

# Product Specification

## Hafnium ICP Standard, 1000 ppm Hf in 3% HNO<sub>3</sub>

**Lot Number:** SAMPLE

**Product Number:** PHF1KN

**Manufacture Date:** N/A

**Expiration Date:** N/A

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 3122. All trace level elements were determined by ICP or ICP-MS.

| Name              | CAS#       | Grade           |
|-------------------|------------|-----------------|
| Water             | 7732-18-5  | ACS/ASTM/USP/EP |
| Nitric Acid       | 7697-37-2  | Trace Metals    |
| Hafnium Oxide     | 12055-23-1 | High Purity     |
| Hydrofluoric Acid | 7664-39-3  | Trace Metals    |

| Test         | Specification    | Result | NIST SRM# |
|--------------|------------------|--------|-----------|
| Appearance   | Colorless liquid | N/A    |           |
| Hafnium (Hf) | 995-1005 ppm     | N/A    | 3122      |

### Trace Elements by ICP or ICP - MS

I=Spectral Interference N=Not Tested

All values reported in mg/L (ppm)

|                 |     |                   |     |                |     |
|-----------------|-----|-------------------|-----|----------------|-----|
| Aluminum (Al)   | N/A | Lanthanum (La)    | N/A | Silver (Ag)    | N/A |
| Antimony (Sb)   | N/A | Lead (Pb)         | N/A | Sodium (Na)    | N/A |
| Arsenic (As)    | N/A | Lithium (Li)      | N/A | Strontium (Sr) | N/A |
| Barium (Ba)     | N/A | Lutetium (Lu)     | N/A | Sulfur (S)     | N/A |
| Beryllium (Be)  | N/A | Magnesium (Mg)    | N/A | Tantalum (Ta)  | N/A |
| Bismuth (Bi)    | N/A | Manganese (Mn)    | N/A | Tellurium (Te) | N/A |
| Boron (B)       | N/A | Mercury (Hg)      | N/A | Terbium (Tb)   | N/A |
| Cadmium (Cd)    | N/A | Molybdenum (Mo)   | N/A | Thallium (Tl)  | N/A |
| Calcium (Ca)    | N/A | Neodymium (Nd)    | N/A | Thorium (Th)   | N/A |
| Cerium (Ce)     | N/A | Nickel (Ni)       | N/A | Thulium (Tm)   | N/A |
| Cesium (Cs)     | N/A | Niobium (Nb)      | N/A | Tin (Sn)       | N/A |
| Chromium (Cr)   | N/A | Osmium (Os)       | N/A | Titanium (Ti)  | N/A |
| Cobalt (Co)     | N/A | Palladium (Pd)    | N/A | Tungsten (W)   | N/A |
| Copper (Cu)     | N/A | Phosphorus (P)    | N/A | Uranium (U)    | N/A |
| Dysprosium (Dy) | N/A | Platinum (Pt)     | N/A | Vanadium (V)   | N/A |
| Erbium (Er)     | N/A | Potassium (K)     | N/A | Ytterbium (Yb) | N/A |
| Europium (Eu)   | N/A | Praseodymium (Pr) | N/A | Yttrium (Y)    | N/A |
| Gadolinium (Gd) | N/A | Rhenium (Re)      | N/A | Zinc (Zn)      | N/A |
| Gallium (Ga)    | N/A | Rhodium (Rh)      | N/A | Zirconium (Zr) | N/A |
| Germanium (Ge)  | N/A | Rubidium (Rb)     | N/A |                |     |
| Gold (Au)       | N/A | Ruthenium (Ru)    | N/A |                |     |
| Holmium (Ho)    | N/A | Samarium (Sm)     | N/A |                |     |
| Indium (In)     | N/A | Scandium (Sc)     | N/A |                |     |
| Iridium (Ir)    | N/A | Selenium (Se)     | N/A |                |     |
| Iron (Fe)       | N/A | Silicon (Si)      | N/A |                |     |

| Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Reference   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| Hafnium ICP, 1000 ppm in HNO <sub>3</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | EPA (200.7) |
| <p>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.</p> |             |

| Part Number | Size / Package Type | Shelf Life (Unopened Container) |
|-------------|---------------------|---------------------------------|
| PHF1KN-100  | 100 mL natural LDPE | 18 months                       |

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

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