

Assurance[®]
Single-Element
Standards for
AA & ICP

Single-Element Standards for AA & ICP

- 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

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.

Assurance® Grade CRMs	
Designed For Use With	AA ICP
Analytical Range For Use	ppm, ppb
Single-Element Standards	√
10 µg/mL	√ (Hg only)
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	High Purity Grade
# Trace Impurities Measured on Certificate of Analysis	68
Trace Impurities Measured to	µg/mL
Volume	
30 mL	√
125 mL	√
250 mL	√
500 mL	√



Al

Aluminum

General Properties

Atomic Number	13
Atomic Mass	26.982
Density	2.7 g/cm ³
Melting Point	660 °C
Boiling Point	2467 °C

Sb

Antimony

General Properties

Atomic Number	51
Atomic Mass	121.760
Density	6.697 g/cm ³
Melting Point	630 °C
Boiling Point	1587 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLAL2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLAL2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLAL2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLAL2-2X
1,000 µg/mL	500 mL	2% HCl	PLAL1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLAL2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLAL2-3X
10,000 µg/mL	500 mL	5% HCl	PLAL1-3X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O/0.6% Tartaric Acid/tr. HNO ₃	PLSB7-2M
1,000 µg/mL	125 mL	H ₂ O/0.6% Tartaric Acid/tr. HNO ₃	PLSB7-2Y
1,000 µg/mL	250 mL	H ₂ O/0.6% Tartaric Acid/tr. HNO ₃	PLSB7-2T
1,000 µg/mL	500 mL	H ₂ O/0.6% Tartaric Acid/tr. HNO ₃	PLSB7-2X
1,000 µg/mL	500 mL	20% HCl	PLSB5-2X
10,000 µg/mL	125 mL	H ₂ O/0.6% Tartaric Acid/1% HNO ₃	PLSB7-3Y
10,000 µg/mL	500 mL	H ₂ O/0.6% Tartaric Acid/1% HNO ₃	PLSB7-3X

As

Arsenic

General Properties

Atomic Number	33
Atomic Mass	74.922
Density	5.727 g/cm ³
Melting Point	817 °C
Boiling Point	614 °C*

Ba

Barium

General Properties

Atomic Number	56
Atomic Mass	137.327
Density	3.51 g/cm ³
Melting Point	727 °C
Boiling Point	1897 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLAS2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLAS2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLAS2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLAS2-2X
1,000 µg/mL	500 mL	2% HCl	PLAS1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLAS2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLAS2-3X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLBA2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLBA2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLBA2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLBA2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLBA2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLBA2-3X

* Sublimation Point.

Be

Beryllium

General Properties

Atomic Number	4
Atomic Mass	9.012
Density	1.848 g/cm ³
Melting Point	1287 °C
Boiling Point	2471 °C

Bi

Bismuth

General Properties

Atomic Number	83
Atomic Mass	208.980
Density	9.78 g/cm ³
Melting Point	271 °C
Boiling Point	1564 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLBE2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLBE2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLBE2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLBE2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLBE2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLBE2-3X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	10% HNO ₃	PLBI4-2M
1,000 µg/mL	125 mL	10% HNO ₃	PLBI4-2Y
1,000 µg/mL	500 mL	10% HNO ₃	PLBI4-2X

B

Boron

General Properties

Atomic Number	5
Atomic Mass	10.811
Density	2.46 g/cm ³
Melting Point	2075 °C
Boiling Point	4000 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O	PLB9-2M
1,000 µg/mL	125 mL	H ₂ O	PLB9-2Y
1,000 µg/mL	250 mL	H ₂ O	PLB9-2T
1,000 µg/mL	500 mL	H ₂ O	PLB9-2X
10,000 µg/mL	125 mL	H ₂ O	PLB9-3Y
10,000 µg/mL	500 mL	H ₂ O	PLB9-3X

Cd

Cadmium

General Properties

Atomic Number	48
Atomic Mass	112.411
Density	8.65 g/cm ³
Melting Point	321 °C
Boiling Point	767 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLCD2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLCD2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLCD2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLCD2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLCD2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLCD2-3X

Ca

Calcium

General Properties

Atomic Number	20
Atomic Mass	40.078
Density	1.55 g/cm ³
Melting Point	842 °C
Boiling Point	1484 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLCA2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLCA2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLCA2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLCA2-2X
1,000 µg/mL	500 mL	2% HCl	PLCA1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLCA2-3Y
10,000 µg/mL	250 mL	5% HNO ₃	PLCA2-3T
10,000 µg/mL	500 mL	5% HNO ₃	PLCA2-3X
10,000 µg/mL	500 mL	5% HCl	PLCA1-3X

C

Carbon

General Properties

Atomic Number	6
Atomic Mass	12.011
Density	2.26 g/cm ³
Melting Point	3550 °C*
Boiling Point	3825 °C*

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O	PLC9-2M
1,000 µg/mL	125 mL	H ₂ O	PLC9-2Y
1,000 µg/mL	500 mL	H ₂ O	PLC9-2X

* Numbers provided are for graphite. Carbon sublimates at -78.5°C.

Ce

Cerium

General Properties

Atomic Number	58
Atomic Mass	140.116
Density	6.689 g/cm ³
Melting Point	798 °C
Boiling Point	3424 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLCE2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLCE2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLCE2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLCE2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLCE2-3X

Cs

Cesium

General Properties

Atomic Number	55
Atomic Mass	132.905
Density	1.879 g/cm ³
Melting Point	28 °C
Boiling Point	671 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLCS2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLCS2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLCS2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLCS2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLCS2-3X

Cr

Chromium

General Properties

Atomic Number	24
Atomic Mass	51.996
Density	7.14 g/cm ³
Melting Point	1907 °C
Boiling Point	2671 °C

Co

Cobalt

General Properties

Atomic Number	27
Atomic Mass	58.933
Density	8.9 g/cm ³
Melting Point	1495 °C
Boiling Point	2927 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLCR2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLCR2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLCR2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLCR2-2X
1,000 µg/mL	500 mL	2% HCl	PLCR1-2X
1,000 µg/mL	500 mL	H ₂ O	PLCR9-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLCR2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLCR2-3X
10,000 µg/mL	500 mL	H ₂ O	PLCR9-3X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLCO2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLCO2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLCO2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLCO2-2X
1,000 µg/mL	500 mL	2% HCl	PLCO1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLCO2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLCO2-3X

Cu

Copper

General Properties

Atomic Number	29
Atomic Mass	63.546
Density	8.92 g/cm ³
Melting Point	1084 °C
Boiling Point	2562 °C

Dy

Dysprosium

General Properties

Atomic Number	66
Atomic Mass	162.5
Density	8.551 g/cm ³
Melting Point	1412 °C
Boiling Point	2567 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLCU2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLCU2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLCU2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLCU2-2X
1,000 µg/mL	500 mL	2% HCl	PLCU1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLCU2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLCU2-3X
10,000 µg/mL	500 mL	5% HCl	PLCU1-3X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLDY2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLDY2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLDY2-2X

Er

Erbium

General Properties

Atomic Number	68
Atomic Mass	167.259
Density	9.066 g/cm ³
Melting Point	1529 °C
Boiling Point	2868 °C

Eu

Europium

General Properties

Atomic Number	63
Atomic Mass	151.964
Density	5.244 g/cm ³
Melting Point	822 °C
Boiling Point	1529 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLER2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLER2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLER2-2X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLEU2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLEU2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLEU2-2X

