Atmos. Chem. Phys. Discuss.,
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Kinetics of the OH + NO_2 reaction: Effect of water vapour and new parameterisation for global modelling" *by* Damien Amedro et al.

Anonymous Referee #1

Received and published: 19 December 2019

This is an excellent and very careful study of the kinetics of the reaction of OH radical with NO2, a reaction of central atmospheric significance. The main finding associated with this work (the second paper from this group on this reaction) is the finding of a significant enhancement to the OH/NO2 rate coefficient in the presence of water vapor. This enhancement is quantified in both N2 and He bath gas, and as a function of temperature. The data appear to be of the highest quality, previous data are discussed in detail, and the modeling work adds significantly to the atmospheric context, and hence the overall value of the manuscript. Overall a superb study! I recommend publication in ACP, after consideration of the minor comments listed below.

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Discussion paper

L12 – molecule misspelled.

L64 – exponent should be +3.

L127 – evaluation of atmospheric

L148- Maybe it is obvious, but it could be added to the text that fitting with an increased Fc gives a lower ko, (which doesn't fit the data).

Page 4,5 - The pure He data are taken here at 292 K, somewhat below other 'room temperature' datasets that comparisons are being made with. Has this has been taken into account? If not, could this account for at least some of the systematic discrepancies with D'Ottoni or Morley? On a related point, there is a T-dependence to the He ko that appears in various places (captions to Fig 2, Fig 4b, L252). What is the origin of this value? (I think it is mostly unnecessary).

L209- delete molecules

L252 – temperature dependence

L254 – delete use

L275 and forward – The tests for HONO and HNO3 are really nice !

L297 – temperature instead of temperatures

L342 – H2O, not HO2, as product of (R7)

L406 – short at

L408 – temperature and pressure conditions

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