MICROWAVE-WAVE SPECTROSCOPY OF 5-METHYL HYDANTOIN

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Hydantoin (Imidazolidine-2,4-dione, $C_3H_4N_2O_2$ is a five-membered heterocyclic compound, and has been regarded as a direct precursor of glycine, the simplest amino acid. The molecule was detected in carbonaceous chondrites together with several kinds of amino acids.[a] We have measured pure rotational spectrum of the molecule in its ground and vibrationally excited states, and have provided the molecular line frequency list in the millimeter-wave region for astronomical search.[b] 5-methyl hydantoin is the simplest chiral molecule among hydantoins, because either of the hydrogen atoms bonded to the C5 position of the five-membered ring is asymmetrically substituted. The molecule becomes a direct precursor of alanine, the simplest chiral amino acid. We have tried to observe pure rotational spectrum of 5-methyl hydantoin in the millimeter-wave to sub-millimeter-wave region. Guided with quantum chemical calculation, several spectral lines can be assigned to b-type transitions.

[a] A. Shimomiya, and R. Ogasawara, Orig. Life Evol. Biosph. 32, 165 (2002)

[b] H. Ozeki, R. Miyahara, H. Ihara, S. Todaka, K. Kobayashi, and M. Ohishi, Astron. Astrophys. 600 A44 (2017).