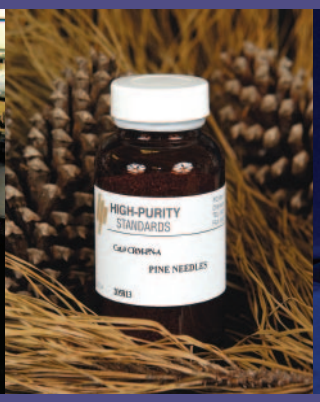
HIGH-PURITY STANDARDS

Greyhound CHROMATOGRAPHY AND ALLIED CHEMICALS

CATALOG OF ANALYTICAL STANDARDS



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High-Purity Standards

High-Purity Standards, Inc. was founded in 1990 by Dr. Theodore Rains following his retirement from the National Institute of Standards and Technology (NIST). During his time at NIST, Dr. Rains developed many procedures now used at HPS. Today, High-Purity Standards serves the scientific community with standards and reference material for both organic and inorganic analyses.

Letter from the President

Welcome to our new 2007 catalog. High-Purity Standards has made a number of changes during this past year. We have expanded our product offerings, increased involvement in a number of areas of research, and added several Certified Reference materials to our catalog. Additionally, we have updated our website and revised our catalog, which is available now in both printed and CD formats.

In 2006 High-Purity Standards continued to expand our product offerings. We have included only some of our more popular offerings in our new catalog. Please visit our website at www.highpuritystandards.com for a complete list of current products. If you cannot find the perfect standard to suit your needs, HPS has a large range of capabilities and would be happy to quote any custom mix. We get many of the ideas of our products from customers and appreciate your input greatly.

This year High-Purity Standards was involved in a number of areas of research, including filters loaded with beryllium oxide for use in industrial hygiene and air monitoring. We expanded our custom standard options to include a variety of materials on filters as well as a several different x-ray standards. Additionally, we continue to offer a variety of custom organic standards. These standards include solutions for the GC, GC-MS, HPLC, and for Karl Fischer analysis. This year we are introducing some of these products as stock items. You can get a complete list of the expanded offerings on our website. It is our practice is to send the customer trial sample solutions free of charge prior to the manufacture of any large quantity of organic solution.

High-Purity Standards continues to add to our Certified Reference Materials (CRM) line. The CRMs are certified for metals using total and partial digestion techniques, as appropriate. Certification is by at least two independent analytical methods. Additionally, many of our CRM certifications now include carbon, sulfur, and nitrogen analyses.

Whether your need is for a catalog item or a custom blend that is NIST traceable, High-Purity Standards prides ourselves on providing prompt and accurate customer service. A friendly, knowledgeable staff stands ready to handle your inquiries. We look forward to providing you with the highest quality analytical standards possible.

Thank you for the trust you place in High-Purity Standards.

Sincerely,

Theodore C. Rains, Ph.D.
President

Connie Rains Hayes
Vice President

High-Purity Standards

Since its inception HPS has had at the cornerstone of its quality system traceability to National Institute of Standards (NIST) Standard Reference Materials. In 2005, HPS set the goal of improving its procedures using the ISO 9001:2000 standard. HPS chose certification because it provided a disciplined framework that complemented HPS laboratory procedures. In addition, ISO 9001:2000 certification emphasizes customer satisfaction. To our customers this means HPS has developed an ISO compliant QMS complete with documentation and certification which can be beneficial for our customers achieving their own quality programs. ISO 9001:2000 Certification helps us reach our goal of offering the most reliable standards in the industry.

Preparation & Certification

At HPS we use methods developed at the National Institute of Standards and Technology (NIST) for the preparation and certification of SRM Spectrometric Standard Solutions.

The process of standard preparation begins with the use of the highest-purity source materials. For preparation of alkali, alkaline earth, or rare earth metals, we use the metal, salt, or oxide. For this material, the stoichiometry of each salt or oxide is first confirmed. The purity of each material is checked by ICP-OES or ICP-MS. Source materials that do not meet required purity levels are not used. Metals are precleaned with dilute acid, rinsed with copious amounts of high-purity water and air dried in a Class 100 area. Salts are dried to a constant weight and oxides are ignited to a constant weight.

Just as the source materials go through an evaluation and preparation process, so do the equipment used in the manufacture. The analytical balance used for weighing the high-purity material is routinely checked with NIST calibrated weights. All volumetric vessels are calibrated by weight to five significant figures. Any piece of equipment not falling within required specification is removed from service. The Teflon beakers and volumetric vessels are precleaned in 20% HNO_3 and rinsed with copious amounts of 18 megaohm high-purity water.

The material is weighed on an analytical balance to one part in ten thousand. The sample is transferred to a clean Teflon beaker and dissolved in high-purity sub-boiling distilled acids. The solution is transferred to a volumetric flask. An appropriate amount of high-purity acid is added to stabilize the standard and the solution is diluted to near calibrated volume. The solution is allowed to come to ambient temperature, and then diluted to the calibrated volume. Finally, the solution is transferred to clean natural high-density polyethylene (HDPE) or low-density polyethylene (LDPE) laboratory grade bottles. Commercial grade HDPE or LDPE are never used in the preparation of HPS solutions. A sample of the prepared standard is collected and stored for stability or other analytical analyses.

HPS single-element and multielement standard solutions are cerified against the NIST SRM 3100 Series standard solutions, where available. The HPS standard solutions must agree with the NIST standard within the acceptable limits of the method. The single-element standard solutions are stocked at 1000 µg/mL and 10.00 mg/mL in 100, 250, and 500 mL HDPE or LDPE laboratory grade bottles. Other packaging options are available. Contact Customer Service for more information. Certification data are included in the Certificate of Analysis that is sent with every product.

Prior to shipping the standard is double sealed in placed bags. Each item is shipped with a Material Safety Data Sheet.

High-Purity Standards is an ISO-9001-2000 registered manufacturer. A copy of our certificate can be obtained at our website, www.highpuritystandards.com.

Custom Designed Blends

HPS welcomes requests for multielement special mixtures designed by our customers. With the president's 50 plus years of experience in the preparation of spectrometric standard solutions, he or his staff will gladly discuss with you the inter-element compatibility and stability of your designed mixture. Special mixtures are prepared and checked with standards that are directly traceable to NIST and have a guaranteed accuracy of ± 0.5%. As a rule, a special mixture can be prepared and certified within three to five days of receipt of the purchase order.

Pricing for 100 or smaller, 250, 500, and 1000 mL or larger solutions are available upon request. A variety of packaging options are available to accommodate your special requests. In addition to aqueous solutions, mixes are available in a variety of oils and organic solvents as well as on filter media. High-Purity Standards has developed the technique of placing solids (metals, salts, oxides) or solution on a variety of filter matrices. These filters are suitable for monitoring air particles by X-ray or chemical dissolution and analyses. The catalog items listed on page 32 are an example of what can be placed on different filter media.

Contact us today to discuss your special mix needs.

Analytical Reagents

Acid Reagent Blanks

Catalog No.	Description	Volume
RB-HNO3-2	2% Nitric Acid Reagent Blank	500 mL
RB-HNO3-5	5% Nitric Acid Reagent Blank	500 mL
RB-HCl-2	2% Hydrochloric Acid Reagent Blank	500 mL
RB-HCl-5	5% Hydrochloric Acid Reagent Blank	500 mL
RB-H2O	High-Purity D.I. 18 megaohm Water	500 mL

High-Purity Subboiling Distilled Acids

All acids are bottled in Teflon FEP (fluorinated ethylene propylene) bottles. All acids must be shipped as hazardous and hazardous shipping charges will apply in addition to your regular shipping charges.

Catalog No.	Description	Volume
SB-HNO3-1L	Nitric Acid	1000 mL
SB-HNO3-500	Nitric Acid	500 mL
SB-HCl-500	Hydrochloric Acid	500 mL
SB-HCl-1L	Hydrochloric Acid	1000 mL

Single-Element Standards

For the following standards, concentrations include both 1000 ± 3 µg/mL and 10.00 ± 0.03 mg/mL (10,000 µg/mL) in aqueous solution unless noted otherwise. The selection of single elements listed below are maintained in stock. Refer to page 9 for information on dilutions of these products. Most standards are packaged in 100, 250, and 500 mL HDPE or LDPE laboratory grade bottles. The density is provided on the Certificate of Analysis as additional information for the user.

The accuracy of all standards is verified against NIST Spectrometric Standard Solutions. A Certificate of Analysis and Material Safety Data Sheet are included with each standard. Standards are certified accurate for a period of 18 months from the date of shipment unless stated otherwise on the Certificate of Analysis.

