ANALYSIS OF THE SUB-MILLIMETER ROTATIONAL SPECTRUM OF UREA

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Urea, ($(NH_2)_2CO$), has broad presence in biological species. As a byproduct of human metabolism, this molecule is commonly tested for in blood to diagnose different pathologies. Furthermore, urea is seen in interstellar medium and its detection could yield valuable insight into the mechanisms governing star formation. Despite the prevalence of urea, an absence exists in recorded frequencies of this molecule. The new generation of the sub-millimeter telescopes, such as ALMA, HERSCHEL, and SOFIA, allows detection of interstellar molecular spectra at unprecedented spatial and spectral resolutions. The knowledge of the precise frequencies of spectra transitions present in interstellar molecular clouds would alleviate the problem of spectral congestion and aid in molecular identification. This paper reports the most recent investigation of the submillimeter/terahertz gas phase spectrum of urea. Up until now, only the microwave laboratory spectrum of ureas vibrational ground state has been available. This paper reports the high-resolution spectra of urea in the sub-millimeter range, and extends the spectroscopic assignment of the rotational transitions in the vibrational ground state. Additionally, the assignment of the first vibrational state and tentative assignments of two additional vibrational states have been made.