PECULIARITIES OF CATION DIFFUSION IN SHOCK PLAGIOCLASE MELTS (POPIGAI ASTROBLEME, USSR). L.V.Sazonova. Moscow State University, 119899, Moscow, USSR.

Archean gneisses are the most frequent target rocks in Popigai astrobleme. There are two types of plagioclases in these gneisses: plagioclases with antiperthite inclusions of alkali feldspar and those without such inclusions. The diffusion of different elements in melt plagioclases have been studied by the method of SEM (Camscan-4) and microprobe analyses (Moscow State University).

At average shock pressure of 30 GPa on the rock some plagioclase grains are transformed non-uniformly due to non-homogeneous shock wave distribution. Most of the grains are transformed into diaplectic glass and only some grains are transformed into diaplectic plagioclase. In some diaplectic plagioclase grains melt glass appears in the form of patches, veins, strings (fig.). In polysynthetic twinning grains melt glass often develops by the same twinning system (1). If there are antiperthite inclusions in plagioclase grains numerous planar elements develop in them in the form of glass lamellae.

At average shock pressure of 45-55 GPa on the rock all leucocratic minerals are transformed into melt glass (2). Mechanical mixture of melt minerals often does not take place becouse of the melt annealing.

30 GPa. In the process of transformation of plagioclase into diaplectic plagioclase, diaplectic glass, melt glass the increase of diffusivity of Na to complete removel, weak diffusivity of Ca (this element is not removed from seperate grains) are noted (fig.). The diffusivity of K is also not very great because a part of Na is replaced by K only in those plagioclase grains in which there are antiperthite inclusions. K diffuses into matrix plagioclase from melt lamellae of antiperthite while Na diffuses from plagioclase into melt lamellae. This melt lamellae consist of rich-Na, poor-K glass.

45-55 GPa. High diffusivity of K, Na, Ca is observed in some grains of melt plagioclase. In some grains of melt plagioclase a total replacement of Na by K and even replacement of Ca by K are observed (fig.). The sources of K at such pressure are not only antiperthite inclusions but also orthoclase of gneisses themselves in which K is replaced by Na (fig.).

Thus a sharp increase of cation diffusivity at pressure is observed not only at the transformation of diaplectic glass into melt glass but also in the family of melt glass.

References:(1) Sazonova L.V., Korotaeva N.N.-52nd Annual Meeting Meteoritical Society, Vienna,Astria.Abstr. 1989. (2) Sazonova L.V., Korotaeva N.N.-Meteoritica.V.49. 1990.(in Russian).

Peculiarities of cation...

Sazonova L.V.

Fig.1.An averaga shock pressure - 30 GPa. 1. Diaplectic Pl-glass. 2. Melt Pl-glass in form of string. 3. Antiperthite inclusions of alkali feldspar with planar elements in the form of glass lamellae.
Fig.2.Compositions of feldspars. P=30 GPa. I. Grains of Pl-without antiperthite inclusions. 1. Target Pl. 2. Diaplectic Pl. 3. Diaplectic PL-glass. 4. Melt Pl-glass. II. Grains with antiperthite inclusions. 1. Target Pl. 2. Diaplectic Pl. 3. Diaplectic Pl-glass. 4. Melt Pl-glass. 5. Target antiperthite inclusions. 6. Glass of the planar elements in the antiperthite inclusions. 7. Matrix of antiperthite inclusions.
Fig.3.P=45-55 GPa. 1. Target Or. 2. Target Pl. 3. Melt Pl-glass. 4. Melt Or-glass

Fig. 1

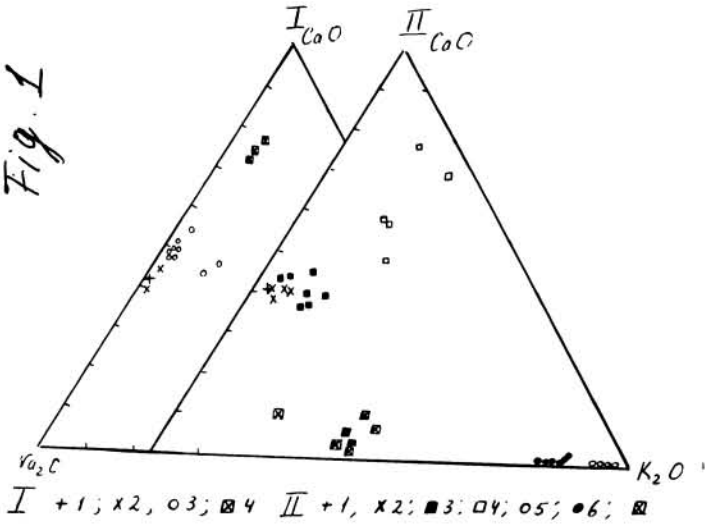

Fig. 2

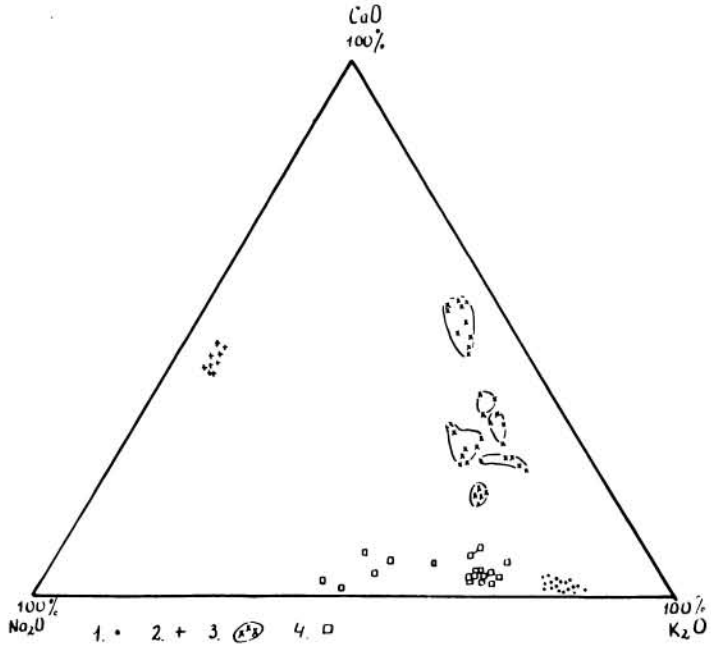

Fig. 3