Element	Source	Concentration	Matrix	Catalog No.	Concentration	Matrix	Catalog No.
Aluminum	Al metal	1000 µg/mL	2% HNO_3	**10001-1**	10 mg/mL	10% HNO_3	**10M1-1**
Aluminum	Al metal	1000 µg/mL	2% HCl	**10001-2**	10 mg/mL	10% HCl	**10M1-2**
Antimony	Sb metal	1000 µg/mL	20% HCl	**10001-2**	10 mg/mL	50% HCl	**10M2-2**
Antimony	Sb metal	1000 µg/mL	5% HNO_3 + 0.1% HF	**10001-3**	10 mg/mL	10% HNO_3 + 2% HF	**10M2-3**
Antimony	Sb metal as Sb^{+3}	1000 µg/mL	20% HCl	**10002-6**			
Antimony	Sb metal	1000 µg/mL	5% Tartaric Acid + 2% HNO_3	**10002-8**			
Arsenic	As metal	1000 µg/mL	2% HNO_3	**10003-1**	10 mg/mL	20% HNO_3	**10M3-1**
Arsenic	As metal	1000 µg/mL	2% HCl	**10003-2**	10 mg/mL	15% HCl	**10M3-2**
Arsenic	As_2O_3 as As^{+3}	1000 µg/mL	2% HCl	**10003-6**			
Arsenic	As_2O_3 as As^{+5}	1000 µg/mL	2% NaOH + Tr Br_2	**10003-7**			
Barium	$BaCO_3$	1000 µg/mL	2% HNO_3	**10004-1**	10 mg/mL	4% HNO_3	**10M4-1**
Barium	$BaCO_3$	1000 µg/mL	2% HCl	**10004-2**	10 mg/mL	5% HCl	**10M4-2**
Beryllium	Be acetate	1000 µg/mL	2% HNO_3	**10005-1**	10 mg/mL	4% HNO_3	**10M5-1**
Beryllium	Be acetate	1000 µg/mL	2% HCl	**10005-2**	10 mg/mL	10% HCl	**10M5-2**
Bismuth	Bi metal	1000 µg/mL	2% HNO_3	**10006-1**	10 mg/mL	4% HNO_3	**10M6-1**
Bismuth	Bi metal	1000 µg/mL	2% HCl	**10006-2**			
Boron	H_3BO_3	1000 µg/mL	H_2O	**10007-4**	5 mg/mL	H_2O	**5M7-4**
Cadmium	Cd metal	1000 µg/mL	2% HNO_3	**10008-1**	10 mg/mL	4% HNO_3	**10M8-1**
Cadmium	Cd metal	1000 µg/mL	2% HCl	**10008-2**	10 mg/mL	10% HCl	**10M8-2**
Calcium	$CaCO_3$	1000 µg/mL	2% HNO_3	**10009-1**	10 mg/mL	4% HNO_3	**10M9-1**
Calcium	$CaCO_3$	1000 µg/mL	2% HCl	**10009-2**	10 mg/mL	5% HCl	**10M9-2**
Carbon	$Na_2C_2O_4$	1000 µg/mL	H_2O	**100071-4**			
Carbon as TOC	$KHC_8H_4O_4$	1000 µg/mL	H_2O	**100071-9**			
Cerium	CeO_2	1000 µg/mL	2% HNO_3	**100010-1**	10 mg/mL	4% HNO_3	**10M10-1**
Cerium	CeO_2	1000 µg/mL	2% HCl	**100010-2**	10 mg/mL	10% HCl	**10M10-2**
Cesium	$CsCO_3$	1000 µg/mL	1% HNO_3	**100011-1**	10 mg/mL	1% HNO_3	**10M11-1**
Cesium	$CsCO_3$	1000 µg/mL	1% HCl	**100011-2**	10 mg/mL	1% HCl	**10M11-2**
Chromium	Cr metal	1000 µg/mL	2% HNO_3	**100012-1**	10 mg/mL	10% HNO_3	**10M12-1**
Chromium	Cr metal	1000 µg/mL	2% HCl	**100012-2**	10 mg/mL	10% HCl	**10M12-2**
Chromium	Cr metal as Cr^{+3}	1000 µg/mL	2% HCl	**100012-6**			
Chromium	$K_2Cr_2O_7$ as Cr^{+6}	1000 µg/mL	H_2O	**100012-7**	10 mg/mL	H_2O	**10M12-7**
Cobalt	Co metal	1000 µg/mL	2% HNO_3	**100013-1**	10. mg/mL	4% HNO_3	**10M13-1**

Single-Element Standards

Element	Source	Concentration	Matrix	Catalog No.	Concentration	Matrix	Catalog No.
Cobalt	Co metal	1000 µg/mL	2% HCl	**100013-2**	10 mg/mL	10% HCl	**10M13-2**
Copper	Cu metal	1000 µg/mL	2% HNO_3	**100014-1**	10 mg/mL	4% HNO_3	**10M14-1**
Copper	Cu metal	1000 µg/mL	2% HCl	**100014-2**	10 mg/mL	10% HCl	**10M14-2**
Dysprosium	Dy_2O_3	1000 µg/mL	2% HNO_3	**100015-1**	10 mg/mL	4% HNO_3	**10M15-1**
Dysprosium	Dy_2O_3	1000 µg/mL	2% HCl	**100015-2**	10 mg/mL	10% HCl	**10M15-2**
Erbium	Er_2O_3	1000 µg/mL	2% HNO_3	**100016-1**	10 mg/mL	4% HNO_3	**10M16-1**
Erbium	Er_2O_3	1000 µg/mL	2% HCl	**100016-2**	10 mg/mL	10% HCl	**10M16-2**
Gadolinium	Gd_2O_3	1000 µg/mL	2% HNO_3	**100018-1**	10 mg/mL	4% HNO_3	**10M18-1**
Gadolinium	Gd_2O_3	1000 µg/mL	2% HCl	**100018-2**	10 mg/mL	10% HCl	**10M18-2**
Gallium	Ga metal	1000 µg/mL	2% HNO_3	**100019-1**	10 mg/mL	4% HNO_3	**10M19-1**
Gallium	Ga metal	1000 µg/mL	2% HCl	**100019-2**	10 mg/mL	10% HCl	**10M19-2**
Germanium	$(NH_4)_2GeF_6$	1000 µg/mL	1% HNO_3	**100020-1**	10 mg/mL	1% HNO_3	**10M20-1**
Germanium	Ge metal	1000 µg/mL	2% HNO_3 + 0.5% HF	**100020-3**	10 mg/mL	10% HNO_3 + 2% HF	**10M20-3**
Gold	Au metal	1000 µg/mL	2% HCl	**100021-2**	10 mg/mL	10% HCl	**10M21-2**
Hafnium	Hf metal	1000 µg/mL	2% HNO_3 + 0.5% HF	**100022-3**	10 mg/mL	4% HNO_3 + 2% HF	**10M22-3**
Holmium	Ho_2O_3	1000 µg/mL	2% HNO_3	**100023-1**	10 mg/mL	4% HNO_3	**10M23-1**
Holmium	Ho_2O_3	1000 µg/mL	2% HCl	**100023-2**	10 mg/mL	10% HCl	**10M23-2**
Indium	In metal	1000 µg/mL	2% HNO_3	**100024-1**	10 mg/mL	4% HNO_3	**10M24-1**
Indium	In metal	1000 µg/mL	2% HCl	**100024-2**	10 mg/mL	10% HCl	**10M24-2**
Iridium	$IrCl_3$	1000 µg/mL	2% HCl	**100025-2**			
Iron	Fe metal	1000 µg/mL	2% HNO_3	**100026-1**	10 mg/mL	10% HNO_3	**10M26-1**
Iron	Fe metal	1000 µg/mL	2% HCl	**100026-2**	10 mg/mL	10% HCl	**10M26-2**
Iron*	Fe metal as Fe^{+2}	1000 µg/mL	2% HCl + 1% Hydroxylamine Hydrochloride	**100026-6**			
Iron	Fe metal as Fe^{+3}	1000 µg/mL	2% HNO_3	**100026-7**			
Lanthanum	La_2O_3	1000 µg/mL	2% HNO_3	**100027-1**	10 mg/mL	4% HNO_3	**10M27-1**
Lanthanum	La_2O_3	1000 µg/mL	2% HCl	**100027-2**	10 mg/mL	2% HCl	**10M27-2**
Lead	Pb metal	1000 µg/mL	2% HNO_3	**100028-1**	10 mg/mL	4% HNO_3	**10M28-1**
Lead	Pb metal	1000 µg/mL	2% HCl	**100028-2**			
Lithium	Li_2CO_3	1000 µg/mL	1% HNO_3	**100029-1**	10 mg/mL	1% HNO_3	**10M29-1**
Lithium	Li_2CO_3	1000 µg/mL	1% HCl	**100029-2**	10 mg/mL	1% HCl	**10M29-2**
^{6}Lithium	$^6Li_2CO_3$	1000 µg/mL	1% HNO_3	**100029-6I**			
Lutetium	Lu_2O_3	1000 µg/mL	2% HNO_3	**100030-1**	10 mg/mL	4% HNO_3	**10M30-1**
Lutetium	Lu_2O_3	1000 µg/mL	2% HCl	**100030-2**	10 mg/mL	10% HCl	**10M30-2**
Magnesium	Mg metal	1000 µg/mL	2% HNO_3	**100031-1**	10 mg/mL	4% HNO_3	**10M31-1**
Magnesium	Mg metal	1000 µg/mL	2% HCl	**100031-2**	10 mg/mL	10% HCl	**10M31-2**
Manganese	Mn metal	1000 µg/mL	2% HNO_3	**100032-1**	10 mg/mL	4% HNO_3	**10M32-1**
Manganese	Mn metal	1000 µg/mL	2% HCl	**100032-2**	10 mg/mL	10% HCl	**10M32-2**
Mercury	Hg metal	1000 µg/mL	2% HNO_3	**100033-1**	10 mg/mL	5% HNO_3	**10M33-1**
Mercury	Diphenylmercury	1000 µg/mL	2% HNO_3	**100033-1D**			
Molybdenum	Mo metal	1000 µg/mL	2% HCl	**100034-2**	10 mg/mL	10% HCl	**10M34-2**
Molybdenum	Mo metal	1000 µg/mL	2% HNO_3 + 0.1% HF	**100034-3**	10 mg/mL	4% HNO_3 + 2% HF	**10M34-3**

