CCQM-K137, Nitrogen Monoxide (NO) in nitrogen, 30 µmol mol^{-1} and 70 µmol mol^{-1} Support for Calibration and Measurement Capabilities

1 Preamble

This guidance note is aimed at reviewers of calibration and measurement capabilities, supported by the participation in a key comparison. In principle, support to measurement capabilities is limited to those measurement results that are consistent with the key comparison reference value (KCRV). In this key comparison [1], several measurement results were not consistent with the KCRV. For those results, this guidance note provides larger expanded uncertainties, based on the GAWG strategy document [2]. The idea behind these larger uncertainties is that

a) National Metrology Institutes (NMIs) can still use their participation in a key comparison to support their measurement service;

b) The stated uncertainty is large enough to ensure comparability with the KCRV and the results of other NMIs;

c) There is a harmonised way of dealing with discrepant results in relation to CMCs.

Discrepant measurement results can occur for a number of reasons. For a discussion of the measurement result in CCQM-K137, see the final report [1]. In case of incidental discrepant results, the default response would be to investigate the cause of the discrepancy and to resolve it [3]. Hence, the attached table should not be viewed as

a) A substitute for appropriate corrective measures from the side of the NMI to resolve the discrepancy;

b) A consent from the GAWG that the submitted measurement result is acceptable;

c) A guarantee that a CMC submitted in accordance with this guidance note will be accepted by reviewers in the review process by the Regional Metrology Organisations;

d) Support for the metrological traceability of the measurement result submitted;

e) A direction or recommendation to assessors in peer reviews or accreditation visits.

2 Support for CMCs

Tables 1 and 2 show the ranges of the amount fractions and the expanded uncertainties supported by participation in CCQM-K137 [1], calculated in accordance with the GAWG Strategy document [2]. Amount fractions below 10 µmol mol^{-1} are supported by results at 30 µmol mol^{-1} nominal value (Table 1), while the ranges above 10 µmol mol^{-1} are supported by results at 70 µmol mol^{-1} nominal value (Table 2). To avoid a step change in the uncertainty at 10 µmol mol^{-1}, the lower limit for the second range is fixed by the data from the comparison at 30 µmol mol^{-1}.

This does not apply to VNIIM and VSL as they did not participate in the comparison at both compositions. For VNIIM, the uncertainty for the 30 µmol mol^{-1} mixture has been used to cover the full range. For VSL, a value of 0.45% relative has been used to cover the lower range and reflects supportive evidence provided.

Table 1: Supported ranges and expanded uncertainties for amount fractions below 10 µmol mol^{-1}

	Amount Fraction (µmol mol^{-1})		Expanded Uncertainty (% Rel)	
	From	To	From	To
BFKH	0.419	10	100	4.187
CERI	0.032	10	100	0.316
GUM	0.499	10	100	4.986
KRISS	0.067	10	100	0.667
LNE	0.022	10	100	0.225
NIM	0.050	10	100	0.501
NMIA	0.087	10	100	0.866
NMISA	0.056	10	100	0.562
NPL	0.020	10	100	0.200
VNIIM	0.004	10	100	0.040
NIST	0.012	10	100	0.121
VSL	0.045	10	100	0.450

Table 2: Supported ranges and expanded uncertainties for amount fractions above 10 µmol mol^{-1}

	Relative Regime			
	Amount Fraction (mmol mol^{-1})		Expanded Uncertainty (% Rel)	
	From	To	From	To
BFKH	10	500	4.187	1.752
CERI	10	500	0.316	0.320
GUM	10	500	4.986	4.085
KRISS	10	500	0.667	0.461
LNE	10	500	0.225	0.229
NIM	10	500	0.501	0.501
NMIA	10	500	0.866	0.443
NMISA	10	500	0.562	0.300
NPL	10	500	0.200	0.143
VNIIM	10	500	0.040	0.040
NIST	10	500	0.121	0.185
VSL	10	500	0.450	0.300

3 Bibliography

[1]. J Viallon, E Flores, F Idrees, P Moussay, R I Wielgosz, S H Oh, S Lee, B M Kim, G Nieuwenkamp, A Van der Veen, O V Efremova, L A Konopelko, Y A Kustikov, A V Kolobova, H Shuguo, J Carney, M E Kelley, G C Rhoderick, J T Hodges, S Uehara, D Akima, P J Brewer, D Worton, S Van Aswegen, T Macé, D Smeulders, J Fükö, N Ntsasa, N Leshabane, K Ramahala, J Tshilongo, D Cieciora, T Shimosaka and N Matsumoto, Metrologia, (2020), 57 08001..

[2]. P J Brewer, A M H van der Veen, GAWG strategy for comparisons and CMC claims. Sèvres : Gas Analysis Working Group, 2016.

[3]. ISO. ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories. Geneva : ISO, 2017.