SPEX®

INORGANIC CERTIFIED REFERENCE MATERIALS

Inorganic Standards for Spectroscopy

MOST TRUSTED BRANDS IN ANALYTICAL REFERENCE MATERIALS

We offer a full range of inorganic standards for IC, AA, ICP, and ICP-MS. The highly characterized standards in our Assurance and Claritas PPT lines are intended for ICP and ICP-MS trace analysis. We have built our reputation by providing chemists and environmental scientists products that exhibit quality, reliability, and convenience.

Inorganic Standards Can Be Used For:

- Atomic Absorption (AA)
- Inductively Coupled Plasma (ICP)
- Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)
- Ion Chromatography (IC)

Certified and Accredited:

- DQS ISO 9001:2015
- A2LA ISO/IEC 17025:2017, ISO 17034:2016

Features of Spex Inorganic Standards:

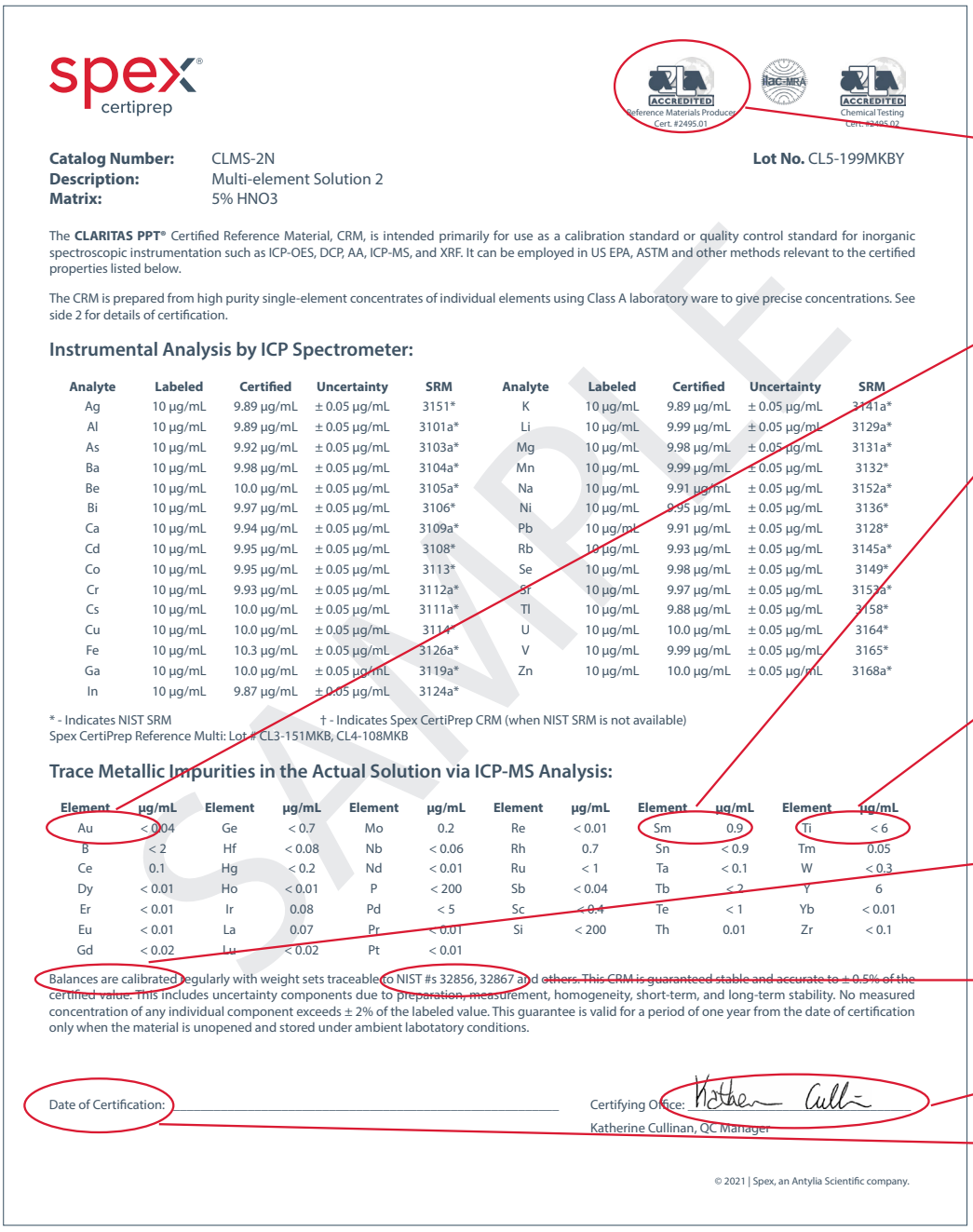
- Wide range of single & multi-element standards for Claritas PPT® and Assurance® grades
- Multi-element standards designed for the latest EPA methods
- Custom standards tailored to your application needs
- Traceable to NIST SRM for confidence in results
- High-purity acids: Assurance® (high purity) & Claritas PPT® (ultra high purity) formulations
- Broad analytical range with detection levels at ppb (Assurance®) & ppb/ppt (Claritas PPT®), backed by a Certificate of Analysis.
- Dedicated team of scientists for expert guidance & support

ZEPTOMETRIX.COM
+1.800.274.5487
ANALYTICAL.CS@ZEPTOMETRIX.COM

Table of Contents

Certificate of Analysis

Every accredited manufacturer of Certified Reference Materials supplies a Certificate of Analysis (COA) with their products. ISO Guide 31 and ISO 17034 outline the information required for a Certificate of Analysis. In order to comply with the ISO standards, an accredited CRM manufacturer must supply more than a dozen informational and analytical values such as certifying bodies, material descriptions, intended use, instructions for use, homogeneity, stability, certified values and their uncertainties, and traceability. Not all certificates are alike. Spex CertiPrep has been supplying some of the most comprehensive Certificates of Analysis in the CRM industry for years. Our certificates are easy to read and have all of the information an analyst would need to use our standards. We have highlighted what you should look for in a Certificate of Analysis and why our certificate is one of the best.



spex certiprep

ACCREDITED Reference Materials Producer Cert. #2495.01 — ACCREDITED Chemical Testing Cert. #2495.02

Catalog Number: CLMS-2N **Lot No.** CL5-199MKBY
Description: Multi-element Solution 2
Matrix: 5% HNO3

The **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 US EPA, 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	Analyte	Labeled	Certified	Uncertainty	SRM
Ag	10 µg/mL	9.89 µg/mL	± 0.05 µg/mL	3151*	K	10 µg/mL	9.89 µg/mL	± 0.05 µg/mL	3141a*
Al	10 µg/mL	9.89 µg/mL	± 0.05 µg/mL	3101a*	Li	10 µg/mL	9.99 µg/mL	± 0.05 µg/mL	3129a*
As	10 µg/mL	9.92 µg/mL	± 0.05 µg/mL	3103a*	Mg	10 µg/mL	9.98 µg/mL	± 0.05 µg/mL	3131a*
Ba	10 µg/mL	9.98 µg/mL	± 0.05 µg/mL	3104a*	Mn	10 µg/mL	9.99 µg/mL	± 0.05 µg/mL	3132*
Be	10 µg/mL	10.0 µg/mL	± 0.05 µg/mL	3105a*	Na	10 µg/mL	9.91 µg/mL	± 0.05 µg/mL	3152a*
Bi	10 µg/mL	9.97 µg/mL	± 0.05 µg/mL	3106*	Ni	10 µg/mL	9.95 µg/mL	± 0.05 µg/mL	3136*
Ca	10 µg/mL	9.94 µg/mL	± 0.05 µg/mL	3109a*	Pb	10 µg/mL	9.91 µg/mL	± 0.05 µg/mL	3128*
Cd	10 µg/mL	9.95 µg/mL	± 0.05 µg/mL	3108*	Rb	10 µg/mL	9.93 µg/mL	± 0.05 µg/mL	3145a*
Co	10 µg/mL	9.95 µg/mL	± 0.05 µg/mL	3113*	Se	10 µg/mL	9.98 µg/mL	± 0.05 µg/mL	3149*
Cr	10 µg/mL	9.93 µg/mL	± 0.05 µg/mL	3112a*	Sr	10 µg/mL	9.97 µg/mL	± 0.05 µg/mL	3153a*
Cs	10 µg/mL	10.0 µg/mL	± 0.05 µg/mL	3111a*	Tl	10 µg/mL	9.88 µg/mL	± 0.05 µg/mL	3158*
Cu	10 µg/mL	10.0 µg/mL	± 0.05 µg/mL	3114*	U	10 µg/mL	10.0 µg/mL	± 0.05 µg/mL	3164*
Fe	10 µg/mL	10.3 µg/mL	± 0.05 µg/mL	3126a*	V	10 µg/mL	9.99 µg/mL	± 0.05 µg/mL	3165*
Ga	10 µg/mL	10.0 µg/mL	± 0.05 µg/mL	3119a*	Zn	10 µg/mL	10.0 µg/mL	± 0.05 µg/mL	3168a*
In	10 µg/mL	9.87 µg/mL	± 0.05 µg/mL	3124a*					

* - Indicates NIST SRM † - Indicates Spex CertiPrep CRM (when NIST SRM is not available)
Spex CertiPrep Reference Multi: Lot # CL3-151MKB, CL4-108MKB

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

Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL	Element	µg/mL
Au	< 0.04	Ge	< 0.7	Mo	0.2	Re	< 0.01	Sm	0.9	Ti	< 6
B	< 2	Hf	< 0.08	Nb	< 0.06	Rh	0.7	Sn	< 0.9	Tm	0.05
Ce	0.1	Hg	< 0.2	Nd	< 0.01	Ru	< 1	Ta	< 0.1	W	< 0.3
Dy	< 0.01	Ho	< 0.01	P	< 200	Sb	< 0.04	Tb	< 2	Y	6
Er	< 0.01	Ir	0.08	Pd	< 5	Sc	< 0.4	Te	< 1	Yb	< 0.01
Eu	< 0.01	La	0.07	Pr	< 0.01	Si	< 200	Th	0.01	Zr	< 0.1
Gd	< 0.02	Lu	< 0.02	Pt	< 0.01						

Balances are calibrated regularly with weight sets traceable to NIST #s 32856, 32867 and others. This CRM is guaranteed stable and accurate to ± 0.5% of the certified value. This includes uncertainty components due to preparation, measurement, homogeneity, short-term, and long-term stability. 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 labotatory conditions.

Date of Certification: _____ Certifying Officer: Katherine Cullinan

Katherine Cullinan, QC Manager

Spex CertiPrep is accredited by A2LA for Inorganic and Organic Certified Reference Materials as complying with the requirements of ISO/IEC 17025 and ISO 17034 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 Inorganic QC Manager.

Stamped with month and year of certification.

Claritas PPT® ICP-MS vs. Assurance® AA & ICP

Single-Element Standards for ICP-MS

- Made with acid and ASTM Type I Water
- Inorganic compounds and metals at 99.99& to 99.9999% purity (where commercially available)
- Directly traceable to NIST (where applicable)
- Certified by DQS to ISO 9001:2015
- Accredited by A2LA to ISO/IEC 17025:2017 and ISO 17034:2016

ICP-MS

Claritas PPT® Grade CRMs are designed for ICP and ICP-MS analysis. They are available in single and multi-element solutions. The standards are at 1 µg/mL, 10 µg/mL, 100 µg/mL, or 1,000 µg/mL and packaged in 30 mL and 125 mL bottles to minimize contamination. They are made using ultra high purity acids, the highest grade starting materials and high purity water in order to minimize contaminants. Custom standards can be manufactured upon request.

AA & ICP

Assurance® Grade CRMs are designed for AA and ICP and are available in single and multi-element formulations. 70 elements are available as single-element standards and are available at 1,000 µg/mL and/or 10,000 µg/mL. They are packaged in
30 mL, 125 mL, 250 mL, and 500 mL bottles to minimize contamination. Custom standards can be manufactured upon request.

	Claritas PPT® Grade CRMs	Assurance® Grade CRMs
Designed For Use With	ICP | ICP-MS	AA | ICP
Analytical Range For Use	ppb, ppt	ppm, ppb
Single-Element Standards	√	√
1 µg/mL	√	
10 µg/mL	√	√
100 µg/mL	√	
1,000 µg/mL	√	√
10,000 µg/mL		√
Multi-Element Standards	√	
Custom Standards	√	√
Certifications		
ISO 9001:2015	√	√
ISO/IEC 17025:2017	√	√
ISO 17034:2016	√	√
Quality		
Traceable to NIST SRM (where applicable)	√	√
Acid Grade	Ultra High Purity Grade	High Purity Grade
# Trace Impurities Measured on Certificate of Analysis	68	68
Trace Impurities Measured to	µg/L	µg/mL
Volume		
30 mL	√	√
125 mL	√	√
250 mL		√
500 mL		√

Assurance® Single-Element Standards for AA & ICP

Element Key

Z AMU
El
Element
Density

Element	Part Number	Volume	Concentration	Matrix
13 26.982 **Al** **Aluminum** 2.7 g/cm³	PLAL2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLAL2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLAL2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLAL2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLAL1-2X	500 mL	1,000 µg/mL	2% HCl
	PLAL1-3X	500 mL	10,000 µg/mL	5% HCl
	PLAL2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLAL2-3X	500 mL	10,000 µg/mL	5% HNO3
51 121.760 **Sb** **Antimony** 6.697 g/cm³	PLSB7-2Y	125 mL	1,000 µg/mL	H2O/0.6% Tartaric Acid/tr. HNO3
	PLSB7-3Y	125 mL	10,000 µg/mL	H2O/0.6% Tartaric Acid/1% HNO3
	PLSB7-2T	250 mL	1,000 µg/mL	H2O/0.6% Tartaric Acid/tr. HNO3
	PLSB7-2M	30 mL	1,000 µg/mL	H2O/0.6% Tartaric Acid/tr. HNO3
	PLSB5-2X	500 mL	1,000 µg/mL	20% HCl
	PLSB7-2X	500 mL	1,000 µg/mL	H2O/0.6% Tartaric Acid/tr. HNO3
	PLSB7-3X	500 mL	10,000 µg/mL	H2O/0.6% Tartaric Acid/1% HNO3
33 74.922 **As** **Arsenic** 5.727 g/cm³	PLAS2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLAS2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLAS2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLAS2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLAS1-2X	500 mL	1,000 µg/mL	2% HCl
	PLAS2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLAS2-3X	500 mL	10,000 µg/mL	5% HNO3
56 137.327 **Ba** **Barium** 3.51 g/cm³	PLBA2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLBA2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLBA2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLBA2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLBA2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLBA2-3X	500 mL	10,000 µg/mL	5% HNO3
4 9.012 **Be** **Beryllium** 1.848 g/cm³	PLBE2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLBE2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLBE2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLBE2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLBE2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLBE2-3X	500 mL	10,000 µg/mL	5% HNO3
83 208.980 **Bi** **Bismuth** 9.78 g/cm³	PLBI4-2Y	125 mL	1,000 µg/mL	10% HNO3
	PLBI4-2M	30 mL	1,000 µg/mL	10% HNO3
	PLBI4-2X	500 mL	1,000 µg/mL	10% HNO3
5 10.811 **B** **Boron** 2.46 g/cm³	PLB9-2Y	125 mL	1,000 µg/mL	H2O
	PLB9-3Y	125 mL	10,000 µg/mL	H2O
	PLB9-2T	250 mL	1,000 µg/mL	H2O
	PLB9-2M	30 mL	1,000 µg/mL	H2O
	PLB9-2X	500 mL	1,000 µg/mL	H2O
	PLB9-3X	500 mL	10,000 µg/mL	H2O

Element	Part Number	Volume	Concentration	Matrix
48 112.411 **Cd** **Cadmium** 8.65 g/cm³	PLCD2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLCD2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLCD2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLCD2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLCD2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLCD2-3X	500 mL	10,000 µg/mL	5% HNO3
20 40.078 **Ca** **Calcium** 1.55 g/cm³	PLCA2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLCA2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLCA2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLCA2-3T	250 mL	10,000 µg/mL	5% HNO3
	PLCA2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLCA1-2X	500 mL	1,000 µg/mL	2% HCl
	PLCA1-3X	500 mL	10,000 µg/mL	5% HCl
	PLCA2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLCA2-3X	500 mL	10,000 µg/mL	5% HNO3
6 12.011 **C** **Carbon** 2.26 g/cm³	PLC9-2Y	125 mL	1,000 µg/mL	H2O
	PLC9-2M	30 mL	1,000 µg/mL	H2O
	PLC9-2X	500 mL	1,000 µg/mL	H2O
58 140.116 **Ce** **Cerium** 6.689 g/cm³	PLCE2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLCE2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLCE2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLCE2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLCE2-3X	500 mL	10,000 µg/mL	5% HNO3
55 132.905 **Cs** **Cesium** 1.879 g/cm³	PLCS2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLCS2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLCS2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLCS2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLCS2-3X	500 mL	10,000 µg/mL	5% HNO3
24 51.996 **Cr** **Chromium** 7.14 g/cm³	PLCR2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLCR2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLCR2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLCR2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLCR1-2X	500 mL	1,000 µg/mL	2% HCl
	PLCR2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLCR2-3X	500 mL	10,000 µg/mL	5% HNO3
	PLCR9-2X	500 mL	1,000 µg/mL	H2O
	PLCR9-3X	500 mL	10,000 µg/mL	H2O
27 58.933 **Co** **Cobalt** 8.9 g/cm³	PLCO2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLCO2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLCO2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLCO2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLCO1-2X	500 mL	1,000 µg/mL	2% HCl
	PLCO2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLCO2-3X	500 mL	10,000 µg/mL	5% HNO3

