ICChEAS
PROGRAM BOOK

NOVEMBER 9th
2022
PEKANBARU, INDONESIA

The 3rd International Conference on Chemical Engineering and Applied Science

"Towards the green and sustainable process engineering and applied science technology"

Program Book of The 3rd International Conference on Chemical Engineering and Applied Sciences 2022 (ICChEAS 2022)

Pekanbaru, Riau, Indonesia

November, 9th 2022

Organized by:

Chemical Engineering Department
Universitas Riau, Indonesia

Supported by:

Universitas Syiah Kuala, Indonesia
Vocational School of UNDIP, Indonesia
Universiti Teknologi MARA, Malaysia

WELCOME MESSAGE FROM RECTOR OF UNIVERSITAS RIAU

Assalamu'alaikum warahmatullahi wabarakatuh

In the stead of Allah, Most Generous, Most Merciful. May Allah's mercy, peace, and blessings be upon you. I would like to sincerely thank and welcome everyone to the third International Conference on Chemical Engineering and Applied Sciences on behalf of the Universitas Riau (ICChEAS 2022). The keynote addresses at ICChEAS 2022 will be delivered by Prof. Dr. Chun-Chen Yang, Ming-Chi University of Technology, Taiwan; Prof. Datuk Dr. Ahmad Fauzi, Universiti Teknologi Malaysia; Prof. Dr. Ing. Ir. Misri Gozan, M.Tech. Universitas Indonesia, Indonesia; and Prof. Yazid Bindar, Ph.D., Institut Teknologi Bandung, Indonesia.

The International Conference on Chemical Engineering and Applied Sciences (ICChEAS) collaboratively organized by the Faculty of Chemical Engineering, Universiti Teknologi MARA (UiTM), Malaysia, and 3 universities in Indonesia, the Vocational School, Universitas Diponegoro (UNDIP), Indonesia, the Chemical Engineering Department of Universitas Riau (UNRI) and the Chemical Engineering Department of Universitas Syiah Kuala (UNSYIAH).

The first ICChEAS was held in Banda Aceh in 2019, the second was in Semarang in 2021, and this year's third ICCheAS is being held in Pekanbaru, Riau. The 3rd ICChEAS's main goal is to offer the most sophisticated and extensive international forum for distributing information about research, development, and applications in the fields of chemical engineering and applied science. "Towards Green and Sustainable Process Engineering and Applied Science Technology" is the subject of the third ICChEAS in 2022.

I believe that ICChEAS 2022 will give participants the chance to exchange information, form partnerships and collaborations, and share research progress between universities, institutions, governments, and small-to-large industries, also it be able to benefit society and the country.

I would like to convey my sincere gratitude to the keynote speakers, all of the seminar participants, and the organizing committee for their tremendous efforts in helping to organize the third ICChEAS in 2022. Hopefully, we can all significantly contribute more to the nation's advancement. I would like to extend a sincere appreciation and a warm welcome to all of our esteemed guests and participants.

Wassalamu’alaikum wr wb.

Prof. Dr. Ir. Aras Mulyadi, M.Sc., DEA

WELCOME MESSAGE FROM DEAN OF FACULTY OF ENGINEERING UNIVERSITAS RIAU

Assalamu'alaikum warahmatullahi wabarakatuh

In the name of Allah, the Most Beneficent and the Most Merciful. May peace, mercy, and blessings of Allah be upon you. Good morning, dear colleagues, professors, lecturers, researchers, ladies and gentlemen, and good morning to our participants joining us online, from around the world.

On behalf of the Dean of the Faculty of Engineering Universitas Riau, I would like to express my sincere gratitude and welcome you to the 3rd International Conference on Chemical Engineering and Applied Sciences (ICChEAS 2022) with the theme "Towards Green and Sustainable Process Engineering and Applied Science Technology. This ICChEAS 2022 is organized by the Chemical Engineering Department Faculty of Engineering, Universitas Riau collaborated with the Faculty of Chemical Engineering, Universiti Teknologi MARA (UiTM), Malaysia, the Vocational School, Universitas Diponegoro (UNDIP), and the Chemical Engineering Department of Universitas Syiah Kuala (UNSYIAH).

May I thank the all committees of the 3rd International Conference on Chemical Engineering and Applied Sciences (ICChEAS 2022). We wish to extend a warm welcome to fellow delegates from various countries and also online participants joining this conference. We want to extend warm greetings to all those who support this international conference. Moreover, I honorably welcome our keynote speakers: Prof. Dr. Chun-Chen Yang, Ming-Chi University of Technology, Taiwan; Prof. Datuk Dr. Ahmad Fauzi, Universiti Teknologi Malaysia; Prof. Dr. Ing. Ir. Misri Gozan, M.Tech. Universitas Indonesia, Indonesia; and Prof. Yazid Bindar, Ph.D., Institut Teknologi Bandung, Indonesia.

Last but not least, my deepest gratitude goes to the Advisory Board, Organizing Committee, International Scientific Committee, institutions, companies, and volunteers who have directly and indirectly supported the success of this International Conference. The committee has organized a vibrant scientific program and is working hard to present highly respected and internationally notorious speakers to lead it. Although we try our finest to be professional, on behalf of the Universitas Riau, please accept our sincere apologies should their inconveniences occur before, during, or after the event. I wish you a very productive conference with exciting and encouraging discussions and exchange of knowledge so that together we can anticipate a future of groundbreaking knowledge, research, and technology for humanities.

May God bless us all with good health to make this event a successful and enjoyable one!

Best Regards,

Prof. Dr. Eng. Ir. Azridjal Aziz, S.T., M.T., IPU

WELCOME MESSAGE FROM THE CONFERENCE CHAIR OF 3rd ICChEAS 2022

Assalamu'alaikum warahmatullahi wabarakatuh

Good morning, ladies and gentlemen.

First of all, I would like to thank Allah subhanallahu wata'ala for giving us His blessing so that we could hold this activity. Because of His mercy, we can present in this opening event in good condition and health.

The honorable Rector Universitas Riau or the representative, the dean of Engineering faculty, Universitas Riau, the Head of the Chemical Engineering Department Universitas Riau, keynote speakers, reviewers, presenters, committees, and to all of you who are present today.

Here, I am Amun Amri, on behalf of the chairman of this event, I would like to welcome all of you to the 3rd International Conference on Chemical Engineering and Applied Sciences (ICChEAS) 2022.

This conference is organized by the Department of Chemical Engineering, Universitas Riau, Indonesia, in collaboration with the Department of Chemical Engineering, Diponegoro University, Indonesia, the Department of Chemical Engineering, Syiah Kuala University, Indonesia, and the Department of Chemical Engineering, University Teknologi MARA Malaysia.

This year, the topic of conference is "Toward the Green and Sustainable Process Engineering and Applied Science Technology". With the successful history of the conference series in the recent five years, we are committed to preparing this conference program for fostering vibrant exchanges and dynamic collaborations among the academic and research communities in dealing with a sustainable process engineering and applied science technology around the world. In this conference, about 95 papers will be presented from around the world namely Indonesia, Malaysia, India, China, Azerbaijan, Brunei, Japan, Nepal, Turkey and UK.

The organization of ICChEAS 2022 gets a great support from the conference organizing team members and conference paper reviewers. We would like to sincerely thank all individuals who have rendered their support in every possible way to make this conference a reality. We would also like to express our gratitude to all the paper authors and registered participants for their stimulating academic contributions to the vibrant intellectual exchange at this conference. With the online setting in the conference program, we hope every participant will have a unique ICChEAS 2022 experience for creating new friendships, professional collaborations, and beautiful memories.
Thank you!

Wassalamualaikum warahmatullahi wabarakatuh

Best regard

Prof. Amun Amri, S.T., M.T., Ph.D.

TABLE OF CONTENTS

CONFERENCE INFORMATION

Date	:	November, 9th (Wednesday) 2022
Time	:	07.30 – 17.00 (UTC +7)
Organizer	:	Chemical Engineering Department, Universitas Riau
Official Language	:	English
Secretariat		Laboratorium Teknologi Produk Fakultas Teknik Universitas Riau Kampus Binawidya, Jl. HR. Soebrantas Km.12,5, Simpang Baru, Panam Pekanbaru, Riau (28293) Indonesia Phone : (+62-761) 567446; 566937 Fax : (+62-761) 567446 Email : iccheas2022@eng.unri.ac.id Web : http://che.ft.unri.ac.id/
Conference Website	:	http://che.ft.unri.ac.id/iccheas
Conference Link	:	https://us06web.zoom.us/j/87602248345?pwd=dUo4bXhiNzlldVQwTFZKNUJTMVFYdz09
Meeting ID	:	876 0224 8345
Passcode	:	2022

ORGANIZING COMMITTEES

Advisory Board Chairs
Prof. Dr. Ir. H. Aras Mulyadi, M.Sc, Universitas Riau,Indonesia
Prof. Dr. M. Nur Mustafa, Universitas Riau,Indonesia
Prof. Dr. Almasdi Syahza, S.E., M.P, Universitas Riau,Indonesia
Prof. Dr. Eng. Azridjal Aziz, S.T., M.T, Universitas Riau,Indonesia
Idral Amri, S.T., M.T., Ph.D, Universitas Riau,Indonesia

Technical Committee
Prof. Amun Amri, S.T., M.T., Ph.D., Universitas Riau,Indonesia
Panca Setia Utama, S.T., M.T., Ph.D., Universitas Riau,Indonesia
Dr. Sunarno, S.T., M.T., Universitas Riau, Indonesia
Nurfatihayati, S.T., M.T., Universitas Riau, Indonesia
Dr. Said Zul Amraini, S.T., M.T., Universitas Riau, Indonesia
Dr. Ida Zahrina, S.T., M.T., Universitas Riau, Indonesia
Hari Rionaldo, S.T., M.T., Universitas Riau, Indonesia
Prof. Dr. Ir. Bahruddin, S.T., M.T., Universitas Riau, Indonesia
Chairul, S.T., M.T., Universitas Riau, Indonesia
Dra. Drastinawati, M.Si., Universitas Riau, Indonesia
Dr. Padil, S.T., M.T., Universitas Riau, Indonesia

Editorial Board
Assc. Prof. Dr. Eng. Muhammad Aziz, The University of Tokyo
Prof. Amun Amri, S.T., M.T., Ph.D., Universitas Riau,Indonesia
Evelyn, S.T., M.Sc., M.Eng., Ph.D.
Hermawan Dwi Ariyanto, Ph.D.

Scientific Committee
Prof. Abrar Muslim, Ph.D. Universitas Syiah Kuala, Indonesia
Prof. Adrianto Ahmad Universitas Riau, Indonesia
Prof. Amun Amri Universitas Riau, Indonesia
Prof. Arif Budiman Gadjah Mada University, Indonesia
Ir. Dr. Ashraf Azmi MARA University of Technology, Malaysia
Assoc. Prof. Atikah Kadri MARA University of Technology, Malaysia
Prof. Bahruddin Universitas Riau, Indonesia
Assoc. Prof. Chun Yang Yin Newcastle University in Singapore, Singapore
Prof. Edy Saputra Universitas Riau, Indonesia
Prof. Erman Taer Universitas Riau, Indonesia
Assoc. Prof. Dr. Junaidah Jai MARA University of Technology, Malaysia
Prof. Karna Wijaya Gadjah Mada University, Indonesia
Prof. M. Mahbubur Rahman Jahangirnagar University, Bangladesh
Assoc. Prof. Mohammednoor Altarawneh UAE University, United Arab Emirates
Prof. Muthia Elma Lambung Mangkurat University, Indonesia
Prof. Dr. Nasrul AR, M.T. Universitas Syiah Kuala, Indonesia
Dr. Norin Zamiah Kassim Shaari MARA University of Technology, Malaysia
Dr. Rohani Mohd Zin MARA University of Technology, Malaysia

Prof. Saryono Universitas Riau, Indonesia
Prof. Setijo Bismo Indonesia University, Indonesia
Dr. Shareena Fairuz Abdul Manaf MARA University of Technology, Malaysia
Prof. Dr. Siswo Sumardiono Universitas Diponegoro, Indonesia
Prof. Sugiman Mataram University, Indonesia
Prof. Sutikno Semarang State University, Indonesia
Prof. Syaiful Bahri Universitas Riau, Indonesia
Prof. Titania T. Nugroho Universitas Riau, Indonesia
Assoc. Prof. Vita Paramita Universitas Diponegoro, Indonesia
Prof. Wega Trisunaryanti, Ph.D., Eng Gadjah Mada University, Indonesia
Assoc. Prof. Wiratni Gadjah Mada University, Indonesia
Prof. Yunardi Universitas Syiah Kuala, Indonesia
Assoc. Prof. Zhong Tao Jiang Murdoch University, Australia
Prof. Zuchra Helwani Universitas Riau, Indonesia

SCOPE OF THE CONFERENCE

Topics of interest include, but are not restricted to:

Chemical Engineering Fundamentals and Applied Chemistry Smart city

- Physicochemical Separation
- Mixing and Fluid Flow
- Multiphase Flow
- Transport Phenomena and Rheology
- Thermodynamic
- Interfacial and Colloidal Phenomena
- Particulate System
- Combustion Technology
- Equipment and Process Designs
- Corrosion and its control
- Industrial photochemistry
- Adhesive industrial chemistry
- Green organic synthesis routes
- Future of Food Engineering
- Physical, Theoretical and Computational Chemistry
- Physical and biophysical chemistries
- Polymer properties, synthesis, modification, and characterization
- Industrial organic and inorganic chemistry
- Chemical synthesis of organic compounds
- Environmental Chemistry
- Unit Operation in Food Processing
- Thermal and Non-Thermal Processing
- Food Packaging
- Fresh and Processed Food Safety
- Sustainability of Food Operation
- Sanitation technologies

Biotechnology/Biochemical/Environmental Engineering

- Biochemical Engineering Process Intensification
- Energy independent
- Biofuels/Bioenergy
- Biobased Polymeric Materials
- Bio-nanotechnology
- Bio-catalysis
- Bioreactors
- Cell and tissue culture Engineering
- Biopharmaceuticals
- Biosensors and Biodevices
- Atmospheric modeling and numerical simulation
- Trends in biological, physical, and chemical treatment processes
- Bioprocessing for Food Engineering

- Agrobiotechnology
- Algae and photo-biotechnology
- Bioresources engineering and technology
- Biorefineries
- Microbial Production of Drugs
- Biomaterials and Regenerative Medicine
- Industrial Ecology and Resource
- Waste Minimization, Reuse, and Recycle
- Domestic and Hazardous Waste Management
- Soil contamination and remediation
- Environmental data analysis and modeling

Catalysis and Catalytic Reaction Engineering, Process Control and Modelling

- Chemical kinetics
- Catalytic Reaction Engineering
- Catalyst Development and Applications
- Catalysis for Environmental and Materials Processing
- Catalysis for Sustainable Systems
- Thermochemical Conversion
- Energy Conversion Management
- Fuel Cells
- Process Control
- Reactive & Combustion Flows
- Complex Fluids
- Dynamic modeling and simulation for control and operation
- Interaction between design and control
- Modeling and identification
- Batch Process Modeling and Control
- Process and Performance Monitoring
- Process optimization
- Chemical Engineering Simulation
- Turbulent and Chemically Reacting Flows
- Large Eddy Simulation
- Multiphase Flows
- Flow Simulation

Polymer, Membrane, Composite Materials, and Nanotechnology Chemical kinetics

- Engineering polymers
- Polymeric catalysts
- Polymer membranes for environments and energy
- Polymeric biomaterials
- Polymer synthesis and characterization
- Polymer processing
- Polymer structure and property, and the modeling and simulation
- Biomedical and Biomimetic Composites
- Nanoelectronics
- New materials, and natural products
- Coating and surface chemistry
- Carbon, Metal, and Ceramic Matrix Composites

- Fibers, Matrices, and Interfaces
- Multifunctional Composites
- Nanotechnology Composites
- Nanomaterials: Synthesis, Characterization, and Applications
- Green Nanotechnology
- Simulation and Modeling of Nanostructures and Nanodevices
- Nano-packaging
- Nanomanufacturing Process
- Applied Sciences

TECHNICAL PROGRAM

Wednesday, November 9th 2022-CONFERENCE

Time	Activities
07.30 – 08.00	Virtual Registration
08.00 – 08.10	Opening
08.10 – 08.30	Indonesian Traditional Dance Performance Singing Indonesian National Anthem Du'a Recitation
08.30 – 08.40	Welcome Speech by ICChEAS 2022 Chairman **Prof. Amun Amri, S.T., M.T., Ph.D.**
08.40 – 08.50	Welcoming Speech by Dean of Engineering Faculty **Prof. Dr. Eng. Azridjal Aziz, S.T., M.T., IPU**
08.50 – 09.05	Opening Speech by Rector of Universitas Riau **Prof. Dr. Ir. Aras Mulyadi, M.Sc., DEA**
09.05 – 09.10	Photo Session (Virtual and Offline)
09.10 – 09.20	Session Break
09.20 – 09.25	Transition from MC to Moderator Moderator Session I: **Prof. Dr. Syaiful Bahri, M.Si.**
09.25 – 10.30 10.30 – 10.40	Keynote Speech Session I: 1. **Prof. Dr. Chun-Chen Yang** 2. **Prof. Dr. Ing. Ir. Misri Gozan, M.Tech.** Q&A Session I
10.40 – 10.45	Transition from Moderator Session I to Moderator Session II Moderator Session II: **Idral Amri, S.T., M.T., Ph.D.**
10.45 – 11.45 11.45 – 11.55	Keynote Speech Session II: 1. **Prof. Yazid Bindar, Ph.D.** 2. **Prof. Datuk Dr. Ahmad Fauzi Ismail** Q&A Session II
11.55 – 12.00	Transition from Moderator II to MC
12.00 – 13.30	Lunch Break
13.30 – 17.00	Parallel Session + Co–Host Meeting
17.00	Virtual Closing ceremony by Head of Chemical Engineering Department, Universitas Riau **(Idral Amri, S.T., M.T., Ph.D.)**

KEYNOTE SPEECH

Plenary Session, November 9th 2022

Preparation of Ni-rich NCA cathode material via a combination of Taylor Flow Reactor and Spray Dry method
Prof. Dr. Chun-Chen Yang
Department of Chemical Engineering
Director of Battery Research Center of Green Energy (BRCGE)
Ming Chi University of Technology

Monoglyceride, Precipitation of Biodiesel blend (BXX) and Fuel Filter Clogging
Prof. Dr. Ing. Ir. Misri Gozan, M.Tech.
Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia

Biomass Pyrolysis as a Hub for Sustainable Chemical Production
Prof. Yazid Bindar, Ph.D.
Department of Chemical Engineering, Faculty of Industrial Technology, Institut Teknologi Bandung

Membrane Technologies for Sustainable Future: To Invest or Not To Invest
Prof. Datuk Dr. Ahmad Fauzi Ismail
Advanced Membrane Technology Research Centre (AMTEC),
Faculty of Chemical and Energy Engineering,
Universiti Teknologi Malaysia

PARALLEL SESSION

Chemical Engineering and Applied Chemistry (CEA)
Break Out Room 1, Session 1 (13.30 – 15.00)
Moderator: Prof Dr. Ir. Bahruddin, M.T.

No	ID Author	Title	Author
1	242	Numerical Investigation of Photonic Crystal Fiber-based Plasmonic Material for Alcohol Concentration Detection	Dedi Irawan, Khaikal Ramadhan, Saktioto, Azhar, Azwir Marwin
2	2528	Deplete the Saturated Fatty Acid Fraction from Palm Biodiesel Fuel with $AgNO_3$ Solvent	Zuchra Helwani, Godlief Fredrik Neonufa, Graecia Lugito, Tirto Prakoso, Rinaldi Idroes
3	411	Lithium-Ion Battery Performance Improvement Using Two-Dimensional Materials	Edy Riyanto, Tony Kristiantoro, Erie Martides, Dedi, Budi Prawara, Dadang Mulyadi, Suprapto
4	1390	The Temperature of The Heat Exchanger Network in the Cleaning Scheduling	Hairul Huda, Tantra Diwa Larasati, Muhammad Rizky Nur Kholik, Tasya Futry Sabilla, Muhammad Faisal Akbar
5	1620	Homogeneity Analysis of B30 Mixing Results with Additives in Mixing Tanks Using Computational Fluid Dynamics (CFD)	Feri Karuana, Hafizh Ghazidin, Suyatno, Andrias R Wimada, Muhammad P Helios, Himawan Sutriyanto, Maharani D Sholikhah
6	5469	The Use of Fractional Factorial Design for Analyzing Effect of Sulfuric Acid Concentration and Temperature on Furfural Yield	Said Zul Amraini, Rozanna Sri Irianti, Nirwana, Sri Rezeki Muria, Novia Liana Sari, Rachmad Aidil Azhar, Reno Susanto

Chemical Engineering and Applied Chemistry (CEA)
Break Out Room 1, Session 2 (15.30 – 17.00)
Moderator: Prof Zuchra Helwani ST., MT., Ph.D.

No	ID Author	Title	Author
1	9666	Synthesis and Characterization of Chitosan/Polyvinyl Alcohol Crosslinked Poly(N-Isopropylacrylamide) Smart Hydrogels Via γ-Radiation	Dhena Ria Barleany, Jayanudin, Andriano Suryawan Utama, Ukas Riyupi, Hafid Alwan, Retno Sulistyo Dhamar Lestari, Alia Badra Pitaloka, Erizal
2	9492	Production of Hydrogen Gas (H_2) and Sodium Hypochlorite (NaOCl) From Seawater Using Photovoltaic-Electrolysis Method	Lukman Hakim, Meriatna, Ishak, A. Setiawan, R. Sari, Fajar
3	2005	Hydrogen Production from Seawater Using H_2SO_4 Catalyst by Photovoltaic-Electrolysis Method	Lukman Hakim, Ratna Sari, Fadli, Fajar, Safrizal
4	2637	Hydrogel Derived from Water Hyacinth and Banana Skin Pectin as a Membrane Layer	Muthia Elmaa, Ni Kadek Devi Ananda Saraswati, Paskah Fransiska Afrida Simatupang, Retno Febriyanti, Aulia Rahma, Fitri Ria Mustalifah
5	3485	Hydrolysis Process of Oil Palm Empty Fruit Bunches for Bioethanol Production with *Saccharomyces cerevisiae*	Adrianto Ahmad, Chairul, Nervi Rita, Riska Wulandari, Vini Alvia Sari
6	3657	Response Surface Methodology for Optimization of Liquid Smoke Production Yield from Durian rinds (*Durio zibethinus Murr.*)	Muhammad Faisal, Suraiya Kamaruzzaman, Hera Desvita, Dini Annisa, Cut Zahara

Chemical Engineering and Applied Chemistry (CEA)
Break Out Room 2, Session 1 (13.30 – 15.00)
Moderator: Prof. Dr. Ir. Nasrul Arahman, M.T.

No	ID Author	Title	Author
1	8690	Response Surface Methodology (RSM) for Corrosion Control by G*igantochloa apus L.* Leaf Extract Toward Low Carbon Steel in Hydrochloride Acid Solution	Komalasari, Abdullah Agung Hayyuka, Syelvia Putri Utami, Evelyn, Ahmad Fadli, Muhammad Iwan Fermi, Desi Heltina
2	6160	Recent Technology of Edible Coating Production: A Review	Vika Andriani, Noer Abyor Handayani
3	602	Effect of Non-Vacuumed and Vacuumed Preparation During Electron Beam Irradiation Wet-Soaked Pretreatment on Oil Palm Crystallinity Index	Amizon Azizan, Nur Amira Aida Jusri, Muhammad Kamarulariffin Mohammed Faisal, Mohd Faizal Abd Rahman
4	1357	Dissolving Pulp from Areca catechu L Fiber by Prehydrolysis, Soda-Cooking and Clorine Free Bleaching Processes	Yusnimar, Al Fikri, Robi Juandry, Drastinawati
5	4311	Economic Evaluation and Sensitivity Analysis of Methanol Plant from Glycerol	Meilani Kusuma Wati, Elmi Sunarya, Nada Zafirah, Hari Rionaldo, Zulfansyah
6	4348	Optimization of the Utilization of Tofu Waste (Whey) and Gypsum ($CaSO_4\ 2H_2O$) as Coagulant Material in the Process of Making Tofu from Aceh Soybeans	Jakfar, Azwar, Husni Husin, Abral Muslim, Nadiatul Hikmah

Chemical Engineering and Applied Chemistry (CEA)
Break Out Room 2, Session 2 (15.30 – 17.00)
Moderator: Hermawan Dwi Ariyanto, Ph.D.

No	ID Author	Title	Author
1	6600	Kinetics Modelling of The Solid-Liquid Extraction Process of Linamarin Compounds from Cassava Leaves Assisted By UV-Photobioextractor	Mohamad Endy Yulianto, Retno Dwi Nyamiati, Mega Mustikaningrum
2	6651	Optimization and Characterization of Nypa Fruit Fruit Shell Activated Carbon Irradiated by Microwave in Term of Carbonization Temperatures and Activated Time	Sofia Anita, T. Abu Hanifah, Itnawita, Ganis Fia Kartika
3	8461	Moisture Removal, Colour Changes and Elemental Analysis of *Momordica Charantia* During Far Infrared Drying	Hanafiah Zainal Abidin, Habsah Alwi, Nadzirah Fisol
4	9624	Production of Dissolving Pulp from Gerunggang (Cratoxylum arborescens) Wood Through Pre-hydrolysis and Kraft-SAQ Cooking Process	Chairul, Evelyn, Deviona, Anisa Mutamima, Yeni Aprianis, Drastinawati, Muhammad Dion Arfi, Sendra Erfa Satria, Muhammad Humam Ridho
5	843	Regeneration of Spent Activated Carbon from an Oleochemical Industry Via Microwave Irradiation Technique	Abdul Qahar Mazelan, Siti Shawalliah Idris, Syazana Mohamad Pauzi, Harumi Veny
6	1745	Effect of Torefaction Temperature and Adhesive Amount on The Characteristics of Waste Briquettes Coffee Grounds as An Alternative Renewable Fuel	Novita Aida, Nurhidayatul Fadila, Budiyono, Slamet Handoko

Chemical Engineering and Applied Chemistry (CEA)
Break Out Room 3, Session 1 (13.30 – 15.00)
Moderator: Dr. Eng. Vita Paramita, S.T., M.M., M.Eng.

