SPEX CertiPrep®

Your Science is Our Passion.®

60TH ANNIVERSARY

CELEBRATING 60 YEARS 1954 - 2014

A2LA ACCREDITED

2014–2015

INORGANIC

CERTIFIED REFERENCE MATERIALS

SPEX CertiPrep

Welcome

Our Mission:

With 60 years of experience manufacturing Inorganic Certified Reference Materials, SPEX Inorganics continues to lead the market with the highest quality products and an offering that spreads out to many market segments worldwide. We consistently strive to design and manufacture new products to meet or exceed the requirements set by the newest instrumentation and regulatory concerns. Our team of highly trained chemists work to provide 100% customer satisfaction.

SPEX CertiPrep is celebrating 60 years of support to the scientific community! Since 1954 we have grown into the industry's most passionate and reliable manufacturer of Certified Reference Materials and Calibration Standards for the Analytical Spectroscopy and Chromatography communities.

We are pleased to share with you the *60th Anniversary 2014-2015 SPEX CertiPrep Certified Reference Materials* catalog. This flipbook style catalog includes our Inorganic Certified Reference Materials on one side and our Organic Certified Reference Materials on the other.

Our primary focus is to provide Inorganic and Organic CRMs of the highest quality and superior customer support. The Inorganic Standards are manufactured for AA, ICP, ICP-MS, IC, XRF, and other analytical instrumentation. The Organic Standards are manufactured for GC, GC-MS, HPLC, LC-MS, and other analytical instrumentation.

SPEX CertiPrep's certification by UL-DQS for ISO 9001 and accreditation by A2LA under ISO 17025 and ISO Guide 34 is the most comprehensive in the industry, and encompasses all our manufactured products.

Our Inorganic product line expands as technology improves. Ninety-nine percent of stock orders ship with 24 hours and custom standards are manufactured and shipped within 5 business days.

We are proud to offer many new and diverse Inorganic products to this catalog including:

- **1 PPM ICP-MS Single Element Standards**
- **USP <232> and <233> Elemental Impurities**
- **Certified pH Buffers**
- **Multi-Element Standards for the Latest EPA Methods**
- **European Methods**

Our heritage is our passion for science and dedication to the analytical community. We produce only the highest quality standards, and offer the best and most reliable customer support in the industry.

We look forward to working with you in the years to come.

Sincerely,

Yvonne Cangelosi
President

60 Years of Manufacturing Quality Products and Supporting the Scientific Community

Printed in the U.S.A.

Inorganic Certified Reference Materials

TABLE OF CONTENTS

Ordering Information & Technical Support

PHONE: **1-800-LAB-SPEX (1-800-522-7739)**

FAX: **732-603-9647**

E-MAIL: **crmsales@spex.com**

ONLINE ORDERS AND LIVE CHAT: **www.spexcertiprep.com**

ASK A CHEMIST: **AskAChemist@spex.com**

MAILING ADDRESS:

SPEX CertiPrep
203 Norcross Avenue
Metuchen, NJ 08840

TERMS & CONDITIONS:

GENERAL CONDITIONS – Payment terms are Net 30 days to rated organizations or payment can be made by credit card. Orders are shipped FCA Metuchen, New Jersey, and are shipped in accordance with IATA or DOT regulations. All freight charges are prepaid and added to the invoice unless otherwise specified by your order.

RETURN AND/OR EXCHANGE – Contact the Sales Department for a Return Authorization Number and instructions before shipping. Unauthorized returns will be refused. Transportation is the responsibility of the customer; all materials must be packed, marked, labeled, and shipped in accordance with regulations governing transportation of hazardous materials, if applicable. Credit for returned merchandise will be issued only if goods are unopened, resalable, and received within 30 days of the original invoice date. Returned items are subject to a 25% restocking charge.

LIMITED LIABILITY – Purchaser's sole and exclusive remedy for damages and Seller's sole and exclusive liability for damages from any cause whatsoever, including alleged negligence, is limited to the refund of the purchase price of the product or replacement of the product at Seller's election. In no event shall Seller be liable for direct, indirect, incidental or consequential damages, including lost profits.

EXPORT ORDERS – SPEX CertiPrep maintains authorized distributors in many countries around the world. Please visit **www.spexcertiprep.com/distributors** for a complete list of international dealers.

PRECAUTIONS – SPEX CertiPrep products are not for any cosmetic, drug, or household application. Our acceptance of a purchase order is with the assumption that products will be used only by qualified individuals who are trained in appropriate procedures. On our clients must rest the entire burden of safe storage, handling, and application of all products ordered from this catalog. We assume requisitioners to be competent, safety-conscious professionals.

CHEMICAL REFERENCE MATERIAL MANUFACTURERS ASSOCIATION CRMMA

SPEX CertiPrep, Inc. UL REGISTERED FIRM ISO 9001 A1572

Accredited by Raad Voor Acreditatie

ACCREDITED

Accredited to 17025 & Guide 34 ISO Certified to 9001

VISA MasterCard AMERICAN EXPRESS Card

Custom Standards Program

SPEX CertiPrep offers custom Certified Reference Materials because we realize that no two laboratories face exactly the same samples, or have precisely the same requirements. In the real world trace element determinations are performed in the presence of one or several major constituents, varying interelement effects, matrix effects… the list goes on and on. These issues become increasingly important as you strive for greater reproducibility and push your technique to the limit and thereby require standards made especially for your application.

With SPEX CertiPrep's custom Certified Reference Materials program, you can remove some of these variables. Select custom standards in connection with all product lines, from Single-Element and Multi-Element aqueous blends to Organometallic Oil standards. Our specialists will be happy to discuss your concerns, combination of elements, their concentrations, and your preferred matrix. We will then design the most compatible, stable mixture using our comprehensive supply of starting materials and certified solutions. Simply tell us what standards you need and let our highly skilled chemists determine the optimum combinations for you. With over 150 years of combined experience, we are truly the experts at manufacturing custom standards.

Aqueous standards are available in 100 mL, 250 mL, 500 mL and 1 L quantities. Oils are sold in 50 or 100 gram quantities. Sizes of custom standards in other matrices will be quoted in the appropriate units.

BENEFITS:

- **Customized For Your Application**
- **Certified by ICP, ICP-MS, LC-ICP/MS or IC Analysis**
- **High Quality Starting Materials Tested for Impurities Prior to Use**
- **60 Years of Experience in Manufacturing Custom CRM's**
- **Manufactured and Shipped within 5 Business Days**
- **Dedicated technical support to answer your CRM and lab questions.**

CUSTOMS AVAILABLE FOR:

- **Assurance® Grade Standards for ICP and AA**
- **Claritas PPT® Grade Standards for ICP-MS**
- **Speciation Standards for LC-ICP/MS**
- **Ion Chromatography/Ion Selective Electrode Standards**
- **Organometallic Oil Standards**
- **Fusion Flux**
- **Consumer Safety Standards**

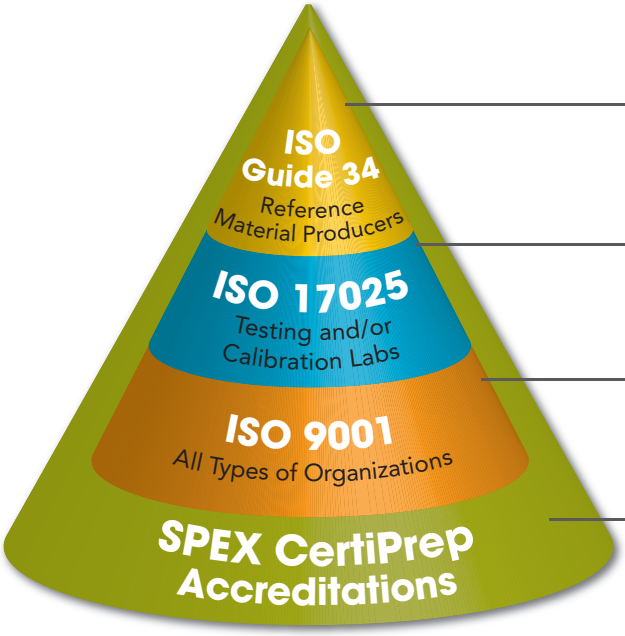
As with most of our products, we will guarantee your custom standards for one year from the date of shipment and supply your standard with certified concentration and impurity analysis.

To get started contact our technical support team or visit:
www.spexcertiprep.com/custominorganics with the following information:

- **Your specific application/instrumentation**
- **The concentration(s) at which you require each component**
- **The elements or complexes you desire**
- **The matrix which you prefer (e.g., water, dilute acid, oil, etc.)**

Quality

Calibrate with Confidence®



Level 3 – Accredited by the A2LA as an ISO/IEC Guide 34:2000 Certified **Inorganic and Organic** Reference Material Producer

Level 2 – Accredited by the A2LA as an ISO/IEC 17025:2005 Certified Chemical Testing Laboratory

Level 1 – Certified by UL DQS as an ISO 9001:2000 facility for our Quality Management System

Your Science is Our Passion® We have the **most comprehensive scope** in the industry!

Reference Materials of the Highest Quality - How Can We Prove It?

To ensure the validity of results from today's high-performance instrumentation, SPEX CertiPrep has developed an extensive line of the highest quality chemical reference materials. How can we prove it? The International Standard Organization (ISO) has established a set of guidelines designed to define common business practices, increase responsibility, and ensure clarity and full disclosure in the industry. As depicted in the diagram above, there are three levels of ISO certification that are most relevant for reference material manufacturers – ISO 9001, ISO 17025 and ISO Guide 34.

Each level has its own set of internationally recognized criteria against which companies are formally measured. Moving toward the top of the cone, each level is more difficult to achieve and fewer companies are able to meet the required criteria. SPEX CertiPrep is proud to be accredited for all three. By taking the extra step of choosing to demonstrate our competence and comply with these standards, we are continuously proving that our tests and calibration results are technically competent and our products truly are of the highest quality.

Three Levels of ISO Accreditation in Short and What They Mean to Our Customers

ISO 9001

- Open to all Types of Organizations
- Written Procedures
- Documented Complaints

Customer Satisfaction

ISO 17025

- Specifically for Organizations Carrying Out Testing and/or Calibrations
- Competent at Quality Related Tests
- Consistent Manufacturing

Technically Sound Products

ISO Guide 34

- Specifically for Reference Material Producers
- Validate Methods to Prove Accuracy
- Report Uncertainty and Sources of Error

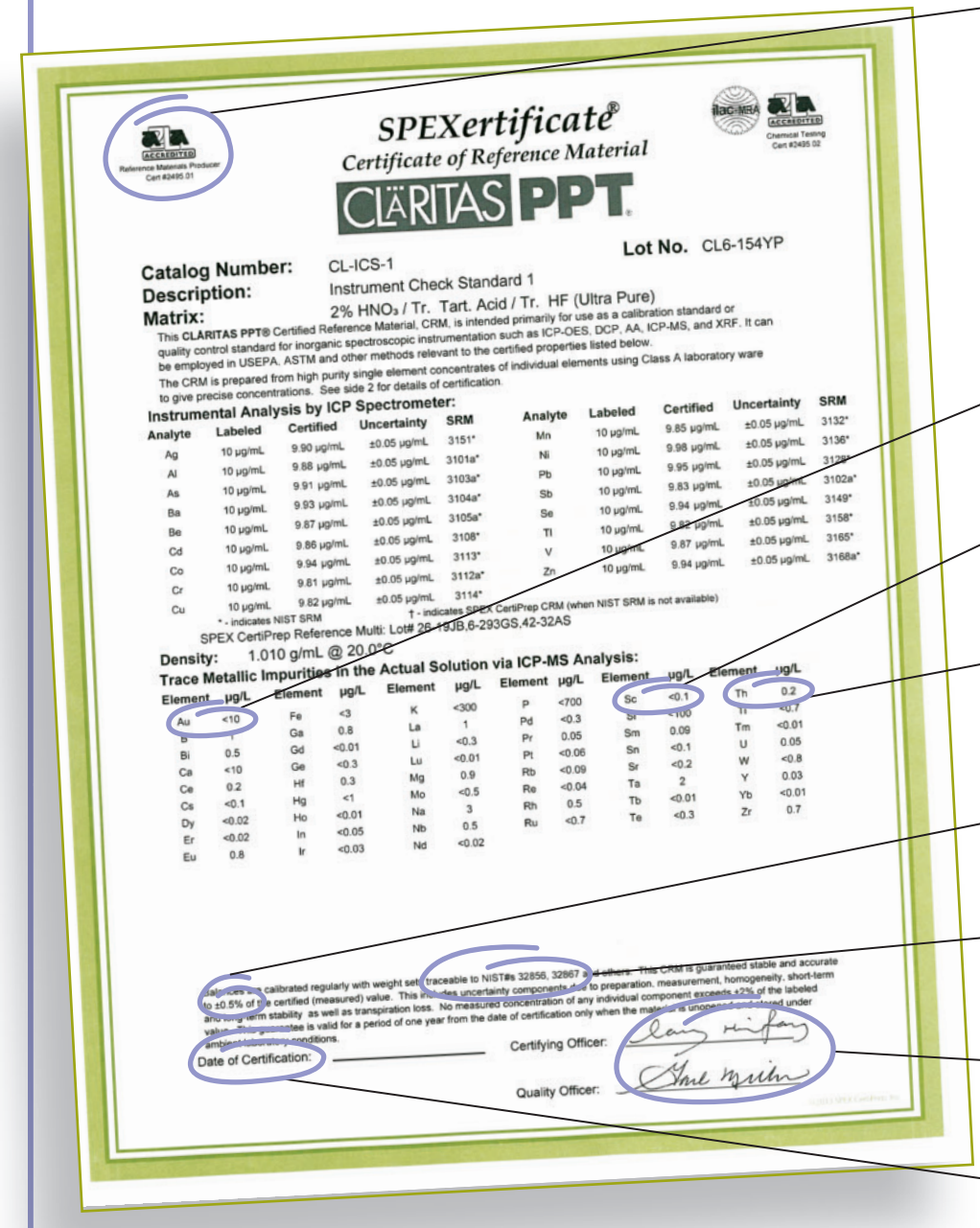
Traceable & Accurate Reference Materials

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

SPEX CertiPrep®

Certificate of Analysis

As you know, every manufacturer of Certified Reference Materials supplies a certificate of analysis with their product. Not all certificates are alike. We know because SPEX CertiPrep® has been supplying the most comprehensive certificate in the industry for years. Many other companies have followed, but no one gives you the information you get from us. We have highlighted why our certificate is the best and what you should look for in a certificate of analysis.



SPEXertificate®
Certificate of Reference Material
CLARITAS PPT®

Lot No. CL6-154YP

Catalog Number: CL-ICS-1
Description: Instrument Check Standard 1
Matrix: 2% HNO_3 / Tr. Tart. Acid / Tr. HF (Ultra Pure)

This CLARITAS PPT® Certified Reference Material, CRM, is intended primarily for use as a calibration standard or quality control standard for inorganic spectroscopic instrumentation such as ICP-OES, DCP, AA, ICP-MS, and XRF. It can be employed in USEPA, ASTM and other methods relevant to the certified properties listed below.
The CRM is prepared from high purity single element concentrates of individual elements using Class A laboratory ware to give precise concentrations. See side 2 for details of certification.

Instrumental Analysis by ICP Spectrometer:

Analyte	Labeled	Certified	Uncertainty	SRM
Ag	10 µg/mL	9.90 µg/mL	±0.05 µg/mL	3151*
Al	10 µg/mL	9.88 µg/mL	±0.05 µg/mL	3101a*
As	10 µg/mL	9.91 µg/mL	±0.05 µg/mL	3103a*
Ba	10 µg/mL	9.93 µg/mL	±0.05 µg/mL	3104a*
Be	10 µg/mL	9.87 µg/mL	±0.05 µg/mL	3105a*
Cd	10 µg/mL	9.86 µg/mL	±0.05 µg/mL	3108*
Co	10 µg/mL	9.94 µg/mL	±0.05 µg/mL	3113*
Cr	10 µg/mL	9.81 µg/mL	±0.05 µg/mL	3112a*
Cu	10 µg/mL	9.82 µg/mL	±0.05 µg/mL	3114*
Mn	10 µg/mL	9.85 µg/mL	±0.05 µg/mL	3132*
Ni	10 µg/mL	9.98 µg/mL	±0.05 µg/mL	3136*
Pb	10 µg/mL	9.95 µg/mL	±0.05 µg/mL	3128*
Sb	10 µg/mL	9.83 µg/mL	±0.05 µg/mL	3102a*
Se	10 µg/mL	9.94 µg/mL	±0.05 µg/mL	3149*
Tl	10 µg/mL	9.82 µg/mL	±0.05 µg/mL	3158*
V	10 µg/mL	9.87 µg/mL	±0.05 µg/mL	3165*
Zn	10 µg/mL	9.94 µg/mL	±0.05 µg/mL	3168a*

* - indicates NIST SRM
† - indicates SPEX CertiPrep CRM (when NIST SRM is not available)

SPEX CertiPrep Reference Multi: Lot# 26-19JB,6-293GS,42-32AS

Density: 1.010 g/mL @ 20.0°C

Trace Metallic Impurities in the Actual Solution via ICP-MS Analysis:

Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L	Element	µg/L
Au	<10	Fe	<3	K	<300	P	<700	Sc	<0.1	Th	0.2
B	1	Ga	0.8	La	1	Pd	<0.3	Si	<100	Ti	<0.7
Bi	0.5	Gd	<0.01	Li	<0.3	Pr	0.05	Sm	0.09	Tm	<0.01
Ca	<10	Ge	<0.3	Lu	<0.01	Pt	<0.06	Sn	<0.1	U	0.05
Ce	0.2	Hf	0.3	Mg	0.9	Rb	<0.09	Sr	<0.2	W	<0.8
Cs	<0.1	Hg	<1	Mo	<0.5	Re	<0.04	Ta	2	Y	0.03
Dy	<0.02	Ho	<0.01	Na	3	Rh	0.5	Tb	<0.01	Yb	<0.01
Er	<0.02	In	<0.05	Nb	0.5	Ru	<0.7	Te	<0.3	Zr	0.7
Eu	0.8	Ir	<0.03	Nd	<0.02						

...calibrated regularly with weight set traceable to NIST#s 32856, 32867 & others. This CRM is guaranteed stable and accurate to ±0.5% of the certified (measured) value. This includes uncertainty components due to preparation, measurement, homogeneity, short-term and long-term stability as well as transpiration loss. No measured concentration of any individual component exceeds ±2% of the labeled value. This guarantee is valid for a period of one year from the date of certification only when the material is unopened and stored under ambient laboratory conditions.

Date of Certification: _____

Certifying Officer:

Quality Officer:

SPEX CertiPrep is accredited by A2LA for Organic and Inorganic Certified Reference Materials as complying with the requirements of ISO/IEC 17025 and ISO/IEC Guide 34 with the most comprehensive scope in the industry.

68 elements are scanned with *found values* for Claritas PPT® and Assurance® Standards.

Each elemental impurity listed with *actual value* - not limited to elements above detection limits.

Trace impurities of the *final solution* - not of the starting material.

Stability and accuracy of the **final solution** - not the *starting materials*.

Traceable to NIST

Signed by SPEX CertiPrep®'s Vice President of Manufacturing and Quality Officer.

Stamped with month and year of shipment.

SPEX CertiPrep Ltd.

SPEX CertiPrep Ltd. is the European subsidiary of SPEX CertiPrep. It is responsible for the sales, marketing and distribution of SPEX CertiPrep's Inorganic and Organic Certified Reference Materials and SPEX SamplePrep products throughout the UK, Ireland and Europe. We are also proud to be the exclusive suppliers of ERA PT Schemes in the UK. We strive to be your single source supplier of certified reference materials.

Our dedicated sales team is prepared to assist you with all of your CRM needs and this is supported by a large, specialized network of local distributors representing most European countries. We maintain a considerable stock in our UK based headquarters, which ensures a timely delivery throughout this territory. SPEX CertiPrep Ltd. makes all of the arrangements to import the products into the EU, and they are packaged and labeled according to international regulations. Our trusted network of carriers is experienced in the handling of both non-hazardous and hazardous materials and we are capable of shipping to all European countries.

SPEX CertiPrep Ltd. also supplies the full range of SPEX SamplePrep products. This includes laboratory mills, presses, XRF accessories and the Katanax® Automated Fusion Machines. Our experienced sales staff and network of local distributors are available to provide product demonstrations and test grind and/or fuse samples. We are able to offer a complete sample preparation solution suited to your application.

To request product catalogs please contact SPEX CertiPrep Ltd. or visit our website at **www.spexcertiprep.co.uk**

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E-MAIL: sales@spexcertiprep.co.uk
WEB: www.spexcertiprep.co.uk

SPEX SamplePrep

Just as calibration standards can limit the success of any analysis, data can be useless if the sample being analyzed is not representative of the whole or is poorly prepared. SPEX SamplePrep's expertise and products can help analysts achieve accurate and consistent results by assuring reliable, reproducible samples. The SPEX SamplePrep Handbook of Sample Preparation and Handling is well known as a primary source of helpful advice for the preparation of samples. Among the topics covered are grinding and pelletizing, fusion fluxing, and controlling contamination.

Sample Preparation products include mills, presses, dies, XRF liquid cells, XRF window films, automated fusion fluxers, and a selection of sample binders and grinding aids to simplify the sample preparation process. These products are used throughout the world in industrial, academic, research and government laboratories. The uses cover many different fields of spectroscopy (XRF, ICP, ICP-MS, AA, IR) and their applications range from genetic research, forensics, geology, medicine, immuno-assay to agriculture. Copies of the Handbook may be obtained by contacting SPEX SamplePrep at (732) 623-0465. The complete text along with demonstration videos is also available on the company website at **www.spexsampleprep.com**

SPEX SamplePrep
65 Liberty St.
Metuchen, NJ 08840

TEL: 1-855-GET-SPEX (1-855-438-7739)
FAX: (732) 906-2492
E-MAIL: sampleprep@spex.com
WEB: www.spexsampleprep.com

SECTION 1

Single Element & Speciation Standards for ICP & ICP-MS

Your Science is Our Passion.®

Single Element & Speciation Standards for ICP & ICP-MS

- Made with only ASTM Type I water
- Inorganic compounds and metals at 99.99% to 99.9999% purity
- Incomparable certification
- Directly traceable to NIST
- Certified by UL-DQS for ISO 9001
- Accredited by A2LA for ISO/IEC 17025
- Accredited by A2LA for ISO/IEC Guide 34
- Customs Available – visit **www.spexcertiprep.com/custominorganics** to submit a request.

ICP

AA and ICP Assurance® Grade CRMs are available in single and multi-element formulations.

Over 70 single-element standards are available at 1,000 and/or 10,000 µg/mL. Custom singles can be manufactured upon request.

ICP-MS

ICP-MS Claritas PPT® Grade CRMs are designed for ICP-MS and can also be used in ICP analysis. They are available in single and multi-element solutions.

The standards are at 1, 10 or 1,000 µg/mL and packaged in 125 mL bottles to minimize contamination. They are made using ultra high purity acids, the highest grade starting materials, and a high purity water to minimize contaminants.

