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Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Halogenation processes of secondary organic aerosol and implications on halogen release mechanisms" *by* J. Ofner et al.

Anonymous Referee #2

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General Comments

In this manuscript the authors present results of laboratory studies conducted in Teflon chambers with simulated sunlight to investigate the effects of reactive halogen species (RHS) on SOA and gas phase products fromed from reactions of α-pinene, catechol, and guiacol with ozone. The RHS were formed from photolysis of simple Cl2 and Br2 precursors as well as from photolysis and ozone reactions of salts deposited in a salt pan. The effects of these SOA aging processes on the composition of SOA and the gas phase species, in addition to various SOA physical-chemical properties were determined using a variety of in situ spectroscopic and offline analytical methods. The experiments are well done and the manuscript is well written, with a very thorough introduction and presentation of the observations. These studies are interesting and

represent a good start in understanding the potential effects of RHS on SOA composition and properties. I think the manuscript is suitable for publication in ACP, but I have a few comments & suggestions that should first be addressed.

Specific Comments

My major criticism of the manuscript is that it is entirely observational, in that it describes what was observed but makes no attempt to explain results in terms of known reaction mechanisms or expected products or to analyze the results in the context of other studies on SOA chemistry. It reads a bit too much like a chapter from a thesis. I understand that these are complex chemical systems and the methods used did not provide sufficient information to evaluate the chemistry in great detail. Nonetheless, there are a few things the authors could do, especially with regards to the mechanisms of incorporation of halogens into SOA. I am aware of two ways this can happen: one via addition of Cl or Br to C=C bonds, the other by reactions of HCl and HBr with SOA hydroxyl groups. I suggest the authors prepare a figure demonstrating how this can happen. Start with the stuctures of the three organic precursors and then discuss the extent to which reactions with ozone will consume C=C bonds or create them through aromatic ring opening. Some comments can also be made regarding possible reactions of hydroxyl groups with HCl and HBr or others mechanisms that might incorporate halogens into SOA. Some discussion can be included about whether these mechanisms and expected products reasonably explain observations, highlighting differences or similarities in the predictions for the three precursors and how those compare with results.

Technical Comments

Page 2983, line 22: Should "medium" be "median"?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 2975, 2012.