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Synthesis and Characterization of Gamma Alumina and Its Adsorption Capability Test for Pomalaa Magnesium Laterite, South Sulawesi

Sintesis dan Karakterisasi Gama Alumina serta Pengujian Kemampuan Adsorpsinya pada Magnesium Laterit Asal Pomalaa, Sulawesi Tenggara

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Based on variations in calcination temperature, gamma alumina has successfully been made using a simple sol-gel method for Pomalaa magnesium-laterite adsorption from the South East of Sulawesi. The laterite leached by sulfuric acid was then precipitated by ammonia, to make the magnesium was separated from its main impurities (Si, Fe and Al). Temperature variations at 500, 650, 800 and 950 °C in gamma alumina making formed the gamma alumina phase while the alpha alumina phase was formed at 1100 °C. The higher calcination temperature the lower the specific surface area respectively from 196.385, 156.239, 105.725, 96.134 and 15.396 (m²/g). This results in decreasing the magnesium of the laterite 9.04, 8.70, 8.09, 6.39 and 0.29 (mg/L) respectively. The 800 °C-calcination gamma alumina has the highest volume of the pore, namely 0.3265 mL/g and the radius of 61.76 Å. The gamma alumina isotherm curve is type IV. The SEM-EDS test shows an aggregation spherical shape. Gamma alumina was detected to adsorb Mg laterite. The X-ray mapping of SEM-EDS test shows even distribution between gamma alumina, magnesium, and nickel. The highest adsorption is retained by GA-800/3 sample, namely 81.31 %.

Keywords: adsorption, gamma alumina, leaching, isotherm, sol-gel

amount of bentonite deposit. One of them is located in Karangnunggal, Tasikmalaya. The aim of this research is to study the effect of bentonite to increase the flexural strength of ceramic. The raw materials consisting of kaolin, feldspar, and quartz were used as raw materials in ceramics production. The weight percents of kaolin and quartz were fixed at 55 % and 20 %, whereas weight percents of feldspar and bentonite were varied at 25 %, 20 %, 15 %, 10 % and 0,5 %, 10 %, 15 %. The firing temperature was kept at 1,200 °C. Result of the experiment shows that the best composition to achieve the highest dry flexural strength at 254.70 kg/cm² is at 55 % kaolin, 20 % quartz, 15 % feldspar, and 10 % bentonite.

Keywords: bentonite, additive, ceramics, flexural

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The Kinetic Profile of Iron Dissolution from Laterite Ore in Chloric Acid Solution

Profil Kinetika Pelarutan Besi dari Bijih Laterit dalam Larutan Asam Klorida

IMJ, Vol. 22, No. 1, April 2019, P. 29-37

Indonesia has large amount of laterite deposits located in Southeast Sulawesi. The laterite contains significant amount of iron. The ore has been processed through high temperature. The high temperature consumes a lot of energy and releases a lot of carbon dioxide. The low temperature of the process is simple and needs less energy. Leaching the ore is the important stage in low temperature which determines the recovery of valuable metal from the ore. This work observes the kinetic aspect of iron dissolution in the process based on the shrinking core model. The data of iron dissolution at temperature 30, 50, 70 and 90 °C are plotted into chemical reaction control and diffusion control equations. The result shows that at 30 and 50 °C, the whole leaching process is controlled by the rate balance between chemical reaction and diffusion, whereas at 70 and 90 °C, the reaction is controlled by diffusion.

Keywords: laterite, iron, hydrometallurgy, leaching, kinetic

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Widodo; Solihin and Subari (Research Centre for Geotechnology-LIPI; Centre for Ceramics)

Effect of Karangnunggal Bentonite Addition on the Mechanical Strength of Conventional Ceramics

Pengaruh Penambahan Bentonit Karangnunggal Terhadap Kekuatan Mekanik Keramik Konvensional

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Bentonite can be used as an additive in ceramics production. It can increase the thermal resistance and flexural strength of ceramics. Indonesia has a large

