THE POSSIBLE PROCESS OF THE ^{146}Nd EXCESS FORMATION IN SOME FRACTIONS OF THE EFREMOVKA CHONDRITE. A.K.Lavrukhina. V.I.Vernadsky Institute of Geochemistry and Analytical Chemistry, USSR Academy of Sciences, Moscow, USSR

The isotopic composition of Nd in HNO_3 and $HClO_4$ soluble fractions of the HCl/HF resistant residues of the Efremovka chondrite was studied /1/. The bulk probe (~59 g) of chondrite was demineralized by HCl, HF-HCl and NaOH-H_2O_2. The residue was separated into coarse and fine grained fractions by ultra-sound breaking and sedimentation in ethyl alcohol. They were etched by HNO_3 (~70°C, 4 hrs) and $HClO_4$ (~140°C, 2 hrs). The maximum excess in ^{146}Nd was found for HNO_3-solution of fine grained fraction. The value of ε_{146} = +211,0 ± 65,0 (for laboratory standard ε_{146} = +5,1 ± 9,3).

This enrichment in ^{146}Nd is not accompanied by an deviation from the standard for all light isotopes of Nd with the exception of ^{143}Nd. Therefore the ^{146}Nd excess can not be explained by means of its formation in s-process. The ^{143}Nd enrichment may be connected with α-decay of ^{147}Sm /2/.

On basis of systematics of contemporary theories of nucleosynthesis we are grounded the idea that the ^{146}Nd enrichment is conditioned by the radioactive decay of ^{146}Pm (EC, $T_{1/2}$ = 5,53 y). This isotope had formed into inner shells of massive stars by means of photodisintegration reaction of ^{147}Pm (γ,n) ^{146}Pm. The intensivety of the γ-radiation is maximum in hotter ($T = 2,7.10^9$ K) O- and Ne-shells of stars in the range ~10 M⊙ to ~20 M⊙ during hydrostatic core silicon burning /3/. That is why at that stage of star evolution appears the most favourable condition for photodisintegration reaction. The seed nuclei of these reactions are the products of s-process which are usually formed during earlier static core He-burning /4/. However, s-isotope of ^{147}Pm is radioactive (β^-, $T_{1/2}$=

2,6 y) and it can enter into the O-and Ne-shells only from outer shells probably during some periods of pulsed s-process. The models of this process /5/ show that it can in particular take place during the stage of C-burning of massive stars ($8 \leq M/M_{\odot} \leq 10$) and during the stage of He-burning of the matter of CNO cycle. If convection which cause pulsed s-process loops cross shell-boundaries, then s-matter in Ne-, O- and C-shells can be processed at high temperature and in these conditions reaction of $^{147}Pm(\gamma, n)\,^{146}Pm \xrightarrow{EC} {}^{146}Nd$ takes place. Thus the shells of O- and Ne-burning have enriched in ^{146}Nd. During following stage of star evolution the matter of these shells would be thrown out into star envelope or interstar space. It can happen during the stage of Wolf-Rayet type stars or supernova burst, In expanding envelope must take place the condensation of high-temperature phases. They would contain ^{146}Ne excess. But this requeres that the O-and Ne- shells of this star were non-convective and that matter from nearby locations within these shells did not become mixed during condensation of REE carriers. About reality of such a situation shows the discovery of isotopically anomalous xenon of nucleosynthetic origin (Xe-X, Xe-S) in high-temperature mineral phases (diamond, silicon carbide) which in different supernova envelopes had been condensed /6/.

References: (1) Fisenko A.V. et al. (1989) Meteoritics, v. 24, N 4. (2) Lugmair G.W. et al. (1983) Science, v.222, p.1015. (3) Arnett W.D. (1977) Astrophys. J. Suppl. v.35, p.145. (4) Heymann D. and Dziczkaniec M. (1979) Meteoritics, v.15, p.418. (5) Jorrissen A. and Arnould M. (1986) In: Nucleosynthesis and its implication on nuclear and particle physics, p.303. (6) Anders E. (1988) In: Meteorites and the Early Solar System, p.927.