NOTE: *100026-6 Fe^{+2} Exp Date: 3 Months

Single-Element Standards

Element	Source	Concentration	Matrix	Catalog No.	Concentration	Matrix	Catalog No.
Molybdenum	$(NH_4)_2MoO_4$	1000 µg/mL	H_2O	**100034-4**	10 mg/mL	H_2O	**10M34-4**
Neodymium	Nd_2O_3	1000 µg/mL	2% HNO_3	**100035-1**	10 mg/mL	4% HNO_3	**10M35-1**
Neodymim	Nd_2O_3	1000 µg/mL	2% HCl	**100035-2**	10 mg/mL	10% HCl	**10M35-2**
Nickel	Ni metal	1000 µg/mL	2% HNO_3	**100036-1**	10 mg/mL	4% HNO_3	**10M36-1**
Nickel	Ni metal	1000 µg/mL	2% HCl	**100036-2**	10 mg/mL	10% HCl	**10M36-2**
Niobium	Nb metal	1000 µg/mL	2% HNO_3 + 0.5% HF	**100037-3**	10 mg/mL	4% HNO_3 + 1% HF	**10M37-3**
Osmium	$(NH_4)_2OsCl_6$	1000 µg/mL	10% HCl	**100070-2**			
Palladium	Pd metal	1000 µg/mL	10% HNO_3 + Tr HCl	**100038-1**	10 mg/mL	10% HNO_3	**10M38-1**
Palladium	Pd metal	1000 µg/mL	5% HCl	**100038-2**	10 mg/mL	10% HCl	**10M38-2**
Phosphorus	$NH_4H_2PO_4$	1000 µg/mL	0.05% HNO_3	**100039-1**	10 mg/mL	0.05% HNO_3	**10M39-1**
Phosphorus	KH_2PO_4	1000 µg/mL	0.05% HNO_3	**100039-1K**	10 mg/mL	0.05% HNO_3	**10M39-1K**
Platinum	Pt metal	1000 µg/mL	5% HCl	**100040-2**	10 mg/mL	10% HCl	**10M40-2**
Potassium	KNO_3	1000 µg/mL	1% HNO_3	**100041-1**	10 mg/mL	1% HNO_3	**10M41-1**
Potassium	KCl	1000 µg/mL	1% HCl	**100041-2**	10 mg/mL	1% HCl	**10M41-2**
Praseodymium	Pr_6O_{11}	1000 µg/mL	2% HNO_3	**100042-1**	10 mg/mL	4% HNO_3	**10M42-1**
Praseodymium	Pr_6O_{11}	1000 µg/mL	2% HCl	**100042-2**	10 mg/mL	10% HCl	**10M42-2**
Rhenium	Re metal	1000 µg/mL	2% HNO_3	**100043-1**	10 mg/mL	4% HNO_3	**10M43-1**
Rhenium	Re metal	1000 µg/mL	2% HCl	**100043-2**			
Rhodium	$RhCl_3$	1000 µg/mL	10% HCl	**100044-2**			
Rubidium	Rb_2CO_3	1000 µg/mL	1% HNO_3	**100045-1**	10 mg/mL	1% HNO_3	**10M45-1**
Rubidium	Rb_2CO_3	1000 µg/mL	1% HCl	**100045-2**	10 mg/mL	1% HCl	**10M45-2**
Ruthenium	$(NH_4)_2RuCl_6$	1000 µg/mL	2% HCl	**100046-2**	10 mg/mL	5% HCl	**10M46-2**
Samarium	Sm_2O_3	1000 µg/mL	2% HNO_3	**100047-1**	10 mg/mL	4% HNO_3	**10M47-1**
Samarium	Sm_2O_3	1000 µg/mL	2% HCl	**100047-2**	10 mg/mL	10% HCl	**10M47-2**
Scandium	Sc_2O_3	1000 µg/mL	2% HNO_3	**100048-1**	10 mg/mL	4% HNO_3	**10M48-1**
Scandium	Sc_2O_3	1000 µg/mL	2% HCl	**100048-2**	10 mg/mL	10% HCl	**10M48-2**
Selenium	Se metal	1000 µg/mL	1% HNO_3	**100049-1**	10 mg/mL	10% HNO_3	**10M49-1**
Selenium	Se metal	1000 µg/mL	1% HCl	**100049-2**	10 mg/mL	10% HCl	**10M49-2**
Silicon	Na_2SiO_3	1000 µg/mL	H_2O	**100050-4**	10 mg/mL	H_2O	**10M50-4**
Silicon	$(NH_4)_2SiF_6$	1000 µg/mL	H_2O	**100050-4F**	10 mg/mL	H_2O	**10M50-4F**
Silver	Ag metal	1000 µg/mL	1% HNO_3	**100051-1**	10 mg/mL	4% HNO_3	**10M51-1**
Sodium	Na_2CO_3	1000 µg/mL	1% HNO_3	**100052-1**	10 mg/mL	1% HNO_3	**10M52-1**
Sodium	NaCl	1000 µg/mL	1% HCl	**100052-2**	10 mg/mL	1% HCl	**10M52-2**
Strontium	$SrCO_3$	1000 µg/mL	2% HNO_3	**100053-1**	10 mg/mL	4% HNO_3	**10M53-1**
Strontium	$SrCO_3$	1000 µg/mL	2% HCl	**100053-2**	10 mg/mL	10% HCl	**10M53-2**
Sulfur	H_2SO_4	1000 µg/mL	H_2O	**100054-5**	10 mg/mL	H_2O	**10M54-5**
Tantalum	Ta metal	1000 µg/mL	2% HNO_3 + 0.1% HF	**100055-3**	10 mg/mL	5% HNO_3 + 2% HF	**10M55-3**
Tellurium	Te metal	1000 µg/mL	2% HCl	**100056-2**	10 mg/mL	40% HCl	**10M56-2**
Tellurium	Te metal	1000 µg/mL	2% HNO_3 + 0.1% HF	**100056-3**	10 mg/mL	5% HNO_3 + 2% HF	**10M56-3**
Terbium	Tb_4O_7	1000 µg/mL	2% HNO_3	**100057-1**	10 mg/mL	4% HNO_3	**10M57-1**
Terbium	Tb_4O_7	1000 µg/mL	2% HCl	**100057-2**	10 mg/mL	10% HCl	**10M57-2**
Thallium	Tl metal	1000 µg/mL	2% HNO_3	**100058-1**	10 mg/mL	4% HNO_3	**10M58-1**
Thorium	ThO_2	1000 µg/mL	2% HNO_3	**100059-1**	10 mg/mL	4% HNO_3	**10M59-1**

Single-Element Standards

Element	Source	Concentration	Matrix	Catalog No.	Concentration	Matrix	Catalog No.
Thorium	ThO_2	1000 µg/mL	2% HCl	**100059-2**			
Thulium	Tb_2O_3	1000 µg/mL	2% HNO_3	**100060-1**	10 mg/mL	4% HNO_3	**10M60-1**
Thulium	Tb_2O_3	1000 µg/mL	2% HCl	**100060-2**	10 mg/mL	10% HCl	**10M60-2**
Tin	Sn metal	1000 µg/mL	20% HCl	**100061-2**	10 mg/mL	60% HCl	**10M61-2**
Tin	Sn metal	1000 µg/mL	2% HNO_3 + 0.5% HF	**100061-3**	10 mg/mL	5% HNO_3 + 2% HF	**10M61-3**
Titanium	Ti metal	1000 µg/mL	20% HCl	**100062-2**	10 mg/mL	40% HCl	**10M62-2**
Titanium	Ti metal	1000 µg/mL	2% HNO_3 + 0.1% HF	**100062-3**	10 mg/mL	5% HNO_3 + 2% HF	**10M62-3**
Tungsten	W metal	1000 µg/mL	2% HNO_3 + 1% HF	**100063-3**	10 mg/mL	5% HNO_3 + 2% HF	**10M63-3**
Uranium	U_3O_8	1000 µg/mL	2% HNO_3	**100064-1**	10 mg/mL	4% HNO_3	**10M64-1**
Vanadium	NH_4VO_3	1000 µg/mL	2% HNO_3	**100065-1**	5 mg/mL	5% HNO_3	**5M65-1**
Vanadium	NH_4VO_3	1000 µg/mL	2% HCl	**100065-2**	10 mg/mL	10% HCl	**10M65-2**
Vanadium	NH_4VO_3				10 mg/mL	10% HNO_3 + Tr HF	**10M65-3**
Ytterbium	Yb_2O_3	1000 µg/mL	2% HNO_3	**100066-1**	10 mg/mL	4% HNO_3	**10M66-1**
Ytterbium	Yb_2O_3	1000 µg/mL	2% HCl	**100066-2**	10 mg/mL	10% HCl	**10M66-2**
Yttrium	Y_2O_3	1000 µg/mL	2% HNO_3	**100067-1**	10 mg/mL	4% HNO_3	**10M67-1**
Yttrium	Y_2O_3	1000 µg/mL	2% HCl	**100067-2**	10 mg/mL	10% HCl	**10M67-2**
Zinc	Zn metal	1000 µg/mL	2% HNO_3	**100068-1**	10 mg/mL	4% HNO_3	**10M68-1**
Zinc	Zn metal	1000 µg/mL	2% HCl	**100068-2**	10 mg/mL	10% HCl	**10M68-2**
Zirconium	$ZrO(NO_3)_2$	1000 µg/mL	0.5% HNO_3	**100069-1**			
Zirconium	$ZrOCl_2$	1000 µg/mL	2% HCl	**100069-2**	10 mg/mL	2% HCL	**10M69-2**
Zirconium	Zr metal	1000 µg/mL	2% HNO_3 + 0.5% HF	**100069-3**	10 mg/mL	4% HNO_3 + 2% HF	**10M69-3**

Single-Element Dilutions

All single-element standards are available as dilutions at any concentration. Most economical pricing is available for 10 and 100 ppm standards. Call Customer Service for pricing.

ICP Multielement Standards

The multielement standards listed on the next several pages are prepared from high-purity metals or salts in subboiling distilled acids and packaged in 100, 250, and 500 mL HDPE or LDPE laboratory grade bottles. We have listed only our most popular items. Please refer to our website or CD catalog for a complete list. If you still do not find what you need, we will be pleased to provide a quotation. Refer to page 4 for more information.

The uncertainty of the standards is certified to ± 0.5% of the stated concentrations against NIST SRM Spectrometric Standard Solutions. Each standard is accompanied by a Certificate of Analysis and a Material Safety Data Sheet.

Standards are certified accurate for a period of one year from the date of shipment.

ICP Working Calibration Solutions

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-WS-1	Al	10 µg/mL	Pb	10 µg/mL	Sn	10 µg/mL	2% HNO_3	100 mL
	Sb	10	Mo	10	Ti	10	+ Tr HF	250 mL
	As	10	Se	10	Tl	10		500 mL
	Be	1	Ag	1	Zn	10		
	Fe	10						
ICP-WS-2	Ba	10 µg/mL	Cr	10 µg/mL	Ni	10 µg/mL	2% HNO_3	100 mL
	Bi	10	Co	10	K	50		250 mL
	B	10	Cu	10	Na	50		500 mL
	Cd	10	Mg	50	Sr	10		
	Ca	50	Mn	10	V	10		
ICP-WS-3	Au	10 µg/mL	Pd	10 µg/mL	Ru	10 µg/mL	5% HCl	100 mL
	Ir	10	Pt	50	Te	50		250 mL
	Os	10	Rh	10				500 mL
ICP-WS-4	Ce	10 µg/mL	La	10 µg/mL	Tb	10 µg/mL	2% HNO_3	100 mL
	Dy	10	Lu	10	Th	10		250 mL
	Er	10	Nd	10	Tm	10		500 mL
	Eu	10	Pr	10	U	10		
	Gd	10	Sm	10	Yb	10		
	Ho	10	Sc	10	Y	10		

Wavelength Calibration Solution

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
WAVECAL	As	20 µg/mL	Mo	20 µg/mL	Sc	20 µg/mL	2% HCl	100 mL
	La	20	Ni	20	Na	20		250 mL
	Li	20	P	100	S	100		500 mL
	Mn	20	K	100				

ICP Analytical Mixtures

HPS analytical mixtures are designed to calibrate the instrument response or as a quality control check for the analysis of geological, wastewater, air particulate, soil, plant, and animal tissue samples.

