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Atmospheric Chemistry and Physics Discussions

Interactive comment on "High resolution mid-infrared cross-sections for peroxyacetyl nitrate (PAN) vapour" *by* G. Allen et al.

G. Allen et al.

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We thank anonymous referee #2 for their detailed review and comments.

We are writing a short reply here, to reassure the reviewer that the errors in data presented in this paper are much smaller than those inferred. This is due, in part, to a misleading figure (figure 1) and possibly to other misconceptions, which the author's hope to clarify and correct. We believe that there is not a requirement for major new experiments for the purpose of this paper, which aims to reduce the uncertainty in previously reported PAN integrated intensities.

The reviewer is correct to note that figure 1 illustrates the retrieval of contaminant impurity levels of ˜40% and 8% of total concentration for CO2 and H2O respectively, although it should be noted that this figure does not relate to impurities seen in any of the samples used in the data presented in this work, which were discarded for the

same reasons that the reviewer cites as a cause for concern. This figure was intended only to illustrate the technique used in retrieving and correcting for impurities, which was used in only two of the samples in this work. Impurity levels in these two samples were both less than 10% and 1% of total concentration for CO2 and H2O respectively. Furthermore, the associated error with the retrieval method is accounted for in the error bars of figures 3 and 4. We believe that the accuracy of the retrieval method and correction method make the inclusion of these two samples sensible.

Simulations of CO2 and H2O in other samples have shown that impurity in other samples is less than 0.6x10-4 mb and 1.0x10-4 mb respectively, corresponding to a relative concentration of 0.025% and 0.042% for the lowest pressure sample used in this work. Again, this error is included in our error budget and typical and quantified error sources, including leak rate, will be given in an additional table in the revised paper to make this clear. In the interest of avoiding further confusion, figure 1 will be removed and a more thorough discussion, similar and in addition to, that given in this comment, will be made in the revised text.

On the subject of acetone contamination, we can confirm that spectral fitting of acetone was performed for the measurements used in this paper and proved negative for its presence. Other contaminated samples (noted to be from a single PAN synthesis) were not included.

We hope that this short response and its suggestions for improvement of clarity in our results will alleviate some of the major concerns that the reviewer has with the quality of the data. A more detailed and full discussion of the other points raised will be addressed in the final author's response.

In summary, we maintain that these results remain a significant improvement in quality and accuracy of PAN cross-section data for the user community and that major new measurements are not required for the purpose of this paper and we thank the reviewer again for bringing these details to our attention.

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Interactive comment on Atmos. Chem. Phys. Discuss., 4, 5655, 2004.

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Interactive Comment