HIGH-RESOLUTION ANALYSIS OF THE 83.3 μm TORSIONAL BANDS OF THE $ClONO_2$ MOLECULE

F. KWABIA TCHANA, ANUSANTH ANANTHARAJAH, JEAN-MARIE FLAUD, *CNRS - Université de Paris - Université Paris Est Créteil , LISA, Créteil, France*; LAURENT MANCERON, *Synchrotron SOLEIL, CNRS-MONARIS UMR 8233 and Beamline AILES, Saint Aubin, France*; JOHANNES ORPHAL, *Karlsruhe Institute of Technology, IMK, Eggenstein-Leopoldshafen, Germany*.

Chlorine nitrate ($ClONO_2$) is a very important atmospheric "reservoir" of ClO and NO_2, destroying stratospheric ozone through catalytic cycles[a]. It was detected for the first time by infrared (IR) spectroscopy[b], a detection confirmed and extended by the MIPAS[c] and the ATMOS satellite experiments[d]. Many high-resolution microwave and mid-IR spectroscopy studies of $ClONO_2$ have been published[e]. However, $ClONO_2$ presents 4 fundamentals in the far-IR region below 600 cm^{-1}, with the lowest one corresponding to the torsional mode ν_9 around 83.3 μm. This band has been observed at low resolution[f] but without precise determination of the band center. More recently, the analysis of the mid-IR ν_8 and ν_8 + ν_9 band spectral regions of $^{35}ClONO_2$ allowed the indirect but accurate determination of the ν_9 band center[g].

In this work, the 83.3 μm region of $ClONO_2$ has been recorded at high resolution (0.001 cm^{-1}) using a Fourier transform spectrometer and the SOLEIL synchrotron light source. The spectrum corresponds to the absorption of the torsional mode, ν_9 around 123 $cm^{-1}$and a series of $n\nu_9$-(n-1)ν_9 hot bands. In this talk, the analysis of the ν_9 bands of $^{35}ClONO_2$ and $^{37}ClONO_2$ and $2\nu_9$-ν_9 band of $^{35}ClONO_2$ will be presented. In turn, this will enable an analysis of the hot bands involving low energy levels in the mid-IR region where $ClONO_2$ is detected and modelled.

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