Gd

Gadolinium

General Properties

Atomic Number	64
Atomic Mass	157.25
Density	7.9 g/cm ³
Melting Point	1312 °C
Boiling Point	3266 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLGD2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLGD2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLGD2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLGD2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLGD2-3X

Ga

Gallium

General Properties

Atomic Number	31
Atomic Mass	69.723
Density	5.904 g/cm ³
Melting Point	30 °C
Boiling Point	2204 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLGA2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLGA2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLGA2-2X

Ge

Germanium

General Properties

Atomic Number	32
Atomic Mass	72.63
Density	5.323 g/cm ³
Melting Point	938 °C
Boiling Point	2833 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O/0.16% F ⁻	PLGE9-2M
1,000 µg/mL	125 mL	H ₂ O/0.16% F ⁻	PLGE9-2Y
1,000 µg/mL	500 mL	H ₂ O/0.16% F ⁻	PLGE9-2X

Au

Gold

General Properties

Atomic Number	79
Atomic Mass	196.967
Density	19.3 g/cm ³
Melting Point	1064 °C
Boiling Point	2970 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	10% HCl	PLAU3-2M
1,000 µg/mL	125 mL	10% HCl	PLAU3-2Y
1,000 µg/mL	500 mL	10% HCl	PLAU3-2X

Hf

Hafnium

General Properties

Atomic Number	72
Atomic Mass	178.49
Density	13.31 g/cm ³
Melting Point	2233 °C
Boiling Point	4603 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HCl	PLHF1-2M
1,000 µg/mL	125 mL	2% HCl	PLHF1-2Y
1,000 µg/mL	500 mL	2% HCl	PLHF1-2X

Ho

Holmium

General Properties

Atomic Number	67
Atomic Mass	164.930
Density	8.795 g/cm ³
Melting Point	1461 °C
Boiling Point	2720 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLHO2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLHO2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLHO2-2X

Interactive Periodic Table

Be sure to check out our Interactive Periodic Table for comprehensive details and information for all elements including appearance, applications and complete property details.

Visit [spex.com/KnowledgeBase/PeriodicTable](https://www.spex.com/KnowledgeBase/PeriodicTable).

In

Indium

General Properties

Atomic Number	49
Atomic Mass	114.818
Density	7.31 g/cm ³
Melting Point	157 °C
Boiling Point	2072 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLIN2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLIN2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLIN2-2X

Fe

Iron

General Properties

Atomic Number	26
Atomic Mass	55.845
Density	7.874 g/cm ³
Melting Point	1538 °C
Boiling Point	2861 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLFE2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLFE2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLFE2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLFE2-2X
1,000 µg/mL	500 mL	2% HCl	PLFE1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLFE2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLFE2-3X
10,000 µg/mL	500 mL	5% HCl	PLFE1-3X

Ir

Iridium

General Properties

Atomic Number	77
Atomic Mass	192.217
Density	22.56 g/cm ³
Melting Point	2446 °C
Boiling Point	4428 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	10% HCl	PLIR3-2M
1,000 µg/mL	125 mL	10% HCl	PLIR3-2Y
1,000 µg/mL	500 mL	10% HCl	PLIR3-2X

La

Lanthanum

General Properties

Atomic Number	57
Atomic Mass	138.905
Density	6.146 g/cm ³
Melting Point	920 °C
Boiling Point	3464 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLLA2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLLA2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLLA2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLLA2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLLA2-3X

Pb

Lead

General Properties

Atomic Number	82
Atomic Mass	207.2
Density	11.34 g/cm ³
Melting Point	327 °C
Boiling Point	1749 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLPB2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLPB2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLPB2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLPB2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLPB2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLPB2-3X

Li

Lithium

General Properties

Atomic Number	3
Atomic Mass	6.941
Density	0.535 g/cm ³
Melting Point	181 °C
Boiling Point	1342 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLLI2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLLI2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLLI2-2X
1,000 µg/mL	500 mL	2% HCl	PLLI1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLLI2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLLI2-3X
10,000 µg/mL	500 mL	5% HCl	PLLI1-3X

Lu

Lutetium

General Properties

Atomic Number	71
Atomic Mass	174.967
Density	9.841 g/cm ³
Melting Point	1663 °C
Boiling Point	3402 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLLU2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLLU2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLLU2-2X

Mg

Magnesium

General Properties

Atomic Number	12
Atomic Mass	24.305
Density	1.738 g/cm ³
Melting Point	650 °C
Boiling Point	1090 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLMG2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLMG2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLMG2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLMG2-2X
1,000 µg/mL	500 mL	2% HCl	PLMG1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLMG2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLMG2-3X
10,000 µg/mL	500 mL	5% HCl	PLMG1-3X

Mn

Manganese

General Properties

Atomic Number	25
Atomic Mass	54.938
Density	7.47 g/cm ³
Melting Point	1247 °C
Boiling Point	2061 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLMN2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLMN2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLMN2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLMN2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLMN2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLMN2-3X

Hg

Mercury

General Properties

Atomic Number	80
Atomic Mass	200.59
Density	13.534 g/cm ³
Melting Point	-39 °C
Boiling Point	356 °C

Concentration	Volume	Matrix	Part #
10 µg/mL	125 mL	5% HNO ₃	PLHG2-1AY
10 µg/mL	500 mL	5% HNO ₃	PLHG2-1AX
100 µg/mL	125 mL	5% HNO ₃	PLHG2-1Y
100 µg/mL	500 mL	5% HNO ₃	PLHG2-1X
1,000 µg/mL	30 mL	10% HNO ₃	PLHG4-2M
1,000 µg/mL	125 mL	10% HNO ₃	PLHG4-2Y
1,000 µg/mL	250 mL	10% HNO ₃	PLHG4-2T
1,000 µg/mL	500 mL	10% HNO ₃	PLHG4-2X
10,000 µg/mL	125 mL	10% HNO ₃	PLHG4-3Y
10,000 µg/mL	500 mL	10% HNO ₃	PLHG4-3X

Ask A Chemist

Do you have a technical CRM question for our experienced chemists?
We are here to help. Submit your question to AskAChemist@antylia.com.

Mo

Molybdenum

General Properties

Atomic Number	42
Atomic Mass	95.96
Density	10.28 g/cm ³
Melting Point	2623 °C
Boiling Point	4639 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O	PLMO9-2M
1,000 µg/mL	125 mL	H ₂ O	PLMO9-2Y
1,000 µg/mL	250 mL	H ₂ O	PLMO9-2T
1,000 µg/mL	500 mL	H ₂ O	PLMO9-2X
10,000 µg/mL	125 mL	H ₂ O	PLMO9-3Y
10,000 µg/mL	500 mL	H ₂ O	PLMO9-3X

Ni

Nickel

General Properties

Atomic Number	28
Atomic Mass	58.693
Density	8.908 g/cm ³
Melting Point	1455 °C
Boiling Point	2913 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLNI2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLNI2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLNI2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLNI2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLNI2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLNI2-3X

Pd

Palladium

General Properties

Atomic Number	46
Atomic Mass	106.42
Density	12.023 g/cm ³
Melting Point	1555 °C
Boiling Point	2963 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	10% HCl	PLPD3-2M
1,000 µg/mL	125 mL	10% HCl	PLPD3-2Y
1,000 µg/mL	500 mL	10% HCl	PLPD3-2X

Nd

Neodymium

General Properties

Atomic Number	60
Atomic Mass	144.242
Density	7.01 g/cm ³
Melting Point	1024 °C
Boiling Point	3074 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLND2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLND2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLND2-2X

