ORTHO-TO-PARA ABUNDANCE RATIO OF CYCLIC-C_3H_2 IN DARK CLOUD CORES

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We have observed four emission lines of cyclic-C_3H_2 in the milimater region with Nobeyama 45m radio telescope toward five cloud cores in TMC-1. From the observed intensities, the density of H_2 molecules and the fractional abundance of ortho(O) and para(P) of c-C_3H_2 were calculated using the LVG model. The O/P abundance ratio of c-C_3H_2 determined from the calculated abundance is foud to be lower than 3 in the all the observed cloud regions, although both the statistical ratio and the thermal equilibrium ratio at the dust temperature of 10K are predicted to be 3. The deviation of the O/P ratio of c-C_3H_2 from 3 indicates that the O/P ratio of the precursor molecule c-$C_3H_3^+$ is also different from its statistical ratio. Since the precursor molecule c-$C_3H_3^+$ is believed to be produced mainly by the reaction of $C_3H^+ + H_2$, the deviation may be a result of the lower O/P ratio of H_2 molecules than the statistical value in the observed regions. We will discuss details of the observed data and its analysis.