

Geochemistry of micas and accessory minerals in P-rich NYF pegmatites at Mangodara (West Africa, Burkina Faso)

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The Mangodara district consists of a dome-shaped granodioritic orthogneiss, including amphibolite and paragneiss septa, intruded by a series of granodiorite, leucotonalite and granite plutons. All units are cross-cut by pegmatite dykes, which show a regional variation in accessory mineralogy moving away from the leucotonalitic pluton. Type-I pegmatites occur within the leucotonalite as veins showing gradational contacts; in addition to quartz, feldspar and biotite, common to all pegmatite types, they contain accessory magnetite, apatite, zircon, epidote and allanite. Type-II pegmatites intrude the granodioritic orthogneiss; they contain muscovite, garnet, accessory apatite, tourmaline, zircon, monazite, xenotime, colombo-tantalite, thorite and Zr-U-Th metamict phases. Type-III pegmatites intrude the orthogneiss and granites in the eastern part of the studied area. They contain garnet, ilmenite-pyrophanite, and accessory amounts of altered Nb-Ti-U oxides.

The mineralogy and trace composition of accessory minerals are typical of NYF pegmatites (Nb>Ta, affinity with Zr, U, Th and REE) except for low F (no topaz) and high P contents. The geochemical signatures of mica and plagioclase (Fe vs Mg content, and An₁₉₋₂₆) point for an origin of the Type-I pegmatites from fractional crystallization of the leucotonalite. The presence of K-feldspar and U-Th-Zr-bearing phases in Type-II pegmatites suggest an origin by partial melting of orthogneisses and paragneiss, which could account for their rare metal content. Type-III pegmatites could either correspond to differentiated pegmatites, or derive from partial melting of an unidentified magmatic or anatectic source. Alternatively, the differences between these pegmatite

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types might be induced by interaction with different host
rocks.