**Draft Protocol for CCQM-K165 Dimethyl sulfide in nitrogen**

Sangil LEE

Gas Metrology Group

Korea Research Institute of Standards and Science

267 Gajeong-ro Yuseong-gu

Daejeon 34113, the Repubic of Korea

Table of Contents

[Background 3](#_Toc2871924)

[Measurand 3](#_Toc2871925)

[Mixtures 3](#_Toc2871926)

[Reference values 3](#_Toc2871927)

[Reporting 3](#_Toc2871928)

[Supported Claims 3](#_Toc2871929)

[Participants 3](#_Toc2871930)

[Schedule 4](#_Toc2871931)

[Coordinator 4](#_Toc2871932)

[Report form 5](#_Toc2871933)

[Calibration standards 5](#_Toc2871934)

[Analytical method 5](#_Toc2871935)

[Uncertainty evaluation 6](#_Toc2871936)

# Background

Dimethlyl sulfide (DMS) is produced by the enzymatic breakdown of its precursor, dimethylsulphoniopropionate (DMSP) which is a metabolite in marine phytoplankton. DMS is oxidized by radicals (OH, NO3) to form its oxidation products (e.g., less volatile compounds (MSA ) and aerosols). Aerosols influence on the atmosphere radiation budget by altering aerosol properties, cloud properties, and interactions with clouds. Sulfur compounds including DMS exist as important impurities in hydrogen fuel. DMS presents at trace levels (nmol mol-1) in the atmosphere and hydrogen fuel. Therefore, it is important to develop measurement capability to quantify DMS in gas mixtures at trace levels for studying climate change and developing high quality hydrogen fuel. This comparison is designed to assess the measurement capability of 5 nmol mol-1 DMS in nitrogen.

# Measurand

Amount-of-substance fraction of DMS in nitrogen

# Mixtures

KRISS will prepare sample gas mixtures in cylinders gravimetrically and then dispatch them to participating laboratories. The nominal amount-of-substance fraction is 5 nmol mol-1.

# Reference values

The amount-of-substance fractions determined gravimetrically by KRISS will be used as the key comparison reference value (KCRV). Each sample cylinder will have its own KCRV and associated uncertainty.

# Reporting

KRISS will prepare the final report to the CCQM. Participating laboratories are responsible to report their measurement data (at least three independent results for statistical analysis) to KRISS in the requested reporting format. Participating laboratories are also responsible to submit detail information for their calibration standards, analytical methods, and uncertainty evaluation. Participating laboratories are responsible for reporting results of stability check after sample cylinders are returned to participants. KRISS is responsible for dispatching sample cylinders to participating laboratories. Participating laboratories are responsible for shipping their sample cylinder back to KRISS.

# Proposed HFTLS

The results from this comparison will be used to underpin laboratories’ calibration and measurement capability claims for DMS in air and nitrogen at the amount-of-substance fraction from 1 nmol mol-1 to 1000 nmol mol-1.

# Participants

Potential participants: KRISS, NPL, VSL, VNIIM, NIM

# Tentative Schedule

|  |  |
| --- | --- |
| **Datea** | **Event** |
| October 2019 | Proposal of draft protocol |
| ~~April 2020~~June 2020 | Agreement of draft protocol |
| ~~June 2020~~July 2020 | Registration of participants |
| July – Oct 2020 | Preparation of sample cylinders by KRISS |
| November 2020 | Shipment of sample cylinders to NMIs |
| Dec 2020 – March 2021 | Measurement of cylinder gas standards by NMIs |
| April 2021 | Return of cylinder gas mixtures to KRISS for stability |
| April – June 2021 | Re-analysis of samples by KRISS for stability check |
| July 2021 | Draft A report to participants |
| Oct 2021 | Discussion of Draft A Report at GAWG meeting |
| April 2022 | Discussion of Draft B Report at GAWG meeting |

aSchedule for this comparison may be adjusted depending on reporting results, shipping samples, and discussion of results.

# Coordinator

Sangil LEE

Korea Research Institute of Standards and Science

267 Gajeong-ro Yuseong-gu

Daejeon 34113, Republic of Korea

Phone: +82-42-868-5020

E-mail: slee@kriss.re.kr

# **Report form**

**CCQM-K165: DMS in nitrogen at 5 nmol mol-1**

Laboratory:

Laboratory code:

Cylinder number:

Measurement 1#

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Component | Date(dd/mm/yy) | Result(nmol mol-1) | Standard deviation(% relative) | Number of replicates |
| DMS |  |  |  |  |

Measurement 2#

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Component | Date(dd/mm/yy) | Result(nmol mol-1) | Standard deviation(% relative) | Number of replicates |
| DMS |  |  |  |  |

Measurement 3#

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Component | Date(dd/mm/yy) | Result(nmol mol-1) | Standard deviation(% relative) | Number of replicates |
| DMS |  |  |  |  |

Measurement X#

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Component | Date(dd/mm/yy) | Result(nmol mol-1) | Standard deviation(% relative) | Number of replicates |
| DMS |  |  |  |  |

**Results**

|  |  |  |  |
| --- | --- | --- | --- |
| Component | Result(nmol mol-1) | Expanded uncertainty(nmol mol-1) | Coverage factor |
| DMS |  |  |  |

## Calibration standards

Please provide a description of the calibration standards used for measurement

## Analytical method

Please provide a description of the instrumentation and method used for analysis

## Uncertainty evaluation

Please provide a description of the evaluation of measurement uncertainty

# **Registration form**

**:** CCQM-K165: DMS in nitrogen at 5 nmol mol-1

|  |
| --- |
| Please complete this document and send it back to:Dr. Sangil LeeGas Metrology GroupKorea Research Institute of Standards and Science267 Gajeong-Ro Yuseong-GuDaejeon 34113, Rep. of KoreaPhone:+82-42-868-5020Fax:+82-42-868-5800Email: slee@kriss.re.kr |

A1. Participating Institute Information:

|  |  |
| --- | --- |
| Institute |  |
| Physical address (for the shipment of the cylinder) |  |
| Contact person |  |
| Phone |  |
| Fax |  |
| e-mail |  |
| Financial address (for the payment of the shipping invoice) |  |

A2. Cylinder import/export:

|  |
| --- |
| What special arrangements, if any, will be required for the import/export of an aluminium cylinder (at 100 bar pressure) containing 5 nmol mol-1 DMSin nitrogen into your country? |