A B S T R A C T

The thesis embodies the results of investigation of the bauxite deposits of Shevaroys and in parts of the Kolli Hills, Salem district, Tamil Nadu. The mineralogy, geochemistry and petrography of the bauxite deposits have been studied in detail using sophisticated instrumental techniques like X-ray diffractometry, derivatography, scanning electron microscopy, electron microprobe, spectrograph, and infrared spectroscopy in order to outline the mode of occurrence of bauxites and laterites and the processes of bauxitisation and lateritisation.

Bauxite occurs as reefs, boulders, pebbles, cobbles, pockets and lenses embedded in laterites, aluminous laterites and even in clays and exhibits textural and mineralogical variations.

Studies of the LANDSAT Imagery (NASA ERTSE-1219 - 04392 - 7102, Band 7) of the area clearly reveal the existence of a number of lineaments. The LANDSAT Imagery also distinctly shows that the Shevaroy Hills are more tectonically disturbed than the Kolli Hills. Occurrence of a large number of bauxite bearing hillocks in the Kolli Hills as compared to the Shevaroys, may be ascribed to the geomorphic control in bauxite and laterite formation of the area.

The mineralogy of bauxites has been studied by petrographical microscopy, X-ray diffractometry, X-ray powder photography, derivatography, IR spectrophotometry and scanning electron microscopy. The various minerals identified are gibbsite, boehmite, goethite, hematite, quartz, kaolinite, chlorite, illite, and halloysite. The studies reveal that most of the minerals in bauxites, laterites and aluminous laterites are well crystallised while kaolinite in a few lithomarge samples are disordered. Sequential textural and mineralogical changes from weathered source rock to bauxite and laterite through intermediate lithomarge zone have been exhibited by scanning electron micrographs.

Electron microprobe investigations prove that the macrogeochemical correlations are also valid in micron level. Some of the trace elements like Cr, Mn, Sn, Ni have preference for highly ferruginous minerals. Al substitutes for Fe in goethites/hematites and ilmenites.

Dehydration studies by Infrared spectroscopic technique point out that the main absorption bands of kaolinite falling in the region 2.7μ - 2.85μ are much affected in the temperature range 400°C to 600°C. The traces of water is almost completely removed at 800°C.

Trace elements like Cr, Ag, In, Ti, V, Ni, Sn, Ga, Mn, Mg, Pb, Th, Ca, Mo, Zr, Cu were detected by the spectrograph. It is observed that usually Ti, Cr and In are enriched while Ga, Mn, Sn, V, etc. are depleted during bauxitisation and lateritisation. Ni is enriched in the transitional lithomarge zone which is a typical phenomenon for nickel laterites. Indium is strongly enriched in the profiles.

The distribution pattern of lanthanides (La, Sm, Eu, Yb and Lu) in the weathering profile supports the generally accepted view that at the alkaline stage, enrichment of lanthanides and at the acid stage, depletion of lanthanides occurs. The concentration of uranium is less than its content in earth's crustal average. The gold content in the samples ($< 10^{-3}$%) is much higher than the Russian bauxites (10^{-8}%). The gold is probably present in magnetite and quartz as native element.

From the detailed field and laboratory investigations, it is concluded that the bauxite deposits of Shevaroy Hills have been formed mainly due to the weathering of the underlying charnockites and associated leptynites. The deposits in parts of Kolli Hills, on the other hand, owe their origin to the weathering of acid charnockites. Magnetite quartzite bands associated with such charnockites have rarely been bauxitised.