4.060 Atmospheric Chemistry of E- and Z-CF3CH=CHCF3.

Early Career Scientist

Presenting Author:
Freja F. Oesterstroem, Copenhagen Center for Atmospheric Research, Department of Chemistry, University of Copenhagen, Universitetsparken 5, DK-2100 Copenhagen Ø, Denmark, freja.oesterstroem@gmail.com

Co-Authors:
Simone Thirstrup Andersen, Copenhagen Center for Atmospheric Research, Department of Chemistry, University of Copenhagen, Universitetsparken 5, DK-2100 Copenhagen Ø, Denmark
Ole John Nielsen, Copenhagen Center for Atmospheric Research, Department of Chemistry, University of Copenhagen, Universitetsparken 5, DK-2100 Copenhagen Ø, Denmark

Abstract:

FTIR smog chamber experiments were performed to investigate the atmospheric fate of E- and Z-$CF_3CH=CHCF_3$ (1,1,1,4,4,4-hexafluoro-2-butene). The experiments were performed to study reactions of E-$CF_3CH=CHCF_3$ or Z-$CF_3CH=CHCF_3$ with Cl atoms, OH radicals, and O_3 in 700 Torr of N_2/O_2 diluents at 296 ± 2 K. The study determined the Cl atom, OH radical, and O_3 kinetics and the mechanism of the atmospheric oxidation of E- and Z-$CF_3CH=CHCF_3$. The main atmospheric fate for both compounds is reaction with OH radicals. Atmospheric chemistry of the reaction of Z-$CF_3CH=CHCF_3$ with OH and OD radicals were investigated by Baasandorj et al. in 2011 [1], no other previous studies are available. The results of the present study are compared to the findings of Baasandorj et al. assessing the atmospheric impact of E- and Z-$CF_3CH=CHCF_3$. Infrared spectra were recorded, and the atmospheric lifetimes, the radiative forcings and global warming potentials (GWP) of the two butenes were calculated. This study provides a comprehensive description of the atmospheric fate of E- and Z-$CF_3CH=CHCF_3$. We present here the first results on the atmospheric chemistry of E-$CF_3CH=CHCF_3$ and of the Cl- and O_3-initiated chemistry of Z-$CF_3CH=CHCF_3$.

References

[1] M. Baasandorj, A.R. Ravishankara, J.B. Burkholder, Atmospheric Chemistry of (Z)-$CF_3CH=CHCF_3$: OH Radical Reaction Rate Coefficient and Global Warming Potential, The Journal of Physical Chemistry A 115 (2011) 10539-10549.