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The Analysis of Dissolution Reaction Mechanism of Antigorite, Goethite, and Nickel Oxide from Laterite Ore in Chloric Acid Solution

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Abstract : This work is aimed to reveal the profile of milled laterite ore and the dissolution mechanism of antigorite, goethite, and nickel oxide during leaching of laterite ore in chloric acid. Laterite ore from South East Sulawesi, Indonesia, which is the product of weathering of earth's mantle's upper part, consists mainly of antigorite, goethite, quartz, and nickel oxide. The laterite ore was analyzed by using Scanning Electron Microscope/ Energy Dispersive X-Ray Spectroscopy (SEM/EDS), X-Ray Diffraction (XRD) and X-Ray Fluorescence (XRF) to obtain the characteristic of milled ore. The milled laterite ore was leached in hydrochloric acid solution at different temperature and acid concentration. The solid parts of leached samples were analyzed by using XRD and XRF to reveal the phases and the % weight of iron and nickel within the samples, respectively. It is found that in the milled laterite ore, antigorite, goethite, and nickel oxide were not chemically and physically associated. The path of antigorite, goethite, and nickel oxide dissolution reaction with chloric acid is independent of one another. The dissolution reaction of antigorite produced significant solid magnesium hydroxide chloride at 50 ^{o}C as an intermediate product before antigorite was fully being dissolved. Meanwhile, goethite was dissolved significantly at 50 ^{o}C and above, whereas and nickel oxide was dissolved at 30 ^{o}C and above. The dissolution of one-mole antigorite and one-mole goethite consumes nine-mole of hydrochloric acid molecules.
Keywords : laterite, goethite, antigorite, leaching, nickel oxide.

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