
SKAM31
UNITING SCIENCE TOWARDS FRONTIER INNOVATIONS
INTERNATIONAL CONFERENCE OF ANALYTICAL SCIENCES
'Uniting Science Towards Frontier Innovations'
17th - 19th August 2018
Vistana Hotel, Kuantan, Pahang
Organised By:
الجامعة الإسلامية العالمية ماليزيا
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA
IIUM KUANTAN
DEPARTMENT OF CHEMISTRY
ANALIS
Persatuan Sains Analisis Malaysia
www.iium.edu.my/skam31

CONTENTS

FOREWORD

السلام عليكم ورحمة الله وبركاته

I am honored to welcome all participants to the 31st International Conference of Analytical Sciences 2018 (SKAM31) that is jointly organised by the International Islamic University Malaysia (IIUM) and Malaysian Analytical Science Society (ANALIS). We are honoured to collaborate with the Malaysian Analytical Science Society.

The theme for the 31st International Conference of Analytical Sciences 2018 (SKAM31) is *"Uniting Sciences Towards Frontier Innovations*". This conference brings together scientists from all over the world to discuss various related issues and provide the opportunity to discuss and share experiences, as well as to think together about the future we envisage for our future generations. I am convinced that the ensuing deliberations and discussions will contribute towards a more systematic research of contemporary analytical chemistry in Malaysia.

The SKAM31 is organised as an effort to advance knowledge as emphasised in the Qur'an for men to make efforts to change some of the current realities of our surrounding world. The Qur'an urges Muslims to seek *ʿilm* (knowledge), by engaging in research in pursuit of finding solutions to the plethora of problems faced by humankind in this millennium. The methodologies adopted to identify the solutions will go a long way to reveal Allah's (SWT) benevolence as the Creator and His Wisdom.

On behalf of the International Islamic University Malaysia, I extend our warm welcome to all participants of the SKAM31. I sincerely wish this conference success in breaking new grounds in the field of chemistry. I am sure the presentations and discussions will enrich and further strengthen the commitment to improve the quality of life of humankind. I also thank the organising committee for all their efforts in conceptualising and successfully organising SKAM31.

Thank you. والسلام

DZULKIFLI ABDUL RAZAK, PROF. TAN SRI DATO'
RECTOR,
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

WELCOMING MESSAGES

Assalamualaikum Warahmatullahi Wabarakatuh

It is an honour and privilege for Kulliyyah of Science, International Islamic University Malaysia (IIUM) to have been given the opportunity to host the 31st International Conference of Analytical Sciences (SKAM31). On behalf of the Kulliyyah, I heartily welcome all honourable speakers and participants to this 31st annual conference at Kuantan, Pahang with an inspiring theme, *"Uniting Science Towards Frontier Innovations"*.

Kulliyyah of Science strongly encourages its staffs and community to always engage in innovative activities and foster continuous improvement. We believe that this event, which gathers local as well as international scientists and researchers will be a good platform to showcase their research and discuss the issues pertaining to analytical chemistry and its related fields. We also believe that this event will be scientifically invigorating, while new collaborations and friendships can emerge and also to encourage participants especially the young researchers to explore current research ideas in the field of analytical chemistry.

I would like to express my sincere appreciation to the invited speakers, all participants and particularly the organising committee of SKAM31 in making this conference a success. Finally, I wish you fruitful discussion in this conference and hope you could spend some time to enjoy the beauty of Kuantan city.

Thank you.

ASSOC. PROF. DR. SHAFIDA ABD HAMID
ADVISOR OF SKAM31

Assalamualaikum and Salam Sejahtera

On behalf of the organising committee, it is my pleasure to welcome all participants to Kuantan and our warmest welcome to all four invited speakers. We are very honored to host 31st International Conference of Analytical Sciences 2018 (SKAM31). This event is co-organised by the Department of Chemistry, Kulliyyah of Science, IIUM with Malaysian Analytical Sciences Society (ANALIS).

Our conference's theme *"Uniting Science Towards Frontier Innovations"* incorporates new findings across interdiciplinary research in science to provide the latest information and knowledge for future advancement in science research. Furthermore, this conference will provide a good platform for researchers and scientists to present and share knowledge, disseminate ideas and to create a platform for collaborative research in the related fields.

I would like to congratulate all participants for being a part in this conference. I am sure that you will find this conference are both fulfilling in embracing new knowledge and enjoyable with huge opportunities for future research collaboration. Thank you very much to all who have contributed either directly or indirectly to the success of this conference, as well as to all sponsors for the generous contributions. Last but not least, to the organising committee for their perseverance, hardwork and endless support to ensure that this event is successful. May Allah's blessing be upon you.

Thank you.

ASSOC. PROF. DR. NURZIANA NGAH
CHAIRMAN OF SKAM31

Greetings from Malaysian Analytical Sciences Society!

On behalf of the Malaysian Analytical Sciences Society (ANALIS), I am delighted to welcome all participants to the International Conference of Analytical Sciences (SKAM31), an annual event under the auspices of the ANALIS. ANALIS would like to welcome the International Islamic University Malaysia (IIUM) into the fraternity of SKAM co-organisers; the ANALIS board members greatly appreciates IIUM's effort through the Department of Chemistry, Kulliyyah of Science, IIUM Kuantan for hosting the 31st annual seminar (SKAM31) in Kuantan, Pahang, Malaysia from 17th – 19th August 2018.

Since its inauguration in 1987, ANALIS is recognised as a leading scientific society to foster the interest and provide platform in bringing rapid development in the field of analytical sciences in Malaysia through SKAM conference series. For this year, the theme chosen for SKAM31, "*Uniting Science Towards Frontier Innovations*" highlighted the importance of uniting and bridging all analytical sciences related field towards the development of innovations and creative ideas. Thus, SKAM31 paves the way to gather all academicians, researchers and students from diverse analytical sciences related field to meet, learn and showcase their research findings, application and advancement of instrumentations, conduct productive discussion as well as to foster essential professional and social networks.

I would like to congratulate the committee members from the Department of Chemistry, Kulliyyah of Science, IIUM Kuantan for their time and great efforts in organising SKAM31. My sincere appreciation and heartfelt thank to all of our sponsors for their generous contribution and support for this conference. I would also like to thank our invited speakers and all the presenters for sharing their knowledge and research discoveries in this platform. Lastly, I wish all the participants a fruitful time of deliberation and discussion. Have an enjoyable and memorable stay in Kuantan.

Thank you.

PROF. DR. NORHAYATI MOHD TAHIR
PRESIDENT OF ANALIS

CONFERENCE BACKGROUND

The 31st International Conference of Analytical Sciences 2018 (SKAM31) is jointly organized by International Islamic University Malaysia (IIUM) and Malaysian Analytical Sciences Society (ANALIS). SKAM31 will be held on 17th - 19th August 2018 in Kuantan, Pahang. SKAM 31 will brings together researchers, scientist, academicians and students to share their findings in related area of research in analytical science and chemistry. Since it inauguration in 1987, SKAM has provided tremendous findings and contributions for the scientific community in various analytical-related field.

SCOPE OF CONFERENCE

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

- Inorganic Chemistry
- Organic Chemistry
- Material Chemistry
- Environmental Chemistry
- Spectroscopies Technique
- Food Chemistry & Biotechnology
- Pharmaceutical and Nutraceutical Chemistry
- Cosmeceutical Chemistry
- Aqua Chemistry
- Nuclear Chemistry
- Catalysis
- Any related analytical sciences

PREVIOUS HOST OF "SIMPOSIUM KIMIA ANALISIS MALAYSIA – SKAK1 UNTIL SKAM31

Year	Institution	Year	Institution	Year	Institution	Year	Institution
1987	UKM	1996	USM	2004	UiTM	2012	UKM
1988	USM	1997	UKM	2005	UTM	2013	UNIMAS
1989	UTM	1998	UTM	2006	UPM	2014	UTM
1990	UPM	1999	UMT	2007	ANALIS and UKM	2015	UPM
1991	UM	2000	UPM	2008	UMS	2016	USM
1992	UiTM	2001	Agensi Nuklear Malaysia	2009	Co-Host with ASIANALYSIS X	2017	ANALIS
1994	ANALIS and UKM	2002	USM	2010	UMT	2018	IIUM
1995	UPM	2003	UNIMAS	2011	UiTM		

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TENTATIVE PROGRAMME

TIME	DAY 1 (17th August 2018)
16:00 – 18:30	Early Registration
TIME	**DAY 2 (18th August 2018)**
8:00 – 9:00	Registration and arrival of participants and guests
9:00 – 9:30	Welcoming remarks by SKAM31 Chairperson Opening remarks by ANALIS President
	VENUE-BALLROOM
9:30 – 10:15	**INVITED SPEAKER**
	Advances in the Determination of Biogenic Amines Prof. Dr. Bahruddin Saad (Universiti Teknologi Petronas)
	VENUE-BALLROOM
10:15 – 10:45	Tea break
10:45 – 12:30	Parallel Session 1 (Rooms A, B, C, D, E) Poster Session Exhibition
12:30 –14:15	Lunch break / poster session /exhibition
14:15 – 15:00	**INVITED SPEAKER**
	Rare Earth Elements (Lanthanides) Assessment in Rocky Shore Organisms and Surface Sediment Along Peninsular Malaysia Coastal Waters Prof. Dr. Kamaruzzaman Yunus (International Islamic University Malaysia)
	VENUE-BALLROOM
15:00 – 15:30	**SESSION WITH ANTON PAAR**
	Microwave-assisted Solutions in the Laboratory — Possibilities and Restrictions Dr. David Reishofer
	VENUE-BALLROOM
15:30 – 16:30	Poster Evaluation Exhibition
16:30 – 17:00	Tea break / poster session / exhibition
17:00 – 18:00	ANALIS Annual General Meeting 2018
	VENUE: ROOM B
20:00 – 22:00	Opening ceremony Conference dinner ANALIS awards
	VENUE-BALLROOM

TIME	DAY 3 (19th August 2018)
9:00 – 9:45	**INVITED SPEAKER**
	Facile Organic-inorganic Hybrid Sorbents for Extraction of Pollutants from Aqueous Samples Prof. Dr. Mohd. Marsin bin Sanagi (Universiti Teknologi Malaysia)
	VENUE: BALLROOM
9:45 – 10:15	**SESSION WITH LYNAS**
	Analytical Chemistry, Rare Earths and Lynas Mr. Richard Amata
	VENUE: BALLROOM
10:15 – 10:45	Tea break / poster session / exhibition
10:45 – 12:30	Parallel session 2 (Rooms A, B, C, D, E) Poster session Exhibition
12.30 – 14:15	Lunch break / poster session / exhibition
14:15 – 15:00	**INVITED SPEAKER**
	Processing of Minerals Containing Naturally Occurring Radioactive Minerals (NORM) in Malaysia: Issue and Prospect of Green Approach Prof. Dr. Amran Ab. Majid (Universiti Kebangsaan Malaysia)
	VENUE: BALLROOM
15:05 – 16:05	Parallel session 3 (Rooms A, B, C, D, E) Exhibition
16:05 – 16:30	Tea break
16:30 – 17:30	Closing ceremony Best presenter awards
	VENUE: BALLROOM

INVITED SPEAKERS

PROF. DR. BAHRUDDIN SAAD
Fundamental & Applied Sciences Department, Universiti Teknologi Petronas, 32610, Seri Iskandar, Perak.

PROF. DR. KAMARUZZAMAN YUNUS
Department of Marine Science & Technology, Kulliyyah of Science, International Islamic University Malaysia, 25200, Kuantan, Pahang.

PROF. DR. MOHD MARSIN SANAGI
Department of Chemistry, Faculty of Science, Universiti Teknologi Malaysia, 81310, UTM Johor Bahru, Johor.

PROF. DR. AMRAN AB MAJID
NORM Research Group, Advance Science Centre, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Bangi, Selangor.

INVITED SPEAKERS - ABSTRACTS

INVITED SPEAKER 1

ADVANCES IN THE DETERMINATION OF BIOGENIC AMINES

Bahruddin Saad[1*]

[1]*Fundamental & Applied Sciences Department and Institute for Sustainable Living, Universiti Teknologi PETRONAS, 32610 Seri Iskandar, Perak Darul Ridzuan*

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Abstract

Biogenic amines (BAs) are low molecular mass nitrogenous compounds with aliphatic (e.g., spermine, spermidine, putrescine, cadaverine), heterocyclic (e.g., tryptamine, histamine) or aromatic (e.g., phenylethylamine, tyramine) structures. Small amounts of BAs are synthesised in plant and animal cells, while larger quantities are found as a consequence of microbial metabolism in a wide range of fermented foods such as fermented sausage and fish products, cheeses, fermented vegetables, and beverages. Meanwhile, their content in food samples varies to a great extent, and are strongly dependent on the composition, microbial flora and fermentation conditions. Therefore, the analysis of BAs is important as indicator of degree of food freshness or spoilage as well as to evaluate their toxicological risks. The analytical determination of BAs is challenging, mainly due to the fact that BAs are relatively polar compounds, making them extraordinary difficult to be extracted using the traditional organic solvents. Many of the BAs also lack the intrinsic structures for substantial absorption for the normal UV or fluorescence detection.

Over the years, our group had been developing analytical methods to meet the aforementioned challenges. The main advances are in the area of sample pretreatment as this is the bottleneck in the entire analytical step. Strategies to achieve this include the use of specialised sorbents coated with crown ethers and hydrazones. These sorbents offer unique selectivity for certain types of BAs. Another interesting approach was the *in-situ* derivatization and extraction based on hollow-fibres liquid phase microextraction. This technique deserves special mentioning as it provides a new paradigm shift in measurements as it not only uses minute amounts of extracting solvents (~ 5 uL) but the extraction and derivatization are feasible in a single step! From the environment point of view, there is also much concern on the role of BAs as potential precursors for the formation of highly carcinogenic N-nitroso compounds. Towards this end, we have developed a capillary electrophoresis method using capacitively coupled contactless conductivity detection for the simultaneous determination of BAs in environmental water, including seawater. This method enables the simultaneous determination of BAs without the need for derivatization. Results on the analysis of BAs on selected Malaysian products such as fermented fish, sauce, etc will be shared.

Keywords: biogenic amines, sample pretreatment, food and environment analysis

INVITED SPEAKER 2

RARE EARTH ELEMENTS (LANTHANIDES) ASSESSMENT IN ROCKY SHORE ORGANISMS AND SURFACE SEDIMENT ALONG PENINSULAR MALAYSIA COASTAL WATERS

Kamaruzzaman Yunus[1*]

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**Corresponding author: kama@iium.edu.my*

Abstract

This study explores the bioavailability of REEs in the ecosystem of rocky shore area along Peninsular Malaysia coastal waters, relating their partitioning between surface sediment and chosen bioindicator and deliberating on interspatial, interspecies, and inter-tissue variation. Teflon Bomb technique was used for digestion method, followed by ICP-MS measurement of 14 naturally occurring REEs concentration. The fractionation patterns of REEs normalized to chondrite or shale showing such data were comparable, hence, representing a mutual source of the REEs for the entire region. Yet, mean concentration finding proposed that east Peninsular Malaysia coasts delivers higher REEs compared to west peninsula area. Constant REEs abundance patterns all samples were shown, with enrichment of LREEs over HREEs. This suggests that REEs are transferred as a consistent group over aquatic ecosystems. There are dissimilarities in the REEs abundance for each site, but they demonstrate similarities in their REEs distribution patterns, which propose that they are of parallel origins. The contaminant metals As, Mn, Cu, and Cd were significantly correlated with REEs ($p<0.05$ and $p<0.01$), consequently suggests that these metals are probably non-anthropogenic in origin as the REEs are geogenic in origin. Anomalies calculation was executed by normalized values to data of chondrite, PAAS and NASC. Results showing ratios for Ce and Eu are higher than unity for former and vice versa for the latter in all places. Filter feeder *S. cucullata* showing potential as a good bioindicator for REEs as a result of its feeding behavior that correlated to particulates as REEs sources. Consistent chondrite-normalized pattern strongly proposes that the REEs accumulated by *S. cucullata*, *T. clavigera* and *N. chameleon* are derived mostly from indigenous rocks. Findings suggested that the values are significantly lower than the safety limit. With regards to sediment, comparative analysis resolved that the concentration of surface sediment in this study is very low compared to limit sets.

INVITED SPEAKER 3

FACILE ORGANIC-INORGANIC HYBRID SORBENTS FOR EXTRACTION OF POLLUTANTS FROM AQUEOUS SAMPLES

Mohd Marsin Sanagi[1,2]*, Nyuk-Ting Ng[1], Amirah Farhan Kamaruddin[1], Faridah M. Marsin[1], Mohamad Raizul Zinalibdin[1], Zetty Azalea Sutirman[1], Aemi S. Abdul Keyon[1], Wan Aini Wan Ibrahim[1,2]

[1]*Department of Chemistry, Faculty of Science, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia*
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[*]*Corresponding author: marsin@kimia.fs.utm.my*

Abstract

Rapid and efficiency extraction or removal of pollutants from aqueous samples has been an important issue in analytical science. Solid phase extraction using sorbents is a well-known separation method and recognized as one of efficient and economic methods for removal of pollutants from water. In the past few years, there has been growing interest on extractions using organic-inorganic hybrid materials. Formed by incorporating inorganic species into organic matrix, these materials possess advantages such as high selectivity, permeability, and mechanical and chemical stabilities. This paper discusses recent significant advances in analytical solid-phase extraction employing organic-inorganic composite and nanocomposite sorbents for the extraction of organic and inorganic pollutants from aqueous samples. Classifications and synthesis methods of organic-inorganic hybrid sorbents are described. The physicochemical characteristics, extraction properties and analytical performances of sorbents are discussed, including morphology and surface characteristics, types of functional groups, interaction mechanism, selectivity and sensitivity, accuracy, and regeneration abilities. Organic-inorganic hybrid sorbents in combination with extraction techniques are highly promising as an emerging research field for sample preparation of samples such as food, biological and environmental matrixes with analytes at trace levels.

Keywords: organic-inorganic hybrid sorbents, extraction methods, environmental pollutants, aqueous samples

INVITED SPEAKER 4

RADIOACTIVE MINERALS (NORM) IN MALAYSIA: ISSUE AND PROSPECT OF GREEN APPROACH

Amran Ab. Majid[1*]

[1]*NORM Research Group, Advance Science Centre, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Bangi, Selangor.*

**Corresponding author: amranabmajid@gmail.com*

Abstract

Malaysia has been involved in production of mineral containing naturally occurring radioactive minerals (NORM) for many decades. Malaysia has a significant deposit of thorium in its rare earth minerals such as monazite, xenotime and also in rare earth element (REE) extraction residue. Despite generating high economy revenue, this industry contribute several environmental problems especially during storage and disposal stages as the residue containing natural radioactivity may contributes a long term radiological risks to public health and environment. However, due to increasing interest in green and nuclear fuel technology worldwide, Malaysia has increased its special interest and research in production of rare earth elements (REE), uranium (U) and thorium (Th). The objectives of this research are to optimise the economy or benefit of these minerals and to develop a green technology to reduce the environmental and radiological impacts of the industry. This paper will revisit Malaysia's tin mine industry cycle and its associated issues and problems especially the radiological environmental impact. This paper will discuss the outcome of works carried out by NORM research group in UKM and Malaysia pertaining to NORM minerals and industry. This paper will also discuss the green approach involving acid digestion, solvent extraction for separation and purification of REE, U and Th developed by our group in processing of NORM minerals for the benefit of human and environment.

SPONSORS - ABSTRACTS

ANTON PAAR

MICROWAVE-ASSISTED SOLUTIONS IN THE LABORATORY - POSSIBILITIES AND RESTRICTIONS

David Reishofer
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Over the last 30 years microwave technology has matured and stepped into several application fields in chemistry like synthesis, extraction and digestion. While in early days domestic ovens have been employed, bearing lots of issues and drawbacks, meanwhile dedicated reactors and individual options have been developed for convenient and efficient processing.

With up-to-date solutions for automation, efficient methods for high-throughput synthesis, extraordinary properties of silicon carbide materials, highly accurate temperature sensors and even possibilities to watch chemical reactions in a microwave reactor, microwave synthesis has been shifted to the next level, being fit for the challenges of the 21st century.

Herein we present a summary of applications showing the employment of tools for convenient, efficient and reproducible processing. But also the technical and applicative limits of microwave technology are discussed in order to give an overview about the possibilities and issues which one should keep in mind when using microwave assistance for chemical synthesis, extraction and digestion.

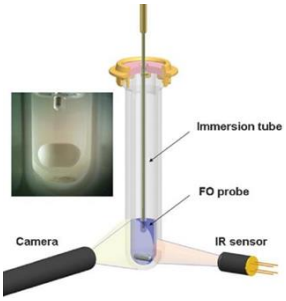

Figure 1. Schematical view of the reaction vessel and respective sensors in a microwave cavity

C. O. Kappe, Chem. Soc. Rev. 2013, 42, 4977
W. Chen, B. Gutmann, C. O. Kappe, ChemistryOpen 2012, 1, 39
L. Maiuolo et al., RSC Adv. 2017, 7, 4898

LYNAS MALAYSIA SDN BHD

ANALYTICAL CHEMISTRY, RARE EARTHS AND LYNAS

Richard James Amata,
Manager, Product Quality, Sales and Marketing,
Lynas MALAYSIA SDN BHD

Rare Earths, a set of 15 + 2 elements critical to recent advancements in science and technology, pose a unique challenge to the analytical sciences. This brief discussion will offer a viewpoint of how analytical science is applied at a rare earth industrial facility; e.g., types of analysis are conducted, technical difficulties of analysis, and a vision of the future for rare earth analysis.

PARALLEL SESSIONS

PARALLEL SESSION 1 (18th AUGUST 2018)

(10:45-12:30)

ROOM A: ENVIROMENTAL CHEMISTRY CHAIRPERSON: ASST. PROF. DR MOHD ARMI BIN ABU SAMAH		
CODE	**NAME**	**TITLE**
OEC01 10:45-11:00	**MS. VIVIAN ZING TING LOH**	**REMOVAL OF Pb(II) FROM AQUEOUS SOLUTION BY PINEAPPLE PLANT STEM**
OEC02 11.00-11.15	**MS. SHARIFAH NUR ATIKAH SYED FIRZATUL AKBAR**	**PRELIMINARY STUDY OF MALACHITE GREEN ELECTROCHEMICAL SENSOR**
OEC03 11.15-11.30	**MRS. NURUL LATIFFAH ABD RANI**	**TREND AND MISSING DATA PREDICTION MODEL OF PM_{10} IN CENTRAL REGION USING ANN AND MLR**
OEC04 11:30-11:45	**DR. FIONA HOW NI FOONG**	**ANALYSIS OF CADMIUM AND CHROMIUM CONTENT IN RAW AND TREATED LEACHATE FROM JERANGAU-JABOR LANDFILL SITE, KUANTAN, PAHANG, MALAYSIA**
OEC05 11:45-12:00	**DR. AEMI SYAZWANI ABDUL KEYON**	**DISPERSIVE MICRO SOLID-PHASE EXTRACTION OF RHODAMINE 6G AND CRYSTAL VIOLET DYES IN TEXTILE WASTEWATER USING POLYPYRROLE-MAGNETITE AS ADSORBENT**
OEC06 12:00-12.15	**DR. MOHD FARID ISMAIL**	**THE EFFECT OF THE ANION PKA IN THE EFFICIENCY OF NAPHTHENIC ACID EXTRACTION FROM MODEL OIL BY 1-BUTYL-3-METHYL-IMIDAZOLIUM-BASED IONIC LIQUIDS**
ROOM B: FOOD CHEMISTRY AND BIOTECHNOLOGY CHAIRPERSON: ASST. PROF. DR. NOR SALIYANA JUMALI		
CODE	**NAME**	**TITLE**
OFB01 10:45-11:00	**MR. MUHAMMAD SHAHRAIN SHUHAIMEN**	**STATISTICAL ANALYSIS AND MOLECULAR DOCKING STUDY ON HALAL POTENTIAL ANTIOXIDANT FROM ANACARDIUM OCCIDENTALE FRUITS**
OFB02 11:00-11:15	**MRS. NOR FARAHIYAH GHAZALI**	**ANTIOXIDANT ACTIVITY AND *IN VITRO* CYTOTOXICITY STUDY OF THE PHENOLIC COMPOUNDS FROM *PIPER SARMENTOSUM***
OFB03 11:15-11:30	**MS. FARAH FARISHA MUSTAFA**	**LC-MS CHARACTERIZATION OF PHENOLIC COMPOUNDS AND ANTI-ACANTHAMOEBIC PROPERTIES OF *PIPER SARMENTOSUM* (KADUK) LEAVES METHANOLIC EXTRACT**
OFB04 11:30-11:45	**DR. SITI AMINAH SETU**	**PRODUCTION OF BACTERIAL-BASED VIOLACEIN NANOPARTICLES AND EVALUATION OF THEIR STABILITY USING SURFACTANT AS STABILIZER**
OFB05 11:45-12:00	**MS. NOR AINI NOH**	**DISCOVERY AND DELOPMENT OF HALAL PROTEASE FROM *SPONDIAS CYTHEREA* FOR MEAT TENDERIZATION**
OFB06 12:00-12:15	**DR. DARFIZZI DERAWI**	**SEPARATION OF UNSATURATED FATTY ACIDS FROM PALM STEARIN USING METHANOL-CRYSTALLISATION METHOD**
OFB07 12:15-12:30	**MS. NUR HUDA MOHD ZIN**	**COMPARISON OF THE ESSENTIAL OIL COMPONENTS IN FRESH PEELS OF LIME (*CITRUS AURANTIFOLIA*) EXTRACTED WITH SUPERCRITICAL FLUID EXTRACTION AND OTHER THREE TRADITIONAL EXTRACTION METHODS**

ROOM C: MATERIAL CHEMISTRY CHAIRPERSON: ASST. PROF. DR. WAN KHARTINI BINTI WAN ABDUL KHODIR		
CODE	**NAME**	**TITLE**
OMC01 10:45-11:00	MS. MONICA LIMAU JADAM	FENOPROFEN INTERCALATED INTO LAYERED DOUBLE HYDROXIDE FOR CONTROLLED RELEASE DRUG DELIVERY STUDY
OMC02 11:00-11:15	DR. ZAEMAH BINTI JUBRI	SYNTHESIS AND CHARACTERIZATION OF NANOHYBRID ANTI-HYPERTENSIVE DRUG, CAPTOPRIL INTERCALATED INTO ZINC-ALUMINIUM LAYERED DOUBLE HYDROXIDE
OMC03 11:15-11:30	MR. AHMAD JAZMI ABDUL RAHMAN	PREPARATION AND CHARACTERIZATION OF *S*-QUINOLIN-2-YL-METHYLDITHIOCARBAZATE FUNCTIONALIZED MAGNETIC NANOPARTICLES
OMC04 11:30-11:45	MRS. NORIAH ABDUL RAHMAN	POTENTIAL OF NITROCHITOSAN SOLID BIOPOLYMER ELECTROLYTE
OMC05 11:45-12:00	MS. NOR ANIISAH HUSIN	SYNTHESIS OF MAGNETIC NANOPARTICLES DEEP EUTECTIC SOLVENT AS ADSORBENTS FOR REMOVAL OF DICLOFENAC IN ENVIRONMENTAL SAMPLES.
OMC06 12:00-12:15	DR.SITI NURUL AIN BINTI MD JAMIL	SYNTHESIS OF POROUS THIOAMIDE-MODIFIED POLY(ACRYLONITRILE-CO-DIVINYLBENZENE-80) SORBENTS FOR THE CAPTURE OF POLAR ANALYTES
OMC07 12:15-12:30	MS. SITI NUR FADHILAH SARDON	SYNTHESIS AND LIQUID CRYSTAL PROPERTIES OF NEW AZO-ESTER LINKED MATERIALS
ROOM D: ORGANIC/INORGANIC CHEMISTRY CHAIRPERSON: ASSOC. PROF. DR. SHAFIDA BINTI ABD HAMID		
CODE	**NAME**	**TITLE**
OOIC01 10:45-11:00	MS. NUR AFIQAH AHMAD	SPECTROSCOPY AND ANTIOXIDANT ACTIVITY OF SALICYLATE-BASED PROTIC IONIC LIQUIDS
OOIC02 11:00-11:15	MR. MUHAMMAD QUSYAIRI	SYNTHESIS, CHARACTERIZATION, REACTION MECHANISM AND THEORETICAL STUDY OF AN ANTIMICROBIAL INHIBITOR FROM HETEROAROMATICS BASED THIOSEMICARBAZONE
OOIC03 11:15-11:30	MRS. NUR MAISARAH SARIZAN	COMPARISON OF LABELLING REACTIONS FOR MONOSACCHARIDE COMPOSITION ANALYSIS USING HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY
OOIC04 11:30-11:45	MS. NURUL FAIEZIN ZUL	PHYSICOCHEMICAL INVESTIGATION OF TRIAZOLYL BENZOATE ANIONIC SURFACTANT AND ITS MIXTURE WITH GLYCOLIPIDS
OOIC05 11:45-12:00	MR. FAZHRUL HAQIMEE ZAIDON	SYNTHESIS AND CHARACTERIZATION OFN-SUBSTITUTED THIOSEMICARBAZONE DERIVATIVES AS CORROSION INHIBITORS FOR MILD STEEL IN 1 M HCL
OOIC06 12:00-12:15	MR. MUHAMMAD ASHRAF MOHD KAHAR	SUBSTITUENTS EFFECT OF SCHIFF BASE DERIVED FROM ANILINE AS CORROSION INHIBITOR ON MILD STEEL IN 1M HCL
ROOM E: ENVIROMENTAL CHEMISTRY CHAIRPERSON: ASST. PROF. DR. ASNOR AZRIN BIN SABUTI		
CODE	**NAME**	**TITLE**

OEC07 10:45-11:00	**MRS.ISMALIZA ISMAIL**	**CORROSION INHIBITION BEHAVIOUR OF SODIUM DODECYLBENZENESULFONATES-ZINC SULFATE SYSTEM ON MILD STEEL IN NACL**
0EC08 11:00-11:15	**MR. HASSAN SHEIKH**	**HEMOLYMPH QUALITY OF WILD MALAYSIAN HORSESHOE CRAB (TACHYPLEUS GIGAS) FROM BALOK, KUANTAN**
OEC09 11:15-11:30	**DR. WAN MOHD AFIQ WAN MOHD KHALIK**	**C_{18}-CTA COMPOSITE FILM USAGE AS AN EXTRACTION SORBENT FOR CAFFEINE RESIDUE IN WATER ANALYSIS**
OEC10 11:30-11:45	**MRS. SITI NOOR SYUHADA MUHAMMAD AMIN**	**DETERMINATION OF AIRBORNE HEAVY METALS AND HEALTH RISK ASSESSMENT OF POPULATIONS EXPOSED TO METALS IN INDUSTRIAL AREA, GEBENG AND PAKA**
OEC11 11:45-12:00	**MR. YONG CHIN HONG**	**IS ORGANIC VEGETABLES IN MALAYSIA REALLY ORGANIC?**

PARALLEL SESSION 2 (19th AUGUST 2018)

(10:45-12:30)