Element	Part Number	Volume	Concentration	Matrix
29 63.546 **Cu** **Copper** 8.92 g/cm³	PLCU2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLCU2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLCU2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLCU2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLCU1-2X	500 mL	1,000 µg/mL	2% HCl
	PLCU1-3X	500 mL	10,000 µg/mL	5% HCl
	PLCU2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLCU2-3X	500 mL	10,000 µg/mL	5% HNO3
66 162.5 **Dy** **Dysprosium** 8.551 g/cm³	PLDY2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLDY2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLDY2-2X	500 mL	1,000 µg/mL	2% HNO3
68 167.259 **Er** **Erbium** 9.066 g/cm³	PLER2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLER2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLER2-2X	500 mL	1,000 µg/mL	2% HNO3
63 151.964 **Eu** **Europium** 5.244 g/cm³	PLEU2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLEU2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLEU2-2X	500 mL	1,000 µg/mL	2% HNO3
64 157.25 **Gd** **Gadolinium** 7.9 g/cm³	PLGD2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLGD2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLGD2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLGD2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLGD2-3X	500 mL	10,000 µg/mL	5% HNO3
31 69.723 **Ga** **Gallium** 5.904 g/cm³	PLGA2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLGA2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLGA2-2X	500 mL	1,000 µg/mL	2% HNO3
32 72.63 **Ge** **Germanium** 5.323 g/cm³	PLGE9-2Y	125 mL	1,000 µg/mL	H2O/0.16% F-
	PLGE9-2M	30 mL	1,000 µg/mL	H2O/0.16% F-
	PLGE9-2X	500 mL	1,000 µg/mL	H2O/0.16% F-
79 196.967 **Au** **Gold** 19.3 g/cm³	PLAU3-2Y	125 mL	1,000 µg/mL	10% HCl
	PLAU3-2M	30 mL	1,000 µg/mL	10% HCl
	PLAU3-2X	500 mL	1,000 µg/mL	10% HCl
72 178.49 **Hf** **Hafnium** 13.31 g/cm³	PLHF1-2Y	125 mL	1,000 µg/mL	2% HCl
	PLHF1-2M	30 mL	1,000 µg/mL	2% HCl
	PLHF1-2X	500 mL	1,000 µg/mL	2% HCl

Element	Part Number	Volume	Concentration	Matrix
67 164.930 **Ho** **Holmium** 8.795 g/cm³	PLHO2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLHO2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLHO2-2X	500 mL	1,000 µg/mL	2% HNO3
49 114.818 **In** **Indium** 7.31 g/cm³	PLIN2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLIN2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLIN2-2X	500 mL	1,000 µg/mL	2% HNO3
77 192.217 **Ir** **Iridium** 22.56 g/cm³	PLIR3-2Y	125 mL	1,000 µg/mL	10% HCl
	PLIR3-2M	30 mL	1,000 µg/mL	10% HCl
	PLIR3-2X	500 mL	1,000 µg/mL	10% HCl
26 55.845 **Fe** **Iron** 7.874 g/cm³	PLFE2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLFE2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLFE2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLFE2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLFE1-2X	500 mL	1,000 µg/mL	2% HCl
	PLFE1-3X	500 mL	10,000 µg/mL	5% HCl
	PLFE2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLFE2-3X	500 mL	10,000 µg/mL	5% HNO3
57 138.905 **La** **Lanthanum** 6.146 g/cm³	PLLA2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLLA2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLLA2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLLA2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLLA2-3X	500 mL	10,000 µg/mL	5% HNO3
82 207.2 **Pb** **Lead** 11.34 g/cm³	PLPB2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLPB2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLPB2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLPB2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLPB2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLPB2-3X	500 mL	10,000 µg/mL	5% HNO3
3 6.941 **Li** **Lithium** 6.146 g/cm³	PLLI2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLLI2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLLI2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLLI1-2X	500 mL	1,000 µg/mL	2% HCl
	PLLI1-3X	500 mL	10,000 µg/mL	5% HCl
	PLLI2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLLI2-3X	500 mL	10,000 µg/mL	5% HNO3
71 174.967 **Lu** **Lutetium** 9.841 g/cm³	PLLU2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLLU2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLLU2-2X	500 mL	1,000 µg/mL	2% HNO3

Element	Part Number	Volume	Concentration	Matrix
12 24.305 **Mg** **Magnesium** 1.738 g/cm³	PLMG2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLMG2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLMG2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLMG2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLMG1-2X	500 mL	1,000 µg/mL	2% HCl
	PLMG1-3X	500 mL	10,000 µg/mL	5% HCl
	PLMG2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLMG2-3X	500 mL	10,000 µg/mL	5% HNO3
25 54.938 **Mn** **Manganese** 7.47 g/cm³	PLMN2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLMN2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLMN2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLMN2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLMN2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLMN2-3X	500 mL	10,000 µg/mL	5% HNO3
80 200.59 **Hg** **Mercury** 13.534 g/cm³	PLHG2-1AY	125 mL	10 µg/mL	5% HNO3
	PLHG2-1Y	125 mL	100 µg/mL	5% HNO3
	PLHG4-2Y	125 mL	1,000 µg/mL	10% HNO3
	PLHG4-3Y	125 mL	10,000 µg/mL	10% HNO3
	PLHG4-2T	250 mL	1,000 µg/mL	10% HNO3
	PLHG4-2M	30 mL	1,000 µg/mL	10% HNO3
	PLHG2-1AX	500 mL	10 µg/mL	5% HNO3
	PLHG2-1X	500 mL	100 µg/mL	5% HNO3
	PLHG4-2X	500 mL	1,000 µg/mL	10% HNO3
	PLHG4-3X	500 mL	10,000 µg/mL	10% HNO3
42 95.96 **Mo** **Molybdenum** 10.28 g/cm³	PLMO9-2Y	125 mL	1,000 µg/mL	H2O
	PLMO9-3Y	125 mL	10,000 µg/mL	H2O
	PLMO9-2T	250 mL	1,000 µg/mL	H2O
	PLMO9-2M	30 mL	1,000 µg/mL	H2O
	PLMO9-2X	500 mL	1,000 µg/mL	H2O
	PLMO9-3X	500 mL	10,000 µg/mL	H2O
60 144.242 **Nd** **Neodymium** 7.01 g/cm³	PLND2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLND2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLND2-2X	500 mL	1,000 µg/mL	2% HNO3
28 58.693 **Ni** **Nickel** 8.908 g/cm³	PLNI2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLNI2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLNI2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLNI2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLNI2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLNI2-3X	500 mL	10,000 µg/mL	5% HNO3
41 92.906 **Nb** **Niobium** 8.57 g/cm³	PLNB9-2Y	125 mL	1,000 µg/mL	H2O/0.4% HF
	PLNB9-3Y	125 mL	10,000 µg/mL	H2O/0.4% HF
	PLNB9-2M	30 mL	1,000 µg/mL	H2O/0.4% HF
	PLNB9-2X	500 mL	1,000 µg/mL	H2O/0.4% HF
	PLNB9-3X	500 mL	10,000 µg/mL	H2O/0.4% HF
46 106.42 **Pd** **Palladium** 12.023 g/cm³	PLPD3-2Y	125 mL	1,000 µg/mL	10% HCl
	PLPD3-2M	30 mL	1,000 µg/mL	10% HCl
	PLPD3-2X	500 mL	1,000 µg/mL	10% HCl

Element	Part Number	Volume	Concentration	Matrix
15 30.974 **P** **Phosphorus** 1.823 g/cm³	PLP9-2Y	125 mL	1,000 µg/mL	H2O
	PLP9-3Y	125 mL	10,000 µg/mL	H2O
	PLP9-2T	250 mL	1,000 µg/mL	H2O
	PLP9-2M	30 mL	1,000 µg/mL	H2O
	PLP9-2X	500 mL	1,000 µg/mL	H2O
	PLP9-3X	500 mL	10,000 µg/mL	H2O
78 194.064 **P** **Platinum** 21.09 g/cm³	PLPT3-2Y	125 mL	1,000 µg/mL	10% HCl
	PLPT3-2M	30 mL	1,000 µg/mL	10% HCl
	PLPT3-2X	500 mL	1,000 µg/mL	10% HCl
19 39.098 **K** **Potassium** 0.856 g/cm³	PLK2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLK2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLK2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLK2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLK1-2X	500 mL	1,000 µg/mL	2% HCl
	PLK1-3X	500 mL	10,000 µg/mL	5% HCl
	PLK2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLK2-3X	500 mL	10,000 µg/mL	5% HNO3
59 140.908 **Pr** **Praseodymium** 6.64 g/cm³	PLPR2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLPR2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLPR2-2X	500 mL	1,000 µg/mL	2% HNO3
75 186.207 **Re** **Rhenium** 21.02 g/cm³	PLRE9-2Y	125 mL	1,000 µg/mL	H2O
	PLRE9-2M	30 mL	1,000 µg/mL	H2O
	PLRE9-2X	500 mL	1,000 µg/mL	H2O
45 102.905 **Rh** **Rhodium** 12.45 g/cm³	PLRH3-2Y	125 mL	1,000 µg/mL	10% HCl
	PLRH3-2M	30 mL	1,000 µg/mL	10% HCl
	PLRH3-2X	500 mL	1,000 µg/mL	10% HCl
37 85.467 **Rb** **Rubidium** 1.532 g/cm³	PLRB2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLRB2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLRB2-2X	500 mL	1,000 µg/mL	2% HNO3
44 101.07 **Ru** **Ruthenium** 12.37 g/cm³	PLRU3-2Y	125 mL	1,000 µg/mL	10% HCl
	PLRU3-2M	30 mL	1,000 µg/mL	10% HCl
	PLRU3-2X	500 mL	1,000 µg/mL	10% HCl
62 150.36 **Sm** **Samarium** 7.353 g/cm³	PLSM2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLSM2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLSM2-2X	500 mL	1,000 µg/mL	2% HNO3

Element	Part Number	Volume	Concentration	Matrix
21 44.956 **Sc** **Scandium** 2.985 g/cm³	PLSC2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLSC2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLSC2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLSC2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLSC2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLSC2-3X	500 mL	10,000 µg/mL	5% HNO3
34 78.96 **Se** **Selenium** 4.809 g/cm³	PLSE2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLSE2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLSE2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLSE2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLSE2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLSE2-3X	500 mL	10,000 µg/mL	5% HNO3
14 28.085 **Si** **Silicon** 2.33 g/cm³	PLSI9-2Y	125 mL	1,000 µg/mL	H2O/0.4% F-
	PLSI9-3Y	125 mL	10,000 µg/mL	H2O/4% F-
	PLSI9-2T	250 mL	1,000 µg/mL	H2O/0.4% F-
	PLSI9-2M	30 mL	1,000 µg/mL	H2O/0.4% F-
	PLSI9-2X	500 mL	1,000 µg/mL	H2O/0.4% F-
	PLSI9-3X	500 mL	10,000 µg/mL	H2O/4% F-
	PLSI9A-2X	500 mL	1,000 µg/mL	H2O
	PLSI9A-3X	500 mL	10,000 µg/mL	H2O
47 107.868 **Ag** **Silver** 10.49 g/cm³	PLAG2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLAG2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLAG2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLAG2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLAG2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLAG2-3X	500 mL	10,000 µg/mL	5% HNO3
11 22.989 **Na** **Sodium** 0.968 g/cm³	PLNA2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLNA2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLNA2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLNA2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLNA1-2X	500 mL	1,000 µg/mL	2% HCl
	PLNA1-3X	500 mL	10,000 µg/mL	5% HCl
	PLNA2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLNA2-3X	500 mL	10,000 µg/mL	5% HNO3
38 87.62 **Sr** **Strontium** 2.63 g/cm³	PLSR2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLSR2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLSR2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLSR2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLSR1-2X	500 mL	1,000 µg/mL	2% HCl
	PLSR2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLSR2-3X	500 mL	10,000 µg/mL	5% HNO3
16 32.065 **S** **Sulfur** 1.96 g/cm³	PLS9-2Y	125 mL	1,000 µg/mL	H2O
	PLS9-3Y	125 mL	10,000 µg/mL	H2O
	PLS9-2T	250 mL	1,000 µg/mL	H2O
	PLS9-2M	30 mL	1,000 µg/mL	H2O
	PLS9-2X	500 mL	1,000 µg/mL	H2O
	PLS9-3X	500 mL	10,000 µg/mL	H2O
73 180.947 **Ta** **Tantalum** 16.65 g/cm³	PLTA9-2Y	125 mL	1,000 µg/mL	H2O/0.8% HF
	PLTA9-3Y	125 mL	10,000 µg/mL	H2O/0.8% HF
	PLTA9-2M	30 mL	1,000 µg/mL	H2O/0.8% HF
	PLTA9-2X	500 mL	1,000 µg/mL	H2O/0.8% HF
	PLTA9-3X	500 mL	10,000 µg/mL	H2O/0.8% HF

Element	Part Number	Volume	Concentration	Matrix
52 127.6 **Te** **Tellurium** 6.24 g/cm³	PLTE4-2Y	125 mL	1,000 µg/mL	10% HNO3
	PLTE4-2M	30 mL	1,000 µg/mL	10% HNO3
	PLTE4-2X	500 mL	1,000 µg/mL	10% HNO3
65 158.925 **Tb** **Terbium** 8.219 g/cm³	PLTB2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLTB2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLTB2-2X	500 mL	1,000 µg/mL	2% HNO3
81 204.383 **Tl** **Thallium** 11.85 g/cm³	PLTL2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLTL2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLTL2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLTL2-2X	500 mL	1,000 µg/mL	2% HNO3
90 232.038 **Th** **Thorium** 11.724 g/cm³	PLTH2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLTH2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLTH2-2X	500 mL	1,000 µg/mL	2% HNO3
69 168.934 **Tm** **Thulium** 9.321 g/cm³	PLTM2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLTM2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLTM2-2X	500 mL	1,000 µg/mL	2% HNO3
50 118.71 **Sn** **Tin** 7.31 g/cm³	PLSN5-2Y	125 mL	1,000 µg/mL	20% HCl
	PLSN5-3Y	125 mL	10,000 µg/mL	20% HCl
	PLSN5-2T	250 mL	1,000 µg/mL	20% HCl
	PLSN5-2M	30 mL	1,000 µg/mL	20% HCl
	PLSN2-2X	500 mL	1,000 µg/mL	1% HNO3/1% HF
	PLSN2-3X	500 mL	10,000 µg/mL	2% HNO3/2% HF
	PLSN5-2X	500 mL	1,000 µg/mL	20% HCl
	PLSN5-3X	500 mL	10,000 µg/mL	20% HCl
22 47.857 **Ti** **Titanium** 4.507 g/cm³	PLTI9-2Y	125 mL	1,000 µg/mL	H2O/0.24% F-
	PLTI9-3Y	125 mL	10,000 µg/mL	H2O/2.4% F-
	PLTI9-2T	250 mL	1,000 µg/mL	H2O/0.24% F-
	PLTI9-2M	30 mL	1,000 µg/mL	H2O/0.24% F-
	PLTI5-2X	500 mL	1,000 µg/mL	20% HCl
	PLTI5-3X	500 mL	10,000 µg/mL	40% HCl
	PLTI9-2X	500 mL	1,000 µg/mL	H2O/0.24% F-
	PLTI9-3X	500 mL	10,000 µg/mL	H2O/2.4% F-
74 183.84 **W** **Tungsten** 19.25 g/cm³	PLW9-2Y	125 mL	1,000 µg/mL	H2O
	PLW9-3Y	125 mL	10,000 µg/mL	H2O
	PLW9-2M	30 mL	1,000 µg/mL	H2O
	PLW2-2X	500 mL	1,000 µg/mL	1% HNO3/2% HF
	PLW2-3X	500 mL	10,000 µg/mL	2% HNO3/5% HF
	PLW9-2X	500 mL	1,000 µg/mL	H2O
	PLW9-3X	500 mL	10,000 µg/mL	H2O

Element	Part Number	Volume	Concentration	Matrix
92 238.027 **U** **Uranium** (Depleted) 19.05 g/cm³	PLU2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLU2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLU2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLU2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLU2-3X	500 mL	10,000 µg/mL	5% HNO3
23 50.941 **V** **Vanadium** 6.11 g/cm³	PLV2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLV4-3Y	125 mL	10,000 µg/mL	15% HNO3
	PLV2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLV1-2X	500 mL	1,000 µg/mL	2% HCl
	PLV2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLV3-3X	500 mL	10,000 µg/mL	15% HCl
	PLV4-3X	500 mL	10,000 µg/mL	15% HNO3
70 173.054 **Yb** **Ytterbium** 6.57 g/cm³	PLYB2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLYB2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLYB2-2X	500 mL	1,000 µg/mL	2% HNO3
39 88.906 **Y** **Yttrium** 4.472 g/cm³	PLY2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLY2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLY2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLY2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLY2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLY2-3X	500 mL	10,000 µg/mL	5% HNO3
70 173.054 **Zn** **Zinc** 6.57 g/cm³	PLZN2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLZN2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLZN2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLZN2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLZN1-2X	500 mL	1,000 µg/mL	2% HCl
	PLZN1-3X	500 mL	10,000 µg/mL	5% HCl
	PLZN2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLZN2-3X	500 mL	10,000 µg/mL	5% HNO3
40 91.224 **Zr** **Zirconium** 6.511 g/cm³	PLZR2-2Y	125 mL	1,000 µg/mL	2% HNO3
	PLZR2-3Y	125 mL	10,000 µg/mL	5% HNO3
	PLZR2-2T	250 mL	1,000 µg/mL	2% HNO3
	PLZR2-2M	30 mL	1,000 µg/mL	2% HNO3
	PLZR2-2X	500 mL	1,000 µg/mL	2% HNO3
	PLZR2-3X	500 mL	10,000 µg/mL	5% HNO3
	PLZR3-2X	500 mL	1,000 µg/mL	10% HCl
	PLZR3-3X	500 mL	10,000 µg/mL	10% HCl

Blanks & ICP Standards Kit

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.

