THE 8th ANNUAL INTERNATIONAL CONFERENCE 2018 ON SCIENCES & ENGINEERING

Connecting the world through innovation and sustainable development

September 12-14, 2018
Banda Aceh, Indonesia

BOOK OF ABSTRACT
BOOK OF ABSTRACT

THE 8TH ANNUAL INTERNATIONAL CONFERENCE 2018 ON SCIENCES & ENGINEERING

Connecting the world through innovation and sustainable development

www.aic.unsyiah.ac.id

September 12-14, 2018
Banda Aceh, Indonesia
BOOK OF PROGRAM

The 8th AIC on Sciences and Engineering

The Annual International Conference 2018
Syiah Kuala University

“Connecting the World through Innovation and Sustainable Development”

Banda Aceh, Aceh, Indonesia
September 12-14, 2018
# Table of Content

Table of Content .................................................................................................................. 1
Advisory Board ...................................................................................................................... 6
Organizing Committee .......................................................................................................... 7
Scientific Committee ............................................................................................................ 8
Welcome Speech from Rector of Syiah Kuala University ..................................................... 9
Welcome Speech from General Chair .................................................................................. 11
Keynote Speaker .................................................................................................................... 12
Invited Speaker 1 ................................................................................................................... 13
Invited Speaker 2 ................................................................................................................... 14
Guidelines .............................................................................................................................. 15
Maps and Location ................................................................................................................ 16
AAC Auditorium Venue Map ................................................................................................. 17
Parallel Sessions Venue Map ............................................................................................... 18
Technical Program Schedule ............................................................................................... 20
Parallel Sessions ................................................................................................................... 22

**Track Mathematical Sciences & Physical Sciences and Engineering** ................................ 31
Risk Factor for Mortality of Children among Victims in Southern Thailand ......................... 31
Generalized Additive Models Fitting with Autocorrelation for Sea Surface Temperature Anomaly Data ........................................................................................................................................ 32
Application of ARCH model on nutmeg price forecasting in South Aceh District .......... 33
Activities Inhibition Methanol Extract Laban Leaf (Vitex pinnata) on Growth of Bacteria S. mutans Atcc 31987 ............................................................................................................. 34
The upwelling dynamics in the Aceh Waters using CMEMS ocean model ..................... 35

**Track Chemical Engineering** .......................................................................................... 36
The Influence of Fe3O4 on Magnetic Chitosan Composite Preparation for Methylene Blue Removal from Water ......................................................................................................................... 36
Geochemistry of Warm Springs in the Ie Brôuk Hydrothermal Areas at Aceh Besar District ............................................................................................................................................... 37
Effects of Temperature and Duration of Drying on the Quality of Powdered Asam Sunti .................................................................................................................................................. 38
Deposition of Polydopamine on the Surface of Polyvinylidene Fluoride (PVDF) Membrane as A UV-Shielding Layer ................................................................................................................. 39
<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>Factorial experimental design for superabsorbent carbonaceous polymer through inverse suspension polymerization method.</td>
</tr>
<tr>
<td>41</td>
<td>Isolation of Pectin from Coffee Pulp Arabica Gayo for the development of Matrices Membrane.</td>
</tr>
<tr>
<td>42</td>
<td>Geochemistry of Sulphate Spring in the Le Jue Geothermal Areas at Aceh Besar District, Indonesia.</td>
</tr>
<tr>
<td>43</td>
<td>Kovats Retention Index Analysis of Flavor and Fragrance Compound using Biplot Statistical Method in Gas Chromatography Systems.</td>
</tr>
<tr>
<td>44</td>
<td>Antibacterial formulation cream of ethanolic Pliek U extracts and ethanolic residue hexane Pliek U extracts against Staphylococcus aureus.</td>
</tr>
<tr>
<td>45</td>
<td>The Study on Composites Formation from HDPE and Sawdust/Rice Husk as Raw Materials.</td>
</tr>
<tr>
<td>46</td>
<td>Phytochemical Screening and In vitro Cytotoxic Activity of Hexane Extract of Temurui (Murraya koenigii (L.) Spreng) Leaves against Human Cervical Cancer (HeLa) Cell Line.</td>
</tr>
<tr>
<td>47</td>
<td>Characterization of Adsorbent Derived from Coconut Husk and Silica (SiO2).</td>
</tr>
<tr>
<td>48</td>
<td>Fabrication and characterization of microbial cellulose based membrane from nata de leri for separation of the oil-water emulsion.</td>
</tr>
<tr>
<td>49</td>
<td>The Potential of Five Therapeutic Herbal Medicines for Dental Treatment.</td>
</tr>
<tr>
<td>50</td>
<td>Synthesis of Kieserite Fertilizer by Using Natural Magnesite Ore as Raw Material.</td>
</tr>
<tr>
<td>51</td>
<td>Effect of H2SO4 concentration on cellulose isolation from palm empty fruit bunches.</td>
</tr>
<tr>
<td>52</td>
<td>Characterization of Adsorbent Derived from Coconut Husk and Silica (SiO2).</td>
</tr>
<tr>
<td>53</td>
<td>The Influence of Fe3O4 on Magnetic Chitosan Composite Preparation for Methylene Blue Removal from Water.</td>
</tr>
<tr>
<td>54</td>
<td>Aplication Bentonite of Bener Meriah Aceh to improve mechanical properties of Polypropylene-Montmorillonite Nanocomposite.</td>
</tr>
<tr>
<td>55</td>
<td>Activated carbon from passion fruit peel as adsorbent in crude glycerol purification.</td>
</tr>
<tr>
<td>56</td>
<td>Extraction of strawbery fruit (fragaria sp) by maceration and microwave for antioxidant activity test.</td>
</tr>
<tr>
<td>57</td>
<td>Low-density composite board from sugarcane residue and polymer of high-density polyethylene.</td>
</tr>
<tr>
<td>58</td>
<td>Development Bioplastic From Wheat Starch Janeng For Food Packaging.</td>
</tr>
<tr>
<td>59</td>
<td>Track geology, Mining and Mechanical and Industrial Engineering.</td>
</tr>
<tr>
<td>59</td>
<td>Enhanced Oil Recovery Concept for CCS Future.</td>
</tr>
<tr>
<td>60</td>
<td>Grain-size characteristics of Aceh’s coastal deposits.</td>
</tr>
<tr>
<td>61</td>
<td>Single microtremor method for estimating site fundamental frequency at a site in the historical city of Byblos - Lebanon.</td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Effect of Sodium Sulfate and Sodium Chloride in Two Stage Thermal Upgrading of Low-grade Nickel Lateritic Ore</td>
<td>62</td>
</tr>
<tr>
<td>The degree of filler dispersion, rheometric and mechanical properties of carbon black-filled styrene-butadiene rubber composites in presence of alkanolamide</td>
<td>63</td>
</tr>
<tr>
<td>The effects of stearyl alcohol addiction on rheometric and tensile properties of silica-filled natural rubber composites</td>
<td>64</td>
</tr>
<tr>
<td>Experimental study on diesel engine coupled with a catalytic converter run on dual-fuel mode using biogas produced from agricultural waste</td>
<td>65</td>
</tr>
<tr>
<td>Effects of welding on the change of microstructure and mechanical properties of low carbon steel</td>
<td>66</td>
</tr>
<tr>
<td>Mechanical behavior of hybrid glass fiber - jute reinforced with polymer composite for the wall of the Acehnese boat Jalo Kayoh</td>
<td>67</td>
</tr>
<tr>
<td>Failure analysis on the fractured surface of the vehicle crankshaft</td>
<td>68</td>
</tr>
<tr>
<td>Optimal Conditions for Selective Reduction Process of Nickel Laterite Ore</td>
<td>69</td>
</tr>
<tr>
<td>The comparison of optimum heuristic and deterministic scheduling rules for job shop scheduling in the manufacture</td>
<td>70</td>
</tr>
<tr>
<td>Monte Carlo simulation for predicting the reliability of a boiler in the Nagan Raya steam power plant</td>
<td>71</td>
</tr>
<tr>
<td>The Relationship between Data Skewness and Accuracy of Artificial Neural Network Predictive Model</td>
<td>72</td>
</tr>
<tr>
<td>Stress analysis of the helical spring of a car front suspension using numerical method</td>
<td>73</td>
</tr>
<tr>
<td>Failure analysis of a centrifugal pump shaft experiencing plastic deformation using finite element method</td>
<td>74</td>
</tr>
<tr>
<td>Mechanical characteristics of marble powder composite materials reinforced kenaf fiber against static load</td>
<td>75</td>
</tr>
<tr>
<td>The Effect of Cutting Speed on Dimension Acuracy and Burr Development of High Speed Micro Drill Proses on Aluminum</td>
<td>76</td>
</tr>
<tr>
<td>Increased Capacity of Water Heater with A Type of Cylindrical Solar Concentrator and The Addition of Heat Storage Material</td>
<td>77</td>
</tr>
<tr>
<td>Mechanical properties of glass fiber reinforced polyester resin for use as the wall material of the Acehnese boat Thep-Thep</td>
<td>78</td>
</tr>
<tr>
<td>Effect of Peanut (Arachis Hypogea l.) Shell Cellulose Composition and Compatibilizer Addition on Properties of Polyester Composite</td>
<td>79</td>
</tr>
<tr>
<td>Effect of cutting parameter on tool wear of HSS tool in drilling of Kevlar composite panel</td>
<td>80</td>
</tr>
<tr>
<td>The spare part maintenance of Cake Breaker Conveyor with Reliability Centered Spares Method</td>
<td>81</td>
</tr>
<tr>
<td>Analysis of Transport Workers’ Postures in the Loading Process of Manual Material Handling Activities by Using the Photogrammetric Method</td>
<td>82</td>
</tr>
</tbody>
</table>
Track Civil and Structural Engineering

Study of hot mix asphalt temperature loss on truck wall surface area during transport

Changes in the unit price of work for reinforced concrete construction based on building sites

The Influence of the Using Waste Tire Rubber and Natural Ziolite as Asphalt and Cement Replacements to Compressive Strength of Semi-Flexible Pavement

Approaching model of Manning’s Coefficient due to an Effect of Density and Height of Vegetation in Open Channel

The Effect of Soil-Structure Interaction on Multi-Storey Building Resonance and Dynamic Shear Modulus for Pidie Jaya Aceh Earthquake

Risk Impact on Cost and Time From the Factors of Contractor’s Managerial and Operational

The potential utilization of natural materials as a wall covering the building in reducing heat

Deformation and crack analysis of tunnel structure subjected to static distributed load using pseudoshell model

The Effect of Rainfall Interception Loss by Palm-Oil Tree towards Flood Discharge in Seunagan Watershed of Nagan Raya District of Aceh Province

The comparison of earthquake design parameters of low rise building structures based on SNI-1726-2002 and SNI 1726 : 2012 at 23 districts of Aceh Province Indonesia

Investigating public perceptions and its implication toward Trans Koetaradja Policy Considering Latent Motivation

Characterizing mode choice behaviors of the evacuees during emergency evacuation using a logistic regression model

Track Architecture, Urban and Rural Planning

Living Together: The Phenomenon of House Occupancy in Indonesia

Spatial Extension as a Housing Strategy in Kampung Kota: A Case Study from Kampung Kingkit, Central Jakarta

Defensible Space in Urban Housing in Indonesia

Housing Preferences and Strategies of Javanese Migrants in Jakarta

Interiorization of Public Space in A High Density Settlement: A Case Study in Kampung Cikini-Ampiun

Co-residence as Housing Strategy for Betawi Families: Case Study of Betawi Family Houses in Cengkareng, West Jakarta

Creating Atmosphere in Hotel Interior Space with Material Roles: Bata Pejaten

Wall Finishing Materials and Heritage Science in the Adaptive Reuse of Jakarta Heritage Buildings
Shifting from Place to Non-Place: A Case Study on the Central Market of Banda Aceh ........................................................................................................... 103
Influence of Material Application to Wayfinding Issue in Underground Station Design .................................................................................................................. 104
Active Waiting: Potentials of Waiting Area at Airport ................................................. 105
Permeable Interior: Unfolding Threshold Space within Transit Corridor ....................... 106
Co-residence as Housing Strategy for Betawi Families: Case Study of Betawi Family Houses in Cengkareng, West Jakarta ................................................................. 107
‘Lanting’ as A Way of Life: A legacy of riverine culture and architecture in present urban life of Sintang City, West Kalimantan ............................................................... 108
A Review of Vertical Evacuation on Tsunami Mitigation Case ....................................... 109

Track Electrical, Computer Engineering & Information System .................................. 110
Grey Wolf Optimization For Track Maximum Power Of Photovoltaic System In Multiple Peak Power Characteristics .................................................................................. 110
The Design of Road Conditions Mapping System by Utilizing Openstreetmap Spatial Data ......................................................................................................................... 111
Online Judge MySQL for Learning Process of Database Practice Course .................... 112
Developing industrial relation information system (IRIS) on inet essa module in PT. XYZ Tbk. ......................................................................................................................... 113
## Advisory Board

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof. Dr. Samsul Rizal</td>
<td>Rector of Syiah Kuala University, Indonesia</td>
</tr>
<tr>
<td>Prof. Dr. Marwan</td>
<td>Vice Rector I for Academic Affairs, Syiah Kuala University, Indonesia</td>
</tr>
<tr>
<td>Dr. Agussabti</td>
<td>Vice Rector II for Financial Affairs, Syiah Kuala University, Indonesia</td>
</tr>
<tr>
<td>Dr. Alfiansyah B.C.</td>
<td>Vice Rector III for Alumnae and Student Affairs, Syiah Kuala University, Indonesia</td>
</tr>
<tr>
<td>Dr. Hizir</td>
<td>Vice Rector IV for Planning, Cooperation, and Community Affairs, Syiah Kuala University, Indonesia</td>
</tr>
<tr>
<td>Dr. Taufik Fuadi Abidin</td>
<td>Head of Institute for Research and Community Services, Syiah Kuala University, Indonesia</td>
</tr>
</tbody>
</table>
Organizing Committee

**General Chair**
Dr. Heru Fahlevi, Syiah Kuala University, Indonesia

**General Co-Chair**
Wahyu Rinaldi, Syiah Kuala University, Indonesia

**Treasurer and Finance Chair**
Dr. Ira Devi Sara, Syiah Kuala University, Indonesia

**Conference Chair**
Dr. Eng. Sugianto, M.Eng, Syiah Kuala University, Indonesia

**Editor in-Chief**
Dr. Saiful, Syiah Kuala University, Indonesia

**Website Developer**
Muhammad Chandra Gunawan, Syiah Kuala University, Indonesia
Editors
1. Dr. Eng. Sugiarto, ST., M.Eng
2. Dr. Saiful, S.Si., M.Si
3. Dr. Bambang Setiawvan, ST., M.Eng.Sc
4. Dr. Sarwo Edhy S, ST., M.Eng
5. Dr. Ashfa, ST., M.T

Scientific Committee Member
1. Prof. Ahmad Fauzi Ismail (Universiti Teknologi Malaysia)
2. Prof. Azman A Ghani (University of Malaya Kuala Lumpur)
3. Dr.-Ing. Joewono Prasetijo (Universiti Tun Hussein Onn Malaysia)
4. Dr. Cristian Tosa (Universitatea Tehnica Cluj-Napoca, Romania)
5. Dr. Tien Dung Chu (University of Transport and Communications, Vietnam)
6. Dr. Satria Antonie (King Abdulaziz University, Saudi Arabia)
7. Dr. Billy G. Adhiperdana (Padjadjaran University, Indonesia)
8. Dr. Yusuf wibisono (Brawijaya University, Indonesia)
9. Dr. Abu Maskur (Sebelas Maret University, Indonesia)
10. Prof. Dr. Ir. Marwan (Syiah Kuala University, Indonesia)
11. Prof. Dr. Ir. Sri Aprilia, M.T (Syiah Kuala University, Indonesia)
12. Dr. Nasrul AR, MT (Syiah Kuala University, Indonesia)
13. Dr. Eng. Sugiarto, ST., M.Eng (Syiah Kuala University, Indonesia)
14. Dr. Saiful, S.Si., M.Si (Syiah Kuala University, Indonesia)
15. Dr. Bambang Setiawvan, ST., M.Eng.Sc (Syiah Kuala University, Indonesia)
16. Dr. Sarwo Edhy S, ST., M.Eng (Syiah Kuala University, Indonesia)
17. Dr. Ashfa, ST., M.T (Syiah Kuala University, Indonesia)
18. Dr. Said Munzir, S.Si., M.Eng.Sc (Syiah Kuala University, Indonesia)
19. Dr. Syarizal Fonna, ST, M.Sc (Syiah Kuala University, Indonesia)
20. Dr. Fitri Arnia, S.T., M.Eng.Sc (Syiah Kuala University, Indonesia)
21. Dr. Ira Devi Sara, ST., M. Eng.Sc (Syiah Kuala University, Indonesia)
22. Dr. Dra. Siti Rusdiana, M.Eng (Syiah Kuala University, Indonesia)
23. Dr. Febriani, S.Si, M.Si (Syiah Kuala University, Indonesia)
24. Muhammad Bahi, S.Si.,M.Sc.,Ph.D (Syiah Kuala University, Indonesia)
25. Muhammad Dani Supardan (Syiah Kuala University, Indonesia)
26. Dr. Sri Mulyati, ST, MT (Syiah Kuala University, Indonesia)
27. Dr. Husni, ST, M.Sc., M. Eng (Syiah Kuala University, Indonesia)
28. Dr.-Ing. Teuku Edisah Putra (Syiah Kuala University, Indonesia)
29. Dr. Ir. Mohd. Iqbal, M.T (Syiah Kuala University, Indonesia)
30. Dr. Muhammad Rizal, S.T, M.Sc (Syiah Kuala University, Indonesia)
31. Dr. Ir. Mochammad Affuaddin, M.Eng (Syiah Kuala University, Indonesia)
32. Dr. Azmeri, ST, MT (Syiah Kuala University, Indonesia)
33. Dr. Munira Sungkar, S.T., M.T (Syiah Kuala University, Indonesia)
34. Dr. Nasaruddin, S.T.,M.Eng (Syiah Kuala University, Indonesia)
35. Dr. Ramzi Adriman, S.T, M. Sc (Syiah Kuala University, Indonesia)
Welcome Speech from Rector of Syiah Kuala University ——

In the name of Allah, the Most Beneficent and the Most Merciful. May peace, mercy, and blessings of Allah be upon you.

Dear colleagues, professors, lecturers, researchers, ladies and gentlemen. On behalf of Syiah Kuala University, I would like to express my sincere gratitude and welcome you to the 8th Annual International Conference (AIC) on Science and Engineering 2018. Moreover, I honorably welcome our keynote and invited speakers Prof. Dr. Ahmad Fauzi Ismail, Universitas Teknologi Malaysia, Malaysia, Prof. Dr. Azman Bin Abd Ghani, University of Malaya, and Prof. Marwan, Syiah Kuala University.

I am optimist that the 8th AIC on Sciences and Engineering 2018 is able to accomplish its goals in addressing critical research priorities in social sciences, as well as information and knowledge gaps in global and specific regions. This event gathers academicians, researchers, and practitioners from all over the world to discuss and share important technological, health and societal challenges, social and sciences contributions and capacities, and make recommendations for future research, practice and policy for a sustainable development.

Sustainability is a strategy that drives long-term growth and effectiveness in development, either in the social sciences, sciences and engineering, and health and sciences fields. Therefore, encompassing technology with the society is crucial for attaining long-term sustainable development because it bears the largest potential for improvement. In this era, the digital revolution creates both new opportunities and challenges for the humankind. Society is required to transform and adapt to the new environment and situation. However, not all of us can adapt and embrace the changes. Many are left behind, and there are also those who do not receive the opportunities offered by the digital revolution. We believe that that technology, innovation and societies can facilitate sustainable development. For that matter, all academicians, researchers, and practitioners should focus their research on helping countries and people to sustain their development. Corresponding to this matter, the theme of the conference this year is “Connecting the world through innovation and sustainable development”. This conference envelops a wide range of interesting topics related to all theoretical and practical aspects in sciences and engineering, but not limited to Mathematical Sciences, Physics Sciences and Engineering, Chemical Sciences and Engineering, Geology, Mining and Petroleum Engineering, Mechanical and Industrial Engineering, Civil and Structural Engineering, Architecture and Planning, Electrical and Computer Engineering, Computer Sciences and Information Systems.

I would also like to take this opportunity to express my deep appreciation to the Advisory Board, Organizing Committee, International Scientific Committee, institutions, companies, and volunteers for their efforts to make this conference
happen, and many others who have generously given help in the process. Although we try our finest to be professional, on behalf of Syiah Kuala University, please accept our sincere apologies should there be inconveniences that occur before, during, or after the event. I hope everyone has interesting and stimulating discussions in these couple of days. I sincerely pray that this conference is a great success not only as a platform to share knowledge and experience, but also as a chance to begin continuous and productive cooperation and friendships.

May God bless us all with good health to have a great and prosperous time at the conference, and I hope you enjoy your stay in Banda Aceh!

Best Regards,

Prof. Dr. Ir. Samsul Rizal, M.Eng
Rector of Syiah Kuala University
Welcome Speech from General Chair

Assalamualaikum Wa Rahmatullahi Wa Barakatuh,

On behalf of the organizing committees, I would like to welcome all of you to Banda Aceh, Indonesia for the 8th Annual International Conference (AIC) on Science and Engineering 2018 as a part of the 2018 Annual International Conference (AIC) Syiah Kuala University. The AIC is an annual international conference carried out regularly by Syiah Kuala University since 2011.

Under the theme of the conference "Connecting the World through innovation and sustainable development ", this conference features a rich program, including Syiah Kuala University Innovation Expo 2018, a keynote speech delivered by Prof. Dr. Ahmad Fauzi Ismail, Universitas Teknologi Malaysia, Malaysia, and two invited speeches by Prof. Dr. Azman Bin Abd Ghani, University of Malaya, and Prof. Marwan, Syiah Kuala University. The 8th AIC on Science and Engineering 2018 offers a special opportunity to bring together professors, researchers and scholars around the globe, and serves as a platform to deliver innovative research results and latest trends and development in the fields of sciences and engineering.

All accepted and presented papers in this conference will have the opportunities to be published in IOP Material Science and Engineering Proceedings and indexed by Sci-Scopus, Thomson Reuters ISI, and EI Compendex. Several selected papers will have an opportunity to be published in Aceh International Journal Science and Technology (AIJST). AIJST is published by Graduate School of Syiah Kuala University and it is accredited by Kemenristek Dikti.

The conference has received 110 submitted papers, whereby 80 papers have been accepted by the committees for presentation and to be included in the proceedings. These papers on various topics are divided into 17 parallel sessions in the conference. To all members of the organizing committees, the international scientific committee, the reviewers, and the collaboration partners, we would like to thank all of them for their tremendous efforts to organize this conference successfully.

