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Atmospheric Chemistry and Physics Discussions

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

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We appreciate the constructive comments and are grateful for your time and effort. Here are our responses to the comments:

1) Discussion of likelihood that nigrosin may exhibit solubility in GA (perhaps before "freezing") or DEHS, and the impact of this on the calculations: The nigrosin particles are solid. They pass through the coating system after being dried using two silica-gel columns. Therefore the possibility that nigrosin may dissolve in GA or DEHS on the time scale of the experiment is very low. Thus, we did not discuss this issue as a possible source of error in the paper. A sentence to this effect has been added.

2) Particle losses in the cavity: Particle losses and other sensitivity issues of our CRD-AS system were thoroughly discussed in our previous publications. We refer you to: Riziq, A. A., Erlick, C., Dinar, E., and Rudich, Y. Atmos. Chem. Phys.,7, 1523–1536, 2007 and to C. Spindler, A.Abo Riziq, and Y. Rudich, Retrieval of aerosol complex refractive index by combining cavity ring down aerosol spectrometer measurement with full size distribution information, Aerosol Science and Technology, 41 (11), 10-11-1017 (2007). A sentence to this effect has been added.

3) Possible evaporation of the nigrosin at higher coating temperatures: Nigrosin has very low vapor pressure (Such dyes have high molecular weights) therefore the risk of evaporation is very low. In addition, nigrosin was transferred through the coating apparatus at high temperature and no changes in the size distribution was observed.

4) Possible effects of errors in the used refractive indices: Measurements as well as calibrations from both previous and current studies of the extinction efficiencies of ammonium sulphate, glutaric acid, nigrosin, and sodium chloride have all yielded refractive indices which are in good agreement with literature values. We regard this as a confirmation that the two diffusion driers used are sufficient for complete drying of the aerosol. A sentence to this effect has been added.

5) Discussion of the sensitivity of the decrease in dielectric constant on selected e-folding parameter and minimum dielectric constant: In the paragraph that ends on line 25, the following discussion has been added: Even if we take w-min to be the lowest possible value, that of a vacuum (1.0), and reduce the e-folding parameter k by an order of magnitude (to 107 cm-1), the calculated Qext for nigrosin coated by GA, core diameter 300 nm, and coated diameter 359 nm with the adjusted real refractive index comes out to 2.280.

6) Thin coatings are also lower than predicted: We regret to say that we disagree with this comment. Figure 4 shows that in some cases the claim is correct while it is not for other cases.

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7) Possible "Blending" of different core sizes: This is a valid point but we cannot quantify the distribution, nor its effect on the measured extinction.

8) Clarification of the calculation with smaller size bins: We included the contribution of small as well as large size bins adjacent to the mode in our calculations. Regarding the size distribution on page 18122, it was directly measured by performing double DMA size selection on the particles and then measuring the size distribution from the double DMA using a third DMA and a CPC (TSI SMPS).

9) Possible homogeneous nucleation: We checked in our experiment the possibility of homogeneous nucleation of glutaric acid by passing the dry nitrogen flow through the hot coating system and performing SMPS measurement. The results showed that no particles formed by homogeneous nucleation. In addition we size-select after the coating apparatus, which eliminate unwanted sizes.

10) Technical points: corrected.

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