	ASSURANCE®	CLARITAS PPT®
Designed for Use With	AA/ICP	ICP/ICP-MS
Analytical Range for Use	PPM, PPB	PPB, PPT
Single Standards:	✔	✔
1 µg/mL		✔
10 µg/mL		✔
1,000 µg/mL	✔	✔
10,000 µg/mL	✔	
Multi-Element Standards	✔	✔
Custom Standards	✔	✔
Certifications:		
ISO 9001	✔	✔
ISO 17025	✔	✔
ISO Guide 34	✔	✔
Quality:		
Traceable by NIST SRM	✔	✔
Acid Grade	High Purity	Ultra High Purity
# Trace Impurities Measured on Certificate of Analysis	68	68
Trace Impurities Measured to	µg/mL	µg/L

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Aluminum (Al)	2% HCl	1	125	**CLAL1-1BY**
	2% HNO_3	1	125	**CLAL2-1BY**
		1,000	125	**CLAL2-2Y**
	2-5% HNO_3	1,000	500	**PLAL2-2X**
			250	**PLAL2-2T**
			125	**PLAL2-2Y**
	2-5% HCl	1,000	500	**PLAL1-2X**
		10,000	500	**PLAL1-3X**
	2-5% HNO_3	10,000	500	**PLAL2-3X**
			125	**PLAL2-3Y**
Antimony (Sb)	5% HCl	1	125	**CLSB1-1BY**
	H_2O/Tr. HNO_3/Tr. Tart	1	125	**CLSB7-1BY**
	H_2O/0.6% Tartaric Acid/tr HNO_3	1,000	125	**CLSB7-2Y**
	H_2O/0.6% Tartaric Acid/tr HNO_3	1,000	500	**PLSB7-2X**
			250	**PLSB7-2T**
			125	**PLSB7-2Y**
	20% HCl	1,000	500	**PLSB5-2X**
	1% HNO_3/6% Tartaric Acid	10,000	500	**PLSB7-3X**
			125	**PLSB7-3Y**
Arsenic (As)	2% HCl	1	125	**CLAS1-1BY**
	2% HNO_3	1	125	**CLAS2-1BY**
		1,000	125	**CLAS2-2Y**
	2% HCl	1,000	500	**PLAS1-2X**
	2-5% HNO_3	1,000	500	**PLAS2-2X**
			250	**PLAS2-2T**
			125	**PLAS2-2Y**
		10,000	500	**PLAS2-3X**
			125	**PLAS2-3Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Barium (Ba)	2% HCl	1	125	**CLBA1-1BY**
	2% HNO_3	1	125	**CLBA2-1BY**
	2% HNO_3	1,000	125	**CLBA2-2Y**
	2% HCl	1,000	500	**PLBA1-2X**
	2-5% HNO_3	1,000	500	**PLBA2-2X**
			250	**PLBA2-2T**
			125	**PLBA2-2Y**
		10,000	500	**PLBA2-3X**
			125	**PLBA2-3Y**
Beryllium (Be)	2% HNO_3	1	125	**CLBE2-1BY**
		1,000	125	**CLBE2-2Y**
	2-5% HNO_3	1,000	500	**PLBE2-2X**
			250	**PLBE2-2T**
			125	**PLBE2-2Y**
		10,000	500	**PLBE2-3X**
			125	**PLBE2-3Y**
Bismuth (Bi)	2% HNO_3	1	125	**CLBI2-1BY**
		10	125	**CLBI2-1AY**
	10% HNO_3	1,000	500	**PLBI4-2X**
			125	**PLBI4-2Y**
Boron (B)	H_2O	1	125	**CLB9-1BY**
	H_2O	1,000	500	**PLB9-2X**
			250	**PLB9-2T**
			125	**PLB9-2Y**
		10,000	500	**PLB9-3X**
			125	**PLB9-3Y**
Boron 10	H_2O	10	125	**ISOT-B10**
Boron 11	H_2O	10	125	**ISOT-B11**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Cadmium (Cd)	2% HCl	1	125	**CLCD1-1BY**
	2% HNO_3	1	125	**CLCD2-1BY**
		1,000	125	**CLCD2-2Y**
	2-5% HNO_3	1,000	500	**PLCD2-2X**
			250	**PLCD2-2T**
			125	**PLCD2-2Y**
		10,000	500	**PLCD2-3X**
			125	**PLCD2-3Y**
Calcium (Ca)	2% HCl	1	125	**CLCA1-1BY**
	2% HNO_3	1	125	**CLCA2-1BY**
		1,000	125	**CLCA2-2Y**
	2-5% HCl	1,000	500	**PLCA1-2X**
	2-5% HNO_3	1,000	500	**PLCA2-2X**
			250	**PLCA2-2T**
			125	**PLCA2-2Y**
		10,000	500	**PLCA2-3X**
			250	**PLCA2-3T**
			125	**PLCA2-3Y**
	2-5% HCl	10,000	500	**PLCA1-3X**
Carbon (C)	H_2O	1	125	**CLC9-1BY**
	H_2O	1,000	500	**PLC9-2X**
			125	**PLC9-2Y**
Cerium (Ce)	2% HNO_3	1	125	**CLCE2-1BY**
	2-5% HNO_3	1,000	500	**PLCE2-2X**
			125	**PLCE2-2Y**
		10,000	500	**PLCE2-3X**
			125	**PLCE2-3Y**
Cesium (Cs)	2% HNO_3	1	125	**CLCS2-1BY**
	2-5% HNO_3	1,000	500	**PLCS2-2X**
			125	**PLCS2-2Y**
		10,000	500	**PLCS2-3X**
			125	**PLCS2-3Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Chromium (Cr)	H_2O	1	125	**CLCR9-1BY**
	2% HCl	1	125	**CLCR1-1BY**
	2% HNO_3	1	125	**CLCR2-1BY**
		1,000	125	**CLCR2-2Y**
	2-5% HNO_3	1,000	500	**PLCR2-2X**
			250	**PLCR2-2T**
			125	**PLCR2-2Y**
	H_2O	1,000	500	**PLCR9-2X**
		10,000	500	**PLCR9-3X**
	2-5% HNO_3	10,000	500	**PLCR2-3X**
			125	**PLCR2-3Y**
Cobalt (Co)	2% HCl	1	125	**CLCO1-1BY**
	2% HNO_3	1	125	**CLCO2-1BY**
		1,000	125	**CLCO2-2Y**
	2% HCl	1,000	500	**PLCO1-2X**
	2-5% HNO_3	1,000	500	**PLCO2-2X**
			250	**PLCO2-2T**
			125	**PLCO2-2Y**
	2% HCl	10,000	500	**PLCO2-3X**
			125	**PLCO2-3Y**
Copper (Cu)	2% HCl	1	125	**CLCU1-1BY**
	2% HNO_3	1	125	**CLCU2-1BY**
		1,000	125	**CLCU2-2Y**
	2-5% HCl	1,000	500	**PLCU1-2X**
	2-5% HNO_3	1,000	500	**PLCU2-2X**
			250	**PLCU2-2T**
			125	**PLCU2-2Y**
		10,000	500	**PLCU2-3X**
			125	**PLCU2-3Y**
	2-5% HCl	10,000	500	**PLCU1-3X**
Copper 65	2% HNO_3	10	125	**ISOT-CU65**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Dysprosium (Dy)	2% HNO_3	1	125	**CLDY2-1BY**
	2% HNO_3	1,000	500	**PLDY2-2X**
			125	**PLDY2-2Y**
Erbium (Er)	2% HNO_3	1	125	**CLER2-1BY**
	2-5% HNO_3	1,000	500	**PLER2-2X**
			125	**PLER2-2Y**
Europium (Eu)	2% HNO_3	1	125	**CLEU2-1BY**
	2% HNO_3	1,000	500	**PLEU2-2X**
			125	**PLEU2-2Y**
Gadolinium (Gd)	2% HNO_3	1	125	**CLGD2-1BY**
	2-5% HNO_3	1,000	500	**PLGD2-2X**
			125	**PLGD2-2Y**
		10,000	500	**PLGD2-3X**
			125	**PLGD2-3Y**
Gallium (Ga)	2% HNO_3	1	125	**CLGA2-1BY**
	2% HNO_3	1,000	500	**PLGA2-2X**
			125	**PLGA2-2Y**
Germanium (Ge)	H_2O	1	125	**CLGE9-1BY**
	H_2O/Tr F^-	10	125	**CLGE9-1AY**
	H_2O/0.16% F-	1,000	500	**PLGE9-2X**
			125	**PLGE9-2Y**
Gold (Au)	2% HCl	1	125	**CLAU1-1BY**
		100	125	**CLAU1-1Y**
	10% HCl	1,000	500	**PLAU3-2X**
			125	**PLAU3-2Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Hafnium (Hf)	2% HCl	1	125	**CLHF1-1BY**
	2% HCl	1,000	500	**PLHF1-2X**
			125	**PLHF1-2Y**
Holmium (Ho)	2% HNO_3	1	125	**CLHO2-1BY**
	2% HNO_3	1,000	500	**PLHO2-2X**
			125	**PLHO2-2Y**
Indium (In)	2% HNO_3	1	125	**CLIN2-1BY**
		10	125	**CLIN2-1AY**
	2% HNO_3	1,000	500	**PLIN2-2X**
			125	**PLIN2-2Y**
Iridium (Ir)	2% HCl	1	125	**CLIR1-1BY**
	10% HCl	1,000	500	**PLIR3-2X**
			125	**PLIR3-2Y**
Iron (Fe)	2% HCl	1	125	**CLFE1-1BY**
	2% HNO_3	1	125	**CLFE2-1BY**
		1,000	125	**CLFE2-2Y**
	2-5% HCl	1,000	500	**PLFE1-2X**
	2-5% HNO_3	1,000	500	**PLFE2-2X**
			250	**PLFE2-2T**
			125	**PLFE2-2Y**
		10,000	500	**PLFE2-3X**
			125	**PLFE2-3Y**
	2-5% HCl	10,000	500	**PLFE1-3X**
Lanthanum (La)	2% HNO_3	1	125	**CLLA2-1BY**
	2-5% HNO_3	1,000	500	**PLLA2-2X**
			125	**PLLA2-2Y**
		10,000	500	**PLLA2-3X**
			125	**PLLA2-3Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Lead (Pb)	2% HNO_3	1	125	**CLPB2-1BY**
		1,000	125	**CLPB2-2Y**
	2-5% HNO_3	1,000	500	**PLPB2-2X**
			250	**PLPB2-2T**
			125	**PLPB2-2Y**
		10,000	500	**PLPB2-3X**
			125	**PLPB2-3Y**
Lead 206	2% HNO_3	10	125	**ISOT-PB206**
Lead 207	2% HNO_3	10	125	**ISOT-PB207**
Lithium (Li)	2% HCl	1	125	**CLLI1-1BY**
	2% HNO_3	1	125	**CLLI2-1BY**
	2-5% HCl	1,000	500	**PLLI1-2X**
	2-5% HNO_3	1,000	500	**PLLI2-2X**
			125	**PLLI2-2Y**
		10,000	500	**PLLI2-3X**
			125	**PLLI2-3Y**
	2-5% HCl	10,000	500	**PLLI1-3X**
Lithium 6	2% HNO_3	100	125	**ISOT-LI6**
Lutetium (Lu)	2% HNO_3	1	125	**CLLU2-1BY**
	2% HNO_3	1,000	500	**PLLU2-2X**
			125	**PLLU2-2Y**
Magnesium (Mg)	2% HCl	1	125	**CLMG1-1BY**
	2% HNO_3	1	125	**CLMG2-1BY**
		1,000	125	**CLMG2-2Y**
	2-5% HCl	1,000	500	**PLMG1-2X**
	2-5% HNO_3	1,000	500	**PLMG2-2X**
			250	**PLMG2-2T**
			125	**PLMG2-2Y**
		10,000	500	**PLMG2-3X**
			125	**PLMG2-3Y**
	2-5% HCl	10,000	500	**PLMG1-3X**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Manganese (Mn)	2% HNO_3	1	125	**CLMN2-1BY**
		1,000	125	**CLMN2-2Y**
	2-5% HNO_3	1,000	500	**PLMN2-2X**
			250	**PLMN2-2T**
			125	**PLMN2-2Y**
		10,000	500	**PLMN2-3X**
			125	**PLMN2-3Y**
Mercury (Hg)	5% HNO_3	1	125	**CLHG2-1BY**
		10	125	**CLHG2-1AY**
	5% HNO_3	10	125	**PLHG2-1AY**
			500	**PLHG2-1AX**
		100	125	**PLHG2-1Y**
			500	**PLHG2-1X**
	10% HNO_3	1,000	125	**CLHG4-2Y**
	10% HNO_3	1,000	500	**PLHG4-2X**
			250	**PLHG4-2T**
			125	**PLHG4-2Y**
		10,000	500	**PLHG4-3X**
			125	**PLHG4-3Y**
Molybdenum (Mo)	H_2O	1	125	**CLMO9-1BY**
		1,000	125	**CLMO9-2Y**
	H_2O	1,000	500	**PLMO9-2X**
			250	**PLMO9-2T**
			125	**PLMO9-2Y**
		10,000	500	**PLMO9-3X**
			125	**PLMO9-3Y**
Neodymium (Nd)	2% HNO_3	1	125	**CLND2-1BY**
	2% HNO_3	1,000	500	**PLND2-2X**
			125	**PLND2-2Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Nickel (Ni)	2% HNO_3	1	125	**CLNI2-1BY**
		1,000	125	**CLNI2-2Y**
	2-5% HNO_3	1,000	500	**PLNI2-2X**
			250	**PLNI2-2T**
			125	**PLNI2-2Y**
		10,000	500	**PLNI2-3X**
			125	**PLNI2-3Y**
Niobium (Nb)	H_2O / Tr. HF	1	125	**CLNB9-1BY**
	H_2O/0.4% HF	1,000	500	**PLNB9-2X**
			125	**PLNB9-2Y**
		10,000	500	**PLNB9-3X**
			125	**PLNB9-3Y**
Palladium (Pd)	2% HCl	1	125	**CLPD1-1BY**
	10% HCl	1,000	500	**PLPD3-2X**
			125	**PLPD3-2Y**
Phosphorus (P)	H_2O	1	125	**CLP9-1BY**
	H_2O	1,000	500	**PLP9-2X**
			250	**PLP9-2T**
			125	**PLP9-2Y**
		10,000	500	**PLP9-3X**
			125	**PLP9-3Y**
Platinum (Pt)	2% HCl	1	125	**CLPT1-1BY**
	10% HCl	1,000	500	**PLPT3-2X**
			125	**PLPT3-2Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Potassium (K)	2% HCl	1	125	**CLK1-1BY**
	2% HNO_3	1	125	**CLK2-1BY**
		1,000	125	**CLK2-2Y**
	2-5% HCl	1,000	500	**PLK1-2X**
	2-5% HNO_3	1,000	500	**PLK2-2X**
			250	**PLK2-2T**
			125	**PLK2-2Y**
		10,000	500	**PLK2-3X**
			125	**PLK2-3Y**
	2-5% HCl	10,000	500	**PLK1-3X**
Praseodymium (Pr)	2% HNO_3	1	125	**CLPR2-1BY**
	2% HNO_3	1,000	500	**PLPR2-2X**
			125	**PLPR2-2Y**
Rhenium (Re)	H_2O	1	125	**CLRE9-1BY**
	H_2O	1,000	500	**PLRE9-2X**
			125	**PLRE9-2Y**
Rhodium (Rh)	2% HCl	1	125	**CLRH1-1BY**
		10	125	**CLRH1-1AY**
	10% HCl	1,000	500	**PLRH3-2X**
			125	**PLRH3-2Y**
Rubidium (Rb)	2% HNO_3	1	125	**CLRB2-1BY**
	2-5% HNO_3	1,000	500	**PLRB2-2X**
			125	**PLRB2-2Y**
Ruthenium (Ru)	2% HCl	1	125	**CLRU1-1BY**
	10% HCl	1,000	500	**PLRU3-2X**
			125	**PLRU3-2Y**
Samarium (Sm)	2% HNO_3	1	125	**CLSM2-1BY**
	2% HNO_3	1,000	500	**PLSM2-2X**
			125	**PLSM2-2Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Scandium (Sc)	2% HNO_3	1	125	**CLSC2-1BY**
		10	125	**CLSC2-1AY**
	2-5% HNO_3	1,000	500	**PLSC2-2X**
			250	**PLSC2-2T**
			125	**PLSC2-2Y**
		10,000	500	**PLSC2-3X**
			125	**PLSC2-3Y**
Selenium (Se)	2% HNO_3	1	125	**CLSE2-1BY**
		1,000	125	**CLSE2-2Y**
	2-5% HNO_3	1,000	500	**PLSE2-2X**
			250	**PLSE2-2T**
			125	**PLSE2-2Y**
		10,000	500	**PLSE2-3X**
			125	**PLSE2-3Y**
Silicon (Si)	H_2O/Tr. F-	1	125	**CLSI9-1BY**
	H_2O	1,000	500	**PLSI9A-2X**
	H_2O/0.4% F-	1,000	500	**PLSI9-2X**
			250	**PLSI9-2T**
			125	**PLSI9-2Y**
	H_2O/4.0% F-	10,000	500	**PLSI9-3X**
			125	**PLSI9-3Y**
	H_2O	10,000	500	**PLSI9A-3X**
Silver (Ag)	2% HNO_3	1	125	**CLAG2-1BY**
		1,000	125	**CLAG2-2Y**
	2-5% HNO_3	1,000	500	**PLAG2-2X**
			250	**PLAG2-2T**
			125	**PLAG2-2Y**
		10,000	500	**PLAG2-3X**
			125	**PLAG2-3Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Sodium (Na)	2% HCl	1	125	**CLNA1-1BY**
	2% HNO_3	1	125	**CLNA2-1BY**
		1,000	125	**CLNA2-2Y**
	2-5% HCl	1,000	500	**PLNA1-2X**
	2-5% HNO_3	1,000	500	**PLNA2-2X**
			250	**PLNA2-2T**
			125	**PLNA2-2Y**
		10,000	500	**PLNA2-3X**
			125	**PLNA2-3Y**
	2-5% HCl	10,000	500	**PLNA1-3X**
Strontium (Sr)	2% HCl	1	125	**CLSR1-1BY**
	2% HNO_3	1	125	**CLSR2-1BY**
	2-5% HCl	1,000	500	**PLSR1-2X**
	2-5% HNO_3	1,000	500	**PLSR2-2X**
			250	**PLSR2-2T**
			125	**PLSR2-2Y**
		10,000	500	**PLSR2-3X**
			125	**PLSR2-3Y**
Strontium 86	2% HNO_3	10	125	**ISOT-SR86**
Sulfur (S)	H_2O	1	125	**CLS9-1BY**
	H_2O	1,000	500	**PLS9-2X**
			250	**PLS9-2T**
			125	**PLS9-2Y**
		10,000	500	**PLS9-3X**
			125	**PLS9-3Y**
Tantalum (Ta)	H_2O / Tr. HF	1	125	**CLTA9-1BY**
	H_2O/0.8% HF	1,000	500	**PLTA9-2X**
			125	**PLTA9-2Y**
		10,000	500	**PLTA9-3X**
			125	**PLTA9-3Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Tellurium (Te)	5% HCl	1	125	**CLTE1-1BY**
	5% HNO_3	1	125	**CLTE2-1BY**
	5% HNO_3	1,000	500	**PLTE2-2X**
			125	**PLTE2-2Y**
Terbium (Tb)	2% HNO_3	1	125	**CLTB2-1BY**
		10	125	**CLTB2-1AY**
	2-5% HNO_3	1,000	500	**PLTB2-2X**
			125	**PLTB2-2Y**
Thallium (Tl)	2% HNO_3	1	125	**CLTL2-1BY**
		1,000	125	**CLTL2-2Y**
	2-5% HNO_3	1,000	500	**PLTL2-2X**
			250	**PLTL2-2T**
			125	**PLTL2-2Y**
Thorium (Th) (Depleted)	2% HNO_3	1	125	**CLTH2-1BY**
		1,000	125	**CLTH2-2Y**
	2% HNO_3	1,000	500	**PLTH2-2X**
			125	**PLTH2-2Y**
Thulium (Tm)	2% HNO_3	1	125	**CLTM2-1BY**
	2% HNO_3	1,000	500	**PLTM2-2X**
			125	**PLTM2-2Y**
Tin (Sn)	5% HCl	1	125	**CLSN1-1BY**
	2% HNO_3 / Tr. HF	1	125	**CLSN2-1BY**
	1% HNO_3 / 1% HF	1,000	125	**CLSN2-2Y**
	20% HCl	1,000	500	**PLSN5-2X**
			250	**PLSN5-2T**
			125	**PLSN5-2Y**
	1% HNO_3/1% HF	1,000	500	**PLSN2-2X**
	20% HCl	10,000	500	**PLSN5-3X**
			125	**PLSN5-3Y**
	2% HNO_3/2% HF	10,000	500	**PLSN2-3X**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Titanium (Ti)	H_2O / Tr. F-	1	125	**CLTI9-1BY**
	H_2O/0.24% F-	1,000	125	**CLTI9-2Y**
	H_2O/tr 0.24% F-	1,000	500	**PLTI9-2X**
			250	**PLTI9-2T**
			125	**PLTI9-2Y**
	20% HCl	1,000	500	**PLTI5-2X**
	40% HCl	10,000	500	**PLTI5-3X**
	H_2O/tr 2.4% F-	10,000	500	**PLTI9-3X**
			125	**PLTI9-3Y**
Tungsten (W)	2% HNO_3 / Tr. HF	1	125	**CLW2-1BY**
	H_2O	1	125	**CLW9-1BY**
	1% HNO_3/2% HF	1,000	500	**PLW2-2X**
	H_2O	1,000	500	**PLW9-2X**
			125	**PLW9-2Y**
		10,000	500	**PLW9-3X**
			125	**PLW9-3Y**
	2% HNO_3/5% HF	10,000	500	**PLW2-3X**
Uranium (U) (Depleted)	2% HNO_3	1	125	**CLU2-1BY**
		1,000	125	**CLU2-2Y**
	2-5% HNO_3	1,000	500	**PLU2-2X**
			125	**PLU2-2Y**
		10,000	500	**PLU2-3X**
			125	**PLU2-3Y**
Vanadium (V)	2% HCl	1	125	**CLV1-1BY**
	2% HNO_3	1	125	**CLV2-1BY**
		1,000	125	**CLV2-2Y**
	2% HCl	1,000	500	**PLV1-2X**
	2% HNO_3	1,000	500	**PLV2-2X**
			125	**PLV2-2Y**
	15% HCl	10,000	500	**PLV3-3X**
	15% HNO_3	10,000	500	**PLV4-3X**
			125	**PLV4-3Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Ytterbium (Yb)	2% HNO_3	1	125	**CLYB2-1BY**
	2% HNO_3	1,000	500	**PLYB2-2X**
			125	**PLYB2-2Y**
Yttrium (Y)	2% HNO_3	1	125	**CLY2-1BY**
		10	125	**CLY2-1AY**
	2-5% HNO_3	1,000	500	**PLY2-2X**
			250	**PLY2-2T**
			125	**PLY2-2Y**
		10,000	500	**PLY2-3X**
			125	**PLY2-3Y**
Zinc (Zn)	2% HCl	1	125	**CLZN1-1BY**
	2% HNO_3	1	125	**CLZN2-1BY**
	2-5% HCl	1,000	500	**PLZN1-2X**
	2-5% HNO_3	1,000	500	**PLZN2-2X**
			250	**PLZN2-2T**
			125	**PLZN2-2Y**
	2-5% HCl	10,000	500	**PLZN1-3X**
	2-5% HNO_3	10,000	500	**PLZN2-3X**
			125	**PLZN2-3Y**
Zinc 68	2% HNO_3	10	125	**ISOT-ZN68**
Zirconium (Zr)	2% HCl	1	125	**CLZR1-1BY**
	2% HNO_3	1	125	**CLZR2-1BY**
	10% HCl	1,000	500	**PLZR3-2X**
	2-5% HNO_3	1,000	500	**PLZR2-2X**
			250	**PLZR2-2T**
			125	**PLZR2-2Y**
	10% HCl	10,000	500	**PLZR3-3X**
	2-5% HNO_3	10,000	500	**PLZR2-3X**
			125	**PLZR2-3Y**

Single Element Standards Key Claritas PPT® Grade ICP-MS Standards | Assurance® ICP Standards

Element	Matrix	Volume mL	Catalog#
Matrix Blanks	2% Ultra Pure HNO_3	125	**CLBLK-HNO3**
		250	**CLBLK-HNO3-250**
	2% Ultra Pure HCl	125	**CLBLK-HCL**
	ASTM Type I Water (18 Megohm)	125	**CLBLK-H2O**
		250	**CLBK-H2O-250**
	5% HNO_3	500	**PLBLK-HNO3**
	5% HCl	500	**PLBLK-HCL**
	ASTM Type I Water (18 Megohm)	500	**PLBLK-H2O**
		1L	**PLBLK-H2O-1L**
		2L	**PLBLK-H2O-2L**
		3.78L	**PLBLK-H2O-4L**

*Interested in a custom standard? Call today with your special request. 1-800-LAB-SPEX, ext. 444.

Helpful Hint:

Don't forget your Gold Blank Standard CLAU1-1Y to reduce the memory effect of Mercury!

Speciation Standards

SPEX CertiPrep has expanded the Assurance® product line to include Speciation Standards.

