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Interactive comment on "Evaluation of the pathways of tropospheric nitrophenol formation using a multiphase model" *by* M. A. J. Harrison et al.

D. Vione

davide.vione@unito.it

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The paper "Evaluation of the pathways of tropospheric nitrophenol formation using a multiphase model" by Harrison et al. describes the development of a computer model intended to simulate and study the formation pathways of nitrophenols upon phenol nitration in the troposphere. The calculation results are very interesting, in particular because they suggest the possibility that, of the nitrophenols that form in the troposphere upon phenol nitration, a relevant fraction may originate in the liquid phase and then be transferred into the gas phase. Accordingly, a relevant fraction of the nitrophe-

nols that are actually found in the tropospheric gas phase may actually have originated upon liquid-phase processes. This result is very relevant to atmospheric chemistry as it opens up a completely new perspective into the interpretation of field data concerning nitrophenol occurrence. The paper is of high scientific quality, well written, and reports very interesting and relevant results. I have a few comments aimed at further improving its quality:

1) While a definite conclusion has not been reached about the exact isomer ratio for the generation of 2NP and 4NP in aqueous solution, various data have been reported on the subject (see for instance Harrison et al., 2005; Barletta et al., Environ. Sci. Technol. 2000, 34, 2224-2230; Vione et al., Chemosphere 2004, 56, 1049-1059). It would be of some interest to briefly discuss the available data on the subject.

2) In the section on the temperature effect, although it is implicit in the discussion, readability would be improved by explicitly saying that the various species are more partitioned to the gas phase at higher temperature, which results in an enhanced role of the gas-phase processes.

3) The effect of droplet diameter on the reaction rates and on the fraction of nitrophenol generation in the liquid phase is quite interesting when considering that, for instance, the proposed reactions can take place in fogwater as well as in clouds. If possible, it would be interesting to discuss the possible differences in reactivity in the different conditions (e.g. fog, cloud, mist...).

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