

# INORGANIC

## CERTIFIED REFERENCE MATERIALS (CRMS) AND CALIBRATION STANDARDS

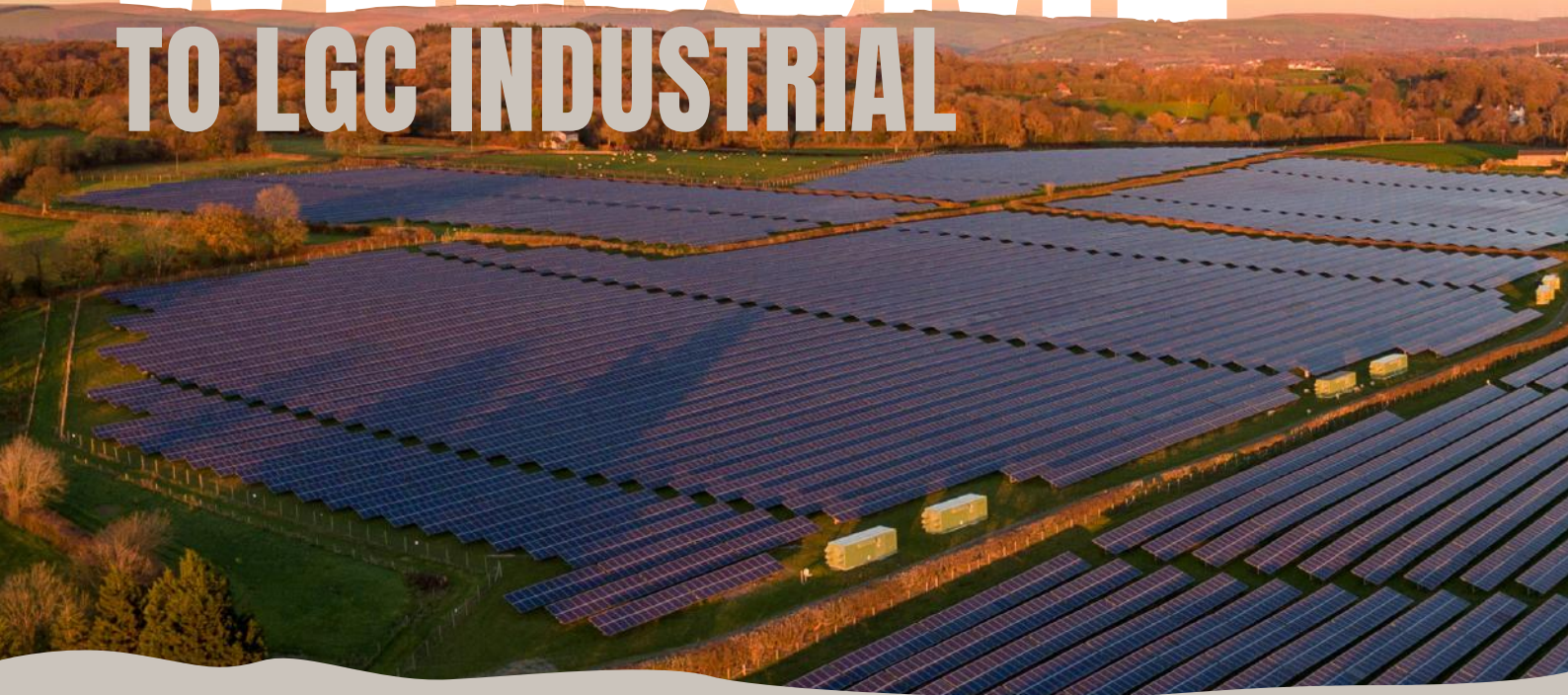
**The Material Difference**

[lgcstandards.com/VHGAqueousInorganic](https://lgcstandards.com/VHGAqueousInorganic)

LGC Quality | ISO 17043 | ISO 17034 | ISO/IEC 17025 | ISO 9001

**Industrial**  
VHG | ARMI | MBH  
Paragon Scientific

# WELCOME TO LGC INDUSTRIAL



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## **LGC Industrial Catalog of Inorganic Certified Reference Materials (CRMs) and Calibration Standards**

Welcome to our full selection of LGC Industrial brand high-purity single and multi-element inorganic standards, CRMs, and instrument solutions for spectrochemical analysis, IC, wet chemistry techniques, and QC applications.

You've trusted us for decades to create superior reference materials and innovative measurement tools that support the quality of your analyses.

Leveraging the synergies of the LGC Industrial product lines, we are joining together VHG, ARMI, MBH, and

Paragon Scientific under a single brand; Industrial. Building on our collective expertise, Industrial fosters the innovation and the agility necessary to create the measurement tools you rely on when developing, using, and transforming materials to achieve your mission.

LGC Industrial – The Material Difference.



## Section 1

# Inorganic Standards

### A+ Single Element CRMs

You require the highest level of accuracy possible in your analysis. LGC Industrial A+ Single Element Standards™ deliver exactly that, so you can have absolute confidence when you need it most.

### Multi-Element Standards

The LGC Industrial Multi-Element Aqueous Inorganic offerings are formulated from our A+ Single Element Standards™ and thus provide you the same high quality, traceability, and dependability. LGC Industrial Multi-Element Standards are designed for use as calibration solutions, fortifying solutions, control checks, interference checks, and tuning solutions suitable for use with spectroscopic techniques. The portfolio also includes a suite of pre-configured environmental standards.



## **Additional Aqueous Inorganic Standards**

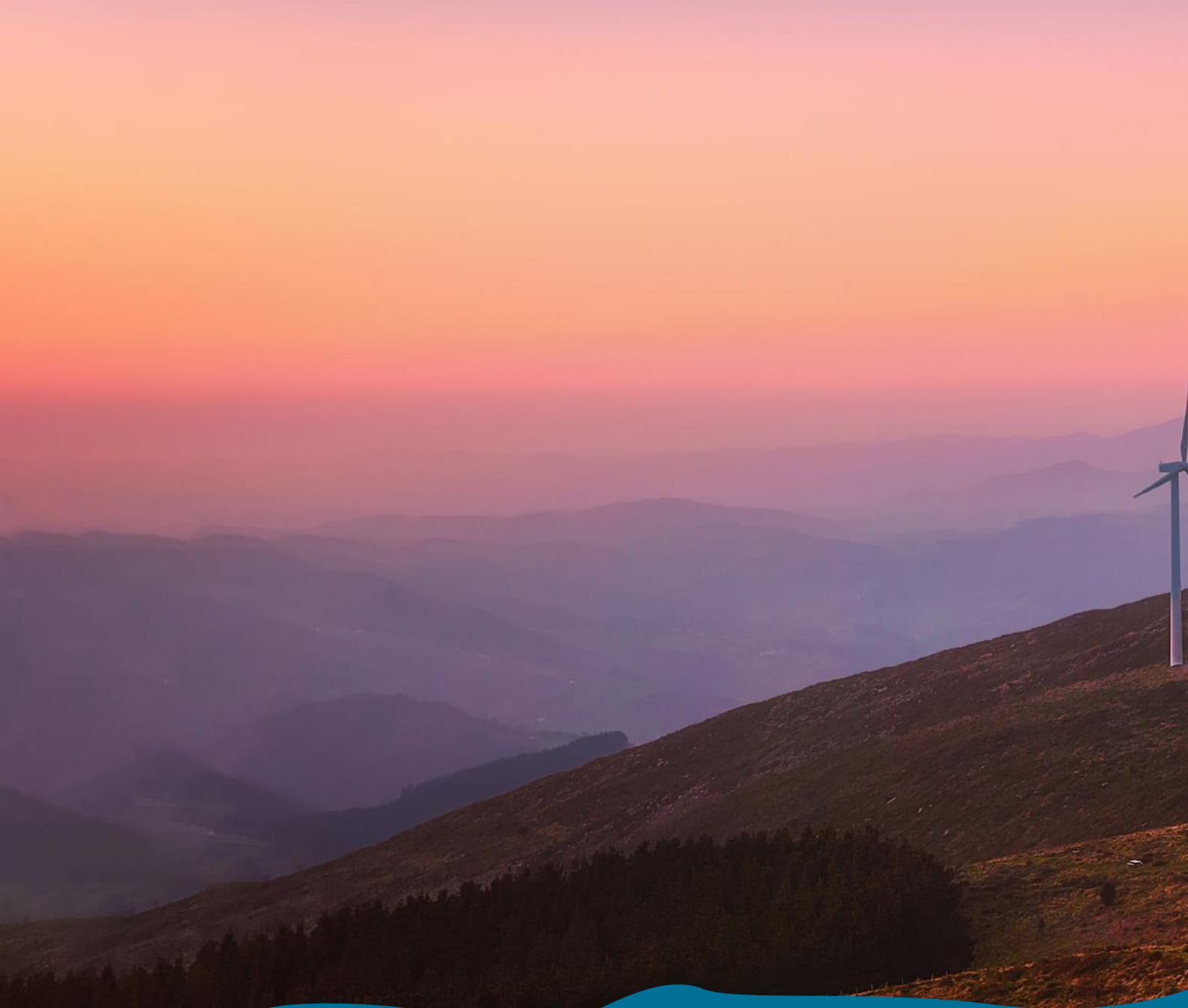
For needs relating to a specific technique, turn to the LGC Industrial range of standards for ICP/ICP-MS, AA, IC, elemental speciation, and isotope analysis. You will also find our pH buffer reference materials in the LGC Industrial line of wet chemistry standards.

