Process Design and Steady State Simulation of Natural Gas Dehydration using Triethylene Glycol (TEG) to Get Minimum Total Annual Costs (TAC)

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Natural gas dehydration is an important process in the gas processing. All acid gas compounds, H_2S, CO_2, and HO_2 must be removed. Dehydration is used to remove water from the gas to prevent blockages in pipes due to the formation of hydrates. The presence of water vapor in natural gas can also cause corrosion and reduction of combustion energy. Most manufacturers use triethylene glycol (TEG) to remove water from natural gas streams since it affects to safety, operability, and stability of the process. In this study, the optimization process will be conducted at TEG Dehydration Unit in order to minimize the Total Annual Costs (TAC) and improve the efficiency of the TEG Dehydration Unit. The method used is absorption by TEG and simulations performed using Aspen Plus software. The optimization is conducted by changing some of operating conditions that have been created using existing condition that aims to obtain the optimum conditions with minimum TAC. The results show that by changing some operating conditions can reduce the size of the column and reduce the energy costs including steam, cooling water, and electricity costs. Validation simulation results of the steady state of the TEG Dehydration Unit using Aspen Plus and real plant produces %error relatively small, so it can be used to create a base case data. The mole fraction of HO_2 in dehydrated gas after optimization using Aspen Plus is 0,000178 while in real plant the result is 0,0002. The simulation results can reduce the TAC from $3.694.601 to $3.215.480.

Keywords: dehydration, natural gas, total annual cost, triethylene glycol

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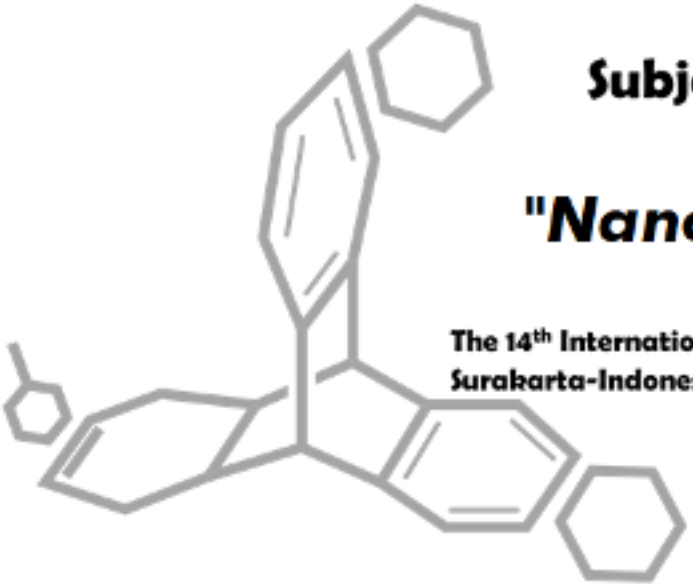
ABSTRACT BOOK

PARALLEL SESSION



Subject:

"*Nanomaterials*"

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N/S-doped carbon derived from chitosan polymer complex with silver nanoparticles for electrochemical non-enzymatic glucose sensor

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N/S-doped carbon supported AgNPs has been synthesized at low-cost, and scalable method using polymer silver complex. The fabricated nanocomposites exhibited excellent electrocatalytic performance as a glucose sensor. Remarkably, the fabricated glucose sensor is exhibited an ultrahigh sensitivity of 35.22 mAmM^{-1} cm^{-2} with a very low detection limit (0.046 mM) and long-term durability (30 dayes). Under optimized conditions, a wide linear response was obtained from 5 µM to 3 mM with an excellent linear response (R^2= 0.9940) was also obtained by AgNPs/NSC modified electrode. The presence of the heteroatom and AgNPs into the carbon matrix greatly enhances the selectivity for glucose over potential interferences in aqueous solution, with interfering agents. Overall, the present methodology demonstrates an efficient, robust, and aqueous-media-tolerable nanocomposite material as an electrochemical sensor and a potential alternative tool for the detection of glucose.

Keywords: chitosan, Ramman, silver nanoparticles, glucose, carbon matrix.

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Study on the Ion-Exchange Properties of the Activated Carbon Black Nanoparticles of ACBNPs20_17 code using Sodium hydroxide Solution

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Ion–exchange properties of the fabricated activated carbon black nanoparticles of ACBNPs20_17 code have been properly studied using several various concentration of 0.001, 0.003, 0.005, 0.007 and 0.009 M sodium hydroxide (NaOH) solutions. The study was performed by mean of measuring both hydroxyl anions (OH^-) quantity and electrical conductivity of the NaOH solution before and after it flowed down through the ACBNPs20_17 material at 1 drop per second flow rate due to gravitation force for four cycle's time. The study was aiming to correlate between the properties of anion-exchange and capability of adsorption of the ACBNPs20_17 material compared to that of the pristine carbon black (CB) powder. This research recorded that there was a competition between hydroxyl anion-exchange and hydroxyl anion adsorption. It was clearly known just the concentration of 9 mM NaOH provided hydroxyl anion-exchange on both ACBNPs20_17 material and CB, whereas the lesser concentrations of 1, 3, 5 and 7 mM NaOH provided hydroxyl anion adsorption rather than anion-exchange. In this case, anion-exchange capacity of the ACBNPs20_17 material was higher than that of the pristine CB materials. Ultimately, it can be concluded that adsorption process happened first

before anion-exchange process, and the later would precede when the concentration of NaOH solution feed higher enough, i.e. about equal or more than 0.009M.

Keywords: Ion-exchange, anion-exchange, adsorption, carbon black, activated carbon black nanoparticles

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Effect of variations in composition of Fe and N dopant on the structure and characteristics of TiO_2 nanomaterials

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In recent years, TiO_2 nanomaterials have attracted many researchers because of their potential use for various purposes, including photocatalysts for degradation of organic waste, decomposition of water into hydrogen, dye-sensitized solar cells, and sensors. However, TiO_2 nanomaterials have bandgap energy 3.2 eV or equivalent to a wavelength less than 400 nm (ultra violet region). In order to shift the responsiveness of the TiO_2 nanomaterials to the visible light region it can be done by several methods, one of which is the doping method. This research was conducted to study the effect of the composition of Fe and N dopants on the structure and characteristics of TiO_2 nanomaterials. The nanomaterials are synthesized using the sol-gel method and calcined at a temperature of 550 °C. The synthesized solids were characterized by XRD, TEM, FTIR, UV-vis DRS and Raman spectroscopy. The results showed that the enhance of Fe and N dopants into TiO_2 caused most TiO_2 crystals phases become anatase, bandgap of TiO_2 decreased to 2.66 eV and the size of TiO_2 crystals decreased. The presence of Fe dopant is confirmed in the form of α-Fe_2O_3 (104 plane). The presence of N dopant was detected from the higher peak of Raman spectra of N-doped TiO_2 compared to Fe-doped TiO_2 especially in bands with wave numbers around 396; 514; and 638 cm^{-1}. Higher peaks on N-doped TiO_2 compared to Fe-doped TiO_2 indicate that the presence of Fe dopant tends to suppress the TiO2 structure.

Keywords: nanomaterials, TiO2, doping, structure, characteristics

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Synthesis of CuO-TiO_2 Nano-Composite for Escherichia coli Disinfection Application

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The frequency of Acute Respiratory Infection (ARI) in Indonesia is still high and significant. One of the main causes of ARI is bacteria and other microorganisms in air. One alternative in disinfecting bacteria in air is by photocatalytic process, which often utilizes TiO_2. However, TiO_2-P25 has the disadvantage of low process activity especially its bacterial disinfection activity. Synthesis of CuO-TiO_2 nanocomposite material has been prepared by Photo Assisted Deposition (PAD) to deposit the CuO in the nanocomposite, for the purpose of improving its ability to disinfect bacteria. The test conducted was Total Plate Count (TPC) test, with Escherichia coli bacteria as the model. The characteristics of CuO-TiO_2 nanocomposite are evaluated with Scanning Electron Microscopy-Energy Dispersive X-Ray Analysis (SEM-EDX), X–ray Diffraction (XRD), and UV–Vis Diffuse Reflectance Spectroscopy (UV-Vis DRS). The SEM results show that the morphology of each nanocomposites remains similar whilst the EDX results show that the amount of CuO deposited in the nanocomposite corresponds to the amount of CuO precursor that is added. The XRD results show that the CuO peak appeared in XRD diffractogram at 10% CuO loading. The UV-Vis DRS results show that the smallest band-gap energy of CuO-TiO_2 is at the 3% CuO loading. The microorganism disinfection shows optimum results at 3% and 5% loadings of CuO-TiO_2, respectively reaches 89% and 91% disinfection in 120 minutes.

Keywords: Nano-Composite, Air-purifying, Anti-bacteria, ARI, PAD

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Chitosan Modified Fe_3O_4 Nanoparticles and its Antibacterial Applications

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Chitosan modified Fe_3O_4 nanoparticles (Fe_3O_4/Cs) were prepared using co-precipitation method by mass ratios of Cs and Fe3O4 of 1:4. The nanoparticles of Fe_3O_4/Cs were characterized by Fourier-transform infrared spectroscopy, X-ray diffraction, Vibrating samples magnetometer and Scanning electron microscopy, then tested its antibacterial activity by diffusion method against Staphylococus aureus and Salmonella typhi. The results suggested that Fe_3O_4/Cs nanoparticles was successfully modified by interacting between oxygen atom of Fe_3O_4 and hydrogen atom in the amino group of Cs, have almost spherical shape and their diameter ranged from 2 to 13 nm. The Fe_3O_4/Cs nanoparticles showed their antibacterial properties on both Gram positive (Staphylococus aureus) and Gram negative (Salmonella typhi) bacterial strains. The diameter of inhibition zone of the Fe_3O_4/Cs nanoparticles toward Staphylococus aureus and Salmonella typhi was 14 and 12 mm, respctively at the concentration of Fe_3O_4/Cs of 200 µg/mL.

Keywords: Chitosan, Fe3O4, Antibacterial

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Synthesis of Salicylic Acid Modified Magnetite Nanoparticles and Its Application in Waste Water Treatment

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Development of industrial fields and limitation of natural dyes have led to an increase in the use of synthetic dyes which produce hazardous wastes if not managed properly. An efforts to treat the liquid waste, especially synthetic dye waste can be done by an effective way by using magnetic nanoscale adsorbent material. The purpose of this study was to synthesize salicylic acid-modified magnetite nanoparticles and apply them as a liquid waste agent, especially green malachite waste that is often used in industry. The magnetic properties possessed by the material is a beneficial in material recovery and reuse. The main stages of the study include: the synthesis of magnetite nanoparticles by electro-oxidation of iron in water; modification of material with salicylic acid; characterization of synthesized materials with XRD, FTIR, SEM, and BET; and the waste treatment process by the adsorbent, salicylic acid modified magnetite. The results of XRD, FTIR, and SEM characterization showed that the salicylic acid modified magnetite nanoparticles were successfully synthesized. The results of BET characterization provide the particle surface area of 88 m^2/g which shows the potential of the material as an adsorbent. The application of the material as an adsorbent successfully absorbed 88% of green malachite with an adsorption capacity of 15.5 mg /g.

Keywords: salicylic acid-modified magnetite nanoparticles, adsorbent, green malachite

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SYNTHESIS AND PURIFICATION OF MAGNETIC CARBON NANOTUBE (MAG-CNT) AND ITS SURFACE MODIFICATION

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The present study aimed to investigated the process of synthesis, purification and surface modification of magnetic carbon nanotube (Mag-CNT). The synthesis process was carried out by chemical vapor deposition (CVD) method using gas mixture of argon and acetylene (C_2H_2). The synthesis process was performed using Incoloy® 800 catalyst material. After synthesis process, the purification stage was carried out in various ways with soaking in toluene organic solvents and vacuum annealing. The Mag-CNT with the best characteristics purified in various purification process was then treated with plasma jet for to attach the hydrophilic functional groups using gas variations of Ar/ethanol, Ar/acetic acid, and Ar/NH_3. Fourier transform infrared, X-ray diffraction, transmission electron microscopy, Raman spectroscopy and thermogravimetri analysis were used to asses the quality and the nature of formed Mag-CNT. During the modification process, the plasma jet technique was able to add the hydrophilic functional groups on the surface of Mag-CNT evidenced by the better dispersion properties compared with that of before the plasma jet treatment. In addition, the use of Ar/NH_3 in plasma treatment is known to have the best effect compared to other gas mixtures in increasing the material hydrophility.

Keywords: chemical vapor deposition, incoloy, magnetic carbon nanotube

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Preparation of Chitosan From Shrimp Shell to Be Used As Nano Organic Fertilizer

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The research background is based on soil damage in Indonesia due to the use of chemical fertilizers and the high cost of organic farming, on the other hand waste from shrimp skin is available in large quantities and has not been utilized. Shrimp skin contains chitosan which is very useful for soil fertility. Answering this problem the author conducted a study on the isolation of chitosan from shrimp skin waste which was then analyzed qualitatively and quantitatively and determined the effectiveness of shrimp organic nano fertilizer for soil fertility. How to make chitosan into nano chitosan using gelation and gamma irradiation methods with variations 0, 5, 10, 15, 20 25 kGy. The results obtained can be concluded that organic nano fertilizer is more effective than chemical fertilizers. Research using tomato plants shows the smaller the size of nano, the more effective plant growth.

Keywords: Fertilizers, organic farming, shrimp skin, chitosan

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Combination of Electrocoagulation and Photocatalysis for Hydrogen Production and Decolorization of Tartrazine Dyes Using Cu-TiO2 Nanotubes Photocatalysts

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Tartrazine dyes contained in various types of industrial waste need to be processed first before being discharged into the waters because it is dangerous for the environment and human being. Combination of electrocoagulation and photocatalysis for hydrogen production and decolorization of tartrazine dyes has been carried out with Cu-TiO_2 nanotubes photocatalysts. Cu-TiO_2 nanotubes thin-film were prepared in glyserol electrolytes solution containing NH4F and 0.124 M copper(II) chloride via the electrochemical oxidation of titanium foil for 2 hours at 50 V, then annealing for 3 hours at 500°C to form anatase crystals. In electrocoagulation process used aluminum plate as anode and 316 stainless steel plate as cathode for 4 hours at 15 V. Hydrogen production was carried out in a reactor made of arcrylic which is equipped with a power supply and UV lamps. H_2 was produced from the reduction of H^+ ions in solution on stainless steel cathodes and watersplitting by photocatalysis simultaneously. Decolorization of tartrazine is obtained from a combination of adsorption by electrocoagulation and degradation by photocatalysis. Determination of H_2 and tartrazine dye concentration were analyzed by using gas chromatograph and UV/Vis spectrophotometer, respectively. The production of H_2 has potential as a renewable energy source and decolorization of tatrazine dyes with high effectiveness could be achieved. The synergistic effects of the both results are also discussed in this paper.

Keywords: Cu/TiO2 nantubes, Electrocoagulation, Photocatalysis, Nanocomposite, Tartrazine

Presenter: Laily Fitri Pelawi (laily.fitri81@ui.ac.id)

Synthesis of Nanocomposites PANI/TiO_2 By Interfacial Polymerization Method and its Characterization

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Conducting polyaniline (PANI) and nanocomposite PANI/TiO_2 were prepared by interfacial polymerization method of two-phase organic/water. Determination of molecular weight polymer with Ostwald viscometer showed a molecular weight PANI at 2803.17 g/mol. The characteristic FT-IR peaks of PANI were found to shift to higher or lower wave number in nanocomposite PANI/ TiO_2 due to formation H-Bonding. UV-Vis characterization showed the presence of electron transitions in PANI compound. DRS characterization showed the compound PANI, PANI/ TiO_2 1%, 5% and 10% have an energy value of ~ 2.0 eV band gap. SEM analysis with image-J software showed a decrease particle size due to the increasing content of TiO_2.

Keywords: photocatalyst, PANI, PANI/TiO_2, nanocomposite polyaniline/ TiO_2

Presenter: roy andreas (royandreas78@gmail.com)

Characterization of Amorphous Carbonaceous-based nanomaterials produced in Chemical Vapor Deposition (CVD) using Copper Catalyst

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In the present study, we investigated the carbonaceous-based nanomaterials produced in chemical vapor deposition (CVD) using copper (Cu) catalyst. The CVD process was performed at 600 °C using Argon and acetylene flown into the CVD chamber until the pressure reached 0.5 MPa for 10 mins. According to spectroscopic data analysis using XRD, Raman spectrometer, and FTIR, the products were confirmed to be carbonaceous nanomaterial with nano-graphene produced in a dominant yield. The XRD spectrum shows the diffraction peak at 2-Theta of 25.07° referred to C(002) with broad characteristics as definitive proof of the disorder of the arrangement of the graphitic layers due to the increasing of d-spacing. Under electron microscopy analysis, both of the catalyst and carbonaceous material were observed, showing nanographene layers presence more dominant.

Keywords: amorphous, carbonaceous nanomaterials, copper, CVD, Raman, XRD

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Structural study of carbon nanoparticles produced by submerged arc discharge in toluene

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Submerged arc discharge is one of the methods of synthesis nanoparticles that low cost processes, high purity produced, simple techniques, and potential to be improved. Submerged arc discharge in the present study was developed by passing a high current between separated two graphite electrodes in a narrow gap submerged in liquid medium of toluene. The carbon nanoparticles were collected by scraping the powder on four different spots, such as the electrode handles, between the electrodes, in liquid medium, and in the bottom of the reaction chamber. The crystal structure, morphology, size, and type of carbon allotropes of nanoparticles from were further analyzed using X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), Raman spectroscopy, and transmission electron microscopy (TEM). The XRD analysis was performed to study the crystal structure and crystallite size of C(002) as a definitive peak for carbon materials. The C(002) peak of carbon nanoparticles collected in different spots have different intensities and broadness. The deposited powder at the bottom has the lowest intensity and broadest peak of C(002). The FTIR was used to identify the functional groups belonging to purified and unpurified carbon nanoparticles. The intensity of hydroxyl absorption at wavenumber of ~3400 cm^{-1} decreased after purification. Raman spectra show significant spectra profile among D, G and G' bands. The deposited powder collected from the bottom of the chamber supposedly as carbon onion, meanwhile the deposited powder collected between the electrodes is highly analyzed as MWNT. In addition, the Raman study has an agreement with the TEM imaging data.

Keywords: submerged, arc-discharge, carbon, nanoparticles, toluene

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Synthesis and Characterization of C-4-phenylcalix[4]resorcinarene become Novelty Nanomaterials of C-4-phenylcalix[4]resorcinarene-nanopalladium

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A novel synthesis of compounds of nanomaterial C-4-phenylcalix[4]resorcinarene-nanopalladium / C4ROPH-PdNPs has been carried out to synthesize materials that will function as copling catalysts, using etherification and complexation reaction methods. The steps in this study will be synthesized new nanobasketing compounds, including several syntheses (1) C-4-phenylcalix[4] resorcinarene, (2) C-4-phenylcalix[4]resorcinarene-ether, (3) C-4-phenylcalix[4]resorcinarene-phenylhydrazine, (4) C-4-phenylcalix[4]resorcinarene-nanopalladium. Compounds of C4R, C4ROPH-PdNPs were characterized using FTIR, H-NMR 500 Hz, TEM and UV-Vis to determine ligands functional groups and particle size of ligands before and after being complexed with palladium transition metals. The results of particle analysis using Transmission Electron Microscopy (TEM), obtained of C4ROPH-PdNPs have particle size between 3-13 nm. Keywords : C-4-phenylcalyx[4]resorcinarene-nanopalladium, C-4-phenylcalix[4]resorcinarene, Nanobasketing, FTIR, H-NMR, TEM, UV-Vis

Keywords: C-4-phenylcalyx[4]resorcinarene-nanopalladium, C-4-phenylcalix[4]resorcinarene, Nanobasketing, FTIR, H-NMR, TEM, UV-Vis

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Self-Assembly Route Using Green Template For Zinc Oxide Nanoparticles Production

MARIA ULFA | sarah ayu aryani

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Well-ordered zinc oxide nanoparticle for the first time was synthesized by self assembly route using gelatin as green template. The structure of nanoparticle was characterized by Fourier transform infrared spectroscopy, X-ray diffraction, transmission electron microscopy, nitrogen adsor[tion desorption techniques and scanning electron microscopy. Elementals analysis on surface monitored by EDAX showed that pure particle produced by the first step produces by self-assembly route. However, the process is effected by block copolymer infiltration into zinc precursor which make the Zn bulk formation. In another approach, the using gelatin as a template had a big effect on the morphology and structure on the nanoparticle. The structure of nanoparticle that synthesized by gelatin involving showed significantly enhanced textural morphologies than zinc oxide without gelatin. Future application, nanoparticle using gelatin as co template can be a new candidate of the green material in the future

Keywords: self-assembly route, zinc oxide, material, gelatin, green template

Presenter: sarah ayu aryani (sarahayuaryani21@gmail.com)

Structural Characterization of Composite Carbon-based Magnetic Nanomaterials Growth in Thermal- and Plasma-enhanced Chemical Vapor Deposition using Iron oxide/Carbon Catalyst

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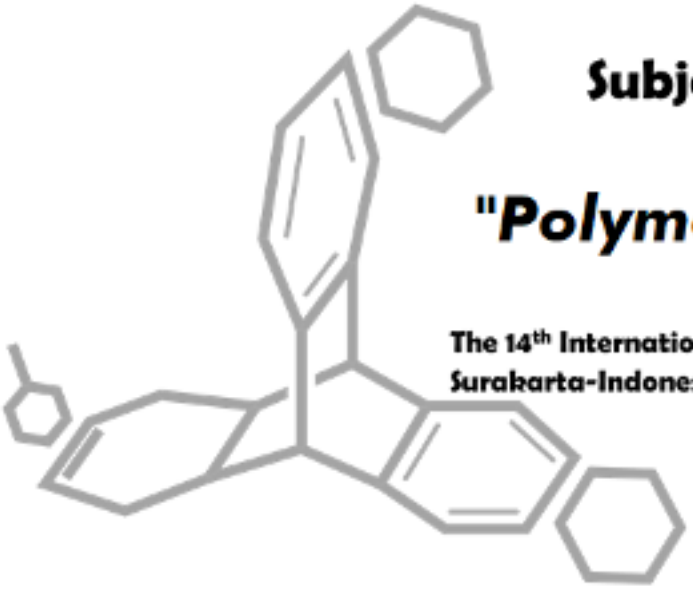
Thermal- and plasma-enhanced chemical vapor deposition (CVD) has been widely used for carbon-based magnetic nanomaterial processing. In general, CVD methods are performed based on the catalytic decomposition of a carbon precursor. In the present study, we investigated the structural characterization of composite carbon-based nanomaterials in CVD using core-shell iron oxide/carbon catalyst. The iron oxide/catalyst was prepared in submerged arc discharge in the liquid medium of ethanol 50% (v/v). The prepared material was then used as a catalyst in both thermal- and plasma-enhanced CVD. This catalyst was expected to have dual function of a catalyst and a secondary carbon source for CNTs growth process, which acetylene and argon gas used as primary carbon source and carrier gas, respectively. The successful formation of carbon nanotubes was assigned by the existed broader X-ray diffraction peak of carbon C(002), indicating that the graphite layers supposedly transformed into carbon atom in sp^2 and quasi-sp^2 hybridization structures. For more detail study, we performed the other assignment by transmission electron microscopy, which successfully observed the presence of graphitic layer structure recovery in material processed in plasma-enhanced CVD without destructing the magnetic iron compounds. Therefore, according to the results observed, the CVD process applied in this study was potentially used as material structural modification technique, especially for carbon-based magnetic nanomaterials.

