



Services of the Gas Analysis Laboratory: Analysis and calibration

Possibilities for immission gases

Material measure	Measurand	Measurement range	Measurement uncertainty		With CMC ¹ entry	Remarks
			U (min.)	U (max.)		
NO ₂ gas mixture	Substance amount fraction	10 µmol mol ⁻¹ ... 100 µmol mol ⁻¹	1.5 %	1.5 %	Yes	
NO ₂ gas mixture	Substance amount fraction	20 nmol mol ⁻¹ ... 1'000 nmol mol ⁻¹	2 %	3 %		
NH ₃ gas mixture	Substance amount fraction	10 µmol mol ⁻¹ ... 100 µmol mol ⁻¹	11 %	11 %	Yes	
NH ₃ gas mixture	Substance amount fraction	2 nmol mol ⁻¹ ... 400 nmol mol ⁻¹	1.7 %	2.1 %	Yes	
BTEX gas mixture (Benzene, Toluene, Ethylbenzene, o-, m- and p-Xylene)	Substance amount fraction	2 nmol mol ⁻¹ ... 1'000 nmol mol ⁻¹	1 %	5 %		Binary or multi-component mixture
Ozone	Substance amount fraction	1 nmol mol ⁻¹ ... 1'000 nmol mol ⁻¹	Q[1.1, 0.022 · x(O ₃)] nmol mol ⁻¹		Yes	
NO _x measurement device	Substance amount fraction of NO and NO ₂	20 nmol mol ⁻¹ ... 1'000 nmol mol ⁻¹	NO: 1.5 % NO ₂ : 2 %	NO: 2.5 % NO ₂ : 3 %		
NH ₃ measurement device	Substance amount fraction	2 nmol mol ⁻¹ ... 400 nmol mol ⁻¹	2 %	3 %	Yes	
BTEX measurement device	Substance amount fraction of Benzene, Toluene, Xylene, Ethylbenzene	2 nmol mol ⁻¹ ... 1'000 nmol mol ⁻¹	1 %	5 %		Binary or multi-component mixture
H ₂ O measurement device	Substance amount fraction	5 µmol mol ⁻¹ ... 15 µmol mol ⁻¹	2.5 %	2.5 %	Yes	Trace moisture
Permeation unit with NO ₂ , NH ₃ , SO ₂ , Benzene, Toluene, Ethylbenzene, m-Xylene, o-Xylene, etc.	Mass flow through the membrane	80 ng min ⁻¹ ... 10'000 ng min ⁻¹	0.5 %	3 %		Other volatile substances on demand

Calibration of measurement devices or gas mixtures for other species such as HCOH, SO₂, N₂O, SF₆, volatile organic compounds (VOC) on demand

Measurements possibilities for gas mixtures

Analyte	Carrier gas	Substance amount fraction (standard)	Measurement uncertainty		With CMC ¹ entry
			U (min.)	U (max.)	
CO	N ₂	1 µmol mol ⁻¹ ... 200 µmol mol ⁻¹	0.6 %	1 %	Yes
	N ₂	1 mmol mol ⁻¹ ... 50 mmol mol ⁻¹	0.4 %	0.4 %	Yes
CO ₂	N ₂	10 mmol mol ⁻¹ ... 200 mmol mol ⁻¹	0.35 %	0.35 %	Yes
C ₃ H ₈	N ₂	100 µmol mol ⁻¹ ... 4'000 µmol mol ⁻¹	0.4 %	0.4 %	Yes
NO	N ₂	20 µmol mol ⁻¹ ... 150 µmol mol ⁻¹	1 %	1 %	Yes
		100 nmol mol ⁻¹ ... 10'000 nmol mol ⁻¹	0.5 %	2 %	
O ₂	N ₂	50 mmol mol ⁻¹ ... 250 mmol mol ⁻¹	0.4 %	0.4 %	Yes
Breath alcohol	Humidified air	50 µg L ⁻¹ ... 2'000 µg L ⁻¹	1.5 %	3 %	

¹ CMC = Calibration and Measurement Capabilities

Reference gas mixtures for halogenierte VOCs

Analyt	Carrier gas	Substance amount fraction (pmol mol ⁻¹)	Measurement uncertainty U (%)
HFO-1234yf (2,3,3,3-Tetrafluoroprop-1-ene)	Synth. Air	1.1	1.3
HFC-125 (pentafluoroethane)	Synth. Air	32.1	1.3
CFC-13 (chlorotrifluoromethane)	Synth. Air	3.3	1.2
HCFC-132b (1,2-dichloro-1,1-difluoroethane)	Synth. Air	1.1	1.2
1,2-dichloroethane	Synth. Air	10.0	1.8
HFO-1336mzz(Z) ((2Z)-1,1,1,4,4,4-hexafluorobut-2-ene)	Synth. Air	1.0	2.1
HFC-32 (difluoromethane)	Synth. Air	31.6	1.4
HFC-365mfc (1,1,1,3,3-Pentafluorobutane)	Synth. Air	1.4	2.3
CH ₂ Cl ₂ (dichloromethane)	Synth. Air	55.6	1.7
CCl ₄ (carbon tetrachloride)	Synth. Air	74.6	0.8

Type approval and conformity evaluation

- **Exhaust gas measuring instrument for combustion plants:**
On the basis of the ordinance of the FDJP on the exhaust gas measuring instrument for combustion plants (941.210.3) and the EN 50379
- **Breath alcohol analyser, breath testers**
On the basis if the ordinance of the FDJP on the breath alcohol analyser (941.210.4) and the OIML R126 and the EN15964
- **Ozone emission**
Air cleaner: assessment according to IEC 60335-2-65

Verification

For the official controls

- exhaust gas measuring instrument for combustion plants for the combustible substance; fuel oil extra light, natural gas et and wood
- Breath alcohol analyser
- Breath analyser

Various

- Production of ethanol reference solution $\gamma(\text{EtOH}) = 0.5 \text{ g L}^{-1} \dots 5 \text{ g L}^{-1}$ (measurement uncertainty (U): 0.35 %).
- Rental of mobile reference gas generators

For further information, please contact:

Federal Institute of Metrology METAS
Gas analysis Laboratory
Lindenweg 50
CH-3003 Bern-Wabern
Tel +41 58 387 01 11
gas@metas.ch