SPEX CertiPrep®

Your Science is Our Passion.®

ACCREDITED

INORGANIC

CERTIFIED REFERENCE MATERIALS

2011
2012

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and
UL DQS Inc. Management Systems Solutions

hereby certify that the company

SPEX CertiPrep Inc. &
SPEX CertiPrep Group, LLC

203 Norcross Avenue
Metuchen, NJ 08840
USA

has implemented and maintains a **Quality Management System**.

Scope:
The design, manufacture and distribution of Certified Reference Materials for ICP, ICPMS, DCP, AA, XRF, GC, GCMS, HPLC, IC, and Quality Control. The resale of high purity inorganic/organic compounds and fusion fluxes not necessarily manufactured under an ISO 9000 registered quality system.
Through an audit, documented in a report, it was verified that the management system fulfills the requirements of the following standard:

ISO 9001 : 2008

Date of certification 2009-08-14

Valid until 2012-08-13

Registration Number: 10002793 QM08

Michael Drechsel
President of IQNet

Ganesh Rao
Managing Director of UL DQS Inc.

IQNet Partners*:

AENOR *Spain* AFNOR Certification *France* AIB-Vinçotte International *Belgium* ANCE *Mexico* APCER *Portugal* CCC *Cyprus* CISQ *Italy* CQC *China* CQM *China* CQS *Czech Republic* Cro Cert *Croatia* DQS Holding GmbH *Germany* DS *Denmark* ELOT *Greece* FCAV *Brazil* FONDONORMA *Venezuela* HKQAA *Hong Kong China* ICONTEC *Colombia* IMNC *Mexico* Inspecta Certification *Finland* IRAM *Argentina* JQA *Japan* KFQ *Korea* MSZT *Hungary* Nemko AS *Norway* NSAI *Ireland* PCBC *Poland* Quality Austria *Austria* RR *Russia* SII *Israel* SIQ *Slovenia* SIRIM QAS International *Malaysia* SQS *Switzerland* SRAC *Romania* TEST St Petersburg *Russia* TSE *Turkey* YUQS *Serbia*

IQNet is represented in the USA by: AFNOR Certification, CISQ, DQS Holding GmbH and NSAI Inc.

* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

Inorganic Certified Reference Materials

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SECTION 3

[STOCK AND CUSTOM]

Assurance®

Single Element Standards for AA & ICP-AES

Your Science is Our Passion®

Assurance®

Single Element Standards

Assurance® is SPEX CertiPrep®'s answer to the necessity for accuracy, purity, and high quality in a plasma emission spectroscopy standard. With many laboratories utilizing ICP-AES spectroscopy for its speed and performance, and upgrading from atomic absorption techniques, we have enhanced our product specifications to meet these growing needs.

- **Made with only ASTM Type I water**
- **Inorganic compounds and metals at 99.99% to 99.9999% purity**
- **Incomparable certification**
- **Directly traceable to NIST**
- **Concentration of major element guaranteed to ±0.5%**
- **Certified by UL-DQS for ISO 9001:2009**
- **Accredited by A2LA for ISO/IEC 17025:2005**
- **Accredited by A2LA for ISO/IEC Guide 34:2009**
- **Customs Available – visit *www.spexcertiprep.com/custominorganics* to submit a request.**

Assurance® standards, single element Certified Reference Materials designed specifically for AA and ICP-AES analyses, are available from SPEX CertiPrep®. The Assurance® product line offers the quality in a calibration standard, for both AA and ICP-AES instrumentation, which today's methods require. With each solution you will receive a SPEXertificate® that lists the actual measured value of the main element by two independent methods, and reports actual measured impurities of up to 30 elements which may be present in the final solution. Each Assurance® standard is manufactured under an Underwriters Laboratories, Inc. internationally accredited ISO 9001:2008 quality assurance program. SPEX CertiPrep Certified Reference Materials are manufactured under a quality system complying with the requirements of ISO/IEC 17025:2005 "General Requirements for the Competence of Testing and Calibration" and ISO/IEC Guide 34:2009 "General Requirements for the Competence of Reference Material Producers."

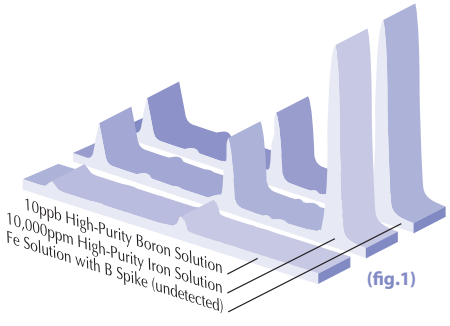
SPEX CertiPrep's unique Triple Checked for Quality just got better. We triple check our products for quality *twice*.

The Starting Material

- Stoichiometry of starting material
- Trace metallic impurities by ICP-AES or ICP-MS
- CL, SO4, checked by classical wet chemistry

The Final Solution

- ICP-AES for the major element
- Classical wet assay for the major element
- Final ICP-AES or ICP-MS analysis for trace metal impurities on the actual solution



(fig.1)

SPEX CertiPrep analyzes each standard in our state-of-the-art laboratory, where the solutions are compared to United States National Institute of Standards and Technology (NIST) solutions (where available). We guarantee the concentration of the major element to ±0.5%, and the accuracy and stability of each Assurance® standard for one year from the date of shipment. All results are reported directly on the corresponding SPEXertificate®.

SPEX CertiPrep uses only high purity acids, ASTM Type I filtered water, and inorganic compounds or pure metals with a 99.99% to 99.9999% range of purity to help guarantee the best product available. The high purity starting materials and SPEX CertiPrep's comprehensive Certificate of Analysis, reporting what is actually in your solution, are your Assurance® that emissions detected are real and are not due to unreported impurities in the calibration standard.

Likewise, you will be aware of trace impurities even in the presence of major analytes as shown above (fig.1).

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
ALUMINUM	2-5% HNO_3	1,000	500	PLAL2-2X
			250	PLAL2-2T
			125	PLAL2-2Y
		10,000	500	PLAL2-3X
			125	PLAL2-3Y
	2-5% HCl	1,000	500	PLAL1-2X
		10,000	500	PLAL1-3X
ANTIMONY	H_2O/tr HNO_3/0.6% Tartaric Acid	1,000	500	PLSB7-2X
			250	PLSB7-2T
			125	PLSB7-2Y
	1% HNO_3/6% Tartaric Acid	10,000	500	PLSB7-3X
			125	PLSB7-3Y
	20% HCl (Teflon)	1,000	500	PLSB5-2X
		10,000	500	PLSB5-3X
ARSENIC	2-5% HNO_3	1,000	500	PLAS2-2X
			250	PLAS2-2T
			125	PLAS2-2Y
		10,000	500	PLAS2-3X
			125	PLAS2-3Y
	2% HCl	1,000	500	PLAS1-2X
BARIUM	2-5% HNO_3	1,000	500	PLBA2-2X
			250	PLBA2-2T
			125	PLBA2-2Y
		10,000	500	PLBA2-3X
			125	PLBA2-3Y
	2% HCl	1,000	500	PLBA1-2X
BERYLLIUM	2-5% HNO_3	1,000	500	PLBE2-2X
			250	PLBE2-2T
			125	PLBE2-2Y
		10,000	500	PLBE2-3X
			125	PLBE2-3Y
BISMUTH	10% HNO_3	1,000	500	PLBI4-2X
			125	PLBI4-2Y
BORON	H_2O	1,000	500	PLB9-2X
			250	PLB9-2T
			125	PLB9-2Y
	H_2O	10,000	500	PLB9-3X
			125	PLB9-3Y
CADMIUM	2-5% HNO_3	1,000	500	PLCD2-2X
			250	PLCD2-2T
			125	PLCD2-2Y
		10,000	500	PLCD2-3X
			125	PLCD2-3Y
	2% HCl	1,000	500	PLCD1-2X

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
CALCIUM	2-5% HNO_3	1,000	500	PLCA2-2X
			250	PLCA2-2T
			125	PLCA2-2Y
		10,000	500	PLCA2-3X
			250	PLCA2-3T
			125	PLCA2-3Y
	2-5% HCl	1,000	500	PLCA1-2X
		10,000	500	PLCA1-3X
CARBON	H_2O	1,000	500	PLC9-2X
			125	PLC9-2Y
CERIUM	2-5% HNO_3	1,000	500	PLCE2-2X
			125	PLCE2-2Y
		10,000	500	PLCE2-3X
			125	PLCE2-3Y
CESIUM	2-5% HNO_3	1,000	500	PLCS2-2X
			125	PLCS2-2Y
		10,000	500	PLCS2-3X
			125	PLCS2-3Y
CHROMIUM	2-5% HNO_3 *(Cr^{+3})*	1,000	500	PLCR2-2X
			250	PLCR2-2T
			125	PLCR2-2Y
		10,000	500	PLCR2-3X
			125	PLCR2-3Y
	2-5% HCl *(Cr^{+3})*	1,000	500	PLCR1-2X
		10,000	500	PLCR1-3X
	H_2O *(Cr^{+6})*	1,000	500	PLCR9-2X
		10,000	500	PLCR9-3X
COBALT	2-5% HNO_3	1,000	500	PLCO2-2X
			250	PLCO2-2T
			125	PLCO2-2Y
		10,000	500	PLCO2-3X
			125	PLCO2-3Y
	2% HCl	1,000	500	PLCO1-2X
COPPER	2-5% HNO_3	1,000	500	PLCU2-2X
			250	PLCU2-2T
			125	PLCU2-2Y
		10,000	500	PLCU2-3X
			125	PLCU2-3Y
	2-5% HCl	1,000	500	PLCU1-2X
		10,000	500	PLCU1-3X
DYSPROSIUM	2% HNO_3	1,000	500	PLDY2-2X
			125	PLDY2-2Y
ERBIUM	2-5% HNO_3	1,000	500	PLER2-2X
			125	PLER2-2Y
		10,000	500	PLER2-3X
			125	PLER2-3Y

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
EUROPIUM	2% HNO_3	1,000	500	PLEU2-2X
			125	PLEU2-2Y
GADOLINIUM	2-5% HNO_3	1,000	500	PLGD2-2X
			125	PLGD2-2Y
		10,000	500	PLGD2-3X
			125	PLGD2-3Y
GALLIUM	2% HNO_3	1,000	500	PLGA2-2X
			125	PLGA2-2Y
GERMANIUM	H_2O/0.16% F^-	1,000	500	PLGE9-2X
			125	PLGE9-2Y
GOLD	10% HCl	1,000	500	PLAU3-2X
			125	PLAU3-2Y
HAFNIUM	2% HCl	1,000	500	PLHF1-2X
			125	PLHF1-2Y
HOLMIUM	2% HNO_3	1,000	500	PLHO2-2X
			125	PLHO2-2Y
INDIUM	2% HNO_3	1,000	500	PLIN2-2X
			125	PLIN2-2Y
IRIDIUM	10% HCl	1,000	500	PLIR3-2X
			125	PLIR3-2Y
IRON	2-5% HNO_3	1,000	500	PLFE2-2X
			250	PLFE2-2T
			125	PLFE2-2Y
		10,000	500	PLFE2-3X
			125	PLFE2-3Y
	2-5% HCl	1,000	500	PLFE1-2X
		10,000	500	PLFE1-3X
LANTHANUM	2-5% HNO_3	1,000	500	PLLA2-2X
			125	PLLA2-2Y
		10,000	500	PLLA2-3X
			125	PLLA2-3Y
LEAD	2-5% HNO_3	1,000	500	PLPB2-2X
			250	PLPB2-2T
			125	PLPB2-2Y
		10,000	500	PLPB2-3X
			125	PLPB2-3Y
LITHIUM	2-5% HNO_3	1,000	500	PLLI2-2X
			125	PLLI2-2Y
		10,000	500	PLLI2-3X
			125	PLLI2-3Y
	2-5% HCl	1,000	500	PLLI1-2X
		10,000	500	PLLI1-3X
LUTETIUM	2% HNO_3	1,000	500	PLLU2-2X
			125	PLLU2-2Y

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
MAGNESIUM	2-5% HNO_3	1,000	500	PLMG2-2X
			250	PLMG2-2T
			125	PLMG2-2Y
		10,000	500	PLMG2-3X
			125	PLMG2-3Y
	2-5% HCl	1,000	500	PLMG1-2X
		10,000	500	PLMG1-3X
MANGANESE	2-5% HNO_3	1,000	500	PLMN2-2X
			250	PLMN2-2T
			125	PLMN2-2Y
		10,000	500	PLMN2-3X
			125	PLMN2-3Y
MERCURY	5% HNO_3	10	125	PLHG2-1AY
			500	PLHG2-1AX
		100	125	PLHG2-1Y
			500	PLHG2-1X
	10% HNO_3	1,000	500	PLHG4-2X
			250	PLHG4-2T
			125	PLHG4-2Y
		10,000	500	PLHG4-3X
			125	PLHG4-3Y
MOLYBDENUM	H_2O	1,000	500	PLMO9-2X
			250	PLMO9-2T
			125	PLMO9-2Y
		10,000	500	PLMO9-3X
			125	PLMO9-3Y
NEODYMIUM	2% HNO_3	1,000	500	PLND2-2X
			125	PLND2-2Y
NICKEL	2-5% HNO_3	1,000	500	PLNI2-2X
			250	PLNI2-2T
			125	PLNI2-2Y
		10,000	500	PLNI2-3X
			125	PLNI2-3Y
NIOBIUM	H_2O/0.4% HF	1,000	500	PLNB9-2X
			125	PLNB9-2Y
	H_2O/0.4% HF	10,000	500	PLNB9-3X
			125	PLNB9-3Y
PALLADIUM	10% HCl	1,000	500	PLPD3-2X
			125	PLPD3-2Y
PHOSPHORUS	H_2O	1,000	500	PLP9-2X
			250	PLP9-2T
			125	PLP9-2Y
		10,000	500	PLP9-3X
			125	PLP9-3Y

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
PLATINUM	10% HCl	1,000	500	PLPT3-2X
			125	PLPT3-2Y
POTASSIUM	2-5% HNO_3	1,000	500	PLK2-2X
			125	PLK2-2Y
			250	PLK2-2T
		10,000	500	PLK2-3X
			125	PLK2-3Y
	2-5% HCl	1,000	500	PLK1-2X
		10,000	500	PLK1-3X
PRASEODYMIUM	2% HNO_3	1,000	500	PLPR2-2X
			125	PLPR2-2Y
RHENIUM	H_2O	1,000	500	PLRE9-2X
			125	PLRE9-2Y
RHODIUM	10% HCl	1,000	500	PLRH3-2X
			125	PLRH3-2Y
RUBIDIUM	2-5% HNO_3	1,000	500	PLRB2-2X
			125	PLRB2-2Y
		10,000	500	PLRB2-3X
			125	PLRB2-3Y
RUTHENIUM	10% HCl	1,000	500	PLRU3-2X
			125	PLRU3-2Y
SAMARIUM	2% HNO_3	1,000	500	PLSM2-2X
			125	PLSM2-2Y
SCANDIUM	2-5% HNO_3	1,000	500	PLSC2-2X
			250	PLSC2-2T
			125	PLSC2-2Y
		10,000	500	PLSC2-3X
			125	PLSC2-3Y
SELENIUM	2-5% HNO_3	1,000	500	PLSE2-2X
			250	PLSE2-2T
			125	PLSE2-2Y
		10,000	500	PLSE2-3X
			125	PLSE2-3Y
SILICON	H_2O/0.4% F^-	1,000	500	PLSI9-2X
			250	PLSI9-2T
			125	PLSI9-2Y
	H_2O/4.0% F^-	10,000	500	PLSI9-3X
			125	PLSI9-3Y
	H_2O	1,000	500	PLSI9A-2X
		10,000	500	PLSI9A-3X
SILVER	2-5% HNO_3	1,000	500	PLAG2-2X
			250	PLAG2-2T
			125	PLAG2-2Y
		10,000	500	PLAG2-3X
			125	PLAG2-3Y

