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Atmospheric Measurement Techniques Discussions



# *Interactive comment on* "A novel semi-direct method to measure OH reactivity by chemical ionisation mass spectrometry (CIMS)" *by* Jennifer B. A. Muller et al.

**Anonymous Referee #2**

Received and published: 15 May 2018

The manuscript by Muller et al. described a new method for OH reactivity measurement by CIMS technique, which can only be realized by LIF-Fage technique before. The authors introduced the instrument setup as well as the calibration method and discussed the sources of uncertainty in great detail. The interference from HOx recycling by NO, known as the major uncertainty when measuring OH reactivity, was explored by box model simulations and laboratory experiments. Empirical equations were used to correct the underestimation of OH reactivity by NO interference under different situations and proved to be applicable. The chamber inter-comparison measurements shown the ability of the instrument to take measurements in 1∼15 s-1 even with several ppb of NO. Finally the 1-year ambient measurement results at MOPh was outstanding and



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are helpful for better understanding the tropospheric oxidative capacity. The restriction of application in low OH reactivity and low NO environment is also clearly stated. The manuscript is well written and I would recommend for publication after the authors addressed the following comments:

Line 31 on Page 3: With 13 SLM sample flow through the 0.019 m diameter chemical reactor sample tube. . .

Comment: The flow rate control in the sample tube is critical in the instrument setup since it is directly related to the scaling rate as well as wall loss rate. It is not clearly stated in the manuscript what the flow rate, how the flow is controlled and what the size of the sample tube in Fig.1 is. Is the pressure in the sample tube close to ambient pressure? All these information will be helpful to understand the reactions between two titration zones.

Line 6 on Page 7: Additionally, changes in volume flow rates can also affect flow characteristics in the sample tube, and therefore OH wall loss and. . .

Line 23 on Page 9: However the wall loss rate can be affected as the measurement of zero reactivity is done with synthetic air . . .

Comment: The wall loss rate is a common issue of OH reactivity measurement and can be caused by various reasons. the wall loss rate can be measured by zero reactivity measurements as well as OH reactivity calibrations, which shall give similar results. In the manuscript the causes of the wall loss rate were discussed in several parts but little data were shown. A more detailed the wall loss rate measurement results will be helpful to prove the stability and capability of the instrument.

Line 18 on Page 14: The effect of OH reactivity underestimation was considerably stronger for CO than for the other OH reactants, so only data from propane, ethane and isoprene experiments were used to derive a correction function. . .

Comment: In Page 19 Line 14, the authors mentioned ‘inorganic trace gases such as





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CO and NO2 which contribute greatly to the total OH reactivity at MOPh'. Why was the CO experiments not used when CO is the main contributor of OH reactivity at MOPh?

Minor comments:

Line 17 on Page 14: 'specie' should be 'species'

Line 19 on Page 14: 'ethane' should be 'ethene'

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