We look forward to having a successful conference, and we hope that all the attendees enjoy and benefit from this conference.

Best Regards,

Dr. Heru Fahlevi
General Chair
Nano-enabled Membrane Technology for Water and Wastewater Treatment

Ahmad Fauzi Ismail*, Zulhairun Abdul Karim, Goh Pei Sean

Abstract

Recent developments in nanotechnology have resulted in a breakthrough in water and wastewater treatment by membrane technology. Nano-enabled membranes have emerged as a significant innovation for providing safe and clean water as environmental discharge or municipal consumption through various membrane processes such as reverse osmosis, forward osmosis, adsorption, photocatalytic, nano- and ultrafiltration. The use of nanomaterials with amazing properties renders extraordinary capability of the newly developed membranes to treat all kinds of contaminated, nonpotable water containing salts (seawater), heavy metals, oil, solvent, and other organic pollutants. Wide ranges of nanoparticles, ranging from carbon allotropes (graphene oxide, carbon nanotubes), metal oxides, and clay minerals have been used to improve the performance of the membranes in terms of water permeability, selectivity, anti-fouling, antibacterial, adsorption capacity, and mechanical stability. Considerable attention is placed on tailoring the microstructure and surface chemistries of the nanoparticles involving optimization of the synthesis procedures and chemical modifications. Nano-enabled membranes with unique morphologies and configurations can be attained by tuning the fabrication techniques or using special devices (such as multiple orifice spinnerets). In essence, different membrane processes require different innovative approaches to battle the current challenges for possible industrial deployment. The future of membrane technology for vast application in water and wastewater treatment relies on the advancement of nanotechnology. Intensive effort should be placed to expand the laboratory-scale research towards commercial level while taking into consideration the feasibility of the innovation to ensure cost effective technology can be proposed.
Classification and Geochemistry of the Granitic rocks from Sumatera: an overview

Azman A Ghani
Department of Geology
University of Malaya Kuala Lumpur
Malaysia

Abstract

The Sumatera Mainland tectonically can be divided into three units: from southwest to northeast, they are the Woyla terrane, West Sumatra block, and East Sumatra block. The granitic rocks in Sumatera exposed mainly in the Woyla and East Sumatra block. The granites of Sumatera can be divided into two groups (1) the tin bearing and (2) the volcanic arc groups. The tin bearing group occurs mainly in the islands off eastern coast of Sumatera (Bangka, Belitung) and the volcanic arc suites which confines to the Barisan Range and western coastal area of Sumatera island. Geochemically the granitic rocks of volcanic arc group is more diverse ranging from granite to gabbro whereas the tin bearing group is mainly syenogranite and monzogranite. The tin bearing group is comparable to the Main Range granite (Peninsular Malaysia and Southern Thailand) in term of the composition and their age (200-220Ma). The volcanic arc suite is younger in age ranging from 50 to 150 Ma. Th/Yb vs Nb/Yb diagram indicate that magma from both granitic groups originated from continental as their source rock. It is however the granitic magma from the volcanic arc group is clay poor whereas the tin bearing granites have more clay rich material.
Microwave heating to accelerate solid catalyzed chemical reactions

Prof. Dr. Marwan

Chemical Engineering Department, Syiah Kuala University
Banda Aceh – Indonesia
E-mail: marwan@unsyiah.ac.id

Abstract

Microwave has been utilized to enhance many chemical reactions due its effect on intermolecular interaction among the reactants. The system also offers simple, clean, efficient, economic, and more environmentally friendly technique. As the result, the microwave irradiation has emerged as new tool in organic synthesis. In this opportunity, some progress on the catalytic reactions involving microwave heating is briefly reported. The biodiesel production from palm oil using hydrated calcined seashell catalyst was carried out under microwave irradiation. The reaction was accomplished in a very short time at much milder conditions than in the conventional reactor with a maximum yield of 96.0% in 10 min reaction. Recently, triacetin, an alternative biodiesel additive, was prepared by esterification of glycerol using activated natural zeolite catalyst. The conversion value of glycerol was more than 95% after 60 min and the reaction took place at much milder condition compared with those reported elsewhere with non-microwave heating. These findings suggest the microwave effect could overcome mass transfer barrier that often limit various solid catalytic reactions.
Guidelines

Official Language
The official language for the 8th AIC on Sciences and Engineering 2018 is English. All presentation including Question and Answer (Q&A) must be delivered in English.

Guideline for Participant

- Conference Venue
  - Opening, Keynote Session, Gala Dinner, and Closing Ceremony
    Academic Activity Center (AAC) Auditorium
    Prof. Dr. Dayan Dawood, Syiah Kuala University,
    Jalan Teuku Nyak Arief, Kota Pelajar Mahasiswa (Kopelma), Darussalam,
    Banda Aceh, 23111 Indonesia
  - Parallel Sessions
    Flamboyan B-203, 2nd Floor, Academic Activity Center (AAC)
    Flamboyan B-306, 3rd Floor, Academic Activity Center (AAC)
    Flamboyan B-309, 3rd Floor, Academic Activity Center (AAC)

- Registration
  Time for registration: 08:00AM – 08:30AM, Wednesday, September 12th, 2018 at Academic Activity Center (AAC) Auditorium.

- Conference Kits
  Conference kit, which contains Conference Book of Program, Final Program Schedule, Electronic Proceedings in CD-ROM, Participant Badge, Seminar Kits, and Official Receipt is provided to participants during check-in at Registration/Information Help Desk on Wednesday, September 12th, 2018.

- Certificate
  The certificates are provided to the presenters and participants after the parallel sessions.

Guideline for Presenters and Session Chairs (Moderator)

- The presenters and sessions chairs are asked to keep to the paper sequence as shown in the Final Program Schedule. By following the predefined schedule, participants can switch between sessions without missing the particular paper of interest.
- All session chairs are requested to attend to the session’s room 10 minutes before the session begins.
- All presenters are requested to report their attendance to the session chair 10 minutes before the session starts.
- The presentation is conducted as panel and divided into two sections in a session. Each section will take for 40 minutes that comprised of 3-4 presenters and continued with Q&A for 10-15 minutes. The session chairs should allow each of presenter for a 10 minutes’ presentation and leave the remaining minutes for discussion.
- Notebook/Desktop PC and LCD projectors are available in every session room.
- Presenters are recommended to prepare their files in Microsoft Power Point format on a USB flash drive and copy in the PC at session room before the session begins. Our volunteers shall assist the presenters to copy the files before presentation.
Maps and Location

Legend:

- Academic Activity Center (AAC) Auditorium
  Prof. Dr. Dayan Dawood, Syiah Kuala University
AAC Auditorium Venue Map
## Technical Program Schedule

### Day 1: Wednesday, September 12, 2018

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:30 - 08:00</td>
<td>Registration</td>
<td>AAC Main Gate and Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td>08:00 - 09:15</td>
<td>Parallel Session I</td>
<td>Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td>09:20 - 09:40</td>
<td>Opening by MC &amp; Prayers (Reciting Qur’an, Seulawat Badar, Pray)</td>
<td></td>
</tr>
<tr>
<td>09:40 - 09:50</td>
<td>Singing the National Anthem of Indonesia (Indonesia Raya)</td>
<td></td>
</tr>
<tr>
<td>09:50 - 10:05</td>
<td>Traditional Dance Performance: Rapa’i Geleng by Sanggar Seni Seulawut</td>
<td></td>
</tr>
<tr>
<td>10:05 - 10:15</td>
<td>Welcoming Remark by the Conference Chairman</td>
<td></td>
</tr>
<tr>
<td>10:15 - 10:30</td>
<td>Welcoming Remark by the Rector of Syiah Kuala University</td>
<td></td>
</tr>
<tr>
<td>10:30 - 10:40</td>
<td>Profile of Syiah Kuala University</td>
<td></td>
</tr>
<tr>
<td>10:40 - 10:50</td>
<td>Photo Session</td>
<td></td>
</tr>
<tr>
<td>10:50 - 11:15</td>
<td><strong>Keynote Speaker 1 : Prof. Dr. Ahmad Fauzi Ismail</strong></td>
<td>Academic Activity Center (AAC) Prof. Dayan Dawood Auditorium</td>
</tr>
<tr>
<td>11:15 - 11:40</td>
<td>Keynote Speaker 2: Dr. Konstantinos Gkatzionis</td>
<td></td>
</tr>
<tr>
<td>11:40 - 12:05</td>
<td>Keynote Speaker 3: Dr. Evan Lau</td>
<td></td>
</tr>
<tr>
<td>12:05 - 12:25</td>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td>12:25 - 12:35</td>
<td>Plaquatte Handover &amp; Photo Session</td>
<td></td>
</tr>
<tr>
<td>12:35 - 13:45</td>
<td>Lunch Break</td>
<td></td>
</tr>
<tr>
<td>13:45 – 15:15</td>
<td>Parallel Session 2</td>
<td>Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td>15:30 - 16:00</td>
<td><strong>Invited Speaker Session 1</strong></td>
<td>Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td></td>
<td>Invited Speaker 1: Prof. Dr. Azman Bin Abd Ghani (Sciences and Engineering), Flamboyan 2nd floor</td>
<td>Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td></td>
<td>Invited Speaker 2: Dr. Berry Juliandi (Health and Life Sciences, Flamboyan 3rd Floor)</td>
<td>Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td></td>
<td>Invited Speaker 3: Dr. Evan Lau (Social Sciences, Flamboyan 3rd) Floor)</td>
<td>Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td>16:00 – 16:15</td>
<td>Break</td>
<td>Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td>16:15 – 17:15</td>
<td>Parallel Session 3</td>
<td></td>
</tr>
<tr>
<td>17:15 – 19:30</td>
<td>City tour of Banda Aceh and Magrib Praying in Masjid Baiturrahim Ulee Lheue</td>
<td>Academic Activity Center (AAC) Prof. Dayan Dawood Auditorium</td>
</tr>
<tr>
<td>19:30 – 21:45</td>
<td>Official Gala Dinner and Acehnese Art/Dance Performances *)</td>
<td></td>
</tr>
</tbody>
</table>
") Official Gala Dinner and Acehnese Art/Dance Performances

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>19:30 - 19:50</td>
<td>Dinner</td>
<td></td>
</tr>
<tr>
<td>19:50 - 20:05</td>
<td>The Aceh Contemporary Folk Songs (by Cikal on Centre for The Arts of Unsyiah)</td>
<td>Academic Activity Center (AAC) Prof. Dayan Dawood Auditorium</td>
</tr>
<tr>
<td>20:05 – 20:15</td>
<td>Greeting by the Rector of Syiah Kuala University</td>
<td></td>
</tr>
<tr>
<td>20:15 – 20:25</td>
<td>Greeting by the Major of Banda Aceh City*</td>
<td></td>
</tr>
<tr>
<td>20:40 – 20:55</td>
<td>The Aceh Contemporary Folk Songs (by Cikal on Centre for The Arts of Unsyiah)</td>
<td></td>
</tr>
<tr>
<td>20:55 – 21:45</td>
<td>The Aceh Contemporary Folk Songs (by Cikal on Centre for The Arts of Unsyiah)</td>
<td></td>
</tr>
</tbody>
</table>

**Day 2: Thursday, September 13, 2018**

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30 – 10:00</td>
<td>Parallel Session 4</td>
<td></td>
</tr>
<tr>
<td>10:00 – 10:15</td>
<td>Coffee Break</td>
<td></td>
</tr>
<tr>
<td>10:15 – 10:40</td>
<td>Invited Speaker Session 1</td>
<td>Flamboyan 2nd and 3rd floor</td>
</tr>
<tr>
<td></td>
<td>Prof. Marwan (Syiah Kuala University)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prof. Samadi (Syiah Kuala University)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dr. M. Shabri Abd. Majid (Syiah Kuala University)</td>
<td></td>
</tr>
<tr>
<td>10:45 – 11:45</td>
<td>Parallel Session 5 and Poster Session*</td>
<td>Flamboyan rooms</td>
</tr>
<tr>
<td>11:45 – 12:30</td>
<td>Visit to Unsyiah Innovation Expo, book fair and souvenir market</td>
<td></td>
</tr>
<tr>
<td>12:30 – 13:30</td>
<td>Lunch Break</td>
<td></td>
</tr>
<tr>
<td>13:30 – 16:00</td>
<td>Visit to Center of Aceh Craft or Coffee Solong Aceh Traditional Coffee center</td>
<td>AAC main building</td>
</tr>
<tr>
<td>16:30 – 18:00</td>
<td>Closing ceremony and the announcement of best papers and best presenters</td>
<td>VIP Rooms</td>
</tr>
</tbody>
</table>

**Day 3: Friday, September 14, 2018 (BANDA ACEH CITY TOUR)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Description</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>08.00 – 08.30</td>
<td>Check in and registration for city tour</td>
<td>AAC Dayan Dawood</td>
</tr>
<tr>
<td>08.30 – 12.00</td>
<td>Islamic and Tsunami City Tour in Banda Aceh</td>
<td>City of Banda Aceh</td>
</tr>
</tbody>
</table>
## Parallel Sessions

### Parallel Session 1: Mathematical Sciences & Physical Sciences And Engineering

**Time:** 12th September 2018, Wednesday/8.00-9.15/B-203  
**Session Chair:** Dr. Said Munzir, M.Sc.

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE01</td>
<td>Zurnila Marli Kesuma, Latifah Rahayu, Mayuening Eso, Rasudin and Rizki Saputra, Shafia Ananda, Miftahuddin</td>
<td>Risk Factor for Mortality of Children among Victims in Southern Thailand</td>
</tr>
<tr>
<td>SE02</td>
<td>Shafia Ananda, Miftahuddin</td>
<td>Generalized Additive Models Fitting with Autocorrelation for Sea Surface Temperature Anomaly Data</td>
</tr>
<tr>
<td>SE03</td>
<td>A Rusyana1, R Ferdhiana2, M E Putri</td>
<td>Application of ARCH model on nutmeg price forecasting in South Aceh District</td>
</tr>
<tr>
<td>SE04</td>
<td>Y Ilhamsyah, Y Koesmaryono, R Hidayat, IW Nurjaya and AS Atmadipoera</td>
<td>The upwelling dynamics in the Aceh Waters using CMEMS ocean model</td>
</tr>
</tbody>
</table>

### Parallel Session 1: Chemical Sciences and Engineering-I

**Time:** 12th September 2018, Wednesday/8.00-9.15/B-309-A  
**Session Chair:** Dr. Saiful, M.Si.

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE05</td>
<td>Ismaturrahmi, Rahmi and Irfan Mustafa</td>
<td>The Influence of Fe3O4 on Magnetic Chitosan Composite Preparation for Methylene Blue Removal from Water</td>
</tr>
<tr>
<td>SE06</td>
<td>Julinawati, Basuki Wirjosentono, Eddiyanto, Saharman Gea, Ichwana</td>
<td>Application Bentonite of Bener Meriah Aceh to improve mechanical properties of Polypropylene-Montmorillonite Nanocomposite Geochemistry of Warm Springs in the Ie Brôuk Hydrothermal Areas at Aceh Besar District</td>
</tr>
<tr>
<td>SE07</td>
<td>R Idroes, M Yusuf, M Alatas, Subhan, A Lala, Muslem, R Suhendra, G M Idroes, Suhendrayatna, Marwan and M Riza</td>
<td>Effects of Temperature and Duration of Drying on the Quality of Powdered Asam Sunti</td>
</tr>
<tr>
<td>SE08</td>
<td>S Mulyati, F A Pramesthy, Fahliza Meutia, Adela Rinaldi, Siti Maysarah Siregar, Syawaliah</td>
<td>Effects of Temperature and Duration of Drying on the Quality of Powdered Asam Sunti</td>
</tr>
</tbody>
</table>
### Parallel Session 1: Chemical Sciences and Engineering - II

**Time:** 12th September 2018, Wednesday/8.00-9.15/B-309-B  
**Session Chair:** Dr. Dani Supardan

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE9</td>
<td>Syawaliah, Mukramah, S Mulyati, M Riza, N Arahman</td>
<td>Deposition of Polydopamine on the Surface of Polyvinylidene Fluoride (PVDF) Membrane as A UV-Shielding Layer</td>
</tr>
<tr>
<td>SE10</td>
<td>Siti NorAinda Mazlan, Saidatul Shima Jamari</td>
<td>Factorial experimental design for superabsorbent carbonaceous polymer through inverse suspension polymerization method</td>
</tr>
<tr>
<td>SE11</td>
<td>U Hasanah, M Setyowati, Edwarsyah, R Efendi, E Safitri, R Idroes, L Y Heng and N D Sani</td>
<td>Isolation of Pectin from Coffee Pulp Arabica Gayo for the development of Matrices Membrane</td>
</tr>
<tr>
<td>SE12</td>
<td>R Idroes, M Yusuf, M Alatas, Subhan, A Lala, Muhammad, R Suhendra, G M Idroes and Marwan</td>
<td>Geochemistry of Sulphate Spring in the Ie Jue Geothermal Areas at Aceh Besar District, Indonesia</td>
</tr>
<tr>
<td>SE13</td>
<td>R Idroes, A F Japnur, R Suhendra and A Rusyana</td>
<td>Kovats Retention Index Analysis of Flavor and Fragrance Compound using Biplot Statistical Method in Gas Chromatography Systems</td>
</tr>
</tbody>
</table>

### Parallel Session 1: Geology, Mining And Petroleum & Mechanical And Industrial Engineering

**Time:** 12th September 2018, Wednesday/8.00-9.15/B-306  
**Session Chair:** Dr. Bambang Setiawan

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE14</td>
<td>B Suharno, C Ramadini, R H Shaleh, A Shofii and F Nurjaman</td>
<td>Effect of Sodium Sulfate and Sodium Chloride in Two Stage Thermal Upgrading of Low-grade Nickel Lateritic Ore</td>
</tr>
<tr>
<td>SE15</td>
<td>Muhammad Iqbal Dista</td>
<td>Enhanced Oil Recovery Concept for CCS Future</td>
</tr>
<tr>
<td>SE16</td>
<td>I Surya, H Ismail</td>
<td>The degree of filler dispersion, rheometric and mechanical properties of carbon black-filled styrene-butadiene rubber composites in presence of alkanolamide</td>
</tr>
<tr>
<td>SE17</td>
<td>Himsar Ambarita</td>
<td>Experimental study on diesel engine coupled with a catalytic converter run on dual-fuel mode using biogas produced from agricultural waste</td>
</tr>
<tr>
<td>SE18</td>
<td>Husaini, N Ali, J K Hamza and S E Sofyan</td>
<td>Effects of welding on the change of microstructure and mechanical properties of low carbon steel</td>
</tr>
<tr>
<td>Paper ID</td>
<td>Authors</td>
<td>Titles of Paper</td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-----------------</td>
</tr>
<tr>
<td>SE19</td>
<td>I Surya, M Ginting, V Purwandari</td>
<td>The effects of stearyl alcohol addition on rheometric and tensile properties of silica-filled natural rubber composites</td>
</tr>
<tr>
<td>SE20</td>
<td>H Nasution, K Kosasih, Maulida M T Al Fath</td>
<td>Effect of Peanut (Arachis Hypogea L.) Shell Cellulose Composition and Compatibilizer Addition on Properties of Polyester Composite</td>
</tr>
<tr>
<td>SE21</td>
<td>F Mulana, Mariana, Hadman M N, Mohibah M</td>
<td>The Study on Composites Formation from HDPE and Sawdust/Rice Husk as Raw Materials</td>
</tr>
<tr>
<td>SE22</td>
<td>Mariana, F Mulana, Sofyana, N P Dian, M A R Lubis</td>
<td>Characterization of Adsorbent Derived from Coconut Husk and Silica (SiO2)</td>
</tr>
<tr>
<td>SE23</td>
<td>S Ferwinda, D R Indri, N M Erfiza, U Fathanah F and F Razi</td>
<td>Fabrication and characterization of microbial cellulose based membrane from nata de leri for separation of the oil-water emulsion</td>
</tr>
<tr>
<td>SE24</td>
<td>Farid Mulana</td>
<td>Synthesis of Kieserite Fertilizer by Using Natural Magnesite Ore as Raw Material</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE25</td>
<td>N Earlia, C Nabila, I Inayati, R Rahmad, M Amin, C R S Prakoeswa, K Khaairan and R Idroes</td>
<td>Antibacterial formulation cream of ethanolic Pliek U extracts and ethanolic residue hexane Pliek U extracts against Staphylococcus aureus</td>
</tr>
<tr>
<td>SE26</td>
<td>U Amna, Halimatussakdiah, P Wahyuningsih, N Saidi, R Nasution, S Y Astryna</td>
<td>Phytochemical Screening and In vitro Cytotoxic Activity of Hexane Extract of Temurui (Murraya koenigii (L.) Spreng) Leaves against Human Cervical Cancer (HeLa) Cell Line</td>
</tr>
<tr>
<td>SE27</td>
<td>D S Ningsih, R Idroes, B M Bachtiar and Khaairan</td>
<td>The Potential of Five Therapeutic Herbal Medicines for Dental Treatment</td>
</tr>
<tr>
<td>SE28</td>
<td>Nilawatia, Rahmia, and Lydia Septa Desyana</td>
<td>Effect of H2SO4 concentration on cellulose isolation from palm empty fruit bunches.</td>
</tr>
<tr>
<td>SE29</td>
<td>Ismaturrahmi, Rahmil Irfan Mustafa</td>
<td>The Influence of Fe3O4 on Magnetic Chitosan Composite Preparation for Methylene Blue Removal from Water</td>
</tr>
<tr>
<td>SE30</td>
<td>K S Sipahutar, E Sundari, V Pramananda and E Misran</td>
<td>Activated carbon from passion fruit peel as adsorbent in crude glycerol purification</td>
</tr>
</tbody>
</table>
### Parallel Session 2: Civil And Structural Engineering

**Time:** 12th September 2018, Wednesday/13.45 - 15.15/B-203  
**Session Chair:** Dr. Eng. Sugiarto

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE31</td>
<td>Muhammad Muhammad</td>
<td>Study of hot mix asphalt temperature loss on truck wall surface area during transport</td>
</tr>
<tr>
<td>SE32</td>
<td>Mubarak, Abdullah, Medyan Riza, Yulia Hayati</td>
<td>Changes in the unit price of work for reinforced concrete construction based on building sites</td>
</tr>
<tr>
<td>SE33</td>
<td>Hamzami, Munirwansyah, Muttaqin Hasan and Sugiarto Sugiarto</td>
<td>The Influence of the Using Waste Tire Rubber and Natural Ziolite as Asphalt and Cement Replacements to Compressive Strength of Semi-Flexible Pavement</td>
</tr>
<tr>
<td>SE34</td>
<td>M Rizalihadi</td>
<td>Approaching model of Manning’s Coefficient due to an Effect of Density and Height of Vegetation in Open Channel</td>
</tr>
<tr>
<td>SE35</td>
<td>M Munirwansyah, R P Munirwan, M Sungkar and Z Melinda</td>
<td>The Effect of Soil-Structure Interaction on Multi-Storey Building Resonance and Dynamic Shear Modulus for Pidie Jaya Aceh Earthquake</td>
</tr>
<tr>
<td>SE36</td>
<td>Saiful Husin, Abdullah, Medyan Riza, and Mochammad Afifuddin</td>
<td>Risk Impact on Cost and Time From the Factors of Contractor’s Managerial and Operational</td>
</tr>
</tbody>
</table>

