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Treatment of batik wastewater using plant derived surfactant-enhanced ultrafiltration membrane (Conference Paper) (Open Access)

Aryanti, N. ✉, Nafiunisa, A., Irmalasari, L.N., Nisa, I.M.K., Wardhani, D.H.

Department of Chemical Engineering, Diponegoro University, Semarang, Indonesia

Abstract

Saponin extract from pericarps of Sapindus rarak DC is utilized to replace synthetic surfactant in the surfactant-enhanced ultrafiltration process. The process conducts to treat real batik wastewater. The extraction by maceration methods was performed in the various ratio of solute to solvent. The extract with proper calculation is used in the wastewater treatment process in various CMC concentration. The highest yield is obtained at solute to solvent ratio of 1:40 (w/v). The flux value of solution without saponin is higher than the one with saponin addition.The flux value is decreased by the increase of saponin concentration on the feed solution. Thelowest average flux value of 31.35 L/m2.h was obtained from the feed solution with saponin concentration of 2 times CMC. Both processes with and without the addition of saponin exhibit permeate flux declined over time. This is due to the interaction of saponin molecule with the pollutant where the pollutant is covered by saponin molecules. The membrane performance shows that saponin is successfully worked to solubilize or bounded the heavy metal molecule, dyes molecules, and other pollutants on its micellar structure. This is proved by the decrease of Cr and COD concentration after the ultrafiltration process enhanced with saponin. Saponin at the concentration of 2 times CMC giving the best result with lowest Cr and COD concentration of 18.3 ppm and 108.4 ppm, respectively, and highest rejection of Cr and COD of 95.88% and 96.91% respectively.

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"Advanced Research and Development Towards Industrial Revolution 4.0"

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KEYNOTE SPEAKERS

Prof. Yukihiko Matsumura
Hiroshima University, Japan

Prof. Yukihiko Matsumura is a Professor at the Academy of Science and Technology, Hiroshima University since April 2017. He first started his career on March 1988 as he graduated from Department of Chemical Engineering, University of Tokyo. He then continued his studies and received his Master of Science degree from Department of Chemical Energy Engineering, University of Tokyo at March 1990. He joined the Research Associate at the Department of Chemistry Engineering, University of Tokyo at April 1993. He finished his studies and earned his Ph. D (Eng) from the Department of Chemical Energy Engineering, University of Tokyo at March 1994. After doing so, he went to the Hawaii Natural Energy Institute, University of Hawaii as a Visiting Scholar at May 1994. Finally joining to the Research Associate at the Department of Chemistry System Engineering, University of Tokyo at April 1996. He continued his academia career by joining the Association Professor Enviromental Science Center in the University of Tokyo at April 1997 and Association Professor Department of Mechanical Engineering in the Hiroshima University at April 2001. He became a Professor in the Department of Mechanical Engineering, Hiroshima University at April 2007 and a Professor in the Faculty of Engineering, Division of Energy and Environmental Engineering, Hiroshima University at April 2010.

Prof. Iswandi Imran
Institute Technology of Bandung, Indonesia

Prof. Iswandi Imran is a Professor in Material and Concrete Structure in the Bandung Institute of Technology. He achieved his Ph.D degree from the University of Toronto, Canada in 1994. He received his master degree from the same university in 1990. He obtained his Bachelor degree from the Bandung Institute of Technology in 1982. He is a Head of the Industry Engineering Centre, the Bandung Institute of Technology and the Infrastructure Coordinator of Disaster Mitigation Research Centre, the Bandung Institute of Technology. He has published numerous international and national conference proceedings, text books that are associated with building structure and materials, as well as concrete structure designs, including those that associated with earthquake resist building structure.

KEYNOTE SPEAKERS

Prof. Anita Firmanti

General Secretary Of Ministry Of Public Work And People Residence, Indonesia

Firmanti holds a Master's degree from the Bandung Institute of Technology. Prof. Anita has been involved research projects, the research deals with building material, Wood Technology for Sustainable Home Construction.
Prof Anita Firmanti took up duties as Secretary General at Indonesia's Ministry of Public Works and Housing of Indonesia in September 2017. Prior to her current role, she was Head of the Human Resource Development Agency within the said Ministry (2015-2016). Prof Firmanti started her career in the Ministry's Center of Research and Development of Housing in 1994, where she held several positions including Head of the Science and Technology section (2001-2005), Head of the Program and Cooperation Division (2005-2008) and ultimately Head of the Center in 2008

Prof. Jae Wan Lee

Kunsan National University, Korea

Professor Lee Jae-Wan is one of the lecturer of Computer Information and Communication Engineering in Kunsan University. He serves as the president of College of Engineering from February 1, 2017 until January 31, 2019 (for two years).
He leads the engineering educational innovation that specifies in engineering education support system, and build industrial network and efficient academics. Kunsan National University will do all efforts to grow into a representative place for practical talent training in the future.

