MICROWAVE SPECTRA OF THE CD_3OD and CH_3OD METHANOL ISOTOPOLOGS UP TO 1.1 THz AND THEIR SEARCH TOWARD IRAS 16293-2422

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Different isotopic species of methanol have been detected in the warm parts of star-forming regions. We have started a program to investigate their rotational spectra to facilitate searches for these in space and here we present the results of our study of torsion-rotation spectra of the two deuterated isotopologs of methanol: $\mathrm{CD_3OD}$ and $\mathrm{CH_3OD}$. The new microwave measurements were carried out using spectrometers in Kharkiv and Köln (in total from 34 GHz up to 1.1 THz). The analysis is done using the rho axis method and the RAM36 program code. For both isotopologs the $v_\mathrm{t} = 2$ torsional state is significantly affected by intervibrational interactions with non-torsional vibrational modes which propagate down through intertorsional interactions. Thus we decided to concentrate our efforts on analysis of the $v_\mathrm{t} = 0, 1$ states at the moment. For both isotopologs we were able to get a fit within experimental error for $v_\mathrm{t} = 0, 1$ states and for both isotopologs we derived a line list for radio-astronomical observations. A search for $\mathrm{CD_3OD}$ in data from the Protostellar Interferometric Line Survey (PILS) of IRAS 16293-2422 obtained with ALMA was performed. While we found several emission features that can be attributed largely to $\mathrm{CD_3OD}$, their number is as yet insufficient to establish a clear detection. For $\mathrm{CH_3OD}$ the analysis of PILS observational data is in progress.

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