## **Custom Standards**

Your requirements are unique. In LGC Industrial you have a partner who specializes in custom mixtures, and has the ISO accreditations that ensure the quality of the custom standards you receive. Our experts are ready to discuss how we can meet your specific needs.

## **About LGC Standards**

Headquartered in Teddington, UK, LGC Standards' network of dedicated sales offices extends across 20 countries on five continents. Our unparalleled breadth of reference materials are the result of decades of expertise and experience, and are produced in facilities accredited to ISO 17034 in sites across the UK, the U.S., Germany and China. In addition to our aqueous inorganic line, we manufacture CRMs and reference materials for the petroleum, pharmaceutical, forensic, clinical, food, beverage, cannabis, environmental, pesticide and contaminants sectors. LGC Standards provides proficiency testing schemes in support of these sectors, as well as others, to more than 12,000 laboratories worldwide.



## Industries Served

The LGC Industrial Aqueous Inorganic product portfolio serves many scientific industries. We strive to provide both standard products as well as custom mixtures to serve your lab's specific needs. Some of the key markets we operate in include:

- Nuclear & Power
- Pharmaceutical
- Food, Beverage & Environment
- Material Testing
- Mining & Metallurgy
- Research & Consumer Safety



## Common Applications

LGC Industrial CRMs and reference materials are designed to meet the unique application needs of many industries.

### Common applications include:

- Elemental Analysis
- Instrument Start Up & Calibration
- Materials Analysis
- Ore Testing
- Consumer Safety Analysis, including USP <232>
- Trace Impurity Analysis for Semiconductor Industry
- Ion Analysis
- QC Check Samples
- Inorganic Contaminant Analysis
- Water Quality Analysis
- Classical Wet Chemistry Analysis

## Section 1

## Single Element Standards™

Element	Matrix	Size (mL)	Product No. (10 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Aluminum (Al)	HCl	100	VHG-LALH-100	VHG-PALH-100	VHG-TALH-100
		250		VHG-PALH-250	VHG-TALH-250
		500		VHG-PALH-500	VHG-TALH-500
	HNO <sub>3</sub>	100	VHG-LALN-100	VHG-PALN-100	VHG-TALN-100
		250		VHG-PALN-250	VHG-TALN-250
		500		VHG-PALN-500	VHG-TALN-500
Antimony (Sb)	HCl	100	VHG-LSBH-100	VHG-PSBH-100	VHG-TSBH-100
		250		VHG-PSBH-250	VHG-TSBH-250
		500	VHG-LSBH-500	VHG-PSBH-500	VHG-TSBH-500
	HNO <sub>3</sub> , Tartaric Acid	100	VHG-LSBWTN-100	VHG-PSBWTN-100	VHG-TSBWTN-100
		250		VHG-PSBWTN-250	VHG-TSBWTN-250
		500	VHG-LSBWTN-500	VHG-PSBWTN-500	VHG-TSBWTN-500
Arsenic (As)	HNO <sub>3</sub>	100	VHG-LASN-100	VHG-PASN-100	VHG-TASN-100
		250		VHG-PASN-250	VHG-TASN-250
		500	VHG-LASN-500	VHG-PASN-500	VHG-TASN-500
Barium (Ba)	HNO <sub>3</sub>	100	VHG-LBAN-100	VHG-PBAN-100	VHG-TBAN-100
		250		VHG-PBAN-250	VHG-TBAN-250
		500		VHG-PBAN-500	VHG-TBAN-500
"Beryllium (Be)"	HNO <sub>3</sub>	100	VHG-LBEN-100	VHG-PBEN-100	VHG-TBEN-100
		250		VHG-PBEN-250	VHG-TBEN-250
		500	VHG-LBEN-500	VHG-PBEN-500	VHG-TBEN-500
Bismuth (Bi)	HNO <sub>3</sub>	100	VHG-LBIN-100	VHG-PBIN-100	VHG-TBIN-100
		250		VHG-PBIN-250	VHG-TBIN-250
		500		VHG-PBIN-500	VHG-TBIN-500
Boron (B)	NH <sub>4</sub> OH	100	VHG-LBZ-100	VHG-PBZ-100	VHG-TBZ-100
		250		VHG-PBZ-250	VHG-TBZ-250
		500		VHG-PBZ-500	VHG-TBZ-500
	H <sub>2</sub> O	100	VHG-LBW-100	VHG-PBW-100	
		250		VHG-PBW-250	
		500		VHG-PBW-500	
Cadmium (Cd)	HNO <sub>3</sub>	100	VHG-LCDN-100	VHG-PCDN-100	VHG-TCDN-100
		250		VHG-PCDN-250	VHG-TCDN-250
		500	VHG-LCDN-500	VHG-PCDN-500	VHG-TCDN-500
Calcium (Ca)	HNO <sub>3</sub>	100		VHG-PCAN-100	VHG-TCAN-100
		250		VHG-PCAN-250	VHG-TCAN-250
		500		VHG-PCAN-500	VHG-TCAN-500

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## Section 1: A+ Single Element Standards™

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Element	Matrix	Size (mL)	Product No. (10 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Cerium (Ce)	HNO <sub>3</sub>	100		VHG-PCEN-100	VHG-TCEN-100
		250		VHG-PCEN-250	VHG-TCEN-250
		500		VHG-PCEN-500	VHG-TCEN-500
Cesium (Cs)	HNO <sub>3</sub>	100		VHG-PCSN-100	VHG-TCSN-100
		250		VHG-PCSN-250	VHG-TCSN-250
		500		VHG-PCSN-500	VHG-TCSN-500
Chromium (Cr)	HCl	100		VHG-PCRH-100	VHG-TCRH-100
		250		VHG-PCRH-250	VHG-TCRH-250
		500		VHG-PCRH-500	VHG-TCRH-500
	HNO <sub>3</sub>	100	VHG-LCRN-100	VHG-PCRN-100	VHG-TCRN-100
		250		VHG-PCRN-250	VHG-TCRN-250
		500	VHG-LCRN-500	VHG-PCRN-500	VHG-TCRN-500
Cobalt (Co)	HNO <sub>3</sub>	100	VHG-LCON-100	VHG-PCON-100	VHG-TCON-100
		250		VHG-PCON-250	VHG-TCON-250
		500		VHG-PCON-500	VHG-TCON-500
Copper (Cu)	HNO <sub>3</sub>	100	VHG-LCUN-100	VHG-PCUN-100	VHG-TCUN-100
		250		VHG-PCUN-250	VHG-TCUN-250
		500		VHG-PCUN-500	VHG-TCUN-500
Dysprosium (Dy)	HNO <sub>3</sub>	100		VHG-PDYN-100	VHG-TDYN-100
		250		VHG-PDYN-250	VHG-TDYN-250
		500		VHG-PDYN-500	VHG-TDYN-500
Erbium (Er)	HNO <sub>3</sub>	100		VHG-PERN-100	VHG-TERN-100
		250		VHG-PERN-250	VHG-TERN-250
		500		VHG-PERN-500	VHG-TERN-500
Europium (Eu)	HNO <sub>3</sub>	100		VHG-PEUN-100	VHG-TEUN-100
		250		VHG-PEUN-250	VHG-TEUN-250
		500		VHG-PEUN-500	VHG-TEUN-500
Gadolinium (Gd)	HNO <sub>3</sub>	100		VHG-PGDN-100	VHG-TGDN-100
		250		VHG-PGDN-250	VHG-TGDN-250
		500		VHG-PGDN-500	VHG-TGDN-500
Gallium (Ga)	HNO <sub>3</sub> , tr. HCl	100		VHG-PGANH-100	VHG-TGANH-100
		250		VHG-PGANH-250	VHG-TGANH-250
		500		VHG-PGANH-500	VHG-TGANH-500
Germanium (Ge)	HNO <sub>3</sub> , tr. HF	100	VHG-LGENF-100	VHG-PGENF-100	VHG-TGENF-100
		250		VHG-PGENF-250	VHG-TGENF-250
		500		VHG-PGENF-500	VHG-TGENF-500
	H <sub>2</sub> O, tr. F <sup>-</sup>	100	VHG-LGEW-100	VHG-PGEW-100	
		250		VHG-PGEW-250	
		500		VHG-PGEW-500	

