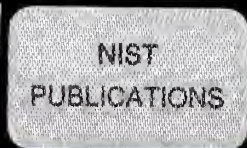


NIST Standard Reference Materials® Catalog



NIST SP 260
FEBRUARY 2003

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NIST Standard Reference Materials® (SRMs®) are used by industry, government, and academia to ensure the highest quality measurements. This catalog lists over 1300 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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■ Engineering Materials

- 1 SIZING
 - 1 Particle Size
 - 2 Cement Turbidity and Fineness
 - 2 Surface Area of Powders
 - 2 Particle Count Materials
 - 2 Mercury Porosimetry Standards
- 2 SURFACE FINISH
 - 3 Abrasive Wear
 - 3 Surface Roughness
- 3 FIRE RESEARCH
 - 3 Surface Flammability
 - 4 Smoke Density Chamber
 - 4 Smoke Toxicity
 - 4 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)
 - 5 Rockwell Hardness
 - 6 Microindentation Hardness (Knoop and Vickers Test Blocks)
 - 6 Coordinate Measuring Machine (CMM) Probe Performance
 - 6 Tape Adhesion Testing
 - 7 Bleached Kraft Pulp
 - 7 Secondary Ferrite Number (FN) Materials
 - 7 Fracture Toughness of Ceramics
 - 7 Magnetic Moment Standards

■ Food & Agriculture

- 9 Trace Elements in Food and Dairy Products
- 9 Wheat Hardness
- 10 Nutrition Composition
- 11 Trace Elements in Botanicals
- 11 Fertilizers
- 11 Whole Biomass Feedstock

■ Health & Clinical

- 13 Pure, Crystalline Standards
- 13 Biological Buffer Systems
- 14 Human Serum
- 15 Bovine Serum
- 15 Ethanol Solutions
- 16 DNA Profiling
- 16 Biomaterials
- 17 Drugs of Abuse in Human Hair
- 17 Drugs of Abuse in Urine
- 17 Toxic Substances in Urine
- 17 Miscellaneous Health-Related Materials

■ Environmental

- 19 ORGANICS
 - 19 Gas Chromatography/Mass Spectrometry (GC/MS) and Characterizing Liquid Chromatography (LC) System Performance
 - 20 Organic Contaminant Calibration Solutions
 - 21 Organic Contaminants in Natural Matrix Materials
 - 22 EPA: Organic Compounds Related to Water Analysis
- 23 INORGANICS
 - 23 Metal Constituents in Natural Matrices: Air Particulate, Indoor Dust, Sediment, Sludge, Soil, and Water
 - 24 Carbon Modified Silica
 - 24 Used Auto Catalysts
 - 24 Primary Gas Mixtures
- 28 FOSSIL FUELS
 - 28 Metal Constituents in Fossil Fuels
 - 28 High Purity Liquids for Fuel Rating
 - 28 Trace Elements in Coals and Coke
 - 29 Alcohols and Ethers [Oxygenates] in Reference Fuels
 - 30 Sulfur in Fossil Fuels
 - 31 Moisture in Oils and Alcohols
- 32 GEOLOGICAL MATERIALS AND ORES
 - 32 Ores
 - 33 Ore Bioleaching Substrate
 - 33 Chinese Ores
 - 33 Clays
 - 34 Rocks and Minerals
 - 34 Refractories
- 35 MICROANALYSIS
 - 35 Metals
 - 35 Synthetic Glasses
 - 35 Thin Film for Transmission Electron Microscope

- 36 ENGINE WEAR MATERIALS
 - 36 Metallo-Organic Compounds
 - 37 Lubricating Base Oils
 - 37 Catalyst Characterization Material
 - 37 Wear-Metals in Oil

■ High Purity Materials

- 39 Elemental Composition in High Purity Metals
- 40 Fine Gold Standards
- 40 Stoichiometric Standards
- 41 Microchemistry
- 42 Spectrometric Single Element Solutions
- 44 Anion Chromatography Solutions
- 44 Stable Isotopic Materials
- 45 Light Stable Isotopic Materials

■ Industrial Materials

- 47 FERROUS METALS
 - 47 Steels
 - 47 Plain Carbon Steels
 - 48 Low Alloy Steels
 - 50 Special Low Alloy Steels
 - 50 High Alloy Steels
 - 51 Stainless Steels
 - 52 Specialty Steels
 - 52 Tool Steels
 - 53 Cast Steels, White Cast Irons, and Ductile Irons
 - 53 Steelmaking Alloys
 - 54 Cast Irons
 - 55 High Temperature Alloys
 - 55 Gases in Metals: Iron and Steel
- 56 NONFERROUS METALS
 - 56 Aluminum Base Alloys
 - 56 Cobalt Base Alloys
 - 57 Copper "Benchmark"
 - 57 Copper Base Alloys
 - 58 Lead Base Alloys
 - 58 Lead Base Materials
 - 59 Nickel Oxides
 - 59 Nickel Base Alloys
 - 59 Trace Elements in Nickel Base Superalloys
 - 60 Tin Base Alloys
 - 60 Titanium Base Alloys
 - 60 Hydrogen in Titanium
 - 60 Zirconium Base Alloys
 - 61 Zinc Base Alloys
- 61 CERAMICS AND GLASSES
 - 61 Carbides
 - 61 Cemented Tungsten Carbides
 - 62 Glasses
 - 62 Trace Elements
- 63 CEMENTS
 - 63 Portland Cements
 - 63 Portland Cement Clinkers

■ Physical Properties

- 65 ION ACTIVITY
 - 65 pH Calibration
 - 66 Biological Buffer Systems
 - 66 pD Calibration
 - 66 Ion-Selective Electrode Calibration
 - 67 Electrolytic Conductivity
 - 67 Positive Electrophoretic Mobility
- 68 POLYMERIC PROPERTIES
 - 68 Molar Mass/Molecular Weight
 - 69 Melt Flow Rate
 - 69 Viscosity
 - 69 Biomaterials
- 70 THERMODYNAMIC PROPERTIES
 - 70 Calorimetry - Combustion
 - 70 Calorimetry - Solution
 - 70 Enthalpy and Heat Capacity
 - 71 Differential Scanning Calorimetry
 - 71 Differential Thermal Analysis
 - 71 Defining Fixed Points, International Temperature Scale of 1990, ITS-90
 - 72 Reference Points
 - 72 Freezing Point, Melting Point, and Triple Point Cells
 - 72 Thermal Expansion of Metal and Glass
 - 72 Thermal Resistance of Glass, Silica, and Polystyrene
 - 73 Vapor Pressure of Metals
 - 73 Thermal Conductivity of Graphite and Iron
 - 73 Laboratory Thermometer
 - 73 Thermocouple Material, Platinum
- 74 OPTICAL PROPERTIES
 - 74 Molecular Transmittance and Absorbance
 - 75 Transmittance Wavelength Standards
 - 75 Fluorescence
 - 75 Specular Spectral Reflectance
 - 75 Near Infrared Reflectance Wavelength Standard
 - 76 Optical Rotation
 - 76 Liquid Refractive Index
 - 76 X-ray and Photographic Imaging
- 77 ELECTRICAL PROPERTIES
 - 77 Electrical Resistivity and Conductivity of Electrolytic Iron and Graphite
 - 77 Electrical Resistivity and Conductivity of Silicon
- 78 OPTOELECTRONICS

- 78 METROLOGY
 - 78 Optical Microscope Linewidth Measurement
 - 79 Scanning Electron Microscope (SEM)
 - 79 Depth Profiling
 - 79 Solder Thickness for X-ray Fluorescence
 - 80 Coating Thickness
 - 80 Ellipsometry
 - 81 Oxygen Concentration in Silicon
 - 81 Superconducting Critical Current
- 81 CERAMICS AND GLASSES
 - 81 Chemical Resistance [Durability]
 - 81 Electrical Properties
 - 82 Viscosity
 - 82 Viscosity Fixpoints
 - 82 Relative Stress Optical Coefficient
 - 82 Density (glass & liquid)
 - 83 Glass Liquidus Temperature
- 83 X-RAY SPECTROMETRY
 - 83 X-ray Diffraction
 - 83 X-ray Stage Calibration

■ Radioactivity

- 85 Radioactive Solutions
- 87 Radioactive Point Sources
- 87 Radiopharmaceuticals
- 88 Radon Emanation
- 88 Beryllium Isotopic Ratio Standard
- 88 Carbon-14 Dating
- 89 Natural Matrix Materials
- 89 Neutron Density Monitor Wire
- 89 Fission Track Glass

■ Industrial Hygiene

- 91 Materials on Filter Media
- 91 Trace Constituent Elements in Blank Filters
- 91 Respirable Silica
- 92 Lead in Paint, Dust, and Soil
- 93 Asbestos

Subject Index 94

Numeric Index 110



ENGINEERING MATERIALS

- 1 Sizing
- 2 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 (Mesh Size)	Unit Size (g)
Glass Beads, Soda Lime		
1021	2 μm to 12 μm	4
1003c	20 μm to 50 μm (No. 635 to No. 325)	28
1004b	53 μm to 125 μm (No. 270 to No. 120)	43
1017b	106 μm to 355 μm (No. 140 to No. 45)	70
1018b	250 μm to 710 μm (No. 60 to No. 25)	87
1019b	850 μm to 2000 μm (No. 20 to No. 10)	200
Sand		
RM 8010	(No. 30 to No. 325)	3 \times 150 g
Silicon Nitride (equiaxed)		
659	0.2 μm to 10 μm	5 \times 2.5 g
Zirconium Oxide (irregular)		
1978	0.2 μm to 10 μm	5
1982	10 μm to 150 μm	10
Tungsten Carbide/Cobalt (spheroidal)		
1984	9 μm to 30 μm	14
1985	18 μm to 55 μm	14
Polystyrene Spheres		
<i>Unit Size: 5 mL vial (unless otherwise noted)</i>		
1690 (0.5 % in H ₂ O)	0.895 μm	
1691 (0.5 % in H ₂ O)	0.269 μm	
1692 (0.25 % in H ₂ O)	2.982 μm	
1960* (0.4 % in H ₂ O)	9.89 μm	
1961* (0.5 % in H ₂ O)	29.64 μm	
1963** (0.5 % in H ₂ O)	0.1007 μm	
1965 (Slide Mounted: 1 slide)	9.94 μm (hexagonal array) 9.89 μm (unordered clusters)	

*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

This SRM is suitable for use with ASTM C 430-92, C 115-93, and C 204-92.

SRM	Description	Properties Certified	Value	Unit Size
114p	Portland Cement	Sieve Residue (45 μm (No. 325) Sieve)	8.24 %	20 pouches \times 10 g
		Specific Surface Area (Wagner Turbidimeter)	2086 $\text{cm}^2 \cdot \text{g}^{-1}$	
		Specific Surface Area (Blaine Air Permeability)	3774 $\text{cm}^2 \cdot \text{g}^{-1}$	

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

SRM	Description	Surface Area (m^2/g)		Unit Size (g)
		Multi-point	Single Point	
1897	SSA (Silica Alumina)	258.32	253.08	7
1899	SSA (Silicon Nitride)	10.67	10.52	4
1900	SSA (Silicon Nitride)	2.85	2.79	4

Mercury Porosimetry Standards

SRM	Description	Unit Size (g)
1917	Mercury Porosimetry Standard (Alumina Beads)	10
1918	Mercury Porosimetry Standard (Extended 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
2806	Medium Test Dust in Hydraulic Fluid	2.8 mg/L	400 mL
RM 8631	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	Roughness, R_a (μm)	Wavelength, D (μm)
<i>Sinusoidal Roughness (Knoop Hardness 500)</i>		
2071b	0.3137	100
2073a	0.034	100
2074	0.025	40
2075	0.012	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



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 ₅₀	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 ²	3 sheets: 104.1 × 25.4 × 0.305



NONDESTRUCTIVE EVALUATION

Artificial Flaw for Eddy Current NDE

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

PERFORMANCE ENGINEERING MATERIALS

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

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

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	62

Microindentation Hardness (Knoop and Vickers Test Blocks)

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

These SRMs are suitable for use with ASTM E 384.

SRM	Description	Load (N)	Hardness (kg/mm ²)
Copper, Bright			
1893	Knoop	0.245, 0.49, 0.98	125
Nickel, Bright			
1895	Knoop	0.245, 0.49, 0.98	600
1896a	Vickers	0.245, 0.49, 0.98	600
1905	Knoop	2.943	600
1906	Knoop	4.905	600
1907	Knoop	9.81	600
Silicon Nitride, Ceramic			
2830 (22 mm diameter × 9.54 mm)	Knoop	19.6	1500

Coordinate Measuring Machine (CMM) Probe Performance

These SRMs are suitable for use with ANSI/ASME B89.4.1.

SRM	Description	Unit Size
2084	Tungsten Carbide Sphere	10 mm diameter (stem mounted with stand)
2084R	Tungsten Carbide Sphere	10 mm diameter (stem mounted)
2085	Stainless Steel Sphere	25 mm diameter (stem mounted)

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 ^{1/2})	No. of Specimens
2100	Silicon Nitride Flexure Specimens	4.57	5

Magnetic Moment Standards

SRM	Description	Certified Property	Unit Size
762	Nickel Disk	Specific Magnetization	disk: 6 mm diameter × 0.13 mm
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 Trace Elements In Food and Dairy Products
- 9 Wheat Hardness
- 10 Nutrition Composition
- 11 Trace Elements in Botanicals
- 11 Fertilizers
- 11 Whole Biomass Feedstock





Trace Elements in Food and Dairy Products



FOOD & AGRICULTURE

SRM	Description	Unit Size (g)
1577b	Bovine Liver	50
RM 8414*	Bovine Muscle Powder	50
RM 8413*	Corn Kernel	47
RM 8412*	Corn Stalk	34
RM 8436*	Durum Wheat Flour	50
RM 8437*	Hard Red Spring Wheat Flour	50
1549	Non-fat Milk Powder	100
1566b	Oyster Tissue	25
1568a	Rice Flour	80
RM 8438*	Soft Winter Wheat Flour	50
1570a	Spinach Leaves	60
1548a	Typical Diet	2 × 6.5 g
1567a	Wheat Flour	80

* Developed by Agriculture Canada in cooperation with NIST

Wheat Hardness

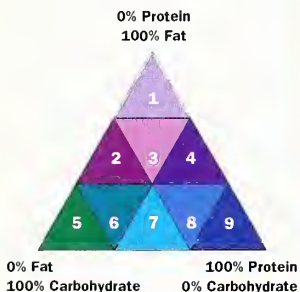
Unit Size: 50 × 20 g

RM	Description	Wheat Numbers
8441*	Wheat Hardness	Hard-1 through Hard-5 Soft-1 through Soft-5

Nutrition Composition

Please visit our website to view the relevant certificate or report of investigation for available certified and non-certified values.

NIST Food-Matrix SRMs and RMs



1. SRM 1563
2. SRM 2384
3. SRM 2387*
4. SRM 1546
RM 8415
5. SRM 2383
RM 8432
RM 8433
RM 8436
6. SRM 1846
RM 8435
SRM 1548a
SRM 1544
7. SRM 1566b
SRM 1570a
SRM 2385*
9. SRM 1946*
SRM 1947*
SRM 1974a
RM 8418

* In prep

SRM	Description	Certified Constituents**	Unit Size (g)
1544	Fatty Acids and Cholesterol in Frozen Diet Composite	Cholesterol, Fatty Acids, Proximates	4 × 15 g
1546	Meat Homogenate	Cholesterol, Fatty Acids, Proximates, Vitamins, Minerals	4 × 85 g
1548a	Typical Diet	Proximates, Trace Elements, Total Dietary Fiber	2 × 6.5 g
1563	Cholesterol and Fat-Soluble Vitamins in Coconut Oil	Cholesterol, Ergocalciferol, dl-α-Tocopheryl Acetate	10 ampoules: 5 fortified, 5 natural
1589a	PCBs, Pesticides, and Dioxins/ Furans in Human Serum	Cholesterol, Triglycerides	5 × 10 mL
1845	Whole Egg Powder	Cholesterol	35
1846	Infant Formula (milk-based)	Minerals, Proximates, Vitamins, Fatty Acids	10 × 30 g
2383	Baby Food Composite	Carotenoids, Cholesterol, Minerals, Proximates, Vitamins	4 × 70 g
RM 8415*	Whole Egg Powder	Fatty Acids, Minerals, Proximates, Vitamins	35
RM 8418*	Wheat Gluten	Fatty Acids, Minerals, Proximates, Vitamins	50
RM 8432*	Corn Starch	Fatty Acids, Minerals, Proximates, Vitamins	50
RM 8433*	Corn Bran	Fatty Acids, Minerals, Proximates, Vitamins	50
RM 8435*	Whole Milk Powder	Fatty Acids, Minerals, Proximates, Vitamins	40
RM 8436*	Durum Wheat Flour	Fatty Acids, Minerals, Proximates, Vitamins	50
1570a	Spinach Leaves	Fatty Acids, Trace Elements, Proximates, Total Dietary Fibers	60
2384	Baking Chocolate	Fat, Fatty Acids, Calcium, Iron, Caffeine, Theobromine, Catechins	5 × 91 g
1566b	Oyster Tissue	Fatty Acids, Nitrogen, Proximates, Total Dietary Fiber, Trace Elements, Mercury, Methylmercury	25
1974a	Organics in Mussel Tissue (<i>Mytilus Edulis</i>)	Selected Proximate	3 × 15 g

* Developed by Agriculture Canada in cooperation with NIST

** Proximates are provided as reference values.





Trace Elements in Botanicals

SRM	Description	Unit Size (g)
1515	Apple Leaves	50
1547	Peach Leaves	50
1570a	Spinach Leaves	60
1575a	Pine Needles	50
1573a	Tomato Leaves	50
2695*	Fluoride in Vegetation	2 × 25 g
RM 8412	Corn Stalk (Zea Mays)	34
RM 8413	Corn Kernel (Zea Mays)	47



* Developed in cooperation with Aluminum Association, Inc.

Fertilizers

Unit Size: 90 g

SRM	Description	Certified Constituents
120c	Phosphate Rock (Florida)	Minerals
193	Potassium Nitrate	N, K
194	Ammonium Dihydrogen Phosphate	N, P
200a	Potassium Dihydrogen Phosphate	K, P
694	Phosphate Rock (Western)	Minerals

Whole Biomass Feedstock*

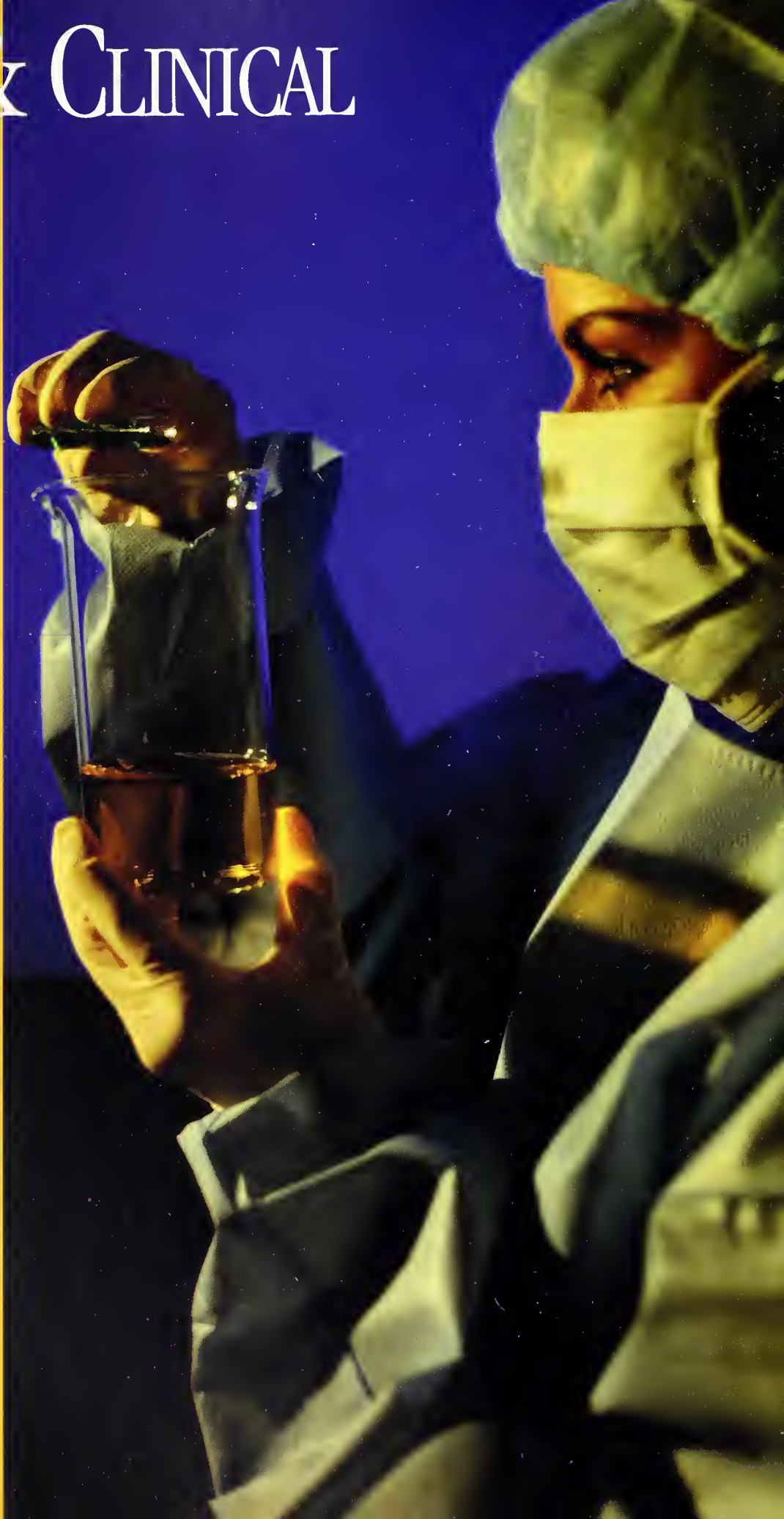
Unit Size: 5 × 10 g

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

* Developed by the International Energy Agency (IEA) Biomass Annex, NREL, and NIST

HEALTH & CLINICAL

- 13 Pure, Crystalline Standards**
- 13 Biological Buffer Systems**
- 14 Human Serum**
- 15 Bovine Serum**
- 15 Ethanol Solutions**
- 16 DNA Profiling**
- 16 Biomaterials**
- 17 Drugs of Abuse in Urine**
- 17 Toxic Substances in Urine**
- 17 Miscellaneous Health-Related Standards**





Pure, Crystalline Standards

SRM	Description	Purity (%)	Unit Size (g)
938	4-Nitrophenol	(99.75)*	15
998	Angiotensin I (Human)	94.1	0.5
916a	Bilirubin	98.3	0.1
915a	Calcium Carbonate	99.9	20
911b	Cholesterol	99.8	2
921	Cortisol (Hydrocortisone)	98.9	1
914a	Creatinine	99.7	10
917b	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	99.867	30
929	Magnesium Gluconate Dihydrate	5.403 Mg	5
918a	Potassium Chloride	99.9817	30
919a	Sodium Chloride	99.89	30
910	Sodium Pyruvate	98.7	25
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

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

Biological Buffer Systems

Unit Size: 60 grams

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	MOPS Free Acid	6.699*	6.694*
2184	NaMOPSOate		

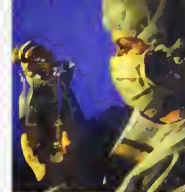


*This pH results only when the two SRMs listed are used as an admixture in solution.

Human Serum



SRM	Description	Certified Constituents	Reference Values Constituents	Form	No. of Levels
1599	Anticonvulsant Drug Level Assay (Valproic Acid and Carbamazepine)	PCB Congeners (16), Chlorinated Pesticides (5), Total Cholesterol	PCB Congeners (9), Chlorinated Pesticides (5), Total Cholesterol, Triglycerides, "Free" Cholesterol, Phospholipids	Lyophilized	1
900	Antiepilepsy Drug Level Assay	Antiepileptics (4)	—	Lyophilized	3
970	Ascorbic Acid in Frozen Human Serum	Total Ascorbic Acid	—	Frozen	2
1952a	Cholesterol in Human Serum	Cholesterol	—	Lyophilized	3
956a	Electrolytes in Frozen Human Serum	Total Ca, Li, Mg, K, Na	Ionized Ca, Cl	Frozen	3
968c	Fat-Soluble Vitamins, Carotenoids, and Cholesterol in Human Serum	Vitamins (4), Cholesterol, Carotenoids (4)	Carotenoids (8), Vitamin D	Lyophilized	2
965	Glucose in Human Serum	Glucose	—	Frozen	3
909b	Human Serum	Organics (6), Inorganics (6)	Bilirubin	Lyophilized	2
1951a	Lipids in Frozen	Total Cholesterol, Total Glycerides Triglycerides	HDL-, LDL-, and Total Cholesterol, Triglycerides, Free Glycerol		
1589a	PCBs, Pesticides, Dioxins/Furans in Serum	PCB Congeners (16), Chlorinated Pesticides (5), Total Cholesterol	PCB Congeners (9), Chlorinated Pesticides (5), Total Cholesterol (5), Triglycerides, "Free" Cholesterol, Phospholipids	Lyophilized	1



Bovine Serum

SRM	Description	Certified Constituents	Reference Constituents	Form	No. of Levels
927c	Bovine Serum Albumin (7 % Solution)	Protein Concentration	—	Solution	1
1598	Inorganic Constituents in Bovine Serum	Elements (13)	—	Frozen	1
955b	Lead in Bovine Blood	Pb	—	Frozen	4
966	Toxic Elements in Bovine Blood	Pb, Cd	Pb, Cd, Total Hg, Inorganic Hg	Frozen	2

Ethanol Solutions

This SRM is for use in the calibration of instruments and techniques for the determination of ethanol (ethyl alcohol) in breath and blood.

SRM	Description	Ethanol Mass Fraction (%)	Unit Size
1828a	Ethanol - Water Solutions (Set: 5 ampoules)	95.60	1 × 20 mL
		1.9957	2 × 20 mL
		0.09480	1 × 5 mL
		0.02186	1 × 5 mL



DNA Profiling

SRMs 2390, and 2391a are intended for use in the standardization of forensic and paternity quality assurance procedures and instructional law enforcement or non-clinical research purposes. SRM 2392 is intended to provide quality control when performing the polymerase chain reaction (PCR) and sequencing of human mitochondrial DNA (mtDNA) for forensic identifications, medical diagnosis, or mutation detection. It may also be used as a control when amplifying (PCR) and sequencing any DNA.