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-AM-1	Ba	25 µg/mL	Mo	50 µg/mL			2% HNO_3	100 mL
	Ca	250	K	500			+ Tr HF	250 mL
	Mg	100	Na	500				500 mL
ICP-AM-3	Al	100 µg/mL	Co	100 µg/mL	Hg	5 µg/mL	2% HNO_3	100 mL
	As	50	Cu	100	Ni	50		250 mL
	Be	10	Fe	50	Se	50		500 mL
	Cd	100	Pb	100	V	100		
	Cr	100	Mn	100	Zn	100		
ICP-AM-4	Sb	100 µg/mL	Se	100 µg/mL	Sn	100 µg/mL	20% HCl	100 mL
	Ca	100	Na	100	Te	100		250 mL
	Mg	100	S	100				500 mL
ICP-AM-5	Al	100 µg/mL	Cr	100 µg/mL	Pb	100 µg/mL	5% HCl	100 mL
	As	100	Co	100	Mn	100		250 mL
	Ba	100	Cu	100	Ni	100		500 mL
	Be	100	Fe	100	Zn	100		
	Cd	100						
ICP-AM-6	Al	100 µg/mL	Co	100 µg/mL	K	100 µg/mL	4% HNO_3	100 mL
	Sb	100	Cu	100	Si	100	+ Tr HF	250 mL
	Ba	100	Fe	100	Ag*	100		500 mL
	Be	100	Pb	100	Na	100		
	B	100	Li	100	Sr	100		
	Cd	100	Mg	100	Tl	100		
	Ca	100	Mn	100	V	100	*Solution B	
	Cr	100	Ni	100	Zn	100	2% HNO_3	
ICP-AM-11	Sb	1000 µg/mL	Si	2000 µg/mL			4% HNO_3	100 mL
	B	1000	Sn	1000			+ 1% HF	250 mL
	Mo	200	Ti	200				500 mL
ICP-AM-12	Al	100 µg/mL	Co	100 µg/mL	Se	100 µg/mL	4% HNO_3	100 mL
	Sb	100	Cu	100	Tl	100	+ Tr HF	250 mL
	As	100	Pb	100	V	100		500 mL
	Be	100	Mn	100	Zn	100		
	Cd	100	Mo	100	Th*	100		
	Cr	100	Ni	100	U	100	*Solution B	
							2% HNO_3	

ICP Multielement Standards

Initial Check Verification Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICV-1	Al	100 µg/mL	Cu	100 µg/mL	K	200 µg/mL	4% HNO_3	100 mL
	As	100	Fe	100	Se	200	+ Tr HF	250 mL
	Ba	50	Pb	100	Si*	100		500 mL
	Be	50	Li	100	Na*	162		
	Bi	100	Mg	100	S*	200		
	B	100	Mn	50	Sr	100	*Solution B	
	Cd	50	Mo	100	Tl	100	H_20	
	Ca	100	Ni	100	V	50		
	Cr	50	P	200	Zn	50		
	Co	50						
ICV-2	Sb	100 µg/mL					15% HCl	100 mL
	Sn	100						250 mL
	Ti	100						500 mL
ICV-3	Au	50 µg/mL					5% HCl	100 mL
	Pd	50						250 mL
	Pt	50						500 mL
ICV-4	Al	200 µg/mL	Co	50 µg/mL	K	5000 µg/mL	4% HNO_3	100 mL
	Sb	60	Cu	25	Se	5	+ Tr HF	250 mL
	As	10	Fe	100	Ag	10		500 mL
	Ba	200	Pb	5	Na	5000		
	Be	5	Mg	5000	Tl	10		
	Cd	5	Mn	15	V	50		
	Ca	5000	Ni	40	Zn	20		
	Cr	10						

Continuing Check Verification Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
CCV-1	Al	200 µg/mL	Cu	200 µg/mL	K	500 µg/mL	4% HNO_3	100 mL
	As	200	Fe	200	Se	200	+ Tr HF	250 mL
	Ba	100	Pb	200	Si*	500		500 mL
	Be	100	Li	200	Na*	810		
	Bi	200	Mg	200	S*	500		
	B	200	Mn	100	Sr	200	*Solution B	
	Cd	100	Mo	200	Tl	200	H_20	
	Ca	200	Ni	200	V	100		
	Cr	50	P	500	Zn	100		
	Co	100						
CCV-2	Sb	200 µg/mL					15% HCl	100 mL
	Sn	200						250 mL
	Ti	200						500 mL
CCV-3	Au	100 µg/mL					5% HCl	100 mL
	Pd	100						250 mL
	Pt	100						500 mL

ICP Multielement Standards

EPA Method 200.7 and 200.8 Calibration Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-200.7-1	Al Ca Cr	1000 µg/mL 1000 500	Mg Ni K	1000 µg/mL 500 1000	Ag* Na Zn	500 µg/mL 1000 500	2% HNO_3 *Solution B 2% HNO_3	100 mL 250 mL 500 mL
ICP-200.7-2	Ba Be Co	100 µg/mL 100 200	Cu Fe Mn	100 µg/mL 1000 100	Sr V	1000 µg/mL 100	2% HNO_3	100 mL 250 mL 500 mL
ICP-200.7-4	Sb Mo Ti	1000 µg/mL 1000 1000					4% HNO_3 + Tr HF	100 mL 250 mL 500 mL
ICP-200.7-5	Al Sb As Ba Be B Cd Cr Co	25 µg/mL 25 25 25 5 25 10 25 10	Cu Fe Pb Li Mn Hg Mo Ni P	25 µg/mL 25 25 25 25 5 10 25 50	Se Si Ag Sr Tl Sn V Zn	25 µg/mL 25 2.5 25 25 10 10 25	2% HNO_3 + Tr HF	100 mL 250 mL 500 mL
ICP-200.7-6	Al Sb As Ba Be B Cd Ca Cr Co	20 µg/mL 20 20 20 20 20 20 20 20 20	Cu Fe Pb Li Mg Mn Hg* Mo Ni P	20 µg/mL 20 20 20 20 20 20 20 20 100	K Se Si Ag Na Sr Tl Sn V Zn	100 µg/mL 20 100 5 20 20 20 20 20 20	2% HNO_3 + Tr HF *Solution B 2% HNO_3	100 mL 250 mL 500 mL
ICP-200.7-8	Al Ba Be Cd Ca Ce	200 µg/mL 50 50 50 50 50	Co Cr Cu Fe Mn Mo	50 µg/mL 50 50 300 50 50	Ni Sn SiO_2 Ti Tl V	50 µg/mL 50 50 50 50 50	2% HNO_3 + Tr HF	100 mL 250 mL 500 mL
ICP-200.8-1	Al Sb As Ba Be Cd Cr	10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL	Co Cu Pb Mn Mo Ni Se	10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL	Ag Tl Th U V Zn	10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL 10 µg/mL	2% HNO_3 + Tr HF	

ICP Multielement Standards

Interference Check Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
INFCS-1	As	1000 µg/mL	Cu	300 µg/mL	Se	500 µg/mL	4% HNO_3	100 mL
	Ba	300	Pb	1000	Ag*	300		250 mL
	Be	100	Mn	200	Tl	1000		500 mL
	Cd	300	Hg	50	V	300		
	Cr	300	Ni	300	Zn	300	*Solution B	
	Co	300	K	20,000				
INFCS-4	Al	5000 µg/mL	Fe	5000 µg/mL			5% HNO_3	100 mL
	Ca	5000	Mg	5000				250 mL
								500 mL
INFCS-5	K	5000 µg/mL					2% HCl	100 mL
	Na	5000						250 mL
								500 mL
INFCS-6	Al	1200 µg/mL	Mg	3000 µg/mL			4% HNO_3	100 mL
	Ca	6000	Na	1000				250 mL
	Fe	5000						500 mL

ICP Stock Solution

This stock solution is used to prepare working calibration standards and instrument performance check standards. The working calibration solutions are prepared from the stock solutions by making 100-, 20- and 10- fold dilutions. The working matrix is 1% HNO_3. To prepare an instrument check standard, the stock solution is diluted 40 fold in 1% HNO_3.

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-SS	Al	100 µg/mL	Co	20 µg/mL	Si	500 µg/mL	2% HNO_3	100 mL
	Sb	50	Cu	20	Ag	1.5	+ Tr HF	250 mL
	As	25	Fe	100	Na	2000		500 mL
	Ba	20	Pb	25	Sr	100		
	Be	20	Mg	500	Tl	10		
	B	20	Mn	20	Sn	20		
	Cd	20	Ni	20	V	20		
	Ca	2000	K	150	Zn	100		
	Cr	20	Se	50				

ICP Multielement Standards

Quality Control Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
QCS-1	Al	100 µg/mL	Co	100 µg/mL	K	100 µg/mL	4% HNO_3	100 mL
	As	100	Fe	100	Se	100	+ Tr HF	250 mL
	Ba	100	Li	100	Si	100		500 mL
	Be	100	Mg	100	S*	100		
	B	100	Mn	100	U	100		
	Cd	100	Mo	100	V	100	*Solution B	
							H_2O	
	Ca	100	Ni	100	Y	500		
	Cr	100	P	100	Zn	100		
QCS-2	Sb	100 µg/mL	Sn	100 µg/mL			5% HCl	100 mL
	Na	100	Y	500				250 mL
								500 mL
QCS-3	Cu	100 µg/mL	Ag	100 µg/mL	Y	500 µg/mL	2% HNO_3	100 mL
	Pb	100	Tl	100				250 mL
								500 mL
QCS-7	Al	100 µg/mL	K	1000 µg/mL	Na	100 µg/mL	2% HNO_3	100 mL
	Ba	100	Si	50				250 mL
	B	100	Ag	100				500 mL
QCS-7-M	Al	100 µg/mL	K	1000 µg/mL	Na	100 µg/mL	2% HNO_3	100mL
	Ba	100	Si	100				250 mL
	B	100	Ag	50				500 mL
QCS-19	Sb	100 µg/mL	Cu	100 µg/mL	Ni	100 µg/mL	4% HNO_3	100 mL
	As	100	Fe	100	Se	100	+ Tr HF	250 mL
	Be	100	Pb	100	Tl	100		500 mL
	Cd	100	Mg	100	Ti	100		
	Ca	100	Mn	100	V	100		
	Cr	100	Mo	100	Zn	100		
	Co	100						
QCS-21	Sb	100 µg/mL	Cu	100 µg/mL	Ni	100 µg/mL	4% HNO_3	100 mL
	As	100	Fe	100	Se	100	+ Tr HF	250 mL
	Be	100	Pb	100	Sr	100		500 mL
	Cd	100	Li	100	Tl	100		
	Ca	100	Mg	100	Ti	100		
	Cr	100	Mn	100	V	100		
	Co	100	Mo	100	Zn	100		
QCS-26	Al	100 µg/mL	Cr	100 µg/mL	Pb	100 µg/mL	4% HNO_3	100 mL
	Sb	100	Cu	100	Ag	100	+ Tr HF	250 mL
	As	100	Fe	100	Se	100		500 mL
	B	100	K	1000	Si	50		
	Ba	100	Mg	100	Ti	100		
	Be	100	Mn	100	Tl	100		
	Ca	100	Mo	100	V	100		
	Cd	100	Na	100	Zn	100		
	Co	100	Ni	100				

