Detection of CH_3CN in Envelope around Sagittarius B2(N)

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Traditionally used model of evolution of molecular clouds in interstellar space is described as increasing of cloud gas density from diffuse to dense conditions, i.e., from an atomic-gas cloud to a star-forming region via a diffuse cloud and a dense cloud. However, recently "reverse evolution" of molecular clouds is suggested by Price *et al*. [1]. For example, outflow from a star-forming region makes a relatively-low-density cloud. To find a clue of reverse evolution, investigation of chemical composition of relatively-low-density clouds is necessary. Absorption of CH_3CN can be observed by the hot axis effect, which shows special rotational distributions of CH_3CN in a relatively-low-density cloud [2]. In our previous work, CH_3CN was detected via absorption of the $J = 4–3$ rotational transition in the envelope of Sagittarius B2(M) core in the Galactic Center region by using Nobeyama 45-m telescope [3]. In this work, using ALMA data archive [4], we investigated absorption of the $J = 5–4$ and 6–5 rotational transitions of CH_3CN in the envelope of Sagittarius B2(N) core, which is an adjacent core of the (M) core. The column density of CH_3CN in the envelope of the (N) core is derived to be $(1.0 \pm 0.2) \times 10^{15}$ cm^{-2}, which is 7 times larger than that in the envelope of the (M) core, while the (N) core has an 11-times larger column density than the (M) core [5]. Similar abundance relation was found in a case of HC_3N. Thus, as chemical compositions of relatively-low-density clouds, it was found that an abundant core has an abundant envelope and vice versa.

[1] Price *et al*., 2003, *MNRAS*, **343**, 1257. [2] Araki *et al*., *Astronomical Journal*, **148**, 87 (2014). [3] Araki *et al*., *JpGU 2018*, PPS09-01. [4] Project Code: 2016.1.00074.S. [5] Belloche *et al*., 2013, A&A, **559**, 47

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