

The Cappa et al. manuscript reports on the application of the Statistical Oxidation Model (SOM) of Cappa and Wilson (2012) for the parameterization of alkane/OH chamber experiments. The SOM differs from some traditional secondary organic aerosol (SOA) model parameterizations, such as the two-product model (Odum et al., 1996) and the static Volatility Basis Set model (Donahue et al., 2006), in that multi-generational oxidation and fragmentation (both by OH) are explicitly captured. The importance of multi-generational oxidation for ambient SOA formation has been demonstrated relatively recently; however, there is still much to be learned about the time-dependent properties of the products that form (including as a function of precursor structure and oxidation conditions). While it is not clear whether the SOM will stand alone as a predictive model, the authors successfully demonstrate the potential utility of the SOM for improving the understanding of SOA formation via multi-generational oxidation in chamber experiments. It is recommended that this manuscript be published in ACP.

Comments

Do the authors have any insight regarding the impact of reacted hydrocarbon levels and/or SOA mass loading on the fitted parameters? Given that the rates of oxidation will be different in the gas and condensed phases (or particle surface), as well as the resulting Δ LVP and O:C ratios, it would be instructive to understand how much the parameterizations change as conditions in the chamber approach those in the ambient atmosphere, changing the distribution of products in the gas and condensed phases.

It is suggested that the authors cite Lim and Ziemann (ES&T, 2009) in which it was demonstrated, in accord with the subject manuscript, that cyclic alkanes have higher SOA yields than linear and branched alkanes.

The legend in Fig. 1/Fig. 7 is somewhat difficult to follow. It is suggested the authors consider including both the solid and dashed model lines (it does not seem like much, if any, additional space would be required).

In Fig. 2, Δ IVP should be Δ LVP.