

THE MILLIMETER-WAVE SPECTROSCOPY OF HYDANTOIN, A POTENTIAL PRECURSOR OF GLYCINE

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Hydantoin (Imidazolidine-2,4-dione, $C_3H_4N_2O_2$) is one of five-membered rings with heteroatoms and could be synthesized from carbonyl compounds such as aldehydes or ketones via so-called Bucherer-Bergs reaction. This molecule is also known as a direct precursor of amino acid by hydrolysis, evidently, hydantoin has been found in carbonaceous chondrites with several kinds of amino acids.^a The aim of this study is to provide spectroscopic information which is useful for the future astronomical search. The hydantoin vapor was obtained by heating hydantoin powder to 150°C, and spectral line survey has been conducted in the frequency range between 138 and 150 GHz. Our DFT calculations suggest that the permanent dipole of this molecule is approximately 2 Debyes and lies mostly along *b*-molecular axis. Forty-five spectral lines in the above frequency region can be so far assigned to *b*-type R-branch transitions, and molecular constants including centrifugal distortion constants up to the 4th-order have been determined. The obtained rotational constants agree well with the calculated values. In addition, some of the unassigned spectral lines were attributed to the hydantoin transitions in the vibrational excited state. We will report the current status of the analysis.

^afor example, A. Shimoyama and R. Ogasawara, 2008, *Orig. Life Evol. Biosph.* **32**, 165 (2002).