

Interactive
Comment

Interactive comment on “Volatility of secondary organic aerosol during OH radical induced ageing” by K. Salo et al.

Anonymous Referee #1

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General Comments

This manuscript describes the results of experiments carried out in the large SAPHIR and AIDA chambers to investigate the aging of SOA formed from alpha-pinene and limonene ozonolysis when exposed to OH radicals. The aerosol is characterized by a variety of methods to monitor changes in mass, composition, and volatility. The observations are interpreted reasonably in terms of the effects of gas phase oxidation on compound volatility and subsequent gas-particle partitioning, which then alters aerosol volatility and composition, as well as gas-particle-wall interactions. I think this is a technically sound and useful study that overall is well done. The manuscript is well written and should be published in ACP. I have only a few specific comments for the authors to consider.

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Specific Comments

1. Page 19510, lines 8-14: Is this paragraph correct? Don't radicals diffuse to a particle faster than they do to a molecule since a particle is larger? I thought the reason reactions of radicals with molecules in particles were slower was that the radicals reaching the particle surface only see a small fraction of the molecules, and that once they penetrate into the particle diffusion is slower. Perhaps it would help to be more precise about whether you are talking about the rate of removal of an organic molecule or a radical.
2. Page 19514, line 20: What values of densities were used?
3. Page 19514, lines 22-25: Since semi-volatile compounds are of interest, what was done to evaluate possible evaporation in the sampling lines and adsorption to tube walls? At these low aerosol concentrations I would expect that the tube walls have the capacity to adsorb a large fraction of the semi-volatile compounds for a long time.
4. Page 19515, lines 2-11: Since NH_4NO_3 particles are also rigid, don't they bounce? How can one correct for bouncing loss of rigid particles by using other rigid particles?
5. Page 19517, line 29- page 19518, line 2: How is it known that only acidic vapours deposit on the walls? Please provide a reference for this.
6. Page 19518, lines 6-7: Might use of a fan in SAPHIR but not AIDA lead to differences in results, for example by enhancing transport of particles and vapours to walls?
7. Page 19520, lines 19-27: How was it determined that SOA losses in SAPHIR are dominated by dilution and particle deposition on walls, and that vapour loss was not important? How does one separate the effects of dilution on the evaporation of vapours from particles from the evaporation of vapours from Teflon walls? Are the timescales for these processes known? It might help to show a figure of the results for SAPHIR comparable to Figure 3 for AIDA. This would make a nice comparison.
8. Were there any surprises or new insights from these experiments? One can get

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the feeling from the clear and confident interpretations that the authors almost knew ahead of time what they would see, and that the results fit a little too neatly into their conceptual model.

Technical Comments

Page 19508, lines 6 and 7: Are KIT and FZJ acronyms? Please define.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 19507, 2011.

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