Matrix Blanks for AA & ICP

Element	Volume	Matrix	Part #
Nitric Acid Blank	500 mL	5% HNO_3	PLBLK-HNO3
Hydrochloric Acid Blank	500 mL	5% HCl	PLBLK-HCL
DI Water Blank	500 mL	H_2O	PLBLK-H2O
DI Water Blank	1 L	H_2O	PLBLK-H2O-1L
DI Water Blank	2 L	H_2O	PLBLK-H2O-2L
DI Water Blank	4 L	H_2O	PLBLK-H2O-4L

ICP Standards Kit

Assurance® Grade, Set of 38 Single-Element Standards.

Assurance® Grade Standards Kit for AA & ICP

Element	Concentration	Volume	Matrix	Part #
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	1,000 µg/mL each	125 mL each	2% HNO_3	ICP-KIT-1
Bi, Hg			10% HNO_3	
Sn			20% HCl	
B, Mo, P, S, W			H_2O	
Sb			H_2O/0.6% Tartaric Acid/ tr. HNO_3	
Ti			H_2O/0.24% F^-	
Nb, Si			H_2O/0.4% F^-	

Lab Bench Tools

Units of Measurement

Common Unit Prefixes

Prefix	kilo	centi	milli	micro	nano	pico	femto	atto
Symbol	k	c	m	µ	n	p	f	a
Factor	10^{3}	10^{-2}	10^{-3}	10^{-6}	10^{-9}	10^{-12}	10^{-15}	10^{-18}
Equivalence	thousand	hundredth	thousandth	millionth	billionth	trillionth	quadrillionth	quintillionth

Weight to Weight Concentrations

Name	*Symbol*	*Equivalence*			
Parts per thousand *	ppt*	g/kg	mg/g	µg/mg	ng/µg
Parts per million	ppm	mg/kg	µg/g	ng/mg	pg/µg
Parts per billion	ppb	µg/kg	ng/g	pg/mg	fg/µg
Parts per trillion **	ppt**	ng/kg	pg/g	fg/mg	ag/µg

Concentration Conversions

Unit	*Symbol*	*ppt**	*ppm*	*ppb*	*ppt***
1 part per thousand *	ppt*	-	1×10^{3}	1×10^{6}	1×10^{9}
1 part per million	ppm	1×10^{-3}	-	1×10^{3}	1×10^{6}
1 part per billion	ppb	1×10^{-6}	1×10^{-3}	-	1×10^{3}
1 part per trillion **	ppt**	1×10^{-9}	1×10^{-6}	1×10^{-3}	-

Weight to Volume Concentrations

Name	*Symbol*	*Equivalence*			
Parts per thousand *	ppt*	g/L	mg/mL	µg/µL	ng/nL
Parts per million	ppm	mg/L	µg/mL	ng/µL	pg/nL
Parts per billion	ppb	µg/L	ng/mL	pg/µL	fg/nL
Parts per trillion **	ppt**	ng/L	pg/mL	fg/µL	ag/nL

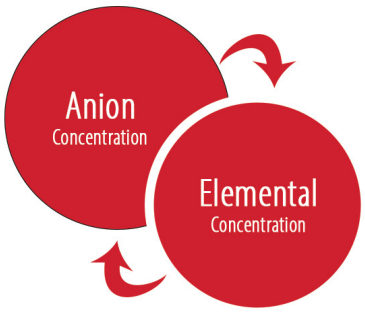
** ppt = parts per thousand*
*** ppt = parts per trillion*

Temperature Scale

Scale	*Symbol*	*Convert To*	*Formula*
Celsius	°C	Fahrenheit	°F = °C x 1.8 + 32
Celsius	°C	Kelvin	°K = °C + 273
Fahrenheit	°F	Celsius	°C = (°F - 32) / 1.8
Fahrenheit	°F	Kelvin	°K = (°F - 32) / 1.8 + 273
Kelvin	°K	Celsius	°C = °K - 273
Kelvin	°K	Fahrenheit	°F = 1.8 (°K - 273) + 32

Anion to Elemental Concentration

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



Anion Concentration		Elemental Concentration
1,000 µg/mL Nitrate	=	226 µg/mL Nitrogen
1,000 µg/mL Nitrite	=	305 µg/mL Nitrogen
1,000 µg/mL Phosphate	=	326 µg/mL Phosphorus
1,000 µg/mL Sulfate	=	334 µg/mL Sulfur
1,000 µg/mL Nitrogen as Nitrate	=	1,000 µg/mL Nitrogen
1,000 µg/mL Nitrogen as Nitrite	=	1,000 µg/mL Nitrogen
1,000 µg/mL Phosphorus as Phosphate	=	1,000 µg/mL Phosphorus
1,000 µg/mL Sulfur as Sulfate	=	1,000 µg/mL Sulfur

Speciation Standards

Speciation analysis has become common in many fields, including environmental, food and pharmaceutical testing labs. To analyze species within a sample requires Certified Reference Materials (CRMs) for sample verification and method validation. Many speciation standards are available in today's market, however, most of them are not certified or analyzed with a state-of-the-art ICP, ICP-MS or LC-ICP-MS. Spex CertiPrep offers a wide variety of speciation standards, certified to the strictest ISO 17034 guidelines, and tested on our own LC-ICP-MS.

Assurance® Grade Single Speciation Standards

Elements	Concentration	Volume	Matrix	Part #
Arsenic +3	1,000 µg/mL	30 mL	2% HCl	SPEC-AS3M
Arsenic +3	1,000 µg/mL	125 mL	2% HCl	SPEC-AS3
Arsenic +5	1,000 µg/mL	30 mL	H_2O	SPEC-AS5M
Arsenic +5	1,000 µg/mL	125 mL	H_2O	SPEC-AS5
Chromium +3	1,000 µg/mL	30 mL	2% HNO_3	SPEC-CR3M
Chromium +3	1,000 µg/mL	125 mL	2% HNO_3	SPEC-CR3
Chromium +6	1,000 µg/mL	30 mL	H_2O	SPEC-CR6M
Chromium +6	1,000 µg/mL	125 mL	H_2O	SPEC-CR6
Selenium +4	1,000 µg/mL	30 mL	2% HNO_3	SPEC-SE4M
Selenium +4	1,000 µg/mL	125 mL	2% HNO_3	SPEC-SE4
Selenium +6	1,000 µg/mL	30 mL	H_2O	SPEC-SE6M
Selenium +6	1,000 µg/mL	125 mL	H_2O	SPEC-SE6

Claritas PPT® Single-Element Standards for ICP-MS

Element Key

Z AMU
El
Element
Density

Element	Part Number	Volume	Concentration	Matrix
13 26.982 **Al** **Aluminum** 2.7 g/cm³	CLAL2-1AM	30 mL	10 µg/mL	2% HNO3
	CLAL2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLAL2-1AY	125 mL	10 µg/mL	2% HNO3
	CLAL2-1BY	125 mL	1 µg/mL	2% HNO3
	CLAL2-2Y	125 mL	1,000 µg/mL	2% HNO3
51 121.760 **Sb** **Antimony** 6.697 g/cm³	CLSB7-2M	30 mL	1,000 µg/mL	H2O/0.6% Tartaric Acid/tr. HNO3
	CLSB7-2Y	125 mL	1,000 µg/mL	H2O/0.6% Tartaric Acid/tr. HNO3
33 74.922 **As** **Arsenic** 5.727 g/cm³	CLAS2-1AM	30 mL	10 µg/mL	2% HNO3
	CLAS2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLAS2-1AY	125 mL	10 µg/mL	2% HNO3
	CLAS2-1BY	125 mL	1 µg/mL	2% HNO3
	CLAS2-2Y	125 mL	1,000 µg/mL	2% HNO3
56 137.327 **Ba** **Barium** 3.51 g/cm³	CLBA2-2Y	125 mL	1,000 µg/mL	2% HNO3
	CLBA2-2M	30 mL	1,000 µg/mL	2% HNO3
4 9.012 **Be** **Beryllium** 1.848 g/cm³	CLBE2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLBE2-1BY	125 mL	1 µg/mL	2% HNO3
	CLBE2-2Y	125 mL	1,000 µg/mL	2% HNO3
83 208.980 **Bi** **Bismuth** 9.78 g/cm³	CLBI2-1AM	30 mL	10 µg/mL	2% HNO3
	CLBI2-1AY	125 mL	10 µg/mL	2% HNO3
	CLBI2-1BY	125 mL	1 µg/mL	2% HNO3
5 10.811 **B** **Boron** 2.46 g/cm³	CLB9-1BY	125 mL	1 µg/mL	H2O
48 112.411 **Cd** **Cadmium** 8.65 g/cm³	CLCD2-1AM	30 mL	10 µg/mL	2% HNO3
	CLCD2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLCD2-1AY	125 mL	10 µg/mL	2% HNO3
	CLCD2-2Y	125 mL	1,000 µg/mL	2% HNO3
20 40.078 **Ca** **Calcium** 1.55 g/cm³	CLCA2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLCA2-2Y	125 mL	1,000 µg/mL	2% HNO3

Element	Part Number	Volume	Concentration	Matrix
24 51.996 **Cr** **Chromium** 7.14 g/cm³	CLCR2-1AM	30 mL	10 µg/mL	2% HNO3
	CLCR2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLCR2-1AY	125 mL	10 µg/mL	2% HNO3
	CLCR2-2Y	125 mL	1,000 µg/mL	2% HNO3
27 58.933 **Co** **Cobalt** 8.9 g/cm³	CLCO2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLCO2-2Y	125 mL	1,000 µg/mL	2% HNO3
29 63.546 **Cu** **Copper** 8.92 g/cm³	CLCU2-1AM	30 mL	10 µg/mL	2% HNO3
	CLCU2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLCU2-1AY	125 mL	10 µg/mL	2% HNO3
	CLCU2-2Y	125 mL	1,000 µg/mL	2% HNO3
64 157.25 **Gd** **Gadolinium** 7.9 g/cm³	CLGD2-1BY	125 mL	1 µg/mL	2% HNO3
31 69.723 **Ga** **Gallium** 5.904 g/cm³	CLGA2-1BY	125 mL	1 µg/mL	2% HNO3
32 72.63 **Ge** **Germanium** 5.323 g/cm³	CLGE9-1AM	30 mL	10 µg/mL	H2O/tr. F-
	CLGE9-1AY	125 mL	10 µg/mL	H2O/tr. F-
79 196.967 **Au** **Gold** 19.3 g/cm³	CLAU1-1AM	30 mL	10 µg/mL	2% HCl
	CLAU1-1M	30 mL	100 µg/mL	2% HCl
	CLAU1-1AY	125 mL	10 µg/mL	2% HCl
	CLAU1-1Y	125 mL	100 µg/mL	2% HCl
	CLAU6-1BY	125 mL	1 µg/mL	1% HNO3/3% HCl
49 114.818 **In** **Indium** 7.31 g/cm³	CLIN2-1AM	30 mL	10 µg/mL	2% HNO3
	CLIN2-1AY	125 mL	10 µg/mL	2% HNO3
	CLIN2-1BY	125 mL	1 µg/mL	2% HNO3
	CLIR1-1BY	125 mL	1 µg/mL	2% HCl
26 55.845 **Fe** **Iron** 7.874 g/cm³	CLFE2-1AM	30 mL	10 µg/mL	2% HNO3
	CLFE2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLFE2-1BY	125 mL	1 µg/mL	2% HNO3
	CLFE2-1AY	125 mL	10 µg/mL	2% HNO3
	CLFE2-2Y	125 mL	1,000 µg/mL	2% HNO3
82 207.2 **Pb** **Lead** 11.34 g/cm³	CLPB2-1AM	30 mL	10 µg/mL	2% HNO3
	CLPB2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLPB2-1AY	125 mL	10 µg/mL	2% HNO3
	CLPB2-1BY	125 mL	1 µg/mL	2% HNO3
	CLPB2-2Y	125 mL	1,000 µg/mL	2% HNO3

Element	Part Number	Volume	Concentration	Matrix
3 6.941 **Li** **Lithium** 6.146 g/cm³	CLLI2-1BY	125 mL	1 µg/mL	2% HNO3
71 174.967 **Lu** **Lutetium** 9.841 g/cm³	CLLU2-1BY	125 mL	1 µg/mL	2% HNO3
12 24.305 **Mg** **Magnesium** 1.738 g/cm³	CLMG2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLMG2-2Y	125 mL	1,000 µg/mL	2% HNO3
25 54.938 **Mn** **Manganese** 7.47 g/cm³	CLMN2-1AM	30 mL	10 µg/mL	2% HNO3
	CLMN2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLMN2-1AY	125 mL	10 µg/mL	2% HNO3
	CLMN2-1BY	125 mL	1 µg/mL	2% HNO3
	CLMN2-2Y	125 mL	1,000 µg/mL	2% HNO3
80 200.59 **Hg** **Mercury** 13.534 g/cm³	CLHG2-1AM	30 mL	10 µg/mL	5% HNO3
	CLHG4-2M	30 mL	1,000 µg/mL	10% HNO3
	CLHG2-1AY	125 mL	10 µg/mL	5% HNO3
	CLHG4-2Y	125 mL	1,000 µg/mL	10% HNO3
	CLHG6-1BY	125 mL	1 µg/mL	0.7% HNO3/0.4% HCl
42 95.96 **Mo** **Molybdenum** 10.28 g/cm³	CLMO9-2M	30 mL	1,000 µg/mL	H2O
	CLMO9-1BY	125 mL	1 µg/mL	H2O
	CLMO9-2Y	125 mL	1,000 µg/mL	H2O
60 144.242 **Nd** **Neodymium** 7.01 g/cm³	CLND2-1BY	125 mL	1 µg/mL	2% HNO3
28 58.693 **Ni** **Nickel** 8.908 g/cm³	CLNI2-1AM	30 mL	10 µg/mL	2% HNO3
	CLNI2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLNI2-1AY	125 mL	10 µg/mL	2% HNO3
	CLNI2-1BY	125 mL	1 µg/mL	2% HNO3
	CLNI2-2Y	125 mL	1,000 µg/mL	2% HNO3
46 106.42 **Pd** **Palladium** 12.023 g/cm³	CLPD1-1AM	30 mL	10 µg/mL	2% HCl
	CLPD1-1AY	125 mL	10 µg/mL	2% HCl
15 30.974 **P** **Phosphorus** 1.823 g/cm³	CLP9-1BY	125 mL	1 µg/mL	H2O

Element	Part Number	Volume	Concentration	Matrix
78 194.064 **P** **Platinum** 21.09 g/cm³	CLPT1-1AM	30 mL	1 µg/mL	2% HCl
	CLPT1-1AY	125 mL	1 µg/mL	2% HCl
	CLPT1-1BY	125 mL	1 µg/mL	2% HCl
19 39.098 **K** **Potassium** 0.856 g/cm³	CLK2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLK2-2Y	125 mL	1,000 µg/mL	2% HNO3
45 102.905 **Rh** **Rhodium** 12.45 g/cm³	CLRH1-1AM	30 mL	10 µg/mL	2% HCl
	CLRH1-1AY	125 mL	10 µg/mL	2% HCl
21 44.956 **Sc** **Scandium** 2.985 g/cm³	CLSC2-1AM	30 mL	10 µg/mL	2% HNO3
	CLSC2-1AY	125 mL	10 µg/mL	2% HNO3
34 78.96 **Se** **Selenium** 4.809 g/cm³	CLSE2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLSE2-2Y	125 mL	1,000 µg/mL	2% HNO3
14 28.085 **Si** **Silicon** 2.33 g/cm³	CLSI9-1BY	125 mL	1 µg/mL	H2O/tr. F-
47 107.868 **Ag** **Silver** 10.49 g/cm³	CLAG2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLAG2-2Y	125 mL	1,000 µg/mL	2% HNO3
11 22.989 **Na** **Sodium** 0.968 g/cm³	CLNA2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLNA2-2Y	125 mL	1,000 µg/mL	2% HNO3
38 87.62 **Sr** **Strontium** 2.63 g/cm³	CLSR2-1BY	125 mL	1 µg/mL	2% HNO3
65 158.925 **Tb** **Terbium** 8.219 g/cm³	CLTB2-1AM	30 mL	10 µg/mL	2% HNO3
	CLTB2-1AY	125 mL	10 µg/mL	2% HNO3

Element	Part Number	Volume	Concentration	Matrix
81 204.383 **Tl** **Thallium** 11.85 g/cm³	CLTL2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLTL2-2Y	125 mL	1,000 µg/mL	2% HNO3
90 232.038 **Th** **Thorium** (Depleted) 11.724 g/cm³	CLTH2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLTH2-1BY	125 mL	1 µg/mL	2% HNO3
	CLTH2-2Y	125 mL	1,000 µg/mL	2% HNO3
50 118.71 **Sn** **Tin** 7.31 g/cm³	CLSN2-2M	30 mL	1,000 µg/mL	1% HNO3/1% HF
	CLSN2-2Y	125 mL	1,000 µg/mL	1% HNO3/1% HF
22 47.857 **Ti** **Titanium** 4.507 g/cm³	CLTI9-2M	30 mL	1,000 µg/mL	H2O/0.24% F-
	CLTI9-2Y	125 mL	1,000 µg/mL	H2O/0.24% F-
74 183.84 **W** **Tungsten** 19.25 g/cm³	CLW2-1BY	125 mL	1 µg/mL	2% HNO3/tr. HF
92 238.027 **U** **Uranium** (Depleted) 19.05 g/cm³	CLU2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLU2-1BY	125 mL	1 µg/mL	2% HNO3
	CLU2-2Y	125 mL	1,000 µg/mL	2% HNO3
23 50.941 **V** **Vanadium** 6.11 g/cm³	CLV2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLV2-2Y	125 mL	1,000 µg/mL	2% HNO3
39 88.906 **Y** **Yttrium** 4.472 g/cm³	CLY2-1AM	30 mL	10 µg/mL	2% HNO3
	CLY2-1AY	125 mL	10 µg/mL	2% HNO3
	CLY2-1BY	125 mL	1 µg/mL	2% HNO3
70 173.054 **Zn** **Zinc** 6.57 g/cm³	CLZN2-1AM	30 mL	10 µg/mL	2% HNO3
	CLZN2-2M	30 mL	1,000 µg/mL	2% HNO3
	CLZN2-1BY	125 mL	1 µg/mL	2% HNO3
	CLZN2-1AY	125 mL	10 µg/mL	2% HNO3
	CLZN2-2Y	125 mL	1,000 µg/mL	2% HNO3
40 91.224 **Zr** **Zirconium** 6.511 g/cm³	CLZR2-1BY	125 mL	1 µg/mL	2% HNO3

Matrix Blanks & Isotopes for ICP-MS

Matrix Blanks

Description	Volume	Matrix	Part #
Hydrochloric Acid Blank	125 mL	2% HCl	CLBLK-HCL
Nitric Acid Blank	30 mL	2% HNO_3	CLBLK-HNO3M
Nitric Acid Blank	125 mL	2% HNO_3	CLBLK-HNO3
DI Water Blank	125 mL	H_2O	CLBLK-H2O

Isotopes for ICP-MS

Elements	Concentration	Volume	Matrix	Part #
Boron 11	10 µg/mL	125 mL	H_2O	ISOT-B11
Copper 65	10 µg/mL	125 mL	2% HNO_3	ISOT-CU65
Lead 206	10 µg/mL	125 mL	2% HNO_3	ISOT-PB206
Lead 207	10 µg/mL	125 mL	2% HNO_3	ISOT-PB207
Zinc 68	10 µg/mL	125 mL	2% HNO_3	ISOT-ZN68

Assurance® Mixed Multi-Element Standards for AA & ICP

The following Calibration Standards are provided for routine instrument calibration. The concentrations and matrices have been selected for convenience of use and stability.