SRM	Description	Unit Size
2390	DNA Profiling Standard - RFLP	20 components
2391b	PCR-Based DNA Profiling Standard	12 components
2392	Mitochondrial DNA Sequencing (Human)	3 components



Biomaterials

SRM	Description	Certified Properties	Reference Properties	Unit Size
2910	Calcium Hydroxyapatite	Calcium Phosphorus Ca/P Molar Ratio Specific Surface Area Solubility Product		5 g (powder)
RM 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)



Drugs of Abuse in Human Hair

SRM	Description	Certified Constituents
2379	Drugs of Abuse in Human Hair I	6
2380	Drugs of Abuse in Human Hair II	4

Drugs of Abuse in Urine

SRM	Description	Certified Constituents	Reference Constituent	Form	Unit Size
1508	Cocaine Metabolites 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 Metabolites in Urine	TH-9-COOH		Lyophilized	3 levels, plus 1 blank
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

Toxic Substances in Urine



SRM	Description	No. of Levels	Unit Size
2671a	Fluoride	2	4 × 20 mL
2672a	Mercury	2	4 × 20 mL

Miscellaneous Health-Related Materials

SRM	Description	Certified Constituents	Form	Unit Size
2389	Amino Acids in 0.1 mol/L HCl	Amino Acids (17)	Solution	5 ampoules
1400	Bone Ash	Elements (8)	Powdered	50 g
1486	Bone Meal	Elements (8)	Powdered	50 g

ENVIRONMENTAL

19 Organics

23 Inorganics

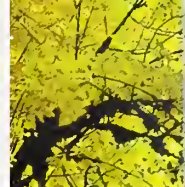
28 Fossil Fuels

32 Geological Materials and Ores

35 Microanalysis

36 Engine Wear Materials





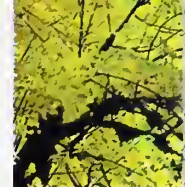
ORGANICS

Gas Chromatography/Mass Spectrometry (GC/MS) and Characterizing Liquid Chromatography (LC) System Performance

SRM	Description	Certified Constituents	Solvent	No. of Levels	Unit Size
1543	GC/MS System	Methyl Stearate, Benzophenone	Hexane	2	4 × 1 mL
RM 8443	Consists of 5 units of SRM 1543				
877	LC Chiral Selectivity	various Chiral components	Ethanol	—	5 × 1 mL
870	LC Performance	Silanol Activity, Trace Metal Activity, Hydrophobic Retention, Methylene Selectivity	Methanol	1	5 × 1 mL
869a	LC Selectivity	Shape Selectivity: PAHs (3)	Acetonitrile	1	5 × 1 mL

Organic Contaminant Calibration Solutions

SRM	Description	Certified Constituents	Non-Certified Constituents	Unit Size
RM 8467	4,4'-DDE (neat)	—	—	Vial: 100 mg
RM 8469	4,4'-DDT (neat)	—	—	Vial: 100 mg
RM 8466	g-HCH (Lindane) (neat)	—	—	Vial: 100 mg
1491	Aromatic Hydrocarbons in Hexane/Toluene	PAHs (23)	PAHs (1)	5 ampoules
2260	Aromatic Hydrocarbons in Toluene	PAHs (23)	PAHs (1)	5 ampoules
1493	Chlorinated Biphenyl Congeners in 2,2,4-Trimethylpentane	PCBs (18)	PCBs (2)	5 ampoules
2262	Chlorinated Biphenyl Congeners in 2,2,4-Trimethylpentane	PCBs (25)	PCBs (4)	5 ampoules
2275	Chlorinated Pesticide Solution-II	Pesticides (9)	—	5 ampoules
1492	Chlorinated Pesticides in Hexane	Pesticides (15)	—	5 ampoules
2261	Chlorinated Pesticides in Hexane	Pesticides (15)	—	5 ampoules
2273	DDTs and Metabolites in Solution	DDTs, Metabolites (7)	5 ampoules	
1596	Dinitropyrene Isomers and 1-Nitropyrene in Methylene Chloride	Nitro-PAHs (4)	—	5 ampoules
1614	Dioxin (2,3,7,8-TCDD) in Iso-octane	Dioxins (2)	Dioxins (2)	6 ampoules
1639	Halocarbons (in Methanol) for Water Analysis	Halocarbons (7)	—	5 ampoules
1586	Isotopically Labeled and Unlabeled Priority Pollutants in Methanol	Priority pollutants (10)	—	6 ampoules
1587	Nitrated PAHs in Methanol	Nitro-PAHs (6)	Nitro-PAHs (1)	4 ampoules
2274	PCB Congener Solution-II	PCBs (11)	—	5 ampoules
2269	Perdeuterated PAH-I	Perdeuterated PAHs (5)	—	5 ampoules
2270	Perdeuterated PAH-II	Perdeuterated PAHs (6)	—	5 ampoules
1647d	Priority Pollutant PAHs (in Acetonitrile)	PAHs (16)	—	5 ampoules
1584	Priority Pollutant Phenols in Methanol	Phenols (10)	Phenols (1)	5 ampoules
2276	Three Planar PCBs in Solution	PCBs (3)	—	5 ampoules



Organic Contaminants in Natural Matrix Materials

SRM	Description	Certified Constituents	Non-Certified Constituents	Unit Size
1597	Complex Mixture of PAHs from Coal Tar	PAHs (12)	PAHs/PASH/PANH (18)	4 ampoules
1975	Diesel Particulate Extract	PAHs (8)	PAHs (29), Nitro-PAHs	4 ampoules
1650	Diesel Particulate Material	PAHs (5), Nitro-PAHs (1)	PAHs (6), Nitro-PAHs (3), PAQ (1)	0.01 g
2975	Diesel Particulate Matter	PAHs (11) (Industrial Forklift)	PAHs (28), Total Extractable Mass, Particle Size Distribution	1 g
2978	Mussel Tissue (Organic Contaminants - Raritan Bay, NJ)	PAHs (7), PCB Congeners (22), Pesticides (12)	PAHs (20), PCBs (2)	10 g
2977	Mussel Tissue	PAHs (14), PCB Congeners (25), Pesticides (7), Trace Elements (6), Methylmercury	PAHs (16), Trace Elements (9)	10 g
2976	Mussel Tissue	Methylmercury, Total Mercury, Trace Elements (7)	Trace elements (20)	25 g
1941b	Organics in Marine Sediment	PAHs (24), PCBs (29), Pesticides (7)	PAHs (43), PCBs (13), Pesticides (2), Tin Species (3) and Total Tin	50 g
1944	New York/New Jersey Waterway Sediment	PAHs (24), PCBs (35), Pesticides (4), Trace Elements (9)	PAHs (32), Pesticides (7), Trace Elements (20), PCDDs/PCDFs (17), Particle Size, Total Organic Carbon	50 g
1588a	Organics in Cod Liver Oil	PCBs (24), Pesticides (4)	PCDDs/PCDFs (7), PCBs (34), Pesticides (3)	5 ampoules
1974a	Organics in Mussel Tissue (<i>Mytilus Edulis</i>) (Frozen)	PAHs (15), PCBs (20), Pesticides (7), Total Mercury, Methylmercury	Aliphatics (16), Trace Elements (32), PAHs (18), PCBs (4), Pesticides (4), Proximates, Calories	3 × 15 g
1580	Organics in Shale Oil	PAHs (5), Phenols (3), PANH (1)	Phenols (6), PANH (1)	5 ampoules
1945	Organics in Whale Blubber (Frozen)	PCBs (27), Pesticides (15)	PCBs (2), Pesticides (2)	2 bottles
1589a	PCBs, Pesticides, and Dioxins/Furans in Human Serum	PCBs Congeners (16), Pesticides (5), Total Cholesterol	CDC Lipid Laboratory: PCB Congeners (9), Pesticides (5), Total Cholesterol, Triglycerides, "Free" Cholesterol, Phospholipids, PCDDs, PCDFs, non-ortho, PCBs	5 × 10 mL
1582	Petroleum Crude Oil	PAHs (5), PASH (1)	PAHs (5), Phenols (2), PANH (1)	5 ampoules
1939a	Polychlorinated Biphenyls (Congeners) in River Sediment	PCBs (20), Pesticides (3)	PCBs (4)	50 g
1649a	Urban Dust	PAHs (22), PCBs (35), Pesticides (8)	PAHs (22), Pesticide (1, Mutagenic Activity), PCDD/ PCDFs (17), Trace Elements (32), Particle size, Total Organic Carbon	2.5 g

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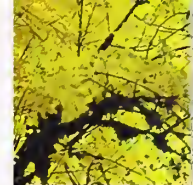
Organic Contaminants in Natural Matrix Materials (continued)

SRM	Description	Certified Constituents	Non-Certified Constituents	Unit Size
1648	Urban Particulate Matter	Trace Elements (9)	Trace Elements (25), PAH (13)	2 g

EPA: Organic Compounds Related to Water Analysis

These SRMs are intended primarily for the calibration of instrumentation and validation of methods for volatile or semi-volatile organic compound determinations. Because of its miscibility with water, each SRM can also be used to fortify aqueous samples with known amounts of the organic compound. These SRMs were developed by the NIST Analytical Chemistry Division (ACD) primarily to support the Chemical Calibration Providers of the Proficiency Testing Program with support by the U.S. Environmental Protection Agency (EPA).

SRM	Description	Unit Size
3011	1,1,1-Trichloroethane in Methanol	2 × 2.5 mL
3014	1,2,3-Trichloropropane in Methanol	2 × 2.5 mL
3012	1,2-Dichloroethane in Methanol	2 × 2.5 mL
3009	1,2-Dichloropropane in Methanol	2 × 2.5 mL
3000	Benzene in Methanol	2 × 2.5 mL
3006	Carbon Tetrachloride in Methanol	2 × 2.5 mL
3002	Ethylbenzene in Methanol	2 × 2.5 mL
3015	Isopropylbenzene in Methanol	2 × 2.5 mL
3008	Methylene Chloride in Methanol	2 × 2.5 mL
3004	m-Xylene in Methanol	2 × 2.5 mL
3003	c-Xylene in Methanol	2 × 2.5 mL
3005	p-Xylene in Methanol	2 × 2.5 mL
3016	sec-Butylbenzene in Methanol	2 × 2.5 mL
3010	Tetrachloroethene (Tetrachloroethylene) in Methanol	2 × 2.5 mL
3001	Toluene in Methanol	2 × 2.5 mL
3007	Vinylidene in Methanol	2 × 2.5 mL
3074	Adipate and Phthalates Methanol	In Prep
3075	Aroclor 1016 in Transformer Oil	5 × 1.2 mL
3076	Aroclor 1232 in Transformer Oil	5 × 1.2 mL
3078	Aroclor 1248 in Transformer Oil	5 × 1.2 mL
3079	Aroclor 1254 in Transformer Oil	5 × 1.2 mL
3080	Aroclor 1260 in Transformer Oil	5 × 1.2 mL
3090	Aroclors in Transformer Oil (set SRMs 3075-3080)	6 × 1.2 mL



INORGANICS

Metal Constituents in Natural Matrices: Air Particulate, Indoor Dust, Sediment, Mine Waste, Sludge, Soil, and Water

SRM	Description	Elements	Unit Size
Air Particulate			
2783	Air Particulate on Filter Media	18 certified 9 reference	2 filters, plus 2 blanks
1648	Urban Particulate Matter	15 certified	2 g
Indoor Dust, Trace Elements in			
2583	Nominal 90 mg/kg Lead	5 certified	8 g
2584	Nominal 1 % Lead	5 certified 10 reference	8 g
Sediment			
RM 8704	Buffalo River Sediment	25 reference	50 g
1646a	Estuarine Sediment	20 certified	70 g
1944	New York/New Jersey Waterway Sediment	72 certified 78 reference	50 g
2702	Marine Sediment	25 certified 8 reference	50 g
Mine Waste and Sludge			
2780	Hard Rock Mine Waste	12 certified 7 reference	50 g
2781	Domestic Sludge	10 certified	40 g
2782	Industrial Sludge	10 certified 16 reference	70 g
Soil, Trace Elements in			
2710	Montana Soil Highly Elevated Trace Element Concentrations	21 certified	50 g
2711	Montana Soil Moderately Elevated Trace Element Concentrations	24 certified	50 g
2709	San Joaquin Soil	26 certified	50 g
2586	Nominal 500 mg/kg Lead	4 certified 18 reference	8 g
2587	Nominal 3000 mg/kg Lead	4 certified 14 reference	8 g
2780	Hard Rock Mine Waste	12 certified 7 reference	50 g
Water			
1641d	Mercury in Water	1 certified	10 × 10 mL
1640	Natural Water	17 certified 10 reference	250 mL
1643e	Trace Elements in Water (In Prep)	—	250 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	

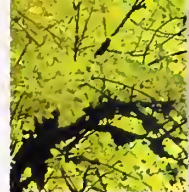


Primary Gas Mixtures

These SRMs are supplied in a DOT 3AL specification aluminum (6061 alloy) cylinder with a nominal pressure exceeding 12.4 MPa that provides the user with approximately 0.73 m³ of usable mixture.

SRM	Nominal Amount-of-Substance (μmol/mol)
Ambient Non-Methane Organics in Nitrogen (15 components in large cylinder)	
1800	5 nmol/mol
Carbon Dioxide in Air (Certified for CO₂)	
1671a	340
1672a	350
1676	365

(continued)



Primary Gas Mixtures (continued)

SRM	Nominal Amount of Substance Fraction ($\mu\text{mol/mol}$)
Carbon Monoxide in Air (Certified for CO)	
2612a	10
2613a	20
2614a	45
Carbon Dioxide in Nitrogen (Certified for CO₂)	
1674b*	7 mol %
1675b*	14 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 %
2626a	4.0 mol %
2745*	16 mol %
Carbon Monoxide in Nitrogen (Certified for CO)	
1677c*	10
1678c*	50
1679c*	100
1680b*	500
1681b*	1000
2635a*	25
2636a*	250
2637a*	2500
2638a*	5000
2639a	1 mol %
2640a	2 mol %
2641a	4 mol %
2642a*	8 mol %

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

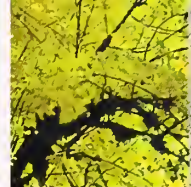
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Primary Gas Mixtures (continued)

SRM	Nominal Amount of Substance Fraction ($\mu\text{mol/mol}$)
Carbon Monoxide in Nitrogen (Certified for CO) continued	
2740a	10 mol %
2741a	13 mol %
Hydrogen Sulfide in Nitrogen (Certified for H ₂ S)	
2730	5
2731	20
Methane in Air (Certified for CH ₄)	
1658a	1
1659a	10
1660a (also certified for C ₃ H ₈)	4 (methane) 1 (propane)
2750	50
2751	100
Nitric Oxide in Nitrogen (Certified for NO)	
1683b*	50
1684b*	100
1685b*	250
1686b*	500
1687b*	1000
2629a*	20
2630*	1500
2631a*	3000
2735	800
2736a	2000
Oxides of Nitrogen in Air (Certified for NO _x)	
2660a*	100

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

(continued)



Primary Gas Mixtures (continued)

SRM	Nominal Amount of substance Fraction ($\mu\text{mol/mol}$)
Oxygen in Nitrogen (Certified for O_2)	
2657a*	2 mol %
2658a*	10 mol %
2659a*	21 mol %
Propane in Air (Certified for CH_4)	
1660a (also certified for C_3H_8)	4 (methane) 1 (propane)
1665b	3
1666b	10
1667b	50
1668b*	100
1669b	500
2764	0.25
Propane in Nitrogen (Certified for C_3H_8)	
2643a	100
2644a	250
2645a	500
2646a	1000
2647a	2500
2648a	5000
Sulfur Dioxide in Nitrogen (Certified for SO_2)	
1661a*	500
1662a*	1000
1663a*	1500
1664a*	2500
1693a*	50
1694a*	100
1696a*	3500

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

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

FOSSIL FUELS

Metal Constituents in Fossil Fuels

SRM	Pb Concentration	Unit Size
2713	Lead in Reference Fuels (19.4 µg/g Pb)	6 × 20 mL
2714	Lead in Reference Fuels (28.1 µg/g Pb)	6 × 20 mL
1634c	Trace Elements in Fuel Oil "No. 6" (As, Co, Ni, Pb, S, Se, V)	100 mL
RM 8505	Vanadium in Crude Oil	250 mL

High Purity Liquids for Fuel Rating

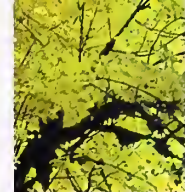
Unit Size: 100 mL

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



Trace Elements in Coals and Coke

SRM	Description	Unit Size (g)
2719	Calcined Petroleum Coke	50
1632c	Coal (Bituminous)	50
1635	Coal (Subbituminous)	75
1633b	Coal Fly Ash	75
2689	Coal Fly Ash	3 × 10 g
2690	Coal Fly Ash	3 × 10 g
2691	Coal Fly Ash	3 × 10 g
2718	Green Petroleum Coke	50



Alcohols and Ethers [Oxygenates] in Reference Fuels



SRM	Description	Constituents	Unit Size
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Alcohols in Gasoline

1829	Alcohols (t-Butanol, Ethanol, Methanol)	4 certified	6 × 20 mL
1838	Ethanol	1 certified	5 × 20 mL
2286	Ethanol	2 certified	3 × 20 mL
2287	Ethanol	2 certified	3 × 20 mL
1839	Methanol	1 certified	5 × 20 mL
1837	Methanol	2 certified	5 × 20 mL

Ethers in Gasoline

Unit Size: 3 × 20 mL

2288	t-Amyl Methyl Ether	2 certified
2289	t-Amyl Methyl Ether	2 certified
2290	Ethyl t-Butyl Ether ETBE	2 certified
2291	Ethyl t-Butyl Ether ETBE	2 certified
2292	Methyl t-Butyl Ether MTBE	2 certified
2293	Methyl t-Butyl Ether MTBE	2 certified

Ethers and Ethanol in Reformulated Gasoline

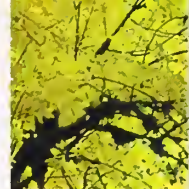
Unit Size: 2 × 20 mL

2294	11 % MTBE	4 certified 26 reference
2295	15 % MTBE	4 certified 26 reference
2296	13 % ETBE	4 certified 26 reference
2297	10 % Ethanol	4 certified 26 reference

Sulfur in Fossil Fuels

SRM	Description	% S
Coke Foundry		
<i>Unit Size: 50 g</i>		
2775	Foundry Coke	0.5816
2776	Foundry Coke	0.825
Diesel Fuel Oil		
<i>Unit Size: 10 × 10 mL</i>		
2723a	Sulfur in Diesel Fuel Oil	0.00108
2724b	Sulfur in Diesel Fuel Oil	0.04304
Gasolines		
2294	Reformulated Gasoline (nominal 11 % MTBE) (2 × 20 mL)	0.00409
2295	Reformulated Gasoline (nominal 15 % MTBE) (2 × 20 mL)	0.0308
2296	Reformulated Gasoline (nominal 13 % ETBE) (2 × 20 mL)	0.00400
2297	Reformulated Gasoline (nominal 10 % Ethanol) (2 × 20 mL)	0.03037
2298	Reformulated Gasoline (5 × 20 mL)	0.00047
2299	Gasoline (High Octane) (5 × 20 mL)	0.00136
Kerosine		
<i>Unit Size: 100 mL</i>		
1616a	Sulfur in Kerosine	0.01462
1617a	Sulfur in Kerosine	0.17307
Petroleum Coke		
<i>Unit Size: 50 g</i>		
2719	Trace Elements in Calcined Petroleum Coke	0.8877
2718	Trace Elements in Green Petroleum Coke	4.7032



**Sulfur in Fossil Fuels (continued)****Residual Fuel Oil***Unit Size: 100 mL*

1619b	Sulfur in Residual Fuel Oil	0.6960
1620c	Sulfur in Residual Fuel Oil	4.561
1621e	Sulfur in Residual Fuel Oil	0.9480
1622e	Sulfur in Residual Fuel Oil	2.1468
1623c	Sulfur in Residual Fuel Oil	0.3806
2717a	Sulfur in Residual Fuel Oil	2.9957

SRM	Description	% S	Hg ($\mu\text{g/kg}$)
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Crude Oil*Unit Size: 5 \times 10 mL*

2721	Crude Oil	1.5832	0.0525
2722	Crude Oil	0.21037	0.1441

Coals*Unit Size: 50 g (unless otherwise noted)*

2683b	Sulfur and Mercury in Coal	1.955	90.0
2684b	Sulfur and Mercury in Coal	3.076	97.4
2685b	Sulfur and Mercury in Coal	4.730	146.2
2692b	Sulfur and Mercury in Coal	1.170	133.3
2682b	Sulfur and Mercury in Coal (Subbituminous)	0.4917	108.8
1632c	Trace Elements in Coal Bituminous	1.462	93.8
1635	Trace Elements in Coal (Subbituminous) (75 g)	0.3616	10.9

Moisture in Oils and Alcohols

SRM	Description	Unit Size (mL)
RM 8509	Methanol	5 mL
RM 8507	Mineral Oil	10 mL
RM 8510	Moisture in Methanol	5 mL
RM 8506a	Transformer Oil	5 \times 9.5 mL
2890	Water Saturated 1-Octanol	5 \times 2 mL

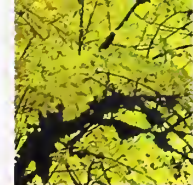
GEOLOGICAL MATERIALS AND ORES

Ores

MINING



SRM	Description	Unit Size (g)
699	Alumina (Reduction Grade)	60
69b	Bauxite, Arkansas	60
697	Bauxite, Dominican	60
698	Bauxite, Jamaican	60
696	Bauxite, Surinam	60
1835	Borate Ore	60
330	Copper Ore Mill Heads	100
331	Copper Ore Mill Tails	100
79a	Fluorspar, Customs Grade	120
180	Fluorspar, High Grade	120
886	Gold Ore, Refractory	200
670	Iron Ore, Canada	90
690	Iron Ore, Canada	100
692	Iron Ore, Labrador	100
693	Iron Ore, Nimba	100
691	Iron Oxide, Reduced	100
182	Lithium Ore (Petalite)	45
181	Lithium Ore (Spodumene)	45
183	Lithium Ore (Lepidolite)	45
25d	Manganese Ore	60
120c	Phosphate Rock, Florida	90
694	Phosphate Rock, Western	90
600	Rutile Ore	90
2430	Scheelite Ore	100
277	Tungsten Concentrate	45
113b	Zinc Concentrate	100



Ore Bioleaching Substrate

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

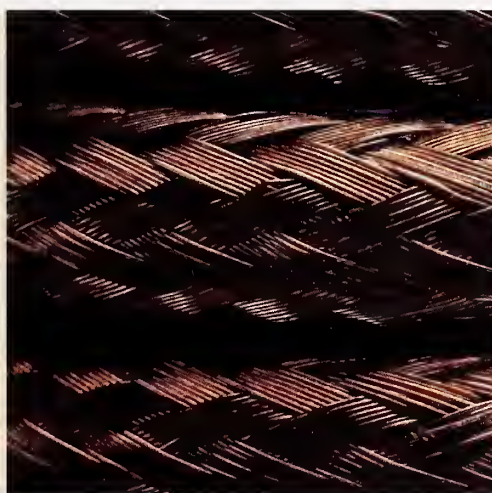
RM	Description	Unit Size (g)
8455	Pyrite Ore	100

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
8600	Copper
8601	Copper
8602	Lead
8603	Lead
8605	Molybdenum
8606	Molybdenum
8607	Tungsten
8608	Tungsten
8604	Zinc



COPPER WIRE

Clays

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

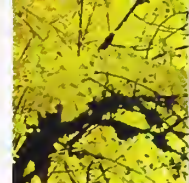
Rocks and Minerals

SRM	Description	Unit Size (g)
688	Basalt Rock	60
70a	Feldspar, Potash	40
99a	Feldspar, Soda	40
81a	Glass Sand	75
165a	Glass Sand (Low Iron)	75
1413	Glass Sand (High Alumina)	75
1c	Limestone, Argillaceous	50
88b	Limestone, Dolomite	75
278	Obsidian Rock	35



Refractories

SRM	Description	Unit Size (g)
76a	Burnt Refractory (Al ₂ O ₃ -40 %)	75
77a	Burnt Refractory (Al ₂ O ₃ -60 %)	75
78a	Burnt Refractory (Al ₂ O ₃ -70 %)	75
198	Silica Brick	45
199	Silica Brick	45
154c	Titanium Dioxide	90



MICROANALYSIS

Metals

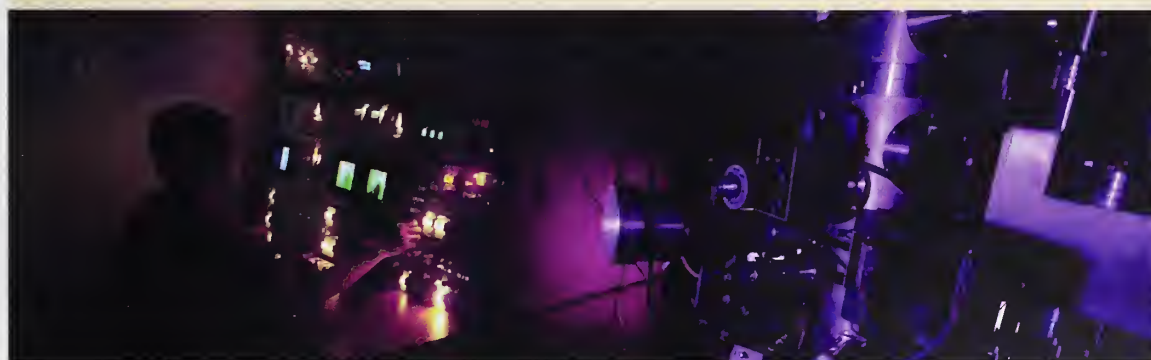
SRM	Description	Unit Size
482	Gold-Copper Wires for Microprobe Analysis	wires: 6
481	Gold-Silver Wires for Microprobe Analysis	wires: 6
480	Tungsten-20 % Molybdenum Alloy Electron Microprobe Standard	rod: 1

Synthetic Glasses

SRM	Description	Unit Size
1873	Barium-Zinc-Silicate Glasses for Microanalysis (K-458, K-489, K-963)	rod: 2 mm × 2 mm × 20 mm
2066	Glass Microspheres (K-411)	glass microspheres: 50 mg
1872	Lead-Germanate Glasses for Microanalysis (K-453, K-491, K968)	rod: 2 mm × 2 mm × 20 mm

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



ELECTRON MICROSCOPE

ENGINE WEAR MATERIALS

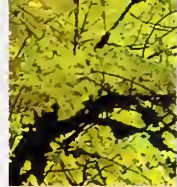
Metallo-Organic Compounds

Unit Size: 5 g

These SRMs are for preparing solutions in oils of known and reproducible concentrations of metals.

SRM	Description	Elemental Composition
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
1059c	Lead Cyclohexanebutyrate	37.5 Pb
1060a	Lithium Cyclohexanebutyrate	4.1 Li
1065b	Nickel Cyclohexanebutyrate	13.89 Ni
1066a	Octaphenylcyclotetrasiloxane	14.14 Si
1077a	Silver 2-Ethylhexanoate	42.60 Ag
1069b	Sodium Cyclohexanebutyrate	12.0 Na
1070a	Strontium Cyclohexanebutyrate	20.7 Sr
1071b	Triphenyl Phosphate	9.48 P
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





Lubricating Base Oils

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
1836	Total Nitrogen	9.0	50.9	113.3	166.2	
1819a	Total Sulfur	423.5	741.1	4022	4689	6135

Catalyst Characterization Material

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

RM	Description	Unit Size
8590	High Sulfur Gas Oil Feed	946 mL

Wear-Metals in Oil

SRM	Description	Unit Size
1848	Lubricating Oil Additive Package	100 mL
1084a	Wear-Metals	5 × 1.6 g
1085b	Wear-Metals	5 × 1.2 g
1083	Wear-Metals (Base Oil)	150 mL

HIGH PURITY MATERIALS

39 Elemental Composition in High Purity Metals

40 Fine Gold Standards

40 Stoichiometric Standards

41 Microchemistry

42 Spectrometric Single Element Solutions

44 Anion Chromatography Solutions

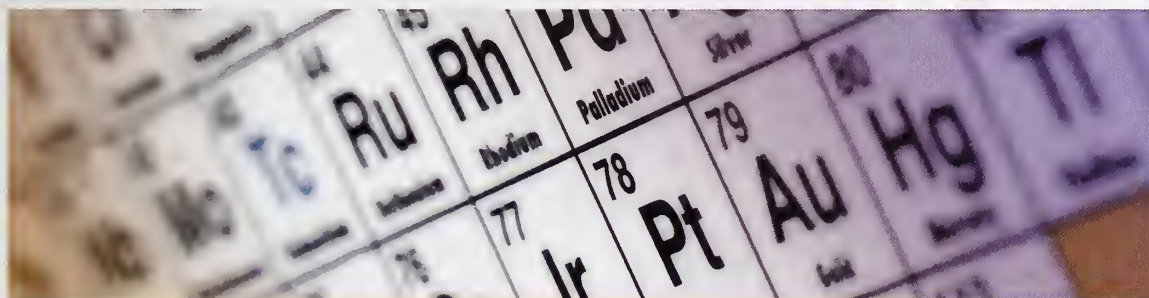
44 Stable Isotopic Materials

45 Light Stable Isotopic Materials





Elemental Composition in High Purity Metals



SRM	Description	Unit Size	
685R	High Purity Gold	rod:	5.9 mm diameter × 25 mm
685W	High Purity Gold	wire:	1.4 mm diameter × 102 mm
680a(L1)	High Purity Platinum	wire:	0.51 mm diameter × 10 cm
680a(L2)	High Purity Platinum	wire:	0.51 mm diameter × 1 m
682	High Purity Zinc	semicirc:	57 mm
885	Refined Copper	pin:	200 g
726	Selenium, Intermediate Purity	shot:	450 g
683	Zinc Metal	semicirc:	57 mm
728	Zinc, Intermediate Purity	shot:	450 g

Fine Gold Standards

These RMs are a series of fine gold and gold bullion products developed and certified by the Royal Canadian Mint (RCM), Ottawa, Canada and distributed by NIST. The fine gold RMs are primarily intended for use as calibration standards for the determination of trace elements by solid sample spectrometric methods; the gold bullion RMs are primarily intended for use as quality control check standards for fire assay. There are five sets of RMs in the gold bullion series (RMs 8068-8082) available in three forms: disc (25 mm diameter \times 20 mm); wire (2 mm diameter); and foil (35 mm \times 40 mm \times 1 mm). There are six sets of RMs in the fine gold series (RMs 8050-8067) available in three forms: block (25 mm \times 25 mm \times 2.5 mm); wire (2 mm diameter); and turnings (25 g).

