

VIBRATION-TORSION-ROTATION INTERACTIONS IN MOLECULES WITH A C_{3v} TOP AND C_s FRAME: $v_t=3,4$ TORSIONAL AND C-S STRETCHING VIBRATIONAL STATES OF METHYL MERCAPTAN CH_3SH

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We present^a the results of our analysis of the FIR and microwave spectra of the ν_8 vibrational state (C-S stretch) of methyl mercaptan CH_3SH near 710 cm^{-1} . The analysis employs a new program which was recently developed for fitting several isolated small-amplitude fundamentals embedded in a pure torsional bath in molecules like methyl mercaptan, in which the frame has C_s symmetry and the methyl top has C_{3v} symmetry. Our study involves the energy levels that belong to the ν_8 vibrational state itself as well as to $v_t = 0, 1, 2, 3, 4$ torsional vibrational states of methyl mercaptan. In our analysis we used data available in the literature [1,2,3] as well as the results of the new measurements from Kharkiv, Köln, and Braunschweig. In the talk the details of this new study will be discussed.

[1] L.-H. Xu, R. M. Lees, G. T. Crabbe, et al., *J. Chem. Phys.* 137, 104313 (2012).

[2] R.M. Lees, Li-Hong Xu, B.E. Billinghurst, *J. Mol. Spectrosc.* 352, 30-38 (2016).

[3] R.M. Lees, Li-Hong Xu, B.E. Billinghurst, *J. Mol. Spectrosc.* 319, 45-56 (2018).

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