



Extraction of Nickel From Indonesian Laterite Nickel Ore Using Microwave Energy

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Abstract

This study investigated nickel extraction from nickel laterite ore from Indonesia using the microwave roasting leaching method. The study focused on investigating the effect of microwave power and roasting temperature on the extraction of nickel. Samples from each step were characterized using X-ray diffraction (XRD) and Atomic Absorption Spectroscopy (AAS). The method has the advantage of being carried out in atmospheric conditions with high nickel extraction at low temperatures, a rapid process, and without pre-roasting as in conventional roasting. It was obtained that 92.8% of nickel was extracted by application of microwave power at 540 W, at a roasting temperature of approximately 335°C for 30 minutes. The maximum result were obtained when the heating temperature is near to the boiling point of sulfuric acid (337°C). However, the amount of nickel extracted decreases when the heating temperature is above the boiling point of sulfuric acid. The results of XRD analysis of samples after roasting and solid leaching residue samples also revealed that the maximum nickel recovery occurred when the roasting process had transformed all iron sulfate-aqueous system $(\text{Fe}(\text{OH})(\text{SO}_2)_2 \cdot 4\text{H}_2\text{O})$ into iron sulfate $(\text{Fe}_2(\text{SO}_4)_3)$ which also directly changed $\text{NiSO}_4 \cdot 6\text{H}_2\text{O}$ into NiSO_4 which is highly soluble in water.

Keywords: *Nickel Extraction, Microwave, Nickel Laterite Ore, Microwave Roasting, Leaching.*