No	ID Author	Title	Author
1	2380	Extraction of Silica from Rice Husk Ash: Effect of Alkaline and Alkaline Concentration	Sri Aprilia, Cut Meurah Rosnelly, Zuhra, Emir Haffiz Akbar, Muhammad Raqib, Khairul Rahmah, Fitriani, and Amri Amin
2	8762	Investigation of The Non-Isothermal Decomposition Kinetics and Biofuel Properties of Leucaena Leucocephala Pellets Via Torrefaction	Sharmeela Matali, Norazah Abd Rahman, Siti Shawalliah Idris
3	6968	Plastic and Organic Waste Identification Using Multispectral Imaging	Minarni Shiddiq, Dodi Syofyan Arief, Zulfansyah, Khusnul Fatimah, Dilham Wahyudi, Dewi Anjarwati Mahmudah, Dinda Kamia Evka Putri, Ikhsan Rahman Husein, Sinta Afria Ningsih
4	5105	The Effect of Sodium Hydroxide on Delignification, Bleaching on Acid Pretreatment, and Hydrolysis (Sulphuric Acid and Phosphoric Acid) on Glucose Production from Young Coconut Husk	Sri Rezeki Muria, Zikir Akbar Kemala, Abdul Hafiz Hidayat, Rozanna Sri Irianti
5	1056	Formulation and Physical Properties of Citronella Oil Emulsion on Differences in Emulsifiers with the Addition of Maltodextrin	Anggun Puspitarini Siswanto, Hermawan Dwi Ariyanto, Mohamad Endy Yulianto, Mirza Muhammad Faisal, Oktaviani Kusuma Wardani and Dmitriy Kuvshinov
6	7315	Pineapple Leaf Extract as Corrosion Controller for ASTM A36 Steel	Syelvia Putri Utami, Viona Aulia Rahmi, Ahmad Fadli, Khairat, Desi Heltina, Evelyn, Komalasari
7	6434	Experimental Study on Drying Characteristic of Black Tea Using Agitated Vibro Fluidized Bed Dryer	Sri Utami Handayani, Eflita Yohana, Mohammad Tauviqirrahman

Catalysis and Catalytic Reaction Engineering (CRR)
Break Out Room 3, Session 2 (15.30 – 17.00)
Moderator: Idral Amri, S.T., M.T., Ph.D.

No	ID Author	Title	Author
1	4758	Green Solvent on Microwaved Assisted Extraction of Star Fruit	Vita Paramita, Aisya Rohmatul Ummah, Heny Kusumayanti, Rizka Amalia, Wahyu Widyati
2	8241	Catalytic Cracking of Pyrolysis Coconut Shell Oil into Benzene Toluene Xylene with CaO/HZSM-5 Catalyst	Setiadi, Jelita Helianisa
3	1446	Pyrolysis of Citronella Oil Residue Impregnated with Metals (Na & Ni) Into Bio-oil and Char Products and Various Characterization Test	Angelina Grace, Vira Annisa Indriani, Setiadi
4	3783	Glycerolysis of stearic acid using green catalyst	Farra Aisha, Ida Zahrina, Sunarno
5	9749	Utilization of Sugarcane Bagasse into Bio Asphalt Through Pyrolysis Process using Zeolite-Based Catalyst	Heny Dewajani, Windi Zamrudy, Zakijah Irfin, Diana Ningtyas, Noufi Mujibur Ridlo
6	2299	Fly Ash/Coconut Fiber Reinforced Polymer Composites: Effect on Physical Properties (Density, Water Absorption, and Thickness Swelling)	Farid Mulana, M Prayogie Aulia, Sri Aprilia

Biotechnology, Biochemical, Environmental Engineering (BIO)
Break Out Room 4, Session 1 (13.30 – 15.00)
Moderator: Prof. Dr. Ir. Yunardi, MA.Sc.

No	ID Author	Title	Author
1	464	Efficacy of Natural and Fullwashed Post-Harvest Processing Variations on Arabica Coffee Characteristics	Prayoga Bagus Widodo, Mohamad Endy Yulianto, Hermawan Dwi Ariyanto, Vita Paramita
2	1025	Rational Use of Water Resources During the Oil Industry	Maya Abdullayeva and Shams Alizadeh
3	1836	Increased Performance Warning Radiation Security Drinking Mineral the Water of The Territory of The Republic of Azerbaijan	Maya Abdullayeva and Aysun Baxshaliyeva
4	7139	Different types of starch on the characterization and quality of edible film as functional packaging in fresh meat or meat products: A review	Tindy Rahmadi Putri, Alfiana Adhitasari, Vita Paramita, Mohamad Endy Yulianto, Hermawan Dwi Ariyanto
5	9626	Utilization of Lamtoro Fruit Peel Waste to Improve the Performance of Supercapacitor Electrodes in Energy Storage	Erman Taer, Inri Br Pasaribu, Novi Yanti, Apriwandi, Rika Taslim
6	5013	Evaluation of Biomass Residues Combustion Characteristics in Open Burning	Maulana G. Nugraha, Elsava Derangga Mozasurya, Muslikhin Hidayat, Harwin Saptoadi
7	554	Combination of red ginger (Zingiber officinale r.) and banana skin (Musa paradisiaca) as instant powder drink that are rich in antioxidants	Nur Ramadani Fitri and Anggun Puspitarini Siswanto

Biotechnology, Biochemical, Environmental Engineering (BIO)
Break Out Room 4, Session 2 (15.30 – 17.00)
Moderator: Sri Rezeki Muria, S.T., M.P., M.Sc.

No	ID Author	Title	Author
1	7379	Rotary Algae Biofilm Reactor (RABR) Using Microalgae Chlorella sp. for Tofu Wastewater Treatment	Fakhriyah Hanifa Mazaya Nasution, Shinta Elystia, Aryo Sasmita
2	208	Gamma Irradiation Study on Rice Straw to Obtain Sugar	Noor Anis Kundari, Panji Pamungkas Jati, Harum Azizah Darojati, Kartini Megasari
3	1803	Water quality analysis using WQI (Water quality index): A review	Monika Verma, Kuldeep Srivastava, Joshan Gajurel, Nirdesh Regmi Avinandan, Mandesh Kumar Yadav, Sonam Lekzin
4	5128	Removal of Total Dissolved Solids from Oil-Field Produced Water Using Ceramic Adsorbents Integrated with Reverse Osmosis	Netty Herawati, Subriyer Nasir, Muhammad Hatta Dahlan, Maulana Yusuf, Maulid M. Iqbal, Kiagus Ahmad Roni
5	8537	Physically Activated Patchouli Dregs Carbon as A Biosorbent for Remotion of Methylene Blue	Fairuza Hysna, Mariana, Farid Mulana, Mahidin, Syawaliah Muchtar
6	6158	Hesperidin Production from Lime peel (*Citrus aurantifolia S*) using Microwave Assisted Extraction (MAE)	Mohamad Endy Julianto, Alihsan Rahmawati, Aisyah Nuraini, Azizah Azhar, Fatma Sekar Putri Dewanty

Biotechnology, Biochemical, Environmental Engineering (BIO)
Break Out Room 5, Session 1 (13.30 – 15.00)
Moderator: Prof. Dr. Sri Aprilia, M.T., Ph.D.

No	ID Author	Title	Author
1	1298	Hydrophilic Metal-chelated Membrane for Biocatalytic Membrane Reactor Application	Nur Ummi Anisa Muhammad Rasidi, Fauziah Marpani, Nur Hashimah Alias, Nur Hidayati Othman, Muhammad Shafiq Mat Shayuti
2	5106	Palm Fruit Fiber Hydrolysis Process in Fermentation by *Saccharomyces cerevisiae* for Bioethanol Production	Zulfansyah, Adrianto Ahmad, Erika Puji Hartanti, Muhammad Shaza
3	699	Novel Spent Bleaching Earth Industrial Waste as Low-Cost Ceramic Membranes Material: Elaboration and Characterization	Aulia Rahma, Muthia Elmaa, Muhammad Roil Bilad, Isnasyauqiah, Abdul Rahman Wahid, Muhammad Sirajul Huda, Dwi Resa Lamandau
4	8069	Effect of Physical and Biological Pretreatment on Sugarcane Bagasse Waste-Based Biogas Production	Siswo Sumardiono, Hashfi Hawali Abdul Matin, Ihdina Sulistianingtias, Tri Yulianto Nugroho, and Budiyono Budiyono
5	4271	The Abundace of Microplastics in Siak Tributary Sediments in The Watershed Area, Pekanbaru City, Riau (Case Study Air Hitam River and Sago River)	Gunadi Priyambada, Budhi Kurniawan, Rillian Gerry, Lita Darmayanti
6	6869	The Utilization of Silica Sand and Clay with The Addition of Sawdust as Raw Material for Manufacturing Ceramic Membrane to Reduce TSS and TDS Levels of Peat Water	Zuqni Meldha, Idral Amri, Muhammad Dandy Tito Angkoso, Yosia Jumaga

Biotechnology, Biochemical, Environmental Engineering (BIO)
Break Out Room 5, Session 2 (15.30 – 17.00)
Moderator: Assoc. Prof. Ch.M. Dr. Ying Chin Lim

No	ID Author	Title	Author
1	6899	Microwave-based Antioxidant Extraction from Pineapple Peel Waste	Nurhanis Syafiqah Harith, Norazah Abd Rahman, Norashikin Ahmad Zamanhuri, Syafiza Abd Hashib
2	7695	Effect of Electric Voltage and Number of Aluminum Electrodes on Palm Oil Industry Liquid Waste Treatment with Continuous Electrocoagulation Process	Idral amri, Zuqni meldha, Syamsu Herman, Della Karmila, Mhd. Fadilah Ramadani
3	2273	Effect of Addition of Palm Oil Shell Biochar on Carbon Dioxide Emissions in Topsoil	Aryo Sasmita, Ulfa Septianda, Shinta Elystia
4	3903	Microwave Drying Characteristics and Quality of Ananas comosus Peel, Core and Pulp	Nurul Asyikin Md Zaki, Habsah Alwi, Syafiza Abd Hashib, Ummi Kalthum Ibrahim, Junaidah Jai, Norashikin Mat Zain, Nurul Hidayah Samsulrizal
5	3336	PLA/PVDF Film as An Alcohol Sensor for Tapai	Suzihaque Maqsood-ul-Haque, Syarah Syamimi Mazlan, Yang Lu
6	3432	Isolation and Identification of Lactic Acid Bacteria (LAB) from Traditional Food Kuantan Singingi Regency, Cangkuok	Ismawati, Silvera Devi, Nova Wahyu Pratiwi, Nia Lovenia, Nabella Suraya, Saryono

Biotechnology, Biochemical, Environmental Engineering (BIO)
Break Out Room 6, Session 1 (13.30 – 15.00)
Moderator: Associated Prof. Dr. Noor Fitrah Abu Bakar

No	ID Author	Title	Author
1	2553	Ultrasound and Ultrasound Combined Thermal Treatment on Resistance of *Paecilomyces Variotii* Mold Spores in Orange Juice	Evelyn, Chairul, F.H. Ramadhani, R. Khairunnisa
2	8230	The Effect of Air Hole Opening on Briquette Stove on CO Emissions from Burning Oil Palm Empty Bunches Briquettes	Hafidawati, Elvi Yenie, Alen Agustarizal
3	7526	Comparison of Imputation Methods to Handle Missing Values in Southeast Asia Datasets of Factors That Influence Climate Change	Arisman Adnan, Muhammad Rayhan Faturrahman, Anne Mudya Yolanda, Noor Ell Goldameir, Gustriza Erda
4	9220	Production of Bioactive Compounds from *Bacillus paramycoides* LBKURCC218 Co-cultivation	Zona Octarya, Titania T. Nugroho, Yuana Nurulita, Nabella Suraya, Saryono
5	372	Production of Lactic Acid from Food Waste by Fermentation: Effect of Organic Loading Rate and Type of Food Waste	Ameerul Haqeem Bin Akmarul Nazli, Norliza Binti Ibrahim
6	6575	Distribution of Microplastics in Surface Water of Tropical Urban River in West Sumatera, Indonesia	Budhi Primasari, Yommi Dewilda, Puti Sri Komala, Reri Afrianita, Herland Triadi
7	3352	Bio-cellulose antibacterial membrane as a mask filter material to protect against bacteria and viruses	Saiful Saiful, Sri Muliyani, Fitti Nasyura, Muhamad Nasir, Muliadi Ramli and Febriani Febriani

Polymer, Membrane, Composite Materials and Nanotechnology (PMN)
Break Out Room 6, Session 2 (15.30 – 17.00)
Moderator: Prof. Edy Saputra, S.T., M.T., Ph.D.

No	ID Author	Title	Author
1	2956	A Mini Review on Polydopamine and Silver Functionalized Membrane for Antibiofouling	Fauziah Othman, Fauziah Marpani, Nur Hidayati Othman, Nur Hashimah Alias and Muhammad Shafiq Mat Shayuti
2	8444	PVC-based Gravity Driven Ultrafiltration Membrane for River Water Treatment	Putu Teta Prihartini Aryanti, Resa Lestary, Ismi Badriyah, Ega Ardi Ronaldi, Dimas Mahayana
3	1181	Development of Chitosan-based Edible Biocomposite Film Incorporated with Starch and Pitaya Extract for Food Packaging	Alissa Farina Binti Aidi Zamri, Noorsuhana Binti Mohd Yusof
4	8859	Comparation of methods synthesis on TiO2-Graphene composites for photodegradation of compound waste	Desi Heltina, Dwi Imamatul Mastura, Amun Amri, Maria Peratenta Sembiring, Komalasari
5	8245	Synthesis of Hydroxyapatite Powder using Natural Latex Particles as Pore Creating Agent	Silvia Reni Yenti, Ahmad Fadli, Amun Amri, Dandi Novandri, Feru Setiawan, Jumiati Hasibuan, Vallerin Goldia Tiffany Herjan
6	5725	Effect of Precursor Concentration on Crystallite Size of ZnO Nanomaterial Synthesized by Green Synthesis Method using *Terminalia catappa* Extract	Atut Reni Septiana, Rizki Wahyudi, Dian Mart Shoodiqin, Agus Rifani, Muhamad Doris

Catalysis and Catalytic Reaction Engineering (CRR)
Break Out Room 7, Session 1 (13.30 – 15.00)
Moderator: Dr. Suffiyana Akhbar, B.Eng., M.Ec.

No	ID Author	Title	Author
1	8661	Biosynthesis of Nanoflower Ag-doped ZnO and Its Application as Photocatalyst for Methylene Blue Degradation	Ari Sulistyo Rini, Adilla Permata Defti, Rahmi Dewi, Jasril, Yolanda Rati
2	8151	Synthesis of The Composite MnO-Oil Palm Fly Ash and its Photocatalytic Activity	Riska Anggraini, Siti Saidah Siregar, Amilia Linggawati, Halida Sophia, Amir Awaluddin
3	6262	Effect of Feed Composition in Co-Pyrolysis of Polypropylene and Triglyceride Using $Ni/ZrO_2.SO_4$ Catalyst on Pyrolysate Composition	Dijan Supramono, Muthia Hanun, Fathiyah Inayatirrahmi
4	6537	The Effect of Variation in Catalyst Amount on Glycerol Conversion from Castor Oil (Ricinus Communis L)	Kiagus Ahmad Roni, Netty Herawati, Dian Kharismadewi
5	9354	Biodiesel Production Using Waste Banana Peel as Renewable Base Catalyst	Meriatna, H Husin, M Riza, M Faisal, Ahmadi, Sulastri
6	6030	Catalytic Co-Pyrolysis of Palm Oil Empty Fruit Bunch and Waste Tire Using Calcium Oxide Catalyst	Sunarno, Ida Zahrina, Silvia Reni Yenti, Rozanna Sri Irianty, Panca Setia Utama

Polymer, Membrane, Composite Materials and Nanotechnology (PMN)
Break Out Room 7, Session 2 (15.30 – 17.00)
Moderator: Panca Setia Utama, S.T., M.T., Ph.D.

No	ID Author	Title	Author
1	958	3D hierarchical porous carbon derived spruce leaves biomass for high-performance of symmetrical supercapacitor	Erman Taer, Sukmawati, Apriwandi Apriwandi, Rika Taslim
2	2986	Preliminary Study of Melt Flow Index of Recycled Polyethylene Terephthalate/Empty Fruit Bunch (rPET/EFB) Composite as a Potential Biodegradable 3D Printing Filament	Suffiyana Akhbar, Nik Siti Nurbaya Nik Omar, Aina Nabila Mohd Yusof, Sakinah Mohd Alauddin, Nadia Kamarrudin
3	4143	Melt Flow Index (MFI) Analysis of Sago Based Thermoplastic Starch Blend with Polypropylene and Polyethylene	Rozanna Dewi, Novi Sylvia, Zulnazri, Medyan Riza
4	7090	Aqueous electrolyte selection of activated carbon derived cassava peel electrode material-based for sustainable symmetrical supercapacitor	Eva Wahyuni Harahap, Apriwandi Apriwandi, Rika Taslim, Erman Taer
5	9352	Structural and Magnetic Properties of Cr-Doped Fe_2O_3 Nanoparticles of Logas Natural Sand for Environmental Application	Erwin Amiruddin, Salomo Sinuraya, Amir Awaluddin, Martha Rianna, Muhammad Rizki, Novalia Magdalena Purba, Indah Tamara Sitorus, Amo Malini
6	2296	Fly Ash/Coconut Fiber Reinforced Polymer Composites: Effect on Physical Properties (Density, Water Absorption, and Thickness Swelling)	Farid Mulana, M Prayogie Aulia, Sri Aprilia

Polymer, Membrane, Composite Materials and Nanotechnology (PMN)
Break Out Room 8, Session 1 (13.30 – 15.00)
Moderator: Dr. -Ing. Amizon Azizan

No	ID Author	Title	Author
1	5400	Plant Mediated Synthesis of Iron Nanoparticles for Environmental Application: Mini Review	Huey Ling Tan, Ying Chin Lim, Law Yong Ng, Ying Pei Lim
2	4686	The Influence of Annealing Temperature on the Microstructure and Energy Band Gap of $0.2BaTio_3$ - $0.8BaZr_{0.5}Ti_{0.5}O_3$ Nanomaterial	Rahmi Dewi, T.S. Luqman, Sri Ningsih Sitorus, Okvarahireka Vitayaya, Ari Sulistyo Rini, Zuhdi
3	323	Studies of Exposure UV light, Soil Burial, and Storage Ability Effect on Characteristics of Biocomposite Films	Fitriani Fitriani, Sri Aprilia, Nasrul Arahman, Muhammad Roil Bilad
4	4107	Effect of Binder Levels Natural Rubber Latex Grafting Styrene and Methyl Methacrylate / Polyvinyl Acetate on Emulsion Paint Characteristics	Ivan Fadhillah, Arya Wiranata, Zuchra Helwani, Bahrudddin
5	4219	The effect of various electrolyte solutions on the electrochemical properties of the carbon electrodes of supercapacitor cells based on biomass waste	Aria Yunita, Rakhmawati Farma, Awitdrus Awitdrus, Irma Apriyani
6	4863	ZnCl2-Assisted Synthesis of Coffea Beans Bagasse-Based Activated Carbon for Stable Material for High-performances Supercapacitors	Rakhmawati Farma, Rizka Indah Julita, Awitdrus Awitdrus, Erman Taer, Irma Apriyani
7	1141	Synthesis Of composite adsorbent based on spent Mushroom Substrate (SMS0 AND Spent Bleaching Earth (SBE)	Elvi Yenie, Syaiful Bahri, Hapsoh, Edy Saputra

Polymer, Membrane, Composite Materials and Nanotechnology (PMN)
Break Out Room 8, Session 2 (15.30 – 17.00)
Moderator: Prof. Muthia Elma, S.T., M.Sc., Ph.D, IPM., ASEAN Eng.

No	ID Author	Title	Author
1	6690	Conversion of Hazelnut Seed Shell Biomass into Porous Activated Carbon with CO_2 Activation for Supercapacitors	Rakhmawati Farma, Yoan Tania, Irma Apriyani
2	9172	A Mini Review on The Methods to Enhance the Interaction of Carbon Dioxide with Polymer Membranes	Fatin Nasreen Ahmad Rizal Lim, Fauziah Marpani, Norazah Abd Rahman
3	3153	Flexural and Structural Properties of PCC-Based Mortar Composited by Different Types of Shear Exfoliation Graphene	Ainis Nidila, Nadia Sukma, Desi Heltina, Sunarno, Amun Amri
4	8079	The Effect of Nitric Concentration and Heat Treatment Temperature on Stainless Steel 316L Acid Treatment Process on Hydroxyapatite Coating	Cory Dian Alfarisi, Nurfatihayati, Hari Rionaldo, Ahmad Fadli, Komalasari, Isnaeny Syafna, Lisa Arianti, Dianti Lita Lestari, Nurva Asnila
5	5844	Dynamic Simulation of Polyethylene/Organoclay Nanocomposites	Rahida Wati Sharudin, Nik Salwani Md Azmi, Zakiah Ahmad, Masahiro Ohshima
6	6218	Structural and Physico-mechanical Properties of Rice Husk Ash-based Geopolimer Mortar with The Addition of Graphene Nanosheets	Revika Wulandari, Meysara, Emiliana, Sunarno, Desi Heltina, Khairat, Amun Amri

ICCHEAS 2022

CONFERENCE
ABSTRACT

KEYNOTE SPEECH

Plenary Session I, November 9th 2022 **Moderator: Prof. Dr. Syaiful Bahri, M.Si.**

Preparation of Ni-rich NCA cathode material via a combination of Taylor Flow Reactor and Spray Dry method

Prof. Dr. Chun-Chen Yang
Department of Chemical Engineering
Director of Battery Research Center of Green Energy (BRCGE)
Ming Chi University of Technology

Abstract

Nowadays, mobile electronics and electric vehicles are powered by lithium-ion batteries (LIBs) because of their high energy densities and long cycle lives. Nevertheless, advancements in electronic devices will lead to demand for batteries having higher energy densities. Ni-rich cathode materials have been promising for application due to their high specific capacities and low cost. Among them, Ni-rich $LiNi_1$-x-y$Co_xAl_yO_2$ (NCA) and $LiNi_{1-x-y}Co_xMn_yO_2$ (NCM) (x+y<0.2) are the most promising next-generation cathode materials, but they do have some drawbacks such as poor cycle-life and inferior thermal stability that restrict their real application in LIBs. Various conventional synthetic methods were used to prepare Ni-rich cathode materials, including sol-gel synthesis, solid-state methods, spray drying, and co-precipitation. The latter is most widely used to obtain particles of ternary transition metal hydroxides having homogeneous distributions and spherical shapes. Here, the Couette-Taylor flow vortex was introduced as a highly efficient medium for preparing Ni-rich hydroxides in a homogeneous phase and with spherically intact secondary particles. By controlling the reaction parameters, e.g., reaction temperature, pH, mean residence time, and rotation speed precipitated particles having a desired shape and size can be prepared effectively, even on large scales. In addition, several modification methods also were introduced to enhance the cycling and thermal stability of the Ni-rich ternary materials.

Short Biography

Dr. Chun-Chen Yang is a full professor in Chemical Engineering at Ming Chi University of Technology, and he is also a director of Battery Research Center of Green Energy (BRCGE), Ming Chi University of Technology, Taiwan, R.O.C in 2012. He received his Ph.D. degree in Chemical Engineering from Columbia University, New York City, U.S.A., in 1993. He worked in Motorola in 1994-1995. He joined in Ming Chi University of Technology in 1996. After 2019, he was appointed as a distinguished professor in BRCGE, and 2021 as a chair professor. Since then, he has published more than 210 refereed journal publications and more than 40 patents. He has active research area in alkaline DMFC, PEMFC, Electro-spun composite polymer membranes, Polymer electrolyte membranes, Zn-air battery, Ni-MH battery, and Li-ion batteries, including $LiFePO_4$, $LiFeMnPO_4$, $LiFeMnCoPO_4$, $Li_3V_2(PO_4)_3$, NCM622, NCM811, NCA cathode materials, Si/Graphene, Si/graphite, $Li_4Ti_5O_{12}$ anode material. He established BRCGE in 2012; and also built a Ph. D. Program of "Energy and Battery Technologies" at BRCGE since 2015. Since 2020-2022, Dr. Yang was listed Top 2% Scientist (Energy subject field) based on Stanford PLoS Biology Journal.

KEYNOTE SPEECH

Plenary Session I, November 9th 2022 **Moderator: Prof. Dr. Syaiful Bahri, M.Si**

Monoglyceride, Precipitation of Biodiesel blend (BXX) and Fuel Filter Clogging

Prof. Dr. Ing. Ir. Misri Gozan, M.Tech.
Department of Chemical Engineering, Faculty of Engineering, Universitas Indonesia

Abstract

Soaking outdoor temperature, biodiesel percentage in BXX fuel, and monoglyceride content influence the amount of precipitate formed. This study elaborate the monoglyceride, precipitation of Biodiesel blend (BXX) and Fuel Filter Clogging The results from a modified cold soak filtration method of ASTM D7501 show that the upper limit of monoglyceride content in biodiesel for B30 implementation should be lower than the current standard limit to achieve the same quality as biodiesel for B20 use. A simulation results show that the ratios between the amount of collected precipitate at the bottom layer of the 2-litre measuring cylinder and the total amount of collected precipitate for the 2-litre measuring cylinder increased with the monoglyceride content biodiesel. This ratio was used to predict the amount of accumulated sludge for a given volume of B20 fuel loaded into the storage tank. This study shows the effect of monoglyceride content on the precipitation behaviour in the storage tank concerning general tank storage dimension parameters and B20 loading frequency. The fuel filter clogging time could also be predicted using the graph of fuel filter clogging time vs precipitate weight of B20 fuel derived from the FBT Test if the precipitate weight had already been determined by the precipitation test (modified CSFT). The simulation model using Erguns Equation for the FBT of B20 fuel show similar results to that of the FBT experiment, with the difference (averaged errors) ranging from 4.15% to 5.79%.

Keywords: *biodiesel; B20; monoglyceride; precipitation; fuel handling*

Short Biography

Misri Gozan is a Professor in industrial waste engineering area of Chemical Engineering Department, Faculty of Engineering, Universitas Indonesia. In 2004, he completed his Ph.D. degree of the Geo-forestry and Hydroscience Faculty of the Technical University Dresden, Germany. He has being as a chairman of the Executive Committee of IABEE-PII From 2018 until now. He was a member of the Society of Biological Engineers (SBE) from 2012 until 2018, and as an Vice President of AFOB in 2010. From 2009 until 2010, he activated of the Business Incubator and Chemical Engineering Laboratory of King Saud University, Riyadh, Saudi Arabia. From 2002 until 2004, as a director of the Institute for Science and Technology Studies (ISTECS) Europe Chapter, also as a director of the Technologiezentrum Wasser (TZW) in Karlsruhe, Germany, from 2000 until 2004. The end in 2013, he awarded as a distinguished professor. From 2016 to 2020, he was as a director of the Res. Center for Biomedical Engineering (RCBE) at the Universitas Indonesia, also as a Leader for Environment and Development (LEAD) at C7 International, from 2018 to 2020. He has been focusing research on biotechnology and bioengineering, and published more than 109 articles in Scopus-indexed journals since then. He has been focusing research on biotechnology and bioengineering. He published 11 registered patents, with 7 granted patents and 3 commercialized patents. His current Scopus h-index is 14, and Google Scholar's h-index is 19. From 2020 until now, he as a chair of the Technical Independent Accreditation Institute (LAM-TEKNIK), in Indonesia.

