

# International Symposium

6-7 February 2019

**TECHNOLOGIES & MATERIALS  
FOR RENEWABLE ENERGY  
ENVIRONMENT & SUSTAINABILITY**



**DEPARTMENT OF CHEMISTRY  
University Of Agriculture  
Faisalabad - Pakistan**



**DEPARTMENT OF CHEMISTRY @ UAF**

The Department of Chemistry, University of Agriculture Faisalabad, was established in 1973 and renamed as Department of Chemistry and Biochemistry in 2008. It was bifurcated into two independent departments in September 2014: Department of Chemistry and Department of Biochemistry. The Department of Chemistry is catering the academic and research needs of local and national population and awarding M.Sc., M.Phil. and Ph.D. degrees. The department is one of the largest postgraduate departments of the University having highly qualified faculty. The department provides an ideal environment for students in almost all areas of contemporary chemistry. Specializations in Physical, Organic, Inorganic & Analytical Chemistry are offered at M.Sc, M.Phil & Ph.D. levels. The department conducts morning and evening shifts at M.Sc & M.Phil levels with a total strength of more than 800 students. Postgraduate programs at M.Phil and Ph.D. include both extensive course work and completion of a research projects. The department offers outstanding opportunities for advanced training and research in Chemistry. The postgraduate programs in the department are designed to prepare students to develop creative and innovative scientific aptitude. The undergraduate and postgraduate curricula are devised to meet the challenges of new advances in the field. Wide range of courses is offered by the department in each semester. Supporting courses are also taken from other departments according to individual research requirements. Oral presentations, seminars, quiz tests and assignments are given to the students throughout the degree programs. To achieve the objective of capability, and to inculcate concept building aptitude in the students, academic groups are formulated amongst them. The goal of the program is to prepare young scientists for the knowledge based society of the 21st century.

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**DEPARTMENT OF CHEMISTRY @ UAF**

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International Symposium on Technologies and Materials  
for Renewable Energy, Environment and Sustainability  
(6-7<sup>th</sup> February 2019)

Organized by: Department of Chemistry, University of  
Agriculture Faisalabad, Pakistan

Funded by: Endowment Fund Secretariat, University of  
Agriculture Faisalabad, Pakistan

**SYMPOSIUM PROGRAM SUMMARY**

<b>DAY 1 (06-02-2019)</b>		
9:00 – 9:30 am	Registration	<b>Iqbal Auditorium UAF</b>
9:30 - 10:30 am	<b>Inauguration</b>	
<b>10:30 – 11:00 am</b>	<b>Tea Break</b>	
<b>Plenary Lectures (1100 – 1:00 pm) Iqbal Auditorium</b>		
<b>1:00 – 2:00 pm</b>	<b>Prayer/Lunch Break</b>	<b>D- Ground UAF</b>
TRACK I (Iqbal Auditorium UAF) (2:00-5:00 pm) Technologies and Materials for Renewable Energy		
<b>TRACK II (New Senate Hall UAF) (2:00-5:45 pm)</b> Environment and Sustainability		
<b>TRACK III (DLC-II UAF) (2:00-5:45 pm)</b> Chemistry, Chemical Industry and Natural Resources		
<b>BREAK (5:00-6:30 PM)</b>		
<b>6:30 – 8:00 pm</b>	<b>Cultural Show (Iqbal Auditorium UAF)</b>	
<b>8:00 – 10:30 pm</b>	<b>Dinner/Musical night (D-Ground UAF)</b>	
<b>DAY 2 (07-02-2019)</b>		
Plenary Lectures (9:00-11:00 am) Iqbal Auditorium, UAF		
<b>Tea Break (11:00-11:20 am)</b>		
<b>TRACK I (11:20-12:35 pm) Iqbal Auditorium UAF)</b> Technologies and Materials for Renewable Energy		
<b>TRACK II (11:20-12:35 pm) New Senate Hall UAF)</b> Environment and Sustainability		
<b>TRACK III (11:20-12:35 pm) DLC-III UAF)</b> Chemistry, Chemical Industry and Natural Resources		
12:35 – 12:50pm	<b>Poster Competition (Iqbal Auditorium/Expo Centre UAF)</b>	
1:00 – 2:00 pm	<b>Prayer/Lunch Break (D-Ground UAF)</b>	
<b>TRACK I (2:00-4:00 pm) Iqbal Auditorium UAF)</b> Technologies and Materials for Renewable Energy		
<b>TRACK II (2:00-4:00 pm) New Senate Hall UAF)</b> Environment and Sustainability		
<b>TRACK III (2:00-4:00 pm) DLC-III UAF)</b> Chemistry, Chemical Industry and Natural Resources		
<b>4:00 pm</b>	<b>Closing Ceremony (Iqbal Auditorium)</b>	

International Symposium on Technologies and Materials  
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**Department of Chemistry, University of Agriculture  
Faisalabad, Pakistan**

### **SYMPOSIUM PROGRAM**

<b>DAY 1 (06-02-2019)</b>		
9:00 – 9:30 am 9:30 – 10:30 am <b>10:30 – 11:00 am</b>	Registration <b>Inauguration</b> <b>Tea Break</b>	<b>Iqbal Auditorium</b> <b>UAF</b>
<b>Chair:</b> Prof. Dr. Hassan Mahmood Khan <b>Co-Chair:</b> Prof. Dr. Haq Nawaz Bhatti		
Plenary Lectures		
11:00 – 11:40 pm	Prof. Wan Azlina Wan Ab Karim Ghani Understanding biomass- environment- food-energy- water (BEFEW) nexus towards a sustainable bio- economy in Malaysia	
<b>11:40 – 12:20 pm</b>	<b>Prof. Dr. Ilkay Erdogan Orhan Gazi</b> Plant Biodiversity as Sustainable Source of New Drug Candidates and Phytotherapeutics	
11:40 – 12:20 pm	<b>Dr. M. Fawzi Mahomoodally</b> Sustainable drug development from bio resources: phases, perspectives and challenges	
<b>1:00 – 2:00 pm Prayer/Lunch Break D- Ground UAF</b>		
TRACK I (Iqbal Auditorium UAF) <b>Technologies and Materials for Renewable Energy</b>		
<b>Chair:</b> Prof. Dr. Tapas Malick, <b>Co -Chair:</b> Dr. Umer Rashid <b>Hall management:</b> Dr. Raziya Nadeem and Dr. Muhammad Zahid		

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Keynote Lecture	
2:00 – 2:30 pm	<b>Dr. Asif Ali Tahir</b> Design and Development Nanoarchitected Semiconductor Materials for Efficient Solar Energy Conversion to Solar Fuel
2:30 – 3:00 pm	<b>Dr. Zulfiqar Ahmad Rehan</b> Membrane technology: A sustainable solution to future drinking water needs
Oral Presentations	
3:00 – 3:15 pm	Development of simultaneous transesterification process for fatty acid methyl esters production by Shafaq Nisar
3:00 – 3:30 pm	<b>Tea Break</b>
3:30 – 3:45 pm	Renewable Energy: Biodiesel production by organometallic complex and nanometal oxide catalysts and spectroscopic, chromatographic characterization <i>by Dr Muhammad Tariq</i>
3:45 – 4:00 pm	Biofuels from catalytic pyrolysis of nut-shell waste by using superparamagnetic iron oxide nanoparticles (spion) <i>by Dr Muhammad Imran Din</i>
4:00 – 4:15 pm	Functionalized Polymeric Membranes as Affinity Matrix for Adsorptive Desulfurization of Thiophenes <i>by Dr. Adnan Mujahid</i>
4:15 – 4:30 pm	Zinc-Magnesium biometallic nanoparticles: Synthesis, characterization and catalytical application <i>by Humayun Rasheed</i>
4:30 – 4:45 pm	Non-fullerenes accepters for organic solar cell <i>by Muhammad Ans Bhatti</i>
4:45 – 5:00 pm	Synthesis and characterization of Ag@Mn <sub>x</sub> O <sub>y</sub> and evaluation of its photocatalytic activities for degradation of Rhodamine B dye in aqueous medium By Dr. Muhammad Saeed

## TMREES – 2019, 6-7<sup>th</sup> February

<b>TRACK II (New Senate Hall UAF) DAY 1 (06-02-2019)</b> Environment and Sustainability	
<b>Chair:</b> Prof. Dr. Tahira Iqbal <b>Co -Chair:</b> Prof. Dr. Amer Jamil <b>Hall management:</b> Dr. Muhammad Abid Rashid and Dr. Nazish Jahan	
<b>Keynote Lectures</b>	
2:00 – 2:30 pm	<b>Prof. Dr. Hassan Mahmood Khan</b> Pesticides and Persistent Organic Pollutants (Pops) Removal from Water by Advance Oxidation Processes (Aops)
2:30 – 3:00 pm	<b>Dr. Abdullah Ijaz Hussain</b> Geographical and seasonal variations in the chemical profile and biological activities of Lamiaceae essential oils
<b>Oral Presentations</b>	
3:00 – 3:15 pm	Synthesis, Characterization and Photocatalytic Applications of poly (Acrylic Acid) Microgel and its Composite with Cu-Doped ZnO Nanoparticles <i>by Muhammad Fayyaz</i>
3:15 – 3:30 pm	Investigation of Cadmium (II) Adsorption from aqueous solutions of Cadmium-calcium chloride as function of chemical properties by Muhammad Jawad Ashraf
3:30 – 3:45 pm	Parasites as bio-indicators of environmental pollution <i>by Dr. Tean Zaheer</i>
<b>3:45 – 4:00 pm</b>	Eco-Friendly Silk Dyeing Using Anthraquinoid Natural Dye Isolated from Cochineal Insect ( <i>Dactylopius coccus</i> ) <i>by Dr. Fazal-ur-Rehman</i>

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4:00 – 4:15 pm	Dye removal from colored aqueous solution using indigenous adsorbents <i>by Muhammad Jahangeer</i>
4:15 – 4:30 pm	Production of Eco-friendly Slow Release Nano Fertilizers by <i>Marium Khaliq</i>
4:30 – 4:45 pm	Biological pesticides: A green approach towards control of Storage pests <i>by Naila Irum</i>
4:45 – 5:00 pm	An Efficient Fe/ZnO/Ceramic Layered Composite for Solar-Photocatalytic Degradation of Humic Substances from Municipal Wastewater <i>by Muhammad Mohsin</i>
5:00 – 5:15 pm	Green synthesis and biological evaluation of novel 5-fluorouracil derivatives <i>by Aisha Liaqat</i>
5:15 – 5:30 pm	The study of antioxidant and antimicrobial activity of crude extracts of <i>Cassia absus</i> and <i>Citrus medica</i> collected from Tehsil Burewala, Punjab, Pakistan <i>by Dr. Suryia Manzoor</i>
5:30 – 5:45 pm	Environmental and seasonal variations in phytochemicals: a case study by <i>Dr. Saima Naz</i>
5:45 – 6:00 pm	Synthesis of novel amido-amine functionalized alginate hydrogel beads for adsorptive remediation of Pb (II) from aqueous solution by <i>Dr. Ahsan Sharif</i>
<b>TRACK III (DLC-II UAF) DAY 1 (06-02-2019)</b> Chemistry, Chemical Industry and Natural Resources	
<b>Chair:</b> Prof. Dr. Khalil ur Rehman <b>Co-Chair:</b> Dr. Muhammad Shahid <b>Hall Management:</b> Dr. Muhammad Adnan Iqbal and Ms. Shanza Rauf Khan	
Keynote Lectures	
2:00 – 2:30 pm	<b>Prof. Dr. Jan Nisar</b> Pyrolysis of polypropylene over molecular sieve: Conversion into fuel oil
2:30 – 3:00 pm	<b>Dr. Majid Muneer</b> Degradation of the antibiotics by Advanced Oxidation Process
<b>Oral Presentations</b>	

## TMREES – 2019, 6-7<sup>th</sup> February

3:00 – 3:15 pm	Impact of salt stress and $\alpha$ -tocopherol application on physiology of pea ( <i>Pisum sativum</i> L.) by <i>Dr. Irfana Lalarukh</i>
3:15 – 3:30 pm	Removal of Halosulfuron Methyl Herbicide from Aqueous Media Using Neem Seeds: Kinetic, equilibrium and thermodynamic studies by <i>Dr. Atta ul Haq</i>
3:30 – 3:45 pm	Synthesis of Molybdenum, Tungsten Supported Calcium Oxide (MoW-CaO) And Its Role in Transesterification of Mustard Oil by <i>Dr. Muhammad Imran</i>
<b>3:45 – 4:00 pm</b>	Neat Synthesis of Bio-Active Copper (II) (Z)-N-(2-Amino-4-Methylphenyl)-N'-Phenylbenzamidine And Its Light-Driven Photo Catalytic Activity by <i>Dr. Muhammad Babar Taj</i>
4:00 – 4:15 pm	Transition Metal Nanocomposites for Phosphopeptides Enrichment from Complex Biological Fluids by <i>Batool Fatima</i>
4:15 – 4:30 pm	Sustainable textile; a need of the day to save environment by <i>Hammad Majeed</i>
4:30 – 4:45 pm	Fabrication of Ag/C3N4/CNTs Hybrid for Enhanced Hydrogen Generation Rate by Photocatalytic Water Splitting by <i>Tehmeena Ishaq</i>
4:45 – 5:00 pm	Synthesis of novel amido-amine functionalized alginate hydrogel beads for adsorptive remediation of Pb (II) from aqueous solution by <i>Rehana Bano</i>
5:00 – 5:15 pm	Nutritional and medicinal benefits of bioactive compounds extracted from Avocado pulp (Ceylon Blue) by <i>Dr. Fozia Anjum</i>
5:15 – 5:30 pm	Mitigation of hazardous effects of mercury pollution on wheat seedlings through <i>Trichoderma harzianum</i> seed coating treatment by <i>Maleeha Umber</i>
5:30 – 5:45 pm	Reduced graphene oxide and Ni hybrid as sustainable materials as filler for polymer composites with enriched electrical character by <i>Tajamal Hussain</i>
5:45 – 6:00 pm	Synergetic effect and kinetics study of co-pyrolysis of sugarcane bagasse and sewage sludge by <i>Dr. Salman Raza Naqvi</i>
<b>6:30 – 8:00 pm</b>	<b>Cultural Show (Iqbal Auditorium UAF)</b>
<b>8:00 – 10:30 pm</b>	<b>Dinner/Musical night (D-Ground UAF)</b>
<b>DAY 2 (07-02-2019)</b>	



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Plenary Lectures (Iqbal Auditorium, UAF)	
<b>Chair:</b> Prof. Dr. Farah Kanwal, <b>Co-Chair:</b> Prof. Dr. Ijaz Ahmad Bhatti	
9:00 – 9:40 am	<b>Prof. Dr. Tapas Mallick</b> Recent Development of Photovoltaic Technologies
9: 40 – 10:20 am	<b>Prof. Dr. Lamia Hamrouni</b> Physicochemical Properties and Antioxidant Activity of mesquite (Prosopis) from different Areas in Tunisia
10:20 – 11:00am	<b>Prof. Dr. Farooq Anwar</b> Exploration of under-utilized natural resources for biofuels: Opportunities and Challenges
<b>Tea Break (11:00-11:20 am)</b>	
<b>TRACK I (Iqbal Auditorium UAF) DAY 2 (07-02-2019)</b> Technologies and Materials for Renewable Energy	
<b>Chair:</b> Dr. Anjum Munir <b>Co-Chair:</b> Dr. Abdul Ghaffar <b>Hall management:</b> Dr. Raziya Nadeem and Dr. Muhammad Zahid	
<b>Keynote Lectures</b>	
11:20 – 11:50 pm	<b>Dr. Asma El Zerey-Belaskri</b> Assessment of a new alternative feedstock for a biofuel production from Pistacia species: potential opportunities and perspectives
11:50 – 12:20 pm	<b>Dr. Murtaza Sayed</b> Photocatalytic degradation of benzafibrate using exposed {001} facets TiO <sub>2</sub> thin film
<b>Oral Presentations</b>	
12:20 – 12:35pm	Ultrafine CaCO <sub>3</sub> Powder as Anti-wear Additive in Commercial Lubricating Greases by <i>Saniya Khalida Akhtar</i>
12:35 – 1:00 pm	<b>Poster Competition</b> (Iqbal Auditorium/Expo Centre UAF)
1:00 – 2:00 pm	<b>Prayer/Lunch Break (D-Ground UAF)</b>
<b>Oral Presentations</b>	

## TMREES – 2019, 6-7<sup>th</sup> February

2:00 – 2:15 pm	Morphological studies of environmental friendly pressure sensitive adhesive by tapping mode atomic force microscopy (AFM) <i>by Nadia Akram</i>
2:15 – 2:30 pm	Synthesis and characterization of Ni-based uniform particles for electrochemical energy storage devices <i>by Muhammad Gul</i>
2:30 – 2:45 pm	Synthesis of biodiesel through photocatalytic process using Cu doped lime coated over metal sheet <i>by Sehrish Naz</i>
2:45 – 3:00 pm	Extraction of phytochemicals from Fagonia arabica and their antimicrobial activity <i>by Amatul Basit</i>
3:00 – 3:15 pm	Hydrothermal synthesis of fine stabilized superparamagnetic nano-particles of manganese ferrite and their application in photocatalytic degradation of methylene blue <i>by Sadia Ata</i>
3:15 – 3:30 pm	Ultrasonic assisted isolation of bio-colorant (tannin) from coconut husk and its application onto bio-mordanted wool fabric <i>by Shahid Adeel</i>
3:30 – 3:45 pm	Microbial-free water using titanium dioxide nanoparticles: A simple and low-cost approach <i>by Dr. Hafeez Anwar</i>
3:45 – 4:00 pm	<i>Pongamia pinnata</i> waste oil gold for green economy <i>by Farwa Nadeem</i>
4:00 pm	<b>Closing Ceremony (Iqbal Auditorium)</b>
<b>TRACK II (New Senate Hall UAF) DAY 2 (07-02-2019)</b> Environment and Sustainability	
Chair: Dr. Asma El Zerey-Belaskri Co-Chair: Dr. Muhammad Anjum Zia	
<b>Hall management:</b> Dr. Muhammad Abid Rashid and Dr. Nazish Jahan	
Keynote Lecture	
11:20 – 11:50pm	<b>Dr. Muhammad Zubair</b> Combustion: Sign of Air Pollution and Energy Inefficiency. Environmental Sustainability A Paradigm of Technical and Educational Resources
<b>Oral Presentations</b>	

**DEPARTMENT OF CHEMISTRY @ UAF**

11:50 – 12:05pm	Uptake of nitrogen and phosphorous from municipal wastewater for microalgae cultivation and wastewater treatment <i>by Munazza Maqbool</i>
12:05 – 12:20pm	Production of biodiesel from pongam tree seed oil by <i>Ayesha Mushtaq</i>
12:20 – 12:35pm	Bioassy based phytochemical analysis of <i>Nyctanthes arbar-tristis</i> in search of natural fungicides <i>by Syeda Mehvish Raza</i>
12:35 – 12:50pm	<b>Poster Competition (Iqbal Auditorium/Expo Centre UAF)</b>
12:50 – 2:00 pm	<b>Prayer/Lunch Break (D-Ground UAF)</b>
2:00 – 2:15 pm	Synthesis, characterization of Zinc oxide and its application for water purification <i>by Saher Muzaffar</i>
2:15 – 2:30 pm	Design of zigzag brick kiln to reduce air pollution <i>by Muhammad Farooq Anwar</i>
2:30 – 2:45 pm	Treatment of textile effluent by solar photocatalysis for irrigation <i>by Ambreen Ashar</i>
2:45 – 3:00 pm	Investigation of Cadmium (II) adsorption from aqueous solutions of Cadmium-calcium chloride on natural soils of various cities of Pakistan and isotherms <i>by Jawad Ashraf</i>
3:00 – 3:15 pm	Synergetic effect and kinetics study of co-pyrolysis of sugarcane bagasse and sewage sludge <i>by Zeeshan Hameed</i>
3:15 – 3:30 pm	Water purification by zirconia- Graphene hybrids <i>by Naila Fatima Zubair</i>
3:30 – 3:45 pm	Production of biodiesel from home grown <i>Spirogyra elongate</i> by Aasma Saeed
3:45 – 4:00 pm	Waste date seeds oil as a sustainable source of biodiesel production by Muhammad Waqar Azeem
<b>4:00 pm</b>	<b>Closing Ceremony (Iqbal Auditorium)</b>
<b>TRACK III (DLC-III UAF) DAY 2 (07-02-2019)</b> Chemistry, Chemical Industry and Natural Resources	
<b>Chair:</b> Prof. Lamia Hamrouni	
<b>Co-Chair:</b> Dr. Ahsan	
<b>Hall Management:</b>	

## TMREES – 2019, 6-7<sup>th</sup> February

Dr. Muhammad Adnan Iqbal and Ms. Shanza Rauf Khan	
<b>Keynote Lectures</b>	
11:20 – 12:00 pm	<b>Dr. Umer Rashid</b> Reusable Bio-based Catalyst for Biodiesel Production
12:00 – 12:30 pm	<b>Dr. Khalid Mehmood Zia</b> Environmental issues of polymer industry
12:30 – 1:15 pm	<b>Poster Competition (Iqbal Auditorium/Expo Centre UAF)</b>
1:15 – 2:00 pm	<b>Prayer/Lunch Break (D-Ground UAF)</b>
Keynote Lecture	
2:00 – 2:25 pm	<b>Dr. Muhammad Nadeem Zafar</b> Bioelectronics based on redox enzymes to produce electric energy
2:25 – 2:45 pm	<b>Dr. Muhammad Shahid</b> Antioxidant profiling and toxicological screening of different mushrooms samples collected from Muzaffarabad and Neelum districts of Azad Jammu and Kashmir
<b>Oral Presentations</b>	
2:45 – 3:00 pm	pH Sensitive Crosslinked Polymeric Material for Controlled Drug Delivery <i>by Dr. Farooq Azam</i>
3:00 – 3:15 pm	Solar Photocatalytic removal of natural organic matter using fluorinated calcium zincate grafted on gravel <i>by Tahseen Answer</i>
3:15 – 3:30 pm	Studies of the adsorption removal of Pb(II) and Cd(II) ions using 4-phenyl-3-thiosemicarbazide modified Ficus religiosa branches powder <i>by M. Salman</i>
3:30 – 3:45 pm	Development of magnetic chitosan bio sorbent beads for the removal of arsenic from water system <i>by Asif Ayub</i>
3:45 – 4:00 pm	The removal of nitrate and reactive yellow 145 dye from waste water by using wetland plant and activated carbon of Cassia fistula impregnated with copper by nanoparticles <i>by Fajar-un-Nisa</i>
4:00 pm	<b>Closing Ceremony (Iqbal Auditorium)</b>

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## DEPARTMENT OF CHEMISTRY @ UAF

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### Composition of Committees

#### Patron-in-Chief

Prof. Dr. Zafar Iqbal  
(Vice Chancellor, University of Agriculture, Faisalabad)

#### Chief Guest

Prof. Dr. Tariq Mahmood Ansari  
(Vice Chancellor, Bahauddin Zakariya University, Multan).

#### Patron

Prof. Dr. Muhammad Asghar  
(Dean Faculty of Sciences, University of Agriculture Faisalabad)

#### Principal Organizer

Prof. Dr. Ijaz Ahmad Bhatti  
(Chairman, Department of Chemistry, UAF)

#### Co-Organizer

Prof. Dr. Haq Nawaz Bhatti  
(Principal, PARS Community College, UAF)

#### Organizing Secretary

Dr. Muhammad Asif Hanif (Assistant Professor, Chemistry, UAF)  
Dr. Muhammad Zahid (Assistant Professor, Chemistry, UAF)

#### Organizing Committee

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(Chairman, Department of Chemistry, UAF)  
Prof. Dr. Haq Nawaz Bhatti  
(Principal, PARS Community College, UAF)  
Dr. Shaukat Ali (Assistant Professor, Chemistry, UAF)  
Dr. Adil Sarfraz (Assistant Professor, Chemistry, UAF)  
Dr. Bushra Sultana (Assistant Professor, Chemistry, UAF)  
Dr. Raziya Nadeem (Assistant Professor, Chemistry, UAF)  
Dr. Rasheed Ahmad Khera (Assistant Professor, Chemistry, UAF)  
Dr. Muhammad Zahid (Assistant Professor, Chemistry, UAF)  
Dr. Muhammad Abid Rashid (Assistant Professor, Chemistry, UAF)  
Dr. Muhammad Asif Hanif (Assistant Professor, Chemistry, UAF)  
Dr. Nazish Jahan (Assistant Professor, Chemistry, UAF)  
Dr. Javed Khattak (Assistant Professor, Chemistry, UAF)  
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Dr. Saima Noureen (Lecturer, Chemistry, UAF)  
Ms. Shanza Rauf Khan (Lecturer, Chemistry, UAF)

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UNESCO Science Laureate

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Vice Chancellor, BZU, Multan

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Institut National de Recherche en Génie Rural, Eaux et Forêts (INRGREF), Tunisia

**Prof. Muhammad Iqbal Bhangar**

University of Sindh, Jamshoro

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### **Prof. Dr. Farah Kanwal**

Institute of Chemistry, University of The Punjab

### **Scientific Committee**

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Dr. Shafiq ur Rehman (Assistant Professor, Chemistry, UAF)

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Dr. Kashif Jilani (Assistant Professor, Biochemistry, UAF)

Dr. Saima Noureen (Lecturer, Chemistry, UAF)

Miss Shanza Rauf Khan (Lecturer, Chemistry, UAF)

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Dr. Maryam Yousaf (Assistant Professor, Chemistry, UAF)

Dr. Nayla Munawar (Assistant Professor, Biochemistry, UAF)

Dr. Fatma Hussain (Lecturer, Biochemistry, UAF)

Miss Shanza Rauf Khan (Lecturer, Chemistry, UAF)

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Dr. Muhammad Adnan Iqbal (Assistant Professor, Chemistry, UAF)

Dr. Saba Jamil (Assistant Professor, Chemistry, UAF)

Dr. Muhammad Jamshed (Assistant Professor, Biochemistry, UAF)

Dr. Saima Noureen (Lecturer, Chemistry, UAF)

Dr. Zahid Mushtaq (Lecturer, Biochemistry, UAF)

Dr. Abdullah Ijaz Hussain (Associate Professor Chem, GCUF)

**Poster Management Committee**

**Prof. Dr. Amer Jamil (Convener)**

Dr. Muhammad Shahid (Associate Professor, Biochemistry, UAF)

Dr. Javed Iqbal Khattak (Assistant Professor, Chemistry, UAF)

Dr. Raja Adil Sarfraz (Assistant Professor, Chemistry, UAF)

Dr. Shamsa Bibi (Assistant Professor, Chemistry, UAF)

**Cultural Show and Musical night Committee**

**Dr. Haq Nawaz (Junior) (Convener)**

(Assistant Professor, Chemistry, UAF)

Dr. Saima Noureen (Lecturer, Chemistry, UAF)

Mr. Zaheer Ahmad (Lecturer, Biochemistry, UAF)

Dr. Shahzad Ali Shahid Chatha (Associate Professor Chem, GCUF)



PLENARY LECTURE ABTRACTS

1.	<b>Sustainable Drug Development from Bio-Resources: Phases, Perspectives and Challenges</b> Mohamad Fawzi Mahomoodally
2.	<b>Plant Biodiversity as Sustainable Source of New Drug Candidates and Phytotherapeutics</b> Ilkay Erdogan Orhan
3.	<b>Reusable Bio-based Catalyst for Biodiesel Production</b> Umer Rashid, Naeemah Abdalabbas Ibrahim
4.	<b>Physicochemical Properties and Antioxidant Activity of mesquite (Prosopis) from different Areas in Tunisia</b> Lamia Hamrouni, Ameni Tarkhani, Zayneb Achouri, Nizar Moujahed
5.	<b>Pesticides and Persistent Organic Pollutants (POPS) Removal from Water by Advance Oxidation Processes (AOPs)</b> Hasan M. Khan, Murtaza Sayed, Noor S. Shah, Javed A. Khan
6.	<b>Pyrolysis of Polypropylene over Molecular Sieve: Conversion into Fuel Oil</b> Jan Nisar
7.	<b>Exploration of Under-utilized Natural Feedstocks for Biofuels: Opportunities and Challenges</b> Farooq Anwar
8.	<b>Bioelectronics Based on Redox Enzymes to Produce Electric Energy</b> Muhammad Nadeem Zafar
9.	<b>Development of <math>^{177}\text{Lu}</math>-Benzylpenicillin for Possible Infection Theranostic Agent</b> Syed Ali Raza Naqvi, Muhammad Adeel Shahzad

