Ashless Blank Filter	41, 101	2751	CH4/Air 100 umol/mol	38
			2764	C3H8/Air .25 umol/mol	39
			2765	Propane in Air	39
			2770	Sulfur in Diesel Fuel	35
			2772	B100 Biodiesel(Soy Based)	11
			2773	B100 Biodiesel (Animal Based)	11



SRM	Descriptor	Page	SRM	Descriptor	Page
2775	Foundry Coke	33, 35	2951	Respirable Alpha Quartz on Filter Media	41, 101
2776	Furnace Coke	33, 35	2952	Respirable Alpha Quartz on Filter Media	41, 101
2780	Hard Rock Mine Waste	28	2953	Respirable Alpha Quartz on Filter Media	41, 101
2781	Domestic Sludge	28	2954	Respirable Alpha Quartz on Filter Media	41, 101
2782	Industrial Sludge	28	2955	Respirable Alpha Quartz on Filter Media	41, 101
2783	Air Particulate on Filter Media	29,40,101	2956	Respirable Alpha Quartz on Filter Media	41, 101
2798a	Microhardness Ni-Vickers	6, 67	2957	Respirable Alpha Quartz on Filter Media	41, 101
2800	Microscope Magnification Standard	88, 89	2958	Respirable Alpha Quartz on Filter Media	41, 101
2806a	Medium Test Dust(MTD) in Hydraulic Fluid	2	2960	Respirable Alpha Cristobalite on Filter Media	41, 101
2810	Rockwell C Hardness, Low	6	2961	Respirable Alpha Cristobalite on Filter Media	41, 101
2811	Rockwell C Hardness, Mid	6	2962	Respirable Alpha Cristobalite on Filter Media	41, 102
2812	Rockwell C Hardness, High	6	2963	Respirable Alpha Cristobalite on Filter Media	41, 102
2830	Microhardness, Ceramic-Knoop	6, 67	2964	Respirable Alpha Cristobalite on Filter Media	41, 102
2831	Microhardness, Ceramic-Vickers	6, 67	2965	Respirable Alpha Cristobalite on Filter Media	41, 102
2841	Semiconductor Thin Film	89	2966	Respirable Alpha Cristobalite on Filter Media	41, 102
2842	Semiconductor Thin Film	89	2967	Respirable Alpha Cristobalite on Filter Media	41, 102
2853	Magnetic Moment Standard - Yttrium Iron Garnet	7	2972	25-Hydroxyvitamin D2 and D3 Calibration Solutions	14
2855	Additive Elements in Polyethylene	28	2975	Diesel Partic.Matter (Indus.Forklift)	29
2870	Relative Permittivity and Loss Tangent	70,91	2976	Mussel Tissue T.E. & Methylmercury Frz-Dr	27
2881	Polyethylene (Molar Mass 9,100 g/mol)	78	2977	Mussel Tissue Organic Contaminants &T.E.	27
2885	Polyethylene (Molar Mass 6,280 g/mol)	78	3000	Benzene in Methanol	21
2886	Polyethylene (Molar Mass 87,000 g/mol)	78	3001	Toluene in Methanol	21