KEYNOTE SPEECH

Plenary Session II, November 9th 2022 **Moderator: Idral Amri, S.T., M.T., Ph,D.**

Biomass Pyrolysis as a Hub for Sustainable Chemical Production

Prof. Yazid Bindar, Ph.D.
Department of Chemical Engineering, Faculty of Industrial Technology, Bandung Institute of Technology

Abstract

Human life globally depends on chemicals. Without the chemicals that exist today, humans will find it difficult to live their lives. All chemicals produced and used today are mostly derived from hydrocarbons supplied by oil and gas. Oil and gas are superior sources of hydrocarbons in terms of quantity and quality as raw materials for the production of chemical derivatives. The problem of life in the future is that the world will enter a period of running out of oil and gas. Oil and gas are depleted, the supply of hydrocarbons is also depleted and the production of chemicals for life will be threatened. Therefore, we must find a solution to substitute raw materials for the production of the necessary chemicals. Another problem is that there are no substitutes for oil and natural gas that are equivalent in terms of quality and quantity. What is available and what may be used is biomass. The biomass is no longer hydrocarbons but hydroxy-carbon. Biomass is first converted into gaseous products, liquid products and solid products. The technology for converting biomass into basic products that can be processed at the next stage is pyrolysis technology. Pyrolysis of biomass produces liquid products as bio-crude oil, gas products as bio-pyrolysis gas and solid products as biochar. This pyrolysis produces basic materials in the form of complex components as well. These chemical components are built by elements of Carbon (C), elements of Hydrogen (H) and Oxygen (O) as the main elements. These chemical components are given the common name as hydroxy-carbon chemicals (HOC). The development of the production process of hydroxy-carbon materials by pyrolysis of biomass is presented here. Process conditions such as temperature, heating rate and type of biomass on yield and composition of chemical components produced by pyrolysis of biomass are very decisive. The method for estimating the composition of the resulting chemical components was developed using a volatile state approach. The chemical components produced by the pyrolysis of biomass under various conditions are known by measurement. A database of chemical components produced by the pyrolysis of biomass must be established. The further processing of biomass pyrolysis products formed by chemical components of hydroxy-carbon into certain chemical products is a future hub for obtaining sustainable chemical products after the end of oil and gas. Various pathways for processing hydroxy-carbon raw materials into certain chemical products have been developed to be implemented in the future as a process that can enter its commercial stage. The biomass pyrolysis process technology is central to the current pathway for producing sustainable chemicals with various challenges in development.

Short Biography

Yazid Bindar is a professor of Department of Chemical Engineering, Faculty of Industrial Technology, Institut Teknologi Bandung. In 1996, he completed his Ph.D. degree in Chemical Engineering at the Queen's University, Canada. He has been focusing his research on biomass technology and food science. He published more than 87 articles in Scopus-indexed journals. He published seven registered patents and two granted patents. He was an invited speaker and a keynote speaker at nine international seminars. His current Scopus h-index is 9, and Google Scholar's h-index is 13.

KEYNOTE SPEECH

Plenary Session II, November 9th 2022 **Moderator: Idral Amri, S.T., M.T., Ph,D.**

Membrane Technologies for Sustainable Future: To Invest or Not To Invest

Professor Datuk Dr. Ahmad Fauzi Ismail
Advanced Membrane Technology Research Centre (AMTEC),
Faculty of Chemical and Energy Engineering,
Universiti Teknologi Malaysia

Abstract

Efficient management of water and energy are important for a sustainable future. Although water is life essential and has always been critical to the social and economic growth of the world, it is distributed irregularly worldwide and is threatened by countless pollutants. Addressing the issue of water resources sustainability is extremely crucial for societies to maintain safety as well as social, ecological, and economic progress that is necessary in achieving the Sustainable Development Goals (SDGs). The issue of water scarcity has further encouraged the development of technologies for sustainable water resources management. In Membrane technology has been advancing exponentially in water and wastewater treatment applications in ensuring the possibility of water reuse and minimising harmful discharge to the environment. In addition, recent research has also been focusing the membrane fabrication of membrane from sustainable resources like biomass and waste as well as non-fossil fuel resources. Besides for water separation and purification processes, membrane has also been widely applied in energy applications especially for green energy technologies like hydrogen fuel, fuel cell and solar power. Furthermore, membrane research involving biofuel that leads to clean and affordable energy which supports the SDGs has been progressing. This paper emphasises the important use of sustainable materials in membrane technologies and fabrications for water and energy applications in supporting the SDGs. It provides the recent development including nanotechnology from natural biobased sources and the relevant challenges while looking at the way forward for membrane technology advancement as well as the advantages. The paper also highlights the membrane applications and future potential in providing clean and safe water and green energy, including the implementation of membrane technology in remote areas and during unexpected disasters as well as industrial involvement in the research advancement.

Short Biography

Professor Datuk Dr. Ahmad Fauzi Ismail is the seventh Vice-Chancellor of Universiti Teknologi Malaysia and was the Deputy Vice Chancellor of Research and Innovation. His research interest is in the development of polymeric, inorganic and novel mixed matrix membranes for water desalination, wastewater treatment, gas separation processes, membrane for palm oil refining, photocatalytic membrane for removal of emerging contaminants, development of haemodialysis membranes and polymer electrolyte membrane for fuel cell applications.

As one of the early pioneers of membrane technology in Malaysia, he is the Founding Director of Advanced Membrane Technology Research Centre (AMTEC) that has initiated various community projects for more than a decade. He has developed 15 patents, with 20 more pending for approval. As a prolific author, his compendium of publications ranges from over 1000 papers in refereed journals, over 80 book chapters and 11 books. His current Scopus h-index is 97 (44,736 citations) and Web of Science h-index stands at 88 (33,373 citations). He has supervised more than 70 PhD and 50 MSc students to completion as well as having supervised 10 post-doctoral fellows.

Among the prestigious awards won are The World Academy of Sciences (TWAS) Award in Engineering Sciences for 2019, Merdeka Award for the Outstanding Scholastic Achievement Category on 4th September 2014, Malaysia's Rising Star Award (2016) and Highly Cited Researcher (2018, 2019, 2020, and 2021) by Clarivate Analytics.

Ahmad Fauzi Ismail graduated with a B.Eng. (Petroleum Engineering) and M.Sc. in (Chemical Engineering) from Universiti Teknologi Malaysia (UTM). He was awarded the Commonwealth Academic Staff Scholarship to pursue his Ph.D. in Chemical and Process Engineering at the University of Strathclyde, Glasgow, UK, specializing in Membrane Technology, where he managed to successfully complete his study in less than three years.

PARALLEL SESSION

Paper ID	**ICChEAS_2022_paper_208**
Title	Gamma Irradiation Study on Rice Straw to Obtain Sugar
Authors	Noor Anis Kundari*, Panji Pamungkas Jati, Harum Azizah Darojati, Kartini Megasari
Abstract	Rice straw contains 32-47% cellulose, 19-27% hemicellulose, and 5-24% lignin which have the potential to be converted into sugar which can be further processed into bioethanol. Utilization of rice straw for the manufacture of bioethanol requires a pre-treatment process. One of the pre-treatment processes is using gamma irradiation. Gamma irradiation can cause breakage of the cellulose. This study aims to determine the effect of irradiation on dry rice straw on the formation of sugar and hydrolysis of the remaining solids of delignification. Clean and dry rice straw was blended to make powder and then irradiated with various doses of 0, 100, 150, 200, 250, and 300 kGy. The irradiated straw powder was then soaked with 4% NaOH for 30 minutes. After the soaking process, the straw mixture was separated between solids and liquids in the form of black leachate. The solid obtained was hydrolyzed with HCl to obtain sugar. The black liquor was added with activated carbon, then filtered, and the obtained clear was analyzed for its sugar content. To determine the formation of sugar, qualitative analysis was carried out using the Benedict method and quantitative analysis using the Luff Schoorl method. The results obtained are the effective dose of irradiation to form sugar occurs starting at a dose of 250 kGy.
Keywords	*gamma irradiation; rice straw; sugar; pre-treatment*

Paper ID	**ICChEAS_2022_paper_242**
Title	Numerical Investigation of Photonic Crystal Fiber-based Plasmonic Material for Alcohol Concentration Detection
Authors	Dedi Irawan, Khaikal Ramadhan, Saktioto, Azhar, Azwir Marwin
Abstract	We have observed a numerical simulation of the PCF-SPR sensor detecting alcohol concentration at low temperatures. The investigation was carried out using the finite element method on the PCF-SPR geometric structure. We use a simple geometry structure of the sensor by using fused silica and gold as the sensor's core and plasmonic material. Observations were made in the alcohol concentration range of 15%, 40%, 60%, and 75%. In the literature, we find the refractive index of each alcohol concentration and input its value into the proposed sensor. The proposed sensor shows that the sensor has a sensitivity in detecting alcohol concentrations at low temperatures of 91 nm/%. In the end, we obtained the optimal sensor components and the sensor can detect the alcohol concentration at low temperatures.
Keywords	*dual-polarized; PCF-SPR; alcohol detection; temperature.*

Paper ID	**ICChEAS_2022_paper_323**
Title	Studies of Exposure UV light, Soil Burial, and Storage Ability Effect on Characteristics of Biocomposite Films
Authors	Fitriani Fitriani, Sri Aprilia*, Nasrul Arahman, Muhammad Roil Bilad
Abstract	UV exposure, soil burial, and storage ability tests were carried out on biocomposite films with different concentrations of nanocrystal cellulose to study their biodegradability and morphological properties compared to neat whey protein films. Biocomposite film biodegradability is highly dependent on the polymer matrix and many environmental factors such as temperature, radiation, humidity and microorganisms. The degradation films were assessed by UV exposure and soil burial tests. On the other hand, packaging ability is analyzed through storage tests under controlled conditions. After the analysis, changes in physical and morphological properties were observed in the biocomposite film. From these results, we can conclude that the whey protein film with the addition of 3% nanocrystal cellulose would be a more favourable choice because of its better properties and suitability for the proposed biodegradable food packaging application.
Keywords	*biodegradability; storage ability; whey protein isolate; nanocrystal cellulose; biocomposite films*

Paper ID	**ICChEAS_2022_paper_372**
Title	Production of Lactic Acid from Food Waste by Fermentation: Effect of Organic Loading Rate and Type of Food Waste
Authors	Ameerul Haqeem Bin Akmarul Nazli, Norliza Binti Ibrahim
Abstract	As global food waste rises, the number of people actively working to address it stays relatively low as it has ever been. Food waste, refers to food that is thrown away, lost, or left unfinished and is much more than just food thrown out by eateries or supermarkets; it has economical, ecological, and societal repercussions if it is not addressed quickly. From this food waste, it can be used to produce lactic acid fermentation. For this research, the concentration of lactic acid obtained by fermentation is observed on the effect of organic loading rate and the type of food waste used. The material is first collected, sort and pre-treat before saccharification and fermentation process can be conducted. Lactobacillus Delbrueckii is use as a bacterium and the enzyme use is amylase. The analysis that is used to measure the concentration of lactic acid is Ultraviolet- Visible Spectroscopy with the aid of standard curve. The highest lactic acid produce is from Sample B (water spinach and green mustard) in which the concentration is 195.51 g/L. In addition, moisture content can greatly affect the production of lactic acid, as the excess water can affect the total mass of the material.
Keywords	*lactic acid; food waste; fermentation; organic loading rate; UV-Vis*

Paper ID	**ICChEAS_2022_paper_411**
Title	Lithium-Ion Battery Performance Improvement Using Two-Dimensional Materials
Authors	Edy Riyanto*, Tony Kristiantoro, Erie Martides, Dedi, Budi Prawara, Dadang Mulyadi, Suprapto
Abstract	One type of nanostructured material that is increasingly being considered will be crucial in the endeavor to produce batteries made of lithium-ion that function excellently is two-dimensional material. In terms of 2D nanomaterial characteristics, characterizations, and applications for lithium-ion batteries, this paper discusses some recent advancements in two-dimensional materials. This review's main objective is to highlight recent developments in using these two-dimensional materials to create lithium-ion batteries that are more advanced in relation to long-life cycle stability, high energy density, and high-rate ability. It has been demonstrated that 2D nanosheet-based nanostructure electrode materials may produce lithium-ion batteries with great performance.
Keywords	*nanostructure materials; 2D nanomaterials; energy storage; lithium-ion battery*

Paper ID	**ICChEAS_2022_paper_464**
Title	Efficacy Of Natural and Fullwashed Post-Harvest Processing Variations on Arabica Coffee Characteristics
Authors	Prayoga Bagus Widodo, Mohamad Endy Yulianto, Hermawan Dwi Ariyanto, Vita Paramita
Abstract	Coffee is Indonesia's leading export commodity which was developed in Aceh. In Indonesia, there are two types of coffee, namely Robusta (Coffea canephora) and Arabica (Coffea arabica). The different post-harvest processing methods are known as dry, wet and semi-dry processing. While all methods aim to remove the pulp of coffee cherries, each method does it in a different way. In this study, we review the effect of post-harvest processing on the characteristics of Arabica coffee so that it is hoped that the results of this study can provide information to coffee business people so that they can find out what coffee variations are most interested in and know the effect of differences on variations in post-processing. arabica coffee harvest. Weighing 1 kg of Arabica coffee beans and doing the dry post-harvest processing stage, do the same thing for the wet process, then do the roasting process with various Arabica coffee treatments. Then put the greenbean coffee into the roasting tube, then do the grinder process, prepare the roasted coffee (roast bean) and let it sit for 24 hours. In the test of caffeine content, the coffee that has the highest caffeine content is at a temperature of 214 with a roasting time of 20 minutes and the type of coffee is natural Arabica.
Keywords	*coffee; post-harvest; arabica; full-washed*

Paper ID	**ICChEAS_2022_paper_554**
Title	Combination of red ginger (Zingiber officinale r.) and banana skin (Musa paradisiaca) as instant powder drink that are rich in antioxidants
Authors	Nur Ramadani Fitri and Anggun Puspitarini Siswanto*
Abstract	Red ginger and banana peels are very easy to find in Indonesia because of their abundant availability and contain high levels of antioxidant compounds. By consuming foods or drinks that are rich in antioxidants can prevent various diseases caused by free radicals and increase immunity. This study aims to determine the best formulation of red ginger and banana peel by identifying the antioxidant activity, water content and ash content of the instant powder drink. This study used a completely randomized design consisting of 3 treatments and each treatment was repeated 6 times so that 18 experimental units were obtained. The red ginger and banana peel treatments consisted of P1(50:50), P2(60:40), and P3(70:30). The data obtained were analyzed statistically using Analysis of Varience (ANOVA) and Duncan's advanced test. While the manufacture of instant powder drinks using the crystallization method with the addition of other ingredients, namely sugar. From the results of the chemical test, the water content test was in accordance with the SNI standard (max. 3%) the highest was at P3 (70:30) of 1.678% while the lowest was at P2 (60:40) of 0.653%. The ash content test is also in accordance with the SNI standard (max. 1.5%), where the highest ash content is at P3 (70:30) which is 0.77% while the lowest ash content is at P1 is 0.605%. The highest antioxidant activity was at P3 (70:30) with an inhibition value of 71.34%, while the lowest was at P1 (50:50) with an inhibition value of 61.07%. Then, the most preferred treatment based on the organoleptic test was P1 with a comparable ratio of red ginger and banana peel, namely 50:50 where the average panelist assessment was brown and liked the color and aroma very much.
Keywords	*antioxidant; banana peel; instant powder drink; red ginger*

Paper ID	**ICChEAS_2022_paper_602**
Title	Effect of Non-Vacuumed and Vacuumed Preparation During Electron Beam Irradiation Wet-Soaked Pretreatment on Oil Palm Crystallinity Index
Authors	Amizon Azizan, Nur Amira Aida Jusri, Muhammad Kamarulariffin Mohammed Faisal, Mohd Faizal Abd Rahman
Abstract	Electron beam irradiation (EBI) pretreatment on lignocellulosic biomass (LCB) enables the usage of lignin or cellulose/hemicellulose for value-added products. Empty fruit bunch (EFB) was EBI pretreated investigating the crystallinity index (CrI). EBI-wet-soaked pretreatment under vacuum (VC) or non-vacuumed (NVC) preparation was compared for its CrI. Oil palm frond (OPF) under VC was compared with the NVC preparation during the EFB/OPF EBI-wet-soaked pretreatment. The calculated CrI reduction percentage effectiveness (CrI%) of the EBI-wet-soaked pretreatment, in preliminary indicating, relatively higher CrI% for the NVC preparation, being preferred during pretreatment prior for the enzymatic hydrolysis for biofuel route.
Keywords	*electron beam irradiation; crystallinity index; pretreatment; lignocellulosic biomass; oil palm frond; empty fruit bunch; wet-soaked; vacuum; non-vacuum; effectiveness*

Paper ID	**ICChEAS_2022_paper_699**
Title	Novel Spent Bleaching Earth Industrial Waste as Low-Cost Ceramic Membranes Material: Elaboration and Characterization
Authors	Aulia Rahma, Muthia Elmaa, Muhammad Roil Bilad, Isnasyauqiah, Abdul Rahman Wahid, Muhammad Sirajul Huda, Dwi Resa Lamandau
Abstract	Ceramic membrane support derived from spent bleaching earth (SBE) become a novel study due to their low-cost material, abundance and there is not yet applicated as membrane. This work aims to the elaborate and characterization of SBE ceramic membrane using pressing method to shapes support into flat disk configuration with different SBE loading mass (38-42 %wt.). The SBE raw material was prepared by deoiled using n-hexane and acetone solvent, then followed by fabricating it into paste and shaped to become flat disk. Then, the characterization was done by using fourier-transform infrared spectroscopy (FTIR) and X-ray fluorescence (XRF) analyzer. Finally, the dimension of fabricated SBE ceramic support membrane flat disk was 41 mm as diameter and thickness of 6 mm. Also, it is indicated that the presence of siloxane functional group which mean the matrix is successfully formed the porous structures.
Keywords	SBE; ceramic membrane; support; pressing method; CPO

Paper ID	**ICChEAS_2022_paper_843**
Title	Regeneration of spent activated carbon from an oleochemical industry via microwave irradiation technique
Authors	Abdul Qahar Mazelan, Siti Shawalliah Idris, Syazana Mohamad Pauzi, Harumi Veny
Abstract	Regeneration of spent activated carbon through microwave technique offers some advantages over conventional treatment methods. The regeneration of spent activated carbon from an oleochemical industry through microwave irradiation under different operating conditions has been investigated. The surface porosity and functional group for virgin, spent, and regenerated activated carbons samples were characterised in the study. The adsorption uptake of the virgin and regenerated activated carbon was identified through batch adsorption experiment with methylene blue solution. Surface area of the activated carbon exhibit larger mesopore surface area than micropore surface area. Micropore surface did not appear when the spent activated carbon regenerated at power level below 1000 W and heating time below 9 min. A longer heating period are required to preserve the porosity and adsorption performance of the activated carbon to high regeneration efficiency.
Keywords	Activated carbon; BET surface area; FTIR spectra; Regeneration; Microwave

Paper ID	**ICChEAS_2022_paper_958**
Title	3D Hierarchical Porous Carbon Derived Spruce Leaves Biomass for High-Performance of Symmetrical Supercapacitor
Authors	Erman Taer*, Sukmawati, Apriwandi Apriwandi, Rika Taslim
Abstract	3D hierarchical porous carbon based on biomass waste was identified as an ideal candidate for its high porosity, regular pore structure, confirmed wettability properties and highly efficient ion transfer pathway for supercapacitor application. In this paper, we fabricate an EDLC type supercapacitor device followed by extra pseudo-capacitance properties by using spruce leaves waste as a 3D porous carbon source. Consistently, we investigated the effect of chemically activating $ZnCl_2$ at different solution concentrations including 0.1, 0.3, and 0.5 M high-temperature pyrolysis on the electrochemical and material properties of the supercapacitor electrode device. Through optimized porous carbon, their surface morphology is highly porous rich in 3D followed by high amorphousness. Furthermore, increasing the concentration of higher solutions markedly reduces their surface structure which is attuned to the sacrifice of device-specific capacitance. Furthermore, the 0.3 M $ZnCl_2$ impregnated porous carbon elicited a faradaic redox reaction of self-doping heteroatoms that could increase the electrochemical capacitance. Through a two-electrode configuration system, the highest specific capacitance reaches 187 F g^{-1} at 1 A g^{-1} in the 1 M H_2SO_4 electrolyte. The electrode resistance that has been obtained ranges from 0.009 Ω to 0.043Ω. The described approach reveals that the porous carbon obtained from spruce leaf derivatives has great potential for the design of compatible supercapacitor devices in the future.
Keywords	Spruce leaves biomass; porous carbon material; symmetrical supercapacitor

Paper ID	**ICChEAS_2022_paper_1025**
Title	Rational Use of Water Resources During the Oil Industry
Authors	Abdullayeva Maya Y.*, Alizadeh Shams N.
Abstract	This article talks about promising ways of development of petrochemical and oil refining industry and efficient use of water resources. Water affects most segments of the petroleum industry, and therefore efficient water management plays a key role in oil and gas exploitation. In most process industries, water is vital to many operations and is used for a variety of purposes such as product preparation, cooling, high purity water makeup water systems, general plant service water, waste handling/conveyance, potable/sanitary service, and fire protection, The water to be managed is produced together with hydrocarbons, formed as a by-product during oil and gas processing. Water has been identified as one of the top four challenges facing the exploitation of one of the largest crude oil fields (oil sands extraction); Large volumes stored in tailings ponds from oil-sand separation must be managed with a long-term view, as dike failure can cause a major environmental disaster. The cumulative effect of groundwater extraction for steam injection and other in situ operations has been underestimated, but has the potential to cause significant damage. Even if the most visible impacts are related to mining operations, the cumulative impact of numerous in situ and enhanced oil recovery (eg, waterflooding) projects could be even greater. The goal of water minimization cannot be considered in isolation, and other environmental impacts must be included in the decision-making analysis. Evaluating the various trade-offs in these systems remains an important challenge. In order to meet environmental regulations as well as reuse and recycling of produced water, many researchers have focused on treating oily saline produced water. Oil content and salinity of produced water from offshore and onshore activities can be reduced through various physical, chemical, and biological methods. In offshore extraction facilities due to space constraints, compact physical and chemical treatment technologies are preferred.
Keywords	oil refining; waste water; water source; sewage system; waterflooding; in-plant recycling; pumping capacity

Paper ID	**ICChEAS_2022_paper_1056**
Title	Formulation and Physical Properties of Citronella Oil Emulsion on Differences in Emulsifiers with the Addition of Maltodextrin
Authors	Anggun Puspitarini Siswanto*, Hermawan Dwi Ariyanto, Mohamad Endy Yulianto, Mirza Muhammad Faisal, Oktaviani Kusuma Wardani and Dmitriy Kuvshinov
Abstract	Various studies have shown that citronella oil is a fatty oil that is efficacious for reducing microbial activity in food. Emulsions are preparations containing two immiscible substances, usually water and oil, where the liquid which when dispersed becomes small particles in another liquid. The combination of maltodextrin and citronella oil requires an emulsifying agent. Methyl cellulose and gum arabic have been widely used with maltodextrin because they can increase the stability of the emulsion formed. Apart from being an emulsifier, the addition of methyl cellulose and gum arabic aims to strengthen the resulting coating layer. This study discusses the formulation of thin layer emulsion-based edible coating materials, studies the characteristics and stability of the thin layer emulsion system on edible coating materials, and studies the effect of storage temperature on the stability of the thin layer emulsion system on edible coating materials by observing the physical properties of the emulsion which includes the type emulsion, droplet size, and creaming index on sedimentation volume for 1 month of storage on variations of emulsifier methyl cellulose and Arabic gum and addition of maltodextrin. The results of observations based on tests on the type of emulsion, droplet size, and creaming index on the sedimentation volume for 1 month of storage on variations in emulsifier methyl cellulose and Arabic gum and the addition of maltodextrin showed that there was a significant difference.
Keywords	Arabic Gum; Emulsion; Maltodextrin; Methyl Cellulose; Lemongrass Oil

Paper ID	**ICChEAS_2022_paper_1141**
Title	Synthesis of composite adsorbent based on Spent Mushroom Subtrate (SMS) and Spent Bleaching Earth (SBE)
Authors	Elvi Yenie, Syaiful Bahri, Hapsoh, Edy Saputra
Abstract	The concept of Waste to Product is an environmentally sound industrial waste management activity that includes efforts to reduce pollution, increase waste utilization and economy. The aim of this study is to synthesis and characterize composite adsorbent SMS-SBE based of Spent Mushroom Subtrate (SMS) and Spent Bleaching Earth (SBE) materials. The adsorbent composite was synthesized by varying the composition of SMS and SBE consists of several samples (1) 75% : 25%; (2) 50% : 50%; (3) 25% : 75%; (4) 100% : 0%; (5) 0% : 100%. Characterizations were carried out using Iodine analysis, FTIR and SEM for material SMS and SBE. The best SMS-SBE materials comparison was found at the composition of 75%; 25% further characterized. The materials of SMS, SBE and composite adsorbent has surface areas 836,62 m^2/g, 788,82 m^2/g, and 812,721 m^2/g. Based on the FTIR spectrum, the presence of hydroxyl groups, alkanes, ketones, amides, esters, carboxyl, aromatic compounds on the SMS, and SBE consisting of OH groups, amine, Si-O, as well as composite adsorbent have hydroxyl, NH, and P-OH groups as a heavy metal binder. The SEM test showed that the morphological structure of the SMS-SBE adsorbent composite had larger and more pores than the SMS, SBE material. The characterization results obtained for the composite adsorbent are indicative of a promising low-cost material as it becomes from waste for applications towards the removal of heavy metals from wastewater streams.
Keywords	Synthesis, Characterization, Spent Mushroom Subtrate, Spent Bleaching Earth, Composite adsorbent