ORAL & POSTER LECTURE ABTRACTS

10.	<b>Biofuels from Catalytic Pyrolysis of Nut-Shell Waste by using Nanoparticles (Superparamagnetic Iron Oxide SPION)</b> Muhammad Imran Din, Abdul Samad
11.	<b>Synthesis, Characterization and Photocatalytic Applications of Poly (Acrylic Acid) Microgel and its Composite with Cu-Doped ZnO Nanoparticles</b> Muhammad Fayyaz, Muhammad Azam Qamar, Mohsin Javed, Naveed Ahmad
12.	<b>Investigation of Cadmium (II) Adsorption from Aqueous Solutions of Cadmium-Calcium Chloride as Function of Chemical Properties</b> Muhammad Jawad Ashraf, Muhammad Saqib, M. Zia ur Rehman, Javaid Akhtar, Ghulam Abbas
13.	<b>Ultrafine CaCO<sub>3</sub> Powder as Anti-wear Additive in Commercial Lubricating Greases</b> Saniya, Khalida Akhtar
14.	<b>Synthesis of Biodiesel through Photocatalytic Process using Cu Doped Lime Coated over Metal Sheet</b> Sehrish Naz, Ijaz Ahmad Bhatti, Maryam Yousaf
15.	<b>Understanding Food Systems, Renewable Energy, Health and Sustainability</b> Nadir Sidiqi
16.	<b>Functionalized Polymeric Membranes as Affinity Matrix for Adsorptive Desulfurization of Thiophenes</b> Adnan Mujahid, Tuba Choudhary, Madiha Mehmood, Tajamal Hussain
17.	<b>Synthesis of Novel Amido-Amine Functionalized Alginate Hydrogel Beads for Adsorptive Remediation of Pb (II) from Aqueous Solution</b> Rehana Bano, Hamza Shehzad and Ahsan Sharif
18.	<b>An Efficient Fe/ZnO/Ceramic Layered Composite for Solar-Photocatalytic Degradation of Humic Substances from Municipal Wastewater</b> Muhammad Mohsin, Ijaz Ahmad Bhatti, Ambreen Ashar, Maryam Yousaf, Qamar ul Hassan and Tahseen Anwer
19.	<b>Eco-Friendly Silk Dyeing using <i>Anthraquinoid</i> Natural Dye Isolated From Cochineal Insect (<i>Dactylopius coccus</i>)</b>

20.	Fazal-ur-Rehman, Shahid Adeel, Nimra Amin <b>Kinetics of Pyrolysis of Waste Polystyrene</b> Ghulam Ali, Jan Nisar
21.	<b>Microbial-Free Water using Titanium Dioxide Nanoparticles: A Simple and Low-Cost Approach</b> Hafeez Anwar, Yousaf Ali, Ayesha, Yasir Javed, Yasir Jamil, Naveed Ahmad and Zahid Farooq
22.	<b>Synthesis and Characterization of Ni-Based Uniform Particles for Electrochemical Energy Storage Devices</b> Muhammad Gul, Khalida Akhtar
23.	<b>Photocatalytic Degradation of Bezafrate using Exposed {001} Facets TiO<sub>2</sub> Thin Film</b> Murtaza Sayed
24.	<b>Investigation of Cadmium (II) Adsorption from Aqueous Solutions of Cadmium-Calcium Chloride on Natural Soils of Various Cities of Pakistan and isotherms</b> Jawad Ashraf
25.	<b>Dye Removal from Colored Aqueous Solution using Indigenous Adsorbents</b> Muhammad Jahangeer, Abdul Rehman, Muhammad Afzal Qamar, Zahed Mahmood, Ghazia Fatima
26.	<b>Transition Metal-Doped ZnO@G Hybrid for Electrophotocatalytic Degradation of Insecticide Imidacloprid from Wastewater</b> Wajeeha Umer Farooq, Ijaz Ahmad Bhatti, Ambreen Ashar, Muhammad Mohsin, Muhammad Furqan, Maryam Yousaf
27.	<b>Mitigation of Hazardous Effects of Mercury Pollution on Wheat Seedlings Through <i>Trichoderma harzianum</i> Seed Coating Treatment</b> Maleeha Umer, Rashida Sultana, Ragheeba Sehar, Faiza Nasir Rizwana Mubashir
28.	<b>Biogas Production using Animal Wastes as an Alternative Energy Source for Sustainable Rural Development</b> Muhammad Tariq and Anjum Munir
29.	<b>Green Synthesis and Biological Evaluation of Novel 5-Fluorouracil Derivatives</b> Farhat Jubeen, Aisha Liaqat, Misbah Sultan, Fizza Amjad, Sania Zafar Iqbal, Imran Sajid
30.	<b>Morphological Studies of Environmentally Friendly Pressure Sensitive Adhesives by</b>

	<b>Tapping Mode Atomic Force Microscopy</b> Nadia Akram
31.	<b>Extraction of Phytochemicals from <i>Fagonia arabica</i> and their Antimicrobial Activity</b>
32.	<b>Dye Sequestration using Calcinized, Alginated Hybrid Materials</b> Amna Khanam, Muhammad Asif Hanif and Faizan-ul-Hassan
33.	<b>Hydrothermal Synthesis of Fine Stabilized Superparamagnetic Nano-Particles of Manganese Ferrite and their Application in Photocatalytic Degradation of Methylene Blue</b> Sadia Ata, Ifra Shaheen, Farzana Majid
34.	<b>Ethnobotanical Study of <i>Pistacia lentiscus</i> L. in Algeria and its Role on the Environment and Health</b> Aicha Blama Merzaia, Malika Douzane, Azzedine Mazari, Ali Ferrah , Salah Chouaki
35.	<b>Synergetic Effect and Kinetics Study of Co-Pyrolysis of Sugarcane Bagasse and Sewage Sludge</b> Zeeshan Hameed, Salman Raza Naqvi, M. Bilal Khan Niazi
36.	<b>Ultrasonic Assisted Isolation of Bio-Colorant (Tannin) from Coconut Husk and its Application onto Bio-Mordanted Wool Fabric</b> Shahid Adeel, Shumaila Kiran, Kinza Aslam
37.	<b>Reduced Grapene Oxide and Ni Hybrid as Sustainable Materials as Filler For Polymer Composites with Enriched Electrical Character</b> Tajamal Hussain, Amna Safdar, Adnan Mujahid
38.	<b>Synthesis of Silver Magnetic Nanocatalysts and their Investigation for the Catalytic Reduction of Chlorantraniliprole (Pesticide)</b> Umar Farooq, Mamona Butt, Rabia Akram Bajwa, M. Salman, Sabah Haider
39.	<b>Nutritional and Medicinal Benefits of Bioactive Compounds Extracted from Avocado Pulp (Ceylon Blue)</b> Irfan Haider, Fozia Anjum, Muhammad Shahid, Muhammad Afzal
40.	<b>Treatment of Textile Effluent by Solar Photocatalysis for Irrigation</b>

41.	Ambreen Ashar, Ijaz Ahmad Bhatti, Asif Ali Tahir, Munir Ashraf, Muhammad Mohsin <b>Uptake of Nitrogen and Phosphorous from Municipal Wastewater for Microalgae Cultivation and Wastewater Treatment</b>
42.	Munazza Maqbool, Haq Nawaz Bhatti, Sana Sadaf, Muhammad Zahid, Muhammad Shahid <b>Zinc-Magnesium Bimetallic Nanoparticles: Synthesis, Characterization and Catalytic Application</b>
43.	Hummayun Rashid, Shanza Rauf Khan, Saba Jamil, Maria Batool <b>Facile Synthesis of Mono Disperse Copper Oxide Nanoparticles by using <i>Allium sativum</i> for Catalytic Applications</b>
44.	Ahsan Sharif, Muhammad Imran Din <b>Solar Photocatalytic Removal of Natural Organic Matter using Fluorinated Calcium Zincate Grafted on Gravel</b>
45.	Tahseen Anwer, Ijaz Ahmad Bhatti, Muhammad Mohsin, Ambreen Ashar, Maryum Yousaf, Muhammad Tahir Hussain, Muhammad Zahid, Zeshan Zia Alvi <b>Parasites as Bio-Indicators Pollution of Environmental</b>
46.	Tean Zaheer, Muhammad Sohail Sajid <b>Impact of Donor and Acceptor Moieties on the Opto-Electronic Properties of Acceptor-Donor-Acceptor (A-D-A) Type Photovoltaic Materials</b>
47.	Amina Tariq, Muhammad Ans, Ijaz Ahmad Bhatti, Hina Ramzan, Maryam Ajmal, Rasheed Ahmad Khara, Javed Iqbal <b>Studies of the Adsorption Removal of Pb(II) and Cd(II) Ions using 4-Phenyl-3-thiosemicarbazide Modified <i>Ficus religiosa</i> Branches Powder</b>
48.	M. Salman, Ammara Shabbir, Umar Farooq, Rabia Akram Bajwa <b>Development of Magnetic Chitosan Bio Sorbent Beads for the Removal of Arsenic from Water System</b>
49.	Asif Ayub, Muhammad Irfan Majeed, Zulfiqar Ali Raza, Haq Nawaz and Hafiz Muhammad Asif Javed <b>Pincer Type Mercury (II)-N-Heterocyclic Carbene</b>

	<b>System With Hg (II)-AreneC-H Close Interaction And Variable Temperature Study</b> Muhammad Adnan Iqbal, Rosenani A. Haque
50.	<b>Synthesis of Organo-Functionalized Calcium Alginate Hydrogel Beads</b> Ejaz Ahmed, Ahsan Sharif, Hafiza Sadia, Rehana Bano
51.	<b><sup>1</sup>H NMR-Based Metabolomics and <sup>13</sup>C Isotopic Ratio Evaluation to Differentiate Conventional and Organic Soy sauce</b> Ghulam Mustafa Kamal, Sadia Bukhtawer, Hafiza Sumera Fraz, Saba Munir
52.	<b>Mathematical Modeling and Experimental Study of Mechanical Properties of Chitosan Based Polyurethanes: Effect of Diisocyanate Nature by Mixture Design Approach</b> Rasheed Ahmad Khera, Muhammad Asif Javaid, Sobia Jabeen, Muhammad Younas, Khalid Mahmood Zia
53.	<b>Thermal Degradation Behavior and X-Ray Diffraction Studies of Chitosan Based Polyurethane Bio-Nanocomposites Using Different Diisocyanates</b> Muhammad Asif Javaid, Muhammad Rizwan, Rasheed Ahmad Khera, Khalid Mahmood Zia, Kei Saito, Javed Iqbal, Peter Langer
54.	<b>Development of Silver Nanoparticles (Ag-Nps) Based Surface-Enhanced Raman Spectroscopy (SERS) Protocol For Counterfeit Antibiotic (Cefixime)Analysis</b> Haq Nawaz, Muhammad Irfan Majeed, Sidra Farooq, Saif Ullah
55.	<b>Fabrication of Ag/C<sub>3</sub>N<sub>4</sub>/CNTs Hybrid for Enhanced Hydrogen Generation Rate by Photocatalytic Water Splitting</b> Tehmeena Ishaq, Ijaz Ahmad Bhatti, Maryam Yousaf, Muhammad Mohsin, Ambreen Ashar and Muhammad Tahir Hussain
56.	<b>Fabrication and Characterization of Sulfonated Graphene Oxide (SGO) Doped Polymeric Membrane with Improved Anti-Biofouling Behaviour</b> Muhammad Zahid, Zulfiqar Ahmad Rehan, Anum Rashid, Saba Akram

57.	<b>Phophorene as Potential Drug Delivery System for Chemotherapeutic Drugs</b> Amina Tariq, Sidra Nazir, Javed Iqbal
58.	<b>Development of Hyperproducing Bacterial Mutant for Exopolysaccharides Production</b> Aneeza Rani, Muhammad Asgher, Nimrah Khalid, Sarmad Ahmad Qamar
59.	<b>Biological Color Stripping: Potential of <i>Ganoderma lucidum</i> IBL-05 for Removal of Dyes from Waste Cotton Fabric</b> Muhammad Muzammil, Muhammad Asgher, Sarmad Ahmad Qamar and Nimrah Khalid
60.	<b>Facile Synthesis of Cr-doped Hierarchical ZnO Nanostructures and their Photovoltaic Performance</b> Muzaffar Iqbal, Akbar Ali Thebo, Aamir Hassan shah, Noor Ahmad Nahyoon, Azim Khan, Khalid Hussain Thebo, Muhammad Ali Mohsin
61.	<b>Development of Nanoparticle-Based Multiplex Sandwich Immunoassay for Stage-Specific Diagnosis of Breast Cancer</b> Muhammad Irfan Majeed, Haq Nawaz, Muhammad Kashif, Muhammad Tahir
62.	<b>Design of Non-fullerene 3D Star Shaped Acceptor for Organic Solar cells: A DFT Study</b> Muhammad Ans, Rasheed Ahmad Khera, Javed Iqbal
63.	<b>Recycling of Hydrochloric Acid from Industrial Effluents</b> Muhammad Ahmad Muhsan, Sadia Ilyas
64.	<b>pH Sensitive Crosslinked Polymeric Material for Controlled Drug Delivery</b> Farooq Azam, Hira Ijaz
65.	<b>Synthesis, Spectroscopy and Biological Studies of Chalcone Derived Pyrimidines</b> Sadia Saleem, Zil-e-Huma Nazli, Nazia Saleem, Muhammad Asif Hanif, Muhammad Naveed, Sheraz Ahmed Bhatti, Rehan Riaz
66.	<b>Optimization of Fatty Acids and Their Derivatives for Biodiesel Production</b> Summayia Inam, Muhammad Asif Hanif and Sadia Ilyas
67.	<b>Biological Color Stripping: Potential of <i>Ganoderma Lucidum</i> IBL-05 for Removal of Dyes</b>

	<b>from Waste Cotton Fabric</b> Muhammad Muzammil, Muhammad Asgher, Sarmad Ahmad Qamar, Nimrah Khalid
68.	<b>Development of Simultaneous Transesterification Process for Fatty Acid Methyl Esters Production</b> Shafaq Nisar, Muhammad Asif Hanif and Ijaz Ahmad Bhatti
69.	<b>Shape-Controlled Synthesis of Silver Nanoparticles: A Review</b> Sehrish Saleem, Shazia Shukrullah, Muhammad Yasin Naz
70.	<b>Application of Citrus and it's Biocomposites for the Removal of 2,4,6-Trichlorophenol from Waste Water</b> Nabiha Aslam, Haq Nawaz Bhatti Muhammad Zahid and Saima Noreen
71.	<b>Evaluation of Taramira Oil to Produce Biodiesel: Pretreatment and Optimization Study using <math>Mos_2</math> <math>Bivo_4</math> Photocatalyst</b> Muhammad Ali, Sana Sadaf, Javed Iqbal
72.	<b>Synthesis of Polyhedral Manganese Tin Oxide by Hydrothermal Method and Study of Its Application as Photocatalyst and Additive</b> Areeba Naeem, Shanza Rauf Khan, Saba Jamil
73.	<b>Biogenic Synthesis of Monodisperse Silver Nanoparticles using <i>Ferocactus Diguettii</i> Plant Extract as Capping Agent for Antibacterial Activity</b> Ejaz Ahmed, Muhammad Imran Din
74.	<b>Impact of Salt Stress and A-Tocopherol Application on Physiology of Pea (<i>Pisum Sativum</i> L.)</b> Irfana Lalarukh, Amna Sarfraz and Muhammad Shahbaz
75.	<b>Production of Alumina Supported Composite Catalyst for Biodiesel Production</b> Iqra Yaqoob, Muhammad Asif Hanif, Saba Jamil and Muhammad Asghar
76.	<b>Modern Technologies to Treat Wastewater for Removal of Heavy Metals: A Review</b> Haassan Ahmed, Muhammad Asim Shabbir, Rana Muhammad Aadil, Talha Ahmad, Muhammad Siddique
77.	<b>Green Synthesis of Stable Co and CoO</b>



	<b>Nanoparticles using <i>Calotropis Gigantea</i> Plant Extract: Catalytic and Antimicrobial Activity</b> Azeem Intisar, Muhammad Imran Din, Amna Safdar
78.	<b><i>Pongamia Pinnata</i> Waste Oil Gold for Green Economy</b> Farwa Nadeem, Muhammad Asif Hanif, Haq Nawaz and Muhammad Jafar Jaskani
79.	<b>Development of Hyperproducing Bacterial Mutant for Exopolysaccharides Production</b> Aneeza Rani, Muhammad Asgher, Nimrah Khalid and Sarmad Ahmad Qamar
80.	<b>Effect of Agronomic Factors on Biomass and Quality of Various Crops for Bio-Energy Production</b> Athar Mahmood, Hafiz Ur Rehman, Ateeq Ur Rehman
81.	<b>Lead Free Ferroelectric Composite for Capacitor Applications</b> S. Akbar, M. Yaseen, Misbah, U. Shahid, A. Kiran. R. Mehmood, A. Ghaffar
82.	<b>Electronic, Optical and Magnetic Properties of <math>\text{PrMnO}_3</math> by First Principle</b> S. Akbar, M. Yaseen, Misbah, U. Shahid, H. Ambreen. R. Mehmood, A. Ghaffar
83.	<b>Potato and Its By-Products as a Potential Source of Biogas Production</b> Sibtain Ahmad and Muhammad Tariq
84.	<b>Removal of Halosulfuron Methyl Herbicide from Aqueous Media Using Neem Seeds: Kinetic, Equilibrium and Thermodynamic Studies</b> Atta ul Haq and Muhammad Kashif
85.	<b>Thermal Degradation Behavior and X-Ray Diffraction Studies of Chitosan Based Polyurethane Bio-Nanocomposites using Different Diisocyanates</b> Muhammad Asif Javaid, Muhammad Rizwan, Rasheed Ahmad Khera, Khalid Mahmood Zia, Kei Saito, Javed Iqbal, Peter Langer
86.	<b>Mathematical Modeling and Experimental Study of Mechanical Properties of Chitosan Based Polyurethanes: Effect of Diisocyanate Nature by Mixture Design Approach</b> Rasheed Ahmad Khera, Muhammad Asif Javaid,

	Sobia Jabeen, Muhammad Younas, Khalid Mahmood Zia
87.	<b>Optimization of Tilt Angle of Solar Panel for Maximum Energy Efficiency</b> Muhammad Imran Irshad, Muhammad Bilal, Hafeez Anwar, Anjum Munir and Yasir Jamil
88.	<b>LIBS and EDX Analysis of Residues of Water Samples</b> Muhammad Bilal, Asma Nisar , Hafeez Anwar, Ayesha Younus and Yasir Jamil
89.	<b>Evaluation of Cytotoxicity, Hemocompatibility and Spectral Studies of Chitosan Assisted Polyurethanes Prepared with Various Diisocyanates</b> Rasheed Ahmad Khera, Muhammad Asif Javaid, Sobia Jabeen, Ijaz Ahmad Bhatti Muhammad Younas, Khalid Mahmood Zia, Irum Mumtaz
90.	<b>Adsorptive Removal of 2,4-Dichlorophenoxyacetic acid and Imidacloprid from Aqueous Media by <i>Mangifera indica</i> Seeds and its Composites</b> Asma Jabeen and Haq Nawaz Bhatti
91.	<b>Bioactive Derivatives of Thuja Oil</b> Aniqa Ishaq, Muhammad Asif Hanif, Raziya Nadeem and Tooba Ashraf
92.	<b>Design of Water Supply System by Using Epanet</b> Touseef Ahmad Babar, Shahbaz Nasir Khan and Muhammad Umar
93.	<b>Synthesis, Single Crystal Analysis and Quantum Chemical Studies of 2,4-Diamino-5-(4-Chlorophenyl)-6-Ethylpyrimidin-1-Ium 3,4,5-Trihydroxybenzoate -Methanol (DETM)</b> Iqra Shafiq, Sohaib ur Rehman, Eisha Tul Razia, Sana Shafiq, Saeed Ahmed, M.Khalid*
94.	<b>Synthesis, Characterization of Zinc Oxide (ZnO) and its Application for Water Purification</b> Saher Muzaffar, Sumbla Shafeeq, Hafeez Anwar, Yasir Javed, Yasir Jamil
95.	<b>Green Synthesis of Selenium N-Heterocyclic Carbenes Adducts and their Characterization</b> Amna Kamal, Haq Nawaz Bhatti, Muhammad Adnan Iqbal
96.	<b>Adsorption of 2,4-Dichlorophenoxy Acetic Acid using Bagasse and its Composite: Batch and Column Mode</b>

	Muhammad Muneeb Khan and Amina Khan, and Haq Nawaz Bhatti
97.	<b>Analysis of Solid Waste Eggshell Nanocatalyst Activity for Biodiesel Synthesis</b> Iqra Sahar, Saima Noreen, Haq Nawaz Bhatti and Muhammad Zahid
98.	<b>High-Performance Materials for Organic Photovoltaic Devices and Light- Emitting Diodes.</b> Shamsa Bibi, Shafiq-ur Rehman, Ahmad Waqas, Ushna Saeed
99.	<b>Mercury Elimination from Industrial Wastewater using Silica Titania Composite (STC)</b> Saima Noreen, Kalsoom Bibi, Haq Nawaz Bhatti and Muhammad Zahid
100.	<b>Design of Zigzag Brick Kiln to Reduce Air Pollution</b> Muhammad Faraog Anwar and Shahbaz Nasir Khan
101.	<b>Bioassay Based Phytochemical Analysis of <i>Nyctanthes arbor-Tristis</i> in Search of Natural Fungicides</b> Syeda Mehvish Raza, Maliha Uroos, Ghulam Mustafa Kamal
102.	<b>Biodiesel Production from Wild Mustard Seeds Oil</b> Maryam Hanif, Haq Nawaz Bhatti, Muhammad Asif Hanif
103.	<b>Purification of Water by Moringa Oleifera Seeds</b> Muhammad Nabeel Riaz and Shahbaz Nasir Khan
104.	<b>Design, Synthesis and in Vitro Antioxidant Activity of 3,5-Disubstituted-2-Pyrazolines</b> Nazia Saleem, Zil-e-Huma Nazli, Sadia Saleem, Ambreen Ashar, Muhammad Naeem Faisal, Zeeshan Ahmad Bhutta, Mushtaq Ahmad, Aftab Ahmad
105.	<b>Production of biodiesel from home grown <i>Spirogyra elongate</i></b> Aasma Saeed, Muhammad Asif Hanif, Haq Nawaz Bhatti and Muhammad Waqar Azeem
106.	<b>Pattern of imbalances of trace metals in Hodgkin lymphoma female patients in comparison with healthy women</b>

107.	<b>Remote Sensing (Rs) and Land Surface Temperature (Lst) Application in Assessment of Urban Heat Island: A Review</b> M. Bilal Ahsan, Shahbaz Nasir khan, Arfan Arshad
108.	<b>Kinetic and Thermodynamic Study of Biodiesel Production from used Cooking Oil using CZO Nanocatalysts</b> Iqra Sahar, Saima Noreen, Haq Nawaz Bhatti and Muhammad Zahid
109.	<b>Environmental Benign Application of Plant Growth Hormones in Combination with Nano-Fertilizer</b> Aleena Umar, Muhammad Asif Hanif and Rasheed Ahmad Khera
110.	<b>Synthesis and Characterization of Chitosan Modified Polyurethane Bio-Nanocomposites with Biomedical Potential</b> Muhammad Asif Javaid, Rasheed Ahmad Khera, Khalid Mahmood Zia, Kei Saito, Ijaz Ahmad Bhatti, Muhammad Asgher
111.	<b>Dye Adsorption using Bentonite and Zeolite Based Composite Materials</b> Ifrah Javed, Muhammad Asif Hanif and Faizan-ul-Hassan
112.	<b>Recovery of Critically Rare Metals from Secondary Waste</b> Rabia Sattar and Sadia Ilyas
113.	<b>Essential Oil Isolates of Indian Black Berry Leaves</b> Rabia Shaheen and Muhammad Asif Hanif
114.	<b>Variations in Menthol Contents of <i>Mentha Arvensis</i> in Response to Application of Growth Regulators</b> Muhammad Raffi Shehzad, Muhammad Asif Hanif, Raziya Nadeem and Rafia Rehman
115.	<b>Liquid-Liquid Extraction of Rhenium from Acidic Liquor</b> Humma Akram Cheema and Sadia Ilyas
116.	<b>Solvent Extraction of Rhenium with Cyanex 923</b> Humma Akram Cheema, Sadia Ilyas
117.	<b>Evaluation of Cytotoxicity, Hemocompatibility and Spectral Studies of Chitosan Assisted Polyurethanes Prepared with Various</b>

	<p><b>Diisocyanates</b>                  Rasheed Ahmad Khera, Muhammad Asif Javaid,                  Sobia Jabeen, Sobia Jabeen, Ijaz Ahmad Bhatti                  Muhammad Younas, Khalid Mahmood Zia, Irum                  Mumtaz</p>
118.	<p><b>Investigation of the Anti-Biofouling Behaviour of Polymeric Membrane Fabricated with Aminated Graphene Oxide (NH<sub>2</sub>-GO)</b>                  Muhammad Zahid, Zulfiqar Ahmad Rehan, Anum Rashid , Saba Akram</p>
119.	<p><b>Development of Silver Nanoparticles (Ag NPs) based Surface-Enhanced Raman Spectral (SERS) Protocol for Oxytocin Estimation in Milk</b>                  Maria Nawaz, Muhammad Irfan Majeed, Haq Nawaz and Muhammad Asif Hanif</p>
120	<p><b>The study of antioxidant and antimicrobial activity of crude extracts of <i>Cassia absus</i> and <i>Citrus medica</i> collected from Tehsil Burewala, Punjab, Pakistan”</b>                  Saima Naz, Zartasha Kousar, Suryyia Manzoor, Muhammad Hayat</p>
121	<p><b>Synthesis of Molybdenum, Tungsten Supported Calcium Oxide (MoW-CaO) And Its Role in Transesterification of Mustard Oil</b>                  Muhammad Imran, Ushna Fatima, Muhammad Babar Taj, Ahmad Kaleem Qureshi</p>
122	<p><b>Degradation of the antibiotics by Advanced Oxidation Process</b>                  Majid Muneer, Muhammad Imran Kanjal, Muhammad Saeed and Muhammad Asghar Jamal</p>
123	<p><b>Neat Synthesis of Bio-Active Copper (II) (Z)-N-(2-Amino-4-Methylphenyl)-N'-Phenylbenzamidine And Its Light-Driven Photo Catalytic Activity</b>                  Muhammad Babar Taj, Ahmed Raheel, Raja Hammad Ahmad, Ahmad Kaleem Qureshi, Muhammad Imran, Syed. Ahmed Tirmizi, Muhammad Asghar Jamal</p>
124	<p><b>Facil Conversion of Mustard Oil into Biodiesel by Zn, Cd Complexes and Their Nano-oxides</b>                  Ahmad Kaleem Qureshi, Muhammad Asghar Jamal, Maria Fazal, Muhammad Babar Taj, Muhammad Imran, Muhammad Tariq and Adeel Abbas</p>

125	<b>ASSESSMENT OF A NEW ALTERNATIVE FEEDSTOCK FOR A BIOFUEL PRODUCTION FROM <i>Pistacia</i> SPECIES: POTENTIAL OPPORTUNITIES AND PERSPECTIVES</b> Asma El Zerey-Belaskri
126	<b>Synthesis and Characterization of Ag@MnxOy and Evaluation of its Photocatalytic Activities for Degradation of Rhodamine B Dye in Aqueous Medium</b> Muhammad Saeed, Aisha Azhar, Nida Mumtaz, Muhammad Adeel
127	<b>Production of biodiesel from pongam tree seed oil</b> Ayesha Mushtaq, Muhammad Asif Hanif, Muhammad Zubair, Muhammad Irfan Majeed
128	<b>Transition Metal Nanocomposites for Phosphopeptides Enrichment from Complex Biological Fluids</b> Batool Fatima
129	<b>The removal of reactive yellow 145 dye from waste water by using wetland plant and activated carbon of <i>Cassia fistula</i> impregnated with copper nanoparticles</b> Fajar-un-Nisa and Dr. Raziya Nadeem and Mr. Anwar ul haq
130	<b>Membrane technology: A sustainable solution to future drinking water needs</b> Zulfiqar Ahmad Rehan
131	<b>Waste date seeds oil as a sustainable source of biodiesel production</b> Muhammad Waqar Azeem and Muhammad Asif Hanif
132	<b>Bio-prospecting of traditional knowledge on Bio-fuels in <i>Uva</i> and <i>Sabaragamuwa</i> provinces of in Sri Lanka</b>
133	<b>Antioxidant profiling and toxicological screening of different mushrooms samples collected from Muzaffarabad and Neelum districts of Azad Jammu and Kashmir</b> Muhammad Shahid, Muhammad Muzammil Jahangir, Nighat Zia ud Din and Hina Fatima
134	<b>Synergetic effect and kinetics study of co-pyrolysis of sugarcane bagasse and sewage sludge</b> Zeeshan Hameed, Salman Raza Naqvi, M. Bilal khan Niazi

135	<b>Production of Eco-friendly Slow Release Nano Fertilizers</b> Marium Khaliq, Muhammad Asif Hanif and Zahid Mushtaq
136	<b>Wastewater treatment using Biocomposites</b> Zubia Sajid, Muhammad Asif Hanif and Faizan-ul-Hassan
137	<b>Isolation of bioactive components from ajwain</b> Shahida, Namra Naeem and Muhammad Asif Hanif
138	<b>High through put synthesis and screening of catalytic supports for biodiesel production</b> Rida Tariq, Muhammad Asif Hanif* and Muhammad Irfan Majeed
139	<b>Determination of phytochemicals present in flax seed</b> Madiha Yasmeen and Muhammad Asif Hanif
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**PLENARY LECTURE ABTRACTS**

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**Sustainable Drug Development from Bio-Resources:  
Phases, Perspectives and Challenges**

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**Abstract**

Bioresources have always provided a source of inspiration in the drug discovery and development process. Template molecules and pharmacophores were identified from terrestrial and marine plants, animals and microorganisms that have served nowadays as blockbuster drugs to alleviate sufferings. Indeed, natural products offer a unique genetic pool that may possess the potential of treating and managing several life-threatening diseases including rare diseases or the ailments that are still considered incurable or neglected. The pharmaceutical sector is a key stakeholder that is fostering bio-innovation from biodiversity and is actively building its inventory of both marine and terrestrial bioresources-based/derived drugs. The systematic search, also known as bioprospection, for and development of new sources of chemical compounds, genes, micro-organisms, macro-organisms, and other valuable products from nature has accelerated recently. However, key guidelines need to be followed for a sustainable development and discovery of lead compounds from nature. In this presentation, the fundamental steps and phases in sustainable drug development from both terrestrial and marine bioresources will be reviewed and some key challenges will be highlighted.