2887	Polyethylene (Molar Mass 196,400 g/mol)	78	3002	Ethylbenzene in Methanol	21
2888	Polyethylene (Molar Mass 7,190 g/mol)	78	3003	o-Xylene in Methanol	21
2890	Water Saturated Octanol	34	3004	m-Xylene in Methanol	21
2891	Ethanol in Water Solutions	17	3005	p-Xylene in Methanol	21
2892	Ethanol in Water Solutions	17	3006	Carbon Tetrachloride in Methanol	21
2893	Ethanol in Water Solutions	17			
2894	Ethanol in Water Solutions	17			
2895	Ethanol in Water Solutions	17			
2896	Ethanol in Water Solutions	17			
2897	Ethanol in Water Solutions	17			
2898	Ethanol in Water Solutions	17			
2899	Ethanol in Water Solutions	17			
2900	Ethanol in Water Solutions	17			
2905	Trace Particle Explosive Simulants	18			
2910a	Calcium Hydroxyapatite	15, 79			
2921	Cardiac Troponin	14			
2940	Relative Intensity Correction Std	85			
2941	Relative Intensity Correction Std	85			
2942	Relative Intensity Correction Std.	85			
2943	Relative Intensity Correction Std	85			
2950	Respirable Alpha Quartz on Filter Media	41, 101			

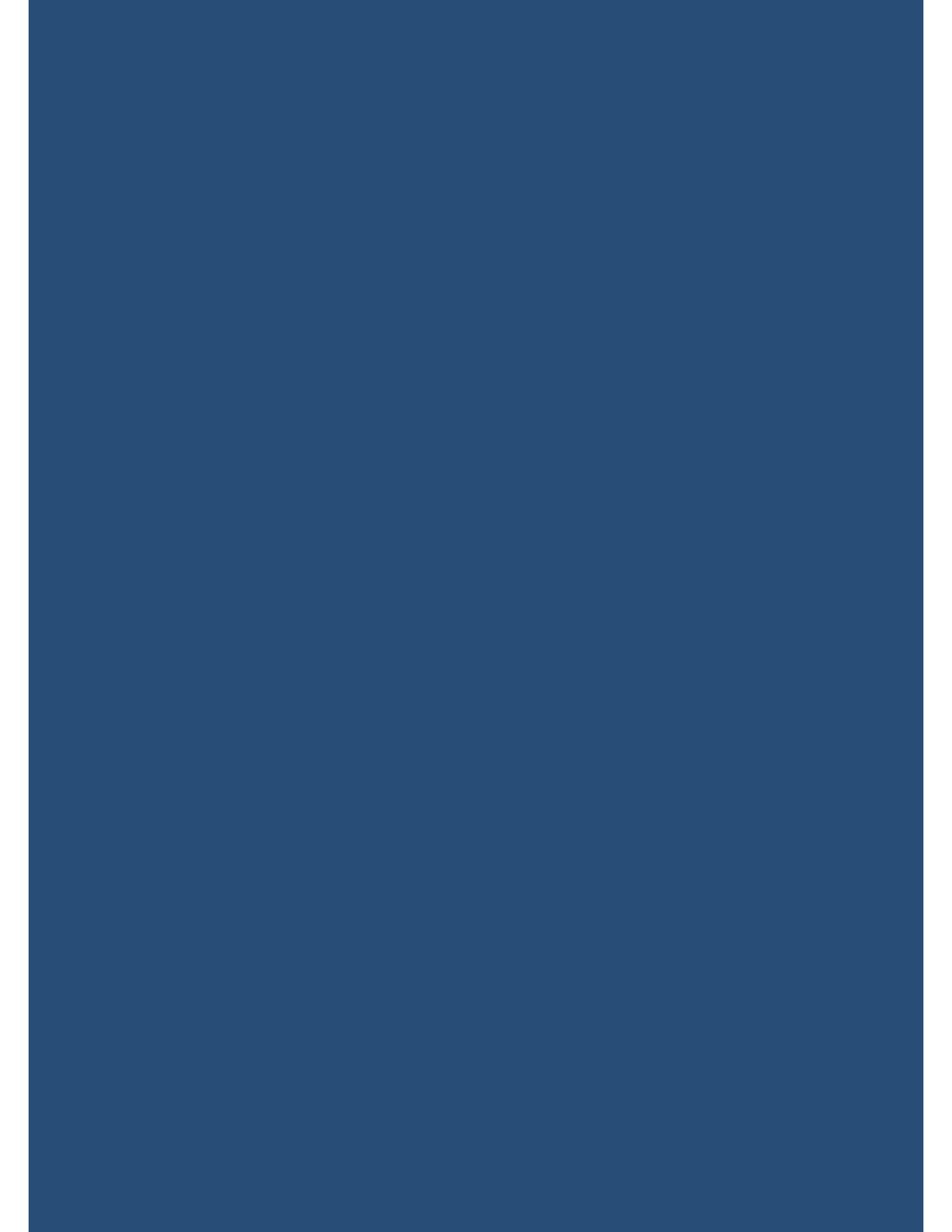
SRM	Descriptor	Page	SRM	Descriptor	Page
3008	Methylene Chloride in Methanol	21	3115a	Dysprosium Standard Solution	23, 48
3009	1,2 Dichloropropane in Methanol	21	3116a	Erbium Standard Solution	23, 48
3010	Tetrachloroethylene in Methanol	21	3117a	Europium Standard Solution	23, 48
3011	1,1,1 Trichloroethane in Methanol	21	3118a	Gadolinium Standard Solution	24, 48
3012	1,2-Dichloroethane in Methanol	21	3119a	Gallium Standard Solution	24, 48
3014	1,2,3 Trichloropropane in Methanol	21	3120a	Germanium Standard Solution	24, 48
3015	Isopropylbenzene in Methanol	21	3121	Gold Standard Solution	24, 48
3016	sec-Butylbenzene in Methanol	21	3122	Hafnium Standard Solution	24, 48
3063	Dioxin in Methanol	21	3123a	Holmium Standard Solution	24, 48
3064	Endothall in Water	21	3124a	Indium Standard Solution	24, 48
3067	Toxaphene in Methanol	21	3126a	Iron Standard Solution	24, 48
3068	Chlordane in Methanol	21	3127a	Lanthanum Standard Solution	24, 48
3071	Glyphosate	21	3128	Lead Standard Solution	24, 48
3072	Diquat Dibromide Monohydrate in Water	21	3129a	Lithium Standard Solution	24, 48
3074	Phalates/Adipate in Methanol	21	3130a	Lutetium Standard Solution	24, 48
3075	Aroclor 1016 in Transformer Oil	21	3131a	Magnesium Standard Solution	24, 48
3076	Aroclor 1232 in Transformer Oil	21	3132	Manganese Standard Solution	24, 48
