

Interactive comment on “Isoprene oxidation by nitrate radical: alkyl nitrate and secondary organic aerosol yields” by A. W. Rollins et al.

Anonymous Referee #2

Received and published: 6 May 2009

The paper presents significant and interesting experimental and model simulation results on isoprene chemistry. The importance of the second generation oxidation products of isoprene are emphasized and well supported. The paper includes important comparisons to some recent work by other groups, although in some cases the comparisons seem to imply inconsistencies without actually specifying what they are. The paper could be improved with minor changes including adding more detail for the sake of clarity and expanding the experimental explanations to strengthen the results found.

Page 8858 Line 3. The acronym SAPHIR should be defined. Line 9. Briefly mention more conditions of the 16 hr experiment. What was the temperature in the chamber? Were the nitrates levels high, low?

Page 8859 Line 1. Word choice? “Traditionally” Line 11. An example of a location

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where high NO_x levels and isoprene sources are collocated would be expected, would add nicely. Line 17 and 21. Specify if these two studies were conducted in chambers. Line 27. Clarify; is the second step the oxidation at the second double bond? Line 19. Perhaps include the lower levels used in the experiment are more relevant to the actual atmosphere. Do the “prior experiments” include Ng. Et al (2008)? Give specific references lest the reader fail to value the prior work appropriately.

Page 8861 “the NOAA group” is an imprecise term which would be somewhat akin statistically to saying “the German group,” and which could refer to thousands of groups at dozens of NOAA facilities – doing a disservice to the scientists involved. For the purposes of accuracy and posterity, perhaps “Ravishankara and coworkers” is meant?

Page 8862 Line 13. Specify the AMS measured non-refractory aerosol chemical.

Page 8863 Line 5. With which instruments was it determined $\approx 90\%$ of the isoprene reacted with NO₃ and $\approx 10\%$ with O₃? Line 8. Were losses to the chamber walls considered?

Page 8864 Line 1. Were the conditions of Kwok et al., 1996 ‘s work similar to the ones used here?

Page 8866 General comment Gas phase products. Use a more descriptive title for the three time periods that refers to the chemistry that dominated in addition to the time period. What were the light conditions during the experiment? Was the amount of light varied to simulate an actual 16 hr period by keeping the shuttering open in the aluminum structure? Also; change “pervious” to “previous”

Page 8868 Line 21. A table summarizing the experiments conducted at different concentrations of isoprene would strengthen the statement high yields of alkyl nitrates is robust.

Page 8869 Line 16. Perhaps mention some other measurements in your experiment that co-occurred with this surprisingly high concentration of MEK, so the reader can

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better understand the environment this occurred in. Line 25 The uncertainty on the “about 40%” and “about 60%” should be clearly stated.

Page 8870 Line 13. Typo? Multiple “only”s. “However, this would contradict the findings of Ng et al. (2008) who report at least 2 nitrogen atoms in almost all of the molecules forming SOA from this system.” This statement seems to imply that Ng claimed a minimum (“contradict”; “at least”) were required; my reading of their work was simply that they did not identify single-nitrogen compounds – not that they claimed they did not exist. I suggest the authors give careful consideration to how they represent their competitors’ work, so as to minimize publication of misleading information. Perhaps they should consider whether their findings might more properly “supplement” or “expand” the earlier work, which would show their contribution while not causing misinterpretation of earlier work.

Page 8871 Line 26. How your experiment addresses alcohols. “then” instead of “than” is meant?

Page 8872 Line 14. Interesting and well-written statement. Line 16. Provide a sense of the time lag between peaks in isoprene concentrations and SOA concentrations. How do you think this time lag might change for observations in an ambient environment?

Page 8874 Line 18 Why was the maximum organic aerosol concentration used?

Page 8892 Fig 2. Provide example structures of NIT 1-4, here or in another table.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 8857, 2009.

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