

# Pengaruh Penambahan 2,5M Natrium Hidroksida pada Proses Presipitasi Nikel Hasil Multistage Iron Removal untuk Produksi Mixed Hydroxide Precipitate = Effect of adding 2.5M Sodium Hydroxide on The Nickel Precipitation Process Resulting from Multistage Iron Removal for The Production of Mixed Hydroxide Precipitate

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## Abstrak

Penelitian ini merupakan rangkaian dari proses pengolahan bijih nikel laterit hingga menjadi produk antara yakni *mixed hydroxide precipitate* (MHP) menggunakan proses hidrometalurgi. Penelitian ini bertujuan untuk mengurangi kandungan pengotor utama besi dan pengotor lainnya serta meningkatkan efisiensi kandungan elemen berharga seperti nikel dan kobalt. Sampel awal yang digunakan pada penelitian ini berbentuk *pregnant leach solution* (PLS). Selanjutnya, PLS akan dilakukan proses *multistage iron removal* dengan menggunakan kalsium karbonat ( $\text{CaCO}_3$ ) dengan kadar 25% w/w, 15% w/w, dan 12,5% w/w pada masing-masing tahap. Kemudian sampel dipanaskan pada temperatur  $90^\circ\text{C}$  selama 2, 1,5, dan 1 jam pada setiap tahap. Kemudian, penelitian dilanjutkan dengan melakukan presipitasi MHP pada sampel yang telah melewati *multistage iron removal*. Proses presipitasi MHP dilakukan dengan menggunakan reagen natrium hidroksida (NaOH) dengan konsentrasi 2,5M. Presipitasi dilakukan hingga mencapai pH 9 lalu dilanjutkan dengan pemanasan pada temperatur  $90^\circ\text{C}$  selama 1 jam. Pada penelitian ini, ditemukan beberapa faktor yang menyebabkan tidak meningkatnya kadar nikel secara signifikan sehingga belum terbentuk produk yang diinginkan. Faktor tersebut diantaranya kadar pengotor lain seperti sulfur dan mangan yang masih cukup tinggi, *ageing time* yang terlalu lama, kecepatan titrasi yang terlalu tinggi, dan tingkat kejenuhan sampel yang tinggi. Hasil dari proses *multistage iron removal* menunjukkan bahwa terjadi pengurangan kandungan besi hingga 92% melalui pengujian ICP OES. Sementara itu, pada proses presipitasi MHP dihasilkan nikel dengan kandungan mencapai 18,83%.

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This research is a series of processing of lateritic nickel ore to become an intermediate product, namely mixed hydroxide precipitate (MHP) using a hydrometallurgical process. This research aims to reduce the content of the main impurities iron and other impurities and increase the efficiency of the content of valuable elements such as nickel and cobalt. The initial sample used in this study was in the form of pregnant leach solution (PLS). Furthermore, PLS will be carried out a multistage iron removal process using calcium carbonate ( $\text{CaCO}_3$ ) with levels of 25% w/w, 15% w/w, and 12.5% w/w at each stage. Then the samples were heated at  $90^\circ\text{C}$  for 2, 1.5, and 1 hour at each stage. Then, the research was continued by conducting MHP precipitation on samples that had undergone multistage iron removal. The MHP precipitation process was carried out using sodium hydroxide (NaOH) reagent with a concentration of 2.5M. Precipitation was carried out until it reached pH 9 and then followed by heating at  $90^\circ\text{C}$  for 1 hour. In this study, several factors were found that caused the nickel content not to increase significantly so that the desired product had not been formed. These factors include the levels of other impurities such as sulfur and manganese which are still quite high, the aging time is too long, the

titration speed is too high, and the sample saturation level is high. The results of the multistage iron removal process show that there is a reduction in the iron content of up to 92% through the ICP OES test. Meanwhile, the MHP precipitation process produces nickel with a content of up to 18.83%.