

ANALYSIS OF ELEMENTAL CARBON AND OXYGEN ABUNDANCES IN CARBON STARS – THEY HAVE TURNED OUT TO BE MORE CARBON-RICH THAN BELIEVED

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We re-analyzed elemental abundances of carbon and oxygen in three carbon stars (TX Psc, BL Ori, and V Aql) from high-resolution infrared spectra originally obtained by Lambert et al. (1986). With the interplay between the atmospheric structure and the chemical composition properly taken into account, we determined carbon and oxygen abundances self-consistently. The oxygen abundances in the three stars are solar or slightly subsolar, showing fairly good agreements with the results by Lambert et al. However, the carbon abundances derived here show marked disagreements with those derived by Lambert et al. Especially for V Aql, the carbon abundance is much higher than that they derived: the C/O ratio is as high as 2.4 in contrast to their result $C/O = 1.25$. These disagreements might be attributed to the difference of the model atmospheres used in the analyses or to the difference of the treatment of the excitation effect. The $^{12}\text{C}/^{13}\text{C}$ ratios derived in our previous work (Ohnaka & Tsuji 1996) and the C/O ratios derived here, including the high value in V Aql, show a very clear correlation. It strongly supports the scenario in which K and M giants evolve to carbon stars by addition of ^{12}C synthesized in the thermal pulse.

References

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