Professor Lee Jae-Wan served as the Director of Computer and Information Engineering and the Student's Affairs Manager in Kunsan National University.

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(1570492554)
About the Community Noize Problem of the Light Propeller Aircraft

Alexey Yakovlev[1*], Petr Moshkov[2], and Valery Samokhin[3]

Moscow Aviation Institute, Russia[1], Sukhoi Civil Aircraft, Russia[2], and Central Aerohydrodynamic Institute, Russia[3]
*Corresponding email: yakovlev@mai.ru

A light aircraft community noise problem was considered. Basic aircraft noise sources were described. A model was presented to evaluate engine-propeller aircraft power plant noise that may be used while estimating both light aircraft community noise and flight paths providing aircraft inaudibility in the housing system area adjacent to an airfield. An effective engineering analysis agreement of experimental and design power plant noise data has been given. Major light aircraft communication noise reduction methods have been considered. The principal future investigation directions were stated to provide scientific-and-engineering experience in developing present-day low-noise light aircraft has been developed.

(1570492622)
Modernization of Facility Layout Design in Earthenware Craft Industry with Green Productivity Approach

Devie Oktarini*

Sriwijaya university, Tridinanti University Palembang, Indonesia
*Corresponding email: devie_oktarini@univ-tridinanti.ac.id

Entering the Industrial Revolution 4.0 as of now there are still many earthenware craft industries that are traditional, both in terms of equipment and materials, procedures for making, and layout of facilities. Facility Layout is the one of many factors that determine the level of worker productivity. If arranged more modern, then the work operation becomes more effective and efficient so that the productivity of the industry will increase. The purpose of this research is redesign the layout of the earthenware craft industry facilities which are modern and having good work environment, improve the work quality of the workers, and increase the profitability of the earthenware craft industry itself. The stage of this research starts from determining the alternative layout of the best facilities, analyzing the layout of the facility using the 5S Method, and analyzing the productivity of the facility layout with the concept of Green Productivity. The results achieved from this research are the best facility layout found in alternative 1, where percentage reduction in path length reached 40% of initial layout. 5S analysis results have a positive impact for time of production process earthenware by reduction in processing time is 42,75% and the electricity savings reduce electricity costs 55,02%. Rate of productivity in this earthenware craft industry has increased by 2.31%.

(1570493190)
The Prediction of Fatigue Crack Growth of Rotary Kiln Shell Welded Under Cyclic Loading

Husan Basri*

Universitas Sriwijaya, Indonesia
*Corresponding email: husan_basri@unsri.ac.id

In this paper, we study the estimated spread of fatigue crack in the kiln shell welded under cyclic load using S-Version FEM. By using the S-FEM technique, it makes the local mesh which is re-meshed automatically, then it becomes easier to make a numerical study of crack growth on the welded kiln shell. Virtual crack closure integral method (VCCM) uses the stress intensity factor evaluated. From the results, it was observed that the crack depth grows faster as the number of cycles increased. It was found that the initial crack of welded shell propagates slowly, and beyond 8 × 105 cycles increase quickly. In addition, the effect of stress distribution and stress intensity factor on cracking have been evaluated and discussed. The life of the component depends on the initial crack depth, stress intensity factors and crack inclination angle

(1570499185)

Experimental Investigation of Long Interlocking Brick Column Subjected to Eccentric Load

Yew Zhi Hao[1], Anis Saggaff[2*], Mahmood Md Tahir[1], Shek Poi Ngian[1], Arizu Sulaiman[1]

