

Mineralogical and Geochemical Characteristics of Serpentinite-Derived Ni-Bearing Laterites from Fars Province, Iran: Implications for the Lateritization Process and Classification of Ni-Laterites

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Abstract : Nickel-bearing laterites occur as two parallel belts along Sedimentary Zagros Orogenic (SZO) and Metamorphic Sanandaj-Sirjan (MSS) petrostructural zones, Fars Province, south Iran. An undisturbed vertical profile of these laterites includes protolith, saprolite, clay, and oxide horizons from base to top. Highly serpentinized harzburgite with relicts of olivine and orthopyroxene is regarded as the source rock. The laterites are unusual in lacking a significant saprolite zone with little development of Ni-silicates. Hematite, saponite, dolomite, smectite and clinochlore increase, while calcite, olivine, lizardite and chrysotile decrease from saprolite to oxide zones. Smectite and clinochlore with minor calcite are the major minerals in clay zone. Contacts of different horizons in laterite profiles are gradual and characterized by a decrease in Mg concentration ranging from 18.1 to 9.3 wt.% in oxide and saprolite, respectively. The maximum Ni concentration is 0.34 wt.% (NiO) in the base of the oxide zone, and goethite is the major Ni-bearing phase. From saprolite to oxide horizons, Al_2O_3 , K_2O , TiO_2 , and CaO decrease, while SiO_2 , MnO, NiO, and Fe_2O_3 increase. Silica content reaches up to 45 wt.% in the upper part of the soil profile. There is a decrease in pH (8.44-8.17) and an increase in organic matter (0.28-0.59 wt.%) from base to top of the soils. The studied laterites are classified in the oxide clans which were derived from ophiolite ultramafic rocks under Mediterranean climate conditions.

Keywords : Iran, laterite, mineralogy, ophiolite

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