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Petrology, mineralogy, and geochemistry of Kekem mafic complex, western Cameroon

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The ***Kekem mafic*** complex located in South Western Cameroon is part of the Central African Orogenic Belt. It is situated in the gneiss area of Proterozoic age which extends between latitudes 5˚03' and 5˚10' North and longitudes 10˚00' and 10˚06' East, covering a surface of about 143 square kilometres.

The Kekem mafic complex is a sub-rounded intrusion with a diameter ranging between 9 to 11 kilometers paralleling the local NNE-SSW structural orientation. Outcrops occur as flagstones or isolated boulders. Some boulders are weathered and covered by iron oxide. Mostly the rock is massive, but shows weak foliation in some places. It has a dark green color with feldspar spots. The grain size and color vary from a coarse-grained melanocratic facies to a fine- to medium-grained rock with pinkish feldspars and pyroxene. The mafic intrusion is in contact with gneisses along its northern and eastern part. It is overlain by volcanic formations in the southern and southwestern part of the intrusion. The contact with surrounding gneisses is characterized by intense fracturation and fissures filling by magmatic liquids.

The complex is made up of three types of gabbroic rocks namely an olivine gabbro, a monzogabbro and gabbro. These rocks are frequently cut by pegmatites, trachytes and granite veins. They range in composition from syenogabbros to gabbros and olivine gabbros. The primary mineral assemblage of the gabbroic rocks is plagioclase (An64 toAn30, sometimes perthitic), clinopyroxene (Wo40-47 En30-44 Fs12-19), orthopyroxene (Wo1-3 En55-65 Fs34-38) which are partially replaced by amphibole, biotite

(phlogopite) and orthoclase. The accessory minerals in all gabbroic rocks are ilmenite, magnetite, apatite, sphene, zircon and trace of quartz in the monzogabbro. Amphiboles (actinolite, hornblende and magnesio-hornblende) and chlorite are secondary minerals.

The rocks are mafic to intermediate in composition (48.13–56.70 wt. % SiO2) and have high contents of alkalis K_2O (1.76–4.27 wt. %), Na_2O (1.94–4.30 wt. %), MgO (3.83-9.23wt %) CaO (5.67–10.46 wt. %) and P_2O_5 (0.30- 1.37 wt. %).They display variable contents in TiO_2 (1.11–2.76 wt. %), Fe_2O_3* (total Fe =7.35–13.08 wt. %) and Al_2O_3 (13.83–18.63 wt. %), K_2O/Na_2O ratios (0.48-1.39), and Cr (5-597ppm), V (121-404ppm), and Sc (13-40 ppm). Also noticed is an enrichment in large ion lithophile elements (LILE) and high-field-strength elements (HFSE). The studied rocks exhibit chemical features of alkaline, medium-K to high-K, metaluminous (A/CNK= 0.55-0.76), and magnesian with the exception of gabbro which are feroan. Chondrite normalized REE patterns are fractionated (CeN/YbN=6.09-17.69) with low YbN values (10.05-14.29) and variable Eu anomalies (Eu/Eu*=1.12- 0.85). Compared to the MORB, the mafic Complex is enriched in Pb, Th, alkali and alkaline earth elements relative to REE and HFSE, resulting in high Rb/Ce (0.58-1.45), Sr/Nd (19.87-31.58), Ba/Ce (6.65-43.96), Pb/Ce (0.12-0.27), Th/Ce (0.02-0.10), which is characteristic of orogenic magmatic series. Primitive mantle normalized incompatible element patterns exhibits well pronounced negative Nb and Ti anomalies (except for the gabbro) and resemble patterns of calc-alkaline melt from a continental margin setting.