INDONESIAN MINING JOURNAL

ISSN 0854 - 9931 **Volume 18, No. 2, June 2015**

Abstract Index

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Displacement Distribution Model of Andesite Rock Mass Due to Blasting Activity Using Finite Element Method

***Model Distribusi Perpindahan Massa Batuan Andesit Akibat Aktivitas Peledakan Menggunakan* Metode Finite Element**

IMJ, Vol. 18, No. 2, June 2015,
P. 47 - 58

In mining operation, blasting is the most common method to disperse rocks. Blasting process does not only minimize rock fraction, but also produce less favourable energy for its surroundings. One of less favourable energies is ground vibration. The ground vibration will affect slope stability, because it will increase the driving force of the slope to collapse. Thereby, a research is needed to understand the influence of ground vibration in the slope stability. From the level of ground vibration influence on slope stability, it can be set the limit of the blasting process to keep the slope stable. Numerical method that used in this research is finite element method. One of its advantages is to accomodate time element in its calculations. Analysis results of this method are the displacements distribution model of the rock mass in static and dynamic conditions. On the track of A-A', rock mass displacement took place at the crest of 6.6 mm (static condition) to 8.5 mm (dynamic condition). Likewise, the track of B-B' line of 0.4 mm to 2.5 mm and line C-C' from 0.6 mm to 2.0 mm. The safety factor value on the floor of the lines B-B 'and C-C' in the dynamic conditions is 1.3. This value is quite prone, so it needs a treatment at the mine slope in order not endanger workers' safety, mining equipment and the surrounding buildings.

Keywords: ground vibration, blasting process, slope stability, finite element method

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Study on Basicity in Direct Reduced Iron Smelting

***Studi Basicitas dalam Peleburan* Direct Reduced Iron**

IMJ, Vol. 18, No. 2, June 2015,
P. 59 - 70

Pig iron as raw material for steel production, can be prepared by smelting a Direct Reduced Iron (DRI)/sponge iron. The smelting process needs optimum conditions to obtain such a high recovery likes basicity, which measures the ratio of alkalinity or acidity by adding the exact quantity of flux ($CaCO_3$) and quartz sand to input materials to generate the reduction process running well. In this study, smelting process was conducted using DRI sample mixed with varied flux ($CaCO_3$), quartz sand and coal. Then a mixture was fed to a resistance furnace. The reduction process was carried out at a temperature of 1600°C, for 1-2 hour. Pig iron as product and slag were analyzed to obtain its chemical composition. Afterward, recovery products was calculated. The results showed that the best conditions in these experiments were achieved at 1.18 basicity with pig iron recovery was reached up to 95.79%, contented of 95.84% Fe, 3.52% C and 0.0024% SiO_2. These data of this study can be used as reference of flux (limestone), quartz sand and carbon addition as input to resistance furnace in smelting process of sponge iron on a larger scale.

Keywords: DRI, basicity, pig iron, slag composition, FeO reduction

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Indication of Grain Enlargement in Dry Grinding Process Using a Rod Mill, Observed at Increased Milling Time

Indikasi Pembesaran Butir pada Proses Penggilingan Kering Penggerus Batang yang Diamati Berdasarkan Pertambahan Waktu Giling

IMJ, Vol. 18, No. 2, June 2015,
P. 71 - 81

The aim of the study is to determine whether size distribution and grain properties of the milling product can be controlled by rod size, milling time or a combination of both. Milling experiments had been carried out using rod of 9.8, 23.8, and 46.0 cm respectively as well as milling time of 30, 60, 210, 360 and 600 minutes. Grain properties were studied by sieve analysis and binocular microscope. The entire rod sizes and 30-minutes milling time yielded grain enlargement as a result of van der Waals forces among colliding particles with the help of dampness as a binding media. The longer the milling time, the more coalesce the grains. It is also known that the smaller the particles, the lesser the particle density but the brighter the grain appearance. For all combinations, grain enlargement took place within size of -60 +100# showing the highest weight proportion in the period of 286.54 minutes.

Keywords: grain property, size distribution, rod size, milling time, grain enlargement

Saleh, Nuryadi (R&D Centre for Mineral and Coal Technology)

Preparation of Metallic Cerium by Metallothermic Reduction Using Cerium Oxide as Raw Material

Pelarutan Batuan Fosfat Menggunakan Penicillium sp

IMJ, Vol. 18, No. 2, June 2015,
P. 82 - 91

Cerium is one of the rare earth elements (REE) which many are found in rare earth minerals of monazite. Cerium is widely used for metal alloys in stainless steel, permanent magnets and automotive industries. In Indonesia, researchs for cerium extraction from such minerals of monazite to procure metallic cerium have not been intensively carried out, although cerium is potentially promising as raw material for alloying. The present research aims to study the conditions of cerium oxide (CeO_2) reduction process to yield metallic cerium (Ce). Cerium oxide reduction process was performed by a metallothermic method using a reductant of magnesium metallic powder and $CaCl_2$ as a flux. The parameters studied during the experiments were the quantity of the reductant, the composition of the flux and temperature of the process. The best result of the experimental process obtains the yield of metallic cerium about 50%, while the metal purity is 91% Ce. The process took place under conditions of that the oxide sample and reductant ratio were 1 : 1, the flux addition was 1%, with temperature of the process at 1200°C for 3 hours.

Keywords: monazite, REE, cerium, oxide cerium, metallothermic reduction

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Reviewing the Properties of Rare Earth Element-Bearing Minerals, Rare Earth Elements and Cerium Oxide Compound

Pengkajian Properti Mineral Pembawa Logam Tanah Jarang, Logam Tanah Jarang dan Senyawa Serium Oksida

IMJ, Vol. 18, No. 2, June 2015,
P. 92 - 108

Of the 17 rare earth elements (REEs), 15 belong to the chemical group called lanthanides, plus yttrium and scandium. The lanthanides consist of lanthanum, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium and lutetium. Cerium is one of the most abundant REEs, comprises more of the earth's crust than copper or lead. At least, there are 29 potential REE-bearing minerals. Basnasite, monazite and xenotime are among them and serve as the most exploited minerals. The REEs are mostly applied for high technology application such as computer, telecommunication, nuclear and sophisticated instruments for exploring the outer space.

Keywords: REEs, lanthanides, cerium, bastnasite, monazite, xenotime, high technology