DOI: 10.30556/imj.Vol22.No1.2019.985 Sophian, Irvan; Herlinawati; Khoirullah, Nur; Abdurrokhim; Haryanto, Iyan and Hendarmawan (Padjadjaran University; PPSDM Geominerba) Preliminary Geomechanical Analysis on Limestones in PPSDM Geominerba Campus, Padalarang, West Java <i>Analisis Geomekanika Awal pada Batugamping di Kampus PPSDM Geominerba, Padalarang, Jawa Barat</i> IMJ, Vol. 22, No. 1, April 2019, P. 39-47 The research location is in the PPSDM Geominerba field campus. The campus is located in Padalarang, West Java that is surrounded by the open-pit mining of limestone and marble. This limestone was formed in Oligo-Miocene of Rajamandala Formation. The research objective was to determine the condition of the slopes around the campus based on geomechanical characteristics. Based on field observations, the slope angle in the area is dominated by steep slopes. The rock hardness level is dominated by hard rock with a hardness ranging from 50-100 MPa. Rock Mass Rating shows that the area is dominated by good rocks. While the Slope Mass Rating calculation show that the maximum slope angle is between 52-75°. Level of deformation and intensive weathering process will reduce the strength of the rock in the future. Several rock fall occurrences on this research area support this assumption. Yet, some local open pit mining area activity near the toe hill of the area need to be concerned regarding the effect of the local rock fall occurrences. Keywords: rock mass rating, slope mass rating, limestone, Rajamandala Formation	ash fusion temperature of coal, determining the ash type and calculating of the fouling and slagging. The results showed that the Pendopo and Palangkaraya coal with a ratio of 25:75 and 50:50 were classified as lignite with fouling and the slagging index was classified as a high and medium tendency. While the other blended coal was classified as a low and low-medium tendency. Keywords: coal blending, ratio, slagging index, fouling index
DOI: 10.30556/imj.Vol22.No1.2019.675 Monika, Ika and Sulistyohadi, Fahmi (R&D Centre for Mineral and Coal Technology) Ash Deposit Characteristic of Blended Coal in Coal Combustion Process <i>Sifat Endapan Abu dari Paduan Batubara dalam Proses Pembakaran Batubara</i> IMJ, Vol. 22, No. 1, April 2019, P. 49-60 In coal combustion process often occurrence the problems in the reactor which is caused by fouling and slagging. One of the ways to reduce the risk of fouling and slagging by blended coal from Pendopo, Palangkaraya, Muara Enim and Samarinda, with the ratio of 25:75, 50:50, and 75:25. The ash deposit tendency is known by analyzing the composition and	DOI: 10.30556/imj.Vol22.No1.2019.275 Purnama, Asep B. and Huda, Miftahul (R&D Centre for Mineral and Coal Technology) A Preliminary Study of Indonesian Coal Basins for Underground Coal Gasification Development <i>Studi Pendahuluan Cekungan Batubara Indonesia untuk Pengembangan Gasifikasi Batubara Bawah Permukaan</i> IMJ, Vol. 22, No. 1, April 2019, P. 61-76 The energy needs in Indonesia are continuing to increase, however, the production of oil and gas declines. This problem can be minimized by developing alternative energy such as underground coal gasification (UCG) by utilizing deep seated coal at 200 to 1.000 m below surface. The objective of this study is to evaluate coal characteristic in the basins for UCG purpose depends on several coal properties such as its rank (below bituminous), thickness (5m), depth (up to 200m), and ash content plus total moisture (below 60%). Based on coal analysis of 11 coal basins from previous exploration drilling, there were several coal layers in four selected basins to be applied for the UCG project, namely 7 coal layers in South Sumatra Basin, 7 coal layers in Barito Basin, 2 coal layers in Asam-asam Basin and 5 coal layers in Kutai Basin. Based on the SNI No. 5015-2011, the coal resources was calculated and converted into a gas by a simulation procedure. Total UCG coal in South Sumatera Basin is 801 million tons, meanwhile, the Barito Basin has 436 million tons, Asam-asam 136 million tons, and Kutai 289.7 million tons. The total hypothetical syngas is 8.38 TSCF. The UCG facilities in South Sumatra Basin should be designed to produce the syngas as the natural gas within this area is in deficit condition and the basic cost for electricity supply belongs to low situation, however, the UCG plants in Kalimantan should produce electricity as its cost ratio of electricity is high and this area retains surplus natural gas supply. Keywords: coal, basins, underground coal gasification, electricity, synthetic gas