ROOM A: ENVIRONMENTAL CHEMISTRY CHAIRPERSON: ASST. PROF. DR. MOHD FUAD MISKON		
CODE	**NAME**	**TITLE**
OEC12 10:45-11:00	**MRS. SITI FATIMAH SAIPUDDIN**	**RADIOLOGICAL ASSESSMENT OF SOIL FROM PAYA BUNGOR, PAHANG, MALAYSIA**
OEC13 11:00-11:15	**MS. NURUL AMILIN SUPARDI**	**DITHIOCARBAMATE-IMMOBILIZED SILICA COATED MAGNETIC FE_3O_4 NANOPARTICLES FOR SOLID-PHASE EXTRACTION OF LEAD IN SHELLFISH**
OEC14 11:15-11:30	**ASSOC. PROF. DR. SUHAIMI SURATMAN**	**NUTRIENTS DISTRIBUTION IN BESUT RIVER BASIN, TERENGGANU, MALAYSIA**
OEC15 11:30-11:45	**ASSOC. PROF. DR. ONG MENG CHUAN**	**ACCUMULATION OF HEAVY METALS CONTENT IN COMMERCIAL CRAB COLLECTED FROM JOHOR STRAIT, MALAYSIA**
OEC16 11:45-12:00	**MS. NUR AMIRA HIDAYAH MADZLAN**	**SEASONAL CHANGES OF HEAVY METALS LEVEL IN SEDIMENT OF SETIU RIVER, TERENGGANU**
OEC17 12:00-12:15	**MS. NUR MARNI ZAINI**	**DISTRIBUTION OF HEAVY METALS CONCENTRATION IN RECENT SEDIMENTS AT MERANG RIVER, TERENGGANU, MALAYSIA**
ROOM B: FOOD CHEMISTRY AND BIOTECHNOLOGY CHAIRPERSON: ASSOC. PROF. DR. DENY SUSANTI BINTI DARNIS		
CODE	**NAME**	**TITLE**
OFB08 10:45-11:00	**ASSOC. PROF. DR. NORMAWATY MOHAMMAD-NOOR**	**QUANTIFICATION OF CARRAGEENAN IN *GRACILARIA CF. MANILENSIS* (RHODOPHYTA) EXPOSED TO DIFFERENT SALINITIES AND PH USING ATTENUATED TOTAL REFLECTION-FOURIER TRANSFORM INFRARED SPECTROSCOPY (ATR-FTIR)**
OFB09 11:00-11:15	**MS. NOR IZZAH MUKHTAR**	**APPLICATION OF DIRECT FLUORESCENCE-BASED LIVE/DEAD STAINING FOR ASSESSMENT OF ANTIFUNGAL ACTIVITY OF COCONUT OIL AGAINST *CANDIDA ALBICANS***
OFB10 11:15-11:30	**MR. JING SHENG NG**	**THE AUTHENTICATION AND EVALUATION OF QUALITY OF CRUDE PALM OIL USING FOURIER TRANSFORM-INFRARED SPECTROSCOPY (FT-IR) AND FOURIER TRANSFORM-NEAR INFRARED SPECTROSCOPY (FT-NIR) COMBINED WITH CHEMOMETRIC ANALYSIS**

OFB11 11:30-11:45	**MR. MOHAMMED ABDULLAH JAINUL**	**ROLE OF L-GLUTAMINE IN THE *IN-VITRO* GROWTH OF HCT-8 AND HT-29 CELL LINES**
OFB12 11:45-12:00	**MRS. AQILAH NOOR BAHARI**	**DESIGN AND DEVELOPMENT OF HALAL NANOCOSMECEUTICAL CONTAINING HYDROLYSATE FROM ACTINOPYGA LECANORA**
OFB13 12:00-12:15	**MR. MOHD AIMAN BARUDIN**	**CHEMICAL COMPONENTS OF PCR IN 18S RRNA FOR CRYPTOSPORIDIUM DETECTION FROM RIVERS**
OFB14 12:15-12:30	**MS. NOOR ATIKAH AB AZIZ**	**DESIGN AND DEVELOPMENT OF NANO-SIZED NIOSOMES CONTAINING COLLAGEN HYDROLYSATE FROM LOCAL JELLYFISH (RHOPILEMA HISPIDUM) WITH POTENTIAL ANTIOXIDANT AND TYROSINASE-INHIBITING ACTIVITIES**
OFB15 12:30-12:45	**MR. IBRAHEEM AWARD**	**CYTOTOXIC EFFECT OF THE CHEMICAL CONSTITUENTS FROM THE RHIZOMES OF *BOESENBERGIA ROTUNDA***
ROOM C: MATERIAL CHEMISTRY CHAIRPERSON: ASST.PROF. DR WAN ZURINA SAMAD		
CODE	**NAME**	**TITLE**
OMC08 10:45-11:00	**MS. NURUL FAKHRIAH ISMAIL**	**PREPARATION AND CHARACTERISATION OF HYDROXYAPATITE EXTRACTED FROM FISH SCALE WASTE FOR THE REMOVAL OF GALLIC ACID AS INHIBITOR IN BIOFUEL PRODUCTION**
OMC09 11:00-11:15	**MS. SOPIA SAGING**	**SYNTHESIS OF LIQUID CRYSTALS WITH LATERAL METHYL GROUP AND THEIR MESOMORPHIC PROPERTIES**
OMC10 11:15-11:30	**MS. NORAMIRA SAAD**	**ELECTROCHEMICAL PROPERTIES OF MESOPOROUS SILICA - CARBON ELECTRODE**
OMC11 11:30-11:45	**DR. HASLINA AHMAD**	**ENHANCED CYTOTOXICITY OF RUTHENIUM COMPLEX CARRIED BY MESOPOROUS SILICA NANOPARTICLES**
OMC12 11:45-12:00	**MS. SITI FATIMAH BINTI MD HANAFIAH**	**EXTRACTION AND CHARACTERIZATION OF MICROFIBRILLATED AND NANOFIBRILLATED CELLULOSE FROM OFFICE PAPER WASTE**
OMC13 12:00-12:15	**MR. MOHAMAD WAFIUDDIN BIN ISMAIL**	**SYNTHESIS OF FOUR ARMS STAR POLYMER FOR HYDROGEL FORMULATION**
ROOM D: ORGANIC AND INORGANIC CHEMISTRY CHAIRPERSON: ASSOC.PROF. DR. NURZIANA NGAH		
CODE	**NAME**	**TITLE**
OOIC07 10:45-11:00	**MS. UMIE FATIHAH MOHAMAD HAZIZ**	**NON-SYMMETRICALLY SUBSTITUTED BIS-BENZIMIDAZOLIUM SALTS AND THEIR RESPECTIVE DINUCLEAR SILVER(I)-NHC COMPLEXES: SYNTHESIS AND ANTIBACTERIAL ACTIVITIES**
OOIC08 11:00-11:15	**DR. FAZIRA ILYANA ABDUL RAZAK**	**INVESTIGATION OF RUTHENIUM ALKYNYL COMPLEXES FOR NONLINEAR OPTIC APPLICATION USING COMPUTATIONAL METHOD**
OOIC09 11:15-11:30	**MR. MUHAMAD AZWAN HAMALI**	**ONE POT GREEN SYNTHESIS AND ANTIMICROBIAL STUDIES OF SALICYLALAZINE DERIVATIVES SCHIFF BASE**
OOIC10 11:30-11:45	**DR. MOHAMED IBRAHIM MOHAMED TAHIR**	**SYNTHESIS, CHARACTERISATION & CYTOTOXICITY STUDY OF BENZYL 2-((1*E*,4*E*)-1,5-BIS(4-BROMOPHENYL)PENTA-1,4-DIEN-3-YLIDENE)HYDRAZINECARBODITHIOATE & BENZYL 2-((1*E*,4*E*)-1,5-BIS(4-CHLOROPHENYL)PENTA-1,4-DIEN-3-YLIDENE)HYDRAZINECARBODITHIOATE AND THEIR NI(II), CU(II), FE(II), ZN(II), & CD(II) COMPLEXES**
OOIC11 11:45-12:00	**MR. MOHAMAD NOR AMIRUL AZHAR KAMIS**	**CRYSTAL GROWTH AND PHYSICAL CHARACTERIZATION OF NICOTINAMIDE CRYSTALLIZED WITH CINNAMIC ACID**

OO1C12 12:00-12:15	**MR. KEN MIN LIEW**	**SYNTHESIS AND CHARACTERISATION OF FERROCENE-INDOLE DERIVATIVES VIA SIMPLE ESTERIFICATION AS HELA INHIBITOR**
ROOM E: ANALYTICAL CHEMISTRY CHAIRPERSON: ASST.PROF. DR. ERNA NORMAYA BT ABDULLAH		
CODE	**NAME**	**TITLE**
OAC01 10:45-11:00	**ASSOC. PROF. DR. SHARIFAH MOHAMAD**	**WASTES FROM KITCHEN: A PROMISING MATERIALS FOR ANALYTICAL SAMPLE PREPARATION**
OAC02 11:00-11:15	**MRS. NURUL AMIRAH BAHARU**	**CHEMOSENSOR DEVELOPMENT USING 2-ACETYLPYRROLE THIOSEMICARBAZONE FOR Cu^{2+} ION RECOGNITION IN AQUEOUS MEDIUM: EXPERIMENTAL AND THEORETICAL STUDIES**
OAC03 11:15-11:30	**MS. NADHIRATUL-FARIHIN SEMAIL**	**ELECTROKINETIC SUPERCHARGING IN CAPILLARY ELECTROPHORESIS FOR ONLINE PRECONCENTRATION OF 5-FLUOROURACIL AND ITS METABOLITES IN HUMAN PLASMA**
OAC04 11:30-11:45	**MS. NURHAKIMAH ISMAIL**	**CHEMOSENSOR DEVELOPMENT OF Cu^{2+} RECOGNITION USING 1,5-DIPHENYLCARBAZONE: OPTIMIZATION, COSMO-RS AND DFT STUDIES.**

PARALLEL SESSION 3 (19th AUGUST 2018)

(15:05-16:05)

ROOM A: ENVIRONMENTAL CHEMISTY CHAIRPERSON: ASST.PROF. DR. FIONA HOW NI FOONG		
CODE	**NAME**	**TITLE**
OEC18 15:05-15:20	**ASSOC. PROF. DR. NIK AHMAD NIZAM**	**REMOVAL OF HERBICIDE PARAQUAT BY CETYLTRIMETHYL AMMONIUM BROMIDE MODIFIED PINEAPPLE LEAVES**
OEC19 15:20-15:35	**MRS.SITI UMI KALTHUM AB WAHAB**	**THE DETERMINATION OF SELECTED ELEMENTS FOUND IN SAMPLES COLLECTED FROM RIVERS IN GEBENG AREA**
OEC20 15:35-15:50	**DR. HANI KARTINI AGUSTAR**	**ABUNDANCE OF PROTOZOA AND HAEMOPARASITES IN ANURANS FROM HIGHLAND AND LOWLAND GOLF COURSES**
OEC21 15:50-16:05	**DR. KHAIRIATUL MARDIANA JANSAR**	**DETERMINATION OF GLYPHOSATE AND AMINOMETHYLPHOSPHONIC ACID AND GLYPHOSATE POTENTIAL TO GROUNDWATER POLLUTION**
ROOM B: MATERIAL CHEMISTRY CHAIRPERSON: ASST.PROF.DR. MOHAMMAD NORAZMI BIN AHMAD		
CODE	**NAME**	**TITLE**
OMC14 15:05-15:20	**MR. SHARIL FADLI MOHAMAD ZAMRI**	**MORPHOLOGICAL AND IONIC CONDUCTIVITY OF TIO2 FILLED PS/NR BLEND ELECTROLYTES**
OMC15 15:20-15:35	**DR. MUGGUNDHA RAOOV RAMACHANDRAN**	**DEVELOPMENT OF IONIC LIQUID BASED MAGNETIC NANOPARTICLES FOR THE EXTRACTION OF ORGANIC COMPOUNDS FROM VARIOUS MATRIXES**
OMC16 15:35-15:50	**DR. ZULKIFLI MERICAN**	**CHARACTERIZATION AND ANALYSIS OF HIGH DENSITY POLYETHYLENE AS A PIPE LINER SUBJECTED TO FIELD OPERATING CONDITION**
OMC17 15:50-16:05	**MS. NUR AMIRAH SYAHIRAH IBRAHIM**	**PREPARATION AND CHARACTERISATION OF SOL-GEL HYBRID SORBENT METHYLTRIMETHOXYSILANECHLOROPROPYLTRIETHOXYSILANE FOR SOLID PHASE EXTRACTION**

ROOM C: MATERIAL CHEMISTRY CHAIRPERSON: ASST.PROF.DR. WAN HAZMAN BIN DANIAL		
CODE	**NAME**	**TITLE**
OMC18 15:05-15:20	**MR. MUHAMMAD AZAM MUHAMMAD ZAKI**	**ONE STEP ACTIVATION AND RECYCLABILITY OF KOH AND CAO MODIFIED CARBON IN TRANSESTERIFICATION OF RICE BRAN OIL**
OMC19 15:20-15:35	**MRS. MIFTAKHUL JANNATIN**	**DEGRADATION OF CHLORAMPHENICOL USING GRAPHENE OXIDE FROM BAGASSE-FE_3O_4**
OMC20 15:35-15:50	**MS. KASTURI GOPAL**	**ACTIVATED CHARCOAL COATED WITH NONIONIC SILICONE SURFACTANT ENHANCED WITH MAGNETIC NANO PARTICLES FOR THE REMOVAL OF PHENOLIC COMPOUNDS IN AQUEOUS SAMPLES USING UV-VIS SPECTROSCOPY.**
OMC21 15:50-16:05	**DR. EMMANUEL JOSEPH**	**INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS OF INTEREST ELEMENTS IN FARMLANDS AT THE CENTRAL AREA OF KATSINA STATE, NIGERIA**
ROOM D: ANALYTICAL CHEMISTRY CHAIRPERSON: ASST.PROF.DR. NURUL IMAN BT AMINUDIN		
CODE	**NAME**	**TITLE**
OAC05 15:05-15:20	**MS. NURUL RAIHANA AZHARI**	**SIMULTANEOUS ENANTIOMERIC RESOLUTION OF IMIDAZOLE ANTIFUNGAL AGENTS USING HYDROXYPROPYL-B-CYCLODEXTRIN AS CHIRAL SELECTOR IN CAPILLARY ELECTROPHORESIS**
OAC06 15:20-15:35	**MS. IRDA HASLINDA HASSAN**	**DEVELOPMENT AND VALIDATION OF HPLC METHOD FOR SIMULTANEOUS DETERMINATION OF CARBAMAZEPINE AND GABAPENTIN IN FIXED-DOSE COMBINATION**
OAC07 15:35-15:50	**MS. MAIZATUL NAJWA BINTI JAJULI**	**ELECTROCHEMICAL LIQUID-LIQUID EXTRACTION OF PHARMACEUTICAL COMPOUNDS**
OAC08 15:50:16:05	**ASSOC. PROF. DR. IBRAHIM SHOGAR**	**THE ETHICAL CONCERNS OF BIOANALYTICAL CHEMISTRY: THE CASE OF FORENSIC SCIENCE**
OAC09 16:05-16:20	**MR. BOON YIH HUI**	**FABRICATION OF MAGNETIC POLY(B-CYCLODEXTRIN FUNCTIONALIZED IONIC LIQUID) NANOCOMPOSITES AND ITS APPLICATION IN THE MAGNETIC SOLID PHASE EXTRACTION OF POLYCYLIC AROMATIC HYDROCARBONS FROM RICE SAMPLES**
ROOM E: CATALYSIS CHAIRPERSON: ASST.PROF.DR. ROSLIZA BINTI MOHD SALIM		
CODE	**NAME**	**TITLE**
OC01 15:05-15:20	**DR. SITI KAMILAH CHE SOH**	**SYNTHESIS, CHARACTERIZATION AND CATALYTIC APPLICATION OF SYMMETRICAL PALLADIUM(II) N_2O_2- SCHIFF BASE TOWARD MIZOROKI-HECK REACTION**
OC02 15:20-15:35	**DR. NORLI ABDULLAH**	**SIZE-CONTROLLED SYNTHESIS OF PALLADIUM NANOPARTICLES SUPPORTED ON TITANIA FOR HYDROGENATION REACTION**
OC03 15:35-15:50	**DR. SUSILAWATI TOEMEN**	**A COMPARATIVE STUDY ON THE STRUCTURE-ACTIVITY RELATIONSHIP OF RU/M*/CE/AL_2O_3 PROMOTED WITH MG AND MN FOR CO_2/H_2 METHANATION REACTION**
OC04 15:50-16:05	**MR. MOHAMAD IMRAN FIRDAUS BIN MHD SAWAL**	**GLYCEROL DEGRADATION WITH ABSENCE OF EXTERNAL HYDROGEN GAS BY USING WASTE EGGSHELL AS HETEROGENEOUS CATALYST**

POSTER SESSIONS

CODE	TITLE
PEC01	ELECTROCHEMICAL TREATMENT OF AQUEOUS C. I. REACTIVE BLUE 21 AND SYNTHETIC TEXTILE EFFLUENT USING METAL/GRAPHITE-POLYVINYL CHLORIDE COMPOSITE ELECTRODE *Norazzizi Nordin, Mohamad Anis Farith Pisal, Nur Izzatie Hannah Razman, Mohd Lokman Ibrahim*
PEC02	A REVIEW ON THE ACCUMULATION OF HEAVY METALS IN COASTAL SEDIMENT OF PENINSULAR MALAYSIA *Kamaruzzaman, B.Y., Zuraidah, M.A, Akbar John, B.*
PEC03	REMOVAL OF Cu AND Pb FROM AQUEOUS SOLUTION USING CORN LEAVES (*Zea Mays*) AS ADSORBENT *Rosliza Mohd Salim, Siti Hajar Abu Bakar*
PEC04	SEDIMENT QUALITY ASSESSMENTS IN RELATION TO SOCIO-ECONOMIC DEVELOPMENT IN KAMPUNG TEKEK, TIOMAN ISLAND, PAHANG DURING SURVEY IN AUGUST 2015 *Asnor Azrin Sabuti, Mohd Fuad Miskon, Nik Hani Shahira Nik Shirajuddin, Nur Sakinah Abdul Razak, Zaleha Kassim*
PEC05	SEASONAL INFLUENCES ON THE LEVELS OF PARTICULATE METALS IN KUANTAN RIVER, EAST COAST MALAYSIA USING PRINCIPAL COMPONENT ANALYSIS *Fikriah Faudzi, Kamaruzzaman Yunus, Mohd Fuad Miskon, Asnor Azrin Sabuti, Azman Azid*
PEC06	DEGRADATION OF METHYL ORANGE BY USING SILVER PHOSPHATE/TITANIUM DIOXIDE PHOTOCATALYST *Noor Izznin Najiah Lansir, Nur Amalina Abdul Aziz, Abdul Halim Abdullah*
PEC07	PENENTUAN KEPEKATAN LOGAM BERAT DALAM SEDIMEN DI MUARA SUNGAI KEMAMAN, TERENGGANU *Samsuddin, A.A., Suratman, S., Shazili, N.A.M, Nor Antonina, A., Mohammed Faizal, A.R*
PEC08	REMOVAL OF CRUDE OIL FROM AQUEOUS SOLUTION BY BIVALVE SHELL AS LOW-COST ADSORBENT *Muhammad Farhan Hanafi, Muhammad Haikal Rosli, Norzahir Sapawe*
PEC09	WATER QUALITY AND ANTROPHOGENIC POLLUTANTS DETERMINATION IN SUNGAI BERTAM, CAMERON HIGHLANDS, PAHANG. *Khairiatul Mardiana Jansar, Ismail Sahid, Siti Nur Ain Suhaimi, Muhamad Safwan Ishak*
PFB01	ULTRASOUND ASSISTED DISPERSIVE LIQUID–LIQUID MICRO EXTRACTION (USADLLME) FOR THE DETERMINATION OF BIOGENIC AMINES IN FOODS *Mardiana Saaid, Solehatun Mhd Bani*
PFB02	*ANDIDA RUGOSA* LIPASE IMMOBILIZED ON DIETHYLAMINOETHYL-CELLULOSE (DEAE) FOR ESTERIFICATION OF OLEIC ACID AND BIOALCOHOL *Mohd Basyaruddin Abdul Rahman, Emilia Abdumalek, Muhammad Alif Mohammad Latiff*
PMC01	TERNARY PHASE BEHAVIOUR OF WATER/GLYCOLIPID/OIL SYSTEM *Nurul Shahidah M Shahripoddin, Noraini Ahmad, Norazlinaliza Salim*
PMC02	CARBOXYMETHYL SAGO STARCH/POLY(ETHYLENE OXIDE) HYDROGEL NANOFIBERS AND ITS CONTROLLED RELEASE BEHAVIOR *Norizah Abdul Rahman, Nurul Husna Rosdi, Norhashidah Talib, Norzita Yacob, Mohd Zobir Hussein*
PMC03	BIPHASIC NANOHYBRID OF LAYERED DOUBLE HYDROXIDE INTERCALATED WITH 4-CHLOROPHENOXYACETATE AND 2,4,5-TRICHLOROPHENOXYACETATE HERBICIDES *S.H. Sarijo, M.Z. Hussein, Z. Zainal*
PMC04	ELECTROSPUN POLY (VINYL ALCOHOL) NANOFIBERS DOPED WITH MESOPOROUS SILICA NANOPARTICLES FOR CONTROLLED RELEASE OF METHYLENE BLUE *Haslina Ahmad, Nur Izzah Md Fadilah, Mohd Firdaus Abd Rahman, Norizah Abdul Rahman*
PMC05	SYNTHESIS OF MESOPOROUS SILICA NANOPARTICLE FROM BAGASSE ASH FOR METHYLENE BLUE DYE REMOVAL *Norzahir Sapawe, Mohd Zulkhairi Zakaria, Muhammad Farhan Hanafi*
PMC06	CRYSTALLISATION VIA MELTING *Azaima Razali, C.Patrick Royall*
POIC01	SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL STUDY OF ACRIDINE IMIDAZOLIUM SALT *Olla Sharhan, Thorsten Heidelberg, Najiahah Mohd Hashim*

POIC02	EVALUATING THE INHIBITION OF THE ENZYME α-GLUCOSIDASE BY IMINOSUGAR INTERMEDIATES OF DEOXYNOJIRIMYCIN *Yong Wai Haan, Hussein Mahmood Ahmed Al-Bajalan, Edison Eukun Sage, Dharshini Elangovan, Noorliana Mat Yajit, Nur Maisarah Sarizan, Siti Aishah Hasbullah, Nicole Zitzmann, J.L. Kiappes, Nor Hadiani Ismail, Mukram Mohamed Mackeen*
POIC03	SYNTHESIS OF AMINOANTHRAQUINONE DERIVATIVES *Siti Mariam Mohd Nor, Siti Fadilah Juhan, Saripah Salbiah Syed Abdul Azziz*
POIC04	SYNTHESIS, MOLECULAR DOCKING OF 5-ACETYL-4-METHYLTHIAZOLE DERIVATIVES AS ANTIMICROBIAL AGENTS *Iswatun Hasanah Abdullah Ripain, Norashikin Roslan, Nurul Shazana Norshahimi, Siti Salwa Mohamed Salleh, Noraslinda Mohammad Bunori, Nurziana Ngah*
POIC05	PALM OIL AS ALTERNATIVE BIOLUBRICANTS FOR IMPROVING TRIBOLOGICAL HYDRODYNAMIC *Norzahir Sapawe, Muhammad Farhan Hanafi, Syahrullail Samion*
POIC06	SYNTHESIS AND STRUCTURAL CHARACTERISATION OF LANTHANIDE METAL-ORGANIC FRAMEWORKS CONTAINING DICARBOXYLIC ACID LIGANDS *Nurul Natasya Muhamad Khirudin, Nurul Nabihah Mohamad Ishak, M. Ibrahim M. Tahir, Thahira B.S.A. Ravoof*
PC01	REDUCED TiO_2 MODIFIED POLY (ETHER SULFONE) FILM: A NEW STRATEGY FOR PHOTOCATALYST IMMOBILIZATION *Zul Adlan Mohd Hir, Abdul Halim Abdullah1, Zulkarnain Zainal, Hong Ngee Lim*
PC02	GLYCEROL ETHERIFICATION FOR PRODUCTION OF FUEL ADDITIVE USING ACTIVATED BENTONITE CATALYST *Noraini Hamzah, Wan Zurina Samad, Mohd Ambar Yarmo*
PC03	ELECTROBIOSYNTHESIS OF NiO USING RAMBUTAN LEAVES FOR PHOTODEGRADATION OF REMAZOL BRILLIANT BLUE DYE *Norzahir Sapawe, Azizzami Radin, Muhammad Farhan Hanafi*
PC04	PHOTODEGRADATION OF PHENOL AND METHYL ORANGE USING *t*-EGZrO_2 NANOPARTICLES CATALYST *Muhammad Farhan Hanafi, Norzahir Sapawe*
PC05	ELECTROSYNTHESIS OF SILVER OXIDE DEPOSITED ONTO HOTSPRING MUD WITH ENHANCED DEGRADATION OF CONGO RED *Muhammad Farhan Hanafi, Norzahir Sapawe*
PCS01	AN OPTICAL SENSOR BASED ON GRAPHENE QUANTUM DOTS FOR HYDROGEN PEROXIDE DETECTION *Amiruddin Ashil Mastar, Jaafar Abdullah, Nor Azah Yusof, Yap Wing Fen*
PPN01	PREPARATION AND CHARACTERIZATION OF INCLUSION COMPLEXES BETWEEN PIOGLITAZONE AND NATIVE β-CYCLODEXTRIN AND β-CYCLODEXTRIN FUNCTIONALIZED IONIC LIQUID *Nur Najihah Md Zuki, Nurul Yani Rahim*
PPN02	EXCIPIENTS SELECTION AS AEROSOLIZED NANOCOLLOIDAL CARRIER SYSTEM LOADED QUERCETIN FOR PULMONARY DELIVERY OF LUNG CANCER *Noor Hafizah Arbain, Norazlinaliza Salim, Wong Tin Wui, Mohd Basyaruddin Abdul Rahman*
PPN03	MODELLING INHIBITION BY ROSMARINIC ACID ON PORCINE PANCREATIC LIPASE *Muhammad Alif Mohammad Latif, Muhammad Muiz Mohd Zuki, Fairolniza Mohd Shariff, Mohd Basyaruddin Abdul Rahman*
PNP01	ANTIBACTERIAL AND ANTIOXIDANT ACTIVITIES OF EXTRACTS FROM *CALOPHYLLUM FERRUGINEUM* AND *CALOPHYLLUM INCRASSATUM* *Nurul Iman Aminudin, Farediah Ahmad, Muhammad Taher, Deny Susanti*
PNP02	PHYTOCHEMICAL SCREENING AND ANTIOXIDANT ACTIVITY OF *PSIDIUM GUAJAVA* *Nor Akmalazura Jani, Nurul Alia Ahmad Aziz, Nurul Iman Aminudin*
PNP03	COMPARISON OF EXTRACTION TECHNIQUES FOR THREE *CALOPHYLLUM* SPECIES AND THEIR ANTIOXIDANT ACTIVITY *Siti Nurhafizah Ramli, Nurul Iman Aminudin, Farediah Ahmad, Deny Susanti*
PCC01	FORMULATION AND EVALUATION OF PVA/PEG PEEL-OFF MASK CONTAINING RICH FRACTION OF *CENTELLA ASIATICA* AND *CUCUMIS SATIVUS* EXTRACT FOR ANTI-AGEING *Anis Natasha Shafawi, Muhammad Taher Bakhtiar, Deny Susanti Darnis*
PRN01	CUMENE HYDROPEROXIDE AS A CO-SENSITIZER IN THE PREPARATION OF PREVULCANIZED NATURAL RUBBER LATEX VIA COMBINATION OF GAMMA RADIATION AND PEROXIDE VULCANIZATIONS *Sofian Ibrahim, Khairiah Haji Badri, Chantara Thevy Ratnam, Chai Chee Keong, Noor Hasni M. Ali, Mohd Noorwadi Mat Lazim*

PARALLEL SESSIONS ABSTRACTS

SKAM31

OEC01 ENVIRONMENTAL CHEMISTRY

REMOVAL OF Pb(II) FROM AQUEOUS SOLUTION BY PINEAPPLE PLANT STEM

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Abstract

The excessive release of lead (Pb) ions into water stream and large production of agricultural wastes cause water and land pollutions. Adsorption is useful in eliminating Pb(II) from water environment. The potential use of agricultural waste, pineapple plant stem as adsorbent to reduce the amount of Pb(II) in aqueous solutions was investigated. The material was modified with oxalic acid (OA) to improve the adsorption efficiency of Pb(II). Adsorption isotherms were determined for the adsorption of Pb(II) on natural and modified pineapple plant stem from aqueous solution in batch studies. The adsorption equilibrium data were found to fit well with the Langmuir isotherm model. Maximum adsorption capacities of Pb(II) at 12.85 and 25.29 mg/g were achieved by natural and OA modified pineapple plant stem, respectively. The adsorption capacity of Pb(II) on pineapple plant stem depends considerably on the solution pH, where the adsorption capacity increased with increasing solution pH from 1 to 4. The adsorption kinetics of pineapple plant stem was studied at different metal ion concentrations (25 – 150 ppm). The results showed an increase in Pb(II) uptake with raising initial metal ion concentration. The kinetic data were found to follow the pseudo-second order model.

Keywords: Adsorption; Pineapple plant stem; Oxalic Acid; Lead

OEC02 ENVIRONMENTAL CHEMISTRY

PRELIMINARY STUDY OF MALACHITE GREEN ELECTROCHEMICAL SENSOR

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Abstract

Malachite green is widely used in aquaculture and textile industry. However, malachite green is carcinogenic, mutagenic and teratogenic. Therefore, a chemical sensor will be developed to detect malachite green in water. Screen printed electrode was coated with poly(acrylamide-*co*-ethyl methacrylate) (p(AAm-*co*-EMA)/silver nanowire (AgNWs) to investigate its potential as a film for chemical sensor. The film was synthesized by using photopolymerization technique and characterized by Attenuated Total Reflectance-Fourier Transform Infrared (ATR-FTIR), ^{1}H Nuclear Magnetic Resonance (NMR) Field Emission Scanning Electron Microscopy/Electron Dispersive X-Ray Analysis (FESEM/EDX) and Thermogravimetric Analysis (TGA). Peak of –CO was shown in FTIR spectra which confirmed the copolymerization was successful. Furthermore, NMR spectrum proved the FTIR spectrum. While, the presence of silver nanowire (AgNWs) in poly(acrylamide-*co*-ethyl methacrylate) (p(AAm-*co*-EMA)) can be seen in EDX spectrum.Thermal decomposition temperature of the film was around 400 °C. In conclusion, p(AAm-*co*-EMA)/AgNWs film was suitable to use for developing malachite green sensor.

Keywords: Malachite green; electrochemical sensor; photopolymerization; silver nanowires

OEC03 ENVIRONMENTAL CHEMISTRY

TREND AND MISSING DATA PREDICTION MODEL OF PM_{10} IN CENTRAL REGION USING ANN AND MLR

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Abstract

Increasing concentrations of PM_{10} are identified to give harmful affect to human health. Trend analysis of PM_{10} for the last six years starting from 2010 until 2015 in Central region Malaysia shows increased and decrease concentration of the PM_{10} pollutant. Some of the PM_{10} concentration exceeds the Malaysia Ambient Air Quality Guidelines which is 150 µg/m^3. In addition, the high Air Pollution Index (API) was assign to the high PM_{10} concentrations which was the main pollutant in the air. Despite their importance in determining the API level in Malaysia, there are some missingness data of PM_{10} detected for certain day perhaps due to the failure of the equipment. Therefore, missing data prediction of PM_{10} may give vital information with the intention of taking actions for the public and government especially regarding the API levels which is the main indicator used to decide the level of air quality. There are eight continuous air quality monitoring station in Central region which located in Selangor (Klang, Petaling Jaya, Banting, Shah Alam, Kuala Selangor) and Kuala Lumpur (Batu Muda, Putrajaya, Cheras). Meteorological and pollutant parameters analyzed for the missing data prediction model of PM_{10} in this study include wind speed, wind direction, temperature, humidity and NO_x, NO, SO_2, NO_2, CO, O_3 respectively. In this study, Artificial Neural Network (ANN) and Multiple Linear Regression (MLR) models conjointly PCA were used to predict the concentration of PM_{10} missing data in Central region Malaysia. The results obtained from trend analysis signified that each continuous air quality monitoring station in Central region give different concentrations of PM_{10} with Klang continuous air quality monitoring station shows the highest concentration which is 581 µg/m^3 in June 2013. This possibly owing to the transboundary pollution from the great land and forest fires in Sumatra and Kalimantan, Indonesia especially during the southwest monsoon (May until September) which is contributed to the worsen air quality in Malaysia. Furthermore, locality of Klang continuous air quality monitoring station and activities done within this region also give high PM_{10} concentration. For the missing data prediction model, inputs to the models obtained from the Principal Component Analysis (PCA) include pearson coefficient with moderate correlation (0.5-0.75) and pearson coefficient with high correlation (>0.75). All parameters (wind speed, wind direction, temperature, humidity, NO_x, NO, SO_2, NO_2, CO, O_3) also being used as inputs besides inputs obtained from PCA. Input parameters obtained from pearson coefficient with moderate correlation (0.5 - 0.75) and high correlation (>0.75) seems not suitable to be applied onto Central regions whether by ANN or MLR model. The results showed that all parameters as inputs use for ANN appeared to be promising with R^2 up to 0.5343 and RMSE up to 23.95. However, results obtained from MLR analysis using the same input parameters shows less accurate than ANN with R^2 and RMSE value obtained are 0.3478 and 27.65 respectively. It is concluded that ANN is capable to predict the missing data concentration of PM_{10} rather than MLR model.

