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District-Raigad, (MS) India, 402 104.

Affiliated to University of Mumbai

Anjuman Islam Janjira Degree College of Science

Murud-Janjira, District-Raigad, (MS) India, 402401.

Affiliated to University of Mumbai

PM USHA Sponsored

INTERNATIONAL CONFERENCE

ON

RECENT TRENDS IN CHEMICAL SCIENCE, PHYSICAL SCIENCE, LIFE SCIENCE AND COMPUTER TECHNOLOGY (*ICRTCPLCT–2025*)

25th February 2025

SOUVENIR

Organized by

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Murud Janjira, Dist. Raigad, 402401
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Email: aijcollege@gmail.com
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Mangaon Shikshan Prasarak Mandal's

D. G. Tatkare Mahavidyalay, Mangaon, District-Raigad, (MS) India, 402401.

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RECENT TRENDS IN CHEMICAL SCIENCE, PHYSICAL SCIENCE, LIFE SCIENCE AND COMPUTER TECHNOLOGY

Chief Editors

Dr. Sajid F. Shaikh

I/C Principal,

A.I.J Degree College of Science, Murud - Janjira

Dr. B.M. Khamkar

Principal,

D. G. Tatkare Mahavidyalay, Mangaon - Raigad

Editorial Board Members

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Schedule of Conference

Inaugural Function	10:15 am (IST)	All Dignitaries & Participants
Welcome Address	10:25 am (IST)	By Principals of Colleges
Presidential Speech	10:35 am (IST)	President of the Function
Keynote Address	10:50 am (IST)	**Dr. Vasant Pandit Mali**
Invited Talk 1	11:35 am (IST)	**Dr. Avinash Bapurao Ade**
Invited Talk 2	12:15 pm (IST)	**Dr, Md. Sanower Hossain**
Invited Talk 3	12:50 pm (IST)	**Dr. Gaurav M. Lohar**
Invited Talk 4	01:30 pm (IST)	**Mr. Nilesh Shinde**
Lunch Break	02:10 pm (IST) to 02:40 pm (IST)	Organizers
Oral/ Poster Paper Presentations	02:40 pm (IST) to 04:30 pm (IST)	Participants
Valedictory Function	4.30 pm onwards (IST)	Certificate and Trophies Awarding

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D. G. T. Tatkare Mahavidyalay, Mangaon

Mr. S. Zainuddin S. U. Kadri
Chairman
Anjuman Islam Janjira Degree College of Science,
Murud - Janjira

About D.G. Tatkare Mahavidyalay, Mangaon

A milestone- D.G. Tatkare Mahavidyalay, Mangaon, District-Raigad (Maharashtra) was laid by Late. Ashoka dada Sable in 1993, with the exclusive purpose of offering education to students in rural areas and upliftment of society. Since its establishment, the holy work of providing education to about 1500 poor students of rural areas is being done. The college has been re-accredited by NAAC with B+ Grade (Second Cycle CGPA 2.64). The college is affiliated to the University of Mumbai and offers 6 Undergraduate and 6 Postgraduate programs. The college is determined and committed to provide an excellent education in elevated region and dedicated to fostering a diverse and inclusive learning environment that emphasize ethical practice, and lifelong learning, empowering our graduates and post-graduates to lead in a dynamic scenario.

About Anjuman Islam Janjira Degree College of Science, Murud Janjira

Anjuman Islam Janjira's Anjuman Islam Janjira Degree College of Science, Murud Janjira, District- Raigad (Maharashtra) is one of the prime educational institutions affiliated to University of Mumbai. The college is run by Anjuman Islam Janjira presumably one of the largest educational trust. It was established in 1907 with the vision of attainment of socio-economic upliftment of minority community by imparting quality education. The college has played an important role in the overall development of Murud Janjira since past 15 years. The college offers B.Sc. and B.Sc. in computer Science, B.M.S. and B.A.F at UG level and M.Sc. Organic Chemistry & Botany Programmes at PG level. In near future Research Centre in Chemistry will start. It underwent assessment and accreditation by NAAC in second cycle and achieved B^+ Grade with 2.69 CGPA. This college received best college award by different organizations.

About Conference

This International Conference on recent trends in chemical science, physical, life sciences and Computer technology is a brain storming to furnish on opportunity to academics aspiring scientist and research scholars from various discipline of science to interact and present their research execution in their respective field. This conference will be platform to highlight research achievement in the field of chemical science, physical science, life science and Computer Technology. Recent research trends of stated topics will be discussed

Subthemes for ICRTCPLCT–2025

Green Chemistry
Mixed Metal Oxides
Material for electronic devises
Polymer Chemistry
Synthetic Chemistry
Scope of Computer technology
Smart Computers
Artificial intelligence
Cyber Security
Ethical Hacking
Plant Diversity
Medicinal Plants
Bioorganic Chemistry
Sensor
Biodiversity
Agro-tourism
Nano material for future
Semiconductors
Bio fertilizers & organic farming
Environmental Sustainability
Electronic & Magnetic Property

दूरध्वनी क्रमांक: २६३०३९ ।। शील परं भूषणम् ।। दूरध्वनी क्रमांक: २६१४४४

माणगांव शिक्षण प्रसारक मंडळ

माणगांव - रायगड.

संस्था नोंदणी क्र. एफ -२७ र. नं. Bom 7 / 1958 KLB Dated 7 - 11 - 1958

ॲड .राजीव साबळे
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श्री.कृष्णा रुपचंद गांधी
सेक्रेटरी
☎:263162, Mob.9423382829

President Message

D. G Tatkare Mahavidyalaya was laid by late Ashok Dada Sable in 1993 with the exclusive purpose of offering education to students in rural areas as an upliftment of the society. Since its establishment, the holy work of providing education is being done. The college has been reaccredited by NAAC with grade B+ (second cycle CGPA2.64). The college is affiliated to University of Mumbai and offer 6 UG and 6 PG programmes.

It is truly a delight to learn that D.G. Tatkare MahavidyalayMangaon Raigad, in collaboration with Anjuman Islam Jangira Degree College of Science, MurudJangiraRaigarh, is taking the initiative to host the international E-conference on Recent Trends in Chemical Science, Physical Science, Life Science, and Computer Technology on February 25th2025and is producing a souvenir to commemorate the event.

As the president and on behalf of the Executive Council & entire College Development Committee, we take great pride in the collaboration of both institutions in organizing such a significant event. We anticipate that this conference will inspire young scientists, aspiring researchers, and students to pursue their ambitions in the future. The students and faculty from both colleges will gain valuable insights from this conference. We extend our gratitude to the staff involved in organizing the event and wish them the utmost success for the conference.

Adv. Rajiv Ashok Sable

President

ANJUMAN ISLAM JANJIRA
DEGREE COLLEGE OF SCIENCE

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Phone. 7038601376/ 9270083578

Anjuman Islam Janjira
Established in 1907

NAAC
Re-Accredited With
2.69 CGPA
B+ Grade

Best College Award2019-20
By Jolly Club- Raigad

Ref. No. AIJDCM/ **Date:**

Message from Chairman of College

Anjuman Islam Janjira Degree College of Science, Murud-Janjira, Raigad was established in 2009 the first in Taluka. The entire team of Anjuman Islam Janjira successful development the campus. Infrastructure & college went through NAAC Accreditation for Second cycle in 2024 with 'B+' grade with 2.69 CGPA. Either this college only cathead undergraduate education in the chemistry, Botany & Computer Science. From A.Y. 2021-22, this college start M. Sc Chemistry & M. Sc. Botany. We have also received permission of Research Centre in Chemistry.

Being a chairman and by entire team of college development committee, we feel, provide that this college is organizing International Conference on 'Recent Trends in Chemical Science Physical Science Life Science and Computer Technology' (ICRTCPLCT- 2025) on 25th February 2025. Research section & Performa from various part will participants in this conference.

We feel that this conference will be useful to all buddy researchers. There will be useful academic work will be short and discussion in the conference.

This student only staff keeping stiff of this college will also be benefited from the conference.

We all thankful to concern staff involved in organizing in conference & wish a best of success for the conference.

Chairman
Anjuman Islam Janjira Degree College of Science

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Golden Jubilee Building, YCIS, Pawai Naka, Satara(Maharashtra)-415001

Dr. Dnyandeo Mhaske M.Sc., Ph.D.

Vice Chancellor

Ref. No. : KBPU/Estd/2024-25/1183 Date : 22 FEB 2025

Message

It is with immense pride and enthusiasm that I extend my heartfelt congratulations to the organizing committee of Mangaon Shikshan Prasarak Mandal's D. G. Tatkare Mahavidyalay, Mangaon, District-Raigad, (MS) India, 402401. and Anjuman Islam Janjira Degree College of Science Murud-Janjira, District-Raigad, (MS) India, 402401. for successfully hosting this **International Conference on Recent Trends in Chemical Science, Physical Science, Life Science, and Computer Technology**. This prestigious event serves as a dynamic platform, bringing together esteemed researchers, academicians, scientists, and professionals from across the globe to exchange ideas, share groundbreaking research, and foster collaborations that will shape the future of science and technology.

Academic gatherings of this nature reflect our institution's unwavering commitment to research excellence, interdisciplinary learning, and global engagement. Conferences such as this not only provide a stage for presenting innovative discoveries but also serve as a catalyst for new collaborations, transformative ideas, and impactful research contributions. The synergy between different scientific disciplines showcased here underscores the importance of an integrated approach to addressing contemporary challenges.

I sincerely appreciate the relentless efforts of the organizing committee, faculty members, research scholars, and participants who have worked tirelessly to make this conference a reality. Their dedication, vision, and passion for advancing knowledge have been instrumental in the success of this event. I am confident that the discussions and interactions during this conference will inspire new perspectives, encourage pioneering research, and lay the groundwork for meaningful partnerships that extend beyond this gathering.

As we embark on this exciting journey of knowledge sharing and academic discourse, I extend my best wishes to all the participants for a fruitful and enriching conference. May this event open new avenues for scientific exploration and innovation, ultimately contributing to the progress of society at large.

Wishing you all a successful and inspiring conference!

Karmaveer Bhaurao Patil University KBPU Estd 2021 Satara

Dr. Dnyandeo Kundlik Mhaske

Phone : 02162-229907 | Website : https://www.unikbp.ac.in

Email : vcoffice@unikbp.ac.in | Email-vc@unikbp.ac.in

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Mangaon Shikshan Prasarak Mandal's

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Arts, Science, Commerce.

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Estt. 14th July 1993
Reg. No. 3664/93

www.mangaonseniorcollege.com mspmmangaonseniorcollege@gmail.com

Late Ashokdada Sable, Founder - (Ex. M. L. A.) | Shri. Rajiv Sable, President | Shri. Krishna Gandhi, Secretary | Dr. Baban M. Khamkar, Principal

Principal

It is a true pleasure that D.G. Tatkare Mahavidyalay Mangaon Raigad, in collaboration with Anjuman Islam Jangira Degree College of Science, Murud Jangira Raigarh, is taking the initiative to host the international E-conference on Recent Trends in Chemical Science, Physical Science, Life Science, and Computer Technology on February 25th2025.

The aim of this conference is to emphasize the latest developments in science and technology. We are currently inhabiting an era of innovation. Innovations arise from extensive research, which has become a crucial element in higher education. Research within the domains of science and technology holds great importance, contributing to the advancement of humanity and the wellbeing of our environment. This conference, which advocates for research initiatives, is vital for emerging scientists. By organizing such an event, a forum is created for nova researchers and seasoned experts to share their perspectives and engage in meaningful discussions, ultimately fostering high-quality research.

I extend my hearty welcome to all delegates, participants and students to this conference and wishing best luck for further discussion.

Dr. B. M. Khamakar

Principal

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Ref. No. AIJDCM/ **Date:**

Message from Principal

It gives me immense pleasure to welcome honourable delegates, participants on the occasion of International Conference on 'Recent Trends in Chemical Science Physical Science Life Science And Computer Technology' ICRTCPLCT-2025) organized by this college in collaboration with D.G. Tatakre College Mangaon, Raigad. It is intention of this college to provide platform to the research scholars in the field of science & technologies to tackle the recent achievement through the present conference organised on 25th February 2025.

It's my duty to say thanks to PM.USHA for providing financial assistance for this International Conference.

This college is one of the Non grant Minority institute wear majority near about 80% Muslim girls students take education since 2009. This college focus on the honest development of students and also make society responsible & cultured citizens. This college always trine to inculcate value added education by organizing different activities, workshop, seminar and conference.

I think so this conference will above help to buddy research to give valuable technology and provide quality research for nations development.

I again welcome all the delegates for this international e-conference & look forward to most successful discussion.

Dr. Sajid F. Shaikh
I/C Principal
Anjuman Islam Janjira Degree College of Science

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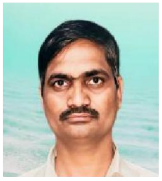

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Message from Organizing Committee

Dear Esteemed Participants,

On behalf of the Organizing Committee, we extend our warmest welcome to you for the **ICRCTCPLCT - 2025**, an International Conference on **Recent Trends in Chemical Science, Physical, Life Sciences and Computer Technology**, to be held on **25th February** at **D.G.T. Mahavidyalay – Mangaon, Raigad**.

This conference aims to bring together leading researchers, academicians, and industry experts to exchange knowledge, foster collaborations, and explore innovative solutions in **Chemical Science, Physical, Life Sciences and Computer Technology**. With insightful keynote sessions, engaging panel discussions, and thought-provoking research presentations and poster, we anticipate a dynamic and intellectually stimulating event.

We sincerely appreciate your participation and look forward to fruitful discussions that will contribute to the advancement of science and society. Wishing you a successful and enriching experience at **ICRCTCPLCT – 2025!**

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Convergence of Disciplines: Revolutionizing Science and Technology for a Sustainable Future

Dr. Vasant Pandit Mali
Principal
J Watumull Sadhubella Girls College, Ulhasnagar, Dist. Thane (MS), India
Email: vasant.mali@rediffmail.com

Abstract:
The integration of Chemical Science, Physical Science, Life Science, and Computer Technology is redefining the landscape of research and innovation, addressing some of the most pressing global challenges of our time. Chemical sciences are driving advancements in green chemistry, nanotechnology, and sustainable energy, while physical sciences continue to unravel the universe's mysteries through breakthroughs in quantum mechanics, materials science, and space exploration. Life sciences are transforming healthcare and biotechnology with innovations like CRISPR, personalized medicine, and synthetic biology. Meanwhile, computer technology, powered by artificial intelligence and quantum computing, is accelerating discoveries across disciplines and revolutionizing industries. This paper explores the transformative potential of interdisciplinary collaboration, highlighting how the convergence of these fields fosters groundbreaking discoveries, sustainable solutions, and ethical innovations. It emphasizes the critical role of researchers, educators, and industry leaders in ensuring that these advancements benefit humanity and the environment.

Keywords: Interdisciplinary Research, Scientific Innovation, Sustainable Technology, Converging Sciences, Global Challenges

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Plastic Waste Management: Biodegradation the Effective Strategy

Avinash Ade
Department of Botany, Savitribai Phule Pune University, Pune 411007 (Maharashtra)

Abstract:
Plastic is the material discovered by human which is derived from the petrochemicals. There are several polymers in the plastic. These are classified according to their properties and utilities. Plastic polymers are light weighted, durable and strong in tensile strength. Because of these unique properties the usage is being increased significantly and it has been reached beyond the control of human. The accumulation of the plastic not only destroys the beauty of nature but also carries some hazardous effects. The water channels are blocked due to plastic garbage which lead to flood like situation on the roads. The consumption of polythene carry bags by domestic animals lead to the carcinogenic effect in their body. Consequently we get defected animal products. The plastic containers which we use for carrying food products and cosmetics, release the plastic additives into the food items and cosmetic creams and lotions. Among such are several hazardous material derived from the plastic the Bisphenol-A and Phthalates are more dangerous as these are responsible for collapsing the endocrine system as well as for causing cancer. In order to avoid these disorders and complications, disposing the plastic waste properly is necessary. There is need of the effective strategy to manage the plastic waste disposal. The plastic pollution can be managed by minimal usage of single use plastic, reusing the plastic, landfilling, incineration and degradation. The degradation is possible by physical, chemical and biological methods. The biological methods involve the usage of microbes associated with the decomposition phenomenon in the ecosystem. As it is biological process it is energy efficient and eco-friendly. We could isolate the microbes (fungi and bacteria) associated with the degrading plastic from the mangrove rhizosphere, using appropriate media. These were tested for degradation of polythene. The degradation was measured in terms of the weight loss and the loss in tensile strength of the polythene. Significant weight loss and tensile strength loss was found after treating certain bacteria and fungi. The bioactivity of the culture filtrates obtained from bacteria and fungi after polythene degradation was studied which was not significant for the mortality of the crop seeds and the tiger fish.

Keywords: Plastic waste management, Biodegradation, microbes.

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Nickel Molybdate Based Nanostructures for Energy Storage Devices

Gaurav M. Lohar
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Author contact details: gauravlohar24@gmail.com

Abstract

Transition metal molybdates are one of the most prominent materials for energy storage devices due to their high energy storage capacity, redox activities, and excellent cyclic stability. The present investigation establishes a strong correlation between structure and electrochemical performance of $NiMoO_4$ through Density Functional Theory (DFT). Initially, the $NiMoO_4$ microspheres were directly deposited on nickel foam using hydrothermal method by tuning experimental parameters (reaction time and calcination temperature). When employed as electrode materials, the $NiMoO_4$ microspheres delivered a specific capacity of 168.9 mAh g^{-1} at 1 A g^{-1}. In addition, the material retained 80% capacity over 7000 charge-discharge cycles with 98.3% coulombic efficiency, implying its excellent stability. We used DFT calculations to determine specific capacity and potassium ion diffusion for 5 layers of [110] planes of $NiMoO_4$. The potential energy landscape was created for [110] plane using potassium atom minimum hopping algorithm and atomic simulation environment. The DFT results clearly aligns with the theoretical capacity of 203 mAh g^{-1} close to the experimental results. We have also developed hybrid supercapacitor of with $NiMoO_4$ as positive and activated carbon (AC) as negative electrode, respectively. The $NiMoO_4$//AC cell delivered a specific energy of 56.3 Wh kg^{-1} at specific power of 421 W kg^{-1} with negligible capacity loss over 15,000 cycles. This investigation offers the development of battery-type electrode for hybrid supercapacitors using the fundamental understanding of ion-diffusion in the materials structure.

