

## ***Interactive comment on “Molecular composition and volatility of isoprene photochemical oxidation secondary organic aerosol under low and high NO<sub>x</sub> conditions” by Emma L. D’Ambro et al.***

**Anonymous Referee #2**

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### General Comments

In this manuscript the authors report results of a study of the formation of aerosol from the OH oxidation of isoprene. Experiments were conducted in an environmental chamber under high and low NO<sub>x</sub> conditions, and gas and aerosol composition and particle volatility were analyzed using a FIGAERO-CIMS instrument with iodide ionization. A major focus was an evaluation of the effects of NO<sub>x</sub> on organic nitrate and SOA formation, gas-particle partitioning, and particle volatility. Information was also obtained on the possible role of oligomer formation on SOA composition and yield. The lab results were used to help interpret measurements made with the same instrument at the 2013 SOAS campaign, providing additional insight into the role of isoprene in aerosol

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chemistry. The study was well done, including measurements, data analysis, and interpretation. The manuscript is also well written. Overall the manuscript is of high quality and represents an important contribution to atmospheric chemistry. I recommend it be published after the following comments are addressed.

### Specific Comments

1. Line 160–162: Were the seed particles dried before entering the chamber. If not, might they not stay as deliquesced particles since the 50% RH is above the efflorescence point?
2. Lines 212–215: If wall loss of NO is significant would you expect wall loss of organic vapors to also be significant?
3. Lines 226–227: It would be useful to explain how you get the factor of 1.5 used to correct AMS data for particle wall loss.
4. I am aware of the mechanism for forming IEPOX under low NO<sub>x</sub> conditions, in which OH is lost from an –OOH group as the epoxide is formed. Is there an analogous mechanism for forming IEPOX under high NO<sub>x</sub> conditions in which NO<sub>2</sub> is lost from a Ñ–ONO<sub>2</sub> group? If so it might be worth mentioning.
5. Lines 336–338: This sentence is confusing to me. Are you saying that HO<sub>2</sub> reacts with an alkene C=C double bond? I don’t think this happens.
6. Lines 344–348 and elsewhere: What about the possibility that HNO<sub>3</sub> serves as an acid catalyst under high NO<sub>x</sub> conditions?
7. Lines 394–395: I’m not sure what “included” means here. Do you mean the estimates have been corrected for these effects? Could make this clearer.
8. Lines 393–394. What are the estimated uncertainties in the measured values of F<sub>p</sub>? 9. Lines 481–502: With regards to the possible presence of accretion reaction products: Do you observe any masses with identical profiles to C<sub>5</sub>H<sub>12</sub>O<sub>6</sub> or C<sub>5</sub>H<sub>10</sub>O<sub>6</sub>

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that would be indicative of co-products of the thermal decomposition reactions?

10. Lines 521–525: Is it likely that SOA can have high viscosity at the temperatures used for thermal desorption?

Technical Comments

1. Line 477: Should be “predicted”.

2. Line 490: Should be FIGAERO-CIMS

3. Throughout the paper it seems like you switch arbitrarily from FIGAERO to FIGAERO-CIMS. I suggest you choose one and stick with it.

4. Line 618: Is the volatility of IEPOX really known to 5 significant figures?

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