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
SODIUM	2-5% HNO_3	1,000	500	PLNA2-2X
			250	PLNA2-2T
			125	PLNA2-2Y
		10,000	500	PLNA2-3X
			125	PLNA2-3Y
	2-5% HCl	1,000	500	PLNA1-2X
		10,000	500	PLNA1-3X
STRONTIUM	2-5% HNO_3	1,000	500	PLSR2-2X
			250	PLSR2-2T
			125	PLSR2-2Y
		10,000	500	PLSR2-3X
			125	PLSR2-3Y
	2-5% HCl	1,000	500	PLSR1-2X
		10,000	500	PLSR1-3X
SULFUR	H_2O	1,000	500	PLS9-2X
			250	PLS9-2T
			125	PLS9-2Y
		10,000	500	PLS9-3X
			125	PLS9-3Y
TANTALUM	H_2O/0.8% HF	1,000	500	PLTA9-2X
			125	PLTA9-2Y
	H_2O/0.8% HF	10,000	500	PLTA9-3X
			125	PLTA9-3Y
TELLURIUM	5% HNO_3	1,000	500	PLTE2-2X
			125	PLTE2-2Y
	10% HCl	1,000	500	PLTE3-2X
	40% HCl *(Teflon)*	10,000	500	PLTE5-3X
TERBIUM	2-5% HNO_3	1,000	500	PLTB2-2X
			125	PLTB2-2Y
		10,000	500	PLTB2-3X
			125	PLTB2-3Y
THALLIUM	2-5% HNO_3	1,000	500	PLTL2-2X
			250	PLTL2-2T
			125	PLTL2-2Y
		10,000	500	PLTL2-3X
			125	PLTL2-3Y
THORIUM	2% HNO_3 Depleted Thorium	1,000	500	PLTH2-2X
			125	PLTH2-2Y
THULIUM	2% HNO_3	1,000	500	PLTM2-2X
			125	PLTM2-2Y
TIN	1% HNO_3/1% HF	1,000	500	PLSN2-2X
	2% HNO_3/2% HF	10,000	500	PLSN2-3X
	20% HCl (Teflon)	1,000	500	PLSN5-2X
			250	PLSN5-2T
			125	PLSN5-2Y
		10,000	500	PLSN5-3X
			125	PLSN5-3Y

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
TITANIUM	20% HCl (Teflon)	1,000	500	PLTI5-2X
	40% HCl (Teflon)	10,000	500	PLTI5-3X
	H_2O/tr 0.24% F^-	1,000	500 250 125	PLTI9-2X PLTI9-2T PLTI9-2Y
	H_2O/tr 2.4% F^-	10,000	500 125	PLTI9-3X PLTI9-3Y
TUNGSTEN	1% HNO_3/2% HF	1,000	500	PLW2-2X
	2% HNO_3/5% HF	10,000	500	PLW2-3X
	H_2O	1,000	500 125	PLW9-2X PLW9-2Y
		10,000	500 125	PLW9-3X PLW9-3Y
URANIUM	2-5% HNO_3 Depleted Uranium	1,000	500 125	PLU2-2X PLU2-2Y
		10,000	500 125	PLU2-3X PLU2-3Y
VANADIUM	2% HNO_3	1,000	500 125	PLV2-2X PLV2-2Y
	15% HNO_3	10,000	500 125	PLV4-3X PLV4-3Y
	2% HCl	1,000	500	PLV1-2X
	15% HCl	10,000	500	PLV3-3X
YTTERBIUM	2% HNO_3	1,000	500 125	PLYB2-2X PLYB2-2Y
YTTRIUM	2-5% HNO_3	1,000	500 250 125	PLY2-2X PLY2-2T PLY2-2Y
		10,000	500 125	PLY2-3X PLY2-3Y
ZINC	2-5% HNO_3	1,000	500 250 125	PLZN2-2X PLZN2-2T PLZN2-2Y
		10,000	500 125	PLZN2-3X PLZN2-3Y
	2-5% HCl	1,000	500	PLZN1-2X
		10,000	500	PLZN1-3X
ZIRCONIUM	2-5% HNO_3	1,000	500 250 125	PLZR2-2X PLZR2-2T PLZR2-2Y
		10,000	500 125	PLZR2-3X PLZR2-3Y
	10% HCl	1,000	500	PLZR3-2X
		10,000	500	PLZR3-3X

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
Matrix Blanks	5% HNO_3		500	PLBLK-HNO3
	5% HCl		500	PLBLK-HCL
	H_2O, ASTM Type I Water, 18 Megohm		500	PLBLK-H2O
			1L	PLBLK-H2O-1L
			2L	PLBLK-H2O-2L
			3.78L	PLBLK-H2O-4L

■ Speciation Standards

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

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
Arsenic^{+3}	As in 2% HCl	1,000	125	SPEC-AS3
Arsenic^{+5}	As in H_2O	1,000	125	SPEC-AS5
Cadmium^{+2}	Cd in 2% HNO_3	1,000	125	SPEC-CD2
Chromium^{+3}	Cr in 2% HNO_3	1,000	125	SPEC-CR3
Chromium^{+6}	Cr in H_2O	1,000	125	SPEC-CR6
Copper^{+2}	Cu in 2% HNO_3	1,000	125	SPEC-CU2
Lead^{+2}	Pb in 2% HNO_3	1,000	125	SPEC-PB2
Mercury^{+2}	Hg in 10% HNO_3	1,000	125	SPEC-HG2
Selenium^{+4}	Se in 2% HNO_3	1,000	125	SPEC-SE4
Selenium^{+6}	Se in H_2O	1,000	125	SPEC-SE6

Did You Know?. . .

SPEX CertiPrep is accredited by A2LA for Organic and Inorganic Certified Reference Materials. In addition to being registered as an ISO 9001:2008 facility, SPEX CertiPrep is accredited by A2LA as complying with the requirements of ISO/IEC 17025:2005 and ISO/IEC Guide 34:2009. Our scope is the **most comprehensive** in the industry.

Matrix Modifiers

SPEX CertiPrep® offers a variety of high-purity matrix modifiers for Graphite Furnace Atomic Absorption (GFAA). The matrix modifier will change the behavior of either the analyte element or matrix in solution with respect to temperature, thus allowing a more optimum graphite furnace program to be used. During the pyrolysis stage of GFAA, certain elements are lost due to their high volatility. Matrix modifiers are added to a solution to prevent these losses by converting the element to a less volatile form.

Element/Matrix	Volume mL	Catalog#
Nickel Nitrate Solution		
5% (50,000mg/L) Nickel in 5% HNO_3	125	MMNI4-100
	500	MMNI4-500
Ammonium Phosphate Solution		
40% (400,000mg/L)	125	MMP9-100
Diammonium Hydrogen Phosphate in H_2O	500	MMP9-500
Lanthanum Nitrate Solution		
5% (50,000mg/L) Lanthanum in 5% HNO_3	125	MMLA2-100
Ammonium Nitrate Solution		
2% (20,000mg/L) Ammonium Nitrate in H_2O	125	MMNO9-100
Palladium Nitrate Solution		
2% (20,000mg/L) Palladium in 10% HNO_3	125	MMPD4-100
	500	MMPD4-500
Magnesium Nitrate Solution		
2% (20,000mg/L) Magnesium in 5% HNO_3	125	MMMG2-100
	500	MMMG2-500

Peace of Mind:

Domestic orders can ship via the following carriers depending on your needs. SPEX CertiPrep follows all US DOT and FAA regulations for shipping hazardous materials.

- **FedEx Ground**
- **UPS Ground**
- **FedEx Air**
- **UPS Air**

Most products are hazardous – resulting in additional charges from the freight carrier.

Plasma Emission Standards Kits

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

Elements are supplied in the most common matrices to enable mixing of compatible elements. As always, each Assurance® standard comes with a SPEXertificate® reporting trace metal analysis and traceability documentation.

Since every laboratory has specific applications, the SPEX CertiPrep ICP Kits may not fill every need. They may be easily supplemented with SPEX CertiPrep single and multi-element plasma standards that are manufactured under the same unique Triple Checked for Quality® Assurance Program to meet your requirements.

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

Plasma Emission Standards Kit 1 (38 elements)

Matrix 2% HNO_3: Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Na, Ni, Pb, Sc, Se, Sr, Tl, V, Y, Zn, Zr
Matrix 10% HNO_3: Bi, Hg
Matrix 20% HCl (in Teflon): Sn
Matrix H_2O: B, Mo, P, S, W
Matrix H_2O/0.6% Tartaric Acid/tr HNO_3: Sb
Matrix H_2O/F^-: Nb, Si, Ti

Catalog#: ICP-KIT-1

Plasma Emission Standards Kit 3

Matrix 2% HNO_3: Al, Ba, Ca, Co, Fe, K, Mg, Mn, Na, V

Catalog#: ICP-KIT-3

Plasma Emission Standards Kit 2 (13 elements)

Matrix 2% HNO_3: Ag, As, Be, Cd, Cr, Cu, Ni, Pb, Se, Tl, Zn
Matrix 10% HNO_3: Hg
Matrix H_2O/0.6% Tartaric Acid/tr HNO_3: Sb

Catalog#: ICP-KIT-2

Plasma Emission Standards Kit 4

Matrix 2% HNO_3: Li, Sc, Sr, Y, Zr
Matrix 10% HNO_3: Bi
Matrix 20% HCl: Sn
Matrix H_2O: B, Mo, P, S, W
Matrix H_2O/F^-: Nb, Si, Ti

Catalog#: ICP-KIT-4

SECTION 4

[STOCK AND CUSTOM]

Assurance®

Multi-Element Standards for AA & ICP-AES

Your Science is Our Passion®

Assurance®

Multi-Element Standards

SPEX CertiPrep® offers off-the-shelf, multi-element standards formulated with element combinations and concentrations for the most common environmental analyses.

Included are a number of blends containing those metals of concern in the pollution of groundwater, drinking water and solid wastes.

SPEX CertiPrep offers custom standards for your individual laboratory's needs. Visit ***www.spexcertiprep.com/custominorganics*** *to submit your request today.*

The sections that follow contain multi-element standards referenced to their application. The combinations of elements, concentrations, and matrices listed have been designed by SPEX CertiPrep® for both convenience of use and stability.

Standards may be diluted in the same matrix as that 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.

- Matrix Blanks
- Calibration Test Solutions
- Instrument Performance Standards
- Quality Control Standards
- Toxicity Characteristic Leachate Procedure (TCLP)
- Custom Standards
- Primary & Secondary Drinking Water Metals
- Extracted Metal Pollutants from Solid Wastes
- Metal Pollutants in Groundwater
- Interference Check Standards

Did You Know?. . .

SPEX CertiPrep is accredited by A2LA for Organic and Inorganic Certified Reference Materials. In addition to being registered as an ISO 9001:2008 facility, SPEX CertiPrep is accredited by A2LA as complying with the requirements of ISO/IEC 17025:2005 and ISO/IEC Guide 34:2009. Our scope is the **most comprehensive** in the industry.

Mixed Multi-Element Calibration Standards

The following series of Calibration Standards are provided for routine instrument calibration. The concentrations and matrices have been selected for both convenience of use and stability. You can also prepare these multi-element standards yourself from individual SPEX CertiPrep® Assurance® single element standards. For use in US EPA method 200.7 (Revision 3.3) and SW-846, method 6010 (Third Edition).

Mixed Calibration Standard 1

Contents: 500mg/L: Pb
200mg/L: Se
150mg/L: Cd, Zn
100mg/L: Mn
50mg/L: Be
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: MIXSTD1-100**
Volume: 500mL **Catalog#: MIXSTD1-500**

Mixed Calibration Standard 2

Contents: 10,000mg/L: Fe
100mg/L: Ba, Co, Cu, V
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: MIXSTD2-100**
Volume: 500mL **Catalog#: MIXSTD2-500**

Mixed Calibration Standard 3

Contents: 500mg/L: As
100mg/L: Mo, Si
Matrix: 2% HNO_3/tr HF
Volume: 125mL **Catalog#: MIXSTD3-100**
Volume: 500mL **Catalog#: MIXSTD3-500**

Mixed Calibration Standard 4

Contents: 1000mg/L: Ca
400mg/L: K
200mg/L: Al, Na
20mg/L: Cr, Ni
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: MIXSTD4-100**
Volume: 500mL **Catalog#: MIXSTD4-500**

Mixed Calibration Standard 5

Contents: 1000mg/L: Mg
200mg/L: Sb, Tl
100mg/L: B
50mg/L: Ag
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: MIXSTD5-100**
Volume: 500mL **Catalog#: MIXSTD5-500**

GREAT VALUE

Set of 5 Mixed Calibration Standards

Includes one of each: MIXSTD1-100, MIXSTD2-100, MIXSTD3-100, MIXSTD4-100, MIXSTD5-100
Catalog#: MIXSTD-SET

The following Calibration Standards are designed for use in US EPA Method 200.7 (Revision 4.4) and SW-846, Method 6010 (Third Edition).

Mixed Calibration Standard 1A

Contents: 100mg/L: As, Ca
50mg/L: Sb, Se
20mg/L: Cd, Cu, Mn, B
10mg/L: Ba
5mg/L: Ag
Matrix: 5% HNO_3/tr HF-TART
Volume: 125mL **Catalog#: MIXSTD1A-100**
Volume: 500mL **Catalog#: MIXSTD1A-500**

Mixed Calibration Standard 2A

Contents: 200mg/L: K
100mg/L: Mo, Na
50mg/L: Li
10mg/L: Sr
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: MIXSTD2A-100**
Volume: 500mL **Catalog#: MIXSTD2A-500**

Mixed Calibration Standard 3A

Contents: 100mg/L: P
20mg/L: Co, V, Ce
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: MIXSTD3A-100**
Volume: 500mL **Catalog#: MIXSTD3A-500**

Mixed Calibration Standard 4A

Contents: 100mg/L: Al, Hg*, SiO_2, Ti
50mg/L: Cr, Zn
40mg/L: Sn
Matrix: 5% HNO_3/tr HF
Volume: 125mL **Catalog#: MIXSTD4A-100**
Hg **Catalog#: MXSTD4A-100N
Volume: 500mL **Catalog#: MIXSTD4A-500**
Hg **Catalog#: MXSTD4A-500N

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

***without Mercury*

Mixed Calibration Standard 5A

Contents: 100mg/L: Fe, Mg, Pb
50mg/L: Tl
20mg/L: Ni
10mg/L: Be
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: MIXSTD5A-100**
Volume: 500mL **Catalog#: MIXSTD5A-500**

Set of 5 Calibration Standards

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

Catalog#: MIXSTD-SETA

Set of 5 Calibration Standards without Mercury

Includes one of each: MIXSTD1A-100, MIXSTD2A-100, MIXSTD3A-100, MXSTD4A-100N, MIXSTD5A-100

** Catalog#: MXSTD-SETAN

*** without Mercury*

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. An aqua regia blank can be prepared by mixing one part nitric acid blank with three parts hydrochloric acid blank. Do not use any acid or water as a diluent if you are not certain of its purity.

Hydrochloric Acid Blank

Matrix: 5% HCl in ASTM Type I Water
Volume: 500mL Catalog#: PLBLK-HCL

Nitric Acid Blank

Matrix: 5% HNO_3 in ASTM Type I Water
Volume: 500mL Catalog#: PLBLK-HNO3

Water Blank

Matrix: ASTM Type I Water, 18 megohm

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

Instrument Check (Lab Performance) Standards

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

Instrument Check Standard 3

Contents: 100mg/L: K, P, S
20mg/L: As, La, Li, Mn, Mo, Na, Ni, Sc
Matrix: 5% HCl
Volume: 125mL Catalog#: CALMIX3-100
Volume: 500mL Catalog#: CALMIX3-500

Instrument Check Standard 4

Contents: 50mg/L: K
10mg/L: Al, As, Cu, Mn, Na, Ni, P, Pb, Sc, Zn
1mg/L: Ba
Matrix: 2% HNO_3
Volume: 125mL Catalog#: CALMIX4-100
Volume: 500mL Catalog#: CALMIX4-500

Instrument Check Standard 7

Contents: 600mg/L: Y
100mg/L: Al, As, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, Pb, Zn
Matrix: 2% HNO_3
Volume: 125mL Catalog#: CALMIX7-100
Volume: 500mL Catalog#: CALMIX7-500

Instrument Check Standard 8

Contents: 50mg/L: Al, As, Co, Cr, Cu, K, Na, P, Pb
Matrix: 2% HNO_3
Volume: 125mL Catalog#: CALMIX8-100
Volume: 500mL Catalog#: CALMIX8-500

Instrument Check Standard 10

Contents: 500mg/L: K
50mg/L: Al, Ba, Cd, Cu, Mn, Zn
Matrix: 2% HNO_3
Volume: 125mL Catalog#: CALMIX10-100
Volume: 500mL Catalog#: CALMIX10-500

Quality Control Standards

Used to check the standard curve, the procedure for interelement correction and other spectral interferences. These standards are carried through the entire analytical operation of the method. If the determined concentration is not within ±5.0% of 1mg/L, the laboratory performance is unacceptable. The source of the problem should be identified and corrected before continuing the analysis.

