

Reviewer #2:

We thank the reviewer for their comments. We have addressed each comment in a point by point basis

In principle, this is a useful experimental contribution to aerosol research. The main issue, though, is the purity of the 2-MTS is reported to be only 73 wt% pure. This is around 63 mole% based on the listed impurities. Therefore, it is difficult to know what to do with any of the measurements for 2-MTS, as they are only indicative of a mixed system and cannot be confidently assigned to the properties of pure 2-MTS.

Another issue is with the writing itself. There is an incredible overuse of the words traditionally (3 times) and traditional (16 times!). I would say those terms typically have no place in scientific writing. Especially if we're talking about kappa-Kohler theory and referencing a 2007 paper.

The word “traditional” was used as this kappa parameterization derives from the original kappa-Kohler theory; in recent papers, different versions of the kappa parameterization have been introduced (e.g., dependent on O/C, surface tension, Frenkel-Halsey-Hill theory, solubility) so the use of “traditional” was to differentiate it from these recent updated parameterizations (e.g., but not limited to Nakao et al., 2017, Gohil et al., 2022, Malek et al 2023) . We also wanted to differentiate the kappa values determined from Kohler theory and experimental kappa values.

For this manuscript, we have taken the reviewer's comments in mind and refined the use of the word “traditional.”

References

Nakao, S. (2017). Why would apparent κ linearly change with O/C? Assessing the role of volatility, solubility, and surface activity of organic aerosols. *Aerosol Science and Technology*, 51(12), 1377–1388. <https://doi.org/10.1080/02786826.2017.1352082>

Gohil, K., Mao, C. N., Rastogi, D., Peng, C., Tang, M., & Asa-Awuku, A. (2022). Hybrid water adsorption and solubility partitioning for aerosol hygroscopicity and droplet growth. *Atmos. Chem. Phys.*, 22(19), 12769–12787. <https://doi.org/10.5194/acp-22-12769-2022>

Malek, K., Gohil, K., Olonimoyo, E. A., Ferdousi-Rokib, N., Huang, Q., Pitta, K. R., Nandy, L., Voss, K. A., Raymond, T. M., Dutcher, D. D., Freedman, M. A., & Asa-Awuku, A. (2023). Liquid–Liquid Phase Separation Can Drive Aerosol Droplet Growth in Supersaturated Regimes. *ACS Environmental Au*. <https://doi.org/10.1021/acsenvironau.3c00015>

Also, overuse of scare quotes. E.g. salting-in is scare quoted two of three times in the text (but not in the title). Further, do "self-limiting" and "equilibrium" really need to be scare quoted? Both of those examples just confuse the reader. What are you even implying there?

These words were put in quotation marks initially to describe the definition of the term, for example:

However, inorganic salts may also enhance organic dissolution, known as “salting in” (Riva et al., 2019).

We do agree that quotation marks did not need to be used after as scare quotes, and have been removed.

Minor: show the structures for 2-MTS and MT in Figure 1 (you already show SOS and SDS).
Citation: <https://doi.org/10.5194/egusphere-2025-1935-RC2>

We thank the reviewer for bringing this up - initially we only showed the SOS and SDS structures to demonstrate how the longer chained compounds resulted in decreased surface tension. However, we see how this may create confusion in the figure. Additionally, 2-MTS and MT can exist as different diastereomers and representing it on one figure may create further confusion (Chen et al., 2020). To simplify Figure 1, we have removed the SOS and SDS structures.