Paper ID	**ICChEAS_2022_paper_1181**
Title	Development of Chitosan-based Edible Biocomposite Film Incorporated with Starch and Pitaya Extract for Food Packaging
Authors	Alissa Farina Binti Aidi Zamri, Noorsuhana Binti Mohd Yusof
Abstract	Food shelf life is extended by edible film, which improves food quality and safety. Natural components in food films have various advantages, including biocompatibility, heat resistance, antibacterial and antioxidant abilities. Development and application of edible and biodegradable packaging materials reduce the use of synthetic materials. The aim of the research is to develop innovative packaging films based on edible biocomposite films incorporated with starch and Pitaya extract. The current study provides a clear description of chitosan-based films use as a protective coating for natural foods such as fruits. The necessity for shelf-life extension of fresh and natural foods without affecting their properties prompted the development of new methods for manufacturing food packages that also serve as a protective edible layer. Chitosan is a biopolymer recognised for its antibacterial and antifungal capabilities, especially when it is paired with its biocompatibility and biodegradability. Hence, it is ideal to be used in the cosmetic, pharmaceutical and food industries. The combination of chitosan with biologically active substances has led to development of edible films with improved mechanical properties. Furthermore, the prospective use of Pitaya extract and starch will be studied in detail
Keywords	edible film; starch; pitaya; food packaging; food preservation

Paper ID	**ICChEAS_2022_paper_1298**
Title	Hydrophilic Metal-chelated Membrane for Biocatalytic Membrane Reactor Application
Authors	Nur Ummi Anisa Muhammad Rasidi, Fauziah Marpani, Nur Hashimah Alias, Nur Hidayati Othman, Muhammad Shafiq Mat Shayuti
Abstract	Membrane filtration via polymer membranes are widely used to remove any pollutants in various industrial process applications. For instance, it is used to remove Bisphenol-A (BPA) from wastewater which has been generated by pharmaceutical and plastic industries. BPA can be degraded to its non-phenolic compound with the aid of enzyme. To ensure the stability of enzyme, a polymer membrane has to be slightly hydrophilic. However, polymer membrane was found to be dominant to hydrophobic nature and it exhibits high trans-membrane pressure and fouling tend to occur. Thus, their applicability is constrained. Hence, modification of a membrane surface is necessary to avoid these shortcomings. Therefore, metal chelated membrane is proposed in this research, which later will act as a support to immobilize laccase for biocatalytic removal of phenolic compounds, BPA. The PVDF membranes were modified by dopamine (DA), polyethyleneimine (PEI) to increase its hydrophilicity, iminodiacetic acid (IDA) as a metal chelator to bind various type of metals, i.e., Mn^{2+} and Ni^{2+} to increase its stability for further enzyme immobilization. The modified membranes were characterized by permeate flux, contact angle measurement and Scanning Electron Microscopy with Energy Dispersive X-ray spectroscopy (SEM-EDX). The results obtained proved that the hydrophilicity of PVDF membrane has improved after several modifications, where the contact angle decreased by 15% and 10% for Mn and Ni chelated membranes, respectively. In addition, SEM-EDX and FTIR results also proved the successful coating of the metals.
Keywords	Polymer Membrane; Membrane Characterization; DA; PEI; IDA; BPA

Paper ID	**ICChEAS_2022_paper_1357**
Title	Dissolving Pulp from Areca catechu L Fiber By Prehydrolysis, Soda-Cooking and Clorine Free Bleaching Processes
Authors	Yusnimar, Al Fikri, Robi Juandry, Drastinawati
Abstract	Nowadays, dissolving pulp (DP) is frequently utilized in the production of rayon. In general, fiber of Areca catechu L. (AC) can serve as a substitute for the production of rayon. Fiber of AC has a cellulose content of > 40%, in addition it is being accessible in Indonesia. This study aims to produce DP from AC by using the water-prehydrolysis process, soda-cooking, and elementarychlorine-free (ECF) bleaching sequences as well as total-chlorine-free (TCF) bleaching sequences on the quality of the resulted pulp. Additionally, a number of characteristics of DP have been done, such brightness, kappa number, pulp yield, viscosity, and αcellulose content. Data from Kraft's acacia pulping were compared. Results of this study, there is no discernible difference between the α-cellulose content of AC raw material (35.6%) and the α-cellulose content of pre-hydrolysis Acacia pulping kraft (39.2%). The content of active alkali affected to kappa number, pulp yield, and DP viscosity. The DP produced in this study had a pulp yield of 42% with a kappa number of 16.22. The DP obtained by ECF bleaching sequences had a viscosity of 7.6 cP, the α-cellulose content of 96.1%, and a brightness of 89.3%, which was higher than the ISO brightness of 88%. This DP corresponds to the minimum DP level for rayon according to the Indonesian National Standard (SNI).
Keywords	alpha-celluloce; brightness; kappa number; viscosity; yield

Paper ID	**ICChEAS_2022_paper_1390**
Title	The Temperature of The Heat Exchanger Network in the Cleaning Scheduling
Authors	Hairul Huda*, Tantra Diwa Larasati, Muhammad Rizky Nur Kholik, Tasya Futry Sabilla, Muhammad Faisal Akbar
Abstract	The increasing energy needs in the oil refinery industry, especially the use of HEN, innovate to solve problems and strive to provide effective solutions. The problem in HEN is a fouling problem in the HEN. This research offers a key to overcoming fouling in HE in HEN. The method used is the HEN cleaning decision based on a 10% decrease in the design temperature. The resulting research will get the total number of each cleaning of the HE on HEN.
Keywords	Cleaning scheduling; Fouling; Heat exchanger network; Temperature

Paper ID	**ICChEAS_2022_paper_1446**
Title	Pyrolysis of Citronella Oil Residue Impregnated with Metals (Na & Ni) Into Bio-oil and Char Products and Various Characterization Test
Authors	Vira Annisa Indriani, Angelina Grace, Setiadi*
Abstract	Citronella oil residue is abundant waste which can be converted into more useful products using the pyrolysis process. The important parameters that affect the pyrolysis process are temperature, inert gas flow rate, and others. In this research, metals (Na and Ni) will be impregnated into the biomass to play a role as catalyst. The presence of metals in char product is also investigated to utilize it as a supercapacitor electrode material. The results showed that the increase in temperature and inert gas flow rate will increase the yield of bio-oil. The presence of metals in biomass will also increase the formation of bio-oil. However, bio-oil characterization using GC-MS showed that there was an increase in the content of oxygenate compounds due to the presence of metals. Meanwhile, FTIR characterization in char showed that the presence of metals was able to reduce the value of absorbance ratio of C-H and C-C bonds and indicated that the pyrolysis process was getting perfect. Then, based on capacitance test and BET characterization, the best sample to be used as a supercapacitor electrode is a char sample resulting from 10% Ni impregnated pyrolysis with capacitance value reached 3747 μF and surface area of 106.5 m^2/g.
Keywords	Characterization, metal, pyrolysis, citronella, super capacitor electrode

Paper ID	**ICChEAS_2022_paper_1620**
Title	Homogeneity Analysis of B30 Mixing Results with Additives in Mixing Tanks Using Computational Fluid Dynamics (CFD)
Authors	Feri Karuana, Hafizh Ghazidin, Suyatno, Andrias R Wimada, Muhammad P Helios, Himawan Sutriyanto, Maharani D Sholikhah*
Abstract	B30 has been implemented in Indonesia as a commercial fuel. The specification of B30 could decrease if B30 is stored for a few months or more. The use of additives in B30 fuel can be conducted to increase B30 quality and to make the specification of B30 more stable. However, the mixture of B30 and additive needs to be homogenous. This study aims to analysis the homogeneity of B30 and additive mixture according to the density and fraction volume. CFD is used to simulate the mixing process of B30 and additive. CFD simulation uses angular velocity and resident time as main parameter, while the dimension of mixing tank uses the design of existing mixing tank. The result shows that at 900 rpm impeller speed is the fastest mixing time in achieving homogeneity of mixing B30 with additives and produces a more equal fluid flow velocity at all levels of the tank. According to the homogeneity parameters, the volume fraction and density values obtained from the CFD simulation (860 kg/m3) is not significantly different from the density obtained from the laboratory test measurement (858.7 kg/m3), that validate the CFD simulation model to represent the mixing of B30 and additive.
Keywords	Blended Biodiesel; Additive; Homogeneity; CFD; Turbulent; Mixing Time

Paper ID	**ICChEAS_2022_paper_1745**
Title	Effect of Torefaction Temperature and Adhesive Amount on The Characteristics of Waste Briquettes Coffee Grounds as An Alternative Renewable Fuel
Authors	Novita Aida, Nurhidayatul Fadila, Budiyono, Slamet Handoko
Abstract	Waste coffee grounds is one of the biomass that has the potential to be used as a renewable alternative energy through the process of making briquette. This study was conducted to determine the process of making briquettes coffee grounds and assess the effect of torefaction temperature and the amount of adhesive to the characteristics of the product briquettes coffee grounds. The sample used in this study is waste coffee grounds obtained from coffee-based beverage cafe. This study was conducted using an independent variable in the form of variations in temperature torefaction 200, 250, and 300, and variations in the amount of adhesive that is tapioca flour with a concentration of 10% and 25%. This study includes 3 stages namely pretreatment stage, operation stage, and analysis stage. At the pretreatment stage, drying and sieving are carried out on coffee grounds waste as raw material for briquettes. At the stage of operations carried out, mixing raw materials with adhesives, briquetting, and torefaction process briquettes of coffee grounds. The resulting briquettes are then followed by a characteristic analysis stage. From the research that has been done obtained the results that the variation of torefaction temperature affects the characteristics of coffee grounds briquettes include proximate analysis, ultimate analysis, calorific value, compressive strength value and briquette burn test while the amount of adhesive has no significant effect on the characteristics that have been done. Based on krevelen diagram shows that briquettes have almost the same characteristics as bituminous coal and anthracite, thus showing that briquettes can be used as a substitute for coal to reduce CO_2 emissions in steam power plants (PLTU), namely through the fulfillment of energy needs on a household scale.
Keywords	Briquettes; Coffee Grounds; Torefaction; Proximate; Ultimate

Paper ID	**ICChEAS_2022_paper_1803**
Title	Water Quality Analysis Using WQI (Water Quality Index): Review Paper
Authors	Monika Verma, Kuldeep Srivastava, Joshan Gajurel, Nirdesh Regmi Avinandan, Mandesh Kumar Yadav, Sonam Lekzin
Abstract	Water is the most consumed matter in the world. 97% of water is saline which cannot be used easily for domestic purposes and the water which can be easily treated is limited as the groundwater table is depleting due to irrigation purposes and water consumption is rural areas. To solve this issue, we must focus on surface water resource such as rivers, rivulets etc. For using such source there should be a meticulous quality audit of substantial water samples of that source to properly ensure suitability for domestic water use. Hence it is conspicuous that water quality is very imperative. For a rational and scientific analysis of water quality, there should be a mathematical parameter. For that matter, we have a water quality index to ensure rationality during the quality audit. We shall include pH, TDS, alkalinity, hardness conductivity, turbidity, dissolved oxygen, chlorine content, fluorine content etc.
Keywords	Water Quality; parameter; Mathematical calculation; WQI.

Paper ID	**ICChEAS_2022_paper_1836**
Title	Increased Performance Warning Radiation Security Drinking Mineral the Water of The Territory of The Republic of Azerbaijan
Authors	Abdullayeva Maya Y., Baxshaliyeva Aysun
Abstract	For the study was and Drinking water samples were taken and analyzed from six different regions of Azerbaijan (Gubadli, Nakhchivan Autonomous Republic, Shamakhi, Hajikend, Khachmaz, Astara). The radiological properties of drinking water sources on the territory of these regions were studied, as well as the total coefficients alpha, beta values in water samples were determined. The total alpha, beta values and the amount of other radioactive substances in water samples were determined. Based on the study, total alpha-beta values were found to be below the minimum values of total alpha-0.5 Bq/l and total beta-1 Bq/l for drinking water established by the World Health Organization (WHO). Also, the total annual equivalent of the effective dose of gamma radiation was found to be significantly lower than 0.100 mSv/l. This indicates that this is the lower limit of the drinking water annual effective dose equivalent.
Keywords	Radioactivity; mineral drinking water; total alpha; total beta; effective dose

Paper ID	**ICChEAS_2022_paper_2005**
Title	Hydrogen Production from Seawater Using H_2SO_4 Catalyst by Photovoltaic-Electrolysis Method
Authors	L. Hakim, R. Sari, Fadli, Fajar, Safrizal
Abstract	Hydrogen is a renewable energy that has many advantages compared to other renewable energy. One of the promising methods for producing hydrogen gas is the seawater electrolysis method, which has unlimited sources. The electrolysis method in this study uses direct electric current (DC) from solar panel (photovoltaic) with 5000 ml of seawater electrolyte solution. Electrolysis times were 15, 30, 45, and 60 minutes, using titanium mesh electrodes with varying voltages of 10, 15, 20, 25 and 30 volts. Electrolysis was carried out without the addition of a catalyst and with the addition of a H_2SO_4 catalyst with a concentration of 0.1M. The electrolysis reactor is in the form of a rectangular with a capacity of 5000 ml, at atmospheric temperature condition and 1 atm. The results showed that the voltage has a greater effect on the electrolysis process compared to time and the addition of a catalyst. The higher the voltage used, the more H_2 gas flow rate produced. The use of H_2SO_4 catalyst with a concentration of 0.1 M showed that the flow rate of H_2 gas produced was less than without using a catalyst. From the research results, the highest hydrogen gas flow rate was obtained in the process without the addition of a catalyst, which was 31.6 ml/minute with an increase in temperature reaching 55^{o}C.
Keywords	Hydrogen; energy; electrolysis; seawater; photovoltaic; catalyst

Paper ID	**ICChEAS_2022_paper_2273**
Title	Effect of Addition of Palm Oil Shell Biochar on Carbon Dioxide Emissions in Topsoil
Authors	Aryo Sasmita, Ulfa Septianda, Shinta Elystia
Abstract	Soil respiration is one of the contributors of CO_2 emissions into the atmosphere, causing global warming. One effort to reduce it is by applying biochar from agricultural waste to capture CO_2 from soil respiration processes. Palm shells have the potential to become biochar, because they contain hemicellulose, cellulose and lignin. The purpose of this study was to analyze the effect of adding variations of doses of palm shell biochar on CO_2 emissions resulting from the soil respiration process. Palm shell biochar was pyrolyzed at 600°C for 1 hour and activated using NaOH. Biochar was then added to the soil with various doses of 0, 8, 10, and 12% and then incubated for 10 days. CO_2 emission from soil respiration was measured by acid base titration method. From this research, it is known that the addition of biochar from palm shells in topsoil does not reduce carbon emissions but provide comfortable habitat and affects the increase in CO_2 emissions. In the treatment with an additional dose of 12% palm shell biochar produced the largest CO_2 emission on the 2nd day of incubation, namely 0.0384 mgCO_2-C/g soil. This value is 75% greater than the soil without the addition of biochar.
Keywords	soil respiration; biochar; palm shell; CO_2 emissions

Paper ID	**ICChEAS_2022_paper_2299**
Title	Fly Ash/Coconut Fiber Reinforced Polymer Composites: Effect on Physical Properties (Density, Water Absorption, and Thickness Swelling)
Authors	Farid Mulana*, M Prayogie Aulia, Sri Aprilia
Abstract	Using unsaturated polyester resin (U.P.R.) as a composite matrix still has physical flaws such as density, water absorption, and thickness swelling. Efforts to improve these physical properties can be made by adding filler. Natural ingredients such as coconut fiber and fly ash can be used as fillers. Both have advantages in terms of obtaining composite materials with the ability of the filler material, in this case, coconut fiber and fly ash. In this study, we investigate the effect of filler hybridization on the physical properties of the composite material. Mold pressing at a pressure of 250 bar was used in this study. Coconut fiber was soaked with 5% sodium hydroxide to remove unwanted substances like lignin and hemicellulose. The ratio of coconut fiber filler to fly ash was used as the independent variable, with ratios of (10:4), (7:4), (4:4), (4:7), and (4:10) %wt. The results indicated that the density value increased with the increase of fly ash amount. Water absorption increased in the composite of a higher ratio of coconut fiber to fly ash. The results of the thickness swelling showed that the thickness changed when more coconut fiber was added than fly ash.
Keywords	Coconut Fiber; Fly Ash; Composite; Polymer; Physical Properties; Hybrid

Paper ID	**ICChEAS_2022_paper_2380**
Title	Extraction of Silica from Rice Husk Ash: Effect of Alkaline and Alkaline Concentration
Authors	Sri Aprilia, Cut Meurah Rosnelly, Zuhra, Emir Haffiz Akbar, Muhammad Raqib, Khairul Rahmah, Fitriani, and Amri Amin
Abstract	Rice husk ash (RHA) as one of agriculture waste that are form silica and carbon content and apart from small amounts of other constituents. In this study, extraction of silica from RHA has been successfully synthesized by alkaline extraction using KOH and NaOH with the concentration 1 M and 2.5 M and the reflux process followed by acidification with hydrochloride acid (HCl 3M). The RHA was refluxed using sodium hydroxide and potassium hydroxide with concentrations of 1 and 2.5 M. The acidification process was performed using hydrochloric acid (HCl) 3N. Then, the silica gel produces by heated to 90oC for hours. Silica powder has produced by heated to 120^{o}C for 12 hours. Silica was characterization for chemical structure by FT-IR, crystallinity with XRD, structure silica with SEM and particle size. The results show the higher concentration of sodium hydroxide and potassium hydroxide led to higher purity of silica. Based on FT-IR revealed bending and stretching vibrations of Si-O and Si-O-Si. The silica extracted from RHA was found to be amorphous, and the structure inform of aggregate. Particle size analysis for all sample is not different and also the same structure.
Keywords	Rice husk ash; silica; sodium hydroxide; potassium hydroxide; concentration of solvent

Paper ID	**ICChEAS_2022_paper_2528**
Title	Deplete the Saturated Fatty Acid Fraction from Palm Biodiesel Fuel with $AgNO_3$ Solvent
Authors	Zuchra Helwani, Godlief Fredrik Neonufa, Graecia Lugito, Tirto Prakoso, Rinaldi Idroes*
Abstract	Biodiesel fuel consists of a mixture of fatty acid methyl esters (FAME). Biodiesel is better to only consist of a FAME mixture that contains more saturated and monounsaturated fatty acid fractions. The existence of polyunsaturated fatty acid fractions accelerates the oxidation reaction so that the stability of biodiesel oxidation is low. Depleting polyunsaturated fatty acids from the FAME mixture can reduce the iodine number and increase the oxidation stability of biodiesel. Research to drain polyunsaturated fatty acids from FAME derived from palm oil by extraction method using $AgNO_3$ solution has been carried out. This study aims to obtain the ratio of biodiesel volume with $AgNO_3$ solution, which is the most effective way to separate saturated fatty acid fractions from unsaturated fractions to produce biodiesel with the lowest iodine number and the highest oxidation stability. Biodiesel extraction with a 1: 2 ratio for the volume of biodiesel with $AgNO_3$ solution was found to be the most effective way to separate polyunsaturated fatty acids from fractions of saturated fatty acid molecules. The iodine number from biodiesel products extracted with the above ratio has decreased from 57.22 to 47.38 gr I2/100 gr of the sample. While the oxidation stability of biodiesel after extraction is 11.69 hours, or an increase of about 0.51 hours from biodiesel feed which is 11.18 hours.
Keywords	Oxidation stability; iodine number; biodiesel high performance; extraction

Paper ID	**ICChEAS_2022_paper_2553**
Title	Ultrasound and Ultrasound Combined Thermal Treatment on Resistance of *Paecilomyces Variotii* Mold Spores in Orange Juice
Authors	Evelyn, Chairul, F.H. Ramadhani, R. Khairunnisa
Abstract	Ultrasonic cavitation inactivation of microorganisms in a liquid environment has emerged in the last decade for non-thermal food pasteurization. Spores from microorganisms are of great concern because they can survive pasteurization and grow in certain foods. *Paecilomycess variotii* is a fungus that is considered a contaminant and can also cause infections in humans and animals. This study aimed to determine the effect of ultrasound, ultrasound in combined with temperature (TS, thermosonication: 55, 65, and 75°C), and ultrasound-assisted thermal (US-T: 50, 70, and 90°C) on the log survivors of *P. variotii* spores in orange juice. US (<5 W/mL) alone resulted in a less than 0.5 log reduction for *P. variotii* spores. TS at 75°C showed the best results with Weibull b- and n-values of 0.37 and 0.33, respectively. US-T processing at 90°C was better than other temperatures (1.7 log after 10 min). Generally, there were no differences in the log survivors between TS and US-T at the same temperature. The results obtained in this study should provide useful information for the cavitation processing of orange juice targeting *P. variotii* spores.
Keywords	Ultrasound; thermosonication; ultrasound-assisted thermal; mold ascospores; survival; fruit juice

Paper ID	**ICChEAS_2022_paper_2637**
Title	Hydrogel Derived from Water Hyacinth and Banana Skin Pectin as a Membrane Layer
Authors	Muthia Elmaa, Ni Kadek Devi Ananda Saraswati, Paskah Fransiska Afrida Simatupang, Retno Febriyanti, Aulia Rahma and Fitri Ria Mustalifah
Abstract	Water is the most essential substance for humans and other living things. In some cases, there are still many low-quality water resources such as peat water, so they cannot be consumed without implementing further treatment. Peat water is acidic and high in natural organic matter (NOM). Over the past decade, hydrogels have been used as potential adsorbents to remove contaminants from aqueous solutions especially in water. Ultrafiltration technology plays an important role in water purification and wastewater treatment. This study used CMC from water hyacinth cellulose and banana peel pectin to produce hydrogel as an ultrafiltration membrane. The aim of this work is to determine the performance of the CMC-Pectin membrane in the ultrafiltration process of peat water. CMC from water hyacinth is made by grinding water hyacinth into powder and then extracting soxhlet, bleaching and degumming then alkalizing for 1 hour then mixing Na-MCA, adding CH_3COOH to neutralize the pH and in the oven for 2 hours, weighing. CMC was mixed with pectin, distilled water and citric acid were added. Heated at 100°C for 30 minutes while stirring. Then poured into a mold with a certain thickness. The results have been successfully fabricated and characterized using FourierTransform Infrared (FTIR) and membrane morphology using SEM analysis. Contact angle test was carried out and revealed that the CMC/Pectin membrane reinforced with 100:0 (%wt.) of CMC has a membrane (63.98°) was the lowest and CMC/Pectin with 70:30(%wt.) had the highest contact angle (68.16°) both CMC and Pectin caused an increase in the above mechanical properties. As a result, CMC/Pectin membranes exhibit an anisotropic to isotropic and highly porous structure with a pore size gradient (from a few nm to a range of 200 m).
Keywords	Carboxymethylcellulose; hydrogel; membrane; peat water; pectin; water hyacinth

Paper ID	**ICChEAS_2022_paper_2956**
Title	A Mini Review on Polydopamine and Silver Functionalized Membrane for Antibiofouling
Authors	Fauziah Othman, Fauziah Marpani, Nur Hidayati Othman, Nur Hashimah Alias and Muhammad Shafiq Mat Shayuti
Abstract	Polydopamine (PDA) membranes with silver (Ag) coating are one of the best strategies to remove harmful material from wastewater and drinking water due to antibacterial and antifouling properties. This mini review paper will identify recent studies with regards to function of Ag as additive to modify polymer membrane especially to PDA modified membrane for antibacterial and antifouling properties. It also gives a holistic review about characteristic of different type of modified membrane that used Ag to enhance the antibacterial and antifouling properties. Initially, membrane surface properties will be outlined as these properties affect the antifouling and antibacterial properties of the modified membrane. Thereafter, the recent studies on the antifouling and antibacterial modified membrane with Ag coating will be discussed in this paper.
Keywords	Polydopamine; silver; antifouling; antibacterial

Paper ID	**ICChEAS_2022_paper_2986**
Title	Preliminary Study of Melt Flow Index of Recycled Polyethylene Terephthalate/Empty Fruit Bunch (rPET/EFB) Composite as a Potential Biodegradable 3D Printing Filament
Authors	Suffiyana Akhbar*, Nik Siti Nurbaya Nik Omar, Aina Nabila Mohd Yusof, Sakinah Mohd Alauddin, Nadia Kamarrudin
Abstract	The preliminary study of recycled Polyethylene Terephthalate (rPET) reinforced Empty Fruit Brunch (EFB) fibers as a potential biodegradable 3-dimensional (3D) printing filament material was investigated through melt flow viscosity analysis. 10 wt% EFB fiber was blended with 90 wt% rPET using internal mixer until steady state condition achieved. The melt flow index (MFI) of rPET/EFB composite was tested at 250°C to 280°C. The addition of 10 wt% EFB fiber increased the MFI value of rPET/EFB composite compared to rPET at all temperatures significantly. rPET/EFB composite starts flowing at lower temperature which is at 250°C at 31.271 g/10min compared to rPET at 260°C at 0.324 g/10min. Thus, the activation energy of rPET/EFB composite is lower compared to rPET which is 216.91 J/mol and 431.94 J/mol respectively. The findings indicate the possibility of rPET/EFB composite to be 3D printed at lower operating temperature.
Keywords	recycle PET bottle; EFB fibers; biodegradable 3D filament; MFI; activation energy

Paper ID	**ICChEAS_2022_paper_3153**
Title	Flexural and Structural Properties of PCC-Based Mortar Composited by Different Types of Shear Exfoliation Graphene
Authors	Ainis Nidila, Nadia Sukma, Desi Heltina, Sunarno, Amun Amri
Abstract	This study aims to improve the flexural strengths of Portland composite cement (PCC) - based mortar with the addition of turbulence-assisted shear exfoliation (TASE) graphene and turbulence-assisted shear exfoliation - high shear exfoliation (TASE-HSE) graphene. The mortars were prepared by mixing fine aggregate, cement, water, with 0%, 5%, 10%, and 15% of graphene. The flexural strength of mortar composite was tested using digital hydraulic concrete beam testing machine following ASTM C293/C293M (2010), porosity was determined following ASTM C624, chemical composition was probed by Raman spectroscopy, and surface morphology was analyzed using scanning electron spectroscopy (SEM). Flexural strength test results showed that the addition of TASE-HSE graphene increased the flexural strength up to 36.5%, or more than double than PCC-based mortar added with TASE graphene, with the optimal composition of graphene added was 10%. The addition of graphene, both TASE and TASE+HSE graphene reduced the degree of mortar porosity. The decrease in the degree of porosity of PCCbased mortar was more significant when graphene TASE+HSE was added, which was about 7.3% compared to the addition of TASE graphene, which was 6.1%. The results of Raman spectroscopy analysis showed that the addition of graphene increased the hydration process in such a way that there was a structure reduction of Alite and Belite. The surface morphology of PCC-based mortar with the addition of, either TASE or TASE-HSE graphene, was composed of a granular structure, which was different from the morphological structure of PCC-based mortar without graphene
Keywords	TASE-HSE graphene; PCC-based mortar; structural; flexural strength properties