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

TOP SELLER

Quality Control Standard 21

Contents: 100mg/L: As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: QC-21**
Volume: 250mL **Catalog#: QC-21-250**
Volume: 500mL **Catalog#: QC-21-500**

Quality Control Standard 7A

Contents: 1000mg/L: K
500mg/L: Si
100mg/L: Al, B, Ba, Na
50mg/L: Ag
Matrix: 5% HNO_3/tr HF
Volume: 125mL **Catalog#: QC-7A**
Volume: 500mL **Catalog#: QC-7A-500**

Quality Control Standard 7

Contents: 1000mg/L: K
100mg/L: Ag, Al, B, Ba, Na
50mg/L: Si
Matrix: 5% HNO_3/tr HF
Volume: 125mL **Catalog#: QC-7**
Volume: 500mL **Catalog#: QC-7-500**

Sets of 2 Quality Control Standards

Includes one of each: QC-21, QC-7A
Catalog#: QC-SETA

Includes one of each: QC-21, QC-7
Catalog#: QC-SETB

Quality Control Standard 23

Contents: 1000mg/L: Ag, Al, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Li, Mg, Mn, Na, Ni, Pb, Sr, Tl, Zn
Matrix: 10% HNO_3
Volume: 125mL **Catalog#: QC-23**

Laboratory Fortifying Stock (LFS) Solution

Used for spiking the laboratory fortified blank and the laboratory fortified sample matrix. 2mL of the LFS Solution must be added to a 125mL aliquot of the laboratory fortified blank. This blank must be carried through the entire sample preparation procedure and analysis scheme. For use in US EPA method 200.7 (Revision 3.3) and SW-846, method 6010 (Third Edition).

Ca, K, Mg, and Na are not included in this solution because their concentrations vary from one environmental sample to the other.

LFS Solution 1

Contents: 50mg/L: P
25mg/L: Al, As, B, Ba, Cr, Cu, Fe, Li, Mn, Ni, Pb, Sb, Se, SiO_2, Sr, Tl, Zn
10mg/L: Cd, Co, Mo, Sn, V, Hg*
5mg/L: Be
2.5mg/L: Ag
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: LFS-1-100**
Hg **LFS-1-100N
Volume: 500mL **Catalog#: LFS-1-500**
Hg ** LFS-1-500N

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

*** without Mercury*

Take a Closer Look. . .

ALL SPEX CertiPrep® Standards are NIST Traceable.

Laboratory Performance Check (LPC) Standard

The Laboratory Performance Check (LPC) Standard is a solution of method analytes used to evaluate the performance of the instrument. The LPC Standard is used immediately following calibration, after every tenth sample, and at the end of the sample run. The analyzed value of each analyte in the LPC solution should be within 95% to 105% of its expected value. If the analyte value is outside the interval, reanalyze the LPC. If the analyte is again outside the ±5% limit, the instrument should be recalibrated and all samples following the last acceptable LPC solution should be reanalyzed. For use in US EPA method 200.7 (Revision 3.3) and SW-846, method 6010 (Third Edition).

LPC Standard 1

Contents: 100mg/L: K, P, SiO_2, Hg*
20mg/L: 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
5mg/L: Ag
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: LPC-1-100**
Hg ** **LPC-1-100N**
Volume: 500mL **Catalog#: LPC-1-500**
Hg ** **LPC-1-500N**

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

*** without Mercury*

Interference Check Standards

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

Interference Check Standard, 1

Contents: 1000mg/L: Sb
Matrix: H_2O/tr HNO_3/0.6% Tartaric Acid
Volume: 125mL **Catalog#: PLSB7-2Y**
Volume: 500mL **Catalog#: PLSB7-2X**

Interference Check Standard, 5

Contents: 6000mg/L: Ca
5000mg/L: Fe
3000mg/L: Mg
1200mg/L: Al
1000mg/L: Na
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: INTER5-100**
Volume: 500mL **Catalog#: INTER5-500**

Set of 3 Interference Check Standards

Includes one of each: INTER18-100, PLSB7-2Y, INTER5-100
Catalog#: INTER-SET

Interference Check Standard, 18

Contents: 20,000mg/L: K
1,000mg/L: As, Pb, Tl
500mg/L: Se
300mg/L: Ag, Ba, Cd, Co, Cr, Cu, Ni, V, Zn
200mg/L: Mn
100mg/L: Be, Hg*
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: INTER18-100**
Hg ** **INTER18-100N**
Volume: 500mL **Catalog#: INTER18-500**
Hg ** **INTER18-500N**

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

*** without Mercury*

Set of 3 Interference Check Standards without Mercury

Includes one of each: INTER18-100N, PLSB7-2Y, INTER5-100
Hg ** **Catalog#: INTER-SETN**

Environmental EPA Set

Set of 8 standards and 2 matrix blanks for use in US EPA methods 6010 and 200.7 for analysis of trace metals by ICP-AES.

Environmental EPA Set

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

Catalog#: EPA-SET

Environmental EPA Set without Mercury

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

Hg **Catalog#: EPA-SETN

Toxicity Characteristic Leachate Procedure (TCLP) Standard

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

In addition to the SPEX CertiPrep® TCLP Standard designed with all elements in one solution, the Toxicity Characteristic rule separates the elements according to specific instrumentation: ICP-AES, GFAA, and Cold Vapor AA (see Section 5).

TCLP Standard 1

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

Matrix: 2% HNO_3

Volume: 125mL Catalog#:TCLP-100

Hg **TCLP-100N

Volume: 500mL Catalog#:TCLP-500

Hg **TCLP-500N

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

*** without Mercury*

Drinking Water Pollutant Standards

These standards are for use with procedures for compliance monitoring of drinking water and for analysis of ground and surface water where determination at the drinking water contaminant levels are required. Refer to US EPA SW-846, method 1310 and US National Primary Drinking Water Regulations 40 CFR, Part 141.

Secondary metals from US Appendix to 200.7 are used in the analysis of drinking water by ICP-AES.

Primary Drinking Water Metals

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

Matrix: 2% HNO_3

Volume: 125mL Catalog#: EP-8

Hg ** EP-8N

Volume: 500mL Catalog#: EP-8-500

Hg ** EP-8-500N

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

*** without Mercury*

Secondary Drinking Water Metals

Contents: 500mg/L: Zn
100mg/L: Cu
30mg/L: Fe
5mg/L: Mn

Matrix: 2% HNO_3

Volume: 125mL Catalog#: EP-4

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

Set of 2 Drinking Water Standards

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

Catalog#: DW-SET

Set of 2 Drinking Water Standards without Mercury

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

Hg **Catalog#: DW-SETN

Groundwater and Wastewater Pollution Control Check Standards

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

Trace Metals I

Contents: 500mg/L: Al
250mg/L: V
100mg/L: As, Be, Co, Cr, Cu, Fe Mn, Ni, Pb, Zn
25mg/L: Cd, Se
10mg/L: Hg*
Matrix: 5% HNO_3
Volume: 125mL **Catalog#:** WP-15
** WP-15N
Volume: 500mL **Catalog#:** WP-15-500
** WP-15-500N

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

*** without Mercury*

Trace Metals II

Contents: 20mg/L: Sb, Tl
10mg/L: Ag
Matrix: 2% HNO_3
Volume: 125mL **Catalog#:** WP-3
Volume: 500mL **Catalog#:** WP-3-500

Set of 3 Trace Metals

Includes one of each: WP-15, WP-3, MN-6
Catalog#: TM-SET

Set of 3 Trace Metals without Mercury

Includes one of each: WP-15N, WP-3, MN-6
Catalog#: TM-SETN

Trace Metals III

Contents: 500mg/L: Ba, Ca, Mo, Na
100mg/L: K, Mg
Matrix: 2% HNO_3
Volume: 125mL **Catalog#:** MN-6
Volume: 500mL **Catalog#:** MN-6-500

Alternate Metals I

Contents: 20mg/L: Al, Fe, V
10mg/L: Co, Cu, Mn, Ni, Zn
5mg/L: Be, Sb, Tl
Matrix: 2% HNO_3
Volume: 125mL **Catalog#:** WP-11
Volume: 500mL **Catalog#:** WP-11-500

Alternate Metals III

Contents: 500mg/L: Ca, Na
100mg/L: K, Mg
Matrix: 2% HNO_3
Volume: 125mL **Catalog#:** MN-4
Volume: 500mL **Catalog#:** MN-4-500

Set of Alternate Metals

Includes one of each: WP-11, MN-4
Catalog#: AM-SET

Did You Know?. . .

SPEX CertiPrep is accredited by A2LA for Organic and Inorganic Certified Reference Materials. In addition to being registered as an ISO 9001:2008 facility, SPEX CertiPrep is accredited by A2LA as complying with the requirements of ISO/IEC 17025:2005 and ISO/IEC Guide 34:2009. Our scope is the **most comprehensive** in the industry.

SECTION 5

[STOCK AND CUSTOM]

Assurance®

Multi-Element CLP Standards

Your Science is Our Passion®

Assurance®

CLP Standards

SPEX CertiPrep® offers a complete series of multi-element standards and blanks designed for use in the U.S. Environmental Protection Agency's Contract Laboratory Program (CLP). These off-the-shelf solutions provide everything you need for:

- **Instrument Calibrations**
- **Calibration Verifications**
- **Interference Checks**
- **Calibration Blanks**
- **Sample Spikes**

As with all SPEX CertiPrep® Assurance-Grade Standards, every CLP standard is prepared under our unique Triple Checked for Quality® Assurance Program. The following standards are to be used in conjunction with the Statement of Work for Inorganic Analysis; Multi-Media/Multi-Concentration Document Number ILM06.0/ILM 05.2.

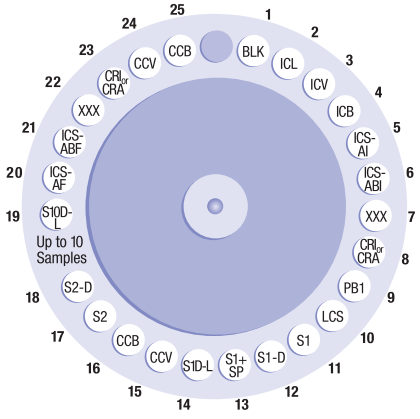
The final ICP-AES check, performed in our own laboratories, is your **stamp of assurance.** We calibrate our instruments with **traceable reference materials** and show you the **actual found value** of the solution you receive—not just an ideal, calculated number as so many other standards manufacturers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

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

The US EPA SOW. ILM06.0/ILM 05.2 gives specific procedures for the methods of analysis, elements to be analyzed for, and concentration levels. Standards are specified not only by the elements present and their relative concentrations, but also the order and frequency of running standards, blanks, and samples. Details of these specifications may be found in the US EPA SOW. ILM06.0/ILM 05.2 in the following sections:

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

Custom solutions are available as special orders – just go to the end of this section for a copy of the design form.



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

Standards for the Contract Laboratory Program

Following is a list of samples, standards, and blanks in a possible running sequence as suggested by the Contract Laboratory Program protocols. Also listed are the SPEX CertiPrep® standards and solutions to be used in preparing the final blanks, standards, and spikes. Complete descriptions of each solution are provided in the following pages.

1. **BLK**
   Blank: PLBLK's
2. **ICL**
   Initial calibration solution: mixture of ICAL's
3. **ICV**
   Initial calibration verification: ICV-1A
4. **ICB**
   Initial calibration blank (not digested): PLBLK's
5. **ICS-AI**
   Initial interferents, A: INT-A1 and INT-A2
6. **ICS-ABI**
   Initial interferents and analytes, AB: INT-A1, INT-A2, INT-B3, INT-B2
7. **XXX**
   "Throw-away" sample; used to clear torch of high levels of interferents: PLBLK's
8. **CRI (ICP-AES) or CRA (AA)**
   2 x Contract required detection limits: CRDL-1
9. **PB1**
   Preparation blank: Digested water or soil blank
10. **LCS**
    Laboratory control sample (digested): ICV-1A
11. **S1**
    Sample #1
12. **S1-D**
    Sample #1 duplicate
13. **S1+SP**
    Sample #1 with spike: SPIKE-1
14. **S1D-L**
    Sample #1 diluted five-fold
15. **CCV**
    Continuing calibration verification (50% ICV): ICV-1A
16. **CCB**
    Continuing calibration blank: PLBLK's (If results of CCV and CCB are within limits, proceed to next sample, if not stop run)
17. **S2**
    Sample #2
18. **S2-D**
    Sample #2 duplicate (Up to 10 samples may be run as long as CCV and CCB tests are within accepted limits)
19. **S10D-L**
    Sample #10 diluted five-fold
20. **ICS-AF**
    Final interferents, A: INT-A1 and INT-A2
21. **ICS-ABF**
    Final interferents, and analytes, AB: INT-A1, INT-A2, INT-B3, INT-B2
22. **XXX**
    "Throw-away" sample; used to clean torch of high levels of interferents: PLBLK's
23. **CRI (ICP-AES) or CRA (AA)**
    2 x Contract required detection limits: CRDL-1
24. **CCV**
    Continuing calibration verification (50% ICV): ICV-1A
25. **CCB**
    Continuing calibration blank: PLBLK's Typical set-up for standards, samples, and blanks to be run for CLP analysis

Instrument Calibration

May be used separately or mixed together for preparation of the analytical curve. When mixed these solutions will yield a standard containing all the elements in the Target Analyte List (TAL). Instruments must be calibrated daily, every 24 hours or each time the instrument is set up. Calibration standards must be prepared fresh for each analysis and discarded after use. A dilution of 100-fold is suggested for ICAL-2, ICAL-3, and ICAL-4A, and a dilution of 10-fold for ICAL-1. Antimony and mercury can be diluted as required.

Instrument Calibration Standard 1

Contents: 5000mg/L: Ca, K, Mg, Na
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: ICAL-1**

Instrument Calibration Standard 2

Contents: 400mg/L: Ni
200mg/L: Zn
150mg/L: Mn
100mg/L: Ag, Cr
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: ICAL-2**

Instrument Calibration Standard 3

Contents: 2000mg/L: Al, Ba
1000mg/L: Fe
500mg/L: Co, V
250mg/L: Cu
50mg/L: Be
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: ICAL-3**

Instrument Calibration Standard 4

Contents: 100mg/L: As, Tl
50mg/L: Cd, Pb, Se
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: ICAL-4**
Volume: 500mL **Catalog#: ICAL-4-500**

Instrument Calibration Standard 5

Contents: 2,000mg/L: Al, Ba
1,000mg/L: Fe
500mg/L: Co, Mn, Ni, V, Zn
250mg/L: Ag, Cu
200mg/L: Cr
50mg/L: Be
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: ICAL-5**

Antimony Single Element Standard

Contents: 1000mg/L: Sb
Matrix: H_2O/0.6% Tartaric Acid/tr HNO_3
Volume: 125mL **Catalog#: PLSB7-2Y**

Mercury Single Element Standard

Contents: 100mg/L: Hg
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: PLHG2-1Y**

Initial Calibration Verification

Independent standards for testing the calibration curve at each wavelength to be used for analysis. SPEX CertiPrep® verification standard, ICV-1A, contains all the elements on the TAL in one solution. You need only select those wavelengths (elements) for verification that are to be subsequently analyzed. A dilution of 10-fold is recommended prior to use.

Initial Calibration Verification Standard IA

Contents: 5000mg/L: Ca, K, Mg, Na
200mg/L: Al, Ba
100mg/L: Fe
60mg/L: Sb
50mg/L: Co, V
40mg/L: Ni
25mg/L: Cu
20mg/L: Zn
15mg/L: Mn
10mg/L: Ag, As, Cr, Tl
5mg/L: Be, Cd, Se
3mg/L: Pb
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 500mL **Catalog#: ICV-1A**

Helpful Hint:

Having trouble finding the Multi-Element Standard you need?

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

Verification Standard II, ICV-2, is used to meet CLP QA second source requirements. ICV-2 is sold only as a set of three solutions (ICV-2A, ICV-2B, and ICV-2C) containing all the TAL elements. A dilution of 100-fold is recommended for all three standards prior to use.

The same Instrument Calibration Standards, ICAL-1 through ICAL-5, can be used with ICV-2. The following dilutions are suggested: A dilution of 250-fold for ICAL-1; 20-fold for ICAL-4A; 100-fold for ICAL-2 and ICAL-3. Antimony and mercury can be diluted as required.

