

Review of Birks et al., AMTD, <https://doi.org/10.5194/amt-2019-399>

This manuscript reports specifications and characterization tests for portable calibrators dedicated to the generation of NO and NO₂/NO/O₃ transfer standards. A special attention was put on assessing their performance in terms of stability, reproducibility, precision and accuracy. An originality of this work is the use of N₂O photolysis to generate a known concentration of NO, which when combined to a previously described O₃ generator, allows the generation of a known concentration of NO₂ using the gas phase titration technique. The authors showed that these calibrators meet the US-EPA requirements for transfer calibration standards (based on the requirements for a level 4 ozone transfer standard).

This manuscript is well structured and well written but some clarifications need to be made about the different analyzers that were used to perform all the reported experiments. Different models of monitors were used and when the same model was used in different experiments, it is not clear whether it was the same monitor. In addition, the authors often indicate that the measurements were made using a “recently calibrated XXX monitor”. How was the monitor calibrated? The authors should clarify these two points.

The reviewer recommend publication in AMT after the authors address the other following comments:

Major comment: Since these apparatus will be used for the calibration of NO_x monitors based on chemiluminescence, the authors should address whether the use of a large concentration of N₂O could lead to the quenching of the chemiluminescence.

Minor comments:

P8 L233: Please indicate what types of O₃ and NO_x scrubbers were used

P9 L249-250: The authors indicate that it is important to maintain a constant ratio of lamp emission between 184.9 and 253.7 nm. How is this ratio changing with the lamp aging? In addition, it is mentioned that NO is varied by adjusting the lamp emission. How is it done? If the current or the voltage applied to the lamp is varied, the authors should comment on the impact on the 184.9nm/253.7nm emission ratio?

P16 Fig.6: The repeatability for NO generation tested over 6 days is excellent. Based on their practical experience, could the authors comment on the repeatability over a longer period? Weeks? Months?

Technical corrections:

P6 L172-173: “O” should read “O(³P)”

P5 L173: M is missing on the right hand side of the equation

P8 L226: “photolytic NO converter” should read “photolytic NO₂ converter”

P18: L436: “the NO calibrator of ambient pressure” should read “the NO calibrator on ambient pressure”

P 21 L476-494: This section should be moved in 3.2 when the calibration sources are first described.

P22 L 539: Section 3.2.3 does not exist. Should it read “section 3.3”?

P24 Fig. 10: Please add the O₃ setpoints in the table.

P26 L588: Please replace “NO_{meas}” by “NO_{meas,O3>0}” and “NO_{O3=0}” by “NO_{meas,O3=0}”