### Parallel Session 2: Geology, Mining And Petroleum & Mechanical And Industrial Engineering

**Time:** 12th September 2018, Wednesday/13.45 - 15.15/B-303-A  
**Session Chair:** Dr. Abrar Muslim

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE37</td>
<td>Akram, Iskandar Hasanuddin, Nazaruddin, Zulfan, Rudiansyah Putra, M.M.Noor</td>
<td>Mechanical behavior of hybrid glass fiber - jute reinforced with polymer composite for the wall of the Acehnese boat Jalo Kayoh</td>
</tr>
<tr>
<td>SE38</td>
<td>T E Putra, Husaini, N Ali, H Husin and Zulfikar</td>
<td>Failure analysis on the fractured surface of the vehicle crankshaft</td>
</tr>
<tr>
<td>SE39</td>
<td>F Nurjaman A Sa’adah and B Suharno</td>
<td>Optimal Conditions for Selective Reduction Process of Nickel Laterite Ore</td>
</tr>
<tr>
<td>SE40</td>
<td>E Fradinata, Z.M Kesuma</td>
<td>The comparison of optimum heuristic and deterministic scheduling rules for job shop scheduling in the manufacture</td>
</tr>
<tr>
<td>SE41</td>
<td>I Pamungkas, Arhami and M Dirhamsyah</td>
<td>Monte Carlo simulation for predicting the reliability of a boiler in the Nagan Raya steam power plant</td>
</tr>
<tr>
<td>SE42</td>
<td>A Larasatia, AM Hajjib, Anik Dwiasutia</td>
<td>The Relationship between Data Skewness and Accuracy of Artificial Neural Network Predictive Model</td>
</tr>
</tbody>
</table>
## Parallel Session 3: Civil And Structural Engineering

**Time:** 12th September 2018, Wednesday/16.15 -15.15/B-303A  
**Session Chair:** Dr. Bambang Setiawan

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE43</td>
<td>Kemala Jeumpa</td>
<td>The Potential Utilization Of Natural Materials As A Wall Covering The Building In Reducing Heat</td>
</tr>
<tr>
<td>SE44</td>
<td>Muttaqin Hasan, Husaini, Nirwal Mahdi Abdullah</td>
<td>Deformation and crack analysis of tunnel structure subjected to static distributed load using pseudoshell model</td>
</tr>
<tr>
<td>SE45</td>
<td>Alfiyansyah Yulianur BC, Azmeri, Khairuddin</td>
<td>The Effect of Rainfall Interception Loss by Palm-Oil Tree towards Flood Discharge in Seunagan Watershed of Nagan Raya District of Aceh Province</td>
</tr>
<tr>
<td>SE46</td>
<td>Taufiq Saidi, Muttaqin Hasan, Fakhrurrazi</td>
<td>The comparison of earthquake design parameters of low rise building structures based on SNI-1726-2002 and SNI 1726 : 2012 at 23 districts of Aceh Province Indonesia</td>
</tr>
<tr>
<td>SE47</td>
<td>Sugianto Sugianto, Renni Anggraini, Sofyan M. Saleh, Muhammad Merfazi</td>
<td>Investigating public perceptions and its implication toward Trans Koetaradja Policy Considering Latent Motivation</td>
</tr>
</tbody>
</table>

## Parallel Session 3: Chemical Sciences and Engineering-1

**Time:** 12th September 2018, Wednesday/16.15 -15.15/B-309-A  
**Session Chair:** Dr. Sri Mulyati

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE48</td>
<td>N Fitri, Halimatussa’diah and D. Fitrriastuti</td>
<td>Extraction of strawberry fruit (fragaria sp) by maceration and microwave for antioxidant activity test</td>
</tr>
<tr>
<td>SE49</td>
<td>Sofyana Juned</td>
<td>Low-density composite board from sugarcane residue and polymer of high-density polyethylene</td>
</tr>
<tr>
<td>SE50</td>
<td>Alfan Danny Arbianto, Raodatul Jannah, Susi Kusumaningrum</td>
<td>Computational Studies of Cephalosporin Acylase Mutant in Complex With glutaryl-7-aminocephalosporanic acid as a source of Cefotaxime and Ceftriaxone Raw Material by Molegro Virtual Docker</td>
</tr>
<tr>
<td>SE51</td>
<td>Saiful, Hira Helwati, Sitti Saleha, Teuku M. Iqbalsyah, Marlisa</td>
<td>Development of Bioplastic From Wheat Starch Janeng For Food Packaging</td>
</tr>
</tbody>
</table>
Activities Inhibition Methanol Extract Laban Leaf (Vitex pinnata) on Growth of Bacteria S. mutans Atcc 31987

<table>
<thead>
<tr>
<th>Parallel Session 3</th>
<th>Geology, Mining And Petroleum &amp; Mechanical And Industrial Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>12th September 2018, Wednesday/16.15 - 15.15/B-309-B</td>
</tr>
<tr>
<td>Session Chair</td>
<td>Dr. Sarwo Edhi</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE52</td>
<td>Cut Aja Nuraskin, Marlina, Rinaldi Idroes, Cut Soraya, Djufri</td>
<td>Activities Inhibition Methanol Extract Laban Leaf (Vitex pinnata) on Growth of Bacteria S. mutans Atcc 31987</td>
</tr>
<tr>
<td>SE54</td>
<td>Husaini, E Saputra, Husni, T E Putra, and M Rachman</td>
<td>Failure analysis of a centrifugal pump shaft experiencing plastic deformation using finite element method</td>
</tr>
<tr>
<td>SE55</td>
<td>Nuzuli Fitriadi, Lindawati, Ismi Ardiansyah</td>
<td>Mechanical characteristics of marble powder composite materials reinforced kenaf fiber against static load</td>
</tr>
<tr>
<td>SE56</td>
<td>M Dirhamsyah, M Tadjuddin, A Udink, Z Yusuf, and H Y Saiful</td>
<td>The Effect of Cutting Speed on Dimension Accuracy and Burr Development of High Speed Micro Drill Processes on Aluminum</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parallel Session 3</th>
<th>Architecture, Urban And Rural Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>12th September 2018, Wednesday/16.15 - 15.15/B-303-B</td>
</tr>
<tr>
<td>Session Chair</td>
<td>Dr. Ashfa</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE57</td>
<td>Wendy Ivannal Hakim, Triatno Yudo Harjoko</td>
<td>Living Together: The Phenomenon of House Occupancy in Indonesia</td>
</tr>
<tr>
<td>SE58</td>
<td>P Kurniasari, R T Gabe, J Adianto</td>
<td>Spatial Extension as a Housing Strategy in Kampung Kota: A Case Study from Kampung Kingkit, Central Jakarta</td>
</tr>
<tr>
<td>SE59</td>
<td>M M Muhyi, R T Gabe, J Adianto</td>
<td>Defensible Space in Urban Housing in Indonesia</td>
</tr>
<tr>
<td>SE60</td>
<td>C Theresia, R T Gabe, J Adianto</td>
<td>Housing Preferences and Strategies of Javanese Migrants in Jakarta</td>
</tr>
</tbody>
</table>
### Parallel Session 4: Geology, Mining And Petroleum & Mechanical And Industrial Engineering

**Time:** 13th September 2018, Thursday/8.30 - 10.0/B-309-A  
**Session Chair:** Dr. Sarwo Edhi

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE61</td>
<td>D Harun, M I Maulana, Akhyar</td>
<td>Increased Capacity of Water Heater with A Type of Cylindrical Solar Concentrator and The Addition of Heat Storage Material</td>
</tr>
<tr>
<td>SE63</td>
<td>M Iqbal, S Bahri and A Akram</td>
<td>Effect of cutting parameter on tool wear of HSS tool in drilling of Kevlar composite panel</td>
</tr>
<tr>
<td>SE64</td>
<td>Nurhayati Sembiring and Yufrazin Pandapotan Batubara</td>
<td>The spare part maintenance of Cake Breaker Conveyor with Reliability Centered Spares Method</td>
</tr>
<tr>
<td>SE65</td>
<td>Iskandar Hasanuddin, Reza Fahrizal, and Didi Asmadi</td>
<td>Analysis of Transport Workers’ Postures in the Loading Process of Manual Material Handling Activities by Using the Photogrammetric Method</td>
</tr>
<tr>
<td>SE66</td>
<td>Bambang Setiawan, Satria Antonie, and Billy G. Adhiperdana</td>
<td>Grain-size characteristics of Aceh’s coastal deposits</td>
</tr>
</tbody>
</table>

### Parallel Session 4: Architecture, Urban And Rural Planning - I

**Time:** 13th September 2018, Thursday/8.30 - 10.0/B-309-B  
**Session Chair:** Dr. Ashfa

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE67</td>
<td>C Devina, J Adianto, R T Gabe</td>
<td>Interiorization of Public Space in A High Density Settlement: A Case Study in Kampung Cikini-Ampiun</td>
</tr>
<tr>
<td>SE68</td>
<td>D H Arima, J Adianto, R T Gabe</td>
<td>Co-residence as Housing Strategy for Betawi Families: Case Study of Betawi Family Houses in Cengkareng, West Jakarta.</td>
</tr>
<tr>
<td>SE69</td>
<td>J Lathifal, N R Kusuma, and E Arvanda</td>
<td>Creating Atmosphere in Hotel Interior Space with Material Roles: Bata Pejaten</td>
</tr>
<tr>
<td>SE70</td>
<td>Meutia Rahmadina, Nevine Rafa Kusuma, Enira Arvanda</td>
<td>Wall Finishing Materials and Heritage Science in the Adaptive Reuse of Jakarta Heritage Buildings</td>
</tr>
<tr>
<td>SE71</td>
<td>F. I. Qismullah</td>
<td>Shifting from Place to Non-Place: A Case Study on the Central Market of Banda Aceh</td>
</tr>
<tr>
<td>SE72</td>
<td>A A Fatinah, N R Kusuma, E Arvanda</td>
<td>Influence of Material Application to Way finding Issue in Underground Station Design</td>
</tr>
</tbody>
</table>
### Parallel Session 4: Architecture, Urban And Rural Planning -II
**Time**: 13 th September 2018, Thursday/8.30 -10.0/B-203  
**Session Chair**: Dr. Abdul Munir

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE73</td>
<td>Mary Thalia Travelita Pasaribu, Enira Arvanda, Nevine Rafa Kusuma</td>
<td>Active Waiting: Potentials of Waiting Area at Airport</td>
</tr>
<tr>
<td>SE74</td>
<td>Niken Rahadiani Maheswari, Enira Arvanda, Nevine Rafa Kusuma</td>
<td>Permeable Interior : Unfolding Threshold Space within Transit Corridor</td>
</tr>
<tr>
<td>SE75</td>
<td>D H Arima, J Adianto, R T Gabe</td>
<td>Co-residence as Housing Strategy for Betawi Families: Case Study of Betawi Family Houses in Cengkareng, West Jakarta</td>
</tr>
<tr>
<td>SE76</td>
<td>Mira S Lubis, TY Harjoko, D Susanto</td>
<td>Lanting’ as A Way of Life: A legacy of riverine culture and architecture in present urban life of Sintang City, West Kalimantan</td>
</tr>
<tr>
<td>SE77</td>
<td>Muhammad Haiqal, Laina Hilma Sari, Evalina Z, Purwandy Hasibuan</td>
<td>A Review of Vertical Evacuation on Tsunami Mitigation Case</td>
</tr>
</tbody>
</table>

### Parallel Session 4: Electrical, Computer Engineering & Information System
**Time**: 13 th September 2018, Thursday/8.30 -10.0/B-306  
**Session Chair**: Dr. Ira Sara

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Authors</th>
<th>Titles of Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE78</td>
<td>Faulianur R and Sara ID</td>
<td>Grey Wolf Optimization For Track Maximum Power Of Photovoltaic System In Multiple Peak Power Characteristics</td>
</tr>
<tr>
<td>SE79</td>
<td>Y W Syaifudin1, D Puspitasari1, Y Ariyanto1, R Ariyanto</td>
<td>The Design of Road Conditions Mapping System by Utilizing Openstreetmap Spatial Data</td>
</tr>
<tr>
<td>SE80</td>
<td>D Puspitasari, P P Arhandi, P Y Saputra, Y W Syaifudin, H A Himawan, P A Sholihah</td>
<td>Online Judge MySQL for Learning Process of Database Practice Course</td>
</tr>
<tr>
<td>SE81</td>
<td>Putri Ayu Rahayu, Muhammad Fiqih Firdiansyah</td>
<td>Developing Industrial Relation Information System (Iris) On Inet Essa Module In Pt. Xyz Tbk.</td>
</tr>
</tbody>
</table>
BOOK OF ABSTRACTS

The 8th AIC on Sciences and Engineering

The Annual International Conference 2018
Syiah Kuala University

“Connecting the World through Innovation and Sustainable Development”

Banda Aceh, Aceh, Indonesia
September 12-14, 2018
Track Mathematical Sciences & Physical Sciences and Engineering

Risk Factor for Mortality of Children among Victims in Southern Thailand

Zurnila Marli Kesuma¹, Latifah Rahayu ², Mayuening Eso³, Rasudin⁴ and Rizki Saputra⁵
¹,²,⁵ Statistics Department, Faculty of Mathematics and Natural Science, Syiah Kuala University, Banda Aceh, Indonesia
³ Department of Mathematics and Computer Science, Faculty of Science and Technology, Prince of Songkla University, Pattani, Thailand
⁴ Informatics Department, Faculty of Mathematics and Natural Science, Syiah Kuala University, Banda Aceh, Indonesia
Email: kesumaku@yahoo.com ¹, latifah.rahayus@gmail.com ², mayuening.eso@gmail.com³, rasudin@gmail.com⁴, rizki.saputra@students.stat.unsyiah.ac.id⁵

Abstract

Conflict can be defined as any type of controversy interactions between two or more parties which occur because of the differences of status, aim, value or perception. The consequence of the conflict in a region was the incidence of fatalities, both the injured and died. Children are the society at greater risk to be the victims because of the conflict. In Southern Thailand, conflicts occur in 4 provinces which the Muslim majority, those are Pattani, Yala, Narathiwat, and Songkhla. The aims of this research were identified the factors that influence the risk of child deaths during conflict in Southern Thailand and determined the models by influence factors. The used method was binary logistic regression method. This method was chosen because the response variable that used is dichotomous. Dichotomous response variable was the risk of children died or not during the conflict in Southern Thailand. The data used were the number of children under 18 years old who were victims of the conflict from 2004 until 2014 in Southern Thailand. The results showed that the influence risks of child death during conflict in Southern Thailand are gender (odds ratio = 1.99; CI 95% = 1.38-2.88), type of guns that used was bomb (odds ratio = 0.16; CI 95% = 0.1-0.26) and the others (odds ratio = 2.46; CI 95% = 1.55-3.9), and the place of the hardness occurred was open field (odds ratio = 2.9; CI 95% = 1.54-5.48). Generally, children there were in open field and female have the greater risk of death to be victimized by bombs, rifles or any other types of guns during conflict in Southern Thailand.

Keyword : Children; Risk factor; Southern Thailand
Generalized Additive Models Fitting with Autocorrelation for Sea Surface Temperature Anomaly Data

Shafia Ananda¹, Miftahuddin²
Department of Statistics, Faculty of Mathematics and Sciences, Syiah Kuala University, Banda Aceh 23111, Indonesia
E-mail: shafia.ananda@students.stat.unsyliah.ac.id¹, miftah@unsyiah.ac.id²

Abstract

Climatic conditions in Sumatra Island are affected by Sea Surface Temperature Anomaly (SSTA) in the Indian Ocean or more commonly referred to as Indian Ocean Dipole (IOD). Extreme climate events also closely related to SSTA. Several climate features that affect SSTA such as air temperature, precipitation rain, relative humidity, wind speed, and solar radiation. SSTA is an increase or decrease in the mean of Sea Surface Temperature so required the analysis to assess extreme climatic events to the risk due to the occurrence of anomalies. Generalized Additive Models (GAM) with autocorrelation can be used to model this phenomenon. GAM method accommodates the nonlinear influence between response variables and predictor variables. The data used in this research is the time series data, daily data from 2006-2017 and there are gaps in it, where there is an autocorrelation value. The purpose of this research is to get a representative model and to know the factors that influence to SSTA. The results show that GAM's best model with autocorrelation is GAM model by including month and year variables with the monthly autocorrelation structure. Factors that affecting SSTA are the air temperature, month and year as time covariates

Keyword : SSTA, IOD, GAM, Autocorrelation
Application of ARCH model on nutmeg price forecasting in South Aceh District

A Rusyana¹, R Ferdhiana², M E Putri³
¹²³Department of Statistics, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Banda Aceh, Indonesia
E-mail: asep.rusyana@unsyiah.ac.id

Abstract

The price of nutmeg which is changing and unstable in South Aceh results to volatility. Volatility is a variance pattern of time series, especially the time series of finances caused by variance not constant. This results the possibility of heteroscedastic data, so that it needs to be made a model of a particular approach to measure residual volatility problems. The data used in this research is the price of nutmeg in South Aceh district from January 2012 to December 2016 which has volatility. ARCH (Autoregressive Conditionals Heteroscedastic) is a model used to resolve the residuals variance which is not constant in financial time series. Then this model was developed into a Generalized Autoregressive Conditional Heteroskedastic (GARCH) to avoid too high orders on ARCH models and make the variance is always positive. The purpose of this research is to get the best ARCH/GARCH model for nutmeg price in South Aceh district and get the nutmeg price forecast for January 2016 until December 2017. The results of this research show that price of nutmeg in South Aceh district is stationary to the mean after the second differencing and the result of the ARCH Lagrange Multiplier test shows the problem in the 4 lag so the data are modelled with ARCH. The best models for forecasting price of nutmeg in South Aceh district is using model of ARIMA (2,2,0)-ARCH (4). While the results of the verification of the model are obtained the value of the MAPE of 6.12 percent.

Keyword : ARCH, volatility, heteroscedastic, forecasting, nutmeg
Activities Inhibition Methanol Extract Laban Leaf (Vitex pinnata) on Growth of Bacteria S. mutans Atcc 31987

Cut Aja Nuraskin1,2, Marlina3, Rinaldi Idroes3,4, Cut Soraya5, Djufri6

1 Graduate School of Mathematics and Applied Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
2 Poltekkes Kemenkes Aceh Jl. Soekarno Hatta, Tingkeum, Darul Imarah, Lheu Blang, Banda Aceh, Kabupaten Aceh Besar, Aceh, 23231, Indonesia
3 Chemistry Department, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
4 Pharmacy Department, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
5 Conservative Dentistry Department, Faculty of Dentistry, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
6 Biology Education Department, Faculty of Teacher Training and Education, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia

E-mail: cutaja82@yahoo.co.id

Abstract
The people of Aceh, especially in the area of Le Seu’um using the surrounding plants to treat the disease. One of the plants used is laban (Vitex pinnata). Laban leaves are used to treat fever, hypertension, and toothache. Various bacteria found in the oral cavity, but only a few bacteria cause dental caries, including S. mutans. Based on the laban plant ethnombotany information, an evaluation of antibacterial activity on bacterial bioindicator of S. mutans and phytochemical screening was performed. Laban plants contain flavonoids, saponins, and tannins. The study aims to determine the inhibition activity of laban leaf methanol extract (Vitex pinnata) on the growth of S. mutans bacteria in vitro. The antimicrobacterial activity was tested by using the Kirby-Bauer method with the extract concentration of 30%, 40%, 50% and 60%. The results showed that there was an inhibition activity with the significance of 0.000 < 0.05, hypothesis in this research can be accepted that Laban leaf methanol extract (Vitex pinnata) has inhibition activity, the higher the concentration the higher inhibition power.

Keyword: Methanol extract; laban (Vitex pinnata); Streptococcus mutans
The upwelling dynamics in the Aceh Waters using CMEMS ocean model

Y Ilhamsyah\textsuperscript{1,2}, Y Koesmaryono\textsuperscript{1}, R Hidayat\textsuperscript{1}, IW Nurjaya\textsuperscript{3} and AS Atmadipoera\textsuperscript{3}

\textsuperscript{1}Applied Climatology, Graduate School of Bogor Agricultural University, Bogor 16680, Indonesia
\textsuperscript{2}Dept. of Marine Sciences, Faculty of Fisheries and Marine Sciences, Syiah Kuala University, Banda Aceh 23111, Indonesia
\textsuperscript{3}Dept. of Marine Sciences and Technology, Faculty of Fisheries and Marine Sciences, Bogor Agricultural University, Bogor 16680, Indonesia

Abstract

Although Aceh Waters surrounded by vast open seas of the Andaman Sea, Indian Ocean, and the entrance of the Malacca Strait in the North, West, and East is believed to hold the most potential marine production, but the resource utilization is still less due to high operational cost. Modelling utility-scale ocean physics is feasible to develop since it is affordable and offers accuracy and reliability of the products. By using the ocean model, the upwelling areas are well-detected, the mechanisms are easily understood, and the predictability is achievable which is greatly assist the fishermen en route to the fishing ground particularly in cutting their costs to the fuel. The ocean model is derived from the Copernicus Marine Environment Monitoring Service (CMEMS). It is a three-dimensional mesoscale ocean circulation model that is governed by the primitive equations and driven by data assimilation from satellite as well as field observation in the initial and boundary condition. The spatial resolution covers 1/12° latitude and longitude between 90°E-100°E and 1.5°N-10°N while the temporal range from 2010 to 2017. Physical characteristics of the seawater, e.g., temperature, salinity, zonal and meridional components of the ocean current both surface and vertical profiles to a depth of 100m are produced to identify the movement and evolving of the water mass in the thermocline layer to gain a better interpretation to the dynamics of the upwelling in the Aceh Waters. Upwelling is often spatially characterized by counter clockwise rotation in the subsurface layer of 30m while vertically it is indicated by the rising of warm water mass to the surface. In many occasion, the upwelling events are discovered in the thermal front region where warm surrounds the cold water. In Aceh, it is detected in the offshore of East Aceh during December-March representing the west season and in the off northern coast of Aceh on April. The upwelling feature is also found in between South Aceh and Simeulue Waters. By recognizing many upwelling areas, potential of marine and fisheries resources is revealed to be well-utilized and preserved for the welfare of the Acehnese People in general and the traditional fishermen of Aceh in particular.

