Discovery of Absorption Features of CH_3NH_2 towards SgrB2(M)

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Abstract

There is a wide agreement that complex organic molecules (COMs), such as amino acids, are crucial material for life. There has been a hot debate where such COMs were formed, on the Earth or in the Universe. Ehrenfreund et al. (2002) suggested that exogenous delivery of COMs to the primitive Earth would be much larger by three orders of magnitude than terrestrial formation of COMs. Thus it would be crucial to study what and how much COMs exist in star and planet forming regions.

Methyl amine (CH_3NH_2) has been proposed as a precursor to glycine through reaction with CO_2 under UV irradiation (Holtom et al. 2005; Kim & Kaiser, 2011). Bases on such laboratory studies it is possible to assume possible formation paths from simple and rich molecular species (CH_4, NH_3, CO_2 and HCN) to glycine (Figure 1).

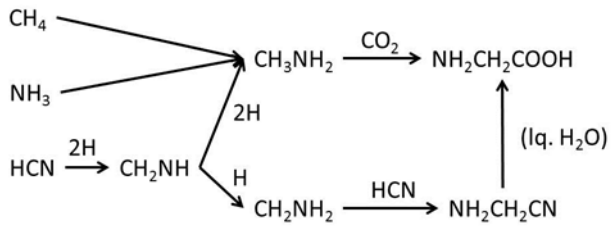

Figure 1. Possible Formation Paths to Glycine

Since there are a very small number of studies on interstellar CH_3NH_2 since its detection by Kaifu et al. (1974), we conducted survey observations of CH_3NH_2 towards several star-forming regions by using the Nobeyama 45m radio telescope in April 2013. During this survey we discovered three low-energy CH_3NH_2 lines in clear absorption against the radio continuum emission towards SgrB2(M). An example spectrum is shown in Figure 2. Our detection may suggest that CH_3NH_2 would be widely distributed even in cold molecular clouds.

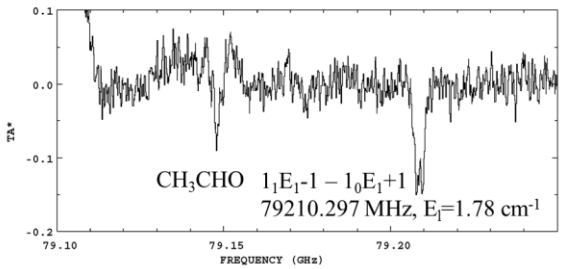

Figure 2. Example of absorption line of CH_3NH_2 towards SgrB2(M)

In the workshop, we will report details on the detected features and comparison results with simulations by using a chemical reaction model.

Key word: Origin of Life; Methyl amine; Glycine formation; Precursor to Glycine