

# CONTEMPORARY METALLIC MATERIALS

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INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Edited by:

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## Upgrading of Iron-rich Laterite Ore Using Reverse Flotation

Hadi Purwanto<sup>1</sup>, Mutaalim<sup>2</sup>, Yuhelda Dahlan<sup>2</sup>, Nuryadi Saleh<sup>2</sup> and Pramusanto<sup>2</sup>

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**Keywords:** Reverse flotation, Iron laterite, Transforms limonite/goethite, Amine thioacetate.

**Abstract:** This Reverse flotation was adopted for Indonesian iron-rich laterite ore from Pomalaa to floats siliceous minerals in the separation of iron mineral. Nickel siliceous mineral such as garnierite is one of the silicate minerals containing in laterite ore that are undesirable and must be eliminated from the ore before used as raw material for iron making industry. Calcine laterite product obtained from reduction process in rotary kiln for 3 hours at 900°C to transforms limonite/goethite to magnetite and contains Fe 45.6% and Ni 1.16%. The reverse flotation tests are focused on the separation of iron mineral from nickel mineral using amine complex, ARMAC, a commercially available amine thioacetate as collector. Influences of pulp pH, dosages of collector amine complex and dosages of frother on the reverse flotation of calcine laterite ore were investigated. The optimal condition is pH 8, collector 500 g/t and frother 100 g/t. The test results show that after one-stage rough reverse flotation the nickel minerals concentrate having Ni and Fe grade of 1.72% and 30.1% with recoveries 92.36% and 41.24%, respectively. However, the iron content in tailing increased up to 71.41% and nickel decrease to 0.237%. Therefore, it is possible to use iron-rich lateritic ore to produce magnetic concentrates by using combine between magnetizing roasting and reverse iron flotation.

### Introduction

Demands on raw materials of iron steel pellets of Indonesia through imports are estimated increased in double up to four million tons annually, in accordance with economic growth. To overcome raw material imports, laterite iron ore is one of many minerals that can be utilized as raw materials for iron steel making which can be found in Indonesia in South Kalimantan, Central Sulawesi and western Papua; it is estimated that its resources one billion tons. The biggest resources are distributed in Sebuku Island, Kukusan Mountain, Geronggang (South Kalimantan), Pomala (Southeast Sulawesi) and Halmahera. As reported by many, it is estimated that iron ore resources reached 950 million tons with Fe contents range between 39.8 up to 55.2 % (Yudawinata and Sunarya, 1996). Other views stated that laterite iron ore resource potency of Indonesia are 1,151,369,714 tons, while reserves reached 215,160,000 tons (Setiawan *et al*, 2004). Laterite iron ore occurred on the top layers as *iron cap* of iron content 60-69%, while national steel industry require iron ore with contents of Fe minimum 65 %. Thus, it is needed intensive study on utilization of laterite iron ore as raw material for