Certificate of Analysis

Custom Standard

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Lot Number: 0006469577 **Lot Issue Date:** 12-Jun-2019 **Expiration Date:** 31-Jul-2021

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 Agilent'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 Agilent's ISO 17025 accredited laboratory using an appropriate analytical technique.

Analyte	Certified Value	Verification	NIST SRM
antimony (ICP grade)	20.0 ± 0.5 µg/mL	ICP-OES	3102a
molybdenum (VI) oxide (ICP grade) (as molybdenum)	20.0 ± 0.5 µg/mL	ICP-OES	3134
ammonium hexafluorotitanate (IV) (ICP grade) (as titanium)	20.0 ± 0.2 µg/mL	ICP-OES	3162a
potassium nitrate (ICP grade) (as potassium)	500.1 ± 2 µg/mL	ICP-OES	3141a
sodium nitrate (ICP grade) (as sodium)	500.6 ± 3 µg/mL	ICP-OES	3152a
aluminum nitrate nonahydrate (ICP grade) (as aluminum)	100.1 ± 1.0 µg/mL	ICP-OES	3101a
calcium carbonate (ICP grade) (as calcium)	100.1 ± 0.6 µg/mL	ICP-OES	3109a
iron (III) nitrate, ferric nitrate (ICP grade) (as iron)	100.2 ± 0.4 µg/mL	ICP-OES	3126a
magnesium nitrate hexahydrate (ICP grade) (as magnesium)	100.0 ± 1.4 µg/mL	ICP-OES	3131a
arsenic (III) oxide (ICP grade) (as arsenic)	20.0 ± 0.8 µg/mL	ICP-OES	3103a
barium nitrate (ICP grade) (as barium)	20.0 ± 0.2 µg/mL	ICP-OES	3104a
beryllium acetate (ICP grade) (as beryllium)	20.0 ± 0.4 µg/mL	ICP-OES	3105a
cadmium nitrate hydrate (ICP grade) (as cadmium)	20.0 ± 0.2 µg/mL	ICP-OES	3108
chromium (III) nitrate nonahydrate (ICP grade) (as chromium)	20.0 ± 0.2 µg/mL	ICP-OES	3112a
cobalt nitrate hexahydrate (ICP grade) (as cobalt)	20.0 ± 0.2 µg/mL	ICP-OES	3113

ANAB ACCREDITED ISO 17034 REFERENCE MATERIAL PRODUCER

ISO 17034
Cert No. AR-1936

Produced in accordance with TUV USA Inc 56 100 18560026
registered ISO 9001 Quality Management System

ANAB ACCREDITED ISO/IEC 17025 TESTING LABORATORY

ISO17025 Cert No.
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Analyte	Certified Value	Verification	NIST SRM
copper (II) nitrate hydrate (ICP grade) (as copper)	20.0 ± 0.2 µg/mL	ICP-OES	3114
lead (II) nitrate (ICP grade) (as lead)	20.0 ± 0.3 µg/mL	ICP-OES	3128
lithium carbonate (ICP grade) (as lithium)	20.0 ± 0.5 µg/mL	ICP-OES	3129a
manganese (II) nitrate (ICP grade) (as manganese)	20.0 ± 0.2 µg/mL	ICP-OES	3132
nickel (II) nitrate hexahydrate (ICP grade) (as nickel)	20.0 ± 0.3 µg/mL	ICP-OES	3136
selenium (IV) oxide (ICP grade) (as selenium)	20.0 ± 0.5 µg/mL	ICP-OES	3149
strontium nitrate (ICP grade) (as strontium)	20.0 ± 0.2 µg/mL	ICP-OES	3153a
thallium (I) nitrate (ICP grade) (as thallium)	20.0 ± 0.2 µg/mL	ICP-OES	3158
ammonium metavanadate (ICP grade) (as vanadium)	19.6 ± 0.2 µg/mL	ICP-OES	3165
zinc nitrate hexahydrate (ICP grade) (as zinc)	20.0 ± 0.2 µg/mL	ICP-OES	3168a
boric acid (ICP grade) (as boron)	20.0 ± 0.1 µg/mL	ICP-OES	3107
indium (ICP grade)	20.0 ± 0.3 µg/mL	ICP-OES	3124a

Matrix: water with 5% nitric and trace tartaric and hydrofluoric acids

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 17034. Calibrated Class A glassware is used for volumetric measurements. Thermometers are calibrated against a NIST traceable thermometer in accordance with NIST Special Publication 819.

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Estimation of Uncertainties:

Uncertainties in certified values are estimated in accordance with ISO 17034 and ISO Guide 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.

Storage:

Store at Room Temperature (15° to 30°C).

Store the RM according to directions noted above. Keep container tightly closed in a dark, dry, and well-ventilated place. Extended storage at temperatures below 4°C or above 35°C is not recommended. Protect from light.

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.

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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, Agilent Technologies will notify the purchaser.

Product Hazards:

Safety Data Sheets are available on www.ultrasci.com/SDS or by contacting our Technical Service department.

Monica Bourgeois
QMS Representative

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