Keywords: Nickel Molybdate Microspheres, Hybrid Supercapacitor, Density Functional Theory, Theoretical Specific Capacity.

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Nanotechnology Meets Sustainability: Green-Synthesized ZnO Nanoparticles for Biodegradable Food Packaging Films

Md. Sanower Hossain[1], Nur Iznin Hanis binti Mohd Azhar[2], Nurul Aini binti Mohd Azman[2], Jun Haslinda Shariffuddin[1,2]

Centre for Sustainability of Mineral and Resource Recovery Technology (Pusat SMaRRT), Universiti Malaysia Pahang Al-Sultan Abdullah, Kuantan, Pahang, 26300 Malaysia[1]

Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah, Kuantan, Pahang, 26300 Malaysia[2]

Abstract

The growing demand for sustainable solutions in food packaging has spotlighted bioplastics like carboxymethyl cellulose (CMC) as promising candidates. This study introduces an innovative approach to enhancing CMC films by incorporating zinc oxide nanoparticles (ZnO NPs)synthesized through green methods using pineapple waste. The resulting ZnO NP-CMC nanocomposite (ZCMC) films were fabricated and systematically characterized using FTIR,XRD, SEM-EDX, TGA, and DSC to evaluate their structural integrity and thermal stability. The nanocomposites demonstrated remarkable improvements in physical and mechanical properties, including a tensile strength of 26.30 MPa, elongation at a break of ~50%, and rapid biodegradability within 9 days under soil conditions. These enhancements underscore the potential of ZCMC films to significantly reduce environmental impact while meeting the functional demands of food packaging. This presentation will focus on the innovative synthesis process, the structural and functional advancements achieved, and the implications for sustainable food packaging. Furthermore, future research directions, including exploring the antimicrobial properties and real-world applicability of these films, will be discussed. This study bridges material science and environmental sustainability, offering a practical step toward replacing conventional packaging with biodegradable alternatives.

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AI and You: Navigating the Future of Tech Careers

Nilesh Shinde
Technical Consultant, Deloitte

Abstract:
Artificial Intelligence is transforming industries, creating new opportunities, and reshaping the job market. In this session, we'll explore the fundamentals of AI, its real-world applications, and the skills needed to build a successful career in this dynamic field. Whether you're a beginner or looking to specialize, discover how to leverage AI to future-proof your career and stay ahead in the tech industry!

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Green Synthesis of Silver Nanoparticles using Ocimum Sanctum (Tulsi) Leaf Extract and Screening its Antimicrobial Act

Sarthak Nitin Mhaskar
D. G. Tatkare Mahavidyalay Mangaon Raigad

Abstract

Development of green nanotechnology is generating interest of researchers toward ecofriendly biosynthesis of nanoparticles. In this study, biosynthesis of stable silver nanoparticles was done using Tulsi leaf extract. These bison-the sized nanoparticles were characterized with the help of UV–vis spectrophotometer, Atomic Absorption Spectroscopy (AAS), Dynamic light scattering (DLS), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and Transmission electron microscopy (TEM). Stability of bio-reduced silver nanoparticles was analyzed using UV–vis absorption spectra, and their antimicrobial activity was screened against both gram-negative and gram-positive microorganisms. It was observed that. leaf extract can reduce silver ions into silver nanoparticles within 8 min of reaction time. Thus, this method can be used for rapid and ecofriendly biosynthesis of stable silver nanoparticles of size range 4–30 nm possessing antimicrobial activity suggesting their possible application in medical industry.

Keywords: Green synthesis, silver nanoparticles (AgNPs), Osmium sanctum (Tulsi), Leaf Extract, Antimicrobial Activity, Biogenic synthesis.

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A Comprehensive Study on Efficient One-Step Multicomponent Synthesis Of 1,4-Dihydropyridines Using Green Catalyst

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Asst. Prof. Mehreen Dawre
D.G Tatkare Mahavidyalay Mangaon - Raigad

Abstract

In the pursuit of sustainable and environmentally benign synthetic methods, this study introduces a novel one-step multicomponent synthesis of 1,4-dihydropyridines (1,4-DHPs) employing a green catalyst. The 1,4-DHP framework is a core structural idea in numerous bioactive molecules and pharmaceuticals, and its efficient synthesis under mild and eco-friendly conditions is of significant interest in modern organic chemistry. Our approach integrates the principles of green chemistry with innovative catalytic design, enabling the rapid assembly of 1,4-DHPs from readily available starting materials in a single operational step. The reaction protocol utilizes an environmentally benign catalyst that is non-toxic, biodegradable, and readily recyclable. The catalyst facilitates a simultaneous condensation, cyclization, and reduction process, effectively lowering the activation energy of the transformation. Mechanistic investigations indicate that the catalyst promotes the formation of a key reactive intermediate, which subsequently undergoes nucleophilic addition and intramolecular cyclization to furnish the dihydropyridine core. This streamlined, multicomponent reaction circumvents the need for multiple purification steps, significantly reducing waste and energy consumption compared to conventional multi-step synthetic routes. By integrating renewable materials and sustainable practices, this method addresses critical environmental concerns while maintaining high efficiency and selectivity in product formation. Overall, the developed protocol represents a significant advancement in the field of heterocyclic synthesis, providing a robust platform for the generation of 1,4-DHPs with broad applications in medicinal chemistry and materials science.

Keywords: 1,4-Dihydropyridines, One-Step Synthesis, Multicomponent, Green Catalyst, Eco-Friendly, Heterocyclic Compounds, Renewable Resources.

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A Comprehensive Study on Extraction and Characterization of Bioactive Pesticidal and Insecticidal Compound from Azadirachta Indica (Neem)

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Abstract

Research into the insecticidal effects of azadirachtin, a limonoid from the Neem (Azadirachta indica) has been ongoing for some 30 years. Its strong antifeedant, insect growth regulatory and reproductive effects are now well understood and documented. Antiffedancy varies markedly between species with mosquitoes being particularlysensitive to azadirachtin. The mode of action of azadirachtin lies in (i) effects on deterrent and other chemoreceptors resulting in antifeedancy and (ii) direct effects on most other tissues studied resulting in an overall loss of fitness of the insect. The complexity of the molecular structure of azadirachtin has precluded its synthesis for pesticide use although novel synthesis of the parent molecule is now almost complete and research into simpler mimetic substances is ongoing. Neem (Azadirachta indica is perhaps the most useful traditional medicinal plant in India. Each part of the neem tree has huge insecticidal property and is thus commercially exploitaed. During the last two decades, apart from the chemistry of the neem compounds, considerable progress has been achieved regarding the biological activity and insecticidal applications of neem. It is now considered as a valuable source of unique natural products for botanical insecticides against various pests. This review gives a bird's eye view mainly on the biological activities of some of the neem compounds isolated, insecticidal actions of the neem extracts, applications of neem has an eco-friendly botanical insecticide in pest management along with their safety evaluation.

KEYWORDS: Azadirachtin indica; Neem leaves; Green Chemistry, Synthetic Insecticide, Limonoid; triterpense; Pest control; Antifeedancy; eproduction; Betasitossterol Mode of action.

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The Role of Penetration Testing in Strengthening Cybersecurity Defenses

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Abstract:
A fundamental technique in ethical hacking, penetration testing has become an essential instrument for locating and fixing flaws in contemporary cybersecurity systems. The function of penetration testing in bolstering organizational defenses against changing cyberthreats is examined in this study. Penetration testing gives businesses important information about possible vulnerabilities in networks, apps, and systems by mimicking actual attacks. The methods, resources, and structures utilized in penetration testing are covered in this paper, with a focus on how well they function to proactively close security flaws. It also draws attention to the difficulties penetration testers have, such as moral and legal issues as well as the growing complexity of cloud-based and Internet of Things settings. The study also looks at how automation and artificial intelligence might be combined to improve penetration test accuracy and efficiency. By looking at case studies. Additionally, this study highlights the important ethical and legal issues related to penetration testing, such as authorization requirements, regulatory compliance, and the possibility of collateral damage during testing. The strategies used by ethical hackers must change along with the strategies used by cybercriminals. This study examines how penetration testing is changing as a result of the combination of artificial intelligence (AI) and machine learning, providing new methods for effectively anticipating, identifying, and exploiting vulnerabilities. The study includes real-world case studies that show how penetration testing can reduce cyber risks, enhance incident response strategies, and improve overall security resilience in order to offer useful insights. Additionally, it covers industry best practices, stressing the value of qualified people, continuous testing, and cultivating an organizational culture that prioritizes security.

Keywords: Ethical hacking, penetration testing, cybersecurity defenses, vulnerability assessment, risk mitigation, threat detection, network security.

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Synthesis and Characterization of Nanosized Transition Metal Oxide Used for the Removal of Organic Pollutant by Photocatalytic Treatment

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Abstract

Zinc oxide nanoparticles were successfully synthesised using Moringa oleifera leaf extract, The ZnO-NPs were precipitated out using water from Moringa oleifera leaves and thermally treated at 400, 450, 500, and 600 degrees Celsius before being characterised. XRD, ultraviolet-visible, and Fourier Transform infrared (FTIR) techniques were used to characterise: the prepared ZnO-NPs. Based on its capacity to break down methylene blue in solution, the photocatalytic activity was ascertained. FTIR examination Based on its capacity o break down methylene blu in solution. The photocatalytic activity was calculated, and the XRD spectrum ‘demonstrates a notable ise in electron characteristics and breakdown bond of methylene blu.“The absorption band at 422-497 em”, which i inked to Zn-O stretching, is shown in the FTIR study.

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Preliminary Phytochemical Analysis of *Eriophorum Comosum* (Cotton grass) and *Ficus exasperata (Brahmas Banyan)* along with their Antibacterial Activity

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Abstract

Phytochemical properties of couple of plants namely „cotton grass" and „brahmas banyan" were analyzed, confirming the presence of secondary metabolites in both plants. Similarly, their antibacterial properties were also tested against a Gram-positive and a Gram-negative bacterium. Agar well diffusion method was implemented for this purpose in presence of standard antimicrobials. Microbial growth area over culture media plates, encompassing the antimicrobials, provide data for analysis. Results obtained confirmed the antibacterial nature of both plants with their characteristic action against specific bacteria, in particular solvent systems.

Keywords: Phytochemical analysis, Antibacterial activity, Agar-well diffusion

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"Impact of Mutagenic Treatments on Seed Germination, Seedling Growth, and Survival of *Capsicum annuum* L."

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Abstract

Chili (*Capsicum annuum* L.) is an economically significant crop valued for its capsaicinoids, carotenoids, and essential vitamins, making it a staple in culinary and medicinal applications. Enhancing yield, nutritional composition, and secondary metabolite content are primary objectives in contemporary breeding programs to maximize crop profitability. The success of such programs relies on genetic diversity, which can be achieved through induced mutations. Chemical mutagens, such as sodium azide (NaN_3), are widely used to induce genetic variability by altering nucleotide sequences and generating novel alleles. This study investigates the effect of sodium azide on seed germination and plant growth in *Capsicum annuum*. The experiment aims to evaluate morphological variations induced by the mutagen, assess germination rates, and analyze subsequent growth responses.

Keywords: *Capsicum annuum*, Chili, sodium azide

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A Study on Electrophilic Aromatic Substitution of Acetanilide

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D G Tatkare Mahavidyalay Mangaon-Raigad

Abstract:
Acetanilide was the first aniline derivative serendipitously found to possess analgesic as well as antipyretic property. The literature review shows the study and preparation of acetanilide. The present work was planned to prepare acetanilide from different aldehydes. Acetanilide was prepared by reacting aniline, acetic anhydride and glacial acetic acid. The produced acetanilide is the substituted with different aromatic aldehydes. Electrophilic Aromatic Substitution (EAS) of acetanilide involves the substitution of a hydrogen atom on the aromatic ring of acetanilide by an electrophile. In this process, the nucleophilic aromatic ring reacts with the electrophile, and one of its hydrogens is replaced by the incoming substituent. Acetanilide, with the formula C8H9NO, consists of a benzene ring attached to an amide group (-NHCOCH3). The preparation of acetanilide from aniline via electrophilic aromatic substitution is a well-established method in organic chemistry. The process involves the activation of the aniline ring by the amino group, which makes it highly reactive toward electrophilic acetylation. Acetic anhydride is commonly used as the acetylating agent due to its higher reactivity compared to glacial acetic acid. Zinc dust plays an essential role in purifying the reaction mixture and improving yields. Acetanilide remains a key intermediate in the chemical and pharmaceutical industries, underscoring the importance of this reaction in organic synthesis.

Keywords: Acetanilide, Aldehyde Derivatives, Benzene, Amide group, Aniline.

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"A Comprehensive Study on Determination of Calcium in 'Calcium' Tablets by Complexometric Method"

Manisha Mahendra Singh
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Abstract

This study describes a complexometric titration method to accurately determine the calcium content in a calcium content in a calcium tablets (cipcal hd , supracal , caldikind plus , gemcal plus, shelcal hd) calcium tablet using ethylenediaminetetraacetic acid (edta) as the chelating agent , where a known volume of dissolved tablets sample is titrated against , a standardized edta solution at a controlled ph , with a suitable
Indicator like patton and reeder , to visually detect the endpoint and calculate the calcium concentration based on the volume of edta consumed. And to study the used of calcium tablets and its over dosage side effects on human body and the natural sources of calcium. This study review the used of calcium tablets and its health issue on human body and determination of calcim in calcium tablets by complexometric method by using ethylenediaminetetraacetic acid based titration.

Keywords : Ethylenediaminetetraacetic Acid , Calcium tablets , complexometric titration, EDTA , pH.

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Optimization of Callus Induction in *Catharanthus pusillus* with Reference to effects of Culture Conditions and Growth Regulators

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Abstract

Catharanthus pusillus (Murray) G. Don is called a Tiny Periwinkle, it is a small herb native to India and Sri Lanka and belongs to the family Apocynaceae, it is widely used traditionally for the treatment of various diseases as herbal medicine. The whole parts and latex of this plant are used to treat skin and liver diseases, leprosy, dysentery, worms, ulcers, tumours and earaches. And it is a close relative of *Catharanthus roseus* or periwinkle which has promising anticancer and anti-diabetic properties. Considering the overall potential secondary metabolite present in it and *In-vitro* callus production by plant tissue culture is a major tool in harnessing its bioactive compounds for large-scale production of secondary metabolite production. Therefore, it is chosen for the study. So, the objective of the study was to determine an optimization of Callus Induction by assessing how explant type, growth regulator concentration, and media composition affect the development of *in-vitro* tissue. Explants like leaves stems, and roots were used to inoculate on Murashige and Skoog (MS) media fortified with different amounts of cytokinins and auxins and incubated under controlled conditions. Among the different concentrations of plant growth regulators used in the study; it was found that MS fortified with 0.5mg/ml 2,4-D and 0.5mg/ml Kinetin for callus induction was best in terms of morphology and proliferation, the study will help large-scale production of bioactive compound and potential use in pharmaceutical industries

Keywords: *Catharanthus pusillus*, Medicinal herb, Callus induction, MS Medium, plant growth regulators.

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Impact of Artificial Intelligence on Everyday Life

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Abstract

The integration of Artificial Intelligence (AI) into daily life has significantly transformed various human activities, influencing technology interactions, decision-making, and task management. This exploration highlights AI's multifaceted impact across healthcare, education, transportation, and personal productivity. By examining case studies and current trends, we identify key benefits such as enhanced efficiency, improved accessibility, and personalized experiences. However, the adoption of AI also presents challenges, including privacy concerns and potential job displacement. Ethical considerations surrounding AI implementation are crucial as society navigates this technological evolution. Ultimately, understanding AI's role in reshaping everyday life is essential for recognizing its future implications and the necessity for responsible application. As AI continues to evolve, it is imperative to balance innovation with ethical standards to ensure that its benefits are maximized while mitigating risks, paving the way for a more efficient and equitable society.

Keywords: Artificial Intelligence (AI),Applications ,Risks

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IOT Smart Medical Devices

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Abstract

The rapid advancement of Internet of Things (IoT) technology has significantly transformed the landscape of healthcare, particularly through the development of smart medical devices. This paper explores the integration of IoT in medical devices, highlighting their potential to enhance patient monitoring, improve treatment outcomes, and facilitate remote healthcare delivery. We examine various applications of IoT-enabled devices, including wearable health monitors, smart insulin pumps, and connected diagnostic tools, emphasizing their roles in real-time data collection and analysis. Furthermore, the paper discusses the challenges associated with the deployment of these technologies, such as data security, interoperability, and regulatory compliance. By analyzing current trends and future prospects, this study aims to provide insights into the evolving role of IoT smart medical devices in modern healthcare, ultimately advocating for their adoption to improve patient care and operational efficiency in medical settings.

Keywords: Internet of Things (IoT),Smart Medical Devices, Patient Monitoring, Remote Healthcare Delivery

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Computational Strategies for Deciding NLO Properties.

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Abstract

Non-linear optical (NLO) materials have garnered significant attention in recent years due to their potential applications in photonics, optoelectronics, and quantum computing. Accurate estimation of NLO properties, such as second- and third-order nonlinear susceptibilities, is crucial for designing and optimizing these materials. Computational strategies, including density functional theory (DFT), time-dependent DFT (TDDFT), and post-Hartree-Fock methods, have emerged as powerful tools for estimating NLO properties. These abstract reviews recent advances in computational strategies for estimating NLO properties, highlighting their strengths, limitations, and applications. We also discuss perspectives on future developments, including the integration of machine learning algorithms and the exploration of new materials with enhanced NLO properties

Keywords: DFT, TDDFT, NLO. Gauss view.

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Cost Optimization in Cloud-Based Systems: A Machine Learning Approach

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Abstract

As cloud computing advances, organizations must balance cost efficiency with optimal resource utilization. This paper presents a machine learning-driven approach to cloud cost optimization, leveraging predictive analytics to anticipate workload demands and allocate resources dynamically. By analyzing historical usage patterns, the proposed model identifies inefficiencies and recommends adjustments to reduce unnecessary expenses while maintaining system reliability.