3077	Aroclor 1242 in Transformer Oil	21	3133	Mercury Standard Solution	24, 49
3078	Aroclor 1248 in Transformer Oil	21	3134	Molybdenum Standard Solution	24, 49
3079	Aroclor 1254 in Transformer Oil	21	3135a	Neodymium Standard Solution	24, 49
3080	Aroclor 1260 in Transformer Oil	21	3136	Nickel Standard Solution	24, 49
3081	Aroclor 1016 in Methanol	21	3137	Niobium Standard Solution	24, 49
3082	Aroclor 1232 in Methanol	21	3138	Palladium Standard Solution	24, 49
3083	Aroclor 1242 in Methanol	21	3139a	Phosphorus Standard Solution	24, 49
3084	Aroclor 1248 in Methanol	21	3140	Platinum Standard Solution	24, 49
3085	Aroclor 1254 in Methanol	21	3141a	Potassium Standard Solution	24, 49
3086	Aroclor 1260 in Methanol	21	3142a	Praseodymium Standard Solution	24, 49
3090	Aroclors in Transformer Oil (set SRMs 3075-3080)	21	3143	Rhenium Standard Solution	24, 49
3091	Aroclors in Methanol (set SRMs 3081 - 3086)	21	3144	Rhodium Standard Solution	24, 49
3101a	Aluminum Standard Solution	23, 48	3145a	Rubidium Standard Solution	24, 49
3102a	Antimony Standard Solution	23, 48	3147a	Samarium Standard Solution	24, 49
3103a	Arsenic Standard Solution	23, 48	3148a	Scandium Standard Solution	24, 49
3104a	Barium Standard Solution	23, 48	3149	Selenium Standard Solution	24, 49
3105a	Beryllium Standard Solution	23, 48	3150	Silicon Standard Solution	24, 49
3106	Bismuth Standard Solution	23, 48	3151	Silver Standard Solution	24, 49
3107	Boron Standard Solution	23, 48	3152a	Sodium Standard Solution	24, 49
3108	Cadmium Standard Solution	23, 48	3153a	Strontium Standard Solution	24, 49
3109a	Calcium Standard Solution	23, 48	3154	Sulfur Standard Solution	24, 49
3110	Cerium Standard Solution	23, 48	3155	Tantalum Standard Solution	24, 49
3111a	Cesium Standard Solution	23, 48	3156	Tellurium Standard Solution	25, 49
3112a	Chromium Standard Solution	23, 48	3157a	Terbium Standard Solution	25, 49
3113	Cobalt Standard Solution	23, 48	3158	Thallium Standard Solution	25, 49
3114	Copper Standard Solution	23, 48	3159	Thorium Standard Solution	25, 49
			3160a	Thulium Standard Solution	25, 49
			3161a	Tin Standard Solution	25, 49

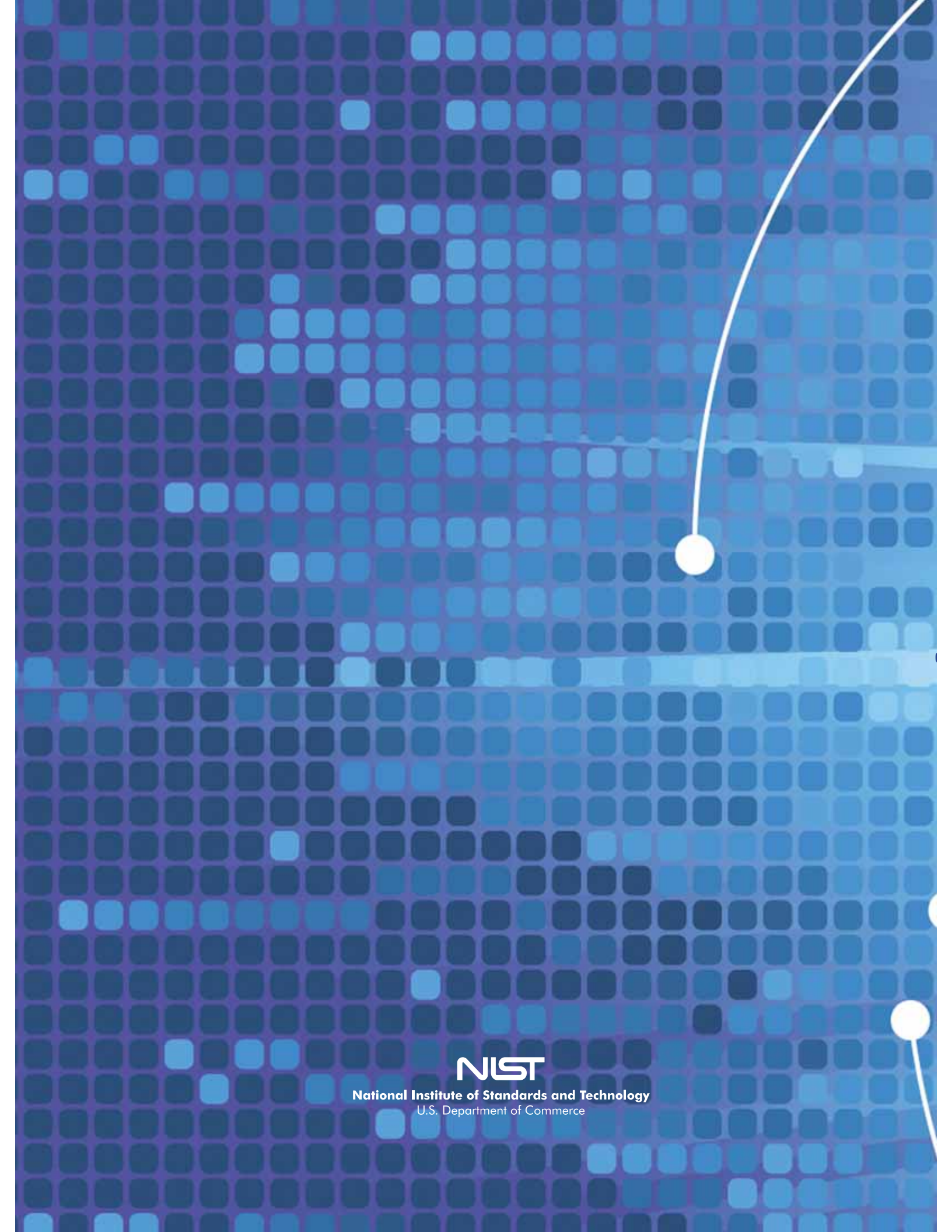
SRM	Descriptor	Page	SRM	Descriptor	Page
3162a	Titanium Standard Solution	25, 49	3278	Tocopherols in Edible Oils	10
