The effect of pressure of formation on the crystal chemistry of aegirines from pegmatites of Mount Malosa, Malawi

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ABSTRACT

The Zomba-Malosa niobium-yttrium-fluorine (NYF) miarolitic, granitic, alkaline pegmatites are characterized by an unique mineralogy including aegirine, arfvedsonite, fluorite, and many Nb-Ta-Y oxides, , REE-carbonates and Na-Be-Zr-Y-silicates. Two crystal fragments of aegirine (Ae>95%) with acute terminations and a third platy prismatic aegirine (Ae > 94%) collected in a pegmatite cavity were investigated by single crystal X-ray diffraction. These aegirines studied at ambient conditions are characterized by a cell volume contraction sensibly lower than that of pure aegirines synthesized at 4 kb and 60 kb and investigated in previous works in the same conditions. The cell volume decreasing of the high-pressure samples, taking place without polyhedral volume contraction, may be related to the progressive distortion of M2 site due to the lengthening of the M2-$O3_{C2}$ and shortening of the M2-$O3_{C1}$ bond lengths. The cell volume vs pressure plot evidences the aegirines of Mount Malosa pegmatites formed at shallow depth conditions and the crystallization occurred at ~1kb.