Keyword : thermal front; upwelling feature
The Influence of Fe3O4 on Magnetic Chitosan Composite Preparation for Methylene Blue Removal from Water

Ismaturrahmi, Rahmi¹ and Irfan Mustafa
Chemistry Department, Syiah Kuala University, Banda Aceh, Indonesia, 23111
Email: rahmi@fmipa.unsyiah.ac.id

Abstract
The influence of Fe₃O₄ on magnetic chitosan composite preparation for methylene blue removal from water had been studied. Fe₃O₄ was loaded on chitosan with various content. The obtained magnetic chitosan composites were characterized by Fourier Transform Infrared (FT-IR), Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD) analysis. Results showed Fe₃O₄ loading on magnetic chitosan composites preparation improved methylene blue adsorption capacity of chitosan. The best ratio of chitosan/Fe₃O₄ obtained in this work was 0.35g/0.5g. The methylene blue adsorption capacity of the magnetic chitosan was higher than pure chitosan. It showed that magnetic composite can be used as potential adsorbent for methylene blue removal from water

Keyword: chitosan, Fe3O4, methylene blue, adsorption, composite
Geochemistry of Warm Springs in the le Brôuk Hydrothermal Areas at Aceh Besar District

R Idroes1, M Yusuf1, M Alatas1, Subhan1, A Lala1, Muslem1, R Suhendra2, G M Idroes3, Suhendrayatna3, Marwan4,5 and M Riza3

1 Department of Chemistry, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
2 Department of Informatics, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
3 Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
4 Graduate School of Mathematics and Applied Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
5 Department of Geophysics Engineering, Faculty of Engineering, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia

E-mail: rinaldi.idroes@unsyiah.ac.id

Abstract
Indonesia is a country with the largest geothermal potential resource in the world, estimated of 28,617 MW or equivalent to 40% of the world's geothermal potential. Geothermal energy is environmentally friendly and quite economical compared to fossil energy. Seulawah Agam is one of Indonesia's geothermal fields that has several manifestation zones, including le Brôuk (BH1 and BH2) manifestations. The analysis for this study was conducted by acid-base titration, UV-Vis Spectrophotometry and Atomic Absorption Spectroscopy (AAS). The data analysis of cations and anions were plotted in liquid chemistry worksheet plotting spreadsheet version 3 Powell geoscience September 2012 by Powell and Cumming. The type of manifestation fluid is bicarbonate, obtained from the geoindicator Cl-SO4-HCO3 while the water condition is immature based on Na-K-Mg ternary diagram. The le Brôuk reservoir temperature was 289 °C and 291 °C obtained from Na/K geothermometer Tonani (1980) and Na/K Giggenbach (1988) respectively. Then the le Brôuk manifestation classified as a high-temperature geothermal system.

Keyword: Asam sunti powder, drying, tray dryer, spray dryer
Effects of Temperature and Duration of Drying on the Quality of Powdered Asam Sunti

S Mulyati*, F A Pramesty2, Fahliza Meutia2, Adela Rinaldi2, Siti Maysarah Siregar2, Syawaliah3

1Department of Chemical Engineering, Syiah Kuala University, Banda Aceh, Indonesia, 23111
2Undergraduate Student of Chemical Engineering, Syiah Kuala University, Banda Aceh, Indonesia, 23111
3Student of Graduate School of Engineering Science, Syiah Kuala University, Indonesia
E-mail: sri.mulyati@unsyiah.ac.id

Abstract

Generally, Acehnese use asam sunti as a spice in cooking. Asam sunti is made from dried bilimbi, it has a flat shape with brownish colour. To increase the aesthetic value, ease of storage and to maintain its quality, asam sunti is produced in powder form. The quality of asam sunti is determined from several parameters such as water content, ash content and oxalic acid content. The powdered asam sunti was prepared by using Tray and Spray Dryer. The effects of temperature and duration of drying on the quality of asam sunti have been studied. Aesthetically, it is seen that the powdered asam sunti has better appearance than that of the original form. The water, ash and oxalic acid contents in the powdered asam sunti dried using a spray dryer was lower than that of dried by tray dryer. The optimum temperature was obtained at 80 ºC. The optimum drying time were 45 minutes and 3 hours for spray and tray dryer, respectively. Water, ash and oxalic acid contents in optimum condition with tray dryer were 49.7%, 26.3% and 10.4%, consecutively. Meanwhile, by using spray dryer, the product has higher quality in terms of water content (4.7%), ash content (14.25%) and oxalic acid level (9.48%).

Keyword: -
Deposition of Polydopamine on the Surface of Polyvinylidene Fluoride (PVDF) Membrane as A UV-Shielding Layer

Syawaliah¹, Mukramah¹, S Mulyati²*, M Riza¹,², N Arahman²
¹Doctoral School of Engineering Science, Syiah Kuala University, Banda Aceh, Indonesia 23111
²Department of Chemical Engineering, Syiah Kuala University, banda Aceh, Indonesia, 23111

E-mail: sri.mulyati@unsyiah.ac.id

Abstract
This paper discusses about the influence of polydopamine layer in enhancing UV resistance of PVDF membrane for membrane photocatalytic reactor application. The PVDF membrane was prepared by common NIPS method using DMAc as a solvent and PEG as a pore-forming additive. The polydopamine layer was deposited on the membrane surface by the facile dip-coating method through Tris-buffered dopamine polymerization. The UV-shielding effect of PDA layer was studied by comparing the changes in pure and PDA coated membrane coating before and after UV irradiation. The studied effects are in terms of changes in chemical, morphological structure and mechanical properties which observed by means of ATR-FTIR, FESEM instrumental analysis, and tensile measurement, respectively. The IR analysis showed that after PDA coating, the membrane surface is rich of catecholamine groups which greatly contributed as free radical scavengers. The change in chemical structure was seen on pure membrane which attributed to the rearrangement of polymer chemical structure caused by UV-induced photodegradation. FESEM imaging results showed that with PDA coating the membrane surface showed minimal damage in comparison to that of non-coated PVDF membrane. These results altogether confirmed, that the PDA layer can protect the membrane surface from UV-initiated free radicals attack.

Keyword : superabsorbent polymer; inverse suspension polymerization; factorial design
Factorial experimental design for superabsorbent carbonaceous polymer through inverse suspension polymerization method

Siti NorAinda Mazlan¹, Saidatul Shima Jamari¹

¹ Faculty of Chemical and Natural Resources Engineering, Universiti Malaysia Pahang, 26300 Gambang, Kuantan, Pahang, Malaysia
E-mail: norainda91@gmail.com, sshima@ump.edu.my

Abstract

This paper studies on the effect of synthesis parameters towards the performance of superabsorbent carbonaceous polymer (SPC) via inverse suspension polymerization method. The SPC consists of acrylic acid, acrylamide, and carbon filler. In this work, four independent factors (synthesis parameters) i.e. the content of carbon filler, the content of initiator, the content of crosslinker and reaction temperature that affecting the water absorbency of SPC was investigated. A 2⁴ full factorial design was used to investigate the effect of independent factors as well as the interaction factors on the water absorbency of SPC. Apart from reaction temperature, other factors were shown to have the significant effect on the water absorbency of SPC. The results showed the order of significance: initiator’s content > crosslinker’s content > carbon filler’s content > reaction temperature. Meanwhile, interaction factor of carbon filler’s and crosslinker’s content had the strongest effect on the water absorbency amongst the other interactions.

Keyword : -
Isolation of Pectin from Coffee Pulp Arabica Gayo for the development of Matrices Membrane

U Hasanah1,2, M Setyowati3, EdwarSYah2, R Efendi4, E Safitri4, R Idroes4,5, L Y Heng6,7 and N D Sani8

1 Graduate School of Mathematics and Applied Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
2 Department of Fishery, Faculty of Fishery and Ocean Science, Teuku Umar University, 23615 West Aceh, Indonesia
3 Department of Agronomy, Faculty of Agriculture, Teuku Umar University, 23615 West Aceh, Indonesia
4 Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Syiah Kuala, Banda Aceh 23111, Indonesia
5 Department of Pharmacy, Faculty of Mathematics and Natural Sciences, University of Syiah Kuala, Banda Aceh 23111, Indonesia
6 School of Chemical Sciences and Food Technology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, Malaysia.
7 Southeast Asia Disaster Prevention Research Initiative (SEADPRI-UKM), LESTARI, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor Darul Ehsan, Malaysia.
8 Sanichem resources Sdn. Bhd. No 7 & 7A Jalan Timur 6/1A Mercato Enstek, Bandar Estek 71060, Negeri Sembilan, Malaysia.

Email : e.safitri@unsyiah.ac.id

Abstract

Pectin from Arabica Gayo coffee pulp has been successfully isolated using citric acid as a solvent. The pectin extracted from the coffee pulp is determined by the extraction conditions. This study aims to produce pectin from dried coffee extract using citric acid using two factors, namely the difference factor of citric acid (1: 5 and 1: 20 b/v) and extraction time 75 and 150 minutes. The optimum ratio of Arabica Gayo coffee pulp with citric acid was 1:20 b/v with rendemen 7.8% with 125 minute extraction time and at the temperature of 80 ºC and pH 4. The methoxyl content of isolated pectin was 12.71% and has been determined as high methoxyl pectin (HMP). The result of analysis with FTIR is known that the extract produced is pectin with comparison with pectin standard. The pectin has been used as a matrix membrane and showed its smooth surface gel form and smaller diameter from scanning electron microscopy (SEM).

Keyword :-
Geochemistry of Sulphate Spring in the Ie Jue Geothermal Areas at Aceh Besar District, Indonesia

R Idroes¹, M Yusuf¹, M Alatas¹, Subhan¹, A Lala¹, Muhammad², R Suhendra³, G M Idroes⁴ and Marwan⁵,⁶

¹ Department of Chemistry, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
² Faculty of Teacher Training and Education, Abulyatama University, Lampoh Keudee, Aceh Besar 23372, Indonesia
³ Department of Informatics, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
⁴ Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
⁵ Graduate School of Mathematics and Applied Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
⁶ Department of Geophysics Engineering, Faculty of Engineering, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia

E-mail: rinaldi.idroes@unsyiah.ac.id

Abstract. Geochemical studies of geothermal manifestations in the Northern Zone of Mt. Seulawah Agam which one of them is Ie Jue manifestation. In this study, water geochemical analysis of cations and anions content was performed to observe the surface characteristics of manifestations, water manifestation type, the water balance of reservoir depth and estimate depth temperature using geothermometer equations. Cations and anions measurements were conducted using atomic absorption spectroscopy, UV-Vis spectrophotometer and acid-base titration. The data analysis was determined using spreadsheet version 3 Powell Geoscience Ltd.3 September 2012 by Powell & Cumming. The geothermal water Ie Jue manifestation was acidic pH, water sulphate type obtained from the geoindicator Cl-SO₄-HCO₃ and the immature water based on plot Na-K-Mg ternary diagram. It’s reservoir temperatures ranged from 690 °C to 761 °C in accordance with Na/K geothermometer equations based on results of Na/K Giggenbach and Fournier. The Ie Jue manifestations indicated a high-temperature geothermal system (high enthalpy) that characterized by the average temperature higher than 225 °C and suitable for power plant development.

Keyword :-
Kovats Retention Index Analysis of Flavor and Fragrance Compound using Biplot Statistical Method in Gas Chromatography Systems

R Idroes¹,², A F Japnur¹, R Suhendra³ and A Rusyana⁴

¹ Department of Chemistry, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
² Department of Pharmacy, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
³ Department of Statistics, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
⁴ Department of Informatics, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia

E-mail: asep.rusyana@unsyiah.ac.id

Abstract
Retention parameters have been introduced and used in chromatographic instrumentation analysis, one of which is the retention index. Retention index is a secondary parameter which in its calculation requires data retention time and dead time. This study uses data from flavor and fragrance retention indices with a variation of columns, boiling points and log Kow which aims to identify the level of similarity between compounds based on retention index using biplot statistical method. Biplot analysis is used to view object relationships based on the variables. The results showed that biplot could describe the relationship of a compound as an object and its retention index as a variable of 99.45%. Based on the results, the compounds can be classified into three groups. The first group has a specific retention index that is lower than other groups. The second group has a high Log Kow whereas the third group is dominated by the influence of DB-Wax column compared to other columns. Columns DB-1, OV-101, and DB-5 have a positive correlation with the correlation level close to 1.00

Keyword : retention index; compound; biplot.
Antibacterial formulation cream of ethanolic Pliek U extracts and ethanolic residue hexane Pliek U extracts against Staphylococcus aureus

N Earlia¹, C Nabila², I Inayati², R Rahmad³, M Amin⁴, C R S Prakoeswa⁵, K Khairan² and R Idroes²,³

¹ Graduate School of Mathematics and Applied Sciences, Universitas Syiah Kuala, Banda Aceh, Indonesia, 23111
² Department of Pharmacy, Faculty Mathematics and Natural Sciences, Universitas Syiah Kuala, Banda Aceh, Indonesia, 23111
³ Department of Chemistry, Faculty Mathematics and Natural Sciences, Universitas Syiah Kuala, Banda Aceh, Indonesia, 23111
⁴ Department of Biology, Faculty of Mathematics and Natural Science, Universitas Negeri Malang, Malang, Indonesia, 65145
⁵ Department of Dermatology and Venereology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, 60132

Email: nanda.lia@mhs.unsyiah.ac.id

Abstract

Indonesia as the largest archipelago country in the world is also known as a country with plenty of natural resources that can be used as traditional medicinal plants. Pliek U is a fermented crude coconut meat has been used as an ingredient in Aceh traditional food and also use as a traditional topical medicine in Aceh. Pliek U is potential as a source of free fatty acids (FFAs) such as lauric acid and monolauric acid which have antimicrobial properties. The aim of this study is to determine the activity ethanolic Pliek U extracts (EPUE) and ethanolic of residue hexane of Pliek U extracts (ERHPUE) and also the activities of their cream formulation against Staphylococcus aureus. The antibacterial activity was determined by disc diffusion method with clindamycin as a positive control. The antibacterial activity results showed that EPUE has antibacterial activity against Staphylococcus aureus with diameter inhibition zone at 8.66±0.57 mm, while ERHPUE and their cream have no activity against Staphylococcus aureus.

Keyword : Ethanol Pliek U extracts (EPUE); ethanolic of residue hexane of Pliek U extracts (ERHPUE); antibacterial activity cream; staphylococcus aureus
The Study on Composites Formation from HDPE and Sawdust/Rice Husk as Raw Materials

F Mulana¹,²,³, Mariana², Hadman M N¹, Mohibah M¹

¹ Faculty of Chemical Engineering, Universiti Teknologi MARA, Shah Alam, Malaysia
² Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam, Banda Aceh, Indonesia

E-mail: seulanga20@gmail.com

Abstract
In this study, composites were prepared using hotplate method from cheap raw materials of high-density polyethylene (HDPE) as matrix and mixture of rice husk and sawdust as filler. The small amount of coupling agent was added during preparation of composites and for comparison composite without addition of coupling agent was also prepared. The coupling agent used in this study was maleic anhydride (MA). The aim of this study is to form composites with and without addition of coupling agent and to know the effect of coupling agent addition and different ratio of matrix and filler toward mechanical properties of produced composites. Composites that contained different ratio of matrix and filler were pressed and heated at temperature of 170°C. The composites were tested its mechanical properties (bending strength and tensile strength) and water absorption capacity. The results indicated that the bending strength of the composite increased with addition of 4 wt% of maleic anhydride and with increased the percentage of filler until 50%. As for the tensile strength, the addition of 4 wt% of maleic anhydride as coupling agent increased the tensile strength significantly. The highest bending strength value of 12.8 MPa was obtained from composite prepared from raw materials contained same amount of matrix and filler and addition of 4 wt% of maleic anhydride. While the highest tensile strength value of 6.1 MPa was obtained from composite prepared from raw materials contained ratio percentage of matrix and filler (40:60 of wt%) and addition of 4 wt% of maleic anhydride.

Keyword: composite; HDPE; maleic anhydride; rice husk; sawdust
Phytochemical Screening and In vitro Cytotoxic Activity of Hexane Extract of Temurui (Murraya koenigii (L.) Spreng) Leaves against Human Cervical Cancer (HeLa) Cell Line

U Amna¹, Halimatussakdiah¹, P Wahyuningsih¹, N Saidi², R Nasution², S Y Astryna²

¹ Chemistry Department, Faculty of Engineering, Universitas Samudra, 24416 Kota Langsa, Aceh, Indonesia
² Chemistry Department, Faculty of Mathematics and Natural Sciences, Universitas Syiah Kuala, 23111 Banda Aceh, Aceh, Indonesia

E-mail: ulil_amna@unsam.ac.id

Abstract
Cancer is a chronic disease caused by the growth of abnormal cells in body tissues and includes the second deadly disease in the world where the number of sufferers increases every year. Some chemotherapy prevention agents using synthetic drugs have been used to treat cancer, but it is relatively expensive and cause poisoning that limits their use. The aim of this study was to evaluate the phytochemical and develop natural anticancer drugs from hexane extract of Temurui (M. koenigii (L.) Spreng) leaves. The phytochemical analysis showed the presence of terpenoids and steroids. Then, the hexane extract of Temurui leaves was screened for in vitro cytotoxic activity against human cervical cancer (HeLa) cell line by using the MTT assay. The result showed a very strong cytotoxic activity effects with CD₅₀ values less than 1 μg/mL. It indicated as a potent cytotoxic activity agent for HeLa cancer cells. Therefore, it is expected to conduct further research for cytotoxic test of other cancer cell lines so that it could be developed as raw materials for the manufacture of new drugs.

Keyword : Phytochemical; cytotoxic; Temurui; Murayya koenigii; HeLa, cancer
Characterization of Adsorbent Derived from Coconut Husk and Silica (SiO2)

Mariana1,2, F Mulana1, Sofyna1, N P Dian 2, M A R Lubis2

1 Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam, Banda Aceh, Indonesia
2 Undergraduate Student of Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam, Banda Aceh, Indonesia

E-mail: mariana_hasyim@yahoo.com

Abstract
Activated carbon is one of the most commonly used adsorbents because of its high adsorption effectiveness. However, an adsorbent with one type of activated carbon causes a lack of adsorption efficiency. Therefore, in this study we prepared activated carbon with two types of raw materials. The type of raw material is a combination of coconut husk and silica with several products of activated carbon contained coconut husk and silica with mass ratio of 70:30, coconut husk with and without activation and pure silica (SiO2). In this study, the raw materials were physically heated at 800 °C for 2 hours and chemically activated with H2SO4 solution for 2 hours. FTIR analysis identified a chemical group of Si-O in adsorbent at 898,83-1442.74 cm⁻¹. XRD analysis showed that the prepared adsorbent of combination coconut husk:silica; coconut husk with activation; coconut husk without activation and pure silica had silica (SiO2) composition of 83%; 75%; 62.4% and 63.2%, respectively. The water content in activated carbon of combination coconut husk:silica; coconut husk with activation; coconut husk without activation and pure silica (SiO2) was 4.41%; 3.87%; 3.21% and 2.71%, respectively and the ash content was 3.9%; 2.04%; 1.86% and 0.32% respectively. Both water content and ash content met SNI No. 06-3730-1995 with the maximum of ash and water content is 10% and 15%.

Keyword: silica, coconut husk, activated carbon, adsorbent and activation
Fabrication and characterization of microbial cellulose based membrane from nata de leri for separation of the oil-water emulsion

S Ferwinda, D R Indri, N M Erfiza, U Fathanah and F Razi

1 Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Banda Aceh, Indonesia
3 Department of Agricultural Product Technology, Faculty of Agriculture, Syiah Kuala University, Banda Aceh, Indonesia
E-mail: fachrurrazi@che.unsyiah.ac.id

Abstract

In this research, nata de leri had been produced from the fermentation of rice washing water with the addition of carboxymethylcellulose (CMC) as the additive by utilization Acetobacter xylinum. Nata de leri was then pressed by a hydraulic press to produce a thin film with the thickness about 150 μm and was utilized as the membrane for separation of the oil-water emulsion. The membranes characteristics were analyzed such as membrane functional groups by FTIR, water permeability, morphological structures, and its mechanical properties. The FTIR results showed that the functional unit of membranes with CMC additive concentrations had the similar functional unit with microbial base cellulose. The membrane water permeability was reduced by an increase of CMC concentration of 0; 5; and 10% (wt.%) those are 37.242; 30.096; and 29.322 L/m².jam.bar, respectively and increased two-fold for the membrane with CMC concentration of 15 wt.%. Membranes tensile strength slightly reduced by an increase of CMC concentration. The highest oil rejection was about 96.10% achieved by membranes with CMC 10 wt.%. Suggesting that the membrane could be used for separation of oil-water emulsion.

Keyword: rice-washing water; nata de leri; CMC; membrane; oil-water emulsion
The Potential of Five Therapeutic Herbal Medicines for Dental Treatment

D S Ningsih\textsuperscript{1,2}, R Idroes\textsuperscript{3,5}, B M Bachtiar\textsuperscript{4} and Khairan\textsuperscript{5}

\textsuperscript{1} Graduate School of Mathematics and Applied Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
\textsuperscript{2} Department of Dental Materials, Faculty of Dentistry, Syiah Kuala University, Banda Aceh 23111, Indonesia
\textsuperscript{3} Department of Chemistry, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
\textsuperscript{4} Oral Biology Department, Faculty of Dentistry, University of Indonesia, Jakarta, 10430, Indonesia
\textsuperscript{5} Department of Pharmacy, Faculty of Mathematics and Natural Sciences, Syiah Kuala University, Kopelma Darussalam, Banda Aceh 23111, Indonesia
E-mail: dee_aceh@yahoo.co.id

Abstract

Indonesia, especially in Aceh Province has huge biodiversity of natural resources in herbal medicine. \textit{Calotrophis gigantea (L)}, \textit{Acrostichum aureum (L)}, \textit{Plucheaindica (L)}, \textit{Cissus adnata} dan \textit{Abutilon indicum (L)} are Considerable have secondary metabolites of compounds that potential for dental therapeutic treatments such as anti-inflammatory, antibacterial, antifungal, antioxidant, antiseptic and as wound healing. The utilization of herbs medicine in dentistry are still limited, in this study we would provide valuable informations of each of five herbal medicines in dental therapeutics. The results indicated resources that five of herbal medicines have different abilities and potentials in treating diseases / abnormalities in the oral cavity. The selection and the use of Appropriate herbal medicines can give a therapeutic effect to the health of the oral cavity. The qualities of the five herbs are directly proportional to Reviews their ability as alternative therapeutics in dentistry. To produce a good potential of herbal medicines in dentistry are still needs to do a lot of supporting research.

