NPL
National Physical Laboratory

Traceable Calibration Gas Standards

NPL prepares an extensive range of traceable calibration gas standards with guaranteed relative uncertainties levels of 0.1% for certain species. NPL's gas standards are generally supplied in 10 litre cylinders filled to 100 bar (deliverable volume 1 m^3)*. The cylinders are sold, eliminating cylinder rental costs. This proves financially beneficial when customers require gas standards over significant periods of time. NPL's gas standards are certified for a period up to three years depending on the stability of the mixture. NPL offers a cost-effective re-certification service after the initial certification period has expired, ensuring long-term traceability.

** A minority of NPL gas standards are filled to less than 100 bar due to technical reasons*

Gaseous Species	Matrix	Amount Fraction Range (mol /mol)
Industrial emissions		
Sulphur dioxide	Nitrogen or Air	Down to 1×10^{-6}
Carbon monoxide	Nitrogen or Air	Down to 1×10^{-6}
Carbon dioxide	Nitrogen or Air	Down to 1×10^{-6}
Oxygen	Nitrogen	Down to 1×10^{-6}
Carbon monoxide	Air	1×10^{-6} to 5×10^{-2}
Propane	Nitrogen	100×10^{-6} to 15×10^{-2}
Propane	Air	100×10^{-6} to 0.5×10^{-2}
Methane	Nitrogen	1×10^{-6} to 15×10^{-2}
Methane	Air	1×10^{-6} to 2×10^{-2}
Nitric oxide	Nitrogen	1×10^{-6} to 10×10^{-2}
Nitrogen dioxide	Nitrogen or Air	1×10^{-6} to 2×10^{-2}
Hexane	Nitrogen	1×10^{-6} to 0.1×10^{-2}
Toluene	Nitrogen	10×10^{-6} to 0.1×10^{-2}
Ammonia	Nitrogen	1×10^{-6} to 0.1×10^{-2}
Vehicle and aircraft emissions		
Carbon monoxide	Nitrogen	0.5×10^{-2} to 15×10^{-2}
Carbon dioxide		5×10^{-2} to 15×10^{-2}
Propane		500×10^{-6} to 0.5×10^{-2}
Oxygen		0.5×10^{-2} to 21×10^{-2}
Occupational exposure		
Hydrogen sulphide	Nitrogen	5×10^{-6} to 25×10^{-6}
Benzene	Nitrogen	0.5×10^{-6} to 15×10^{-6}
Dichloromethane	Nitrogen	100×10^{-6} to 0.5×10^{-6}
Benzene, toluene, xylene and ethylbenzene	Nitrogen	0.5×10^{-6} to 10×10^{-6}
Air quality		
Ozone precursors	Nitrogen	2×10^{-9} to 20×10^{-9}
30 component VOCs (C_2 - C_9)	Nitrogen	10×10^{-9} to 100×10^{-9}
Sulphur dioxide	Nitrogen or Air	50×10^{-9} to 500×10^{-9}
Nitric oxide	Nitrogen	50×10^{-9} to 500×10^{-9}
Nitrogen dioxide	Nitrogen or Air	50×10^{-9} to 500×10^{-9}
Benzene, toluene, xylene and ethylbenzene	Nitrogen	10×10^{-9} to 500×10^{-9}

Gaseous Species	Matrix	Amount Fraction Range (mol/mol)
Natural gas †		
Methane		42×10^{-2} to 99×10^{-2}
Nitrogen		200×10^{-6} to 35×10^{-2}
Carbon dioxide		500×10^{-6} to 25×10^{-2}
Ethane		200×10^{-6} to 17×10^{-2}
Propane		200×10^{-6} to 8×10^{-2}
i-butane		40×10^{-6} to 1.85×10^{-2}
n-butane		50×10^{-6} to 1.85×10^{-2}
neo-pentane		10×10^{-6} to 0.35×10^{-2}
i-pentane		40×10^{-6} to 0.43×10^{-2}
n-pentane		40×10^{-6} to 0.43×10^{-2}
n-hexane		20×10^{-6} to 0.43×10^{-2}
Helium		250×10^{-6} to 0.9×10^{-2}
C_6 -C_{10} hydrocarbons		10×10^{-6} to 0.4×10^{-2}
Natural gas odorants		
Hydrogen sulphide	Methane or Nitrogen	0.4×10^{-6} to 0.5×10^{-2}
Carbonyl sulphide		0.4×10^{-6} to 0.5×10^{-2}
Dimethyl sulphide		0.4×10^{-6} to 0.5×10^{-2}
Ethyl methyl sulphide		0.4×10^{-6} to 0.5×10^{-2}
Diethyl sulphide		0.4×10^{-6} to 0.5×10^{-2}
Methyl mercaptan		0.4×10^{-6} to 0.5×10^{-2}
Ethyl mercaptan		0.4×10^{-6} to 0.5×10^{-2}
i-propyl mercaptan		0.4×10^{-6} to 0.5×10^{-2}
n-propyl mercaptan		0.4×10^{-6} to 0.5×10^{-2}
tert-butyl mercaptan		0.4×10^{-6} to 0.5×10^{-2}
Tetrahydrothiophene		0.4×10^{-6} to 0.5×10^{-2}
Odour		
n-butanol	Air or Nitrogen	10×10^{-6} to 80×10^{-6}
1-pentene	Air or Nitrogen	1×10^{-6} to 60×10^{-6}
Evidential breath alcohol		
Ethanol	Air or Nitrogen	50×10^{-6} to 2000×10^{-6}
Methanol and ethanol	Air or Nitrogen	100×10^{-6} to 1000×10^{-6}
Acetone and ethanol	Air or Nitrogen	100×10^{-6} to 1000×10^{-6}
Toluene and ethanol	Air or Nitrogen	100×10^{-6} to 1000×10^{-6}
Methyl ethyl ketone and ethanol	Air or Nitrogen	100×10^{-6} to 1000×10^{-6}
Trace gases		**Detection Limit**
Water	Most inert and passive gases	$< 1 \times 10^{-9}$
Oxygen		$< 1 \times 10^{-9}$
Methane		5×10^{-9}
Non–methane hydrocarbons		5×10^{-9}
Hydrogen		5×10^{-9}
Carbon monoxide		5×10^{-9}
Carbon dioxide		5×10^{-9}

† Pressure of natural gas standards dependent on dew point /Joule-Thomson cooling considerations

NPL specialise in producing custom gas mixtures with guaranteed uncertainties for complex gas analysis. NPL's gas experts are available to discuss specific gas requirements.

For further information, please contact:

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