For use in US EPA Method 200.7 (Revision 4.4) and SW-846, Method 6010 (Third Edition).

Mixed Calibration Standard 1A

Elements	Concentration	Matrix
Ag	5 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF
Ba	10 µg/mL	
B, Cd, Cu, Mn	20 µg/mL	
Sb, Se	50 µg/mL	
As, Ca	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD1A-100	500 mL	MIXSTD1A-500

Mixed Calibration Standard 1C

Elements	Concentration	Matrix
Ag	5 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF
B, Ba	10 µg/mL	
Cd, Cu, Mn	20 µg/mL	
Sb, Se	50 µg/mL	
As, Ca	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD1C-100	500 mL	MIXSTD1C-500

Mixed Calibration Standard 2A

Elements	Concentration	Matrix
Sr	10 µg/mL	5% HNO_3
Li	50 µg/mL	
Mo, Na	100 µg/mL	
K	200 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD2A-100	500 mL	MIXSTD2A-500

Mixed Calibration Standard 3A

Elements	Concentration	Matrix
Ce, Co, V	20 µg/mL	5% HNO_3
P	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD3A-100	500 mL	MIXSTD3A-500

Mixed Calibration Standard 4A w/Mercury

MIXSTD4A-100 contains 1 each of MXSTD4A-100N and PLHG2-1AY | MIXSTD4A-500 contains 1 each of MXSTD4A-500N and PLHG2-1AX

Elements	Concentration	Matrix
Sn	40 µg/mL	5% HNO_3/tr. HF
Cr, Zn	50 µg/mL	
Al, Hg*, SiO_2, Ti	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD4A-100	500 mL	MIXSTD4A-500

** Mercury is supplied as a separate solution (PLGH2-1AY/X) due to incompatibility with other elements.*

Mixed Calibration Standard 4A w/o Mercury

Elements	Concentration	Matrix
Sn	40 µg/mL	5% HNO_3/tr. HF
Cr, Zn	50 µg/mL	
Al, SiO_2, Ti	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MXSTD4A-100N	500 mL	MXSTD4A-500N

Mixed Calibration Standard 5A

Elements	Concentration	Matrix
Be	10 µg/mL	5% HNO_3
Ni	20 µg/mL	
Tl	50 µg/mL	
Fe, Mg, Pb	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD5A-100	500 mL	MIXSTD5A-500

Calibration Standards w/ Mercury*, 125 mL

Set Contains	Part #
MIXSTD1A-100	MIXSTD-SETA
MIXSTD2A-100	
MIXSTD3A-100	
MIXSTD4A-100	
MIXSTD5A-100	
PLHG2-1Y	

Calibration Standards w/o Mercury, 125 mL

Set Contains	Part #
MIXSTD1A-100	MXSTD-SETAN
MIXSTD2A-100	
MIXSTD3A-100	
MXSTD4A-100N	
MIXSTD5A-100	

** Mercury is supplied as a separate solution (PLGH2-1X/Y) due to incompatibility with other elements.*

Mixed Calibration Standards, 125 mL

Set Contains	Part #
MIXSTD1-100	MIXSTD-SET
MIXSTD2-100	
MIXSTD3-100	
MIXSTD4-100	
MIXSTD5-100	

Mixed Calibration Standard 1

Elements	Concentration	Matrix
Be	50 µg/mL	2% HNO_3
Mn	100 µg/mL	
Cd, Zn	150 µg/mL	
Se	200 µg/mL	
Pb	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD1-100	500 mL	MIXSTD1-500

Mixed Calibration Standard 2

Elements	Concentration	Matrix
Ba, Co, Cu, V	100 µg/mL	5% HNO_3
Fe	10,000 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD2-100	500 mL	MIXSTD2-500

Mixed Calibration Standard 3

Elements	Concentration	Matrix
Mo, Si	100 µg/mL	2% HNO_3/tr. HF
As	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD3-100	500 mL	MIXSTD3-500

Mixed Calibration Standard 4

Elements	Concentration	Matrix
Cr, Ni	20 µg/mL	5% HNO_3
Al, Na	200 µg/mL	
K	400 µg/mL	
Ca	1,000 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD4-100	500 mL	MIXSTD4-500

Mixed Calibration Standard 5

Elements	Concentration	Matrix
Ag	50 µg/mL	5% HNO3/tr. Tartaric Acid/tr. HF
B	100 µg/mL	
Sb, Tl	200 µg/mL	
Mg	1,000 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MIXSTD5-100	500 mL	MIXSTD5-500

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 for methods development. Check your ICP manual or service guide for more information.

Instrument Check Standard 3

Elements	Concentration	Matrix
As, La, Li, Mn, Mo, Na, Ni, Sc	20 µg/mL	5% HCl
K, P, S	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	CALMIX3-100	500 mL	CALMIX3-500

Instrument Check Standard 4

Elements	Concentration	Matrix
Ba	1 µg/mL	2% HNO_3
Al, As, Cu, Mn, Na, Ni, P, Pb, Sc, Zn	10 µg/mL	
K	50 µg/mL	

Volume	Part #	Volume	Part #
125 mL	CALMIX4-100	500 mL	CALMIX4-500

Instrument Check Standard 7

Elements	Concentration	Matrix
Al, As, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Zn	100 µg/mL	2% HNO_3
Y	600 µg/mL	

Volume	Part #	Volume	Part #
125 mL	CALMIX7-100	500 mL	CALMIX7-500

Instrument Check Standard 8

Elements	Concentration	Matrix
Al, As, Co, Cr, Cu, K, Na, P, Pb	50 µg/mL	2% HNO_3

Volume	Part #	Volume	Part #
125 mL	CALMIX8-100	500 mL	CALMIX8-500

Instrument Check Standard 10

Elements	Concentration	Matrix
Al, Ba, Cd, Cu, Mn, Zn	50 µg/mL	2% HNO_3
K	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	CALMIX10-100	500 mL	CALMIX10-500

Quality Control Standards

Quality Control Standards are used to check the standard curve, the procedure for inter-element 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% of 1 µg/mL, the laboratory performance is unacceptable. The source of the problem should be identified and corrected before continuing the analysis.

Quality Control Standard 7

Elements	Concentration	Matrix
Si	50 µg/mL	5% HNO_3/tr. F^-
Ag, Al, B, Ba, Na	100 µg/mL	
K	1,000 µg/mL	

Volume	Part #	Volume	Part #
125 mL	QC-7	500 mL	QC-7-500

Quality Control Standard 7A

Elements	Concentration	Matrix
Ag	50 µg/mL	5% HNO_3/tr. HF
Al, B, Ba, Na	100 µg/mL	
Si	500 µg/mL	
K	1,000 µg/mL	

Volume	Part #	Volume	Part #
125 mL	QC-7A	500 mL	QC-7A-500

Quality Control Standard 21

Elements	Concentration	Matrix
As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn	100 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF

Volume	Part #	Volume	Part #	Volume	Part #
125 mL	QC-21	250 mL	QC-21-250	500 mL	QC-21-500

Quality Control Standard 22

Elements	Concentration	Matrix
Ag	50 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF
As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn	100 µg/mL	

Volume	Part #	Volume	Part #	Volume	Part #
125 mL	QC-22	250 mL	QC-22-250	500 mL	QC-22-500

Quality Control Standard 23

Elements	Concentration	Matrix
Ag, Al, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Li, Mg, Mn, Na, Ni, Pb, Sr, Tl, Zn	1,000 µg/mL	10% HNO_3

Volume	Part #
125 mL	QC-23

Quality Control Standard 24

Elements	Concentration	Matrix
Ag, Al, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Li, Mg, Mn, Na, Ni, Pb, Tl, Zn	10 µg/mL	10% HNO_3

Volume	Part #
125 mL	QC-24

Set of 2 Quality Control Standards, 125 mL

Set Contains	Part #
QC-21	QC-SETA
QC-7A	

Set of 2 Quality Control Standards, 125 mL

Set Contains	Part #
QC-21	QC-SETB
QC-7	

Laboratory Fortifying Stock (LFS) Solutions

Used for spiking the laboratory fortified blank and the laboratory fortified sample matrix. Two (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. *Note: LFS Solution 1 does not contain Ca, K, Mg, or Na because their concentration will vary from one environmental sample to the other. Please view pages 10-21 for all single-element CRMs.*

LFS Solution 1 w/ Mercury*

(LFS-1-100 contains LFS-1-100N and PLHG2-1AY | LFS-1-500 contains LFS-1-500N and PLHG2-1AX)

Elements	Concentration	Matrix
Ag	2.5 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF
Be	5 µg/mL	
Cd, Co, Hg*, Mo, Sn, V	10 µg/mL	
Al, As, B, Ba, Cr, Cu, Fe, Li, Mn, Ni, Pb, Sb, Se, SiO_2, Sr, Tl, Zn	25 µg/mL	
P	50 µg/mL	

Volume	Part #	Volume	Part #
125 mL	LFS-1-100	500 mL	LFS-1-500

** Mercury is supplied as a separate solution (PLHG2-1AY/AX (10 µg/mL)) due to incompatibility with other elements.*

LFS Solution 1 w/o Mercury

Elements	Concentration	Matrix
Ag	2.5 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF
Be	5 µg/mL	
Cd, Co, Mo, Sn, V	10 µg/mL	
Al, As, B, Ba, Cr, Cu, Fe, Li, Mn, Ni, Pb, Sb, Se, SiO_2, Sr, Tl, Zn	25 µg/mL	
P	50 µg/mL	

Volume	Part #	Volume	Part #
125 mL	LFS-1-100N	500 mL	LFS-1-500N

LFS Solution 2

Elements	Concentration	Matrix
Ag	5 µg/mL	Multiple
Sb, As, Sn, Mo, V, B, Ba, Be, Cd, Cr, Co, Cu, Si, Mn, Ni, Tl, Zn	10 µg/mL	
Ca, SiO_2, Ti, Se, Pb, Al, Fe, Mg, Na, Ce	25 µg/mL	
P	50 µg/mL	
K	250 µg/mL	

Volume	Part #
125 mL	LFS-2-100

Laboratory Performance Check (LPC) Standards

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 of the interval, reanalyze the LPC. If the analyte is again outside of the ± 5% limit, the instrument should be recalibrated and all samples following the last acceptable LPC solution should be reanalyzed.

LPC Standard w/ Mercury*

LPC-1-100 contains LPC-1-100N and PLHG2-1Y | LPC-1-500 contains LPC-1-500N and PLHG2-1X

Elements	Concentration	Matrix
Ag	5 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF
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	20 µg/mL	
Hg*, K, P, SiO_2	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	LPC-1-100	125 mL	LPC-1-500

** Mercury is supplied as a separate solution (PLHG2-1X/Y (10 µg/mL)) due to incompatibility with other elements.*

LPC Standard w/o Mercury*

Elements	Concentration	Matrix
Ag	5 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF
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	20 µg/mL	
K, P, SiO_2	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	LPC-1-100N	125 mL	LPC-1-500N

Environmental EPA Sets

For use in US EPA Method 6010 and 200.7 (Revision 4.4).

Environmental EPA Set w/ Mercury*, 125 mL**

Set Contains	Part #
MIXSTD1-100	EPA-SET
MIXSTD2-100	
MIXSTD3-100	
MIXSTD4-100	
MIXSTD5-100	
INTER18-100	
INTER5-100	
PLHG2-1Y	
PLSB7-2Y	
PLBLK-HCL**	
PLBLK-HNO3**	

Environmental EPA Set w/o Mercury, 125 mL**

Set Contains	Part #
MIXSTD1-100	EPA-SETN
MIXSTD2-100	
MIXSTD3-100	
MIXSTD4-100	
MIXSTD5-100	
INTER18-100N	
INTER5-100	
PLSB7-2Y	
PLBLK-HCL**	
PLBLK-HNO3**	

** Mercury is supplied as a separate solution (PLHG2-1X/1Y) due to incompatibility with other elements.*
*** PLBLK-HCL and PLBLK-HNO3 are at 500 mL.*

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 inter-element correction factors are set for simultaneous ICP spectrometers.

For use in US EPA Method 200.7 (Revision 4.4) and SW-846, Method 6010 (Third Edition).

Interference Check Standard 1

Elements	Concentration	Matrix
Sb	1,000 µg/mL	H_2O/tr. HNO_3/0.6% Tartaric Acid

Volume	Part #	Volume	Part #
125 mL	PLSB7-2Y	500 mL	PLSB7-2X

Interference Check Standard 5

Elements	Concentration	Matrix
Na	1,000 µg/mL	5% HNO_3
Al	1,200 µg/mL	
Mg	3,000 µg/mL	
Fe	5,000 µg/mL	
Ca	6,000 µg/mL	

Volume	Part #	Volume	Part #
125 mL	INTER5-100	500 mL	INTER5-500

Interference Check Standard 18 w/ Mercury*

INTER18-100 contains 1 each of INTER18-100N and PLHG2-1Y | INTER18-500 contains 1 each of INTER18-500N and PLHG2-1X

Elements	Concentration	Matrix
Be, Hg*	100 µg/mL	5% HNO_3
Mn	200 µg/mL	
Ag, Ba, Cd, Co, Cr, Cu, Ni, V, Zn	300 µg/mL	
Se	500 µg/mL	
As, Pb, Tl	1,000 µg/mL	
K	20,000 µg/mL	

Volume	Part #	Volume	Part #
125 mL	INTER18-100	500 mL	INTER18-500

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

Interference Check Standards w/ Mercury, 125 mL

Set Contains	Part #
PLSB7-2Y	INTER-SET
PLHG2-1Y	
INTER5-100	
INTER18-100	

Interference Check Standards w/o Mercury, 125 mL

Set Contains	Part #
PLSB7-2Y	INTER-SETN
INTER5-100	
INTER18-100N	
PLSB7-2Y	
INTER5-100	
INTER18-100N	

Interference Check Standards (continued)

Blank Table

Elements	Concentration	Matrix
Be	100 µg/mL	5% HNO_3
Mn	200 µg/mL	
Ag, Ba, Cd, Co, Cr, Cu, Ni, V, Zn	300 µg/mL	
Se	500 µg/mL	
As, Pb, Tl	1,000 µg/mL	
K	20,000 µg/mL	

Volume	Part #	Volume	Part #
125 mL	INTER18-100N	500 mL	INTER18-500N

Toxicity Characteristic Leachate Performance (TCLP) Standards

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. In addition to the Spex CertiPrep TCLP Standards, designed with all of the elements in one solution, the Toxicity Characteristic rule separates the elements according to specific instrumentation: ICP, GFAA, and Cold Vapor AA.

For use in accordance with the Toxicity Characteristic Rule Regulatory Levels issued in the Federal Register 55, 11846 March 1990; Method 1311.

TCLP Standard w/ Mercury*

TCLP-100 contains 1 each of TCLP-100N and PLHG2-1Y | TCLP-500 contains one each of TCLP-500N and PLHG2-1X

Elements	Concentration	Matrix
Cd, Se	5 µg/mL	2% HNO_3
Ag, As, Cr, Pb	25 µg/mL	
Hg*	100 µg/mL	
Ba	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	TCLP-100	500 mL	TCLP-500

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

TCLP Standard w/o Mercury

Elements	Concentration	Matrix
Cd, Se	5 µg/mL	2% HNO_3
Ag, As, Cr, Pb	25 µg/mL	
Ba	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	TCLP-100N	500 mL	TCLP-500N

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 of the drinking water contamination levels are required.

Refer to US National Primary Drinking Water Regulations 40 CFR, Part 141.