Element	Matrix	Conc. µg/mL	Volume mL	Catalog#
Arsenic^{+3}	As in 2% HCl	1,000	125	**SPEC-AS3**
Arsenic^{+5}	As in H_2O	1,000	125	**SPEC-AS5**
Chromium^{+3}	Cr in 2% HNO_3	1,000	125	**SPEC-CR3**
Chromium^{+6}	Cr in H_2O	1,000	125	**SPEC-CR6**
Selenium^{+4}	Se in 2% HNO_3	1,000	125	**SPEC-SE4**
Selenium^{+6}	Se in H_2O	1,000	125	**SPEC-SE6**

Plasma Emission Standards Kit

The SPEX CertiPrep Plasma Emission Standards Kit is designed to provide your laboratory with a convenient set of Assurance® single element standards covering the most common elements for the most common applications. All of the elements of environmental concern on the Toxic Analyte List have been included. Elements are supplied in the most common matrices to enable mixing of compatible elements.

As always, each Assurance® standard comes with a SPEXertificate® reporting trace metal analysis and traceability documentation. Since every laboratory has specific applications, the SPEX CertiPrep ICP Kit may not fill every need. They may be easily supplemented with SPEX CertiPrep single and multi-element plasma standards that allow you to Calibrate With Confidence®.

The kit contains one 125mL bottle of each element listed at 1,000mg/L in the matrix specified.

Plasma Emission Standards Kit 1 (38 elements)

GREAT VALUE

Matrix 2% HNO_3: Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sc, Se, Sr, Tl, V, Y, Zn, Zr

Matrix 10% HNO_3: Bi, Hg

Matrix 20% HCl (in Teflon): Sn

Matrix H_2O: B, Mo, P, S, W

Matrix H_2O/0.6% Tartaric Acid/tr HNO_3: Sb

Matrix H_2O/F-: Nb, Si, Ti

Catalog#: ICP-KIT-1

SECTION 2

Assurance® Multi-Element Standards for ICP

Your Science is Our Passion.®

Assurance® Multi-Element Standards for ICP

SPEX CertiPrep continues to supply the most comprehensive certificate of analysis in the industry. For example, our SPEXCertificate shows actual reported values for classical wet assay and ICP of the final solution - not reported values of the starting materials or by a calculation. It also reports the trace impurities of the final solution—not of the starting materials.

In addition, each elemental impurity is listed with actual value—not limited to element above detection limits. We also scan 68 elements with found values for all of our products which are traceable to NIST. Many other companies have followed, but not one gives you the information you get from us!

Calibrate with Confidence®

The sections that follow contain multi-element standards with a combination of elements, concentrations, and matrices designed by SPEX CertiPrep for both convenience of use and stability.

Standards may be diluted in the same matrix as specified; however, caution must be exercised in the choice of the source for your diluents. Diluting the matrix may cause some standards to precipitate. Also, an impure or unknown diluent turns your standard into an unknown. We recommend using only SPEX CertiPrep Matrix Blanks when diluting your standards.

- Mixed Multi-Element Calibration Standards
- Calibration and Matrix Blanks
- Instrument Check (Lab Performance) Standards
- Quality Control Standards
- Lab Fortifying Stock (LFS) Solution
- Laboratory Performance Check (LPC) Standards
- Interference Check Standards
- Environmental EPA Set
- Toxicity Characteristic Leachate Procedure (TCLP) Standard
- Drinking Water Pollutant Standards
- Groundwater and Wastewater Pollution Control Check Standards

Did You Know?

SPEX CertiPrep is accredited by A2LA for Organic and Inorganic Certified Reference Materials. In addition to being registered as an ISO 9001 facility, SPEX CertiPrep is accredited by A2LA as complying with the requirements of ISO/IEC 17025 and ISO/IEC Guide 34. Our scope is the **most comprehensive** in the industry.

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

Mixed Multi-Element Calibration Standards

The following series of Calibration Standards are provided for routine instrument calibration. The concentrations and matrices have been selected for both convenience of use and stability. You can also prepare these multi-element standards yourself from individual SPEX CertiPrep Assurance® single element standards.
For use in US EPA Method 200.7 (Revision 4.4) and SW-846, Method 6010 (Third Edition).

Mixed Calibration Standard 1A

Contents: 100 µg/mL: As, Ca
50 µg/mL: Sb, Se
20 µg/mL: Cd, Cu, Mn, B
10 µg/mL: Ba
5 µg/mL: Ag

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: MIXSTD1A-100

Volume: 500 mL
Catalog#: MIXSTD1A-500

Mixed Calibration Standard 1C

Contents: 100 µg/mL: As, Ca
50 µg/mL: Sb, Se
20 µg/mL: Cd, Cu, Mn
10 µg/mL: Ba, B
5 µg/mL: Ag

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: MIXSTD1C-100

Volume: 500 mL
Catalog#: MIXSTD1C-500

Mixed Calibration Standard 2A

Contents: 200 µg/mL: K
100 µg/mL: Mo, Na
50 µg/mL: Li
10 µg/mL: Sr

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: MIXSTD2A-100

Volume: 500 mL
Catalog#: MIXSTD2A-500

Mixed Calibration Standard 3A

Contents: 100 µg/mL: P
20 µg/mL: Co, V, Ce

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: MIXSTD3A-100

Volume: 500 mL
Catalog#: MIXSTD3A-500

Mixed Calibration Standard 4A

Contents: 100 µg/mL: Al, Hg*, SiO2, Ti
50 µg/mL: Cr, Zn
40 µg/mL: Sn

Matrix: 5% HNO_3/tr HF

Volume: 125 mL
Catalog#: MIXSTD4A-100
Hg ****Catalog#: MXSTD4A-100N**

Volume: 500 mL
Catalog#: MIXSTD4A-500
Hg ****Catalog#: MXSTD4A-500N**

**Mercury, when included, is supplied as a separate solution (PLHG2-1X/Y) due to incompatibility with other elements.*

***without Mercury*

Mixed Calibration Standard 5A

Contents: 100 µg/mL: Fe, Mg, Pb
50 µg/mL: Tl
20 µg/mL: Ni
10 µg/mL: Be

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: MIXSTD5A-100

Volume: 500 mL
Catalog#: MIXSTD5A-500

Set of 5 Calibration Standards

GREAT VALUE

Includes one of each: **MIXSTD1A-100**
MIXSTD2A-100
MIXSTD3A-100
MIXSTD4A-100
MIXSTD5A-100

Catalog#: MIXSTD-SETA

Hg ****Catalog#: MXSTD-SETAN**

For use in US EPA Method 200.7 (Revision 3.3) and SW-846, Method 6010 (Third Edition).

Mixed Calibration Standard 1

Contents: 500 µg/mL: Pb
200 µg/mL: Se
150 µg/mL: Cd, Zn
100 µg/mL: Mn
50 µg/mL: Be

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **MIXSTD1-100**

Volume: 500 mL
Catalog#: **MIXSTD1-500**

Mixed Calibration Standard 2

Contents: 10,000 µg/mL: Fe
100 µg/mL: Ba, Co, Cu, V

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **MIXSTD2-100**

Volume: 500 mL
Catalog#: **MIXSTD2-500**

Mixed Calibration Standard 3

Contents: 500 µg/mL: As
100 µg/mL: Mo, Si

Matrix: 2% HNO_3/tr HF

Volume: 125 mL
Catalog#: **MIXSTD3-100**

Volume: 500 mL
Catalog#: **MIXSTD3-500**

Mixed Calibration Standard 4

Contents: 1000 µg/mL: Ca
400 µg/mL: K
200 µg/mL: Al, Na
20 µg/mL: Cr, Ni

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **MIXSTD4-100**

Volume: 500 mL
Catalog#: **MIXSTD4-500**

Mixed Calibration Standard 5

Contents: 1000 µg/mL: Mg
200 µg/mL: Sb, Tl
100 µg/mL: B
50 µg/mL: Ag

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **MIXSTD5-100**

Volume: 500 mL
Catalog#: **MIXSTD5-500**

Set of 5 Mixed Calibration Standards

GREAT VALUE

Includes one of each: **MIXSTD1-100, MIXSTD2-100, MIXSTD3-100, MIXSTD4-100, MIXSTD5-100**

Catalog#: **MIXSTD-SET**

Calibration and Matrix Blanks

May be used to dilute your multi-element standards or can be run directly as a blank to establish your base line. Do not use any acid or water as a diluent if you are not certain of its purity.

Hydrochloric Acid Blank

Matrix: 5% HCl

Volume: 500 mL
Catalog#: **PLBLK-HCL**

Nitric Acid Blank

Matrix: 5% HNO_3

Volume: 500 mL
Catalog#: **PLBLK-HNO3**

Water Blanks

Matrix: ASTM Type I Water, 18 megohm

Volume: 500 mL
Catalog#: **PLBLK-H2O**

Volume: 1 L
Catalog#: **PLBLK-H2O-1L**

Volume: 2 L
Catalog#: **PLBLK-H2O-2L**

Volume: 3.78 L
Catalog#: **PLBLK-H2O-4L**

Instrument Check (Lab Performance) Standards

Used to calibrate and verify wavelength accuracy and stability in sequential and simultaneous ICP units. Each CAL-MIX is designed to give the user wavelength ranges from 160 nm to 790 nm. Every ICP manufacturer has a specific group of elements at varying concentrations to determine instrument accuracy and reliability. Some have special calibration programs incorporated into their software; others give you information in their manuals. These standards are also useful as training tools for technicians or in methods development. Check your ICP manual or service guide for further information.

Instrument Check Standard 3

Contents: 100 µg/mL: K, P, S
20 µg/mL: As, La, Li, Mn, Mo, Na, Ni, Sc

Matrix: 5% HCl

Volume: 125 mL
Catalog#: **CALMIX3-100**

Volume: 500 mL
Catalog#: **CALMIX3-500**

Instrument Check Standard 4

Contents: 50 µg/mL: K
10 µg/mL: Al, As, Cu, Mn, Na, Ni, P, Pb, Sc, Zn
1 µg/mL: Ba

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CALMIX4-100**

Volume: 500 mL
Catalog#: **CALMIX4-500**

Helpful Hint:

An aqua regia blank can be prepared by mixing one part nitric acid blank with three parts hydrochloric acid blank.

Instrument Check Standard 7

Contents: 600 µg/mL: Y
100 µg/mL: Al, As, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Zn

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CALMIX7-100**

Volume: 500 mL
Catalog#: **CALMIX7-500**

Instrument Check Standard 8

Contents: 50 µg/mL: Al, As, Co, Cr, Cu, K, Na, P, Pb

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CALMIX8-100**

Volume: 500 mL
Catalog#: **CALMIX8-500**

Instrument Check Standard 10

Contents: 500 µg/mL: K
50 µg/mL: Al, Ba, Cd, Cu, Mn, Zn

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CALMIX10-100**

Volume: 500 mL
Catalog#: **CALMIX10-500**

Quality Control Standards

Used to check the standard curve, the procedure for interelement correction and other spectral interferences. These standards are carried through the entire analytical operation of the method. If the determined concentration is not within ±5.0% of 1 µg/mL, the laboratory performance is unacceptable.
The source of the problem should be identified and corrected before continuing the analysis.
For use in US EPA method 200.7 (Revision 4.4) and SW-846, method 6010 (Third Edition).

Quality Control Standard 7

Contents: 1000 µg/mL: K
100 µg/mL: Ag, Al, B, Ba, Na
50 µg/mL: Si

Matrix: 5% HNO_3/tr HF

Volume: 125 mL
Catalog#: **QC-7**

Volume: 500 mL
Catalog#: **QC-7-500**

Quality Control Standard 7A

Contents: 1000 µg/mL: K
500 µg/mL: Si
100 µg/mL: Al, B, Ba, Na
50 µg/mL: Ag

Matrix: 5% HNO_3/tr HF

Volume: 125 mL
Catalog#: **QC-7A**

Volume: 500 mL
Catalog#: **QC-7A-500**

Quality Control Standard 21

TOP SELLER

Contents: 100 µg/mL: As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **QC-21**

Volume: 250 mL
Catalog#: **QC-21-250**

Volume: 500 mL
Catalog#: **QC-21-500**

Sets of 2 Quality Control Standards

Includes one of each: **QC-21, QC-7A**

Catalog#: QC-SETA

Includes one of each: **QC-21, QC-7**

Catalog#: QC-SETB

Quality Control Standard 22

Contents: 10 µg/mL: Ag, Al, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Li, Mg, Mn, Na, Ni, Pb, Tl, Zn

Matrix: 10% HNO_3

Volume: 125 mL
Catalog#: QC-22

Contents: 100 µg/mL: Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Li Mg, Mn, Mo, Ni, Se, Sr, Tl, V, Zn

Matrix: 5% HNO_3 / tr Tartaric Acid / tr HF

Volume: 250 mL
Catalog#: QC-22-250

Volume: 500 mL
Catalog#: QC-22-500

Quality Control Standard 23

Contents: 1000 µg/mL: Ag, Al, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Li, Mg, Mn, Na, Ni, Pb, Sr, Tl, Zn

Matrix: 10% HNO_3

Volume: 125 mL
Catalog#: QC-23

Quality Control Standard 24

Contents: 10 µg/mL: Al, Ba, Bi, B, Cd, Ca, Cr, Co, Cu, Ga, In, Fe, Pb, Li, Mg, Mn, No, K, Ag, Na, Tl, Zn

Matrix: 10% HNO_3

Volume: 125 mL
Catalog#: QC-24

Laboratory Fortifying Stock (LFS) Solution

Used for spiking the laboratory fortified blank and the laboratory fortified sample matrix. 2 mL of the LFS Solution must be added to a 100 mL aliquot of the laboratory fortified blank.
This blank must be carried through the entire sample preparation procedure and analysis scheme. **For use in US EPA method 200.7 (Revision 4.4) and SW-846, method 6010 (Third Edition).**

Ca, K, Mg and Na are not included in this mix because their concentration will vary from one environmental sample to the other. Please view pages 10-25 for all single element CRM's.

LFS Solution 1

Contents:
50 µg/mL: P
25 µg/mL: Al, As, B, Ba, Cr, Cu, Fe, Li, Mn, Ni, Pb, Sb, Se, SiO2, Sr, Tl, Zn
10 µg/mL: Cd, Co, Mo, Sn, V, Hg*
5 µg/mL: Be
2.5 µg/mL: Ag

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: LFS-1-100
Hg ****LFS-1-100N**

Volume: 500 mL
Catalog#: LFS-1-500
Hg ****LFS-1-500N**

** Mercury, when included, is supplied as a separate solution (PLHG2-1AX/Y) due to incompatibility with other elements.*

*** without Mercury*

Take a Closer Look...
ALL SPEX CertiPrep Standards are NIST Traceable.

Kit of 2 Lab Fortifying Standards:

LFS Solution 2A

10 µg/mL: Sb, As, Sn, Mo, V, B
25 µg/mL: SiO2, Ti, Se
50 µg/mL: P

Matrix: 2% HNO3 / Tr. Tartaric acid / Tr. HF

Volume: 125 mL

Reference#: LFS-2A-100

LFS Solution 2B

250 µg/mL: K
25 µg/mL: Ca, Pb, Al, Fe, Mg, Na, Ce
10 µg/mL: Ba, Be, Cd, Cr, Co, Cu, Si, Mn, Ni, Tl, Zn
5 µg/mL: Ag

Matrix: 5% HNO3

Volume: 500 mL

Reference#: LFS-2B-500

Catalog#: LFS-2
(Contains LFS-2A-100 and LFS-2B-500)

Laboratory Performance Check (LPC) Standard

The Laboratory Performance Check (LPC) Standard is a solution of method analytes used to evaluate the performance of the instrument. The LPC Standard is used immediately following calibration, after every tenth sample, and at the end of the sample run. The analyzed value of each analyte in the LPC solution should be within 95% to 105% of its expected value. If the analyte value is outside the interval, reanalyze the LPC. If the analyte is again outside the ±5% limit, the instrument should be recalibrated and all samples following the last acceptable LPC solution should be reanalyzed.
For use in US EPA method 200.7 (Revision 4.4) and SW-846, method 6010 (Third Edition).

LPC Standard 1

Contents: 100 µg/mL: K, P, SiO2, Hg*
20 µg/mL: Al, As, B, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Sn, Sr, Tl, V, Zn
5 µg/mL: Ag

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: LPC-1-100
Hg ****LPC-1-100N**

Volume: 500 mL
Catalog#: LPC-1-500
Hg ****LPC-1-500N**

** Mercury, when included, is supplied as a separate solution (PLHG2-1X/1Y) due to incompatibility with other elements.*

*** without Mercury*

Interference Check Standards

The Interference Check Standards are used to set or confirm that the correct background correction intervals have been set for sequential ICP spectrometers and that the proper interelement correction factors are set for simultaneous ICP spectrometer systems. **For use in US EPA method 200.7. (Revision 4.4) and SW-846 method 6010 (Third Edition).**

Interference Check Standard, 1

Contents: 1000 µg/mL: Sb

Matrix: H_2O/tr HNO_3/0.6% Tartaric Acid

Volume: 125 mL
Catalog#: PLSB7-2Y

Volume: 500 mL
Catalog#: PLSB7-2X

Interference Check Standard, 5

Contents: 6000 µg/mL: Ca
5000 µg/mL: Fe
3000 µg/mL: Mg
1200 µg/mL: Al
1000 µg/mL: Na

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: INTER5-100

Volume: 500 mL
Catalog#: INTER5-500

Interference Check Standard, 18

Contents: 20,000 µg/mL: K
1,000 µg/mL: As, Pb, Tl
500 µg/mL: Se
300 µg/mL: Ag, Ba, Cd, Co, Cr, Cu, Ni, V, Zn
200 µg/mL: Mn
100 µg/mL: Be, Hg*

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: INTER18-100
Hg ****INTER18-100N**

Volume: 500 mL
Catalog#: INTER18-500
Hg ****INTER18-500N**

** Mercury, when included, is supplied as a separate solution (PLHG2-1X/1Y) due to incompatibility with other elements.*

*** without Mercury*

Set of 3 Interference Check Standards

Includes one of each: **INTER18-100, PLSB7-2Y, INTER5-100**

Catalog#: INTER-SET

Set of 3 Interference Check Standards without Mercury

Includes one of each: **INTER18-100N PLSB7-2Y INTER5-100**

****Catalog#: INTER-SETN**

Environmental EPA Set

Set of 8 standards and 2 matrix blanks for analysis of trace metals by ICP. **For use in US EPA methods 6010 and 2007 (Revision 4.4).**

Environmental EPA Set

Includes one each of: **MIXSTD1-100**
MIXSTD2-100
MIXSTD3-100
MIXSTD4-100
MIXSTD5-100
INTER18-100
INTER5-100
PLSB7-2Y
PLBLK-HNO3
PLBLK-HCL

Catalog#: EPA-SET

Environmental EPA Set without Mercury

Includes one each of: **MIXSTD1-100**
MIXSTD2-100
MIXSTD3-100
MIXSTD4-100
MIXSTD5-100
INTER18-100N
INTER5-100
PLSB7-2Y
PLBLK-HNO3
PLBLK-HCL

Hg ****Catalog#: EPA-SETN**

Toxicity Characteristic Leachate Procedure (TCLP) Standard

Designed to determine the mobility of the inorganic contaminants present in liquid, solid, and multi-phase wastes. To simplify, TCLP is designed to determine the hazardous contaminants that are actually entering into the environment. **For use in accordance with the Toxicity Characteristic rule regulatory levels issued in the Federal Register 55, 11846 March 1990; method 1311.**

In addition to the SPEX CertiPrep TCLP Standard designed with all elements in one solution, the Toxicity Characteristic rule separates the elements according to specific instrumentation: ICP, GFAA, and Cold Vapor AA (see Section 4).

TCLP Standard 1

Contents: 500 µg/mL: Ba
100 µg/mL: Hg*
25 µg/mL: Ag, As, Cr, Pb
5 µg/mL: Cd, Se

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: TCLP-100
Hg ****TCLP-100N**

Volume: 500 mL
Catalog#: TCLP-500
Hg ****TCLP-500N**

** Mercury, when included, is supplied as a separate solution (PLHG-1X/1Y) due to incompatibility with other elements.*

*** without Mercury*

Drinking Water Pollutant Standards

These standards are for use with procedures for compliance monitoring of drinking water and for analysis of ground and surface water where determination at the drinking water contaminant levels are required. **Refer to US National Primary Drinking Water Regulations 40 CFR, Part 141.**

Primary Drinking Water Metals

Contents: 100 µg/mL: Ba
10 µg/mL: Ag, As, Cr, Hg*, Pb
5 µg/mL: Cd, Se

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: EP-8
Hg ****EP-8N**

Volume: 500 mL
Catalog#: EP-8-500
Hg ****EP-8-500N**

** Mercury, when included, is supplied as a separate solution (PLHG2-1AX/Y) due to incompatibility with other elements.*

*** without Mercury*

Secondary Drinking Water Metals

Contents: 500 µg/mL: Zn
100 µg/mL: Cu
30 µg/mL: Fe
5 µg/mL: Mn

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: EP-4

Volume: 500 mL
Catalog#: EP-4-500

Set of 2 Drinking Water Standards

Includes one of each: **EP-8, EP-4**

Catalog#: DW-SET

Set of 2 Drinking Water Standards without Mercury

Includes one of each: **EP-8N, EP-4**

Hg ****Catalog#: DW-SETN**

Did You Know?

SPEX CertiPrep has a library of YouTube webinars on a variety of interesting subjects such as trace metals in wine, analysis of phthalates and BPA in children's toys, and clean laboratory techniques.

View these videos at **www.spexcertiprep.com/knowledge-base/webinars**

Groundwater and Wastewater Pollution Control Check Standards

May be used either as standards or as a means to check the individual analyst's accuracy and precision. **Refer to US EPA methods manual 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes": Trace metals 21I, 21II and 21III methods.**

Trace Metals 1

Contents: 500 µg/mL: Al
250 µg/mL: V
100 µg/mL: As, Be, Co, Cr, Cu, Fe Mn, Ni, Pb, Zn
25 µg/mL: Cd, Se
10 µg/mL: Hg*

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: WP-15
Hg ****WP-15N**

Volume: 500 mL
Catalog#: WP-15-500
Hg ****WP-15-500N**

** Mercury, when included, is supplied as a separate solution (PLHG2-1AX/Y) due to incompatibility with other elements.*

*** without Mercury*

Trace Metals 2

Contents: 20 µg/mL: Sb, Tl
10 µg/mL: Ag

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: WP-3

Volume: 500 mL
Catalog#: WP-3-500

Trace Metals 3

Contents: 500 µg/mL: Ba, Ca, Mo, Na
100 µg/mL: K, Mg

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: MN-6

Volume: 500 mL
Catalog#: MN-6-500

Set of 3 Trace Metals

Includes one of each: **WP-15, WP-3, MN-6**

Catalog#: TM-SET

Set of 3 Trace Metals without Mercury

Includes one of each: **WP-15N, WP-3, MN-6**

Hg ****Catalog#: TM-SETN**

Alternate Metals 1

Contents: 20 µg/mL: Al, Fe, V
10 µg/mL: Co, Cu, Mn, Ni, Zn
5 µg/mL: Be, Sb, Tl

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: WP-11

Volume: 500 mL
Catalog#: WP-11-500

Alternate Metals 3

Contents: 500 µg/mL: Ca, Na
100 µg/mL: K, Mg

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: MN-4

Volume: 500 mL
Catalog#: MN-4-500

Set of Alternate Metals

Includes one of each: **WP-11, MN-4**

Catalog#: AM-SET

SECTION 3

Multi-Element CLP Standards for ICP & ICP-MS

Your Science is Our Passion.®

Multi-Element CLP Standards for ICP & ICP-MS

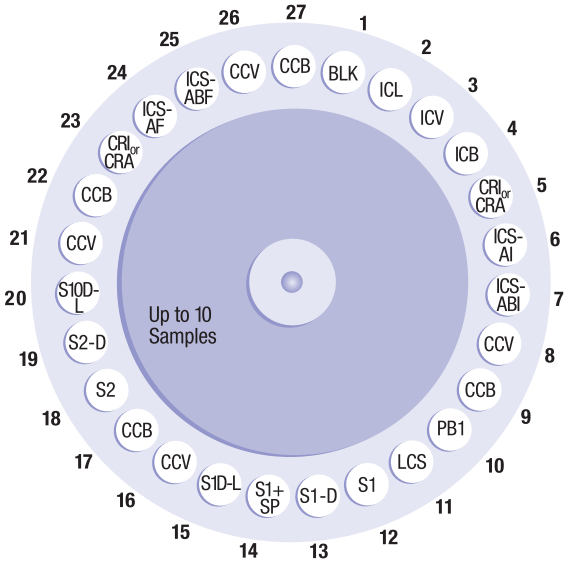
Every CLP standard allows you to "Calibrate With Condfidence"®. The following standards are to be used in conjunction with the **Statement of Work for Inorganic Analysis; Multi-Media/Multi-Concentration Document Number ILM05.3/ISM 01.2.**

The final ICP check, performed in our own laboratories, is your **stamp of assurance**. We calibrate our instruments with **traceable reference materials** and show you the **actual found value** of the solution you receive — not just an ideal, calculated number as so many other standards manufacturers do. The sections that follow contain multi-element standards referenced to their application. The combinations of elements, concentrations, and matrices listed have been designed by SPEX CertiPrep for both convenience of use and stability.

