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Abstract Index

Daulay, Bukin; Santoso, Binarko and Ningrum, Nining S. (R&D Centre for Mineral and Coal Technology)
Evaluation of Selected High Rank Coal in Kutai Basin, East Kalimantan Relating to Its Coking Properties
Evaluasi Beberapa Batubara Peringkat Tinggi di Cekungan Kutai, Kalimantan Timur Berkaitan dengan Sifat Kokasnya
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P. 1 - 10

Abundant coal seams of Miocene age with thickness of up to 4.7 metres occur in Kutai Basin, East Kalimantan. Selected coals are analyzed in order to evaluate its coking properties. The coals have bituminous in rank with calorific value of 5,582-8,357 kg/kcal (adb) and vitrinite reflectance of 0.57-0.97%. These selected high rank coals are normally concentrated in high gradient temperature zone or proximity to intrusive body. Vitrinite reflectances of these coals are lower than those of Australian coking coals (1.04-1.06%), but higher than of Indonesian normal coalification coals. Vitrinite is the dominant maceral in coals from Kutai Basin (73-96%), while inertinite and liptinite are only present in small amount, i.e. trace-10.2% and trace-8.2%, respectively. In contrast, vitrinite is lower and inertinite is higher in Australian coking coals, i.e. 64.8- 79.0% and 18.4-31.6%, respectively. Generally, crucible swelling number of Kutai Basin coals is lower than of Australian coking coals. Based on its vitrinite reflectance and calorific values, some of selected high rank coals from Kutai Basin have developed semi coking properties. The enhancement of rank is probably due to the effect of igneous intrusions or high gradient temperature. However, vitrinite content of the coals is higher than of coking coal range. Crucible swelling number of the coal is also too low, except for sample EK 1 and EK 2 which have CSN too much of 6 and 4, respectively. Therefore, the coals are not categorized as prime coking coal, but they can be blended with bituminous inertinite rich coals to make metallurgical coke for blast furnace.

Keywords: coking coal, maceral, vitrinite reflectance, crucible swelling number

Umar, Datin F.; Soelistyohadi, Fahmi and Hudaya, Gandhi K. (R&D Centre for Mineral and Coal Technology)
Coal De-ashing by Solvent Extraction
Penurunan Kadar Abu Batubara dengan Cara Ekstraksi Pelarutan
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P. 11 - 17

Coal contains mineral matter that will be left as ash after coal is burned. Coal will be referred to as dirty coal if the ash content of the coal is high. High ash content is not preferred by consumers of coal users especially coal fired power plants, because ash content will produce fly ash and bottom ash that cause environmental problem. The process of ash content reduction by solvent extraction would produce coal with very low ash content (near zero) known as ash free coal (AFC). The study of ash content reduction was conducted by using Peranap coals that were taken from stockpile and mine site. The coals were then washed and separated into coals with low and high ash contents. The high ash content of coals from stockpile (46.02%) and mine site (25.02%) were then extracted using solvent. Three kinds of solvent have been tested, namely 1-methyl naphthalene, 1-1-1-methoxy ethoxy acetic acid and N-methyl 2 pyrolidynon. The results indicate that the ash content of coal derived from the stockpile decreased to 0.06% and coal from the mine site decreased to 0.11% by using 1-methyl naphthalene solution with a ratio of coal and solvent of 1: 6 (weight/weight).

Keywords: mineral matter, ash, solvent, extraction, ash free coal (AFC)

Saleh, Nuryadi and Ardha, Ngurah (R&D Centre for Mineral and Coal Technology)
Beneficiation of Borehole Iron Ore Samples Through Multi-Stages Magnetic Separation
Benefisiasi Percontoh Inti Bor Bijih Besi Melalui Pemisah Magnetik Bertingkat
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P. 18 - 28