3163	Tungsten Standard Solution	25, 49	3280	Multivitamin/Multielement Tablets	10
3164	Uranium Standard Solution	25, 49	3281	Cranberry Fruit	10
3165	Vanadium Standard Solution	25, 49	3282	Low calorie Cranberry Juice Cocktail	10
3166a	Ytterbium Standard Solution	25, 49	3283	Cranberry Extract	10
3167a	Yttrium Standard Solution	25, 49	3284	Cranberry Containing Solid Oral	10
3168a	Zinc Standard Solution	25, 49	3285	Mixed Berry Containing Solid Oral Dosage Form	10
3169	Zirconium Standard Solution	25, 49	3291	Bilberry Extract	10
3177	Mercury(II) Chloride Solution	25, 49	4201B	Niobium-94 Point Source	97
3181	Sulfate Anion Solution	25, 50	4218F	Europium-152 Point Source	97
3182	Chloride Anion Solution	25, 50	4222C	Carbon-14 (as hexadene)	96
3183	Fluoride Anion Solution	25, 50	4226C	Nickel-63 Solution	96
3184	Bromide Anion Solution	25, 50	4233E	Cesium-137	96
3185	Nitrate Anion Solution	25, 50	4239	Strontium	96
3186	Phosphate Anion Solution	25, 50	4241C	Barium-133 Point Source	97
3190	Aqueous Electrolytic Conductivity 25 uS/cm	77	4251C	Barium-133 Solution	96
3191	Aqueous Electrolytic Conductivity 100 uS/cm	77	4274	Holmium-166m	96
3192	Aqueous Electrolytic Conductivity 500 uS/cm	77	4288B	Technetium-99	96
3193	Aqueous Electrolytic Conductivity 1000 uS/cm	77	4320A	Curium-244 Solution	95
3198	Aqueous Electrolytic Conductivity 5 uS/cm	77	4321C	Natural Uranium Solution	95
3199	Aqueous Electrolytic Conductivity 15 uS/cm	77	4322C	Americium-241 Solution	95
3231	Iodine-129, Isotopic (high levels)	50	4323B	Plutonium-238 Solution	95
3246	<i>Ginkgo biloba</i> Dietary Sup.	10	4324B	Uranium-232	95
3247	<i>Ginkgo biloba</i> Extract	10	4325	Beryllium-10/9 Solution	98,99
3248	Ginkgo Containing Tablets	10	4326	Polonium-209 Solution	95
3249	Ginkgo Dietary Supplement Suite	10	4328C	Thorium-299	95
3250	<i>Serona repens</i> (Fruit)	10	4329	Curium-243 Solution	95
3251	<i>Serona repens</i> (Extract)	10	4330C	Plutonium-239 Solution	95
			4332E	Americium-243 Solution	95
			4334H	Plutonium-242 Solution	95
			4337	Lead-210 Solution	96
			4338A	Plutonium-240 Solution	95
			4339A	Radium-228 Solution	96
			4340B	Plutonium-241 Solution	96
			4341	Neptunium-237 Solution	95
3254	<i>Camellia sinensis</i> Green Tea Leaves	10	4342A	Thorium-230	95
3255	<i>Camellia sinensis</i> Green Tea Extract	10	4350B	River Sediment (Radioactivity)	98
