KEYWORD INDEX

AUTHORS INDEX

INDEX OF ABSTRACTS

Multi-array Electrical Resistivity Tomography survey was conducted in coal mining concession of PT. Bukit Baiduri Energi at the Marandai pit, Loa Janan District, Kutai Kartanegara-East Kalimantan. Data acquisition has been done using the MAE-X612 unit with 48 electrodes and 5 meters interval and the maximum length of the survey was 235 meters. The aim of the survey is to analyze resistivity images from three different electrodes configurations for interpreting coal seams and other lithologies. We deployed three configurations, including Wenner-Schlumberger, Dipole-Dipole, and Pole-Dipole in one traverse. The resistivity images analyses were constrained using geological and geophysical logging. The result shows that the Wenner-Schlumberger array is the reliable result comparing to the dipole-dipole and pole-dipole arrays. This technique will apply for further assessment to provide the reliable result in this coal mining concession. Electrical Resistivity Tomography offers rapid mapping for shallow mine working up to 45-meter depth. This method can be applied to one or two hour's measurements with 48 electrodes with maximum 5-meter electrodes interval. This method offers the possible saving of drilling cost by using resistivity profile for coal seam correlation instead of conducting more drilling.

Keywords: electrical resistivity tomography, multi-array, coal seam, lithology.

Due to increasing technological advancements, the demand for pure niobium products emanated from columbite ore processing has led to the wide array of its application in capacitors, nuclear uses, superconducting RF cavities, an electromagnetic radiation detector, medical devices, and aerospace among others. Therefore, this paper focuses on the kinetics of dissolution of a Nigerian Columbite mineral in sulphuric acid solution for improved industrial applications. The effects of acid concentration, reaction temperature and particle size on the ore dissolution rate were examined. Experimental results showed that the ore dissolution increases with increasing acid concentration and temperature and decreases with increasing particle size fraction. With 2 mol/L H_2SO_4 solution, 60.2% of the ore dissolved within 120 minutes using <90µm particle size at a temperature of 75^oC with moderate stirring (300 rpm). The unleached products were analyzed and found to contain siliceous compounds applicable as industrial by-products. The calculated activation energy (Ea) deduced to be 30.3 kJ/mol supported the proposed diffusion reaction mechanism for the first order dissolution process with a collision factor of 0.12 per minute. Hence, the dissolution data obtained in this study is an indication of thermodynamic feasibility for Nigeria Columbite ore fitness in improving science and technology for economic growth and development.

Keywords: columbite-rich ilmenite ore, leaching, sulphuric acid, dissolution kinetics, product characterization

3. Isyatun Rodliyah, Andina Septiarani, Hasudungan E. Mamby, Zulfiadi Zulhan and D. Cristina A. Sitompul

THERMODYNAMIC SIMULATION AND VALIDATION EXPERIMENT OF NEODYMIUM OXIDE REDUCTION INTO METALLIC NEODYMIUM BY METALLOTHERMIC PROCESS

SIMULASI TERMODINAMIKA DAN EKSPERIMEN VALIDASI REDUKSI NEODIMIUM OKSIDA MENJADI LOGAM NEODIMIUM MENGGUNAKAN METODE METALOTERMIK

Indonesian Mining Journal, Volume 21, Number 1, April 2018, P. 21 - 34

Neodymium (Nd) is one of the rare-earth elements (REEs) found in significant amount within monazite and bastnasite minerals. Nd is a ferromagnetic metal that is often used as a material to produce magnet, commonly known as a permanent magnet. Neodymium is alloyed with other metals such as iron and boron to form one of the strongest types of permanent magnet. This research aim is to study the reduction process of Nd-oxide into Nd-metal through the metallothermic process. The Nd metal product is expected to fulfill the material specification for a permanent magnet. Thermodynamics simulation of Nd reduction into its metal was conducted using ITB's licensed Factsage software. A validation experiment was conducted only to the Nd metal resulting simulation. The simulations involved some parameters, i.e. temperatures (600, 700, 800, 900, 1000, 1100 and 1200 °C), types of fluxes ($CaCl_2$ and $Ca(OH)_2$), composition of the reducing agent (1x, 2x dan 3x of the stoichiometric calculations), types of the reducing agents (Ca and Mg), and types of feeds used (Nd-oxide and Nd-chloride). The thermodynamic simulation shows that Nd metal was produced in a condition where the temperature should be1100-1200 °C using Ca as the reducing agent and $CaCl_2$ as the flux, while the amount of reducing agent has no effect on the resulted product. Validation result of the simulations shows that the Nd metal is formed up to 49% metal in a non-oxidative condition.