Primary Drinking Water Metals w/ Mercury*

EP-8 contains 1 each of EP-8N and PLHG2-1AY | EP-8-500 contains 1 each of EP-8-500N and PLHG2-1AX

Elements	Concentration	Matrix
Cd, Se	5 µg/mL	2% HNO_3
Ag, As, Cr, Hg*, Pb	10 µg/mL	
Ba	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	EP-8	500 mL	EP-8-500

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

Primary Drinking Water Metals w/o Mercury

Elements	Concentration	Matrix
Cd, Se	5 µg/mL	2% HNO_3
Ag, As, Cr, Pb	10 µg/mL	
Ba	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	EP-8N	500 mL	EP-8-500N

Secondary Drinking Water Metals

Elements	Concentration	Matrix
Mn	5 µg/mL	2% HNO_3
Fe	30 µg/mL	
Cu	100 µg/mL	
Zn	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	EP-4	500 mL	EP-4-500

Drinking Water Standards w/Mercury*, 125 mL

Set Contains	Part #
EP-8	DW-SET
EP-4	
PLHG2-1AY	

Drinking Water Standards w/o Mercury, 125 mL

Set Contains	Part #
EP-8N	DW-SETN
EP-4	

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

Groundwater and Wastewater Pollution Control Check Standards

May be used either as standards or as a means to check the individual analysts 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 w/ Mercury*

WP-15 contains 1 each of WP-15N and PLHG2-1AY | WP-15-500 contains 1 each of WP-15-500N and PLHG2-1AX

Elements	Concentration	Matrix
Hg*	10 µg/mL	5% HNO_3
Cd, Se	25 µg/mL	
As, Be, Co, Cr, Cu, Fe, Mn, Ni, Pb, Zn	100 µg/mL	
V	250 µg/mL	
Al	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	WP-15	500 mL	WP-15-500

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

Trace Metals w/o Mercury

Elements	Concentration	Matrix
Cd, Se	25 µg/mL	5% HNO_3
As, Be, Co, Cr, Cu, Fe, Mn, Ni, Pb, Zn	100 µg/mL	
V	250 µg/mL	
Al	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	WP-15N	500 mL	WP-15-500N

Trace Metals II

Elements	Concentration	Matrix
Ag	10 µg/mL	2% HNO_3
Sb, Tl	25 µg/mL	

Volume	Part #	Volume	Part #
125 mL	WP-3	500 mL	WP-3-500

Trace Metals III

Elements	Concentration	Matrix
K, Mg	100 µg/mL	2% HNO_3
Ba, Ca, Mo, Na	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MN-6	500 mL	MN-6-500

Alternate Metals

Elements	Concentration	Matrix
Be, Sb, Tl	5 µg/mL	2% HNO_3
Co, Cu, Mn, Ni, Zn	10 µg/mL	
Al, Fe, V	20 µg/mL	

Volume	Part #	Volume	Part #
125 mL	WP-11	500 mL	WP-11-500

Alternate Metals III

Elements	Concentration	Matrix
K, Mg	100 µg/mL	2% HNO_3
Ca, Na	500 µg/mL	

Volume	Part #	Volume	Part #
125 mL	MN-4	500 mL	MN-4-500

Trace Metals w/ Mercury*, 125 mL

Set Contains	Part #
WP-15	TM-SET
WP-3	
MN-6	
PLHG2-1AY	

Trace Metals w/o Mercury, 125 mL

Set Contains	Part #
WP-15N	TM-SETN
WP-3	
MN-6	

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

Alternate Metals, 125 mL

Set Contains	Part #
WP-11	AM-SET
MN-4	

Claritas PPT® Multi-Element Standards for ICP-MS

Tuning Solutions

For ICP-MS instrumentation tuning and mass calibration prior to analysis.

ICP-MS Tuning Solution 1

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.

Elements	Concentration	Volume	Matrix	Part #
Ba, Be, Ce, Co, In, Li, Mg, Pb, Rh, Tl, U, Y	10 µg/mL	125 mL	5% HCl/2% HNO_3	CL-TUNE-1

ICP-MS Tuning Solution 2

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.

Elements	Concentration	Volume	Matrix	Part #
Ba, Be, Ce, Co, In, Mg, Pb, Rh, U	10 µg/mL	125 mL	2% HNO_3	CL-TUNE-2

ICP-MS Tuning Solution 3

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.

Elements	Concentration	Volume	Matrix	Part #
Be, Ce, Co, Fe, In, Mg, Pb, Th, U	1 µg/mL	125 mL	2% HNO_3	CL-TUNE-3
Ba	10 µg/mL			

ICP-MS Tuning Solution 4

A dilution of 100-fold to 1,000-fold is suggested. Dilute with Claritas PPT® Nitric Acid Blank to match your sample matrix.

Elements	Concentration	Volume	Matrix	Part #
Co, In, Li, Tl	10 µg/mL	125 mL	2% HNO_3	CL-TUNE-4

Calibration and Matrix Blanks

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% HNO3. May be used for dilution or to establish baselines.

Description	Volume	Matrix	Part #
Nitric Acid Blank	125 mL	2% HNO_3	CLBLK-HNO3
Hydrochloric Acid Blank	125 mL	2% HCl	CLBLK-HCL
DI Water Blank	125 mL	H_2O	CLBLK-H2O

Instrument Calibration

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

ICP-MS Instrument Calibration Standard 1

Elements	Concentration	Volume	Matrix	Part #
Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Th, Tl, U, V, Zn	20 µg/mL	125 mL	5% HNO_3/tr. Tartaric Acid	CL-CAL-1

ICP-MS Instrument Calibration Standard 1A

Elements	Concentration	Volume	Matrix	Part #
Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Th, Tl, U, V, Zn	10 µg/mL	125 mL	5% HNO_3/tr. Tartaric Acid	CL-CAL-1A
Se	50 µg/mL			

ICP-MS Instrument Calibration Standard 2

Elements	Concentration	Volume	Matrix	Part #
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	100 µg/mL	125 mL	5% HNO_3/tr. Tartaric Acid/tr. HF	CL-CAL-2

ICP-MS Instrument Calibration Standard 2A

Elements	Concentration	Volume	Matrix	Part #
Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Sb, Tl, V, Zn	10 µg/mL	125 mL	5% HNO_3/tr. Tartaric Acid	CL-CAL-2A
Se	50 µg/mL			

ICP-MS Instrument Calibration Standard 3

Elements	Concentration	Volume	Matrix	Part #
Ca, Fe, K, Mg, Na	1,000 µg/mL	125 mL	5% HNO_3	CL-CAL-3

ICP-MS Initial Calibration Verification Standard 1

Elements	Concentration	Volume	Matrix	Part #
Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Th, Tl, U, V, Zn	10 µg/mL	125 mL	5% HNO_3/tr. Tartaric Acid	CL-ICV-1
Ca, Fe, K, Mg, Na, Sr	1,000 µg/mL			

ICP-MS Initial Calibration Verification Standard 2

Elements	Concentration	Volume	Matrix	Part #
Sn, Ti	10 µg/mL	125 mL	2% HNO_3/tr. HF	CL-ICV-2

ICP-MS Initial Calibration Verification Standard 3

Elements	Concentration	Volume	Matrix	Part #
Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Tl, V, Zn	10 µg/mL	125 mL	5% HNO_3/tr. Tartaric Acid	CL-ICV-3
Se	50 µg/mL			
Ca, Fe, K, Mg, Na	100 µg/mL			

ICP-MS Quality Control Standard 21

Elements	Concentration	Volume	Matrix	Part #
As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn	100 µg/mL for each component	125 mL	5% HNO_3/tr. Tartaric Acid/tr. H	CL-QC-21

ICP-MS Quality Control Standard 21A

Elements	Concentration	Volume	Matrix	Part #
As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Ni, Sb, Tl, V, Zn	10 µg/mL	125 mL	5% HNO_3/tr. Tartaric Acid	CL-QC-21A
Se	50 µg/mL			

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% ^{6}Li can be analyzed as an internal standard, avoiding the signal from the ^{7}Li peak.

Single Element Internal Standards

Elements	Concentration	Volume	Matrix	Part #
Bi	10 µg/mL	125 mL	2% HNO_3	CLBI2-1AY
Ge	10 µg/mL	125 mL	H_2O/tr. F^-	CLGE9-1AY
In	10 µg/mL	125 mL	2% HNO_3	CLIN2-1AY
Rh	10 µg/mL	125 mL	2% HCl	CLRH1-1AY
Sc	10 µg/mL	125 mL	2% HNO_3	CLSC2-1AY
Tb	10 µg/mL	125 mL	2% HNO_3	CLTB2-1AY
Y	10 µg/mL	125 mL	2% HNO_3	CLY2-1AY

ICP-MS Alternate Internal Standard 1

Elements	Concentration	Matrix
Bi, Ge, In, ^{6}Li, Sc, Tb, Y	10 µg/mL	5% HNO_3

Volume	Part #
125 mL	CL-ISM1-100

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, 125 mL

Elements	Concentration	Matrix	Part #
Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn	10 µg/mL	2% HNO_3/tr. Tartaric Acid/ tr. HF	CL-ICS-1

ICP-MS Instrument Check Standard 3, 125 mL

Elements	Concentration	Matrix	Part #
Ca, Fe, K, Mg, Na	200 µg/mL	2% HNO_3	CL-ICS-3

ICP-MS Instrument Check Standard 4, 125 mL

Elements	Concentration	Matrix	Part #
Mo, Th, U	10 µg/mL	2% HNO_3	CL-ICS-4

ICP-MS Instrument Check Standard 5, 125 mL

Elements	Concentration	Matrix	Part #
Mo, Sn, Sr, Ti	10 µg/mL	2% HNO_3/tr. HF	CL-ICS-5

ICP-MS Mercury Single Element Standard, 125 mL

Elements	Concentration	Matrix	Part #
Hg	10 µg/mL	5% HNO_3	CLHG2-1AY

ICP-MS Instrument Check Standards Set, 125 mL

Set Contains	Part #
CL-ICS-1	CL-ICS-SET
CL-ICS-3	
CL-ICS-4	
CL-ICS-5	
CLHG2-1AY	

Multi-Element Solution Standards

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

ICP-MS Multi-Element Solution 1, 125 mL

Elements	Concentration	Matrix	Part #
Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Th, Tm, Y, Yb	10 µg/mL	5% HNO_3	CLMS-1

ICP-MS Multi-Element Solution 2 w/ Mercury*, 125 mL

Elements	Concentration	Matrix	Part #
Ag, Al, As, Ba, Be, Bi, Cd, Co, Cr, Cs, Cu, Fe, Ga, Hg*, In, K, Li, Mg, Mn, Na, Ni, Pb,m Rb, Se, Sr, Tl, U, V, Zn	10 µg/mL	5% HNO_3	CLMS-2

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

ICP-MS Multi-Element Solution 2 w/o Mercury, 125 mL

Kit contains 1 each of CLMS-2N and CLHG2-1AY

Elements	Concentration	Matrix	Part #
Ag, Al, As, Ba, Be, Bi, Cd, Co, Cr, Cs, Cu, Fe, Ga, In, K, Li, Mg, Mn, Na, Ni, Pb,m Rb, Se, Sr, Tl, U, V, Zn	10 µg/mL	5% HNO_3	CLMS-2N

ICP-MS Multi-Element Solution 2A w/ Mercury*, 125 mL

Kit contains 1 each of CLMS-2AN and CLHG2-1AY

Elements	Concentration	Matrix	Part #
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	10 µg/mL	5% HNO_3	CLMS-2A

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

ICP-MS Multi-Element Solution 2A w/o Mercury, 125 mL

Elements	Concentration	Matrix	Part #
Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cs, Cu, Fe, Ga, K, Li, Mg, Mn, Na, Ni, Pb, Rb, Se, Sr, Tl, U, V, Zn	10 µg/mL	5% HNO_3	CLMS-2AN

ICP-MS Multi-Element Solution 3, 125 mL

Elements	Concentration	Matrix	Part #
Au, Hf, Ir, Pd, Pt, Rh, Ru, Sb, Sn, Te	10 µg/mL	10% HCl/1% HNO_3	CLMS-3

ICP-MS Multi-Element Solution 4, 125 mL

Elements	Concentration	Matrix	Part #
B, Ge, Mo, Nb, P, Re, S, Si, Ta, Ti, W, Zr	10 µg/mL	H_2O/tr. HF/tr. HNO_3	CLMS-4

ICP-MS Multi-Element Solution 5, 125 mL

Elements	Concentration	Matrix	Part #
Be, Bi, Ce, Co, In, Mg, Ni, Pb, U	10 µg/mL	2% HNO_3	CLMS-5

ICP-MS Multi-Element Solution Standards Set with Mercury*, 125 mL

Set Contains	Part #
CLMS-1	CLMS-SET
CLMS-2	
CLMS-3	
CLMS-4	
CLBLK-HNO3	
CLBLK-HCL	
CLBLK-H2O	
CLHG2-1AY	

ICP-MS Multi-Element Solution Standards Set without Mercury, 125 mL

Set Contains	Part #
CLMS-1	CLMS-SETN
CLMS-2N	
CLMS-3	
CLMS-4	
CLBLK-HNO3	
CLBLK-HCL	
CLBLK-H2O	

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

Memory Test Solutions

To identify or confirm the maximum concentration of an analyte that does not cause a memory effect greater than the contract required detection limit (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, 125 mL

Elements	Concentration	Matrix	Part #
Ag, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Se, Tl, V, Zn	20 µg/mL	5% HNO_3	CL-MEM-1
Al, Ca, Fe, K, Mg, Na	1,000 µg/mL		

ICP-MS Memory Test 1, 125 mL

Elements	Concentration	Matrix	Part #
Mo, Sb, Ti	20 µg/mL	H_2O/tr. HF	CL-MEM-2
P, S	1,000 µg/mL		
C	2,000 µg/mL		
Cl	7,200 µg/mL		

Memory Test Solutions Set, 125 mL

Contents	Part #
CL-MEM-1	CL-MEM-SET
CL-MEM-2	

Gold Blank Standard

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

Gold Blank Standard, 125 mL

Elements	Concentration	Matrix	Part #
Au	100 µg/mL	2% HCl	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), 125 mL

Elements	Concentration	Matrix	Part #
Ag, Be, Cd, Se, Tl	25 µg/mL	5% HNO_3/tr. Tartaric Acid/ tr. HF	CL-SPIKE-1
As, Pb	50 µg/mL		
Co, Cr, Cu, Mn, Ni, Sb, V	100 µg/mL		
Ba, Zn	250 µg/mL		
Fe	500 µg/mL		

ICP-MS Spike Sample Standard 2 (Soil), 125 mL

Elements	Concentration	Matrix	Part #
Ag, Be, Se, Tl	25 µg/mL	5% HNO_3/tr. Tartaric Acid/ tr. HF	CL-SPIKE-2
As, Cd	50 µg/mL		
Co, Pb, Sb	100 µg/mL		
Ni	125 µg/mL		
V	150 µg/mL		
Ba, Cr, Cu, Zn	250 µg/mL		

Isotope Standards

Spex CertiPrep Claritas PPT® Isotope Standards can be used for isotope dilution analysis and internal standards. 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 elemental 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 standard will consist of:

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

Isotope Standards

Elements	Concentration	Volume	Matrix	Part #
Boron 11	10 µg/mL	125 mL	H_2O	ISOT-B11
Copper 65	10 µg/mL	125 mL	2% HNO_3	ISOT-CU65
Lead 206	10 µg/mL	125 mL	2% HNO_3	ISOT-PB206
Lead 207	10 µg/mL	125 mL	2% HNO_3	ISOT-PB207
Zinc 68	10 µg/mL	125 mL	2% HNO_3	ISOT-ZN68

Multi-Element CLP Standards for ICP & ICP-MS

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 as seen on page 65. 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 on the following pages.

1. **BLK**
   Blank: PLBLKs
2. **ICL**
   Initial Calibration Solution: Mixture of ICALs
3. **ICV**
   Initial Calibration Verification: ICV-1A
4. **ICB**
   Initial Calibration Blank (not digested): PLBLKs
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: PLBLKs (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: PLBLKs (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 PLBLKs (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: PLBLKs

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 of 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 ISM 01.2, at least one of your calibration standards must be at the Contract Required Quantification Limit (CRQL). See ISM 01.2 sections for CRQL standards.

Applies to part numbers ICAL-1, ICAL-2, ICAL-3, ICAI-4A, ICAL-4A-500, PLSB7-2Y, and PLHG2-1Y.

Initial Calibration Verification for CLP Methods

The US EPA retains analytical services through the Contract Laboratory 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.

Our verification standards, ICV-1A, ICV-2 and ICV-3, contain all of 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 71 for a complete list of ICAL standards.

We recommend dilution of ICV standards to a range within your instruments 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.

Applies to part numbers ICV-1A and ICV-3.

Contract Required Detection Limits, CRDL

CLP ISM 01.2 & ILM 05.3 STANDARDS FOR ICP

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/ISCAB. The sequence order is CCV, CCB, CRI, ICSA, ICSAB, CCV, and 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.

Applies to part numbers CRDL-2 and CRDL-2A.

CLP ISM 01.2 STANDARDS FOR ICP-MS

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.

Applies to part numbers CL-CRDL-2.

CLP ILM 05.3 STANDARDS FOR ICP-MS

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.

Applies to part numbers CL-CRDL-2

Contract Required Detection Limits, CRDL (continued)

CLP ILM 02.0 & 05.2 Standards for ICP and CLP-M/6020/SW-846 Standards for ICP-MS

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, K, Mg, and Na.

Our CRDL-1 and CL-CRDL-1standards contain all of the required elements on the TAL, in their appropriate concentration ratios. CRDL-1 should be diluted by a factor of 1,000 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 2,000 prior to use in the "one time CRDL" run. CL-CRDL-1 should be diluted by a factor of 1,000 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 2,000 prior to use in the "one time CL-CRDL" run.

