HETEROGENEOUS DISTRIBUTIONS OF THE Kr AND Ar RELATIVE TO Xe IN EFREMOVKA CV3 CHONDRITE DIAMONDS. A.V.Fisenko, A.B.Verkhovskii, L.F.Semjonova, and Yu.A.Shukolyukov. V.I.Vernadsky Institute of Geochemistry and Analytical Chemistry, USSR Academy of Sciences, Moscow

Abundance and isotopic composition of noble gases in the Efremovka chondrite sample DE-2 have been analysed using pyrolysis (at 590°C) and stepped combustion (from 410 to 1020°C) extraction procedures. The DE-2 was obtained from HCl-HF residue after its prolonged (25 d) treatment with HCl at ~80°C followed by boiling $HClO_4$ for 4h. The DE-2 was cream - coloured and contained diamonds and amorphic phase only. Noble gas mass spectrometry have been performed in Max Planck Institute fur Chemie (Germany). The main results are : 1. Xe and Kr released at pyrolysis have considerable excesses of 129-Xe and 80-Kr (~43% and ~13% relatively solar composition, respectively). These excesses are probably surface-sited, but the difficult question in raised of where the 129-Xe and 80-Kr came from. 2. Linear correlation between Kr and Xe isotopes have not been found (Fig.1). The gas fractions released at 530°C and 630°C (later on designated as Fr-1 and Fr-2, respectively) are particularly interesting because they have the same ratios of 136-Xe/130-Xe, but different ratios of 86-Kr/82-Kr.

Surprisingly, the Fr-1 and Fr-2 turned out to be differented on fractionation extents of the Kr and Ar relative to Xe, but the same for the He and Ne (Fig.2). Therefore the diamond particles (or groups of particles) of the DE-2 are heterogeneous on fractionation extents of the some noble gas elements. On the basis of the Fr-1 and Fr-2 released temperature we can say either diamond particles containing the more fractionated gas are more stable to oxidation or inside part of the particles contains more fractionated gas in comparison to their surface part. The linear correlations between $lg(i\text{-}X/132\text{-}Xe)_{sample} / /(i\text{-}X/132\text{-}Xe)_{sol}$ and the respective ionization energies E_x for Xe, Kr, and Ar (Fig.3) indicate these elements were incorporated into diamonds perhaps as ions, e.g. under ionization solar composition gas. In this case the different fractionation factors of Kr and Ar for the Fr-1 and Fr-2 are result of the different temperature of gas ionization. However this change of temperature probably was not changed to a marked degree of the He and Ne ion abundances and therefore the fractionation factors for these elements in the Fr-1 and Fr-2 are identical. The abrupt deviation of the He and Ne data from the lines in Fig.3 can be explained by considerable abundance of the He and Ne ions in place of diamonds formation (e.g., in rest of the supernova He-shell or in the O,B star wind). Possibly the He and Ne in diamonds have another origin in comparison to Xe,Kr, and Ar, e.g. they have been implanted in diamonds in the

HETEROGENEOUS DISTRIBUTIONS...: Fisenko A.V. et al.

interstellar space /2/.

The different fractionation factor of Kr relative to Xe in the Fr-1 and Fr-2 may be reason of the different ratios 86-Kr/82-Kr in these fractions, provided the Kr-X abundance is not depend on fractionation extents.

Conclusions. 1. The diamond particles (or groups of particles) of Efremovka chondrite have heterogeneous abundances of Kr and Ar, and homogeneous abundances of He and Ne relative to Xe. 2. Under incorporation of the noble gas ions into diamonds the ion correlations of the Xe,Kr, and Ar with normal isotopic composition have been changed and they were probably dependent on conditions of these ions formation, while ion abundances of the Kr-X and Xe-X at this process were most probably constant.

References. 1. A.S.Lewis et al., J.Geophys.Res.V.82,P.779, 1977. 2. D.D.Clayton. Astrophys. J. V.340, P.613, 1989.

Figure captions : Fig.1. Deviations of the Kr and Xe data for DE-2 from linear correlation. Number denote combustion temperature. Errors are 1σ . The total (T) is compatible with linear correlation for Allende chondrite.

Fig.2. Difference fractionation extents of noble gases in Fr-1(1) and Fr-2(2) of Efremovka chondrite sample DE-2 and of Allende chondrite sample 4C57 (3) /1/.

$D_{Xe}=(i\text{-}X/132\text{-}Xe)_{sample} / (i\text{-}X/132\text{-}Xe)_{sol}$

Fig.3. Linear correlation between lg D_{Xe} and E_X for Xe, Kr, and Ar for diamonds of Efremovka and Allende chondrites. Explanation of symbols as in Fig.2.