Keywords: missing data prediction model, PM_{10}, ANN, MLR, PCA, Malaysia

OEC04 ENVIRONMENTAL CHEMISTRY

ANALYSIS OF CADMIUM AND CHROMIUM CONTENT IN RAW AND TREATED LEACHATE FROM JERANGAU-JABOR LANDFILL SITE, KUANTAN, PAHANG, MALAYSIA

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Abstract

Raw and treated leachate collected from Jerangau-Jabor Landfill Site (JJLS), Kuantan, Pahang, Malaysia were analyzed for the content of cadmium and chromium. The presence of these heavy metals was monitored and analyzed using Flame Atomic Absorption Spectroscopy (FAAS). The metal analyses results were compared with standard value limits from the Environmental Quality (Control of Pollution from Solid Waste Transfer Station and Landfill) Regulations 2009, Malaysian Environmental Quality Act 1974 (Act 127) set by the Department of Environment, Ministry of Natural Resources and Environment, Malaysia. All metal concentrations in the raw leachate were significantly higher than the treated leachate. The concentration of the cadmium in the treated leachate were found to be within the permissible standard limit and showed no potential pollution risk. However, the concentration of chromium in the treated leachate remains high and above the permissible limit stipulated in the regulation as given for chromium hexavalent and chromium trivalent, which was 0.05 mg/L and 0.20 mg/L, respectively. It can be concluded that, a proper treatment for heavy metals such as chromium removal is necessary at JJLS.

Keywords: Raw and treated leachate; Landfill site; Cadmium; Chromium

OEC05 ENVIRONMENTAL CHEMISTRY

DISPERSIVE MICRO SOLID-PHASE EXTRACTION OF RHODAMINE 6G AND CRYSTAL VIOLET DYES IN TEXTILE WASTEWATER USING POLYPYRROLE-MAGNETITE AS ADSORBENT

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Abstract

The batik textile industry consumes a large quantity of dyes that requires large volumes of water for washing. The problem arises when this industry discharges wastewater effluents containing harmful dyes into the environment without treatment. Their analysis becomes a major challenge since they also have a large variety of functional groups contributing to their diverse properties. For this purpose, polypyrrole-magnetite (PPy-Fe_3O_4) dispersive micro-solid phase extraction (PPy-Fe_3O_4-D-μ-SPE) method combined with UV-visible (UV-Vis) spectrophotometry was developed for the determination of selected cationic dyes in textile wastewater. PPy-Fe_3O_4 was used as adsorbent due to its thermal stability, magnetic properties and capability of adsorbing Rhodamine 6G (Rh 6G) and crystal violet (CV). Sample pH, amount of adsorbent, extraction time and type of desorption solvents governing the efficacy of extraction method were optimized. The optimum PPy-Fe_3O_4-D-μ-SPE conditions were at sample pH 8, 60 mg of PPy-Fe_3O_4 adsorbent, 5 min of extraction time and ACN as the desorption solvent. Under the optimized conditions, PPy-Fe_3O_4-D-μ-SPE-UV-Vis method showed good linearity in the range of 0.05-7 mg L^{-1} ($R^2 > 0.9980$). The method also showed good LOD for the dyes (0.05 mg L^{-1}) and good analyte recoveries (97.4-111.3%) with relative standard deviations (RSD) < 10%. The method was successfully applied to the analysis of dyes in textile wastewater samples where the concentration found was 1.03 mg L^{-1} (RSD of 7.9%) and 1.13 mg L^{-1} (RSD of ±4.6%) for Rh 6G and CV, respectively. The results obtained revealed the applicability of PPy-Fe_3O_4 for the analytical problem.

Keywords: Dispersive micro-solid phase extraction; organic-inorganic hybrid adsorbent; cationic dyes; textile wastewater

OEC06 ENVIRONMENTAL CHEMISTRY

THE EFFECT OF THE ANION pKa IN THE EFFICIENCY OF NAPHTHENIC ACID EXTRACTION FROM MODEL OIL BY 1-BUTYL-3-METHYL-IMIDAZOLIUM-BASED IONIC LIQUIDS

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Abstract

The possible utility of naphthenic acid (NA) as an important raw material in various industries makes the recovery of NA from crude oil an important process. Liquid-liquid extraction using ionic liquid (IL) appears to be a promising method. This is because IL is considered a versatile "designer solvent" with the possibility of fine tuning its properties as desired, while at the same time being the green solvent that will not pollute the environment. However, the factors that affect NA extraction efficiency by different ILs are not known. This impedes the design of the best IL for optimal extraction of NA from crude oil. In this work the extraction efficiency of NA against the pK_a of the anion of the 1-butyl-4-methyl imidazolium (BMIM)-based ILs are investigated. The anions investigated are trifluoromethanesulfonate ($SO_3CF_3^-$), tetrafluoroborate (BF_4^-), thiocyanate ($SO_3CF_3^-$), and dicyanamide ($C_2N_3^-$) with respective pK_a values of -14.70, -0.44, 1.10 and 9.21. From the experiment, it is found that the highest percentage of NA removal by BMIM-based IL follows the order of [BMIM] [BF_4^-] < [BMIM] [SCN^-] < [BMIM] [$SO_3CF_3^-$] < [BMIM] [$C_2N_3^-$]. This order does not conform to the order of the anion pK_a values. Thus it is concluded that the pK_a of the anion does not influence the extraction efficiency of NA from model oil.

Keywords: Ionic liquid, naphthenic acid, extraction, BMIM, pKa, anion.

OEC07 ENVIRONMENTAL CHEMISTRY

CORROSION INHIBITION BEHAVIOUR OF SODIUM DODECYLBENZENESULFONATES-ZINC SULFATE SYSTEM ON MILD STEEL IN NaCl

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Abstract

The corrosion inhibition and adsorption behavior of sodium dodecylbenzeneulfonates surfactant alone and in the presence of various concentration of zinc sulfate on mild steel in 0.05 M NaCl at 25 ^{o}C was investigated using electrochemical impedance spectroscopy (EIS), polarization measurement, fourier transform infrared spectroscopy (FTiR) and determination of thermodynamic/kinetic parameters. The inhibition efficiency (IE) of sodium dedocylbenzenesulfonates is enhanced on addition of zinc sulfate showing the maximum IE of 95% at mixtures of 200 ppm of sodium benzenesulfonates and 200 ppm of zinc sulfate. FTiR analysis confirmed on the existence of an adsorbed protective film on the mild steel surface. The calculated thermodynamic/kinetic parameter reveals that adsorption process is obey Frumkin adsorption isotherm.

Keywords: corrosion inhibition; adsorption isotherm; sodium dodecylbenzenesulfonates; zin sulfate; mild steel; sodium chloride

OEC09 ENVIRONMENTAL CHEMISTRY

C_{18}-CTA COMPOSITE FILM USAGE AS AN EXTRACTION SORBENT FOR CAFFEINE RESIDUE IN WATER ANALYSIS

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Abstract

Research work that aimed to develop the optimal condition for caffeine residue extraction in water method was successfully carried out. C_{18} was impregnated with cellulose triacetate (CTA) by using a solution casting method to produce a thin film. Optimisation work was constructed based on a 2^4 full factorial central composite design that was subjected to the number of C_{18}-CTA films, pH water sample, extraction time and stirring rate as the main parameters. The optimum condition suggested by the model was as follows; number of film (1-piece i.d. 66 mm), pH of water sample (9), stirring rate (200 rpm), and extraction time (30 min). The generated model and 2-way interaction were significant at $p<0.05$. Analytical figure of merits, i.e. linearity ($r2 = 0.993$), recovery (92.6-94.8%), repeatability (<3% RSD), detection limit (0.13 ng/ml), and quantification limit (0.45 ng/ml) were calculated during study. Analysis of real sample showed that the developed method was able to extract caffeine residue at low level concentration. The concentrations measured from two samples were recorded at 6.98 ng/ml and 18.23 ng/ml, respectively.

Keywords: emerging contaminant; experimental design; microextraction

OEC10 ENVIRONMENTAL CHEMISTRY

DETERMINATION OF AIRBORNE HEAVY METALS AND HEALTH RISK ASSESSMENT OF POPULATIONS EXPOSED TO METALS IN INDUSTRIAL AREA, GEBENG AND PAKA

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Abstract

The aim of this study is focused on airborne heavy metal pollution in the industrial area. Paka and Gebeng are chosen as the industrial area with eight points respectively were selected for this study within two monsoon seasons. The samples were analysed for heavy metals (Cd, As, Cu, Fe. Pb and Zn) by using inductively coupled plasma mass spectrometry (ICP-MS). The results showed that the mean concentration value of As, Pb and Cd for Paka were 0.005 mg/L ± 0.001, 0.107 mg/L ± 0.088 and 0.010 mg/L ± 0.008 respectively. For Gebeng, the mean concentration value of As, Pb and Cd were 0.004 mg/L ± 0.002, 0.069 mg/L ± 0.059 and 0.005 mg/L ± 0.004 respectively. The results showed in the southwest monsoon, the mean concentration of heavy metals much higher than the target value by European Commission in Directive 2004/107/EC and Directive 2008/50/EC. The HQs and His of six metals are almost all lower than the safe level (=1) for children and adults, indicating no risks from these metals. On the whole, HI value decreased in the order of Fe>Cd>Pb>As>Zn>Cu. Fe and Cd exhibited higher values close to safe level, while Zn and Cu are lowest. The HI values of these metals for children are higher than those for adults. It could be concluded that the industrial and transportation emission were the major source of heavy metals in the atmosphere along the Paka and Gebeng industrial area. The human health risk assessment has proved to be a powerful tool to distinguish heavy metals and exposure routes of most concern in urban environments.

OEC11 ENVIRONMENTAL CHEMISTRY

IS ORGANIC VEGETABLES IN MALAYSIA REALLY ORGANIC?

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Abstract

Natural nitrogen isotope abundance ($\delta^{15}N$) has been a potential indicator to discriminate organic produce, namely vegetables, from that of the non-organic ones. However, little is known about the $\delta^{15}N$ composition of organic vegetables grown in Malaysia. Chinese spinach *(Amaranthus gangeticus)*, cucumber *(Cucumis sativus)*, Chinese broccoli *(Brassica oleracea var. alboglabra)*, long bean (*Vigna unguiculata subsp. sesquipedalis)*, okra *(Abelmoschus esculentus)*, Chinese white cabbage *(Brassica rapa subsp. chinensis)*, sweet potato leaves *(Ipomoea batatas)*, string bean *(Phaseolus vulgaris)*, eggplant (*Solanum melongena*) and carrot *(Daucus carota subsp. sativus)* are among the common vegetables grown and consumed in Malaysia, hence these organic vegetables were obtained from organic farm in Balik Pulau, Jawi, and Relau, located in Penang, Malaysia for the investigation of $\delta^{15}N$ values. Each specific farm adheres to their own set of organic farming regime which can influence the nitrogen isotopic composition in the vegetables. Results showed that organic vegetables from Balik Pulau farm, Jawi farm and Relau farm have the mean $\delta^{15}N$ value ranging from 6.62‰ to 22.38‰, 6.25‰ to 17.20‰ and 8.05‰ to 16.85‰, respectively. This shows that each set of organic farming regime has its own range of mean $\delta^{15}N$ value with Balik Pulau farm having an enriched value as high as 22.38‰. Conclusively, the mean $\delta^{15}N$ value of organic vegetables grown in Malaysia (6.62‰ to 22.38‰) is within the range of hypothesized $\delta^{15}N$ organic value (≥ 3‰) and were comparable to the $\delta^{15}N$ mean value worldwide (5.70‰ to 36.70‰).

Keywords: Isotopic ratio mass spectrometry; $\delta^{15}N$; Malaysia organic vegetables

OEC12 ENVIRONMENTAL CHEMISTRY

RADIOLOGICAL ASSESSMENT OF SOIL FROM PAYA BUNGOR, PAHANG, MALAYSIA

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Abstract

Recently, radiological health risk and potential of ecological damage has become subject of public concern. As one of the oldest tropical rainforest in the world, the soil is expected to have radiological activities and the rate of radon gas emission to the surrounding that may pose risks to the public health. Previously, Paya Bungor, Pahang was well known as recreational water park for the public where it is surrounded by a large lake and was rich with flora and fauna. However, over the years, this area has been deserted and most of the area have been transformed into a plantation area by the locals. An increase in agricultural activities led to the use of phosphate fertilizers and pesticides that subsequently contribute to the accumulation of radionuclides and heavy metals in the soils that may give rise to the environmental impact to the surrounding. Radiological assessment of natural radionuclides and radon emanation study from soil was carried out in the study area. Soil samples were collected using a hand auger, based on a standard sampling method. Uranium, thorium and potassium mass concentration in samples were determined using Energy Dispersive X-ray Fluorescence (EDXRF) spectrometry. Then the respective activities of natural radionuclides; ^{238}U, ^{232}Th, and ^{40}K were calculated. Radon emanation rate from the soil samples were determined using Solid State Nucler Track Detector, CR-39. The results enable to determine the annual effective dose (AED) and external hazard index (H_{ex}) due to gamma-ray emission of the three natural radionuclides. While radon cancer risk could also be calculated. Generally, the results showed the concentration of ^{238}U ranging from 44.9605 ± 5.7112 Bq / kg to 89.2852 ± 10.3668 Bq / kg, ^{232}Th from 102.49 ± 8.4083 Bq / kg to 213.494 ± 87.387 Bq / kg and ^{40}K from 0.02404 Bq / kg ± 0.13% to 0.07856 ± 0.10%. The H_{ex} of the area are all less than 1, indicating low radiological risk to the population. Radon emanation rate measured range from 6.0 ± 0.5 mBq kg^{-1} hr^{-1} to 12.8 ± 0.4 mBq kg^{-1} hr^{-1} and is considered as low. However further study involving all areas around the lake (Paya Bungor) need to be carried out to make more conclusive findings on the radiological assessment of the area.

Keywords: NORM; EDXRF; Radiological Risk Assessment; Radon emanation rate; SSNTD; CR-39

OEC13 ENVIRONMENTAL CHEMISTRY

DITHIOCARBAMATE-IMMOBILIZED SILICA COATED MAGNETIC Fe_3O_4 NANOPARTICLES FOR SOLID-PHASE EXTRACTION OF LEAD IN SHELLFISH

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Abstract

This study describes the synthesis, characterization and application of dithiocarbamate-immobilized silica coated magnetic nanoparticles (Fe_3O_4-CPTS-DTC) as an adsorbent for separation and preconcentration of trace lead in shellfish. The adsorbent was characterized using FTIR, SEM and XRD. The extraction efficiency of Fe_3O_4-CPTS-DTC was analysed using Flame Atomic Absorption Spectrometry. Parameters such as pH, adsorption-desorption time, effect of eluent and sample volume have been investigated in order to establish the optimum conditions for the determination of lead. The MSPE method was also validated using certified reference materials with good recovery.

OEC14 ENVIRONMENTAL CHEMISTRY

NUTRIENTS DISTRIBUTION IN BESUT RIVER BASIN, TERENGGANU, MALAYSIA

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Abstract

The aim of this study was to determine the distribution of nitrogen (N)- and phosphorus (P)-based nutrients in Besut River basin, Malaysia. The mean concentrations of ammonia, nitrate, total dissolved N and total particulate N were 43 µg/L N, 195 µg/L N, 485 µg/L N, 431 µg/L N, respectively. In contrast to N, lower mean concentrations of P were recorded with values of 2.30 µg/L P (dissolved inorganic P), 4.84 µg/L P (total dissolved P) and 8.35 µg/L P (total particulate P). In general, higher concentrations of nutrients were recorded at the middle and lower reaches of the river basin due to human activities. Elevated levels of both forms of nutrients were present in wet season resulting from terrestrial runoff to the water column. The molar ratio of dissolved inorganic N:P (nitrate + ammonia: inorganic P) was extremely high (range 105-1448) than 16:1 (Redfield ratio) suggesting the nutrient limiting factor for phytoplankton growth in this river basin was P. The results from this study can be used as a baseline comparison for future monitoring of this river basin.

Keywords: Surface water; dissolved and particulate N and P; N:P ratio; Besut River basin (South China Sea)

OEC15 ENVIRONMENTAL CHEMISTRY

ACCUMULATION OF HEAVY METALS CONTENT IN COMMERCIAL CRAB COLLECTED FROM JOHOR STRAIT, MALAYSIA

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Abstract

Rapid development occurs in Johor Strait lead to the pollution issue, and raises an issue on the safety to consume the sea food from the area. Hence, the objective of this study were to determine the concentration of selected metallic elements (Cu, Zn, Cd and Pb) in the blue swimmer crab from the east of Johor Strait and estimate the potential health risk on human. The samples were digested with Teflon Bomb Digestion method and the concentrations of selected metals in crab were detected by the Inductively Couple Plasma Mass Spectrometry (ICP-MS). Based on the analysis, the concentration pattern of metals in crabs decrease and order of Zn >Cu>Pb>Cd and tend to accumulate in internal organs> gill > muscle> claw muscle. All the selected elements concentration are much higher than the previous study in 1991 with the same species of crab collected from nearby area, Singapore River, this indicate that more pollutant had added into the aquatic environment and accumulate in the local seafood. Based on the trend of accumulation, the essential elements are tend to accumulate in the body of crab than non-essential element may due to the need for biological function. At the same time, the correlation result suggest that the intake of elements Zn, Cd, and Pb are size dependent but might relate to the biochemical and environmental factors. The average PLI value is 35.3, thus suggest that a long term monitoring on metallic element pollution should be conduct in the study area. According to the recommendation of PTWI, the consumption of the crab from study area should not exceed 0.42 kg per week to avoid the adverse health impact.

Keywords: Johor Straits; blue swimmer crab; heavy metals; pollution load index; PTWI

OEC16 ENVIRONMENTAL CHEMISTRY

SEASONAL CHANGES OF HEAVY METALS LEVEL IN SEDIMENT OF SETIU RIVER, TERENGGANU

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Abstract

Heavy metals contaminations could have greater effects than organic or microbial contamination because these elements could be cycled over a long time through aqueous and particulate phases This study aims to investigate the seasonal changes of distribution of selected metals elements (As, Pb, Cu and Zn) in bottom sediment of Sungai Setiu. The sediment samples were collected on January and July, 2017 in conjunction with the dry and wet season, from 60 different sampling points along Setiu river. The metals concentration was detected by using Inductively Coupled Plasma Mass Spectrometry after Teflon bomb closed digestion method with mixed acid. From the results obtained, the average concentration values of As, Pb, Cu and Zn are 3.05 ± 0.534 µg/g dry wt ; 19.9 ± 9.89 µg/g dry wt ; 1.304 ± 0.663 µg/g dry wt and 68.4 ± 31.8 µg/g dry wt for January, whereas, 2.46 ± 2.78 µg/g dry wt ; 16.7 ± 15.1 µg/g dry wt ; 14.7 ± 16.9 µg/g dry wt and 68.9 ± 48.5 µg/g dry wt for July. Result of the geoaccumulation index showed that the area still can be considered as practically uncontaminated since the I-geo values [January : As =0.004, Pb = (-0.553), Cu = (-0.400) and Zn = (-0.331) ; July : As = (-1.256), Pb = (-1.113), Cu = (-1.239) and Zn = (-0.521)] are classified in Class 0. However, the pollution load index (PLI) revealed the higher levels of As, Pb, Cu and Zn, therefore, indicating to the anthropogenic sources especially around the fish farm area. Thus, Setiu River can be assumed as contaminated since there are heavy metal contaminations occur (PLI = 1.25±0.34 (January) and 0.99±1.00 (July)).

Keywords: Heavy metals; Setiu river; Sediment; As; Pb; Cu; Zn; dry and wet season

OEC17 ENVIRONMENTAL CHEMISTRY

DISTRIBUTION OF HEAVY METALS CONCENTRATION IN RECENT SEDIMENTS AT MERANG RIVER, TERENGGANU, MALAYSIA

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Abstract

Human activities such as fishing, aquaculture and boating activities can be seen throughout Merang river. The main and private jetty transporting tourists to islands like Redang Island is considered as an important establishment due to high boating activities in this area. This study aimed to focus on metal study (Cr, Mn, Cu, Pb, Zn, Fe) of Merang river. A total of 64 sediment samples; 44 samples along the river and 20 samples at Merang coastal area were sampled using Ponar grab in the month of November 2017. Teflon Bomb closed digestion method with mixed acid was used to determine the concentration in the sediment. The contamination of heavy metal in the sediments were analyzed by using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). The average of heavy metal concentration for the elements are as follows; Pb (29.8±12.4) µg/g dry wt, Cu (17.7±6.5) µg/g dry wt, Fe (3.5±1.2) µg/g dry wt, Zn (58±22) µg/g dry wt, Cr (37.2±10.7) µg/g dry wt and Mn (320±151) µg/g dry wt. Geo-accumulation Index (*Igeo*) and Pollution Level Index (PLI) approach were used to determine the heavy metals contamination levels in river sediment of Merang river. Igeo value shows that Merang river is practically uncontaminated and falls under Class 0. However, the contamination values shows higher level of all six heavy metal elements, therefore, most of the elemental sources are naturally derived. The PLI value is 1.68±0.53, hence, there are heavy metal contamination occur in Merang river. Thus, it is important to record the current levels of metals so that if there is any changes in the concentration, it can be observed and managed due to limited information of the study area is available.

Keywords: Heavy Metal; Sediment; Geo-accumulation Index; Pollution Level Index; Merang river

OEC18 ENVIRONMENTAL CHEMISTRY

REMOVAL OF HERBICIDE PARAQUAT BY CETYLTRIMETHYL AMMONIUM BROMIDE MODIFIED PINEAPPLE LEAVES

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Abstract

Paraquat pesticide is categorized as contaminants of emerging concern (CEC) that can cause serious environmental problem and toxic effects toward human and animals. Whereas, the decomposing of pineapple leaves by burning in the field could create environmental problems such as air pollution. Therefore, in the present study, the pineapple leaves powder was utilized as a low-cost adsorbent to remove paraquat from aqueous solution. The adsorption of paraquat from aqueous solution by pineapple leaf powder (PLP) and surfactant modified pineapple leaf powder (SMPLP) was examined. SMPLP was prepared by reacting PLP with different concentrations of cationic surfactant, cetyltrimethyl ammonium bromide (CTAB) (0.5, 1.0, 2.5 and 4.0 mM). The PLP and SMPLP were characterized using Fourier transform infrared (FTIR) spectroscopy after the modification process with CTAB and after adsorption process with paraquat. The result shows that there are no significant changes in the chemical structure of pineapple leaves after modification. The SMPLP exhibited higher adsorption affinity toward cationic herbicide. The adsorption experiments of paraquat were carried out in a batch mode at room temperature. The effect of paraquat concentration (2-20 mg/mL) on the adsorption capacity of PLP and SMPLP were investigated. The suitability of adsorbent was tested by fitting the adsorption data into Langmuir and Freundlich isotherm equilibrium models. The experimental adsorption data fitted well with Freundlich isotherm with multilayer adsorption capacity of 13.0 mg/g. The highest removal of paraquat was obtained by SMPLP treated with CTAB 2.5 mM while the lowest removal was found for PLP. As a conclusion, the utilization surfactant modified pineapple leaves powder can become an alternative adsorbent for the removal of herbicide compound in aqueous solution.

Keywords: Paraquat; pineapple leaves; surfactant; adsorption

OEC19 ENVIRONMENTAL CHEMISTRY

THE DETERMINATION OF SELECTED ELEMENTS FOUND IN SAMPLES COLLECTED FROM RIVERS IN GEBENG AREA

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Abstract

A study was carried out to determine the level of concentration of selected elements in samples collected from two rivers located in Gebeng area, Kuantan, Pahang. The rivers selected were namely as Balok River and Tunggak River. The samples collected were analyzed by using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). Prior to Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) analysis, the samples were going through a few steps of sample preparations. From the result of this study, it was found that the preferences of various elements traced in the samples collected were different in average of concentration and range from the upstream area, middle stream area and downstream area of both of the selected rivers.

Keywords: Rivers; trace elements; Inductively Couple Plasma-Mass Spectrometry

OEC20 ENVIRONMENTAL CHEMISTRY

ABUNDANCE OF PROTOZOA AND HAEMOPARASITES IN ANURANS FROM HIGHLAND AND LOWLAND GOLF COURSES

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Abstract

Frogs are important in maintaining stable ecosystems and they eat insects which are the important vectors in transmitting diseases in human. Unfortunately, they have been shrinking in numbers worldwide. Factors contributing to this include fragmentation, pollution, UV radiation, pesticides, climate change and parasites. This study was conducted to determine the water quality index, usage of pesticide and assemblage of anurans. The abundance of anuran protozoan and the haemoparasites present in the host from three different location sites which are Jeriau River, Fraser's Hill Golf and UKM Danau Golf was also determined. Water quality index was determined by six physico chemical parameters including biochemical oxygen demand, chemical oxygen demand, total suspended solid, ammonia-nitrogen, dissolved oxygen saturation and pH. Anurans were collected during at night and killed using the pithing method. Protozoan were observed in liver, stomach, intestine, rectum and kidney. Thin blood smears were prepared from the blood samples and observed for haemoparasites. Results from this study concluded that there are no significant evidences to prove that environmental parameters such as water quality index and usage of pesticide (metsulfuron methyl) affected the composition of anurans and also the presence of protozoan and blood parasites. UKM Danau Golf (disturbed area) had the lowest WQI at class III but it had the most diverse anurans while Jeriau River (non-urban) with the highest WQI at class I had the most abundant anurans though limited in the number of species. 30% of frog were found to be infected with one or more protozoa. 22.14% from Phylum Opalinata and 10.71% from Phylum Ciliophora. These protozoan were only detected in intestines and rectums. 44.44% of anurans were infected with one or more group of blood parasites including *Trypanosoma*, *Haemogregarina*, *Lankesterella*, *Aegyptianella* and Microfilaria. Trypanosoma had the highest prevalence followed by *Haemogregarina*, *Aegyptianella*, *Lankesterella* and Microfilaria.

Keywords: anuranh; haemoparasites; protozoa; pesticide; metsulfuron methyl; golfcourse

OEC21 ENVIRONMENTAL CHEMISTRY

DETERMINATION OF GLYPHOSATE AND AMINOMETHYLPHOSPHONIC ACID AND GLYPHOSATE POTENTIAL TO GROUNDWATER POLLUTION

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Abstract

Glyphosate (GLY) is an herbicide widely use in agriculture and having a wide spectrum and non-selective mode of action. The use of glyphosate in Malaysian agriculture produces an interest in learning about the presence of these substances in different environmental matrices. With the aim of evaluation on the contamination produced by GLY and its metabolite, aminomethylphosphonic acid (AMPA) in water, sediments and soils, it is important to establish a set of standard determination techniques. In this research work, the earlier published analytical method for determination of GLY and AMPA has been improved in order to be applied for water and sediment/soils. The sediments/soil samples were extracted using potassium hydroxide, conversely for water samples, the samples were directly use. The method further consist of derivatization with 9-fluorenylmethylchloroformate (FMOC-Cl) followed by determination with high performance liquid chromatography (HPLC) coupled with fluorescence detector. A good linear relationship (correlation coefficients ≥0.99) for GLY and AMPA standards were observed within the range of 0.001–0.1 mg/L. The limit of detection (LOD) and the limit of quantitation (LOQ) were determined in water to be 0.01mg/L and 0.05mg/L, respectively. But for soils/sediments, LOD and LOQ were to be 0.05mg/kg and 0.1 mg/kg, respectively. The precision and accuracy for both GLY and AMPA were satisfactory with the relative standard deviation (RSD) lower than 10% and the mean recovery values ranging from 75% to 105% (n = 3), that spiked at three levels (0.5, 1.0 and 2.0 mg/kg) in sediments/soils. The groundwater ubiquity score (GUS) is an experimentally calculated value that relates pesticide half-life and sorption potential Koc (from laboratory data). The GUS may be used to rank pesticides for their potential to move toward groundwater. For this research, value of GUS index for three rain simulations (light, intermediate and heavy) were 6.56, 7.59 and 6.73 respectively. Based on the results, all level of rain simulations were having high potential to cause groundwater pollution.

Keywords: herbicide; metabolite; HPLC; florescent detector; groundwater ubiquity score

OFB01 FOOD CHEMISTRY AND BIOTECHNOLOGY

STATISTICAL ANALYSIS AND MOLECULAR DOCKING STUDY ON HALAL POTENTIAL ANTIOXIDANT FROM *Anacardium Occidentale* FRUITS

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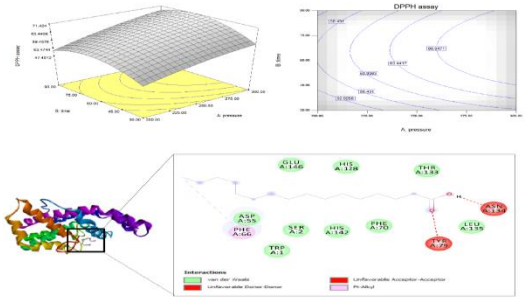
Abstract

Lipids in foods are prone to oxidation that causes deterioration of food quality and formation of free radicals. Free radicals in food products can cause oxidative damage which could results in many chronic health diseases. Commercially-available synthetic antioxidants used as food additives are reported to endanger health. Therefore, Halal natural antioxidants from plants are investigated. In this study, viscious liquid containing antioxidant properties was extracted from freeze-dried cashew (*Anacardium occidentale*) apple using supercritical fluid extraction (SFE) with carbon dioxide (CO_2) as the solvent. The extractions were optimized with response surface methodology (RSM) using the central composite rotatable design (CCRD). The effects of pressure (x_1; 200-300 bars), time (x_3; 30-90 min), and temperature (x_2; 30-50°C) were studied on the antioxidant activity of the liquid, measured using the DPPH inhibition assay. The statistical analysis was performed by ANOVA and the quadratic model obtained is significant (R^2 = 0.9858). Based on the RSM model, the optimal extraction conditions were obtained at 288.98 bar, 66.21 min, and 36.98°C that yields 70.3399% DPPH inhibition, which is in reasonable agreement with the validation test (n = 3) that yields the highest activity (71.5167±0.6684%). Based on the t-values, the ascending order of the effects of linear terms on cashew apple antioxidant activity was was temperature < time < pressure. The total phenolic content of the extract is 0.056 mg GAE/mL. The optimised extract was analysed using GC-MS and FT-IR for chemical compounds identification. Four prominent compounds were identified from the chromatogram. The antibacterial activity of the extract was tested against Gram-positive and Gram-negative bacteria. Molecular docking was used to study the interactions of the identified compounds from the extract with the bacteria.



Keywords: *Anacardium occidentale*, response surface methodology, supercritical fluid extraction, antioxidant, antibacterial, molecular docking

OFB02 FOOD CHEMISTRY AND BIOTECHNOLOGY

ANTIOXIDANT ACTIVITY AND *IN VITRO* CYTOTOXICITY STUDY OF THE PHENOLIC COMPOUNDS FROM *Piper Sarmentosum*

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Abstract

Cancer is by far one of the most worrying health issues and continues to be the major killing diseases, worldwide accounting for more than 6 million died because of the cancer and it is predicted that cancer incidence is continue rising every year with an approximated 12 million of deaths in 2030. The significant interest has been concentrated increasingly in finding medicinal herbs and their derivative phytocompounds as useful supportive treatments for cancer. Besides that, about 60% of currently used anticancer agents are derived from natural sources, including plants due to its less side effects. *Piper sarmentosum* Roxb. is locally known as 'kaduk' is one of natural medicinal herbal and is being used traditionally to treat headache, arthritis, menstrual pain, cough and eczema. It is proven to have various biological properties including hypoglycaemic effect, anti-inflammatory, antioxidant, antimalarial, antiplasmodial, anti-diabetic, antifungal and anticarcinogenic. The aims of this study are to identify the phenolic compounds of *Piper sarmentosum* methanolic extracts by measuring total phenolic content, HPLC analysis, to evaluate the antioxidant activity by DPPH scavenging assay and also to determine the cytotoxicity effect on human breast cancer cells. *Piper sarmentosum* exhibited antioxidant property at 96.98 ± 2.29 µg/mL by DPPH scavenging activity with its high phenolic content at 89.22 mg GAE/ g dry extract. The HPLC analysis showed the presence of quercetin, naringin, gallic acid and tannic acid in *Piper sarmentosum*. The cytotoxicity screening of *Piper sarmentosum* extract using MTS assay indicated IC_{50} of 24.63 ± 0.23 µg/mL and 2.85 ± 0.16 µg/mL on MCF-7 and T-47D, respectively. The phenolic compounds of *Piper sarmentosum* possess potent antioxidant and anticancer properties against breast cancer cells. However, further study should be conducted to establish its anticancer mechanisms.