Applies to part number CRDL-1 and CL-CRDL-1.

Interference Checks

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP

For verification of inter-element 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 mL of INT-B3 into a 100 mL volumetric flask, brought to volume with a matrix blank (see pages 22 & 40). Once prepared, the solutions should be analyzed consecutively, starting with Solution A.

Applies to part numbers INT-A1 and INT-B3.

CLP ILM 02.0 Standards for ICP

For verification of inter-element 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 mL of INT-B1 into a 100 mL volumetric flask, brought to volume with a matrix blank (see pages 22 & 40). Once prepared, the solutions should be analyzed consecutively, starting with Solution A.

Applies to part numbers INT-A1 and INT-B1.

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP-MS

For verification of inter-element 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 or 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-B3 or CL- INT-B4 100-fold; for example, 10 mL of CL-INT-A2 and 1 mL of CL-INT-B3 or CL-INT-B4 into a 100 mL volumetric flask, brought to volume with a matrix blank (see pages 22 & 40). Once prepared, the solutions should be analyzed consecutively, starting with Solution A.

Applies to part numbers CL-INT-A2, CL-INT-B3, CL-INT-B3N, and CL-INT-B4.

Interference Checks (continued)

CLP-M/6020/SW-846 Standards for ICP-MS

For verification of inter-element 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 mL of CL-INT-B1 into a 100 mL volumetric flask, brought to volume with a matrix blank (see pages 22 & 40). Once prepared, the solutions should be analyzed consecutively, starting with Solution A.

Applies to part numbers CL-INT-A1 and CL-INT-B1.

Alternate Standards

We also provide 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, or any combination involving the four solutions, depending on the analytes and interferents of interest to you.

We provide ICP-MS interferents and interferent check solutions for SW-845.

Applies to part numbers INT-A2, INT-B2, CL-INT-A3, and CL-INT-B2.

Spike Sample Analysis

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

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP

Our spike standard, SPIKE-4, provides all of the analytes required for the IC, ICP-AES and the AA spike.

Applies to part numbers SPIKE-4.

CLP ILM 02.0 Standards for ICP

Our spike standard, SPIKE-1, provides all of the analytes required for the ICP-AES and the AA spike. Add 1 mL of SPIKE-1 to aqueous samples and 2 mL of SPIKE-1 to solid samples prior to digestion.

Applies to part numbers SPIKE-1 and SPIKE1-500.

CLP ILM 05.2 Standards for ICP-MS

Our spike standard, CL-SPIKE-3, provides all of the analytes required for the ICP and AA spike.

Applies to part number CL-SPIKE-3.

CLP ISM 01.2 Standards for ICP-MS

Our spike standard, CL-SPIKE-4, provides all of the analytes required for the ICP-MS and the AA spike. Add 1 mL of CL-SPIKE-4 to aqueous samples and 2 mL of CL-SPIKE-4 to solid samples prior to digestion.

Applies to part number CL-SPIKE-4.

CLP ILM 05.3 Standards for ICP-MS

Our spike standard, CL-SPIKE-4, provides all of the analytes required for the ICP-MS.

Applies to part number CL-SPIKE-4.

CLP-M/6020/SW-846 Standards for ICP-MS

Our spike standards, CL-SPIKE-1 and CL-SPIKE-2, provide all of the analytes required for ICP-MS. Add 1 mL of CL-SPIKE-1 to aqueous samples and 2 mL of CL-SPIKE-2 to solid samples prior to digestion.

Applies to part numbers CL-SPIKE-1 and CL-SPIKE-2.

Instrument Calibration for CLP Methods | See page 43 for details.

Instrument Calibration Standard 1

Elements	Concentration	Matrix	Volume	Part #
Ca, K, Mg, Na	5,000 µg/mL	5% HNO_3	125 mL	ICAL-1

Instrument Calibration Standard 2

Elements	Concentration	Matrix	Volume	Part #
Ag, Cr	100 µg/mL	5% HNO_3	125 mL	ICAL-2
Mn	150 µg/mL			
Zn	200 µg/mL			
Ni	400 µg/mL			

Instrument Calibration Standard 3

Elements	Concentration	Matrix	Volume	Part #
Be	50 µg/mL	5% HNO_3	125 mL	ICAL-3
Cu	250 µg/mL			
Co, V	500 µg/mL			
Fe	1,000 µg/mL			
Al, Ba	2,000 µg/mL			

Instrument Calibration Standard 4A

Elements	Concentration	Matrix
Pb	30 µg/mL	5% HNO_3
Cd, Se	50 µg/mL	
As, Tl	100 µg/mL	

Volume	Part #	Volume	Part #
125 mL	ICAL-4A	500 mL	ICAL-4A-500

The following dilutions are suggested: a dilution of 250-fold for ICAL-1; 100-fold for ICAL-2 and ICAL-3; 20-fold for ICAL-4A. Antimony and mercury can be diluted as required.

Instrument Calibration Standard 3

Elements	Concentration	Matrix	Volume	Part #
Hg	100 µg/mL	5% HNO_3	125 mL	PLHG2-1Y
Sb	1,000 µg/mL	H_2O/0.6% Tartaric Acid/tr. HNO_3	125 mL	PLSB7-2Y

Initial Calibration Verification for CLP Methods | See page 43 for details.

Initial Calibration Verification Standard 1A

Elements	Concentration	Matrix	Volume	Part #
Pb	3 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	500 mL	ICV-1A
Be, Cd, Se	5 µg/mL			
Ag, As, Cr, Tl	10 µg/mL			
Mn	15 µg/mL			
Zn	20 µg/mL			
Cu	25 µg/mL			
Ni	40 µg/mL			
Co, V	50 µg/mL			
Sb	60 µg/mL			
Fe	100 µg/mL			
Al, Ba	200 µg/mL			
Ca, K, Mg, Na	5,000 µg/mL			

Initial Calibration Verification Standard 3

Elements	Concentration	Matrix	Volume	Part #
Be	5 µg/mL	5% HNO_3	500 mL	ICV-3
Cr	20 µg/mL			
Ag, Cu	25 µg/mL			
Cd, Co, Mn, Ni, V, Zn	50 µg/mL			
As, Fe, Pb, Se, Tl	100 µg/mL			
Al, Ba	200 µg/mL			
Ca, K, Mg, Na	500 µg/mL			

Contract Required Detection Limits

CLP ISM 01.2 and ILM 05.3 Standards for ICP | See page 43 for details.

ICP Contract Required Detection Limit Standard 2

Elements	Concentration	Matrix	Volume	Part #
Be, Cd	10 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CRDL-2
As, Cr, Pb, Ag	20 µg/mL			
Mn	30 µg/mL			
Cu, Tl	50 µg/mL			
Se	70 µg/mL			
Ni	80 µg/mL			
Co, V	100 µg/mL			
Sb, Zn	120 µg/mL			
Fe	200 µg/mL			

ICP Contract Required Detection Limit Standard 2A

Elements	Concentration	Matrix	Volume	Part #
Al, Ba	200 µg/mL	10% HNO_3	125 mL	CRDL-2A
Ca, K, Mg, Na	5,000 µg/mL			

Contract Required Detection Limits (continued)

CLP ISM 01.2 and ILM 05.3 Standards for ICP-MS | See page 45 for details.

ICP-MS Contract Required Detection Limit Standard 2

Elements	Concentration	Matrix	Volume	Part #
Ag, As, Be, Cd, Co, Mn, Ni, Pb, Tl	2 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CL-CRDL-2
Cr, Cu, Sb, Zn	4 µg/mL			
Se, V	10 µg/mL			
Ba	20 µg/mL			
Al	40 µg/mL			
Fe	400 µg/mL			
Ca, K, Mg, Na	1,000 µg/mL			

CLP ILM 02.0 & 05.2 Standards for ICP and CLP-M/6020/SW-846 Standards for ICP-MS | See page 44 for details.

ICP Contract Required Detection Limit Standard 1

Elements	Concentration	Matrix	Volume	Part #
Pb	6 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CRDL-1
Be, Cd, Se	10 µg/mL			
Ag, As, Cr, Tl	20 µg/mL			
Mn	30 µg/mL			
Zn	40 µg/mL			
Cu	50 µg/mL			
Ni	80 µg/mL			
Co, V	100 µg/mL			
Sb	120 µg/mL			

CLP-M/6020/SW-846 Standards for ICP-MS | See page 44 for details.

ICP-MS Contract Required Detection Limit Standard 1

Elements	Concentration	Matrix	Volume	Part #
Pb	0.3 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CL-CRDL-1
Be, Cd, Se	0.5 µg/mL			
Ag, As, Cr, Tl	1 µg/mL			
Mn	1.5 µg/mL			
Zn	2 µg/mL			
Cu	2.5 µg/mL			
Ni	4 µg/mL			
Co, V	5 µg/mL			
Sb	6 µg/mL			
Fe	10 µg/mL			
Al, Ba	20 µg/mL			
Ca, K, Mg, Na	500 µg/mL			

Interference Checks

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP | See page 44 for details.

ICP Interferents A1

Elements	Concentration	Matrix	Volume	Part #
Fe	2,000 µg/mL	5% HNO_3	500 mL	INT-A1
Al, Ca, Mg	5,000 µg/mL			

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP | See page 44 for details.

ICP Analytes B3

Elements	Concentration	Matrix	Volume	Part #
Pb, Se	5 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	INT-B3
As, Tl	10 µg/mL			
Ag	20 µg/mL			
Ba, Be, Co, Cr, Cu, Mn, V	50 µg/mL			
Sb	60 µg/mL			
Cd, Ni, Zn	100 µg/mL			

CLP ILM 02.0 Standards for ICP | See page 44 for details.

ICP Interferents A1

Elements	Concentration	Matrix	Volume	Part #
Fe	2,000 µg/mL	5% HNO_3	500 mL	INT-A1
Al, Ca, Mg	5,000 µg/mL			

ICP Analytes B1

Elements	Concentration	Matrix	Volume	Part #
Ba, Be, Co, Cr, Cu, Mn, V	50 µg/mL	5% HNO_3	125 mL	INT-B1
Ag, Cd, Ni, Pb, Zn	100 µg/mL			

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP-MS | See page 44 for details.

ICP-MS Interferents A2

Elements	Concentration	Matrix	Volume	Part #
Mo, Ti	20 µg/mL	5% HNO_3/tr. HF	125 mL	CL-INT-A2
Al, Ca, Fe, K, Mg, Na, P, S	1,000 µg/mL			
C	2,000 µg/mL			
Cl	10,000 µg/mL			

ICP-MS Analytes B3 w/ Mercury* - Kit contains 1 each of CLINT-B3N and CLHG2-1AY

Elements	Concentration	Matrix	Volume	Part #
Ag, As, Ba, Be, Cd, Co, Cr, Cu, Hg*, Mn, Ni, Pb, Sb, Se, Tl, V, Zn	2 µg/mL	2% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CL-INT-B3

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

ICP-MS Analytes B3 w/o Mercury

Elements	Concentration	Matrix	Volume	Part #
Ag, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn	2 µg/mL	2% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CL-INT-B3N

Interference Checks (continued)

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP-MS | See page 44 for details.

ICP-MS Analytes B4

Elements	Concentration	Matrix	Volume	Part #
Ag, As, Ba, Be, Cd, Co, Sb, Se, Tl, V	20 µg/mL	5% HNO_3/tr. HF	125 mL	CL-INT-B4
Cu, Pb, Ni	25 µg/mL			
Mn, Zn	30 µg/mL			
Cr	40 µg/mL			

CLP-M/6020/SW-846 Standards for ICP-MS | See page 45 for details.

ICP-MS Interferents A1

Elements	Concentration	Matrix	Volume	Part #
Mo, Ti	20 µg/mL	5% HNO_3/tr. HF	125 mL	CL-INT-A1
Al, K, Mg, P, S	1,000 µg/mL			
C	2,000 µg/mL			
Fe, Na	2,500 µg/mL			
Ca	3,000 µg/mL			
Cl	21,215 µg/mL			

ICP-MS Analytes B1

Elements	Concentration	Matrix	Volume	Part #
Ag	5 µg/mL	2% HNO_3	125 mL	CL-INT-B1
As, Cd, Se, Zn	10 µg/mL			
Co, Cr, Cu, Mn, Ni, V	20 µg/mL			

Spike Sample Analysis

CLP ILM 02.0 Standards for ICP | See page 45 for details.

ICP Spike Sample 1

Elements	Concentration	Matrix
Ag, Be, Cd	5 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF
Cr	20 µg/mL	
Cu	25 µg/mL	
Co, Mn, Ni, Pb, Sb, V, Zn	50 µg/mL	
Fe	100 µg/mL	
Al, As, Ba, Se, Tl	200 µg/mL	

Volume	Part #	Volume	Part #
125 mL	SPIKE-1	500 mL	SPIKE-1-500

Spike Sample Analysis (continued)

CLP ILM 05.2 Standards for ICP-MS | See page 45 for details.

ICP-MS Spike Sample 3

Elements	Concentration	Matrix	Volume	Part #
Se	1 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CL-SPIKE-3
Pb	2 µg/mL			
As	4 µg/mL			
Ag, Be, Cd, Tl	5 µg/mL			
Sb	10 µg/mL			
Cr	20 µg/mL			
Cu	25 µg/mL			
Co, Mn, Ni, V, Zn	50 µg/mL			
Al, Ba	200 µg/mL			

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP | See page 45 for details.

ICP Spike Sample 4

Elements	Concentration	Matrix	Volume	Part #
Pb	2 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	SPIKE-4
As	4 µg/mL			
Ag, Be, Cd, Se, Tl	5 µg/mL			
Sb	10 µg/mL			
Cr	20 µg/mL			
Cu	25 µg/mL			
Co, Mn, Ni, V, Zn	50 µg/mL			
Fe	100 µg/mL			
Al, Ba	200 µg/mL			

CLP-M/6020/SW-846 Standards for ICP-MS | See page 45 for details.

ICP-MS Spike Sample 1 (Water)

Elements	Concentration	Matrix	Volume	Part #
Ag, Be, Cd, Se, Tl	25 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CL-SPIKE-1
As, Pb	50 µg/mL			
Co, Cr, Cu, Mn, Ni, Sb, V	100 µg/mL			
Ba, Zn	250 µg/mL			
Fe	500 µg/mL			

ICP-MS Spike Sample 2 (Soil)

Elements	Concentration	Matrix	Volume	Part #
Ag, Be, Se, Tl	25 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CL-SPIKE-2
As, Cd	50 µg/mL			
Co, Pb, Sb	100 µg/mL			
Ni	125 µg/mL			
V	150 µg/mL			
Ba, Cr, Cu, Zn	250 µg/mL			

Spike Sample Analysis (continued)

CLP ISM 01.2 and ILM 05.3 Standards for ICP-MS | See pages 44-45 for details.

ICP-MS Spike Sample 4

Elements	Concentration	Matrix	Volume	Part #
Se	1 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	CL-SPIKE-4
Pb	2 µg/mL			
As	4 µg/mL			
Be, Cd, Ag, Tl	5 µg/mL			
Sb	10 µg/mL			
Cr	20 µg/mL			
Cu	25 µg/mL			
Co, Mn, Ni, V, Zn	50 µg/mL			
Fe	100 µg/mL			
Al, Ba	200 µg/mL			

Alternate Standards

Interference Checks | See page 45 for details.

ICP Alternate Interferents A

Elements	Concentration	Matrix	Volume	Part #
Cr, Cu, Mn, Ni, Ti, V	1,000 µg/mL	5% HNO_3/tr. F^-	500 mL	INT-A2

ICP Alternate Interferents B

Elements	Concentration	Matrix	Volume	Part #
Ca, Fe, Mg, Si	10 µg/mL	5% HNO_3/tr. Tartaric Acid/tr. HF	125 mL	INT-B2
Al, As, B, Mo, Na, Sb, Se, Tl	100 µg/mL			

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

Elements	Concentration	Matrix	Volume	Part #
Ag, As, Cd, Co, Cr, Cu, Mn, Ni, Zn	10 µg/mL	2% HNO_3	125 mL	CL-INT-B2

ICP-MS Interferents Check Solution A3 (for SW-846)

Elements	Concentration	Matrix	Volume	Part #
Mo, Ti	20 µg/mL	5% HNO_3/tr. HF	125 mL	CL-INT-A3
Al, Mg, P, K, S	1,000 µg/mL			
C	2,000 µg/mL			
Fe, Na	2,500 µg/mL			
Ca	3,000 µg/mL			
Cl	20,000 µg/mL			

Heavy Metals & Minerals Testing Kits

For routinely analyzed Heavy Metals and Minerals

Heavy Metals and Minerals Testing Kits are designed for routinely analyzed heavy metals and minerals. All kits come with six, 30 mL standards which includes a nitric acid blank for easy dilution. Conveniently packaged in a sturdy, heavy-duty carton, these kits are perfect to store on a lab bench or in a cabinet. The 30 mL standards ship non-hazardous, saving money on shipping costs. The smaller volume also allows for less hazardous waste should the standard expire before its contents are used.