Please refer to the appropriate sections of this catalog for additional single- and multi-element standards that can also be used in these studies.

The **US EPA SOW. ILM05.3/ISM 01.2** gives specific procedures for the methods of analysis, elements to be analyzed for, and concentration levels. Standards are specified not only by the elements present and their relative concentrations, but also the order and frequency of running standards, blanks, and samples. Details of these specifications may be found in the **US EPA SOW. ILM05.3/ISM 01.2** in the following sections:

- **Exhibit C, Inorganic Target Analyte List (TAL)**
- **Exhibit D, Analytical Methods**
- **Exhibit E, QA/QC Requirements**



Typical set-up for standards, samples, and blanks to be run for CLP analysis

Standards for the Contract Laboratory Program

Following is a list of samples, standards, and blanks in a possible running sequence as suggested by the Contract Laboratory Program protocols.

Also listed are the SPEX CertiPrep standards and solutions to be used in preparing the final blanks, standards, and spikes. Complete descriptions of each solution are provided in the following pages. (ILM05.3)

1. **BLK**
   Blank: PLBLK's
2. **ICL**
   Initial calibration solution: mixture of ICAL's
3. **ICV**
   Initial calibration verification: ICV-1A
4. **ICB**
   Initial calibration blank (not digested): PLBLK's
5. **CRI (ICP-AES) or CRA (AA)**
   CRDL-2
6. **ICS-AI**
   Initial interferents, A: INT-A1
7. **ICS-ABI**
   Initial interferents and analytes, AB: INT-A1, INT-B3
8. **CCV**
   Continuing calibration verification (50% ICV): ICV-1A
9. **CCB**
   Continuing calibration blank: PLBLK's (If results of CCV and CCB are within limits, proceed to next sample, if not stop run)
10. **PB1**
    Preparation blank: Digested water or soil blank
11. **LCS**
    Laboratory control sample (digested): ICV-1A
12. **S1**
    Sample #1
13. **S1-D**
    Sample #1 duplicate
14. **S1+SP**
    Sample #1 with spike: SPIKE-1
15. **S1D-L**
    Sample #1 diluted five-fold
16. **CCV**
    Continuing calibration verification (50% ICV): ICV-1A
17. **CCB**
    Continuing calibration blank: PLBLK's (If results of CCV and CCB are within limits, proceed to next sample, if not stop run)
18. **S2**
    Sample #2
19. **S2-D**
    Sample #2 duplicate (Up to 10 samples may be run as long as CCV and CCB tests are within accepted limits)
20. **S10D-L**
    Sample #10 diluted five-fold
21. **CCV**
    Continuing calibration verification (50% ICV): ICV-1A
22. **CCB**
    Continuing calibration blank: PLBLK's (If results of CCV and CCB are within limits, proceed to next sample, if not stop run)
23. **CRI (ICP-AES) or CRA (AA)**
    2 x Contract required detection limits: CRDL-1
24. **ICS-AF**
    Final interferents, A: INT-A1
25. **ICS-ABF**
    Final interferents, and analytes, AB: INT-A1, INT-B3
26. **CCV**
    Continuing calibration verification (50% ICV): ICV-1A
27. **CCB**
    Continuing calibration blank: PLBLK's
    Typical set-up for standards, samples, and blanks to be run for CLP analysis

Instrument Calibration for CLP Methods

May be used separately or mixed together for preparation of the analytical curve. When mixed these solutions will yield a standard containing all the elements in the Target Analyte List (TAL). Instruments must be calibrated daily, every 24 hours or each time the instrument is set up.

Calibration standards must be prepared fresh for each analysis and discarded after use. **A dilution of 100-fold is suggested for ICAL-2, ICAL-3, and ICAL-4A, and a dilution of 10-fold for ICAL-1.** Antimony and mercury can be diluted as required.

For ISM01.2, at least one or your calibration standards must be at the Contract Required Detection Limit (CRQL). See ISM01.2 sections for CRQL standards.

Instrument Calibration Standard 1

Contents: 5000 µg/mL: Ca, K, Mg, Na

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICAL-1**

Instrument Calibration Standard 2

Contents: 400 µg/mL: Ni
200 µg/mL: Zn
150 µg/mL: Mn
100 µg/mL: Ag, Cr

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICAL-2**

Instrument Calibration Standard 3

Contents: 2000 µg/mL: Al, Ba
1000 µg/mL: Fe
500 µg/mL: Co, V
250 µg/mL: Cu
50 µg/mL: Be

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICAL-3**

Instrument Calibration Standard 4A

Contents: 100 µg/mL: As, Tl
50 µg/mL: Cd, Pb, Se

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICAL-4A**

Volume: 500 mL
Catalog#: **ICAL-4A-500**

Antimony Single Element Standard

Contents: 1000 µg/mL: Sb

Matrix: H_2O/0.6% Tartaric Acid/tr HNO_3

Volume: 125 mL
Catalog#: **PLSB7-2Y**

Mercury Single Element Standard

Contents: 100 µg/mL: Hg

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **PLHG2-1Y**

The same Instrument Calibration Standards, ICAL-1 through ICAL-4, can be used with ICV-2. **The following dilutions are suggested: A dilution of 250-fold for ICAL-1; 20-fold for ICAL-4A; 100-fold for ICAL-2 and ICAL-3.** Antimony and mercury can be diluted as required.

Helpful Hint:

Having trouble finding the Multi-Element Standard you need?

Fill out the Custom Standard Request Form on **www.spexcertiprep.com/custominorganics**

Initial Calibration Verification for CLP Methods

The US EPA retains analytical services through the Contract Lab Program (CLP). The CLP follows detailed SOPs derived from EPA methods. The CLP Methods require calibration of analytical instrumentation within the expected quantitative range (ICAL standards) and additional CLP QA standards (ICV standards) to verify the calibration curve at each of the selected wavelengths that will be used for sample analysis.

SPEX CertiPrep verification standards, ICV-1A, ICV-2, ICV-3, contain all the elements on the TAL list and are independent standards for testing an instruments' calibration curve. SPEX CertiPrep's ICV standards are designed to be used with their corresponding instrument calibration standards (ICAL). Refer to page 43 of this catalog for a complete list of ICAL standards.

SPEX CertiPrep recommends dilution of ICV standards to a range within your instrument's calibration curve. A dilution of 200-fold is recommended for ICV-2A, PLSB7-2X, and ICV-2C. A dilution of 20-fold is recommended for ICV-1A and ICV-3.

Initial Calibration Verification Standard 1A

Contents:
5000 µg/mL: Ca, K, Mg, Na
200 µg/mL: Al, Ba
100 µg/mL: Fe
60 µg/mL: Sb
50 µg/mL: Co, V
40 µg/mL: Ni
25 µg/mL: Cu
20 µg/mL: Zn
15 µg/mL: Mn
10 µg/mL: Ag, As, Cr, Tl
5 µg/mL: Be, Cd, Se
3 µg/mL: Pb

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 500 mL
Catalog#: ICV-1A

Kit of 3 Initial Calibration Verification Standard 2

ICV-2A (only as part of ICV-2 Set)

Contents:
2000 µg/mL: Ca, K, Mg, Na
1000 µg/mL: Al, Ba, Fe
500 µg/mL: Co, Ni, V
200 µg/mL: Cr, Cu
100 µg/mL: Ag, Be, Mn, Zn

Matrix: 5% HNO_3
Volume: 500 mL

ICV-2C (only as part of ICV-2 Set)

Contents:
500 µg/mL: As, Pb, Se, Tl
100 µg/mL: Cd

Matrix: 5% HNO_3
Volume: 500 mL

PLSB7-2X (also available separately)

Contents: 1000 µg/mL: Sb

Matrix: H_2O/0.6% Tartaric Acid/tr HNO_3

Volume: 500 mL
Catalog#: PLSB7-2X

Includes one of each: **ICV-2A, ICV-2C and PLSB7-2X**
Catalog#: ICV-2

Initial Calibration Verification Standard 3

Contents:
500 µg/mL: Ca, K, Mg, Na
200 µg/mL: Al, Ba
100 µg/mL: As, Pb, Se, Tl, Fe
50 µg/mL: Mn, Cd, Co, Ni, V, Zn
25 µg/mL: Ag, Cu
20 µg/mL: Cr
5 µg/mL: Be

Matrix: 5% HNO_3

Volume: 500 mL
Catalog#: ICV-3

CLP ISM 01.2 & ILM 05.3 STANDARDS FOR ICP

Contract Required Detection Limits, CRDL

For ILM 05.3, a standard must be run at the Contract Required Detection Limits, CRDL.
To verify linearity near the CRQL this standard is analyzed at the beginning of the analysis run after the ICV/ICB and before the ICSA and ICSAB.
In addition this standard must be run at a frequency of not less than 20 analytical samples and at the end of the analysis run followed by the ICSA/ICSAB.
The sequence order is CCV, CCB, CRI, ICSA, ICSAB, CCV, CCB.
For ISM 01.2, at least one of your calibration standards must be at the Contract Required Detection Limit (CRDL). This standard when diluted can be used as a calibration standard to fulfill this requirement.

ICP Contract Required Detection Limit Standard 2

Contents: 200 µg/mL: Fe
120 µg/mL: Sb, Zn
100 µg/mL: Co, V
80 µg/mL: Ni
70 µg/mL: Se
50 µg/mL: Cu, Tl
30 µg/mL: Mn
20 µg/mL: As, Cr, Pb, Ag
10 µg/mL: Be, Cd

Catalog#: CRDL-2

ICP Contract Required Detection Limit Standard 2A

Contents: 5000 µg/mL: Ca, Mg, K, Na
200 µg/mL: Al, Ba

Matrix: 10% HNO_3

Volume: 125 mL
Catalog#: CRDL-2A

Interference Checks

For verification of interelement and background correction factors at the beginning and the end of each analysis run. In addition a verification must be done after every 20th sample.
Two solutions are required for the most common interference check: Solution A, the interferents alone (INT-A1), and Solution AB, a combination of interferents (INT-A1) and analytes (INT-B3).
Solution A is prepared by diluting INT-A1 20-fold.
Solution AB is prepared by diluting INT-A1 20-fold and INT-B3 100-fold; for example, 5 mL of INT-A1 and 1.0 mL of INT-B3 into a 100 mL volumetric flask, brought to volume with a matrix blank (see page 25). **Once prepared, the solutions should be analyzed consecutively, starting with Solution A.**

ICP Interferents A1

Contents: 5000 µg/mL: Al, Ca, Mg
2000 µg/mL: Fe

Matrix: 5% HNO_3

Volume: 500 mL
Catalog#: INT-A1

ICP Analytes B3

Contents: 100 µg/mL: Cd, Ni, Zn
60 µg/mL: Sb
50 µg/mL: Ba, Be, Co, Cr, Cu, Mn, V
20 µg/mL: Ag
10 µg/mL: As, Tl
5 µg/mL: Pb, Se

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: INT-B3

Spike Sample Analysis

In the spike sample analysis a spike containing the required elements, in their respective required amounts, is added to the sample prior to addition of any reagents, digestion, distillation, etc.

The SPEX CertiPrep spike standard, SPIKE-4, provides all the analytes required for the ICP and the AA spike.

ICP Spike Sample 4

Contents: 200 µg/mL: Al, Ba
100 µg/mL: Fe
50 µg/mL: Co, Mn, Ni, V, Zn
25 µg/mL: Cu
20 µg/mL: Cr
10 µg/mL: Sb
5 µg/mL: Be, Cd, Se, Ag, Tl
4 µg/mL: As
2 µg/mL: Pb

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: SPIKE-4

CLP ILM 02.0 STANDARDS FOR ICP

Contract Required Detection Limits, CRDL

A standard must be run at two times the Contract Required Detection Limits, CRDL, or at two times the Instrument Detection Limits, IDL, whichever is greater. This standardization is performed at the start and the end of each sample analysis or at least twice in each eight-hour shift.
All elements to be analyzed must be run except Al, Ba, Ca, Fe, Mg, Na, and K.

SPEX Certiprep CRDL-1 standard contains all the required elements on the TAL, in their appropriate concentration ratios. CDRL-1 should be diluted by a factor of 1000 prior to use in the "two times CRDL" run for ICP-AES analysis. For analysis by atomic absorption, CRDL-1 should be diluted by a factor of 2000 prior to use in the "one time CRDL" run.

ICP Contract Required Detection Limit Standard 1

Contents: 120 µg/mL: Sb
100 µg/mL: Co, V
80 µg/mL: Ni
50 µg/mL: Cu
40 µg/mL: Zn
30 µg/mL: Mn
20 µg/mL: Ag, As, Cr, Tl
10 µg/mL: Be, Cd, Se
6 µg/mL: Pb

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CRDL-1**

Interference Checks

For verification of interelement and background correction factors at the beginning and the end of each analysis run. In addition a verification must be done after every 20th sample.
Two solutions are required for the most common interference check: Solution A, the interferents alone (INT-A1), and Solution AB, a combination of interferents (INT-A1) and analytes (INT-B1). Solution A is prepared by diluting INT-A1 20-fold. Solution AB is prepared by diluting INT-A1 20-fold and INT-B1 100-fold; for example, 5 mL of INT-A1 and 1.0 mL of INT-B1 into a 100 mL volumetric flask, brought to volume with a matrix blank (see page 25). **Once prepared, the solutions should be analyzed consecutively, starting with Solution A.**

ICP Interferents A1

Contents: 5000 µg/mL: Al, Ca, Mg
2000 µg/mL: Fe

Matrix: 5% HNO_3

Volume: 500 mL
Catalog#: **INT-A1**

ICP Analytes B1

Same dilution factor as given previously.

Contents: 100 µg/mL: Ag, Cd, Ni, Pb, Zn
50 µg/mL: Ba, Be, Co, Cr, Cu, Mn, V

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **INT-B1**

Spike Sample Analysis

In the spike sample analysis a spike containing the required elements, in their respective required amounts, is added to the sample prior to addition of any reagents, digestion, distillation, etc. Information is then provided on the effects of the sample matrix and the entire methodology.

The SPEX CertiPrep spike standard, SPIKE-1, provides all the analytes required for the ICP-AES and the AA spike. Add 1.0 mL of SPIKE-1 to aqueous samples and 2.0 mL of SPIKE-1 to solid samples prior to digestion.

ICP Spike Sample 1

Contents: 200 µg/mL: Al, As, Ba, Se, Tl
100 µg/mL: Fe
50 µg/mL: Co, Mn, Ni, Pb, Sb, V, Zn
25 µg/mL: Cu
20 µg/mL: Cr
5 µg/mL: Ag, Be, Cd,

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **SPIKE-1**

Volume: 500 mL
Catalog#: **SPIKE-1-500**

CLP ILM 05.2 STANDARDS FOR ICP

Contract Required Detection Limits, CRDL

A standard must be run at two times the Contract Required Detection Limits, CRDL, or at two times the Instrument Detection Limits, IDL, whichever is greater. This standardization is performed at the start and the end of each sample analysis or at least twice in each eight-hour shift.
All elements to be analyzed must be run except Al, Ba, Ca, Fe, Mg, Na, and K.

SPEX Certiprep CRDL-1 standard contains all the required elements on the TAL, in their appropriate concentration ratios. CRDL-1 should be diluted by a factor of 1000 prior to use in the "two time CRDL" run for ICP-AES analysis. For analysis by atomic absorption, CRDL-1 should be diluted by a factor of 2000 prior to use in the "one time CRDL" run.

ICP Contract Required Detection Limit Standard 1

Contents: 120 µg/mL: Sb
100 µg/mL: Co, V
80 µg/mL: Ni
50 µg/mL: Cu
40 µg/mL: Zn
30 µg/mL: Mn
20 µg/mL: Ag, As, Cr, Tl
10 µg/mL: Be, Cd, Se
6 µg/mL: Pb

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CRDL-1**

Interference Checks

For verification of interelement and background correction factors at the beginning and the end of each analysis run. In addition a verification must be done after every 20th sample.
Two solutions are required for the most common interference check: Solution A, the interferents alone (INT-A1), and Solution AB, a combination of interferents (INT-A1) and analytes (INT-B3). Solution A is prepared by diluting INT-A1 20-fold. Solution AB is prepared by diluting INT-A1 20-fold and INT-B3 100-fold; for example, 5 mL of INT-A1 and 1.0 mL of INT-B3 into a 100 mL volumetric flask, brought to volume with a matrix blank (see page 25). **Once prepared, the solutions should be analyzed consecutively, starting with Solution A.**

ICP Interferents A1

Contents: 5000 µg/mL: Al, Ca, Mg
2000 µg/mL: Fe

Matrix: 5% HNO_3

Volume: 500 mL
Catalog#: **INT-A1**

ICP Analytes B3

Contents: 100 µg/mL: Cd, Ni, Zn
60 µg/mL: Sb
50 µg/mL: Ba, Be, Co, Cr, Cu, Mn, V
20 µg/mL: Ag
10 µg/mL: As, Tl
5 µg/mL: Pb, Se

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **INT-B3**

Spike Sample Analysis

In the spike sample analysis a spike containing the required elements, in their respective required amounts, is added to the sample prior to addition of any reagents, digestion, distillation, etc. Information is then provided on the effects of the sample matrix and the entire methodology.

The SPEX CertiPrep spike standard, SPIKE-4, provides all the analytes required for the ICP-AES and the AA spike.

ICP Spike Sample 4

Contents: 200 µg/mL: Al, Ba
100 µg/mL: Fe
50 µg/mL: Co, Mn, Ni, V, Zn
25 µg/mL: Cu
20 µg/mL: Cr
10 µg/mL: Sb
5 µg/mL: Be, Cd, Se, Ag, Tl
4 µg/mL: As
2 µg/mL: Pb

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **SPIKE-4**

CLP ISM 01.2 STANDARDS FOR ICP-MS

Contract Required Detection Limits, CRDL

For ISM01.2, at least one or your calibration standards must be at the Contract Required Detection Limit (CRDL). This standard when diluted can be used as a calibration standard to fulfill this requirement.

ICP-MS Contract Required Detection Limit Standard 2

Contents: 1000 µg/mL: Ca, Mg, K, Na
400 µg/mL: Fe
40 µg/mL: Al
20 µg/mL: Ba
10 µg/mL: Se, V
4 µg/mL: Sb, Cr, Cu, Zn
2 µg/mL: As, Be, Cd, Co, Pb, Mn, Ni, Ag, Tl

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: CL-CRDL-2

Spike Sample Analysis

In the spike sample analysis a spike containing the required elements, in their respective required amounts, is added to the sample prior to addition of any reagents, digestion, distillation, etc. Information is then provided on the effects of the sample matrix and the entire methodology.

The SPEX CertiPrep spike standard, CL-SPIKE-4, provides all the analytes required for the ICP-MS and the AA spike. Add 1.0mL of CL-SPIKE-4 to aqueous samples and 2.0mL of CL-SPIKE-4 to solid samples prior to digestion.

ICP-MS Spike Sample 4

Contents: 200 µg/mL: Al, Ba
100 µg/mL: Fe
50 µg/mL: Co, Mn, Ni, V, Zn
25 µg/mL: Cu
20 µg/mL: Cr
10 µg/mL: Sb
5 µg/mL: Be, Cd, Ag, Tl
4 µg/mL: As
2 µg/mL: Pb
1 µg/mL: Se

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: CL-SPIKE-4

Interference Checks

For verification of interelement and background correction factors at the beginning and the end of each analysis run. In addition a verification must be done after every 20th sample.
Two solutions are required for the most common interference check: Solution A, the interferents alone (CL-INT-A2), and Solution AB, a combination of interferents (CL-INT-A2) and analytes (CL-INT-B4). Solution A is prepared by diluting CL-INT-A2 10-fold. Solution AB is prepared by diluting CL-INT-A2 10-fold and CL-INT-B4 100-fold; for example, 10 mL of CL-INT-A2 and 1.0 mL of CL-INT-B4 into a 100 mL volumetric flask, brought to volume with a matrix blank (see page 25).
Once prepared, the solutions should be analyzed consecutively, starting with Solution A.

ICP-MS Interferents A2

Run at a 1:10 dilution in 2% HNO3.

Contents: 10000 µg/mL: Cl
2000 µg/mL: C
1000 µg/mL: Al, Ca, Fe, K, Mg, Na, P, S
20 µg/mL: Mo, Ti

Matrix: 5% HNO_3/tr HF

Volume: 125 mL
Catalog#: CL-INT-A2

ICP-MS Analytes B4

Contents: 40 µg/mL: Cr
30 µg/mL: Mn, Zn
25 µg/mL: Cu, Pb, Ni
20 µg/mL: Sb, As, Ba, Be, Cd, Co, Se, Ag, Tl, V

Matrix: 5% HNO_3 / tr HF

Volume: 125 mL
Catalog#: CL-INT-B4

CLP ILM 05.2 STANDARDS FOR ICP-MS

Interference Checks

For verification of interelement and background correction factors at the beginning and the end of each analysis run. In addition a verification must be done after every 20th sample.
Two solutions are required for the most common interference check: Solution A, the interferents alone (CL-INT-A2), and Solution AB, a combination of interferents (CL-INT-A2) and analytes (CL-INT-B3). Solution A is prepared by diluting CL-INT-A2 10-fold. Solution AB is prepared by diluting CL-INT-A2 10-fold and CL-INT-B3 100-fold; for example, 10 mL of CL-INT-A1 and 1.0 mL of CL-INT-B3 into a 100 mL volumetric flask, brought to volume with a matrix blank (see page 25). **Once prepared, the solutions should be analyzed consecutively, starting with Solution A.**

ICP-MS Interferents A2

Run at a 1:10 dilution in 2% HNO3.

Contents: 10000 µg/mL: Cl
2000 µg/mL: C
1000 µg/mL: Al, Ca, Fe, K, Mg, Na, P, S
20 µg/mL: Mo, Ti

Matrix: 5% HNO_3/tr HF

Volume: 125 mL
Catalog#: **CL-INT-A2**

ICP-MS Analytes B3

Contents: 2 µg/mL: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Hg*, Ni, Se, Ag, Tl, V, Zn

Matrix: 2% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CL-INT-B3**
****CL-INT-B3N**

* *Mercury, when included, is supplied as a separate solution (CLHG2-1AY) due to incompatibility with other elements.*

** *without Mercury*

Spike Sample Analysis

In the spike sample analysis a spike containing the required elements, in their respective required amounts, is added to the sample prior to addition of any reagents, digestion, distillation, etc. Information is then provided on the effects of the sample matrix and the entire methodology.
The SPEX CertiPrep spike standard, CL-SPIKE-3, provides all the analytes required for the ICP and the AA spike.

ICP-MS Spike Sample 3

Contents: 200 µg/mL: Al, Ba
50 µg/mL: Co, Mn, Ni, V, Zn
25 µg/mL: Cu
20 µg/mL: Cr
10 µg/mL: Sb
5 µg/mL: Be, Cd, Ag, Tl
4 µg/mL: As
2 µg/mL: Pb
1 µg/mL: Se

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CL-SPIKE-3**

Helpful Hint:

How do I prevent my antimony oxide (Sb_2O_3) solution from becoming a gelatin when I dissolve it in tartaric acid?

While Sb_2O_3 dissolves easily in tartaric acid and water, the solution is clear at first but a gelatin-like substance can form over time. This is a form of mold. Adding a trace amount of nitric acid to the solution can prevent this.