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## Section 1: A+ Single Element Standards™

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Element	Matrix	Size (mL)	Product No. (10 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Gold (Au)	HCl	100		VHG-PAUH-100	VHG-TAUH-100
		250		VHG-PAUH-250	VHG-TAUH-250
		500		VHG-PAUH-500	VHG-TAUH-500
Hafnium (Hf)	HCl	100		VHG-PHFH-100	VHG-THFH-100
		250		VHG-PHFH-250	VHG-THFH-250
		500		VHG-PHFH-500	VHG-THFH-500
Holmium (Ho)	HNO <sub>3</sub>	100		VHG-PHON-100	VHG-THON-100
		250		VHG-PHON-250	VHG-THON-250
		500		VHG-PHON-500	VHG-THON-500
Indium (In)	HNO <sub>3</sub>	100	VHG-LINN-100	VHG-PINN-100	VHG-TINN-100
		250		VHG-PINN-250	VHG-TINN-250
		500		VHG-PINN-500	VHG-TINN-500
Iridium (Ir)	HCl	100	VHG-LIRH-100	VHG-PIRH-100	VHG-TIRH-100
		250		VHG-PIRH-250	VHG-TIRH-250
		500		VHG-PIRH-500	VHG-TIRH-500
Iron (Fe)	HNO <sub>3</sub>	100		VHG-PFEN-100	VHG-TFEN-100
		250		VHG-PFEN-250	VHG-TFEN-250
		500		VHG-PFEN-500	VHG-TFEN-500
Lanthanum (La)	HNO <sub>3</sub>	100		VHG-PLAN-100	VHG-TLAN-100
		250		VHG-PLAN-250	VHG-TLAN-250
		500		VHG-PLAN-500	VHG-TLAN-500
Lead (Pb)	HNO <sub>3</sub>	100	VHG-LPBN-100	VHG-PPBN-100	VHG-TPBN-100
		250		VHG-PPBN-250	VHG-TPBN-250
		500	VHG-LPBN-500	VHG-PPBN-500	VHG-TPBN-500
Lithium (Li)	HNO <sub>3</sub>	100	VHG-LLIN-100	VHG-PLIN-100	VHG-TLIN-100
		250		VHG-PLIN-250	VHG-TLIN-250
		500		VHG-PLIN-500	VHG-TLIN-500
Lutetium (Lu)	HNO <sub>3</sub>	100	VHG-LLUN-100	VHG-PLUN-100	VHG-TLUN-100
		250		VHG-PLUN-250	VHG-TLUN-250
		500		VHG-PLUN-500	VHG-TLUN-500
Magnesium (Mg)	HNO <sub>3</sub>	100		VHG-PMGN-100	VHG-TMGN-100
		250		VHG-PMGN-250	VHG-TMGN-250
		500		VHG-PMGN-500	VHG-TMGN-500
Manganese (Mn)	HNO <sub>3</sub>	100	VHG-LMNN-100	VHG-PMNN-100	VHG-TMNN-100
		250		VHG-PMNN-250	VHG-TMNN-250
		500	VHG-LMNN-500	VHG-PMNN-500	VHG-TMNN-500
Mercury (Hg)	HNO <sub>3</sub>	100	VHG-LHGN-100	VHG-PHGN-100	VHG-THGN-100
		250	VHG-LHGN-250	VHG-PHGN-250	VHG-THGN-250
		500	VHG-LHGN-500	VHG-PHGN-500	VHG-THGN-500

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## Section 1: A+ Single Element Standards™

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Element	Matrix	Size (mL)	Product No. (10 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Molybdenum (Mo)	HNO <sub>3</sub> , tr. HF	100	VHG-LMONF-100	VHG-PMONF-100	VHG-TMONF-100
		250		VHG-PMONF-250	VHG-TMONF-250
		500	VHG-LMONF-500	VHG-PMONF-500	VHG-TMONF-500
	NH <sub>4</sub> OH	100		VHG-PMOZ-100	VHG-TMOZ-100
		250		VHG-PMOZ-250	VHG-TMOZ-250
		500		VHG-PMOZ-500	VHG-TMOZ-500
Neodymium (Nd)	HNO <sub>3</sub>	100		VHG-PNDN-100	VHG-TNDN-100
		250		VHG-PNDN-250	VHG-TNDN-250
		500		VHG-PNDN-500	VHG-TNDN-500
Nickel (Ni)	HNO <sub>3</sub>	100	VHG-LNIN-100	VHG-PNIN-100	VHG-TNIN-100
		250		VHG-PNIN-250	VHG-TNIN-250
		500	VHG-LNIN-500	VHG-PNIN-500	VHG-TNIN-500
Niobium (Nb)	HF	100		VHG-PNBF-100	VHG-TNBF-100
		250		VHG-PNBF-250	VHG-TNBF-250
		500		VHG-PNBF-500	VHG-TNBF-500
Osmium (Os)	HCl	100	VHG-LOSH-100	VHG-POSH-100	
		250	VHG-LOSH-250	VHG-POSH-500	
		500		VHG-POSH-250	
Palladium (Pd)	HCl	100		VHG-PPDH-100	VHG-TPDH-100
		250		VHG-PPDH-250	VHG-TPDH-250
		500		VHG-PPDH-500	VHG-TPDH-500
	HNO <sub>3</sub>	100		VHG-PPDN-100	VHG-TPDN-100
		250		VHG-PPDN-250	VHG-TPDN-250
		500		VHG-PPDN-500	VHG-TPDN-500
Phosphorus (P)	HNO <sub>3</sub>	100		VHG-PPN-100	VHG-TPN-100
		250		VHG-PPN-250	VHG-TPN-250
		500		VHG-PPN-500	VHG-TPN-500
Platinum (Pt)	HCl	100	VHG-LPTH-100	VHG-PPTH-100	VHG-TPTH-100
		250		VHG-PPTH-250	VHG-TPTH-250
		500	VHG-LPTH-500	VHG-PPTH-500	VHG-TPTH-500
Potassium (K)	HNO <sub>3</sub>	100		VHG-PKN-100	VHG-TKN-100
		250		VHG-PKN-250	VHG-TKN-250
		500		VHG-PKN-500	VHG-TKN-500
Praseodymium (Pr)	HNO <sub>3</sub>	100		VHG-PPRN-100	VHG-TPRN-100
		250		VHG-PPRN-250	VHG-TPRN-250
		500		VHG-PPRN-500	VHG-TPRN-500
Rhenium (Re)	HNO <sub>3</sub>	100		VHG-PREN-100	VHG-TREN-100
		250		VHG-PREN-250	VHG-TREN-250
		500		VHG-PREN-500	VHG-TREN-500

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## Section 1: A+ Single Element Standards™

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Element	Matrix	Size (mL)	Product No. (10 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Rhodium (Rh)	HCl	100	VHG-LRHH-100	VHG-PRHH-100	VHG-TRHH-100
		250	VHG-LRHH-250	VHG-PRHH-250	VHG-TRHH-250
		500		VHG-PRHH-500	VHG-TRHH-500
Rubidium (Rb)	HNO <sub>3</sub>	100		VHG-PRBN-100	VHG-TRBN-100
		250		VHG-PRBN-250	VHG-TRBN-250
		500		VHG-PRBN-500	VHG-TRBN-500
Ruthenium (Ru)	HCl	100		VHG-PRUH-100	VHG-TRUH-100
		250		VHG-PRUH-250	VHG-TRUH-250
		500		VHG-PRUH-500	VHG-TRUH-500
Samarium (Sm)	HNO <sub>3</sub>	100		VHG-PSMN-100	VHG-TSMN-100
		250		VHG-PSMN-250	VHG-TSMN-250
		500		VHG-PSMN-500	VHG-TSMN-500
Scandium (Sc)	HNO <sub>3</sub>	100	VHG-LSCN-100	VHG-PSCN-100	VHG-TSCN-100
		250		VHG-PSCN-250	VHG-TSCN-250
		500		VHG-PSCN-500	VHG-TSCN-500
Selenium (Se)	HNO <sub>3</sub>	100	VHG-LSEN-100	VHG-PSEN-100	VHG-TSEN-100
		250		VHG-PSEN-250	VHG-TSEN-250
		500		VHG-PSEN-500	VHG-TSEN-500
Silicon (Si)	H <sub>2</sub> O, tr. F <sup>-</sup>	100		VHG-PSIW-100	VHG-TSIW-100
		250		VHG-PSIW-250	VHG-TSIW-250
		500		VHG-PSIW-500	VHG-TSIW-500
Silver (Ag)	HNO <sub>3</sub>	100	VHG-LAGN-100	VHG-PAGN-100	VHG-TAGN-100
		250		VHG-PAGN-250	VHG-TAGN-250
		500	VHG-LAGN-500	VHG-PAGN-500	VHG-TAGN-500
Sodium (Na)	HNO <sub>3</sub>	100		VHG-PNAN-100	VHG-TNAN-100
		250		VHG-PNAN-250	VHG-TNAN-250
		500		VHG-PNAN-500	VHG-TNAN-500
Strontium (Sr)	HNO <sub>3</sub>	100	VHG-LSRN-100	VHG-PSRN-100	VHG-TSRN-100
		250		VHG-PSRN-250	VHG-TSRN-250
		500		VHG-PSRN-500	VHG-TSRN-500
Sulfur (S)	H <sub>2</sub> O	100		VHG-PSW-100	VHG-TSW-100
		250		VHG-PSW-250	VHG-TSW-250
		500		VHG-PSW-500	VHG-TSW-500
Tantalum (Ta)	HF	100		VHG-PTAF-100	VHG-TTAF-100
		250		VHG-PTAF-250	VHG-TTAF-250
		500		VHG-PTAF-500	VHG-TTAF-500