The framework integrates intelligent decision-making mechanisms that adapt to fluctuating workloads, ensuring that resources are allocated efficiently based on real-time demand. Through automated scaling and cost-aware scheduling, the approach minimizes operational costs while enhancing performance. Unlike traditional cost management techniques, which rely on static provisioning or manual adjustments, this AI-powered system provides a proactive strategy to optimize expenditures without compromising service quality.

Experimental evaluations conducted on diverse cloud environments demonstrate substantial reductions in resource wastage and overall operational expenses. The results highlight the model's ability to predict future resource requirements with high accuracy, allowing organizations to achieve significant cost savings. Additionally, the adaptive nature of machine learning improves cloud resilience by dynamically responding to changing workload patterns.This study emphasizes the growing importance of AI-driven solutions in cloud management and advocates for integrating machine learning to enhance cost efficiency, scalability, and performance in modern cloud infrastructures.

Keywords: Cost Optimization, Cloud Computing, Machine Learning, Predictive Analytics, Resource Management, Operational Efficiency.

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Effects of Industrial Emissions on Chlorophyll, Heavy Metals, and Organic Matter in Plants

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Abstract

Industrial pollution significantly affects plant health, influencing physiological, biochemical, and structural characteristics. This study evaluates the impact of industrial emissions on the chlorophyll content, heavy metal accumulation, and organic composition of plant leaves in the MIDC area of Roha, Raigad. By comparing plants from polluted industrial sites to those from non-polluted control sites, the research aims to assess environmental stress induced by industrial activities. Three ecologically and economically significant plant species—*Areca catechu* (Areca palm), *Cocos nucifera* (Coconut), and *Manilkara zapota* (Sapodilla)—were selected for analysis. Chlorophyll content, an indicator of photosynthetic efficiency, was estimated using Arnon's method with spectrophotometric analysis. Heavy metal concentrations, including chromium (Cr), iron (Fe), copper (Cu), and cadmium (Cd), were quantified through Atomic Absorption Spectrophotometry (AAS) following tri-acid digestion. Organic matter composition was analyzed to understand biochemical alterations due to pollution exposure.

The study found that plants in polluted environments exhibit reduced chlorophyll content, elevated heavy metal accumulation, and significant variations in CHNS composition compared to those in cleaner surroundings. By correlating pollutant levels with plant health indicators, the research provides a scientific foundation for monitoring industrial pollution and its ecological effects. The findings highlight the role of plants as bioindicators of environmental health and emphasize the necessity of regular pollution monitoring to mitigate its ecological consequences. The research contributes to environmental management strategies, pollution control measures, and the conservation of biodiversity in industrial regions, offering valuable insights for policymakers and ecological restoration initiatives.

Keywords: Industrial pollution, chlorophyll content, heavy metal accumulation, bioindicators, environmental monitoring, plant health, pollution control, ecological restoration.

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Investigation of Structure in Structure of LiAl Intercalated and Tin Substituted Fe2TiO5

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Abstract

Iron titanate is a metal pseudobrookite which exhibits many interesting properties such as spin glass behaviour, thermal microcracking, magnetic texture, high resistivity. The polycrystalline pseudobrookite has wide range of applications.This communication presents the characterization of LiAl intercalated and Tin containing iron titanates prepared by using rutile titanium oxide and sintered at two temperatures viz.1000^0C and 1250^0C. The iron titanates are synthesized by usual standard ceramic technique using A.R. grade oxides. The single phase formation is confirmed by XRD and FTIR techniques. Structurally all the samples remain pseudobrookite having orthorhombic unit cell. It is observed from the XRD data that the relative intensities of (040) plane passing through interstices have increased and there exists a spinel like network within the pseudobrookite phase and gets increasingly ordered and stronger with the "$(LiAl)^{4+}$" content.

Keywords: Pseudobrookite, Intercalation, Tin Substitution, Iron Titanate.

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Gamification in Education: Using AI and VR for Immersive Learning Experiences

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Abstract

This paper explores the integration of gamification, artificial intelligence (AI), and virtual reality (VR) in education to enhance learning through immersive experiences. Gamification applies game-like elements such as rewards, challenges, and leaderboards to educational settings, fostering student motivation, engagement, and active participation. AI personalizes learning by analyzing individual performance and adapting content to match students' needs, thereby improving knowledge retention and comprehension. Additionally, VR introduces experiential learning by simulating real-world environments, allowing students to interact with digital scenarios that enhance their conceptual understanding.

By merging these technologies, educators can transform traditional learning methods, making them more interactive, adaptive, and student-centered. AI-driven systems provide real-time feedback and customized learning paths, while VR bridges the gap between theory and practice through hands-on experiences. However, challenges such as accessibility, cost, and ethical concerns related to AI biases and data privacy must be addressed. This study evaluates the benefits and limitations of these technologies, emphasizing the need for a balanced and inclusive approach. By leveraging gamification, AI, and VR effectively, education can become more dynamic, engaging, and effective for learners across diverse backgrounds. The study advocates for a structured implementation strategy to maximize the impact of these innovations in modern education.

Keywords: gamification, artificial intelligence, virtual reality, immersive learning, student engagement, personalized education.

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Taurine as a Green Bio-organic Catalyst in Heterocyclic Synthesis: A Comprehensive Review

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Abstract

The comprehensive review shows how Taurine (2-aminoethanesulfonic acid) acts as a bio-organic green catalyst for heterocyclic synthesis during multicomponent reactions. In biological systems Taurine naturally occurs to serve as an environmentally friendly substitute for traditional catalysts that perform heterocyclic reactions under green chemistry principles in water-based reaction solutions. The article assesses Taurine's catalytic capability by highlighting its rapid reaction duration combined with maximum product yield under solventless conditions which produces clean final products. This study presents systematic information about how Taurine functions to enable heterocyclic reactions together with a comparison versus conventional catalysts. This paper presents the reusability and recyclability characteristics of Taurine which illustrates its effectiveness for sustainable economical synthetic methodologies. Taurine demonstrates versatile functionality in heterocyclic scaffold construction through transforming various types of substrates.

Keywords: Taurine, green bio-organic catalyst, heterocyclic synthesis, Biginelli reaction, , aqueous medium, ecofriendly synthesis, recyclable catalyst, multicomponent reaction, sustainable chemistry, pharmaceutical intermediates.

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Detection and Estimation of Benzoate Preservative in Processed Food: An Investigation into Packaged Chips

Dr. Sajid F. Shaikh, Nida M. Gorme, Tandel Akshay Bandu
Anjuman Islam Janjira Degree College of Science Murud, Murud-Janjira, Raigad, Maharashtra, India

Abstract

Benzoate preservatives, such as sodium benzoate, are widely used in processed foods, including packaged chips, to prevent microbial growth and extend shelf life. However, excessive consumption of benzoates has been linked to potential health risks, including allergic reactions, hyperactivity, and metabolic disturbances. This study aims to detect and quantify benzoate preservatives in different brands of packaged chips using advanced analytical techniques.

Samples of commercially available chips were collected and analyzed using high-performance liquid chromatography (HPLC), UV-Vis spectrophotometry, and Fourier transform infrared (FTIR) spectroscopy. The concentration of benzoates in each sample was compared against the maximum permissible limits set by the Food Safety and Standards Authority of India (FSSAI) and the U.S. Food and Drug Administration (FDA). Preliminary results indicate significant variations in benzoate levels among different brands, with some exceeding regulatory limits.

The study highlights the need for stricter quality control measures and transparent labeling practices in the food industry. Future research will focus on developing rapid, portable detection methods for on-site testing. The findings contribute to food safety regulations, consumer awareness, and the promotion of healthier alternatives in processed food production.

Keywords: Benzoate Preservative, Processed Food, Packaged Chips, Food Safety, HPLC, UV-Vis Spectrophotometry

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Detection of Heavy Metal Contamination in Vegetables: A Focus on Spinach, Potatoes, and Carrots

Dr. Sajid F. Shaikh, Nida M. Gorme, Kadu Alpesh Ashok
Anjuman Islam Janjira Degree College of Science Murud, Murud -Janjira, Raigad, Maharashtra, India

Abstract

Heavy metal contamination in vegetables poses a serious threat to human health, as toxic metals such as lead (Pb), cadmium (Cd), arsenic (As), and mercury (Hg) can accumulate in crops through soil, water, and atmospheric pollution. This study focuses on assessing the levels of heavy metal contamination in commonly consumed vegetables—spinach (*Spinacia oleracea*), potatoes (*Solanum tuberosum*), and carrots (*Daucus carota*).

Samples were collected from various agricultural regions and analyzed using advanced analytical techniques, including atomic absorption spectroscopy (AAS), inductively coupled plasma mass spectrometry (ICP-MS), and X-ray fluorescence (XRF). The concentrations of heavy metals were compared against permissible limits set by the World Health Organization (WHO) and Food and Agriculture Organization (FAO). Results indicate that spinach exhibited the highest accumulation of lead and cadmium due to its high metal absorption capacity, while potatoes and carrots showed moderate contamination levels.

The study highlights the potential health risks associated with consuming metal-contaminated vegetables and emphasizes the need for continuous monitoring and sustainable agricultural practices to mitigate contamination. Future research will explore phytoremediation techniques and biochar application to reduce heavy metal uptake in crops. The findings serve as a crucial reference for policymakers, farmers, and consumers in ensuring food safety and public health protection.

Keywords: Heavy Metal Contamination, Vegetables, Spinach, Potatoes, Carrots, Food Safety.

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Green Synthesis of silver Nanoparticles Using Medicinal Plants

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Abstract

Nanotechnology has marked a significant revolution in various areas of science. Nanoscience and nanotech- neology are involved in the production and application of nanoparticles that can be used in various fields. Silver nanoparticles (AgNPs), among other nanoparticles, have received substantial attention because of their unique properties. This review article focuses on the green synthesis of AgNPs using medicinal plant extracts. Green synthesized AgNPs offer numerous advantages, including energy efficiency, low toxicity, high yields, cost- effectiveness, eco-friendliness, and ready availability. The effects of pH, temperature, incubation time, light and plant extracts, and silver nitrate ($AgNO_3$) concentrations on the green synthesis of AgNPs are discussed. This review also discusses analytical techniques for the characterization of AgNPs. Furthermore, recent advances in the application of biosynthesized AgNPs from herbal plants as therapeutic agents against bacteria, fungi, and tumors are considered. Finally, the challenges and potential future research directions for the synthesis of AgNPs using green technology are discussed.

Keywords: Green synthesis, Silver nanoparticles, Medicinal plants, Cancer therapy, Physical method, Chemical methood.

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Estimation of Sodium Benzoate From Jam and Jelly

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Abstract

Sodium benzoate is a common preservative used in jams and jellies to prevent microbial growth and extend shelf life. However, excessive consumption may pose health risks. This study estimates the concentration of sodium benzoate in commercial jam and jelly samples using analytical techniques such as UV-Visible spectrophotometry, High-Performance Liquid Chromatography (HPLC), and titrimetric analysis. Jam is made from whole or crushed fruit, sugar, and pectin, while jelly is derived from fruit juice, giving it a smoother texture. Both products are widely consumed and have historical and cultural significance. Proper processing and ingredient balance ensure their quality and shelf stability. Analytical methods used in this study revealed that HPLC provides the highest accuracy and sensitivity, while UV-Vis spectrophotometry offers a cost-effective alternative for rapid screening. Titrimetric methods, though simple, lack specificity. The results were compared with permissible limits set by regulatory agencies to assess compliance. Findings highlight the importance of monitoring preservative levels to ensure food safety. Future research should focus on developing faster and more cost-effective analytical techniques while maintaining accuracy and reliability.

Keywords: Sodium benzoate, jam, jelly, preservative, food safety, HPLC, UV-Vis spectrophotometry, titrimetric analysis.

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Electrochemical Synthesis of Green Hydrogen: Exploring Catalyst Design and Optimization

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Abstract

The shift towards sustainable energy has driven growing interest in the electrochemical production of green hydrogen, which involves using renewable electricity to split water into hydrogen and oxygen. Unlike conventional methods, this approach eliminates carbon emissions, making green hydrogen a promising clean energy source for fuel cells, energy storage, and industrial applications. The effectiveness of this process largely depends on the catalysts used in water electrolysis, as they help lower the energy required for hydrogen generation. This study focuses on the development and optimization of catalysts for the hydrogen evolution reaction (HER), aiming to create materials that are efficient, cost-effective, and suitable for large-scale use. Special attention is given to enhancing catalysts for both the oxygen evolution reaction (OER) at the anode and the HER at the cathode. By refining the active sites of these materials and improving their interaction with electrolytes, the study seeks to achieve higher efficiency and longer operational durability. Additionally, it highlights the significance of scalable production techniques to accelerate the adoption of green hydrogen technologies across multiple industries.

Keywords: electrochemical production, hydrogen evolution reaction, higher efficiency.

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Preparation of Paint Pigment

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Abstract

Paint pigments find important applications in industries including art, building, and manufacturing. They are the cause of colour in paints, coatings, and other materials. The project has revolved around the synthesis of various paint pigments through basic chemical reactions. In this research, four major pigments, Prussian Blue, Chrome Yellow, White, and Malachite, have been synthesized and examined using available chemical reagents.

The process is through precipitation reactions, where insoluble pigment compounds are created through controlled chemical mixing. Prussian Blue is prepared from ferric chloride and potassium ferrocyanide to give a deep blue pigment. Chrome Yellow is prepared by reacting potassium chromate with lead nitrate to give a bright yellow colour. The White pigment is synthesized from sodium chloride and lead nitrate, whereas Malachite, a green pigment, is produced by the reaction between copper sulphate and sodium carbonate. Each pigment is filtered, dried, and tested for its yield and efficiency.

This study brings to light the chemistry involved in pigment development, such as precipitation, solubility, and theory of colour. It also offers an understanding of industrial pigment manufacturing and its effects on the environment. With industries moving towards green and non-toxic pigments, this study opens the door for investigating safer and greener options.

From this project, we develop a greater appreciation for organic and inorganic pigment chemistry, setting the stage for new developments in modern coatings and dyes.

Keywords: Paint pigments, Prussian Blue, Chrome Yellow, White, Malachite, pigment chemistry

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Leafy Nutrients: Analyzing Iron Content in Spinach through Spectrophotometry

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Abstract

This research paper focuses on determine the iron content in spinach leaves utilizing spectrophotometry, a widely used analytical technique known for its precision and efficiency. Iron is a crucial micronutrient that is integral to various metabolic processes, and its deficiency poses serious health risks. Fresh spinach samples were collected, cleaned, and subjected to a rigorous extraction process involving acid digestion to liberate iron ions from the plant material. Following treatment, the iron concentration in the sample was analyzed through spectrophotometry, where absorbance measurements were taken at specific wavelengths corresponding to the iron complexes formed. Calibration curves were constructed using standard solutions of known iron concentrations to ensure accurate quantification. The findings indicated the iron content in spinach samples, which were then compared to dietary recommendations, demonstrating spinach's nutritional value as a significant source of iron. This research highlights the effectiveness of spectrophotometric methods in the nutritional analysis of food products, contributing valuable insights into the dietary importance of leafy greens.

Keywords: Iron content, spinach leaves, spectrophotometry, acid digestion, iron ions, absorbance measurements, calibration curves, quantification, nutritional analysis, dietary recommendations.

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Developing Herbal Acid-Base Indicators from Pomegranate Seeds

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Abstract

Natural indicators derived from plant sources offer an eco-friendly and cost-effective alternative to synthetic acid-base indicators. This study explores the potential of pomegranate (Punica granatum) seed extract as a natural pH indicator. The extract was prepared using aqueous and ethanol-based solvents and tested against standard acidic and basic solutions to evaluate its color transition range. The results demonstrated distinct and reproducible color changes across varying pH levels, indicating the presence of anthocyanins and other flavonoids responsible for pH sensitivity. The study highlights the efficacy of pomegranate seed extract as a viable natural indicator, promoting sustainable and non-toxic alternatives for laboratory and industrial applications.

Keywords: Pomegranate seeds, natural indicators, acid-base titration, anthocyanins, eco-friendly chemistry, pH sensitivity, sustainable alternatives.

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Assessment of Synthetic Dye Adulteration in Confectionery Products

Tamseel Shakeel Shahjahan, Jawalekar Bhagyashri Sharad
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Abstract

Food is an essential requirement for all living beings and plays a crucial role in sustaining life. However, food adulteration has become a widespread concern, where various substances are deliberately added to lower production costs and enhance appearance. Common adulterants include metanil yellow, an artificial color used to enhance turmeric, as well as chalk and brick powder, which compromise food quality and pose serious health risks. Consumption of such adulterated food can lead to severe health conditions, including anemia, neurological disorders, digestive issues, and even cancer. Spices are particularly vulnerable to contamination due to poor harvesting and processing conditions, leading to foodborne illnesses and spoilage. Similarly, synthetic dyes are frequently added to confectionery items to enhance their visual appeal, but unauthorized use of these additives can cause allergic reactions, hyperactivity, and toxicity. This study investigates the presence and concentration of synthetic dyes in confectionery products through advanced techniques such as spectrophotometry and chromatography. The findings indicate widespread usage of unauthorized dyes, often exceeding permissible safety limits, emphasizing the urgent need for stricter regulations. This research highlights the importance of consumer awareness and industry responsibility in ensuring food safety, particularly for products marketed toward children.

Keywords: food, adulteration, microbial contamination.

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Assessment of Water Quality in Girna River, Kalwan Taluka, Nashik: A Comprehensive Study.

Miss. Vaibhavi Bhausaheb Pagar and Dr. K. N. Gaikawad
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Abstract

The present study provides a detailed assessment of the water quality of the Girna River in Kalwan Taluka, Nashik, over a two-year period, focusing on seasonal variations in key physicochemical parameters. The study evaluates atmospheric and water temperature, pH levels, dissolved oxygen (DO), biological oxygen demand (BOD), total alkalinity (TA), total hardness (TH), and essential nutrient concentrations such as phosphates, nitrates, and sulfates. By analyzing data from multiple stations along the river, this research identifies seasonal trends, potential sources of contamination, and their implications for aquatic life and human usage. The findings provide a scientific basis for sustainable water resource management, pollution control measures, and conservation strategies to maintain the ecological integrity of the Girna River.

Keywords: Water quality assessment, Girna River, physicochemical parameters, dissolved oxygen, biological oxygen demand, seasonal variations, pollution control, water resource management.

