SKAM33
2021 | ANALIS-UM

33rd INTERNATIONAL CONFERENCE OF ANALYTICAL SCIENCES (SKAM33)

GREEN ASPIRATIONS:
THE WAY FORWARD FOR A SUSTAINABLE WORLD

PROGRAMME BOOK

Virtual Conference

UNIVERSITI MALAYA

13 - 15

SEPTEMBER 2021

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Persatuan Sains Analisis Malaysia

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MESSAGE FROM THE PATRON

Assalamualaikum Warahmatullahi Wabarakatuh and greetings.

It is my pleasure to welcome all participants to the **33rd International Conference of Analytical Sciences (SKAM33) 2021**. Universiti Malaya is proud to be given the honour to host this conference in collaboration with the Malaysian Analytical Sciences Society (ANALIS) in contributing and making an impact to research and development in Analytical Sciences and Chemistry.

The conference indeed fits aptly with the focus given by the Ministry of Higher Education Malaysia, to further enhance collaborations among universities around the nations, while unlocking the inherent potentials in universities and thus beneficial for all. With conference participants coming from both academic and industry background, both sides are expected to complement each other and be exposed to recent developments in the field. I have high hopes that SKAM33 will further stimulate research, resulting in potential collaborations in various areas related to sciences, engineering and technology.

Organizing a conference requires an immense amount of work and dedication and thus I would like to take this opportunity to congratulate the organizing committee for their efforts in coordinating SKAM33 albeit having to shift online halfway through. Last but not least, I would like to express my gratitude to all authors, session chairs, reviewers, speakers and participants for your contribution to SKAM33. Without you, this conference will not take place. I hope you will enjoy the conference and I am confident that this conference will be highly successful with an intellectually rich and stimulating program for all.

Thank you.

PROFESSOR DATO' IR. DR. MOHD. HAMDI ABD. SHUKOR

Vice-Chancellor

Universiti Malaya

MESSAGE FROM THE PRESIDENT OF ANALIS

Salam and Greetings from the Malaysian Analytical Sciences Society!

On behalf of the Malaysian Analytical Sciences Society (ANALIS), it is an honour and a great pleasure to welcome everyone to the 33rd International Conference of Analytical Sciences 2021 (SKAM33). This year, ANALIS is delighted to have Universiti Malaya as the SKAM co-organizer after a long hiatus.

Since the SKAM inauguration in 1987, ANALIS has been recognised as a leading scientific society to foster interests and provide a strategic platform for bringing rapid development in the field of analytical sciences in Malaysia through the annual SKAM conference series. With your support and participation, SKAM will continue its success for years to come. The theme this year: “Green Aspirations: The Way Forward for A Sustainable World” aligns with the Sustainable Development Goals not only in Malaysia but worldwide as well.

SKAM33 brings virtually together academic pioneers and experts, industrial professionals, and graduate researchers to exchange and share their latest research findings in analytical sciences, environmental and related technologies. Special thanks to the organizer for providing opportunities for the delegates to discuss ideas and application experiences in addition to accommodating networking among attendees through our first virtual SKAM conference.

Finally, I must thank all plenary speakers, keynote speakers, invited speakers, presenters, participants, sponsors and the organizing committee, who have contributed, directly or indirectly, to the success of SKAM33 despite of pandemic COVID19. I hope you will have a stimulating, informative and rewarding experience and am looking forward to seeing all of you in person for SKAM33.

Best Wishes

Professor ChM Dr Mohd Basyaruddin Abdul Rahman, FASc, FRSC, FIAAM

President

Malaysian Analytical Sciences Society (ANALIS)

MESSAGE FROM THE CHAIRMAN OF SKAM33

On behalf of the organizing committee, it is my pleasure to warmly welcome all participants, delegates, as well as all plenary, keynote and invited speakers to the 33rd International Conference of Analytical Sciences (SKAM33) 2021. Due to the current pandemic, we had to make the difficult decision to move the entire conference online.

This year, SKAM33 is jointly organized by Universiti Malaya and the Malaysian Analytical Sciences Society (ANALIS). What makes it more meaningful is that UM last hosted this prestigious conference in 1991 and we are glad to be hosting it once again after a long time.

The chosen conference theme for this year: “Green Aspirations: The Way Forward for A Sustainable World”, is in line with the Sustainable Development Goals in Malaysia and around the world. We hope to incorporate new advancements across interdisciplinary research between science, chemistry and engineering, specifically to analytical sciences, to facilitate a sustainable future.

Furthermore, this conference will provide a good platform for researchers and scientists to present and share their knowledge, disseminate ideas and create a platform for collaborative research in the related fields. My gratitude to all delegates from around the world for being part of this conference. I am sure that you will find this conference both fulfilling in embracing new knowledge and fruitful with huge opportunities for research collaboration.

Thank you very much to all who have contributed directly or indirectly to the success of this conference. Appreciation also goes to all sponsors for the support and generous contribution. Last but not least, I would like to give credit to the organizing committee: thank you for your perseverance, hard work, excellent teamwork and endless support to ensure that this event, even in trying circumstances, is the best that it can be and a successful one.

I look forward to meeting all of you online. Please enjoy the conference. Thank you.

Professor Dr Sharifah Mohamad
Conference Chairman, SKAM33 (2021)
Universiti Malaya

33rd INTERNATIONAL CONFERENCE OF ANALYTICAL SCIENCES (SKAM33)

INTRODUCTION

SKAM33 (2021) – Green Aspirations: The Way Forward for a Sustainable World

The 33rd Symposium of Malaysia Analytical Sciences (Simposium Kimia Analisis Malaysia - SKAM33), also known as International Conference of Analytical Science 2021 is jointly organized by Universiti Malaya (UM) and Malaysian Analytical Sciences Society (ANALIS). Participants from universities, industries, governmental and non-governmental organizations and venture capital providers will present their views on recent research and application in related area of research in analytical science and chemistry. In this international conference, we also aim to provide a platform for researchers to share and discuss research findings and build a research network. The conference consists of local and international expert keynote speakers, invited lectures, researchers, and postgraduate students. Since its inauguration in 1987, SKAM has provided tremendous findings and contributions for the scientific community in various analytical-related field.

OBJECTIVES

The SKAM33 will help to rationalize ANALIS mission through the following objectives:

- To improve the advancement and to promote knowledge transfer in analytical sciences,
- To give critical views and advice at liberty in matter related to analytical science and
- To promote collaboration of members within the society and outside bodies which shares the same purpose.

CONFERENCE TOPICS

The symposium comprises of invited keynote speaker, parallel and poster sessions. The topics to be covered are:

- Green Chemistry & Technology
- Separation Science
- Spectroscopic Techniques
- Chemical Sensors and Biosensors
- Environmental Analysis
- Biomedical and Pharmaceutical Analysis
- Halal Analysis
- Natural Products
- Organic and Inorganic Synthesis
- Advanced Materials

History of SKAM-ANALIS

The Symposium Analytical Chemistry series was started in 1987 at UKM Bangi when efforts led by analytical scientists from several local universities received rave reviews from scientists around the country. The original idea of organizing seminar based on analytical chemistry was inspired by Professor Dr Sukiman Sarmani (now Datuk, Emeritus Professor) in 1986, who was then Dean of the Faculty of Physics and Applied Sciences (FSFG) of Universiti Kebangsaan Malaysia (UKM). The First Malaysian Analytical Chemistry Symposium, known as Simposium Kimia Analisis Kebangsaan (SKAK 1) was held on September 2-4, 1987 on the campus of Universiti Kebangsaan Malaysia Bangi. The theme of the symposium was "*Kimia Analisis Dalam Penyelidikan dan Pembangunan Negara*".

Based on the success and good feedback from the first symposium, next the Universiti Sains Malaysia took the lead to organize the Second Malaysian Analytical Chemistry Symposium (SKAK 2) on 6-8 September 1988 with the theme of "*Arah Kimia Analisis Semasa"*. After gaining its momentum, the symposium continues to be an annual event, and for the first six years, it is known as the Simposium Kimia Analisis Kebangsaan (SKAK) and is being rotated between institutions of higher learning in Peninsular Malaysia such as Universiti Kebangsaan Malaysia (UKM), Universiti Sains Malaysia (USM), Universiti Teknologi Malaysia (UTM), Universiti Pertanian Malaysia (now Universiti Putra Malaysia or UPM), Universiti Malaya (UM), and Institut Teknologi MARA (now UiTM), and Bahasa Malaysia became the language of the symposium.

Several issues have been raised in several discussion sessions, including the publication of journals related to analytical sciences and the publisher. It was proposed that the association be formed to manage the journal publishing (as publisher) and organizing symposium. This is where the initiative to publish journals and establish associations began. The proposal presented at SKAK 2 at the USM campus, was once again being presented at the UM campus during the organization of SKAK 5 in a special meeting on the establishment of the association and the appointment of a 'protemp' committee chaired by Professor Dr Sukiman Sarmani (now Datuk, Emeritus Professor). This committee has been mandated to register the Persatuan Sains Analisis Malaysia (ANALIS). Finally, thanks to the efforts and perseverance of the ANALIS 'protemp' committee, in 1993, the registration of the Persatuan Sains Analisis Malaysia (ANALIS) was approved by the Jabatan Pertubuhan Malaysia (ROS) and the start of a new era for analyst in the country. Professor Sukiman Sarmani (who is now Datuk, Emeritus Professor) had been elected the first President of ANALIS.

In the following year (1994), the 7th Simposium Kimia Analisis Kebangsaan was continued by the ANALIS under the new rebranding name, Simposium Kimia Analisis Malaysia (SKAM) with jointly organized by UKM and held at a leading hotel in Kuala Lumpur. Since 1994, all the work presented at the symposium has been published in the journal owned by ANALIS called the "Malaysian Journal of Analytical Sciences (MJAS)". The first volume of MJAS was published in 1995 and was launched by the Vice-Chancellor of UPM at SKAM 8, UPM.

The SKAM Symposium Series continues as an annual ANALIS event, and is being held on a rotational basis until this year, the 32nd year of the SKAM launch in Malaysia. For the first time, SKAM32 is being organized by Universiti Kuala Lumpur (UniKL) as the first Government-Linked University (GLU) hosting, with active participations from research academic fellows, postgraduate students, involvement of research institute researchers, and also even receiving participations from abroad.

Previous Host University of SKAM from Year 1987 – *present*

Year		Host University
1987	SKAK 1	UKM
1988	SKAK 2	USM
1989	SKAK 3	UTM
1990	SKAK 4	UPM
1991	SKAK 5	UM
1992	SKAK 6	UiTM
1994	SKAM 7	ANALIS and UKM
1995	SKAM 8	UPM
1996	SKAM 9	USM
1997	SKAM 10	UKM
1998	SKAM 11	UTM
1999	SKAM 12	UMT
2000	SKAM 13	UPM
2001	SKAM 14	Agensi Nuklear Malaysia
2002	SKAM 15	USM
2003	SKAM 16	UNIMAS
2004	SKAM 17	UiTM
2005	SKAM 18	UTM
2006	SKAM 19	UPM
2007	SKAM 20	ANALIS and Institut Kimia Malaysia
2008	SKAM 21	UMS
2009	SKAM 22	Co-Host with ASIANALYSIS X
2010	SKAM 23	UMT
2011	SKAM 24	UiTM
2012	SKAM 25	UKM
2013	SKAM 26	UNIMAS
2014	SKAM 27	UTM
2015	SKAM 28	UPM
2016	SKAM 29	USM
2017	SKAM 30	ANALIS
2018	SKAM 31	IIUM
2019	SKAM 32	UniKL
2021	**SKAM33**	**UNIVERSITI MALAYA**

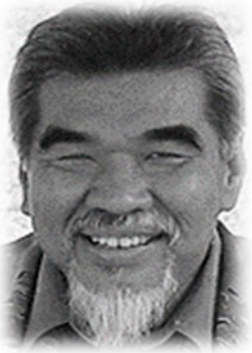
Former Presidents and Current President of ANALIS from Year 1993 – *present*

EMERITUS PROFESSOR DATUK DR SUKIMAN SARMANI
THE 1st PRESIDENT OF ANALIS, 1993 – 1997

EMERITUS PROFESSOR DATO' DR WAN MD ZIN WAN YUNUS
THE 2nd PRESIDENT OF ANALIS, 1997 – 2001

PROFESSOR DR MHD RADZI ABAS
THE 3rd PRESIDENT OF ANALIS, 2001 – 2005

ASSOCIATE PROFESSOR DR ZAINI HAMZAH
THE 4th PRESIDENT OF ANALIS, 2005 – 2016



PROFESSOR DR NORHAYATI MOHD TAHIR
THE 5th PRESIDENT OF ANALIS, 2016 – 2018

PROFESSOR DR MOHD BASYARUDDIN ABDUL RAHMAN
THE 6th PRESIDENT OF ANALIS, 2018 – present

PLENARY SPEAKER

Professor Dr Ahmad Zaharin Aris, CEnv, FGS, MRSC has conducted pioneering work on the establishment and development of hydrochemistry and environmental forensics studies in Malaysia where some of his works have been used to set up national guidelines and policies on environmental issues. He has instituted various impressive and successful programs including the establishment of comprehensive chemical databases for fingerprinting and a hub for training and technological transfer in environmental forensics. He is one of the top researchers in environmental science in Malaysia, and a globally recognized scientist and academia in his field of expertise. This has led him to be accorded with the Top Research Scientist Malaysia award in 2019 and one of the finalists for Zayed International Prize (Young Scientists Award for Environmental Sustainability). He is also a national representative for APEC Science Prize for Innovation, Research and Education ("ASPIRE") and many others. He is an Associate Editor for a few top tier journals, including Nature Scientific Report and Environmental Geochemistry and Health. He is the youngest faculty member with a brilliant academic record with over 300 academic writings related to his field in refereed international journals (over 225; 200 in SCI Journals), books (5) and chapters in books (37), and the rest are conference papers as well as four (4) policy papers with over 2400, 2800 and 5000 citations respectively for WOS, h-index 25; SCOPUS, h-index 27; and Google Scholar, h-index 36. Over 50% of his published SCI papers are in Q1 and Q2 tiers. Some of his papers have been ranked as the most downloaded papers and received many citations within a short period of time. Furthermore, Elsevier's Scival Spotlight has ranked him third among the global experts under the Distinguished Competency of water quality, sediment and pollution category. He has been featured in several international symposia, professional meetings, news media, and scientific publications. He has trained over 130 graduate and undergraduate students, postdoctoral associates, and visiting scholars in his laboratories.

KEYNOTE SPEAKER 1

Professor Jared L. Anderson, Alice Hudson Professor of Chemistry, and Faculty Scientist at Ames Laboratory earned his B.S. in 2000 from South Dakota State University and his Ph.D. from Iowa State University in 2005. Prior to joining Iowa State University, he was a Professor of Chemistry at The University of Toledo from 2005-2015 where held the ranks of assistant professor, associate professor, and full professor. His research focuses on the development of stationary phases for multidimensional chromatography, alternative approaches for sample preparation, particularly in nucleic acid isolation and purification, and analytical tools for trace-level analysis within active pharmaceutical ingredients. He has published over 200 peer-reviewed publications, 5 book chapters, and has co-edited a book series titled “Analytical Separation Science”. He currently holds 6 patents and is an editor for the *Journal of Chromatography A*.

KEYNOTE SPEAKER 2

Professor Dato’ Dr Mohd Jamil Maah graduated with BSc (Hons) in Chemistry from UM in 1979 and started his academic career as a chemistry tutor at PASUM and later went to University of Sussex, UK to do his MSc in Organometallic Chemistry. This was the year he worked collaboratively with the late Prof Sir Harry Kroto, a Nobel Laureate in Chemistry. In 1985 he went again to Sussex University for his DPhil - continuing the pioneer work he initiated during MSc on the coordination chemistry of ligands containing P-C multiple bonds under the supervision of Prof John F Nixon. Other than research, he is actively involved in chemical education and had been consultants to several ministries and industries in Malaysia. He held several academic administrative positions in UM like Head of Department, Directors and Dean of several establishments in UM and Deputy Vice Chancellor (Research & Innovation) and Deputy Vice Chancellor (Academic & International). He was Chairman of Malaysia Chemistry Olympiad Committee and heading several scientific committees involving government ministries and societies. He was seconded to the Ministry of Science, Technology and Innovation (MOSTI) in 2013-2014 as Undersecretary of Biotechnology Division. He was Professor of Inorganic Chemistry at the Department of Chemistry, University of Malaya and recently completed his tenure as the Director of Centre for Foundation Studies in Science. He was also a member of Board of Trustee for National Institutes of Biotechnology Malaysia (NIBM) and chaired the Management Committee from March 2014 to February 2016. Internationally, he is a member of Advisory Board of Education and Outreach (ABEO) of Organisation for Prevention of Chemical Weapons (OPCW). Currently he is Deputy Vice Chancellor at Universiti Islam Malaysia, Petaling Jaya and Honorary Professor at UM STEM Research Centre, University of Malaya.

KEYNOTE SPEAKER 3

Professor Kate Grudpan, a Emeritus Professor of chemistry at Chiang Mai University, Thailand. Experiences include German Alexander von Humboldt Fellow, DAAD, the UK Royal Society visiting grant, IAEA expert, apart from others, a member in broads of Journals. He beliefs in networking teamwork, for example, previously in flow-based analysis. Current research interests engage in bridging local wisdom with today's technology for bringing green analytical chemistry to white analytical chemistry. This involves the initiatives in making use of natural resources for natural reagents and material-based platforms for chemical analysis.

INVITED SPEAKERS

Professor Dr Sharifuddin Md Zain has been a member of the Chemistry Department, Faculty of Science since 1995. He graduated in Chemistry and Chemical Instrumentation from Imperial College of Science, Technology and Medicine in 1991 and received his PhD in High Resolution Laser Jet Spectroscopy from the same institution in 1995. Three years after his stint as a new lecturer in UM, he assumed the position of the Head of UM Computer Services Department in 1998 for 2 years. From the years 2006-2007, 2012-2014 and 2019-2020, Sharifuddin was trusted as the HoD of Chemistry. When the Bright Sparks Unit was established in 2009, he was given the responsibility to develop and lead the unit until 2012. Sharifuddin was promoted to full Professor in 2008. He had published more than 100 ISI articles (H-index of 18) with more than 20 graduated PhD and MSc candidates under him. In research, Prof Sharifuddin is interested in the various aspects of the use of computers in chemistry. One of his latest publications concerns a computational study on anti-viral and anti-malarial drugs that might be used in fighting the Covid-19 virus. Professionally, he is currently involved in various committees in the Malaysian Chemistry Institute, promoting chemical education in Malaysia. He is also a committee member for the scholarship selection program of the Islamic Development Bank. He is currently also responsible for the development of the Makerspace@UM project.

Professor Dr Nor Azah Yusof, who was born on October 24, 1973 is a leading academic at the Universiti Putra Malaysia. She is known for its impressive achievements in various academic branches. Her research has resulted in more than 200 journal articles and 63 conference articles. Of this amount, 75% was as a main author and communicator. 60% of the journals are in the Q1 and Q2. Her articles have been cited 3000 times by international researchers, including leading researchers in her field. Her expertise in the field of sensor allows her to be elected as the auditor of articles by various international journals. She has 10 national and international patents. The result of her achievements, she was appointed a professor at the age of 39 years. She is also the recipient of research grants in total of almost MYR 10 million of funding from various national sources and abroad. She has guided 40 graduate students. Some of her students are now serving as academics and researchers in research institutions, universities and industry. She has been awarded as Top Research Scientist Malaysia (TRSM) for 2012 and received Oustanding Researcher Award for 2017. She started working on optical chemical sensor for toxic metal detection. She further developed her expertise on electrochemical based biosensor. She has been working on DNA based biosensor and protein based biosensor for 10 years. Further information can be obtained from our group website www.upmbiosensor.com.

INVITED SPEAKERS

Professor Dr Abdul Rohman graduated from Faculty of Pharmacy, University Gadjah Mada Yogyakarta. He completed Ph.D degree in 2011 from Institute of Halal Product Reseach, Universiti Putra Malaysia. His research interest is mainly on development of analytical techniques for halal products authentication. Since 2005, Abdul Rohman is lecturer in Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Universitas Gadjah Mada Yogyakarta. He has supervised some research projects on halal product authentication. Rohman has published more than 250 articles in Science citation and Scopus-indexed journals, written some book chapters and edited some text books. Besides, Abdul Rohman acted as editors and reviewers in several reputed journals. Several awards have been achieved including Young Scientist Scopus Award on Sustainable Agriculture in 2014 and "Anugerah kekayaan Intelektual Luar Biasa or AKIL" in the field of international publication from the Ministry of Research, technology and higher education year 2014.

Professor Dr Lim Kuan Hon graduated from the Department of Chemistry, University of Malaya with a Bachelor of Science (Chemistry) in 2003 and a PhD in 2009. Dr Lim was appointed to a lectureship at the School of Pharmacy, University of Nottingham Malaysia (UNM) in 2009. He was promoted to Associate Professor in 2013 and Full Professor in 2020. Dr Lim is currently the Director of the BSc Pharmaceutical and Health Sciences programme at UNM. Dr Lim's research is centred on the identification of plant natural products with novel molecular structures and/or possess potential applications in the treatment of cancers and hypertension. Dr Lim's research group also focuses on the synthesis/semisynthesis of biologically active natural products, as well as structural modification of natural products for structure-activity relationship investigations.

Associate Professor Dr Apinpus Rujiwatra, an associate professor of Chemistry, Chiang Mai University, earned her B.S. (Chemistry) from Chiang Mai University in 1995 and D.Phil. (Chemistry) from Oxford University in 2001 before joining the faculty at her alma mater. Her research focuses on crystal engineering of nanostructured materials using natural reagents, as well as the fabrication of coordination polymers aka metal organic frameworks of lanthanides. Because of her research works, she has honored with Young Scientist Award from The Foundation for the Promotion of Science and Technology under the Patronage of His Majesty the King in 2006 and the CST Distinguished Young Chemist Award from the Chemical Society of Thailand under the Patronage of Her Royal Highness Princess Chulabhorn Mahidol in 2010.

INVITED SPEAKERS

Associate Professor Dr Pakorn Varanusupakul graduated his B.Sc. (chemistry) in 1994 from Chulalongkorn University, Bangkok, Thailand under the Development and Promotion of Science and Technology Talents Project. He received his Ph.D. (analytical chemistry) in 2000 from University of Massachusetts Lowell, USA. He worked as an environmental analyst at Massachusetts Department of Environmental Protection, Lawrence, Massachusetts, USA for two years. He has joined the department of chemistry, Chulalongkorn University since 2002. His researches focus on design and developing of new platforms of liquid phase microextraction (LPME) techniques based on green analytical chemistry concept; i.e., hollow fiber membrane supported liquid microextraction, electromembrane extraction and dispersive liquid-liquid microextraction. In addition, incorporation of LPME with paper based analytical devices and flow based analytical systems and use of ionic liquid and deep eutectic solvent as a green solvent in LPME are also interested.

Associate Professor Dr Thorsten Heidelberg studied chemistry at the University of Hamburg. After his Ph.D. in synthetic carbohydrate chemistry, he spent time as a postdoctoral researcher in the USA and in France, before joining a startup company on particular nanotechnology. He joined the University of Malaya as lecturer in 2006. His current research is focusing on the synthesis of carbohydrate-based surfactants and their application for the creation of nanosized drug carriers.

Associate Professor Dr Mohd Shahrul Mohd Nadzir graduated from National University of Malaysia with a BSc in Environmental Chemistry and continued his Msc at Brandenburg Technical University of Cottbus, Germany for Process Engineering & Plant Design. Afterward, he did his PhD in Atmospheric Science at The University Malaya, Malaysia. While in PhD period, he distinguished himself as an atmospheric scientist due to his achievement in scientific research activities involving University of Cambridge (UK), University of East Anglia (UK), University of York (UK), and University of Heildelberg (Germany). Dr Mohd Shahrul was also awarded a PhD with distinction from UM at the age of 28 in 2012. After completed his PhD, he joined The National University of Malaysia (UKM) as a senior lecturer at Department of Earth Sciences & Environment and appointed as the Head of Centre for Tropical System & Climate Change (IKLIM) at The Institute of Climate Change UKM from 2014 to 2018. He has garnered many research grant including Antarctic Research Grant for Climate Change studies. He has published more than 30 publications including refereed journals, chapter in book and proceedings. Currently, he is working with his team on Low-cost air quality sensor (LAQS) based on Internet of Things (IoT) platform, known as AiRBOXSense. The AiRBOXSense capable to conduct real-time continuous air quality level at various locations.

Programme Summary

13 September 2021 (Monday)

Time	Programme	Venue
08.00 am - 08.25 am	Registration	ROOM 1
08.30 am - 09.00 am	Welcome Address & Opening Ceremony	
09.00 am - 09.45 am	Plenary Lecture	
09.45 am - 10.00 am	Presentation by Platinum Sponsor	
10.00 am - 12.25 pm	Oral Presentation (4 parallel sessions)	ROOM 1, 2, 3 4
12.30 pm - 02.00 pm	Lunch break	
02.00 pm - 02.25 pm	Poster Presentation (Session 1)	ROOM 1
02.30 pm - 03.40 pm	Oral Presentation (4 parallel modules)	ROOM 1, 2, 3 4
03.45 pm - 04.05 pm	Poster Presentation (Session 2)	ROOM 1
04.10 pm - 05.20 pm	Oral Presentation (4 parallel modules)	ROOM 1, 2, 3 4

14 September 2021 (Tuesday)

Time	Programme	Venue
08.30 am - 09.15 am	Keynote Lecture 1	ROOM 1
09.20 am - 09.40 am	Presentation by Platinum Sponsor	ROOM 1
09.45 am - 12.55 pm	Oral Presentation (4 parallel modules)	ROOM 1, 2, 3 4
01.00 pm - 02.30 pm	Lunch break	
02.30 pm - 03.15 pm	Keynote Lecture 2	ROOM 1
03.20 pm - 03.40 pm	Poster Presentation (Session 3)	ROOM 1
03.45 pm - 05.20 pm	Oral Presentation (4 parallel modules)	ROOM 1, 2, 3 4

15 September 2021 (Wednesday)

Time	Programme	Venue
08.30 am - 11.40 am	Oral Presentation (4 parallel modules)	ROOM 1, 2, 3 4
12.00 pm - 12.45 pm	Keynote Lecture 3	ROOM 1
12.50 pm - 01.20 pm	ANALIS Best Thesis Award & Closing Ceremony	ROOM 1
01.25 pm - 02.30 pm	Lunch break	
02.30 pm - 04.30 pm	Annual General Meeting ANALIS	ZOOM

Opening Ceremony

13 September 2021 (Monday)

Time	Programme
08.00 am - 08.25 am	Virtual Platform Open for Logging On
08.30 am - 08.40 am	Welcoming Speech by Prof. Dr. Ismail Yusoff (Dean of Faculty of Science, Universiti Malaya)
08.40 am - 08.50 am	Speech by Prof. Dr. Mohd Basyaruddin Bin Abdul Rahman (President of ANALIS)
08.50 am - 09.00 am	Officiating Speech by Prof. Dr. Noorsaadah Abd Rahman (Deputy Vice Chancellor (Research and Innovation), Universiti Malaya)

Closing Ceremony

15 September 2021 (Wednesday)

Time	Programme
12.50 PM - 1.00 PM	ANALIS Best Thesis Award Announcement by Dr. Wan Nazihah Wan Ibrahim (Chairman of Hadiah ANALIS)
1.00 PM - 1.10 PM	Closing remark by Prof. Dr. Sharifah Mohamad (Chairman of SKAM33)
1.10 PM - 1.20 PM	SKAM Handover Ceremony to Associate Professor Dr. Marinah Mohd Ariffin (Dean of Faculty of Science and Marine Environment (FSSM, UMT)

Schedule

Date	Time	Program			
13 September 2021 (Monday)	08.00 am - 08.25 am	Virtual Platform Open for Login (ROOM 1)			
	08.30 am - 09.00 am	Welcome Address & Opening of SKAM33 & Photo Session (ROOM 1)			
	09.00 am - 09.45 am	Plenary Lecture (ROOM 1)			
	09.45 am - 10.00 am	Platinum Sponsor - IKA (ROOM 1)			
	Topic	ENV, BIO & HAL	SYN, NAT & SPE	SEP & GRE	MAT & SEN
	(Venue)	ROOM 1	ROOM 2	ROOM 3	ROOM 4
	10.00 am - 10.30 am	Invited Paper 1 (INV-1)	Invited Paper 2 (INV-2)	Invited Paper 3 (INV-3)	Invited Paper 4 (INV-4)
	10.35 am - 10.55 am	HAL-1	NAT-1	GRE-1	MAT-1
	11.00 am - 11.20 am	BIO-1	NAT-2	GRE-2	MAT-2
	11.25 am - 11.40 am	Break (Gold Sponsor)	Break (Gold Sponsor)	Break (Gold Sponsor)	Break (Gold Sponsor)
	11.40 am - 12.00 pm	ENV-1	NAT-3	GRE-3	MAT-3
	12.05 pm - 12.25 pm	ENV-2	NAT-4	GRE-4	MAT-4
	12.30 pm – 02.00 pm	Lunch break			
	02.00 pm - 02.25 pm	Poster Presentation Session 1 (ROOM 1) P1 - P9			
	02.30 pm - 02.50 pm	ENV-3	NAT-5	GRE-5	MAT-5
	02.55 pm - 03.15 pm	ENV-4	NAT-6	GRE-6	MAT-6
	03.20 pm - 03.40 pm	ENV-5	NAT-7	GRE-7	MAT-7
	03.45 pm - 04.05 pm	Poster Presentation Session 2 (ROOM 1) P10 - P17			
	04.10 pm - 04.30 pm	ENV-6	SYN-1	GRE-8	MAT-8
	04.35 pm - 04.55 pm	ENV-7	SYN-2	GRE-9	MAT-9
	05.00 pm – 05.20 pm	ENV-8	SYN-3	GRE-10	MAT-10
14 September 2021 (Tuesday)	08.30 am – 09.15 am	Keynote Lecture 1 (ROOM 1)			
	09.20 am – 09.40 am	Platinum Sponsor - WATERS (ROOM 1)			
	09.45 am - 10.05 am	ENV-9	SYN-4	GRE-11	MAT-11
	10.10 am - 10.30 am	ENV-10	SYN-5	GRE-12	MAT-12
	10.35 am - 10.55 am	ENV-11	SYN-6	GRE-13	MAT-13
	11.00 am - 11.10 am	Break (Gold Sponsor)	Break (Gold Sponsor)	Break (Gold Sponsor)	Break (Gold Sponsor)
	11.10 am - 11.40 am	Invited Paper 5 (INV-5)	Invited Paper 6 (INV-6)	Invited Paper 7 (INV-7)	Invited Paper 8 (INV-8)
	11.45 am - 12.05 pm	ENV-12	SYN-7	SEP-1	MAT-14
	12.10 pm - 12.30 pm	ENV-13	SYN-8	SEP-2	SEN-1
	12.35 pm - 12.55 pm	ENV-14	SYN-9	SEP-3	SEN-2
	01.00 pm - 02.30 pm	Lunch break			
	02.30 pm - 03.15 pm	Keynote Lecture 2 (ROOM 1)			
	03.20 pm - 03.40 pm	Poster Presentation Session 3 (ROOM 1) P18-P26			
	03.45 pm - 04.05 pm	ENV-15	SYN-10	SEP-4	SEN-3
	04.10 pm - 04.30 pm	ENV-16	SYN-11	SEP-5	SEN-4
	04.35 pm - 04.55 pm	ENV-17	SYN-12	SEP-6	SEN-5
	05.00 pm – 05.20 pm	ENV-18	SYN-13	SEP-7	SEN-6
15 September 2021 (Wednesday)	08.30 am - 08.50 am	ENV-19	SPE-1	SEP-8	SEN-7
	08.55 am - 09.15 am	ENV-20	SPE-2	SEP-9	SEN-8
	09.20 am - 09.40 am	ENV-21	SPE-3	SEP-10	END
	09.45 am - 09.55 am	Break	Break	Break	Break
	09.55 am - 10.15 am	ENV-22	SPE-4	SEP-11	
	10.20 am - 10.40 am	ENV-23	SPE-5	SEP-12	
	10.45 am - 11.15 am	END	END	SEP-13	
	11.20 am - 11.40 am			SEP-14	
	11.45 am - 12.00 pm	Break	Break	Break	Break
	12.00 pm - 12.45 pm	Keynote Lecture 3 (ROOM 1)			
	12.50 pm - 1.20 pm	ANALIS Best Thesis Award & Closing Ceremony (ROOM 1)			
	01.25 pm - 02.30 pm	Lunch break			
	02.30 pm - 04.30 pm	Annual General Meeting ANALIS (ZOOM)			

