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Atmospheric Chemistry and Physics Discussions

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

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General comments

This paper reports on the measurement and the analysis of cross-sections for PAN in the infrared spectral range. It follows a former publication (Allen et al. ACP 2005) and extends the information. PAN is a key molecule for tropospheric chemistry related studies. With the advent of high-resolution space-borne infrared instruments, we hope to detect it from space. But in order to derive concentrations from atmospheric spectra we need reliable laboratory data, at temperatures and pressures characteristics of the atmosphere. It is the aim of this paper to provide such cross section data to be used for remote sensing applications. After an introduction that specifies the importance of PAN

in atmospheric chemistry, it details the experimental work to obtain the spectra and the calculation to derive cross sections, infrared absorptivities and integrated intensities (with associated errors).

The subject of the paper is appropriate to ACP and I found the paper very useful and clearly presented. I recommend the paper to be published, but I would like to make the following points, which the authors might like to consider to improve the manuscript:

Specific comments

- Page 5670. Line 24. I am not sure PAN is a super greenhouse gas. Efficient greenhouse gases are those which combine strong absorption bands in the infrared window (8 to 13 μm) AND long lifetimes. Its radiative forcing may be significant but on the global scale, due to it's high atmospheric variability, its contribution to the climate forcing is probably low. The sentence could be modified.

- Page 5671. Line 10-15. You could quote the ACE mission too. It is an IR solar occultation instrument and some preliminary work has started to identify PAN. The general reference for this mission is Bernath, P. F., et al., Atmospheric Chemistry Experiment (ACE): Mission overview, Geophys. Res. Lett., 32, L15S01, doi:10.1029/2005GL022386.

- Page 5775, Line 27-28, and Page 5676,Line 20-22, and P5678, Line 1-2: redundant information. Also I am not sure to understand what you mean by 'the possibility of overlap between all values...'

- Conclusions: Ten spectra or twelve (see abstract)?

- References: I think the reference Nett et al. is not quoted in the text.

- Figure 1. I suggest adding a sentence in the caption of Fig 1. to mention that at 273K the measurements were not performed above 1500 cm-1 (as it is, it seems that the bands are appearing at 250K!).

ACPD

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Technical corrections

- Reference Emmons et al is quoted with ‘1997’ in the text and ‘2000’ in the reference list.

- Page 5671. Line 26. Blanc missing between ‘variability’ and ‘in’

- Page 5673. Line 9. Add ‘spectral’ between ‘instrument’ and ‘resolution’

- Page 5678. Line 5. 1742 cm-1? Is it 1741 or 1842?

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 5669, 2005.