Keywords: carbon, catalyst, chemical vapor deposition, iron oxide, magnetic nanomaterial

Presenter: Teguh Endah Saraswati (teguh@mipa.uns.ac.id)

ABSTRACT BOOK

PARALLEL SESSION



Subject:

"*Polymer Chemistry*"

The 14th International Joint Conference on Chemistry
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THE EFFECT OF COCONUT SHELL ACTIVATED CHARCOAL ON VULCANIZATON AND MORPHOLOGY BEHAVIOUR IN NATURAL RUBBER STARCH MODIFIED

Popy Marlina | Hari Adi Prasetya | Rochmi Widjayanti

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Vulcanization is an established process of cross-linking chemistry from a single molecular chain, increasing elasticity and decreasing plasticity. This reaction can occur if the rubber molecules are in contact with certain materials. The characteristics of vulcanization and the physical properties of vulcanized rubber are influenced by the vulcanization system and bound rubber. Cross-link formation can be observed by increasing the torque value as a function of the vulcanization time and temperature. This study aims to determine the vulcanized and morphology characteristics of natural rubber starch modified. Variations in a load of coconut shell activated charcoal (0, 15, 30, 45 and 60 phr) were applied in this study. Measurements of vulcanization characteristics include minimum torque modulus (MH), maximum torque modulus (ML), and optimum vulcanization time (t90) and scorch time (ts2) and morphology of natural rubber starch modified. The results showed that coconut shell activated charcoal could be used as a new filler because of its ability to improve vulcanized characterization (MH and ML). The content of coconut shell activated charcoal can shorten t90 and ts2. In other words, the greater a load of coconut shell activated charcoal, MH and ML is greater and t90 and ts2 are smaller, reaching the optimum on coconut shell activated charcoal load 45 phr. Morphology analysis with SEM micrographs reveals strengths and weaknesses in the system. Coconut shell activated charcoal influences the characteristics of vulcanization and morphology of natural rubber starch modified.

Keywords: Vulcanization, morphology, natural rubber starch modified, coconut shell activated charcoal

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AGING RESISTANCE AND FUNCTIONAL GROUP ANALYSIS OF NATURAL RUBBER/OIL PALM EMPTY FRUIT BUNCH CHARCOAL COMPOSITES

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Rubber products utilization often experienced hardening and elastic power reducing. The decrease in physical properties caused by rubber degradation due to oxidation and ozone. Oxidation is accelerated by heat, ultraviolet light, and metals that catalyze the oxidation of rubber. This study aims to determine the ageing resistance and functional groups of natural rubber composites (NR) and oil palm empty fruit bunch (OPEFB) charcoal. OPEFB used charcoal with variations loads, 15, 25, 35, 45 and 55 phr. The observation parameters were rubber vulcanization before and after aging (hardness, tensile strength, elongation at break, and abrasion resistance) while functional group analysis was carried out by the Fourier Transform Infrared (FTIR) Spectroscopy method. The aging test was conducted at 70° C for a storage period of 0, 24, 48 and 72 hours. The results of the study showed that the time of aging influences changes in the NR composite physical properties/ OPEFB charcoal. The more time to obsolete caused increased hardness and tensile strength. On the other hand, elongation at break and the abrasion resistance decreases with a longer time of aging. The NR/OPEFB charcoal composite functional group was shown in the absorption band area of 3031.20 cm-1 with C-H bond, vibration C = C at 1594.45 cm-1 and C-S bond 698.37 cm-1. OPEFB charcoal can be used as a filler with short-term using resistance, for rubber products that require medium tensile strength properties and can be used as alternative fillers to replace commercial fillers.

Keywords: Aging resistance, functional groups, composites, natural rubber, oil palm empty fruit bunch charcoal

Presenter: Hari Adi Prasetya (hariadiprasetya@yahoo.co.id)

CURING CHARACTERISTICS, MECHANICAL PROPERTIES, AND FUNCTIONAL GROUP FROM CRUMB RUBBER WASTE /SBR COMPOSITE WITH SOFTENER VARIATIONS

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The softener commonly used to make compounds is paraffin which is a synthetic softening obtained from petroleum processing. It is necessary to look for alternative fillers and natural softening that can be used to make rubber compounds, such as rice husk ash and vegetable oil. The purpose of this study was to find the type of softening in the mechanical properties, curing characteristics and functional group. This study uses a variety of softener, paraffin oil (A), vegetable oil waste (B), palm oil (C) and castor oil (D), with a concentration of 1.5 phr. The parameters chosen were the vulcanization characteristics of 150oC, mechanical properties and characterization of functions by FTIR method. The results showed that variations in softening oil opposed the characteristics of maximum vulcanization (Smax), minimum torque (Smin), S (Smax -Smin), optimal cure time (t90) and scorch time (ts2). The mechanical properties of rubber for hardness and tensile strength, using softeners from vegetable oils, are difficult to increase compared to paraffin oil. The best results on formula C use palm oil softeners where Smax: 22.74 kg/cm, Smin: 0.74 kg/cm, S: 22 kg/cm, t90: 7.48 minutes, sec and ts2: 2.06 minutes, sec. Meanwhile, the results of mechanical testing are hardness 70 Shore A and tensile strength 3.8 MPa. The results of the Fourier Transform Infra Red (FTIR), which regulates the functional groups contained in formulas A, B, C and D. The spectra at the absorption wavelength of 2922.35 cm^{-1} contain C-H groups, according to spectrophotograph A using paraffin oil softener.

Keywords: Softeners, rice husk ash, mechanical properties, curing characteristics, crumb rubber waste, SBR, functional group.

Presenter: Rahmaniar (rahmaniar_een@yahoo.co.id)

Study of Cr(VI) Transport Through Polymeric Inclusion Membrane

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The aim of this study was to investigate the effect of PIM carrier concentration, pH of Cr(VI) solution, and the co-ion toward Cr(VI) transport through PIM. Research was conducted using a diffusion cell consisted of feed and stripping chambers that is separated with a thin layer of PIM. Feed chamber was filled with 100 mL of 50 mg Cr(VI)/L. Co-ion in the feed phase was varied using diluted acid of Cl; SO_4^{2-}; and NO_3^-. pH solution in the feed phase was adjusted from 2.0 to 8.0. PIM was prepared from PVC as base polymer, Trioctyl methyl ammonium chloride (TOMAC) as carrier, and Dioctyl phthalate as plasticizer. Concentration of carrier was varied from 10 to 30% w/w. All the PIM materials were diluted in tetrahydrofuran. The stripping chamber was filled with 100 mL of NaOH 0.05 M. Feed and stripping solutions were stirred for three hours. Result shows that flux of Cr(VI) was affected by the carrier concentration. The optimum flux of Cr(VI) was occurred through PIM that consisted of 60% of PVC, 25% of carrier, and 10% of plasticizer at flux of $1,67x10^{-2}$ $mg.min^{-1}.cm^{-2}$. The Cr(VI) transport was optimum at solution pH at 4.0 when the feed phase was consisted of chloride as co-ion.

Keywords: PIM, Cr(VI), flux

Presenter: Barlah Rumhayati (rumhayati_barlah@ub.ac.id)

The Separation of CO_2 from CH_4 for Biogas Upgradation Process Using ZIF-8/Polysulfone and ZIF-8/Pebax-based Mixed Matrix Membranes

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Biogas is one type of renewable energy that has been explored widely in Indonesia to substitute un-renewable energy. The applicability of biogas can be improved by the up gradation of biogas to biomethane with higher content of methane. Carbon dioxide (CO_2) gas contained in biogas can decrease the calorific value as well as generate greenhouse gas. The separation of CH_4/CO_2 mixture can be conducted using polymeric membrane that needs no chemical, hence considered as environmentally friendly technique. However, the utilization of polymeric membrane in gas separation processes is hampered by the trade-off between gas throughput and selectivity. To solve this problem, the incorporation of inorganic particle, such as ZIF-8, into polymer matrix to improve the gas separation performance of the membrane has been conducted recently. ZIF-8 has pore size between the sizes of CO_2 and CH_4, hence suitable to separate such gases. In this research, ZIF-8 has been incorporated into copolymer Pebax by simple blending and solvent evaporation techniques in flat sheet configuration. The CO2 permeation tests showed an increase in gas permeability (120 Barrer compared to 90 Barrer) after the inclusion of ZIF particles with a slight decrease in CO_2/CH_4 selectivity. Further analysis confirmed that ZIF particles in Pebax dispersed more uniform compared to other polymers, such as Polysulfone and Cellulose Acetate. At FTIR wave number of 800 cm^{-1}– 1,100 cm^{-1}, it has been found that ZIF particles formed chemical bonding with C-O-C ring of polymer that could potentially improve the mechanical and plasticization resistance of the membranes.

Keywords: Biogas, biomethane, ZIF-8/Pebax, mixed matrix membranes, CO_2/CH_4 gas

Presenter: Putu Doddy Sutrisna (pudod@staff.ubaya.ac.id)

Improvement of physico-mechanical property and n-pentane resistance of epoxidized natural rubber - nitrile butadiene rubber blends filled carbon black using chlorobutadiene rubber as compatibilizer

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Natural rubber was intentionally modified as epoxidized natural rubber (ENR) in order to improve oil resistance and physical properties. However, rubber products formulation for oil and gas application based on binary blends of nitrile butadiene rubber (NBR) and ENR needs to be improved in physical properties. This research aims to study the composition of chlorobutadiene rubber as compatiblizer in ENR/NBR and its effect on the physico-mechanical properties like hardness, tensile strength, elongation at break, modulus 300% and n-pentane resistance after 24 hours immersion. The CR was added 0; 2,5; 5; 7,5; 10 phr into NBR/ENR (60:40 phr) binary blends filled using 50 phr of Carbon Black. Other chemical additives were compounded in accordance to ASTM D-3182. The results show that CR addition could increase the hardness of the vulcanizates as well as improve tensile strength, elongation at break, and modulus young. This indicates that the higher CR added, the higher compatibility and process-ability dispersion of NBR and ENR. However, this should be investigated further by study the morphological and reological characteristics. Furthermore, CR addition into NBR/ENR also give positive effect on the effect of n-pentane immersion. It is found that higher CR addition cause vulcanizates become more stable of swelling index as well as minimize the hardness and tensile strength changes during n-pentane immersion. It could be inferred that CR addition in NR/ENR blends could improve its physco-mechanical properties, while inhibit the rubber deterioration during usage in a certain environment.

Keywords: n-pentane resistance, chloroprene compatibilizer, epoxidized natural rubber

Presenter: Tri Susanto (3trisusanto87@kemenperin.go.id)

Effects of percent weight divinylbenzene as crosslinking agent on the properties of eugenol–divinylbenzene copolymers

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Synthesis of eugenol-divinylbenzene copolymers were carried out by reacting eugenol with variaous percent weight of divinylbenzene in a reactor at room temperature for 24 hours in the presence of sulfuric acid as a catalyst. Methanol was used to quench the copolymerization process. The effect of DVB mass on copolymer properties was studied based on molecular weight, thermal stability, surface morphology and swelling degree of the copolymers produced. The weight percent of the added DVB was responsible for the molecular weight of the copolymer by multiplying the site for propagation in the copolymerization process. In addition, the swelling degree value was also affected by the number of crosslinkers used. However, the influence of the weight percent of DVB was not seen on the copolymer morphology.

Keywords: eugenol, divinylbenzene, copolymer, percent weight

Presenter: Nor Basid Adiwibawa Prasetya (nor.basid.prasetya@live.undip.ac.id)

Bioplastic made from nata de coco for fruits and vegetable packaging

Saiful

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In this study, bioplastics were made from cellulose obtained from Nata de coco. Sorbitol was used as the plasticizer. The cellulose was prepared from nata de coco, which was produced from coconut water fermentation by using Acetobacter xylinum. Cellulose powder was obtained from a two-step NaOH purification procedure, followed by drying. A mixture of N, N-dimethyl acetamide (DMAc) and lithium chloride (LiCl) was used as a solvent to prepare a casting solution. The pure cellulose bioplastic was obtained by using 0.5% cellulose that has a tensile strength of 142.5 Kgf/mm^2 and elongation value of 49.1%, therefore water absorption and solubility in water were 70.8% and 20.8% respectively. By adding sorbitol of 1.5% the bioplastic shows a better performance, with a tensile strength of 145.0 Kgf/mm^2 and elongation value of 24.0%. The water absorption and solubility were increased by 78.4 % and 87.4% respectively. The bioplastic can be applied for wrapping of tomato dan apple slice maintaining good quality.

Keywords: Nata de coco, cellulose, sorbitol and bioplastic, fruit, vegetable

Presenter: Saiful Saiful (saiful@unsyiah.ac.id)

Study of the Pirolysis of Trypolyphosphate-Chitosan crosslinkedPoliyethilen glycol-polyether sulfone (PEG-PES/TPP-CS) Using the Thermaogravimetric Analysis

Retno Ariadi Lusiana | Gunawan

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In the work of this study, the PES modified chitosan derivative membrane kinetic characteristics were evaluated and compared at heating rates 5,10,15°C/min. The results show that three stages appear during pyrolisisis: moisture evaporation, primary devolatilization and residual decomposition. The heating rate slightly affects the decomposition properties of the benzene ring of PES, with the heating rate increasing, the maximum peak of weight loss shifts to a higher temperature. The is oconventional Friedman method is used to obtain the kinetic parameters of the pyrolysis reaction data in the third zone. The average activation energy of PES was 200 kJ mol^{-1}. This data provides information for further applications for designing and modeling in the gelidium thermo chemical conversion system of PES.

Keywords: PES, Chitosan, pyrolysis

Presenter: Retno Ariadi Lusiana (retno.lusiana@live.undip.ac.id)

Preparation of Starch-Graft-Acrylic Acid/Bentonite Composite Gel

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Hydrogel is a hydrophilic polymer with three-dimensional network that has the ability to retain large amount of water and swelling behavior without dissolving in water. Hydrogel can be applied in various fields, some are for Enhanced Oil Recovery (EOR), water harvesting, and diapers. To obtain a higher water absorption capacity and mechanical strength of the hydrogel, this research carried out by modifying structure of polymer, which was done by modifying acrylic acid, crosslinker, bentonite, and degree of neutralization of acrylic acid. The hydrogel was prepared by grafting partially neutralized acrylic acid onto gelatinized starch in a reactor using potassium persulfate as initiator with temperature of 60 °C. Then, it was added by N,N'-methylene-bis-acrylamide (MBA) as crosslinker to create three-dimensional network. This hydrogel was characterized by Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and water absorbency. The result demonstrated that the highest absorption of water with variable concentration of crosslinker was 512.12 g/g.

Keywords: Hydrogel, Composite Gel, Starch, Acrylic Acid, Bentonite

Presenter: Kaeksi Sekar Arum | Enggar Candra Prastiti (kaeksi15@mhs.chem-eng.its.ac.id | enggarcandraprastiti@gmail.com)

Forward Osmosis Membrane to Produce Energetic Drinking Water from Seawater

Saiful

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The need for clean water will continue to increase in the future as the growth of the world population, climate change and water pollution by industrial and household waste and future indicators shows increasing scarcity of water worldwide. Sea and brackish water desalination is the most fast and easy to meet growing water needs. A chitosan-based forward osmosis (FO) membrane has been prepared in this study for sea water desalination. The FO membrane was casted by phase inversion method. The membrane posses asymmetric structure with 33,67 % of porosity and 15,76 % of a swelling degree. The chitosan membrane have the tensile strength of 28,83 kgf / mm^2 and elongation equal to 7,16%. Chitosan FO membrane were tested using fructose, sucrose, and mixture of fructose and sucrose as the draw solution to extract water from a brackish water feed solution. An increase in draw solution concentration lead to an increase in water flux. For all three draw solutions, the order of water flux is sucrose; fructose; mixture of sucrose and fructose, at the same of flow rate. High product water quality was obtained for all draw solutions. The product of water quality has been met to indonesian government regulation of drinking water quality. Chitosan forward osmosis membrane can be an alternative method for production drinking water from sea water.

Keywords: forward osmosis membrane, chitosan, desalination, sea water, drinking water

Presenter: Saiful Saiful (saiful@unsyiah.ac.id)

Effect of Phosphate ion on Sorption of Nd(III) ion from Aqueous Solution using Ion Imprinted Polymers

Muhammad Yudhistira Azis

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Neodymium (Nd) is one of the rare earth element (REE), which currently has a very high economic value. This was due neodymium metal begin to used extensively in high-tech industry needs. Neodymium metal is an important ingredient in the manufacture of electric motor and generator hybrid cars and the essential ingredients in the manufacture of hybrid cars NiMH batteries. In nature Nd element is found in xenotime and monazite minerals along with other REE in the form of phosphate salts. In this study, the effect of phosphate ion on sorption of Nd ion from aqueous solution onto ion imprinted polymer (IIP) has been investigated. The effect of phosphate ion on Nd ion adsorption onto IIP was tested by dispensing 2 g of IIP beads in 50 mL phosphate ion (10-25 mmol/L) solution containing 100 mg/L Nd ion at pH 7. It was observed that the amount of Nd ion adsorbed on IIP is not affected by phosphate ions at certain concentrations.

Keywords: ion imprinted polymer; Neodimium; phosphate; sorption

Presenter: Muhammad Yudhistira Azis (m.yudhistira.azis@mail.chem.itb.ac.id)

The Effect of Zeolite Addition and Freeze-drying Method on Alginat Beads for Controlled Release Fertilizer

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The Effect of zeolite on alginate beads for fabrication of Controlled Release Fertilizer (CRF) and using freeze drying method during manufacturing have been studied. CRF fabrication was done by mixing of alginate, zeolite and liquid NPK fertilizer followed by dipping into CaCl2 solution. The effect of zeolite was determined by the release of Nitrogen (N), Phosphorus (P) and Potassium (K) from A/Z/NPK and A/NPK bead. The CRF preparation using freeze-drying methods for A/NPK beads was also compared with air-drying method. The CRF products were characterized by using FTIR and SEM. Analysis of N, P and K was done by Kjeldahl method, UV-Vis and AAS. Swelling test (SR) of the beads and chemical reaction kinetics were investigated. The result showed that A/Z/NPK composite beads could be used as Controlled Release of NPK fertilizer and showed better capability than beads of A/NPK. The freeze-drying during beads formation showed better performance than air-drying method. The addition of zeolite and freeze-drying method is effective to enhance the swelling ratio of A/NPK. The chemical reaction kinetics model representing of A/Z/NPK, A/NPK beads using air and freeze-drying is Korsmeyer-Peppas model.

