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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Internal mixing of the organic aerosol by gas phase diffusion of semivolatile organic compounds" *by* C. Marcolli et al.

Anonymous Referee #3

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This paper is very comprehensive and within the scope of the journal. The provided new information is very useful for the chemistry/climate community. The paper deserves publication in Atmospheric Chemistry and Physics after some improvements.

In addition to the points suggested by the other reviewers the following need to be considered:

1. Fig. 1 and accompanying discussion: It would be interesting to show an additional case in which the organic species of interest is initially distributed between the one particle population and the gas phase with most of it in the gas phase - that is expected to be the case for semi volatile organic compounds that are chemically formed in the gas phase.

2. What is the dependence of the differences between monodisperse and polydisperse distributions shown in Fig. 1, on the polydisperse distribution that has been chosen with a 4 digital precision (initially lognormal- 0.0718 μm with sigma=1.6)? For instance, does it make difference if this is shifted to 0.1000 μm?

3. page 5795, line 11: What is the criterion applied to derive the equilibration time? From Fig.1, it seems that in case A/B gas phase comes to equilibrium in about 1 hour and not in 7 min as stated here.

4. page 5798, last sentence and 1st sentence in page 5799: In the paper the authors presented two reasons for changes in the equilibration time. The first one is the molecular weight of the compounds - as depicted in Figure 2 for particles of r=100 nm - and the second one is the size of the particles - as discussed in page 5797, line 23. This needs to be mentioned again in the discussion here since both effects appear to have similar impacts, is there one that dominates under the specific conditions? From the elements in the paper it is not clear that the molecular weight is the dominant factor.

5. Small typographic errors:

-page 5794, line 25: Figs are 1a and b

-page 5795, line 1: Figs are 1c and d

-page 5795, line 10: There are not ‘three’ cases but ‘two’ (A/B and C/D)

- The authors might consider using μm or nm in the paper but not both of them.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 5789, 2004.