**Atmospheric
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Interactive comment on "A quantitative test of infrared optical constants for supercooled sulphuric and nitric acid droplet aerosols" *by* R. Wagner et al.

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The sulphate and nitrate aerosol mass concentrations are indeed as accurate as quoted in the paper (section 2.1). Less than 1 % sulphuric acid aerosol is lost in the cold sampling line for the configuration used in our experiments. Sulphuric acid is partially lost by evaporation when sampled on Teflon filters at room temperature under very dry conditions. However, this breakthrough effect does not occur on Nylon membrane filters, as was shown by using Nylon backup filters.

Nitric acid solution droplets were sampled through PFA Teflon tubes heated to 293 K. Neuman et al. (1999) reported that significant adsorption of nitric acid on Teflon occurs only above 60 % relative humidity at this temperature. Under our conditions (relative humidity <1 % at 293 K) nitric acid is quantitatively passed to the Nylon filter. We could

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show by detecting HNO_3 with a chemical ionisation mass spectrometer that significant adsorptive losses occurred only when the Teflon tube temperature drops below 240 K. Because the mass loading of the Nylon filter was relatively high (up to 3 μg cm^{-2}) about 10 % of the nitric acid mass was collected on a Nylon backup filter. Thus, the total loss was of the order of 1 % in our experiments.

Including the uncertainty of the IC analysis yields 10 % is a conservative upper limit for the relative uncertainty of the aerosol sulphate and nitrate mass concentrations.

Furthermore, we do not believe that the discrepancies between the optical constants can be traced to difficulties in determining the correct composition of the sample. Both Biermann et al. (2000) and Myhre et al. (2003) have derived the optical constants using bulk samples of known composition. Also, TDL spectrometry of water vapour in equilibrium with the supercooled liquid aerosols in the Niedziela et al. (1999) and Norman et al. (1999) studies should yield accurate aerosol compositions (estimated error $\pm$ 1 wt%, according to the authors). Let us suppose that e.g. Biermann et al. (2000) had problems in determining the correct acid concentration of their sample: this cannot explain the large residuals between our measured FTIR spectra and those calculated by Mie theory using their optical constants (cf. Figures 3 and 4 in our paper) because we have used the acid composition as an optimisation parameter in our fitting algorithm. So, if the optical constants of Biermann et al. (2000) were correct there should be a *n* and *k* data set of a given wt% H_2SO_4 or HNO_3 which exactly reproduces our measured spectra albeit this data set might not represent the measured droplet composition. But our results clearly indicate that this is not the case. Hence we believe that the deviations between the optical constants have different reasons, as discussed in our paper.

Interactive comment on Atmos. Chem. Phys. Discuss., 3, 2219, 2003.

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