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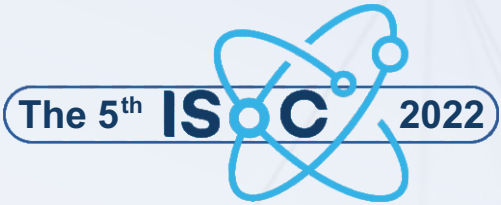
The 5th ISOC 2022

"Chemistry Contribution Toward Sustainable Development Goals"

THE 5th INTERNATIONAL SEMINAR ON CHEMISTRY

PROGRAM BOOK

Hotel Majapahit
Surabaya, Indonesia
12th-13th October 2022



The 5th INTERNATIONAL SEMINAR ON CHEMISTRY

"Chemistry Contribution Toward Sustainable Development Goals"

Hybrid Mode Conference
Hotel Majapahit, Surabaya Indonesia
12 th - 13th October 2022

FOREWORD

Prof. Dr. Djoko Hartanto, M.Si
Conference Chair

The 5th INTERNATIONAL SEMINAR ON CHEMISTRY
(ISoC 2022)

The 5th ISoC aims to display the essential role of chemistry to the global agenda for sustainable future as expressed in the theme "Chemistry Contribution toward Sustainable Development Goals (SGDs)". Notably, the vast development of chemistry covers the goals focusing on water, energy, climate, oceans, urbanization, transport, science and technology. Opportunities for new chemical research, green and sustainable chemistry education, as well as green and sustainable chemical manufacturing practices have emerged for current and future chemist. The chemistry enterprise has an extensive reach to the economy, human health, and many ways to support the global sustainable goals. Subsequently, many studies have been attempted to provide significant key in helping society to achieve Sustainable Development Goals. The 5thISOC exhibits the research related to SDGs program conducted by of Indonesian researcher, educator, and practitioner to the global scientific society. The 5th ISOC is also expected to promote international research collaboration between Indonesian academia and scientist abroad.

Prof. Dr. Djoko Hartanto, M.Si
Conference Chair

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CONFERENCE SCHEDULE

The 5th INTERNATIONAL SEMINAR ON CHEMISTRY

Hybrid Mode Conference
Hotel Majapahit, Surabaya Indonesia
12 th - 13th October 2022

CONFERENCE SCHEDULE

The 5th International Seminar on Chemistry (ISoC 2022)

"Chemistry Contribution Toward Sustainable Development Goals"

Majapahit Hotel, Surabaya Indonesia
12th-13th October 2022 (Hybrid Conference)

Indonesia Time (GMT+7)	DAY 1 (12th October 2022, Wednesday)	
08:00-08:30	**REGISTRATION**	
08:30-08:45	**OPENING CEREMONY**	
08:45-09:00	**Speech by Bambang Pramujati, ST., MSc., Eng., Ph.D** Vice Chancellor 4 Institut Teknologi Sepuluh Nopember	
09:00-09:15	**Speech by Prof. Dr. rer. nat. Fredy Kurniawan, S.Si., M.Si** Head of Chemistry Department ITS	
09:15:09:30	**Speech by Prof. Dr. Djoko Hartanto, M.Si** Chairman of ISoC 2022	
09:30-10:15	**PLENARY SPEAKER 1:** **Prof. Sridhar Sivasubbu, Institute of Genomics and Integrative Biology**	
10:15-10:30	***Coffee Break***	
PARALLEL SESSION 1		
	Parallel Room 1(Balai Adika)	**Parallel Room 2 (Shima Room)**
10:30-11:00	**Invited Speaker 1** **Dr. Wu Hao** Manipulating Charge Transport in Solar Energy Conversion and Environmental Catalysis	**Invited Speaker 2** **Tran Quang Huy, Ph.D** Gold Nanoparticles-Based Electrochemical Sensors for Food and Health Safety Monitoring: Recent Advances and Future Perspective
11:00-11:15	[IC003] Facile Synthesis of Silver Nanoparticles Immobilized in Nickel-based Metal-Organic Frameworks for High-performance Electrochemical Glucose Sensors	[FC016] Determination Of Yoghurt Shelf Life With Audiosonic Waves Exposure Using Accelerated Shelf Life Testing (ASLT) Method Arrhenius Model
11:15-11:30	[OC011] Antioxidant and Antibacterial Activities of Nicotiana tabacum Leaves Extracts	[MC013] The Influence of pH Variations of Methyl Orange and Methylen Blue Dyes Solutions in Photodegradation Process Using ZnO and ZnO/MOP-CTAB Materials

11:30-11:45	[PC020] Biodiesel Production from Crude Palm Oil (CPO) through Variation Steps of Esterification-Transesterification and Its Evaluations	[EnC017] Valorisation of Glycerol By-Product From Biodiesel Production From Crude Palm Oil (CPO) By Catalytic Conversion
11:45-12:00	[MC021] Molasses Impression in Hyaluronic Acid Production From Streptococcus zooepidemicus with Feed Batch Method	
12:00-13:00	***Prayer and Lunch Time***	
PARALLEL SESSION 2		
	Parallel Room 1(Balai Adika)	**Parallel Room 2 (Shima Room)**
13:00-13:30	**Invited Speaker 3** **Dr. Nor Laili-Azua Jamari** Novel Non-Targeted Analysis of Perfluoroalkyl Substances (PFAS) using ICPMS/MS as Fluorine- Spesific Detector	**Invited Speaker 4** **Dr. Aep Patah** Preparation of Hierarchical Sheet/Plate-Like M-BDC (M = Cu, Mn, Ni, Zr) Metal Organic Frameworks under Solvothermal Condition
13:30-13:45	[B062]Biodecolorization of Methylene Blue by Ralstonia pickettii Bacterium Immobilized on Sodium Alginate – Polyvinyl Alcohol – Bentonite Matrix	[CE063]Kinetic Performance of a Novel Diethanolamine-Monosodium Glutamate Solvent for CO_2 Removal in a Wetted Wall Column
13:45-14:00	[EnC040] Biotransformation of DDT by White-rot Fungus Ganoderma lingzhi	[B061] Methylene Blue Removal by Entrapment Trichoderma viride into Sodium Alginate-Polyvinyl Alcohol Bentonite Beads
14:00-14:15	[FC064]Nanoemultion of Citrus Pericarp Extract using Soy Protein Isolated (SPI) and Maltodextrin (MD) as Additive on Egg Tart	[MC087]Synthesis of Carbon Nanodots from Several Wastes Using Hydrothermal Method
14:15-14:30	[MC089]Synthesis and Characterization of Membrane Based on Chitosan/Modificated Fly Ash for Fuel Cell Application	[MdC096]Potential of Adenium obesum Flower Extracts as an Antibacterial Against Gram-Negative Bacteria and Gram-Positive Bacteria
14:30-14:45	[AC104]A study of photolithography on a polyethylene terephthalate (PET) sheet and its characterization using FTIR	[IC083] Facile synthesis of porous graphitic carbon nitride via sulfuric acid post-treatment and its activity for Methylene Blue Degradation
14:45-15:00	[B097]ISOLATION AND IDENTIFICATION OF POTENTIAL NOVEL BACTERIA FROM SEMERU MUD FLOW USING GRAM STAINING AND 16S rRNA GENE ANALYSIS METHODS	[IC086]Effect of Tannic Acid Concentration on The Stability of Copper Nanoparticles
Coffee Break and Pray Time		

15:00-15:15	[FC065]Nanoemultion of Citrus Pericarp Extract using Soy Protein Isolated (SPI) and Maltodextrin (MD) as Additive on Mud Cake	[MC090]PHYTOCHEMICALS SCREENING OF Quercus infectoria GALLS EXTRACT METHANOL-WATER (50-50) USING LIQUID CHROMATOGRAPHY MASS SPECTROMETRY
15:15-15:30	[MC093]Encapsulation of neem seed oil in alginate/black liquor matrices	[IC010]Gold Nanoparticles Incorporation into the Cu-BTC MOF as an Electrode Material for Glucose Sensor
15:30-15:45	[MC038] The Effect of Adding Plastic Waste and Fiber Ash Coconut as Concrete Aggregate on Mechanical Characteristics of Composite Concrete Materials	[AC103]Gelatin Analysis in Commercial Ice Cream Using PANI/NiO Nanoparticles Modified Quartz Crystal Microbalance (QCM) Sensor
15:45-16:00	[GC078] The production of green diesel through the catalytic upgrade of fatty acid methyl ester over supported cobalt catalysts	[IC002] The Effect of H_2SO_4 Concentration and Time on The Sphalerite Leaching Process
16:00-16:30	**Invited Speaker 5** **Dr. Greg Mutch** Next-Generation Membranes for Dilute CO_2 Capture	**Invited Speaker 6** **Prof. Michael Chan** The Role of HDAC Inhibitor in Restoring Anti-Tumor Immunity of NK Cell in Human Cancer
16:30-17:15	**PLENARY SPEAKER 2: (Main Hall, Adika Room)** **Prof. Jan Skakle, University of Aberdeen** An Apatite for Reconstruction: from The Body to Nuclear Waste	
17:15-17:30	***Conclusion remarks***	

Link Zoom for The 5th International Seminar on Chemistry 2022

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CONFERENCE SCHEDULE

Indonesia Time (GMT+7)	DAY 2 (13th October 2022, Thursday)		
08:00-08:30	**REGISTRATION**		
08:30-08:45	**OPENING CEREMONY**		
08:45-09:30	**PLENARY SPEAKER 3:** **Prof. Syafsir Akhlus, Institut Teknologi Sepuluh Nopember**		
09:30-10:15	**PLENARY SPEAKER 4:** **Assoc. Prof. Dr. Juhana Jaafar, Advanced Membrane Technology Research Center, Universiti Teknologi Malaysia** Alternative Polymer Electrolyte Membrane For Fuel Cell Applications		
10:15-10:30	***Coffee Break***	***Featured Speaker 1***	***Featured Speaker 2***
PARALLEL SESSION 1			
	Parallel Room 1 (Balai Adika)		
10:30-11:00	**Invited Speaker 8** **Dr. Wan Norharyati Wan Salleh** Tungsten Trioxide as a Photocatalysts for Degradation of Recalcitrant Pollutants		
11:00-11:15	[MC004] Optimization of $NaClO_4$ Concentration and Addition of SiO_2 Filler to Increase the Conductivity of Solid Polymer Electrolytes PVA/CS/$NaClO_4$/SiO_2		**VIRTUAL SESSION**
11:15-11:30	[GC078] The production of green diesel through the catalytic upgrade of fatty acid methyl ester over supported cobalt catalysts		
11:30-11:45	[GC074] Recent development of polyimide membrane for biogas upgrading: a review		
11:45-12:00	[GC001] Green synthesis of NaY zeolite/MIL-100(Fe) composites as adsorbent for methylene blue		
12:00-13:00	***Prayer and Lunch Time***		

	Parallel Room 1(Balai Adika)
13:00-13:30	**Invited Speaker 9** **Dr. Kojo Sekyi Acquah, University of Connecticut, USA**
13:30-14:00	**Invited Speaker 7** **Prof. Adi Setyo Purnomo, Ph.D** Biodecolorization of Methyl Orange by Bacteria Immobilized on Sodium Alginate – Polyvinyl Alcohol – UiO66 Matrix
14:00-14:15	[MC072] Effect of Different Solvents in Synthesis of Fe_3O_4/Zeolit-NaY Composite Catalysts for The Fenton Catalytic Degradation of Methylene Blue
14:15-14:30	[PC027] The CO_2/CH_4 Gas Separation Performance through Poly(phenylene sulfide sulfone) Membrane : A Computational Study
14:30-14:45	[MC073] Synthesis and Characterization of Microcrystalline Cellulose (MCC) from Water Hyacinth and Sengon Wood
14:45-15:00	[MC071]Influence of calcination temperature of kaolin capkala on the compressive strength of geopolymer
15:00-15:30	***Coffee Break and Pray Time***
15:30-15:45	HKI (Himpunan Kimia Indonesia)
15:45-16:00	OWSD (Organization for Woman in Science for the Developing World
16:00-16:15	IZI (Ikatan Zeolit Indonesia)
16:15-16:30	Sponsorship FMM
16:30-16:40	***Conclusion Remarks***
16:40-16:55	***Awarding***

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CONFERENCE SCHEDULE
VIRTUAL SESSION

Indonesia Time (GMT+7)	DAY 2 (13th October 2022, Thursday)	
PARALLEL SESSION 2		
VIRTUAL SESSION	**BREAKOUT ROOM 1**	**BREAKOUT ROOM 2**
10:15- 10:30	**Featured Speaker 1:** [PC102]Transformation of CO_2 into value added chemicals: the use of natural polymers to produce cyclic carbonates.	**Featured Speaker 2:** [B105]Development of a wastewater-based risk index for SARS-CoV- 2 transmission across three cities of the Canadian Prairies
11:00-11:15	[MC005]Dual Surfactant ZnO/SBA for Photocatalyst Degradation of Methylene Blue	[MC018]Synthesis and Characterization of Mesoporous Silica using Sapindus rarak Extract Template
11:15-11:30	[MC007] Extraction and Characterization of α-Cellulose Derived from Oil Palm Empty Fruit Bunch Waste	[OC012]Biomarker Analysis of Air Laya Coal (AL-71) Muara Enim Formation, South Sumatra Basin As a Potential Coalbed Methane (CBM) in Indonesia
11:30-11:45	[FC008]Optimization of Transglutaminase, α-Amylase and Purple Sweet Potato Extract Supplementation for Quality and Functionality Improvement of Bread using Response Surface Method Approach	[GC024]Green Synthesis of ZnO Nanoparticles As An Antimicrobial Substance Using Spinach Extract
11:45-12:00	[B014]Bioactive Compounds of Terminalia ballerica Seed Extracts in Different Solvent Polarities	[MC025]Synthesis of Mesoporous Silica Derived from Extracted Natural Template (Sapindus rarak) for Biofuel Production
12:00-12:15	[PC019]Performance of Polysulfone Membrane for Biogas Upgrading	[MdC026]Identification of Pogostemon Cablin Benth Plant Essential Oil
	BREAKOUT ROOM 3	**BREAKOUT ROOM 4**
11:00-11:15	[PC028]Preparation of Membrane Polymer Electrolyte from PVA/Nanocrystalline Cellulose/$LiClO_4$ as Separator for Lithium Ion Battery	[PC031]SYNTHESIS OF ZINC OXIDE NANOPARTICLES (ZnO) BY POLYOL METHOD FOR CONCENTRATION REDUCTION OF MALACHITE GREEN AND RHODAMINE B DYE VIA PHOTOCATALYTIC
11:15-11:30	[MdC029]Characteristics and performance of phytosynthesised ZnO-NPs as a potential diosgenin nanocarrier	[MdC033]Antioxidant and antibacterial activities of Curcuma aeruginosa and Curcuma zedoaria Rhizomes extracts

11:30-11:45	[MC032]Synthesis, Characterization and Photocatalytic Properties of H6P2W18O62/TiO_2 Composites	[OC030]The Profiles of Gaharu Bouya Oil from Gonystylus bancanus
11:45-12:00	[OC036]Synthesis of 4-methoxyphenethyl (E)-3-(2-methoxyphenyl)acrylate by Shiina Method	[MC035]The Effects of ZIF-8/TiO_2 and ZIF-8/Chitosan Composite Materials on The Photodegradation Reaction of Methylene Blue under Visible Light
12:00-12:15	[FC068]Proximate analysis as verificatory method for quality assessment of secondary reference material	-
	BREAKOUT ROOM 5	**BREAKOUT ROOM 6**
11:00-11:15	[MdC045]Preparation, Characterization, and Anticancer Profile of N'-(E)-benzylidenebenzohydrazide and N'-(E)-(2-methylbenzylidene)benzohydrazide	[OC046]Lubricating Properties of Nyamplung-Oil (Calophyllum inophyllum L.) Glycerides and Their Effect on the Lubricity of Low-Sulfur Fossil Diesel
11:15-11:30	[AC048]Optimization of Sun Protection Factor (SPF) by Varying the Composition of Lemongrass (Cymbopogon nardus L.) in Sunscreen Cream Based on Virgin Coconut Oil (VCO)	[MC050]Fabrication and Characterization of Polycaprolactone-Hydroxyapatite Scaffold based on Indonesian Natural Resources for Bone Tissue Engineering
11:30-11:45	[EnC049]Preparation of Porous Geopolymer from Biomass Ash for Synthetic Dyes Adsorbent	[EnC052]The Effect of MOFs on Properties and Performance of Poly(vinylidene) Flouride /GO based Mixed Matrix Membrane
11:45-12:00	[O051]Utilization of Moringa Stem As a CaO Catalyst Mixer in Making Biodiesel	[CE053]Effect of Zinc Oxide Powder Characteristics on Physical Sunscreen Performance
12:00-12:15	[MC101]Enhancing Electrocatalytic Nitrogen Reduction to Ammonia over Oxygen-deficient TiO_2 by Copper Loading	[OC023]Sterol Composition of Caulerpa racemosa (Forsskal) J. Agardh. from the Gulf of Boni and potential anti-inflammatory activity
	BREAKOUT ROOM 7	**BREAKOUT ROOM 8**
11:00-11:15	[EnC055]THE EFFECT OF SEASON VARIATIONS TO HEAVY METALS AND TRACE ELEMENTS CONTENT AS PARAMETERS OF AGRICULTURAL IRRIGATION WATER QUALITY IN BREBES REGENCY - INDONESIA	[OC056]Synthesis and Biological Activities of Prenylated and Geranylated 2(4-Nitrophenyl)-4,5-diphenyl-1H-imidazoles
11:15-11:30	[OC058]Antibacterial and Antifungal Activities of Phytosynthesized Selenium Nanoparticles Using Solanum lycopersicum Extract	[AC059]Performance of pH Indicator Paper by Immobilization Purple Sweet Potato Pigmen on Cellulose Paper

11:30-11:45	[B066]The Effects of Carbon and Nitrogen Sources on Biopigment Formation by Penicillium Sp. B.96	[MdC069]The Antioxidant Activity and Total Phenol Content of Sonneratia ovata Back.
11:45-12:00	[MdC076]Antioxidant activity of various solvent extracts of Hambawang (Mangifera foetida) Stem Bark	[IC070]Controlled Pyrolysis of Zn-based Metal Organic Framework for nanocrystalline C@ZnO semiconductor
12:00-12:15	[OC075]Chemical Composition of Essential Oil in Cymbopogon nardus Stems from Hatalai Village	[MdC042]Spectral Characterization and Bioactivity of 5-(2-nitrobenzylidene)-2-thiohydantoin and 5-(4-nitrobenzylidene)-2-thiohydantoin
	BREAKOUT ROOM 9	**BREAKOUT ROOM 10**
11:00-11:15	[OC060]Synthesis 4-(butyramidomethyl)-2-methoxyphenyl butyrate	[OC080]Study on in vitro antinephrolithiasis activity of ethanolic extract of Uncaria gambir Roxb leaves
11:15-11:30	[OC081]Phytochemical Screening and Cytotoxicity of Melastoma malabathricum L. Leaves Extracts Against MCF-7, HeLa, A549, B16, and HT29 Cells	[MC082]Synthesis and Charaterization of Nanomagnetite-Chitosan for Water Purification
11:30-11:45	[OC088](E)-N′-(3-(4-bromophenyl)acryloyl)isonicotinohydrazide: Synthesis and Bioactivity Against α-glucosidase Enzyme	[FC084]Effect of Addition of NaCl salt on Extraction of Essential Oil from Lemongrass Leaves by Microwave Hydro-Destillation Method
11:45-12:00	[CE091]Bio-oil production from low-rank coal by catalytic microwave pyrolysis using reservoir rock and activated carbon catalyst	[EnC100]Fabrication of MOF-derived Mesoporous Heterojunction Fe_2O_3/ZnO as Photocatalyst for Degradation of Methylene Blue
	BREAKOUT ROOM 11	**BREAKOUT ROOM 12**
11:00-11:15	[FC092]Effect of Moisture Content on Essential Oil Extraction of Sweet Orange Peel (Citrus Sinensis Ls.) using Steam Distillation Method	[GC094]ONION (Allium cepa L.) OIL EXTRACTION USING MICROWAVE HYDRO-DIFFUSION GRAVITY METHOD: Parametric Effect and Kinetic Model
11:15-11:30	[MC095]Manufacture Of Environmental Friendly Concrete by Using Sea Shells For Partial Substitute Of The Cement	[CE085]Extraction of Citronella oil using Solvent-Free Microwave Extraction (SFME) : Parametric study and Kinetic Model
11:30-11:45	[MC098]In-situ Synthesis of Fe2O3/HKUST-1 Composites and Its Application as Methylene Blue Adsorb	[MC099]Adsorption of Methyl Orange on UiO-66 Synthesized using Ultrasound-Assisted Method
11:45-12:00	[MC015]Preparation of Mixed Matrix Membrane PSf/Graphene for Gas Separation of CO_2/CH_4	[MC006]Synthesis and Characterization of ZSM-5 From Local Source With Two Step Crystallization Method
	BREAKOUT ROOM 13	**BREAKOUT ROOM 14**

11:00-11:15	[FC077]The Potency of Single Bulb Garlic (Allium sativum L) Fermented by Lactobacillus plantarum B1765 as an Alpha Glucosidase Enzyme Inhibitor	[PC079]The Chemical Cleaning Performance of PVDF/LiCl Membrane with Sodium Hypochlorite (NaClO) and Citric Acid in Harvesting Microalgae Dunaliella salina
11:15-11:30	[IC057]Synthesis and Characterization of Cu-ZIF-8/AC for Photocatalytic Degradation of β-Naphthol	[MdC054]The Use of Widely Metabolomics Profilling in Medicinally Important Compounds from Zingiberaceae species
11:30-11:45	[AC067]X-ray Diffraction Analysis of Calcinated TiO_2/ZnO Synthesized by Sol-Gel Method	[MdC039]Synthesis and Characterization of Mesoporous Silica Nanoparticles (MSN) Modified by Hydrazone as Drug Delivery
11:45-12:00	[MdC047]Synthesis and Characterization of 2- thiohydantoin Derivatives by Hydroxyl Groups in Orto/Para Position and The Compound's Biological Activities	[MdC043]Antibacterial Activity of 5-(2-methoxybenzylidene)-2-thiohydantoin and 5- (4-methoxybenzylidene)-2-thiohydantoin
	BREAKOUT ROOM 15	
11:00-11:15	[GC037]Biosynthesis and Characterization of ZnO Nanoparticles Using Lemongrass Extract	
11:15-11:30	[MdC044]Antiviral Activity of Hydrazone Derivatives Based Benzohydrazide/2-thiohydantoin Analogs Against HPV-16 (Human Papillomavirus) : In Silico Study	
11:30-11:45	[OC009]The Toxic Compounds from Citrus Parasite (Scurrula ferruginea (Jack) Danser)	
11:45-12:00	[MdC041]Design, Synthesis, and Biological Evaluation of 5-Substituted 2-Thiohydantoin with Methyl benzaldehyde in Ortho/Para Position	
12:00-12:15	[AC022] Electrochemical Study of Gold Electrode modified by Channa strita Albumin	

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HOTEL MAJAPAHIT

Jalan Tunjungan 65, Kec Genteng,
60275 60275 SURABAYA INDONESIA
Telephone +62315454333

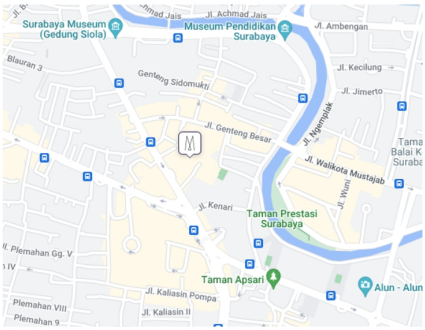
Originally built in 1910 by the famous Sarkies brothers, the Hotel Majapahit is a **classic landmark institution filled with national pride**, where history blends with romance and elegance. Its graceful **colonial architecture** with immaculate landscaped gardens, combined with modern facilities and its famous Spa makes the Majapahit the preferred choice for the most discerning travellers. Located in the heart of Surabaya, Indonesia's second largest city and re-known trading port since the 15th century, the Majapahit has gone through different names over its long history.

FACILITY

Restaurant, Bar & Lounge
Swimming Pool
living room with sofa, work desk, free unlimited basic Internet, 32" TV, minibar, coffee and tea making facilities, hot and cold shower with bathtub.

POINT OF INTEREST

Monumen Kapal Selam
Tugu Pahlawan
Ciputra Golf Club
Surabaya North Quay
Pantai Ria Kenjeran



Hotel Map

PLENARY SPEAKERS

The 5th INTERNATIONAL SEMINAR ON CHEMISTRY

Hybrid Mode Conference
Hotel Majapahit, Surabaya Indonesia
12 th - 13th October 2022

PLENARY SPEAKERS

Plenary Speaker 1	**Prof. Sridhar Sivasubbu**
	Institute of Genomics and Integrative Biology
Plenary Speaker 2	**Prof. Jan Skakle**
	University of Aberdeen
	An Apatite for Reconstruction: from The Body to Nuclear Waste
Plenary Speaker 3	**Prof. Syafsir Akhlus**
	Institut Teknologi Sepuluh Nopember
Plenary Speaker 4	**Assoc. Prof. Dr. Juhana Jaafar**
	Advanced Membrane Technology Research Center, Universiti Teknologi Malaysia
	Alternative Polymer Electrolyte Membrane For Fuel Cell Applications

An Apatite for Reconstruction: from The Body to Nuclear Waste

Prof Jan Skakle

Department of Chemistry, University of Aberdeen, Scotland, UK

ABSTRACT

Apatites derive from minerals with general formula $Ca_{10}(PO_4)_6(F,Cl,OH)_2$. The apatite structure is very flexible and a good starting point for many types of substitutional solid-state chemistry.

In this talk I will cover our work on substituted apatites as applies to medical implants, pigments, decarbonisation and remediation. In the first example, it is the chemical resemblance to bone that makes forms of $Ca_{10}(PO_4)_6(OH)_2$ attractive as a bioceramic for bone replacement and scaffolding. Our research focussed on increasing the osteoconductivity of the replacement material, thus encouraging new bone to grow through and absorb the implant. During this research, doped apatites were formed which as well as having anti-microbial effects also delivered intense pigmentation in a non-toxic material.

Bone is itself a carbonated calcium phosphate, and applying knowledge gained in work on bioceramics, a material was developed with good levels of carbon capture / exchange and excellent recyclability. These materials were studied by thermal analysis coupled with mass spectrometry, as well as XRD, FTIR and combustion analysis, to assess their capacity under different conditions.

Finally I will briefly look at the use of apatites for remediation, in both the water and nuclear industries, showing where the structure does have some limitations. In covering these topics, we also see the road from fundamental “blue skies” research through to commercialisation.

ALTERNATIVE POLYMER ELECTROLYTE MEMBRANE FOR FUEL CELL APPLICATIONS

Assoc. Prof Juhana Jaafar

AMTEC Universiti Teknologi Malaysia

ABSTRACT

Global primary energy consumption is mostly come from oil, coal and gas which contribute almost 84% of total energy worldwide. The rapidly increased demands of power supply due to the rapid urbanizations particularly facing shortage of fossil fuel supply and required for greater energy generation capacity. In addition, around three quarters of the global greenhouse gas emissions come from burning of fossil fuel for energy supply that producing carbon dioxide and other greenhouse gases that become the primary reason for global climate change. There are numbers of initiatives have been introduced in order to mitigate the environmental issues globally. For instance, Malaysia has enacted the Efficient Management of *Electrical Energy Regulations 2008* and thus aspired to reduce carbon emissions up to 45% by 2030 by replacing it with renewable energy sources. Renewable energy technologies including fuel cell, bioenergy, hydropower, solar, wind and geothermal are the options of replacing the fossil fuels. Fuel cell technology has long been seen as future of clean energy because it only produces water as by-product when reacted with oxygen to produce energy via combustion or electrochemical reactions. The global fuel cell market was valued at USD 4.1 billion in 2020 and is expected to grow massively at a compound annual growth rate of 23.3% for the following eight years. Research has been explored to improve the properties of every part of the fuel cell system, especially the proton exchange membrane (PEM) has a significant impact on the cell performance. PEM is a semipermeable membrane that is designed as a medium for only proton transportation and simultaneously blocking the fuel, reactant and electron passing through it. One of the most common and commercially available PEM is Nafion which is expensive and encounter unstable membrane performance under high temperature and low humidity. The current research towards new PEM that can withstand this conditions and even results in excellent fuel cell performance become main highlight in this presentation. This presentation also covers the current development of fuel cell and R&D of the fuel cell technology in AMTEC. The way forward

of the fuel cell technology towards efficient affordable energy generation technology was also presented.

