

Interactive comment on “The vapor pressures and activities of dicarboxylic acids reconsidered: the impact of the physical state of the aerosol” by V. Soonsin et al.

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I would like to second the comment by Reviewer 2 that “strong statements about the physical state observed in previous measurements are not backed up by the experimental evidence and other reasons are far more likely to be the cause of discrepancies.” We have demonstrated that solvent, if any is present in the particles, does not affect the vapor pressure and enthalpy of vaporization of adipic acid and azelaic acid aerosols (Saleh et al., 2010). In our study, the aerosols produced by homogeneous nucleation from a dry gas and by spray-drying aqueous solutions showed the same thermodynamic properties. Therefore, I find the author’s statements about the

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solvent effects quite objectionable. The authors should either present the evidence of the solvent effect or remove such statements from the manuscript. With respect to the presence of amorphous material, it would be interesting to know whether the optical scattering data could distinguish crystalline and amorphous forms and/or differences in the amount of crystal structure defects. Such data would make the argument for the effects of solid structure on OA vapor pressure much more compelling. In our study, SEM measurements of the particles produced with or without solvent did not reveal any significant differences in particle morphology or presence of amorphous material. It is possible that significantly larger sizes of particles used in the EDB experiments favor formation of amorphous material and/or crystal structure defects. However, since the ambient OA is found mostly in sub-micrometer aerosol, could the authors comment on the relevance of such effects of particle structure on vapor pressure (if any) to ambient particles?

Further, if I am not mistaken, there is an error in Equation 1: x should be in the denominator and the right hand side should be negative. The authors should present the derivation of this equation or provide a reference containing one. It should be also noted that x is not the molar fraction of solute in a solution in equilibrium with the gas phase at the given RH. Rather, it is a steady-state molar fraction, which for the given mixture is very close to the equilibrium molar fraction. The authors should explain this to the reader.

Reference:

Saleh, R., Khlystov, A. and Shihadeh, A. (2010). Effect of aerosol generation method on measured thermodynamic properties of dicarboxylic acid aerosols. *Aerosol Science and Technology*, 44, 302.

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