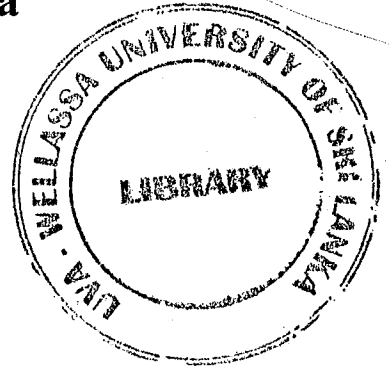


**Structural and Geochemical Characteristics of
Limonite ore in Dela, Sri Lanka**



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Abstract

Iron ore is a natural abundant mineral commodity, including oxides, hydroxides, silicates, carbonates, and sulfides. Goethite (FeO.OH) and Limonite (FeO.OH (H₂O)) are hydrated form of iron and amorphous and non-crystalizing form of iron containing around 52.86% of iron. In Sri Lanka hydrated iron oxide- present as boulders and near surface deposits. This is classified as Supergene Deposits of Dela-Noragolla type present in Highland Complex. Main objectives of this research are to identify the chemical compositions, provenance, weathering grade, weathering pattern, and decomposition of Dela limonite during Holocene period by identifying geochemistry with mineralogical characteristics of the deposit. For that fresh 26 limonite samples were collected. Powders of the samples were analyzed using FTIR, XRD and XRF. Develop the base map for the deposit. FTIR analysis revealed several peaks in 3570 cm⁻¹, 2360 cm⁻¹, 1420 cm⁻¹, 1350 cm⁻¹, 1100 cm⁻¹, and 800 cm⁻¹ wavenumbers showing water group, P-H bond, Organic sulfate, P=O and silicate iron. In XRD analyzing minerals were verified as limonite, goethite, quartz and hematite represent in the deposit. Geochemically enrichment of Fe₂O₃, MnO, P₂O₅, low amount of silica, S, trace elements and Chalcophile elements in the deposit identified that the initial rock formation in mafic or ultramafic source environments. Geochemical analyzed revealed that apatite is present as the gangue. Then metasedimentary processes were taken place to evolve the deposit. Base rock of the area is khondalites. Sr, Rb traces show deposit was exposed to weathering and diagenesis. SiO₂, Al₂O₃, MnO, P₂O₅, CaO, and S is depleted with in past 50 years and Fe percentage is increased about 10% because other elements were leached out and form laterite in certain areas of the deposit. The trace elements in sediments are positively correlated with Al₂O₃ because they are readily adsorbed on to clays during weathering, transport and depreciation.

Key words: Limonite, hydrated iron oxide, Supergene Deposit, provenance, weathering, decomposition, Holocene, geochemistry, FTIR, XRD and XRF, khondalite, apatite, mafic, metasedimentary, and laterite.