Keywords: *Piper sarmentosum*, medicinal plants, phenolic compounds, antioxidant, cytotoxicity.

OFB03 FOOD CHEMISTRY AND BIOTECHNOLOGY

LC-MS CHARACTERIZATION OF PHENOLIC COMPOUNDS AND ANTI-ACANTHAMOEBIC PROPERTIES OF *Piper Sarmentosum* (KADUK) LEAVES METHANOLIC EXTRACT

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Abstract

Phenolic compounds are plant secondary metabolites that are beneficial to human health. Previous studies reported that many plant extracts could mitigate the effect of many microbial infections attributed to its phenolic content. *Piper sarmentosum* or locally known as Kaduk is a tropical herb that has long history in traditional medicinal purposes and food and the plant was reported to contain many bioactive compounds including phenolic compounds. In this study, the phenolic compounds in crude methanolic extract of *Piper sarmentosum* leaves were characterized and its anti-amoebic properties were evaluated against two pathogenic *Acanthamoeba* namely *Acanthamoeba castelanii* and *Acanthamoeba* sp. (Hospital Kuala Lumpur (HKL) isolate). The phenolic compounds were first characterized using high resolution liquid chromatography-mass spectrometry (LC-MS) analysis, followed by two cytotoxicity assays: determination of IC_{50} by eosin dye method and cell morphological analysis using inverted light and scanning electron microscopies. A total of 39 phenolic compounds were identified, predominantly comprised of 15 phenolic glycosides. The IC_{50} values obtained were 74.64 µg/mL for *Acanthamoeba castelanii* while 22.13 µg/mL for *Acanthamoeba* sp (HKL isolate). Microscopy analyses showed that the extract caused cell encystment indicated by distinctive morphological changes on acanthopodia, cell shape and cell organelles. The result provided the evidence that crude methanolic extract of Piper sarmentosum leaves contains active phenolic compounds that contributed to its anti-acanthamoebic properties.

Keywords: *Piper sarmentosum*, LC-MS, Phenolic, Anti-amoeba, Acanthamoeba, Cytotoxicity

OFB04 FOOD CHEMISTRY AND BIOTECHNOLOGY

PRODUCTION OF BACTERIAL-BASED VIOLACEIN NANOPARTICLES AND EVALUATION OF THEIR STABILITY USING SURFACTANT AS STABILIZER

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Abstract

Violacein, a violet biopigment produced from *Chromobacterium violaceum* has gained interest due to its antimicrobial, anticancer and antioxidant activities. However, limited solubility of violacein in water has restricted its applications in various industries. Hence, this study focuses on the production of violacein nanoparticles using sonication technique. Owing to the exceptional properties of high surface to volume ratio of nanoparticles, the solubility of the violacein pigment in water could be improved. It is well known that particles in nanoscale will tend to aggregate, thus causing diminution of their biological activities. In order to overcome this problem, the addition of surfactants to ensure steric and electrostatic stabilization is chosen as a technique to stabilize the nanoparticles. As results, water soluble violacein nanoparticles were successfully produced at surfactant concentration above the critical micelle concentration. Minimum particles size of 131.5 ± 2.001 nm with polydispersity index of 0.180 ± 0.018 and zeta potential of -49.8 ± 3.49 mV were obtained indicate that the particles were monodispersed and stable upon dispersion in water. In addition, the violet color of the nanoparticles was maintained despite its nanoscale size. In conclusion, the method used in this study provides potential solutions in developing and stabilizing natural colorant pigment dispersions down to the scale of nanometer, consequently, will widen up their application in various industries with the aid of non-toxic and eco-friendly properties.

Keywords: Violacein nanoparticles; surfactants; water solubility; sonication technique

OFB05 FOOD CHEMISTRY AND BIOTECHNOLOGY

DISCOVERY AND DEVELOPMENT OF HALAL PROTEASE FROM *Spondias Cytherea* FOR MEAT TENDERIZATION

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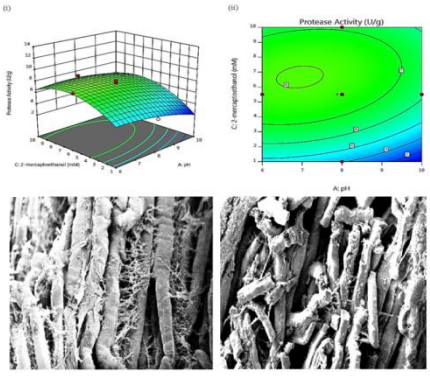
Abstract

Meat tenderness has been recognized as the most important quality trait for consumer satisfaction. In this regard, meat industry especially in Malaysia strive to search a new method development for producing meat with standardized and guaranteed tenderness. Protease treatment is one of the popular methods used by meat industry due to its efficiency, safety, and halal status. Therefore, this research sought to identify a novel protease from Ambarella fruits (*Spondias cytherea*) as a new potential halal meat tenderizer. The protease extraction was done following the treatment combinations by RSM that investigated the possible interactions between four variables which are pH (pH 6 – 10), TX-100 (1 – 5 %), 2-mercaptoethanol (1 – 10 mM), and mixing time (1 – 3 min) on protease activity. The most optimized extraction variables was found at pH 8.22, 4.95 % of TX-100, 6.80 mM of 2-mercaptoethanol, and 1.71 min of mixing time at 12.37 U/g of protease activity. The overall model was significant ($p < 0.05$) with satisfactory R^2 value at 0.9885. Characterization of the crude Ambarella protease showed that the enzyme is stable at pH 8.0 – 10.0 and temperature up to 60 °C. Incubation of enzyme with organic solvents showed higher activity in hydrophobic rather than hydrophilic phases. In addition, prolonged storage time (14 days) of Ambarella protease resulted in decreased activity by 32 %. For application in meat tenderization, chunks of beef samples were marinated with Ambarella crude enzyme before subjected to various physical and chemical properties determinations. The SDS-PAGE pattern of the muscle proteins revealed extensive proteolysis and reduction of protein bands in the treated samples. Through texture analysis, firmness of the muscle samples was significantly decreased with the increased addition of crude Ambarella protease (mL). In addition, at the microstructural level, tissue fibers were broken and loosen of myofibrils upon treatment with Ambarella protease was observed. From the results, it is determined that protease from Ambarella fruit can be used as an alternative source of proteolytic enzymes in meat tenderization.



Keywords: Protease, Response surface methodology (RSM), Meat tenderization, *Spondias cytherea*, Electrophoresis, Scanning Electron Microscopy (SEM), Texture

OFB06 FOOD CHEMISTRY AND BIOTECHNOLOGY

SEPARATION OF UNSATURATED FATTY ACIDS FROM PALM STEARIN USING METHANOL-CRYSTALLISATION METHOD

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Abstract

Refined, bleached and deodorized palm stearin (RBDPS) was hydrolysed using ethanolic potassium hydroxide (KOH) based on two different parameters such as concentration of ethanolic KOH used (1.50 M, 1.75 M and 2.00 M) and temperature (70 °C, 75 °C and 80 °C) upon heating for 2 hours. A methanol-crystallisation method was introduced to optimise the separation and purification of unsaturated fatty acids (UFA) of RBDPS from its saturated fatty acids (SFA) by manipulating the weight ratio of FFA : MeOH (1:5, 1:6, 1:7, 1:8, 1:9 and 1:10) and temperature (-5 °C and -20 °C) for 24 hours. Free fatty acids (FFA) were characterised using fourier transform infrared spectroscopy (FTIR), gas chromatography (GC-FID) and nuclear magnetic resonance (^{1}H and ^{13}C NMR). The highest yield (98 % by weight) was obtained using FFA:methanol with 1:9 by weight ratio. The iodine value (IV) recorded for SFA and UFA are 0 and 98 respectively. High purity of unsaturated fatty acids can be utilized in various applications such as food formulation, biolubricant synthesis, polymers and pharmaceuticals.

Keywords: palm stearin; hydrolysis; unsaturated fatty acids; methanol-crystallisation method; separation; purification

OFB07 FOOD CHEMISTRY AND BIOTECHNOLOGY

COMPARISON OF THE ESSENTIAL OIL COMPONENTS IN FRESH PEELS OF LIME (*CITRUS AURANTIFOLIA*) EXTRACTED WITH SUPERCRITICAL FLUID EXTRACTION AND OTHER THREE TRADITIONAL EXTRACTION METHODS

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Abstract

Citrus is one of the famous crops that widely cultivated and is the most commonly utilized fruits in the world due to its pleasant taste and nutritional value. Citrus essential oil is also highly in demand by consumer but the production cost is quite expensive as it produced in very low quantity. Moreover, the chemical compositions in citrus essential oil influence its biological activity such as antioxidant, germicidal, antifungi and antimicrobial. Unfortunately, there is lack of information comparing the chemical components in *Citrus aurantifolia* essential oils extracted using different methods. In this study the peels of *C. aurantifolia* fruits were extracted using hydro-distillation, steam-distillation, solvent extraction and supercritical fluid extraction (SFE) techniques and the chemical composition was compared using Gas Chromatography-Mass Spectrometry (GC-MS) and Gas Chromatography-Flame Ionization Detector (GC-FID). The main components in the essential oils from hydro-distillation and steam-distillation were (+)-limonene, (-)-β-pinene and α-citral with leden oxide (II) and 5α-cholestan-3β-ol, 2-methylene were also present in the essential oil from steam-distillation process. While, ethyl iso-allocholate, citraptene, D:C-friedours-7-ene-3-one, herniarin, and isopimpinellin were the major components present in the essential oil from solvent extraction method. In SFE extraction, the main chemical compounds in peel of *C. aurantifolia* were 7,9-di-tert-butyl-1-oxaspiro(4,5)deca-6,9-diene-2,8-dione, citraptene, isopimpinellin, and herniarin. The results show that monoterpene was the major component in hydro-distillation and steam-distillation while, coumarin was the major component in solvent extraction and SFE methods. The results also indicate that different extraction methods used produce different yield and chemical constituents. The percentage yield and major class of component of fresh peels *C. aurantifolia* using different methods were significantly different ($p<0.05$). However, there was no significance difference ($p>0.05$) in extraction methods used in total chemical composition in *C. aurantifolia* essential oils.

Keywords: *Citrus aurantifolia*; extraction; essential oil; chemical components

OFB08 FOOD CHEMISTRY AND BIOTECHNOLOGY

QUATIFICATION OF CARRAGEENAN IN *GRACILARIA CF. MANILENSIS* (RHODOPHYTA) EXPOSED TO DIFFERENT SALINITIES AND pH USING ATTENUATED TOTAL REFLECTION-FOURIER TRANSFORM INFRARED SPECTROSCOPY (ATR-FTIR)

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Abstract

Carrageenan is a gel-forming and viscosifying polysaccharides that is commonly found in red algae (Rhodophyta). Previous studies indicate that carrageenan content in the seaweed can be influenced by different environmental conditions. Therefore, in this study, *Graciliaria* cf. *manilensis*, a red algae, was exposed at 500 lux under different salinities (15, 20, 25 and 30 psu) and pH (7.6, 7.8 and 8.0) in laboratory condition and carrageenan was determined qualitatively and quantitatively using Attenuated Total Reflection-Fourier Transform Infrared Spectroscopy (ATR-FTIR). Qualitatively, kappa carrageenan was found in most of the *Gracilaria* samples. Quantitatively, kappa carrageenan was detected ranging from 29.74 ± 7.24 to 56.97 ± 4.03 % (w/w) with the highest carrageenan content was determined at low salinity and slightly neutral pH (15 psu and pH 7.6). . However, *G. cf. manilaensis* collected from farm and used as a control did not showed the presence of carrageenan. This suggests that different environmental conditions play an important role in determining the carrageenan type and content. This is important as carrageenan is widely used in food, medicinal, pharmaceutical and industrial applications. Furthermore, *G. cf. manilensis* can be an alternative source of carrageenan besides available sources which is quite limited, to fulfil the high demand of carrageenan.

Keywords: red algae; light intensity, salinities; pH; kappa carrageenan

OFB09 FOOD CHEMISTRY AND BIOTECHNOLOGY

APPLICATION OF DIRECT FLUORESCENCE-BASED LIVE/ DEAD STAINING FOR ASSESSMENT OF ANTIFUNGAL ACTIVITY OF COCONUT OIL AGAINST *Candida albicans*

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Abstract

Candida albicans is becoming a significant problem for oral candidiasis worldwide. In addition, the proliferation of antifungal-resistant *C. albicans* has become a major concern. This study was carried out to evaluate the effects of activated virgin coconut oil (AVCO) and the crude extract of virgin coconut oil (VCO) to search for a new antifungal agent for treatment of oral candidiasis. The viability of *C. albicans* cells was determined using live/dead bacterial viability kit. *C. albicans* cells were grown in YPD broth culture overnight. The fungus was treated with AVCO and VCO at the concentration of minimum inhibitory concentration (MIC), 6.24 µg/ml. To evaluate the viability of *C. albicans* cells, SYTO 9 and propidium iodide (PI) staining were used in this study and observed using fluorescence microscopy. *C. albicans* cells treated with AVCO showed more dead cells compared to cells treated with VCO. The data indicated that exposure of *C. albicans* to AVCO was the most inhibitory to growth ($P<0.01$).

Keywords: Live-dead staining; `antifungal activity; *Candida albicans*; coconut oil

OFB10 FOOD CHEMISTRY AND BIOTECHNOLOGY

THE AUTHENTICATION AND EVALUATION OF QUALITY OF CRUDE PALM OIL USING FOURIER TRANSFORM-INFRARED SPECTROSCOPY (FT-IR) AND FOURIER TRANSFORM-NEAR INFRARED SPECTROSCOPY (FT-NIR) COMBINED WITH CHEMOMETRIC ANALYSIS

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Abstract

This study was carried out to discriminate fresh palm oils from that of used ones by assessing the authenticity and quality characteristics using mid-infrared and near-infrared spectroscopy. Fresh crude palm oil (CPO) samples were fried with different portion of meat products, at varying frequency of 3, 10, 20 and 30 times. Then different proportion of used frying oil, 5,10, 20, 30 ($^{m}/_{m}$%) was blended into CPO. Chemometric was applied on the infrared spectra and discrimination was carried out using discriminant analysis (DA). Results showed that the analysis with mid-IR spectra successfully distinguished the adulterated oil samples from that of authentic CPOs with 2 misclassification, in which case, 2 adulterated samples out of 66 samples were grouped into the authentic group. The performance index of this model was 95.1 based on the Mahanalobis distance. The success rate of authentication was 96.7%. On the other hand, the NIR data gave different result as 11 adulterated samples out of 66 samples showed false positive. The performance index of this model was 85.7. The success rate of authentication was 83.3%. For the work on discrimination based on oil quality using mid-IR, the success rate was low with only 42.4% with the performance index of 73.4. Similarly, the NIR model for oil quality discrimination had 36.4 % of success rate with the performance index of 56.4. The discrimination based on oil quality was not very successful and further work will be carried out in the future. Overall, the authentication of palm oil was quite successful but the discrimination based on quality did not achieve the current objective. These rapid screening techniques, which are mid-infrared and near-infrared spectroscopy has proven to be useful for the authentication of edible palm oil but discrimination based on quality has to be further improved.

Keywords: Crude Palm Oil; authenticity; mid-infrared; near-infrared; discriminant analysis

OFB11 FOOD CHEMISTRY AND BIOTECHNOLOGY

ROLE OF L-GLUTAMINE IN THE *IN-VITRO* GROWTH OF HCT-8 AND HT-29 CELL LINES

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Abstract

L-glutamine is one of the essential supplements of *in-vitro* growth medium for cancer cells. The amino acid L-glutamine is well known as the vital source of nutrition in cancer cell growth for its ability to provide carbon and nitrogen. A common phenomenon of cancer cell is the rapid production of lactic acid through aerobic glycolysis. Apart from nutritional value, the released ammonia from L-glutamine may neutralize the acidic environment to ensure continuous cell growth. The study aimed to observe the role and effect of L-glutamine concentration in culture media for cancer cell lines. Detection of L-glutamine uptake and ammonia release by the cell line was carried out after certain time intervals. Complete cell growth media was prepared where L-glutamine concentrations were 0 mM, 10 mM and 15 mM with different pH range (pH 6.5 and pH 7.0). The cell density was calculated after 8 hrs of time interval using Trypan Blue staining method. UV-VIS spectrophotometer was used to detect the concentration of L-glutamine uptake and ammonia release. The result shows that the cell density decreases continuously in the media without L-glutamine supplement whereas, a rapid increase is observed in L-glutamine supplemented growth media in HCT-8 and HT-29 cell lines. The L-glutamine uptake was found higher in the media with low pH, but a relatively low L-glutamine consumption was observed in media with higher pH condition. The result confirms the necessity of L-glutamine in cancer cell growth. In addition higher L-glutamine uptake in acidic condition supports the role of L-glutamine in acid resistance activity in cancer cell growth.

Keywords: L-glutamine; cancer cell growth; aerobic glycolysis; acid resistance

OFB12 FOOD CHEMISTRY AND BIOTECHNOLOGY

DESIGN AND DEVELOPMENT OF HALAL NANOCOSMECEUTICAL CONTAINING HYDROLYSATE FROM *ACTINOPYGA LECANORA*

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Abstract

Actinopyga lecanora (A. lecanora), commonly known as stone fish is classified among edible species of sea cucumber. The stone fish is reported to be rich in antioxidant, antibacterial and wound healing properties that are essential in skin care products mainly to demote skin aging. Women in the age of 40 and above tend to age predominantly as the thickness of the skin and collagen decreased naturally. Moreover, hectic lifestyle with constant exposure to UV radiation also contributed to the premature skin ageing such as darkening and pigmentation. There are many anti-aging products available in the market, however the effectiveness of the product varies depending on the skin penetration of the actives. These problems have lead to the current research on the developments of nanoemulsion as a novel skin care product to maintain healthy skin, while upholding the youthful appearance. Nanoemulsion is a dispersion of nanoscale droplets (20-200 nm) formed using mechanical device. The system involves two immiscible phases, which are oil and water phases stabilized by a surfactant. Nanoemulsion is promoted for the delivery of active ingredients to the targeted cells for better penetration. In recent years, skin care products from hydrolysate or biopeptide become more popular due to their beneficial ability to stimulate the physiological processes. To date, the application of *A. lecanora* hydrolysate is only utilized as a component in functional food. However, no work has been conducted on its potential for cosmeceutical application. In this study, the *A. lecanora* hydrolysate was extracted and used as a bioactive compound in the formulation. The extraction optimization of *A. lecanora* hydrolysate was done using two-level factorial design analysis with four parameters identified to be responsible in the enzymatic hydrolysis reaction (pH, reaction temperature, reaction time and enzyme/substrate ratio). Degree of hydrolysis (DH), 2,2-Diphenyl-1-picrylhydrazyl (DPPH) assay and ferric reducing antioxidant power (FRAP) assay were the responses. Analysis of variance (ANOVA), main effects, normal plot of residuals, 3D contour plots were used to study the effects and interaction between parameters. The best conditions selected from the optimization were; pH 5, 70°C reaction temperature, 9 h hydrolysis time and with 1 % enzyme/substrate ratio gave 51.9 % DH, 42.7 % DPPH activity and 109.9 Fe^{2+}µg/ml in FRAP assay. A stable nanoemulsion formulation containing hydrolysate from *A. lecanora* was prepared by high-energy emulsification method. The formulation was designed and optimized using D-optimal mixture design with five independent variables (oil, surfactant, hydrolysate, xanthan gum and water). The physicochemical and stability of the optimized nanoemulsion were also determined. The optimal nanoemulsion have a potential for topical application in cosmeceutical industry.

Keywords: hydrolysate; stone fish; antioxidant; skin care; nanoemulsion; *Actinopyga lecanora*

OFB13 FOOD CHEMISTRY AND BIOTECHNOLOGY

CHEMICAL COMPONENTS OF PCR IN 18S rRNA FOR *CRYPTOSPORIDIUM* DETECTION FROM RIVERS

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Abstract

The gene of 18S ribosomal RNA or 18S rRNA is the universal gene function as a general genetic marker for species identification of microorganisms including parasites. *Cryptosporidium* has also distinct 18S rRNA genes along different species within the same genus. In this study, polymerase chain reaction or PCR was used to study chemical components of PCR setup in amplification of 18S rRNA gene of this parasite. *Cryptosporidium* was collected from river water samples and confirmed its presence using specific immunofluorescence detection of this parasite. Isolated water containing *Cryptosporidium* was then subjected for genomic DNA extraction before PCR step. The chemical components of PCR consists of $MgCI_2$, deoxynucleotide triphosphate (DNTPs), Polymerases, free DNase-water, universal primers and PCR buffer were studied in different volume and concentration. Each chemical component of PCR was optimized differently in yielding the same final volume of 20 uL per each reaction. The value range of chemical components of PCR consists of MgCI2 (0.1 uM-0.5 uM), DNTPs (50-250 mM), free DNase water (5-10 uL), polymerases (0.2-0.5 U) and universal primers (2-20uM). The result indicated that 0.2 uM of $MgCI_2$, 100 mM of DNTPs, less than 10 uL of free DNase water, 0.5 U of polymerases and 10 mM of universal primers were the best combination to get better result for molecular identification of 18S rRNA *Cryptosporidium*. As a conclusion, accurate and proper concentration or volume to each PCR chemical components is essential for molecular identification of 18S rRNA *Cryptosporidium* gene. In future studies, study on gradient of temperature parameters of PCR run can be included to study the chemical nature of amplified genes either in denaturation, annealing or extension steps.

Keywords: chemical; *Cryptosporidium*; $MgCI_2$; PCR, polymerases; 18S rRNA gene

OFB14 FOOD CHEMISTRY AND BIOTECHNOLOGY

DESIGN AND DEVELOPMENT OF NANO-SIZED NIOSOMES CONTAINING COLLAGEN HYDROLYSATE FROM LOCAL JELLYFISH (*Rhopilema hispidum*) WITH POTENTIAL ANTIOXIDANT AND TYROSINASE-INHIBITING ACTIVITIES

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Abstract

Collagen is the main building block in mammals and known to play crucial role for skin rejuvenation and reducing wrinkles. However, common sources of collagen are bovine and porcine, which has been controversial due to the outbreak of disease namely bovine spongiform encephalopathy (BSE) that can be transmitted to human and religious issues. Therefore, collagen derived from marine organism like edible, local jellyfish (*Rhopilema hispidum*) is preferred to solve these issues. Collagen extracted from jellyfish was further hydrolysed using papain at its optimum condition in order to obtain desired activities. Collagen hydrolysates obtained from this study has been shown to exhibit antioxidant (80 % metal chelating activity and 25 % DPPH scavenging activity) and tyrosinase inhibiting activity (up to 62 %). The hydrolysates were further encapsulated into niosomal formulation using thin film hydration techniques and sonication method, and further optimized using mixture experimental design (MED). Niosomes is a novel vesicular carrier system having droplet size between 10 to 100 nm, providing large surface area for rapid penetration of active ingredients into the skin. It offers numerous advantages including powerful permeation ability with high actives loading capacity and also non-irritant to skin. At the end of the research, it is expected that niosomal formulation containing collagen hydrolysates which suitable for skin care will be developed with excellent stability and effectivity.

OFB15 FOOD CHEMISTRY AND BIOTECHNOLOGY

CYTOTOXIC EFFECT OF THE CHEMICAL CONSTITUENTS FROM THE RHIZOMES OF *BOESENBERGIA ROTUNDA*

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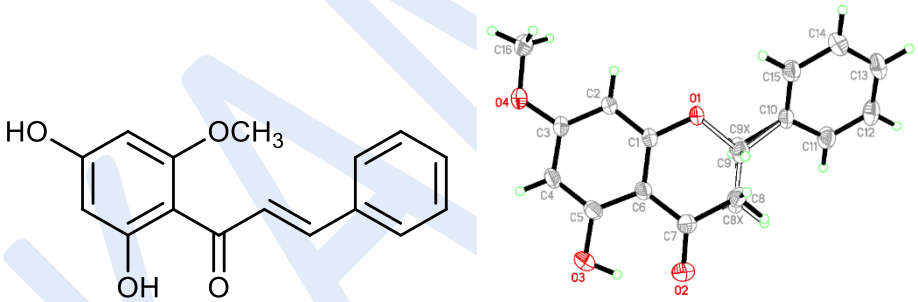
Abstract

The *Boesenbergia rotunda* is commonly known as "Temu Kunci" or finger root. It is herbaceous ginger species belong to family *Zingiberacea* and originated from Southeast Asia. China. Breast cancer is the most common cancer and the second most common cause of death in women in the United States. Breast cancer begins in the breast tissue that is made up of glands for milk production, called lobules. Colon cancer is one of the main causes of cancer deaths in the Western world. This is mainly because of progressively increasing, changes in lifestyle, particularly changes in dietary habits. According to the National Cancer Institute 232,340 female breast cancers and 2,240 male breast cancers are reported in the USA. Their characterizations were achieved with help of single X-ray, ^{1}H-NMR, HREIMS, EI-MS and ^{13}C-NMR spectroscopic techniques. The isolated compounds were screening against colon cancer (H-29) and MDAMB23. A brief about biological and characterizations studies of the title will be present.



Cardamonin

Keywords: *Boesenbergia rotunda*, cardomonin, breast cancer lines and colon cancer cell lines

OMC01 MATERIAL CHEMISTRY

FENOPROFEN INTERCALATED INTO LAYERED DOUBLE HYDROXIDE FOR CONTROLLED RELEASE DRUG DELIVERY STUDY

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Abstract

Fenoprofen, a non-steroidal anti-inflammatory Drug (NSAID) was successfully intercalated into Zn-Al-layered double hydroxide (ZAL) by direct co-precipitation method at optimum condition of 0.3 M fenoprofen and molar ratio of Zn:Al = 2. This successfully intercalation confirmed by patterns analysis from Powder X-Ray Diffraction (PXRD), Fourier Transform-Infrared Spectroscopy (FT-IR), Elemental Analysis (CHNS), Brunauer-Emmett-Teller (BET) surface area analysis and Ultraviolet-Visible (UV-VIS) Spectroscopy. Basal spacing of ZAL synthesized in this study observed from PXRD is 9.8 Å. Due to the inclusion of fenoprofen into the layered materials, basal spacing expanded to 20.1 Å in Zn-Al-fenoprofen (ZAF). Both FTIR spectra of the hybrid nanocomposite show resemblance peaks of the layered double hydroxide (LDH) and fenoprofen indicating the inclusion of the drug into the LDH interlamellae. The percentage loading of fenoprofen calculated from the data obtained from CHNS analyzer is 63.40 % (w/w) in ZAL. This study shows that ZAL can be a potential carriers for sustained release delivery of fenoprofen.

Keywords: Layered double hydroxide, fenoprofen, controlled release, anti-inflammatory, drug, drug delivery

OMC02 MATERIAL CHEMISTRY

SYNTHESIS AND CHARACTERIZATION OF NANOHYBRID ANTI-HYPERTENSIVE DRUG, CAPTOPRIL INTERCALATED INTO ZINC-ALUMINIUM LAYERED DOUBLE HYDROXIDE

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Abstract

Captopril (CPL), an anti-hypertensive drug was intercalated into the interlayer spaces of zinc-aluminium-layered double hydroxide (LDH) for the formation of the ZCPL hybrid nanocomposite material by self-assembly method. The concentration of CPL used was 0.08 M and pH 7 in a constant 4:1 molar ratio of Zn : Al in the mother liquor. As a result of the successful intercalation of captopril (CPL), powder X-ray diffraction pattern (PXRD) shows the basal spacing increased from 8.91 Å in zinc-aluminium layered double hydroxide (ZLDH) to 9.69Å in the ZCPL nanohybrid material. FTIR study shows the intercalated compound of ZCPL resembled the spectra of ZLDH and captopril (CPL) thus indicating the presence of both functional groups in ZCPL spectra. CHNS analysis shows the ZCPL nanohybrid material contains 30.63 % (w/w) of CPL calculated based on the percentage of carbon in the sample. It was also found that the BET surface area increased from 1.7 m^2 /g to 10.9 m^2 /g for ZLDH and ZCPL, respectively. The pore texture of the resulting material was also changed as the result of the intercalation and the expansion of the basal spacing together with pore formation between the crystallite during the formation of the resulting layered intercalated ZACPL nanohybrid material.

Keywords: captopril, anti-hypertensive drug, intercalation, layered double hydroxide, nanocomposite

OMC03 MATERIAL CHEMISTRY

PREPARATION AND CHARACTERIZATION OF *S*-QUINOLIN-2-YL-METHYLDITHIOCARBAZATE FUNCTIONALIZED MAGNETIC NANOPARTICLES

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Abstract

The Fe_3O_4 magnetic nanoparticles (MNPs) attached with *S*-quinolin-2-yl-methyl-dithiocarbazate (SQ2MDTC) have been developed, aiming to function as the heavy metal adsorbent. The surface of MNPs was first coated with (3-aminopropyl)triethoxysilane (APTES) as cross-linker and then SQ2MDTC was covalently incorporated to the coated MNPs. The structural and surface characteristics were investigated by Fourier transform infrared spectroscopy (FT-IR), CHNS elemental analysis, thermogravimetric analysis (TGA), x-ray powder diffraction (XRD), field emission scanning electron microscopy (FESEM), and Brunauer-Emmett-Teller (BET) analysis. The SQ2MDTC functionalized MNPs exhibited high adsorption affinity for aqueous Cu(II) and Pb(II) ions when analysed using inductively coupled plasma optical emission spectrometer (ICP-OES), resulting from complexation of the metal ions by surface amino groups. Findings of the present work highlighted the potential of MNP-SQ2MDTC as an effective adsorbent for the removal of heavy metal ions in water and wastewater treatment.

Keywords: magnetic nanoparticles, *S*-quinolin-2-yl-methyl-dithiocarbazate, heavy metals removal

OMC04 MATERIAL CHEMISTRY

POTENTIAL OF NITROCHITOSAN SOLID BIOPOLYMER ELECTROLYTE

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Abstract

Utilization of chitosan derivatives has enhanced electrochemical properties of chitosan as host polymer. In this work, the potential of nitrochitosan for biopolymer electrolyte will be explored. The substitution of nitro group was confirmed by using Attenuated Total Reflectance Fourier Transform Infra-Red (ATR-FTIR) analysis as the presence of nitro peak at 1646 and 1355 cm^{-1} with the highest degree of substitution is 0.74 determined by elemental analysis. Glass transition temperatures were increased towards acidic condition, thus contribute to the degree of crystallinity increment from 37 to 69% calculated from XRD. The highest ionic conductivity of nitrochitosan was ~10^{-6} cm^{-1}.

Keywords: Nitrochitosan, chitosan derivatives, conductivity

OMC05 MATERIAL CHEMISTRY

SYNTHESIS OF MAGNETIC NANOPARTICLES DEEP EUTECTIC SOLVENT AS ADSORBENTS FOR REMOVAL OF DICLOFENAC IN ENVIRONMENTAL SAMPLES.

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Abstract

Magnetic nanoparticles modified with deep eutectic solvent (MNP-DES) has been successfully synthesised by co-precipitation method. The structure of MNP-DES was examined by Fourier Transform Infrared Spectroscopy (FTIR), Field Emisson Scanning Electron Microscope (FESEM), Transmisson Electron Microsocpe (TEM) and X-ray Diffraction (XRD). In this study, the MNP-DES has been employed as an adsorbents for removal of diclofenac in environmental samples. The modified magnetic nanoparticles based DES has showed great ability and performance for removal of diclofenac with removal percentage up to 95% compare to native magnetic nanoparticles which only has 30% removal percentage.