Heavy Metals Testing Kit

Description	Concentration	Matrix	Volume	Part #
Arsenic (CLAS2-2M)	1,000 µg/mL	30 mL each	2% HNO_3	SPXHM-KIT
Cadmium (CLCD2-2M)	1,000 µg/mL		2% HNO_3	
Chromium (CLCR2-2M)	1,000 µg/mL		2% HNO_3	
Lead (CLPB2-2M)	1,000 µg/mL		2% HNO_3	
Mercury (CLHG4-2M)	1,000 µg/mL		10% HNO_3	
Nitric Acid Blank (CLBLK-HNO3M)	-		2% HNO_3	

Minerals Testing Kit

Description	Concentration	Volume	Matrix	Part #
Calcium (CLCA2-2M)	1,000 µg/mL	2% HNO_3	30 mL each	SPXMT-KIT
Iron (CLFE2-2M)	1,000 µg/mL	2% HNO_3		
Magnesium (CLMG2-2M)	1,000 µg/mL	2% HNO_3		
Potassium (CLK2-2M)	1,000 µg/mL	2% HNO_3		
Sodium (CLNA2-2M)	1,000 µg/mL	2% HNO_3		
Nitric Acid Blank (CLBLK-HNO3M)	-	2% HNO_3		

Ion Chromatography & Ion SelectiveElectrode Standards

Single-Element Ion Anion Standards

Single-Element Ion Anion Standards

Anions	Concentration	Volume	Matrix	Part #
Acetate $(C_2H_3O_2)^-$	1,000 µg/mL	125 mL	H_2O	AS-ACE9-2Y
		500 mL		AS-ACE9-2X
Bromate $(BrO_3)^-$	1,000 µg/mL	125 mL	H_2O	AS-BRO39-2Y
		500 mL		AS-BRO39-2X
Bromide (Br-)	1,000 µg/mL	125 mL	H_2O	AS-BR9-2Y
		500 mL		AS-BR9-2X
Chlorate $(ClO_3)^-$	1,000 µg/mL	125 mL	H_2O	AS-CLO39-2Y
		500 mL		AS-CLO39-2X
Chloride $(Cl)^-$	100 µg/mL	125 mL	H_2O	AS-CL9-1Y
		500 mL		AS-CL9-1X
	1,000 µg/mL	125 mL		AS-CL9-2Y
		500 mL		AS-CL9-2X
Chlorite $(ClO_2)^-$	1,000 µg/mL	125 mL	H_2O	AS-CLO29-2Y
		500 mL		AS-CLO29-2X
Chromate $(CrO_4)^{-2}$	1,000 µg/mL	125 mL	H_2O	AS-CRO49-2Y
		500 mL		AS-CRO49-2X
Fluoride $(F)^-$	100 µg/mL	125 mL	H_2O	AS-F9-1Y
		500 mL		AS-F9-1X
	1,000 µg/mL	125 mL		AS-F9-2Y
		500 mL		AS-F9-2X
Formate $(HCO_2)^-$	1,000 µg/mL	125 mL	H_2O	AS-HCO29-2Y
		500 mL		AS-HCO29-2X
Iodide $(I)^-$	1,000 µg/mL	125 mL	H_2O	AS-I9-2Y
		500 mL		AS-I9-2X
Nitrate $(NO_3)^-$	1,000 µg/mL	125 mL	H_2O	AS-NO39-2Y
		500 mL		AS-NO39-2X
Nitrate-Nitrogen	1,000 µg/mL	125 mL	H_2O	AS-NO3N9-2Y
		500 mL		AS-NO3N9-2X
Nitrite $(NO_2)^-$	1,000 µg/mL	125 mL	H_2O	AS-NO29-2Y
		500 mL		AS-NO29-2X
Nitrite-Nitrogen	1,000 µg/mL	125 mL	H_2O	AS-NO2N9-2Y
		500 mL		AS-NO2N9-2X
Ammonia Nitrogen	1,000 µg/mL	125 mL	H_2O	AS-NH3N9-2Y
Oxalate $(C_2O_4)^{-2}$	1,000 µg/mL	125 mL	H_2O	AS-C2O49-2Y
		500 mL		AS-C2O49-2X
Perchlorate $(ClO_4)^-$	1,000 µg/mL	125 mL	H_2O	AS-CLO49-2Y
Phosphate $(PO_4)^{-3}$	1,000 µg/mL	125 mL	H_2O	AS-PO49-2Y
		500 mL		AS-PO49-2X
Phosphate-Phosphorus	1,000 µg/mL	125 mL	H_2O	AS-PO4P9-2Y
		500 mL		AS-PO4P9-2X
Sulfate $(SO_4)^{-2}$	1,000 µg/mL	125 mL	H_2O	AS-SO49-2Y
		500 mL		AS-SO49-2X
Sulfate-Sulfur	1,000 µg/mL	125 mL	H_2O	AS-SO4S9-2Y
		500 mL		AS-SO4S9-2X

Single-Element Ion Cation Standards

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

Single-Element Ion Selective Electrode Standards

Ion Selective Electrodes	Concentration	Volume	Matrix	Part #
Bromide (Br^-)	1,000 µg/mL	125 mL	H_2O	AS-BR9-2Y
	1,000 µg/mL	500 mL		AS-BR9-2X
	0.1 M	125 mL		AS-BR9-5Y
	0.1 M	500 mL		AS-BR9-5X
Chloride (Cl^-)	100 µg/mL	125 mL	H_2O	AS-CL9-1Y
	100 µg/mL	500 mL		AS-CL9-1X
	1,000 µg/mL	125 mL		AS-CL9-2Y
	1,000 µg/mL	500 mL		AS-CL9-2X
	0.1 M	125 mL		AS-CL9-5Y
	0.1 M	500 mL		AS-CL9-5X
Fluoride (F^-)	10 µg/mL	125 mL	H_2O	AS-F9-1AY
	10 µg/mL	500 mL		AS-F9-1AX
	100 µg/mL	125 mL		AS-F9-1Y
	100 µg/mL	500 mL		AS-F9-1X
	1,000 µg/mL	125 mL		AS-F9-2Y
	1,000 µg/mL	500 mL		AS-F9-2X
	0.1 M	125 mL		AS-F9-5Y
	0.1 M	500 mL		AS-F9-5X
Cyanide (CN^-)	1,000 µg/mL	125 mL	2% KOH	RSCN9-2Y
	1,000 µg/mL	500 mL		RSCN9-2X

Ionic Strength Adjustment Buffers

Buffers	Concentration	Volume	Matrix	Part #
5M Sodium Nitrate ($NaNO_3$) Buffer	5 M	500 mL	H_2O	IS-BUF1-500
10M Sodium Hydroxide (NaOH) Buffer	10 M	500 mL	H_2O	IS-BUF2-500
Low Level TISAB II Buffer	-	500 mL	H_2O	IS-BUF3-500

Multi-Element Ion Anion Standards

IC Instrument Check Standard 1

Elements	Concentration	Volume	Matrix	Part #
F^-	20 µg/mL	125 mL	H_2O	ICMIX1-100
CL^-	30 µg/mL			
NO_3^-	100 µg/mL			
HPO_4^{-2}, SO_4^{-2}	150 µg/mL			

IC Instrument Check Standard 2

Elements	Concentration	Volume	Matrix	Part #
F^-	100 µg/mL	125 mL	H_2O	ICMIX2-100
Cl^-	200 µg/mL			
Br-, NO_3-, SO_4^{-2}	400 µg/mL			
HPO_4^{-2}	600 µg/mL			

IC Instrument Check Standard 6

Elements	Concentration	Volume	Matrix	Part #
F^-	20 µg/mL	125 mL	H_2O	ICMIX6-100
NO_3^- as N, NO_2^- as N	25 µg/mL			
Cl^-	50 µg/mL			
Br^-	100 µg/mL			
HPO_4^{-2}, SO_4^{-2}	150 µg/mL			

Multi-Element Ion Cation Standards

IC Instrument Check Standard 3

Elements	Concentration	Volume	Matrix	Part #
Li^+	50 µg/mL	125 mL	2% HNO_3	ICMIX3-100
K^+, Mg^{+2}, NA^+	200 µg/mL			
NH_4^+	400 µg/mL			
Ca^{+2}	1,000 µg/mL			

IC Instrument Check Standard 4

Elements	Concentration	Volume	Matrix	Part #
Li^+	10 µg/mL	125 mL	0.5% HNO_3	ICMIX4-100
Na^+	50 µg/mL			
K+, NH_4^+	100 µg/mL			

IC Instrument Check Standard 5

Elements	Concentration	Volume	Matrix	Part #
Mg^{2+}	200 µg/mL	125 mL	2% HNO_3	ICMIX5-100
Ca^{2+}	400 µg/mL			
Sr^{2+}	600 µg/mL			
Ba^{2+}	1,600 µg/mL			

Eluents

Eluents are made from high purity 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.

Multi-Element Ion Standards - Eluents

Description	Concentration	Volume	Matrix	Part #
0.5 M Sodium Carbonate (Na_2CO_3) Eluent Concentrate	0.5 M	125 mL	H_2O	IC-ELCON1-100
0.5 M Sodium Bicarbonate ($NaHCO_3$) Eluent Concentrate	0.5 M	125 mL	H_2O	IC-ELCON2-100
0.18 M Sodium Carbonate (Na_2CO_3)	0.18 M	125 mL	H_2O	IC-ELCON3-100
0.17 M $NaHCO_3$ Sodium Bicarbonate Concentrate	0.17 M			
ASTM Type I Water, 18 Megaohm	-	500 mL	H_2O	PLBLK-H2O
ASTM Type I Water, 18 Megaohm	-	1 L	H_2O	PLBLK-H2O-1L
ASTM Type I Water, 18 Megaohm	-	2 L	H_2O	PLBLK-H2O-2L
ASTM Type I Water, 18 Megaohm	-	4 L	H_2O	PLBLK-H2O-4L

Set of 3 Solutions for Bromide

Contents	Part #
AS-BR9-5Y	AS-BR9-SET
AS-BR9-2Y	
IS-BUF1-500	

Set of 2 Solutions for Cyanide

Contents	Part #
RSCN9-2Y	RSCN9-SET
IS-BUF2-500	

Set of 5 Solutions for Fluoride

Contents	Part #
AS-F9-5Y	AS-F9-SET
AS-F9-1AY	
AS-F9-1Y	
AS-F9-2Y	
IS-BUF3-500	

Certified Wet Assay

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 Certified Reference Standards

Description	Element	Concentration	Volume	Matrix	Part #
Cyanide, Simple	CN^-	1,000 µg/mL	125 mL	2% KOH	RSCN9-2Y
Cyanide, Simple	CN^-	1,000 µg/mL	500 mL	2% KOH	RSCN9-2X
Cyanide, Complex	CN^-	1,000 µg/mL	500 mL	2% KOH	RSCN9C-2X

Carbon Black Reagents for ASTM D1510

Our sodium thiosulfate solutions are prepared from ACS Grade, micro-crystalline $Na_2S_2O_3$. In order to maximize shelf life, our matrix is prepared using double-deionized, ASTM Type I Water.

Our iodine solutions are prepared from ACS Grade potassium iodide and crystalline elemental iodine. To guarantee a clean and stable product, our matrix is prepared using double-deionized, ASTM Type I Water.

All solutions are prepared gravimetrically using high accuracy analytical balances to ensure precise target concentrations. Each batch is thoroughly homogenized using a high speed industrial mixer to ensure reliable results from the first bottle to the last.

We are titrating our samples on our automated titrator. The automated dosing drive uses 10,000 steps over a 20 mL volume, so its dosing increment *can be* as small as 2 µL. For these applications, we are using a minimum dose of 10 µL for the sodium thiosulfate endpoint and 4 µL for the iodine endpoint. These settings achieve the extremely precise measurements for each titration while also staying within the parameters of the dosing unit.

As stated on our Certificate of Analysis, the sodium thiosulfate is run against a 0.1 N potassium dichromate solution. The exact normality of this solution is calculated by comparing it to NIST potassium dichromate. A set of 6 samples are run that must all be within the nominal value of 0.0394 N ± 0.00008 N.

The certified sodium thiosulfate is then used to titrate iodine. A set of 3 samples are run that must all be within the nominal value of 0.0473 N ± 0.00003 N.

Before releasing either of these reagents for packaging, we run QC checks with a previous lot to ensure accuracy over time.

Carbon Black Reagents

Description	Packaging	Volume	Matrix	Part #
0.0394 N Sodium Thiosulfate	Cubitainer	1 Gallon	H_2O/0.5% Amyl Alcohol	182002
0.0473 N Iodine	Amber Glass Bottle	1 Gallon	H_2O	183134

USP/ICH Standards

The new guidelines set by the United States Pharmacopeia (USP) and the International Conference on Harmonization (ICH) have pushed the pharmaceutical and nutraceutical industries to provide accurate, quantifiable results for metal analysis in drugs, pharmaceutical substances and raw materials.

USP <232> outlines new limits in pharmaceutical products for arsenic, cadmium, lead, and mercury. The procedures focus on the use of ICP-MS for the analysis of low level impurities. ICP-MS instrumentation, along with accurate ICP-MS standards, allow for increased efficiency and accuracy of the analysis necessary to comply with the new regulations. In addition to the changes enacted by the USP.

Developed in accordance with USP <232> Elemental Impurities, Spex CertiPrep offers these additions to our Consumer Safety Compliance Standards line. These standards can be used as a calibration or check standard to verify Oral Daily Dose PDE, Parenteral Component Limit or Parenteral Daily Dose PDE as well as Inhalation Component Limit or Daily Dose. Our extensive experience in creating quality trace metal standards, coupled with your ICP-MS analysis, will ensure your company will remain compliant with the new and changing regulations.

USP <232> and <233> Elemental Impurities

USP 232 Revision 40, Oral 2A

Element	Concentration	Volume	Matrix	Part #
Co	50 mg/kg	125 mL	2% HNO_3	USP-ORAL2A
V	100 mg/kg			
Ni	200 mg/kg			

USP 232 Revision 40, Oral 2B Mix 1

Element	Concentration	Volume	Matrix	Part #
Tl	8 mg/kg	125 mL	2% HNO_3	USP-ORAL2B-1
Ag	150 mg/kg			
Se	150 mg/kg			

USP 232 Revision 40, Oral 2B Mix 2

Elements	Concentration	Volume	Matrix	Part #
Au, Ir, Os, Pd, Pt, Rh, Ru	100 mg/kg for each component	125 mL	15% HCl	USP-ORAL2B-2

USP 232 Revision 40, Oral 3 Mix 1

Element	Concentration	Volume	Matrix	Part #
Li	550 mg/kg	125 mL	10% HNO_3	USP-ORAL3-1
Ba	1,400 mg/kg			
Cu	3,000 mg/kg			
Cr	11,000 mg/kg			

USP 232 Revision 40, Oral 3 Mix 2

Element	Concentration	Volume	Matrix	Part #
Sb	1,200 mg/kg	125 mL	5% HNO_3/tr. Tartaric Acid/tr. HF	USP-ORAL3-2
Mo	3,000 mg/kg			
Sn	6,000 mg/kg			

USP 232 Revision 40, Parenteral 2A

Element	Concentration	Volume	Matrix	Part #
Co	5 mg/kg	125 mL	2% HNO_3	USP-PARENT2A
V	10 mg/kg			
Ni	20 mg/kg			

USP 232 Revision 40, Parenteral 2B Mix 1

Element	Concentration	Volume	Matrix	Part #
Tl	8 mg/kg	125 mL	2% HNO_3	USP-PARENT2B-1
Ag	10 mg/kg			
Se	80 mg/kg			

USP 232 Revision 40, Parenteral 2B Mix 2

Element	Concentration	Volume	Matrix	Part #
Ir	10 mg/kg	125 mL	10% HCl	USP-PARENT2B-2
Os	10 mg/kg			
Pd	10 mg/kg			
Pt	10 mg/kg			
Rh	10 mg/kg			
Ru	10 mg/kg			
Au	100 mg/kg			

USP 232 Revision 40, Parenteral 3

Element	Concentration	Volume	Matrix	Part #
Sb	90 mg/kg	125 mL	5% HNO_3/tr. Tartaric Acid/tr. HF	USP-PARENT3
Li	250 mg/kg			
Cu	300 mg/kg			
Sn	600 mg/kg			
Ba	700 mg/kg			
Cr	1,100 mg/kg			
Mo	1,500 mg/kg			

USP 232 Revision 40, Inhalation Mix 1

Elements	Concentration	Volume	Matrix	Part #
Hg	1 mg/kg	125 mL	5% HNO_3	USP-INHL1
As, Cd	2 mg/kg			
Pb	5 mg/kg			

USP 232 Revision 40, Inhalation Mix 2A

Element	Concentration	Volume	Matrix	Part #
V	1 mg/kg	125 mL	2% HNO_3	USP-INHL2A
Co	3 mg/kg			
Ni	5 mg/kg			

USP 232 Revision 40, Inhalation 2B, Mix 1

Element	Concentration	Volume	Matrix	Part #
Ag	7 mg/kg	125 mL	2% HNO_3	USP-INHL2B-1
Tl	8 mg/kg			
Se	130 mg/kg			

USP <232> and <233> Elemental Impurities (continued)

USP 232 Revision 40, Inhalation 2B, Mix 2

Element	Concentration	Volume	Matrix	Part #
Gold	1 mg/kg for each component	125 mL	5% HCl	USP-INHL2B-2
Iridium				
Osmium				
Palladium				
Platinum				
Rhodium				
Ruthenium				

USP 232 Revision 40, Inhalation Mix 3

Element	Concentration	Volume	Matrix	Part #
Cr	3 mg/kg	125 mL	2% HNO_3/tr. Tartaric Acid/tr. HF	USP-INHL3
Mo	10 mg/kg			
Sb	20 mg/kg			
Li	25 mg/kg			
Cu	30 mg/kg			
Sn	60 mg/kg			
Ba	300 mg/kg			

Oral Elemental Impurities A

Element	Concentration	Volume	Matrix	Part #
As	1.5 mg/kg	125 mL	5% HNO_3	USP-TXM2
Pb	5 mg/kg			
Hg	15 mg/kg			
Cd	25 mg/kg			

