

ABUNDANCE OF SODIUM IN THE ATMOSPHERES OF ALGOL A AND B

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Abstract. The Na D1 and D2 lines of Algol A and B observed by Tomkin and Lambert(1978) were analyzed to obtain sodium abundance. A mild deficiency of sodium $[Na/H] \sim -0.5$ is found in Algol B, while a slight overabundance $[Na/H] \sim +0.3$ is found in Algol A.

Chemical composition of component stars in semi-detached binary systems of the Algol-type is one of the important factors for understanding of structure and evolution of those systems. Tomkin and Lambert (1978) detected the Na D lines of Algol B. We determined sodium abundance of Algol A and B from their line profiles.

We measured equivalent widths of the Na D lines of Algol A and B, which are less than those by Tomkin and Lambert(1978), as shown in the following table. The equivalent widths, belonging to both components, have to be converted to those with respect to the separated light of each component. Taking the reflection effect and the aspherical shape of Algol B into consideration and using model atmospheres, we obtain the light ratios at $\lambda 5893A$ to be $L_A/L_B = 5.63$ and $L_C/(L_A+L_B+L_C) = 0.112$ for the observed phases (0.306 and 0.716). These light ratios lead to the corrected equivalent widths from which we derive sodium abundance and microturbulence in the atmospheres of Algol A and B.

Fitting of the computed profiles based on our solution to the observed is fairly satisfactory for Algol A and B. Here we assumed the synchronized rotation for both components. About Algol C, however, we have little knowledge. If we adopt $T_{\text{eff}} = 8400K$, $\log g = 3.8$, solar abundance of sodium, and 3 km/s of microturbulence for Algol C, we obtain not small D lines of Algol C, that contaminate the profiles of Algol A in the observation. This situation suggests that the above obtained value of sodium abundance for Algol A should be regarded as the upper limit.

Different results have been reported among recent observational studies of metal abundance in the secondary component in semi-detached

binary systems of the Algol-type. We find that $[Na/H] \sim -0.50$ derived for Algol B is comparable to the mild deficiency in the secondary of U Sge (Naftilan, 1976). Our result $[Na/H] \sim +0.30$ for Algol A is consistent with Naftilan (1975), who found a slight overabundance of metals in the primaries of some Algol-type binary systems.

		Measured EW (Å)	$\log \epsilon$	T_{eff} (K)	$\log g$	ξ_t (km/s)	v_{rot} (km/s)
Algol A	D2	0.040	6.55	12000	4.0	1.5	54.4
	D1	0.029					
Algol B	D2	0.040	5.75	5900	3.3	2.5	57.0
	D1	0.032					

References.

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