CHEMICAL COMPOSITION OF COOL GIANT STARS

N. S. Komarov, N. J. Basak, T. V. Gorbaneva, L. E. Kantsen
Astronomical Observatory, Odessa State University,
T.G.Shevchenko Park, Odessa 270014 Ukraine
E-mail: root@astro.odessa.ua

ABSTRACT. Based upon the catalogue of cquivalent widths of absorption lines in spectra of cool giant - stars created at the Astrospectroscopy Aepartment of the Astronomical Observatory in Odessa the abundances in their atmospheres is determined. This determination was made by using the method of model atmospheres. Fundamental characterictics of stars are determined by an independent method by using photometric observations.

Key words: Stars: abundances, giant

The chemical composition in the atmospheres of stars and interstellar medium is needed for testing nucleosynthesis theories and stellar evolution theories.It is necessary to obtain these data for a great number of objects as only in this case one can reliably judge the abundances of light elements, elements of CNO-group, those of iron type and elements of α , r, s - processes.An attempt has been made by use of creating a catalogue of equivalent widths of absorption lines in spectra of cool stars on the basis of literature sources. Spectral material with high resolution is used. The catalogue examination has shown that there is relationely only a few number of stars whose spectra were relationly obtained by different authors. In addition, for common stars there is a little quantity of common absorption lines for iron peak elements. Therefore, at the first stage of investigation the material was reduced by a unified procedure by using model atmospheres and common input data on radiation atomic constants such as the wavelength, oscillator's strength, energies of lower and higher levels. In the given work, a list of absorption lines from the work Kurucz & Peytremann (1975) has been used.

In order to avoid the blending of atomic lines by molecular absorption lines, the giant-stars in the G8 - K3 spectral range have been chosen.

Fundamental characteristics were used according to the method Korotina et al. (1988), Korotina et al. (1989), Korotina & Komarov (1992) by using corresponding photometric indices.

In Table 1 are given values of [A/Fe] averaged from G8, K0, K2, K3 spectral types, and N is the number of stars.

In Table 2 are summarized characteristics of the investigated stars in which a star number, a spectral type Sp, effective temperature T_{eff} gravity lg g, metallicity [Fe/H] from Korotina et al. (1988), Korotina et al. (1989), Korotina & Komarov (1992), Motrich (1990), metallicity [Fe/H] determined in this work, are given.

As is shown in work Korotina et al.(1989), the prevalence of metallic- poor stars is characteristics of G8-K0 spectral types, as to stars of K2-K5 spectral types, it being vice versa. The photometric metallicity index comprises many chemical elements and even molecular bands, therefore it is undoubtedly of interest to check the average abundance of different chemical elements in these or those spectral types.

It is early to draw ultimate conclusions because of a few number of stars studied but one can notice a constant sodium excess tending to enhance from G8 to K3. It should be noted that many elements show discrepancies in abundances determined from absorption lines of atoms and ions.

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Table 1. Abundances in the atmospheres of the stars