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Green Synthesis of Bimetallic Ag-Ni and it's Applications for Degradation of Organic Pollutants

Minakshi N. Bhatu, Guruprasad R. Mavlankar, Prajkta P. Baikar, Deepa N. Rangadal, Dr. Shubhangi P. Patil

Abstract

The monometallic Ag, Ni, and bimetallic Ag-Ni nanocatalysts were synthesized using green synthesis method. Sprout water extract is the green reducing reagent which will assist the reduction of silver and nickel precurssor and convert it in to nanoparticles. The above synthesized nanocatalyst is used for the degradation of 4-nitrophenol. The $Ag_{25}Ni_{75}$ is the most effective catalyst for degradation and shows 84.69% degradation in 60 sec. The above nanocatalyst is further characterized by UV, nanotracking analyzer, FTIR and TEM. The characterization indicates the formation of well dispersed bimetallic nanocatalyst and UV results of nitrophenol reduction shows the efficiency of these catalyst for degradation of organic pollutants.

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Digital Pencil: Enhancing Digital Writing and Drawing Experience

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Students, Anjuman Islam Janjira Degree College of Science, University of Mumbai, Mumbai, India[2]

Abstract

The evolution of digital input devices has led to the development of digital pencils, which bridge the gap between traditional handwriting and digital convenience. This paper explores the significance, technological advancements, and applications of digital pencils in education, design, and professional fields. The study focuses on sensor technology, pressure sensitivity, and ergonomic design that improve user experience. Findings indicate that digital pencils enhance productivity, creativity, and accuracy in digital content creation. This research provides insights into the current state of digital pencils and potential advancements that can further optimize their usability and accessibility.

Keywords: digital pencil, handwriting, education, drawing.

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Detection of Vitamin C in Fruits: A study of Orange, Kiwi, and Lemon

Dr. Sajid F. Shaikh, Nida M. Gorme, Mane Dipali Chandrakant
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Abstract

Vitamin C (ascorbic acid) is an essential antioxidant found abundantly in citrus and tropical fruits, playing a crucial role in immune function, collagen synthesis, and overall health. The concentration of vitamin C varies among different fruits, influencing their nutritional value. This study aims to detect and quantify vitamin C levels in orange (*Citrus sinensis*), kiwi (*Actinidia deliciosa*), and lemon (*Citrus limon*) using laboratory-based analytical techniques.

Fruit samples were analyzed using iodometric titration, high-performance liquid chromatography (HPLC), and UV-Vis spectrophotometry. The results were compared to determine variations in vitamin C content among the selected fruits. Preliminary findings indicate that kiwi exhibited the highest vitamin C concentration, followed by lemon and orange. The study also assessed the impact of storage conditions and processing methods on vitamin C degradation.

The findings provide valuable insights into the nutritional composition of these fruits and emphasize the importance of fresh consumption to maximize vitamin C intake. Future research will focus on developing rapid, portable detection methods for vitamin C analysis in food products. This study contributes to dietary recommendations and quality control in the food industry.

Keywords: Vitamin C, Ascorbic Acid, Orange, Kiwi, Lemon, HPLC, UV-Vis Spectrophotometry, Food Analysis

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Synthesis of Novel Schiff Bases From 1-Amino-2-Naphthol

Omkar Suresh Sawant and Asst. Prof. Ankita Mhaske
D. G. Tatkare Mahavidyalay, Mangaon-Raigad

Abstract

This project investigates the synthesis of Schiff base derived from 1-amino-2-naphthol is a molecule synthesized through a condensation reaction between 1-amino-2-naphthol (an amine) and an aromatic aldehyde, resulting in a compound with an imine linkage (-CH=N-) characteristically attached to the naphthalene ring, Synthesis of Schiff base is often carried out with or without acid catalyzed and generally by refluxing the mixture of aldehyde (or ketone) and amine in organic medium. ; FTIR, and UV-Vis spectroscopy to confirm the structure and investigate the properties of the synthesized Schiff base.

This project provides a collection of studies on the synthesis of 1-amino-2 naphthol derivatives using solvent free grind stone technique which is alternative to conventional method of synthesis so it bis green chemistry synthesis which give excellent yield of product save time and solvent.

Keywords: Schiff base, green chemistry, antibacterial, antifungal, grind stone

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A Comprehensive Study on Acylation of Amine through Novel Techniques

Sidra A. Rashid Nagdade and Asst. Prof. Mehreen M. Dawre
D. G. Tatkare Mahavidyalay, Mangaon-Raigad

Abstract:
An environmentally sustainable and efficient alternative to conventional acylation methods is essential in modern organic synthesis. Acylation of amines is a fundamental transformation in organic chemistry, playing a crucial role in pharmaceuticals, agrochemicals, and material sciences. However, traditional acylation techniques often rely on toxic reagents, prolonged reaction times, and hazardous solvents, raising concerns about sustainability, efficiency, and environmental impact. To address these limitations, advanced acylation techniques such as microwave-assisted synthesis, biocatalysis, and solvent-free methodologies have emerged as promising eco-friendly substitutes. Microwave-assisted acylation significantly enhances reaction rates by providing uniform heating, reducing energy consumption, and improving product yields. Biocatalytic approaches utilize enzyme specificity to achieve highly selective transformations under mild conditions, making them an attractive green alternative. Solvent-free methodologies further minimize environmental waste and align with green chemistry principles by eliminating the need for hazardous solvents, thereby reducing toxic byproducts. A comparative analysis of these methods highlights their advantages over conventional techniques in terms of reaction efficiency, selectivity, and sustainability. This study underscores the urgent need for greener and more economically viable alternatives in organic synthesis, paving the way for sustainable advancements in chemical processes and industrial applications.

Keywords: Green synthesis, Acylation, ecofriendly Synthesis, Microwave-Assisted Reaction, Biocatalysis, Solvent-Free Methods.

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Phytochemical and Thin-Layer Chromatography of Two Medicinal Plants from the Surroundings of Murud Janjira, Maharashtra, India

Dr. Firoj Shaikh, Miss. Arfad Iqra and Mr. Rahim Bagwan
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Abstract

Two plants *Ipomoea pes-caprae* Roth and *Ipomoea triloba* L. leaves have been analysed for Thin-Layer Chromatography (TLC). Qualitative phytochemical screening of selected plants was performed to explore scientific basis of ethno medicinal potential. It confirmed the presence of various phyto-constituents like alkaloid, flavonoid, saponin, tannin etc. Thin Layer chromatography of the ethanol,pet-ether and methanol extract of plants was performed for the important phytochemicals like Alkaloids, Tannin and Flavonoids. The presence investigation of the alkaloids, tannin and flavonoids was confirmed in *Ipomoea pes-caprae* and Roth *Ipomoea triloba* L. leaves. These findings provided the evidence that polyherbal mixture of two medicinal plants potent source for medicinally important and phytochemicals.

Keywords: Ethanol, Pet-ether and Methanol extract, TLC, phytochemical.

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Dragonverse Explorer App

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Abstract

I'm thrilled to introduce the AR Dragon Experience through my "Dragonverse Explorer" app, an immersive and interactive augmented reality (AR) project that brings mythical dragons to life. At the heart of this project are five unique image targets, each carefully crafted to unlock a corresponding 3D dragon model. When you scan one of these targets using the Vuforia image tracking system, you'll be transported to a fantastical world where dragons roam free.

As you gaze through the AR camera view, you'll get an unobstructed view of your dragon as it explores its surroundings, flies through the air, and even interacts with the real world around it. As you move your device or manipulate the image target, the dragon responds in kind, its movements and animations adapting to the changing environment in a way that's both captivating and educational.

Under the hood, we're using the Unity game engine to create a robust and flexible framework for interactive 3D experiences. We've seamlessly integrated the Vuforia image tracking system into Unity, allowing us to detect and track the image targets in real-time. Our dragon 3D models are crafted with precision and attention to detail, optimized for performance and realism to ensure a smooth and captivating experience even on lower-end hardware. By balancing technology, artistry, and imagination, we've created an experience that's truly one-of-a-kind – an experience that inspires wonder and awe in users of all ages.

Keywords: Augmented Reality, Dragonverse Explorer App, Unity and Vuforia, Virtual Reality (VR)

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A Study on Green Approach of Biginelli Reaction Using Biocatalyst

Fatima Akhlaque Khatib
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Abstract
The growing demand for environmentally friendly chemical processes has led to the exploration of biocatalysts as an alternative to conventional catalysts in organic synthesis. Green chemistry aims to reduce the environmental impact of chemical reactions by using sustainable, non-toxic, and biodegradable catalysts. In this study, we investigate the potential of fruit juices, particularly Kiwi and Karvanda, as natural biocatalysts for promoting organic reactions, specifically the Biginelli reaction. These fruit juices contain organic acids, polyphenols, and enzymes that facilitate chemical transformations under mild reaction conditions, reducing the need for harsh reagents and extreme temperatures. The Biginelli reaction, a widely studied multicomponent reaction, is crucial for synthesizing dihydropyrimidinones (DHPMs), which have applications in pharmaceutical and medicinal chemistry. The use of fruit juice-based catalysts offers several advantages, including low cost, easy availability, non-toxic nature, and environmental sustainability. This study not only demonstrates the efficiency of natural catalysts but also highlights their potential role in promoting eco-friendly synthetic methodologies. Despite their numerous benefits, the large-scale implementation of biocatalysts in organic chemistry faces challenges such as standardization of catalytic activity, stability, and reusability. However, ongoing research and technological advancements are expected to overcome these limitations, making green catalysts a viable alternative in the future. This study contributes to the growing field of sustainable chemistry by encouraging further exploration of natural catalysts in organic synthesis.

Keywords: Biocatalysis, Green Chemistry, Fruit Juice Catalysts, Biginelli Reaction, Sustainable Organic Synthesis, Natural Catalysts, Eco-Friendly Reactions.

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Biodiversity of Algal Flora of Chlorophyceae (Scenedesmus) from Waghur Dam of Jalgaon District of Maharashtra

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Abstract

The Algae are natural inhabitants of water and serve as indicator of water quality in various way. The study of algae of Waghur Dam situated in Jalgaon district the authors came across several members of chlorococcales. Scenedesmus is a common fresh water alga commonly found in standing water of dams, lakes, ponds etc. The thallus of Scenedesmus is a coenobium consisting of 2, 4, 6 or 8 cells. The coenobium is a flat sometimes curved plate of fusiform to elliptic cells which are arranged in a a single to double series with their long axes parallel to one another. There cell wall may be smooth, corrugated, granulate or spicate with or without lateral or terminal spines. The presence of this process helps in floatation of the colony and are probably related to the planktonic mode of life.

Systematic Position :
Division: Chlorophyta (Chlorophycophyta)
Class: Chlorophyceae
Order: Chlorococcales
Family: Coelestraceae
Genus: Scenedesmus
Species: armatus, bijugatus, etc.

Keywords: Biodiversity, Algae, Chlorophyceae, Scenedesmus, Waghur Dam, Jalgaon, Maharashtra .

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Synthesis and Characterization of Schiff Bases from 1-Amino Naphthalen-2-OL

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Abstract

Schiff bases are a significant class of organic compounds exhibiting diverse applications in medicinal chemistry, catalysis, and material science. This study presents the synthesis and characterization of novel Schiff bases derived from 1-amino-2-naphthol through its condensation with various aromatic aldehydes under optimized reaction conditions. The synthesized compounds were characterized using spectroscopic techniques to confirm their structural properties. It is potential as effective antimicrobial agents. These Schiff bases also hold industrial significance and exhibit diverse biological properties. The synthesized compounds were structurally confirmed using thin-layer chromatography (TLC), melting point analysis, and spectral data, which were consistent with reported literature. This method provided excellent product yield, minimized solvent usage, and reduced reaction time, making it a sustainable and efficient approach for synthesizing Schiff bases. The findings support the advancement of greener methodologies in organic synthesis and highlight the significance of these compounds in pharmaceuticals and industrial applications.

Keywords : Schiff bases, 1-amino-2-naphthol, synthesis, characterization, spectroscopy, azomethine, bioactive compounds, catalysis.

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A Comprehensive Study on Synthesis of Imidazole and its Derivatives using Novel Techniques

Ibtisam Ishaque Mapkar and Asst. Prof. Mehreen M. Dawre
D. G. Tatkare Mahavidyalay, Mangaon-Raigad

Abstract

Imidazole is the heterocyclic 5-membered ring structure, out of which three are carbon and the Remaining two are nitrogen, arranged at 1 and 3 positions. It is the constituent of several natural Compounds like histamine, histidine, biotin, alkaloids and nucleic acid and a very important Class among the medicinal compounds. The unique structural feature of imidazole ring with desirable electron-rich characteristic is beneficial for imidazole derivatives to readily bind with a variety of enzymes and receptors in biological systems through diverse weak interactions, thereby exhibiting broad bioactivities. Thus, increasing research is being carried out on the synthesis of imidazoles and their derivatives, mainly because of the application of imidazoles in pharmaceutical and medicinal research. Keeping sustainability in mind, researchers are developing synthetic pathways for the synthesis of imidazoles and their derivatives by employing techniques involving green tools, thus leading to sustainable pathways. In this review, we aim to compile such synthetic methodologies involving green tools for the synthesis of imidazoles. The review will cover the synthetic reactions that involve green tools such as microwave irradiation and synthesis under green catalyst or a without catalyst. Imidazole-based compounds with antibacterial, anti-Inflammatory, antidiabetic, antiparasitic, antituberculosis, antifungal, antioxidant, antitumor, Antimalarial, anticancer, antidepressant and many others make up the therapeutic arsenal and New bioactive compounds proposed in the most diverse works. Large number of imidazole derivatives have been are Being developed for different therapeutic actions, therefore this article aims to review the work Reported on the synthesis of imidazole derivatives using microwave reactions as a modern Method for synthesis.

Keywords: Imidazole, Synthesis, Microwave Techniques, Green Chemistry, Ecofriendly

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Innovative Applications Of Nanoparticles In Cancer Diagnosis And Treatment

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Abstract

Numerous nanoparticles have been created and evaluated during the last few decades, sparking a great deal of interest in their possible applications as therapeutic and diagnostic tools. Iron oxide nanoparticles are the sole formulation of nanoparticles that has been used in clinical practice to date, despite the fact that they have been suggested as potential diagnostic tools. This is mostly because it is difficult to consistently produce monodispersed nanoparticles and get appropriate pharmacokinetic characteristics. Concerns exist over their possible toxicity, biodegradation, and remove as well. Currently, therapeutic applications account for the majority of nanoparticle formulations utilized in clinical settings. The goal of these therapeutic nanoparticles is to minimize accumulation in healthy tissues and organs while more effectively delivering (chemo-)therapeutic medicines to specific locations. The "enhanced permeability and retention" (EPR) effect forms a substantial part of their foundation.

Furthermore, because nanoparticles can combine therapeutic and diagnostic properties in a single formulation, they exhibit significant promise for theranostic applications. They are extremely useful for customizing therapies based on nanomedicine because of this feature. In this study, we address the function of EPR in the development of nanotheranostic formulations, examine the application of therapeutic and diagnostic nanoparticles, and provide an overview of popular non-invasive imaging methods. We also look at the practical possibilities of image-guided drug administration and nanotheranostics for more individualized and effective (chemo-)therapeutic treatments.

Keywords: Nanoparticles; Diagnostic agents; Pharmacokinetics; Drug delivery;(Chemo-) therapeutic interventions; Targeted drug delivery.

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A Comprehensive Study on Synthesis of Heterocyclic Compound by using Cyanoacetohydrazide of Triazole

Juveriya Sirajuddin Kheratkar
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Abstract

The synthesis of heterocyclic compounds has gained immense importance due to their extensive applications in medicinal chemistry, pharmaceuticals, and materials science. Among these, 1,2,4-triazole derivatives have attracted considerable attention due to their diverse biological activities, including antimicrobial, anticancer, and antioxidant properties. Cyanoacetohydrazide, a key precursor, plays a vital role in constructing nitrogen-containing heterocycles, particularly 1,2,4-triazoles. Traditional synthetic methods often involve prolonged reaction times, excessive solvent usage, and harsh reaction conditions, which raise concerns regarding environmental sustainability. To address these issues, this study focuses exclusively on microwave-assisted synthesis, a green chemistry approach that enhances reaction efficiency while minimizing environmental impact. Microwave-assisted synthesis offers several advantages over conventional methods, including significantly reduced reaction times, improved yields, enhanced selectivity, and lower energy consumption. This technique promotes rapid heating, uniform energy distribution, and controlled reaction conditions, leading to efficient cyclization of Cyanoacetohydrazide into bioactive 1,2,4-triazoles. The mechanistic aspects of this transformation are explored, highlighting the role of microwave irradiation in accelerating reaction kinetics and optimizing product formation. In addition, this study discusses the structural diversity of synthesized triazoles and their potential applications in drug discovery and material science. The findings underscore the importance of adopting sustainable methodologies for heterocyclic synthesis. By integrating microwave-assisted techniques, this research contributes to the advancement of eco-friendly organic synthesis, paving the way for green and sustainable developments in pharmaceutical and industrial applications.

Keywords: Cyanoacetohydrazide, 1,2,4-Triazole, Microwave-Assisted Synthesis, Green Chemistry, Sustainable Organic Synthesis, Heterocyclic Synthesis

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Formulation and Evaluation of Herbal Pain Relief Balm

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Abstract

There has been an increasing focus on development of new routes of drug administration to provide tailored treatments for patients, without decreasing efficacy of analgesia, in proportion to the progression of the knowledge of pain mechanisms. While acute pain acts as an alarm, chronic pain is a syndrome requiring meticulous selection of analgesic drugs of high bioavailability for long-term use. Such criteria are challenges that topical medications aim to overcome, allowing progressive delivery of active component, maintaining stable plasma levels, with a good safety profile. This review presents recent findings regarding topical formulations of the most widely used drugs for pain treatment, ; Disclosed herein is an herbal balm composition and the method of preparing said composition. The composition comprising extracts of organically certified herbs, organic essential oils and organic beeswax, wherein the extract is prepared employing a super critical fluid extraction (SCFE) and where in the essential oils used herein is obtained by cold pressed method. The oils used in it is used as a pain killer.

Keywords: natural pain relief balm, vitex negundo oil, Eucalyptus oil.

