Supplement of

Understanding the oxidants transition and SOA property in limonene ozonolysis: Role of different double bonds, radical chemistry, and water

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The accuracy of particulate products analysis

For particulate products analysis, two factors that would impact the accuracy of the results were the deposition of gas-phase products on the filter and the volatilization of particle-phase products. To investigate the effect of the deposition of gas-phase products, after the first filter (PTFE or quartz filter) we added another filter (PTFE or quartz filter) to collect the gaseous products. Results showed that the products collected on the second filter were negligible meaning that the deposition of gas-phase species on filter did not have a great impact on the results. As for the effect of the volatilization of particle-phase products, the variation of SOA and particulate products yields on collection time was studied. The results showed that when the collection time was controlled to be 3 h the SOA loss caused by volatilization of particles was less than 6%, so the second factor was considered to have no obvious influence on the particulate products analysis.

The evolution of particulate total peroxides in solution

Figure S2 showed the time profiles of total peroxides evolution of SOA formed in different cases. Although the initial content of peroxides in particles was influenced by RH and OH scavenger, at each circumstance the variation of the total peroxides content with the storage time was similar. When SOA extract solution was stored at 277 K, the total peroxides concentration was found to decrease slightly, which was mainly attributed to the decay of some peroxides. The fact that the total peroxides content nearly maintained stable indicated that at 277 K some active components in particles would not go through obvious decay so that more uncertainty could be avoided. In addition, this phenomenon suggested that the H_2O_2 generation was due to the decomposition or hydration of some kinds of peroxides so the total peroxides concentration measured did not show large fluctuation.

Figure caption.

Figure S1. The dependence of SOA wall loss fractions on RH.

Figure S2. Time profiles of total peroxides evolution per particle mass of different SOA formed (a) without OH scavenger, (b) with 2-butanol, and (c) with cyclohexane in the RH range of 0-90% under high $[O_3]/[limonene]$.

Figure S3. The variation of the molar fraction of unstable particulate peroxides with RH at low or high $[O_3]/[limonene]$ in the presence or absence of OH scavenger (2-butanol or cyclohexane).

Figure S4. The variation of HMW peroxides molar yields with RH at low or high [O₃]/[limonene] in the presence or absence of OH scavenger (2-butanol or cyclohexane).

Figure S5. Dependence of formaldehyde yield on RH at low or high [O₃]/[limonene] in the presence or absence of OH scavenger (2-butanol or cyclohexane).



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