

MILLIMETER-WAVE SPECTRUM OF 2-PROPANIMINE AND ITS SEARCH IN THE INTERSTELLAR MEDIUM

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Imines are believed to be important prebiotic molecules that lead to the synthesis of amino acids in the interstellar medium (ISM). However, only four aldimine molecules, methanimine ($\text{CH}_2=\text{NH}$), ethanimine ($\text{CH}_3\text{CH}=\text{NH}$), cyanomethanimine ($\text{NCCH}=\text{NH}$), and propargylimine ($\text{HCCCH}=\text{NH}$), have been detected so far in the ISM, resulting in a poor understanding of their interstellar chemistry. The lack of high resolution spectroscopy data, which are partially caused by the chemical instability of imines under terrestrial conditions, hinders the search for other imines. Calculations suggested that 2-propanimine ($(\text{CH}_3)_2\text{C}=\text{NH}$) is the most stable isomer in the group of 3-carbon imine with a molecular formula of $\text{C}_3\text{H}_7\text{N}$. Following the lowest energy principle, it is a good target for astronomical search. If found, it would also be the first ketenimine detected in space. The rotational spectrum of 2-propanimine is not available currently, because of its chemical instability under room temperature. In addition, the two methyl internal rotors in 2-propanimine also complicate its rotational spectrum due to internal rotation, and make the spectral assignment and analysis non-trivial. In this work, we successfully measured and assigned the millimeter-wave spectrum of 2-propanimine between 50 and 500 GHz using a cryogenic preserved fresh sample from dedicated chemical synthesis. The spectroscopic results and the search for 2-propanimine in imaging spectral line surveys of SgrB2(N) and IRAS16293-2422 performed with ALMA will be presented.

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