Presenter: Dwi Ratih Purwaningsih (dwi.dw09@gmail.com)

Effect of Graphene Oxide on Cellulose Acetate/Polyethylene Glycol Membrane by using Blending Method

Bertiningrum Cintya Devi | Bagus Arief Febriansyah | Arnesya Ramadhani | Retno Dwi Nyamiati | Yeni Rahmawati | Siti Nurkhamidah

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Cellulose acetate/Polyethylene glycol (CA/PEG) membrane was prepared and modified with addition of graphene oxide (GO) by blending method. The Cellulose acetate/polyethylene glycol (CA/PEG) has a ratio of 80:20 was prepared by phase inversion method. After the membrane's solution was prepared, graphene oxide is added to the solution with variety of GO compositions ranged from 0.0025 to 0.0125 wt% to the mass of the solvent. The modification was also made with the addition of polyester woven fabric as thin layer in order to make Thin Film Composite (TFC) membrane. The desalination performance of the membranes was evaluated with water flux and salt rejection measurement. While its characteristics were observed by using Scanning Electron Microscopy (SEM), Fourier-Transformed Infra-Red (FTIR), contact angle analysis and Dynamic Mechanical Analysis (DMA). The experiment results showed that the best membrane was CGB 2 with the addition of 0.005 wt% GO resulted in salt rejection (%R) 29.7% and flux permeate (F) 1075 L/m^2.h. While the modified membrane of CA/PEG/GO TFC with the addition of 0.0125 wt% GO obtained %R=24% and F=752 L/m^2.h. Salt rejection of these membranes is still low enough, it needs more modification to improve its performance.

Keywords: cellulose; desalination; graphene oxide; membrane

Presenter: Retno Dwi Nyamiati

The compounds of montmorillonite-filled natural rubber: cure rate index, swelling and hardness properties

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The semi efficient vulcanization system was applied for investigation on the effects of nano-sized montmorillonite (MMT) on cure rate index, swelling and hardness properties of compounds of natural rubber (NR). The MMT as the nano-sized filler was incorporated into NR at 2.0, 4.0, 6.0, 8.0 and 10.0 parts per hundred rubber (phr). It was found that the MMT functioned not only as a co-curing material but also as a reinforcing filler. It increased the cure rate index of the compounds of NR. The higher the MMT loading, the higher the cure rate index was. It also increased the crosslink density and hardness up to a 10.0 phr. of MMT loading.

Presenter: I Surya (isurya@usu.ac.id)

The compounds of styrene-butadiene rubber in the incorporation of palmitamide: abrasion resistance, cure rate index and torque properties

I Surya | Edwin

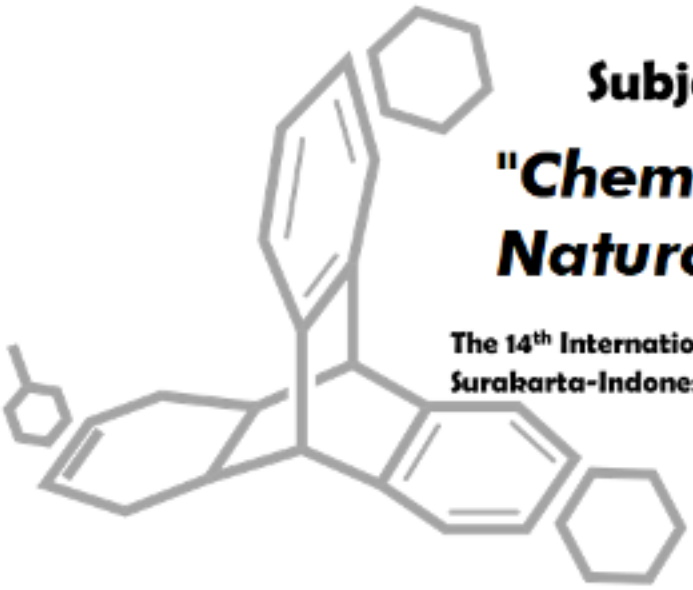
Faculty of Engineering, Universitas Sumatera Utara, Medan, Indonesia

The semi efficient vulcanization system was applied for investigation on the effects of nano-sized montmorillonite (MMT) on cure rate index, swelling and hardness properties of compounds of natural rubber (NR). The MMT as the nano-sized filler was incorporated into NR at 2.0, 4.0, 6.0, 8.0 and 10.0 parts per hundred rubber (phr). It was found that the MMT functioned not only as a co-curing material but also as a reinforcing filler. It increased the cure rate index of the compounds of NR. The higher the MMT loading, the higher the cure rate index was. It also increased the crosslink density and hardness up to a 10.0 phr. of MMT loading.

Presenter: I Surya (isurya@usu.ac.id)

ABSTRACT BOOK

PARALLEL SESSION



Subject:

"*Chemistry of Natural Products*"

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Effect of Phenanthrene derivatives isolated from Dioscorea dumetorum (wild yam variety) on some plant pathogens for the control of postharvest losses.

Ichiko Odeh

Benue State University (Center for Food Technology and Research) Makurdi Nigeria

This study aims at investigating the antifungal activity of three phenanthrene derivatives isolated from tuber extracts of Dioscorea dumetorum (wild yam) against some plant pathogens. The extraction of bioactive constituents of tubers of Dioscorea dumetorum (Kunth) Pax was carried out sequentially using hexane and ethylacetate (maceration or soaking) at room temperature (272 0C). The Phytochemical analysis revealed the presence of alkaloids 2.4%, tannins 6.5%, flavoniods 8.3%, phenolics 9.7%, saponins 7.0%, steroids 10.3% and terpeniods 1.8%. Column chromatography and thin layer chromatography techniques were used for purification and isolation of components. ^{1}H *and* ^{13}C *Nuclear Magnetic Resonance (NMR) spectra were obtained for some fractions. These spectra showed stearic acid (*$C_{17}H_{35}COOH$*),Oleic acid (*$C_{17}H_{33}COOH$*), stigmasterol (*$C_{29}H_{48}O$*), sitosterol (*$C_{29}H_{50}O$*), ferulic acid (*$C_{10}H_{10}O_4$*) and three phenanthrene derivatives (*$C_{17}H_{16}O_4$*,* $C_{18}H_{18}O_4$ *and* $C_{18}H_{18}O_5$*). The zone of inhibition ranged from 23 mm- 34mm against fungi. 3,5,7-trimethoxy-2-phenanthrenol was 34mm against Gloeophyllum sapiarium, 33 mm against Fomitopsis pinicola and Sepula lacrymans, 32 mm against Rhizopus sp and Aspergillus fumigates respectively. MIC ranged between 25 µg/ mL – 100 µg/mL for most of the test pathogens within 7 days and 25 µg/ mL – 100 µg/mL within 3 days on treatment. Rapid effect was observed on most of the pathogens with 3, 5, 7-trimethoxy-2-phenanthrenol. The potent antifungal activity of these compounds and their spectra are modulated by hydroxylation and methoxylation of the phenanthrene ring moiety. The high activity against these pathogens is in response to free radicals via donating hydrogen atom from its phenolic hydroxyl group.*

Keywords: Phenanthrene derivatives, Dioscorea dumetorum, Fungi, Postharvest loses

Presenter: Odeh Ichiko (igwueichiko@gmail.com)

Antibiotics produced by actinobacteria from Taklimakan desert in China

chenghang sun | Ting Wang | Qin-Pei Lu

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Taklimakan desert is the world's second largest shifting sand desert with strong UV, arid, poor nutrition. There are a little studies on actinobacteria dwelling in the desert and their capacity to produce antibacterial secondary metabolites. Herein, we report antibiotics, with new chemical structures or new antibacterial activities, produced by two Streptomyces strains, S405 and S90. Under guidance of antibacterial activity against Gram-positive bacterium, Staphylococcus aureus, two new streptogramin-type antibiotics, desulphurizing griseoviridin and acetyl-griseoviridin, along with one known compound, griseoviridin, were isolated from the culture broth of the strain by chromatographic methods. Their chemical structures were determined by HR-MS and NMR. In all previous research, two types of streptogramin antibiotics were produced simultaneously such as griseoviridin and viridogrisein, which indicates potential new antibiotics in the culture broth of Streptomyces sp. S405 are still waiting to be found in the future. Streptomyces sp. S90 showed moderate activity against Gram-negative bacterium, Acinetobacter baumannii. Under guidance of antibacterial activity and LC-UV-MS, six known compounds with 2, 2'-bipyridine core structure were isolated from the fermentation broth of Streptomyces sp. S90, two compounds showed the moderate activity against Acinetobacter baumannii with MIC value of 64μg/ml. The result that compound with 2, 2'-bipyridine core structure can inhibit Gram-staining-negative bacterium provided a template for chemical modification to get new group of antibiotics against clinic important bacteria.

Keywords: desert, actinobacteria, antibiotics, anti-bacteria

Presenter: chenghang sun | Ting Wang | Qin-Pei Lu (chenghangsun@hotmail.com | wangting07@outlook.com | qinpei89@hotmail.com)

Syntesis and characterization of water hyacinth (Eichhornia crassipes) cellulose-based bioplastic reinforced with chitosan

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Increased use of the synthetic-based conventional plastics has caused high rates of pollution by plastic waste which is difficult to decompose by the environment. The use of natural polymeric materials continues to be developed to become an alternative to making bioplastics that are more environmentally friendly. In this study, bioplastics were made with a matrix of 3% mixture of starch and cellulose from water hyacinth through different compositions, 10 : 0; 9 : 1; 8 : 2; and 5 : 5 to improve the performances of the starch bioplastics. Chitosan with a matrix of 1% is added to improve the mechanical function of starch bioplastic. There are three main steps taken to isolate water hyacinth cellulose, i.e. specifically bleaching, alkali treatment and acid hydrolysis. Starch-based bioplastics and their composites were characterized by Fourrier transform infrared (FTIR) spectroscopy, scanning electron microscopy (SEM), tensile strength tests, and bioplastic degradation tests. FTIR data shows that pure cellulose can be isolated from water hyacinth. The tensile strength of bioplastic starch-chitosan increases with the addition of cellulose. The improvement of physical properties of bioplastic starch was achieved through the addition of chitosan and cellulose composition isolated from water hyacinth. The mixture of starch-chitosan with a combination of water hyacinth cellulose produces environmentally friendly bioplastics accompanied by increased mechanical and physical properties compared to starch bioplastic.

Keywords: bioplastic, Eichhornia crassipes, starch, chitosan, cellulose

Presenter: Jeesica Hermayanti Pratama | Amalia | Rizka Lailatul Rohmah
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OPTIMIZATION OF SUPERSATURATED SOLUTION FROM Stevia rebaudiana WATER EXTRACT LEAD TO CRYSTAL NUCLEATION

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The nucleation of crystal growth is thought influenced by super saturated solution. Crystallization of steviol glycoside based on water extract of Stevia rebaudiana is challenging. We use factorial 4^3 D-optimal design for simultaneously optimizing super saturation solution. As factors applied were concentrating the solution, addition of anti-solvent, temperature and time in crystal formation. Each factor consisted in 3 levels. Supersaturated solution was observed by measurement of total dissolved solid and total suspended solid. Stevioside and rebaudioside A concentration were determined from solution which obtained in optimum condition by High Performance Liquid Chromatography (HPLC). The results obtained that the optimal condition of the super-saturated solution was reached at a concentration of 5%, the addition of 90% ethanol as an antisolvent, a temperature of 5 ° C and a length of time of 6 hours in crystal formation. Optimization of super saturation from water extract of S. rebaudiana lead to the formation of heterogeneous primary nuclei of crystallization process.

Keywords: optimization, supersaturated solution, Stevia rebaudiana, D-optimal, crystal

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Anthocyanin from Telang by Ultrasound Assisted Extraction

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The food industry is an easy to develop industry. To be attractive consumers, producers provide innovation with the addition of dyes. There are two types of dyes that are most commonly used, namely synthetic dyes and natural dyes. The synthetic dyes waste is very dangerous for the environment. Therefore, it is necessary to find an alternative for saving the environment by using natural dyes. One natural dye can be obtained from Telang. It contains anthocyanin as natural pigment. It gives blue pigment and red pigment in acid condition. Several studies to extract anthocyanin from Telang have been carried out, but have not extracted anthocyanin efficiently. One way to extract anthocyanin is by ultrasound extraction with aquadest solution. By detailed, this paper focused on the influence time extraction at 30-150 minutes, temperature at 30-60 °C, pH at 4-10, and ratio feed to solvent at 0,02-0,1. Temperature extraction was maintain under 70°C. If it was done above 70 °C, it can decrease anthocyanin in Telang exctract. Color display of anthocyanin can be tested using a UV-Vis spectrophotometer with maximum length absorption of 500-700 nm. And the anthocyanin concentration can be known by making standar curve with pure anthocyanin. The results showed that concentration of maximum anthocyanin 14,8 mg/L at 90 minutes, 60 °C, pH 4, and ratio feed to solvent 0,02.

Keywords: ultrasound-extraction, anthocyanin, UV-Vis spectrophotometer

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In vivo acute toxicological studies of mountain papaya fruit (*Vasconcellea pubescens* A.DC) against hepatic injury

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Mountain papaya fruit was maceration extraction method. This research to evaluated on acute toxicity test on white mice liver. The toxic parameter will be determined on LD50, toxic effect symptoms, SGPT serum levels, and hepatic histology profile. The experiment using 25 male Swiss Webster albino mice were divided into five groups. It consists of negative control (CMC 0.25%), dose I (1.12 mg / 20g BW), dose II (5.6 mg / 20g BW), dose III (28 mg / 20g BW), and dose IV (140 mg / 20g BW) was oral administered. Observations were done by observing the number of deaths as well as symptoms of toxic effects arisen during the first 24 hours and continued for up to 14 days. The levels of SGPT, LD50, and hepatic histologic profile of mice were measured on the 15th day. Analysis of SGPT levels was performed statistically using One Way ANOVA. The results showed the LD50 value of ethanol extract of the mountain papaya was 27.99 mg / 20 g which categorized as mild toxic. The result of the SGPT analysis showed that there was a significant difference between negative control and all treatment groups ($p \leq 0.05$). The result of histology observation of hepatic organ showed the average liver cels damage score in the negative control group was 41.5 ± 2.12. Whereas in a group of dose I-IV there was increasing liver damage with average damage score of 70.5 ± 0.70; 127 ± 7.77; 135 ± 0.70 and 248 ± 2.8 respectively.

Keywords: acute toxicity, liver injury, mountain papaya

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Acute oral toxicity test of eel (Anguilla bicolor bicolor) oil in mice liver and kidney cells

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The present research aimed to investigate the acute toxicity effects of eel oil on liver and kidney function after oral administration in mice. The eel oil was extraction with reflux method. This study used 24 male mice that were divided into four groups. It consisted of the negative control (aquadest), the eel oil dose I (0.09 g/20 g b.w), dose II (0.25 g/20 g b.w), and dose III (0.74 g/20 g b.w) administered orally. Toxic effect symptoms were observed for 14 days. On the 15th day, the level of alanine aminotransferase (ALT), histology profile of liver, creatinine and histology profile of kidney were measured. Data analysis was performed statistically using One Way ANOVA. The result showed the LD50 value of eel oil was > 15 g/kg b.w, which categorized practically nontoxic. Eel oil didn't affect the toxic effect symptoms on ALT level, lever histology profile, and creatinine level. Histology profile observation showed that eel oil effects on the histological profile of mice kidney (p;0,05) with moderate injury level (26-50%).

Keywords: acute toxicity, eel, liver, kidney.

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Modification of Biochitin Immobilized Dithizone as Adsorbent Cr (VI)

Lutfiyatul mukhlisah | Barlah rumhayati

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Biochitin is chitin obtained using a biological method of fermentation that will be used as adsorbent. One way to increase biochitin adsorption capacity is to immobilized biochitin with dithizone. The purpose of this study was to modify biochitin using dithizone. Biochitin is made from white shrimp skin which is fermented by Lactobacillus plantarum and then fermented with Bacillus thuriengenesis bacteria. Modifications were made by adding dithizone (0.01 g; 0.02 g; 0.03 g; and 0.04 g) to 2 grams of biochitin in toluene solvents with reflux time (2, 4, and 6 hours) at temperature of 700C . Modified biochitin was used to adsorb Cr (VI) 50 ppm for 6 hours. The results showed that the best immobilization conditions from dithizone to chitin were achieved when the reaction was carried out for 4 hours with optimum dithizone mass of 0.04 g dithizone each 2 g chitin at 70oC in toluene. FTIR spectra at wavelength number 2376.13 cm-1 shows S-H group, S = C group at wavelength of 1382.87 cm-1 and N-H group at 1558.38 cm-1 which shows that dithizone has been successfully immobilized to chitin surface. The particle size distribution in the adsorbent powder was 220,79 µm. The adsorption test results showed that modified biocytin can adsorb Cr (VI) by 97,87%.

Keywords: biochitin, immobilization, dithizone, adsorption

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The Application of Face-Centered Central Composite Design for the Optimization of Clove Oil Extraction from Syzygium aromaticum Stem using Solvent-Free Microwave Extraction Method

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Predominantly, the essential oil industry in Indonesia produces crude oil using conventional methods. This method has disadvantages that includes longer extraction time and low oil quality. Several clove oil extraction methods such as solvent-free microwave extraction (SFME) were developed. The optimum conditions for clove oil extraction were determined using response surface methodology (RSM). Face-centered central composite design (FCCCD) is an efficient RSM approach in comparing individual effects and interactions between variables. The variables used as parameters are microwave power (300 W, 450 W, 600 W), feed to distiller (F/D) ratio (0.06 g/mL, 0.10 g/mL, 0.14 g/mL) and extraction time (20, 40, 60 min). The experimental design showed that a maximum yield of 3.303% obtained at 546.678 W microwave power, 0.062 g/mL F/D ratio and 41.551 min extraction time. Based on the coefficient of determination R^2 of 0.9008, the model obtained is able to describe the experimental results and determine the results of clove oil. Furthermore, the results of analysis of variance (ANOVA) show the important parameters that determine the oil yield are microwave power, F/D ratio and extraction time.

Keywords: solvent-free microwave extraction, clove oil, Syzygium aromaticum, face-centered central composite design

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Optimization of Essential Oil Extraction from Dried Clove Leaves (Syzygium aromaticum) using Solvent-Free Microwave Extraction by Face-Centered Central Composite Design (FCCCD)

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Dried clove leaves is a spices that become very valuable thing in Indonesia. These leaves can be used as Clove Leaves Oil with many methods developed. Extraction of essential oils from clove leaves (Syzygium aromaticum) using Solvent-Free Microwave Extraction (SFME) method, is much more effective and more efficient than conventional methods. In this study, the extraction of clove leaves oil using Solvent-Free Microwave Extraction (SFME) method, has been done with several parameters such as microwave power (300; 450; 600 W), F/D Ratio (0.06; 0.10; 0.14 g/mL), and extraction time (20; 40; 60 min). The purpose of this study is to optimize and analyze the effect of each variable with Face-Centered Central Composite Design (FCCCD) technique, one of a type of Response Surface Methodology (RSM). There is a value analysis of variance (ANOVA) which indicated important factor that determines the results of the research. From the analysis, there are 4 parameters that has significant effect (p-value < 0.05), these parameters are microwave power (A), F/D ratio (B), Extraction Time (C) and quadratic effect of extraction time (C^2). The result of the extraction experiment showed that the optimum condition was at microwave power 542.037 W, F/D ratio 0.07 g/mL, the extraction time 44.5 min. From this optimum condition, the maximum predicted yield was 4.45%. It can be concluded that this result shows the suitability of the model used in the extraction of essential oils from dried clove leaves (R^2 = 0.8906).

Keywords: Clove leaves oil, Face-Centered Central Composite Design, Solvent-Free Microwave Extraction, Syzygium aromaticum

Presenter: Yurie Nurmitasari (nurmitasari.yurie@gmail.com)

Microwave Hydrodistillation of Clove (*Syzgium aromaticum*) Stem Oil using Face-Centered Central Composite Design

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Research interest in the extraction of essential oil has increased over the last decade. One of the potential aromatic plants that is extensively prosperous is clove (Syzgium aromaticum), because all parts of this plant (bud, stem, leaves) contain a decent amount of essential oils. The present work focuses on the application of microwave hydrodistillation (MHD) to extract essential oil from the stem of clove plant. The objective of this study was to obtain the best possible combination of operating parameters for a high yield of clove stem oil using response surface methodology (RSM). In this study, face-centered central composite design (FCCCD) was employed to optimize MHD operational parameters including the microwave power (300 to 800 W), feed to solvent ratio (0.3 to 0.7 g/mL) and extraction time (40 to 120 min). The experimental data obtained were fitted to a second-order polynomial equation. The three operational parameters (microwave power, extraction time and feed to solvent ratio) were shown to have significant effect on the extraction yield of the clove stem oil (p < 0.05). The optimum extraction conditions were: irradiation power 555.45 W, F/S ratio 0.3 g/mL, and extraction time 95.2 min. Under these conditions, the maximum yield of clove stem oil of 6.85 % (w/w) was obtained. Furthermore, the value of adjusted R^2 was close to the corresponding R^2 value with difference below 0.2, indicating a high degree of correlation between observed and predicted data. Hence, this result demonstrates the suitability of the model used in the experiment.