Nb

Niobium

General Properties

Atomic Number	41
Atomic Mass	92.906
Density	8.57 g/cm ³
Melting Point	2477 °C
Boiling Point	4744 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O/0.4% HF	PLNB9-2M
1,000 µg/mL	125 mL	H ₂ O/0.4% HF	PLNB9-2Y
1,000 µg/mL	500 mL	H ₂ O/0.4% HF	PLNB9-2X
10,000 µg/mL	125 mL	H ₂ O/0.4% HF	PLNB9-3Y
10,000 µg/mL	500 mL	H ₂ O/0.4% HF	PLNB9-3X

P

Phosphorus

General Properties

Atomic Number	15
Atomic Mass	30.974
Density	1.823 g/cm ³
Melting Point	44 °C
Boiling Point	277 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O	PLP9-2M
1,000 µg/mL	125 mL	H ₂ O	PLP9-2Y
1,000 µg/mL	250 mL	H ₂ O	PLP9-2T
1,000 µg/mL	500 mL	H ₂ O	PLP9-2X
10,000 µg/mL	125 mL	H ₂ O	PLP9-3Y
10,000 µg/mL	500 mL	H ₂ O	PLP9-3X

Pt

Platinum

General Properties

Atomic Number	78
Atomic Mass	195.064
Density	21.09 g/cm ³
Melting Point	1768 °C
Boiling Point	3825 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	10% HCl	PLPT3-2M
1,000 µg/mL	125 mL	10% HCl	PLPT3-2Y
1,000 µg/mL	500 mL	10% HCl	PLPT3-2X

K

Potassium

General Properties

Atomic Number	19
Atomic Mass	39.098
Density	0.856 g/cm ³
Melting Point	63 °C
Boiling Point	759 °C

Concentration	Volume	Matrix	Part #1,000
1,000 µg/mL	30 mL	2% HNO ₃	PLK2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLK2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLK2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLK2-2X
1,000 µg/mL	500 mL	2% HCl	PLK1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLK2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLK2-3X
10,000 µg/mL	500 mL	5% HCl	PLK1-3X

Pr

Praseodymium

General Properties

Atomic Number	59
Atomic Mass	140.908
Density	6.64 g/cm ³
Melting Point	935 °C
Boiling Point	3520 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLPR2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLPR2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLPR2-2X

Re

Rhenium

General Properties

Atomic Number	75
Atomic Mass	186.207
Density	21.02 g/cm ³
Melting Point	3186 °C
Boiling Point	5596 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O	PLRE9-2M
1,000 µg/mL	125 mL	H ₂ O	PLRE9-2Y
1,000 µg/mL	500 mL	H ₂ O	PLRE9-2X

Rh

Rhodium

General Properties

Atomic Number	45
Atomic Mass	102.905
Density	12.45 g/cm ³
Melting Point	1964 °C
Boiling Point	3695 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	10% HCl	PLRH3-2M
1,000 µg/mL	125 mL	10% HCl	PLRH3-2Y
1,000 µg/mL	500 mL	10% HCl	PLRH3-2X

Rb

Rubidium

General Properties

Atomic Number	37
Atomic Mass	85.467
Density	1.532 g/cm ³
Melting Point	39 °C
Boiling Point	688 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLRB2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLRB2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLRB2-2X

Ru

Ruthenium

General Properties

Atomic Number	44
Atomic Mass	101.07
Density	12.37 g/cm ³
Melting Point	2334 °C
Boiling Point	4150 °C

Sm

Samarium

General Properties

Atomic Number	62
Atomic Mass	150.36
Density	7.353 g/cm ³
Melting Point	1072 °C
Boiling Point	1790 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	10% HCl	PLRU3-2M
1,000 µg/mL	125 mL	10% HCl	PLRU3-2Y
1,000 µg/mL	500 mL	10% HCl	PLRU3-2X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLSM2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLSM2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLSM2-2X

Sc

Scandium

General Properties

Atomic Number	21
Atomic Mass	44.956
Density	2.985 g/cm ³
Melting Point	1541 °C
Boiling Point	2836 °C

Se

Selenium

General Properties

Atomic Number	34
Atomic Mass	78.96
Density	4.819 g/cm ³
Melting Point	221 °C
Boiling Point	685 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLSC2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLSC2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLSC2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLSC2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLSC2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLSC2-3X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLSE2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLSE2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLSE2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLSE2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLSE2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLSE2-3X

Si

Silicon

General Properties

Atomic Number	14
Atomic Mass	28.085
Density	2.33 g/cm ³
Melting Point	1414 °C
Boiling Point	3265 °C

Ag

Silver

General Properties

Atomic Number	47
Atomic Mass	107.868
Density	10.49 g/cm ³
Melting Point	962 °C
Boiling Point	2162 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O/0.4% F ⁻	PLSI9-2M
1,000 µg/mL	125 mL	H ₂ O/0.4% F ⁻	PLSI9-2Y
1,000 µg/mL	250 mL	H ₂ O/0.4% F ⁻	PLSI9-2T
1,000 µg/mL	500 mL	H ₂ O/0.4% F ⁻	PLSI9-2X
1,000 µg/mL	500 mL	H ₂ O	PLSI9A-2X
10,000 µg/mL	125 mL	H ₂ O/0.4% F ⁻	PLSI9-3Y
10,000 µg/mL	500 mL	H ₂ O/0.4% F ⁻	PLSI9-3X
10,000 µg/mL	500 mL	H ₂ O	PLSI9A-3X

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLAG2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLAG2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLAG2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLAG2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLAG2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLAG2-3X

Na

Sodium

General Properties

Atomic Number	11
Atomic Mass	22.989
Density	0.968 g/cm ³
Melting Point	98 °C
Boiling Point	883 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLNA2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLNA2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLNA2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLNA2-2X
1,000 µg/mL	500 mL	2% HCl	PLNA1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLNA2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLNA2-3X
10,000 µg/mL	500 mL	5% HCl	PLNA1-3X

Sr

Strontium

General Properties

Atomic Number	38
Atomic Mass	87.62
Density	2.63 g/cm ³
Melting Point	777 °C
Boiling Point	1382 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLSR2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLSR2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLSR2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLSR2-2X
1,000 µg/mL	500 mL	2% HCl	PLSR1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLSR2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLSR2-3X

S

Sulfur

General Properties

Atomic Number	16
Atomic Mass	32.065
Density	1.96 g/cm ³
Melting Point	115 °C
Boiling Point	445 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O	PLS9-2M
1,000 µg/mL	125 mL	H ₂ O	PLS9-2Y
1,000 µg/mL	250 mL	H ₂ O	PLS9-2T
1,000 µg/mL	500 mL	H ₂ O	PLS9-2X
10,000 µg/mL	125 mL	H ₂ O	PLS9-3Y
10,000 µg/mL	500 mL	H ₂ O	PLS9-3X

Ta

Tantalum

General Properties

Atomic Number	73
Atomic Mass	180.947
Density	16.65 g/cm ³
Melting Point	3017 °C
Boiling Point	5458 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O/0.8% HF	PLTA9-2M
1,000 µg/mL	125 mL	H ₂ O/0.8% HF	PLTA9-2Y
1,000 µg/mL	500 mL	H ₂ O/0.8% HF	PLTA9-2X
10,000 µg/mL	125 mL	H ₂ O/0.8% HF	PLTA9-3Y
10,000 µg/mL	500 mL	H ₂ O/0.8% HF	PLTA9-3X

