PRELIMINARY RESULTS OF ABUNDANCE DETERMINATION OF IRAS 09276+4454.

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ABSTRACT. The model atmosphere parameters and chemical abundance curve are derived for the infrared source IRAS 09276+4454 identified with the peculiare supergiant HD 82040 (M6). The effective temperature from hand head intensity relations of TiO α-system was determined. The abundances of 11 chemical elements in atmosphere of IRAS 09276+4454 were estimated. The chemical abundance pattern is close to the solar one.

Key words: stars: abundances - stars: atmospheres - stars: evolution

1. Introduction

The stars with IRAS-excess are the first candidates in the stars on the post-AGB stage and its chemical composition is of great interest concerning the star evolution.

2. Observations and atmosphere parameters

The observations of IRAS 09276+4454 have been carried out at the 6m telescope echelle spectrometer LYNX (Panchuk et al., 1993). equipped with a CCD of 1040×1160 pixels. The spectral region 7350-7580 ÅÅ is relatively free from the molecular line-blanketing and it is used to obtain abundances from atomic lines of Al I, Si I, Ti I, V I, Cr I, Fe I, Co I, Ni I, Y II and Zr I. The sites 5540-5596 and 8065-8210 ÅÅ were also used. For all the sites a synthetic spectrum of atomic lines was calculated with the oscillator strengths $\log gf$ from Gurtovenko and Kostyk (1989) and solar model from a new grid model by Kurucz (1993) and compared with the Atlas of the Sun. A synthetic spectrum was calculated by using the program STARSP (Tsymbal,1993). As a result, the lines, adequately describing a solar spectrum, were selected. For compilation of the line list were involved also the lines from papers of Klochkova and Panchuk (1996), Whitmer et al. (1995), Smith and Lambert (1990). Thus in the list there are about 30 neutral iron lines and 1-4 line of other elements. The level of a continuous spectrum was carried out by a standard method for cold stars - from peaks of intensity on a wide site of a spectrum. For the control of placing a level of a continuous spectrum and estimation of the contribution in absorption of TiO a synthetic spectrum was carried out for selected sites. The effective temperatures were derived from the spestral type Sp - T_{eff} calibrations. The spectral type was derived by a technique, given in paper of Boyarchuk (1969). The method uses the intencity relations of a spectrum with long-wave part of a strip to short-wave at wavelengths of α-system head band strips of TiO ($I_{\lambda+}/I_{\lambda-}$). We employed ($I_{\lambda+}/I_{\lambda-}$) at 4761(2,0), 4804(3,1), 4955(1,0), 5000(2,1), 5167(0,0), 5240(1,1), 5448(0,2) ÅÅ for spectral class determination. The averaging of Sp was taken from three spectra (s15735, s15736, s15737). The value is M5. ($I_{\lambda+}/I_{\lambda-}$) and the results of the Sp definition are presented in Table 1 . Calibrations Sp - T_{eff} give the following data: a) - 3220 K (Flower, 1975); b) - 3420 K (Ridgway, 1980), c) - 3470 K (Dyck et al., 1996), d) - 3450 K (Fabbroni, Richichi, 1997). The surface gravity of the star was esti-

Table 1. The determination of spectral type

λ, Å	s15735	s15736	s15737	Sp
4761	0.20	0.19	0.21	M5.0
4804	0.39	0.34	0.39	M5.0
4955	0.14	0.13	0.12	M4.7
5000	0.39:	0.42:	0.47:	M5.5:
5167	0.13	0.13	0.12	M5.2
5240	0.53:	0.57:	0.59:	M6:
5448	0.31	0.29	0.30	M4.5
5759	0.77	0.76	0.75	M4.5

mated from her luminosity assigned from the effective temperature using evolutionary track calculations from Boothroyd and Sackmann (1988) and the standard formula log $(g/g_\odot)$ = 4log $(T_{eff}/T_{eff\odot})$ - log $(L/L_\odot)$ + log $(M/M_\odot)$, where the solar parameters T_{eff} = 5770 K and log g = 4.40 have been adopted. The value of a mass for this star was assumed 1.2 $M_\odot$. The otained value of log g = 1.2. The microturbulent velocity V_t was determined by forcing the abundance of individual FeI lines to be independent of equivalent width. The accuracy of the microturbulent velocity determination is $\pm$0.3 km s^{-1}, $\Delta T_{eff} = \pm$ 100 K, Δlog $g = \pm$ 0.3 dex.

3. Determination of the chemical composition

Determination of the chemical element abundances in atmosphere of the object is carried out under the program WIDTH-9 of Kurucz using the model with parameters T_{eff} = 3400 K, log g = 1.0, V_t = 3 km s^{-1} and solar metallicity from a grid of atmosphere models of Brown et al. (1989).

The oscillator strengths are taken from Gurtovenko and Kostyk (1989), for a line of Zr I and Y II- from Kurucz, Peytremann (1975). In Table 2 results of determination of chemical composition are given.

4. Discussion of results

As seen from Table 2, the slight deficiency of iron was found. The elements of iron group follow the iron abundance. The overabundance

Table 2. The results of the determination of the chemical composition

El.	n	log A	σ	log $A_\odot$
Al I	3	6.61	.28	6.49
Si I	2	7.68	.19	7.64
Ti I	3	4.47	.15	5.06
V I	1	4.13	-	4.00
Cr I	3	5.53	.35	5.64
Fe I	31	7.28	.26	7.55
Co I	2	4.89	.21	4.92
Ni I	3	6.10	.16	6.22
Cu I	1	3.87	-	4.10
Zr I	4	2.55	.22	2.56
Y II	1	2.36	-	2.24

of Al, Si and Ti underabundance relative to Fe were obtained. The elements of s-process show the abundance near to the solar one.

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