Initial Calibration Verification Standard II

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

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

Contents: 2000mg/L: Ca, K, Mg, Na
1000mg/L: Al, Ba, Fe
500mg/L: Co, Ni, V
200mg/L: Cr, Cu
100mg/L: Ag, Be, Mn, Zn
Matrix: 5% HNO_3
Volume: 500mL *(only as part of ICV-2 Set)*

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

Contents: 500mg/L: As, Pb, Se, Tl
100mg/L: Cd
Matrix: 5% HNO_3
Volume: 500mL *(only as part of ICV-2 Set)*

PLSB7-2X (also available separately)

Contents: 1000mg/L: Sb
Matrix: H_2O/0.6% Tartaric Acid/tr HNO_3
Volume: 500mL **Catalog#: PLSB7-2X**

Initial Calibration Verification Standard III

Includes one of each: ICV-3 and PLSB7-2X. **Catalog#: ICV-3**

ICV-3 (only as part of ICV-3 Set)

Contents: 500mg/L: Ca, K, Mg, Na
200mg/L: Al, Ba
100mg/L: As, Pb, Se, Tl, Fe
50mg/L: Mn, Cd, Co, Ni, V, Zn
25mg/L: Ag, Cu
20mg/L: Cr
5mg/L: Be
Matrix: 5% Nitric Acid
Volume: 500mL *(only as part of ICV-3 Set)*

Interference Checks

For verification of interelement and background correction factors at the beginning and the end of each analysis run. In addition a verification must be done after every 20th sample. Two solutions are required for the most common interference check: Solution A, the interferents alone (INT-A1), and Solution AB, a combination of interferents (INT-A1) and analytes (INT-B3). Solution A is prepared by diluting INT-A1 10-fold. Solution AB is prepared by diluting INT-A1 10-fold and INT-B3 100-fold; for example, 10mL of INT-A1 and 1.0mL of INT-B3 into a 125mL volumetric flask, brought to volume with a matrix blank (see page 15). Once prepared, the solutions should be analyzed consecutively, starting with Solution A.

Interferents A for SOW.ILM06.0/ILM 05.2

Contents: 5000mg/L: Al, Ca, Mg
2000mg/L: Fe
Matrix: 5% HNO_3
Volume: 500mL **Catalog#: INT-A1**

Analytes B

Contents: 100mg/L: Cd, Ni, Zn
60mg/L: Sb
50mg/L: Ba, Be, Co, Cr, Cu, Mn, V
20mg/L: Ag
10mg/L: As, Tl
5mg/L: Pb, Se
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: INT-B3**

Analytes B for SOW.ILM02.0

Same dilution factor as given previously.

Contents: 100mg/L: Ag, Cd, Ni, Pb, Zn
50mg/L: Ba, Be, Co, Cr, Cu, Mn, V
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: INT-B1**

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

Alternate Interferents A

Contents: 1000mg/L: Cr, Cu, Mn, Ni, Ti, V
Matrix: 5% HNO_3/Tr F^-
Volume: 500mL **Catalog#: INT-A2**

Alternate Analytes B

Contents: 100mg/L: Al, As, B, Mo, Na, Sb, Se, Tl
10mg/L: Ca, Fe, Mg, Si
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: INT-B2**

Contract Required Detection Limits, CRDL

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

SPEX CertiPrep® CRDL-1 standard contains all the required elements on the TAL, in their appropriate concentration ratios. CRDL-1 should be diluted by a factor of 1000 prior to use in the "two times CRDL" run for ICP-AES analysis. For analysis by atomic absorption, CRDL-1 should be diluted by a factor of 2000 prior to use in the "one times CRDL" run. The elements arsenic and lead should be run at two times the Instrument Detection Limit, IDL. The concentrations of these elements may be adjusted with the corresponding SPEX CertiPrep single element standards for arsenic, PLAS2-2X and lead, PLPB2-2X.
This standard may also be used as an IDL standard or alternatively the Instrument Calibration Standards can be mixed and diluted accordingly.

Contract Required Detection Limits Standard

Contents: 120mg/L: Sb
100mg/L: Co, V
80mg/L: Ni
50mg/L: Cu
40mg/L: Zn
30mg/L: Mn
20mg/L: Ag, As, Cr, Tl
10mg/L: Be, Cd, Se
6mg/L: Pb
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: CRDL-1**

Helpful Hint:

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

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

Spike Sample Analysis

In the spike sample analysis a spike containing the required elements, in their respective required amounts, is added to the sample prior to addition of any reagents, digestion, distillation, etc. Information is then provided on the effects of the sample matrix and the entire methodology. The SPEX CertiPrep® spike standard, SPIKE-1, provides all the analytes required for the ICP-AES and the AA spike. Add 1.0mL of SPIKE-1 to aqueous samples and 2.0mL of SPIKE-1 to solid samples prior to digestion.

Spike Sample Standard I

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

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

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

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

Did You Know?. . .

SPEX CertiPrep is accredited by A2LA for Organic and Inorganic Certified Reference Materials. In addition to being registered as an ISO 9001:2008 facility, SPEX CertiPrep is accredited by A2LA as complying with the requirements of ISO/IEC 17025:2005 and ISO/IEC Guide 34:2009. Our scope is the **most comprehensive** in the industry.

SECTION 6

[STOCK AND CUSTOM]

Claritas PPT®

Single and Multi-Element Standards for ICP-AES & ICP-MS

Your Science is Our Passion®

Claritas PPT®

Standards for ICP-AES & ICP-MS

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

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

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

The Claritas PPT® selection of standards includes a complete series of single and multi-element solutions, many designed for use with US EPA Methods 6020 CLP-M, SW-846, and 200.8 and CLP 05.2. These solutions are made with the highest purity materials available and are tested on our state-of-the-art ICP-MS under an internationally accredited ISO 9001:2008 quality assurance program. SPEX CertiPrep Certified Reference Materials are manufactured under a quality system complying with the requirements of ISO/IEC 17025:2005 "General requirements for the Competence of Testing and Calibration" and ISO/IEC Guide 34:2009 "General Requirements for the Competence of Reference Material Producers." For over 55 years, our commitment to quality has made SPEX CertiPrep the leading manufacturer of inorganic reference standards.

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

ACCREDITED

Accredited to 17025 & Guide 34 ISO Certified to 9001

SPEX CertiPrep, Inc. UL REGISTERED FIRM ISO 9001 A1572

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

CLARITAS PPT®

Certified by ICP-MS

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

Single Element Standards

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
ALUMINUM	2% HNO_3	1,000	125	CLAL2-2Y
ANTIMONY	H_2O/0.6% Tartaric Acid/tr HNO_3	1,000	125	CLSB7-2Y
ARSENIC	2% HNO_3	1,000	125	CLAS2-2Y
BARIUM	2% HNO_3	1,000	125	CLBA2-2Y
BERYLLIUM	2% HNO_3	1,000	125	CLBE2-2Y
BISMUTH	2% HNO_3	10	125	CLBI2-1AY
CADMIUM	2% HNO_3	1,000	125	CLCD2-2Y
CALCIUM	2% HNO_3	1,000	125	CLCA2-2Y
CHROMIUM	2% HNO_3	1,000	125	CLCR2-2Y
COBALT	2% HNO_3	1,000	125	CLCO2-2Y
COPPER	2% HNO_3	1,000	125	CLCU2-2Y
GERMANIUM	H_2O/Tr F^-	10	125	CLGE9-1AY
GOLD	2% HCl	100	125	CLAU1-1Y
INDIUM	2% HNO_3	10	125	CLIN2-1AY
IRON	2% HNO_3	1,000	125	CLFE2-2Y
LEAD	2% HNO_3	1,000	125	CLPB2-2Y
MAGNESIUM	2% HNO_3	1,000	125	CLMG2-2Y
MANGANESE	2% HNO_3	1,000	125	CLMN2-2Y
MERCURY	10% HNO_3 5% HNO_3	1,000 10	125 125	CLHG4-2Y CLHG2-1AY
MOLYBDENUM	H_2O	1,000	125	CLMO9-2Y

Element	Matrix	Conc. mg/L	Volume mL	Catalog#
Nickel	2% HNO_3	1,000	125	CLNI2-2Y
Potassium	2% HNO_3	1,000	125	CLK2-2Y
Rhodium	2% HCl	10	125	CLRH1-1AY
Scandium	2% HNO_3	10	125	CLSC2-1AY
Selenium	2% HNO_3	1,000	125	CLSE2-2Y
Silver	2% HNO_3	1,000	125	CLAG2-2Y
Sodium	2% HNO_3	1,000	125	CLNA2-2Y
Terbium	2% HNO_3	10	125	CLTB2-1AY
Thallium	2% HNO_3	1,000	125	CLTL2-2Y
Thorium	2% HNO_3	1,000	125	CLTH2-2Y
Tin	1% HNO_3/1% HF	1,000	125	CLSN2-2Y
Titanium	H_2O/0.24% F-	1,000	125	CLTI9-2Y
Uranium	2% HNO_3	1,000	125	CLU2-2Y
Vanadium	2% HNO_3	1,000	125	CLV2-2Y
Yttrium	2% HNO_3	10	125	CLY2-1AY
Zinc	2% HNO_3	1,000	125	CLZN2-2Y

■ Speciation Standards

SPEX CertiPrep® has expanded the ICP-MS product line to include Speciation Standards. *See page 28.*

Take a Closer Look. . .

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

TOP SELLER

Tuning Solution 1

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

Contents: 10mg/L: Ba, Be, Ce, Co, In, Li, Mg, Pb, Rh, Tl, U, Y
Matrix: 2% HNO_3/5% HCl
Volume: 125mL **Catalog#: CL-TUNE-1**

Tuning Solution 2

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

Contents: 10mg/L: Ba, Be, Ce, Co, In, Mg, Pb, Rh, U
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CL-TUNE-2**

Tuning Solution 3

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

Contents: 10mg/L: Ba
1mg/L: Be, Ce, Co, Fe, In, Mg, Pb, Th, U
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CL-TUNE-3**

Tuning Solution 4

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

Contents: 10mg/L: Co, In, Li, Tl
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CL-TUNE-4**

ICP-MS Check Standard

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

Contents: 50 µg/L Ag, Al, As, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Ge, Gd, Hg, Ho, In, K, La, Li, Lu, Mg, Mn, Mo, Na, Nd, Ni, P, Pb, Pd, Pr, Rb, Re, Rh, Sc, Se, Sm, Sr, Tb, Te, Th, Tl, Tm, U, V, Y, Yb, Zn
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: CL-QC-55**

Contract Required Detection Limits

To verify linearity near the Contract Required Detection Limit (CRDL), a standard must be run at two times the CRDL. This standardization is performed at the start and the end of each sample analysis run, or at least twice in each eight-hour shift.

Contract Required Detection Limit Standard

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

Instrument Calibration

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

TOP SELLER

Instrument Calibration Standard 1

Contents: 20mg/L: Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Th, Tl, U, V, Zn
Matrix: 5% HNO_3/tr Tartaric Acid
Volume: 125mL **Catalog#: CL-CAL-1**

TOP SELLER

Instrument Calibration Standard 2

Contents: 100mg/L: 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
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: CL-CAL-2**

Calibration Standard 3

Contents: 1000mg/L: Fe, K, Ca, Na, Mg
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: CL-CAL-3**

Initial Calibration Verification Standard 1

Contents: 1000mg/L: Fe, K, Ca, Na, Mg, Sr
10mg/L: Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Tl, V, Zn, Th, U
Matrix: 5% HNO_3/tr Tartaric Acid
Volume: 125mL **Catalog#: CL-ICV-1**

Initial Calibration Verification Standard 2

Contents: 10mg/L: Sn, Ti
Matrix: 2% HNO_3/tr HF
Volume: 125mL **Catalog#: CL-ICV-2**

Did You Know?. . .

SPEX CertiPrep is accredited by A2LA for Organic and Inorganic Certified Reference Materials. In addition to being registered as an ISO 9001:2008 facility, SPEX CertiPrep is accredited by A2LA as complying with the requirements of ISO/IEC 17025:2005 and ISO/IEC Guide 34:2009. Our scope is the **most comprehensive** in the industry.

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.

Instrument Check Standard 1

Contents: 10mg/L: Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V, Zn
Matrix: 2% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: CL-ICS-1**

Mercury Single Element Standard

Contents: 10mg/L: Hg
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: CLHG2-1AY**

Instrument Check Standard 3

Contents: 200mg/L: Ca, Fe, K, Mg, Na
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CL-ICS-3**

Instrument Check Standard 4

Contents: 10mg/L: Mo, Th, U
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CL-ICS-4**

Instrument Check Standard 5

Contents: 10mg/L: Mo, Sn, Sr, Ti
Matrix: 2% HNO_3/tr HF
Volume: 125mL **Catalog#: CL-ICS-5**

GREAT VALUE

Set of Instrument Check Standards

Includes one of each: CL-ICS-1, CLHG2-1AY, CL-ICS-3, CL-ICS-4, CL-ICS-5
Catalog#: CL-ICS-SET

Interference Checks

Designed to contain known concentrations of elements that will demonstrate the magnitude of interferences, and provide an adequate test for necessary corrections. Working solutions should be made at least weekly of a ten-fold dilution of CL-INT-A1 and a solution containing a ten-fold dilution of CL-INT-A1 and a 100-fold dilution of CL-INT-B1.

Interferents A (for CLP-M)

Contents: 21215mg/L: Cl
3000mg/L: Ca
2500mg/L: Fe, Na
2000mg/L: C
1000mg/L: Al, K, Mg, P, S
20mg/L: Mo, Ti
Matrix: 5% HNO_3/tr HF
Volume: 125mL **Catalog#: CL-INT-A1**

Analytes B (for CLP-M)

Contents: 20mg/L: Co, Cr, Cu, Mn, Ni, V
10mg/L: As, Cd, Se, Zn
5mg/L: Ag
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CL-INT-B1**

Analytes C (for ILM 05.2)

Contents: 2mg/L: Sb,As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mn, Hg*, Ni, Se, Ag, Tl, V, Zn
Matrix: 2% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: CL-INT-B3**
Hg ** CL-INT-B3N

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

** *without Mercury*

Interference Check Solution 1 (for SW-846 & ILM 05.2)

Run at a 1:10 dilution in 2% HNO_3.
Contents: 10000mg/L: Cl
2000mg/L: C
1000mg/L: Al, Ca, Fe, K, Mg, Na, P, S
20mg/L: Mo, Ti
Matrix: 5% HNO_3/tr HF
Volume: 125mL **Catalog#: CL-INT-A2**

Interference Check Solution 2 (for SW-846)

Spike at 20ppb into CL-INT-A2 (diluted).
Contents: 10mg/L: Ag, As, Cd, Co, Cr, Cu, Mn, Ni, Zn
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CL-INT-B2**

Set of Interference Check Standards

Includes one of each: CL-INT-A1, CL-INT-B1
Catalog#: CL-INT-SET

Set of Interference Check Standards for ILM 05.2

Includes one of each: CL-INT-A2, CL-INT-B3
Catalog#: CL-INT-SET2

Set of interference Check Standards for ILM 05.2 without Mercury

Includes one of each: CL-INT-A2, CL-INT-B3N
Hg **Catalog#: CL-INT-SET2N

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.

Spike Sample Standard 1 (water)

Contents: 500mg/L: Fe
250mg/L: Ba, Zn
100mg/L: Co, Cr, Cu, Mn, Ni, Sb, V
50mg/L: As, Pb
25mg/L: Ag, Be, Cd, Se, Tl
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: CL-SPIKE-1**

Spike Sample Standard 2 (soil)

Contents: 250mg/L: Ba, Cr, Cu, Zn
150mg/L: V
125mg/L: Ni
100mg/L: Co, Pb, Sb
50mg/L: As, Cd
25mg/L: Ag, Be, Se, Tl
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: CL-SPIKE-2**

Spike Sample (for ILM 05.2)

Contents: 200mg/L: Al, Ba
50mg/L: Co, Mn, Ni, V, Zn
25mg/L: Cu
20mg/L: Cr
10mg/L: Sb
5mg/L: Be, Cd, Ag, Tl
4mg/L: As
2mg/L: Pb
1mg/L: Se
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: CL-SPIKE-3**

Memory Test Solutions

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

Memory Test 1

Contents: 1000mg/L: Al, Ca, Fe, K, Mg, Na
20mg/L: Ag, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Ni, Pb, Se, Tl, V, Zn
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: CL-MEM-1**

GREAT VALUE

Set of Memory Test Solutions

Includes one of each: CL-MEM-1, CL-MEM-2
Catalog#: CL-MEM-SET

Memory Test 2

Contents: 7200mg/L: Cl
2000mg/L: C
1000mg/L: P, S
20mg/L: Mo, Sb, Ti
Matrix: H_2O/tr HF
Volume: 125mL **Catalog#: CL-MEM-2**

Contract Laboratory Program Modification (CLP-M) Set

Set of 15 standards for use with US EPA ICP-MS Method 6020 CLP-M

GREAT VALUE

Includes one of each: CL-TUNE-1, CL-CAL-1, CL-CAL-2, CLCRDL-1, CL-ICS-1, CLHG2-1AY, CL-ICS-3, CL-ICS-4, CL-ICS-5, CL-INT-A1, CL-INT-B1, CL-SPIKE-1, CL-SPIKE-2, CL-MEM-1, CL-MEM-2
Catalog#: CL-CLPM-SET

Helpful Hint:

Don't forget to run blanks!

