

Interactive comment on “Design of and initial results from a highly instrumented reactor for atmospheric chemistry (HIRAC)” by D. R. Glowacki et al.

Anonymous Referee #1

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This is an excellent, very well-written paper describing the construct of the new ‘HIRAC’ environmental chamber facility. The material covered in the paper, including the details of the design and some preliminary data, are entirely appropriate for publication in ACP. A few details that the authors should address prior to final publication are given below. (As an aside, I look forward to seeing many interesting future results from this system.)

p. 10695 - It was not immediately obvious that the three lamps in each quartz tube are oriented end-to-end.

p. 10709, bottom - Isn't the N₂O actinometry more complex than what is shown here, due to quenching of O(1D), reaction of O(1D) with N₂O making N₂ and O₂ as well as

2 NO, etc.? The Edwards et al. (2003) paper gives a more complete treatment.

p. 10713 - The linearity checks on the FTIR system are certainly a worthwhile check, but I think they would be more informative if absolute IR cross sections or integrated band intensities were given and compared with literature data where possible.

p. 10714 - Could FTIR have been used here to provide a comparison with the GC data?

p. 10715-10716 - The Cl + ethene study was limited to pressures of 1 atm or less. Can higher pressures be looked at with HIRAC?

p. 10717 - The rate coefficient for Cl + chloroethane has been determined by a few groups to be considerably less than the value of $1.15 \times 10^{-11} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$ used in the present work (see Bryukov et al., JPCA v. 107, p. 6565, 2003 for a summary). Note also that Kaiser and Wallington use $k(\text{Cl}+\text{chloroethane}) = 8.05 \times 10^{-12} \text{ cm}^3 \text{ molecule}^{-1} \text{ s}^{-1}$ in their low-pressure study of Cl + ethene. I think this issue needs to be discussed - what is the effect of a lower $k(\text{Cl}+\text{chloroethane})$ rate coefficient on the Cl + ethene data?

p. 10717 - Was the trans-2-butene concentration monitored during the ozonolysis experiments?

A couple of typos:

p. 10699, line 4 - the period after “lamps” should be deleted. p. 10699, line 15 - the word “in” is spelled incorrectly. p. 10702, line 15 - should read “measurements to be performed...” ? p. 10704, line 13 - There is an ‘n’ missing in Chernin. p. 10704, line 20 - “OpticsWorks” is spelled incorrectly. p. 10707, 4th line from the bottom - shouldn't this read “conversion of HO₂ to OH” ? p. 10719, last line prior to section 3.3 - There is a missing superscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 10687, 2007.