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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Heterogeneous Interactions between SO_2 and Organic Peroxides in Submicron Aerosol" *by* Shunyao Wang et al.

Anonymous Referee #2

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Wang et al. ran a series of laboratory experiments to explore the uptake of SO2 onto aerosols containing organic peroxides. They systematically explored several factors, including RH, peroxide types, peroxide content, and aerosol pH. This study addresses an important topic, and the experiments provide insights into the factors that control the heterogenous conversion of SO2 to sulfate. This study is well within scope of the journal. My comments are below.

Major comments:

1. How good was the reproducibility of the experiments (data shown in Figure 2-6)? I am a little concerned about the small statistics in these experiments that the authors used to conclude any trend. Were there any replicate experiments done?

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Minor comments:

1. Were the experiments conducted in a dark chamber? Could peroxides undergo photolysis?

2. Line 187: Does the repartitioning of SO2 from the wall depend on the type of organic peroxide in the chamber?

3. Line 208-line 209: “The average molecular mass for aerosol was assumed based on the chemical composition in order to calculate the molar fraction of total peroxides”. The authors need to provide more details on how this was done, especially for the SOA particles. How were the chemical composition determined for SOA? What were the molar fractions of peroxides in the SOA particles?

4. Figure S9: the residual distribution does not look like a normal distribution.

5. When using the SMPS to derive the average aerosol surface area, how well was the RH maintained in the SMPS flow? In other words, could there be a size change due to a change in RH in the SMPS that leads to an underestimation of the surface area?

6. Could SO2 interacts with peroxides on the wall during the experiments? This includes the peroxides in the particles deposited on the wall and the gas-phase peroxides that were deposited on the wall.

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