Calibration and Matrix Blanks

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

2% Nitric Acid Blank

Matrix: 2% HNO_3 in ASTM Type I Water
Volume: 125mL **Catalog#: CLBLK-HNO3**
Volume: 250mL **Catalog#: CLBK-HNO3-250**

1% Nitric Acid Blank

Matrix: 1% HNO_3 in ASTM Type I Water
Volume: 125mL **Catalog#: CLBLK-A-HNO3**

Hydrochloric Acid Blank

Matrix: 2% HCl in ASTM Type I Water
Volume: 125mL **Catalog#: CLBLK-HCL**

Water Blank

Matrix: ASTM Type I Water, 18 megohm
Volume: 125mL **Catalog#: CLBLK-H2O**
Volume: 250mL **Catalog#: CLBK-H2O-250**

Internal Standard Stock Solutions

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.

TOP SELLER

Multi-element Internal Standard 1

Contents: 10mg/L: Bi, Ho, In, ^6Li, Sc, Tb, Y
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CLISS-1**

Multi-element Internal Standard 2

Contents: 10mg/L: Bi, Ho, In, ^6Li, Rh, Sc, Tb, Y
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CLISS-2**

Single Element Internal Standards

Contents: 10mg/L analyte
Volume: 125mL each

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

Internal Standard Mix 1

Contents: 10mg/L: ^6Li, Sc, Ge, Y, In, Tb, Bi
Matrix: 5-10% HNO_3
Volume: 125mL **Catalog#: CL-ISM1-100**
Volume: 500mL **Catalog#: CL-ISM1-500**

Internal Standard Mix 2

Contents: 100mg/L: Bi, Ge, In, ^6Li, Lu, Rh, Sc, Tb
Matrix: 10% HNO_3
Volume: 125mL **Catalog#: CL-ISM2-100**

Quality Control Standard

May be used to check the standard curve, the procedure for interelement correction, and other spectral interferences.

Quality Control Standard 21

Contents: 100mg/L: As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn
Matrix: 5% HNO_3/tr Tartaric Acid/tr HF
Volume: 125mL **Catalog#: CL-QC-21**

Gold Blank Standard

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

Gold Blank Standard 1

Contents: 100mg/L: Au
Matrix: 2% HCl
Volume: 125mL **Catalog#: CLAU1-1Y**

Multi-element Solution Standards

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

Multi-element Solution 1

Contents: 10mg/L: Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Th, Tm, Y, Yb
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: CLMS-1**

Multi-element Solution 2

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

TOP SELLER

Matrix: 5% HNO_3
Volume: 125mL **Catalog#: CLMS-2**
Hg ****CLMS-2N**

Multi-element Solution 2A

Contents: 10mg/L: Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cs, Cu, Fe, Ga, Hg*, K, Li, Mg, Mn, Na, Ni, Pb, Rb, Se, Sr, Tl, U, V, Zn
Matrix: 5% HNO_3
Volume: 125mL **Catalog#: CLMS-2A**
Hg ****CLMS-2AN**

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

*** without Mercury*

Multi-element Solution 3

Contents: 10mg/L: Au, Hf, Ir, Pd, Pt, Rh, Ru, Sb, Sn, Te
Matrix: 10% HCl/1% HNO_3
Volume: 125mL **Catalog#: CLMS-3**

Multi-element Solution 4

Contents: 10mg/L: B, Ge, Mo, Nb, P, Re, S, Si, Ta, Ti, W, Zr
Matrix: H_2O/tr HF/tr HNO_3
Volume: 125mL **Catalog#: CLMS-4**

Multi-element Solution 5

Contents: 10mg/L: Be, Bi, Ce, Co, In, Mg, Ni, Pb, U
Matrix: 2% HNO_3
Volume: 125mL **Catalog#: CLMS-5**

GREAT VALUE

Set of Multi-element Solutions

Includes one of each: CLMS-1, CLMS-2, CLMS-3, CLMS-4, CLBLK-HNO3, CLBLK-HCL, CLBLK-H2O
Catalog#: CLMS-SET

GREAT VALUE

Set of Multi-element Solutions without Mercury

Includes one of each: CLMS-1, CLMS-2N, CLMS-3, CLMS-4, CLBLK-HNO3, CLBLK-HCL, CLBLK-H2O
Hg ****Catalog#: CLMS-SETN**

Isotope Standards

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

Every Claritas PPT® standard is supplied with a comprehensive SPEXertificate® which reports actual measured values in the final solution of both the major analytes and up to 68 trace element impurities at PPT levels. SPEX CertiPrep will guarantee the stability and accuracy of each Claritas PPT® standard to +/- 0.5%, averaged labeled analyte concentrations, for one full year from date of shipment.

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

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

Each standard offered as 125mL volume.

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

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

Helpful Hint:

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

SECTION 7

[STOCK AND CUSTOM]

Ion Chromatography

Single and Multi-Element Standards

Your Science is Our Passion®

Ion Chromatography *Standards*

As with SPEX CertiPrep®'s Assurance® Standards, every IC Standard is prepared under our unique Triple Checked for Quality® Assurance Program. Only our IC standards are checked three ways with all results reported accurately on an informative SPEXertificate® of Analysis and are NIST traceable (where applicable).

SPEX CertiPrep's unique Triple Checked for Quality® just got better. We triple check our products for quality *twice*.

The Starting Material

- Stoichiometry of starting material
- Trace cation/anion impurities by ICP-AES or ICP-MS or IC

The Final Solution

- ICP-AES or IC for the major element
- Classical wet assay for major element
- Final ICP-AES or ICP-MS or IC analysis for trace cation/anion impurities on the actual solution

Helpful Hint:

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

1000 mg/L Nitrate=226 mg/L Nitrogen
1000 mg/L Phosphate=326 mg/L Phosphorus
1000 mg/L Nitrate-Nitrogen=1000 mg/L Nitrogen
1000 mg/L Phosphate-Phosphorus=1000 mg/L Phosphorus
1000 mg/L Nitrite=305 mg/L Nitrogen
1000 mg/L Sulfate=334 mg/L Sulfur
1000 mg/L Nitrite-Nitrogen=1000 mg/L Nitrogen
1000 mg/L Sulfate-Sulfur=1000 mg/L Sulfur

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

Multi-Element Ion Standards

ANIONS

IC Instrument Check Standard 1

Contents: 150mg/L: HPO_4^{-2}, SO_4^{-2}
100mg/L: NO_3^-
30mg/L: Cl^-
20mg/L: F^-
Matrix: H_2O
Volume: 125mL Catalog#: ICMIX1-100

IC Instrument Check Standard 2

Contents: 600mg/L: HPO_4^{-2}
400mg/L: Br^-, NO_3^-, SO_4^{-2}
200mg/L: Cl^-
100mg/L: F^-
Matrix: H_2O
Volume: 125mL Catalog#: ICMIX2-100

TOP SELLER

IC Instrument Check Standard 6

Contents: 150mg/L: HPO_4^{-2}, SO_4^{-2}
100mg/L: Br^-
50mg/L: Cl^-
25mg/L: NO_3^- -N, NO_2^- -N
20mg/L: F^-
Matrix: H_2O
Volume: 125mL Catalog#: ICMIX6-100

CATIONS

IC Instrument Check Standard 3

Contents: 1000mg/L: Ca^{+2}
400mg/L: NH_4^+
200mg/L: K^+, Mg^{+2}, Na^+
50mg/L: Li^+
Matrix: 2% HNO_3
Volume: 125mL Catalog#: ICMIX3-100

IC Instrument Check Standard 4

Contents: 100mg/L: K^+, NH_4^+
50mg/L: Na^+
10mg/L: Li^+
Matrix: 0.5% HNO_3
Volume: 125mL Catalog#: ICMIX4-100

IC Instrument Check Standard 5

Contents: 1600mg/L: Ba^{+2}
600mg/L: Sr^{+2}
400mg/L: Ca^{+2}
200mg/L: Mg^{+2}
Matrix: 2% HNO_3
Volume: 125mL Catalog#: ICMIX5-100

Eluents

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

0.5M Sodium Carbonate (Na_2CO_3) eluent concentrate

Catalog#: IC-ELCON1-100

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

Catalog#: IC-ELCON3-100

0.5M Sodium Bicarbonate ($NaHCO_3$) eluent concentrate

Catalog#: IC-ELCON2-100

ASTM Type I Water, 18 Megohm:

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

■ Single Element Ion Standards

Anion	Matrix	Concentration (mg/L)	Vol. mL	Catalog#
ACETATE	H_2O	1,000	500	AS-ACE9-2X
			125	AS-ACE9-2Y
BROMATE	H_2O	1,000	500	AS-BRO39-2X
			125	AS-BRO39-2Y
BROMIDE	H_2O	1,000	500	AS-BR9-2X
			125	AS-BR9-2Y
CHLORATE	H_2O	1,000	500	AS-CLO39-2X
			125	AS-CLO39-2Y
CHLORIDE	H_2O	1,000	500	AS-CL9-2X
			125	AS-CL9-2Y
		100	500	AS-CL9-1X
			125	AS-CL9-1Y
CHLORITE	H_2O	1,000	500	AS-CLO29-2X
			125	AS-CLO29-2Y
CHROMATE	H_2O	1,000	500	AS-CRO49-2X
			125	AS-CRO49-2Y
FLUORIDE	H_2O	1,000	500	AS-F9-2X
			125	AS-F9-2Y
		100	500	AS-F9-1X
			125	AS-F9-1Y
FORMATE	H_2O	1,000	500	AS-HCO29-2X
			125	AS-HCO29-2Y
IODIDE	H_2O	1,000	500	AS-I9-2X
			125	AS-I9-2Y
NITRATE	H_2O	1,000	500	AS-NO39-2X
			125	AS-NO39-2Y
NITRATE-NITROGEN	H_2O	1,000	500	AS-NO3N9-2X
			125	AS-NO3N9-2Y
NITRITE	H_2O	1,000	500	AS-NO29-2X
			125	AS-NO29-2Y
NITRITE-NITROGEN	H_2O	1,000	500	AS-NO2N9-2X
			125	AS-NO2N9-2Y

Anion	Matrix	Concentration (mg/L)	Vol. mL	Catalog#
Ammonia Nitrogen	H_2O	1,000	125	AS-NH3N9-2Y
Oxalate	H_2O	1,000	500 125	AS-C2O49-2X AS-C2O49-2Y
Perchlorate	H_2O	1,000	125	AS-CLO49-2Y
Phosphate	H_2O	1,000	500 125	AS-PO49-2X AS-PO49-2Y
Phosphate-Phosphorus	H_2O	1,000	500 125	AS-PO4P9-2X AS-PO4P9-2Y
Sulfate	H_2O	1,000	500 125	AS-SO49-2X AS-SO49-2Y
Sulfate-Sulfur	H_2O	1,000	500 125	AS-SO4S9-2X AS-SO4S9-2Y
Ammonium	H_2O	1,000	125	CS-NH49-2Y

Cation	Matrix	Concentration (mg/L)	Vol. mL	Catalog#
Barium	0.2% HNO_3	1,000	125	CS-BA2-2Y
Calcium	0.2% HNO_3	1,000	125	CS-CA2-2Y
Lithium	0.2% HNO_3	1,000	125	CS-LI2-2Y
Magnesium	0.2% HNO_3	1,000	125	CS-MG2-2Y
Potassium	0.2% HNO_3	1,000	125	CS-K2-2Y
Sodium	0.2% HNO_3	1,000	125	CS-NA2-2Y
Strontium	0.2% HNO_3	1,000	125	CS-SR2-2Y

Take a Closer Look. . .

Come take advantage of our SPoints program. Earn reward points on every order you place. Redeem them for great prizes throughout the year! See our available prizes or learn more at **www.spexcertiprep.com/SPoints.**

SECTION 8

[STOCK AND CUSTOM]

Ion *Selective Electrode Standards*

Your Science is Our Passion®

Ion *Selective Electrode Standards*

Customer Testimonial:

"The combination of Fisher Scientific and SPEX CertiPrep® provides a unique relationship that offers quality standards with the convenience of 'one stop shopping'."

– Cameron Baker

SPEX CertiPrep® Ion Standards, for calibration of ion-selective electrodes from all manufacturers, are made from high purity salts and ASTM Type I water.

SPEX CertiPrep Ionic Strength Adjustment Buffers maintain a nearly constant pH value for samples and standards during calibration and measurement.

Ion-Selective Electrode	Ion	Concentration	Volume (mL)	Catalog#
BROMIDE	Br^-	0.1M NaBr	125	AS-BR9-5Y
			500	AS-BR9-5X
		1000mg/L Br^-	125	AS-BR9-2Y
			500	AS-BR9-2X
CHLORIDE	Cl^-	0.1M NaCl	125	AS-CL9-5Y
			500	AS-CL9-5X
		100mg/L Cl^-	125	AS-CL9-1Y
			500	AS-CL9-1X
		1000mg/L Cl^-	125	AS-CL9-2Y
			500	AS-CL9-2X
FLUORIDE	F^-	0.1M NaF	125	AS-F9-5Y
			500	AS-F9-5X
		10mg/L F^-	125	AS-F9-1AY
			500	AS-F9-1AX
		100mg/L F^-	125	AS-F9-1Y
			500	AS-F9-1X
		1000mg/L F^-	125	AS-F9-2Y
			500	AS-F9-2X
CYANIDE	CN^-	1000mg/L CN^-	125	RSCN9-2Y
			500	RSCN9-2X

GREAT VALUE

Ion-Selective Electrodes Sets

Set of 3 Solutions for Bromide
Includes one of each: AS-BR9-5Y, AS-BR9-2Y, IS-BUF1-500
Catalog#: AS-BR9-SET

Set of 4 Solutions for Chloride
Includes one of each: AS-CL9-5Y, AS-CL9-1Y, AS-CL9-2Y, IS-BUF1-500
Catalog#: AS-CL9-SET

Set of 2 Solutions for Cyanide
Includes one of each: RSCN9-2Y, IS-BUF2-500
Catalog#: RSCN9-SET

Set of 5 Solutions for Fluoride
Includes one of each: AS-F9-5Y, AS-F9-1AY, AS-F9-1Y, AS-F9-2Y, IS-BUF3-500
Catalog#: AS-F9-SET

SPEX CertiPrep® Ionic Strength Adjustment Buffers

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

Take a Closer Look. . .

Specifications of Four Types of ASTM Water

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

SECTION 9

Other Reference Standards

Cyanide Reference Standards

Certified Wet Assay

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

Cyanide, Simple

Contents: 1000mg/L: CN from KCN
Matrix: H_2O/2% KOH
Volume: 125mL **Catalog#: RSCN9-2Y**
Volume: 500mL **Catalog#: RSCN9-2X**

Cyanide, Complex

Contents: 1000mg/L: CN from $K_3Fe(CN)_6$
Matrix: H_2O/2% KOH
Volume: 500mL **Catalog#: RSCN9C-2X**

Conductivity Standards: TDS as KCL

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

Helpful Hint:

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

SECTION 10

[STOCK AND CUSTOM]

Organo*metallic*

Single and Multi-Element Oil Standards

Your Science is Our Passion®

Organo*metallic*
Oil Standards

Applications

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

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

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

- Choice of 37 single elements at 1,000 or 5,000µg/g
- Popular multi-element blends of 23, 21, 12, or 5 elements
- Clear, transparent matrix
- 1 year expiration date
- Convenient sizes, 50 or 100 grams
- Competitive pricing
- Certificate of Analysis with every solution
- Guaranteed stable and accurate
- Manufactured under an internationally accredited ISO 9001:2008 Quality System
- Expert technical/customer support
- Custom standards available

To ensure the validity of results from today's high-performance instrumentation, SPEX CertiPrep® presents an extensive line of the highest quality reference materials. While the quality of our standards results directly from the manufacturing and testing requirements of our ISO 9001:2008 Quality System, our comprehensive Certificates of Analysis are critical to confirming and documenting that quality. **Therefore, every standard is automatically supplied with a Certificate of Analysis which includes:**

- Catalog number
- Lot number
- Matrix statement
- Method of analysis used
- Found concentrations of trace metallic impurities on single element standards and blanks
- Certified analyte concentration
- Material Safety Data Sheet (MSDS), authorized by Safety Officer

SPEX CertiPrep also offers custom organometallic oil standards because we realize that no two labs face exactly the same types of samples and problems, or have precisely the same requirements. Our specialists will be happy to discuss your applications, combination of elements and concentrations, and your preferred matrix. We will then design the most compatible, and stable mixture. For a quotation, submit your request using our online form at **www.spexcertiprep.com/custominorganics**.

