

P46b **Molecular Anions in the Low-Mass Star-Forming Region, L1527**

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We have detected a molecular anion,  $C_6H^-$ , toward a low-mass protostar, IRAS04368+2557 in L1527, which shows extraordinary richness of various carbon-chain molecules. This is the first detection of molecular anions in star forming regions. The abundance ratio of  $[C_6H^-]/[C_6H]$  is found to be 0.093 in L1527, being four times higher than that in TMC-1. This high ratio is successfully accounted for in terms of the lower abundance of the atomic hydrogen in a dense region. We presented this result in the last annual meeting (Sep. 2007, Q14b).

As an extension of the above study, we have very recently detected a  $C_4H^-$  line ( $J = 9 - 8$ ) in L1527 with the IRAM 30 m telescope.  $C_4H^-$  has not been detected even in TMC-1, and thus this is the first detection in molecular clouds. The column density of  $C_4H^-$  is determined to be  $1.1 \times 10^{10} \text{ cm}^{-2}$ . The  $[C_4H^-]/[C_4H]$  ratio is found to be  $6.8 \times 10^{-5}$ , which is much lower than the  $[C_6H^-]/[C_6H]$  ratio. From this result, the rate coefficient for the radiative attachment reaction between  $C_4H$  and electron is estimated to be as small as  $3 \times 10^{-11} \text{ cm}^3\text{s}^{-1}$  on the basis of the simplified chemical model. The present result along with our detection of  $C_6H^-$  has demonstrated the uniqueness and importance of L1527 in searching for a new molecule in a star-forming region.