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Mechanism of Intense Chemical Weathering of Gabbro to Bauxite in Bukit Jebong, Sarawak

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Bauxite is referred as the type of ore that contains high amount of aluminium content and are formed through a chemical weathering mechanism from a parent igneous rock such as gabbro. Bukit Jebong, Sarawak, composed abundant amount of bauxite deposits are form from gabbro. However, the mechanism of how the minerals within the gabbro evolve to bauxite in Bukit Jebong, Sarawak has never been fully evaluated. The paper shall discuss the integration and correlation the petrology, mineralogy and geochemistry, of the fresh gabbro and bauxite deposit in Bukit Jebong Sarawak, and discuss the mechanism of how mineral within the gabbro are transformed into the bauxite minerals through chemical weathering. In order to achieve these objectives, both gabbro and bauxite deposits from Bukit Jebong, Sarawak were subjected to petrological, mineralogical, and chemical analysis.

The petrological, mineralogical and chemical compositions of the bauxite deposits are controlled by the original composition of the parent rock, gabbro. Based on the petrological analysis, plagioclase, pyroxene, muscovite and quartz are identified to be presence within the gabbro sample. For the bauxite samples, two minerals are identified to be presence which is the bauxite and goethite. Albite, $Na(Si_3Al)O_8$, an alkaline plagioclase minerals composed an abundant amount within the gabbro followed by forsterite, diopside, tremolite, clintonite and quartz based on the mineralogical analysis. Meanwhile the bauxite that is composed of mainly gibbsite $Al(OH)_3$ followed by goethite and hydro gibbsite minerals. Based on the geochemical analysis, gabbro shows high amount of SiO_2 and Al_2O_3, but the amount of the SiO_2 and Al_2O_3 seems to be reduced in the bauxite. Apart from that, the amount of Fe_2O_3 has increased in the bauxite. Intense chemical weathering due to the tropic conditions and good drainage system tends to alter the mineral composition of the gabbro and transforms it directly into bauxite minerals without any intermediate stage. High amount of Albite, $Na(Si_3Al)O_8$ within the gabbro to converted to gibbsite $Al(OH)_3$ due to the chemical weathering. Apart from that, the presences of abundant amount of goethite, FeO(OH), within the bauxite are also results from the intense chemical weathering.

The objective of the study was achieved through integration and correlation the petrology, mineralogy and geochemistry of the fresh gabbro and bauxite deposit in Bukit Jebong Sarawak. The main finding from this study is the presence of albite minerals in the gabbro has been undergone heavy weathering which alter the albite minerals and good drainage system which cause it to transform into goethite.

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