

Interactive comment on “Liquid–liquid phase separation in particles containing organics mixed with ammonium sulfate, ammonium bisulfate, ammonium nitrate or sodium chloride” by Y. You et al.

Anonymous Referee #2

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This manuscript describes a systematic study of the phase behaviour of a wide range of mixed component systems with varying inorganic and organic solutes. Improving our understanding of the phase behaviour of aerosols, the liquid-liquid phase separations that can occur and the partitioning between hydrophobic and hydrophilic domains is of topical interest. This manuscript adds considerably to the rather limited amount of data currently available. As such, it is largely just a comprehensive account of a wide range of systems and I feel this is entirely appropriate and necessary, meriting publication. The manuscript is largely well-written and clear in its presentation. I have

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a small number of minor comments that the authors should consider responding to before the manuscript is accepted for publication.

- Measurements are only done at an organic-to-inorganic mass ratio of 2:1. The authors should provide some broader justification for this and discuss how this compares with recent work by other authors. They should also provide some discussion of how the trends observed might be expected to depend on the organic-to-inorganic mass ratio.

- On line 19 of page 20086, the sentence "Shown in Fig. 4a are the SRH results of the organics (20 out of the 23 investigated) that followed the trend $(\text{NH}_4)_2\text{SO}_4 > \text{NH}_4\text{HSO}_4 > \text{NaCl} > \text{NH}_4\text{NO}_3$." This sentence needs clarifying (do they mean the SRHs are in this order?) and the authors should talk through more explicitly how this relates to the Hofmeister series. I felt this paragraph was perhaps not as clear/unambiguous as it could be.

- Fig. 3: It is not why Sigmoidal-Boltzmann fits are chosen, particularly as these are intended only to guide the eye. Most of the systems in which phase separation occurs lie above the fit line with the systems for which phase separation was not observed receiving undue weighting in the fitting. Are these fits related in anyway (or how do they compare) with the expected behaviour from the previous parameterizations by the authors (recognising that these were only for ammonium sulphate)?

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