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Trace and Rare Earth Element Chemistry of Lateritic Mantle in Sukinda Area, Odisha

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Abstract

The present paper deals with the geochemical constraints and behavior of chromium in the laterites of Sukinda area, Odisha. The mafic and ultramafic rocks in this area are highly weathered and converted into lateritic soil cover, up to the depth of > 20m. Laterite is broadly classified based on the nature of basement, colour of soil, abundance and nature of laterite, abundance of transported boulders in the weathered profile and nature of vegetation. In the study area, low level laterite, disintegrated laterite, cavernous laterite, pisolitic and concretionary laterites are abundant. The Sukinda laterite is brown to brick red, orange and spongy with metallic luster that sometimes show pisolitic and concretionary textured laterite and illustrates re-constituent forms of rhythmic colloform bandings. Hematite is the dominant mineral followed by goethite with subordinate amount of limonite, quartz and traces of magnetite. Cavities of various sizes are common in the Sukinda laterites.

Cr and Ni are the major constituents of Sukinda laterite. Cr content varies from 6020 to 117810ppm, while Ni content shows wide range from 3100 to 15900ppm in this laterite. The Cr_2O_3 and NiO range from 0.88 to 15.12% and 0.39 to 2.02%, respectively, whereas TiO_2 content ranges from 0.02 to 0.71%. Sukinda laterite indicates maximum gain of Zn on lateritisation, which varies from 298.16 to 1547.74ppm. The contents of other trace elements in Sukinda laterite are V (109.93 - 586.85ppm), Cu (79.67 - 265.91ppm), Ga (3.79 - 30.59 ppm), Rb (1.66 - 26.61ppm), Sr (8.70 - 25.06ppm), Y (1.34 - 31.33ppm), Zr (8.34 - 129.63ppm), Nb (0.55 - 42.34ppm), Cs (1.47 - 70.95ppm) and Ba (36.37 - 750.33ppm). The LREE ranges from 13.23 to 232ppm, whereas MREE and HREE range from 3.05 to 24.53 ppm and 1.07 to 11.83ppm, respectively.

Keywords: Trace and REE geochemistry, Laterite mineralogy, Sukinda mafic-ultramafic complex, Singhbhum craton, India