

## Chemical / Physical Properties of CH<sub>2</sub>NH Sources

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Despite its importance for the Origin of Life, long lasting challenges to detect interstellar simplest amino acid, glycine (NH<sub>2</sub>CH<sub>2</sub>COOH) were not successful. Since precursor-rich sources would be potential glycine-rich sources, understanding the chemistry of its precursors will lead a breakthrough of future glycine surveys with ALMA. For the formation mechanism, laboratory experiments demonstrated that dust surface reactions could form glycine. This process start with the hydrogenation (H added) to HCN : HCN → CH<sub>2</sub>NH (Methylenimine) → CH<sub>3</sub>NH<sub>2</sub> (Methylamine) (Theule et al. (2011)), similar to well known formation process of CH<sub>3</sub>OH: CO → H<sub>2</sub>CO → CH<sub>3</sub>OH. After that, reaction of CH<sub>3</sub>NH<sub>2</sub> with CO<sub>2</sub> will form glycine (Kim & Kaiser (2011)). However, precursors of glycine, CH<sub>2</sub>NH and CH<sub>3</sub>NH<sub>2</sub>, were also not well investigated in the actual interstellar medium.

Since 2013 April, we have conducted survey observations of CH<sub>2</sub>NH using NRO 45m telescope towards 11 high-mass and three low-mass star-forming regions. As a result, CH<sub>2</sub>NH was detected in eight sources, including four new ones. Among them, G10.47+0.03 and G31.41+0.3 showed especially high CH<sub>2</sub>NH abundance.

The chemical properties of CH<sub>2</sub>NH sources give us clues to reveal the CH<sub>2</sub>NH chemistry. The positive correlations between “CH<sub>2</sub>NH vs CH<sub>3</sub>OH” and “CH<sub>2</sub>NH vs HC<sup>15</sup>N” would suggest that hydrogenation to HCN is plausible way to form CH<sub>2</sub>NH in the actual interstellar medium. Further, other complex N-bearing species, like C<sub>2</sub>H<sub>5</sub>CN and C<sub>2</sub>H<sub>3</sub>CN also tend to be higher in CH<sub>2</sub>NH-rich sources, while non N-bearing species does not show this trend (figure 1). Such chemical properties might be linked to the evolutionary phase and/or initial condition of star formation. In this work shop, we will show our results and would like to discuss the connection between physical and chemical properties of CH<sub>2</sub>NH-rich sources.

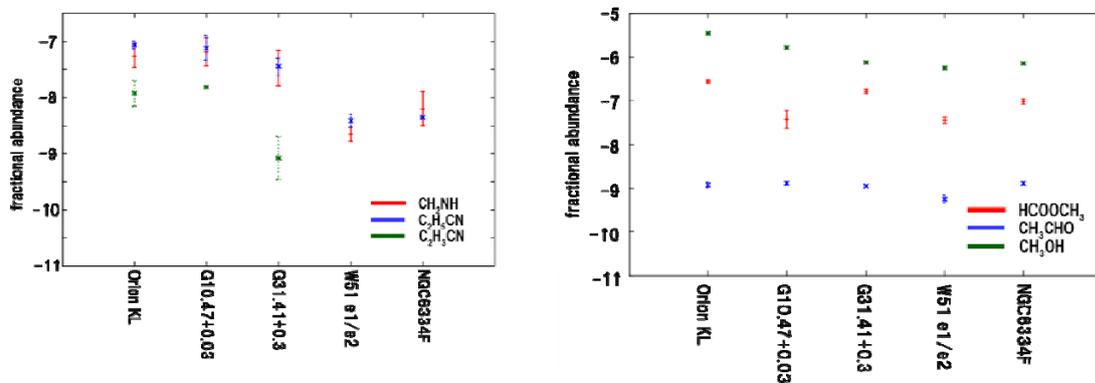


Figure 1: Comparison of fractional abundances among complex organic species

### References

[1] Kim & Kaiser. ApJ, 729:68

[2] Theule et al., 2011, A& A, 534, A64