Topics:
Green Chemistry & Technology (GRE)
Separation Science (SEP)
Spectroscopic Techniques (SPE)
Chemical Sensors & Biosensors (SEN)
Environmental Analysis (ENV)
Biomedical & Pharmaceutical Analysis (BIO)
Halal Analysis (HAL)
Natural Product (NAT)
Organic & Inorganic Synthesis (SYN)
Advanced Materials (MAT)

Website for Poster Presentation

https://analis.com.my/index.php/skam/posters

Detailed Schedule — Oral Presentation

DAY 1: 13 SEPTEMBER 2021 (MONDAY)

PLENARY LECTURE

ROOM 1		
Chairperson: Professor Dr Noorsaadah Abdul Rahman (Universiti Malaya)		
Time	**Code**	**Title**
09.00 am - 09.45 am	Plenary	**Environmental Emerging Pollutants: Issues, Approaches and Solutions** Professor Dr Ahmad Zaharin Aris (Universiti Putra Malaysia)

ORAL PRESENTATION

ROOM 1		
Session Chairperson: Dr Wan Mohd Afiq Wan Mohd Khalik (Universiti Malaysia Terengganu)		
Time	**Code**	**Title**
10.00 am - 10.30 am	INV-1	**Recent Development on Gelatin Origins in Food and Pharmaceutical Products for Halal Authentication** Professor Dr Abdul Rohman (Universitas Gadjah Mada)
10.35 am - 10.55 am	HAL-1	**Rapid Discrimination of Gelatine Sources in Selected Food Products Using ATR-FTIR Spectroscopy and Chemometrics** Nor Kartini Abu Bakar (Universiti Malaya)
11.00 am - 11.20 am	BIO-1	**Biodegradation of Pharmaceutical Active Compounds in Wastewater Using Fungi: A Bibliometric Analysis** Nur Maisarah Sarizan (Universiti Teknologi MARA)
11.40 am - 12.00 pm	ENV-1	**Fabrication of TiO_2/ZnS/GO with Enhanced Photocatalytic Activity for the Degradation of Methylene Blue** Allysha Riziana Binti Reduan (Universiti Malaysia Sarawak)
12.05 pm - 12.25 pm	ENV-2	**Comparison of Spatial Interpolation Methods for the Water Quality Physico-Chemical Parameter in Klang River, Malaysia** Azhar Jaffar (UiTM Shah Alam & Politeknik Ungku Omar)
Session Chairperson: Professor Dr Abdul Rohman (Universitas Gadjah Mada)		
02.30 pm - 02.50 pm	ENV-3	**Water Quality Parameters as Early Warning Indicators in Earthquake Risk Management** Aznah Nor Anuar (Universiti Teknologi Malaysia)
02.55 pm - 03.15 pm	ENV-4	**Removal of Tetracyclines Using Magnetic Nanoparticle Deep Eutectic Solvents from Environmental Water** Clayrine Shima Anak Lasu (Universiti Sains Malaysia)
03.20 pm - 03.40 pm	ENV-5	**Potential Contamination Analysis Of Palm Oil Mill Effluent as Fertilizer to the Surrounding Soil and Groundwater Using Principal Component Analysis** Elisabeth Leonora Leleury (Universiti Sains Malaysia)

Detailed Schedule — Oral Presentation

DAY 1: 13 SEPTEMBER 2021 (MONDAY)

ROOM 1		
Session Chairperson: Associate Professor Dr Nor Kartini Abu Bakar (Universiti Malaya)		
04.10 pm - 04.30 pm	ENV-6	**Synthesis of TiO_2/Ag/CA for the Degradation of Methylene Blue** Feniellia Diwvya Anak Kutiang (Universiti Malaysia Sarawak)
04.35 pm - 04.55 pm	ENV-7	**Spectroscopic Fingerprinting Combined with Chemometrics for Organic Produce Screening** Intan Amirah Restu (Universiti Sains Malaysia)
05.00 pm – 05.20 pm	ENV-8	**Exploring the Elemental Variations in Commercial Non-glutinous Brown and White Rice from Malaysia by Chemometrics** Isa Baba Koki (Yusuf Maitama Sule University Kano)

ROOM 2		
Session Chairperson: Dr Lim Siew Huah (Universiti Malaya)		
Time	**Code**	**Title**
10.00 am - 10.30 am	INV-2	**Schwarzinicine Alkaloids as Vasorelaxant Agents: Discovery, Synthesis, Structure-Activity Relationship, and Mechanism of Action Studies** Professor Dr Lim Kuan-Hon (University of Nottingham Malaysia)
10.35 am - 10.55 am	NAT-1	**Effects of Drying Processes on Lysine, Leucine and Glycine Content in Wild Ulva lactuca for Cosmetic Purposes** Deny Susanti (International Islamic University Malaysia)
11.00 am - 11.20 am	NAT-2	**Metabolite Profile of Marine Polychaete based on ATR FTIR and ^{1}H NMR Metabolomics** I Dewa Made Rizky Wijaya (Universiti Malaysia Terengganu)
11.40 am - 12.00 pm	NAT-3	**Exploring the Volatile Oil Profile in Characterization of Ginger Produce from Bentong Region by Chemometrics** Low Kah Hin (Universiti Malaya)
12.05 pm - 12.25 pm	NAT-4	**Xanthones from *Garcinia mangostana* Extracts against Clinical Isolates of Methicillin-Resistant *Staphylococcus aureus* (MRSA)** Maizatul Hasyima Omar (National Institutes of Health)
Session Chairperson: Dr Low Yun Yee (Universiti Malaya)		
02.30 pm - 02.50 pm	NAT-5	**Comparative Studies on the Release Behaviours of Gallic Acid and Eurycomanone as an Active Ingredients in Herbal Supplement** Noorazwani Zainol (Universiti Teknologi Malaysia)
02.55 pm - 03.15 pm	NAT-6	**Antioxidant and Antiviral Assessment of Microalgae Chlorella sp. UKM8 Methanolic Extract** Shaima Abdulfattah Gamal (Universiti Kebangsaan Malaysia)
03.20 pm - 03.40 pm	NAT-7	**Indole Alkaloids from *Kopsia arborea*** Wong Soon Kit (Universiti Malaya)

Detailed Schedule — Oral Presentation

DAY 1: 13 SEPTEMBER 2021 (MONDAY)

ROOM 2		
Session Chairperson: Associate Professor Dr Thorsten Heidelberg (Universiti Malaya)		
04.10 pm - 04.30 pm	SYN-1	**Synthesis of Quinolactacin Derivatives via Diels – Alder Reaction** Ahmad Zahir Hafiz Ismail (Universiti Teknologi MARA Puncak Alam)
04.35 pm - 04.55 pm	SYN-2	**Mechanochemical-Synthesis and Morphological characterization of Copper-Isonicotinate Metal-Organic Frameworks Crystal for Beta-agonist Removal** Marinah M. Ariffin (Universiti Malaysia Terengganu)
05.00 pm – 05.20 pm	SYN-3	**Synthesis of new β-Carboline Derivatives as Potential Chemotherapeutic Agents** Nurul Tasnim Noor Aaisa (Universiti Kuala Lumpur Royal College of Medicine Perak)

ROOM 3		
Session Chairperson: Associate Professor Dr Norzahir Sapawe (University Kuala Lumpur)		
Time	**Code**	**Title**
10.00 am - 10.30 am	INV-3	**Gel-Electromembrane Extraction (G-EME): A green extraction and direct determination approach for ionic analytes** Associate Professor Dr Pakorn Varanusupakul (Chulalongkorn University)
10.35 am - 10.55 am	GRE-1	**Effect of Sous-Vide and Ohmic Cooking on Physicochemical Properties and Sensory Acceptability of Meat** Aishah Bujang (Universiti Teknologi MARA)
11.00 am - 11.20 am	GRE-2	**Amine Functionalized Carbon-based Soybean Curd Residues as Potential Adsorbent for Carbon Dioxide** Dina Sofiea Zakaria (Universiti Malaysia Perlis)
11.40 am - 12.00 pm	GRE-3	**Chitosan@activated Carbon Beads Modified in 1-ethyl-3-methylimidazolium acetate for Cd (II) Uptake from Aqueous Medium** Ismaila Olalekan Saheed (Universiti Sains Malaysia & Kwara State University)
12.05 pm - 12.25 pm	GRE-4	**Effect of Physicochemical Characterizations of Various Palm Oil Fuel Ash on Pozzolanic Activity and Strength** Mohd Azrul Abdul Rajak (Universiti Malaysia Sabah)
Session Chairperson: Dr Nor Asrina Sairi (Universiti Malaya)		
02.30 pm - 02.50 pm	GRE-5	**Decontamination of Chemical Warfare Agent by Nanocomposite Adsorbent: A GC-MS Study** Mohd Faris Mohd Rudi (Ministry of Defence, Malaysia)
02.55 pm - 03.15 pm	GRE-6	**Bibliometric Analysis of Oil Contamination from 2000 to 2020** Mohd Lias Kamal (Universiti Teknologi MARA)
03.20 pm - 03.40 pm	GRE-7	**Study of Caffenol & Ascorbic Acid-Based Chemical Developing Formulations in Relation To Silver Particle Density of Various Photographic Film Emulsions** Salihin Mohd Saidi (University Kuala Lumpur Malaysian Institute of Chemical & Bioengineering Technology)

Detailed Schedule — Oral Presentation

DAY 1: 13 SEPTEMBER 2021 (MONDAY)

ROOM 3		
Session Chairperson: Dr Mohd Azrul Abdul Rajak (Universiti Malaysia Sabah)		
04.10 pm - 04.30 pm	GRE-8	**Detecting Degradation and Adulteration of Refined, Bleached, Deodorised Palm Oil Using Fatty Acids as Diagnostic Ratios** Ng Jing Sheng (Universiti Sains Malaysia)
04.35 pm - 04.55 pm	GRE-9	**Sustainability Analysis of Ethanol Plant Between Two Chemical Process Routes During Early Stages of Design** Norfazilah Abdul Halim (Universiti Kuala Lumpur Malaysian Institute of Chemical and Bioengineering Technology)
05.00 pm – 05.20 pm	GRE-10	**Preparation Of Activated Carbon from Oils and Fats Industrial Waste for Smoke Filter System** Norli Umar (Universiti Malaya)

ROOM 4		
Session Chairperson: Dr Mazidatulakmam Miskam (Universiti Sains Malayaia)		
Time	**Code**	**Title**
10.00 am - 10.30 am	INV-4	**Sensors in Medical, Agriculture and Environment** Professor Dr Nor Azah Yusof (Universiti Putra Malaysia)
10.35 am - 10.55 am	MAT-1	**Facile Preparation of Silica-Silver Core-Shell Nanoparticles Incorporated with Cellulose Filter Paper as Colorimetric Probe for Mercury Ions Detection in Aqueous Media** Alyza Azzura Abd Rahman Azmi (Universiti Malaysia Terengganu)
11.00 am - 11.20 am	MAT-2	**Biocompatible Fish Oil-coated Magnetic Nanoparticles as Potential Diagnostic Agent** Auni Hamimi Idris (Universiti Putra Malaysia)
11.40 am - 12.00 pm	MAT-3	**Preparation and Adsorption Studies of Tryptophan-Imprinted Polymer in Aqueous Medium via Bulk Polymerization** Faizatul Shimal Mehamod (Universiti Malaysia Terengganu)
12.05 pm - 12.25 pm	MAT-4	**Synthesis and Characterization Of 4-Chlorophexyacetic Acid Herbicide Intercalated with Calcium-Aluminium Layered Double Hydroxide through Co-Precipitation Method** Farah Liyana Bohari (Universiti Teknologi MARA)
Session Chairperson: Professor Dr Nor Azah Yusof (Universiti Putra Malaysia)		
02.30 pm - 02.50 pm	MAT-5	**Synthesis and Characterization of New Schiff Base Ester Liquid Chrystals with Fatty Acids from Palm Oil as Flexible Alkyl Chain** Lee Weng Nam (Universiti Malaya & Heriot-Watt University Malaysia)
02.55 pm - 03.15 pm	MAT-6	**Hydrolysis of Nanocellulose from Almond Shells: The Effect of Different Acid, Acid Concentration, Temperature, and Time** Mohammed Alhaji Mohammed (Universiti Malaya & Federal University Lafia)
03.20 pm - 03.40 pm	MAT-7	**Chemoselective Decarboxylation of Ceiba Oil to Diesel-Range Alkanes over Red Mud Based Catalyst over H_2-Free Condition** Nur Athirah Adzahar (Universiti Putra Malaysia)

Detailed Schedule — Oral Presentation

DAY 1: 13 SEPTEMBER 2021 (MONDAY)

ROOM 4		
Session Chairperson: Dr Nur Nadhirah Binti Mohamad Zain (Universiti Sains Malaysia)		
04.10 pm - 04.30 pm	MAT-8	**Production of Levulinic Acid from Cellulose Using Noble Metal Pd Incorporated into Supports** Puteri Nurain Syahirah Megat Muhammad Kamal (Universiti Kuala Lumpur Malaysian Institute of Chemical and Bioengineering Technology)
04.35 pm - 04.55 pm	MAT-9	**Synthesis and Optimization Selective Ion-imprinted Polymer for the Elimination of Ca II Ions using Taguchi Design** Sazlinda Kamaruzaman (Universiti Putra Malaysia)
05.00 pm – 05.20 pm	MAT-10	**Acetylation of Glycerol over Sulfated Titania as Solid Acid Catalyst** Shera Farisya Mohamad Rasid (Universiti Putra Malaysia)

Detailed Schedule — Oral Presentation

DAY 2: 14 SEPTEMBER 2021 (TUESDAY)

KEYNOTE LECTURE

ROOM 1		
Chairperson: Associate Professor Dr Marinah M. Ariffin (Universiti Malaysia Terengganu)		
Time	**Code**	**Title**
08.30 am – 09.15 am	KEYNOTE-1	**High Throughput Nucleic Acid Sample Preparation and Analysis** Professor Dr Jared L. Anderson (Iowa State University)
Chairperson: Professor Dr Sharifuddin Md Zain (Universiti Malaya)		
Time	**Code**	**Title**
02.30 pm - 03.15 pm	KEYNOTE-2	**Heavy Metal Contents and Distributions in Various Environmental Samples in West Malaysia** Professor Dato' Dr Mohd Jamil Maah (Universiti Malaya)

ORAL PRESENTATION

ROOM 1		
Session Chairperson: Dr Tay Joo Hui (Universiti Malaysia Pahang)		
Time	**Code**	**Title**
09.45 am - 10.05 am	ENV-9	**Biopolymer Magnetic Composites Adsorbents Fabrication and Application for Heavy metal Ions Removal in Water Samples** Gimba Joshua Dagil (Universiti Teknologi Malaysia & Plateau State Polytechnic)
10.10 am - 10.30 am	ENV-10	**Determination of dissolved Zn^{2+}, Cd^{2+}, Pb^{2+} and Cu^{2+} ions in seawater at Tropical coastal water** Khairul Nizam Mohamed (Universiti Putra Malaysia)
10.35 am - 10.55 am	ENV-11	**Sporopollenin Supported Imidazolium (Sp-IM) Bio-sorbent for Targeted Selective Adsorbate Removal from Aqueous Environment** Kumuthini Chandrasekaram (Universiti Malaya)
Session Chairperson: Associate Professor Dr Faizatul Shimal Mehamod (Universiti Malaysia Terengganu)		
11.10 am - 11.40 am	INV-5	**Making Sense of Sensor: An Update from Low-cost Air Quality Sensor for Air Quality Monitoring** Associate Professor Dr Mohd Shahrul Mohd Nadzir (Universiti Kebangsaan Malaysia)
11.45 am - 12.05 pm	ENV-12	**Experimental and Theoretical Study on Adsorption Mechanism of Polyvinylpolypyrrolidone (PVPP) for Effective Phenol Removal in an Aqueous Medium** Muhammad Ammar Mohammad Alwi (International Islamic University of Malaysia)
12.10 pm - 12.30 pm	ENV-13	**MXene as Sorbent in Membrane Protected Micro-Solid-Phase Extraction for Determination of Triclosan in Municipal Wastewater** Muhammad Nur' Hafiz Rozaini (Universiti Teknologi PETRONAS)
12.35 pm - 12.55 pm	ENV-14	**Acute Toxicity of Bisphenol A and Diclofenac Towards Tropical Freshwater Cladocerans: *Moina Micrura*** Muhammad Raznisyafiq Razak (Universiti Putra Malaysia)

Detailed Schedule — Oral Presentation

DAY 2: 14 SEPTEMBER 2021 (TUESDAY)

ROOM 1		
Session Chairperson: Associate Professor Dr Mohd Shahrul Mohd Nadzir (Universiti Kebangsaan Malaysia)		
03.45 pm - 04.05 pm	ENV-15	**Presence of Selected Toxicants in Litopenaeus Sp. Shrimps at Local Markets in Johor Bahru and Its Health Risk Assessment** Nurazira Anuar (Universiti Teknologi Malaysia)
04.10 pm - 04.30 pm	ENV-16	**Heavy Metals Concentration in Perna Veridis Collected from Straits of Johor, Malaysia** Ong Meng Chuan (Universiti Malaysia Terengganu)
04.35 pm - 04.55 pm	ENV-17	**Seasonal Variation of Inorganic Nutrient and Dissolved Greenhouse Gases Concentration in the Oligotrophic Tropical Lake Kenyir, Malaysia** Poh Seng Chee (Universiti Malaysia Terengganu)
05.00 pm – 05.20 pm	ENV-18	**A Comparative Study on Groundwater Nitrate Pollution between Four Villages in Bachok District, Kelantan State, Malaysia** Shaharuddin Mohd Sham (Universiti Putra Malaysia)

ROOM 2		
Session Chairperson: Associate Professor Dr Maisara Abdul Kadir (Universiti Malaysia Terengganu)		
Time	**Code**	**Title**
09.45 am - 10.05 am	SYN-4	**Review on Influence of the Preparation Method on the Catalytic Activity of MgAl Hydrotalcites as Solid Base Catalysts Synthesis** Munirah Zulkifli (Universiti Teknologi MARA)
10.10 am - 10.30 am	SYN-5	**Synthesis, Characterization and Catalytic Performance of Polystyrene Supported Palladium(II)-Hydrazone Ligand Functionalized with Electron Donating Group (CH_4) as Catalyst in Heck Reaction** Najwa Asilah M. Shamsuddin (Universiti Teknologi MARA)
10.35 am - 10.55 am	SYN-6	**Synthesis, Characterisation and Biological Studies of Zinc-Chelate Conjugated Gold Nanosphere** Ng Yin Zhuang (Universiti Malaya)
Session Chairperson: Professor Dr Lim Kuan-Hon (University of Nottingham Malaysia)		
11.10 am - 11.40 am	INV-6	**Triazole-Linked Surfactants from Bio-Resources** Associate Professor Dr Thorsten Heidelberg (Universiti Malaya)
11.45 am - 12.05 pm	SYN-7	**Thermal Decomposition of Calcium Carbonate in Chicken Eggshell: Study on Temperature and Contact Time** Nurriswin Jumadi (Universiti Kuala Lumpur – Malaysian Institute of Chemical and Bioengineering & Kolej Komuniti Jelebu)
12.10 pm - 12.30 pm	SYN-8	**The Conjugation of Ternatin Biomolecule with Polyethylene Glycol (PEG) Enhanced Conjugates Solubility and Stability: Synthesis and Physicochemical Characterization** Nurul Aina Jamaludin (Universiti Kuala Lumpur)
12.35 pm - 12.55 pm	SYN-9	**Effect of plant organs of *Ficus deltoidea* plant in the synthesis of silver nanoparticles** Shahrulnizahana Mohammad Din (Universiti Teknologi Malaysia)

Detailed Schedule — Oral Presentation

DAY 2: 14 SEPTEMBER 2021 (TUESDAY)

ROOM 2		
Session Chairperson: Dr Mohamed Ibrahim Mohamed Tahir (Universiti Putra Malaysia)		
03.45 pm - 04.05 pm	SYN-10	**Synthesis and Characterization of Amino-functionalized Zirconium-based Metal-organic Framework** Siti Sufiana Kamni (Universiti Teknologi MARA)
04.10 pm - 04.30 pm	SYN-11	**2-Acetylpyrazine Thiosemicarbazone as Multifunctional Food Spoilage Inhibitor: Insights from Tyrosinase Kinetic, Microbial Activity and Computational Approaches** Syamimi Sulfiza Shamsuri (International Islamic University Malaysia)
04.35 pm - 04.55 pm	SYN-12	**Solvothermal Synthesis of s-block Metal Organic Frameworks** Umar Abd Aziz (Institute of Advanced Technology)
05.00 pm – 05.20 pm	SYN-13	**Synthesis, Spectroscopy, and Conductivity studies of 4-(diphenylamino)benzaldehyde-4-(4-fluorophenyl) thiosemicarbazone and Its Copper (II) Complex** Siti Zuliana Zulkifli (Universiti Malaysia Terengganu)

ROOM 3		
Session Chairperson: Dr Sharil Fadli Mohamad Zamri (Universiti Teknologi MARA)		
Time	**Code**	**Title**
09.45 am - 10.05 am	GRE-11	**The Effect of Nanofillers on the Functional Properties of PLA and Chitosan Based Film** Raja Hasnida Binti Raja Hashim (Universiti Malaysia Perlis)
10.10 am - 10.30 am	GRE-12	**Microwave-assisted Synthesis, Characterization and DNA Binding Studies of Ni(II) and Pd(II) Schiff complexes Containing o- and m- Hydroxyl (O-H) Group on Imine Ligand** Siti Solihah Khaidir (Universiti Teknologi MARA)
10.35 am - 10.55 am	GRE-13	**Biobased Epoxy Coating Derived From Natural Rubber and Tannic Acid** Yong Ming Yee (Universiti Malaya)
Session Chairperson: Associate Professor Dr Pakorn Varanusupakul (Chulalongkorn University)		
11.10 am - 11.40 am	INV-7	**Fun with Drug Design – An In-silico Exercise** Professor Dr Sharifuddin Md Zain (Universiti Malaya)
11.45 am - 12.05 pm	SEP-1	**Characterization of Inclusion Complex of β-cyclodextrin Ethambutol using Spectroscopic Methods** Goh Soen Qeng (Universiti Sains Malaysia)
12.10 pm - 12.30 pm	SEP-2	**A Comparative Accuracy Study between Calibration and Standard Addition Methods in Quantification of Diclofenac Sodium in Commercial Medicinal Tablets using RP HPLC** Haliza Kassim (University Technology MARA)
12.35 pm - 12.55 pm	SEP-3	**Detection of Sulfonamides using Paper Based Material in Environmental Water Samples prior HPLC-DAD Analysis** Mohamad Shariff Shahriman (Universiti Malaya)

Detailed Schedule — Oral Presentation

DAY 2: 14 SEPTEMBER 2021 (TUESDAY)

ROOM 3		
Session Chairperson: Associate Professor Dr Mohammad Norazmi Bin Ahmad (International Islamic University Malaysia)		
03.45 pm - 04.05 pm	SEP-4	**Adsorption of Acid Orange 7 by Cetyltrimethyl Ammonium Bromide Modified Oil Palm Leaf Powder** Nik Ahmad Nizam Nik Malek (Universiti Teknologi Malaysia)
04.10 pm - 04.30 pm	SEP-5	**An Efficient Biosorption-based Dispersive Liquid-liquid Microextraction with Extractant Removal by Magnetic Nanoparticles for Quantification of Bisphenol A in Water Samples by Gas Chromatography-Mass sSpectrometry Detection** Noorfatimah Yahaya (Universiti Sains Malaysia)
04.35 pm - 04.55 pm	SEP-6	**Development and Validation of a Simultaneous Solid Liquid Microextraction and Gas Chromatography- Electron Capture Detector Method for the Determination of Selected Poisons in Entomological Specimens for Forensic Application** Nor Wajihan Muda (Universiti Teknologi Malaysia)
05.00 pm – 05.20 pm	SEP-7	**Separation and Quantification of Lycopene and β-carotene in Watermelon (Citrullus lanatus) Juice Extract Using Isocratic HPLC Mode** Nur Shafinaz Mohamad Salin (Universiti Teknologi MARA)

ROOM 4		
Session Chairperson: Dr Kavirajaa Pandian Sambasevam (Universiti Teknologi MARA)		
Time	**Code**	**Title**
09.45 am - 10.05 am	MAT-11	**Menthol-Based Low Transition Temperature Mixtures as New Extractant Solvent for Vortex-Assisted Dispersive Liquid-Liquid Microextraction for Trace Analysis of Pyrethroids by HPLC** Siti Amira Mat Hussin (Universiti Malaya)
10.10 am - 10.30 am	MAT-12	**Magnetite@SiO_2 Supported Pd(II) Schiff Base Complex: A Magnetically Separable Catalyst for Suzuki-Miyaura Reaction** Siti Kamilah Che Soh (Universiti Malaysia Terengganu)
10.35 am - 10.55 am	MAT-13	**Determination of Pesticides Residues in Food Matrix using Deep Eutectic Solvent Functionalized Magnetic Adsorbent** Vasagee Elencovan (Universiti Sains Malaysia)
Session Chairperson: Associate Professor Dr Siti Kamilah Che Soh (Universiti Malaysia Terengganu)		
11.10 am - 11.40 am	INV-8	**Natural Reagents as Reliable Reagents in Inorganic Synthesis of Functional Materials** Associate Professor Dr Apinpus Rujiwatra (Chiang Mai University)
11.45 am - 12.05 pm	MAT-14	**Electronic, Reactivity and Third Order Nonlinear Optical Properties of 'Push-Pull' Aromatically Fused-chalcones for Optoelectronic Interest** Wan Mohd Khairul Wan Mohamed Zin (Universiti Malaysia Terengganu)
12.10 pm - 12.30 pm	SEN-1	**The Conjugation and Characterization of Thermoresponsive Poly (N-isopropylacrylamide) with a Ternatin Biomolecule** Adrina Zulkifli (Universiti Kuala Lumpur)
12.35 pm - 12.55 pm	SEN-2	**Highly Sensitive and Selective Determination of Malathion in Vegetable Extracts by an Electrochemical Sensor Based on Cu-Metal Organic Framework** Aisha Mohammed Zahran Al'Abri (University of Nizwa)

Detailed Schedule — Oral Presentation

DAY 2: 14 SEPTEMBER 2021 (TUESDAY)

ROOM 4		
Session Chairperson: Associate Professor Dr Apinpus Rujiwatra (Chiang Mai University)		
03.45 pm - 04.05 pm	SEN-3	**Physical and Electrochemical Characterization of Modified Graphite Nanoparticles-Phosphotungstic Acid-Nafion on Glassy Carbon Electrode for Bisphenol A Determination** Azrilawani Ahmad (Universiti Malaysia Terengganu)
04.10 pm - 04.30 pm	SEN-4	**Polythiophene-Polyvinylchloride Thin Film as Potential Sensing Material for the Determination of Volatile Organic Compounds** Hafiza Mohamed Zuki (Universiti Malaysia Terengganu)
04.35 pm - 04.55 pm	SEN-5	**Differential Colorimetric Nanobiosensor Array for Discrimination and Quantitation of Acrylamides in Coffee** Khor Sook Mei (Universiti Malaya)
05.00 pm – 05.20 pm	SEN-6	**A Colorimetric Chemosensor for Highly Selective Sensing of Hg^{2+} Ion in an Aqueous Medium: Experimental and Theoretical Approach** Nurul Rashidah Mohamad Helmi (International Islamic University Malaysia)

Detailed Schedule — Oral Presentation

DAY 3: 15 SEPTEMBER 2021 (WEDNESDAY)

ROOM 1

Chairperson: Dr Woi Pei Meng (Universiti Malaya)

Time	Code	Title
12.00 pm - 12.45 pm	KEYNOTE-3	**Initiatives in Utilizing Natural Reagents and Natural Materials for Chemical Analysis: Talent and Challenge for ASEAN in New Normal Chemical Analysis** Emeritus Professor Kate Grudpan (Chiang Mai University)

ROOM 1

Session Chairperson: Associate Professor Dr Poh Seng Chee (Universiti Malaysia Terengganu)

Time	Code	Title
08.30 am - 08.50 am	ENV-19	**Source Characterization of Nitrogen in Urban Stormwater Runoff Using Dual Isotopes and Mixing Models** Jariani Jani (Universiti Malaya)
08.55 am - 09.15 am	ENV-20	**Heavy Metal in Different Size Fractions of Household Dust Collected from Rural Residential Area of Simpang Renggam, Johor** Tay Joo Hui (Universiti Malaysia Pahang)
09.20 am - 09.40 am	ENV-21	**An Improved Method for Multiclass Emerging Organic Contaminants in Tropical Marine Biota using QuEChERS Extraction followed by LC MS/MS** Tuan Fauzan Tuan Omar (Universiti Malaysia Terengganu)
Session Chairperson: Dr Shaharuddin Mohd Sham (Universiti Putra Malaysia)		
09.55 am - 10.15 am	ENV-22	**Adsorptive Removal of Methylene Blue via Banana Trunk Derived Activated Carbon (BTAC)** Zaidi Ab Ghani (Universiti Teknologi MARA)
10.20 am - 10.40 am	ENV-23	**Application of Arduino Microcontroller for the Preparation of Homemade Auto-titrator** Kheng Soo Tay (Universiti Malaya)

ROOM 2

Session Chairperson: Dr Alyza Azzura Abd Rahman Azmi (Universiti Malaysia Terengganu)

Time	Code	Title
08.30 am - 08.50 am	SPE-1	**Rapid Assessment of Octane Number and Benzene Content in Gasoline Fuel by Fourier-Transform Near Infrared Spectrometry Coupled with Chemometrics** Abd Rahim Othman (Universiti Malaya)
08.55 am - 09.15 am	SPE-2	**Metabolite Fingerprint of Malaysian Stingless Bee Honey based on ATR-FTIR Chemometrics** Kok Suet Cheng (Universiti Malaysia Terengganu)
09.20 am - 09.40 am	SPE-3	**Simultaneous UV-spectrophotometric Estimation of Aceclofenac and Cyclobenzaprine HCl by Three Different Methods** Mahesh Mukund Deshpande (Amrutvahini College of Pharmacy)
Session Chairperson: Dr Low Kah Hin (Universiti Malaya)		
09.55 am - 10.15 am	SPE-4	**Supramolecular Assemblies of 1,2-Disubstituted Cyclohexane Amide Ligands and Their Coordination Polymer: Synthesis, Characterization and Crystal Structure** Maisara Abdul Kadir (Universiti Malaysia Terengganu)
10.20 am - 10.40 am	SPE-5	**Detecting Adulteration of Stingless Bee Honey using Untargeted ^{1}H-NMR Metabolomics with Chemometrics** Yong Chin Hong (Universiti Sains Malaysia)

Detailed Schedule — Oral Presentation

DAY 3: 15 SEPTEMBER 2021 (WEDNESDAY)

ROOM 3

Session Chairperson: Dr Sazlinda Kamaruzaman (Universiti Putra Malaysia)

Time	Code	Title
08.30 am - 08.50 am	SEP-8	**Dispersive Micro Solid-Phase Extraction with Polypyrrole-Graphene Oxide Nanocomposite Sorbent for the Determination of Tetracycline Antibiotics in Water Samples** Nurzaimah Zaini @ Othman (Universiti Teknologi MARA)
08.55 am - 09.15 am	SEP-9	**A Ferrofluidic Deep Eutectic Solvent Functionalized Graphene Oxide Magnetite Nanocomposite for the Extraction of Fuoroquinolones from Water Samples** Rania Edrees Adam Mohammad (Universiti Sains Malaysia)
09.20 am - 09.40 am	SEP-10	**A Review: Effect of Organic and Inorganic Filler on Starch-Based Bioplastic** Siti Amira Othman (Universiti Tun Hussein Onn Malaysia)
Session Chairperson: Dr Noorfatimah Yahaya (Universiti Sains Malaysia)		
09.55 am - 10.15 am	SEP-11	**Efficiency of Bronsted Acidic Ionic Liquids in the Dissolution and Depolymerization of Lignin from Rice Husk into High Value -Added Products** Siti Mastura Mohamad Zakaria (Universiti Malaya)
10.20 am - 10.40 am	SEP-12	**Extraction Solvents of Microalgal Lipid Extraction for Biofuel Production: A review** Tan Yeong Hwang (Universiti Tenaga Nasional, Malaysia)
10.45 am - 11.15 am	SEP-13	**Bisphenol-A Removal from Synthetic Wastewater using Thin-Film Composite Forward Osmosis Membrane** Taofiq Damilare Aiyelabegan (Universiti Teknologi PETRONAS)
11.20 am - 11.40 am	SEP-14	**Removal of Terbutaline from Aqueous Solution using Cu-based Metal Organic-Frameworks ([Cu (INA)2]) Mechano-synthesized using Ball-Milling Method** Usman Armaya'u (Universiti Malaysia Terengganu & Al-Qalam University Katsina)