Paper ID	**ICChEAS_2022_paper_3336**
Title	PLA/PVDF Film as An Alcohol Sensor for Tapai
Authors	Suzihaque Maqsood-ul-Haque, Syarah Syamimi Mazlan, Yang Lu
Abstract	Tapai is a common sweet-and-sour dessert in the Southeast Asia. When ripe, tapai is sweet, despite the fact that no sugar was added prior to fermentation. Anaerobic fermentation converts enzymes to glucose, which is then converted into ethanol. Alcohol content increased as the level of glucose is higher. The intake of tapai has recently raised a halal issue among Muslims, as its alcohol content is similar to that of beer, which is 5%. Ethanol concentrations in the tapai have been observed to be around 5%. We developed the hot press approach, which does not require sample pre-treatment like other analytical methods. Hot press can give us advantages in order to determine and analyse the alcohol in tapai because it can help us to reduce the time cost, and at the same time, it is also contribute for a good precision and accuracy when dealing with the parameters in alcohol detection. To be more sure on the result, the characterization of the film using scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR) is being observed. Through SEM, a flower-like shape appears in between PLA/PVDF 'sea island' morphology which proven the presence of ethanol in the film. Through FT-IR characterization, all film detect the presence of alcohol which can see through the peak at 3444.72 cm^{-1} which represent OH bands. Lastly, throughout the experiment, the objective to detect alcohol in tapai is partially successful as the film does change into transparent but not fully.
Keywords	PLA/PVDF; Film; Sensor; Alcohol; Tapai

Paper ID	**ICChEAS_2022_paper_3352**
Title	Bio-Cellulose Antibacterial Membrane as a Mask Filter Material to Protect Against Bacteria and Viruses
Authors	Saiful, Fitti Nashura, Sri Muliyani, Febriani, Muliadi Ramli,Muhamad Nasir
Abstract	The antibacterial filtration membrane that has been developed in this study is an alternative filtration membrane made from biocellulose to improve mask performance and has antibacterial properties. In this study, cellulose was obtained from nata de coco as the basic material for manufacturing filtration membranes. The membrane filter was made using the phase inversion method. The antibacterial properties of membrane masks were obtained by adding an antibacterial extract from red betel leaf (piper crocatum), which contains active compounds as antibacterial. The filtration membrane was characterized by mechanical properties, porosity, swelling degree, membrane structure and the performance of the aerosol filtration membrane as a mask material and its antibacterial properties.
Keywords	filtration membrane; mask; antibacterial; bio-cellulose; nata de coco

Paper ID	**ICChEAS_2022_paper_3432**
Title	Isolation and Identification of Lactic Acid Bacteria (LAB) from Traditional Food Kuantan Singingi Regency, Cangkuok
Authors	Ismawati, Silvera Devi, Nova Wahyu Pratiwi, Nia Lovenia, Nabella Suraya, Saryono
Abstract	Cangkuok semaung fermented food is a traditional food in Kuantan Singingi Regency. This food is processed by fermenting all of the fruit, which is one of the food processing techniques using microbes both from the food and from the outside. In this study, the fermentation of semaung fruit was carried out by adding a starter in the form of turmeric leaves, and water. This study aimed to isolate and identify lactic acid bacteria from the traditional food of Kuantan Singingi Regency. Isolation and purification of LAB isolates were carried out using MRS agar media by streak quadrant method, and the results showed that 45 isolates that were successfully isolated were gram-positive bacteria with bacillus colonies and were identified as Lactobacillus Sp.
Keywords	Cangkuak semaung; Fermentation; Lactic acid bacteria

Paper ID	**ICChEAS_2022_paper_3485**
Title	Hydrolysis Process of Oil Palm Empty Fruit Bunches for Bioethanol Production with *Saccharomyces cerevisiae*
Authors	Adrianto Ahmad*, Chairul, Nervi Rita, Riska Wulandari, Vini Alvia Sari
Abstract	Currently energy is of particular concern because of its increasing limited availability. The use of energy for various purposes such as industry, transportation and households, almost all countries are completely dependent on fossil fuels, especially petroleum. The development of the world's increasing energy needs and the dwindling availability of fossil energy are causing current attention. So that other alternative sources are needed that can produce energy, namely renewable alternative energy sources that are environmentally friendly and based on biological energy sources, namely bioethanol. Bioethanol can be produced from agricultural waste containing lignocellulosic biomass, such as oil palm empty fruit bunches. The procedure used in this research is the pretreatment of raw materials to reduce the size of the raw material to a size of 40 mesh, then delignification to reduce lignin content with the help of a solution of empty oil palm fruit bunch ash extract. Then purification using H_2O_2 3% with a ratio of 1:10 and adding NaOH 1 M, inshaker at 200 rpm, temperature 100 for 1 hour. Then hydrolysis for the breakdown of polysaccharides in lignocellulosic biomass, namely cellulose and hemicellulose into sugar, with a variation of 1 M, 2 M and 3 M hydrochloric acid in a ratio of 1:20 with a temperature of 100 for 3 hours and the filtrate is neutralized with 50% NaOH to pH 4.5-5, and fermentation to convert sugar into bioethanol with the help Saccharomyces cerevisiae as much as 4 g/L with variations in fermentation time of 24 hours, 48 hours, 72 hours, 96 hours and 120 hours. The optimum results obtained were variations in HCl concentration of 2 M with a sugar content of 11,661 g/L and the best bioethanol content at a fermentation time of 96 hours, namely 6% (v/v).
Keywords	Bioethanol; empty fruit bunches of oil palm; hydrolysis; fermentation; *saccharomyces cerevisiae*

Paper ID	**ICChEAS_2022_paper_3657**
Title	Response Surface Methodology for Optimization of Liquid Smoke Production Yield from Durian rinds (*Durio zibethinus Murr.*)
Authors	Muhammad Faisal, Suraiya Kamaruzzaman, Hera Desvita, Dini Annisa, Cut Zahara
Abstract	The purpose of this study is to determine the optimal pyrolysis time and temperature in the production of liquid smoke by employing a Response Surface Methodology (RSM). Liquid smoke was prepared by slow pyrolysis of durian rind at 300°C, 340°C, and 380°C. A Box-Behnken design (BBD) was employed to determine the optimum production of liquid smoke from durian rinds waste to obtain higher production. A quadratic model was developed for predicting the production (ml) based on BBD using RSM. The RSM was employed with two processing parameters including pyrolysis temperature and pyrolysis times in the production of liquid smoke. Based on the analysis, the optimum pyrolysis temperature and time to produce liquid smoke were 347°C and 99.4 min, respectively.
Keywords	Response surface methodology; Optimization; Box-Behnken Design; Liquid smoke; Durian rinds

Paper ID	**ICChEAS_2022_paper_3753**
Title	Characterization of Physical and Chemical Properties of Functional Beverages of Robusta Coffee Leaf Herbal Tea with Red Ginger-Enriched Green Tea Technique
Authors	Fahmi Arifan, Wisnu Broto, Edy Supriyo, Mirza Muhammad Faisal, Oktaviani Kusuma Wardani and Enrico Fendy Sapatra
Abstract	Immunity is the immune that exists in the human body which has the ability to fight various kinds of pathogenic microorganisms such as viruses. The low immunity in the body causes the body to be susceptible to disease. Efforts can be made to increase immunity by consuming functional foods or drinks. One of them by consuming herbal teas derived from herbal plants. The purpose of this study was to determine the effect of adding red ginger to total phenol, antioxidant, mineral content, water content and organoleptic properties of robusta coffee leaf herbal tea. These stages include the extraction of coffee leaves, size reduction of red ginger and characterization of red ginger, and the manufacture of herbal tea drinks with a mixture of robusta coffee leaf tea extract and red ginger.In determining the physical parameters of coffee leaf tea, the moisture content was 0.17% ± 1.61%; ash content 7.75 % ± 1.42%. The results of the identification of chemical compounds showed that robusta coffee leaf herbal tea contains alkaloids, flavonoids, tannins and saponins. The results of the identification with the test results showed that the concentrated brewed water of robusta coffee herbal tea contained alkaloids, flavonoids, tannins and saponins with a % inhibition of 67.52% in the run 4. The addition of ginger to the coffee leaf tea formulation greatly supported the increase in antioxidant levels. which is in this robusta coffee leaf tea because of the compound content of shogaol, gingerol, zingeron of 2.58-2.72%.
Keywords	Antioxidant; Extraction; Red Ginger; Robusta Coffee Leaf Tea

Paper ID	**ICChEAS_2022_paper_3783**
Title	Glycerolysis of stearic acid using green catalyst
Authors	Farra Aisha, Ida Zahrina*, Sunarno
Abstract	Conventional fatty acid glycerides production by glycerolysis of fatty acids can be carried out in the presence of homogenous acid catalysts (such as H_2SO_4 and HPO_4) or basic catalysts (such as KOH and NaOH). However, these catalysts had led to inefficient process and environmental problems. The use of green catalyst such as DES (deep eutectic solvents) for this process is preferable due to their less toxicity, cheap raw materials, biodegradability, non-volatile, easy separation, excellent reusability as well as produce relatively high conversion. Type of DES from less toxic compounds known as NADES (natural deep eutectic solvents) were used in this study to investigate their catalytic activity. NADES consist of HBA (choline chloride, betaine hydrochloride) and HBD (sorbitol, citric acid, propionic acid) were synthesized. Glycerolysis of stearic acid were conducted with the variations of molar ratios of stearic acid to glycerol (1:2, 1:4, 1:6), temperatures (120^0C, 150^0C, 180^0C) and catalyst concentrations (1, 3, 5 wt%) and the effect of reaction conditions on the presence of functional groups in ester glycerol were analyzed by infrared spectrum. The results showed that the highest conversion of stearic acid (97,60%) were obtained using choline chloride-sorbitol NADES at temperature of 180^0C, molar ratio of reactants (1:6) and catalyst concentration (5 wt%). Infrared spectra showed identical peaks of ester glycerol functional groups were absorbed at all variations of temperatures and molar ratios of reactants. NADES as catalyst provided good catalytic activity with relatively high conversion suggesting that NADES has great potential as green catalyst in glycerolysis of stearic acid in the future.
Keywords	catalyst; glycerolysis; natural deep eutectic solvents; stearic acid

Paper ID	**ICChEAS_2022_paper_3903**
Title	Microwave Drying Characteristics and Quality of Ananas comosus Peel, Core and Pulp
Authors	Nurul Asyikin Md Zaki, Habsah Alwi, Syafiza Abd Hashib, Ummi Kalthum Ibrahim, Junaidah Jai, Norashikin Mat Zain, Nurul Hidayah Samsulrizal
Abstract	Pineapple waste produced from pineapple canning industries contains many nutritional values and can be utilized for many purposes. Thus, this work aims to study the drying characteristics and quality of pineapple wastes in microwave drying. The peel, core and pulp samples of pineapple were dried using microwave oven at various power levels (300, 450, 600 W/kg) until the moisture content reduced to below 10% for each experiment. Dried samples were then analysed for protein content and phenolic compounds. All drying processes were completed between 6 to 43 min depending on microwave power level. The results indicated that an increase in power level will reduce the drying time during microwave treatment. Overall, protein content was highest for peel and core samples dried at 450 W/kg, while drying at 600 W/kg retained the highest phenolic compounds in peel and core samples. Findings showed that both pineapple peel and core contain significant amount of protein and phenolic compounds compared to the pulp. Microwave drying could remarkably preserve both pineapple peel and core while retaining the quality of the dried pineapple wastes.
Keywords	microwave drying; pineapple waste; peel; core; total phenolic content; drying rate

Paper ID	**ICChEAS_2022_paper_4107**
Title	Effect of Binder Levels Natural Rubber Latex Grafting Styrene and Methyl Methacrylate / Polyvinyl Acetate on Emulsion Paint Characteristics
Authors	Ivan Fadhillah, Arya Wiranata, Zuchra Helwani, Bahrudddin*
Abstract	Infrastructure developments in recent decades have led to increasing demand for high-performance paints for construction and decorative purposes. Paint performance is strongly influenced by the type and amount of binder used in the paint formulation. Commercial paints use conventional formaldehyde-based binders and, for some reason, are prohibited from being used in paints due to health and environmental issues. The development of bio-based paints is growing again with natural rubber latex (NRL), which has the potential to be developed as an emulsion paint binder. However, the performance of natural polymer-based binders is still less competitive than synthetic polymers. This study aims to develop an NRL-based paint binder by combining NRL grafted with styrene monomer and methyl methacrylate with polyvinyl acetate to compete with commercial binders. The result was that the combination of NRL grafted with 30% methyl methacrylate monomer and polyvinyl acetate in a ratio of 7:3 showed very satisfactory performance. Washability showed 23 cycles, good opacity, and 80 minutes of drying time. NRL grafted with methyl methacrylate monomer showed compatibility with polyvinyl acetate in improving binder performance against scrubbing and wet abrasion and increasing paint resistance to water, oil, and dirt. Methyl methacrylate monomer performed better than styrene in enhancing the adhesion and cohesion properties of NRL related to the ability of the binder to bind to the substrate.
Keywords	emulsion paint; grafting; methyl methacrylate; natural rubber latex; styrene; washability

Paper ID	**ICChEAS_2022_paper_4143**
Title	Melt Flow Index (MFI) Analysis of Sago Based Thermoplastic Starch Blend with Polypropylene and Polyethylene
Authors	Rozanna Dewi, Novi Sylvia, Zulnazri, Medyan Riza
Abstract	Click here and insert your abstract text. Thermoplastic sago starch produced from starch synthesis with polyols and methylene diisocyanate and chitosan can be used as raw material for producing environmentally friendly plastics as it can decompose naturally. In order to be printed in various shapes according to the desired application, thermoplastic starch should be mixed with polyethylene or polypropylene in a certain ratio. The amount of polyethylene/polypropylene added was adjusted, with consideration that the product can still decomposed in nature within a shorter period compared to the conventional one. Melt Flow Index (MFI) is one of important characteristic on the mechanical properties of thermoplastics. MFI need to be studied due to the molding ability of plastic depend on plastic melt flow index. The addition of polyethylene/polypropylene has significant effect on the melt characteristic. Melt Flow Index of thermoplastic blend with polypropylene was 10,9 ± 0,1 gr/10 min, while for thermoplastic with polyethylene was 13,5 ± 0,1 gr/10 min. The value improved significantly from the result obtained for MFI of thermoplastic using palm oil based polyol and castor oil based polyol without blending with polypropylene/polyethylene were 2,4800 ± 0,1237 gr/10 min and 0,5616 ± 0,0460 gr/10 min, respectively. Various plastic products are formed by processing polymers by one of the available techniques such as injection molding, compression molding, blow molding, profile extrusion, and sheet extrusion followed by stamping or thermoforming. It is absolutely essential for process optimization and product quality to understand which processing type most suitable for certain polymers especially a polymer mixture. MFI of thermoplastic starch blend with polypropylene/polyethylene showed the most suitable molding technique should be used is injection molding. The higher the MFI value affects the viscosity of the flow rate during the injection process. When pellet plastic process using injection molding, the product shaped very well.
Keywords	Sago Starch; Polyethylene; Polypropylene; Melt Flow Index; Injection Molding

Paper ID	**ICChEAS_2022_paper_4219**
Title	The Effect of Various Electrolyte Solutions on The Electrochemical Properties of The Carbon Electrodes of Supercapacitor Cells Based on Biomass Waste
Authors	Aria Yunita, Rakhmawati Farma*, Awitdrus Awitdrus, Irma Apriyani
Abstract	Electrolytes are the key to supercapacitor devices having high specific capacitance, high power density and energy density and long service life. Ionic mobility and conductivity are important factors for evaluating the performance of electrolytes, so in this study various electrolyte solutions were used to determine how they affect the electrochemical properties of carbon electrodes. Biomass-based activated carbon electrodes (AC) were synthesized through a pre-carbonization process, then chemically activated with 0.5 M KOH. Samples that have been chemically activated are dried and printed, then the carbonization process is carried out at a temperature of 600 and physical activation at a temperature of 800 using a furnace. AC that has been neutralized is immersed in an electrolyte of 1 M H_2SO_4 (AC-01), 1 M KOH (AC-02), and 1 M NH_3 (AC-03). The physical properties of AC electrodes were characterized using XRD to determine crystallinity and FTIR to determine functional groups. To determine the value of specific capacitance of supercapacitor cells, AC was tested using CV and GCD. The results showed that AC has an amorphous nature which is indicated by the presence of two sloping peaks at an angle of 2θ 25.3° and 45.58°. The FTIR test results showed that the carbon electrode had O-H and C=O functional groups. The specific capacitance values obtained from AC-01, AC-02 and AC-03 are 192, 154, and 112 Fg^{-1} respectively. The highest capacitance value is obtained when the AC is immersed in H_2SO_4 electrolyte, because H_2SO_4 has smaller ion sizes than other electrolyte solutions so that many of these ions enter the pores of the carbon electrode.
Keywords	supercapacitor; electrolytes; electrode; specific capacitance

Paper ID	**ICChEAS_2022_paper_4271**
Title	The Abundace of Microplastics in Siak Tributary Sediments in The Watershed Area, Pekanbaru City, Riau (Case Study Air Hitam River and Sago River)
Authors	Gunadi Priyambada, Budhi Kurniawan, Rillian Gerry, Lita Darmayanti
Abstract	The Siak River has branches in the form of tributaries which empties and gathers into one in the Siak River. Dense population activities along the watershed which are considered as entry points for microplastics into rivers. The decreasing in the quality of aquatic ecosystems is caused by the presence of plastic waste which is further degraded and formed micro-particles called microplastics. Microplastics are plastic with measurement less than 5 mm in size. This study aims to analyze the abundance and distribution of microplastics based on 3 (three) segments in the river basin (upstream, middle, and downstream). The process of communal sediment analysis is carried out in several stages, including drying, filtration, visual sorting, density separation (flotation) and microscopic analysis. The types of microplastics found in sago river were fibers, films, and debris, but the pellet type was not found in this study. The highest abundance of microplastics in sago's river was 14,000 particles/kg dry sediment and Air Hitam's river was 13,333 particles/kg dry sediment. The types of microplastics found in this study were dominated by fragments (65.42%), fiber (18.69%), and films (15.89%) in Sago's River. The types of microplastics identified using FTIR are Polystyrene (PS), nylon, cellulose acetate (CA), high-density polyethylene (HDPE), Polyvinyl chloride (PVC). The main types of microplastics in Air Hitam Rivers were fragments at 49.58%, followed by films at 27.73% and fibers at 22.69%. Results for the highest amount of microplastics found at 13,333 particles/kg in dry sediments, with the highest amounts found in the lower reaches of the river. The types of microplastics found were fibers, films, and debris, but the pellet type was not found in this study. Both Microplastics in the Sago and Air Hitam's Rivers sediment are believed to originate from household waste, singleuse plastic waste (plastic bags, PET bottles, food and beverage packaging), and waste from the industry.
Keywords	Microplastic; Abundance; Sediment; River; Siak River

Paper ID	**ICChEAS_2022_paper_4311**
Title	Economic Evaluation and Sensitivity Analysis of Methanol Plant from Glycerol
Authors	Meilani Kusuma Wati, Elmi Sunarya, Nada Zafirah, Hari Rionaldo, Zulfansyah
Abstract	Methanol plant from glycerol is a good prospect in Indonesia. Until 2021, methanol is only supplied by one methanol producer located in East Kalimantan, namely PT. Kalimantan Timur with a production capacity of 660,000 tons/year. Therefore, the methanol plant from glycerol has a very important meaning for the acquisition of foreign exchange as well as employment. This article presents an economic evaluation of a methanol plant from glycerol with a capacity of 40,000 tons/year. Profitability analysis calculation is done by two methods, the method that do not consider the time value of money and the method that consider the time value of money. The results of the method that do not consider the time value of money obtained ROI value (before tax) 34.62%, ROI value (after tax) 24.24%, and the value of PBP 2.98 years. Using the method that consider the time value of money, the NPW value was Rp. 1,458 billion and the DCFRR / IRR was 39.25%. The sensitivity analysis also deserves to see the effect of the factor that influence the economic viability, and provide more information for the optimization of Methanol production
Keywords	Economic Evaluation; Glycerol; Methanol; Profitability Analysis; Sensitivity Analysis

Paper ID	**ICChEAS_2022_paper_4348**
Title	Optimization of the Utilization of Tofu Waste (Whey) and Gypsum ($CaSO_4$ $2H_2O$) as Coagulant Material in the Process of Making Tofu from Aceh Soybeans
Authors	Jakfar, Azwar, Husni Husin, Abral Muslim, Nadiatul Hikmah
Abstract	The research focus is on optimizing the use of tofu waste (whey) and gypsum ($CaSO_4$ 2 H_2O) as a coagulant material in the process of making tofu from Acehnese soybeans using the response surface methodology (RSM). Modification This process involves experiments carried out according to the Central Composite Design (CCD). Furthermore, this study was investigated as a function of two independent factors, consisting of the mass of gypsum ($CaSO_4$ $2H_2O$) as a coagulant (2.0–12.0 g) and tofu waste (whey) (2.0–12.00 l), and the variable response: yield (%), protein (%), fat (%), carbohydrates (%), minerals (%), water content (%), pH, and hardness degree. Analysis of variance (ANOVA) explains the influence of individual variables, and the interaction is very significant. Optimization equations were developed for all independent and response variables. Based on the RSM CCD model, the optimal condition was achieved at the mass of $CaSO_4$ (X_1) 9.59% g, and the volume of tofu waste (X_2) 10 L, the yield (Y_1) = 13.84%, protein content (Y_2) = 8.1%, fat content (Y_3) = 4.86 %, carbohydrates (Y_4) = 3 %, minerals (Y_5) = 1.383 %, water content (Y_6) = 81.92 %, pH (Y_7) = 5.212., and hardness degree (Y_8) = 5.25 at a desirability value of 0.88. Therefore, this research is a promising candidate for the utilization of tofu waste in increasing the quantity, quality, and efficiency of the tofu-making process in the province of Aceh, Indonesia in the future.
Keywords	Optimization; Whey; Gypsum; Response Surface Methodology; Central Composite Design; Desirability

Paper ID	**ICChEAS_2022_paper_4686**
Title	The Influence of Annealing Temperature on the Microstructure and Energy Band Gap of $0.2BaTio_3$ - $0.8BaZr_{0.5}Ti_{0.5}O_3$ Nanomaterial
Authors	Rahmi Dewi*, T.S. Luqman, Sri Ningsih Sitorus, Okvarahireka Vitayaya, Ari Sulistyo Rini, Zuhdi
Abstract	The sol-gel process was used to create the nanostructure of the dielectric material $0.2BaTiO_3$ - $0.8BaZr_{0.5}Ti_{0.5}O_3$ (BT-BZT) on an FTO substrate. The nanomaterial structure's structural and optical properties were investigated. The BT-BZT material was annealed for 1 hour at 700°C, 750°C, and 800°C and characterized using X-ray diffraction (XRD) and a Field Emission Scanning Electron Microscope (FESEM). A UV-Vis spectrophotometer was used to measure band gap energy. According to the XRD results, all of the materials are single-phase with a cubic structure. According to the FESEM results, the morphology of the annealed material at 700°C, 750°C, and 800°C was spherical. The energy band gap of BT-BZT nanomaterials was discovered to be dependent on the morphology of the nanostructures.
Keywords	Dielectric material BT-BZT; sol-gel; microstructure; energy band gap

Paper ID	**ICChEAS_2022_paper_4758**
Title	Green Solvent on Microwaved Assisted Extraction of Star Fruit
Authors	Vita Paramita, Aisya Rohmatul Ummah, Heny Kusumayanti, Rizka Amalia, Wahyu Widyati
Abstract	The purpose of this study is to analyze the antioxidants in star fruit (*Averrhoa blimbi Liin*) extract using microwave assisted extraction. The extraction process used water as a green solvent and variable was used power (200; 400; 600 watt), time (1; 2; 3 minutes) and solvent/weight (v/w) ratio (10; 17.5; 25 ml/g). After the extraction is complete, extract star fruit is separated from solvent and precipitate used a centrifuge for 15 minutes at 3000 rpm. Antioxidant analysis of the extract was tested by DPPH (1,1-diphenyl-2-picrylhydrazil) method using a spectrophotometer. Additional tests were carried out in the form of measuring pH, density and viscosity of the extract. The results of the analysis using response surface methodology (RSM) showed that the critical point maximum at variable power 600 watts, time 3 minutes and ratio (v/w) 25 ml/g with an estimated antioxidant content 26,2904%. Highest antioxidant value was 27,865% at variable power 600 watts, time 3 minutes and ratio (v/w) 25 ml/g. The error value get from the result is 5,989%.
Keywords	Star fruit; antioxidant; MAE; DPPH; green solvent

Paper ID	**ICChEAS_2022_paper_4863**
Title	$ZnCl_2$-Assisted Synthesis of Coffea Beans Bagasse-Based Activated Carbon for Stable Material for High-performances Supercapcitors
Authors	Rakhmawati Farma*, Rizka Indah Julita, Irma Apriyani, Awitdrus Awitdrus, Erman Taer
Abstract	$ZnCl_2$ activator is a hydrating reagent that works effectively to facilitate the formation of pores in the carbon matrix. In addition, the activation method used is very simple and low-cost to synthesize carbon-based materials from coffee bean bagasse (CBB). The optimization of the $ZnCl_2$ impregnation process was carried out by varying the molarity (0.1, 0.2, and 0.3) at 80°C for 2 h. Electrochemical studies show that CBB provides a maximum specific capacitance of 250 F g^{-1} at a scan rate of 1 mVs^{-1} in a 1M H_2SO_4 electrolyte solution at a voltage of 1 V. This high specific capacitance value is due to the high irregularity associated with good conductivity and increased wettability of the electrolyte. These results provide a evident, simple and relevant synthesis strategy for the sustainable large-scale conversion of waste biomass into carbon materials for supercapacitor energy storage applications.
Keywords	Coffea beans bagasse; activated carbon; $ZnCl_2$ activation; supercapacitor

Paper ID	**ICChEAS_2022_paper_5013**
Title	Evaluation of Biomass Residues Combustion Characteristics in Open Burning
Authors	Maulana G. Nugraha, Elsava Derangga Mozasurya, Muslikhin Hidayat, Harwin Saptoadi
Abstract	Open burning of biomass residues is known as major source of atmospheric pollutant in agricultural areas. Biomass open burning released several toxic compounds that endanger not only human health but also enhance global warming effect. This paper aims to evaluate the characteristics of combustion in bagasse, rice straw and leaf litter open burning. Experimental furnace is designed to mimic the open burning condition with controlled observation system of combustion parameters i.e., temperature, gas composition, and particulate concentration. It is obtained that bagasse produced the lowest emission factor compared to other biomasses combustion i.e., 35 g CO/kg biomass and 0.2 g PM/kg biomass. High temperature level is obtained to be the main factor of low emission emitted in open burning.
Keywords	Open burning; biomass residues; particulate matter; carbon monoxide; emission factor

