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# *Interactive comment on* "A novel tandem differential mobility analyzer with organic vapor treatment of aerosol particles" *by* "J. Joutsensaari et al."

**J. Joutsensaari et al.**

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We thank Dr. Pöschl for his thoughtful comments, and agree that the definition of growth factor presented in the paper only considers deliquescent growth, whereas, due to various reasons, particles may grow in the solid or glassy states as well. A point in case is the growth of citric acid particles both in water and in ethanol vapors (Figs. 2 and 3); at low saturation ratios and growth factors, the physical state of the particles is unclear.

Concerning liquid phase chemical reactions between the particle material (e.g. sulfuric acid) and the absorbed vapor (e.g. alcohol), we do not think the reactions would necessarily alter the picture of droplet growth in undersaturated vapor. In such a situation, vapor will be taken up until the reaction has been completed, i.e. there is a ther-



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modynamic equilibrium between the reactants and the products, and the liquid phase is in equilibrium with the vapor. If the primary particle composition is known, the activity coefficient of the vapor species in the solution droplet can be measured regardless of whether chemical reactions take place or not. A simple example illustrating this is the growth of sulfuric acid droplets in water vapor - in this case the chemical reactions are proton transfer reactions occuring between H2SO4 and H2O. However, if the reaction products are volatile, the situation becomes more complicated, as suggested by Dr. Pöschl.

Finally, we would like to mention that the interaction of fractal sodium chloride aerosols with n-propanol vapor has recently been studied by Petersen et al. (Phys. Rev. Lett. 2001, in press) in connection with heterogeneous nucleation experiments (preprint available from A. Laaksonen). It was known from earlier studies (e.g. Krämer et al. J. Aerosol Sci, 31:673, 2000) that undersaturated water vapor causes sodium chloride particles produced by the evaporation-condensation technique to collapse, presumably due to attractive forces between adsorbed water molecules. Somewhat surprisingly, Petersen et al. found that the particle mobility diameter is reduced even more in saturated n-propanol than in undersaturated water vapor.

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