ROOM 4

Session Chairperson: Dr Khor Sook Mei (Universiti Malaya)

Time	Code	Title
08.30 am - 08.50 am	SEN-7	**Chiral Recognition Sensor for Ketoprofen Enantiomers using L -cysteine Capped Silver Nanoparticles** Asma Omar Obaid (Universiti Malaya & Jazan University)
08.55 am - 09.15 am	SEN-8	**Fabrication of a Microfluidic Paper Device for Drug Detection** Salamatu Hayatu (Kaduna State University & Bayero University)

Website for Poster Presentation

https://analis.com.my/index.php/skam/posters

Detail Schedule — Poster Presentation

DAY 1: 13 SEPTEMBER 2021 (MONDAY)

POSTER PRESENTATION SESSION 1

Time: 02.00 pm - 02.25 pm

Code	Title
P1-BIO	**Adsorption Study of Ibuprofen onto Magnetic Material Based Deep Eutectic Solvents** Nor Munira Hashim (Universiti Sains Malaysia)
P2-BIO	**A UHPLC–MS/MS Method for Simultaneous Determination of Five Chemical Markers of Carica papaya Leaves in Rat Urine and Its Application for Pharmacokinetic Study** Norazlan Mohmad Misnan (Institute for Medical Research (IMR), National Institute of Health)
P3-ENV	**Biodegradation of Pharmaceutical Wastes Using Bacteria: A Scientometric Analysis** Nor Atikah Husna Ahmad Nasir (Universiti Teknologi MARA)
P4-ENV	**Potential of Epipremnum aureum in Reduction of COD in Wastewater** Rozidaini Mohd Ghazi (Universiti Malaysia Kelantan)
P5-HAL	**Qualities of Soap Making Oil: Differentiation of Lard and Palm oil by ATR-FTIR and GCMS** Atiqah Ab Aziz (Universiti Malaya)
P6-GRE	**Combined Pretreatment of Torrefaction and Washing Using Torrefaction Liquid Products to Upgrade Fuel Properties of Empty Fruit Bunches** Mohamad Azri Sukiran (Malaysian Palm Oil Board)
P7-GRE	**Modification of Polyethylene Polypropylene Sheet by Radiation-induced Grafting as Membrane Separator for Vanadium Redox Flow Battery** Norliza Ishak (Malaysian Nuclear Agency)
P8-GRE	**Characterization of Oil Palm Frond Biochar for Palm Oil Secondary Effluent Treatment** Nurhanim Zulaikha Kamarulzaman (Universiti Kuala Lumpur)
P9-GRE	**The Effect of Rice Water as Plant Growth Booster of *Solanum lycopersicum* Through Tissue Culture Method** Siti Nursyazwani Maadon (Universiti Teknologi MARA)

Detail Schedule — Poster Presentation

DAY 1: 13 SEPTEMBER 2021 (MONDAY)

POSTER PRESENTATION SESSION 2

Time: 03.45 pm - 04.05 pm

Code	Title
P10-MAT	**Zinc Sulfide for Photocatalytic Degradation of Organic Pollutants: A Review** Izyan Najwa binti Mohd Norsham (Universiti Teknologi MARA)
P11-MAT	**Potential Applications of Conducting Polymer/Tungsten Disulfide Composites: A Mini Review** Kavirajaa Pandian Sambasevam (Universiti Teknologi MARA)
P12-MAT	**Biomimetic Synthesis of Silver Nanoparticles using *Eleusine indica* Extract and Its Antibacterial Properties** Muhammad Hafiz Istamam (Universiti Teknologi MARA)
P13-MAT	**Preliminary studies on Sunlight Assisted Degradation of 2-Chlorophenol using PANI/MoS_2/GO as Photocatalyst** Syara Syazliana Muhammad Rajab (University Teknologi MARA)
P14-NAT	**Review on Occurrence and Biological Activities of Natural β-Carboline Alkaloids and Its Derivatives** Nur Ain Nabilah Ash'ari (Universiti Teknologi MARA)
P15-NAT	**Isolation of Pteropodic Acid from Malaysian *Uncaria lanosa var. ferrea* by using LC/MS Dereplication Approach** Nursyaza Husna Shaharuddin (Universiti Teknologi MARA)
P16-NAT	**Aspidospermatan-, Corynanthean-, and Strychnan-type Indole Alkaloids from *Alstonia scholaris*** Premanand Krishnan (University of Nottingham Malaysia)
P17-NAT	**Imidazole-containing Alkaloids from *Glochidion rubrum*** Sayed Mohammadhossein Modaresi (University of Nottingham Malaysia)

Detail Schedule — Poster Presentation

DAY 2: 14 SEPTEMBER 2021 (TUESDAY)

POSTER PRESENTATION SESSION 3

Time: 03.20 pm - 03.40 pm

Code	Title
P18-NAT	**Evaluation of Physicochemical Properties of Coconut Water Collected Between Shoreline and Outskirt Area of Port Dickson, Negeri Sembilan, Malaysia** Rabiatul Adawiah Mohammad Noor (Universiti Teknologi MARA)
P19-NAT	**Bisindole Alkaloids from *Leuconotis eugeniifolia*** Tan Yi Sheng (Universiti Malaya)
P20-NAT	**Iboga Alkaloids from *Tabernaemontana polyneura*** Tang Sin Yee (Universiti Malaya)
P21-NAT	**Purification and Screening of Selected Microbes for Biotransformation of Xanthorrizol from the Essential Oil of *Curcuma xanthorrhiza*** Nurul Iman Aminudin (International Islamic University Malaysia)
P22-SEN	**Investigation on Optimization Parameters for Electropolymerization of Melamine in Deep Eutectic Solvents** Woi Pei Meng (Universiti Malaya)
P23-SEP	**Emulsification Liquid-liquid Microextraction using Hydrophobic Deep Eutectic Solvents Based Fatty Acids for Simultaneous Determination of Acidic−Basic Herbicides from Environmental Samples** Nur Hidayah Sazali (Universiti Sains Malaysia)
P24-SPE	**Analytical Method of Caffeine Content Determination in Selected Beverages : A Review** Afiq Azil (KPJ Healthcare University College)
P25-SEP	**Rapid Detection Tool for Monitoring the Production of Kombucha Tea as a Natural Source of Antioxidant** Maulidiani (Universiti Malaysia Terengganu)
P26-SYN	**Synthesis and Characterization of Cobalt(II), Copper(II) and Nickel(II) Complexes of Hydrazone Schiff Base** Arif Naim Rosnizam (Universiti Teknologi MARA)

ABSTRACTS

Plenary Lecture

Keynote Lectures

Invited Lectures

PLENARY

Environmental Emerging Pollutants: Issues, Approaches and Solutions

Ahmad Zaharin Aris[1,2,*]

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Along with the industrial revolution, emerging pollutants i.e., endocrine disrupting compounds (EDCs) have primarily arisen as the global environmental issues based on the occurrence, distribution, and risk of exposure in environment and humans. EDC exposures are closely linked to endocrine dysfunction effects with developmental toxic, genotoxic, carcinogenic, hepatotoxic, reproductive toxic, immunotoxic, cytotoxic, neurotoxic, and hormonal toxic. Occurrence and risk of EDCs were persisted, distributed, bioaccumulative, and biomagnified in the ecosystem i.e., water, sediment, and biota, as well as humans due to the wide application and usage of the broad scopes of EDCs and the incomplete treatment technologies. Conventional treatment techniques that are still being widely used are commonly known for not being efficient in removing the emerging EDCs. Advanced treatment technologies are incapable of removing them completely and are subjected to several concerns such as cost-effectiveness and sustainability. Metal organic framework has unique properties due to ultra-large surface-to-volume ratios and tunable pore channels, is expected to be an adaptive material with several advantages i.e., effective removal, cost-effectiveness, process sustainability, and environmentally friendly. Environmental forensic approach and a holistic system that incorporating multibarrier approach in monitoring and management are essential for constructive mitigation, prevention, and intervention by way of sustainable ecosystem and healthier lives.

Keywords: Endocrine disrupting compounds (EDCs); emerging pollutants; ecosystem; health risk; sustainability

KEYNOTE-1

High Throughput Nucleic Acid Sample Preparation and Analysis

Jared L. Anderson[1,*], **Marcelino Varona**[1], **Miranda Emaus**[1], **Derek Eitzmann**[1]

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Ionic liquids (ILs) can be designed to exhibit unique properties for their use in a number of applications in analytical and bioanalytical chemistry. This talk will focus on the design and synthesis of ILs, magnetic ionic liquids (MILs), and polymeric ionic liquids (PILs) as well as the use of these materials in a number of applications for the analysis of nucleic acids. Nucleic acids are biopolymers that constitute important diagnostic molecules for a broad range of applications from clinical testing to forensic analysis. A major challenge faced by DNA and RNA analysis techniques is the selective extraction of particular nucleic acid sequences using rapid and sensitive methodologies. It will be shown that ion-tagged oligonucleotides (ITOs) can be used in conjunction with MILs to efficiently capture DNA sequences from complex samples. The ITOs can be created through thio-lene "click" chemistry and the nature of the ion tag can influence the partitioning of the ITO to the hydrophobic MIL. This novel liquid-phase approach towards sequence-selective DNA capture provides superior extraction efficiencies to conventional magnetic bead technology as well as a platform for using external fields to manipulate the liquid droplets. The development of isothermal amplification approaches capable of achieving single-nucleotide resolution of nucleic acid sequences will be demonstrated through the use of molecular beacons.

Acknowledgement: The authors acknowledge funding from the Chemical Measurement and Imaging Program at the National Science Foundation (Grant Number: CHE-1709372).

KEYNOTE-2

Heavy Metal Contents and Distributions in Various Environmental Samples in West Malaysia

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Heavy metal contents in various environmental samples in Malaysia had been extensively studied in the past 30 years. Various analytical methods had been used to analyse these samples. Their contents will be described and their distributions in West Malaysia will be discussed. Most of them were within the limits allowed by the authorities that governed their usage.

KEYNOTE-3

Initiatives in Utilizing Natural Reagents and Natural Materials for Chemical Analysis: Talent and Challenge for ASEAN in New Normal Chemical Analysis

Kate Grudpan[1,*]

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Chemical analysis plays roles in today communities in various aspects. One of the directions for the development for chemical analysis would be a simple but cost-effective deployment by anyone, and without sophisticate instrument/procedure. It involves not only citizen sciences, but also advance sciences. Natural reagents and natural materials have been proposed as novel approaches for green chemical analysis. Various natural agents have been exploited for the uses in the assays of both inorganic and organic analytes, with an example of using a simple aqueous guava leaf extract for iron which derived from the knowledge of local knowledge of the Chiang Mai-Fang villagers. Nitrogen content in a fertilizer can be assayed by using butterfly pea flowers extract immobilized on paper. Apart from paper, various natural materials have been proposed to serve as a platform for chemical analysis, including cotton fiber and thread, and noodles, for examples.

This presentation will brief the utilizing natural reagents and natural materials for white chemical analysis. Discussion will be made to explore the talent and challenge for ASEAN in new normal chemical analysis, as ASEAN area is rich of bioresources. The initiatives involve local problems -global issue -sustainable world and serves the UN Sustainability Development Golds (UN SDGs).

INVITED PAPER-1 (INV-1)

Recent Development on Gelatin Origins in Food and Pharmaceutical Products for Halal Authentication

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Gelatine is one of the components commonly used in food, cosmetics and pharmaceutical products due to its gelling properties. The most commonly used gelatines in those products are porcine and bovine gelatines. Unclear labelling and information regarding the actual sources of gelatines in products have become the main concern among societies in terms of religion and health aspects. Porcine gelatine (PG) is prohibited to be consumed by Muslim and Jewish and considered non-halal (and non-kosher) following some scholars of thought. Therefore, reliable methods for identifying gelatine sources in the products must be developed. Some analytical methods including physico-chemical methods as well as biological methods along with advantage and disadvantage for differentiation of PG intended to halal authentication studies. Some analytical methods are used for rapid identification of raw materials of PG. FTIR spectroscopy in combination with chemometrics of pattern recognition either supervised and unsupervised is used for identification and differentiation of PG by investigating the specific functional groups and peak intensities related to PG. HPLC using certain detector is also successful for identification of gelatine sources by analysing amino acid composition. Liquid chromatography hyphenated with mass spectrometer (LC-MS/MS) is candidate to be used as standard method for identification of PG in food and pharmaceutical products by investigating the peptide markers which are specific to PG. Finally, our laboratory has accredited real-time polymerase chain reaction according to ISO 17025: 2017 for identification of porcine gelatine in capsule shells.

Keywords: porcine gelatine, LC-MS/MS, peptide markers, real-time PCR.

INVITED PAPER-2 (INV-2)

Schwarzinicine Alkaloids as Vasorelaxant Agents: Discovery, Synthesis, Structure-Activity Relationship, and Mechanism of Action Studies

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A series of 1,4-diarylbutanoid–phenethylamine conjugates, known as the schwarzinicine alkaloids, have been isolated from a local fig species. The schwarzinicine alkaloids were found to show pronounced vasorelaxation in rat aortae, with activity comparable to that induced by dobutamine, a known phenylalkylamine vasorelaxant. To address the supply issue due to the low isolation yields of these alkaloids, total synthesis of schwarzinicines A, B, F, and G was recently accomplished. Additionally, several series of synthetic analogues based on modifications to the structure of schwarzinicine A as the lead compound were prepared. The vasorelaxation effect of several analogues was improved from μM to nM range. A few structural features associated with vasorelaxation enhancement have been identified in our ongoing structure-activity relationship studies. Preliminary mechanism of action studies indicated that these compounds induce vasorelaxation in rat aortae via blockage of calcium influx.

INVITED PAPER-3 (INV-3)

Gel-Electromembrane Extraction (G-EME): A green extraction and direct determination approach for ionic analytes

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Electromembrane extraction (EME) has been introduced and gained a great popularity for extraction and preconcentration of ionic analytes in the last decade. Basically, EME is a liquid phase microextraction (LPME) with the application of electric field, where the charged analytes are extracted by electro-transportation from the donor solution across a solvent supported hollow fiber membrane (HF), toward the opposite charged electrode and collected into the acceptor solution. EME provides higher preconcentration factors in shorter analysis times in comparison with the conventional LPME. Recently, agarose known as a green material has been used in place of hollow-fiber membrane to separate between donor and acceptor phase in place, so called Gel-electromembrane extraction (G-EME). G-EME has brought several benefits over classical EME, namely easy fabrication of gel membranes with different possible shapes and thicknesses and extraction of ionic analytes without using ion-pairing reagent or any organic solvent. Developments of G-EME of cationic and anionic analytes such as speciation of chromium and iodine are reviewed. Finally, a new approach of integration of G-EME with direct in-gel colorimetric detection is presented.

INVITED PAPER-4 (INV-4)

Sensors in Medical, Agriculture and Environment

Nor Azah Yusof[1,2,*], Umi Zulaikha Mohd Azmi[2], Nazifah Ariffin[2], Noremylia Mohd Bakhori[2], Nor Ain Shahera Khairi[2], Devandran Krishnan[3], Alamgir Hossain[4]

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Sensors have been widely developed and applied in many fields including medical diagnostic, agriculture and environmental. In this talk, some latest technology on sensor development related to these fields will be reviewed followed by author's own related research development. Tuberculosis (TB) has become one of the most serious infectious diseases, causing death globally. Failure to control the spread of TB is largely due to inability to detect and treat all infectious cases of pulmonary TB in a timely fashion, allowing continued Mycobacterium tuberculosis transmission within communities. We have developed three techniques with features that suits the TB diagnosis based on nanotechnology. The first one is on Plasmonic ELISA which has proven to be very sensitive and selective in TB patient's sputum sample analysis. The second detection system is using Lateral Flow system which utilize gold nanoparticle. The advantages in using Lateral Flow system or commonly known as strip test is the low cost and the user friendly feature. The third technique is using electrochemical reader. The reader was developed using Differential Pulse Voltammetry technique where the usage of nanomaterial has proven to enhance the current signal. This technique is very sensitive and manage to detect down to picomolar level. Another highlight of our research is on our E-nose detection system for oil palm tree disease. Malaysia is currently the second main producer of palm oil in the world after Indonesia. Malaysia export palm oil of 39% of world palm oil production and 44% of world exports. But the planters of oil palm in Malaysia are facing a devastated crop disease infection called Basal Stem Rot (BSR) that mostly caused by Ganoderma boninense which is a basidiomycete white rot fungus that will disrupt the water and nutrient transport to the upper part of the palm thus causing frond wilting, yellowing of fronds, unopened spear leafs, reduce and "one sided mottling" canopy and emergence of basidiocarps on the lower stem. We have developed an E-nose system to detect an increase level of secondary metabolite when the tree is infected by Ganoderma boninense at early stage. The e-nose developed is equipped with semiconductor based sensors where it will give out changes in signal/pattern upon exposure to the leaves of the infected tree. The E-nose system is equipped with Bluetooth system and can be operated using mobile apps. The current e-nose system is currently being tested with Sime Darby plantation (one of the major producer of Malaysian palm oil) and Malaysian Palm Oil Board (MPOB) plantation.

Keywords: Tuberculosis sensor, Ganoderma boninense, E-nose,

INVITED PAPER-5 (INV-5)

Making Sense of Sensor: An Update from Low-cost Air Quality Sensor for Air Quality Monitoring

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Clean air is one of the most fundamental principles of life quality and well-being. Outdoor and indoor air pollutions both can contributes to human health problems. Conventionally, the methodologies adapted to measure indoor air pollutants are based on: (i) passive samplers, which require long sampling periods and/or (ii) continuous sampling, which generally are bulky and expensive, generating noise and vibration, preventing its deployment in many places at the same time, leading to a limited spatiotemporal coverage. In recent years, low-cost air pollution technologies have gained increasing interest and, consequently, have been studied widely by the scientific community for air pollutions monitoring. Thus, it is important that these new sensing technologies provide reliable data, with good precision and accuracy. Electrochemical (EC) sensors from AiRBOXSense were constructed to measure CO, NO_2, and O_3. The sensors behaved highly linearly in laboratory experiments and had response times of around 0.5–1.6 min. During the laboratory experiment, a simple equation was used to translate the signal to mixing ratio and was calibrated by adding a correction in order to achieve the minimum difference against the gas standard. We found that with the added corrections such as the new sensitivity and offset to the equation, the difference values between mixing ratio of EC sensor and gas standard became decreased. Furthermore, this equation is deployed together with the other calibration model which constructed using the machine learning to translate signal to mixing ratios in the field experiment. Nevertheless, it should be noted that the representatives of measurements in this result only showed during the conditions of this campaign. Thus, the use of low-cost sensing technology to monitor indoor air pollutions is encouraged, but not waiving the relevance of high quality instruments (mainly reference instruments) as reference.

INVITED PAPER-6 (INV-6)

Triazole-Linked Surfactants from Bio-Resources

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Surfactants are chemical bulk products with wide application potential, ranging from cleaning, over emulsification to smart drug delivery. Particular interesting are non-ionic surfactants: As pH-neutral compounds, they exhibit better skin compatibility compared to market-dominant anionic surfactants, and, therefore, are frequently used in personal care products. Their indifferent response to pH and salinity, however, also enhances the surfactant performance in various other applications, leading to a growing market share for non-ionic surfactants. Increasing environmental concerns and decreasing petrochemical resources have created a demand for substitutes of the currently dominating ethylene-oxide-based surfactants. The most prominent candidates are sugar-based surfactants. These cover a variety of compounds, differing in chemical structure. While sugar esters are most economic, the delicate sensitivity of the ester-bond disfavors their use for applications at demanding conditions or requesting for long product shelf life. High chemical stability can be found in alkyl glycosides. Industrial alkyl polyglucosides (APGs) [1] have, therefore, gained significant market share. Their production, however, is energy intense and demanding in terms of the reactor design. The reasons are a poor miscibility of the surfactant precursors on the one hand, and unavailability of an inert solvent on the other. In response to this, we have developed alternative glycoside surfactants via click-coupling [2] of suitable surfactant precursors.[3] The separation of sugar functionalization and surfactant domain coupling enables a unique variation of the surfactant design. Particularly interesting is the opportunity to alter the surface dominance of surfactant antipodes, thereby enabling a tuning of the assembly behavior for specific applications.[4,5]

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INVITED PAPER-7 (INV-7)

Fun with Drug Design – An In-silico Exercise

Sharifuddin Md Zain[1,*], Vannajan Sanghiran Lee[1], Wei Lim Chong[1], Zhi Yan Lee[1], Low Kah Hin[1] and Piyarat Nimmanpipug[2]

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Today, in-silico drug design plays an increasing role in cost effective drug discovery. In-silico design of drugs involves the use of computer aided drug design (CADD) methodologies, which assist in the rational design of novel and safe drug candidates. In this work, several approaches of in-silico drug design were employed in identifying promising molecules for a given target. A controversial drug, ivermectin, is purported to exhibit efficacy against COVID-19 and several in-silico studies have shown strong binding efficacy against key proteins of SARS-CoV-2 virus.

Docking of ivermectin against the ACE-2 receptor and the spike glycoprotein of the SARS -CoV-2 virus was initially carried out in this work. From the results, we identified the ivermectin moieties which bind strongly to the targets. Focusing on the nature of the moieties, about 30 ivermectin derivatives were enumerated and docking of these enumerated molecules to the ACE-2 and spike protein targets were consequently carried out. Various molecular descriptors of the enumerated molecules were also generated and a QSAR model was developed to screen ivermectin related compounds found in various online databases as potential drug candidates. It should be noted that literature data on the activity of the enumerated derivatives against the SARS-CoV-2 virus is lacking. However, in view of the nature of this exercise, which is to demonstrate the typical methodologies used in computer aided drug design, instead of employing experimental activity (eg. IC_{50}) in the QSAR model, the calculated binding energies of ivermectin and its enumerated derivatives against the targets were used as the dependent variable in this step. The QSAR model is then used to screen the many ivermectin related molecules found in several databases such as PubChem.

In this work, ivermectin is assumed as the 'lead' compound. The objective of the exercise, as an illustration of the methodologies used in CADD, is to screen compounds similar to ivermectin in the database that would possibly perform better as an antiviral drug. In a real drug design work, lead compounds are identified and optimized after random screening of many molecules. In addition, lead identification and optimization may involve compounds with diverse structural traits. Despite the lack of such elaborate features, the CADD cycle of creating new compounds, docking them to the targets, evaluating their binding strengths and building of screening models as demonstrated in this work exemplify the typical in-silico drug design procedure. This exercise combines the two general approaches of CADD – structure based and ligand based design and should give the audience a good idea of how in-silico drug design would result in a cost-effective, rapid and systematic way of identifying novel, effective drugs.

INVITED PAPER-8 (INV-8)

Natural Reagents as Reliable Reagents in Inorganic Synthesis of Functional Materials

Apinpus Rujiwatra[1,*]

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Complying to the concept of green synthesis, reagents from natural resources have been attempted for the synthesis of important functional materials. Here, exemplary cases are presented to illustrate reliability of natural reagents in the synthesis of functional materials, i.e. ZnO nanoparticles using crude water extracts of Psidium guajava Linn. (guava) leaves and Dimocarpus longan Lour. (longan) seeds, and nanocomposites of Ag using crude water extract of Citrus hystrix DC (kaffir lime) leaves and Camellia sinensis var. assamica (miang) leaves. In all cases, microwave synthesis which is well-acknowledged as green synthetic technique with the most efficient energy usage was adopted to facilitate facile and rapid procedures. Influences of different synthetic parameters and shelf life of the reagents are discussed. Reliable applications of the derived materials in photocatalysis, antimicrobial application, and selective determination of nitrite are included.

ABSTRACT
FOR
ORAL PRESENTATION

ROOM 1

Environmental Analysis (ENV)

Biomedical & Pharmaceutical Analysis (BIO)

Halal Analysis (HAL)

HAL-1

Rapid Discrimination of Gelatine Sources in Selected Food Products Using ATR-FTIR Spectroscopy and Chemometrics

Mohd Zaid Mohd Yazid[1], Azmaniza Tulimin[1,2], Atiqah Ab Aziz[3], Zalina Zakaria[3] and Nor Kartini Abu Bakar[1,3,*]

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This study investigated on how to discriminate gelatine sources in selected food products by attenuated total reflectance Fourier Transform Infrared (ATR–FTIR) spectroscopy and chemometrics. ATR–FTIR technique was used to qualitatively determine gelatine in selected food samples. Chemometrics, namely Hierarchical cluster analysis (HCA) and Principle Component Analysis (PCA) were used to cluster and classify the sources of gelatine. Polymerase Chain Reaction (PCR) technique was used to further confirm the presence of porcine deoxyribonucleic acid (DNA) in the discriminated gelatine. The experiment was conducted on three types of samples i.e. cooking gelatines, gelatine capsules, and gummy candies. Our findings revealed that ATR–FTIR technique coupled with chemometrics was able to discriminate porcine and bovine gelatines in cooking gelatines. It also was able to discriminate plant gelatine from bovine gelatines in gelatine capsules. However, these techniques could not discriminate a mixed of bovine and porcine gelatine from bovine gelatine in gummy candies. These results indicate that ATR –FTIR spectroscopy combined with chemometrics work only if the food samples are of the same matrix and composition, and there is no mix of gelatine sources in a particular sample.

BIO-1

Biodegradation of Pharmaceutical Active Compounds in Wastewater Using Fungi: A Bibliometric Analysis

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The conventional water treatment plants are designed to filter out sediments, bacteria, and viruses but limited to organic molecules such as pharmaceutical wastes. Therefore, the occurrence of pharmaceutically active compounds (PhACs) in surface water has raised a serious global concern. Fungi are among organisms that have been used in many studies to degrade the PhACs. Thus, this paper aims to perform a bibliometric analysis in mapping the research output which is related to biodegradation of PhACs in wastewater by using fungi. Articles relevant to this study have been retrieved using the Scopus database and analysed with the bibliometric tool, VOSviewer. The keywords used which are “pharmaceutical”, “degradation” and “fungi” gave results of 229 research papers published from 2001 to 2021. The analysis shows the publications on the biodegradation of pharmaceuticals in wastewater by fungi have steadily increased from 4 to 29 publications per year during 2001 and 2020, respectively. Of all countries, Spain has the highest number of publications (n = 46), whereas higher quality papers were produced by the United States. By analysing the co-occurrence and clusters of keywords, *Trametes versicolor* (n=30) and *Phanerochaeta chrysosporium* (n=12) are the top fungi used in the biodegradation of PhACs. Overall, our analysis could provide information regarding the potential of fungi to be used for the development and future opportunities in the removal of pharmaceuticals waste via the biodegradation process, which is useful for the decision-makers and researchers who are interested in this area.

ENV-1

Fabrication of TiO_2/ZnS/GO with Enhanced Photocatalytic Activity for the Degradation of Methylene Blue

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TiO_2-based ternary composites have been regarded as an excellent photocatalysts for environmental applications. In this study, the efficiency of TiO_2/ZnS/GO was evaluated for the degradation of methylene blue in aqueous solution under ultraviolet irradiation. Different ratios of TiO_2/ZnS/GO (1:1:1) and (1:2:1) composites were successfully synthesized via the one pot hydrothermal method. The photocatalyst was characterized by scanning electron microscopy (SEM) and Fourier-transform infrared (FT-IR) spectroscopy. The results showed that TiO_2/ZnS/GO with the ratio of 1:1:1 exhibited better methylene blue removal of 98.39% after 150-min treatment compared to 1:2:1 ratio. The effect of the strong absorption of the photocatalyst and the effective separation of photogenerated electron-hole pairs by the ternary composite influenced the enhanced photocatalytic activity.

Keywords: Hydrothermal method, TiO_2, ZnS, graphene oxide, photocatalytic degradation, adsorption

ENV-2

Comparison of Spatial Interpolation Methods for the Water Quality Physico-Chemical Parameter in Klang River, Malaysia

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Water quality is now one of the prevalent issues that are highlighted anywhere, globally. The scarce of good water resources in this world threatens human health, limits food production, and reduces environmental functions. The rising cases of river pollution caused by untreated wastewater from agriculture, industrial and households, need to be addressed. One way is by getting help from the advancement of intelligent data processing in the analysis of hydrological parameters. To have a good water quality analysis, a lot of structured data are required for a conclusive study. Unfortunately, the long-term hydrological data contains unfilled data (gaps in data) that are possibly due to the device malfunctions, interrupted collection schedule, or unavailability of the data collection officer. The missing hydrological data causes its interpretation to be inaccurate. Therefore, the interpolation technique is proposed to reconstruct and fill the missing hydrological data. In this work, one of the hydrological data, a Biochemical Oxygen (BOD) of Klang River in Selangor, Malaysia from 2012 to 2017 has been used as a sample. Three interpolation techniques available in MATLAB software are investigated to determine their effectiveness, namely, Piecewise Cubic Hermite Interpolating Polynomial (PCHIP), Cubic Spline data interpolation (Spline), and Modified Akima Piecewise Cubic Hermite Interpolation (Makima). They are tested using the Root Mean Square Error (RMSE). It is found that all interpolation algorithms give a good result with low RMSE values. However, the PCHIP technique gives the best accuracy with a remarkable match between the interpolated and the original data.

ENV-3

Water Quality Parameters as Early Warning Indicators in Earthquake Risk Management

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5 June 2015, a 6.0 magnitude earthquake occurred at Mount Kinabalu in the district of Ranau, Sabah. Impact-based forecasting and warning services aim to bridge the gap between producers and users of warning information by connecting and increasing synergies between the components of effective early warning systems. In this study, the water quality of Liwagu River located in the earthquake zone of the 2015 Ranau Earthquake is assessed to be investigated for its possibility as early warning indicators into earthquake risk management in the area. Data for 11 parameters were obtained and recorded monthly for the period of 2013 to 2019 to be analyzed for its 'before, during, and after the impact of the 2015 Ranau earthquake to the water quality. This is done by calculating the mean value for each water quality parameters annually for the year under normal condition and for a determined period of before and after the 2015 Ranau earthquake that occurred in June 2015. The data is subsequently tabulated and plotted into a graph to be observed of any pattern that may be shown where it can be seen that some parameters displayed pronounced pattern which are Aluminium, Colour, Dissolved Oxygen, Iron, Manganese, Nitrate and Turbidity. Data from the aforementioned parameters were then fitted to any seismic activities on relevant dates and tested using mathematical and computational methods to predict an event, of which in this case is to see whether a data can be used to predict an earthquake. A mathematical model is used to forecast earthquake using time-based upon changes to the model inputs, which is the water quality parameters that shows promising pattern upon screening. A model is first identified to accurately compute a dynamic system response to the water quality data and is recognized as NonLinear AutoRegresive with eXogenous (NLARX). All parameters satisfy at least 89% of best fit data for modelling and validation. Therefore, the formulated model obtained from all parameters can be used with high confidence as an early warning system of earthquake prediction in the future, limited to the parameters and the area.