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**Section 1: A+ Single Element Standards™**

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Element	Matrix	Size (mL)	Product No. (10 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Tellurium (Te)	HCl	100		VHG-PTEH-100	VHG-TTEH-100
		250		VHG-PTEH-250	VHG-TTEH-250
		500		VHG-PTEH-500	VHG-TTEH-500
	HNO <sub>3</sub>	100		VHG-PTEN-100	
		250		VHG-PTEN-250	
		500		VHG-PTEN-500	
Terbium (Tb)	HNO <sub>3</sub>	100	VHG-LTBN-100	VHG-PTBN-100	VHG-TTBN-100
		250		VHG-PTBN-250	VHG-TTBN-250
		500		VHG-PTBN-500	VHG-TTBN-500
Thallium (Tl)	HNO <sub>3</sub>	100		VHG-PTLN-100	VHG-TTLN-100
		250		VHG-PTLN-250	VHG-TTLN-250
		500		VHG-PTLN-500	VHG-TTLN-500
Thorium (Th)	HNO <sub>3</sub>	100		VHG-PTHN-100	VHG-TTHN-100
		250		VHG-PTHN-250	VHG-TTHN-250
		500		VHG-PTHN-500	VHG-TTHN-500
Thulium (Tm)	HNO <sub>3</sub>	100		VHG-PTMN-100	VHG-TTMN-100
		250		VHG-PTMN-250	VHG-TTMN-250
		500		VHG-PTMN-500	VHG-TTMN-500
Tin (Sn)	HCl	100	VHG-LSNH-100	VHG-PSNH-100	VHG-TSNH-100
		250		VHG-PSNH-250	VHG-TSNH-250
		500		VHG-PSNH-500	VHG-PSNH-500
	HNO <sub>3</sub> , tr. HF	100	VHG-LSNNF-100	VHG-PSNNF-100	VHG-TSNNF-100
		250		VHG-PSNNF-250	VHG-TSNNF-250
		500		VHG-PSNNF-500	VHG-TSNNF-500
Titanium (Ti)	HNO <sub>3</sub> , tr. HF	100	VHG-LTINF-100	VHG-PTINF-100	VHG-TTINF-100
		250		VHG-PTINF-250	VHG-TTINF-250
		500		VHG-PTINF-500	VHG-TTINF-500
	H <sub>2</sub> O, tr. F <sup>-</sup>	100		VHG-PTIW-100	VHG-TTIW-100
		250		VHG-PTIW-250	VHG-TTIW-250
		500		VHG-PTIW-500	VHG-TTIW-500
Tungsten (W)	HNO <sub>3</sub> , tr. HF	100		VHG-PWNF-100	VHG-TWNF-100
		250		VHG-PWNF-250	VHG-TWNF-250
		500		VHG-PWNF-500	VHG-TWNF-500
	H <sub>2</sub> O	100		VHG-PWW-100	VHG-TWW-100
		250		VHG-PWW-250	VHG-TWW-250
		500		VHG-PWW-500	VHG-TWW-500
Uranium (U)	HNO <sub>3</sub>	100	VHG-LUN-100	VHG-PUN-100	VHG-TUN-100
		250		VHG-PUN-250	VHG-TUN-250
		500		VHG-PUN-500	VHG-TUN-500

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## Section 1: A+ Single Element Standards™

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Element	Matrix	Size (mL)	Product No. (10 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Vanadium (V)	HNO <sub>3</sub>	100	VHG-LVN-100	VHG-PVN-100	VHG-TVN-100
		250		VHG-PVN-250	VHG-TVN-250
		500		VHG-PVN-500	VHG-TVN-500
Ytterbium (Yb)	HNO <sub>3</sub>	100		VHG-PYBN-100	VHG-TYBN-100
		250		VHG-PYBN-250	VHG-TYBN-250
		500		VHG-PYBN-500	VHG-TYBN-500
Yttrium (Y)	HNO <sub>3</sub>	100	VHG-LYN-100	VHG-PYN-100	VHG-TYN-100
		250	VHG-LYN-250	VHG-PYN-250	VHG-TYN-250
		500		VHG-PYN-500	VHG-TYN-500
Zinc (Zn)	HNO <sub>3</sub>	100	VHG-LZNN-100	VHG-PZNN-100	VHG-TZNN-100
		250		VHG-PZNN-250	VHG-TZNN-250
		500	VHG-LZNN-500	VHG-PZNN-500	VHG-TZNN-500
Zirconium (Zr)	HCl	100		VHG-PZRH-100	VHG-TZRH-100
		250		VHG-PZRH-250	VHG-TZRH-250
		500		VHG-PZRH-500	VHG-TZRH-500
	HNO <sub>3</sub>	100		VHG-PZRN-100	VHG-TZRN-100
		250		VHG-PZRN-250	VHG-TZRN-250
		500		VHG-PZRN-500	VHG-TZRN-500

## Section 1

# Internal Standard Stock Solutions

These standards serve as a reference that can be used to correct for any variability between calibration standards and your sample, significantly improving the accuracy of your data.

Single Element Internal Standards					
Element	Symbol	Conc. (µg/mL)	Matrix	Size (mL)	Product No.
Lithium-6	<sup>6</sup> Li	100	2% HNO <sub>3</sub>	100	VHG-LISC6LI-100
Lithium-6	<sup>6</sup> Li	10	2% HNO <sub>3</sub>	100	VHG-LISA6LI-100
Bismuth	Bi	100	2% HNO <sub>3</sub>	100	VHG-LISBI100-100
Bismuth	Bi	10	2% HNO <sub>3</sub>	100	VHG-LISABI-100
Cobalt	Co	10	2% HNO <sub>3</sub>	100	VHG-LISACO-100
Germanium	Ge	100	2% HNO <sub>3</sub>	100	VHG-LISGE100-100
Germanium	Ge	10	2% HNO <sub>3</sub> , tr. F <sup>-</sup>	100	VHG-LISAGE-100
Indium	In	100	2% HNO <sub>3</sub>	100	VHG-LISIN100-100
Indium	In	10	2% HNO <sub>3</sub>	100	VHG-LISAIN-100
Iridium	Ir	10	2% HCl	100	VHG-LISAIR-100
Lutetium	Lu	10	2% HNO <sub>3</sub>	100	VHG-LISALU-100
Platinum	Pt	10	5% HCl	100	VHG-LISAPT-100
Rhodium	Rh	10	2% HCl	100	VHG-LISARH-100
Scandium	Sc	100	2% HNO <sub>3</sub>	100	VHG-LISSCI100-100
Scandium	Sc	10	2% HNO <sub>3</sub>	100	VHG-LISASC-100
Terbium	Tb	100	2% HNO <sub>3</sub>	100	VHG-LISTB100-100
Terbium	Tb	10	2% HNO <sub>3</sub>	100	VHG-LISATB-100
Yttrium	Y	100	2% HNO <sub>3</sub>	100	VHG-LISY100-100
Yttrium	Y	10	2% HNO <sub>3</sub>	100	VHG-LISAY-100

