HIGH-RESOLUTION INFRARED AND RAMAN SPECTROSCOPY OF SF_6: THE STATE-OF-THE-ART IN JUNE 2006

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Sulfur hexafluoride is recognized by the Kyoto Protocol as a powerful greenhouse gas whose emissions should be monitored and reduced. Although its abundance is still relatively small (3.8×10^{-6} ppmv), it is increasing rapidly (8 %/year) while the lifetime of SF_6 in the atmosphere is extremely long (3200 years) with a Global Warming Potential equal to 23900 compared to CO_2[a,b]. It is thus necessary to correctly model the atmospheric absorption of SF_6[c], especially in the strongly absorbing ν_3 region (near 939 cm^{-1}). Until recently, however, respective spectra were not very well known. In particular, the knowledge of hot bands is very important for atmospheric applications, but this implies to study various vibrational levels, some being only accessible through Raman scattering. During the past decade, we have analyzed different fundamental, harmonic and combination bands for both $^{32}SF_6$ and $^{34}SF_6$ using high-resolution infrared and Raman spectra[d]. In this talk, we will discuss the present status and prospects of SF_6 spectroscopy. In particular, new spectra and analyses of $^{34}SF_6$ will be reported and discussed. We will also show that a correct modelling of absorption intensities is still a pending question.

[a] L. Geller, J. Elkins, J. Lobert, A. Clarke, D. Hurst, J. Butler and R. Myers, *Geophys. Res. Lett.* **24**, 675–678 (1997).

[b] `http://www.epa.gov/electricpower-sf6/faq.html`

[c] W. Zhong, J. Haig, S. T. Sallvåg and V. Boudon, submitted to *Atmospheric Environment* (2006).

[d] See for instance V. Boudon and N. Lacome, *J. Mol. Spectrocsc.* **222**, 291–295 (2003), V. Boudon, J. L. Doménech, D. Bermejo and H. Willner, *J. Mol. Spectrosc.* **228**, 392–400 (2004) and references therein.