

P102a Molecular complexity around a high-mass young stellar object in the Small Magellanic Cloud seen by ALMA

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Observations of complex organic molecules in low-metallicity environments will be crucial information for understanding organic chemistry in the past metal-poor universe. The Small Magellanic Cloud (SMC) is a nearby star-forming dwarf galaxy, whose metallicity is lower than the standard solar value by a factor of five. Here we report the first detection of a complex organic molecule, methanol (CH_3OH), in the SMC based on submillimeter observations towards a high-mass young stellar object (YSO) with ALMA. Besides CH_3OH , we also detect the dust continuum as well as emission lines of CS, C^{33}S , H_2CS , SO, SO_2 , H^{13}CO^+ , H^{13}CN , SiO, and tentatively HDS from the observed source. The target infrared point source is spatially resolved into two dense molecular cores; one is associated with a deeply embedded high-mass YSO, while another is not associated with an infrared source but shows rich molecular lines including those of CH_3OH . The CH_3OH gas temperature is estimated to be ~ 10 K based on the rotation analysis, and the fractional molecular abundance is estimated to be $(0.5\text{--}1.5) \times 10^{-8}$, which is comparable with or marginally higher than those of similar cold sources in our Galaxy, despite a factor of five lower metallicity in the SMC. In this presentation, we discuss observed properties of chemically-rich molecular gas and a possible origin of cold CH_3OH gas around a high-mass YSO at 0.2 solar metallicity.