

***Interactive comment on* “Light induced conversion of nitrogen dioxide into nitrous acid on submicron humic acid aerosol” by K. Stemmler et al.**

Anonymous Referee #3

Received and published: 29 April 2007

The paper presents experimental work investigating the conversion of NO₂ to HONO upon photoactivated humic-acid aerosols. The research is original and contributes to the understanding of HONO sources in the near-ground atmosphere. Such understanding is highly important as HONO is a significant precursor for HO_x but its budget is still not fully understood. The manuscript is written in a clear and coherent way and I recommend publishing it as is or after minor correction that are listed below.

Major comments:

1. Can the authors provide more information on the nature of the generated aerosols: are the aerosols internal mix of HA and soluble salts (including those due to added chlorine)?

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2. If the generated aerosols are solid when exiting the diffusion drier, is it possible that, due to the HA buffering capacity, the protonation state of the HA on the surface of the generated aerosol does not differ much regardless of the pH of the original solution they were generated from? This may provide an explanation to the lower pH dependency for HONO formation observed on HA aerosols relative to that on HA coatings (in the later there is probably more contribution from original bulk solution).

Minor comments:

1. Page 4037 line 11: instead of "ground near levels" use "near-ground levels".
2. Page 4038 line 12: remove prentice before Stemmler et al.
3. Page 4040 line 17-18: when discussing the potential interference of aerosols in the HONO measurement the authors only refer to the aerosol size. Do the aerosol chemical properties effect the extant of interference too?
4. Page 4041 line 1: The measurements were of aerosol number not surface area - the later was calculated assuming spherical particles.
5. Page 4042 line 21: in equation R1 it would be appropriate to mention that HNO₃ is also formed during the NO₂ hydrolysis on the surface. The authors can specify later on in the text that they refer in their activity coefficient calculations only to the fraction of the NO₂ that is converted to HONO.
6. Page 4045 line 5: To my understanding, neglecting the photochemical loss of HONO and NO₂ leads to overestimation (not underestimation) of k_1 and reaction coefficient (γ_{rxn}) (because of the lower measured HONO level in equation. 1), am I right?
7. Page 4048 line 25: also possible OH reaction with the surface.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 4035, 2007.