Titanium Pin Certified Reference Material

Product No: AR648

Lot No: 240205

Material and Use

AR648 is a Certified Reference Material (CRM) traceable to the listed primary reference standards. All reference materials should be verified as fit for purpose prior to use. The intended use of this CRM is for the verification and calibration of inert gas fusion (or other appropriate) analyzers for the determination of oxygen, nitrogen, and hydrogen in accordance with the listed test methods. Each bottle contains 10 g of reference material as nominal 0.1 g pins. Typical sample size for analytical testing is dependent upon the test method and instrumentation used, however, a minimum sample size of one pin is recommended. This product should be kept sealed tight and stored under normal laboratory conditions. Certified values are valid for 20 years from the initial date of certification.

Element	Value	(+/-)	Method & Detection	n	k
% Oxygen	0.1189	0.0201	Inert Gas Fusion/IR	50	2.0
% Nitrogen	0.0056	0.0023	Inert Gas Fusion/TC	50	2.0
% Hydrogen	0.0165	0.0017	Inert Gas Fusion/TC	51	2.0

Note: (+/-) indicates expanded uncertainty.

Traceability

The reported values are traceable to the following primary reference standards:

NIST	360b, 173c, 2453a, 2454, 2454a
AR	AR649-1023C, AR651-621R, AR650-520X, AR648-721Y, AR648-1219A, AR648-1218A,

Methods and References

ARI-LAB-622 – Alpha Resources Method, Oxygen and Nitrogen Analysis by Inert Gas Fusion
ARI-LAB-623 – Alpha Resources Method, Hydrogen Analysis by Inert Gas Fusion
ASTM E1409-13 – Standard Test Method for Determination of Oxygen and Nitrogen in Titanium and Titanium Alloys by Inert Gas Fusion
ASTM E1447-22 – Standard Test Method for Determination of Hydrogen in Reactive Metals and Reactive Metal Alloys by Inert Gas Fusion with Detection by Thermal Conductivity or Infrared Spectrometry
ISO/IEC 17025:2017 – General requirements for the competence of testing and calibration laboratories
ISO 17034:2016 – General requirements for the competence of reference material producers
ISO 33401:2024 – Reference materials – Contents of certificates, labels, and accompanying documentation
ISO Guide 30:2015 – Terms and definitions used in connection with reference materials
ISO Guide 35:2017 – Reference materials – General and statistical principles for certification

Calculation of Reported Values

Analytical values are accredited under Alpha Resources, LLC ISO/IEC 17025 and ISO 17034 accreditation issued by ANSI National Accreditation Board (ANAB). Please refer to certificates and scopes of accreditation AT-1200 and AR-1920. Sampling and calculation of reported values for each analyte are performed in compliance with guidance found in ISO 17034, ISO 33401, and ISO Guide 35. Material homogeneity, uncertainty of primary reference standards, characterization uncertainty from contributing laboratories, and other factors are considered in the assessment of overall measurand uncertainty. Analysis of variance is used in the calculation of uncertainty between contributing labs and between samples. Expanded uncertainty is calculated by application of a coverage factor to the combined uncertainty value.

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Global Technical Director
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ANAB
ANSI National Accreditation Board
ACCREDITED
ISO 17034
REFERENCE MATERIAL PRODUCER