CLP ILM 05.3 STANDARDS FOR ICP-MS

Contract Required Detection Limits, CRDL

A standard must be run at the Contract Required Detection Limits, CDRL. To verify linearity near the CRQL this standard is analyzed at the beginning of the analysis run after the ICV/ICB and before the ICSA and ICSAB. In addition this standard must be run at a frequency of not less than 20 analytical samples and at the end of the analysis run followed by the ICSA/ICSAB. The sequence order is CCV, CCB, CRI, ICSA, ICSAB, CCV, CCB.

ICP-MS Contract Required Detection Limit Standard 2

Contents: 1000 µg/mL: Ca, Mg, K, Na
400 µg/mL: Fe
40 µg/mL: Al
20 µg/mL: Ba
10 µg/mL: Se, V
4 µg/mL: Sb, Cr, Cu, Zn
2 µg/mL: As, Be, Cd, Co, Pb, Mn, Ni, Ag, Tl

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: CL-CRDL-2

Spike Sample Analysis

In the spike sample analysis a spike containing the required elements, in their respective required amounts, is added to the sample prior to addition of any reagents, digestion, distillation, etc. Information is then provided on the effects of the sample matrix and the entire methodology. The SPEX CertiPrep spike standard, CL-SPIKE-4, provides all the analytes required for the ICP-MS.

ICP-MS Spike Sample 4

Contents: 200 µg/mL: Al, Ba
100 µg/mL: Fe
50 µg/mL: Co, Mn, Ni, V, Zn
25 µg/mL: Cu
20 µg/mL: Cr
10 µg/mL: Sb
5 µg/mL: Be, Cd, Ag, Tl
4 µg/mL: As
2 µg/mL: Pb
1 µg/mL: Se

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: CL-SPIKE-4

Interference Checks

Interference checks are used for verification of interelement and background correction factors at the beginning and the end of each analysis run. In addition a verification must be done after every 20th sample. Two solutions are required for the most common interference check: Solution A, the interferents alone (CL-INT-A1), and Solution AB, a combination of interferents (CL-INT-A1) and analytes (CL-INT-B3). Solution A is prepared by diluting CL-INT-A2 10-fold. Solution AB is prepared by diluting CL-INT-A2 10-fold and CL-INT-B3 100-fold; for example, 10 mL of CL-INT-A1 and 1.0 mL of CL-INT-B3 into a 100 mL volumetric flask, brought to volume with a matrix blank (see page 25). **Once prepared, the solutions should be analyzed consecutively, starting with Solution A.**

ICP-MS Interferents A2

Run at a 1:10 dilution in 2% HNO3.

Contents: 10000 µg/mL: Cl
2000 µg/mL: C
1000 µg/mL: Al, Ca, Fe, K, Mg, Na, P, S
20 µg/mL: Mo, Ti

Matrix: 5% HNO_3/tr HF

Volume: 125 mL
Catalog#: CL-INT-A2

ICP-MS Analytes B3

Contents: 2 µg/mL: Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Hg*, Ni, Se, Ag, Tl, V, Zn

Matrix: 2% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: CL-INT-B3
Hg ****CL-INT-B3N**

* *Mercury, when included, is supplied as a separate solution (CLHG2-1AY) due to incompatibility with other elements.*

** *without Mercury*

CLP-M/6020/SW-846 STANDARDS FOR ICP-MS

Contract Required Detection Limits, CRDL

A standard must be run at two times the Contract Required Detection Limits, CRDL, or at two times the Instrument Detection Limits, IDL, whichever is greater. This standardization is performed at the start and the end of each sample analysis or at least twice in each eight-hour shift.
All elements to be analyzed must be run except Al, Ba, Ca, Fe, Mg, Na, and K.

SPEX Certiprep CL-CRDL-1 standard contains all the required elements on the TAL, in their appropriate concentration ratios. CL-CRDL-1 should be diluted by a factor of 1000 prior to use in the "two times CL-CRDL" run for ICP analysis. For analysis by atomic absorption, CL-CRDL-1 should be diluted by a factor of 2000 prior to use in the "one time CL-CRDL" run.

ICP-MS Contract Required Detection Limit Standard 1

Contents: 500 µg/mL: Ca, K, Mg, Na
20 µg/mL: Al, Ba
10 µg/mL: Fe
6 µg/mL: Sb
5 µg/mL: Co, V
4 µg/mL: Ni
2.5 µg/mL: Cu
2 µg/mL: Zn
1.5 µg/mL: Mn
1 µg/mL: Ag, As, Cr, Tl
0.5 µg/mL: Be, Cd, Se
0.3 µg/mL: Pb

Matrix: 5% HNO_3/tr Tartaric Acid

Volume: 125 mL
Catalog#: **CL-CRDL-1**

Spike Sample Analysis

In the spike sample analysis a spike containing the required elements, in their respective required amounts, is added to the sample prior to addition of any reagents, digestion, distillation, etc. Information is then provided on the effects of the sample matrix and the entire methodology.

ICP-MS Spike Sample 1 (water)

Contents: 500 µg/mL: Fe
250 µg/mL: Ba, Zn
100 µg/mL: Co, Cr, Cu, Mn, Ni, Sb, V
50 µg/mL: As, Pb
25 µg/mL: Ag, Be, Cd, Se, Tl

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CL-SPIKE-1**

Interference Checks

For verification of interelement and background correction factors at the beginning and the end of each analysis run. In addition a verification must be done after every 20th sample.
Two solutions are required for the most common interference check: Solution A, the interferents alone (CL-INT-A1), and Solution AB, a combination of interferents (CL-INT-A1) and analytes (CL-INT-B1). Solution A is prepared by diluting CL-INT-A1 20-fold. Solution AB is prepared by diluting CL-INT-A1 20-fold and CL-INT-B1 100-fold; for example, 5 mL of CL-INT-A1 and 1.0 mL of CL-INT-B1 into a 100 mL volumetric flask, brought to volume with a matrix blank (see page 25).
Once prepared, the solutions should be analyzed consecutively, starting with Solution A.

ICP-MS Interferents A1

Contents: 21215 µg/mL: Cl
3000 µg/mL: Ca
2500 µg/mL: Fe, Na
2000 µg/mL: C
1000 µg/mL: Al, K, Mg, P, S
20 µg/mL: Mo, Ti

Matrix: 5% HNO_3/tr HF

Volume: 125 mL
Catalog#: **CL-INT-A1**

ICP-MS Analytes B1

Contents: 20 µg/mL: Co, Cr, Cu, Mn, Ni, V
10 µg/mL: As, Cd, Se, Zn
5 µg/mL: Ag

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CL-INT-B1**

The SPEX CertiPrep spike standard, CL-SPIKE-1 and CL-SPIKE-2, provides all the analytes required for the ICP-MS. Add 1.0 mL of CL-SPIKE-1 to aqueous samples and 2.0 mL of CL-SPIKE-2 to solid samples prior to digestion.

ICP-MS Spike Sample 2 (soil)

Contents: 250 µg/mL: Ba, Cr, Cu, Zn
150 µg/mL: V
125 µg/mL: Ni
100 µg/mL: Co, Pb, Sb
50 µg/mL: As, Cd
25 µg/mL: Ag, Be, Se, Tl

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CL-SPIKE-2**

ALTERNATE STANDARDS

Interference Checks

SPEX CertiPrep also provides a solution of alternate interferents and alternate analytes. Alternate Interferents A (INT-A2) and Alternate Analytes B (INT-B2) may be prepared in combination with the INT-A1 and INT-B3 solutions mentioned on page 53, or any combination involving the four solutions, depending on the analytes and interferents of interest to you.

ICP Alternate Interferents A

Contents: 1000 µg/mL: Cr, Cu, Mn, Ni, Ti, V

Matrix: 5% HNO_3/Tr F^-

Volume: 500 mL
Catalog#: INT-A2

ICP Alternate Analytes B

Contents: 100 µg/mL: Al, As, B, Mo, Na, Sb, Se, Tl
10 µg/mL: Ca, Fe, Mg, Si

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: INT-B2

SPEX CertiPrep provides the following ICP-MS Interferents and Interferents Check Solution for SW-846.

ICP-MS Interferents A3 (For SW-846)

Contents: 20000 µg/mL: Cl
3000 µg/mL: Ca
2500 µg/mL: Fe, Na, C
1000 µg/mL: Al, Mg, P, K, S
20 µg/mL: Mo, Ti

Matrix: 5% HNO_3 / tr HF

Volume: 125 mL
Catalog#: CL-INT-A3

ICP-MS Interferents Check Solution B2 (for SW-846)

Spike at 20ppb into CL-INT-A2 (diluted).

Contents: 10 µg/mL: Ag, As, Cd, Co, Cr, Cu, Mn, Ni, Zn

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: CL-INT-B2

Did You Know?

SPEX CertiPrep's chemists have decades of experience and are available to answer your questions. Submit your questions to **askachemist@spex.com** and receive a free gift if we post your question on our website.

Quality is Our Heritage

ICP and ICP/MS Certified Reference Materials

CELEBRATING 60 YEARS 1954 - 2014

- 99% of stock orders ship within 24-hours
- New Inorganic Multi-Element Standards for the latest EPA methods
- Ion Chromatography, Organometallic Oil, Speciation and Buffer Standards
- Custom Standards manufactured and shipped within 5 business days
- Dedicated technical support to answer your CRM and lab questions

SPEX CertiPrep®

Your Science is Our Passion.®

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ISO 9001:2008 • ISO/IEC 17025:2005 • ISO/IEC Guide 34:2009

SECTION 4

Claritas PPT® Multi-Element Standards for ICP-MS

Your Science is Our Passion.®

Claritas PPT® Multi-Element Standards for ICP-MS

The great precision, sensitivity, and rapid analysis of multi-element mixtures by ICP and ICP-MS instrumentation have mandated their widespread use in environmental, agricultural, semiconductor, metallurgical, and biological laboratories. Advancements in ICP spectroscopy over recent years have extended limits of detection into the low PPB (parts per billion) range. The ICP-MS technique has provided even greater sensitivity, extending detection limits routinely into the low PPT (parts per trillion) range. No longer is one in a million good enough!

- **Environmental**
- **Agricultural**
- **Semiconductor**
- **Metallurgical**
- **Biological**
- **Geological**
- **Nuclear**

SPEX CertiPrep Claritas PPT® standards are a class of certified inorganic reference standards designed specifically for today's new generation of trace ICP and ICP-MS instrumentation. Based on extensive development, our chemists have formulated this line of high-purity standards for user convenience and stability, while providing documentation tailored to the low levels of detection.

This Claritas PPT® selection of standards includes a complete series of multi-element solutions, many designed for use with US EPA Methods. These solutions are made with the highest purity materials available and are tested on our state-of-the-art ICP-MS. SPEX CertiPrep Certified Reference Materials are manufactured under a quality system complying with the requirements of ISO 9001, ISO/IEC 17025 and ISO/IEC Guide 34.

Calibrate With Confidence®

For 60 years, our commitment to quality has made SPEX CertiPrep the leading manufacturer of inorganic reference standards.

Every Claritas PPT® standard is supplied with a comprehensive SPEXertificate® which reports actual measured values in the final solution of both the major analytes and up to 68 trace element impurities at PPT levels. As always, each certificate includes NIST documentation and information regarding the methods used. SPEX CertiPrep will guarantee the stability and accuracy of each Claritas PPT® standard to ±0.5%, averaged certified analyte concentrations, for one full year from date of shipment.

When One In A Million Isn't Good Enough...

CLARITAS PPT®

Certified by ICP-MS

ACCREDITED

Accredited to 17025 & Guide 34 ISO Certified to 9001

SPEX CertiPrep, Inc. UL REGISTERED FIRM ISO 9001 A1572

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

Tuning Solutions

ICP-MS Tuning Solution 1

TOP SELLER

For ICP-MS instrument tuning and mass calibration prior to analysis. A dilution of 100-fold to 1,000-fold, depending on the sensitivity of the instrument, is suggested. Dilute with equal parts of Claritas PPT® Nitric Acid Blank and Water Blank to yield a 1% nitric acid matrix.

Contents: 10 µg/mL: Ba, Be, Ce, Co, In, Li, Mg, Pb, Rh, Tl, U, Y

Matrix: 2% HNO_3/5% HCl

Volume: 125 mL
Catalog#: **CL-TUNE-1**

ICP-MS Tuning Solution 2

For ICP-MS instrument tuning and mass calibration prior to analysis. A dilution of 1,000-fold is suggested. Dilute with Claritas PPT® Nitric Acid Blank and Water Blank to yield a 1% nitric acid matrix.

Contents: 10 µg/mL: Ba, Be, Ce, Co, In, Mg, Pb, Rh, U

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CL-TUNE-2**

ICP-MS Tuning Solution 3

For ICP-MS instrument tuning and mass calibration prior to analysis. A dilution of 1,000-fold is suggested. Dilute with Claritas PPT® Nitric Acid Blank and Water Blank to yield a 0.5% nitric acid matrix.

Contents: 10 µg/mL: Ba
1 µg/mL: Be, Ce, Co, Fe, In, Mg, Pb, Th, U

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CL-TUNE-3**

ICP-MS Tuning Solution 4

For ICP-MS instrument tuning and mass calibration prior to analysis. A dilution of 100-fold to 1,000-fold is suggested. Dilute with Claritas PPT® Nitric Acid Blank to match your sample matrix.

Contents: 10 µg/mL: Co, In, Li, Tl

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CL-TUNE-4**

ICP-MS QC Standard

ICP-MS instrument check standard and tuning solution. A dilution of 10 to 100 fold is suggested. Dilute with our Claritas PPT® Nitric Acid Blank, CLBLK-HNO_3, to match your sample matrix.

Contents: 50 µg/L: Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Ge, Gd, Hg, Ho, In, K, La, Li, Lu, Mg, Mn, Mo, Na, Nd, Ni, P, Pb, Pd, Pr, Rb, Re, Rh, Sc, Se, Sm, Sr, Tb, Te, Th, Tl, Tm, U, V, Y, Yb, Zn

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **CL-QC-55**

Instrument Calibration

For preparation every two weeks or as needed. Dilute to the concentration appropriate for the instrument with equal parts of Claritas PPT® Nitric Acid Blank and Water Blank.

ICP-MS Instrument Calibration Standard 1

Contents: 20 µg/mL: Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Th, Tl, U, V, Zn

TOP SELLER

Matrix: 5% HNO_3/tr Tartaric Acid

Volume: 125 mL
Catalog#: **CL-CAL-1**

ICP-MS Instrument Calibration Standard 1A

Contents: 50 µg/mL: Se
10 µg/mL: Al, Sb, As, Ba, Be, Cd, Cr, Bo, Cu, Pb, Mn, Mo, Ni, Ag, Tl, Th, U, V, Zn

Matrix: 5% HNO_3/tr Tartaric Acid

Volume: 125 mL
Catalog#: **CL-CAL-1A**

ICP-MS Instrument Calibration Standard 2

Contents: 100 µg/mL: Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Sn, Sr, Ti, Tl, V, Zn

TOP SELLER

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CL-CAL-2**

ICP-MS Instrument Calibration Standard 2A

Contents: 50 µg/mL: Se
10 µg/mL: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Ag, Na, Tl, V, Zn

Matrix: 5% HNO_3/tr Tartaric Acid

Volume: 125 mL
Catalog#: **CL-CAL-2A**

ICP-MS Calibration Standard 3

Contents: 1000 µg/mL: Fe, K, Ca, Na, Mg

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **CL-CAL-3**

ICP-MS Initial Calibration Verification Standard 1

Contents: 1000 µg/mL: Fe, K, Ca, Na, Mg, Sr
10 µg/mL: Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn, Th, U

Matrix: 5% HNO_3/tr Tartaric Acid

Volume: 125 mL
Catalog#: **CL-ICV-1**

ICP-MS Initial Calibration Verification Standard 2

Contents: 10 µg/mL: Sn, Ti

Matrix: 2% HNO_3/tr HF

Volume: 125 mL
Catalog#: **CL-ICV-2**

ICP-MS Initial Calibration Verification Standard 3

Contents: 100 µg/mL: Ca, Fe, Mg, K, Na
50 µg/mL: Se
10 µg/mL: Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, K, Ag, Na, Tl, V, Zn

Matrix: 5% HNO_3/tr Tartaric Acid

Volume: 125 mL
Catalog#: **CL-ICV-3**

Take a Closer Look...

SPEX CertiPrep uses a clean room for production and packaging of our Claritas Grade Standards as well as housing our state-of-the-art ICP-MS to analyze these standards.

Calibration and Matrix Blanks

May be used for dilution or to establish base lines. The calibration, reagent, and rinse blanks are prepared by diluting the appropriate acid with water and any necessary internal standards to produce the required acid concentration, generally 1% HNO_3.

2% Nitric Acid Blank

Matrix: 2% Ultra High Purity HNO_3

Volume: 125 mL
Catalog#: CLBLK-HNO3

Volume: 250 mL
Catalog#: CLBK-HNO3-250

Hydrochloric Acid Blank

Matrix: 2% Ultra High Purity HCl

Volume: 125 mL
Catalog#: CLBLK-HCL

Water Blank

Matrix: ASTM Type I Water (18 Megohm)

Volume: 125 mL
Catalog#: CLBLK-H2O

Volume: 250 mL
Catalog#: CLBK-H2O-250

Helpful Hint:

Don't forget to run blanks!

Internal Standards

May be used to monitor and correct for changes that occur from differences between standards and samples. Since environmental samples often contain significant amounts of lithium, isotopically enriched 95% ^6Li can be analyzed as an internal standard, avoiding the signal from the ^7Li peak.

ICP-MS Internal Standard 1

TOP SELLER

Contents: 10 µg/mL: Bi, Ho, In, ^6Li, Sc, Tb, Y

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: CLISS-1

ICP-MS Internal Standard 2

Contents: 10 µg/mL: Bi, Ho, In, ^6Li, Rh, Sc, Tb, Y

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: CLISS-2

Single Element Internal Standards

Contents: 10 µg/mL: analyte

Volume: 125 mL each

Bismuth in 2% HNO_3	**Catalog#: CLBI2-1AY**
Germanium in H_2O	**Catalog#: CLGE9-1AY**
Indium in 2% HNO_3	**Catalog#: CLIN2-1AY**
Rhodium in 2% HCl	**Catalog#: CLRH1-1AY**
Scandium in 2% HNO_3	**Catalog#: CLSC2-1AY**
Terbium in 2% HNO_3	**Catalog#: CLTB2-1AY**
Yttrium in 2% HNO_3	**Catalog#: CLY2-1AY**

ICP-MS Alternate Internal Standard 1

Contents: 10 µg/mL: ^6Li, Sc, Ge, Y, In, Tb, Bi

Matrix: 5-10% HNO_3

Volume: 125 mL
Catalog#: CL-ISM1-100

Volume: 250 mL
Catalog#: CL-ISM1-500

ICP-MS Alternate Internal Standard 2

Contents: 100 µg/mL: Bi, Ge, In, ^6Li, Lu, Rh, Sc, Tb

Matrix: 10% HNO_3

Volume: 125 mL
Catalog#: CL-ISM2-100

Instrument Check Standards

For testing the calibration curves as Initial Calibration Verification (ICV) and Continuing Calibration Verification (CCV) solutions. The standards may be mixed and diluted as required.

ICP-MS Instrument Check Standard 1

Contents: 10 µg/mL: Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn

Matrix: 2% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CL-ICS-1**

ICP-MS Mercury Single Element Standard

Contents: 10 µg/mL: Hg

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **CLHG2-1AY**

ICP-MS Instrument Check Standard 3

Contents: 200 µg/mL: Ca, Fe, K, Mg, Na

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CL-ICS-3**

ICP-MS Instrument Check Standard 4

Contents: 10 µg/mL: Mo, Th, U

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **CL-ICS-4**

ICP-MS Instrument Check Standard 5

Contents: 10 µg/mL: Mo, Sn, Sr, Ti

Matrix: 2% HNO_3/tr HF

Volume: 125 mL
Catalog#: **CL-ICS-5**

ICP-MS Set of Instrument Check Standards

GREAT VALUE

Includes one of each: **CL-ICS-1**
CLHG2-1AY
CL-ICS-3
CL-ICS-4
CL-ICS-5

Catalog#: **CL-ICS-SET**

Multi-Element Solution Standards

Designed to contain virtually every element in the mass spectrum for concentration verification checks.

ICP-MS Multi-Element Solution 1

Contents: 10 µg/mL: Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Th, Tm, Y, Yb

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **CLMS-1**

ICP-MS Multi-Element Solution 2

TOP SELLER

Contents: 10 µg/mL: Ag, Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cs, Cu, Fe, Ga, Hg*, In, K, Li, Mg, Mn, Na, Ni, Pb, Rb, Se, Sr, Tl, U, V, Zn

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **CLMS-2**
Hg ****CLMS-2N**

ICP-MS Multi-Element Solution 2A

Contents: 10 µg/mL: Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cs, Cu, Fe, Ga, Hg*, K, Li, Mg, Mn, Na, Ni, Pb, Rb, Se, Sr, Tl, U, V, Zn

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **CLMS-2A**
Hg ****CLMS-2AN**

** Mercury, when included, is supplied as a separate solution (CLHG2-1AY) due to incompatibility with other elements.*

*** without Mercury*

ICP-MS Multi-Element Solution 3

Contents: 10 µg/mL: Au, Hf, Ir, Pd, Pt, Rh, Ru, Sb, Sn, Te

Matrix: 10% HCl/1% HNO_3

Volume: 125 mL
Catalog#: CLMS-3

ICP-MS Multi-Element Solution 4

Contents: 10 µg/mL: B, Ge, Mo, Nb, P, Re, S, Si, Ta, Ti, W, Zr

Matrix: H_2O/tr HF/tr HNO_3

Volume: 125 mL
Catalog#: CLMS-4

ICP-MS Multi-Element Solution 5

Contents: 10 µg/mL: Be, Bi, Ce, Co, In, Mg, Ni, Pb, U

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: CLMS-5

ICP-MS Set of Multi-Element Solutions

Includes one of each: **CLMS-1**
CLMS-2
CLMS-3
CLMS-4
CLBLK-HNO3
CLBLK-HCL
CLBLK-H2O

GREAT VALUE

Catalog#: CLMS-SET

Set of Multi-Element Solutions without Mercury

GREAT VALUE

Includes one of each: **CLMS-1**
CLMS-2N
CLMS-3
CLMS-4
CLBLK-HNO3
CLBLK-HCL
CLBLK-H2O

Hg ****Catalog#: CLMS-SETN**

Memory Test Solutions

To identify or confirm the maximum concentration of an analyte that does not cause a memory effect greater than CRDL. The test solutions are not analyzed directly; equal volumes of the two are mixed and then introduced into the instrument for a normal sample exposure time. A blank is then run to confirm that all analyte memory effects are below the CRDL.

ICP-MS Memory Test 1

Contents: 1000 µg/mL: Al, Ca, Fe, K, Mg, Na
20 µg/mL: Ag, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Se, Tl, V, Zn

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: CL-MEM-1

ICP-MS Memory Test 2

Contents: 7200 µg/mL: Cl
2000 µg/mL: C
1000 µg/mL: P, S
20 µg/mL: Mo, Sb, Ti

Matrix: H_2O/tr HF

Volume: 125 mL
Catalog#: CL-MEM-2

ICP-MS Set of Memory Test Solutions

Includes one of each: **CL-MEM-1**
CL-MEM-2

GREAT VALUE

Catalog#: CL-MEM-SET

Gold Blank Standard

May be run between samples to reduce the memory effect arising from mercury. It is recommended that a solution of gold be run which is five times the concentration of the mercury in the prior sample.

ICP-MS Gold Blank Standard 1

Contents: 100 µg/mL: Au

Matrix: 2% HCl

Volume: 125 mL
Catalog#: **CLAU1-1Y**

Spike Sample Analysis

Designed for addition to a matrix blank prior to digestion for both water and soil. An aliquot of the respective Spike Standard should be added to produce the proper concentration levels in the digestate.

ICP-MS Spike Sample Standard 1 (water)

Contents: 500 µg/mL: Fe
250 µg/mL: Ba, Zn
100 µg/mL: Co, Cr, Cu, Mn, Ni, Sb, V
50 µg/mL: As, Pb
25 µg/mL: Ag, Be, Cd, Se, Tl

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CL-SPIKE-1**

ICP-MS Spike Sample Standard 2 (soil)

Contents: 250 µg/mL: Ba, Cr, Cu, Zn
150 µg/mL: V
125 µg/mL: Ni
100 µg/mL: Co, Pb, Sb
50 µg/mL: As, Cd
25 µg/mL: Ag, Be, Se, Tl

Matrix: 5% HNO_3/tr Tartaric Acid/tr HF

Volume: 125 mL
Catalog#: **CL-SPIKE-2**

Helpful Hint:

Don't forget your **Gold Blank Standard CLAU1-1Y** to reduce the memory effect of Mercury!