## Section 2

# Calibration & QC Control

Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.
Alkalis & Alkaline Earths	Ba, Be, Ca, Cs, K, Li, Mg, Na, Rb, Sr	100	5% HNO <sub>3</sub>	100	VHG-SM10-100
				500	VHG-SM10-500
Refractory Elements	Al, B, Cr, Hf, Mo, Nb, Si, Ta, Ti, V, W, Zr	100	5% HCl, tr. HF	100	VHG-SM30A-100
				500	VHG-SM30A-500
Noble Metals	Au, Ir, Os, Pd, Pt, Re, Rh, Ru	100	20% HCl	100	VHG-SM40-100
				500	VHG-SM40-500
Metalloids / Hydride Elements	As, Bi, Ga, Ge, In, Pb, Sb, Se, Sn, Te, Tl	100	20% HCl, tr. HF	100	VHG-SM50B-100
				500	VHG-SM50B-500
Rare Earth and 'Geo' Elements	Ba, Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Rb, Sc, Sm, Sr, Tb, Th, Tm, U, Y, Yb	100	5% HNO <sub>3</sub>	100	VHG-SM60A-100
				500	VHG-SM60A-500
Non-Metals	As, B, P, S, Se, Si, Te	100	5% HCl, tr. HF	100	VHG-SM25A-100
				500	VHG-SM25A-500
Major Cations Mix	Al, Ca, Fe, K, Mg, Na	1,000	5% HNO <sub>3</sub>	100	VHG-SM16-100
				500	VHG-SM16-500
Common Elements Mix 1	Cd, Co, Cr, Cu, Fe, Mn, Ni, V, Zn	100	5% HNO <sub>3</sub>	100	VHG-SM35A-100
				500	VHG-SM35A-500
Common Elements Mix 2	Ag, Al, B, Ca, Co, Cr, Cu, Fe, K, Mg, Mn, Na, Ni, P, Pb, Si, Sn, Ti, V, Zn	100	5% HNO <sub>3</sub> , tr. HF	100	VHG-SM70B-100
				500	VHG-SM70B-500
Common & Transition – Multi Conc.	Ag, Al, As, Ba, Be, Bi, Cd, Cr, Co, Cu, Fe, Li, Mn, Mo, Ni, Pb, Sb, Se, Sr, Tl, V, Zn	100	5% HNO <sub>3</sub> , 0.2% HF	100	VHG-SM75B-100
	Ca, K, Mg, Na	1,000		500	VHG-SM75B-500
Comprehensive Mix A	Ag, Al, As, Ba, Bi, Ca, Cd, Ce, Dy, Er, Eu, Ga, Gd, Ho, La, Lu, Mg, Na, Nd, P, Pb, Pr, Rb, Sc, Se, Sm, Sr, Tb, Th, Tl, Tm, U, Y, Yb	10	40% Aqua Regia	100	VHG-SM80C-100
				500	VHG-SM80C-500
Comprehensive Mix B	Au, B, Be, Co, Cr, Cu, Fe, Ge, Hf, Ir, K, Li, Mn, Mo, Nb, Ni, Os, Pd, Pt, Re, Rh, Ru, Sb, Si, Sn, Ta, Te, Ti, V, W, Zn, Zr	10	40% Aqua Regia, tr. HF	100	VHG-SM90C-100
				500	VHG-SM90C-500
68 Element Multi Standard 1 (48 elements in Std. 1)	Al, As, B, Ba, Be, Bi, Ca, Cd, Ce, Co, Cr, Cs, Cu, Dy, Er, Eu, Fe, Ga, Gd, Ho, In, K, La, Li, Lu, Mg, Mn, Na, Nd, Ni, P, Pb, Pr, Rb, Re, Sc, Se, Sm, Sr, Tb, Th, Tl, Tm, U, V, Y, Yb, Zn	100	5% HNO <sub>3</sub>	100	VHG-SM68-1-100
				500	VHG-SM68-1-500
68 Element Multi Standard 2 (12 elements in Std. 2)	Ag, Ge, Hf, Mo, Nb, Sb, Si, Sn, Ta, Ti, W, Zr	100	5% HNO <sub>3</sub> , tr. HF	100	VHG-SM68-2-100
				500	VHG-SM68-2-500
68 Element Multi Standard 3 (8 elements in Std. 3)	Au, Ir, Os, Pd, Pt, Rh, Ru, Te	100	10% HCl	100	VHG-SM68-3-100
				500	VHG-SM68-3-500

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## Section 2: Calibration & QC Control

Continued from previous page

Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.
23 Element Standard	Ag, Al, B, Ba, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Li, Mg, Mn, Na, Ni, Pb, Sr, Tl, Zn	1,000	2% HNO <sub>3</sub>	100	VHG-SM23-2-100
				500	VHG-SM23-2-500
24 Element Standard	Ag, Al, B, Ba, Ca, Cd, Cr, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Si, Sn, Ti, V, Zn	100	5% HNO <sub>3</sub> , tr. HF	100	VHG-SM24-100
US EPA 23 Metals	Ag, Al, As, Ba, Be, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, Pb, Sb, Se, Tl, V, Zn	100	5% HNO <sub>3</sub> , tr. Tartaric Acid, tr. HF	100	VHG-SM23-100
				500	VHG-SM23-500
US EPA RCRA Elements	Ag, As, Ba, Cd, Cr, Hg, Pb, Se	100	5% HNO <sub>3</sub>	100	VHG-SM45-100
				500	VHG-SM45-500
QC Standard '7'	Ag, Al, B, Ba, Na	100	5% HNO <sub>3</sub> , tr. F <sup>-</sup>	100	VHG-QC7-100
	K	1,000		500	VHG-QC7-500
	Si	50			
QC Standard '7A'	Al, B, Ba, Na	100	5% HNO <sub>3</sub> , tr. F <sup>-</sup>	100	VHG-QC7A-100
	Ag	50		500	VHG-QC7A-500
	Si	500			
	K	1,000			
QC Standard '19'	As, Be, Ca, Cd, Co, Cr, Cu, Fe, Mg, Mn, Mo, Ni, Pb, Sb, Se, Ti, Tl, V, Zn	100	5% HNO <sub>3</sub> , tr. F <sup>-</sup> , tr. Tartaric Acid	100	VHG-QC19-100
				500	VHG-QC19-500
QC Standard '20'	Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Th, Tl, U, V, Zn	10	5% HNO <sub>3</sub> , tr. F <sup>-</sup> , tr. Tartaric Acid	100	VHG-ISQC20-100
				500	VHG-ISQC20-500
QC Standard '21'	As, Be, Ca, Cd, Co, Cr, Cu, Fe, Li, Mg, Mn, Mo, Ni, Pb, Sb, Se, Sr, Ti, Tl, V, Zn	100	5% HNO <sub>3</sub> , tr. F <sup>-</sup> , tr. Tartaric Acid	100	VHG-QC21-100
				500	VHG-QC21-500

# Wavelength Calibration & Related Solutions for ICP-OES

These products are designed to meet ICP instrument manufacturers' specifications.

Wavelength Calibration & Related Solutions						
Description	Elements	Conc. (µg/mL)	Size (mL)	Matrix	Product No.	Suitable for
Low UV Wave Cal Solution	Al, P, S	10	250	2% HNO <sub>3</sub>	VHG-ISUPE-LOW-250	PerkinElmer® ICP-OES
VIS Wave Cal Solution	Ba, Ca	1	250	2% HNO <sub>3</sub>	VHG-ISUPEVIS-250	PerkinElmer® ICP-OES: Optima® / Avio®
	La, Li, Mn, Na, Sr	10				
	K	50				
UV Wave Cal Solution	Ca	1	500	5% HCl	VHG-ISUPEUVW-500	PerkinElmer® ICP-OES: Optima® / Avio®
	As, La, Li, Mn, Mo, Na, Ni, Sc	20				
	K, P, S	100				
Multi-Element Setup Standard	Ba, Mg	1	500	2% HNO <sub>3</sub>	VHG-ISUPEOPTME-500	PerkinElmer® ICP-OES: Optima®
	La, Li, Mn, Ni, Sr, Zn	10				
	As, K	50				
Instrument Check Standard 3	As, La, Li, Mn, Mo, Na, Ni, Sc	20	250	5% HCl	VHG-ISUPECHKSTD3-250	PerkinElmer® ICP-OES
	K, P, S	100				
Instrument Calibration Standard 4	Cd, Pb, Se	50	100	5% HNO <sub>3</sub>	VHG-ISUPECAL4-100	PerkinElmer® ICP-OES: Optima® / Avio®
	As, Tl	100				

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Wavelength Calibration & Related Solutions						
Description	Elements	Conc. (µg/mL)	Size (mL)	Matrix	Product No.	Suitable for
ICAL Solution	Ca	1	250	2% HNO <sub>3</sub> , 2% HCl	VHG-ISUSPCTICAL-250	Spectro ICP-OES: Genesis®, ARCOS®, Blue®
	Be, Li, Sr	2				
	Mn, Mo, Na, Sc	5				
	Ce, Cu, Eu, Fe, In, K, Ni, P, Si, Ti, V, Y, Zr	10				
	S	50				

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# Tuning & Mass Calibration Solutions for ICP-MS

These products are designed to meet ICP-MS instrument manufacturers' specifications. We offer an array of Concentrates and Ready-to-Use Concentration solutions

