

Interactive comment on “A method for detecting the presence of organic fraction in nucleation mode sized particles” by P. Vaattovaara et al.

P. Vaattovaara et al.

Received and published: 9 September 2005

We would like to thank the referee for very useful comments, suggestions and recommendations.

SPECIFIC COMMENTS

The referee suggested to study theoretically the UFO-TDMA measured growth factors and thus the role of Kelvin effect for ultrafine sized particles. In the revised version we present comparison between experimental and theoretically calculated GFs and Kelvin terms for the ultrafine citric acid, tartaric acid, benzoic acid ammonium bisulfate particles. That comparison supports our discussion in the ACPD paper.

The referee got the impression that the method does not work for particles larger than

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper

10 nm, because the growth factors are very similar for organic and inorganic substances. That's true, when sulfuric acid / ammonium bisulfate concentrations in 20-50 nm particles are as high as in our laboratory measurements. That kind of situation could be possible for 20-50 nm particles in tropospheric conditions during daytime new particle formation events if ammonia concentrations are low enough. However, ammonium bisulfate does not really grow any more at ethanol saturation ratios of 0.82 and below. Thus, if solar radiation is not efficient enough to produce lot of sulfuric acid (e.g. cloudy sky, night time, or sulfuric acid is aged in the particle phase i.e. reacted to less acidic form), or ammonia concentration is high enough for immediate neutralization (e.g. polluted regions), the 20-50 nm sulfate particles are not expected to grow at ethanol saturation ratios below 0.82. It remains an open question whether it is possible to find such an ethanol saturation at which highly concentrated (e.g. 18 m-%) sulfuric acid particles do not grow but many types of organic particles do. As an interesting detail, it has been shown that sulfuric acid concentrations are generally relatively low (i.e. percentage contribution below 10%) in usual lower troposphere situations (e.g. diesel engine at 40 % engine load, Tobias et al., 2001; a boreal forest site and a polluted continental area, Fiedler et al., 2005).

As recommended by the referee, the X- and Y-axes have been newly scaled, the size of the symbols has been increased and the number of tick labels on the X-axes has been reduced in the figures 2-9.

Also the typographic errors have been corrected as recommended.

References

Fiedler, V., Dal Maso, M., Boy, M., Aufmhoff, H., Hoffmann, J., Schuch, T., Birmili, W., Hanke, M., Uecker, J., Arnold, F., and Kulmala, M.: The contribution of sulphuric acid to atmospheric particle formation and growth: a comparison between boundary layers in Northern and Central Europe, *Atmos. Chem. Phys.*, 5, 1773-1785, 2005.

Tobias, H.J., Bewing, D.E., Ziemann, P.J, Sakurai, H., Zuk, M., McMurry, P.H., Zarling,

[Full Screen / Esc](#)[Print Version](#)[Interactive Discussion](#)[Discussion Paper](#)

D., Waytulonis, R., and Kittelson, D.B.: Chemical analysis of diesel engine nanoparticles using a Nano-DMA/Thermal desorption particle beam mass spectrometer, *Env. Sci. Technol.*, 35, 2233-2243, 2001.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 5, 3595, 2005.

ACPD

5, S2528–S2530, 2005

Interactive
Comment

Full Screen / Esc

Print Version

Interactive Discussion

Discussion Paper