STUDIES OF THE ULTRAVIOLET SPECTRA OF WOLF-RAYET STARS

By

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New ultraviolet observations of nine Wolf-Rayet stars have been obtained with the S2/68 experiment of the ESRO satellite TD-1. These low resolution ($\Delta\lambda$ ~ 35Å) spectra have been studied yielding line identifications and strengths of the numerous emission lines observed in both WN and WC stars. The ultraviolet data are combined with complementary ground based photoelectric measurements to yield new estimates of the interstellar reddening corrections required. The combined ultraviolet and visible WR energy distributions, corrected for interstellar extinction, yield colour temperatures ~ 30000 K for all nine stars. These temperatures are close to those derived from a Zanstra analysis of the He II 1640 Å line observed in emission in single WN and WC stars.

The observed helium, carbon and nitrogen lines in the ultraviolet and visible spectra of four WR stars have been analysed using a non-LTE treatment and Escape Probability methods to determine the abundances of these species in the WR atmospheres. The analysis of low excitation carbon and nitrogen lines in the ultraviolet allows for the first time accurate abundances for these species to be determined. It is found that in the WC star studied the C/He and N/He ratios are close to the normal cosmic values. In the WN stars the N/He ratio is slightly higher than normal but the C/He ratio is much reduced. In both sequences the H/He ratio is very low. Thus it appears that the carbon abundance is the controlling factor in determining the spectral characteristics of both sequences. It is clear that the WR stars are in the helium burning phase, with the WN sequence being less evolved than the WC sequence. These results in many ways support the recent suggestion of Conti (1976) that the Of stars are the progenitors of the WR class.

https://doi.org/10.1017/S0252921100120299 Published online by Cambridge University Press