Keywords: neodymium, rare earth oxides, metallothermic, reduction, thermodynamic simulation

4. Wanda Adinugraha, Nana Sulaksana, Hendarmawan, Binarko Santoso, Datin F. Umar and Fitri Amalia

WASHING TEST OF KENDILO COAL USING A SINK-FLOAT METHOD TO IMPROVE ITS QUALITY

STUDI PENCUCIAN BATUBARA KENDILO MENGGUNAKAN UJI ENDAP-APUNG UNTUK MENINGKATKAN KUALITASNYA

Indonesian Mining Journal, Volume 21, Number 1, April 2018, P. 35 - 44

Kendilo coal is known as a high-ash content type. Beneficiating such the coal for gasification process needs to wash the coal first. The purpose of washing is to lower the ash content until the permitted amount of about 10%. Samples for coal washing were obtained from PT. Kendilo Coal Indonesia at Pasir Belengkong, Paser Regency, East Kalimantan. The samples were taken at Bindu and Betitit Block, which containing ash of about 20%–30%. To wash the coal samples, a sink-float method was applied to test its separation characteristic. The washing process employed three sizes fraction, i.e, -12.5+5.6, -5.6+1.18, and -1.18 mm and the separation density was varied between 1.3 to 1.6 g/cc within the interval of 0.1. The liquid solutions as the separation media were made from mixing of perchloroethylene and toluene. From the coal washability curve, the best coal washing in order containing ash content of about 8% in the case of Bindu Block's coal, occurs at the fraction of -12.5+5.6 mm, at density separator of 1.36 g/cc with the recovery of 50%. While the coal of Betitit's Block, the washed coal was 50.82% at similar fraction but at different density separator of 1.39 g/cc.

Keywords: coal washability, sink and float test, recovery, coal washability curve

5. Retno Damayanti and Herni Khaerunissa

CARBON OXIDE EMISSION FACTOR ESTIMATION FROM INDONESIAN COAL

PRAKIRAAN FAKTOR EMISI KARBON DIOKSIDA DARI BATUBARA INDONESIA

Indonesian Mining Journal, Volume 21, Number 1, April 2018, P. 45 - 58

Climate change will become the priority for the air quality management. It focuses more on carbon dioxide emission. Indonesia which has power generation dominated by coal combustion is expected to develop the national CO_2 emission factor. Due to the high variation in Indonesia coal rank and its growing magnitude in CO_2 emission caused by the future coal-fired power plant development, the characteristic emission value

becomes an important concern. The method used in this study is developed from the IPCC Guidelines for Energy. The conversion unit plays an important role in the calculation method. The result shows that the higher in C content, the lower in its CO_2 emission factor. It means that coal classified as high C content or high heating value will produce low carbon dioxide emission factor. The average CO_2 emission factor obtained in Indonesian coal is 99,718 kg CO_2/TJ with an average value of carbon content 27.2 kg C/GJ, and NCV equal to 19.8 TJ/Gg. Coal rank is categorized as lignite to subbituminous or bituminous.

Keywords: coal classification, climate change, emission factor, gross calorific value, net calorific value

