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Abstract Index

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A Characteristic Study of Popay Zircon Sand Used for Ceramics, Refractory and Foundry Raw Materials

Studi Karakteristik Pasir Zirkon Sebagai Bahan Baku Keramik, Refraktori dan Pasir Cetak

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P. 1 - 17

The objective of this study is characterizing the zircon sand from Popay of Nanga Pinoh District, West Kalimantan as well as its performance when separated using physical method, i.e., tabling and magnetic separator in terms of obtaining zircon concentrate for making zircon flour. The satisfied requirement of zircon flour will be used for ceramics, refractory and foundry raw materials. Tabling followed by magnetic separator of Popay zircon sand increase zircon content from 43.54 to 65.50%. The content increases to 66.11% when reversing the process, namely started with magnetic separator and then tabling. Mineralogical analysis using optical microscope detected six minerals available within zircon sands. Those are zircon, ilmenite, magnetite, hematite, rutile and quartz while XRD analysis only identified five minerals. Hematite was not distinguished within Popay samples. Chemical analysis of the samples shows that the ZrO_2 content within zircon flour is bigger than 65%. Such a figure is categorized as premium class for zircon flour to be used for refractory, ceramics and foundry.

Keywords: Popay zircon, tabling and magnetic separator, optical microscope and XRD analysis.

DDC 621.313

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Utilization of Coal Gasification Producer Gas for Power Generation Using 10 KW Spark Ignition Engine

***Pemanfaatan Gas Produser Gasifikasi Batubara untuk Pembangkit Listrik Menggunakan Genset 10 KW Tipe* Spark Ignition**

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P. 19 - 26

Coal gasification is the process of converting coal into gas to ease its use and more environmentally friendly. Research and Development Center for Mineral and Coal Technology (*tek*MIRA) has been researching, designing, and developing a small-capacity gasifier with the brand of GasMin. This study discusses GasMin design and utilization for power generation using internal combustion engine type spark ignition engine. The result of laboratory analysis shows that the calorific value of producer gas was 1,013 kcal/Nm^3, tar content was 4.04 mg/Nm^3, particulate content was 11.17 mg/Nm^3 and temperature of gas was 36^oC. Based on characteristic of producer gas, it can be used for fuel in internal combustion engine. The internal combustion engine generator set (genset) used in this research was 10 kW spark ignition type. To be used for gas producer, some modifications were made on genset engine by replacing the function of the carburetor into mixing chamber for air and producer gas, and placed before mixing gas entering the combustion chamber.The results ofthis researchshow that the power generated was 4.8 kW, which was about 53% of maximum power on fuel. It isin accordance with the literature whichstates that de-rating of the genset engine ranges from 40-50%.

Keywords: gasifier, coal, generator set (genset), internal combustion engine, spark ignition engine.

DDC 511.8

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Implementation of Mathematical Equation for Calculating Alumina Extraction from Bauxite Tailing Digestion

Penerapan Persamaan Matematika untuk Menghitung Persentase Ekstraksi Alumina dari Proses Ekstraksi Ampas Bauksit

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P. 27 - 38

Research on bauxite tailing digestion using pressurized batch reactor at a feed capacity of 86.66 kg had been conducted. Bauxite with -150 mesh of particle size is reacted with 42.15 kg of caustic soda (433.49 g/l) at 140^oC for 1.0 to 2.5 hours using steam as heating media. Lime added are varied from 3 to 9 kg. After processing for a certain period of time, slurry product is transfered into a mixer. To evaluate percent extraction of Al_2O_3 from this process, the height of slurry level in the mixer, densities of the slurry, filtrat, and solid residue are measured and determined. The head sample of bauxite, filtrate and residue are analysed by using wet method to obtain Al_2O_3 content of each sample taken from the mixer. There are four equations that are used for obtaining the alumina extraction, namely :

V_{sl} = 4.176x+15.83

W_{sl} = (4.176x+15.83)ρsl

S = (ρsl - ρl)/ (ρs - ρl) (ρs/ ρsl)*100%

E = [10 (4.176x+15.83) [1- (ρ_{sl} - ρ_l)/ (ρ_s - ρ_l)]*[c_l/Fx_F]%

The calculation results show that by increasing lime added into the slurry, percent yield of alumina extraction tend to decrease from 46.63% for 3 kg of lime to 15.84% by using 9 kg of lime. Whereas by varying reaction time

between 1.0-2.5 hours, percent yield of alumina extraction are fluctuation in the range of 42.07-60.54%, and the highest result was obtanined for 1,5 hours of reaction time. By implementing those four equations above for evaluating the data, we do not need to weigh the slurry in the reactor.

Keywords: bauxite tailing, digestion, alumina extraction, mathematical model, Bayer process.

DDC 669

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Processing Zirconia Through Zircon Sand Smelting with NaOH as a Flux

Pembuatan Zirkonia Melalui Metode Peleburan Pasir Zirkon Menggunakan NaOH sebagai Bahan Imbuh

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P. 39 - 49

Zirconia had been made through smelting the zircon sand along with NaOH as a flux. The zircon sand as the smelter feed was taken from CV. Kurnia Alam Sejati mine at Palangkaraya, Middle Kalimantan. Major content of the zircon sand was 28.04% ZrO_2 and SiO_2 51.22% with several minor oxides such as 0.54% HfO_2, 2.53% Fe_2O_3, 10.53% TiO_2, 3.27% Al_2O_3 and less than 1% of alkali, alkaline earth and rare earth elements. In order to economizing the process, zircon sand upgrading was conducted prior to zirconia production. The upgrading process was conducted using several comprehensive equipments, consist of shaking table, magnetic separator and high tension separator (HTS). The upgraded sand contained 65.35% of ZrO_2+HfO_2 with 73.25% recovery, which was then used for smelting process at 650°C for 2 hours using NaOH as a flux. The product was then leached with water and sulphuric acid then crystallized to get precipitated zirconium hydroxide. The precipitated product was calcined at 900°C for 1 zirconia content was 97.27% of ZrO_2+HfO_2 with 65.13% recovery.

Keywords: zirconia, zircon sand, smelting, upgrading process and concentrate.

DDC 381.598

Haryadi, Harta and Yunianto, Bambang (R&D Centre for Mineral and Coal Technology)

Analysis on Terms of Trade of Indonesia's Nickel

Analisis* Terms of Trade *Nikel Indonesia

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The import-export trade of nickel Indonesia until 2013 was always in a less prestigous position. It is due to the entire production of nickel is exported in raw materials, while nickel is continued to be imported to meet the industrial needs of stainless steel, nickel alloys, batteries and nickel metal alloys in the country. This study aims to analyze the advantages and disadvantages of export and import of nickel with a terms of trade analysis in net barter, which measures the ratio of the nickel export price with imports price, and gross barter measures the ratio of the nickel export volume to the import volume. Net barter of the analysis results shows that in 2007, the nickel export price was only 0.0121 times than the nickel import price, while gross barter indicates that the export volume was 11044.87 times compared to the import volume. Volume and value of the exports are in nickel ore), while imports in nickel oxide sinters, product of nickel metallurgy, nickel alloys, nickel waste and scrap and nickel powders and flakes. The analysis overview of nickel gives an indication that international trade (export-import) of nickel has not provided an optimal impact on the national and regional economy.

Keywords: terms of trade, nickel, nickel matte, export-import, international trade balance.