

Supporting Information for

Uptake of Semivolatile Secondary Organic Aerosol Formed

from α -Pinene into Nonvolatile Polyethylene Glycol Probe

Particles

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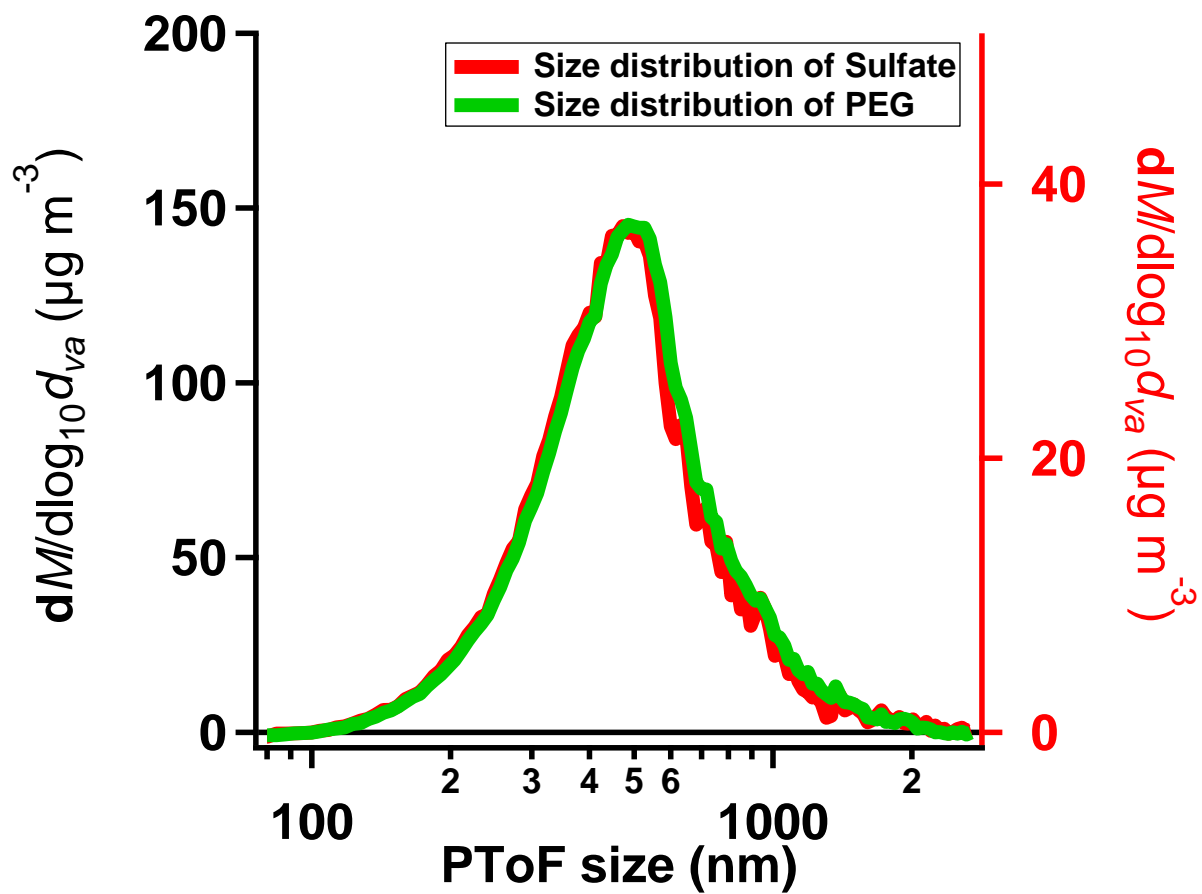


Figure S1. The size distribution of organics (PEG400, green) and sulfates (red) measured by HR-AMS at 22 °C. They matched with each other very well.

