

Interactive comment on “The atmospheric chemistry of sulphuryl fluoride, SO₂F₂” by T. J. Dillon et al.

Anonymous Referee #1

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General comments

This paper describes a well thought out and systematic laboratory study of the atmospheric chemistry of sulfur dioxide. The rate coefficients for the reactions of sulfur dioxide with O(1D), OH and O₃ are measured using standard laboratory techniques: resonance fluorescence, pulsed-laser-photolysis laser-induced-fluorescence, relative rate method with FTIR analysis. Additionally, the heterogeneous loss of sulfur dioxide was measured with a wetted-wall flow tube. Overall, this study finds that there is no significant loss of sulfur dioxide in the troposphere and that it is very likely to have a very long lifetime in the stratosphere.

The one drawback to this study, and it does not preclude it in any way from deserving

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to be published, is that the most likely loss process for sulfur dioxide is found to be VUV photolysis in the stratosphere and that process was not studied as part of this work.

Specific comments

p. 15218 - I am assuming that measuring the concentration of SO₂F₂ by manometric methods involves putting a flow of a mixture of SO₂F₂ through a flow meter. Is this flow meter heated? Is there any chance that SO₂F₂ could be lost inside the flow meter?

p. 15219, line 26 - is "about 8 s" the most precise that this time can be reported for this time?

p. 15222, line 27 - it would be helpful to list the recommended values from Sander et al. and Atkinson et al. for k₁₁ so that the reader can make his/her own evaluation of what is "good agreement"

p. 15233, line 2 - a reference should be provided for the 10⁶ kg/year number

p. 15239, Table 1 - I applaud the authors for including this table that has a number of experimental parameters listed in it; I would encourage the authors to include even more experimental details (pressure, H-donor concentrations, laser fluence, etc.) so that it is easier for future experimentalists who wish to repeat these experiments to do so

Technical corrections

p. 15219, line 15 - remove word "about" in describing pressure range

p. 15226, line 18 - superscript for k₁ rate coefficient should be "-10" instead of "-11"

p. 15230, line 12 - upper limit should not be reported as "= 1 x 10⁻⁷", but rather "< 1 x 10⁻⁷"

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 15213, 2007.