

Developments in Isotope Ratio Measurements for Gas Analysis Workshop

METAS, Berne, Switzerland | 10 October 2019

Rationale

High precision isotope ratio measurements are an expanding and evolving area and have been a key measurement tool in many fields. The delta notation for light elements has been accepted as one of the few traceability exceptions to the SI. For over a decade, to recognise the importance of this field and address measurement challenges, NMIs have made substantial investments in capabilities for isotope ratio measurements and engaged in fundamental and applied research. A new CCQM Isotope Ratio Working Group (IRWG) was established in 2018 to progress isotope ratio measurement science and support measurement applications by providing a permanent forum for NMIs to exchange information, advance capabilities and demonstrate comparability. The Gas Analysis Working Group (GAWG) has made significant advances in recent years to advance the state of the art in measurement capabilities for underpinning source apportionment measurements of greenhouse gases. A pilot study is currently underway to assess the measurement capabilities of NMIs and expert laboratories for realising measurements of $\delta^{13}\text{C}\text{-CO}_2$ and $\delta^{18}\text{O}\text{-CO}_2$ on the VPDB scale.

Objectives

The workshop organised by the CCQM - IRWG and CCQM - GAWG has the following objectives:

1. To highlight novel research and advances in isotope ratio measurements for gas analysis
2. To promote scientific exchange amongst NMIs, expert laboratories and stakeholders
3. To identify future measurement requirements and opportunities

Agenda

09:00 Welcome address **Paul Brewer and Zoltan Mester**

SESSION 1: ADVANCES IN GAS REFERENCE MATERIALS FOR ISOTOPE RATIO

09:10 CO₂ isotope research: analysis, reference materials and achievements within the SIRS project **Harro Meijer**

09:40 N₂O isotope research: analysis, reference materials and achievements within the SIRS project **Joachim Mohn**

10:10 Developments with the VPDB scale materials and linking to WMO-GAW **Sergey Assonov**

10:40 COFFEE BREAK

11:00 Current stable isotope ratio measurements in China **Lu Hai**

11:30 Isotope ratio measurements by IRMS in TUBITAK UME **Adnan ŞİMŞEK**

12:00 LUNCH

SESSION 2: ADVANCES IN SI TRACEABLE MEASUREMENTS

13:00 SI-traceable carbon isotope ratios **Philip Dunn**

13:30 SI traceable isotope ratios of carbon dioxide— a feasibility study **Lukas Flierl**

14:00 Stable isotope primary reference gas mixtures for determination of SI traceable isotope ratio of international reference materials **Kiryong Hong**

14:30 TEA BREAK

SESSION 3: ADVANCES IN SPECTROSCOPY AND FIELD MEASUREMENTS

14:45 Insights into the new tracer ¹⁷O-excess: results from the Swiss precipitation network **Markus Leuenberger**

15:15 New method for high precision measurements of water inclusions in speleothems-based laser absorption spectroscopy and its application **Stéphane Affolter**

15:45 Calibration methods for IRIS instruments for high precision measurements of $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ in CO₂ **Edgar Flores**

16:15 Challenges of using noble gas isotope ratios for reconstructing mean global ocean temperatures **Daniel Baggenstos**

16:45 Concluding remarks **Paul Brewer and Zoltan Mester**

APERITIF AND NETWORKING