MICROWAVE SPECTRA OF FLUOROFORMYLOXYL AND FLUOROSULFATE RADICALS

Š. URBAN, J. VARGA, L. KOLESNIKOVÁ, Z. MELTZEROVÁ, T. UHLÍKOVÁ, J. KOUCKÝ, P. KANIA, *Department of Analytical Chemistry, Institute of Chemical Technology, 16628 Prague 6, Czech Republic*; H. BECKERS, H. WILLNER, *Bergische Universität Wuppertal, FB 9, Anorganische Chemie, Gaußstr. 20, 42097 Wuppertal, Germany*.

Rotational spectra of fluoroformyloxyl (FCO_2) and fluorosulfate radicals (FSO_3) were studied in their ground states. The spectra measured involve fine structures due to a unpaired electron as well as hyperfine interaction features due to ^{19}F nucleus that can give rise to an additional hyperfine doubling of levels.
These radicals are of the atmospheric interest, for example the FCO_2 radical may be produced by stratospheric degradations of HCFCs and HFCs . Their atmospheric presence can be now supported by Eyjafjallajokull volcano massive eruptions of gasses and dust particles containing Fluor and Sulfur.
Both the radicals were prepared by a pyrolysis of a suitable precursor[a] directly in a sample cell. Besides the radical spectra, the majority of spectral lines in observed spectra belongs to other molecular species. Therefore the identification of the radical lines was simplified by using an external magnetic field affecting only the radical species by the molecular Zeeman effect.
The radicals FCO_2 and FSO_3 were measured in the frequency regions 125 -242 GHz and 93 - 430 GHz, respectively. From obtained transition frequencies the set of rotational, centrifugal distortion, fine and hyperfine constants were calculated. The study of the fluorosulfate radical was performed in the Prague laboratory for the first time.

---

[a]L. Kolesniková, J. Varga, H. Beckers, M. Šimečková, Z. Zelinger, L. Nová Stříteská, P. Kania, H. Willner, and Š. Urban: Detailed study of fine and hyperfine structures in rotational spectra of the free fluoroformyloxyl radical FCO2, J. Chem. Phys. 128 (2008) 1-8.
L. Kolesniková, J. Varga, L. Nová Stříteská, H. Beckers, H. Willner, F. Aubke, and Š. Urban: The Ground State Rotational Spectrum of the Fluorosulfate, J. Chem. Phys. 130 (2009) 18430.