Certificate of Analysis

ULTRAgold™ Custom Standard

Product Number: ICUS-3685 **Page:** 1 of 2

Lot Number: AU-01228 **Lot Issue Date:** 19-Mar-2018 **Expiration Date:** 30-Apr-2019

This Certified Reference Material (CRM) is intended for use as a calibration standard for the quantitative determination of the analytes listed. The CRM was manufactured and verified in accordance with ULTRA's ISO 9001 registered quality system. The certified concentration value reported for each analyte is based upon the gravimetric and volumetric measurements made during the preparation of the CRM. The analyte concentrations were verified by ULTRA's ISO 17025 accredited laboratory using an appropriate analytical technique.

Analyte	Certified Value	Verification	NIST SRM
ammonium sulfate (ICP grade) (as sulfur)	500.7 ± 4 µg/mL	ICP-OES	3154
ammonium hexafluorostannate (IV) (ICP grade) (as tin)	50.1 ± 0.5 µg/mL	ICP-OES	3161a

Matrix: 5% nitric acid with trace hydrofluoric acid in water

Traceability:

Traceability has been established through an unbroken chain of comparisons, each having stated uncertainties. Comparisons are based on appropriate physical or chemical measurements, including gravimetric or volumetric dilution, where the mass or volume of a solution before and after dilution is measured. The balances used for these measurements are calibrated with weights traceable to NIST in compliance with ANSI/NCSL Z-540-1, ISO 9001, ISO 17025, and ISO Guide 34. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

Estimation of Uncertainties:

Uncertainties in certified values are estimated in accordance with ISO Guides 34 and 35, and include assessments of the uncertainty contributions resulting from the gravimetric characterization of the reference material (u_{char}), the packaging of the reference material into individual units (u_{bb}), the transportation of the reference material to the end user (u_{sts}), and the long term storage of the reference material (u_{lts}). The uncertainty (U) is reported as an expanded uncertainty calculated as:

$$U = k\sqrt{u_{char}^2 + u_{bb}^2 + u_{sts}^2 + u_{lts}^2}$$

using a coverage factor of k=2, which gives a level of confidence of approximately 95%.

Description:

This RM was manufactured using purified acids and 18 megohm double deionized water, and is packaged in sealed, low density polyethylene (LDPE) bottles.

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ANAB ACCREDITED ISO GUIDE 34 REFERENCE MATERIAL PRODUCER

ISO 9001
Registered
TUV USA, Inc.

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President

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Agilent

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Storage:

Store Refrigerated (2° - 8°C), Do Not Freeze.

Store the CRM according to directions noted above. Keep container tightly closed in a dry and well-ventilated place. Unless otherwise specified, refrigeration (< 4°C) is recommended if storing for extended periods. Do not store at temperatures greater than 35°C.

Instructions for Use:

Sample aliquots for analysis should be withdrawn at 20°C to 25°C immediately after opening the bottle and should be processed without delay for the certified values to be valid within the stated uncertainties. Do not pipet from the bottle. Do not return any material removed for pipeting to the bottle. Tightly cap the bottle after removing any of the material, and store according to the instructions noted above. Since this is a solution, there is no minimum subsample size required to be drawn.

Expiration of Certification:

The certification of this CRM is valid, within the measurement uncertainty specified, until the expiration date specified above, provided the CRM is handled and stored in accordance with instructions given in this certificate. This certification is nullified if the CRM is damaged, contaminated, or otherwise modified.

Maintenance of Certification:

The long term stability of this RM may be monitored over the lifetime of the certification. If substantive changes occur that affect the certification before the expiration of this certificate, ULTRA Scientific will notify the purchaser.

Product Hazards:

Material Safety Data Sheets are available on ULTRA's web site or by contacting our Technical Service department.

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