**Keywords:** Marine, medicinal plants, biodiversity, drug, bio-innovation, bioprospection

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**Plant Biodiversity as Sustainable Source of New Drug  
Candidates and Phytotherapeutics**

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**Abstract**

Plant kingdom has a great biodiversity in terms of species number. Among them, medicinal plants have always possessed a major importance in terms of exploring new drug candidates as well as phytotherapeutics since ancient civilizations. Many plants have still remained from Chinese traditional medicine, Ayurvedic medicine, Unani medicine, Kampo medicine, etc in our day to be used for human health. In this sense, protection and sustainability of plant species are of great importance, while almost 80% of world population relies on traditional or folk medicine. On the other hands, intellectual rights are also vital for local people as well as inventors. However, it is still reality that plants are attractive targets for drug discovery and research as many clinically used drugs (quinine, aspirin, tubocurarine, taxol, artemisinin, etc) had been isolated from plants initially. Not only plants, but also other organisms such as microorganisms, macrofungi, insects, animal venoms as well as marine organisms. Turkey has a very rich flora consisting of approximately 12.000 plant taxa, which is due to various climatic conditions throughout the country. It is the richest flora considering whole Europe continent. In our extensive search and screening through Turkish flora as well as other countries, we have so far identified many promising natural compounds with significant bioactivities, particularly enzyme inhibitors by *in vitro* and *in silico* approaches.

## Reusable Bio-based Catalyst for Biodiesel Production

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### Abstract

Bio-based heterogeneous catalyst support bearing sulfonic groups was used for biodiesel production from palm fatty acid distillate (PFAD). Bio-based catalyst was synthesized, characterized, and tested. The esterification process variables such as PFAD/methanol ratio, catalyst concentration, reaction time and reaction temperature were optimized for PFAD to develop a comprehensive protocol for obtaining high biodiesel yield with better quality. Bio-based catalyst was synthesized using doping of different groups into the carbon substrate and tested for several purposes in this work. TPD showed that all peaks shift towards higher temperatures suggesting the effect of doping of the sulphonating group on the surface. FESEM images are consistent with the finding of TPD results. The results of BET showed that the pore size ranges between 5.70 and 30.96 nm in agreement with TPD and FESEM results. TGA show that produced catalysts which aligned with TPD results. The best catalyst was tested for optimization under PFAD/methanol ratio, catalyst mass, temperature, and time and found that the optimization occurs at 16:1, 2 g, 100°C and 2h, respectively. The bio-based catalyst was finally tested for reusability and found that it can be used for five times. In conclusion, the bio-based catalysts are very effective, easy to handle, a high conversion factor of about 96%, and very economical reusability.

**Keywords:** Palm based waste, sulphonated acidic catalyst, catalyst characterization, separation, biodiesel

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**Physicochemical Properties and Antioxidant Activity of  
mesquite (*Prosopis*) from different Areas in Tunisia**

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**Abstract**

The mesquite « *Prosopis* » with these different species is part of the rich flora of Tunisia. In addition to its forage value confirmed, mesquite « *Prosopis* » contributes to the fixation and enrichment of marginal soils. In this study, mesquite grains and fruits have been study. Each oil sample was extracted by solvent. A series of physical and chemical tests including polyphenol, flavonoids and antioxidant activity were carried out on extracted oils and aqueous extract. It was concluded that the fruits coming from the region of Sfax (South of Tunisia) give the highest yield of vegetable oil (37%) whereas one obtains for the same species but in another region (Tozeur) a very low value 12%. Thus we can conclude that the yield of vegetable oil depends greatly on the geographical origin but also on the organ used for the extraction. The chemical analysis of these plant materials allowed us to determine its richness in soluble or insoluble fiber minerals. Wide prospects are now open to consolidate the results and test and deepen the use of different parts of the plant in medicinal and pharmaceutical fodder level.

**Keywords:** Mesquite, *Prosopis*, forage quality, polyphenol, flavonoids, antioxidant activity

**Pesticides and Persistent Organic Pollutants (POPS)  
Removal from Water by Advance Oxidation Processes  
(AOPs)**

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Khan

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**Abstract**

Removal of some pesticides commonly used in Pakistan, such as atrazine, lindane and endosulfane from water will be explained using gamma irradiation and photocatalysis based advanced oxidation processes. The concentration of these pesticides in water was determined using a gas chromatograph with electron capture detector (GC-ECD). Extraction of pesticides from water samples were carried out using SPME fibre fitted in a CTC autosampler. The percent destruction and removal efficiency (G-value) of atrazine, lindane and endosulfan were greatly influenced by absorbed gamma ray dose. Using 1  $\mu\text{M}$  aqueous solution of endosulfan, almost complete (96 %) removal of endosulfan was achieved at the highest dose of 1020 Gy. The results obtained showed a decrease in G-value and increase in percent destruction with increasing absorbed dose. The effects of different scavengers were also studied to know the effective radical for the decay of endosulfan. It was found out that the degradation is primarily due to the role of hydrated electron ( $e - aq$ ). For atrazine, the calculated dose constant was  $9.42 \times 10^{-4} \text{ Gy}^{-1}$  at 296  $\text{Gyh}^{-1}$  dose rates using 6.95  $\mu\text{M}$  initial atrazine concentration. The atrazine degradation rate was determined as 0.019  $\mu\text{M min}^{-1}$ .

**Keywords:** AOPs, POPs, catalytic, organic, pollutants

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**Pyrolysis of Polypropylene over Molecular Sieve:  
Conversion into Fuel Oil**

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**Abstract**

This study is focused on the use of a commercially available molecular sieve LZ-Y52 as catalyst for thermo-catalytic conversion of model polypropylene into fuel oil with no undesirable products, higher yield and conversion. The process involves simple unit operations associated with liquid fuel yield with a wide range of hydrocarbons. Hence it can be concluded that the catalytic degradation of polypropylene carried out in an indigenously manufactured furnace in the presence of a simple molecular sieve LZ-Y52 offers an improved selectivity in the product distribution and was demonstrated to be a useful method for the production of potentially valuable hydrocarbons.

**Keywords:** Selectivity, degradation, liquid, fuel, catalyst



**Exploration of Under-utilized Natural Feedstocks for  
Biofuels: Opportunities and Challenges**

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**Abstract**

Continuously increasing energy demand, in due part to rapid increase in global population and industrial growth, is steadily depleting natural resources of fossil fuels. To meet the ever-growing energy demand, and to create a greener and cleaner environment, there is a dire need to explore some alternative means of renewable fuels. Biofuels such as biodiesel, bioethanol and bio CNG, being derived from plant materials/biomass, can be explored as eco-friendly and renewable green fuels. In view of complex chemical nature of plant materials/ biomass, an understanding of natural variability in chemical composition and adoption of some efficient processing technologies are required to meet the challenges related to production of biofuels with sustainable quality and compatible fuel characteristics. Indeed, biofuels being biodegradable and renewable in nature can make a significant difference towards improving our environment and quality of life, helping economy, and reducing dependence on fossil fuels. Nevertheless, cost-effectiveness, competitiveness, demand and supply as well as fuel versus food dilemma linked with biofuels are some of the serious concerns to be addressed. The present lecture mainly focuses on exploration of under-utilized natural plant resources as potential feedstocks for biofuel production. The current status of biofuel industry, market trends, potential opportunities and challenges will also be covered.

**Keywords:** Feed stock, biofuel, energy, green, fossil

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**Bioelectronics Based on Redox Enzymes to Produce Electric Energy**

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50700 PakistanEmail: [znadeempk@gmail.com](mailto:znadeempk@gmail.com)**Abstract**

Bioelectronics deals with integration of biomolecules with electronic elements to form functional devices. In bioelectronics, the biomolecule can be enzymes, organelles, antigen/antibodies, DNA or living cells, which can be integrated with electrical units to yield energy e.g. biofuel cells. Enzyme based bioelectronics could be biosensors or biofuel cells. An enzymatic biofuel cells (EBFC) is a specific type of fuel cell, which uses biocatalysts i.e. enzymes especially redox enzymes, instead of metal catalysts, to convert energy stored within chemicals into electrical energy. Most of the (EBFCs) include anodes that oxidize the fuel substrates and cathodes that reduce the O<sub>2</sub>. In contrast to traditional fuel cells, the introduction of enzymes enables the operation of the cell under mild conditions and utilization of renewable, chemicals as fuels. In addition, if the enzymes are immobilized on the surface of the anode and cathode electrodes, the need for other components required for conventional fuel cells, such as a protective case and membrane are eliminated due to the specificity of the enzyme reactions at the respective electrodes and it is possible to assemble membraneless, non-compartmentalized biofuel cells. Biofuel cells design aims to maximize electron transfer at the two compartments, anode and cathode, in order to produce electric power for electronic devices.

**Key words:** Bioelectronics, biofuel cells, redox enzymes, portable electronics

**Development of  $^{177}\text{Lu}$ -Benzylpenicillin for Possible  
Infection Theranostic Agent**

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**Abstract**

Infections are the second leading cause of morbidity and mortality all over the world. Antibiotics are being mainly, prescribed to treat infections after biochemical tests that are not reliable in case of deep seated bacterial infections. This mainly causes bacterial resistance and eventually antibiotic become non-specific. Therefore, development of a robust diagnostic agent can help in accurate diagnosis and up to the mark treatment. In this study we have developed  $^{177}\text{Lu}$ -benzylpenicillin as a theranostic tracer agent for accurate diagnosis of bacterial infections. Radiolabeling and quality control study reveals the benzylpenicillin is an agent of choice to obtain good yield of  $^{177}\text{Lu}$ -benzylpencillin. At optimized labeling conditions such as radioactivity of  $^{177}\text{LuCl}_3$  (74MBq), amount of benzylpenicillin, DTPA, pH, reaction temperature and time >93 %  $^{177}\text{Lu}$ -benzylpencillin was obtained. Radiochemical purity were tested with the help of Watt men No.2 paper and instant thin layer chromatography. Biodistribution and glomerular filtration rate studies revealed rapid clearance from non-targeted organs. Radiolabeling yield, quality control parameters, biodistribution and glomerular filtration rate studies of  $^{177}\text{Lu}$ -benzylpencillin revealed the newly developed tracer agent is a potential candidate to diagnose deep seated bacterial infection and also can help in decision making to treat infection with high accuracy rate.

**Keywords:** benzylpenicillin, infection imaging, radiopharmaceuticals, nuclear medicine

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**ABTRACTS**

**ORAL & POSTER PRESENTATIONS**



**Biofuels from Catalytic Pyrolysis of Nut-Shell Waste by using Nanoparticles (Superparamagnetic Iron Oxide SPION)**

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**Abstract**

In this research work, Superparamagnetic iron oxide nanoparticles (SPION) were synthesized by a novel method from reduction of  $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$  precursor in three neck round bottom flask. For large scale synthesis, 8:1 (v/v) of  $\text{Fe}(\text{NO}_3)_3 \cdot 9\text{H}_2\text{O}$  and cetyltrimethyl ammonium bromidesolutions were mixed together, 5 mL of  $\text{NaBH}_4$  solution added to mixture and then maintained the pH of the mixture at 12 by adding solution of  $\text{NaOH}$  dropwise. The morphology of prepared nanoparticles was determined by using scanning electron microscope (SEM). Size and crystallinity of nanoparticles was (10-12nm) investigated by diffractogram obtained from XRD. These particles were used as catalyst in the pyrolysis of nut-shell waste to produce alternative fuel and other chemicals feedstock for industrial applications. FT-IR analysis of nut-shell waste revealed the existence of lignocellulosic compounds. The effect of temperature on conversion of biomass into products and on percentage yield of products was also studied.

**Keywords:** Iron oxide nanoparticles, alternative fuel, catalytic pyrolysis

**Synthesis, Characterization and Photocatalytic Applications of Poly (Acrylic Acid) Microgel and its Composite with Cu-Doped ZnO Nanoparticles**

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**Abstract**

Poly (Acrylic Acid) microgel incorporated with Cu-doped ZnO nanoparticles were synthesized free radical polymerization method and employed for photocatalytic degradation of methylene blue dye. The prepared samples were characterized by X-ray diffraction, Transmission electron microscopy, Scanning electron microscopy, Energy dispersive X-Ray spectroscopy; UV-visible absorption spectroscopy, Raman spectroscopy, and Fourier transform infrared spectroscopy. The composite particles were in spherical shape having size 4-5  $\mu\text{m}$ . The size of Cu-doped ZnO was found in 40-50 nm range. The nanoparticles were synthesized with different concentrations of Cu (5%, 10%, 15% and 20%) by simple chemical co-precipitation method. The photocatalytic activity of ZnO is increased by doping, and 15% Cu-doped ZnO nanoparticles showed best photodegradation of dye. When poly(Acrylic Acid) microgel was incorporated with 15% Cu-doped ZnO nanoparticles, the resultant composite showed drastic increase in photodegradation of methylene blue dye. The composite completely degraded dye in 90 minutes which was degraded in 150 minutes by Cu-doped ZnO nanoparticles.

**Keywords:** Cu-doped ZnO, Photocatalytic degradation, Composite, UV-visible light

**Investigation of Cadmium (II) Adsorption from Aqueous Solutions of Cadmium-Calcium Chloride as Function of Chemical Properties**

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**Abstract**

Cadmium (Cd<sup>2+</sup>) is found to be very toxic and hazardous for life even in a minute quantity. Adsorption capacity and kinetic attitude with soil matrix are major parameters to determine mobility of heavy metals in soil water environment. The purpose of this study is to investigate cadmium adsorption occurring in soil matrix which is performed in feigned conditions (lab conditions) for analysis. The basic analysis such as pH, EC, SAR, texture composition, cation and anion measurement (Na, K, Ca, Mg, Cl<sup>-</sup>, CO<sub>3</sub><sup>2-</sup> and HCO<sub>3</sub><sup>-</sup>) were determined by respective chemical analytical techniques. Four soil samples of different textures (based on clay contents from high clayey to low clayey soil) were exploited to quantify cadmium retention on clay minerals from aqueous solutions of cadmium-calcium chloride of various input concentrations i.e. 25, 50, 75, 100 and 125 mg L<sup>-1</sup>. Three-gram soil was mixed in 30 ml cadmium containing solution with CaCl<sub>2</sub> as background reagent. Adsorption process was performed in triplicates at constant temperature of 25 °C. Experimental inference explored that cadmium had been adsorbed on clay in following order: Highly clayey soil > Medium clayey soil > Medium to low clayey soil > Low clayey soil. Freundlich model of isotherm was applied to analyse data. Acquired data was processed to graphical representation and statistical models such as ANOVA for evaluations, effects and treatments efficacy as well as analysed by adsorption isotherms.



**Ultrafine CaCO<sub>3</sub> Powder as Anti-wear Additive in Commercial Lubricating Greases**

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**Abstract**

Ultrafine CaCO<sub>3</sub> powder, composed of nanoparticles with uniform morphology was synthesized by controlled precipitation and carbonation process from lime water. Commercially available cheap source of quick lime was used as a precursor reactant against different precipitating agents, i.e. CO<sub>2</sub>, Na<sub>2</sub>CO<sub>3</sub> and (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>. Various morphologies of particles were obtained under extreme optimized conditions. Different physical techniques were used for characterization of the synthesized particles. Selected batches of the prepared monodispersed particle systems were used as an anti-friction and anti-wear additive in the commercial lithium based greases. Four ball tribometer and Ball on disc wear tester were used for the evaluation of anti-wear and anti-friction performance of the blank and blended lithium based greases. It was investigated that as synthesized CaCO<sub>3</sub> blended greases showed enhanced anti-wear and anti-friction performance as compared to the blank grease as well as commercial CaCO<sub>3</sub> blended grease. These observations showed that particle shape and uniformity greatly enhanced the tribological properties of the commercial grease. The effect of synthesized CaCO<sub>3</sub> particles on rheology of the commercial greases was also investigated.

**Keywords:** Calcium carbonate; uniform particles; carbonation; antiwear; antifriction; rheology

**Synthesis of Biodiesel through Photocatalytic Process  
using Cu Doped Lime Coated over Metal Sheet**

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**Abstract**

Spherical shaped and highly crystalline hexagonal structure of Cu/lime nanoparticles were efficiently synthesized as clear Scanning Electron Microscopy (SEM) and X-ray Diffraction analysis (XRD). Furthermore, the presence of Oxygen, Calcium, and Copper in Energy Dispersive X-ray Spectroscopy (EDX) confirmed doping and purity of Cu/lime. Later on, photocatalytic transesterification reaction for biodiesel production from waste cooking oil was carried out under sunlight using Cu/lime/metal hybrid. All operational parameters such as Methanol to oil ratio, reaction temperature and time for the biodiesel synthesis were optimized by Response Surface Methodology. The highest yield percentage of the photocatalytic transesterification reaction was 86% having reaction conditions 6:2 methanol to oil ratio at 50°C for 3 hours. Evaluation of amount of synthetic biodiesel was done by Gas chromatography analysis. Gas chromatography analysis confirmed the presence of fatty acid methyl ester from which following are Methanoic acid, Butyric acid and Capric acid having peak area 2.3, 0.2, 15.6 respectively. Biodiesel produced from WCO was found to contain high octane number 55, low iodine value 58, saponification value within the range of 232-258 and Acid value less than 1. The cloud point ranges from 3°-5°C.

**Keywords:** Biodiesel, transesterification, response surface methodology

**Understanding Food Systems, Renewable Energy, Health  
and Sustainability**

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**Abstract**

The humanity blessed with the positive aspect of technology as such the world is fast becoming a global networking a village to share our thoughts, challenges, and opportunities. For the one main purpose healthy, happy, and sustainable life to mankind and their environment. Indeed, our viewpoints are focused in various sector such as agriculture, food systems with the advancement in food production and to increase the food nutritious value, health, and wellness of the growing global population. All areas of our lives would be impossible without chemical products that come directly or indirectly in contact with chemical production that linked with the principles of Green Chemistry. Another big challenge that humanity and their environment are facing is the pollutants and toxins in the soil, water, air and ultimately will lead to the depletion of soil health, human health, plant health, animal health, and the environment. Human beings are a noble creature of Almighty God with knowledge, wisdom, and intellectual power that bestowed upon them with responsibilities to maintain and sustain with love and care of their mother Earth planet. Without rethinking and admit the fact for the incorporation renewable energy sources to help mitigate climate change with the affordable, reliable, and sustainable energy in order to meet the energy supply needed to end extreme poverty and promote shared well-being of the current and future generations.

**Keywords:** Food systems, renewable energy, health, environment, sustainability

**Functionalized Polymeric Membranes as Affinity Matrix  
for Adsorptive Desulfurization of Thiophenes**

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**Abstract**

The production of clean fuel free from sulfur is greatly desirable in order to minimize SO<sub>x</sub> emissions and also for improved performance of catalytic exhaust converter. Although hydrodesulfurization is an established methodology for removal of organosulfur compounds (OSCs) such as thiols, disulfides, thioethers from gasoline and diesel nevertheless, it is relatively less effective against thiophenes including benzothiophene and dibenzothiophene which comprises more than 50% of total OSCs present in crude oil. In order to remove thiophenes from liquid fuels herein, we synthesized functionalized polymeric membranes as affinity matrix for adsorptive removal of thiophenes. The synthesized material was characterized by FTIR and AFM techniques. The potential advantage of developed product is its ability to rebind dibenzothiophene at low ppm concentrations under ambient environment since this strategy does not need high temperature or pressure thus, developing a cost effective route for producing clean fuels.

**Synthesis of Novel Amido-Amine Functionalized Alginate Hydrogel Beads for Adsorptive Remediation of Pb (II) from Aqueous Solution**

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**Abstract**

4-Phenyl semicarbazide modified calcium alginate (PSC-CA) hydrogel beads were synthesized. The properties of these hydrogel beads were compared with pure calcium alginate beads and it was found that PSC-CA beads were more selective and efficient for Pb (II) adsorptive remediation from aqueous solution. Adsorption studies include effect of pH, sorbent dose, initial concentration of metal ion, kinetics and isothermal studies. Adsorption capacity of PSC-CA beads was found higher due to grafting of amido-amine moieties of carbamate group which increases the binding capacity for Pb (II) metal ions. The results showed that PSC-CA hydrogel beads are cost effective, ecofriendly and biodegradable for the removal of Pb (II) metal ions from waste water.

**An Efficient Fe/ZnO/Ceramic Layered Composite for Solar-Photocatalytic Degradation of Humic Substances from Municipal Wastewater**

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**Abstract**

Currently, upgradation of wastewater treatment plant is underway and demanding more innovative, sustainable and energy neutral process such as Zero-cost photocatalytic degradation. Herein, solar-photocatalytic degradation of HA (Sources: industry, municipal and public wastewaters) has been principally assessed using Fe/ZnO/Ceramic composite synthesized by successive ionic layer adsorption and reaction approach. Fe/ZnO/Ceramic composite effectively removed humic substances (700 mg/L@5.6kgm<sup>-3</sup>d<sup>-1</sup>) with significant reduction of BOD, COD and TOC. High removal rates are possibly due to reduction of ZnO band gap to 3.15 eV when doped with Fe which enabled Fe/ZnO/Ceramic to absorb visible radiations efficiently. The stability of Fe/ZnO/Ceramic composite was found even strong after continuous operation of 22 reuse-cycles, due to strong bonding between ceramic and Fe-ZnO. It is believed Fe/ZnO/Ceramic composite would definitely assist in the development of most economical and energy neutral water/wastewater treatment system.

**Keywords:** Humic substances; Nano-Environment; Photocatalytic degradation; Industrial wastewater

**Eco-Friendly Silk Dyeing using *Anthraquinoid* Natural Dye Isolated From Cochineal Insect (*Dactylopius Coccus*)**

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**Abstract**

Current study is the microwave assisted exploration of natural anthraquinoid dye (carminic acid) from cochineal insect (*Dactylopius coccus*) and its application onto chemical and bio-mordant silk fabrics. Natural anthraquinone dye (carminic acid) was isolated from cochineal under microwave treatment for 1-6 min in aqueous, acidic and organic media to obtain excellent color yield onto silk fabric. Dyeing of un-irradiated and irradiated silk was carried out using un-irradiated and irradiated respective extracts. For improving shades with good fastness rating, 1-10% of eco-friendly chemical mordant such as salt of Al (Aluminum sulphate) and 1-10% of bio-mordants such as extracts of pomegranate (*Punica granatum*) and accacia (*Acacia nilotica*) were used. It is found that irradiation of acidic extract for 3 min has given good results on irradiated silk. Bio-mordanting has given excellent colour strength than that of chemical mordants used and ISO standards for fastness properties employed show that microwave treatment upon pre and post mordanting of silk using has improved the rating form good to excellent. It is concluded that microwave radiation has an excellent potential to improve the dyeing behaviour of natural anthraquinone colorant for silk dyeing.

**Keywords:** Acacia, bio-mordant, carminic acid, colorfastness, Cochineal, pomegranate, silk

## **Kinetics of Pyrolysis of Waste Polystyrene**

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### **Abstract**

In the present study pyrolysis of waste polymers was carried out in the presence and absence of catalyst in special furnace under inert condition by using nitrogen as inert gas. The pyrolysis products (liquid, gas and char) were collected in separate fraction and analyzed by various techniques i.e., GC/MS, FTIR etc. The oil properties were determined by standard and non-standard techniques and compared with the standard values. Hence optimum temperature and optimum flow rate of inert gas were determined. Whereas, the kinetic study is concerned, the waste polymers were analyzed by thermogravimetry at different heating rates under inert condition. The thermogravimetric data obtained was interpreted by using various models. All the kinetic parameters were calculated, and the most suitable model was investigated, which play key a role in industrial and engineering processes.



**Microbial-Free Water using Titanium Dioxide Nanoparticles: A Simple and Low-Cost Approach**

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**Abstract**

We report synthesis of TiO<sub>2</sub> nanoparticles using sol-gel method and their use as antimicrobial photocatalyst in water purification. The prepared nanoparticles were analyzed using X-ray diffraction (XRD) and scanning electron microscopy (SEM). TiO<sub>2</sub> nanoparticles belonging to the phase anatase were obtained with average particle size ca. 22 nm as determined by Debye-Scherrer equation. For water purification treatment, transparent plastic bottles were coated on the inside with TiO<sub>2</sub> nanoparticles, filled with water samples and irradiated under sunlight for 24 hours. Samples were then analyzed for pH, electrical conductivity (EC), total dissolved solids (TDS) and colony forming units (CFU). The results showed a considerable variation in all these parameters with approximately 100% microorganisms-free water as compared to uncoated water containers. This method is cheap and can be used at large scale for water purification.

