**Atmospheric
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Discussions**

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Comment

Interactive comment on "Ternary solution of sodium chloride, succinic acid and water – surface tension and its influence on cloud droplet activation" *by* J. Vanhanen et al.

J. Vanhanen et al.

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We thank the reviewer for the comments. A detailed response to each point is given below. The comments of the referee are italicized.

In this paper there is no review of other models presented in the literature. Unfortunately, the community at large will only have the option of using entirely predictive methods when probing the influence of organics or mixed inorganic/organic systems on droplet activation properties. Its has been shown previously that such models perform poorly and that binary experimental data is indeed required to reproduced measured behaviour in mixed systems (Topping et al 2007 Atmos. Chem. Phys., 7, 2371-2398,2007). In essence, you have also shown that here, yet no comparison with

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entirely predictive models is given. Could you comment on this?

The main purposes of this work are to present measured surface tensions of the ternary mixture of atmospheric importance, and to present a surface tension parameterization covering the whole concentration range. In addition the effect on cloud droplet activation is studied. It is indeed known that totally predictive models perform quite poorly in estimating surface tensions, especially with solutions with multiple compounds. Discussion of this will be presented in the revised paper (introduction). However, in our opinion, a comprehensive comparison between the measured surface tensions and those given by purely predictive models is out of scope of this study.

In figure 6 it would appear that model extrapolations result in surface tensions predictions approach a very high value of 160 mN/m. Does this highlight the range of applicability of the model chosen. Or, at least, does this suggest it is wrong to extrapolate this model beyond the range of concentrations for which it was fitted?

The high value for the surface tension of pure sodium chloride comes from the fact that the surface tension of molten sodium chloride was used as a data point in the fitting procedure. The surface tension of molten salt was obtained by extrapolating measured molten sodium chloride surface tensions to the temperature range used in our measurements. This was done in order to get the best estimate for the surface tension beyond solubility limits. The error in the surface tension parameterization will obviously increase with increasing sodium chloride concentration. Actually a linear fit to the water + salt data would produce a similar result (162mN/m at 25oC). Usually a linear behaviour is assumed in surface tension of salt + water mixtures. Overall the extrapolation is done because the estimate is needed in nucleation models.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 7189, 2008.