

Interactive comment on “Temperature effect on physical and chemical properties of secondary organic aerosol from *m*-xylene photooxidation” by L. Qi et al.

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Thank you for your interactive comments. I think you got the summary of the findings quite right. Regarding to the arguments that you don't agree with our conclusion that the gas-particle partitioning theory alone cannot explain our data results, you came up with another plausible argument. We actually tried the experiment you suggested for the temperature cycle to test both arguments further more. Basically, we started the experiment at 278K, and after five hour's irradiation (uncorrected PM volume concentration started decaying), we turned off the lights and let it sit in the dark for another half hour at the same temperature. And then we heated up the temperature to 300K while

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still keeping the lights off. After it reached 300K, we acquired data at this stabilized temperature for half an hour and then started cooling it down back to 278K. Below are the results we got in terms of wall-loss corrected PM volume concentration and particle density.

From the results, you can see that the aerosol cannot recover back to what is originally formed in terms of wall-loss corrected PM volume and density through a temperature ramp. In other words, the gas-particle partitioning alone doesn't explain the data.

Reaction mechanism for aromatic photooxidation reaction still remains poorly understood due to the limitation of product identification with current instrumentation. We still think the reaction route through RO₂+RO₂ may be dominant for high NO_x runs, and HO₂+RO₂ route dominates low NO_x runs. The reaction mechanism still needs to be further investigated.

If changing figure 5 to normalize each unit mass resolution spectra to the total mass signal, we got the similar trend just with a different percentage, which is not shown here. We will modify the figure when revising the paper draft. The fragmentation table we used is the same one as that in Aiken EST paper (2008) on elemental analysis.

The aerosol mass yields are 19.4%, 14.6% and 7.4% for reactions at 278K, 300K and 313K, respectively assuming the particle density is 1.5g/cm³ for 278K and 1.4 g/cm³ for both 300K and 313K. Since it is not the major focus of this paper, it is not included in the main text.

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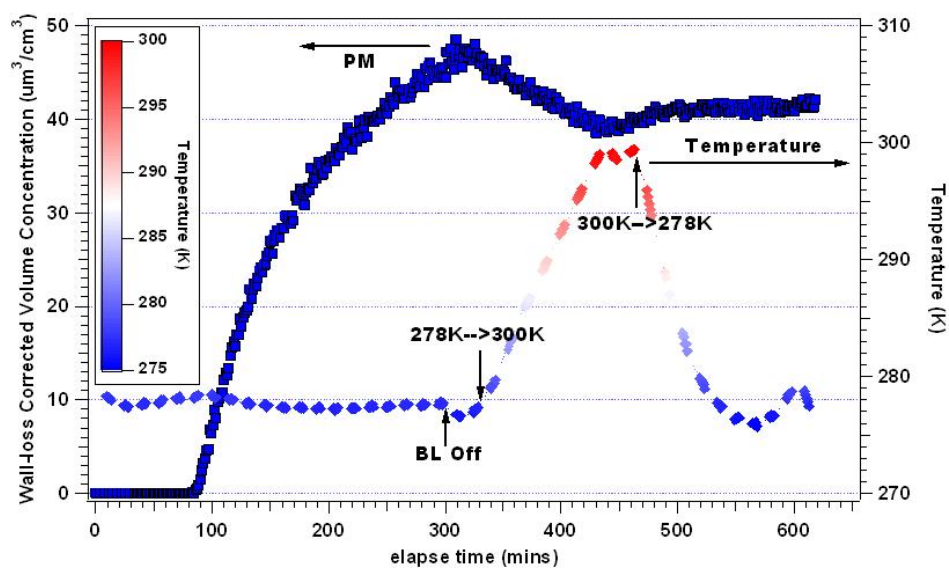


Fig. 1. Wall-loss corrected volume concentration for m-xylene photooxidation reaction (Targets: HCx:NO₂=100 ppb: 20ppb) with temperature ramp from 278K→300K→278K.

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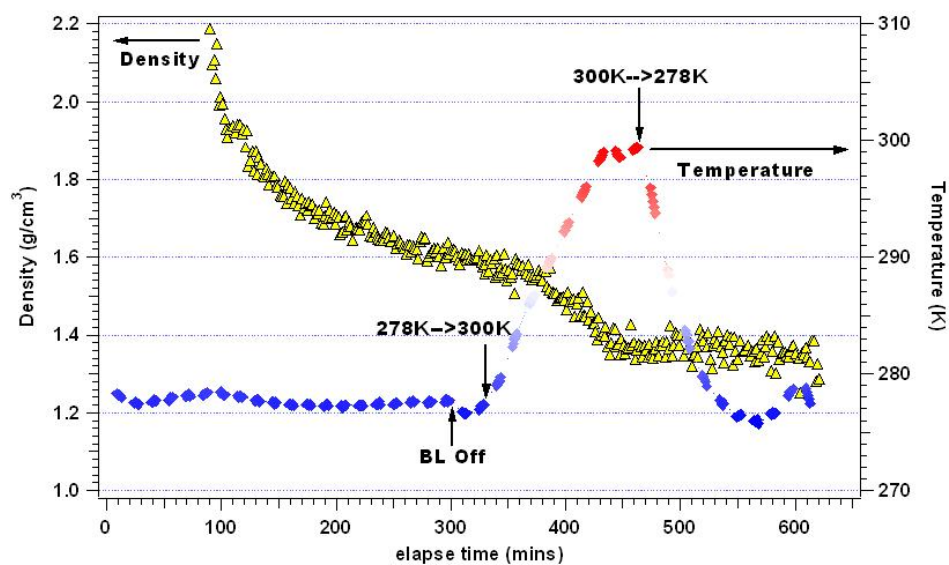


Fig. 2. Particle density evolution for m-xylene photooxidation reaction (Targets: HCx:NO₂=100 ppb: 20ppb) with temperature ramp from 278K→300K→278K.

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