CLP Calibration Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
CLP-CAL-1	Al	2000 µg/mL	Cu	250 µg/mL	Ni	500 µg/mL	4% HNO_3	100 mL
	Ba	2000	Fe	1000	Na	5000		250 mL
	Be	50	K	5000	Ag*	250		500 mL
	Ca	5000	Mg	5000	V	500		
	Cr	200	Mn	500	Zn	500		
	Co	500					*Solution B	
CLP-CAL-2	Sb	1000 µg/mL					5% Tartaric Acid + 2% HNO_3	100 mL 250 mL 500 mL
CLP-CAL-3	As	1000 µg/mL	Se	1000 µg/mL			2% HNO_3	100 mL
	Cd	500	Tl	1000				250 mL
	Pb	1000						500 mL

CLP Check Verification Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
CLP-CV-1	Al	1000 µg/mL	Cu	125 µg/mL	Ni	250 µg/mL	4% HNO_3	100 mL
	Ba	1000	Fe	500	Ag	125		250 mL
	Be	25	K	2500	Na	2500		500 mL
	Ca	2500	Mg	2500	V	250		
	Cr	100	Mn	250	Zn	250		
	Co	250						
CLP-CV-2	Sb	500 µg/mL					2% HNO_3 + Tr HF	100 mL 250 mL 500 mL
CLP-CV-3	As	500 µg/mL	Se	500 µg/mL			2% HNO_3	100 mL
	Cd	250	Tl	500				250 mL
	Pb	500						500 mL

CLP Interference Check Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
CLP-INF-1	Al	5000 µg/mL					5% HNO_3	100 mL
	Ca	5000						250 mL
	Fe	2000						500 mL
	Mg	5000						

Any multielement standard in the HPS Catalog can be modified to meet your needs.

CLP Spike Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
CLP-SP-1	Al	2000 µg/mL	Co	500 µg/mL	Ni	500 µg/mL	4% HNO_3	100 mL
	Ba	2000	Cu	250	Ag*	50		250 mL
	Be	50	Fe	1000	V	500		500 mL
	Cr	200	Mn	500	Zn	500	*Solution B	
CLP-SP-2	Sb	500 µg/mL					5% Tartaric	100 mL
							Acid +	250 mL
							2% HNO_3	500 mL
CLP-SP-3	As	2000 µg/mL	Se	2000 µg/mL			4% HNO_3	100 mL
	Cd	50	Tl	2000				250 mL
	Pb	500						500 mL

CLP Analyte Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ANALCS	Ba	50 µg/mL	Co	50 µg/mL	Ni	100 µg/mL	2% HNO_3	100 mL
	Be	50	Cu	50	Ag	100		250 mL
	Cd	100	Pb	100	V	50		500 mL
	Cr	50	Mn	50	Zn	100		
ANALCS-R	Sb	60 µg/mL	Cu	50 µg/mL	Se	5 µg/mL	2% HNO_3	100 mL
	As	10	Co	50	Ag	20	+ Tr HF	250 mL
	Ba	50	Pb	5	Tl	10		500 mL
	Be	50	Mn	50	V	50		
	Cd	100	Ni	100	Zn	100		
	Cr	50						

CRDL Detection Limit Standard

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
CRDL	Sb	120 µg/mL	Co	100 µg/mL	Se	10 µg/mL	2% HNO_3	100 mL
	As	20	Cu	50	Ag	20	+ Tr HF	250 mL
	Be	10	Pb	6	Tl	20		500 mL
	Cd	10	Mn	30	V	100		
	Cr	20	Ni	80	Zn	40		

ICP Starter Kits

These kits are designed for ICP to provide the analyst with a modest supply of high-purity single-element spectrometric standard solutions. Individual kits are designed to meet the analyst's needs for a variety of environmental and industrial applications. **Each kit contains individual 100 or 250 mL bottles of the listed elements at 1000 ± 3 µg/mL**. The complete kit, ICP-KIT-A-E, contains all 60 single-element solutions listed below.

Catalog No.	1000 µg/mL	Matrix	Volume
ICP-KIT-A	Aluminum, Chromium, Manganese, Sodium Arsenic, Cobalt, Mercury, Strontium Barium, Copper, Nickel, Thallium Beryllium, Indium, Potassium, Vanadium Bismuth, Iron, Selenium, Zinc Cadmium, Lead, Silicon* Calcium, Magnesium, Silver *Silicon from $(NH_4)_2SiF_6$	2% HNO_3	100 mL 250 mL
ICP-KIT-B	Antimony, Niobium, Tin, Zirconium Hafnium, Tantalum, Titanium Molybdenum, Tellurium, Tungsten	2-5% HNO_3 + Tr HF	100 mL 250 mL
ICP-KIT-C	Boron, Phosphorus, Sulfur	H_2O	100 mL 250 mL
ICP-KIT-D	Gold, Palladium, Platinum	2-5% HCl	100 mL 250 mL
ICP-KIT-E	Cerium, Gadolinium, Praseodymium, Thulium Dysprosium, Holmium, Samarium, Uranium Erbium, Lanthanum, Scandium, Ytterbium Europium, Lutetium, Terbium, Yttrium Neodymium, Thorium	2% HNO_3	100 mL 250 mL
ICP-KIT-A-E	**Complete ICP Starter Kit (Includes all of the above kits)**		**100 mL** **250 mL**

Need technical assistance? Call us for help with all your laboratory questions.

ICP-MS Starter Kits

These kits are designed for ICP-MS to provide the analyst with a modest supply of high-purity single-element spectrometric standard solutions. Individual kits are designed to meet the analyst's needs for a variety of environmental and industrial applications. **Each kit contains individual 100 mL bottles of the listed elements at 10 ± 0.05 µg/mL**. The complete kit, ICP-MS-KIT-A-E, contains all 60 single-element solutions listed below

For a standard containing most of these elements as a multielement mix, please reference ICP-MS-68A on page 23.

Catalog No.	10 µg/mL				Matrix	Volume
ICP-MS-KIT-A	Aluminum Arsenic Barium Beryllium Bismuth Boron Cadmium Calcium Cesium	Chromium Cobalt Copper Gallium Germanium Indium Iron Lead Lithium Magnesium	Manganese Mercury Nickel Phosphorus Potassium Rhenium Rubidium Selenium Silicon* Silver	Sodium Strontium Sulfur Thallium Thorium Uranium Vanadium Zinc	2% HNO_3	100 mL
			*Silicon from $(NH_4)_2SiF_6$			
ICP-MS-KIT-B	Antimony Hafnium Molybdenum	Niobium Tantalum Tin	Tellurium Titanium Tungsten	Zirconium	2% HNO_3 + Tr HF	100 mL
ICP-MS-KIT-C	Gold Iridium	Osmium Palladium Platinum	Rhodium Ruthenium		2% HCl	100 mL
ICP-MS-KIT-D	Cerium Dysprosium Erbium Europium	Gadolinium Holmium Lanthanum Lutetium	Neodymium Praseodymium Samarium Scandium	Terbium Thulium Ytterbium Yttrium	2% HNO_3	100 mL
ICP-MS-KIT-E	Bromide	Chloride	Fluoride	Iodide	H_2O	100 mL
ICP-MS-KIT-A-E	**Complete ICP-MS Starter Kit (Includes all of the above kits)**				**100 mL**	

Please see website for complete listing of products.

ICP-MS Multielement Standards

ICP-MS Calibration Standards

The following solutions include elements chosen to calibrate the ICP-MS over the entire mass spectrum. These multielement standards are designed to assist the analyst in the verification of the mass range.

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-MSCS	Li	10 µg/mL	Co	10 µg/mL	Sb	10 µg/mL	2% HNO_3	100 mL
	Be	10	Ni	10	Ba	10	+ Tr HF	250 mL
	B	10	Cu	10	La	10		500 mL
	Na	10	Zn	10	Eu	10		
	Mg	10	As	10	Ho	10		
	Al	10	Sc	10	Yb	10		
	Ca	10	Sr	10	Tl	10		
	Se	10	Mo	10	Pb	10		
	V	10	Ag	10	Th	10		
	Cr	10	Cd	10	U	10		
	Mn	10						
ICP-MSCS-M	Li	10 g/mL	Co	10 µg/mL	Ba	10 µg/mL	2% HNO_3	100 mL
	Be	10	Ni	10	La	10	+ Tr HF	250 mL
	B	10	Cu	10	Eu	10		500 mL
	Na	10	Zn	10	Ho	10		
	Mg	10	As	10	Yb	10		
	Al	10	Se	10	Tl	10		
	Ca	10	Sr	10	Pb	10		
	V	10	Mo	10	Bi	10		
	Cr	10	Ag	10	Th	10		
	Mn	10	Cd	10	U	10		
	Fe	10	Sb	10				

Interference Check Solutions

These solutions contain known concentrations of elements that will demonstrate the magnitude of interference and provide adequate tests for many corrections.