Keywords: Syzgium aromaticum, clove stem oil, microwave hydrodistillation, face-centered central composite design

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Optimization of the Formulation in the Production of Anti-Acne Cream made from Basil (*Ocimum basilicum* L.) Oil with Central Composite Design

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Ocimum basilicum L. is a plant that has antibacterial activity toward Staphylococcus aureus bacteria, which is one of the pathogen bacteria that causing the acnes. The objective of this study was made anti-acne cream from basil oil and optimize the formulation using Response Surface Methodology (RSM). Design Expert 11 was used to design the experiments based on the Central Composite Design with six parameters, namely basil oil, stearic acid, triethanolamine, nipagin, nipasol and propylene glycol. The ranges of the variables (factors), i.e. the volume of basil oil of 5-15 mL, mass of stearic acid of 7.10-21.30 g, volume of triethanolamine of 0.5–1.5 mL, mass of nipagin of 0.05-1.15 g, mass of nipasol of 0.025-0.075 g and volume of propylene glycol of 2.5–7.5 mL were identified by preliminary experiments. Anti-acne cream that is produced by physically tested covers: pH and spreadability with standard range values for pH is 5.6-6.8 and spreadability is 50-70 mm. The results showed that basil oil, stearic acid and triethanolamine have significant effect (p < 0.05) to pH and stearic acid has significant effect to spreadability. The optimum formulas of anti-acne cream were found to be volume of basil oil of 5.467 mL; mass of stearic acid of 21.299 g; volume of triethanolamine of 0.500 mL; mass of nipagin of 0.066 g; mass of nipasol of 0.075 g; volume of propylene glycol of 2.822 mL. Anti-acne cream with these optimum formulas have predicted values of pH 6.332 and spreadability 69.990 mm.

Keywords: Anti-Acne Cream, Basil Oil, Central Composite Design, Ocimum basilicum L.

Presenter: Verycha Finish Wiya Tania (herirahasia@gmail.com)

Chemical Interaction Analysis of L-Theanine Compounds from Tea Plants (*Camelia sinensis*) with Kainate Glutamate Receptors and The Toxicity Effect as Anti Autism Candidates

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Autism is a neuropshyciatric disease, one of the causes of autism is damage to neurons. L-Theanine is a bioactive compound in Camellia sinensis which is analogous to L-Glutamate Acid structure and its neuroprotective effect. This study aimed to analyze the binding side of L-Theanine and L-Glutamate Acid to the kainate of glutamate receptor protein to determine and the effectiveness of its inhibitor function. Toxicity analysis is also used to determine the suitability of compounds as bioactive components to be consumed orally. The method used to analyze the interaction of compounds with target proteins is reverse docking. Toxicity analysis using the toxtree v2 application. 6.13 and collection of information from the Human Metabolome Database. The docking show that L-Glutamate Acid and L-Theanine have the same site in the ionotropic Glutamate receptor protein, kainate1. The residual groups of the two compounds when binding to the similiar glutamate receptor protein are THR (A: 91), GLU (A: 191), and ARG (A: 96). Binding affinity of the two compounds is almost the same, namely -5.0 kcal / mol for L-Glutamate Acid and -4.9 kcal / Mol for L-Theanine. This allows L-Theanine to act as an inhibitor that blocks L-Glutamate Acid from binding to glutamate receptors on prostsynap membranes. The compound docking results show that L-Theanine has four bond side residues that are the same as the same L-Glutamate Acid and binding afinity of -5.0 kcal / mol. Analysis with the principle of RO5 Lipinski is known that L-Theanine compounds have the potential if taken orallyorally.

Keywords: autism, Camelia sinensis, kainate glutamate receptors, neuroprotective, theanine

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A nortriterpenoid And A steroid From Aglaia angustifolia (Miq.) Miq Stem Bark

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A nortriterpenoid, 3-epi-cabraleahydroxylactone (1) along with A steroid, Stigma-4-en-3-on (2) were isolated from the n-hexana extract of stem bark of Aglaia angustifolia (Miq.). The structure of those compounds was identified by spectroscopic methods including one and two-dimensional NMR as well as high-resolution mass spectrometric analysis. Additionally, steroid compound were reported in Genus Aglaia for the first time.

Keywords: Aglaia angustifolia (Miq.); Cabraleahydroxylactone; Stigmastan; N-hexane extract; steroid

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Optimization of Furfural Rice Straw (*Oryza sativa* L.) as Revealed by Rice Varieties, H_2SO_4 Concentration, and Substrate Mass Ratio and H_2SO_4

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The study of furfural optimation from rice straw had been conducted. The purposes of this study were to produce optimum furfural rendemen as revealed by the rice varieties, H_2SO_4 concentrations, and substrate mass ratio and H_2SO_4 and its interactions. The varieties were Ciherang and IR64. The acid concentrations were as follows 12,5%, 15% and 17,5% respectively and substrate mass ratio and H_2SO_4 were as follows: 1:20, 1:22,5 and 1:25, respectively. Research design used was factorial treatment design (2x3x3) with the basic design of Randomized Block Design, 3 replications and as a group was the analysis time. The average test between treatments was carried out with Honest Real Difference test (BNJ) with a significance level of 5%. Rice straw was mixed with additives and then hydrolized by using different H_2SO_4 concentration, and substrate mass ratio and H_2SO_4. The hydrolysis results were measured by using UV-Vis specthrophotometer at 495 nm wavelength. The results showed optimum furfural rendemen of both varieties are obtained by substrate mass ratio and H_2SO_4 1:20, the H_2SO_4 concentration 12,5% (IR64) and 15% (Ciherang).

Keywords : rice straw varieties, furfural

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IMPROVING ACTIVITIES OF LIMESTONE FROM JEDDIH MADURA AS CATALYST IN TRANSESTERIFICATION REACTIONS OF COCONUT OIL TO BIODIESEL

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Biodiesel is a renewable fuel that is in great demand by both society and industry. The basic ingredients of biodiesel are generally derived from vegetable oils, animal fats containing triglycerides through alkaline-assisted trans-esterification reactions. CaO is a good base catalyst for the reaction of biodiesel formation. One of the low-cost and high-grade sources of CaO is limestone. In this study, the limestone used was limestone from Jeddih Hill Madura containing MgO. The catalyst was obtained from the thermal decomposition of limestone at 900°C for 3 hours. Modification of CaO was carried out with Calcination-Hydration and Dehydration (CHD), addition of CTAB and PEG surfactants. The characterization results show that the catalyst contains CaO and MgO, is strongly alkaline with a number of moles of bases 6.66 to 7.92 mol. Maximum biodiesel yield was obtained on Lime-PEG catalyst, catalyst amount 2.5% b / b, and reaction temperature 150°C with yield = 88.3%. The resulting biodiesel has a flash point of 132°C, kinematic viscosity of 1.679 and density of 0.867 g / cm3. Based on the results of the analysis with GC-MS, the methyl ester component was obtained, including methyl octanoate, methyl octanoate, methyl caprate, methyl laurate, methyl myristate, methyl palmitate, methyl stearate and methyl oleate.

Keywords: Biodiesel, Limestone, Triglycerides, Methyl ester

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Fatty Acid Profile and Squalene Content of Three Cucurbitaceae Seed Oils

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The profile of fatty acid and squalene content from 3 Cucurbitaceae seed oils were studied. Water melon (Citrullus lanatus Thunb), yellow pumpkin (Cucurbita moschata D), and ridge gourd (Luffa acutangula Linn) seed oils were used as a squalene sources. The oils were obtained by using solvent extraction methods, further on fatty acid profile and squalene content were analyzed by GCMS . The results showed that the highest linoleic acid (77.8 %) was found in watermelon seed oil, followed by yellow pumpkin seed oil (45.29 %), and the lowest is ridge gourd seed oil (1.78 %). Oleic acid was found only in ridge gourd seed oil (22.44%), Palmitic acid was found in yellow pumpkin, watermelon, and ridge gourd seed oil in amount of 18.70%, 13.04%, and 11.97 %, respectively, whereas Stearic acid, 7.0% in ridge gourd seed oil, 5.43 % in watermelon and 4.59 % in yellow pumpkin. All the samples contain squalene in different concentration. Base on GCMS data, the highest crude squalene was demonstrated by ridge gourd seed oil (45,9 mg/ g oil), followed by yellow pumpkin seed oil (31.43 mg/ g oil) and the lowest is watermelon seed oil (3.73 mg/ g oil).

Keywords: Fatty acid profile, Squalene, Cucurbitaceae, Plant oils

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Toxicity Of Benzyl Benzoate From *Kaempferia Rotunda* L. Rhizome

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Benzyl benzoate is the major components of essential oil of K. rotunda L. rhizome. They are potential to be developed as the medicinal compound. However, the toxicity study of benzyl benzoate as the bioactive compound were still limited. Therefore, the toxicity of benzyl benzoate was investigated. The isolation steps include the extraction of K. rotunda L. rhizome using acetone by maceration, then acetone extract was partitioned with n-hexane and chloroform respectively. The benzyl benzoate from n-hexane fraction was isolated using vacuum liquid chromatography and radial chromatography. The molecular structure of benzyl benzoate was determined based on NMR (1D and 2D) spectroscopic data. The toxicity assay of acetone extract and isolated compounds carried out using the brine shrime lethality test (BSLT). BSLT results were presented through the lethal concentration 50 (LC_{50}).The toxicity evaluation confirms that acetone extract of K. rotunda L rhizome and the benzyl benzoate have biological activity with LC_{50} 35,86 µg/mL and 173,49 µg/mL respectively.

Keywords: Benzy benzoate, Kaempferia rotunda L, BSLT

Presenter: Hartiwi Diastuti (hartiwidiastuti@yahoo.com)

Antioxidant activity from of endhophytic Bacteria Isolated from Carica Papaya Leaves

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Antioxidant compound is an inhibitor that is used to inhibit autoxidation carbohydrates, nucleic acids and lipids by free radicals in the body. One source of antioxidant compounds are secondary metabolites which can be obtained from the endophytic bacteria that is symbiotic with leave of papaya (Carica papaya). The endophytic bacteria have many advantages in produce of bioactive compound. This study aims to isolate the endophytic microbes that is symbiotic with papaya, obtaining data of antioxidant activity with DPPH method and obtaining phytochemical screening of secondary metabolites that is produce by endophytic bacteria. The results from this study is one isolate endophytic bacteria that is symbiotic with papaya leave. Obtained bacterial isolate has staphyllococcus shape and is a type of gram-negative bacteria. The antioxidant activity of secondary metabolites of endophytic bacteria isolate using DPPH method has IC_{50} of 22.472 ppm. Phytochemical screening showed that the production of secondary metabolites of endophytic bacteria which were isolated from papaya leave contains alkaloids, flavonoids, tannins and saponins.

Keywords: endhophytic bacteria, carica papaya leaves, antioxidant

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Chemical Metabolites from the Endophytic Fungi Alternaria sp

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Endophytic fungi have been known as great sources of chemical metabolites with unique and interesting structural features. Chemical investigation of secondary metabolites from endophytic fungi Alternaria sp had led to the isolation of alternariol (1) and tenuzoanic acid (2). The endophytic fungi Alternaria was cultivated under solid rice media and extracted with ethyl acetate. The ethyl acetate crude extract was subjected to fractionation with normal phase vacuum liquid chromatography to afford alternariol (1) and tenuazonic acid (2). The structures of the compounds 1 and 2 were identified based on the analysis of NMR and mass spectral data. Compounds 1 and 2 were evaluated for their antibacterial activity against a panel of clinical isolates bacteria including MRSA, Streptococcus pneumonia, Pseudomonas aureginosa, Staphyloccus aureus, Enterococcus faecalis and E. coli but were found inactive up to the tested concentration of 125 µg/mL.

Keywords: Endophytic fungi, Alternariol, Antibacterial, metabolites

Presenter: Antonius R B Ola (antonius.ola@staf.undana.ac.id)

Larvicidal Potential of Tagetes erecta as Bio Larvicidal for Aedes aegypti 3rd Instar Larvae

November Rianto Aminu | Ribka Dwi Kristiana | Sri Hartini

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Resistance to temephos as a larvicide of A. aegypti mosquitoes has occurred in Indonesia. Therefore, it is necessary to look for other active compounds that can act as larvicides, but also environmentally friendly. This study used fractions of hexane, ethyl acetate, and methanol leaf extract of T. erecta as a larvicide. The process begins with fraction extraction of dried T. erecta leaf follow by the phytochemical screening of the extracts. Test solutions were made with a concentration of 0, 100, 200, 300, 400, 500, and 600 ppm from the extract. Larvicide test was carried out referring to WHOPES by observing the mortality of 3rd instar larvae of A. aegypti mosquitoes for 24, 48, and 72 hours. Based on this study, instar 3 larvae of A. aegypti was most susceptible to ethyl acetate fraction compared to other fraction with LC_{50} of 564, 102 and 84 ppm at 24, 48, and 72 hours respectively. Generally, T. erecta leaf extract has the potential to be a bio larvicide.

Keywords: Larvicide, Tagetes erecta, Aedes aegypti, larvae

Presenter: November Rianto Aminu (november.aminu@uksw.edu)

Odor-Free Modification of Synthetic Fur Carpet Using Chitosan-Titania Nanocomposite

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The modification of an odor-free carpet is conducted by coating chitosan-titania nanocomposite on a white synthetic fur carpet. The nanocomposite is synthesized by adding chitosan to titania by means of wet impregnation method. The nanocomposite is then characterized by FTIR to determine the bonds that occur, UV-Vis DRS to determine the energy band gap, and SEM-EDX to analyze the morphology and composition. An Escherichia coli colony disinfection test is carried out using the synthesized nanocomposite to analyze its disinfectant ability. After obtaining the most optimum nanocomposite composition based on the test, the best nanocomposite is then coated on the carpet using varied tetraethyl orthosilicate (TEOS) additions. An ammonia degradation test is carried out by dipping the coated carpet in an ammonia solution under UV light irradiation. The FTIR characterization shows that a number of bonds occur between chitosan and titania, while UV-Vis DRS shows that the synthesized nanocomposite has an energy band gap value of 3.11 eV. The E. coli disinfection test shows that the best nanocomposite composition is of the 3wt% chitosan concentration, while the ammonia degradation test shows that the addition of 0.67v% tetraethyl orthosilicate solution is the most optimum addition in the nanocomposite coating on the carpet surface.

Keywords: Ammonia, Chitosan, Odor-Free, Titania, Wet Impregnation

Presenter: Mohamad Iman Sulaeman (mohamadimans97@gmail.com)

Analysis of Chemical Profile and Antimicrobial Activity of Secondary Metabolites of Endophytic Fungi from Annona squamosa Grown in Timor Island-Eastern Indonesia

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Endophytic fungi have been known as potential sources of bioactive metabolites with promising application in medicine and agriculture. A research had been undertaken to determine the profile of chemical compounds of endophytic fungi from mature anona leaves (Annona squamosa L.) growing in hot and dry area in Timor Island. The purpose of this study was to isolate endophytic fungi from mature anona leaves, to determine the content of chemical compounds using HPLC and LC-MS/MS and to evaluate its antibacterial activity. Endophytic fungus was isolated from mature anona leaves on potato dextrose agar (PDA) media and identified as Aspergillus niger. The endophytic fungi was then grown on solid rice media and extracted with ethyl acetate. The ethyl acetate extract was analyzed by HPLC and indicated the presence of several active compounds. Further analysis of LC-MS/MS showed that there were five compounds including lycorine, fuzinoside, neoline, trichosanic acid and ergosta-4,6,8 (14), 22-tetraen-3 -one. The antibacterial activity test showed that ethyl acetate extract of endophytic fungi Aspergillus niger had A strong inhibition against Staphyloccus aureus, Escherechia coli and Salmonella enteritidis with diameter of zone inhibition of 10.4, 10.0 and 11.0 mm, respectively

Keywords: Annona squamosa; endophytic fungi ; antibacterial; Aspergillus niger

Presenter: Antonius R B Ola (antonius.ola@staf.undana.ac.id)

Hydrocarbon Source Identification of Seepages on the Northern Offshore Taliabu-Mangole Islands, Molucca Sea, Indonesia

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The northern offshore Taliabu-Mangole Islands is located between Banggai-Sula Platform and Molucca Sea Collision Complex Zone. This area is a frontier exploration area. Only two wells were drilled around this area, since 1980s. Numbers of seepages found on the seabed indicate that there are source rocks generating and expelling a significant amount of hydrocarbon. However, the source of hydrocarbons have not yet been determined where the seepages were derived from GC, GCMS, and stable isotope results from 8 rock extracts at the Jurassic Bobong and Buya Formations intervals taken from two exploration wells also 1 hydrocarbon seepage sample and GC analysis of 76 seepage samples were used to uncover this problem. By correlating host rock and seepage using parameters such as n-alkane distribution, the value of the Carbon Preference Index (CPI), Pristane-Phytane ratio, Pr/n-C17 vs. Ph/n-C18 plot, C27, C28; C29 steranes, and plots of isotopes saturates and aromates fractions, sources of petroleum seepages can be identified. The results of biomarker and isotope correlation suggests that hydrocarbon seepages are originated from Buya Formation. The correlation of n-alkanes shows that both of Buya and Bobong Formations are sources of the seepages within the study area.

Keywords: hydrocarbon, source rock, seepages, geochemistry correlation

Presenter: Muhamad Rizki Asy'ari (muhamad.rizki.a@mail.ugm.ac.id)

Formulation of Topical gel loaded with Methanolic Root Extract of Annona reticulata for treatment of Skin Cancer

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Skin cancer is among one of most the commonly occurring type of cancer in human and usually caused by high exposure to ultraviolet radiation. The extract from different part of plant Annona reticulata is reported to have anti-proliferative and cytotoxic activity. The current therapy for skin cancer suffers from various side effects; topical delivery of methanolic root extract of Annona reticulata can be taken as an innovative approach.

Objective: The present study is an attempt to formulate a topical gel loaded with methanolic root extract of Annona reticulata for the skin cancer.

Methods: The methanolic root extract was prepared and it was subjected to preliminary phytochemical screening as well as volatile component analysis using GC-MS. The in-vitro SRB assay was conducted by using B16-F10 for anti-melanoma activity. The topical gel loaded with methanolic extract was evaluated for its physicochemical properties and further evaluated for in-vivo anti-cancer efficacy and histological study.

Result: The phytochemical screening of the extract showed presence of alkaloid, acetogenins, carbohydrate, flavonoid, tannin and protein while the GC-MS analysis showed presence of 46differnt component. The extract showed cytotoxicity at concentration of 15±1.4µg/ml. The methanolic root extract was found to be compatible and formed a homogenous gel and further the histopathological study clearly reveals the efficacy of the gel in the treatment of skin cancer.

Conclusion: The outcome from both in-vitro and in-vivo study of methanolic root extract loaded carbopol gel clearly reflects its potential to treat skin cancer.

Keywords: Annona reticulata, root extract, skin cancer, B16-F10, GC-MS, carbopol gel

Presenter: Subhash Medhi (subhashmedhi79@gmail.com)

Isolation and Separation Bioactive Secondary Metabolites from Jengkol Plant (Archidendron jiringa (Jack) I. C. Nielsen) Through Bioassay Guided Fractination Approach

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University of Lampung | University of Lampung | University of Lampung | University of Lampung | University of Lampung | University of Lampung | Universiti Sains Malaysia

Infectious diseases caused by bacteria has become the global health issues especially antibacterial drug resistance. The most serious concern with antibacterial resistance is that some bacteria have become resistant to almost all antibacterial drugs and making them less effective. Plants are the one of the most important natural resources because they are relatively less side effects and cheap. One of the potential plants that has antibacterial properties is the jengkol plant (Archidendron jiringa (Jack) I. C. Nielsen). Jengkol plant is the one of Lampung's natural resources that has not been optimally used, particularly in the field of technology development and drug health. In current research, isolation and separation secondary metabolites of the roots bark of A. jiringa have been conducted through Bioassay Guided Fractination Approach. Bioactive secondary metabolites from jengkol plant roots has been carried out using general isolation procedures including extraction with maceration method, fractionation and purification by various chromatographic techniques such as vacuum chromatography (VLC), column chromatography (CC) and medium performance liquid chromatography (MPLC). The preliminary identification of bioactive metabolites were recognized by TLC monitoring and ^{1}H-NMR spectroscopy analysis, and its displayed a good antibacterial activity against resistant bacteria, S. aureus and E. coli with the same MIC value of 25 mg / mL Based on the ^{1}H-NMR spectroscopy analysis, the major compound identified on the bioactive metabolites was predicted as a phenolic compound. However, the purification of these bioactive metabolites is still in progress and will be reported in the future.

Keywords: Archidendron jiringa, jengkol plant, bioassay guided fractionation, antibacterial activity, Staphylococcus aureus, Escherichia coli

Presenter: Noviany (noviany@fmipa.unila.ac.id)

Analysis Production of Kojic Acid by Endophytic Fungi Aspergillus flavus from Annona squamosa Using OSMAC Approach

Antonius R B Ola | Christina Pada Soa | Caterina D Lay | Bibiana D Tawo | Reiner I Lerrick | Yoseph Sugi

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OSMAC (One Strain-Many Compounds) approach has been widely applied in enhancing the chemical diversity as well as higher production of certain chemical metabolites from microorganism especially endophytic fungi. One strategy in OSMAC approach was changes in media cultivation. In this study, analysis production of kojic acid produced by endophytic fungi Aspergillus flavus from anonna leaves (Annona squamosa) was analyzed using three different media condition including rice (Oryza sativa), sweet corn (Zea mays L.) and waxy corn (Zea mays ceritina) . The grown fungi from each media were extracted using ethyl acetate and quantitatively analyzed for their content of kojic acid using HPLC. The intrapolation peak area of kojic acid's content in each fungal medium to the regression equation of standard kojic acid revealed that concentration of kojic acid in each extract was 3.149% for rice media , 5.998% for sweet corn media extract and 2.226% for waxy corn media extract, respectively. Ethyl acetate extract was further subjected to vacuum liquid chromatography. Pure kojic acid was obtained from 90% CH_2Cl_2 fraction. HPLC, LC-MS/MS and NMR data analysis of 90% CH_2Cl_2 fraction confirmed the structure of kojic acid. As kojic acid is widely used in cosmetics and pharmaceutical industry, sweet corn media is one good option for its production.

