

Geochemical behavior of nickel in weathered profile of the Rio Tuba laterite deposit, Palawan Island, Philippines

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Serpentinized ultramafic rocks accompanied by ophiolite are widely distributed at southern Palawan Island. Laterite type Ni deposit at the Rio Tuba mine is developed over the weathered serpentine body. It produces low grade Ni-ore, and after the introduction of high pressure acid leach (HPAL) technology, about 1 % of world nickel production comes from the deposit.

Weathered profile consists of dark brown zone, reddish to brown zone and yellowish gray zone from surface to bottom. Because yellowish gray zone of >8 m from the surface poorly possesses original texture, this zone corresponds to saprolite. Upper zone of <8 m corresponds to laterite. Results of chemical analysis on bulk samples show that laterite zone is rich in Fe₂O₃(about 60 wt. %), and contains Al₂O₃(about 10 wt.%), SiO₂(about 8 wt.%) and Cr₂O₃(about 5 wt.%). Iron content decreases in saprolite (Fe₂O₃= about 15 wt.%), while SiO₂(about 35 wt.%) and MgO (about 25 wt. %) contents increase. Nickel is accompanied in saprolite with maximum content of 2.3 wt.%. XRD and IR-absorption studies suggest that laterite consists of hematite-goethite, and saprolite consists of upper smectite-talc and lower lizardite zones.

In order to determine host minerals of nickel, sequential extraction experiments have been conducted. Nickel is extracted from soil samples with reaction of various chemical reagents. Nickel contents in fractions of 'soluble', 'exchangeable', 'carbonate phase', 'oxide phase', 'organic matter' and 'silicate and residual phases' will be separately obtained. Relationship between ore mineralogy and nickel content in each fraction will be discussed.

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