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Interaction between melt inclusions and synthetic host periclase on heating

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Abstract: Detailed studies of melt inclusions in synthetic periclase, obtained from natural magnesite by arc-fusion, showed that their compositions essentially differ from the composition of the starting melt. They are to a greater extent enriched in elements (Si, Ca, Al, Fe) which are present in small amounts in the starting melt (does not exceed 4-5 wt.% in total). It is assumed that the trapping of these inclusions is intimately associated with segregation of components which do not enter the periclase lattice at the front of crystallization of the host mineral. Heating of the samples resulted in diffusive exchange of components between melt inclusions and host mineral (diffusion of iron from the inclusions into the matrix, and of magnesium from periclase into the inclusions takes place on heating). This process starts at 950°C and is considerably accelerated with the appearance of the first portions of melt (1250°C).

Key-words: melt inclusion, synthetic periclase, iron diffusion.

1. Introduction

Data on melt inclusions in minerals of various magmatic rocks are widely used in petrology (Roedder, 1984). However, several fundamental problems, such as: (1) the adequation of melt inclusion compositions to those of the bulk initial melts; (2) the possibility of interaction between inclusions and their host mineral on heating in homogenization experiments; and (3) the possible mechanism of inclusion conservation, remain largely unsolved (Bazarova *et al.*, 1975; Roedder, 1984; Dolgov *et al.*, 1984; Girnis *et al.*, 1991). More and more observations pertinent to these problems appear in scientific publications.

Zlobin *et al.* (1990) compared compositions of homogenized melt inclusions and hosting Cr-spinelids from metapicrites of ophiolites from Maynitsky zone, Koryakia. They inferred redistribution of iron and aluminum between melt inclusions and the host mineral in homogenization experiments. Gurenko *et al.* (1991) concluded that depletion in iron content, characteristic of homogenized melt inclusions in olivines from alkaline basalts of Iceland, is due to the interaction of the inclusions with the host mineral. Zolotukhin *et al.* (1988) described primary melt inclusions in olivines from picritic gabbro-dolerites of the Norilsk intrusion. Compositions of the inclusions varied from ultrabasic to granitic even within single grains and drastically contrasted with the whole-rock composition. Girnis *et al.* (1991) demonstrated that the compositions of homogenized inclusions in clinopyroxenes of

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