No matter what your application, if you are testing engine oils via ICP-AES, RDE, DCP, AA, or XRF, SPEX CertiPrep has reference standards that are pure, defined completely, and accurate to suit your needs. Be assured that our starting materials and solutions meet exacting specifications, and that our in-house quality control chemists and customer service representatives are at your disposal to design your Certified Reference Materials in the desired sensitivity and accuracy of your instrument.

Our entire team is committed to serving our customers and striving for Total Customer Satisfaction. Our order department, technical support and sales staff are waiting to assist you. If you have a standardization, quality control, or purity problem, please call our specialist for technical expertise and reliable products to solve your problem. Let over half a century of experience be your advantage.

Base Oils and Kerosene Blanks

Description	Volume	Catalog#
BASE OIL 20	500mL	BASE20
	3.78L	BASE20-G
BASE OIL 75	500mL	BASE75
	3.78L	BASE75-G
KEROSENE	500mL	KER-BLK
	3.78L	KER-BLK-G

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

■ Single Element Organometallic Oil Standards

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

Element in Base Oil	Conc. µg/g	Catalog#
Aluminum (Al)	1000	ORG-AL8-2Z
	5000	ORG-AL8-4Z
Antimony (Sb)	1000	ORG-SB8-2Z
Arsenic (As)	1000	ORG-AS8-2Z
Barium (Ba)	1000	ORG-BA8-2Z
	5000	ORG-BA8-4Z
Beryllium (Be)	1000	ORG-BE8-2Z
Bismuth (Bi)	1000	ORG-BI8-2Z
	5000	ORG-BI8-4Z
Boron (B)	1000	ORG-B8-2Z
	5000	ORG-B8-4Z
Cadmium (Cd)	1000	ORG-CD8-2Z
	5000	ORG-CD8-4Z
Calcium (Ca)	1000	ORG-CA8-2Z
	5000	ORG-CA8-4Z
Chromium (Cr)	1000	ORG-CR8-2Z
	5000	ORG-CR8-4Z
Cobalt (Co)	1000	ORG-CO8-2Z
	5000	ORG-CO8-4Z
Copper (Cu)	1000	ORG-CU8-2Z
	5000	ORG-CU8-4Z
Iron (Fe)	1000	ORG-FE8-2Z
	5000	ORG-FE8-4Z
Lanthanum (La)	1000	ORG-LA8-2Z
Lead (Pb)	1000	ORG-PB8-2Z
	5000	ORG-PB8-4Z
Lithium (Li)	1000	ORG-LI8-2Z
	5000	ORG-LI8-4Z
Magnesium (Mg)	1000	ORG-MG8-2Z
	5000	ORG-MG8-4Z
Manganese (Mn)	1000	ORG-MN8-2Z
	5000	ORG-MN8-4Z
Mercury (Hg)	1000	ORG-HG8-2Z
Molybdenum (Mo)	1000	ORG-MO8-2Z
	5000	ORG-MO8-4Z

Element in Base Oil	Conc. µg/g	Catalog#
Nickel (Ni)	1000	ORG-NI8-2Z
	5000	ORG-NI8-4Z
Phosphorous (P)	1000	ORG-P8-2Z
	5000	ORG-P8-4Z
Potassium (K)	1000	ORG-K8-2Z
	5000	ORG-K8-4Z
Scandium (Sc)	1000	ORG-SC8-2Z
Selenium (Se)	1000	ORG-SE8-2Z
	5000	ORG-SE8-4Z
Silicon (Si)	1000	ORG-SI8-2Z
	5000	ORG-SI8-4Z
Silver (Ag)	1000	ORG-AG8-2Z
	5000	ORG-AG8-4Z
Sodium (Na)	1000	ORG-NA8-2Z
	5000	ORG-NA8-4Z
Strontium (Sr)	1000	ORG-SR8-2Z
	5000	ORG-SR8-4Z
Sulfur (S)	1000	ORG-S8-2Z
	5000	ORG-S8-4Z
Thallium (Tl)	1000	ORG-TL8-2Z
Tin (Sn)	1000	ORG-SN8-2Z
	5000	ORG-SN8-4Z
Titanium (Ti)	1000	ORG-TI8-2Z
	5000	ORG-TI8-4Z
Vanadium (V)	1000	ORG-V8-2Z
	5000	ORG-V8-4Z
Yttrium (Y)	1000	ORG-Y8-2Z
Zinc (Zn)	1000	ORG-ZN8-2Z
	5000	ORG-ZN8-4Z
Zirconium (Zr)	1000	ORG-ZR8-2Z
	5000	ORG-ZR8-4Z

■ Multi-element Organometallic Oil Standards

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

B100 Biodiesel Standards

Governments worldwide have passed new regulations that mandate lower levels of sulfur in biodiesel fuel. To coincide with the implementation of these regulations, SPEX CertiPrep® now offers specifically designed Certified Reference Materials for industrial use. Our B100 Biodiesel standards meet the requirements for testing ASTM methods D6751, D5453, and EN14214 (see below for a complete list). All SPEX CertiPrep standards are manufactured from materials of the highest purity and rigorously tested to ensure that our products are of the highest quality. All standards come with a comprehensive Certificate of Analysis. If other concentrations are needed, our chemists can produce custom standards that meet your requirements; for a quote, please contact your local sales representative for additional information.

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

Sulfur Oil Standards for Diesel Fuel Analysis, in Base Oil

Available in 100 gram quantities

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

Set for Sulfur Standards

This set includes the following concentrations:

1000, 750, 500, 300, 200, 100, and 50mg/L; plus BASE 20

Catalog#: DSS8-SET

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

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

Available in 100 gram quantities

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

Set for Ultra Low Level Sulfur Standards

This set includes the following concentrations:

100, 50, 25, 15, 10, 5, and 0mg/L in #2 Diesel Fuel.

Catalog#: SDFS-SET

SECTION 11

[STOCK AND CUSTOM]

Fusion

Fluxes and Additives

Your Science is Our Passion®

Fusion

Fluxes and Additives

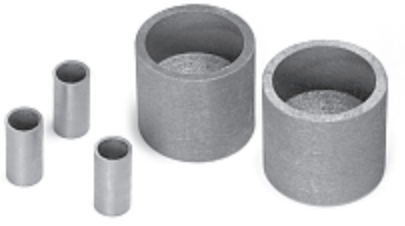
Fusion is an extremely effective method to prepare oxides, sulfides, fluorides, ferroalloys, and metals for analysis by XRF, AA, ICP, DCP, etc. The samples are (if necessary) pulverized and mixed with a flux; this mixture is heated until the flux melts and the sample dissolves in it, yielding a clear,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

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

Features of our Fluxes:

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

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



SPEX SamplePrep Graphite Crucibles

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

■ Fusion Flux (1kg quantity)

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

Additives

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

Helpful Hint:

For more information or to request a FREE SAMPLE, visit **www.spexfusionflux.com**. Can't find the blend you are looking for? Contact us today and ask about our custom mixtures – we can make a Fusion Flux to meet your exact needs.

SECTION 12

Consumer Safety Standards

Your Science is Our Passion®

Consumer
Safety Standards

Can't find the specific mix your method requires? SPEX CertiPrep can manufacture a custom Certified Reference Material to your exact specifications. We offer a wide range of analytes and matrices to fulfill almost any request. Visit ***www.spexcertiprep.com/custominorganics*** to submit your design.

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

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

- CPSC-CH-C100.09.3
- CPSC-CH-E1001-08
- ASTM F9603-07
- EC Directive 94/62/EC Art. 11
- EC Directive 91/388 EC

SPEX CertiPrep leads the way in producing standards for our consumer product testing methods. All of our consumer products testing standards are prepared under our Triple Checked for Quality Assurance Program. The range of SPEX CertiPrep's consumer product safety products includes standards for both organic and inorganic analysis.

Our products include:

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

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

Extractible Metals in Plastic Toys

Kit of 2 Extractible Metals in Plastic Toys Standards:

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

Contents: 1000mg/L: As, Cd, Cr, Pb, Se, Sb
Matrix: 10% HNO_3/tr. Tart / Tr. HF
Volume: 125mL **Catalog#: EMPT-1A**

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

Contents: 1000mg/L: Ba, Hg
Matrix: 10% HNO_3
Volume: 125mL **Catalog#: EMPT-1B**

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

Kit of EMPT-1 and an Internal Check Standard:

Contains EMPT-1A, EMPT-1B, INT-EM1

Interference Check Standard (only available with kit EMPT-2)

Contents: 2000mg/L: Al, Ca, Fe, Mg
20mg/L: As, Cd, Cr, Pb, Se, Sb
Matrix: 10% HNO_3/tr. Tart / Tr. HF
Volume: 125mL **Catalog#: INT-EM1**

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

RoHS/WEEE Check Standard

Contents: Br, Pb, Hg, Cr, Cd
Matrix: Polyethylene
Volume: 25g **Catalog#: ROHS-25**

Phthalates in Polyethylene QC Standards

Phthalates Standard in Polyethylene Matrix

Contents:	bis(2-Ethylhexyl) phthalate	3000 µg/g
	Butylbenzyl phthalate	3000 µg/g
	Di-n-butyl phthalate	3000 µg/g
	Di-n-octyl phthalate	3000 µg/g
	Diethyl phthalate	3000 µg/g
	Dimethyl phthalate	3000 µg/g
	Diisononyl phthalate	30,000 µg/g
	Diisodecyl phthalate	30,000 µg/g

Matrix: Polyethylene
Volume: 5g **Catalog#: CRM-PE001**

Polyethylene Matrix Blank

Matrix: Polyethylene
Volume: 5g **Catalog#: CRM-PEBLK**

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

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

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

Inorganic *Subject Index*

Inorganic *Catalog # Index*

For Organic CRM Index see page 154 in *Organic Standards Certified Reference Materials* catalog

QC Samples

TABLE OF CONTENTS

Inorganic
Water Pollution

Organic
Water Pollution

Inorganic
Water Supply

Organic
Water Supply

Water Pollution

MINERALS/SOLIDS

Minerals

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

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

Hardness

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

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

pH

pH ..... 5-10 units

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

Settleable Solids

Settleable solids ..... 5-100 mL/L

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

Volatile Solids

Volatile solids ..... 100-500 mg/L

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

Solids Concentrate

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

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

Solids

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

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

NUTRIENTS

Simple Nutrients

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

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

Complex Nutrients

Total Kjeldahl-nitrogen as N ..... 1.5-35 mg/L
Total phosphorus as P ..... 0.5-10 mg/L

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

Nitrite

Nitrite as N ..... 0.4-4 mg/L

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

DEMAND

Demand

5-day BOD ..... 15-250 mg/L
Carbonaceous BOD ..... 15-250 mg/L
COD ..... 30-250 mg/L
TOC ..... 6-100 mg/L

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

OIL & GREASE/TPH

Oil & Grease

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

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

Oil & Grease Concentrate

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

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

1 liter Oil & Grease

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

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

Please specify if for SPE compatible PT.

1 liter Boston Round Oil & Grease

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

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

Please specify if for SPE compatible PT.

HEM / SGT-HEM

HEM ..... 5-100 mg/L
SGT-HEM ..... 5-100 mg/L

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

Total Petroleum Hydrocarbons (TPH) in Water #1

Total Petroleum Hydrocarbons ..... 20-170 mg/L

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

Total Petroleum Hydrocarbons (TPH) in Water #2

Total Petroleum Hydrocarbons ..... 20-170 mg/L

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

TRACE METALS

Trace Metals

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

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

Mercury

Mercury, total ..... 2-30 µg/L

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

Low-Level Mercury

Mercury, total ..... 1–100 ng/L

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

Hexavalent Chromium

Hexavalent chromium ..... 45-880 µg/L

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

Tin & Titanium

Tin ..... 1,000-5,000 µg/L
Titanium ..... 80-300 µg/L

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

Uranium

Uranium ..... 25-200 µg/L

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

Lithium

Lithium ..... 50-500 µg/L

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

PHYSICAL PROPERTY

Color

Color ..... 10-75 PC units

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

Turbidity

Turbidity ..... 1-20 NTU

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

MISC. CHEMISTRY

Cyanide & Phenol

Total Cyanide .....0.1-1 mg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution. Analyze for total cyanide using distillation followed by colorimetric, titrimetric or ISE methods. The CRM is also certified for Total Phenolics at 0.06-5 mg/L. For a Total Phenolics PT, order Cat. # 589.
Catalog#: 502

Total Organic Halides (TOX)

TOX ..... 300-1,500 µg/L

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

Total Phenolics (4-AAP)

Total phenolics by 4-AAP .....0.06-5 mg/L

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

Silica

Silica as SiO_2 .....50-250 mg/L

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

Sulfide

Sulfide ..... 1-10 mg/L

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

Surfactants-MBAS

Surfactants-MBAS.....0.2-1 mg/L

One 10 mL flame-sealed ampule yields up to 2 liters after dilution. Analyze for Surfactants-MBAS with EPA method 425.1.
Catalog#: 776

Acidity

Acidity as $CaCO_3$ .....650-1,800 mg/L

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

Boron

Boron .....800-2000 µg/L

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

Bromide

Bromide ..... 1-10 mg/L

One 2 mL flame-sealed ampule yields up to 1 liter after dilution. Use with ion chromatography or colorimetric methods.
Catalog#: 769

Total Residual Chlorine

Total Residual Chlorine .....0.5-3 mg/L

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

Low-Level Total Residual Chlorine

Total Residual Chlorine ..... 20-250 µg/L

Designed for testing at low µg/L levels. One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with sensitive titrimetric or colorimetric methods. Check FoPT tables on TN1 Web site for NELAC acceptability.
Catalog#: 917

Ready-to-Use Wastewater

WHOLE-VOLUME CRMs

The following whole-volume standards are ready to use as provided and require no dilution before analysis. These standards are guaranteed stable for a minimum of one month after receipt at your facility.

