

EXAMINING METHYLAMINE DISSOCIATION PRODUCTS USING THEORY AND MILLIMETER/SUBMILLIMETER SPECTROSCOPY

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Studying the chemical inventory of the interstellar medium (ISM) is critical to developing new theories of molecular formation and evolution. Furthermore, the search for biologically relevant species and their precursors has been at the forefront of astrobiology and astrochemistry in recent years. As such, this work focuses on the dissociation products of methylamine (CH_3NH_2), a known precursor to the simplest amino acid, glycine ($\text{C}_2\text{H}_5\text{NO}_2$). It is likely that the radical products of cosmic-ray induced photodissociation of methylamine are important in prebiotic interstellar pathways as well as atmospheric models of planetary bodies such as Titan. Therefore, we are studying the radical species produced in a methylamine discharge as a guide for future studies of methylamine photodissociation. Our initial molecular targets are the radicals CH_2NH_2 , CH_3NH , and CH_3N , for which no rotational spectroscopic information is available. We examined the structure of these radicals using high-level computational methods. We then compared the predictions of these calculations to the rotational spectra of species obtained using a high voltage discharge of methylamine in argon at the throat of a supersonic expansion. Here we will present the spectroscopic predictions and the initial experimental results and discuss the implications for astrochemistry and astrobiology.