MILLIMETER AND SUBMILLIMETER WAVE SPECTRA OF THE $HCOO^{13}CH_3$ ISOTOPOLOG OF METHYLFORMATE IN THE GROUND STATE AND IN THE FIRST EXCITED TORSIONAL STATE.

I. HAYKAL, L. MARGULÈS, T. R. HUET, R. A. MOTIYENKO, *Laboratoire PhLAM, UMR8523 CNRS-Université Lille 1, F-59655 Villeneuve d'Ascq Cedex, France*; M. CARVAJAL, *Unidad Asociada IEM-CSIC-Dpto. de Física Aplicada, Universidad de Huelva, Spain*; I. KLEINER, *LISA, CNRS et Université Paris Est et Paris Diderot, 61 av. Général de Gaulle, 94010, Créteil, France*; J. C. GUILLEMIN, *ENS de Chimie de Rennes -CNRS -35700 Rennes, France*; B. TERCERO, J. CERNICHARO, *Centro de Astrobiología (CSIC-INTA). Ctra de Ajalvir, Km 4, 28850 Torrejón de Ardoz, Madrid, Spain*.

The detection of nineteen new rotational transitions of the parent molecule of methylformate ($HCOOCH_3$) in the second lowest excited torsional mode ($\nu_t = 2$) was recently reported in Orion-KL[a], as well as the detection of eighty new lines corresponding to the two ^{18}O isotopologs of methylformate in their ground states[b]. The laboratory work on $HCOO^{13}CH_3$ was continued[c]. A wide spectral range from 50 to 940 GHz was recorded in Lille with the submillimeter-wave spectrometer based on harmonic generation of a microwave synthesizer source, using a multiplication chain of solid state sources (50-100 and 150-940 GHz) and a backward wave oscillator (100-150 GHz), and coupled to a 2.2 m cell. The absolute accuracy of the line positions is better than 30 kHz up to 630 GHz and 50 kHz above. The two states (ν_t = 0 and 1) were fitted together using the RAM Hamiltonian of the BELGI program and a new set of 45 parameters was accurately determined. The fit contains 7050 lines corresponding to the ground state up to $J = 78$ and $K_a = 34$ and 1907 lines related to $\nu_t = 1$ up to $J = 59$ and $K_a = 24$. The detection of new $\nu_t = 1$ lines in Orion KL will be reported and discussed.
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[c] M. Carvajal, et al. *A& A.* **500**, 1109, 2009.