[1]Universiti Teknologi Malaysia
[2]Universitas Sriwijaya, Indonesia

The Industrialized Building System (IBS) is referred as advanced construction technique which involved the prefabrication of construction components in controlled environment and then installed on site. It promotes faster, neater, safer, easier and cheaper construction works in future. Interlocking Brick (Blockwork System) is one of the IBS which has not commonly known in Malaysia. The key objectives of this research are to investigate the compressive strength of long interlocking brick column with cement mortar and SikaGrout®-215 filler under concentric and eccentric load, in addition to study its failure mechanism and compare the experimental result with existing design code. Four number of 2.3-meter height column was built by using interlocking brick with Y12 steel bar and different filler and performed compressive strength test and the result is compare with the existing design code which is Eurocode 2 and BS 8110. From the research, Interlocking brick column with cement mortar filler had lower compressive strength capacity compare to column with SikaGrout®-215 under concentric and eccentric load. In term of failure mechanism, the column samples were failed by sudden crushing of interlocking brick. For column sample with grout, the percentage of difference of BS 8110 and Eurocode 2 modified equation compare to the experimental result is 10.20% and 12.56% respectively under concentric load. Moreover, for column sample with mortar infill, the percentage of difference is 67.16% for BS 8110 and 73.23% for Eurocode 2. For eccentric load, Eurocode 2 did not provide reasonable agreement where the percentage difference is range from 66.40% to 482.47%. The optimum design of interlocking brick column in this study is the column sample with SikaGrout®-215 as it has higher compressive strength compare to Type M cement mortar.

(1570462662)

The Effectiveness of Palembang Ferry Port Displacement

Rhaptyalyani Hemo Della*, Taih-Cheng Lirn

National Taiwan Ocean University, Taiwan
*Corresponding email: rhapty@unsri.ac.id

Ferry is an important mode for Indonesia as an archipelago country. One of the main routes for the commercial ferry in Indonesia is Palembang - Bangka trajectory. In 2013, there was displacement of Palembang ferry port from 35 Ilir port in central of Palembang to Tanjung Api-api port in the countryside of Palembang to improve ferry service quality. The displacement reduce travel distances of the ferry from 92 miles to 30 miles. This paper discusses analysis of the effectiveness of port displacement by analysis of operating expenses of the vessel, load factor, and the feasibility of fare. The results showed that operating expenses of vessel decreased by 9.09% after displacement. Load factor of passengers and vehicles shown increasing as well as the production. The analysis shows the minimum fare become decreasing proportionately with reducing of travel distance. With that result, the displacement is an appropriate way to improve the quality of Palembang ferry services.

(1570463611)

Transit Oriented Development of Light Rapid Transit Palembang

Rhaptyalyani Hemo Della, Mirka Pataras, Bimo Brata Adhitya

Sriwijaya University of Palembang, Indonesia
*Corresponding email: rhapty@unsri.ac.id

Light Rapid Transit (LRT) is one of the public mass transport which is necessary to break the problem of the urban transportation system in developing countries. LRT has many promises in development of the city, in addition to solving the transportation problem is an increase in economic activity. This current case study of the paper is Palembang, one of the cities in Indonesia; the government develops mass public transport to solve the transportation problems. The government planned LRT construction to optimize the development of demand for public transport. This paper studies the concept of LRT construction by the development of Transit Oriented Development (TOD), include the development of estate management at stations area. The concept of Transit Oriented Development (TOD) for the develop stations location to spur the growth of economic activity around the locations. This concept needs to analyze the socio-economic impact study to determine the feasibility of developing TOD level especially at stations and the land use impact of the construction of LRT. Survey of Palembang City land use shown that 23 location can use as stations. The analysis by the impact of the socio-economic condition, land use, and feasibility of LRT construction; present that there are 13 locations can be used as TOD and shown as stations of Palembang LRT.

(1570470259)

Development Integration Risk on Integrated Management System in Order to Increase Organizational Performance of Construction Company

Ringgy Masuin[1], Yusuf Latief[2]

[1] University of Indonesia & Ministry of Public Work and Public Housing, Indonesia
[2] University of Indonesia, Indonesia
* Corresponding email: ringgy.masuin61@ui.ac.id

Implementation of Integrated Management System between Quality, Health and Safety, Environment Management System (QHSE) begins in the manufacturing industry which then develops in the health industry. This research focus on its application in the construction industry by construction company. There are various risks in the standard management system and seen as individual risk. These risks are very influential on the operational process of an organization. The risks inherent in an organization's operations include quality risk, environmental risk, occupational health and safety risks, information system risks, and so forth. When the risk is recognized, it can be managed properly to increase organizational performance. This study explores how risk can be manage integrated by construction company through Integrated Management System (QHSE). This risk conducted of standard management system according to High Level Structire (HLS). This research was held by survey method by giving questionnaires to respondents to know the possible high risk and preventive action should be made. The survey results will be done quantitative analysis using AHP method and failure mode and effect analysis (FMEA).