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-MS-ICS	**Solution A**			**Solution AB**			2% HNO_3	100 mL
	Al	500 mg/L	Al	500 mg/L	As	0.10 mg/L	+ Tr HF	250 mL
	Ca	500	Ca	500	Cd	0.05		500 mL
	Fe	500	Fe	500	Cr	0.10		
	Mg	500	Mg	500	Co	0.20		
	Na	500	Na	500	Cu	0.10		
	P	500	P	500	Ni	0.20		
	K	500	K	500	Mn	0.10		
	S	500	S	500	Se	0.10		
	C	1000	C	1000	Ag	0.10		
	Cl	3600	Cl	3600	V	0.20		
	Mo	10	Mo	10	Zn	0.10		
	Ti	10	Ti	10				

ICP-MS Verification Standards

The following series of ICP-MS standards are used as concentration verification checks.

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-MS-B	Ce	10 µg/mL	La	10 µg/mL	Tb	10 µg/mL	2% HNO_3	100 mL
	Dy	10	Lu	10	Th	10		250 mL
	Er	10	Nd	10	Tm	10		500 mL
	Eu	10	Pr	10	Yb	10		
	Gd	10	Sm	10	Y	10		
	Ho	10	Sc	10				
ICP-MS-C	Sb	10 µg/mL	Pd	10 µg/mL	Ru	10 µg/mL	10% HCl	100 mL
	Au	10	Pt	10	Sn	10		250 mL
	Hf	10	Rh	10	Te	10		500 mL
	Ir	10						
ICP-MS-D	B	10 µg/mL	P	10 µg/mL	Ta	10 µg/mL	2% HNO_3	100 mL
	Ge	10	Re	10	Ti	10	+ Tr HF	250 mL
	Mo	10	S	10	W	10		500 mL
	Nb	10	Si	10	Zr	10		

ICP-MS Method 6020

When the following solution is diluted 100-fold, the Contract Required Detection Limits (CRDL) of the elements approved for ICP-MS Method 6020 CLP-M are met.

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-MS-6020	Al	200 µg/L	Co	50 µg/L	K	5000 µg/L	4% HNO_3	100 mL
	Sb	60	Cu	25	Se	5	+ Tr HF	250 mL
	As	10	Fe	100	Ag	10		500 mL
	Ba	200	Pb	5	Na	5000		
	Be	5	Mg	5000	Tl	10		
	Cd	5	Mn	15	V	50		
	Ca	5000	Ni	40	Zn	20		
	Cr	10						

ICP-MS Multielement Standards

Tuning Solutions

The following solutions include elements chosen to calibrate the ICP-MS over the entire mass spectrum. These multielement standards are designed to assist the analyst in the verification of the mass range.

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
ICP-MS-TS-1	Li Co	10 µg/mL 10	In Tl	10 µg/mL 10			2% HNO_3	100 mL 250 mL 500 mL
ICP-MS-TS-2	Li Y	10 µg/mL 10	Ce Tl	10 µg/mL 10			2% HNO_3	100 mL 250 mL 500 mL
ICP-MS-TS-3	Be Mg Co	10 µg/mL 10 10	In Pb	10 µg/mL 10			2% HNO_3	100 mL 250 mL 500 mL
ICP-MS-TS-4	Be Mg Al V	10 µg/mL 10 10 10	Co Ni Y In	10 µg/mL 10 10 10	Ba Ce Pb Bi	10 µg/mL 10 10 10	2% HNO_3	100 mL 250 mL 500 mL
ICP-MS-TS-5	Bi Ho In	10 µg/mL 10 10	^{6}Li Sc Tb	10 µg/mL 10 10	U Y	10 µg/mL 10	2% HNO_3	100 mL 250 mL 500 mL

Simulated Rainwater

The following Simulated Rainwater standards are available in 250 mL, packaged as 5 x 50 mL bottles. The concentrations shown below are the targeted values for each level.

Catalog No.	SR-1	SR-2
pH, 25°C	4.3	3.6
Specific Conductance (µs/cm, 25°C)	26	130
Components	**mg/L**	**mg/L**
Fluoride	0.05	0.10
Chloride	0.25	1
Nitrate	0.50	7
Sulfate	2.5	11
Sodium	0.20	0.40
Potassium	0.05	0.10
Ammonium	0.10	1
Calcium	0.01	0.05
Magnesium	0.02	0.05

68-Element Standard

This was developed for our customers as a standard to use when screening for a large number of elements. The chloride in Solution C has been reduced to minimize ICP-MS interferent effects. All three solutions may be purchased as a set, or individually.

Catalog No.	ICP-MS-68A-A Solution A 10 mg/L	ICP-MS-68A-B Solution B 10 mg/L	ICP-MS-68A-C Solution C 10 mg/L	Volume
ICP-MS-68A (Includes all three solutions)	Al, As, Ba, Be, Bi, B, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ho, In, K, La, Li, Lu, Mg, Mn, Na, Nd, Ni, P, Pb, Pr, Re, Rb, Sc, Se, Sm, Sr, Tb, Th, Tl, Tm, U, V, Y, Yb, Zn	Ag, Hf, Ge, Mo, Nb, Sb, Si, Sn, Ta, Te, Ti, W, Zr	Au, Ir, Os, Pd, Pt, Rh, Ru	100 mL 250 mL 500 mL
Matrix	2% HNO_3	2% HNO_3 + Tr HF	2% HNO_3 + Tr HCl	
Catalog No.	**ICP-MS-68B-A Solution A 10 mg/L**	**ICP-MS-68B-B Solution B 10 mg/L**	**ICP-MS-68B-C Solution C 10 mg/L**	**Volume**
ICP-MS-68B (Includes all three solutions)	ICP-MS-68B offers identical elements organized similar to ICP-MS-68A but at a concentration of 100 mg/L. Volumes of 100, 250 and 500 mL are stocked.			
Matrix	4% HNO_3	2% HNO_3 + Tr HF	4% HNO_3 + 2% HCl	

Graphite Furnace Standards

Matrix Modifiers

HPS Matrix Modifiers are designed for use with Graphite Furnace Atomic Absorption (GFAAS). A matrix modifier is added to the sample to prevent analyte loss during the ashing step by converting the analyte to a less volatile form.

Catalog No.	Description
MM-9001	0.1% $NH_4H_2PO_4$ in 0.05% HNO_3
MM-9002	1% $NH_4H_2PO_4$ in 0.05% HNO_3
MM-9003	10% $NH_4H_2PO_4$ in 0.05% HNO_3
MM-9004	20% $NH_4H_2PO_4$ in 0.05% HNO_3
MM-9010	0.1% $Mg(NO_3)_2$ in 1% HNO_3
MM-9011	1% $Mg(NO_3)_2$ in 1% HNO_3
MM-9012	5% $Mg(NO_3)_2$ in 1% HNO_3
MM-9020	0.1% Pd in 10% HNO_3
MM-9023	0.5% Pd in 10% HNO_3
MM-9021	1% Pd in 10% HNO_3
MM-9022	2% Pd in 10% HNO_3
MM-9030	0.1% $Ni(NO_3)_2$ in 1% HNO_3
MM-9031	1% $Ni(NO_3)_2$ in 1% HNO_3
MM-9032	5% $Ni(NO_3)_2$ in 1% HNO_3
MM-9100	1000 µg Pd/mL - 600 µg $Mg(NO_3)_2$/mL in 10% HNO_3

Catalog No.	Description
MM-9040	0.1% NH_4NO_3 in H_2O
MM-9041	1% NH_4NO_3 in H_2O
MM-9042	5% NH_4NO_3 in H_2O
MM-9101	1500 µg Pd/mL - 1000 µg $Mg(NO_3)_2$/mL in 10% HNO_3
MM-9102	750 µg Pd/mL - 500 µg $Mg(NO_3)_2$/mL in 10%HNO_3
MM-9110	10,000 µg $NH_4H_2PO_4$/mL - 500 µg $Mg(NO_3)_2$/mL in 1% HNO_3

Flame AAS Standards

Ionization Buffers

Ionization Buffers are used to increase the free electron population in flame emission or absorption and thereby suppress ionization interference effects of many ions in high temperature flames such as nitrous oxide - acetylene. While the alkali metals are known to be ionized at various degrees, many metals including aluminum and silicon are ionized to an appreciable extent in a nitrous oxide - acetylene flame. Ionization buffers are always recommended with the nitrous oxide - acetylene flame. It is of interest to note that the ionization potential of lanthanum (5.6 eV) is very close to that of lithium (5.39 eV). Therefore, lanthanum acts as an ionization buffer as well as a releasing agent for the alkaline earth metals, silicon, and aluminum. The cesium ionization buffer is recommended by the manufacturers of the ICP and AAS instrumentation.

Catalog No.	Description
IB-CS-B1	1% Cesium in 1% HNO_3
IB-CS-B5	5% Cesium in 1% HNO_3
IB-K-A5	5% Potassium in 1% HCl
IB-K-B5	5% Potassium in 1% HNO_3
IB-LA-B5	5% Lanthanum in 1% HNO_3*
IB-LA-A1	1% Lanthanum in 1% HCl*
IB-LA-A5	5% Lanthanum in 1% HCL*

***Also used as releasing agents in flame AAS**

Single-Element Standards

The standards listed below are for determination of wear metals in oils and lubricants. The standards below can also be ordered in parafin 20 Base Oil, 75 Base Oil, Soybean Oil, and Xylene. Blank oil standards are available as well.