El.	G8	N	KO	N	K2	N	K3	N
Li I	-0.06	1	0.09	1	-	-	-0.39	1
C I	-	-	-	-	-	-	2.11	1
Na I	0.40	6	0.41	6	0.76	2	0.75	2
Al I	0.07	1	0.14	2	1.80	1	0.67	2
Si I	0.35	6	0.36	6	0.14	2	0.63	3
Si II	0.78	4	1.24	5	1.99	1	1.37	1
S I	1.24	5	1.27	5	1.87	1	0.97	1
Ca I	0.19	6	0.20	6	0.49	2	0.27	3
Sc I	-0.02	6	0.12	6	0.50	2	0.63	3
Sc II	0.28	6	0.16	6	0.44	1	-0.13	3
Ti I	0.19	6	0.23	6	0.40	2	0.34	3
Ti II	0.23	6	0.14	5	0.31	2	0.04	2
V I	0.15	6	0.26	6	0.68	2	0.42	3
V II	2.35	4	1.90	4	-	-	1.74	1
Cr I	0.03	6	0.03	6	0.36	2	0.21	3
Cr II	0.29	6	0.23	6	0.22	2	0.44	3
Mn I	0.50	6	0.58	6	0.71	2	0.68	3
Mn II	-	-	-	-	-	-	3.54	3
Fe I	0.00	6	0.00	6	0.00	2	0.00	3
Fe II	0.22	6	0.25	6	0.39	2	0.08	2
Co I	0.19	6	0.21	6	0.32	2	0.43	3
Ni I	0.05	6	0.13	6	0.24	2	0.05	3
Cu I	0.78	5	0.96	2	0.19	2	-	-
Zn I	0.80	3	0.79	2	0.24	1	1.12	2
Sr I	1.40	1	0.97	3	0.73	1	0.73	3
Y I	1.21	5	0.96	4	-	-	1.48	2
Y II	0.01	5	0.17	4	-0.09	1	0.16	1
Zr I	0.05	5	-0.21	6	0.17	1	0.75	3
Zr II	0.38	1	-	-	-	-	-	-
Mo I	0.46	5	0.43	4	-	-	0.90	1
Ba I	-	-	0.85	1	-	-	-	-
Ba II	0.23	5	0.17	6	0.07	2	-0.77	2
La II	0.57	6	0.55	6	1.18	1	1.35	2
Ce II	0.13	5	0.31	4	-	-	0.07	2
Pr II	1.28	5	1.46	3	-	-	1.56	1
Nd II	0.45	5	0.39	4	-	-	0.48	1
Eu II	0.78	1	0.52	2	-	-	0.13	1

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Table 2. Characteristics of the stars

*	Sp	T_{eff}	lg g	$[Fe/H]^{Ph}$	$[Fe/H]^{Sp}$
HD 6497	K2 III	4610	2.00	-0.02	-0.74
HD 35620	K3 III	4250	1.60	0.07	-0.22
HD 37160	G8 III	4770	2.60	-0.61	-0.87
HD 43039	G8 III	4720	2.50	-0.42	-0.33
HD 49009	K2 III	4480	2.10	-0.04	-0.68
HD 68879	G8 III	4450	2.20	-0.41	-0.76
HD 95272	K0 III	4780	2.40	-0.12	-0.21
HD 95689	K0 III	4840	2.50	-0.13	-0.15
HD 107328	K1 III	4490	2.10	-0.23	-0.64
HD 129312	G8 III	5060	2.60	-0.14	-0.06
HD 135722	G8 III	4810	2.60	-0.48	-0.69
HD 148856	G8 III	4970	2.80	-0.30	-0.24
HD 188056	K3 III	4690	1.90	0.39	0.02
HD 197989	K0 III	4780	2.50	-0.28	-0.20
NGC 752 N213	K0 III	4730	2.30	-0.04	-0.76
HD 2796		5340	2.50	-0.84	-2.38
HD 4306		5390	3.00	-1.17	-2.67
CD -30 298		5260	3.10	-1.21	-2.96
HD 6268		5120	2.80	-0.93	-2.21
BD -18 271		4280	2.00	-1.31	-2.06

ELEMENTAL ABUNDANCES IN THE ATMOSPHERES OF THREE METAL – DEFICIENT GIANTS

T. V. Mishenina[1], V. G. Klochkova[2], V. E. Panchuk[2]
[1] Astronomical Observatory, Odessa State University,
T.G.Shevchenko Park, Odessa 270014 Ukraine
[2] Special Astrophysical Observatory RAS
Nizhniy Arkhyz, Stavropl'skii Kraii, 357147 Russia

ABSTRACT. High dispersion high resolution CCD spectra have been used for the determination of the elemental abundances in three metal-deficient stars. The following results were obtained: 1) an overabundance of O is found; 2) Si, Ca, Ti are overabundant with respect to iron in stars with [Fe/H]= –1.5; 3) halo stars show an underabundance of the odd elements Na and Al relative to the abundance of the even element Mg); 4) Ni and Mn are slightly overdeficient; 5) an underabundance of Cu is found in all three stars ; 6) s-process elements are slightly overabundant.

Key words: stars: metal-deficient giants – stars: abundances – stars: atmospheres – Galaxy(the): evolution of