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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The interaction of N_2O_5 with mineral dust: aerosol flow tube and Knudsen reactor studies" *by* C. Wagner et al.

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The paper reports results for the uptake of N_2O_5 on mineral dust obtained from Knudsen cell experiments using bulk samples as well as from aerosol flow tube measurements performed with airborne mineral dust particles.

The uptake of N_2O_5 on mineral dust has already been studied twice using Knudsen cell experiments. Between those studies a discrepancy in the derived uptake coefficients of roughly one order of magnitude exists. Moreover, it is still under discussion if uptake coefficients measured on bulk samples are applicable to atmospheric conditions.

The present paper is intended to resolve both issues and therefore may be regarded as an important study, which is within the scope of ACP. The paper is well written and

clearly structured. I therefore recommend publication in ACP. The following remarks, however, should be considered in the final version of the manuscript.

1. N_2O_5 is known to undergo hydrolysis. Have the authors measured the wall loss also under humidified conditions?

2. The authors state, that the uptake coefficients determined are independent of concentration. As already mentioned in the short comment, the concentration in the KC experiments has only been varied by a factor of 3-4. In the AFT experiments the concentration used was roughly 3 orders of magnitude higher as in the KC experiments and has only been varied once. It may well that the uptake is first order in N_2O_5 over the whole concentration range. At the high concentration used in the AFT experiments, however, the uptake may saturate quickly and result in an apparent lower uptake coefficient. Have the authors performed KC experiments at that high concentration in order to verify that the uptake coefficients are indeed independent of concentration over this broad range?

3. For the KC experiments, the uptake coefficients may be regarded as initial values. What is the time resolution of the AFT measurements and may the uptake coefficients determined with that time resolution and at high concentrations (see point 3) still be regarded as initial ones?

4. Equations iii, v and viii contain an uptake coefficient. The first represents the overall uptake (uptake on dust + wall loss), the second the uptake on dust and the third the wall loss. The three values should be named differently.

5. The mean values for the uptake coefficients given in Table 1 are not consistent with the individual values.

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