Te

Tellurium

General Properties

Atomic Number	52
Atomic Mass	127.6
Density	6.24 g/cm ³
Melting Point	449 °C
Boiling Point	988 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	10% HNO ₃	PLTE4-2M
1,000 µg/mL	125 mL	10% HNO ₃	PLTE4-2Y
1,000 µg/mL	500 mL	10% HNO ₃	PLTE4-2X

Tb

Terbium

General Properties

Atomic Number	65
Atomic Mass	158.925
Density	8.219 g/cm ³
Melting Point	1356 °C
Boiling Point	3230 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLTB2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLTB2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLTB2-2X

Tl

Thallium

General Properties

Atomic Number	81
Atomic Mass	204.383
Density	11.85 g/cm ³
Melting Point	304 °C
Boiling Point	1473 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLTL2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLTL2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLTL2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLTL2-2X

Th

Thorium
(Depleted)

General Properties

Atomic Number	90
Atomic Mass	232.038
Density	11.724 g/cm ³
Melting Point	1842 °C
Boiling Point	4788 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLTH2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLTH2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLTH2-2X

Tm

Thulium

General Properties

Atomic Number	69
Atomic Mass	168.934
Density	9.321 g/cm ³
Melting Point	1545 °C
Boiling Point	1950 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLTM2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLTM2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLTM2-2X

Sn

Tin

General Properties

Atomic Number	50
Atomic Mass	118.71
Density	7.31 g/cm ³
Melting Point	232 °C
Boiling Point	2602 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	20% HCl	PLSN5-2M
1,000 µg/mL	125 mL	20% HCl	PLSN5-2Y
1,000 µg/mL	250 mL	20% HCl	PLSN5-2T
1,000 µg/mL	500 mL	20% HCl	PLSN5-2X
1,000 µg/mL	500 mL	1% HNO ₃ /1% HF	PLSN2-2X
10,000 µg/mL	125 mL	20% HCl	PLSN5-3Y
10,000 µg/mL	500 mL	20% HCl	PLSN5-3X
10,000 µg/mL	500 mL	2% HNO ₃ /2% HF	PLSN2-3X

Ti

Titanium

General Properties

Atomic Number	22
Atomic Mass	47.857
Density	4.507 g/cm ³
Melting Point	1668 °C
Boiling Point	3287 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O/0.24% F ⁻	PLTI9-2M
1,000 µg/mL	125 mL	H ₂ O/0.24% F ⁻	PLTI9-2Y
1,000 µg/mL	250 mL	H ₂ O/0.24% F ⁻	PLTI9-2T
1,000 µg/mL	500 mL	H ₂ O/0.24% F ⁻	PLTI9-2X
1,000 µg/mL	500 mL	20% HCl	PLTI5-2X
10,000 µg/mL	125 mL	H ₂ O/2.4% F ⁻	PLTI9-3Y
10,000 µg/mL	500 mL	H ₂ O/2.4% F ⁻	PLTI9-3X
10,000 µg/mL	500 mL	40% HCl	PLTI5-3X

W

Tungsten

General Properties

Atomic Number	74
Atomic Mass	183.84
Density	19.25 g/cm ³
Melting Point	3422 °C
Boiling Point	5555 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O	PLW9-2M
1,000 µg/mL	125 mL	H ₂ O	PLW9-2Y
1,000 µg/mL	500 mL	H ₂ O	PLW9-2X
1,000 µg/mL	500 mL	1% HNO ₃ /2% HF	PLW2-2X
10,000 µg/mL	125 mL	H ₂ O	PLW9-3Y
10,000 µg/mL	500 mL	H ₂ O	PLW9-3X
10,000 µg/mL	500 mL	2% HNO ₃ /5% HF	PLW2-3X

U

Uranium
(Depleted)**General Properties**

Atomic Number	92
Atomic Mass	238.027
Density	19.05 g/cm ³
Melting Point	1132 °C
Boiling Point	4131 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLU2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLU2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLU2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLU2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLU2-3X

V

Vanadium

General Properties

Atomic Number	23
Atomic Mass	50.941
Density	6.11 g/cm ³
Melting Point	1910 °C
Boiling Point	3407 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLV2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLV2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLV2-2X
1,000 µg/mL	500 mL	2% HCl	PLV1-2X
10,000 µg/mL	125 mL	15% HNO ₃	PLV4-3Y
10,000 µg/mL	500 mL	15% HNO ₃	PLV4-3X
10,000 µg/mL	500 mL	15% HCl	PLV3-3X

Yb

Ytterbium

General Properties

Atomic Number	70
Atomic Mass	173.054
Density	6.57 g/cm ³
Melting Point	824 °C
Boiling Point	1196 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLYB2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLYB2-2Y
1,000 µg/mL	500 mL	2% HNO ₃	PLYB2-2X

Y

Yttrium

General Properties

Atomic Number	39
Atomic Mass	88.906
Density	4.472 g/cm ³
Melting Point	1526 °C
Boiling Point	3336 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLY2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLY2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLY2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLY2-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLY2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLY2-3X

Zn

Zinc

General Properties

Atomic Number	30
Atomic Mass	65.38
Density	7.14 g/cm ³
Melting Point	419 °C
Boiling Point	907 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLZN2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLZN2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLZN2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLZN2-2X
1,000 µg/mL	500 mL	2% HCl	PLZN1-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLZN2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLZN2-3X
10,000 µg/mL	500 mL	5% HCl	PLZN1-3X

Zr

Zirconium

General Properties

Atomic Number	40
Atomic Mass	91.224
Density	6.511 g/cm ³
Melting Point	1855 °C
Boiling Point	4409 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	PLZR2-2M
1,000 µg/mL	125 mL	2% HNO ₃	PLZR2-2Y
1,000 µg/mL	250 mL	2% HNO ₃	PLZR2-2T
1,000 µg/mL	500 mL	2% HNO ₃	PLZR2-2X
1,000 µg/mL	500 mL	10% HCl	PLZR3-2X
10,000 µg/mL	125 mL	5% HNO ₃	PLZR2-3Y
10,000 µg/mL	500 mL	5% HNO ₃	PLZR2-3X
10,000 µg/mL	500 mL	10% HCl	PLZR3-3X

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 ₂ O	PLBLK-H2O
DI Water Blank	1 L	H ₂ O	PLBLK-H2O-1L
DI Water Blank	2 L	H ₂ O	PLBLK-H2O-2L
DI Water Blank	4 L	H ₂ O	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, Ti, 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 ₂ O	
Sb			H ₂ O/0.6% Tartaric Acid/tr. HNO ₃	
Ti			H ₂ O/0.24% F ⁻	
Nb, Si			H ₂ O/0.4% F ⁻	

Claritas PPT[®]
Single-Element
Standards for ICP-MS

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.

Claritas PPT [®] Grade CRMs	
Designed For Use With	ICP ICP-MS
Analytical Range For Use	ppb, ppt
Single-Element Standards	✓
1 µg/mL	✓
10 µg/mL	✓
100 µg/mL	✓
1,000 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
# Trace Impurities Measured on Certificate of Analysis	68
Trace Impurities Measured to	µg/L
Volume	
30 mL	✓
125 mL	✓



Al

Aluminum

General Properties

Atomic Number	13
Atomic Mass	26.982
Density	2.7 g/cm ³
Melting Point	660 °C
Boiling Point	2467 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLAL2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLAL2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLAL2-2Y

As

Arsenic

General Properties

Atomic Number	33
Atomic Mass	74.922
Density	5.727 g/cm ³
Melting Point	817 °C
Boiling Point	614 °C*

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLAS2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLAS2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLAS2-2Y

* Sublimation Point.

