P136b Cyanopolyyne Chemistry around Massive Young Stellar Objects

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Recent radio astronomical observations showed that cyanopolyynes ($HC_{2n+1}N$), one of the representative carbon-chain series, are abundant around some massive young stellar objects, which was not predicted by classical carbon-chain chemistry. In particular, the G28.28–0.36 massive young stellar object (MYSO) shows a unique feature; the HC_5N abundance is higher than that in L1527, which is one of the warm carbon chain chemistry (WCCC) sources, and the HC_5N/CH_3OH ratio in the envelope is higher than those in other MYSOs by more than one order of magnitude. These results imply chemical diversity around MYSOs. Motivated by such observational results, we have investigated the cyanopolyyne chemistry with chemical simulations of hot-core models containing a warm-up period, using the astrochemical code *Nautilus*. Cyanopolyynes are efficiently formed in the gas phase during the warm-up period and accreted onto dust grains ($25 < T < 100$ K), followed by the sublimation after the temperature reaches their sublimation temperatures. Besides, we find that there are largely two types of carbon-chain species, and our models support recent observational results toward high-mass protostellar objects and massive cluster-forming regions. We also discuss possible interpretations of relationships between the chemical diversity observed around MYSOs and the star-formation process or physical conditions such as the size of warm region, infall velocity and cosmic-ray ionization rate.