**Key words:** water purification, photocatalyst, titanium dioxide, CFU, TDS, antimicrobial activity

**Synthesis and Characterization of Ni-Based Uniform Particles for Electrochemical Energy Storage Devices**

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**Abstract**

The current study addresses two aspects of Ni-based particles for electrochemical capacitors application, i.e., (a) stability of electrode material in alkaline medium, and (b) uniformity in particle size and shape.  $\alpha$ -Ni(OH)<sub>2</sub> show good performance in electrochemical applications, however, the lower stability of  $\alpha$ -Ni(OH)<sub>2</sub>/ $\gamma$ -NiOOH couple in alkaline medium is the main bottleneck associated with this material and eventually  $\beta$ -Ni(OH)<sub>2</sub>/ $\beta$ -NiOOH couple is evolved upon cycling. To address this issue, various metals are incorporated into the matrix of  $\alpha$ -Ni(OH)<sub>2</sub> to get layered double hydroxide structure which is stable in alkaline conditions. On the other hand, uniformity in particle size and morphology of particles is considered essential for batch-to-batch reproducible results in all powder based technologies. Surface area and exposed crystal planes of nickel hydroxide/oxide significantly affect their performance in practical application. Therefore, control over the particle shape and size of the electrode material is considered essential during its synthesis for producing nickel hydroxide/oxide powder, composed of particles with identical morphological features. Such features strongly depend on precipitation conditions and nature of reactants. For this reason, we have chosen homogeneous precipitation route which provide better control over particle size and morphology.

**Key words:** Synthesis; Energy materials, Nickel, uniform particles, homogeneous precipitation

**Photocatalytic Degradation of Bezafibrate using Exposed {001} Facets TiO<sub>2</sub> Thin Film**

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**Abstract**

The role of iso-propanol was investigated on the photocatalytic activity and enhanced stability of high energy {001} facets TiO<sub>2</sub> film. The high energy {001} facets TiO<sub>2</sub> film showed photocatalytic activity nearly 2.6 times higher than conventional P25 film coated on Ti-substrate. The as synthesized catalyst was characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscope (TEM), Raman spectroscopy, X-ray photoelectron spectroscopy (XPS), and UV-vis absorption spectroscopy. The size of the as synthesized anatase single crystals was ca. 380 nm, exposing 57.00 % high energy {001} facets. The photocatalytic activity was evaluated by using pharmaceutical pollutant, Bezafibrate (BZF) in aqueous solution under UV-light. From the stability experiments it was found that the stability of {001} facets was highly increased when the hydrothermal solution was mixed with optimum dose of iso-propanol. Results revealed that the photocatalytic activity of a pharmaceutical pollutant, Bezafibrate (BZF) in aqueous solution under UV-light was greatly enhanced after calcination procedures at 600°C, which may be due to oxygen deficiency related to Ti<sup>+3</sup> or Ti<sup>+2</sup>. Photocatalytic degradation intermediates of BZF were analyzed by ultra-performance liquid chromatography, UPLC-MS/MS.

**Keywords:** {001} facets TiO<sub>2</sub> film, iso-propanol, photocatalytic stability, Bezafibrate, hydrothermal treatment, degradation intermediates

**Investigation of Cadmium (II) Adsorption from Aqueous Solutions of Cadmium-Calcium Chloride on Natural Soils of Various Cities of Pakistan and isotherms**

Jawad Ashraf

**Abstract**

Cadmium ( $Cd^{2+}$ ) is found to be very toxic and hazardous for life even in a minute quantity. Adsorption capacity and kinetic attitude with soil matrix are major parameters to determine mobility of heavy metals in soil water environment. The purpose of this study is to investigate cadmium adsorption occurring in soil matrix which is performed in feigned conditions (lab conditions) for analysis. The basic analysis such as pH, EC, SAR, texture composition, cation and anion measurement (Na, K, Ca, Mg,  $Cl^-$ ,  $CO_3^{2-}$  and  $HCO_3^-$ ) were determined by respective chemical analytical techniques. Four soil samples of different textures (based on clay contents from high clayey to low clayey soil) were exploited to quantify cadmium retention on clay minerals from aqueous solutions of cadmium-calcium chloride of various input concentrations i.e. 25, 50, 75, 100 and 125 mg L<sup>-1</sup>. Soil of 3 g was mixed in 30 ml cadmium containing solution with  $CaCl_2$  as background reagent. Adsorption process was performed in triplicates at constant temperature of 25 °C. Experimental inference explored that cadmium had been adsorbed on clay in following order: Highly clayey soil > Medium clayey soil > Medium to low clayey soil > Low clayey soil. Freundlich model of isotherm was applied to analyze data. Acquired data was processed to graphical representation and statistical models such as ANOVA for evaluations, effects and treatments efficacy as well as analyzed by adsorption isotherms.

**Dye Removal from Colored Aqueous Solution using  
Indigenous Adsorbents**

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**Abstract**

Water is essential for life as it is best solvent and is used widely for drinking, washing and cleaning. The use of water for human benefit results in its pollution by addition of different wastes and chemicals. Water is polluted in different ways by mixing of different environmental wastes like animal waste, organic matter, minerals, pesticides, insecticides, fertilizers, dyes, pigments. Textile dyeing is one of the major fields that adds enough to pollution of water and is major source of water pollution. Orthodox technologies used for eliminating colour from industrial waste water but are very costly. An alternative and cheap way for the removal of dyes from the waste water is studied. Three adsorbents i.e. banana bark, rice straw and wheat straw were used without any treatment, having a particle size less than 841 micron to remove Disperse blue 106 (BT. B) dye and Reactive red 195 (C.R) dye from their aqueous solution. Experiments were performed in the batch method. All the experiments performed under various variables such as dose of the Bio-adsorbent, shaking time, dye concentration, pH and nature of the Bio-adsorbent. Experiments were performed for both shaking and static condition.

**Key Words:** Dye removal, Industrial effluents, Natural adsorbents, Reactive red 195, Disperse blue 106

**Transition Metal-Doped ZnO@G Hybrid for  
Electrophotocatalytic Degradation of Insecticide  
Imidacloprid from Wastewater**

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**Abstract**

Globally excessive use of pesticides to accelerate the food production is one of the major causes of water pollution. Present study is focused on the photoelectrocatalytic (PEC) degradation of imidacloprid residues by using Co/Ni/ZnO/graphite hybrid (Co/Ni/ZnO@G hybrid). Highly crystalline Nanaoflakes of Co/Ni/ZnO over graphite were prepared by Sol-gel method. X-ray diffraction spectra of Co/Ni/ZnO confirmed the formation of hexagonal wurtzite structure of synthesized Co/Ni/ZnO@G hybrid. Reduced peaks intensity in the range of 1500-1600 cm<sup>-1</sup> (due to N=N (amide group) of imidacloprid) and 2100-2200 cm<sup>-1</sup> (nitrile group) in FTIR spectrum of imidacloprid containing wastewater after PEC treatment clearly depicted the effective degradation by Co/Ni/ZnO@G hybrid. Furthermore, degradation of imidacloprid in wastewater using Co/Ni/ZnO@G hybrid in PEC reactor was also monitored by measuring the absorbance of effluent at wavelength of 269.5nm by using UV-Visible spectrophotometer. Complete disappearance of peak at 269.5nm of wavelength indicated that wastewater sample containing imidacloprid was efficiently degraded in PEC reactor within 90 min of exposure to sunlight and at applied voltage of 12 volts. In addition to this, these results were also confirmed by % reduction in water quality parameter COD (88%), BOD (81%) and TOC (85%), indicating the successful PEC degradation of imidacloprid in wastewater using Co/Ni/ZnO@G hybrid.

**Mitigation of Hazardous Effects of Mercury Pollution on Wheat Seedlings Through *Trichoderma Harzianum* Seed Coating Treatment**

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**Abstract**

This research was performed in botany department of Nusrat Jahan College Rabwah Chenab Nagar to evaluate the potential of *Trichoderma harzianum*, fungus seed coating on two wheat cultivars namely “Shafaq-06” and “Punjab-11” in mitigating mercury stress. Seeds of wheat cultivars and *Trichoderma* fungus were taken from NARC PAKISTAN. Seeds after surface sterilization were coated with *Trichoderma* at the rate of  $2 \times 10^7$  CFU using pelgel for 24 hours and then they were air dried for 12 hours. After air drying seeds were sown in cups of sand and seedlings were harvested after thirty days of sowing. Mercury stress (S1:30mM and 40mM) was applied at two leaf stage. Seedlings (roots and shoots separate) were preserved in potassium phosphate buffer (50mM) and were then subjected to different biochemical tests. Results of these tests revealed that *Trichoderma harzianum* seed coating very positively overcame mercury stress by triggering production of ROS scavenging proteins and preventing from oxidative damages.

**Key words:** wheat, mercury, *Trichoderma harzianum*, seed coating

**Biogas Production using Animal Wastes as an Alternative Energy Source for Sustainable Rural Development**

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**Abstract**

In Rural areas, livestock keeping offers a great opportunity to combat poverty in Pakistan like many other developing countries. Most of the resource poor rural livestock keepers (95%) are living in extreme poverty. Income from livestock and their by-products – milk, eggs, meat, wool, leather, could allow poor families to put food on the table, improve their livelihood, nutrition, send their children to school and purchase medicine for themselves and their livestock. Rural communities traditionally use livestock-dung cakes and fuel-wood as a source of energy in Pakistan. Seventy five percent of the total energy used by a rural household is consumed for the two basic necessities; cooking and lighting. Literature review has revealed that the annual per capita fuel-wood requirement is 0.52 m<sup>3</sup> that implies a consumption of 5.20 m<sup>3</sup> of fuel-wood for a family of 10 persons per year. Thus, a single family may cut three to four mature trees in a year just to meet its domestic energy needs leading to natural degradation of natural forests.

**Key Words:** Eco-Friendly, Poverty Alleviation, Livestock, Renewable Energy



**Green Synthesis and Biological Evaluation of Novel 5-Fluorouracil Derivatives**

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**Abstract**

5-Fluorouracil (5-FU) based derivatives or combinations are the most widely prescribed chemotherapeutic medicines. The co-crystallization of 5-FU is a novel derivatization technique that relies on the presence of hydrogen bond donor and acceptor groups in the 5-FU molecule. There are outstanding advantages associated with this technique like easy fabrication protocols, 5-Fluorouracil (5-FU) based derivatives or combinations are the most widely prescribed no temperature maintenance requirements, no need of expensive solvents, hardly available apparatus, isolation and purification of the desired product. In addition, there is no byproducts formation; in fact, a phenomenon embracing the requirements of green synthesis. In the present study, two fabrication schemes were followed i.e., solid state grinding protocol, in which API and co-formers were mixed through vigorous grinding while in the other method separate solutions of both participants were made and mixed together. Urea, Thiourea, Acetanilide and Aspirin were selected as co-formers and methanol as a solvent in both the methodologies. In FTIR and PXRD spectra, significant shifts in the anticipated peaks of co-crystals in comparison to the API were indicative of the changes in the already present interactions. In addition, percent growth inhibition was also observed through MTT assay against HCT 116 colorectal cell lines *in vitro*.

**Keywords:** 5-Fluorouracil derivatives, Co-crystals, green synthesis and supramolecular interactions

**Morphological Studies of Environmentally Friendly  
Pressure Sensitive Adhesives by Tapping Mode Atomic  
Force Microscopy**

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**Abstract**

The polyurethane pressure sensitive adhesive (PUPSA) films have been prepared on polypropylene sheets with coating bars. The topographical information of the dried films is investigated using phase images by using Atomic Force Microscope (AFM) in tapping mode. The film develops a segmental architecture by using different compositions. Various samples of PUPSA comprising of polypropylene glycol PPG ( $M_n = 425, 1000, 2000$  and  $2700 \text{ g}\cdot\text{mol}^{-1}$ ) and hydroxyl terminated polybutadiene HTPB ( $M_n = 1984$  and  $2912 \text{ g}\cdot\text{mol}^{-1}$ ) along with three different isocyanates: 1,6 hexane diisocyanate (HDI), isophorone diisocyanate (IPDI) and hexamethylene diisocyanate (H12MDI) have been used for capturing the images through AFM. The samples contained 40 wt.% of solid content containing different nature of macrodiols and diisocyanate. Due to varying composition, dispersion in domain area along with different contour and dimension has been observed in the images. Apparently, there seems no correlation of spherulites and lamellae in different domains. However, the properties imparted by high molecular weight HTPB resulted in non-adhesive stiff material.

**Keywords:** Polyurethane, pressure sensitive adhesives, Morphology, AFM

**Extraction of Phytochemicals from *Fagonia arabica* and their Antimicrobial Activity**

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**Abstract**

Plants contain useful phytochemicals that remained most easily accessible, affordable and beneficial for human being. The local people are using them for a long historical period for medicine, food and vegetable purposes. In current study *Fagonia arabica* was used. Phytochemicals were extracted by using four different solvents ethanol, methanol, chloroform and water. Concentration of total phenolics, photosynthetic pigments and carotenoids was calculated. Effectiveness of these phytochemicals was determined by antimicrobial activity on four bacterial strains (*E.coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus pyogenes*, and one fungal strain *Candida albicans*). *E.coli* has maximum zone of inhibition (ZOI) in ethanol extract (11.66mm), medium zone of inhibition in methanol and chloroform (9.76mm and 9.56mm) and least in water (7.56mm). *Pseudomonas* showed more zone of inhibition in methanol (13.1mm) , medium zone in Chloroform ( 12.43mm) ,less ZOI in ethanol(11.34 mm) and least in water (10.66mm). *Staphylococcus* showed maximum ZOI in ethanol (13.68mm), medium in chloroform (12.69mm) and less in methanol (7.30mm) and least in water (7.29mm). *Streptococcus* showed maximum in ethanol (12.11mm), medium in methanol (11.65mm), less in chloroform (7.65mm) and least in water (7.35, mm). In case of *Candida* methanol extract showed maximum value of (7.69mm) and other extracts showed ZOI ranging from 7.00mm-7.34mm. Phytochemicals from plants can be proved useful natural sources.

**Dye Sequestration using Calcined, Alginate Hybrid Materials**

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**Abstract**

Waste water especially water from textile industries is rich in dyes which have serious detrimental effects on human health and this waste water is being discharged in the drinking water sources without any treatment. One of the main hindrance in the treatment of water in developing countries like Pakistan is high cost of available techniques. In this scenario adsorption is the low cost and easily doable method for dyes removal. The present study aimed to develop cheap, sustainable, and easily available adsorbent materials for the removal of dyes from water effluents. Clay, alginate and their hybrid materials were used as adsorbents. Various factors such as pH of dye solution, temperature and contact time of dye with adsorbent were carefully controlled to obtain the optimum values for the best results. Characterization and analysis were done by various spectroscopic techniques. ANOVA and post-hoc Tukey test were used for statistical analysis of experimental results.

**Keywords:** Clay, alginate, hybrid materials, dyes, pollution

**Hydrothermal Synthesis of Fine Stabilized Superparamagnetic Nano-Particles of Manganese Ferrite and their Application in Photocatalytic Degradation of Methylene Blue**

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**Abstract**

The hydrothermal process was used to synthesize zinc doped manganese ferrite  $MnFe_2O_4$  to investigate its photocatalytic activity. The photocatalytic activity of synthesized ferrite was studied by degradation of Methylene Blue dye. X-Ray diffraction confirmed the formation of cubic hexagonal spinel structure. FTIR was studied in between 500 to  $4000cm^{-1}$  show absorption bands for Fe-O bond at  $442cm^{-1}$ . Particle size was calculated by X-Ray study range from 24nm. Photocatalytic activity of nanoferrites samples was evaluated by irradiating the solution of methylene blue organic dye to ultraviolet light of intensity 500W. The experiments reveal that different conditions for Mn ferrites were optimized towards photodegradation. 30mg of photocatalyst has maximum efficiency for degradation of MB at pH 2 within 5 minutes. These nanoparticles could be potentially used for treatment of water system contaminated with organic dyes.

**Keywords:** Mn ferrite nanoparticles, photocatalytic degradation, methylene blue dye

**Ethnobotanical Study of *Pistacia lentiscus* L. in Algeria  
and its Role on the Environment and Health**

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**Abstract**

*Pistacia lentiscus* L. commonly called lentisk or mastic, 'Derou', 'Tadist' or 'Tidekt' in local language, has many useful properties in Algeria. This shrub is famous for producing the vegetable oil, especially in the Jijel Wilaya/province located at 340 km northeast of the country's capital. The coordinates of the study area are: 36°49'N 05°45'E. The study was conducted in this region for the reason of the availability of the mastic shrub in this area as well as for the various indigenous uses of the different part of the plant. This communication aims at emphasizing the importance of the ethnobotanical study of this plant to the conservation and development of its properties. Ethnobotanical surveys were conducted in April 2017 and December 2018. The target segment of society is a homogeneous sample of 70 probed people composed of 20 female and 50 male including residents, herbalists, employers, civil servants and farmers. The questionnaire was distributed to the sample population according to the following considerations: personal information, education level, family situation, type of collector, origin of the information, type of disease treated with lentisk, part of the plant used, collection period of this plant and other traditional knowledge of the lentisk or mastic tree.

**Keywords:** *Pistacia lentiscus* L.; ethnobotanical study; Algeria

**Synergetic Effect and Kinetics Study of Co-Pyrolysis of Sugarcane Bagasse and Sewage Sludge**

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**Abstract**

The management and effective utilization of potential wastes such as lignocellulosic biomass and sewage sludge blends are gained much attention because of their increasing volume, their localized generation and related problems. The purpose of this study is to explore the feasibility of the co-pyrolysis of biomass, sewage sludge and their mixture as a potential management technology of these residues. To investigate the synergetic effect, bagasse (B), sewage sludge (S), and their blends of different proportions (100% B, 70% B/30% S, 50% B/50% S, 30% B/70% S, and 100% S) are pyrolyzed in a thermogravimetric analyzer at a heating rate of 20 °C/min. Synergistic effect was more pronounced when 30% sludge was added to the sugarcane bagasse. 50% sludge had a slighter positive effect on the pyrolysis whereas increasing the sludge up to 70% affected negatively on the formation of volatiles. Kinetic and thermodynamic analyses of co-pyrolysis process were investigated with seventeen reaction mechanisms using Coats and Redfern method for kinetic and thermodynamic evaluation during two temperature phases I (200-400°C) and phase II (400-600°C) in the activate pyrolysis zone. Blend of 70% bagasse 30% sewage sludge has highest values of activation energy and pre-exponential factors among all other blends for all reaction mechanisms.

**Keywords:** Sugarcane bagasse, sewage sludge, co-pyrolysis, kinetics

**Ultrasonic Assisted Isolation of Bio-Colorant (Tannin)  
from Coconut Husk and its Application onto Bio-  
Mordanted Wool Fabric**

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**Abstract**

Due to non-toxic nature and health concerning matters, the bio-colorants are gaining worldwide fame in different applied fields such as textiles, foods, cosmetics, pharmaceuticals etc.. Coconut coir (*Cocos nucifera*) which contains tannin as bio-colorant, has been selected for dyeing of bio-mordanted wool fabric. Extraction was carried out using aqueous and acidic and organic media. The extracts and fabrics were ultrasonic treated irradiated for 15-60 minutes. To get optimum results, dyeing of treated and un-treated fabrics were carried out using treated and un-treated extracts. For optimum coloring variable, dyeing of fabric was carried out using methanolic extract of 1-7 pH containing 1-10g/100ml of table salt as exhausting agent. For improvement in rating of colorfastness, pomegranate and turmeric extracts as bio-mordant have been employed using optimum extraction and dyeing condition. All dyed samples were investigated using Spectra Flash SF 600. The results showed that ultrasonic treatment to both extract and fabric has improved the colour strength of wool fabric whereas ISO standard methods for rating of fastness show that bio-mordanting has improved the properties from good to excellent.

**Keywords:** Bio-mordant, Coconut coir, Colorfastness, Ultrasonic radiation, wool, Tannin



**Reduced Graphene Oxide and Ni Hybrid as Sustainable Materials as Filler For Polymer Composites with Enriched Electrical Character**

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**Abstract**

Graphene and related entities, 2D single layer materials of carbon atoms, are excellent charge carrier, remarkable semiconductor with zero band gap and possess unusual half-integer quantum hall effect. Along these extraordinary electrical features, outstanding mechanical strength made them potential sustainable materials to be used in modern days electronic devices with high efficiency. In present work, composite films of poly methylmethacrylate (PMMA) with blend of Ni and rGO (Ni-rGO) at various weight percentages, but having same thickness, have been fabricated. Synthesis of the Ni-rGO and its composites with PMMA (Ni-rGO/PMMA) has been characterized by UV-Visible and FTIR Spectroscopy. To explore the electrical character of the synthesized composites, capacitance/dielectric constant and resistance/conductivity measurements of the composite were made by using LCR meter at various frequencies for composites with different filler compositions. Promising values obtained for tangent loss for synthesized composites encourage their used as electronic devices of low energy consumptions.

**Keywords:** PMMA, rGO, Ni, Composites, Conductivity and Dielectric constants

**Synthesis of Silver Magnetic Nanocatalysts and their Investigation for the Catalytic Reduction of Chlorantraniliprole (Pesticide)**

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**Abstract**

Silver magnetic nanocatalysts were synthesized and investigated for the catalytic reduction of chlorantraniliprole (pesticide). The reaction progress was investigated spectrophotometrically. The synthesized nanocatalysts were characterized by FTIR, concentration of Ag in those was determined by ICP-OES while, combination of solvent was selected by the help of TLC. The degraded product was separated by column chromatography. 75 fractions of 5mL were collected and their UV/Vis spectroscopic analysis was done. 1-35 fractions [A] were executing almost same spectra and 35-75 fractions [B] were exhibiting same. After pre concentration of A and B their UV/Vis, FTIR and HPLC analysis was performed. In the light of all these results it was proposed that CAP (3-bromo-N-[4-chlore-2-methyl-6(methylcarbomoyl)phenyl]-1-(3-chloro-2-pyridine-2-yl)-1H-pyrazole-5carboxamide) was degraded into 2-(3-bromo-1-(3-hydroxypyridin-2-yl)-1H-pyrazol-5-yl)-6chloro-3, 8-dimethylquinazolin-4(3H)-one).

**Nutritional and Medicinal Benefits of Bioactive Compounds Extracted from Avocado Pulp (Ceylon Blue)**

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**Abstract**

The purpose of this research project was to determine the nutritional as well as medicinal potential of avocado pulp (Ceylon blue). Ultrasonically assisted extraction was done using different solvents (like water, ethanol, methanol and acetone). The chromatogram obtained from the HPLC showed the presence of bioactive compounds such as Neoxanthin, Luteoxanthin, Lutein, Zeaxanthin,  $\alpha$  – carotene,  $\beta$  – carotene and Possible xanthophylls are present in pulp of the avocado. After the characterization, extracts were analyzed to evaluate the antioxidant capacities including TPC, TFC and DPPH. The results showed that DPPH value is significant in *n*-hexane solvent and for TPC, ethanol solvent showed significant values. Acetone extract had rich value for TFC. Antibacterial and antifungal activity of avocado seeds was investigated by using bacterial strains (*Bacillus Subtilis* and *Escherichia coli*) and fungal strains (*Aspergillus niger* and *Fusarium solani*). Measured inhibition zone indicated that the *n*-hexane extract of avocado pulp showed maximum antibacterial activity followed by acetone, methanol and ethanol extract. Antifungal activity exhibited maximum by methanol extract followed by acetone, ethanol and *n*-hexane extract.

**Keywords:** Avocado pulp, Ultrasonication, bioactive compounds, antioxidants, medicinal effects

**Treatment of Textile Effluent by Solar Photocatalysis for Irrigation**

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**Abstract**

Solar photocatalysis is a promising technique to degrade the dye residues present in textile effluent, economically. In this study, a series of Fe<sup>3+</sup> doped ZnO photocatalysts have been synthesized through microwave assisted sol-gel method. The crystallinity and elemental composition of fabricated material was determined by X-ray diffraction (XRD). Two-dimensional disc shaped morphology of Fe<sup>3+</sup>-doped ZnO photocatalyst and elemental composition was examined by SEM, TEM, HRTEM, STEM and EDX. Diffused reflectance spectroscopy (DRS) confirmed its high photocatalytic activity in solar range on reduction of band gap from 3.2 to 2.8 eV after doping. The optical and surface properties determined by photoluminescence (PL), contact angle and zeta potential further supported the hydrophilic nature of the catalyst synthesized. The characterized Fe<sup>3+</sup> doped ZnO powdered samples have been used to degrade RB5 dye on irradiating with artificial sunlight (D65). The reaction parameters i.e. initial dye and oxidant concentration, pH and irradiation time have been optimized by Response surface methodology (RSM). The extent of dye degradation has been evaluated by UV/vis and FTIR spectroscopy.

**Keywords:** Textile effluent, solar photocatalysis, response surface methodology, phytotoxicity

**Uptake of Nitrogen and Phosphorous from Municipal Wastewater for Microalgae Cultivation and Wastewater Treatment**

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**Abstract**

Microalgae due to its photosynthetic ability has tendency to remediate highly nutrient containing wastewater. In this investigation, an indigenously isolated microalgae stain; *Scenedesmus* was used for municipal wastewater treatment. The isolated strain was cultured in municipal wastewater. Physiochemical parameters such as pH, EC, TDS, chemical oxygen demand, total nitrogen, total phosphorus, etc. of municipal wastewater were evaluated before and after algae cultivation. It was observed that *Scenedesmus* has best nutrient removal capability i.e. 85.5% reduction in total nitrogen, 83.2 % reduction in phosphorus concentration and 89.3 % reduction in COD. The obtained microalgae biomass was used for lipid extraction and de-oiled microalgal biomass was further used for the adsorptive removal of Reactive Red 120 (RR 120) dye from aqueous solution. To check the adsorption potential of de-oiled microalgal biomass, batch mode experiments were carried out. De-oiled microalgal biomass was used in H<sub>2</sub>SO<sub>4</sub> treated, immobilized and in polyaniline composite form. The study results revealed that *Scenedesmus* de-oiled biomass has good potential for the removal of RR 120 synthetic dye. Maximum dye removal by using H<sub>2</sub>SO<sub>4</sub> treated, immobilized and polyaniline composite was 713.02, 682.52 and 752.68 (mg/g) respectively. Kinetic study showed best fitness of pseudo second order kinetic model and experimental data was best fitted with Freundlich adsorption isotherm model.

**Key words:** Microalgae, municipal wastewater, physiochemical parameters, nutrient removal, adsorption

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**Zinc-Magnesium Bimetallic Nanoparticles: Synthesis,  
Characterization and Catalytic Application**

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**Abstract**

Zinc-magnesium (Zn-Mg) bimetallic nanoparticles are synthesized by reflux assisted co-precipitation method employing precursor salts magnesium acetate and zinc acetate, surfactant tri-sodium citrate, solvent ethanol and reductant phenyl hydrazine. Energy dispersive X-ray spectroscopy is used to determine the chemical composition of product. X-ray diffractometry is used to determine lattice parameters and to predict the structural model of product. The morphology and size of particles are analyzed by scanning electron microscopy. Synthesized product is used to catalyze the reduction of organic compounds: 4-nitrobenzoic acid, 4-nitrophenol and reactive carbon black 5 dye. The catalyst is found to be more active towards 4-nitrobenzoic acid as compared to 4-nitrophenol and dye. Synthesized product is found to be an efficient catalyst for towards nitroarenes substituted with electron withdrawing groups.

**Facile Synthesis of Mono Disperse Copper Oxide Nanoparticles by using *Allium sativum* for Catalytic Applications**

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**Abstract**

In present study synthesis of Copper oxide (CuO) nanoparticles was carried out in aqueous media by using leaves extract of *Allium sativum* as reducing agent as well as capping agent. The optical and structural properties of CuO nanoparticles were investigated by employing various characterization techniques including UV/Visible spectroscopy, Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD). The results of UV/Visible spectroscopy revealed that formed nanoparticles were monodisperse in nature and plant extract controlled the particle size as effectively. The Fourier transform infrared spectrum of copper oxide nanoparticle revealed that amines and phenolic groups of plant were responsible for the formation and stabilization of CuO nanoparticles. The best yield of nanoparticles was obtained in plant mediated fabrication at pH 12 using 1M salt, temperature and heating temperature of 50°C and 30 minutes, respectively. The catalytic properties of plant were studied by conducting their photo-catalysis on methylene blue, and 4-Nitro Phenol. The degradation followed 1st order reaction kinetics and the maximum degradation efficiency obtained for Methylene blue after 15 minutes 75.67%, for 4-Nitro Phenol after 20 minutes 85.98%.

