Q14b   Detection of Molecular Anion, C_6H^-, toward Low-Mass Protostar L1527

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Recently we have detected the $J = 7 - 6$ (19.3 GHz), $8 - 7$ (22.0 GHz), and $15 - 14$ (41.3 GHz) lines of C_6H^- toward a low-mass star-forming region of L1527 with GBT and Nobeyama 45 m telescope. We have also detected the $J = 15/2 - 13/2$ and $33/2 - 31/2$ lines of the corresponding neutral species, C_6H, and the $8_{1,8} - 7_{1,7}$ line of C_6H_2 in L1527. This is the first detection of these three species in star forming regions.

The intensities of the $J = 7 - 6$, $8 - 7$, and $15 - 14$ lines of C_6H^- are 14, 26, and 26 mK (T_{MB}), respectively. The column density of C_6H^- is $(5.8 \pm 1.8) \times 10^{10}$ cm^{-2}, which is comparable to that in TMC-1, although the column density of C_6H in L1527 is about 1/5 of that in TMC-1. Thus the $N(C_6H^-)/N(C_6H)$ ratio is evaluated to be 0.093 ± 0.029, being much higher than that in TMC-1 by a factor of 4. The high $N(C_6H^-)/N(C_6H)$ ratio is discussed in terms of the simplified chemical model. The present result demonstrates importance of the anion chemistry in a dense part of the star forming region. The chemical simulation of the $[C_6H^-]/[C_6H]$ ratio in the gravitationally contracting cloud would be interesting.