**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "Extinction efficiencies of coated absorbing aerosols measured by cavity ring down aerosol spectrometry" *by* A. A. Riziq et al.

Anonymous Referee #1

Received and published: 21 December 2007

This paper is a very well written description of a comparison of mie theory shell-and-core extinction calculations to experimental observations. The comparison, as now expected, is good for pure spherical particles. For thinly coated cores it is also good. For thickly coated cores the agreement breaks down somewhat – this is the central observation of the study. Several possible mechanisms for the degradation of the agreement are discussed in broad terms, without any definitive conclusions.

The paper could be strengthened with deeper discussion and analysis of the main observation, to help clarify whether this observation represents a breakdown of theory or experimental control. Specifically:

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

EGU

1) discussion of likelihood that nigrosin may exhibit solubility in GA (perhaps before "freezing") or DEHS, and the impact of this on the calculations.

2) Making the point that the discrepancy cannot be linked to particle losses in the transmission of aerosol between the CPC and the extinction cell because for pure particles agreement with mie theory is excellent.

3) discussion of the possibility that at the thicker coating sizes (i.e. higher coating temperatures) the nigrosin core could also undergo some evaporation, resulting in a smaller core/coating ratio.

4) discussion of the relative impact of errors in refractive index for nigrosin in the pure vs coated state, due, for example, by incomplete drying of the nigrosin or possibly water contamination in the organics/coating

5) discussion of the sensitivity of the decrease in dielectric constant on selected e-folding parameter and minimum dielectric constant

6) discussion of the observation thinly coated nigrosin are also systematically lower than predicted by mie theory, but to a smaller extent.

7) Discussion of the "blending" of different core sizes (due to the width of the distribution from the first dma) with different coating thicknesses to have the same mobility diameter but different extinction properties.

8) It wasn't clear to me that the discussion of the smaller size bins from the DMA included the impact of smaller particles being counted by the CPC. Another point: I assume that that the (so-called) actual size distribution referred to on page 18122 was not directly measured, but assumed based on the transfer function of the second DMA being applied to the size distribution measured in the SMPS mode?

9) I think you should make the point that homogeneously nucleated non-absorbing particles are too small (I imagine, else a big error in the right direction) to be transferred through the second DMA and thus contribute to the number concentrations measured

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

with the CPC.

technical points: 1) page 18114: "shape and morphology" redundant

2) I suggest improving the quality of figure 7 and extending the caption to include an explanation of the figures on the right.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 18113, 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

EGU