Isotope Standards

SPEX CertiPrep Claritas PPT® Isotope Standards can be used as internal standards and for isotope dilution analysis. The internal standard element must have similar characteristics to the tested/measured element(s) and not be present in the sample. Using Isotope modification standards, the chemist can use less internal standard and have a higher intensity reading while avoiding interferences.

Every Claritas PPT® standard is supplied with a comprehensive SPEXertificate® which reports actual measured values in the final solution of both the major analytes and up to 68 trace element impurities at PPT levels.

SPEX CertiPrep will guarantee the stability and accuracy of each Claritas PPT® standard to +/- 0.5%, averaged labeled analyte concentrations, for one full year from date of shipment.

Additionally, the SPEXertificate® for the Isotope standards will consist of:

- The isotope ratio measured by ICP-MS
- The concentration of each isotope calculated by ICP-MS and measured by ICP

Each standard offered as 125 mL volume.

Element	Matrix	Volume mL	Catalog#
Boron 10	H_2O	10	**ISOT-B10**
Boron 11	H_2O	10	**ISOT-B11**
Copper 65	2% HNO_3	10	**ISOT-CU65**
Lithium 6	2% HNO_3	100	**ISOT-LI6**
Lead 206	2% HNO_3	10	**ISOT-PB206**
Lead 207	2% HNO_3	10	**ISOT-PB207**
Strontium 86	2% HNO_3	10	**ISOT-SR86**
Zinc 68	2% HNO_3	10	**ISOT-ZN68**

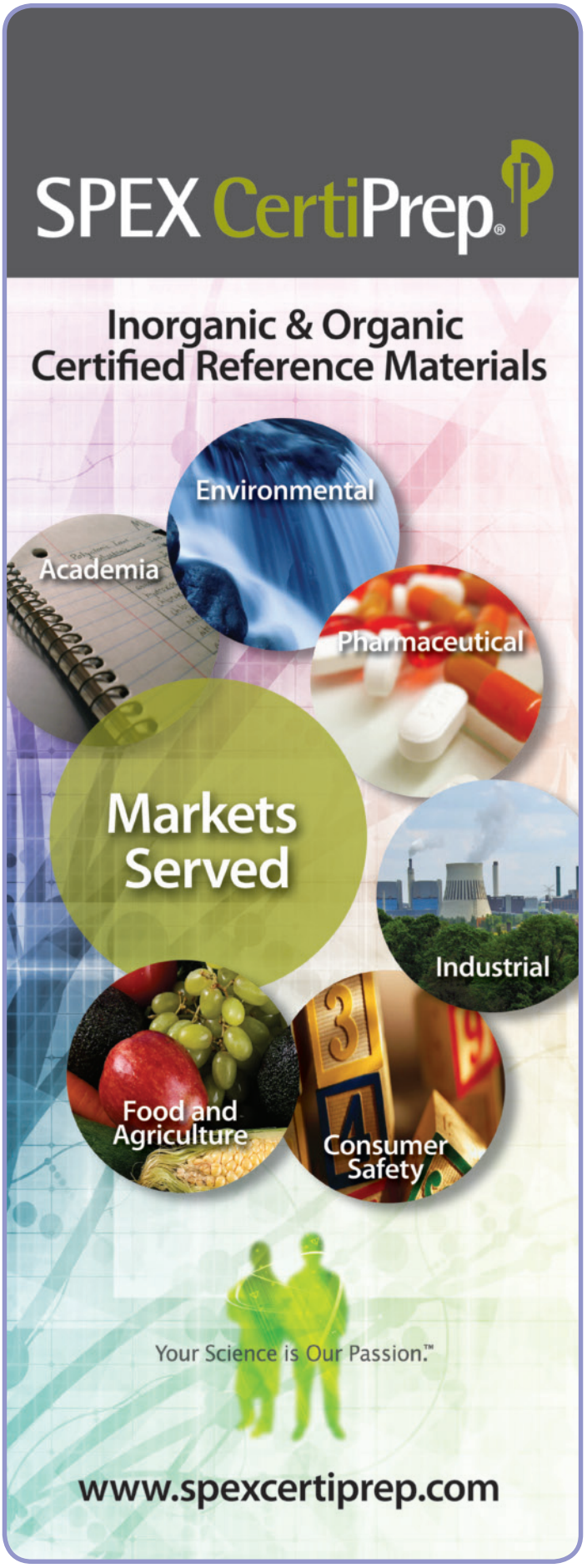
*Interested in other elements? Call today with your special request. 1-800-LAB-SPEX, ext. 444.

Did You Know?

SPEX CertiPrep offers a variety of customer loyalty programs.
Our SPoints Program allows customers to earn valuable credits every time you order.
For more information visit **www.spexcertiprep.com/spoints**

SPEX CertiPrep also offers a Loyal Customer Program to reward our customers with an ***automatic*** discount ranging from 5% to 20% off all our qualified products.

There is ***no need to apply for either of these programs as you are automatically enrolled when you purchase SPEX CertiPrep products!***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SECTION 5

Single & Multi-Element Standards

for Ion Chromatography & Ion Selective Electrode Standards

Your Science is Our Passion.®

Single & Multi-Element Standards
for Ion Chromatography & Ion Selective Electrode Standards

Ion chromatography is an analytical process for the separation of ions based on charge affinity. IC can be used for a variety of different kinds of charged molecules from large proteins to amino acids. In order to assure accurate analysis, quality standards which are traceable and stable are necessary. SPEX CertiPrep offers the highest quality IC standards available for the analytical laboratory.

Calibrate With Confidence®

SPEX CertiPrep leads the way in producing standards for our consumer product testing methods. All of our consumer products testing standards are prepared in our registered ISO 9001 facility under our A2LA accreditation as complying with the requirements of ISO/IEC 17025 and ISO/IEC Guide 34. The range of SPEX CertiPrep's consumer product safety products includes standards for both organic and inorganic analysis.

Helpful Hint:

When calculating gravimetric factors for Ion Chromatography standards, remember that:

1000 µg/mL Nitrate	= 226 µg/mL Nitrogen
1000 µg/mL Phosphate	= 326 µg/mL Phosphorus
1000 µg/mL Nitrate-Nitrogen	= 1000 µg/mL Nitrogen
1000 µg/mL Phosphate-Phosphorus	= 1000 µg/mL Phosphorus
1000 µg/mL Nitrite	= 305 µg/mL Nitrogen
1000 µg/mL Sulfate	= 334 µg/mL Sulfur
1000 µg/mL Nitrite-Nitrogen	= 1000 µg/mL Nitrogen
1000 µg/mL Sulfate-Sulfur	= 1000 µg/mL Sulfur

Single Element Ion Standards - Anions

Anions	Matrix	µg/mL	Volume mL	Catalog#
Acetate ($C_2H_3O_2^-$)	H_2O	1,000	500	AS-ACE9-2X
			125	AS-ACE9-2Y
Bromate (BrO_3^-)	H_2O	1,000	500	AS-BRO39-2X
			125	AS-BRO39-2Y
Bromide ($Br0_3^-$)	H_2O	1,000	500	AS-BR9-2X
			125	AS-BR9-2Y
Chlorate (ClO_3^-)	H_2O	1,000	500	AS-CLO39-2X
			125	AS-CLO39-2Y
Chloride (Cl^-)	H_2O	100	500	AS-CL9-1X
			125	AS-CL9-1Y
		1,000	500	AS-CL9-2X
			125	AS-CL9-2Y
Chlorite (ClO_2^-)	H_2O	1,000	500	AS-CLO29-2X
			125	AS-CLO29-2Y
Chromate (CrO_4^{-2})	H_2O	1,000	500	AS-CRO49-2X
			125	AS-CRO49-2Y
Fluoride (F^-)	H_2O	100	500	AS-F9-1X
			125	AS-F9-1Y
		1,000	500	AS-F9-2X
			125	AS-F9-2Y
Formate (HCO_2^-)	H_2O	1,000	500	AS-HCO29-2X
			125	AS-HCO29-2Y
Iodide (I^-)	H_2O	1,000	500	AS-I9-2X
			125	AS-I9-2Y
Nitrate (NO_3^-)	H_2O	1,000	500	AS-NO39-2X
			125	AS-NO39-2Y
Nitrate-Nitrogen	H_2O	1,000	500	AS-NO3N9-2X
			125	AS-NO3N9-2Y
Nitrite (NO_2^-)	H_2O	1,000	500	AS-NO29-2X
			125	AS-NO29-2Y

Anions	Matrix	µg/mL	Volume mL	Catalog#
Nitrite-Nitrogen	H_2O	1,000	500	**AS-NO2N9-2X**
			125	**AS-NO2N9-2Y**
Ammonia Nitrogen	H_2O	1,000	125	**AS-NH3N9-2Y**
Oxalate ($C_2O_4^{-2}$)	H_2O	1,000	500	**AS-C2O49-2X**
			125	**AS-C2O49-2Y**
Perchlorate (ClO_4^-)	H_2O	1,000	125	**AS-CLO49-2Y**
Phosphate (PO_4^{-3})	H_2O	1,000	500	**AS-PO49-2X**
			125	**AS-PO49-2Y**
Phosphate-Phosphorus	H_2O	1,000	500	**AS-PO4P9-2X**
			125	**AS-PO4P9-2Y**
Sulfate (SO_4^{-2})	H_2O	1,000	500	**AS-SO49-2X**
			125	**AS-SO49-2Y**
Sulfate-Sulfur	H_2O	1,000	500	**AS-SO4S9-2X**
			125	**AS-SO4S9-2Y**

Single Element Ion Standards - Cation

Cation	Matrix	µg/mL	Volume mL	Catalog#
Ammonium (NH_4^+)	H_2O	1,000	125	**CS-NH49-2Y**
Calcium (Ca^{+2})	0.2% HNO_3	1,000	125	**CS-CA2-2Y**
Lithium (Li^+)	0.2% HNO_3	1,000	125	**CS-LI2-2Y**
Magnesium (Mg^{+2})	0.2% HNO_3	1,000	125	**CS-MG2-2Y**
Potassium (K^+)	0.2% HNO_3	1,000	125	**CS-K2-2Y**
Sodium (Na^+)	0.2% HNO_3	1,000	125	**CS-NA2-2Y**

Single Element Ion Selective Electrode Standards

Ion-Selective Electrode	Ion	Concentration	Volume mL	Catalog#
Bromide	Br–	0.1 M NaBr	125	**AS-BR9-5Y**
			500	**AS-BR9-5X**
		1000 µg/mL Br–	125	**AS-BR9-2Y**
			500	**AS-BR9-2X**
Chloride	Cl–	0.1 M NaCl	125	**AS-CL9-5Y**
			500	**AS-CL9-5X**
		100 µg/mL Cl–	125	**AS-CL9-1Y**
			500	**AS-CL9-1X**
		1000 µg/mL Cl–	125	**AS-CL9-2Y**
			500	**AS-CL9-2X**
Fluoride	F–	0.1 M NaF	125	**AS-F9-5Y**
			500	**AS-F9-5X**
		10 µg/mL F–	125	**AS-F9-1AY**
			500	**AS-F9-1AX**
		100 µg/mL F–	125	**AS-F9-1Y**
			500	**AS-F9-1X**
		1000 µg/mL F–	125	**AS-F9-2Y**
			500	**AS-F9-2X**
Cyanide	CN–	1000 µg/mL cn–	125	**RSCN9-2Y**
			500	**RSCN9-2X**

Ionic Strength Adjustment Buffers

Buffer	Volume mL	Catalog#
5M Sodium Nitrate ($NaNO_3$) Buffer	500	**IS-BUF1-500**
10M Sodium Hydroxide (NaOH) Buffer	500	**IS-BUF2-500**
Low Level TISAB II Buffer	500	**IS-BUF3-500**

Take a Closer Look…

Specifications of Four Types of ASTM Water

ASTM Type	I	II	III	IV
Total matter (µg/mL)	<0.1	0.1	1	2
Specific Resist. (megohm/cm) (max)	18	1	4	0.2
pH	NA	NA	NA	5-8
Color retention time of $KMnO_4$ (mins)	60	60	10	10
Total Silica (µg/L) (max)	3	3	500	High
Total Organic Carbon (µg/L) (max)	50	50	200	NA

Multi-Element Ion Standards

Anions

IC Instrument Check Standard 1

Contents: 150 µg/mL: HPO_4^{-2}, SO_4^{-2}
100 µg/mL: NO_3^-
30 µg/mL: Cl^-
20 µg/mL: F^-

Matrix: H_2O

Volume: 125 mL
Catalog#: **ICMIX1-100**

IC Instrument Check Standard 2

Contents: 600 µg/mL: HPO_4^{-2}
400 µg/mL: Br^-, NO_3^-, SO_4^{-2}
200 µg/mL: Cl^-
100 µg/mL: F^-

Matrix: H_2O

Volume: 125 mL
Catalog#: **ICMIX2-100**

IC Instrument Check Standard 6

TOP SELLER

Contents: 150 µg/mL: HPO4–2, SO4–2
100 µg/mL: Br–
50 µg/mL: Cl–
25 µg/mL: NO3– -N, NO2– -N
20 µg/mL: F–

Matrix: H_2O

Volume: 125 mL
Catalog#: **ICMIX6-100**

Cations

IC Instrument Check Standard 3

Contents: 1000 µg/mL: Ca^{+2}
400 µg/mL: NH_4^+
200 µg/mL: K^+, Mg^{+2}, Na^+
50 µg/mL: Li^+

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **ICMIX3-100**

IC Instrument Check Standard 4

Contents: 100 µg/mL: K+, NH4+
50 µg/mL: Na+
10 µg/mL: Li+

Matrix: 0.5% HNO_3

Volume: 125 mL
Catalog#: **ICMIX4-100**

Instrument Check Standard 5

Contents: 1600 µg/mL: Ba+2
600 µg/mL: Sr+2
400 µg/mL: Ca+2
200 µg/mL: Mg+2

Matrix: 2% HNO_3

Volume: 125 mL
Catalog#: **ICMIX5-100**

Eluents

SPEX CertiPrep Eluents are made from high pure salts and filtered ASTM Type I water. All eluents are at 100-fold concentration and ready for dilution as needed with filtered ASTM Type I water.

0.5 M Sodium Carbonate (Na_2CO_3) eluent concentrate

Catalog#: **IC-ELCON1-100**

0.5 M Sodium Bicarbonate ($NaHCO_3$) eluent concentrate

Catalog#: **IC-ELCON2-100**

0.18 M Sodium Carbonate (Na_2CO_3)/0.17 M $NaHCO_3$ Sodium Bicarbonate concentrate

Catalog#: **IC-ELCON3-100**

Astm Type I Water, 18 Megohm:

500 mL	**Catalog#: PLBLK-H2O**
I L	**Catalog#: PLBLK-H2O-1L**
2 L	**Catalog#: PLBLK-H2O-2L**
3.78 L	**Catalog#: PLBLK-H2O-4L**

Ion-Selective Electrodes Sets

GREAT VALUE

Set of 3 Solutions for Bromide

Includes one of each: **AS-BR9-5Y**
AS-BR9-2Y
IS-BUF1-500

Catalog#: AS-BR9-SET

Set of 4 Solutions for Chloride

Includes one of each: **AS-CL9-5Y**
AS-CL9-1Y
AS-CL9-2Y
IS-BUF1-500

Catalog#: AS-CL9-SET

Set of 2 Solutions for Cyanide

Includes one of each: **RSCN9-2Y**
IS-BUF2-500

Catalog#: RSCN9-SET

Set of 5 Solutions for Fluoride

Includes one of each: **AS-F9-5Y**
AS-F9-1AY
AS-F9-1Y
AS-F9-2Y
IS-BUF3-500

Catalog#: AS-F9-SET

Loyal Customer Programs

SPEX CERTIPREP UNDERSTANDS THE IMPORTANCE OF REWARDING OUR LOYAL CUSTOMERS.

We offer several programs that provide deep discounts and unique and useful gifts for purchasing our products. There is no need to apply! Read on for more information.

SPOINTS REWARDS:

The *SPoints* Rewards Program is one of the many ways that SPEX CertiPrep likes to show its appreciation for your continued business. Every time you make a purchase with SPEX CertiPrep, you will earn 1 *SPoint* (or credit) for every $10 dollars spent. There is no limit on how many *SPoints* you can earn and they are good for up to one year after your order has shipped.

There is no need to register for this rewards program.

If you place a direct order for any qualifying product, you automatically earn *SPoints* rewards!

For more information and to view our current *SPoints* rewards prizes, visit: **www.spexcertiprep.com/spoints**

You can redeem your *SPoints* at any time by calling **1-800-LAB-SPEX, ext. 444**

LOYAL CUSTOMER DISCOUNT:

SPEX CertiPrep's Loyal Customer Program rewards our customers with an automatic discount ranging from 5% to 20% off all our qualified products. If you purchase a minimum of $2,000 in any calendar year and are in good payment standing with us, we will enroll you into the program automatically in the beginning of the next year so you can receive these discounts! The program starts at a 5% discount and increases by 5% each year you are a member in good standing.

Our loyal customers also benefit from special promotions featured on our website!

Visit **www.spexcertiprep.com**

SPEX CertiPrep®

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

SECTION 6

Consumer Safety Standards

Your Science is Our Passion.®

Consumer Safety Standards

Can't find the specific mix your method requires?

SPEX CertiPrep can manufacture a custom Certified Reference Material to your exact specifications. We offer a wide range of analytes and matrices to fulfill almost any request.

Visit **www.spexcertiprep.com/custominorganics** *to submit your design.*

Companies manufacturing consumer products face a barrage of testing requirements to satisfy the regulations for consumer product safety.

SPEX CertiPrep's Compliance Standards can be used in the following testing methods and directives:

- **CPSC-CH-C1001.09.3**
- **CPSC-CH-E1001-08**
- **ASTM F9603-07**
- **EC Directive 94/62/EC Art. 11**
- **EC Directive 91/388 EC**

Calibrate With Confidence®

SPEX CertiPrep leads the way in producing standards for our consumer product testing methods. All of our consumer products testing standards are prepared in our registered ISO 9001 facility under our A2LA accreditation as complying with the requirements of ISO/IEC 17025 and ISO/IEC Guide 34. The range of SPEX CertiPrep's consumer product safety products includes standards for both organic and inorganic analysis.

Our products include:

- **Polyethylene matrix reference standards for RoHS/WEEE testing**
- **Compliance standards for testing of extractable metals in plastic toys**

All SPEX CertiPrep standards are checked for quality from the starting material impurities to the final analytical analysis.

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

Extractable Metals in Plastic Toys

Kit of 2 Extractable Metals in Plastic Toys Standards

Extractable Metals in Plastic Toys – 1A
(only available with kit)

Contents: 1000 µg/mL: As, Cd, Cr, Pb, Se, Sb

Matrix: 10% HNO_3/tr. Tart/Tr. HF

Volume: 125 mL

Reference#: EMPT-1A

Extractable Metals in Plastic Toys – 1B
(only available with kit)

Contents: 1000 µg/mL: Ba, Hg

Matrix: 10% HNO_3

Volume: 125 mL

Reference#: EMPT-1B

Catalog#: EMPT-1
(contains EMPT-1A & EMPT-1B)

Kit of 3 Extractable Metals in Plastic Toys with Interference Check Standard

Contains EMPT-1A, EMPT-1B
Interference Check Standard
(only available with kit EMPT-1)

Contents: 2000 µg/mL: Al, Ca, Fe, Mg
20 µg/mL: As, Cd, Cr, Pb, Se, Sb

Matrix: 10% HNO_3/tr. Tart/Tr. HF

Volume: 125 mL

Reference#: INT-EM1

Catalog#: EMPT-2
(contains EMPT-1A, EMPT-1B, & INT-EM1)

RoHS/WEEE Check Standard

Contents: Br, Pb, Hg, Cr, Cd

Matrix: Polyethylene

Volume: 25 g
Catalog#: ROHS-25

Did You Know?

As with most of our products, we will guarantee your custom standards for one year from the date of shipment and supply your standard with certified concentration and impurity analysis. With our aqueous standards you may choose between our conventional ICP certification, or request Claritas PPT® certification, which includes an impurities analysis of up to 68 elements to PPT levels measured on ICP-MS.

To get started contact our technical support team or visit **www.spexcertiprep.com/custominorganics** with the following information:

- **Your specific application/instrumentation**
- **The elements or complexes you desire**
- **The concentration(s) at which you require each component**
- **The matrix which you prefer (e.g., water, dilute acid, oil, methanol, etc.)**

USP<232> and <233> Elemental Impurities

USP Oral Elemental Impurities A

Contents: 25 mg/kg: Cd
15 mg/kg: Hg
5 mg/kg: Pb
1.5 mg/kg: As

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **USP-TXM2**

USP Precious Metal Impurities B (with Os)

Contents: 100 mg/kg: Ir, Os, Pd, Pt, Rh, Ru

Matrix: 15% HCl

Volume: 125 mL
Catalog#: **USP-TXM3**

USP Precious Metals Impurities B (without Os)

Contents: 100 mg/kg: Ir, Pd, Pt, Rh, Ru

Matrix: 15% HCl

Volume: 125 mL
Catalog#: **USP-TXM4**

USP Oral/Parenteral Elemental Impurities C

Contents: 1000 mg/kg: Cu
500 mg/kg: Ni
100 mg/kg: Mo, V

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **USP-TXM5**

USP Parenteral Elemental Impurities D (Big 4)

Contents: 5 mg/kg: Pb
2.5 mg/kg: Cd
1.5 mg/kg: As, Hg

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **USP-TXM6**

ICH/Global Compliance Standards

Global/ICH Oral Elemental Impurities A

Contents: 25 mg/kg: Cd
15 mg/kg: Hg
5 mg/kg: Pb
1.5 mg/kg: As

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICH-TXM2**

Global/ICH Precious Metal Impurities B (with Os)

Contents: 100 mg/kg: Ir, Os, Pd, Pt, Rh, Ru

Matrix: 15% HCl

Volume: 125 mL
Catalog#: **ICH-TXM3**

Global/ICH Precious Metals Impurities B (without Os)

Contents: 100 mg/kg: Ir, Pd, Pt, Rh, Ru

Matrix: 15% HCl

Volume: 125 mL
Catalog#: **ICH-TXM4**

Global/ICH Parenteral Elemental Impurities D (Big 4)

Contents: 5 mg/kg: Pb
2.5 mg/kg: Cd
1.5 mg/kg: As, Hg

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICH-TXM6**

Global/ICH Elemental Impurities E

Contents: 2500 mg/kg: Mn
1000 mg/kg: Cu
250 mg/kg: Cr, Ni
100 mg/kg: Co, Mo
100 mg/kg: Mo

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICH-TXM7**

Global/ICH Elemental Impurities F

Contents: 13000 mg/kg: Fe, Zn

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICH-TXM8**

SECTION 7

Miscellaneous Chemistries

Certified pH Buffers
Cyanide Reference Standards
Conductivity Standards

Certified pH Buffers

Product Name	Matrix	Volume mL	Catalog#
pH 2 Buffer Standard	H_2O	500	**PH-BUFF2-500**
pH 3 Buffer Standard	H_2O	500	**PH-BUFF3-500**
pH 4 Buffer Standard	H_2O	500	**PH-BUFF4-500**
pH 5 Buffer Standard	H_2O	500	**PH-BUFF5-500**
pH 6 Buffer Standard	H_2O	500	**PH-BUFF6-500**
pH 7 Buffer Standard	H_2O	500	**PH-BUFF7-500**
pH 8 Buffer Standard	H_2O	500	**PH-BUFF8-500**
pH 9 Buffer Standard	H_2O	500	**PH-BUFF9-500**
pH 10 Buffer Standard	H_2O	500	**PH-BUFF10-500**

Cyanide Reference Standards

Certified Wet Assay

SPEX CertiPrep offers a cyanide reference standard in a simple form designed for US EPA methods 335.2 and 335.3, ASTM method D2036-19 and Standard method 4500-CNF, and in a complex form for use with US EPA method 335.1.