ENV-4

Removal of Tetracyclines Using Magnetic Nanoparticle Deep Eutectic Solvents from Environmental Water

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This study was conducted to evaluate the performance of newly synthesized material, magnetic iron particles coated with environmentally friendly deep eutectic solvents towards removal of four tetracycline compounds from wastewater samples. Six crucial parameters were taken into account for optimization – pH, contact time, adsorbent dosage, sample volume, initial concentration, and temperature. The kinetics, isotherm and thermodynamics model was applied to evaluate the performance, stability and favourability and of the solid adsorbent at different degrees of temperature, concentration, and contact time. The study suggests that the adsorbent follows a pseudo -second-order kinetic model and exhibit an excellent removal percentage with small volume and concentration of analyte. Some heat was required during the adsorption process to achieve shaking time less than 60 minutes. The isotherm model best fit Freundlich and Halsey model which suggests multilayer adsorption is involved on the heteroporous surface of adsorbent while the thermodynamic parameters ($\Delta H°$, $\Delta S°$ and $\Delta G°$) revealed that TC adsorption onto the adsorbent was exothermic and spontaneous in nature. The optimized condition was applied to treat five real wastewater samples by successful removing more than 80% of TC.
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Keywords: Tetracycline, magnetic deep eutectic solvent, adsorption, UV-spectroscopy

ENV-5

Potential Contamination Analysis Of Palm Oil Mill Effluent as Fertilizer to the Surrounding Soil and Groundwater Using Principal Component Analysis

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This study is proposed to evaluate and acquire a better understanding about how Palm Oil Mill Effluent (POME) recycling and application as fertilizer might contribute to the alterations of surrounding soil and groundwater quality by utilizing multivariate statistical method i.e., Principal Component Analysis (PCA). This study investigated secondary data acquired from an oil palm company operating in Sumatera area, Indonesia from January 2017 until June 2020. There are 138 samples data comprising of 36 samples data for POME, 72 samples data for soil and 30 samples data for groundwater which were collected based on the routine monitoring data of treated POME (monthly-basis), soil (yearly-basis) and groundwater wells (semester-basis). Soil quality parameters which were analysed consist of pH and metals (Pb, Cu, Cd, Zn) while parameters for groundwater quality consist of pH, BOD, COD, and metals (Pb, Cu, Cd, Zn). The collected data were then analysed using PCA utilizing open-source R software. PCA was able to distinct the POME and surrounding soil quality data into three separate clusters: POME, soil bed – soil bedside and soil control. Meanwhile, for POME and surrounding groundwater quality data set, PCA was able to distinct two separate clusters: POME and groundwater samples (observation wells and residential wells). These findings demonstrated that the application of POME did not contaminate or change the features of the surrounding soil and groundwater quality thus implying that the company managed to implement good agricultural practices in their concession area.

ENV-6

Synthesis of TiO_2/Ag/CA for the Degradation of Methylene Blue

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The photocatalytic efficiency of TiO_2 could be improved by doping with a noble metal candidate, silver (Ag) and incorporating a suitable support. This study investigated the effect of Ag and cellulose acetate (CA) concentrations on the photocatalytic performance of TiO_2 for the degradation of a model pollutant, methylene blue (MB). TiO_2 was doped with Ag via wet impregnation method and combined with CA via mechanical mixing method. The prepared TiO_2/Ag/CA photocatalysts were characterized using Scanning electron microscopy (SEM) and Energy Dispersive X-ray spectroscopy (EDX) and Fourier transform infrared spectroscopy (FTIR). The highest removal of MB (93.20%) was obtained using 1 g/L of TiO_2/Ag-2%/CA-2% after 120 min of treatment under UV irradiation (365 nm). The results showed that Ag doping and addition of CA enhanced the performance of TiO_2 under UV irradiation.

ENV-7

Spectroscopic Fingerprinting Combined with Chemometrics for Organic Produce Screening

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Pesticides detection for the purpose of organic produce authentication is often time-consuming and laborious in terms of laboratory work involved in testing the sample. More often than not, techniques such as high-performance liquid chromatography and gas chromatography require lab expertise, controlled testing condition, long testing time and destruction of the samples. In the industry today, especially in Fast Moving Consumer Goods (FMCG) industry, a fast and reliable technique which can give an instant result on pesticides screening of the organic produce is much needed to relieve the burden of confirmation testing in a sophisticated laboratory by the food regulators. Fourier Transform Infrared-Attenuated Total Reflection (FTIR-ATR) serves this purpose with its non-destructive capability and portability, yet reliable in producing accurate result in a matter of minutes when combined with chemometric analysis. Thus, in the present work, FTIR-ATR combined with chemometrics was used to screen for the presence of pesticide residues on chili and mustard green samples. The results showed the potential to distinguish vegetable samples that were sprayed with cypermethrin and fenobucarb pesticides from that of organic samples. However, differentiation between organic vegetables and vegetable samples that were sprayed with malathion showed a lack of success due to the similarities in the IR spectra of the two groups. In conclusion, FTIR-ATR combined with chemometrics is a potentially reliable screening tool for 'front-line' organic produce screening with only the failed samples needed to undergo for confirmation testing.

ENV-8

Exploring the Elemental Variations in Commercial Non-glutinous Brown and White Rice from Malaysia by Chemometrics

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The concentrations of Na, Mg, K, Ca, Mn, Fe, Cu, and Zn in a selection of commercial non-glutinous rice sampled from Malaysia were determined using microwave assisted digestion with inductively coupled plasma-mass spectrometry and the data obtained were evaluated using chemometric techniques. Both principal component analysis (PCA) and hierarchical cluster analysis (HCA) revealed two distinct clusters where the brown rice are associated with higher elemental content compared to the white rice; and Mg level was identified as a key discriminatory factor according to linear discriminant analysis (LDA) outcomes. The concentrations of macroelements use to exhibit a consistent sequence: K > Mg > Ca > Na; whereas no regular trend was observed on the microelements. The results suggested that the elemental variations in the rice samples were largely attributed to the grain treatment processes while the impacts of the other underlying factors are more apparent on microelemental concentrations. From the nutritional assessment, the brown rice appeared be a noteworthy dietary source of Mg, Mn, and Zn, however, the contributions of Na and Ca to daily needs are negligible.

Keywords: Food; ICP-MS; Metal; Mineral; Pattern recognition

ENV-9

Biopolymer Magnetic Composites Adsorbents Fabrication and Application for Heavy metal Ions Removal in Water Samples

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Three new viable biopolymer adsorbents namely, alginate, sporopollenin amine functionalized silica-coated magnetite (alg/Sp-SiO/Fe_3O_4), tannic acid, amine functionalized silica-coated magnetite (tan-NH_2-SiO_2/Fe_3O_4), and alginate, chitosan amine functionalized silica-coated (alg/Cs-NH_2-SiO_2/Fe_3O_4) were synthesized and applied for the first time for the removal of Pb (II), Cu (II), Cd (II) ions from water sample by utilizing Inductive Couple Plasma-Optical Emission spectroscopy (ICP-OES). Findings revealed % metal ions removal by alg/Cs-NH_2-SiO_2/Fe_3O_4 as 76.64%, 70.08% and 67.76% for Pb (II), Cu (II), Cd (II) showed superior adsorption over alg/Sp-SiO/Fe_3O_4 and tan-NH_2-SiO_2/Fe_3O_4. Characterization of the selected adsorbent alg/Cs-NH_2-SiO_2/Fe_3O_4 by utilizing Fourier transform infrared spectroscopy (FT-IR) showed new spectra at 1542, 1404, and 1053cm^{-1}, corresponding to changes in vibration of -NH_2, -C=O, and Si-O-Si bonds respectively, field emission-scanning electron microscopy (FESEM) showed a gel dense dark morphology formation with a diameter distribution of 114-148nm due to the cross-linking by the glutaraldehyde, energy dispersive X-ray analysis (EDX) gave the % elements as 0.70, 21.90, 9.50, 7.50 and 56.20% for Fe, O, Si, N, and C respectively, and vibrating sample magnetometry (VSM) give 24.48,20.10, and 14.77emu/g for Fe_3O_4, NH_2-SiO_2/Fe_3O_4, and alg/Cs-NH_2-SiO_2/Fe_3O_4 respectively,indicating good superparamagnetic property for separation.

Keywords: Heavy metals, adsorbent, aqueous environment, biopolymer

ENV-10

Determination of dissolved Zn^{2+}, Cd^{2+}, Pb^{2+} and Cu^{2+} ions in seawater at Tropical coastal water

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This study was conducted to determine the dissolved concentration of Zn^{2+}, Cd^{2+}, Pb^{2+} and Cu^{2+} ions in seawater collected from Malaysia coastal water. The concentration of dissolved trace metals was determining simultaneously by using voltammetry analysis after UV irradiation procedure on the seawater sample. Different UV irradiation periods was applied to the seawater samples in order to optimize the determination of each metal ion selected. A 5 minutes UV irradiation period was required to optimised the determination of dissolved Pb^{2+} and Cu^{2+} ion concentrations in the sample and 30 minutes for Zn^{2+} and Cd^{2+} ions. This different UV irradiation periods that required for each metal ions determination indicated that the present of natural organic ligands in controlling the biogeochemistry cycle of the elements in the coastal water. It suggested that this organic ligand has bind to the metal ions at different architectures that have different binding strength. This study also suggested that the determination of trace metals should be analysed individually due to the present of different natural organic metal-ligands complex in the seawater.

ENV-11

Sporopollenin Supported Imidazolium (Sp-IM) Bio-sorbent for Targeted Selective Adsorbate Removal from Aqueous Environment

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Sporopollenin supported imidazolium (Sp-IM) was prepared as biosorbent for targeted adsorption study. Sporopollenin acts as the host with the accessible chamber while imidazolium acts as the active site that binds adsorbates from the aqueous system. Imidazolium being chemically immobilized onto sporopollenin simultaneously ensures that the ionic liquid does not leach into the aqueous environment while providing increased selectivity. This study attempts to bring about a facile approach for selective adsorption that is sensitive, selective, and sustainable, all within a single material. A series of imidazolium based Sp-IM, namely methyl-, butyl-, decyl-, benzyl- and benzi-imidazolium was prepared and characterized using solid-state characterization techniques including FTIR, solid-state NMR, TGA and BET/BJH analysis. The variants in the imidazolium group were analysed and selectivity was determined via analyte screening under UV-Visible spectroscopy.

Keywords: sporopollenin, imidazolium, biosorbent, selective, sustainable

ENV-12

Experimental and Theoretical Study on Adsorption Mechanism of Polyvinylpolypyrrolidone (PVPP) for Effective Phenol Removal in an Aqueous Medium

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\Phenol is considered as environmental priority pollutants and widely present in the wastewater generated from various sources such as industries. This research focuses on the ability of polyvinylpolypyrrolidone (PVPP) in removing phenol from aqueous medium. Two pH aqueous medium was investigated which are 3.5 and 6.5. The result showed PVPP was better in removing phenol at pH 6.5 than pH 3.5 with 74.91 % and 66.54 % respectively. The kinetics and equilibrium adsorption data of phenol by PVPP well fitted to the Langmuir isotherm (R^2=0.9905) and pseudo second order model (R^2=0.9925). Then, the study by using 1D and 2D IR spectroscopy showed the adsorption mechanism PVPP–phenol complex where the response peaks of the hydroxyl groups of phenol (OH) and the carboxyl groups (C=O) of PVPP were altered, which signified the formation of a hydrogen bond in between PVPP and phenol. Density functional theory (DFT) was calculated to determine the potential energy, quantum chemical, electronic energy, bond angles, bond lengths and Mulliken charges in the solution phase. Furthermore, COSMO RS and RDG-NCI result showed the conformation of the presence of hydrogen bond interactions between PVPP and phenol. Then, the global and local quantum chemical descriptors clarified that PVPP acts as a nucleophile, while phenol acts as an electrophile. The result indicated also the O9 atom (donor electron) reacts with the H22 atom (acceptor electron) during the formation of hydrogen bond in removing of phenol.

Keywords: Phenol-PVPP complex, Adsorption, 2D IR Spectroscopy, Theoretical study, Density functional theory, COSMO-RS.

ENV-13

MXene as Sorbent in Membrane Protected Micro-Solid-Phase Extraction for Determination of Triclosan in Municipal Wastewater

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The increasing consumption of antimicrobial-based personal care products has raised concerns about their fates in the environment. Triclosan is one of the antimicrobial agents that has been widely used in personal care products. Although the concentration used in personal care products is low, it poses a threat to human health due to its ability to disturb the human endocrine system. Therefore, this study aims to develop a microextraction technique known as micro-solid phase extraction coupled with HPLC-DAD to determine triclosan in water. MXene was chosen as the potential sorbent, and parameters that significantly affected the extraction efficiency, such as the amount of sorbent, extraction condition and desorption condition, were optimized and validated. At the optimum condition, the proposed method showed good linearity with a low detection limit, good analyte recovery (> 95 %) and good precision (< 15 %). The proposed method was successfully applied in municipal wastewater while offering a straightforward method for the extraction of triclosan.

ENV-14

Acute Toxicity of Bisphenol A and Diclofenac Towards Tropical Freshwater Cladocerans: *Moina Micrura*

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Bisphenol A (BPA) and diclofenac are well known endocrine-disrupting compounds (EDCs) that cause several toxic effects towards human and aquatic organisms even at low concentrations levels (µg/L and ng/L). Despite the numerous adverse endocrine-disrupting effects linked to the EDCs in aquatic organisms, comprehensive risk and ecotoxicity assessment are not well elucidated especially towards native tropical species bioindicators. In this study, the toxicity of bisphenol A, and diclofenac was investigated using Moina micrura which is a representative native tropical freshwater organism's model. Various endpoints in the different biological organizations were assessed such as organ (heart beat, heart size), individual (growth size) and population (lethal concentration 50, LC50). The order of toxicity based on the LC50 values was as follows: diclofenac > BPA. Results showed that the heart beat, heart size and growth size were decreased under both BPA and diclofenac exposure. Species Sensitivity Distributions (SSDs) shows that M. micrura was more sensitive than species commonly used in ecotoxicological studies, such as the fish (Danio rerio) and other cladocerans (Daphnia magna and Daphnia similis). Thus, M. micrura is a suitable bioindicator for evaluating endocrine-disrupting compounds contamination. Furthermore, the incorporated method combining the response in organ, individual and population can comprehensively interpret the toxic effect of EDCs, thus provide more understanding of the mechanism of toxicity in aquatic organisms.

ENV-15

Presence of Selected Toxicants in *Litopenaeus* Sp. Shrimps at Local Markets in Johor Bahru and Its Health Risk Assessment

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The demand for *Litopenaeus* sp. (white shrimps) has been increasing in Malaysia, attributable to its high protein content. Since contamination by toxic metals in aquatic organisms has been indicated, continuous monitoring of such toxicants as well as performing health risk assessment for consuming *Litopenaues* sp. shrimp sold at the different levels of supply chain (landing sites, major markets, and local grocers) in Johor appears imperative. A Perkin-Elmer Analyst PinAAcle 900T atomic absorption spectrometer equipped with graphite furnace (GFAAS) and autosampler was used for quantitating the concentrations of As, Pb, and Cd, while flow injection mercury/hydride system (FI-MHS) was utilized for analyzing the total Hg. The mean concentration of As, Pb, Cd, and total Hg in the shrimp (dry weight) during the four months of sampling ranged between 0.13-117.90 mg/kg, 0.03-0.52 mg/kg, 0.2-0.46 mg/kg, 0.12-1.14 mg/kg, respectively. The concentration of As in all samples collected during September 2020 exceeded the maximum permitted proportion as prescribed by the Malaysian law, while the high concentration of Hg was detected in samples collected from markets A and B. Samples from markets A and B (landing sites) appeared as highly contaminated when compared with other sampling sites. Since the Total Hazard Quotient and Hazard Index values for As in samples from markets A and B exceeded 1, the possibility of these contaminated shrimps causing a greater negative effect on human health cannot be neglected. The data provided here may prove useful for the relevant health authority to construct suitable intervention remedies for benefiting the community.

Keywords: *Litopenaeus* sp. shrimp, Toxic metal, Health risk assessment, Graphite furnace atomic absorption spectrometer, Flow injection mercury/hydride system.

ENV-16

Heavy Metals Concentration in *Perna Veridis* Collected from Straits of Johor, Malaysia

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Perna viridis or green mussel are one of the commercially valuable seafood that rich in protein and mainly cultured in Straits of Johor. Over the years, industrial activities and urban development around Straits of Johor keep increasing, which may cause heavy metal pollution issues in the aquatic environment. Therefore, this study was carried out to determine the heavy metals concentration in *Perna viridis* collected from Straits of Johor and estimate the pollution level using this species as a bio-indicator. A total of 45 samples were collected and the concentration of the metals was detected using Inductively Couple Plasma Mass Spectrometry (ICP-MS). Teflon Bomb digestion method with HNO_3 acid was used to digest the samples. Generally, the concentration of heavy metals in *Perna viridis* was as follow; Zn > Cu > Pb > Cd. By analysing the correlation between size and heavy metals concentration, the correlation value showed that mussel size is not the main factor controlling the heavy metal concentration. On the other hand, there is no significant correlation among the selected heavy metals, which means the selected heavy metals may not come from the same source. The level of pollution was evaluated by using the Pollution Load Index (PLI) and the value showed the study area was no or minor heavy metal pollution. The data obtained in this study can be used as baseline data and to evaluate the metals contamination and impact of human activities on the marine environment in the future.

Keywords: *Perna veridis*, heavy metals, Straits of Johor, ICPMS

ENV-17

Seasonal Variation of Inorganic Nutrient and Dissolved Greenhouse Gases Concentration in the Oligotrophic Tropical Lake Kenyir, Malaysia

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This study evaluates the dynamic of dissolve carbon dioxide (CO_2) and methane (CH_4) distribution patterns in Kenyir Lake, aiming for a better understanding of the physical processes controlling internal loading of CO_2, CH_4 and nutrients in one of the largest freshwater lakes in Malaysia. The distribution of CO_2, CH_4, nutrients and physicochemical parameters in the water column of Lake Kenyir was determined from Nov 2017 to Nov 2018. The study showed the level of thermal stratification in the Kenyir Lake varied at different times of the year. The hypolimnion often remains around 3-6°C cooler than surface water temperature (range:28-32°C) throughout the year. Throughout the wet period, the Schmidt stability index and Lake Number were greatly reduced indicating the water in the epilimnion to mix deeper with the hypolimnetic water through the metalimnion, however lake turnover does not occur during this study. As Kenyir Lake is always thermal stratified, this situation will lead to the CO_2, CH_4 and inorganic nutrients accumulation at the bottom of the lake. Spearman's correlation study shows addition of nitrogen and phosphorus-based nutrients could result in an increase of CH_4 production in the lake. Stronger linear effect of CH_4 on the CO_2 during the dry period (r^2=0.85) compared to wet period (r^2=0.46) was also evident, suggesting that the methane oxidation process could induce almost 85% CO_2 production in lake water during the dry period.

ENV-18

A Comparative Study on Groundwater Nitrate Pollution between Four Villages in Bachok District, Kelantan State, Malaysia

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INTRODUCTION: Nitrate pollution of groundwater is a problem especially in agricultural areas. Users who rely solely on groundwater sources are exposed to nitrate that seep from adjacent agricultural areas or septic tanks that are built very close to the water source. In Malaysia, the maximum acceptable level of nitrate in water used for drinking is 45 ppm (in NO_3^-). **METHODOLOGY:** This study was conducted in January 2019 in four villages in Bachok district, Kelantan state, namely Keting, Kuchelong, Telaga Ara and Bukit Bator villages. These villages were chosen as they were located near paddy fields, and some homes may also have animal enclosures. Wells used for drinking and cooking purposes were selected for nitrate determination, Houses using other source of water and with installed water purification system were excluded from this study. Data was collected during the harvest season of October and November of 2018 and three replicates of water samples were analysed for nitrate using a multimeter with an attached nitrate electrode. Distance of nitrate source from wells were calculated using coordinates from global positioning system (GPS) readings. **RESULTS AND DISCUSSION:** A total of 181 wells were selected after fulfilling a few inclusive and exclusive criteria. The number of wells analysed based by villages were Kuchelong with 43 wells, Keting with 36 wells, Telaga Ara with 57 wells and Bukit Bator with 45 wells. Nitrate concentration in Kuchelong village ranged from 0.09 to 8.12 ppm with a mean of 0.74 $\pm$ SD 1.82 ppm, in Keting village ranged from 0.81 to 28.8 ppm with a mean of 3.76 $\pm$ SD 5.49 ppm, in Telaga Ara village ranged from 0.95 to 43.0 ppm with a mean of 8.34 $\pm$ SD 7.70 ppm and Bukit Bator village ranged from 0.61 to 25.10 ppm with a mean of 3.61 $\pm$ SD 1.88 ppm. At a glance, nitrate readings from all four villages did not surpass the maximum acceptable limit of 45ppm; Spearman's Rho analysis found no significant relationships between nitrate concentration and variables such as age and depth of well, as well as distance from nitrate source ($p>0.05$). **CONCLUSION:** All well sampled in the study area have nitrate with concentrations below the maximum acceptable level. Steps such as periodical sampling and analysis of well water should be performed to ensure nitrate remains low for the sake of residents' health.

Keywords: Nitrate, groundwater, agricultural, Bachok, paddy fields

ENV-19

Source Characterization of Nitrogen in Urban Stormwater Runoff Using Dual Isotopes and Mixing Models

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Enrichment of nitrogen (N) in stormwater runoff has been recognized as a leading factor that leads to quality degradation of urban waters. Stormwater runoff was monitored in an urban residential watershed in Bradenton, Florida, to investigate the sources, and temporal trends for N. In the wet season from May to September 2016, a total of 220 water samples (22 storm events) were collected during from the inlet of a stormwater wet pond that had been installed with an autosampler and flow meter. The $\delta^{15}N–NO_3^-$ of stormwater runoff samples (n=148) ranged from –9.72‰ to 8.06‰ (mean: 1.02‰), whereas $\delta^{18}O–NO_3^-$ of stormwater runoff samples ranged from –9.19‰ to 59.70‰ (mean: 26.93‰). The $\delta^{15}N–NO_3^-$ and $\delta^{18}O–NO_3^-$ in rainfall samples (n=12) ranged from –4.43‰ to 5.69‰ (mean: –0.53‰) and 36.70‰ to 67.08‰ (mean: 60.52‰), respectively. The variation of $\delta^{15}N–NO_3^-$ and $\delta^{18}O–NO_3^-$ value in our runoff samples might be attributed to the changes in sources of atmospheric NO_3–N and mixing of NO_3–N from different sources in the watershed during storm events. Bayesian stable isotope mixing model showed that NO_3-N in our stormwater samples was derived from the mixing of multiple sources with atmospheric deposition as the dominant NO_3-N source (34.9%) followed by NO_3^- fertilizer (24.7%), NH_4^+ fertilizer (17.2%), nitrification (14.8%), and soil and organic N (8.4%).

ENV-20

Heavy Metal In Different Size Fractions Of Household Dust Collected From Rural Residential Area Of Simpang Renggam, Johor

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A study has been carried out to investigate the concentrations of selected heavy metals in household dust collected from seven rural residential homes within the area of Simpang Renggam, Johor. All dust samples were sieved through 200 µm before analysis. Additionally, two dust samples with sufficient masses (Sample A and B) were further separated into four discrete fractions (<63 µm, 63-75 µm, 75-150 µm and 150-200 µm). All samples were acid digested with nitric acid and analyzed for Al, Cr, Mn, Ni, Zn, Cu, Cd, Ba, Pb, Mg and Fe by using Inductively Coupled Plasma - Mass Spectrometer (ICP-MS). Results showed that the mean concentrations of metals in <200 µm dust ranged between 0.027 mg/kg to 8500 mg/kg. Fe and Al were the most abundant metals, with lower concentrations measured in finer particle size. For Mn, Mg, Cu, and Zn, higher levels were measured in coarser particle size. Health risk estimation indicated Hazard Index (HI) values lower than 1, suggesting no non-carcinogenic risk to the occupants via ingestion, inhalation and dermal absorption pathways.

ENV-21

An Improved Method for Multiclass Emerging Organic Contaminants in Tropical Marine Biota Using QuEChERS Extraction Followed by LC MS/MS

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Marine biota is one of the important components of an ecosystem, and it has been widely used as a pollution indicator for emerging organic contaminants (EOCs) in the coastal zone. Previous studies divulged the concentration of EOCs in various types of biota matrices at trace level detection. Considering various matrix interferences for EOC analysis in marine biota, a combination technique of QuEChERS and solid phase extraction cleanup with detection based on liquid chromatography with tandem mass spectrometry (LC MS/MS) is presented in this study. A method for 16 compounds grouped into four different classes, namely, pharmaceutically active chemicals, phenolic endocrine disrupter compounds, estrogenic hormones, and pesticides, was developed and validated for biota extraction. Satisfactory extraction was obtained for the optimized method with percentage of recovery from 64% to 114% and excellent sensitivity with detection limit in the range of 0.02–3.50 ng/g. Linearity of the standards (in the solvent) in the LC MS-MS analysis ranged from 0.991 to 0.999. The relative standard deviation for intra-day and inter-day repeatability was less than 20%, indicating good-precision analysis. Assessment on the matrix effects showed ionization suppression for all the developed compounds. The developed method was verified by analyzing biota matrices collected from the Klang River estuary. Trace concentrations of EOCs, ranging from 0.05 to 10.76 ng/g, were found in those matrices. Of the 16 targeted compounds, 10 were detected, namely, diclofenac, bisphenol A, sulfamethoxazole, amoxicillin, E2, E1, progesterone, testosterone, primidone, and 4-octylphenol. The other compounds were below the method detection limit.

ENV-22

Adsorptive Removal of Methylene Blue via Banana Trunk Derived Activated Carbon (BTAC)

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In this study, the banana trunk derived activated carbon (BTAC) was prepared via zinc chloride ($ZnCl_2$) activation. BTAC used as an adsorbent for the removal of methylene blue (MB) from an aqueous solution. The BET surface area, total pore volume and pore diameters of the BTAC were 1329.5 m^2/g, 1.16 cm^3/g and 3.8 nm, respectively. Adsorption isotherm, kinetics and thermodynamic studies were developed to design the model for MB removal. Adsorption isotherm data were analysed by Langmuir, Freundlich, Temkin and Dubinin–Radushkevich isotherms model. It was found the Langmuir model presented the best fit to the experimental data with the correlation coefficient, R^2=0.9998. The maximum monolayer adsorption of MB onto BTAC was calculated to be 217 mg/g. Pseudo-first-order (PFO), pseudo-second-order (PSO) and Weber–Morris intraparticle diffusion (IPD) model were used to analyse adsorption kinetics data. The regression results showed that a PSO model more accurately represented the adsorption kinetics. While the plot of q_t versus $t^{1/2}$ for the IPD model represented multi-linearity and proved that the adsorption processes occurred more than one step. For the thermodynamic study, the free energy changes (ΔG°), enthalpy (ΔH°) and entropy (ΔS°) were evaluated between temperatures of 30 to 45 °C. The ΔG° values were negative and the overall adsorption process was determined as spontaneous and endothermic. The results from this study suggested that BTAC could be a viable adsorbent in managing higher concentrations of dyes from water and wastewater.

ENV-23

Application of Arduino Microcontroller for the Preparation of Homemade Auto-titrator

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This project is a final year project designed to provide undergraduate students with skills in building laboratory apparatus using Arduino Uno microcontroller. This project helped students to understand the actual process behind designing a prototype to solve the problems related to chemistry. We started this project by requesting the student to design an automated device to improve the conventional manual titration for the food industry using a low-cost Arduino UNO Microcontroller. The student managed to design and build an auto-titrator for acid-base titration. This auto-titrator was utilizing a pH probe as a sensor. It consists of 2 main electronic circuits that recording the changes of pH during titration and controlling the solenoid valve. A solenoid valve was used to dispense the titrant into droplet form during titration. Through Arduino Uno Microcontroller, the pH values were recorded in an Excel sheet, and the endpoint was calculated.

ROOM 2

Natural Product (NAT)

Organic & Inorganic Synthesis (SYN)

Separation Science (SPE)

NAT-1

Effects of Drying Processes on Lysine, Leucine and Glycine Content in Wild *Ulva lactuca* for Cosmetic Purposes

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This study aims to evaluate the effects of different drying processes on the amino acid quantity and quality in green algae, *Ulva lactuca,* collected from Merambong coast, Pontian Johor for utilisation in the future for cosmetic purposes. The effects of different drying processes (sun-dry and air-dry) on the amino acids content were screened using High Performance Liquid Chromatography (HPLC). Amino acids were extracted following the treatment combinations of different drying processes, analysis of moisture content, determination of protein using Kjeldahl method, removing of pigments and lipids, and extraction procedure for fats and colours using Soxtec system. The results of the protein analysis of *U. lactuca* shows that the dominant percentage of protein crude in the proximate analysis of *U. lactuca* was higher using the air-dry method (10.116 %) rather than sun-dry method (9.811 %). Moisture, pigments and lipids content were observed about 26.0925 % and 4.5471 % for the sun-dry method while 18.9346 % and 10.5167 % for the air-dry method respectively. Both drying methods somehow indicates the same percentage value for fats and colour content (1.19 %) as reported by National University of Malaysia (UKM). The suggested drying method to extract higher selected amino acids content was determined by using the sun-dry method for leucine (7.587 %) and lysine (5.405 %), while glycine was found to be more favoured by using the air-dry method (7.249 %) based on the Total Amino Acids (TAAs) obtained.

Keywords: *U. lactuca*; extraction; amino acids; lysine; leucine; glycine; drying processes

NAT-2

Metabolite Profile of Marine Polychaete Based on ATR FTIR and ^{1}H NMR Metabolomics

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Marine polychaete is an important component in marine benthic communities that can be found widely in Malaysia. In spite of their potential as natural resources of new drugs, however, there are limited studies regarding its chemical constituents. Hence, this research aims to evaluate the metabolite profile of the marine polychaete *Diopatra claparedii* and *Marphysa moribidii* via ATR-FTIR and ^{1}H NMR metabolomics. The principal component analysis (PCA) score plot showed distinct clusters between *M. moribidii* and *D. claparedii*. Further investigation via PCA loading plot showed that the wavenumbers at 3340, 2940, 2854, 1090, 1047 and 880 cm^{-1} were the characteristics of *D. claparedii* while the wavenumbers at 2900, 1726, and 1640 cm^{-1} appeared to be more prominent in *M. moribidii*. Similar result was also observed in ^{1}H NMR metabolomics that showed the separate clusters of both polychaetes. According to the partial least square discriminant analysis (PLS-DA) loading plot, the metabolites such as phenylalanine, 4-hydroxyphenyllactic acid, 2-bromophenol, tribromophenol, and some organic acids were found to be higher in *D claparedii* while fatty acid, glucose and lactate were more prominent in *M. moribidii*. The findings of this study may provide the key importance metabolite fingerprint of different marine polychaete (*D. claparedii sp.* and *M. moribidii*) that will be useful for the future research.

NAT-3

Exploring the Volatile Oil Profile in Characterization of Ginger Produce from Bentong Region by Chemometrics

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Ginger (*Zingiber officinale* Roscoe) is a valuable agriculture produce where the nutritional medicinal and nutritional qualities are subjected to composition variation that believed to be associated with its geographical origin. Considering the consumer preference towards premium gingers originated from Bentong region, this study attempts to examine the volatile oil profiles of Bentong and non-bentong produce that derived from hydrodistillation and gas chromatography-mass spectrometry. Based on the chromatography data, α-zingiberene, neral, eucalyptol, camphene, α-farnesene, β-sesquiphellandrene, α-pinene, ar-curcumene, and β-mycrene were generally the major volatiles. Further exploratory data analysis by principal component analysis and hierarchical cluster analysis revealed the clustering tendency of Bentong produce by prevalent oxygenated monoterpenes/monoterpenoids whereas non-Bentong produce by sesquiterpenes/sesquiterpenoids. This generally reflected the relationship between ginger quality and terpene/terpenoid variability which would be useful for authentication purposes.

NAT-4

Xanthones from *Garcinia mangostana* Extracts against Clinical Isolates of Methicillin-resistant *Staphylococcus aureus* (MRSA)

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Gracinia mangostana (mangosteen) is referred to as a queen of fruits owing to its pleasant flavour and medicinal benefits. The medicinal value of this pericarp mangosteen including, antifungal (Narasimhan et al. 2017), antioxidant (Tjahjani et al. 2014), anti-inflammatory (Herrera-Aco et al. 2019) and antibacterial (Koh et al. 2013). In this study, the antibacterial properties of two extracts of mangosteen pericarp against Gram-positive and Gram-negative pathogens were investigated. Mangosteen extracts (methanol and acetone) exhibited potent antibacterial activity (MIC=3.9-7.8 mg/mL) with great selectivity against clinical isolates MRSA respectively. However, these extracts were inactive towards Gram-negative bacteria. These extracts also correspond to different value of total phenolics (8.7-31.7 mg/mL) and antioxidant activity (0.135-0.245 mM Fe^{+2}). The presence of five major xanthones in these extracts, including a-mangostin, 3-isomangostin, gartanin, 9-hydroxycalabaxanthone and 8-desoxygartanin were confirmed via UHPLC analysis. Thus, we suggest the xanthones from mangostin can be utilized as antimicrobial agents an option in the need of isolating a single compound.