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A Study of "Extraction & Isolation of Bioactive Compounds of Piperine From Black Pepper and White Pepper"

Ketan Sunil Pitnaik
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Abstract

One of the most commonly used spices is black pepper (Piper nigrum). For itsdistinct biting consistency attributed to the alkaloid, piperine, it is appreciated. Blackpepper is not only used for human diets, but also for a number of otheruses, such asdrugs, preservatives and perfumery. In recent decades, severalphysiological effectsof black pepper, its extracts, or its main active ingredient,piperine, have been recorded. Dietary piperine increases digestive ability byfavourably enhancing the digestive enzymes of the pancreas and substantiallyreduces the transit time ofgastrointestinal food. In vitro studies have beenshown to protect against oxidative damage by inhibiting or quenching freeradicals and reactive oxygen species in piperine. Black pepper or piperinetreatment has also been shown to lower in vivo lipid peroxidation and to havea beneficial impact on the status of cellular thiol,antioxidant molecules andantioxidant enzymes in a variety of oxidative stress experimental situations. Piperine's most far-reaching feature has been its inhibitory effect onbio-transforming enzymatic drug reactions in the liver. It strongly inhibitshydroxylase and UDP-glucuronyl transferase of hepatic and gut arylhydrocarbons. The bioavailability enhancing property of piperine is alsopartially due to increased absorption as a result of its effect on the intestinalbrush boundary ultrastructure.While there were initially a few controversialreports on the safety of black pepper as a food additive, such evidence wasdoubtful and subsequent research in many animal studies have proven the safety of black pepper or its active ingredient, piperine. Piperine has actuallybeen shown to have anti- mutagenic and anti-tumor influences, though it isnon-genotoxic.

Keywords: Alkaloid,Dietary piperine,Vivo lipid peroxidation,evidence,Anti-mutagenic,Anti-tumor

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To Study Fenton and Photo Fenton Reaction for the Degradation of Water Pollutants

Khansa Abdul Gafoor Mozar
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Abstract

Fenton and photo-Fenton reactions have emerged as effective Advanced Oxidation Processes (AOPs) for the degradation of organic pollutants in wastewater treatment. The Fenton process utilizes ferrous ions (Fe^{2+}) and hydrogen peroxide (H_2O_2) to generate hydroxyl radicals (•OH), which play a crucial role in breaking down contaminants. The photo-Fenton process, an enhanced version of the Fenton reaction, involves the application of ultraviolet (UV) light to further accelerate hydroxyl radical formation, leading to improved degradation efficiency, particularly for recalcitrant pollutants. This study aims to optimize key parameters influencing the Fenton and photo-Fenton processes, such as pH, Fe^{2+}/H_2O_2 concentration, reaction time, and UV light intensity, to achieve maximum pollutant removal. Experimental investigations involve UVVis spectrophotometry, Chemical Oxygen Demand (COD) reduction, and Total Organic Carbon (TOC) measurements to assess treatment performance. The study highlights the potential of these methods as cost-effective and environmentally friendly alternatives for wastewater treatment. However, challenges such as iron sludge formation, high hydrogen peroxide consumption, and acidic operating conditions require further optimization. Future research should focus on catalyst stabilization, solar-assisted photo-Fenton systems, and integration with other treatment technologies to enhance practical applications.

Keywords: Fenton Process, Photo-Fenton Process, Advanced Oxidation Processes (AOPs), Hydroxyl Radicals (•OH), Water Pollutants, Wastewater Treatment, Hydrogen Peroxide (H_2O_2), Ferrous Ions (Fe^{2+}), UV Light, Pollutant Degradation, Environmental Remediation, Industrial Wastewater, Sustainability in Water Treatment

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Extraction of Cinnamaldehyde from Cinnamon Bark and its Aldol Condensation Reaction

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Abstract

Cinnamaldehyde, a major component of cinnamon bark oil, possesses significant industrial applications in the food, pharmaceutical, and cosmetic industries due to its distinctive aroma and biological properties. This study explores the extraction of cinnamaldehyde from cinnamon bark using steam distillation, followed by its aldol condensation reaction to synthesize α, β-unsaturated carbonyl compounds. The extraction process involves heating crushed cinnamon bark in water, generating steam that carries volatile oil components, which are then condensed and collected. The separated oil phase is further purified using solvent extraction and drying techniques to obtain pure cinnamaldehyde. The effectiveness of steam distillation in isolating cinnamaldehyde is evaluated based on yield and purity.

Following extraction, cinnamaldehyde undergoes aldol condensation in the presence of a base catalyst, typically sodium hydroxide or potassium hydroxide, resulting in the formation of higher molecular weight carbonyl compounds. This reaction is crucial in organic synthesis, as it leads to the formation of complex molecular structures used in various industrial applications, including fragrance synthesis and pharmaceutical intermediates. The study provides insights into natural product isolation and their subsequent chemical modifications, demonstrating an integrated approach to extraction and organic synthesis. Additionally, it emphasizes the efficiency and sustainability of steam distillation in extracting valuable organic compounds from natural sources. The aldol condensation reaction further highlights the chemical reactivity of cinnamaldehyde, paving the way for its utilization in industrial and laboratory settings.

Keywords: Cinnamaldehyde, Cinnamon bark, Steam distillation, Essential oil extraction, Aldol condensation

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A Comprehensive Study on Synthesis of Benzimidazole and its Derivatives using Novel Techniques

Manal M. Iqbal Takey and Asst. Prof. Mehreen M. Dawre
D. G. Tatkare Mahavidyalay, Mangaon-Raigad

Abstract

Benzimidazoles are a class of heterocyclic compounds in which a benzene ring is fused to the 4 and 5 positions of an imidazole ring. Benzimidazole refers to the parent compound, while benzimidazoles are a class of heterocyclic compounds having similar ring structures, but different substituents. Green chemistry is the new and rapidly emerging field of chemistry. It involves the utilization of a set of principles that reduces or eliminates the use or generation of Hazardous substances in the design, manufacture and application of chemical products. Conventional methods of synthetic reactions need longer heating time, elaborate and tedious apparatus set up which result in higher cost and environmental pollution in Contrast to greener methods which are eco-friendly and economical. In Recent years, a large number of reports related to synthesis of Nitrogen, Oxygen and Sulphur containing heterocyclic have appeared owing to a wide variety of their biological Activity. In recent years, numerous reports concerning the synthesis of heterocyclic compounds under various conditions like solvent-free, reactants immobilized on solid Support, microwave irradiation condition, green catalyst and green solvent have appeared. Benzimidazole is a heterocyclic aromatic organic compound, it is an important Pharmacophore and privileged structure in medicinal chemistry. It plays a very important role with plenty of rational therapeutic activities such as antiulcer, antihypertensive, analgesic, Anti-inflammatory, anti-viral, antifungal, anticancer, and antihistaminic. Because of its Importance, the methods for their synthesis have become a focus of Synthetic Organic Chemists. Therefore, in the present work I tried to organize the chemistry of different Derivative of substituted benzimidazole and some of the important methodologies used for the Synthesis.

Keywords: Benzimidazole, Eco-Friendly, Solvent free, green synthesis, Microwave Assisted, Catalysis.

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Development of an Electrochemical Sensor for Detecting Heavy Metals in Drinking Water

Dr. Sajid F. Shaikh,Nida M. Gorme, Malekar Maryam Mazhar
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Abstract

The contamination of drinking water with heavy metals such as lead (Pb^{2+}), cadmium (Cd^{2+}), and mercury (Hg^{2+}) poses significant health and environmental risks. Existing detection methods, such as atomic absorption spectroscopy (AAS) and inductively coupled plasma mass spectrometry (ICP-MS), though highly accurate, are expensive, time-consuming, and require sophisticated laboratory infrastructure. This study aims to develop a cost-effective, portable, and highly sensitive electrochemical sensor for the rapid detection of heavy metals in water.

The sensor is based on a modified electrode surface incorporating nanomaterials, such as graphene oxide and metal nanoparticles, to enhance selectivity, conductivity, and sensitivity. Electrochemical techniques, including differential pulse voltammetry (DPV) and square wave anodic stripping voltammetry (SWASV), were used to detect trace levels of heavy metals. The sensor exhibited a low detection limit in the nanomolar range, high reproducibility, and rapid response time, making it suitable for real-time monitoring. Additionally, the developed sensor demonstrated excellent stability and selectivity, even in the presence of interfering ions commonly found in drinking water.

The results indicate that this electrochemical sensor is a promising tool for environmental monitoring and public health protection, providing a user-friendly and efficient alternative to traditional methods. Future work will focus on sensor miniaturization and integration with wireless technology for real-time data transmission. This research contributes to developing sustainable, low-cost solutions for water quality assessment, particularly in resource-limited settings.

Keywords: Electrochemical Sensor, Heavy Metals, Drinking Water, Nanomaterials, Environmental Monitoring, Water Quality

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Mating Behaviour in *Dolichogenidea mythimna* (Hymenoptera), a Parasitoid of Army Worm, *Mythimna separata* (Lepidoptera)

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Abstract

The present study aimed to evaluate the mating behavior of *Dolicogenidea mythima* (Hymenoptera) a parasitoid of Army worm Mythimna separate (Lepidoptera) was studied under laboratory conditions (24 ± 1.^{o}C, 55-60 % R.H.,12 hr. photoperiod). Mating behaviour consist of classical sequence viz., attraction, recognition, orientation, wing fanning wing or vibration, antenation mounting, copulation and post Copulatory grooming. Mating occurred at day time, copulation lasts 2.5 minutes, males ware polygamous and female were monogamous.

Keywords: *Meeting behavior*, *Dolichogenidea mythima Armyworm*, *Lepidoptera* etc.

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The Behavioural Patterns in the Indian Catfish, Clarias Batrachus During LC_{50} Investigation of Octylphenol

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Abstract

The present study was aimed to evaluate the median lethal concentration (LC_{50}) of octylphenol for 96 hours in the Indian catfish *Clarias batrachus* and the behavioural patterns during the exposure period. Behaviour is considered as an ideal parameter for studying the effect of environmental pollutant as it reflects the physiological status and greatly influences the fitness of the affected species. The eight different concentrations of octylphenol were exposed to the fish to evaluate the LC_{50} of octylphenol for 96 hours.The result of the study showed that 30mg/L was the LC_{50} where 50% of the test animals were killed, which was determined by probit analysis test. The fishes in the treated groups were observed unchanged with respect to their body weight, but their movement affected greatly as they were move slowly to the surface and remained at the bottom in groups, hitting to the side wall of the aquarium and showed inability to maintain normal posture, refusal of feeding ,jerky movement and finally reached in the vicinity of lethargic nature and rolling of the body prior to death were observed.The increase in mucus deposition on their body with an increase in the concentration of octylphenol and decreased opercular movement were also observed.The result of the study concluded that octylphenol caused to changes in the behavioural patterns of the exposed fishes that can be used as a marker in monitoring the issues related to environmental contaminants.

Keywords: Octylphenol, *Clarias batrachus*, acute toxicity, median lethal concentration

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Potassium Permanganate Infusion: A Novel Approach to Activated Charcoal Modification

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Abstract

The efficacy of activated charcoal as an ethylene absorber in prolonging the shelf life of bananas was enhanced through modification with strong bases, namely potassium permanganate (KMnO4) and sodium hydroxide (NaOH), at concentrations of 1M, 2M, and 3M. Activated charcoal was subjected to immersion in a 5 w/v% solution of KMnO4 for an overnight period, followed by filtration, powder collection, and subsequent drying. In this study, the impact of ethylene absorbers comprising charcoal-KMnO4 and a control group without the absorber was investigated concerning their effects on the ripening process and peel colour changes of bananas stored at ambient room temperature. Daily evaluations were conducted on both bananas and charcoal-KMnO4 powder to monitor changes. The findings revealed that bananas treated with the ethylene absorber exhibited a significantly slower ripening process and maintained a fresher peel colour compared to the control group. Notably, at the initiation of the experiment, bananas were in a raw state, and it was observed that those without the ethylene absorber ripened at an accelerated rate in contrast to those treated with the absorber. This research underscores the potential of modified activated charcoal as an effective ethylene absorber for extending the post-harvest life of bananas, thereby offering promising prospects for enhancing the preservation and marketability of perishable produce.

Keywords: Activated carbon, Ethylene absorption, Post-harvest q

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A Comprehensive Study on Extraction of Limonene from Orange Peels

Neelam Nisar Dhansay and Asst. Prof. Pankaj Gaikwad
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Abstract

Orange peel wastes, with an estimated global annual production of 25 million tonnes, are problematic to dispose of but can be used to obtain a range of valuable products, among them the main constituent of orange essential oil, D-limonene (DL). This review aims to layout recent advances in the field of DL extraction and purification. Besides substitution of the conventional solvent hexane with certain bio-based solvents, a range of techniques are presented. These include enhanced solvent extraction processes through temperature and pressure intensification or ultrasound, improved distillation most commonly using different microwave-based techniques but also enzymes, and supercritical CO2 extraction. Even though purification has been found to be the most energy-intensive and environmentally impacting step, most studies did not improve on existing centrifugation, decantation, or fractional distillation methods. Chromatography has been proven effective at obtaining high DL purities; however, it still has to be improved because of its high costs and low productivity.

D-Limonene is a compound that can be acquired from the rinds of the citrus family like oranges, limes, and mandarins. it is quite possibly the most well-known terpene present in nature. It has a few applications and a wide scope of advantages. Numerous medical service suppliers have supported the possible advantages of D-limonene guaranteeing that it can forestall or treat some ailments, for example, Bronchitis, Cancer, Diabetes, Gall stones, etc. It is likewise utilized in enterprises to make hand sanitizers, fragrances, plant pesticides, and synthetic solvents.

Keywords: D-Limonene, Orange Peels, Orange Essentiol Oil, Simple Fractional Distillation, Solvent Hexane, Extraction.

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Identification and Estimation of Metal Contaminants in Wastewater Using Complexometric Titration: A study on Pb, Mn, and Hg

Dr. Sajid F. Shaikh, Nida M. Gorme, Mali Rutika Ravindra
Anjuman Islam Janjira Degree College of Science Murud, Murud -Janjira, Raigad, Maharashtra, India

Abstract

Industrial and agricultural activities often lead to the contamination of wastewater with heavy metals such as lead (Pb), manganese (Mn), and mercury (Hg), which pose significant environmental and health risks. Monitoring the concentration of these metal contaminants is crucial for water quality assessment and pollution control. This study aims to identify and estimate the levels of Pb, Mn, and Hg in wastewater samples using complexometric titration, a well-established analytical technique.

Wastewater samples were collected from various industrial discharge sites and subjected to complexometric titration using ethylenediaminetetraacetic acid (EDTA) as the titrant for metal ion determination. The metal ions were first pre-treated with appropriate reagents to form stable complexes, and then their concentrations were determined by measuring the end point of the titration using a suitable indicator. The results were compared against the permissible limits for heavy metals in wastewater, as set by environmental protection agencies.

Preliminary findings indicate that Pb and Hg concentrations exceeded the regulatory limits in certain samples, while Mn levels were within acceptable thresholds. The study demonstrates the effectiveness of complexometric titration in the precise estimation of metal contaminants in wastewater, offering a simple, cost-effective approach for environmental monitoring. Future research will focus on improving detection sensitivity and exploring the integration of this method into real-time monitoring systems.

Keywords: Metal Contaminants, Wastewater, Complexometric Titration, Lead, Manganese, Mercury, Environmental Monitoring

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Recent Progress in the Synthesis of Thiadiazole and its Derivatives using Thiosemicarbazides and Hydrazides

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Vivekanand Arts, Sardar Dalipsingh Commerce and Science College, Chhatrapati Sambhajinagar.

Abstract

Thiadiazoles and their derivatives have gained significant attention due to their diverse pharmacological and industrial applications. Recent advancements in their synthesis have primarily focused on utilizing thiosemicarbazides and hydrazides as key precursors. These methodologies involve various catalytic and non-catalytic approaches, including green chemistry techniques, microwave-assisted synthesis, and solvent-free conditions, enhancing efficiency and yield. Structural modifications of thiadiazoles have led to compounds with improved biological activities, such as antimicrobial, anticancer, and anti-inflammatory properties. This review highlights the latest progress in synthetic strategies, reaction mechanisms, and emerging applications of thiadiazole derivatives, emphasizing sustainable and cost-effective methodologies.

Keywords: Thiadiazole, thiosemicarbazides, hydrazides, green chemistry, catalytic approaches, biological activities.

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Bacopa Monnieri: A Systematic Review of Its Neuroprotective Potential in Neurodegenerative Disease Management

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Abstract

Neurodegenerative diseases (NDs), including Alzheimer's disease (AD) and Parkinson's disease (PD), represent a growing global health challenge, primarily due to their progressive nature and lack of effective long-term treatments. Acetylcholinesterase (AChE) inhibitors are commonly used pharmacological agents in neurodegenerative therapy, but their limited efficacy and adverse effects necessitate alternative strategies. *Bacopa monnieri,* an Ayurvedic medicinal herb, has gained attention for its neuroprotective, antioxidant, anti-inflammatory, and cholinergic-modulating properties. In silico (computational) and in vitro (laboratory-based) studies highlight bacopaside X as a strong AChE inhibitor, demonstrating significant cognitive enhancement and neuroprotection. This review systematically analyzes the available molecular docking, biochemical, and preclinical evidence supporting *Bacopa monnieri*'s role as a natural therapeutic option for neurodegenerative diseases.

Keywords: *Bacopa monnieri*, Acetylcholinesterase inhibitors, Neurodegeneration, Bacopaside X, Cognitive enhancement, Memory loss.

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Green Synthesis and Characterization of Ni-Mg Oxide Nanoparticles by using Calotropis Gigantea

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Abstract

Green chemistry, also known as sustainable chemistry, aims to develop environmentally friendly chemical processes that minimize hazardous substances. The green synthesis of metal oxide nanoparticles (MONPs) focuses on eco-friendly methods for producing these materials. This study explores the green synthesis of Nickel-Magnesium (Ni-Mg) oxide nanoparticles using plant-based extracts from Calotropis gigantea, a naturally occurring plant with bioactive properties. Plant-based synthesis offers an efficient and non-toxic alternative to conventional chemical methods, utilizing natural phytochemicals as reducing and stabilizing agents. The research highlights the role of microorganisms and plant extracts in MONP synthesis, emphasizing their advantages in safety, cost-effectiveness, and environmental sustainability. The synthesized Ni-Mg oxide nanoparticles are characterized using techniques like UV-Vis spectroscopy, XRD, FTIR, SEM, and TEM to analyze their structural, optical, and chemical properties. Key synthesis parameters such as temperature, pH, extract concentration, and incubation time influence nanoparticle formation, stability, and yield.