## Solar Photocatalytic Removal of Natural Organic Matter using Fluorinated Calcium Zincate Grafted on Gravel

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### Abstract

Herein, removal of NOM using fluorinated and non-fluorinated calcium zincate composite grafted over gravel by spray pyrolysis method has been reported. The fabricated material was characterized by scanning electron microscopy (SEM), energy dispersive X-ray (EDX), Fourier transforms infrared spectroscopy (FTIR) and X-ray diffraction spectroscopy (XRD). Reaction parameters like initial concentration of NOM, concentration of oxidant (H<sub>2</sub>O<sub>2</sub>), pH and irradiation time was optimized using Response surface method (RSM). Later on, photocatalytic activity of fluorinated/non-fluorinated calcium zincate under the conditions optimized by RSM for degradation of NOM in municipal wastewater upon sun light exposure was determined. Extent of degradation of NOM was measured via UV/visible spectrophotometry, Fourier transform infrared spectroscopy (FTIR) and high performance liquid chromatography (HPLC). Water quality parameters such as biological oxygen demand (BOD), chemical oxygen demand (COD) and total organic carbon (TOC) was determined before and after treatment.

**Keywords:** Natural organic matter (NOM); nano composites; photocatalysis; response surface methodology



**Parasites as Bio-Indicators Pollution of Environmental**

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**Abstract**

Parasites are ubiquitous organisms exhibiting great bio-diversity. They are important modulators maintaining the integrity of food webs. They have well-established role in understanding the environmental change at global level. Due to wider spread distribution and greater accumulation potential, the parasites are known to carry more weightage than other bio-indicators. The parasites can bioconcentrate the amounts of heavy metals like Arsenic, Beryllium, Cadmium, Chromium, Iron, Lead, Manganese, Mercury, Selenium, Silver, etc., thus sensitively detecting their presence in ecosystem. The detection of these heavy metals and other toxic chemicals mediated by sentinel orders of metazoan parasites (acanthocephalans, cestodes, nematodes and digeneans) is possible by conventional Laboratory methods like spectroscopic analysis, quantitative volumetric titration, etc. For study of bio-indicator ectoparasites, the skin, fins, eyes, ears, gills, mouth and gill cavity and the inner organs such as the digestive tract, liver, spleen, kidneys, reproductive tract, heart, gall bladder and swim bladder of hosts can be checked for endo-parasites.

**Keywords:** Environment, parasites, bio-indicators

**The study of antioxidant and antimicrobial activity of crude extracts of *Cassia absus* and *Citrus medica* collected from Tehsil Burewala, Punjab, Pakistan”**

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**Abstract**

The present research focused on the antioxidant activities, antimicrobial activities and phenolic compound analysis of crude methanolic extract fractions of two medicinal plants *Cassia absus* and *Citrus medica* of Fabaceae and Rutaceae families collected from Burewala, Punjab, Pakistan. Five fractions have been collected from partition fractionation of crude methanolic extract. Polar solvents methanol, ethanol, acetic acid and acetone gave high yield than that of less polar solvent ethyl acetate as compared to nonpolar n-hexane solvent fraction. The solvent fractions were evaluated for their phenolic profiling, antioxidant and antimicrobial activity. Antioxidant activity (AA) was determined by measuring reducing power, inhibition of linoleic acid peroxidation and 2, 2-diphenyl-1-picrylhydrazyl radical (DPPH) scavenging assay. Significant ( $p < 0.05$ ) differences were observed in the TPC, TFC, inhibition of linoleic acid oxidation and DPPH scavenging activity of leaves extracts. All the extracts also showed remarkable antimicrobial activity. Overall results of the study showed that methanol fractions are good source of natural antioxidant and antimicrobial compounds, and thus can be utilized in herbal formulations.

**Synthesis of Molybdenum, Tungsten Supported Calcium Oxide (MoW-CaO) And Its Role in Transesterification of Mustard Oil**

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**Abstract**

Biodiesel envisioned to swap the fuel from non-renewable energy sources. In the last ten years, development of substitute fuels has been extensively considered because of the diminution of fossil fuels and increased apprehensions for the environment. The one step transesterification reaction in the presence of molybdenum, tungsten supported calcium oxide (MoW-CaO) to use Mustard oil is planned as an alternative cost-effective method to produce biodiesel. The catalyst was prepared by the wet impregnation method and characterized by FT-IR, X-ray diffraction, scanning electron microscopy and energy dispersive X-ray analysis. The catalytic activity of catalyst to convert mustard oil into biodiesel has been studied in different parameters like the molar ratio of alcohol, catalyst concentration and time of reaction. It has been investigated that synthesized catalyst is capable for almost 50% transformation of mustard oil into biodiesel. The FT-IR and <sup>1</sup>H NMR studies confirmed the successful conversion.

**Key Words:** Biodiesel, transesterification, heterogeneous catalyst, vegetable oils, methyl ester, glycerol

**Degradation of the antibiotics by Advanced Oxidation Process**

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**Abstract**

The presence of antibiotics in sewage, drinking and surface water is of great concern now a day so a considerable attention need to remove antibiotics. The advanced oxidation processes (AOPs) have gained popularity due to its effectiveness. The present aimed to use UV/H<sub>2</sub>O<sub>2</sub> for degradation and detoxification of Moxifloxacin as a model compound in aqueous media. The 50 and 100 mg/L samples were treated using UV radiation for 1-5 minutes alone and then in conjunction with hydrogen peroxide. The maximum degradation was observed as 51.95% and 57.89% while the reduction in COD value of 49% and 56% achieved when the drug aqueous solutions were exposed to UV and UV/H<sub>2</sub>O<sub>2</sub> respectively at 5 minutes exposure time. The change in absorbance after each treatment was observed at 295 nm ( $\lambda_{max}$ ) and High-Performance Liquid Chromatography (HPLC) while Gas Chromatography-Mass Spectrometry (GC-MS) and Fourier Transform Infrared Spectroscopy (FTIR) was conducted to monitor the radiolytic end products. The FTIR study showed that all the peaks were disappeared except a minor peak after treatment and no characteristics peak was observed using GC-MS. The cytotoxicity of the drug samples was checked using Allium Cepa, Brine Shrimp and Hemolytic test while mutagenic evaluation was carried out using the Ames test before and after each radiation treatment. For the degradation of Moxifloxacin, it was concluded that UV/H<sub>2</sub>O<sub>2</sub> is a more efficient method as compare to UV alone. The data was

statistically optimized using response surface methodology (RSM).

**Keywords:** Moxifloxacin, Mutagenicity, UV radiation, Cytotoxicity and Advanced Oxidation Process

**Neat Synthesis of Bio-Active Copper (II) (Z)-N-(2-Amino-4-Methylphenyl)-N-Phenylbenzamide And Its Light-Driven Photo Catalytic Activity**

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**Abstract**

In search of the bio-active and photo-active material, the neat synthesis of Copper (II) (*Z*)-*N*-(2-Amino-4-Methylphenyl)-*N*-Phenylbenzamide and its magical action in the medicinal and material field has been studied. The formation of compounds has been confirmed by FT-IR, multinuclear (<sup>1</sup>H, <sup>13</sup>C) NMR, CHN, UV-Vis, PXRD, TGA/DTA, DRS and Viscometer. In the first part of the work, the cytotoxic effect of synthesized compounds on MDA-MB-231, MCF-7, WRL-68 and MCF-10A cells was observed and we found that both the compounds can induce apoptosis. Their DNA binding studies proved their attractions through external and groove binding modes and their behavior as an artificial nuclease highlight an efficient DNA cleavage via an oxidative mechanism. Secondly, the optical study of compounds has figured out that Cu (II) complex is good ultraviolet, visible and NIR light-driven photocatalyst with band gap value 1.19 eV. The minimum band gap value makes the copper complex superconductive and a very good ultra-violet, visible and NIR light-driven photo catalyst.

**Keywords:** Cu (II) complex, apoptosis, DNA binding and optical activity

**Facil Conversion of Mustard Oil into Biodiesel by Zn, Cd Complexes and Their Nano-oxides**

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**Abstract**

Mustard oil has been used for the synthesis of biodiesel fuel by transesterification reaction. Catalytic effect of zinc (Zn), cadmium (Cd) complexes along with their nano-oxides has been investigated in the production of biodiesel fuel. For this purpose, Zn and Cd complexes were synthesized by using anthranilic acid. Later on these metal complexes were converted to nano-oxide through controlled hydrothermal and calcination methods. The conversion of the catalysts into the nanoscale is confirmed by FT-IR, SEM and XRD. The synthesized biodiesel is chemically characterized by FT-IR, and UV-visible spectroscopic techniques. While qualitative analysis of biodiesel fuel was carried out through High Performance Liquid Chromatography (HPLC). The synthesis of biodiesel was confirmed by the comparison of FT-IR and <sup>1</sup>H-NMR analysis of raw mustard oil and biodiesel. The chemical composition of fatty acid methyl esters (FAMEs) in biodiesel was verified by retention time data through HPLC. The HPLC profile of synthesized biodiesel from bulk and nanocatalysts showed different fragments of FAMEs at different retention times.

**Keywords:** mustard oil, transesterification, biodiesel, metal complexes, nanocatalyst

**ASSESSMENT OF A NEW ALTERNATIVE  
FEEDSTOCK FOR A BIOFUEL PRODUCTION FROM  
*Pistacia* SPECIES: POTENTIAL OPPORTUNITIES AND  
PERSPECTIVES**

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**Abstract**

In Algeria, the energy sector is the first and the principal sector on which depend the economic and social development. The energy sector mission is to ensure the long-term coverage of national energy needs and financing the economic development through the revenues of hydrocarbure exports. However, Algeria is resolutely committed to the path of renewable energies in order to provide global and sustainable solutions to environmental challenges and for the preservation of fossil energy resources. Actually, photovoltaics and wind energy are the principal sectors being considered in the national program of new and renewable energies for 2030. Furthermore, the development of bioenergy is being improved on an experimental scale. Currently, the use of biofuels, as a renewable alternative is part of the Ministry of Environment and Renewable Energy's strategy. Vegetable oils are considered to be an efficient alternative to substitute fossil fuels. They are increasingly used since their production technology has already been launched. Their use is safe with a positive environmental impact. Their combustion releases only the amount of carbon dioxide that plants can consume during growth while the combustion of fossil fuels releases huge quantities previously stored in another form. The genus *Pistacia* belongs to the family of Anacardiaceae with the Cashew and the Mango; while one species (*Pistacia vera*) is by far the most economically important member in the genus producing edible seeds. However, the other species produce oily fruits (edible for some of them) and a very



dense foliage, opening up economic opportunities for first and second generation biofuel production. Opportunities and challenges for a sustainable energy production from *Pistacia* species in Algeria are discussed here.

**Synthesis and Characterization of Ag@Mn<sub>x</sub>O<sub>y</sub> and Evaluation of its Photocatalytic Activities for Degradation of Rhodamine B Dye in Aqueous Medium**

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**Abstract**

Water pollution by textile industry is one of the important issues. Therefore, there is a need for methods to remove organic dyes from textile industrial effluents. Various metal oxides have been used as catalysts for degradation of these dyes. The catalytic efficiency of metal oxide can be enhanced by doping of metal oxides with metals. Here, we report the synthesis and characterization of nano sized mixed valence manganese oxide (Mn<sub>x</sub>O<sub>y</sub>) and silver doped mixed valence manganese oxide (Ag@Mn<sub>x</sub>O<sub>y</sub>) and investigation of their photo catalytic efficiency towards aqueous phase photo-degradation of rhodamine B dye under irradiation of light. Mn<sub>x</sub>O<sub>y</sub> was prepared by KMnO<sub>4</sub>, MnSO<sub>4</sub> and NH<sub>3</sub> and Ag@Mn<sub>x</sub>O<sub>y</sub> was prepared by AgNO<sub>3</sub> and *Calotropis gigantea* plant extract. The prepared materials were characterized by X-Rays Diffractometry (XRD), Scanning Electron Microscopy (SEM) and Fourier Transform Infrared (FTIR) spectroscopy. Pyrex glass batch reactor was used for catalytic degradation experiments in the presence of oxygen. It was observed that doping of Ag enhanced the photo catalytic performance of Mn<sub>x</sub>O<sub>y</sub> from 11 to 28% and

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45 to 91% degradation of rhodamine B dye (40 mL, 200 mg/L) in 15 and 120 minutes at 313 K respectively. Irradiation of catalyst excites electrons from conduction band of catalyst to valence band yielding an electron-hole pair. These photo excited electrons and positive hole undergo secondary reaction and produce OH radicals. These active radicals take part in degradation of rhodamine B dye. Ag doped on  $Mn_xO_y$  prevents the recombination of photo excited electrons and positive hole thus enhancing the photo catalytic activity of  $Mn_xO_y$ .

**Key Words:**  $Mn_xO_y$ , Ag@ $Mn_xO_y$ , Rhodamine B, Eley-Rideal mechanism, Kinetics analysis, Degradation, Activation energy

## **Production of biodiesel from pongam tree seed oil**

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### **Abstract**

Biodiesel is a renewable fuel and can be easily produced from domestic feedstocks. For the future, many think a better way of making biodiesel. In order to reduce the production costs and to make it competitive with petroleum diesel, there is a need of search for alternatives crops, such as non-edible oils for biodiesel production. And to overcome other technical problems, superior production methodologies should be developed. The present study describes production of low-cost biodiesel using non-edible feedstock pongam and describes a simple cost effective novel methodology to overcome the low temperature operability problems of biodiesel and ways to produce consistent quality biodiesel. Pongam oil was fractionated under vacuum and quality of biodiesel was accessed by various European and American standards.

**Keywords:** Pongam oil, Biodiesel, feedstock, non-edible

**Transition Metal Nanocomposites for Phosphopeptides  
Enrichment from Complex Biological Fluids**

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**Abstract**

Transition metal oxides are known for its high affinity and biocompatibility towards biomolecules and is used exclusively in separation sciences and life science research. In present study, different metal oxides composites are synthesized as affinity material for the phosphopeptides enrichment from complex mixtures and human serum through MALDI-TOF-MS. Synthesized metal oxide composites are characterized by Fourier transform infrared (FT-IR) spectroscopy, scanning electron microscopy (SEM) and energy dispersive X-ray (EDX) spectroscopy. The nanocomposites are then applied to the standard protein digest and results show the selectivity of metal composites superior to many other reported materials. These composites are also applied to the milk digest samples and serum samples from for the potential biomarkers. Database search is carried out by the Mascot program for the assignment of phosphorylation sites. The designed composite materials are thus versatile separation media with multifunctional use and can be applied to cancer protein profiling for the diagnosis and biomarker identification.

**The removal of reactive yellow 145 dye from waste water by using wetland plant and activated carbon of *Cassia fistula* impregnated with copper nanoparticles**

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**Abstract**

Water is a basic component for each living thing present in our environment. It is a need of time to improve the quality of water for safety of living beings. Textile industry is very popular in our country but the dyes used in textile industry have caused severe problem for living beings. Reactive Yellow 145 dye is used as a coloring agent but its untreated removal to surface and ground water cause deaths. In history, various techniques are used but adsorption is one among the best technique due to easy procedure and cheap factor. Activated carbon (AC) prepared through *Cassia fistula* (CF) plant was used for copper nanoparticles (Cu-NPs) preparation. After that another adsorbent was prepared through constructed wetland plant (Common reed) and the comparison between all prepared adsorbents was analyzed with help of different parameters and analytical techniques. Furthermore kinetic modeling was applied to get efficient and detailed values of RY-145 dye adsorption. It was proved that AC-Cu-NPs showed 75 % adsorption for RY - 145 dye whereas AC-Cu-NPs in constructed wetland plants showed 80 % for RY-145 dye adsorption.

**Membrane technology: A sustainable solution to future drinking water needs**

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**Abstract**

With rapid increase in world's population, demand for drinking water has been increased up to sevenfold. Within next 30 years it is expected that population will increase up to 40% and need of domestic, agriculture and industrial water sources will be increased, especially in developing countries where the need of water is greater as compared to its economic status and population. According to an estimation of World Health Organization (WHO), 1.1 billion people lack access to clean drinking water. By 2030 there will be a great chance of 3.9 billion people to live in 'water scarce' regions (according to a report of World Water Council). Only 0.5% Earth's overall water resource is available for drinking purpose while rest of 97% is covered by sea water which is unfit for human consumption due to high salinity and by 2050, according to estimation there will be a 7 to 10 billion increase in world's population. In order to overcome the problem of water shortage and demand for clean drinking water, there is a need of development of new water sources and protection of existing water resources through proper strategy for water treatment. Membrane technology contributes upto 53% of total world processes for production of clean water and is an effective approach for water treatment due to its simplicity in operation, no addition of chemical additives (or less), cost effective, no

phase changing, high productivity, easy scaling up and high removal capacity. Due to aforementioned features, membrane technology plays an important role in treatment of brackish and wastewater, desalination of sea water (its reuse for consumption purposes), dairy industry for milk skimming and effluents treatment etc.



**Waste date seeds oil as a sustainable source of biodiesel production**

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**Abstract**

Biodiesel production had received a considerable attention as a green, nontoxic and renewable alternative to petroleum diesel. To avoid using vegetable oils, which are expensive and compete with food, as feedstock, waste oils have been proposed. In the present study, seeds of various date varieties cultivated in Pakistan were collected. The oil from date seeds was extracted using solvent extraction. Solvent from obtained oil was removed using rotary evaporator under vacuum. Thus, obtained oil was transesterified using acid, base and enzyme catalysts to produce biodiesel. The quality of produced biodiesel was determined using European and American standards.

**Keywords:** Biodiesel, date seed, oil, transesterification

**Bio-prospecting of traditional knowledge on Bio-fuels in  
*Uva* and *Sabaragamuwa* provinces of in Sri Lanka**

**Abstract**

Energy shortage, energy safety, environment pollution and global warming are considered as major burning problems faced by people around the world. This crisis is mainly occurs due to the increasing gap between energy demand and supply coupled with the focus of limited fossil fuel resources availability. Therefore, greater attention is given for the investigation of eco-friendly alternative energy resources to ensure the energy availability, reduce environmental pollution and to mitigate the impacts of global warming. Bioprospecting is a novel concept of exploitation of commercial valuable bioresources and their traditional knowledge for sustainable utilization. Currently, production of biodiesel using edible and non-edible crops species is gaining popular due to its eco-friendly and renewable nature. Initially scientists attempted to produce biodiesel using edible oil crops such as soybeans, rapeseed, canola, mustard, camelina, castor bean and sunflower seeds. Since all these crops are highly utilized in edible oil industry, incorporation for biodiesel production was not economical. Therefore, scientists compelled to investigate non-edible bio resources to prevent possible competition with the edible bio-resources. Sri Lanka is well famous for its rich traditional knowledge, skills practices and experiences in use of natural energy sources. According to the Sri Lankan Forester, country has more than 3700 species of flowering plants and majority of these plants contain fuel value. Therefore, use of bio-prospecting to identify new fuel sources is timely important. The present survey covered two provinces with a high population of people with traditional knowledge on bio fuel in Sri Lanka. Information was gathered from a total of fifty

participants. A questionnaire was prepared and pre-tested prior to the survey. Data were gathered through face to face interviews. A total of 36 plant species belonging to 20 families were collected from 50 respondents' resided in Uva and Sabaragamuwa provinces of Sri Lanka. Out of 36 species 11 plant species belonging to 8 families were used for the oil extraction and lightening while 3 plant species were used for the production of resins and 22 plant species were used for firewood requirements. The highest number of species were recorded from family Euphorbiaceae followed by Dipterocarpaceae. The widely used plant species for oil extraction were *Aleurites triloba*, *Canarium zeylanicum*, *Madhuca longifolia*, *Horsfieldia irya* and *Pongamia pinnata* while *Shorea affinis*, *Acasia* species and *Dipterocarpus glandulosus* were used for resin extraction. The highest percentage of correspondents has keen interest of development of biofuel instead of fossil fuels in the market. Further, all investigated plant species can be easily cultivated and hence, it can be concluded that Sri Lanka has a great potential for plant based biofuel production as a renewable energy production in future.

**Keywords:** Alternative biofuels, bio prospecting, traditional knowledge, Sri Lanka, *Aleurites triloba*, *canarium eylanicum*

**Antioxidant profiling and toxicological screening of  
different mushrooms samples collected from  
Muzaffarabad and Neelum districts of Azad Jammu and  
Kashmir**

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**Abstract**

Mushrooms have been consumed throughout the world for many centuries, not only for nutritional value but also for functional purpose. Consumption of edible mushrooms leads to significant health improvements. This is because mushrooms provide key nutrients and bioactive components such as high percentage of proteins, carbohydrates, fibers, vitamins and minerals. The present study was planned to evaluate the antioxidant, toxicological and mutagenic potential of twenty mushrooms samples collected from Muzaffarabad and Neelum districts of Azad Jammu and Kashmir during survey. Extraction of mushrooms samples were carried out in three different solvents i-e Methanol, ethyl acetate and Hexane. The results of biological evaluation based on the different assays revealed that methanolic extracts of mushroom possess significant antioxidant potential followed by ethyl acetate and hexane. Toxicological screening of mushroom extracts exhibits them least cytotoxic towards human RBCs. Further mutagenicity

and non-mutagenicity of mushroom extracts exhibit them non mutagenic towards both TA-98 and TA-100.

**Keywords:** Mushrooms, cytotoxicity, antioxidant potential, mutagenicity/non-mutagenicity

**Synergetic effect and kinetics study of co-pyrolysis of sugarcane bagasse and sewage sludge**

Zeeshan Hameed<sup>1</sup>, Salman Raza Naqvi<sup>†</sup>, M. Bilal Khan Niazi<sup>1</sup>

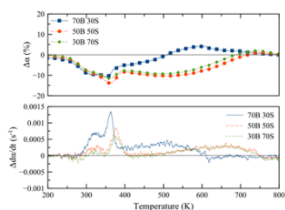
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**Abstract**

The management and effective utilization of potential wastes such as lignocellulosic biomass and sewage sludge blends are gained much attention because of their increasing volume, their localized generation and related problems. The purpose of this study is to explore the feasibility of the co-pyrolysis of biomass, sewage sludge and their mixture as a potential management technology of these residues. To investigate the synergetic effect, bagasse (B), sewage sludge (S), and their blends of different proportions (100% B, 70% B/30% S, 50% B/50% S, 30% B/70% S, and 100% S) are pyrolyzed in a thermogravimetric analyzer at a heating rate of 20 °C/min. Overall, the synergistic effect was more pronounced when 30% sludge was added to the sugarcane bagasse. 50% sludge had a slighter positive effect on the pyrolysis whereas increasing the sludge up to 70% affected negatively on the formation of volatiles. Kinetic and thermodynamic analyses of co-pyrolysis process were investigated with seventeen reaction mechanisms using Coats and Redfern method for kinetic and thermodynamic evaluation during two temperature phases I (200-400°C) and phase II (400-600°C) in the activate pyrolysis zone. Blend of 70% bagasse 30% sewage sludge has highest

values of activation energy and pre-exponential factors among all other blends for all reaction mechanisms.  $\Delta H$  and  $\Delta G$  is usually greater in phase II than phase I for all reaction mechanisms used in Coats and Redfern method. In the second phase, the enthalpy  $\Delta H$  is usually lower or in a negative value.



**Figure1:** Conversion and conversion rate deviation of different sewage sludge and sugarcane bagasse blends.

**Keywords:** Sugarcane bagasse, sewage sludge, co-pyrolysis, kinetics.

***Pongamia Pinnata* Waste Oil Gold for Green Economy**

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**Abstract**

The green economy aims at reducing environmental risks and ecological scarcities, and that aims for sustainable development without degrading the environment. It is closely related with utilization or bringing wastes into useful end products. Therefore, the present research was designed to overcome these short comings taking a step forward towards sustainable developments. Nonedible seed oil of *Pongamia pinnata* was extracted through screw press for further processing to produce superior quality biodiesel. Extracted seed oil was fractionated and processed to optimize the carbon chain length in triglycerides by increasing unsaturation proceeded by addition reaction and breakage of larger molecules. Biodiesel was then produced by base catalyzed transesterification and compositional analysis was performed using GC-MS. Various fuel quality parameters including density, cetane number, saponification value, viscosity, pour point, iodine value, cloud point and acid value were determined and obtained results were statistically analyzed using ANOVA along with post-hoc Tukey HSD test.

**Keywords:** Biodiesel, Fatty Acids, Chain Length  
Optimization, Triglycerides and Fuel Quality Parameters



**Production of biodiesel from home grown *Spirogyra elongata***

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**Abstract**

Cultivating microalgae for use in the production of biofuels is an attractive alternative to traditional sources of biomass. Although there is much excitement about the potential of algae biofuels, much work is still required in the field. In this research work, we attempt to elucidate the major challenges to economic algal biofuels at small scale and improve the focus of the scientific community to address these challenges and move algal biofuels from promise to reality. *Spirogyra elongata* algae was cultivated at small scale for biodiesel production. *Spirogyra elongata* algae oil was extracted using solvent extraction and was purified under high vacuum. Biodiesel production from *Spirogyra elongata* algae oil was carried out by zeolite and traditional catalyst. The analysis of the biodiesel produced was done by GC-MS. The experiments were conducted in triplicate and data was analyzed by using one-way ANOVA.

**Keywords:** *Spirogyra elongata*, Saponification value, Total fatty acid contents, Biodiesel

## Production of Eco-friendly Slow Release Nano Fertilizers

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### Abstract

Without fertilizer, soils are not as productive, and crops do not grow as quickly since fertilizers give more productive soils and ensuring enough produce is grown to feed populations on a large scale. Unfortunately, the chemical fertilizers used today often wash out with water or after rain events into habitats where extensive amounts of it cause harmful impacts. Typically, excessive fertilizer is applied, and the crop cannot take all of it up. It is in fact a major source of pollution in soil and water ways globally. The direct application of micronutrients to soil does not serve the purpose well, as most of the added active ingredients are leached out due to watering. Thus a constant and sustained supply of micronutrients deserves attention. The current experiment was designed to enhance the binding of micronutrients nano fertilizers to soil with various complexing agents for enhanced growth of indigenous basil as a model crop under randomized complete block design (RCBD) with four experimental replicates of each treatment. Tukey's Test was used accessing significance of results.

**Keywords:** Vegetative development, Essential oil, Basil, *Ocimum basilicum*

**Impact of Donor and Acceptor Moieties on the Opto-Electronic Properties of Acceptor-Donor-Acceptor (A-D-A) Type Photovoltaic Materials**

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**Abstract**

Five acceptor-donor-acceptor (A-D-A) molecules having malononitrile derivatives as end capped groups were designed. The ground state geometries and electronic properties were calculated by using density functional theory (DFT) at MPW1PW91/6-31G(d,p) level of theory. The absorption spectra were computed by using time dependent DFT at TD-MPW1PW91/6-31G(d,p) level of theory. We observed that the end capped groups have significant effect on opto-electronic properties of molecules. The designed molecules have broad absorption range in visible region. M<sub>3</sub> (2.20) shows relatively lower band gap so that having high light harvesting efficiency (LHE). The  $\lambda_e$  and  $\lambda_h$  calculation of M<sub>1</sub>, M<sub>2</sub> and M<sub>4</sub> shows that these molecules are the best candidate for electron transportation. High value of V<sub>oc</sub> is observed for M<sub>1</sub> (1.92), M<sub>2</sub> (1.8) and M<sub>5</sub> (1.79) which favorably contributed in power conversion efficiency. M<sub>1</sub>, M<sub>2</sub>, M<sub>4</sub> and M<sub>5</sub> are more stable in terms of absolute hardness and electrostatic potential surfaces. All molecules show good opto-electronic properties in the aspect of their use in photovoltaic application.

