

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-285

Anonymous Referee #1

Referee comment on "Isothermal evaporation of α -pinene secondary organic aerosol particles formed under low NO_x and high NO_x conditions" by Zijun Li et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-285-RC1>, 2022

This study investigates the isothermal evaporation of α -pinene secondary organic aerosol (SOA) formed under both low- and high-NO_x conditions and under a range of relative humidity conditions. Applying positive matrix factorization (PMF) simplifies the analysis of mass spectra data. Linking the changes in individual PMF factors during isothermal evaporation and their volatility information obtained from FIGAERO-CIMS enables separation of the physical process - evaporation from chemical processes, e.g. hydrolysis. Although the evaporation behavior of α -pinene SOA with low-NO_x and the influence of humidity on particle evaporation behavior have been published in a previous paper (Li et al, 2021), I think it still provides valuable information on the evaporation and evolution of the SOA formed under high-NO_x conditions. There are a few major and minor comments I would like the authors to address before it is considered for publication in ACP.

Major comments:

(1) A link between the PMF factors and their corresponding chemical reactions/pathways is missing. As the chemical composition of individual factors is available, it would be possible and great to build the link to help better understand the mechanisms behind the observed changes and differences.

(2) I am wondering about any relationship and/or correlation between the factors of non-nitrated organics and the factors of organic nitrates for high-NO_x systems? I understand separating non-nitrated organics and organic nitrate allows having common PMF factors for low- and high-NO_x systems. However, especially when discussing potential transformation, these factors are closely related. The discussion of NCR of the factors of non-nitrated organics and the factors of organic nitrates should not be separated.

Minor comments:

Line 160: It would be nice to add some explanation about why the thermograms of factors (with fixed molecular composition, oxidation state, etc) would change/shift under different conditions.

Line 267-268: For F5, T_{max} is actually the temperature of thermal decomposition, right? In this case, how did you calculate the volatility based on the thermal decomposition temperature?

Line 320 -322: This sentence is difficult to follow.

Line 386 – 398: In Figure 7, there is no NCR for individual NF factors, I would suggest adding the NCR of individual NFs to Figure 7 or a SI figure.

Line 682: "FIGERO" -> "FIGAERO".

SI

Figure S6, S10: what are "DMA blanks" and "snap blanks"? Specify them.

Figure S6: In the figures of high-NO_x dry fresh and dry RTC, the background factor (black dashed lines) has nice thermograms with T_{max} of 60 – 70? It is different compared to their thermograms in blanks (e.g. Snap blank 40). Why?