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+ %)
- Working Standard: a commercially available substance of purity $100\% \pm 0.05\%$ (Purity 99.95+ %)
- Secondary Standard: a substance of lower purity which can be standardized against a primary grade standard

SRM	Description	Certified Use	Stoichiometric Purity (%)	Unit Size (g)
951	Boric Acid	Acidimetric and Boron Isotopic Value	100.00	100
84k	Potassium Hydrogen Phthalate	Acidimetric Standard	99.9911	60
350a	Benzoic Acid	Acidimetric Standard	99.9958	30
351	Sodium Carbonate	Acidimetric Standard	99.9796	50
723d	Tris(hydroxymethyl)aminomethane In Prep	Acidimetric Standard	—	—
987	Strontium Carbonate	Assay and Isotopic Values	99.98	1
999a	Potassium Chloride	Assay Values for: 1. Potassium Chloride 2. Potassium 3. Chloride	99.9817 52.4354 47.5463	60
136e	Potassium Dichromate	Oxidimetric Standard	99.984	60
17e	Sucrose	Polarimetric Standard	99.950	60
917b	D-Glucose (Dextrose)	Polarimetric Standard	99.7	50
40h	Sodium Oxalate	Reductometric Standard	99.972	60
83d	Arsenic Trioxide	Reductometric Standard	99.9926	60

Microchemistry

Unit Size: 2 g



SRM	Description	Certified Component
141d	Acetanilide	C, H, N, O
142	Anisic Acid	CH ₃ O-
143d	Cystine	C, H, N, S, O
2144	m-Chlorobenzoic Acid	Cl
148	Nicotinic Acid	C, H, N
2143	p-Fluorobenzoic Acid	F
2141	Urea	N

HIGH PURITY MATERIALS

Spectrometric Single Element Solutions

Unit Size: 50 mL

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

SRM	Element	Nominal Acid Concentration
3101a	Aluminum	HNO ₃ 10 %
3102a	Antimony	HNO ₃ 10 % + HF 2 %
3103a	Arsenic	HNO ₃ 15 %
3104a	Barium	HNO ₃ 1 %
3105a	Beryllium	HNO ₃ 10 %
3106	Bismuth	HNO ₃ 10 %
3107	Boron	H ₂ O
3108	Cadmium	HNO ₃ 10 %
3109a	Calcium	HNO ₃ 10 %
3110	Cerium	HNO ₃ 10 %
3111a	Cesium	HNO ₃ 1 %
3112a	Chromium	HNO ₃ 10 %
3113	Cobalt	HNO ₃ 10 %
3114	Copper	HNO ₃ 10 %
3115a	Dysprosium	HNO ₃ 10 %
3116a	Erbium	HNO ₃ 10 %
3117a	Europium	HNO ₃ 16 %
3118a	Gadolinium	HNO ₃ 10 %
3119a	Gallium	HNO ₃ 10 %
3120a	Germanium	HNO ₃ 10 % + HF 2 %
3121	Gold	HNO ₃ 5 % + HF 2 %
3122	Hafnium	HNO ₃ 10% + HF 2%
3123a	Holmium	HNO ₃ 16 %
3124a	Indium	HNO ₃ 10 %
3126a	Iron	HNO ₃ 10 %
3127a	Lanthanum	HNO ₃ 10 %
3128	Lead	HNO ₃ 10 %
3129a	Lithium	HNO ₃ 1 %
3130a	Lutetium	HNO ₃ 10 %
3131a	Magnesium	HNO ₃ 10 %
3132	Manganese	HNO ₃ 10 %

(continued)



Spectrometric Single Element Solutions (continued)

SRM	Element	Nominal Acid Concentration
3133	Mercury	HNO ₃ 10 %
3134	Molybdenum	HCl 10 %
3135a	Neodymium	HNO ₃ 10 %
3136	Nickel	HNO ₃ 10 %
3137	Niobium	HNO ₃ 10 % + HF 2 %
3138	Palladium	HCl 10 %
3139a	Phosphorus	HNO ₃ 0.8 %
3140	Platinum	HCl 10 %
3141a	Potassium	HNO ₃ 1 %
3142a	Praseodymium	HNO ₃ 10 %
3143	Rhenium	HNO ₃ 10 %
3144	Rhodium	HCl 10 %
3145a	Rubidium	HNO ₃ 1 %
3147a	Samarium	HNO ₃ 10 %
3148a	Scandium	HNO ₃ 10 %
3149	Selenium	HNO ₃ 10 %
3150	Silicon	H ₂ O
3151	Silver	HNO ₃ 10 %
3152a	Sodium	HNO ₃ 1 %
3153a	Strontium	HNO ₃ 10 %
3154	Sulfur	H ₂ SO ₄ 0.1 %
3155	Tantalum	HNO ₃ 10 % + HF 2 %
3156	Tellurium	HCl 20 %
3157a	Terbium	HNO ₃ 16 %
3158	Thallium	HNO ₃ 10 %
3159	Thorium	HNO ₃ 10 %
3160a	Thulium	HNO ₃ 10 %
3161a	Tin	HNO ₃ 5 % + HF 2 %
3162a	Titanium	HNO ₃ 10 % + HF 2 %
3163	Tungsten	HNO ₃ 7 % + HF 4 %
3164	Uranium	HNO ₃ 10 %
3165	Vanadium	HNO ₃ 10 %
3166a	Ytterbium	HNO ₃ 16 %
3167a	Yttrium	HNO ₃ 10 %
3168a	Zinc	HNO ₃ 10 %
3169	Zirconium	HNO ₃ 10 % + HF 2 %

HIGH PURITY MATERIALS

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 of control materials.

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

Stable Isotopic Materials

SRM	Description	Chemical Form	Unit Size (g)
951	Boron Isotope Standard	Boric Acid	100
952	Enriched ^{10}B Isotope Standard	Boric Acid	0.25
975a	Chlorine Isotope Standard	Sodium Chloride	0.25
976	Copper Isotope Standard	Metal	disk: 0.4
977	Bromine Isotope Standard	Sodium Bromide	0.25
978a	Silver Isotope Standard	Silver Nitrate	0.25
979	Chromium Isotope Standard	Chromium Nitrate	0.25
980	Magnesium Isotope Standard	Metal	0.25
981	Lead Isotope Standard, Natural	Metal	wire: 1.0
982	Lead Isotope Standard, $^{208}\text{Pb}/^{206}\text{Pb}$ Equal Atom	Metal	wire: 1.0
983	Lead Isotope Standard, Radiogenic	Metal	wire: 1.0
984	Rubidium Isotope Standard	Rubidium Chloride	0.25
985	Potassium Isotope Standard	Potassium Chloride	1.0
986	Nickel Isotope Standard	Metal	0.5
987	Strontium Isotope Standard	Strontium Carbonate	1.0
991	Nitrate Spike Isotope Standard, ^{206}Pb	Nitric Acid	15
994	Gallium Isotope Standard	Metal	disk: 0.25
997	Thallium Isotope Standard	Metal	rod: 0.25



Light Stable Isotopic Materials

These RMs 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. D / H | 5. ^{30}Si / ^{28}Si |
| 2. ^{18}O / ^{16}O | 6. ^{15}N / ^{14}N |
| 3. ^{13}C / ^{12}C | 7. ^{34}S / ^{32}S |
| 4. ^6Li / ^7Li | |

RM	Description	Isotopic Ratios	Unit Size
8535	VSMOW-Water	1,2	20 mL
8536	GISP-Water	1,2	20 mL
8537	SLAP-Water	1,2	20 mL
8538	NBS30-Biotite	1,2,3	2 g
8539	NBS22-Oil	1,2,3	1 mL
8540	PEFI-Polyethylene	1,2,3	~2 mg
8541	USGS24-Graphite	1,2,3	0.8 g
8542	Sucrose ANU-Sucrose	1,2,3	1 g
8543	NBS18-Carbonatite	2,3	0.4 g
8544	NBS18-Limestone	2,3	0.4 g
8545	LSVEC-Lithium Carbonate	3,4	0.4 g
8546	NBS28-Silica Sand (Optical)	2,5	0.4 g
8547	IAEA-N1-Ammonium Sulfate	6	0.4 g
8548	IAEA-N2-Ammonium Sulfate	6	0.4 g
8549	IAEA-N3-Potassium Nitrate	6	0.4 g
8550	USGS25-Ammonium Sulfate	6	0.4 g
8551	USGS26-Ammonium Sulfate	6	0.4 g
8552	NSVEC-Gaseous Nitrogen	6	300 μmol
8553	Soufre de Lacq - Elemental Sulfur	2,7	0.5 g
8554	IAEA-S1-Silver Sulfide	2,7	0.5 g
8555	IAEA-S2-Silver Sulfide	2,7	0.5 g
8556	NBS123-Sphalerite	2,7	0.5 g
8557	NBS127-Barium Sulfate	2,7	0.5 g
8558	USGS32-Potassium Nitrate	6	0.5 g
8562	CO ₂ -Heavy, Paleomarine Origin	2,3	2 tubes: 9 mm diameter \times 300 mm
8563	CO ₂ -Light, Petrochemical Origin	2,3	2 tubes: 9 mm diameter \times 300 mm
8564	CO ₂ -Biogenic, Modern Biomass Origin	2,3	2 tubes: 9 mm diameter \times 300 mm

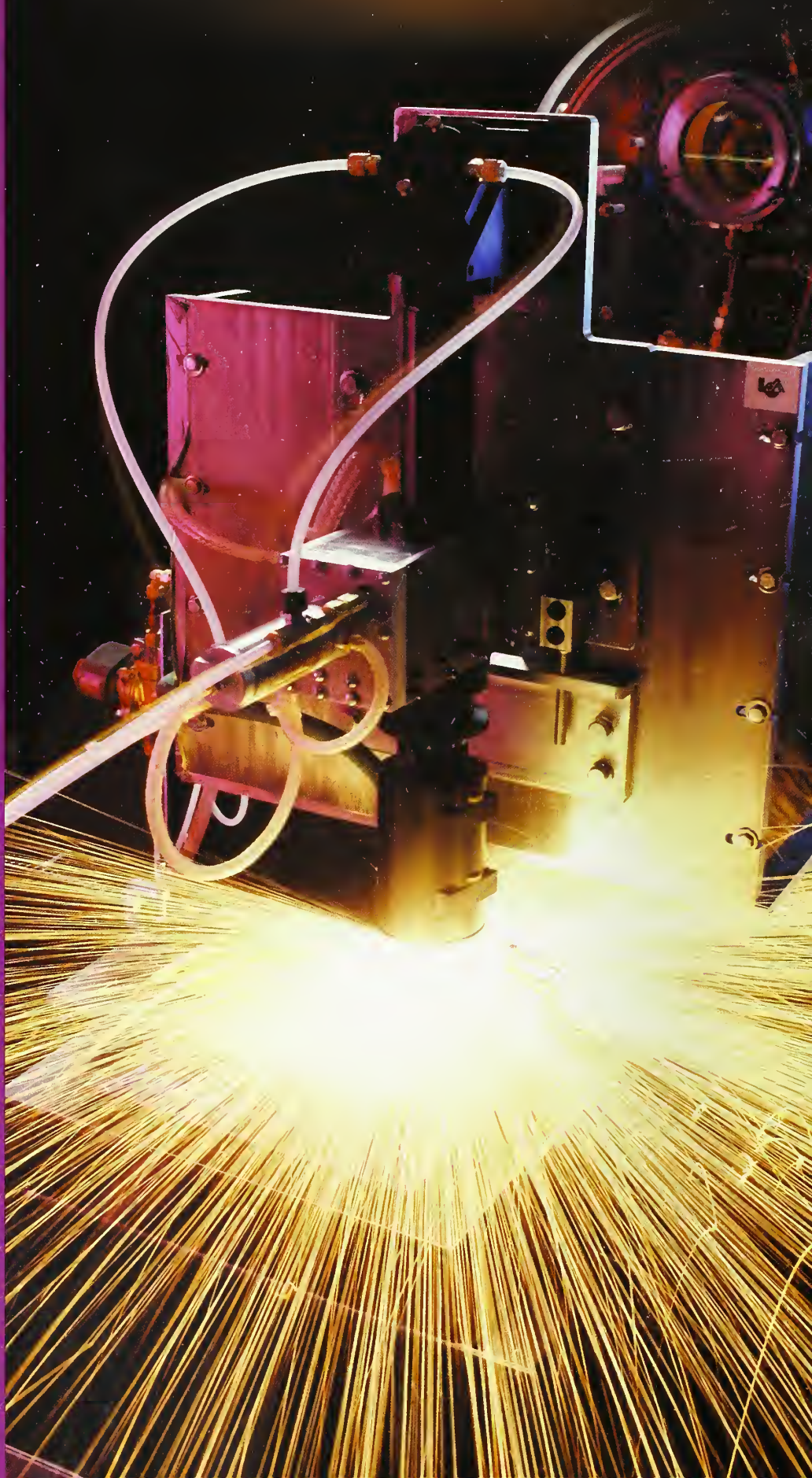
INDUSTRIAL MATERIALS

47 Ferrous Metals

56 Nonferrous Metals

61 Ceramics and Glasses

63 Cements





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

Plain Carbon Steels (chip)

Unit Size: 150 g (unless otherwise noted)

SRM	Description
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

Basic Open-Hearth Steel

15h	0.1 % Carbon
11h	0.2 % Carbon
12h	0.4 % Carbon
152a	0.5 % Carbon (Tin-Bearing)
337a	1 % Carbon (300 g)



Low Alloy Steels (disk and rod)

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
1224	AISI 1078, Carbon Steel
C1221	AISI 1211, Modified, Resulfurized/Rephosphorized
1269	AISI 1526, Modified (Line Pipe Steel)
1225	AISI 4130
661	AISI 4340
1262b	AISI 94B17 (Modified)
1254	Calcium in Low Alloy Silicon Steel
663	Chromium-Vanadium Steel, Modified
1263a	Chromium-Vanadium Steel, Modified
1265a	Electrolytic Iron
664	High Carbon Steel, Modified
1264a	High Carbon Steel, Modified
1135	High Silicon Steel
1134	High Silicon Steel
1768	High Purity Iron
1226	HY 130
1286	HY 80
1228	Basic Open Hearth Steel (0.1 % Carbon)
1227	Basic Open Hearth Steel (1 % Carbon)

(continued)



Low Alloy Steels (disk and rod) (continued)

SRM	Description
1761	Low Alloy Steel
1762	Low Alloy Steel
1763	Low Alloy Steel
1764	Low Alloy Steel
1765	Low Alloy Steel
1766	Low Alloy Steel
1767	Low Alloy Steel

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

Special Low Alloy Steels (chip and pin)

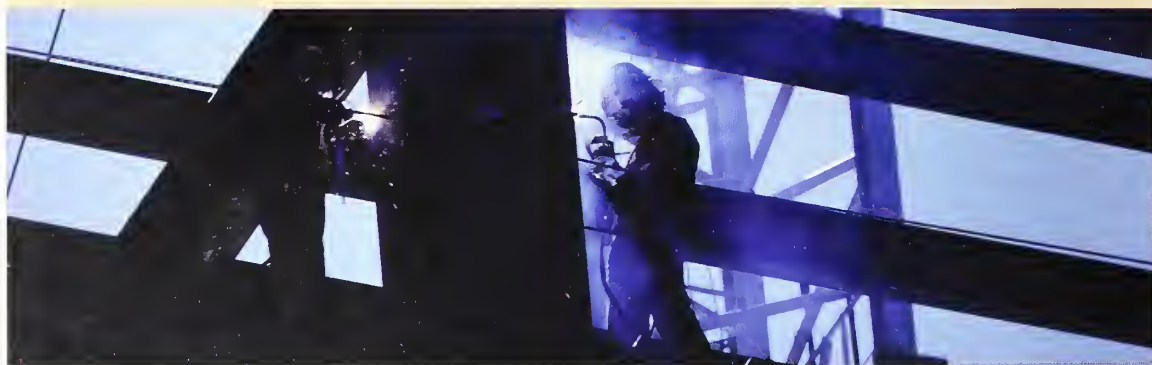
Unit Size: 150 g (unless otherwise noted)

SRM	Description
2159	Low Alloy Steel (pin - 200 g)
2160	Low Alloy Steel (pin - 200 g)
2166	Low Alloy Steel
2167	Low Alloy Steel
361	AISI 4340 Steel
362	AISI 94B17, Modified
363	Chromium-Vanadium Steel, Modified
364	High Carbon Steel, Modified
2168	High Purity Iron

High Alloy Steels (chip)

Unit Size: 150 g (unless otherwise noted)

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





Stainless Steels (chip)

Unit Size: 150 g (unless otherwise noted)

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)

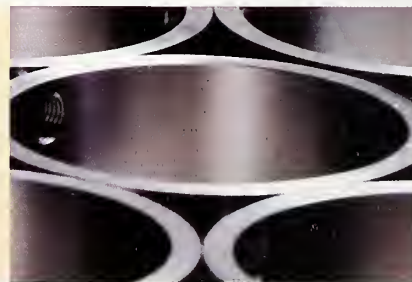
Stainless Steels (disk)

Unit Size: 32 mm diameter × 19 mm

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)

Specialty Steels (disk)

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

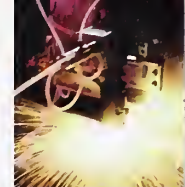


Tool Steels (chip)

Unit Size: 150 g

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





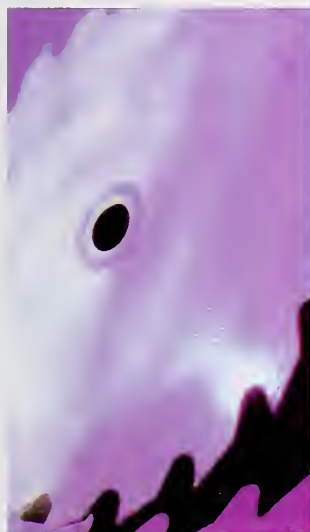
Cast Steels, White Cast Irons, and Ductile Irons (disk)

Unit Size: 32 mm diameter × 19 mm

SRM	Description
1138a	Cast Steel (No. 1)
1139a	Cast Steel (No. 2)
C1173	Cast Steel (No. 3)
C2423	Ductile Iron A
C2423a	Ductile Iron B
C2424	Ductile Iron C
C2424a	Ductile Iron D
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

Steelmaking Alloys (fine powder)

Unit Size: 150 g



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

Cast Irons (chip)

Unit Size: 150 g

SRM	Title
4L	Cast Iron
5m	Cast Iron
6g	Cast Iron
122i	Cast Iron
7g	High Phosphorus 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



**High Temperature Alloys (chip and disk)**

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 SRM 1096 AISI 94B17 Steel, Modified** SRM 1097 Cr-V Steel, Modified SRM 1098 High Carbon Steel** SRM 1099 Electrolytic Iron	6.4 × 102 6.4 × 102 6.4 × 102 6.4 × 102 6.4 × 102
1754	AISI 4320 Oxygen in Low Alloy Steel,**	9.5 × 9.5 × 102
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.

SRM	Description	Unit Size
87a	Silicon - Aluminum Alloy	75 g
855a	Aluminum Casting Alloy 356	30 g
856a	Aluminum Casting Alloy 380, Fine Millings	30 g
858	Alloy 6011, Modified	35 g
1258	Alloy 6011, Modified	disk: 35 mm diameter × 19 mm
859	Alloy 7075	35 g
1259	Alloy 7075	disk: 35 mm diameter × 19 mm
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

Cobalt Base Alloys (chip and disk)

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

SRM		Description
Chip	Rod	
395	495	Unalloyed Copper - Cu II
396	496	Unalloyed Copper - Cu III
	457	Unalloyed Copper - Cu IV (6.6 mm diameter × 103 mm)
398	498	Unalloyed Copper - Cu V
399	499	Unalloyed Copper - Cu VI
400	500	Unalloyed Copper - Cu VII
454		Unalloyed Copper - Cu XI (35 g)

Copper Base Alloys (chip and rod)

SRM	Description	Unit Size (g)
158a	Silicon, Bronze	150
Beryllium-Copper		
458	17510	50
459	17200	50
460	17300	50
Phosphor-Bronze		
871	CDA 521	100
872	CDA 544	100
Cupro-Nickel		
874	10 % CDA 706, High-Purity	100
875	10 % CDA 706, Doped	100
Nickel-Silver		
879	CDA 762	100
880	CDA 770	100
1034	Unalloyed Copper	rod: 6.35 mm diameter × 103 mm
1035	Leaded-Tin Bronze Alloy	50

(continued)

Copper Base Alloys (block and disk)

The 1100 series SRMs are wrought disks 32 mm diameter \times 19 mm. The C1100 series SRMs are chill cast blocks 32 mm square \times 19 mm. Both forms have nearly identical elemental compositions.

SRM		Description
<i>Disk</i>	<i>Block</i>	
1104		Free-Cutting Brass
1107		Naval Brass B
1108		Naval Brass C
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	C1116	Commercial Bronze B
1117	C1117	Commercial Bronze C
	C1122	Beryllium-Copper
1276a		CDA 715 Cupro-Nickel

Lead Base Alloys (disk and powder forms)

SRM		Description	Unit Size (g)	
<i>Powder</i>	<i>Disk</i>		<i>Powder</i>	<i>Disk</i>
1129		Solder 63Sn - 37Pb	200	
127b	1131	Solder 40Sn - 60Pb	150	32 mm diameter \times 19 mm
53e	1132	Lead Base Bearing Metal (84Pb - 10Sb - 6Sn)	150	32 mm diameter \times 19 mm

Lead Base Materials (disk)

Unit Size: 50 mm diameter \times 16 mm

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



Nickel Oxides (powder)

Unit Size: 25 g

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

Nickel Base Alloys (chip and disk)

SRM	Description	Unit Size
349a	Waspaloy™	150 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

Trace Elements in Nickel Base Superalloys (chip)

Unit Size: 35 g

SRM	Description	Elemental Composition
897	"Tracealloy" A	Pb, Sc, Te, Ti
898	"Tracealloy" B	
899	"Tracealloy" C	

Tin Base Alloys (chip)

SRM	Description	Unit Size
54d	Tin Base Bearing Metal	170 g

Titanium Base Alloys (chip and disk)

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
2431	6Al - 2Sn - 4Zr - 6Mo	50
2432	10V - 2Fe - 3Al	50
2433	8Al - 1Mo - 1V	50

Hydrogen in Titanium (platelet)

SRM	Description	Unit Size
352c	Hydrogen in Unalloyed Titanium	20 g

Zirconium Base Alloys (chip)

SRM	Description	Unit Size
360b	Zircaloy-4	100 g

**Zinc Base Alloys (chip and disk)**

SRM	Description	Unit Size
94c	Die Casting Alloy	chip: 150 g
625	ASTM AG 40A Die Casting Alloy	disk: 44 mm diameter × 19 mm
626	ASTM AG 40A Die Casting Alloy	disk: 44 mm diameter × 19 mm
627	ASTM AG 40A Die Casting Alloy	disk: 44 mm diameter × 19 mm
628	ASTM AC 41A Die Casting Alloy	disk: 44 mm diameter × 19 mm
629	ASTM AC 41A Die Casting Alloy	disk: 44 mm diameter × 19 mm
630	ASTM AC 41A Die Casting Alloy	disk: 44 mm diameter × 19 mm
631	Zinc spelter, Modified	disk: 45 mm diameter × 19 mm
1736	Zinc-Aluminum (.31 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1737	Zinc-Aluminum (.63 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1738	Zinc-Aluminum (.10 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1739	Zinc-Aluminum (.21 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1740	Zinc-Aluminum (.42 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1741	Zinc-Aluminum (.52 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
1742	Zinc-Aluminum (.79 % Al) Die Casting Alloy	disk: 50.8 mm diameter × 12.7 mm
2139	Zinc-Aluminum (.80 % Al) Die Casting Alloy	chip: 100 g

CERAMICS AND GLASSES**Carbides (powder)**

SRM	Description	Unit Size (g)
112b	Silicon Carbide	80
276b	Tungsten Carbide	75

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)

Glasses (powder and solid)

SRM	Description	Unit Size (g)
81a	Glass Sand	75
89	Lead-Barium	45
92	Low-Boron Soda-Lime Powder	45
93a	High-Boron Boro-silicate	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

Trace Elements (powder and 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.

Also certified for isotopic ratio: $^{87}\text{Sr}/^{86}\text{Sr} = 1.20039$

SRM	Description	Certified Elements
607	Trace Elements in Potassium Feldspar (5 g)	
Trace Elements in Glass		
610/611		33 elements
612/613		33 elements
614/615		33 elements
616/617		33 elements



CEMENTS

Portland Cements (powder)

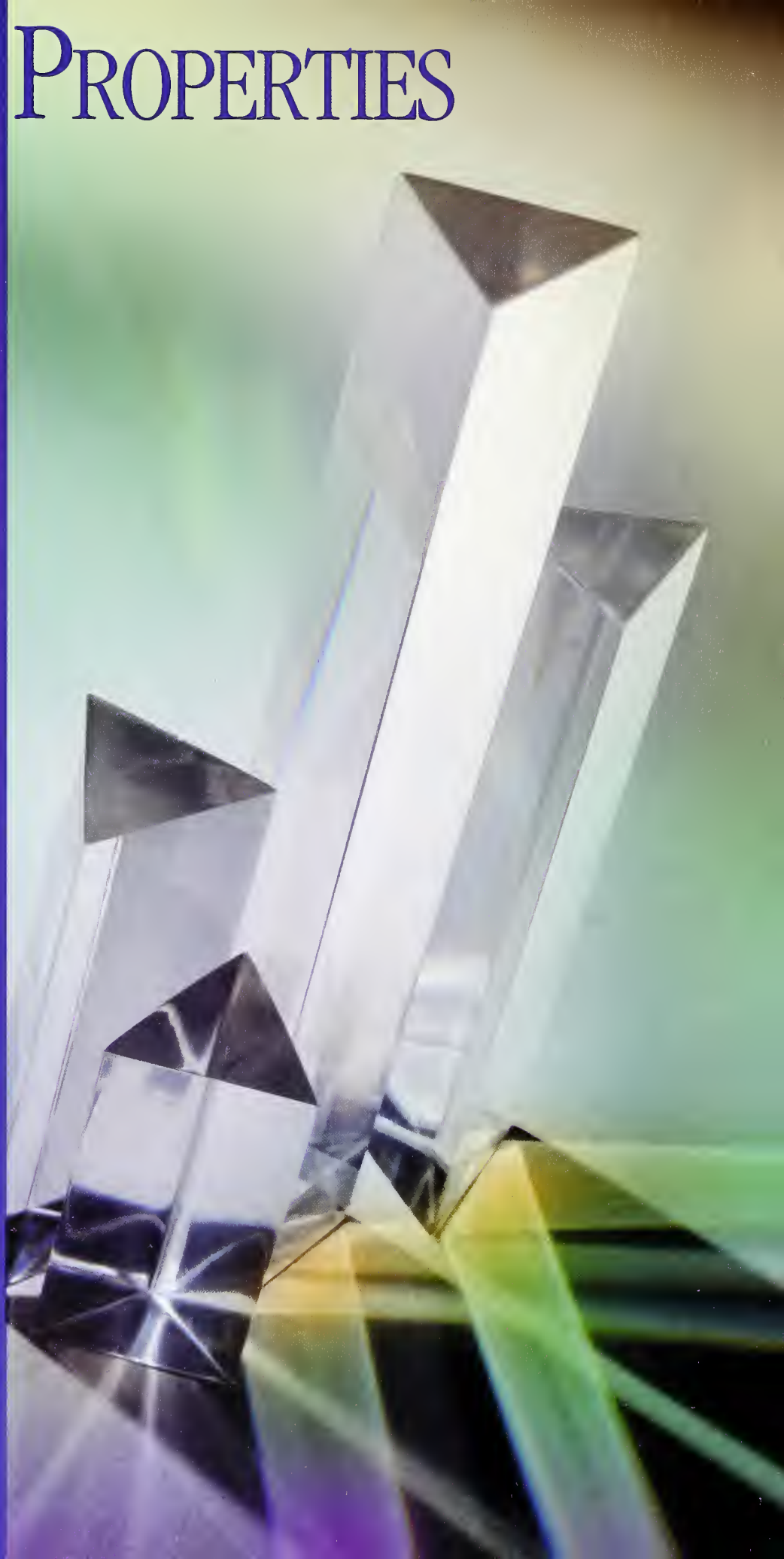
SRM	Unit Size
<i>Calcium Aluminate Cement</i>	
1882a	4 × 5 g
1883a	4 × 5 g
<i>Portland Cement</i>	
1880a	4 × 5 g
1881a	4 × 5 g
1884a	4 × 5 g
1885a	4 × 5 g
1886a	4 × 5 g
1887a	4 × 5 g
1888a	4 × 5 g
1889a	4 × 5 g

Portland Cement Clinkers (solid)

SRM	Unit Size
<i>Portland Cement Clinkers (5 phases certified)</i>	
2686	3 × 10 g
2687	3 × 10 g
2688	3 × 10 g

PHYSICAL PROPERTIES

- 65 Ion Activity
- 68 Polymeric Properties
- 70 Thermodynamic Properties
- 74 Optical Properties
- 77 Electrical Properties
- 78 Optoelectronics
- 78 Metrology
- 81 Ceramics and Glasses
- 83 X-ray Spectrometry



ION ACTIVITY

pH Calibration

SRM	Description	pH(S) Values (at 25 °C)	Unit Size (g)
2193	Calcium Carbonate (In Prep)	—	—
723d	Tris(Hydroxymethyl) aminomethane (In Prep)	—	—
185g	Potassium Hydrogen Phthalate	4.006	60
188	Potassium Hydrogen Tartrate	3.557	60
189b	Potassium Tetroxalate	1.719	65
187d	Sodium Tetraborate Decahydrate (Borax)	9.182	30
Admixtures			
<i>Unit Size: 30 g (unless otherwise noted)</i>			
186If	Potassium Dihydrogen Phosphate	6.860*	
186IIIf	Disodium Hydrogen Phosphate	7.414**	
191b	Sodium Bicarbonate (25 g)	10.015*	
192b	Sodium Carbonate		

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

** Physiological buffer preparation.

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 (In Prep)	—
<i>KCl in Deionized Water</i>		
3191		100
3192		500
3193		1000
3194		10 000
3195		100 000
<i>KCl in n-Propanol/Deionized Water</i>		
3198		5
3199		15
<i>NaCl in deionized Water</i>		
3196		—

Positive Electrophoretic Mobility

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

POLYMERIC PROPERTIES

Molar Mass/Molecular Weight (M_w)

SRM	M_w (g/mol)	Unit Size (g)
Poly(ethylene oxide)		
1924	$M_w \approx 120\,900$ ($M_w/M_n \approx 1.04$)	0.2
1923	$M_w \approx 26\,900$ ($M_w/M_n \approx 1.06$)	0.2
Poly(methylmethacrylate)		
1489*	$M_n \approx 115\,000$ ($M_w/M_n \leq 1.1$)	1.1
1488*	$M_n \approx 29\,300$ ($M_w/M_n \leq 1.1$)	2
1487*	$M_w \approx 6300$	2
Polyethylene		
2887*	$M_w \approx 196\,400$	0.3
2885*	$M_w \approx 6280$	0.3
2886*	$M_w \approx 87\,000$	0.3
Polyethylene, linear		
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*	$M_w \approx 13\,600$ ($M_w/M_n \approx 1.19$)	0.4
1483*	$M_w \approx 32\,100$ ($M_w/M_n \approx 1.11$)	1
Polystyrene, linear, broad molecular weight distribution		
706a	$M_w \approx 285\,000$	18
Polystyrene, linear, narrow molecular weight distribution		
1478*	$M_w \approx 37\,400$ ($M_w/M_n \approx 1.04$)	2
705a*	$M_w \approx 179\,300$ ($M_w/M_n \approx 1.07$)	5
1479	$M_w \approx 1\,050\,000$	2
Polyurethane		
1480	$M_w \approx 47\,300$	1

* Also certified for viscosity



Melt Flow Rate

SRM	Description	Melt Flow Rate (g/10 min)	Unit Size (g)
1473b	Polyethylene Resin, Low Density	1.13	50
1475a	Polyethylene, Linear	2.02	50
1474	Polyethylene Resin	5.03	60
1497	Polyethylene Gas Pipe Resin, Pigmented	0.186	9080
1496	Polyethylene Gas Pipe Resin, Unpigmented	0.26	908