Oral Elemental Impurities A

Element	Concentration	Volume	Matrix	Part #
Cd	5 mg/kg	125 mL	5% HNO_3 /1% HCl	USP-TXM2A
Pb	5 mg/kg			
As	15 mg/kg			
Hg	30 mg/kg			

Oral Elemental Impurities A

Element	Concentration	Volume	Matrix	Part #
Cd	5 mg/kg	125 mL	5% HNO_3 /1% HCl	USP-TXM2A
Pb	5 mg/kg			
As	15 mg/kg			
Hg	30 mg/kg			

Precious Metal impurities B (with Os)

Elements	Concentration	Volume	Matrix	Part #
Ir, Os, Pd, Pt, Rh, Ru	100 mg/kg for each component	125 mL	15% HCl	USP-TXM3

Precious Metal impurities B (without Os)

Elements	Concentration	Volume	Matrix	Part #
Ir, Pd, Pt, Rh, Ru	100 mg/kg for each component	125 mL	15% HCl	USP-TXM4

Oral/Parenteral Elemental Impurities C

Element	Concentration	Volume	Matrix	Part #
Mo	100 mg/kg	125 mL	5% HNO_3	USP-TXM5
V	100 mg/kg			
Ni	500 mg/kg			
Cu	1,000 mg/kg			

Oral Elemental Impurities C

Element	Concentration	Volume	Matrix	Part #
V	100 mg/kg	125 mL	5% HNO_3	USP-TXM5A
Ni	200 mg/kg			
Cu	3,000 mg/kg			
Mo	3,000 mg/kg			
Cr	11,000 mg/kg			

Parenteral Elemental Impurities C

Element	Concentration	Volume	Matrix	Part #
V	10 mg/kg	125 mL	5% HNO_3	USP-TXM5B
Ni	20 mg/kg			
Cu	300 mg/kg			
Cr	1,100 mg/kg			
Mo	1,500 mg/kg			

Parenteral Elemental Impurities D

Element	Concentration	Volume	Matrix	Part #
Cd	2 mg/kg	125 mL	5% HNO_3/1% HCl	USP-TXM6A
Hg	3 mg/kg			
Pb	5 mg/kg			
As	15 mg/kg			

ICH/Global Compliance Standards

Oral Elemental Impurities A

Element	Concentration	Volume	Matrix	Part #
As	1.5 mg/kg	125 mL	5% HNO_3	ICH-TXM2
Pb	5 mg/kg			
Hg	15 mg/kg			
Cd	25 mg/kg			

Precious Metal Impurities B (with Os)

Element	Concentration	Volume	Matrix	Part #
Ir, Os, Pd, Pt, Rh, Ru	100 mg/kg	125 mL	15% HCl	ICH-TXM3

Precious Metal Impurities B (without Os)

Elements	Concentration	Volume	Matrix	Part #
Ir, Pd, Pt, Rh, Ru	100 mg/kg	125 mL	15% HCl	ICH-TXM4

Elemental Impurities E

Elements	Concentration	Volume	Matrix	Part #
Co, Mo, V	100 mg/kg	125 mL	5% HNO_3	ICH-TXM7
Cr, Ni	250 mg/kg			
Cu	1,000 mg/kg			
Mn	2,500 mg/kg			

Elemental Impurities F

Element	Concentration	Volume	Matrix	Part #
Fe, Zn	13,000 mg/kg	125 mL	5% HNO_3	ICH-TXM8

pH Buffers & Conductivity Standards

ISO 17034 Certified

Certified pH Buffers

Description	Concentration	Matrix	Part #
pH 2.00 Buffer	2 SI Units	H_2O	PH-BUFF2-500
pH 3.00 Buffer	3 SI Units	H_2O	PH-BUFF3-500
pH 4.00 Buffer	4 SI Units	H_2O	PH-BUFF4-500
pH 5.00 Buffer	5 SI Units	H_2O	PH-BUFF5-500
pH 6.00 Buffer	6 SI Units	H_2O	PH-BUFF6-500
pH 7.00 Buffer	7 SI Units	H_2O	PH-BUFF7-500
pH 8.00 Buffer	8 SI Units	H_2O	PH-BUFF8-500
pH 9.00 Buffer	9 SI Units	H_2O	PH-BUFF9-500
pH 10.00 Buffer	10 SI Units	H_2O	PH-BUFF10-500
pH 11.00 Buffer	11 SI Units	H_2O	PH-BUFF11-500
pH 12.00 Buffer	12 SI Units	H_2O	PH-BUFF12-500

Conductivity Standards: TDS as KCL

Description	Element	Concentration	Volume	Matrix	Part #
100 µmhos/cm @ 25°C	65 µg/mL as KCL	100 µmhos	500 mL	H_2O	TDS-1-500
1,000 µmhos/cm @ 25°C	650 µg/mL as KCL	1,000 µmhos	500 mL	H_2O	TDS-2-500

** This is for general informational purposes only. These are uncertified values and do not pertain to any specific lot of product. **

		TEMPERATURE (°C)									
Part #	pH Buffer	0	5	10	15	20	25	30	35	40	50
PH-BUFF2-500	pH 2	1.97	1.98	1.98	2.02	2.00	2.00	2.00	2.02	2.01	2.02
PH-BUFF3-500	pH 3	2.97	2.98	2.97	3.00	3.00	3.00	3.02	3.03	3.03	3.06
PH-BUFF4-500	pH 4	4.01	3.99	4.00	4.00	4.00	4.00	4.01	4.02	4.03	4.06
PH-BUFF5-500	pH 5	5.05	5.04	5.03	5.00	5.00	5.00	5.01	5.01	5.04	5.07
PH-BUFF6-500	pH 6	6.07	6.05	6.06	6.05	6.00	6.00	5.99	5.98	5.97	5.96
PH-BUFF7-500	pH 7	7.13	7.10	7.07	7.05	7.02	7.00	6.99	6.98	6.97	6.83
PH-BUFF8-500	pH 8	8.15	8.13	8.08	8.01	8.00	8.00	8.00	7.95	7.94	7.93
PH-BUFF9-500	pH 9	9.17	9.13	9.09	9.06	9.02	9.00	8.97	8.93	8.91	8.87
PH-BUFF10-500	pH 10	10.34	10.26	10.19	10.12	10.06	10.00	9.94	9.90	9.85	9.77
PH-BUFF11-500	pH 11	11.80	11.69	11.46	11.31	11.17	11.00	10.88	10.76	10.62	10.37
PH-BUFF12-500	pH 12	12.02	12.03	12.04	12.01	12.00	12.00	12.02	12.02	12.06	12.10

Organometallic Single & Multi-Element Oil Standards

Single-Element Organometallic Oil Standards

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

Single-Element Organometallic Oil Standards

Elements in Base Oil	Concentration	Weight	Matrix	Part #
Aluminum (Al)	1,000 µg/g	50 g	Base Oil 20	ORG-AL8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-AL8-4Z
Antimony (Sb)	1,000 µg/g	50 g	20	ORG-SB8-2Z
Arsenic (As)	1,000 µg/g	50 g	Base Oil 75	ORG-AS8-2Z
Barium (Ba)	1,000 µg/g	50 g	Base Oil 75	ORG-BA8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-BA8-4Z
Beryllium (Be)	1,000 µg/g	50 g	Base Oil 75	ORG-BE8-2Z
Bismuth (Bi)	1,000 µg/g	50 g	Base Oil 75	ORG-BI8-2Z
Boron (B)	1,000 µg/g	50 g	Base Oil 75	ORG-B8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-B8-4Z
Cadmium (Cd)	1,000 µg/g	50 g	Base Oil 75	ORG-CD8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-CD8-4Z
Calcium (Ca)	1,000 µg/g	50 g	Base Oil 75	ORG-CA8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-CA8-4Z
Chromium (Cr)	1,000 µg/g	50 g	Base Oil 75	ORG-CR8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-CR8-4Z
Cobalt (Co)	1,000 µg/g	50 g	Base Oil 75	ORG-CO8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-CO8-4Z
Copper (Cu)	1,000 µg/g	50 g	Base Oil 75	ORG-CU8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-CU8-4Z
Iron (Fe)	1,000 µg/g	50 g	Base Oil 75	ORG-FE8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-FE8-4Z
Lead (Pb)	1,000 µg/g	50 g	Base Oil 75	ORG-PB8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-PB8-4Z
Lithium (Li)	1,000 µg/g	50 g	Base Oil 20	ORG-LI8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-LI8-4Z
Magnesium (Mg)	1,000 µg/g	50 g	Base Oil 75	ORG-MG8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-MG8-4Z
Manganese (Mn)	1,000 µg/g	50 g	Base Oil 75	ORG-MN8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-MN8-4Z
Mercury (Hg)	1,000 µg/g	50 g	Base Oil 75	ORG-HG8-2Z
Molybdenum (Mo)	1,000 µg/g	50 g	Base Oil 75	ORG-MO8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-MO8-4Z
Nickel (Ni)	1,000 µg/g	50 g	Base Oil 75	ORG-NI8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-NI8-4Z
Phosphorus (P)	1,000 µg/g	50 g	Base Oil 75	ORG-P8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-P8-4Z
Potassium (K)	1,000 µg/g	50 g	Base Oil 75	ORG-K8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-K8-4Z
Scandium (Sc)	1,000 µg/g	50 g	Base Oil 75	ORG-SC8-2Z
Selenium (Se)	1,000 µg/g	50 g	Base Oil 75	ORG-SE8-2Z
Silicon (Si)	1,000 µg/g	50 g	Base Oil 20	ORG-SI8-2Z
Silver (Ag)	1,000 µg/g	50 g	Base Oil 75	ORG-AG8-2Z

Single-Element Organometallic Oil Standards

Elements in Base Oil	Concentration	Weight	Matrix	Part #
Sodium (Na)	1,000 µg/g	50 g	Base Oil 20	ORG-NA8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-NA8-4Z
Sulfur (S)	1,000 µg/g	50 g	Base Oil 75	ORG-S8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-S8-4Z
Thallium (Tl)	1,000 µg/g	50 g	Base Oil 20	ORG-TL8-2Z
Tin (Sn)	1,000 µg/g	50 g	Base Oil 20	ORG-SN8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-SN8-4Z
Titanium (Ti)	1,000 µg/g	50 g	Base Oil 20	ORG-TI8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-TI8-4Z
Vanadium (V)	1,000 µg/g	50 g	Base Oil 75	ORG-V8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-V8-4Z
Yttrium (Y)	1,000 µg/g	50 g	Base Oil 75	ORG-Y8-A-2Z
Zinc (Zn)	1,000 µg/g	50 g	Base Oil 20	ORG-ZN8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-ZN8-4Z
Zirconium (Zr)	1,000 µg/g	50 g	Base Oil 20	ORG-ZR8-2Z
	5,000 µg/g	50 g	Base Oil 75	ORG-ZR8-4Z

Multi-Element Organometallic Oil Standards

Multi-Element Organometallic Oil Standards, 23 Elements

Elements in Base Oil	Concentration	Weight	Matrix	Part #
Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Si, Sn, Ti, V, Zn	100 µg/g	50 g	Base Oil 75	S23-100Z
	100 µg/g	100 g		S23-100Y
	300 µg/g	50 g		S23-300Z
	300 µg/g	100 g		S23-300Y
	500 µg/g	50 g		S23-500Z
	500 µg/g	100 g		S23-500Y
	900 µg/g	50 g		S23-900Z
	900 µg/g	100 g		S23-900Y

Multi-Element Organometallic Oil Standards, 21 Elements

Elements in Base Oil	Concentration	Weight	Matrix	Part #
Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, Mg, Mn, Mo, Na, Ni, P, Pb, Si, Sn, Ti, V, Zn	100 µg/g	50 g	Base Oil 75	S21-100Z
	100 µg/g	100 g		S21-100Y
	300 µg/g	50 g		S21-300Z
	300 µg/g	100 g		S21-300Y
	500 µg/g	50 g		S21-500Z
	500 µg/g	100 g		S21-500Y
	900 µg/g	50 g		S21-900Z
	900 µg/g	100 g		S21-900Y

Multi-Element Organometallic Oil Standards, 12 Elements

Elements in Base Oil	Concentration	Weight	Matrix	Part #
Ag, Al, Cr, Cu, Fe, Mg, Na, Ni, Pb, Si, Sn, Ti	100 µg/g	50 g	Base Oil 75	S12-100Z
	100 µg/g	100 g		S12-100Y
	500 µg/g	50 g		S12-500Z
	900 µg/g	50 g		S12-900Z
	900 µg/g	100 g		S12-900Y

Multi-Element Organometallic Oil Standards, 5 Elements

Elements in Base Oil	Concentration	Weight	Matrix	Part #
Ba, Ca, Mg, P, Zn	900 µg/g	50 g	Base Oil 75	AM-900Z
	900 µg/g	100 g		AM-900Y
	1,000 µg/g	50 g		AM-1000Z
	1,000 µg/g	100 g		AM-1000Y
	5,000 µg/g	50 g		AM-5000Z
	5,000 µg/g	100 g		AM-5000Y

Base Oil and Kerosene Blanks

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

Base Oil 20 Blank, 500 mL

Matrix	Part #
Base Oil 20	BASE20

Base Oil 20 Blank, 1 Gallon

Matrix	Part #
Base Oil 20	BASE20-G

Base Oil 75 Blank, 500 mL

Matrix	Part #
Base Oil 75	BASE75

Base Oil 20 Blank, 1 Gallon

Matrix	Part #
Base Oil 75	BASE75-G

Kerosene Blank, 500 mL

Matrix	Part #
Kerosene	KER-BLK

Kerosene Blank, 1 Gallon

Matrix	Part #
Kerosene	KER-BLK-G

B100 Biodiesel Standards

Governments worldwide have passed regulations that mandate lower levels of sulfur in biodiesel fuel. To comply with the implementation of these regulations, Spex CertiPrep offers specifically designed Certified Reference Materials for industrial use. Our B100 Biodiesel Standards meet the requirements for testing ASTM Methods D6751, D5453 and EN 14214.

B100 Biodiesel Standards

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

Sulfur Oil Standards for Diesel Fuel Analysis in Base Oil

Sulfur Oil Standards for Diesel Fuel Analysis in Base Oil

Description	Concentration	Volume	Matrix	Part #
Sulfur Blank	0 µg/g	100 mL	Base Oil 20	DSS8-Y
Sulfur	5 µg/g	100 mL	Base Oil 20	DSS8-5Y
Sulfur	10 µg/g	100 mL	Base Oil 20	DSS8-10Y
Sulfur	15 µg/g	100 mL	Base Oil 20	DSS8-15Y
Sulfur	20 µg/g	100 mL	Base Oil 20	DSS8-20Y
Sulfur	25 µg/g	100 mL	Base Oil 20	DSS8-25Y
Sulfur	50 µg/g	100 mL	Base Oil 20	DSS8-AY
Sulfur	75 µg/g	100 mL	Base Oil 20	DSS8-75Y
Sulfur	100 µg/g	100 mL	Base Oil 20	DSS8-1Y
Sulfur	200 µg/g	100 mL	Base Oil 20	DSS8-BY
Sulfur	300 µg/g	100 mL	Base Oil 20	DSS8-CY
Sulfur	500 µg/g	100 mL	Base Oil 20	DSS8-1AY
Sulfur	750 µg/g	100 mL	Base Oil 20	DSS8-1BY
Sulfur	1,000 µg/g	100 mL	Base Oil 20	DSS8-2Y

Set for Sulfur Standards

Contents	Part #
DSS8-1AY	DSS8-SET
DSS8-1BY	
DSS8-1Y	
DSS8-2Y	
DSS8-AY	
DSS8-BY	
DSS8-CY	
BASE20	

Set for Ultra Low Sulfur Standards

Contents	Part #
SDFS-10-Y	SDFS-SET
SDFS-100-Y	
SDFS-15-Y	
SDFS-20-Y	
SDFS-25-Y	
SDFS-5-Y	
SDFS-50-Y	
SDFS-BLK-Y	

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

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

Description	Concentration	Volume	Matrix	Part #
Sulfur Blank	0 µg/g	100 mL	#2 Diesel Fuel	SDFS-BLK-Y
Sulfur	5 µg/g	100 mL	#2 Diesel Fuel	SDFS-5-Y
Sulfur	10 µg/g	100 mL	#2 Diesel Fuel	SDFS-10-Y
Sulfur	15 µg/g	100 mL	#2 Diesel Fuel	SDFS-15-Y
Sulfur	20 µg/g	100 mL	#2 Diesel Fuel	SDFS-20-Y
Sulfur	25 µg/g	100 mL	#2 Diesel Fuel	SDFS-25-Y
Sulfur	50 µg/g	100 mL	#2 Diesel Fuel	SDFS-50-Y
Sulfur	75 µg/g	100 mL	#2 Diesel Fuel	SDFS-75-Y
Sulfur	100 µg/g	100 mL	#2 Diesel Fuel	SDFS-100-Y
Sulfur	200 µg/g	100 mL	#2 Diesel Fuel	SDFS-200-Y
Sulfur	300 µg/g	100 mL	#2 Diesel Fuel	SDFS-300-Y
Sulfur	400 µg/g	100 mL	#2 Diesel Fuel	SDFS-400-Y
Sulfur	500 µg/g	100 mL	#2 Diesel Fuel	SDFS-500-Y
Sulfur	750 µg/g	100 mL	#2 Diesel Fuel	SDFS-750-Y
Sulfur	1,000 µg/g	100 mL	#2 Diesel Fuel	SDFS-1000-Y

SPEX®

Precision & Accuracy for Every Analysis

Contact

Sales & Customer Service: analytical.cs@zeptometrix.com

Quotes: analytical.quotes@zeptometrix.com

Orders: analytical.orders@zeptometrix.com

Technical Support: analytical.tech@zeptometrix.com

Proficiency Testing: analytical.pt@zeptometrix.com