Paper ID	**ICChEAS_2022_paper_5105**
Title	The Effect of Sodium Hydroxide on Delignification, Bleaching on Acid Pretreatment, and Hydrolysis (Sulphuric Acid and Phosphoric Acid) on Glucose Production from Young Coconut Husk
Authors	Sri Rezeki Muria, Zikir Akbar Kemala, Abdul Hafiz Hidayat, Rozanna Sri Irianti
Abstract	The manufacture of fermented products from young coconut fibers as an alternative raw material to produced environmental friendly product and its use as fuel has proven to be more efficient in combustion. Bioethanol is the result of the fermentation process of sugar (glucose) from cellulose biomass from carbohydrate sources using the help of microorganisms. The purpose of this study is to determine the influence of various pretreatment processes, which were delignification and bleaching on the glucose produced. Delignification was carried out with NaOH with concentrations of 6%, 9% and 12% while the bleaching process is carried out with H_2O_2 10 %. The hydrolysis process used a mixture of H_2SO_4 and H_3PO_4 as first variable and by using only H_2SO_4 3% as second variable. From the experiment, it was found that the cellulose content increased, while hemicellulose and lignin decreased during delignification, furthermore the hemicellulose and lignin content decreased, whereas cellulose increased during the bleaching process. The best results are during the delignification process with NaOH 9%, bleaching with H_2O_2 10% continued with hydrolysis of mixed acids (H_2SO_4 and H_3PO_4) had the percentage of glucose produced of 45.514 89 gr / L
Keywords	Bleaching; Delignification; Glucose; Hydrolisis

Paper ID	**ICChEAS_2022_paper_5106**
Title	Palm Fruit Fiber Hydrolysis Process in Fermentation by *Saccharomyces cerevisiae* for Bioethanol Production
Authors	Zulfansyah, Adrianto Ahmad*, Erika Puji Hartanti, and Muhammad Shaza
Abstract	Bioethanol has been widely used in transportation as a fuel which is decreasing day by day. Palm fruit fiber has a high enough potential to be developed as an alternative energy source, namely bioethanol because of its high lignocellulosic content. The purpose of this study was to determine the composition of hydrochloric acid in the hydrolysis process, determine the initial sugar composition of the bioethanol produced, and determine the optimal processing time for the formation of bioethanol in the Hydrolysis and Separate Fermentation (SHF) method. This research began with the pretreatment of palm fruit fiber and then continued with the delignification process using the ash extract of empty palm fruit bunches (TKS), then the hydrolysis process using HCl with variations of 1 M, 2 M, and 3 M at a temperature of 100^{o}C for 3 hours. Then the results of the hydrolysis were fermented using Saccharomyces cerevisiae. The fermentation process lasted for 24 hours, 48 hours, 72 hours, 96 hours, and 120 hours. The results showed that the highest sugar concentration was obtained from the hydrolysis of 3 M HCl of 26.3304 g/L and the best bioethanol content was obtained from fermentation for 96 hours, which was 4.5%. The greater the initial concentration and the longer the fermentation time, the more bioethanol obtained at the optimal time.
Keywords	Bioethanol; Fermentation; Hydrolysis; Palm Fruit Fiber

Paper ID	**ICChEAS_2022_paper_5128**
Title	Removal of Total Dissolved Solids from Oil-Field Produced Water Using Ceramic Adsorbents Integrated with Reverse Osmosis
Authors	Netty Herawati, Subriyer Nasir*, Muhammad Hatta Dahlan, Maulana Yusuf, Maulid M. Iqbal, Kiagus Ahmad Roni
Abstract	Total dissolved solids (TDS) consisting of inorganic salts and organic matter are pollutants to the aquatic and water systems for human use. This paper studied the effect of ceramic adsorbent composition on improving the quality of the produced water (PW) by decreasing TDS before entering reverse osmosis (RO). The manufacture of ceramic adsorbents uses a mixture of spent catalysts of catalytic cracking residues (RCC) and natural clay in various compositions. Experiments were performed using the PW from one oil and gas company in South Sumatra, Indonesia. The flow rate of PW into the ceramic adsorbent column varied from 6 to 8 L/min at a contact time of 15 to 120 min. The results showed that ceramic adsorbent A (diameter 10 mm and thickness 10 mm, 70% clay, and 30% RCC) reduced TDS by 74.58%. Adsorbent B (diameter of 20 mm and thickness of 10 mm, 70% RCC and 30% clay) lowers TDS by 56.68% at a flow rate of 6 L/min and a contact time of 60 min. Adsorbent C (diameter of 10 mm and thickness of 10 mm, 30% clay, and 70% RCC) reduced TDS by 59.40% at a flow rate of 6 L/min and a flow time of 60 min. Adsorbent D (diameter of 20 mm, thickness of 10 mm, 30% clay, and 70% RCC) lowers TDS by 54.38% at a flow rate of 6 L/ min and a contact time of 60 min. After being transferred into the adsorption column, their filtrates were sent into the Reverse Osmosis (RO) membrane. Permeates of RO have TDS values between 1720 mg/L to 3930 mg/L that meet water standards for oil and gas exploration wastewater.
Keywords	Adsorbent; adsorption; catalytic cracking residues; oil exploration; total dissolved solids

Paper ID	**ICChEAS_2022_paper_5400**
Title	Plant Mediated Synthesis of Iron Nanoparticles for Environmental Application: Mini Review
Authors	Huey Ling Tan, Ying Chin Lim, Law Yong Ng, Ying Pei Lim*
Abstract	Nowadays, nanoparticles have recently sparked increased research interest due to their scientific potential and technological significance. Iron based nanoparticles (INPs) are among the most intriguing novel materials due to their high magnetic properties and catalytic activities. Physical and chemical methods are conventionally used for the synthesis of nanoparticles; however, recent research has shifted to the development of novel clean and sustainable synthesis protocols. Green nanoparticle synthesis method using biological subtracts such as bacteria, fungi, algae and plants is preferred because it is stable, cost effective and environmentally friendly. In comparison to bacteria/fungi mediated synthesis, plant mediated synthesis is relatively simple and easy to scale up to industrial scale. This review summarizes recent advance in the synthesis of INPs using different plant sources as the reducing or capping/stabilizing agents. The associated green synthesis protocols, characterization techniques and recommendations for future work in this area are also discussed. The present mini review may provide insight into plant-based synthesis of novel iron-based nanoparticles for environmental remediation application. Limitation for the green synthesis protocols and recommendations for future scope of work in this area are also discussed.
Keywords	Iron nanoparticles; Green synthesis; Plant mediated synthesis; Environmental friendly

Paper ID	**ICChEAS_2022_paper_5469**
Title	The Use of Fractional Factorial Design for Analyzing Effect of Sulfuric Acid Concentration and Temperature on Furfural Yield
Authors	Said Zul Amraini*, Rozanna Sri Irianti, Nirwana, Sri Rezeki Muria, Novia Liana Sari, Rachmad Aidil Azhar, Reno Susanto
Abstract	Furfural is a compound derived from monosaccharides widely applied in several industries. The need for furfural and its derivatives in Indonesia continues to increase, so all domestic furfural needs are obtained through imports. Furfural production uses materials containing lignocellulose, such as empty fruit bunch (EFB), with an acid chemical treatment to break the lignocellulosic bonds so that furfural is obtained. Making furfural begins with reducing the size of the EFB and drying it until the moisture content is below 10%. In this study, a fractional factorial design was used with a variation of sulfuric acid concentration of 6%-10% (w/v) and temperature variation of 110°C-130°C for 60 minutes. During the process, furfural goes through two reaction stages, namely hydrolysis and dehydration with the help of a sulfuric acid catalyst, where in the hydrolysis reaction it will form pentoses, and then pentoses are converted into furfural by the elimination of water as a dehydration reaction process. Furfural products are separated by extraction and distillation. Based on the results of the FTIR analysis shows that the furfural constituent groups are aromatic, ether, and aldehyde groups. The results of this study indicate that the variables that have a significant effect on furfural density and yield are concentration and temperature with the highest furfural yield obtained at 10% sulfuric acid concentration with a temperature of 130°C, which is 7.31% with a density of 1,1596 gr/mL.
Keywords	EFB; Furfural; fractional factorial design; yield

Paper ID	**ICChEAS_2022_paper_5725**
Title	Effect of Precursor Concentration on Crystallite Size of ZnO Nanomaterial Synthesized by Green Synthesis Method using *Terminalia catappa* Extract
Authors	Atut Reni Septiana, Rizki Wahyudi, Dian Mart Shoodiqin, Agus Rifani, Muhamad Doris
Abstract	Here, we report green synthesis method of zinc oxide nanomaterials using *Terminalia catappa* extract. Zinc oxide nanomaterials were produced by dissolving the zinc acetate dehydrate as precursor in aquadest then followed by titration of *Terminalia catappa* extract with varied precursor concentration, i.e. 0.3, 0.4, 0.5, 0.6, and 0.7 M. The synthesized zinc oxide nanomaterials were characterized by different techniques such as X-Ray Diffraction (XRD), Scanning Electron Microscopy – Energy Dispersive X-Ray (SEM-EDX), and Fourier Transform Infrared spectroscopy (FTIR). The XRD data analysis results indicated the presence of pure crystalline hexagonal wurtzite structure of zinc oxide nanomaterials and exhibited the crystallite grain size ranging from 5.9 to 14.6 nm. SEM-EDX analysis displayed the aglomeration of zinc oxide nanomaterials and confirmed the elements contained on the samples consist of Zn and O. The functional groups responsible for formation of ZnO nanomaterials were confirmed using FTIR analysis. Furthermore, FTIR spectra peaks showed the characteristic absorption of the ZnO nanoparticles at around 433 and 441 cm^{-1}.
Keywords	Zinc oxide nanomaterials; green synthesis; *Terminalia catappa* extract; precursor concentration

Paper ID	**ICChEAS_2022_paper_5844**
Title	Dynamic Simulation of Polyethylene/Organoclay Nanocomposites
Authors	Rahida Wati Sharudin, Nik Salwani Md Azmi, Zakiah Ahmad, Masahiro Ohshima
Abstract	Polyethylene materials is of great interest to be used in many applications due to its many advantageous attributes compared to other materials. It is light, have good mechanical properties, chemical resistance, easy to process and low in cost. Polyethylene is widely used as cable insulating material. However, the research is still ongoing to further improve the insulation quality and properties. In this study, an alternative approach through dynamic modelling method was conducted and it has become the main objective to investigate the effect of modified nanoclay concentration to the properties of polyethylene/nanoclay nanocomposites by looking at its characterization, optical and mechanical properties. The optical properties i.e dielectric constant, refractive index, and conductivity calculated showing lower values as the amount of modified nanoclay used increased. Interfacial tension, Young modulus, shear modulus, bulk modulus and Poisson's ratio was predicted based on the result obtained from dynamic simulation. Young's modulus, bulk modulus and shear modulus is higher at 378K than 348K while the opposite trend is noted for Poisson's ratio. Increasing the concentration of nanoclay up to 2.0 wt% reduced the interfacial tension and increasing the concentration above 2.0 wt% did not bring any changes to the interfacial tension value. Trajectory observation shows that the pores formed are larger as the concentration of nanoclay increases, which could lead to crack formation to occur from the overlapping of pores. This shows that the control of the formulation is important to control the final result of the XLPE nanocomposite products
Keywords	clay; dielectric; interfacial tension; molecular modelling; polyethylene

Paper ID	**ICChEAS_2022_paper_6030**
Title	Catalytic Co-Pyrolysis of Palm Oil Empty Fruit Bunch and Waste Tire Using Calcium Oxide Catalyst
Authors	Sunarno*, Ida Zahrina, Silvia Reni Yenti, Rozanna Sri Irianty, Panca Setia Utama
Abstract	The paper discusses the influence of percentage of calcium oxide catalyst and operation temperature of catalytic co-pyrolysis to the yield and characterization of the bio-oil product. Palm oil empty fruit bunch (POEFB) was treated with immersion by immersion in 0.1 M sodium hydroxide solution for 24 hours. Catalytic co-pyrolysis is carried out in fixed-bed reactor with an inner diameter of 30 mm and a total length of 300 mm. EFB that had been treated was mixed with the waste tire with a weight ratio of 25:75 and was added calcium oxide catalyst with percentage of (1,2,3,4,5%). The mixed raw material and calcium oxide were put into the catalytic co-pyrolysis reactor and heated at 400 – 550^{o}C, the nitrogen gas was used as a carrier and flowed at a flow rate of 400 mL/min for 45 minutes. The highest yield generated on the use of CaO/raw material ratio of 3% w/w and temperature of 500°C was 38.3%. The characteristics of the bio-oil obtained were the density of 0.914 g/mL, the viscosity of 4.12 cSt, pH of 4.20, and heating value of 43.39 MJ/Kg. The results of GC-MS analysis showed that bio-oil contained 94.01% hydrocarbon and 5.99% oxygenated compounds.
Keywords	Bio-oil; catalytic co-pyrolysis; calcium oxide; empty fruit bunch; waste tire

Paper ID	**ICChEAS_2022_paper_6158**
Title	Hesperidin Production from Lime peel (*Citrus aurantifolia S*) using Microwave Assisted Extraction (MAE)
Authors	Mohamad Endy Julianto, Alihsan Rahmawati, Aisyah Nuraini, Azizah Azhar, Fatma Sekar Putri Dewanty
Abstract	Indonesia is rich in biological natural resources, so it is necessary to develop the potential of natural materials that can be used in various industries. One of them is used in the development of new drugs because this natural ingredient contains active compounds such as lime peel (*Citrus aurantifolia Swingle*) which contains an active compound in the form of hesperidin where one of the benefits is as an immunomodulator. This study aims to extract the active compound hesperidin from lime peel using the Microwave Assisted Extraction (MAE) method with methanol as solvent at the best process conditions, namely temperature (50^0C, 55^0C and 60^0C), extraction time (4 minutes, 6 minutes and 8 minutes), and the solvent:feed ratio (1:20, 1:25 and 1:30). During the study, the levels of hesperidin compounds were measured using a UV-Vis spectrophotometer. Determination of influential research variables using Response Surface Methodology (RSM). The best condition for extracting hesperidin compounds from lime peel using the MAE method is 0.000779829 (μg/mL) or 7.9216999% at 60^0C for 8 minutes, the feed ratio is 15 grams with a volume of 300 mL. The coefficient of determination obtained by R2 is 0.89773. It can be interpreted that 89.77% of the total variability in the response can be explained in the regression equation/model. The critical value for the best condition of hesperidin compound level using MAE method was obtained at 4.87168 minutes, temperature 50.76466^{0}C and feed ratio of 8.71303 grams has an estimated content of hesperidin compounds produced by 4.592262%
Keywords	Extraction; Hesperidin; Lime peel; MAE

Paper ID	**ICChEAS_2022_paper_6160**
Title	Recent Technology of Edible Coating Production: A Review
Authors	Vika Andriani, Noer Abyor Handayani
Abstract	Food products in the agricultural industry face challenges ranging from post-harvest damage, management factors, health indications, packaging and preservation techniques. Therefore, prolonging storage quality and reducing postspoilage of fruits, vegetables, harvesting red meat and white meat that is safer leads the preservation method to edible coating. Edible coatings continue to be developed, edible coatings are thin layers that can be eaten optimally with their capacity to prevent damage due to mechanical handling, improve and maintain quality, extend shelf life, food safety, control humidity, processes to prevent loss of gas exchange, and ethylene production. Edible Coating technology has various techniques such as dipping, spraying, layer by layer and 3D food printing. Then, some ingredients can be incorporated into the edible coating matrix and applied to the surface of the food, thereby increasing the safety, quality and quantity of nutrients. Coatings in quality parameters, such as color, firmness, weight loss and nutritional parameters, which are very specific to product type and storage conditions, can be monitored with great precision. This study summarizes the latest studies on edible coatings as an alternative to food preservatives, namely natural biopolymers consisting of lipids, proteins, polysaccharides and composite coatings as well as carrier materials used as functional antimicrobials, with the addition of essential oils for texture (maturation or browning) and nutraceuticals can be slowed down. with storage at room temperature and/or cold temperatures.
Keywords	Postharvest; Edible coating; Food Products; Biopolymer; Essential oil

Paper ID	**ICChEAS_2022_paper_6218**
Title	Structural and Physico-mechanical Properties of Rice Husk Ash-based Geopolimer Mortar with The Addition of Graphene Nanosheets
Authors	Revika Wulandari, Meysara, Emiliana, Sunarno, Desi Heltina, Khairat, Amun Amri
Abstract	This study aims to examine the effects of graphene nanosheets (GNs) addition on the compressive and structural properties of rice husk ash - based geopolymer mortar. The manufacture of geopolymer was carried out in several stages, starting from the preparation of rice husks, preparation of alkaline activator (NaOH and Na_2SiO_3) solution with various NaOH concentrations of 6 M, 10 M, 14 M and preparation of GNS using the turbulence - assisted shear exfoliation (TASE) method. All the ingredients were mixed with GNs at with various concentrations of 0%, 2% and 4% wt and molded in a 5x5x5 cm3 geopolymer mold. The geopolymers were then allowed to cool for 24 hours and cured for the next 24 hours in oven at curing temperature of 40°C, 60°C and 80°C. The compressive strength of geopolymers was tested using universal compressive strength test machine following ASTM C 579-01, porosity was determined using ASTM C642 (2013), morphological properties were observed using Scanning Electron Microscopy (SEM), crystal structure was probed by X-ray diffraction (XRD) and chemical functional group was analyzed using Fourier transform infra-red (FTIR). Compressive strength test showed that the increase in GNs concentration increased the compressive strength of geopolymer. Geopolymer fabricated by 14 M NaOH, 4 %wt GNs and curing temperature of 80°C showed the highest compressive strength (17.4 MPa). SEM analysis showed that the addition of GNs changed the surface morphology of the geopolymer from a granular structure to a denser structure with less granular. XRD analysis showed that the crystal diameter of GNs was around 60.5 nm. FTIR analysis showed the presence of a polysialate functional group and a C-H group which indicated the presence of GNs.
Keywords	rice husk ash; geopolymer; graphene nanosheet; compressive strength

Paper ID	**ICChEAS_2022_paper_6262**
Title	Effect of Feed Composition in Co-Pyrolysis of Polypropylene and Triglyceride Using Ni/ZrO_2.SO_4 Catalyst on Pyrolysate Composition
Authors	Dijan Supramono*, Muthia Hanun, Fathiyah Inayatirrahmi
Abstract	Cracking of polyolefin plastics in triglyceride pyrolysis allows hydrogen donation for deoxygenation of triglycerides. In this study, the co-pyrolysis reaction of polypropylene-triglycerides from palm oil was carried out in a stirred reactor using Ni/ZrO_2.SO_4 catalyst, which had mesoporous characteristics and contained both Brønsted and Lewis acid sites. This co-pyrolysis produced more bio-oil yield and less non-condensable gas yield compared to that reaction involving ZrO_2/Al_2O_3.TiO_2 containing only Lewis acid site. The purpose of this study was to determine the effect of the polypropylene composition in the feed, varied at 0%, 25%, 50%, 75% and 100% by weight of the feed using catalyst of Ni/ZrO_2.SO_4, on the co-pyrolysis bio-oil yield and bio-oil composition. The co-pyrolysis products were analyzed based on yield, FTIR, GC-MS, and C-NMR to determine the composition of functional groups and chemical bonds in the bio-oil. Results of co-pyrolysis show that increasing polypropylene composition in the feed reduced the amount of oxygenated compounds. Hydrodeoxygenation reaction of the pyrolysate from the co-pyrolysis was carried out in a hydrogenation stirred tank reactor equipped with gas self-inducing impeller with hydrogen gas pressure of 14 bar. The bio-oil produced by hydrodeoxygenation using catalyst of Ni/ZrO_2.SO_4 presented a positive effect on removing most of oxygen from bio-oil and leaving long chain carboxylic acids and esters in the bio-oil.
Keywords	Co-pyrolysis; Triglycerides; Polypropylene; Ni/ZrO_2.SO_4 Catalyst; Bio-oil; Hydrodeoxygenation

Paper ID	**ICChEAS_2022_paper_6434**
Title	Experimental Study on Drying Characteristic of Black Tea Using Agitated Vibro Fluidized Bed Dryer
Authors	Sri Utami Handayani, Eflita Yohana, Mohammad Tauviqirrahman
Abstract	In Indonesia, tea plays a vital role in driving the economy, increasing employment, food independence and a source of foreign exchange. Most of the tea production in Indonesia is for export, and the rest is for domestic consumption. Tea exports are dominated by black tea, which is 36,368 tons or 84.95% in 2019. Tea drying is different from other agricultural products because of the non-uniform size of the material, the presence of oil content due to the grinding and cutting process, and the significant difference in the water content of the incoming and outgoing tea leaves. In tea factories, the air velocity tends to be large, so the energy consumption for the drying process is also significant. Adding an agitator to FBD has been shown to reduce drying time. Rotary agitators with proper design and rotation also can reduce the minimum fluidization velocity, bubble size, and the possibility of channelling and agglomeration. Research on the development of a rotary agitator on VFBD needs to be done to determine its effect on the uniformity of water content. The data obtained can be used as a basis for designing or modifying VFBD used in the tea industry or other similar industries. The experiment was carried out by drying tea powder that had undergone a process of withering, rolling and cutting in a continuous horizontal fluidized bed dryer before and after adding a rotary agitator. The results showed a decrease in the moisture content of the tea powder, which was dried in a continuous horizontal fluidized bed dryer with the addition of a rotary agitator.
Keywords	Tea; drying; rotary agitator; fluidized bed dryer

Paper ID	**ICChEAS_2022_paper_6537**
Title	The Effect of Variation in Catalyst Amount on Glycerol Conversion from Castor Oil (*Ricinus Communis L*)
Authors	Kiagus Ahmad Roni*, Netty Herawati, Dian Kharismadewi
Abstract	The ability of a chemical compound to catalyze a chemical reaction is measured by the activity of the catalyst which usually expressed in the percentage of conversion or the number of products from the amount of reactants in a certain reaction time. This study reviewed the amount of catalyst and the variation ratio of oil which were proposed by determine the effect of the amount of catalyst on the conversion of glycerol. This stage of glycerol conversion carried out in the transesterification process by using a variation of amount catalyst (0,5 ; 1 ; 1,5 ; 2,0 ; 2,5) and with the ratio of ethanol (1:1, 1:2, 1:3, 1:4, 1:5, 1:6) the mixture was stirred at 300 rpm for 60 minutes occurs at a temperature 383 K. This study obtained the value of the highest glycerol conversion was found to be 58,56 % in the amount of catalyst 2.0(%) with ratio between castor oil and ethanol has been found to be a value of 1:3.
Keywords	Glycerol; Castrol Oil; Amount of catalyst; Conversion; Transesterification

Paper ID	**ICChEAS_2022_paper_6575**
Title	Distribution of Microplastics in Surface Water of Tropical Urban River in West Sumatera, Indonesia
Authors	Budhi Primasari, Yommi Dewilda, Puti Sri Komala, Reri Afrianita, Herland Triadi
Abstract	Microplastics (MPs) in the environment have become an emerging issue worldwide. However, data about MPs in freshwater systems are still limited so far. Special attention has been given to plastic waste, as it can pollute the water environment by microplastics. In 2018, plastic waste in Indonesia reached 64 million tons annually. 3.2 million tons, or about 5% of the plastic waste, reaches the sea. This study's objective was to investigate the distribution of microplastic in river surface water from a river in a tropical area, West Sumatera, Indonesia. The river flows upstream to downstream near to estuary, passing different urban activities, such as domestic and industrial. The samples were collected at 12 sampling sites along the urban river of Batang Arau, West Sumatera Indonesia. Surface water samples were collected using a water sampler. The average concentration of microplastics in surface water samples was 1,700-10,000 particles/m^3. The majority of microplastics obtained in surface water samples were in the shape of fragments, 1-5 mm in size (Large Microplastics), and black in colour. The most dominant type of polymer was PET. ANOVA analysis showed a significant difference in the spatial distribution of microplastics in the surface water samples. The difference in microplastic concentration was dominantly due to activities along the river.
Keywords	Concentration; Distribution; Microplastic; River; Surface water

Paper ID	**ICChEAS_2022_paper_6600**
Title	Kinetics Modelling of The Solid-Liquid Extraction Process of Linamarin Compounds from Cassava Leaves Assisted By UV-Photobioextractor
Authors	Mohamad Endy Yulianto, Retno Dwi Nyamiati, Mega Mustikaningrum
Abstract	One of the difficulties experienced when extracting linamarin is the hydrolysis of the bioactive compound linamarin by an enzyme known as the enzyme linamarase. In this study, linamarin was isolated using UV-Photobioextractor technology and a simultaneous osmosis dehydration system aimed at inactivating the linamarase enzyme. The inactivation of the linamarase enzyme was carried out by destroying the enzyme cells with the help of ultraviolet light. The ethanol solvent used in this case aims to penetrate so that it deactivates the enzyme and functions as a solvent for linamarin. Based on kinetic studies, the model that fits the isolation phenomenon is a second-order kinetic model. Based on the results obtained, the value of the extraction speed constant (k) is 0.1879 /min in the first-order kinetic model with a regression value (R^2) of 0.8830 and 0.091003 L/(gram. min) with a regression value (R^2) of 0.9789 in the second-order kinetic model.
Keywords	Linamarin; UV-Photobioextractor; etanol; first-order kinetic model; second-order kinetic model

Paper ID	**ICChEAS_2022_paper_6651**
Title	Optimization and Characterization of Nypa Fruit Fruit Shell Activated Carbon Irradiated by Microwave in Term of Carbonization Temperatures and Activated Time
Authors	Sofia Anita, T. Abu Hanifah, Itnawita, Ganis Fia Kartika
Abstract	Nypa palm (Nypa frutican Wurmb) is one of the most abundant plantation products in the coastal of Riau Province. Nypa palm shell is one part of nipa that potentially used as an adsorbent due to its content 45.6% of cellulose, 23.5% of hemicellulose and 19.4% of lignin. The aim of this research were to determine the optimum condition of carbonization temperature and irradiation time. Preparation of nipa palm shell used carbonization method various carbonization temperatures (300, 400, 500, 600 and 700°C) and physical activation by microwave at 600 W with various activation times (5, 10 and 15 minutes). Activated carbon from nypa palm shell characterized by FTIR and SEM-EDX. Optimum condition from non-activated carbon at 500°C produced 3.53% of water content, 5.07% of ash content, 751.13mg/g of iodine adsorption, 7.59 mg/g of methylene blue adsorption and 27.39m^2/g of surface area. Optimum microwave activation time at 10 minutes produce 1.28% of water content, 10.63% of ash content, 1,003.3 mg/g of iod adsorption, 7.57 mg/g of methylene blue adsorption and 28.06 m^2/g of surface area. FTIR analysis showed that the activated and non-activated carbon contained many functional groups such as C-O-C, C-H, C=O, C=C and N-H. SEM-EDX showed that activated and non-activated carbon from nipa palm shell contained many elements such as C, O, Na, Mg, Si, Cl and K. Activated process by using microwave succeed to improve the ability of adsorbent.
Keywords	Nypa palm shell; Microwave; FTIR; SEM-EDX