Keywords: *mangosteen, MRSA, xanthones, LCMS*

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NAT-5

Comparative Studies on the Release Behaviours of *Gallic Acid* and *Eurycomanone* as an active ingredients in Herbal Supplement

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Mixtures of herbs in herbal supplement allow them to bind together, regulate the release of the active ingredients and hide the bitter taste. The release rate of active ingredients was affected by the media solution and time. The objective of this study is to evaluate the release behaviour of active ingredients when submitted to different media (0.1 M HCl, 30% EtOH, acetate buffer (pH 4.8) and phosphate buffer pH 6.8) at different time using dissolution apparatus. The aliquots were collected at 15 minutes time interval for duration of 105 minutes. The dissolution activity of each group in both herbal supplements namely Kacip Fatimah (samples I, II, III) and Tongkat Ali (samples TA, TB, TC) were compared. The aliquots sampling which contain *Galic acid* and *Eurycomanone* were quantified using a reverse-phase HPLC. Pure standard of Kacip Fatimah (V) and Tongkat Ali (TS) were used as a benchmark. Results obtained indicate that the release behaviour for all samples were varied, however amongst those, sample labelled as I and TA showed the highest release rate of *galic acid* and *eurycomanone* in an acidic medium (0.1 M HCl), respectively after 30 minutes. Meanwhile, sample labelled as TC showed the lowest released rate of *Eurycomanone*. HPLC results showed that content of *Gallic acid* in sample I and the content of *Eurycomanone* in sample TA was the highest. The acidic media was found to be the appropriate medium to determine the release behaviour of active ingredients for both groups ranging from 20 to 60 minutes.

NAT-6

Antioxidant and Antiviral Assessment of Microalgae *Chlorella* sp. UKM8 Methanolic Extract

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Microalgae are good potential source for the exploration of new, cost-effective, safe, and potent free-radical scavenging compounds and antiviral therapeutics. This study aimed to investigate the antioxidant and antiviral properties in local microalgae, *Chlorella* sp. (UKM8). The methanol extract (ME) from the biomass of *Chlorella* sp. UKM8 (UKM8-ME) were prepared and tested for the radical scavenging activity (RSA) according to the elimination of DPPH radicals and total phenolic content (TPC) by the Folin-Ciocalteu reactions. Gallic acid was used as the positive control in RSA. The antiviral activity of UKM8-ME was evaluated using plaque reduction assay against Human Herpes Virus HHV 1 strain. In DPPH, IC50 of positive control and UKM8-ME were 106.55± 7.91 and 198.78±14.35 µg/mL, respectively. The TPC value was 254.793± 3.31mg GAE g−1. UKM8-ME was capable of inhibiting viral replication by 50% (EC50) at 222.33± 24.54 µg/mL. Results revealed the excellent quality of antioxidant properties in UKM8-ME. This is the first report on the unique natural antioxidant and antiviral properties of the UKM8-ME. The extract possesses remarkable potential as a natural antioxidant and antiviral for further use in the pharmaceuticals.

Keywords: Antioxidant, Antiviral, Chlorella, biomass, extraction

NAT-7

Indole Alkaloids from *Kopsia arborea*

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A phytochemical investigation on the bark extract of the Malayan *Kopsia arborea* led to the isolation of three new indole alkaloids, viz., arbophyllidine, a monoterpenoid indole alkaloid characterized by a previously unencountered carbon-nitrogen skeleton, and arbophyllinines A and B, two pentacyclic corynanthean alkaloids incorporating a hydroxyethyl-substituted tetrahydrofuranone ring. The structures of the alkaloids were determined based on analysis of the MS and NMR data. The absolute configuration of arbophyllidine was established based on comparison of the experimental and calculated ECD data, while that of arbophyllinine A was determined by X-ray diffraction analysis (Cu Kα). A plausible biosynthetic pathway to arbophyllidine is presented. Arbophyllidine displayed in vitro growth inhibitory activity against the HT-29 human cancer cell line with IC_{50} 6.2 μM, while arbophyllinine A was found to be ineffective (IC_{50} > 30 μM).

SYN-1

Synthesis of Quinolactacin Derivatives via Diels – Alder Reaction

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Quinolactacins are rare fungal alkaloids obtained from a culture broth of penicillium species, isolated from larvae mulberry pyralis (Margonia pyloalis Welker). Synthesis of such natural alkaloids has gained interests among many researchers due to the unique quinolone skeleton conjugated with γ-lactam ring. These alkaloids are also proven to exhibit inhibitory activity against tumor necrosis factor (TNF) production. The synthesis began with the formation of the key pyrrolidine-2,4-dione intermediates *via* Meldrum's acid mediated reaction and tetramic acid cyclisation of different amino acids. The diketo intermediates then underwent consecutive reduction and elimination reactions to form hydroxy and enone analogues, respectively. The enone analogues could subsequently react with an amine-substituted diene by aza Diels-Alder reaction to form the anticipated 4-pyridone-lactam moiety with different substitutions. Even though aza Diels-Alder reactions could assist in forming a tricyclic compound in a short step, the availability of amine-substituted dienes is limited. Thus, a synthesis of quinolactacin derivatives was performed *via* an alternative route in which the key pyrrolidine-2,4-dione underwent acylation with 2-nitrobenzoyl chloride to obtain an acylated tetramic acid, and hydrogenation to furnish the final quinolactacin derivatives. A multicomponent reaction of diethyl oxaloacetate salt with aldehydes and amines is another synthesis option in this study to synthesize derivatives of quinolactacin. All synthesized compounds in this work were analyzed and confirmed by nuclear magnetic resonance (NMR) and infrared (IR) spectroscopy.

SYN-2

Mechanochemical-Synthesis and Morphological characterization of Copper-Isonicotinate Metal-Organic Frameworks Crystal for Beta-agonist Removal

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Beta-agonist residues are among the toughest micro-contaminants compounds to be removed from the environment waters especially with their constant daily introduction and their polarity, which favours their spread in water. This study attempts to utilize Copper (II) isonicotinate metal–organic frameworks (MOFs) as an alternative removal adsorbent due to their high surface area and porosity. The MOFs were synthesized using solvent-free method termed as the mechanochemical synthesis for the pre-heated and non-pre-heated samples of the MOFs. The crystallinity and the surface functional groups of the MOFs were ascertained and indicated by X-ray diffraction (XRD) and Fourier transformed infrared spectroscopic (FTIR) analysis, respectively. A rough surface of the bar-like particles of its morphology was observed by Scanning Electron Microscopy (SEM), while corresponding surface elemental compositions comprising of C, Cu, O and N were examined by Energy Dispersive X-ray spectroscopy (EDX). Thermogravimetric analysis (TGA) has indicated the thermal stabilities of the MOFs. From this initial observation, the good properties of the MOFs were established and should offer a great potential to be applied as an adsorbent for beta-agonist removal and remediation in environmental water samples.

SYN-3

Synthesis of new β-Carboline Derivatives as Potential Chemotherapeutic Agents

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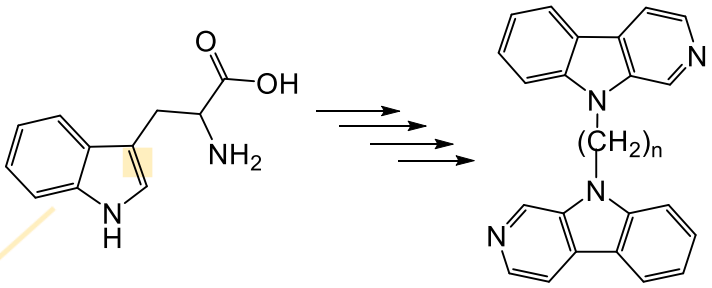

Current conventional chemotherapeutic agents in cancer therapy have several drawbacks that limit their effectiveness, such as multidrug resistance of tumour cells and toxicity to the normal cells. Recently, many studies had shown great interest in β-carboline derivatives as they have been reported to demonstrate excellent anticancer activities. β-carboline is known as an indole alkaloid with an indole structure fused to a pyridine ring. Therefore, this study was aimed to synthesize various new β-carboline derivatives with different substitutions in position-2 and -9 in four synthesis steps with good yields. The preliminary structure-activity relationships indicated that substituents in position-2 and -9 of the β-carboline ring could enhance the anticancer properties. A new method was established to synthesize β-carboline derivatives from starting from L-tryptophan using the Pictet-Spengler reaction. The new β-carboline derivatives were structurally elucidated using ^{1}H-NMR and APT-NMR. In short, the synthesized new β-carboline derivatives are expected to elicit good anticancer activity, which suggested their potential to be developed as chemotherapeutic agents.

SYN-4

Review on Influence of the Preparation Method on the Catalytic Activity of MgAl Hydrotalcites as Solid Base Catalysts Synthesis

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Hydrotalcite is an anionic clay which is a naturally occurring mineral of chemical composition $Mg_6Al_2(OH)_{16}CO_34H_2O$, exhibits a layered crystal structure. Hydrotalcites is classified as heterogeneous catalyst gives a good separation of catalyst after the reaction occurred. In addition, hydrotalcites also an environmentally friendly catalyst and commercially available. The discovery of hydrotalcites in organic synthesis reactions have attracted many researchers. They are regarded as important solid base materials for a good number of organic reactions such as Aldol condensation reaction, Knoevenagel reaction, Claisen-Schmidt reaction, Michael addition and others. This review deals with the synthesis of MgAl hydrotalcites with different ratio of Mg/Al used for the preparation of catalyst. This review also highlighted the characterization of MgAl hydrotalcites using Powder X-Ray Diffraction (PXRD), Scanning Electron Microscopy (SEM), Thermogravimetric Analyzer (TGA), N_2 adsorption-desorption and Fourier Transform Infrared (FTIR) Spectroscopy. These instruments were used to identify the catalyst's physiochemical properties including crystallinity, surface area, pore size, morphology and also the basicity and acidity of the catalyst using CO_2-TPD.

SYN-5

Synthesis, Characterization and Catalytic Performance of Polystyrene Supported Palladium(II)-Hydrazone Ligand Functionalized with Electron Donating Group (CH_3) as Catalyst in Heck Reaction

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Polystyrene as polymer support has various requirements of catalysts for different chemical reactions due to its accessibility, mechanical robustness, product selectivity, chemical inertness and facile functionalization. This study focus on the synthesis of polystyrene supported palladium(II)-hydrazone ligand functionalized with electron donating group (-CH_3) as catalyst in Heck reaction. The synthesis started with the modification of chloromethylated polystyrene with aldehyde functionality to form PS-CHO. The reaction was continued by the reaction of PS-CHO with p-toluic hydrazide to form polystyrene anchored hydrazone (PS-H(CH_3)). Then, the PS-H(CH_3) was reacted with palladium(II) chloride to form polystyrene supported palladium(II) hydrazone catalyst which is PS-Pd(CH_3). The synthesized compounds were confirmed by using FTIR, BET surface area analysis, TGA, CHN elemental analysis, PXRD, FESEM-EDX and AAS. The catalyst PS-Pd(CH_3) was tested in the Heck reaction between 1-bromo-4-nitrobenzene and methyl acrylate. The catalytic performance of PS-Pd(CH_3) were determined by using GC-FID. The optimum conversion rate was 49.15% with the presence of 1.0 mmol% catalyst loading, Na_2CO_3 as a base and DMA as solvent at 165 ° C within 60 min reaction time.

SYN-6

Synthesis, Characterisation and Biological Studies of Zinc-Chelate Conjugated Gold Nanosphere

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A zinc chelated conjugated gold nanosphere (AuNS-TA-ZnS) has been prepared by conjugating zinc(II) salophen, a zinc complex of Schiff base with functionalized gold nanosphere. Schiff base is widely use as sensors, catalyst[1] and possess anticancer properties[2] after chelation with zinc(II) ion. However, the impact of conjugating metal complexes to gold nanoparticles is not widely investigated. In this study, the chemical properties, binding properties with proteins and biological activities of the newly synthesized AuNS-TA-ZnS were investigated. It aims to provide a better understanding on their role in drug delivery and anticancer property. Interaction with bovine serum albumin (BSA) shows that AUNS-TA-ZnS would not alter the conformation of BSA. Cytotoxicity study with MCF-7, MDA-MB-231, MDA-MB-468 and Caco-2 cells suggests that AuNS-TA-ZnS is more cytotoxic than zinc(II) salophen.

SYN-7

Thermal Decomposition of Calcium Carbonate in Chicken Eggshell: Study on Temperature and Contact Time

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The disposal of millions of tons of eggshell waste created each year is a critical environmental concern. Within the context of a circular economy, the recycling or valorization of eggshells, which are typically discarded in landfills, represents an opportunity. The major compound in eggshells is calcium carbonate and can be decomposed into calcium oxide by the calcination process. This study was conducted to examine the calcination conditions (temperature and contact time) for the optimum calcium carbonate decomposition rate. The eggshells samples were pre-treated to eliminate dirt and unnecessary biological substance, grounded into powder form, and sieved. The primary physical and chemical characteristics of eggshell powder such as color changes, mass loss, bulk density, moisture content, pH, thermal properties, and identification of chemical bonds and compounds in a molecule were studied. From the physical observation, the results showed significant differences in the color transition of the samples at various temperatures and contact times. TGA analysis showed eggshell powder decomposed at a temperature range of 600oC to 900oC. FTIR results reported that the grey color of calcined samples consists of calcium carbonate while solid white powder consists of metal oxide content. There are similar seven diffraction peaks reported in XRD analysis for calcination at 900oC and industrial calcium oxide. Calcined eggshell powder at temperature 900oC for 3 hours contact time was identified as an ideal condition for decomposition of raw eggshell powder based on FTIR and XRD analysis. Both results showed there is calcium oxide corresponded to the wavelength spectrum and diffraction analysis of the sample.

Keywords: calcium carbonate, calcium oxide, eggshell, calcination

SYN-8

The Conjugation of Ternatin Biomolecule with Polyethylene Glycol (PEG) Enhanced Conjugates Solubility and Stability: Synthesis and Physicochemical Characterization

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Ternatin, a highly N-methylated cyclic heptapeptide has promising potential for cancer treatment. However, its efficiency in biological treatment is limited due to its poor water solubility and stability. In this present study, Ternatin- Polyethylene glycol (PEGs) conjugate, Ternatin-PEGs, were synthesised by direct esterification between the carboxyl group of methoxy polyethylene glycol, mPEGs-COOH ($mPEG_{5kDa}$, $mPEG_{10kDa}$, and $mPEG_{20kDa}$) and the hydroxyl group in the β-position of the Ternatin biomolecule to enhance its solubility and stability in the aqueous solution while retaining its inherent anticancer properties. To this end, Ternatin-PEGs linked through ester bond was further confirmed using various analytical technique including FTIR, UV-Vis Spectroscopy, HPLC and H-NMR. Importantly, in the solubility and stability studies, the highest solubility of Ternatin biomolecule was found to be 14.33% higher in Ternatin-PEG_{20kDa} conjugate than free Ternatin. Meanwhile, the stability studies exhibited that Ternatin-PEG_{20kDa} conjugate decreases the percentage of degradation of Ternatin by 2.3-fold lower than free Ternatin. Ultimately, the enhanced properties of Ternatin by a method of conjugation with mPEGs will provide new insight into cancer treatments to improve its biological properties by improving its solubility and stability in aqueous solution compared to that of the free Ternatin molecule.

Keywords: Polyethylene glycol, Ternatin, Esterification, Solubility and Stability

SYN-9

Effect of Plant Organs of *Ficus deltoidea* Plant in the Synthesis of Silver Nanoparticles

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The effect of different plant organs (leaf, stem, fig and root) extracts of *Ficus deltoidea* var. *kunstleri* (King) Corner (Mas Cotek) in the synthesis of silver nanoparticles (AgNP) was studied. The plant analysis using Liquid Chromatography Mass Spectrometry yields more than 100 phytochemical compounds in each organ, of which around 50% belong to the phenolic compounds. The biomarker compounds (vitexin and isovitexin) are only found in the leaf, and the antioxidant property was observed the highest in fig compared to other organs. The Localized Surface Plasmon Resonance (LSPR) for the biosynthesized AgNP using all organs was found at 409 to 428 nm. The capping and stabilization of AgNP by phytochemical compounds was verified by Fourier Transform Infrared Spectroscopy as the vibration and stretching of amide, -OH, -CH3, - CH2, -CH (alkane), C=O and -OH (carboxylic) functional group were found. There are phytochemical compounds in high abundance in each organ which are gallic acid, kaempferol-3-(6''-caffeoylglucoside), quercetin-3-O-rhamnoside and kaempferol 3-(3'',4''- diacetylrhamnoside) in leaf, stem, fig and root, respectively. These compounds belong to the phenolic and flavonoid groups on which have known to have the capacity to synthesis Ag^{+} to AgNP. The results showed *F. deltoidea* is a good potential green synthesis source material for AgNP production.

Keywords: *F. deltoidea*, biosynthesis, silver nanoparticles, plant organs

SYN-10

Synthesis and Characterization of Amino-functionalized Zirconium-based Metal-organic Framework

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Metal–organic framework (Zr-MOF) materials have recently attracted considerable interest due to their remarkable chemical and mechanical stabilities, which will facilitate their industrial application such as gas adsorption, gas separation processes, chemical sensing, energy storage, homogenous and heterogeneous catalysis, and drug delivery. Therefore, in this study a new sorbent namely amino-functionalized zirconium-based metal organic framework (Zr-MOF-NH_2) was synthesized and characterized. Amino-functionalized zirconium-based metal-organic framework (UiO-66-NH_2) was prepared by reflux method and characterized by using X-ray diffraction (XRD), Fourier Transform Infrared (FTIR), and Thermogravimetric Analysis (TGA) to elucidate the effect that varying the degrees of amine functionalization has on the stability (thermal and chemical) and porosity of the framework. UiO-66-NH_2 was synthesized effectively and this was confirmed by XRD result that the desired product with characteristic peaks of UiO-66 appeared at 2θ = 7.626, 8.765. Furthermore, the FTIR spectra appeared similar to the spectrum reported in the previous study where the appearance of an absorption band at 1589 cm^{-1} indicated that carboxylic group reacted with Zr^{4+} ions. Meanwhile the band of 1477 cm^{-1} represent the alkene (C=C) in the aromatic bond and the peak at 3391cm^{-1} is of amine (NH_2) on the organic linker which confirms that amine-functionalized MOFs was synthesized successfully. In addition, the TGA profile indicated that the weight loss at a temperature greater than 303 °C can be attributed to the decomposition of the material. It could be inferred from the plot that the particles were thermally stable up to 450 °C. This was confirmed that amino-functionalized zirconium-based metal-organic framework was successfully synthesized.

Keywords: Metal-organic frameworks, sorbents, X-ray diffraction (XRD), Fourier Transform Infrared (FTIR), Thermogravimetric Analysis (TGA).

SYN-11

2-Acetylpyrazine Thiosemicarbazone as Multifunctional Food Spoilage Inhibitor: Insights from Tyrosinase Kinetic, Microbial Activity and Computational Approaches

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Nowadays, the demand of high-quality food has increased among the consumers. However, their appearance and color are the critical factors during food purchasing. Therefore, maintaining of their shelf life has become a challenge to food industries. Chemical and biological oxidation have been identified as the main factors that affect the food quality. In this study, 2-acetylpyrazine thiosemicarbazone (2APT) has been synthesized, and characterized using spectroscopy methods. Based on the IC_{50} obtained, it shows that 2APT was significantly inhibited tyrosinase activity (chemical spoilage) at 8 µM concentration. Kinetic study shows that 2APT was a mixed-type inhibitor with K_m and V_{max} value were 8.20 mM and 0.013 µM/min, respectively. 2APT also inhibits *E. coli*, *B. cereus*, and *C. albican* at concentrations of 1.4 ± 0.1 cm, 1.6 ± 0.1 cm, and 1.2 ± 0.1 cm, respectively. In the light of these study, we performed in silico study involving Reduced Density Gradient (RDG), Molecular Electrostatic Potential (MEP) and molecular docking simulation technique. RDG used to find the weak non-covalent interaction (Van der Wall interaction) and strong repulsion (steric effect) of the 2APT. MEP and molecular docking were done to identify and investigate the key structural features of 2APT that are important for their activity and the interaction that contribute to tyrosinase inhibition, respectively.

Keywords: Thiosemicarbazone (TCT) derivatives; tyrosinase inhibitors; antibacterial activity; Reduced Density Gradient (RDG); Molecular Electrostatic Potential (MEP); molecular docking.

SYN-12

Solvothermal Synthesis of s-block Metal Organic Frameworks

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Metal organic frameworks (MOFs) are a class of reticular compounds consisting of metal ions or clusters coordinated to organic ligands. Theoretically, s-block metals have low electronegativity due to their large ionic radii and low ionic charges. Thus, the coordination number of s-block metals immensely varies depending on the size of the binding partners and electrostatic interactions with the ligands. As a result, designing strategic synthesis of s-block MOFs becomes a challenge and explains its scarcity found in literature. This study aims to investigate the different procedure of synthesizing s-block metals using flexible and rigid organic linkers via the use of organic solvents in high temperature; termed solvothermal method. Calcium nitrate tetrahydrate ($Ca(NO_3)_2.4H_2O$) and/or magnesium nitrate hexahydrate ($Mg(NO_3)_2.6H_2O$) was used as the metal precursors and was reacted with various straight chain organic dicarboxylic acids, amino acids, and plant acids. Rigidity is then introduced by the addition of organic ligands, which is either benzene-1,3,5-tricarboxylic acid (H_3BTC) or benzene-1,4-dicarboxylic acid (H_2BDC). With varying parameters of precursor ratios, organic solvents, reaction temperature and time, we hope to be able to identify the best reaction condition for s-block MOF synthesis. The powder X-ray diffraction (PXRD) spectra showed that the rigid linker mostly persisted its reaction with the metal ion in equal ratio condition. Single crystal X-ray diffraction (SXRD) on the synthesised crystals shows that under the same condition, calcium ions can react separately with the plant acid and rigid linker in the same reaction vessel. Coordination of s-block ions has also been found to be most suited in a solvent mixture of H_2O and DMF.

SYN-13

Synthesis, Spectroscopy, and Conductivity studies of 4-(diphenylamino)benzaldehyde-4-(4-fluorophenyl) thiosemicarbazone and Its Copper (II) Complex

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4-(diphenylamino)benzaldehyde-4-(4-fluorophenyl)thiosemicarbazone ligand (LH) was derived from the reaction between 4-diphenylaminobenzaldehyde and 4-fluorophenyl thiosemicarbazide. Then, the CuL_2 complex containing LH ligand was further synthesized using copper(II) acetate. Both compounds were characterized using elemental analysis, infrared spectroscopy, magnetic susceptibility, molar conductivity, UV-Vis spectroscopy and thermogravimetric analysis. However, LH ligand was characterized *via* ^{1}H and ^{13}C NMR spectroscopy. The FTIR spectra shows that the LH ligand behave as mononegative bidentate, which coordinate through nitrogen and sulphur atoms to the Cu(II) metal ion. The CuL_2 complex has been expected to have square planar geometry based on the results of the electronic spectra and magnetic moments. The conductivity studies LH and CuL_2 polymer electrolyte (PE) films composed of carboxymethyl cellulose (CMC) polymer, propylene carbonate as a plasticizer were prepared by a solution casting technique. The conductivity of the prepared PE films was studied using Electrochemical Impedance Spectroscopy (EIS). The conductivity was observed for both LH ligand and CuL_2 complex at 2.16×10^{-8} Scm^{-1} and 8.10×10^{-7} Scm^{-1}, respectively.

SPE-1

Rapid Assessment of Octane Number and Benzene Content in Gasoline Fuel by Fourier-Transform Near Infrared Spectrometry Coupled with Chemometrics

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Octane number and benzene content are among quality parameters of unleaded gasoline that address the resistance to auto-ignition of fuel in engine and the health hazard associated with the emission. In refinery industry, these two parameters are determined with reference to standard test methods using research octane engine and gas chromatography; which operations are time consuming and costly. Hence, this work investigates the feasibility of Fourier-transformed near infrared spectrometry coupled with chemometrics as an alternative for rapid quality assessment of gasoline products; based upon the capability of partial least square to model the relationship between the spectral information and the parameters. According to the results, the developed model showed satisfactory performance for rapid prediction of the octane number and benzene content in gasoline samples, their trueness and precision were acceptable when compared to the corresponding test method by American Society for Testing and Materials.

SPE-2

Metabolite Fingerprint of Malaysian Stingless Bee Honey based on ATR-FTIR Chemometrics

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Stingless bee honey is consumed not only for its taste and nutritional value, but also for its health benefits. Currently, authenticity and standardization are the major issues in ensuring the quality of kelulut honey. In this study, 147 kelulut honey samples obtained from different species and different states in Malaysia were characterized for its chemical profile based on ATR-FTIR chemometrics. Based on different species, the ATR-FTIR chemometrics showed the wavenumbers at 2934, 1400, 1040 and 1256 cm^{-1} were more prominent in *H. itama* and *G. thoracica,* while the predominant wavenumbers at 600-900 cm^{-1} were observed in *T. apicalis*. According to the results, the species *H. itama* has more variation of samples as compared to *G. thoracica* and *T. apicalis*. Furthermore, the ATR-FTIR chemometrics was managed to discriminate the raw stingless bee honey samples from the dehumidified. The wavenumbers at 3242, 2934, 1657, and 1040 cm^{-1} were the characteristics of raw samples while the wavelength numbers at 700-978 cm^{-1} were prominent in dehumidified samples. In addition, present study showed that the stingless bee honey samples from Northern and East Coast regions have similar chemical characteristics that were separated from Southern and West Coast regions. This study may contribute to development of a fast and cost-effective method for the classification and quality control of stingless bee honey, thus, ensuring the safety and efficacy of its consumption.

Keywords: Stingless bee honey, chemometrics, ATR-FTIR, classification, chemical profile

SPE-3

Simultaneous UV-spectrophotometric Estimation of Aceclofenac and Cyclobenzaprine HCl by Three Different Methods

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Background: The three different spectrophotometric methods for estimation of aceclofenac and cyclobenzaprine HCl were developed and validated. Aceclofenac sodium and Cyclobenzaprine HCl are NSAID and antidipressive agent, a rare combination. **Objective:** The aim was to simultaneous estimation of the aceclofenac and Cyclobenzaprine HCl as no spectrophotometric methods are available for this combination. **Method:** In first method (Method I) simultaneous estimation with forced degradation were performed. In second method (Method II) simultaneous estimation by derivatization technique was performed. In third method (Method III) the simple simultaneous estimation was performed. In all three methods the parameters like Linearity, Precision, accuracy, sensitivity, recovery were studied. The method I and II were developed on shimadzu-1800 and Method III was developed on Lab India 3092.**Results:** In method I, the linearity range were obtained as 5 - 25µg/ml for aceclofenac and cyclobenzaprine HCl with correlation coefficient 0.997 and 0.999 for both drugs respectively. The recovery was carried out at 80%,100% and 120% and the results were 99.45% 99.50% 99.97% 99.78% 99.36% 99.67% respectively for aceclofenac and cyclobenzaprine HCl respectively. The forced degradation for both drugs by applying the method was carried out which gives an idea about the stability of the drugs. In method II, the derivatization with 2% ninhydrin was carried out to obtain strong absorption in UV-Visible range. The linearity range for both the drugs was found to be 5 - 25µg/ml. The correlation coefficient was obtained as 0.997 and 0.997 for both the drugs respectively. The recovery study values were obtained as 95.60%, 95.95%, 95.53% 95.85% 98.82% 98.33% respectively for both the drugs. In the method III, the linearity range were obtained as 5 - 25µg/ml for both the drugs with 0.999 respectively. The recovery study values were obtained as 99.56-100.32% 99.05 – 100.2% for both drugs respectively. **Conclusion:** All values were obtained in the acceptable range of as per ICH guidelines and therefore these methods can be used for routine analysis of both drugs in bulk as well as formulation.

Keywords: Aceclofenac, Cyclobenzaprine HCl, UV-spectrophotometric, forced degradation, Derivatization, ICH guidelines.

SPE-4

Supramolecular Assemblies of 1,2-Disubstituted Cyclohexane Amide Ligands and Their Coordination Polymer: Synthesis, Characterization and Crystal Structure

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Supramolecular interactions such as hydrogen bonding, phi-phi stacking, Van der Waals interactions and metal-ligand are important in stabilizing the structure of molecules either in the solid state or in solution. In order to determine the present of supramolecular interactions in two novel compounds, 1,2-disubstituted cyclohexane amide ligands, namely 1,2-bis[*N,N'*-6-(3-pyridylmethylamido)pyridyl-2-carboxyamido]cyclohexane (L1) and 1,2-bis[*N,N'*-6-(3-pyridylmethylamido)pyridyl-2-carboxyamido]cyclohexane (L2) were synthesized from a racemic mixture of *trans*-1,2-diaminocyclohexane and fully characterized by FTIR, ^{1}H and ^{13}C NMR and mass spectrometry. The formula molecules of the compounds were confirmed *via* elemental analysis. X-ray crystallography reveals that the folded conformations of both ligands are stabilized by intramolecular N-H···O=C and N-H···N hydrogen bonds at the pre-organized amide moieties. The crystals structure was also stabilized by weak face-to-face p-stacking interaction or centroid-centroid p-stacking interaction involving the two pendant pyridine rings. In the crystal structure of one dimensional coordination polymer, there are two intermolecular hydrogen bonding interactions (N-H···O=C, d = 2.094 Å, D = 2.946 Å and d = 2.090 Å, D = 2.938 Å, N-H···O angle = 161.52°) formed between the pre-organized NH amide donors of a molecule of L1 in one coordination polymer and the amide carbonyl group of a molecule of L1 in an adjacent polymer. In addition, the intermolecular hydrogen bonding leads to the formation of 2-D hydrogen bonded sheets of the 1-D coordination polymer that extend in the *ac* diagonal.

SPE-5

Detecting Adulteration of Stingless Bee Honey using Untargeted ^{1}H-NMR Metabolomics with Chemometrics

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As stingless bee honey (SBH) is gaining in popularity in the Malaysian market, it is now prone to adulteration. The higher price of SBH compared to floral honey has led to the use of unusual adulterants such as vinegar and even floral honey to mimic the unique taste and appearance of SBH. Since the current AOAC 998.12 method fails to detect these adulterants as their $\delta^{13}C$ values are in the range for C_3 plants, untargeted ^{1}H-NMR metabolomics was proposed. Principal component analysis of SBH ^{1}H-NMR fingerprints was able to distinguish authentic SBHs from adulterated ones down to 1% adulteration level for selected adulterants. Discriminant analysis showed promising results for distinguishing authentic SBHs from adulterated ones, including discriminating SBHs adulterated with different adulterants derived from C_3 and C_4 plants. Conclusively, any ^{1}H -NMR metabolic region could potentially be crucial as markers for any emerging adulterants that can be used to adulterate SBHs.

ROOM 3

Green Chemistry & Technology (GRE)

Separation Science (SEP)

GRE-1

Effect of Sous-Vide and Ohmic Cooking on Physicochemical Properties and Sensory Acceptability of Meat

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This study evaluated the effect of sous-vide and ohmic cooking on beef meat at different cooking times. Sous-vide cooking was conducted at 80 °C for 10, 11, 12 hrs, while ohmic cooking was measured after 20, 40 and 60 s of electrode contact time. The sous-vide cooked meat had significantly ($p<0.05$) higher water holding capacity and shearing force with lower protein content compared to ohmic cooked meat. No significant difference in moisture content, penetration force and redness (a*) were observed between the different cooking methods. An increase in darkness (L*) and decrease in yellowness (b*) also, in fat content were observed with the increase of treatment time for ohmic cooked sample. For sensory, sous-vide cooked meat obtained significantly greater acceptability by panelists in terms of tenderness, juiciness and overall acceptability except for colour attribute. From sensory standpoint, sous-vide cooked meat is the best cooking technique but ohmic cooking method offers much greater time and energy saving option.

GRE-2

Amine Functionalized Carbon-based Soybean Curd Residues as Potential Adsorbent for Carbon Dioxide

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Currently, carbon dioxide (CO_2) capture can preserve environmental quality by using carbon- based adsorbent. In this research, polyethylenehexamine (PEHA) functionalized carbon-based soybean curd residues (carbonized SCR-PEHA) was prepared for CO_2 adsorption. The functional groups of the prepared adsorbent were examined using Fourier Transform Infrared Spectroscopy (FTIR), confirmed the functionalization of PEHA on the carbonized SCR. CO_2 uptake of the prepared adsorbents (carbonized SCR-PEHA) was compared with the bare SCR using TGA analysis. TGA results revealed that the carbonized SCR-PEHA achieved 8.816 mg/g while bare SCR only achieved 3.027 mg/g CO_2 uptake. Its mean carbonized SCR-PEHA adsorbed more than 50% CO_2 compared to the bare SCR at 30 ^{o}C. from the soybeans curd residues (SCR) is compared with dried and carbon -based SCR. Physiochemical characterization analysis was carried out by using to determine the functional group of the prepared sample. The adsorption rate during adsorption was analysed using a thermogravimetric analyzer (TGA). Carbonized SCR with functionalized of polyethylenehexamine (PEHA) exhibits a greater advantage in the adsorption of CO_2 compared to dried SCR. The dried SCR was not showing any adsorption while carbonized SCR-PEHA was achieved up to 50.58% adsorption of CO_2 at 30 ^{o}C. Carbonized SCR-PEHA was showing great potential as adsorbent for CO_2 in post-combustion activity.