Catalog No.	Element	Concentration	Weight
ALOMS	Aluminum	1000 µg/g	100 grams
SBOMS	Antimony	1000	100
ASOMS	Arsenic	50	100
BAOMS	Barium	1000	100
BEOMS	Beryllium	1000	100
BIOMS	Bismuth	1000	100
BBOMS	Boron	1000	100
CDOMS	Cadmium	1000	100
CAOMS	Calcium	1000	100
CROMS	Chromium	1000	100
COOMS	Cobalt	1000	100
CUOMS	Copper	1000	100
INOMS	Indium	1000	100
FEOMS	Iron	1000	100
PBOMS	Lead	1000	100
LIOMS	Lithium	1000	100
MGOMS	Magnesium	1000	100
MNOMS	Manganese	1000	100
HGOMS	Mercury	50	100
MOOMS	Molybdenum	1000	100
NIOMS	Nickel	1000	100
PPOMS	Phosphorus	1000	100
KKOMS	Potassium	1000	100
SEOMS	Selenium	50	100
SIOMS	Silicon	1000	100
AGOMS	Silver	1000	100
NAOMS	Sodium	1000	100
SNOMS	Tin	1000	100
TIOMS	Titanium	1000	100
WWOMS	Tungsten	1000	100
VVOMS	Vanadium	1000	100
ZNOMS	Zinc	1000	100
BMOMS	Base Mineral Oil		500 mL
OMS-12	Ag, Al, Cr, Cu, Fe, Mg, Na, Ni, Pb, Si, Sn, Ti all elements at 200 µg/g	Mineral Oil	100 g 200 g
OMS-21	Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, Mg, Mn, Mo, Na, Ni, P, Pb, Si, Sn, Ti, V, Zn all elements at 200 µg/g	Mineral Oil	100 g 200 g

Single Component IC Standards

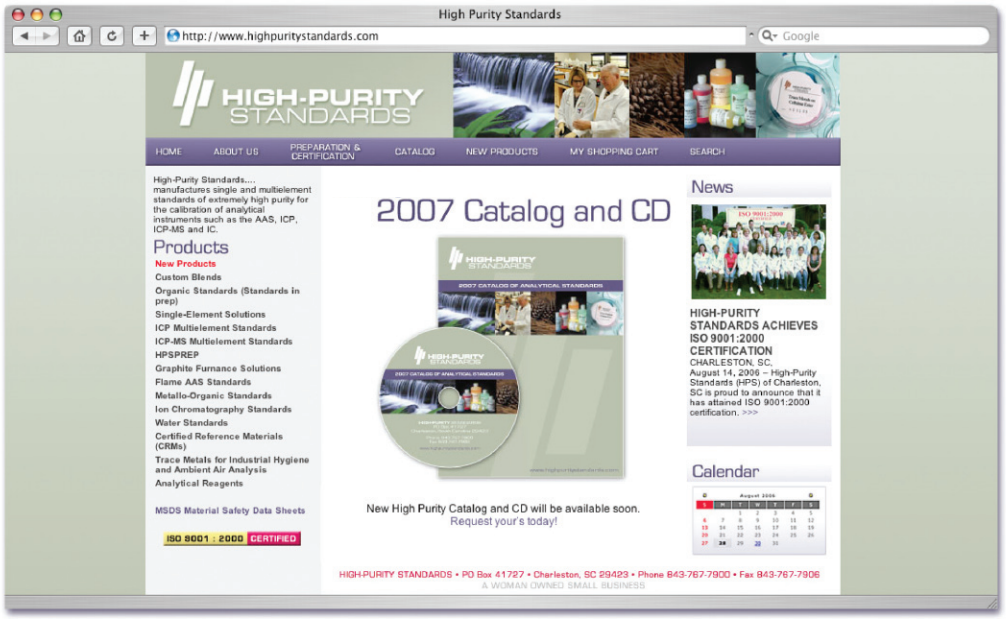
The following standards are prepared from high-purity salts in 18-megaohm water except where noted otherwise and packaged in high-density polyethylene bottles. Standards are certified accurate for a period of 18 months from the date of shipment, except where noted otherwise.

Component	Source	Concentration	Catalog No.	Concentration	Catalog No.
Acetate	Na Acetate	100 µg/mL	**IC-AC**	1000 µg/mL	**IC-AC-M**
‡ Ammonium	NH_4Cl	100 µg/mL	**IC-NH**	1000 µg/mL	**IC-NH-M**
Bromide	NaBr	100 µg/mL	**IC-BR**	1000 µg/mL	**IC-BR-M**
Bromide	NaBr	10,000 µg/mL	**IC-BR-10M**		
Bromate	$NaBrO_3$	100 µg/mL	**IC-BRO3**	1000 µg/mL	**IC-BRO3-M**
Calcium	$CaCl_2$	100 µg/mL	**IC-CA**	1000 µg/mL	**IC-CA-M**
Chloride	NaCl	100 µg/mL	**IC-CL**	1000 µg/mL	**IC-CL-M**
Chloride	NaCl	10,000 µg/mL	**IC-CL-10M**		
*Chlorite	$NaClO_2$	100 µg/mL	**IC-CLO2**	1000 µg/mL	**IC-CLO2-M**
‡ Chlorate	$NaClO_3$	100 µg/mL	**IC-CLO3**	1000 µg/mL	**IC-CLO3-M**
‡ Perchlorate	$NaClO_4$	100 µg/mL	**IC-CLO4**	1000 µg/mL	**IC-CLO4-M**
Dichromate	$K_2Cr_2O_7$	100 µg/mL	**IC-CRO**	1000 µg/mL	**IC-CRO-M**
‡ Cyanide	KCN	100 µg/mL	**IC-CN**	1000 µg/mL	**IC-CN-M**
Fluoride	NaF	100 µg/mL	**IC-FF**	1000 µg/mL	**IC-FF-M**
Fluoride	NaF	10,000 µg/mL	**IC-FF-10M**		
† Formate	Na Formate	100 µg/mL	**IC-FM**	1000 µg/mL	**IC-FM-M**
Iodide	NaI	100 µg/mL	**IC-II**	1000 µg/mL	**IC-II-M**
Lactate	Na Lactate	100 µg/mL	**IC-LAC**	1000 µg/mL	**IC-LAC-M**
Magnesium	$MgCl_2$	100 µg/mL	**IC-MG**	1000 µg/mL	**IC-MG-M**
Nitrate	$NaNO_3$	100 µg/mL	**IC-NO**	1000 µg/mL	**IC-NO-M**
Nitrate	$NaNO_3$	10,000 µg/mL	**IC-NO-10M**		
‡ Nitrite	$NaNO_2$	100 µg/mL	**IC-N**	1000 µg/mL	**IC-N-M**
‡ Nitrogen	$NaNO_2$	100 µg/mL	**IC-NO2**	1000 µg/mL	**IC-NO2**
Nitrogen	$NaNO_3$	100 µg/mL	**IC-NO3**	1000 µg/mL	**IC-NO3**
‡ Nitrogen	NH_4Cl	100 µg/mL	**IC-NT**	1000 µg/mL	**IC-NT-M**
‡ Oxalate	Na Oxalate	100 µg/mL	**IC-OX**	1000 µg/mL	**IC-OX-M**
Phosphate	$NH_4H_2PO_4$	100 µg/mL	**IC-PP**	1000 µg/mL	**IC-PP-M**
Phosphate	$NH_4H_2PO_4$	10,000 µg/mL	**IC-PP-10M**		
Phosphorus	$NH_4H_2PO_4$	100 µg/mL	**IC-P**	1000 µg/mL	**IC-P-M**
Phosphorus	KH_2PO_4	100 µg/mL	**IC-KP**	1000 µg/mL	**IC-KP-M**
Potassium	KCl	100 µg/mL	**IC-K**	1000 µg/mL	**IC-K-M**
Propionate	Na Propionate	100 µg/mL	**IC-PRO**	1000 µg/mL	**IC-PRO-M**
Sodium	NaCl	100 µg/mL	**IC-NA**	1000 µg/mL	**IC-NA-M**
Sulfate	Na_2SO_4	100 µg/mL	**IC-SS**	1000 µg/mL	**IC-SS-M**
Sulfate	Na_2SO_4	10,000 µg/mL	**IC-SS-10M**		
Sulfur	Na_2SO_4	100 µg/mL	**IC-SR**	1000 µg/mL	**IC-SR-M**

* Exp Date: 3 Months
† Exp Date: 6 Months
‡ Exp Date: 12 Months

Multielement IC Standards

Catalog No.	Element	Conc.	Matrix	Volume
IC-1	Nitrate	100 µg/mL	H_2O	100 mL
	Nitrite*	100		250 mL
	Phosphate	100		500 mL
	Fluoride	100		
	Bromide	100	*Solution B	
	Chloride	100		
	Sulfate	100		
IC-2	Nitrate	1000 µg/mL	H_2O	100 mL
	Nitrite*	1000		250 mL
	Phosphate	1000		500 mL
	Fluoride	1000		
	Bromide	1000	*Solution B	
	Chloride	1000		
	Sulfate	1000		
IC-4	Ammonium	100 µg/mL	H_2O	100 mL
	Calcium	100		250 mL
	Magnesium	100		500 mL
	Potassium	100		
	Sodium	100		



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Trace Metals in Drinking Water Standards

Catalog No.	Element	Conc.	Element	Conc.	Element	Conc.	Matrix	Volume
CRM-TMDW	Al	120 µg/L	Cu	20 µg/L	Se	10 µg/L	2% HNO_3	100 mL
	Sb	10	Fe	100	Ag	2	+ Tr HF	250 mL
	As	80	Pb	40	Na	6000		500 mL
	Ba	50	Li	20	Sr	250		
	Be	20	Mg	9000	Te	3		
	Bi	10	Mn	40	Tl	10		
	Cd	10	Mo	100	V	30		
	Ca	35,000	Ni	60	U	10		
	Cr	20	K	2500	Zn	70		
	Co	25	Rb	10				
CRM-TMDW-A	Al	125 µg/L	Co	25 µg/L	K	2500 µg/L	2% HNO_3	100 mL
	Sb	55	Cu	20	Se	11	+ Tr HF	250 mL
	As	55	Fe	90	Ag	2		500 mL
	Ba	500	Pb	20	Na	2300		
	Be	15	Li	15	Sr	300		
	B	150	Mg	8000	Tl	10		
	Cd	10	Mn	40	V	35		
	Ca	31,000	Mo	110	Zn	75		
	Cr	20	Ni	60				
CRM-TMDW-B	Al	125 µg/L	Co	25 µg/L	K	2500 µg/L	2% HNO_3	100 mL
	Sb	55	Cu	20	Se	11	+ Tr HF	250 mL
	As	10	Fe	90	Ag	2		500 mL
	Ba	500	Pb	20	Na	22,000		
	Be	15	Li	15	Sr	300		
	B	150	Mg	8000	Tl	10		
	Cd	10	Mn	40	V	35		
	Ca	31,000	Mo	110	Zn	75		
	Cr	20	Ni	60				

Primary Drinking Water Metals

Catalog No.	Element	Conc.	Element	Conc.			Matrix	Volume
DWPS	As	100 µg/mL	Pb	100 µg/mL			2% HNO_3	100 mL
	Ba	50	Hg*	20	*Solution B			250 mL
	Cd	50	Se	50				500 mL
	Cr	100	Ag	10				

Secondary Drinking Water Metals

Catalog No.	Element	Conc.	Element	Conc.			Matrix	Volume
DWSS	Cu	50 µg/mL	Mn	50 µg/mL			2% HNO_3	100 mL
	Fe	100	Zn	50				250 mL
								500 mL

Certified Wastewater - Trace Metals Solutions

HPS is offering a series of certified reference solutions which simulate the concentrations found of a variety of materials. These solutions, which are directly traceable to NIST, may be used in laboratory performance evaluation, quality control, and method development. All of the following solutions are certified to ± 0.5% and are ideally suited for AAS, ICP, and ICP-MS.

