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Atmospheric Chemistry and Physics Discussions

Interactive comment on "In-cloud processes of methacrolein under simulated conditions – Part 2: Formation of Secondary Organic Aerosol" *by* I. El Haddad et al.

Anonymous Referee #2

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General comments: Increasing attention has been paid to the in-cloud processes, which are gradually considered to have an important contribution to the SOA formation. But the related experiment evidence on the SOA formation via the cloud processes is insufficient. Haddad et al. report an experimental study of the aqueous-phase OH-oxidation of methacrolein and the fate of reaction products upon water droplets evaporation. The authors present one main conclusion in this work: a significant production of SOA was produced, with a mass yield of 2-12% upon water droplets evaporation. As far as can be assessed from the information provided in this study, the experiments were well done. The results reported by the authors are interesting and may have important consequences on SOA formation. In my view, this paper is worthy of publi-

cation.

Specific comments: 1. The authors are suggested to provide the concentration level of OH radicals during the reaction. Are there any other oxidants, such as O3 and O2-, produced in H2O2 photolysis? 2. Methacrolein was considered by several previous studies to react with H2O2 under aqueous-phase acid-catalyzed condition. Considering the high concentration of H2O2 (0.4 M) used in the experiment, how do the authors evaluate the contribution of H2O2 oxidation to the formation of SOA? 3. According to the description in this work, the aerosol generation experiments lasted for 22 h. During such a long time, the heterogeneous reaction on the reactor wall should be considered. The authors are suggested to exclude the readers' misgivings. 4. The authors used 100 mg/L NaCl solution to estimate the transmission efficiency of aerosols from their experimental setup and concluded that the low transmission efficiency is due to a guard flask and a small mixing chamber. As we know, the size distribution, hygroscopicity and properties between organic and inorganic particles are different, possibly resulting in different transmission efficiencies. The authors are suggested to consider this. 5. In addition to OH radicals, there are other oxidants, including O3, H2O2 and NO3 radicals, which potentially react with methacrolein in the cloud. Accordingly, in the conclusion section concerning the atmospheric implication, it is necessary to have an evaluation on the importance of all these oxidation processes.

Technical corrections: 1. Page 6428, line 25: 2-5.10-3 M should be 2-5$\times$10-3M. 2. Page 6435, lines 17-23: This production can be...in part to the SOA mass. The expression is unclear. Please rewrite these two sentences.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 6425, 2009.