

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

K. Salo et al.

kent.salo@chem.gu.se

Received and published: 4 August 2011

We thank Dr Pöschl for his comments on this paper.

MUCHACHAS was designed in the positive sense to test the effect of OH radical reactions with gas-phase vapors formed as first-generation products associated with biogenic SOA formation. It was designed to ensure that gas-phase reactions dominated the experimental signal and thus not directly designed to test the relative influence of aging mechanisms in the atmosphere. For example, the experiments were conducted at relatively low RH and so aqueous chemistry was not important. Also, experiments were conducted at quite low SOA levels, so that the ratio of vapors to SOA was quite high. The question of how much additional SOA mass is formed from aging of biogenic SOA, and how the SOA properties change, is a critical issue in atmospheric chemistry,

C7311

as discussed in Hallquist et al, and this gas-phase pathway has received relatively little attention in the literature to date.

In our study on OH radical induced SOA aging we did not find indications for a significant contribution of bulk or surface reactions to the observed changes in SOA volatility. Additional SOA mass formation dominated during the first 1-3 hours of OH radical induced aging in our experiments. Also in experiments continued for more than 12 hours with OH radical levels $2\text{--}3 \times 10^6 \text{ cm}^{-3}$ no indication of possible contributions of heterogeneous reactions to changes in volatility could be identified (cf. Fig 4). However, this doesn't mean that heterogeneous reactions can't or will not play a role in atmospheric aerosol transformations but that gas phase reactions have a strong potential impact on SOA properties. Since we did not find indications for a significant contribution of bulk or surface reactions to the observed changes in SOA volatility in our experiments we do not see the need for an extended discussion of such processes in a paper dedicated to another important aging process. Potential fragmentation or volatilisation of SOA material is discussed in the paper and the potential role of heterogeneous reactions is given credit to in the introduction. Therefore, we do not think this paper is an example for not giving sufficient credit to previous work or to be in contradiction to own previous work.

A synthesis and integration of the unique concept of MUCHACHAS (including major conclusions from the results and interpretations from all chambers and the extensive set of analytical tools/models) will be presented elsewhere (Donahue et al, 2011) and will contain part of the issues addressed by Pöschl. Rather the important information in the current paper and other MUCHACHAS papers on specific topics provides the basis for the upcoming Donahue et al, 2011 paper on the recent progress made in connecting chamber studies to the atmosphere. The updated manuscript potentially re-submitted to ACP can more strongly state this link.