EGUsphere, referee comment RC2
https://doi.org/10.5194/egusphere-2022-1317-RC2, 2023

Comment on egusphere-2022-1317

Anonymous Referee #2

Referee comment on "A combined gas- and particle-phase analysis of highly oxygenated organic molecules (HOMs) from *α*-pinene ozonolysis" by Jian Zhao et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-1317-RC2, 2023

Understanding the molecular level of aerosol formation has been a long-standing challenge, especially concerning the detailed chemical composition of organic aerosols. Zhao et al. used a new VIA-nitrate-CIMS technique to measure the detailed chemical composition of SOA produced by ozonolysis of α-pinene and provided some interesting new insights. They found the detected HOM molecules in the aerosol phase are significatnly different from the "condensed" phase, especially in the dimer range, and indicated that the aerosol phase reactions influenced the aging processes. The manuscript is overall well organized. And more importantly, this is an encouraging attempt and can be an important step in understanding organic molecules in the aerosol phase. I recommend it can be published after a minor revision.

- The main findings from this work are, to some extent, similar of Pospisilova et al., 2020. Both studies suggest that aerosol phase reaction plays important role in the aging processes, and the decay of C20 and C19 HOM dimers was likely the source of C17 dimers in the aerosol phase. I suggest that the authors can discuss more on the difference from Pospisilova et al., 2020.
- My biggest concern is still how much we can trust the VIA measurement. Is it possible the heating in the inlet speed up the decay of condensed HOM dimers? The authors suggested some possible reactions that should be responsible for the particle phase processes, e.g., the Baeyer-Villiger reactions. Does the heating process have the potential to influence the Baeyer-Villiger reactions?
- Please provide the NO concentration for all the NOx runs
- Although I understand this is no longer possible in this work, it would be interesting to compare the three technologies, EESI, VIA, and FIGAERO in an experiment together.

Pospisilova, V., Lopez-Hilfiker, F. D., Bell, D. M., El Haddad, I., Mohr, C., Huang, W., Heikkinen, L., Xiao, M., Dommen, J., Prevot, A. S. H., Baltensperger, U., and Slowik, J. G.: On the fate of oxygenated organic molecules in atmospheric aerosol particles, Science Advances, 6, eaax8922, doi:10.1126/sciadv.aax8922, 2020.