ROTATIONAL SPECTROSCOPY AND INTERSTELLAR SEARCH FOR N- AND I-BUTYRALDEHYDE

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Large organic molecules of extraordinary complexity have recently been found in diverse regions of the interstellar medium (ISM). In this context, we aim to provide accurate frequencies of the ground vibrational state of two key aliphatic aldehydes, n-butyraldehyde, and its branched-chain isomer i-butyraldehyde. We employed a frequency modulated millimeter-wave absorption spectrometer to measure the rotational features of n- and i-butyraldehyde; several thousands of transitions belonging to the lower-energy conformers have been assigned up to 325 GHz. A precise set of the relevant rotational spectroscopic constants have been determined for each structure as a first step to identifying both molecules in the ISM. We then used the spectral line survey named Re-Exploring Molecular Complexity with ALMA (REMoCA), performed toward the star-forming region Sgr B2(N) with ALMA to search for n- and i-butyraldehyde. We also searched for both aldehydes toward the molecular cloud G+0.693-0.027 with IRAM 30m and Yebes 40m observations. We report the nondetection of these isomers toward both astronomical sources. Our astronomical results indicate a leap around one order of magnitude in the aldehyde's abundance while increasing the level of complexity.

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