

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-1006

Anonymous Referee #1

Referee comment on "Volatility parameterization of ambient organic aerosols at a rural site of the North China Plain" by Siman Ren et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-1006-RC1>, 2022

This work utilized FIGAERO-LToF-CIMS for offline organic aerosol volatility characterization. The authors identified a series of CHO and CHON compounds from ambient samples and developed empirical volatility-molecular formula functions making use of the desorption thermograms that can be obtained by FIGAERO. This study also compared two different methods for laboratory standard compound calibration, which is useful information for FIGAERO users. This paper is overall well written and organized. One suggestion is that, both CHO and CHON were characterized for ambient samples, but it seems that they were treated the same in subsequent analyses. It would be helpful to label CHO and CHON differently in the figures. In addition, O/C ratio was used to distinguish compounds, which should also be discussed differently for CHO and CHON compounds. More specific comments are described below.

- Line 14: "Because most standard particulate organic compounds are scarce..." This sentence is incomplete.
- Line 86: the success of the methods depends on many factors, not only the standards' thermogram characterization. Please clarify here.
- Line 112: what is the heating temperature ramping rate? The ramping rate can have an influence on the thermal desorption/decomposition process (Yang et al. 2021), and more details here would be helpful.
- Line 138: can the authors explain here how they determine the particle density?
- Line 149: "It is assumed that the atomized particles were internally mixed with the same mass ratio as that in the solution." Ammonium sulfate is much less volatile than organic compounds mixed with it, and it's highly possible the AS/Org ratio in the particles is higher than that in the solution. More evidence or discussion of the potential bias is needed.
- Figure 1: Besides fitted lines, can the author also add the raw data points from each measurement? In addition, can the authors add to the legend the corresponding experiment sets No. (as in Table 1)?
- Line 235-240: sample NO.4 and NO.5 are different mixtures of different masses, making it hard to compare them. I suggest adding another set of experiments atomizing 500 ng AS + 500 ng Organics (each).

- Line 285: 181 out of 1448 measured species were included in further analysis. I wonder how much of the total signals can be accounted for by the 181 compounds. Are they the most dominant compounds?
- Line 306: "The data points for the higher-temperature ones in double-peak thermograms that in fact, do not correspond to a T_{max} are removed." How many, if not all, of them are removed?

References

Yang, L.H., Takeuchi, M., Chen, Y., Ng, N.L., 2021. Characterization of thermal decomposition of oxygenated organic compounds in FIGAERO-CIMS. *Aerosol Science and Technology* 55, 1321-1342.