

Interactive comment on “Importance of relative humidity in the oxidative ageing of organic aerosols: case study of the ozonolysis of maleic acid aerosol” by P. J. Gallimore et al.

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We thank the reviewer 1 for the valuable comments. Below are detailed answers to the reviewer's comments.

General comments: “The high concentration caveat should therefore also be mentioned in the abstract”. We added a sentence in the abstract (p. 23170, line 9): “Due to the slow reaction kinetics relatively high ozone concentrations of 160–200 ppm were used to achieve an appreciable degree of oxidation of maleic acid.”

1. We added a clarification in the introduction section of the manuscript (p. 23173, below line 13): “ We rationalize the EDB hygroscopic growth data presented in Pope et al. (2010a) using the chemical analyses and the mechanism developed in the current study.”

2. Is corrected.

3. Figure 2a in Vesna et al. shows a very slight increase in hygroscopicity of oleic acid after oxidation. To account for the comments of reviewer 1 we adjust the sentence on p.23172, line 1-3: “A very slight increased hygroscopicity is observed after oxidative processing of the oleic acid particles due to the carboxylic acid oxidation products (Vesna et al., 2008) ...”. In addition we have also seen a very slight increase in hygroscopicity of oleic acid particles in EDB experiments (Carrascon, in prep.).

4. The sentence (p. 23174, line 25-27) was changed to address the raised questions: “During ozonolysis experiments, a flow meter regulating the flow rate (GPE, Leighton Buzzard, UK) was positioned prior to the particle filter venting a small flow into the fume hood. The flow meter creates only a very minor pressure drop, which ensures that the entire flow apparatus operates essentially at ambient pressure.”

5. The residence time in the reaction barrel was estimated from flow and volume as now described clearly on p. 23175, line 9-10: “The resulting reaction time between aerosol and ozone in the flow apparatus was approximately 7.5 h, which was estimated by the volume of the barrel and the flow rate assuming a well-mixed reaction volume.”

6. It is difficult to assess the physical state of the particles collected on the filter. Because very similar results (i.e., mass spectra) were obtained for the filter-based oxidation and the aerosol oxidation in the barrel, we assume this is not influencing the oxidation scheme significantly.

7. We now address the issue that denuders could lead to a shift in particle/gas distribution of semi-volatile compounds clearly in the experimental section where the use of the denuders is described (p. 23175, line 13): “The use of denuders can potentially shift the equilibrium of compounds which are simultaneously present in the particle and

gas phase towards the gas phase. This aspect was not further investigated and could potentially lead to underestimation of particle phase reaction routes.”

8. The reference Shiraiwa 2011 is now added to the manuscript as suggested by the referee (p.23180, line 27).

9. The UNIFAC modeling used for Figure 4 takes interactions into account between different functional groups and are not simply averages of pure compounds as described on p. 23179, line 20-22. As suggested by the referee we added a sentence on p. 23186, line 17:” This could result in a positive feed back to increase water uptake and oxidation reactions and gradual solvation of the maleic acid particle bulk.”

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