Keyword: Antibacterial; antimicrobial; anti-inflammatory; herbal medicines; dental therapeutic
Synthesis of Kieserite Fertilizer by Using Natural Magnesite Ore as Raw Material

Farid Mulana
Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Banda Aceh 23111, Indonesia
E-mail: seulanga20@gmail.com

Abstract
Magnesite ore is one kind of rare minerals that can be found in area of Aceh Besar District, Province of Aceh and other two provinces. The further treatment of this rare magnesite mineral containing mainly magnesium to form kieserite fertilizer product with composition magnesium and sulphur would be more benefit. The purpose of this study is to study the synthesis of kieserite fertilizer from magnesite ore as raw material with addition of sulphur and to see whether the composition of prepared product meet the specification of kieserite fertilizer as stated in SNI 02-2807-1992. The synthesis was carried out by mixing the treated natural magnesite ore and the solid sulphur in a ball mill. The product of kieserite fertilizer was then analyzed according to SNI 02-2807-1992. The results showed that kieserite fertilizer can be produced from raw material of magnesite ore and a product met the SNI 02-2807-1992. The prospective product of kieserite fertilizer was obtained after mixing magnesite ore with addition 20 wt% of solid sulphur. The composition of prepared kieserite fertilizer was in range of 26.72-30.20 wt% for MgO, 20.29-23.93 wt% for S and 0.40-0.76 wt% for free water content with the prospective product composition was 30.20 wt% for MgO, 23.93 wt% for S and 0.45 wt% for free water content.

Keyword: magnesite ore; sulfur; kieserite; magnesium; fertilizer
Effect of H2SO4 concentration on cellulose isolation from palm empty fruit bunches.

Nilawatia, Rahmi9, and Lydia Septa Desiyana

Chemistry Department, Syiah Kuala University, Banda Aceh, Indonesia
Pharmacy Department, Syiah Kuala University, Banda Aceh, Indonesia
E-mail: rahmi@fmipa.unsyiah.ac.id

Abstract

Isolation of cellulose from palm empty fruit bunches had been conducted. Isolation was conducted with H2O2 30% and H2SO4 with various concentrations (20, 30, 40, and 50%). Hydrolysis and bleaching processes were performed for 90 minutes. The obtained cellulose was characterized by Fourier Transform Infrared (FTIR), X-Ray Diffraction (XRD) and Scanning Electron Microscope (SEM). FTIR analysis confirmed the typical bands of cellulose in the sample. XRD patterns showed increasing H2SO4 concentration on hydrolysis process increased crystallinity of cellulose. However, at H2SO4 concentration more than 40% the crystallinity of cellulose reduced. It was due to the reduction of crystalline part of cellulose.

Keyword: cellulose; hydrolysis; bleaching; crystallinity
Characterization of Adsorbent Derived from Coconut Husk and Silica (SiO2)

Mariana1,2, F Mulana1, Sofyan1, N P Dian 2, M A R Lubis2

1 Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam, Banda Aceh, Indonesia
2 Undergraduate Student of Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam, Banda Aceh, Indonesia

E-mail: mariana_hasyim@yahoo.com

Abstract
Activated carbon is one of the most commonly used adsorbents because of its high adsorption effectiveness. However, an adsorbent with one type of activated carbon causes a lack of adsorption efficiency. Therefore, in this study we prepared activated carbon with two types of raw materials. The type of raw material is a combination of coconut husk and silica with several products of activated carbon contained coconut husk and silica with mass ratio of 70:30, coconut husk with and without activation and pure silica (SiO2). In this study, the raw materials were physically heated at 800 °C for 2 hours and chemically activated with H2SO4 solution for 2 hours. FTIR analysis identified a chemical group of Si-O in adsorbent at 898.83 - 1442.74 cm⁻¹. XRD analysis showed that the prepared adsorbent of combination coconut husk: silica; coconut husk with activation; coconut husk without activation and pure silica (SiO2) composition of 83%; 75%; 62.4% and 63.2%, respectively. The water content in activated carbon of combination coconut: silica; coconut husk with activation; coconut husk without activation and pure silica (SiO2) was 4.41%; 3.87%; 3.21% and 2.71%, respectively and the ash content was 3.9%, 2.04%; 1.86% and 0.32% respectively. Both water content and ash content met SNI No. 06-3730-1995 with the maximum of ash and water content is 10% and 15%.

Keyword: silica, coconut husk, activated carbon, adsorbent and activation
The Influence of Fe₃O₄ on Magnetic Chitosan Composite Preparation for Methylene Blue Removal from Water

Ismaturrahmi, Rahmi¹ and Irfan Mustafa
Chemistry Department, Syiah Kuala University, Banda Aceh, Indonesia, 23111

Email: rahmi@fmipa.unsyiah.ac.id

Abstract
The influence of Fe₃O₄ on magnetic chitosan composite preparation for methylene blue removal from water had been studied. Fe₃O₄ was loaded on chitosan with various content. The obtained magnetic chitosan composites were characterized by Fourier Transform Infrared (FT-IR), Scanning Electron Microscopy (SEM) and X-Ray Diffraction (XRD) analysis. Results showed Fe₃O₄ loading on magnetic chitosan composites preparation improved methylene blue adsorption capacity of chitosan. The best ratio of chitosan/Fe₃O₄ obtained in this work was 0.35g/0.5g. The methylene blue adsorption capacity of the magnetic chitosan was higher than pure chitosan. It showed that magnetic composite can be used as potential adsorbent for methylene blue removal from water.

Keyword: chitosan, Fe₃O₄, methylene blue, adsorption, composite
Application Bentonite of Bener Meriah Aceh to improve mechanical properties of Polypropylene-Montmorillonite Nanocomposite

Julinawati*, Basuki Wirjosentono, 2, Eddiyanto3, Saharman Gea2, Ichwana4
1Chemistry Department, Faculty of Mathematics and natural science, Universitas Syiah Kuala
Jalan Tgk. Tanoh Abe Nomor 3, Kopelma Darussalam, 23111 Banda Aceh, Indonesia
2Chemistry Department, Faculty of Mathematics and natural science, Universitas Sumatera Utara
Jalan Bioteknologi No.1 Kampus USU, 20155 Medan, Indonesia
3Chemistry Department, Faculty of Mathematics and natural science, Universitas Negeri Medan
Jl. Willem Iskandar Psr. V Medan Estate, 20222 Sumatera Utara, Indonesia
4Department of Agricultural Engineering-Faculty of Agriculture, Universitas Syiah Kuala
Jl. Tgk. Hasan Krueng Kalee No. 3 Kopelma Darussalam, 23111 Banda Aceh, Indonesia

Email: julinawati@unsyiah.ac.id

Abstract
Research on application of bentonite Bener Meriah of Aceh to improve the mechanical properties of polypropylene-montmorillonite nanocomposite has been done. Bentonite was isolated into nano-sized montmorillonite and used as a filler of polypropylene-montmorillonite nanocomposites by the addition of PP-g-MA as a compatibilizer and octadecylamine as a modifier of MMT. The results showed that bentonite of Bener Meriah Aceh contained montmorillonite of 70.6%. Based on the result of mechanical properties test, it was found that montmorillonite isolated from Bentonite of Bener Meriah could improve the mechanical properties of PP-MMT nanocomposite in composition ratio of PP/PP-g-MA/MMT is 85/10/5

Keyword: Bentonite, Bener Meriah Aceh, montmorillonite, polypropylene, nanocomposite, mechanical properties.
Activated carbon from passion fruit peel as adsorbent in crude glycerol purification

B K S Sipahutar1*, E Sundari1, V Pramananda1 and E Misran1,2

1Department of Chemical Engineering, Faculty of Engineering, Universitas Sumatera Utara, Medan 20155, Indonesia.
2Sustainable Energy and Biomaterial Center of Excellence, Universitas Sumatera Utara, Medan 20155, Indonesia.

Email: bangkit.syahputra26@gmail.com

Abstract

Pure glycerol has high economic value and therefore it is critical for attempting to purify glycerol from biodiesel by-products. This research aimed to define the process of making activated carbon of passion fruit (Passiflora edulis) peel and to determine its effectiveness as adsorbent in the purification of crude glycerol produced from biodiesel production. This research conducted in two steps: synthesis of activated carbon from passion fruit peel and glycerol purification by adsorption using the activated carbon. The best activated carbon with time of carbonization variations of 30; 60; 90 and 120 min and percentage of activator variations were 0%, 2.5%, 5% and 7.5% that conforms to the standard that is with 60 min carbonization by addition 5% activator of Na₂CO₃. The initial purity of crude glycerol is 64.46%. Purification process was carried out by the addition of 1%, 3%, 5% and 7% activated carbon. The final purity from each variation after adsorption was 64.46%, 69.07%, 82.88% and 87.49%. The best activated carbon variation dose was 7% with the percentage of adsorption of 35.71%. At this condition, the glycerol purity after adsorption process met the purity level of commercial glycerol.

Keyword: activated carbon, glycerol purification, passion fruit peel
Extraction of strawberry fruit (Fragaria sp) by maceration and microwave for antioxidant activity test

N Fitri1, Halimatussa’diah1 and D. Fitriastuti1

1 Department Chemistry, Universitas Islam Indonesia, Jl. Kaliurang KM 14.5, Besi, Sleman, Yogyakarta, Indonesia.
E-mail: noor.fitri@uii.ac.id.

Abstract
A research on strawberry fruit extraction (Fragaria sp) by maceration and microwave and antioxidant activity test has been conducted. To comparison result between maceration and microwave extraction techniques and IC50 antioxidant activity from strawberry fruit ethanol extract. The research steps are: sample preparation, maceration and microwave extraction with 96% ethanol solution, phytochemical screening test, flavonoids compound identification using UV-Vis Spectrophotometer, FTIR and LC MS/MS, antioxidant activity test with DPPH method. The yield of extraction of 5.77%, 2.12%, 1.55% and 2.58% are achieved from 24 hours maceration and 3, 5 and 7 min microwaves, respectively. The phytochemical screening result shows that strawberry fruit ethanol extract contains tannins, flavonoids, alkaloids, and saponins compounds. The identification result of flavonoids compounds by UV-Vis spectrophotometer shows that strawberry fruit ethanol extract is suspected to have isoflavones compound. The FTIR spectra shows the existence of specific function groups of flavonoids compound such as OH, C-O alcohol, C=C aromatic, C-H aromatic, C-H alifatic, C=O and C-O ether. Antioxidant activity test by DPPH method shows that strawberry fruit ethanol extract from 24 h maceration and 3, 5 and 7 min microwave has IC50 of 50.61 ppm and 67.97, 118.45 and 61.42 ppm, respectively. The identification result using LC-MS-MS shows the existence of isoflavones compound peak i.e. formononetin and daidzin. The extraction techniques comparison result of strawberry fruit ethanol extract shows the highest yield and the best antioxidant activity with maceration techniques. This shows that the antioxidant activity of strawberry fruit ethanol extract with maceration technique is more active than the microwave technique.

Keyword: strawberry, extraction, maceration, microwave, antioxidant
Low-density composite board from sugarcane residue and polymer of high-density polyethylene

Sofyana Juned
Syiah Kuala University
Email:sofyana71@unsyiah.ac.id

Abstract
Bagasse is one of biomass wastes often found in the sugar industry. In large quantities, such wastes are a problem for environmental sustainability because it is not handled properly. Likewise, plastic wastes are an environmental problem with difficulty coping. Both of these wastes can be integrated into a product with economic value by processing it into a composite board. The research aims to produce low-density composite boards and to study the process variables that influence its manufacturing process, namely the compressing temperature and Maleic Anhydride (MAH) as a coupling agent. HDPE plastic waste will be tested as an adhesive for the manufacture of composite boards. The composite board is made by preparing the raw material with the drying of the sugarcane residue and the dissolving of the plastic waste using xylene solvent. Furthermore, the mixing process is carried out with various coupling agents by 2, 4, 6, 8, and 10%, as well as the hot press temperatures by 160, 180, and 200°C. The results showed that the optimum value of the hot press temperature of the composite board was 160°C with 10% coupling agent concentration. The value of the thickness expansion was in the range of 0.0021–0.0153%, the water absorption was 0.067–0.640%, and the average density was 449.80 kg/m³. Its MOE was 92.188–459.901 Mpa, the MOR was in the range of 1.92–3.07 Mpa, and the DSC analyses were 5.3 and 23.52 KJ/g at 2% and 10% MAH concentrations, respectively. The physical and mechanical tests of the composite board obtained have fulfilled the standard of SNI 03-2105-1996 with the exception for MOR.

Keyword: sugarcane residue, coupling agent, composite, High-Density Polyethylene (HDPE)
Development Bioplastic From Wheat Starch Janeng For Food Packaging

Saiful Saiful, Hira Helwati, Sitti Saleha, Teuku M. Iqbalsyah, Marlisa
Chemistry Department Faculty of Mathematics and Natural Science Syiah Kuala University
Email: alfan.danny@bppt.go.id

Abstract
Agricultural and industrial products needs a high performance of packaging that can preserve its properties in a long period. A high performance bioplastic was developed in this study. Bioplastics was prepared by casting over the glass plate and formed by phase inversion method. Glycerol and palm oil were used as plasticizer to modify mechanical properties. High tensile strength was obtained by adding glycerol as plasticizer. Bioplastics are made from a mixture of starch and glycerol provides transparent films, a high tensile strength and elongation value. The best bioplastics composition were 12 % of starch and 5 % of glycerol as plasticizer. The addition of plasticizers of glycerol to the concentration of 5 %, bioplastics has a high tensile value that is equal to 20.95 kgf/mm² and 42.69 % of elongation. Bioplastics are made from starch can be used for packaging apples and tomatoes slice.

Keyword: Dioscorea hispida; bioplastics; packaging; biodegradable
Enhanced Oil Recovery Concept for CCS Future

Muhammad Iqbal Dista¹
¹Badan Pengelola Migas Aceh (BPMA), Banda Aceh, Indonesia;
*Corresponding author: Iqbal.dista@gmail.com

Abstract
Even though known as proven and effective EOR mechanism, implementing CO2 flooding in mature oil field is easier said than done. There are several definite factors which determine a degree of success of these projects: miscibility & MMP, residual oil saturation after gas flooding, WAG ratio and geological properties. Therefore, reservoir simulation is a key to gain better understanding of those definite factors and to obtain the best operational scenario for actual applications. In this thesis, investigation towards several parameters related to CO2 flooding is performed by reservoir simulation. The result from reservoir simulation indicates that the operation schedule defines the degree of success in this project. Different injection schedule will affect the ultimate recovery factor and the operation lifetime, thus expanding the utilization of CO2. Moreover, among many factors involved in the application of CO2 flooding, the primary obstacle is a sustainable supply of CO2. Noted that not less than 7000 scf CO2 is needed to recover at least 1 bbl oil. Those CO2 rate can rise significantly depending on type of the formation, operation schedule and miscibility phase. As the world becomes more concerned to the emission produced by human activities, Carbon Capture Storage (CCS) plays a significant role in emission reduction. The CCS concept is basically to inject the CO2 to the geological formation. This concept simultaneously is considered to be a new driver for the compliance of CO2 supply in EOR projects. Therefore, the next generation of CO2-EOR is expected to be supplied from anthropogenic sources rather than from conventional natural source. Among many industrial activities which produce green house gas emissions, the most potential sources in terms of amount of CO2 produced and technology availability are natural gas processing plant and coal fired power plants. Natural gas processing plants supply a significant amount of CO2 by separating CO2 content in the natural gas stream e.g. using amine (MEA). Meanwhile, by equipping carbon capture technology such as IGCC, future or retrofitted coal fired power plant can also be a reliable CO2 supply source in the future. Nevertheless, to compromise the objective of CCS, CO2 sequestration while performing CO2-EOR is a crucial part in its operation. In the future, CO2-EOR would have three different models with respect to the carbon injection.

Keyword : CCS, EOR, CO2, oil, gas, sequestration
Grain-size characteristics of Aceh’s coastal deposits

Bambang Setiawan¹, Satria Antonie², and Billy G. Adhiperdana³

¹Program Study of Geological Engineering, Faculty of Engineering, Syiah Kuala University, 23111 Banda Aceh, Indonesia
²Faculty of Sciences, King Abdulaziz University, 21589 Jeddah, Saudi Arabia
³Faculty of Engineering Geology, Padjadjaran University, 45363 Jatinangor, Indonesia

Abstract
This study investigates the grain size characteristics and sediment types of the Aceh’s coastal deposits that are primarily based on the sieve analysis. This study is mainly driven by two reasons. Firstly, this study will be a preliminary effort to identify coastal sediment in the Aceh coastal area which was produced by ordinary coastal processes such as tidal- and along shore current-related processes or by processes other than tidal- and shore-related processes such as deposits associated with the tsunami event as the coastal area of the Aceh Province is directly facing the forearc environment. This region is tectonically unstable and often shaken by destructive earthquake in the offshore which can generate tsunami wave. Grain size analysis can determine the strength of currents that transported the sediment. Therefore, the paleohydraulic conditions size can be interpreted. In addition, the variations in sorting and skewness reflect the transport mechanism of the sediment. This information is important to interpret the support mechanism of sediment during transportation and depositional processes. In this study, 10 sediment deposits from both east and west coasts of Banda Aceh were collected. Laboratory sieve analysis will be carried out to these samples. Then, an analysis of this sieve analysis is carried out. The analysis will reveal the paleohydraulic condition and past transport mechanism of the deposits.

Keywords: sediment deposit; grain size analysis; paleohydraulics
Single microtremor method for estimating site fundamental frequency at a site in the historical city of Byblos - Lebanon

B. Setiawan¹, N. Tumur-Uyal², and M. S. Oucherif³

¹Program Study of Geological Engineering, Faculty of Engineering, Syiah Kuala University, Indonesia bambang.setiawan@unsyiah.ac.id
²Department of Geology & Geophysics, National University of Mongolia, Mongolia t.narangarav@yahoo.com
³Geoexplo, Cheraga, Algiers, Algeria oucherifmedsaid@hotmail.com

A single ambient noise measurement has been found to be useful in investigating the near-surface geology in particularly for estimating site fundamental frequency. This single microtremor method is very attractive and has been successfully applied in many projects as the method is non-destructive, low cost, feasible for urban environments, fast, and deep penetration. Furthermore, this single microtremor method has been successfully applied in many projects. This paper presents the application of the single microtremor method to estimate the site fundamental frequency at a site in the historical city of Byblos, Lebanon. Pre-processing of industrial origin detection will be carried out. Several durations of the measurements will be investigated to obtain the most stable results. The site fundamental frequency will be validated using one-dimensional site response analysis.

Keywords: microtremor, site fundamental frequency, Byblos, Lebanon
Effect of Sodium Sulfate and Sodium Chloride in Two Stage Thermal Upgrading of Low-grade Nickel Lateritic Ore

B Suharno1 C Ramadini1 R H Shaleh1 A Shofi1 and F Nurjaman2

1Metallurgical and Materials Engineering Department, Faculty of Engineering Universitas Indonesia, Kampus Baru UI Depok, 16424 – Indonesia
E-mail: suharno@metal.ui.ac.id

2Indonesian Institute of Science, Lampung, Indonesia
E-mail: fajar.nurjaman@lipi.go.id

Abstract
Selective reduction process and magnetic separation of nickel lateritic ore were conducted through the two-stage thermal mechanism with the addition of sodium sulphate and sodium chloride as the additives agent. The first thermal process was pre-heating at temperature of 500°C and holding for 90 minutes. Afterward, the reduction continued at temperature of 1150°C for the same holding time. The mineralogical composition of the reduced samples was determined by XRD. The microstructure of reduced nickel laterite ore was also examined using SEM-EDS. The optimum composition of the additive was the combination of 10% Na2SO4 + 10% NaCl, which produced a concentrate with 5.52% and 85.89% for nickel grade and nickel recovery, respectively.

Keyword: Low-grade Nickel, Two-stage Thermal Upgrading, Ferronickel, Sodium Sulfate, Sodium Chloride
The degree of filler dispersion, rheometric and mechanical properties of carbon black-filled styrene-butadiene rubber composites in presence of alkanolamide

I Surya*1,2, H Ismail3
1Department of Chemical Engineering, Faculty of Engineering, Universitas Sumatera Utara, Medan, 20155, Indonesia
2Sustainable Energy and Biomaterial Center of Excellence, Faculty of Engineering, Universitas Sumatera Utara, Medan, 20155, Indonesia
3School of Materials and Mineral Resources Engineering, Engineering Campus, Universiti Sains Malaysia, 14300, Nibong Tebal, Penang, Malaysia
*E-mail: indradanas@yahoo.com

Abstract
The degree of filler dispersion, rheometric and mechanical properties of carbon black (CB)-filled styrene-butadiene rubber (SBR) composites in presence of alkanolamide (ALK) were investigated using a semi-efficient sulphur accelerated vulcanisation system. The ALK was prepared from Refined Bleached Deodorized Palm Stearin and diethanolamine and added into the CB-filled SBR composites at 1.0, 3.0, 5.0 and 7.0 parts per hundred rubber (phr). It was found that ALK decreased the scorch time, cure time and minimum torque of the CB-filled SBR composites. The ALK also increased the torque difference, tensile modulus, hardness, resilience and tensile strength; especially up to a 5.0 phr of loading. Due to its plasticising effect, ALK improved the degree of CB dispersion and increased the elongation at break of the CB-filled SBR composites. The crosslink density was increased by improving the degree of CB dispersion and rubber-filler interaction, respectively. The 5.0 phr of ALK was the optimum loading for CB-filled SBR composites which exhibited the highest values in tensile modulus, hardness, resilience and tensile strength.

Keyword : Degree of filler dispersion; Rheometric properties; Mechanical properties; Carbon black; Natural rubber; Composites; Alkanolamide
The effects of stearyl alcohol addiction on rheometric and tensile properties of silica-filled natural rubber composites

I Surya*, M Ginting3, V Purwandari4
1Department of Chemical Engineering, Universitas Sumatera Utara, Medan, Indonesia
2Sustainable Energy and Biomaterial Center of Excellence, Faculty of Engineering, Universitas Sumatera Utara, Medan, Indonesia
3Department of Science of Chemistry, Universitas Sumatera Utara, Medan, Indonesia
4Department of Science of Chemistry, Universitas Sari Mutiara, Medan, Indonesia

*E-mail: indradanas@yahoo.com

Abstract
The effects of the stearyl alcohol (SA) incorporation as a new rubber additive on rheometric and tensile properties of silica-filled natural rubber (NR) composites were investigated using a semi-efficient vulcanisation system. The NR composite was filled with silica filler with a fixed loading, 30.0 parts per hundred rubber (phr). The SA was a fatty alcohol based on palm kernel oil and incorporated into the silica-filled NR composites at 1.0, 2.0, 3.0 and 4.0 phr. It was found that the incorporation of SA increased the scorch time but decreased the cure time of silica-filled NR composites. It was also found that SA acted as an internal plasticiser which decreased the minimum torque and tensile modulus but increased the elongation at break of silica-filled NR composites. The SA increased the torque difference/crosslink density and tensile strength up to 2.0 phr of loading. The 2.0 phr of SA was the optimum loading. From the overall results could be concluded that the SA produced softer silica-filled NR composites with a higher tensile strength.