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

RM	Description	Unit Size
8456	Ultra High Molecular Weight Polyethylene <i>Properties:</i> - Young's Modulus - Yield Strength - Ultimate Strength - Elongation	bar: 7.62 cm diameter × 152.4 cm (3 in diameter × 60 in)

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)
RM 5	Copper	1.9 cm diameter 12 cm	25 to 300
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
2222	Biphenyl (99.984 %)	342.41	120.41	1 g
2232	Indium (99.9999 %)	156.5985 °C	28.51	1 g
2225	Mercury	234.30	11.469	2.5 g
2220	Tin (99.9995 %)	505.10	60.2	(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

Differential Thermal Analysis


RM	Description	Temperature Range (°C)	Unit Size
GM 754	ICTA Polystyrene DTA	97.8 to 107.5	10 g
8759	ICTA Set DTA	295 to 675	5 × 10 g
8760	ICTA Set DTA	570 to 940	5 × 10 g

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

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

Reference Points

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



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
1972	1,3-Dioxolan-2-one (Ethylene Carbonate) (Triple Point), 99.999+ %	36.3143	60
1969	Rubidium (Triple Point), 99.9+ %	39.30	154
1973	n-Docosane (Triple Point), 99.999+ %	43.879	60
1970	Succinonitrile (Triple Point), 99.999+ %	58.0642	60
1971	Indium (Freezing Point), 99.9999+ %	156.598	100

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
736L1	Copper	20 to 800	0.64 × 5.1
738	AISI 446 Stainless Steel	293 to 780	0.64 × 5.1

Thermal Resistance of Glass, Silica, and Polystyrene

SRM	Description	Temperature Range (K)	Thermal Resistance (m ² · K · W ⁻¹)	Unit Size (cm)
1453	Expanded Polystyrene Board	285 to 310	0.381 to 0.420	66 × 93 × 1.34
1450c	Fibrous Glass Board	280 to 340	0.661 to 0.818	61 × 61 × 2.54
1449	Fumed Silica Board	297	1.195 to 1.253	60 × 60 × 2.54
1459	Fumed Silica Board	297	1.195 to 1.253	30 × 30 × 2.54

Vapor Pressure of Metals

SRM	Description	Pressure Range (Pa) (K, ITS-90)	Temperature Range	Unit Size
745	Gold	10^{-3} to 10^2	1300 to 2100	wire: 0.14 cm diameter \times 15.2 cm
746	Cadmium	10^{-6} to 10^1	350 to 594	rod: 0.64 cm diameter \times 6.4 cm

Thermal Conductivity of Graphite and Iron

RM	Conductivity Range ($\text{W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$)	Unit Size
<i>Electrolytic Iron (2 K to 1000 K)</i>		
8420	12.32 to 32.98	0.64 cm diameter \times 5.0 cm
8421	12.32 to 32.98	3.17 cm diameter \times 5.0 cm
<i>Graphite (5 K to 2500 K)</i>		
8424	0.0354 to 32.96	0.64 cm diameter \times 5.0 cm
8426	0.0354 to 32.96	2.54 cm diameter \times 5.0 cm

Laboratory Thermometer (mercury in glass)

Unit Size: 1 each

SRM	Description	Calibrated Points ($^{\circ}\text{C}$)
934	Clinical Laboratory Thermometer	-0.20 to +0.20

Thermocouple Material, Platinum

Unit Size: 1 each

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

OPTICAL PROPERTIES

Molecular Transmittance and Absorbance



SRM	Description	Wavelength Range	Unit Size
Crystalline and Solution Forms			
935a	Crystalline Potassium Dichromate, UV Absorbance	235 nm to 350 nm	15 g
1935	Potassium Dichromate Solution, UV Absorbance	235 nm to 350 nm	10 ampoules: 5 samples, plus 5 blanks
2032	Potassium Iodide, Stray Light	240 nm to 275 nm	25 g
931f	Liquid Filters, Absorbance	302 nm to 678 nm	12 ampoules: 3 × 3 levels, plus 3 blanks

Glass Filters, Transmittance

930e	10 %, 20 %, 30 % Transmittance	440 nm to 635 nm	3 filters, plus 1 blank
1930	1 %, 3 %, 50 % Transmittance	440 nm to 635 nm	3 filters, plus 1 blank
2030a	30 % Transmittance	465.0 nm	1 filter, plus 1 blank
2031a	Metal-on-Quartz Filters 10 %, 30 %, 90 % Transmittance	250 nm to 635 nm	3 filters, plus 1 blank
2046	Optical Density = 1	1064 nm	51 mm × 51 mm × 1.0 mm
2047	Optical Density = 2	1064 nm	51 mm × 51 mm × 2.2 mm
2048	Optical Density = 3	1064 nm	51 mm × 51 mm × 3.2 mm
2049	Optical Density = 4	1064 nm	51 mm × 51 mm × 4.2 mm
2050	Optical Density = 5	1064 nm	51 mm × 51 mm × 5.4 mm
2051	Optical Density = 6	1064 nm	51mm × 51 mm × 6.4 mm
2053	20 nm Ni-Cr Film on Silica	2 μm to 25 μm	25 mm diameter × 250 μm
2054	90 nm Ni-Cr Film on Silica	2 μm to 25 μm	25 mm diameter × 250 μm
2055	77 nm Cu-Ni Film on Silica	2 μm to 25 μm	25 mm diameter × 250 μm
2056	97 nm Cu-Ni Film on Silica	2 μm to 20 μm	25 mm diameter × 250 μm



Transmittance Wavelength Standards

SRM	Description	Wavelength Range	Unit Size
2034	Holmium Oxide Solution	240 nm to 650 nm	1 sealed cuvette
2035	Near IR Transmission	971 nm to 1949 nm	25 mm diameter × 1.5 mm
2065	Transmission Wavelength/Vacuum Wavenumber	ultraviolet–visible– near-infrared	25 mm diameter × 1.5 mm
1921a	Infrared Transmission	3.2 μ m to 18.5 μ m	1 polystyrene film

Fluorescence

SRM	Description	Wavelength Range	Unit Size
936a	Quinine Sulfate Dihydrate	375 nm to to 675 nm	1 g
2241	Relative Intensity Correction, Raman Spectroscopy	785 nm	1 glass slide (10.7 × 30.4 × 2.0mm)

Specular Spectral Reflectance

SRM	Description	Wavelength Range	Unit Size
2003	First Surface, Aluminum on Glass	250 nm to 2500 nm	5.1 cm diameter × 0.65 cm
2026	Second Surface, Aluminum on Fused Quartz	250 nm to 2500 nm	5.1 cm diameter × 0.6 cm
2017	Multi-Angle White Reflectance Standard	360 nm to 780 nm	5.7 cm diameter × 1.3 cm
2040	PTFE Diffuser for Spectral Reflectance Factor	380 nm to 780 nm	5 × 26 g

Near Infrared Reflectance Wavelength Standard

SRM	Description	Wavelength Range	Unit Size
1920a	Rare Earth Oxide Mixture	740 nm to 2000 nm	5.1 cm diameter × 1.2 cm

Optical Rotation

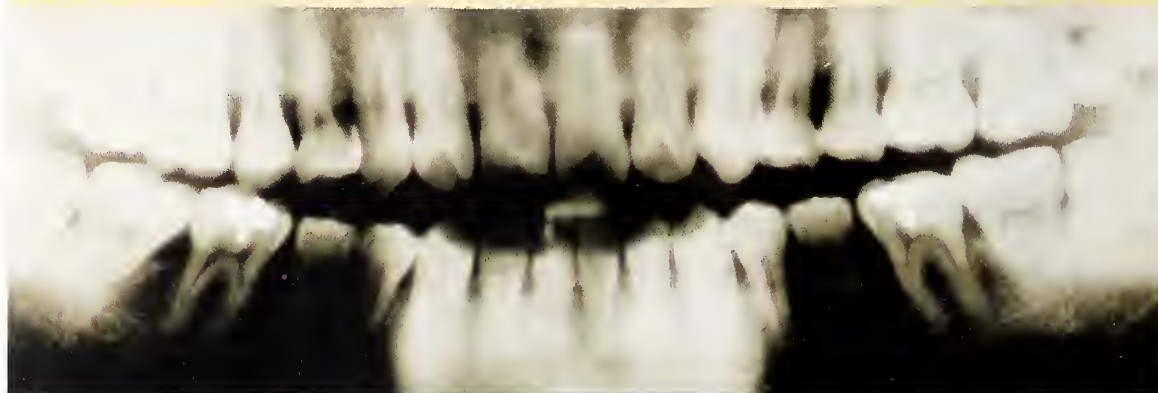
SRM	Description	Wavelength Range	Unit Size
917b	D-Glucose (Dextrose)	546 nm to 589 nm	50 g
17e	Sucrose	546 nm to 633 nm	60 g

Liquid Refractive Index

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

X-ray and Photographic Imaging

SRM	Description	Unit Size
1010a	Microcopy Resolution Test Chart	5 charts
1008	Photographic Step Tablet	25.4 cm × 3.5 cm
1001	X-ray Film Step Tablet	25.4 cm × 3.5 cm



ELECTRICAL PROPERTIES

Electrical Resistivity and Conductivity of Electrolytic Iron and Graphite

Unit Size: rod: 0.64 cm diameter \times 5.0 cm

RM	Resistivity Range ($\mu\Omega \cdot m$)	Unit Size
Electrolytic Iron (2 K to 1000 K)		
8420	0.004 to 0.909	0.64 cm diameter \times 5.0 cm
8421	0.004 to 0.909	3.17 cm diameter \times 5.0 cm
Graphite (5 K to 2500 K)		
8424	28.78 to 12.59	0.64 cm diameter \times 5.0 cm
8426	28.78 to 12.59	2.54 cm diameter \times 5.0 cm



Electrical Resistivity and Conductivity of Silicon

SRM	Resistivity ($\Omega \cdot cm$)	Type
Spreading Resistance		
Unit Size: 16 chips: (5 \times 10 \times 0.625) mm		
2526	0.001 to 200	(111) p-type
2527	0.001 to 200	(111) n-type
Silicon Resistivity		
Unit Size: (100 diameter \times 0.625) mm		
2544	10	float zone n-type silicon wafer with (111) crystallographic orientation
2547	200	

OPTOELECTRONICS

SRM	Description	Unit Size
Wavelength Calibration Standards		
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
2519	Wavelength Reference Absorption Cell for 1530 nm to 1560 nm Hydrogen Cyanide ($\text{H}^{13}\text{C}^{14}\text{N}$)	Gas Absorption Cell
Polarization Mode Dispersion Standards		
2518	Polarization Mode Dispersion Standard	1 each
2538	Deterministic Polarization Mode Dispersion Standard	1 each
Fiber and Fiber-Connector Geometry Standards		
2513	Mode Field Diameter Standard for Single-Mode Fiber	1 each
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
2553	Optical Fiber Coating Diameter ($n = 1.504$)	1 each: 250 μm diameter
2554	Optical Fiber Coating Diameter ($n = 1.515$)	1 each: 250 μm diameter

METROLOGY

Optical Microscope Linewidth Measurement



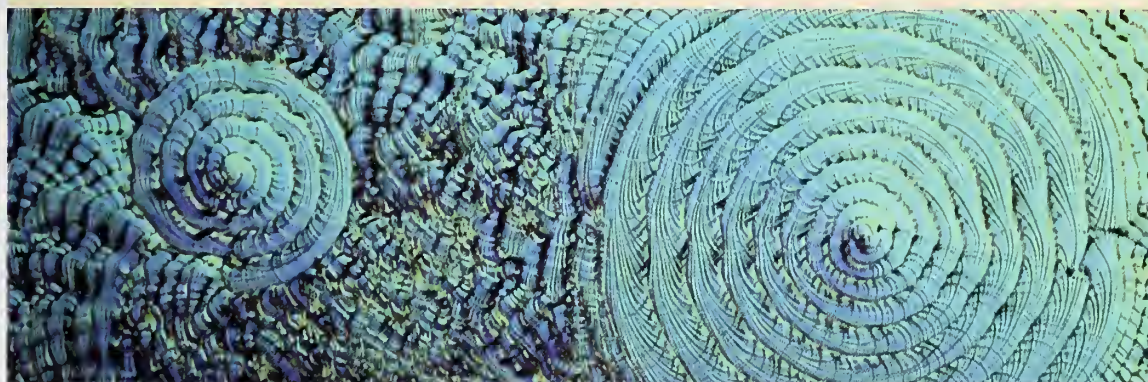
SRM	Linewidth (μm)	Pitch (μm)	Unit Size (cm)
Linewidth Measurement Standards			
475	0.9 to 10.8	2 to 36	$6.35 \times 6.35 \times 0.15$
476	0.9 to 10.8	2 to 36	$6.35 \times 6.35 \times 0.15$

Scanning Electron Microscope (SEM)

SRM	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

Depth Profiling

SRM	Description	Value	Unit Size (cm)
2134	Arsenic Implant in Silicon Profile Standard	$^{75}\text{As} - 7 \times 10^{14} \text{ atoms/cm}^2$	crystal: 1 × 1
2135c	Nickel-Chromium Thin-Film Depth Profile Standard	Cr: 41.3 $\mu\text{g/cm}^2$ Ni: 49.4 $\mu\text{g/cm}^2$	1 × 2.54 × 0.04
2137	Boron Implant in Silicon Depth Profile Standard	$^{10}\text{B} - 1.018 \text{ v } 1015 \text{ atoms/cm}^2$	1 × 1



SILICON CRYSTAL

Solder Thickness for X-ray Fluorescence

Unit Size: plate: 15 mm × 15 mm

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

Coating Thickness

Unit Size: 45 mm × 45 mm

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

SRM	Nominal Coating Thickness	
	(μm)	(mils)
<i>Chromium over Copper on Steel</i>		
1358a	80, 255, 1000	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

Ellipsometry

Unit Size: 76 mm substrate diameter

Each unit is certified for the ellipsometric parameters delta (Δ) and psi (ψ) at the vacuum wavelength $\lambda = 633.0$ nm, and for the derived values of the thicknesses and indexes of refraction of the silicon dioxide and silicon layers.

SRM	Thickness (nm)
<i>Thin Film Thickness Standards</i>	
2531	50
2532	100
2533	200
2534	25
2535	14

Oxygen Concentration in Silicon

SRM	Description	Unit Size (mm)	Concentration (mg/kg)
2551	Oxygen in Silicon	4 wafers: 25 × 25 × 2	Low: 10 Medium: 13 High: 15 FZ: (<0.1)

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 ₂ SO ₄	Unit Size (kg)
623	Borosilicate	0.34	2.2
622	Soda-Lime Silica	7.67	2.2

Electrical Properties of Glass

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	Unit Size (cm)	Value
624	Lead Silica for dc Volume Resistivity	5 × 5 × 2.5	$\log_{10} \rho \approx 9.9 \Omega\text{-cm}$ at 300 °C
774	Lead Silica for Dielectric Constant and ac Loss Characteristics	5 × 5 × 2.5	$K \approx 7.47$ at 100 Hz

Viscosity of Glass

SRM	Description	Unit Size (mm)
717a	Borosilicate Glass	block: 40 × 40 × 150
710a	Soda-Lime-Silica Glass	block: 100 × 100 × 40

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
713	Dense Barium Crown 620/603 Glass	225 g
709	Extra Dense Lead Silica	4 cm × 4 cm × 5 cm
716	Neutral Glass	250 g
710a	Soda-Lime-Silica	100 mm × 100 mm × 40 mm

Relative Stress Optical Coefficient

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

Density

SRM	Description	Density (kg/m ³)	Unit Size
1827b	Lead Silica Glass	3593.800 at 20 °C	slab: 25 cm × 25 cm × 12 cm
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)
676	Alumina (Corundum Structure)	Quantitative Analysis	20
1976	Alumina Plate, Sintered	Instrument Response	45 mm × 45 mm × 1.6 mm
2910	Calcium Hydroxyapatite	Quantitative Analysis	5
660a	Lanthanum Hexaboride Powder	Line Position, Line Shape	6
675	Mica	Low 2θ (Large d-Spacing)	7.5
1879a	Respirable Cristobalite	Quantitative Analysis	5
1878a	Respirable Quartz	Quantitative Analysis	5
656	Silicon Nitride	Quantitative Analysis	2 × 10 g
640c	Silicon Powder 2~ /d-Spacing	Line Position, Line Shape	7.5
674b	X-ray Powder Diffraction Intensity Set (α -Al ₂ O ₃ , CeO ₂ , Cr ₂ O ₃ , TiO ₂ , ZnO) (In Prep)	Quantitative Analysis	—

X-ray Stage Calibration

SRM	Description	Unit Size (mm)
1842	Calibration Board (X and Y dimensions)	Board: 300 × 300 × 3
1843	Calibration Board (Z dimension)	Triangular Block: 37 × 20 × 12

RADIOACTIVITY

- 85 Radioactive Solutions
- 87 Radioactive Point Sources
- 87 Radiopharmaceuticals
- 88 Radon Emanation
- 88 Beryllium Isotopic Ratio Standard
- 88 Carbon-14 Dating
- 89 Natural Matrix Materials
- 89 Neutron Density Monitor Wire
- 89 Fission Track Glass



Radioactive Solutions

Each SRM is contained in a 5 mL flame-sealed glass ampoule and, except as noted, consists of the radionuclide dissolved in an aqueous solution (usually acidic, unless noted).

SRM	Radionuclide	Massic Activity (Bq/g)	Calibration Date
4322B*	Americium-241	40	09/1991
4332D*	Americium-243	40	05/1995
4251C*	Barium-133	500 000	09/1993
4222C	Carbon-14 (as hexadecane)	50 000	09/1990
4233E*	Cesium-137 Burn-up Standard (In Prep)	300 000	—
4943	Chlorine-36 (3 mL)	10 000	12/1984
4915E*	Cobalt-60	75 000	01/1995
4329*	Curium-243	70	06/1984
4320A*	Curium-244	35	02/1996
4370C*	Europium-152	90 000	02/1987
4361C	Hydrogen-3 (as water) (500 mL)	2	09/1998
4926E	Hydrogen-3 (as water) (20 mL)	5 000	09/1998
4927F	Hydrogen-3 (as water)	600 000	09/1998
4947C	Hydrogen-3 (as toluene) (4 mL)	300 000	03/1987
4949C*	Iodine-129 (dilute base solution)	3 000	03/1993
4341*	Neptunium-237	100	03/1992
4226C	Nickel-63	50 000	08/1995
4323B*	Plutonium-238	40	11/1999
4330B*	Plutonium-239	40	11/1999
4338A*	Plutonium-240	40	05/1996
4340B*	Plutonium-241 (In Prep)	250	—
4334G*	Plutonium-242	25	06/1994
4326	Polonium-209	90	03/1994

* These SRMs require a license certification.

(continued on next page)

Radioactive Solutions (continued)

SRM	Radionuclide	Massic Activity (Bq/g)	Calibration Date
4969	Radium-226	3	09/1998
4965	Radium-226	30	09/1991
4966	Radium-226	270	09/1991
4967	Radium-226	2 700	09/1991
4339B	Radium-228 (In Prep)	500	—
4919H*	Strontium-90	4 000	07/1995
4234A*	Strontium-90	2 500 000	03/1995
4288A	Technetium-99	30 000	09/1996
4328C	Thorium-229 (In Prep)	30	—
4342A	Thorium-230 (In Prep)	40	—
4324B	Uranium-232 (In Prep)	40	—
4321C	Uranium-238, Natural Uranium	250	08/1997



* These SRMs require a license certification.

Radioactive Point Sources

SRM	Radionuclide	Principal Photon Energies (keV)	Activity (Bq)	Calibration Date
4241C	Barium-133	81 to 384	60 000 to 170 000	01/1999
4203D*	Cobalt-60	1173, 1332	10 000 to 60 000	01/1995
4218F*	Europium-152	122 to 1400	50 000 to 150 000	01/1999
4201B*	Niobium-94	702, 871	4000	04/1970

* These SRMs require a license certification.

Radiopharmaceuticals

A typical schedule of SRMs for a year:

SRM	Radionuclide	High Level†	Low Level	Month
4401*	Iodine-131	750 MBq (20 mCi)	25 MBq (700 µCi)	January
4412*	Molybdenum-99	1.5 GBq (40 mCi)	75 MBq (2 mCi)	February
4415*	Xenon-133	7.5 GBq (200 mCi)	750 MBq (20 mCi)	March
4416*	Gallium-67	375 MBq (10 mCi)	20 MBq (500 µCi)	April
	OPEN			May
4404*	Thallium-201	375 MBq (10 mCi)	35 MBq (900 µCi)	June
4425*	Samarium-153	375 MBq (10 mCi)	20 MBq (500 µCi)	July
4417*	Indium-111	375 MBq (10 mCi)	20 MBq (500 µCi)	August
4410*	Technetium-99m	7.5 GBq (200 mCi)**	**	September
4407*	Iodine-125	750 MBq (20 mCi)	6 MBq (150 µCi)	October
	OPEN			November
4427*	Yttrium-90	200 MBq (5 mCi)	20 MBq (500 µCi)	December

* These SRMs require a license certification.

† High level radiopharmaceutical SRMs are distributed through a program with the exception of technetium-99m. This program includes:

- Distribution of radioactivity Standard Reference Materials (usually a high level [10^7 Bq to 10^{10} Bq] and low level [10^6 Bq to 10^8 Bq] pair of sources), for quantification, to sponsoring participating companies ten times per year.
- Two "open" months per year when the sponsors have the opportunity to send in sources of their choice for calibration.

For the more information, please contact Daniel Golas, the program's Project Manager, at NIST (301) 975-5540.

** Technetium-99m is also available to purchasers of low level radiopharmaceutical SRMs.

Radon Emanation Standard

This SRM is intended for the calibration of radon-222 measuring instruments. It consists of a small heat-sealed polyethylene cylinder containing approximately 0.35g of radium-226 solution. The SRM is calibrated in terms of the radium-226 activity and in terms of the emanation fraction of the radon-222 under specified conditions.

SRM	Radionuclide	Activity (Bq)	Calibration Date
4968	Radium-226	4, 40, or 400	09/1991

Beryllium Isotopic Ratio Standard

SRM	Radionuclide	Isotopic Ratio	Total Nuclide Concentration (mg/g)	Calibration Date	Volume (mL)
4325	Beryllium-10/ Beryllium-9 (in 1N HCl)	3×10^{-11}	5	08/1986	50

Carbon-14 Dating Standard

This SRM is an international standard for contemporary carbon-14 against which world-wide measurements can be compared.

SRM	Description	Unit Size
4990C	Oxalic Acid	8 × 28 g

Natural Matrix Materials

These SRMs are intended for use in testing measurements of low level, biological, and environmental radioactivity contained in matrices similar to the sample, for evaluating analytical methods, or as a generally available calibrated "real" sample matrix in interlaboratory comparisons.

SRM	Description	Unit Size (g)
4350B	Columbia River Sediment	85
4351	Human Lung	45
4352	Human Liver	45
4354	Freshwater Lake Sediment	25
4355	Peruvian Soil	75
4356	Ashed Bone	15
4357	Ocean Sediment	85



Neutron Density Monitor Wire

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

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 ¹⁴ n/cm ²)	
				Copper Foil	Gold Foil
963a	0.823	0.2792	RT-4	39.5	43.0
			RT-3	41.2	45.8

INDUSTRIAL HYGIENE

91 Materials on Filter Media

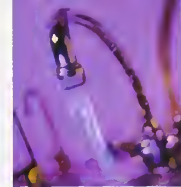
**91 Trace Constituent Elements
in Blank Filters**

91 Respirable Silica

92 Lead in Paint, Dust, and Soil

93 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	Description	Set Size	Elemental Composition	Diameter (mm)	Pore Size (μm)
2679a	Quartz on Filter Media	2 × 3 levels, plus 2 blanks	Quartz, Clay	47	0.45
2783	Air Particulate on Filter	2 filters, plus 2 blanks	18 certified values 9 reference values	47	0.4

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_p) 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 (%)	Unit Size (g)
1878a	Respirable Alpha Quartz	100.00 ± 0.21	5
1879a	Respirable Cristobalite	95.6 ± 0.4	5

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



Asbestos

SRM	Description	Asbestos Type	Unit Size
1866a	Common Commercial Asbestos	chrysotile grunerite (Amosite) riebeckite (Crocidolite)	3 × 4 g
1876b	Chrysotile Asbestos for TEM	—	10 sections: 3 mm × 3 mm
RM 8411	Mixed Asbestos Research Filter	chrysotile asbestos grunerite (Amosite)	1 cm ²



ASBESTOS TESTING

SUBJECT INDEX

A

ABSORBANCE

- 74 See MOLECULAR...
SPECTROMETRY

ACETANILIDE

- 41 use in MICROCHEMISTRY

ACIDIMETRIC VALUE (STOICHIOMETRY)

- 40 of Benzoic Acid
- 40 of Boric Acid
- 65 of Potassium Hydrogen
Phthalate

ADHESION (TAPE ADHESION TESTING)

- 6 Linerboard for

AGRICULTURAL MATERIALS

- 11 Apple Leaves
- 9 Corn Kernel (Zea Mays)
- 9 Corn Stalk (Zea Mays)
- 11 Fluoride in Vegetation
- 11 Peach Leaves
- 11 Pine Needles
- 9 Spinach Leaves
- 11 Tomato Leaves

AIR PARTICULATE

- 91 See MATERIALS
ON FILTER MEDIA

AIR POLLUTION

- 24 See PRIMARY GAS
MIXTURES

ALCOHOL

- 15 Ethanol Solutions

ALCOHOLS (FOSSIL FUELS)

- 29 Alcohol in Gasoline
- 29 Ethanol
- 29 Methanol
- 29 Methanol and t-Butanol

ALLOYS (FERROUS)

- 47 See FERROUS METALS

ALLOYS (NONFERROUS)

- 56 See NONFERROUS METALS

ALUMINA

- 32 as Bauxite (ORES)
- 34 as Burnt REFRACTORIES
- 32 Reduction Grade (ORES)
- 72 REFERENCE POINT
- 2 for SURFACE AREA OF POW-
DERS
- 83 X-RAY SPECTROMETRY

ALUMINUM

- 71 Freezing Point of (DEFINING
FIXED POINT, ITS-90)
- 36 as a METALLO-ORGANIC
COMPOUND
- 42 SPECTROMETRY Solution
- 75 Specular Reflectance
(Mirrors)

ALUMINUM BASE ALLOYS

- 56 See NONFERROUS
METALS

AMERICIUM (RADIOACTIVITY)

- 85 Americium-241
- 85 Americium-243
- 89 Columbia River Sediment
- 89 Human Liver
- 89 Human Lung
- 89 Peruvian Soil

AMMONIUM DIHYDROGEN PHOSPHATE

- 11 See FERTILIZERS

ANALYZED GASES

- 24 See PRIMARY GAS
MIXTURES

ANGIOTENSIN I

- 13 See HEALTH & CLINICAL

ANISIC ACID

- 41 use in MICROCHEMISTRY

ANION CHROMATOGRAPHY

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

ANTICONVULSANT DRUG LEVEL ASSAY

- 13 See HEALTH & CLINICAL

ANTIEPILEPSY DRUG LEVEL ASSAY

- 13 See HEALTH & CLINICAL

ANTIMONY

- 42 SPECTROMETRY Solution

ARGILLACEOUS LIMESTONE

- 34 See ROCKS AND MINERALS

ARSENIC

- 79 Implant in Silicon (DEPTH
PROFILING)
- 42 SPECTROMETRY Solution

ARSENIC TRIOXIDE (STOICHIOMETRY)

- 40 Reductometric value

ASBESTOS

- 93 Common Commercial
- 93 Mixture on Filter

ASHED BONE (RADIOACTIVITY)

- 89 NATURAL MATRIX
MATERIALS

ATOMIC ABSORPTION SPECTROMETRY

- 42 See SPECTROMETRIC
SINGLE ELEMENTS

AUTO CATALYSTS

- 24 Recycled Monolith
- 24 Recycled Pellet

B

BALL BAR (PERFORMANCE MATERIALS)

- 6 Coordinate Measuring
Machine Probe

BARIUM

- 85 as Barium-133
(RADIOACTIVITY)
- 85 as Cesium-137 Burn-up
Standard
- 36 as a METALLO-ORGANIC
COMPOUND
- 42 SPECTROMETRY Solution

BASALT ROCK

- 34 See ROCKS AND MINERALS

BASIMETRIC VALUE (STOICHIOMETRY)

- 40 of Tris(hydroxymethyl)-aminomethane

BAUXITE (ORES)

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

BEARING METAL (PB-SB-SN)

- 58 See LEAD BASE ALLOYS

BENZOIC ACID

- 40 Acidimetric Value (STOICHIOMETRY)
- 70 Calorimetric Value (COMBUSTION CALORIMETRY)

BERYLLIUM

- 57 in COPPER BASE ALLOYS
- 42 SPECTROMETRY Solution

BET

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

BET SURFACE AREA

- 2 See SURFACE AREA OF POWDERS

BILIRUBIN

- 13 See HEALTH & CLINICAL

BIOLOGICAL

- 9 See FOOD & AGRICULTURE
- 13 See HEALTH & CLINICAL

BIOLOGICAL BUFFER SYSTEMS (ION ACTIVITY)

- 13 HEPES Free Acid
- 13 MOPSO Free Acid
- 13 NaHEPESate
- 13 NaMOPSOate

BIPHENYL

- 71 for DIFFERENTIAL SCANNING CALORIMETRY

BISMUTH

- 42 SPECTROMETRY Solution

BLEACHED KRAFT PULPS

- 7 Northern Softwood
- 7 Eucalyptus Hardwood

BONE ASH

- 17 See HEALTH & CLINICAL
- 89 See NATURAL MATRIX MATERIALS

BONE MEAL

- 17 See HEALTH & CLINICAL

BORATE ORE

- 32 See ORES

BORON

- 79 Implant in Silicon (DEPTH PROFILING)
- 42 SPECTROMETRY Solution

BORIC ACID

- 40 Acidimetric/Assay Values of (STOICHIOMETRY)
- 44 Enriched in Boron-10 (STABLE ISOTOPIC MATERIALS)