Keywords: Endophytic fungi; Aspergillus flavus ; OSMAC; secondary metabolites ; kojic acid ;

Presenter: Ola R B Antonius (antonius.ola@staf.undana.ac.id)

ANTIOXIDANT ACTIVITIES OF ETHANOL EXTRACTION PRODUCTFROM CITRONELLA GRASS (Cymbopogonnardus) DISTILLATION RESIDUE

Eko Febrianto R | Enny Fachriyah | Dewi Kusrini1

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Indonesia's floral diversity provides huge reserve for traditional medicinal raw materials, one of which is citronella grass (Cymbopogonnardus). This study aims to identify the content of secondary metabolites in its ethanol extraction product from distillation residue and determine its antioxidant activity. Ethanol extractionproduct of the distillation residuewas blackish red in color with a yield of 8.882%. Phytochemical screening on residual powder and EDR (distillation residueethanol extraction product) showed positive results for flavonoids, tannins, quinones, phenols and steroids. Total polyphenolcontent test obtained a concentration of 45.955 mg gallic acid equivalent/g EDR while EDRantioxidant activity test obtained IC₅₀ value of 189.905 ppm.

Keywords: Cymbopogonnardus, antioxidant, distillation residueethanol extraction product (EDR)

Presenter: Enny Fachriyah (enny.fachriyah@live.undip.ac.id)

Antioxidant Activity and Identification of Bioactive Compounds from Teak (*Tectona grandis*) Leaves

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Teak (Tectona grandis) grows in tropical area and the Teak wood is widely used for building construction and furniture. Young Teak leaf contains red pigment and often are used for natural food coloring. The isolation of the young Teak leaf compounds have been performed and their antioxidant activities have been investigated. The compounds indentification was carried out using UV-VIS, GC-MS and LC-MS. The antioxidant activity test was carried out by 2,2-diphenyl-1-picryl-hydrazyl-hydrate (DPPH) method. The total phenolics was determined using Folin-Ciocalteu method and total antioxidant was examined using the H-differential method.

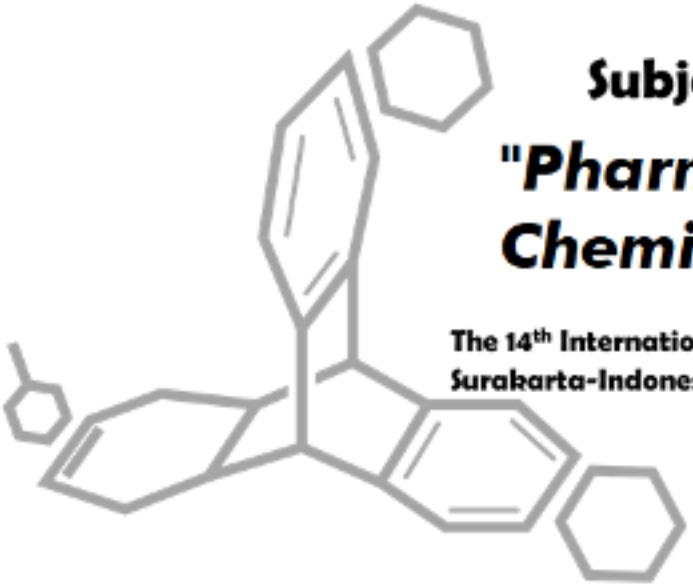
The GC-MS spectrum of fraction A (F_A) shows 4-hydroxy-4-methyl-2-pentanone, glycerin monoacetate, glycerin diacetate and 1-eicosanol. The UV-Vis spectrum of F_A confirmed the presence of anthocyanins which has maximum absorbance at 208 and 492 nm. The LC-MS spectrum of fraction A (F_C) shows malvidin-3-o-(6-o-acetyl)-5-o-diglucoside. The UV-Vis spectrum of F_C also confirm the presence of anthocyanins which has maximum absorbance at 489 nm. The F_A and F_C teak leaf fractions have strong antioxidant activities as their IC_{50} values are less than 50. Total phenolic of teak leaf extract was 6.17 mgGAE/g and total anthocyanins of teak leaf extract was 0.0675 mg/L.

Keywords: Tectona grandis, teak leaves, antioxdant activity, total phenolics, total anthocyanins.

Presenter: Venty Suryanti (venty@mipa.uns.ac.id)

ABSTRACT BOOK

PARALLEL SESSION



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Development of gelatin based hybrid hydrogels as drug release controller for treatment of typhoid fever

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Typhoid fever is an endemic disease in Indonesia and the incidence keeps increasing every year. Antibiotic is generally used for the treatment of this typhoid fever. Patient's compliance to consume antibiotics is usually interrupted by the obligation to take the drug several times a day. Conventional (immediate release) drugs tend to have short half life which lead to frequent consumption of the drug. Low compliance to consume antibiotics will result higher risk to antibiotic resistance. By modifying the release rate of the antibiotic, the patient will be able to consume antibiotics in less frequency while maintaining a stable drug concentration in the plasma, thus lowering the risk of antibiotic resistance. In this work, we report the use of hybrid hydrogels based on the gelatin as drug release controller. The slow release Cefixime will be put in simulated gastric fluid and simulated intestinal fluid to calculate the release speed of Cefixime. Lastly, it will be tested on Salmonella enterica serovar. Typhi.

Keywords: Hydrogels, extended release, antibiotics, typhoid fever

Presenter: Eko Adi Prasetyanto (prasetyanto@atmajaya.ac.id)

Determination of The Optimum Composition to Produce The Minimum Particle Size of β-carotene Microencapsulated in Acid-Hydrolyzed Starch-Chitosan/TPP (Tripolyphosphate) Matrices Using Taguchi Method

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In this study, the combination of acid-hydrolyzed starch/chitosan weight ratio, β-carotene feed concentration, and tripolyphosphate ion (TPP) concentration were investigated to produce minimum particles size of microencapsulation of β-carotene in acid hydrolyzed starch-chitosan/TPP matrices using a precipitation method. For this purpose, the design of experiment Taguchi has been applied. The results showed that the optimum composition to produce the smallest particle size was obtained at the weight ratio of acid hydrolyzed starch/chitosan 1:1, β-carotene feed concentration 5 mg/L and TPP concentration 3 mg/L. These confirmed that the Taguchi method can be used to determine the optimum composition to produce optimum particle size of microencapsulation product using limited data.

Keywords: β-carotene, starch, chitosan, TPP, microencapsulation, Taguchi Method

Presenter: Agnes Dyah Novitasari Lestari (a.dyahnovitasari@gmail.com)

Synthesis and anticancer study of Complex nickel(II) 5,7-dibromoisatin-derived hydrazine carbothioamide

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The synthesis and anticancer study of 5,7-dibromoisatin-derived hydrazine carbothioamide and its nickel (II) complex are reported herein. The ligand was successfully synthesized from 4-phenyl-3-thiosemicarbazide and 5,7-dibromoisatin. The ligand and its complex were characterized by spectroscopic methods (UV, IR, NMR, MS) and thermal analysis. The complex had LC_{50} 270 ug/mL in anticancer test using HeLa cells.

Keywords: synthesis, complex, derived hydrazine carbothioamide, anticancer, HeLa cells

Presenter: Fahimah Martak (fahimahm@chem.its.ac.id)

Optimization of Suweg Starch (Amorphophallus paeoniifolius) and Lactose as Co-processed Excipient of Ibuprofen-PEG 6000 Solid Dispersion's Effervescent Tablet

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Ibuprofen is an analgetics-anti inflamatory agents that's often prescribed, but has gastrointestinal side effects. Effervescent tablet is expected to resolve that problem, but Ibuprofen has a low solubility in water, so it modified into a solid dispersion using PEG 6000 as hydrophilic polymer to improved solubility into water. Direct comppression method is suitable for Effervescent tablet, so it needs co-processed excipient. Combination of Suweg starch and lactose are developed as co-processed excipient by Simplex Lattice Design method.

Pure ibuprofen-PEG 6000 are formulated with ratios of 1:1; 1:2; 1:3; and 2:1. Optimum ratio was confirmed by aqueos solubility, drug content, solid dispersion yield, and FTIR. Software Design Expert will produce 8 formulas based on lower and upper value of Suweg starch and lactose ratio, with physical respons are : granular flow velocity; granular angle; and tablet uniformity. Optimum combination of co-processed excipient werw confirmed by statistical analysis of student's t-test based on physical respons compare to software prediction.

Optimum ratio of ibuprofen-PEG 6000 is 1:1 based on FTIR analysis drug excipient compatibility showed no interaction with excipients; highest solubility of 0,37 mg/mL; drug content of 99,16%; and solid dispersion yield of 96,70%. Optimum proportion of Suweg starch : lactose are 64,32% : 35,68% that no significantly different compare with software prediction (p>0,05). Optimum Formula of Effervescent Tablet meets good tablet quality standard, there are : flow velocity of 4,76±0,72 g/sec; granule angle of 27,52±0,95°; dissolving time of 212±13,11 sec; tablet hardness of 2,11±0,15 Kg; fragility of 0,47±0,04%; active substance of 98,54±0,42%.

.

Keywords: Ibuprofen; solid dispersion; effervescent tablet; suweg starch; co-processed excipient

Presenter: Dian Eka Ermawati (dianekaerma@gmail.com)

Optimization of HPMC and CMC-Na as Polymers of Transdermal Patch of Antihipertension Jamu "Hortus Medicus" and Transport Through Membrane using Franz Difusion Cell Method

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B2P2TO2T [Plants Medicine Research and Testing Center] Tawangmangu has an antihypertension herbal medicine Jamu "Hortus Medicus" consist of A. graveolens, C. asiatica, P. urinaria, O. aristatus, C. longa, and C. xanthoriza. It has been confirmed pre-clinical trial, clinical trial, and toxicity test to liver and kidney. The dose of 72 mg/Kg B.W effectively lowers blood pressure in Rats, and the effect of decreasing blood pressure equivalent with HCT 25 mg in pra-hypertension patients. Jamu has stability problems, gastrointestinal side effect, less practical, stink and volominous dose. Transdermal patch is expected to resolve that problem. Polymers are important because effected to drug release. This study will combine of two hydrophilic polymers there are hydroxy propyl methyl cellulose and carboxy methyl cellulose sodium. HMPC produces a strong and flexible matrix system. CMC-Na showed drug release 66,54% in 24 hours. The proportion of HPMC and CMC-Na are optimized by D-Optimal method.

Herbals are infused into hot water 80 ºC during 15 minutes. Software will produce 13 formulas with physical respons weight uniformity and moisture content. Optimum combination of polymers were confirmed by statistical analysis of t-test based on observation compare to software prediction. Transport active substance through membrane is done by Franz Difusion Cell Method. Optimum proportion of HPMC : CMC-aq are 1,25 : 1 that no significantly different compare with software prediction (p;0,05). Optimum Formula of Jamu "Hortus Medicus" patch meets good quality standard. Active substance of flavonoid total 0,32% w/w. Comulative amount of flavonoid total transported through membrane is 134 mg.

Keywords: jamu; patch; HPMC; CMC Na; transport membrane

Presenter: Dyah Ayu Ambarwati/Niken Rosyana (ambarw76.da@gmail.com)

MANGIFERIN BIOACTIVE FRACTION MEMBRANES AS TREATMENT FOR BURNS INFECTION

Astika | Faldy Filando Sardi | Ilza Millenia Jalius | Friardi

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Burns are a global health problem with high mortality and morbidity. Infection causes more than 61% of deaths in burn patients so that control of bacteria is a vital thing to do. Mangiferin bioactive fraction from mango leaves (Mangifera Indica L.) can play a role in the treatment of burns because it has analgesic, anti-inflammatory and antimicrobial activity. This study aims to determine the effectiveness of healing burns from membrane preparations with mangiferin bioactive fractions concentrations of 5%, 10%, and 15%. MERIN (Mangiferin bioactive fraction membrane) was tested on second degree burns in 4 rabbits divided into 6 test groups namely negative control (not given membrane), positive control (Bioplacenton), and membrane with mangiferin bioactive fraction concentration 0% (base), 5%, 10% and 15% for 21 days. Data on the percentage of healing burns were analyzed statistically using two-way ANOVA followed by the Duncan post hoc test at the 95% confidence level. The results showed that MERIN concentrations of 10% were most effective in healing burns but were not significantly different from MERIN concentrations of 15% followed by MERIN concentrations of 5%, positive controls, MERIN bases and negative controls. Thus, MERIN concentrations of 10% and 15% were most effectively of all test groups.

Keywords: mangiferin bioactive fraction, burns, membrane

Presenter: Astika (astikadiobariski16@gmail.com)

Liposomes from Jack Bean's Phospholipid Extract for Delivering Vitamin C

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Liposomes from jack bean's phospholipid extract were used to encapsulate vitamin C. The liposomes were made with cholesterol concentration between 0% and 40%. The encapsulation efficiency of liposomes were evaluated just after they were formed. Then the liposomes were stored under several temperature namely 37 °C, 25 °C, and 5 °C. The vitamin C released from liposomes were monitored in 8 days. The highest value of vitamin C encapsulation efficiency (EEvit.C) in jack bean liposome was 86.61% once the cholesterol concentration was 40 %. The existence of cholesterol cut down the leakage of liposomes. The vitamin C minimum released from liposome was found at 20% cholesterol for the whole storing temperatures.

Keywords: Canavalia ensiformis L., Cholesterol, Drug Delivery, encapsulation, Leakage, Release

Presenter: Dwi Hudiyanti (dwi.hudiyanti@live.undip.ac.id)

SYNTHESIS OF PHENILKALIXS[4]RECORCINARENA SULFONATE AND ITS APLICATION AS AN ANTIOXIDANT

Santi Nur Handayani[1*], Heny Ekowati[2], Irmanto[1], Della Nadya Ayu Aprilia[1] and Silva Utami[1]

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Phenylcalix[4]resorcinarene sulfonate can be synthesized through two stages, namely the first stage, benzaldehyde and resorcinol condensation reactions in the presence of an acid catalyst (HCl) and ethanol solvent, the reaction is carried out for 24 hours. The second stage of the sulfonation reaction using concentrated sulfuric acid with catalyst Ag_2SO_4 against phenylcalix[4]resorcinarene compounds. The first condensation reaction results in the form of a yellowish solid with a yield of 82.81% and a melting point; 368.8 °C. The results of the sulphonation reaction of calix[4]recorinarene in the form of black solid with a yield of 75% and melting point above 300 °C. The reaction products were analyzed by infra red spectrophotometer (FT-IR), and 1H NMR. The reaction product has a hydroxy phenol group which can be used as an antioxidant. The antioxidant activity test carried out by DPPH method on phenylcalixs[4] recorcinene sulfonate compounds and BHT (positive control) obtained ES50 (electron scavenging 50) with 248.18 ppm and 12.56 ppm respectively.

Keywords: synthesis, antioxidant assay, phenylcalix[4]recorcinarena sulfonat

Presenter: Santi NUr Handayani (santi.handayani@unsoed.ac.id)

Developing Formula of SNEDDS [Self Nano Emulsifying Drug Delivery System] Antihypertensiv Jamu "Hortus Medicus"

Dian Eka Ermawati | Yeni Farida | Sholichah Rohmani | Wisnu Kundarto | Estu Retnaningtyas

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Jamu "Hortus Medicus" as antihypertensive consists of A. graveolens, C. asiatica, P. urinaria, O. aristatus, C. longa, and C. xanthoriza. It has been confirmed pre-clinical trial, clinical trial, and toxicity test. The dose of 72 mg/Kg B.W effectively lowers blood pressure in Rats equivalent with HCT 25 mg in pra-hypertension patients grade 1. it is taken three times a day of 200 cc. Toxicity test of Jamu shows that it is safe for long-term use. Jamu usually is consumed by liquids and capsul formulation, there are have several obstacles related to stability and voluminous, therefore modification of the formula is needed to maintain stability and reduce the frequency of taking medication, SNEDDS is a technique of drug delivery that is effective in increasing the stability of the drug given orally, this study aims to modify the jamu in a nanoemulsion consisting of candlenut oil, tween 80, and propylene glycol. Plants of jamu is extracted using hot water during 15 minutes, then evaporated. Jamu ready to dispersed into system. Optimum composition of candlenut oil: tween 80: propylene glycol antihypertensive jamu is a ratio of 1: 9: 1, this is capable of loading 200 mg of jamu with a transmittance value of 89,02%; particle size of 15,2 nm; index polydispersion 0,14; emulsification time of 34,16 seconds; and the value of F 0,95. Based on the results of loading dose it can be concluded that the SNEEDS formula of antihypertensive herbs can reduce the frequency of drug administration by 25 times.

Keywords: SNEDDS; antihypertensive jamu; loading dose

Presenter: Dian Eka Ermawati (dianekae@staff.uns.ac.id)

Hybrid PVA/Alginate for extended delivery of antibiotics

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A wide range of gastrointestinal diseases are caused by pathogenic bacteria infection. In Indonesia, due to poor sanitation and hygiene, typhoid fever caused by S. typhi or S. paratyphi is the number one illness recorded in the hospitals. These gram negative bacteria are able to tolerate the acidic environment of the human stomach and has been shown to be a major cause of peptic ulcers. Treatment of these pathogenic infections by conventional therapy is difficult due to barriers created by the bacteria in order to evade the antibacterial regime. The treatment involves seven days of antibiotic therapy administered orally or by intravenous route which may trigger drug resistant bacteria.

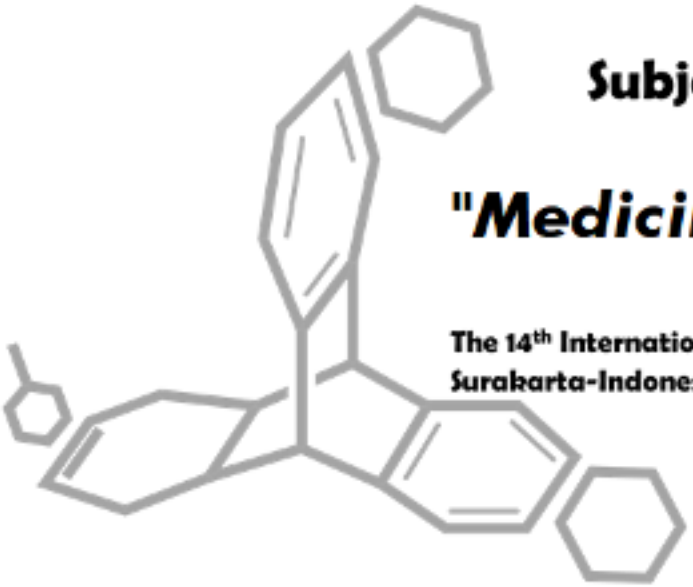
In this paper, we would like to encapsulate third generation cephalosporins such as cefixime or cefotaxime, which are usually used to treat gastrointestinal infection in a nano-hybrid hydrogel system for oral drug delivery. The system will consist of PVA/Alginate, in which the drug will be loaded, that will be encapsulated in large micrometers size gel particles to allow the protection of the drug and avoid its early release. The gel microparticles is a biocompatible soft material permeable to small molecules and through which the drug can be easily released.

Keywords: extended delivery, hydrogels, antibiotics

Presenter: Eko Adi Prasetyanto (prasetyanto@atmajaya.ac.id)

ABSTRACT BOOK

PARALLEL SESSION



Subject:

"*Medicinal Chemistry*"

The 14th International Joint Conference on Chemistry
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Antibacterial Activity of Quinine Derivatives

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Nowadays, the rise of antimicrobial resistance is a global health concern as many of bacterial strains had become resistant to available antibiotics. Quinine is a natural alkaloid from the bark of the cinchona tree that has been used for years as an antimalarial drug. Various literature also regarded an antibacterial effect of quinine against both Gram-positive and Gram-negative pathogenic microorganisms. With this vision, a series of some novel quinine derivatives were synthesized as they are well known for diverse biological activities. This present study, therefore, attempted to examine the antimicrobial properties of quinine derived compounds and their Minimal Inhibitory of Concentration (MIC) against common pathogenic bacteria, including Escherichia coli, Staphylococcus aureus, Pseudomonas aeruginosa, and Bacillus substillis. The results were evaluated and compared with references drug streptomycin. This study revealed that different structure of quinine derivatives with a concentration of 5% showed an inhibitory effect on the test pathogenic bacteria. Further well-designed studies are needed to assess the efficacy, safety, and mechanisms of those compounds as antimicrobial.