GRE-3

Chitosan@activated Carbon Beads Modified in 1-ethyl-3-Methylimidazolium Acetate for Cd (II) Uptake from Aqueous Medium

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Chitosan/activated charcoal blend was developed in 1-ethyl-3-methylimidazolium acetate ionic liquid medium and was subsequently modified into beads for the removal of Cadmium (II) from aqueous solution. The prepared bead was characterised using Scanning Electron Microscopy (SEM) and Fourier Transform Infrared Spectroscopy (FTIR). The influence of initial concentrations (10-50 mg/L), pH (3-7), contact time and adsorbent dosage (5-25mg) on the uptake of Cd (II) onto the prepared adsorbent beads (CB) were assessed. Atomic absorption spectroscopy (AAS) was utilised to monitor the change in concentration of Cd (II) in the aqueous medium. The SEM imaging revealed available pores on the prepared beads, and as well the morphological differences between the beads and the precursors used for the bead's preparation. The experimental data were analysed using Langmuir and Freundlich isotherm models. The adsorption capacity of 84.6 mg/g calculated from Langmuir model was obtained for CB. The adsorption kinetic studies show that the adsorption process followed pseudo-second order.

Keywords: Chitosan, activated carbon, ionic liquid, bead, adsorption

GRE-4

Effect of Physicochemical Characterizations of Various Palm Oil Fuel Ash on Pozzolanic Activity and Strength

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Palm oil fuel ash (POFA) previously revealed its suitability as a supplementary cementing material (SCM) in mortar and concrete. However, variations in the physicochemical compositions of POFA due to differences in burning conditions could affect the main properties sought in its application as SCM. This paper presents findings on physicochemical characteristics of POFA obtained from different sources and its effect on pozzolanic activity of POFA and strength of mortars. Characterizations of POFA from five (5) different sources were carried out via X-ray fluorescence, X-ray diffraction and Fourier transformed infrared, loss on ignition test and Field emission scanning electron microscopy – Energy dispersive X-ray. The strength of mortar and pozzolanic activities of POFA specimens were evaluated using ASTM C 618 strength activity index (SAI) and electrical conductivity test, respectively. Findings show all POFA have a significant silica content and the POFA specimens of different origins contain variations in physicochemical characteristics. However, the findings of SAI test show that all the specimens exceeded the minimum value (75%) of strength, which suggests that irrespective of burning conditions at palm oil mills, the resulting POFA could be utilized as SCM. The relative loss in conductivity observed among all specimens further confirmed the pozzolanic characteristics of POFA specimens.

GRE-5

Decontamination of Chemical Warfare Agent by Nanocomposite Adsorbent: A GC-MS Study

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The increase use of chemical warfare agents (CWA) as murder weapons in recent years despite its legal prohibition is alarming. Contamination of CWA to the victims and the environment poses serious health hazards, thus requires appropriate decontamination agents and methods to neutralise CWA into non-toxic products. Zeolites which are commonly used as adsorbents and catalysts have found new use as a decontamination agent. In this study, zinc oxide nanoparticles/silver nitrate-clinoptilolite zeolite (ZnO NPs/ Ag-clinoptilolite zeolite) as a novel nanocomposite adsorbent was synthesised and tested as a decontamination agent for a mustard simulant. The reaction of nanocomposite and nerve agent simulant was carried out in hexane solution and the decontamination process was monitored by gas chromatography mass spectrometer (GC-MS). Our research findings revealed that ZnO NPs/Ag-clinoptilolite has the potential to be used as a decontamination agent.

GRE-6

Bibliometric Analysis of Oil Contamination from 2000 to 2020

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The effects of oil contamination on the environment and human health are well documented. Attentions are drawn from various international and local scholars, to find and create solutions to overcome the environmental problems. The purpose of this manuscript is to study and analyse literature related to oil contamination. Data in this study are obtained from Scopus database by using “oil contamination” as keyword. A total of 388 documents from Asian countries, published from 2000 to 2020 were sorted and analysed. The data were further analysed using Microsoft Excel and VOSviewer. Based on the analysis, in comparison to other countries, the document obtained is dominated by China and Chinese institutions. In the 20-year period studied, 2019 has seen the most documents being published. Most of the published documents are written in English, followed with Chinese and Japanese, while the majority of the documents are in the field of engineering. As of April 2020, the publications retrieved from the Scopus database had been cited 4274 times, with an annual citation of 213.70. Apart from examining the current state of research on oil contamination, this study also contributes to the understanding of the field.

GRE-7

Study of Caffenol & Ascorbic Acid-Based Chemical Developing Formulations in Relation To Silver Particle Density of Various Photographic Film Emulsions

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Characteristic curves of photographic film emulsion are considered as an industry standard among photographic film manufacturers. Based on optical density of suspended silver particles, a characteristic curve unique to each film type provide a reference point to the users on the quality of any chemical development process subjected to the product. Majority of commercial developing chemicals usage were calibrated towards the curves. [1] However, majority of published but non- commercialized chemical formulations are without reference to the characteristic curves. To justify the feasibility of these formulations we must therefore construct the required characteristic curves, albeit qualitatively [3]. Utilizing a software-based analysis method [2], qualitative analysis was conducted toward a comparative study of multiple non-commercial formulations. This study suggests ways in which utilizing the trend in characteristic curves to provide a preliminary assessment of any chemical developers over any film emulsion product. In the end run, how non-commercial formulations effect the particle density of film emulsion? How they differ from commercially available formulations? And are caffenol & ascorbic acid-based chemical formulations have a significant feasibility values for general film development by the end user?

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GRE-8

Detecting Degradation and Adulteration of Refined, Bleached, Deodorised Palm Oil Using Fatty Acids as Diagnostic Ratios

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The utilisation of used oil in the food industry has triggered alerts among consumers since the 2014 gutter oil scandal in China. In Malaysia, palm oil is the most common cooking oil and surely susceptible to such oil scandal. Therefore, this study aims to develop a technique to detect used oil adulteration using fatty acid diagnostic ratios. Used oil was simulated by frying refined, bleached, deodorised palm oil (RBDPO) with four different types of meat, and a control set, intermittently, over 25 cycles at 180°C. The samples were then analysed with a gas chromatography-flame ionisation detector and the fatty acid profiles were obtained. The subsequent chemometric anaysis was done utilising the diagnostic ratios which consisted of the four main fatty acids abundance, namely palmitic acid, stearic acid, oleic acid and linoleic acid. Discriminant models successfully separated pure RBDPOs from used and admixed RBDPOs, except for one misclassification in Beef and Fish groups. The most significant discrimination factor was found to be the diagnostic ratio of the sum of stearic acid and palmitic acid to the sum of oleic acid and linoleic acid in pure, admixed, and used RBDPOs. In conclusion, fatty acids diagnostic ratio is potentially a very useful tool for detecting used oil adulteration in pure oils.

GRE-9

Sustainability Analysis of Ethanol Plant Between Two Chemical Process Routes During Early Stages of Design

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The sustainability topic of the petrochemical process plants is gaining a lot of attention and based on recent statistics, there will be an increase in demand for syngas derivatives from natural gases as coal gasification led to a negative impact on the environment. The synthetic gas that contains carbon monoxide and hydrogen has already been commercialized from the gasification of methane or biomass. In comparison to developing countries, demand for direct hydration of ethylene is increasing in the Middle East. Heat integration along the chemical process and the implementation of sustainability assessment are required for the selection of sustainable chemical processes. Therefore, this paper will demonstrate the simulation of two ethanol process plants categorized under thermochemical processes: direct hydration of ethylene and hydrogenation of synthetic gas. Both conversion processes yield lower relative reactivity of ethanol-water from the extraction distillation output, hence the proposed flowsheets are being implemented to improve the desired ethanol purity. The data from the simulation will then be utilized for sustainability assessment via Multi-Criteria Analysis (MCA) for the selection of sustainable process routes. The MCA is applied to measure the weightage for three sustainability impacts of ethanol process plants such as economic impact, environmental impact, and social impact. From the study, ethanol production from the hydrogenation of synthetic gas is more sustainable than the direct hydration of ethylene. The paper offered a significant contribution to the body of knowledge and industrial practice at the early stage of chemical process design.

GRE-10

Preparation Of Activated Carbon from Oils and Fats Industrial Waste for Smoke Filter System

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This study describes the preparation of activated carbon (AC) from oils and fats industrial waste for application as combustion smoke filter system. Oils and fats are a vast growing industry that creates environmental problem especially from its abundance solid waste. Turning these wastes into wealth is one of the options to solve this problem. This leads to the aim of this study which is to prepare activated carbon using two different wastes: palm kernel shell (PKS) and coconut shell (CS). In addition to this, a comparative study to investigate the most suitable biomass as smoke filter is conducted as well. Starting material properties were identified by proximal (moisture, ash and volatile matter content) and ultimate analysis (CHNS). Lignocellulosic background of lignin, hemicellulose, cellulose and extractives composition was determined. Preparation of AC involves two-step: carbonisation and activation process. Carbonisation temperature of CS was set at 600°C and PKS at 650°C. Activation using potassium hydroxide (KOH) at ration of 1:1 (w/w) followed by microwave radiation for four minutes at a power input of 700W. Fourier – Transform Infra-Red (FTIR) analysis and percentage yield of preparation were identified. In order to study the morphology of produced AC, Field Emission Scanning Electron Microscope (FESEM) images were obtained, and Brunauer– Emmett–Teller (BET) analysis was conducted to study the pore volume and surface area. Since adsorption of smoke combustion require meso to nano pores, is recommended that palm kernel shell is the most suitable agricultural waste to be applied as smoke filter.

GRE-11

The Effect of Nanofillers on the Functional Properties of PLA and Chitosan Based Film

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The aim of this study was to develop poly (lactic acid) and chitosan based films and to examine the effect of crystal nano cellulose (CNC) as nanofillers on the properties of the films. The biofilms were prepared by solvent casting method. The antimicrobial, antioxidant, physical and mechanical properties of the resulting films were examined. The results for antimicrobial test showed that the addition of CNC did not affect ($p > 0.05$) the inhibitory zones. On the contrary, the results showed that DPPH scavenging activity of the biopolymer films significantly increased ($p< 0.05$) with increasing CNC concentration. The antioxidant values varied from 0.21% to 7.73% using the 1,1□ Diphenyl□2□picrylhydrazyl radical (DPPH) method. The highest antioxidant activity was obtained for the films containing 4% CNC, which has a little higher than the film containing 3%. Furthermore, the percent of water absorption and moisture content of the films increased with increasing amount of CNC in PLA/Chitosan matrix. Tensile test results indicated higher TS value by incorporation of 2% of CNC. However, the PLA/ Chitosan-CNC films at 3 % and 4 % CNC concentration exhibited a decreased TS value. PLA/Chitosan films were improved with the addition of a small amount of CNC resulting in PLA nanocomposite, which will be further evaluated for fruit packaging applications. The data obtained through this research could contribute to the establishment of a biofilms with improved the gas barrier properties promising significant advantages in term of longer storage life, maintaining safety, and keeping quality of a product especially in fruit packaging.

GRE-12

Microwave-assisted Synthesis, Characterization and DNA Binding Studies of Ni(II) and Pd(II) Schiff complexes Containing *o*- and *m*- Hydroxyl (O-H) Group on Imine Ligand

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Microwave irradiation method was one of the green chemistry that can reduced reaction time, increased yields and optimizes the use of solvents and energy. Herein, we reported the synthesis of tetradentate Schiff base ligand 3,3'-((1*E*,1'*E*)-(cyclohexane-1,2-diylbis (azanylylidene))bis(methanylylidene)) bis(benzene-1,2-diol) **(1)** and its Ni(II)**(2)** and Pd(II) **(3)** metal complexes via green microwave-assisted synthesis technique. The ligand and complexes were characterized by elemental analysis (CHNS), molar conductivity, magnetic susceptibility (MSB) as well as spectral techniques such as FT-IR, ^{1}H-NMR, UV -Vis, and thermogravimetric analysis (TGA). From CHNS analysis, it is found that the ligand acts as tetradentate ligand coordinating metal ion with 1:1 metal ligand stoichiometry. IR spectra of the complexes shows a shifting of n(C=N) and n(C-O) peak to a lower frequency as well as the appearance of new M-N and M-O peak indicated that the metal ion was bonded to *ONNO* donor atoms. The disappearance of phenolic proton in ^{1}H NMR spectrum of the complexes proof that deprotonation of hydrogen proton occurred due to coordination of oxygen donor atoms with metal ion. The binding mode and interaction of ligand and complexes with calf thymus DNA (CT-DNA) was determined by UV–Vis DNA titration technique.

GRE-13

Biobased Epoxy Coating Derived From Natural Rubber and Tannic Acid

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The use of renewable resources in development of polymeric products is becoming more pertinent in the past few decades including surface coating industry, due to the scarcity of fossil resources and threat from global warming [1-3]. This research work focuses on synthesis of epoxy resin from epoxidised natural rubber by mean of ultraviolet irradiation, subsequently investigation on the properties of the films produced by blending the natural rubber-based epoxy resin with another naturally resourced compound, tannic acid as the hardener. The UV treatment involved for the purpose of producing shorter rubber chains by cleaving the C=C of the rubber, thus its compatibility with common solvents can be improved. This method is able to break the rubber at the same time preserve significant amount of epoxide group [4]. After blending the epoxidised natural rubber with tannic acid, applying into film and thermal curing in oven at 80˚C, the epoxide group in the rubber was found to react with phenolic -OH of tannic acid and formed crosslinked networks. As a result, there was significant improvement in gel content, glass transition temperature as well as other physicochemical properties. Besides, biodegradability test was also conducted on the films and petroleum-derived epoxy film that served as a control. Soil bury method was implemented to evaluate the weight loss of coatings. The high percentage of natural contents in coatings allows most of them to exhibit significantly higher post-burial weight loss compared to the control.

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SEP-1

Characterization of Inclusion Complex of β-cyclodextrin Ethambutol Using Spectroscopic Methods

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The inclusion complex of the first-line drug of TB treatment, ethambutol (ETB) and β-Cyclodextrin (β-CD) was prepared by using the kneading method. The inclusion behaviour of β-CD/ETB complex in solid and liquid state were investigated. Different spectroscopic methods such as Fourier Transform Infrared (FTIR) spectrometer, Thermogravimetric Analysis (TGA), ^{1}H and NOESY Nuclear Magnetic Resonance (NMR) and UV-Vis spectroscopy were employed to determine the successful formation of inclusion complex, where ETB had encapsulated into the hydrophobic β-CD cavity. The inclusion complex was characterized using the FTIR spectrometer and TGA, while the ^{1}H and NOESY NMR results had indicated the hydrophobic interaction between β-CD and ETB. The Benesi-Hildebrand equation was used to calculate the formation constant (K) of β-CD/ETB complex in natural condition, pH4, and pH9, which were 105.43, 107.06, and 119.11, respectively. The stoichiometry ratio of β-CD/ETB complex was proven to be 1:1.

Keywords: β-Cyclodextrin, antituberculosis drug, ethambutol, inclusion complex

SEP-2

A Comparative Accuracy Study between Calibration and Standard Addition Methods in Quantification of Diclofenac Sodium in Commercial Medicinal Tablets Using RP HPLC

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A high dose of diclofenac sodium is often required for treatment of rheumatoid arthritis, osteoarthritis, musculoskeletal injuries and post-surgery analgesia, which can cause high possibility of overdoses. Overdoses of diclofenac sodium are often life-threatening. [1].Hence precision and accuracy of quantification is essential to avoid such occurrences.This study aims to compare the accuracy of three quantification methods: external standard, internal standard and standard addition calibration methods, to determine the amount of diclofenac sodium in commercial tablets. Three brands of tablet which are Voren, Remafen and Remethan was investigated.The % recovery was used to assess the accuracy of each method. The separation method used was a reverse phase high performance liquid chromatography (RP-HPLC) developed by Alquadeib (2019) [2]. The sample was prepared by homogenizing known weight of finely powdered diclofenac sodium tablets in methanol with additional ultra-sonification. All standards and sample solutions were injected in triplicates.Suitable working standard solutions were prepared, with 2 ppm mefenamic acid used as the internal standard and 2mL sample added in the standard addition method. From the study it was found that Voren was accurately quantified using both external and internal standard methods, with recovery of 103.7% and 96.6% respectively. However improved sample precision was seen for all when using internal standard method with RSD below 0.3 compared to external standard method with RSD greater than 1.0. The standard addition method showed improved accuracy data for Remethan and Remafen with a better recovery, at 102% and 96% respectively.

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SEP-3

Detection of Sulfonamides using Paper Based Material in Environmental Water Samples prior HPLC-DAD Analysis

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Ionic liquid (IL) was coated on surface commercial filter paper was successfully developed by using dipping method, presenting a new cost-effective film. The newly developed paper-based IL technique was acts adsorbent materials in paper-based thin-film micro extraction (p-TFME) for determination of four representative sulfonamides (SAs) drugs in environmental samples. Besides that, paper based ionic liquid was characterized successfully by Fourier-Transform Infrared Spectroscopy (FT-IR), Field Emission Scanning Electron Microscopy (FESEM), and X-ray Powder Diffraction (XRD) techniques. This developed method was pass-through optimization parameter processes for the optimum extraction efficiency of SAs. Under the optimal conditions, the proposed method was evaluated and applied to analyze SAs in environmental samples using a high-performance liquid chromatography-diode array detector (HPLC-DAD). The validation method showed good linearity with the highest coefficient of determination (R^2). The limits of detection (LOD) and quantification (LOQ) of the developed method showed lowest as possible toward sensitivity of HPLC-DAD analysis. The newly developed paper-based ionic liquid for analysis of SAs under the p-TFME procedure in various environmental samples, possesses limited sample volume and organic solvent, fast extraction, and good practicable used in the daily analysis.

SEP-4

Adsorption of Acid Orange 7 by Cetyltrimethyl Ammonium Bromide Modified Oil Palm Leaf Powder

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The capability of oil palm leaf (OPL) and surfactant modified oil palm leaf (SMOPL) to remove acid orange 7 (AO7) anionic dye in an aqueous solution was studied. The SMOPL was prepared by treating the OPL with different concentrations of cetyltrimethylammonium bromide (CTAB) solutions (1.0, 2.5, and 4.0 mM). The samples were characterized using Fourier Transform Infrared (FTIR) spectroscopy and dispersion behaviour test. The FTIR results showed the modification of OPL with CTAB surfactant do not change the chemical structure of the OPL, except some increase in the intensity of C-H bond, occurred due to the hydrocarbon group in CTAB. The effects of initial AO7 concentrations on the adsorption capacity of SMOPL were studied, and the highest adsorption capacity AO7 was found for the SMOPL4.0 where the initial CTAB concentration was 4.0 mM. Comparatively, the raw OPL demonstrated the lowest adsorption capability. The presence of the CTAB surfactant molecules on the samples increases the adsorption site of the adsorbent, allowing more attachment of dye molecules onto the OPL adsorbent. The Langmuir and Freundlich isotherm models were used to describe the adsorption isotherm. The equilibrium data were better fitted by Langmuir isotherm with a maximum adsorption capacity of AO7 was 138.89 mg/g. Thus, it is suggested that the adsorption of AO7 was taken place as a single monolayer on a homogeneous OPL surface. From this study, it can be concluded that the modification of OPL with cationic surfactant can enhance its adsorption process for anionic dye from an aqueous solution.

SEP-5

An Efficient Biosorption-based Dispersive Liquid-liquid Microextraction with Extractant Removal by Magnetic Nanoparticles for Quantification of Bisphenol A in Water Samples by Gas Chromatography-Mass sSpectrometry Detection

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In this work, a simple, fast, sensitive, and environmentally friendly method was developed for preconcentration and quantitative measurement of bisphenol A in water samples using gas chromatography with mass spectrometry. The preconcentration approach, namely biosorption-based dispersive liquid-liquid microextraction with extractant removal by magnetic nanoparticles was performed based on the formation of microdroplet of rhamnolipid biosurfactant throughout the aqueous samples, which accelerates the mass transfer process between the extraction solvent and sample solution. The process is then followed by the application of magnetic nanoparticles for easy retrieval of the analyte containing extraction solvent. Several important variables were optimized comprehensively including type of disperser solvent and desorption solvent, rhamnolipid concentration, volume of disperser solvent, amount of magnetic nanoparticles, extraction time, desorption time, ionic strength, and sample pH. Under the optimized microextraction and gas chromatography with mass spectrometry conditions, the method demonstrated good linearity over the range of 0.5–500 µg/L with a coefficient of determination of R^2 = 0.9904, low limit of detection (0.15 µg/L) and limit of quantification (0.50 µg/L) of bisphenol A, good analyte recoveries (84–120%) and acceptable relative standard deviation (1.8–14.9 %, n = 6). The proposed method was successfully applied to three environmental water samples, and bisphenol A was detected in all samples.

SEP-6

Development and Validation of a Simultaneous Solid Liquid Microextraction and Gas Chromatography- Electron Capture Detector Method for the Determination of Selected Poisons in Entomological Specimens for Forensic Application

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Entomotoxicology focuses on the analysis of drugs and poisons in necrophagous insects for the possible determination of cause of death and circumstances surrounding death as well as its influence on the accuracy of post-mortem interval (PMI). Specific analytical methods for analyzing drugs and poisons in human specimens have been duly reported in the literature; however, specific methods for analyzing drugs and poisons in entomological specimens remain scarce. Most of the previously reported entomotoxicological studies neither utilized the extraction methods that were specifically developed for the necrophagous insects nor that they provided a suitable and complete validation data pertaining to their analysis. In this research, the specific solid liquid microextraction and Gas Chromatography-Electron Capture Detector methods for simultaneous determination of dimethoate, diazinon, malathion and chlorpyrifos in entomological specimens were developed. Calibration curves in the range of 0.25–1000 ng/mL of the analytes in larvae matrix were established with linear correlation coefficients (r^2) > 0.995. The limit of detection for all analytes ranged from 0.06-3.25 ng/mL with good accuracy and precision. The currently developed analytical methods may prove useful for forensic entomotoxicology practical caseworks.

SEP-7

Separation and Quantification of Lycopene and β-carotene in Watermelon (*Citrullus lanatus*) Juice Extract Using Isocratic HPLC Mode

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Watermelon (*Citrullus lanatus*) is a nutritional fruit with appealing flesh colour. The flesh colour is reflected by the present of carotenoid compounds; lycopene and β-carotene. Carotenoid is responsible for colour pigmentation in fruit. In addition, these carotenoid components are able to scavenge free radicals and protect from harmful diseases. In this study, isocratic mode high-performance liquid chromatography (HPLC) was performed to separate and quantify lycopene and β-carotene in watermelon juice extract. A 20 µL sample injection was passed through C-18 column at maintained 45°C coupled with DAD detector at 470 nm. Mobile phase of acetonitrile and water (95:5, v/v) with flow rate of 1 mL/min was used with 30 minutes retention time. Excellent chromatographic separation of lycopene and β-carotene were achieved at elution time of 4.568 and 6.831 min respectively. The amount of quantified lycopene (1662 µg/mL) and β-carotene (180 µg/mL) indicated that lycopene is major carotenoid presented in watermelon juice extract followed by β-carotene. This study described the ability of isocratic mode HPLC to separate and quantify carotenoid profiling in watermelon juice extract. The analytical method was validated and the results showed good precision, accuracy and linearity.

SEP-8

Dispersive Micro Solid-Phase Extraction with Polypyrrole-Graphene Oxide Nanocomposite Sorbent for the Determination of Tetracycline Antibiotics in Water Samples

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This work describes the development of dispersive micro solid phase extraction (D-μ-SPE) using polypyrrole-graphene oxide (PPy-GO) nanocomposite sorbent for the extraction and pre-concentration of tetracycline antibiotics (TCs) residues namely oxytetracycline (OTC), tetracycline (TC), chlortetracycline (CTC), demeclocycline (DMC) and doxycycline (DOC) in water samples prior to high-performance liquid chromatography-ultraviolet/diode array detector (HPLC-UV/DAD). The PPy-GO nanocomposite was prepared by in situ chemical oxidative polymerization. The synthesized PPy-GO was characterized using field emission scanning electron microscopy (FESEM), Fourier transforms infrared spectroscopy (FTIR), Brunner-Emmett-Teller (BET) and thermogravimetric analysis (TGA). Several important parameters such as the effect of sample pH, mass of sorbent, desorption solvent, extraction time and desorption time on the peak area of analytes were evaluated and optimized. The optimum parameters were as follows: mass of sorbents: 50 mg; extraction time: 15 min; desorption time: 10 min; desorption solvent: methanol; and sample pH: 7. Under the optimum conditions, the method demonstrated good linearity (R^2=0.9989-0.9995) over a concentration range of 10-1000 μg L^{-1}. Limit of detection (LOD) was in the range of 4.9-8.7 μg L^{-1} with satisfactory relative recoveries (80 – 105 %) and good relative standard deviation (RSD) of ≤ 2.3 % (n = 3) were obtained. The method was successfully applied to river water and tap water samples. The proposed method proves to be simple, rapid and reliable with high extraction efficiencies for the detection of tetracycline antibiotics in water samples.

SEP-9

A Ferrofluidic Deep Eutectic Solvent Functionalized Graphene Oxide Magnetite Nanocomposite for the Extraction of Fuoroquinolones from Water Samples

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The development of smart materials has a significant impact on sample preparation and pre-concentration methods. The ferrofluid phase was prepared by mixing graphene oxide magnetite nanocomposite (GO@Fe_3O_4) and the deep eutectic solvent-based choline chloride and ethylene glycol as a green solvent. The synthesized composite GO@Fe_3O_4-DES ferrofluid was used as adsorbent for Magnetic solid-phase extraction (MSPE) to extract the fluoroquinolone (FQs) residual. The FQs extract was determined using high-performance liquid chromatography-ultraviolet (HPLC-UV). The characteristic results of vibrating sample magnetometer (VSM), X-ray diffraction (XRD), Fourier transform infrared spectrometry (FT-IR), thermal gravimetric analysis (TGA) and scanning electron microscopy (SEM) indicated the successful preparation of GO@Fe_3O_4-DES ferrofluid. The influence factors of the extraction process such as the pH value, the temperature, the extraction time, the concentration of (FQs) and the amount of GO@Fe_3O_4-DES were evaluated. Under optimized conditions, the suggested approach method had good linearity, $R^2 \geq 0.988$, repeatability, RSD 5.4–12.1%, and the limits of detection (LOD) and quantification (LOQ) were 0.0727- 0.254 g/L^{-1} and 0.07-0.54 g/L^{-1}, respectively. Furthermore, the analysis of real sample demonstrated that the prepared magnetic nanoparticles did have extraction ability on (FQs) in water sample with recoveries between 86.70 and 97.48%, with RSD% lower than 6.72%.

Keywords: deep eutectic solvent, ferrofluid, fluoroquinolone, Magnetic solid-phase extraction.

SEP-10

A Review: Effect of Organic and Inorganic Filler on Starch-Based Bioplastic

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There is increasing demand for starch-based bioplastic because of increasing public awareness and also its unique properties such as renewable, biodegradable, abundance, non-toxic and more. However, due to undesirable characteristics such as poor mechanical and lack of water barrier properties have limited their potential. Despite their limitations, much research has shown the effectiveness addition of fillers (organic and inorganic) towards starch-based bioplastic to improve mechanical and barrier properties. Therefore, this review focuses on discussing the effect of organic filler (microcrystalline cellulose, nanocrystalline cellulose, fiber and starch nanocrystals) and inorganic filler (graphene oxide, eggshell powder, montmorillonite, and titanium dioxide nanoparticle) towards the mechanical and water barrier properties of starch-based bioplastic. Since both of the filler exhibited similar results, it can be concluded that by addition of filler either organic or inorganic into starch-based bioplastic can improve the mechanical and water barrier properties.

SEP-11

Efficiency of Bronsted Acidic Ionic Liquids in the Dissolution and Depolymerization of Lignin from Rice Husk into High Value-Added Products

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Lignocellulosic agricultural waste, like rice husk, is generated abundantly from rice milling industries. It is no longer mere waste but has become a treasure trove of outstanding potentials for sustainable environment growth. In this study, a series of Bronsted acidic ionic liquids (BAILs) were synthesized, characterized and used as a medium solvent to dissolve rice husk. Fractionation of rice husk into lignin, cellulose and hemicellulose was successfully achieved after 6 hours of stirring at 100 °C. About 78 % and 53 % of the regenerated lignin were effectively extracted from rice husk by 1-methyl-3-(3-sulfopropyl)-imidazolium chloride , $[C_3SO_3HMIM]Cl$ and 1-methyl-3-(3-sulfopropyl)-imidazolium acetate, $[C_3SO_3HMIM][Ace]$ respectively, while 1-methyl-3-(3-sulfopropyl)-imidazolium hydrogen sulfate, $[C_3SO_3HMIM][HSO_4]$ only extracted 11 % (based on the original rice husk). The regenerated lignin and cellulose were characterized using FTIR and TGA. Among the BAILs, $[C_3SO_3HMIM]Cl$ was found to be a good medium solvent to extract lignin from rice husk and could be recycled up to four times. The regenerated lignin was further depolymerized using the synthesized BAILs at 120 °C (1 hour) to generate low molecular weight aromatic products, which were analysed using gas chromatography-mass spectrometry (GC-MS). During depolymerization process, $[C_3SO_3HMIM][HSO_4]$ was identified as an excellent solvent to depolymerize the lignin into low molecular weight aromatic products.

Keywords: lignin, rice husk, ionic liquids, delignification, depolymerizations

SEP-12

Extraction Solvents of Microalgal Lipid Extraction for Biofuel Production: A Review

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Oleaginous microalgae biomass is regarded as a noteworthy feedstock for biofuel production due to its fast growth rate and capability of growing in non-arable land with high lipid content. Among biofuels, biodiesel has been a prevailing area of interest to many researchers. Prior to transformation of microalgae lipid into biodiesel, a lipid extraction step required to be performed to disrupt the microalgal cell walls to extract the lipid. Hence, selecting an appropriate extraction solvent is utterly important for efficient extraction of desired lipid content that can be transformed into high quality biodiesel. Conventional organic solvents such as chloroform, dichloromethane and methanol are usually used in lipid extraction due to its high extraction efficiency. However, toxicity and environmental issues of these solvents are major concerns. Hence, many recent studies have focused on the use of green solvents such as bio-based solvent, supercritical carbon dioxide and ionic liquid. This review discusses the conventional organic solvents and green solvents used in microalgae lipid extraction. Advantages and shortcomings of these solvents are also discussed. In addition, the future perspectives for extraction solvents used in lipid extraction is also discussed.

SEP-13

Bisphenol-A Removal from Synthetic Wastewater using Thin-Film Composite Forward Osmosis Membrane

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This study aimed to investigate the removal of BPA from synthetic wastewater using a Polyamide (PA) thin-film composite membrane (TFC). Forward osmosis (FO) is a promising membrane filtration technology developed in recent years for wastewater treatment and seawater desalination. Bisphenol-A (BPA), an endocrine-disrupting compound, exist widely in the aquatic environment, such as groundwater and sewage effluents. This organic pollutant has been reported with the potential to cause serious health hazards to human health, wildlife, and the ecosystem in general, even at low concentrations. In this study, The PA-TFC Membrane was prepared using the in situ interfacial polymerization technique, where Polysulfone (PSf) flat sheets was used as the membrane substrate. M-phenylenediamine (MPD) and 1,3,5-benzenecarbonly trichloride (TMC) were used as the monomers in aqueous and organic solution, respectively, to fabricate the thin layer surface. BPA rejection performance of both the PSf and PA-TFC membrane was investigated and compared. The membranes were characterized using the Atomic Force Microscopy (AFM), Field Emission Scanning Electron Microscope (FESEM), Fourier-transform infrared spectroscopy (FTIR) and the Contact Angle analysis. Synthetic wastewater of BPA solution was prepared to test for membrane performance. The removal of Bisphenol A was done using the Forward Osmosis system. The PSf substrate and PA-TFC membrane gave a BPA rejection of 25% and 91%, respectively, from the feed solution. The data from this study established the capability and reliability of the PA-TFC membrane for the treatment of wastewater containing Bisphenol-A.

