NEW HIGH RESOLUTION ANALYSIS OF H_2CO IN THE 3.6 and 4.3 μm REGION BY FOURIER TRANSFORM SPECTROSCOPY

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Using new Fourier transform spectra recorded at high resolution at LPMA Paris, it has been possible to perform a new study of the formaldehyde absorption spectra in the 2600-3000cm^{-1} and in the 2200-2500cm^{-1} spectral ranges. This analysis was started using the results obtained by previous studies performed in the same spectral regions [a] [b]. In the high frequency range, the analysis of the strongest bands, namely ν_1 and ν_5 (symmetric and antisymmetric stretching modes) was complicated by the existence of Fermi-type resonances and by A-type, B-type and C-type Coriolis interactions involving the ν_1 and ν_5 energy levels and levels from various overtone or combination states namely $\nu_2+\nu_6$, $2\nu_3$, $\nu_2+\nu_4$, $\nu_3+\nu_6$ and $\nu_3+\nu_4$. In the low frequency range, which involve the weak $2\nu_4$ and $2\nu_6$ bands and the very weak $\nu_4+\nu_6$ band, the $2\nu_4 \leftrightarrow 2\nu_6$ Fermi type resonance and the $2\nu_4 \leftrightarrow \nu_4+\nu_6$ and $2\nu_6 \leftrightarrow \nu_4+\nu_6$ A-type Coriolis interaction had to be considered. For each analysed spectral region, a preliminary calculation of the energy levels was performed taking into account the observed resonances. It appears that these two spectral domains should not be considered as independent because of the existence of additional resonances linking levels measured in each spectral region.

[a] L. R. Brown, R. H. Hunt, and A. Pine, J. Mol. Spectrosc. 75, 406 (1979).
[b] F. Ito, T. Nakanaga, and H. Takeo, Spectrochimica Acta. 50A, 1397 (1994).