RICCA CHEMICAL COMPANY®

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Certificate of Analysis

Bismuth ICP-MS Standard, 1000 ppm Bi in 3% HNO_3

Lot Number: 4309J16 **Product Number:** MSBI1KN

Manufacture Date: SEP 15, 2023
Expiration Date: MAR 2025

This is a single element solution that was prepared volumetrically to contain the certified value reported. The uncertainty associated with the certifiec value is the sum of the estimated errors due to the purity of the raw material, the volumetric preparation of the solution, and transpiration of the solution through the container wall.
The final solution concentration is confirmed by AA, ICP, or ICP-MS, and is traceable to NIST Standard Reference Material 3106. All trace level elements were determined by ICP or ICP-MS.

Name	CAS#	Grade
Water	7732-18-5	
Nitric Acid	7697-37-2	
Bismuth	7440-69-9	

Test	Specification	Result	NIST SRM#
Appearance	Colorless liquid	Passed	
Bismuth (Bi)	997-1003 ppm	1000 ppm	3106

I=Spectral Interference N=Not Tested

Trace Elements by ICP or ICP - MS

All values reported in mg/L (ppm)

Aluminum (Al)	N	Lead (Pb)	N	Strontium (Sr)	0.198 ppm
Antimony (Sb)	< 0.0001 ppm	Lithium (Li)	N	Sulfur (S)	N
Arsenic (As)	0.084 ppm	Lutetium (Lu)	0.026 ppm	Tantalum (Ta)	0.141 ppm
Barium (Ba)	0.633 ppm	Magnesium (Mg)	N	Tellurium (Te)	0.059 ppm
Beryllium (Be)	0.035 ppm	Manganese (Mn)	0.413 ppm	Terbium (Tb)	< 0.00003 ppn
Boron (B)	N	Mercury (Hg)	< 0.03 ppm	Thallium (Tl)	0.149 ppm
Cadmium (Cd)	0.008 ppm	Molybdenum (Mo)	0.313 ppm	Thorium (Th)	0.007 ppm
Calcium (Ca)	< 0.004 ppm	Neodymium (Nd)	0.008 ppm	Thulium (Tm)	N
Cerium (Ce)	0.013 ppm	Nickel (Ni)	0.053 ppm	Tin (Sn)	< 0.0002 ppm
Cesium (Cs)	0.070 ppm	Niobium (Nb)	0.005 ppm	Titanium (Ti)	I
Chromium (Cr)	0.078 ppm	Osmium (Os)	< 0.003 ppm	Tungsten (W)	0.109 ppm
Cobalt (Co)	0.895 ppm	Palladium (Pd)	0.001 ppm	Uranium (U)	0.008 ppm
Copper (Cu)	< 0.00005 ppn	Phosphorus (P)	I	Vanadium (V)	0.633 ppm
Dysprosium (Dy)	0.000 ppm	Platinum (Pt)	< 0.00003 ppn	Ytterbium (Yb)	0.003 ppm
Erbium (Er)	0.000 ppm	Potassium (K)	< 0.00002 ppn	Yttrium (Y)	0.184 ppm
Europium (Eu)	0.002 ppm	Praseodymium (Pr)	< 0.00003 ppn	Zinc (Zn)	0.693 ppm
Gadolinium (Gd)	0.105 ppm	Rhenium (Re)	0.002 ppm	Zirconium (Zr)	0.080 ppm
Gallium (Ga)	0.019 ppm	Rhodium (Rh)	< 0.00003 ppn		
Germanium (Ge)	< 0.0003 ppm	Rubidium (Rb)	0.045 ppm		
Gold (Au)	< 0.0005 ppm	Ruthenium (Ru)	0.001 ppm		
Hafnium (Hf)	0.004 ppm	Samarium (Sm)	< 0.002 ppm		
Holmium (Ho)	0.001 ppm	Scandium (Sc)	0.001 ppm		
Indium (In)	< 0.00003 ppn	Selenium (Se)	0.192 ppm		
Iridium (Ir)	0.000 ppm	Silicon (Si)	I		
Iron (Fe)	N	Silver (Ag)	I		
Lanthanum (La)	0.003 ppm	Sodium (Na)	< 0.02 ppm		

Specification	Reference
Bismuth ICP-MS, 1000 ppm in HNO3	EPA (200.8)

Volumetric glassware complies with Class A tolerance requirements of ASTM E 288 and NIST Circular 434; it is calibrated before first use and recalibrated regularly in accordance with ASTM E 542 and NIST Procedure NBSIR 74-461. Balances are calibrated regularly with weights certified traceable to the NIST national mass standard. Thermometers and temperature probes are calibrated before first use and recalibrated regularly with a thermometer traceable to NIST standards. All products are prepared according to master documents that assure manufacture according to validated methods. Batch records document raw material traceability and production and testing history for each lot manufactured.

Part Number	Size / Package Type	Shelf Life (Unopened Container)
MSBI1KN-100	100 mL natural LDPE	18 months

Recommended Storage: 15°C - 30°C (59°F - 86°F)

Paul Brandon (09/15/2023)
Production Manager
This document is designed to comply with ISO Guide 31 "Reference Materials -- Contents of Certificates and Labels."