THE PROPERTIES OF POPULATION I WO STARS

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ABSTRACT: High and low resolution UV and optical spectra of the four Population I WO stars originally classified by Barlow and Hummer (1982), Sanduleak 1, 2, 4 and 5, have been analyzed. Reddenings, terminal velocities and the relative abundances of He^{2+}, C^{4+} and O^{6+} have been determined. The results are presented in Table 1.

The WO stars show strong OVI 3811,34 Å, CIV+HeII 4658+86 Å and CIV 5801,12 Å emission. The oxygen lines are stronger in these stars than in the WC class and the WO stars are believed to be the next evolutionary stage after WC stars.

P Cyg line profiles in the UV spectra of Sand 1 and 2 yielded wind expansion velocities. In the case of Sand 1, the terminal velocity (v_∞) was obtained from $v_{\rm black}$ of the saturated CIV 1548,50 Å profile in a high resolution IUE spectrum. Sand 1 was used to check which optical lines were most appropriate for determining v_∞. Half the FWZI's of HeII 1640 Å and of CIV 5801,12 Å (corrected for instrumental profile and doublet separation) were found to give the best agreement with the CIV 1548 Å $v_{\rm black}$, so these were used to derive v_∞ for the other WO stars.

The abundance ratios C^{4+}/He^{2+} and O^{6+}/He^{2+} were derived from recombination lines which were assumed to be optically thin at T=50000K and $\log(n_e)=11$, using the method described by Barlow and Hummer (Proc. IAU Symp. 99, p. 387, 1982).

Table 1: WO Properties	Sand 1	Sand 2	Sand 4	Sand 5
Other names	Sk 188, AB 8	Brey 93, FD 73	WR 102	WR 142, ST 3
Spectral Type	WO4+O7	WO4	WO1	WO2
EW(OIV 3400) (Å)	68±1	299±3	–	–
EW(OVI 3434)	–	–	74±8	60±20
EW(OIV 3811,34)	64±1	336±5	1740±30	990±30
EW(CIV+HeII 4658,86)	90±5	531±5	150±10	380±10
EW(OVI 5290)	10±1	45±3	71±3	62±8
EW(OV 5590)	25±1	110±10	30±5	25±5
EW(CIV 5801,12)	200±30	2450±40	150±5	320±10
E(B–V)	0.05	0.19	1.65	2.04
V	13.52	16.35	14.56	13.37
M_V	–5.4	–2.6	(–2.8)	–2.8
D (*kpc*)	57.5	46.8	(2.9)	0.9
v_∞ ($km\ s^{-1}$)	4200	4500	4600	5500
$n(C^{4+})/n(He^{2+})$	0.51	0.38	0.66	0.20
$n(O^{6+})/n(He^{2+})$	0.08	0.03	0.10	0.03

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