

Observational Studies relating to Diffuse Interstellar Bands

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Identification of diffuse interstellar bands (DIBs), which are mostly observed as an absorption spectrum in the visible and ultraviolet regions is a problem in astronomy that has remained unresolved for over 70 years. Many candidates have been proposed for the carrier. Negative bare carbon chains, such as C_6^- , C_7^- and C_8^- , was probable candidates because of the agreement found in wavelengths between laboratory data and astronomical data, as pointed out by Tulej et al. (1). If Tulej et al.'s assumption of C_7^- is correct, the shorter-chain C_2^- anion can be expected to exist with detectable abundance.

A search has been carried out for the C_2^- ion in diffuse clouds, toward HD 24398, HD 46711, HD 50064, HD 23180, HD 24912, HD 46711 in the 5400 Å region using an Okayama 188-cm telescope HIDES spectrometer. The upper limit for C_2^- of 10^{11} cm^{-2} in column density has been reported, which is smaller than the C_7^- abundance obtained from the assumption that C_7^- is responsible for diffuse interstellar bands (DIBs). To examine the C_7^- assumption, we investigated the wavelength region where many vibrational bands for C_7^- can be expected. All our observed results indicate no evidence for the hypothesis that some diffuse bands originate from carbon chain such C_6^- , C_7^- , and C_8^- .

Further observations are carried out to obtain information about distribution and correlation of diffuse interstellar bands. In 2003, we observed 15 diffuse clouds in the 6500-7500 Å and 7900-9000 Å region. Observational results of diffuse clouds toward Perseus will be mainly presented.

(1) M. Tulej et al. *Astrophys. J.* **506**, 69 (1998).