Geology and geochemistry of bauxite deposits in Lushoto District, Usambara Mountains, Tanzania

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Abstract
Bauxite deposits in the Usambara Mountains of north eastern Tanzania occur as remnants of residual deposits on two geomorphologically related plateaus of Mabughai-Mlomboza and Kidundai at Magamba in Lushoto, Usambara Mountains. The parent rocks for the deposits are mainly granulites and feldspathic gneisses of Neoproterozoic Mozambique belt. The plateaus represent a preserved Late Cretaceous–Lower Tertiary old land surface (African surface). Other parts of the Usambara Mountains and the neighbouring Pare Mountains are covered mostly by red–brown lateritic soils and impure reddish-brown kaolinitic clays. The bauxite deposits contain mainly Al_2O_3 (40–69 wt.%), Fe_2O_3 (3–10 wt.%), SiO_2 (0.16–7 wt.%) and other elements occur in quantities not substantial to affect the quality or processing of the bauxite, and are attributed to the presence of relic minerals. Gibbsite makes up to 98 vol.% of the bauxite ore in special cases. Gibbsite is accompanied by goethite in the ore. Boehmite occurs in small amounts and is usually accompanied by hematite. Impurities include goethite, hematite, kaolinite, and minor relic quartz and microcline. Kaolinite is the sole clay mineral encountered in the bauxite ore, suggesting mature soil profiles and a development of the bauxite deposits on a well-drained peneplanation. Ore reserve estimates from the drilling data and surface geological mapping of the deposits yielded bauxite reserves of about 37 million tonnes.

Keywords
Bauxite;
Saprolite;
Gibbsite;
Relic minerals;
Old land surfaces