Mineralogy and Phosphate Paragenesis of the Ewoyaa Lithium Pegmatites, Southern Ghana

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The presence of Fe-Mn phosphates and ferromagnesian silicates, such as biotite, garnet, and tourmaline, offers a chance to look at the connections between these two families of minerals. In this study, we determined the mineralogy of the Ewoyaa lithium-rich pegmatites. We also determined the paragenesis of the pegmatites using the phosphate minerals with emphasis on apatite.The pegmatite dykes (and quartz) came in as intrusions in the schists and are observed to be intercalating the schists. Three types of spodumene were identified; P1, P2, and P3. The P1 spodumene are coarse to very coarse grained and more abundant. The P2 spodumene are medium grained and less abundant as compared to the P2. The P3 are fine grained spodumene, which occurs as inclusions in the silicates. The most common of these ore minerals are apatite, columbite-tantalite, pyrite, uraninite, and zircon. The oxides are systematically associated with the silicates; albite, biotite, garnet, and spodumene. From the results, the type of apatite identified is fluorapatite. The manganese content ranges from 0.02 wt % to 8.46 wt % MnO, 0.02-16.43 wt % FeO, 0.01-0.31 wt % Na_2O, and 0.0-6.55 wt % Al_2O_3. Their mineral chemistry reveals low fractionation degrees, which is typically not of complex LCT pegmatites. Different phosphate species are crystallised in pegmatite melt. These species include primary phosphate and secondary phospahates. The Mankessim-Cape Coast pegmatite field and the Ewoyaa pegmatites could both be considered weakly to moderately evolved rare-element beryl pegmatites. The pegmatites are categorized as beryl and beryl-phosphate subtypes since the columbite-group minerals are insufficiently abundant in the Ewoyaa area while phosphate minerals are present in large amounts.