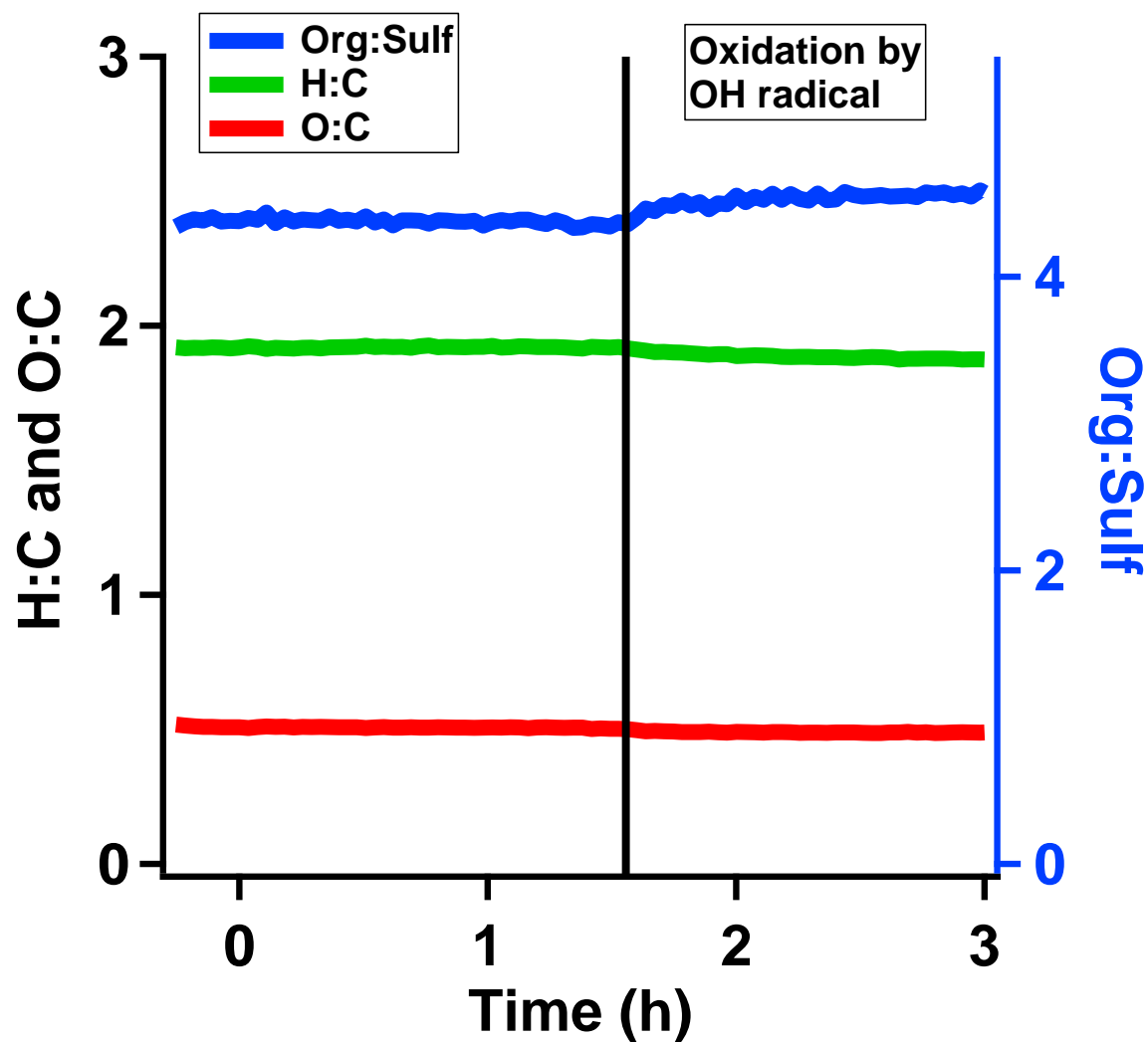


Figure S2. The change of org/sulf and the elemental composition, O/C and H/C, of PEG400/AS binary particles. The passive decay started at 0h. O/C is around 0.5, which indicated that PEG400 may be a good solvent for SOA. After OH radicals were produced through photolysis of HONO in the chamber from 1.6h, org/sulf showed a small increase. And O/C and H/C showed almost no change, only a very small decrease. This showed PEG400 was relatively stable with OH radicals.