INVITED SPEAKERS

The 5th INTERNATIONAL SEMINAR ON CHEMISTRY

Hybrid Mode Conference
Hotel Majapahit, Surabaya Indonesia
12 th - 13th October 2022

INVITED SPEAKERS

Invited Speaker 1	**Dr. Nor Laili-Azua Jamari** **Universiti Pertahanan Malaysia** Novel Non-Targeted Analysis of Perfluoroalkyl Substances (PFAS) using ICPMS/MS as Fluorine-Spesific Detector
Invited Speaker 2	**Tran Quang Huy, Ph.D** **Phenika University, Vietnam** Gold Nanoparticles-Based Electrochemical Sensors for Food and Health Safety Monitoring: Recent Advances and Future Perspective
Invited Speaker 3	**Dr. Wu Hao** **City University of Hongkong** Manipulating Charge Transport in Solar Energy Conversion and Environmental Catalysis
Invited Speaker 4	**Dr. Aep Patah** **Institut Teknologi Bandung, Indonesia** Preparation of Hierarchical Sheet/Plate-Like M-BDC (M = Cu, Mn, Ni, Zr) Metal Organic Frameworks under Solvothermal Condition
Invited Speaker 5	**Dr. Greg Mutch** **Newcastle University** Next-Generation Membranes for Dilute CO_2 Capture
Invited Speaker 6	**Prof. Michael Chan** **National Chung Cheng University, Taiwan** The Role of HDAC Inhibitor in Restoring Anti-Tumor Immunity of NK Cell in Human Cancer
Invited Speaker 7	**Prof. Adi Setyo Purnomo, Ph.D**

	Institut Teknologi Sepuluh Nopember, Indonesia
	Biodecolorization of Methyl Orange by Bacteria Immobilized on Sodium Alginate – Polyvinyl Alcohol – UiO66 Matrix
Invited Speaker 8	**Dr. Wan Norharyati Wan Salleh**
	Universiti Teknologi Malaysia
	Tungsten Trioxide as a Photocatalysts for Degradation of Recalcitrant Pollutants
Invited Speaker 9	**Dr. Kojo Sekyi Acquah**
	University of Connecticut, USA

The 5th ISOC 2022

Novel Non-Targeted Analysis of Perfluoroalkyl Substances (PFAS) using ICPMS/MS as Fluorine-Spesific Detector

Nor Laili Azua Jamari[1], Andrea Raab[2,3], Eva M.Krupp[3], and Jörg Feldmann[2,3]

[1]Department of Chemistry and Biology, Centre for Defence Foundation Studies, National Defence University of Malaysia, Sungai Besi Camp, 57000 Kuala Lumpur, Malaysia
[2]TESLA - Environmental Analytical Chemistry, Institute of Chemistry, University of Graz, 8010, Graz, Austria
[3]Trace Element Speciation Laboratory Aberdeen (TESLA), Department of Chemistry, University of Aberdeen, Aberdeen AB24 3UE, Scotland, UK
*Corresponding author: azua@upnm.edu.my

ABSTRACT

Per- and polyfluoroalkyl substances (PFAS) are anthropogenically produced chemicals with widespread commercial and industrial applications due to PFAS amphiphilic properties and stability. Although some PFAS such as perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) have been phased out, total fluorine determination revealed a substantial amount of fluorinated organic compounds has not been identified indicating that many new and novel PFAS are generated. Currently, only small number of these compounds are being detected and monitored in environmental and biological samples using molecular mass spectrometry (MS). Due to the small mass deficiency of fluorine, it is not an easy task to screen successfully all fluorinated compounds including those which are not easy ionisable, hence a novel fluorine-specific detector is needed. Inductively coupled plasma mass spectrometry (ICPMS) allows for specific element detection for speciation analysis, leading to the creation of non-target methods for the identification and quantification of unknown compounds (e.g., organoarsenicals or metalloproteins) in the absence of species-specific standards. The fluorine-speciation method used ICPMS/MS for detection through the formation of polyatomic ion, BaF+. By coupling a reverse phase-high performance liquid chromatography (RP-HPLC) to ICPMS/MS and electrospray MS (ESI-MS), result shows that the method was able to detect not only ionisable but also non-ionisable compounds such as perfluorinated carboxylic methyl esters. Hence, this fluorine-specific detection method could be used as a promising method for detection of unknown organofluorine compound and overcome the limitation imposed by conventional methods.

Keywords: PFAS, fluorine-spesific detection, ICPMS/MS.

The 5th ISOC 2022

Gold Nanoparticles-Based Electrochemical Sensors for Food and Health Safety Monitoring: Recent Advances and Future Perspective

Tran Quang Huy and Nguyen Thi Hue

Phenikaa University Nano Institute, Phenikaa University, Vietnam

ABSTRACT

Modern society and globalization have been facing serious health-related problems including food safety, diseases and illness. Particularly, food safety and emerging infectious diseases have become global public health concern worldwide. Therefore, it is very important to develop useful methods, techniques and analytical equipment with high sensitivity, accuracy, and compactness, which have the ability to detect toxic agents or pathogens quickly and on site. Electrochemical sensor is one of the modern technologies that meet the above requirements and is being interested and developed by scientists and technologists around the world. Several trademarks of electrochemical sensors have been commercially available on the market for quick determination of blood sugar levels, which people can buy and use at home easily without requiring complicated operations or sending samples to analytical laboratories. However, one of the most drawbacks of this technology is how to remain the stability, sensitivity, and specificity over time as well as enhance the electrode surface for tight binding with specific probes. Various materials have been developed to improve the working surface properties of electrochemical electrodes, including gold nanoparticles (AuNPs). In fact, AuNPs, one of the most impressive nanomaterials, have been widely used in electrochemical sensors and biochemical sensors. AuNPs reveal an advanced platform for sensing owing to their unique behaviors. Indeed, AuNPs with a diameter of 1-100 nm also possess a large surface area, high conductivity, and good biocompatibility. Hence, AuNPs could act as bridges to enhance the electron transfer between biological targets, solution and electrodes. In our recent research, we have investigated the role of AuNPs modified on different types of electrochemical electrodes for food control as well as pathogenic detection, good results were successfully published in peer reviewed international journals.

To have a better overview of the role of AuNPs in electrochemical sensing systems, this presentation will share the most recent advances and future prospects of AuNPs-based electrochemical sensors for food and health safety monitoring.

Keywords: gold nanoparticle, electrochemical sensor, food safety, health monitoring.

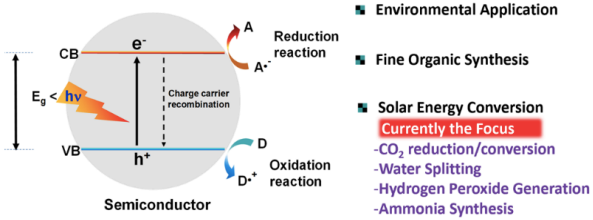
Manipulating Charge Transport in Solar Energy Conversion and Environmental Catalysis

Dr. Hao WU

School of Energy and Environment, City University of Hong Kong

ABSTRACT

The research on artificial photosynthesis for power-to-X focuses on the area of solar energy conversion and storage through the method of nanocatalysis, including photocatalysis and photoelectrocatalysis. It involves many sustainable processes such as hydrogen and hydrogen peroxide production, ammonia synthesis, carbon dioxide reduction, etc. Artificial photosynthesis involves multiple steps, including photon excitation, charge separation, polaron formation, charge recombination, charge extraction, and surface catalysis. The time scale of photoinduced electron-hole charge carriers is multiple-scale faster than the surface catalysis process, which is challenging to control but critical to overall energy conversion efficiency. The speaker manipulates the charge transport by rational photoactive materials design and is interested in the questions of photoinduced charge transport relevance in photochemistry and photophysics,1-3 addressing questions centered around polaron hopping and interfacial charge transfer at solid/solid and solid/liquid interfaces. The speaker aims that pollutants from factories, farmlands, and transportation can be 'recycled' to produce green fuels in the future.



Reference

1Hao Wu, Yun Hau Ng, *ACS Energy Letters*, 6, 3400-3407 (2021).

2Hao Wu, Yun Hau Ng, *Angewandte Chemie International Edition*, 60, 8455-8459 (2021).

3Hao Wu, Yun Hau Ng, *Advanced Materials*, 32, 1904717 (2020)

Preparation of Hierarchical Sheet/Plate-Like M-BDC (M = Cu, Mn, Ni, Zr) Metal Organic Frameworks under Solvothermal Condition

Aep Patah

Division of Inorganic and Physical Chemistry, Faculty of Mathematics and Natural Sciences,
Institut Teknologi Bandung
Jl. Ganesha 10, Bandung 40132 – Indonesia
*Corresponding author: aep@itb.ac.id

ABSTRACT

The utilization of metal-organic frameworks (MOFs) has numerous applications. Recently, two-dimensional (2D) MOFs have become desirable due to their unique physical and chemical properties that arise from electronic effects caused by small thicknesses, large surface areas, and high surface-to-volume atom ratios. These 2D-MOFs are an attractive platform for developing new catalysts, such as an electrochemical biosensor for glucose sensing. The synthesis strategy using acetonitrile and polyvinylpyrrolidone (PVP) under the solvothermal condition leads to benzene dicarboxylic acid (BDC)-based MOFs with hierarchical 3D morphologies composed of 2D nanosheets or nanoplates. Acetonitrile helps solvate the metal ions in the solution. It affects the morphology, while polyvinylpyrrolidone (PVP) serves as a shape-control agent to assist in the nucleation and growth of MOF nanosheets. PVP also acts as a depletion agent to drive the hierarchical sheet/plate-like M-BDC assembly. Further, this strategy demonstrates the flexibility of the proposed method using numerous coordinating metal ions (M = Cu, Mn, Ni, and Zr) for synthesizing 2D M-BDC MOFs.

The 5th ISOC 2022

Next-Generation Membranes for Dilute CO_2 Capture

G.A. Mutch[1,2*]

[1] *Materials, Concepts and Reaction Engineering (MatCoRE) Research Group, School of Engineering, Newcastle University, Newcastle-upon-Tyne, UK*
[2] *Centre for Energy, Newcastle University, Newcastle-upon-Tyne, UK*
**Corresponding author:greg.mutch@newcastle.ac.uk*

ABSTRACT

Supported molten-salt membranes are emerging as promising CO_2 separation devices. They recently overcame key performance targets required for economically competitive post-combustion CO_2 capture (CO_2 permeance (10^{-7} mol m^{-2} s^{-1} Pa^{-1}), CO_2 permeability (10^{-11} mol m^{-1} s^{-1} Pa^{-1}), CO_2/N_2 selectivity (>100)).[2] However, due to their relatively earlier stage of development, challenges for supported molten-salt membranes include microstructural control and stability of support materials, characterization from the materials to device scale, and understanding permeation mechanism.

In this presentation, microfabrication strategies to produce high performance membranes, *e.g.* laser-drilling, directional solidification, phase-inversion, freeze-casting *etc*, will be discussed in the context of the underlying theory on pore structure. The utility of cutting-edge characterization, including 'whole device' X-ray micro-computed tomography, will be shown to provide unique insights into the temporal evolution of membrane structure, whilst also elucidating the impact of pore structure on performance.

Finally, the difficulties in capturing CO_2 directly from the air at ~400 ppm will be introduced at the process scale, with challenges for the application of membranes discussed (performance requirements and experimental methodologies). The advantages of using microfabrication approaches in tandem with improved permeation measurements (*i.e.*, well-defined driving forces *via* the use of permeant-containing sweep gases) will be presented as a call for the field to significantly improve the robustness and utility of permeation data, and to push membranes towards application in the most dilute and difficult CO_2 capture scenarios.

1. G. A. Mutch *et al.*, *J. Mater. Chem. A*. **7**, 12951-12973 (2019).
2. G.A. Mutch *et al.*, *Energy Environ. Sci.* **13**, 1766-1775 (2020).
3. L. Grima *et al.*, *J. Memb. Sci.*, **630**, 119057 (2021).

4. S. Tsochataridou *et al.*, *ACS Appl. Mater. Interfaces* **12**, 16436-16441 (2020).
5. M. Kazakli *et al*. *J. Memb. Sci.* **617**, 106408 (2021).
6. J. Ortiz-Landeros *et al*. *Chem. Eng. Sci.* **104**, 891-898 (2013).
7. M. Erans *et al*. *Energy Environ. Sci.* **15**, 1360-1405 (2022).

The 5th ISOC 2022

The Role of HDAC Inhibitor in Restoring Anti-Tumor Immunity of NK Cell in Human Cancer

Michael W.Y. Chan[1,2,3]

[1]Department of Biomedical Sciences
[2]Epigenomics & Human Diseases Research Center
[3]Center for Innovative Research on Aging Society, National Cung Cheng University, Chia Yi, Taiwan

ABSTRACT

Cancer immunotherapy using cell-based or antibody-based targeting immune checkpoint proteins (i.e. immune checkpoint blockade, ICB), have demonstrated improved overall survival in several human cancers. However, tumors that suppress anti-tumor immunocytes (known as **cold tumor**) are resistant to immunotherapy. Therefore, understanding the molecular mechanism leading to tumor immunoediting (resulting in selective outgrowth of tumor variants that can escape immunosurveillance), is crucial for the development of novel therapeutics that can restore an inflammatory tumor microenvironment (i.e. **hot tumor**) and the efficacy of cancer immunotherapy. Recent studies suggested that cancer reprograms the epigenome for immunoevasion. In this regard, our recent finding demonstrated that ULBP2, an activating ligand for NK cells, is epigenetically suppressed in urothelial carcinoma (UC). Pre-treatment of HDAC inhibitor can enhance the expression of ULBP2 and subsequent cytotoxicity towards NK-92 cells in UC. This cytotoxicity can be further enhanced by CRISPR-mediated activation of NKG2D in NK-92 cells. Taken together, epigenetic treatment is able to restore cell-based immunotherapy in human cancer.

The 5th ISOC 2022

Biodecolorization of Methyl Orange by Bacteria Immobilized on Sodium Alginate – Polyvinyl Alcohol – UiO66 Matrix

Adi Setyo Purnomo[1)], Nindy Sekar Arumdani Putri[1], Kristina Wahyu Wijaya[1], Ratna Ediati[1], Asranudin[1], and Taufiq Rinda Alkas[1]*

[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, ITS, Sukolilo Campus, Surabaya, Indonesia
**Corresponding author: adi_setyo@chem.its.ac.id ; adi.spurrnomo@yahoo.com*

ABSTRACT

Methyl orange (MO) is an azo dye that is widely used in the textile industry, the waste from MO can cause various problems for the environment and health, so it requires a way to process. In this study, MO biodecolorization process was carried out by immobilized bacteria (*Pseudomonas aeruginosa* and *Bacillus subtilis*) using the entrapment method in the sodium alginate/polyvinyl alcohol/Universitetet i Oslo-66 (SA/PVA/UiO-66) matrix in 2:4:0.4 (%w/v) composition. The biodecolorization process by bacteria was carried out using the free cell and immobilization methods, with variations of live and dead bacterial cells. MO biodecolorization was carried out in aqueous media with a concentration of 50 mg/L at 37 ℃ under static conditions. The results of the biodecolorization of MO by bacteria using the immobilization method was better than free cell. *P. aeruginosa* (PA) and *B. subtilis* (BS) free cells decolorized MO by 43.28% and 37.21%, respectively. MO decolorization percentage of the variation SA/PVA/UiO-66/PA beads were the highest at 96.68%, followed by SA/PVA/UiO-66/BB at 95.94% and SA/PVA/UiO-66 (without bacteria) at 68.96%. The success of decolorization was proven by using FTIR and SEM characterization. The performance of the beads tested used a reusability test, where the beads were SA/PVA/UiO-66/BB was able to efficiently decolorize MO for 3 cycles, 95.94% in the first cycle, 67.38% in the second cycle, and 50.04% in the third cycle. The use of immobilized *B. subtilis* in SA/PVA/UiO-66 beads to decolorize MO can be used as an alternative to deal with the problem of MO dye waste in the environment.

Keywords: *methyl orange, biodecolorization, immobilization, Pseudomonas aeruginosa, Bacillus subtilis.*

The 5th ISOC 2022

Tungsten Trioxide as a Photocatalysts for Degradation of Recalcitrant Pollutants

Wan Norharyati Wan Salleh[1,2], Nur Aqilah Mohd Razali[1,2]*

[1]Advanced Membrane Technology Research Centre (AMTEC), Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia
[2]School of Chemical and Energy Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor
**Corresponding author: hayati@petroleum.utm.my*

ABSTRACT

Recently, the increasing level of water pollution worldwide has not only contributed to environmental issues, but also triggered considerable interest in photocatalysis that act as promising wastewater treatment. Among the explored photocatalysts, tungsten trioxide (WO_3) known for its extraordinary characteristics for photocatalytic degradation applications, such as photostability, high crystallinity with high yield and recyclability, and photo-corrosion resistance. However, its insignificant structure would lead to recombination of photogenerated carriers, which diminishes photocatalytic efficiency; this is deemed to be a major hurdle to the widespread application of WO_3. Thus, the objective of this review was representing several scopes of WO_3-based photocatalyst such as the introduction of its basic principles, significant each different precursor, synthesis methods, numerous types of modifications, influential operating parameter and their pro and cons into a photocatalytic system under irradiation. The interesting and unique features of tertiary composites of WO_3-based photocatalyst are found to be more effective for photocatalytic degradation due to their more efficient absorption band, band gap, and surface area, as compared to binary and unitary. The enhanced photocatalytic capabilities of WO_3-based photocatalyst with their different significant parameters are reviewed towards various pollutant removal, such as synthetic wastewater and real industrial wastewater. Finally, the benefits with ongoing challenges of WO_3 are proposed with the aim to improve the design of a highly efficient WO_3-based photocatalyst.

Keywords: photocatalyst, tungsten trioxide, photocatalytic degradation, tertiary composites, wastewater.

ORAL PRESENTERS

The 5th INTERNATIONAL SEMINAR ON CHEMISTRY

Hybrid Mode Conference
Hotel Majapahit, Surabaya Indonesia
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LIST OF ORAL PRESENTATIONS

GC001	**Dr. Ratna Ediati, M.Sc**
	Green synthesis of NaY zeolite/MIL-100(Fe) composites as adsorbent for methylene blue
IC002	**Mrs. Riskaviana Kurniawati**
	The Effect of H_2SO_4 Concentration and Time on The Sphalerite Leaching Process
IC003	**Mr. Faesal Amri**
	Facile Synthesis of Silver Nanoparticles Immobilized in Nickel-based Metal-Organic Frameworks for High-performance Electrochemical Glucose Sensors
MC004	**Dr. Yatim Lailun Ni'mah**
	Optimization of $NaClO_4$ Concentration and Addition of SiO_2 Filler to Increase the Conductivity of Solid Polymer Electrolytes PVA/CS/$NaClO_4$/SiO_2
MC005	**Mr. Habiddin**
	Dual Surfactant ZnO/SBA for Photocatalyst Degradation of Methylene Blue
MC006	**Mrs. Dina Kartika Maharani**
	Synthesis and Characterization of ZSM-5 From Local Source With Two Step Crystallization Method
MC007	**Mr. Naftali Canadian Putra Yakup**
	Extraction and Characterization of α-Cellulose Derived from Oil Palm Empty Fruit Bunch Waste
FC008	**Ms. Sani Dwiningrum Rahayu Br Gnting**
	Optimization of Transglutaminase, α-Amylase and Purple Sweet Potato Extract Supplementation for Quality and Functionality Improvement of Bread using Response Surface Method Approach
OC009	**Prof. Wiwik Susanah Rita**
	The Toxic Compounds from Citrus Parasite (Scurrula ferruginea (Jack) Danser)
IC010	**Mr. Wandi Kasim**
	Gold Nanoparticles Incorporation into the Cu-BTC MOF as an Electrode Material for Glucose Sensor
OC011	**Mrs. Devi Anggraini Putri**
	Antioxidant and Antibacterial Activities of Nicotiana tabacum Leaves Extracts
OC012	**Mr. Sandy Ilhamsyah**

	Biomarker Analysis of Air Laya Coal (AL-71) Muara Enim Formation, South Sumatra Basin As a Potential Coalbed Methane (CBM) in Indonesia
MC013	**Ms. Aulia Dewi Rosanti, S.Si.,M.Sc**
	The Influence of pH Variations of Methyl Orange and Methylen Blue Dyes Solutions in Photodegradation Process Using ZnO and ZnO/MOP-CTAB Materials
B014	**Ms. Atmira Sariwati**
	Bioactive Compounds of Terminalia ballerica Seed Extracts in Different Solvent Polarities
MC015	**Mr. Saiko Rahmadi Lusman**
	Preparation of Mixed Matrix Membrane PSf/Graphene for Gas Separation of CO_2/CH_4
FC016	**Ms. Yohana Putri Citra A**
	Determination Of Yoghurt Shelf Life With Audiosonic Waves Exposure Using Accelerated Shelf Life Testing (ASLT) Method Arrhenius Model
EnC017	**Ms. Shofiyah Nada**
	Valorisation of Glycerol By-Product From Biodiesel Production From Crude Palm Oil (CPO) By Catalytic Conversion
MC018	**Ms. Diana Inas Utami**
	Synthesis and Characterization of Mesoporous Silica using Sapindus rarak Extract Template
PC019	**Ms. Shalita Nafisah Putri Wahyudhie**
	Performance of Polysulfone Membrane for Biogas Upgrading
PC020	**Ms. Safana Zahra Harmaini**
	Biodiesel Production from Crude Palm Oil (CPO) through Variation Steps of Esterification-Transesterification and Its Evaluations
MC021	**Mrs. Andi Nina Asriana**
	Molasses Impression in Hyaluronic Acid Production From Streptococcus zooepidemicus with Feed Batch Method
AC022	**Mr. Tri Paus Hasiholan Hutapea**
	Electrochemical Study of Gold Electrode modified by Channa strita Albumin
OC023	**Mr. Iwan DIni S.Si, M.Si**
	Sterol Composition of Caulerpa racemosa (Forsskal) J. Agardh. from the Gulf of Boni and potential anti-inflammatory activity
GC024	**Mr. Nisfiar Sya'bana Nur Fadilah**
	Green Synthesis of ZnO Nanoparticles As An Antimicrobial Substance Using Spinach Extract
MC025	**Ms. Khawiyatur Riv'ah Agustina**
	Synthesis of Mesoporous Silica Derived from Extracted Natural Template (Sapindus rarak) for Biofuel Production

MdC026	**Mrs. Maulidella**
	Identification of Pogostemon Cablin Benth Plant Essential Oil
PC027	**Mr. Afdhal Junaidi**
	The CO_2/CH_4 Gas Separation Performance through Poly(phenylene sulfide sulfone) Membrane : A Computational Study
PC028	**Mrs. Endah Purwanti**
	Preparation of Membrane Polymer Electrolyte from PVA/Nanocrystalline Cellulose/LiClO4 as Separator for Lithium Ion Battery
MdC029	**Mrs. Oktavina Kartika Putri**
	Characteristics and performance of phytosynthesised ZnO-NPs as a potential diosgenin nanocarrier
OC030	**Ms. Ika Oktavianawati**
	The Profiles of Gaharu Bouya Oil from Gonystylus bancanus
PC031	**Mr. Ceisar Andrian Putra**
	SYNTHESIS OF ZINC OXIDE NANOPARTICLES (ZnO) BY POLYOL METHOD FOR CONCENTRATION REDUCTION OF MALACHITE GREEN AND RHODAMINE B DYE VIA PHOTOCATALYTIC
MC032	**Mr. Syahman Zhafiri**
	Synthesis, Characterization and Photocatalytic Properties of $H6P2W18O62/TiO_2$ Composites
MdC033	**Ms. Wiwit Denny Fitriana**
	Antioxidant and antibacterial activities of Curcuma aeruginosa and Curcuma zedoaria Rhizomes extracts
MC035	**Mrs. Lely Kurniawati**
	The Effects of ZIF-8/TiO_2 and ZIF-8/Chitosan Composite Materials on The Photodegradation Reaction of Methylene Blue under Visible Light
OC036	**Ms. Kresentia Verena**
	Synthesis of 4-methoxyphenethyl (E)-3-(2-methoxyphenyl)acrylate by Shiina Method
GC037	**Dr. Tjokorde Walmiki Samadhi**
	Biosynthesis and Characterization of ZnO Nanoparticles Using Lemongrass Extract
MC038	**Mr. Josua Margandatua Hutapea**
	The Effect of Adding Plastic Waste and Fiber Ash Coconut as Concrete Aggregate on Mechanical Characteristics of Composite Concrete Materials
MdC039	**Mr. Moch. Nurhasan**
	Synthesis and Characterization of Mesoporous Silica Nanoparticles (MSN) Modified by Hydrazone as Drug Delivery
EnC040	**Mrs. Erly Grizca Boelan**
	Biotransformation of DDT by White-rot Fungus Ganoderma lingzhi

MdC041	**Ms. Miftahul Jannah**
	Design, Synthesis, and Biological Evaluation of 5-Substituted 2-Thiohydantoin with Methyl benzaldehyde in Ortho/Para Position
MdC042	**Ms. Febiola Putri Utami**
	Spectral Characterization and Bioactivity of 5-(2-nitrobenzylidene)-2-thiohydantoin and 5-(4-nitrobenzylidene)-2-thiohydantoin
MdC043	**Ms. Heni Masitoh**
	Antibacterial Activity of 5-(2- methoxybenzylidene)-2-thiohydantoin and 5- (4-methoxybenzylidene)-2-thiohydantoin
MdC044	**Mr. Syafri Izzat Abidiy**
	Antiviral Activity of Hydrazone Derivatives Based Benzohydrazide/2-thiohydantoin Analogs Against HPV-16 (Human Papillomavirus) : In Silico Study
MdC045	**Ms. Nur Rahmayanti Affifah**
	Preparation, Characterization, and Anticancer Profile of N'-(E)-benzylidenebenzohydrazide and N'-(E)-(2-methylbenzylidene)benzohydrazide
OC046	**Mr. Muhammad Salman Al Kahfi**
	Lubricating Properties of Nyamplung-Oil (Calophyllum inophyllum L.) Glycerides and Their Effect on the Lubricity of Low-Sulfur Fossil Diesel
MdC047	**Ms. Dias Nur Arista**
	Synthesis and Characterization of 2- thiohydantoin Derivatives by Hydroxyl Groups in Orto/Para Position and The Compound's Biological Activities
AC048	**Prof. Ni Made Suaniti**
	Optimization of Sun Protection Factor (SPF) by Varying the Composition of Lemongrass (Cymbopogon nardus L.) in Sunscreen Cream Based on Virgin Coconut Oil (VCO)
EnC049	**Mrs. Irna Rosmayanti**
	Preparation of Porous Geopolymer from Biomass Ash for Synthetic Dyes Adsorbent
MC050	**Mrs. Herlina Damayanti**
	Fabrication and Characterization of Polycaprolactone-Hydroxyapatite Scaffold based on Indonesian Natural Resources for Bone Tissue Engineering
Other051	**Dr. I Wayan Bandem Adnyana**
	Utilization of Moringa Stem As a CaO Catalyst Mixer in Making Biodiesel
EnC052	**Mr. Hari Agung Triadi**
	The Effect of MOFs on Properties and Performance of Poly(vinylidene) Flouride /GO based Mixed Matrix Membrane
CE053	**Dr. Vita Wonoputri**

	Effect of Zinc Oxide Powder Characteristics on Physical Sunscreen Performance
MdC054	**Mrs. Laila Khamsatul Muharrami**
	The Use of Widely Metabolomics Profilling in Medicinally Important Compounds from Zingiberaceae species
EnC055	**Mrs. Sri Murniasih**
	THE EFFECT OF SEASON VARIATIONS TO HEAVY METALS AND TRACE ELEMENTS CONTENT AS PARAMETERS OF AGRICULTURAL IRRIGATION WATER QUALITY IN BREBES REGENCY - INDONESIA
OC056	**Mr. Reynal Restu Affandi**
	Synthesis and Biological Activities of Prenylated and Geranylated 2(4-Nitrophenyl)-4,5-diphenyl-1H-imidazoles
IC057	**Ms. Siti Khomariyah**
	Synthesis and Characterization of Cu-ZIF-8/AC for Photocatalytic Degradation of β-Naphthol
OC058	**Ms. Winda Seviani**
	Antibacterial and Antifungal Activities of Phytosynthesized Selenium Nanoparticles Using Solanum lycopersicum Extract
AC059	**Mrs. Maria Aloisia Uron Leba**
	Performance of pH Indicator Paper by Immobilization Purple Sweet Potato Pigmen on Cellulose Paper
OC060	**Ms. Iffah Karimah**
	Synthesis 4-(butyramidomethyl)-2- methoxyphenyl butyrate
B061	**Ms. Alya Awinatul Rohmah**
	Methylene Blue Removal by Entrapment Trichoderma viride into Sodium Alginate-Polyvinyl Alcohol Bentonite Beads
B062	**Ms. Badzlin Nabilah**
	Biodecolorization of Methylene Blue by Ralstonia pickettii Bacterium Immobilized on Sodium Alginate – Polyvinyl Alcohol – Bentonite Matrix
CE063	**Dr. Fadlilatul Taufany**
	Kinetic Performance of a Novel Diethanolamine-Monosodium Glutamate Solvent for CO_2 Removal in a Wetted Wall Column
FC064	**Ms. NATASYA AYU FADHILLA**
	Nanoemultion of Citrus Pericarp Extract using Soy Protein Isolated (SPI) and Maltodextrin (MD) as Additive on Egg Tart
FC065	**Ms. FARCHANAH NOOR FITROH**
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AC067	**Ms. Siti Oryza Sativa**

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OC080	**Ms. Khoirun Nisyak**

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OC081	**Mr. MUDDATSTSIR IDRIS**
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MC082	**Ms. nina ariesta**
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IC083	**Ms.Arza Ajeng Mahardika**
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Green synthesis of NaY zeolite/MIL-100(Fe) composites as adsorbent for methylene blue

Ratna Ediati[1], Anggi Ratri Anggoro Kasih[1], Nuhaa Faaizatunnisa[1], Hamzah Fansuri[1], Djoko Hartanto[1], Afifah Rosyidah[1], Mustafa Al Bakri Abdullah[2]

[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia
[2] Centre of Excellence Geopolymer and Green Technology, Universiti Malaysia Perlis (UniMAP), Perlis, Malaysia
*Corresponding author: rediati@chem.its.ac.id

ABSTRACT

MIL-100(Fe) is a type of metal organic frameworks (MOF) that was first successfully synthesized by Ferey et al. using iron powder (Fe) and trimesic acid as precursors. MIL-100(Fe) is generally synthesized by hydrothermal/solvothermic method in a high temperature autoclave, with addition of hydrofluoric acid (HF) at 150°C. However, hydrofluoric acid (HF), as a mineralizing agent that increases crystallinity and initiates crystal growth, is a material that is harmful to the environment and humans because it is toxic and corrosive. Green synthesis of MIL-100(Fe) and NaY zeolite/MIL-100(Fe) composites were successfully carried out by a hydrothermal method at 160 °C for 12 hours using autoclave without adding the hydrofluoric acid. The amounts of NaY zeolite added to the reaction mixture of iron(iii) nitrate nonahydrate and benzene-1,3,5-tricarboxylic acid were varied at 5, 10 and 20 w/w% toward the amount of MIL-100(Fe), and the obtained composites were denoted as ZNY(5)/MIL-100(Fe), ZNY(10)/MIL-100(Fe) and ZNY(20)/MIL-100(Fe), respectively. The all materials were characterized using XRD, FTIR and SEM-EDX. The XRD patterns showed characteristic peak that matched with that of reported MIL-100(Fe). The FTIR spectra of the synthesized materials also showed the same adsorption bands at wave number to that of MIL-100(Fe) and zeolite NaY standard. The morphology of MIL-100(Fe) and ZNY(20)/MIL-100(Fe) exhibited the irregular octahedral shape with small spherical on the surface of materials indicated the formation on iron oxide.

Methylene blue adsorption results revealed that ZNY(20)/MIL-100(Fe) composite had the highest adsorption capacity of 116,245 mg/g, followed the second-order kinetic model and Freundlich adsorption isothermal.