Keywords: quinine derivatives, antimicrobial, minimum inhibitory of concentration, zone of inhibition

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SCREENING OF ANTIBIOTIC-RESISTANT BACTERIA FROM SOIL SAMPLE OF LAPINDO MUD SIDOARJO

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This study has been conducted for screening ampicillin antibiotic-resistant bacteria at a concentration of 0,125 ppm of the Lapindo mudflow point A1 (South Latitude: 70 31'46,23 "and Longitude East: 1120 42'36,83"). Based on the screening results, isolate A1 had been isolated and tested in gram stain, growth pattern, interaction with fungus, and the antibacterial activity. The process was done by the extraction of secondary metabolites from isolated culture. Gram stain test showed that the isolate A1 was Streptobacillus gram-positive type bacterium. The results of the morphology showed that isolate A1 has characteristic such as Actinomycetes bacteria group. On its growth pattern, the life duration of A1 isolate was 32 hours with the stationary time started at the 14th hour. In the crossed culture, the test result was found that it has no inhibition interaction on Aspergillus sp. and Aspergillus fumigatus. The antibacterial activity test had also been carried out by the method proposed by the Kirby-Bauer. This research will also investigate the antibacterial activity of secondary metabolites using Staphylococcus aureus, Pseudomonas aeruginosa, and Escherichia coli.

Keywords: Antibiotics, Lapindo mud, MIC, antibiotic resistance

Presenter: Nur Azizatun Nisa (azizatunnisaa66@gmail.com)

Synthesis, Anticancer Activity, and Apoptosis Mechanism of Some Chalcone Derivatives

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The research for finding new cancer agents with good efficacy and low toxicity is still in demand because cancer is still considered as a leading cause of death worldwide. Chalcone derivatives are good known as prospective sources to find potent anticancer agent. Some amino chalcone and coumarin chalcone derivatives have been successfully synthesized from the reaction of 4'-amino acetophenone, acetyl coumarin, and derivatives of benzaldehyde by Claisen-Schmidt reaction. The structure of the prepared compounds was established by spectroscopic evidences, those are FTIR, ESIMS, ^{1}H- and ^{13}C-NMR. Anti-proliferative activity of the prepared compounds were examined using MTT reagent. Induction of apoptosis, as well as cell cycle inhibition activity were determined by flow cytometer. Double staining using orange acridine – etidium bromide was used to determine morphologically cancer cells underwent apoptosis. The IC_{50} value of anti-proliferative examination ranging from 30.4 µg/mL to more than 100 µg/mL toward T47D cells and from 27.5 µg/mL to more than 100 µg/mL toward HeLa cells. Compound 2 (E)-1-(4-aminophenyl)-3-(4-fluoro-phenyl)prop-2-en-1-one exhibited the most active anticancer activity through induction apoptosis mechanism. It induced cell cycle arrest at G0/G1 and G2/M phase both for HeLa cells and T47D cells. Additionally it also blocks S phase for T47D cells.

Keywords: Amino chalcone, coumarin chalcone, anticancer, apoptosis

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Synthesis and in vitro Anticancer Activity Against HepG2 Cell Line of 5-Nitroisatin Derivatives

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This paper reports on the synthesis of 5-nitroisatin derivatives and their in vitro anticancer activity against liver cancer cells HepG2. The compounds contains nitro or amino in position 5 of oxindole and two or three indolyl groups in position 3. Compared to compound with amino group, the compounds with nitro group exhibited higher cytotoxicity. The similar result also showed by the compound with three indolyl groups. The nitro group and the number of indolyl groups greatly affected the cytotoxicity.

Keywords: synthesis, 5-nitroisatin derivatives, anticancer, HepG2 cell line

Presenter: Arif Fadlan (afadlan@yahoo.com)

Synthesis of Indolin-2-one Derivatives and Their in vitro Anticancer Activity Against WiDr Cell Line

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We report the synthesis of indolin-2-one derivatives, and their in vitro anticancer activity against colon cancer WiDr cell line. The compounds contain a fluorine and a bromine in position 5, and a bromine in position 7. The results established that indolin-2-one with bromine in position 5 gave up to a 4-fold improved cytotoxicity over indolin-2-one with fluorine in position 5. The indolin-2-one with bromine in posititon 5 also exerted higher cytotoxicity compared to bromine in position 7. This work highlights the importance of halogen and their position in cytotoxicity.

Keywords: synthesis, indolin-2-one, anticancer, WiDr cell line

Presenter: Arif Fadlan (afadlan@yahoo.com)

Design, Synthesis and in vitro Cytotoxicity Evaluation of Isatin and Derivatives against Hep G2 Cell Line

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To develop new potential anticancer agents, four novel isatin derivatives was designed, prepared and tested against human liver cancer HepG2 cell lines. The isatin derivatives were prepared in good yields, and showed anticancer activity. The presence of nitro group substituent at C-5 of isatin ring caused better anticancer activity.

Keywords: isatin derivatives, Hep G2 cell line, pyrrole

Presenter: A. Fadlan (afadlan@chem.its.ac.id)

Cigarette Smoke Mask Microfilter Based from Reeds (Imperata cylindrical)

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This research was based on the hazardous of the contains of cigarette smoke, especially for passive smokers. The use of masks was an alternative to reduce the risks, but masks that were able to filter cigarette smoke more expensive than ordinary health masks. The reeds were chosen as the main raw material because in Indonesia has an accumulation large of growth and utilization that is not optimal. The researcher synthesized methylcellulose to make microfilter masks which were then tested for effectiveness. The method used was conventional acetylation of cellulose using acetic anhydride, glacial acetic acid, and the addition of concentrated sulfuric acid with volume variations of 10, 15 and 20 mL. The results of cigarette smoke masks were analyzed using a Scanning Electron Microscopy (SEM). It was found that the surface structure of particle masks of cigarette smoke was more tenuous than the surface structure of commercial cellulose acetate filter particles.

Keywords: Cigarette Smoke Mask, Microfilter, Asetylation, reeds

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Synergistic Cytotoxicity Effect By Combination of Active Extract Of Parijoto Fruit (Medinilla speciosa Reinw. ex. Bl) and Cisplatin Against Hela Cell Line

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One of the chemotherapy agents in the treatment of cervical cancer which is often used is cisplatin. However, due to drug resistance and its side effects are much needed an agent that can be combined with cisplatin. One of the agents who have the potential to give the cytotoxic effect derived from natural ingredients is Parijoto fruit (Medinilla speciosa Reinw.ex.Bl). The study aims to determine the potential cytotoxic effects of methanol extract, ethyl acetate and n-hexane of Parijoto fruit calculated from the value of IC_{50} and the synergicity of the cytotoxic effect combination of the active extract of Parijoto fruit with cisplatin against cancer cells Cervix which is seen from the value of the CI (Combination Index) and its cell viability. The determination of the cytotoxic effect of Parijoto fruit extract using MTT assay method that the results can be read absorption by using ELISA reader. Data analysis is calculated by linear regression methods by using Microsoft Excel software. Results showed that methanol extracts, ethyl acetate and n-hexane of parijoto fruit performed cytotoxic effect on HeLa cell line with IC50 respectively, 209.6 µg/mL; 352,9 µg/mL; 904,7 µg/mL while the value of IC50 cisplatin against HeLa cells amounted to 12.8 µg/ mL. Methanol extract of parijoto fruit (EMP) is the most active extract that selected to be combined with cisplatin. The combination of 26,205 ppm (EMP + 1,601 ppm (performed synergistic effect on HeLa cell line with the Combination Index (CI) value of 0.69.

Keywords: cytotoxic, Medinilla speciosa, cisplatin, co-chemotherapy, MTT.

Presenter: anif nur artanti (anif.apt@staff.uns.ac.id)

SYNTHESIS OF HYDROXYLATED AZOMETHINE COMPOUNDS AND THEIR ANTIOXIDANT ACTIVITY

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Azomethine compounds are one group of compounds that play a biologically important role as antioxidants. Azomethine compounds have a group; C = N- from condensation reaction between the carbonyl group of the aldehyde or ketone and the nucleophilic primary amine through an addition-elimination reaction. The presence of a substituent such as a hydroxy group (-OH) attached to an azomethine is reported to affect antioxidant activity. The purpose of this study were to synthesize hydroxylated azomethine derivative compounds including N,N'-Bis(2-hydroxybenzylidene)ethylenediamine from salicaldehyde and ethylenediamine and compound N,N'-Bis(4-hydroxy-3-methoxybenzylidene)ethylenediamine from vanillin and ethylenediamine, and synthesize compound azomethine N,N'-Bis(benzylidene)ethylenediamine as a comparison, and the three azomethine derivatives were tested to antioxidant activity using DPPH method. The results were hydroxylated azomethine derivative compounds N,N'-Bis(2-hydroxy benzylidene)ethylenediamine obtained yellow solids with a yield of 87.04% and melting point of 125.6ºC-127.5ºC and compound N,N'-Bis(4-hydroxy-3-methoxy benzylidene)ethylenediamine obtained light brown solid with a yield of 70.045% and melting point of 220.2ºC-222.1ºC and compound N,N'-Bis(benzylidene) ethylenediamine obtained orange solids with a yields of 34.83% and melting point 110.2ºC-111.4oC. The antioxidant activity test results for the three azomethine derivatives from high to low were N,N'-Bis(2-hydroxybenzylidene) ethylenediamine, N,N'-Bis (benzylidene)ethylenediamine and N,N'-Bis(4-hydroxy-3-methoxybenzylidene) ethylenediamine with IC_{50} values were 130.573 ppm, 187.66 ppm and 235.164 ppm respectively.

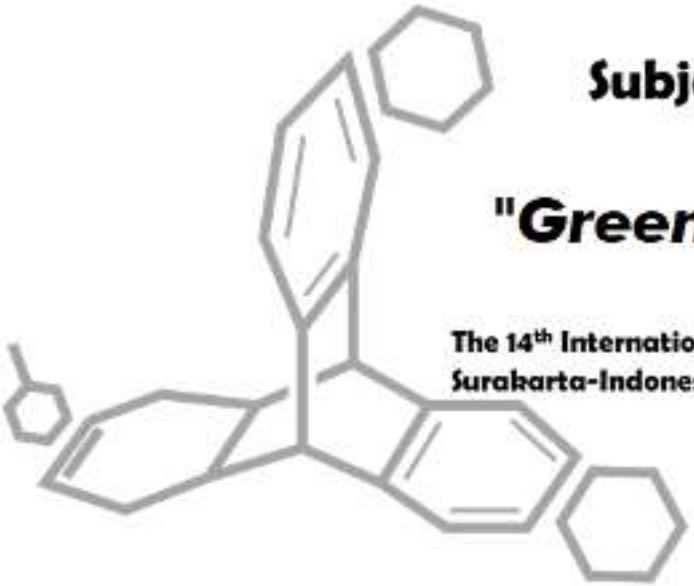
* *

Keywords: Azomethine compound, addition-elimination reaction, hydroxy, antioxidant

Presenter: Ismiyarto (ismiyarto@live.undip.ac.id)

ABSTRACT BOOK

PARALLEL SESSION



Subject:

"Green Chemistry"

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Synthesis of Gold Nanoparticles Using L-Histidine as Reducing and Stabilizing Agent at Room Temperature

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Synthesis of gold nanoparticles had been successfully performed in this research. For this purpose, reducing and stabilizing agent amino acid L-histidine was added to HAuCl4. The mixture solution was then incubated at room temperature for 3-7 days and the color was changed from clear yellow to pink-red. Absorbance and wavelength on gold nanoparticles were also determined by observing the concentration of HAuCl4, L-histidine as well as the time of reactions. Absorption band peak of gold nanoparticles at 525-545 nm confirmed using a UV-visible spectrophotometer. TEM results showed that gold nanoparticles had a spherical structure and monodisperse forms. The average size of gold nanoparticles was 27.2 nm using DLS measurement. While Zeta Potential Analyzer measurement showed that the surface charge of gold nanoparticles was -41.2 mV.

Keywords: Gold nanoparticles, L-histidine

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PROCESS DESIGN OF HEAVY FRACTION SEPARATION FROM USED LUBE OIL USING VACUUM DISTILLATION AND THIN FILM EVAPORATOR TO OBTAIN OPTIMUM TOTAL ANNUAL COST

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Used lubricating oil is a hazardous waste that must be treated before being discharged into the environment. The processing of used lubricating oil consists of several stages, including the removal of heavy fraction of hydrocarbons entering the final separation stage. Some equipment can be used to do this process, one of which is distillation using a thin film evaporator as the reboiler. This study aims to determine the effect of feed temperature and the number of trays on the distillation column using a thin film evaporator as a reboiler, so that the performance of the distillation column and thin film evaporator can be observed in distilling the separation of heavy hydrocarbon fraction. The controlled variables are the composition of hydrocarbons and the design of the evaporator from Alghifari and Robbi (2018) with rotor rotation of 30 rpm, pressure of 2.53 kPa, and temperature of 330°C. Feed temperature will be varied from 150 to 300°C while the number of tray is 5 to 19 with two intervals. The amount of lube oil in distillate and the total annual cost are observed for each variable. From this research, the relation between feed temperature and tray is directly proportional to the lube oil produced. The optimum operating condition in this research is at the feed temperature of 150°C and 9 trays of the distillation column.

Keywords: modelling, simulation, thin film evaporator

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Technology improvement in extraction of antioxidant from Andaliman (*Zanthoxylum acanthopodium* DC)

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As one of the spices that found in North Sumatra, andaliman (Zanthoxylum acanthopodium DC) is a source of natural bioactive with potential as antioxidant. Recently, studies of andaliman increase due to its potential that can also inhibit the tumor necrosis. However, the hard texture of andaliman become an obstacle in the extraction process so that an effective method to extract andaliman is needed. Therefore in this study, andaliman extraction has been carried out by comparing three method extraction such as hydrodistillation extraction, microwave hydrodistillation (MHD), and solvent free microwave extraction (SFME). The extraction was conducted for four hours and got yield of 1.88% using hydrodistillation, 2.79% using MHD at 300 W and 2.60% using SFME at 300 W. In addition, the effect of microwave power in microwave-hydrodistillation was studied by varying in three levels that are 300 W, 450 W, and 600 W. The maximum extraction yield of andaliman was gained at 450 W (3.23%), and it was higher than at 600 W (2.79%). Thus, it can be concluded that microwave hydrodistillation is more effective than conventional hydrodistillation. Besides, it is a green technology in the extraction of andaliman to satisfy the needs of antioxidant.

Keywords: Andaliman, antioxidant, Essential oil, Microwave, Zanthoxylum acanthopodium DC

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INITIAL STUDY ON THE SYNTHESIS OF 1-(4'-ISOPROPILBENZIL)-1,10-PHENANTHROLINIUM BROMIDE FROM CUMINYL ALCOHOL, A POTENT ANTIMALARIAL

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Because of the rapid development of malaria resistance to conventional drugs such as chloroquine, pamaquine, amodiakuin, meflokuin and pyrimethamin, the development of new and effective antimalarial drugs is highly desirable. In this work, initial study on the synthesis of potent antimalarial, 1-(4'-isopropylbenzyl)-1,10-phenantrolinium bromide, from cuminyl alcohol has been carried out. The synthesis was performed through two stages of reaction. First, the synthesis of cuminyl bromide by bromination reaction and the second, the synthesis of 1-(4'-isopropylbenzyl)-1,10-phenanthrolinium bromide by bimolecular nucleophilic substitution reaction (SN_2). Structural analyses of the bromination reaction of cuminyl alcohol and PBr_3 using FTIR, ^{1}H-NMR and GC-MS showed the formation yellowish liquid cuminyl bromide. Furthemore, the formed cuminyl bromide was reacted with 1,10-phenanthroline in acetone at 56 °C for 12 h to afford orange solid phenantrolinium salt target with melting point of 165-167 °C.

Keywords: Antimalaria, cuminyl alcohol, 1,10-phenanthroline, 1-(4'-isopropylbenzl)-1,10-phenanthrolinium bromide

Presenter: Maulidan Firdaus (maulidan@mipa.uns.ac.id)

Experimental Study of Natural Dyes Extraction to be Utilised for Fashion Indutries

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Recently, small scale fashion industries are growing quite rapidly in Indonesia. This is due to the continuous encouragement and facilitation by the Indonesia government to improve workforce in creative industry. As fashion industries depend on the availability of dyes as one of their resource, it is very important to develop a new and sustainable supply of dyes for dyeing process in fashion industries. Actually, the term sustainable here is not only refer to the sustainability of supply, but also to the sustainability to the environment. Hence, research on the extraction of dyes from sustainable and natural resources for fashion industries are considered very important and urgent. Dyes for fashion and textile are naturally occurred in plants or parts of plants. The extraction of dyes from these sources can be conducted by using simple mixing between solvent and the plants inside a soxhlet extractor or reflux apparatus. In this study, both soxhlet extractor and reflux apparatus were employed to extract natural dyes from three materials, i.e. sappanwood, mango leaf, and indigofera. The experiments were conducted to analyse the effects of extraction time, temperature, and solvent to materials ratios on the yield of dyes. Spectrophotometer UV-Vis was mainly used to determine the concentration of dyes after each experiment. Preliminary study showed the increase of dyes concentration with extraction time and temperature. In addition, the soxhlet extraction process provided maximum yield of dyes from sappanwood.

Keywords: natural dyes, extraction, fashion

Presenter: Putu Doddy Sutrisna (pudod@staff.ubaya.ac.id)

Green Syntheses of Silver Nanoparticles

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Silver nanoparticles have a wide range of applications, such as for sensing materials, biomedical applications, and as a catalyst for various chemical reactions. Loading such nanoparticles into a polymer provides stabilisation, prevents agglomeration and facilitates ease of application. Here, we present two green synthesis methods of polymeric-silver nanoparticles.

The first is using $ScCO_2$ as medium of the synthesis. The unique properties of $ScCO_2$, a high mass transfer rate and zero surface tension could facilitate diffusion of the nanoparticles to achieve a homogeneous dispersion of the nanoparticles within the polymeric support. This synthesis method is the one-step process which produces a clean material as the solvent is readily removed on depressurisation.

Secondly, we use plant extract as a reducing agent in the synthesis. Conventionally, silver nanoparticles are synthesised by a chemical method using chemicals as reducing agents which are generally toxic and led to non-eco-friendly by-products. Here, we use plant extracts as a reducing agent in the synthesis of silver nanoparticles. Poly(vinyl alcohol) was then added to modify and stabilise the nanoparticles. The effect of synthesis parameters on the nanoparticle's formation will be presented.

Keywords: silver nanoparticles, green synthesis

Presenter: mohammad alauhdin (m.alauhdin@mail.unnes.ac.id)

Microbial life on the surface of the soft coral for solve the self-healing concrete

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The phenomenon of cracking in concrete can be caused by the nature of concrete which is not strong against tensile and shrinkage stresses. In addition, environmental factors such as rainwater also affect concrete structures. The method commonly used to overcome crack problems in concrete is the impregnation method. However, this method is relatively expensive, difficult and has an impact on the environment and health. Therefore, it is necessary to look for other alternatives to increase the durability of concrete. The efforts that have been made by several researchers are by adding bacteria which have activity to precipitate calcium carbonate on the cracked concrete surface. This method is commonly called Microbially Induced Calcite Precipitation (MICP). The source of bacteria in this study is bacteria that symbiont with soft corals. The results showed that the concrete made with the addition of MICP-70 isolates as much as 1.6x108 cells / mL had a greater compressive strength than the concrete without the addition of isolates. The value of compressive strength and absorbency of concrete water with the addition of MICP-70 isolates has a compressive strength of 6.0 Mpa and absorption capacity of 4.2%. So when compared to concrete without the addition of isolates and concrete with the addition of MICP-70 isolates, the value of concrete compressive strength occurred at 9%, while the absorption of water decreased by 3%. The results of microstructure analysis showed concrete with the addition of MICP-70 isolates little pores, because the pore is covered by calcium carbonate deposits.

Keywords: bacteria, calcium carbonate, crack, soft coral

Presenter: Prima Endang Susilowati (primaendangsusilowati@gmail.com)

RENEWABLE ELECTRICAL ENERGY THROUGH MICROBIAL FUEL CELL TECHNOLOGY FROM SEDIMENT BAY KENDARI

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The study of the utilization of organic matter contained in several potential substrates as an alternative source of electrical energy through MFC technology has been carried out. Microbial fuel cell (MFC) is a form of technology that can convert complex organic matter in sediments and from wastewater to produce electrons as an energy source through the process of microbial metabolism. The purpose of this study was to determine the characteristics of several potential substrates, to know the performance of MFC using potential substrate using KMnO4 electrolytes and aerators, to know the effect of increasing the surface area of graphite sheet electrodes in MFC performance, to determine changes in the characteristics of potential substrates and to know the characteristics of MFC bacteria from potential substrates. The results showed that the characteristics of Kendari Bay sediment which included organic matter in the form of organic C were 4.23%, total nitrogen was 1.08%, and C / N ratio was 3.92. Kendari Bay marine sediment SMFC system using an aerator can produce electricity voltage of 0.404 V while using KMnO4 is 1,628 V. The results of MFC substrate characterization indicate that the substrate organic matter has decreased. The content of Kendari marine sediment organic matter after the use of SMFC is C / N ratio 4.19.

Keywords: Microbes, Marine sediments, MFC, Electricity

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Biodiesel Production Using Palm Fatty Acid Distillate and Rice Husk Silica Supported $NiSO_4$ as Catalyst

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In the present study, renewable green fuel is produced using by-product generated during the purification process of palm oil refinery known as palm fatty acid distillate (PFAD). PFAD has been considered as the most promising biodiesel feedstock despite its drawbacks of high free fatty acid (FFA) and water contents. In order to overcome these problems, the $NiSO_4$-rice husk silica (Ni-RHS) catalyst was used in esterification of PFAD. Parametric study has been conducted and the optimal conditions were found to be: MeOH:oil molar ratio of 15:1 and 15 wt.% catalyst amount at 100 °C, yielding highest methyl ester content 88.6% at 9 h reaction time. The catalyst could maintain a high catalytic activity (80 %) even during the four cycles. The research results show that Ni-RHS is a potential catalyst for biodiesel production.