Cyanide, Simple

Contents: 1000 µg/mL: CN from KCN

Matrix: H_2O/2% KOH

Volume: 125 mL
Catalog#: **RSCN9-2Y**

Volume: 500 mL
Catalog#: **RSCN9-2X**

Cyanide, Complex

Contents: 1000 µg/mL: CN from $K_3Fe(CN)_6$

Matrix: H_2O/2% KOH

Volume: 500 mL
Catalog#: **RSCN9C-2X**

Helpful Hint:

Visit our Web site at **www.spexcertiprep.com** for the latest and greatest information about Certified Reference Materials.

Conductivity Standards: TDS as KCL

Conductivity (calibration resistance)	Dissolved Solids	Volume	Catalog#
100 micromhos/cm@25°C	65 µg/mL as KCL	500 mL	**TDS-1-500**
1000 micromhos/cm@25°C	650 µg/mL as KCL	500 mL	**TDS-2-500**

SECTION 8

Organometallic Single & Multi-Element Oil Standards

Your Science is Our Passion.®

Organometallic Single & Multi-Element Oil Standards

Applications

- Wear Metals
- Crude Oil
- Additive Metals
- Environmental Monitoring
- Petrochemical Testing
- Pharmaceuticals
- Food Processing
- Sulfur in Diesel Fuel

The determination of wear metals in engine oils and other lubricants can be applied to machines such as automobiles, aircraft, heavy equipment, trucks, locomotives, military vehicles… the examples are endless. By tracking metals suspended in the used oil, engineers, designers, and mechanics can determine the breakdown of specific engine parts. Specific elements present in the used oils have been found to be directly related to specific engine problems. Engine failures, as well as expensive repairs, can be avoided if engine oils are analyzed, providing a periodic trend to predict maintenance or replacement.

SPEX CertiPrep presents a comprehensive offering of Organometallic Oil Standards. The benefits and advantages of these standards are many:

- **Choice of 37 single elements at 1,000 or 5,000 µg/g**
- **Popular multi-element blends of 23, 21, 12, or 5 elements**
- **Clear, transparent matrix**
- **1 year expiration date**
- **Convenient sizes, 50 or 100 grams**
- **Competitive pricing**
- **Certificate of Analysis with every solution**
- **Guaranteed stable and accurate**
- **Manufactured under an internationally accredited ISO 9001 Quality System and complying with the requirements of ISO/IEC 17025 and ISO/IEC Guide 34.**
- **Expert technical/customer support**
- **Custom standards available**

Did You Know?

SPEX CertiPrep is accredited by A2LA for Organic and Inorganic Certified Reference Materials. In addition to being registered as an ISO 9001 facility, SPEX CertiPrep is accredited by A2LA as complying with the requirements of ISO/IEC 17025 and ISO/IEC Guide 34. Our scope is the **most comprehensive** in the industry.

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

Single Element Organometallic Oil Standards

Each standard supplied with a Certificate of Analysis and is packaged in a 50 gram bottle.

Element in Base Oil	Conc. µg/g	Catalog#
Aluminum (Al)	1000	ORG-AL8-2Z
	5000	ORG-AL8-4Z
Antimony (Sb)	1000	ORG-SB8-2Z
Arsenic (As)	1000	ORG-AS8-2Z
Barium (Ba)	1000	ORG-BA8-2Z
	5000	ORG-BA8-4Z
Beryllium (Be)	1000	ORG-BE8-2Z
Bismuth (Bi)	1000	ORG-BI8-2Z
	5000	ORG-BI8-4Z
Boron (B)	1000	ORG-B8-2Z
	5000	ORG-B8-4Z
Cadmium (Cd)	1000	ORG-CD8-2Z
	5000	ORG-CD8-4Z
Calcium (Ca)	1000	ORG-CA8-2Z
	5000	ORG-CA8-4Z
Chromium (Cr)	1000	ORG-CR8-2Z
	5000	ORG-CR8-4Z
Cobalt (Co)	1000	ORG-CO8-2Z
	5000	ORG-CO8-4Z
Copper (Cu)	1000	ORG-CU8-2Z
	5000	ORG-CU8-4Z
Iron (Fe)	1000	ORG-FE8-2Z
	5000	ORG-FE8-4Z
Lanthanum (La)	1000	ORG-LA8-2Z
Lead (Pb)	1000	ORG-PB8-2Z
	5000	ORG-PB8-4Z
Lithium (Li)	1000	ORG-LI8-2Z
	5000	ORG-LI8-4Z

Element in Base Oil	Conc. µg/g	Catalog#
Magnesium (Mg)	1000	ORG-MG8-2Z
	5000	ORG-MG8-4Z
Manganese (Mn)	1000	ORG-MN8-2Z
	5000	ORG-MN8-4Z
Mercury (Hg)	1000	ORG-HG8-2Z
Molybdenum (Mo)	1000	ORG-MO8-2Z
	5000	ORG-MO8-4Z
Nickel (Ni)	1000	ORG-NI8-2Z
	5000	ORG-NI8-4Z
Phosphorous (P)	1000	ORG-P8-2Z
	5000	ORG-P8-4Z
Potassium (K)	1000	ORG-K8-2Z
	5000	ORG-K8-4Z
Scandium (Sc)	1000	ORG-SC8-2Z
Selenium (Se)	1000	ORG-SE8-2Z
	5000	ORG-SE8-4Z
Silicon (Si)	1000	ORG-SI8-2Z
	5000	ORG-SI8-4Z
Silver (Ag)	1000	ORG-AG8-2Z
	5000	ORG-AG8-4Z
Sodium (Na)	1000	ORG-NA8-2Z
	5000	ORG-NA8-4Z
Strontium (Sr)	1000	ORG-SR8-2Z
	5000	ORG-SR8-4Z
Sulfur (S)	1000	ORG-S8-2Z
	5000	ORG-S8-4Z
Thallium (Tl)	1000	ORG-TL8-2Z
Tin (Sn)	1000	ORG-SN8-2Z
	5000	ORG-SN8-4Z
Titanium (Ti)	1000	ORG-TI8-2Z
	5000	ORG-TI8-4Z

Element in Base Oil	Conc. µg/g	Catalog#
Vanadium (V)	1000	**ORG-V8-2Z**
	5000	**ORG-V8-4Z**
Yttrium (Y)	1000	**ORG-Y8-2Z**
Zinc (Zn)	1000	**ORG-ZN8-2Z**
	5000	**ORG-ZN8-4Z**
Zirconium (Zr)	1000	**ORG-ZR8-2Z**
	5000	**ORG-ZR8-4Z**

Multi-Element Organometallic Oil Standards

Elements in Base Oil	Conc. µg/g	Volume g	Catalog#
23 Element Standard	100	50	**S23-100Z**
Al, Ba, B, Cd, Ca, Cr		100	**S23-100Y**
Cu, Fe, K, Pb, Mg, Mn	300	50	**S23-300Z**
Mo, Ni, P, Si, Ag		100	**S23-300Y**
Na, Sb, Sn, Ti, V, Zn	500	50	**S23-500Z**
		100	**S23-500Y**
	900	50	**S23-900Z**
		100	**S23-900Y**
21 Element Standard	100	50	**S21-100Z**
Al, Ba, B, Cd, Ca, Cr		100	**S21-100Y**
Cu, Fe, Pb, Mg, Mn	300	50	**S21-300Z**
Mo, Ni, P, Si, Ag		100	**S21-300Y**
Na, Sn, Ti, V, Zn	500	50	**S21-500Z**
		100	**S21-500Y**
	900	50	**S21-900Z**
		100	**S21-900Y**
12 Element Standard	100	50	**S12-100Z**
Al, Cr, Cu, Fe, Pb, Mg		100	**S12-100Y**
Ni, Si, Ag, Na, Sn, Ti	500	50	**S12-500Z**
		100	**S12-500Y**
	900	50	**S12-900Z**
		100	**S12-900Y**
5 Element Standard	900	50	**AM-900Z**
Ba, Ca, Mg, P, Zn		100	**AM-900Y**
	1,000	50	**AM-1000Z**
		100	**AM-1000Y**
	5,000	50	**AM-5000Z**
		100	**AM-5000Y**

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

Base Oils and Kerosene Blanks

Base Oil 20 and 75 are the same certified base oils that are used in our single and multi-element blends.

Description	Volume	Catalog#
Base Oil 20	500 mL	**BASE20**
	3.78 L	**BASE20-G**
Base Oil 75	500 mL	**BASE75**
	3.78 L	**BASE75-G**
Kerosene	500 mL	**KER-BLK**
	3.78 L	**KER-BLK-G**

B100 Biodiesel Standards

Governments worldwide have passed new regulations that mandate lower levels of sulfur in biodiesel fuel. To coincide with the implementation of these regulations, SPEX CertiPrep now offers specifically designed Certified Reference Materials for industrial use. Our B100 Biodiesel standards meet the requirements for testing ASTM methods D6751, D5453, and EN14214 (see below for a complete list).

Description	Conc. µg/g	Volume	Catalog#
Certified Matrix Blank B100	N/A	100 mL	**BF-BLKY**
		500 mL	**BF-BLKX**
Sulfur in B100	5	100 mL	**BFS-5Y**
	10	100 mL	**BFS-10Y**
	15	100 mL	**BFS-15Y**
	20	100 mL	**BFS-20Y**
	25	100 mL	**BFS-25Y**
	50	100 mL	**BFS-50Y**
	100	100 mL	**BFS-100Y**
Ca, K, Mg, Na, and P in B100	5	100 g	**BFM-5Y**
	10	100 g	**BFM-10Y**
	20	100 g	**BFM-20Y**

Sulfur Oil Standards for Diesel Fuel Analysis, in Base Oil

Conc. µg/g	Catalog#
Available in 100 gram quantities	
0	**DSS8-Y**
5	**DSS8-5Y**
10	**DSS8-10Y**
15	**DSS8-15Y**
20	**DSS8-20Y**
25	**DSS8-25Y**
50	**DSS8-AY**
75	**DSS8-75Y**
100	**DSS8-1Y**
200	**DSS8-BY**
300	**DSS8-CY**
500	**DSS8-1AY**
750	**DSS8-1BY**
1000	**DSS8-2Y**

Set for Sulfur Standards

GREAT VALUE

This set includes the following concentrations:

1000, 750, 500, 300, 200, 100, and 50 µg/mL; plus BASE 20

Catalog#: DSS8-SET

For determination of sulfur in diesel fuel. Standards are designed for use with ASTM Method D2622, Standard test method for sulfur in Petroleum Products.

Sulfur Oil Standards for Diesel Fuel Analysis, in #2 Diesel Fuel

Conc. µg/g	Catalog#
Available in 100 gram quantities	
0	**SDFS-BLK-Y**
5	**SDFS-5-Y**
10	**SDFS-10-Y**
15	**SDFS-15-Y**
20	**SDFS-20-Y**
25	**SDFS-25-Y**
50	**SDFS-50-Y**
75	**SDFS-75-Y**
100	**SDFS-100-Y**
200	**SDFS-200-Y**
300	**SDFS-300-Y**
400	**SDFS-400-Y**
500	**SDFS-500-Y**
750	**SDFS-750-Y**
1000	**SDFS-1000-Y**

Set for Ultra Low Level Sulfur Standards

This set includes the following concentrations:

GREAT VALUE

100, 50, 25, 20, 15, 10, 5, and 0 µg/mL in #2 Diesel Fuel.

Catalog#: SDFS-SET

60 Years of Support to the Environmental Community

Manufacturing Organic and Inorganic Certified Reference Materials

- Quick turnaround based on your individual needs
- QuEChERS Kits & Internal Standards – Custom Kits also available
- LC/MS Single & Custom Standards
- New Inorganic Multi-Element Standards for the latest EPA methods
- Custom Blends & Daily Checks

Markets Served:

Environmental • Industrial • Pharmaceutical • Consumer Safety • Academia • Food & Agriculture

A2LA ACCREDITED

Accredited to 17025 & Guide 34 ISO Certified to 9001

UL REGISTERED FIRM

Accredited by A2LA for ISO 17025 and Guide 34, and Certified by UL-DQS for ISO 9001.

SPEX CertiPrep®

Your Science is Our Passion.®

For more information contact us at:
CRMSales@spex.com
www.spexcertiprep.com

SECTION 9

Fusion Fluxes & Additives

Your Science is Our Passion.®

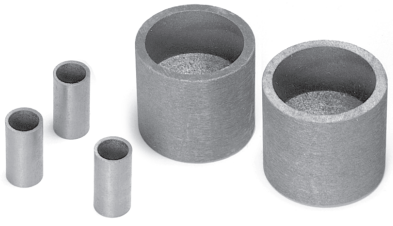
Fusion Fluxes & Additives

Fusion is an extremely effective method to prepare oxides, sulfides, fluorides, ferroalloys, and metals for analysis by XRF, AA, ICP, DCP, etc. The samples are (if necessary) pulverized and mixed with a flux; this mixture is heated until the flux melts and the sample dissolves in it, yielding a clear, homogeneous melt. The melt can be cast as a glass disc for XRF, or dissolved in diluted acid for analysis in solution form. In many cases fusion fluxing is simpler, or the analytical results more accurate, than if the sample were prepared by conventional acid dissolution or pressed powder methods.

SPEX CertiPrep is proud to offer a full line of fluxes and additives with exceptional qualities due to their purity and coarse texture. Go to our Web site at **www.spexfusionflux.com** to request a free sample of flux or obtain information on a custom blend.

SPEX SamplePrep Graphite Crucibles

SPEX SamplePrep graphite crucibles are a cost effective alternative to metal (platinum/gold) crucibles used to contain samples during fusion. Graphite crucibles are disposable, eliminating both the need for time-consuming cleaning and the possibility for sample cross-contamination. Chemically inert and heat-resistant, graphite will not combine with samples during fusion.



Features of our Fluxes:

- Homogeneity – Each flux has the same composition throughout. If a flux is not homogenous, segregation will affect the XRF intensities.
- Purity – With pure fluxes, no element impurity exceeds 10 µg/mL. With ultra pure fusion flux, impurities are practically non-existent.
- High Density – Our fluxes have a density of 1.4 (as compared to 0.3 for fine fluxes). High density flux is easier to handle, measure and, with certain applications, smaller, less expensive platinumware can be used.
- Not Hydroscopic – All our fluxes have a water content <0.05%. The major disadvantage of absorbed water is a loss of accuracy in the analytical result. This is due to an error in the sample/flux ratio; and also the volatization of water can sometimes occur suddenly, blowing a fraction of the flux sample out of the crucible.
- Granularity – All our fluxes have a granularity greater than 500 µm which means that they contain no dust. Due to electrostatic forces, dusty flux sticks to the weighing pan, the funnel, and the crucible wall resulting in a loss of flux and the formation of glass droplets on the wall of the crucible.
- Outstanding fluidity – Granular flux will not stick to surfaces and will leave the crucible wall clean after fusion. SPEX SamplePrep offers two approaches to fusion fluxing: the SPEX SamplePrep Automated Fluxer for rapid, repetitive fusions, and graphite crucibles for smaller scale operation.

The SPEX SamplePrep automated fusion fluxing device is capable of simultaneously preparing either glass discs for XRF or solutions for AA and ICP-DCP analysis. Fluxers can be placed under manual control to develop methods or process samples. Fluxing procedures can also be carried out automatically through the sequential, microprocessor controlled commands or linked to a computer.

Visit **www.spexsampleprep.com/katanax** for details.

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

Fusion Flux (1kg quantity)

Description	Grade	Catalog#
Lithium Tetraborate	Pure	**FFB-1000-02**
	Ultra Pure	**FFB-1000-03**
99.5% Lithium Tetraborate **0.50% Lithium Bromide**	Pure	**FFB-1005-02**
	Ultra Pure	**FFB-1005-03**
99.5% Lithium Tetraborate **0.50% Lithium Iodide**	Pure	**FFB-1007-02**
	Ultra Pure	**FFB-1007-03**
67% Lithium Tetraborate **33% Lithium Metaborate**	Pure	**FFB-6700-02**
	Ultra Pure	**FFB-6700-03**
66.67% Lithium Tetraborate **32.83% Lithium Metaborate** **0.50% Lithium Bromide**	Pure	**FFB-6705-02**
	Ultra Pure	**FFB-6705-03**
66.67% Lithium Tetraborate **32.83% Lithium Metaborate** **0.50% Lithium Iodide**	Pure	**FFB-6707-02**
	Ultra Pure	**FFB-6707-03**
50% Lithium Tetraborate **50% Lithium Metaborate**	Pure	**FFB-5000-02**
	Ultra Pure	**FFB-5000-03**
49.75% Lithium Tetraborate **49.75% Lithium Metaborate** **0.50% Lithium Bromide**	Pure	**FFB-5005-02**
	Ultra Pure	**FFB-5005-03**
49.75% Lithium Tetraborate **49.75% Lithium Metaborate** **0.50% Lithium Iodide**	Pure	**FFB-5007-02**
	Ultra Pure	**FFB-5007-03**
35% Lithium Tetraborate **65% Lithium Metaborate**	Pure	**FFB-3500-02**
	Ultra Pure	**FFB-3500-03**
34.83% Lithium Tetraborate **64.67% Lithium Metaborate** **0.50% Lithium Bromide**	Pure	**FFB-3505-02**
	Ultra Pure	**FFB-3505-03**
Lithium Metaborate	Pure	**FFB-0000-02**
	Ultra Pure	**FFB-0000-03**
99.5% Lithium Metaborate **0.50% Lithium Bromide**	Pure	**FFB-0005-02**
	Ultra Pure	**FFB-0005-03**
98.50% Lithium Metaborate **1.50% Lithium Bromide**	Pure	**FFB-0007-02**
	Ultra Pure	**FFB-0007-03**

Additives

Description	Size	Grade	Catalog#
Lithium Bromide Crystal	125 g	Ultra Pure	**FFB-100-03**
Lithium Bromide	15 mL Solution	Ultra Pure	**FFB-103-03**
	15 mL Solution (10 pack)	Ultra Pure	**FFB-105-03**
Lithium Carbonate	1 Kg	Ultra Pure	**FFB-401-03**
Lithium Iodide Crystal	125 g Trihydrate Salt	Ultra Pure	**FFB-110-03**
Lithium Iodide	15 mL Solution	Ultra Pure	**FFB-113-03**
	15 mL Solution (10 pack)	Ultra Pure	**FFB-115-03**
Lithium Fluoride Crystals	125 g	Ultra Pure	**FFB-200-03**
Lithium Nitrate	250 g	Ultra Pure	**FFB-300-03**
	500 g	Ultra Pure	**FFB-301-03**

Helpful Hint:

For more information or to request a FREE SAMPLE, visit **www.spexfusionflux.com**

Can't find the blend you are looking for?
Contact us today and ask about our custom mixtures.
We can make a Fusion Flux to meet your exact needs.

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

SECTION 10

QC Samples

Your Science is Our Passion.®

QC Samples

The end-product of most analytical laboratories is data. It is therefore imperative that the quality of the data produced meet or exceed performance criteria. The implementation of Quality Control (QC) processes helps control error and estimate uncertainty. QC can be a tool in method development, regulatory processes, laboratory training and performance monitoring. QC samples can help an analytical laboratory determine its precision, accuracy, linear range and method ruggedness.

QC samples allow the laboratories to fulfil documentation requirements as well as correct errors in a root cause analysis of a possible failure. Finally, QC samples monitor the effectiveness of the laboratory analysts to produce accurate data.

SPEX CertiPrep proudly partners with ERA to offer Quality Control Samples. All of ERA's QC samples have been tested in-house with the USEPA, NIST, NELAC and ISO protocols to ensure accuracy, homogeneity and stability.

Water Pollution

Minerals/Solids

Minerals

Total alkalinity as $CaCO_3$.....10-120 µg/mL
Chloride.....35-275 µg/mL
Fluoride.....0.3-4 µg/mL
Potassium.....4-40 µg/mL
Sodium.....6-100 µg/mL
Specific conductance at 25°C..... 200-930 µmhos/cm
Sulfate.....5-125 µg/mL
Total dissolved solids at 180°C.....140-650 µg/mL
Total solids at 105°C.....140-675 µg/mL

One 500 mL whole-volume bottle is ready to analyze.
Catalog#: 506

Hardness

Calcium.....3.5-110 µg/mL
Calcium hardness as $CaCO_3$.....8.7-275 µg/mL
Total hardness as $CaCO_3$.....17-440 µg/mL
Magnesium.....2-40 µg/mL
Non-filterable residue (TSS).....23-100 µg/mL

One 500 mL whole-volume bottle is ready to analyze
Catalog#: 507

pH

pH..... 5-10 units

One 250 mL whole-volume bottle is ready to analyze.
Catalog#: 977

Settleable Solids

Settleable solids.....5-50 µg/mL

One 60 mL poly bottle with a solid yields up to 1 liter after dilution.
Use with Standard Methods 2540F and EPA method 160.5.
Catalog#: 911

Volatile Solids

Volatile solids.....100-500 µg/mL

One 12 mL screw-top vial with a solidyields up to 1 liter after dilution.
Use with EPA method 160.4 and Standard Methods 2540E.
Catalog#: 913

Solids Concentrate

Total solids at 105°C.....140-675 µg/mL
Total dissolved solids at 180°C.....140-650 µg/mL
Non-filterable residue (TSS).....23-100 µg/mL

Provided as one sample in 23 mL glass screw-top vial with a powder, yielding 1 liter of solution.
Catalog#: 4032

Solids

Total solids at 105°C.....140-675 µg/mL
Total dissolved solids at 180°C.....140-650 µg/mL
Non-filterable residue (TSS).....23-100 µg/mL

One 500 mL whole-volume bottle is ready to analyze.
Catalog#: 499

Nutrients

Simple Nutrients

Ammonia as N.....0.65-19 µg/mL
Nitrate as N.....0.25-40 µg/mL
Nitrate plus nitrite as N.....0.25-40 µg/mL
ortho-Phosphate as P.....0.5-5.5 µg/mL

One 15 mL screw-top vial yields up to 2 liters after dilution.
Catalog#: 505

Complex Nutrients

Total Kjeldahl-nitrogen as N.....1.5-35 µg/mL
Total phosphorus as P.....0.5-10 µg/mL

One 15 mL screw-top vial yields up to 2 liters after dilution.
Catalog#: 525

Nitrite

Nitrite as N.....0.4-4 µg/mL

One 15 mL screw-top vial yields up to 2 liters after dilution.
Catalog#: 770

Demand

Demand

5-day BOD.....15-250 µg/mL
Carbonaceous BOD.....15-250 µg/mL
COD.....30-250 µg/mL
TOC.....6-100 µg/mL

One 15 mL screw-top vial yields up to 2 liters after dilution.
Catalog#: 516

Oil & Grease/TPH

Oil & Grease

Oil & Grease.....20-100 mg/bottle

One 250 mL whole-volume bottle is ready to analyze.
Use with EPA method 1664. Certified values are provided for IR and gravimetric methods.
Catalog#: 504

Oil & Grease Concentrate

Oil & Grease.....20-100 µg/mL

One 23 mL screw-top vial yields at least 2 liters after dilution. Gravimetric analysis only.
Use with EPA method 1664.
Catalog#: 4122

1 liter Oil & Grease

Oil & Grease.....20-100 µg/mL

One liter whole-volume glass bottle with a 33-430 thread is ready to analyze.
Use with EPA method 1664.
For gravimetric and IR analysis.
Catalog#: 518

Please specify if for SPE compatible PT.

1 liter Boston Round Oil & Grease

Oil & Grease.....20-100 µg/mL

One liter whole-volume bottle is ready to analyze.
Designed for SPE equipment with Boston Round glass bottles with a 33-400 thread.
Use with EPA method 1664.
For gravimetric and IR analysis.
Catalog#: 818

Please specify if for SPE compatible PT.