Listed below are the concentrations that will be found when each 10 mL sample is diluted to **one liter**.

Catalog No.	CWW-TM-A	CWW-TM-B	CWW-TM-C	CWW-TM-D	CWW-TM-E	CWW-TM-F	CWW-TM-G	CWW-TM-H
Matrix	10% HNO_3 + Tr HF µg/mL	10% HNO_3 + Tr HF µg/mL	10% HNO_3 + Tr HF µg/mL	10% HNO_3 + Tr HF µg/mL	10% HNO_3 + Tr HF µg/mL	10% HNO_3 + Tr HF µg/mL	10% HNO_3 + Tr HF µg/mL	10% HNO_3 + Tr HF µg/mL
Elements								
Aluminum	0.050	0.200	0.500	1	0.025	0.025	1	0.100
Antimony	0.010	0.050	0.150	0.250	0.005	0.250	0.005	0.200
Arsenic	0.010	0.050	0.150	0.250	0.005	0.005	0.250	0.100
Barium	0.050	0.200	0.500	1	0.025	1	0.025	0.100
Beryllium	0.010	0.050	0.150	0.250	0.005	0.005	0.250	0.020
Boron	0.050	0.200	0.500	1	0.025	1	0.025	0.250
Cadmium	0.010	0.050	0.150	0.250	0.025	0.005	0.250	0.100
Chromium	0.050	0.200	0.500	1	0.025	1	0.025	0.500
Cobalt	0.050	0.200	0.500	1	0.025	0.025	1	0.500
Copper	0.050	0.200	0.500	1	0.025	1	0.025	0.500
Iron	0.050	0.200	0.500	1	0.025	0.025	1	0.250
Lead	0.050	0.200	0.500	1	0.025	1	0.025	0.500
Manganese	0.050	0.200	0.500	1	0.025	0.025	1	0.100
Mercury*	0.001	0.005	0.010	0.02	0.001	0.020	0.005	0.0010
Molybdenum	0.050	0.200	0.500	1	0.025	0.025	1	0.100
Nickel	0.050	0.200	0.500	1	0.025	1	0.250	0.500
Selenium	0.010	0.050	0.150	0.250	0.005	0.005	0.250	0.050
Silver	0.010	0.050	0.150	0.250	0.005	0.250	0.005	0.020
Strontium	0.050	0.200	0.500	1	0.025	0.025	1	0.100
Thallium	0.010	0.050	0.150	0.250	0.005	0.025	0.005	0.250
Vanadium	0.050	0.200	0.500	1	0.025	0.025	1	0.500
Zinc	0.050	0.200	0.500	1	0.025	1	0.025	0.500
Volume	10 mL	10 mL	10 mL	10 mL	10 mL	10 mL	10 mL	10 mL

***The concentration of Mercury cannot be guaranteed for any extended period of time due to the nature of the element.**

Soil and Biological Solutions

A sampling of our most popular simulated solutions. Simulations of natural solids are based upon dissolution of 1 gram of a natural material in acid and diluted to 100 mL.

	Sea Water	River Sediment Solution B	Estuarian Sediment Solution	Soil Solution A	Orchard Leaves Solution
Catalog No.	**CRM-SW**	**CRM-RS-B**	**CRM-ES**	**CRM-SOIL-A**	**CRM-OL**
Matrix	2% HNO_3 mg/kg	4% HNO_3 µg/mL	4% HNO_3 µg/mL	4% HNO_3 µg/mL	4% HNO_3 µg/mL
Elements					
Aluminum	0.5	600	700	500	3
Antimony	- -	0.04	0.004	0.03	- -
Arsenic	0.02	0.20	0.10	0.2	0.1
Barium	0.05	4	- -	5	0.5
Beryllium	- -	- -	0.02	- -	- -
Boron	5	- -	- -	- -	- -
Bromide	65	- -	- -	- -	0.1
Cadmium	(0.0001)	0.03	(0.0004)	0.003	0.001
Calcium	400	300	80	350	200
Carbon	30	- -	- -	- -	- -
Chloride	19,000	- -	- -	- -	7
Chromium	(0.0003)	15	0.80	- -	0.03
Cobalt	- -	0.15	0.10	- -	0.002
Copper	0.01	1	0.20	0.30	0.1
Iodide	0.05				
Iron	0.02	400	350	200	3.0
Lead	0.004	2.0	0.30	0.40	0.5
Lithium	0.1				- -
Magnesium	1,250	120	100	70	60
Manganese	0.01	6	4.0	0.10	1
Nickel	(0.0001)	0.50	0.30	0.30	0.01
Phosphorus	0.1	10	5.0	10	20
Potassium	380	200	150	200	150
Rubidium	0.2	- -	- -	- -	0.1
Selenium	0.004	0.01	0.05	0.01	0.0008
Silicon	4	3000.0	3000	3000	5
Sodium	10,500	50	200	70	1
Strontium	12	- -	- -	- -	- -
Sulfur	900	- -	- -	- -	20
Thallium	- -	0.01	- -	- -	- -
Thorium	- -	0.10	0.10	0.10	- -
Uranium	(0.0015)	0.03	- -	0.01	- -
Vanadium	(0.0003)	1	1	0.10	0.005
Zinc	0.005	5	1.5	1	25

Note: Values in parentheses are for information purposes only.

Solid CRM List

The following is a sampling of Certified Reference Materials (CRM) in solid form currently available. At least two different analytical techniques were used to certify these CRMs for major, minor and trace elements after total digestion. Data for additional digestion techniques, such as EPA-3050 digestion procedure, are included for most.

The soil samples are dried and crushed, coarse particles are removed, and only particles that a sleve opening of 150 µm (No 100) are collected, blended, and bottled. Samples from each lot are checked for homogeneity, and if found homogeneous, the digestion procedures are performed and the analytes determined.

The material is intended for the calibration of instrumentation, the evaluation of analytical methods, and the quality control of the analytical measurements.

Catalog No.	Matrix	Level*	Certified For	Weight/grams
CRM-DF-A	Dog Food	A	Metals, Carbon, Sulfur, Nitrogen	50
CRM-CM-A	Corn Meal	A	Metals, Carbon, Sulfur, Nitrogen	50
CRM-COAL-A1	Coal	A	Metals, Sulfur	50
CRM-CSM-A	Cotton Seed Meal	A	Metals, Carbon, Sulfur, Nitrogen	50
CRM-LO-A	Loam	A	Metals, Carbon, Sulfur	50
CRM-LO-B	Loam	B	Metals, Carbon, Sulfur	50
CRM-LO-C	Loam	C	Metals	40
CRM-LO-D	Loam	D	Metals	40
CRM-LO-X	Highly Contaminated Loam	X	Metals, Carbon, Sulfur	40
CRM-MP-A	Milk Powder	A	Metals, Carbon, Sulfur, Nitrogen	40
CRM-MS-S	Marine Sediment	A	Metals, Carbon, Sulfur	50
CRM-PC-A	Paint Chips	A	0.1% Lead	40
CRM-PC-B	Paint Chips	B	0.5% Lead	40
CRM-PN-A	Pine Needles	A	Metals, Carbon, Sulfur, Nitrogen	30
CRM-S-D	Sludge	Domestic	Metals, Carbon, Sulfur	50
CRM-S-I	Sludge	Industrial	Metals, Carbon, Sulfur	50
CRM-SA-A	Sand	A	Metals, Carbon, Sulfur	50
CRM-SA-B	Sand	B	Metals, Carbon, Sulfur	50
CRM-SA-C	Sand	C	Metals, Sulfur	50
CRM-SBM-A	Soybean Meal	A	Metals, Carbon, Sulfur, Nitrogen	50
CRM-SG-A	Sugar	A	Metals, Carbon, Sulfur, Nitrogen	75
CRM-WF-S	Wheat Flour	A	Carbon, Sulfur, Nitrogen	40

*Level:	A	Pristine
	B-D	Elevated Concentrations of Priority Pollutants
	X	High Concentrations of Priority Pollutants

Trace Metals on Filter Media for Industrial Hygiene and Ambient Air Analysis

The following trace metals on filter media are designed to meet the QC requirements for Method 7300. The filters are mixed cellulose ester type with 0.8 µm pore size and 37 mm diameter. Each set includes 10 filters and 5 blank filters. Each filter is spiked with 16 to 17 elements, ranging in concentration from 1 to 100 µg per filter. The concentrations on each filter are certified to ± 1 percent. A Certificate of Analysis is provided with each set stating the exact concentrations. The elements and their target concentrations are as follows:

Each set of filters includes 10 spiked filters and 5 blanks

Catalog No.	QC-TMFM-A	QC-TMFM-B	QC-TMFM-C	QC-TMFM-D	QC-TMFM-E	QC-TMFM-F
Elements	µg per Filter	µg per Filter	µg per Filter	µg per Filter	µg per Filter	µg per Filter
Aluminum	- -	- -	- -	50	100	- -
Arsenic	10	50	100	10	20	10
Barium	2.5	10	25	2.5	5	2.5
Beryllium	1	10	25	0.1	0.2	1
Cadmium	1	10	25	1	2	1
Chromium	2.5	10	25	2.5	5	2.5
Cobalt	2.5	10	25	2.5	5	2.5
Copper	2.5	25	50	2.5	5	2.5
Iron	2.5	25	50	2.5	5	2.5
Lead	2.5	25	50	2.5	5	2.5
Manganese	1	10	25	1	2	1
Nickel	2.5	10	25	2.5	5	2.5
Selenium	5	25	50	5	10	5
Silver	1	5	10	1	2	1
Thallium	2.5	10	25	2.5	5	2.5
Uranium						2.5
Vanadium	2.5	10	25	2.5	5	2.5
Zinc	2.5	50	100	2.5	5	2.5

Trace, minor and major concentrations of metals can be prepared on mixed cellulose acetate, glass, PVC or PTFE filters.

HIGH-PURITY STANDARDS

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