

**Review:** Formation of aqueous-phase a-hydroxyhydroperoxides (a-HHP): potential atmospheric impacts by Zhao et al., submitted to ACPD

**General:** This is a very interesting study on HHPs which could lay the groundwork to better treat these compound in atmospheric aqueous phase models. It is a very thorough and innovative study.

I think the manuscript could be accepted when a few points are treated in addition to the current version.

### Details

Page 5510, Introduction: I wonder if the carbonyl pathway requires the hydration of the carbonyl into the diol at which then hydrogen peroxide performs a nucleophilic attack. What is the state of knowledge for this in literature ? It would be good to discuss this in the introduction and in the context of Figure 1 which might be a bit simplistic. I find this very important because the whole manuscript is about the quantifying Khydr and Kadd. This is also important in the course of the manuscript with regard to Figure 4, see the next comment.

Page 5518, line 10ff: I would like to suggest to also give values of  $K_{eq}$  wherever possible. It is stated that these values are calculated but values are not given. If such values exist ( as stated), a comparison of the product Khydr \* Kadd vs.  $K_{eq}$  could be performed: Is the product of Khydr times Kadd different from  $K_{eq}$  ?

Page 5520, line 11: What is the reason for the large discrepancy in the hydration constant for formaldehyde ?

Page 5522, line 21: G  b or Gaeb, not Gab. This needs to be corrected throughout the manuscript.

Page 5532, Conclusions: I suggest to not just list bullet points but use regular flow text.

Table 1: Reference 1 in Table 1 is not Betterton and Hermann, but Betterton and Hoffmann, please correct. Please check all referencing again for correct author names.  
I feel it would be good to plot the values of the Table against each other and discuss this in the text.