

International comparison CCQM-K74.2018:

Nitrogen dioxide, 10 $\mu\text{mol mol}^{-1}$

Introduction

This guidance note is provided for reviewers of calibration and measurement capabilities that are supported by participation in a key comparison. In principle, only measurement capabilities of laboratories whose measurement results were consistent with the key comparison reference value (KCRV) can be supported by the result of the key comparison. In this key comparison¹, several measurement results were not consistent with the KCRV. For those results, this guidance note provides enlarged expanded measurement uncertainties, based on the GAWG strategy document² so that:

- a) National Metrology Institutes (NMIs) can use their key comparison results to support their measurement service;
- b) The stated uncertainty is large enough to ensure compatibility with the KCRV and the results of other NMIs; and
- c) There is a harmonised way of dealing with discrepant results in relation to CMCs.

For a full discussion of the measurement results in CCQM-K74.2018, see the [final report](#)¹. Following usual practice laboratories were encouraged to investigate the cause of any discrepancy and to resolve it³.

Support for CMCs

Table 1 lists the amount fraction range for CMCs for Nitrogen dioxide in nitrogen or air and the expanded uncertainties that participants can claim are supported by their measurement results in CCQM-K74.2018¹, based on the GAWG Strategy document². As the comparison resulted in KCRVs calculated at three different times for two different submitted standards for each participant, the values of uncertainties listed in the table are reported for the largest value of the uncertainty obtained when applying the CCQM GAWG strategy. Smaller uncertainties cannot be claimed by NMIs without additional supporting evidence. Laboratories for who enlarged expanded uncertainties needed to be calculated for CMC support due to discrepant results in CCQM-K74.2018 are indicated by an asterisk (*).

Further advice on how to interpret Table 1, and potential limitations of the approach, can be found in [CCQM-GAWG/CMC-06A](#).

Table 1. Supported ranges and expanded uncertainties for CMCs based on participation in CCQM-K74.2018

Laboratory	Nitrogen dioxide in N ₂ or air amount fraction		Expanded uncertainty that is supported by CCQM-K74.2018 participation
	From (μmol/mol)	To (μmol/mol)	<i>U</i> (% rel.)
CERI	10	1000	0.8
GUM	10	1000	2.3
INRIM*	10	1000	13.5
KRISS*	10	1000	20.1
LNE*	10	1000	5.5
METAS	10	1000	1.7
NIM	10	1000	0.3
NMIA*	10	1000	12.4
NMISA*	10	1000	9.5
NPL*	10	1000	5.8
SMU*	10	1000	16.6
UME*	10	1000	19.4
VNIM*	10	1000	10.1
VSL	10	1000	1.2

Note: * indicates the laboratory had at least one discrepant result in CCQM-K74.2018, resulting in the calculation and listing of enlarged expanded uncertainties that can be claimed in CMCs.

1. Flores, E.; Viallon, J.; Idrees, F.; Moussay, P.; Wielgosz, R.; Shinji, U.; Cieciora, D.; Rolle, F.; Segal, M.; Sang-Hyub, O.; Macé, T.; Sutour, C.; Pascale, C.; Zhang, T.; Wang, D.; Guo, H.; Han, Q.; Smeulders, D.; Jozela, M.; Ntsasa, N. G.; Tshilongo, J.; Mphamo, T.; Aswegen, S. V.; Worton, D.; Brewer, P.; Valkova, M.; Tarhan, T.; Efremova, O.; Konopelko, L.; Krom, I. d.; Persijn, S.; Veen, A. v. d., International comparison CCQM-K74.2018: Nitrogen dioxide, 10 μmol mol⁻¹. *Metrologia* **2021**, 58 (1A), 08018.
2. Veen, P. B. a. A. M. H. v. d., CCQM-GAWG strategy for comparisons and CMC claims (GAWG/19-41). Group, G. A. W., Ed. 2016.
3. ISO, ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories. In *International Organization for Standardization*, 2017.