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Comment on acp-2021-367 Li et al.

Anonymous Referee #2

Referee comment on "Evolution of volatility and composition in sesquiterpene-mixed and α -pinene secondary organic aerosol particles during isothermal evaporation" by Zijun Li et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-367-RC2>, 2021

Li et al. conducted laboratory experiments to investigate the change in volatility and composition during the evaporation of SOA formed from alpha-pinene and a mixture of sesquiterpenes. They conducted two types of experiments, isothermal evaporation and thermo-desorption using the FIGAERO CIMS. They ran the experiments under different RH conditions to probe possible diffusive limitations and water-induced changes in composition. This study is well within the scope of the journal. However, there are some important missing pieces of information that affect the final conclusions. My comments are the following:

1. What were the mass concentrations of these experiments? How variable were the concentrations in dry and high RH experiments? It is unclear if the change in volatility (and composition) was due to the difference in mass loading which to the first order, determines the volatility distribution in the particles.

2. Here particles were generated using an OFR, and the average O/C value (from Table S1) is on the high end compared to the O/C from most of the alpha-pinene SOA generated in chamber experiments. In fact, many studies on SOA viscosity were done using chamber SOA. The authors should discuss the effects of the highly oxidized (and polar) nature of the particles on the evaporation behavior and how would this affect the comparison to other studies.

3. Did the presence of moist on the FIGAERO filter in high RH experiments affect the thermograms? Did the authors conduct any tests to make sure that for a single compound, or a mixture of known compounds, high RH did not change the shape of the thermograms?

4. How was the relationship between T_{desorp} and volatility determined (Figure 2a)? Did the authors do any calibration using known compounds?

5. What was the vapor wall loss in the residence time chamber? How did vapor wall loss affect particle volatility and composition in the experiments?

6. Based on Figure 3b, it seems that the authors did not observe O3 and O4 species that are known to be major α -pinene oxidation products (e.g. pinic acid, pinoic acid). What is the reason for that?