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Stability relations of monazite-(Ce), gadolinite-(Ce), gadolinite-(Y), britholite-(Ce) and bastnäsite-(Ce) during late- to post-magmatic processes in nepheline syenite (Čistá pluton, Czech Republic)

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Stability relations of the REE-bearing accessory phases and alteration processes in the cancrinite-bearing nepheline syenite from the Čistá pluton (the center of the upper-crustal Tepla–Barrandian unit, Bohemian Massif, Czech Republic) were studied. Observations of rock microtextures, quantitative analyses of minerals and compositional X-ray mapping were performed using electron probe microanalysis (EPMA). The primary REE-bearing accessory minerals assemblage includes monazite-(Ce) associated with gadolinite-group minerals (i.e. gadolinite-(Ce) and gadolinite-(Y)), which were partially replaced by britholite-(Ce), bastnäsite-(Ce), aggregates of fine-grained REE-bearing phases (possibly fluorapatite and/or britholite-(Ce)) and, rarely, cerianite. K-feldspar and albite form intergrowths or symplectites with REE-phases in the investigated reaction microtextures. Furthermore, the zircon crystals demonstrate oscillatory zoning and/or extensive patchy zoning due to alteration processes. The alteration of accessory minerals are interpreted as driven by K- and Na-bearing alkali fluids with high CO₂ activity during late- to post-magmatic processes.

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