Minerals

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

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

Hardness

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

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

pH

pH ..... 5-10 units

One 250 mL whole-volume bottle is ready to analyze for pH.
Use with electrometric methods.
Catalog#: 977

Oil & Grease

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

One 250 mL whole-volume bottle is ready to analyze use with EPA hexane extraction method 1664. Certified values are provided for IR and gravimetric methods. For additional Oil & Grease CRMs see page 2.
Catalog#: 504

Solids available monthly

Total solids at 105°C ..... 140-675 mg/L
Total dissolved solids at 180°C ..... 140-650 mg/L
Non-filterable residue (TSS) ..... 23-100 mg/L
pH ..... 5-10 units

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

Trace Metals

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

One 500 mL whole-volume bottle is ready to analyze.
Use with AA, ICP-OES or ICP-MS methods.
Catalog#: 740

Demand

5-day BOD ..... 15-250 mg/L
Carbonaceous BOD ..... 15-250 mg/L
COD ..... 30-250 mg/L
TOC ..... 6-100 mg/L

One 500 mL whole-volume bottle is ready to analyze.
Catalog#: 743

Simple Nutrients

Ammonia as N ..... 0.65-19 mg/L
Nitrate as N ..... 0.25-40 mg/L
Nitrate plus nitrite as N ..... 0.25-40 mg/L
Orthophosphate as P ..... 0.5-5.5 mg/L

One 500 mL whole-volume bottle is ready to analyze.
Catalog#: 739

Complex Nutrients

Total Kjeldahl-nitrogen as N ..... 1.5-35 mg/L
Total phosphorus as P ..... 0.5-10 mg/L

One 500 mL whole-volume bottle is ready to analyze.
Catalog#: 741

Water Pollution

VOLATILES

Volatiles

Acetone
Acetonitrile
Acrylonitrile
Acrolein
Benzene
Bromodichloromethane
Bromoform
Bromomethane
2-Butanone (MEK)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroethane
2-Chloroethyl vinyl ether
Chloroform
Chloromethane
1,2-Dibromo-3-chloropropane (DBCP)
1,2-Dibromoethane (EDB)
Dibromomethane
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethylbenzene
Hexachlorobutadiene
2-Hexanone
Methylene chloride
Methyl tert-butyl ether (MTBE)
4-Methyl-2-pentanone (MIBK)
Naphthalene
Styrene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
1,2,3-Trichloropropane
Vinyl acetate
Vinyl chloride
Xylenes, total

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA methods 601, 602, 8021, 624 and 8260. Contains at least 60% of the EPA/NELAC analytes in the required range 5-300 µg/L and a percentage of the additional analytes, all randomly selected from the list above.
Catalog#: 710

Volatile Aromatics

1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Benzene
Ethylbenzene
Toluene
Total Xylenes

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA methods 602 and 8021. Each standard contains all listed analytes at 5-300 µg/L after dilution.
Catalog#: 4452

BTEX & MTBE in Water

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA methods 602 and 8021. Includes all BTEX compounds and MTBE in the EPA/NELAC required range 7-300 µg/L after dilution.
Catalog#: 760

Gasoline Range Organics (GRO) in Water

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with both purge & trap and modified EPA 8015 GC/FID methods to test for GRO in the EPA/NELAC required range 200-4,000 µg/L. Also use to test for BTEX in gasoline.
Catalog#: 762

HERBICIDES

Chlorinated Acid Herbicides

Acifluorfen
Bentazon
Chloramben
2,4-D
2,4-DB
Dacthal diacid (DCPA)
Dalapon
Dicamba
3,5-Dichlorobenzoic acid
Dichlorprop
Dinoseb
MCPA
MCPP
4-Nitrophenol
Pentachlorophenol
Picloram
2,4,5-T
2,4,5-TP (Silvex)

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 615 and 8151. Contains all of the EPA/NELAC analytes in the required range 2-10 µg/L (except MCPA and MCPP 10-100 µg/L) and a percentage of the additional analytes, all randomly selected from the list above. Note: 4-nitrophenol and pentachlorophenol are not within the EPA/NELAC range. Use the Acids standard (pg. 7) for these compounds in the EPA/NELAC range.
Catalog#: 718

PCBs

PCBs in Water

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 608 and 8082. Contains a different Aroclor, randomly selected from the list above, in the EPA/NELAC required range 1-15 µg/L.
Catalog#: 734S

PCBs in Oil

Aroclor 1016
Aroclor 1254
Aroclor 1242
Aroclor 1260

One 10 mL flame-sealed ampule is ready to analyze. Use with EPA method 8082. Contains a different Aroclor, randomly selected from the NELAC list, in the EPA/NELAC required range 12-50 mg/kg.
Catalog#: 729S

SEMIVOLATILES

Base/Neutrals

Acenaphthene
Acenaphthylene
2-Amino-1-methybenzene (o-Toluidine)
Aniline
Anthracene
Benzidine
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(a)pyrene
Benzyl alcohol
4-Bromophenyl-phenylether
Butylbenzylphthalate
Carbazole
4-Chloroaniline
bis(2-Chloroethoxy) methane
bis(2-Chloroethyl)ether
bis(2-Chloroisopropyl) ether
1-Chloronaphthalene
2-Chloronaphthalene
4-Chlorophenyl-phenylether
Chrysene
Dibenz(a,h)anthracene
Dibenzofuran
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
3,3'-Dichlorobenzidine
Diethyl phthalate
Dimethyl phthalate
Di-n-butylphthalate
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-n-octylphthalate
bis(2-Ethylhexyl) phthalate
Fluoranthene
Fluorene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclo-pentadiene
Hexachloroethane
Indeno(1,2,3-cd)pyrene
Isophorone
2-Methylnaphthalene
Naphthalene
2-Nitroaniline
3-Nitroaniline
4-Nitroaniline
Nitrobenzene
N-Nitrosodiethylamine
N-Nitrosodimethylamine
N-Nitroso-di-n-propylamine
N-Nitrosodiphenylamine
Pentachlorobenzene
Phenanthrene
Pyrene
Pyridine
1,2,4,5-Tetrachlorobenzene
1,2,4-Trichlorobenzene

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 625 and 8270. Contains at least 60% of the EPA/NELAC analytes in the required range 10-225 µg/L (except Benzidine at 200-1,000 µg/L) and a percentage of the additional analytes, all randomly selected from the list above.
Catalog#: 711

Acids

Benzoic Acid
4-Chloro-3-methylphenol
2-Chlorophenol
2,4-Dichlorophenol
2,6-Dichlorophenol
2,4-Dimethylphenol
2,4-Dinitrophenol
2-Methyl-4,6-dinitrophenol
2-Methylphenol
3&4-Methlyphenol
2-Nitrophenol
4-Nitrophenol
Pentachlorophenol
Phenol
2,3,4,6-Tetrachlorophenol
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 604, 625, 8041 and 8270. Contains at least 80% of the EPA/NELAC analytes in the required range 30-200 µg/L and a percentage of the additional analytes, all randomly selected from the list above.
Catalog#: 712

Diesel Range Organics (DRO) in Water

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with modified EPA 8015 GC/FID methods. Includes #2 Diesel in the EPA/NELAC required range 500-4,000 µg/L.
Catalog#: 764

Low-Level Nitroaromatics & Nitramines

4-Amino-2,6-dinitrotoluene
2-Amino-4,6-dinitrotoluene
1,3-Dinitrobenzene
2,4-Dinitrotoluene
2,6-Dinitrotoluene
HMX
Nitrobenzene
2-Nitrotoluene
3-Nitrotoluene
4-Nitrotoluene
RDX
Tetryl
1,3,5-Trinitrobenzene
2,4,6-Trinitrotoluene

One 2 mL flame-sealed ampule yields up to 2 liters of sample after dilution. Use with EPA methods 8330 and 8091 for explosive and explosive residue analytes. Contains at least 80% of the EPA/NELAC analytes, randomly selected from the list above, in the required range 1-20 µg/L.
Catalog#: 677

Low-Level PAHs

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(a)pyrene
Chrysene
Dibenz(a,h)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA HPLC methods 610 and 8310 and GC/MS method 8270 SIM. Contains at least 80% of the EPA/NELAC analytes, randomly selected from the list above, in the required range 0.3-10 µg/L.
Catalog#: 715

PAHs - GC/GCMS

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Chrysene
Dibenz(a,h) anthracene
Fluoranthene
Fluorene
Indeno (1,2,3-cd) pyrene
Naphthalene
Phenanthrene
Pyrene

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 625, 8100 and 8270. Each standard contains at least 80% of the EPA/NELAC analytes, randomly selected from the list provided, in the required range 10-200 µg/L.
Catalog#: 4882

PESTICIDES

Organochlorine Pesticides

Aldrin
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC (Lindane)
alpha-Chlordane
gamma-Chlordane
4,4'-DDD
4,4'-DDE
4,4'-DDT
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
Endrin ketone
Heptachlor
Heptachlor epoxide (beta)
Methoxychlor

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 608 and 8081. Contains at least 80% of the EPA/NELAC analytes, randomly selected from the list above, in the required range 0.5-20 µg/L.
Catalog#: 713

Chlordane

One 2 mL flame-sealed ampule yields up to 2 liters of sample after dilution. Use with EPA methods 608 and 8081. Contains technical chlordane in the EPA/NELAC required range 3-25 µg/L.
Catalog#: 716

Toxaphene

One 2 mL flame-sealed ampule yields up to 2 liters of sample after dilution. Use with EPA methods 608 and 8081. Contains toxaphene in the EPA/NELAC required range 20-100 µg/L.
Catalog#: 717

Carbamate Pesticides

Aldicarb
Aldicarb sulfone
Aldicarb sulfoxide
Baygon
Carbaryl
Carbofuran
Diuron
3-Hydroxycarbofuran
Methiocarb
Methomyl
Oxamyl (vydate)
Propham

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA method 632 for carbamates at 5-200 µg/L. Contains a random selection of analytes from the list above in the required range 5-200 µg/L.
Catalog#: 908

Nitrogen Pesticides

Alachlor
Ametryn
Anilazine
Atraton
Atrazine
Bromacil
Butachlor
Butylate
Cyanazine
Deethyl atrazine
Deisopropyl atrazine
Diaminoatrazine
EPTC (Eptam)
Hexazinone
Metolachlor
Metribuzin
Napropamide
Prometon
Prometryn
Pronamide
Propachlor
Propazine
Simazine
Terbacil
Trifluralin

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 619, 633, 8141 and 8270 for pesticides at 2-20 µg/L. Contains a random selection of analytes from the list above.
Catalog#: 674

Organophosphorus Pesticides (OPP)

Azinphos-methyl (Guthion)
Carbophenothion
Chlorpyrifos
Demeton O & S
Diazinon
Dichlorvos (DDVP)
Dimethoate
Dioxathion
Disulfoton
Ethion
Ethoprop
Ethyl Parathion (Parathion)
Famphur
Fonofos
Malathion
Methyl parathion
Phorate
Phosmet
Ronnel
Stirophos (tetrachlorovinphos)
Terbufos

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 614, 622 and 8141. Contains all of the EPA/NELAC analytes in the required range 2-20 µg/L and a percentage of the additional analytes all randomly selected from the list above.
Catalog#: 665

QC PLUS STANDARDS

ERA's QC Plus program includes environmental analytes at concentrations that reflect realistic levels of pollutants in an industrial setting. Each sample level is designed for wastewater and industrial analysis. These QC samples are an asset to any quality assurance program because they enable you to test your internal systems to ensure that your equipment, methods, and analysts are producing quality data.

QC Plus - Demand

Biochemical Oxygen Demand (BOD)..... 100-300 mg/L
Carbonaceous BOD.....87.0-256 mg/L
Chemical Oxygen Demand (COD)..... 150-500 mg/L
Total Organic Carbon (TOC) .....50.0-200 mg/L

One screw-cap vial yields up to 1 liter after dilution.
Catalog#: 4013

QC Plus - Hexavalent Chromium

Chromium, Hexavalent ..... 100-1,000 µg/L

One screw-cap vial yields up to 2 liters after dilution.
Catalog#: 4183

QC Plus - Minerals

Alkalinity as $CaCO_3$.....10.0-300 mg/L
Calcium.....5.00-150 mg/L
Calcium Hardness as $CaCO_3$.....12.5-375 mg/L
Chloride.....10.0-700 mg/L
Conductivity.....100-4,000 µmhos/cm
Magnesium.....1.00-50.0 mg/L
Potassium.....1.00-300 mg/L
Sodium .....10.0-300 mg/L
Sulfate .....10.0-300 mg/L
Total Dissolved Solids at 180°C ..... 20.0-2,400 mg/L
Total Hardness as $CaCO_3$ .....15.0-600 mg/L

Two screw-cap vials yield up to 2 liters after dilution.
Catalog#: 4053

QC Plus - Nutrients

Ammonia Nitrogen as N..... 0.250-10.0 mg/L
Nitrate Nitrogen as N ..... 0.250-10.0 mg/L
Orthophosphate as P.....0.0500-10.0 mg/L
Total Kjeldahl Nitrogen ..... 0.250-10.0 mg/L
Total Phosphorus as P ..... 0.100-10.0 mg/L

Two screw-cap vials yield up to 2 liters each after dilution.
Catalog#: 4023

QC Plus - Oil & Grease

Oil & Grease.....10.0-100 mg/L

One screw-cap vial yields up to 2 liters after dilution.
Catalog#: 4123

QC Plus - pH

pH .....2.00-12.0 Units

One 250 mL whole-volume bottle is ready to analyze.
Catalog#: 4063

QC Plus - Fluoride

Fluoride..... 5-20 mg/L

One screw-cap vial yields up to 2 liters after dilution.
Catalog#: 4423

QC Plus - Solids

Total Dissolved Solids at 180°C .....500-2,000 mg/L
Total Solids.....600-2,500 mg/L
Total Suspended Solids..... 100-500 mg/L

One screw-cap vial yields up to 1 liter after dilution.
Catalog#: 4033

QC Plus - Total Cyanide

Total Cyanide .....1.00-5.00 mg/L

One screw-cap vial yields up to 2 liters after dilution.
Catalog#: 4093

QC Plus - Total Phenolics

Total Phenolics (4-AAP).....0.0500-0.500 mg/L

One screw-cap vial yields up to 2 liters after dilution.
Catalog#: 4083

QC Plus - Total Residual Chlorine

Total Residual Chlorine ..... 0.100-1.00 mg/L

One screw-cap vial yields up to 2 liters of solution after dilution.
Catalog#: #4103

QC Plus - Trace Metals

Aluminum	50.0-200 µg/L
Antimony	10.0-300 µg/L
Arsenic	10.0-250 µg/L
Barium	50.0-500 µg/L
Beryllium	5.00-100 µg/L
Boron	50.0-250 µg/L
Cadmium	5.00-100 µg/L
Chromium	15.0-500 µg/L
Cobalt	25.0-500 µg/L
Copper	15.0-500 µg/L
Iron	25.0-500 µg/L
Lead	50.0-500 µg/L
Manganese	50.0-500 µg/L
Mercury	0.500-5.00 µg/L
Molybdenum	20.0-500 µg/L
Nickel	50.0-500 µg/L
Selenium	10.0-100 µg/L
Silver	10.0-100 µg/L
Strontium	50.0-500 µg/L
Thallium	10.0-250 µg/L
Tin	200-1,000 µg/L
Titanium	10.0-100 µg/L
Vanadium	50.0-250 µg/L
Zinc	25.0-250 µg/L

Two screw-cap vials yield up to 2 liters each after dilution.
Catalog#: 4073

Water Supply

MINERALS/SOLIDS

Hardness

Calcium ..... 30-90 mg/L
Calcium hardness as $CaCO_3$ ..... 75-375 mg/L
Total hardness as $CaCO_3$ ..... 83-307 mg/L
Magnesium ..... 2-20 mg/L
Sodium ..... 12-24 mg/L

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

Inorganics

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

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

pH

pH ..... 5-10 units

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

Solids

Total filterable residue (TDS) at 180°C ..... 200-450 mg/L
Total solids (TS) ..... 220-550 mg/L
Non-filterable residue (TSS) at 105° ..... 23-100 mg/L

One 23 mL glass screw-cap vial yields 1 liter after dilution.
Catalog#: 5152

TRACE METALS

Metals

Aluminum ..... 130-2,500 µg/L
Antimony ..... 6-50 µg/L
Arsenic ..... 5-50 µg/L
Barium ..... 500-3,000 µg/L
Beryllium ..... 1-10 µg/L
Boron ..... 800-2,000 µg/L
Cadmium ..... 2-50 µg/L
Chromium ..... 10-200 µg/L
Copper ..... 50-2,000 µg/L
Iron ..... 100-1,800 µg/L
Lead ..... 5-100 µg/L
Manganese ..... 40-900 µg/L
Molybdenum ..... 15-130 µg/L
Nickel ..... 10-500 µg/L
Selenium ..... 10-100 µg/L
Silver ..... 20-300 µg/L
Thallium ..... 2-10 µg/L
Vanadium ..... 315-2,500 µg/L
Zinc ..... 400-2,500 µg/L

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

Mercury

Mercury, total ..... 0.5-10 µg/L

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

Hexavalent Chromium

Hexavalent Chromium ..... 5-50 µg/L

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

Uranium

Uranium ..... 3-104 µg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution. Use with ICP/MS methods EPA 200.8, ASTM D5673-03 and Standard Methods 3125.
Catalog#: 930

Vanadium

Vanadium ..... 5-50 µg/L

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

INORGANIC DISINFECTION BY-PRODUCTS

Chlorate & Chlorite

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

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Use with ion chromatography methods.
Catalog#: 5272

Bromate & Bromide

Bromate.....7-50 µg/L
Bromide.....75-500 µg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Use with colorimetric, ion chromatography methods.
Catalog#: 5262

NUTRIENTS

Nitrite

Nitrite as N.....0.4-2 mg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Use with colorimetric, IC, or ISE methods.
Catalog#: 695

o-Phosphate Nutrients

ortho-Phosphate as P.....0.5-5.5 mg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Use with colorimetric, ion chromatography, and ISE methods.
Catalog#: 667