Suitable for use with all ICP-MS					
Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.
Tuning/ Mass Calibration Multi-Element Mix 1 (concentrate)	<sup>7</sup> Li, Y, Ce, Tl	10	5% HNO <sub>3</sub>	500	VHG-LMSTNG1-500
Tuning/ Mass Calibration Multi-Element Mix 1A (concentrate)	<sup>7</sup> Li, Co, Y, Ce, Tl	10	1% HNO <sub>3</sub> , 0.5% HCl	500	VHG-LMSTNG5CONC-500
Tuning/ Mass Calibration Multi-Element Mix 2 (concentrate)	Be, Mg, Co, In, Ce, Pb	10	1% HNO <sub>3</sub>	500	VHG-LMSTNG2Z-500
Tuning/ Mass Calibration Multi-Element Mix 3 (concentrate)	<sup>7</sup> Li, Be, Mg, Co, Y, In, Ba, Ce, Tb, Pb, U	10	5% HNO <sub>3</sub>	500	VHG-LMSTNG3Z-500

Suitable for use with Agilent® ICP-MS						
Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.	Suitable for
Tuning Solution (see composition)	Ce, Co, Li, Tl, Y	10	2% HNO <sub>3</sub>	100	VHG-LAGTSTK1-100	7500, 7700, 7800, 7900, 8800, 8900
Tuning Solution 2	Ce, Co, Li, Mg, Tl, Y	10	2% HNO <sub>3</sub>	100	VHG-LAGTSTK2-100	7500, 7700, 7800, 7900, 8800, 8900
Tuning Solution (see composition)	Ce, Co, Li, Mg, Tl, Y	1	2% HNO <sub>3</sub>	500	VHG-LMSTNG101-500	7500, 7700, 7800, 7900, 8800, 8900
Tuning Solution (see composition)	<sup>7</sup> Li, Co, Y, Ce, Tl	10	2% HNO <sub>3</sub>	500	VHG-LMSTNG5DIL-500	All

## Section 2: Calibration & QC Control

Suitable for use with PerkinElmer® ICP-MS						
Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.	Suitable for
"Tuning Solution (see composition)"	Be, Mg, Fe, Co, In, Ce, Pb, Th, U	1	2% HNO <sub>3</sub>	500	VHG-LMSTNG8-500	DRC, DRCII
	Ba	10				
Setup / Stability / Masscal Solution	Al, Cd, Ce, Cr, Cu, In, Mg, Mn, Pb, Rh, Th	1	0.5% HCl	500	VHG-LPEMCAL-500	E6100DRC, DRCII
	Ba	10				
Tuning Solution I	Ba, Be, Ce, Co, In, Li, Mg, Pb, Rh, Tl, U, Y	10	2% HNO <sub>3</sub> , 5% HCl	100	VHG-LPETSOLI-100	DRC, DRCII, NexION™
Product	Elements	Conc. (µg/L)	Matrix	Size (mL)	Product No.	Suitable for
Setup Solution	Be, Ce, Fe, In, Li, Mg, Pb, U	1	1% HNO <sub>3</sub>	500	VHG-LPENXSUSDIL-500	NexION™
KED Setup Solution	Ce	1	1% HNO <sub>3</sub>	250	VHG-LPENXKED-SUS-250	NexION™
	Co	10				
Setup Solution	Be, Ce, Fe, In, Li, Mg, Pb, U	10	1% HNO <sub>3</sub>	500	VHG-LPENXSUS-500	NexION™

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Suitable for use with Thermo Scientific™ ICP-MS						
Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.	Suitable for
Tuning Solution	<sup>7</sup> Li, Be, Mg, Co, In, Ba, Ce, Pb, Bi, U	10	2% HNO <sub>3</sub>	100	VHG-LMSTNG6-100	X-Series

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Suitable for use with Varian™ ICP-MS						
Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.	Suitable for
Tuning Solution	Be, Mg, Co, In, Ba, Ce, Tl, Pb, Th	250	2% HNO <sub>3</sub>	500	VHG-LMSTNG9-500	All models

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# Stability Solutions & Detector Calibration for ICP-MS

Accurate “cross calibration” is a requirement for establishing linearity of the detector. We offer a range of solutions suitable for this activity that were designed to meet instrument manufacturers’ specifications.

Stability Solutions						
Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.	Suitable for
Stability Solution	Cd, Cu, Mg, Pb	1	1% HNO <sub>3</sub>	500	VHG-LPENXSTB-500	Non-Cell ICP-MS: NexION™
Stability Solution	Cd, Cr, Fe, Mg, Pb	1	1% HNO <sub>3</sub>	500	VHG-LPENXCELL-500	Cell ICP-MS: NexION™
	Co, Cu, In, Se	10				

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Detector Calibration						
Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.	Suitable for
Dual Detector Solution	Al, Ba, Ce, Co, Cu, In, Li, Mg, Mn, Ni, Pb, Tb, U, Zn	200	2% HNO <sub>3</sub>	250	VHG-LSUSPENXDD-250	PerkinElmer® Cell ICP-MS: NexION™
P/A Tuning Mix 1	Tb, Y	2.5	20% HCl, tr. HF	100	VHG-LDPAI-100	Agilent® 7500, 7700, 7800, 7900, 8800, 8900
	<sup>6</sup> Li, Al, Bi, Ba, Co, Cr, Cu, In, Ir, Lu, Mn, Na, Th, Ti, Tl, Sc, Sr, U, V	5				
	Ge, Mg, Mo, Ni, Pb, Pd, Ru, Sb, Sn	10				
	As, Be, Cd, Zn	20				
P/A Tuning Solution 1	Y, Yb	2.5	2% HNO <sub>3</sub>	100	VHG-LAGPATSOL1-100	Agilent® 7500, 7700, 7800, 7900, 8800, 8900
	Al, Ba, Bi, Co, Cr, Cu, In, <sup>6</sup> Li, Lu, Mn, Na, Sc, Sr, Th, Tl, U, V	5				
	Mg, Ni, Pb	10				
	As, Be, Cd, Zn	20				
P/A Tuning Solution 2	Ir, Ti	5	10% HCl, 1% HNO <sub>3</sub> , tr. HF	100	VHG-LAGPATSOL2-100	Agilent® 7500, 7700, 7800, 7900, 8800, 8900
	Ge, Mo, Pd, Ru, Sb, Sn	10				

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## Multi-Element Internal Standards

Multi-Element Internal Standards					
Product	Elements	Conc. (µg/L)	Matrix	Size (mL)	Product No.
Internal Standard Multi-Element Mix 1	<sup>6</sup> Li, Bi, Ga, In, Sc, Tb, Y	100	5% HNO <sub>3</sub>	100	VHG-LIS1-100
Internal Standard Multi-Element Mix 2	Bi, Ga, In, Tb, Y	20	2% HNO <sub>3</sub>	100	VHG-LIS2-100
	<sup>6</sup> Li, Sc	100			
Internal Standard Multi-Element Mix 3	<sup>6</sup> Li, Bi, Ge, In, Lu, Sc, Tb	100	5% HNO <sub>3</sub> , tr. F <sup>-</sup>	100	VHG-LIS3-100
Internal Standard Multi-Element Mix 4	Bi, In, Tb	10	5% HNO <sub>3</sub> , tr. F <sup>-</sup>	100	VHG-LIS4-100
	Ge, Te	25			
	<sup>6</sup> Li, Sc	50			
Product	Elements	Conc. (µg/mL)	Matrix	Size (mL)	Product No.
ICP-MS Internal Standard Solution	Bi, Ge, In, <sup>6</sup> Li, Rh, Sc, Tb, Y	100	5% HNO <sub>3</sub> , tr. F <sup>-</sup>	100	VHG-LIS8-100
ICP-MS Internal Standard 7 Element Mix	Bi, Ge, <sup>6</sup> Li, In, Sc, Tb, Y	10	2% HNO <sub>3</sub>	100	VHG-LAGISTDMIX-100
ICP-MS Pharma & USP <232> Internal Standard Solution	Bi, Ga, In	100	5% HNO <sub>3</sub>	100	VHG-LIS9-100

