THE FRACTIONATION OF NOBLE GASES IN DIAMONDS OF CV3 EFREMOVKA CHONDRITE .*A.V.Fisenko, A.B.Verchovsky, L.F.Semjonova, and Yu.A.Shukolyukov* .V.I.Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, Moscow, Russia.

It have been shown that in diamonds of Efremovka CV3 the noble gases with normal isotopic compositions are fractionated in different degree while the correlation of isotopic anomalous components is nearly constant.

Here we consider the some data for noble gases in DE-4 sample of Efremovka chondrite. In contrast to DE-2 sample [1] the DE-4 was treated except conc.HClO4, 220°C in addition with mixture of conc. H2SO4+H3PO4 (1:1), 220°C, twice. Noble gases analysis have been performed at Germany in Max Plank Institute fur Chemie. Noble gases were released by oxidation of sample at stepped heating from 420°C to 810°C and by pyrolysis at 580,590 and 680°C.

The gases released at stepped oxidation of DE-4 sample have variable elemental composition (Fig.1) as well as for DE-2. The variation of coefficient fractionation value (F) at oxidation until 460°C are caused perhaps by gases diffusion at pyrolyses (590°C), which has preceded of sample oxidation. At oxidation higher 460°C the quantity released gas considerable exceed those at pyrolysis. Therefore the alteration of value F at $T \geq 460°C$ most probably is due to that diamond grains have the gases with various elemental composition. As can be seen from Fig.1 the gases with more fractionated elemental composition are released at high temperatures, i.e.from more thermostable to oxidation the diamond grains. The value F for Ne and He is changed in less degree than for Ar. Perhaps the Ne and He origin in diamond grains is another than Xe,Kr and Ar or they are more dissolved in fine diamond grains as compared with another gases [2,3].

For reseach of possibility influence of various gases fractionation degree on scatter data on plot 86-Kr/82-Kr vs 136-Xe/130-Xe (Fig.2a) we have reduced all gas-fractions to the same value F.In calculating it has been suggested:

a) noble gases in diamonds are the mixture of solar composition gas with formed in supernova isotopic anomalous components (Xe-H + Xe-L + Kr-H) . The two-component model is the simplified variant of origin gases explanation in diamonds. It is confirmed, in particular, by linear dependence 134-Xe/130Xe vs 136-Xe/130-Xe sinse detected today the deviation of data from this dependence can be explained, for example, with few sources of Xe-H;

b)only the gas of solar composition was fractionated in different degree. This follows from insignificant variation of value ratio 86-Kr-H/136-Xe-H for all gas fractions: its mean value is equal to 0.12 ± 0.02. As can seen from Fig.2b for corrected data there is almost linear functional dependence. Hence, the fractionation in different degree only of gases with normal isotopic composition is really the reason of data scatter on plot 2a.

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On the basis of analysis of noble gases in Efremovka chondrite diamonds can be suggested:

a)the diamond grains were present or were formed in environment containing the noble gases with normal isotopic composition. Not all Xe, Kr and Ar atoms in this environment were ionizated during ionization processes and because the correlation of implanted ions of these elements in diamond grains have depended on ionization gas degree. According to our data either this ionization degree was not constant or exist two groups of diamond grains. In last case these grain groups differ by fractionation degree of gas with normal isotopic composition and thermostable to oxidation [4].

b) the formed in supernova shells the nuclei of (Xe-H, Xe-L, Kr-H) were not completely neutralized until its capture with diamond grains. All these conditions could be realized at formation of diamonds in supernova atmosphere by influence of shock waves.

References:1.A.V.Fisenko, A.B.Verchosky, L.F.Semjonova, Yu.A Shukolyukov, 1991,LPSC,XXII, p. 387. 2. D.D.Clayton, 1989, Ap.J., v.340, p. 613. 3. I.Matsuda, K.Fukunaga, K.Ito, 1991, G.C.A.,v.55 p. 2011. 4. A.V.Fisenko et al. , 1992, Dokl.Akad.Nauk (in pres).

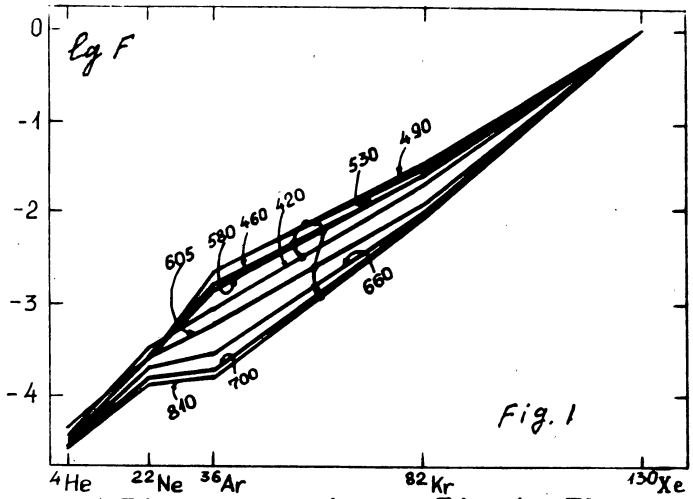

Figure captions. Fig.1. The variations of elemental composition of gases released at various oxidation temperatures of Efremofka diamonds. $F=(A/130\text{-}Xe)_{samp.}/(A/130\text{-}Xe)_{sol}$, A= =4-He,22-Ne,36-Ar,and 82-Kr. Numbers denote the combustion temperature.

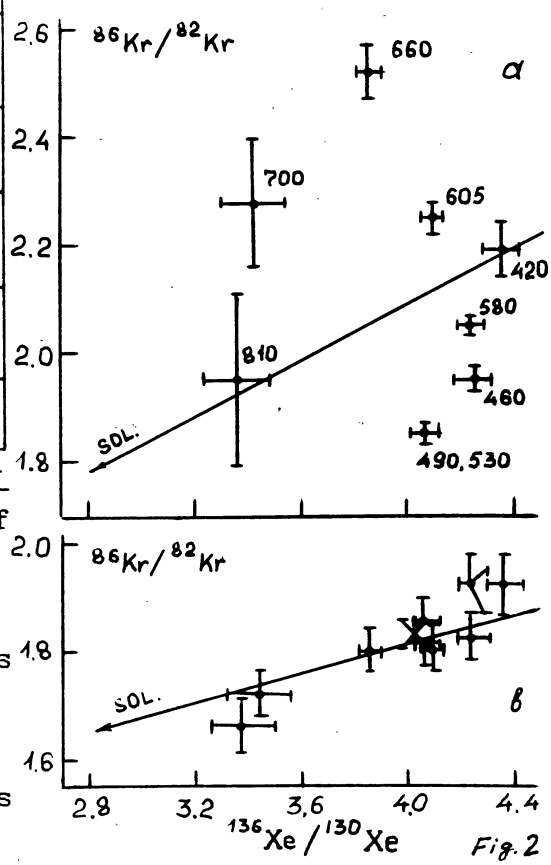

Fig.2. The scatter of data on (a) is due to most probably different fractionation degree of gases with normal isotopic composition. The reducing all gas-fractions to the same fractionation coefficient F led to linear dependence 86-Kr/82-Kr vs 136-Xe/130-Xe (b).