Response to Referee Comment on acp-2022-278
Anonymous Referee #1

The authors investigated aging of secondary organic aerosols (SOA) produced by mixing hydrogen peroxide (H2O2) (2 ppm), toluene (1.5 ppm) and NO (0.7 ppm) upon UV-B light irradiation. The aerosol particles were collected on PTFE filters and then after extraction photolyzed in pure water and in solution containing 1 M of ammonium sulfate.

Changes in optical properties were monitored by UV-VIS spectroscopy and changes in molecular composition of the irradiated SOA were observed by high-resolution mass spectrometry (UPLC-PDA-HR-MS). The SOA composition was monitored by HR-TOF-AMS.

The authors show that photobleaching is faster in pure water representative of cloud water compared to that in presence of 1m of ammonium nitrate representative of aqueous particles. The photobleaching in the viscous organic phase is much slower compared to that in pure water and in the presence of ammonium sulfate. Nitrophenols and other chromophores were responsible for the absorption of SOA.

The experiments were well performed and the obtained results can be of interest for the readers of Atmospherics Chemistry and Physics (ACP). Indeed, understanding the influence of sample matrix on photodegradation and photobleaching processes is very important issue and needed to resolve the complex puzzle of chemical processes occurring in the atmosphere.

Therefore, I recommend publication in ACP.

I am just curious about the slower photobleaching in solution containing 1 M ammonium sulfate. Is it influenced by the ammonium ions (NH4+) or by the sulfate anions (SO42-)?

We thank the reviewer for the assessment and for this question. At this time, we are not in a position to answer the question posed by the reviewer because we only carried out experiments in ammonium sulfate, and we did not experiment with other salts. Since the effect of the ammonium sulfate on photochemistry was relatively minor, it is not clear whether a more detailed study with different salts is warranted. It will be more interesting to examine pH effects in the future as pH varies over a wide range in atmospheric particles.