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Geochemical Evolution of Microgranular Enclaves Hosted in Cambro-Ordovician Kyrdem Granitoids, Meghalaya Plateau, Northeast India

Khurajam Mohon Singh
Imphal College, India

Cambro-Ordovician (512.5 ± 8.7 Ma) felsic magmatism in the Kyrdem region of Meghalaya plateau, here with referred to as Kyrdem granitoids (KG), intrudes the low-grade Shillong Group of metasediments and Precambrian Basement Gneissic complex forming an oval-shaped plutonic body with longer axis almost trending N-S. Thermal aureole is poorly developed or covered under the alluvium. KG exhibit very coarse grained porphyritic texture with abundant K-feldspar megacrysts (up to 9 cm long) and subordinate amount of amphibole, biotite, plagioclase and quartz. The size of K-feldspar megacrysts increases from margin (Dwarksuid) to the interior (Kyrdem) of the KG pluton. Late felsic pulses as fine grained granite, leucocratic (aplite) and pegmatite veins intrude the KG at several places. Grey and pink varieties of KG can be recognized, but pink colour of KG is the result of post-magmatic fluids, which have not affected the magnetic properties of KG. Modal composition of KG corresponds to quartz monzonite, monzogranite and granodiorite. KG has been geochemically characterized as metaluminous (I-type) to peraluminous (S-type) granitoids. The KG is characterized by development of variable attitude of primary foliations mostly marked along the margin of the pluton and is located at the proximity of Tyrsad-Barapani lineament. The KG contain country rock xenoliths (amphibolite, gneiss, schist etc.) which are mostly confined to the margin of the pluton and microgranular enclaves (ME) are hosted in the porphyritic variety of KG. Microgranular Enclaves (ME) in Kyrdem Granitoids is fine to medium grained, mesocratic to melanocratic, phenocryst bearing or phenocryst-free and rounded to ellipsoidal showing typical magmatic textures. Mafic-felsic phenocrysts in ME are partially corroded and dissolved because of their involvement in magma-mixing event and thus represent xenocrysts. Sharp to diffused contacts of ME with host Kyrdem Granitoids, fine grained nature and presence of acicular apatite in ME suggest comingling and undercooling of coeval, semi-solidified ME magma within partly crystalline felsic host magma.

Geochemical features recognize the nature of ME (molar A/CNK=0.76-1.42) and KG (molar A/CNK=0.41-1.75) similar to hybrid-type formed by mixing of mantle-derived mafic and crustal-derived felsic magmas. Major and trace including rare earth elements variations of ME suggest the involvement of combined processes such as magma mixing, mingling and crystallization differentiation in the evolution of ME but KG variations appear primarily controlled by fractionation of plagioclase, hornblende biotite and accessory phases. Most ME are partially to nearly re-equilibrate chemically with felsic host KG during magma mixing and mingling processes.

Keywords: Cambro-Ordovician granitoids, Geochemistry, Meghalaya Plateau, Microgranular enclaves.

Biography:

Dr. Khurajam Mohon Singh has a distinguished career as faculty member for a period of about three decades in the Department of Geology, Imphal College, Imphal (Manipur University). He has carried out extensive researches on igneous rocks, Geochemistry and Geo-hazards in India. Dr. Mohon Singh has served several national and international scientific bodies as an expert in igneous petrology, geochemistry and Geo-hazards. He is an energetic field geologist and has led number of expeditions in India and abroad.