

International comparison CCQM-K175: Hydrogen chloride, 30 $\mu\text{mol mol}^{-1}$

Support for Calibration and Measurement Capabilities

1. Introduction

This guidance document is aimed at reviewers of calibration and measurement capabilities (CMCs), supported by the participation in a key comparison. In principle, support for 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 results in CCQM-K175, 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

Table 1 lists the amount fraction range for CMCs for hydrogen chloride in nitrogen and the expanded uncertainties that participants can claim are supported by their measurement results in CCQM-K175 [1], based on the GAWG Strategy document [2].

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-K175 are indicated by an asterisk (*) in table 1. 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 ($k=2$) for CMCs based on participation in CCQM-K175

| Laboratory | Amount Fraction ($\mu\text{mol mol}^{-1}$) | | Expanded Uncertainty, U (% rel.) |
|------------|--|-----|------------------------------------|
| | From | To | |
| NIST* | 10 | 100 | 11.61 |
| NPL | 10 | 100 | 4.26 |
| VNIIM* | 10 | 100 | 7.48 |
| VSL | 10 | 100 | 2.99 |
| PTB | 10 | 100 | 1.40 |
| KRISS | 10 | 100 | 1.07 |

Note: * indicates the laboratory had a discrepant result in CCQM-K175, resulting in the calculation and listing of enlarged expanded uncertainties that can be claimed as CMCs.

3. References

- [1] J. Jung, S. Oh, B. Kim, C. Cecelski, C. Goodman, J. Carney, D. Worton, Yoana Hristova, M. Ward, R. Hill-Pearce, P. Brewer, J. Nwaboh, V. Ebert, L. A. Konopelko, Y. A. Kustikov, A. V. Kolobova, I. K. Chubchenko, I. de Krom, E. Efremov, A. van der Veen International Comparison CCQM-K175 – Hydrogen chloride in nitrogen. **Metrologia** (2025), TBC
- [2] P J Brewer, A M H van der Veen, GAWG strategy for comparisons and CMC claims (CCQM-GAWG/19-41). Sèvres: Gas Analysis Working Group, 2019.
- [3] ISO. ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories. Geneva: ISO, 2017.