MILLIMETER WAVE SPECTRUM OF THE TWO MONOSULFUR DERIVATIVES OF METHYL FORMATE: S- AND O-METHYL THIOFORMATE, IN THE GROUND AND THE FIRST EXCITED TORSIONAL STATES

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Methyl formate $CH_3OC(O)H$ is a relatively abundant component of the interstellar medium (ISM) [a]. Thus, we decided to study its sulfur derivatives as they can be reasonably proposed for detection in the ISM. In fact there is two relatively stable isomers for methyl thioformate, S-Methyl thioformate $CH_3SC(O)H$ and O-Methyl thiofomate $CH_3OC(S)H$. Theoretical investigations on these molecules have been done recently by Senent et al.[b]. Previous experimental investigations were performed only for the S-Methyl thioformate in the 10-41 GHz spectral range by Jones et al.[c] and Caminati et al.[d]. For the present study both isomers were synthesized and the millimeter wave spectrum was then recorded for the first time from 150 to 660 GHz with the Lille's spectrometer based on solid-state sources. The internal rotation effect on the millimeter wave spectra is not the same for these two molecules because the barrier height to internal rotation is relatively low for the S- isomer ($V_3 \approx 140\ \mathrm{cm}^{-1}$) and rather high for the O- isomer ($V_3 \approx 700\ \mathrm{cm}^{-1}$). Analysis of the ground and excited torsional states performed with the *BELGI-C_s* code[e] will be presented and discussed. We will provide the search for methyl thioformate in different sources.

[a] E. Chruchwell, G. Winnewisser, A&A, 45, 229 (1975)

[b] M. L. Senent, C. Puzzarini, M. Hochlaf, R. Dominguez-Gomez, and M. Carvajal, J. Chem. Phys., 141, 104303 (2014)

[c] G. I. L. Jones, D. G. Lister, N. L. Owen, J. Mol. Spectrosc., 60, 348 (1976)

[d] W. Caminati, B. P. V. Eijck, D. G. Lister, J. Mol. Spectrosc., 90, 15 (1981)

[e] J. T. Hougen, I. Kleiner, and M. Godefroid, J. Mol. Spectrosc. 163, 559 (1994)