

ORIGIN OF THE FE-TI-P MINERALIZATIONS ASSOCIATED WITH THE 1800 MA RAFTSUND BATHOLITH, VESTERÅLEN-LOFOTEN, NORTHERN NORWAY

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The ferroan alkalic 1800 Ma magmatism in Vesterålen-Lofoten consists mainly of monzonitic intrusions containing scattered Fe-Ti-P mineralizations, with minor gabbro, anorthosite and granite. The Raftsund batholith is the largest monzonitic to quartz monzonitic intrusion in the area and can be subdivided in four units which are coeval. The most voluminous unit, which corresponds to what was previously referred as the Raftsund monzonite in the literature, contains scattered Fe-Ti-P mineralizations. In this study we focus on the mineralizations occurring in the pigeonite-Cpx syenite. Mineralizations form cm-scale up to 200 m x 50 m large scattered bodies, displaying both sharp and gradational contacts with the surrounding host monzonite to syenite. The mineralizations are composed Fe-rich olivine (Fo₂₂₋₂₉), subhedral clinopyroxene (Wo₃₄₋₄₅ En₂₀₋₄₆ Fs₂₃₋₄₄), anhedral magnetite and ilmenite, scattered late hornblende and variable proportions of subhedral ternary feldspars. One mineralization contains pigeonite surrounded by Fe-rich olivine. Euhedral apatite, found as inclusions in Fe-Ti oxides and other mafic silicates, can reach up to 12 modal percent and is present in all minerals but ternary feldspars. The presence of Fe-rich olivine instead of pigeonite in most mineralizations, indicate that these rocks cannot represent direct cumulate from the host monzonite and syenite. Bulk-rock compositional variations are well explained by recent experimental work on liquid immiscibility (Charlier & Grove, 2012) with enrichment in Fe, Ti, P, Mg, Ca, Sc, Co, Zn, Cu, V and REE in the mineralizations. Clinopyroxene from the mineralizations is enriched in Sc and to a lesser extent in Ti, Zn and depleted in V, Co, Sr, Y, Nb, LREE and Al, which is consistent with co-precipitation of apatite and magnetite and the formation of such a melt by liquid immiscibility.

Charlier, B. & Grove, T. L. 2012: Experiments on liquid immiscibility along tholeiitic liquid lines of descent. Contributions to Mineralogy and Petrology 164, 27–44.