This study investigates the effectiveness of magnetic concentration techniques for the beneficiation of borehole samples of Arasuko - West Sumatera iron ore. It is a low-grade type of ore sample (±35% Fe) with high silica and calcium content (±36%). Based on the fact, that there are appreciable differences in magnetic susceptibility between the desired iron minerals and the gangue minerals, hence, it was suggested that multi-stages magnetic separation may be useful to concentrate this type of ore. Because of the fine dissemination of the iron minerals and the most abundant gangue mineral, the particles size of ore was set at 80% passing 150 meshes. Rougher tests of magnetic separation produced concentrates with iron content of about 58.2% Fe; the tailing of rougher stage was then scavenged using higher magnetic intensity. Further, the rough and scavenged concentrates were mixed and fed into a cleaner stage with low magnetic intensity. Results indicate that the final iron concentrate assaying of 68.1% Fe at a recovery of about 80% is achieved and reckoned as an iron premium-grade concentrate.

Keywords: iron ore, beneficiation, magnetic separation, iron concentrate

Handayani, Sri and Suratman (R&D Centre for Mineral and Coal Technology)
Biosolubilization of Phosphate Rock by *Penicillium sp*
Pelarutan Batuan Fosfat Menggunakan Penicillium sp
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P. 29 - 38

Phosphorus is an essential element that regulates soil fertility. Its deficiency is replenished by chemical fertilizer made from phosphate rock. An environmentally friendly and economically alternative to chemical processing of phosphate rock is the use of phosphate solubilizing microorganisms. In this research, a potential phosphate solubilizing fungi were successfully isolated from the surface of Cijulang phosphate rock and identified as close relative of Penicillium sp. The phosphate biosolubilization capability of the fungus was tested and the influence of leaching parameters such as particle size of mineral, ore concentration (pulp density), and initial pH of medium was investigated using a shake flask study to characterize the solubilization of phosphorus by Penicillium sp. The x-ray diffraction data indicated the presence of hydroxyl apatite $Ca_5(PO_4,CO_3)_3OH$ as the main source of phosphorus.The fungal strains of Penicillium sp produced oxalic and citric acids during fermentation of glucose which resulted in a drop pH of the growth medium. The results also indicated a potential relationship between the phosphorus biosolubilization and the production of organic acids by the fungus. In addition, particle size, ore concentration and initial pH were also shown to have significant effects on the solubilization of phosphorus from the phosphate rock. The optimal speed of attack was obtained for a surface area of substrate of .-200 mesh. A concentration of 5% solid gave the highest speed of P biosolubilization. The optimum range of initial pH was 6-7 and initial pH began to show an inhibiting effect at 4. The maximum percentage of soluble phosphorus released of 42.8% was attained using -200 mesh particle size, 5% pulp density and initial pH 6 after 16 days of process.

Keywords: phosphate rock, biosolubization, Penicillium sp, oxalic acid, citric acid

Rodliyah, Isyatun; Rohani, Siti and Wahyudi, Tatang (R&D Centre for Mineral and Coal Technology)
Extraction of Rare Earth Metals from Monazite Mineral Using Acid Method
Ekstraksi Logam Tanah Jarang dari Mineral Monasit dengan Metode Asam
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P. 39 - 45

There are two types of REE-bearing mineral in Indonesia, namely monazite and xenotime. Those minerals have not been further processed to obtain pure REEs or to obtain its oxides. The objective of this study is to study the performances of the REE extracted from monazite in acid method. The results show that the highest REE-extraction (28.41%) is achieved when the comparison between of sulfuric acid and water (v/v) is 1:2 with leaching temperature 220°C and leaching time 150 minutes. The process employed hydrogen peroxide as an oxidizer. Pregnant solution was then precipitated using sodium hydroxide and then was calcined at 900°C for 3 hours to produce RE-oxide. Characteristic of the RE-oxide contains such elements of Ce, Gd, Y, Nd, La, Dy and Sm within 29.10, 1.54, 1.53, 11.53, 14.02, 0.489 and 1.85%, respectively.

Keywords: monazite, REEs, RE-oxide, extraction, acid method