Keywords: MIL-100(Fe); NaY zeolite; composite; methylene blue; adsorption

THE EFFECT OF H_2SO_4 CONCENTRATION AND TIME ON THE SPHALERITE LEACHING PROCESS

Riskaviana Kurniawati[1], Wiwik Dahani1, Subandrio[1], Mixsindo Korra Herdyanti[1], Imanuel Purba[1]*

[1] Department of Mining Engineering, Faculty of Earth Technology and Energy, Universitas Trisakti, Indonesia
*Corresponding author: *riskaviana@trisakti.ac.id*

ABSTRACT

Galena (PbS) is an important and abundant source of Pb. Galena often coexists with other sulfide minerals such as sphalerite (ZnS), and pyrite (FeS2). Zinc exists in the earth's crust primarily as sulfide, and sphalerite is its most important ore. Zinc sulfide concentrate is the main raw material for extracting zinc by leaching method. The leaching method is a simple and eco-friendly to extract zinc metal on a small scale. This research focuses on the leaching of zinc sulfide concentrate in sulfuric acid solution (H_2SO_4) to determine the effect of concentration and time on the recovery of zinc levels. The samples were roasted for 3 hours at 700°C and then H_2SO_4 was leached of 2, 4, and 6M for 2, 3, and 4 hours. The zinc content obtained was tested by XRF characterization. Zinc filtrate levels for a concentration of 2,4,6M sequentially were 75.59; 68.89; 35.74%. The leaching process using H_2SO_4 solution resulted in a decrease in zinc content as the concentration of the H_2SO_4 solution increased. The decrease in zinc levels was due to the H_2SO_4 solution being able to dissolve impurity minerals thereby reducing the dissolved zinc content. In contrast, the longer the leaching time, the higher the zinc content, which is 99.17 g/L. This research is then expected to obtain data at optimal conditions, which can be used as a reference in the small and large-scale mining industry.

Keywords: H_2SO_4, leaching, sphalerite, zinc

Facile Synthesis of Silver Nanoparticles Immobilized in Nickel-based Metal-Organic Frameworks for High-performance Electrochemical Glucose Sensors

Faesal Amri, Achmad Rochliadi, Aep Patah

Division of Inorganic and Physical Chemistry, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Bandung, Indonesia
*Corresponding author: aep@itb.ac.id

ABSTRACT

Diabetes is a chronic disease with patients worldwide; according to International Diabetes Federation 2021, Indonesia is among the top five countries with the most significant number of patients with diabetes. Moreover, Indonesia has the most significant percentage of undiagnosed patients, around 73.7%. Diabetes can be diagnosed based on the glucose level in human body with the concentration in people with diabetes are above 6.6 mM in blood samples and 200 μM in saliva samples. Therefore, monitoring glucose level is vital to prevention and early diagnosis of diabetes, so patients with diabetes can get treatment as soon as possible. Metal-organic frameworks (MOFs) are porous materials consisting of metal ions that coordinate with organic ligands with a large surface area and are rich in active sites. Ni-MOF is one type of MOFs that have large surface area, stable and good catalytic properties against glucose oxidation. However, Ni-MOF has low conductivity, so modification with immobilization of conducting materials such as silver nanoparticles into Ni-MOF (AgNP@Ni-MOF) can increase the conductivity. In this work, the first was to synthesize Ni-MOF under various conditions using a microwave. The materials used were Ni(NO3)2.6H2O as a metal precursor, H3BTC as a ligand, DMF solvent and tri-ethylamine as a base. The synthesis conditions varied at temperatures of 120oC, 130oC, 140oC for 1 hour with 200 watts of power to get optimum conditions. The composite of AgNP@Ni-MOF has been synthesized by one-step microwave heating and characterized by powder X-ray diffraction, FTIR, SEM and TEM. The Ni-MOF and composite formed were used to fabricate carbon paste modified electrodes and characterized by cyclic voltammetry and linear sweep voltammetry. The result showed that the optimum condition to synthesize Ni-MOF using microwave heating was at 130 °C. The diffraction pattern and the morphology of AgNP@Ni-MOF composite was like Ni-MOF, suggesting that immobilization of AgNP doesn't affect the structure of Ni-MOF. The

TEM images showed that the size of silver particles immobilized in Ni-MOF was in nanometer scale. The electrochemical detection toward glucose obtained that immobilization of AgNP enhanced sensor performance with lower limit of detection, 17.20 µM, higher sensitivity 2741.82 µA mM-1 cm-2 and the linear range 10 – 2000 µM. Moreover, the AgNP@Ni-MOF composite also exhibited good selectivity toward interferences, reusability, and reproducibility. Based on the linear range data, AgNP@Ni-MOF is excellent potential to use in practical applications for detecting glucose in saliva.

Keywords: Diabetes, Ni-MOF, AgNP, Glucose.

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Optimization of $NaClO_4$ Concentration and Addition of SiO_2 Filler to Increase the Conductivity of Solid Polymer Electrolytes PVA/CS/$NaClO_4$/SiO_2

Yatim Lailun Ni'mah[1], Suprapto Suprapto[1], Farah Aimmatur Rusydiyah[1], Fredy Kurniawan[1], Putu Suwarta[2]

[1] Chemistry Department, Faculty of Science and Analytica Data, Institut Teknologi Sepuluh Nopember Syrabaya
[2] Mechanical Engineering Department, Institut Teknologi Sepuluh Nopember Syrabaya
**Corresponding author: yatimnikmah@gmail.com*

ABSTRACT

Solid Polymer Electrolyte (SPE) has been made by the solution casting method. SPE consists of PVA as host polymer mixed with chitosan (CS) biopolymer, $NaClO_4$ as salt, and SiO_2 synthesized from bagasse ash as a filler to increase the ionic conductivity of the electrolyte system. Using chitosan biopolymer and SiO_2 filler from bagasse ash to obtain environmentally friendly SPE, reduce waste problems, and lower production costs. The use of $NaClO_4$ salt as a source of sodium ions and the addition of fillers is done so that the crystallinity of the polymer is reduced and high ionic conductivity is obtained. In this study, a thin SPE film was produced that was not easily torn. XRD test results showed a decreased crystallinity after the addition of $NaClO_4$ salt and SiO_2 filler. The FTIR spectra showed that $NaClO_4$ binds to the polymer and SiO_2 acts as a filler only. From the characterization results, it was concluded that the addition of $NaClO_4$ and SiO_2 salts as fillers could increase the ionic conductivity of the electrolyte system. The maximum ionic conductivity of 3.00×10^{-4} S cm^{-1} at room temperature is obtained from the ratio of PVA:CS:$NaClO_4$ (3:2:4) and 5% SiO_2.

Keywords: Chitosan, Ionic Conductivity, $NaClO_4$, PVA, SiO_2.

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Dual Surfactant ZnO/SBA for Photocatalyst Degradation of Methylene Blue

Habiddin Habiddin,[1,2], Didik Prasetyoko[1], Eko Santoso[1], and Widiya Nur Safitri[1]

[1] Department of Chemistry, Institut Teknologi Sepuluh Nopember, Surabaya, East Java, Indonesia
[2] Department of Chemistry, Universitas Negeri Malang, East Java, Indonesia 65145
*Corresponding author: didikp@chem.its.ac.id

ABSTRACT

Mesoporous silica material is a dye adsorption agent that can degrade the dye into a harmless compound. The addition of Zinc oxide (ZnO) contributes to the photochemical effect of mesoporous silica by modifying its surface. This paper describes the photocatalyst degradation of methylene blue using ZnO/SBA mesoporous silica (ZnO/SBA – MS). The ZnO/SBA-MS was synthesized using the sol-gel method with various ZnO loading concentrations (10,20 and 30%) and involved a dual surfactant of P123 and gelatin. XRD characterization demonstrates a mixed phase between ZnSiO4 and ZnO crystals. The IR spectra show the characteristics of Si-O-Si vibration mode at wave numbers 1100 and 950 cm^{-1} and Zn-O-Si vibration at wave number ~420 cm^{-1}. Our finding confirmed that the best performance was observed at the 20% loading concentration with 94% degradation.

Keywords: mesoporous silica, porous material, ZnO Loading, template P123, gelatin.

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Synthesis and Characterization of ZSM-5 From Local Source with Two Step Crystallization Method

Dina Kartika Maharani[1], Didik Prasetyoko[2]*, Yuly Kusumawati[2]
[1]Doctoral Student of Departement of Chemistry, Sepuluh Nopember Institute of Technology Surabaya, Indonesia
[2] Departement of Chemistry, Sepuluh Nopember Institute of Technology Surabaya, Indonesia
*Corresponding email: 1dprasetyoko@its.ac.id

ABSTRACT

This research study on mechanism of ZSM-5 synthesis from kaolin Bangka with two step crystallization process. Mesoporous ZSM-5 was synthesized with the following molar ratio : $10Na_2O$: $100SiO_2$: $2Al_2O_3$: $1800H_2O$: : 25 CTABr : 20TPA. The synthesis of mesoporous ZSM-5 was carried out at the first hydrothermal time variations of 1, 1.5, 3, 6, and 9 hours. Solids were characterized by XRD, FTIR, and SEM. Kaolin has been successfully converted into ZSM-5 based on the results of characterization using XRD and FTIR. The crystallinity of ZSM-5 increased with increasing first crystallization time. The results of X-ray characterization (XRD) showed that as the first hydrothermal time increased, the intensity of the characteristic peak of ZSM-5 also increased so that higher crystallinity was obtained. Infrared spectroscopic (FTIR) characterization showed that the kaolinite-associated peaks had disappeared along with the appearance of peaks at around 1087, 796, and 459 cm^{-1} which is characteristic of ZSM-5. The results of the analysis using SEM showed that the synthesized material had an increasing regular crystal shape with increasing crystallization time. The surface area analysis showed highest surface area for ZSM-5 with crystallization time 1 hour.

Keywords: ZSM-5, mesoporous, kaolin, synthesis, characterization

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Extraction and Characterization of α-Cellulose Derived from Oil Palm Empty Fruit Bunch Waste

*Randy Yusuf Kurniawan[1], Naftali Canadian Putra Yakup[2], Desita Amalia Pratiwi[3], Ayesha Ramadhany Pramesti[4], Yulfi Zetra[5]**

[1,5] Department of Chemistry, Institut Teknologi Sepuluh Nopember, Surabaya, 60111, Indonesia
[2,4] Department of Environmental Engineering, Institut Teknologi Sepuluh Nopember, Surabaya, 60111, Indonesia
[3] Department of Biology, Institut Teknologi Sepuluh Nopember, Surabaya, 60111, Surabaya
*Corresponding author: *yzetra@gmail.com*

ABSTRACT
Cellulose is the most abundant and renewable polymer materials and it has been widely used in many application because of its excellent properties and present in local resources and agriculture waste. This study aims to produce α-cellulose from oil palm empty fruit bunch (OPEFB) waste through extraction method using sodium hydroxide at variation 0; 15; 20 and 25% wt. The process followed by bleaching using 1% NaOCl solution to remove hemicellulose and lignin. Physiochemical properties of α-cellulose were evaluated and compared to previous studies. The physiochemical properties include functional groups by Fourier Transform Infrared (FTIR) spectroscopy, crystallinity by X-Ray Diffraction (XRD) and determination of cellulose content using UV-VIS spectrophotometer. The optimum yield of OPEFB α-cellulose was 59.01% wt in 25% NaOH and 54.05% wt in 20% NaOH. Physically, OPEFB α-cellulose in 20% NaOH produces solids that best match the characteristics of standard α-cellulose characters, which are the whiteness and the largest decrease in OPEFB waste mass is 89.46% wt. The formed sample also shows a semi-crystalline phase and has the same functional group as that of standard α-cellulose.

Keywords: OPEFB Waste, α-Cellulose, Extraction.

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Optimization of Transglutaminase, α-Amylase and Purple Sweet Potato Extract Supplementation for Quality and Functionality Improvement of Bread using Response Surface Method Approach

*Sani Dwiningrum Br Ginting[1], Agus Safari[1], Toto Subroto[1], Ukun M.S. Soedjanaatmadja[1], Endah Wulandari[1], Muhammad Fadhlillah[1], Safri Ishmayana[1]**

[1]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran

*Corresponding author: *ishmayana@unpad.ac.id*

ABSTRACT

Bread is one of main food in the world and made from wheat flour as one of the main ingredients. Efforts have been conducted to improve the quality of bread such as increasing swelling volume and addition of antioxidant compound to provide functional properties of the product. The present study was directed to determine the optimum level of transglutaminase (TGase), α-amylase (AA) and purple sweet potato extract (PSPE) to give the highest swelling volume and antioxidant activity using response surface method approach. TGase can enhance the formation of crosslink between proteins, which leads to better carbon dioxide retention and eventually improve swelling volume. AA can provide simple sugars available for yeast fermentation, and PSPE can provide high antioxidant property due to its anthocyanin content. Breads were prepared with three consecutive proofing after dough kneading for 20, 15 and 60 minutes, respectively, followed by baking at 200°C for 20 minutes. The bread was then examined for their swelling volume, antioxidant activity and organoleptic properties. The results of the present study indicate that TGase and AA does not significantly affect swelling volume and antioxidant activity, however PSPE has significant effect towards antioxidant activity of the final product. According to the data collected, the best combination of TGase, AA and PSPE to give the highest swelling volume and antioxidant activity were 0.035 Unit/g protein, 5 Units/g flour, and 6 g for 300 g of flour, respectively. Bread prepared with the best combination of TGase, AA and PSPE has lower hardness and springiness, which is 495.98 gf and 49.8%, respectively, indicating softer bread crumb. Degree of likeness of the bread was similar to control bread, indicating good acceptance by the panelist. The bread has 4162%/20 g bread DPPH inhibition activity, indicating very high antioxidant property

and become evidence that baking process does not completely devour antioxidant compound in bread.

Keywords: α-amylase, antioxidant, anthocyanin, bread, functional food, transglutaminase

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The Toxic Compounds from Citrus Parasite (*Scurrula ferruginea* (Jack) Danser)

Wiwik Susanah Rita[1], Ni Kadek Novita Yulandari[2], Ni Luh Rustini[1]*

[1] Chemistry Department, Faculty of Math. and Natural Sciences, Universitas Udayana
[2] Magister of Chemistry Department, Faculty of Math. and Natural Sciences, Universitas Udayana
*Corresponding author: susanah.rita@unud.ac.id

ABSTRACT

Citrus parasite (*Scurrula ferruginea* (Jack) Danser) can be used for treatment of cancer. This study aims to determine the toxicity of citrus parasite leaf extract against *Artemia salina* Leach and identify the toxic compounds in the active fraction. **Extraction was carried out by maceration and partitioning methods,** as well as separation was done by column chromatography method. The toxicity test was done by Brine Shrimp Lethality Test (BSLT) method and Liquid Chromatography tandem Mass Spectrometry/Mass Spectrometry (LCMS/MS) was applied to identify of the toxic compound. Citrus parasite leaf powder as much as 1 kg was macerated with ethanol and produced 49.7406 g of ethanol extract. The partition process of 10 g of the ethanol extract produced 5.3838 g of n-hexane extract, 2.2239 g of ethyl acetate extract, 1.3012 g of n-butanol extract, and 1.0911 g of water extract. The results of the toxicity test of the four fractions showed that n-hexane extract was the most toxic extract with LC_{50} value of 83.3018 ppm. This indicates that the extract has potential as an anticancer. The *n*-hexane was then separated by column chromatography with a stationary phase of silica gel mobile phase of n-hexane: chloroform (5:5). It was obtained 7 fractions (F1, F2, F3, F4, F5, F6, and F7). The highest toxicity was indicated by the F3 fraction with LC_{50} value of 113.5173 ppm. Based on LCMS/MS data analysis, F3 is suspected to contain five compounds namely epinephirine, 17-methylandrostane-3,17-diol, mirtazapine, **schleicherastatin 5,** and 9-[2-(1H-benzimidazole-2-yl) ethyl] carbazole. Based on the result above, it can be concluded that the citrus parasite has potential as an anticancer agent.

Keywords: Brine Shrimp Lethality Test, Citrus parasite, Scurrula ferruginea (Jack) Danser, Toxicity test

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Gold Nanoparticles Incorporation into the Cu-BTC MOF as an Electrode Material for Glucose Sensor

*Wandi Kasim, Achmad Rochliadi, Aep Patah**

Division of Inorganic and Physical Chemistry, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung.
*Corresponding author: *aep@itb.ac.id*

ABSTRACT

Carbon paste has been used as an electrode in many electrochemical reactions, including glucose electro-oxidation reaction, for its use as an electrochemical sensor. Any electro-oxidation reaction on an electrode surface has its reaction rate, determined numerically by the electron-transfer rate constant, k^0. In the case of glucose, it is well known that relatively challenging to oxidize using the electrochemical method. To help electrochemical glucose oxidation, one or more catalysts must be added by mixing with carbon paste. The gold nanoparticles and Cu-BTC MOF have separately been used as glucose electro-oxidation catalysts. Usually, gold nanoparticles are synthesized by reducing Au(III) in hot citrate solution and stabilized using a polymer stabilizer like PVP. Adding gold nanoparticles to Cu-BTC and used simultaneously probably could improve the catalytic activity of oxidizing glucose. In this research, gold nanoparticles/Cu-BTC composite (AuNP@Cu-BTC) is fabricated by mixing Cu-BTC with gold nanoparticle solution without any polymer stabilizer and characterized using X-ray diffraction and SEM. Gold nanoparticles seemingly changed Cu-BTC's appearance from bright blue to darker blue. Various scan rate of cyclic voltammetry is used to investigate the catalytic activity (k^0). It's been found that carbon-paste electrode containing AuNP@Cu-BTC has a k^0 value of 2.29×10^{-4} cm^2/s, significantly larger than carbon-paste only, carbon-paste with gold nanoparticles, and carbon-paste with Cu-BTC that have a k^0 value 2.7×10^{-7} cm^2/s, 4.55×10^{-5} cm^2/s, and 9.38×10^{-5} cm^2/s respectively. It can be concluded that adding gold nanoparticles and Cu-BTC MOF as glucose electro-oxidation catalysts can increase its catalytic activity, k^0.

Keywords: Glucose sensor, carbon-paste electrode, Cu-BTC, gold nanoparticles, electron-transfer rate.

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Antioxidant and antibacterial activities of Nicotiana tabacum leaves extracts

*Devi Anggraini Putri[1], Norma Farizah Fahmi[1], Dhimas Pramayoga Sinatra[1], Rizka Efi Mawli[1], Sri Fatmawati[2]**

[1] Department of Medical Laboratory Technology, Sekolah Tinggi Ilmu Kesehatan Ngudia Husada Madura, Kampus STIKes NHM Mlajah Bangkalan 69111, Indonesia
[2] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Kampus ITS Sukolilo Surabaya 60111, Indonesia
*Corresponding author: devi@stikesnhm.ac.id

ABSTRACT

Nicotiana tabacum, recognized as tobacco, is widely cultivated on both tropical and subtropical regions especially in Indonesia. In the past decade, many biological activities and secondary metabolites of *N. tabacum* had been reported. Madura is one of the islands in Indonesia that produces *N. tabacum* rapidly. In Madura, *N. tabacum* is called as bekoh. This research was aimed at the antioxidant and antibacterial activities of *N. tabacum* leaves from Madura. Furthermore, *N. tabacum* leaves were extracted by using different solvents. The extracts including *n*-hexane, dichloromethane, ethyl acetate, acetone, and methanol extracts have been evaluated their antioxidant activities by using 2,2-diphenyl-1-picryl-hydrazyl (DPPH) method. While, the antibacterial activity has been determined by using colorimetric resazurin microtiter assay (REMA) method. Furthermore, the extracts have been assayed their antibacterial activities against both gram-positive and negative bacteria such as *Bacillus subtilis*, *Staphylococcus aureus*, *Propionibacterium acnes*, *Pseudomonas aeruginosa*, and *Salmonella typhi*. This research showed that the methanol and acetone extracts have the highest antioxidant and antibacterial activities, respectively. Therefore, methanol and acetone extracts of *N. tabacum* leaves are potential as antioxidant and antibacterial agents.

Keywords: Antibacterial, antioxidant, DPPH, *Nicotiana tabacum,* REMA

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Biomarker Analysis of Air Laya Coal (AL-71) Muara Enim Formation, South Sumatra Basin As a Potential Coalbed Methane (CBM) in Indonesia

Yulfi Zetra[1], R. Y. Perry Burhan[1,2], Puspa Ratu[2], Sigmatresna Wasatya[1], Sandy Ilhamsyah[1]*

[1] Molecular Geochemistry Laboratory, Departement of Chemistry, Institut Teknologi Sepuluh Nopember, Kampus ITS Keputih, Surabaya, 60111, Indonesia
[2]Politeknik Energi dan Mineral Akamigas, Jl. Gajah Mada 38, Cepu, Indonesia
*Corresponding author: yzetra@chem.its.ac.id

ABSTRACT

Coal samples collected from the Air Laya Mine, Muara Enim Formation, and South Sumatra Basin were analyzed for their organic geochemical characteristics using extraction, fractionation, and compound identification methods using gas chromatography-mass spectrometer (GC-MS) instruments. This analysis aims to determine the implications of organic geochemistry such as the origin of organic matter, level of thermal maturity, and palaeodepositional environment. The identification of aliphatic hydrocarbon fraction obtained homologous *n*-alkanes (n-C_{13}-n-C_{33}), branched alkanes pristane and phytane, and pentacyclic triterpane. The abundance of *n*-alkane compounds with a bimodal distribution type indicates that coal organic matter comes from various sources such as bacteria, algae, macrophytes, aquatic environments, and higher plants. Some parameters such as CPI >1; ACL >27; OEP >1; and the abundance of olean-18-ene, olean-12-ene, urs-12-ene, and C31αβ 22S/(22S + 22R) <1 indicated low maturity and a source of terrestrial higher plant organic matter. The value of ratio n-C_{31}/n-C_{19} <0.4; n-C_{29}/n-C_{17} <1; n-C_{17}/n-C_{31} >1; LHCPI >1; and the abundance of neohop-13(18)-ene, 17β(H),21α(H)-hopane, 17α(H)-21β(H)-homohopane (22R), and 17α(H)-21β(H)-homohopane (22S) indicates the presence of bacterial input in the coal depositional process. The value of the Pr/Ph ratio >3 indicates that the AL-71 coal sample was deposited in an oxic environment. AL-71 coal is included in type III kerogen which indicates the potential of the source rock as a gas-prone and potential to be used as a source of coalbed methane (CBM).

Keywords: Air Laya Coal, Muara Enim Formation; Biomarker; GC-MS; Aliphatic Hydrocarbon; Coalbed Methane

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The Influence of pH variations of Methyl Orange and Methylen Blue Dyes solutions in photodegradation process using ZnO and ZnO/MOP-CTAB materials

Aulia Dewi Rosanti[1], Yuly Kusumawati[2], Fahmi Hidayat[1], Arif Fadlan[2], Rizky Arief Shobirin[1], Asvikatus Sa'diyah[1]*

[1]Department of Chemistry, Universitas Islam Kadiri, Kediri
[2]Department of Chemistry, Institut Teknologi Sepuluh November, Surabaya
*Corresponding author: *aulia.dewi.r@uniska-kediri.ac.id*

ABSTRACT

This research aimed to study the degradation of Methyl Orange Dyes (MOD) and Methylene Blue Dyes (MBD) dyestuffs in different pH solutions using ZnO and ZnO/MOP-CTAB materials under UV light. Medan Orange Peel (MOP) materials which modified by CTAB was added to ZnO which aimed to improve ZnO ability for MOD and MBD dyestuffs degradation. This research was conducted in the dark and the light methods by adding ZnO and ZnO / MOP-CTAB materials to the MOD and MBD with various pH solutions, which was at pH 2,4,6,8, and 10. The characterization results showed that ZnO/MOP-CTAB had better character than ZnO, with BET characterization results showed ZnO/MOP-CTAB had surface area of 36.07 m^2/g which larger than ZnO, and DRUV results obtained narrower band gap energy value of 3.15 eV. The XRD results showed that the addition of MOP-CTAB modifications into ZnO did not affect crystal structure of wurtzite with hexagonal shape. SEM photographs showed that the surface of ZnO/MOP-CTAB was more homogeneous than ZnO. The results of the pH variation treatment of MOD and MBD solutions showed that ZnO/MOP-CTAB was better than ZnO for dyestuffs degradation in dark and light methods. In the bright method with UV light assistance, the optimum result of MOD degradation by ZnO/MOP-CTAB occurred at acidic pH of 2 at 50th minute of 79%, while using ZnO otbained at the 40th minutes of 49%. In MBD degradation, optimum results were obtained by ZnO/MOP-CTAB at pH 10 at the 40th minutes by 90%, while in ZnO by 83%.

The reaction kinetics that occured in dyestuffs with pH variations in both the dark and the light methods followed the pseudo-second-order reaction kinetics.

Keywords: Methyl Orange Dyes, Methylen Blue Dyes, pH variations, Medan Orange Peel, ZnO/MOP-CTAB.

Bioactive compounds of *Terminalia ballerica* seed extracts in different solvent polarities

Although *Terminalia ballerica* seeds have popular folkloric ethnomedicinal in Indonesia, to treat colic, cholera, for the treatment of spasms during menstruation, and as a stomach-strengthening. This research focuses on finding metabolite bioactive contents in different solvent polarities, such as water, methanol, ethyl acetate, and hexane. The total phenol content was analyzed by the Follin-Ciocalteu method and found to be in the range of 43.84 to 127.72 mg GAE /g. Total flavonoid compounds were measured by the aluminum chloride colorimetric method and were obtained in the range of 20.42 to 45.90 mg QE /g. The alkaloid, saponin, tannin, terpenoid, and cardiac glycoside contents were measured by Spectrophotometry UV-Vis and found 15.24 – 43.40 mg CoE /g; 1.56-12.04 mg DE/g; 0.31-6.29 mg TAE/g; 40.12-81.02 mg Linalool Ekivalent /g and 7.34-34.53 mg DXE /g, respectively. The extracts were investigated for antioxidant activities by DPPH (2,2-diphenyl-1-picrylhydrazyl) free-radical and ABTS (2,2' azinobis (3-ethylbenzene-thiazoline-6-sulfonic-acid) scavenging ability. The methanol extract was found to have the highest antioxidant activity with the value of IC50 26.13µg/mL for DPPH and 43.39 µg/mL for ABTS. Antibacterial and antifungal activities were performed against at methanol extract *Escherichia coli* (23 mm) and Candida albicans (15 mm). Antidiabetic activities were in vitro assayed by α-amylase inhibition and α-glucoside inhibition. The methanol extract have IC_{50} α-amylase inhibition (24.35 µg/mL), and IC_{50} of α-glucoside inhibition (25.04 µg/mL). Overall, *P. timoriana* seed contains secondary metabolites which are good candidates as lead compounds for the development of potent drugs.

Keywords : antibacterial activity, antidiabetic activity, antioxidant activity, Terminalia ballerica seeds, secondary metabolite

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Preparation of Mixed Matrix Membrane PSf/Graphene for Gas Separation of CO2/CH4

Saiko Rahmadi Lusman[1], Nurul Widiastuti[1], and Triyanda Gunawan[1]
[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya, Indonesia 60111;
*Corresponding author: saikorahmadilusman@gmail.com

ABSTRACT

The high organic content of Palm Oil Mill Effluent (POME) can potentially be used into valueadded products such as biogas. The biogas produced contains methane (CH_4) which can be used as energy and carbon dioxide (CO_2) which is unwanted. Upgrading process is required to reduce the high CO_2 concentration and increase the CH_4 content. In this research, mixed matrix membranes have been successfully fabricated with a polysulfone polymer matrix and grapheme filler material with filler loading variations of 0,5%; 1%; and 1,5% by weight relative to polysulfone. Graphene filler material is fabricated with graphite precursor using electrochemical exfoliation method. MMM PSf/Graphene was fabricated using the phase inversion method (NIPS) to form an asymmetric membrane. The results of characterization using X-Ray Diffraction (XRD), Fourier Transform Infrared (FTIR), and Scanning Electron Microscopy (SEM) instruments indicate the effect of adding graphene filler material and PDMS coating on the structure and morphology of pure PSf membranes and MMM PSf/Graphene. In general, the order of CO_2 gas permeability on pure PSf and MMM PSf/Graphene membranes respectively is pure PSf > PSf/Graphene (1% > 0.5% > 1.5%) w/w non-PDMS > PSf/Graphene (1 % > 0.5% = 1.5%) w/w with PDMS. Meanwhile, for CH_4 gas permeability, the sequence is pure PSf > PSf/Graphene (1% > 0.5% > 1.5%) w/w non-PDMS > PSf/Graphene (1.5% > 1% > 0, 5%) w/w with PDMS. Optimum selectivity of CO_2/CH_4 gas was observed in PSf/Graphene MMM coated with PDMS with a loading variation of 0.5% and 1% w/w graphene filler with an increase of +212.86% and +10.34%, respectively compared to pure PSf membrane. In fulfilling the industrial demand regarding a minimum % purity of CH_4 gas of 90-95%, it was found that the membrane that meets the standards of the biogas upgrading process is MMM PSf/Graphene 0.5% w/w with PDMS coating with % CH_4 purity of 91.56 %. The results of the comparison using the Robeson curve show that all membranes from this study are still below the Robeson boundary line. MMM PSf/Graphene has the potential to be

used for CO_2/CH_4 gas separation because with a small amount of graphene as filler, it can produce a fairly good gas separation performance.

Keywords: Gas Separation, Mixed Matrix Membranes, Polysulfone, Graphene.

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Determination Of Yoghurt Shelf Life With Audiosonic Waves Exposure Using Accelerated Shelf Life Testing (ASLT) Method Arrhenius Model

Herdayanto Sulistyo Putro[1], Farah Alifia Zulfaidah[1], Marchelina Permatasari Widodo[1], Yohana Putri Citra Anggraini[1] , Siti Zahrany Tuasamu[1], Bernika Aurelia Marpaung[1], Astri Elsa Yustanti[1], Zjahra Vianita Nugraheni[1], Surya Rosa Putra[1], Harmami[1], Setiyo Gunawan[2]

1 Department of Chemistry, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya 60111, Indonesia
2 Department of Chemical Engineering, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya 60111, Indonesia
*Corresponding author: hsputro@chem.its.ac.id

ABSTRACT

Yogurt is generally obtained from milk fermentation using lactic acid bacteria (LAB). However, yogurt is prone to damage. Therefore, to prevent damage and contamination of yogurt, additional treatment like fortification is needed. In this study, the effect of audiosonic waves on microbes in yogurt with variations in temperature of 4 ℃, 25 ℃, and 38 ℃ and 14 days storage time with a specified frequency of 8000 Hz has been carried out. This study aims to determine the shelf life of yogurt with audiosonic waves exposure using the Accelerated Shelf Life Testing (ASLT) method with the Arrhenius equation. The parameters studied were pH, Titrated Total Acid (TAT), and organoleptic tests. The pH and TAT values decreased during 14 days of storage time and organoleptic tests result showed that the physical characteristics of yogurt decreased in quality. The shelf life of yogurt without audiosonic waves exposure at temperatures 4 ℃, 25 ℃, and 38 ℃ respectively was 38 days, 22.7 days, and 16.6 days, respectively. Meanwhile, for yogurt with audiosonic waves exposure (YCA), it was 30.7 days, 18.7 days, and 12.3 days. It can be concluded that the yogurt sample with the addition audiosonic waves exposure treatment had a shorter shelf life and decreased quality faster than yogurt without the addition of treatment.

