ISOTOPIC COMPOSITION OF OXYGEN IN THE ELENOVKA L5 CHONDRITE CHONDRULES; A.K.Lavrukhina, V.I.Ustinov, G.V. Baryshnikova, and Yu.A.Shukolyukov. V.I.Vernadsky Institute of Geochemistry and Analytical Chemistry, USSR Academy of Sciences, Moscow

The Elenovka L5 ordinary chondrite with clearly chondrule structure took to globule chondrites, but with clearly recrystalized matrix (1). The chondrite consist of large (0.4-1.2 mm) chondrules (38.6 vol.%) and recrystalize matrix (61.4 vol.%) (2,3). The RP and BO chondrules predominate over POP, PO and GO, GOP chondrules. According to these characteristics the Elenovka chondrite differs from unequilibrated ordinary chondrites (4). It was investigated isotopic composition of oxygen for three 10 mg fractions of various size chondrules. They were refined from matrix and were crushed in order to identificate their structure. The results are in Table.

Table. $\delta^{17}O$ and $\delta^{18}O$ values relative to SMOW, ‰

Chondrule size, mm	Type of structure	$\delta^{18}O$	$\delta^{17}O$
0.4-0.7	various	+3.6	+2.6
1.3-1.5	—"—	+1.8	+1.7
2.5	RP	+0.8	+1.0

It is shown that the $\delta^{18}O$ and $\delta^{17}O$ values decrease with enlarge of chondrule sizes. This tendency is contrast to that,which earlier for the Dhajala H3.8 unequilibrated chondrite was observed (5): $\delta^{18}O$=3.27‰ ($\delta^{17}O$= 1.79‰) for the chondrules of 0.1-0.15 mm and $\delta^{18}O$=5‰ ($\delta^{17}O$=3.6‰ for the chondrules of 0.53-0.82 mm.

The Elenovka chondrules of > 1.3 mm have the most light oxygen out of all investigated chondrules of H, L, LL, EH chondrites (6). The $\delta^{18}O$ value of chondrules of 0.4-0.7 mm lies within values of common oxygen reservoir for eucrites, hovardites, diogenites, pallasites and mezosiderites ($\delta^{18}O$=3.6 ± 0.2‰). They are like to the extreme values for chondrules of Allende CV and unequilibrated ordinary (O) and E chondrites. The $\delta^{17}O$ value differs from the same by +0.7‰.

The $\delta^{18}O$ and $\delta^{17}O$ values of all fractions lie on the line, which is parallel to terrestrial mass-fractionation line. It lies within region of the ^{17}O enrichment just as all chondrules of unequilibrated chondrites. However for the latter effect of mass-fractionation is not observed. Their oxygen isotope composition are conditioned mainly by a process of isotope exchange of oxygen between chondrules and their rims and common gas reservoir, enriched in ^{16}O in comparison with chondrule precursor (6). The oxygen isotope composition of chondrules of unequilibrated O chondrites does not depend on their chemical group. Therefore we take for initial oxygen composition the same of the Chainpur LL3.4 chondrules with maximum values of $\delta^{18}O$=8.6‰

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and $\delta^{17}O=6.0‰$ (7).

The oxygen isotopic composition of the Elenovka equilibrated chondrite chondrules are conditioned by a process of mass-fractionation at the expence of kinetic isotopic effect, which under evaporation of melting chondrules took place. The experiments (8) show high effectiveness of this process for ^{18}O, ^{26}Mg and ^{30}Si (a enrichment in residual liquid). A such effect must increase as chondrule sizes decrease. Table shows such effect. Preservation of relicts of the most early stage of chondrule genesis (melting) for the Elenovka chondrite means that chondrules were quickly isolated from gas and therefore they are kept primary isotopic composition of oxygen. Its witnesses about quickly agglomeration of this chondrite matter by sticking together chondrules and mineral aggregates into primary protoobjects with the sizes of 1-3 mm. About it witnesses a spotty texture of chondrite (2).

Thus genesis processes of chondrules of unequilibrated and equilibrated chondrites were different. The former had gone over a stage of interaction with gas phase; the latter had avoided it. The precursor matters of chondrules of these chondrites were different about isotopic composition of oxygen. For the Elenovka chondrules it has $\delta^{18}O=0.8‰$ and $\delta^{17}O=1.0‰$. It is obvious that chemical compositions were also different, because in the Elenovka chondrite predominate PR and BO chondrules. They have formed by melting of dust, enriched in SiO_2(46wt.%) (9). In unequilibrated O chondrites predominate POP and PP chondrules (4), that have formed from matter with lower contents of SiO_2 (9). Hence equilibrated O chondrites could not have formed by thermal metamorphism of unequilibrated chondrite matter.

References. (1) Kvasha L.G. (1954) Meteoritika, 11, p.76. (2) Baryshnikova G.V., Lavrukhina A.K. (1979) Meteoritika, 38, p.37. (3) Stakheev Yu.I. et al. (1973) Meteoritika, 32, p.103. (4) Lavrukhina A.K., Baryshnikova G.V. Geokhimia, N 3, p.323. (5) Clayton R.N. et al. (1983) Meteoritics, v.18, N 4, p.282. (6) Lavrukhina A.K. (1989) Geokhimia, N 7, p.992. (7) Clayton R.N. et al (1981) LPS XII, p.154. (8) Hashimoto A. et al. (1989) Meteoritics, v.24, N 4, p. (9) Lavrukhina A.K. (1989) Geokhimia, N 10, p.1407.