

Certificate of Analysis

Bismuth ICP Standard, 10,000 ppm Bi in 5% HNO₃
Lot Number: 4309D77

Product Number: PBI10KN

Manufacture Date: SEP 01, 2023

Expiration Date: FEB 2025

This is a single element solution that was prepared volumetrically to contain the certified value reported. The uncertainty associated with the certified 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) | 9950-10050 ppm | 10000 ppm | 3106 |

Trace Elements by ICP or ICP - MS

I=Spectral Interference N=Not Tested

All values reported in mg/L (ppm)

| | | | | | |
|-----------------|---------------|-------------------|---------------|----------------|---------------|
| Aluminum (Al) | < 0.0009 ppm | Lead (Pb) | 0.2874 ppm | Strontium (Sr) | < 0.00006 ppm |
| Antimony (Sb) | < 0.0001 ppm | Lithium (Li) | < 0.03 ppm | Sulfur (S) | I |
| Arsenic (As) | < 0.0007 ppm | Lutetium (Lu) | < 0.0003 ppm | Tantalum (Ta) | 0.1455 ppm |
| Barium (Ba) | 0.0655 ppm | Magnesium (Mg) | 0.0425 ppm | Tellurium (Te) | I |
| Beryllium (Be) | 0.2574 ppm | Manganese (Mn) | 0.0025 ppm | Terbium (Tb) | < 0.00003 ppm |
| Boron (B) | < 0.00005 ppm | Mercury (Hg) | < 0.03 ppm | Thallium (Tl) | I |
| Cadmium (Cd) | 0.0006 ppm | Molybdenum (Mo) | 0.0298 ppm | Thorium (Th) | 0.0047 ppm |
| Calcium (Ca) | 0.4094 ppm | Neodymium (Nd) | < 0.0002 ppm | Thulium (Tm) | < 0.00002 ppm |
| Cerium (Ce) | < 0.00003 ppm | Nickel (Ni) | 0.0649 ppm | Tin (Sn) | < 0.0002 ppm |
| Cesium (Cs) | 0.0522 ppm | Niobium (Nb) | < 0.00008 ppm | Titanium (Ti) | < 0.001 ppm |
| Chromium (Cr) | 0.0018 ppm | Osmium (Os) | < 0.003 ppm | Tungsten (W) | 0.0492 ppm |
| Cobalt (Co) | < 0.00002 ppm | Palladium (Pd) | < 0.0004 ppm | Uranium (U) | 0.0030 ppm |
| Copper (Cu) | 0.1573 ppm | Phosphorus (P) | I | Vanadium (V) | < 0.00004 ppm |
| Dysprosium (Dy) | 0.0002 ppm | Platinum (Pt) | 0.0014 ppm | Ytterbium (Yb) | < 0.001 ppm |
| Erbium (Er) | < 0.00007 ppm | Potassium (K) | < 0.00002 ppm | Yttrium (Y) | < 0.00009 ppm |
| Europium (Eu) | < 0.00008 ppm | Praseodymium (Pr) | < 0.00003 ppm | Zinc (Zn) | < 0.0003 ppm |
| Gadolinium (Gd) | 0.0003 ppm | Rhenium (Re) | < 0.00003 ppm | Zirconium (Zr) | < 0.002 ppm |
| Gallium (Ga) | 0.0018 ppm | Rhodium (Rh) | < 0.00003 ppm | | |
| Germanium (Ge) | 0.0054 ppm | Rubidium (Rb) | 0.0012 ppm | | |
| Gold (Au) | 0.0432 ppm | Ruthenium (Ru) | < 0.00007 ppm | | |
| Hafnium (Hf) | 0.0040 ppm | Samarium (Sm) | < 0.002 ppm | | |
| Holmium (Ho) | < 0.0001 ppm | Scandium (Sc) | 0.0116 ppm | | |
| Indium (In) | 0.0133 ppm | Selenium (Se) | 0.0336 ppm | | |
| Iridium (Ir) | 0.0001 ppm | Silicon (Si) | I | | |
| Iron (Fe) | < 0.001 ppm | Silver (Ag) | N | | |
| Lanthanum (La) | < 0.00004 ppm | Sodium (Na) | < 0.02 ppm | | |

Specification**Reference**Bismuth ICP, 10,000 ppm in HNO₃

EPA (200.7)

This standard is guaranteed to be stable and accurate provided the product is kept tightly capped and stored under normal laboratory conditions. Balances are calibrated using NIST traceable weights whose verification of maintenance and recalibration is documented per in-house Standard Operating Procedures. Class A glassware is also calibrated and routinely rechecked per in-house Standard Operating Procedures. Trace metal analyzed acids and Trace Metals Analyzed Water are used in the manufacture of this product. Triple cleaned containers are used in the manufacture of this product.

Part Number**Size / Package Type****Shelf Life (Unopened Container)**

PBI10KN-50

50 mL natural poly

18 months

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

Paul Brandon (09/01/2023)

Production Manager

This document is designed to comply with ISO Guide 31 "Reference Materials -- Contents of Certificates and Labels."

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