BOTANICAL

- 11 See FOOD & AGRICULTURAL

BOVINE

- 9 Liver (FOOD & AGRICULTURE)
- 9 Muscle Powder
- 15 Serum Albumin (HEALTH & CLINICAL)

BRASS

- 56 See NONFERROUS METALS

BROMIDE

- 44 ANION CHROMATOGRAPHY Solution
- 44 Sodium Bromide (STABLE ISOTOPICS)

BROMINE

- 9 in FOOD & AGRICULTURE

BRONZE

- 57 See COPPER BASE ALLOYS

BUFFERS

- 65 See ION ACTIVITY

BURNT REFRACTORIES (ALUMINUM OXIDE)

- 34 See REFRACTORIES

C

CADMIUM

- 36 Cadmium Cyclohexanebutyrate
- 42 SPECTROMETRY Solution
- 73 VAPOR PRESSURE OF METALS

CALCIUM

- 13 Calcium Carbonate (HEALTH & CLINICAL)
- 16 Calcium Hydroxyapatite (BIOMATERIALS)
- 42 SPECTROMETRY Solution

CALORIMETRY (THERMODYNAMIC PROPERTIES)

- 70 COMBUSTION CALORIMETRY
- 71 DIFFERENTIAL SCANNING CALORIMETRY
- 71 DIFFERENTIAL THERMAL ANALYSIS
- 70 ENTHALPY AND HEAT CAPACITY
- 70 SOLUTION CALORIMETRY

CARBIDES (CERAMICS AND GLASSES)

- 61 Silicon CARBIDE
- 61 Tungsten CARBIDE
- 61 See CEMENTED TUNGSTON CARBIDES

CARBON

- 24 Carbon Modified Silica (INORGANICS)
- 88 Carbon-14 Dating
- 47 in PLAIN CARBON STEELS
- 47 (FERROUS METALS)

CARBON DIOXIDE (PRIMARY GAS MIXTURES)

- 25 Carbon Dioxide in Nitrogen

CARBON MONOXIDE (PRIMARY GAS MIXTURES)

- 25 Carbon Monoxide in Air
- 25 Carbon Monoxide in Nitrogen
- 25 Carbon Monoxide and Propane in Nitrogen

B-CAROTENE (FAT SOLUBLE VITAMINS)

- 14 in Human Serum (HEALTH & CLINICAL)

CAST IRON

- 47 See FERROUS METALS

CAST STEEL

- 53 See FERROUS METALS

CATALYST MATERIALS

- 37 High Sulfur Gas Oil Feed (CATALYST CHARACTERIZATION MATERIAL)
- 24 Used Auto Catalysts (INORGANICS)

CEMENTS

- 2 CEMENT TURBIDIMETRY AND FINENESS(SIZING)
- 63 PORTLAND CEMENT CLINKERS
- 63 PORTLAND CEMENTS

CERAMIC MATERIALS (CERAMICS AND GLASSES)

- 61 CARBIDES
- 61 CEMENTED TUNGSTON CARBIDES
- 62 GLASSES
- 34 See REFRACTORIES
- 34 See ROCKS AND MINERALS
- 75 See SPECULAR SPECTRAL REFLECTANCE

CERIUM

- 42 SPECTROMETRY Solution

CESIUM (RADIOACTIVITY)

- 85 as Cesium-137 Burn-up Standard
- 42 SPECTROMETRY Solution

CHARPY

- 5 V-NOTCH TEST BLOCKS

CHEMICAL

- 39 See HIGH PURITY MATERIALS

CHLORIDE

- 44 ANION ION CHROMATOGRAPHY Solution

CHLORINE

- 85 as Chlorine-36 (RADIOACTIVITY)
- 37 in LUBRICATING BASE OILS
- 44 STABLE ISOTOPIC MATERIAL

CHLORO COMPOUNDS (ORGANIC CONSTITUENTS)

- 20 in Biphenyls
- 21 in Cod Liver Oil
- 20 in Halocarbons
- 41 m-Chlorobenzoic Acid (MICROCHEMISTRY)
- 20 in Pesticides
- 20 in Phenols
- 20 in Pollutants

CHOLESTEROL (HEALTH & CLINICAL)

- 10 in Coconut Oil
- 14 in freeze-dried Human Serum
- 14 in frozen Human Serum
- 10 in Whole Egg Powder

CHROMIUM

- 44 as Chromium Nitrate (STABLE ISOTOPIC MATERIALS)
- 33 in CLAYS
- 79 Cr/CrO Thin Film Depth Profile
- 36 Tris (1-phenyl-1,3-butanedion) chromium (III)
- 42 SPECTROMETRY Solution
- 48 in Steels (FERROUS METALS)

CHROMIUM COMPOUNDS

- 34 in ROCKS AND MINERALS

CHRYSOTILE

- 93 in ASBESTOS (INDUSTRIAL HYGIENE)

CLAYS

- 33 Brick
- 33 Flint
- 33 Plastic

CLINICAL LABORATORY MATERIALS

- 17 Amino Acids in HCl
- 13 Angiotensin I (Human)
- 14 Anticonvulsant Drug Level Assay
- 14 Antiepilepsy Drug Level Assay
- 13 Bilirubin
- 17 Bone Ash
- 17 Bone Meal
- 15 Bovine Serum Albumin
- 15 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 (SERUM MATERIALS)
- 13 Lead Nitrate
- 15 Lead in Blood
- 14 Lipids in Frozen Human Serum
- 13 Lithium Carbonate
- 13 Magnesium Gluconate Dihydrate
- 13 d-Mannitol
- 13 4-Nitrophenol
- 13 Potassium Chloride
- 13 Sodium Chloride
- 13 Sodium Pyruvate
- 13 Tripalmitin
- 13 Urea
- 13 Uric Acid
- 14 Vitamins (Fat-Soluble) and Cholesterol in Human Serum
- 13 VMA (4-hydroxy-3-methoxymandelic acid)

COAL

- 70 for COMBUSTION CALORIMETRY
- 30 Sulfur in (SULFUR IN FOSSIL FUELS)
- 28 TRACE ELEMENTS in

COAL FLY ASH

- 28 TRACE ELEMENTS in

COATING THICKNESS

- 80 NonmagneticCOPPER AND CHROMIUM ON STEEL
- 79 Tin-Lead Alloy (SOLDER THICKNESS)

COBALT

- 85 as Cobalt-60 (RADIOACTIVITY)
- 42 SPECTROMETRY Solution

COBALT BASE ALLOYS

- 56 NONFERROUS METALS

COCAINE METABOLITE

- 17 See FREEZE-DRIED URINE

COCONUT OIL

- 10 Cholesterol in (FOOD & AGRICULTURE)

COD LIVER OIL

- 21 Organics in (ORGANIC CONSTITUENTS)

COLUMBIA RIVER SEDIMENT

- 89 See NATURAL MATRIX MATERIALS

CONDUCTIVITY, ELECTRICAL PROPERTIES)

- 77 of Electrolytic Iron
- 77 of Lead-Silica (GLASS)

CONDUCTIVITY, ELECTROLYTIC (ION ACTIVITY)

- 67 Hydrochloric Acid in Water
- 66 Potassium Chloride in Water
- 67 Sodium Chloride in Water

CONDUCTIVITY, THERMAL (THERMODY- NAMIC PROPERTIES)

- 77 of Electrolytic Iron
- 77 of Graphite

COORDINATE MEASUR- ING MACHINE PROBE PERFORMANCE 6

COPPER

- 36 Bis(1-phenyl-1,3-butane-
dion)copper (II) (METALLO-
ORGANIC COMPOUNDS)
- 58 Brass (COPPER BASE
ALLOYS)
- 58 Bronze (COPPER BASE
ALLOYS)
- 57 Cupro-Nickel (COPPER BASE
ALLOYS)
- 70 ENTHALPY AND HEAT CAPAC-
ITY of
- 47 in FERROUS METALS
- 72 Freezing Point of (SEC-
ONDARY REFERENCE
POINTS)
- 35 High-Purity METALS (MICRO-
ANALYSIS)
- 57 Nickel Silver (COPPER BASE
ALLOYS)
- 57 in NONFERROUS METALS
- 33 in ORES
- 42 SPECTROMETRY Solution
- 44 STABLE ISOTOPES of
- 57 as Unalloyed Copper (COP-
PER BENCHMARK)

COPPER BASE ALLOYS

- 56 See NONFERROUS METALS

CORN

- 10 Bran (FOOD &
AGRICULTURE)
- 9 Kernel (FOOD &
AGRICULTURAL)

- 9 Stalk (FOOD &
AGRICULTURAL)
- 10 Starch (See Nutrition
Composition)

CORROSION

- 3 Tool Steel (ABRASIVE WEAR)

CORTISOL (HYDROCORTISONE)

- 13 See HEALTH & CLINICAL

COTININE

- 17 in FREEZE-DRIED URINE

CREATININE

- 13 See HEALTH & CLINICAL

CRUDE OIL

- 28 Vanadium in (METAL
CONSTITUENTS)

CUP FURNACE (FIRE RESEARCH)

- 4 See SMOKE TOXICITY

CURIUM (RADIOACTIVITY)

- 85 as Curium-243
- 85 as Curium-244

CYSTINE

- 41 See MICROCHEMISTRY

D

DENSITY

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

DEPTH PROFILING

- 79 Nickel/Chromium
Thin Film
- 79 Arsenic Implant in Silicon
- Boron Implant in Silicon 79

DEXTROSE (D-GLUCOSE)

- 13 See HEALTH & CLINICAL

DIFFERENTIAL SCANNING CALORIMETRY

- 71 Biphenyl
- 71 Indium
- 71 Mercury
- 71 Thermal Analysis
Purity Set
- 71 Tin

DIFFERENTIAL THERMAL ANALYSIS 71

DIFFRACTION (X-RAY) 83

DIOXIN (IN ISOCTANE)

- 20 See ORGANIC
CONSTITUENTS

DISODIUM HYDROGEN PHOSPHATE

- 66 for pD CALIBRATION
- 65 for pH CALIBRATION

DNA

- (abbr. for Deoxyribonucleic Acid)

DNA PROFILING

- 16 See HEALTH & CLINICAL
- 16 DNA Profiling
- 16 PCR-Based DNA Profiling
- 16 DNA Mitochondrial
Sequencing

DOLOMITIC LIMESTONE

- 34 See ROCKS AND
MINERALS

DOSIMETRY (RADIOACTIVITY)

- 89 Neutron Density Monitor Wire

DRUG LEVEL ASSAY (ANTIEPILEPSY)

- 14 See HEALTH & CLINICAL

DRUGS OF ABUSE

- 17 in FREEZE-DRIED URINE

DSC

- 71 abbr. for Differential
Scanning Calorimetry

DTA

- 71 abbr. for Differential Thermal
Analysis

DUST

- 92 Urban (TRACE ELEMENTS)
- 21 Urban (ORGANIC
CONSTITUENTS)

DYE PENETRANT TEST (CRACK) BLOCK

- 5 (NONDESTRUCTIVE
EVALUATION)

DYSPROSIUM

- 42 SPECTROMETRY Solution

E

EDDY CURRENT

- 5 ARTIFICIAL FLAW FOR NDE

ELECTRICAL PROPERTIES

- 77 See ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF GRAPHITE & ELECTROLITIC
- 77 See ELECTRICAL RESISTIVITY AND CONDUCTIVITY OF SILICON
- 81 See SUPERCONDUCTING CRITICAL CURRENT
- 81 of GLASS (CERAMICS AND GLASSES)

ELECTROLYTIC CONDUCTIVITY (ION ACTIVITY)

- 67 Hydrochloric Acid Solutions for
- 67 Potassium Chloride Solutions for
- 67 Sodium Chloride Solutions for

ELECTRON MICROSCOPE

- 35 THIN FILM FOR TRANSMISSION ELECTRON MICROSCOPE

ELECTRONIC AND MAGNETIC ALLOY

- 59 Nickel-Iron
- 59 Nickel-Molybdenum

ELECTROPHORETIC MOBILITY 67

ELLIPSOMETRY

- 80 Silicon Dioxide on Silicon

ENTHALPY (THERMODYNAMIC PROPERTIES)

- 70 of Copper
- 70 of Molybdenum
- 70 of Synthetic Sapphire
- 70 of Polystyrene

ENVIRONMENTAL MATRICES

- 23 See METAL CONSTITUENTS (INORGANICS)
- 89 See NATURAL MATRIX MATERIALS (RADIOACTIVITY)
- 20 See ORGANIC CONSTITUENTS (ORGANICS)
- 28 See TRACE ELEMENTS IN COALS & COKE

ERBIUM

- 42 SPECTROMETRY Solution

ESTUARINE SEDIMENT

- 23 See (SOILS, SEDIMENTS, AND SLUDGES)

ETHANOL

- 29 Ethanol (ALCOHOLS AND ETHERS IN REFERENCE FUELS)
- 15 Ethanol-Water (ETHANOL SOLUTIONS)

ETHERS (ALCOHOLS AND ETHERS IN REFERENCE FUELS)

- 29 t-Amyl Methyl Ether
- 29 Ethyl t-Butyl Ether
- 29 Methyl t-Butyl Ether

EUCALYPTUS HARDWOOD

- 7 BLEACHED KRAFT PULPS

EUROPIUM

- 85 as Europium-152 (RADIOACTIVITY)
- 42 SPECTROMETRY solution

F

FATTY ACIDS (FOOD & AGRICULTURE)

- 10 Typical Diet

FELDSPAR (ROCKS AND MINERALS)

- 34 in Potash
- 34 in Soda

FERROUS ALLOYS

- 47 See FERROUS METALS

FERTILIZERS (FOOD & AGRICULTURE)

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

FIBROUS GLASS BOARD

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

FILTER MEDIA (MATERIALS ON FILTER MEDIA)

- 91 Air Particulate on Filter
- 91 Quartz on

FILTERS, OPTICAL 74

FINENESS (SIZING)

- 2 of Portland Cement (CEMENT TURBIDIMETRY AND FINENESS)

FIRE RESEARCH

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

FISSION TRACK GLASS 89

FLAMMABILITY

- 3 SURFACE FLAMMABILITY (FIRE RESEARCH)

FLOORING RADIANT PANEL 4

- 3 See FIRE RESEARCH

FLOUR

- 9 Durum Wheat
- 9 Hard Red Spring Wheat
- 9 Rice
- 9 Soft Winter Wheat
- 9 Spinach Leaves
- 9 Wheat Hardness

FLUORESCENCE

- 75 Quinine Sulfate Dihydrate

FLUORIDE

- 44 ANION CHROMATOGRAPHY solution
- 17 in FREEZE-DRIED URINE
- 11 in Vegetation

FLUORO COMPOUNDS

- 41 p-Fluorobenzoic Acid (MICRO-CHEMISTRY)

FLUORSPAR (ORES)

- 32 Customs Grade
- 32 High Grade

FLY ASH COAL

- 28 Coal Fly Ash (FOSSIL FUELS)
- 28 TRACE ELEMENTS

FOODS & AGRICULTURE (NUTRITION COMPOSITION)

- 10 Baking Chocolate
- 10 Baby Food Composite
- 10 Corn Bran
- 10 Corn Starch
- 10 Durham Wheat Flour
- 10 Fatty Acids & Cholesterol
- 10 Infant Formula
- 10 Meat Homogenate
- 10 Typical Diet
- 10 Whole Egg Powder
- 10 Whole Milk Powder
- 10 Wheat Gluten
- 9 Bovine Liver
- 9 Non-fat Milk Powder
- 9 Oyster Tissue
- 9 Rice Flour
- 9 Wheat Flour

FOSSIL FUELS

- 28 Alcohols & Ethers in Reference Fuels
- 70 Coal Heat of Combustion (COMBUSTION CALORIMETRY)
- 29 Ethanol (ALCOHOLS AND ETHERS IN REFERENCE FUELS)
- 28 Isooctane
- 28 n-Heptane
- 28 METAL CONSTITUENTS in Fossil Fuels
- 28 METAL CONSTITUENTS in Residual Fuel Oil
- 29 Methanol
- 30 Sulfur in Coal (SULFUR IN FOSSIL FUELS)
- 30 Sulfur in Kerosine (SULFUR IN FOSSIL FUELS)
- 31 Sulfur in Residual Fuel Oil (SULFUR IN FOSSIL FUELS)
- 70 Synthetic Refuse Derived Oil (COMBUSTION CALORIMETRY)
- 28 TRACE ELEMENTS in Coal
- 28 TRACE ELEMENTS in Coal Fly Ash
- 28 TRACE ELEMENTS in Fuel Oil
- 28 Vanadium in Crude Oil (METAL CONSTITUENTS IN FOSSIL FUELS)

FREE CUTTING BRASS

- 56 See NONFERROUS METALS

FRESHWATER LAKE SEDIMENT (RADIOACTIVITY)

- 89 Freshwater Lake Sediment (NATURAL MATRIX MATERIALS)

FREEZING POINT (THERMODYNAMIC PROPERTIES)

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

FSV

- 14 abbr. for Fat Soluble Vitamins

FUELS

- 28 See FOSSIL FUELS

FUMED SILICA BOARD 72

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

G

GADOLINIUM

- 42 SPECTROMETRY Solution

GALLIUM

- 23 in Buffalo River Sediment (SOILS, SEDIMENTS, AND SLUDGES)
- 28 in Coal (TRACE ELEMENTS)
- 28 in Coal Fly Ash (TRACE ELEMENTS)
- 87 as Gallium-67 (RADIOPHARMACEUTICALS)
- 62 in Glass (TRACE ELEMENTS)
- 72 Melting Point (THERMODYNAMIC PROPERTIES)
- 44 Metal (STABLE ISOTOPIC MATERIALS)
- 42 SPECTROMETRY Solution

GAS CHROMATOGRAPHY (ORGANIC CONSTITUENTS)

- 19 GC/MS System Performance
- 19 LC Selectivity

GASES (PRIMARY GAS MIXTURES)

- 24 See PRIMARY GAS MIXTURES

GASES IN METALS

- 55 in Irons (FERROUS METALS)
- 55 in Steels (FERROUS METALS)
- 60 in Unalloyed Titanium (NON-FERROUS METALS)

GASOLINE

- 29 See FOSSIL FUELS

GEOLOGICAL

- 32 See GEOLOGICAL MATERIALS AND ORES

GERMANIUM

- 42 SPECTROMETRY Solution

GILDING METAL

- 58 See NONFERROUS METALS

GLASS BEADS

- 1 See SIZING

GLASSES

- 82 Borosilicate (VISCOSITY OF GLASS)
- 62 Chemical Composition
- 81 Chemical Resistance
- 82 DENSITY AND REFRACTIVE INDEX of
- 62 Fused Ore Glass
- 83 GLASS LIQUIDUS TEMPERATURE
- 62 High-Boron Borosilicate
- 62 Lead-Barium
- 81 Lead-Silica (ELECTRICAL PROPERTIES OF GLASS)
- 62 Low-Boron Soda-Lime Powder
- 73 LABORATORY THERMOMETER (MERCURY IN GLASS)
- 62 Multi Component
- 82 RELATIVE STRESS OPTICAL COEFFICIENT of
- 34 Sand (ROCKS AND MINERALS)
- 62 Soda-Lime Container
- 62 Soda-Lime Flat
- 62 Soda-Lime Float
- 62 Soda-Lime Sheet

- 82 Soda-Lime-Silica (VISCOSITY OF GLASS)
- 62 Soft Borosilicate
- 62 SYNTHETIC GLASS (TRACE ELEMENTS)
- 72 THERMAL EXPANSION OF METAL & GLASS
- 72 THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE
- 82 VISCOSITY FIXPOINTS of

GLASS SAND

- 34 See ROCKS AND MINERALS

GLASS SPHERES

- 1 PARTICLE SIZE (SIZING)

D-GLUCOSE

- 13 aka. Dextrose (HEALTH & CLINICAL)
- 40 Polarimetric Value of (STOICHIOMETRY)

GOETHITE

- 67 Aka. A-FeOOH (ELECTROPHORETIC MOBILITY)

GOLD

- 75 First Surface Gold on Nickel-Plated Aluminum (SPECULAR SPECTRAL REFLECTANCE)
- 39 METALS (HIGH PURITY METALS)
- 41 METALS (MICROANALYSIS)
- 32 Ore Refractories
- 42 SPECTROMETRY Solution
- 73 VAPOR PRESSURE OF METALS
- 40 Royal Canadian Mint Reference Materials (HIGH PURITY MATERIALS)

GRAPHITE

- 73 THERMAL CONDUCTIVITY OF GRAPHITE AND IRON

GRAVITY SEDIMENTATION

- 1 Zirconium Oxide (PARTICLE SIZE)

H

HAFNIUM

- 42 SPECTROMETRY Solution
- 60 in Zircaloy (ZIRCONIUM BASE ALLOYS)

HARDNESS (FOOD AND AGRICULTURE)

- 9 WHEAT HARDNESS

HARDNESS (SURFACE FINISH)

- 6 of Bright Copper (MICRO-HARDNESS)
- 6 of Bright Nickel (MICROHARDNESS)
- 6 Of Ceramic (MICROHARDNESS)
- 5 ROCKWELL HARDNESS

HASTELLOY

- 59 NICKEL BASE ALLOYS

HEALTH, NUTRITION COMPOSITION

- 10 Baby Food Composite
- 10 Cholesterol.....in Coconut Oil
- 10 Fatty Acids.....Frozen Diet Composite
- 10 Infant Formula (milk-based)
- 10 Typical Diet
- 10 Whole Egg Powder
- 10 Whole Milk

HEAT (THERMODYNAMIC PROPERTIES)

- 70 COMBUSTION CALORIMETRY
- 71 DEFINING FIXED POINT, ITS-90
- 71 DEFINING FIXED POINT CELLS, ITS-90
- 71 DIFFERENTIAL SCANNING CALORIMETRY
- 71 DIFFERENTIAL THERMAL ANALYSIS
- 80 ENTHALPY AND HEAT CAPACITY
- 72 FREEZING POINT, MELTING POINT, AND TRIPLE POINT CELLS
- 73 LABORATORY THERMOMETER
- 72 REFERENCE POINTS
- 70 SOLUTION CALORIMETRY
- 73 THERMAL CONDUCTIVITY OF GRAPHITE AND IRON
- 72 THERMAL EXPANSION OF METAL & GLASS
- 72 THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE

- 73 THERMOCOUPLE MATERIAL, PLATINUM
- 73 VAPOR PRESSURE OF METALS

HEPES (BIOLOGICAL BUFFERS)

- 66 abbr. for N-2-Hydroxyethyl-piperazine-N-2-ethanesulfonic Acid
- 66 HEPES Free Acid
- 66 NaHEPESate

N-HEPTANE (FOSSIL FUELS)

- 29 REFERENCE LIQUIDS FOR EVALUATING FUELS

HIGH ALLOY STEELS (FERROUS METALS)

- 50 Chromium Nickel (Copper Precipitation Hardening)
- 50 Chromium Nickel (Molybdenum Precipitation Hardening)
- 50 High Nickel
- 50 High Temperature Alloy (A286) Nickel-Chromium
- 50 High Temperature Alloy L605
- 50 High Temperature Alloy Iron-Nickel-Cobalt
- 50 Valve Steel

HIGH PURITY METALS

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

HIGH TEMPERATURE ALLOYS

- 47 See FERROUS METALS

HOLMIUM

- 75 Holmium Oxide Solution Wavelength
- 42 SPECTROMETRY Solution

HUMAN

- 14 See HEALTH & CLINICAL
- 89 LIVER (NATURAL MATRIX MATERIALS) (RADIOACTIVITY)
- 89 LUNG (NATURAL MATRIX MATERIALS) (RADIOACTIVITY)
- 14 Serum (SERUM MATERIALS)

HUMAN SERUM (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 SERUM MATERIALS

HUMAN SERUM (ORGANICS)

- 21 Polychlorinated Biphenyls in (ORGANIC CONSTITUENTS)

HYDROGEN

- 85 as Hydrogen-3 (RADIOACTIVITY SOLUTIONS)
- 60 Unalloyed Titanium for (GASES IN METALS)

HYDROXYAPATITE

- 16 See Calcium Hydroxyapatite

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

I

ICTAC

- 71 abbr. for International Confederation of Thermal Analysis and Calorimetry
- 76 X-RAY AND PHOTOGRAPHY

INCONEL

- 59 NICKEL BASE ALLOYS (NON-FERROUS METALS)

INDIUM

- 87 as Indium-111 (RADIOPHARMACEUTICALS)
- 71 DEFINED FIXED POINT, ITS-90
- 72 FREEZING POINT, MELTING POINT, AND TRIPLE POINT CELLS
- 42 SPECTROMETRY Solution

INDUSTRIAL HYGIENE

- 91 See INDUSTRIAL HYGIENE

INFRARED, NEAR

- 75 INFRARED REFLECTANCE

IODINE (RADIOACTIVITY)

- 87 as Iodine-125 (RADIOPHARMACEUTICALS)

- 85 as Iodine-129 (RADIOACTIVE SOLUTIONS)

- 87 as Iodine-131 (RADIOPHARMACEUTICALS)

ION ACTIVITY

- 66 BIOLOGICAL BUFFER SYSTEMS
- 67 ELECTROLYTIC CONDUCTIVITY
- 66 ION-SELECTIVE ELECTRODE CALIBRATION
- 66 pD CALIBRATION
- 65 pH CALIBRATION

IRON

- 73 Electrolytic Iron (THERMAL CONDUCTIVITY OF GRAPHITE AND IRON)
- 47 See FERROUS METALS
- 13 Iron Metal (HEALTH & CLINICAL)
- 42 SPECTROMETRY Solution
- 36 Tris(1-phenyl-1,3 butaine-diono)-iron(III) (METALLO-ORGANIC COMPOUNDS)

ISOTOPE(S)

- 45 See LIGHT STABLE ISOTOPIC MATERIALS
- 45 See HIGH PURITY MATERIALS
- 88 See RADIOACTIVITY

K

KEROSINE

- 30 Sulfur in (SULFUR IN FOSSIL FUELS)

KNOOP MICROHARDNESS (SURFACE FINISH)

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

L

LANTHANUM

- 42 SPECTROMETRY Solution

LAKE SEDIMENT (RADIOACTIVITY)

- 89 Freshwater Lake Sediment (NATURAL MATRIX MATERIALS)

LEAD

- 36 Lead Cyclohexanebutyrate (METALLO-ORGANIC COMPOUNDS)
- 15 Lead in Blood (HEALTH & CLINICAL)
- 13 Lead Nitrate (HEALTH & CLINICAL)
- 44 Metal Equal Atom (STABLE ISOTOPIC MATERIALS)
- 44 Metal, Natural (STABLE ISOTOPIC MATERIALS)
- 44 Metal, Radiogenic (STABLE ISOTOPIC MATERIALS)
- 92 In Paint Film
- 92 In Powdered Paint
- 92 In Indoor Dust, Trace Elements
- 92 In Paint on Fiberboard
- 92 In Soil, Trace Elements
- 56 See NONFERROUS METALS
- 92 Powdered Lead Base Paint (LEAD IN PAINT, DUST AND SOIL)
- 28 in Reference Fuel (METAL CONSTITUENTS IN FOSSIL FUELS)
- 42 SPECTROMETRY Solution

LEAD BASE ALLOYS/MATERIALS

- 56 See NONFERROUS METALS

LEAVES (FOOD & AGRICULTURE)

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

LIMESTONE (ROCKS AND MINERALS)

- 34 Argillaceous
- 34 Dolomitic

LINERBOARD

- 6 for TAPE ADHESION TESTING

LINEWIDTH (METROLOGY)

- 78 OPTICAL MICROSCOPE LINEWIDTH MEASUREMENT

LIPIDS

- 14 in Human Serum (SERUM MATERIALS)

LIQUID CHROMATOGRAPHY

- 19 GS/MS AND LC SYSTEM PERFORMANCE

LIQUIDUS TEMPERATURE

- 83 Soda-Lime Silica
- 83 Aluminosilicate

LITHIUM

- 45 Carbonate (LIGHT STABLE ISOTOPIC MATERIALS)
- 13 Carbonate (HEALTH & CLINICAL)
- 36 Lithium Cyclohexanebutyrate (METALLO-ORGANIC COMPOUNDS)
- 32 Ore, Petalite (ORES)
- 32 Ore, Spodumene (ORES)
- 42 SPECTROMETRY Solution

LIVER

- 9 Bovine (FOODS AND BEVERAGES)
- 89 Human (NATURAL MATRIX MATERIALS) (RADIOACTIVITY)

LUBRICATING BASE OIL

- 37 Total Chlorine
- 37 Total Nitrogen
- 37 Total Sulfur
- 37 WEAR-METALS IN OIL

LUNG (RADIOACTIVITY)

- 89 Human (NATURAL MATRIX MATERIALS)

LUTETIUM

- 42 SPECTROMETRY Solution

M

MAGNETIC MOMENT

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

MAGNESIUM

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

MAGNIFICATION

- 79 SCANNING ELECTRON MICROSCOPE (SEM)

MANGANESE

- 79 SEM Performance Standard
- 79 SEM Sharpness Standard
- 42 SPECTROMETRY Solution

D-MANNITOL (HEALTH & CLINICAL) 13

MARIJUANA METABOLITE

- 17 THC-9-COOH (DRUGS OF ABUSE IN URINE)