WS MISCELLANEOUS INORGANIC

Residual Chlorine

Total Residual Chlorine.....0.5-3 mg/L
Free Residual Chlorine.....0.5-3 mg/L

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

Cyanide

Free Cyanide.....0.1-0.5 mg/L

One 15 mL screw-cap vial yields up to 2 liters after dilution.
Catalog#: 983

Organic Carbon

Total Organic Carbon.....1.2-4.9 mg/L
Dissolved Organic Carbon.....1.2-4.9 mg/L

One 15 mL screw-cap vial yields up to 1 liter after dilution. Use with combustion or persulfate oxidation procedures.
Catalog#: 669

Perchlorate

Perchlorate.....4-20 µg/L

One 15 mL screw-top vial yields up to 2 liters after dilution. Use with IC or IC/MS/MS and LC/MS/MS methods. Call for ng/L level perchlorate PTs.
Catalog#: #910

Silica

Silica as SiO_2.....5-50 mg/L

One 60 mL poly bottle yields 1 liter after dilution.
Use with colorimetric or ICP methods.
Catalog#: #785

Surfactants-MBAS

Surfactants-MBAS.....0.05-1 mg/L

One 10 mL flame-sealed ampule yields up to 2 liters after dilution.
Use with EPA method 425.1.
Catalog#: 784

WS PHYSICAL PROPERTY

Corrosivity

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

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

Turbidity

Turbidity.....0.5-8 NTU

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

UV 254 Absorbance

UV 254 Absorbance.....0.02-0.7 cm^{-1}

One 15 mL screw-cap vial yields up to 1 liter after dilution.
Use with Standard Method 5910B.
Catalog#: 662

Water Supply

DISINFECTION BY-PRODUCTS

Chloral Hydrate

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA method 551. Includes chloral hydrate in the EPA/NELAC required range, 4-30 µg/L.
Catalog#: 676

Haloacetic Acids (HAA)

Bromochloroacetic Acid
Dibromoacetic Acid
Dichloroacetic Acid
Monobromoacetic Acid
Monochloroacetic Acid
Trichloroacetic Acid

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA method 552. Includes all the analytes above in the EPA/NELAC required range, 10-50 µg/L.
Catalog#: 684

VOLATILE ORGANICS

Gasoline Additives

tert-Amylmethylether (TAME)
tert-Butyl Alcohol
Di-isopropylether (DIPE)
Ethyl tert-butyl ether (ETBE)
Methyl tert-butyl ether (MTBE)
Trichlorofluoromethane (Freon® 11)
Trichlorotrifluoroethane (Freon® 113)

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA method 524.2 for gasoline additives/oxygenates. Contains all of the analytes above, 5-50 µg/L.
Catalog#: 909

Halomethanes (THMs)

Bromodichloromethane
Bromoform
Chlorodibromomethane
Chloroform

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA methods 502.2, 524.2 and 551. Contains all of the analytes above in the required range, 10-50 µg/L.
Catalog#: 702

Regulated Volatiles

Benzene
Carbon tetrachloride
Chlorobenzene
1,2-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Dichloroethane
1,1-Dichloroethylene
cis-1,2-Dichloroethylene
trans-1,2-Dichloroethylene
1,2-Dichloropropane
Ethylbenzene
Methylene Chloride
Styrene
Tetrachloroethylene
Toluene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Vinyl Chloride
Xylenes, total

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA methods 502.2 and 524.2. Contains all of the analytes above in the EPA/NELAC required range, 1-50 µg/L.
Catalog#: 703

Unregulated Volatiles

Bromobenzene
Bromochloromethane
Bromomethane
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Chloroethane
Chloromethane
2-Chlorotoluene
4-Chlorotoluene
Dibromomethane
1,3-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,3-Dichloropropane
2,2-Dichloropropane
1,1-Dichloropropene
cis-1,3-Dichloropropene
trans-1,3 Dichloropropene
Fluorotrichloromethane
Hexachlorobutadiene
Isopropylbenzene
4-Isopropyltoluene
Methyl tert-butyl ether (MTBE)
Naphthalene
n-Propylbenzene
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA methods 502.2 and 524.2. Contains at least 60% of the analytes randomly selected from the list above in the EPA/NELAC required range, 5-50 µg/L, except naphthalene, which if spiked, is included at 2-50 µg/L after dilution. All unspiked analytes are certified at <5 µg/L.
Catalog#: 683

PESTICIDES

Pesticides

Alachlor
Aldrin
Atrazine
Bromacil
Butachlor
Diazinon
Dieldrin
Endrin
Heptachlor
Heptachlor Epoxide (beta)
Hexachlorobenzene
Hexachlorocyclopentadiene
Lindane (gamma-BHC)
Methoxychlor
Metolachlor
Metribuzin
Molinate (Ordram)
Prometon
Propachlor
Simazine
Thiobencarb
Trifluralin

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 505, 507, 508 and 525 for organochlorine, nitrogen and organophosphorus pesticides. Each standard contains at least 16 analytes randomly selected from the list above in the required range 0.1-100 µg/L.
Catalog#: 709

Carbamate/Carbamoxyloxime Pesticides

Aldicarb
Aldicarb sulfone
Aldicarb sulfoxide
Baygon
Carbaryl
Carbofuran
3-Hydroxycarbofuran
Methiocarb
Methomyl
Oxamyl (Vydate)

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 531.1, 531.2 and 632. Each standard contains all analytes above in the EPA/NELAC required range 15-150 µg/L.
Catalog#: 707

Chlordane

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 505, 508 and 525. Each standard contains technical chlordane in the EPA/NELAC required range 2-20 µg/L.
Catalog#: 705

Toxaphene

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 505, 508 and 525. Each standard contains toxaphene in the EPA/NELAC required range 3-20 µg/L.
Catalog#: 700

EDB/DBCP/TCP

1,2-Dibromo-3-Chloropropane (DBCP)
Ethylene Dibromide (EDB)
1,2,3-Trichloropropane (1,2,3-TCP)

One 2 mL flame-sealed ampule yields in excess of 200 mL after dilution. Use with EPA methods 504 and 551. Each lot contains all analytes above in the EPA/NELAC required range 0.1-2 µg/L.
Catalog#: 706

SEMIVOLATILE ORGANICS

Dioxin

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 613, 1613, 8280 and 8290. Each standard contains 2,3,7,8-TCDD in the EPA/NELAC required range 25-80 µg/L.
Catalog#: 663

PCBs as Decachlorobiphenyl

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA quantitative method 508A. This standard can also be used for Aroclor identification and quantification using EPA methods 505, 508, and 508.1. Includes an Aroclor randomly selected from the list above in the EPA/NELAC required range 0.5-5 µg/L.
Catalog#: 708

Semivolatiles #1

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(a)pyrene
Butylbenzylphthalate
Chrysene
Dibenz(a,h)anthracene
Di-n-butylphthalate
Diethylphthalate
Dimethylphthalate
Di-n-octylphthalate
bis(2-Ethylhexyl)adipate
bis(2-Ethylhexyl) phthalate
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 506, 525 and 550 for PAHs, phthalates and adipates. Each standard contains at least 16 of the analytes randomly selected from the list above in the EPA/NELAC required range 0.2-50 µg/L.
Catalog#: 690

HERBICIDES

Chlorinated Acid Herbicides

Acifluorfen
Bentazon
Chloramben
2,4-D
2,4-DB
Dacthal diacid (DCPA)
Dalapon
Dicamba
3,5-Dichlorobenzoic acid
Dichlorprop
Dinoseb
4-Nitrophenol
Pentachlorophenol
Picloram
2,4,5-T
2,4,5-TP (Silvex)

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 515.1, 515.2, 515.3, 515.4 and 555. Includes 80% of the analytes above in the EPA/NELAC required range 1-150 µg/L.
Catalog#: 704

Semivolatiles #2 Herbicides

Diquat
Endothall
Glyphosate
Paraquat

One 2 mL flame-sealed ampule yields up to 2 liters after dilution. Use with EPA methods 547, 548, and 549. Each standard contains all the analytes above in the EPA/NELAC required range 8-800 µg/L.
Catalog#: 691

UCMR 2 ORGANICS

UCMR 2 Pesticides and Flame Retardants in Water

Dimethoate
2,2′,4,4′,5-Pentabromodiphenyl ether (BDE-99)
2,2′,4,4′,6-Pentabromodiphenyl ether (BDE-100)
2,2′,4,4′,5,5′-Hexabromobiphenyl (245-HBB)
2,2′,4,4′,5,5′-Hexabromodiphenyl ether (BDE-153)
Terbufos sulfone
2,2′,4,4′-Tetrabromodiphenyl ether (BDE-47)

One 2 mL flame-sealed ampule yields in excess of 2 liters after dilution. Use with EPA method 527. Each standard contains all analytes above at 0.5-10 µg/L after dilution.
Catalog#: 151

UCMR 2 Nitrosamines in Water

N-Nitrosodiethylamine (NDEA)
N-Nitrosodimethylamine (NDMA)
N-Nitrosodi-n-butylamine (NDBA)
N-Nitrosodi-n-propylamine (NDPA)
N-Nitrosomethylethylamine (NMEA)
N-Nitrosopyrollidine (NPYR)

One 2 mL flame-sealed ampule yields in excess of 2 liters after dilution. Use with EPA method 521. Each standard contains all analytes above at 5-100 ng/L after dilution.
Catalog#: 153

UCMR 2 Explosives in Water

1,3-Dinitrobenzene
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
2,4,6-Trinitrotoluene (TNT)

One 2 mL flame-sealed ampule yields in excess of 2 liters after dilution. Use with EPA method 529. Each standard contains all analytes above at 1-15 µg/L after dilution.
Catalog#: 152

UCMR 2 Chlorinated Pesticides in Water

Acetochlor
Alachlor
Metolachlor

One 2 mL flame-sealed ampule yields in excess of 2 liters after dilution. Use with EPA method 525.2. Each standard contains all analytes above at 1-20 µg/L after dilution.
Catalog#: 154

UCMR 2 Herbicide Degradates in Water

Acetochlor ethane sulfonic acid (ESA)
Acetochlor oxanilic acid (OA)
Alachlor ethane sulfonic acid (ESA)
Alachlor oxanilic acid (OA)
Metolachlor ethane sulfonic acid (ESA)
Metolachlor oxanilic acid (OA)

One 2 mL flame-sealed ampule yields in excess of 2 liters after dilution. Use with EPA method 535. Each standard contains all analytes above at 1-20 µg/L after dilution.
Catalog#: 155

QC Samples
PRODUCT INDEX

Inorganic
Water Pollution

Organic
Water Pollution

Inorganic
Water Supply

Organic
Water Supply

Notes

Notes

Periodic *Table of* the *Elements*

Key to Chart

Atomic Number — 24 — Oxidation States (+2, +3, +6)
Symbol — Cr
Wavelength (nm) — 205.552
Atomic Weight — 51.996

1 +1 −1 H 1.0079																	2 0 He 4.00260
3 +1 Li 670.784 6.94	4 +2 Be 313.042 9.01218											5 +3 B 249.773 10.81	6 +2 +4 −4 C 12.011	7 +1 +2 +3 +4 +5 −1 −2 −3 N 14.0067	8 −2 O 15.99	9 −1 F 18.99	10 0 Ne 20.17$_3$
11 +1 Na 589.592 22.98977	12 +2 Mg 279.553 24.305											13 +3 Al 396.152 26.98154	14 +2 +4 −4 Si 251.611 28.0855	15 +3 +5 −3 P 213.618 30.97376	16 +4 +6 −2 S 180.731 32.06	17 +1 +5 +7 −1 Cl 35.453	18 0 Ar 39.948
19 +1 K 766.490 39.0983	20 +2 Ca 317.933 40.08	21 +3 Sc 361.384 44.9559	22 +2 +3 +4 Ti 334.941 47.90	23 +2 +3 +4 +5 V 292.402 50.9415	24 +2 +3 +6 Cr 205.552 51.996	25 +2 +3 +4 +7 Mn 257.610 54.9380	26 +2 +3 Fe 259.940 55.847	27 +2 +3 Co 228.616 58.9332	28 +2 +3 Ni 231.604 58.71	29 +1 +2 Cu 324.754 63.546	30 +2 Zn 213.856 65.38	31 +3 Ga 294.364 69.735	32 +2 +4 Ge 209.426 72.59	33 +3 +5 −3 As 189.042 74.9216	34 +4 +6 −2 Se 196.090 78.96	35 +1 +5 −1 Br 79.904	36 0 Kr 83.80
37 +1 Rb 420.185 85.467$_3$	38 +2 Sr 421.552 87.62	39 +3 Y 371.03 88.9059	40 +4 Zr 343.823 91.22	41 +3 +5 Nb 309.418 92.9064	42 +6 Mo 202.030 95.94	43 +4 +6 +7 Tc 98	44 +3 Ru 240.272 101.07	45 +3 Rh 233.477 102.9055	46 +2 +4 Pd 340.458 106.4	47 +1 Ag 328.068 107.868	48 +2 Cd 214.438 112.41	49 +3 In 230.606 114.82	50 +2 +4 Sn .989 118.69	51 +2 +4 −3 Sb 217.581 121.75	52 +4 +6 −2 Te 214.281 127.60	53 +1 +5 +7 −1 I 126.9045	54 0 Xe 131.30
55 +1 Cs 452.675 132.9054	56 +2 Ba 233.527 137.33	57* +3 La 379.083 138.9055	72 +4 Hf 277.336 178.49	73 +5 Ta 226.230 180.947$_3$	74 +6 W 207.911 183.85	75 +4 +6 +7 Re 197.313 186.207	76 +3 +4 Os 190.2	77 +3 +4 Ir 224.268 192.22	78 +2 +4 Pt 214.423 195.09	79 +1 +3 Au 242.795 196.9665	80 +1 +2 Hg 194.232 200.59	81 +1 +3 Tl 351.924 204.37	82 +2 +4 Pb 220.353 207.2	83 +3 +5 Bi 223.061 208.9804	84 +2 +4 Po (209)	85 At (210)	86 0 Rn (222)
87 +1 Fr (223)	88 +2 Ra 226.0254	89** +3 Ac (227)															

*Lanthanides	58 +3 +4 Ce 413.765 140.12	59 +3 Pr 390.844 140.9077	60 +3 Nd 401.225 144.24	61 +3 Pm (145)	62 +2 +3 Sm 359.260 150.4	63 +2 +3 Eu 381.967 151.96	64 +3 Gd 342.247 157.25	65 +3 Tb 350.917 158.9254	66 +3 Dy 353.170 162.50	67 +3 Ho 345.600 164.9304	68 +3 Er 337.271 167.26	69 +3 Tm 313.126 168.9342	70 +2 +3 Yb 328.937 173.04	71 +3 Lu 261.542 174.967
**Actinides	90 +4 Th 283.730 232.0381	91 +5 +4 Pa 231.0359	92 +3 +4 +5 +6 U 385.958 238.029	93 +3 +4 +5 +6 Np 237.0482	94 +3 +4 +5 +6 Pu (244)	95 +3 +4 +5 +6 Am (243)	96 +3 Cm (247)	97 +3 +4 Bk (247)	98 +3 Cf (251)	99 +3 Es (254)	100 +3 Fm (257)	101 +2 +3 Md (258)	102 +2 +3 No (259)	103 +3 Lr (262)

Transition Elements

Group 8

Conversion Table

1 microgram (µg) = 1 X 10^{-6} grams (g)

1 milligram (mg) = 0.001 grams (g)

1 kilogram (kg) = 1000 grams (g) = 2.205 lbs.

1 pound (lb) = 453.59237 grams (g)

1 milliliter (mL) = 0.001 Liters (L)

1 Liter (L) = 1000 milliliters (mL)

1 Liter (L) = 0.26417205 gallons (gal)

1 gallon (gal) = 3.7854118 Liters (L)

1 mg/L = 1 part per million (ppm) = 1 µg/g*

1 µg/L = 1 part per billion (ppb)

1 mg/mL = 1000 ppm = 1 mg/g*

1 mg/L = 1 ppm = 1000 ppb

1 ppb = 0.001 ppm = 1000 ppt

1 ppt = 0.001 ppb = 1 X 10^{-6} ppm

10,000 ppm of metal =
10 g of metal/L = 1% of metal

1000 ppm of metal =
1 g of metal/L = 0.1% of metal

100 ppm of metal =
0.1 g of metal/L = 0.01% of metal

**By weight*