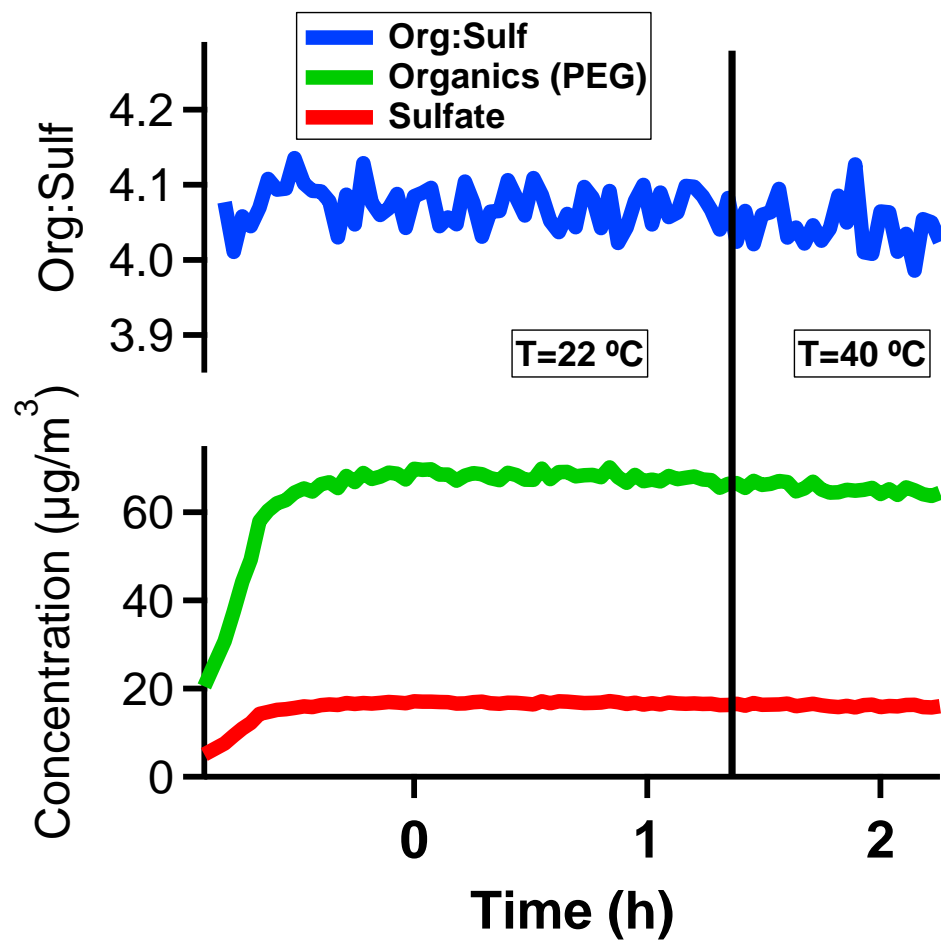


Figure S3. The organics (PEG400, green) and sulfates (red) concentration of PEG400/AS binary seeds measured by HR-AMS at 22 °C and 40 °C. The passive decay started from time 0h. The temperature increased to 40 °C after 1.3h. Org/sulf (blue), the ratio of organics to sulfates concentrations, showed almost no change even at 40 °C.

