

IRON AND TITANIUM ABUNDANCE IN THE ATMOSPHERES OF CHEMICALLY PECULIAR STARS

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ABSTRACT

From the equivalent widths (W_λ) of the selected FeII and TiII lines the peculiarity indices P(FeII) and P(TiII) are determined for 70 normal B8-A8 stars of III-V luminosity classes and for 95 magnetic chemically peculiar (CP) B3-A8 stars.

For normal stars all the P(FeII) and P(TiII) indices are within the limits of 0.5-1.7. A close correlation of P(FeII) and P(TiII) is found. The dependence character of P(FeII) and P(TiII) indices on the iron and titanium abundance [lg (Fe)] and [lg(Ti)], determined using the model atmosphere method, is ascertained, i.e. P indices can be used for prompt determination of relative chemical abundance in the atmospheres of B and A stars.

Analysing the dependences of P(FeII) and P(TiII) on the spectral class (or T_e) peculiarity type and magnetic field $\langle B_e \rangle$ for CP-stars it follows:

a). P(FeII) and P(TiII) indices increase rapidly with the temperature increase from the "normal" values $P = 0.5-1.7$ for the latest (Sr, Cr, Eu) stars ($Sp \approx A3-A8$, $8700 \geq T \geq 7500$ K). They approach the values from >2 to $10-13$ for the hot (He-weak), Si 4200 and Hg, Mn stars ($Sp \approx B3-B8$, $18000 \geq T_e \geq 12000$ K),

b). Fe and Ti overabundances in the atmospheres (on the surface on the average) of CP-stars of He-weak, Si, Si 4200 and, perhaps, Hg, Mn types can approach 2.7 dex.,

c). He-weak, Si, Si 4200 stars with the substantially strengthened Fe, Ti, Cr etc. metal lines with $P(FeII) + P(TiII) / 2 > 4$ have two times larger $\langle B_e \rangle$ than CP stars of the other peculiarity types within the same interval of spectral classes, B3-B8: for them $\langle B_e \rangle = 2000$ Gs, for the other (Si, He-weak) stars $\langle B_e \rangle = 1000$ Gs, for Hg, Mn stars $\langle B_e \rangle = 420$ Gs.