Keywords: magnetic nanoparticles, deep eutectic solvent, diclofenac

OMC06 MATERIAL CHEMISTRY

SYNTHESIS OF POROUS THIOAMIDE-MODIFIED POLY(ACRYLONITRILE-*CO*-DIVINYLBENZENE-80) SORBENTS FOR THE CAPTURE OF POLAR ANALYTES

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Abstract

Pharmaceuticals contain biologically active components that can pollute water courses as a result of excretion from individuals and/or the uncontrolled release of residues from chemical plants, and this can pose a hazard to health. Pharmaceutical residues can persist at low concentrations in the environment, and thus may be potentially harmful to aquatic animals and to humans. The control and monitoring of such residues is therefore of prime interest by, for example, solid-phase extraction using solid sorbents to purify and preconcentrate the residues prior to their chemical analysis. In the present work, poly(acrylonitrile-*co*-divinylbenzene-80) sorbents were synthesised by varying the comonomer feed ratios under precipitation polymerisation conditions to deliver a family of porous polymer microspheres. Acrylonitrile confers polar character onto the sorbents, and the acrylonitrile-derived nitrile groups can be chemically transformed *via* polymer-analogous reactions into thioamide residues which makes the sorbents even more suitable for the capture of polar analytes, including selected pharmaceuticals. The utility of the porous thioamide-containing sorbents was demonstrated *via* the solid-phase extraction of mefenamic acid from aqueous media; mefenamic acid is an anthranilic acid derivative which is a potent, non-steroidal anti-inflammatory drug which is found in environmental waters at low concentrations.

Keywords: Polyacrylonitrile, chemical modification, thiourea, polar pharmaceuticals, solid-phase extraction

OMC07 MATERIAL CHEMISTRY

SYNTHESIS AND LIQUID CRYSTAL PROPERTIES OF NEW AZO-ESTER LINKED MATERIALS

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Abstract

Azo-ester linked materials had been familiarise with its useful properties towards photoresponsive and photosensitive materials for lots of technological devices such as the LCD television, calculator, mobile phone and etc. Therefore a series of azo-ester linked mesogen with a lateral methyl substituted containing liquid crystalline acrylate compound **C1-C3** by having different electron-withdrawing group (-Cl, -Br, -CN) were successfully synthesised and characterised. Compounds prepared were characterised by infrared and ^{1}H-NMR spectroscopy, and their mesophase behaviour is investigated by Differential Scanning Calorimetry (DSC) and identified by Polarised Light Microscopy (POM). Meanwhile, the thermal stability will be examined through Thermogravimetric Analysis (TGA)

Keywords: azo-ester linked materials, lateral methyl substituted, mesophase behaviour, thermal stability

OMC08 MATERIAL CHEMISTRY

PREPARATION AND CHARACTERISATION OF HYDROXYAPATITE EXTRACTED FROM FISH SCALE WASTE FOR THE REMOVAL OF GALLIC ACID AS INHIBITOR IN BIOFUEL PRODUCTION

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Abstract

Acid pretreatment of lignocellulosic waste to produce fermentable sugar for production of bioethanol and biofuel has created phenolic compounds, aliphatic acid, and furfural which are recognised as inhibitor to the fermentation process that reduce the final yield product. This study is a preliminary study that aimed on the potential of hydroxyapatite (HAp) extracted from fish scale for phenolic compound (gallic acid as model solution) removal. HAp was extracted by modified enzymatic hydrolysis with various temperatures (500 oC, 600 oC, 700 oC, 800 oC, 900 oC, 1000 oC) of 4 hours calcination. The extracted HAp was characterised using Fourier Transform Infrared spectroscopy (FTIR), X-Ray Diffraction (XRD), and Scanning Electron Microscope (SEM). Batch adsorption was conducted to select the best adsorbent and to study the effect of initial concentration, time, dosage, and temperature. The batch adsorption experiment was performed and the result shows the gallic acid removal of 78.9% in 100 mg/l initial concentration gallic acid adhered by HAp800. This adsorption process fitted more to Freundlich isotherm (r2 = 0.9951) compared to Langmuir isotherm. The kinetics of adsorption most fitted with pseudo second-order (0.996).

Keywords: Batch adsorption; Langmuir; Freundlich; First-order; Pseudo second-order

OMC09 MATERIAL CHEMISTRY

SYNTHESIS OF LIQUID CRYSTALS WITH LATERAL METHYL GROUP AND THEIR MESOMORPHIC PROPERTIES

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Abstract

A series of new liquid crystalline materials containing azo-ester linkage with lateral methyl substitution and different terminal unit which consists of alkoxy groups substituents (–OCH_3, –OCH_2CH_3 and –OCH_3CH_7) was synthesized and characterized. The mesomorphic behavior, thermal stability, optical properties were investigated by using differential scanning calorimetry (DSC), optical polarizing microscopy (POM), and thermogravimetric analyzer (TGA).

Keywords: Synthesis; azo-ester; lateral methyl; alkoxy; mesomophase behavior; optical property

OMC10 MATERIAL CHEMISTRY

ELECTROCHEMICAL PROPERTIES OF MESOPOROUS SILICA-CARBON ELECTRODE

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Abstract

Mesoporous silica is material that possesses the pore sizes between 2 nm to 50 nm which had expanded their applications rapidly. In this study, mesostructured SBA-15 with pore sizes 5.5 nm was successfully synthesized by surfactant templating technique, using triblock copolymer pluronic (P123) as directing agent and tetraethyl orthosilicate (TEOS) as silica sources. The synthesized material was characterized using various techniques including X-Ray diffraction (XRD), scanning electron microscope (SEM), N2 adsorption-desorption and infra- red (IR). Two different electrodes were fabricated which carbon paste electrode (CPE) and modified carbon paste electrode (SBA-15/MCPE) and analysed using cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). The SBA-15/MCPE offer better adsorption and enhanced the response signal to 48% and results lower resistance compared to CPE with 179Ω and 187Ω respectively This study demonstrates that mesoporous silica (SBA-15) can be considered as promising material in development of high performance, lightweight and flexible devices in electrochemistry.

Keywords: mesoporous silica; SBA-15; electrochemical properties; mesoporous silica-carbon electrode

OMC11 MATERIAL CHEMISTRY

ENHANCED CYTOTOXICITY OF RUTHENIUM COMPLEX CARRIED BY MESOPOROUS SILICA NANOPARTICLES

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Abstract

Mesoporous silica nanoparticles (MSN) are amongst the nanomaterials that garnered research interests as potential drug carrier due to the fine tuning of morphology and porosity of the material. In this experiment, a phenanthrolinium salt, 1-hexadecyl-1,10-phenanthrolinium bromide (Phen-C_{16}) was used as a template in a co-condensation method to prepare silica nanoparticles. The template was removed and the mesoporous silica nanoparticles with average size of 75 nm to 80 nm were loaded with a potential anti-cancer ruthenium drug, $Ru(dppz)_2PIP]^{2+}$. The average loading percentage is 25%, making the concentration of ruthenium complex at 5.17 µM in 1 mg of MSN. The cytotoxicity of the ruthenium complex, the MSN and the MSN loaded with the ruthenium complex (MSN-Ru) towards cervical cancer cells, Hela were done *via* MTT-assay. The ruthenium complex is barely toxic with IC50 38 µM while the bare MSN were mostly non-toxic with ED_{50} value above 100 µg. Remarkably, the ED_{50} of the drug loaded MSN is 16.69 µg which hold approximately 0.056 µM of ruthenium complex in concentration. This indicates that the cytotoxicity of ruthenium complex $Ru(dppz)_2PIP]^{2+}$ against the Hela cells were enhanced by using MSN as a carrier.

Keywords: mesoporous silica nanoparticles; ruthenium; cytotoxicity; drug carrier

OMC12 MATERIAL CHEMISTRY

EXTRACTION AND CHARACTERIZATION OF MICROFIBRILLATED AND NANOFIBRILLATED CELLULOSE FROM OFFICE PAPER WASTE

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Abstract

The tremendous increased in papermaking and cellulose production, which both sources from wood pulp has resulted in severe exploitation of trees, leading to environmental problems, the deforestation. Besides, the reduction of paper usage is rather not in the horizon. Thus, concerning with the environmental issue, the extraction of cellulose from the paper waste can be an alternative initiative to mitigate the negative impact via reusability of paper waste. In this study, the extraction of cellulose microfibers and nanofibers were achieved using office paper waste as the source material. Alkali and bleaching treatments were employed for the extraction of cellulose fibers followed by controlled-conditions of acid hydrolysis for the isolation of the cellulose nanofibers. The alkali treatment was carried out using various concentrations of 2%, 4%, 8% and 16% of sodium hydroxide (NaOH) solution while the bleaching treatment was carried out using sodium hypochlorite (NaClO) solution. The extraction of nanofibrillated cellulose was achieved using controlled-conditions of acid hydrolysis treatment with various concentrations of 5%, 15%, 30% and 60% sulphuric acid (H_2SO_4). Structural and functional groups analysis was analyzed using Attenuated Total Reflection Fourier Transform Infra-Red (ATR-FTIR) while imaging and morphological analysis was examined using optical microscopy and transmission electron microscopy (TEM). FTIR analysis indicated the lignin, ink, fillers and other components were removed after alkali and bleaching treatments. Imaging analysis using optical microscope showed a fibrous and rod-like structure of the extracted cellulose while TEM images showed that the size of the cellulose extracted range from micro to nano size down to ~20-30 nm depending on the concentration of acid used. The extraction of either microfibrillated or nanofibrillated cellulose from office paper waste in this work might paves the way toward alternative reuse of office paper waste in cellulose materials production and application.

Keywords: cellulose; microfibrillated; nanofibrillated; office paper waste

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OMC13 MATERIAL CHEMISTRY

SYNTHESIS OF FOUR ARMS STAR POLYMER FOR HYDROGEL FORMULATION

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Abstract

Star-shaped polymer can be described as macromolecules with multi-armed polymeric material with a huge potential in biomedical applications. This study investigated the effect of molecular architecture of amphiphilic star polymers in drug formulation for wound healing application. Four arms star-shaped block copolymers constructed of polyethylene glycol (PEG) as hydrophilic block and polycaprolactone (PCL) as hydrophobic block were synthesized via combination of Steglich Reaction and ring opening polymerization (ROP). ^{1}H NMR and FTIR analysis shows that the four star-shaped polymers is successfully synthesized. XRD analysis of the polymers shows that PEG decrease the crystallinity of the polymers. Thermal analysis (XRD and DSC) shows the thermal stability difference between homopolymer star and block copolymer star in which modification of end-group affect their thermal stability. The polydispersity index (PDI) indices from GPC were narrow suggesting controlled polymerization reaction. Preparation of hydrogel formulation shows the presence of PEG in the polymers increase the hydrophilicity and solubility in water. Drug loading of the formulation with Ciprofloxacin as drug cargo indicating high entrapment efficiency of the drug towards star-shaped polymer formulation.

Keywords: star-shaped block copolymer; Ring opening polymerization; hydrogel formulation

OMC15 MATERIAL CHEMISTRY

DEVELOPMENT OF IONIC LIQUID BASED MAGNETIC NANOPARTICLES FOR THE EXTRACTION OF ORGANIC COMPOUNDS FROM VARIOUS MATRIXES

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Abstract

In the present work, few types of magnetic nanoparticles functionalized ionic liquid material have been developed for the extraction of organic compounds from various matrixes. In this study, first application will be focused on the magnetic polyaniline functionalized dicationic ionic liquid for the extraction of polycyclic aromatic hydrocarbon. The second application will be focused on the magnetic cylodextrin loaded ionic liquid polymer for the extraction of parabens and third application will be focused more towards cyclodextrin funtionalized with new type of ionic liquid for the determination of polycyclic aromatic hydrocarbons in the food samples. All the nanomaterials are well synthesized and characterized. The influences of several experimental variables such as ionic strength, amount of sorbents, volume of extractant solvent pH, extraction and desorption time, sample volume, strength and volume of desorption solvent have been considered in depth during the optimization process to achieve the best extraction efficiency. The developed methods are validated and applied towards various real samples. The developed methods are found to be sensitivity with higher adsorption capacity towards all the studied analytes. The methods also were found to simple, efficient, remarkably free from interference effects and comparable with previous work.

Keywords: ionic liquid; cyclodextrin; polyanaline; extraction; real samples

OMC17 MATERIAL CHEMISTRY

PREPARATION AND CHARACTERISATION OF SOL-GEL HYBRID SORBENT METHYLTRIMETHOXYSILANE-CHLOROPROPYLTRIETHOXYSILANE FOR SOLID PHASE EXTRACTION

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Abstract

A new sol-gel hybrid methyltrimethoxysilane-chloropropyltriethoxysilane (MTMOS-CPTES) was produced and applied as sorbent for solid phase extraction (SPE). Three selected organophosphorus pesticides (OPPs) namely chlorpyrifos, profenofos and malathion were employed as test analytes to assess the extraction performance of the synthesized sol-gel hybrid MTMOS-CPTES. Analysis was performed using gas chromatography-mass spectrometry. Several vital parameters were optimised to identify the best extraction conditions. Under the optimum extraction conditions, the MTMOS-CPTES SPE method showed good linearity in the range of 50-1000 µg L^{-1} with coefficient of determination, r2 > 0.995. The limits of detection (LOD) at S/N = 3 obtained were in the range of 0.01-0.07 µg mL^{-1} and limits of quantification (LOQ) ranging from 0.03-0.21 µg mL^{-1}. The method showed good repeatability (RSD 2.4-4.7%, n=3). The performance of the MTMOS- CPTES SPE was compared to commercial C_{18} SPE sorbent. The LOD obtained for MTMOS-CPTES SPE was 2.3-6.5x lower than the LOD of commercial C_{18}. The developed MTMOS-CPTES SPE method was successfully applied to real sample analysis of the selected OPPs from two fruits samples. The proposed method provided acceptable recoveries (88.33-120.7%) with good RSDs ranging from 1.6% to 3.3% (n=3). Recoveries and RSDs of OPPs from fruits samples using commercial C_{18} SPE sorbent were 70.3-100.2%, RSDs 6.3-8.8%, n=3. The proposed MTMOS-CPTES SPE method demonstrates the potential as an alternative extraction sorbent for OPPs.

Keywords: sol-gel; methyltrimethoxysilane-chloropropyltriethoxysilane; solid phase extraction; organophosphorus pesticides, gas-chromatography-mass spectrometry

OMC18 MATERIAL CHEMISTRY

ONE STEP ACTIVATION AND RECYCLABILITY OF KOH AND CaO MODIFIED CARBON IN TRANSESTERIFICATION OF RICE BRAN OIL

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Abstract

Carbon materials is a promising future in catalysis of chemical reactions. In this work palm kernel shell modified carbon was prepared by using one step activation with potassium hydroxide (KOH) and calcium oxide (CaO) as dopant. The modified carbon was prepared by mixing various concentration of calcium oxide while keeping the concentration of potassium hydroxide with palm kernel shell constant and subsequently activating at 500^{o}C for 5 hours. The prepared catalyst were characterized by thermal gravimetry analysis (TGA), back titration analysis, nitrogen adsorption analysis, field emission electron microscope (FESEM), energy dispersive x-ray (EDX) and x-ray diffraction (XRD). The catalytic performance was evaluated by transesterification of rice bran oil with methanol. Gas chromatography –flame ionization detector (GC-FID) was used to analyze the product while X-ray fluorescence (XRF) was used to check for the possibility of leaching. A low BET surface area of around 3.62 m^2/g was obtained indicating that the KOH and CaO loading covers the pores of the carbon. This study shows, as the percentage of calcium increases, the basic strength also increases followed by the increase in biodiesel production. The percentage conversion of biodiesel for 0% CaO/KOH/C, 10% CaO/KOH/C, 15% CaO/KOH/C, 20% CaO/KOH/C, 25% CaO/KOH/C and 30% CaO/KOH/C calculated about 80.9%, 86.2%, 90.4%, 92.8%, 93.6% and 94.3%, respectively. Recyclability test of the prepared catalyst was still good for 3 consecutive runs however, for the fourth run the percentage conversion of biodiesel drops.

Keywords: One step Activation; Biodiesel; Recyclability; Rice Bran Oil

OMC19 MATERIAL CHEMISTRY

DEGRADATION OF CHLORAMPHENICOL USING GRAPHENE OXIDE FROM BAGASSE-Fe_3O_4

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Abstract

A new method for chloramphenicol degradation using graphene oxide (GO)-Fe_3O_4 has been developed. The GO has been made from bagasse with pyrolisis process and Hummers method then. GO-Fe_3O_4 has been produced by co precipitation process of iron (III) chloride hexahydrate and iron (II) sulfate heptahydrate. It characterized using X-Ray Diffraction, Surface Area and Pore Analyzer (SAA), Raman spectroscopy and Fourier Transform Infrared Spectrometer (FT-IR) to ensure the structure of the compossite. HPLC instrument was used for chloramphenicol content analysis for each optimization. The conditions used of HPLC instrument was used mobile phase of water/methanol 35/65 (v/v) at wavelength of 278 nm. The optimum conditions of chloramphenicol degradation which include the dosage of the catalyst, the concentration of H_2O_2, pH, and temperature were 0.15 g/L; 25 mM, 5, and 25° C, respectively. Application of chloramphenicol degradation under optimum conditions of various concentration of 1, 3, 10, 15 and 20 ppm shows the higher chloramphenicol concentration, the lower the degradation rate. However, in the degradation process there was no significant difference when applied to a standard concentration of 20 ppm chloramphenicol.

Keywords: Degradation; chloramphenicol; graphene oxide; bagasse; Fe_3O_4

OMC20 MATERIAL CHEMISTRY

ACTIVATED CHARCOAL COATED WITH NONIONIC SILICONE SURFACTANT ENHANCED WITH MAGNETIC NANO PARTICLES FOR THE REMOVAL OF PHENOLIC COMPOUNDS IN AQUEOUS SAMPLES USING UV-VIS SPECTROSCOPY

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Abstract

Magnetic nanoparticles modified with activated charcoal and nonionic silicone surfactant was synthesized in order to extract the phenolic compounds (2, 4–dichlorophenol and 2, 4-dinitrophenol) from waste water samples. The nature of the synthesized material was examined by XRD, SEM, TEM, VSEM and FTIR techniques. First the MNP was synthesized via co-precipitation method and then was coated with non-ionic silicone surfactant. The material was further optimized for future use. The parameters that were optimized in this study were pH, contact time, amount of adsorbent, concentration of analyte and temperature. All the parameters were analysed using UV-VIS spectrometer. The chosen experimental parameters and their ranges were: pH 6 and pH 4 for 2, 4-dichlorophenol and 2, 4- dinitrophenol respectively, extraction time, 40 - 60minutes for both the analytes; amount of adsorbent was used 40 mg for both the analytes. After the optimization process the adsorption equilibrium results were further used in adsorption kinetic, isotherm and thermodynamic study to identify the suitable model. Then the optimized material was further subjected in the use of real sample analysis.

Keywords: magnetic nanoparticles; activated charcoal; nonionic surfactant; phenolic removal; UV-Vis spectroscopy

OMC21 MATERIAL CHEMISTRY

INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS OF INTEREST ELEMENTS IN FARMLANDS AT THE CENTRAL AREA OF KATSINA STATE, NIGERIA

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Abstract

In this study, macro and micro essential elements for plants growth in the Guinea Savannah region of Katsina State in Northern Nigeria have been identified in the farmlands using instrumental neutron activation analysis. Two fundamental soil physical parameters for healthy growth of some common crops revealed the soil pH in H_2O in the range of 6.0 pH – 7.0 pH, soil pH in 0.01M $CaCl_2$ and the percentage organic carbon (OC) ranges from 0.0375 - 1.3315, which are optimal for plant nutrients availability in the soils within the study area. The Percentage Deviation from the Certified (PDC) Reference Material NIST Coal Fly Ash 1633b are within tolerable range and the results obtained showed a good agreement between the values obtained in our study with the certified values. The mean concentration of various elements in the samples investigated are (in mg/kg) Mg (253.8 ± 57.53), Al (23047.73), Ca (987.67 ± 229.50), Ti (2825.033), V (26.1187 ± 2.75), Mn (184.71 ± 2.567), Na (1596.4 ± 6.527), K (10651.53 ± 271.8), As (1.2358 ± 0.112), Br (1.08467 ± 0.144), Cr (23.107 ± 1.98), Fe (10475.57 ± 1984), Co (3.8897 ± 0.235), Zn (18.533 ± 3.367), Rb (55.7233 ± 4.35), Sb (0.1167 ± 0.031), Cs (1.716 ± 0.2503) and Ba (290.062±26.441). The results of the pH and organic matter content shows near acidic and very low content respectively. The result of the analyzed samples indicate that Mg and Ca are less available to support plant growth while Al has reached toxic level, with other elements of interest being moderately available in this area of study.

Keywords: Elements of Interest; INAA; HpGe Detector; WISPAN 2004; pH; Organic Carbon

OOIC01 ORGANIC AND INORGANIC CHEMISTRY

SPECTROSCOPY AND ANTIOXIDANT ACTIVITY OF SALICYLATE-BASED PROTIC IONIC LIQUIDS

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Abstract

The objective of this study is to synthesize and characterize the performance of the protic ionic liquids (PILs) to assess its use as a potential antioxidant in drug design. The PILs based on salicylate anion with the 3-dimethylamino-1-propanol (3DMAP) and 3-diethylamino-1-propanol (3DEAP) were synthesized. Proton nuclear magnetic resonance (^{1}HNMR), Fourier transformation infrared spectroscopy (FTIR) and thermogravimetric analysis (TGA) were used to characterize the synthesized PILs. Furthermore, the antioxidant activity of the synthesized PILs was determined using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical assay. 3DMAPS and 3DEAPS show higher DPPH free radical scavenging than parent acid (salicylic acid) which leads to good antioxidant activity.

Keywords: protic ionic liquids, salicylic acid, radical scavenging, free radical, DPPH assays

OOIC02 ORGANIC AND INORGANIC CHEMISTRY

SYNTHESIS, CHARACTERIZATION, REACTION MECHANISM AND THEORETICAL STUDY OF AN ANTIMICROBIAL INHIBITOR FROM HETEROAROMATICS BASED THIOSEMICARBAZONE

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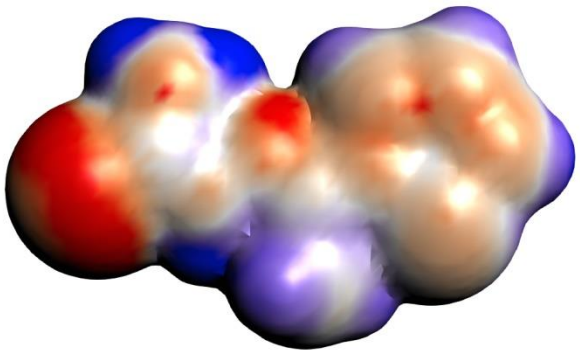
Abstract

Invasive fungal and bacteria diseases are the major cause of morbidity and mortality in the critically ill and imunocompromised patients. The impact of current situation was encouraged researcher to develop a better drug against microbial activity. Previous study has reported single prologue of heteroaromatic and thiosemicarbazide have the unique ability as biomimetics as well as active pharmacophore. This study is successfully synthesised through combination of both 2-acetylthiophene and thiosemicarbazide in one molecule structure to form 2-acetylthiophenethiosemicarbazone. Both experimental and theoretical approaches have been applied to comprehend its structure synthesised compound as well as computational drug design. Structure of synthesised compound was characterized using spectroscopy methods. Computational drug design was conducted to calculate the binding interaction between protein and inhibitor. Density Functional Theory (DFT) was used to calculate the chemical properties of title compound such as highest occupied molecular orbital (HOMO), lowest unoccupied molecular orbital (LUMO), chemical hardness, softness, energy gap, chemical potential, and Fukui functions. Solvent determination and predictive interaction element were confirmed using COSMO-RS method calculation. The synthesised compound was tested in vitro against two Gram-positive and one Gram-negative bacterial strains which are *Staphylococcus aureus, Staphylococcus epidermidis* and *Klebsiella pneumonia* respectively and a fungus *Candida Albicans*. Synthesis compound was found that susceptible with all Gram-positive bacterial strain and fungus while not to Gram-negative bacterial strain. The synthesised compound was evaluated the inhibition zone and showed that *Staphylococcus epidermidis* was active at concentration 100µg/mL with 16±1.5mm while *Staphylococcus Aureus* at 50µg/mL with 15±2.0mm of inhibition zone. *Candida Albicans* showed the highest active activity at concentration 50µg/mL with 19±3.2mm.



Keywords: Heterocyclic compounds, Thiosemicarbazide, Density Functional Theory, COSMO-R

OOIC03 ORGANIC AND INORGANIC CHEMISTRY

COMPARISON OF LABELLING REACTIONS FOR MONOSACCHARIDE COMPOSITION ANALYSIS USING HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY

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Abstract

Monosaccharides are the basic units of carbohydrates and are hydrophilic molecules multiple hydroxyl groups. Compared to other molecules, monosaccharides do not possess intrinsic fluorescent or chromophore moiety which makes its detection difficult and challenging. Thus, pre-column labelling techniques via derivatisation reactions have been carried out for monosaccharide analysis using high performance liquid chromatography (HPLC). In this study, a series of monosaccharides standards namely mannose (Man), glucose (Glc), and *N*-acetylglucosamine (GlcNAc) were analysed. These monosaccharides are the building blocks in asparagine-linked oligosaccharides (*N*-glycans) in all eukaryotes. Derivatisation was performed using 2-aminobenzoic acid (2-AA; fluorescence), 2-aminobenzamide acid (2-AB; fluorescence), 2-aminobenzoic acid ethyl ester (ABEE; UV and fluorescence), and 1-phenyl-3-methyl-5-pyrazolone (PMP; UV) labels possessing different levels of sensitivity. Labelled monosaccharides were then analysed using a HPLC instrument connected to both ultraviolet-visible (HPLC-PDA) and fluorescence (HPLC-FD) detectors using a C18 reversed-phase column. In this study, the sensitivity and resolution of the derivatised monosaccharide peaks were compared. The most suitable label was found to be ABEE which was then used to determine the limits of detection (LOD) and quantification (LOQ) values. Subsequently, the monosaccharide composition of the total hydrolysate of intracellular free oligosaccharides (fOS) prepared from *Saccharomyces cerevisiae* and *Pichia pastoris* was determined using fluorescence detection of the ABEE label.

Keywords: High performance liquid chromatography (HPLC), 2-aminobenzoic acid (2-AA), 2-aminobenzamide acid (2-AB), 2-aminobenzoic acid ethyl ester (ABEE), 1-phenyl-3-methyl-5-pyrazolone (PMP), free oligosaccharides (fOS), *Saccharomyces cerevisiae*, *Pichia pastoris*.

OOIC04 ORGANIC AND INORGANIC CHEMISTRY

PHYSICOCHEMICAL INVESTIGATION OF TRIAZOLYL BENZOATE ANIONIC SURFACTANT AND ITS MIXTURE WITH GLYCOLIPIDS

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Abstract

Recently, conjugated fatty acids such as linoleic acid mostly from nuts, aromatic fatty acids from butter fats, and furan fatty acids from algae were reported and potentially have remarkable health benefits. These inspire us to synthesize and investigate a synthetic fatty acid contains phenyl and triazolyl that connecting the carboxylic acids head group and the hydrophobic tail. The synthetic fatty acid has been previously reported having extremely lower cmc value compared to natural fatty acid with similar length using conductivity and absorbance measurements. However, investigations of the surfactant behavior using conventional and appropriate methods like surface tension and pH is not fully described. Besides, correlations between the unexpected lower cmc of the substance with the presence of both aromatic and heteroaromatics moieties are not well understood. In these present works, the surfactant was analyzed under ^{1}H-NMR in basic condition with selected surfactant concentrations. At 0.05 mM surfactant concentration, which below cmc value, proton signals on phenyl were indicated as doublets at 8.1 and 7.9 ppm, while proton on triazolyl as a singlet at 8.6 ppm. At above the cmc with 5 mM surfactant concentration, the signals were shifted to higher field at 8.3 ppm for proton triazolyl, and proton aromatic shifted to 7.75 and 7.0 ppm. pH profile indicates micelle-to-vesicle phase transition of the surfactant when pH decreased from 10 to 9. The surface tension of the surfactant was only reduced to 65.4 mN m^{-1} while showing the trend of micelization with cmc value at 0.13 mM. Although the substance displays an example of fatty acid with additional interactions occurred from pi-pi interaction of phenyl groups, plausibly hydrogen bond between the triazolyls and well-ordered aggregation structures, it is not excellent to further reduce the surface tension of water. Therefore, glycolipids with different chain lengths to the fatty acid solution introduced to the surfactant solution in order to improve its surfactant behavior. A series of surfactant-glycolipids mixtures have been prepared with molar ratio of 9:1. The samples were analyzed with surface tension, conductivity, pH and fluorescence spectroscopy. The results suggest the presence of glycolipid with C12 is significantly reduces the surface tension from 65.4 mN m^{-1} to 32.1 mN m^{-1}. Aggregation of the surfactant-C12 glycolipid is much stable than in C8 and C10, suggesting by larger hydrophobic interaction of glycolipid C12 with the surfactant. The results imply the possible additional interactions that could only exist between non-ionic glycolipids and fatty acids with aromatic and heterocyclic moieties.

Keywords: Surfactant, Heterocyclic, Self-assembly, Critical micellar concentration

OOIC05 ORGANIC AND INORGANIC CHEMISTRY

SYNTHESIS AND CHARACTERIZATION OF *N*-SUBSTITUTED THIOSEMICARBAZONE DERIVATIVES AS CORROSION INHIBITORS FOR MILD STEEL IN 1 M HCl

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Abstract

Two *N*-substituted thiosemicarbazones derivatives namely as, 2-(4-hydroxybenzylidene)-*N*-phenylhydrazinecarbothioamide (L2OH) and 2-(4-methylbenzylidene)-*N*-phenylhydrazinecarbothioamide ($L4CH_3$) were synthesized using condensation method. The synthesized compounds were successfully characterized by melting point, elemental analysis (C, H, N, and S), fourier-transform infrared spectroscopy (FT-IR) and NMR (^{1}H and ^{13}C) spectroscopy. The ligands were tested as corrosion inhibitors on the corrosion of mild steel in 1 M HCl using Tafel polarization and electrochemical impedance spectroscopy (EIS) techniques. The Tafel results showed that the inhibition efficiency (IE%) of L2OH increased with increasing inhibitor concentrations as compared to $L4CH_3$. The highest (IE%) obtained for L2OH was 88.96%, while for $L4CH_3$ was 78.59%. The mild steel surface morphology was studied using scanning electron microscopy (SEM) and atomic force microscopy (AFM) to proves formation of protective film protects the surface of mild steel from the attack of acidic solutions.

Keywords: Thiosemicarbazone, corrosion, mild steel, 1 M HCl

OOIC06 ORGANIC AND INORGANIC CHEMISTRY

SUBSTITUENTS EFFECT OF SCHIFF BASE DERIVED FROM ANILINE AS CORROSION INHIBITOR ON MILD STEEL IN 1M HCl

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Abstract

Two series of azomehtine compounds both derived from 2-hydroxy-3-methoxybenzaldehyde (o-vanillin) with 3-nitroaniline and *p*-toluidine were synthesized and characterized through condensation method. The structure of synthesized products were elucidated via elemental analysis (CHNS), nuclear magnetic resonance (NMR), infrared spectroscopy (IR) and single crystal X-ray diffraction. The corrosion inhibitory effects of two azomethinecompound namely 2-methoxy-6-((p-toly limino)methyl)phenol (D2) and 2-methoxy-6-(((3-nitrophenyl)imino)methyl)phenol (D3) were studied on mild steel in 1.0 M HCl by electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization measurements. Based on the electrochemical measurement, the azomethine compound being studied can possibly achieve inhibition efficiency up to 90% on mild steel in acidic environment. It was found that the presence of electron donating gro up substituent on the compound increases the corrosion inhibition efficiency on the mild steel. The surface morphology of mild steel specimen was further investigated by atomic force microscopy (AFM) and scanning electron microscopy (SEM).

Keywords: Azomethine, O-vanillin, Aniline, Mild Steel, Hydrochloric Acid.

