P6 COMPONENT OR HETEROGENEOUS DISTRIBUTION OF ISOTOPES OF XE-H AND XE-L COMPONENTS. A. V. Fisenko and L. F. Semjonova, Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences, 117975 Moscow, Russia. (ugeochem@geochem.home.chg.ru).

Explanation of isotopic composition of noble gas in presolar diamonds include the P6 component -- nearly isotopically normal component which is released at higher temperature than P3 and HL components [1]. We suggest the alternative variant of the explanation of Xe data deviations from mixing line between P3 and HL components: these deviations can be due to heterogenous distribution of isotopes of Xe-H and Xe-L components in diamond grains.

On Fig. 1 are shown the alterations of ratio yields of ^{134}Xe-H, ^{132}Xe-H and ^{124}Xe-L to ^{136}Xe-H vs. temperature for gas fractions, released at pyrolysis of Allende diamonds. The ratios were calculated using superprecision Xe data for Allende [2]. The Allende diamonds do not nearly contain the P3 component [3] and therefore at calculation of the ratios we assumed that Xe consists of Ur-Xe normal component [4] and Xe-H and Xe-L components, formed after supernova explosion. One can see the values of ^{134}Xe-H/^{136}Xe-H and ^{132}Xe-H/^{136}Xe-H are decreased with increasing of pyrolysis temperature. These alterations we interpret as the result of heterogeneous distribution of isotopes of Xe-H component in diamonds grains, i.e., the grains, destroyed at high temperatures, contain less ^{134}Xe-H and ^{132}Xe-H relatively ^{136}Xe-H than other grains.

Such heterogeneity could be caused due to irradiation by xenon, enriched in ^{136}Xe, of the most thermostable diamond grains. We suggest that such irradiation could have taken place after supernova explosion as (1) The part of thermostable grains among remaining grains will be increased in the direction of supernova as a result of the effects of shockwave. The similar radial gradient on thermostability will also have taken place if the diamond grains were formed in gas environment from carbon phases by the effects of shockwave [5]. (2) Xenon-isotopic composition is changed in time as a result of production of Xe isotopes by way of decay of precursors, having sharply differential $T_{1/2}$ (from ~1 min for ^{136}Xe to 17 m.y. for ^{129}Xe). Therefore, the part of Xe isotopes, formed after decay more short-live isotopes (e.g., ^{136}Te, ^{124}Ba) will be also increased in the direction of supernova. Thus, the remaining near of the exploded supernova the most thermostable diamond grains will be irradiated by Xe enriched in ^{136}Xe and ^{124}Xe. Taking into consideration that at expansion of gas-dust cloud the gas moves more rapidly than the dusty, it may be supposed that correlation of formed after explosion supernova of Xe isotopes do not necessarily change in these grains later on. As a result, the mixing of these grains with another thermostable diamond grain, which were located further from supernova and were irradiated by Xe with another isotopic composition, will lead to a decrease of ^{134}Xe-H/^{136}Xe-H and ^{132}Xe-H/^{136}Xe-H ratios in comparison to those for less thermostable grains.

After supernova explosion ^{124}Xe is produced via precursor ^{124}Ba with half-life of ~12 min. This half-life is the most like those for precursors of ^{136}Xe (~1.5 min) and therefore temporal and space conditions of the ^{124}Xe-L and ^{136}Xe-H implantation to diamond grains should be similar. As a result, the ^{124}Xe-L/^{136}Xe-H ratio for released at different temperatures of gas fractions would be changed in less degree than, e.g., ^{134}Xe-H/^{136}Xe-H ratio. This is confirmed by data on Fig. 1C with the exception of the most high temperature fraction. Probably, this fraction was depleted in ^{124}Xe due to diffusion.

Unlike ^{124}Xe, the production of ^{132}Xe is the result of decay of more long-lived radioisotopes (^{132}Te, ^{132}I) than for ^{134}Xe. Therefore, the interval of ^{132}Xe-H/^{136}Xe-H alterations should be more than for ^{134}Xe-H/^{136}Xe-H ratio. The data on Fig. 1a,b confirm this suggestion.

