Deep Search for Glycine in Barnard 5

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One of the goals of astrochemistry is to understand the formation of molecules which could act as precursors of biologically important molecules, such as amino acids. While the simplest amino acid, glycine, has been detected in comets, searches for it in massive star-forming regions have been proven controversial [1, 2, 3, 4]. Emission divided between thousands of spectral lines result in weak lines and severe line blending in hot and line-rich sources, complicating a detection. However, many of the problems inherent in searching for glycine in star-forming regions can be alleviated by instead targeting lines in the 4 mm band in cold sources where complex organic molecules (COMs) are prevalent. Such a source is the so-called methanol hotspot in Barnard 5 where we have detected high abundances of methanol, gas phase water and COMs [5, 6]. In particular, the surprisingly high abundance of the high-energy conformer cis-HCOOH [5] indicates that the glycine conformer Gly-II could produce stronger emission lines at 4 mm than the lowest energy conformer Gly-I.

Here, we present the observational results of our search for glycine towards the B5 methanol hotspot made with the Onsala 20m telescope in 2017 and 2018. We were not able to detect glycine, but we deduced upper limit column densities for Gly-I and Gly-II transitions in the frequency ranges 71-73 GHz (2017) and 74-78 GHz (2018). Additionally, we derived column densities for CH_3CHO, DCO^+, H_2CO, $H_2{}^{13}CO$, OCS, and SO_2.

References

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