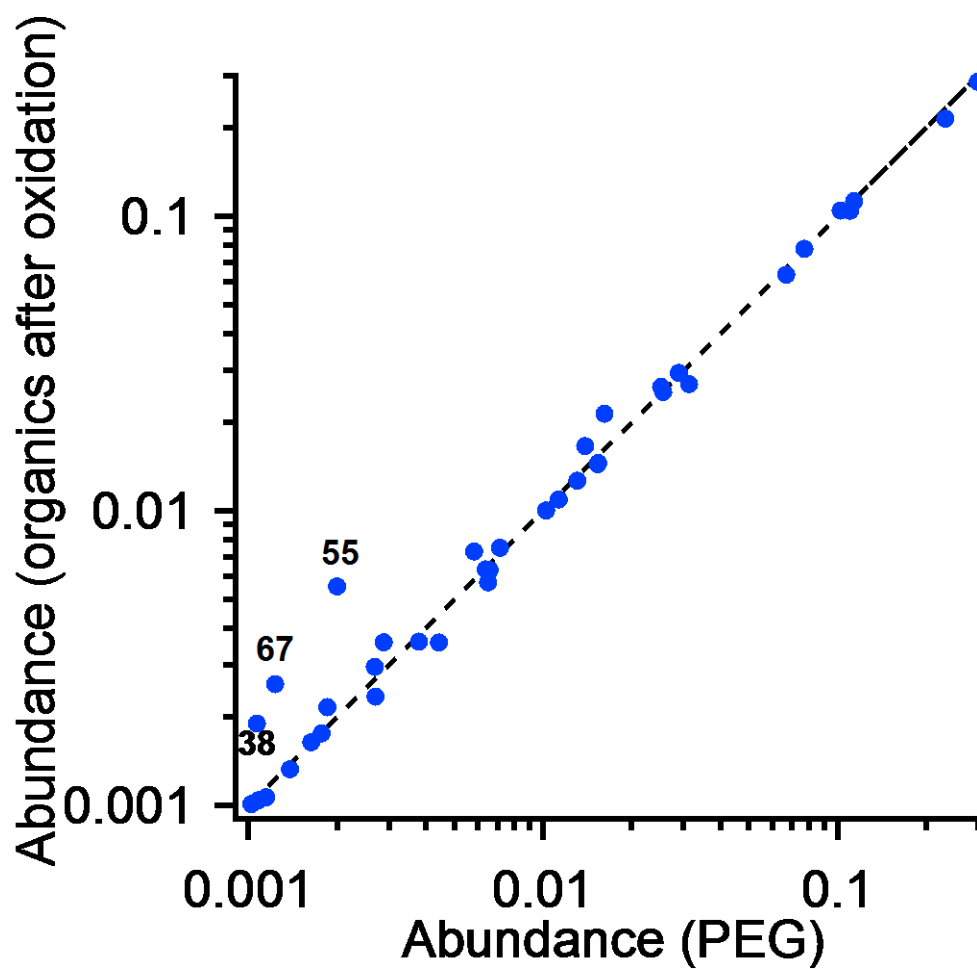


Figure S4. The normalized mass abundance of organics after oxidation with OH radicals over the pure PEG400. The difference showed very small. m/z 38, 55, and 67 showed significant increase after the oxidation, which also existed in SOA mass spectra. This indicated that the increase may come for the oxidation of residual VOCs in the chamber.