Be

Beryllium

General Properties

Atomic Number	4
Atomic Mass	9.012
Density	1.848 g/cm ³
Melting Point	1287 °C
Boiling Point	2471 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLBE2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLBE2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLBE2-2Y

Sb

Antimony

General Properties

Atomic Number	51
Atomic Mass	121.760
Density	6.697 g/cm ³
Melting Point	630 °C
Boiling Point	1587 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O/0.6% Tartaric Acid/tr. HNO ₃	CLSB7-2M
1,000 µg/mL	125 mL	H ₂ O/0.6% Tartaric Acid/tr. HNO ₃	CLSB7-2Y

Ba

Barium

General Properties

Atomic Number	56
Atomic Mass	137.327
Density	3.51 g/cm ³
Melting Point	727 °C
Boiling Point	1897 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLBA2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLBA2-2Y

Bi

Bismuth

General Properties

Atomic Number	83
Atomic Mass	208.980
Density	9.78 g/cm ³
Melting Point	271 °C
Boiling Point	1564 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLBI2-1BY
10 µg/mL	30 mL	2% HNO ₃	CLBI2-1AM
10 µg/mL	125 mL	2% HNO ₃	CLBI2-1AY

B

Boron

General Properties

Atomic Number	5
Atomic Mass	10.811
Density	2.46 g/cm ³
Melting Point	2075 °C
Boiling Point	4000 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	H ₂ O	CLB9-1BY

Cd

Cadmium

General Properties

Atomic Number	48
Atomic Mass	112.411
Density	8.65 g/cm ³
Melting Point	321 °C
Boiling Point	767 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLCD2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLCD2-2Y

Ca

Calcium

General Properties

Atomic Number	20
Atomic Mass	40.078
Density	1.55 g/cm ³
Melting Point	842 °C
Boiling Point	1484 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLCA2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLCA2-2Y

Cr

Chromium

General Properties

Atomic Number	24
Atomic Mass	51.996
Density	7.14 g/cm ³
Melting Point	1907 °C
Boiling Point	2671 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLCR2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLCR2-2Y

Co

Cobalt

General Properties

Atomic Number	27
Atomic Mass	58.933
Density	8.9 g/cm ³
Melting Point	1495 °C
Boiling Point	2927 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLCO2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLCO2-2Y

Cu

Copper

General Properties

Atomic Number	29
Atomic Mass	63.546
Density	8.92 g/cm ³
Melting Point	1084 °C
Boiling Point	2562 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLCU2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLCU2-2Y

Gd

Gadolinium

General Properties

Atomic Number	64
Atomic Mass	157.25
Density	7.9 g/cm ³
Melting Point	1312 °C
Boiling Point	3266 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLGD2-1BY

Ga

Gallium

General Properties

Atomic Number	31
Atomic Mass	69.723
Density	5.904 g/cm ³
Melting Point	30 °C
Boiling Point	2204 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLGA2-1BY

Ge

Germanium

General Properties

Atomic Number	32
Atomic Mass	72.63
Density	5.323 g/cm ³
Melting Point	938 °C
Boiling Point	2833 °C

Concentration	Volume	Matrix	Part #
10 µg/mL	30 mL	H ₂ O/tr. F ⁻	CLGE9-1AM
10 µg/mL	125 mL	H ₂ O/tr. F ⁻	CLGE9-1AY

Au

Gold

General Properties

Atomic Number	79
Atomic Mass	196.967
Density	19.3 g/cm ³
Melting Point	1064 °C
Boiling Point	2970 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	1% HNO ₃ /3% HCl	CLAU6-1BY
100 µg/mL	30 mL	2% HCl	CLAU1-1M
100 µg/mL	125 mL	2% HCl	CLAU1-1Y

In

Indium

General Properties

Atomic Number	49
Atomic Mass	114.818
Density	7.31 g/cm ³
Melting Point	157 °C
Boiling Point	2072 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLIN2-1BY
10 µg/mL	30 mL	2% HNO ₃	CLIN2-1AM
10 µg/mL	125 mL	2% HNO ₃	CLIN2-1AY

Ir

Iridium

General Properties

Atomic Number	77
Atomic Mass	192.217
Density	22.56 g/cm ³
Melting Point	2446 °C
Boiling Point	4428 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HCl	CLIR1-1BY

Fe

Iron

General Properties

Atomic Number	26
Atomic Mass	55.845
Density	7.874 g/cm ³
Melting Point	1538 °C
Boiling Point	2861 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLFE2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLFE2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLFE2-2Y

Pb

Lead

General Properties

Atomic Number	82
Atomic Mass	207.2
Density	11.34 g/cm ³
Melting Point	327 °C
Boiling Point	1749 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLPB2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLPB2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLPB2-2Y

Li

Lithium

General Properties

Atomic Number	3
Atomic Mass	6.941
Density	0.535 g/cm ³
Melting Point	181 °C
Boiling Point	1342 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLLI2-1BY

Lu

Lutetium

General Properties

Atomic Number	71
Atomic Mass	174.967
Density	9.841 g/cm ³
Melting Point	1663 °C
Boiling Point	3402 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLLU2-1BY

Mg
Magnesium

General Properties

Atomic Number	12
Atomic Mass	24.305
Density	1.738 g/cm ³
Melting Point	650 °C
Boiling Point	1090 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLMG2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLMG2-2Y

Mn
Manganese

General Properties

Atomic Number	25
Atomic Mass	54.938
Density	7.47 g/cm ³
Melting Point	1247 °C
Boiling Point	2061 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLMN2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLMN2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLMN2-2Y

Hg
Mercury

General Properties

Atomic Number	80
Atomic Mass	200.59
Density	13.534 g/cm ³
Melting Point	-39 °C
Boiling Point	356 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	0.7% HNO ₃ /0.4% HCl	CLHG6-1BY
10 µg/mL	30 mL	5% HNO ₃	CLHG2-1AM
10 µg/mL	125 mL	5% HNO ₃	CLHG2-1AY
1,000 µg/mL	30 mL	10% HNO ₃	CLHG4-2M
1,000 µg/mL	125 mL	10% HNO ₃	CLHG4-2Y

Mo
Molybdenum

General Properties

Atomic Number	42
Atomic Mass	95.96
Density	10.28 g/cm ³
Melting Point	2623 °C
Boiling Point	4639 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	H ₂ O	CLMO9-1BY
1,000 µg/mL	30 mL	H ₂ O	CLMO9-2M
1,000 µg/mL	125 mL	H ₂ O	CLMO9-2Y

Nd
Neodymium

General Properties

Atomic Number	60
Atomic Mass	144.242
Density	7.01 g/cm ³
Melting Point	1024 °C
Boiling Point	3074 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLND2-1BY

Ni
Nickel

General Properties

Atomic Number	28
Atomic Mass	58.693
Density	8.908 g/cm ³
Melting Point	1455 °C
Boiling Point	2913 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLNI2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLNI2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLNI2-2Y

P

Phosphorus

General Properties

Atomic Number	15
Atomic Mass	30.974
Density	1.823 g/cm ³
Melting Point	44 °C
Boiling Point	277 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	H ₂ O	CLP9-1BY

Pt

Platinum

General Properties

Atomic Number	78
Atomic Mass	195.064
Density	21.09 g/cm ³
Melting Point	1768 °C
Boiling Point	3825 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HCl	CLPT1-1BY

