

Interactive comment on “Role of glyoxal in SOA formation from aromatic hydrocarbons: gas-phase reaction trumps reactive uptake” by S. Nakao et al.

Anonymous Referee #2

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This paper describes a series of aerosol chamber experiments performed in order to elucidate the role of glyoxal in SOA formation by toluene and 2-tert-butylphenol. It is very clearly written, although, as the other referee pointed out, it would benefit from more discussion.

- One of my concerns is regarding the conclusion stated in lines 6-7 of the abstract: “Glyoxal is found to only influence SOA formation by raising hydroxyl (OH) radical concentrations.” It seems that this phenomenon will be mainly important in the chamber studies conducted here (and other similar controlled studies). Or do the authors think that this would be significant in the atmosphere as well? If not, strong statements such as this one must be reworded to make the specific relevance to chamber experiments clear.

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- What kind of glyoxal uptake did the authors expect to observe in the toluene SOA uptake experiments (section 3.2)? As the authors state in lines 5-6 of page 30601, the vapor pressure of glyoxal is far too high to partition to organic aerosol. If this was basically a control experiment designed to evaluate the effect of glyoxal on the chamber photochemistry, this should be made clear.

- Section 3.3. I agree with the other referee that more discussion of these experiments is in order. Is there evidence for core-shell morphology in the aerosols, from this group or from the literature? How thick is the coating? There is a large body of literature on the uptake of gas-phase molecules to aqueous particles coated with organic films; this phenomenon depends greatly on the thickness of the coating and the molecular identity of the film organics and the incoming gas molecules. So, statements such as “glyoxal uptake onto aerosol is minor when the surface (and near-surface) of aerosols are primarily composed of secondary organic compounds” are much too general to be made based on the results here (especially when no actual knowledge about the particle morphology seems to be available).

- The phrase “. . . lack of these enhancements by sulfate ion and ammonium ion in water associated with SOA can contribute to the lack of reactive uptake of glyoxal onto SOA” is a bit cryptic. Please elaborate on what is meant here. That the salts were inaccessible to the incoming glyoxal, and glyoxal will just interact with water in the organic phase of the toluene SOA?

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