(1570498042)

Utilization of Sugarcane Bagasse and Banana Midrib Mixture as Raw Materials for Paper Making Using Acetosolve Method

Tine Aprianti

Universitas Sriwijaya
Corresponding email: tine.aprianti@gmail.com

Utilization of sugarcane bagasse and banana midrib mixture as raw materials for paper making using acetosolve method
Abstract. Paper making requires raw materials with high cellulose and hemicellulose content. The alternative materials that can be used in the paper making are sugarcane bagasse and banana midrib. The paper production method used in this study is acetosolve which involves acetic acid as an organic solvent. The objectives of this research are to figure out the acetic acid concentration in delignification process and the ratio between sugarcane bagasse and banana midrib that produce pulp with the highest yield, cellulose and kappa number. In this research, there are some variables, the first is the levels of acetic acid concentration in delignification process, which are 70%, 75%, 80%, 85%, 90%, the second is the ratio between sugarcane bagasse and banana midrib, which are 20:0, 18:2, 16:4, 14:6, 12:8, 10:10. The results show that the best pulping conditions are found to be 80% acetic acid concentration with 12:8 (w/w) ratio between sugarcane bagasse and banana midrib, and also 1:20 (w/v) ratio between raw material and solution of acetic acid at two hours cooking duration. The highest yield of pulp inacetosolve process was 63.1%, and its characteristics are 84.67% of cellulose and 10.44 kappa number.

(1570498933)

Sensitivity Analysis in life Cycle Cost of Upgrading Brown Coal Process in Indonesia

Bazlina Dawami Afrah[1*], Bonrood Sajjakulnukit[2], M Ihsan Riady[1], Lia Cundari[1]

[1]Universitas Sriwijaya
[2]King Mongkut's University Technology Thonburi Thailand.

Corresponding email: bazlina.afrah@ft.unsri.ac.id

The main environmental problem in the textile industry is the waste from the dyeing process. Heavy dye and heavy metals are water pollutants. The most widely used method in water treatment is filtration using membrane technology. Membrane technology has several advantages, such as separation process that can occur at room temperature and its use is not destructive. In this research will be made membrane with basic forming material such as bentonite, clay (clay), activated carbon as additive in filtration process. The activated carbon used is made from avocado seed which is carbonized with a temperature of 500oC for 1 hour. This research is used to know the influence of flow rate and the best time of contact with ceramic membrane during the treatment of songket wastewater and to know the result of ceramic membrane use with different type of active carbon raw material to the treatment of songket liquid waste which can fulfill the condition of the waste water ready dispose of by water quality standard. Parameters examined TSS, BOD, COD, PH, and turbidity. The contact time used during the filtration process is 30 minutes, 60 minutes, 90 minutes, 120 minutes and 150 minutes. As for the flow rate used 3L / min and 5L / min. From the result of the research, it is known that the best result of waste samples with 150 minutes contact time and 3L / min flow rate.

(1570499188)

Aerobic Treatment of POME with Indigeneous Individual and Consortium Bacteria

Muhammad Said[1*], Rizki Muthiah Rayahu , Annisa Dela Yuliani[1], Muhammad Faizal[1]

[1]Universitas Sriwijaya

Corresponding email: saidm_19@yahoo.com

Palm Oil Mill Effluent contains high value of COD, BOD and TSS being able to pollute the water body. Application of aerobic indigeneous bacteria for treatment of the POME was conducted to reduce the value of COD, BOD and TSS. Bacillus cereus ATCC 14579 (KP 1.1), Pseudomonas azotoformans strain NBRC 12693 (KP 1.3) and Burkholderia cepacia ATCC 25416 (KP 2.2) were used to degrade the components of cellulose, protein and lipase in the POME, respectively. The consortium of bacteria were also applied for degradation of POME. The research was conducted in four bioreactors of 12 litres with variation of time 3, 6, 9, 12, 15, 18, 21 and 24 hours. Parameters observed in the research consisted of bacterial population, COD, BOD, TSS and pH. The experimental results showed that the highest population of bacteria of Bacillus cereus ATCC 14579 (KP 1.1), Pseudomonas azotoformans strain NBRC 12693 (KP 1.3), Burkholderia cepacia ATCC 25416 (KP 2.2) and the bacterial consortium were 8.4 x 107 CFU/ml, 8.5 x 107 CFU/ml, 8.2 x 107 CFU/ml and 9.4 x 107 CFU/ml, respectively. The lowest COD value obtained for those bacteria were 22.6 mg/l, 12.3 mg/l, 14.4 mg/l and 11.8 mg/l, respectively. The lowest BOD values were 9.2 mg/l, 4.4 mg/l, 5.2 mg/l, dan 2.9 mg/l while those of TSS value were 3.2 mg/l, 3.0 mg/l, 4.0 mg/l and 4.2 mg/l. Values of pH ranged from 6.7 to 7.6 for Bacillus cereus ATCC 14579 (KP 1.1), from 6.8 to 7.4 for Pseudomonas azotoformans strain NBRC 12693 (KP 1.3), from 6.9 to 7.5 for Burkholderia cepacia ATCC 25416 (KP 2.2) and from 6.7 to 7.5 for the bacterial consortium.

