



Certificate of Calibration

NPL PRIMARY REFERENCE MATERIAL

Cylinder Number: D933520

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CUSTOMER: University of York
ADDRESS: Cape Verde Atmospheric Observatory, National Centre for Atmospheric Science,
Department of Chemistry, University of York, York, YO10 5DD, United Kingdom
CALIBRATION DATE: 28 October 2021
AMOUNT FRACTIONS:

Component	Amount fraction / (nmol/mol)	Component	Amount fraction / (nmol/mol)
Ethane	4.24 ± 0.09	2-methylpentane	4.39 ± 0.09
Ethene	4.15 ± 0.11	<i>n</i> -hexane	4.39 ± 0.09
Propane	4.18 ± 0.09	Isoprene	4.37 ± 0.09
Propene	4.16 ± 0.09	<i>n</i> -heptane	4.40 ± 0.09
2-methylpropane	4.26 ± 0.11	Benzene	3.72 ± 0.08
<i>n</i> -butane	4.22 ± 0.09	2,2,4-trimethylpentane	4.13 ± 0.09
Ethyne	4.38 ± 0.22	<i>n</i> -octane	4.14 ± 0.09
<i>trans</i> -but-2-ene	4.24 ± 0.09	Toluene	3.62 ± 0.10
But-1-ene	4.21 ± 0.09	Ethylbenzene	3.91 ± 0.10
<i>cis</i> -but-2-ene	4.22 ± 0.09	<i>m</i> -xylene + <i>p</i> -xylene	7.61 ± 0.20
2-methylbutane	4.17 ± 0.09	<i>o</i> -xylene	3.74 ± 0.10
<i>n</i> -pentane	4.18 ± 0.09	1,3,5-trimethylbenzene	3.80 ± 0.10
1,3-butadiene	4.27 ± 0.09	1,2,4-trimethylbenzene	3.83 ± 0.10
<i>trans</i> -pent-2-ene	4.21 ± 0.09	1,2,3-trimethylbenzene	3.80 ± 0.10
Pent-1-ene	4.27 ± 0.09	Nitrogen	Balance

The reported expanded uncertainties are based on standard uncertainties multiplied by a coverage factor $k = 2$, providing a coverage probability of approximately 95 %. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

METHODS: Preparation: gravimetry; Analysis: gas chromatography (FID)
TRACEABILITY: The values on this certificate are traceable to NPL Primary Standards
EXPIRY: Certificate valid for 4 years from the date of issue
PRESSURE: Fill pressure: 107 bar; Minimum utilisation pressure: 10 bar
STORAGE: No special precautions are required
HANDLING: Refer to ISO 16664
OUTLET: DIN 477 No. 1 valve
INTENDED USE: Calibration standard

Reference: 2021080206 **Date of issue:** 04 November 2021

Signed:  (Authorised Signatory)

Name: Dr D R Worton (on behalf of NPLML)

Checked by: 

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This certificate is consistent with the capabilities that are included in Appendix C of the MRA drawn up by the CIPM. Under the MRA, all participating institutes recognise the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (for details see <http://www.bipm.org>).