3256	Green Tea-Containing Solid, Oral Dosage	10	4351	Human Lung Powder	98
3258	Bitter Orange Plant	10	4352	Human Liver Powder	98
3259	Bitter Orange Extract	10	4353A	Rocky Flats Soil II	99
3260	Orange Finished Product	10	4354	Lake Sediment Powder	99
3274	Botanical Oils Containing Omega 3	10	4355	Peruvian Soil Powder	99
3275	Omega-3 and Omega-6 Fatty Acids in Fish Oil	10	4356	Ashed Bone (Radioactivity)	99
3276	Carrot Extract in Oil	10	4357	Ocean Sediment Powder	99
			4359	Seaweed	99

SRM	Descriptor	Page	SRM	Descriptor	Page
4361C	Hydrogen-3 Water	96	8441a	Wheat Hardness	11
4370C	Europium-152 Solution	96	8444	Cotinine in Freeze Dried Human Urine	15, 19
4401L	Iodine-131 Solution	97	8445	Egg for Allergen Detection	9
4404L	Thallium-201	97	8455	Pyrite Ore	30
4407L	Iodine-125 Solution	97	8456	Ultra-hi Molecular Wt. Polyethylene Bar	15, 79
4410H	Technetium-99m	97	8457	Ultra-hi Molecular Wt. Polyethylene Bar	15, 79
4412L	Molybdenum-99 Solution	97	8458	Artificial Flaw for Eddy Current	5
4415L	Xenon-133 Solution	97	8466	Y-HCH (Lindane)(neat)	22
4416L	Gallium-67 Solution	97	8467	4, 4'-DDE (neat)	22
4417L	Indium-111	97	8469	Pesticide, 4,4'-DDT (neat)	22
4427L	Yttrium-90 Solution (Lot 5)	97	8480	Secondary Ferrite # Standard - Low Range	7
4915F	Cobalt-60 Solution	96	8481	Secondary Ferrite # Standard - High Range	7
4919I	Strontium-90 Solution	96	8491	Sugar Cane Bagasse	11
4926E	Hydrogen-3 Water	96	8492	Eastern Cottonwood	11
4927F	Hydrogen-3 Water	96	8493	Monterey Pine	11
4929F	Iron-55 Solution	96	8494	Wheat Straw	11
4943	Chlorine-36 Solution	96	8495	Northern Softwood	7
4947C	Hydrogen-3 Toluene	96	8496	Eucalyptus Hardwood	7
4949C	Iodine-129 Solution	96	8504	Transformer Oil	21
4965	Radium-226 Solution	95	8505	Vanadium in Crude Oil	33
4966A	Radium-226 Solution	95	8506a	Transformer Oil	34
4967A	Radium-226 Solution	95	8507	Mineral Oil	34
4969	Radium-226 Solution	95	8509	Moisture in Methanol, 93 mg/kg	34
4971	Radon-222	95	8510	Moisture in Methanol, 325 mg/kg	34
4972	Radon-222	95	8535	Vsmow-Water	51
4973	Radon-222	95	8536	GISP-Water	51
4974	Radon 222	95	8537	SLAP-Water Light Stable Isotopic Std	51
4990C	Oxalic Acid Powder	98	8538	NBS30-Biotite	51
5000	Calibrated Overlay Wafer Std.	88	8539	NBS22-Oil	51
5001	Two-Dimensional Grid Photomask	88	8540	PEFI-Polyethylene Foil	51