Paper ID	**ICChEAS_2022_paper_6690**
Title	Conversion of Hazelnut Seed Shell Biomass into Porous Activated Carbon with CO_2 Activation for Supercapacitors
Authors	Rakhmawati Farma*, Yoan Tania, Irma Apriyani
Abstract	Utilization of waste biomass into an economical high-performance energy storage device has become the focus of research in the fields of science and technology. The high cost of production and the low storage capacity of supercapacitors are one of the obstacles in the development of supercapacitors. In this study, supercapacitor electrodes were synthesized from hazelnut seed shell (HSS) biomass as a renewable carbon source with optimization of CO_2 activation. The process of making this supercapacitor cell electrode through a pre-carbonization process, chemical activation of 0.3 M KOH, carbonization flowed N_2 gas at a temperature of 600°C, and Physical activation is flowed CO_2 gas with temperature variations of 700°C, 800°C, and 900°C. Microstructure analysis shows that the HSS-800 carbon electrode is semicrystalline with the lowest Lc value of 9.339 nm. The HSS-800 carbon electrode also has good conductivity and wettability characteristics caused by the electrode containing the O-H, C-H, C=O, and C=C functional groups. Electrochemical properties were analyzed used cyclic voltammetry and galvanostatic charge discharge which showed that the largest specific capacitance value was produced by the HSS-800 sample with specific capacitance values of 166.42 F g^{-1} and 137.6 F g^{-1}, respectively. Based on these results, activation of CO_2 at a temperature of 800°C produces porous carbon with the best performance which has the potential to be used as carbon electrodes for supercapacitor cell applications.
Keywords	hazelnut seed shell; activated carbon; CO_2 activation; supercapacitor

Paper ID	**ICChEAS_2022_paper_6869**
Title	The Utilization of Silica Sand and Clay with The Addition of Sawdust as Raw Material for Manufacturing Ceramic Membrane to Reduce TSS and TDS Levels of Peat Water
Authors	Zuqni Meldha, Idral Amri, Muhammad Dandy Tito Angkoso, Yosia Jumaga
Abstract	Peat water is abundant on the Riau Province. The amount has potential to be processed into clean water, but it is constrained by the condition of peat water which is not good for health. Therefore, it is necessary to process it first so that it can be used by the community. One of the alternative technologies that are easy and inexpensive to purify peat water is ceramic membrane technology. Ceramic membrane as a porous medium is able to filter impurities contained in peat water so that it can improve the quality of the peat water. In this study, a ceramic membrane was synthesized using a mixture of silica sand, clay, and sawdust with various compositions. This study aims to synthesize ceramic membranes based on silica sand, clay and sawdust, determine the optimal ratio of material composition between silica sand, clay, and sawdust and reduce the TDS and TSS levels of peat water at Ujung Batu Street, Farmer Field, Mandau District. The synthesis of ceramic membranes was carried out at a burning temperature of 700^{o}C for 4 hours with a membrane size of 11 cm in diameter and 0.5 cm in height in the form of a plate. The composition of the material in this study is silica sand: clay: sawdust M1 = 58%:38%:4%, M2 = 48%:48%:4%, and M3 = 38%:58%:4%. From the results of this study, the best ceramic membrane for rejecting TSS is a membrane with a composition of silica sand: clay: sawdust (38%: 58%: 4%) of 26.97% and the ceramic membrane that produces the highest flux for peat water is membrane with a composition of 58%:38%:4% of 879 x 10-4 l/m^{2}.hour. The ceramic membrane succeeded in reducing the TDS level of peat water by 10.36% and reducing the TSS level of peat water by 26.97%.
Keywords	peat water; ceramic membrane; silica sand; TDS; TSS

Paper ID	**ICChEAS_2022_paper_6899**
Title	Microwave-based Antioxidant Extraction from Pineapple Peel Waste
Authors	Nurhanis Syafiqah Harith, Norazah Abd Rahman, Norashikin Ahmad Zamanhuri, Syafiza Abd Hashib
Abstract	Pineapples are known to contain approximately 60% of 137,550 tons pineapple peel wastes (PPW) in Malaysia, which were frequently regarded as pineapple waste and underutilized resources. Currently, PPW is an issue that is discarded as being of poor value, resulting in environmental pollution such as air pollution. The add-value process to pineapple peels was another solution to the existing waste problem. Non-conventional method is one of the add-value process and in this research, microwave assisted extraction (MAE) with ethanol and distilled water solvent was used. The objective of this work is to study the effect of microwave parameters towards the yield of antioxidants from pineapple peels extraction. Total phenolic content (TPC), total flavonoid content (TFC), and 2, 2 -diphenyl-1-picrylhydrazyl (DPPH) methods were used to measure the antioxidant activity. The yield of extraction between the two concentrations of ethanol and distilled water shows that the percentage of solid in ethanol is larger with 27.31% than that distilled water with 21.58%. Ethanol was found to extract higher TPC than water as solvent. In conclusion, it was found that pineapple peel waste (PPW) has potential for antioxidant extract using MAE method and is a well-known technological extraction process that able to shorten extraction time and provide a higher yield as compared to conventional method.
Keywords	Antioxidant; Microwave Assisted Extraction; TPC; TFC; DPPH; Pineapple waste

Paper ID	**ICChEAS_2022_paper_6968**
Title	Plastic and Organic Waste Identification Using Multispectral Imaging
Authors	Minarni Shiddiq, Dodi Syofyan Arief, Zulfansyah, Khusnul Fatimah, Dilham Wahyudi, Dewi Anjarwati Mahmudah, Dinda Kamia Evka Putri, Ikhsan Rahman Husein, Sinta Afria Ningsih
Abstract	World cities face major problems of municipal solid wastes which come from households and industry activities. These problems need an integrated waste management and advanced technologies especially in waste segregation. Artificial intelligence and imaging methods have been proposed for faster and reliable waste sorting due to advances in machine learning and camera technology. Waste segregation is needed to reduce wastes reaching waste landfills and incineration, and to maximize recycling wastes such as metal and plastics and collect organic waste for further use. Effort to segregate plastic and organic waste from municipal solid waste is important since plastics types of PET, HDPE, PP are valuable recycling materials and organic waste are potential for biogas source. This study aimed to use multispectral imaging system with ten wavelengths to identify and characterize the reflectance intensities of the plastic and organic wastes. Principal Component Analysis (PCA) was used to analyze and visualize the datasets. The samples were plastics of PET, HDPE, and PP types and organic waste of carton, paper, and wet organic or vegetable, each type had 35 pieces. The results show significance differences in reflectance intensities of the sample types especially at 710 nm. HDPE plastic has higher intensity than PET and PP. There was a slightly difference in intensity between the unlabeled and labeled plastic bottles. Organic samples showed higher intensity than the plastics but varied between the organic waste types. PCA results show that the multispectral imaging has potential to be used in an automatic waste segregation system.
Keywords	Municipal solid waste; plastics; organics; multispectral imaging; principal component analysis

Paper ID	**ICChEAS_2022_paper_7090**
Title	Aqueous Electrolyte Selection of Activated Carbon Derived Cassava Peel Electrode Material-Based for Sustainable Symmetrical Supercapacitor
Authors	Eva Wahyuni Harahap, Apriwandi Apriwandi, Rika Taslim, Erman Taer*
Abstract	Electrolytes have been generally recognized as one of the most important components in enhancing the electrochemical performance of supercapacitors. On the other hand, aqueous electrolytes are considered prime candidates for the development of the next generation of symmetric supercapacitors due to their low-cost, environmentally friendly, high ionic conductivity, fine ionic size, and high capacitance. Herein, the symmetrical supercapacitor of the sustainable porous carbon-based electrode material was confirmed through various aqueous electrolytes consisting of neutral, basic, and acidic Na_2SO_4, KOH, and H_2SO_4. Activated carbon is obtained from high potential biomass sources of cassava peel waste. Activated carbon synthesis was performed with a comprehensive approach in order to obtain abundant pore structure, high porosity, and improved wettability through a combination of high-temperature chemical and physical activation. in addition, the electrode material is designed to resemble a solid disc without the addition of a synthetic binder. The evaluation of the disc dimensions showed high porosity in the obtained activated carbon. Furthermore, the symmetrical supercapacitor of the optimized electrode material exhibit excellent specific capacitances of 112, 150, and 183 F g^{-1} at 1 mV s^{-1} in the electrolytes Na_2SO_4, KOH, and H_2SO_4, respectively. In addition, the highest rate capability of 70% was confirmed in the H_2SO_4 acid electrolyte. Moreover, their coulombic efficiency can be maintained around 89% with low equivalent series resistance 0.21-0.42 Ω. Therefore, the activated carbon-based supercapacitor symmetric cell device from cassava peel shows high performance for developing high-performance supercapacitor applications with guaranteed stability in aqueous electrolytes.
Keywords	aqueous electrolyte; biomass waste; activated carbon; electrode materials; symmetrical supercapacitor

Paper ID	**ICChEAS_2022_paper_7139**
Title	Effect of Different Starch on The Characteristics of Edible Film as Functional Packaging in Fresh Meat or Meat Products: A Review
Authors	Tindy Rahmadi Putri, Alfiana Adhitasari, Vita Paramita, Mohamad Endy Yulianto, Hermawan Dwi Ariyanto
Abstract	Edible film is thin film matrix with specific and flexible properties. Nowadays edible film is widely used as food packaging in the form of sheets or thin layers that can be eaten together with the food product. Films have barrier properties against mass transfer (such as moisture, oxygen, light, lipids, and solutes), protect food and increase product shelf life. In current few years, the development of edible films is increasing rapidly, and many researchers focus to explore the main parameter in the developing of edible film. Edible films are formulated with natural polymers of polysaccharides, lipids, and proteins, or combined of them. Among of the polysaccharides that used in edible film, starch is the most popular type of polysaccharide. The used of starch in the development of edible film due to its easy availability, cost effectiveness, and excellent film forming ability. Starch-based films have good gas barrier properties but have poor mechanical properties. Some researchers have been modified successfully the structure of edible film using the addition of co-biopolymers or other secondary additives such as plasticizers or natural extracts to improve the mechanical properties of the films. Therefore, understanding the mechanism of these factors is very important for future studies on the development of starch-based edible films. This review focuses on the use of various types of starch as a film/coating material and then comprehensively discusses the characteristics of the film and its application to fresh meat and meat products.
Keywords	edible film; starch; coating; film properties; surface

Paper ID	**ICChEAS_2022_paper_7315**
Title	Pineapple Leaf Extract as Corrosion Controller for ASTM A36 Steel
Authors	Syelvia Putri Utami, Viona Aulia Rahmi, Ahmad Fadli, Khairat, Desi Heltina, Evelyn, Komalasari*
Abstract	Corrosion mostly occurred in industries which used metal in their piping system. Therefore, the inhibitor employed might help reduce and control the corrosion. Extract from pineapple leaves can be used as green inhibitor. This study aimed to apply the pineapple leaves extract for constrained the corrosion rate varying the soaking time of metal, corrosive media (H_2SO_4 0.1M and NaOH 1M), and inhibitor concentration (0, 1, 1.5 and 2 g/L). Extraction was conducted with ethanol and aquadest by 1:4 ratio. This study applied the weight loss method as a testing method. It was found that the lowest corrosion rate was 20.686 mpy by H_2SO_4 0.1M at a concentration 2 g/L for 48 h. Meanwhile, the lowest corrosion rate for NaOH 1M at a concentration 2 g/L was 0.444 mpy. The highest efficiency was 99.455% for 48 h by 1M NaOH
Keywords	Corrosion; efficient; pineapple leaves; rate; sodium oxide; sulfuric acid

Paper ID	**ICChEAS_2022_paper_7379**
Title	Rotary Algae Biofilm Reactor (RABR) Using Microalgae Chlorella sp. for Tofu Wastewater Treatment
Authors	Fakhriyah Hanifa Mazaya Nasution, Shinta Elystia*, Aryo Sasmita
Abstract	Indonesia was known to be dominated by the household-scale tofu industry with limited funds to treat the tofu wastewater produced, therefore the producers choose to directly discharge the tofu wastewater to ditch or water bodies without appropriate treatment. The tofu wastewater can pollute the aquatic environment due to its content consisting of organic compounds and high nutrients. Utilization of tofu wastewater as a source of nutrients to support the growth of microorganisms such as microalgae Chlorella sp. can be an alternative to the problem of tofu wastewater using Rotary Algae Biofilm Reactor (RABR) technology. This study aims to determine the growth rate of microalgae and the removal of COD and NH3 parameters by cultivating Chlorella sp. on a medium with various treatments of tofu wastewater concentration, namely 40%, 60%, 80% and 100% and contact time within (0, 1, 3, 5 days). The results showed that in the treatment of 40% tofu wastewater concentration on day 5, the highest COD and NH3 removal efficiency were 75,88% and 80,45%, respectively, with the total density of suspended and attached cells of Chlorella sp. of 3,99 x 106 cells/ml.
Keywords	Chlorella sp.; Rotary Algae Biofilm Reactor (RABR); Tofu Wastewater

Paper ID	**ICChEAS_2022_paper_7526**
Title	Comparison of Imputation Methods to Handle Missing Values in Southeast Asia Datasets of Factors That Influence Climate Change
Authors	Arisman Adnan, Muhammad Rayhan Faturrahman, Anne Mudya Yolanda, Noor Ell Goldameir, Gustriza Erda
Abstract	Climate change is currently the most discussed environmental issue, and it must be addressed immediately. Statistical models can be used to examine variables that influence climate change. However, there is a large amount of missing data in the dataset, which must be handled by predicting the missing values so that the data can be used for further analysis, such as machine learning analysis. The analysis in this study is limited to Southeast Asian countries with similar climate patterns. Total carbon dioxide emissions, total nitric oxide emissions, methane emissions, greenhouse gas emissions, and total electricity production are the variables used, with three imputation methods used, namely the mean, median, and k-NN imputation methods. After predicting data using each imputation, multiple linear regression analysis was used to calculate the RMSE. The mean imputation produces an RMSE of k2566.76, while the median produces an RMSE value of 5943.59 and the k-NN have RMSE of 4314.44, implying that the mean method is the best method for performing imputation on a dataset of factors influencing climate change in Southeast Asia
Keywords	Climate change; missing value; mean imputation; median imputation; k-NN imputation; RMSE

Paper ID	**ICChEAS_2022_paper_7695**
Title	Effect of Electric Voltage and Number of Aluminum Electrodes on Palm Oil Industry Liquid Waste Treatment with Continuous Electrocoagulation Process
Authors	Idral amri, Zuqni meldha, Syamsu Herman, Della Karmila, Mhd. Fadilah Ramadani
Abstract	Palm oil mill effluent (POME) is one of type agro-industrial organic waste in the form of water, oil and organic solids derived from crude palm oil (CPO) waste from the processing of oil palm fresh fruit bunches (FFB). POME can cause environmental disasters because they are dumped in open ponds or water bodies such as rivers, swamps and lakes thereby releasing large amounts of methane gas and other harmful gases that will cause the greenhouse effect. To avoid the problems caused, one of them is the electrocoagulation process using a continuous reactor. The purpose of this study was to determine the application of the electrocoagulation method used to reduce the concentration of COD and TSS in the liquid waste of the palm oil industry and also to determine the effect of electric voltage and the number of aluminum electrodes on the percentage of COD and TSS removal in the liquid waste of the palm oil industry. Parameters tested include TSS (Total Suspended Solid), and COD (Chemical Oxygen Demand). The electrocoagulation process uses electrical power that flows through the electrodes. Aluminum electrodes in the electrocoagulation reactor are wired connected to the power supply and then connected to an electric current with variations in electrical voltage (18; 20; and 24 Volts) and variations in the number of electrodes (11; 13; and 15 electrodes). The higher the voltage and the greater the number of electrodes, the greater the removal of COD and TSS. The best conditions in this study were obtained at 24 volts and 15 electrodes, with a decrease in COD from 3,000 mg/L to 270 mg/L (91%) while a decrease in TSS from 1,220 mg/L to 120 mg/L (90%). The results of the study have met the quality standard of the Minister of Environment Regulation No. 5 of 2014
Keywords	electrocoagulation; continuous; total suspended solid; chemical oxygen demand

Paper ID	**ICChEAS_2022_paper_8069**
Title	Effect of Physical and Biological Pretreatment on Sugarcane Bagasse Waste-Based Biogas Production
Authors	Siswo Sumardiono, Hashfi Hawali Abdul Matin*, Ihdina Sulistianingtias, Tri Yulianto Nugroho, and Budiyono Budiyono
Abstract	The increasing global population causes high demand for energy needs. This condition causes various countries to compete in developing alternative energy, one of which is through biogas energy. Biogas energy is energy that has been developed and proven for a long time, and currently biogas energy is being developed using biomass raw materials, one of which is sugarcane bagasse. Sugarcane bagasse is a biomass with a very high potential, especially in agricultural countries. In this research, a study related to pretreatment and the ratio of C/N to biogas production from sugarcane bagasse was conducted. The study was carried out on a laboratory scale with physical pretreatment by grinding with a size of 6 mesh, then biological pretreatment with the microbial consortium 5% g V^{-1}, and variations in the C/N ratio at 25 and 30. Cow rumen fluid was used in this study as a source of anaerobic bacteria and technical urea is used to adjust the C/N ratio. The solid total is set at 7%. Based on research that has been carried out for 60 days, it was found that physical pretreatment by grinding with a size of 6 mesh can increase biogas production. Biogas production increased both at C/N ratio conditions of 25 and 30. Furthermore, biological pretreatment with the microbial consortium 5% g V-1 was proven to increase biogas production at both C/N ratios of 25 and 30. Further studies on the C/N ratio, it was found that the C/N ratio of 25 was better than the C/N ratio of 30. This is evident in several variables, including raw and fine substrate conditions, as well as on variables with or without a microbial consortium, with the amount of biogas productivity at a C/N 25 ratio of 53-90.5% higher than the C/N 30 ratio
Keywords	biogas; sugarcane bagasse; physical pretreatment; biological pretreatment

Paper ID	**ICChEAS_2022_paper_8079**
Title	The Effect of Nitric Concentration and Heat Treatment Temperature on Stainless Steel 316L Acid Treatment Process on Hydroxyapatite Coating
Authors	Cory Dian Alfarisi*, Nurfatihayati, Hari Rionaldo, Ahmad Fadli, Komalasari, Isnaeny Syafna, Lisa Arianti, Dianti Lita Lestari, Nurva Asnila
Abstract	316L stainless steel implants are commonly used for orthopedic and dental implant applications, because its metallic implants exhibit good biocompatibility, corrosion resistance, non-magnetic response, and mechanical properties. However, there are drawbacks in the use of stainless steel metal in the implantation process, this material can be considered a foreign object by the body, because the composition and chemical structure of this material are not the same as human bone. To overcome this problem, hydroxyapatite coating was carried out on the stainless steel surface. The purpose of this study was to determine the effect of nitric acid concentration for hydroxyapatite coating on stainless steel 316L and to determine the effect of temperature for hydroxyapatite coating on stainless steel 316L. The preparation of the substrate, namely by sanding 316L stainless steel with grit 1200 sandpaper, acid substrate treatment followed by heat treatment, the coating process by dipping the substrate into the HA slurry using a dip coating tool then followed by the drying and sintering process. The optimum conditions for acid pretreatment in this study were the addition of 20% nitric acid concentration and a heat treatment temperature of 500 °C. The higher the concentration of nitric acid (HNO3) pretreatment acid in 316L stainless steel immersion, the higher the shear strength and coating thickness values obtained. The higher the pretreatment temperature, the lower the tensile strength and the thickness of the HA layer. The thickness of the HA layer obtained in this study were: 60.23 µm – 67.8 µm and 71.29 µm.
Keywords	acid concentration; dip coating; heat treatment; hydroxyapatite; stainless steel 316L

Paper ID	**ICChEAS_2022_paper_8151**
Title	Synthesis of The Composite MnO-Oil Palm Fly Ash and its Photocatalytic Activity
Authors	Riska Anggraini, Siti Saidah Siregar, Amilia Linggawati, Halida Sophia, Amir Awaluddin
Abstract	Manganese oxides have been reported to have various applications such as catalysts, ion exchangers, supercapacitors, biosensors and adsorbents. The oxides have a wide range of structures depending upon the connectivity of its smallest MnO6 octahedral unit. Few studies have been focused on the MnO manganosite rocksalt structure, but its synthetic route and catalytic activity for degradation of a dye have not fully explored. In this study, the composite MnO-Oil Palm Fly ash have been prepared by reacting $KMnO_4$, glucose and fly ash simultaneously (one-pot) by sol-gel method. The ash was first activated with the solution of NaOH. The effect of different loads of the ash and calcination temperature on the structure of composite was studied and correlated with their photocatalytic activities for the degradation of methylene blue (MB). The XRD results indicated that the increasing concentration of the ash from 5% to 15% led to the decrease of reflection peaks due to MnO phase, while the calcination temperature has no significant effect of the structure of MnO Manganosite on the composite. The photocatalytic studies revealed that the catalytic activity strongly depend on the solution pH. The increasing solution pH (pH 1) has highly positive effect on the photo-degradation of MB, whereas the decreasing the solution pH (pH 3) has negative effect on the photo-degradation of MB. The neutral pH seems to have moderate effect on the photo-degaradation of MB, except for the composite MnO-fly ash 5% sample calcinet at 600°C with the highest photo-degradation of MB. The optimum degradation of MB was 96,69 %, which is achieved using MnO-fly ash 5% prepared using calcination temperature of 700°C in 10 minute of reaction time.
Keywords	MnO; activated Oil Palm Fly ash; photocatalytic; one-pot; methylene blue

Paper ID	**ICChEAS_2022_paper_8230**
Title	The Effect of Air Hole Opening on Briquette Stove on CO Emissions from Burning Oil Palm Empty Bunches Briquettes
Authors	Hafidawati*, Elvi Yenie, Alen Agustarizal
Abstract	Waste oil palm empty bunches (TKS) is one of the renewable energy sources with great potential and is produced approximately 21% of the entire palm oil processing process. Burning TKS briquettes using biomass stoves has a low combustion efficiency, so it has the potential to emit CO. For this reason, it is necessary to test CO emissions from burning TKS briquettes. In this study, co emission test was conducted using environmental combustion analyzer type 450 and biomass stove performance using water boiling test method. Testing was conducted with variations of air hole openings L1 (3.51 cm^2), L2 (7.03 cm^2), and L3 (10.55 cm^2). The results of CO gas testing obtained by L1, L2 and L3 are 523.54 mg/Nm^3, 425.59 mg/Nm^3, and 351.13 mg/Nm^3 and still meet the quality standards of ESDM No. 47 of 2006. Thermal efficiency of briquette stoves obtained in L1, L2 and L3 are 26.51%, 24.28% and 22.28% and for specific consumption rates obtained in L1, L2 and L3 are 3.47 grams/minute, 5.54 grams/minute and 7.17 grams/minute, where these results show a value that is still below the quality standard of SNI 7926-2013. Based on the results of the study, it was concluded that the smaller the opening of the briquette stove air hole, the more CO emissions produced, the higher the thermal efficiency and the smaller the consumption rate.
Keywords	biomass stoves; briquettes; CO emission; palm empty bunches; thermal efficiency

Paper ID	**ICChEAS_2022_paper_8241**
Title	Catalytic Cracking of Pyrolysis Coconut Shell Oil into Benzene Toluene Xylene with CaO/HZSM-5 Catalyst
Authors	Setiadi*, Jelita Helianisa
Abstract	Coconut shell is a by-product of processing coconuts whose utilization is not optimal because it is considered worthless waste. In the development process, coconut shell waste has an excellent opportunity for being utilized as a product with high economic value as BTX (Benzene, Toluene, Xylene) due to its high content of lignin which its building block is in the form of aromatic compounds. Thermal pyrolysis and catalytic cracking of coconut shell biomass have been carried out in a fixed bed reactor to produce BTX compounds at 550^{o}C and 500^{o}C, respectively. CaO/HZSM-5 catalyst was synthesized using physical mixing and wet impregnation technique with a ratio of 1:2 in the upgrading process of catalytic cracking. CaO/HZSM-5 catalyst was chosen because the use of the two catalysts simultaneously provides a synergistic effect in producing BTX compounds. The addition of CaO has proven to increase the average pore size of the catalyst after modification and reduce the possibility of catalyst deactivation by preventing coke formation. The BET characterization of the catalyst showed that the pore diameters of the CaO/HZSM-5 physical mixed and wet impregnated catalyst were 2.14 nm and 5.24 nm, respectively. Furthermore, FTIR characterization showed the upgrading product of coconut shell bio-oil was dominated by aromatic compounds, phenols, and alcohols. Based on the GC-MS characterization, the CaO/HZSM-5 physical mixed catalyst gave an optimal performance where the highest BTX yield was obtained at 45.85%. This research was expected to provide alternative solutions to reduce dependency on fossil fuels.
Keywords	Coconut shell waste; Lignin, Upgrading; Catalytic cracking, BTX

Paper ID	**ICChEAS_2022_paper_8444**
Title	PVC-based Gravity Driven Ultrafiltration Membrane for River Water Treatment
Authors	Putu Teta Prihartini Aryanti*, Resa Lestary, Ismi Badriyah, Ega Ardi Ronaldi, Dimas Mahayana
Abstract	Gravity driven membrane (GDM) has been considered as a promising technology in water treatment since it performed under low gravitational pressure. In this work, ultrafiltration (UF) GDM with a heigh water level of 80 cm was used to treat river water. The UF membrane was prepared by blending polyvinyl chloride (PVC60R, 10-12 wt.%) with polyethylene glycol (PEG400, 5-15 wt.%) and ZnO nanoparticles (1 wt.%) in Dimethyl acetamide (DMAc). The influence of solution composition (PVC60R/PEG400/ZnO) on the porosity, water contact angle, permeate flux, and contaminant removal was investigated. The change of membrane porosity was more influenced by PEG400 concentration compared to the PVC. The lowest water contact angle of 45o was achieved by the membrane composition of PVC60/PEG400/ZnO 10/15/1 with permeate flux of 20.77 L.m-2 .h^{-1}. However, the mentioned composition resulted in a high flux decline of 25% during 12 hours of filtration. The larger pore formed in the membrane structure led to the formation of internal fouling, which might reduce the effective membrane area. The more stable flux resulted by the membrane composition of PVC60/PEG400/ZnO 14/10/1 with a permeate flux of 3 L.m^{-2}.h^{-1}. The highest removal of contaminants (turbidity >99.9%, TDS ≈ 47 - 53%, conductivity ≈ 6%) was achieved by blending 12 wt.% of PVC with 5 wt.% of PEG400 and 1 wt.% of ZnO nanoparticle. The permeate flux was 11 L.m-2 .h-1 with a flux decline of 15% after 12 hours of filtration time.
Keywords	clean water; gravity driven membrane; low-energy; ultrafiltration; water treatment