Keywords: Transesterification, Heterogeneous acid catalyst, Palm fatty acid distillate, Rice husk silica, Biodiesel

Presenter: Noor Hindryawati/Nanang Triwidodo (ienwati@yahoo.com)

Ultrasound-Assisted the Green Synthesis of 2,4-Diacetylphloroglucinol (DAPG) and Its Application as A Novel Acid-Base Indicator

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An analogue natural product compound namely 2,4-diacetylphloroglucinol (DAPG) was successfully synthesized in excellent yield via greener Friedel-Craft acylation between phloroglucinol and acetic anhydride in the presence of biodegradable catalyst methanesulphonic acid (MSA) under ultrasound-assisted and ordinary method. Both methods were attempted the green chemistry approach including solvent-free reaction, but a better improvement reached under ultrasound-assisted. Operational simplicity, good to excellent yields, expedient metal-free synthesis, energy efficient and mild reaction conditions are the notable advantages in this procedure. Additionally, this protocol is compared and evaluated its green metrics over the previous reports. A Scale up reaction demonstrated the practical applicability of this newly developed protocol. We have obtained a sharp and clear colour change from colourless to yellow after adding NaOH solution and followed by the change of UV-vis absorption. Because of its sensitivity, this compound may be potential candidates for the future acid-base indicator.

Keywords: DAPG, green syhthesis, green metrics, natural product, acid-base indicator

Presenter: Wahyu E Prasetyo (wahyuekoprasetyo95@student.uns.ac.id)

Utilization of Palm Kernel Oil to Synthesis Biodegradable Nanofluid Detergent

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In this study, biodegradable nanofluid detergent was synthesized from Palm Kernel Oil (PKO) and titanium dioxide (TiO_2). Palm Kernel Oil (PKO) is one of the palm oil products which is obtained from the extraction process of palm kernel and has the potential to be contained in the creamer waste as fat residue from the production that is lost during the production process. PKO is used as a fat waste creamer model and can be used as an MES (Methyl Ester Sulfonate) surfactant. MES surfactant can be used as raw material of eco-friendly detergent. MES surfactant was obtained by esterification, trans-esterification and sulfonation process. In sulfonation process, natrium bisulfite ($NaHSO_3$) was varied to the methyl ester that is used in the process. In detergent synthesis, MES surfactant was varied with the addition of 0.1% TiO_2. Performance of detergent was tested by detergent stability and pollutant degradation. Biodegradability test of detergent was measured by Pseudomonas sp. growth in detergent culture. In sulfonation process, mole ratio of 1:4 of methyl ester and $NaHSO_3$ showed the best performance with the lowest surface tension value 37.2 dyne/cm^2. The results of detergent synthesis showed that detergent with MES concentration of 3% has the best performance with stability and pollutant degradation ability about 99%. The detergent also has biodegradable characteristic compared with commercial detergent, with the growth of Pseudomonas sp. reached 57.9% within 10 days.

Keywords: Palm Kernel Oil, environmental pollution, detergent, biodegradable, titania

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CHARACTERIZATION OF THE INDOGOSOL BLUE DYE DECOLORIZATION PROCESS BY Aspergillus sp. 03 : STUDY OF SCANNING ELECTRON MICROSCOPY (SEM) AND THE ENERGY DISPERSIVE X-RAY SPECTROSCOPY (EDS) ANALYSIS

RATNA STIA DEWI | MARDIYAH KURNIASIH

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Extracellular enzymes were involved in the fungal decolorization of dyes. This study compared free enzyme, immobilized enzymes and fungal biomass in decolorization of Indigosol blue dyes using Aspergillus sp. 03. The free enzyme was the crude enzyme that obtained from partial purification of fermentation of fungi isolates. The immobilized enzyme was a crude enzyme that was immobilized using alginate. Biomass was a pellet mycelium isolate fungus which formed from incubation in the cultivation medium. Higher decolorization were achieved when the Indigosol Blue dye were exposed in biomass, while slower rates of decolorization occurred with its dye exposed in immobilized enzyme. Biomass, immobilized enzyme, and free enzyme preparations from Aspergillus sp. 03 , decolorize Indigosol blue by 99.2%, 47.47%, and 80.1%, respectively. Study of Scanning Electron Microscopy (SEM) which was equipped with Energy Dispersive X-Ray Spectroscopy (EDS) was done to see the surface morphology and analysis of the chemical composition on the surface of the biomass before and after decolorization. Fundamental changes were observed using SEM that was a rough surface compared to microscopic appearance before decolorization occurs. The results of the analysis showed that in the sample after decolorization there was an increase in N, S, O, Br elements after decolorization which proved the presence of Indogosol Blue dye functional groups adsorption. Increase in Cr metal which refers to the accumulation of heavy metals on the surface of the mycelium. Decolorization using fungi biomass has the ability to decolorize more perfectly than free enzymes and immobilized enzymes.

Keywords: Aspergillus, decolorization, enzyme, EDS, SEM

Presenter: RATNA STIA DEWI (ratna.dewi0509@unsoed.ac.id)

DEVELOPMENT CATALYTIC PYROLYSIS OF BIOFUEL PRODUCTION FROM MICROALGAE Chlorella sp

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Biofuel has developed, from the first generation to the third. Microalgae as a third generation biofuel feedstock has several advantages over other biomass. In this study, the microalgae species that used is Chlorella sp. which contain up to 28-32% oil based on its dry weight. Pyrolysis method has great potential to be developed in producing fuel oil and a relatively new approach to convert microalgae to biofuel. The purpose of this study are to learn how to convert Chlorella sp. become biofuel by conventional pyrolysis using activated carbon catalyst and knowing the effect of pyrolysis time in using various of catalyst concentration of active carbon are 0%, 1%; 2% and the variables of time of pyrolysis are 1; 2; 3 and 4 hours with reactor temperature is 550°C .The first method to do is 200 grams of Chlorella sp. and catalyst is mixed and put in the reactor in the Fixed bed reactor in vacum condition (-3 mmH_20)to isolate from the existing of oxygen. Then, adjust the temperature of reaction. When the desired temperature is reached, the time is set according to the residence time variable used. Liquid oil products were analyzed by testing physical properties. The highest yield of liquid oil is 43.7525% at optimum condition is obtained by 1% activated carbon catalyst at temperature and pyrolysis time are 550 °C and 3 hours, repesctively. While, density and viscosity of liquid oil are 0.8770 Kg/m^3 and 5.7945 cSt accordance with SNI for biofuel from plants.

Keywords: Activated carbon, Biofuel, Catalytic Pyrolysis, Chlorella sp., Microalgae.

Presenter: Rifa Fatma Ningrum (rifafatma97@gmail.com)

Study The Effect Of UV-B Mutation On Biodiesel Microalgae Botryococcus brauni Using Esterification, Transesterification And Combination Esterification-Transesterification

Arief Widjaja | Muhammad Hafizh Prashantyo | Anggia Putri Ramadhani

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Biodiesel from microalgae as the third generation is promising sustainability and eco-friendly energy source. The objective of this study was comparing of biodiesel microalgae Botryococcus braunii conversion process with UV-B mutations using esterification, transesterification and combined esterification-transesterification processes. In this study, Ultraviolet (UV-B) is one of the rays with radiation between 280-315 nm that was damaged the cell walls of microorganism. The yield conversion lipid to biodiesel of mutation and normal variables using esterification method were 2,86% and 1,46% with 1: 10 ratio molar alga oil: methanol. It was using 60°C with 1,5% w/w H_2SO_4 at 200 rpm for 2 hours. While the transesterification method of UV-B mutation and normal variables doesn't form biodiesel with 1: 7 ratio molar alga oil: methanol with 0.5% w/w NaOH catalyst. It was using 60 °C at 200 rpm for 1 hour. Furthermore, the combination esterification-transesterification of mutation and normal variables were 26,42% and 20,38%. In the first stage esterification mutation and normal variable to lessen acid value from 24,13 to 0,567 mg KOH/g and 23,21 to 0,486 mg KOH/g. It was using 1: 8 molar ratio alga oil: methanol with H_2SO_4 catalyst 1.5% w/w, temperature 60 °C at 400 rpm for 2 hours. The next stage transesterification was conducted at molar ratio 9:1, KOH catalyst concentration 0,75% (wt%), temperature 65 °C at 600 rpm for 1 hour. The results showed that the UV-B mutation of combination esterification-transesterification was the best conversion lipid to biodiesel. Biodiesel was analyzed by Gas Chromatography (GC) characterization and acid value.

Keywords: Biodiesel, Botryococcus braunii, Esterification, Transesterification, Mutation, UV-B

Presenter: Muhammad Hafizh Prashantyo (muhammad.hafizhp@gmail.com)

Bio-heterogenous metal-catalyst from agro-waste for various cross-coupling reactions

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Herein, not only the catalytic activity and selectivity but also the stability and reusability for safe, non-toxic, sustainable chemistry, and green organic synthesis, development of heterogeneous metal catalysts become a particular interest. Thus, we present the synthesis of poly(hydroxamic acid)/poly(amidoxime) ligand from cellulose-graft-poly(acrylonitrile) copolymer. Various agro-waste are used to prepared the poly(hydroxamic acid)/ poly(amidoxime)-Pd(II) and Cu(II) complex and characterized by FE-SEM, HR-TEM, EDX, XPS, TGA and ICP-AES analyses. The cellulose supported heterogeneous Pd(II) and Cu(II) catalysts showed high stability and catalytic activity towards several cross-coupling reactions such as Suzuki, Huisgen, Michael addition and Heck reaction of aryl halides and arenediazonium tetrafluoroborate with a variety of olefins to give the corresponding cross-coupling products including Click reactions up to 97% yield. The Pd(II) and Cu()II) complex was separated from the aqueous reaction mixtures and repeatedly used up to seven times without any significant decrease of its catalytic performance.

Keywords: Agro-waste cellulose, Heck reaction, Heteroaryl halide, Poly(hydroxamic acid), poly(amidoxime), Palladium catalyst, Copper catalyst, Huisgen reaction.

Presenter: Md Lutfor Rahman (lutfor73@gmail.com)

A Green Route Synthesis of 2,4-Diacyl Phloroglucinol (DAPG) using $CuSO_4$-$5H_2O$

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2,4-diacyl phloroglucinol (DAPG) compound has been successfully synthesized through Friedel-Craft acetylation reaction between phloroglucinol and acetic anhydride in solvent-free condition at room temperature with $CuSO_4.5H_2O$ as a environmentally-friendly heterogeneous catalyst. These reactions were carried out in various variations weight of catalyst i.e 0,20, 0,25, 0,30, 0,35, 40, 0,45, and 0,5 mmol. This reaction could be completed in 12-24 hours and produced DAPG compound in good to excellent yields. This product was fully characterized by FT-IR spectroscopy, ^{1}H-NMR, and ^{13}C-NMR.

Keywords: green synthesis, Friedel-Craft acetylation reaction, phloroglucinol, DAPG compound.

Presenter: Carissa H (carissa@student.uns.ac.id)

Experimental Study of Natural Dyes Extraction to be Utilised for Fashion Indutries

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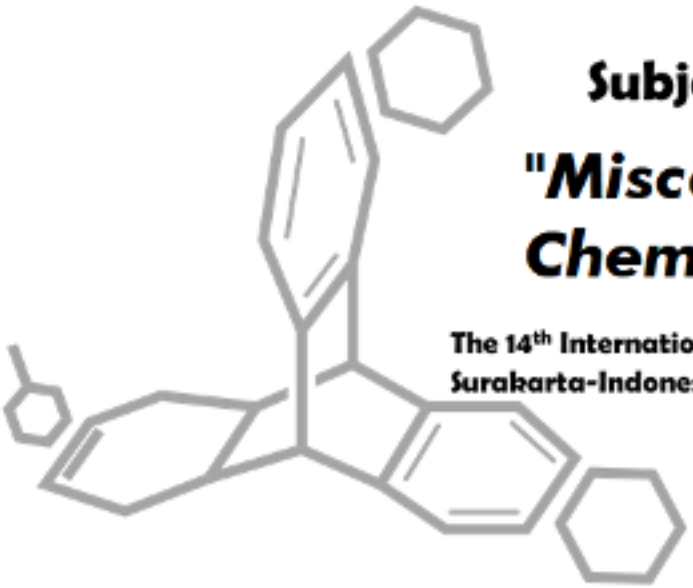
Recently, small scale fashion industries are growing quite rapidly in Indonesia. This is due to the continuous encouragement and facilitation by the Indonesia government to improve workforce in creative industry. As fashion industries depend on the availability of dyes as one of their resource, it is very important to develop a new and sustainable supply of dyes for dyeing process in fashion industries. Actually, the term sustainable here is not only refer to the sustainability of supply, but also to the sustainability to the environment. Hence, research on the extraction of dyes from sustainable and natural resources for fashion industries are considered very important and urgent. Dyes for fashion and textile are naturally occurred in plants or parts of plants. The extraction of dyes from these sources can be conducted by using simple mixing between solvent and the plants inside a soxhlet extractor or reflux apparatus. In this study, both soxhlet extractor and reflux apparatus were employed to extract natural dyes from three materials, i.e. sappanwood, mango leaf, and indigofera. The experiments were conducted to analyse the effects of extraction time, temperature, and solvent to materials ratios on the yield of dyes. Spectrophotometer UV-Vis was mainly used to determine the concentration of dyes after each experiment. Preliminary study showed the increase of dyes concentration with extraction time and temperature. In addition, the soxhlet extraction process provided maximum yield of dyes from sappanwood.

Keywords: natural dyes, extraction, fashion

Presenter: Putu Doddy Sutrisna (pudod@staff.ubaya.ac.id)

ABSTRACT BOOK

PARALLEL SESSION



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Photodegradation of Phenol in Batik Wastewater with Copper(II) oxide under Visible Light Illumination

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Fakultas MIPA, Jurusan Kimia, UNSOED, Jalan Dr. Soeparno, Karangwangkal, Purwokerto

Batik wastewater is one of the reason of environment pollution in Indonesia. One of the substances that lead to pollution in batik wastewater is the phenol content in it. Phenol can be degraded with adding CuO photocatalysts. Furthermore, pH of the solution also affects the formation of hydroxyl radicals. This study discusses the time of irradiation and supports CuO photocatalysts on phenol degradation. The parameters that varied were CuO weight, irradiation time, and pH, photocatalytic mechanism tests were also carried out. The results showed that visible light increase phenol degradation in batik wastewater. Phenol degradation in batik wastewater using CuO is 31.53 % by adding 1gram CuO with visible light irradiation for 5 hours. The optimum pH condition obtained for the system is pH 9 with percent degradation 36.15%. Addition of scavengers such as benzoquinone, ammonium oxalate and isopropanol in a row can block superoxide radical, hole (h^+), and hydroxyl radicals during the degradation process which cause a decrease in degradation percentage.

Keywords: Phenol Degradation, batik wastewater, Copper(II) oxide, Photocatalyst

Presenter: Cherly Firdharini (cherly.chefi@gmail.com)

Selective Fluorescent Chemosensor of Fe^{3+} Ions Based on Schiff Base Azo-Imine Derivative

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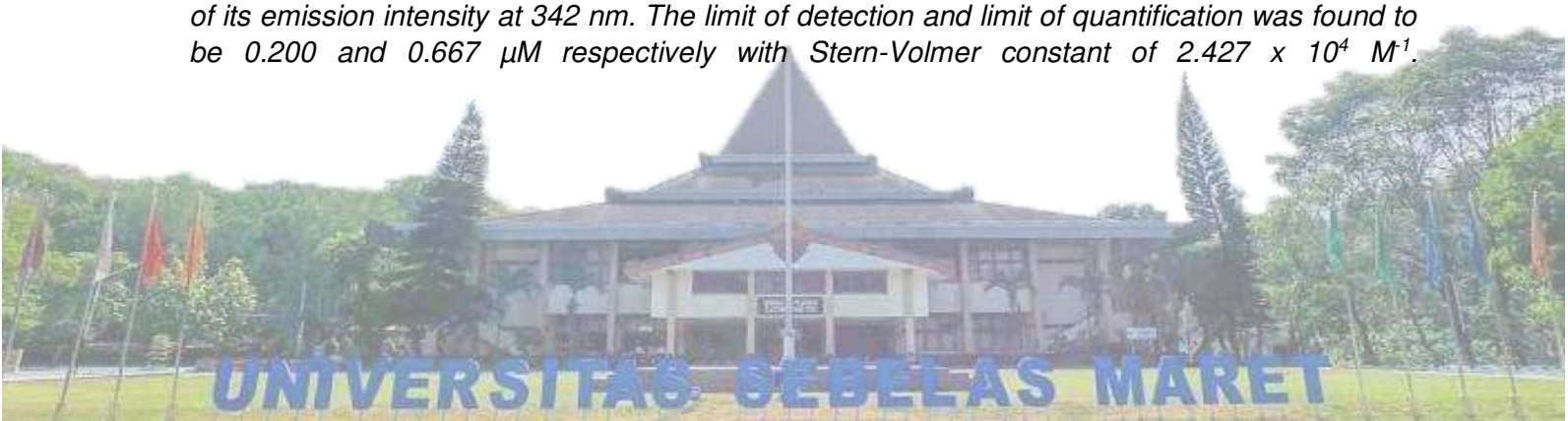
The development of Schiff-base imine compounds with chelation and fluorescent dyes properties has received particular attention for selective and sensitive detection of iron metal ions (Fe^{3+}). Since azo compounds have been found as a chromophore with a conjugation effect, the attachment with Schiff-base imine without any dyes will be one of particular attention in the development of chemosensors. In the present work, Schiff-base azo-imine compound shows fluorescent chemosensors for selective detection of Fe^{3+} ions with turn-OFF of its emission intensity in 100% through solvatochromic effect with a color change from yellow to transparent in methanol/water. In particular, azo-imine derivative, 2-methoxy-6-(p-phenyldiazenilsulfonate)-4-(phenylimino)phenol (L2) from vanillin was successfully synthesized from 4-hydroxy-3-methoxy-5-(p-phenyldiazenylsulfonate) benzaldehyde (L1) and aniline in 71% yield as confirmed using FT-IR spectroscopy and LC-MS spectrometry. Upon monitoring at 202, 233 and 279 nm as an excitation wavelength, the sensing capability of L2 using fluorescent spectroscopy showed that L2 could selectively detect Fe^{3+} with a significant quenching in 100% of its emission intensity at 342 nm. The limit of detection and limit of quantification was found to be 0.200 and 0.667 µM respectively with Stern-Volmer constant of 2.427 x 10^4 M^{-1}.



Furthermore, Job's plot and Benesi-Hildebrand equation indicate that Fe^{3+} and L2 formed a complex in 1:1 with the association constant 1.563 x 10^4 M^{-1} due to the formation of weak interaction. The interference study showed that the selectivity and sensing capability of L2 was maintained even in the mixture of Fe^{3+} together with the presence of other metal ions at higher concentration.

Keywords: azo-imine, chemosensor, detection, Fe^{3+}, fluorescent

Presenter: Krisfian Tata Aneka Priyangga (krisfian.tata@machung.ac.id)

Mass spectrometry in chemical analysis

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Mass spectrometry (MS) has been considered as a gold analytical method in analytical science because of its ability of providing the direct molecular structural information of analyte compounds. Therefore, MS technique has been extensively used not only in chemistry also in various fields like proteomics, metabolomics, genomics, lipidomics etc. Recent research on "MS imaging for biological samples" exhibited as a promising diagnostic tool for cancer diagnosis. The compounds present in nature as neutral form except proteins, peptides, nucleic acids which present inherently as ionic in nature. In MS, an ionization source that known as the heart of MS, is used to ionize neutral molecules. Performance of MS in terms of quantification depends on efficiency of ion source. Therefore development an efficient ion source is very much needed. Traditional ion sources like CI, EI, ESI need high vacuum system which make the MS heavier and bulky where miniature MS is very much needed in practical applications. Development of ambient ion source would be the choice to fabricate miniature MS. Attempts have been paid to develop ambient ion source for analysis of various compounds like explosives, drugs, amino acids, proteins, steroids, herbicides, ionic liquids etc with better LOD. New desorption methods such as flash heating/rapid cooling, solid/solid friction, liquid/solid friction etc for non-volatile compounds are also developed. Attempt has also been taken to fabricate environmental monitoring techniques such as SPA-MS, VOCs etc. Mechanism of ion formation and concept of how to desorb less-volatility compounds from surface will be discussed.