Keywords: Yogurt, audiosonic waves, Accelerated Shelf Life Testing (ASLT)

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Valorisation of Glycerol By-Product From Biodiesel Production From Crude Palm Oil (CPO) By Catalytic Conversion

Nada Shofiyah[1], Ritvirulh Chonlada[2], Juwono Hendro3

[1] Sepuluh Nopember Institute of Technology, Indonesia
[2] King Mongkut's Institute of Technology Ladkrabang, Thailand
[3] Sepuluh Nopember Institute of Technology, Indonesia
*Corresponding author: *hjachmad@gmail.com*

ABSTRACT

Valorization of glycerol through catalytic conversion conducted using KOH base catalysts with a mass ratio between KOH / glycerol of 0.08 (w/w) was carried out at temperature variations of 230 °C and 300 °C and feedstock variations that is pure glycerol (98%) and crude glycerol with a total reaction time of 2 hours. Crude glycerol was obtained from the by-product of biodiesel transesterification from crude palm oil (CPO) using a KOH catalyst of 1% by weight of crude palm oil with variations CPO: methanol such as 1:3, 1:6, and 2:1 which are performed at 60°C for 4 hours and stirring speeds of 400 rpm. The largest percentage of crude glycerol conversion was obtained from the variation CPO: methanol (2:1) of 30.67%. The results of the GC–MS characterization of glycerol catalytic conversion products showed the largest yield percentage is on the variation of pure glycerol feedstock at a temperature of 230°C with the most abundance percentage which was the long-chain hydrocarbon fraction in the form of stearic acid compounds (abundance percentage of 26.54%). Catalytic conversion of pure glycerol feedstock variations with a reaction temperature of 300°C resulted in formic acid (abundance percentage of 24.68%) with the greatest abundance and oxalic acid (abundance percentage of 2.28%). Meanwhile, in the feedstock variation of crude glycerol produced 2-propenoic acid (abundance percentage of 5.04%) and acetone (abundance percentage of 2.84%) and also hexadecanoic acid with the largest abundance percentage (32.04%). These results showed that glycerol catalytic conversion with KOH(s) catalysts produced potential compounds for a wide range of industrial applications.

Keywords: Valorisation, Transesterification, CPO,Glycerol, Catalytic Conversion

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Synthesis and Characterization of Mesoporous Silica using *Sapindus rarak* Extract Template

*Diana Inas Utami[1], Holilah Holilah[1], Nada Nabila Khairunisa[1], Hasliza Bahruji[2], Reva Edra Nugraha[3], Widya Nur Safitri[1], Didik Prasetyoko[1]**

[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya, 60111, Indonesia
[2]Centre of Advanced Material and Energy Sciences, Universiti Brunei Darussalam, Jl. Tungku Link, BE 1410, Brunei
[3]Department of Chemical Engineering, Faculty of Engineering, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, 60294, Indonesia
*Corresponding author: didikp@chem.its.ac.id

ABSTRACT

Mesoporous silica was successfully synthesized using Sapindus rarak extract template. The preparation of the *Sapindus rarak* (SPr) extract involved maceration in distilled water. The addition of SPr extract was varied with the ratio of silicon source ie., 1:0.5, 1:1, 1:1.5 and 1:2 (v/v). The structural phase of the mesoporous silica material with an angle range of 2 = 5-60 was produced using SPr extract as a template. The existence of a band at 2914 cm^{-1}, which displays to the asymmetric and symmetric C-H strain vibrations, is a sign that the silica framework has been incorporated into the SPr extract and was further supported by the FTIR. Mesoporous silica with SPr extract had the isotherm type IV and the addition SPr extract increased the mesoporous area up to 526 m^2/g which owned by MS-L1.5 sample. TEM revealed a disordered, 3D-connected wormhole mesopore structure in MS-L1.5. Furthermore, SPr extract has a role in the formation of the mesopore in this material.

Keywords: Keywords: Mesoporous, silica, *Sapindus rarak*, organic template.

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Performance of Polysulfone Membrane for Biogas Upgrading

Shalita Wahyudhie[1], Triyanda Gunawan[1], Nurul Widiastuti[1]

[1] Chemistry Department, Institut Teknologi Sepuluh Nopember
*Corresponding author: salsa.wahyudhie@gmail.com

ABSTRACT

Indonesia, the world's largest palm oil producer and exporter, generates palm oil mill effluent (POME) in abundant quantities annually. POME can naturally form biogas through the anaerobic digester (AD) process. The use of POME-based biogas as an alternative fuel is crucial to control the environmental impact of the palm oil industry, yet still very limited because of the CO2 impurities in it. Membrane technology has been widely used for biogas upgrading because the process is simple and requires relatively low operational costs. In this study polysulfone (PSf) membranes were prepared for CO_2/CH_4 gas separation. Membranes were prepared by phase inversion method with variations of PSf concentration in the dope solution of 18, 20, and 22 wt%. PSf concentration variations in dope solution was found to visibly affect membranes CO_2/CH_4 separation performances, where both CO2 and CH_4 permebility decreases as PSf concentration increases. However, increasing PSf concentration from 18 to 22 wt% was found to improve CO_2/CH_4 selectivity from 1,65 to 3,43 that can be attributed to a difference of thickness and pore size in the membranes.

Keywords: Membrane separation, CO_2/CH_4 separation, polysulfone, biogas upgrading

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Biodiesel Production from Crude Palm Oil (CPO) through Variation Steps of Esterification-Transesterification and Its Evaluations

Harmaini Safana Zahra[1], Juwono Hendro[2]

[1] Sepuluh Nopember Institute of Technology, Indonesia
*Corresponding author: *hjachmad@gmail.com*

ABSTRACT

Indonesia is the biggest palm oil supplier in the world. Crude palm oil (CPO) which gained from palm oil is aspired that starting from 2045, it can be produced 60 million tons per year. This condition will not give the good impact if the production isn't in line with the utilization. Hence, CPO utilizations are researched and found that it can be used as a biodiesel feedstock to replace or at least reduce the use of conventional diesel. So, in this research CPO is converted into biodiesel with four different variation steps and evaluated for conformance to biodiesel standards. CPO contains triglycerides which can be separated to fatty acid methyl esters and glycerol by transesterification. Methanol solvent and KOH catalyst were used in this reaction but before the transesterification, feedstocks must be pre-treated first. After the whole production, fatty acid methyl esters were successfully converted into biodiesel. The product of biodiesel was tested according to SNI 7182:2015 standard in density, viscosity, the percentage of esters content, and cetane number parameters. Obtained, in terms of density are 858,65; 856,30; 858,60; 863,20 Kg/m3. Viscosity is 1,3; 1,48; 1,25; 1,34 mm2/s. Henceforth for the percentage of esters were tested with GC-MS instrument and was obtained respectively 98,89; 97,99; 99,12; 99,03 percent. Methyl oleic, methyl palmitate, and methyl stearate as the dominant fatty acids type. Cetane numbers were analyzed with four variations. First is B100 (is a mixture of biodiesel products). Second, B100+5% cetane number improver. Third, B100+10% cetane number improver. Last is B50 (50% mixture with DEXLITE). Successively obtained >75,00; >75,00; >75,00; 61,20. The results of the density, percentage of esters, and cetane number of the product showed conformity with biodiesel standards. As for the viscosity, it does not meet the standard because the value is too low.

Keywords: Crude Palm Oil, Transesterification, Biodiesel.

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Molasses Impression in Hyaluronic Acid Production From Streptococcus zooepidemicus with Feed Batch Method

*Andi Nina Asriana[1,2], Suprapto[1], Tri Paus Hutapea Hasiholan[1,3], Anisa Salma Hasna[2], and Fredy Kurniawan,[1,]**

[1] Laboratory of Instrumentation and Analytical Sciences, Chemistry Department, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia.
[2] Department of Chemical Engineering, Politeknik Negeri Malang, Jl. Soekarno Hatta No.9, Malang 65141, Indonesia
[3] Fisheries Product Technology Department, Faculty of Fishery and Marine Science, University of Borneo Tarakan, North Borneo, Indonesia
*fredy@chem.its.ac.id

ABSTRACT

This research was conducted with the aim of knowing the effect of the amount of sugarcane molasses on the production of hyaluronic acid by *Streptococcus zooepidemicus*. Briefly, this research begins with the preparation of sugarcane molasses, followed by bacterial culture propagation, fermentation process, and analysis. This research was conducted using a fed-batch fermentation method with sugarcane molasses as a substrate and *Streptococcus zooepidemicus* bacteria as a producer of hyaluronic acid. The sugarcane molasses used had a concentration of 83 brix which was then diluted to a concentration of 12 brix. The variable that changed in this study were 50 g, 100 g, and 150 g level of molasses and the fixed variables were the type of bacteria used, namely *Streptococcus zooepidemicus*, substrate feeding time at 7, 9, and 11 hours of fermentation duration, and operating temperature was 37ºC. The materials used in this study included the bacteria *Streptococcus equi subsp. zooepidemicus*, Brain-heart-infusion-powder, nutrient agar, sugarcane molasses, activated charcoal, NaCl, $MgSO_4$, NaOH, and K_2HPO_4. Qualitative analysis of hyaluronic acid using FTIR and analysis of the quantitative of hyaluronic acid produced using UV-Vis. The results showed that the manufacture of hyaluronic acid with molasses content of 43% produced hyaluronic acid products with the highest concentration of 190.4 ppm. The results of the qualitative analysis showed that samples of all variables were detected as hyaluronic acid.

Keywords: Hyaluronic Acid, Sugarcane Molasses, *Streptococcus zooepidemicus*

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Electrochemical Study of Gold Electrode modified by Channa strita Albumin

Tri Paus Hasiholan Hutapea[1,2], Suprapto[2], Andi Nina Asriana[1,3], Muhammad Yudha Syaputra[2], Fredy Kurniawan[2,]*

[1]Fisheries Product Technology Department, Faculty of Fishery and Marine Science, University of Borneo Tarakan, North Borneo, Indonesia
[2]Chemistry Department, Institut Teknologi Sepuluh Nopember, Surabaya, East Java, Indonesia
[3]Department of Chemical Engineering, state polytechnic of Malang, Malang, 65141, Indonesia
*Corresponding author: fredy@chem.its.ac.id

ABSTRACT
The electrochemical fabrication and characterization of the albumin-modified gold electrode have to be done. The gold electrode used in the form of a wire with a length of 5 cm and a diameter of 1 mm was modified by attaching a composite of albumin and paraffin to the surface of the electrode. Furthermore, the electrodes were electrochemically characterized using a cyclic voltammetry technique at a potential range of -0.4 to +1.0 V with a scan rate of 100 mV/s in a solution of $K_4Fe(CN)_6$. Variations in the scan rate were also carried out to determine the nature of the reactions that occurred on the electrode surface. In addition, the determination of the conductivity properties was also measured using the EIS method. The measurements found that the albumin-modified gold electrode had a positive response to the $K_4Fe(CN)_6$ solution. It is shown that there is a response to the anodic current at the potential +0.53 V and the response of the cathodic current to the potential 0.00 V. The results of the variation of the scan rate show the reaction on the surface of the diffusion-controlled electrode. The albumin-modified gold electrode is also conductive, which means it can conduct electrons well. Based on the results, albumin-modified gold electrodes can be used as working electrodes in electrochemical systems.

Keywords: electrochemistry, gold electrode, Channa striata, albumin.

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Sterol Composition of Caulerpa racemosa (Forsskal) J. Agardh. from the Gulf of Boni and potential anti-inflammatory activity

*Muharram & Iwan Dini**

Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Negeri Makassar, Makassar, Indonesia
*Corresponding author: iwandini@unm.ac.id

ABSTRACT
Caulerpa racemosa is one of the green macroalgae species used as food in many Southeast Asian countries, including Indonesia. In some parts in Indonesia, this species is consumed locally as food and is believed to have anti-inflammatory properties. The present study aimed to evaluate the sterol composition of *Caulerpa racemosa (*Forsska*)* J. Agard. and related bioactivity opportunities as an anti-inflammatory. The sample was extracted by hexane and ethyl acetate and subjected to different chromatographic separation methods and sterol identification with the Liberman-Burchard reagent. Terol composition of extract analyzed using gas chromatography (GC) equipped with flame ionization detector (FID) and gas chromatography-mass spectrometry (GC-MS). Cholesterol, fucosterol, and cholesta-4,6-dien-3-ol, 3b-benzoate as the dominant sterol found pada in four sterol fraction of *Caulerpa racemosa* (Forsska) J. Agard and oxidized sterol were also found. Oxidized sterol and fukosterol are a group of sterols that have anti-inflammatory properties. Therefore, the sterol fraction extracted from *Caulerpa racemosa* (Forsska) J. Agard. in this study puya potesi was developed as an anti-inflammatory.

Keywords: *Caulerpa racemosa* (Forsskal) J. Agardh., inflammatory, Gulf of Boni

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GREEN SYNTHESIS OF ZnO NANOPARTICLES AS AN ANTIMICROBIAL SUBSTANCE USING SPINACH EXTRACT

*Nisfiar Sya'bana Nur Fadilah1, Lizda Johar Mawarani1**

1 Departement of Engineering Physics, Faculty of Industrial Systems, Institut Teknologi Sepuluh Nopember Indonesia
*Corresponding author: *lizda@ep.its.ac.id*

ABSTRACT

Green synthesis is a new approach in the nanoparticle synthesis process which is environment-friendly and economical. One of the materials used in green synthesis is plants, and spinach is one of them, which can be used as a bioreductor because of its flavonoid content. To understand the potential use of the spinach as a reducing agent, a research is conducted. In this research, the green synthesis of zinc oxide nanoparticles (ZnO) is done using spinach leaf extract as a reduction agent. The varied variables in this research are synthesis temperature and the amount of spinach filtrate. The result of the characterization of the samples made in this research shows that the ZnO nanoparticle is successfully made and has the size of an aggregated nanoparticle of 226,6 nm. According to UV-Vis spectroscopy result, of all the samples of filtrate amount variation, sample with 10 mL of spinach filtrate has the highest absorption rate, while sample with synthesis temperature of 60 ºC has the highest absorption rate of all the samples of synthesis temperature variation. According to FTIR spectroscopy result, the absorption peaks at 445 cm^{-1}, 449 cm^{-1}, 665 cm^{-1} and 672 cm^{-1} contain Zn-O bonds. This means that the extract of spinach leaves can be used as a bioreductor in the green synthesis of ZnO nanoparticles. The antimicrobial nature of ZnO nanoparticles is observed with antimicrobial testing using e. coli bacteria-filled disc and the best antimicrobial activity is found to be owned by the sample which is synthesized at a temperature of 80 ºC with a spinach filtrate amount of 10 mL. The sample creates a zone of inhibition (ZOI) of 3,45 ± 1,36 mm.

Keywords: nanoparticle (NPs), green synthesis, zinc oxide (ZnO), flavonoid, antibacterial activity

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Synthesis of mesoporous silica derived from extracted natural template (*Sapindus rarak*) for biofuel production

Khawiyatur Riv'ah Agustina[1], Holilah Holilah[1], Hasliza Bahruji[2], Reva Edra Nugraha[3], Widya Nur Safitri[1], Didik Prasetyoko[1]*
[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya, 60111, Indonesia
[3]Centre of Advanced Material and Energy Sciences, Universiti Brunei Darussalam, Jl. Tungku Link, BE 1410, Brunei
[3]Department of Chemical Engineering, Faculty of Engineering, Universitas Pembangunan Nasional "Veteran" Jawa Timur, Surabaya, 60294, Indonesia
*Corresponding author: didikp@chem.its.ac.id

ABSTRACT

Mesoporous silica has been successfully synthesized via natural template using Sapindus rarak extract as directing agent. The effects of porosity and catalytic activity of mesoporous silica were determined for deoxygenation of biofuel. In this research mesoporous silica catalysts were prepared via hydrothermal method at 100 °C and various solvents (water and ethanol) of Sapindus rarak extract. The character of mesoporous structure of the sample were characterized by Fourier Transform Infrared (FTIR), X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM) and N_2 adsorption-desorption. Based on FTIR spectra and X-ray diffraction pattern showed mesoporous silica. N_2 adsorption-desorption analysis showed that surface are of mesoporous silica of sapindus rarak ethanol extract was 659 m^2/g with pore volume 0.75 cm^3/g and a pore diameter of 6.55 nm. Catalytic performance mesoporous silica was used for deoxygenation reaction of waste cooking oil showed an excellent catalytic performance and produced biofuel yield (26.3%) and selectivity towards long-chain (C_{11}-C_{18}) green diesel hydrocarbon.

Keywords: Keywords: Mesoporous, silica, Sapindus rarak, organic template.

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Identification of Pogostemon Cablin Benth Plant Essential Oil

Maulidella1, Sri Fatmawati1, Mardi Santoso1*

1 Master program, chemistry department, faculty of science and data analytics, Institut technology sepuluh nopember
*Corresponding author: fatma@chem.its.ac.id

ABSTRACT
Pogostemon cablin Benth (Nilam) is an aromatic herbal plant that is cultivated to produce high value essential oils and is also one of the medicinal plants in Indonesia. The importance of carrying out scientific research on essential oil-producing plants and tropical medicinal plants, so this study aims to screening phytochemicals in the essential oil of *P. cablin* plants. The research method used was the distillation of 3 variables of patchouli oil using distilled water to determine the % yield of the essential oil produced compared to commercial patchouli oil as a variable 4. The test used GC-MS and HPLC chromatogram so that the components of the core compound and its derivatives could be analyzed. Based on GC-MS data from variable 1, 30 compounds were obtained with the major compounds being patchouli alcohol 21.79%, Alpha-Santalol 16.27% and Alpha-Bulnesen 12.69%. Variable 2 obtained 24 compounds with major compounds Patchouli Alcohol 58.63%, Alpha-Bulnesen 8.51%, and Alpha.-Guaiene 7.34%. Variable 3 obtained 24 compounds with major compounds Patchouli Alcohol 68.15%, Delta-Guaiene 4.80% and Seychellene 4.80%. Variable 4 obtained 29 compounds with major compounds Patchouli Alcohol 61.30%, Alpha-Bulnesen 7.75% and Alpha.-Guaiene 5.79%.

Keywords: *Pogostemon cablin Benth, essential oil, phytochemical analysis, patchouli alcohol.*

The 5th ISOC 2022

The CO_2/CH_4 Gas Separation Performance through Poly(phenylene sulfide sulfone) Membrane : A Computational Study

Afdhal Junaidi[1], Nurul Widiastuti[1], Triyanda Gunawan[1]*

[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya 60111, Indonesia
**Corresponding author: nurul_widiastuti@chem.its.ac.id*

ABSTRACT

A novel membrane, poly(phenylene sulfide sulfone – PPSS), is proposed to be used for gas separation, particularly for carbon dioxide (CO_2) and methane (CH_4). PPSS has excellent mechanical, thermal, and chemical properties, and the main constituent sulfides and sulfones are superior in the separation of CO_2 and CH_4. Molecular dynamics (MD) and Grand Canonical Monte Carlo (GCMC) simulation methods were performed by using material studio 2020 (MS) software. These computational approaches are able to evaluate the transport properties and morphology of membranes prior to conducting empirical research to obtain solid data on the performance of gas separation. The COMPASS force field, NPT, and NVT ensembel were used to predict the diffusivity and solubility in order to obtain the permeability and selectivity of CO_2 and CH_4 gases through PPSS membranes and also PSF membranes. Since the PSF membrane is well-known for its use for gas separation. The parameters radial distribution function (RDF), X-Ray Diffraction (XRD), and equilibrium density have been calculated and satisfactory results have been obtained. The PPSS membrane has the potential to be used as a gas separation membrane.

Keywords: Poly(phenylene sulfide sulfone), Molecular Dynamics, Monte Carlo, CO_2/CH_4 separation

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Preparation of Membrane Polymer Electrolyte from PVA/Nanocrystalline Cellulose/$LiClO_4$ as Separator for Lithium Ion Battery

*Endah Purwanti[1], Deana Wahyuningrum[2], Achmad Rochliadi[1], and I Made Arcana[1]**

[1]Inorganic and Physical Chemistry Research Groups, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Jl. Ganesha No10 Bandung 40132, Indonesia
[2]Organic Research Groups, Faculty of Mathematics and Natural Sciences, *Institut Teknologi Bandung, Jl. Ganesha No10 Bandung 40132, Indonesia*
*Corresponding author: arcana@itb.ac.id

ABSTRACT

The development of renewable energy from the battery that can store large capacity energy will be increased. Lithium-ion battery is the best battery to be developed because it has a high energy density and long cycle life, and also it is lighter than lead acid, Ni-Cd, and Ni-MH batteries. Generally, the lithium-ion battery uses a liquid electrolyte which has some disadvantages, such as the limited operating temperature range, the frequent occurrence of an explosion and also the cause of electrode corrosion. Therefore, it is necessary to be developed lithium-ion battery based on a polymer electrolyte membrane to minimize the shortage. The polymer electrolyte membrane with PVA as a polymer matrix base material and lithium perchlorate ($LiClO_4$) as an ionic salt in various compositions still has a relatively low ionic conductivity, so it needs to be modified by adding a nanocrystalline cellulose obtained from hydrolysis cellulose of corncob. The aim of this study is to obtain the information about the influence of $LiClO_4$ compositions and the addition of the nanocrystalline cellulose on the characteristics of the resulting polymer electrolyte membrane with PVA base material. Based on infrared data, the pattern of infrared absorption for the polymer electrolyte membrane of PVA/$LiClO_4$ in various compositions of $LiClO_4$ are not different significantly, and also for the polymer electrolyte membrane of PVA/$LiClO_4$ after the addition of the nanocrystalline cellulose in various compositions.The optimum condition of PVA/$LiClO_4$ polymer electrolyte membrane based on ionic conductivity and mechanical properties was obtained in the membrane composition of the PVA/$LiClO_4$ at 85/15 (% w/w). The polymer electrolyte membrane of PVA/$LiClO_4$ after the addition of the nanocrystalline cellulose, the optimum condition was obtained in

membranes with the PVA/$LiClO_4$/nanocrystalline cellulose composition of 80/15/5 (% w/w) with ionic conductivity 1.66 x 10^{-4} S/cm. Based on the analysis of TGA thermogram, the polymer electrolyte membrane synthetized with the PVA/$LiClO_4$/nanocrystalline cellulose composition of 80/15/5 is relatively thermally stable. The small amounts addition of nanocrystalline cellulose can improve the ionic conductivity and mechanical properties of the membrane, but it practically is not changed the thermal stability of the membrane. Therefore, the polymer electrolyte membrane of PVA/$LiClO_4$/nanocrystalline cellulose can be potentially used as a polymer electrolyte membrane for the lithium-ion battery application.

Keywords: polymer electrolyte, PVA, nanocrystalline cellulose, $LiClO_4$, lithium-ion battery.

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Characteristics and performance of phytosynthesised ZnO-NPs as a potential diosgenin nanocarrier

Oktavina Kartika Putri1,2, Lina Oktavia Rahayu2, Yuly Kusumawati1,, Arif Fadlan1, and Mardi Santoso1*

1 Department of Chemistry, Sepuluh Nopember Institute of Technology (ITS), Surabaya, 60111, Indonesia
2 Department of Pharmacy, Academy of Pharmacy of Putra Indonesia Malang, Jalan Barito, Malang, 65122, Indonesia
*Corresponding author: *y_kusumawati@chem.its.ac.id*

ABSTRACT

Diosgenin has been reported to be able to overcome various health disorders such as arthritis, asthma, cancer, cardiovascular disease, and diabetes. The use of Zinc oxide (ZnO) nanocarrier is expected to increase the bioavailability of diosgenin. This study reported the preparation of ZnO nanoparticles (ZnO-NPs) by phytosynthesis technique mediated by Hibiscus tiliaceus leaf extract (HLE), characterization of phytosynthesised ZnO-NPs, preparation then the characterization of ZnO-NPs and diosgenin composites (ZnO-NPs/diosgenin), and evaluation of diosgenin release from ZnO-NPs/diosgenin. ZnO-NPs were synthesized through a phytosynthetic method mediated by HLE and zinc acetate as precursors. To determine the characteristics of ZnO-NPs, X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, and scanning electron microscopy (SEM) evaluations were carried out. To explore the characteristics of ZnO-NPs/diosgenin, FTIR spectroscopy, thermogravimetry/differential thermal analysis (TG/DTA), and diosgenin release were conducted. XRF and FTIR spectra showed that the phytosynthesised ZnO-NPs were pure. The particle size of the phytosynthesised ZnO-NPs included in the nanoparticle scale was confirmed via SEM images. In conclusion, ZnO-NPs/diosgenin showed a distinctive and potential character as a diosgenin delivery system and nanocarrier based on FTIR and DT/TGA spectra, as well as diosgenin release studies.

Keywords: *diosgenin, nanocarrier, ZnO nanoparticles, ZnO-NPs/diosgenin*

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The Profiles of Gaharu Bouya Oil from Gonystylus bancanus

Ika Oktavianawati[1],[2], Martsiano Dirgantara[3], Mardi Santoso[1], Sri Fatmawati[1]

[1]Dept. Chemistry, Fac. Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Kampus ITS, Sukolilo, Surabaya, 60111
[2]Dept. Chemistry, Fac. Math and Sciences, Universitas Jember, Kampus Tegalboto, Jember, 68121
[3]CV. Padaelo Sejahtera, Sendangtirto, Sleman, Yogyakarta
*Corresponding author: fatma@chem.its.ac.id (SF)

ABSTRACT

Gaharu bouya oil, which is commonly known as agarwood bouya; gaharu buaya or crocodile agarwood; and aetoxylon oil, can be obtained from distillation of the woods from *Gonystylus* and *Aetoxylon* genus. Ramin wood from *Gonystylus bancanus* species has become a source of gaharu bouya oil which attracts essential oil industry interest nowadays. However, the information related to the profile of gaharu bouya essential oil is limited. The presence of *Gonystylus* species is also in critically endangered status on the IUCN Red List. Therefore, exploration of the -omics profiles of *G. bancanus*, as a native plant from Borneo Island, is important for Indonesia as a way in conserving the population. This research investigated the metabolite profiling of *G. bancanus*, especially volatile components of its essential oils. Distillations were performed in two technical ways to obtain the oils: hydrodistillation for 6 hours in laboratorium scale, and steam distillation for 20 hours in industrial scale. According to LC-MS and GC-MS profiles, both essential oils displayed similar chemical compositions. This article also discusses about the similarity of the chemical contents on gaharu bouya oil and agarwood oil from gaharu superior type (*Aquilaria*) to support the value of the oil.

Keywords: *Gaharu buaya,* crocodile agarwood, Gonystylus bancanus, ramin, metabolomic

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SYNTHESIS OF ZINC OXIDE NANOPARTICLES (ZnO) BY POLYOL METHOD FOR CONCENTRATION REDUCTION OF MALACHITE GREEN AND RHODAMINE B DYE VIA PHOTOCATALYTIC

Ceisar Andrian Putra[1], Riki Subagyo[1], Yuly Kusumawati[1]*

[1] Chemistry Department, Institut Teknologi Sepuluh Nopember
*Corresponding author: y_kusumawati@chem.its.ac.id

ABSTRACT

Zinc oxide nanoparticles (ZnO-P) were synthesized using the polyol method as a photocatalytic agent carried out with concentration of Zn^{2+} (z) = 0,5 mol/L, base ratio to Zn^{2+} (b) = 1, and ratio of H_2O to Zn^{2+} (h) = 5 (ZnOP-A) and 20 (ZnOP-B) for concentration reduction of malachite green and rhodamine B dyes. ZnO-P was characterized by X-Ray Diffraction (XRD), Field Emission Scanning Electron Microscopy (FESEM), UV-Diffuse Reflectance (UV-DRS), and Fourier Transform Infrared (FT-IR). The characterization results showed that the ZnO-P synthesized through the polyol method had a hexagonal crystal structure, particle size less than 100 nm, and had a band gap energy (E_g) around 3,2 eV. The obtained particles have different shapes according to the hydrolysis ratio. Particles synthesized with a hydrolysis ratio = 5 (ZnOP-A) had a spherical shape and slightly elongated, while the particles synthesized with a hydrolysis ratio = 20 (ZnOP-B) had a conical shape. Zinc oxide nanoparticles were tested for their photocatalytic activity for concentration reduction of malachite green and rhodamine B dyes, the concentrations are 20, 30 and 40 mg L^{-1} under UV-LED irradiation. It was found that the particle size and morphology affect the performance of the particles in decreasing the dye concentration. The biggest concentration reduction of rhodamine b dye by zinc oxide nanoparticles (ZnOP-A) was 98,454% within 12 minutes of irradiation, while for malachite green dye was 99,030% within 120 minutes of irradiation.

Keywords: *Zinc oxide nanoparticles, polyol, photocatalytic, malachite green, rhodamine b.*

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Synthesis, Characterization and Photocatalytic Properties of $H_6P_2W_{18}O_{62}/TiO_2$ Composites

Syahman Zhafiri[1], Triyanda Gunawan[1], Nurul Widiastuti[1]

[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya 60111, Indonesia
**Corresponding author: nurul_widiastuti@chem.its.ac.id*

ABSTRACT

Water contamination has become an increasingly severe issue, threatening human health and lowering quality of life. Synthetic dyes, one of the sources of water contaminant, have a stable and complicated structure making them difficult to breakdown. Photocatalytic methods have shown to be an efficient and straightforward solution to this problem. To provide a new photocatalyst to deal with water contamination caused by dyes, a $H_6P_2W_{18}O_{62}/TiO_2$ composite was synthesized and characterized. The $H_6P_2W_{18}O_{62}$, or P_2W_{18}, is a Dawson type Polyoxometalate (POM) which has photocatalytic activity that can be used to degrade organic compounds in water. In this research, P2W18/TiO2 composite was synthesized by sol-gel and calcination method and characterized by Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), scanning electron microscopy (SEM) and ultraviolet-visible diffuse reflectance spectroscopy (UV-vis DRS). The $H_6P_2W_{18}O_{62}/TiO_2$ composite could be an alternative material for degradation of dyes in water.