MARINE MATERIALS

- 23 Buffalo River Sediment (METAL CONSTITUENTS IN NATURAL MATRICES)
- 23 Estuarine Sediment (METAL CONSTITUENTS IN NATURAL MATRICES)
- 34 Limestone Argillaceous
- 34 (ROCKS AND MINERALS)
- 34 Limestone Dolomitic (ROCKS AND MINERALS)
- 21 Organics in Marine Sediment (ORGANIC CONSTITUENTS)
- 21 Organics in Mussel Tissue (ORGANIC CONSTITUENTS)
- 21 Organics in Whale Blubber (ORGANIC CONSTITUENTS)
- 9 Oyster Tissue (FOOD & AGRICULTURE)
- 21 Polychlorinated Biphenyls (Congeners) in River Sediment A (ORGANIC CONSTITUENTS)

MASS SPECTROMETRY

- 19 GC/MS AND LC SYSTEM PERFORMANCE(ORGANICS)
- 19 GC/MS SYSTEM
- 19 Lc Chiral Selectivity
- 19 LC Performance
- 19 LC Selectivity
- 45 See LIGHT STABLE ISOTOPIC MATERIALS
- 88 See RADIOACTIVITY
- 44 See STABLE ISOTOPIC MATERIALS

MATERIALS ON FILTER MEDIA

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

MELTING POINT AND TRIPLE POINT (THERMODYNAMIC PROPERTIES) 72

MERCURY

- 17 Mercury (TOXIC SUBSTANCES IN URINE)
- 71 Mercury (Triple Point) (DEFINING FIXED POINT ITS-90)
- 43 SPECTROMETRY Solution
- 28 TRACE ELEMENTS (FOSSIL FUELS)
- 28 Trace Mercury in Coal (TRACE ELEMENTS)
- 23 in Water (METAL CONSTITUENTS IN NATURAL MATRICES)

METALLO-ORGANICS (ENGINE WEAR MATERIALS) 36

METALS ON FILTER MEDIA

- 91 See MATERIALS ON FILTER MEDIA

METHANE (PRIMARY GAS MIXTURES)

- 26 Methane in Air

METROLOGY 78

MICROANALYSIS 35

MICROCHEMISTRY (HIGH PURITY MATERIALS)

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

MICROCOPY

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

MICROHARDNESS (SURFACE FINISH)

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

MICROSCOPY (METROLOGY)

- 79 DEPTH PROFILING
- 80 ELLIPSONOMETRY
- 78 OPTICAL MICROSCOPE LINEWIDTH MEASUREMENT
- 79 SCANNING ELECTRON MICROSCOPE (SEM)

MICROSPHERE (SIZING)

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

MILK (FOOD AND AGRICULTURE)

- 10 Infant Formula
- 9 Non-fat Milk Powder

MINERALS

- 34 See ROCKS AND MINERALS

MIXTURES AND POLLUTANTS (PRIMARY GAS MIXTURES)

- 24 Ambient Non-Methane Organics in Nitrogen
- 25 Carbon Dioxide in Nitrogen
- 25 Carbon Monoxide in Air
- 25 Carbon Monoxide in Nitrogen
- 26 Hydrogen Sulfide in Nitrogen
- 26 Methane in Air
- 26 Nitric Oxide in Nitrogen
- 26 Oxides of Nitrogen in Air
- 27 Oxygen in Nitrogen
- 27 Propane in Air
- 27 Sulfur Dioxide in Nitrogen

MOLECULAR WEIGHT AND MELT FLOW (POLYMERIC PROPERTIES)

- 69 Polyethylene Gas Pipe Resin
- 68 Polyethylene Linear
- 68 Poly(ethylene oxide)
- 69 Polyethylene Resin
- 68 Poly(methylmethacrylate)
- 68 Polystyrene

MOLYBDENUM

- 70 ENTHALPY AND HEAT CAPACITY
- 87 as Molybdenum-99-Technetium-99m (RADIO-PHARMACEUTICALS) 87
- 43 SPECTROMETRY Solution

N

NAVAL BRASS

- 56 See NONFERROUS METALS

NDE

- 5 abbr. for Nondestructive Evaluation

NEODYMIUM

- 43 SPECTROMETRY Solution

NEUTRON MONITOR (RADIOACTIVITY)

- 89 Neutron Density Monitor Wire (RADIATION DOSIMETRY)

NICKEL

- 85 as Nickel-63 (RADIOACTIVE SOLUTION)
- 36 Nickel
- 36 Cyclohexanecarboxylate(METAL-LO-ORGANIC COMPOUNDS)
- 44 Nickel (STABLE ISOTOPIC MATERIALS)
- 79 Nickel-Chromium Thin Film(DEPTH PROFILING)
- 59 NICKEL BASE ALLOYS (NON-FERROUS METALS)
- 59 NICKEL OXIDES (NONFERROUS METALS)
- 7 Nickel Disk (MAGNETIC MOMENT)
- 7 Nickel Sphere (MAGNETIC MOMENT)
- 43 SPECTROMETRY Solution

NICOTINIC ACID

- 41 MICROCHEMISTRY (HIGH PURITY MATERIALS)

NIOBIUM

- 87 as Niobium-94 (GAMMA RAY POINT SOURCES)
- 43 SPECTROMETRY Solution

NITRATE

- 44 ANION CHROMATOGRAPHY Solution

NITRIC OXIDE (PRIMARY GAS MIXTURES)

- 26 Nitric Oxide in Nitrogen

NITRIDE

- 2 Silicon Nitride (SURFACE AREA OF POWDERS)
- 6 (MICROHARDNESS)

NITROGEN (PRIMARY GAS MIXTURES)

- 37 Total Nitrogen (LUBRICATING BASE OILS)

4-NITROPHENOL 13

NONDESTRUCTIVE EVALUATION

- 5 ARTIFICIAL FLAW FOR EDDY CURRENT NDE

NONFERROUS ALLOYS

- 56 See NONFERROUS METALS

NORTHERN SOFTWOOD

- 7 BLEACHED KRAFT PULPS

NUCLEAR MATERIALS (RADIOACTIVITY)

- 88 Carbon-14 DATING
- 89 FISSION TRACK GLASS
- 87 GAMMA RAY POINT SOURCES
- 89 NATURAL MATRIX MATERIALS
- 85 RADIOACTIVE SOLUTIONS
- 87 RADIOPHARMACEUTICALS
- 88 RADON EMANATION

NUTRITION

- 9 See FOOD & AGRICULTURE

O

OBSIDIAN ROCK

- 34 ROCKS AND MINERALS

OCEAN MATERIALS (RADIOACTIVITY) (NATURAL MATRIX MATERIALS)

- 89 Ocean Sediment

OIL

- 37 Chlorine in (LUBRICATING BASE OILS)
- 31 Fuel Oil (FOSSIL FUELS)
- 37 High Sulfur Gas Oil Feed (CATALYST CHARACTERIZATION MATERIALS)
- 31 Moisture in Oils (FOSSIL FUELS)
- 37 Nitrogen (LUBRICATING BASE OILS)
- 21 Organics in Cod Liver Oil (ORGANIC CONSTITUENTS)
- 21 Petroleum Crude Oil (ORGANIC CONSTITUENTS)
- 21 Polychlorinated Biphenyls in (ORGANIC CONSTITUENTS)
- 21 Shale Oil (ORGANIC CONSTITUENTS)
- 37 Sulfur in (LUBRICATING BASE OILS)
- 31 Sulfur in Residual Fuel Oil (SULFUR IN FOSSIL FUELS)
- 28 Vanadium in Crude Oil (METAL CONSTITUENTS IN FOSSIL FUELS)
- 28 Vanadium and Nickel in Residual Fuel Oil (METAL CONSTITUENTS IN FOSSIL FUELS)
- 37 WEAR-METALS IN OIL (ENGINE WEAR MATERIALS)

OPTOELECTRONICS (METROLOGY)

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

ORES (GEOLOGICAL MATERIALS AND ORES)

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

ORGANICS

- 22 EPA: ORGANIC COMPOUNDS RELATED TO (WATER ANALYSIS)
- 22 1,1,1-Trichloroethane in Methanol
- 22 1,2,3-Trichloropropane in Methanol
- 22 1,2-Dichloroethane in Methanol
- 22 1,2-Dichloropropane in Methanol
- 22 Benzene in Methanol
- 22 Carbon Tetrachloride in Methanol
- 22 Ethylbenzene in Methanol
- 22 Isopropylbenzene in Methanol
- 22 Methylene Chloride in Methanol
- 22 m-Xylene in Methanol
- 22 o-Xylene in Methanol

- 22 p-Xylene in Methanol
- 22 sec-Butylbenzene in Methanol
- 22 Tetrachloroethene (Tetrachloroethylene) in Methanol
- 22 Toluene in Methanol
- 22 Vinylidene in Methanol
- 20 ORGANIC CONSTITUENTS
- 19 GC/MS AND LC SYSTEM PERFORMANCE

OXALIC ACID (RADIOACTIVITY)

- 88 Carbon-14 Dating

OXYGEN (PRIMARY GAS MIXTURES)

- 27 Oxygen in Nitrogen

OXYGENATES

- 29 ALCOHOLS...IN REFERENCE FUELS

OYSTER TISSUE

- 9 FOOD & AGRICULTURE

P

PACKAGE

- 24 Catalyst Package (CATALYST PACKAGE FOR LUBRICANT OXIDATION)

PAINT

- 92 LEAD IN PAINT, DUST AND SOIL

PALLADIUM

- 43 SPECTROMETRY Solution

PARTICAL COUNT MATERIALS

- 2 For suspensions

PARTICLE SIZE (SIZING)

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

PARTICULATES

- 21 Diesel Particulate Matter (ORGANIC CONSTITUENTS)
- 91 MATERIALS ON FILTER MEDIA
- 21 Urban Dust/Organics (ORGANIC CONSTITUENTS)
- 23 Urban Particulate Matter (INORGANICS)

66pD CALIBRATION (ION ACTIVITY)

- 66 Disodium Hydrogen Phosphate
- 66 Potassium Dihydrogen Phosphate
- 66 Potassium Hydrogen Phthalate
- 66 Sodium Bicarbonate
- 66 Sodium Carbonate

PERUVIAN SOIL (RADIOACTIVITY) 89

PESTICIDES (ORGANIC CONSTITUENTS)

- 20 Chlorinated Pesticides in Hexane
- 20 Chlorinated Pesticides in Isooctane

PH CALIBRATION (ION ACTIVITY)

- 65 Calcium Carbonate
- 65 Disodium Hydrogen Phosphate
- 65 Potassium Dihydrogen Phosphate
- 65 Potassium Hydrogen Phthalate
- 65 Potassium Hydrogen Tartrate
- 65 Potassium Tetroxalate
- 65 Sodium Bicarbonate
- 65 Sodium Carbonate
- 65 Sodium Tetraborate Decahydrate
- 66 See BIOLOGICAL BUFFER SYSTEMS

PHOSPHATE

- 66 See pD CALIBRATION
- 65 See pH CALIBRATION
- 44 ANION CHROMATOGRAPHY Solution
- 32 Phosphate Rock (ORES)
- 36 Triphenyl Phosphate (METAL-LO-ORGANIC COMPOUNDS)

PHOSPHORUS

- 43 SPECTROMETRY Solution

PHOTOGRAPHY

- 76 See X-RAY AND PHOTOGRAPHY

PINE NEEDLES

- 9 See FOOD & AGRICULTURAL

PLASTIC

- 68 See POLYMERIC PROPERTIES

PLATINUM (HIGH PURITY METALS)

- 39 High Purity Platinum
- 73 Platinum High Purity (THERMOELEMENT MATERIAL)
- 43 SPECTROMETRY Solution

PLUTONIUM (RADIOACTIVITY)

- 89 Ashed Bone
- 89 Columbia River Sediment
- 89 Human Liver
- 89 Human Lung
- 89 Ocean Sediment
- 89 Peruvian Soil
- 85 Plutonium-238
- 85 Plutonium-239
- 85 Plutonium-240
- 85 Plutonium-241
- 85 Plutonium-242

POLLUTANTS

- 28 METAL CONSTITUENTS IN FOSSIL FUELS
- 24 PRIMARY GAS MIXTURES
- 28 ORGANIC CONSTITUENTS (ORGANICS)

POLONIUM (RADIOACTIVITY)

- 85 Polonium-209 (RADIOACTIVE SOLUTIONS)

POLYCHLORINATED BIPHENYLS PCBs

- 20 Chlorinated Biphenyls
- 20 Chlorinated Biphenyl Congeners in Isooctane
- 21 Polychlorinated Biphenyl Congeners in Isooctane
- 21 Polychlorinated Biphenyls in Human Serum
- 21 Polychlorinated Biphenyls in Oil
- 21 Polychlorinated Biphenyls in River Sediment A

POLYETHYLENE (MOLECULAR WEIGHT AND MELT FLOW)

- 69 Polyethylene Gas Pipe Resin
- 68 Polyethylene Linear
- 68 Poly(ethylene Oxide)
- 68 Polyethylene Resin

POLYMER

- 68 See POLYMERIC PROPERTIES

POLY(METHYL-METHACRYLATE) (POLYMERIC PROPERTIES)

- 68 MOLECULAR WEIGHT AND MELT FLOW

POLYSTYRENE

- 70 ENTHALPY AND HEAT CAPACITY
- 70 (THERMODYNAMIC PROPERTIES)
- 68 MOLECULAR WEIGHT AND MELT FLOW
- 68 (POLYMERIC PROPERTIES)

POTASSIUM

- 43 SPECTROMETRY Solution

POTASSIUM CHLORIDE

- 13 See PURE CRYSTALLINE STANDARDS
- 67 ELECTROLYTIC CONDUCTIVITY
- 66 ION-SELECTIVE ELECTRODE CALIBRATION
- 44 STABLE ISOTOPIC MATERIALS
- 70 SOLUTION CALORIMETRY
- 40 STOICHIOMETRY

POTASSIUM DICHROMATE

- 74 MOLECULAR ABSORPTION
- 40 STOICHIOMETRY

POTASSIUM DIHYDROGEN PHOSPHATE

- 11 FERTILIZERS
- 66 pD CALIBRATION
- 65 pH CALIBRATION

POTASSIUM FLUORIDE

- 66 ION-SELECTIVE ELECTRODE CALIBRATION

POTASSIUM HYDROGEN PHTHALATE

- 66 pD CALIBRATION
- 65 pH CALIBRATION
- 40 STOICHIOMETRY

POTASSIUM HYDROGEN TARTRATE

- 65 pH CALIBRATION

POTASSIUM IODIDE

- 74 MOLECULAR ABSORPTION

POTASSIUM NITRATE

- 11 FERTILIZERS
- 45 LIGHT STABLE ISOTOPIC MATERIALS

POTASSIUM TETROXALATE

- 65 pH CALIBRATION

POWDERED LEAD BASE PAINT

- 92 LEAD IN PAINT, DUST, AND SOIL

PRASEODYMIUM

- 43 SPECTROMETRY Solution

PRIMARY CHEMICALS

- 40 STOICHIOMETRY

PRIORITY

POLLUTANT PAH

- 21 ORGANIC CONTAMINANTS

PYRITE ORE

- 33 ORE BIOLEACHING SUBSTRATE

Q

QUARTZ

- 91 MATERIALS ON FILTER MEDIA

R

RADIOACTIVITY

- 89 FISSION TRACK GLASS
- 87 GAMMA RAY POINT SOURCES
- 89 NATURAL MATRIX MATERIALS
- 89 RADIATION DOSIMETRY
- 85 RADIOACTIVE SOLUTIONS
- 87 RADIOPHARMACEUTICALS
- 88 RADON EMANATION
- 88 Carbon-14 DATING

RADIUM (RADIOACTIVITY)

- 86 Radium-226 (RADIOACTIVE SOLUTIONS)
- 88 Radium-226 (RADON EMANATION)

REFERENCE FUELS

- 28 See FOSSIL FUELS

REFLECTANCE (OPTICAL PROPERTIES)

- 75 DIFFUSE SPECTRAL REFLECTANCE
- 75 INFRARED REFLECTANCE
- 75 SPECULAR SPECTRAL REFLECTANCE

**REFRACTORIES
(GEOLOGICAL
MATERIALS AND
ORES)**

- 34 Burnt Refractory

**REFORMULATED
GASOLINES**

- 28 See FOSSIL FUELS

**RESIDUAL RESISTIVITY
RATIO (ELECTRICAL
PROPERTIES) 77**

**RESISTANCE
(THERMODYNAMIC
PROPERTIES)**

- 72 THERMAL RESISTANCE OF
GLASS, SILICA, AND POLY-
STYRENE

**RESISTIVITY
(ELECTRICAL
PROPERTIES)**

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

RHENIUM

- 43 SPECTROMETRY Solution

RHODIUM

- 43 SPECTROMETRY Solution

**RICE FLOUR (FOOD &
AGRICULTURE) 9**

**RIVER SEDIMENT
(INORGANICS)**

- 23 SOILS, SEDIMENTS, AND
SLUDGES
- 23 Buffalo River Sediment
- 23 Estuarine Sediment

**RIVER SEDIMENT
(ORGANICS)**

- 21 Polychlorinated Biphenyls in
River Sediment A

**RIVER SEDIMENT
(RADIOACTIVITY)**

- 89 Columbia River Sediment
(NATURAL MATRIX
MATERIALS)

ROCKS

- 34 Basalt Rock (ROCKS AND
MINERALS)
- 34 Obsidian Rock (ROCKS AND
MINERALS)
- 11 Phosphate Rock (Florida)
(FERTILIZERS)
- 11 Phosphate Rock (Western)
(FERTILIZERS)

**ROYAL CANADIAN
MINT REFERENCE
MATERIALS 40**

RUBIDIUM

- 72 Rubidium (FREEZING POINT,
MELTING POINT AND TRIPLE
POINT CELLS)
- 44 Rubidium Chloride (STABLE
ISOTOPIC MATERIALS)
- 43 SPECTROMETRY Solution

S

SAMARIUM

- 43 SPECTROMETRY Solution

SAND (GLASS)

- 34 See ROCKS AND MINERALS

SCANDIUM

- 43 SPECTROMETRY Solution

**SCANNING ELECTRON
MICROSCOPE
(METROLOGY)**

- 79 SEM Performance Standard
- 79 SEM Sharpness Standard

SCHEELITE ORE

- 32 ORES

SEDIMENT

- 23 METAL CONSTITUENTS IN
NATURAL MATRICES
- 89 NATURAL MATRIX MATERIALS
(RADIOACTIVITY)

SELENIUM

- 39 Selenium Intermediate Purity
(HIGH PURITY METALS)
- 43 SPECTROMETRY Solution

SERUM MATERIALS

- 15 Bovine Serum Albumin
- 14 Electrolytes in Frozen Human
Serum
- 14 Glucose in Frozen Human
Serum
- 14 Human Serum
- 14 Lipids in Frozen Human
Serum

SHELLFISH

- 21 Mussel Tissue (ORGANIC
CONSTITUENTS)
- 10 Oyster Tissue (FOOD & AGRI-
CULTURE)

SILICA

- 24 Carbon Modified Silica
(INORGANICS)
- 72 Fumed Silica Board (THER-
MAL RESISTANCE OF GLASS,
SILICA, AND POLYSTYRENE)
- 72 THERMAL EXPANSION OF
GLASS AND SILICA)
- 82 Lead Silica Glass (DENSITY
AND REFRACTIVE INDEX)
- 91 Respirable Alpha Quartz
(RESPIRABLE SILICA)
- 91 Respirable Cristobalite
(RESPIRABLE SILICA)
- 34 Silica Brick (REFRACTORIES)

SILICON

- 77 ELECTRICAL RESISTIVITY
AND CONDUCTIVITY OF
SILICON
- 36 Octaphenylcyclotetrasiloxane
(METALLO-ORGANIC
COMPOUNDS)
- 53 Silicon Metal (STEELMAKING
ALLOYS)
- 83 Silicon Powder (X-RAY DIF-
FRACTION)
- 43 SPECTROMETRY Solution
- 53 See STEELMAKING ALLOYS

SILICON DIOXIDE

- 80 Thin Film Thickness
(ELLIPSOmetry)

**SILICON NITRIDE
(SIZING) (SURFACE
FINISH)**

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

SILVER

- 35 Alloy (METALS)
(MICROANALYSIS)
- 40 Royal Canadian Mint
Reference Materials
- 36 Silver 2-ethylhexanoate (MET-
ALLO-ORGANIC MATERIALS)
- 44 Silver Nitrate (STABLE
ISOTOPIC MATERIALS)
- 43 SPECTROMETRY Solution

**SINUSOIDAL
ROUGHNESS**

- 3 SURFACE ROUGHNESS
(SURFACE FINISH)

SIZING

- 2 CEMENT TURBIDIMETRY AND
- 2 FINENESS
- 1 PARTICLE SIZE
- 2 SURFACE AREA OF POWDERS

SLUDGE

- 23 Domestic Sludge (METAL CONSTITUENTS IN NATURAL MATRICES)
- 23 Industrial Sludge (METAL CONSTITUENTS IN NATURAL MATRICES)
- 23 SOILS, SEDIMENTS, AND SLUDGES (GEOLOGICAL MATERIALS AND ORES)

SMOKE

(FIRE RESEARCH)

- 4 SMOKE DENSITY CHAMBER
- 4 SMOKE TOXICITY

SODA LIME GLASS (CERAMICS AND GLASSES)

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

SODIUM

- 65 Disodium Hydrogen Phosphate
- 65 Sodium Bicarbonate (ION ACTIVITY)
- 40 Sodium Carbonate (STOICHIOMETRY)
- 65 Sodium Carbonate (ION ACTIVITY)
- 13 Sodium Chloride (HEALTH & CLINICAL)
- 36 Sodium Cyclohexanecarboxylate (METALLO-ORGANIC MATERIALS)
- 40 Sodium Oxalate (STOICHIOMETRY)
- 13 Sodium Pyruvate (HEALTH & CLINICAL)
- 65 Sodium Tetraborate Decahydrate
- 43 SPECTROMETRY Solution

SOILS

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

SOLDER (METROLOGY)

- 79 Tin-Lead Alloy (SOLDER THICKNESS)

SPECTRAL REFLECTANCE (OPTICAL PROPERTIES)

- 75 SPECULAR SPECTRAL REFLECTANCE

SPHERES (SIZING)

- 1 PARTICLE SIZE

SPECTROMETRY

- 42 SINGLE ELEMENT solutions
- 74 See MOLECULAR ABSORPTION

SPECULAR SPECTRAL REFLECTANCE

- 75 First Surface, Aluminum on Glass
- 75 First Surface, Black Glass

STAINLESS STEEL

- 47 See FERROUS METALS

STEEL COATINGS

- 80 CHROMIUM OVER COPPER ON STEEL

STEELS (FERROUS METALS) 48

STRONTIUM

- 86 Strontium-90 (RADIOACTIVITY)
- 40 Strontium Carbonate (STOICHIOMETRY)
- 44 Strontium Carbonate (STABLE ISOTOPIC MATERIALS)
- 36 Strontium Cyclohexanecarboxylate (METALLO-ORGANIC MATERIALS)
- 43 SPECTROMETRY Solution
- 72 SUCCINONITRILE (THERMODYNAMIC PROPERTIES)
- 72 FREEZING POINT, MELTING POINT AND TRIPLE POINT CELLS

SUCROSE

- 76 OPTICAL ROTATION
- 40 STOICHIOMETRY

SULFATE

- 44 ANION CHROMATOGRAPHY Solution

SULFIDE (PRIMARY GAS MIXTURES)

- 26 Hydrogen Sulfide in Nitrogen

SULFUR

- 37 CATALYST CHARACTERIZATION MATERIALS
- 43 SPECTROMETRY Solution
- 30 SULFUR IN FOSSIL FUELS
- 37 WEAR-METALS IN OIL

SULFUR DIOXIDE (PRIMARY GAS MIXTURES)

- 27 Sulfur Dioxide in Nitrogen
- 2 SURFACE AREA (SIZING)
- 2 SURFACE AREA OF POWDERS
- 3 SURFACE FINISH
- 3 ABRASIVE WEAR
- 6 MICROHARDNESS
- 3 SURFACE ROUGHNESS

SURFACE FLAMMABILITY (FIRE RESEARCH)

- 3 Hardboard Sheet

T

TANTALUM

- 43 SPECTROMETRY Solution

TAPE ADHESION TESTING

- 6 Linerboard for Tape Adhesion Testing

TECHNETIUM

- 86 Technetium-99m (RADIOACTIVE SOLUTIONS)
- 87 Technetium-99m (RADIO-PHARMACEUTICALS)

TELLURIUM

- 43 SPECTROMETRY Solution

TERBIUM

- 43 SPECTROMETRY Solution
- 17 TETRAHYDROCANNABINOL (Marijuana Metabolite)
- 17 DRUGS OF ABUSE IN URINE, SINGLE ANALYTE
- 17 DRUGS OF ABUSE IN URINE, MULTIANALYTE

THALLIUM

- 43 SPECTROMETRY Solution
- 87 Thallium-201 (RADIO-PHARMACEUTICALS)

THERMAL ANALYSIS (THERMODYNAMIC PROPERTIES)

- 70 COMBUSTION CALORIMETRY
- 71 DIFFERENTIAL SCANNING CALORIMETRY
- 71 DIFFERENTIAL THERMAL ANALYSIS
- 70 ENTHALPY AND HEAT CAPACITY
- 70 SOLUTION CALORIMETRY

THERMAL CONDUCTIVITY OF GRAPHITE AND METALS

- 70 (THERMODYNAMIC PROPERTIES)
- 73 Electrolytic Iron
- 73 Graphite

THERMAL EXPANSION OF METAL GLASS AND SILICA

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

THERMAL RESISTANCE OF GLASS, SILICA, AND POLYSTYRENE

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

THERMOMETER (THERMODYNAMIC PROPERTIES)

- 73 Laboratory Thermometer

THERMOMETRIC FIXED POINTS (THERMODYNAMIC PROPERTIES)

- 71 DEFINING FIXED POINT, ITS-90
- 71 DEFINING FIXED POINT CELLS, ITS-90
- 71 FREEZING POINT, MELTING POINT AND TRIPLE POINT

THIANTHRENE

- 70 COMBUSTION CALORIMETRY

THICKNESS (METROLOGY)

- 80 CHROMIUM OVER COPPER ON STEEL
- 80 ELLIPSOmetry
- 79 SOLDER THICKNESS

THORIUM

- 43 SPECTROMETRY Solution

THORIUM (RADIOACTIVITY)

- 85 RADIOACTIVE SOLUTIONS

THULIUM

- 43 SPECTROMETRY Solution

TIN

- 71 DEFINING FIXED POINT, ITS-90
- 71 DEFINING FIXED POINT CELLS, ITS-90
- 36 Dibutyltin bis (2-ethylhexanoate) (METALLO-ORGANIC COMPOUNDS)

- 71 DIFFERENTIAL SCANNING CALORIMETRY
- 43 SPECTROMETRY Solution

TIN BASE ALLOYS

- 60 See NONFERROUS METALS

TITANIUM

- 60 GASES IN METALS (NONFERROUS METALS)
- 43 SPECTROMETRY Solution
- 60 TITANIUM BASE ALLOYS (NONFERROUS METALS)

TITANIUM DIOXIDE

- 34 REFRACTORIES

TOXIC METALS

- 17 TOXIC SUBSTANCES IN URINE

TRACE ELEMENTS

- 61 See CERAMICS AND GLASSES
- 28 See FOSSIL FUELS
- 59 See TRACE ELEMENTS IN NICKEL BASE SUPERALLOYS

TRANSMISSION ELECTRON MICROSCOPE

- 35 See THIN FILM FOR TRANSMISSION
- 93 See ASBESTOS

TRANSMITTANCE

- 74 See MOLECULAR ABSORPTION

TRIPLE POINT

- 72 (THERMODYNAMIC PROPERTIES)
- 28 REFERENCE LIQUIDS FOR RATING FUELS

TRIPALMITIN

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

TUNGSTEN

- 43 SPECTROMETRY Solution
- 61 Tungsten Carbide (CARBIDES)
- 6 Tungsten Carbide (MICRO-HARDNESS)
- 32 Tungsten Concentrate (ORES)

TURBIDIMETRY (SIZING)

- 2 Portland Cement (CEMENT TURBIDIMETRY AND FINENESS)

U

UNIVERSITY OF PITTSBURGH I (FIRE RESEARCH)

- 4 See SMOKE TOXICITY

URANIUM

- 43 SPECTROMETRY Solution

URANIUM (RADIOACTIVITY)

- 89 Fission Track Glass
- 85 RADIOACTIVE SOLUTIONS
- 89 NATURAL MATRIX MATERIALS

UREA

- 13 HEALTH & CLINICAL
- 70 COMBUSTION CALORIMETRY (THERMODYNAMIC PROPERTIES)
- 14 in Human Serum (SERUM MATERIALS)
- 41 MICROCHEMISTRY

URIC ACID

- 13 HEALTH & CLINICAL

URINE FREEZE-DRIED (HEALTH & CLINICAL)

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

USA/CANADA COLLABORATIVE MATERIALS

- 9 Bovine Muscle
- 9 Corn Kernel
- 9 Corn Stalk
- 9 Corn Starch
- 10 Durum Wheat Flour
- 9 Hard Red Spring Wheat Flour
- 9 Soft Winter wheat Flour
- 10 Wheat Gluten
- 10 Whole Egg
- 10 Whole Milk

V

VANADIUM

- 36 Bis(1-phenyl-13-butane-diono)oxovanadium (IV)
- 43 SPECTROMETRY Solution
- 28 Vanadium in Crude Oil (METAL CONSTITUENTS IN FOSSIL FUELS)

VAPOR PRESSURE OF METALS (THERMODYNAMIC PROPERTIES)

- 73 Cadmium
- 73 Gold

VICKERS (MICROHARDNESS) (SURFACE FINISH)

- 6 Bright Copper
- 6 Bright Nickel
- 6 Tungsten Carbide

VISCOSITY OF GLASS (CERAMICS AND GLASSES)