Keywords: Illicit compounds, Ambient Mass Spectrometry, Miniature Mass Spectrometry, Environmental monitoring techniques, Desorption Methods for Non-Volatile Compounds

Presenter: Ahsan Habib (habibchem@du.ac.bd)

Chemosensor of Gold(I) 4-(3,5-Dimethoxybenzyl)-3,5-dimethyl Pyrazolate Complex for Quantification of Ethanol in Aqueous Solution

Matheus Randy Prabowo | Almira Praza Rachmadian | Leny Yuliati | Hendrik Oktendy Lintang

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Ethanol quantification in liquor and pharmaceutical industry is important for quality assurance in consumer goods where it can be determined using desktop instruments like gas chromatography. However, it requires a specific skilled operator and is expensive. In order to alter the method to handheld equipment, ethanol vapor sensors have been developed using dyes. On the other hand, luminescent materials from organic dyes have drawn attention, especially in chemical sensing (chemosensor) applications. Although gold complexes have been found as luminescent materials with phosphorescent properties, its quantitative applications have been rarely reported. Here, by using gold(I) 4-(3,5-dimethoxybenzyl)-3,5-dimethyl pyrazolate complex as a chemosensor, we report the first successful quantification of ethanol in aqueous solution based on vapor-induced phosphorescent quenching. To mirror the real beverage or pharmaceutical products containing ethanol, the various concentration of ethanol-water mixtures (0%, 25%, 50%, 75%, and 100%) were prepared in a closed chamber for evaluation of sensing capability by using spectrofluorometer. Upon monitoring at 278 nm, the emission intensity at 609 nm of the complex was quenched by ethanol vapor from the mixture. In particular, it showed linearity between quenching magnitude and concentration of ethanol with detection limit up to 13% of ethanol/water (v/v). When the chemosensor was applied to quantify the ethanol content of 4 real samples (two beverage products and pharmaceutical alcohols), the accuracy of the measurement was achieved up to 96%. Therefore, this organometallic compound is a good candidate of chemosensors to be applied for handheld devices in ethanol quantification.

Keywords: ethanol quantification, gold complex, chemosensor, phosphorescence

Presenter: Matheus Randy Prabowo (matheus.randy@machung.ac.id)

Box-Behnken Design for the Optimization of Esterification Reaction of Acetic Acid with Methanol using Microwave-Assisted Method

Ansori Ansori | Heri Septya Kusuma | Mahfud Mahfud

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Methyl acetate has wide applications in the production of solvents, perfumes, surfactants, emulsifiers, biodiesel fuels, and other surface active agents. Methyl acetate is produced through catalytic esterification of acetic acid with methanol using sulfuric acid catalyst in a batch reactor. This research was done by a microwave method to produce methyl acetate so that it is more effective and efficient than conventional methods. The variables used as parameters refer to the microwave power (300; 450; 600 W), concentration of catalyst (0; 3.5; 7%), methanol to acetic acid ratio (0.75:1; 1:1; 1.25:1) and esterification time (10; 20; 30 min). The purpose of this study is to optimize and analyze the effect of each variable using the Box-Behnken Design (BBD) from Response Surface Methodology (RSM). The combination of microwave technology and Box-Behnken for the optimization design are considered a new and modern method for the production of methyl acetate. The results showed that the optimum condition was set in microwave power at 577.466 W, concentration of catalyst in 4.078%, methanol to acetic acid ratio of 1.193, and esterification time is 24.444 min can produce the optimal conversion from methyl acetate of 98.755%. Furthermore, the analysis of variance (ANOVA) show that the important factors to determine the conversion of methyl acetate are microwave power, concentration of catalyst, methanol to acetic acid ratio, and esterification time. In addition, the design R^2 value of 0.9828, indicating the suitability of the model used to describe the experimental results to obtain the conversion of methyl acetate.

Keywords: Box-Behnken design; esterification; methyl acetate; microwave; response surface methodology

Presenter: Ansori Ansori (ansor17k54pascal@gmail.com)

Can Glucose with Concentration within the Physiological Range be Detected by Fourier Transform Near-Infrared Spectroscopy in Trans-reflectance Mode?

Ferdy S. Rondonuwu | Andreas Setiawan

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Invasive diagnostic approaches such as puncturing fingertips to collect blood for glucose level measurements often cause psychological trauma and risk of infection. Non-invasive measurements in various ways have recently gained favor because such psychological trauma and risk of infection can be avoided, even allowing the diagnostic to be repeated several times with the patient's convenience. On the other hand, near-infrared spectroscopy has recently emerged as a powerful apparatus for fast and mostly does not required wet chemical analysis. However, non-destructive and non-invasive measurement by near-infrared spectroscopy can only be realized when operated in all types of reflectance mode. This paper discusses the accuracy of measuring glucose concentrations in aqueous solutions using near-infrared spectroscopy operated in reflectance mode. In this experiment, glucose with various concentrations was dissolved in water as a media that represent the blood as it is mainly water. Eighty-one samples of glucose in aqueous solutions with concentrations from 0 to 100 mg/dL were carefully prepared and dispersed between pairs of glasses and then randomly divided into two sets, i.e., for calibration and validation. Partial least square regression analysis to near-infrared spectra was applied. The results revealed that glucose content in aqueous solutions could be predicted accurately with a maximum deviation of 10 mg/dL, indicating that the near-infrared prediction model is sufficient to determine glucose content in the physiological range. The ability of the NIR to detect glucose content in that of a particular range has seed light for non-invasive glucose detection in blood.

Keywords: NIR spectroscopy, glucose, trans-reflectance mode, non-invasive.

Presenter: Ferdy Semuel Rondonuwu (ferdy.rondonuwu@uksw.edu)

Esterification of Oxidized Ricinoleic Acid with Various Alcohols to Produce Emulsifier and Antimicrobial Compounds

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This study's objective was to synthesize esters of ricinoleic oxidation product. The esterification products were expected may act as emulsifiers and to have antimicrobial activity against Staphylococcus epidermidis and Propionibacterium acnes. Before esterified, ricinoleic acid was oxidized by $KMnO_4$. The success of the oxidation reaction was proven by determining iodine number. Esterification was carried out using $ZnCl_2$ as catalyst with various alcohols, namely methanol, ethanol, isopropanol, and 1-butanol. Mole ratio fatty acid to alcohol used in esterification was 1: 2. The ester products were characterized using FTIR and the conversion percentage were determined by titrimetric method. Emulsifier test also performed to determine the ability of ester product as emulsifier. The success of oxidation was proven by decreasing iodine number from 44.05 mg/g to 17.15 mg/g and increasing absorption intensity -OH group in FTIR spectrum. FTIR spectrum of ester products showed the presence of absorption of C = O ester groups at 1750-1735 cm^{-1} and C-O-C at 1300-1000 cm^{-1} which proved the success of esterification. Emulsifier test showed that esterification products can act as emulsifiers and the emulsions formed were stable up to 24 hours for water-in-oil emulsion (w/o). The best ability as an emulsifier was shown by methyl esters. Antimicrobial assay showed that all esters can inhibit the growth both bacteria, P. acnesand S. epidermidis. The largest inhibition zone obtained for butyl ester against P. acnes by 17 mm and methyl ester against S. epidermidis by 17 mm.

Keywords: ricinoleic acid, esters, emulsifier, antimicrobial agent

Presenter: Atika Nabilah (atikanabilah.29@gmail.com)

Synthesis of biolubricant from coconut oil using zeolite-Y as solid catalysts

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Biolubricants are estimated to replace fossil origin-based lubricants, due to the environmental friendliness and the high biodegradability. In this work, the synthesis of biolubricant from coconut oil using commercial zeolite-Y based catalysts (dealuminated and non-dealuminated) has been done. The synthesis was carried out via two routes of transesterification. The first stage is the reaction of coconut oil with alcohols (methanol and isopropanol) using concentrated sulfuric acid as a catalyst to produce biodiesels (methyl ester and isopropyl ester). The process is then followed by the second transesterification, which is the reaction of biodiesels and ethylene glycol using zeolite based catalysts (0.5 wt% of total feed) to yield biolubricants. This synthesis of biolubricant was carried out by using the reflux method with the temperature kept at 120 centigrade for 10 hours. From our results, we found that dealumination of zeolite and the type of biodiesel will affect the conversion into biolubricants. Our GC-MS results clearly showed that the use of dealuminated zeolite-Y yields higher conversion of methyl esters into ethylene glycol based esters (biolubricants) than that of non-dealuminated one. On the contrary, we could not find a similar trend by replacing methyl ester with isopropyl ester. More detailed information and procedure, followed by further characterization of Si/Al ratio, surface area, and crystallinity of zeolite-based catalysts will be discussed in the presentation.

Keywords: Coconut oil, biolubricant, transesterification, ethylene glycol, zeolite-Y

Presenter: Haryo Satriya Oktaviano (haryo.so@universitaspertamina.ac.id)

CYSTINE-BASED 3,5-DINITROBENZAMIDE DERIVED LIGANDS AS COLORIMETRIC RECEPTORS FOR AMINES

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Chromogenic receptors for amines has potential applications in food, environment, and pharmacy Industries. Excess amines in the environment are toxic, and many aromatic amines are potential carcinogens as recognised by the International Agency for the Research on Cancer. Moreover, reversible and visual detection of amines still remains a major challenge, and only few such applications have been reported. Among the Hydrazine and their derivatives, phenyl hydrazine may cause damage to red blood corpuscle, potentially resulting in anemia and cancer. Therefore, there is an immediate need for the development of rapid, reliable and economical method for sensing these analytes.

In this connection we have designed and synthesized two 3,5- dinitrobenzamide derivatives of cystine (receptors R1 and R2) which can recognize amine both in solution as well as in solid state. The recognition results of R1 and R2 provided important insights into the selective binding of phenylhydrazine vs hydrazine and the effects of 1^0, 2^0 and 3^0 amines. Detailed UV-visible studies revealed that the addtion of phenyl hydrazine to R1 produced distinct colorimetric transition in polar solvents, e.g. aqueous THF and aqueous dimethyl sulfoxide. ^{1}H NMR studies provided vital insights into the nature of receptor-amine interactions, highlighting the role of hydrogen bonding and charge-transfer interactions.

Keywords: Amine recognition, Charge-transfer, Cystine

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EXAMINATION OF MALAYSIAN RIVER WATER QUALITY INDEX BY SOME SELECTED PHYSICO-CHEMICAL PARAMETERS

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The river water quality in Malaysia is classified in accordance with National Water Quality Standards (NWQS) proposed by the Department of Environment. Classification of water quality, however, is very unlikely as the tested parameters may not fall in same classes. For this reason, mathematical approach called Water Quality Index (WQI) that only utilizes six physico-chemical parameters in NWQS was formulated and used since 1982. However, the results in this study showed that current Malaysian WQI is unrealistic as the provided river-water classes does not correspond with the physical observation. Further investigation of the physico-chemical parameters in laboratory scale revealed that four out of six parameters (i.e. DO, COD, BOD and TSS) in the Malaysian WQI are correlated, which account for 73% of the of total weightage in the Malaysian WQI. Therefore, physico- chemical parameters that are not significantly related are more favourable to obtain WQI output with the least bias. The results obtained also revealed that pH, NH 3 -N, TSS and colour are independent and could be used as the determining parameters in the assessment of river water quality. A better and more relevant water-quality output was obtained when the four parameters were substituted in the Canadian Water Quality Index (CWQI). This study implies that river water quality can be quickly and precisely determined by avoiding correlated parameters that can cause exaggeration or diminution of the WQI value and lead to misinterpretation of the river water quality and classes.

Keywords: Water Quality Index; River; Physico-chemical parameters; Correlation.

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Application of various UV and Solar radiation wavelength in the photodegradation of Methylene Blue Dye in aqueous medium using TiO_2 Photocatalysis: Parametric and Kinetic Studies

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This study uses photocatalysis, classified under AOPs, for the treatment of simulated cationic dye (Methylene Blue) contaminated wastewater treatment using TiO 2 as the photocatalyst. Three parameters were manipulated throughout this study that are the effects of ultraviolet irradiation wavelength (using UV-A, UV-B, UV-C, and Solar), initial dye concentration (2.10 ppm) and initial solution pH (4-10) conditions on the photocatalytic degradation of MB in a total reaction time of 1 hour. The shortest wavelength irradiation (UV-C) proved to be the most effective where it achieved a 100% degradation of MB within 14 minutes of irradiation time andthis wavelength was used as a control for the other parameters. Solar lamp irradiation only achieved 47.01% as its absolute degradation efficiency within the reaction time of 1 hour and showed the least effectiveness for photocatalytic degradation. Increasing the initial concentration of dye proved to lower the degradation rate due to inner filter effect by dye molecules and a reduced generation of hydroxyl radicals as a consequence of it.

Keywords: Photocatalysis, TiO¬2, Ultraviolet A, B, C irradiation, Solar light irradiation, Methylene Blue

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The Freundlich Adsorption Isotherm in the Perspective of Chemical Kinetics (II); the Rate Law Approach

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The Freundlich Adsorption Isotherm (FAI) equation, has been introduced with kinetics approach, but without an adequate explanation on the actual relationship of the fitting-constant, b and reaction-order, n. Conventionally, data is obtained by varying the weight of adsorbent with the same amount of adsorbate (or conversely) and measured at the same contact time. There is no restriction in the number of adsorbents and adsorbates used. An adsorption is usually confirmed as FAI or Langmuir Adsorption Isotherm (LAI) based on the regression coefficient of its linear plot which is closer to ± 1.000. Adsorption is believed to be reversible but there is no special treatment related to the reversibility concept. This study aims to explain relation between b and nand the limitations of their use. Also to show inconsistencies in the conventional determination techniques and to create alternatives. The study was conducted theoretically and the validity of the new technique was tested by applying the technique to a literature data equipped with a statistical test. The result shows that the b constant and the reaction order n are interconnected.

Keywords: Freundlich adsorption isotherm, Langmuir adsorption isotherm, fitting-constant, reaction-order

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Sulfonated Eugenol-Divinyl Benzene Copolymer as an adsorbent for removal aqueous metal ions

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Sulfonated eugenol-divinyl benzene copolymer (PEDVB-SO_3H) synthesized by cationic copolymerization of eugenol and divinyl benzene using sulfuric acid catalyst and followed by sulfonation was investigated as an adsorbent for removal Fe(III), Cu(II) and Cd(II) from aqueous solutions. The influence of treatment parameters such as pH, contact time, initial concentration of metal ions have been systematically studied. The results showed that the pH of the solution greatly affected the adsorption capacity of metal ions in the order of Fe(III) > Cu(II) > Cd(II). Calculation of reaction kinetics to the all metal ions shows that adsorption follows the first-order kinetic model. The PEDVB-SO_3H displayed higher adsorption efficiency toward metal ions compared to PEDVB, which is mainly attribute to the additional adsorption sites of sulfonic acid. These results suggested that modification through additional active site in the polymer is promising to provide effective adsorbing metal ions.

Catalytic Hydrocracking of Palm Oil to Biofuel on Ni-Cu/Zirconia-Pillared Bentonite

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Catalytic hydrocracking on Ni-Cu/Zirconia-pillared bentonite was investigated. The catalyst was prepared by using pillarization-impregnation technique and has been characterized by nitrogen adsorption, x-ray diffraction methods, and GC-MS was used to evaluate the product. Ni-Cu/ Zirconia-pillared bentonite was used as the catalyst with the oil to catalyst ratio of 100. The cracking process of palm oil was carried out in a fixed bed continuous reactor system at the temperatures of 325°C, 350°C, and 375°C under atmospheric pressure.Analysis of GC-MS showed the formation of light hydrocarbon products with C_5-C_{12} of 5% at the temperature of 350°C. The distribution of light hydrocarbon products reveals that the product C_5-C_7 has the highest percentage at 350 °C.

Keywords: Ni-Cu catalyst, light hydrocarbon, zirconia-pillared bentonite

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Chemical Composition and Antioxidant Activities of Citronella Essential Oil Cymbopogon nardus (L.) Rendle fractions

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Indonesia is one of the largest producers of citronella oils in the world. Citronella oil contains compounds that have the potential to be used as antioxidants. This study aims to fractionate citronella oil to obtain fraction-1 (F1), fraction-2 (F2), fraction-3 (F3) and residue, and to evaluate their antioxidant activities. The chemical components of citronella oil, F1, F2, F3 and the residue were determined using gas chromatography-mass spectrometer (GCMS). Citronella oil, its fractions (F1, F2, F3) and residues were evaluated their antioxidant activity using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) method. GCMS analysis of the citronella oil and its fractions showed that the main compound of citronella oil was citronellal (36.63%), F1 was limonene (67.07%), F2 was citronellal (92.39%), F3 was geraniol (62.41%) and the residue was geraniol (47.03%). The result showed that the antioxidant activity (IC_{50}) of citronella oil, F1, F2, F3 and the residues were 488, 14.254, 305, 253 and 93 µg/ml respectively.

Keywords: Essential Oil, Cymbopogon nardus (L.), Antioxidant

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Effect of bio-char on Cr availability and Capsicum annuum L growth in artificial contaminated soil

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This study was performed to investigate the effect of nano bi-ochar manufactured from agriculture residues for the stabilization of chromium (Cr) in artificially contaminated soil. A surface loamy sand soil was spiked with Cr at 600 mg kg-1. There after, the spiked soil was treated with biochar, $ZnFe_2O_4$, $ZnFe_2O_4$,-bio-char at 1000 mg.kg^{-1} and incubated for two weeks. The treated soil was cultivated with (Capsicum annuum L lasting 10 weeks . Addition of biouchar, ,$ZnFe_2O_4$, $ZnFe_2O_4$,-bio-char, significantly increased the soil reaction (pH), organic matter (OM) and nutrient content of nitrogen, phosphorus and potassium (N, P and K). The phytotoxiciti test revealed that bio-char, $ZnFe_2O_4$, $ZnFe_2O_4$,-bio-char significantly increased Capsicum annuum L height, number fruit and mass fruit especially with applications of $ZnFe_2O_4$,-bio-char treatments.

Keywords : biochar, Chromium, loamy sand soil, (Capsicum annum L)

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Fenton Reaction Involvement on Methyl Orange Biodegradation by Brown-rot Fungus Gloeophyllum trabeum

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*The involvement of Fenton reaction on biodegradation of methyl orange (MO) by brown-rot fungus Gloeophyllum trabeum was investigated based on Fe^{2+}-dependent reaction. The degradation of MO (final concentration 75 mg/L) was performed in mineral salt media with and without Fe^{2+} with incubation period at 0, 7, 14, 21, and 28 days. Degradation analysis was performed using UV-Vis Spectrophotometer and LC-TOF/MS. The highest MO degradation was occurred during 28 days incubation, which approximately 46,67% and 38,89% in medium with and without Fe^{2+}, respectively, that indicated that the presence of Fe^{2+} enhanced MO degradation. $C_{15}H_{17}N_3O_5S$ and $C_{17}H_{21}N_3O_7S$ were detected as metabolic products of MO degradation in mineral salt medium with Fe^{2+}. MO degradation pathway by G. trabeum was proposed by termination to double bond of azo group and followed by hydroxylation to compound **1**, and then undergoes dimethylation to compound **2**. This study assumed that Fenton reaction might be involved on MO biodegradation by G. trabeum.*

Keywords : Biodegradation, Fenton Reaction, Gloeophyllum trabeum, Methyl Orange

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Development of an inhibitive assay using Monopterus albus (Asian swamp eel) brain cholinesterase for heavy metal detection

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Cholinesterase-based biosensor well known as a sensitive method to detect the presence of toxicant in river. This method can be applied as a preliminary screening to determine the contamination level of the river in a short of time as well as low cost and easy to operate. The aim of this study to assess the use of acetylcholinesterase source from the brain tissue of Asian swamp eel; Monopterus albus as a potential environmental biosensor. Purified AChE from the brain tissue of M. albus was incubated separately with 10 metal ions and mercury show the highest inhibition at the percentage of 62.9 % followed by chromium at 59.22% while silver, arsenic, cadmium, cobalt, copper, nickel, zinc and lead not more than 50% inhibition (around 37 to 50 %). Half maximal inhibitory concentration; IC_{50} of mercury, zinc, chromium and copper were calculated at 0.005, 0.595, 0.687 and 1.329 mgL^{-1} , respectively. Field trial works exhibited that the enzyme was applicable in sensing heavy metals pollution from the river which closes to the industrial and agricultural sites at near real time and verified using ICP-OES. This study proves the potential use of acetylcholinesterase source from M. albus as an alternative biomonitoring tool to assess the contamination level of the river.

Keywords: Heavy metal, Biosensor, Monopterus albus, cholinesterase, IC 50

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Synthesis and characterization of Unsymmetrically Branched Alkyl Chains Carbazole- Based Polymer

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This work introduces a modified poly{N - dodecanyl -2,7-carbazole - alt - 5, 5- [4', 7' -di -2-thienyl -(N, N' - dodecanyl -6, 6'- isoindigo)]} (PCDTID) with the unsymmetrically branched N-alkyl chain, which name as. poly{N -(2-hexyldecyl) -2,7-carbazole -alt -5, 5-[4',7'-di -2-thienyl N,N' -(2-hexyldecyl) -6,6'- isoindigo]} (P1) The synthesis of P1 involves dimerization, cyclization, tosylation, N-alkylation, bromination, Stille's and Suzuki's coupling reactions. Suitable analysis techniques have used to study the chemical, physical, electrochemical, optical, and thermal properties of P1. The analysis results show that P1 possesses higher HOMO and LUMO energy levels than the previously reported PCDTID, which have been narrowing the electrochemical band gap down to 1.37 eV. However, the P1 experiences 5% thermal degradation at 393 o C, which is relatively less favourable than the PCDTID. Hence, the replacement of the symmetrically branched alkyl chains of PCDTID with unsymmetrically branched alkyl chains results in both improvement and drawback on the characteristics of the polymer.

Keywords: Alkylation, bond energy, cyclic voltammetry, electrochemistry, polymerization

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