Keywords: Green chemistry, metal oxide nanoparticles, Calotropis gigantea, biomedical applications, environmental sustainability.

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Nanoparticals from Natural Sources and their Application : A Brief Review

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Assistant Professor Veer Wajekar ASC College Phunde , Uran, Raigad, (M.S.), India.

Abstract

Nanoparticles derived from natural sources have gained significant attention due to their biocompatibility, sustainability, and eco-friendly synthesis methods. These nanoparticles can be obtained from plants, microorganisms, and other biological materials, often through green synthesis techniques that eliminate the need for toxic chemicals. This review explores various natural sources of nanoparticles, their physicochemical properties, and their diverse applications in medicine, agriculture, environmental remediation, and industry. Special emphasis is placed on their role in drug delivery, antimicrobial activity, and nanocatalysis. Despite their promising potential, challenges such as scalability, stability, and regulatory concerns remain. Future research directions include optimizing synthesis methods, enhancing functionality, and ensuring safety for large-scale applications.

Keywords: Natural Nanoparticles, Green Synthesis, Drug Delivery etc

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Identification and Estimation of Iron (Fe) Content in Different Folic Acid Tablets

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Abstract

Iron (Fe) is an essential micronutrient that plays a vital role in oxygen transport, energy production, and immune function. Folic acid tablets, commonly used as dietary supplements, often contain added iron to address iron deficiency anemia, especially in populations at risk. This study aims to identify and estimate the iron content in different commercially available folic acid tablet brands using laboratory-based analytical methods.

Samples of various folic acid tablets were analyzed using atomic absorption spectroscopy (AAS) and spectrophotometric methods. The tablets were first dissolved and treated with suitable reagents to release iron, which was then quantified by measuring absorbance at specific wavelengths. The iron content in each tablet was compared against the label claim and the permissible limits set by pharmacological standards.

Preliminary results show significant variations in iron content across different brands, with some tablets containing higher than claimed amounts. This study highlights the importance of accurate labeling and quality control in dietary supplements to ensure consumer safety and effectiveness. Future research will explore the bioavailability of iron in folic acid tablets and its potential impact on iron deficiency treatment.

Keywords: Iron Content, Folic Acid Tablets, , Dietary Supplements, Iron Deficiency, Spectrophotometry

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A Study on the Role of Polymer-Based Hydrogels in Soil Moisture Retention for Improved Irrigation Efficiency

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Abstract

The increasing global demand for water, coupled with the challenges posed by climate change, has made the efficient use of water resources critical, particularly in agricultural irrigation. In this context, polymer-based hydrogels have emerged as a promising solution for enhancing soil moisture retention, thereby improving irrigation efficiency. This study explores the role of these hydrogels in soil water management, focusing on their mechanisms, advantages, and potential applications in sustainable agriculture. Polymer-based hydrogels are water-absorbing materials that can retain large quantities of water relative to their weight, gradually releasing it to the soil as needed. These hydrogels function by absorbing water during periods of excess moisture, which is then gradually released during dry spells. This property can help to mitigate water stress in crops and reduce the need for frequent irrigation. The research examines the different types of hydrogels—synthetic and natural—and their performance in various soil types and environmental conditions. Factors such as water retention capacity, biodegradability, and impact on soil structure are analyzed to assess their suitability for agricultural use.

Keywords: Water, Polymer Based Hydrogels, Irrigation,

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Assessment of Physico-Chemical Properties of Coal Mine Water for Sustainable Water Resource Management

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Abstract

The aim of our study is to gather various facts from coal mine water regarding seasonal changes, water quality, and abiotic variables. Mine water from coal mines is recycled in the Indian state of Chhattisgarh and used as a thermal energy source as well as in the public sector and on agricultural ground. With the onset of Summer, water samples were obtained for this investigation from coal mine in the Korba district of Chhattisgarh. To evaluate the quality of water ,analyses were made of sixteen different physiochemical parameters, such as pH, alkanity, total hardness, fluorides, chlorides, BOD, COD, and DO. The Water Quality Index (WQI), ,. The most useful indicator of the quality of the water is the Water Quality Index (WQI), which is produced by averaging any or all of the features. Therefore, it is safe and there is plenty of source to use mine water as an additional resource for aquatic ecosystems. The preservation and restoration of aquatic ecosystems, as well as the scientific distribution and management of water resources, are essential to the effective use of freshwater. The complete usage and ideal allocation mode of mine water must be taken into consideration based on actual conditions because of the variations in the quantity and quality of coal mine water as well as the notable variations in the surrounding conventional water resource conditions. Additionally, they must include the full utilization of mine water resources into their development plans for the circular economy and local communities.

Key words: coal mine water, Monthly variation, Opencast mine .WQI, Physio-chemical parameters.

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To Determine Potassium Content in a Fertilizers Sample by Flame Photometry

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Abstract

Potassium is an essential element widely used in agriculture, pharmaceuticals, and industry. Ensuring its accurate measurement is crucial for product quality, regulatory compliance, and environmental safety. This study focuses on determining potassium in potassium chloride (KCl) using flame photometry, a reliable and cost-effective method. Potassium is sourced from natural deposits, seawater, organic matter, and industrial processes. It plays a key role in fertilizers, medicines, and chemical manufacturing. Flame photometry works by measuring the light emitted by potassium atoms at a specific wavelength (766.5 nm) when introduced into a flame. This technique is valued for its simplicity, speed, and sensitivity. A calibration curve using standard potassium solutions ensures accurate results. The method is widely applied in agriculture to monitor fertilizer quality, in medicine to check potassium levels in formulations, and in environmental science to assess potassium content in soil and water. While flame photometry is efficient, it has limitations, such as interference from other elements like sodium. Proper calibration and sample preparation help minimize errors. Despite these challenges, flame photometry remains a preferred method for routine potassium analysis due to its affordability and ease of use.

Keywords: Potassium, flame photometry, agriculture, pharmaceuticals, fertilizers, accuracy, environmental safety, cost-effective.

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Review of Ipomoea triloba L. on Phytochemicals Studies

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Abstract

Convolvulaceae known as the morning glory family is widely distributed in tropical, subtropical and temperate regions. The Convolvulaceae are mostly twining herbs or shrubs, sometimes with milky sap, comprising about 60 genera and nearly 1600 species in the world. The present study has been taken up to review one of the ethnomedicinal important plant under this family, *Ipomoea triloba* L. The study documented the details of phytochemical studies

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Isoxazole Synthesis: Diverse Approaches to a Versatile Heterocycle

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Abstract

Isoxazoles are a significant class of five-membered heterocyclic compounds with diverse applications in pharmaceuticals, agrochemicals, and material sciences. Various synthetic approaches have been developed to construct the isoxazole core, ranging from classical condensation reactions to modern transition-metal-catalyzed and green chemistry-based methodologies. This review explores the key strategies for isoxazole synthesis, including the 1,3-dipolar cycloaddition of nitrile oxides with alkynes, oxidative cyclization of oximes, and metal-catalyzed cross-coupling reactions. Additionally, recent advancements in environmentally friendly and one-pot synthesis techniques are discussed, highlighting their efficiency and sustainability. The comparative advantages, limitations, and scope of these methods are analyzed to provide insights into their practical applications in synthetic chemistry.

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Study on Synthesis of 2, 4, 5 Triphenyl Imidazole form Dicarbonyl Compound an Aldehyde and Ammonia

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Abstract

The synthesis of 2,4,5-triphenylimidazole is an important reaction in organic chemistry, involving the condensation of a carbonyl compound (an aldehyde), ammonia, and phenyl groups. This study focuses on the reaction mechanism, optimization of reaction conditions, and characterization of the resulting imidazole derivative. The condensation occurs through the reaction of an aldehyde with ammonia to form an intermediate imine, which then undergoes a cyclization process to form the imidazole ring. The phenyl groups at the 2, 4, and 5 positions on the imidazole ring are introduced by the use of phenyl-substituted aldehydes or by the addition of phenyl derivatives during the cyclization.

The influence of factors such as temperature, solvent choice, and reactant concentrations on the yield and purity of 2,4,5-triphenylimidazole was systematically investigated. The use of polar solvents and controlled temperature conditions proved to be crucial in enhancing the formation of the imidazole ring, while also minimizing side reactions. The reaction was optimized to maximize the product yield and efficiency.

Keywords: Imidazole Derivatives, Organic Synthesis, Cyclization Reaction, Nucleophilic Substitution

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Algal Biofuels Improving Yield and Efficiency through Chemical Modification

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Abstract

Algal biofuels have emerged as a promising alternative to fossil fuels due to their sustainability, rapid growth rates, and ability to sequester CO_2. However, challenges related to low lipid yields, high production costs, and process inefficiencies hinder their large-scale adoption. Chemical modification has proven to be a transformative approach to improving the productivity and efficiency of algal biofuel production. This study focuses on enhancing lipid accumulation and extraction efficiency in microalgae through targeted chemical interventions. Key strategies include the use of chemical additives such as phytohormones, trace metal ions, and nutrient stressors to optimize metabolic pathways for lipid biosynthesis. Additionally, chemical pretreatment techniques, such as acid hydrolysis, ionic liquid exposure, and solvent-based lipid recovery, significantly enhance the extraction and conversion of bio-oils. Genetic engineering combined with chemical treatment has further demonstrated potential in creating strains with higher photosynthetic efficiency, improved lipid profiles, and faster growth rates.

Keywords: Algal Biofuels, sustainability, extraction.

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Tea Leaves to Titration: Simplifying Caffeine Extraction and Analysis

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Abstract

This research paper focuses on the extraction and analysis of caffeine from tea leaves using a simple titration method. The primary objective was to evaluate the caffeine content in various tea types, while employing a straightforward and accessible analytical technique. The caffeine was extracted from the tea leaves through a solvent extraction process, followed by quantification through titration, which allowed for the precise determination of caffeine concentrations. The study assessed the efficiency of the extraction process and analyzed the impact of factors caffeine yield. Results showed variations in caffeine content across different samples, highlighting the influence of specific extraction conditions. This research not only demonstrates the effectiveness of simple titration as an analytical method for caffeine determination but also provides insights into the caffeine composition of common teas. The findings are valuable for both consumers and manufacturers interested in understanding caffeine levels in tea products.

Keywords: Caffeine extraction, tea leaves, Soxhlet, ultrasonic extraction, analytical methods, sustainability, tea types, and nutritional analysis.

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Determination of Organic Carbon From Soil

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Abstract

Soil Organic Carbon (SOC) is a crucial component of soil organic matter, playing a vital role in maintaining soil health, enhancing nutrient availability, supporting microbial activity, and influencing carbon cycling. Accurate SOC quantification is essential for sustainable land management, agricultural productivity, and climate change mitigation. However, SOC determination presents challenges due to its spatial and temporal variability, necessitating precise measurement techniques. Traditional methods such as the Walkley-Black method have been widely used but are known to underestimate SOC content due to incomplete oxidation. More advanced approaches, including dry combustion and spectroscopic techniques like Near-Infrared (NIR) and Mid-Infrared (MIR) spectroscopy, offer improved accuracy and efficiency. Emerging methodologies integrating isotopic analysis, thermal techniques, and remote sensing have further enhanced large-scale SOC estimation capabilities. This study evaluates and compares various SOC determination methods, assessing their accuracy, efficiency, and cost-effectiveness across different soil types. The research highlights the potential of combining traditional and modern techniques to optimize SOC assessment. By identifying the most effective approaches, this study aims to contribute to improved soil management practices, carbon sequestration strategies, and climate resilience efforts.

Keywords: Soil Organic Carbon, Carbon Sequestration, Soil Health, Soil Fertility, Carbon Quantification

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Detection of Microplastic Pollution in Fresh Water Sources of Murud Taluka

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Abstract

Water popularly termed the 'The Elixir of Life' is now polluted beyond control in several regions. Microplastics, the tiny contaminants have found their way into all walks of life. They have also been found to be present in human blood, multiple organs, and even breast milk. There is an abundance of microplastics in the air we breathe, the food we eat, and the water we drink. Curbing them has to start with a ban of all forms of primary microplastics, and single use plastics with preference being given to biodegradable alternatives. India in particular banned single use plastics in 2022, which put an end to several commonly used plastic items being replaced with biodegradables. Paint is one of the largest contributors to microplastics, followed by textile industry, cosmetic, pharmaceutical industry, packaging industry are all top contributors to microplastics. The wastewater treatment plants aren't designed to filter microplastics from the source and this results in microplastics polluting all water resources. Though several novel techniques for microplastic segregation exist such as sieving, filtration, density separation, visual sorting, alkali digestion exist, they aren't fully employed as the initial process of microplastic segregation from waste is still in question.

Keywords: Water, Microplastics

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A Comprehensive Study on Extraction and Characterization of Bioactive Pesticidal and Insecticidal Compound From Annona Squamosa (Custard Apple Seeds)

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Abstract

The Insecticide and Pesticide is a substance which helps to kill the bugs and insects and helps to maintain the crop yield. There basically two types of pesticides are one is natural and second is synthetic. Due to industrialization and easily availability synthetic pesticides used more often. In this paper we will study about manufacturing of natural pesticide from custard apple seed. The manufacturing process based on distillation in which solvents are used acetone and hexane. Annona squamosa (custard apple or sugar apple), belonging to the Annonaceae family, is a small tree or shrub that grows natively in subtropical and tropical regions. Seeds of the custard apple have been employed in folk medicines because of the presence of bioactive chemicals/compounds such as alkaloids, flavonoids and phenolic compounds and acetogenins and cyclopeptides that are responsible for various biological activities. From investigations, it has been shown that the seeds of A. squamosa have considerable potential to be used as an antibacterial, hepatoprotective, antioxidant and antitumor/anticancer agent. Cyclosquamosin B, extracted from the custard apple seed, possesses vasorelaxant properties. Tocopherols and fatty acids, notably oleic acid and linoleic acid, are also found in the seed oil. Annona Squamosa seeds contain a high amount of annonaceous acetogenins compounds, which are potent mitochondrial complex I inhibitors and have high cytotoxicity. A survey primarily based on the nutritional, phytochemical and biological properties showed that A. squamosa seeds can be used for the discovery of novel products, including pharmaceutical drugs.

Keywords: Annona squamosa; Custard Apple Seed; Health Benefits; Bioactivities; Phytochemistry; Anticancer.

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Mutagenic Effects of Sodium Azide on the Growth and Development of Spinach (*Spinacia oleracea* L.)

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Abstract

Spinacia oleracea L. (spinach) is a nutritionally rich leafy vegetable with significant medicinal and agricultural value. This study investigates the mutagenic effects of sodium azide (NaN_3) on spinach growth and development by analyzing seed germination rates, shoot and root growth. Seeds were treated with increasing concentrations of NaN_3 (0.001%–0.005%) and observed over 8, 16, and 24 hours. Results indicate that higher concentrations of NaN_3 significantly inhibited germination, reducing it from 94% (control) to 9% at 0.005% after 24 hours. Shoot and root growth also declined with increasing concentrations, with shoot length dropping from 7.2 cm (control) to 1.4 cm and root length from 1.5 cm to 0.4 cm at the highest concentration. While some phytochemical variations were noted, the overall impact of NaN_3 was detrimental. These findings suggest that controlled doses of NaN_3 may induce genetic variability in spinach, which could be useful for crop improvement while requiring careful application to mitigate adverse effects.

Keywords: *Spinacia oleracea* L., sodium azide (NaN_3), mutagenic effects, seed germination

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Identification of Adulteration in Spices and there Impact on Human Body

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Abstract

Spice adulteration is a major food safety issue, especially in India, where spices are widely used for cooking and medicinal purposes. The addition of harmful substances reduces the quality and safety of spices, posing health risks such as digestive disorders and toxicity. This study highlights the importance of spices in daily life, the reasons behind adulteration, and various methods to detect contaminants. Experimental techniques for identifying adulterants in chili powder, coriander powder, turmeric powder, and black pepper are discussed. The findings emphasize the need for strict regulations, better testing methods, and greater consumer awareness to ensure food safety and maintain India's culinary traditions.

Keywords: Spice adulteration, food safety, adulterants, consumer awareness, public health, quality assessment.

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Detection of Pesticide Residues in Cereals: A Focus on Rice, Wheat, and Maize

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Abstract

Pesticide residues in cereals pose significant health risks due to their potential toxicity and long-term environmental persistence. Excessive or improper pesticide use in agriculture can lead to contamination of staple grains such as rice (*Oryza sativa*), wheat (*Triticum aestivum*), and maize (*Zea mays*), raising concerns about food safety and regulatory compliance. This study aims to detect and quantify pesticide residues in these cereals using advanced analytical techniques.

Samples were collected from various agricultural regions and analyzed using gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS). The pesticide residue levels were compared against the maximum residue limits (MRLs) set by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO). Preliminary findings indicate that organophosphates, pyrethroids, and neonicotinoids were among the most commonly detected pesticide residues. Rice exhibited higher pesticide accumulation compared to wheat and maize, likely due to its water-intensive cultivation process.

The study underscores the need for stringent monitoring and sustainable farming practices to minimize pesticide contamination in cereals. Future research will explore bioremediation techniques and the potential of organic farming to reduce pesticide residue levels. The findings provide valuable insights for policymakers, food safety authorities, and consumers in ensuring a safer food supply.

Keywords: Pesticide Residues, Cereals, Rice, Wheat, Maize, Food Safety.

