

Interactive comment on “Chemical characterization of SOA formed from aqueous-phase reactions of phenols with the triplet excited state of carbonyl and hydroxyl radical” by L. Yu et al.

Anonymous Referee #2

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The authors present a detailed study of the products of aqueous-phase oxidation of phenol, guaiacol, syringol. They examine oxidation by the OH radical and by the triplet excited states of 3,4-DMB. This manuscript can be viewed as a companion paper to Smith et al., ES&T (2014). In that study the authors presented the kinetics and SOA yields of these processes, but the discussion is confined to product characterization here. The volatility and optical properties of the SOA are also examined, although these results are discussed only briefly in the manuscript.

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- The $3C^*$ pathway is very interesting and potentially important. I would like to hear more from the authors regarding their choice of 3,4-DMB as a photosensitizer. Why was this model compound chosen when other aromatic carbonyl compounds exist in biomass burning aerosol which might be more environmentally relevant? Could any of the reactants (or the aromatic carbonyl products they form) also act as photosensitizers? Were any control experiments performed to investigate this?
- The authors propose a mechanism in Figure 7 based on their product analysis. It wasn't clear to me why the authors concluded that the $3C^*$ exclusively oxidizes phenols directly, rather than also reacting with O_2 to producing singlet molecular oxygen (and therefore other oxidants) in the aqueous phase (e.g. Figure 4 of Smith et al. (2014)?
- The recent work of C. George and coworkers demonstrating SOA formation via photosensitizer chemistry (Aregahegn et al. (2013), Rossignol et al. (2014), Monge et al. (2012)) should be referenced in the introduction.
- Can the authors comment on the possible impacts of sample drying on the observed product distributions (e.g. oligomers and light-absorbing species)?

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