- 82 VISCOSITY FIXPOINTS
- 82 VISCOSITY OF GLASS

VITAMINS

- 10 Baby Food Composite (NUTRITION COMPOSITION)
- 10 Cholesterol and FSV in Coconut Oil
- 14 Fat Soluble Vitamins in Human Serum (HEALTH & CLINICAL)
- 10 Infant Formula

VMA

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

W

WASPALLOY

- 59 NICKEL BASE ALLOYS (NONFERROUS METALS)
- 23 WATER ANALYSIS (INORGANICS)
- 23 Mercury in Water (METAL CONSTITUENTS IN NATURAL MATRICES)
- 23 Natural Water (METAL CONSTITUENTS IN NATURAL MATRICES)
- 23 Trace Elements in Water (METAL CONSTITUENTS IN NATURAL MATRICES)

WAVELENGTH (OPTICAL PROPERTIES)

- 75 Holmium Oxide Solution

WEAR (SURFACE FINISH)

- 3 D-2 Tool Steel (ABRASIVE WEAR)

WEAR-METALS (ENGINE WEAR MATERIALS)

- 37 WEAR METALS IN OIL

WHALE BLUBBER (ORGANICS) 21

WHEAT FLOUR (FOOD AND AGRICULTURE)

- 9 USA/CANADA COLLABORATIVE MATERIALS

X

XENON (RADIOACTIVITY)

- 87 as Xenon-133 (RADIOPHARMACEUTICALS)

X-RAY

- 83 X-RAY DIFFRACTION
- 83 X-RAY STAGE CALIBRATION

X-RAY FILM

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

Y

YTTERBIUM

- 43 SPECTROMETRY Solution

YTTRIUM

- 43 SPECTROMETRY Solution

Z

ZINC

- 71 DEFINING FIXED POINT, ITS-90
- 72 DEFINING FIXED POINT CELLS, ITS-90
- 71 DIFFERENTIAL SCANNING CALORIMETRY
- 39 METALS (HIGH PURITY METALS)
- 91 Metals on Filter Media (MATERIALS ON FILTER MEDIA)
- 43 SPECTROMETRY Solution
- 61 Spelter (ZINC BASE ALLOYS)
- 36 Zinc Cyclohexanecarboxylate (METALLO-ORGANIC COMPOUNDS)
- 32 Zinc Concentrate (ORES)

ZIRCONIUM

- 43 SPECTROMETRY Solution
- 60 Zircaloy-4 (ZIRCONIUM BASE ALLOYS)

NUMERIC INDEX

SRM	Descriptor	Page	SRM	Descriptor	Page
1c	Limestone, Argillaceous	34	77a	Burnt Refractory, (Al2O3-60 %)	34
4l	Cast Iron	54	78a	Burnt Refractory, (Al2O3-70 %)	34
5m	Cast Iron	54	79a	Fluorspar, Customs Grade	52
6g	Cast Iron	54	81a	Glass Sand	34, 62
7g	Cast Iron (High Phosphorus)	54	82b	Cast Iron (Ni-Cr)	54
11h	Carbon Steel, 0.2 C	47	83d	Arsenic Trioxide (Reductometric)	40
12h	Carbon Steel, 0.4 C	47	84k	Potassium Hydrogen Phthalate	40
13g	Carbon Steel, 0.6 C	47	87a	Aluminum-Silicon Alloy	56
14g	Carbon Steel, 0.8 C	47	88b	Dolomitic Limestone	34
15h	Carbon Steel, 0.1 C	47	89	Glass, Lead Barium	62
17e	Sucrose (Polarimetric)	40, 76	90	Ferrophosphorus	53
19h	Carbon Steel, 0.2 C	47	92	Low-Boron, Soda-Lime Powder	62
20g	Carbon Steel	47	93a	High-Boron Borosilicate	62
25d	Manganese Ore	32	94c	Zinc-Base Die Casting Alloy	61
30f	LA Steel, Cr-V (SAE 6150)	49	97b	Flint Clay	33
32e	LA Steel, Ni-Cr (SAE 3140)	49	98b	Plastic Clay	33
33e	LA Steel, Ni-Mo (SAE 4820)	49	99a	Feldspar, Soda	34
36b	LA Steel, Cr-Mo	49	100b	LA Steel, Manganese (SAE T340)	49
39j	Benzoic Acid (Calorimetric Standard)	70	101g	Stainless Steel (AISI 304L)	51
40h	Sodium Oxalate (Reductometric)	40	106b	LA Steel, Cr-Mo-Al (Nitalloy rG)	49
45d	Cu Freezing Point	72	107c	Cast Iron (Ni-Cr-Mo)	54
49e	Lead Freezing Point	72	112b	Silicon Carbide	60
50c	Tungsten-Chromium-Vanadium Steel	52	113b	Zinc Concentrate	32
53e	Bearing Metal (84Pb-10Sb-6Sn)	58	114p	Portland Cement Fineness Standard	2
54d	Bearing Metal (Tin Base)	60	115a	Cast Iron (Cu-Ni-Cr)	54
57a	Silicon Metal	53	120c	Phosphate Rock (Florida)	11, 32
58a	Ferrosilicon (73 % Si)	53	121d	Stainless Steel Cr-Ni-Ti (AISI 321)	51
59a	Ferrosilicon	53	122i	Cast Iron	54
64c	Ferrochromium, High Carbon	53	123c	Stainless Steel Cr-Ni-Nb (AISI 348)	51
68c	Ferromanganese, High Carbon	53	125b	High Silicon Steel – Calcium Bearing	49
69b	Bauxite (Arkansas)	32	126c	High Alloy Steel, High Nickel	50
70a	Feldspar, Potash	34	127b	Solder, 40Sn-60Pb	58
72g	LA Steel (AISI 4130)	49	129c	LA Steel, High Sulfur (SAE 112)	49
73c	Stainless Steel, Cr (SAE 420)	51	131g	LA Steel, High Silicon	49
76a	Burnt Refractory (Al2O3-40 %)	34	132b	Tool Steel (AISI M2)	52

SRM	Descriptor	Page	SRM	Descriptor	Page
134a	Tool Steel, Mo-W-Cr-V	52	291	LA Steel, Cr-Mo (ASTM A 213)	49
136e	Potassium Dichromate (oxidimetric standard)	40	293	LA Steel, Cr-Ni-Mo (AISI 8620)	49
139b	LA Steel, Cr-Ni-Mo (AISI 8640)	49	330	Copper Ore Mill Heads	32
141d	Acetanilide	41	331	Copper Ore Mill Tails	32
142	Anisic Acid	41	334	Gray Cast Iron (Carbon & Sulfur)	32, 54
143d	Cystine	41	337a	Basic Open Hearth Steel, 1 % Carbon	47
148	Nicotinic Acid	41	338	White Cast Iron (Carbon & Sulfur)	54
152a	Carbon Steel, 0.5 C	47	339	Stainless Steel, Cr-Ni-Se (SAE 30)	51
154c	Titanium Dioxide	34	341	Ductile Cast Iron	54
155	LA Steel, Cr-W	49	342a	Nodular Cast Iron	54
158a	Bronze, Silicon	57	343a	Stainless Steel (AISI 431)	51
160b	Stainless Steel Cr-Ni-Mo (AISI 316)	51	344	HA Steel, (Mo Precipitation Hardening)	50
163	LA Steel, 1.0 C	49	345a	HA Steel, (Cu Precipitation Hardening)	50
165a	Glass Sand (Low Iron)	34, 62	346a	Valve Steel	50
166c	Stainless Steel, Carbon Only	51	347	Magnesium Ferrosilicon	53
178	Carbon Steel, 0.4 C	47	348a	Hi Temp. Alloy, (A286) Ni-Cr	50
179	LA Steel, High Silicon	49	349a	Waspalloy	59
180	Fluorspar, High Grade	32	350a	Benzoic Acid	40
181	Lithium Ore (Spodumene)	32	351	Sodium Carbonate	40
182	Lithium Ore (Petalite)	32	352c	Unalloyed Titanium, Hydrogen	60
183	Lithium Ore (Lepidolite)	32	360b	Zircaloy 4, Zr-Base Alloy	60
185g	Potassium Hydrogen Phthalate, pH	65	361	LA Steel (AISI 4340)	50
186lf	Potassium Dihydrogen Phosphate	65	362	LA Steel (AISI 94B17) (mod.)	50
186llf	Disodium Hydrogen Phosphate	65	363	LA Steel, Cr-V (mod.)	50
187d	Sodium Tetraborate (Borax), pH	65	364	LA Steel, High C (mod.)	50
188	Potassium Hydrogen Tartrate, pH	65	368	Carbon Steel (AISI 1211)	47
189b	Potassium Tetroxalate, pH	65	395	Unalloyed Copper II (chips)	57
191b	Sodium Bicarbonate, pH	65	396	Unalloyed Copper III (chips)	57
192b	Sodium Carbonate, pH	65	398	Unalloyed Copper V (chips)	57
193	Potassium Nitrate	11	399	Unalloyed Copper VI (chips)	57
194	Ammonium Dihydrogen Phosphate	11	400	Unalloyed Copper VII (chips)	57
195	Ferrosilicon (75 % Si-HP Grade)	53	454	Unalloyed Copper XI (chips)	57
196	Ferrochromium, Low Carbon	53	458	Beryllium-Copper (17510)	57
198	Silica Brick	34	459	Beryllium-Copper (17200)	57
199	Silica Brick	34	460	Beryllium-Copper (17300)	57
200a	Potassium Dihydrogen Phosphate	11	475	Optical Linewidth	78
211d	Toluene Liquid Density	82	476	Optical Linewidth	78
276b	Tungsten Carbide	61	480	Tungsten-Molybdenum EPMA	35
277	Tungsten Concentrate	32	481	Gold-Silver EPMA	35
278	Obsidian Rock	34	482	Gold-Copper EPMA	35
			494	Unalloyed Copper I (solid)	57

SRM	Descriptor	Page	SRM	Descriptor	Page
495	Unalloyed Copper II (solid)	57	663	LA Steel, Cr-V (mod.)	48
496	Unalloyed Copper III (solid)	57	664	LA Steel, High Carbon, (mod.)	48
498	Unalloyed Copper V (solid)	57	670	Rutile Ore	32
499	Unalloyed Copper VI (solid)	57	671	Nickel Oxide 1	59
500	Unalloyed Copper VII (solid)	57	672	Nickel Oxide 2	59
600	Bauxite, Australian	32	673	Nickel Oxide 3	59
607	Potassium Feldspar	62	674	X-Ray Powder Diffraction Intensity, set	83
610	Trace Elements in Glass	62	675	Line Position, Mica (XRD)	83
611	Trace Elements in Glass	62	676	Quantitative Analysis, Alumina (XRD)	83
612	Trace Elements in Glass	62	679	Brick Clay	33
613	Trace Elements in Glass	62	680L1a	High Purity Platinum	39
614	Trace Elements in Glass	62	682	High Purity Zinc	39
615	Trace Elements in Glass	62	683	Zinc, Metal	39
616	Trace Elements in Glass	62	685R	High Purity Gold	39
617	Trace Elements in Glass	62	685W	High Purity Gold	39
620	Soda Lime, Flat	62	688	Basalt Rock	34
621	Soda-Lime Container	62	689	Ferrochromium Silicon	53
622	Soda-Lime Silica (Durability)	81	690	Iron Ore (Canada)	32
623	Borosilicate (Durability)	81	691	Iron Oxide, Reduced	32
624	Lead-Silica Glass for dc Resistivity	81	692	Iron Ore, Labrador	32
625	Zinc-Base A	61	693	Iron Ore, Nimba	32
626	Zinc-Base B	61	694	Phosphate Rock, Western	32, 11
627	Zinc-Base C	61	696	Bauxite, Surinam	32
628	Zinc-Base D	61	697	Bauxite, Dominican	32
629	Zinc-Base E-ASTM AC 41A	61	698	Bauxite, Jamaican	32
630	Zinc-Base F	61	699	Alumina (Reduction Grade)	32
631	Zinc Spelter (mod)	61	705a	Polystyrene 179k Mol/Wt	68, 70
640c	Silicon Line Position (XRD)	83	706a	Polystyrene 258k mol/wt	68
641	Titanium Alloy, 8 Mn (A)	60	709	Extra Dense Lead	82
642	Titanium Alloy, 8 Mn (B)	60	710a	Soda-Lime Silica Glass	82
643	Titanium Alloy, 8 Mn (C)	60	713	Barium Glass Anneal Pt	82
647	Titanium Alloy, Al-Mo-Sn-Zr	60	714	Alumina Glass Anneal Pt	82
648	Titanium Alloy, Al-Sn-Zr-Cr-Mo	60	716	Neutral Glass Anneal Pt	82
649	Titanium Alloy V-Al-Cr-Sn	60	717a	Hi Boron Glass Viscosity	82
650	Unalloyed Titanium A	60	720	Sapphire Heat Capacity	70
651	Unalloyed Titanium B	60	723d	Tris (hydroxymethy) amionmethane	40, 65
654b	Titanium Alloy, Al-V	60	726	Selenium, Inter-Purity	39
656	Silicon Nitride Quantitative Analysis	83	728	Zinc, Intermediate Purity	39
659	Silicon Nitride, Particle Size	1	731L1	Borosilicate Glass - Thermal Expansion	72
660a	Line Profile LaB6	83	731L2	Borosilicate Glass - Thermal Expansion	72
661	LA Steel (AISI 4340)	48	731L3	Borosilicate Glass - Thermal Expansion	72

SRM	Descriptor	Page	SRM	Descriptor	Page
736L1	Copper Thermal Expansion	72	892	Cast Iron, Ni-Hard, Type IV	54
738	Stainless Steel - Thermal Expansion	72	893	Stainless Steel (SAE 405)	51
740a	Zinc (Freezing Point)	71	895	Stainless Steel (SAE 201)	51
741a	Tin (Freezing Point)	71	897	Tracealloy A	59
742	Alumina (Reference Point)	72	898	Tracealloy B	59
743	Mercury (Triple Point)	71	899	Tracealloy C	59
745	Gold-Vapor Pressure	73	900	Antiepilepsy Drug (4) Level	14
746	Cadmium-Vapor Pressure	73	909b	Human Serum	14
762	Magnetic Moment Standard Nickel Disk	7	910	Sodium Pyruvate	13
772a	Nickel Sphere for Magnetic Moment	7	911b	Cholesterol	13
773	Soda-Lime Silica (Glass Liquidus)	83	912a	Urea	13
774	Lead-Silica (Dielectric Constant)	81	913a	Uric Acid	13
781D2	Molybdenum (Heat Capacity)	70	914a	Creatinine	13
855a	Aluminum Casting Alloy 356	56	915a	Calcium Carbonate (Clinical)	13
856a	Aluminum Casting Alloy 380	56	916a	Bilirubin	13
858	Aluminum Alloy 6011	56	917b	D-Glucose (Dextrose-Clinical)	13, 40, 76
859	Aluminum Alloy 7075	56	918a	Potassium Chloride (Clinical)	13
861	Nickel-based Superalloy	50	919a	Sodium Chloride (Clinical)	13
862	High Temperature Alloy L-605	50, 56	920	D-Mannitol	13
864	Inconel 600	59	921	Cortisol (Hydrocortisone)	13
865	Inconel 625	59	924a	Lithium Carbonate (Clinical)	13
866	Incoloy, 800	55	925	VMA (Clinical)	13
867	Incoloy, 825	55	927c	Bovine Serum Albumin (7 % solution)	15
868	High Temp Alloy Fe-Ni-Co	50	928	Lead Nitrate (Clinical)	13
869a	LC Column Selectivity	19	929	Magnesium Glutamate Dihydrate	13
870	LC Column Performance	19	930e	Glass Filters Transmittence	74
871	Bronze, Phosphor (CDA521)	57	931f	Liquid Absorbance Filters UV-VIS	74
872	Bronze, Phosphor (CDA 544)	57	934	Clinical Thermometer	73
874	Cupro-Nickel, 10 % (CDA 706) "H-P"	57	935a	Potassium Dichromate, UV Absorbance	74
875	Cupro-Nickel, 10 % (CDA 706)	57	936a	Quinine Sulfate	75
877	LC Chiral Selectivity	19	937	Iron Metal Clinical	13
879	Nickel Silver (CDA 762)	57	938	4-Nitrophenal	13
880	Nickel Silver (CDA 770)	57	951	Boric Acid, Assay and Isotopic	40, 44
882	Alloy Ni-Cu-Al	59	952	Boric Acid 95 % enr 10B	44
885	Refined Copper	39	953	Cobalt in Aluminum Wire	89
886	Gold, Ore Refractory	32	955b	Lead in Blood	15
887	Cemented Carbide (W-83,Co-10)	61	956a	Electrolytes in Frozen Human Serum	14
888	Cemented Carbide (W-64,Co-25,Ta-5)	61	963a	Fission Track Glass U-1 mg/g	89
889	Cemented Carbide(W-75,Co-9,Ta-5,Ti-4)	61	965	Glucose in Human Serum	14
890	Cast Iron HC250+V	54	966	Toxic Metals in Bovine Blood	15
891	Cast Iron, Ni-Hard Type 1	54	968c	Fat-Sol Vit,Caroten,Cholest in Hum Serum	14

SRM	Descriptor	Page	SRM	Descriptor	Page
970	Ascorbic Acid in Frozen Human Serum	14	1060a	Lithium (Metallo-Organic)	36
975a	Chlorine (Isotopic)	44	1065b	Nickel (Metallo-Organic)	36
976	Copper (Isotopic)	44	1066a	Silicon (Metallo-Organic)	36
977	Bromine (Isotopic)	44	1069b	Sodium (Metallo-Organic)	36
978a	Silver (Isotopic)	44	1070a	Strontium (Metallo-Organic)	36
979	Chromium (Isotopic)	44	1071b	Phosphorus (Metallo-Organic)	36
980	Magnesium (Isotopic)	44	1073b	Zinc (Metallo-Organic)	36
981	Natural Lead (Isotopic)	44	1075a	Aluminum (Metallo-Organic)	36
982	Equal Atom Lead (Isotopic)	44	1077a	Silver (Metallo-Organic)	36
983	Radiogenic Lead (Isotopic)	44	1078b	Chromium (Metallo-Organic)	36
984	Rubidium Assay (Isotopic)	44	1079b	Iron (Metallo-Organic)	36
985	Potassium (Isotopic)	44	1080a	Copper (Metallo-Organic)	36
986	Nickel (Isotopic)	44	1083	Wear Metals (Base Oil)	37
987	Strontium Assay and Isotopic	40, 44	1084a	Wear Metals in Oil, 100 mg/kg	37
991	Lead-206 Spike Assay and Isotopic	44	1085b	Wear Metals in Oil, 300 mg/kg	37
994	Gallium (Isotopic)	44	1089	Steels, Set (consists of SRMs 1095-1099)	55
997	Thallium (Isotopic)	44	1090	Ingot Iron, Oxygen	55
998	Angiotensin I (Human)	13	1091a	Stainless Steel (AISI 431)	55
999a	Potassium Chloride(Assay)	40	1093	Valve Steel, Oxygen	55
1001	X-ray Film Step Tablet	76	1094	Maraging Steel	55
1002d	Hard Board (Surface Flammability)	3	1104	Fire Cutting Brass	58
1003d	Glass Spheres (Particle Size)	1	1107	Naval Brass B	58
1004b	Glass Beads - Particle Size Distribution	1	1108	Naval Brass C	58
1006d	Smoke Density, Cellulose	4	1110	Red Brass B	58
1007b	Plastic (Smoke Density)	4	1111	Red Brass C	58
1008	Photographic Step Tablet	76	1112	Gilding Metal A (disk)	58
1010a	Microcopy Test Chart	76	C1112	Gilding Metal A (block)	58
1012	Flooring Radiant Panel	4	1113	Gilding Metal B (disk)	58
1017b	Glass (Particle Size)	1	C1113	Gilding Metal B (block)	58
1018b	Glass (Particle Size)	1	1114	Gilding Metal C (disk)	58
1019b	Glass (Particle Size)	1	C1114	Gilding Metal C (block)	58
1021	Glass Beads, Soda Lime	1	1115	Commercial Bronze A (disk)	58
1034	Unalloyed Copper	57	C1115	Commercial Bronze A (block)	58
1035	Leaded-Tin Bronze Alloy	57	1116	Commercial Bronze B (disk)	58
1048	Smoke Toxicity (Cup Furnace)	4	C1116	Commercial Bronze B (block)	58
1049	Smoke Toxicity (Univ of Pittsburgh)	4	1117	Commercial Bronze C (disk)	58
1051b	Barium (Metallo-Organic)	36	C1117	Commercial Bronze C (block)	58
1052b	Vanadium (Metallo-Organic)	36	C1122	Beryllium-Copper (block)	58
1053a	Cadmium (Metallo-Organic)	36	1128	Ti Alloy (15V-3AL-3CR-3SN)	60
1057b	Tin (Metallo-Organic)	36	1129	Solder (63Sn-37Pb)	58
1059c	Lead (Metallo-Organic)	36			

SRM	Descriptor	Page	SRM	Descriptor	Page
1134	LA Steel, High Silicon	48	1254	LA Steel (Ca only)	48
1135	LA Steel, High Silicon	48	1258	Aluminum Alloy 6011	56
C1137a	White Cast Iron	53	1259	Aluminum Alloy 7075	56
1138a	Cast Steel (No 1)	53	1262b	LA Steel (AISI 94B17)	48
1139a	Cast Steel (No 2)	53	1263a	Cr Steel Cr-V (mod)	48
C1145a	White Cast Iron	53	1264a	LA Steel, High Carbon (mod)	48
C1151a	Stainless Steel 23Cr-7Ni	51	1265a	Electrolytic Iron	48
C1152a	Stainless Steel 18Cr-11Ni	51	1269	Line Pipe (AISI 1521 mod)	48
C1153a	Stainless Steel 17Cr-9Ni	51	1270	LA Steel, Cr-Mo (A336) (F-22)	48
C1154a	Stainless Steel 19Cr-13Ni	51	1271	LA Steel (HSLA-100)	48
1155	Stainless Steel Cr18-Ni12-Mo2 (AISI 316)	51	1276a	Cupro-Nickel (CDA 715)	58
1157	Specialty Steel, Tool (AISI M2)	52	C1285	LA Steel (A242) (mod)	48
1158	Specialty Steel, High Nickel (36 % Ni)	52	1286	Low Alloy Steel (HY 80)	48
1159	Elec/Mag Ni-Fe	59	C1290	High Alloy (HC-250 + V)	53
1160	Elec/Mag Ni-Mo-Fe	59	C1291	High Alloy (Ni-Hard, Type I)	53
1171	Stainless Steel Cr17-Ni11-Ti0.3 AISI 321	51	C1292	High Alloy (Ni-Hard, Type IV)	53
1172	Stainless Steel, Cr17-Ni11-Nb.6 AISI 348	51	1295	Stainless Steel (SAE 405)	51
1173	Ni-Cr-Mo-V Steel	53	C1296	Stainless Steel	51
C1173	Cast Steel 3	53	1297	Stainless Steel (SAE 201)	51
1216	Carbon Modified Silica	24	1358a	Cu & Cr Coating on Steel	80
1219	Stainless Steel Cr-Ni (AISI 431)	51	1359b	Cu & Cr Coating on Steel	80
C1221	Carbon Steel	48	1361b	Cu & Cr Coating on Steel	80
1223	Chromium Steel	51	1362b	Cu & Cr Coating on Steel	80
1224	LA Steel, Carbon (AISI 1078)	48	1363b	Cu & Cr Coating on Steel	80
1225	LA Steel AISI 4130	48	1364b	Cu & Cr Coating on Steel	80
1226	LA Steel	48	1400	Bone Ash	17
1227	LA Steel, Basic Open Hearth, 1 %C	48	1411	Soft Borosilicate Glass	62
1228	LA Steel 0.1 % C	48	1412	Multicomponent Glass	62
1230	High Temp Alloy A286	55	1413	Glass Sand (High Alumina)	34, 62
1233	Specialty Steel, Valve Steel	52	1416	Aluminosilicate Glass for Liquidus Temp	83
1242	High Temp Alloy L-605	56	1449	Fumed Silica Board	72
1243	Waspalloy	59	1450c	Fibrous Glass Board	72
1244	Inconel 600	59	1453	Thermal Resis Expanded Polystyrene Board	72
1246	Incoloy 800	55	1457	Superconducting Nb-Ti Wire	81
1247	Incoloy 825	55	1459	Fumed Silica Board	72
C1248	Nickel-Copper Alloy	59	1473b	Low Density Polyethylene Resin	69
1249	Inconel 718	59	1474	Polyethylene Resin	69
1250	High Temp Alloy Fe-Ni-Co	55	1475a	Polyethylene, Linear	68, 69
			1478	Polystyrene Narrow Mol Wt	68

SRM	Descriptor	Page	SRM	Descriptor	Page
1479	Polystyrene, Narrow Mol Wt	68	1587	Nitro PAH in Methanol	20
1480	Polyurethane	68	1588a	Organics in Cod Liver Oil	21
1482a	Polyethylene, 14K Molecular Weight	68	1589a	PCBs, Pesti, Dioxins/ Furans in Human Serum	21, 10, 14
1483	Polyethylene, Linear	68	1595	Tripalmitin	13
1484a	Polyethylene, Linear	68	1596	Dinitropyrene Imrs, 1Nitropyrene Meth-Chl	20
1486	Bone Meal	17	1597	Complex PAH Mix	21
1487	Poly (methyl methacrylate)	68	1598	Inorganic Constituents in Bovine Serum	15
1488	Poly (methyl methacrylate)	68	1599	2 Anticonvulsant Drugs	14
1489	Poly (methyl methacrylate)	68	1614	Dioxin in Isooctane	20
1491	Arom Hydro/Hexane Toluene	20	1616a	Sulfur in Kerosene	30
1492	Chlor Pesticides/Hexane	20	1617a	Sulfur in Kerosene	30
1493	PCB Congeners	20	1619b	Sulfur in Residual Fuel Oil 0.7 %	31
1496	Polyethylene Gas Pipe Resin	69	1620c	Sulfur in Residual Fuel Oil 4 %	31
1497	Polyethylene Gas Pipe Resin	69	1621e	Sulfur in Residual Fuel Oil 1 %	31
1507b	THC-COOH in Freeze-Dried Urine	17	1622e	Sulfur in Residual Fuel Oil 2 %	31
1508a	Benzoylcegonine(Cocaine Meta) FR-DR URINE	17	1623c	Sulfur in Residual Fuel Oil 0.3 %	31
1511	Multi Drugs of Abuse in Freeze-Dried Urine	17	1632c	Trace Elements in Coal	28, 31
1514	Thermal Analysis Purity Set (DSC)	71	1633b	Trace Elements in Coal Fly Ash	28
1515	Apple Leaves	11	1634c	Trace Elements in Fuel Oil	28
1543	GC/MS System Performance	19	1635	Trace Elements in Coal (Subbituminous)	28, 31
1544	Fatty Acids & Chol in Froz Diet Composit	10	1639	Halocarbons (in Methanol)	20
1546	Meat Homogenate	10	1640	Natural Water	23
1547	Peach Leaves	11	1641d	Mercury in Water	23
1548a	Typical Diet	10, 9	1643e	Trace Elements in Water	23
1549	Non-Fat Milk Powder	9	1646a	Estuarine Sediment	23
1563	Cholesterol & Fat Soluble Vitamins in Coconut Oil	10	1647d	Priority Pollutant PAHs	20
1566b	Oyster Tissue	10, 9	1648	Urban Particulate Matter	22, 23
1567a	Wheat Flour	9	1649a	Urban Dust/Organics	21
1568a	Rice Flour	9	1650	Diesel Particulate Matter	21
1570a	Trace Elements in Spinach Leaves	11, 9, 10	1655	KCl Solution Calorimetry	70
1573a	Tomato Leaves	11	1656	Thianthrene Combustion Calorimeter	70
1575a	Trace Elements in Pine Needles	11	1657	Synthetic Refuse Derived Fuel	70
1577b	Bovine Liver	9	1658a	CH ₄ /Air, 1umol/mol	26
1580	Shale Oil	21	1659a	CH ₄ /Air, 10 umol/mol	26
1582	Petroleum Crude Oil	21	1660a	CH ₄ /C ₃ H ₈ /Air 1 umol/mol	26, 27
1584	Phenols in Methanol	20	1661a	SO ₂ /N ₂ 500 umol/mol	27
1586	Isotope Label Pollutants	20	1662a	SO ₂ /N ₂ 1000 umol/mol	27
			1663a	SO ₂ /N ₂ 1500 umol/mol	27