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A Study to Determine Non Covalent Interaction of Some Analgesic Drugs by Viscometric and Volumetric Methods

Shreyash Ram More
D. G. Tatkare Mahavidyalaya Mangaon Mangaon, Raigad-(MH)

Abstract

The study of non-covalent interactions between analgesic drugs and solvents or biological macromolecules is essential for understanding their therapeutic efficacy and pharmacokinetic behavior. This paper explores the non-covalent interactions of selected analgesic drugs, specifically through viscometric and volumetric methods, to gain insights into their molecular interactions and solution dynamics. Viscometric techniques, such as the measurement of solution viscosities at different concentrations and temperatures, provide information on the molecular size, shape, and the nature of intermolecular forces in the drug-solvent system. Volumetric methods, including density and apparent molar volume measurements, allow for the investigation of drug-solvent and drug-drug interactions at the molecular level. Results from these studies suggest that analgesics, such as ibuprofen, paracetamol, and aspirin, exhibit varying degrees of non-covalent interactions, including hydrogen bonding, van der Waals forces, and electrostatic interactions. These interactions influence their solubility, stability, and bioavailability. This research highlights the importance of understanding the molecular behavior of analgesic drugs in solution to optimize their pharmacological properties and to design more effective drug formulations.

Keywords:- Non-covalent interactions, Analgesic drugs, Viscometric methods, Volumetric methods, Molecular interactions, Hydrogen bonding, Van der Waals forces.

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Isolation of Alkaloids : Caffeine And Nicotine

Shubham Rajendra Salaskar
D. G. Tatkare Mahavidyalay, Mangaon-Raigad

Abstract

This study presents a comparative analysis of the isolation methodologies and properties of two prominent alkaloids, nicotine and caffeine, extracted from natural sources. The isolation process involved initial solvent extraction followed by purification techniques, including chromatography, to obtain pure compounds. The yields, purity, and physical properties of the isolated nicotine and caffeine were evaluated and compared to elucidate their similarities and differences in terms of extraction efficiency and chemical characteristics. Through this research, insights into the effectiveness of various isolation techniques and the unique properties of nicotine and caffeine alkaloids are provided, contributing to a better understanding of their applications in pharmaceuticals, agriculture, and other industries. The findings of this study serve as a valuable resource for future studies aiming to optimize alkaloid extraction processes and exploit their diverse functionalities.

Keywords: Chromatographic Technique, Physical properties, purity.

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Comparative Analysis of Fluoride Ion Content in Toothpastes: An Analysis of Colgate, Sensodyne, and Pepsodent

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Anjuman Islam Janjira Degree College of Science Murud, Murud -Janjira, Raigad, Maharashtra, India

Abstract

Fluoride is a key ingredient in toothpaste formulations, playing a crucial role in preventing dental caries and strengthening enamel. However, variations in fluoride content across different brands can impact their effectiveness and safety. This study aims to conduct a comparative analysis of fluoride ion concentration in three popular toothpaste brands—Colgate, Sensodyne, and Pepsodent—using laboratory-based analytical techniques.

Samples were collected and analyzed using ion-selective electrode (ISE) method, UV-Vis spectrophotometry, and fluoride ion chromatography. The fluoride content was compared against the standard limits set by the American Dental Association (ADA) and the Food and Drug Administration (FDA). Preliminary results indicate that while all three brands contain fluoride within permissible limits, differences exist in their bioavailability and formulation efficiency. Sensodyne, formulated for sensitive teeth, showed a lower fluoride ion release rate compared to Colgate and Pepsodent, which are designed for general oral care.

The findings provide valuable insights into the fluoride efficacy of commercial toothpaste brands and their compliance with regulatory standards. This study emphasizes the importance of accurate labeling and consumer awareness regarding fluoride intake. Future research will explore the long-term impact of varying fluoride concentrations on dental health.

Keywords: Fluoride Content, Toothpaste, Colgate, Sensodyne, Pepsodent, Ion-Selective Electrode.

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A study of Determination of Calcium in 'CALCIUM' Tablets by Complexometric Method

Siddhesh Santosh Parte
D. G. Tatkare Mahavidyalaya Mangaon Mangaon, Raigad-(MH)

Abstract

A laboratory experiment is described in which students compare two methods for the determination of the calcium content of commercial dietary supplement tablets. In a two-week sequence, the sample tablets are first analyzed via complexometric titration with ethylenediaminetetraacetic acid and then, following ion exchange of the calcium ion present for hydronium ion, by acid–base titration with sodium hydroxide. Upon completion of the laboratory work, students pool their data with classmates and perform a statistical analysis to determine whether the average values of the calcium content obtained by the two methods are equivalent. When taken together with such considerations as analysis time, accuracy, simplicity and ease of use, susceptibility to interference, and waste generation, these results enable the students to evaluate the relative merit of the two approaches to calcium determination. In so doing, they are introduced to an important aspect of "real-world" chemical analysis, namely.

Reeder's Indicator [2hydroxy-1-(2-hydroxy-4-sulpho1naphthylazo) 3naphthanoic acid] selectively forms chelate with calcium, while other ions are masked by hydroxylamine hydrochloride.

Key words: complexometric titration.

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Structural and Optical Study of Lead Doping on Cobalferrite Nanoparticles Synthesized via Sol-Gel Autocombution Method

Altaf Isuf Fakir, Masira AbdulJalil Pangarkar, Fatima Nasir Surve
Anjuman Islam Janjira Degree College of Science, Murud Janjira

Abstract

Lead (Pb^{2+}) substituted cobalt ferrite ($Co_{1-x}Pb_xFe_2O_4$, x = 0.1–0.5) nanoparticles were synthesized via the sol-gel autocombustion method to investigate the impact of Pb^{2+} concentration on structural and optical properties. X-ray diffraction (XRD) confirmed phase purity, with an increasing lattice parameter due to the larger ionic radius of Pb^{2+}. UV-Visible spectroscopy revealed an absorption edge shift (690–703 nm), and band gap values were determined using both absorption edge and Tauc's plot methods. The band gap decreased up to x = 0.3 due to impurity band formation and grain size effects but increased at x > 0.3, attributed to the Burstein–Moss effect. The findings highlight the tunability of $CoFe_2O_4$ properties through Pb^{2+} substitution, making them promising for optoelectronic applications.

Keywords: Nanoparticles, Cobalt Ferrite, Sol-Gel Method, Optical Properties.

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Study of Magnetic Properties of Lithium-Cadmium Ferrite Nanoparticles Prepared by Sol-Gel Method.

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Abstract

Lithium-Cadmium ferrite ($Li_{1-x}Cd_xFe_2O_4$, where x = 0, 0.1, 0.2) nanoparticles were synthesized using a simple, cost-effective sol-gel auto-combustion method at low temperature. Lithium-Cadmium ferrite belongs to the category of soft ferrites and has potential applications, particularly in gas sensors. The present study focuses on analyzing the structural and magnetic properties of the synthesized Lithium-Cadmium nanoferrite samples.The magnetization behavior of the nanoparticles was investigated, and key parameters such as saturation magnetization (Ms), remanence (Mr), and coercivity (Hc) were derived from the hysteresis loops. Vibrating Sample Magnetometry (VSM) results indicate that as Cd^{2+} substitution increases in Lithium ferrite, both remanence (Mr) and saturation magnetization (Ms) increase. However, coercivity (Hc) initially increases up to x = 0.1 and then decreases at x = 0.2. These magnetic property variations suggest that the synthesized materials transition from hard ferrite to soft ferrite behavior.

Keywords: Nanoparticles, Lithium-Cadmium ferrite, Sol-Gel Method, Magnetic Properties.

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Development of Analytical Methods for Detecting Synthetic Sudan Dye in Adulterated Turmeric

Dr. Sajid F. Shaikh, Nida M. Gorme, Mohite Sushant Sandeep, Ayesha Nakhuda
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Abstract

The adulteration of turmeric with synthetic Sudan dyes, a class of industrial colorants, poses significant health risks due to their carcinogenic and toxic nature. Despite regulatory restrictions, Sudan dyes are still illicitly used to enhance turmeric's color and market appeal. This study aims to develop and evaluate reliable methods for detecting Sudan dyes in adulterated turmeric to ensure food safety and consumer protection.

Various analytical techniques, including UV-Vis spectroscopy, thin-layer chromatography (TLC), high-performance liquid chromatography (HPLC), and mass spectrometry (MS), were employed to identify and quantify Sudan dyes. The sensitivity and specificity of these methods were compared to determine the most effective approach. Results indicate that HPLC-MS provides high accuracy and sensitivity, detecting trace levels of Sudan dyes, while TLC serves as a cost-effective and rapid screening tool. UV-Vis spectroscopy further aids in preliminary identification based on characteristic absorption peaks.

The study highlights the importance of adopting robust analytical techniques for routine food safety monitoring. The developed methods can be utilized by regulatory agencies and food industries to prevent adulteration and safeguard public health. Future research will focus on developing portable, field-deployable sensors for on-site testing.

Keywords: Sudan Dye, Turmeric Adulteration, Food Safety, HPLC, Spectroscopy, Analytical Methods

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Preparation of White Phenyl Floor Cleaner: A Sustainable Approach to Household Hygiene

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Abstract

White phenyl is a common disinfectant and floor cleaner that contains mostly pine oil emulsified in water. In this research, the formulation, stability, and confirmation testing of white phenyl are emphasized using pine oil and cutting oil as major components. The main aim is to prepare an efficient, stable, and cost-effective formulation and confirm its disinfectant nature.

The process of formulation entails emulsifying the pine oil with cutting oil acting as an emulsifier and later diluting it in water to form a stable milky white solution. The emulsion is then tested for stability through phase separation analysis, and a good formulation should be homogeneous without oil separation after 24 hours. In addition, solubility tests validate its miscibility with water, and pH testing verifies a slightly alkaline character (6.5–8.0) appropriate for efficient cleaning. The disinfectant activity of the synthesized phenyl is assessed through microbial growth inhibition tests, determining its capacity to inhibit bacterial colonies on treated surfaces.

This research seeks to maximize the long-term stability of the formulation without compromising its high efficacy as a cleaning agent. The findings give light to the function of cutting oil as an emulsifier in phenyl manufacture and set scientific procedures to assure the performance of the product. This work helps in the sustainable development of low-cost disinfectants with real-world applications in household and industrial cleaning.

Keywords: White phenyl, Pine oil, Cutting oil, Disinfectant, Cost-effective Disinfectant

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Determination of the PH and Acidity of Various Household Vinegars using Simple Titration Methods

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Abstract

Vinegar is a widely used household ingredient composed primarily of acetic acid, which contributes to its characteristic acidity and pH. This study aims to determine the pH and acidity of various household vinegar samples using simple titration methods. The pH of each sample was measured using a pH meter, while the acetic acid content was quantified through acid-base titration with a standardized sodium hydroxide solution, using phenolphthalein as an indicator. The results revealed variations in acidity levels among different vinegar types, reflecting differences in their production processes and raw materials. This study provides valuable insights into the chemical properties of household vinegars, contributing to consumer awareness and quality assessment.

Keywords: Vinegar, pH determination, acidity analysis, acetic acid, acid-base titration, household chemistry, food quality.

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Advancements and Future Prospects of Flexible Wearable Sensors in Spacesuit Technology

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Abstract

Spacesuits are essential for astronauts, providing life support in the extreme conditions of space. During extravehicular activities, these suits maintain pressure and protect astronauts from the vacuum of space. However, the pressurized suit increases joint resistance, making movement more challenging. Wearable sensors have gained significant attention due to their ease of use and ability to provide real-time monitoring. These sensors can track vital signs such as heart rate, breathing, and sweat, as well as recognize movements and collect data. By integrating flexible wearable sensors, researchers have analyzed the impact of joint resistance in pressurized spacesuits, offering insights to enhance suit performance. This paper reviews recent advancements in flexible wearable sensors, their classifications, and their applications in spacesuit technology. Additionally, it discusses the challenges faced in implementing these sensors, providing a theoretical foundation for further research in this field.

Keywords: Spacesuits, Gas Sensors, Flexible wearable sensors.

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Industrial Waste Water Treatment

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Abstract

Industrial wastewater treatment is a critical process in mitigating the environmental impact of effluents generated by various industries, including textiles, pharmaceuticals, food processing, chemicals, and metal industries. The goal of industrial wastewater treatment is to remove pollutants—such as organic compounds, heavy metals, suspended solids, and toxic chemicals—before the water is released into the environment or reused in industrial processes. Effective treatment not only ensures compliance with environmental regulations but also promotes sustainable practices by conserving water resources. Industrial wastewater treatment typically involves a combination of physical, chemical, and biological methods, tailored to the specific characteristics of the effluent. Physical methods, such as filtration and sedimentation, are used to remove large particles and suspended solids. Chemical treatments, including coagulation-flocculation, neutralization, and advanced oxidation processes, help break down complex pollutants like organic compounds, dyes, and heavy metals. Biological treatments, including the activated sludge process and anaerobic digestion, leverage microorganisms to degrade biodegradable organic pollutants, reducing biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in the wastewater.

Recent advancements in industrial wastewater treatment technologies focus on improving efficiency, reducing energy consumption, and enabling the recovery of valuable resources, such as biogas, phosphorus, and water. The integration of innovative techniques like membrane filtration, electrocoagulation, and phytoremediation further enhances treatment performance and supports the development of circular economy practices.

Keywords: Industrial waste water, heavy metals, BOD, COD, reducing energy consumption

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The Use of Post Harvest Treatment to Extend Flower Vase Life

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Abstract

A fresh flower is still a living specimen even though it has been cut from the plant. Its maximum potential vase life, although acceptable in the marketplace, is short. There are many impinging forces that can interact to reduce fresh-flower vase life. As an industry, we need to be more successful in preserving the potential life of fresh flowers. However, there are well-known solutions for this. Proper harvesting and care of flowers after harvest are important to maximize the vase life and ensure a high-quality product. Maximizing the vase life of cut flowers is dependent on pre-harvest procedures too. Long before harvest, plant cultivar selection should be considered for postharvest longevity to provide the best possible cultivars for cutting. Postharvest factors like method of harvest, time of harvest, maturity stage, ethylene management, vase life enhancement, packaging ,storage and transportation has to be taken into account with almost all care. More technology adaptation efforts are required to be undertaken by technology generating laboratories through a field-level program of adaptive research and community based production systems. This can happen with better linkages with laboratories, financial institutions, and governmental bodies as a way of continuously improving the competitiveness of the local system. Besides, the developed and promoted technology should come as low cost devices, practical and effective for use at farmer level. Apart from the adaptation the training for flower harvesting, handling, packing and transportation should be given to the growers to avoid the losses during handling of cut flowers

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Wastewater from Washed Rice Water as Plant Nutrient Source

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Abstract

A significant wastewater source in every household is washed rice water (WRW) because it contains leached nutrients (from washing the rice prior to cooking) that could be used as fertilizer. The paper reviewed the current understanding of the potential use of WRW as a plant nutrient source. WRW was shown to increase vegetables growth, such as water spinach, Pakchoy, lettuce, mustard, tomato, and eggplant. Different researchers have used various amounts of WRW, and their results followed a similar trend: the higher the amount of WRW, the higher the plant growth. WRW has also been used for other purposes, such as a source of carbon for microbial growth. WRW from brown rice and white rice had nutrients ranging from 40-150, 43-16306, 51-200, 8-3574, 36-1425, 27-212, and 32-560mg L^1 of N. P. K. Ca, Mg, S, and vitamin B1 (thiamine), respectively. Proper utilization of WRW could reduce chemical fertilizer use and prevent both surface and groundwater contamination and environmental pollution.

However, only a few of the studies have compared the use of WRW with the use of conventional NPK fertilizer. The major drawback of WRW studies is that they lack depth and scope, such as determining the initial and (or) final soil physico-chemical properties or plant nutrient contents. Considering the rich nutrient content in WRW, it will impact plant Growth and soil fertility when used. As Irrigation water and plant nutrient source therefore it is recommended that studies on WRW Effect on soil microbial population plant an soil nutrient contain to be carried out to ascertain the sustainability of WRW use as a plant nutrients source.

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Analysis of Citric Acid Content in Lemon Juice and Commercial Beverages using Acid-Base Titration

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Abstract

Citric acid is a key organic acid found in citrus fruits and is widely used in commercial beverages for its flavor-enhancing and preservative properties. This study aims to determine the citric acid content in fresh lemon juice and various commercial beverages using acid-base titration with a standardized sodium hydroxide solution. Phenolphthalein was used as an indicator to identify the equivalence point. The results revealed variations in citric acid concentration among different samples, with fresh lemon juice exhibiting higher acidity ompared to most commercial beverages. The findings provide insights into the citric acid levels in commonly consumed drinks, aiding in quality control and consumer awareness regarding acidity in beverages.

Keywords: Citric acid, lemon juice, commercial beverages, acid-base titration, acidity analysis, food chemistry, quality control.

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AI-Driven Cybersecurity: Enhancing Threat Detection and Response

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Abstract

The integration of artificial intelligence (AI) into cybersecurity has revolutionized the way threats are detected, analyzed,and mitigated. This paper explores the transformative potential of AI-driven solutions in enhancing the efficiency and accuracy of threat detection and response mechanisms. Key advancements such as machine learning, natural language processing, and anomaly detection are examined, along with their applications in identifying sophisticated cyberattacks. He rapid evolution of cyber threats in an increasingly interconnected digital world demands innovative approaches to cybersecurity. AI-driven cybersecurity solutions have emerged as a pivotal tool for combating sophisticated and evolving cyberattacks. This research paper delves into the integration of artificial intelligence technologies—such as machine
learning, deep learning, and natural language processing—into threat detection and response mechanisms. These technologies empower systems to analyze vast amounts of data in real time, recognize patterns, detect anomalies, and predict potential breaches with unparalleled precision.The study also highlights the role of AI in automating incident response, reducing response time, and mitigating human error.

Keywords: AI-driven cybersecurity, threat detection, threat response, cybersecurity automation, machine learning security, AI in cybersecurity.

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Green Synthesis and Characterization of Ni-Mg Oxide Nanoparticles by using alotropis Gigantea

Nitin S. Pawar, Gaykar P. Naresh, Shreya R. Baji
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Abstract

Green chemistry, also known as sustainable chemistry, aims to develop environmentally friendly chemical processes that minimize hazardous substances. The green synthesis of metal oxide nanoparticles (MONPs) focus on eco-friendly methods for producing these materials. This study explores the green synthesis of Nickel-Magnesium (Ni-Mg) oxide nanoparticles using plant-based extracts from Calotropis gigantea, a naturally occurring plant with bioactive properties. Plant-based synthesis offers an efficient and non-toxic alternative to conventional chemical methods, utilizing natural phytochemicals as reducing and stabilizing agents. The research highlights the role of microorganisms and plant extracts in MONP synthesis, emphasizing their advantages in safety, cost-effectiveness, and environmental sustainability. The synthesized Ni-Mg oxide nanoparticles are characterized using techniques like UV-Vis spectroscopy, XRD, FTIR, SEM, and TEM to analyze their structural, optical, and chemical properties. Key synthesis parameters such as temperature, pH, extract concentration, and incubation time influence nanoparticle formation, stability, and yield.