Keywords: Bisphenol A, Forward Osmosis, wastewater, thin-film composite

SEP-14

Removal of Terbutaline from Aqueous Solution Using Cu-based Metal Organic-Frameworks ([Cu (INA)$_2$]) Mechano-synthesized using Ball-Milling Method

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Copper-based Metal-organic frameworks (MOFs), ([Cu (INA)2]), was synthesized by ball milling and characterized using scanning electron microscopy (SEM) for the topography, microstructure, and elemental evidence determination, powdered X-ray diffraction (XRD) for the crystallinity measurement, thermogravimetric (TG) analysis was performed to determine the thermal stability of the material, and Fourier transformed infrared (FTIR) spectroscopy for functional groups identification. The removal efficiency was determined to be 97.7% within 40 minutes, and the MOFs have proved to be effective at removing the TERB even after 5 consecutive cycle, the MOFs removed the TERB effectively. The langmuir model was used to study the adsorption isotherm, which was shown to be more favorable, while the kinetics were found to follow a pseudo-second order model. The reaction was exothermic and spontaneous from a thermodynamic standpoint and that the higher temperatures were unfavorable for the process. As a result, the studied MOFs have shown promising properties as possible adsorbents for the removal of TERB in wastewater.

ROOM 4

Advanced Materials (MAT)

Chemical Sensors & Biosensors (SEN)

MAT-1

Facile Preparation of Silica-Silver Core-Shell Nanoparticles Incorporated with Cellulose Filter Paper as Colorimetric Probe for Mercury Ions Detection in Aqueous Media

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We reported the facile and rapid detection of mercury ions using silica-silver core-shell nanoparticles (SiO_2-Ag core-shell NPs) as a smart probe paper-based colorimetric sensor strip. UV-Vis analysis confirms the presence of silver nanoparticles on the surface of silica core structures by exhibited a strong surface plasmon resonance peak at 430 nm. The High-Resolution Transmission Electron Microscopy (HR-TEM) also proves that the silver nanoparticles were chemically attached to the surface of silica. The morphology of the paper strip sensor was monitored using Scanning Electron Microscopy (SEM). The sensing of mercury ions was carried out in an aqueous solution, with a rapid response of color changes from yellowish-brown to colorless within 5 to 10 seconds. The optical change was also measured using a UV-Vis spectrophotometer, which shows a significant drop in the absorbance intensity at 415 nm, along with a blue shift in the plasmonic peak. The prepared SiO_2-Ag NPs loaded on the paper strip shows high selectivity towards Hg^{2+} ions compared to other metal ions. No color changes were observed except in the presence of Hg^{2+} ions. The limit of detection of this assay was found to be 1.13 nM with a good correlation value of R^2=0.9936. In addition, both NPs complex and the interaction with Hg^{2+} were calculated and optimized by theoretical modelling using Gaussian09 software via DFT B3LYP/LanL2DZ theoretical level. The calculated interaction distance and interaction energy between SiO_2-Ag NPs and Hg atom are found to be 2.85 Å and -65 kJ/mol.

MAT-2

Biocompatible Fish Oil-coated Magnetic Nanoparticles as Potential Diagnostic Agent

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Surface chemistry of iron oxide nanoparticles (IONP) is one of the determining factors for its suitability in biomedical application. Hydrophobic coating of IONP synthesized from thermal decomposition of iron salts must be replaced with biocompatible coating for use as diagnostic agent. In this work, the oleic acid-coated IONP was synthesized from thermal decomposition of Fe(O)OH, and the surface coating was further substituted with Menhaden fish oil (MFO) using ligand exchange. Its physicochemical properties such as size, surface chemistry, and cytotoxicity were then investigated. Spherical monodisperse IONP with 10 nm size was obtained via a one-pot reaction and displayed excellent aqueous dispersibility after functionalization with MFO coating. The MFO-coated IONP exhibited dose□dependent toxicity on human lung fibroblast cells (MRC5), with an IC_{50} value of 494 µg/mL within 72 hours exposure. In conclusion, the MFO□IONP prepared in this work is potentially safe to be used as a diagnostic agent.

MAT-3

Preparation and Adsorption Studies of Tryptophan-Imprinted Polymer in Aqueous Medium via Bulk Polymerization

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One of the effective technologies in molecular recognition should undoubtedly be based on the molecular imprinting process. In this work, the design of adsorbent material based on molecularly imprinted polymer for the determination of tryptophan molecules (Tryp-IP) was successfully synthesized. The imprinted polymer was fabricated using methacrylic acid monomer and crosslinked by ethylene glycol dimethacrylate via bulk-polymerization method. The confirmation by hydrogen bonds proved the specific binding sites were formed in the imprinted polymer. The effect of polymer dosage and time taken during the adsorption process was explored by the batch binding experiment. The resulting polymer showed that the increased dosage from 1 to 9 mg led to the increasing in percentage removal of tryptophan and 120 min as the optimum time for Tryp-IP to get saturated at pH 5. The percentage removal of Tryp-IP could reach 82% compared to non-imprinted polymer (NIP) was 70%. The isotherm and kinetics study were evaluated by fitting the equilibrium data to the adsorption isotherm models. The adsorption isotherm demonstrated that the Langmuir model had fit with the experimental data, indicating the Tryp-IP owning homogenous surface type of adsorbent whereas the NIP fit with Redlich-Peterson model indicating that mechanism adsorption is mix type. The adsorption kinetic of Tryp-IP showed that chemisorption effectively controls the adsorption process by fitting the pseudo-second order model. However, the adsorption kinetic of NIP appeared to fit with pseudo-first order, indicating the rate-limiting step was physisorption. Results also revealed high selectivity towards the structural analogues of tryptophan molecules.

MAT-4

Synthesis And Characterization of 4-Chlorophexyacetic Acid Herbicide Intercalated with Calcium-Aluminium Layered Double Hydroxide through Co-Precipitation Method

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Layered double hydroxide (LDH) or hydrotalcite-like compound is a material that can be used as a host to herbicide such as 4-Chlorophenoxyacetic acid (4-CPA) in agriculture. In this study, Calcium-Aluminium (Ca-Al) LDH host was prepared as a host by intercalating 4-CPA with Ca-Al LDH through co-precipitation method. The synthesis was performed at pH 12 with different concentrations of $Al(NO_3)_3.9H_2O$ which were 0.025 M and 0.10 M. The successful intercalation was obtained at 0.025 M and had been confirmed through several analyses. The result obtained from Powder X-Ray Diffraction (PXRD) pattern showed that the basal spacing for the 0.025M nanocomposites was increased from 8.54 Å to 9.98 Å which indicate the intercalation of 4-CPA into the Ca-Al LDH were presence, but for 0.10 M, the basal spacing remain unchanged. The successful intercalated result was supported by the ATR-FTIR band showed that the nitrate peak disappeared and carboxylate ion (COO^-) band present at 1634 cm^{-1} unlike the nitrate peak for 0.10 M nanocomposite which remains at 1365.30 cm^{-1}. The nanocomposite synthesized has shown mesoporous-type material with H3 hysteresis loop in the BET analysis. This study has signified the potential of Ca-Al LDH as a safer agent of agrochemicals by reducing the dosage of herbicide in the agriculture field and protect the herbicide through leaching and runoff into water system.

Keywords: 4-Chlorophenoxyacetic Acid (4-CPA), intercalation, co-precipitation, LDH, Nanoparticles

MAT-5

Synthesis and Characterization of New Schiff Base Ester Liquid Chrystals with Fatty Acids from Palm Oil as Flexible Alkyl Chain

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Three palm-based liquid crystals, namely, PB_1, PB_2 and PB_3 were synthesized to result in a flexible alkyl chain for a Schiff base ester mesogen. The proposed structures of PB_{1-3} have been confirmed by Fourier-Transform Infrared Spectroscopy (FTIR) and Nuclear Magnetic Resonance (^{1}H NMR and ^{13}CNMR). All synthesized palm-based liquid crystals are smectogenic with wide range smectic A phase. Both PB_1 and PB_2 are enantiotropic whereas PB_3 is monotropic as mesophase was observed only during heating scan of Differential Scanning Calorimetry (DSC). The presence of smectic A phase texture was confirmed by Polarizing Optical Microscopy (POM) and Small Angle X-ray Scattering (SAXS). All phase transition temperatures observed under POM were consistent with those measured in DSC. Thermogravimetric analysis (TGA) showed that the onset decomposition temperatures of PB_{1-3} were more than 300^{o}C which implies that the synthesized palm-based liquid crystals have high thermal stability. The synthesized palm-based liquid crystals are potential candidates for various practical applications such as engineering of nanostructure and biomaterials due to the presence of curvatures which is a unique characteristic of smectic liquid crystals. The use of fatty acids from palm oil as a green alternative for the flexible alkyl chain in the synthesis of liquid crystals would be a great effort towards green chemistry to protect our environment and health.

Keywords: palm oil, fatty acids, liquid crystals, flexible alkyl chain, smectic, green chemistry.

MAT-6

Hydrolysis of Nanocellulose from Almond Shells: The Effect of Different Acid, Acid Concentration, Temperature, and Time

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Nanocellulose (NC) have been successfully extracted by acid hydrolysis method. Different types of acid (sulfuric, perchloric and methane sulfonic acid) in different concentrations, temperature and time of hydrolysis were used in the hydrolysis process. The highest percentage yield of NC obtained from each type of acid was 69.7% with 45% w/v. sulfuric acid at 50°C, 71.1% with 50 % w/v perchloric acid at 35 °C and 67% with 60% w/v methane sulfonic acid at 25 °C. NC particles with smaller size and shorter length were obtained from the hydrolysis of cellulose with sulfuric and perchloric acids. The NC obtained were characterized, the FTIR results showed that the absorption bands of the NCs are like each other which, confirms that no changes in the chemical structure occur after the acid hydrolysis process. Similarly, the extracted NCs showed different thermal degradation profiles due to the crystallinity index and different acids used. Hydrolysis with strong acids produces NC with lower crystallinity due to the degradation of both amorphous and crystalline regions in the cellulose. Also, the NCs possess a smooth morphology with few agglomerations due to the strong intramolecular hydrogen bonding. BET results of NC with the highest surface area were obtained by sulfuric acid hydrolysis with higher nitrogen adsorption than those obtained from perchloric acid and MSA hydrolysis.

Keywords: nanocellulose, acid hydrolysis, crystallinity, thermal degradation, surface area

MAT-7

Chemoselective Decarboxylation of Ceiba Oil to Diesel-Range Alkanes over Red Mud Based Catalyst over H_2-Free Condition

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Due to the depletion of petroleum fossil resources, concern on the emission global greenhouse gasses (GHG) such as CO_x and NO_x have triggered global society to find an alternative energy known as green diesel. The green diesel was synthesized via deoxygenation reaction of ceiba oil under H_2-free atmosphere over Ni modified red mud oxide (Ni/RMO_x) (x:1,2,3) catalyst. The Ni/RMO_x catalysts were prepared via deep-deposition method and further characterized by XRF, XRD, FTIR, TPD-NH_3, FESEM and TGA. The RMO_x predominantly contains iron (Fe) species (>98%). Based on the catalytic activity test, all Ni/RMO_x catalysts facilitated greater deoxygenation activity by yielding ~90% of hydrocarbon yield and product selectively toward formation of desired saturated diesel hydrocarbon range (C_{15} and C_{17}). Overall, Ni/RMO_3 shows remarkable enhancement in deoxygenation activity, this is due to the existence of rich acidic sites. Based on the reusability study, the Ni/RMO_3 is a highly stable catalyst since it could be reused up to five consecutive runs with hydrocarbon yield and C_{15}+C_{17} maintain at range 85%-51% and 82%-41% respectively.

Keywords: Deoxygenation, green diesel, red mud, ceiba oil, nickel

MAT-8

Production of Levulinic Acid from Cellulose Using Noble Metal Pd Incorporated into Supports

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In resolving the current energy crisis, it is vital to employ abundant biomass effectively in producing platform chemicals for instance levulinic acid (LA). LA is very flexible for the formation of high value-added chemicals, as it belongs to the family of carboxyl and ketone. This valuable platform chemical can be produced from cellulose (the most abundant biomass in nature). Palladium (Pd) as a noble metal incorporated with catalyst supports (silica-alumina; SiO_2-Al_2O_3, gamma-alumina; γ-SiO_2-Al_2O_3 and titanium dioxide; TiO_2) was prepared using wet impregnation method aiming for 4 wt.% of noble metal on supports followed by catalyst calcination at the temperature of 500 ˚C. The catalyst was characterized using Thermogravimetric analysis (TGA), Fourier-Transform Infrared Spectroscopy (FTIR), Brunauer–Emmett–Teller (BET), and particle size analyzer. The study on the effect of reaction parameters such as agitation speed, reaction temperature, and cellulose loading was investigated using this catalyst in a semi-batch reactor for 8 hrs. The highest conversion of cellulose (73.9%) and yield of LA (43.3%) was achieved under these conditions; agitation speed of 1100 rpm, reaction temperature of 200 ˚C and cellulose loading of 1.5 g with pre-reduction of catalyst Pd/SiO_2-Al_2O_3 (surface area and pore volume up to 485.6 m^2/g and 0.2459 cm^3/g, respectively) at the temperature of 150 ˚C and agitation speed of 1300 rpm (in 5 bar of H_2 for 1 hr).

MAT-9

Synthesis and Optimization Selective Ion-imprinted Polymer for the Elimination of Ca II Ions Using Taguchi Design

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One of the most important problems associated with calcium measurement is the possibility of underdiagnosed due to a false prediction of hypercalcemia results. Ion imprinting has become one of the fast growing technologies that have gained a lot of attention recently especially in the area of materials science. The present work proposes the synthesis and characterization of ion-imprinted polymer (IIP) in the form of porous film for the removal of Ca (II) from aqueous solution and human blood serum. Ca (II)-IIP films are prepared from mixing of two naturally formed biopolymers cellulose and sodium alginate, $CaCl_2$, ECH, EDTA are used as the source of template ions, cross-linker and extraction agent, respectively. Taguchi method is used to optimize the synthesis and adsorption parameters of the new developed IIP. The optimum IIP films are characterized using FTIR, TGA, FESEM and XRD for determining the performance of the imprinting process achieved. ph dosage, initial concentration, reusability, selectivity, isotherm and kinetic study are investigated for the optimized IIP in Ca (II) aqueous solution. The resulted optimum conditions are pH 5.9, initial concentration (50 mg/l), dosage (300 mg) and 90 min contact time. It was clear from the adsorption data that the Ca (II) sorption by Ca (II)-IIP was fitted with the Langmuir isotherm model. The Langmuir adsorption constants for the adsorption of Ca (II) at room temperature are calculated to be (0.017 L/ mg) and the R is 0.9469. The rate of removal of Ca (II) by Ca (II)-IIP is sustained between 98.99 and 86.12% for five periods. Furthermore, findings show that the Ca (II)-IIP is can successfully applied for the removal of free Ca (II) ions in human blood serum.

Keywords: Ca II ions, Taguchi design, Ion-imprinted polymer, Adsorption, Isothermal study

MAT-10

Acetylation of Glycerol over Sulfated Titania as Solid Acid Catalyst

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In this research, the acetylation of glycerol with acetic acid was carried out over solid acid catalyst. The sulfated catalysts were prepared via impregnation method and was further functionalized with 5%, 10%, 15% and 20% sulfuric acid and labelled as 5SA,10SA, 15SA and 20SA respectively. Non – sulfated catalyst was also prepared and labelled as TC. The synthesize catalyst were characterized using XRD, FTIR, TGA, BET and SEM-EDX and the product obtained from acetylation of glycerol using GC-FID. The effect of temperature (100 ºC - 140 ºC), mole ratio of glycerol to acetic acid (1:3 - 1:15), catalyst loading (0.1 g- 1.0 g) and time reaction (1 h – 5 h) were also investigate. The excellent catalytic performance was conducted using 15SA catalyst at 130 ºC, 1:6 w/v mole ratio, 0.5 g catalyst and 2 h reaction with 94.97% glycerol conversion and 3.14%, 41.01% and 55.03% of MAG, DAG, TAG respectively.15SA catalyst can maintain a good performance of glycerol conversion in fifth successive cycles but the selectivity of TAG reduced from 55.03 % to 24.11 % due to leaching of active sites.

Keywords: Glycerol, Acetylation, Acetins, Titania dioxide, Acid catalyst

MAT-11

Menthol-Based Low Transition Temperature Mixtures as New Extractant Solvent for Vortex-Assisted Dispersive Liquid-Liquid Microextraction for Trace Analysis of Pyrethroids by HPLC

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LTTMs based on DL-menthol as hydrogen bond accepter (HBA) with naturally occuring hydrogen bond donor (HBD), namely thymol, sesamol, and 3-hydroxybenzoic acid were synthesized and characterized. The characterization of LTTMs was monitored and studied by polarizing optical microscopy (POM), differential scanning calorimetry (DSC), Fourier transform infrared spectroscopy (FTIR), and Nuclear Magnetic Resonance (NMR). In addition, density, viscosity and water content of LTTMs were determined to analyse its solvent characteristics. Thermogravimetric analysis (TGA) was studied to identify the thermal stability. These LTTMs have been applied as green extraction solvent in vortex assisted dispersive liquid-liquid microextraction (VA-DLLME) for the extraction of pyrethroid pesticides followed detection by high-performance liquid chromatography with a diode-array detector (HPLC-DAD). Several key parameters that affect pyrethroid extraction efficiency are identified as the vortex time, type of LTTM, volume of LTTM, type of dispersive solvent, dispersive solvent volume, type of salt, and amount of salt.

Keywords: DL-menthol, liquid transition temperature mixture (LTTM), pyrethroids, vortex assisted dispersive liquid-liquid microextraction (DLLME), high-performance liquid chromatography (HPLC).

MAT-12

Magnetite@SiO_2 Supported Pd(II) Schiff Base Complex: A Magnetically Separable Catalyst for Suzuki-Miyaura Reaction

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The development of magnetically separable catalysts has received attention due to their thermal and chemical stability and the ease of separation from the product mixture. This research reports on synthesis, characterization of magnetite@SiO_2 supported Pd(II) Schiff base complex and explored the possibility of using this synthesized supported catalyst in the Suzuki-Miyaura cross-coupling reaction. Magnetite nanoparticle was initially synthesised before functionalised with tetraethylorthosilicate (TEOS) and 3-aminopropyltriethoxysilane (APTES), and grafted on Pd(II) Schiff base complex. The catalyst was characterized using Fourier Transform Infrared (FTIR), X-ray Diffraction (XRD), Vibrating Sample Magnetometer (VSM) and Field Emission Scanning Electron Microscopy/ Electron Dispersive X-ray (FESEM/EDX). The amount of Pd in the magnetite@SiO2 supported Pd(II) Schiff base complex was measured by Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES) analysis. The performance of catalyst was monitored in the Suzuki-Miyaura reactions of 4-bromoacetophenone with phenylboronic acid. The preliminary study of catalytic activity afforded excellent percentage conversion up to 90% in the presence of 1 mmol% of (0.121 g), using Na_2CO_3 as a base at 100 °C in N,N-dimethylacetamide (DMA) for 24 hours. Moreover, magnetite@SiO2 supported Pd(II) Schiff base catalyst was recover by applying the magnet and reused for another reaction. The catalyst showed excellent structural and chemical stability and can be reused up to six cycles without a substantial loss in its catalytic performance.

MAT-13

Determination of Pesticides Residues in Food Matrix Using Deep Eutectic Solvent Functionalized Magnetic Adsorbent

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In this work, green silicone surfactant (SS) and dodecanoic acid (DoAc) based deep eutectic solvent coated magnetic iron particles (Fe_3O_4) was successfully synthesized as a novel adsorbent for magnetic solid phase extraction (MSPE). The developed Fe_3O_4@SS-DoAc nano adsorbent was efficiently utilized for the pre-concentration and isolation of organophosphorus pesticides (OPPs) in various honey and vegetables samples with the aid of gas chromatography-mass spectrometry (GC-MS) detection. The proposed Fe_3O_4@SS-DoAc based MSPE technique was validated and the figure of merits were assessed after optimizing the factors affecting extraction performance of OPPs. Under optimum conditions, detection limit of the developed method was identified to be 0.03 - 0.1 μgL^{-1} while the quantification limit ranged at 0.09 - 0.5 μgL^{-1}. Satisfactory coefficient of determination, with $R^2 > 0.9970$ were achieved from calibration curves ranged at 0.1 - 200 μgL^{-1} for all OPPs. Application of the developed method on honey and vegetable matrices gave acceptable recovery values (80 - 119%) for the target OPPs. In short, the suggested technique has proven to be simple, reliable, inexpensive and environmentally friendly.

Keywords: Deep eutectic solvent; Magnetic iron particle; Organophosphorus pesticides; Gas chromatography; Food samples

MAT-14

Electronic, Reactivity and Third Order Nonlinear optical properties of 'Push-Pull' Aromatically Fused-chalcones for Optoelectronic Interest

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Nowadays, nonlinear materials derived from π-conjugated organic semiconductor widely used in the development of electro-optics applications namely laser light protection, optical data storage and optoelectronic transfer. These materials become one of the promising candidates in this field due to their distinctive features which display exceptional first hyperpolarizability, capable to tunable absorption spectra and possess nonlinear optical properties. In the field of organic NLO, it is crucial key to evaluate how structure-property are correlate with NLO response. Within this interest, the integration of quantum chemical approach and experimental results in attempts to elucidate the structural-property characteristics and behaviour of the fused-aromatic chalcones on the impact of their nonlinear attribute at the molecular level are highlighted. In this work, two push-pull chalcones (**1AECP** and **3ECPP**) were successfully designed, synthesised, characterized for their spectroscopic, thermal analysis and third-order optical nonlinearities. Concurrently, DFT analysis with basis set of B3LYP / 6-31G (d,p) was computed to optimize the most stable molecular geometry configuration, HOMO-LUMO energy gap, GCRD, MEP, NBO analysis and hyperpolarizability analyses. The experimental optical gap (E_g^{opt}) has demonstrated good agreement with corresponding calculated result and fall in the range of organic semiconducting materials, 2.98 and 2.74 eV respectively. Indeed, thermal stability analysis are able to withstand high temperature up to 300˚C for their performance potentially. Z-scan analysis discovered that targeted compounds are indeed nonlinear refraction (NLR) active, manifesting self-defocusing effect with n_2 value of -1.75 x 10^{-9} esu (**1AECP**) and -1.75 x 10^{-8} esu (**3ECPP**). Therefore, this type of molecular framework is promising candidates as optoelectronic-manufacturing development essentially.

SEN-1

The Conjugation and Characterization of Thermoresponsive Poly (*N*-isopropylacrylamide) with a Ternatin Biomolecule

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Poly (N-isopropylacrylamide) (PNIPAAm) is a well-known thermoresponsive polymer shows a reversible coil-to-globule transition at the lower critical solution temperature (LCST) (32°C) in aqueous solution [1]. Chemically modified PNIPAAm with a hydrophilic and/or hydrophobic compound will tune its LCST [2]. In this study, a direct conjugate of PNIPAAm with a Ternatin biomolecule and their physicochemical characterizations were investigated. Ternatin biomolecule is an anti-adipogenic cyclic peptide. To begin with, a controlled structure of PNIPAAm-CTA was synthesized through reversible addition-fragmentation chain transfer (RAFT) polymerization using DDMAT as chain transfer reagent, and subsequently modified one end-group of PNIPAAm-CTA with a molecule of maleimide compound to form PNIPAAm-Maleimide (PNIPAAm-M) through aminolysis reaction. Then, a carboxylic end-group of PNIPAAm-M was directly conjugated with a hydroxyl group of ternatin biomolecule (PNIPAAm-Ternatin) through ester bond formation. The chemical structure, molecular weight (Mw) and molecular weight distribution (Mw/Mn) of PNIPAAm were determined through ^{1}H-NMR and size exclusion chromatography (SEC) measurements. Moreover, PNIPAAm and its conjugate were determined their LCST through light scattering intensity analysis. As the results, PNIPAAm-CTA showed 22,000 g/mol of Mw and having a quite narrow molecular weight distribution (Mw/Mn = 1.24). Furthermore, upon heating the solutions of PNIPAAm and its conjugates in 10 mM HEPES solution pH 7.4 at 25-40°C, PNIPAAm-CTA solution started to increase light scattering intensity at 32°C. Meanwhile, PNIPAAm-M and PNIPAAm-Ternatin solutions started to increase their light intensities at 34°C and 35°C, respectively. As a conclusion, chemically modified PNIPAAm with a hydrophobic and/or hydrophilic compound could tune their LCST.

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SEN-2

Highly Sensitive and Selective Determination of Malathion in Vegetable Extracts by an Electrochemical Sensor Based on Cu-Metal Organic Framework

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This work demonstrates the first use of a copper-based porous coordination polymer (BTCA-P-Cu-CP) as a carbon paste electrode (CPE) modifier for the malathion detection. The electrochemical behavior of BTCA-P-Cu-CP/CPE was studied using cyclic voltammetry (CV) while chrono-amperometry methods were utilized for the analytical evaluation of the sensor performance. Under optimized conditions and based on inhibition signal measurement, the developed sensor showed stability, high reproducibility, and wide dynamic range (0.6–24 nM) with the limits of detection and sensitivity equal to 0.17 nM and 5.7 mAnMcm1, respectively. Furthermore, the presence of common coexisting interfering species showed a minor change in signals (<4.4%). The developed sensor was used to determine malathion in spiked vegetable extracts. It showed promising results in term of fast and sensitive determination of malathion in real samples at trace level with recoveries of 90.0 to 112.0%. (RSDs < 5%, n=3). A comparison of the two studied techniques showed that the HPLC technique is unable to detect malathion when the concentration is lower than 1.8 mM while 0.006 mM is detected with appropriate RSDs 0.2-5.2 % (n=3) by amperometric method. Due to the high sensitivity and selectivity, this new electrochemical sensor will be useful for monitoring trace malathion in real samples.

SEN-3

Physical and Electrochemical Characterization of Modified Graphite Nanoparticles-Phosphotungstic Acid-Nafion on Glassy Carbon Electrode for Bisphenol A Determination

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ABSTRACT

A simple and rapid electrochemical sensor based on modified graphite nanoparticle with phosphotungstic acid and Nafion (GN–PTA–nafion) on glassy carbon electrode (GCE) has been developed for detecting bisphenol A (BPA). The GN was characterized using a scanning electron microscope (SEM) and X-ray diffractometer (XRD), while the modified GCE was characterized using differential pulse voltammetry (DPV) and cyclic voltammetry (CV). Several parameters such as GN concentration, scan rate, equilibrium time, and pH of phosphate buffer were optimized in this study. The GN–PTA–Nafion modified GCE that consists of graphite nanoparticle with a large surface area showed better and faster electron transfer, whereas the phosphotungstic acid (PTA) increased the sensitivity of the electrode for BPA detection. Good electrochemical performances for analyzing BPA, with a detection limit of 0.3995 mol L^{-1}, as well as good reproducibility (RSD 2.51%) were obtained. The modified electrode showed that it had short analysis time, inexpensive and good sensitivity for BPA detection.

SEN-4

Polythiophene-Polyvinylchloride Thin Film as Potential Sensing Material for The Determination of Volatile Organic Compounds

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Development of potential polythiophene-polyvinylchloride (PTh-PVCs) thin films capable of detecting and measuring toxic volatile organic compounds (VOCs) of benzene, toluene and m-xylene in indoor air environment was studied. These VOCs are known as highly carcinogenic, neurotoxic, genotoxic and mutagenic [1]. Polythiophene (PTh) was synthesized by chemical oxidation method in the presence of $FeCl_3$ and dichloromethane [2]. Synthesised PTh was entrapped within the confine of polyvinylchloride (PVC) as a thin film on a glass substrate. Fluorescence results showed that the excitation and emission wavelengths of each PTh-VOCs film response were identical to each other (λ_{ex}= 477 nm, λ_{em} 527 nm). The film's sensing system showed high sensitivity of responses towards VOCs as the fluoresced PTh quenched when reacted to VOCs (LODs obtained in the range of 10^{-4} M). The VOCs response order obtained are m-xylene > benzene > toluene. Low film's regenerability was observed as the percentage of PTh-VOCs reaction were highly decreased for every repetition test of the same film measurement. However, efficient film's reproducibility was observed with RSD value between 1 to 2%.

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SEN-5

Differential Colorimetric Nanobiosensor Array for Discrimination and Quantitation of Acrylamides in Coffee

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In this paper, we reported for the first time, the exploration of dynamic biophysicochemical interactions at bio-nano interfaces to facilitate the development of novel functional materials for superior sensing behaviors in array-based detection platforms. In this study, the amalgamation of distinct spheroproteins as cross-reactive bioreceptors on the gold nanosurface was identified as being capable of improving the biocompatibility of the differential sensing platform. Subsequent fine-tuning of the protein surface coverage on the gold nanosurface with dithiothreitol resulted in a differential-based colorimetric nanobiosensor array for the detection, differentiation, and predictive quantification of seven foodborne amides in coffee. Using the principal component analysis and hierarchical cluster analysis, acrylamide and six analogues were efficaciously identified and discriminated by a differential-based colorimetric nanobiosensor array in accordance with their amine subgroups, IARC carcinogen classifications, and types of food additives. With the superb anti-interference performance, the developed differential-based colorimetric nanobiosensor array has the potential to recognize and discriminate non-targeted analytes by the types of sweeteners and food ingredients, apart from distinguishing and quantifying individual analytes or mixtures of them in real food samples. In short, by intermingling the concept of a differential sensing system with low-selective biosensor arrays possessing cross-reactivity and pertinent chemometric tools for multivariate data analysis, a new trend in sensor technology, known as bioelectronic tongue, can be advanced.

SEN-6

A Colorimetric Chemosensor for Highly Selective Sensing of Hg^{2+} Ion in an Aqueous Medium: Experimental and Theoretical Approach

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Colorimetric probe for cation detection has gained many interests among scientists, chemists, and environmentalists. Various organic-based chemosensor has been developed for cation recognition in an aqueous medium since it offers rapid, inexpensive, and on-site visual analysis. In this study, 2-acetylthiophene thiosemicarbazone (ATTSC) was developed as a highly selective, sensitive, and stable colorimetric chemosensor to detect Hg^{2+} ions in an aqueous medium. Response surface methodology (RSM) was used to obtain the optimized values for independent variables of pH, the concentration of Hg^{2+} ion and reaction time. All the independent variables were significant ($p < 0.05$) and shows the optimum detection occurring in 9:1 v/v DMSO/H_2O at pH of 7.7, 10:89 µM ATTSC/Hg^{2+} ion and at 16 minutes. Under the optimum conditions, the ATTSC chemosensor shows high selectivity towards Hg^{2+} ions with a detection limit of 1.96 µM. A job's plot analysis revealed the 1:1 molecular complexation between ATTSC and Hg^{2+} ion. Theoretical approaches like COSMO-RS and TD/DFT were performed to support the experimental data and investigates the type of interaction that occurs between the ATTSC and Hg^{2+} ion. The results of COSMO-RS showed the presence of a strong hydrogen bond between the ATTSC and DMSO solvent. Then, TD/DFT calculations proved that complex interaction occurs between S atom of ATTSC and Hg^{2+} ion. The colour changes of the ATTSC chemosensor's test strip have demonstrated its ability as a simple and portable sensor for Hg^{2+} ions recognition in an aqueous medium.

Keywords: Chemosensor, ATTSC, Hg^{2+} ion, RSM, COSMO-RS, DFT

SEN-7

Chiral Recognition Sensor for Ketoprofen Enantiomers using L-cysteine Capped Silver Nanoparticles

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L-cysteine capped silver nanoparticles (L-Cys-AgNPs) as a colorimetric sensor for visual chiral recognition of ketoprofen enantiomers was developed. The colorimetric sensor was prepared by citrate-capped silver nanoparticles then mixed with L-cysteine solution in the presence of NaCl. NaCl stimulated color change and rapid aggregation to occurred with only one enantiomer. This considered method is simple, low- cost and effective. Upon the addition of R-ketoprofen to L-Cys-AgNPs, color change from yellow to green whereas no effect on the color in the presence of S-ketoprofen. UV-Vis, FESEM, FT-IR, SERS, and zeta potential measurements were used to characterize the results. The chiral assay reported in this work can be easily differentiated between ketoprofen enantiomers with the naked eye. The SERS investigation revealed the proposed interaction between L-Cys and ketoprofen enantiomers.