(1570477169)

Microwave Assisted ZnCl2 Activation of Salacca Peel Derived Activated Carbons as Adsorbents for Cu(II) Removal from Aqueous Solution

Arenst Arie

Parahyangan Catholic University, Indonesia
Corresponding email: arenst@unpar.ac.id

In this present study,salacca peel based activated carbons (SPAC) were prepared by microwave assisted ZnCl2 activation method. The effects of microwave power, activation time and impregnation ratio on the characteristics of activated carbon were studied. The activated carbons were characterized by N2 adsorption-desorption and scanning electron microscopy (SEM) instruments. The BET surface area of 1796 m2/g were obtained at a microwave power of 540 W, activation time of 25 minutes with an impregnation ratio (ZnCl2:salacca peel) of 4:1. The resulting activated carbon was used for removal of Cu(II) from aqueous solution. The prepared activated carbons were then used as adsorbents for removing Cu(II) metal ions from aqueous solutions. The adsorption equilibrium was investigated using using Langmuir, and Freundlich model equations. It was found that the adsorption equilibrium data followed the Langmuir isotherm equations with maximum capacity of 1262.62 mg Cu(II)/g SPAC at room temperature. The adsorption kinetics were also studied using the pseudo first order, pseudo second order and intraparticle diffusion models. The adsorption kinetics was shown to fit well with the pseudo second-order kinetic model.

(1570482890)

Monoglyceride and Monoglyceride Derivatives from Glycerol Generated in Catfish Based Biodiesel Production Process

Hue Bui, Jr

Campus II, 3/2 Streeet, Ninh Kieu, Can Tho, Vietnam
Corresponding email: btbhue@ctu.edu.vn

Glycerol is a major byproduct in the biodiesel manufacturing process which causes environmental problem since glycerol cannot be released without treatment. In this study, crude glycerol was refined into a pure form by using phosphoric acid. Esterification of the purified glycerol with oleic acid afforded glycerol monooleate in 43% yield using p-toluenesulfonic acid as a catalyst. The obtained glycerol monooleate was then allowed to react with lactic acid, acetic acid or diacetyl tartaric acid to provide the corresponding lactylated, acetylated or diacetyl tartarylated glycerol monooleate, respectively, in reasonable yields. These ester derivatives of monoglycerides have been known to be the most commonly used food surfactants.

(1570487886)

Utilization of PT. HOK TONG Liquid Waste Rubber Industry in Making of Liquid Organic Fertilizer with Addition of Eceng Gondok and EM4 (EFFECTIVE MICROORGANISM 4)

Farida Ali

Sriwijaya University of Palembang, Indonesia
Corresponding email: faridaali@ft.unsri.ac.id

The liquid waste of the rubber industry is currently not fully utilized, whereas the industrial rubber waste is the nutrient needed by plants, especially nitrogen (N), phospate (P2O5), and potassium (K2O). The presence of macro nutrients contained in the liquid waste of rubber industry is expected to be an alternative material for the manufacture of liquid compost. Water hyacinth is a plant that also contains a good macro nutrients for plants, so it can be used as an additional material to improve the nutrient elements of liquid compost fertilizer. This research aims to know the utilization of industrial rubber waste in the manufacture of liquid compost fertilizer with the addition of water hyacinth and EM4. The method used in making this liquid organic fertilizer was anaerobic fermentation process. The variables studied were addition of water hyacinth and volume of EM4 added. The results of fermentation were analyzed to obtain data of percentage of nitrogen, phosphate, and potassium content. Obtained results of liquid compost fertilizer, with the largest nitrogen content is 1.6% found in EM4 25 mL and water hyacinth 30 gr, the highest percentage of Phospate 0.160% found in liquid compost fertilizer with addition of water hyacinth as much as 20 gr and EM4 25 mL, highest percentage of Potassium equal to 0.358% is found in water hyacinth as much as 25 gr and EM4 25 mL.