

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-593

Anonymous Referee #1

Referee comment on "Diverse mixing states of amine-containing single particles in Nanjing, China" by Qi En Zhong et al., Atmos. Chem. Phys. Discuss.,
<https://doi.org/10.5194/acp-2021-593-RC1>, 2021

This paper reported the different mixing states of two amine-containing single particles, and discussed their different formation processes and influencing factors. The results showed the ambient RH was the major reason for the increase of TMA-containing particles, while the formation and influencing factors for DEA-containing particles were more complicated due to the enrichment of secondary organics. The accumulation of nitrate and organic nitrogen species in DEA-containing particles were explained as the nighttime production of particulate DEA via reactions with gaseous HNO₃ and/or particulate nitrate. The different mixing states of TMA and DEA with sulfate, nitrate and ammonium were investigated, which implied that particulate DEA existed both as nitrate and sulfate aminium salts, while the particulate TMA primarily presented as nitrate aminium salt.

Since most of the field observations did not distinguish between the different behaviors of each type of amine molecule under the same ambient influencing factors, these results and conclusions based on single particle analysis are quite interesting, which shows the different fates and formation processes of two particulate amines. Given the substantial roles of amines in new particle formation and contributions to the SOA mass, the distinct mixing states and influencing factors of amine-containing particles are of great significance to reveal the formation and evolution processes of bulk OA. Overall, this manuscript is well written and results are interesting with novelty. I recommend this manuscript should be accepted for publication with one substantial revision.

In the introduction part.

I asked the authors consider why your method is suitable to do this work. For mixing state of individual particles, some scientists used the electron microscope to observe very good mixing state of inorganic and organic. However, there is no ability to obtain the amine species in organic compounds. Then the SPAMS not only can get the organic compounds of single organic particles, but they can specifically distinguish the amines. Therefore, the authors can find some related studies for this part.

Here I also feel that the authors need to tell us why you select the Nanjing city as the sampling site. In the introduction particle, you might tell us what the sampling site is suitable. Then you conducted the field campaign. Seemly, the authors did not give us strong reason for this point.

In the method part, I am interesting with the cut off size of aerosol particles in the HR-SPAMS because the study work is related with the new particle formation. I didn't noticed what size range of particles were analyzed in the SPAMS

I might ask the authors to improve the English writing as below:

- Line 58: "Further" should be "Furthermore".
- Line 111-113: references should be cited here.
- Line 113: "(NO₃ radicals, OH radicals, and ozone)" should be put in the right place.
- Line 176: "three portions" should be "three parts".
- Line 180: "delayed extraction technology" was not clearly described here, the authors should give more details about this technology.
- L236, delete the should
- L240 Change "are presented in Figure 2" to (Figure 2)
- L257 deleted the should. I might ask the authors carefully check the English. There are many "should" before the have been
- L267, deleted the ambient
- Line 283: "Generally, TMA- and DEA-containing particles both contained amine marker ions, as well as organic fragments". The amine marker ions mentioned here were redundant since these single particles were selected based on the presence of amine markers.
- Line 393: The upper axis in Figure 10 was not adequately presented.
- Line 412: "the new Ra¹ was reduced" should be "the new Ra¹ reduced".