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Interactive comment on **"Homogeneous nucleation rates of nitric acid dihydrate (NAD) at simulated stratospheric conditions – Part I: Experimental results"** *by* **O. Stetzer et al.**

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I did some quick calculations on the nucleation rates shown in Figure 6. Lets take the two star points with mole fraction of 0.26-0.27 at 192 and compare them to Salcedo et al. data for a mole fraction of 0.32-0.33 at the same T. These points (the stars from this work and squares from Salcedo et al. work) all give a volume nucleation rate in the range of 10^6 to 10^7 cm-3 s-1. Using the conversion eq. from Tabazadeh et al. the surface rate = (r/3) * volume rate. Following through with the particles sizes used in the two experiments, 0.25 (this work) vs 25 (Salcedo et al.) micron I obtain a surface

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nucleation rate which is faster by about 100 for the mole fraction of 0.33 as compared to mole fraction of 0.26. This is an expected trend in nucleation rate (less saturation for a solution with a lower mole fraction should give a lower rate), which is only obtained when the rates are converted into surface dimensions. This conversion in fact goes in the right direction to conclude that the process is more likely surface-based because if it was volume-based the rates for mole fractions of 0.33 and 0.26 should not land on top of each other as they do in Figure 6. I cannot follow the authors' discussion as to why they conclude so strongly that this is a volume process. The fact that they find a match with Salcedo et al. data argues against their conclusion and I would have come up with an opposite conclusion with the data shown in Figure 6.

I believe this paper presents interesting data but the authors may benefit from converting the rates following the procedures outlined in Salcedo et al. and compare the rates at the same SATURATION ratio. In fact the Salcedo et al. do present functions that the authors can use to compare their data against theirs at the same mole fraction via conversion through the saturation ratio. I strongly recommend that the authors follow through with this suggestion since it is really meaningless to compare nucleation rates of two different compositions and draw conclusions from these types of comparisons.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 2091, 2006.

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