

Microwave spectroscopy of prebiotic molecules

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Among molecules so far detected in interstellar media(ISM), some are configuring the part of chemical synthesis pathway toward building block of life. Existence of such “prebiotic” molecules in ISM has drawn much attention to many researchers for a long time. For example, various kinds of formation mechanism of glycine, the simplest amino acid, have been proposed. Chemical models developed recently have taken into account reactions of the prebiotic molecules to tell the abundance and the distribution of these species.[1] Guided with the theoretical works, plenty of observational studies have been reported, leading to an identification of new interstellar molecule. Spectroscopic information such as molecular constants, permanent dipole moment, partition function, spectral line shape parameters, are prerequisite for this purpose. Most of them are derived from high-resolution molecular spectroscopy in the microwave region.[2]-[5]

Laboratory spectroscopy of “new” molecule demands both an accurate prediction of molecular structure and an efficient production of the molecule under investigation. State-of-the-art theoretical calculations provide molecular rotational constants with an accuracy of one percent level. Standardized way for efficient production of unstable molecules in the laboratory condition is hard to be established, thus we need to consider individually for each case. Recent progress on laboratory spectroscopy of prebiotic molecules are reviewed from the above-mentioned standpoints.

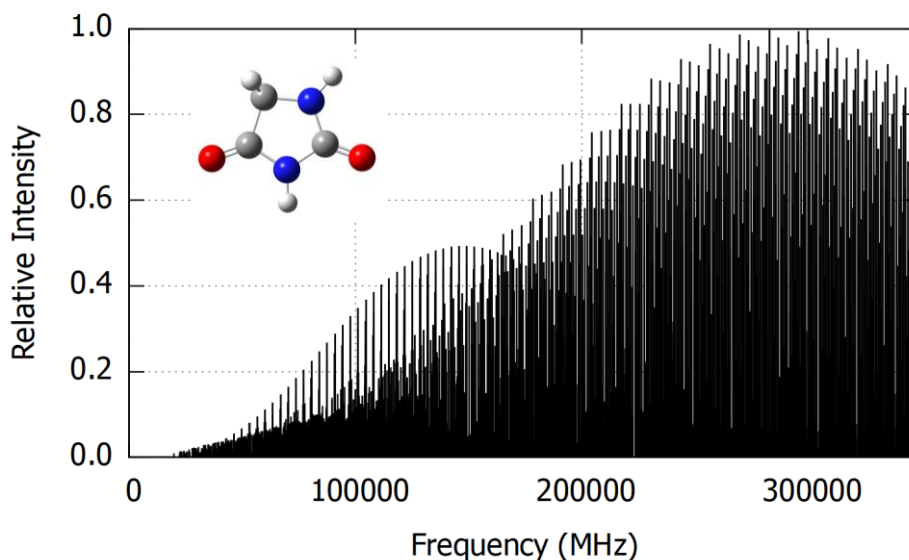


Figure 1: Spectral intensity distribution of Hydantoin, a possible precursor of glycine, at 100 K [4].

References

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