**Studies of the Adsorption Removal of Pb(II) and Cd(II) Ions using 4-Phenyl-3-thiosemicarbazide Modified *Ficus religiosa* Branches Powder**

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**Abstract**

This research work presents the efficiency of modified *Ficus religiosa* branches for the removal of Pb(II) and Cd(II) ions from the aqueous solution. The branches of *Ficus religiosa* have been modified by 4-phenyl-3-thiosemicarbazide. The modification of biomass added additional binding sites like  $-NH_2$ ,  $-CH_2$ ,  $-C=S$ ,  $-CN$  which may be responsible for the adsorption process. Different parameters i.e., time of contact, concentration and pH were optimized during batch adsorption studies. The maximum adsorption occurred during 30 minutes at pH 6 and adsorption of metal ions on modified biomass increased many times with increasing metal ion concentration. Various kinetic models were employed to equilibrium data in order to have an idea for adsorption mechanism. The pseudo second order kinetic model was followed by metal biosorption system. Freundlich model was found to best fit. The results showed the modified biomass to be good adsorbent for Pb(II) and Cd(II) removal.

**Development of Magnetic Chitosan Bio Sorbent Beads for the Removal of Arsenic from Water System**

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**Abstract**

Ground water is getting contaminated with arsenic by natural and anthropogenic activities. Intake of even very low concentration of arsenic for a long period of time has an adverse effect on human health. It is imperative to remove arsenic from drinking water. Among various water treatment techniques adsorption by bio sorbent is considered as cost-effective technique. So magnetic chitosan beads will be prepared by impregnating magnetite nanoparticles in chitosan for arsenic removal from water. Adsorption capacity will be tested at different pH of the arsenic containing solutions. This method will be more efficient over the other techniques because of its advantages like, low cost, produce no toxic waste, biodegradability and its regenerating ability. Magnetic chitosan beads will be characterized by scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR), X-ray powder diffraction (XRD), energy dispersive X-ray spectroscopy (EDS) and thermogravimetric analysis (TGA).

**Keywords:** Biosorption, magnetic nanoparticles, chitosan, arsenic

**Pincer Type Mercury (II)-N-Heterocyclic Carbene System  
With Hg (II)-AreneC-H Close Interaction And Variable  
Temperature Study**

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**Abstract**

Synthesis, characterization (FT-IR, NMR, microanalysis, X-ray crystallography), and variable temperature study of a new Hg-NHC complex, namely [Hg(NHC)<sub>2</sub>].2PF<sub>6</sub> was carried out. The single crystal x-ray diffraction studies of title complex revealed a linear coordination of the mercury ion with both carbene centers of the ligand. Interestingly, an attractive interaction (2.768 Å) between the mercury ion and a carbon atom (C14) of aryl ring of the ligand was also observed where aryl ring is perpendicular (90.62°) to the NHC-Hg-NHC compartment. In <sup>1</sup>H NMR spectrum, this interesting interaction was further supported by observing a unique splitting for the benzylic and N-substituted propyl chain protons. Furthermore, to observe the strength of Hg-areneC-H interaction, a variable temperature study was conducted using <sup>1</sup>H NMR technique in the temperature ranges 298-393 K.

**Keywords:** Bis-benzimidazolium salt, Hg(II) complex, N-heterocyclic carbenes, Hg(II)-areneC-H interaction, X-ray diffraction

**Synthesis of Organo-Functionalized Calcium Alginate Hydrogel Beads**

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**Abstract**

Organo-functionalized calcium alginate (OF-CA) hydrogel beads were synthesized by grafting with urea, thiourea, semicarbazide and thiosemicarbazide. These hydrogel beads were characterized by Fourier transform infrared spectroscopy (FTIR). It was observed that organo-functionalities such as carbamate, thiocarbamate, amido-amine and thioamido-amine were grafted on calcium alginate at hydroxyl (-OH) group with the release of ammonia gas (NH<sub>3</sub>). The release of ammonia gas was confirmed by increase in pH of reaction media. Like calcium alginate, these organo-functionalized calcium alginate (OF-CA) hydrogel beads can be used for the removal of heavy metals and dyes from aqueous solution.

**<sup>1</sup>H NMR-Based Metabolomics and <sup>13</sup>C Isotopic Ratio Evaluation to Differentiate Conventional and Organic Soy sauce**

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**Abstract**

Our study describes the <sup>1</sup>H NMR based approach to characterize and differentiate soy sauce prepared from organically and conventionally grown raw materials (wheat and soybean). Commercial soy sauce samples fermented from organic and conventional raw materials were purchased from local markets. Principal component analysis showed clear separation among organic and conventional soy sauce samples. Orthogonal partial least squares discriminant analysis showed a significant ( $p < 0.01$ ) separation among two types of soy sauce yielding leucine, isoleucine, ethanol, glutamate, lactate, acetate,  $\beta$ -glucose, sucrose, choline, valine, phenylalanine and tyrosine as important metabolites contributing towards this separation. Abundance ratio of <sup>13</sup>C to <sup>12</sup>C was also evaluated by <sup>1</sup>H NMR spectroscopy which showed an increased ratio of <sup>13</sup>C isotope in organic soy sauce samples indicating the organically grown wheat and soybean used for the preparation of organic soy sauce. The results can be helpful to convey the information to the end user whether the soy sauce, they are purchasing was produced from organic raw materials or it was just labeled fraudulently to earn more money.

**Keywords:** <sup>1</sup>H NMR, multivariate analysis, organic, conventional, soy sauce, <sup>13</sup>C isotopic ratio



**Mathematical Modeling and Experimental Study of  
Mechanical Properties of Chitosan Based Polyurethanes:  
Effect of Diisocyanate Nature by Mixture Design  
Approach**

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**Abstract**

This research work has been done to investigate the influence of the geometry of aliphatic diisocyanate (hexamethylene diisocyanate, HDI), cycloaliphatic diisocyanate (isophorone diisocyanate, IPDI) and aromatic diisocyanate (2,4-toluene diisocyanate, TDI) on the tensile strength and hardness of chitosan based polyurethane biomaterials. For this purpose, chitosan (CS) and polycaprolactone diol (PCL) based polyurethanes have been synthesized with above mentioned diisocyanates following statistical design (mixture design). Simplex mixture design was used for analysis and totally 10 experiments were generated by the software. Samples were tested based on the portions of mixture components. Fourier transform Infrared attenuated total reflection (FTIR-ATR) and nuclear magnetic resonance (NMR) spectroscopic techniques confirmed the synthesis of chitosan based polyurethanes. This biomaterial has been established as an innovative and promising strategy to improve the mechanical strength of chitosan-based polyurethanes.

**Thermal Degradation Behavior and X-Ray Diffraction Studies of Chitosan Based Polyurethane Bio-Nanocomposites Using Different Diisocyanates**

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**Abstract**

Five different samples of chitosan based polyurethane bio-nanocomposites (PUBNCs) were synthesized by step growth polymerization technique. Five different diisocyanates were used by keeping hydroxyl terminated polybutadiene (HTPB)/1,4-butane diol (1,4-BDO)/chitosan (CS) and montmorillonite (MMT) clay ratios constant (PUR1–PUR5). For comparative studies, PUR-6 was prepared without CS and clay components. Molecular characterizations of polyurethane (PU) films were carried out by FTIR and NMR which was found to have confirmatory evidence of the proposed structures. X-ray diffraction angles ( $2\theta$ ), d-spacing and intensities of chitosan based samples (PUR1-PUR5) and PUR-6 indicated that crystalline behavior of PUBNCs is influenced by varying diisocyanate structures. TGA/DTA results revealed that chitosan increased thermal stability of PU samples; it also enhanced the mechanical strength and decreased the glass transition temperature ( $T_g$ ) of all the samples.

**Development of Silver Nanoparticles (Ag-Nps) Based Surface-Enhanced Raman Spectroscopy (SERS) Protocol For Counterfeit Antibiotic (Cefixime) Analysis**

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**Abstract**

Cefixime a model antibiotic was used to develop a sophisticated method to verify the originality and effectiveness of the drug. Already used spectroscopic and chromatographic techniques e.g. HPLC, TLC, NMR and FTIR are expensive and time consuming. Here in we have demonstrated the development of silver nanoparticles (AgNPs) based surface-enhanced Raman spectroscopy (SERS) protocol to identify the fake or counterfeit antibiotic (Cefixime). Dynamic Light Scattering (DLS) and Scanning Electron Microscope (SEM) were used for AgNPs characterization. In this study antibiotic cefixime third generation of cephalosporin was studied. Top ten brands of cefixime capsules from different pharmaceutical companies in Pakistan were evaluated. Statistical analysis by Partial Least Square Regression (PLSR) and Principal Component Analysis (PCA) distinguished counterfeit medicines from original. Initial results of our developed SERS method are quite promising showing its much higher sensitivity in comparison to the conventional methods.

**Keywords:** Counterfeit drugs, antibiotics, Cefixime, silver nanoparticles, Raman, SERS

**Fabrication of Ag/C<sub>3</sub>N<sub>4</sub>/CNTs Hybrid for Enhanced Hydrogen Generation Rate by Photocatalytic Water Splitting**

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**Abstract**

To overcome the energy crises is the scorching issue of the present world due to population growth and continuous depletion of energy sources. In this research work, we used urea to synthesize carbon nitride which in turn was doped with silver nanoparticles and carbon nanotubes by sonication treatment to make Ag/C<sub>3</sub>N<sub>4</sub>/CNTs nano hybrid for the enhanced splitting rate of water. The XRD, FTIR, EDX and SEM indicated that this ternary hybrid was successfully fabricated. GC-TCD and LSV were used to check hydrogen generation activity and it was observed that Ag/C<sub>3</sub>N<sub>4</sub>/CNTs and Ag/C<sub>3</sub>N<sub>4</sub> nano hybrids presented greater hydrogen generation efficiency upto 5 and 6 times as compared to parental g-C<sub>3</sub>N<sub>4</sub> nanocatalyst. For the first time coupling effect of Ag and CNTs to g-C<sub>3</sub>N<sub>4</sub> for improved catalytic water splitting was illustrated. The enhancement of improved water splitting efficiency of this ternary hybrid can be attributed to synergic effect of silver doping and efficient charge separation capability of CNTs.

**Fabrication and Characterization of Sulfonated Graphene Oxide (SGO) Doped Polymeric Membrane with Improved Anti-Biofouling Behaviour**

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**Abstract**

Cellulose acetate (CA) being naturally occurring biopolymer possessing good toughness, hydrophilicity and increased bio-compatibility suitability employed as polymeric material and sulfonated GO with hydrophilic character and anti-bacterial activity added as nanofillers for fabrication of CA polymer-doped SGO membrane. Phase inversion is commonly exploited method applied for membrane fabrication. Hummer's method is used for Graphene Oxide (GO) preparation and its sulfonation is done via diazonium salt of sulfanilic acid. The fabricated membranes were characterized via scanning electron microscopy (SEM) for surface morphology analysis, Fourier transform infrared spectroscopy (FT-IR) for attached chemical functional groups detection and X-ray diffraction (XRD) for crystallinity identification. Anti-biofouling behavior was evaluated using disc diffusion method which suggested its enhanced anti-bacterial activity against microbes. High water permeability was shown by cellulose acetate doped SGO membrane whereas decrease in contact angle was observed with SGO nano-fillers addition.

**Keywords:** Polymer doped membrane; biofouling; Sulfonated graphene oxide

## Phophorene as Potential Drug Delivery System for Chemotherapeutic Drugs

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### Abstract

In this study the density functional theory was used at B3LYP/6-31G\*\* level of theory for calculations of physical and chemical properties of the doxorubicin, chlorambucil, phosphorene molecules and [Phosphorene+Chlorambucil], [Phosphorene+ Doxorubicin] complexes to devise drug delivery system for chemotherapeutic drugs to achieve the therapeutic effect to treat cancer. Some parameters like band gap, dipole moment, chemical potential, chemical hardness chemical softness and global electrophilicity Index were calculated at the ground state geometries of molecules and complexes to investigate their biological activity. The non-covalent interaction analysis of complexes shows that there are weak forces of interaction present between the complex components. The excited state calculations was done by using TD-DFT. The UV-visible absorption spectrum of complexes shows that the  $\lambda_{\max}$  has been red shifted by 79 nm and 67 nm for [Phosphorene+Chlorambucil], [Phosphorene+ Doxorubicin] complexes respectively. The photo-induced electron transfer (PET) process was observed for different excited states which is well explained visually on the basis of electron hole theory.

**Development of Hyperproducing Bacterial Mutant for  
Exopolysaccharides Production**

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**Abstract**

Exopolysaccharides (EPS) are the carbohydrate polymers, extracted from higher plants and different microbial species. EPS exhibit remarkable significance in the field of health, food, pharmaceuticals, disease prevention, bioremediation and emulsification. EPS production depends upon several factors like bacterial species, culture media, carbon source and extraction method. This study was designed for the development of mutant strain *Bacillus licheniformis* for enhanced EPS production. Sugarcane molasses was used as substrate for submerged fermentation of *B. licheniformis* ethyl methane sulfonate (EMS-50-120) was used to induce random chemical mutagenesis for EPS hyperproduction. Different factors (e.g. temperature, pH, inoculum size and incubation time) were optimized using RSM under CCD. The amount of EPS produced by the native strain was 20.55 mg/L while by the selected mutant was 29.40 mg/L. The mutagenesis and process optimization significantly enhanced the EPS production.

**Biological Color Stripping: Potential of *Ganoderma lucidum* IBL-05 for Removal of Dyes from Waste Cotton Fabric**

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**Abstract**

Synthetic dyes are extensively used in textile industries. The residual dyes are released into industrial effluents having adverse effects on biological systems such as toxicity, carcinogenicity and mutagenicity. Biological stripping deals with the removal of dyes using microorganisms or their enzymes and chemical stripping involves the removal of dyes by using different chemicals. This study was carried out to compare the decolorizing efficiency of chemical and optimized biological stripping processes in terms of economics and environmental effects. Waste dyed cotton fabric was subjected to both chemical and fungal stripping individually. It was noted that the color strength does not influence the fabric strength, but chemical and biological treatment influence the quality of cotton fabric in terms of durability/ bursting strength. *Ganoderma lucidum* IBL-05 (a white-rot fungus) presented amazing potential for color stripping/dye decolorization of waste cotton fabric under optimized condition. The biological stripping process is superior to chemical stripping process in terms of stripping percentage and quality of fabric.



**Facile Synthesis of Cr-doped Hierarchical ZnO Nanostructures and their Photovoltaic Performance**

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**Abstract**

ZnO is an important nanostructure (NSs) material and has been widely used in various area such as optoelectronic devices, chemical sensors, solar cells and photo-catalysts. Herein, we fabricated Cr-doped ZnO nanospheres by a facile solvothermal treatment. Structural and optical properties of Cr doped ZnO were investigated by scanning electron microscopy (SEM), X-ray diffraction technique (XRD), UV-Visible spectroscopy (UV-Vis) respectively. XRD patterns confirm that the samples have hexagonal (wurtzite) structure with no additional peak which suggests that Cr ions go to the regular Zn sites in the ZnO crystal structure. Further, doped ZnO nanospheres were employed in the hybrid solar cells in combination with P3HT and gave better current densities than their corresponding undoped counterparts.

**Keywords:** nanostructures; solvothermal method; optical absorption; hybrid solar cell

**Development of Nanoparticle-Based Multiplex Sandwich Immunoassay for Stage-Specific Diagnosis of Breast Cancer**

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**Abstract**

Technique for diagnosis of breast cancer is biopsy followed by histopathology which depends upon the experience of pathologist rendering it as a subjective method. Therefore, to reduce subjectivity of human error, substitute techniques should be introduced for a rapid, sensitive and reliable diagnosis of breast cancer at an early stage. In the proposed study, four target proteins/antigens are selected including Del-1, IKBP1, Bcas3, and IRX1, which are up-regulated in the Luminal, Luminal-HER2, HER2 and Triple negative subtypes of breast cancer respectively. The blood plasma samples of patients diagnosed with breast cancer will be targeted for identification of the stage of that breast cancer patient. For this purpose, combination of the nanotechnology, immunochemistry as well as Raman spectral reporter molecules will be exploited for the enhanced sensitivity and specificity of the detection of the target molecules. The proposed research project has been accepted in HEC NRPU-program 2018.

**Keywords:** Breast cancer, nanoparticles, immunoassay, Raman spectroscopy.

**Design of Non-fullerene 3D Star Shaped Acceptor for Organic Solar cells: A DFT Study**

Muhammad Ans, Rasheed Ahmad Khera, Javed Iqbal

Department of Chemistry, University of Agriculture,  
Faisalabad 38040, Faisalabad, Pakistan**Abstract**

Design and fabrication of solar cell has recently witnessed the exploration of non-fullerene based acceptor molecules for higher efficiency. In this study, four new three dimensional (3D) star shaped acceptor molecules (M1, M2, M3 and M4) are evaluated for their optical and electronic properties for use as acceptor molecules in organic solar cells. These molecules contain triphenylamine donor core with diketopyrrolopyrrole acceptor arms linked via a thiophene bridge. Molecules M1-M4 are characterized by different end capped acceptor moieties including 2-(5-methylene-6-oxo-5,6-dihydrocyclopenta-b-thiophen-4-ylidene)malononitrile (M1), 2-(2-methylene-3-oxo-2,3-dihydroinden-1-ylidene)malononitrile (M2), 2-(5-methyl-2-methylene-3-oxo-2,3-dihydroinden-1-ylidene)malononitrile (M3) and 3-methyl-5-methylnene-thioxothiazolidin-4-one (M4). The properties of newly designed molecules were compared with a well-known reference compound R which is recently reported as excellent acceptor molecule for organic solar cell. Molecules M1-M4 exhibit the suitable frontier molecular orbital pattern for charge mobility. M2 shows maximum absorption ( $\lambda_{max}$ ) at 846.8 nm in dichloro methane solvent which is ideal for the design of transparent solar cell. Strong electron withdrawing end capped acceptor causes red shift in absorption spectra. All molecules are best for hole mobility due to lower value of  $\lambda_h$  compared to the reference R.

**Recycling of Hydrochloric Acid from Industrial Effluents**

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Email: [sadiailyas1@yahoo.com](mailto:sadiailyas1@yahoo.com)**Abstract**

Disposal of acidic effluents containing high chlorides concentration is a serious problem for ecology, environment and human health. Therefore, the recovery of HCl with tri-butyl phosphate (TBP) has been investigated from the effluent streams in presence of metal ( $\text{Na}^+$ ,  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$ ) chlorides and compared to the behavior exhibited by HCl extraction in absence of metal chlorides. The comparative study on parametric influence showed a higher acid removal in presence of additional metal chlorides in aqueous solution. The variation of TBP, chloride and ions concentration clearly demonstrated their influence on acid extraction and revealed the formation of TBP·HCl adduct nearly at 1:1 ratio, yielding equilibrium constant ( $\log K_{ext.}$ ) values  $-0.428$  and  $-0.316$  in absence and presence of additional metal chlorides. The McCabe-Thiele plots indicated the requirement of four and two extraction-stages under counter-current flow for acid solutions in absence and presence of metal chlorides respectively at a same phase ratio of 0.8:1. The maximum loaded organics in both conditions of aqueous feed were subsequently stripped with water, recovering ( $> 99\%$ ) hydrochloric acid can be reused. The acid removal from effluent stream is a sustainable process to control the chlorides discharge and limiting the consumption by its possible recovery and recycling.

**pH Sensitive Crosslinked Polymeric Material for  
Controlled Drug Delivery**

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**Abstract**

A novel xanthan gum-co-acrylic acid superabsorbent hydrogel composite was formulated by free radical polymerization reaction of acrylic acid on xanthan gum. Effect of variables like dynamic swelling ratio, equilibrium swelling ratio, drug loading and drug release was investigated. Swelling ratio increases with decrease in crosslinker concentration. Drug release studies were conducted in pH 7.4 and 0.1N HCl. In acidic environment, drug release was low whereas it was sustained release in alkaline. XG4 showed significant swelling and drug release up to 24 hr. Physicochemical evaluation also confirmed it was optimized formulation. Hence XG4-co-AA was optimized for once daily dose of Perindopril Erbumine.

**Keywords:** Acrylic acid, perindopril erbumine, xanthan gum

**Synthesis, Spectroscopy and Biological Studies of  
Chalcone Derived Pyrimidines**

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**Abstract**

Nine biologically important pyrimidine derivatives have been prepared by conventional method and UV-irradiation methods. The percentage yield of a product was substantially higher (40%-88%) by UV-irradiation method compared to that (18%-51%) by conventional method. The structures of the compounds were verified by microanalysis (CHN), Infrared (IR) spectroscopy and X-ray powder diffraction analysis. The investigated compounds consist of a pyrimidine ring and two benzene rings with intermolecular N-H...N interaction between the adjacent molecules. The compounds crystallized in the monoclinic space group P-1. The synthesized products have also been tested for their anti-bacterial/anti-fungal and anti-oxidant activities. The compounds have shown comparatively higher activities against the fungal microbes as compared to the gram positive and gram negative bacteria.

**Keywords:** Conventional method, UV-irradiation, XRD, Antibacterial, Antifungal, Antioxidant

**Optimization of Fatty Acids and Their Derivatives for Biodiesel Production**

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**Abstract**

Global energy utilization is increasing day by day due to increase in population and industrialization. Traditionally fossil fuels are the main source of energy. Fossil fuels are non-renewable and have negative environmental impact. The biodiesel is possible substitute of conventional fuel. Non-edible and edible seeds are widely using for biodiesel production due to high free fatty acid contents. In this study derivatives of fatty acids were produced to get maximum yield of biodiesel. Non-edible seeds were collected and oil was extracted and purified. Vacuum fractions of oil were collected and derivatives of all the fractions were produced. Biodiesel was produced by catalytical transesterification. Chemical and physical parameters were determined. GC-MS analysis was used for compositional analysis. The obtain results was tested statistically by ANOVA followed by post-hoc Tuckey HSD test.

**Keywords:** Biodiesel, fatty acids, derivatives, GC-MS

**Biological Color Stripping: Potential of *Ganoderma Lucidum* IBL-05 for Removal of Dyes from Waste Cotton Fabric**

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**Abstract**

Synthetic dyes are extensively used in textile industries. The residual dyes are released into industrial effluents having adverse effects on biological systems such as toxicity, carcinogenicity and mutagenicity. Biological stripping deals with the removal of dyes using microorganisms or their enzymes and chemical stripping involves the removal of dyes by using different chemicals. This study was carried out to compare the decolorizing efficiency of chemical and optimized biological stripping processes in terms of economics and environmental effects. Waste dyed cotton fabric was subjected to both chemical and fungal stripping individually. It was noted that the color strength does not influence the fabric strength, but chemical and biological treatment influence the quality of cotton fabric in terms of durability/ bursting strength. *Ganoderma lucidum* IBL-05 (a white-rot fungus) presented amazing potential for color stripping/dye decolorization of waste cotton fabric under optimized condition. The biological stripping process is superior to chemical stripping process in terms of stripping percentage and quality of fabric.



**Development of Simultaneous Transesterification Process  
for Fatty Acid Methyl Esters Production**

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**Abstract**

Biodiesel is a renewable fuel that can be produced from biological oils derived from plants, animals, or microbes. The oils (triglycerides) are converted by transesterification using alcohols (e.g., methanol) and catalyst (base or acid) to yield glycerol and the fatty acid alkyl ester or fatty acid methyl ester (FAME) if methanol is the alcohol. For several reasons, there is interest in developing simultaneous biodiesel production process. Cost effectiveness and control over quality are among few reasons to be mentioned. In the present study, an innovative simultaneous approach was used for biodiesel production in the absence of catalysts. Composition of produced biodiesel was analyzed with the help of Gas Chromatographic Mass Spectrometry (GC-MS) and obtained results were tested statistically by one-way analysis of variance followed by post-hoc Tukey test.

**Keywords:** Biodiesel, transesterification, GC-MS,  
Renewable energy

## Shape-Controlled Synthesis of Silver Nanoparticles: A Review

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### Abstract

Nanoparticles had great interest both from the fundamental point of view and for future application. Silver nanoparticles (AgNPs) had unique properties included optical, catalytic and electrical properties which depend on size and shape of produced nanoparticles. Due to these remarkable properties AgNPs used in different applications such as medicine, electronics and biotechnology etc. This article aimed to study the possible methods for the synthesis of AgNPs of specific shapes. For the synthesis of AgNPs different methods had been reported, including biological, physical and chemical methods. Composition, morphology and chemical structure of AgNPs are discussed in relation to different techniques such as X-rays diffraction (XRD), scanning electron microscope (SEM) and UV-visible spectroscopy (UV-Visible). The review of literature reveals that different shapes of AgNPs including cubic, spherical, nanoprism, nanobars, nanorods and nanowires are possible by turning the synthesis method and changing the reaction parameters.

**Application of Citrus and it's Biocomposites for the Removal of 2,4,6-Trichlorophenol from Waste Water**

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Saima Noreen

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**Abstract**

This study focused on the utilization of citrus (CT) and it's biocomposites for the removal of 2,4,6-Trichlorophenol (TCP) from aqueous solution. Different composites with polyaniline (PAn-CT), polypyrrole (PPy-CT) and sodium alginate (NaA-CT) were synthesized. Native and biocomposite with polyaniline showed enhanced biosorption capacity as compare to polypyrrole and sodium alginate biocomposites. Batch mode experiments were performed as a function of temperature, contact time, adsorbent dose, pH and initial TCP concentration. Maximum removal was observed at acidic pH, lower dose and lower temperature. Maximum POP removal with CT, PAn-CT, PPy-CT and NaA-CT was 23.86, 23.87, 21.53 and 2.36 mg/g, respectively. Kinetic study was carried out and results showed best fitness of pseudo second order kinetic model. In case of equilibrium isotherms, data was fitted best for Langmuir isotherm. Thermodynamic factors such as entropy ( $\Delta S$ ), Gibbs free energy ( $\Delta G$ ) and enthalpy ( $\Delta H$ ) revealed that adsorption process of TCP was exothermic and spontaneous in nature. FT-IR and SEM results also confirmed the experimental results.

**Keywords:** trichlorophenol, Biosorption, biocomposites, batch study, kinetic study

**Evaluation of Taramira Oil to Produce Biodiesel:  
Pretreatment and Optimization Study using MoS<sub>2</sub> BiVO<sub>4</sub>  
Photocatalyst**

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**Abstract**

Use of biodiesel comes with number of advantages over petroleum diesel due to its renewability, superior high biodegradability, low toxicity and negligible sulfur contents. The *Eruca Sativa* (Taramira) oil used to produce biodiesel. A photochemically active heterogeneous nanocomposite MoS<sub>2</sub>BiVO<sub>4</sub> synthesized by hydrothermal process. Photocatalyst used for the treatment of free fatty acids present in the sample oil. The response to surface methodology (RCM) is employed for the process of optimization of variable parameters. Photoesterification reaction parameters i.e. methanol to oil ratio, catalyst dose, stirring speed and reaction time were optimized. About 90% of free fatty acids have been successfully esterified by using 1:1 methanol to oil ratio, 1% catalyst, and 7 hours of contact time with stirring speed of 400 rpm. Egg shells biomass employed as catalyst for transesterification of triglycerides. Eggshells collected, rinsed and calcinated to enhance catalytic activity. Fourier-transform infrared spectroscopy (FTIR) technique used to obtain an infrared spectrum of biodiesel for its characterization. The physico-chemical properties of this Bio-fuel such as specific gravity, density, cetane number and flash point indicate toward a promising source for the generation of renewable bioenergy source.

**Keywords:** Free fatty acids, Photoesterification, Process optimization, Transesterification, Biodiesel

**Synthesis of Polyhedral Manganese Tin Oxide by Hydrothermal Method and Study of Its Application as Photocatalyst and Additive**

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**Abstract**

Manganese tin oxide ( $\text{MnSnO}_3$ ) polyhedral nanoparticles are synthesized by hydrothermal approach using urea as template. The crystallinity, purity and lattice parameters of  $\text{MnSnO}_3$  are analyzed by X-ray diffraction spectroscopy. Morphology of the product is analyzed with the help of Scanning electron microscopy and transmission electron microscopy. Synthesized product is used as additive and photocatalyst. Synthesized  $\text{MnSnO}_3$  are used as photocatalyst for degradation of Congo red dye (CR) in aqueous medium. Photocatalytic degradation is monitored at different concentrations of catalyst and hydrogen peroxide in the presence of sunlight. Moreover the role of  $\text{MnSnO}_3$  as an additive in commercial diesel is also studied. The efficiency of modified fuel is analyzed by analyzing parameters such as flash point, fire point, cloud point, pour point, calorific values and specific gravity, in the presence of different dosages of additive. The values of all these parameters are found to be significantly affected by the dosage of additive.