OOIC07 ORGANIC AND INORGANIC CHEMISTRY

NON-SYMMETRICALLY SUBSTITUTED BIS-BENZIMIDAZOLIUM SALTS AND THEIR RESPECTIVE DINUCLEAR SILVER(I)-NHC COMPLEXES: SYNTHESIS AND ANTIBACTERIAL ACTIVITIES

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Abstract

This work described the synthesis of the non-symmetry bis-benzimidazolium salts as precursors for the dinuclear Ag(I)-NHC complexes (NHC = *N*-heterocyclic carbene). Through the reaction of 3-(2-bromoethyl)-1-butylbenzimidazole bromide (**I**) with *n*-alkylbenzimidazole (alkyl = methyl, ethyl, propyl, pentyl) with 1:1 ratio in acetonitrile, non-symmetry bis-benzimidazolium bromide salt (**1a, 2a, 3a** and **5a**) were obtained. On the other hand, the symmetry bis-benzimidazolium bromide salt (**4a**) was synthesized through the easier reaction of *n*-butylbenzimidazole with 1,2-dibromoethane with 1:2 ratio in 1,4-dioxane. A part of these salts were converted to their hexafluorophosphate salts (**1b**-**5b**), respectively for characterization purpose while the other remaining were then undergo *in-situ* deprotonation with Ag_2O to produce dinuclear Ag(I)-NHC complexes, **6-10**. The successful complexations were proved by the disappearence of the most downfield *H2'* peak in ^{1}H NMR (*ca* 9.8-10) and confirmed by the presence of doublet peaks *C2'*-Ag at 187-180 and 188-190 ppm in ^{13}C NMR. The bis-benzimidazolium salts **1-5b** and Ag(I)-NHC complexes **6-10** were screened for their antibacterial potential against *E. coli* (ATCC 25922) and *S. aureus* (ATCC 12600). All the bis-benzimidazolium salts exhibited no activity against both bacteria while the Ag(I)-NHC complexes showed similar or medium activities compared to standard antibiotic, amoxicillin.

Keywords: *N*-Heterocyclic carbene; non-symmetry; bis-benzimidazolium; Ag(I)-NHC; *in-situ* deprotonation; antibacterial activity

OOIC08 ORGANIC AND INORGANIC CHEMISTRY

INVESTIGATION OF RUTHENIUM ALKYNYL COMPLEXES FOR NONLINEAR OPTIC APPLICATION USING COMPUTATIONAL METHOD

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Abstract

Hartree Fock (HF) and density functional theory (DFT) methods based on a 3-21G set level were used to computationally assess the nonlinear optic (NLO) response of six ruthenium (Ru) arylalkynyl complexes. Substitution of Ru-phenyl with six simplified models of Ru-H and Ru-methyl complexes revealed that DFT-based calculations were more accurate than HF in estimating the NLO response. The calculated bond lengths and angles of Ru-methyl was in good agreement with Ru-phenyl. Given that the calculated C≡C stretching vibration and UV-vis maximum absorption for Ru-methyl was comparable to Ru-phenyl, with values corresponding to 2154.56 cm^{-1} and 460.93 nm, respectively, it was evident that Ru-H, Ru-methyl and Ru-phenyl complexes undergo intraligands π-π* and Laporte forbidden metal d-d transition. Henceforth, it is affirmed that calculations using simplified Ru-H complexes were as much as reliable as the full structure of Ru to assess the NLO response. Assessment of electron inductive effect on Ru-carbonyl (Ru-Co), Ru-cyclopentadienyl (Ru-Cp) and Ru-bipyridine (Ru-bpy) complexes revealed two absorption maxima that appeared in regions 320−375 nm and 382−460 nm, which represent an intraligand π-π* orbital and Laporte forbidden d-d-transition, respectively. Migration of electrons from Ru center to the bipyridine ligand suggests a greater electron acceptor effect than Ru center to the arylalkynyl group. However, Ru conjugated to an electron withdrawing group i.e. carbonyl tend to render lower NLO response while elevating HOMO-LUMO energy gap and Ru to Cα bond lengths.

Keywords: ruthenium; nonlinear optic; computational studies; Gaussian; ADF

OOIC09 ORGANIC AND INORGANIC CHEMISTRY

ONE POT GREEN SYNTHESIS AND ANTIMICROBIAL STUDIES OF SALICYLALAZINE DERIVATIVES SCHIFF BASE

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Abstract

Two azine Schiff base ligands, Hla and HLb derived from thiocarhohydrazide and salicylaldehyde derivatives were synthesized using microwave assisted synthesis approach. The confirmation of both ligands were elucidated through physiochemical and spectroscopy technique as well as single x-ray crystallography diffraction. The analyses shown that the ligands synthesized were formed as azine instead of thiocarbohydrazone based on the missing thione, C=S moiety throughout all spectral data. The molecule stucture was further conclude by x-ray crystal analysis. The biological properties of these ligands were screened using Disc diffusion method. The result shows that HLb give significant inhibition toward all of the bacteria tested.

Keyword: antimicrobial, azine, disc diffusion, microwave, Schiff base

OOIC10 ORGANIC AND INORGANIC CHEMISTRY

SYNTHESIS, CHARACTERISATION & CYTOTOXICITY STUDY OF BENZYL 2-((1*E*,4*E*)-1,5-BIS(4-BROMOPHENYL)PENTA-1,4-DIEN-3-YLIDENE)HYDRAZINECARBODITHIOATE & BENZYL 2-((1*E*,4*E*)-1,5-BIS(4-CHLOROPHENYL)PENTA-1,4-DIEN-3-YLIDENE)HYDRAZINECARBODITHIOATE AND THEIR Ni(II), Cu(II), Fe(II), Zn(II), & Cd(II) COMPLEXES

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Abstract

Dithiocarbazate Schiff bases and their derivatives have drawn considerable attention due to their unique properties and applications. Many dithiocarbazate metal complexes have been synthesised and applied in many applications such as antibacterial, antifungal, antioxidant agents and in catalysis. Dithiocarbazate metal complexes have also shown significant cytotoxicity against many types of cancer cell lines. This study aimed to synthesise non-toxic compounds by synthesising halogenated chalcones and studying the effect of halogen electronegativity on the cytotoxicity of the metal complexes. Two chalcones, *p*-chlorodibenzalacetone and *p*-bromodibenzalacetone were synthesised using base-catalysed Aldol condensation. These chalcones were then reacted with *S*-benzyldithiocarbazate to form two novel Schiff bases. Ten novel metal complexes were synthesised by reacting these two Schiff bases with five divalent transition metal acetates which were Ni^{2+}, Fe^{2+}, Cu^{2+}, Zn^{2+}, and Cd^{2+}. These Schiff bases and their metal complexes were fully characterised using various characterisation techniques including FTIR, UV-Vis, ^{1}H & ^{13}C NMR spectroscopy, mass spectral and elemental analysis, and single crystal X-ray diffraction. The cytotoxic properties of these compounds were also tested against two types of bladder cancer cell lines which were RT112 and EJ28. Copper(II) complexes showed better activity than the rest of the metal complexes and better selectivity toward EJ28 than RT112 cell lines. The bromo-substituted complexes showed better effect on the cytotoxicity than chloro-substituted complexes. The copper(II) complex containing di-*p*-bromobenzalacetone-S-benzyldithiocarbazate Schiff base was observed to have the strongest cytotoxicity with an IC_{50} value of 2.62 µM against the EJ28 bladder cancer cell line.

Keywords: Schiff base; dithiocarbazate; S-benzyldithiocarbazate; SBDTC; metal complexes; bladder cancer; cytotoxicity; dibenzalacetone

OOIC11 ORGANIC AND INORGANIC CHEMISTRY

CRYSTAL GROWTH AND PHYSICAL CHARACTERIZATION OF NICOTINAMIDE CRYSTALLIZED WITH CINNAMIC ACID

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Abstract

Pharmaceutical cocrystals can be defined as compounds that contain two or more different molecular components at certain stoichiometry, usually present in different characteristics from the precursors. In this work, cinnamic acid (CIN) was employed to form the cocrystal with the active pharmaceutical ingredients nicotinamide (NIC), which characterized to compare with the precursors. The cocrystallization of NIC with CIN was studied in different molar ratios. It was anticipated that acid-amide heterosynthon as the driving force for cocrystallization. Prior to cocrystallization of NIC with CIN, the estimation of miscibility using Group Contribution Method (GCM) and pK_a difference rule showed possible miscibility and the formation of cocrystal respectively. NIC-CIN cocrystal was prepared by the slow evaporation method using ethanol solvent. The synthesized cocrystal was characterized using DSC, FTIR, PXRD and ^{1}H-NMR. The PXRD analysis revealed significant peaks shift which indicates the feasible formation of cocrystal. The DSC thermogram of NIC-CIN mixture showed a lower melting point at 98.95 °C compared to NIC at 129.94 °C and CIN at 134.33 °C precursors. The difference in the melting point of the mixture from the precursors supports the PXRD data which confirmed the feasible formation of cocrystal. The crystal structure of NIC-CIN cocrystal was determined by single crystal X-ray diffraction (SCD). The crystal system of NIC-CIN cocrystal was monoclinic with space group $P2_1/c$ and Z=4. Amide-carboxylic acid heterosynthon was observed in the cocrystal. The intermolecular hydrogen bond, O-H··N, N-H··O and π-π interactions were detected in packing of NIC-CIN cocrystal.

Keywords: cocrystal; physical characterization; molecular interaction; hydrogen bonding; single crystal XRD; crystal structure

OOIC12 ORGANIC AND INORGANIC CHEMISTRY

SYNTHESIS AND CHARACTERISATION OF FERROCENE-INDOLE DERIVATIVES VIA SIMPLE ESTERIFICATION AS HELA INHIBITOR

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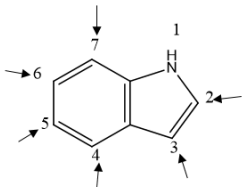
Abstract

The rise of organometallics in various applications is noticeable in the past few decades. Conventionally, organometallics are usually perceived as difficult to synthesis, isolate and involves high maintenance in terms of storage due to high susceptibility to oxidation especially on the metal centres. Hence, ferrocene is chosen as the organometallic core of interest due to its classical representation of an organometallic compound. A conjugate of ferrocenephenyldiamide-indole hybrids were synthesised via a one-step reaction that resembles Steglich Esterification. As the use of ferrocene-indole for biology application is still new to be ventured. A precursor molecule ferrocenephenylenediamine is also synthesised, with the same method proposed and dicyclohexylcarbodiimide (DCC) as coupling agent. However, 1-Ethyl-3-(3-dimethylaminopropyl)carbodiimide (EDC) was used for the synthesis of the final hybrids, as the use of DCC yield excessive insoluble by-products (dicyclohexylurea) that are very difficult to separate. Both reactions mentioned are successful, the novel precursor and a series of 6 compounds with all 6 possible substitution site of indole substituted by ferrocenephenylenediamine were obtained.



All 7 mentioned compounds are obtained in reasonable yields. Surprisingly, among the 6 ferrocene-indole hybrids, only substitution of position -7 has a significant lower yield of 32% while the others are pretty much similar at around 60%. Besides, precipitates of the final products are stable under room condition, they does not undergo drastic change of colour over time. Structure of the compounds are confirmed by the help of Nuclear Magnetic Resosnance (NMR) and Fourier-Transform Infrared Spectroscopy (FT-IR). The obtained ferrocene-indole hybrids were treated to HeLa cell lines in MTS assay for 24h, 48h and 72h, the IC_{50} values obtained show that all 6 of the compounds (with substitution site of indole at position -2, -3, -4, -5, -6 and -7 replaced by precursor) are cytotoxic towards HeLa, and the most potent compound has its indole substituted at position 3 (-3), showing a IC_{50} value as low as 1.9µM. This project is believed to be able to serve as a pioneering approach to any future ferrocene-indole based anticancer drugs design.

Keywords: Organometallics, ferrocene, indole, Steglich esterification, HeLa

OAC01 ANALYTICAL CHEMISTRY

WASTES FROM KITCHEN: A PROMISING MATERIALS FOR ANALYTICAL SAMPLE PREPARATION

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Abstract

In this study, we are discovering the hidden potential of the kitchen wastes as useful resources for analytical sample preparation in environmental studies. Kitchen wastes that are available have a potential to be used as inexpensive materials for analytical sample preparation. Transformation of kitchen wastes into valuable material is of double interest: on the one hand, a waste is converted into value added product, and, on the other, alternative way in waste management. In this presentation, we focus mainly on various strategies in the preparation of new materials from kitchen wastes and their corresponding applications in separation science.

Keywords: Kitchen wastes, sample preparation, separation science.

OAC02 ANALYTICAL CHEMISTRY

CHEMOSENSOR DEVELOPMENT USING 2-ACETYLPYRROLE THIOSEMICARBAZONE FOR CU^{2+} ION RECOGNITION IN AQUEOUS MEDIUM: EXPERIMENTAL AND THEORETICAL STUDIES

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Abstract

A sensitive and selective colorimetric of 2-acetylpyrrole thiosemicarbazone for the efficient detection of Cu^{2+} has been developed. The colorimetric and optical properties of a new chemosensor of 2-acetylpyrrole thiosemicarbazone were studied by the naked-eye detection and UV-VIS spectroscopy. The ligand was synthesised from thiosemicarbazone and 2-acetylpyrrole through condensation reaction. The ligand was further characterized by melting point, elemental analysis CHNS, IR, UV-visible spectroscopy, and 1H-NMR spectroscopy. The sensitivity of 2-acetylpyrrole thiosemicarbazone was done by optimizing the solvent, ratio of solvent:co-solvent and the pH buffer that was used. The selectivity test of the chemosensor was also conducted. DMSO was chosen as the best solvent with a 5:5 ratio at pH 7. All the optimization that was used has given a significant result in the detection of Cu^{2+} ion. The 2-acetylpyrrole thiosemicabazone chemosensor did not encounter any interference from other metal ions. The detection limit of the probe towards Cu^{2+} was 1.88×10^{-5} M. The interaction by the formation of the 2-acetylpyrrole-Cu complex is 1:1 stoichiometry that was calculated using Job's plot method. The sensing behavior of the chemosensor was further emphasized by computational studies. The sigma profile was calculated using COSMO-RS. Density Functional Theory (DFT) calculations, such as MEP, Fukui function and HOMO-LUMO energy gap were successfully calculated to visualize and clarify the interaction between 2-acetylpyrrole thosemicarbazone and Cu^{2+}.

Keywords: Thiosemicarbazone, Chemosensor, COSMO-RS, DFT

OAC03 ANALYTICAL CHEMISTRY

ELECTROKINETIC SUPERCHARGING IN CAPILLARY ELECTROPHORESIS FOR ONLINE PRECONCENTRATION OF 5-FLUOROURACIL AND ITS METABOLITES IN HUMAN PLASMA

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Abstract

In this work, an online preconcentration method termed electrokinetic supercharging (EKS) combined with capillary electrophoresis with diode array detector (CE-DAD) system, was developed and evaluated for the determination of 5-fluorouracil (5-FU) and its metabolites in human plasma. Several important parameters such as buffer composition and concentration, terminating electrolyte, organic modifier, and injection voltage and injection time of both terminating electrolyte and sample were comprehensively optimized. The optimum EKS conditions used were as follows: type of background electrolyte, 45 mM sodium hydrogen phosphate at pH 8; temperature, 20 ºC; voltage, 15 kV; injection time, 200 s; total capillary length, 65 cm; leading electrolyte, 50 mM NaCl and terminating electrolyte, 50 mM TRIS. Under the optimized EKS and CE-DAD conditions, the proposed method will be validated in terms of its linear dynamic range, precision (repeatability) and accuracy (relative recovery). To test the applicability of the method, the developed EKS-CE-DAD will be applied to the analysis of 5-FU and its metabolites in human plasma samples from cancer patients after pretreatment procedure.

Keywords: electrokinetic supercharging, capillary electrophoresis, 5-fluorouracil and its metabolites, human plasma

OAC04 ANALYTICAL CHEMISTRY

CHEMOSENSOR DEVELOPMENT OF Cu^{2+} RECOGNITION USING 1,5-DIPHENYLCARBAZONE: OPTIMIZATION, COSMO-RS AND DFT STUDIES

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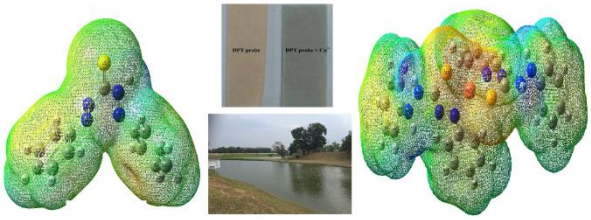
Abstract

The sensitive and selective chemosensor for copper (II) ions (Cu^{2+}) was successfully optimized using the 1,5-diphenylthiocarbazone (DPT) compound. Results showed that Dimethyl Sulfoxide (DMSO) in a 9:1 ratio with a co-solvent at a pH 3 was the optimum condition for DPT to act as chemosensor of Cu^{2+} recognition. The DPT chemosensor did not encounter any interference from other metal ions, including Fe^{3+}, Ag^{+}, Cr^{3+}, Pb^{2+}, Cu^{2+}, Mg^{2+}, Cd^{2+}, Zn^{2+}, K^{+}, Ni^{2+} and Co^{2+} . The presence of Cu^{2+} led to an absorption peak at 658 nm, where the colour changed from cantaloupe to grey-green color indicating the interaction by the formation of the DPT-Cu complex in 2:1 stoichiometry. The theoretical σ-profile calculation using conductor-like screening model for real solvents (COSMO-RS) showed the compatibility of DPT with the DMSO solvent through hydrogen bonding. In the density functional theory (DFT) calculations, the formation energy of DPT and DPT-Cu were -1113.79645660 a.u. and -2435.71832681 a.u., respectively. Under optimal conditions, a detection limit of 1.47 ppm for the DPT chemosensor for Cu^{2+} recognition can compete with the atomic absorption spectroscopy (AAS) value of 1.50 ppm. The preliminary results show that DPT was able to provide less expensive, more portable and convenient chemosensor for Cu^{2+} recognition in aqueous medium, as compared to AAS.



Keywords: Chemosensor, 1,5-diphenylthiocarbazone (DPT), COSMO-RS, DFT

OAC05 ANALYTICAL CHEMSTRY

SIMULTANEOUS ENANTIOMERIC RESOLUTION OF IMIDAZOLE ANTIFUNGAL AGENTS USING HYDROXYPROPYL-β-CYCLODEXTRIN AS CHIRAL SELECTOR IN CAPILLARY ELECTROPHORESIS

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Abstract

Capillary electrophoresis (CE) method employing native β-cyclodextrin (β-CD) and modified hydroxypropyl-β-cyclodextrin (HP-β-CD) was studied and they were being compared as a chiral selector for simultaneous enantioseparation of two imidazole antifungals. The CE method was developed and applied to discriminate two stereoisomers of cis-ketoconazole and two stereoisomers of miconazole as the subjects of study. The background electrolyte (BGE) type and concentration, and chiral selector types and concentrations, pHs, running voltage, and capillary temperature were studied and optimized. In this study, the modified cyclodextrin was proved to enhance the enantioseparation of ketoconazole and miconazole compared to native β-CD as it exhibited a higher resolving power than the native one. Under optimum conditions such as 35 mM tris-phosphate buffer at pH 2.5 containing 1.5 mM HP-β-CD with applied voltage of 15 kV at 15°C, the ketoconazole and miconazole enantiomers are successfully resolved within 30 minutes. In order to understand the possible chiral recognition mechanism of both imidazole compounds with native β-CD and HP-β-CD, the host-guest inclusion complex and binding constant studies were done using UV-vis spectroscopy, FTIR and NMR analyses.

Keywords: hydroxypropyl-β-cyclodextrin, imidazole, capillary electrophoresis

OAC06 ANALYTICAL CHEMISTRY

DEVELOPMENT AND VALIDATION OF HPLC METHOD FOR SIMULTANEOUS DETERMINATION OF CARBAMAZEPINE AND GABAPENTIN IN FIXED-DOSE COMBINATION

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Abstract

This paper describes a simple, sensitive and selective high-performance liquid chromatographic (HPLC) method for the separation and determination of carbamazepine (CBZ) and gabapentin (GBP) simultaneously in fixed-dose combination. The chromatographic separation was performed using COSMOSIL (250 mm × 4.6 mm i.d., 5 µm particle size) at 30 ± 0.5°C, with a mobile phase composed of phosphate buffer (pH 4.0 ± 0.02) and an organic phase (methanol:acetonitrile; 62.5:37.5) in the ratio of 60:40. The flow rate was maintained at 1.0 ml/min, injected volume was 5 µl and detection wavelength at 210nm. The method was validated according to ICH Q2 (R1) guidelines and found to be linear over a range of 375-2250 µg/ml (R2 = 0.9999) and 125-750µg/ml (R2 = 0.9985) for GBP and CBZ, respectively. The drugs in combination were subjected to various stress degradation studies as per the International Conference Harmonization (ICH) guidelines. Results obtained from the stress degradation studies revealed that the developed method is applicable for stability studies.

Keywords: Carbamazepine; Gabapentin; HPLC; method development; validation

OAC07 ANALYTICAL CHEMISTRY

ELECTROCHEMICAL LIQUID-LIQUID EXTRACTION OF PHARMACEUTICAL COMPOUNDS

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Abstract

Quantification of drugs in biological sample such as urine and plasma remain challenging for the study of their pharmacokinetics. Unfortunately, drug traces in biological sample have a very low concentration. Therefore, sample preparation plays significant role in drugs determination as it can improve the limit of detection. The classical methods such as liquid-liquid extraction do not operate with hydrophilic medical drugs Electrochemistry at the liquid-liquid interface allows the control of drugs distribution between the two immiscible phases [1]. We propose here a method for drug extraction based on electrochemistry at the interface between two immiscible electrolyte solutions (ITIES). The principle is based on the application of an electrical driving force to transfer desired ions across the ITIES. Cyclic voltammetry studies at ITIES showed that metformin, phenyl biguanide, phenformin can be extracted from urine to dichloroethane despite their hydrophilicity. The application of different Galvani potential differences enables selective extraction of drugs. Metformin which is the most hydrophilic drug needs a higher potential to transfer across interface compared to phenformin (more hydrophobic). Chemical potential modulation method was developed as an instrument-free extraction methodbased on electrochemical principles. The potential was applied by introducing concentration gradients of tetramethylammonium chloride (TMA^+ Cl^-) between two phases. Important parameters such as volume of aqueous and organic phase, pH and concentration of TMA^+ Cl^- were optimized to improve the enrichment factor. Values of 40.8, 44.2, 49.3 for the enrichment factor were obtained for extracted metformin, phenyl biguanide, phenformin respectively. The results showed that by using this method, the targeted compounds can be extracted from aqueous phase and analysed by classical chromatographic methods.

Keywords: Metformin; phenformin; phenyl biguanide; electrochemically modulated liquid-liquid extraction; ITIES; concentration gradient

OAC08 ANALYTICAL CHEMISTRY

THE ETHICAL CONCERNS OF BIOANALYTICAL CHEMISTRY: THE CASE OF FORENSIC SCIENCE

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Abstract

Due to its pragmatic nature, bioanalytical science, a sub-discipline of analytical chemistry, is increasingly becoming a central point to address the practical needs of modern community life. It seems to be very promising and potential to play a major role in many sectors of industrial, environmental and medical applications. It nevertheless, encompasses various forms of analytical chemistry, such as: (i) bioanalysis for medical and clinical purposes, especially in the pharmaceutical industry; (ii) quality assurance purposes in food industry and products; (iii) environmental chemistry and ecosystem; and (iv) bioanalysis for forensic purposes. The practical part of all these sciences depends on bioanalytical chemistry, which is based on techniques and technologies that are characterized by accuracy, preciseness and honesty. To harness potentials of the newly growing science of bioanalysis, the analytical chemists need to address, not only matters of accuracy and preciseness of measurement methods and techniques, but also the ethical implications of bioanalysis. In fact, the ethical concerns are arising alongside with the various techniques adopted, application methods, fraudulent cases, negligence, as well as other problems that may jeopardize the integrity of bioanalytical science. This paper focuses, especially, on the ethical aspects of forensic science which depends solely on bioanalytical chemistry. Forensic science is mainly concerned with using results of bioanalysis for legal purposes, to draw evidences for conviction. Although there is a considerable literature on forensic science, however, the ethical dimension of this science needs further investigation, especially based on technical study of bioanalytical chemistry, as aimed by this paper. The paper, firstly, outlines briefly the basic forms of bioanalytical chemistry, as summarized above, and their technical methods of analysis; secondly, the paper investigates the ethical implications of forensic science. The method adopted will be theoretical, analytic and critical in nature.

Keywords: Bioanalysis; analytical techniques; forensic evidences; biological fluids; ethical implications; legal investigation

OAC09 ANALYTICAL CHEMISTRY

FABRICATION OF MAGNETIC POLY(B-CYCLODEXTRIN FUNCTIONALIZED IONIC LIQUID) NANOCOMPOSITES AND ITS APPLICATION IN THE MAGNETIC SOLID PHASE EXTRACTION OF POLYCYLIC AROMATIC HYDROCARBONS FROM RICE SAMPLES

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Abstract

Ionic liquid and chemical cross-linker were employed as a structural modifier for magnetized β-cyclodextrin to increase its merit, also to overcome some limitation of β-CD alone in the solid phase extraction process. In-situ chemical functionalization and polymerization were used to prepare $Fe_3O_{4@}$βCD-Vinyl-TDI nanosorbents. Application of this designed material in the magnetic SPE (MSPE) of selected polycyclic aromatic hydrocarbons (PAHs), as model analytes in the rice samples coupled with GC-FID was evaluated. The characterization of the nanocomposite was performed using transmission electron microscopy (TEM), scanning electron microscopy (SEM), X-ray diffraction analysis (XRD), Fourier Transform Infrared (FT-IR) spectroscopy, 1H and 13C NMR spectrometry, zeta potential analysis, thermogravimetric analysis (TGA), wetting analysis, Brunauer-Emmett-Teller (BET) Surface Area and Barrett-Joyner-Halenda (BJH) Pore Size and Volume Analysis, elementary analysis (EA) and vibrating sample magnetometry (VSM). Nine important parameters, affecting the extraction efficiency of PAHs, including: sorbent dosage, sample solution, effect of pH, salt addition, organic modifier, extraction time and desorption conditions were investigated. The optimum extraction conditions were obtained as: 20 mg of sorbents in 25 mL sample solution without pH adjustment, 3% (w/v) of salt addition, extraction time of 30 minutes, 200 µL of acetonitrile without organic modifier as desorption solvent and a desorption time of 15 minutes under shaking. Good performance data were obtained at the optimized conditions. Detection limits were in the range of 0.01-0.18 µg/kg in real matrix. The calibration curves were linear over the concentration ranges from 0.1 to 500 µg/kg with correlation determinations (R^2) from 0.9970 to 0.9982 for all the studied analytes. The RSDs values were found to be between 2.95%-5.34% for intra-day and between 4.37%-7.05% for inter-day precision in six different days. The sorbents exhibited a satisfactory reproducibility in the range of 2.9% to 9.9% in extracting the five selected analytes. Acceptable recoveries values 80.4% -112.4%, were also obtained for the real sample analysis using the proposed method. The fabricated adsorbent combines the advantages of the superior adsorption capability of modified cyclodextrin cross-link polymer and separation ability of magnetic nanoparticles to provide high adsorption capacity, and easy isolation from sample solutions.

Keywords: Ionic liquid; β-cyclodextrin; $Fe_3O_{4@}$βCD-Vinyl-TDI nanosorbents; Magnetic solid phase extraction; GC-FID

OC01 CATALYSIS

SYNTHESIS, CHARACTERIZATION AND CATALYTIC APPLICATION OF SYMMETRICAL PALLADIUM(II) N_2O_2- SCHIFF BASE TOWARD MIZOROKI-HECK REACTION

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Abstract

A symmetrical square planar palladium(II) complex with N_2O_2-tetradentade ligand was synthesized by condensation reaction of 3,5-di-*tert*-butyl-2-hydroxybenzaldehyde with 2,2-dimethyl-1,3-propanediamine followed by complexation with palladium(II) acetate using equimolar amount to give $C_{35}H_{52}N_2O_2Pd$. The catalyst was then characterized by several techniques such as elemental chemical analysis CHNS, FTIR, NMR spectroscopy and Single X-ray crystallography. This air/moisture stable symmetrical catalyst was investigated for Mizoroki-Heck reaction of aryl bromide with methyl acrylate using several parameters such as different of bases, catalyst loading and temperatures. The catalytic reactions were monitored by GC-FID. The isolated product from the catalytic testing obtained as 3-(4-acetylphenyl) acrylic acid methyl ester.

Keywords: N_2O_2-tetradentade ligand; palladium(II) complex; Mizoroki-Heck reaction

OC02 CATALYSIS

SIZE-CONTROLLED SYNTHESIS OF PALLADIUM NANOPARTICLES SUPPORTED ON TITANIA FOR HYDROGENATION REACTION

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Abstract

Sol-immobilisation method was employed in the preparation of 1wt% palladium nanoparticles (Pd NPs) supported on TiO_2 (different phases: P25, rutile, anatase). The size of Pd NPs were controlled by controlling the reduction temperature of Pd nucleation, in which the kinetic growth was altered by variation of the temperature from 1 ^{o}C up to 75 ^{o}C. The method lead to the formation of Pd NPs with diameter range between 2.6 nm up to 5 nm. The process of reduction was monitored by UV/Vis spectrometer. Whereas, TEM, IR-CO adsorption and EXAFS were used to characterized catalysts properties. Various attempts have been made by other researchers to develop a suitable catalytic system for cinnamalydehyde hydrogenation, however the selectivity is still an important subject. The immobilized Pd NPs catalysts from our work demonstrated an outstanding activity and selectivity of reaction at C=C which can be tune with controlled particles size and metal support interaction.

Keywords: Palladium nanoparticles; EXAFS; TEM

OC03 CATALYSIS

A COMPARATIVE STUDY ON THE STRUCTURE-ACTIVITY RELATIONSHIP OF Ru/M*/Ce/Al_2O_3 PROMOTED WITH Mg AND Mn FOR CO_2/H_2 METHANATION REACTION

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Abstract

In this paper, the influence of Mg and Mn incorporation method on the ceria based catalyst for CO_2 methanation was systematically investigated. A series of trimetallic Ru/M*/Ce/Al_2O_3 (M*= Mg or Mn) catalysts with different ratios and calcination temperatures were prepared by wetness impregnation method. Among the catalyst screened, the Ru/Mn/Ce (5:30:65)/Al_2O_3 catalyst with calcination temperature of 1000^{o}C exhibited the highest CO_2 conversion of 97.73% and nearly 100% selectivity to methane at a reaction temperature as low as 200^{o}C. The TPR-TPD analysis of Ru/Mn/Ce (5:30:65)/Al_2O_3 catalyst disclosed the addition of Mn improving the reducibility of the catalyst due to its higher surface basicity as compared with the Mg modification. The presence of Mn_2O_3 species could help to form a moderated interaction with the support which inhibited the particles agglomeration in high temperature, improved the dispersion thus enhanced in the CO_2/H_2 adsorption capacity.

Keywords: methanation; carbon dioxide; catalyst; ceria, magnesium; manganese

OC04 CATALYSIS

GLYCEROL DEGRADATION WITH ABSENCE OF EXTERNAL HYDROGEN GAS BY USING WASTE EGGSHELL AS HETEROGENEOUS CATALYST

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Abstract

The demand of biodiesel production nowadays is getting high every day. The function of biodiesel itself as alternative fuel to replace the usage of fossil fuels is one of the best technique to reduce the carbon dioxide (CO2) gas release in the atmosphere. However, the booming of biodiesel's demand resulted in increasing of glycerol as major by-products. Although glycerol could serve in various industries, the demand and usage are still limited. Therefore, an alternative has been taken in this research in order to convert glycerol into more value-added chemical of methanol (MeOH), propanol (PrOH) and 1,2-propanediol (1,2-PDO) through low-cost and simple reflux technique. The calcium oxide catalyst derived from waste eggshells was utilized as heterogeneous catalyst. The optimum condition was obtained at temperature of 170 ^{o}C, 7 hours, 1 g of catalyst and 20 wt% of glycerol concentration. The optimum glycerol conversion (82 %) and products selectivity to MeOH (7.95 %), PrOH (70.8 %) and 1,2-PDO (21.2 %) were observed.

