INFRARED SPECTROSCOPY AND MOLECULAR DYNAMICS OF FLUOROMETHANE : ATMOSPHERIC INTEREST.

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Recent advances in both experimental and theoretical rovibrational molecular spectroscopy permit to analyze and monitor the composition of atmospheric and astrophysical environments. The results obtained lead to a better understanding of the photochemical processes that govern the equilibrium of the atmospheric gases. This challenge was enhanced by the constant increase of the aptitude of optical remote-sensing missions. Quantitative detections of these gases require accurate measurements of line positions, line strengths and broadening coefficients of molecular rovibrational transitions using high-resolution spectroscopy. Methyl fluoride CH_3F being a minor molecular constituent of the Venus atmosphere[1], is also present in the earth atmosphere at low concentration. The present work is dedicated to the $2\nu_6$, $2\nu_3$ and ν_3+ν_6 bands of CH_3F with the aim of generating a complete line list for databases (line positions, intensities, and self-broadening coefficients). The spectra were recorded at room temperature for seven pressures of CH_3F from 1.0172 to 14.956 mbar using the Bruker IFS125HR Fourier Transform spectrometer located at GSMA in Reims. This study builds upon our previous work on this molecule, which focused on the ν_2 and ν_5 bands and was published in the Journal of Quantitative Spectroscopy and Radiative Transfer in April 2022[2].

[1] K. Narahari Rao. and CW. Mathews, *Molecular Spectroscopy: Modern Research*,(1972)

[2] H. Ziadi, O. Ben Fathallah, I. Ben Chouikha, F. Kwabia Tchana, X. Landsheere and H. Aroui, *J. Quant. Spectrosc. Radiat. Trans.*, **286**, 108218, (2022).

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