Paper ID	**ICChEAS_2022_paper_8245**
Title	Synthesis of Hydroxyapatite Powder using Natural Latex Particles as Pore Creating Agent
Authors	Silvia Reni Yenti, Ahmad Fadli, Amun Amri, Wisrayetti, Dandi Novandri, Feru Setiawan, Jumiati Hasibuan, Vallerin Goldia Tiffany Herjan
Abstract	The purpose of this research was to determine the appropriate empirical model of hydroxyapatite particles surface area produced using natural rubber as porogen. Firstly, 100 mL a solution of $Ca(NO_3)_2$ and latex was added dropwise into 100 mL of $[(NH_4)2HPO_4]$ solution at 37°C under stirring variation of 200 and 300 rpm for 30 and 45 minutes. Subsequently, the solution was aged for 12 and 24 hours, washed, filtered, and dried in an oven at 110°C for 5 h. Finally, the sample was calcined for 5 h at 600 °C in a furnace. The empirical model obtained to control the surface area of porous hydroxyapatite particles with the addition of latex was Y= 645,2 – 2,241 A – 16,61 B – 31,35 C + 0,06106 A*B + 0,1190 A*C + 0,8650 B*C – 0,003293 A*B*C. The R^2 obtained for this model was 99.99%. With the order of parameters/variables that gave the greatest to the smallest effect, respectively three-way interaction between stirring time and aging time (ABC), variable stirring time (B), two-way interaction between stirring time and aging time (BC), stirring speed (A), two-way interaction between stirring speed and aging time (AC), two-way interaction between stirring speed and stirring time (AB), and aging time (C). The highest hydroxyapatite surface area was 49 m^2/g that produced at 30 minutes stirring time, 200 rpm stirring speed, and 12 hours aging time.
Keywords	Hydroxyapatite; natural rubbers; surface area

Paper ID	**ICChEAS_2022_paper_8461**
Title	Moisture Removal, Colour Changes and Elemental Analysis of *Momordica Charantia* During Far Infrared Drying
Authors	Hanafiah Zainal Abidin, Habsah Alwi*, Nadzirah Fisol
Abstract	*Momordica charantia*, known as bitter melon or bitter gourd, is a food and natural medicine. *Momordica charantia* contains a variety of bioactive phytochemicals such as triterpenes, proteins, steroids, alkaloids, saponins, flavonoids and acid which can provide plants with antifungal, antibacterial, anti-parasitic, anti-virus, anti-fertility, anti-tumour, hypoglycemic for medicinal benefits. In this research, the drying characteristics of *momordica charantia* were dried by using fabricated infrared dryer at 50, 60 & 70°C. An investigation on drying behaviour and the physicochemical of dried MC were made with conventional oven. The results shows that FIR drying method at 70°C is the ideal temperature for drying the *Momordica charantias*' fruits as it has the highest effects on the colour changing analysis, moisture content removal and elemental analysis compared to oven drying. The results of the dried *Momordica charantia* by far infrared dryer gave better results in colour appearance, moisture content removal and the elemental analyzer compared to the hot air drying.
Keywords	*Momordica charantia*; infrared drying; moisture content

Paper ID	**ICChEAS_2022_paper_8537**
Title	Physically Activated Patchouli Dregs Carbon as a Biosorbent for Remotion of Methylene Blue
Authors	Fairuza Hysna, Mariana*, Farid Mulana, Mahidin, Syawaliah Muchtar
Abstract	Here we report about the utilization of patchouli dregs which are disposed waste from the production of patchouli oil production as a material source of biosorbent. This biosorbent offers a lot of merits such as being environmentally friendly, and low manufacturing costs. The biosorbent was derived from patchouli dregs which was physically activated at a temperature of 350°C. The characterization of the obtained material was carried out using a Scanning Electron Microscopy (SEM) to study the morphological structure, X-Ray Diffraction (XRD) to determine the crystalline structure, and Fourier Transform Infra-red (FTIR) spectroscopy to determine the functional group of the compound. The results showed that the activated patchouli dregs sorbent had the optimum adsorption capacity for methylene blue of 1.871 mg/g and the adsorption efficiency of 96.11% with a contact time of 60 minutes, mass adsorbent 0.4 gram and adsorbate concentration 5 ppm.
Keywords	patchouli dregs; biosorbent; activated carbon; methylene blue

Paper ID	**ICChEAS_2022_paper_8661**
Title	Biosynthesis of Nanoflower Ag-doped ZnO and Its Application as Photocatalyst for Methylene Blue Degradation
Authors	Ari Sulistyo Rini*, Adilla Permata Defti, Rahmi Dewi, Jasril, and Yolanda Rati
Abstract	The addition of doping to semiconductor materials is an attempt to enhance the performance of these materials. In this study, Agdoped ZnO (Ag:ZnO) nanoparticles was synthesized using pineapple peel extract at various doping percentage of 0, 2, 4, and 6%. The morphological, structural and optical properties of Ag:ZnO samples were characterized using SEM-EDX, XRD, and UV-Vis spectroscopy, respectively. SEM images exhibit the nano-flower shapes with a reduced particle size as increasing % Ag doping. EDX analysis revealed the presence of Ag in the ZnO sample. XRD analysis demonstrates a single phase of ZnO wurtzite structure. Ag:ZnO samples displays blue-shifted absorption peaks compared to pure ZnO and a larger band gap energy than ZnO. Using the doctor blade technique, Ag:ZnO films were fabricated for photocatalysis applications. The photocatalytic degradation of methylene blue was carried out under UV-C illumination. The photocatalytic activity demonstrates that 4% Ag:ZnO has an optimum kinetic reaction rate and degradation efficiency. Therefore, the addition of Ag to the ZnO nanoparticle has improved the ZnO's photocatalytic activity.
Keywords	Ag-Doped ZnO; Biosynthesis; Doctor Blade; Methylene Blue; Photocatalyst

Paper ID	**ICChEAS_2022_paper_8690**
Title	Response Surface Methodology (RSM) for Corrosion Control by *Gigantochloa apus L*. Leaf Extract Toward Low Carbon Steel in Hydrochloride Acid Solution
Authors	Komalasari*, Abdullah Agung Hayyuka, Syelvia Putri Utami, Evelyn, Ahmad Fadli, Muhammad Iwan Fermi, Desi Heltina
Abstract	Using inhibitors is one way to protect the internal parts of industrial pipes as fluid transportation from corrosion. In addition to the use of synthetic inhibitors, inhibitors from natural materials are one of the alternative methods that have been developed to control metal corrosion. Spring bamboo leaf extract (G*igantochloa apus*) can be used as a natural inhibitor because it contains tannin compounds. This study aims to determine the best corrosion rate reduction and calculate the highest inhibition efficiency of the extract of spring bamboo leaves (*Gigantochloa apus*) on low carbon steel, as well as determine the variables that affect the corrosion rate analysis using a central composite design (CCD). The extraction method used is soxhletation with a solvent ratio of ethanol: aquadest that is 1:4. Determination of the corrosion rate using the weight loss method of carbon steel in a solution of hydrochloric acid (HCl) with varying concentrations of 0.5M, 1.0M, 1.5M, immersion time for 24, 32, 40 hours and inhibitors of extracts of spring bamboo leaves added as much as 2 g/L. The results showed that the extract of spring bamboo leaves could reduce the corrosion rate of low carbon steel with the best value of 7.65 mpy at a concentration of 1M HCl and an immersion time of 20.69 hours. The corrosion rate test with a central composite design on steel showed that the most influential variable was immersion time.
Keywords	central composite design, corrosion rate, efficiency inhibition, G*igantochloa apus* leaf, inhibitor

Paper ID	**ICChEAS_2022_paper_8762**
Title	Investigation of The Non-Isothermal Decomposition Kinetics and Biofuel Properties of Leucaena Leucocephala Pellets Via Torrefaction
Authors	S. Matali*, N.A. Rahman, S.S. Idris
Abstract	*Leucaena Leucocephala* as an energy crop in Malaysia is relatively new biomass source to be studied where it offers good fuel properties, fast-growing and ease of cultivation. Torrefaction, also known as mild pyrolysis, of this woody species in pellet form is a promising way to convert this potential energy crop into bioenergy fuel and address the disadvantages associated with raw biomass pellets. Thus, this paper aims to report the impact of torrefaction parameters (temperature (200–300 °C) and holding times (30 and 60 minutes) on *Leucaena Leucocephala* fuel properties, structural changes, and its non-isothermal decompositions kinetics. Results obtained from this study showed high energy densification factor of torrefied pellets in the range of 1.07–1.50, dependent on torrefaction temperature and time. Via FTIR, the most significant structural changes brought by torrefaction were on the hydroxyl stretch (–OH) (3400–3000 cm^{-1}) and C–O stretch (1150– 980 cm^{-1}) due to the reductions of hydrogen and oxygen atoms in the biomass structure where consequently, lignin-related concentrated bonds are high and atomic ratios O/C and H/C reduced significantly causing favorable fuel ratio to increase up to 1.06. As for kinetic study via thermogravimetric analysis, decomposition of *Leucaena Leucocephala* during torrefaction follows diffusion reaction mechanism with activation energy values obtained in the range of 158–193 kJ/mol via Coats-Redfern method with high correlation coefficients ($R^2 \geq 0.992$). Results obtained in this work could provide valuable insights on the understanding of torrefaction effects on *Leucaena Leucocephala* pellets where this biochar pellets can be further utilized as sustainable fuel source for energy generation both for combustion and gasification processes.
Keywords	Torrefaction; thermal decomposition kinetics; *Leucaena Leucocephala*; energy density; biochar pellet

Paper ID	**ICChEAS_2022_paper_8859**
Title	Comparation of Methods Synthesis on TiO2-Graphene Composites for Photodegradation of Compound Waste
Authors	Desi Heltina*, Dwi Imamatul Mastura, Amun Amri, Maria Peratenta Sembiring, Komalasari
Abstract	A comparative study of TiO_2-Grapehene prepared by reflux and mechanical mixing methods for phenol photodegradation under visible and ultraviolet lamp is presented. The addition of graphene into TiO_2 material has been applied to control the surface area, structure, and phase of the TiO_2 nanocrystals. The characterization analysis of SEM-EDX observed that the TiO_2 nanoparticles were uniformly distributing on the graphene nanoplatelets and supported by the presence of Ti-O-C through FTIR characterization for the both methods. The phase structure was characterized by using X-ray diffraction (XRD). It was found that TiO_2 anatase phase in reflux method is bigger than mechanical mixing method. According to the analysis by BET the TiO_2/graphene nanocomposites possess huge specific surface area by the reflux method than the mechanical mixing method. Photodegradation efficiency of TiO_2-graphene by the reflux method under mercury lamp has the best performance because it has large surface area and good crystallinity.
Keywords	Graphene; nanocomposites; TiO_2.

Paper ID	**ICChEAS_2022_paper_9172**
Title	A Mini Review on The Methods to Enhance the Interaction of Carbon Dioxide with Polymer Membranes
Authors	Fatin Nasreen Ahmad Rizal Lim, Fauziah Marpani*, Norazah Abd Rahman
Abstract	By utilizing the captured CO_2 as feedstock to produce valuable chemicals is an attractive method to reduce the anthropogenic CO_2 emissions and overcoming the global warming issue that have been worsen as each year goes by. One of the reactor systems that have been proposed to support the reaction is known as the enzyme membrane reactor (EMR) system, where it is low-cost, simple reactor design, environmentally friendly, operates under mild reaction conditions and able to provide high energy efficiency. However, the main challenge faced by the system is still found similar with the other reactor systems suggested (e.g. electrochemical cell and photocatalytic reactor systems), which is to increase the solubility of CO_2 in reaction solution. The immobilization of carbonic anhydrase (CA) in/on membrane utilized is one of the most efficient methods to speed up the CO_2 hydration in the current study, but the activity of CA could be easily disrupted by the reactor conditions such as the existence of contaminants that could be the inhibitors of CA, pH of reaction solution and temperature. Hence, it is worth to investigate other alternatives that could substitute the method to facilitate the hydration of captured CO_2. Polymeric membranes have been widely applied as gas separation membranes because of its high availability, it is cheap and easy to fabricate, but most of the polymeric membranes are hydrophobic. To enhance the membrane's ability to hydrate CO_2, the membrane needs to be hydrophilic. In this paper, several techniques and their efficiency to increase the hydrophilicity in polymeric membranes (such as by incorporating nanocellulose, graphene oxide, ionic liquids, and amines with polymeric membranes) shall be reviewed and discussed so that it could be applied in the future enzyme membrane reactor systems to capture, hydrate, and further convert the CO_2 into chemicals.
Keywords	CO_2 hydration; carbonic anhydrase; polymeric membrane; hydrophilic modification; enzyme membrane reactor

Paper ID	**ICChEAS_2022_paper_9220**
Title	Production of Bioactive Compounds from *Bacillus paramycoides* LBKURCC218 Co-cultivation
Authors	Zona Octarya, Titania T. Nugroho, Yuana Nurulita, Nabella Suraya, Saryono*
Abstract	Bioactive compounds continue to be sought because they have certain functions in the body of living things, one of which is a compound that acts as an antibacterial and antifungal. Bioactive compounds can be produced by microorganisms, such as bacteria and fungi. In this study, we co-cultured Bacillus paramycoides LBKURCC218 with Aspergillus fumigatus LBKURCC269 to synthesize bioactive compounds. A liquid co-cultivation of these two organisms was tried firstly. The antifungal activity was determined by disc diffusion method and the profiles of secondary metabolites from each cowpea culture and co-culture were analyzed by Thin Layer Chromatography (TLC) and High Performance Liquid Chromatography (HPLC). The highest antifungal activity test results were obtained from co-cultured fermented ethyl acetate extract of B. paramycoides LBKURCC218 with A. fumigatus LBKURCC269 with a clear zone of 25.67 mm. The results of HPLC analysis showed 3 main peaks that only appeared during co-cultures of fungi and bacteria but did not appear in single cultures, namely retention times of 3.41, 31.4 and 36.5. These results indicate the presence of bioactive compounds induced by co-culture fermentation and potential as antifungal compounds
Keywords	Bioactive compounds; Fermentation; HPLC; Microbial coculture; TLC

Paper ID	**ICChEAS_2022_paper_9352**
Title	Structural and Magnetic Properties of Cr-Doped Fe_2O_3 Nanoparticles of Logas Natural Sand for Environmental Application
Authors	Erwin Amiruddin, Salomo Sinuraya, Amir Awaluddin, Martha Rianna, Muhammad Rizki, Novalia Magdalena Purba, Indah Tamara Sitorus and Amo Malini
Abstract	The chromium doped hematite (α-Fe_2O_3) nanoparticles have been prepared by ball milling method using Logas natural sand as a raw material. The hematite nanoparticles were doped using chromium with concentration of 0, 5, 10, and 15 wt.%. Magnetic, structural properties and composition of the samples were studied using vibration sample magnetometer (VSM), X-ray diffractometer (XRD) and X-ray fluorescence (XRF) spectroscopy, respectively. The magnetic properties are strongly depend on chromium content and showed that all of the samples exhibited weak ferromagnetic behaviour with the coercivity ranged from 350 Oe to 377 Oe. The XRD measurements confirmed the formation of crystalline, rhombohedral crystal structure and α-Fe_2O_3 nanoparticles. Chromium doped samples show chromium-hematite phase as indicated through XRD measurement. The average crystallite size calculated using Scherrer formula found to be 38.28, 35.43, 32.21, and 30.83 nm after being doped with chromium 0, 5 and 10, and 15 wt.%, respectively. Some other elements such as silicon and titanium and others elements were detected, which demonstrates that these magnetic iron oxide particles (α-Fe_2O_3) samples are not purely hematite as confirmed by X-Ray Fluorescence Spectroscopy (XRF) results.
Keywords	Logas natural sand; ball milling; chromium doped hematite; magnetic; structural properties

Paper ID	**ICChEAS_2022_paper_9354**
Title	Biodiesel Production Using Waste Banana Peel as Renewable Base Catalyst
Authors	Meriatna, H Husin*, M Riza, M Faisal, Ahmadi, Sulastri
Abstract	This study aimed to examine the exploration of banana peel ash calcined at temperatures of 500°C, 600°C, and 700°C to be used as a heterogeneous base catalyst in converting triglycerides into methyl esters through transesterification reactions. The prepared catalyst was characterized using X-Ray Diffraction (XRD) to determine the crystalline phase, while Fourier Transform Infra-Red (FT-IR) was used to determine the functional groups. The experimental results showed that the optimum parameter conditions were achieved at a calcination temperature of 700°C and a duration of 4 hours with a yield of 98.06%. Furthermore, based on the FT-IR analysis, the largest functional group of the catalyst was from alkaline earth metal oxides. This was also confirmed by the XRD analysis, which showed that K_2O compounds have the potential as green catalysts for future use.
Keywords	Banana peel; heterogenous catalyst; potassium oxide; biodiesel

Paper ID	**ICChEAS_2022_paper_9492**
Title	Production of Hydrogen Gas (H_2) and Sodium Hypochlorite (NaOCl) From Seawater Using Photovoltaic-Electrolysis Method
Authors	L. Hakim, Meriatna, Ishak, A. Setiawan, R. Sari, Fajar
Abstract	During the crisis of energy resources and the current Covid-19 pandemic, it is necessary to find a solution for the benefit of mankind. For the need for alternative non-fossil energy, the use of hydrogen gas as fuel has begun to be looked at and developed seriously. This is because hydrogen gas has a high heating value compared to other fuels and does not produce pollutants in its use as fuel. This study aims to increase the percentage of hydrogen gas, manufacture hydrogen gas as a vehicle fuel, and manufacture hydrogen as renewable energy as well as a by-product of sodium hypochlorite (NaOCl). This research was conducted by photovoltaic-electrolysis method with the electrolyte solution is seawater as much as 3,500 ml. The electrodes used are graphite plates with electrolysis times of 15, 30, 45, and 60 minutes with varying voltages of 5, 10, 15, and 20 volts. The results of this study indicate that voltage is an influential variable in the process of decomposing seawater into hydrogen gas and NaOCl. The highest hydrogen gas flow rate is 22.5 ml/min with a NaOCl content of 0.816 % with a voltage of 20 volts and an electrolysis time of 20 minutes. The results of this study also showed that the electrolysis time did not show a significant effect on hydrogen production but could increase the temperature during the electrolysis process. The electrolysis of seawater produces two hydrogen isotopes, namely hydrogen gas (H2) and deuterium gas (D) which both have the same chemical-physical properties but different amounts of mass.
Keywords	Electrolysis; Seawater; Hydrogen; Energy; Photovoltaic; Disinfectant

Paper ID	**ICChEAS_2022_paper_9624**
Title	Production of Dissolving Pulp from Gerunggang (Cratoxylum arborescens) Wood Through Pre-hydrolysis and Kraft-SAQ Cooking Process
Authors	Chairul*, Evelyn, Deviona, Anisa Mutamima, Yeni Aprianis, Drastinawati, Muhammad Dion Arfi, Sendra Erfa Satria, Muhammad Humam Ridho
Abstract	Gerunggang wood is a woody plant product from gerunggang (Cratoxylum arborescens), which is one of the native species of peatlands, distributed in several areas in Indonesia. Gerunggang wood has considerable potential and can be used for the manufacture of dissolving pulp, although it has not been utilized properly. However, the use of gerunggang wood as an alternative raw material to produce dissolving pulp is still in the research stage. The production of dissolving pulp in this study consisted of a pre-hydrolysis process at 150°C for 90 minutes, a cooking process at 150°C with cooking times varied at 120 and 150 minutes, and the ECF (Elemental Chlorine Free) bleaching process. The ECF (Elemental Chlorine Free) bleaching consisted of five stages process; ODL (Oxygen Delignification), D0 (Initial Delignification), EOP (Alkali Extraction, Oxidation, and Peroxide) process, D1 (First Brightening), and D2 (Advance Brightening). The S/L ratio used was 1:7. The cooking liquor variables were carried out using the kraft method with and without Soluble Anthraquinone (SAQ) application, and active alkali charge varied at 18, 20, 22, and 24%. In the cooking process, 0.1% of SAQ was added. The best kappa number in unbleached dissolving pulp was obtained from 150 minutes of cooking time with 24% active alkali using the kraft-SAQ method with a kappa number of 13.68. The best brightness, viscosity, and alpha-cellulose were obtained after the bleaching process at 150 minutes of cooking time with 24% active alkali using the kraft-SAQ method with brightness 91.25% ISO, viscosity 20.4 cP, and 94.19% alpha-cellulose.
Keywords	dissolving pulp; gerunggang wood; cooking; kraft-SAQ

Paper ID	**ICChEAS_2022_paper_9626**
Title	Utilization of Lamtoro Fruit Peel Waste to Improve the Performance of Supercapacitor Electrodes in Energy Storage
Authors	ErmanTaer*, Inri Br Pasaribu, Novi Yanti, Apriwandi, Rika Taslim
Abstract	Activated carbon based on biomass waste from lamtoro fruit peel, Leucaena Leucocephala (Lam.) (LAC) has been prepared and characterized for its physical and electrochemical properties. The preparation process uses a simple, uncomplicated and cost-effective technique because it does not require additional adhesive in its processing to increase the use value of biomass waste, especially lamtoro fruit peel. This study was based on impregnation of low concentration $ZnCl_2$ (0.1, 0.3 and 0.5) M. These three concentrations were chosen to maximize the potential of LAC to produce the best conditions from the electrode with the highest specific capacitance. The manufacture of activated carbon was carried out by one-step integrated carbonization and physical activation up to a temperature of 800°C to produce highly amorphous, porous LAC according to the XRD test pattern. Sample LAC-0.3 has been known to have the best physical and electrochemical properties with carbon content reaching 93.05% with the availability of 6.89% oxygen heteroatom doping. Interestingly, the large number of irregular porous lumps in sample LAC-0.3 can increase the electrochemical performance of the carbon electrode from 74 F/g to 176 F/g, with an optimum energy density of 26.81 Wh/kg and a power density of 96.6 W/kg obtained using the GCD method. Electrochemical testing for LAC samples was carried out at a low potential of 0-1 V with a scan rate of 1 mV/s under the influence of an aqueous electrolyte of 1 M H_2SO_4. These results show the extraordinary potential of lamtoro fruit peel waste as a basic material for making activated carbon electrodes for supercapacitors with competitive capacitance.
Keywords	lamtoro fruit peel; uncomplicated; cost-effective; activated carbon electrodes; supercapacitors

Paper ID	**ICChEAS_2022_paper_9666**
Title	Synthesis and Characterization of Chitosan/Polyvinyl Alcohol Crosslinked Poly(N-Isopropylacrylamide) Smart Hydrogels Via γ-Radiation
Authors	Dhena Ria Barleany*, Jayanudin, Andriano Suryawan Utama, Ukas Riyupi, Hafid Alwan, Retno Sulistyo Dhamar Lestari, Alia Badra Pitaloka, Erizal
Abstract	Chitosan-based smart hydrogels with stable mechanical and good flexibility have many desirable qualities and broad applications. In this present study, novel smart hydrogels of chitosan crosslinked with poly(N-Isopropylacrylamide) (pNIPAAm) and polyvinyl alcohol (PVA) was synthesized by freezing and thawing procedures and then subjected to γradiation at room temperature. The effect of irradiation dose on the gel fraction and water absorption characters of chitosan-pNIPAAm hydrogels was investigated. In addition, the structure-property behavior of the hydrogels was characterized by FTIR spectroscopy and thermogravimetric analysis (TGA). The experimental results reveal that the hydrogels synthesized with 15 kGy total dose showed higher gel content (83.73%) compared to 5 kGy and 10 kGy, while the appropriate dose of γ-radiation to achieve the highest absorption in water (484,146%) was 5 kGy. The hydrogel characterization test confirmed that cross-linking occurred between pNIPAAm, PVA, and chitosan. Increasing the radiation dose resulted in more cross-links in the hydrogel and resulted in better thermal stability. In this work confirmed that chitosan/PVA cross-linked pNIPAAm hydrogel with dual pH/temperature stimuli-responsiveness hold the promise to be used in various applications
Keywords	Chitosan; Dual-Responsive; Hydrogel; Radiation; Smart Material

Paper ID	**ICChEAS_2022_paper_9749**
Title	Utilization of Sugarcane Bagasse into Bio Asphalt Through Pyrolysis Process using Zeolite-Based Catalyst
Authors	Heny Dewajani*, Windi Zamrudy, Zakijah Irfin, Diana Ningtyas, Noufi Mujibur Ridlo
Abstract	The availability of biomass in the form of bagasse in Indonesia is very abundant. Indonesia has around 420,000 hectares of sugar cane land and sugarcane production is more than 2 million tons per year, with bagasse yields reaching 1 million tons per year. This has the potential to be processed into more useful products because bagasse is one of the renewable biomasses and has high lignin and cellulose content (20%). The presence of lignin and cellulose in bagasse causes the bagasse to be processed by pyrolysis into a liquid product (bio-oil) then through the evaporation process produces a product with characteristics similar to asphalt which is a residue from the petroleum refining process. Therefore, this evaporation of bio-oil is referred to as bio-asphalt. In this study, the pyrolysis process was carried out catalytically using a natural zeolite catalyst from Bayah, West Java. The purpose of this study was to study the effect of catalyst percentage on bagasse raw materials and the effect of pyrolysis temperature on the yield of biooil products and characteristics of bio-asphalt. The catalytic pyrolysis process was carried out in fixed bed reactors at temperatures of 400, 450, 500, and 550°C, with a ratio of catalyst mass to raw materials of 0, 3, 6 and 9% of 100 g of bagasse. From the results of the study concluded that the percentage of catalyst and reaction temperature affect the yield of bio-oil and characteristics of bioasphalt. The best results in the pyrolysis process were obtained at a catalyst percentage of 6% and a temperature of 500°C which gave the highest bio-oil yield of 29.54% and bio-asphalt yield of 9.81%. From the results of testing the penetration point and flash point, the bio-asphalt product complies the standard penetration asphalt type 60/70.
Keywords	Bagasse; natural zeolite; catalytic pyrolysis; bio-asphalt