Keywords: glycerol; degradation; external hydrogen; waste eggshell; heterogeneous catalyst

POSTER SESSIONS ABSTRACTS

SKAM31

PEC01 ENVIRONMENTAL CHEMISTRY

ELECTROCHEMICAL TREATMENT OF AQUEOUS C. I. REACTIVE BLUE 21 AND SYNTHETIC TEXTILE EFFLUENT USING METAL/GRAPHITE-POLYVINYL CHLORIDE COMPOSITE ELECTRODE

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Abstract

In this study, the electrochemical oxidation of C. I. Reactive Blue 21 (RB21) on a cobalt/graphite-polyvinyl chloride ($Co_{47.5}/C_{47.5}$-PVC_5) composite electrode was investigated using electrochemical technique. $Co_{47.5}/C_{47.5}$-PVC_5 and graphite rod were used as an anode and cathode, respectively, in the presence of NaCl as a supporting electrolyte in the electrolysis of RB21 solution. Optimum electrolysis conditions for the decolorization of RB21 solution using $Co_{47.5}/C_{47.5}$-PVC_5 electrode is by using 20 V of applied voltage for 45 min of electrolysis time in the presence of 0.5 mol L-1 NaCl solution as a supporting electrolyte. Under the optimum electrolysis conditions, 99.95% of RB21 decolorization percentage has been achieved. The $Co_{47.5}/C_{47.5}$-PVC_5 electrode also shows high efficiency in the decolorization of synthetic textile effluent containing azo and anthraquinone dyes using similar optimum electrolysis conditions as mentioned above. This is further confirmed by the wastewater parameter analyses in which the high removal percentage (>75 %) of COD and BOD_5 was achieved for the treated solution. This shows that the prepared electrode provides high efficiency in the removal of dye compounds. Characterization of the electrode surface using FESEM-EDX shows no significant changes in the composition of C, Co and Cl elements in the prepared electrode before and after electrolysis of RB21 solution. This shows that the prepared electrode has a good binding ability between C and Co by using PVC as a binder agent.

Keywords: Electrochemical technique; C. I. Reactive Blue 21; synthetic textile effluent; composite electrode

PEC03 ENVIRONMENTAL CHEMISTRY

REMOVAL OF Cu AND Pb FROM AQUEOUS SOLUTION USING CORN LEAVES (*Zea Mays*) AS ADSORBENT

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Abstract

Corn leaves are considered as an agricultural waste which causes environmental problems due to the way they have been disposed. The potential to remove Pb and Cu ion from wastewater treatment systems using untreated corn leaves (CLUT) and treated corn leaves (CLT) through adsorption was investigated in batch experiments. CLT were treated by 0.1 M NaOH. Batch mode experiments were conducted in various parameters such as adsorbent mass (0.1-0.9 g), pH (1-11), concentration of toxic metals (5-25 mg/L) and contact time (0-120 min). Highest percentage removal of Cu (41 % and 78 %) and Pb (72 % and 92 %) were achieved using 0.9 g of CLUT and CLT. Maximum adsorption was obtained at pH condition of 3-4 for both adsorbents. At contact time of 120 min, for concentration of 5 mg/L, Pb was removed up to 80 % using CLUT and 90 % using CLT. Meanwhile, as for Cu ion, at contact time of 120 min with concentration of toxic metal of 5 mg/L, 46 % was removed using CLUT while the removal percentage achieved up to 93 % using CLT. Low initial concentration of toxic metals would give high percentage removal of toxic metals. The adsorption data fitted well to the Langmuir isotherm model which assumes that the adsorption process occurred is a monolayer adsorption which occurs on the same sites on the adsorbent surface. Therefore, this study demonstrated that both adsorbents which are CLUT and CLT could be used to remove Cu and Pb from industrial wastewater.

Keywords: agriculture waste, corn leaves, adsorbent, toxic metals

PEC04 ENVIRONMENTAL CHEMISTRY

SEDIMENT QUALITY ASSESSMENTS IN RELATION TO SOCIO-ECONOMIC DEVELOPMENT IN KAMPUNG TEKEK, TIOMAN ISLAND, PAHANG DURING SURVEY IN AUGUST 2015

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Abstract

The study to identify the sediment quality changes affected by the increasing human activities along the coastal environment in Kampung Tekek, Tioman Island has been conducted in August 2015. In total, 15 surface sediment samples were collected from three transects in the bay of Kampung Tekek to be analyzed with particle size analyzer (PSA) and loss on ignition (LOI) methods. The results demonstrates good relationship between grain size classification, sediment sorting, skewness and kurtosis which shows differences between the coarser grain and poorly sorted zone up to the finest grain and best sorted zone. However, the highest percentages of sediment composition were recorded to be sand content (23 to 64%) with a mean of 48%, followed with silt content (29 to 68%) with a mean of 43%. The total organic matter (TOM) were ranged from 4.88 to 14.15% with a mean value of 7.61%. This sediment texture contains mostly fine and medium silts could expose potent threat to the coral reefs in the bay of Kampung Tekek due to sedimentation and higher partitioning of contaminants in sediment.

PEC05 ENVIRONMENTAL CHEMISTRY

SEASONAL INFLUENCES ON THE LEVELS OF PARTICULATE METALS IN KUANTAN RIVER, EAST COAST MALAYSIA USING PRINCIPAL COMPONENT ANALYSIS

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Abstract

Principal component analysis (PCA) were performed to evaluate temporal variations of trace metals of Kuantan River waters. Water samples from 12 sampling stations were taken from downstream of the estuary towards the upstream of Kuantan River during the Northeast Monsoon (NEM) and Southwest Monsoon (SWM). Particulate metals were filtered, dried, weighed, analyzed using Teflon Bomb digestion processes and detected using ICP-MS. The metals distribution in suspended particulate matter was found influenced by monsoon seasons particularly during NEM. The PCA/FA identified six varifactors, which were responsible for 83.30% of total variance in the dataset. The PCA results showed that the main source of river water pollution is mostly due to the point sources such as domestic wastewater, wastewater treatment plants and industries as well as non-point sources namely agriculture and oil palm plantations. This study illustrates the usefulness of PCA for identification of pollution sources and understanding temporal variations in river water for effective river water management.

Keywords: Trace Metals, River water, Principal component analysis, Suspended particulate matter

PEC06 ENVIRONMENTAL CHEMISTRY

DEGRADATION OF METHYL ORANGE BY USING SILVER PHOSPHATE/TITANIUM DIOXIDE PHOTOCATALYST

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Abstract

Azo dyes have been widely used in the industries and they contributed to the largest group of pollutants found in water. They are not only highly toxic and hazardous, but also causing various diseases and disorders to aquatic life and human being. Hence, photodegradation is an important method for wastewater treatment. In this research, six samples Ag_3PO_4/TiO_2 photocatalysts were prepared via simple precipitation method by varying the mass ratio of Ag_3PO_4 to TiO_2 and these were used in the photodegradation of methyl orange (MO) dye solution. Three samples were uncalcined while the rest were calcined for 4 hours at 400°C. These photocatalysts were characterized by its phase and band gap energy using X-ray diffraction analysis and UV-Visible spectrometer, respectively. The photocatalytic activities of these photocatalysts were tested by degrading MO dye in aqueous medium under visible light irradiation. For uncalcined photocatalyst, 4A/T1 exhibits highest photodegradation efficiency (100%) compared to 2A/T1 and 1A/T1. The effect of MO concentration and mass of photocatalyst used on the photocatalytic performance of 4A/T1 was evaluated for optimization of MO degradation. 4A/T1 photocatalyst exhibit 100% degradation for 0.3g used and also for 10ppm MO. The synthesized photocatalysts are analyzed using X-Ray Diffraction (XRD) to study the crystallinity where Ag_3PO_4 is cubic and TiO_2 is tetragonal both for rutile and anatase. The band gap energy for 1A/T1, 2A/T1 and 4A/T2 are 2.17eV, 2.25eV and 2.29eV, respectively. Meanwhile, for calcined photocatalysts, the activities of Ag_3PO_4/TiO_2 towards MO degradation were found to be greatly dependent on the mass ratio of Ag_3PO_4/TiO_2 where 4-A/T-1 showed the highest photocatalytic degradation which showed an enhancement of approximately 22.68% in catalytic activity when using 4-A/T-1 compared to 1-A/T-1 and 2-A/T-1. This improvement in photocatalytic activity may be because of induced changes of the Ag_3PO_4/TiO_2 physical properties during calcination process and the highest Ag_3PO_4 content in the catalyst. Moreover, the photocatalytic performance of 4-A/T-1 was studied particularly by carried out the effect of MO concentration and photocatalyst loading on the photocatalytic performance of 4-A/T-1 was studied in order to optimize the photocatalytic degradation of MO. 4-A/T-1 exhibited the highest photodegradation efficiency at optimum conditions of 0.5g photocatalyst and 10ppm of MO. The calculated band gap for 2-A/T-1, 1-A/T-1 and 4-A/T-1 are 1.70eV, 1.98eV and 2.15eV respectively while the XRD results shown that Ag_3PO_4 was cubic and TiO_2 was tetragonal both for rutile and anatase.

Keywords: Methyl orange, Ag_3PO_4/TiO_2, visible light, photodegradation, photocatalyst.

PEC07 ENVIRONMENTAL CHEMISTRY

PENENTUAN KEPEKATAN LOGAM BERAT DALAM SEDIMEN DI MUARA SUNGAI KEMAMAN, TERENGGANU

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Abstrak

Penentuan kepekatan dan taburan beberapa logam berat seperti Al, Fe, Cr, Cu, Mn, Ni, Pb dan Zn di dalam enapan dasar telah dijalankan di muara Sungai Kemaman (Laut China Selatan) menggunakan kaedah pencernaan basah. Selepas pencernaan, logam berat di dalam larutan ekstrak dianalisa dengan spektrofotometer serapan atom (AAS) dan spektrofotometer serapan atom relau grafit (GFAAS). Umumnya, keputusan menunjukkan bahawa kepekatan kebanyakan logam berat di kawasan kajian adalah lebih rendah atau setara jika dibandingkan dengan kawasan lain. Bagi penyampelan pertama, purata kepekatan logam adalah 4.44 ± 2.55% bagi Al, 2.36 ± 1.01% bagi Fe, 44.29 ± 23.82 $\mu g.g^{-1}$ bagi Cr, 12.13 ± 6.03 $\mu g.g^{-1}$ bagi Cu, 135 ± 83.08 $\mu g.g^{-1}$ bagi Mn, 27.08 ± 13.47 $\mu g.g^{-1}$ bagi Ni, 25.11 ± 10.34 $\mu g.g^{-1}$ bagi Pb dan 69.85 ± 29.13 $\mu g.g^{-1}$ bagi Zn. Bagi penyampelan kedua pula purata kepekatan adalah 10.18 ± 6.64% bagi Al, 1.78 ± 0.75% bagi Fe, 27.00 ± 18.27 $\mu g.g^{-1}$ bagi Cr, 10.15 ± 6.75 $\mu g.g^{-1}$ bagi Cu, 120.71± 72.69 $\mu g.g^{-1}$ bagi Mn, 11.88 ± 5.18 $\mu g.g^{-1}$ bagi Ni, 20.49 ± 9.20 $\mu g.g^{-1}$ bagi Pb dan 34.17 ± 29.97 $\mu g.g^{-1}$ bagi Zn. Analisis statistik anova menunjukkan terdapatnya perbezaan bererti ($p<0.05$) di antara penyampelan pertama dan kedua. Penentuan faktor pengkayaan menunjukkan kepekatan Pb di kawasan kajian dipengaruhi oleh sumber-sumber antropogenik. Beberapa aktiviti di sekitar Sungai Kemaman telah dikenalpasti sebagai penyumbang sumber antropogenik iaitu aktiviti-aktiviti perikanan, perindustrian, aktiviti-aktiviti di dermaga dan daripada kawasan perbandaran.

Katakunci: Logam berat, faktor pengkayaan, sedimen, Sungai Kemaman (Laut China Selatan)**.**

PEC08 ENVIRONMENTAL CHEMISTRY

REMOVAL OF CRUDE OIL FROM AQUEOUS SOLUTION BY BIVALVE SHELL AS LOW-COST ADSORBENT

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Abstract

The removal of crude oil from aqueous solution by bivalve shell (BS) was studied via batch adsorption under varying parameter such as pH (3-11), adsorbent dosage (10-50 g/L), initial oil concentration (10000-100000 ppm) and temperature (303-323 K). The crude oil was completely removed at pH 9 using 40 g/L of BS dosage under 10000 ppm of crude oil concentration at 303K within 30 min of time contact. The significant uptake of crude oil from aqueous solution onto the BS was proven by FT-IR and FE-SEM analyses. The isotherm studies revealed that the experimental data agree with Langmuir Isotherm type 1 model with R^2= 0.9999. The pseudo-first-order kinetics model fitted well with the experimental results. The negative value of enthalpy (ΔH°) indicate that the nature of the adsorption process is exothermic, the negative value of entropy (ΔS°) show that the decrease in the randomness at sorbate-solution interface during the adsorption process. A negative value of Gibbs free energy (ΔG°) means that the reaction is favourable; increased in the value of ΔG° with rise in temperature show that the adsorption is more favourable at lower temperature.

Keywords: Bivalve shell, crude oil, batch adsorption, low-cost

PEC09 ENVIRONMENTAL CHEMISTRY

WATER QUALITY AND ANTROPHOGENIC POLLUTANTS DETERMINATION IN SUNGAI BERTAM, CAMERON HIGHLANDS, PAHANG.

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Abstract

Water quality in Sungai Bertam declining because of clearing land for settlement, logging, agriculture and development. Therefore, a study to determine the current status of water quality and both nutrient and heavy metal content in the water and sediment was conducted on November 2017 in Cameron Highlands. Six sampling stations along the river were selected by considering the anthropogenic activities nearby to represent the entire river. In-situ parameters determined in this study were pH and dissolve oxygen (DO). Laboratory analysis have determined the parameters of biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solid (TSS) and ammonia nitrogen (NH3-N) according to standard methods. The results showed that Bertam River is classified as class II based on WQI. Those determined nutrients content comprised flouride (F-), chloride (Cl-), nitrate (NO3-), sulphate (SO42-), phosphate (PO3-) dan bromide (Br-). The concentration of (F-) in water was in the range of 0.035 to 0.058 mg/L, 1.488 to 4.157 mg/L for (Cl-), 0.056 to 1.273 mg/L for (Br-), 3.425 to 9.688 mg/L for (NO3-), 2.902 to 7.444 mg/L for (SO42-), and 0.112 to 0.242 mg/L for (PO3-). Meanwhile, the concentration of (F-) in sediment was in the range of 0.34 to 0.66 µg/g, 11.29 to 16.37 µg/g for (Cl-), 0.12to 0.25 µg/g for (Br-), 10.04 to 17.07 µg/g for (NO3-), 26.33 to 51.87 µg/g for (SO42-),and 1.03 to 2.85 µg/g for (PO3-). The composition of heavy metals in the organic oxidation fraction (OO) and resistant fraction (RR) were determined with inductively coupled plasma mass spectrometry (ICP-MS). Those determined heavy metals content comprised of Fe, Mn, Zn, Cu, Cd, Cr and Pb. The results showed that the total amount of heavy metals extracted from sediment sequentially was in the order Fe>Mn>Zn>Cr>Pb>Cu>Cd. Amount of heavy metals extracted sequentially in OO was in the order of Mn>Fe>Zn>Pb>Cr>Cu>Cd and in the order of Fe>Mn>Zn>Cr>Pb>Cu>Cd for RR. Meanwhile, the composition of heavy metals in water samples were in the order Fe>Zn>Cu>Cr>Pb>Mn>Cd. Sandy and sandy loam were the dominant texture of sediment in the sampling areas. This study overall contributes to identify the sources and level of pollution on Bertam River in Cameron Highlands.

Keywords: nutrients, heavy metals, water quality index, sandy, sandy loam

ULTRASOUND ASSISTED DISPERSIVE LIQUID–LIQUID MICRO EXTRACTION (USADLLME) FOR THE DETERMINATION OF BIOGENIC AMINES IN FOODS

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Abstract

Ultrasound assisted dispersive liquid-liquid microextraction (USADLLME) was developed for the extraction of seven biogenic amines (BAs) in foods. BAs were derivatized with dansyl chloride and 1-butyl-3-methylimidazolium hexafluorophosphate (extraction solvent) was dispersed into the aqueous sample solution as fine droplets by ultrasonication. Acetonitrile was used as disperser solvent respectively. The factors affecting the extraction efficiency, such as the dansylation condition, volume of ionic liquid, ultrasonication time and extraction temperature have been optimized. Analyte was analyzed using C18 monolithic column of high performance liquid chromatography coupled with diode array detector after extraction and centrifugation. The proposed method was linear over 0.1-100 mg L^{-1} with a correlation coefficient of 0.991-0.999. The limits of detection and quantification based on signal to noise ratio ranges from 0.06-0.3 mg L^{-1} and 0.19-0.99 mg L^{-1} respectively. The relative standard deviations (RSD) for intra-day and inter-day assay were found to be less than 3.6%. Relative recoveries ranging from 78.3 to 114% were established using mango juice, tempe and sardine samples with %RSD less than 5.5%. The developed method was found to be sensitive, rapid, green, and cost-effective for the determination of biogenic amines in wide range of sample matrices.

Keywords: Biogenic amines, foods, dansylation, USADLLME, HPLC

PFB02 FOOD CHEMISTRY AND BIOTECHNOLOGY

CANDIDA RUGOSA LIPASE IMMOBILIZED ON DIETHYLAMINOETHYL-CELLULOSE (DEAE) FOR ESTERIFICATION OF OLEIC ACID AND BIOALCOHOL

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Abstract

Lipase from *Candida rugosa* was immobilized onto diethylaminoethyl-cellulose (DEAE) through physical adsorption method with high percentage of protein absorption obtained at 83.4%. The enzymatic synthesis of butyl oleate, was tested by reacting oleic acid and butanol using immobilized lipases. The reaction was carried out in hexane as reaction medium. The effect of reaction temperature, thermostability of the immobilization lipase, stability in organic solvent for 10 days, leaching with hexane and storage studies under various conditions of immobilization lipase were investigated. The optimum esterification was found to be more than 90%. Only a slight of lipase leached out after being washed by 20 ml of hexane. This showed that lipases were strongly attached to the support via physical adsorption method, and it could be used as industrial biocatalyst.

Keywords: lipase, immobilized, esterification, oleyl ester

PMC01 MATERIAL CHEMISTRY

TERNARY PHASE BEHAVIOUR OF WATER/GLYCOLIPID/OIL SYSTEM

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Abstract

The question on how glycolipids would behave in surfactant-oil-water (SOW) systems was still understudied, especially in regards to its effect with medium-chain triglycerides (MCT) and long-chain triglycerides (LCT), which predominated in coconut oil (CO) and olive oil (OO) respectively. Several Cremophor® EL (CrEL)-stabilized systems were compared in the absence and the presence of dodecyl glucopyranoside (DDG). Preliminary results showed that DDG played consequential role in the size and stability of nanoemulsion and microemulsion produced. The systems with coconut oil were also found to be more stable than the systems with olive oil. In order to elucidate the mechanism behind these observations, the components were individually characterized: fatty acid profile of oils using gas-chromatography-mass-spectrometry (GCMS); thermal analysis of glycolipid using thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC); and solubility of ketoprofen using ultra-visible (UV-Vis) spectrometry. Three ternary phase diagrams of CrEL/CO/W, CrEL:DDG/CO/W, and drug-loaded CrEL:DDG/CO/W systems were constructed. Selected formulations were prepared by phase inversion composition, which then were characterized to gain information on size and polydispersity using dynamic light scattering (DLS), morphological features using transmission electron microscopy (TEM); storage stability and its potential towards pharmaceutical applications.

Keywords: Glycolipid, Nonionic surfactant, Coconut oil, Olive oil, Nanoemulsion, Microemulsion, Cremophor EL, Phase inversion composition

PMC02 MATERIAL CHEMISTRY

CARBOXYMETHYL SAGO STARCH/POLY(ETHYLENE OXIDE) HYDROGEL NANOFIBERS AND ITS CONTROLLED RELEASE BEHAVIOR

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Abstract

Starch is a natural polymer that readily available, low cost and biodegradable [1]. Sago starch is product of sago palm tree or scientifically known as metroxylon sagu. It is come from the spongy center or pith of sago palm tree. The major producers of sago in Southeast Asia are Malaysia and Indonesia. In Malaysia, sago was largely produced in Sarawak, and was exported to many countries such as Japan, Taiwan, Singapore and other countries [2]. In this study, sago starch was chemically functionalized to produce carboxymethyl sago starch to improve processability of sago starch in water. CMSS and poly(ethylene oxide) (PEO) composite hydrogels nanaofibers were prepared by using electrospinning technique and non-toxic and biodegradable cross-linker, citric acid. The characterization of the CMSS/PEO hydrogel was done by using scanning electron microscopy (SEM), Fourier transform infrared (FT-IR), and thermogravimetric analysis (TGA). The optimum condition swelling capacity of CMSS/PEO hydrogel was found to be at 5% concentration of citric acid, 70°C curing temperature and 3 hours curing duration. The CMSS/PEO hydrogel shows the highest swelling percentage in pH 8 followed by pH 7.4, pH 4 and pH 1.2. The loading and release of methylene blue (MB) in CMSS/PEO hydrogel at different pH was investigated by using UV-vis spectroscopy at ʎmax 664 nm. The release profile of MB exhibits pH dependent, where the highest MB release was in pH 1.2 and slowest release in pH 4. The results show the potential of CMSS/PEO composite to be used drug delivery application.

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Keywords: Sago starch, drug delivery, controlled release, hydrogel, citric acid, nanofibers, electrospinning

PMC03 MATERIAL CHEMISTRY

BIPHASIC NANOHYBRID OF LAYERED DOUBLE HYDROXIDE INTERCALATED WITH 4-CHLOROPHENOXYACETATE AND 2,4,5-TRICHLOROPHENOXYACETATE HERBICIDES

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Abstract

This template Simultaneous intercalation of 4-chlorophenoxyacetate (4CPA) and 2,4,5-trichlorophenoxyacetate (TCPA) into zinc-aluminium-layered double hydroxide (ZAL) was successfully accomplished by anion-exchange method for the formation of a biphasic organic-inorganic nanohybrid. The 4CPA anion was found to be more preferentially intercalated into the inorganic layered double hydroxide (LDH) interlayer galleries than the TCPA anion with percentage loadings of 35.5 and 21.0 % (w/w), respectively. Further studies using this biphasic nanohybrid showed that controlled release of both the 4CPA and TCPA anions occurred at the same time but the kinetics of their release was different, with higher percentage release of 4CPA compared to TCPA anion. However simultaneous release of both anions are fitted well to pseudo-second order kinetics with optimum amount of 70% and 46% for 4CPA and TCPA, respectively.

Keywords: Simultaneous intercalation, simultaneous controlled release, anion-exchange, chlorophenoxyacetates, organic-inorganic nanohybrid.

PMC04 MATERIAL CHEMISTRY

ELECTROSPUN POLY (VINYL ALCOHOL) NANOFIBERS DOPED WITH MESOPOROUS SILICA NANOPARTICLES FOR CONTROLLED RELEASE OF METHYLENE BLUE

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Abstract

Nanofiber materials have often been reported as transporters for clinical drugs but face the limitation of burst releasing the drugs. Therefore, mesoporous silica nanoparticles (MSNs) have raised much interest to be used in drug delivery system because of their large pore volume and high surface area. In this study, nanofiber drug delivery system based on poly(vinyl alcohol) (PVA) loaded with novel ionic liquid templated MSNs were successfully prepared by the electrospinning method. The composite fiber mat was designed for the prolonged and sustained release of drug. MSNs were synthesized by co-condensation method with average particles size of ~70 nm and then loaded with hydrophilic model drug methylene blue (MB). The effect incorporation of MB-loaded MSNs into the polymer solution to form fibrous structure was investigated. Uniform PVA/MB nanofiber mat was also produced as controls. The morphologies of nanoparticles and composite nanofiber were characterized by field emission scanning electron microscope (FESEM). After electrospinning, electron microscope revealed that MSNs were randomly distributed in the regions of nanofiber. Drug release profiles of MB from MSNs and electrospun mats were evaluated. The results indicated that adsorption of model drug MB into MSNs and incorporation them into nanofiber are effective way of minimizing burst release of drug. Sustained delivery was achieved with controllable release during the 120h releasing period.

Keywords: poly(vinyl alcohol), mesoporous silica nanoparticles, nanofiber, electrospinning, drug delivery

PMC05 MATERIAL CHEMISTRY

SYNTHESIS OF MESOPOROUS SILICA NANOPARTICLE FROM BAGASSE ASH FOR METHYLENE BLUE DYE REMOVAL

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Abstract

In this study, mesoporous silica nanoparticles (MSNs) was synthesis from bagasse ash using formaldehyde as growth suppressant. The removal of methylene blue (MB) by bare silica and MSNs were investigated by batch adsorption after varying pH (3-11), adsorbent dosage (0.1-0.5 g/L), initial dye concentration (10-100 ppm) and temperature (303-343 K). The modification of MSNs using formaldehyde (MSNF) significantly increased the surface area of the adsorbent, thus creating MSNF with much better adsorption capacity for MB removal. The adsorption kinetic and equilibrium isotherm of the MSNF were studied using pseudo-first-order and psedo-second-order kinetic equation as well as Langmuir isotherm (Type I-IV), Freundlich and Temkin models. The experimental data obtained with MSNF fits best to the Langmuir Type I model and exhibits a maximum adsorption capacity (q_{max}) of 52.9 mg/g; data followed the pseudo-second-order model. The thermodynamic study showed that the adsorption is endothermic, random and spontaneous at high temperature. The results indicate that MSNF adsorbs MB efficiently and could be utilized as a low-cost alternative adsorbent for the removal of dye effluent in wastewater treatment.

Keywords: Sugarcane bagasse ash, MSNs, methylene blue dye, adsorbent, adsorption capacity

CRYSTALLISATION VIA MELTING

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Abstract

Self-assembly is a dynamical process of units coming together without external intervention into ordered organisation. A common example of self-assembly is crystallisation. We investigate crystallisation using a well-known colloid-polymer mixture. The addition of nonadsorbing polymer to a colloidal suspension with hard sphere interactions introduce effective attraction between the colloids. By cooling the system close to θ-temperature, the polymer radius of gyration decreases and leads to a reduced effective attraction between the colloids. In turn, the deeply quenched system is "warmed-up" bringing it to a more shallow quenched region. Structural rearrangement is expected when the effective attraction is weaker due to bond reversibility, and an improved self-assembly takes place when the system is brought back to room temperature. The temperature change investigations were carried out by using a temperature stage fitted to a confocal microscope. After carrying out a series of cooling and heating, we have identified a temperature close to θ-temperature where more improved crystallisation was observed.

Keywords: self-assembly, colloid-polymer mixture, depletive attraction, crystallisation

POIC01 ORGANIC/INORGANIC CHEMISTRY

SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL STUDY OF ACRIDINE IMIDAZOLIUM SALT.

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Abstract

A series of acridine- imidazolium salts were synthesized based on 9-chloroacridine and N-substituted imidazole. The compounds were characterized by FTIR, UV-Vis, ^{1}H and ^{13}C NMR, and evaluated for *in vitro* cytotoxicity against non-tumorigenic cell line **MCF-10a** and breast cancer cell line **MCF-7** by MTT assay. The results indicated the non- toxic behaviour for all compounds. While simple alkyl substituted imidazole only showed low bioactive against MCF-7, the benzyl substituted derivative furnished promising therapeutic potential with an IC_{50} of 5 µg/mL.

Keywords: 9-chloroacridine, breast cancer (**MCF-7**), MTT and imidazolium salts

POIC02 ORGANIC/INORGANIC CHEMISTRY

EVALUATING THE INHIBITION OF THE ENZYME α-GLUCOSIDASE BY IMINOSUGAR INTERMEDIATES OF DEOXYNOJIRIMYCIN

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Abstract

α-Glycosidase enzymes hydrolyse α-glycosidic linkages and are involved in bodily processes such as the catabolism of glycans, intestinal digestion, and the degradation of glycoproteins. Various types of diseases which are caused by the failure of this enzyme to function properly can be treated through enzyme inhibition. Although the iminosugar, D-deoxynojirimisin (D-DNJ) is an excellent micromolar glycosidase inhibitor, α-glucosidase inhibition activity of D-DNJ synthesis intermediates have yet to be reported. Therefore, the scalable synthesis of the D-DNJ intermediates 1,2-*O*-isopropylidene-α-D-glucurono-3,6-lactone **2**, 1,2-*O*-isopropylidene-β-L-idurono-3,6-lactone **3** and 5-azido-5-deoxy-1,2-*O*-isopropylidene-α-D-glucurono-3,6-lactone **4** was carried out using D-glucuronolactone **(1)** as the starting material based on Best et al. 2010, and subsequently, evaluated for anti-α-glucosidase activity. The synthesis was started with D-glucuronolactone **1** using acetone and concentrated sulfuric acid to obtain the acetonide **2**. Purification of **2** by recrystallisation using hot toluene afforded a yield of 55%. Triflic anhydride added to intermediate **2** in dichloromethane and pyridine formed the major product **2a**. Crude triflate derivative containing **2a** was obtained from the organic fraction after washing with aqueous HCl. Addition of sodium trifluoroacetate to crude triflate dissolved in DMF followed by extraction with EtOAc partitioned with aqueous sodium bicarbonate formed the inverted L-*ido*-lactone **3**. Purification of **3** by recrystallisation using hot toluene followed by vacuum liquid chromatography (hexane:ethyl acetate = 2:1) afforded a yield of 46%. Triflic anhydride was added to the L-*ido*-lactone **3** in dichloromethane and pyridine to obtain the corresponding triflate **3a** and was subsequently reacted with sodium azide in DMF to form the D-*gluco*-azide **4**. Purification of **4** was carried out by recrystallisation using hot toluene, vacuum liquid chromatography (hexane:ethyl acetate = 3:1) and preparative TLC (hexane:ethyl acetate = 2:1) to obtain **4** in 1% yield. Purity analysis using HPLC-ELSD gave a single peak at the retention times of 3.72, 3.59 and 3.52 minutes for **2**, **3** and **4**, respectively. All products were identified by mass spectrometry (DI-ESI-MS) and NMR spectroscopy (via comparison of 1D ^{1}H dan ^{13}C with previously reported values). The inhibitory activity of **1**, **2**, **3** and **4** towards α-glucosidase from *Saccharomyces cerevisiae* using *p*NP-glucoside substrate was tested. Compound **3** showed 29.5% inhibition followed by **2** (21.4%), **1** (15.8%) and **4** (15.7%) compared to the positive control, quercetin (72.7%).

Keywords: D-Glucuronolactone **1**, 1,2-*O*-Isopropylidene-α-D-glucurono-3,6-lactone **2,** 1,2-*O*-Isopropylidene-β-L-idurono-3,6-lactone **3,** 5-Azido-5-deoxy-1,2-*O*-isopropylidene-α-D-glucurono-3,6-lactone **4**, Iminosugar, Deoxynojirimycin, α-Glucosidase enzyme inhibition

POIC03 ORGANIC/INORGANIC CHEMISTRY

SYNTHESIS OF AMINOANTHRAQUINONE DERIVATIVES

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Abstract

Amino derivatives of anthraquinone have been known to have a wide range of reactivities as anticancer agents. Structure modification of anthraquinone such as via reduction, alkylation or acylation also play important roles to increase their bioactivities. Twelve aminoanthraquinones including eight new aminoanthraquinones were synthesized via two different sequence of synthetic pathways that consisted of two step-step reactions. In the first synthetic pathway, quinizarin was subjected to reduction, alkylation and acylation separately before treated with amination in the presence of iodobenzene diacetate to produce seven aminoanthraquinones. In the second synthetic pathway, quinizarin was subjected to amination and then further reduction, alkylation and acylation separately to produce another five aminoanthraquinone derivatives. All aminoanthraquinone derivatives were characterized using melting point measurement, common spectroscopic techniques and comparison with the literature data. 2-(Butylamino)-9,10-dioxo-9,10-dihydroanthracene-1-yl acetate exhibited strong antimicrobial towards Methicillin-resistant *Staphylococcus aureus* (MRSA), *Psedomonas aeruginosa*, *Candida albicans* and *Escherichia coli* with MIC values of 0.1-0.5 mg/mL. This compound together with other five aminoanthraquinones named 2-(butylamino)anthracene-1,4-dione, 2-(butylamino)-4-methoxyanthracene-9,10-dione, 1-(butylamino)-4-methoxyanthracene-9,10-dione, 2-(butylamino)-1-hydroxy-4-methoxyanthracene-9,10-dione and 2-(butylamino)-1,4-dimethoxyanthracene-9,10-dione showed strong cytotoxic activities against human estrogen receptor positive breast cancer (MCF-7) cell line with IC_{50} 1.1-11.0 µg/mL and human liver hepatocellular carcinoma (Hep-G2) cell line with IC_{50} 1.1-14.0 µg/mL.