SEN-8

Fabrication of a Microfluidic Paper Device for Drug Detection

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Microfluidics provide an innovative platform for fluid handling and analysis through micro channels. Microfluidic paper device was fabricated by screen printing. Different paper cards were analyzed for wettability. Silver ink was prepared by reduction method and used as the conducting ink. The ink was used to screen print on the metallic gold and silver card. SEM and EDX analysis of silver ink shows the presence and wide distribution of silver particles. The ink gave a conductivity of 23.1 mS. The resistivity and conductivity of the paper device indicate good conductance for both gold and silver card.

ABSTRACTS

POSTER PRESENTATION

P1-BIO

Adsorption Study of Ibuprofen onto Magnetic Material Based Deep Eutectic Solvents

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The aim of this study to investigate the adsorption study of ibuprofen onto magnetic nanoparticle modified deep eutectic solvent (Fe_3O_4@DES MNP). The synthesized material was characterized by scanning electron microscopy and Fourier-transform infrared spectroscopy. Batch adsorption experiment was conducted to study the effects of different adsorption parameters such as solution pH, contact time and mass of adsorbent for both Fe_3O_4 MNP and Fe_3O_4@DES MNP. Different initial concentrations and temperatures were used to study the equilibrium and thermodynamic of ibuprofen adsorption towards Fe_3O_4@DES MNP. After optimization, Fe_3O_4@DES MNP exhibited adsorption of more than 90% compared to Fe_3O_4 MNP at only <60 %. The kinetic data were adequately fitted to the pseudo-second-order models for both materials. The result of adsorption isotherm indicated that the adsorption mechanism models fitted well the Temkin model. The thermodynamic study showed that from the values of ΔH^o and ΔG^o, it was possible to conclude that endothermic and spontaneous reaction occurred during the study. This research conclude that Fe_3O_4@DES MNP is a very promising adsorbent for the removal of ibuprofen from the water polluted by this pharmaceutical drug.

Keywords: Non-steroidal Anti-Inflammatory Drugs, Ibuprofen, adsorption, magnetic nanoparticle, deep eutectic solvent

P2-BIO

A UHPLC–MS/MS Method for Simultaneous Determination of Five Chemical Markers of *Carica papaya* Leaves in Rat Urine and Its Application for Pharmacokinetic Study

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Carica papaya has been traditionally used to treat dengue fever for many years. The leaf is known to contain a diverse range of bioactive metabolites including alkaloids (i.e. carpaine) and flavonoids (i.e clitorin, manghaslin, rutin and nicotiflorin). To support pharmacokinetic evaluation, a selective and sensitive method was developed using ultra high performance liquid chromatography coupled with a triple quadrupole tandem mass spectrometer (UHPLC–MS/MS), to simultaneously quantify of five chemical markers of *C. papaya* leaves in rat urine samples. Protein precipitation was carried out to extract the compounds from urine samples. The extracts were injected onto an Agilent ZORBAX Eclipse Plus C18 column with a gradient elution of methanol and water containing 0.1% formic acid. All analytes were ionized using electrospray ionization (ESI) source in polarity switching mode between the negative (for flavonoid) and positive (for alkaloid). Detection was carried out with multiple reaction monitoring (MRM). The results revealed that the method had excellent selectivity and linearity. The inter- and intra-batch precisions of all analytes were less than 15% and the accuracies were within 85%–115%. The sensitivity, matrix effect, extraction recovery, linearity, and stabilities were validated for all analytes in rat model urine samples. In conclusion, the validation results showed that this method was robust, specific, and sensitive for the pre-clinical pharmacokinetic study of carpaine, clitorin, manghaslin, rutin and nicotiflorin in rat urine after an oral dose of *C. papaya* leaves formulation.

Keywords: Alkaloid, Flavonoid, Metabolites, UHPLC-MS/MS, Urine pharmacokinetics

P3-ENV

Biodegradation of Pharmaceutical Wastes using Bacteria: A Scientometric Analysis

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Pharmaceutical drugs have been used to improve man's health and wellbeing. Unfortunately, inappropriate disposal of pharmaceutical waste could give a negative impact on the environment when discharged into waterbodies. Thus, the researchers have figure out ways on using bacteria for the removal of the pharmaceutical contaminant. The aim of this manuscript is to identify and analyse literature and research related to the degradation of pharmaceutical waste using bacteria. In total, 229 publications were sorted from 1980 to 2021 using Scopus database, through keywords of “bacteria”, “degradation” and “pharmaceutical waste”. The data were further analysed using Microsoft Excel and VOSviewer. Important scientometric information including documents by year, type, country or territory, continent, subject area, sponsoring institution along with *h*-index, word grouping and density of co-occurrence between words were identified and studied. The most waste released into the environment was discovered to be ibuprofen and sulfamethoxazole (n=29), whereas *Pseudomonas aeruginosa* (n=7) was the most microorganism discussed. China was found to dominate number of publications in this field with 40 publications in 41 years. *Journal of Environmental Science* was discovered to be the most prominent journal in this topic, with 141 articles and 5,066 citations. As a result, this study contributes to a broad understanding of global trends and research patterns in pharmaceutical waste degradation, as well as helpful references for future research in this subject.

P4-ENV

Potential of *Epipremnum aureum* in Reduction of COD in Wastewater

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High chemical oxygen demand (COD) level in water indicates a vast amount of oxidizable matter that consumes a lot of dissolved oxygen in water. This results in adverse impacts on both aquatic ecosystems and human health. Wastewater from the fish cracker industry typically has high organic content and high COD value. This study focuses on the potential of *Epipremnum aureum (Common name: Golden photos) as a new plant for reduction of COD in fish cracker industry wastewater. Epipremnum aureum (E.aureum) was selected as a plant for phytoremediation due to its abundant and economical. The quality of the wastewater was determined and classified as polluted in accordance with the Environmental Quality Act (EQA). The parameters affecting COD reduction such as pH of wastewater, retention time, initial COD concentration and number of plants used in phytoremediation were investigated. After ten days of retention time with two E. aureum plants, the highest COD reduction was 99.42% in pH 6 of 75% wastewater. E. aureum produced new shoots in the wastewater at a 50% concentration after 14 days of retention time, indicating that the plant is suitable for planting in polluted water or industrial effluent. Therefore, E. aureum can be categorized as a pollution resistance plant. Based on this study, E. aureum proved to be* an alternative method for reduction of COD in wastewater.

P5-HAL

Qualities of Soap Making Oil: Differentiation of Lard and Palm oil by ATR-FTIR and GCMS

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The purity and fatty acids distribution are two important elements in choosing oils/fats for soap making. A study was conducted to differentiate lard and palm oil using Attenuated Total Reflection-Fourier Transform Infrared (ATR-FTIR) Spectroscopy and Gas Chromatography-Mass Spectrophotometry (GCMS). This article aims to determine the authenticity and fatty acids composition in tested samples. Free fatty acid extracted from lard and palm oil were analysed based on their functional group using ATR FTIR and the total fatty acid composition of FAME derived from tested samples were obtained through GCMS analysis. The FTIR spectra indicates that the sample after extraction were rich in certain constituents than before extraction. This analysis showed the presence of the ester, alkene, amine salt, carboxyl compounds in palm oil whereas in lard revealed different types of biomolecules except for carboxyl and alkene group. The comparison of overall fatty acid data showed that lard and palm oil having notable amounts of saturated fatty acids. Palm oil consisted of high palmitic acid, oleic acid, lauric acid, and myristic acid whereas lard was high in stearic acid composition. Verification of the ingredients used in soap is a must to maintain its high standard for the sake of religion and safety aspects which enhancing the use of GCMS/ATR FTIR in detecting fraud and quality of natural ingredients in cosmetics products. GCMS and ATR-FTIR analysis is a perfect combination in illustrating the physical properties and chemical components in different oils/fats which are known to be an important ingredient in soap making.

P6-GRE

Combined Pretreatment of Torrefaction and Washing Using Torrefaction Liquid Products to Upgrade Fuel Properties of Empty Fruit Bunches

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This study presented an approach to upgrade fuel properties of empty fruit bunches (EFB) using a process based on torrefaction liquid washing combined with torrefaction pretreatment. The torrefaction of EFB was first conducted at 275 °C for 60 min and then the resulting torrefaction liquid products were collected and reused to wash EFB at EFB: torrefaction liquid ratio of 1:2 for 30, 60, 120 and 180 min. The washed-EFB were subjected to torrefaction using a fixed bed reactor at temperature of 200-320 °C with residence time of 30 min. The yields and fuel properties of the torrefied products before and after undergoing different pretreatments were investigated. The optimum conditions achieved for the combined torrefaction liquid washing and torrefaction pretreatment were: torrefaction temperature, 300 °C and washing period, 30 min. The results indicated that the combined pretreatment could reduce the metallic species and ash content in EFB as well as increase the calorific value of torrefied EFB. The combined pretreatment not only highlighted the unused of torrefaction liquid, but also improved the quality of torrefied EFB as well as created an economically feasible and novel integrated process for biomass pretreatment.

P7-GRE

Modification of Polyethylene Polypropylene Sheet by Radiation-induced Grafting as Membrane Separator for Vanadium Redox Flow Battery

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Grafting technique is one of the common methods in practice for the surface modification of polymeric materials. In this study, non-woven polyethylene polypropylene (NWPEPP) sheet was developed as a membrane separator for Vanadium Redox Flow Battery (VRFB) due to great chemical stability and low cost by employing radiation induced grating (RIG) technique. The membrane was prepared by one step radiation induced grafting process via electron beam (EB) irradiation whereby both Sodium Styrene Sulfonate (SSS) and N-Vinylformamide (NVF) were co-grafted onto the surface of NWPEPP sheet. NWPEPP was successfully modified as indicated on surface morphology evolution using Field Emission Scanning Electron Microscope coupled with Energy Dispersive X-ray (FESEM/EDX). The FTIR results also showed prominent new peaks of SSS and VNF on the surface of modified NWPEPP which correspond to the C=O and S=O bonds from RIG of SSS and NVF technique.

P8-GRE

Characterization of Oil Palm Frond Biochar for Palm Oil Secondary Effluent Treatment

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Oil palm waste used in this study was the oil palm frond (OPF). Hypothetically, the OPF biomass contains chemical characteristics as a potential alternative adsorbent in wastewater treatment applications. In this study, the OPF biochar was produced by using a top-lit updraft (TLUD) gasifier. The designated process yielded 20% w/w. The maximum temperature of this process was 750ºC. The Brunauer-Emmett-Teller (BET) surface area for the OPF biochar was 248.08 m^2/g with an average pore size of 4.3 nm. The OPF biochar was categorized as mesoporous adsorbent. The OPF biochar had a high carbon content of more than 70%, which was desirable for the alternative adsorbent. It was found out that the aromatic ring and aliphatic functional group was detected in the biochar based on the Fourier Transform Infrared (FTIR) analysis which was commonly found in the biochar produced at a temperature above 500 ºC. Based on the result obtained from the adsorption test, the OPT biochar could provide maximum removal of 64.65% of COD with an initial COD of 3960 mg/L. This study has found that the OPF biochar is reasonable to be utilized as an alternative adsorbent for wastewater applications.

P9-GRE

The Effect of Rice Water as Plant Growth Booster of *Solanum lycopersicum* Through Tissue Culture Method

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Solanum lycopersicum is commonly used as an experimental subject to study interactions between various plant growth regulators in tissue culture due to the short germination time. However, cost production of tissue culture medium is significantly high; thus, rice water was used as alternative low-cost plant growth regulator to study the morphogenesis effect of *S. lycopersicum*. Four different treatments of rice water were; a pool of three times- rice washing with concentration of 150 ml L^{-1} and 50 ml L^{-1}, and six hours-soaked rice with concentration of 150 ml L^{-1} and 50 ml L^{-1}. Murashige and Skoog (MS) medium supplemented with 3.0 ml L^{-1} benzyl aminopurine (BAP) were used as control. The results obtained shows that *S. lycopersicum* seed treated with 150 ml L^{-1} soaked rice water induced the highest number of shoots per explant (3.5). In addition, soaked rice water showed significant results on the length of root and the number of leaves. Fourier-Transformed Infrared Spectroscopy (FT-IR) showed the presence of phosphate and nitrate in rice water which reveals a suitable growth regulator substitute for *S. lycopersicum* growth. Atomic Absorption Spectroscopy (AAS) confirmed the presence of potassium that acts as an additional macronutrient for the development of *S. lycopersicum*.

Keywords: Atomic Absorption Spectroscopy, Fourier Transformed Infrared Spectroscopy, rice water, *Solanum lycopersicum,* , tissue culture

P10-MAT

Zinc Sulfide for Photocatalytic Degradation of Organic Pollutants: A Review

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ZnS has gained attention as an effective photocatalyst for the photocatalytic degradation method in wastewater treatment. Photocatalysis is believed as a promising solution to solve the problem of water pollution and removed organic pollutants. Apart from other photocatalysts such as ZnO, TiO_2 and MoS_2, ZnS is a developing photocatalyst in this degradation method due to its large bandgap energy. This review paper comprehensively considered the preparation (hydrothermal, solvothermal, low temperature, green synthesis, solid-state reaction, solid-liquid chemical reaction, and microwave-assisted synthesis) of ZnS, application, and some challenges that been faced by photocatalytic degradation method. The adsorption and photocatalytic properties of ZnS depend on the different morphology and size formed by different method. The smaller the size of ZnS much presenting higher the decomposition to treat wastewater and removing organic pollutants. Considering the aspect of the photocatalytic decomposition process, challenges was another subject that has been highlighted for the discussed photocatalyst.

Keywords: metal disulfide, organic pollutants, photocatalytic degradation, sustainable water management.

P11-MAT

Potential Applications of Conducting Polymer/Tungsten Disulfide Composites: A Mini Review

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Recent work on many types of synergistic conducting polymers/tungsten disulfide (CP/WS_2) composites were thoroughly covered in this mini review. The data was gathered from over 50 scientific research papers from throughout the world, with a focus on the previous ten years. The mini review started with CPs as a versatile material because of its remarkable advantages over other traditional materials, including wide and adjustable electrical conductivity, high mechanical flexibility, high capacitance, and low manufacturing cost. However, CPs do possess limitations in terms of stability, processability, and mechanical strength. As a result, CPs are frequently integrated with inorganic fillers such as metal sulfide. WS_2 has garnered significant attention among metal sulfides when combined with CPs, where it improved chemical/thermal stability and provided good processability to the CPs/WS_2 composites. Sol-gel processing, hydrothermal procedures, and solvothermal techniques were all mentioned and discussed as relevant synthesis methods. As a result, hybridized CP/WS_2 composites have shown prospects in terms of functionality. Sensors, energy storage, and electrical applications were among the areas where CP/WS_2 have enhanced their performance. A brief discussion of the mechanisms underlying these successful applications was also included. This mini review is meant to provide readers with information on CP/WS2 and, as a result, pique their interest in new research topics.

P12-MAT

Biomimetic Synthesis of Silver Nanoparticles using *Eleusine indica* Extract and Its Antibacterial Properties

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The biomimetic method, which relies on natural resources such as plant extracts, bacteria, and fungi, offers an alternative in synthesizing AgNPs. The use of plant extract in synthesizing AgNPs have various benefits including cost effectiveness, low toxicity, and suitable for biomedical application. In this study, plant mediated AgNPs has been successfully synthesized by reduction of silver nitrate with a methanol extract of the *Eleusine indica* leaves (Sambau extract). A methanol extract of *Eleusine indica* was treated with 1 mM of silver nitrate at room temperature (25 – 27°C) for 24 hours. The sample was characterized using UV-Vis spectroscopy and Transmission Electron Microscope (TEM). The UV-Vis absorption spectroscopy displays a strong resonance centered on the surface of AgNPs at approximately 413 nm. Physical appearance of AgNPs characterized by transmission electron microscopy (TEM) showed formation of AgNPs with average particle size of 20 nm. Further, the antibacterial activity of the synthesized AgNPs was investigated using dilution tests (MIC/MBC assay) has been reported to be beneficial towards *Escherichia coli*, *Staphylococcus aureus*, *Enterobacter aerogenes* and *Bacillus subtilis*.

P13-MAT

Preliminary studies on Sunlight Assisted Degradation of 2-Chlorophenol using PANI/MoS_2/GO as Photocatalyst

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PANI/MoS_2/GO was utilized as a photocatalyst for degradation of 2-chlorophenol under solar light irradiation. Three different compositions of PANI/MoS_2/GO (1%, 5% and 15%) were synthesized with different weight ratio of MoS_2. The composites material of PANI, MoS_2, GO and PANI/MoS_2/GO was characterized by FTIR and XRD indicating successful formation of PANI/MoS_2/GO composites. The photodegradation of the 10 ppm of 2-chlorophenol were observed under the exposure of sunlight for 180 minutes and analyzed using UV-VIS to measure percent degradation of 2-chlorophenol. MoS_2/GO has been chosen as the composite to degrade 2-chlorophenol due to having the most percent degradation of 51.41%. The percentage degradation is low since there is more thorough optimization has to be done in order to elucidate the optimum condition with highest degradation efficiency. Immobilizing the composites material into thin films helps to reduce the opacity and increase the catalytic transfer which leads to highest degradation of the pollutants.

P14-NAT

Review on Occurrence and Biological Activities of Natural β-Carboline Alkaloids and Its Derivatives

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β-Carboline or 9H-pyrido[3,4-b]indole, belongs to the class of indole alkaloids and comprises of pyridine ring fused to an indole skeleton. Commonly known as norharmane, this tricyclic compound was originally isolated from wild Syrian rue (*Peganum harmala*), a herbaceous plant mainly found in the Middle East, North Africa, and Central Asia. The discovery of β-carboline has made a massive impact in miscellaneous biomedical fields through exploitation of its ring moiety. Indeed, the spectrum of biological activities displayed by this natural compound is remarkable in diversity. Numerous studies have proven the abundance of β-carbolines manifest remedial bioactivities such as neuroprotection, antioxidant, anticancer, antibacterial, antitumor, antiviral, anti-allergic, antimalarial, anti-leishmania and anti-HIV. This review focuses on the exceptional abilities of β-carbolines extracted from different parts of *P. harmala* in the treatment of various diseases, predominantly from its seeds. The seeds and roots contained the highest levels of alkaloids with low levels in stems and leaves, and absence in flowers. This review also includes key information on occurrence, structural diversity, and biological activity of daibucarboline A, a derivative of β-carboline with anti-inflammatory potential.

P15-NAT

Isolation of Pteropodic Acid from Malaysian *Uncaria lanosa* var. *ferrea* by Using LC/MS Dereplication Approach

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Previous chemical profiling on Malaysian *Uncaria lanosa* var. *ferrea* through liquid chromatography mass spectrometer (LC/MS) managed to identify three alkaloids namely pteropodine, isopteropodine, and isopteropodic acid along with a flavonoid known as rutin. Continuing our interest on this species, a dereplication strategy was applied to target unknown peak from the same plant material and this has successfully led to the isolation of a new alkaloid. The molecular structure of the isolated alkaloid was elucidated by using various spectroscopic techniques and was recognized as an acidic derivative of the alpha-beta unsaturated carbonyl methyl ester of pteropodine, one of the previously identified alkaloid from the plant. Thus the new alkaloid was named as pteropodic acid. This study demonstrates that LC/MS dereplication strategy will not only lead to an increased possibility of discovery of new compounds but also will safe time, energy, and resources.

Keywords: *Uncaria*, LC/MS, dereplication, alkaloid

P16-NAT

Aspidospermatan-, Corynanthean-, and Strychnan-type Indole Alkaloids from *Alstonia scholaris*

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Nature particularly plants are the source of a vast and diverse assortment of organic compounds including primary and secondary metabolites, some of which are biologically active. Malaysia, being the host to a plethora of biodiverse plant species provides a perfect platform for the discovery of novel secondary metabolites, thus *Alstonia scholaris* (L.) R. Br. was investigated. In the present study, the leaf sample of *A. scholaris* cultivated on the west coast of Peninsular Malaysia was investigated for its alkaloidal composition. As a result, three novel and six known monoterpenoid indole alkaloids have been isolated. Of these, four are aspidospermatan-type alkaloids, i.e., alstoscholactine[1] (new), alstolaxepine[1] (new), 19,20-*E*-vallesamine[2] (known) and *seco*angustilobine B[2] (known); four are corynanthean-type alkaloids, i.e., alstobrogaline[3] (new), picrinine[4] (known), burnamine[5] (known) and 16*R*-19,20-*Z*-isositsirikine[6] (known); one is a strychnan-type alkaloid, i.e., scholaricine[7] (known). Alstoscholactine and alstolaxepine are stemmadenine-derived alkaloids possessing unprecedented ring systems, while alstobrogaline is a unique strictamine-derived alkaloid incorporating a third N atom and possessing two aldimine functions. While alstoscholactine and alstolaxepine showed no appreciable cytotoxicity against a panel of five breast cancer cell lines, alstobrogaline was weakly active against the MDA-MB-231 and MCF7 cancer cells. Additionally, alstolaxepine induced concentration dependent vasorelaxation effects in rat isolated aortic rings precontracted with phenylephrine.

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P17-NAT

Imidazole-containing Alkaloids from *Glochidion rubrum*

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Human's basic needs, as well as medicines for the treatment of various diseases, have been met by nature. Plant natural products, in particular, have continued to play a significant role in the development of modern medicines by being natural drugs or a source of drug leads for further development. Although *Glochidion* is the second largest plant genus in the Phyllanthaceae family, its phytochemical composition and bioactivity has received relatively little attention and thus remains largely unknown due to limited research.[1] To date, there has been only one report of alkaloids from a *Glochidion* species, i.e., *G. philippicum*. In our preliminary and ongoing investigation, we detected the presence of at least five alkaloids from the leaves of *Glochidion rubrum*, which is mainly distributed in India, Southeast Asia, China, and south Japan. Herein, two plausibly interrelated imidazole-bearing compounds are reported. Their structures were characterized based spectroscopic analysis. The first compound was determined to be a 6,7-didehydro derivative of glochidine, which possesses a tricyclic ring system along with a hexyl side chain.[2,3] The second compound possesses only the monocyclic imidazole ring, a double bond at C-6/C-7, and a cyclopropyl ring in the hexyl side chain. Their biological activity will be evaluated in due course.

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P18-NAT

Evaluation of Physicochemical Properties of Coconut Water Collected between Shoreline and Outskirt Area of Port Dickson, Negeri Sembilan, Malaysia

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The present study highlighted physicochemical profiling of coconut water from different planting areas on the shoreline and outskirt of Port Dickson, Negeri Sembilan. Two types of coconuts were studied in each location, which were young coconuts (greenish shell) and mature coconuts (brownish shell). Data was presented as mean±standard deviation using one-way ANOVA. The mean differences for both shoreline and outskirt areas were compared to each other based on their maturity in order to see the significance of the results. The level of significance applied was $p<0.05$. Five quality properties of coconut water which were pH, volume, total soluble solids, titratable acidity, and water activity were discussed. The quality assessment of all samples revealed that only key quality volumes gave significant differences ($P < 0.05$) in both young CW and mature on the shoreline and outskirts. Inorganic cations and anions determinations were carried out in all samples to further understand the chemical compositions. Atomic Absorption Spectroscopy (AAS) was used to determine inorganic cations (K, Mg, Ca) in all samples, and it revealed that there was no significant level ($P > 0.05$) for young coconut water despite different locations. Nevertheless, significant differences ($P < 0.05$) were observed for mature CW on both shorelines. Selected inorganic anions (chloride, fluoride, phosphate, sulphate and nitrate) were determined by Ion Chromatography and the results exposed that the most prominent inorganic anion present in all samples was chloride ion (200-450 mg/L) and there was no significant difference ($P > 0.05$) found in all respective anions in different locations. The finding reveals that planting area; outskirt or shoreline does only affect the volume of coconut water.

Keywords: Coconut water, physicochemical, nutrient, shoreline, outskirt

P19-NAT

Bisindole Alkaloids from *Leuconotis eugeniifolia*

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A Malayan plant from the genus *Leuconotis*, viz. *L. eugeniifolia*, was investigated for its alkaloidal content. Extensive fractionations of the basic fraction of the stem-bark extract, using various chromatographic techniques, led to the isolation of two known bisindole alkaloids, leucophyllidine (**1**) and bisleuconothine A (**2**). The bisindole alkaloids isolated were characterized based on the MS data and comparison of their NMR spectroscopic data with those reported in the literature.[1-2] Alkaloids **1** and **2** are bisindoles of eburnane–vinylquinoline and eburnane–*Aspidosperma* structural types, respectively.

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P20-NAT

Iboga Alkaloids from *Tabernaemontana polyneura*

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The Malaysian plant, *Tabernaemontana polyneura* (family: Apocynaceae)[1], was investigated for its alkaloidal composition. A total of nine known iboga alkaloids were isolated and characterized from the bark extract of *T. polyneura*, collected from Fraser's Hill, Pahang. The structures of these alkaloids were identified by extensive analysis of their NMR and MS data as well as by comparison with the literature data.

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P21-NAT

Purification and Screening of Selected Microbes for Biotransformation of Xanthorrizol from the Essential Oil of *Curcuma xanthorrhiza*

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Xanthorrhizol, a bisabolene-type sesquiterpenoid is the most active and abundant component present in the essential oil of *Curcuma xanthorrhiza* (temulawak) [1]. It was reported to possess various pharmacological activities that includes antimicrobial, anti-inflammatory, antioxidant, antihyperglycemic, antihypertensive, antiplatelet, nephroprotective and hepatoprotective, estrogenic and antiestrogenic properties [2]. To further evaluate its pharmacological potency based on the structure-activity relationship, abundance amount of xanthorrhizol need to be purified and subject to chemical synthesis to yield the xanthorrhizol analogues. Common approaches to synthesize the analogues is through the chemical reactions. Biotransformation utilizing microbes as biocatalysts served as one of the green alternatives replacing chemical synthesis method which able to yield potential xanthorrhizol analogues. In this study, xanthorrhizol will be purified from the crude essential oil utilizing chromatographic and two steps chemical synthesis techniques. The structure and purity of xanthorrhizol were determined through spectroscopic analysis. Selected microbes i.e *Streptomyces sp.* and *Aspergillus sp*. will be screened as potential biocatalysts for the biotransformation reaction. Thin layer chromatography (TLC) and Gas Chromatography (GC) were used to monitor the presence of biotransformation product.

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P22-SEN

Investigation on Optimization Parameters for Electropolymerization of Melamine in Deep Eutectic Solvents

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Polymelamine is a new class of polymer which possess electrocatalytic behavior in the dopamine (DA) detection. Herein we report the investigation of the optimization parameters which involved in melamine electropolymerization process under the presence of deep eutectic solvent (DES) as the electrolyte system. The parameters including the potential window, scan rate, number of scan cycles, and electrolyte temperature were studied using various electrochemical techniques. Cyclic voltammetry was employed in the electropolymerization of melamine to optimize the redox behavior of polymelamine film on surface electrode. The growing of polymer film which indicated by the increased of reduction current can be well-controlled by the slow scan rate and optimum scan cycles which leads to strong adhesion and uniform morphology. DES was successfully replaced the conventional acidic electrolyte in such process which open the opportunity for a greener solvent. Amperometry sensing on DA was performed to study and compare the sensitivity and limit of detection for the polymers synthesized in varied parameters. A brief discussion on the principal factors affecting the polymerization behavior of melamine is included.

Keywords: Melamine; deep eutectic solvent; optimization; electropolymerization

P23-SEP

Emulsification Liquid-liquid Microextraction using Hydrophobic Deep Eutectic Solvents Based Fatty Acids for Simultaneous Determination of Acidic−Basic Herbicides from Environmental Samples

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A method was developed for the simultaneous extraction of herbicides such as 2,4 D, MCPA, ametryn, chlorothalonil, and bromacil in water samples and green leafy vegetables by emulsifying liquid microextraction using novel hydrophobic deep eutectic solvents (DESs) based fatty acids. Using that DESs as the microextraction solvent, several vital parameters were optimised, including the type and volume of hydrophobic DES, pH of the sample, sonication time, and the type and volume of emulsifier. Then, the extracted herbicides were back-extraction into a phosphoric acid solution (0.05 M). The detection limits were in the range of 0.01 - 2.5 ng mL^{-1}, limits of quantification were in the range of 0.03 – 8.3 ng mL^{-1} and recoveries were in the range 73.1 - 98.8% with RSD <10%. The emulsification liquid-liquid microextraction using DES can be considered a simple, practical, and environmentally friendly method.

P24-SPE

Analytical Method of Caffeine Content Determination in Selected Beverages : A Review

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The purpose of this study is to review the method of caffeine content determination and to review the caffeine concentration in selected beverages comply with Ministry of Health (MOH) requirement or US Food and Drug Administration FDA recommendation. Through this study the caffeine content in these beverages available in market around the world can be compared figuratively. In this review many analytical methods were able to be identified for quantitative determination of caffeine in various caffeinated beverages like energy drinks, carbonated drinks, tea, instant coffee & etc. Different scientific method approach been taken by different researchers to separate and quantify caffeine content that includes UV-Visible spectrophotometry, potentiometry, high performance liquid chromatography (HPLC), ion chromatography, high performance thin-layer chromatography (HPTLC) and capillary electrophoresis. In one some study reviewed, the caffeine content in some energy drinks were in alarming level with one sample reported a 101.705 mg/serving [1]. Most of the studies done reported that some brands of energy drinks obey the allowed limit of caffeine content set by the regulatory agency or US Food and Drug Administration. This study can provide an easy pathway to the future researcher to conduct base on the simplified study and also can provide an accurate set of data research based on experimentation on coffee.

Keywords: Caffeine content, caffeinated beverages, analytical method, separation techniques

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P25-SEP

Rapid Detection Tool for Monitoring the Production of Kombucha Tea as a Natural Source of Antioxidant

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Kombucha tea is known to have beneficial effects to health such as antioxidant, antiobesity, and antidiabetes. It consumption is also believed to boost immune system. In this project, the production of kombucha tea was made from the combination of black tea and natural honey instead of regular sugar. The kombucha production was monitored using ATR-FTIR and ^{1}H NMR metabolomics. ATR-FTIR metabolomics was successfully discriminated the metabolite fingerprint of kombucha and black tea extracts. ^{1}H-NMR metabolomics was also carried out to further evaluate the metabolite changes during the kombucha tea production. The partial least square (PLS) analysis revealed the metabolites in kombucha tea such as phenolics (gallic and 4-hydroxymandelic acids), amino acids (phenylalanine and alanine), methylxanthine (hypoxanthines, caffeine, and theophylline), and organic acids (succinic and methylmalonic acids) were positively correlated with its antioxidant activity. According to the bioassay results, kombucha tea has higher total phenolic content (67.06±6.89 mg GAE/g extract) and DPPH free radical scavenging activity (IC_{50} value of 0.24±0.05 mg/ml) as compared to black tea extract. Hence, the innovative multiplatform metabolomics of ATR-FTIR and ^{1}H-NMR are very useful for monitoring the production of kombucha tea as a natural source of antioxidant.

P26-SYN

Synthesis and Characterization of Cobalt(II), Copper(II) and Nickel(II) Complexes of Hydrazone Schiff Base

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Hydrazone Schiff base and metal complexes have attracted a considerable attention. owing their importance for biological and pharmacological activities. It has chelating capability and structural flexibility with various metals. A tridentate ligand, (*E*)-N'-(1-pyridine-2-yl)ethylidene)benzohydrazide (HL1a) was synthesized from condensation of 2-acetylpyridine and 2-hydroxybenzohydrazide in 1:1 ratio. Three Co(II), Cu(II) and Ni(II) complexes were obtained from reaction of ligand with metal salts in 2:1 ratio. HL1a and its complexes were characterized using elemental analysis, IR, ^{1}H NMR, magnetic moment and single X-ray crystallography. From the IR, three significant peaks of ligand, i.e., carbonyl (C=O) appeared at 1638 cm^{-1}, azomethine (C=N) at 1605 cm^{-1} and acetylpyridine ring nitrogen (C=N*) at 1547 cm^{-1}, experienced a shift to lower frequencies upon complexation. The ligand crystalized in the orthorhombic space group Pbca, with a=12.863(7) Å, b = 11.837(6) Å, c = 17.002(10) Å, V = 2589(2) $Å^3$, and Z = 8. Magnetic moment data shown that all complexes exhibited six coordinated structures indicating the octahedral geometry. The ligand coordinated in tridentate manner to metal centre via azomethine (C=N), carbonyl oxygen in enol form and acetylpyridine ring nitrogen. The antibacterial activity of the compounds will be investigated in the future.

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