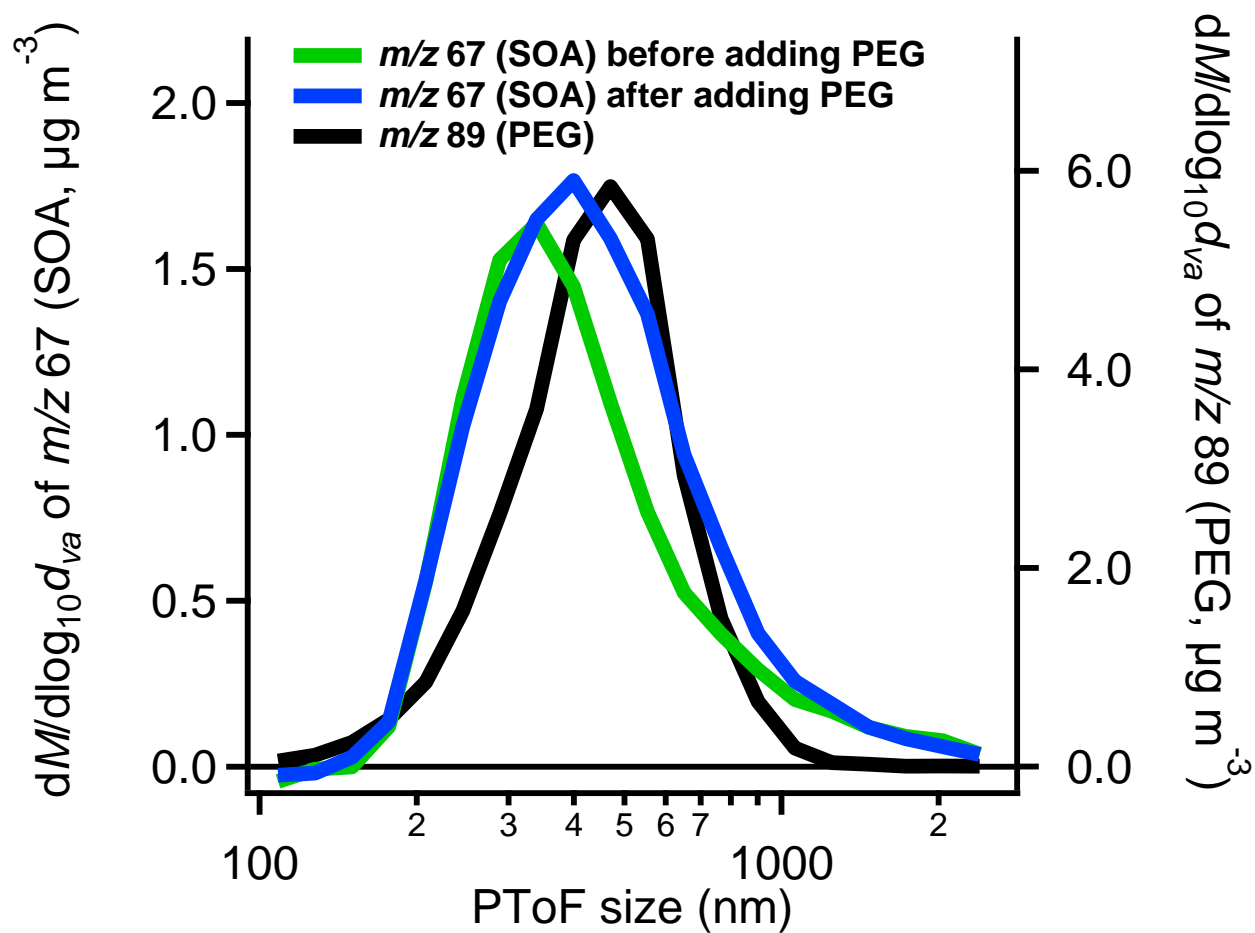


Figure S5. Particle time of flight (PToF) size distributions for tracer fragments before and after addition of PEG400 probe particles to an SOA suspension. The unique mass fragment for SOA (m/z 67) shifted to higher sizes (from green to blue) after PEG probe particles were added (black), consistent with sorption of SOA vapors into the PEG probe particles.

