

INCLUSIONS IN OLIVINE: INDICATORS OF THE EVOLUTION OF MAGMA IN THE KOVDOR MASSIF (KOLA PENINSULA, RUSSIA)

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Inclusions in olivine occur in most of the rock types present in the Kovdor massif, and have been investigated using microprobe analyses and homogenization experiments in evacuated quartz tubes. Two types of inclusions were observed: I) - regular, oriented, lamellae of magnetite-diopside intergrowths (exsolution structures) which first began to homogenize at temperatures not less than 1050°C, and II) - solid, primary inclusions, some are crystallized melt, with a range of daughter minerals including diopside, phlogopite, tetraferriphlogopite, apatite, magnetite, calcite, shortite(?), barite, and pyrite. Type II inclusions were found in forsterite from the phoscorite-carbonatite complex, and the compositions depend on the composition of the host rock type. Inclusions in forsterite of the forsteritic rocks are typically characterized by oval-shaped apatite grains with magnetite crystals 1mm in size. Daughter minerals of the inclusions in forsterite from apatite-forsterite-magnetite, calcite-forsterite-magnetite rocks and carbonatites have either a very similar composition to the main minerals of the corresponding rock-type, or are represented by less abundant minerals, e.g. Fe-bearing dolomite, Na,Ca carbonates, bradleyite, Na,Ba phosphate, pyrrhotite, pyrite, which are typical of the late-stage rocks. The parental ultramafic magma at Kovdor was relatively enriched in SiO₂ which gave rise to the formation of diopside within the exsolution-type structures, whereas SiO₂ was deficit in the phoscorite and carbonatite melts which led to the formation of phosphate or carbonate daughter minerals. (This work has been supported by INTAS grant 97-0722).