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Interactive comment on "Importance of Sulfate Radical Anion Formation and Chemistry in Heterogeneous OH Oxidation of Sodium Methyl Sulfate, the Smallest Organosulfate" *by* Kai Chung Kwong et al.

Anonymous Referee #1

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This is an interesting manuscript describing the formation of sulfate radical anions through heterogeneous oxidation and transformation of selected organosulfate model compounds (sodium methyl sulfate and sodium ethyl sulfate). The authors reported kinetics and mass spectrometric data to explain the potential chemical mechanisms for the observed composition change. Overall, this manuscript is concise and well written, and provides useful information for a better understanding of the chemical evolution of particle phase products that is thus far not very well understood. These findings are of great interest to the atmospheric chemistry community. I am in support of publication

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Discussion paper

after the following comments being addressed in the revised manuscript.

1) Have the authors observed any evidence for hydrolysis of organosulfates without OH exposures? Could the presence of bisulfate be also resulting from the acid-base equilibrium of sulfate ions in the aqueous droplet (via water dissociation) without radicals involved? 2) Page 3, Line 17: the estimated vapor pressure for sodium methyl sulfate is actually not low enough that can be considered as insignificant. Please provide more support to justify this statement. In addition, is there any evidence showing that this compound may be present in the gas phase? 3) Page 6, Lines 13-14: what are the bond dissociation energies for the C−O versus C−C bonds, respectively? 4) Page 6, Lines 14-15: please provide more detailed explanation about why the authors think the bond dissociation energy of a C−O bond is likely to be lowered in the presence of a sulfur atom (C−O−S). 5) Page 6, Line 23: "……typically have an order of magnitude ranging from……" This sentence reads incomplete. Please double check if something is missing. 6) Page 6, Line 27: the acid dissociation constant (Ka) of the bisulfate ion is 1.2 × 10-2. The authors might report this as "pKa" by mistake.

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