Keywords: Photocatalytic, Polyoxometalate, Wells-Dawson, TiO_2

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Antioxidant and antibacterial activities of *Curcuma aeruginosa* and *Curcuma zedoaria* Rhizomes extracts

Wiwit Denny Fitriana[1], Devi Anggraini Putri[2], Norma Farizah Fahmi[2], Dhimas Pramayoga Sinatra[2], Rizka Efi Mawli[2], Sri Fatmawati[3]*

[1] Faculty of Science and Technology, Universitas PEsantren Tinggi Darul Ulum Jombang 61481, Indonesia
[2] Department of Medical Laboratory Technology, Sekolah Tinggi Ilmu Kesehatan Ngudia Husada Madura, Kampus STIKes NHM Mlajah Bangkalan 69111, Indonesia
[3] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Kampus ITS Sukolilo Surabaya 60111, Indonesia
*Corresponding author: wiwitdenny@mipa.unipdu.ac.id

ABSTRACT

Curcuma aeruginosa and Curcuma zedoaria, recognized as Temu ireng and Temu Putih, is widely used as traditional herbal in Indonesia. Many biological activities and secondary metabolites of *Curcuma aeruginosa and Curcuma zedoaria* had been reported. This research was aimed at the antioxidant and antibacterial activities of *Curcuma aeruginosa and Curcuma zedoaria* rhizomes extracts using ethanol solvents. The ethanol extracts have been evaluated their antioxidant activities by using 2,2-diphenyl-1-picryl-hydrazyl (DPPH) method. While, the antibacterial activity has been determined by using colorimetric resazurin microtiter assay (REMA) method. Furthermore, the extracts have been assayed their antibacterial activities against both gram-positive and negative bacteria. This research showed that *Curcuma aeruginosa and Curcuma zedoaria* rhizomes extracts has potency as antioxidant and antibacterial.

Keywords: *Curcuma aeruginosa, Curcuma zedoaria,* antioxidant, antibacterial, DPPH, REMA

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The Effects of ZIF-8/TiO_2 and ZIF-8/Chitosan composite materials on the photodegradation reaction of Methylene Blue under visible light

Lely Kurniawati[1)], Hamzah Fansuri[2)], Ratna Ediati[3)], Yuly Kusumawati[4)]

[1)] University of Mataram Lombok NTB
[2),3),4)] Institute Of Technology Sepuluh November Surabaya
CP: tiaravanda96@gmail.com

Abstract

In this study, ZIF-8/TiO_2 and ZIf-8/Chitosan were both promising modified MOF candidates to act as photocatalysts in the photodegradation reaction of dye waste, especially Methylene Blue. The increase in photocatalyst activity of the two materials requires absorption of visible light so that they can work effectively and simultaneously on the photodegradation reaction of dyestuffs. In addition to increasing photocatalyst activity, it is also hoped that the results of photodegradation reactions are compounds that are harmless and environmentally friendly, especially the aquatic environment. Material characterization and analysis using UV-VIS, FTIR, XRD, SEM and Spectrophotometry reactors. The results of all analyzes showed significant differences between the two materials, ZIF-8/TiO_2 was more effective in its photocatalytic performance compared to ZIF-8 Chitosan.

Keywords: ZIF-8/TiO_2, ZIF-8/Chitosan, Photocatalyst, Photodegradation

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Synthesis of 4-methoxyphenethyl (E)-3-(2-methoxyphenyl)acrylate by Shiina method

*Kresentia Verena[1], Mardi Santoso[1]**

[1] Master Program, Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh November, Surabaya, Indonesia
*Corresponding author: tsv09@chem.its.ac.id

ABSTRACT
Cinnamic acids are widely used in cosmetics since they have bioactivity such as antioxidants and antimicrobials. Moreover, they are also used in fragrance as well as sunscreen composition for their ability to filter and absorb UV. As the chemistry of odorants always evolves each year, there is a need to discover new molecules thus a new profile of sensory. While 4-methoxyphenethyl alcohol is known for its powdery notes, esters are known for its fruity notes. A derivative of 4-methoxyphenethyl alcohol could give a new profile aroma. An ester derivative of 4-methoxyphenethyl alcohol and 4-methoxycinnamic acid was obtained rapidly by Shiina methods reaction in a yield of 35.2%. It was then elucidated structurally by NMR, mass, and IR spectroscopies.

Keywords: esterification reaction, 4-methoxyphenethyl ester, cinnamic acid

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Biosynthesis and Characterization of ZnO Nanoparticles Using Lemongrass Extract

Tjokorde Walmiki Samadhi, Vita Wonoputri, Selli W. Astuti, David T. Widagdo*

Faculty of Industrial Technology, Institut Teknologi Bandung
*Corresponding author: twsamadhi@che.itb.ac.id

ABSTRACT
Biosynthesis of ZnO nanoparticles for antibacterial applications was undertaken by mixing zinc nitrate solution and extract of lemongrass (*Cymbopogon citratus*) stalk, which acted as reducing and capping agent. Extraction was done at 98 °C for 15 minutes, as guided by analysis of extract aliquots by UV-Vis spectrophotometry. The same analytical method was also used to identify the formation of zinc nanoparticles in the reaction mixture. Phase characterization of the final dried product using XRD confirmed the formation of ZnO in the wurtzite structure. Particle size medians measured using DLS were in the order of several hundred microns, indicating severe agglomeration which was also confirmed by particle morphology characterization by TEM. Antibacterial and antibiofilm activities were measured using Escherichia coli ATCC 25922 as the model organism. All biosynthesized nanoparticles exhibited enhanced antibacterial and antibiofilm activities compared to the reference commercial ZnO nanoparticle. These results suggest that biosynthesis using lemongrass extract is a viable pathway for low-cost synthesis of ZnO nanoparticles, with the added benefit of enhanced antimicrobial activity.

Keywords*:* nanoparticles, zinc oxide, antibacterial, biosynthesis, plant extract

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THE EFFECT OF ADDING PLASTIC WASTE AND FIBER ASH COCONUT AS CONCRETE AGGREGATE ON MECHANICAL CHARACTERISTICS OF COMPOSITE CONCRETE MATERIALS

Dyah Sawitri, S.T., M.T.[1], Febrian Kurniawan[1], Josua Margandatua Hutapea[1], Ir. Zulkifli, M.Sc.[1]

[1] Departement of Engineering Physics, Sepuluh Nopember Institute of Technology
Corresponding author: *josuahutapea.17023@student.its.ac.id*

ABSTRACT

Research has been conducted on adding a mixture of Polyethylene Terephthalate (PET) and Coconut Fiber Ash (CFA) as a substitute for fine aggregate to see the characteristics of composite concrete. Variations were made to increase the weight percentage of PET by 3%, 5%, and 8% and use CFA by weight percentages of 5%, 10%, and 15% to replace the fine sand aggregate. This study uses a standard concrete mix design by SNI 03-2834-2000, which consists of sand, stone, cement, and water. The test object is cylindrical with a diameter of 10 cm and a height of 20 cm. The tests carried out are concrete density test, compression test, split tensile test, and analysis of the rule of the mixture of composite materials. This test was carried out when the concrete was 28 days old. The test analysis found that the more a mixture of PET and CFA to the concrete, the lower the compressive strength, split tensile strength, and modulus of elasticity of concrete. The best value occurred in the percentage of the weight of the mixture of PET 3% and CFA 5% resulting in a concrete compressive strength of 19.48 MPa, a split tensile strength of 6.86 MPa, and an elastic modulus of 19,993 GPa.

Keywords: composite concrete, Polyethylene Terephthalate (PET), Coconut Fiber Ash (CFA), compressive strength, split tensile strength

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Synthesis and Characterization of Mesoporous Silica Nanoparticles (MSN) Modified by Hydrazone as Drug Delivery

*Moch. Nurhasan[1], Fajar Nurharyadi Dwiyono[1], Dias Nur Arista[1], Nur Rahmayanti Affifah[1], Yusuf Syahril Alam1, Fahimah Martak1, Arif Fadlan[1]**

[1] Department of Chemistry, Faculty of Science and Data Analytical, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia
*Corresponding author: afadlan@chem.its.ac.id

ABSTRACT
Mesoporous Silica Nanoparticles (MSN) modified by hydrazone has been successfully synthesized through sol-gel and reflux methods. Characterization using a particle size analyzer indicates MSN size of 30.14 nm. Characterization using BET surface area analyzer is expected to indicate the presence of a hysterisis loop that is categorized as mesoporous. The FTIR characterization is expected to show the presence of MSN and Hydrazone's bond, indicated by the loss of the carbonyl group. Characterization using zeta potential is predicted to show a positive charge of the MSN–Hydrazone surface, so that it can bind to anionic drugs such as doxorubicin. The release of doxorubicin drugs from MSN–Hydrazone carrier materials is predicted to work optimally on acidic pHs that are suitable for the endosome conditions of cancer cells, so that nanoparticle formulations on MSN–Hydrazone are efficient in increasing the bioavailability of drugs.

Keywords: Bioavailability, Doxorubicin, Hydrazone, Mesoporous Silica Nanoparticles

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Biotransformation of DDT by White-rot Fungus Ganoderma lingzhi

Erly Grizca Boelan[1], Adi Setyo Purnomo[2], Ichiro Kamei[3]

[1] Department of Chemistry Education, Faculty of Teacher Training and Education. Universitas Katolik Widya Mandira, Jl. San Juan Penfui, Kupang, Indonesia
[2] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Kampus ITS Sukolilo, Surabaya, Indonesia
[3]Department of Forest and Environmental Science, Faculty of Agriculture, University of Miyazaki, 1-1, Gakuen-kibanadai-nishi, Miyazaki, Japan
**Corresponding author: adi_setyo@chem.its.ac.id*

ABSTRACT

DDT (1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane) is one of the persistent organic pollutants (POPs) extensively used in 1940s for pest control and some diseases such as malaria and dengue. Although since the 1990s the use of DDT has been restricted in Indonesia, the residue of DDT persists in the environment and has a negative impact on animals and humans. In this study, DDT was metabolized with white-rot fungus Ganoderma lingzhi. DDT was degraded approximately 53% by G. lingzhi in potato dextrose broth (PDB) medium for 7 days incubation. The metabolites were identified by using gas chromatography/mass spectrometry (GC/MS). This fungus transformed DDT to at least two metabolites namely DDD (1,1-dichloro-2,2-bis (4-chlorophenyl) ethane) and DDE (1,1-dichloro-2,2-bis (4-chlorophenyl) ethylene). The results indicated that G. lingzhi has a potential ability to degrade DDT in the environment.

Keywords: Biotransformation, Biodegradation, DDT, Ganoderma lingzhi

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Design, Synthesis, and Biological Evaluation of 5-Substituted 2-Thiohydantoin with methyl benzaldehyde in ortho/para position

*Miftahul Jannah[1], Febiola Putri Utami[1], Yusuf Syahril Alam[1], Arif Fadlan[1], and Fahimah Martak[1]**

[1] Department of Chemistry, Faculty of Science and Data Analytical, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia
*Corresponding author: fahimahm@chem.its.ac.id

ABSTRACT

The derivative 2-thiohydantoin has exhibited some interesting biological properties such as antimicrobial, antifungal, antihypertensive, antiviral, anticonvulsant, and anticancer. In this study, two derivatives of the compound (5-arylmethylene)-2-thiohidantoin have been successfully synthesized. The carbon atom part of the methylene of the compound 2-thiohidantoin is modified with an allyl group incorporated in the framework of the conjugated double bond "methyl benzaldehyde" at the ortho and para positions. The synthesized ligands show a narrow range in melting point testing, namely 280-281 °C and 284-286 °C. After that, the material is characterized by IR, ^{1}H-NMR, ^{13}C-NMR, and ESI-MS. The product that has been obtained is predicted to have antibacterial activity.

Keywords: 2-thiohydantoin, Antibacterial, Arylmethylene, Methyl benzaldehyde.

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Spectral Characterization and Bioactivity of 5-(2-nitrobenzylidene)-2-thiohydantoin and 5-(4-nitrobenzylidene)-2-thiohydantoin

*Febiola Putri Utami[1], Yusuf Syahril Alam[1], Miftahul Jannah[1], Arif Fadlan[1], and Fahimah Martak[1]**

[1] Department of Chemistry, Faculty of Science and Data Analytical, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia

*Corresponding author: fahimahm@chem.its.ac.id

ABSTRACT

(5-nitrobenzylidene)-2-thiohydantoin and 5-(4-nitrobenzylidene)-2-thiohydantoin have been successfully synthesized by condensation reactions between aromatic aldehydes and 2-thiohydantoin. Based on the results of the TLC test, one spot has been obtained which indicates the purity of the product. The ligands that have been formed are then tested for structure using the melting point test resulting in a melting temperature exceeding 400 °C, functional group analysis using FT-IR, proton and carbon analysis using NMR, and mass spectrometer. In addition, the material was tested for antibacterial using the diffusion method. Based on antibacterial testing, both compounds are predicted to have antibacterial activity.

Keywords: Antibacterial, 2-thiohydantoin, Condensation, Aromatic Aldehyde

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Antibacterial Activity of 5-(2-methoxybenzylidene)-2-thiohydantoin and 5-(4-methoxybenzylidene)-2-thiohydantoin

*Heni Masitoh[1], Yusuf Syahril Alam[1], Dias Nur Arista[1], Fajar Nurharyadi Dwiyono, Arif Fadlan[1], and Fahimah Martak[1]**

[1] Department of Chemistry, Faculty of Science and Data Analytical, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia
*Corresponding author: fahimahm@chem.its.ac.id

ABSTRACT
The compound 2-thiohydantoin is one of the ligands that has an important role in its application in the field of medicinal chemistry. Changes in the descriptor on the carbon atom of the methylene 2-thiohydantoin compound in this study were due to modifications with the allyl group which was double bonded conjugated to the methoxy group (-OCH_3) in the ortho and para positions. The 2-thiohydantoin derivative compound that is formed provides significant advantages with several interesting biological activities including being proven as anticonsulvan, antibacterial, antifungal, antiviral, and anticancer. Qualitative analysis of 2-thiohydantoin derivatives was carried out using Thin Layer Chromatography (TLC) to determine the product formed and the purity of the compound. The results of the synthesis show one spot on the product section which indicates that the synthesis has been successfully carried out and a pure compound is obtained. The compound purity test is also carried out through a melting point test where the narrower the melting point range, the higher the purity of the compound. The results of the melting point test for 4-OCH_3 and 2-OCH_3 compounds, respectively, were 287-290 °C and 260-262 °C. After that, the obtained ligands were characterized by FTIR to determine the functional group, NMR to determine the structure of the ligand, and MS to determine the relative molecular mass (Mr). Then an antibacterial test was carried out using the diffusion method and the synthesized product was predicted to have antibacterial activity.

Keywords: Antibacterial, 2-thiohydantoin, condensation, aromatic aldehyde

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Antiviral Activity of Hydrazone Derivatives Based Benzohydrazide/2-thiohydantoin Analogs Against HPV-16 (Human Papillomavirus) : *In Silico Study*

*Syafri Izzat Abidiy[1], Triyanda Gunawan[1], Yusuf Syahril Alam[1], Adi Setyo Purnomo[1], Arif Fadlan[1], and Fahimah Martak[1]**

[1] Department of Chemistry, Faculty of Science and Data Analytics, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia
*Corresponding author: fahimahm@chem.its.ac.id

ABSTRACT

The prevalence of cervical cancer remains at the top of the rankings in the world threatening millions of women's lives, especially in Indonesia. However, the growth of cervical cancer can be prevented in the presence of compounds with good and antiviral activity. This study was performed in silico by binding a hydrazone ligands molecule to the HPV-16 (Human papillomavirus) (ID: 4XR8) on the C and F chains. The ligand compounds were first drawn with 3D structures using Avogadro then geometric optimization and frequency calculations were carried out with B3LYP/6-31G* using Gaussian 16. Molecular docking is carried out specifically on a predetermined binding site with a grid box size and spacing are 40 x 40 x 40 and 0.5, respectively and performed on Autodock 4 ver. 1.5.7. The best docking results were obtained in the ligand-protein complex of the 2A ligand with affinity energy and inhibition constant are -8.49 kcal/mol and 0.599 μM, respectively. Visualization analysis of docking results were performed using the web servers PLIP Tools and Proteins Plus Server which provided information on the interaction of residual amino acids formed and drug score from each ligand-protein complex. Based on the results of the analysis, the complex compound hydrazone-derived ligand-protein has the potential to be antiviral drug in cervical cancer.

Keywords: HPV-16, molecular docking, hydrazone, cervical cancer

The 5th ISOC 2022

Preparation, Characterization, and Anticancer Profile of *N'*-(E)-benzylidenebenzohydrazide and *N'*-(E)-(2-methylbenzylidene)benzohydrazide

*Nur Rahmayanti Affifah[1], Vinda Aprilia Nurul Andifa[2], Awik Puji Dyah Nurhayati[2], Fahimah Martak[1], Arif Fadlan[1], and Yusuf Syahril Alam[1]**

[1] Department of Chemistry, Faculty of Science and Data Analytics, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia
[2] Department of Biology, Faculty of Science and Data Analytics, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia
*Corresponding author: yusufsyahrilalam31@gmail.com

ABSTRACT

Two aroylhydrazones ligands L (L in general; in detail, L1 = *N'*-(E)-benzylidenebenzohydrazide and L2 = *N'*-(E)-(2-methylbenzylidene)benzohydrazide) based benzohydrazide and aromatic aldehyde have been successfully synthesized with yield of 26% and 70%. The obtained product were confirmed using different spectroscopic techniques, such as fourier transform infrared (FTIR), ^{1}H and ^{13}C NMR, and ESI-MS. The FTIR spectra showed that both materials have secondary amine peaks; -CH sp^2 aromatic; carbonyl; and azomethines respectively at wave numbers 3177-3224; 3059-3061; 1639-1640; and 1552-1578 cm^{-1}. The NMR technique shows that L1 and L2 are E-isomer on the -C=N- group. The mass spectra inform the relative molecular masses of L1 and L2. Hydrazone ligands showed substantial anticancer activity against MDA-MB 231 by MTT assay with the greatest toxicity (IC_{50}) value of 8.33 µM.

Keywords: Aroylhydrazone, anticancer activity, benzohydrazide, ligands, MDA-MB 231

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Lubricating Properties of Nyamplung-Oil (*Calophyllum inophyllum* L.) Glycerides and Their Effect on the Lubricity of Low-Sulfur Fossil Diesel

Yulfi Zetra[1], R. Y. Perry Burhan[1,2], Muhammad Salman Al Kahfi[1], R. Arizal Firmansyah[1]*

[1] Departement of Chemistry, Institut Teknologi Sepuluh Nopember, Kampus ITS Keputih, Surabaya 60111, Indonesia

[2] Departemen of Oil and Gas Processing Engineering, PEM Akamigas, Jl. Gajah Mada 38, Cepu, Blora 58315, Indonesia

*Corresponding author: *yfzetra@gmail.com*

ABSTRACT

The problem of lubricating low-sulfur fossil diesel in diesel engines is a significant concern because desulfurization removes important polar compounds from fossil diesel. Removing these polar compounds reduces the lubricity of fossil diesel. Hence adding additives is required. Using conventional additives from fossil fuels has low biological degradability and is unsustainable. Replacing conventional additives with non-edible vegetable oil-based bio-additives is a promising option. This research focuses on synthesizing Nyamplung Oil-Glycerides (NOG) bio-additives through a glycerolysis reaction between *Calophyllum inophyllum L.* methyl ester (CIME) and glycerol. The fatty acids composition of Nyamplung oil was identified using a Gas Chromatography-Mass Spectrometer (GC-MS). The fraction of NOG was identified using Gas Chromatography (GC) with a derivation process using MSTFA reagent according to the ASTM D6584-17 method. The lubricating properties of fossil diesel, NOG, and a mixture of both (0.2; 0.4; 0.6; 0.8; and 1.0 % v/v) were evaluated using the High-Frequency Reciprocating Rig (HFRR) instrument with the standard procedure of ASTM D6079-18. The NOG has a wear scar diameter (WSD) of 214 µm, a coefficient of friction (CoF) of 0.051, and an average film thickness of 86%. Adding 1.0 % v/v NOG to fossil diesel demonstrated good lubricity compared to fossil diesel without NOG. It is due to the effect of the fatty acids composition of nyamplung oil, which contains 71.04% unsaturated fatty acids such as linoleic acid (35.88%) and oleic acid (34.87%). Furthermore, the effect of the composition of the glycerides also determines the lubricating properties. The results showed that the composition of NOG consists of 64.81% monoglycerides (MG), 30.39% diglycerides (DG), and 4.80% triglycerides (TG). Hydroxyl groups on MG improved the lubricating

performance of low-sulfur diesel. Thus, NOG could potentially serve as a bio-additive for enhancing the lubricating properties of fossil diesel.

Keywords: Bio-additives; Diesel fuel; Glycerides; Lubricity enhancer; and Nyamplung oil

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Synthesis and Characterization of 2-thiohydantoin Derivatives by Hydroxyl Groups in Orto/Para Position and The Compound's Biological Activities

*Dias Nur Arista[1], Heni Masitoh[1], Fajar Nurharyadi Dwiyono[1], Yusuf Syahril Alam[1], Arif Fadlan[1], and Fahimah Martak[1]**

[1] Department of Chemistry, Faculty of Science and Data Analytical, Sepuluh Nopember Institute of Technology, Surabaya, Indonesia
*Corresponding author: fahimahm@chem.its.ac.id

ABSTRACT

The 2-thiohydantoin compound (2-thioxoimidazolidin-4-one) is a heterocyclic group that has an important role in drug chemistry, this compound is a precursor in the synthesis of amino acids. The activity ability of the 2-thiohydantoin derivative comes from descriptor changes, one of which is in the methylene carbon atom. Modifications of the 2-thiohydantoin derivative are intended to determine the quantitative relationship of structural changes to antibacterial and antifungal bioactivity. Carbon methylene atoms of 2-thiohydantoin are paired with a hydroxyl group with variations in the position of the ortho-hydroxyl group and para-hydroxyl group. The synthesized ligands were analyzed with TLC, FT-IR, NMR, ESI-MS, and antibacterial tests. Antibacterial testing of both ligands of synthesis results showed substantial activity against the bacteria *E. Coli* and *S. Aureus* by the disc diffusion method.

Keywords: Hydroxybenzaldehyde, 2-thiohidantoin, Biology Activities, Synthesis

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Optimization of Sun Protection Factor (SPF) by Varying the Composition of Lemongrass (*Cymbopogon nardus* L.) in Sunscreen Cream Based on Virgin Coconut Oil (VCO)

Ni Made Suaniti[1], Putu Udiyani Prayikaputri[1], I Nyoman Putu Riasa[2], and Ida Bagus Ketut Widnyana Yoga[1]

[1] Department of Chemistry, Faculty of Mathematics and Natutral Sciences, Udayana University, Bali Indonesia
[2] Department of Plastic Surgery, Faculty of Medicines, Udayana University, Bali Indonesia
*Corresponding author: madesuaniti@unud.ac.id

ABSTRACT

Sunblock cream was successfully made from virgin coconut oil with lemongrass powder and charcoal by varying the weight composition of lemongrass, such as 0%, 4%, 8%, 16%, and 32% for determining the effectiveness of Sun Protection Factor (SPF) value. Characterization was performed using FT-IR spectroscopy, showed that sunscreen cream contains citronellal as major active ingredients in lemongrass that act as aromatic compounds. Using UV-Visible spectrophotometry, we can determine the SPF value in wavelength range from 280 nm to 310 nm and the result showed that the types of lemongrasses, especially in powder gives the highest SPF value with composition 32%. From the data, we can conclude that this sunscreen cream can protect the skin maximally.

Keywords: lemongrass, sun protection factor, sunscreen, virgin coconut oil

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Preparation of Porous Geopolymer from Biomass Ash for Synthetic Dyes Adsorbent

Irna Rosmayanti[1] , Tjokorde Walmiki Samadhi[2]

[1] Balai Besar Keramik

[2] Chemical Engineering Department, Institut Teknologi Bandung

**Corresponding author: irna.rosmayanti@gmail.com*

ABSTRACT

Dyes removal in wastewater treatment is still become a major topic to ensure availability and sustainable management of clean water and sanitation (SDG 6). In Indonesia, dyeing and finishing activities in textile industry discharge 200,000 ton/year wastewater which contains hazardous toxic and non-biodegradable synthetic dyes which could accumulate on lands and in river causing ecological problems. Porous geopolymer is potential to be used as adsorbent of synthetic dyes due to its amorphous polymeric structure. Low manufacturing temperature (<100^{o}C) and waste recycling concept through utilization of industrial and agricultural waste such as fly ash and biomass ash gives added-value to geopolymer as eco-friendly adsorbent material. The objective of this study is to synthesize porous geopolymer from rice husk ash and evaluate its performance as an adsorbent for Indigo Carmine dye. Synthesis of porous geopolymer from rice husk ash was carried out using a 23 full factorial experimental design with center point replications to evaluate effects of Si/Al ratio of geopolymer precursor (1.5; 2.5; 3,5), molar ratio of alkaline activator (2.0; 2,5; 3.0) and concentration of H2O2 as geopolymer foaming agent (0.3; 0.6; 0.9) %-wt. Performance testing of porous geopolymer was carried out through the adsorption of Indigo Carmine at contact time of 24 hours. The morphological properties of the porous geopolymer were studied by using X-ray diffraction and Fourier transform infrared. Results show that porous geopolymer exhibited good properties as adsorbent with amorphous XRD pattern with one hump centered at 27-29^{o}. It was observed that the geopolymer synthesized at 1.5 Si/Al ratio, 2.0 molar ratio of alkaline activator and 0.9%-wt of H_2O_2 exhibited highest removal efficiency of Indigo Carmine up to 94.8%.

Keywords: porous geopolymer, rice husk ash, adsorbent, Indigo Carmine, wastewater treatment

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Fabrication and Characterization of Polycaprolactone-Hydroxyapatite Scaffold based on Indonesian Natural Resources for Bone TissueEngineering

Herlina Damayanti[1,2], Lia A. T. W. Asri[2], Kristanto Wahyudi[1], and Anita Yuliati[3]

[1] *Center for Ceramics, Ministry of Industry of Indonesia, Ahmad Yani 392, Bandung 40272, WestJava, Indonesia*

[2] *Material Science and Engineering Research Group, Faculty of Mechanical and AerospaceEngineering, Institut Teknologi Bandung, Bandung 40132, Indonesia*

[3] *Department of Dental Material, Faculty of Dental Medicine, Airlangga University, Mayjen Prof. Dr. Moestopo 47, Surabaya 60132, East Java, Indonesia*

*Corresponding author: herlinadamayanti49@gmail.com

ABSTRACT

Bone repair and regeneration using a three-dimensional scaffold based on biomaterials has been developed in tissue engineering. In this study, the scaffold based on polycaprolactone- hydroxyapatite (PCL/HA) composite has been successfully fabricated using the salt leaching method with NaCl as the porogen agent. The HA was obtained from Indonesian natural limestone and phosphoric acid through a wet precipitation process. PCL/HA scaffold produced heterogeneous pore sizes (small pores ~40 μm and large pores 100-300 μm) and pore interconnectivity that qualified as a bone scaffold. The fabricated PCL/HA scaffold showed non- toxic and supported the proliferation of osteoblasts. The bioactivity of the scaffold was characterized by the formation of an apatite layer on the surface of the scaffold after immersionin SBF solution. Based on the characterization results, it is shown that the PCL/HA scaffold hasthe potential to be applied to repair and regenerate bone defects.

Keywords: polycaprolactone, hydroxyapatite, Indonesian natural limestone, scaffold

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Utilization of Moringa Stem As a CaO Catalyst Mixer in Making Biodiesel

I Wayan Bandem Adnyana[1], Ni Made Suaniti[2], David Lie[1]

1 Department of Mechanical Engineering, Faculty of Engineering, Udayana University, Bali Indonesia
[2] Department of Chemistry, Faculty of Mathematics and Natutral Sciences, Udayana University, Bali Indonesia
*Corresponding author: bandem.adnyana@unud.ac.id

ABSTRACT

Fuel derived from petroleum is a non-renewable energy source, the existence of which is very limited so it is necessary to seek alternative fuels. Biodiesel as an alternative fuel in the manufacturing process can use Moringa stem as a catalyst mixture with CaO. The purpose of this study was to determine the effect of Moringa stems that received traditional cooking treatment, heating at a temperature of 600^{o}C with a duration of 3, 4, and 5 hours and without treatment in the process of making biodiesel with used cooking oil as the base material. The manufacturing method uses the esterification and transesterification process at a temperature of 60^{o}C, the analysis is proximate and FTIR. Proximately obtained in biodiesel the content of the highest volatile compounds in Moringa stem powder without treatment was compared to CaO alone and the FTIR spectrograms were similar with differences in absorption.

Keywords: biodiesel, CaO, Moringa stems

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The effect of MOFs on Properties and Performance of Poly(vinylidene) Flouride /GO based Mixed Matrix Membrane

Hari Agung Triadi[1], Mita Nurhayati, 1,2, Triyanda Gunawan3, Witri Wahyu Lestari[4], Fitri Khoerunnisa[1,],*

[1]Departemen Pendidikan Kimia, Universitas Pendidikan Indonesia
[2] Department of Advanced Science and Technology Convergence, Kyungpook National University, Sangju-si, Gyeongsangbuk-do, South Korea
[3] Department of Chemistry, Faculty of Science, Institut Teknologi Sepuluh Nopember, 60111 Surabaya, Indonesia
[4]Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Sebelas Maret
*Corresponding author: *fitri@upi.edu*

ABSTRACT

This study aims to determine the effect of Metal Organic Frameworks (MOFs) on properties and performance of Poly (Vinylidene fluoride)/GO based mixed matrix membranes for desalination. The membrane was synthesized using the mixed-matrix method at certain precursor's composition and non-solvent phase inversion casting (NIPs).The synthesized membrane was characterized using Fourier Transform Infrared (FTIR), hydrophilicity, and porosity measurement. The effect of MO on the membrane performance was evaluated using measurement of permeability (Pure Water Flux), permselectivity (rejection of dyes including methylene blue and rhodamine B, as well as salts including K_2CrO_4, $FeCl_2$, and $FeCl_3$ as mono, di, and trivalent cation, respectively) by means of crossflow method. The FTIR analysis indicated that chemical interaction of MOFs/GO with PVDF matrix was observed from the new absorptions at wavenumbers of ~3435 cm^{-1} and ~1639 cm^{-1}, which correspond to the -OH stretching vibration and -COO asymmetric stretching vibration. The porosity of the membrane notably increased from 15.5% to 46.5%. The contact angle decreased from 77.9° to 59.9° indicate the increase of membrane hydrophilicity as a result of MOF addition. The permeability of the composite membrane also increased with permeate water flux up to 74.2%. Permselectivity of the membrane also increased in line with MOFs concentration, up to 98.68% (methylene blue), 94.46% (rhodamine B), 61.31% (K_2CrO_4), 57.38% ($FeCl_2$), and 98.82% ($FeCl_3$). These results inferred that MOF addition into PVDF/ GO membrane increase the performance of the membrane.