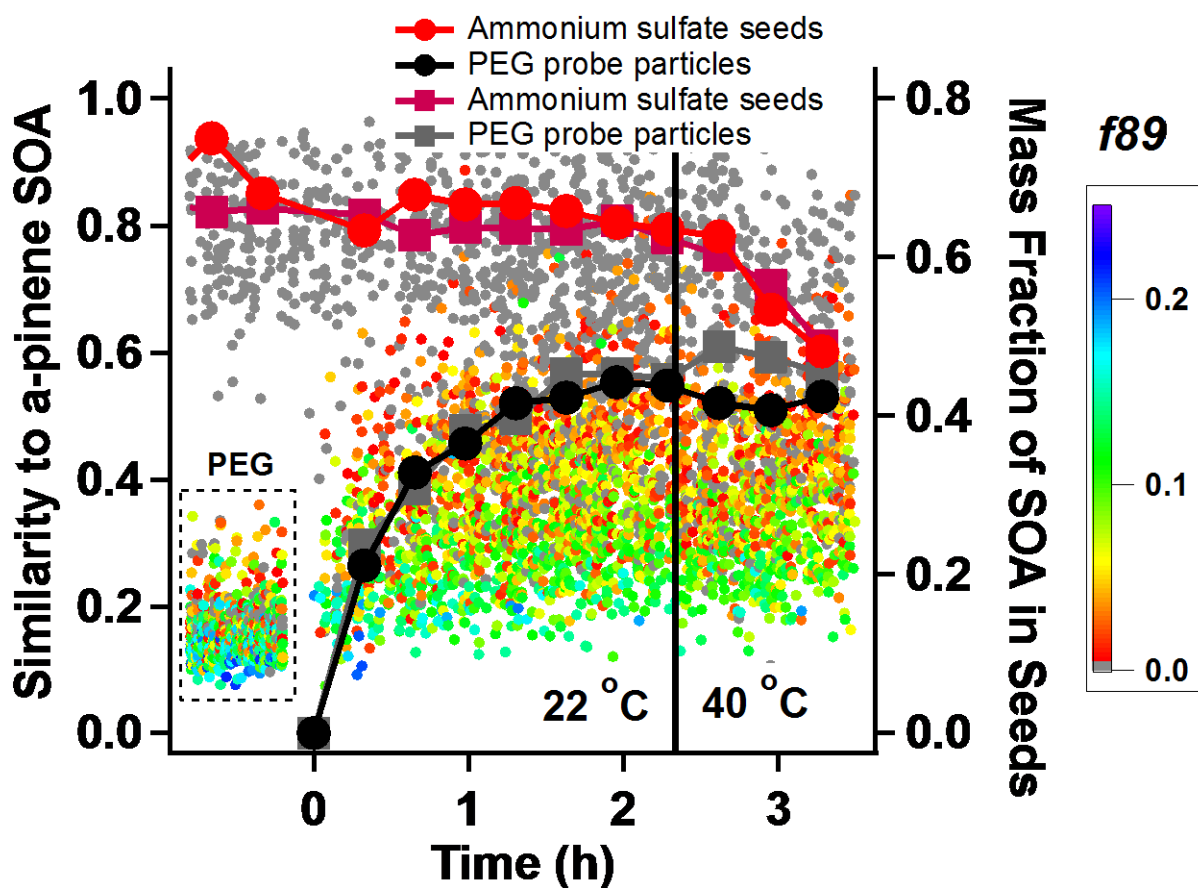


Figure S6. The mass fraction of SOA in or on two particle populations calculated with 2 different methods. In each case the core-particle signal is used to aggregate single-particle signals in 20-minute bins. Circles show the results obtained by subtracting the core particle signals (ammonium sulfate or PEG) from the total mass spectrum and then finding the ratio of the residual (SOA) mass signal to the total particle mass signal. Squares show the results based simple AMS ratios (organic/sulfate for SOA on ammonium sulfate and organic : m/z 89 (the PEG unique mass fragment) for PEG probe particles. The results are very similar for the two methods.

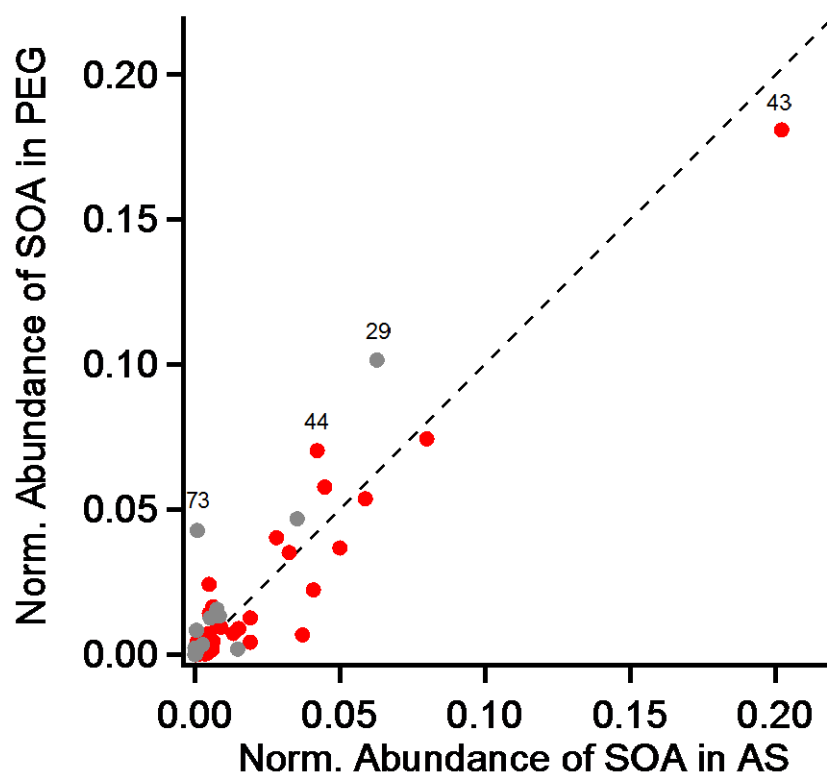


Figure S7. Scatter plot of the two residual SOA mass spectra shown in Figure 4. Peaks with significant PEG “contamination” are again shown in gray.

