

**% Oxygen**

Mean = 0.119

Standard Deviation =  $\pm 0.004$

Expanded Uncertainty =  $\pm 0.008$

(k=2, @95% confidence) (n=58)

**% Nitrogen**

Mean = 0.0058

Standard Deviation =  $\pm 0.0010$

Expanded Uncertainty =  $\pm 0.0021$

(k=2, @95% confidence) (n=58)

**% Hydrogen**

Mean = 0.0169

Standard Deviation =  $\pm 0.0004$

Expanded Uncertainty =  $\pm 0.0010$

(k=2, @95% confidence) (n=37)

Method of Analysis is ASTM E 1409-13, E 1447-09, ARI-LAB-622, and ARI-LAB-623

Primary (NMI)/ISO 17034 references used for traceability:

NIST SRM 2454, 173c, 360b, 2453a

BCR 276

NCS NS11089, NS57101, NS11093, NS11091

ALPHA – AR648-TA811114, AR589-814C, AR648-1219A, AR649-319G, AR648-1218A, AR648-112B,  
AR648-614D, AR637-1116A, AR642-1515B, AR647-415D, AR642-319B, AR642-412A, AR642-813B,  
AR649-614E, AR648-217E, AR647-220G

The intended use of this reference standard is for the calibration and validation of inert gas fusion, InfraRed (Oxygen), and Thermal Conductivity (Nitrogen, Hydrogen) detection analysers as described in the above ASTM methods. The mean analytical values were derived by separate data sets showing traceability to the above-mentioned reference standards and reported in mass fraction. Metrological traceability is to the SI derived unit of mass fraction expressed as percent. The precision values represent the estimated mean value and uncertainty derived from the data sets utilizing ANOVA, ISO Guide 35, and the Guide to Uncertainty Measurement. Refer to your test method for the expanded method derived uncertainty if needed. When necessary, professional judgment is applied toward consideration of data and statistical information.

The material used in production of this reference standard was identified in accordance with ARI-LAB-603. The samples for round robin testing were selected in accordance with ARI-LAB-625. The above values relate only to the material used to produce this standard. This bottle consists of 10g material in 0.1g (nominal) pins and is to be used directly from the bottle without preparation. Multiple pins may be used per test method requirements, with a minimum sample size of 1 pin. While unable to determine a definite shelf life, this reference should be reviewed every 25 years from the date of certification. Keep sealed and store under normal laboratory conditions. Remedies for any claimed defect in this product will be limited to product replacement or refund of the purchase price. In no event, shall Elemental Microanalysis Ltd be liable for incidental or consequential damages. This certificate cannot be reproduced except in full.

This Reference Material (RM) is traceable to the above-mentioned standards. For good laboratory practice it is recommended that all standards be verified as fit for purpose prior to use.

Certified April 25, 2022

Elemental Microanalysis Ltd