6. Ijang Suherman and Ridwan Saleh

SUPPLY CHAIN ANALYSIS FOR INDONESIAN NICKEL

ANALISIS RANTAI PASOKAN NIKEL DI INDONESIA

Indonesian Mining Journal, Volume 21, Number 1, April 2018, P. 59 - 75

It is imperative to increase the value-added of mineral product, especially nickel, as mandated in Law Number 4 of 2009. This law forces government and industry to optimize the added value in this country. The importing countries that perform further processing obtain most benefit from this value added. This creates an opportunity to optimize the value-added products in this country. This research aims to map supply chains along with their product flows and their relation to problem identification, to analyze product development in the supply chain, to analyze the performance of the industrial chain and its impacts on the national economy. Thus, efforts to increase the backward and forward linkages of nickel industry through value-added improvement program, as mandated in the law can be run according to plan. The research approaches were undertaken through direct and indirect surveys. From the results, there is an interrelated success between the value-added improvement policy from the Ministry of Energy and Mineral Resources and the downstreaming policy from the Ministry of Industry. This is indicated by a continuous product flow. By 2020, an estimated 71.7 million tons of nickel ore will be absorbed entirely by smelter of processing and refining in the country. Then the products generated by these smelters will be absorbed by approximately 24% by the domestic stainless steel industry. The contribution to the national economy can boost Gross Domestic Product by approximately 0.526%.

Keywords: value-added, supply chain, backward-forward linkages, economic contribution

7. Miftahul Huda

CEMENT MATERIAL DEVELOPMENT USED FOR CEMENTING UNDERGROUND COAL GASIFICATION WELL

PENGEMBANGAN SEMEN UNTUK PENYEMENAN SUMUR GASIFIKASI BATUBARA BAWAH TANAH

Indonesian Mining Journal, Volume 21, Number 2, October 2018, P. 77 - 88

R&D Centre for Mineral and Coal Technology, the Ministry of Energy and Mineral Resources developes an underground coal gasification (UCG) technology including its UCG test in a coal mine at Musi Banyuasin regency, South Sumatra. The UCG is safer than the underground mine since there is no worker underground however there is a concern in risk of ground water pollution. One of the mthods to reduce the risk is a proper instalation of well casing and cementing that seal aquifer from contact with UCG product gas. Development of special cement for cementing UCG well is needed due to its high process temperature (up to 1300°C). The objective of this research is to develop a cement material that can withstand high temperatures environtment. Domestically available an oil well cement (OWC) and a castables (CT) were used for the experiments. Single material of OWC is not suitable for cementing UCG well since the OWC compressive strength reduced drastically at heat treatment above 300°C due to decomposistion of portlandite and calcium silicate hydrate. On the other hand, there was a synergistic effect that resulted of higher compressive strength sample if 60% weight of OWC and 40% weight of CT was blended. The absence of portlandite and the presence of inert filler materials in the blend is believed to improve thermal and mechanical properties of the blend.

Keywords: underground coal gasification, oil well cement, castables, heat treatment

8. Rezky I. Anugrah, Dessy Amalia, M. Zaki Mubarok

PARAMETERS THAT AFFECT THE DISSOLUTION OF INDONESIAN GALENA CONCENTRATE IN FLUOROSILICIC ACID AND HYDROGEN PEROXIDE

PARAMETER-PARAMETER YANG MEMENGARUHI PELARUTAN KONSENTRAT GALENA INDONESIA DALAM LARUTAN ASAM FLUOROSILIKAT DAN HIDROGEN PEROKSIDA

