

Pengaruh Dua Tahap Proses Pengaruh Peningkatan Panas Pada Reduksi Selektif Bijih Nikel Laterit Jenis Limonit Dan Saprolit = The Effect Of Two Stages Of Thermal Upgrading On The Selective Reduction Of Laterite Nickel Ore Limonite And Saprolite

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Abstrak

Indonesia merupakan negara yang kaya akan batuan mineral, salah satunya adalah bijih nikel laterit, dengan potensi cadangan sebanyak 1,391 milyar ton. Bijih nikel laterit merupakan batuan mineral yang mengandung senyawa oksida besi-nikel. Rendahnya penguasaan teknologi pengolahan bijih nikel laterit menyebabkan potensi sumber daya mineral tersebut belum dapat dimanfaatkan secara optimal. Dalam penelitian ini akan dilakukan proses benefisi dari bijih limonit dan saprolit dengan proses selektif reduksi menggunakan penambahan aditif Na_2SO_4 , reduktor grafit, dan dua tahap panas (pre-treatment dan reduksi) untuk menghasilkan konsentrat FeNi dengan kadar nikel diatas 5 %. Pemanasan 2 tahap adalah proses pre-treatment bijih nikel laterit agar didapatkan besi nikel yang memiliki kadar dan perolehan kembali logam nikel yang tinggi dengan penggunaan panas yang tidak terlalu tinggi (1000 °C) seperti 250 °C, 300 °C, dan 350 °C selama 30, 60, dan 90 menit dan penambahan sulfur yang relatif sedikit (10 %). Teknologi pengolahan bijih nikel laterit kadar rendah menjadi FeNi banyak dilakukan. Namun, penelitian ini berfokus pada dua tahap panas dengan reduktor grafit kadar karbon 90-99 % berat sehingga kelak dapat digunakan sebagai pemodelan pengolahan bijih nikel laterit. Dalam penelitian ini bijih nikel laterit terlebih dahulu menjalani proses benefisi/pengkayaan dengan menggunakan metode reduksi selektif pada suhu rendah dan dilanjutkan pada suhu tinggi 1150 °C. Kemudian, dilanjutkan dengan proses pemisahan magnetik. Variasi berat grafit berdasarkan stoikiometri, konsentrasi sodium sulfat, jenis reduktor dan pre-treatment atau thermal upgrading akan dipelajari dalam proses peleburan reduced nickel ore menjadi konsentrat FeNi menggunakan mechanical chemical process. Luaran penelitian ini berupa suatu bagan untuk dijadikan pemodelan alternatif dalam pengolahan bijih nikel laterit jenis limonit dan saprolit menjadi konsentrat FeNi kedepannya dan konsentrat FeNi dengan persentase nikel di atas 5%.

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nickel ore processing technology causes the potential of these mineral resources to not be optimally utilized. In this research, the beneficiation process of limonite and saprolite ore will be carried out with a selective reduction process using the addition of Na₂SO₄ additives, graphite reducing agents, and two heat stages (pre-treatment and reduction) to produce FeNi concentrates with nickel content above 5%. 2-stage heating is a process of pre-treating laterite nickel ore in order to obtain nickel iron which has high levels and recoveries of nickel metal with the use of heat that is not too high (1000 ^oC) such as 250 ^oC, 300 ^oC, and 350 ^oC for 30, 60, and 90 minutes and the addition of relatively little sulfur (10%). The technology of processing low grade nickel laterite ore into FeNi is widely used. However, this research focuses on two heat stages with a graphite reducing agent with a carbon content of 90-99% by weight so that later it can be used as a modeling for laterite nickel ore processing. In this study, the laterite nickel ore first undergoes a beneficiation / enrichment process using a selective reduction method at low temperature and is continued at a high temperature of 1150 °C. Then, followed by the magnetic separation process. Graphite weight variations based on stoichiometry, sodium sulfate concentration, type of reducing agent and pre-treatment or thermal upgrading will be studied in the process of smelting reduced nickel ore into FeNi concentrate using a mechanical chemical process. The output of this research is in the form of a chart to be used as an alternative modeling in the processing of limonite and saprolite laterite nickel ore into FeNi concentrate in the future and FeNi concentrate with a nickel percentage above 5%.

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