

METHANIMINE AT HIGH SPATIAL RESOLUTION IN SGR B2: IMPLICATIONS FOR THE FORMATION OF CYANOMETHANIMINE

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Two transitions of methanimine (CH₂NH) have been mapped towards Sgr B2 using the Jansky Very Large Array (VLA) with 1.5 arcsecond resolution. The two targeted transitions are both between low-lying energy states at similar frequencies, yet one appears in absorption whereas the other is in emission with the same line profile. The VLA data reveals that the spatial distributions of the two transitions match and that they are NOT associated with the hot core toward Sgr B2(N). As compared to other molecular lines observed towards Sgr B2 at centimeter wavelengths, the CH₂NH emission line is highly uncharacteristic, and the transitions exhibits non-thermal effects implying a population inversion. We discuss the non-thermal excitation of CH₂NH, observed spatial distributions, and implications for the chemistry in Sgr B2. Specifically, CH₂NH may be important for the formation of the recently detected species E-cyanomethanimine [1] and of the Z- and N- conformers of cyanomethanimine. Laboratory work by Balucani et al [2] indicates that reactions between the CN radical and olefins (with a carbon-carbon double bond) may proceed without a barrier, potentially making the reaction CH₂NH + CN → HCNHCN viable in the interstellar medium.

1 Zaleski, D.P., et al. 2013, ApJL, 765, L10 2 Balucani, N., et al. 2000, ApJ, 545, 892