Keyword: Stearyl alcohol; Rheometric properties; Tensile properties; Natural rubber; Composite; Silica
Experimental study on diesel engine coupled with a catalytic converter run on dual-fuel mode using biogas produced from agricultural waste

Himsar Ambarita
Sustainable Energy Research Centre, Faculty of Engineering, University of Sumatera Utara, Medan 20155, Indonesia
Email: himsar@usu.ac.id

Abstract
This work studied experimentally the performance and exhaust gas emission of a diesel engine coupled with a catalytic converter run on dual-fuel mode using refined biogas resulted from agricultural waste. The content of methane on the biogas is 70%. The experiments were carried out at constant load 1500 kW. The engine rotation varies from 1000 rpm to 1500 rpm. The biogas flow rate varies from 0 to 6 L/min. The output power of the engine operated on dual-fuel mode is better than the engine operated with pure diesel. The brake thermal efficiency of the diesel engine with flow rate of 2 L/min and 4 L/min is better than diesel only. The specific fuel consumption of the diesel engine operated on dual-fuel mode is higher than pure diesel mode. The opacity number of the engine operated on dual-fuel mode is higher than pure diesel mode. However, the CO number and HC number of the engine operated on dual-fuel mode are higher than pure diesel mode. The diesel replacement ratio is within the range 15.6% % to 74.8%. It is recommended to run the present diesel engine in dual fuel mode with biogas flow rate 2 L/min - 4 L/min.

Keyword : Diesel Engine; Catalytic Converter; Dual-Fuel; Biogas
Effects of welding on the change of microstructure and mechanical properties of low carbon steel

Husaini, N Ali, J K Hamza and S E Sofyan
Department of Mechanical Engineering, Syiah Kuala University, Jl. Syech Abdurrauf No.7, Darussalam-Banda Aceh, 23111, Indonesia
E-mail: husainiftm@unsyiah.ac.id

Abstract
Mostly Steel Construction is connected by using welding technique. The result of the welding process can cause the change of mechanical properties of the welding zone. Therefore, the change caused by the welding needs to be reviewed to guarantee the quality of the welding zone. This research’s purpose is to assess the effect of welding to the microstructure change and the connection of produced mechanistic characteristic. Low carbon steel is welded by using Shield Metal Arc Welding method (SMAW) with electrode E7016, diameter 2.6 mm. Type of notch used is single V with angle 70° and welding position is 1G. Then continued to Charpy impact test, Rockwell hardness and micro-macro structure monitoring on the welding zone including base metal, Heat Affected Zone (HAZ) and weld metal. The result of this research shows that the highest impact toughness value at metal welding area of 251 joule/mm², and lowest impact toughness is at the heat affected area (HAZ) with a value of 119 joule/mm². Hardness values of welding zones are found of about 87.6 HR₈ for weld metal, 73.9 HR₈ for HAZ zone and 67.1 HR₈ for the base metal. Microstructure of weld metal zone, HAZ and base metal are included on ferrite and pearlite formed by welding on low carbon steel AISI 1010 observer by using an optic microscope.

Keyword: Low carbon steel; SMAW; Impact Charpy; HAZ; Micro Structure
Mechanical behavior of hybrid glass fiber - jute reinforced with polymer composite for the wall of the Acehnese boat Jalo Kayoh

Akram¹, Iskandar Hasanuddin¹, Nazaruddin², Zulfan², Rudiansyah Putra³, M.M.Noor⁴

¹) Department of Mechanical and Industrial Engineering, Faculty of Engineering University of Syiah Kuala Banda Aceh, Indonesia
²) Department of Informatics, Faculty of Mathematics and Natural Sciences, University of Syiah Kuala, Banda Aceh, Indonesia
³) Department of Civil Engineering, Faculty of Engineering University of Syiah Kuala Banda Aceh, Indonesia
⁴) Faculty of Mechanical Engineering, University Malaysia Pahang (UMP), Malaysia
E-mail: akram@unsyiah.ac.id

Abstract

Hybrid fiber composites are the most widely used composites in engineering applications, especially for the frame and wall structure of Acehnese traditional boat Jalo Kayoh. The purpose of this study is to obtain a hybrid material which is a blend of natural jute fiber reinforced with the synthetic fibers e-glass and polyester as a matrix. The materials potential to become a material for the structure and walls in the traditional Acehnese boat Jalo Kayoh. The fabrication of the hybrid composites is carried out manually using an engineered press at a pressure of 25 kg/cm² for 24 hours. The ratio of jute fiber and e-glass in the composites at each layer are (1:0), (1:1) and (2:1). Tensile testing of the hybrid composites refers to ASTM D 3039 - 00. The results show that the tensile strength of the hybrid composites tends to increase with the increase in volume of the fiber, with the maximum tensile strength of 4.8 MPa. The increase in the number of layers in the jute and E-glass adds more strength to the composites. This will be good to use in the initial material of the structure and walls in the traditional Acehnese boat Jalo Kayoh.

Keyword: Jalo kayoh, tensile test, mechanical properties, jute, hand lay up.
Failure analysis on the fractured surface of the vehicle crankshaft

T E Putra¹, Husaini¹, N Ali¹, H Husin² and Zulfikar¹
¹ Department of Mechanical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam 23111, Banda Aceh, Indonesia
² Department of Chemical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam 23111, Banda Aceh, Indonesia

E-mail: edi@unsyiah.ac.id

Abstract
The purpose of this study is to determine the cause of fracture of the 1000 cc gasoline engine crankshaft. On the broken surface, it was seen that the direction of cracks starting from oil hole. From the visual examination, there was a beach mark on the surface of the fracture, which is usually common in fatigue failure due to dynamic load. From the chemical composition testing, it was found that the material was classified into alloy steel. The Rockwell based material hardness values were different. The highest hardness value was on the outer shell portion of the crankshaft on the X and Y axes at points 1 and 14, which was 102.2 Kgf. Finally, it could be concluded that the fracture in the crankshaft occurred due to fatigue failure, the material hardness that did not match with the standard, as well as the initial crack contained on the crank pin number 1 radius area.

Keyword :-

Optimal Conditions for Selective Reduction Process of Nickel Laterite Ore

F Nurjaman¹ A Sa'adah² and B Suharno²

¹Research Unit for Mineral Technology, Indonesian Institute of Sciences, Lampung, 35361 Indonesia
E-mail: fajar.nurjaman@lipi.go.id

²Metallurgical and Materials Engineering Department, Faculty of Engineering Universitas Indonesia, Kampus Baru UI Depok, 16424 – Indonesia
E-mail: suharno@metal.ui.ac.id

Abstract

A low-grade nickel laterite ore from Indonesia was selected to investigate the effect of temperature and time of reduction upon the extraction of nickel through the selective reduction-magnetic separation process to produce the ferronickel. The nickel ore was mixed with 5 wt. % of anthracite coal and 10 wt. % of sodium sulfate additive. The mixed ore was pelletized into 10-15 mm of diameter. A series of selective reduction processes were carried out into the pellet ores at various temperatures of 950-1150°C for 60-120 minutes. The optimal selective reduction parameters of nickel laterite ore were observed clearly. The experimental results indicated that the reduction reactions proceed more completely at a higher temperature and longer reduction time. The optimum of nickel grade and recovery in the ferronickel concentrate was obtained at the reduction temperature of 1150°C for 120 minutes, which was 8.45% and 72.1%, respectively. The increasing of temperatures and times of reduction process resulted in higher of troilite phase formation which suppressed the iron metallization and also increased the ferronickel particle size.

Keyword: Nickel laterite; selective reduction; ferronickel; sodium sulfate; anthracite coal; magnetic separation.
The comparison of optimum heuristic and deterministic scheduling rules for job shop scheduling in the manufacture

E Fradinata1, Z.M Kesuma2
1Industrial Engineering Department, Syiah Kuala University, Banda Aceh, Indonesia.
2Statistics Study Program, Faculty of Mathematics and Natural Science, Syiah Kuala University, Banda Aceh, Indonesia.

E-mail: edinata69@gmail.com

Abstract
There are some types of scheduling problems in the production line of manufacturing, one of the most multiple usages of the operational machine for doing some jobs is job shop scheduling. The implementation of the job shop problem in this study uses the input random order of job numbers are eight. The raw materials for the job numbers to do the process and the five type machines are considered. The machines work in different functions to do the jobs for some materials. The materials have processed the work in process (WIP) before they are sent to the warehouse. The proposed of this study is to find the optimal condition of job shop scheduling to minimize the makespan, tardiness with the heuristic and some deterministic rules in the Lekin. The result shows that the minimum makespan is 47 minutes and the tardiness is 27, and the best result with the minimum makespan is FCFS method and Machine 3. It produces the effective percentage of The contras deviation performance among the jobs of DASH, and compare to the FCFS is as follow, DASH, LPT, MS, SPT, WSPT are increasing 4.26%; 31.91%; 8.51%; 4.26% and 12.77% respectively.

Keyword: job shop, warehouse, scheduling, work in process, heuristic
Monte Carlo simulation for predicting the reliability of a boiler in the Nagan Raya steam power plant

I Pamungkas, Arhami and M Dirhamsyah

Mechanical and Industrial Engineering Departement, Engineering Faculty, Syiah Kuala University
Tengku Syech Abdul Rauf Street, No. 7, Darussalam, Banda Aceh, 23111, Indonesia
Email: pamungkas.iiing@gmail.com

Abstract
The Nagan Raya steam power plant 2x110 Megawatt is one of the power plants owned by PT. PLN (Persero) is located in Aceh. The Nagan Raya steam power plant that operates continuously is often failure. An overhaul of maintenance activities that lasted only six months was the cause of frequent disruptions or failures. Performance evaluation in terms of reliability is urgently needed to minimize the failure. This study aims to determine the level of reliability and preventive maintenance time based on Monte Carlo simulation to the nine critical components of the boiler section. Monte Carlo simulations are used to predict precise maintenance time and future reliability values. Monte Carlo simulation results on nine important components of the boiler section, maintenance time is required within 40 days to 86 days of maintenance with a reliability value of 31% to 38%.

Keyword :-
The Relationship between Data Skewness and Accuracy of Artificial Neural Network Predictive Model

A Larasati*, AM Hajji*, Anik Dwiastuti*

*Department of Industrial Engineering, Universitas Negeri Malang, Indonesia
*Department of Civil Engineering, Universitas Negeri Malang, Indonesia

E-mail: aisyah.larasati.ft@um.ac.id

Abstract
This purpose of this study is to investigate the relationship between data skewness in the output variable and the accuracy of artificial neural network predictive model. The artificial neural network predictive models is built using multilayer perceptron and consist of one output variable and six input variable. Data used in this study is generated by conducting simulation. The results show that data skewness does not have a significant affect on the accuracy of the artificial neural network predictive model. This results imply that artificial neural network predictive model have a higher capability to cope skewed data due to its complexity in the hidden layer.

Keyword : artificial neural network; accuracy; skewness
Stress analysis of the helical spring of a car front suspension using numerical method

Hendrayana, Husaini, N Ali, I Hasanuddin, T E Putra, A Bakhtiar
Department of Mechanical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam 23111, Banda Aceh, Indonesia
E-mail: hendrayana461985@gmail.com

Abstract. This study discussed on the failure of a vehicle coil spring using numerical method. The component was fabricated using ASTM A227. The coil spring was analyzed according to three kinds of conditions, such as flawless, defect of 0.2 mm, and defect of 3.5 mm. The simulation results showed that the maximum shear stress occurred on the 3.5 mm defected coil spring, which was 745.8 MPa. The value was close to the allowed shear stress, which was 799 MPa, but passed the yield strength, which was 731 MPa. This caused the plastic deformation and contributed to failure due to fatigue.

Keyword :-
Failure analysis of a centrifugal pump shaft experiencing plastic deformation using finite element method

Husaini\textsuperscript{1,1}, E Saputra\textsuperscript{1,1,2}, Husni\textsuperscript{12,1}, T E Putra\textsuperscript{13,1} and M Rachman\textsuperscript{14,1}

\textsuperscript{1}Computational Mechanics Laboratory, Department of Mechanical Engineering, Faculty of Engineering, Syiah Kuala University, Darussalam 23111, Banda Aceh, Indonesia
\textsuperscript{2}Department of Mechanical Engineering, South Aceh Polytechnic, Tapaktuan 23715, Aceh, Indonesia

E-mail: husainiftm@unsyiah.ac.id

Abstract

Eight stage-centrifugal pump that used in oil and gas industries has plastic deformation on the shaft because torque load. Thus, this study aims to analyze the shear stress that occurs on the shaft by exact and finite element method. The shaft was made from SUS 304 material with length of 1.5 m and diameter of 0.05 m. From exact and finite element analysis results, the shear stress that occurred on the shaft was more high than the shaft material shear stress. Therefore, the pump shaft has deform plastically and twisted. The results of finite element method, the torque, shear stress, and strain were increase by increasing the twist angle on the pump shaft.

Keyword: -
Mechanical characteristics of marble powder composite materials reinforced kenaf fiber against static load

Nuzuli Fitriadi15, Lindawati16, Ismi Ardiansyah17
Mechanical Engineering Study Program, Politeknik Aceh Selatan
Jl. Merdeka Komplek Reklamasi Pantai, Tapaktuan, Aceh Selatan, Aceh, Indonesia 23711

E-mail: nuzuli @poltas.ac.id, lindawati203@gmail.com, ismi.mgg@gmail.com

Abstract
Kenaf fibre is one of the strongest natural fibres in the world today. For that purpose, the purpose of this study is to create a new composite of Kenaf fibres combined with marble waste powder. The incorporation of marble powders and Kenaf fibres using a matrix of a polyester resin type has never been done. Thus, this study aims to create and test various composite material composites (mixture of matrix, marble powder and Kenaf fibre) which will produce different mechanical properties and obtain good tensile strength in test specimens with several composition variations. Preparation of test specimens was carried out with 4 (four) compositions of matrix mix and marble powder that is 50:50, 60:40, 70:30 and 80:20 with the weight of Kenaf fibre fixed 2 gram. The largest tensile test value is 63,407 MPa, obtained from 80:20 composition with the largest E value 3.03 GPa. The largest compression test value is 33.49, obtained from the composition of 60:40 with the largest E value of 2.35 GPa. The largest bending test value is 19.80 MPa, obtained from the composition of 80:20 with the largest E value of 36.55 GPa. From the research results of tensile test, compression test, and bending test which possess good value is between composition ratio 60:40 and 70:30.

Keyword : Composite material; kenaf fiber; marble powder; mechanical characteristics
The Effect of Cutting Speed on Dimension Accuracy and Burr Development of High Speed Micro Drill Processes on Aluminum

M Dirhamsyah, M Tadjuddin, A Udink, Z Yusuf and H Y Saiful
Department of Mechanical and Industrial Engineering Syiah Kuala University Indonesia

E-mail: m.tadjuddin@unsyiah.ac.id

Abstract
Machining process is a part of the production technology used in almost every manufacture of industrial products. The world of industry continues to grow along with technology, emerging machining technology that can produce miniaturization products on of that is a micro drilling processes. This research observed the dimension accuracy and burr development on micro drilling processes on Aluminum. The accuracy of the hole dimension and burr development on top and bottom were observed on three different cutting speeds. Thickness of aluminum as the workpiece is 0.5mm and drill with diameter of tungsten carbide drill bit 0.3mm. The results show at the cutting speed of 13.2 m/min, the largest hole diameter was found 0.3117 mm, while the smallest hole diameter is 0.3039 mm measured at a cutting speed of 18.8 m/min. For the top burr height found that the largest number is 0.19 mm and the smallest number at 0.07 mm. While the bottom burr height has the highest value of 0.39 and the lowest at 0.12 mm. It can be concluded that the deviation of hole dimension size and burr height is inversely proportional to cutting speed.

Keyword: micro-drilling; quality product; dimension aquisition; burr
Increased Capacity of Water Heater with A Type of Cylindrical Solar Concentrator and The Addition of Heat Storage Material

D Harun, M I Maulana, Akhyar
Department of Mechanical Engineering, Syiah Kuala University
Jln. Syech Abdurrauf No.7 Darussalam – Banda Aceh, 23111, Indonesia
E-mail: darwinmtir@unsyiah.ac.id, ilhammaulana@unsyiah.ac.id, akhyar@unsyiah.ac.id

Abstract

Energy today is an essential requirement for everyday activities. The Indonesian community has long used utilization of solar energy for electricity, water heater, and dryer. Solar Collector is a tool to absorb solar energy and convert it into thermal energy, and the water passed through heat tubes induce an increase of water temperature. Increased heating capacity in this experiment performed with the addition of paraffin on tube as solar heat storage material in the solar collector. Solar water heater apparatus calls a type of cylindrical solar concentrator has been developed in this experiment. Paraffin placed in copper tube with two conditions. Paraffin placed in tube 2 call as Collector A and paraffin inserted between tube 1 and 2 (in tube 1 and outside tube 2) name with Collector B. The result shows that the highest water out temperature at the collector A (paraffin in tube 2) is 56 °C at 01:00 pm with the solar radiation intensity is 1,289 W/m². Collector B (paraffin in tube 1) resulted water out temperature is 52 °C. The conclusion of this experiment shows that the positioning of paraffin in tube as collector A conditions can improve the efficiency of solar water heating systems compared to paraffin in tubes as collector B conditions.

Keyword : Solar collector; solar energy; reflector; paraffin.
Mechanical properties of glass fiber reinforced polyester resin for use as the wall material of the Acehnese boat Thep-Thep

Nazaruddin¹, Akram², Iskandar Hasanuddin², Mohd Iqbal², Rudi Kurniawan², Rudiansyah Putra³, Zulfan¹

¹) Departement of Informatics, Faculty of Mathematics and Natural Sciences, University of Syiah Kuala, Banda Aceh, Indonesia
²) Departement of Mechanical and Industrial Engineering, Faculty of Engineering University of Syiah Kuala Banda Aceh, Indonesia
³) Departement of Civil Engineering, Faculty of Engineering University of Syiah Kuala Banda Aceh, Indonesia

E-mail: anzaro@unsyiah.ac.id

Abstract: Fiber composites are very commonly used for engineering applications nowadays. The product has begun to enter the field of boat and ship manufacturing. An Acehnese traditional boat known as thep-thep, which has a capacity of 3 GT, is a means of transportation used in Aceh waters. This study focuses on the mechanical properties of the material used for the structure and walls of the thep-thep. Specimens are made from materials with E-glass fiber reinforced polyester resin. The hand lay-up method is used in the process of making the specimens, applied with a pressure of 25 kg/cm² for 24 hours. This study aimed to obtain higher mechanical properties using composites of layers of chopped strand mat (CSM) fibers and woven roving mat (WRM) fibers with a ratio of 1:0, 1:1, and 2:1, respectively. Tensile testing is done using the ASTM D3039-00 standard. From the tensile test data obtained from several different composite ratios, the highest composite is found at around 49.2 MPa. An increase in the number of fiber layers make the fiber composites more reliable to be the raw material in the making of the Acehnese boat thep-thep.

Keywords: Boat Aceh, hand lay-up, mechanical properties, tensile testing
Effect of Peanut (Arachis Hypogea L.) Shell Cellulose Composition and Compatibilizer Addition on Properties of Polyester Composite

H Nasution1,2, K Kosasih1, Maulida1 and M T Al Fath1

1Department of Chemical Engineering, Faculty of Engineering, Universitas Sumatera Utara, Padang Bulan, Medan 20155, Indonesia.

Email: h_dahlia@yahoo.com

Abstract. Polyester composite containing the powder of peanut shell fiber filler is a panel product made by compacting the particles of peanut shell powder and binding them with unsaturated polyester resin. The use of peanut shell powder filler is not only to utilize existing wastes, but also because it contains crystalline cellulose which has stronger and more ordered structure, and therefore it is suitable to improve the mechanical properties of composite. The purpose of this research is to investigate the effect of peanut shell fiber powder cellulose filler composition and addition of compatibilizer on the tensile properties, impact strength and water absorption of polyester composites. The composites were made of unsaturated polyester resin as matrix and mixed with peanut shell powder as filler, with methyl ethyl ketone peroxide catalyst, and molded in the manner of compression molding method. The result of physical properties test supported by FTIR characterization of the composite showed that the filler was dispersed into the matrix with the formation of new wave from 3463 to 3495 cm\(^{-1}\). The best of tensile and impact properties were found on 5% filler and 4% of compatibilizer composition with tensile strength of 26.04 MPa and impact strength of 99.82 MPa. The results obtained have been supported by Scanning Electron Microscopy (SEM) analysis demonstrates that there was resistance from the composite when impact was applied. Water absorption of composite tended to rise with the increasing amount of filler, and the smaller the particle size, the time required to reach saturation point is also faster.

Keyword: peanut shell; polyester; tensile properties; impact strength; water absorption
Effect of cutting parameter on tool wear of HSS tool in drilling of Kevlar composite panel

M Iqbal, S Bahri and A Akram
Department of Mechanical and Industrial Engineering, Faculty of Engineering, Syiah Kuala University, Banda Aceh, Indonesia
E-mail: mohd.iqbal@unsyiah.ac.id

Abstract. The paper reports the tool wear in drilling of composite panel in various cutting conditions. The drilling process was applied to 4mm thickness kevlar composite panel by using HSS drill tool (Nichi, 2 flutes, 12 mm diameter, 17 mm length and 118° drill point angle). The process was conducted using a machining centre (Agma type A-8 and max spindle speed 8000 rpm). The tool wear was measured by using optical microscope (Olympus GX-71 with the max precision 0.01 µm). The drilling process was conducted with constant feed rate (75 mm/min) and three levels of spindle rotation speeds (1000, 3000 and 5000 rpm). Each cutting condition was applied to 2 different drill tools. In order to investigate the wear rate, the tool wear was measured in several level of cutting time (i.e. after drilling of 5, 10, 20 and 30 drill holes). The result of the experiment shows that the cutting speed give significant effect to the tool wear of HSS drill tool when drilling kevlar composite panel. Higher cutting speed produced higher tool wear at any cutting time level. The result of the experiment also shows the effect of continuous/ discontinuous cutting. Higher tool wear was found in a direct 20 holes drilling, compare to paused drilling (i.e. start with 10 holes, pause for 20 minutes then continue with other 10 holes).