8010	Sand for Sand Sieve Analysis	1	8541	USGS24-Graphite	51
8011	Gold Nanoparticles	1, 15, 45, 79	8542	Sucrose ANU-Sucrose	51
8012	Gold Nanoparticles	1, 15, 45, 79	8543	NBS18-Carbonatite	51
8013	Gold Nanoparticles	1, 15, 45, 79	8544	NBS19-Limestone	51
8040	Sodium Oxalate	46	8545	LSVEC-Lithium Carbonate	51
8091	SEM Sharpness Standard	89	8546	NBS28-Silica Sand	51
8107	Additives in Smokeless Powder	18	8547	IAEAN1-Ammonium Sulfate	51
8323	Yeast Protein Extract	14	8548	IAEAN2-Ammonium Sulfate	51
8327	Peptide Reference Material	13	8549	IAEA-N3-Potassium Nitrate	51
8385	Ultra-High Molecular Weight Polyethylene Wear Particles	15, 79	8550	USGS25-Ammonium Sulfate	51
8395	Tissue Engineering Reference, Scaffold 13	79	8551	USGS26-Ammonium Sulfate	51
8396	Tissue Engineering Reference, Scaffold 13	79	8552	NSVEC-Gaseous Nitrogen	51
8397	Tissue Engineering Reference, Scaffold 13	79			
8420	Iron Electrolytic	83, 87			
8424	Graphite Thermal Conductivity	83, 87			

<b>SRM</b>	<b>Descriptor</b>	<b>Page</b>	<b>SRM</b>	<b>Descriptor</b>	<b>Page</b>
8553	Soufre de Lacq-Elemental Sulfur	51	8983	Silicon Nitride Powder	68
8554	NZ1-Silver Sulfide	51	8988	Titanium Dioxide Power	1
8555	NZ2-Silver Sulfide	51	9951	Aluminum Wafer Drop In Sample	89
8556	NBS123-Sphalerite	51	9952	Aluminum Wafer Drop-In Sample	89
8557	NBS127-Barium Sulfate	51			
8558	USGS32-Potassium Nitrate	51			
8559	Natural Gas Isotopic	51			
8561	Natural Gas Isotopic	51			
8562	CO2-Heavy, Paleomarine Origin	51			
8563	CO2-Light, Paleomarine Origin	51			
8564	CO2-Biogenic, Modern Biomass Origin	51			
8568	USGS34 Potassium Nitrate	51			
8569	USGS35 Sodium Nitrate	51			
8573	Carbon and Nitrogen Isotopes	51			
8574	Carbon and Nitrogen Isotopes	51			
8590	High Sulfur Gas Oil Feed	33			
8602	Chinese Lead Ore	31			
8603	Chinese Lead Ore	31			
8607	Chinese Tungsten Ore	31			
8631	Medium Test Dust (MTD)	3			
8632	Ultrafine Test Dust	3			
8642	Saxitoxin Dihydrochloride Solution	9,14			
8680	Paint on Fiberboard	42, 102			
8704	Buffalo River Sediment	29			
8785	Particulate Matter on Filters	29, 40, 101			
8786	Blank Filter for RM8785	29, 40, 101			
8820	Scanning Electron Microscope...	88, 89			
8850	Zeolite Y	43			
8851	Zeolite A	43			
8852	Ammonium ZSM-5	43			

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