## Section 3

# AA Single Element Standards

Product	Symbol	Conc. (µg/mL)	Matrix	Size (mL)	Product No.
Aluminum	Al	1,000	HCl	100	VHG-AAALH-100
				500	VHG-AAALH-500
Antimony	Sb	1,000	HCl	100	VHG-AASBH-100
				500	VHG-AASBH-500
Arsenic	As	1,000	HNO <sub>3</sub>	100	VHG-AAASN-100
				500	VHG-AAASN-500
Barium	Ba	1,000	HNO <sub>3</sub>	100	VHG-AABAN-100
				500	VHG-AABAN-500
Beryllium	Be	1,000	HNO <sub>3</sub>	100	VHG-AABEN-100
				500	VHG-AABEN-500
Bismuth	Bi	1,000	HNO <sub>3</sub>	100	VHG-AABIN-100
				500	VHG-AABIN-500
Boron	B	1,000	H <sub>2</sub> O	100	VHG-AABW-100
				500	VHG-AABW-500
Cadmium	Cd	1,000	HNO <sub>3</sub>	100	VHG-AACDN-100
				500	VHG-AACDN-500
Calcium	Ca	1,000	HNO <sub>3</sub>	100	VHG-AACAN-100
				500	VHG-AACAN-500
Chromium	Cr	1,000	HCl	100	VHG-AACRH-100
				500	VHG-AACRH-500
Cobalt	Co	1,000	HNO <sub>3</sub>	100	VHG-AACON-100
				500	VHG-AACON-500
Copper	Cu	1,000	HNO <sub>3</sub>	100	VHG-AACUN-100
				500	VHG-AACUN-500
Gold	Au	1,000	HCl	100	VHG-AAAUH-100
				500	VHG-AAAUH-500
Iron	Fe	1,000	HNO <sub>3</sub>	100	VHG-AAFEN-100
				500	VHG-AAFEN-500
Lead	Pb	1,000	HNO <sub>3</sub>	100	VHG-AAPBN-100
				500	VHG-AAPBN-500
Lithium	Li	1,000	HNO <sub>3</sub>	100	VHG-AALIN-100
				500	VHG-AALIN-500
Magnesium	Mg	1,000	HNO <sub>3</sub>	100	VHG-AAMGN-100
				500	VHG-AAMGN-500
Manganese	Mn	1,000	HNO <sub>3</sub>	100	VHG-AAMNN-100
				500	VHG-AAMNN-500

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### Section 3: AA Single Element Standards

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Product	Symbol	Conc. ( $\mu\text{g/mL}$ )	Matrix	Size (mL)	Product No.
Mercury	Hg	1,000	$\text{HNO}_3$	100	VHG-AAHGN-100
				500	VHG-AAHGN-500
Molybdenum	Mo	1,000	$\text{HNO}_3$ , tr. HF	100	VHG-AAMONF-100
				500	VHG-AAMONF-500
Nickel	Ni	1,000	$\text{HNO}_3$	100	VHG-AANIN-100
				500	VHG-AANIN-500
Palladium	Pd	1,000	HCl	100	VHG-AAPDH-100
				500	VHG-AAPDH-500
Platinum	Pt	1,000	HCl	100	VHG-AAPTH-100
				500	VHG-AAPTH-500
Potassium	K	1,000	$\text{HNO}_3$	100	VHG-AAKN-100
				500	VHG-AAKN-500
Selenium	Se	1,000	$\text{HNO}_3$	100	VHG-AASEN-100
				500	VHG-AASEN-500
Silicon	Si	1,000	$\text{H}_2\text{O}$ , tr. $\text{F}^-$	100	VHG-AASIW-100
				500	VHG-AASIW-500
Silver	Ag	1,000	$\text{HNO}_3$	100	VHG-AAAGN-100
				500	VHG-AAAGN-500
Sodium	Na	1,000	$\text{HNO}_3$	100	VHG-AANAN-100
				500	VHG-AANAN-500
Strontium	Sr	1,000	$\text{HNO}_3$	100	VHG-AASRN-100
				500	VHG-AASRN-500
Thallium	Tl	1,000	$\text{HNO}_3$	100	VHG-AATLN-100
				500	VHG-AATLN-500
Tin	Sn	1,000	HCl	100	VHG-AASNH-100
				500	VHG-AASNH-500
Titanium	Ti	1,000	$\text{HNO}_3$ , tr. HF	100	VHG-AATINF-100
				500	VHG-AATINF-500
Vanadium	V	1,000	$\text{HNO}_3$	100	VHG-AAVN-100
				500	VHG-AAVN-500
Zinc	Zn	1,000	$\text{HNO}_3$	100	VHG-AAZNN-100
				500	VHG-AAZNN-500



# Matrix Modifiers, Ionization Buffers & Releasing Agents

GFAA Matrix Modifiers			
Modifier	Matrix	Size (mL)	Product No.
Ammonium Phosphate	10% NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub> , 2% HNO <sub>3</sub>	100	VHG-MAP10P-100
Magnesium Nitrate	1% Mg(NO <sub>3</sub> ) <sub>2</sub> , 2% HNO <sub>3</sub>	100	VHG-MMGN1P-100
Nickel Nitrate	1% Ni(NO <sub>3</sub> ) <sub>2</sub> , 2% HNO <sub>3</sub>	100	VHG-MNIN1P-100
Palladium Nitrate	0.1% Pd, 5% HNO <sub>3</sub>	100	VHG-MPDNIK-100
	1% Pd, 10% HNO <sub>3</sub>	100	VHG-MPDN1P-A-100

Pre-Mixed GFAA Matrix Modifiers			
Modifier	Matrix	Size (mL)	Product No.
Palladium + Magnesium	750 µg/mL Pd & 500 µg/mL Mg(NO <sub>3</sub> ) <sub>2</sub> , 2% HNO <sub>3</sub>	250	VHG-MPM1-250
Palladium + Magnesium	1,000 µg/mL Pd & 600 µg/mL Mg(NO <sub>3</sub> ) <sub>2</sub> , 2% HNO <sub>3</sub>	250	VHG-MPM2-250
Ammonium Phosphate + Magnesium	10 mg/mL NH <sub>4</sub> H <sub>2</sub> PO <sub>4</sub> & 600 µg/mL Mg(NO <sub>3</sub> ) <sub>2</sub> , 2% HNO <sub>3</sub>	250	VHG-MPM3-250

Ionization Buffers			
Modifier	Matrix	Size (mL)	Product No.
Lithium Nitrate	1% Li (from carbonate), 5% HNO <sub>3</sub>	100	VHG-MLIN1P-100
Cesium Nitrate	1% Cs (from carbonate), 5% HNO <sub>3</sub>	100	VHG-MCSN1P-100

Lanthanum Releasing Agents			
Modifier	Matrix	Size (mL)	Product No.
Lanthanum Chloride	1% La (from oxide), 2% HCl	100	VHG-MLAH1P-100
Lanthanum Nitrate	1% La (from oxide), 5% HNO <sub>3</sub>	100	VHG-MLAN1P-100

## Section 4

## Single Ion Standards

Ion	Matrix	Size (mL)	Product No. (100 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Acetate $\text{CH}_3\text{CO}_2^-$	$\text{H}_2\text{O}$	100		VHG-IACET-100	
		500		VHG-IACET-500	
Bromate $\text{BrO}_3^-$	$\text{H}_2\text{O}$	100		VHG-IBRO3-100	
		500		VHG-IBRO3-500	
Bromide $\text{Br}^-$ (Raw material: $\text{NaBrO}_3$ )	$\text{H}_2\text{O}$	100		VHG-IBR-100	VHG-IIPBR-100
		500		VHG-IBR-500	VHG-IIPBR-500
Bromide $\text{Br}^-$ (Raw Material: $\text{KBr}$ )	$\text{H}_2\text{O}$	100			VHG-IIPABR-100
		500			VHG-IIPABR-500
Chlorate $\text{ClO}_3^-$	$\text{H}_2\text{O}$	100		VHG-ICLO3-100	
		500		VHG-ICLO3-500	
Chloride $\text{Cl}^-$ (Raw material: $\text{KCl}$ )	$\text{H}_2\text{O}$	100	VHG-ICL100-100	VHG-ICL1K-100	VHG-IIPCL-100
		500	VHG-ICL100-500	VHG-ICL1K-500	VHG-IIPCL-500
Chloride $\text{Cl}^-$ (Raw material: $\text{NH}_4\text{Cl}$ )	$\text{H}_2\text{O}$	100			VHG-IIPA CL-100
		500			VHG-IIPA CL-500
Chlorite $\text{ClO}_2^-$	$\text{H}_2\text{O}$	100		VHG-ICLO2-100	
		500		VHG-ICLO2-500	
Chromate $\text{CrO}_4^{2-}$	$\text{H}_2\text{O}$	100		VHG-ICRO-100	VHG-IIPCRO-100
		500		VHG-ICRO-500	VHG-IIPCRO-500
Dichromate $\text{Cr}_2\text{O}_7^{2-}$	$\text{H}_2\text{O}$	100		VHG-IDCRO-100	VHG-IIPDCRO-100
		500		VHG-IDCRO-500	VHG-IIPDCRO-500
Fluoride $\text{F}^-$	$\text{H}_2\text{O}$	100	VHG-IF100-100	VHG-IF1K-100	
		500	VHG-IF100-500	VHG-IF1K-500	VHG-IIPF-500
Formate $\text{HCO}_2^-$	$\text{H}_2\text{O}$	100		VHG-IFORM-100	
		500		VHG-IFORM-500	
Glycolate $\text{C}_2\text{H}_3\text{O}^-$	$\text{H}_2\text{O}$	100		VHG-IGLY-100	
		500		VHG-IGLY-500	
Iodide $\text{I}^-$ (Raw material: $\text{NaI}$ )	$\text{H}_2\text{O}$	100		VHG-II-100	
		500		VHG-II-500	VHG-IIP I-500
Iodide $\text{I}^-$ (Raw material: $\text{NH}_4\text{I}$ )	$\text{H}_2\text{O}$	100			VHG-IIPAI-100
		500			VHG-IIPAI-500
Nitrate $\text{NO}_3^-$	$\text{H}_2\text{O}$	100		VHG-INO3-100	VHG-IIPNO3-100
		500		VHG-INO3-500	VHG-IIPNO3-500
Nitrate as N $\text{NO}_3^-$	$\text{H}_2\text{O}$	100		VHG-INO3N-100	VHG-IIPNO3N-100
		500		VHG-INO3N-500	VHG-IIPNO3N-500