Keywords: aminoanthraquinone, amination, cytotoxic, antimicrobial

POIC04 ORGANIC/INORGANIC CHEMISTRY

SYNTHESIS, MOLECULAR DOCKING OF 5-ACETYL-4-METHYLTHIAZOLE DERIVATIVES AS ANTIMICROBIAL AGENTS

Iswatun Hasanah Abdullah Ripain[1], Norashikin Roslan[1], Nurul Shazana Norshahimi[1], Siti Salwa Mohamed Salleh[1], Noraslinda Mohammad Bunori[2], Nurziana Ngah[1*]

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Abstract

The emergence of antibiotic resistance against bacterial strains has attracted great interest in the discovery and development of new antibacterial agents. Thiazole derivatives had been widely used in the field of biological as well as pharmacological and their efficiency as pharmaceutical drugs are well established. In this study, a series of thiazole derivatives were synthesized by incorporating selected primary amines in one-pot synthesis manner. The compounds were structurally characterized via several spectroscopy analyses such as FTIR, UV-vis and ^{1}H NMR. Their antibacterial properties were screened against selected Gram-positive such as *Bacillus cereus*, *Staphylococcus epidermidis* as well as Gram-negative bacteria *Escherichia coli* and *Pseudomonas aeruginosa* using disc diffusion technique. Molecular docking studies also were performed in order to rationalize the obtained antibacterial results. On the other hand, four compounds exhibited positive result against both types of bacterial strains with **4** was proven to be most promising candidate as antibacterial agent.

Keywords: Thiazole, Amines, Antibacterial, Disc diffusion, Molecular docking

POIC05 ORGANIC/INORGANIC CHEMISTRY

PALM OIL AS ALTERNATIVE BIOLUBRICANTS FOR IMPROVING TRIBOLOGICAL HYDRODYNAMIC

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Abstract

Metal-on-metal (MoM) hip replacements are commonly used in hip implants. However, one of the issues under debate is the interference of friction and wear. The purpose of this feasibility study is to elucidate the performance of palm lubrication between the femoral head and the acetabular cup. In the tribology of hip implants, the use of palm oil as natural lubricants for human joints has shown tremendous potential. Palm oil give significant value as alternative biolubricant due to its advantages, large production in country, and also has potential to replace petroleum based lubricants. A modified pin-on-disc as hip screening has been used to evaluate the friction and wear on an acetabular cup. The wear debris was then observed with microscopy image analysis. This study revealed that the physical and unique chemical properties in palm oil can optimize the rate of friction and wear on the metal acetabular cup and thus allow for a stable implant of MoM.

Keywords: Metal-on-metal, tribology, palm oil, friction, wear

POIC06

ORGANIC/INORGANIC CHEMISTRY

SYNTHESIS AND STRUCTURAL CHARACTERISATION OF LANTHANIDE METAL-ORGANIC FRAMEWORKS CONTAINING DICARBOXYLIC ACID LIGANDS

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Abstract

Metal-Organic Frameworks (Ln-MOFs) are compounds that contain lanthanide metal ions or clusters coordinated to organic ligands. Ln-MOFs have been reported to have diverse architectures due to their high coordination numbers and the large ionic radii of the cations, potentially creating the possibilities of various coordination environments around the central metal ions. Ln-MOFs combine the advantages of MOFs and the intrinsic spectroscopic properties of lanthanides, such as a large Stokes shift, a long fluorescence lifetime, and a wide emission range. Their luminescent properties have been extensively studied and applied in many applications including as chemical and luminescent sensors. In this work, four lanthanide-based Metal Organic Frameworks La(III)-MOFs, Ce(III)-MOFs, Pr(III)-MOFs, and Nd(III)-MOFs were synthesised using mixed dicarboxylic acid ligands, terephthalic acid (H_2BDC) and 4,4-oxybis (benzoic acid) (H_2OBA) with dimethyl formamide (DMF) as the solvent. These MOFs were successfully synthesised using a solvothermal method for 72 hours at 150 °C by varying the molar ratio of metal to ligand. MOFs assembled from La(III), Ce(III), Pr(III), Nd(III), H_2BDC and H_2OBA, were named Ce-112 (**9**), La-112 (**10**), Pr-112 (**11**) and Nd-112 (**12**). These MOFs were characterised to obtain information on their structure using Fourier Transform Infrared Spectrophotometer (FT-IR) Analysis, Powder X-ray Diffraction (PXRD) Analysis, Thermogravimetric Analysis (TGA), Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES) Analysis, Scanning Electron Microscopy (SEM) Analysis, and Single-crystal X-ray Diffraction (SXRD). Peaks below 10° present in the PXRD analysis indicated the formation of the large lattice unit of the frameworks. TGA analysis indicated that these compounds **9-12** had excellent thermal stability where all of them decomposed at above 700 °C. The SEM images indicated needle-shaped crystals for all four compounds. The SXRD analysis data revealed that compound **9** crystallized in a monoclinic crystal system with a space group space of $P2_1/n$ while compounds **10-12** crystallized in an orthorhombic crystal system with a space group of I_2/a. The luminescent properties of these MOFs are currently being investigated.

Keywords: Metal-Organic Frameworks, Lanthanide metals, Single-crystal X-ray diffraction analysis

PC01 CATALYSIS

REDUCED TiO_2 MODIFIED POLY (ETHER SULFONE) FILM: A NEW STRATEGY FOR PHOTOCATALYST IMMOBILIZATION

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Abstract

Reported here is a method to synthesize reduced TiO_2 ($rTiO_2$) by simple thermal reduction with $NaBH_4$ before immobilized into poly (ether sulfone) (PES) polymer film via immersion precipitation. The combination of reduced TiO_2 with PES showed better photoactivity in degrading methyl orange dye with long-term stability under visible light irradiation. The absorption of visible light by the interstitial site of reduced TiO_2 was enhanced due to the presence of Ti^{3+} species or oxygen vacancies which acted as electron acceptors facilitating the charge carrier transfer. The addition of $rTiO_2$ could endow the film photocatalyst with excellent hydrophilicity, increasing its interfacial contact with the pollutant in water. The kinetic study of the best film photocatalyst (PES-13 wt% $rTiO_2$) was improved with complete removal in acidic condition, and full recovery of the film photocatalyst is sustained over five cycles without itself being subjected to any regeneration process.

Keywords: Reduced TiO_2, Poly (ether sulfone), Photocatalyst, Immobilization

PC02 CATALYSIS

GLYCEROL ETHERIFICATION FOR PRODUCTION OF FUEL ADDITIVE USING ACTIVATED BENTONITE CATALYST

(Tindak balas eterifikasi gliserol untuk penghasilan bahan tambah bahan api menggunakan pemangkin bentonit teraktif)

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Abstract

Glycerol is a by-product from transesterification of vegetable oil and alcohol for biodiesel production. In order to utilize the excess glycerol, it was converted to a value-added chemical. In this study, glycerol was reacted with *tert*-butyl alcohol (TBA) to produce fuel additives, which are mono-*tert*-butyl glycerol ethers (MTBGs), di-*tert*-butyl glycerol ethers (DTBGs) and tri-*tert*-butyl glycerol ether (TTBG) using acid-activated bentonite as the solid acid catalyst. Higher ethers (DTBGs and TTBG) are preferred due to lower affinity to water and good solublity in biofuel. Acid activated bentonite catalysts were prepared using various of mineral acid (H_2SO_4, HNO_3, HCl) and p-toluenesulfonic acid by impregnation method. The prepared catalysts were tested in glycerol etherification. The reaction was conducted at inert atmosphere for 6 hours at 70°C, mol ratio TBA to glycerol of 4:1 and 5wt% catalyst loading .The glycerol *tert*-butyl ether was analyzed using GC-FID with HP-INNOWAx column (30m,0.32mm,0.5um) under the following temperature program: the initial column temperature was 45°C (for 3 min), the temperature was then increased at 5°C/min to 240°C and at 240°C for 3 min isothermally. The prepared catalysts were also characterized using BET and TPD-NH3. The result showed hydrochloric acid treated bentonite (B-HCl) is the best catalyst system as it produced relatively high amount of higher ethers (desired products), which is 94% and the best in conversion of glycerol, which is 52%. BET surface area of B-HCl increases from 80.51 m^2g^{-1} to 202.93 m^2g^{-1} due to cation interchange of H^+ from the hydrochloric acid into the structure of bentonite smectite. The acid amount of B-HCl is 3.10 mmol H^+/ g compared to 0.80 mmol H^+/ g for untreated bentonite. The improvement of acidity and surface area leads to a better performance of B-HCl catalyst in glycerol etherification.

Keywords: solid acid bentonite catalyst, glycerol etherification, glycerol *tert*-butyl ethers, fuel additive

PC03 CATALYSIS

ELECTROBIOSYNTHESIS OF NiO USING RAMBUTAN LEAVES FOR PHOTODEGRADATION OF REMAZOL BRILLIANT BLUE DYE

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Abstract

A NiO catalyst was prepared through electrochemical method with rambutan (*Nephelium lappaceum*) leaves as an electrolyte. The effect of the preparation methods on the physical properties of the catalyst were studied via FTIR. The interaction between nickel species and bio-active compounds of rambutan leaves crude during the electrochemical was found to affect the NiO structure. An amount of 3.0 g L^{-1} of NiO was found to be optimum dosage for 10 mg L^{-1} of Remazol Brilliant Blue (RBB) dye, which resulted in 83.7% of maximum degradation after 1 h of contact time at pH 3 under fluorescent light. This study showed that the kinetics follow a pseudo-first order Langmuir–Hinshelwood model with calculated value of K_r and K_{LH} were 1.38 mg L^{-1} h^{-1} and 0.03 L mg^{-1}, respectively. Measurements of the mineralization of RBB by COD and BOD_5 analysis were 66.6% and 73.4%, respectively, before and after reaction. Therefore, the effectiveness of synthesis NiO by electrobiosynthesis method was established and confirmed through this studies. The synthesized NiO has a great potential as a photocatalyst in photocatalytic reaction for wastewater treatment.

Keywords: Electrobiosynthesis, NiO, RBB dye, degradation, light irradiation

PC04 CATALYSIS

PHOTODEGRADATION OF PHENOL AND METHYL ORANGE USING *t*-EGZrO$_2$ NANOPARTICLES CATALYST

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Abstract

A facile one–pot electrosynthesis method of *t*-EGZrO$_2$ nanoparticles catalyst was studied. The catalyst were characterized using Fourier transform infrared (FTIR), X-ray diffraction (XRD), transmission electron microscopy (TEM), Brunauer-Emmett-Teller (BET), and ultraviolet–visible diffuse reflectance spectroscopy (UV–vis DRS). A 10 mg L^{-1} phenol was nearly complete degraded (97.1%) when using 0.4 g L^{-1} of *t*-EGZrO$_2$ catalyst at pH 9 under light irradiation; while a 10 mg L^{-1} methyl orange was completely degraded (~100%) when using 0.4 g L^{-1} of *t*-EGZrO$_2$ catalyst at pH 3 under light irradiation. The degradation followed pseudo first–order kinetic rationalized Langmuir–Hinshelwood model. An excellent activity towards degradation of phenol and methyl orange promises the catalyst to be used in textile industry wastewater treatment and also other applications.

Keywords: Electrosynthesis, *t*-EGZrO$_2$, phenol, methyl orange, degradation, light irradiation

PC05 CATALYSIS

ELECTROSYNTHESIS OF SILVER OXIDE DEPOSITED ONTO HOTSPRING MUD WITH ENHANCED DEGRADATION OF CONGO RED

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Abstract

AgO-supported hotspring mud (AgO-HSM) catalyst was prepared by introducing AgO onto HSM support through electrochemical method. The effect of the preparation methods on the physical properties of the catalyst were studied. The interaction between silver species and HSM during the electrochemical was found to affect the AgO-HSM structure. An amount of 0.2 g L^{-1} of 11 wt% AgO-HSM was found to be the optimum dosage for 10 mg L^{-1} Congo red (CR), which resulted in 98.2% of maximum degradation after 2 h of contact time at pH 5 under fluorescent light. This study showed that the kinetics follow a pseudo-first order Langmuir–Hinshelwood model with calculated value of K_r and K_{LH} were 172.41 mg L^{-1} h^{-1} and 0.005 L mg^{-1}, respectively. Measurements of the mineralization of CR by COD and BOD_5 analysis were 38.4% and 61.1%, respectively, before and after reaction. Therefore, AgO-HSM could be a promising catalyst for the degradation of various dyes in wastewater.

Keywords: AgO-HSM, electrochemical, degradation, Congo red, light irradiation

AN OPTICAL SENSOR BASED ON GRAPHENE QUANTUM DOTS FOR HYDROGEN PEROXIDE DETECTION

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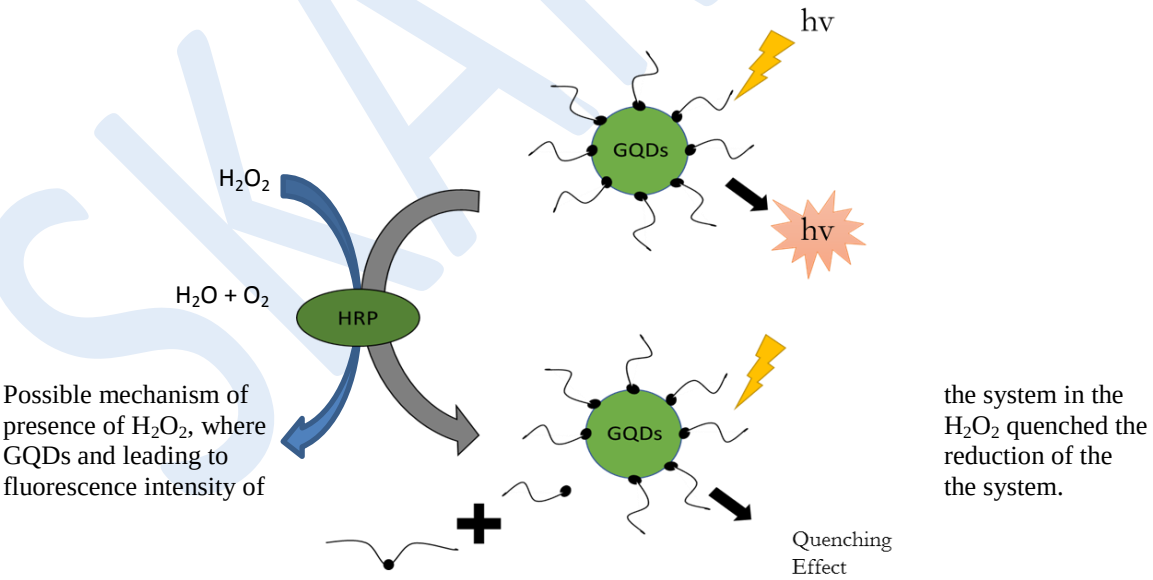
Abstract

Graphene quantum dots (GQDs) is a zero-dimensional material of the carbon family and considered as a small cutting fragment from graphene sheet. It has unique electronic and optical properties due to electron confinement in the finite size of graphene cluster that leads to the opening of energy gap and quantization of electronic energy. In this study, biosensing based on GQDs in combination with enzyme (horseradish peroxidase, HRP) for the determination of hydrogen peroxide (H_2O_2) has been presented. The GQDs was used as an indicator reveal the fluorescence property of the system based on fluorescence quenching of GQDs which is induced from the enzymatic reaction. The presence of H_2O_2 quenches the fluorescence intensity of GQDs system which is proportional to the concentration of H_2O_2. Parameter optimization such as response time, enzyme concentrations, pH of buffer have been investigated. For linear calibration graph, it showed a linear dependence on the H_2O_2 concentration ranging from 0.1 mM to 1.0 μM with the detection limit of 0.1 μM.

Keywords: Quantum dots, fluorescence, hydrogen peroxide, quenching, sensor



Possible mechanism of the system in the presence of H_2O_2, where H_2O_2 quenched the GQDs and leading to reduction of the fluorescence intensity of the system.

PREPARATION AND CHARACTERIZATION OF INCLUSION COMPLEXES BETWEEN PIOGLITAZONE AND NATIVE β-CYCLODEXTRIN AND β-CYCLODEXTRIN FUNCTIONALIZED IONIC LIQUID

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Abstract

The complexes of pioglitazone with β-cyclodextrin (β-CD) and β-CD functionalized ionic liquid (IL) were prepared by kneading method. Characterization of products by Fourier Transform Infrared (FTIR) spectrometer and Thermogravimetric Analysis (TGA) had proven the formation of the complexes of β-CD/pioglitazone and β-CD-IL/pioglitazone. The interactions of β-CD and β-CD-IL with pioglitazone was analyzed by ^{1}H Nuclear Magnetic Resonance (^{1}H NMR) and Ultraviolet-visible spectroscopy (UV-VIS). The interaction of pioglitazone was occurred in the hydrophobic cavity of native β-CD. However, the interaction of pioglitazone was appeared at external cavity of β-CD-IL. The formation constants of complexes at different pH were calculated using a modified Benesi-Hildebrand equation. The stoichiometry ratio was also determined to be 1:1 for the both complexes of β-CD and β-CD-IL with pioglitazone.

Keywords: β-cyclodextrin, pioglitazone, kneading, ionic liquid, hydrophobic cavity

EXCIPIENTS SELECTION AS AEROSOLIZED NANOCOLLOIDAL CARRIER SYSTEM LOADED QUERCETIN FOR PULMONARY DELIVERY OF LUNG CANCER

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Abstract

Globally, lung cancer has become the most common type of cancer cases. Quercetin (QT) has been extensively investigated for its pharmacological effects on lung cancer. However, clinical applications of QT are limited due to poor solubility and low stability in aqueous medium. Hence, this study focused on the development of nanocolloidal carrier system to enhance the solubility of QT by pulmonary administration. The screening of oils and surfactants as the excipients in the formulation were investigated as it is important to obtain stable formulation. The solubility of drug in the oil phase and emulsification test was taken as criteria for selection of oils and surfactants. Palm oil esters with ricinoleic acid (ratio 1:1 wt./wt.) and Tween 80 gave the highest solubilizing effect of QT and smallest droplet size. Oil in water nanoemulsion system loaded with QT was prepared by high energy emulsification method. The formulation was stable against phase separation test and characterization of Zetasizer analysis showed the droplet size, polydispersity index and zeta potential were 131.5 ± 1.70 nm, 0.258 ± 0.004 and -51.9 ± 0.86 mV, respectively. Aerosols performance analysis demonstrated the volume median diameter was 4.644 ± 0.09 µm, Span value of 1.32 ± 0.06 and fine particle fraction (< 5 µm) of 62.87 ± 0.83 %. These results suggest that the nanocolloidal formulation containing QT could be successful carrier system for pulmonary drug delivery application.

Keywords: Palm oil ester, nanoemulsion, quercetin, aerosols pulmonary delivery

MODELLING INHIBITION BY ROSMARINIC ACID ON PORCINE PANCREATIC LIPASE

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Abstract

An enzyme known as pancreatic lipase is responsible for the gastrointestinal absorption of fats. The inhibition of the enzyme is one of the widest studied methods used to determine the potential activity of natural products to inhibit dietary fat absorption. This inhibition by using natural products can be one of an excellent strategy to prevent and treat obesity. In this study, rosmarinic acid (RA), an ester of caffeic acid and 3,4-dihydroxyphenyllactic acid which is mainly found in *Boraginaceae* and *Lamiaceae* plant species was studied as the potential enzyme inhibitor. The purpose of this research is to model the inhibition of RA on a porcine pancreatic lipase (PPL). The effect of inhibition was determined by comparing the structural properties and intermolecular interactions at the active site of PPL with and without the presence of RA. Firstly, molecular dynamics (MD) simulation was performed on PPL in water. Then, the final PPL conformation was docked with RA molecule. The most stable conformation from the molecular docking was chosen based on the binding energy at the active site of PPL. This was followed by aqueous MD simulation on the docked compound. The result from MD simulation of PPL and docked compound of PPL and RA was compared in term of their stability and flexibility. Root mean square deviation and root mean square fluctuation of PPL-RA has lower value compared to the free PPL. The structure of PPL-RA in water showed higher stability and lower flexibility as compared to PPL in water. The results indicated that inhibition of PPL by RA did not induce major conformational changes towards the enzyme.

Keywords: pancreatic lipase; rosmarinic acid; molecular docking; molecular dynamics, enzyme inhibition

PNP01 NATURAL PRODUCT ANALYSIS

ANTIBACTERIAL AND ANTIOXIDANT ACTIVITIES OF EXTRACTS FROM *CALOPHYLLUM FERRUGINEUM* AND *CALOPHYLLUM INCRASSATUM*

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Abstract

Calophyllum is a pan-tropical genus belongs to the Guttiferae family and locally known in Malaysia as '*bintangor*'. There has been a continual interest to further investigate the phytochemistry of *Calophyllum sp* since this genus is a rich source of active secondary metabolites which showed anti-HIV, cytotoxicity and antimicrobial properties. In this study, antibacterial and antioxidant activities of barks and leaves of *C. ferrugineum* and *C. incrassatum* were investigated. Cold extraction method employing dichloromethane, ethyl acetate and methanol as solvent was performed. All extracts were tested for their total phenolic content and antioxidant activities by DPPH radical scavenging and Ferric Reducing Antioxidant Power (FRAP) assays. The methanol extract from the leaves of *C. ferrugineum* showed the highest TPC value at 122.08 mg GAE/g and the lowest DPPH SC_{50} value at 11.80 µg/mL. The methanol extract from the barks of *C. ferrugineum* was found to have the highest FRAP value among all extracts. The antibacterial activity of all extracts was tested by minimum inhibition concentration (MIC) test against *Bacillus subtilis, Staphylococcus aureus, Escheria coli* and *Pseudomonas aeruginosa*. Only the dichloromethane extract from bark of *C. ferrugineum* showed moderate MIC value against Gram positive bacteria, *B. subtilis* and *S. aureus* at 125 µg/mL.

Keywords: *Calophyllum, C. ferrugineum, C. incrassatum*, antioxidant, antibacterial, Guttiferae

PHYTOCHEMICAL SCREENING AND ANTIOXIDANT ACTIVITY OF *PSIDIUM GUAJAVA*

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Abstract

Psidium guajava or commonly known as guava is useful to treat gastroenteritis, dysentery, stomach pain and indigestion. The leaves of *P. guajava* was screened for phytochemical and antioxidant activity. The phytochemicals were extracted by sequential maceration using *n*-hexane, chloroform and methanol, while phytochemical screening was performed using various chemical tests. Antioxidant activity was assessed by 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. Steroids and terpenoids were present in the *n*-hexane extract, while phenols and terpenoids were detected in the chloroform extract. The methanol extract was found to contain flavonoids, steroids, saponins, phenols and terpenoids. Among the tested extracts, the methanolic extract demonstrated strong DPPH radical scavenging activity with an IC_{50} value of 51.07 µg/mL.

Keywords: *Psidium guajava*, phytochemical screening, antioxidant

PNP03 NATURAL PRODUCT ANALYSIS

COMPARISON OF EXTRACTION TECHNIQUES FOR THREE *CALOPHYLLUM* SPECIES AND THEIR ANTIOXIDANT ACTIVITY

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Abstract

Calophyllum is a pan-tropical genus belongs to the Guttiferae family and locally known in Malaysia as '*bintangor*'. There has been a continual interest to further investigate the phytochemistry of *Calophyllum sp* since this genus is a rich source of active secondary metabolites which showed anti-HIV, cytotoxicity and antimicrobial properties. This study was conducted to investigate the effect of extraction techniques on the phytochemicals content and antioxidant activity of the barks, leaves and heartwood extracts of three *Calophyllum* species, *C. incrassatum*, *C. rubiginosum* and *C. canum*. Soxhlet and maceration extraction techniques by using methanol as solvent were chosen in this study. Maceration extraction technique produced higher percentage yield compared to Soxhlet extraction for leaves and barks of the three *Calophyllum* species. Highest percentage yield was obtained from bark extract of *C. canum* (21.76%) followed by bark extract of *C. rubiginosum* (20.24%) and leaves extract of *C. rubiginosum* (19.34%). Meanwhile, Soxhlet extraction technique gave higher percentage yield compared to maceration technique for heartwood extracts of all samples. The phytochemical screening test revealed all the extracts contain tannin, phenol, flavonoid, terpenes, cardiac glycoside, coumarin and phytosterol. The antioxidant activity of all extracts was tested by determining the Total Phenolic Content and DPPH radical scavenging activity. The highest Total Phenolic Content was obtained from Soxhlet extraction technique. The bark extract of *C. canum* displayed the highest phenolic content (461.90 mg GAE/g) followed by bark extract of *C. incrassatum* (394.52 mg GAE/g) and leave extract of *C. incrassatum* (227.89 mg GAE/g). Meanwhile, the extracts from Soxhlet extraction technique gave higher antioxidant activity compared to maceration extraction. The bark extract of *C. canum* showed the lowest IC_{50} value (3.07 µg/mL) followed by bark extract of *C. incrassatum* (5.12 µg/mL) and leave extract of *C. incrassatum* (5.93 µg/mL). Pearson's correlation test showed positive correlation between Total Phenolic Content and DPPH radical scavenging activity.

Keywords: *Calophyllum, C. incrassatum*, *C. rubiginosum C. canum* antioxidant, Guttiferae

FORMULATION AND EVALUATION OF PVA/PEG PEEL-OFF MASK CONTAINING RICH FRACTION OF *CENTELLA ASIATICA* AND *CUCUMIS SATIVUS* EXTRACT FOR ANTI-AGEING

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Abstract

Premature ageing can be seen through the formation of wrinkles and altered pigmentation earlier than it should be. Due to premature ageing and high demand for a mask that can dry faster with easy application, peel-off mask can be used to solve the problems due to its ability to remove dead skin cells and able to treat premature ageing with the addition of active ingredients. Generally, peel-off mask is a gel that is thinly applied on face and can be peeled off as thin film from the face. In this research, the benefits of peel-off mask will be enhanced with the addition of rich fraction of *Centella asiatica* (asiaticoside) and *Cucumis sativus* extract due to their antioxidant properties and collagen-synthesis inducer. Thus, the objectives of this research are to formulate peel-off mask containing rich fraction of *C. asiatica* and *C. sativus* extract and to evaluate the physicochemical properties of peel-off mask formulation. In orderto identify the best formulation, screening test was conducted by using different concentration of chemical ingredients to obtain the desired properties of peel-off mask formulation. The modified formulation was made up of 20 % of polyvinyl alcohol (PVA) with some additional ingredients which are polyethylene glycol (PEG), glycerine, propylene glycol, ethanol, parabens, citric acid, rich fraction of *C. asiatica* and *C. sativus* extract. The physicochemical properties of this peel-off mask formulation were found to be affected by its storage temperature. Generally, all formulations remained colourless with slight PVA odour. Besides that, they were homogenous with no visible coarse grains. The ranges of spreadability were between 0.47 and 0.77 cm, and they have low drying time which was about five min. The pH values fall within skin pH, which were between 5.74 and 6.19, with viscosity ranges between 0.16 and 0.32 kP. Surface morphology of dried films was affected by the spreadability of the gel, where formulation with ideal spreadability produced smooth surface. Lastly, this formulation was found to be stable against mold and fungi, but not against bacteria. To conclude, peel-off mask made up of 20 % of PVA with rich fraction of *C. asiatica* and *C. sativus* extract has good physicochemical properties with good stability at low (8 ± 3 °C) and room temperature (24 ± 3 °C).

Keywords: *Centella asiatica*, *Cucumis sativus*, peel-off mask, polyvinyl alcohol, polyethylene glycol, ageing

PRN01 RADIOCHEMISTRY AND NUCLEAR SCIENCES

CUMENE HYDROPEROXIDE AS A CO-SENSITIZER IN THE PREPARATION OF PREVULCANIZED NATURAL RUBBER LATEX VIA COMBINATION OF GAMMA RADIATION AND PEROXIDE VULCANIZATIONS

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Abstract

In order to improve the viscoelastic property of the Radiation Vulcanization of Natural Rubber Latex (RVNRL), an attempt has been made onto the processing method by combining both radiation and peroxide vulcanizations. In this study, hexanediol diacrylate (HDDA) played a major role as a sensitizer during the gamma radiation vulcanization and cumene hydroperoxide (CHPO) with an aromatic molecular structure acted as the co-sensitizer in the peroxide vulcanization. The vulcanized natural rubber latex film via hybrid radiation and peroxide vulcanization has tensile strength of 26.6 MPa, an increment of more than 16 % compared to controlled film (22.7 MPa). Besides, the crosslink percentage of the rubber film achieved 6.5 % increment from 90.7 % to 96.6 %. The utilization of HDDA and CHPO during the hybrid vulcanization process was analysed using Fourier transform infrared (FTIR) spectroscopy. The FTIR spectrum confirmed the absence of functional groups such as C=C, C-O and C=O from HDDA and CHPO in the hybrid RVNRL-peroxide samples. It is predicted that all the compounds are fully utilized during the radiation vulcanization.

Keywords: vulcanization, gamma radiation, peroxide, latex, RVNRL

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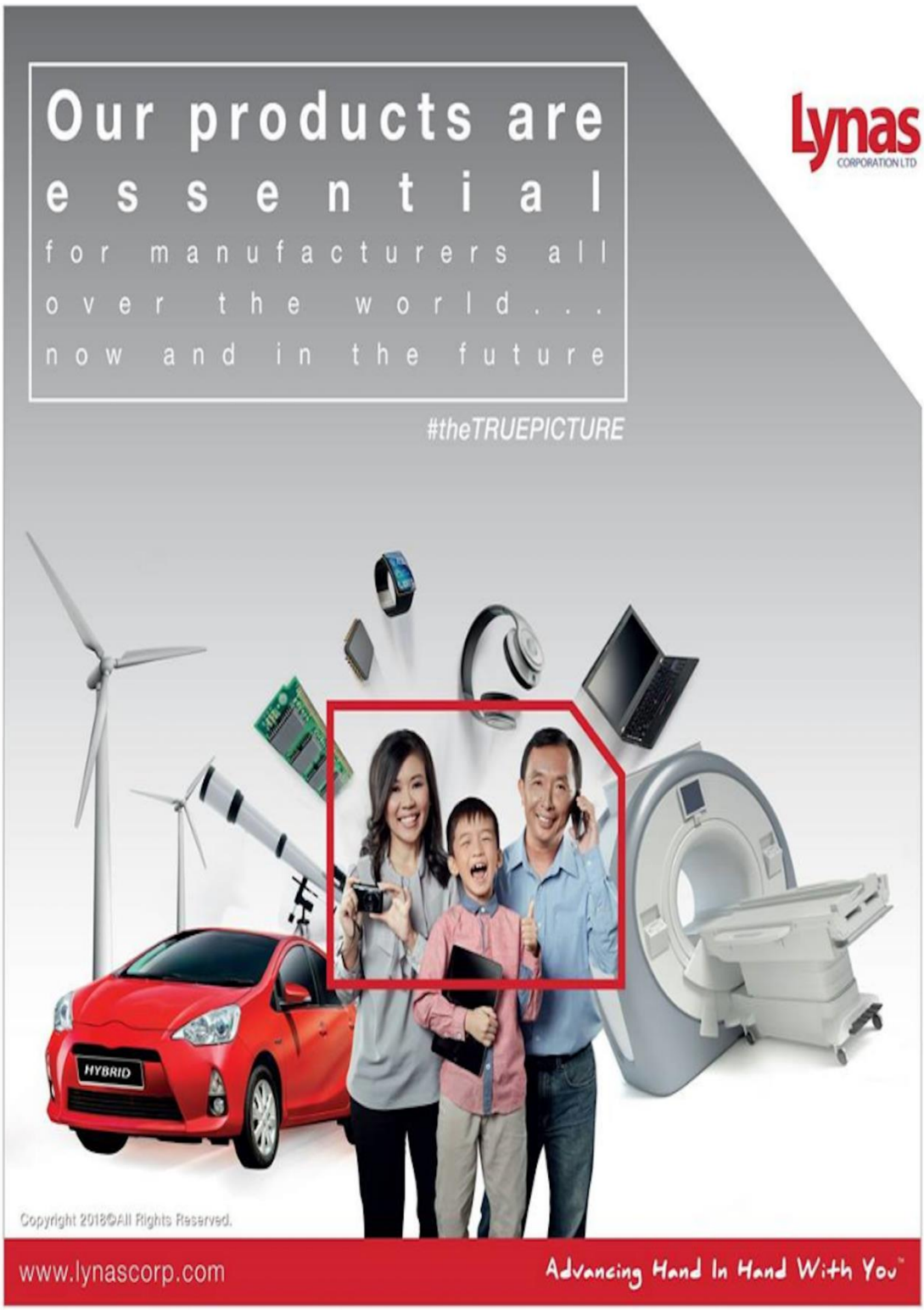
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