HEM / SGT-HEM

HEM.....5-100 µg/mL
SGT-HEM.....5-100 µg/mL

One 5 mL flame-sealed ampule yields up to 2 liters after dilution.
Use with EPA method 1664 to measure hexane extractable material (HEM) and silica gel treated-HEM.
Contains both hexadecane and stearic acid.
If a NELAC compliant PT is required, use Catalog #582 or Catalog #4120.
Catalog#: 519

Total Petroleum Hydrocarbons (TPH) in Water #1

Total Petroleum Hydrocarbons.....20-200 µg/mL

One liter whole-volume bottle is ready to analyze for total petroleum hydrocarbons (TPH) without interfering fatty acids.
Use with EPA methods 418.1, 1664 and 5520.
Catalog#: 600

Total Petroleum Hydrocarbons (TPH) in Water #2

Total Petroleum Hydrocarbons.....20-200 µg/mL

One liter whole-volume bottle is ready to analyze for Total Petroleum Hydrocarbons in the presence of interfering fatty acids.
Use with EPA methods 418.1, 1664 and 5520.
Catalog#: 601

Trace Metals

Trace Metals

Aluminum.....200-4,000 µg/L
Antimony.....95-900 µg/L
Arsenic.....70-900 µg/L
Barium.....100-2,500 µg/L
Beryllium.....8-900 µg/L
Boron.....800-2,000 µg/L
Cadmium.....8-750 µg/L
Chromium.....17-1,000 µg/L
Cobalt.....28-1,000 µg/L
Copper.....40-900 µg/L
Iron.....200-4,000 µg/L
Lead.....70-3,000 µg/L
Manganese.....70-4,000 µg/L
Molybdenum.....60-600 µg/L
Nickel.....80-3,000 µg/L
Selenium.....90-2,000 µg/L
Silver.....26-600 µg/L
Strontium.....30-300 µg/L
Thallium.....60-900 µg/L
Vanadium.....55-2,000 µg/L
Zinc.....100-2,000 µg/L

One 15 mL screw-top vial yields up to 1 liter after dilution.
Use with AA, ICP-OES or ICP-MS and selected colorimetric methods.
Catalog#: 500

Mercury

Mercury, total.....2-30 µg/L

One 15 mL screw-top vial yields up to 1 liter after dilution.
Analyze for total mercury.
Catalog#: 514

Low-Level Mercury

Mercury, total.....1–100 ng/L

One 5 mL flame-sealed ampule yields up to 4 liters after dilution.
Use with EPA 1631 or other sensitive CVAA methods for mercury in the range 1-100 ng/L.
Check FoPT tables on TN1 Web site for NELAC acceptability.
Catalog#: 931

Hexavalent Chromium

Hexavalent chromium.....45-880 µg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Use with IC or colorimetric methods.
Catalog#: 984

Tin & Titanium

Tin.....200-2,000 µg/L
Titanium.....60-300 µg/L

One 15 mL screw-cap vial concentrate yields up to 1 liter after dilution.
Use with AA, ICP-OES or ICP-MS methods.
Catalog#: 517

Uranium

Uranium.....25-200 µg/L

One 15 mL plastic screw-cap vial yields up to 1 liter after dilution.
Catalog#: 4402

Lithium

Lithium.....50-500 µg/L

One 15 mL plastic screw-cap vial yielding up to 2 liters after dilution.
Designed for the Ohio VAP program
Catalog#: 4992

Physical Property

Color

Color.....10-75 PC units

One 125 mL whole-volume bottle is ready to analyze.
Use with EPA methods 110.1, 110.2 and 110.3 and Standard Methods 2120B, 2120C and 2120E.
Catalog#: 070

Turbidity

Turbidity.....2-30 NTU

One 15 mL screw-cap vial yields up to 1 liter after dilution. Use with nephelometric methods.
Catalog#: 777

Misc. Chemistry

Cyanide & Phenol

Total Cyanide .....0.1-1 µg/mL

One 15 mL screw-cap vial yields up to 2 liters after dilution.
The CRM is also certified for Total Phenolics PT at 0.08-5 mg/L.
For a Total Phenolics PT, order Catalog # 589.
Catalog#: 502

Total Organic Halides (TOX)

TOX.....300-1,500 µg/L

One 2 mL flame-sealed ampule yields up to 2 liters after dilution.
Analyze for total organic halides with adsorption pyrolysis titrimetric methods.
Catalog#: 670

Total Phenolics (4-AAP)

Total phenolics by 4-AAP.....0.5-5 µg/mL

One 2 mL flame-sealed ampule yields up to 2 liters after dilution.
Analyze for total phenolic compounds by 4-AAP methods.
Catalog#: 515

Silica

Silica as SiO_2.....50-250 µg/mL

One 60 mL poly bottle yields up to 1 liter after dilution.
Analyze for silica as SiO_2 with colorimetric or ICP methods.
Catalog#: 775

Sulfide

Sulfide.....2-10 µg/mL

One 10 mL flame-sealed ampule yields up to 1 liter after dilution.
Preserved sample is guaranteed stable.
Analyze for sulfide by titrimetric or colorimetric methods or ISE.
Catalog#: 071

Surfactants-MBAS

Surfactants-MBAS .....0.2-1 µg/mL

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Analyze for Surfactants-MBAS with EPA method 425.1.
Catalog#: 776

Acidity

Acidity as $CaCO_3$.....650-1,800 µg/mL

One 250 mL whole-volume bottle is ready to analyze.
Designed for use with titrimetric methods to a pH endpoint of 8.3.
Catalog#: 915

Boron

Boron .....800-2,000 µg/L

One unpreserved 60 mL poly bottle yields in excess of 2 liters after dilution.
Designed for colorimetric methods.
Catalog#: 919

Bromide

Bromide .....1-10 µg/mL

One 15 mL flame-sealed ampule yields up to 2 liter after dilution.
Use with ion chromatography or colorimetric methods.
Catalog#: 769

Low-Level Total Residual Chlorine

Total Residual Chlorine .....0.5-3 µg/mL

One 2 mL flame-sealed ampule yields up to 2 liters after dilution.
Use with titrimetric or colorimetric methods.
Catalog#: 501

Low-Level Total Residual Chlorine

Total Residual Chlorine .....75-250 µg/L

Designed for testing at low µg/L levels.
One 2 mL flame-sealed ampule yields up to 2 liters after dilution.
Use with sensitive titrimetric or colorimetric methods.
Catalog#: 917

Water Supply

Minerals/Solids

Hardness

Calcium .....30-90 µg/mL
Calcium hardness as $CaCO_3$ .....75-225 µg/mL
Total hardness as $CaCO_3$.....83-307 µg/mL
Magnesium .....2-20 µg/mL
Sodium.....12-50 µg/mL

One 250 mL whole-volume bottle is ready to analyze.
Catalog#: 693

Inorganics

Alkalinity as $CaCO_3$.....25-200 µg/mL
Chloride .....5-100 µg/mL
Fluoride.....1-8 µg/mL
Nitrate as N.....3-10 µg/mL
Nitrate plus Nitrite as N.....3.5-9 µg/mL
Potassium .....10-40 µg/mL
Specific Conductance at 25°C..... 250-2,500 µmhos/cm
Sulfate.....5-500 µg/mL
Total filterable residue (TDS) at 180°C.....200-450 µg/mL

One 500 mL whole-volume bottle is ready to analyze.
The CRM is also certified for Sodium.
For a Sodium PT, order Hardness, Catalog #555
Catalog#: 698

pH

pH..... 5-10 units

One 250 mL whole-volume bottle is ready to analyze for pH.
Catalog#: 779

Solids

Total filterable residue (TDS) at 180°C.....100-1,000 µg/mL
Total solids (TS).....123-1,100 µg/mL
Non-filterable residue (TSS) at 105°.....23-100 µg/mL

One 24 mL screw-cap vial yields 1 liter after dilution.
Catalog#: 5152

Trace Metals

Metals

Aluminum.....130-1,000 µg/L
Antimony .....6-50 µg/L
Arsenic .....5-50 µg/L
Barium.....500-3,000 µg/L
Beryllium.....2-20 µg/L
Boron .....800-2,000 µg/L
Cadmium.....2-50 µg/L
Chromium .....10-200 µg/L
Copper.....50-2,000 µg/L
Iron.....100-1,800 µg/L
Lead .....5-100 µg/L
Manganese .....40-900 µg/L
Molybdenum .....15-130 µg/L
Nickel .....10-500 µg/L
Selenium .....10-100 µg/L
Silver .....20-300 µg/L
Thallium .....2-10 µg/L
Vanadium.....50-1,000 µg/L
Zinc.....200-2,000 µg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Use with ICP-OES, ICP-MS and AA methods.
Catalog#: 697

Mercury

Mercury, total..... 0.5-10 µg/L

One 15 mL screw-cap vial yields up to 1 liter after dilution.
Use with CVAA, ICP-MS or CVAFS methods.
Catalog#: 666

Hexavalent Chromium

Hexavalent Chromium .....5-50 µg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Catalog#: 658

Uranium

Uranium .....3-104 µg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Use with ICP/MS methods.
Catalog#: 930

Vanadium

Vanadium.....5-50 µg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Designed to meet California ELAP requirements.
Catalog#: 660

Inorganic Disinfection By-Products

Chlorate & Chlorite

Chlorate.....60-180 µg/L
Chlorite.....100-1,000 µg/L

One 24 mL screw-cap vial yields up to 4 liters after dilution.
Catalog#: 5272

Bromate & Bromide

Bromate.....7-50 µg/L
Bromide.....50-300 µg/L

One 24 mL screw-cap vial yields up to 4 liters after dilution.
Catalog#: 5262

Nutrients

Nitrite

Nitrite as N.....0.4-2 µg/mL

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Catalog#: 695

o-Phosphate Nutrients

ortho-Phosphate as P .....0.5-5.5 µg/mL

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Catalog#: 667

WS Miscellaneous Inorganic

Residual Chlorine

Total Residual Chlorine .....0.5-3 µg/mL
Free Residual Chlorine .....0.5-3 µg/mL

One 2 mL flame-sealed ampule yields up to 2 liters after dilution.
Catalog#: 696

Cyanide

Free Cyanide .....0.1-0.5 µg/mL

One 15 mL screw-cap vial yields up to 2 liters after dilution. Source material is free cyanide.
Catalog#: 983

Organic Carbon

Total Organic Carbon.....1.3-13 µg/mL
Dissolved Organic Carbon .....1.3-13 µg/mL

One 15 mL screw-cap vial yields up to 1 liter after dilution.
Catalog#: 669

Perchlorate

Perchlorate .....4-20 µg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Catalog#: 910

Silica

Silica as SiO_2.....5-75 µg/mL

One 60 mL poly bottle yields 1 liter after dilution.
Catalog#: 785

Surfactants-MBAS

Surfactants-MBAS .....0.1-1 µg/mL

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Use with EPA method 425.1.
Catalog#: 784

WS Physical Property

Corrosivity

Corrosivity ..... -4 to +4 SI units

One 500 mL whole-volume bottle is ready to analyze for corrosivity, calcium carbonate saturation and Langelier saturation index.
Catalog#: 980

Turbidity

Turbidity .....0.5-8 NTU

One 15 mL screw-cap vial yields up to 1 liter after dilution.
Use with nephelometric methods.
Catalog#: 699

UV 254 Absorbance

UV 254 Absorbance..... 0.05-0.7 cm-1

One 15 mL screw-cap vial yields up to 1 liter after dilution.
Catalog#: 662


Made for Chemists by Chemists
Copper
2% HNO3
Made for Chemists by Chemists
Arsenic (III)
2% HCl
1000 mg/L
SPEX CertiPrep
Instrument Calibration
SPEX CertiPrep
Made for Chemists by Chemists
Aluminum
Al
2% HNO3
1000 mg/L
SPEX CertiPrep

SECTION 11

International Standards

Your Science is Our Passion.®

International Standards

SPEX CertiPrep offers standards for global applications. Around the world, analytical labs are required to meet their countries requirements for environmental and safety testing. SPEX CertiPrep prides itself as being a standards provider for the international market.

Over the years our customers have asked for more catalog parts with global applications. We have responded to their requests and now have a selection of the most commonly requested standards to address the testing regulations in the international community.

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

ICH/Global Compliance Standards

Elemental Impurities in Pharmaceuticals and Dietary Supplements

Global/ICH Oral Elemental Impurities A

Contents: 25 mg/kg: Cd
15 mg/kg: Hg
5 mg/kg: Pb
1.5 mg/kg: As

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICH-TXM2**

Global/ICH Precious Metal Impurities B (with Os)

Contents: 100 mg/kg: Ir, Os, Pd, Pt, Rh, Ru

Matrix: 15% HCl

Volume: 125 mL
Catalog#: **ICH-TXM3**

Global/ICH Precious Metals Impurities B (without Os)

Contents: 100 mg/kg: Ir, Pd, Pt, Rh, Ru

Matrix: 15% HCl

Volume: 125 mL
Catalog#: **ICH-TXM4**

Global/ICH Parenteral Elemental Impurities D (Big 4)

Contents: 5 mg/kg: Pb
2.5 mg/kg: Cd
1.5 mg/kg: As, Hg

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICH-TXM6**

Global/ICH Elemental Impurities E

Contents: 2500 mg/kg: Mn
1000 mg/kg: Cu
250 mg/kg: Cr, Ni
100 mg/kg: Co, Mo, V

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICH-TXM7**

Global/ICH Elemental Impurities F

Contents: 13000 mg/kg: Fe, Zn

Matrix: 5% HNO_3

Volume: 125 mL
Catalog#: **ICH-TXM8**

Did You Know?

SPEX CertiPrep has a worldwide network of distributors. Visit our website at **www.spexcertiprep.com/distributors** to find a dealer near you.

If you can't find a dealer in your country or if you interested in distributing SPEX CertiPrep products, contact us at **crmsales@spex.com**

Brazil Standards

The safety and testing of water supplies in the world is of critical importance in many countries. In Brazil, the Brazilian national Environmental Council (Conselho Nacional do Meio Ambiente; "CONAMA") is responsible for the monitoring of wastewater and effluent discharges under Resolution 430. Resolution 430 implements a new testing and monitoring standard for environmental testing laboratories. Drinking water regulations in Brazil are governed by Portaria 2.914 which is the regulation that provides for the control and monitoring procedures of the quality of water intended for human consumption.

Multi-Element Standard

Contents: 1000 µg/mL: Al, As, Ba, Cd, Cr, Cu, Fe, Mn, Na, Ni, Pb, Sb, Se, U, Zn

Matrix: 10% HNO_3/Tr. HF/Tr. Tart

Volume: 100 mL
Catalog#: **POR-2914-GY**

Volume: 500 mL
Catalog#: **POR-2914-GX**

Multi-Element Standard

Contents: 1000 µg/mL: BR, CL, F, NO_3, SO_4

Matrix: H_2O

Volume: 100 mL
Catalog#: **POR-2914-HY**

Volume: 500 mL
Catalog#: **POR-2914-HX**

Multi-Element Standard

Contents: 2 µg/mL: Cu
0.7 µg/mL: Ba
0.07 µg/mL: Ni
0.05 µg/mL: Cr
0.03 µg/mL: U
0.01 µg/mL: As, Pb, Se
0.005 µg/mL: Cd, Sb

Matrix: 5% HNO_3./Tr. HF/Tr. Tart

Volume: 100 mL
Catalog#: **POR-2914-JY**

Mercury Standard

Contents: 2 µg/mL: Hg

Matrix: 5% HNO_3

Volume: 100 mL
Catalog#: **POR-2914-KY**

Multi-Element Ion Standard

Contents: 10 µg/mL: NO_3-N
1.5 µg/mL: F

Matrix: H_2O

Volume: 100 mL
Catalog#: **POR-2914-LY**

Multi-Element Ion Standard

Contents: 1 µg/mL: NO_2-N

Matrix: H_2O

Volume: 100 mL
Catalog#: **POR-2914-MY**

Ion Standard

Contents: 10 µg/mL: CN

Matrix: 1-2% NaOH/H_2O

Volume: 100 mL
Catalog#: **POR-2914-NY**

Chromium Standard

Contents: 0.1 µg/mL: Cr(+6)

Matrix: H_2O

Volume: 100 mL
Catalog#: **CON-430-CY**

Volume: 500 mL
Catalog#: **CON-430-CX**

Sulfur and Silver Standard

Contents: 1 µg/mL: S
0.1 µg/mL: Ag

Matrix: 2% HNO_3

Volume: 100 mL
Catalog#: **CON-430-DY**

Volume: 500 mL
Catalog#: **CON-430-DX**

Ion Standard

Contents: 20 µg/mL: NO_3-N (from $NaNO_3$)
10 µg/mL: F

Matrix: H_2O

Volume: 100 mL
Catalog#: **CON-430-EY**

Volume: 500 mL
Catalog#: **CON-430-EX**

Ion Standard

Contents: 20 µg/mL: NO_2-N (from $NaNO_2$)
10 µg/mL: F

Matrix: H_2O

Volume: 100 mL
Catalog#: **CON-430-FY**

Volume: 500 mL
Catalog#: **CON-430-FX**

Ion Standard

Contents: 20 µg/mL: NH_4-N (from NH_4Cl)
10 µg/mL: F

Matrix: H_2O

Volume: 100 mL
Catalog#: **CON-430-GY**

Volume: 500 mL
Catalog#: **CON-430-GX**

Ion Standard

Contents: 0.01 µg/mL: HG

Matrix: HNO_3

Volume: 100 mL
Catalog#: **CON-430-HY**

Volume: 500 mL
Catalog#: **CON-430-HX**

Multi-Element Standard

Contents: 15 µg/mL: Fe
5 µg/mL: B, Ba, Zn
4 µg/mL: Sn
2 µg/mL: Ni
1 µg/mL: Cr (+3), Cu, Mn
0.5 µg/mL: As, Pb
0.3 µg/mL: Se
0.2 µg/mL: Cd

Matrix: 2% HNO_3/Tr. HF

Volume: 100 mL
Catalog#: **CON-430-IY**

Volume: 500 mL
Catalog#: **CON-430-IX**

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SECTION 12

Laboratory Products & Contamination Control

Your Science is Our Passion.®

Laboratory Products & Contamination Control

SPEX CertiPrep, the industry leader for 60 years in the CRM marketplace, has continued to meet the needs of laboratories worldwide with innovation and research.

Our contamination control products are designed and Made by Chemists for Chemists® in response to the need for cost-effective, easy-to-use equipment and high-purity matrix/wash blanks for the clean laboratory environment.

Over the years, sophisticated instruments that can detect contaminants in parts per billion levels have necessitated the need for eliminating the contaminants right at the source. Our dedicated chemists have designed, tested, and approved these products for your use.

Do you know where contamination can come from?

- **Powder in latex gloves used frequently in labs contains high levels of Zinc**
- **Yellow stoppers used for sealing volumetric flasks contain high levels of Cadmium**
- **Dental work containing Mercury amalgam fillings can contaminate samples that are directly exposed to exhalation**
- **Calamine lotion is pure Zinc oxide**
- **Hair dyes contain Lead acetate**
- **Eye makeup contains Mercury as a preservative**

Visit **www.spexcertiprep.com** to download slides and see a recording of our *FAMOUS Clean Lab Techniques Presentation!*

SPEX CertiPrep, Inc. UL REGISTERED FIRM ISO 9001 A1572

PHONE: **1-800-LAB-SPEX** • FAX: **732-603-9647**

Pipette Washer/Dryer (Patented)

One major source of contamination is the volumetric pipette. At SPEX CertiPrep, our chemists realized that they were spending valuable time manually washing and rinsing pipettes. Conventional washers were expensive, and too large to comfortably fit in our laboratory. Our chemists designed a device that could be hooked up to a water line to allow the flow of water or other liquid through the inside and over the outside of the pipettes. As a result, our chemists spent less time cleaning pipettes, and more time manufacturing SPEX CertiPrep Certified Reference Materials; used and trusted by labs all over the world.

The pipette washer/dryer is easy to use. Simply insert up to 23 pipettes at a time, close the door and attach the tubing to the wash or rinse line. The washer can also be used with the washer basin and pump to circulate wash or rinse solution through the pipettes. The solution shoots out of the pipette tip, reflects off the ceiling portion of the washer and rains a shower down over the outside of the pipettes; thus cleaning both the inside and outside of the pipettes.

To dry the insides of the pipettes the line is connected to a vacuum source and air is pulled in through the pipette tips until the inside of all the pipettes are dry.

Pipette Washer/Dryer (Patented) and optional accessories

Description	Catalog#
Pipette Washer/Dryer 3 ft. tall x 1 ft. wide x 1 ft. deep	**PIPWASH-1**
Pipette Washer Pump 115 V/60 Hz/1.1 amp, Capacity: 205 Gal/hr	**PIPPUMP-115V**
Pipette Washer Pump 230 V/60 Hz/1.1 amp, Capacity: 205 Gal/hr	**PIPPUMP-230V**
Pipette Washer Basin	**PIPBASIN-1**

Product Features

- Technical Service available 8 AM–5 PM EST. *Speak directly with the chemists who developed the washer/dryer*
- Lightweight and compact, the washer/dryer fits within a sink or on a lab bench
- Durable polyethylene construction
- Convenient, independent on/off valves control flow to the front and back rows of washers, and the main water supply
- Transparent door closes to prevent splashing when washer is in use
- 23 cone-shaped, plastic pipette holders accommodate pipettes 0.5-250 mL in size
- Optional pump and basin available separately
- Demo units available. Please contact us for information and availability

OdorEroder®

OdorEroder® effectively neutralizes a wide range of offensive chemical odors and fumes in the lab, everything from Aldehydes to Xylenes.

These non-toxic, environmentally safe purple beads are placed where odor-causing chemicals in the air pass near the beads. When this occurs, the purple beads absorb and chemically transform the odor-causing chemicals into harmless compounds that remain trapped within the beads. As the purple beads absorb, they start turning brown. When a majority of the beads have turned brown, it is time to replace the OdorEroder®.

Depending on exposure, the OdorEroder® lasts up to three months.

OdorEroder® is effective in the following areas:

- **Hoods**
- **Waste Disposal Areas**
- **Lab Benches**
- **Chemical Storage Cabinets**
- **Glove Boxes**
- **Other Odor-Causing Areas within a Lab**
- **Lab Refrigerators**

100 g

Catalog#: ODER-100G

250 g

Catalog#: ODER-250G

What is a PPM?

UNIT	1 Part Per Million	1 Part Per Billion	1 Part Per Trillion
Length	1 inch/16 miles	1 inch/16,000 miles	1 inch/16 million miles. 6 inch step on trip to the sun.
Time	1 minute/2 years	1 second/32 years	1 second/320 centuries
Money	1 cent/$10,000	1 cent/$10 million	1 cent/$10 billion
Weight	1 oz./32 tons chips	1 pinch salt/10 tons chips	1 pinch salt/10,000 tons chips
Volume	1 drop vermouth/ 80 fifths gin	1 drop vermouth/ 500 barrels gin	1 drop vermouth/ 500,000 barrels gin
Area	1 sq. ft./23 acres	1 sq. ft./36 sq miles	1 sq. inch/250 sq miles - 1 sq. ft. in Indiana
Action	1 bogey/3,500 golf tournaments	1 bogey/3.5 million golf tournaments	1 bogey/3.5 billion golf tournaments
Quality	1 bad apple/ 2,000 barrels	1 bad apple/ 2 million barrels	1 bad apple/ 2 billion barrels
Rate	1 dented fender/ 10 car lifetimes	1 dented fender/ 10,000 car lifetimes	1 dented fender/ 10 million car lifetimes

ShaQer™

The ShaQer™ is the new, low cost solution for QuEChERS sample prep! It agitates up to 6 samples simultaneously compared to just 2 by hand. The vigorous clamp movement results in improved extraction from samples.

Description	Catalog#
ShaQer Base Unit with Clamp for 50 mL/15 mL Vials	CP1500-1590
ShaQer Base Unit with Clamp for 50 mL/2mL Vials	CP1500-1595
ShaQer Ceramic Grinding Media 5/32 in x 5/16 in	CP2185
ShaQer Ceramic Grinding Media-3/8 in x 7/8 in	CP2183
ShaQer Ceramic Grinding Media-5/16 in x 5/8 in	CP2184
ShaQer Clamp for 50 mL/2 mL Vials	CP1595
ShaQer Clamp for 50mL/15 mL Vials	CP1590

Safety interlock prevents unit from operating when lid is open. Window allows analyst to view samples during operation.

Vertical shaking motion ensures thorough mixing and analyte extraction.

Clamp holds six 50 mL vials or six 15 mL vials. Alternate clamp for six 50 mL vials or six 2 mL vials.

Spill tray for easy cleanup.

Digital timer display with adjustable operating time.

Compact, powerful motor agitates samples at 1500 rpm.

Inorganic Part # Index

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