Keywords: mixed matrix membrane, PVDF/MOFs/GO, permeability, permselectivity

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Effects of Zinc Oxide Powder Characteristics on Physical Sunscreen Performance

Vita Wonoputri[1], Tjokorde Walmiki Samadhi[1], Ibrahim Asysyafi'i Fauzi[1], Syafa Audika Ayu Anggini[1], Anita Fajrin[2], Nur Huda Arif Indiarto[2]
[1] Department of Chemical Engineering, Institut Teknologi Bandung
Jalan Ganesha 10, Bandung 40132, Indonesia
[2] Research and Development, PT Paragon Technology and Innovation, Banten, Indonesia
*Corresponding author: *vita@che.itb.ac.id*

ABSTRACT

High exposure to UV rays emitted by the sun can cause skin problems, such as irritation or even skin cancer. To minimize the damaging effect of UV rays, sunscreen use in daily lives is highly encouraged. Sunscreen can be divided into two types based on the active ingredients, physical and chemical sunscreen. Chemical sunscreens can cause allergies and skin sensitivities in some people, hence the use of physical sunscreen has gained attention recently. One active agent that is commonly used in physical sunscreen is zinc oxide (ZnO). In this paper, the effect of ZnO characteristics on sunscreen performance is studied. Three types of commercially available ZnO powder were used, namely SUNZnO-SA, Zano 10 Plus, ZnO Pharma.grade. All samples exhibited wurtzite crystal structure with grain sizes of 26, 38, and 68 nm, respectively, as analyzed by Xray diffraction. Particle morphology analysis using scanning electron microscopy showed that both SunZnO-SA and ZnO-Pharma.grade exhibited plate shape morphology, with particle size of 114 and 74 nm, respectively. Meanwhile, Zano 10 Plus had rod shape with particle size of 74 nm. The samples was then further used as an active component in a water-in-oil physical sunscreen suspension, and the maximum Sunscreen Protection Factor (SPF) value was obtained when Zano 10 Plus was used. Additionally, Zano 10 Plus suspension was still stable even after one month of storage.

Keywords: powder characteristics, zinc oxide, sunscreen

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The Use of Widely Metabolomics Profilling in Medicinally Important Compounds from Zingiberaceae species

Laila Khamsatul Muharrami[1,2], Mardi Santoso[1],
Sri Fatmawati[1,3*]

[1] Laboratory of Natural Products and Synthetic Chemistry, Faculty of Science and data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia
[2] Natural Science Education, Faculty of Education, Universitas Trunojoyo Madura
[3]Agri-Food and Biotechnology Research Center, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia
*Corresponding author: fatma@chem.its.ac.id

ABSTRACT

Madura is known with traditional knowledge about herbal medicine. The traditional medicine, Jamu, The basic ingredients for making “Jamu” are often derived from Zingiberaceae species. *Zingiberaceae* is a typical medicinal plant in tropical region especially in Indonesia. *Zingiberaceae* are usually considered to be anti-viral, anti-tumor and antibacterial plants. It is essential to study metabolic characteristics of these plants for their rational use and in-depth development. This study was investigated to compare and differentiate fingerprint/ metabolites profile of Zingiberaceae species based on HPLC.

Keywords: *Zingiberaceae, Metabolite Profile*, *HPLC*

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THE EFFECT OF SEASON VARIATIONS TO HEAVY METALS AND TRACE ELEMENTS CONTENT AS PARAMETERS OF AGRICULTURAL IRRIGATION WATER QUALITY IN BREBES REGENCY - INDONESIA

Sri Murniasih[1,2], Sri Juari Santosa[1], and Roto Roto[1]
[1]Department of Chemistry - Faculty of Mathematics and Natural Science, Gadjah Mada University
[2]Center for Accelerator Technology Research – National Research and Innovation Agency
**Corresponding author: sjuari@ugm.ac.id*

ABSTRACT

This study was conducted to determine the effect of seasonal variations on the content of heavy metals and trace elements as parameters of irrigation water quality in Dukuloh village and its surroundings in Bulakamba, Brebes Regency as a shallot farming area and map their spatial distribution. In addition, this study also assessed the impact of heavy metals and trace elements on the health of the surrounding community. Sampling was carried out during the dry (August) and the rainy season (January) in 2019 at 9 points along the irrigation water flow that flows in 5 villages in Bulakamba - Kab. Brebes. Analysis of the content of heavy metals and trace elements in irrigation water samples was carried out using the Neutron Activation Analysis (NAA) method. The results of sample analysis in the dry season detected the presence of Ti, Mg, Al, V, Mn, Br, Na, Cr, Fe, Zn, Co, and Sb elements, while in the rainy season elements are more complex than the dry season were detected, namely Ti, Mg. , Cu, Al, V, Mn, Ca, Cd, Br, As, Se, Hg, Cr, Sr, Fe, Zn, Co, and Sb. Almost all elements of the rainy season water samples had relatively higher concentrations than the dry season, except for the elements Al, Zn, and Sb. The distribution pattern of heavy metals and trace elements tend to be higher in the flow close to the sea estuary. The level of heavy metal and trace elements pollution in irrigation water in Bulakamba, Brebes Regency was at a medium level compared to other irrigation water in some countries. Although it does not have a significant impact on public health, the results of this study can provide basic data for efficient water management for the protection of public health in Bulakamba, Brebes Regency.

Keywords: Irrigation water quality, heavy metals, trace elements, NAA, agriculture, health risk assessment

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Synthesis and Biological Activities of Prenylated and Geranylated 2(4- Nitrophenyl)-4,5-diphenyl-1*H*-imidazoles

Reynal Restu Affandi[1], Adinda Fitria Hidayati[1], Binti Ainiatur Rohmah[1], Winda Seviani[1], and Arif Fadlan[1]*

[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia
*Corresponding author: afadlan@chem.its.ac.id

ABSTRACT

Substituted imidazoles represent an important class of heterocyclic compounds having valuable biological activities. Previous reports indicated that prenyl and geranyl substituents affect the activities of compounds. Herein we report the synthesis of 1-prenyl- and 1-geranyl-2(4- nitrophenyl)-4,5-diphenyl-1*H*-imidazoles from reaction of a dicarbonyl compound, ammonium acetate, and 4-nitrobenzaldehyde followed by alkylation using 3,3-dimethylallyl bromide and geranyl bromide. The prenylated and geranylated imidazoles was afforded in good yield and their structure was elucidated by NMR, MS, and infrared spectroscopic analysis. In addition, the antibacterial and antifungal of the compounds were also evaluated

Keywords: *N-prenyl imidazole, N-geranyl imidazole, 4-nitrobenzaldehyde, biological activities*

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Synthesis and Characterization of Cu-ZIF-8/AC for Photocatalytic Degradation of β-Naphthol

Siti Khomariyah[1], Sinta Eka Septa Sari[2], Nabella Alvi Kurniawati[3], and Ratna Ediati[4]

[1]Departement of Chemistry, Faculty of Science and Analytical Data, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia
*Corresponding author: *rediati@chem.its.ac.id*

ABSTRACT

β-naphthol is a reactive dye that is widely used in the textile industry with a low level of degradation and toxic. ZIF-8 photocatalyst can be applied for β -naphthol degradation with high chemical and thermal properties. The unsaturated exposed metal sites and high specific surfacearea of ZIF-8 play a role in the adsorption and separation of organic reactions. Modification of ZIF-8 with Cu metal doping may increase the capacity of ZIF-8 by donating valence electrons which can accelerate the rate of degradation. In addition, activated carbon (AC) from oil palm empty fruit bunches is a material that has a high specific surface area with a significant porous structure that plays a role in increasing the adsorption catalyst performance. The purpose of this study was to obtain Cu-ZIF-8/AC composite, where the Cu-ZIF-8 was synthesized using solvothermal in methanol sovent, followed by impregnation of Cu-ZIF-8 into the activated carbonprepared from the oil palm empty fruit bunche. The results of the composite diffractogram synthesis showed characteristic peaks at 2θ = 7.4°, 10.4°, 12.8°, 16.4°, and 18.0° which matchedthe standard ZIF-8 diffractogram material. ZIF-8 exhibits high crystallinity. The synthesized FTIRspectra showed an absorption band at the same wavenumber as the Standard ZIF-8. The SEM results showed good regularity with the formation of the same central body cubic crystal as the standard ZIF-8 structure. The addition of Cu to ZIF-8 did not change the morphology and the distribution of AC was seen evenly on the surface of ZIF-8.

Keywords: Activited carbon, Oil palm empty fruit bunche, Photocatalytic degradation, Cu, and ZIF-8.

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Antibacterial and Antifungal Activities of Phytosynthesized Selenium NanoparticlesUsing *Solanum lycopersicum* Extract

*Winda Seviani[1], Adinda Fitria Hidayati[1], Binti Ainiatur Rohmah[1], Heni Masitoh[1], SitiKhomariyah[1], and Arif Fadlan[1]**

[1]*Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia*
*Corresponding author: afadlan@chem.its.ac.id

ABSTRACT

The present report describes the synthesis of selenium nanoparticles by using *Solanum lycopersicum* extract as a natural reducing agent and sodium selenite as the precursor. This study emphasizes the environmentally friendly and green synthesis of selenium nanoparticles and evaluates the antibacterial and antifungal activities of the nanoparticles. A various analysis including UV-Vis, infrared, particle size, SEM, XRD was employed for nanoparticles characterization. The phytosynthesized nanoparticles were brown blackish showed a maximum wavelength of 275 nm with a particle size of 424 nm and an absorption of the Se-O functional group at a wavenumber of 619 cm^{-1}. The shape and crystallinity nature of nanoparticles were confirmed by SEM and XRD analysis. The antibacterial and antifungal activities of the yielded nanoparticles were also examined against *Staphylococcus aureus*, *Escherichia coli*, and *Candidaalbicans*.

Keywords: selenium nanoparticles, phytosynthesis, Solanum lycopersicum, antibacterial, antifungal

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Performance of pH Indicator Paper by Immobilization Purple Sweet Potato Pigmen on Cellulose Paper

Maria Aloisia Uron Leba[1], Adi Setyo Purnomo[2], Erly Grizca Boelan[1], Aloisius Masan Kopon[1], FaderinaKomisi1[5], Maria Benedikta Tukan[1], Anselmus Boy Baunsele[1]*

[1]Department of Chemistry Education, Faculty of Teacher Training and Education. UniversitasKatolik Widya Mandira, Kupang, Indonesia
[2]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember,Kampus ITS Sukolilo, Surabaya, Indonesia
**Corresponding author:*
mariaaloisiauronleba@gmail.com

ABSTRACT

Research has been carried out on the manufacture of pH indicator paper by immobilizing of purple sweet popato pigmen on cellulose paper. This pimen was extracted from purple sweet potato tubers with ethanol 95% medical grade and ethanol 96% analytical grade. The purpose of this study was to examine the phytochemical content of purple sweet potato pigment extracted by medical grade 95% ethanol (PSPP-95%) and purple sweet potato pigment extracted by analytical grade 96% ethanol (PSPP-96%), color character of PSPP-95% and PSPP-96% in pH 1-14, application of PSPP-95% and PSPP-96% in the manufacture of pH indicator paper. PSPP-95% and PSPP-96% immobilized on cellulose paper. It produced purple sweet potato pigment indicator paper 95% (PSPPIP-95%) and purple sweet potato pigment indicator paper 96% (PSPPIP-96%). PSPPIP-95% and PSPPIP-96% were tested for color characteristics in pH 1-14, color stability, sensitivity based on storage time and application in real samples. Based on the research results, it was known that PSPP-95% and PSPP-96% contain alkaloids, flavonoids, tannins, saponins and steroids. PSPP-95% and PSPP-96% gave a deep red color at pH 1, pink at pH 3- 6, purple at pH 7, blue at pH 8-9, green at pH 10-11 and yellow at pH 12-14. PSPPIP-95% and PSPPIP- 96% ware produced is pink. PSPPIP-95% and PSPPIP-96% ware pink (no color change) at pH 1-7, paleblue at pH 8-9, pale green at pH 10-11, deep green at pH 12 and yellow at pH 13- 14. PSPPIP-95% was stable for 30 days while PSPPIP-96% was stable for 180 days. PSPPIP-95% and PSPPIP-96% gave a good sensitivity after 180 days of storage. PSPPIP-95% and PSPPIP-96% also gave a good test results in testing

of real samples after 180 day of storage. Thus, PSPPIP-95% and PSPPIP-96% could be used as pH indicators to replace litmus paper.

Keywords: pH indicator, pH paper, purple sweet potatos, *Ipomoea batatas* L, plant pigment

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Synthesis 4-(butyramidomethyl)-2- methoxyphenyl butyrate

Iffah Karimah[1] , Mardi Santoso[1]

[1] Master Program Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh November, Surabaya, Indonesia
*Corresponding author: tsv09@yahoo.com

ABSTRACT

Butyryl chloride undergo nucleophilic addition-elimination with vanillylamine hidrochloride in the presence of DMAP and sodium bicarbonate to afford 4-(butyramidomethyl)-2-methoxy-phenyl butyrate in good yield

Keywords: *Butyryl chloride, vanillylamine, reaction*

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Methylene Blue Removal by Entrapment Trichoderma viride into Sodium Alginate- Polyvinyl Alcohol Bentonite Beads

Alya Awinatul Rohmah [1], Adi Setyo Purnomo [1], and Rachma Aini Ziyana [1]*

[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, ITS, Sukolilo Campus, Surabaya, Indonesia
*Corresponding author: adi_setyo@chem.its.ac.id ; adi.spurrnomo@yahoo.com

ABSTRACT

Methylene blue (MB) is a dye usually used in textile industry, but it can pose an environmental and human problems. Hence a removal treatment of MB being discharge in wastewater is needed. This study discussed about MB removal by using immobilized filamentous fungus *Trichoderma viride* into SA-PVA-bentonite beads. The immobilization was combined within composition SA-PVA-Bentonite beads by 2:4:1 ratio. This MB removal process was carried out by using two methods, free cell and immobilization methods. The results showed that immobilization method reached the highest decolorization percentage of 95.72%, meanwhile free cell only showed 55.36 % within 7 days incubation under static condition. Synthesized beads were characterized by using FTIR and SEM. The fungi cell was spread inside and at the beads surface. In addition, reusability test showed that the beads could be reused until four cycle MB removal. These results indicated that *T. viride* immobilized in SA-PVA-Bentonite matrix could decolorize MB and can be used as an alternative method on removing pollutant waste.

Keywords: *Methylene Blue, Trichoderma viride, Immobilization, Decolorization*

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Biodecolorization of Methylene Blue by *Ralstonia pickettii* Bacterium Immobilized on Sodium Alginate – Polyvinyl Alcohol – Bentonite Matrix

Badzlin Nabilah[1], Adi Setyo Purnomo[1]), and Didik Prasetyoko[1]*

[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, ITS, Sukolilo Campus, Surabaya, Indonesia
*Corresponding author: *adi_setyo@chem.its.ac.id ; adi.spurrnomo@yahoo.com*

ABSTRACT

Methylene Blue (MB) is one of the synthetic dyes used in the coloring industry. The disposal of MB in nature can pollute the waters and cause several diseases in humans. In this study, the bacterium culture of *Ralstonia pickettii* was immobilized into a Sodium Alginate – Polyvinyl Alcohol – Bentonite (SA-PVA-Bentonite) matrix. The immobilization process was carried out by the entrapment method, where *R. pickettii* cells (1 mL bacterium suspension = 2.48 × 108 CFU) were homogenized with the SA-PVA-Bentonite matrix. The beads that had been formed were characterized by Fourier Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM). The results indicated that the bacterium and the matrix were successfully homogenated. The biodecolorization process was carried out by free cell and immobilized *R. pickettii* on Mineral Salt Medium (MSM) with the final MB concentration was 50 mg/L. MB biodecolorization solution was analyzed by UV-Vis Spectrophotometer and the metabolic products were analyzed by LC-TOF/MS. From the MB biodecolorization process, it showed that immobilized R. pickettii showed better performance (96%) than the free cell (38%) after 48 h incubation period. The biodecolorization process produced 5 metabolite products that were identified by LC-TOF/MS. The metabolite products produced from the process were Azure A, Thionine, $C_{12}H_{11}N_3O_6S$, $C_{12}H_{13}N_3O_6$, $C_{12}H_{13}N_3O_7$. Furthermore, MB biodecolorization process was supported by FTIR and SEM characterization. The characterization result indicated that MB was adsorbed by the beads. One of the advantages of bacterium immobilization on dye decolorization was that the beads can be reused again. The reusability study of immobilized R. pickettii showed that the beads can be reused up to 3 cycles of MB biodecolorization.This study indicated that immobilized R. pickettii on SA-PVA-Bentonite matrix can be used as an alternative method in MB Biodecolorization.

Keywords: Methylene Blue, Biodecolorization, Ralstonia pickettii, Immobilization, Beads.

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Kinetic Performance of a Novel Diethanolamine-Monosodium Glutamate Solvent for CO2 Removal in a Wetted Wall Column

Fadlilatul Taufany[1], Ali Altway[1], Fitri Adi Iskandarianto[2], Ragilia Rahma Maulidia[1], Wahyu Adinda Larasati[1]*
[1]Department of Chemical Engineering Department, Institut Teknologi Sepuluh Nopember
[2]Department of Instrumentation Engineering, Institut Teknologi Sepuluh Nopember
*Corresponding author: f_taufany@chem-eng.its.ac.id

ABSTRACT

The carbon dioxide (CO_2) removal in natural gas is essential because the CO_2 gas has corrosive behavior that could harm piping parts and factory utilities. In addition, the presence of CO_2 in natural gas can reduce its calorific value of natural gas. In the present study, we report the use of Monosodium Glutamate (MSG) promoted Diethanolamine (DEA) absorbent solvent to remove the impurities of CO_2 gas within the natural gas. DEA as an absorbent solvent was applied for the CO_2 absorption process because DEA is relatively stable from degradation during the regeneration process. In addition, the MSG with its content of amino acid salts, i.e., L-Glutamic Acid, was added to the DEA solvent to improve the CO_2 absorption performance. Therefore, obtaining data on the kinetics of the CO_2 absorption reaction with MSG-promoted DEA solvent is crucial. The determination of reaction kinetics data was carried out experimentally using laboratory scale Wetted Wall Column (WWC) equipment with variations of the operating temperature and MSG promoter concentration at atmospheric pressure. Liquid MSG-promoted DEA solvent flows through the center of the WWC tube and is evenly distributed on the surface to form a thin falling film. The CO_2 gas supplied with water flows counter-currently through the liquid film. The concentration of absorbed CO_2 was subsequently analyzed by precipitation acid-base titration method, using phenolphthalein and methyl orange indicators. In the operating temperature range of 308,15 K to 328,15 K, we found that the kinetic constant rate equations for CO_2 absorption using only DEA solvent and MSG-promoted DEA solvent are 5,54 x 106 e-2540,04/T m3/kmole·s and 8,294 x 106 e-2633,9/T m3/kmole·s, respectively. This finding suggests that the presence of MSG promoter could significantly boost the kinetic reaction rate of DEA solvent by almost 50 %.

Keywords: Absorption, kinetic, CO_2, DEA, MSG

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Nanoemultion of Citrus Pericarp Extract using Soy Protein Isolated (SPI) and Maltodextrin (MD) as Additive on Egg Tart

Zjahra Vianita Nugraheni[1], Adeline Margaretha[1], Ricky Dana Setiawan[1], and Herdayanto Sulistyo Putro[1]
[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya
*Corresponding author: zjahravianita@chem.its.ac.id

ABSTRACT

Citrus pericarp has been known to have many biological activities such as antioxidant, antifungal, antibacterial. *Citrus pericarp* also contains vitamin C and has bioactive compounds such as phenolics and flavonoids. The citrus pericarp was extracted using the maseration method with ethanol-water solvent. The optimum result of total phenolic, flavonoid, and the antioxidant activity of the *Citrus pericarp* extract content were 1208.63 ± 1.44 µg AGE/g citrus pericarp extrac, 165.77 ± 0.12 µg QE/g of *Citrus pericarp* extract, and 86.14% at temperature variation of 90°C. Soy protein isolated (SPI), maltodextrin (MD), and combination of both of them are used as a wall material for *Citrus pericarp* extraction and sonicator homogenizer was utilized as an encapsulation method with a time variation of 5 and 10 minutes. Encapsulated *Citrus pericarp* extract was used in the egg tart fortification. The optimum result of total phenolic, flavonoid, and antioxidant activity of the egg tart extract using maltodextin wall material (KP4) are 519.40 ± 0.83 µg AGE / g egg tart extract, 565.49 ± 0.96 µg QE / g egg tart extract, and 50.26%.

Keywords: *Citrus pericarp*, nanoemultion, soy protein isolated, maltodextrin, egg tart, food additive.

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Nanoemultion of Citrus Pericarp Extract using Soy Protein Isolated (SPI) and Maltodextrin (MD) as Additive on Mud Cake

Zjahra Vianita Nugraheni[1], Ricky Dana Setiawan[1], Adeline Margaretha[1], and Herdayanto Sulistyo Putro[1]
[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya
*Corresponding author: zjahravianita@chem.its.ac.id

ABSTRACT

Citrus pericarp has been known to have many biological activities, one of which is antioxidant. *Citrus pericarp* also contains bioactive compounds such as phenolics and flavonoids. The *Citrus pericarp* was extracted using maceration method with ethanol-water as solvent. The optimum result of total phenolic, flavonoid, and the antioxidant activity of the *Citrus pericarp* extract content were 1208.63 ± 1.44 µg AGE/g citrus pericarp extract, 165.77 ± 0.12 µg QE/g of citrus pericarp extract, and 86.14% at temperature variation of 90°C. Soy Protein Isolated (SPI), maltodextrin (MD), and combination of both of them are used as a wall material for citrus pericarp extraction and sonicator homogenizer was utilized as an encapsulation method with a time variation of 5 and 10 minutes. Encapsulated citrus pericarp extract was used in the mud cake fortification. The optimum result of total phenolic, flavonoid, and antioxidant activity of the mud cake extract using combination wall material of SPI and MD (KL6), which is 474.40 ± 0.59 g AGE/g dried mud cake, 655.56 ± 0.69 g QE/ g dried mud cake, and 56.77%.

Keywords: *Citrus pericarp*, nanoemultion, soy protein isolated, maltodextrin, mud cake, food additive

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The Effects of Carbon and Nitrogen Sources On Biopigment Formation by Penicillium Sp. B.96

Refdinal Nawfa[1],Hamdan Dwi Rizqi[1], and Adi Setyo Purnomo[1]*

[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia
*Corresponding author:refnawfal@chem.its.ac.id

ABSTRACT

Penicillium fungi have been widely informed as producers of antimicrobial compounds, including the fungus Penicillium chrysogenum which produces antimicrobial penicillin (Nawfa, Retal;2019). Other studies have stated that the species Rhodotorul asp. can produce carotenoid bio pigments such as β-carotene, γ-carotene, torularhodin, astaxanthin, and others (Molineetal;2012). Penicillium Sp B96 is a fungus isolated from soil that grows in Indonesia. After preliminary tests, Penicillium Sp B96 shows the ability to produce bio pigment compounds in liquid media as a result of fermentation. Carotenoids play an important role in the health sector asanti-cancer, preventing diseases liver diseases, and various diseases such as cataracts and macular degeneration (Carilhoetal;2014). This study aims to examine the effect of carbon sources and nitrogen on bio pigment formation by the Penicillium Sp B96. Fructose, glucose, and dextrose were used as carbon sources and ammonium sulfate, peptone, and urea were used as nitrogen sources. After the treatment, bio pigments were separated and identified by chromatography. The results show that the use of glucose as a carbon source could produce more bio pigments while fructose and dextrose did not. The use of nitrogen source ammonium sulfate, peptone, and urea with glucose carbon source produces different characteristics of bio pigments. It is confirmed by the solubility test results using ethyl acetate and 2-butanol. The use of ethylacetate solvent was able to extract 1.125 g/L bio pigment from cultures with ammonium sulfate as a nitrogen source with concentrated color intensity. The use of 2-butanol as a solvent was able to extract 16,863g/L bio pigment from cultures with peptone as a nitrogen source with concentrated color intensity.The use of ethylacetate and 2-butanol as solvent not capable to bio pigment from cultures with urea as nitrogen source. The results of the separation by TLC and column chromatography of the bio pigment produced by culture with peptone as a nitrogen source obtained a yellow bio pigment of 14.825g/L. This indicates that carbon and nitrogen sources affect the production of bio pigments produced by Penicillium Sp B96.

Keywords : Carbon and Nitrogen Sources, Penicillium Sp., Biopigment, Solvent Extraction

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X-ray Diffraction Analysis of Calcinated TiO_2/ZnO Synthesized by Sol-Gel Method

Siti Oryza Sativa[1], Muhammad Ali Zulfikar[1], Aep Patah1, and Wibawa Hendra Saputera[2]*

[1] Department of Chemistry, Institut Teknologi Bandung, Jalan Ganesa 10, Bandung, Indonesia 40132

[2] Department of Chemical Engineering, Institut Teknologi Bandung, Jalan Ganesa 10, Bandung, Indonesia 40132

*Corresponding author: sitioryzasativa@gmail.com

ABSTRACT

Binary oxide system nanomaterials can be synthesized by sol-gel method which a wet chemical method. In this research, semiconductor material photocatalysts of TiO_2/ZnO have been synthesized by simple sol-gel method followed by calcination temperature at 400℃, 500°C, 600°C, and 700 °C. The precursors of TiO_2 and ZnO were titanium (IV) ethoxide and zinc acetate dihydrate respectively. The X-ray diffraction analysis was used to determine the alteration structure of TiO_2/ZnO. In addition, we calculated the phase content of anatase and rutile structure using Spurr equation. The result showed that anatase structure was obtained at 400 °C and 500 °C without rutile structure. However, $ZnTiO_3$ was observed from calcination temperature above 600 °C It indicates the structure of TiO_2-ZnO or zinc titanate that has photoactive properties.

Keywords: TiO_2/ZnO, calcination, XRD, sol-gel

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Proximate analysis as verificatory method for quality assessment of secondary reference material

Ukis Shofarudin[*1], Helena Manik[1], Diah Ikasari[1], Rinta Kusumawati[1], Hana Iswahyuni[2]*
[1]National Research and Innovation Agency, Jakarta, Indonesia
[2] Research Center for Marine and Fisheries Product Processing and Biotechnology, Jakarta, 10260, Indonesia
*Corresponding author: ukis.shofarudin@gmail.com

ABSTRACT
Secondary reference material is reference material with standardized value based on certified primary reference material. The quality of secondary material reference can be determined based on its chemical composition for certain period. Proximate analysis is one of reliable method to assess the quality of secondary reference material. This research aims to employ the proximate method as verificatory protocols to assess the quality of secondary reference materials for 3 years storage. In this assessment, fish flour that has been standardized for its homogeneity and stability was used as reference material. The flour was analyzed for its moisture, ash, protein and fat contents using protocols according to SNI 2354-2-2015, SNI 2354-1-2010, SNI 2354-3-2017 and SNI 2354-3-2006, respectively. Results show that for three years storage, moisture and ash content of the reference materials were stable, while fat and protein content tended to decrease gradually. This was attributed to the fat and protein degradation which increased as the increase of storage duration. It appears that proximate method is a good reliable protocol to assess secondary reference materials.

Keywords: secondary reference material, proximate analysis, fish flour, quality assessment

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The Antioxidant Activity and Total Phenol Content of *Sonneratia ovata* Back

Maria Dewi Astuti1, Kholifatu Rosyidah1, Dewi Umaningrum1, Ratna Ardiyanti1, Hanan
Johan Abd Rasyied1 and Aisyah Puteri Azzahra1

1 Department of Chemistry, Faculty of Mathematics and Natural Science, Lambung Mangkurat University
**Corresponding author: mdastuti@ulm.ac.id*

ABSTRACT

This research aims to determine antioxidant activity and total phenol content of *Sonneratia ovata* Back, a mangrove plant. Leaves, fruit, stem bark, and root of *Sonneratia ovata* Back. were extracted with methanol. The antioxidant assay was carried out based on a scavenging radical DPPH, and the total
phenol content was based on Folin Ciaocalteu method. Methanol extract of leaves of *Sonneratia ovata* Back. presented the highe**s**t antioxidant activity than stem bark, root, and fruit. The IC50 are 4. 07 mg/L, 25.94 mg/L, 100,94 mg/L, and 195.83 mg/L, respectively. Leave's total phenol content (52 mgGAE/g) is higher than fruits (14. 06 mgGAE/g). This study suggested that *Sonneratia ovata* has a potential source of antioxidant compounds.

