Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC3
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Comment on acp-2022-590

Anonymous Referee #3

Referee comment on "The shifting of secondary inorganic aerosol formation mechanisms during haze aggravation: the decisive role of aerosol liquid water" by Fei Xie et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2022-590-RC3, 2022

The manuscript offered a fully discussion on atmospheric interest, the formation mechanisms of secondary inorganic aerosols during a month-lasting haze periods by occupying the scientific stoichiometry methods. The manuscript is nicely constructed and the result presented in this work is relevant because, unlike the previous works, this work not only highlights the importance of both reaction medium and its corresponding gaseous precursors on secondary inorganic aerosol generations, but also identifies the chemical behavior transformation of gaseous precursors during haze aggravation. The findings of this manuscript could provide a new insight on secondary inorganic formation mechanisms. Nevertheless, some details must be addressed before it is accepted for publication at ACP.

- Many μg/m^3 were mistakenly written as ug/m^3, pls. carefully checked.
- There were many abbreviations in this manuscript, pls. give the full-length of the words at their first appearance.
- Some important effects of haze pollution should be mentioned in the introduction part as the motivation and urgency, such as climate and health.
- Line 235, the data points in summer mostly lied in HNO3 sensitive region. How is this defined? I can hardly find the sensitive domain boundaries during summer time.
- The authors considered that ALW equals to 75 is the determining parameter for haze generations in studied area, however, for which step in the haze processes is equivalent to ALW=75. The definition of the haze processes is far easier than the definition of ALWC.
- Line 244, it should not be the pH of secondary inorganic aerosol.
- Line 287, I can hardly find Fig.S9a corresponded to the S-curve proposed by Guo et al. (2017). Pls. check carefully.
- Line 362-365, grammar check.
- The details of solar spectrophotometer did not mention in the manuscript. pls. provide

it. In addition, Line 314-316 was poorly expressed, serious pollution stages were much higher than 1/4.

- Detailed calculation method of aqueous NO3- concentrations should place in this manuscript to make easier reading for readers.
- Compared with the sulfate heterogeneous rate calculation, NOR, SOR and NTR used more frequently in this manuscript and were the key parameters on mechanism presentation, thus, I recommend authors a fully rewritten on method part after a fully consideration.