

Interactive comment on “Uptake of HNO₃ to deliquescent sea-salt particles” by C. Guimbaud et al.

C. Guimbaud et al.

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Answer to Anonymous referee 1

Answer n°1 : Maximum N₂O₅ production

The maximum rate (molecule s⁻¹) for the N₂O₅ production (from reactions 1 and 2) is at least 3000 times slower than the minimum rate of HNO₃ production (from reaction 3), implying that uptake of N₂O₅ on particles cannot falsify the uptake of HNO₃. This value is calculated according to (i) the IUPAC recommended rate constants for reactions 1 and 3; (ii) the maximum O₃ concentration produced by the Xe excimer UV lamp (100ppbv) and (iii) the minimum OH concentration produced by this UV lamp

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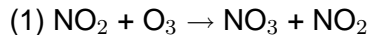
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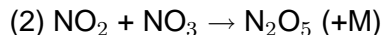
(1ppbv) for the lowest HNO_3 concentration used under our experimental conditions (2ppbv).

References:



$$k(1\text{bar}, 298\text{K}) = 3.5 \times 10^{-17} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$$

http://www.iupac-kinetic.ch.cam.ac.uk/datasheets/gas/NOx28_NO2_O3.pdf



$$k(\infty, 298\text{K}) \simeq 2 \times 10^{-12} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$$

http://www.iupac-kinetic.ch.cam.ac.uk/datasheets/gas/NOx31_NO2_NO3.pdf



$$k(1\text{bar}, 298\text{K}) = 1.1 \times 10^{-11} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$$

http://www.iupac-kinetic.ch.cam.ac.uk/datasheets/gas/NOx13_HO_NO2.pdf

Answer n°2 : Comparison with pure NaCl aerosol

The purpose of Fig. 2, representing the growth factor study of our marine sea-salt aerosol, is not to determine with accuracy the Deliquescence Relative Humidity (DRH) and the Efflorescence Relative Humidity (ERH) values for our sea-salt but just to confirm that particles remain deliquescent (supersaturated) under our experimental conditions. Also, the DRH and ERH values observed are approximate and they cannot be accurately and easily compared with pure NaCl aerosols because they are extremely

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dependent on the nature and on the amount of the impurities present in sea-salt. Thus, we only describe the growth factor characteristics of our marine sea-salt aerosol to assess the extent of supersaturation.

However, we will add a paragraph in section 2.2. to briefly compare the growth factor of our marine aerosol with the one observed for a pure NaCl aerosol by Tang et al., (1977) and Gysel et al. (2001).

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 739, 2002.

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