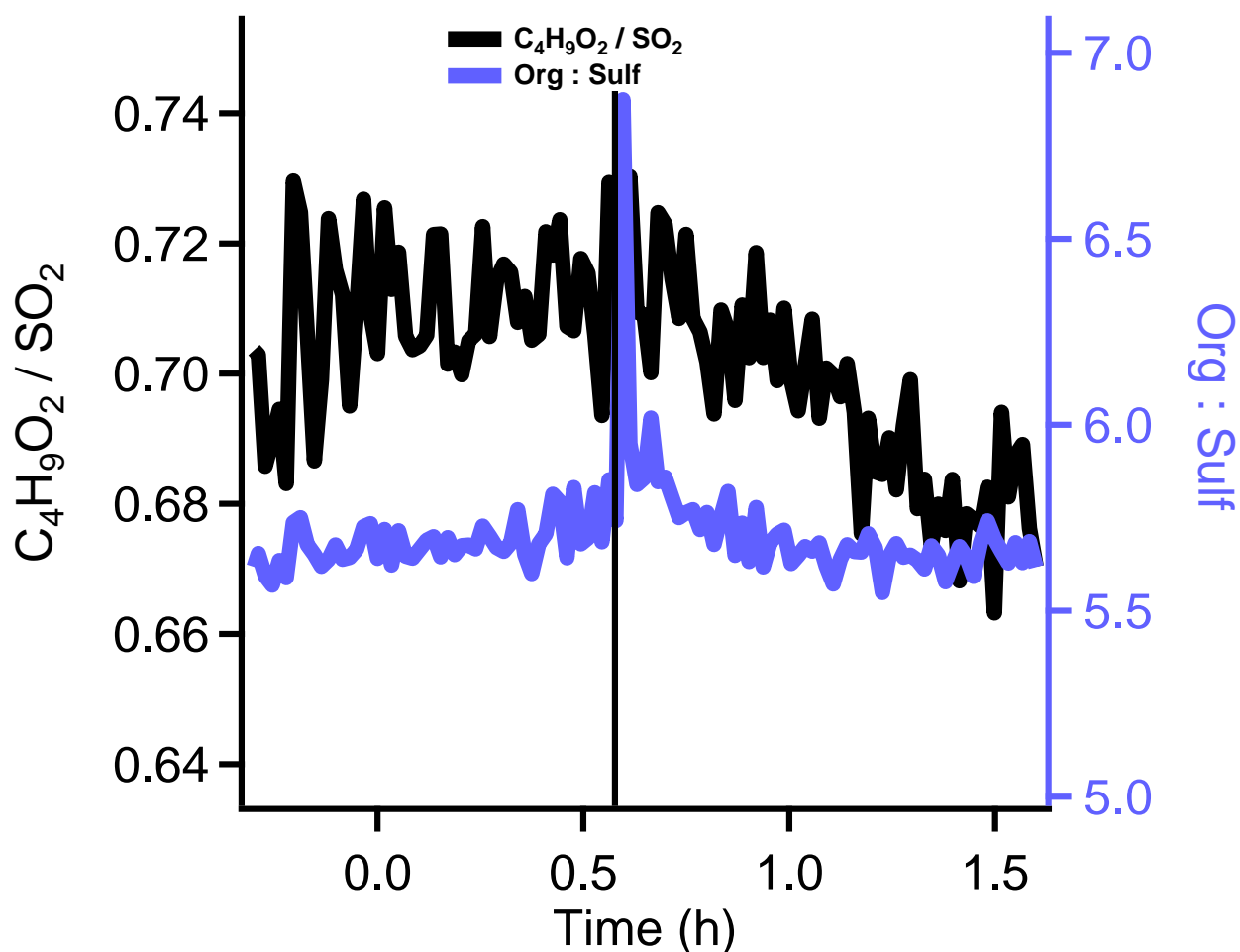


Figure S8. The ratio of $C_4H_9O_2^+$ (PEG400) to SO_2^+ (ammonium sulfate) and the ratio of organic to sulfate (org/sulf) vs the time. After oxalic acid was added into the chamber at 0.6h (black vertical line), we did not observe a significant increase of the ratio of organic to seeds (org/sulf, blue) after oxalic acid addition. The spike and small increase of org/sulf at around 0.6h is consistent with mixing processes during the injection of oxalic acid; this signal may come from the nucleation or condensation of oxalic acid due to supersaturation of the vapors near the injection port. The ratio of $C_4H_9O_2^+$ to SO_2^+ showed a steady decrease; while the decrease was not very large – only 0.05 h^{-1} . – this is a very straightforward sign of esterification.