It is to be noted that in our scenario of formation of heterogeneous distribution of Xe-H and Xe-L component isotopes in diamond grains we used the Ott's suggestion [6] that if in grains would be implanted of some radioactive precursors of Xe then either these grains would be destroyed due to recoil energy or Xe atoms would be lost during β-decay. Moreover, we propose one more variant of formation Xe-HL component in diamond grains using Ott's model [6]. The variant consists of the following: (1) after supernova explosion, the diamond grains are produced from carbonaceous phases in the gas environment as a result of the effect of the shock wave. As a result of relaxation of the shockwave, the diamond grains would be only produced in some gas layer. (2) the radioactive precursors have no time for decay totally during their movement through this layer. Thus, we consider that the Xe-HL isotopic composition is the result of no total decay of Xe precursors in gas layer, containing the diamond grains.

Thus, on the basis of the irregular distribution of diamond grains into thermostable near by supernova and production of Xe isotopes in different time after supernova explosion can explain Xe-isotopic ratios on Fig. 1 without consideration of P6 component. Probably, the heterogeneous distribution of isotopes of Kr-H component in diamond grains may also account for the variations in Kr-isotopic composition at diamond pyrolysis.

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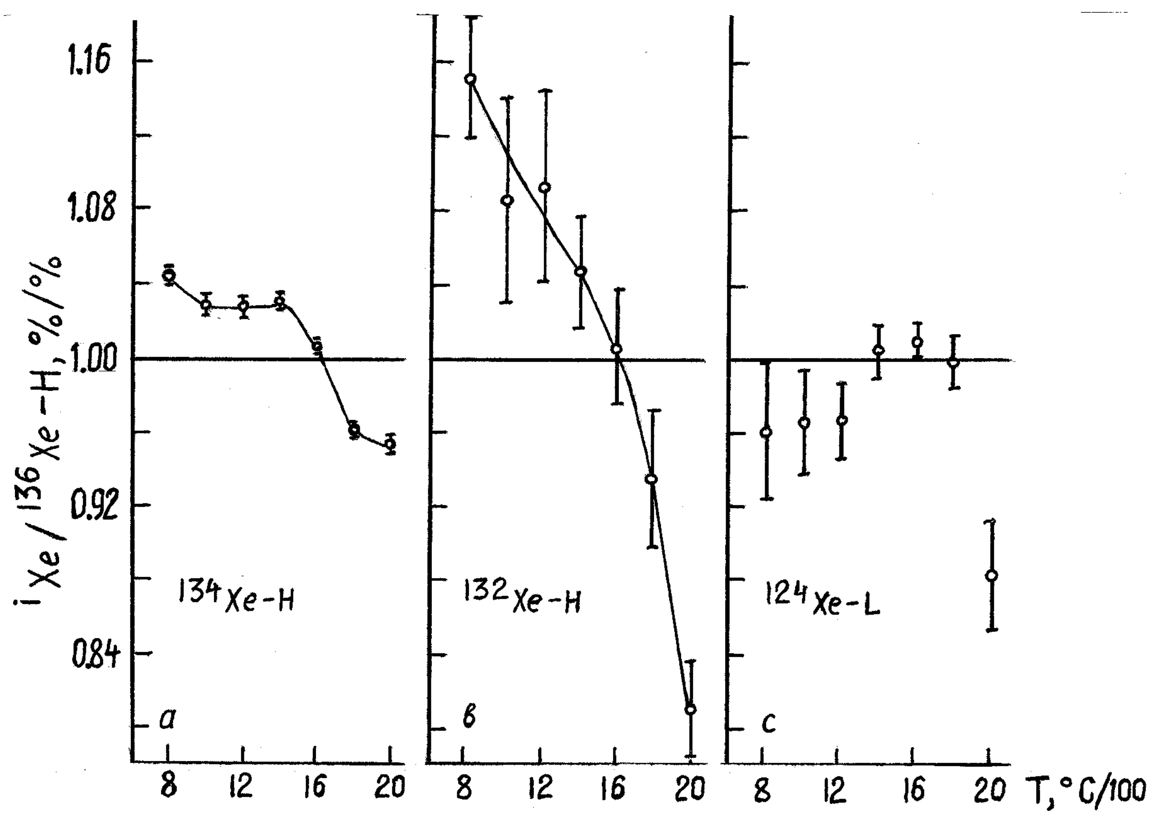

Fig. 1. The alteration of ratio yields of ^{134}Xe-H, ^{132}Xe-H, and ^{124}Xe-L to ^{136}Xe-H for middle fraction of Allende diamond. The ratios were calculated based on the Lewis and Anders data [2].