Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC3
https://doi.org/10.5194/acp-2021-228-RC3, 2021

Comment on acp-2021-228

Anonymous Referee #3

Referee comment on "Reactions of NO_3 with aromatic aldehydes: gas-phase kinetics and insights into the mechanism of the reaction" by Yangang Ren et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-228-RC3, 2021

This manuscript describes a detailed investigation of the reactions of seven aromatic aldehydes with the nitrate radical. Rate coefficients have been determined using two experimental methods and the results are in very good agreement. Theoretical calculations have also been carried out to understand the reactivity patterns and mechanisms. The data obtained in this work is of high quality and interpreted well. Overall, the manuscript is well written and presented. I recommend publication after the authors satisfactorily address my minor comments below.

- My main comment is that the authors have neglected direct photolysis as a potential degradation pathway for the aromatic aldehydes. As demonstrated by Clifford et al. (2011), this pathway is certainly important for o-tolualdehyde, where the lifetime due to photolysis can be as short as 1-2 hours. The authors should incorporate this into the relevant parts of their manuscript (lines 51-55, lines 543-560, Table 2).
- Line 103: please add detection limit for nitrate radical in units of molecule/cm^3.
- Line 126: replace "watching" with "monitoring".
- Line 143: should be [ref]
- Lines 174, 177 and maybe elsewhere: use a big K for the equilibrium constant.
- Table 1, Table 2 and tables in SI: use "rate coefficients" instead of "rate constants" to be consistent with other parts of the manuscript.

Reference for Clifford et al:

G.M. Clifford, A. Hadj-Aïssa, R.M. Healy, A. Mellouki, A. Muñoz, K. Wirtz, M. Martín Reviejo, E. Borrás, J.C. Wenger

The atmospheric photolysis of o-tolualdehyde

Environ. Sci. Technol., 40 (2011), pp. 9649-9657