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Interactive comment on “Heterogeneous reaction of peroxyacetic acid and hydrogen peroxide on ambient aerosol particles under dry and humid conditions: kinetics, mechanism and implications” by Q. Q. Wu et al.

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This work reported the heterogeneous reaction of peroxyacetic acid (PAA) and hydrogen peroxide (H₂O₂) on ambient fine particles at different relative humidities and found that this heterogeneous reaction could be an important but yet unconsidered loss pathway of gaseous PAA. The work is of interest to atmospheric chemistry community and the results can help to better understand the atmospheric budget of peroxides and their impacts on atmospheric chemistry. In this regard, I would recommend publica-

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tion of this paper in ACP after the authors fully address the points as follows. Major comments: Page 5718 line 25-26: Give a more detailed description of the uptake experiments, e.g., the reaction time for each RH, any treatment of the samples before moving to next RH. Page 5724 line 4-6: How did the authors conclude that “the larger value of $\gamma_{\text{H}_2\text{O}_2}$ than that of γ_{PAA} in low humidity indicated a physical process is important for the uptake of H_2O_2 onto $\text{PM}_{2.5}$ when humidity is low”? Page 5724 line 9-10: It cannot be seen from Figures 3 and 5 that the measurements of γ_{PAA} and $\gamma_{\text{H}_2\text{O}_2}$ are performed with both increasing and decreasing RH. Page 5728 line 24-26: Give the data to support that ADS particles are coated with salts but ATD not Page 5729 line 5-7: The conclusion “chemical processes rather than physical processes dominate the heterogeneous reaction of peroxide compounds on $\text{PM}_{2.5}$ and aged mineral dust particles” is contrary to that “physical process is important for the uptake of H_2O_2 onto $\text{PM}_{2.5}$ when humidity is low” (Page 5724 line 4-6).

Minor comments: Page 5723 line 3 and 8, and Page 5725 line 14: The definition of $\alpha_{\text{H}_2\text{O}}$ is already given on page 5722 line 22. Page 5727 line 17-19: The literature result is not helpful to explain the positive RH dependence of the uptake coefficient of H_2O_2 on $\text{PM}_{2.5}$. English usage needs to be significantly improved (here are just some examples) Page 5715 line 18: delete “on” Page 5716 line 3: “undertook” should be “undertake” Page 5720, line 21: “dispersive” should be “dispersed” Page 5727, line 25: delete “consider”

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