Keyword: Tool wear; Drilling; HSS tool; Kevlar composite
The spare part maintenance of Cake Breaker Conveyor with Reliability Centered Spares Method

Nurhayati Sembiring\textsuperscript{1} and Yufrazin Pandapotan Batubara\textsuperscript{2}

\textsuperscript{1,2} Department of Industrial Engineering, Engineering Faculty, Universitas Sumatera Utara, Medan, Indonesia
E-mail: nurhayatipandia68@yahoo.com

Abstract
The company that this research conducted is a manufacturing industry that produce CPO. Many machines in the production section need maintenance activities so that existing machines can work without inhibiting the production process. At seed processing station, there is CBC machine that experienced frequent occurrence damage. The machine applies corrective maintenance regardless of reliability machine production components, consequently often occur sudden machine damage. Calculation of time interval based maintenance policy scheduled discard task and needs a replacement component (spare part) that should be available are concerned with optimal using method of Reliability centered Spares (RCS). Based on the results of the calculations are based on a policy scheduled discard task then obtained a policy to perform maintenance on a screw conveyor components is 91 days, hangers and bearings is 40 days, jig-drilled couplings is 21 days. The result of the method of reliability centered spares acquired number of screw conveyor parts needs with this type of repair of repairable spare needs 3 units for one year, while jig-drilled couplings with this type of repair repairable with need spare part 27 units for a year, as well as the hangers and bearing with this type of repair of repairable spare part needs is 21 units for one year.

Keyword: Corrective Maintenance; Scheduled Discard Task; Reliability Centered Spares
Analysis of Transport Workers’ Postures in the Loading Process of Manual Material Handling Activities by Using the Photogrammetric Method

Iskandar Hasanuddin, Reza Fahrizal, and Didi Asmadi

1Department of Mechanical and Industrial Engineering, Faculty of Engineering, University of Syiah Kuala, Darussalam, Banda Aceh 23111, INDONESIA
E-mail: iskandarhasanuddin@unsyiah.ac.id

Abstract

This research was conducted on the loading process of manual material handling of cup mineral water activity at PT. PA, Aceh Besar, Indonesia. With samples of 12 transport workers, the observed loading activity includes the position of lifting, walking and loading. The loading process is done manually from the warehouse into the truck. This work is done continuously by a transport worker with each transported load reaching 48 kilograms. In a one-time loading process, a transport worker performs as many as 33 trips and the timing for each transport loading process is 20 seconds. With the work done continuously and the loads transported are weighty; therefore there are risks of experiencing musculoskeletal disorders by the transport workers. Thus, questionnaires, interviews and observations were used as instruments to obtain data. Calculations were further conducted to analyse the postures of transport workers by using the Photogrammetric Method. The results show that the moment force calculation at L5/S1 is greatest in the position of lifting the load at 5.756.81 N; meanwhile the NIOSH provision is 3,400 N for a normal lift limit. Hence, the solutions proposed to this problem are to reduce the load to 24 kilogram/loading and the utilization of the trolley.

Keyword :-
Study of hot mix asphalt temperature loss on truck wall surface area during transport

Muhammad, Ahmad Syuhada, Syifaul Huzni, Zahrul Fuadi
Department of Mechanical Engineering, Syiah Kuala University, Banda Aceh, Indonesia

Email: syifaul@unsyiah.ac.id

Abstract
This study was conducted to observe the phenomenon of the temperature loss on hot mix asphalt type Asphalt Concrete Binder Course (AC-BC), on the surface area of the truck wall during transport. The tests were conducted experimentally using thermometers and thermocouples with a 25-ton capacity truck at 153°C loading temperatures. Data retrieval is carried out over time, 20, 40, 60 to 420 minutes of transport, from the Asphalt Mixing Plant (AMP) plant to the job site with an average truck speed of 30 km/h. Data from the results of the study were analyzed using the descriptive method. The results indicate that the maximum transport distance that meets the technical specifications is at the furthest distance of 165 km, with a minimum temperature of 130.1°C, at a distance of 10 cm from the surface of the truck wall. Loss of average hot mix asphalt temperature to 6 (six) sides of the truck wall surface, floor surface and the top surface, for 420 minutes of transport is (45.2°C - 65.7°C). From the phenomenon shows that the hot mix asphalt condition on the surface area of the truck wall is hardened (crusty).

Keywords: Hot mix asphalt, Surface truck wall, Temperature loss, Transport time
Changes in the unit price of work for reinforced concrete construction based on building sites

Mubarak\textsuperscript{20}, Abdullah\textsuperscript{21}, Medyan Riza\textsuperscript{22}, Yulia Hayati\textsuperscript{23}

\textsuperscript{1, 2, 4}Dept. of Civil Engineering, University of Syiah Kuala, Jl. Syekh Abdurrauf 10, Banda Aceh, Indonesia

\textsuperscript{3}Faculty of Engineering, University of Syiah Kuala, Jl. Syekh Abdurrauf 10, Banda Aceh, Indonesia

E-mail: mubarak@unsyiah.ac.id

Abstract

The unit price of work is the price required to complete each unit of quantity of work that consists of the unit price for the wage of labour, materials, and equipment used. Changes in unit prices are possibly determined by the different sites in which a building is constructed. For budget planners or construction executors, a good understanding of the changes in the unit price of work is required to identify the reasonable amount of budget needed. Given these circumstances, this study was conducted to analyse and identify the pattern of changes in the unit price of work based on the locations of a building in the Province of Aceh. This research focuses on the unit price of reinforced concrete work for the building structure components, as the work that has the most significant proportion of cost in building construction. The pattern of change is described in the form of price indexes by applying the price in Banda Aceh City as a reference for other cities/districts. The analysis results in two patterns of the unit price index, which is below or above of the reference index. This condition follows the pattern of the unit price of materials and wages. The ease of access to a region also determine the changes in the price index.

Keyword: unit price; construction; reinforced concrete; building sites
The Influence of the Using Waste Tire Rubber and Natural Ziolite as Asphalt and Cement Replacements to Compressive Strength of Semi-Flexible Pavement

Hamzami¹, Muniwansyah², Muttaqin Hasan³ and Sugiarto Sugiarto⁴

¹) Doctor of Engineering Candidate, Syiah Kuala University, Banda Aceh, Indonesia, Email: hamzani.hasbi@gmail.com
²,³,⁴) Dept. of Civil Engineering, Syiah Kuala University, Banda Aceh, Indonesia

Abstract

The objective of this research is to study the compressive strength of semi-flexible pavement by using waste tire rubber and natural ziolite as asphalt and cement replacements. The mix design of porous asphalt is started with determination of optimum asphalt proportion with open graded aggregate as specified in Australian Asphalt Pavement Association (AAPA) 2004. The asphalt was then replaced by 3 %, 4 % and 5 % of waste tire rubber and the Marshall test was conducted. The cement mortar with 0 %, 5 %, 10 %, 15 % and 20 % natural ziolite was injected to porous asphalt specimens. The compressive strength test was conducted based on ASTM C670-91a at the age of the specimens of 14 days. The test results showed that the higher compressive strength is reached at the 15 % natural ziolite and 5 % waste tire rubber, which is 15.43 MPa.

Keyword: waste tire rubber, natural ziolite, semi-flexible pavement, compressive strength
Approaching model of Manning’s Coefficient due to an Effect of Density and Height of Vegetation in Open Channel

M Rizalihadi

1 Civil Engineering Department, Syiah Kuala University, Jl. Syech Abdurrauf No. 7, Darussalam, Banda Aceh, Indonesia.
Email: maimunrizalihadi@unsyiah.ac.id

Abstract

The presence of vegetation growing in the channel can cause increasing the Manning’s coefficient. The magnitude of Manning’s coefficient is depended on the characteristic and type of vegetation. The purpose of the research is to study and model the effect of density and height of vegetation on Manning’s coefficient in open channel. The study was conducted in open channel with 15.5 m length, 0.5 m width and 1.0 m height. At the centre part of the channel is planted with Elephant grass (Pennisetum Purpureum). The effect of different density and height of vegetation were run with fixed discharge to measure the velocity and water profiles in order to obtain Manning's coefficients. The effect of those variables on the developed model was evaluated using statistical analysis of variance and paired t-test with significance level of 0.05. The results showed that Manning’s coefficient is increasing as increasing density and height of vegetation. If compared to un-vegetated channel, Manning’s coefficient increase in between 4.92-54.07%. Based on statistical analysis, it is found that $F_{\text{calculation}}=367.776 > F_{\text{critic}}=19.452$, $t_{\text{calculation}}=12.298$ and $22.464 > t_{\text{critic}}=2.571$ and $R^2=0.967$, showing that the density and height of vegetation significantly influence on the Manning’s coefficient with strong correlation variables in the model.

Keyword: Open channel; vegetated channel; Elephant grass (Pennisetum Purpureum); Manning’s coefficient
The Effect of Soil-Structure Interaction on Multi-Storey Building Resonance and Dynamic Shear Modulus for Pidie Jaya Aceh Earthquake

M Munirwansyah, R P Munirwan, M Sungkar and Z Melinda
1Department of Civil Engineering, Syiah Kuala University, Banda Aceh, Indonesia

Corresponding E-mail: r.munirwan@unsyiah.ac.id

Abstract

Shockwave-proof building design must be considered as a design standard in the future for Pidie Jaya - Aceh government as in 7th December in 2016 earthquake in Pidie Jaya Aceh which destroyed many major and minor infrastructures. Therefore, soil dynamic parameters must be obtained for design purposes in Pidie Jaya reconstruction and rehabilitation in the future. To avoid the structural failure during the earthquake process, the value of structural vibration frequency \( f \) should not equal to the value of natural soil vibration frequency \( f_n \). The aims of this article are to determine the soil dynamic parameter of soil layers for disaster mitigation purposes. Several existing buildings namely Dayah Mudi Samalanga, Baitul Muttaqin Mosque, Cubo Bridge, Regent Office Building, Local Lawyer Office and around Pidie Jaya fault were chosen for soil sampling locations. Dynamic parameter of \( G_{\text{max}} \) and \( V_s \) are the result of this research. Moreover, the \( f_n \) value was calculated by Kramer method. Comparison of \( f_n \) values was performed by simple modelling of \( f \) values based on SNI 1726-2012. The highest value of \( e \) was obtained in Baitul Muttaqin Mosque soil sample which is 1.84. The highest \( f_n \) value is at Pidie Jaya fault, which is 2.01 Hz, and the lowest \( f_n \) value is at Baitul Muttaqin Mosque, Pidie Jaya, which is 1.301 Hz.

Keyword: earthquake; resonance; dynamic; vibration
Risk Impact on Cost and Time From the Factors of Contractor’s Managerial and Operational

Saiful Husin\textsuperscript{1,2}, Abdullah\textsuperscript{2,6}, Medyan Riza\textsuperscript{2}, and Mochammad Afifuddin\textsuperscript{2}

\textsuperscript{1}Engineering Doctoral Study Program, Univ. Of Syiah Kuala, 23111 Banda Aceh, Indonesia
\textsuperscript{2}Faculty of Engineering, Univ. Of Syiah Kuala, 23111 Banda Aceh, Indonesia

E-mail: saifulhusin@unsyiah.ac.id

Abstract

Aceh Province over the last 20 years has experienced different events that can be divided into 3 (three) phases. 1\textsuperscript{st} Phase is the phase of the conflict (2000-2004), 2\textsuperscript{nd} Phase is the post-earthquake and tsunami rehabilitation and reconstruction phase of Aceh (2005-2009), and 3\textsuperscript{rd} Phase is the post-rehabilitation and reconstruction phase (2010-present). Events that occurred during the last 20 years are certainly likely to provide risks to community activities in the province of Aceh. One of the activities affected by the event is the construction project work. The implementation of construction works affected by events in Aceh Province over the last 20 years is highly vulnerable to risks that impact on achieving project objectives such as cost and time. This study analyzes the impact of the contractor and operational managerial risk factors on the cost and timing of construction. Data were obtained from questionnaires distributed to 15 large qualification companies in Aceh Province. Testing data is done by using the validity test and reliability test. Data that has been valid and reliable then analyzed by using Severity Index ($SI$). The variables of a managerial risk factor with $SI$ to the highest cost in 1\textsuperscript{st} Phase are F5 (incompetent Engineer), 2\textsuperscript{nd} Phase is F3 (lack of contractor experience), and 3\textsuperscript{rd} Phase is F5 (incompetent Engineer). From the operational risk factor, the highest cost $SI$ in each phase is the G3 variable (electrical disorder). The managerial risk factors with the highest time $SI$ in 1\textsuperscript{st} Phase are F6 (lack of top management support), 2\textsuperscript{nd} Phase is F5 (incompetent engineer), and in 3\textsuperscript{rd} Phase is F3 (lack of contractor experience). From the operational risk factor, the highest time $SI$ at each phase is G3 (electrical disorder).

Keyword: Risk impact, cost, time, severity, aceh, contractor
The potential utilization of natural materials as a wall covering the building in reducing heat

Kemala Jeumpa

1Doctoral Study Program of Technology and Vocational Education, Faculty of Engineering, State University Padang, 25132
2Laboratory of Applied Physics, North Sumatera University, Medan 20155

Email : ipajeumpa@gmail.com

Abstract
This paper was purposed to examine the potential of natural materials, especially coco fiber as a wall covering the building envelope in the sun radiation. For the fulfillment of thermal comfort in buildings requires engineering, knowledge and skills and innovation. One way to reduce the hotter air inside the room can be done through the wall so as to reduce the use of air conditioning. The walls need protection and dampening of the sun's heat that can make the room inside the building has thermal comfort. Based on this, it is necessary to conduct research on natural materials that can function in reducing heat through the wall of the building. In this case testing is done by comparing the two materials. The material is coco fiber material coated with a mixture of cement and mixture of cement and sand material used as plaster walls. Compacted coco fiber sheets are coated with a mixture of cement that also functions as a glue between the coi. After the fiber and cement is good enough to bind and harden then tested. In this case the test by providing heat on one side of the fiber part and measuring the temperature that occurs on the other side of the fiber. The same heat test and treatment is also carried out on the material without a fiber. Test results found there is a significant difference between the temperature of heat that occurs in the fiber material and materials without fiber. The fiber material a lower heat temperature than the material without a fiber. This indicates that coco fiber has potential as heat insulation to coat the walls of the building so as to minimize solar thermal radiation into the room.

Keyword : building wall, cement, coco fiber, reducing heat
Deformation and crack analysis of tunnel structure subjected to static distributed load using pseudoshell model

Muttaqin Hasan¹, Husaini², Nirwal Mahdi Abdullah³

¹Dept. of Civil Engineering, Syiah Kuala University, Banda Aceh, Indonesia, Email: muttaqin@unsyiah.ac.id
²Dept. of Mechanical Engineering, Syiah Kuala University, Banda Aceh, Indonesia, Email: husainiftm@unsyiah.ac.id
³Engineering Consultant, Banda Aceh, Indonesia, Email: nirwalmahdi@gmail.com

Abstract
The objective of this research is to study the deformation and crack in shotcrete of tunnel structure subjected to distributed static load. Tunnel is modeled as two dimensional finite element model using commercial finite element software, namely ATENA (Advance Tool for Engineering Non Linear Analysis) version V5. Non linear material models for concrete and reinforcing bars are adopted. For deformation and crack analysis, pseudoshell model is adopted in which fictitious crack opening is assumed occur first in pseudoshell then propagate to the tunnel structures. Three variations of pseudoshell thickness of 30 mm, 60 mm and 100 mm are used. The development of crack opening and propagation of crack and its displacement due to the increasing of static load is therefore analyzed. The analytical results show that the dummy load and displacement at the crack opening width of 1 mm for the pseudoshell thickness of 30 mm, 60 mm and 100 mm are 48 kN/m and 48.33 mm; 55 kN/m and 42.75 mm; 67 kN/m and 35.5 mm respectively. The relationships between dummy load, displacement and crack opening width are closely linear.

Keyword: tunnel structure; pseudoshell model; crack; displacement; finite element
The Effect of Rainfall Interception Loss by Palm-Oil Tree
towards Flood Discharge in Seunagan Watershed of Nagan

Raya District of Aceh Province

Alfiansyah Yulianur BC1, Azmeri2, Khairuddin3
1,2) Lecturer, Faculty of Civil Engineering, Syiah Kuala University, Darussalam, Banda Aceh, Indonesia
3) Officer, Water Resources Department of Aceh Province, Lueng Bata, Banda Aceh, Indonesia
E-mail: fian_7anur@yahoo.com

Abstract

Flood discharge comes from the surface run-off affected by factors such as evaporation, evapotranspiration, infiltration and interception. This research aims to predict the magnitude of interception demonstrated by palm-oil tree and its effects toward flood discharge. This paper covers the calculations for rainfall interception loss by palm-oil tree, designed areal rainfall, and designed flood discharge. During the calculations, watershed is divided into two sub-watersheds. Rainfall data were obtained from Meulaboh, Beutong and Alue-Bilie station. Areal rainfall distribution obeys the pattern of Gumbel distribution. Areal rainfall of 100 years return period for each sub-watershed are 230.81 mm and 197.59 mm before the inclusion of interception effects, while after interception effects are included the areal rainfalls are 152.94 mm and 189.09 mm. The calculated effective rainfall using SCS method where curve number (CN) before interception effects are 72.19 and 73.15 while 81.54 and 73.99 after interception is accounted. Flood discharge is calculated using the method of unit hydrograph synthetic SCS. Calculation results shows that designed flood discharge of 100 years return period before and after the effects of interception were 3,042.72 m3/s and 2,521.23 m3/s, respectively. It shows that rainfall interception loss by palm-oil tree can reduce the flood discharge.

Keyword: Rainfall interception loss; palm-oil tree; Seunagan watershed; flood discharge.
The comparison of earthquake design parameters of low rise building structures based on SNI-1726-2002 and SNI 1726 : 2012 at 23 districts of Aceh Province Indonesia

Taufiq Saidi¹, Muttaqin Hasan¹, Fakhrurrazi²
¹Dept. of Civil Engineering, Syiah Kuala University, Banda Aceh, Indonesia, Email: taufiq_saidi@unsyiah.ac.id
¹Dept. of Civil Engineering, Syiah Kuala University, Banda Aceh, Indonesia, Email: muttaqin@unsyiah.ac.id
²Republic of Indonesia Public Work Ministry Staff, Email: muhammadfakhrurrazi@gmail.com

Abstract
This paper presents the comparison study of earthquake design parameters such as response spectrum, modal mass participation, base shear and natural vibration period of low rise building structures based on SNI-1726-2002 and SNI 1726:2012 at 23 districts of Aceh Province Indonesia. A four floor reinforced concrete frame structure building is analyzed. The results show that among 23 district in Aceh Province, the maximum spectral accelerations based on SNI 1726:2012 are higher than those of SNI-1726-2002 at 15 districts. The modal mass participation for those two standards is almost the same. The base shear force of SNI 1726:2012 is much higher that that of SNI-1726-2002. The structure natural period is satisfy those both standards.

Keyword: earthquake design; response spectrum; modal mass participation; base force; natural period
Investigating public perceptions and its implication toward Trans Koetaradja Policy Considering Latent Motivation

Sugiarto Sugiarto¹, Renni Anggraini², Sofyan M. Saleh³, Muhammad Merfazi⁴

¹²³ Civil Engineering Department Faculty of Engineering, Syiah Kuala University, Banda Aceh, Indonesia
⁴Officer, Public Works and Spatial Planning Department of Aceh Province, Geuceu Kayee Jato, Banda Aceh, Indonesia

E-mail: sugiarto@unsyiah.ac.id

Abstract
The purpose of this study is to investigate public perceptions towards Trans Koetaradja policy in Banda Aceh. The data were collected at two lines of the Trans Koetaradja namely City Center - Mata Ie and City Center - Ajun - Lhoknga lines. The Stated Preference (SP) survey method was used to collect the data, in a total of 220 respondents were interviewed. The SP questionnaire contains information about socio-economic, travel behavior, and respondents' perceptions. The Multiple Indicators Multiple Causes (MIMIC) model is governed to examine psychometric data that collected using the SP method. The result of the analysis showed that all psychological questions had a good value above 2.5 (average) which was 2.81 (70.20%) from the reference of the 1-4 Likert scale with the indicator with the highest level of acceptance of 3.32 that was a private vehicle needed in everyday life. The result from the MIMIC approach reveals that the latent variable of "private-mode dependence" has the most significant factor that is influencing the public in using public transport. They tend not to use and reject the Trans Koetaradja policy due to their past behavior in using private mode.

Keyword: earthquake design; response spectrum; modal mass partisipation; base force; natural period
Characterizing mode choice behaviors of the evacuees during emergency evacuation using a logistic regression model

Sugiarto Sugiarto¹, Lulusi Lulusi¹, and Muhammad Isya¹, Taufik²

¹Department of Civil Engineering, Syiah Kuala University, Banda Aceh, Indonesia.
²Post Graduate School of Civil Engineering Alumny, Syiah Kuala University, Banda Aceh, Indonesia.
E-mail: sugiarto@unsyiah.ac.id

Abstract
Mode choice evacuation behavior is regarded as one of the essential aspects in a transportation disaster planning. This study is aiming to investigate an individual’s preferences for selecting motorized and non-motorized modes for their evacuation during imaginary tsunami evacuation. The Stated Preference (SP) experimental data were collected in Kuta Raja sub-district, one of the most exposed sub-district in Banda Aceh. Binary logistic regression was conducted to evaluate the effects of several factors quantitatively and to identify the dominant factor that affected evacuation mode choice. The result from the BL model shows that male, older people and educated people and car owners tend to select motorized transport for their evacuation. The result of the empirical modeling reveals that the socio-demographic attributes have significant influence on the mode choice behaviors of the evacuees during their emergency evacuation.

Keyword: evacuation behavior, Stated Preference (SP), Binary logistic, socio-demographic attributes, mode choice behaviors, the evacuees, emergency evacuation.
Track Architecture, Urban and Rural Planning

Living Together: The Phenomenon of House Occupancy in Indonesia

Wendy Ivanna Hakim1, Triatno Yudo Harjoko2
1Doctoral Student at Departemen Arsitektur FT Universitas Indonesia
Kukusan, Beji, Depok City, West Java 16425 Indonesia
2Professor at Departemen Arsitektur FT Universitas Indonesia
Kukusan, Beji, Depok City, West Java 16425 Indonesia

Abstract
A house is an architectural product as well as one of the basic human needs. A house and the problem of housing are always unique because they carry out the variety of the occupants. The background of this study is the problem of the dominant paradigm of housing tenure, which is globally and mainly perceived as owning and renting. In Indonesia, this view excludes the array of aspirations of its occupants in the terms of diversity in social and cultural context. This research highlights the other kind of occupancy phenomenon among Indonesian who can get access to and live in a housing unit without owning or renting. The idea of this kind of occupancy is a part of way of life, values, and tradition of living arrangement in Indonesia, in which some people live and stay together with their extended families and relatives. The purpose of this study is to pinpoint housing strategy of certain occupants and reveal their aspiration in this kind of house occupancy. This study is a preliminary research that employs literature assessment and previous studies review concerning similar topic to develop an alternative standpoint to comprehend housing problem in Indonesia. This house occupancy phenomenon embodies the ideas of living in other people’s house; hence this study focuses on the aspect of the presence of house occupants.