Keywords: *Sonneratia ovata* Back*., antioxidant, phenol, leave, stem bark*

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Controlled Pyrolysis of Zn-based Metal Organic Framework for nanocrystalline C@ZnO semiconductor

*Yasni Novi Hendri[1], Muhammad Miftahul Munir[1], Aep Patah[2], Yudi Darma[1]**

[1] *Department of Physics, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Ganesha 10, Bandung 40132, Indonesia*
[2] *Inorganic and Physical Chemistry Research Division, Faculty of Mathematics and Natural Sciences, Institut Teknologi Bandung, Jl. Ganesha 10, Bandung 40132, Indonesia*
*Corresponding author: yudi@fi.itb.ac.id

ABSTRACT
C@ZnO semiconductor has been successfully synthesized by controlled pyrolysis of Zn-based metal-organic framework with benzene-1,3,5-tricarboxylate as a linker (Zn-BTC). The Zn-BTC was prepared using the sonochemistry method, which led to $Zn_3(BTC).12H_2O$ composition. We found the conversion of Zn-BTC into nanocrystalline C@ZnO to be tunable and straightforward simply by controlling pyrolysis. The Zn-BTC pyrolysis was controlled at 450 ^oC and choosing gas treatment (air, nitrogen, oxygen) which was signed as C@ZnO-air, C@ZnO-N_2, and C@ZnO-O_2. From SEM-EDX measurement, the pyrolysis transforms the rod-like of Zn-BTC to become granular-like C@ZnO and significantly reduces the presence of carbon. C@ZnO-O_2 has optimal for achieving high crystallinity grown along (101) direction. C@ZnO-O_2 and C@ZnO-N2 exhibit absorbance under UV light, and C@ZnO-N_2 have visible light absorbance. The presented approach would be instructive and informative for controlled gas pyrolysis treatments for the preparation of C@ZnO based MOF-derived nanostructure.

Keywords: sonochemistry method; Zn-BTC; gas treatment; zinc oxide; surface modification; optical properties

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Influence of calcination temperature of kaolin capkala on the compressive strength of geopolymer

Nurlina[1], Subaer[2], Mohd Mustafa Al Bakri Abdullah [3,4], Hamzah Fansuri[1]*

[1]Departement of Chemistry, Faculty of Science and Data Analitics, Institut Teknologi Sepuluh Nopember, 60111 Surabaya, Jawa Timur, Indonesia
[2] Departement of Physics, Faculty of Mathematisc and Natural Science, Universitas Negeri Makasar, Makasar, Indonesia
[3]Faculty of Chemical Engineering Technology Universiti Malaysia Perlis (UniMAP),
[4]Center of Excellence Geopolymer and Green Technology (CEGeoGTech), Universiti Malaysia Perlis (UniMAP),
*Corresponding author: h.fansuri@chem.its.ac.id

ABSTRACT

The main objective of this research is to study the effect of different calcined temperatures of kaolin on the compressive strength of geopolymer. Kaolin capkala, *as a* raw material used as a source of aluminosilicates, was characterized by X-Ray Fluorescence (XRF), X-Ray Diffraction (XRD) and Scanning Electron Microscopy (SEM). The kaolin capkala was converted into metakaolin by calcination at 700, 750 and 800 ℃. The first step in the synthesis of geopolymer is alkalination. Metakaolin was blended with an alkaline mixture of sodium hydroxide 10 M and sodium silicate (mass ratio *of* SiO_2/Na_2O is 3.25) to form a paste. The setting time of these pastes was measured. The second step is measuring the setting time of the paste. *The paste is then poured into cubic moulds (23 mm x 23 mm x 23 mm) and cured at 60 °C for 24 h.* The compressive strength of geopolymer was performed after 28 days of curing. The compressive strength of geopolymer was performed after 28 days of curing. The geopolymers were analyzed with XRD and FTIR. The success of metakaolin formation was confirmed by X-ray diffractogram with the loss of the peak of kaolinite at 2θ = 11-13°, 20°, dan 38-39°. The comparison between the diffractogram of metakaolin and geopolymer revealed specific changes in the halo peak representing the amorphous phase. The halo peak 2θ between 18 and 32° for metakaolins shifted to between 20° and 40°, which is characteristic of geopolymer. Geopolymer formation is verified by the disappearance or shift of some of the typical bands of the metakaolin in FTIR analyses. The main vibration mode of kaolin is the Si–O at 1031 cm^{-1} as asymmetric vibration was shifted to a higher wavenumber at 1063-1094 cm^{-1} in metakaolin 700, 750 and 800 ℃, which is attributed to kaolin dehydroxylation. This absorption peak shifted to

a lower value at around 1008-1012 cm^{-1} after geopolymerization. The bands between 692-696 cm^{-1}, characteristic of symmetric vibration of Si-O bonds in quartz, are still present in the geopolymer. This peak is related to the XRD diagrams that showed the quarts as a non-reactive phase in the geopolymer reaction. Another band that disappears in the geopolymeric material at 912 and 796 cm^{-1} is attributed to the Al(IV)-O vibration of metakaolin. This shift or disappearance of the peak is associated with the dissolution of the aluminosilicate source due to the reaction of the silicate group, which is evidence that the geopolymerization has taken place. The higher the kaolin calcination temperature used in the geopolymer synthesis, the faster the geopolymer setting time hardening, and the higher the compressive strength value. The compressive strength of the geopolymer was between 19.5337 ± 1.0914 to 32.0708 ± 3.3321 MPa. It increased with geopolymer-based kaolin calcined between 700 and 800 ℃ with varying setting times of 95 to 192 minutes. It can be concluded that the temperature for the calcination of kaolin capkala given producing geopolymer with high compressive strength is 800 ℃.

Keywords: kaolin, calcination, geopolymer, compressive strength, setting time

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Effect of Different Solvents in Synthesis of Fe_3O_4/Zeolit-NaY Composite Catalysts for The Fenton Catalytic Degradation of Methylene Blue

Dinia Astira[1], Romario Abdullah[1], Dety Oktavia Sulistiono[2], Zeni Rahmawati[1], Ratna Ediati[1], M Hasan[3], Hamzah Fansuri[1]

[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya 60111, Indonesia
[2]Automotive Engineering, Engineering Department, Politeknik Negeri Jember, Jember 68101, Indonesia
[3]Department of Chemistry Education, Faculty of Teacher Training and Education, Universitas Syiah Kuala, Darussalam, Banda Aceh 23111, Indonesia
**Corresponding author: h.fansuri@chem.its.ac.id*

ABSTRACT

Methylene blue (MB) is one of the synthetic dyes found in textile industry waste. Several methods ever used to overcome MB problems such as adsorption, filtration, and precipitation can only change MB from one phase to another, causing secondary pollutants. In this research, a Fenton-like composite catalyst, one of the advanced oxidation process (AOP) methods has been synthesized to solve MB waste. The catalyst composite was synthesized by combining zeolite-NaY in Fe_3O_4 precursor by coprecipitation method in two different solvents (H_2O and HCl). The catalyst composite was characterized by XRD, FTIR, and SEM. The combination of Fe_3O_4 and Zeolit-NaY can be seen from the X-Ray diffraction. FTIR analysis proved the success of the synthesis by showing the presence of new vibration at 573 cm^{-1} which indicated the Fe-O bond in the composite catalyst. The performance of the composite catalyst was then tested by degrading 100 mL MB 20 ppm through the Fenton reaction with the addition of hydrogen peroxide as an oxidizing agent. The results showed that more than 90% of MB could be degraded within 10 minutes using the synthesized composite catalyst with HCl solvent. The lower degradation percentage was shown by the catalyst synthesized with water solvent, which was 45%.

Keywords: Fenton, composite, H_2O, HCl, zeolite-NaY.

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Synthesis and Characterization of Microcrystalline Cellulose (MCC) from Water Hyacinth and Sengon Wood

Romario Abdullah[1], Dinia Astira[1], Dety Oktavia Sulistiono[2], Zeni Rahmawati[1], Yuly Kusumawati[1], and Hamzah Fansuri[1]

[1] Departement of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya 60111, Indonesia
[2] Automotive Engineering, Engineering Departement, Politeknik Negeri Jember, Jember 68101, Indonesia
*Corresponding author: h.fansuri@chem.its.ac.id

ABSTRACT
Microcrystalline Cellulose (MCC) is one of the materials that can be synthesized by utilizing the abundance of lignocellulosic biomass in nature. This study aims to produce MCC from water hyacinth (WH) and sengon wood (SW) and study their characteristics. MCC is obtained through dewaxing, alkalization, bleaching, and hydrolysis processes. The dewaxing step was carried out using toluene:ethanol (2:1), then WH and SW were alkalized using 5% NaOH, then bleached using 5% NaOH and 3% H_2O_2, and the last stage was hydrolyzed using 5% HCl. The synthesized MCC was characterized using FTIR, XRD, SEM, and PSA. The results of FTIR MCC characterization of the two biomasses have confirmed the presence of specific absorption peaks typical of cellulose at wave numbers 3250-3500, 2800-3000, 1600-1750, and 1000-1250 cm^{-1}. The results of XRD characterization showed that there was a typical peak of MCC from the yields of the two biomasses, namely the intensity peaks at 2θ = 15, 22, and 34°. The MCC crystallinity index of water hyacinth and sengon wood were 80.49 and 79.67%, respectively.

Keywords: MCC, Cellulose, Water Hyacinth, Sengon Wood

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Recent development of polyimide membrane for biogas upgrading: a review

Alvin Rahmad Widyanto[1], Triyanda Gunawan[1,], Nurul Widiastuti[1], Hamzah Fansuri[1], Didik Prasetyoko[1], Silvana Dwi Nurherdiana[2]*

[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya 60111, Indonesia
[2] Department of Chemical Engineering, Faculty of Technology, Universitas Pembangunan Nasional "Veteran" Jawa Timur, 60294, East Java, Indonesia
*Corresponding author: triyanda@its.ac.id

ABSTRACT

Biogas is considered to be one of the most viable alternatives for addressing the world's energy demands. However, biogas still carries 30–50% CO_2 impurities; thus, further CO_2 separation is required to increase the quality of biogas into bio-methane. Compared to traditional methods based on adsorption and cryogenic processes, gas separation using membrane technology offers more potential to eliminate CO_2 both efficiently and economically. Polyimide and its derivates have been utilized as membrane material for gas separation. However, polymeric membranes consist of trade-off issues between gas permeability and selectivity. Thus, optimization of the polyimide membrane for upgrading biogas is required to provide vital information for the next development. Such as the various source of biogas are also elucidated, existing polyimide-based membrane for biogas is discussed, and the recent development of mixed matrix membranes are presented. Moreover, an evaluation of membrane technology in biogas upgrading systems for upscale is provided. Additionally, the methane recovery process in biogas upgrading is studied. Finally, this review will outline challenges, future prospects, and strategies for developing polyimide-based membranes for biogas upgrading.

Keywords: Polyimide, Membrane technology, Gas separation, Biogas upgrading, Methane recovery.

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Chemical Composition of Essential Oil in *Cymbopogon nardus* Stems from Hatalai Village

Healthy Kainama[1], Yelsy Loppies[1], Hanoch J, Sohilait[2*]

[1]*Department of Chemistry Education, Faculty of Teacher Training and Science Education,*
Universitas Pattimura, Ambon, Indonesia
[2]*Laboratory of Organic Chemistry, Department of Chemistry, Faculty of Mathematic and Natural Science, Universitas Pattimura, Ambon, Indonesia*
*Corresponding author: nokesohilait@yahoo.com

ABSTRACT

Cymbopogon nardus leaves, roots and stems produce citronella oil. Chemical composition contained in each of these plant tissue can be influenced by where growing location.This study was to analyze the chemical composition of citronella oil on the stems of *C.nardus* growing on Hatalai village, Ambon Island. The data obtained will then be used to suggest a biosynthetic pathway to classifythe chemotype of citronella oil from this location. Isolation of citronella oil steam distillation for four hours and identification using GC-MS. The result showed that *C.nardus* stems contain 0.022 % w/w of citronella oil. The major compounds were citronellal (30.34 %), elemol (11.39 %) citronellol (9.74 %), and geraniol (6.93 %). The chemotypes of *C. nardus* from Hatalai village were the monoterpenes hydrocarbon are geraniol, limonene, γ-terpinene, while the sesquiterpene hydrocarbon are elemol, and phenilpropanoids are eugenol.

Keywords: *Cymbopogon nardus,* Hatalai village, GC-MS, Chemotypes

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Antioxidant activity of various solvent extracts of Hambawang (*Mangifera foetida*) Stem Bark

Kamilia Mustikasari[1,2], Sri Fatmawati[3,4], and Mardi Santoso[3]*

[1] Doctoral Program in Chemistry, Faculty of Science and Data Analytics, Institute Technology Sepuluh Nopember
[2] Departement of Chemistry, Faculty of Mathematics and Natural Science, Lambung Mangkurat University
[3] Departement of Chemistry, Faculty of Science and Data Analytics, Institute Technology Sepuluh Nopember
[4]Agri-food and Biotechnology Research Center, Institut Teknologi Sepuluh Nopember

**Corresponding author: fatma@chem.its.ac.id*

ABSTRACT

Antioxidant properties of the extracts of n-hexane, methylene chloride, ethyl acetate, and methanol of the Hambawang (Mangifera foetida) stem bark were examined. Antioxidant activity was determined using the radical scavenging activity of DPPH and FRAP. Methanol extract with the most potent antioxidants, followed by ethyl acetate, dichloromethane, and n-hexane extract, with a value of 1168.31 ± 1.15; 113.78 ± 0.46; 36.94 ±0.40; and 5.91±0.23 µmol TE/g DW respectively (DPPH assays). While the FRAP method with a value of 482.8531 ± 1.81; 42.94 ± 0.14; 34.52 ±0.38; and 2.07±1.08 µmol TE/g DW, respectively. Based on the results obtained, methanol extract of stem bark proved to be a potential source of antioxidants.

Keywords: antioxidant, various solvent extracts, M. foetida, stem bark

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The Potency of Single Bulb Garlic (*Allium sativum* L) Fermented by *Lactobacillus plantarum* B1765 as an Alpha Glucosidase Enzyme Inhibitor

Prima Retno Wikandari[1], Nuniek Herdyastuti [2], Tukiran [3], Ratih Dewi Saputri[4]*

Chemistry Department, Faculty of Mathematics and Natural Sciences, Universitas Negeri Surabaya
*Corresponding author: primaretno@unesa.ac.id

ABSTRACT

The objectives of this research were to study the effect of single bulb garlic fermented with a starter culture of *Lactobacillus plantarum* B1765 on total phenolic and alpha glucosidase enzyme inhibitory activity. Fermentation was carried out for 6, 9, and 12 days at 37^0C with 10% (w/v) of starter culture. The methanol extract was then used to determine the total phenolic and the inhibitory activity of the alpha glucosidase. Single bulb garlic that was not fermented and stored for the same time was used as a control. The results showed that total phenolic decreased during storage of control and during fermentation, but fermented garlic showed higher total phenolic (0.604 mg/mL; 0.569 mg/ml; 0.447mg/ml) than control (0.486 mg/ml; 0.371mg/ml; 0.304 mg/ml). Control single bulb garlic showed relatively constant inhibitory activity (24.42%-25.63%) and was lower than fermented garlic with inhibitory activity of 57.41%, 74.94%; 66.69% respectively during the fermentation process. The best inhibitory activity was shown by fermented garlic with a fermentation time of 9 days with an IC_{50} of 0.321 mg/mL but lower than acarbose as a positive control that showed IC_{50} of 2.19 mg/ml. Therefore, fermentation was able to increase total phenol and correlated with an increase in alpha glucosidase inhibitory activity, but the length of fermentation also affected the decrease in total phenol and alpha glucosidase inhibitory activity. Fermented garlic with *L. plantarum* B1765 as a starter culture is more potential in inhibiting alpha glucosidase than non-fermented garlic

Keywords: Single bulb garlic, fermentation, *L. plantarum* B1765, total phenol, alpha glucosidase activity inhibition

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The production of green diesel through the catalytic upgrade of fatty acid methyl ester over supported cobalt catalysts

*Zeni Rahmawati[1], Triyanda Gunawan[1], Hamzah Fansuri[1], James A. Anderson[2], Alan McCue[2]**

[1] *Chemistry Department, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia*
[2] *Surface Chemistry and Catalysis, Chemistry Department, University of Aberdeen, United Kingdom*
*Corresponding author: a.mccue@abdn.ac.uk

ABSTRACT

This study explains the deoxygenation of fatty acid methyl ester using methyl stearate as model compound over cobalt supported SiO_2 and Al_2O_3. Catalysts were prepared by wet impregnation method and characterised by XRD, TPR, H_2 chemisorption, and N_2 adsorption-desorption. The deoxygenation was conducted in a batch reactor at 300oC and 50 bar. Preliminary reaction inferred the dependence of reaction pathway and product selectivity upon the catalyst support. Stearyl alcohol was the major product over Co/Al_2O_3, while Co/SiO_2 favoured heptadecane and octadecane. In terms of activity, Co/Al_2O_3 exhibited excellent conversion and initial reaction rate. A series study of methyl stearate over Co/Al_2O_3 confirmed that Co/Al_2O_3 generated maximum stearyl alcohol selectivity of 85% at 16% conversion and 80% selectivity of alkanes at 87% conversion.

Keywords: green diesel, deoxygenation, fatty alcohol, alkane

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The Chemical Cleaning Performance of PVDF/LiCl Membrane with Sodium Hypochlorite (NaClO) and Citric Acid in Harvesting Microalgae Dunaliella salina

Alfi K. Huda[1],Nurul Widiastuti[1], Adi S. Purnomo[1], Triyanda Gunawan[1], Badrut T.I Ali[1],Taufik Q. Romadiansyah[1]*

[1] Department of Chemistry, Faculty of Science and Data Analytics, *Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya 60111, Indonesia*
**Corresponding author: nurul_widiastuti@chem.its.ac.id*

ABSTRACT

Microalgae is one of the biomasses that has a productivity of producing bioethanol that reaches 46,760–140,290 L/ha. Harvesting microalgae with the right technique is needed to get high concentrations of microalgae. Microalgae harvesting techniques can be chosen as an alternative for harvesting microalgae because they have advantages, including being able to maintain up to 100% biomass and low energy consumption. The membrane filtration technique has the disadvantage that there is a blockage in the membrane during the harvesting process. In this study, membrane cleaning was carried out through a process of immersion into cleaning reagents, namely sodium hypochlorite (NaClO) and citric acid. The membranes before cleaning and the membranes after five cycles of cleaning were characterized using a Scanning Electron Microscope (SEM). The results showed that the membrane cleaning with sodium hypochlorite (NaClO) was more effective than cleaning with citric acid.

Keywords: Biomass, harvesting, PVDF/LiCl membrane, membrane cleaning, flux recovery.

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Study on in vitro antinephrolithiasis activity of ethanolic extract of *Uncaria gambir* Roxb leaves

Khoirun Nisyak[1], A'yunil Hisbiyah[1], Hardiansyah[1], and Rahadian Zainul[2]*

[1] Department of Pharmacy, Faculty of Health Science, Universitas Anwar Medika, Indonesia
[2] Department of Chemistry, Faculty of Mathematics and Natural Science, Universitas Negeri Padang, Indonesia
*Corresponding author: nisachemist@gmail.com

ABSTRACT

Kidney stones (nephrolithiasis) are stones that form in the kidney tubules and one of the kidney disorders. One of the plants that has specifications as a medicinal plant is gambir (Uncaria gambir Roxb.). This study aims to determine the effect and activity of ethanol extract of gambir leaves as antinephrolithiasis in vitro. Gambir leaves were extracted by maceration method with ethanol as solvent. The compound content of the ethanol extract was analyzed qualitatively by TLC and quantitatively by Liquid Chromatography – Mass Spectrophotometer (LC-MS). The elemental content in kidney stones was analyzed by X-Ray Fluorescence (XRF). Testing the solubility of kidney stones with gambier extract was carried out using the incubation method at various concentrations of 1-6% gambier extract. Dissolved calcium levels of kidney stones were analyzed by spectrophotometric method using Atomic Absorption Spectrophotometer (AAS). Gambier leaf ethanol extract contains alkaloids, flavonoids (catechins, quercetin and grosvenorine), tannins, anthraquinones, stigmastan-3,6-dione, and procyanidin A2. Kidney stones used as samples contain Ca of 16.2657 %. Calcium levels of dissolved kidney stones in the variation of gambir leaf extract 1-6% respectively 1.79%; 2.84%; 3.15%; 3.42%; 4.84%; and 5.59%, the increasing concentration of gambir leaf extract caused the higher the dissolved calcium level of kidney stones. The results showed the effect of ethanol extract of gambier leaves as antinephrolithiasis in vitro by forming a water-soluble Ca-catechin complex.

Keywords: antinephrolithiasis, calcium dissolved, catechin, flavonoid, and gambir leaves.

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Phytochemical Screening and Cytotoxicity of *Melastoma malabathricum* L. Leaves Extracts Against MCF-7, HeLa, A549, B16, and HT29 Cells

*Muddatstsir Idris[1,2], Adi Setyo Purnomo[1], Fahimah Martak[1], Sri Fatmawati[1,3]**
[1]Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Jalan Arif Rahman Hakim, Sukolilo, Surabaya 60111, East Java, Indonesia
[2]Department of Pharmacy, Faculty of Mathematics and Natural Sciences, University of Lambung Mangkurat, A. Yani KM. 35.8 Banjarbaru 70714, South Kalimantan, Indonesia
[3]Agri-food and Biotechnology Research Center, Institut Teknologi Sepuluh Nopember, Jalan Arif Rahman Hakim, Sukolilo, Surabaya 60111, East Java, Indonesia
*Corresponding author: fatma@chem.its.ac.id

ABSTRACT

Melastoma malabathricum L. is medicinal plant that grow a lot in South Kalimantan, Indonesia and this plant used to treat various diseases including cancer. This study aimed to evaluate the phytochemicals (terpenoids, steroids, alkaloids, and flavonoids) of *M. malabathricum* leaves extracts and the cytotoxicity of leaves methanol extract of *M. malabathricum*. Phytochemical screening methods were used to determine the terpenoid, steroid, alkaloid, and flavonoid contents. In vitro cytotoxic assay was performed against MCF-7, HeLa, A549, B16, and HT29 cancer cell lines. *M. malabathricum* leaves extract contains terpenoids, steroids, alkaloids, and flavonoids. Methanol extract showed cytotoxicity against MCF-7, HeLa, A549, B16, and HT29 cancer cell lines with IC50 values of 327.37±0.67, 327.05±0.48, 304.46±1.93, 319.21±0.67, and 1.43±0.19 µg/mL, respectively. Based on the test results, this plant can be used as source of anticancer agents.

Keywords: cytotoxicity, phytochemicals, *Melastoma malabathricum* L.

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Synthesis and Charaterization of Nanomagnetite-Chitosan for Water Purification

Nina Ariesta[1], Gladys Ayu PKW[1], Mia Azizah[2], Deden Saprudin[3], Noviyan Darmawan[3],*

[1] Chemistry Study Program, Nusa Bangsa Universsity, Bogor, Indonesia
[2] Biology Study Program, Nusa Bangsa Universsity, Bogor, Indonesia
[3] Chemistry Department, IPB University, Bogor, Indonesia
*Corresponding author: ariestanina14@gmail.com

ABSTRACT

Water has an important role for the survival of living things in meeting their daily needs, so it is necessary to improve water quality. One method of water purification can be done by flocculation process. The use of flocculants for water treatment has been an alternative so far, but the process is needed to be improved in separating it from all parts of the water. One of the modifications that can be done is modification with magnetite iron oxide nanoparticles, which are widely used for water decontamination because of their small particle size, easy magnetic separation, larger surface area and reusability. The purpose of research was to synthesis and characterize of nanomagnetite composites with chitosan as flocculant agent used for the water treatment process, to obtain effective magnetite flocculant composites for water treatment process. The synthesis of nanomagnetite-chitosan was conducted by hydrothermal method with the various of mass chitosan used in research. Nanomagnetite chitosan were characterized using FT-IR spectroscopy, XRD and SEM. Optimum conditions were determined for pH and the optimum percent mass of nanomagnetite flocculant. The qualities of water were determined by the measurement of of TSS, TDS, DO, COD, BOD. The FT-IR spectra confrmed that the nanomagnetite chitosan was produced form the fuctional groups N-H and O-H stretching. The morphology of nanomagnetite and nanomagnetite chitosan was different based on SEM captured. The nanomagnetite angles were detected from difractogram. The nanomagnetic chitosan 0,9 miligrams showed the highest percentages of decreasing in TSS, TDS and turbidity of the water.

Keywords: *nanomagnetite; chitosan, flocculant, water purification*

The 5th ISOC 2022

Facile synthesis of porous graphitic carbon nitride via sulfuric acid post-treatment and its activity for Methylene Blue Degradation

*Arza Ajeng Mahardika[1], Ade Irma Rozafia[2], Djoko Hartanto**

[1]Departement of Chemistry, Sepuluh Nopember Institute of Technology, Surabaya, East Java, Indonesia
**Corresponding author: Djokohar@its.ac.id*

ABSTRACT

Porous graphitic carbon nitride (porous g-C_3N_4) was successfully prepared by posttreatment process using concentrated sulfuric acid for the pore formation. The scanning electron microscopy (SEM) observation and N_2 adsorption/desorption measurements verified the formation of pores, which increases the surface area. The characterization using X-ray diffraction (XRD) and Fourier transform (FTIR) shows that the formation of the pores does not significantly change the structural properties. Photocatalytic performance test on the degradation of methylene blue (MB) shows that porous graphite carbon nitride has an enhanced photocatalytic activity compared to the bulk g-C_3N_4, which can be attributed to the larger surface area, more efficient charge carriers' transfer, and light scattering effect on the porous g-C_3N_4.

Keywords : carbon nitride, porous, photocatalysis, photodegradation, dye.

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Effect of Addition of NaCl salt on Extraction of Essential Oil from Lemongrass Leaves by Microwave Hydro-Destillation Method

Fenny Suryanti[1], Lailatul Qadariyah[1], Mahfud Mahfud[1,]*

[1] Department of Chemical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia
*Corresponding author: mahfud@chem-eng.its.ac.id

ABSTRACT

Essential oils are compounds that are extracted from plants and obtained by destillation. Indonesia has many kinds of plant commodities for essential oil production. Among the essential oils that have not been developed in Indonesia is citronella oil which can be extracted from the lemongrass plant. It is known that the *Microwave Hydro-Destillation Method* has several advantages over conventional steam distillation methods including: shorter distillation time, higher oil quality and yield. So this research purposes to extract citronella oil from lemongrass leaves using the *Microwave Hydro-Destillation* (MHD) method. Operating variables used are extraction time (20-180 min), material size (0.5 cm, 1 cm and 1.5 cm), feed to solvent ratio (0.1; 0.15; 0.2 g/ ml) and microwave power (300; 450; 600 watt), with operating conditions at atmospheric pressure (1 atm). Analysis of the essential oil results obtained included GC-MS analysis, specific gravity, refractive index, and solubility. The results showed that it increased w ith extraction time which was followed by almost constant conditions, tended to decrease with increasing feed to solvent ratio, and increase in yield with increasing microwave power. From the results of the GC-MS analysis, the active substance content of Geraniol 46.61% and Citronelal 5.62%. The tested kinetic model shows that the first-order model can represent experimental data well.

Keywords: Extraction; Essential Oil; Lemongrass; *Cymbopogon nardus*; Microwave Hydro-Destillation.

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Extraction of Citronella oil using Solvent-Free Microwave Extraction (SFME) : Parametric study and Kinetic Model

Mahfud Mahfud[1],, Lailatul Qadariyah[1], Fenny Suryanti[1]*
[1]Department of Chemical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya 60111
*Corresponding author: *mahfud@ chem-eng.its.ac.id*

ABSTRACT

Citronella oil is one of the prospective volatile commodities in terms of exports in Indonesia. The demand for citronella oil is quite high and tends to increase at a stable price. The extraction method generally uses steam distillation. Recently, several microwave-assisted extraction methods have been developed which are more efficient because of the short extraction time. The aim of this research is prametric study and determine kinetic model of the essential oil extraction from citronella leaves using Solvent-free microwave extraction (SFME). The operating parameters are microwave power (300 - 600 Watt), extraction time (15 - 90 minutes), feed ratio to distiller volume (F/D). The results showed that the yield of citronella oil increased with the length of extraction time by SFME methods. Also, the effect of microwave power increases with increasing power, but decreases if the microvave power exceeds 450 W due to raw material damage. Meanwhile, the effect of the F/D ratio has only a slight increase on yield. The highest yield obtained by the SFME method is 1.591%. Based on the physical and chemical analysis of citronella essential oil, the extraction results were obtained using the microwave assisted method (SFME) according to the conventional method of citronella oil research, but with a shorter extraction time.

Keywords: Citronella oil, Cymbopogon Nardus, Solvent-Free Microwave Extraction.

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Effect of Tannic Acid Concentration on The Stability of Copper Nanoparticles

Oka Shinta Sekar Kirana[1], Ade Irma Rozafia[2], Djoko Hartanto[3]

[1,2,3]Institut Teknologi Sepuluh Nopember
*Corresponding author: shinta.19012@mhs.its.ac.id

ABSTRACT

Copper-tannic acid nanoparticles can be synthesized through green synthesis by reacting copper (II) nitrate solution with tannic acid as a natural reducing agent without using hazardous materials. Tannic acid is designed as reducing agent for Cu^{2+} and stabilizing agent for nanoparticles. Tannic acid contains hydroxyl group act as a ligand that binds to metal ions into complex compounds. In this study, formation of copper-tannic acid nanoparticles was represented by mixing copper (II) nitrate with various concentrations of tannic acid 250 ppm, 500 ppm, 750 ppm, 1000 ppm. Copper-tannic acid nanoparticles were successfully characterized by color changing of the copper ion solution from blue to light yellow. The synthesized copper-tannic acid nanoparticles were characterized by UV-vis absorption spectra using UV-vis spectrophotometer. The nanoparticles' size was characterized by particle size analyzer. Higher wavelength or red shift leads to lower stability of the copper-tannic acid nanoparticles and bigger particle size.

Keywords: Copper, Green synthesis, Nanoparticles, Stability, Tannic acid.

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Synthesis of Carbon Nanodots from Several Wastes Using Hydrothermal Method

Dian Permana[1,2], Arif Priyangga[1], Mardi Santoso[1], Lukman Atmaja[1] , Djoko Hartanto[1], Juhana Jaafar[3]*

[1]Department of Chemistry, Institut Teknologi Sepuluh Nopember, ITS Sukolilo, Surabaya 60111,Indonesia
[2]Department of Educational Chemistry, Universitas Sembilanbelas November Kolaka, Sulawesi Tenggara 93517, Indonesia
[3]Advanced Membrane Technology (AMTEC) Research Centre, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Malaysia
*Corresponding author: lukman_at@chem.its.ac.id

ABSTRACT
Synthesis of carbon nanodots has been successfully synthesized using hydrothermal method. The 5 gram of cellulosic waste used as starting material was mixed into 40 mL aquades, 30 mL sulfuric acid, and 50 mL NaOH 2 M. A precusor solution was prepared by adding urea as passivation agent. We use reaction at 150 °C in hydrothermal circumtances using time variation of 20, 40, 60 minutes. The resulted carbon was qualitatively checked by UV light (365 nm) and shows blue luminesence containing microscopic particles spreading across the solution. Particle size of the synthesized carbon nanodots of 0.7372 nm, 0.7390 nm, and 1.224 nm for recycled newspaper, office waste paper, and wood powder, respectively, were confirmed by particle size analyser. The density of carbon nanodots was also investigated using pycnometer and a range of its density exhibited is 1.2145-1.2911 g/mL. The spectrophotometer also shows a maximum wavelength of carbon nanodots. The variation of hydrothermal time affects the increasing rate of its wavelength. The lowest wavelength is at 309 nm and the highest is at 329 nm. The low wavelength seems to affect the smaller particle size of carbon nanodots.