K

Potassium

General Properties

Atomic Number	19
Atomic Mass	39.098
Density	0.856 g/cm ³
Melting Point	63 °C
Boiling Point	759 °C

Rh

Rhodium

General Properties

Atomic Number	45
Atomic Mass	102.905
Density	12.45 g/cm ³
Melting Point	1964 °C
Boiling Point	3695 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLK2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLK2-2Y

Concentration	Volume	Matrix	Part #
10 µg/mL	30 mL	2% HCl	CLRH1-1AM
10 µg/mL	125 mL	2% HCl	CLRH1-1AY

Sc

Scandium

General Properties

Atomic Number	21
Atomic Mass	44.956
Density	2.985 g/cm ³
Melting Point	1541 °C
Boiling Point	2836 °C

Se

Selenium

General Properties

Atomic Number	34
Atomic Mass	78.96
Density	4.819 g/cm ³
Melting Point	221 °C
Boiling Point	685 °C

Concentration	Volume	Matrix	Part #
10 µg/mL	30 mL	2% HNO ₃	CLSC2-1AM
10 µg/mL	125 mL	2% HNO ₃	CLSC2-1AY

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLSE2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLSE2-2Y

Si

Silicon

General Properties

Atomic Number	14
Atomic Mass	28.085
Density	2.33 g/cm ³
Melting Point	1414 °C
Boiling Point	3265 °C

Ag

Silver

General Properties

Atomic Number	47
Atomic Mass	107.868
Density	10.49 g/cm ³
Melting Point	962 °C
Boiling Point	2162 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	H ₂ O/tr. F ⁻	CLSI9-1BY

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLAG2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLAG2-2Y

Na

Sodium

General Properties

Atomic Number	11
Atomic Mass	22.989
Density	0.968 g/cm ³
Melting Point	98 °C
Boiling Point	883 °C

Sr

Strontium

General Properties

Atomic Number	38
Atomic Mass	87.62
Density	2.63 g/cm ³
Melting Point	777 °C
Boiling Point	1382 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLNA2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLNA2-2Y

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLSR2-1BY

Tb

Terbium

General Properties

Atomic Number	65
Atomic Mass	158.925
Density	8.219 g/cm ³
Melting Point	1356 °C
Boiling Point	3230 °C

Concentration	Volume	Matrix	Part #
10 µg/mL	30 mL	2% HNO ₃	CLTB2-1AM
10 µg/mL	125 mL	2% HNO ₃	CLTB2-1AY

Tl

Thallium

General Properties

Atomic Number	81
Atomic Mass	204.383
Density	11.85 g/cm ³
Melting Point	304 °C
Boiling Point	1473 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLTL2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLTL2-2Y

Th

Thorium
(Depleted)

General Properties

Atomic Number	90
Atomic Mass	232.038
Density	11.724 g/cm ³
Melting Point	1842 °C
Boiling Point	4788 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLTH2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLTH2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLTH2-2Y

Sn

Tin

General Properties

Atomic Number	50
Atomic Mass	118.71
Density	7.31 g/cm ³
Melting Point	232 °C
Boiling Point	2602 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	1% HNO ₃ /1% HF	CLSN2-2M
1,000 µg/mL	125 mL	1% HNO ₃ /1% HF	CLSN2-2Y

Ti

Titanium

General Properties

Atomic Number	22
Atomic Mass	47.857
Density	4.507 g/cm ³
Melting Point	1668 °C
Boiling Point	3287 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	H ₂ O/0.24% F ⁻	CLTI9-2M
1,000 µg/mL	125 mL	H ₂ O/0.24% F ⁻	CLTI9-2Y

W

Tungsten

General Properties

Atomic Number	74
Atomic Mass	183.84
Density	19.25 g/cm ³
Melting Point	3422 °C
Boiling Point	5555 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃ /tr. HF	CLW2-1BY

U

Uranium
(Depleted)

General Properties

Atomic Number	92
Atomic Mass	238.027
Density	19.05 g/cm ³
Melting Point	1132 °C
Boiling Point	4131 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLU2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLU2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLU2-2Y

V

Vanadium

General Properties

Atomic Number	23
Atomic Mass	50.941
Density	6.11 g/cm ³
Melting Point	1910 °C
Boiling Point	3407 °C

Concentration	Volume	Matrix	Part #
1,000 µg/mL	30 mL	2% HNO ₃	CLV2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLV2-2Y

Y

Yttrium

General Properties

Atomic Number	39
Atomic Mass	88.906
Density	4.472 g/cm ³
Melting Point	1526 °C
Boiling Point	3336 °C

Zn

Zinc

General Properties

Atomic Number	30
Atomic Mass	65.38
Density	7.14 g/cm ³
Melting Point	419 °C
Boiling Point	907 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLY2-1BY
10 µg/mL	30 mL	2% HNO ₃	CLY2-1AM
10 µg/mL	125 mL	2% HNO ₃	CLY2-1AY

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLZN2-1BY
1,000 µg/mL	30 mL	2% HNO ₃	CLZN2-2M
1,000 µg/mL	125 mL	2% HNO ₃	CLZN2-2Y

Zr

Zirconium

General Properties

Atomic Number	40
Atomic Mass	91.224
Density	6.511 g/cm ³
Melting Point	1855 °C
Boiling Point	4409 °C

Concentration	Volume	Matrix	Part #
1 µg/mL	125 mL	2% HNO ₃	CLZR2-1BY

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
Nitric Acid Blank	250 mL	2% HNO ₃	CLBK-HNO3-250
DI Water Blank	125 mL	H ₂ O	CLBLK-H2O
DI Water Blank	250 mL	H ₂ O	CLBK-H2O-250

Isotopes for ICP-MS				
Elements	Concentration	Volume	Matrix	Part #
Boron 10	10 µg/mL	125 mL	H ₂ O	ISOT-B10
Boron 11	10 µg/mL	125 mL	H ₂ O	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
Lithium 6	100 µg/mL	30 mL	2% HNO ₃	ISOT-LI6M
Lithium 6	100 µg/mL	125 mL	2% HNO ₃	ISOT-LI6
Strontium 86	10 µg/mL	125 mL	2% HNO ₃	ISOT-SR86
Zinc 68	10 µg/mL	125 mL	2% HNO ₃	ISOT-ZN68

Did You Know?

"Famed chemist Glenn Seaborg was the only person who could write his address in chemical elements. He would write Sg, Lr, Bk, Cf, Am. That's Seaborgium (Sg), named after Seaborg himself; Lawrencium (Lr), named after the Lawrence Berkeley National Laboratory; Berkelium (Bk), named after the city of Berkeley, the home of UC Berkeley; Californium (Cf), named after the state of California; Americium (Am), named after America."

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[®]
Multi-Element
Standards
for AA & ICP

Assurance[®] Multi-Element Standards for AA & ICP

The section that follows contains multi-element standards with a combination of elements, concentrations and matrices, designed by Spex CertiPrep for convenience of use and stability.

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

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

CALIBRATE WITH CONFIDENCE[®]

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

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

Did You Know?

Spex CertiPrep is accredited by A2LA for Inorganic and Organic Certified Reference Materials. In addition, to being registered as an ISO 9001:2015 facility, Spex CertiPrep is accredited by A2LA as complying with the requirements of ISO/IEC 17025:2017 and ISO 17034:2016. Our scope of accreditation is the most comprehensive in the industry.