**Biogenic Synthesis of Monodisperse Silver Nanoparticles using *Ferocactus Diguetii* Plant Extract as Capping Agent for Antibacterial Activity**

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54590, Pakistan

**Abstract**

In this research work, silver nanoparticles have been synthesized by using *Ferocactus diguetii* natural plant extract as reducing agent. *Ferocactus diguetii* a species of cactus family, has high medicinal value and rich in polyphenols antioxidant, has been used for reduction of metal ions. Its extraction is simple and cost-effective and it can reduce the silver ions easily without involvement of any external chemical agent. The bio-reduction of silver nanoparticles was analyzed by UV-Vis spectrometer and further characterized by FTIR and SEM as a function of time and concentration. The synthesized silver nanoparticles were uniform and elliptical shape with average diameter 40 nm. These nanoparticles were active against both gram positive and negative bacteria (*Escherichia coli*, *Staphylococcus aureus*) indicating their broad spectrum antibiotic ability.

**Keywords:** Silver nanoparticles, Green synthesis, Antimicrobial activity, Oligodynamic effect

**Impact of Salt Stress and A-Tocopherol Application on  
Physiology of Pea (*Pisum Sativum* L.)**

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**Abstract**

Seeds of Pea 40 cultivar were soaked in 4 levels of  $\alpha$ -tocopherol, [control (untreated), distil. H<sub>2</sub>O, 150 and 300 mg L<sup>-1</sup>] for 16 hours and sown in clay pots containing sandy loam and organic compost mix. Plants were irrigated with saline water (EC = 6.25 dS m<sup>-1</sup>), 15 days after seed sowing. Same 4 levels of  $\alpha$ -tocopherol were sprayed on the leaves of plants, 38 days after seed sowing. Plants were sampled 24 days after foliar application of  $\alpha$ -tocopherol for physiological attributes. Results showed that salt stress significantly reduced the rate of net CO<sub>2</sub> assimilation (*A*) and transpiration (*E*), water use efficiency (*A/E*) and stomatal conductance (*gs*), whereas it increases sub-stomatal CO<sub>2</sub> concentration (*C*), *C/C<sub>a</sub>* ratio, chlorophyll *a* and *b* content. Application of  $\alpha$ -tocopherol mitigated severity of salt stress by subsequently improving net CO<sub>2</sub> assimilation (*A*) rate and stomatal conductance and decreasing transpiration rate. Seed priming with  $\alpha$ -tocopherol showed overall increase in chlorophyll *a* and *b* content. However, foliar application of alpha-tocopherol increased net CO<sub>2</sub> assimilation (*A*) rate and stomatal conductance. Experimental findings suggested that seed priming with low level (150 mg L<sup>-1</sup>) of  $\alpha$ -tocopherol was more effective in alleviation of negative impact of salt stress on pea 40 cultivar.

**Production of Alumina Supported Composite Catalyst for Biodiesel Production**

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**Abstract**

Biodiesel is an energy efficient, renewable and substitution fuel that reduces the net emissions. Vehicles that use biodiesel in their diesel engine can help to reduce greenhouse gases without reducing their efficiency. The transesterification process for biodiesel production is well established but still there remain significant inefficiencies in the existing transesterification process. The present study was designed to carry out efficient transesterification by using alumina supported composite catalyst. Composite catalyst was prepared by precipitation and impregnation method. The characterization of the catalyst was checked by different techniques to gain insight into its physical and chemical compositions. Biodiesel was produced by using composite catalyst and the prepared biodiesel was separated from the excess methanol, by-product glycerol and solid catalyst. Physical and chemical fuel quality parameters were assessed while compositional analysis was performed by Gas Chromatographic Mass Spectrometry (GC-MS). The obtained results were tested statistically by one-way analysis of variance followed by post-hoc Tukey test.

**Keywords:** Biodiesel, transesterification, Composite catalyst, Alumina



**Modern Technologies to Treat Wastewater for Removal of Heavy Metals: A Review**

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**Abstract**

The world faces the shortage of water in current era. So, the use of waste water to overcome the water scarcity is the major aspect that is prevailing globally. Wastewater contains huge amount of heavy metals that accumulate in it and pollute the environment. Use of waste water to the crops or fossils leads to the damage in their functionality and various diseases are caused by using these crops as food source in human body. Heavy metals like lead, phosphorus, cadmium, arsenic, mercury, zinc, nickel and many others are present in wastewater. Treatment of wastewater to limit or remove metal contamination is the main purpose of this review and it focuses on different technologies such as chemical precipitation, membrane filtration, ultra-filtration, floatation (ion and precipitate), adsorption, reverse osmosis, electrochemical, and nanotechnology used to treat the waste water. Utilization of these techniques makes the wastewater free from heavy metals and makes it useful for further processes such as in watering of food crops or for fossil plants and for cleaning and washing in different industries.

**Keywords:** Wastewater, Heavy metals, Electrochemical, Filtration, Floatation

**Green Synthesis of Stable Co and CoO Nanoparticles  
using *Calotropis Gigantea* Plant Extract: Catalytic and  
Antimicrobial Activity**

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**Abstract**

In this research work, cobalt nanoparticles were synthesized by using *Calotropis gigantea* natural plant extract as reducing agent. *Calotropis gigantea* species are considered common weeds in some parts of the world, being rich in polyphenols have high medicinal value and are used for the reduction of metal ions. Its extraction is simple and cost-effective and it can reduce the cobalt ions easily without involvement of any external chemical agent. The bio-reduction of cobalt nanoparticles was analyzed by UV-Vis spectrophotometer and further characterized by FTIR and SEM as a function of time and concentration. The synthesized cobalt nanoparticles were uniform and elliptical shape with average diameter of 40-55 nm. These nanoparticles were active against both gram positive and negative bacteria indicating their broad spectrum antibiotic ability.

**Development of Hyperproducing Bacterial Mutant for  
Exopolysaccharides Production**

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**Abstract**

Exopolysaccharides (EPS) are the carbohydrate polymers, extracted from higher plants and different microbial species. EPS exhibit remarkable significance in the field of health, food, pharmaceuticals, disease prevention, bioremediation and emulsification. EPS production depends upon several factors like bacterial species, culture media, carbon source and extraction method. This study was designed for the development of mutant strain *Bacillus licheniformis* for enhanced EPS production. Sugarcane molasses was used as substrate for submerged fermentation of *B. licheniformis* ethyl methane sulfonate (EMS-50-120) was used to induce random chemical mutagenesis for EPS hyperproduction. Different factors (e.g. temperature, pH, inoculum size and incubation time) were optimized using RSM under CCD. The amount of EPS produced by the native strain was 20.55 mg/L while by the selected mutant was 29.40 mg/L. The mutagenesis and process optimization significantly enhanced the EPS production.

**Effect of Agronomic Factors on Biomass and Quality of Various Crops for Bio-Energy Production**

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**Abstract**

Utilization of crops (i.e. maize and sorghum) for biomass and bio-energy production is getting prime importance due to diminishing reserves of fossil fuels and environment pollution. Various agriculture crops are being used for bio-energy i.e. sorghum, maize, miscanthus etc. To get higher biomass yield and quality, agronomic factors optimization is very crucial. Agronomic factors such as sowing times, cultivars, harvesting times, nitrogen rates and location had significant impact on biomass yield and quality of crops implication for bio-energy production. Early sowing of sorghum and maize crops produced significantly higher biomass yield compared to late sowing. Increasing nitrogen rates clearly increased the biomass yield and NDF, protein contents of maize. Regarding harvesting dates, delayed harvesting increased biomass yield but clearly reduced protein contents of maize cultivars. Cultivars have also significant influence on biomass as well as quality of sorghum and maize crops grown for bio-energy production.

**Keywords:** Agronomic Factors, Maize, Sorghum, Biomass, Quality

**Lead Free Ferroelectric Composite for Capacitor Applications**

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**Abstract**

$\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3\text{-BaTiO}_3$  (NBT-BT) has a complex perovskite structure and lead free ceramic. NBT-BT exhibits excellent ferroelectric and dielectric properties. It has wide range of application like sensors, nano-positioners, actuators, transducers and image forming devices. NBT is considered to be a good alternate of PZT as it is not hazardous to environment. In this work, nanoparticles of NBT-BT were synthesized by using sol gel technique. The obtained nanoparticles were sintered at high temperature at 600 °C, 700 °C and 850 °C for two hours in the air. Then this material was analysed using XRD technique and SEM, respectively. The SEM micrographs show the polycrystalline nature of the sample with nearly rectangular shape and increase with the sintering temperature of samples. Sharp peaks in XRD patterns confirm that material was well crystalline. No significant changes were observed in XRD graphs of samples sintered at various temperatures. Impedance analyser was used to study dielectric properties of this material. Minor variations were observed in dielectric graphs of samples sintered at temperatures ranging from 600°C to 850°C. Results revealed that  $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3\text{-BaTiO}_3$  gives higher values of dielectric constant with increase in frequency and the value of dielectric loss was very low. Results revealed that NBT-BT is a suitable candidate for capacitor applications.

**Electronic, Optical and Magnetic Properties of PrMnO<sub>3</sub> by First Principle**

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**Abstract**

Pervoskites transition oxide has been widely used in different applications as a catalyst, gas sensors and spintronics devices. Praseodymium manganese oxide (PrMnO<sub>3</sub>) exists in different phases as cubic, orthorhombic, tetragonal, rhombohedral and hexagonal crystal structure. In this work, optical, electronic and magnetic properties were calculated from the frame work of density functional theory at pressure range from 0 to 50 GPa in a cubic phase. It was observed that electronic structure of PrMnO<sub>3</sub> materials was strongly couple to the lattice constant, with the increase in pressure lattice constant reduced. Density of states (DOS) graphs revealed the Mn plays significant role in the band structure of the material. In optical properties, absorption, reflection, refraction and extinction coefficient were calculated at a pressure range from 0 to 50 GPa. Also, it was observed that Pr and Mn plays significant role in the magnetic properties of the material. Results revealed that PrMnO<sub>3</sub> is a suitable candidate for optoelectronic and spintronics devices. PrMnO<sub>3</sub>

**Potato and Its By-Products as a Potential Source of  
Biogas Production**

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**Abstract**

Presently, it is estimated that the total annual domestic production amounts to around 2.02 Million MT of which 280000 MT is used as seed and 1.7 Million MT is available for consumption after post-harvest losses. The process of anaerobic digestion for converting potato and its by-products consists of four steps including (i) hydrolysis/saccharification (additional step in case of starchy materials like potato), (ii) acido genesis, (iii) aceto genesis, and (iv) methano genesis. Starch is a polysaccharide (*i.e.* a polymer made up of linked monosaccharides) consisting of long chains of glucose molecules. Through hydrolysis, where the starch reacts with water, the starch is broken down to fermentable glucose molecules. Hydrolysis can either be enzymatic (using amylases) or acid-based. Once the starch is broken down to glucose syrup, the sugars are fermented to ethanol (typically using the yeast called *Saccharomyces cerevisiae*), followed by distillation of the ethanol to the desired concentration and removal of water). The process also yields several by-products, such as protein-rich animal feed (e.g. dried distillers' grains with soluble, DDGS) that is commonly used in ruminants feed especially beef cattle to avoid sub-acute acidosis thereby proving potatoes and its by-products a sustainable and easily accessible alternate energy source.

**Keywords:** vegetables, anaerobic digestion, methane, saccharification

**Removal of Halosulfuron Methyl Herbicide from Aqueous Media Using Neem Seeds: Kinetic, Equilibrium and Thermodynamic Studies**

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**Abstract**

In the present study, the removal of Halosulfuron methyl from aqueous solution was carried out using neem seed powder (NSP). The removal study was conducted in batch system under the effect of several operational parameters such as pH, sorbent dose, contact time, initial Halosulfuron methyl concentration, agitation time and temperature. Surface area analyzer (SAA), Energy Dispersive X-ray (XRD), and Scanning electron microscopy (SEM) tests were performed before and after the sorption process. The maximum removal was achieved at pH 3. The removal data of the Halosulfuron methyl was fitted to the various kinetic models and the result showed that kinetic data well fitted into intraparticle diffusion kinetic model not only due to high value of  $R^2$  (0.92). Sorption data was also fitted into various isotherms and the result showed Langmuir isotherm is the best one to explain the data due to its high  $R^2$  value (0.92). Thermodynamic parameter such as enthalpy, free energy and entropy were also calculated and showed that removal of Halosulfuron methyl using neem seeds is exothermic and spontaneous process.

**Keywords:** Halosulfuron Methyl, biosorption, kinetic, equilibrium, thermodynamic



**Thermal Degradation Behavior and X-Ray Diffraction  
Studies of Chitosan Based Polyurethane Bio-  
Nanocomposites using Different Diisocyanates**

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**Abstract**

Five different samples of chitosan based polyurethane bio-nanocomposites (PUBNCs) were synthesized by step growth polymerization technique. Five different diisocyanates were used by keeping hydroxyl terminated polybutadiene (HTPB)/1,4-butane diol (1,4-BDO)/chitosan (CS) and montmorillonite (MMT) clay ratios constant (PUR1–PUR5). For comparative studies, PUR-6 was prepared without CS and clay components. Molecular characterizations of polyurethane (PU) films were carried out by FTIR and NMR which was found to have confirmatory evidence of the proposed structures. X-ray diffraction angles ( $2\theta$ ), d-spacing and intensities of chitosan based samples (PUR1-PUR5) and PUR-6 indicated that crystalline behavior of PUBNCs is influenced by varying diisocyanate structures. TGA/DTA results revealed that chitosan increased thermal stability of PU samples; it also enhanced the mechanical strength and decreased the glass transition temperature ( $T_g$ ) of all the samples. Based on the above mentioned facts this study suggests the best usage of PUs according to the operational and environmental conditions.

**Mathematical Modeling and Experimental Study of  
Mechanical Properties of Chitosan Based Polyurethanes:  
Effect of Diisocyanate Nature by Mixture Design  
Approach**

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**Abstract**

This research work has been done to investigate the influence of the geometry of aliphatic diisocyanate (hexamethylene diisocyanate, HDI), cycloaliphatic diisocyanate (isophorone diisocyanate, IPDI) and aromatic diisocyanate (2,4-toluene diisocyanate, TDI) on the tensile strength and hardness of chitosan based polyurethane biomaterials. For this purpose, chitosan (CS) and polycaprolactone diol (PCL) based polyurethanes have been synthesized with above mentioned diisocyanates following statistical design (mixture design). Simplex mixture design was used for analysis and totally 10 experiments were generated by the software. Samples were tested based on the portions of mixture components. Fourier transform Infrared attenuated total reflection (FTIR-ATR) and nuclear magnetic resonance (NMR) spectroscopic techniques confirmed the synthesis of chitosan based polyurethanes. This biomaterial has been established as an innovative and promising strategy to improve the mechanical strength of chitosan-based polyurethanes.

## Optimization of Tilt Angle of Solar Panel for Maximum Energy Efficiency

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### Abstract

Photo voltaic cells (PV) are one of the most favorable renewable technologies to fulfill the demand of energies for future buildings. The earth receives huge amount of radiation directly from the sun every day. The solar radiation can be converted to electrical energy using PV. For the installation of photo voltaic cells on the roof or wall we should have knowledge for different optimum tilt angles ( $-20^{\circ} \leq \beta \leq 90^{\circ}$ ) and different orientations ( $-90^{\circ} \leq \gamma \leq 90^{\circ}$ ) at which maximum energy is obtained ( $W/m^2$ ). Many methods were used for this purpose, but had used semiconductor devices called solar cells also known as photo voltaic cells which convert directly sun light into electricity. In this work, solar radiation data (global and diffused radiations) is used. It was used to evaluate monthly average daily diffuse irradiation on horizontal surfaces. First, PV module mounted horizontally then rotate PV module at different tilt angles and calculate the sun radiations ( $W/m^2$ ). These optimum values will be useful for designing an economical photovoltaic system for future needs.

## **LIBS and EDX Analysis of Residues of Water Samples**

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### **Abstract**

In many parts of the world, water is not safe enough for drinking. There are basic qualitative observations that quickly determine if water is not safe. There are many substances that must be tested to identify the contaminants and to figure out how the specific polluted water can be purified. In the present study, the sample used in this work was residue of water after evaporation, analyzed using Laser induced breakdown spectroscopy (LIBS) with the help of a nanosecond pulsed Nd: YAG laser operating at wavelength 1064nm to ablate the sample. The emission spectrum were recorded using a high resolution spectrometer. The radiation spectrum of plasma is obtained at different laser energies and different time delays, with the help of a spectrometer and detector using the AVANTES (AVASOFT) software. The spectra is then analyzed using ORIGIN. We found major elements C, Na, O, Mg, Fe, Ca, K and H in the Water Samples by LIBS. The results were compared with standard results. Samples were also be analyzed by other techniques e.g. Routine chemical analysis, UV-Visible photo spectrometer, energy dispersive x-rays (EDX) and results were compared with LIBS analysis.

**Evaluation of Cytotoxicity, Hemocompatibility and Spectral Studies of Chitosan Assisted Polyurethanes Prepared with Various Diisocyanates**

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**Abstract**

In this research work cytocompatibility, mutagenicity, and hemolytic activity of chitosan based polyurethanes (PUs) have been evaluated. The chitosan modified PUs were prepared by step-growth polymerization technique using various diisocyanates like Isophorone diisocyanate (IPDI), 4,4'-methylenedicyclohexyl diisocyanate (H12MDI), 2,4-toluene diisocyanate (TDI) and hexamethylene diisocyanate (HMDI) by reacting with hydroxylterminated polybutadiene (HTPB). Structural confirmation of prepared samples was done by FTIR-ATR and <sup>1</sup>HNMR techniques. Chitosan bearing PU samples showed good hemocompatibility, non-mutagenic behavior and less or non-cytotoxic behavior with all the diisocyanates. Among all the diisocyanates, aromatic diisocyanate (TDI) showed less hemocompatibility, high mutagenicity, and more cytotoxicity. However, this still showed a better result than non-chitosan based sample. It is concluded that chitosan improved the biological behavior of PU samples.

**Adsorptive Removal of 2,4-Dichlorophenoxyacetic acid and Imidacloprid from Aqueous Media by *Mangifera indica* Seeds and its Composites**

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**Abstract**

2,4-Dichlorophenoxyacetic acid and Imidacloprid are most applicable pesticides in the agriculture world. In this research work mango stone biomass native (NB) form and Hybrid (HB) composite was prepared for the adsorptive removal of pesticides from waste water. Batch study shows that the optimum pH for 2,4-D was observed in acidic range with both NB and HB. Similarly, removal of imidacloprid was observed in acidic range with NB and in basic range with BH. On increasing contact time for both pollutants biosorption capacity was also increased. Maximum removal of 2,4-D was obtained after 90 min and 120 min with NB & HB respectively, contact time up to 120 min also increase the adsorption capacity of NB and HB for the removal of Imidacloprid. On increasing pollutant concentration up to 35 ppm, adsorption capacity of both adsorbents was also increased. Kinetic study for the adsorption phenomenon was carried out by using pseudo-first and second order kinetics. Similarly, Langmuir, Freundlich and Temkin were applied to determine the adsorption characteristics. Thermodynamic parameters were also determined to see the nature and feasibility of adsorption mechanism.

**Keywords:** Adsorption, pollutants, Composites, Kinetic study, Equilibrium study, Thermodynamics

### Bioactive Derivatives of Thuja Oil

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#### Abstract

Essential oils are complex mixtures of biologically active substances which are being used since a long time as flavoring agents and constituents of number of commercial products. The purpose of this study was to extract essential oil of *Thuja orientalis* by distillation process and to inspect its impact on microorganisms and pests. *Thuja* leaves were collected from the University of Agriculture Faisalabad and then oil was extracted via hydro distillation. Different components were separated by using vacuum fraction distillation. The present study was designed to determine the  $\alpha$ -thujone derivatives prepared from *Thuja orientalis* essential oil. Fractions of *Thuja orientalis* oil were analyzed by using Gas Chromatography- Mass Spectrometry (GC-MS). All the biological actions of *Thuja orientalis* oil were observed by exposing antimicrobial agents and insects toward *Thuja* oil derivatives. The results obtained were analyzed by using ANOVA followed by post hoc Tuckey's test.

**Keywords:** *Thuja orientalis*, antimicrobial agents, insect repellent, *Thuja* oil derivatives

## Design of Water Supply System by Using EPANET

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### Abstract

EPANET was used to design water supply system of the area providing input parameters to the software. A profile survey was conducted to determine the length of pipes and the elevation of each junction. The other input parameters such as diameter of pipes, pipe network map, head losses were provided. EPANET gave detailed water supply system plan with respect to design period, expansion of water quality behavior within the distribution of drinking water. The present study is exceptional for the people lives in that area. By adopting this design provided by detailed surveys of the area and EPANET will help control water borne diseases and quality of water and life will improve.

**Keyword:** EPANET, Water supply system, Water borne diseases



**Synthesis, Single Crystal Analysis and Quantum  
Chemical Studies of 2,4-Diamino-5-(4-Chloro phenyl)-6-  
Ethylpyrimidin-1-Ium 3,4,5-Trihydroxybenzoate -  
Methanol (DETM)**

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**Abstract**

In the present work, co-crystals synthesis of pyrimethamine with 3,4,5-trihydroxybenzoic acid (Gallic acid), its single crystal analysis, spectroscopic data, and computational studies have been accomplished. The single crystal analysis shows that there are C-H...O, N-H...N, N-H...Cl and O-H...O types hydrogen bonding interactions responsible to stabilize these chemical structural designs in the form of 3-dimensional (3-D) network. Additional stabilization of this 3-D set-up is attributed by the  $\pi$ - $\pi$  and C-H... $\pi$  interactions. Furthermore, the computational study was carried out for comparative purpose. Natural bond orbitals (NBOs), frontier molecular orbitals (FMOs), molecular electrostatic potential (MEP) surfaces and FT-IR analysis were performed using DFT/B3LYP/6-311+G(d,p) level. While, the UV-Vis analysis of DETM was done by using TD-DFT/B3LYP/6-311+G(d,p) level of theory. NBO study shows non-covalent interactions (NCIs) which are in good agreement with experimental SC-XRD findings. Calculated FT-IR bands are also found to be in good agreement with experimental FT-IR findings. FMOs and UV-Vis results allowed us to explain the vertical transitions and to interpret the nonlinear optical (NLO) properties. Chemical reactivity of DETM was indicated through the color scheme of plotting MEP surfaces. The NLO properties of DETM have been compared to the standard molecule urea.

**Synthesis, Characterization of Zinc Oxide (ZnO) and its Application for Water Purification**

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**Abstract**

Availability of standard quality drinking water is very essential for all living-beings. Availability of drinkable water has become a biggest challenged for the whole world. Water is a vital necessity for living- beings. Contamination of water has caused the several millions of deaths in every year. Therefore, significant action has performed to obtain the pure water. Zinc oxide (ZnO) is good reactive agent that had used to immobilize the toxic substance and destroyed the virus from contaminated water. Zinc oxide nanoparticles (ZnO-NPs) was prepared by using the zinc sulfate heptahydrate ( $ZnSO_4 \cdot 7H_2O$ ) and sodium hydroxide (NaOH). As prepared zinc oxide nanoparticles (ZnO-NPs) were characterize by XRD and SEM and UV-Vis spectroscopy. XRD technique has found particle size of ZnO-NPs is 29 nm. SEM analysis has found nano-rods shaped of ZnO-NPs. UV-Vis analysis was used to find the band gap of ZnO-NPs has found maximum absorbance range between 320 nm to 380 nm. After the characterization, zinc oxide nanoparticles (ZnO-NPs) had used for purification of water. The treated water had tested to find the electrical conductivity (EC), analysis of pH, total dissolved solids (TDS), atomic absorption spectroscopy (AAS) for the study of heavy metals and colony forming units (CFU) for microbial count such as bacteria, virus and protozoa etc. Water had purified through ZnO-NPs, was calculated 100% results and compared with uncoated water sample under the sunlight had 63%.

**Green Synthesis of Selenium N-Heterocyclic Carbenes Adducts and their Characterization**

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**Abstract**

This synthesis involves three steps. First step was performed at room temperature for 3 h with constant stirring in which N substituent of benzimidazolium is formed. In second step reaction mixture of N-substituent was refluxed with different alkyl halides at 100 °C with vigorous stirring for 24 h. In third step, previously synthesized ligands and selenium powder was refluxed at 80 °C with constant stirring for 5 h using water as reaction medium. The obtained novel salts (L<sub>1</sub>-L<sub>10</sub>) and their respective selenium (II) adducts (Se<sub>1</sub>-Se<sub>10</sub>) were characterized by FT-IR, NMR (<sup>1</sup>H, <sup>13</sup>C) and elemental techniques. Data suggested that selenium (II) bonding occurs with ligand through the carbon atom of N heterocyclic carbenes. Their structures were confirmed by NMR (<sup>1</sup>H, <sup>13</sup>C). In proton NMR a peak present at the range of 10.0-110.9 δ ppm is due to NCHN which is also present in all ligands, (L<sub>1</sub>-L<sub>10</sub>) but this peak disappears in all compounds (Se<sub>1</sub>-Se<sub>10</sub>) due to formation of C=Se bond. Similarly in <sup>13</sup>C NMR a peak at the range of 142.2-142.5 δ ppm was due to NCHN. This peak shifted to 167.1-168.6 δ ppm (downfield region) due to presence of selenium. The synthesized compounds show moderate to good anticancer activity.

**Keywords:** Selenium, N-Heterocyclic Carbenes, NHCs. Synthesis, Green Synthesis

**Adsorption of 2,4-Dichlorophenoxy Acetic Acid using Bagasse and its Composite: Batch and Column Mode**

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**Abstract**

Batch and column study was carried out by using sugarcane bagasse and its biocomposite with polypyrrole for the removal of 2,4-dichlorophenoxy acetic acid (2,4-D) from simulated waste water. In batch mode, effect of different process parameters such as contact time, temperature, adsorbent dose, pH and initial 2,4-D concentration has been studied. The results exhibited that maximum adsorption capacity of bagasse and its polypyrrole composite was observed at pH 3.0. Equilibrium data was fitted well to the Freundlich isotherm for bagasse and its biocomposite. Different kinetics models like pseudo first and second order were applied. It was observed that pseudo second order was best fitted to experimental data. Thermodynamics parameters of adsorption like Free energy change ( $\Delta G$ ), enthalpy change ( $\Delta H$ ) and entropy change ( $\Delta S$ ) were also calculated, which proved the exothermic and spontaneous nature of reaction. Column mode experiments were performed to check the optimized conditions of bed height, flow rate and initial POP concentration for maximum 2,4-D removal. Maximum 2,4-D removal in continuous study was 50.25 mg/g at 4 cm bed height and 80 mg/L initial POP concentration. Thomas and bed depth service time (BDST) models were applied on the experimental results of column study. The results confirm that sugarcane bagasse and its composite can be used as a potential biosorbent for the removal of 2,4-D from waste water.

**Analysis of Solid Waste Eggshell Nanocatalyst Activity  
for Biodiesel Synthesis**

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**Abstract**

The fossil fuels depletion has increased the cost of petroleum extraordinarily and created a requirement of alternative energy like biodiesel. In this research, biodiesel was made from waste oil using heterogeneous catalyst such as CaO (waste eggshell nanocatalyst) under the transesterification process. By optimizing the various parameters for example catalyst dose 0.2 % (w/w), alcohol to oil ratio (1:1), temperature 50°C, time 150min and stirring speed 360 rpm were used to enhance the yield of biodiesel. CaO (waste eggshell nanocatalyst) was gave 90% fatty acid methyl ester yield. The characterization of catalyst was approved by SEM and FTIR. The biodiesel yield was observed by GC with FID detector analysis and FTIR. Testing of biodiesel was done with diverse ASTM standard factors saponification value, iodine value, acid value, calorific value, viscosity and density etc of biodiesel. Mean and standard deviation was used for analysis of data.