SRM	Descriptor	Page	SRM	Descriptor	Page
1664a	SO ₂ /N ₂ 2500 umol/mol	27	1745	Indium (Freezing Point)	71
1665b	C ₃ H ₈ /Air 3 umol/mol	27	1746	Silver (Freezing Point)	71
1666b	Propane in Air 10 umol/mol	27	1747	Tin Freezing Point Cell	71
1667b	Propane in Air 50 umol/mol	27	1748	Zinc Freezing Point Cell	71
1668b	Propane in Air 100 umol/mol	27	1749	Gold vs. Platinum Thermocouple Thermometer	73
1669b	Propane in Air 500 umol/mol	27	1750	Standard Platinum Resistance Thermometer	73
1671a	CO ₂ /Air, 340 umol/mol	24	1754	Steel (AISI 4320)	55
1672a	CO ₂ /Air, 350 umol/mol	24	1755	Low Alloy Steel	55
1674b	CO ₂ /N ₂ mol 7%	25	1761	Low Alloy Steel	49
1675b	CO ₂ /N ₂ mol 14%	25	1762	Low Alloy Steel	49
1676	CO ₂ /Air, 365 umol/mol	24	1763	Low Alloy Steel	49
1677c	CO/N ₂ 10 ppm	25	1764	Low Alloy Steel	49
1678c	CO/N ₂ 50 umol/mol	25	1765	Low Alloy Steel	49
1679c	CO/N ₂ 100 umol/mol	25	1766	Low Alloy Steel	49
1680b	CO/N ₂ 500 umol/mol	25	1767	Low Alloy Steel	49
1681b	CO/N ₂ 1000 umol/mol	25	1768	High-Purity Iron	48
1683b	NO/N ₂ 50 umol/mol	26	1772	Tool Steel (S-7)	52
1684b	NO/N ₂ 100 umol/mol	26	1775	MP 35N Refractory Alloy	56
1685b	NO/N ₂ 250 umol/mol	26	1800	Organic Compounds/N ₂	24
1686b	NO/N ₂ 500 umol/mol	26	1810a	Linerboard	6
1687b	NO/N ₂ 1000 umol/mol	26	1815a	n-Heptane (Fuel Rating)	28
1690	Polystyrene (Particle Size)	1	1816a	Isooctane (Fuel Rating)	28
1691	Polystyrene (Particle Size)	1	1818a	Chlorine in Lub Base Oil	37
1692	Polystyrene (Particle Size)	1	1819a	Sulfur in Lub Base Oil	37
1693a	SO ₂ /N ₂ 50 umol/mol	27	1827b	Lead Silica Glass Density	82
1694a	SO ₂ /N ₂ 100 umol/mol	27	1828a	Ethanol-Water Solution	15
1696a	SO ₂ /N ₂ 3500 umol/mol	27	1829	Alcohols in Reference Fuel	29
1710	Aluminum Alloy 3004	56	1830	Soda Lime Float (Glass)	62
1711	Aluminum Alloy 3004	56	1831	Soda Lime Sheet (Glass)	62
1712	Aluminum Alloy 3004	56	1834	Fused Ore (Glass)	62
1713	Aluminum Alloy 5182	56	1835	Borate Ore	32
1714	Aluminum Alloy 5182	56	1836	Nitrogen in Lub Base Oil	37
1715	Aluminum Alloy 5182	56	1837	Methanol and Butanol (in Gasoline)	29
1736	Zinc-Aluminum Alloy	61	1838	Ethanol (in Gasoline)	29
1737	Zinc-Aluminum Alloy	61	1839	Methanol (in Gasoline)	39
1738	Zinc-Aluminum Alloy	61	1842	X-Ray Stage Calibration Board (X,Y Dim)	83
1739	Zinc-Aluminum Alloy	61	1843	X-Ray Stage Calibration Board (Z Dim)	83
1740	Zinc-Aluminum Alloy	61	1845	Whole Egg Powder	10
1741	Zinc-Aluminum Alloy	61			
1742	Zinc-Aluminum Alloy	61			
1744	Aluminum (Freezing Point)	71			

SRM	Descriptor	Page	SRM	Descriptor	Page
1846	Infant Formula (milk-based)	10	1941b	Organics in Marine Sediment	21
1848	Lubricating Oil Additive Pkg	37	1944	New York/New Jersey Waterway Sediment	21, 23
1857	Tool Steel for Abrasive Wear	3	1945	Organics in Whale Blubber	21
1866a	Common Commercial Asbestos	93	1951a	Lipids in Frozen (Liquid) Human Serum	14
1872	Synthetic Glass	35	1952a	Cholesterol in Human Serum	14
1873	Synthetic Glass	35	1960	Polystyrene (10 um)	1
1876b	Chrysotile Asbestos	93	1961	Polystyrene (30 um)	1
1878a	Respirable Alpha Quartz	83, 91	1963	Polystyrene Spheres	1
1879a	Respirable Cristobalite	83, 91	1965	Polystyrene (on Slide) (Particle Size)	1
1880a	Portland Cement (Formerly Black)	63	1967	PT Thermocouple Wire	73
1881a	Portland Cement	63	1968	Gallium Melting Point	72
1882a	Calcium Aluminate Cement	63	1969	Rubidium Triple Point	72
1883a	Calcium Aluminate Cement	63	1970	Succinonitrile Triple Point	72
1884a	Portland Cement	63	1971	Indium Freezing Point	72
1885a	Portland Cement	63	1972	1, 3-Dioxolan-2-one Triple Point	72
1886	Portland Cement, Cranberry	63	1973	N-Docosane Triple Point	72
1886a	Portland Cement	63	1974a	Organics-Mussel Tissue (Mytilus edulis)	10, 21
1887	Portland Cement, Brown	63	1975	Diesel Particulate Extract	21
1887a	Portland Cement	63	1976	Instrument Sens.for Xray Pwder Diffraction	83
1888a	Portland Cement	63	1978	Zirconium Oxide (Particle Size)	1
1889a	Portland Cement	63	1980	Geothite	67
1893	Microhardness Cu-Knoop	6	1982	Zirconia Thermal Spray Powder	1
1895	Microhardness Ni-Knoop	6	1984	Thermal Spray Pwder Particle Size Distribution	1
1896a	Microhardness Ni-Vickers	6	1985	Thermal Spray Pwder Particle Size Distribution	1
1897	Specific Surface Area	2	2003	First Surface Aluminum on Glass	75
1899	Specific Surface Area for BET	2	2017	Multi-Angle White Reflectance	75
1900	Specific Surface Area for BET	2	2026	First Surface, Black Glass	75
1905	Microhardness, Ni-Knoop	6	2030a	30% Transmittance	74
1906	Microhardness, Ni-Knoop	6	2031a	Metal-on-Quartz Filters	74
1907	Microhardness, Ni-Knoop	6	2032	Potassium Iodide, Stray Light	74
1917	Mercury Porosimeter Instrusion	2	2034	Holmium Oxide Wavelength	75
1918	Mercury Porosimeter Instrusion	2	2035	Near Infrared Transmission Wavelength	75
1920a	Near IR Reflectance	75	2040	Bidirectional White Diffuser	75
1921a	IR Transmiss Wavelength Polystyrene film	75	2046	Transmission Filter	74
1922	Liquid Refractive Index - Mineral Oil	76	2047	Transmission Filter	74
1923	Poly(ethylene oxide)	68	2048	Transmission Filter	74
1924	Poly(ethylene oxide)	68	2049	Transmission Filter	74
1930	Glass Filters, Transmittance	74			
1935	Potassium Dichromate Soln/UV Absorbance	74			
1939a	PCBs in River Sediment A	21			

SRM	Descriptor	Page	SRM	Descriptor	Page
2050	Transmission Filter	74	2183	MOPSO Free Acid	13, 66
2051	Transmission Filter	74	2184	NaMOPSOate	13, 66
2053	IR Transmission Filter	74	2185	Pot. Hydrogen Phthalate	66
2054	IR Transmission Filter	74	2186I	Potassium Dihydrogen Phosphate	66
2055	IR Transmission Filter	74	2186II	Disodium Hydrogen Phosphate	66
2056	IR Transmission Filter	74	2191a	Sodium Bicarbonate	66
2063a	Mineral Glass (Thin Film)	35	2192a	Sodium Carbonate	66
2065	UV-Vis-NIR Transmission Wavelength	75	2193	Calcium Carbonate	65
2066	K-411 Glass Microspheres	35	2201	Sodium Chloride (Ion-Selective)	66
2069b	SEM Performance	79	2202	Potassium Chloride (Ion-Selective Electr)	66
2071b	Sinusoidal Roughness	3	2203	Potassium Fluoride (Ion-Selective Electr)	66
2073a	Sinusoidal Roughness	3	2214	Isooctane Liquid Density	82
2074	Sinusoidal Roughness	3	2220	Tin (99.9995%)	71
2075	Sinusoidal Roughness	3	2222	Biphenyl (Differen Scanning Calorimeter)	71
2084	CMM Probe Performance Standard	6	2225	Mercury (Differen Scanning Calorimeter)	71
2084R	CMM Probe (10-mm sphere)	6	2232	Indium DSC Calibr Std Temp & Enth of Fus	71
2085	CMM Probe Performance Standard	6	2241	Relative Intensity Correction Standard	75
2092	Low-Energy Charpy V-Notch	5	2260	Aromatic Hydrocarbon in Toluene	20
2096	High-Energy Charpy V-Notch	5	2261	Chlorinated Pesticides in Hexane	20
2098	Super High-Energy Charpy V-Notch	5	2262	Chlorinated Biphenyls in Isooctan	20
2100	Fracture Toughness of Ceramic	7	2269	Perdeuterated PAH I	20
2134	Arsenic in Silicon	79	2270	Perdeuterated PAH II	20
2135c	Ni-Cr Thin Film Depth Profile	79	2273	DDT and Metabolites	20
2137	B Implant in Si Depth Profile	79	2274	PCB Congeners II	20
2139	Zinc-Aluminum Alloy	61	2275	Chlorinated Pesticide II	20
2141	Urea	41	2276	Coplanar PCBs	20
2143	p-Fluorobenzoic Acid	41	2286	Ethanol (in Gasoline)	29
2144	m-Chlorobenzoic Acid	41	2287	Ethanol (in Gasoline)	29
2151	Nicotinic Acid (Combust Calorimetric Standard)	70	2288	t-Amyl-methyl-Ether (in Gasoline)	29
2152	Urea (Combustion & Calorimetric Standard)	70	2289	t-Amyl-methyl-Ether (in Gasoline)	29
2159	LA Steel, Carbon & Sulfur Only	50	2290	Ethyl-t-butyl Ether (in Gasoline)	29
2160	LA Steel, Carbon & Sulfur only	50	2291	Ethyl-t-butyl Ether (in Gasoline)	29
2166	LA Steel, F	50	2292	Methyl-t-Butyl Ether (in Gasoline)	29
2167	LA Steel, G	50	2293	Methyl-t-Butyl Ether (in Gasoline)	29
2168	High Purity Iron	50	2294	Reformulated Fuels (Nominal 11 % MTBE)	29, 30
2171	LA Steel, (HSLA-100)	49	2295	Reformulated Fuel (Nominal 15 % MTBE)	29, 30
2172	S-7 Tool Steel	52			
2175	MP 35N Refractory Alloy	56			
2181	HEPES Free Acid	13, 66			
2182	NaHEPESate	13, 66			

SRM	Descriptor	Page	SRM	Descriptor	Page
2296	Reformulated Fuel (Nominal 13 % ETBE)	29, 30	2518	Polarization Mode Dispersion	78
2297	Reformulated Fuel (Nominal 10 % ETOH)	29, 30	2519	Wavelength Reference Absorption	78
2298	Sulfur in Gasoline	30	2520	Optical Fiber Geometry Standard	78
2299	Sulfur in Gasoline	30	2522	Pin Gage for Optical Fiber Ferrul	78
2321	Sn-Pb Alloy Coating	79	2523	Optical Fiber Ferrule Geometry	78
2379	Cocaine in Human Hair Segments I	17	2526	111 p-Type Silicon Resistivity Specimens	77
2380	Codeine in Human Hair Segments II	17	2527	111 n-Type Silicon Resistivity Specimens	77
2381	Morphine and Codeine in Urine	17	2531	Si/SiO ₂ Thickness-50 nm	80
2382	Morphine Glucoronide in Urine	17	2532	Si/SiO ₂ Thickness-100 nm	80
2383	Baby Food Composite	10	2533	Si/SiO ₂ Thickness-200 nm	80
2384	Baking Chocolate	10	2534	Si/SiO ₂ Thickness-25 nm	80
2389	Amino Acids in 0.1 mol/L Hydrochlor Acid	17	2535	Si/SiO ₂ Thickness-14 nm	80
2390	DNA Profiling	16	2538	Deterministic Polarization Mode Dispersion	78
2391b	PCR-Based DNA Profiling	16	2544	Silicon Resistivity	77
2392	DNA Mitochondrial Sequencing	16	2547	Silicon Resistivity	77
C2400	HA Steel ACI (17/4 PH)	55	2551	Oxygen in Silicon	81
C2401	HA Steel (ACI-C-4M-Cu)	55	2553	Optical Fiber Coating Standard	78
C2402	Hastelloy 7C	59	2554	Optical Fiber Coating Standard	78
C2415	Battery Lead	58	2556	Recycled Pellet (Autocatalyst)	24
C2416	Bullet Lead	58	2557	Recycled Monolith (Autocatalyst)	24
C2417	Lead-Base Alloy	58	2570	Lead Paint Film White/Blank .001 mg/cm ²	92
C2418	High-Purity Lead	58	2571	Lead Paint Film (yellow) Nominal 3.5 mg/cm ²	92
C2423	Ductile Iron A	53	2572	Lead Paint Film (Orange) Nominal 1.6 mg/cm ²	92
C2423a	Ductile Iron B	53	2573	Lead Paint Film (Red) Nominal 1.0 mg/cm ²	92
C2424	Ductile Iron C	53	2574	Lead Paint Film (Gold) Nominal .7 mg/cm ²	92
C2424a	Ductile Iron D	53	2575	Lead Paint Film (Green) Nominal .3 mg/cm ²	92
2430	Scheelite Ore	32	2576	Lead Paint Film, High Level	92
2431	Titanium Base Alloy	60	2579a	Lead Paint Films for Portable XRF Analyz	92
2432	Titanium Base Alloy	60	2580	Powdered Paint Nominal 4 % Lead	92
2433	Titanium Alloy	60	2581	Powdered Paint Nominal 0.5 % Lead	92
2490	Non-Newtonian Polymer Solution/Rheology	69	2582	Powdered Paint Nominal 200 mg/kg L	92
2491	Non-Newtonian Polymer Melt for Rheology	69	2583	Trace Elements in Indoor Dust	23, 92
2513	Mode-Field Diameter of Single-Mode Fiber	78	2584	Trace Element in Indoor Dust	23, 92
2514	Wavelength Reference Absorption Cell-12CO	78	2586	Trace Elements in Soil w/lead from paint	23, 92
2515	Wavelength Reference Absorption Cell-13CO	78			
2517a	Wavelength Reference Absorption Cell	78			

SRM	Descriptor	Page	SRM	Descriptor	Page
2587	Trace Elements in Soil w/Lead from Paint	23, 92	2671a	Fluoride in Freeze-Dried Urine	17
2589	Powdered Paint Nominal 10 % Lead	92	2672a	Mercury in Urine	17
2612a	CO/Air 10 umol/mol	25	2678	Membrane Blank Filter	91
2613a	CO/Air 20 umol/mol	25	2679a	Quartz on Filter Media	91
2614a	CO/Air 45 umol/mol	25	2681	Ashless Blank Filter	91
2619a	Carbon Dioxide in Nitrogen .5 % mol/mol	25	2682b	Sulfur & Mercury in Coal	31, 70
2620a	Carbon Dioxide in Nitrogen 1.0 % mol/mol	25	2683b	Sulfur in Coal, 2 %	31, 70
2621a	Carbon Dioxide in Nitrogen 5 % mol/mol	25	2684b	Sulfur & Mercury in Coal	31, 70
2622a	Carbon Dioxide in Nitrogen 2.0 % mol/mol	25	2685b	Sulfur & Mercury in Coal	31, 70
2623a	Carbon Dioxide in Nitrogen 2.5 % mol/mol	25	2686	Portland Cement Clinker	63
2624a	Carbon Dioxide in Nitrogen 3.0 % mol/mol	25	2687	Portland Cement Clinker	63
2625a	Carbon Dioxide in Nitrogen 3.5 % umol/mol	25	2688	Portland Cement Clinker	63
2626a	Carbon Dioxide in Nitrogen 4.0 % umol/mol	25	2689	Coal Fly Ash	28
2629a	NO/N ₂ , 20 umol/mol	26	2690	Coal Fly Ash	28
2630	NO/N ₂ , 1500 umol/mol	26	2691	Coal Fly Ash	28
2631a	NO/N ₂ , 3,000 umol/mol	26	2692b	Sulfur & Mercury in Coal	31, 70
2635a	CO/N ₂ 25 umol/mol	25	2695	Fluoride in Vegetation	11
2636a	CO/N ₂ 250 umol/mol	25	2702	Marine Sediment	23
2637a	CO/N ₂ 2500 umol/mol	25	2709	San Joaquin Soil	23
2638a	CO/N ₂ 5000 umol/mol	25	2710	Montana I Soil	23
2639a	CO/N ₂ 1.0 % mol/mol	25	2711	Montana II Soil	23
2640a	CO/N ₂ 2.0 % mol/mol	25	2713	Lead in Reference Fuel	28
2641a	CO/N ₂ 4 % mol/mol	25	2714	Lead in Reference Fuel	28
2642a	CO/N ₂ 8 % mol/mol	25	2717a	Sulfur in Residual Fuel Oil	31
2643a	Propane in Nitrogen 100 umol/mol	27	2718	Green Petroleum Coke	28, 30
2644a	Propane in Nitrogen 250 umol/mol	27	2719	Calcined Petroleum Coke	28, 30
2645a	Propane in Nitrogen 500 umol/mol	27	2721	Moisture & Sulfur in Crude Oil (Yeates Sour)	31
2646a	C ₃ H ₈ /N ₂ , 1000 umol/mol	27	2722	Moisture & Sulfur in Crude Oil (Rufrio Sweet)	31
2647a	C ₃ H ₈ /N ₂ , 2500 umol/mol	27	2723a	Sulfur in Diesel Fuel Oil	30
2648a	C ₃ H ₈ /N ₂ , 5000 umol/mol	27	2724b	Sulfur in Diesel Fuel Oil, 0.04 %	30
2657a	O ₂ /N ₂ 2 % mol/mol	27	2730	H ₂ S/N ₂ , 5 umol/mol	26
2658a	O ₂ /N ₂ 10 % mol/mol	27	2731	H ₂ S/N ₂ , 20 umol/mol	26
2659a	O ₂ /N ₂ , 21 % mol/mol	27	2735	NO/N ₂ , 800 umol/mol	26
2660a	Total Oxides of Nitr in Air 100 umol/mol	26	2736a	NO/N ₂ , 2000 umol/mol	26
			2740a	CO/N ₂ , 10 % mol/mol	26
			2741a	CO/N ₂ , 13 % mol/mol	26
			2745	CO ₂ /N ₂ , 16 % mol/mol	25
			2750	CH ₄ /Air 50 umol/mol	26
			2751	CH ₄ /Air 100 umol/mol	26

SRM	Descriptor	Page	SRM	Descriptor	Page
2764	C ₃ H ₈ /Air .25 umol/mol	27	3014	1,2,3 Trichloropropane in Methanol	22
2775	Foundry Coke	30	3015	Isopropylbenzene in Methanol	22
2776	Furnace Coke	30	3016	sec-Butylbenzene in Methanol	22
2780	Hard Rock Mine Waste	23	3063	Dioxin in Methanol	22
2781	Domestic Sludge	23	3069	Organochlorine Pesticides I	22
2782	Industrial Sludge	23	3070	Organochlorine Pesticides II	22
2783	Air Particulate on Filter Media	23, 91	3071	Glyphosate	22
2806	Medium Test Dust(MTD) in Hydraulic Fluid	2	3101a	Aluminum Standard Solution	42
2810	Rockwell C Hardness, Low	5	3102a	Antimony Standard Solution	42
2811	Rockwell C Hardness, Mid	5	3103a	Arsenic Standard Solution	42
2812	Rockwell C Hardness, High	5	3104a	Barium Standard Solution	42
2830	Microhardness, Ceramic-Knoop	6	3105a	Beryllium Standard Solution	42
2853	Magnetic Moment Standard - Yttrium Iron Garnet	7	3106	Bismuth Standard Solution	42
2885	Polyethylene (Molar Mass 6,280 g/mol)	68	3107	Boron Standard Solution	42
2886	Polyethylene (Molar Mass 87,000 g/mol)	68	3108	Cadmium Standard Solution	42
2887	Polyethylene (Molar Mass 196,400 g/mol)	68	3109a	Calcium Standard Solution	42
2890	Water Saturated Octanol	31	3110	Cerium Standard Solution	42
2910	Calcium Hydroxyapatite	16, 83	3111a	Cesium Standard Solution	42
2975	Diesel Partic.Matter (Indus.Forklift)	21	3112a	Chromium Standard Solution	42
2976	Mussel Tissue T.E. & Methylmercury Frz-Dr	21	3113	Cobalt Standard Solution	42
2977	Mussel Tissue Organic Contaminants &T.E.	21	3114	Copper Standard Solution	42
2978	Mussel Tissue Org.Contam Raritan Bay, NJ	21	3115a	Dysprosium Standard Solution	42
3000	Benzene in Methanol	22	3116a	Erbium Standard Solution	42
3001	Toluene in Methanol	22	3117a	Europium Standard Solution	42
3002	Ethylbenzene in Methanol	22	3118a	Gadolinium Standard Solution	42
3003	o-Xylene in Methanol	22	3119a	Gallium Standard Solution	42
3004	m-Xylene in Methanol	22	3120a	Germanium Standard Solution	42
3005	p-Xylene in Methanol	22	3121	Gold Standard Solution	42
3006	Carbon Tetrachloride in Methanol	22	3122	Hafnium Standard Solution	42
3007	Vinylidene in Methanol	22	3123a	Holmium Standard Solution	42
3008	Methylene Chloride in Methanol	22	3124a	Indium Standard Solution	42
3009	1,2 Dichloropropane in Methanol	22	3126a	Iron Standard Solution	42
3010	Tetrachloroethylene in Methanol	22	3127a	Lanthanum Standard Solution	42
3011	1,1,1 Trichloroethane in Methanol	22	3128	Lead Standard Solution	42
3012	1,2-Dichloroethane in Methanol	22	3129a	Lithium Standard Solution	42
			3130a	Lutetium Standard Solution	42
			3131a	Magnesium Standard Solution	42
			3132	Manganese Standard Solution	42
			3133	Mercury Standard Solution	43
			3134	Molybdenum Standard Solution	43
			3135a	Neodymium Standard Solution	43

SRM	Descriptor	Page	SRM	Descriptor	Page
3136	Nickel Standard Solution	43	3191	Aqueous Electrolytic Conductivity 100 uS/cm	67
3137	Niobium Standard Solution	43	3192	Aqueous Electrolytic Conductivity 500 uS/cm	67
3138	Palladium Standard Solution	43	3193	Aqueous Electrolytic Conductivity 1000 uS/cm	67
3139a	Phosphorus Standard Solution	43	3194	Aqueous Electrolytic Conductivity 10,000 uS/cm	67
3140	Platinum Standard Solution	43	3195	Aqueous Electrolytic Conductivity 100,000 uS/cm	67
3141a	Potassium Standard Solution	43	3196	Aqueous Electrolytic Conductivity 20,000 uS/cm	67
3142a	Praseodymium Standard Solution	43	3198	Aqueous Electrolytic Conductivity 5 uS/cm	67
3143	Rhenium Standard Solution	43	3199	Aqueous Electrolytic Conductivity 15 uS/cm	67
3144	Rhodium Standard Solution	43	4201B	Niobium-94 Point Source	87
3145a	Rubidium Standard Solution	43	4203D	Colbalt-60	87
3147a	Samarium Standard Solution	43	4218F	Europium-152 Point Source	87
3148a	Scandium Standard Solution	43	4222C	Carbon-14 (as hexadene)	85
3149	Selenium Standard Solution	43	4226C	Nickel-63 Solution	85
3150	Silicon Standard Solution	43	4234A	Strontium/Yttrium-90	86
3151	Silver Standard Solution	43	4241C	Barium-133 Point Source	87
3152a	Sodium Standard Solution	43	4251C	Barium-133 Solution	85
3153a	Strontium Standard Solution	43	4288A	Technetium-99	86
3154	Sulfur Standard Solution	43	4320A	Curium-244 Solution	86
3155	Tantalum Standard Solution	43	4321C	Natural Uranium Solution	86
3156	Tellurium Standard Solution	43	4322B	Americium-241 Solution	85
3157a	Terbium Standard Solution	43	4323B	Plutonium-238 Solution	85
3158	Thallium Standard Solution	43	4324B	Uranium-232	86
3159	Thorium Standard Solution	43	4325	Beryllium-10/9 Solution	88
3160a	Thulium Standard Solution	43	4326	Polonium-209 Solution	85
3161a	Tin Standard Solution	43	4328C	Thorium-299	86
3162a	Titanium Standard Solution	43	4329	Curium-243 Solution	85
3163	Tungsten Standard Solution	43	4330B	Plutonium-239 Solution	85
3164	Uranium Standard Solution	43	4332D	Americium-243 Solution	85
3165	Vanadium Standard Solution	43	4334G	Plutonium-242 Solution	85
3166a	Ytterbium Standard Solution	43	4338A	Plutonium-240 Solution	85
3167a	Yttrium Standard Solution	43	4339B	Radium-228 Solution	86
3168a	Zinc Standard Solution	43	4340A	Plutonium-241 Solution	85
3169	Zirconium Standard Solution	43	4341	Neptunium-237 Solution	85
3181	Sulfate Anion Solution	44	4342A	Thorium-230	86
3182	Chloride Anion Solution	44	4350B	River Sediment (Radioactivity)	89
3183	Fluoride Anion Solution	44			
3184	Bromide Anion Solution	44			
3185	Nitrate Anion Solution	44			
3186	Phosphate Anion Solution	44			
3190	Aqueous Electrolytic Conductivity 25 uS/cm	67			

SRM	Descriptor	Page	SRM	Descriptor	Page
4351	Human Lung Powder	89	8426	Graphite Thermal Conductivity	73, 77
4352	Human Liver Powder	89	8432	Corn Starch	10
4354	Lake Sediment Powder	89	8433	Corn Bran	10
4355	Peruvian Soil Powder	89	8435	Whole Milk Powder	10
4356	Ashed Bone (Radioactivity)	89	8436	Durum Wheat Flour	9, 10
4357	Ocean Sediment Powder	89	8437	Hard Red Spring Wheat Flour	9
4361C	Hydrogen-3 Water	85	8438	Soft Winter Wheat Flour	9
4370C	Europium-152 Solution	85	8441	Wheat Hardness	9
4401	Iodine-131 Solution	87	8443	GC/MS System Performance	19
4407	Iodine-125 Solution	87	8444	Cotinine in Freeze Dried Human Urine	17
4410	Technetium-99m	87	8455	Pyrite Ore	33
4412	Molybdenum-99 Solution	87	8456	Ultra-hi Molecular Wt. Polyethylene Bar	16, 69
4415	Xenon-133 Solution	87	8458	Artificial Flaw for Eddy Current	5
4416	Gallium-67 Solution	87	8466	Y-HCH (Lindane)(neat)	20
4425	Samarim-153	87	8467	4, 4'-DDE (neat)	20
4427	Yttrium-90 Solution (Lot 5)	87	8469	Pesticide, 4,4'-DDT (neat)	20
4915E	Cobalt-60 Solution	85	8480	Secondary Ferrite # Standard - Low Range	7
4919H	Strontium-90 Solution	86	8481	Secondary Ferrite # Standard - High Range	7
4926E	Hydrogen-3 Water	85	8491	Sugar Cane Bagasse	11
4927F	Hydrogen-3 Water	85	8492	Eastern Cottonwood	11
4943	Chlorine-36 Solution	85	8493	Monterey Pine	11
4947C	Hydrogen-3 Toluene	85	8494	Wheat Straw	11
4949C	Iodine-129 Solution	85	8505	Vanadium in Crude Oil	28
4965	Radium-226 Solution	86	8506a	Transformer Oil	31
4966	Radium-226 Solution	86	8507	Mineral Oil	31
4967	Radium-226 Solution	86	8509	Moisture in Methanol, 93 mg/kg	31
4968	Radium-226/Radon-222 Capsule	88	8510	Moisture in Methanol, 325 mg/kg	31
4969	Radium-226 Solution	86	8535	Vsmow-Water	45
4990C	Oxalic Acid Powder	88	8536	GISP-Water	45
8010	Sand for Sand Sieve Analysis	1	8537	SLAP-Water Light Stable Isotopic Std	45
8091	SEM Sharpness Standard	79	8538	NBS30-Biotite	45
8411	Mixed Asbestos Research Filter	93	8539	NBS22-Oil	45
8412	Corn Stalk (Zea Mays)	9, 11	8540	PEFI-Polyethylene Foil	45
8413	Corn Kernel (Zea Mays)	9, 11	8541	USGS24-Graphite	45
8414	Bovine Muscle Powder (Beef)	9	8542	Sucrose ANU-Sucrose	45
8415	Whole Egg Powder	10	8544	NBS19-Limestone	45
8418	Wheat Gluten	10	8546	NBS28-Silica Sand	45
8420	Iron Electrolytic	73, 77	8547	IAEAN1-Ammonium Sulfate	45
8421	Iron Electrolytic	73, 77			
8424	Graphite Thermal Conductivity	73, 77			

SRM	Descriptor	Page
8548	IAEAN2-Ammonium Sulfate	45
8549	IAEA-N3-Potassium Nitrate	45
8550	USGS25-Ammonium Sulfate	45
8551	USGS26-Ammonium Sulfate	45
8552	NSVEC-Gaseous Nitrogen	45
8553	Soufre de Lacq-Elemental Sulfur	45
8554	NZ1-Silver Sulfide	45
8555	NZ2-Silver Sulfide	45
8556	NBS123-Sphalerite	45
8557	NBS127-Barium Sulfate	45
8558	USGS32-Potassium Nitrate	45
8562	C02-Heavy, Paleomarine Origin	45
8563	C02-Light, Paleomarine Origin	45
8564	C02-Biogenic, Modern Biomass Origin	45
8590	High Sulfur Gas Oil Feed	37
8600	Chinese Copper Ore	33
8601	Chinese Copper Ore	33
8602	Chinese Lead Ore	33
8603	Chinese Lead Ore	33
8604	Chinese Zinc Ore	33
8605	Chinese Molybdenum Ore	33
8606	Chinese Molybdenum Ore	33
8607	Chinese Tungsten Ore	33
8608	Chinese Tungsten Ore	33
8631	Medium Test Dust (MTD)	2
8632	Ultrafine Test Dust	2
8680	Paint on Fiberboard	92
8704	Buffalo River Sediment	23
8759	ICTA Set DTA	71
8760	ICTA Set DTA	71
GM754	ICTA Polystyrene DTA	71
RM5	Cu Low Temperature Heat Capacity	70

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