EFFECT OF HALOGEN-BEARING FLUID ON MELILITE-PLAGIOCLASE AND LEUCITE-SODIC-PLAGIOCLASE INCOMPATIBILITY IN POTASSIUM RICH TEPRITIC MAGMA

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The joins leucite-akermanite-albite and leucite-akermanite-albite$_{50}$ anorthite$_{50}$ of the system Nepheline-leucite-CaO-MgO-SiO$_2$ were studied to explore the cause of melilite-plagioclase incompatibility problem in case of ultrapotassic mafic and ultramafic volcanic rocks. Two starting compositions namely leucite$_5$ akermanite$_{58}$ (albite$_{50}$ anorthite$_{50}$)$_{37}$ and Lc$_{20}$Ak$_{50}$(Ab$_{50}$An$_{50}$)$_{30}$ equilibrated at 1000°C and under atmospheric pressure show the presence of leucite$_{ss}$, plagioclase/ternary feldspar, melilite, diopside$_{ss}$, nepheline$_{ss}$ and wollastonite$_{ss}$ in X-ray diffractograms. When these compositions were crystallized under 1 kb [P(H$_2$O) = P(Total)] at 750°C in presence of an aqueous vapour containing 0.5 or 0.1 M HCl, it was observed that melilite completely diappeared. In presence of the albite component associated with plagioclase, akermanite reacted to produce diopside$_{ss}$ containing Tchermak molecule, nepheline$_{ss}$, leucite$_{ss}$ and wollastonite$_{ss}$. These phases coexisted with melilite. If the starting materials contained more akermanite, with respect to albite, melilite still persisted but in presence of aqueous vapour containing HCl (0.5 molar solutions), melilite disappeared as it was dissolved in aqueous solution as chlorite complex. Excess silica reached with feldspathoids to form feldspar which entered into the feldspar structure.