Indonesian Mining Journal, Volume 21, Number 2, October 2018, P. 89 - 97

Pyrometallurgical process still dominates the extraction of galena concentrates. The process used to extract the lead includes reduction smelting in a blast furnace, air flash smelting (Boliden process), oxygen flash smelting (Kivcet, Boliden Kaldo, Outokumpu), air-slag bath smelting (Isasmelt) and oxygen-slag bath smelting (QSL). However, those generate dust, SO_2 gas and volatile Pb liquid. As a result, such processes are ineffective to treat the complex sulfides and low-grade flotation con concentrates. Referring to the lack of high-grade lead ore the lead pyrometallurgical is a problem in the future. In addition, the environmental regulation becomes very strict lately. Those pushes the metallurgist to seek the alternative process that are environmentally friendly and able to treat the low-grade concentrates. Lead extraction through hydrometallurgical process is considered to be safer as the process do not produce dust, SO_2 gas and lead vapor.Researches for lead extraction through hydrometallurgical routes have been performed using various leaching agents such as acetic acid, ferric methanesulfonate, ferric chloride, ferric fluorosilicate and nitric acid with hydrogen peroxide and ferric ion as the oxidants. So far, no lead plant operates hydrometallurgically in an industrial scale. Fluorosilicic acid has a potential to be used as the leaching reagent for concentrating the lead because of high lead solubility in this solution and cheaper price of the reagent in compared to sulfamate and fluoroborate solutions. This research used galena concentrates from a mining area in Bogor, Indonesia, fluorosilicic acid and hydrogen peroxide as the oxidants. The highest Pb extraction percentage of 99.26% was achieved from the leaching experiment using 3.44 M of H_2SiF_6 and 9.79 M of H_2O_2, at 97^oC and concentrate particle size distribution of -100+150 mesh after 135 minutes. The XRD analysis of the leaching residue with no oxidant showed the presence of galena, sphalerite and chalcopyrite, while the residue of the leaching with oxidant showed anglesite ($PbSO_4$), galena, sphalerite, sulphur and pyrite. Lead extractions were increased by the increase of temperature and concentration of fluorosilicic acid. The best solid percentage that gave the highest lead extraction percentage was 12%. Variations of rotation speeds at the range of 300-700 rpm did not significantly influence lead extraction percentage. However, the particle size distribution that resulted in the best extraction percentage of lead is 100+150#, at which the finer particle size of the concentrate give a lower extraction percentage of the lead due to $PbSO_4$ precipitation.

Keywords: galena concentrate, leaching, fluorosilicic acid, extraction

9. Dessy Amalia, Tatang Wahyudi and Yuhelda Dahlan

THE NATURES OF ZINC SULFIDE CONCENTRATES AND ITS BEHAVIOR AFTER ROASTING PROCESS

KARAKTER KONSENTRAT SENG SULFIDA DAN PERUBAHAN SETELAH PROSES PEMANGGANGAN

Indonesian Mining Journal, Volume 21, Number 2, October 2018, P. 99 - 112

The sample used for this study was a sulfide flotation concentrate that came from PT Lumbung Mineral Sentosa. The phase changes that occur in the particles of zinc sulfide concentrate during roasting in a muffle furnace were investigated using light microscopy, X-ray diffraction (XRD), and Scanning Electron Microscopy (SEM) with Energy Dispersive Spectroscopy (EDS) while its chemical composition was analyzed using atomic absorption spectroscopy (AAS) and X-ray fluorescence (XRF) methods. Characterization also employed DTA-TGA instrument to provide data on the transformations that have occurred while the TGA data presents information about physical and chemical phenomena. Mineral composition of the sample included sphalerite, galena, chalcopyrite, and pyrite. Sphalerite was the most dominant one. Roasting sphalerite samples was intended to release the sulfur from its sulfide, Such a release was made easier for further treatment of the zinc such as a leaching process. Roasting temperature varied from 200-1,100°C. Sphalerite starts to change when the temperature was raised to 650 °C performing the formation of zincite, franklinite, quartz, and sphalerite as well. This composition did not change although the temperature increased to 1,100 °C. The Zn content within the original sample was 59.00% and then increased with the increasing of temperature but the improved in line with the increased temperature. The highest Zn was 78.98% achieved at 1,100°C.

Keywords: concentrate, zinc sulfide, sphalerite, galena, chalcopyrite

10. Suganal

RARE EARTH ELEMENTS ENRICHMENT OF FIXED-BED COAL ASH FROM A PILOT PLANT GASIFICATION BY PHYSICAL METHODS

PENINGKATAN KANDUNGAN LOGAM TANAH JARANG (LTJ) ABU BATUBARA SISTEM UNGGUN DIAM SKALA* PILOT PLANT *MENGGUNAKAN METODE SECARA FISIK

Indonesian Mining Journal, Volume 21, Number 2, October 2018, P. 113 - 125

Research and development regarding coal gasification at a pilot scale in Palimanan has been conducted since 2008. Besides the gas product, attention on chemical element identification within the bottom ash is also necessary. The aim is to implement the research and development activities in integrating coal utilization processes by zero waste. The most important content within the coal ash is the precious metal elements, namely the rare earth elements. Characterization on the fixed bed gasification coal ash from Palimanan pilot plant shows that the ash contains the rare earth elements (REE) such as cerium, lanthanum, samarium, neodymium, praseodymium, euporium, gadolinium, dysprosium, and yttrium. Its bearing minerals include zircon silicate minerals ($ZrSiO_4$) and monazite-Ce ($CePO_4$). The total content of the rare earth elements is 77.85 ppm. In this work, the rare earth elements concentration successfully increased using shaking table and magnetic separator methods. It reached up to 217 ppm. However, the shaking table was more effective to increase the concentration. Approximately two times concentrates were achieved, while no significant results derived from the magnetic separator process.

