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# CNO abundances in the early Galaxy

Carbon-enhanced metal-poor (CEMP) stars contribute to about 20% of the metal-poor stars below [Fe/H] < -2.0. The origin of carbon in these stars could be due to AGB mass transfer in a binary system. These class of objects (CEMP-s) also show enhancement of s-process elements, and most of them show radial velocity variations indicating the presence of a companion. However, the class of CEMP stars that do not show s-process enhancements, that are more dominant at much lower metallicities ([Fe/H] < -3.5), are thought to be true first low mass stars that received contributions from winds of rotating very massive star (spinars) or faint supernovae. C, N, O abundances of these objects are crucial to understand the contributions of C, N, O from these massive stars. Carbon and nitrogen abundances can be derived from the $C_2$, CH, CN and NH bands. However, obtaining oxygen abundance is very time-consuming and difficult in CEMP stars due to the weak 6300 [OI] line and crowded C2 and CN lines in cool-CEMP stars that require high resolution, high S/N optical spectra. Hence, we use NIR CO rovibrational bands in the NIR region, to derive oxygen abundances. For a carbon-enhanced star, the CO lines are sensitive to change in oxygen abundances. We also derived C, N, O abundances from optical wavelengths to calibrate the C, N, O abundances from NIR CO lines for a subset of CEMP stars. Here, we report CNO measurements of 10 CEMP stars from high-resolution optical spectra and low-resolution NIR spectra and compare them. This is the first time such comparison of CNO abundance over optical and NIR wavelength done in CEMP stars. We also present a detailed abundance of alpha, Fe-peak, and n-capture elements as well to understand the origin of CNO.

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