Keywords: carbon nanodots; hydrothermal; waste.

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(*E*)-*N*'-(3-(4-bromophenyl)acryloyl)isonicotinohydrazide: Synthesis and Bioactivity Against α-glucosidase Enzyme

*Nur Pasca Aijijiyah[1], Farah Mahzumi[1], and Mardi Santoso[1]**

[1]Department of Chemistry, Faculty of Sciences and Data Analytics, Sepuluh Nopember Institute of Technology, 60115, Surabaya, Indonesia
*Corresponding author: tsv09@chem.its.ac.id

ABSTRACT
Diabetes mellitus (DM) is a condition characterized by high blood sugar levels (hyperglycemia), which can have adverse effects on several organ systems. Commercial DM medications are used as theraphy for people with DM II, but they have side effects, thus new compounds inhibiting the α-glucosidase enzyme needs to be developed. Cinnamic acid derivatives such as cinnamamides have been shown to possess α-glucosidase inhibitory activity including cinnamamide. Synthesis of cinnamamide compounds generally involves thionyl chloride ($SOCl_2$), which is listed in the Chemical Weapons Convention and List of Chemicals-3 in the Law of the Republic of Indonesia Number 9 of 2008 concerning the Use of Chemicals and the Prohibition of the Use of Chemicals as Chemical Weapon. We successfully synthesized a novel cinnamamide compound, namely (E)-N'-(3-(4-bromophenyl)acryloyl)isonicotinohydrazide, and investigated its inhibitory activity against α-glucosidase enzyme through in vitro assays. The synthesis of this compound was carried out by the Shiina method, and a yield of 59% was obtained. (E)-N'-(3-(4-bromophenyl)acryloyl)-isonicotinohydrazide has stronger α-glucosidase inhibitory activity than acarbose with IC50 values of 47.78 and 188.22 μM, respectively.

Keywords: Synthesis, Shiina method, cinnamamides, α-glucosidase enzyme, diabetes mellitus II.

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Synthesis and Characterization of Membrane Based on Chitosan/Modificated Fly Ash for Fuel Cell Application

Dhita Ariyanti[1], Dika Bhakti Praja[2], Deni Kurniawan[3], Nurul Widiastuti[4], Lukman Atmaja[5]*

[1,2,3] Department of Nuclear Chemical Engineering, Indonesian Nuclear Technology Polytechnic, National Research and Innovation Agency, Babarsari Street POBOX 6101 YKBB Yogyakarta 55281, Indonesia
[4,5] Chemistry Department, Faculty of Science and Data Anaalytics, Institute of Sepuluh Nopember of Technologi, Surabaya 60111
*Corresponding author: dhit001@brin.go.id

ABSTRACT

The lack of energy based on fossil can create alternatively energy, fuel cell is one of it. The most important of fuel cell's component is membrane. Besides place of proton mobility, membrane takes part to hold methanol and water in high temperature. In this research, it will increase of membrane's based on chitosan performance. Chitosan is as matrix of polymer, while fly ash is inorganic filler. Hidrofilicity of chitosan and hidrofobicity of modified fly ash can hold methanol permeability in high temperature. Inorganic filler can interact with chitosan matrix, this interaction can increase polymer chain growth and decrease cavity in membrane system. Low cavity in membran system can be predicted to hold methanol diffusion. Loading modified fly ash is 0%, 10%, 30%, and 50%. This membrane will be characterized by FTIR, AFM (Atomic Force Microscopy), and percentage water and methanol uptake, to dig depthly about its properties and apply it in fuel cell. The result shows that modificated fly ash in membrane based on chitosan can decrease percentage water uptake till 38,02%, increase percentage methanol uptake till 23,27%. Moreover, modificated fly ash in membrane based on chitosan can decrease methanol permeability till 0,51 cm^2/s, increase permselectivity till 84,7%.

Keywords: fuel cell application, membrane, chitosan, modified fly ash

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PHYTOCHEMICALS SCREENING OF *Quercus infectoria* GALLS EXTRACT METHANOL-WATER (50-50) USING LIQUID CHROMATOGRAPHY MASS SPECTROMETRY

R. Purbowati[1], T. Taufiqurohmah[2], A. Syahrani[1]*

[1]Department of Farmacy, Faculty of Farmacy, Airlangga University. Indonesia
[2]Department of Chemistry, Faculty of Mathematica and Science, the state University of, Indonesia
*Corresponding author: asyahrani@ff.unair.ac.id

ABSTRACT

Phytochemical composition of *Quercus infectoria Gall* ware determined using by methanolic and water extraction and report the main compound screened by Liquid chromatography-mass spectrometry (LC-MS) method. Twenty seven bioactive compounds were identified in the water-methanol (50-50) extract. The identification of that bioactive compound is based on retention time molecular weight, and molecular formula from LC-MS peak and fragmentation ie :) quinic acid, 2) malic acid, 3) Ellagic acid, 4) tr-aconitic acid, 5) gallic acid, 6) chlorogenic acid, 7) tannic acid, 8) tr-caffeic acid, 9) vanillin, 10) p-coumaric acid, 11) rosmarinic acid, 12) rutin, 13) hesperidin, 14) hyperoside, 15) 4-OH benzoic acid, 16) salicylic acid, 17) myricetin, 18) fisetin, 19) coumarin, 20) quercetin, 21) naringenin, 22) hesperetin, 23) luteolin, 24) kaempferol, 25) apigenin, 26) rhamnetin, and 27) chrysin. And base on peak area *Quercus Infectoria Gall* have major compound: 1) 65-70% tannic acid, 2) 7-8% Quinic Acid, 3) 4-5% Galic acid and 4) 0,1-2% ellagic acid

Keywords: *Quercus Infectoria Gall*, methanol-water, Extraction, LC-MS, Phytochemical composition

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Bio-oil production from low-rank coal by catalytic microwave pyrolysis using reservoir rock and activated carbon catalyst

*Bambang sardi[1], Ali Altway[2], Mahfud Mahfud[2],**

[1]Departement of Geological Engineering, Tadulako University, Palu 94118, Indonesia
[2]Department of Chemical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia
*Corresponding author: *mahfud@ chem-eng.its.ac.id*

ABSTRACT

To manage environmental challenges, clean coal technology is still urgently required. Low-rank coal (LRC) dominates the global coal industry. An improved method to turn LRC into clean energy, such as bio-oil, is microwave pyrolysis (MP). Low heating efficiency and the dominance of heavy tars in the end products are the key pyrolysis problems, nevertheless. In this investigation, MP was employed to treat LRC using the catalysts and receptors RC+$Fe_2(SO_4)_3$ and AC+$Fe_2(SO_4)_3$, respectively. The distribution of the product and the process variables (time, temperature, and power) were evaluated. According to the results, RC+$Fe_2(SO_4)_3$ and AC+$Fe_2(SO_4)_3$ changed the distribution of the product by increasing up the rate of temperature rise and ultimate temperature of MP. Bio-oil produced from MP+1.0%RC+24.6%$Fe_2(SO_4)_3$ was 40.0%, 4.4% higher than the conventional pyrolysis (CP), when compared to CP at the same conditions (620 °C and 60 min). Using MP+1.0%AC+24.6%$Fe_2(SO_4)_3$, 44.4% bio-oil was generated while there was an 8.8% increase overall. The maximum bio-oil production with 1.0%RC+24.6%$Fe_2(SO_4)_3$ was observed at 60 min, 620°C, and 600W, producing 41.9% bio-oil. The maximum bio-oil production was seen using 1.0%AC+24.6%$Fe_2(SO_4)_3$ at 120 min, 620 °C, and 450W, producing 49.2% bio-oil. The outcomes of the studies could serve as a foundation to produce clean fuels in the future that use LRC to lower carbon emissions globally.

Keywords: LRC, microwave pyrolysis, activated carbon, reservoir rock, $Fe_2(SO_4)_3$

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Effect of Moisture Content on Essential Oil Extraction of Sweet Orange Peel (*Citrus Sinensis Ls.*) using Steam Distillation Method

*Yuyun Yuniati[1], Lailatul Qadariyah[2], Mahfud Mahfud[2],**

[1] Department of Chemistry, Ma Chung University, Malang 65151, Indonesia
[2] Department of Chemical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia
*Corresponding author: *mahfud@ chem-eng.its.ac.id*

ABSTRACT

The aims of this study was to compare the yield and quality of citrus oil obtained from the raw material of sweet orange peel (*Citrus Sinensis Ls.*) in fresh and dried condition using steam distillation method. The mass of raw materials used were 200, 300, 400, and 500 grams. The extraction process by steam distillation is conducted for 7 hours. The operating conditions of this method are the temperature around 100 oC and the pressure of 1 atm. The moisture content of fresh materials is more than 66%, and for materials dried in an oven for 12 hours ranging from 43 - 66% and for drying for 24 hours less than 43%. Analysis of oil components, especially the content of %limonene using GCMS and morphology of orange peel using SEM. The experimental result shows that the drying pre-treatment can affect the yield of citrus oil obtained significantly. The yield obtained for sweet orange peel oil for fresh, 12 hours drying and 24 hours drying successively was 0.58 - 0.62%; 0.59 - 1.05%; 0.65 - 0.88%. The quality of the orange peel oil obtained increased along with the pre-treatment with oven drying. The content of limonene in sweet orange peel oil fore fresh, 12 hours drying, and 24 hours drying were respectively 93.39%; 97.57%; 95.32%. Meanwhile, the extraction kinetics modelling shows that the first-order extraction kinetics model represents good experimental data.

Keywords: Citrus Oil, Steam Distillation, Drying, *Citrus Aurantium* L., Kinetic model.

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Encapsulation of neem seed oil in alginate/black liquor matrices

Amira Ghosiyah[1], Dwi Indarti[1], Lutfi Rohman[2], Asmoro Lelono[2], Bambang Piluharto[1,2]

[1] Biomaterial research group, department of chemistry, Faculty of Mathematics and Natural Sciences, University of Jember
[2] Integrated Mathematics and Sciences for Applied Researches, Faculty of Mathematics and Natural Sciences, University of Jember
*Bambang Piluharto: bampito.fmipa@unej.ac.id

ABSTRACT

Neem seed oil (NSO) have widely used as biopesticide due to azadirachtin content that play role as an antifeedant. However, the use of azadirahtin for biopesticide was limited by susceptibility to UV light. The aim of the research is encapsulated NSO in the alginate/black liquor matrices and characterize the swelling degree and its the release rate. In here, different content of black liquor in matrices was studied effect on swelling degree and its the release rate. As the result, the swelling degree and the release rate decrease as black liquor increased.

Keywords: neem, azadirachtin, encapsulation, swelling degree, release rate

The 5th ISOC 2022

ONION (*Allium cepa* L.) OIL EXTRACTION USING MICROWAVE HYDRO-DIFFUSION GRAVITY METHOD: Parametric Effect and Kinetic Model

Yeni Variyana[1],, Haqqyana Haqqyana[2], Mahfud Mahfud[2],**

[1] Department of Industrial Chemical Engineering, Politeknik Negeri Lampung, Bandar Lampung 35144, Indonesia.
[2] Department of Chemical Engineering, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia
*Corresponding author: *mahfud@ chem-eng.its.ac.id* , *yenivariyana@polinela.ac.id*

ABSTRACT

Research efforts to develop greener approaches to extracting essential oils are increasing. Utilizing microwave technology to extract oils and/or natural products from plants aids to provide higher extraction rates while minimizing the use of toxic organic solvents. This study investigated the effect of drying treatment, material size, microwave power level, and extraction time on the yield of onion oil from *Allium cepa* L. using microwave hydro diffusion. Domestic microwave ovens are installed and modified to let the extracted oil come out of the oven cavity due to the force of gravity. Increasing the microwave power level had a positive effect on increasing the oil yield of dried onion bulbs in a short time, however, little effect was observed from fresh onion bulbs. In addition, chemical compounds from onion oil extract were also identified. GC-MS analysis showed that the main compounds detected in onion oil consisted of two types of furan derivatives, namely aryl-aldehydes and carbonate esters. Other compounds such as 2,6-dimethyl-5-hepten-1-ol, Cyclohexanol, 5-methyl-2-(1-methylenetenyl), and Z-Sitral were also found in significant amounts. The applied microwave method provides promising features such as shorter extraction times as an alternative to conventional extraction methods. The extraction model of order 1 and order 2 can represent good experimental data.

Keywords: *Allium cepa L., Onion, Essential oil, Microwave hydro-diffusion gravity*

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Manufacture of Environmental Friendly Concrete by Using Sea Shells for Partial Substitute of The Cement

Agus Martono Hadi Putranto[1], Anggi ade Saputro[1], Kurnia Juang Purnomo[1], Randi Putra[1]

[1] Chemistry Department, Mathematic and Natural Science Faculty, University of Bengkulu
*Corresponding author: agus.martono@unib.ac.id

ABSTRACT

Research has been carried out on the use of remis and lokan shells types as a partial substitute for cement in the manufacture of environmental friendly concrete. The percentage of replacement variation are 10%, 15% and 20% by weight of CaO. The method used in the research is a laboratory experiment using the SEM-EDX instrument to determine the CaO content of the two types of sea shells. Furthermore, the compressive strength test of concrete with storage time of 14, 28 and 42 days, and flexural strength test concrete with storage time of 28 and 42 days was carried out. The results of this study indicate that the content of CaO in Mussel shells is 97.97% (w/w), while for lokan it is 99.92% (w/). For the best compressive strength test at 15% replacement of lokan calm shells with 28 days of storage it reached 12.6 M.Pa. As for the best flexural strength test at 10% replacement of lokan and mussel shells with a storage time of 42 days of 1.48 M.Pa.

Keywords: *Shellfish, lokan, remis, compressive strength, flexural strength*

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Potential of Adenium obesum Flower Extracts as an Antibacterial Against Gram-Negative Bacteria and Gram-Positive Bacteria

*Nurmala Maulidina Helayanti[1], Adi Setyo Purnomo[1], Hamdan Dwi Rizqi[1]**

[1]Department of Chemistry, Faculty of Science and Analytical Data, Institut Teknologi Sepuluh Nopember (ITS), Kampus ITS-Sukolilo, Jalan Arif Rachman Hakim, Surabaya, East Java 60111 Indonesia
*Corresponding author: hamdan.c28@gmail.com

ABSTRACT

The high number of bacterial resistance to commercial antibacterials requires researchers to create new antibacterials. So far, plant-based antibacterials are still being researched and developed. In this study, the potential of *Adenium obesum* flower extracts as an antibacterial against Gram-negative bacteria (*E. coli* and *P. aeruginosa*) and Gram-positive bacteria (*S. aureus* and *E. faecalis*) were evaluated. *Adenium obesum* flowers were extracted using four different solvents based on polarity (ethyl acetate, acetone, ethanol, and water) by the maceration method. The secondary metabolite contents of each extract were tested qualitatively by the phytochemical screening method. Afterward, each extract was tested for its antibacterial potential against Gram-negative and Gram-positive bacteria qualitatively (disc diffusion method) and quantitatively (microdilution method). Phytochemical screening showed that each extract contained various secondary metabolites. Qualitative antibacterial assay showed that ethyl acetate extract gave the best inhibition against *E. coli* and *S. aureus*, while water extract gave the best inhibition against *P. aeruginosa* and *E. faecalis*. The acetone extract and ethanol extract did not give any inhibition to test bacteria at all. This shows that Adenium obesum flower extract works as a specific antibacterial. IC_{50} for each bacteria was determined using quantitative method. Against Gram-negative, IC_{50} value was reached at concentration 571,57 mg/mL for *E. coli* and at concentration 475,15 mg/mL. Whilst against Gram-positive bacteria, IC_{50} value was reached at concentration 358,84 mg/mL for *S. aureus* and at concentration 56,99 mg/mL for *E. faecalis*. From quantitative assay, it shows that *Adenium obesum* flower extracts inhibited Gram-positive bacteria more effectively than Gram-negative bacteria. This study states that the *Adenium obesum* flower has potential as an antibacterial against Gram-positive bacteria and Gram-negative bacteria.

Keywords: *Adenium obesum*, Antibacterial, Gram-negative bacteria, Gram-positive bacteria.

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ISOLATION AND IDENTIFICATION OF POTENTIAL NOVEL BACTERIA FROM SEMERU MUD FLOW USING GRAM STAINING AND 16S rRNA GENE ANALYSIS METHODS

Herdayanto Sulistyo Putro1, Djarot Sugiarso1, Hamdan Dwi Rizqi1, Ratna Ediati1, Refdinal Nawfa1, Jonathan Arsha Permana1, Daniel Joshua Rompas 1, Ivana Caroline Sinaga 1, Gravilla Olenda Prastica1, Tunastiti Ayu Bintari1, Kamila Zahranisa1

1 Department of Chemistry, Institut Teknologi Sepuluh Nopember, Sukolilo, Surabaya, 60111, Indonesia
*Corresponding author: hsputro@chem.its.ac.id

ABSTRACT
Exploration of extremophilic microorganisms in Mount Semeru area is rarely done. This research was conducted to isolate the bacterial isolates contained in it and to identify using gram staining and analysis of the 16S rRNA gene. The results of the isolation obtained were bacteria coded LS-ISP2-JS2 and then identified using the gram staining method and analysis of the 16S rRNA gene. The result of gram staining showed that the isolate was gram negative and had a bacillus form. The isolate DNA was extracted and amplified 16S rRNA gene with forward primer 27F (5'-AGAGTTTGATCMTGGCTCAG-3') and reverse primer 1492R (5'-TACGGYTACCTTGTTACGACTT-3') using PCR method. The electrophoresis process that using 2% agarose gel showed a single band with a size of ± 200 bp. The data from the sequencing shows the number of nucleotide base sequences is 146 bases. The sequenced nucleotide were compared with the data on NCBI (National Center for Biotechnology Information) using the BLAST method. Phylogenetic tree is made using MEGA11 software, showed that the LS-ISP2-JS2 isolate had similarities with Uncultured bacterium clone 1 16S ribosomal RNA gene with a similarity percentage of 98.56%, which indicated that the isolate was an uncultured bacterium and can be categorized as a novel bacteria.

Keywords: Semeru, Extremophilic, 16S rRNA gene, Gram Staining, Novel Bacteria

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In-situ Synthesis of Fe_2O_3/HKUST-1 Composites and Its Application as Methylene Blue Adsorbent

Ratna Ediati[1], Furi Dina Ria[1], Liyana Labiba Zulfa[1], Dety Oktavia Sulistiono[1], Hamzah Fansuri[1]

[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia
*Corresponding author: rediati@chem.its.ac.id

ABSTRACT

A series of Fe_2O_3/HKUST-1 composites has been successfully synthesized using the solvothermal method in a solvent mixture of dimethylformamide, ethanol and demineralized water at 100 °C for 10 hours. The Fe_2O_3 was directly added to the reaction mixture with a mass variation of 5, 10, and 20% of the HKUST-1 mass. The obtained composites were then notated as Fe(5)/HKUST-1, Fe(10)/HKUST-1 and Fe(20)/HKUST-1, respectively. The X-ray diffraction (XRD) patterns of all the synthesized composites show characteristic peaks at 2θ values similar to that of standard HKUST-1. Further, the Fourier-transform infrared (FTIR) spectra and scanning electron microscope (SEM) of the synthesized composites prevailed that there was no change in the functional groups and morphology of HKUST-1 after addition of Fe_2O_3 during the synthesis process. The morphology of Fe_2O_3/HKUST-1 is in the form an octahedral crystal which is very similar to morphology of a standard HKUST-1. The test results on the methylene blue adsorption revealed that Fe(20)/HKUST-1 had highest adsorption capacity of 222 mg/g and followed the pseudo-second order kinetic and Langmuir isothermal adsorption models.

Keywords: HKUST-1; Fe_2O_3/HKUST-1; adsorption kinetic; adsorption isothermal; methylene blue

The 5th ISOC 2022

Adsorption of Methyl Orange on UiO-66 Synthesized using Ultrasound-Assisted Method

Alvin Romadhoni Putra Hidayat[1], Liyana Labiba Zulfa[1], Nuhaa Faaizatunnisa[1], Yuly Kusumawati[1], Djoko Hartanto[1], Nurul Widiastuti[1], Adi Setyo Purnomo[1], Ratna Ediati[1]

[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia
*Corresponding author: rediati@chem.its.ac.id

ABSTRACT

The adsorbent UiO-66, which was produced using an ultrasound-assisted technique, was utilized to remove Methyl Orange. In terms of material properties and adsorption performance (188.7 mg/g), UiO-66 performed admirably. Several adsorption parameters were evaluated, including initial dye concentration, contact length, ionic strength, solution pH, and adsorbent dose. According to the kinetics and adsorption isotherms, the experimental data were compatible with the pseudo second order kinetic and Langmuir isotherm models. The hypothesized adsorption process is derived from numerous interactions, including hydrogen bonding, electrostatic interactions, and π-π interactions, based on pH effect and FTIR characterization. UiO-66 can be regenerated four times without losing its adsorption ability.

Keywords: UiO-66, Ultrasound irradiation, Dye, Adsorption

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Fabrication of MOF-derived Mesoporous Heterojunction Fe_2O_3/ZnO as Photocatalyst for Degradation of Methylene Blue

Liyana Labiba Zulfa[1], Alvin Romadhoni Putra Hidayat[1], Riki Subagyo[1], Nuhaa Faaizatunnisa[1], Djoko Hartanto[1], Nurul Widiastuti[1], Yuly Kusumawati[1], Ratna Ediati[1]

[1] Department of Chemistry, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember (ITS), Surabaya, Indonesia
*Corresponding author: rediati@chem.its.ac.id

ABSTRACT

A mesoporous heterojunction Fe_2O_3/ZnO derived from Fe_2O_3/ZIF-8 was successfully fabricated and investigated for degradation of methylene blue (MB) using batch experiment. The obtained mesoporous Fe(25)ZnO heterojunction possess a mesoporous structure with a diameter pore of 25.7 nm, and the band gap value of 1.85 eV, which is lower than that of Fe_2O_3 and ZnO. Compared to the pristine ZIF-8 and Fe_2O_3/ZIF-8 composites, the mesoporous Fe(25)ZnO heterojunction exhibits an increased in photocatalytic performance, with the highest degradation performance reached up to 100% within 150 min under UV LED irradiation, and the rate constant value of 4 times higher than that of pristine ZIF-8. The possible mechanism of photocatalytic degradation of MB by the mesoporous Fe_2O_3/ZnO heterojunction is proposed. These results indicate that the combination of two semiconductors (Fe_2O_3 and ZnO) leads to an increase in the photocatalytic performance.

Keywords: ZIF-8; mesoporous metal oxide; heterojunction; methylene blue; photocatalytic

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Enhancing Electrocatalytic Nitrogen Reduction to Ammonia over Oxygen-deficient TiO_2 by Copper Loading

Wahyu Prasetyo Utomo[1], Hao Wu[1], and Yun Hau Ng[1]**

[1]School of Energy and Environment, City University of Hong Kong, Kowloon 999077, Hong Kong SAR
*Corresponding author: *haowu92@cityu.edu.hk; yunhau.ng@cityu.edu.hk*

ABSTRACT

Electrocatalytic nitrogen reduction reaction (NRR) emerges as a potential sustainable process for ammonia production. However, the strong N≡N triple bond makes it difficult to activate N_2. Here, the experimental finding that copper loading is an efficient strategy to enhance the NRR performance of oxygen-deficient TiO_2 (OV-TiO_2) is presented. The copper-loaded OV-TiO_2 shows the enhanced ammonia yield rate of 13.6 μg mg_{cat}^{-1} h^{-1} at -0.5 V vs. reversible hydrogen electrode (RHE) and Faradaic efficiency of 17.9% at -0.4 V vs. RHE, which are significantly higher than the pristine TiO_2. The enhanced performance was attributed to the strong metal support interaction between the loaded copper nanoparticles and the OV-TiO_2, which increases electrochemically active surface area and electron density as well as promotes electron transfer. Moreover, oxygen vacancies in TiO_2 modulate the electron density of the neighboring copper atoms, improving the polarization of adsorbed N_2 molecules for better activation.

Keywords: ammonia, copper, electrocatalysis, nitrogen reduction, TiO_2.

The 5th ISOC 2022

Transformation of CO_2 into value added chemicals: the use of natural polymers to produce cyclic carbonates.

Heriberto Díaz Velázquez

ABSTRACT

Nowadays, the increment of natural disasters produced by global warming has made mandatory for the big contaminant companies to realize more efficient ways to reduce their CO_2 emissions. This way, carbon capture technologies are one of the most efficient ways to avoid large amounts of GHGs to reach the atmosphere. To seize the captured CO_2, several technologies exist to transform it into fine or commodity chemicals, but the high chemical stability of CO_2 make many of these technologies non economically feasible for their industrial application. That is why our research has been focused on the application of simple and non-expensive processes. The application of natural polymers such as cellulose a chitosan to promote the transformation of CO_2 to cyclic carbonates is well known. We have been working on the use of chitin, especially the system Chitin-DBU-KI to boost the catalytic properties of KI, reducing the consumption of such catalyst and to promote selectivities up to 99% and conversions at the same level. This way, it would be feasible to construct chemical facilities to produce cyclic carbonates at massive amounts, taking advantage of the low environmental impact of chitin and KI. A special mention will be made to our investigation on reactor technologies to produce cyclic carbonates with solid catalysts, where the benefits of the use of Robinson-Mahoney reactor are presented, which presented 5 times higher performance than tubular reactor in a process.

Keywords: ammonia, copper, electrocatalysis, nitrogen reduction, TiO_2.

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Gelatin Analysis in Commercial Ice Cream Using PANI/NiO Nanoparticles Modified Quartz Crystal Microbalance (QCM) Sensor

Ahmad Syafiq[1], Amalia Muharramah[1], Ulum Amalia[1], Andi Nina Asriana[1,2], Kartika Anoraga Madurani[1], and Fredy Kurniawan[1,]*

[1] Laboratory of Instrumentation and Analytical Sciences, Chemistry Department, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia.
[2] Department of Chemical Engineering, Politeknik Negeri Malang, Jl. Soekarno Hatta No.9, Malang 65141, Indonesia
*Corresponding author: *fredy@chem.its.ac.id*

ABSTRACT

Gelatin in ice cream samples has been successfully identified using Quartz Crystal Microbalance (QCM) sensors. The sensor was prepared by polyaniline and nickel nanoparticles modification. The modification was deposited on the QCM surface using layer by layer (LbL) method. Performance of the sensor was investigated for gelatin determination in the commercial ice cream samples. The experiments were performed in various brand of the ice cream (A, B, C, D, E, and F) at pH 9. The measurement was compared to the standard of porcine and bovine gelatins. The results showed that the sensor can be identified gelatin in ice cream samples. Frequency shift of ice cream that contained porcine gelatin was appeared as positive value, whereas a negative shift value was occurred in ice cream that contained bovine gelatin. The commercial ice cream has been identified as containing porcine or bovine gelatins.

Keywords: Porcine Gelatin, Fast analysis, Frequency, Ice Cream

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A study of photolithography on a polyethylene terephthalate (PET) sheet and its characterization using FTIR

Febri Hadi [1], Fredy Kurniawan[1]

[1] Laboratory of Instrumentation and Analytical Sciences, Chemistry Department, Faculty of Science and Data Analytics, Institut Teknologi Sepuluh Nopember, Surabaya 60111, Indonesia.
*Corresponding author: *fredy@chem.its.ac.id*

ABSTRACT

Modification of polyethylene terephthalate (PET) sheet and its characterization has been done. The PET sheet was modified using photolithography method. The PET sheet was initially cleaned using ethanol, and then irradiated with UV light for 4 hours at a distance of 2 cm at room temperature. Furthermore, the modified PET sheet was characterized by FTIR. The result of the modified PET sheet was compared by the unmodified PET sheet. The result shows the carbonyl group at wavenumber of 1721 cm-1 was already present in the unmodified PET sheet. Also, there are wide absorption on the modified PET sheet at a wavenumber of 3500 cm-1. This wide absorption indicates the formation of hydroxy (carboxy groups) after UV light exposure.

Keywords: Photolithography, FTIR, PET.

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Development of a wastewater-based risk index for SARS-CoV-2 transmission across three cities of the Canadian Prairies

Femi F. Oloye[1*]

[1] *Toxicology Centre, University of Saskatchewan, Saskatoon, SK, Canada*

*Corresponding author: *f.oloye@usask.ca*

ABSTRACT

Many scientists know wastewater-based epidemiology (WBE) as a form of environmental public health surveillance frequently applied in monitoring drug usage, including pharmaceuticals and illicit drugs, and their impact on wildlife. However, its use in monitoring infectious disease outbreaks was limited mainly outside of its use in polio outbreak monitoring until COVID-19 appeared in late 2019. Early in the pandemic, it was recognized that fragments of SARS-CoV-2 could be detected in wastewater and that this could provide a robust alternative and economical way to track trends in the spread of COVID-19 and its Variants of Concern. Interpretation and usage of data obtained from WBE has been challenging, given that WBE results may or may not correlate with clinical data. A Wastewater Viral Load Risk Index (WVLRI) was developed based on SARS-CoV-2 WS viral load and available clinical data expressed as 7-day moving averages of new/active cases to characterize potential COVID-19 outbreaks. The weekly average was considered 'low risk' when the viral load was below 10,000 gc/100 mL and 'high risk' when the load was ≥ 50,000 gc/100 mL. The other risk indexes were classified as medium or medium-high if they fell between high and low, but the rate of change was greater than 2-fold up or down. WVLRI performed well across the Alpha, Delta, and Omicron variant waves in Saskatoon, as well as the Delta and Omicron waves in Prince Albert and North Battleford. If discrepancies arise in the future, the derivation of the index could be fine-tuned for each city by adjusting the WVLRI parameters.

Keywords: Wastewater surveillance; Wastewater Viral Load Risk Index; COVID-19 outbreak; population health

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