Keywords: coal ash, gasification, rare earth elements, monazite, shaking table

11. Datin F. Umar, Mikio Shimojo and R. M. Nendaryono Madiutomo

EVALUATION OF COMBUSTION BEHAVIOUR FOR INDONESIAN LOW-RANK COALS TREATED HYDROTHERMALLY

EVALUASI PERILAKU PEMBAKARAN BATUBARA PERINGKAT RENDAH INDONESIA YANG TELAH DIPROSES SECARA HIDROTERMAL

Indonesian Mining Journal, Volume 21, Number 2, October 2018, P. 127 - 139

Hydrothermal dewatering process has been made to produce dry-processed coals, which are comparable to bituminous coal. Two types of coals, i.e. low rank and high-rank coals. The low-rank coal came from West Papua while the high one was from Central Kalimantan. The behaviour of raw and processed coals were observed using thermogravimetry and differential scanning calorimetry techniques The change in chemical properties that are based on proximate, ultimate, calorific value and Fourier-transform infrared spectroscopy analyses are studied. Those are closely related to some combustion problems. This process was conducted in a laboratory scale using an autoclave with 5,000 ml/batch in capacity at the temperature of 300 and 330°C for one hour. The results indicate that the processed coals generally have a better combustion behaviour than that of the raw coals. The processed coals have a lower reactivity than that of raw ones, due to the higher ignition temperature (Tig), char burnout temperature (Tbo) as the end of combustion and maximum combustion rate (Rmax) of processed coals. The processing temperature of the process was a slight effect on combustion behaviour. The process is very effective to improve the quality of low-rank coal, nonetheless to high-rank coal, which has low moisture content and high calorific value, and the combustion behaviour of processed coals was not significantly changed.

Keywords: calorific value, high-rank coal, hydrothermal dewatering, ignition temperature, low-rank coal

12. Retno Damayanti

STUDY ON ENVIRONMENTAL QUALITY AND HAZARD IDENTIFICATION OF UNDERGROUND COAL GASIFICATION PROJECT: A LITERATURE AND FIELD SURVEY

KAJIAN KUALITAS DAN IDENTIFIKASI BAHAYA LINGKUNGAN PENGEMBANGAN GASIFIKASI BATUBARA BAWAH TANAH: TINJAUAN LITERATUR DAN SURVEI DI LAPANGAN

Indonesian Mining Journal, Volume 21, Number 2, October 2018, P. 141 - 161

Underground coal gasification (UCG) is a procedure to extract synthesis gas (syngas) from the in situ underground coal seams that could not be extracted by conventional mining methods. This is a clean technology as an alternative method for direct in situ coal conversion. This process involves some heavy equipment and complex operation. Hazards identification and risk assessment in the UCG Project involve identifying the environmental hazards that cover physical, chemical and biological environments to predict the process sequences, its frequency as well as consequences that lead to those hazards. The assignment of risk level is also conducted to design corrective action in minimizing the risk or eliminating the hazards. The environmental

condition of the project plan is generally good with the fulfillment of the established environmental quality standards.

Keywords: underground coal gasification, risk, hazard identification, risk assessment

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Santoso, B. (1994) "Petrology of Permian coal, Vasse Shelf, Perth Basin, Western Australia," *PhD Thesis at School of Applied Geology*, Curtin University of Technology. 355 p.

Abstract

Santoso, B. and Daulay, B. (2006) "Geologic influence on type and rank of selected Tertiary Barito coal, South Kalimantan, Indonesia," *Abstract of the 23rd Annual Meeting of the Society for Organic Petrology,* Beijing, p. 214-216.

Map

Harahap, B.H. and Noya, Y. (1995) *Geological map of Rotanburg sheet, Irian Jaya, scale 1:250.000.* Geological Research Development Centre, Bandung.

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