



## Certificate of Calibration

## PRIMARY REFERENCE GAS MIXTURE

Cylinder Number: D99 4206

This certificate provides traceability of measurement to recognised national standards, and to the units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, unless permission for the publication of an approved extract has been obtained in writing from the Managing Director. It does not of itself impute to the subject of calibration any attributes beyond those shown by the data contained herein.

**CUSTOMER:** ISAC-CNR  
**ADDRESS:** Via Gobetti 101, 40129 Bologna, Italy  
**CALIBRATION DATE:** 26 February 2014  
**AMOUNT FRACTIONS:**

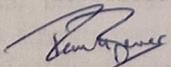
Component	Amount fraction / (nmol/mol)	Component	Amount fraction / (nmol/mol)
Ethane	0.521 ± 0.026	Hexane	0.495 ± 0.025
Ethene	0.508 ± 0.025	Isoprene	0.495 ± 0.025
Propane	0.506 ± 0.025	Heptane	0.489 ± 0.024
Propene	0.501 ± 0.025	Benzene	0.498 ± 0.025
2-methylpropane	0.510 ± 0.026	2,2,4-trimethylpentane	0.498 ± 0.025
Butane	0.495 ± 0.025	Octane	0.493 ± 0.025
Ethyne	0.548 ± 0.027	Toluene	0.492 ± 0.025
<i>trans</i> -but-2-ene	0.495 ± 0.025	Ethylbenzene	0.485 ± 0.024
But-1-ene	0.487 ± 0.024	<i>m</i> -xylene	0.485 ± 0.024
<i>cis</i> -but-2-ene	0.488 ± 0.024	<i>p</i> -xylene	0.479 ± 0.024
2-methylbutane	0.494 ± 0.025	<i>o</i> -xylene	0.499 ± 0.025
Pentane	0.501 ± 0.025	1,3,5-trimethylbenzene	0.499 ± 0.025
1,3-butadiene	0.501 ± 0.025	1,2,4-trimethylbenzene	0.518 ± 0.026
<i>trans</i> -pent-2-ene	0.477 ± 0.024	1,2,3-trimethylbenzene	0.485 ± 0.024
Pent-1-ene	0.486 ± 0.024	Nitrogen	Balance
2-methylpentane	0.494 ± 0.025	-	-

The reported expanded uncertainties are based on standard uncertainties multiplied by a coverage factor  $k=2$ , providing a coverage probability of approximately 95 %.

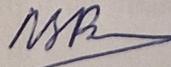
**METHODS:** Preparation: gravimetry; Analysis: gas chromatography (FID)  
**TRACEABILITY:** The values on this certificate are traceable to NPL Primary Standards  
**EXPIRY:** Certificate valid for 2 years from the date of issue  
**PRESSURE:** Fill pressure: 100 bar; minimum utilisation pressure: 10 bar  
**STORAGE:** No special precautions are required  
**HANDLING:** Refer to ISO 16664  
**OUTLET:** DIN 477 No.1 valve  
**INTENDED USE:** Calibration standard

Reference: 2013120110

Date of issue: 11 March 2014

Signed:  (Authorised Signatory)

Name: Dr P J Brewer (on behalf of NPLML)

Checked by: 

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