



# Certificate of Analysis

**ULTRAGrade™ Solution**  
**Titanium ICP Standard**  
**1000 µg/mL**

**Catalog Number:** ICP-022  
**Lot Number:** M00275  
**Job Number:** J00012544  
**Lot Issue Date:** 03/17/2011  
**Expiration Date:** 04/30/2018

**Starting Material:** Ammonium Hexafluorotitanate  
**Starting Material Purity:** 99.998%  
**Starting Material Lot No.:** BH01796  
**Matrix:** 2% nitric acid, with trace hydrofluoric acid, in low TOC water (< 50 ppb)  
**Atomic Weight Ti:** 47.90

**Certified Value:** 1001 ± 2 µg/mL

This Certified Reference Material (CRM) was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system. The analyte concentrations were verified by our ISO 17025 accredited laboratory to be within ± 2.5%, when compared to calibration standards independently prepared using NIST SRM(s). The certified value and uncertainty value at the 95% confidence level for each analyte is determined gravimetrically.

**Classical Wet Assay Method:** Theoretical, based on gravimetric measurements

**Confirmation by Inductively Coupled Plasma Spectroscopy (ICP / ICP-MS) vs. NIST SRM 3162a**

ULTRA uses purified acids, 18 megohm double deionized water, calibrated Class A glassware & meticulously cleaned bottles in the manufacturing of ULTRAGrade standards. Balances used in the manufacturing of this standard are calibrated with weights traceable to NIST in compliance with ANSI/NCCL Z-540-1 and ISO 9001.

## Trace Metallic Impurities in Solution Standard in µg/mL:

|      |        |    |      |        |    |      |        |      |
|------|--------|----|------|--------|----|------|--------|------|
| * Al | <0.005 | ND | * Ga | <0.005 | ND | n Nb |        | n S  |
| * Sb | <0.005 | ND | n Ge |        |    | n Os |        | n Ta |
| * As | <0.005 | ND | n Au |        |    | * Pd | <0.005 | ND   |
| * Ba | <0.005 | ND | n Hf |        |    | * P  | <0.005 | ND   |
| * Be | <0.005 | ND | n Ho |        |    | * Pt | <0.005 | ND   |
| * Bi | <0.005 | ND | * In | <0.005 | ND | * K  | <0.005 | ND   |
| * B  | <0.005 | ND | n Ir |        |    | n Pr |        | n Th |
| * Cd | <0.005 | ND | * Fe | <0.005 | ND | n Re |        | n Tm |
| * Ca | <0.005 | ND | * La | <0.005 | ND | n Rh |        | * Sn |
| n Ce |        |    | * Pb | <0.005 | ND | n Rb |        | n Ti |
| n Cs |        |    | * Li | <0.005 | ND | n Ru |        | n W  |
| * Cr | <0.005 | ND | n Lu |        |    | n Sm |        | n U  |
| * Co | <0.005 | ND | * Mg | <0.005 | ND | n Sc |        | * V  |
| * Cu | <0.005 | ND | * Mn | <0.005 | ND | * Se | <0.005 | ND   |
| n Dy |        |    | * Hg | <0.005 | ND | * Si | <0.005 | ND   |
| * Er | <0.005 | ND | * Mo | <0.005 | D  | * Ag | <0.005 | ND   |
| * Eu | <0.005 | ND | n Nd |        |    | * Na | <0.005 | ND   |
| * Gd | <0.005 | ND | * Ni | <0.005 | ND | * Sr | <0.005 | ND   |

\* - element checked for  
ND - not detected

i - spectral interference  
D - detected

n - not checked for  
s - solution standard element

**Density of Solution** (measured at 22.0°C ± 0.5°C): 1.012 g/mL



ISO 9001 Registered Quality System – TUV USA

  
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