

Interactive comment on “The Rate of Equilibration of Viscous Aerosol Particles” by S. O’Meara et al.

Anonymous Referee #1

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Review of “the rate of equilibration of viscous aerosol particles” by O’Meara et al.

This manuscript illustrates that three different models previously used to predict equilibrium times in particles give the same results. This manuscript also illustrates how mixing times in particles can vary as a function of diffusion coefficient, particle diameter, and change in saturation ratio of the volatile component. Finally the manuscript illustrates appropriate experimental conditions for determining diffusion coefficients from particle growth experiments. Since equilibration times in viscous aerosols is currently receiving considerable attention in the atmospheric community, this manuscript is appropriate for publication in ACP. I recommend publication after the following minor comments are addressed.

1) The modelling studies and results from this manuscript are most relevant for the hygroscopic growth of water soluble particles. This point is made clearly in the Discussion and Conclusions Section. However, I think this point should be made more clearly in

C1

the Abstract and Introduction. For example, line 17 of the abstract “this as well as other results here questions whether particle-phase diffusion can be a limiting factor in gas-particle mass transfer in the ambient atmosphere, at least for water-soluble particles”. This sentence may be clearer if they point out that they are referring to mainly water vapor-particle mass transfer. Perhaps something like the following may be clearer: “this as well as other results here question whether particle-phase diffusion can be a limiting factor in the hygroscopic growth of atmospheric particles”.

2) Equation 2. For clarity, please define the variables in the equation.

3) Three different functions were used to describe diffusion coefficients. It would be useful to indicate why the logarithmic dependence and sigmoidal dependence were chosen. For example, are these dependences consistent with theory or are they consistent with experimental results for systems like water and sucrose?

4) End of section 2.3. At this location, please give more details on the system already presented by Zobrist et al. (2011), so the reader has a better idea of the type of systems the results apply to.

5) Page 9, line 23. Please give more details on what you mean by “we have used the non-ideality described in Zobrist (2011)”.

6) The contour plots were too small for me to read. I suggest making bigger figures or figures with larger fonts.

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2015-1019, 2016.

C2