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

Assurance® Mixed Multi-Element Standards for AA & ICP (continued)

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	MIXSTD4A-100N	500 mL	MIXSTD4A-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	MIXSTD-SETAN
MIXSTD2A-100	
MIXSTD3A-100	
MIXSTD4A-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	MIXSTD4-100	MIXSTD-SET
MIXSTD2-100	MIXSTD5-100	
MIXSTD3-100		

Assurance[®] Mixed Multi-Element Standards for AA & ICP (continued)

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% HNO ₃ /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 $\pm 5\%$ of $1 \mu\text{g/mL}$, 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 #			
125 mL		QC-7			
Volume		Part #			
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 #			
125 mL		QC-7A			
				Volume	
				Part #	

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 $\mu\text{g/mL}$		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

Helpful Hint

Aqua regia, or "royal water", is a mixture of 1 part nitric acid and 3 parts hydrochloric acid used to digest gold and platinum. An aqua regia solution can be prepared by using Spex CertiPrep nitric acid and hydrochloric acid blanks.

Quality Control Standards (continued)

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

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 $\pm 5\%$ 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 ₂ O/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	

Interference Check Standards (continued)

Interference Check Standard 18 w/o Mercury			
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

Groundwater and Wastewater Pollution Control Check Standards (continued)

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**

Claritas PPT® Multi-Element Standards for ICP-MS

Spex CertiPrep Claritas PPT® standards are a class of Inorganic Certified Reference Standards designed specifically for today's new generation of trace ICP and ICP-MS instrumentation. Based on extensive development, our chemists have formulated this line of high-purity standards for user convenience and stability.

Our Claritas PPT® selection of standards includes a complete series of multi-element solutions, many designed for use with US EPA Methods. These solutions are made with the highest purity materials available and are tested on our state-of-the-art ICP-MS. Spex CertiPrep Certified Reference Materials (CRMs) are manufactured under a quality system complying with the requirements of ISO 9001, ISO/IEC 17025 and ISO 17034.

CALIBRATE WITH CONFIDENCE®

Since 1954, our commitment to quality has made Spex CertiPrep the leading manufacturing of Inorganic Certified Reference Materials.

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

When One in a Million Isn't Good Enough...Claritas PPT® Certified by ICP-MS

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

Did You Know?

Spex CertiPrep offers a variety of customer loyalty programs. Our SPoints Program allows you to earn valuable credits every time you order. For more information, visit [spex.com/PurchasingOptions/SPointsRewards](https://www.spex.com/PurchasingOptions/SPointsRewards).

Spex CertiPrep also offers a Loyalty Customer Discount Program to reward you with an **automatic** discount ranging from 5% to 20% off all qualified products.

There is no need to apply for either of these programs. You are automatically enrolled when you purchase Spex CertiPrep products!

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.

ICP-MS Tuning Solution 1				
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.

ICP-MS Tuning Solution 2				
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.

ICP-MS Tuning Solution 3				
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.

ICP-MS Tuning Solution 4				
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.

Calibration and Matrix Blanks			
Description	Volume	Matrix	Part #
Nitric Acid Blank	125 mL	2% HNO ₃	CLBLK-HNO3
	250 mL	2% HNO ₃	CLBK-HNO3-250
Hydrochloric Acid Blank	125 mL	2% HCl	CLBLK-HCL
DI Water Blank	125 mL	H ₂ O	CLBLK-H2O
	250 mL	H ₂ O	CLBK-H2O-250

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			

Instrument Calibration (continued)

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

ICP-MS Internal Standard 1				
Elements	Concentration	Volume	Matrix	Part #
Bi, Ho, In, ⁶ Li, Sc, Tb, Y	10 µg/mL	125 mL	2% HNO ₃	CLISS-1

ICP-MS Internal Standard 2				
Elements	Concentration	Volume	Matrix	Part #
Bi, Ho, In, ⁶ Li, Rh, Sc, Tb, Y	10 µg/mL	125 mL	2% HNO ₃	CLISS-2

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 ₂ O/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 #	Volume	Part #	
125 mL	CL-ISM1-100	500 mL	CL-ISM1-500	

ICP-MS Alternate Internal Standard 2				
Elements		Concentration	Matrix	
Bi, Ge, In, ⁶ Li, Lu, Rh, Sc, Tb		100 µg/mL	2% HNO ₃	
		Volume	Part #	
		125 mL	CL-ISM2-100	

Instrument Check Standards

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

ICP-MS Instrument Check Standard 1, 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 4, 125 mL			
Elements	Concentration	Matrix	Part #
Mo, Th, U	10 µg/mL	2% HNO ₃	CL-ICS-4

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 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 5, 125 mL			
Elements	Concentration	Matrix	Part #
Mo, Sn, Sr, Ti	10 µg/mL	2% HNO ₃ /tr. HF	CL-ICS-5

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/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/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 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 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 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

Multi-Element Solution Standards

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

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 ₂ O/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-HNO ₃	
CLBLK-HCL	
CLBLK-H ₂ O	
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-HNO ₃	
CLBLK-HCL	
CLBLK-H ₂ O	

*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, Ti, 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 2, 125 mL			
Elements	Concentration	Matrix	Part #
Mo, Sb, Ti	20 µg/mL	H ₂ O/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			
Element	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 10	10 µg/mL	125 mL	H ₂ O	ISOT-B10
Boron 11	10 µg/mL	125 mL	H ₂ O	ISOT-B11
Copper 65	10 µg/mL	125 mL	2% HNO ₃	ISOT-CU65
Lithium 6	10 µg/mL	125 mL	2% HNO ₃	ISOT-LI6
Lead 206	10 µg/mL	125 mL	2% HNO ₃	ISOT-PB206
Lead 207	10 µg/mL	125 mL	2% HNO ₃	ISOT-PB207
Strontium 86	10 µg/mL	125 mL	2% HNO ₃	ISOT-SR86
Zinc 68	10 µg/mL	125 mL	2% HNO ₃	ISOT-ZN68

Helpful Hint

Don't forget your Gold Blank Standard, CLAU1-1Y (see page 62), to reduce the memory effect of mercury!

Multi-Element CLP Standards for ICP & ICP-MS

CLP Standards for ICP & ICP-MS

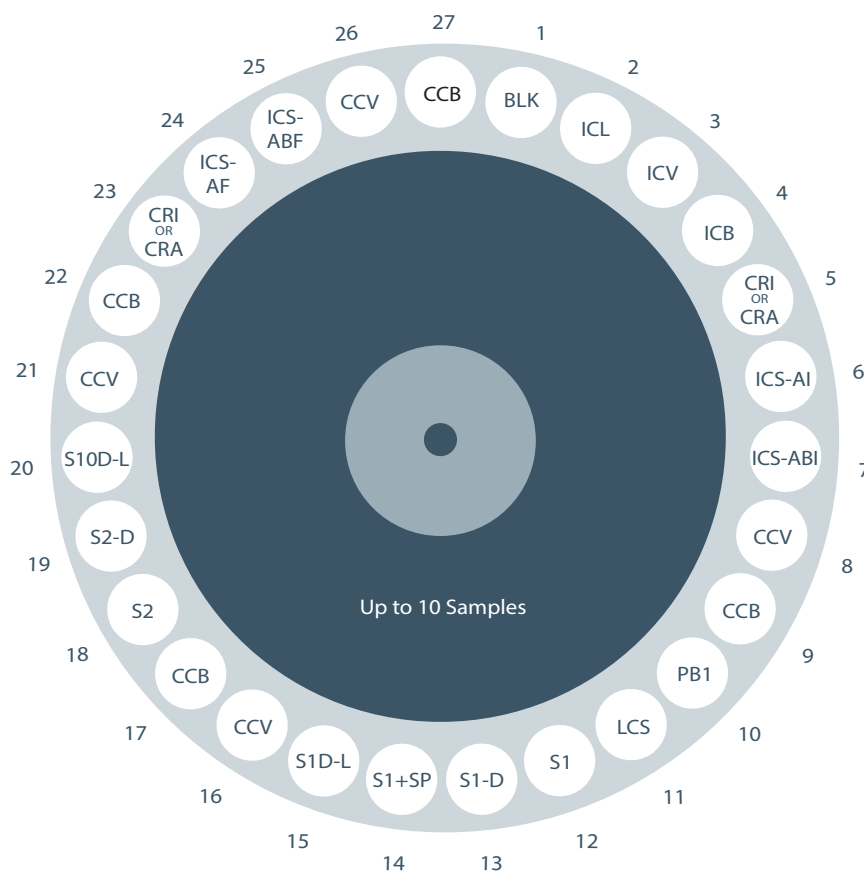
Our Contract Laboratory Program (CLP) standards allow you to Calibrate with Confidence®. The following standards are to be used in conjunction with the Statement of Work for Inorganic Analysis; Multi-Media/Multi-Concentration Document Number ILM 05.3/ISM 01.2.