Keyword: house; housing; tenure; occupancy; living arrangement
Spatial Extension as a Housing Strategy in Kampung Kota: A Case Study from Kampung Kingkit, Central Jakarta

P Kurniasari, R T Gabe27, J Adianto
1 Department of Architecture, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, West Java, 16424

E-mail: rossa.simatupang@eng.ui.ac.id

Abstract
The massive flood of urbanization implicates the shortage of affordable housing for the low-income people in the big cities, especially in Jakarta. In order to live and survive in Jakarta, the kampung kota becomes the housing solution rather than problems, due to its ability in providing low-cost housing. While it solves the affordability and the proximity to job location issues, this type of settlement is responsible for several wicked problems to its dwellers, such as space scarcity. Additionally, it creates inevitable health and social problems. In order to overcome these ever-growing problems, the dwellers develop an adaptable social system, which takes form as a spatial extension in the alley for domestic and social activities. This paper takes Gang Kingkit (Central Jakarta) as one of the high-density kampung kota settlements to examine the type of spatial extension and how it is produced by dwellers. Through in-depth interview and direct observation, we discover that there is a social system which allows several types of spatial extension to emerge simultaneously or reciprocally in public space. The social systems are embedded and manifested in the distinctive spatial system, which effectively minimizes the problems of living in kampung kota.

Keyword : spatial extension; co-residence; housing strategy
Defensible Space in Urban Housing in Indonesia

M M Muhyi, R T Gabe', J Adianto
Department of Architecture, Faculty of Engineering, Universitas Indonesia, Kampus Baru
UI Depok, West Java, 16424
E-mail: rossa.simatupang@eng.ui.ac.id

Abstract
Security in the housing is considered as one of the most important thing in the fulfillment of occupant’s needs. However, there are still many cases of criminality that still occur in urban housing. Defensible space is a concept of residential environment design that is able to prevent crime. Through literature study methods, field observations, and interviews, this paper discusses how defensible space is created in urban housing in Indonesia as well as its effect on the quality of security created between two different types of organic dwellings in Bogor City. The explanation starts from identification of physical characteristics that create territoriality, natural surveillance, image, and milieu. Then, the social and physical condition are associated with their effects on people’s behaviours. The result of our discovery is that physical and social conditions create the whole defensible space condition. In the middle-class urban housing, the environment condition still opens the opportunity for the criminals to commit the crime because the defensible space is not created as a whole. Contrarily, this is created in the lower-class urban housing as a whole. Therefore, the environment condition is free from any crime.

Keyword: defensible space; housing; security; criminality
Housing Preferences and Strategies of Javanese Migrants in Jakarta

C Theresia, R T Gabe, J Adianto
Departement of Architecture, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, West Java, 16424
E-mail: rossa.simatupang@eng.ui.ac.id

Abstract

As the center of development growth, Jakarta has been flooded with massive migration from all over the country, especially Java. With the limited skill to compete in the formal economy sector and soaring house price, living in limited size house becomes the plausible solution for the Javanese migrants. This reality bite serves a severe mismatch between the culture-based housing preferences and available rooms in the occupied house. In order to minimize the mismatch, the migrants deliver various meticulous strategies by utilizing the available resources. This paper examines the housing preferences of Javanese migrants in Jakarta and their strategy to minimize the mismatch between the housing preferences and the occupied houses. Qualitative method and means-end chain analysis are conducted to reveal the housing preferences based on Javanese culture, the delivered strategies, and their connections. The respondent selection encompasses low-cost apartment and high-density slum settlements to represent the common housing type of low-skilled migrants in Jakarta. The result demonstrates that the anchored spirit of togetherness in housing preferences takes form in their unique strategies beyond physical boundaries and materiality.

Keyword: migrants; Javanese; housing preferences; housing choices; strategies
Interiorization of Public Space in A High Density Settlement:

A Case Study in Kampung Cikini-Ampiun

C Devina, J Adianto, R T Gabe
Departement of Architecture, Faculty of Engineering, Universitas Indonesia,
Kampus Baru UI Depok, West Java, 16424

E-mail: joko.adianto@gmail.com

Abstract

High-density settlements in an urban area are always confronted with the lack of space issue. This situation leads to the use of public space – specifically the alley as a circulation space – for exclusive uses of the inhabitants, such as cooking, cleaning, and selling. This study will discuss about the strategy of making a public space into individual interior space as an analogy of collecting process by Walter Benjamin, from choosing, bring inside, and presenting. A qualitative method was conducted to trace the process and the result of interiorization in public space which case study was taken is located in Kampung Cikini-Ampiun, Central Jakarta. The study revealed that the process and the result of individual interiorization in public space are no longer separated from each other and yet they are connected by the inhabitant’ social relations.

Keyword: interiorization; urban interior; collecting; high density settlement.
Co-residence as Housing Strategy for Betawi Families: Case Study of Betawi Family Houses in Cengkareng, West Jakarta.

D H Arima, J Adianto, R T Gabe
Departement of Architecture, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, West Java, 16424
E-mail: joko.adianto@gmail.com

Abstract

This paper aims to examine the co-residence as a housing strategy of Betawi families to live in Jakarta. The number of Betawi families, known as the native tribe of Jakarta, in the capital city is decreasing due to massive urbanization. The fierce economic competition with the resilient migrants has purged them to the suburban Jakarta. In order to live in Jakarta and close to their current job locations, transforming the inherited multi-generational family house to co-residence becomes the favorable option. There are certain adjustments in determining the strategy of living together, especially with a lot of relatives. Qualitative research method with in-depth interviews and longitudinal thorough direct observations were delivered to investigate and discover the meticulous the process of transformations throughout the years. Based on the selected two houses of Betawi families in Cengkareng, West Jakarta, this paper poses the argument that co-residence is not only the housing strategy for Betawi families to live in Jakarta but also generating extra incomes to the family as it provides rent rooms for migrants.

Keyword: Co-Residence, Housing Strategy, Betawi Families
Creating Atmosphere in Hotel Interior Space with Material Roles: Bata Pejaten

J Lathifa1, N R Kusuma1, and E Arvanda1
1Department of Architecture, Faculty of Engineering, Universitas Indonesia, Depok, Jawa Barat 16424, Indonesia
E-mail: jessica.lathifa@gmail.com

Abstract
As a major tourist destination in Indonesia, Bali possesses hospitality industries that are competing to present the best experience for guests. One of the hotels, Katamama, offers a specific spatial experience through the use of Bata Pejaten, traditionally handmade bricks made from mixtures of clay and paras sand—a fine stone powder of volcanic material sourced locally in Bali. Meticulous selection of Bata Pejaten applied to the 5-star quality boutique hotel became its own uniqueness as these bricks are generally seen as a simple inexpensive material and mainly used for temples construction. The atmosphere of space that exists between human and their built environment is understood through the senses, creating an impression and significant meaning to the person. In this case, the material becomes one of the important aspects of spatial atmosphere production. For Bata Pejaten, it is their craftsmanship, composition, and organic transformation. The paper aims to explore how Bata Pejaten and its properties and qualities generate the atmosphere of space. This paper presents a case study analysis on interior spaces characterized by its specific material and authentic substances from volcanic eruptions as the core investigation. This paper demonstrates a design approach from the material perspective. In particular, this study introduces the concept of using materials attentively in creating spatial atmosphere characterized by modest material but rich in its values.

Keyword: Interior Architecture Design; Local Material; Atmospheres
Wall Finishing Materials and Heritage Science in the Adaptive Reuse of Jakarta Heritage Buildings

Meutia Rahmadina¹, Nevine Rafa Kusuma², Enira Arvanda³
¹,²,³ Universitas Indonesia, Depok, Indonesia
meutia.rahmadina@gmail.com¹, nevinerafa@gmail.com², enira28@gmail.com³

Abstract
Given its tropical setting, moisture problems are inherent issues found in walls of heritage buildings in Indonesia that require replacement of wall finishing materials with specific properties. This is where heritage science becomes an important approach in the creation of plasters and paints that best resemble its original and/or provide better performance through new innovations. Heritage science possesses great potential in improving evidence-led conservation work in Indonesia by incorporating properties of traditional materials with present technology for cultural sustainability that are gaining urgency in the midst of burgeoning population growth. However, despite its growing application for historically significant heritage buildings, the need of preliminary scientific testing is not commonly acknowledged and applied in the adaptive reuse of small scale heritage buildings in Indonesia. Therefore this paper studies two UNESCO-funded pilot projects in Jakarta and tracks the role of heritage science throughout their conversion, and aims to evaluate the constraints, by conducting literature studies and eight interviews with various stakeholders involved. It is found that heritage science is yet a key player in Indonesian conservation works, however it helps uncover material properties of wall finishing materials that best tackle moisture problems in Jakarta heritage buildings.

Keyword: Adaptive Reuse; Moisture; Heritage Science; Plasters and Paints
Abstract
The transformation of Banda Aceh, Indonesia, through the phases of political war and tsunami disaster leads to the alteration of the central urban areas. The impact of the temporary agglomeration is on the functions of public spaces. There has been a paradigmatic shift of culture transformation in this city from a place of local tradition to a multicultural environment opened to change. The complexity of this transformation was especially influential to its central market. By using the two sided theories and framework of Jacobs and Alexander, and Auge and Koolhas, this study analyses the historical evolution and perspectives of the central market for urban space. Data collection was from field observations and interviews with the vendors and customers in the market. The results imply that without disregarding the importance of heritage and history, stakeholders that have the power to change the central market must be realistic and adjust the condition according to the current people’s needs as users of this place. Nevertheless, despite some of the vendors’ rejections towards the development of modern markets in the city, this realism of modern markets has been able to solve the problem of other cities by the concept of one stop shopping for time efficiency and goods availability.

Keyword: transformation; non-place; place of belonging; central market; urban space
Influence of Material Application to Wayfinding Issue in Underground Station Design

A A Fatinah1, N R Kusuma2, E Arvanda3
1,2,3 Universitas Indonesia, Depok, Indonesia

E-mail: annisa.aulia41@ui.ac.id1, nevinerafa@gmail.com2, enira28@gmail.com3

Abstract
Getting lost and disoriented due to the lack of legibility of the space are common problems found in underground stations. Wayfinding inside underground stations is often thought as being solely supported by the presence of signage and directory maps as the tools that help users to understand their orientation and route better. However, the influence of materials on wayfinding in underground stations is often overlooked. Hence this paper presents a comprehensive examination of literature studies and an analysis on Dhoby Ghaut Station in Singapore as case studies. This station serves three interchange MRT lines and complex routes, which renders wayfinding issues even more urgent. The goal of this paper is to examine the potential of contrasting the material application for effective wayfinding inside the underground station. To identify aspects regarding the impact of selection and placement of materials applied on spatial elements of underground stations, two types of questionnaires regarding users experience when maneuvering in underground stations were distributed to both Singaporean and Indonesian tourists. The results indicate that the materials used in the underground station influences behaviour of users in varying degrees.

Keyword: Materials; Wayfinding; Spatial elements; Underground station
Active Waiting: Potentials of Waiting Area at Airport

Mary Thalia Travelita Pasaribu1, Enira Arvanda2, Nevine Rafa Kusuma3
Departement of Architecture, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, West Java, 16424
E-mail: marythaliatrav@gmail.com1, enira.arvanda28@gmail.com2, nevinераfa@gmail.com3

Abstract
For travellers in the airport—waiting is often associated as an unpleasant activity. One of the reasons of the perception is because waiting area is viewed as a space for uncomfortable waiting experience. Bissel explains that the experience of waiting is often conceptualised as a stasis period that bore the passenger to be passive. Regarding to this understanding, Schweizer and Gasparini try to dissect the potential of a waiting space by using active waiting concept as a lens of analysing the space. According to their concept, active waiting is where waiting is seen as an activity that has balance focus between achieving what is expected and how to have comfort when experiencing the process itself. This paper argues, by incorporating this concept to a waiting space, passengers will experience in both passenger system and a new occasional experience. This paper will observe and analyse the relation between spatial elements and the behaviour of passengers at a waiting area within an airport terminal, through the lens of active waiting concept. The experience of waiting can be achieved through three stages of habitation, which is lingering, tarrying, and the state of dwelling. The expected result from this study is to discover the potentials of waiting area at an airport. Findings from this paper may be useful for planning the airport waiting area, in order to create a more comfortable experience for the body and state of mind of the passengers.

Keyword: transit, space, active-waiting, waiting, human, body, wait, waiting-room
Permeable Interior : Unfolding Threshold Space within Transit Corridor

Niken Rahadiani Maheswari¹, Enira Arvanda², Nevine Rafa Kusuma³
¹,²,³ Department of Architecture, Faculty of Engineering, Universitas Indonesia, Depok, Indonesia
E-mail : nikenrahadiani1996@gmail.com¹, enira28@gmail.com², nevinerafa@gmail.com³

Abstract
At a transit corridor, threshold plays a key role in creating connectivity between the interior of transit facilities and its immediate urban context. The threshold is a choreographer of spatial experience and might potentially generate various public activities. As a transitional space, the permeability of threshold space’s boundary becomes an important factor for the users’ spatial experience and in providing a sense of safety and direction for the pedestrian. Such penetrable properties also help the users predict what is going on around the space. This paper suggests that threshold space can be read as an interior space. Therefore, the author uses interior theories as a groundwork for the case study. This paper aims to reveal how permeability in threshold space within transit corridor might have an impact on its atmosphere and the people’s experience within. It also argues that permeable threshold can have a significant impact on users’ perception of the transitional space. The method used on this paper is a qualitative method, using literature review, case study, and field observation. The findings may be useful in planning threshold space in the future to create a better and safer transit experience.

Keyword : Threshold; Boundary; Atmosphere; Interior; Interiority
Co-residence as Housing Strategy for Betawi Families: Case Study of Betawi Family Houses in Cengkareng, West Jakarta.

D H Arima, J Adianto, R T Gabe
Departement of Architecture, Faculty of Engineering, Universitas Indonesia, Kampus Baru UI Depok, West Java, 16424
E-mail: joko.adianto@gmail.com

Abstract

This paper aims to examine the co-residence as a housing strategy of Betawi families to live in Jakarta. The number of Betawi families, known as the native tribe of Jakarta, in the capital city is decreasing due to massive urbanization. The fierce economic competition with the resilient migrants has purged them to the suburban Jakarta. In order to live in Jakarta and close to their current job locations, transforming the inherited multi-generational family house to co-residence becomes the favorable option. There are certain adjustments in determining the strategy of living together, especially with a lot of relatives. Qualitative research method with in-depth interviews and longitudinal thorough direct observations were delivered to investigate and discover the meticulous process of transformations throughout the years. Based on the selected two houses of Betawi families in Cengkareng, West Jakarta, this paper poses the argument that co-residence is not only the housing strategy for Betawi families to live in Jakarta but also generating extra incomes to the family as it provides rent rooms for migrants.

Keyword :-
‘Lanting’ as A Way of Life: A legacy of riverine culture and architecture in present urban life of Sintang City, West Kalimantan

Mira S Lubis, TY Harjoko, D Susanto
Department of Architecture, Faculty of Engineering, University of Indonesia, Depok 16424, INDONESIA
E-mail: miralubis@gmail.com

Abstract
The vast island of Borneo, in the heart of Southeast Asia, is an island famous for its large and powerful rivers, such as Kapuas, Mahakam, Barito, Kahayan, and so on. Along with their tributaries and numerous smaller rivers, they represent key factor of communication. Sintang is one of riverfront cities with the population of about 200,000, located in the middle stream of the Kapuas river in West Kalimantan. In the midst of a rapid urbanization process in Sintang, 'lanting' or floating houses which are the legacy of culture and architecture of the past Sintang are still present and needed by its community. This paper discussed the dynamics of life of the lanting community in the midst of vast urbanization and modernization of the city. Through grounded-theory method, this study found that the presence of lanting is still relevant and has a significant role in the process of urbanization as a linkage between rural and urban community. We elaborated the concept of linkage and depicted the transition process of rural-urban society and the role of river community in the urbanization of Sintang city.

Keyword : riverine culture; riverine architecture; floating settlements; Sintang
A Review of Vertical Evacuation on Tsunami Mitigation
Case

Muhammad Haiqal¹, Laina Hilma Sari¹, Evalina Z¹, Purwandy Hasibuan²
¹Architecture and Planning Department, Engineering Faculty, Syiah Kuala
University, Indonesia
²Civil Department, Engineering Faculty, Syiah Kuala University, Indonesia

E-mail: mhaiqal@unsyiah.ac.id

Abstract
Banda Aceh City was hit by tsunami at the end of 2004. The experience of this
great disaster, directly or indirectly has led to many problems that is a must in
finding the right solution. It is very important to do in order to minimize the
disaster victims of the tsunami in the future. During the rehabilitation and
reconstruction period after the 2004 earthquake and tsunami, between 2005
until now, various mitigation efforts have been carried out. One of the tsunami
mitigation efforts is to build tsunami evacuation buildings. The city of Banda
Aceh is one of the cities in Indonesia that has vertical tsunami evacuation
facilities such as escape building and escape road. Although it still does not meet
the expected availability standards, it can be called the right initial step for
Banda Aceh City in the face of the tsunami disaster in the future. However, its
existence will be in vain if the community does not use it to its full potential in
their daily activities.

Keyword : riverine culture; riverine architecture; floating settlements; Sintang
Grey Wolf Optimization For Track Maximum Power Of Photovoltaic System In Multiple Peak Power Characteristics

Faulianur R and Sara ID
Syiah Kuala University Jl. Tgk. Syech Abdur Rauf No.7 Darussalam Banda Aceh Indonesia 2311
E-mail: ira.sara@gmail.com

Abstract
Photovoltaic module has nonlinear current and voltage characteristic where maximum power peak got at one point. Power characteristic of photovoltaic module would change depending on the radiation and temperature level. In addition, power characteristic also changes when the module has a disturbance in shading that produces multiple peak power. This multiple peak consists of local peak and global peak power. Where maximum power area located in global peak. Maximum Power Point Tracking (MPPT) needed to obtain maximum power in global peak. This paper aims to analyses performance a MPPT based on GWO to extract maximum power in multiple peak power. Previous research with the same method has been tested on the photovoltaic array. In this study the proposed scheme is on a single photovoltaic with partial shading in some of its cells. Perturb and Observe (P&O) method is tested to compare the performance of the GWO. This system implemented by simulation with Matlab/Simulink. From the simulation result GWO based MPPT was accurately tracked maximum power in multiple peak than P&O method.

Keyword : Single photovoltaic; MPPT; GWO; Multiple Peak; Partial Shading
The Design of Road Conditions Mapping System by Utilizing Openstreetmap Spatial Data

Y W Syaifudin¹, D Puspitasari¹, Y Ariyanto¹, R Ariyanto¹
¹ Department of Information Technology, State Polytechnic of Malang, Malang, East Java, 65141, Indonesia
E-mail: qulis@polinema.ac.id

Abstract
Land transportation still becomes a vital role in human and material mobility to date. In developing countries, like Indonesia, the development of land transportation infrastructure is growing very fast but the level of road damage is also still quite high. Therefore, road users need information on road conditions that will be passed. This research proposes the use of OpenStreetMap data to develop spatial data of road conditions dynamically and inexpensively, because it is open access and free editable. The focus is to design spatial data of road conditions and to present visualization of road condition maps based on OpenStreetMap. The raw data will be exported to the Spatial Database Management Systems (SDBMS) and then redesigned the data so that the system can add the status of road condition on each road segments. The result is a system design that can store spatial data and present a visualization of the road condition map. With this system, anyone can update the condition data of a road and can access the road condition map through web and mobile applications.

Keyword: map; road condition; spatial data; SDBMS; openstreetmap; open access
Online Judge MySQL for Learning Process of Database Practice Course

D Puspitasari¹, P P Arhandi², P Y Saputra³, Y W Syaifudin⁴, H A Himawan⁵, P A Sholihah⁶

¹,²,³,⁴,⁵,⁶ Department of Information Technology, State Polytechnic of Malang
E-mail: ¹dwi.puspitasari@polinema.ac.id, ²putraprima@polinema.ac.id,
³pramana.yoga@polinema.ac.id, ⁴qulis@polinema.ac.id,

Abstract

Database course is the main courses in the department of informatics and computer science. This course aims to provide knowledge to students to build and manage data on Database Management Systems (DBMS) like MySQL. Therefore, the implementation of database processing practices in one of the DBMS such as MySQL is very important as basic skills in the field of informatics. With the growing number of informatics students, lectures have limitation to correct the results of student exercises quickly. For that, we need a system that is able to help lecturers to make corrections of query exercise on MySQL automatically, which is called Online Judge MySQL. This application was developed using NodeJS to execute queries that users input and ReactJS to build its interfaces. Testing is done by using this application for online exam on several classes simultaneously. The results show that this application is able to correct the test results quickly and lightly.

Keyword: Database course; database practice learning; DBMS; Online Judge; MySQL; query; online exam
Developing industrial relation information system (IRIS) on inet essa module in PT. XYZ Tbk.

1*Putri Ayu Rahayu, 2Muhammad Fiqih Firdiansyah,

1Informatics Management Programmed, Faculty of Informatics Management, Astra Polytechnic of Manufacture, Jakarta 14330, Indonesia;
2Informatics Management Programmed, Faculty of Informatics Management, Astra Polytechnic of Manufacture, Jakarta 14330, Indonesia

*Corresponding author: ayuputri110@gmail.com

Abstract
Abstract—PT XYZ Tbk (XYZ) is a multinational company in Indonesia which has many subsidiary companies spread nationwide, or commonly addressed as affiliated company (AFFCO). Industrial Relation Division is responsible to monitor all AFFCO companies in manpower field, which functions as manpower statistic (MPS) and employee engagement survey (EES) data processing, in addition to monitor AFFCO companies that have sent their files. Nowadays, IR division are still processing the data manually, hence taking a lot of time in data processing until the reporting and file monitoring. Based on this problem, a system was made – Industrial Relation Information System (IRIS) – which has the ability to automate the MPS and EES data processing and report making, furthermore IRIS is able to speed up the MPS and EES file monitoring sent by AFFCO. IRIS was made with three-tier client-server architecture and prototyping methodology, using MVC 4 framework-based ASP.NET as its programming language and Kendo UI. Database used was SQL Server 2008. IRIS has the ability to automate the data processing to the report making and speed up the file monitoring from eight hours per month to less than an hour per month.

Keyword: Man Power Statistic; Employee Engagement Survey; Kendo UI; ASP.NET; Prototyping Methodology