Figure before:

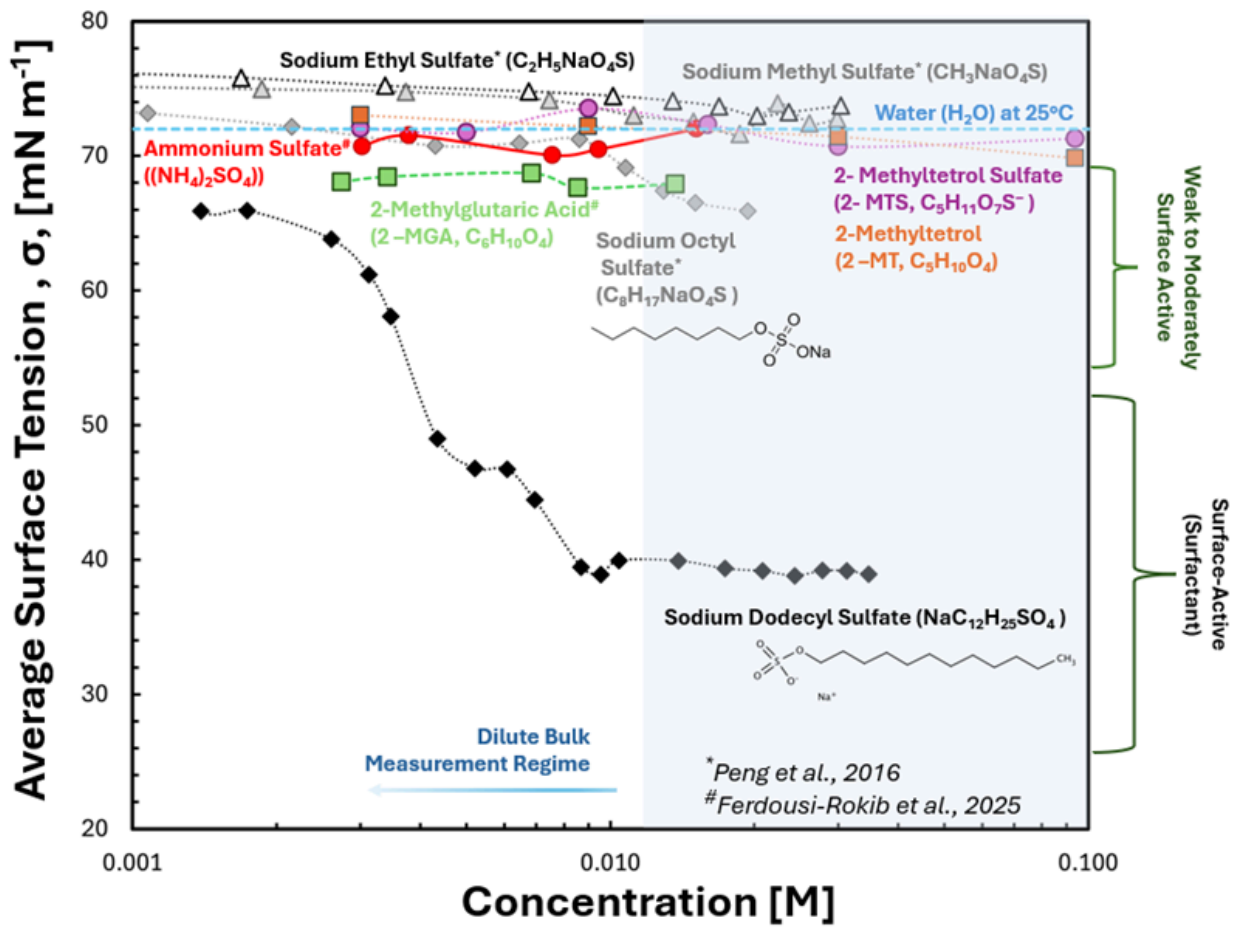
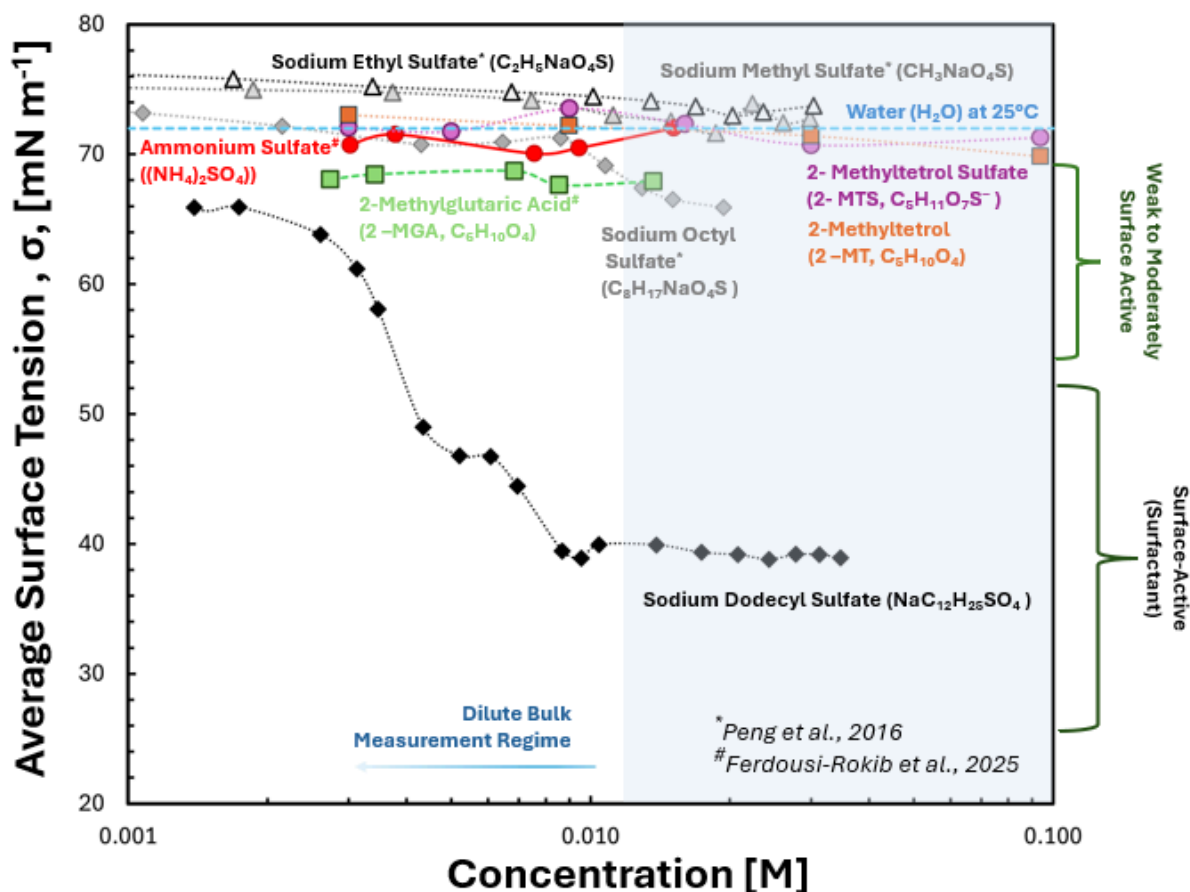


Figure after:



References:

Clements, A. L., & Seinfeld, J. H. (2007). Detection and quantification of 2-methyltetrols in ambient aerosol in the southeastern United States. *Atmospheric Environment*, 41(9), 1825–1830. <https://doi.org/https://doi.org/10.1016/j.atmosenv.2006.10.056>

Chen, Y., Zhang, Y., Lambe, A. T., Xu, R., Lei, Z., Olson, N. E., Zhang, Z., Szalkowski, T., Cui, T., Vizuet, W., Gold, A., Turpin, B. J., Ault, A. P., Chan, M. N., & Surratt, J. D. (2020). Heterogeneous Hydroxyl Radical Oxidation of Isoprene-Epoxydiol-Derived Methyltetrol Sulfates: Plausible Formation Mechanisms of Previously Unexplained Organosulfates in Ambient Fine Aerosols. *Environmental Science & Technology Letters*, 7(7), 460–468. <https://doi.org/10.1021/acs.estlett.0c00276>