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

The US EPA SOW ILM 05.3/ISM 01.2 gives specific procedures for the methods of analysis, target elements, and concentration levels. Standards are specified not only by the elements present and their relative concentrations, but also the order and frequency of running standards, blanks and samples. Details of these specifications may be found in the US EPA SOW ILM 05.3/ISM 01.2 in the following sections:

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

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



Standards for the Contract Laboratory Program

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

- | | |
|---|---|
| <p>1. BLK
Blank: PLBLKs</p> <p>2. ICL
Initial Calibration Solution: Mixture of ICALs</p> <p>3. ICV
Initial Calibration Verification: ICV-1A</p> <p>4. ICB
Initial Calibration Blank (not digested): PLBLKs</p> <p>5. CRI (ICP-AES) or CRA (AA)
CRDL-2</p> <p>6. ICS-AI
Initial Interferents, A: INT-A1</p> <p>7. ICS-ABI
Initial Interferents and Analytes, AB: INT-A1, INT-B3</p> <p>8. CCV
Continuing Calibration Verification (50% ICV): ICV-1A</p> <p>9. CCB
Continuing Calibration Blank: PLBLKs (if results of CCV and CCB are within limits, proceed to next sample, if not, stop run)</p> <p>10. PB1
Preparation Blank: Digested Water or Soil Blank</p> <p>11. LCS
Laboratory Control Sample (digested): ICV-1A</p> <p>12. S1
Sample #1</p> <p>13. S1-D
Sample #1 Duplicate</p> <p>14. S1+SP
Sample #1 with SPIKE: SPIKE-1</p> | <p>15. S1D-L
Sample #1 Diluted Five-Fold</p> <p>16. CCV
Continuing Calibration Verification (50% ICV): ICV-1A</p> <p>17. CCB
Continuing Calibration Blank: PLBLKs (if results of CCV and CCB are within limits, proceed to next sample, if not, stop run)</p> <p>18. S2
Sample #2</p> <p>19. S2-D
Sample #2 Duplicate (up to 10 samples may be run as long as CCV and CCB tests are within accepted limits)</p> <p>20. S10D-L
Sample #10 Diluted Five-Fold</p> <p>21. CCV
Continuing Calibration Verification (50% ICV): ICV-1A</p> <p>22. CCB
Continuing Calibration Blank PLBLKs (if results of CCV and CCB are within limits, proceed to next sample, if not, stop run)</p> <p>23. CRI (ICP-AES) or CRA (AA)
2 x Contract Required Detection Limits: CRDL-1</p> <p>24. ICS-AF
Final Interferents, A: INT-A1</p> <p>25. ICS-ABF
Final Interferents and Analytes, AB: INT-A1, INT-B3</p> <p>26. CCV
Continuing Calibration Verification (50% ICV): ICV-1A</p> <p>27. CCB
Continuing Calibration Blank: PLBLKs</p> |
|---|---|

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, ICAL-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/ICSAB. 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-1 standards 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.

Spike Sample Analysis (continued)

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 67 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 for CLP Methods (continued)

See page 67 for details.

Single Element Standards				
Elements	Concentration	Matrix	Volume	Part #
Hg	100 µg/mL	5% HNO ₃	125 mL	PLHG2-1Y
Sb	1,000 µg/mL	H ₂ O/0.6% Tartaric Acid/tr. HNO ₃	125 mL	PLSB7-2Y

Initial Calibration Verification for CLP Methods

See page 67 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			

Helpful Hint

Having trouble finding the Multi-Element Standard you need?
 Fill out the Custom Standard Request Form at
[speX.com/CustomProduct/InorganicProduct](https://www.speX.com/CustomProduct/InorganicProduct).

Contract Required Detection Limits

CLP ISM 01.2 and ILM 05.3 Standards for ICP

See page 67 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			

CLP ISM 01.2 and ILM 05.3 Standards for ICP-MS

See page 67 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			

Helpful Hint

How do I prevent my antimony oxide (Sb₂O₃) solution from becoming a gelatin when I dissolve it in tartaric acid?

While Sb₂O₃ dissolves easily in tartaric acid and water, the solution is clear at first but a gelatin-like substance can form over time. This is a form of mold. Adding a trace amount of nitric acid to the solution can prevent this.

Contract Required Detection Limits (continued)**CLP ILM 02.0 & 05.2 Standards for ICP and CLP-M/6020/SW-846 Standards for ICP-MS**

See page 68 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 68 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 68 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			

Interference Checks (continued)

CLP ISM 01.2 and ILM 05.2 & 05.3 Standards for ICP

See page 68 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 68 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 68 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 68 for details.

ICP-MS Analytes B4				
Elements	Concentration	Matrix	Volume	Part #
Ag, As, Ba, Be, Cd, Co, Sb, Se, Ti, 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 69 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 69 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, TI		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 69 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 69 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 70 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 69-70 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 69 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

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	Volume	Matrix	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	30 mL each	2% HNO ₃	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	

Did You Know?

Spex CertiPrep is proud to announce the installation of over 335 Solar Panels on the roof of our Metuchen, NJ headquarters. This system produces 85 kW of electricity, removing our reliance on power from fossil fuels and other sources. We are committed to helping keep our planet green, and this is just our latest green initiative. For more information, visit spex.com.

USP/ICH Standards

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				
Elements	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				
Elements	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				
Elements	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> and <233> Elemental Impurities (continued)

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> and <233> Elemental Impurities (continued)

USP 232 Revision 40, Inhalation Mix 2A				
Elements	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				
Elements	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 Revision 40, Inhalation 2B, Mix 2				
Elements	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				
Elements	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				
Elements	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				
Elements	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			

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

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

Elemental Impurities E				
Element	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

Did You Know?

We will guarantee your custom standards for one year from the date of shipment and supply your standard with a Comprehensive Certificate of Analysis. With our aqueous standards, you may choose between our conventional ICP certification, or request Claritas PPT® certifications, which includes an impurities analysis of up to 68 elements to ppt levels measured on ICP-MS.

To get started, contact our technical support team or visit

[spex.com/CustomProduct/InorganicProduct](https://www.spex.com/CustomProduct/InorganicProduct) with the following information:

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