

Interactive comment on “Effect of mixing structure on the water uptake of mixtures of ammonium sulfate and phthalic acid particles” by Weigang Wang et al.

Anonymous Referee #2

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Wang and Lei et al., present a study about the hygroscopicity of aerosol particles consisting of ammonium sulfate (AS) and phthalic acid (PA). Using a HTDMA setup, the authors study first the hygroscopicity of particles where AS and PA are present in a well-mixed, internal mixture and then particles consisting of AS core and PA shell of varying size. Later, the authors compare the hygroscopicity of internally mixed particles to those with core-shell structure.

The authors show that at RH above 80% the core-shell particles have higher hygroscopicity than the well-mixed particles. Further, a traditional ZSR-relation, coupled with an empirical growth factor fit for PA hydration curve, predicts a lower hygroscopicity

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than what is measured for the core-shell particles. These differences in predicted and measured hygroscopicity are attributed to particle morphology changes, i.e., the shape of the particles deviate from a spherical shape.

The manuscript is generally well written and the results increase the understanding of Atmospheric Chemistry and Physics community about the hygroscopicity of complex organic-inorganic particles. I recommend that the manuscript is published after a minor revision.

General comments

1. How the uncertainty of the measurements was determined? In Figures 2-5 the measured points have uncertainty both in the RH and growth factor direction. However, in the manuscript no information is given how this uncertainty was calculated.

Specific comments

1. Section 2.2.2. Please explain what the different R symbols are in Eq. (2) and (3). Supposedly they refer to radii of spheres.
2. Lines 242–244. To me it looks like the ZSR relation does not predict the hygroscopic growth of AS/PA core-shell particles. The sentence starting from line 245 states the same (“The ZSR-based predictions are lower than...”)
3. Lines 338–342. I do not understand this sentence. Please rephrase it. Do you mean that in the future you will explore why the ZSR relation predicts lower growth factors than what is measured for the core-shell particles?
4. The manuscript contains several typographical or grammar errors.

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