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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mass transfer effects in hygroscopic measurements of aerosol particles" *by* M. N. Chan and C. K. Chan

Anonymous Referee #2

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This manuscript presents a literature review of hygroscopic measurements using TDMA instrument. The central idea is to consider if the time within the conditioner (humidifier) has been long enough to allow the particles to reach the equilibrium size. However, there are not many studies that explicitly documented the time constants at the various parts in the experimental set-up. One of the main conclusions is to recommend the future studies to be more specific on this. The review of this type has not been published earlier and therefore presents new information that should be published. There are some aspects that the authors should consider (see below) and before publication in ACP revisions are required.

Main comment

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The hygroscopic growth depends, not only on the composition of the particles, but also on the size and shape of the particles. The shape is typically not known for the atmospheric aerosols, but the size is determined by classifying the aerosol with the first DMA. The size of particles both changes the equilibrium size (Kelvin effect) and also the time needed for the particle to grow to the final size. Since some of the experiments have been performed for particles of just some nanometers, these aspects needs to be considered.

Other comments:

Page 4060, line 19: An essential part of the setup is the humidifier of the sheath air of the second DMA. The details of the humidification/dehumidification of the particles differ for different setups and this aspect could be discussed further.

Page 4061, line 17: Hansson et al (1998) studied the uptake of water for NaCl particles coated with significant amounts of organic compounds. They observed very little effect even with thick layers of the organic compounds. It is not clear if this type of coating is possible in atmosphere and whether it can play any role in preventing the particle growth.

Page 4061, line 26: The work of Kerminen (1997) gives theoretical background for analysis of this study. The actual times for particles to reach the equilibrium size should be given and discussed here. This is important especially for particles of different sizes. In addition, the order of magnitude of the accommodation coefficient to be relevant slowing down the particle growth could be discussed further here.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 4057, 2005.