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## Section 4: Single Ion Standards

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Ion	Matrix	Size (mL)	Product No. (100 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Nitrite NO <sub>2</sub> <sup>-</sup>	H <sub>2</sub> O	100		VHG-INO2-100	VHG-IIPNO2-100
		500		VHG-INO2-500	VHG-IIPNO2-500
Nitrite as N NO <sub>2</sub> <sup>-</sup>	H <sub>2</sub> O	100		VHG-INO2N-100	VHG-IIPNO2N-100
		500		VHG-INO2N-500	VHG-IIPNO2N-500
Oxalate C <sub>2</sub> O <sub>4</sub> <sup>-2</sup>	H <sub>2</sub> O	100		VHG-IOXAL-100	VHG-IIPOXAL-100
		500		VHG-IOXAL-500	VHG-IIPOXAL-500
Perchlorate ClO <sub>4</sub> <sup>-</sup>	H <sub>2</sub> O	100		VHG-ICLO4-100	
		500		VHG-ICLO4-500	VHG-IIPCLO4-500
Phosphate PO <sub>4</sub> <sup>-3</sup>	H <sub>2</sub> O	100		VHG-IPO4-100	VHG-IIPPO4-100
		500		VHG-IPO4-500	VHG-IIPPO4-500
Phosphate as P PO <sub>4</sub> <sup>-3</sup>	H <sub>2</sub> O	100		VHG-IPO4P-100	
		500		VHG-IPO4P-500	VHG-IIPPO4P-500
Silica SiO <sub>2</sub>	H <sub>2</sub> O	100	VHG-ISIO2100-100	VHG-ISIO21K-100	
		500	VHG-ISIO2100-500	VHG-ISIO21K-500	
Sulfate SO <sub>4</sub> <sup>-2</sup>	H <sub>2</sub> O	100	VHG-ISO4100-100	VHG-ISO41K-100	VHG-IIPSO4-100
		500	VHG-ISO4100-500	VHG-ISO41K-500	VHG-IIPSO4-500

Ion	Conc. (µg/mL)	Matrix	Size (mL)	Product No.
Dichloroacetate	500	H <sub>2</sub> O	100	VHG-IDCA500-100
			500	VHG-IDCA500-500

Single Cation Standards					
Ion	Matrix	Size (mL)	Product No. (100 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Ammonium NH <sup>+</sup>	H <sub>2</sub> O	100	VHG-INH4100-100	VHG-INH41K-100	VHG-IIPNH4-100
		500	VHG-INH4100-500	VHG-INH41K-500	VHG-IIPNH4-500
Barium Ba <sup>+2</sup>	H <sub>2</sub> O	100		VHG-IBAW1K-100	
		500		VHG-IBAW1K-500	
Calcium Ca <sup>+2</sup>	H <sub>2</sub> O	100		VHG-ICAW1K-100	
		500		VHG-ICAW1K-500	
Ethanolamine C <sub>2</sub> H <sub>7</sub> NO	H <sub>2</sub> O	100		VHG-IETA1K-100	
		500		VHG-IETA1K-500	VHG-IETA1P-500
Lithium Li <sup>+</sup>	H <sub>2</sub> O	100		VHG-ILIW1K-100	
		500	VHG-ILI100-500	VHG-ILIW1K-500	
Magnesium Mg <sup>+2</sup>	H <sub>2</sub> O	100		VHG-IMGW1K-100	
		500		VHG-IMGW1K-500	
Potassium K <sup>+</sup>	H <sub>2</sub> O	100		VHG-IKW1K-100	
		500		VHG-IKW1K-500	

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## Section 4: Single Ion Standards

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Single Cation Standards					
Ion	Matrix	Size (mL)	Product No. (100 µg/mL)	Product No. (1,000 µg/mL)	Product No. (10,000 µg/mL)
Sodium Na <sup>+</sup>	H <sub>2</sub> O	100		VHG-INAW1K-100	
		500	VHG-INAW100-500	VHG-INAW1K-500	
Strontium Sr <sup>+2</sup>	H <sub>2</sub> O	100	VHG-ISR-100		
		500	VHG-ISR-500		

Single Ion Ammonia Standards*				
Ion	Matrix	Conc. (µg/mL)	Size (mL)	Product No.
Ammonia NH <sub>3</sub>	H <sub>2</sub> O	1	100	VHG-INH3-1-100
		10	100	VHG-INH3-10-100
		100	100	VHG-INH3-100-100
		1,000	100	VHG-INH3-1K-100
		10,000	100	VHG-INH3-1P-100

\*Also available in 500 mL size

## Multi-Ion Standards

Multi-Anion Standards					
Product	Ions	Conc. (µg/mL)	Matrix	Size (mL)	Product No.
Multi-Anion Standard 1	F <sup>-</sup> , Cl <sup>-</sup> , Br <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , PO <sub>4</sub> <sup>-3</sup> , SO <sub>4</sub> <sup>-2</sup>	100	H <sub>2</sub> O	100	VHG-ICM1-100
Multi-Anion Standard 2	F <sup>-</sup> , Cl <sup>-</sup> , SO <sub>4</sub> <sup>-2</sup>	100	H <sub>2</sub> O	100	VHG-ICM2-100
Multi-Anion Standard 3	F <sup>-</sup>	20	H <sub>2</sub> O	100	VHG-ICM3-100
	Cl <sup>-</sup>	30			
	NO <sub>3</sub> <sup>-</sup>	100			
	PO <sub>4</sub> <sup>-3</sup> , SO <sub>4</sub> <sup>-2</sup>	150			
Multi-Anion Standard 4	F <sup>-</sup>	100	H <sub>2</sub> O	100	VHG-ICM4-100
	Cl <sup>-</sup>	200			
	Br <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>-2</sup>	400			
	PO <sub>4</sub> <sup>-3</sup>	600			
Multi-Anion Standard 7A	F <sup>-</sup> , Cl <sup>-</sup> , Br <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> as N, PO <sub>4</sub> <sup>-3</sup> as P, SO <sub>4</sub> <sup>-2</sup>	1,000	H <sub>2</sub> O	100	VHG-ICM7A-100
Multi-Anion Standard 8	F <sup>-</sup> , Cl <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>-2</sup>	1,000	H <sub>2</sub> O	100	VHG-ICM8-100

## Section 4: Single Ion Standards

Multi-Cation Standards					
Product	Ions	Conc. ( $\mu\text{g/mL}$ )	Matrix	Size (mL)	Product No.
Multi-Cation Standard 1	$\text{Ca}^{+2}$	500	dil. $\text{HNO}_3$	100	VHG-ICM5A-100
	$\text{K}^+$	500			
	$\text{Li}^+$	50			
	$\text{Mg}^{+2}$	250			
	$\text{Na}^+$	200			
	$\text{NH}_4^+$	250			

## Eluent Concentrates

GFAA Matrix Modifiers			
Product	Description	Size (mL)	Product No.
Eluent 1	0.18M $\text{Na}_2\text{CO}_3$ and 0.17M $\text{NaHCO}_3$	500	VHG-IELUENT1-500
Eluent 3	0.5M $\text{Na}_2\text{CO}_3$	500	VHG-IELUENT3-500
Eluent 4	0.5M $\text{NaHCO}_3$	500	VHG-IELUENT4-500

## Section 5

# Blank Water & Acid Matrices

Multi-Anion Standards			
Product	Matrix	Size (mL)	Product No.
ICP-OES Blank	2% HNO <sub>3</sub>	500	VHG-L2HNO3BLK-500
Nitric Acid Blank	5% HNO <sub>3</sub>	500	VHG-HNO3-BLK-500
Hydrochloric Acid Blank	5% HCl	500	VHG-HCL-BLK-500
Hydrochloric/Nitric Blank	5% HCl, 1% HNO <sub>3</sub>	500	VHG-ICB/CCB-500
ICP-MS Wash Solution	1% HNO <sub>3</sub> Blank	250	VHG-LPENXWASH-250
ICP-MS Wash Water Blank	18 MΩ DI Water	250	VHG-LDIWASH-250
ICP-MS Blank	5% HNO <sub>3</sub> in ASTM Type I Water	250	VHG-LNITWASH5-250

# THANK YOU

**to all of our customers.  
We look forward to supporting  
your continued success.**

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