**Keywords:** Biodiesel, Transesterification, heterogeneous nanocatalysts, energy crisis, fossil-diesel

**High-Performance Materials for Organic Photovoltaic Devices and Light-Emitting Diodes.**

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**Abstract**

Nowadays, finding renewable energy sources and low cost electronic devices are of major concern in the fields of both industrial and academic research. New devices have been introduced with the advancement of science and technology. Among them, organic light emitting diodes (OLEDs) have been recognized as the shining star in lighting and digital display technologies. In this research work, a series of bipolar molecules (D1-D8) of Donor- $\pi$ -Acceptor (D- $\pi$ -A) topology has been investigated by quantum computations, by inserting different  $\pi$ -conjugated aromatic bridging fragments, to find the appropriate material to be used in efficient OLEDs. Optical and electronic properties have been computed by CAM-B3LYP/6-31G (d,p) and TD-CAM-B3LYP/6-31G+(d,p) level of theory, respectively. Investigated molecules show narrow energy gap  $E_g$  (range from 1.63-2.0 eV) as compared to reference molecule (4.18 eV). Molecules D4, D5 and D6 show red shift of 15, 184 and 26 nm as compared to reference molecule (806 nm) and all investigated molecules show  $\pi$ - $\pi^*$  electronic transitions except D5 and D6 which display ICT (intramolecular charge transfer) transitions. Moreover, molecular electrostatic potential surfaces and charge transfer properties proved that D4, D5 and D6 have potential as best hole transport materials to be used in OLEDs. In a nutshell, these results indicated that all investigated molecules can be used as an efficient materials for fabrication of OLEDs as well as organic solar cells.

**Mercury Elimination from Industrial Wastewater using  
Silica Titania Composite (STC)**

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**Abstract**

Heavy metals, especially Hg (II) is the most poisonous metal associated with some serious health problems. Adsorption is the highly efficient method to remove metals from waste water. The current study involved the utilization of silica titania composite (STC) and silica titania template with surfactant (ST:TX) for reduction of mercury from aqueous media. To enhance the adsorption efficiency, various parameters were studied like pH effect, adsorbent dose, Contact time effect, initial metal concentration and temperature effect. The mercury removal increased under optimized condition. The equilibrium and kinetic models were also applied on adsorption data. It was noted that Langmuir adsorption isotherm and second order kinetic model were well fitted model for both the composites. Thermodynamic factors like Gibbs free energy ( $\Delta G$ ), enthalpy ( $\Delta H$ ) and entropy ( $\Delta S$ ) were also examined. All the data was statistically evaluated using linear regression.

**Keywords:** Mercury; Removal; Adsorption; Composite; Equilibrium modelling; kinetics; Thermodynamics

## Design of Zigzag Brick Kiln to Reduce Air Pollution

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### Abstract

The major sources of air pollution are industries and traditional brick kilns leaving a high amount of smoke, which are concentrated in urban areas, where also a large number of population lives. The air quality in most major cities of the world has worsened due to the pollutants present in air. As Faisalabad is the third most populated city of Pakistan and is an industrial city because of its location and connecting roads, railway and an international airport. Due to industrialization it has a major issue of air pollution. Fixed Chimney Bull Trench Kiln (FCBTK) is one of the major causes of air pollution so to minimize the air pollution we should use new technology that is High Draught Zigzag Brick Kiln. This can reduce the air pollution up to a large extent. The situation at Faisalabad is taken as an example. This paper is based on a study carried out to determine the flue gases emitted by zigzag brick kiln and FCBTK. The purpose of the present study is to investigate effectiveness of zigzag brick kiln technology for lowering of atmospheric pollution. This technology is an emerging technology, receiving acknowledgement in the world due to its great potential in removing of particulate matter and carbon monoxide from the atmosphere. The study would be divided into three phases: the designing of zigzag brick kiln, sampling of flue gases and comparison with FCBTK. It is strongly expected to use this technology by the government on large scale in order to reduce the pollution.

**Keywords:** Zigzag Brick kiln, FCBTK, Air Pollution



**Bioassay Based Phytochemical Analysis of *Nyctanthes  
Arbor-Tristis* in Search of Natural Fungicides**

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**Abstract**

*Nyctanthes arbor-tristis* an important medicinal plant. All four fractions were bioassayed for their anti-fungal potential. Ethyl-acetate and chloroform fractions of leave significantly inhibited the growth of fungus. Based on the results of bioassay, ethyl acetate and chloroform fractions from the leaf were selected for the isolation of bioactive constituents responsible for their activity. Two unknown compounds A and B were isolated from ethyl acetate and one compound C from the chloroform fraction of the leaves. The three compounds A, B and C were tested for antifungal potential against *Fusarium oxysporum* f. sp. *lycopersici*. The results revealed that all three compounds exhibit strong antifungal activity against *Fusarium oxysporum* f. sp. *lycopersici* and their activity was comparable to the commercial fungicide Tebuconazole. The minimum inhibition concentration (MIC) value found for these compounds after 72 h was 2 mg/mL, which was quite promising. The phytochemical analysis shown the presence of alkaloids, carbohydrates, flavonoids, saponins, tannins, sterols, terpenoids, coumarins, carotenoids, acids and phenolic compounds in methanolic leave and stem extract. It was thus concluded that the antifungal compounds present in leaves of *N. arbor-tristis* can be used as alternatives to synthetic fungicides to control *Fusarium* wilts.

**Biodiesel Production from Wild Mustard Seeds Oil**

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**Abstract**

Energy is chief determinant of sustainable and economic growth worldwide. At present, transport sector utilizes, approximately 80 percent of total energy obtained from fossil fuel. Fossil fuel depletion has provoked researchers to discover and determine performance of substitute fuels like biodiesel. The approach presented in this study has price competency of biodiesel to petroleum diesel. The oil extracted from Wild Mustard seeds was used to produce biodiesel using sodium superoxide ( $\text{NaO}_2$ ) and potassium superoxide ( $\text{KO}_2$ ) and immobilized lipase catalyzed processes. The maximum biodiesel (BD) yield from unroasted pure *Sinapis arvensis* oil was 84 and 87.3%, using  $\text{KO}_2$  and  $\text{NaO}_2$ , respectively. The maximum BD production from roasted *Sinapis arvensis* oil employing  $\text{KO}_2$  and  $\text{NaO}_2$  catalyst was 78.6, and 80.6%, respectively. The results clearly show that  $\text{NaO}_2$  is excellent catalyst for BD production from roasted and unroasted *Sinapis arvensis* oil and its fractions. Biodiesel properties were checked using standard fuel tests. BD produced from *Sinapis arvensis* has low iodine value and high cetane number. Biodiesel produced from *Sinapis arvensis* showed good pour point. GC-MS analysis was used to identify the components present in biodiesel produced. The presence of low chain fatty acids is prominent feature of biodiesel obtained from *Sinapis arvensis* seed oil.

**Keywords:** *Sinapis arvensis*, Wild Mustard seeds, Biodiesel, Cetane number

**Purification of Water by *Moringa Oleifera* Seeds**

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**Abstract**

According to Pakistan Council of Research in Water Resources Pakistan is facing shortage of water. There is not much time left when Pakistan will be out of drinking water. Many canals are left unused just because of the suspended solids and bio active constituents. If we can just decrease the suspended solids of the canals to National Environmental Quality standards we can create many new drinking water resources. This study is focused on developing an efficient and cost-effective processing technique by using *Moringa oleifera* seeds to produce natural coagulant to use in drinking water treatment. Though various physicochemical and biological treatment methods are employed for the removal of organic contaminants present in the water, but these are not so efficient for decreasing the value of suspended solids. In my work, the extract of *Moringa oleifera* seeds are used as a coagulant to treat water. The natural coagulant can be used as an alternate worldwide for water treatment. The efficiency of *Moringa oleifera* seed extract towards suspended solids was studied at various coagulant dosage. The turbidity removal was very efficient using 0.1 g/L of processed *Moringa oleifera* seeds to treat canal water without any additives. The natural coagulant produced was used with low dosages to get high suspended solids removal which considered to be a breakthrough in this study and recommended to be scaled up. The product is commercially valuable at the same time it is minimizing the cost of water treatment.

**Keywords:** Water Treatment, *Moringa oleifera* and Coagulation

**Design, Synthesis and in Vitro Antioxidant Activity of  
3,5-Disubstituted-2-Pyrazolines**

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**Abstract**

Taking substituted chalcones and azachalcones as the starting material two novel series of pyrazolines were synthesized by conventional heating and microwave irradiation. Claisen Schmidt condensation between intended aryl methyl ketones (1a-b) and different substituted aromatic aldehydes (2a-c) resulted in the formation of corresponding chalcones (3a-c; 4a-c) which were cyclized using hydrazine hydrate to yield final pyrazolines (5a-c; 6a-c) in good yields (59-81%). Reaction time and %ag yield data ratified the superiority of microwave assisted technique over classical heating. The infrared spectral group frequencies of chalcones and pyrazolines have been found in good correlation that approved the synthetic routes. Further, the compounds of both series (5a-c; 6a-c) have been screened against 1,1-diphenyl-2-picrylhydrazyl free radical (DPPH•) to assess their antioxidant potentials and results were compared with positive control. All the compounds showed good free radical scavenging activity which is comparable to that of standard gallic acid. Amongst all the tested compounds 5a (75%) and 5b (79%) were found to be more active.

**Pattern of imbalances of trace metals in Hodgkin lymphoma female patients in comparison with healthy women**

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**Abstract**

Lymphoma arises from cells of the immune system and *trace metals* augment the *immune* system and their imbalance may promote immunological disorders including *tumorigenesis*. The nails samples were collected from patients/controls and were digested in HNO<sub>3</sub>-HClO<sub>4</sub> mixture and quantification of the metals was performed by flame atomic absorption spectrometry. Mean levels of Cr, Cu, Cd and Pb were found to be significantly elevated ( $p < 0.05$ ) in the nails of Hodgkin lymphoma patients compared to the controls whereas average levels of Fe, Mn and Zn were significantly higher in the nails of healthy women in comparison with patients ( $p < 0.05$ ). The correlation pattern of trace metals in the nails of patient groups revealed significantly different mutual associations compared with the controls. Most of the metals exhibited noticeable disparities in their concentrations based on gender, food habits, tobacco use and types/stages of the donor's groups. Overall, the pathogenesis of disease is significantly affecting the trace metals balance in both patient's groups.

**Keywords:** Hodgkin Lymphoma; Metal; Nails; Statistical analysis; AAS

**Remote Sensing (Rs) and Land Surface Temperature (Lst)  
Application in Assessment of Urban Heat Island:A  
Review**

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**Abstract**

Urban heat island (UHI) is an area/region which is warmer compared to surrounding regions. Numerous researches have conducted studies to analyze the UHI phenomenon using directly temperature measurement techniques and remotely sensing based data sets. UHI is more noticeable in winter and summer and the main cause of urban heat island effect is the modification of land surfaces. The UHI decrease the air quality by increasing the air pollutants such as ozone, and decrease water quality as warmer water flow into the area streams and put a huge stress on ecosystem. UHIs have the potential to directly influence the health and welfare of all urban residents. Increased temperatures have been reported to causes heat stroke, heat exhaustion, heat syncope and heat cramps. This study reviews the urban heat island, factors influencing it and provides description on how to retrieve UHI using remote sensing data. Overview of this study indicated that various aspects effect the utility of remote sensing in UHI studies. However, remote sensing based measurement of LST distinguish spots of urban heat island over large region. Real time spatiotemporal retrieval of UHI spots enable the city planners and managers in addressing Challenges related to the phenomenon.

**Keywords:** UHI, LST, Resolution, RS and Radiance

**Kinetic and Thermodynamic Study of Biodiesel  
Production from used Cooking Oil using CZO  
Nanocatalysts**

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**Abstract**

Biodiesel decreases the pollution effect like air pollution, greenhouse effect and acid rain. Due to energy crisis, there is a need of alternative energy resources such as H<sub>2</sub> energy, solar energy and biodiesel. In this research, biodiesel was formed by reacting heterogeneous based nanocatalysts with used cooking oil in presence of methanol. CZO nanoparticles were characterized by SEM and FTIR. Biodiesel was characterized by GC equipped with FID and FTIR. Optimum conditions for maximum biodiesel yield 90% were 0.2% (w/w) catalyst dose, 3:1 methanol to oil ratio, 50°C reaction temperature, 150 minutes reaction time and 136 rpm stirring speed. Kinetic modeling and thermodynamic factors like enthalpy ( $\Delta H$ ), activation energy ( $E_a$ ), entropy ( $\Delta S$ ) and free energy ( $\Delta G$ ) were operated on all the data. Mean and standard deviation was used for analysis of data.

**Keywords:** Transesterification, CZO nanocatalysts, catalysts, Biodiesel, Renewable fuel

**Environmental Benign Application of Plant Growth Hormones in Combination with Nano-Fertilizer**

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**Abstract**

Micronutrients along with macronutrients play a vital role for the better growth of plants and their reduction in the soil becomes major problem of concern for the scientists all over the world. As nutrients are leached out due to extensive cropping, hence a constant and sustained supply of micronutrients and macronutrients required for better quality agriculture products. The development and application of new types of fertilizers using nanotechnology are one of the potential effective option for enhancement of global crop production. The current experimental study was designed to analyze the effect of micronutrients and macronutrients nano-fertilizers with different growth hormones (Oxalic acid, Salicylic acid, Abscisic acid, Triacantanol, Gibberellic acid, NATCA, Butyric acid, 1-Naphthylacetamide, Sodium nitrophenolate, IAA) on vegetative development and essential oil contents of Basil (*Ocimum tenuiflorum* and *Ocimum basilicum*). The concentration of micronutrients (Iron, Zinc, Boron, Manganese, Molybdenum) and macronutrients (Calcium, Phosphorus, Nitrogen, Potassium, Magnesium and Sulphur) remained invariable during all different trails of experiment. ANOVA and Tukey's test were used for the evaluation of results.

**Keywords:** Basil, *Ocimum tenuiflorum*, *Ocimum basilicum*, growth hormones, nano particles



**Synthesis and Characterization of Chitosan Modified Polyurethane Bio-Nanocomposites with Biomedical Potential**

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**Abstract**

A series of chitosan (CS) and montmorillonite (MMT) clay based polyurethane bio-nanocomposites were synthesized by step growth polymerization; reacting hydroxyl terminated polybutadiene (HTPB) and toluene diisocyanate (TDI) to improve thermal and antibacterial properties of polyurethane (PU). Five different PU samples were prepared by varying mole ratio of CS and 1,4-butane diol (from 0 to 2 mol). Structural studies of PUs through FTIR and <sup>1</sup>H NMR spectroscopy confirmed the incorporation of CS into the polymer matrix. The scanning electron microscope (SEM) analysis confirmed well dispersion of MMT clay into the PU matrix. Thermogravimetric analysis (TGA) of PUs indicated significant enhancement of thermal stability of PU with addition of CS. Antibacterial properties of PUs were measured by disc diffusion method; showed excellent potential against the selected strains. On the whole, CS showed potential to improve the antibacterial and structural properties of PU significantly; which might be precursor for biological applications.

**Dye Adsorption using Bentonite and Zeolite Based Composite Materials**

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**Abstract**

Water contamination by dyes from industries constitutes serious threat to public health. The use of clay mineral has undoubtedly become more popular and widely used as an adsorbent and ion exchange for water and wastewater treatment applications especially for removing heavy metal, organic pollutants, and nutrients. This study was focused on bentonite clay and zeolite based composite materials which were synthesized and used for water purification. The effect of various parameters including initial dye concentration, temperature, pH and contact time was investigated to obtain optimized process conditions. This study also investigated the comparative suitability of raw bentonite and combinations of bentonite as adsorbents and coagulants for wastewater treatment based on the removal of efficiencies of dyes, turbidity, as well as sludge volume index under the optimum conditions of both coagulants. Post-hoc Tukey test was used to test the significance of the results obtained.

**Keywords:** Water contamination, dyes, bentonite, zeolite, coagulant

**Recovery of Critically Rare Metals from Secondary Waste**

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**Abstract**

The increasing demand for critical metals and mounting pressure on the environmental impact of solid waste disposal have widely attracted the recycling of spent lithium ion batteries (LIBs). Although the hydrometallurgical recycling of  $\text{LiCoO}_2$  cathode materials from spent LIBs has been commonly investigated, the studies on  $\text{LiNi}_x\text{Co}_y\text{Mn}_z\text{O}_2$  type cathode materials are infrequent. Hence, the present work is focused on sulfuric acid leaching of  $\text{LiNi}_x\text{Co}_y\text{Mn}_z\text{O}_2$  cathode material for resource recovery of all the critical and rare metals from spent LIBs. The process parameters viz., pulp density, acid concentration, the dosage of reducing agent (i.e.,  $\text{H}_2\text{O}_2$ ), time, and temperature have been optimized for leaching of cathode powder (of weight composition: 7.6% lithium, 20.48% cobalt, 19.47% manganese, and 19.35% nickel). The maximum 92% lithium and nickel, 68% cobalt, and 34.8% manganese could be leached while leaching a 5% pulp density in 3.0 M  $\text{H}_2\text{SO}_4$  without  $\text{H}_2\text{O}_2$  at 90 °C. Leaching efficiencies of metals were found to be increased within 30 min and reaching to >98% by adding 4 vol%  $\text{H}_2\text{O}_2$  even at a lower temperature, 50 °C.

## Essential Oil Isolates of Indian Black Berry Leaves

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### Abstract

Essential oils are concentrated liquids of complex mixtures of volatile compounds which can be extracted from several plant organs and are a good source of several bioactive compounds, which possess antioxidative and antimicrobial properties. This study aimed to determine the essential oil isolates from Indian black berry leaves for accessing their antioxidant properties. Essential oil was analyzed by gas chromatography-mass spectrometry (GC-MS). The antioxidant activities of all components were examined using various antioxidant assays. Due to their antioxidant properties, the leaf extracts from Indian black berry may be used as natural preservative ingredient in food and pharmaceutical industries. The results obtained were reported using ANOVA with post hoc Tukey test.

**Keywords:** Indian black berry, Essential oils, antioxidative, antimicrobial

**Variations in Menthol Contents of *Mentha Arvensis* in Response to Application of Growth Regulators**

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**Abstract**

Salinity stress negatively influences plant growth. Plant growth, developmental process and abiotic stress tolerance is highly enhanced by plant growth regulators (PGRs). The current experiment on *Mentha arvensis* plant was designed to analyze the plant growth and essential oil contents by applying plant growth regulators. In the present research different concentrations of plant growth regulators were applied on *Mentha arvensis* to check the performance with regards to crop yield, growth, quality grades, contents of menthol and other physiological attributes. The growth regulators were applied in randomized complete block design to *Mentha arvensis* plants. Gas Chromatography- Mass Spectrometric (GC-MS) study were performed to conclude the essential oil contents of *Mentha arvensis*. ANOVA and then Tukey's test were used for the estimation of results.

**Keywords:** *Mentha arvensis*, PGRs, Nano fertilizers, stress tolerance

**Liquid-Liquid Extraction of Rhenium from Acidic Liquor**

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**Abstract**

The liquid extraction of rhenium from acidic liquor and its subsequent stripping were investigated using the solvent extraction technique. In this study, tri-butyl phosphate (TBP) as organic extractant and metals bearing dust solution were used as the organic and aqueous feed, respectively. The extraction curve as a function of equilibrium pH depicted the maximum separation of rhenium at high acid concentration i.e.,  $\text{pH}_{\text{eq}(\text{ext.})} = -0.3$ . The variation of TBP concentration and  $\text{pH}_{\text{eq}(\text{ext.})}$  revealed the formation of  $[\text{HReO}_4 \cdot 3\text{TBP}]$  adduct in the organic phase. A quantitative rhenium extraction of approximately  $> 99.6\%$  was observed while contacting the metal-bearing aqueous with  $0.65 \text{ mol/L}$  TBP. A study on thermodynamic parameters indicated exothermic extraction process. The stripping of rhenium from loaded TBP as a function of pH yielded an efficient recovery of  $99\%$  at  $\text{pH}_{\text{eq}(\text{strip})} \geq 3.0$  that demonstrated the potential of present work.

## Solvent Extraction of Rhenium with Cyanex 923

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### Abstract

Rhenium is extensively used in super alloy due to extraordinary properties like high melting temperature, excellent resistance and anticorrosive also predominantly used in gas turbines of air craft engines and power plants. 3–6% of rhenium found in new generation single-crystal super alloys whose market price is more than the total cost of alloyed-elements. Rhenium gets dissolved in electro-generated chlorine along with other metals. To recover the leached rhenium, liquid-liquid extraction has been employed by using Cyanex 923 organic solvent with 99.2% extraction efficiency. The influence of various parameters like, the extractant, acid and chloride concentration, and organic-to-aqueous phase ratio has been investigated. The rhenium was efficiently back-extracted with ammonia solution to recover the pure solution of ammonium perrhenate,  $\text{NH}_4\text{ReO}_4$ . The study validates Cyanex 923 as a promising extractant for rhenium (VII) from a chlorinated leach liquor of HCl medium.

**Evaluation of Cytotoxicity, Hemocompatibility and Spectral Studies of Chitosan Assisted Polyurethanes Prepared with Various Diisocyanates**

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**Abstract**

In this research work cytocompatibility, mutagenicity, and hemolytic activity of chitosanbased polyurethanes (PUs) have been evaluated. The chitosan modified PUs were prepared by step-growth polymerization technique using various diisocyanates like Isophorone diisocyanate (IPDI), 4,4'-methylenedicyclohexyl diisocyanate (H12MDI), 2,4-toluene diisocyanate (TDI) and hexamethylene diisocyanate (HMDI) by reacting with hydroxylterminated polybutadiene (HTPB). Structural confirmation of prepared samples was done by FTIR-ATR and <sup>1</sup>HNMR techniques. Chitosan bearing PU samples showed good hemocompatibility, non-mutagenic behavior and less or non-cytotoxic behavior with all the diisocyanates. Among all the diisocyanates, aromatic diisocyanate (TDI) showed less hemocompatibility, high mutagenicity, and more cytotoxicity. However, this still showed a better result than non-chitosan based sample. It is concluded that chitosan improved the biological behavior of PU samples.



**Investigation of the Anti-Biofouling Behaviour of Polymeric Membrane Fabricated with Aminated Graphene Oxide (NH<sub>2</sub>-GO)**

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**Abstract**

The fabricated membranes were characterized by scanning electron microscopy (SEM) for analysis of surface morphology, Fourier transform infrared spectroscopy (FT-IR) for detection of attached functional groups and X-ray diffraction (XRD). Cellulose Acetate membrane blended with NH<sub>2</sub>-GO content exhibited highest water permeability. The contact angle of the membrane was decreased with the addition of NH<sub>2</sub>-GO composite while with the further addition the contact angle of the membrane was decreases. Biofouling is deposition of microorganisms on membrane's surface which consequently reduces its flux and working lifetime. Hence, polymeric nano-composite membranes exhibiting properties like high water flux, high hydrophilicity and more anti-biofouling behaviour are employed for biofouling mitigation. In the present study, graphene oxide (GO) was synthesized by Hummer's method and graphene oxide was functionalized with amine (NH<sub>2</sub>) group with the addition of ammonia in the presence of ethylene glycol. Cellulose acetate membranes were fabricated with different concentration of graphene oxide.

**TMREES/PP/Development of Silver Nanoparticles (Ag NPs) based Surface-Enhanced Raman Spectral (SERS) Protocol for Oxytocin Estimation in Milk**

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**Abstract**

Currently HPLC and ELISA are the main available techniques for OT detection in milk but they have limitations such as high cost, difficult sample preparation, low sensitivity, and requirement of high level of expertise and instrumentation. Herein, we are developing a simple, quick, low-cost and an ultra-sensitive protocol for OT estimation in milk based on surface-enhanced Raman spectroscopy (SERS). Silver nanoparticles (Ag NPs) covalently immobilized on glass slides serve as nanoparticles-based SERS substrates and Raman spectra of the milk samples are recorded for OT. Raman spectral data obtained is analyzed using principal component analysis (PCA) and partial least squares regression (PLSR) analysis with Mat lab software and a simple and quick Raman based protocol is developed for OT determination in milk. Initial results of our developed SERS method are quite promising showing its much higher sensitivity in comparison to the conventional methods.

**Keywords:** Oxytocin, milk, silver nanoparticles, Raman, SERS.

**Wastewater treatment using Biocomposites**

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**Abstract**

Adsorption on biocomposite materials has been identified as a proper alternative to the present technologies applied for toxic and cyanogenic metal particle and dye removal from wastewater streams. The recent studies disclosed that surface and underground waters everywhere in world are polluted with toxic substances, organic pollutants such as pesticides and textile effluents. This research dealt with preparation of low cost and easily processed biocomposite materials and their potential use as bio-adsorbents for water decontamination and analytical separations. The efficiency of biocomposite materials were discussed with reference to the adsorption capacities and operating conditions (e.g. temperature, pH, concentration). Post-hoc Tukey test was used for statistical studies of experimental results.

**Keywords:** Adsorption, biocomposite, dyes, decontamination, textile effluents

**Isolation of bioactive components from ajwain**

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**Abstract**

The present study was undertaken for the separation of bioactive components from ajwain oil. Ajwain (*Trachyspermum ammi*) is a source of medicinally active compounds and has various pharmacological effects and therapeutic uses. Ajwain oil contributed to a wide range of medicinal applications, such as antibacterial, antifungal, and antioxidant activities. Ajwain oil was extracted by distillation process and analyzed by using gas chromatography mass spectrometry (GC-MS). The significance of obtained results was tested using Post-hoc Tuckey test.

**Keywords:** *Trachyspermum ammi*, ajwain, antibacterial, antifungal, antioxidant

**High through put synthesis and screening of catalytic supports for biodiesel production**

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**Abstract**

A catalytic support provides a high surface area to a catalyst that is affixed on it. Secondly, the use of support does not require a great effort to separate out the catalyst from reaction mixture. Zirconia, zinc oxide, plaster of Paris, silica, and alumina were prepared using selective precipitation, washing, drying, shaping, impregnation with desired catalytic material followed by drying, decomposition, activation to produce catalyst containing supports. Gas chromatographic-mass spectrometric (GC-MS) analysis was performed to determine the composition of produced biodiesel. The obtained results were tested using ANOVA with post-hoc Tukey HSD test.

**Keywords:** zirconia, zinc oxide, plaster of Paris, silica, and alumina

**Determination of phytochemicals present in flax seed**

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**Abstract**

Flax seeds are essential part of several foods of South Asia. The present study was undertaken to determine phytochemicals present in the flax seeds. Essential oils are complex mixtures of biologically active substances which are being used since a long time as a flavoring agents and constituents of number of commercial products. The essential oils from flax seed were extracted using hydro distillation. The extracted essential oil were fractioned by using vacuum fractional distillation to obtain various classes of fractional group. Antioxidant potential and bioactive activities of essential oil and its fractions were tested in laboratory experiments. Fractions were analyzed by using Gas chromatography mass spectrometry (GC-MS). The results obtained were reported using ANOVA with Post-Hoc Tuckey test.

**Development of composite support material for biodiesel production from apricot kernel oil**

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**Abstract**

The production of biodiesel from vegetable and animal fatty acid sources is next feasible way to overcome increasing petroleum demands which has become a great concern because of depleting natural sources of fossil fuels. Apricot kernel oil, being a non-edible feed stock for biodiesel production can serve as a potential candidate as Pakistan is the 7<sup>th</sup> largest apricot producing country. Composite material was used as a support for a base, which served as a heterogenous base catalyst for the process of biodiesel production from apricot kernel oil feed stock. Biodiesel was produced by catalytic transesterification and different physical and chemical parameters such as temperature, methanol to oil ratio, time of reaction, and catalyst loading were assessed. GC-MS was used for the analysis of biodiesel. Results were statistically analysed using ANOVA along with post-hoc Tukey HSD test.

Look Deep into nature, and then you will understand everything better.

*Albert Einstein*

“The use of vegetables oils for Engine Fuels may seem insignificant today. But such oils may become in course of time as important as petroleum and coal tar products of the present time.”

*Rudolf Diesel*

“ The Fuel of the Future is going to come from fruit like that Sumac out by the road, or from apples, weeds, sawdust almost anything.”

*Henry Ford*



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