Keywords: Green chemistry, metal oxide nanoparticles, Calotropis gigantea, biomedical applications, environmental sustainability.

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A Study on Electrophilic Aromatic Substitution of Acetanilide

Suhaima Shaukat Ali Gothekar
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Abstract

Acetanilide was the first aniline derivative serendipitously found to possess analgesic as well as antipyretic property. The literature review shows the study and preparation of acetanilide. The present work was planned to prepare acetanilide from different aldehydes. Acetanilide was prepared by reacting aniline, acetic anhydride and glacial acetic acid. The produced acetanilide is the substituted with different aromatic aldehydes. Electrophilic Aromatic Substitution (EAS) of acetanilide involves the substitution of a hydrogen atom on the aromatic ring of acetanilide by an electrophile. In this process, the nucleophilic aromatic ring reacts with the electrophile, and one of its hydrogens is replaced by the incoming substituent. Acetanilide, with the formula C8H9NO, consists of a benzene ring attached to an amide group (-NHCOCH3). The preparation of acetanilide from aniline via electrophilic aromatic substitution is a well-established method in organic chemistry. The process involves the activation of the aniline ring by the amino group, which makes it highly reactive toward electrophilic acetylation. Acetic anhydride is commonly used as the acetylating agent due to its higher reactivity compared to glacial acetic acid. Zinc dust plays an essential role in purifying the reaction mixture and improving yields. Acetanilide remains a key intermediate in the chemical and pharmaceutical industries, underscoring the importance of this reaction in organic synthesis.

Keywords: Acetanilide, Aldehyde Derivatives, Benzene, Amide group, Aniline.

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Qualitative Analysis of Dark Chocolates

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Abstract

Chocolates have become one of the most popular flavours in the world of today. They form The basics ingredient in very many pastries and cake. Chocolates can alsobe used as hot and Cold Beverages. Each manufacture combines secret formulas of the different varieties of the Coca sweets to develop exclusive chocolates and try to make the exotic teat. Gifts of Chocolates moulded to different shapes has become traditional on certain festivals and Occasions. That's a sweet tribute to chocolates! You're absolutely right, chocolates have Become a beloved flavor worldwide, andtheir versatility has made them a staple in baking, Beverages, and gift-giving. The art of chocolate-making has evolved, with manufacturers Experimenting with unique flavor combinations and techniques to create exclusive treats.

The tradition of gifting chocolates on special occasions, such as Valentine's Day, birthdays, And holidays, is indeed a thoughtful way to show love and appreciation. The variety of Shapes, sizes, and flavors available makes it easy to find the perfect chocolate gift for Anyone.Chocolates are made from the seeds of COCO Atrees. Spanish mythology consider these Trees were grown in the garden of the PARADISE and believed that the chocolates drink was Divine. The cocoa trees is a tropical plant, sometimes living and producing for more than 200 years. Chocolates are made from the seeds of these trees. There are many varieties Cultivated today and this farming is highly pro table

Keywords: dark chocolate, cocoa

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Extraction of Natural Dyes from Plants

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Abstract

The negative impacts and threat posed by synthetic dyes have led to a significant increase in interest in natural dyes derived from plant sources in recent years. The primary goal of obtaining dyes from natural plant sources is to prevent pollution of the environment. Many studies are being conducted worldwide on the usage of natural dyes in light of the current global concern over the use of eco-friendly and biodegradable products. In this study dyes are extracted from different part of plants i.e., Ixora Coccinea Flower (pink), Nerium Oleander Flower (red), Tradescantia Pallida flower, Portulaca Oleracea, Cissus Qudrangularisstem and Celosia Cristata stem. The fabrics were mordanted with copper sulphate, ferrous sulphate and potassium chromate for fastening of the imparted colours. The dyes produced from these flowers were dyed on cotton fabrics and tested for their colour fastness to washing properties. The dyed cottons fabrics were observed with different shades of colour. Moreover, the dyes obtained from the plant flowers may also be alternative sources to synthetic dyes for the dyeing of natural cotton fibre.

Keywords: Natural dyes, Biodegradable, Hibiscus Flower (red), Merigold Flower (yellow or orange), Asian pigeonwings flower.

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Extraction Of Tartaric Acid From Tamarind Pulp

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Abstract

Tartaric acid is an essential organic acid widely used in the food, pharmaceutical, and industrial sectors. The extraction of tartaric acid from natural sources such as tamarind pulp presents a sustainable and cost- effective alternative to synthetic production methods. This research focuses on optimizing the extraction process from tamarind pulp by employing eco-friendly techniques that minimize chemical usage and maximize yield. The study investigates various extraction methods, including solid-liquid extraction and chemical precipitation, to determine the most efficient approach for obtaining high-purity tartaric acid. India, being one of the largest producers of tamarind, provides a vast and renewable resource for this process. Utilizing tamarind pulp not only reduces agricultural waste but also promotes the utilization of byproducts, contributing to a circular economy. The extracted tartaric acid has numerous applications, including use as a food additive, stabilizer, and acidity regulator in pharmaceutical formulations. By focusing on green chemistry principles, this study aims to enhance sustainability while meeting industrial demands. The findings of this research are expected to provide valuable insights into sustainable acid extraction methodologies, offering economic benefits to small-scale industries and contributing to environmental conservation. Future advancements in this area could further refine the process, making tartaric acid extraction from tamarind an attractive and commercially viable alternative.

Keywords: Tartaric Acid, Tamarind Pulp, Extraction, Sustainable Chemistry, Green Chemistry, Agricultural Byproducts, Food Industry, Pharmaceutical Applications.

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A Study of Synthesis of Aspirin by using Microwave Assisted Method

Juili Naresh Deshmukh
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Abstract

The synthesis of aspirin has been a popular experiment in organic chemistry teaching laboratories and even in some introductory chemistry laboratories . Many laboratory text-Books have included procedures for aspirin synthesis to study Carbonyl nucleophilic substitution reactions under acidic or basic conditions . However, these traditional experiments use a cookbook recipe approach that does not allow The student to use critical reasoning to thoroughly understand the reaction. Recently, there has been a growing interest in the use of Microwave technology for organic synthesis. The use of microwave induced heating offers certain advantages, such as shorter reaction times, controlled heating and cooling (by placement of an in-line heat exchanger adjacent to the Microwave heating zone or by direct contact between a cold finger and the reaction mixture), and reduction of secondary products . Microwave ovens offer a clean and sometime cheaper alternative to oil baths for many organic reactions. The popularity of microwave heating has been extended to research applications and recently even to academic teaching laboratories . It has been proven that microwave heating is effective in solvent-free reactions as well as in reactions that do not utilize catalysts . In addition, reactions under solvent-free conditions offer the additional advantage of avoiding the use of solvents that can sometimes be expensive, toxic, or difficult to remove and dispose. Recently, the synthesis of analgesic drugs has been employed to demonstrate the advantages of microwave-assisted synthesis in terms of purity, yield, And reaction time . For this reason, an experiment was designed so that the students could determine the best conditions for synthesizing as under microwave irradiation

Keywords: Aspirin, Microwave oven, Organic chemistry.

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Soil Algal Flora and Cyanobacteria of Sugarcane Field from the Khuldabad Region Dist. (Aurangabad) Chhtrapati Sambhaji Nagar, Maharashtra, India

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Abstract

Soil algae constitute an important group of soil microflora. Ecologically soil algae are significant and play a crucial role in soil fertility. To study the algal flora of cultivated fields, a sugarcane (Saccharum officinarum L.) field located in the Khuldabad tehsil area of (Aurangabad) Chhtrapati Sambhaji Nagar district of Maharashtra has been selected. Algal samples from moist places of the sugarcane field were collected at regular intervals from November 2021 to December 2022. Bold`s basal medium was also used to culture algae from the soil of the sugarcane field. Under a research microscope, algae samples were carefully examined, and their identities were confirmed using standard algae literature. A total of 69 species from 35 genera belonging to the families Chlorophyceae, Xanthophyceae, Bacillariophyceae and Cyanophyceae were identified and recorded. Cyanobacteria were found to be dominant. The main algal forms were Gloeocystis, Trebouxia, Chlorella, Nitzschia, Chroococcus, Gloeothece, Aphanothece, Myxosarcina, Oscillatoria, Phormodium, Lyngbya, Microcoleus, Nostoc, Plectonema and Scytonema. Physic-chemical analysis of the soil of the sugarcane fields was carried out by choosing important physical and chemical parameters, such as pH, electrical conductivity, organic carbon, affordable nitrogen, affordable phosphorus, and available potassium. It was discovered that the soil of a sugarcane crop contained algae.

Keywords: Cyanobacteria, Physicochemical parameters, Soil algal flora, Sugarcane field,

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Extraction and Investigating the Acidity of Fruit Juices and Vegetables using Titration.

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Abstract

This study aimed to extract and investigate the acidity of various fruitjuices and vegetables using titration. The acidity of different samples which I get including lemon, orange, apple, and tomato, was determined by reacting them with a strong base, sodium hydroxide (NaOH), and measuring the volume of base required to neutralize the acid. The extraction process is some involved juicing the fruits and vegetables, followed by filtration to obtain clear samples. The pH values of the samples were measured using a pH meter, and the acidity was determined by titration with NaOH. results showed approximately significant variations in acidity among the tested samples, with lemon exhibiting the highest acidity level. In this experiment The pH values of the samples were also measured and correlated with the titration data. The findings have implications for food science, nutrition, and the development of new products. Additionally, this project provides a valuable educational experience in analytical chemistry techniques. Considering the experiment on extracting and investigating the acidity of fruit juices and vegetables using titration, here are some useful product ideas: Household and Cleaning Natural cleaning products: Develop natural cleaning products, such as all-purpose cleaners or disinfectants, with optimal acidity levels for effectiveness. pH-neutral cleaning solutions: Create cleaning solutions with optimal acidity levels to prevent damage to surfaces. Drain cleaners: Use the knowledge of acidity levels to develop effective drain cleaners.

Keywords: acidity, titration, fruit juices, vegetables, pH, natural cleaning products, food science.

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A Comprehensive Study on Extraction and Bioactive Compound of Clove Essential Oil (syzygium aromaticum L. Myrtaceae)

Ritesh Yashwant Shinde and Asst. Prof. Ankita Mhaske
D. G. Tatkare Mahavidyalaya Mangaon, Raigad-(MH)

Abstract

Clove (Syzygium aromaticum L. Myrtaceae) is an aromatic plant widely cultivated in tropical and subtropical countries, rich in volatile compounds and antioxidants such as eugenol, caryophyllene, and -humulene. Clove essential oil has received considerable interest due to its wide application in the perfume, cosmetic, health, medical, flavoring, and food industries. Clove essential oil has biological activity relevant to human health, including antimicrobial, antioxidant, and insecticidal activity. The impacts of the extraction method (hydrodistillation, steam distillation,ultrasound-assisted extraction, microwave-assisted extraction, cold pressing, and supercritical fluid extraction) on the concentration of the main volatile compounds in clove essential oil and organic clove extracts are shown. Eugenol is the major compound, accounting for at least 50%. The remaining 10–40% consists of eugenyl acetate, caryophyllene, and humulene. The main biological activities reported are summarized. Furthermore, the main applications in clove essential oil in the food industry are presented. This review presents new biological applications beneficial for human health, such as anti- inflammatory, analgesic, anesthetic, antinociceptive, and anticancer activity. This review aims to describe the effects of different methods of extracting clove essential oil on its chemical composition and food applications and the biological activities of interest to human health.

Keywords: Food Application; Health Benefits; Clove Essential Oil; Biological Activity; Chemical Composition; Extraction.

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To Study the Preparation of Ant killing Powder By using Homemade Ingredients

Sakshi Ghanshyam Gaikar
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Abstract

Ant infestations are a ubiquitous problem worldwide, with conventional chemical-based control methods posing environmental and health risks. This study explores the efficacy of a natural ant killing powder composed of baking soda and sugar. The powder's insecticidal properties were evaluated against ants, revealing a significant mortality rate of 90% within 24 hours. The baking soda's reaction with the ant's stomach acid, producing carbon dioxide gas,was identified as the primary mechanism of action. This natural, non-toxic, and cost-effective ant killing powder offers a promising alternative to conventional chemical-based control methods. Here's an abstract for an ant killing powder made using baking soda and sugar: Its ease of preparation, environmental sustainability, and safety for human use make it an attractive solution for household and agricultural ant control. Additionally, this powder can be used in conjunction with other natural ant control methods, such as diatomaceous earth and essential oils, to create a comprehensive ant management strategy.

Keywords: ant killing powder, baking soda, sugar, natural insecticide, environmental sustainability.

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Production of Handmade Papers from Waste Sugarcane Bagasse

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Abstract

Solid waste is one of the biggest problem of civil society. In this project, agriculture waste from bagasse and banana fibers have been used to produce handmade paper. These fibers were collected, dried under the sun and passed through water vat to remove dust. A Next, it is cooked with 10% caustic solution in pressure cooker and then blended in mixer for different timing. Diluted solution of Clorox was used for discoloration and purification of pulp. Three types of papers were made from ready pulp. First type was by made by using raw material only, second type by addition of 2% of CaCO3 and 2% of starch. And the third types by addition of 5% of both additives. Â These papers were dried and then ironed for straightening. GSM, pH, Thickness, Bulk, and Moisture Content were calculated for all types of papers. It was found that papers from bagasse fibers are heavy and suitable for heavy and rough usage. While paper from banana fibers are useful for soft usage like tissues, wipes, tracing paper etc. This project is ecofriendly as it used agricultural waste and only little electricity was used.

Keywords: waste sugarcan bagasse, NaOH , Pulp refinement

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Preliminary Phytochemical Screening And Ftir Analysis Of Sadafuli (Catharanthus Roseus (L.) Plant Extract

Sujit Bhaguram Shinde and Asst. Prof. Naziya Sajjad Jummal
D.G. Tatkare Mahavidyalay Mangaon - Raigad.

Abstract

The biologically active compounds present in plants are called Phytochemicals. This 7 Phytochemicals are derived from various parts of plants such as leaves, flowers and stem by Maceration extraction. In maceration grind plant is kept in contact with the solvent in stoppered container for a defined period withfrequent agitation until soluble matter is dissolved. The maceration extraction was performed using aqueous, acetone and methanol as solvent. The result of each extract confirm the active substances such as carbohydrates,redusing sugar, proteins and Amino acids, flavonoids, phenolic compounds,tannin, coumarins, quinones. FTIR analysis was used to identify the functional groups of the compound and indicates the presence of functional groups such as phenol, alkanes, lipids, ester, ethers, alkyl halide in the Catharanthus roseus stem extract of aceton sample.Catharanthus roseus represents a reservoir of over 130 medicinally important alkaloids, many of which are currently in therapeutic use. It is one of the most extensively investigated medicinal plants and has acquired the status of a model non-model plant due to many decades of active research conducted upon it by various groups across the globe. Nevertheless, the plant still remains an enigma due to gaps in the understanding of the biosynthesis of pharmacologically important terpenoid indole alkaloids (TIAs) coupled with extremely low content of the potent anticancer bisindole alkaloids, vincristine and vinblastine. Genomic and transcriptomic resources have been generated for the plant, but their full exploitation is yet to be achieved. This chapter will provide an overview of the research potential with respect to C. roseus and also elaborate upon the future prospects for research on the plant in terms of the gaps to be filled.

Keywords: Catharanthus roseus(L), Phyotochemicals, Apocynaceae, Maceration extraction, FTIR

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Synthesis of Derivatives of Pyrazole and its Bioactivity

Samar Prabhakar Surve and Asst. Prof. Naziya Sajjad Jummal
D. G. Tatkare Mahavidyalaya Mangaon Mangaon, Raigad-(MH)

Abstract

Pyrazole derivatives have attracted significant attention in the field of medicinal chemistry due to their diverse biological activities and therapeutic potential. These compounds exhibit a wide range of bioactivities, including anti-inflammatory, antimicrobial, antidiabetic, anticancer, and neuroprotective properties, making them valuable candidates for drug discovery. The unique structural features of pyrazole, such as its nitrogen-containing ring and the potential for various substitutions at the 3, 4, and 5 positions, allow for the design of compounds with tailored pharmacological profiles. This review highlights the synthesis, structure-activity relationships (SAR), and mechanisms of action of pyrazole derivatives, focusing on their impact on various biological targets, including enzymes, receptors, and cell signaling pathways. In addition to their pharmacological effects, the pharmacokinetic properties, such as solubility, bioavailability, and toxicity, are also critical factors in the development of pyrazole-based drugs. Overall, pyrazole derivatives present a promising scaffold for the development of novel therapeutic agents, with ongoing research continually expanding their potential applications in treating a wide array of diseases. Pyrazole derivatives are synthesized through various methods, typically starting with simple pyrazole or substituted pyrazole compounds. The synthesis often involves modifications at the 3, 4, and 5 positions of the pyrazole ring, leading to a wide variety of derivatives with diverse biological activities Keywords:- Pyrazole Derivatives, Bioactivity, Anticancer Activity, Antimicrobial Activity, Anti-inflammatory, Antidiabetic Properties, Neuroprotective Effects.

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Preparation of Natural Indicators from Parts of Plant

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Abstract

A dye that change colour when inserted in an acid or base is called an indicator. The dye changes colour when mixed with the substance. There are two types of indicators synthetic indicators synthesized in the laboratory and & natural indicators obtained from natural sources such as plants. Some commonly used synthetic indicators are methyl red, phenolphthalein, and methyl orange & commonly used natural indicators are grape juice, turmeric, onion, China rose, etc. In natural indicators Anthocyanin pigment is present will change their colour depending upon the pH of their environment. This project provide useful details about natural indicators such as chinarose(hibiscus), rose ,onion, butterfly pea flower indicator etc.

Natural indicators derived from plants offer a sustainable and eco-friendly alternative to synthetic pH indicators. This research focuses on the extraction and preparation of natural indicators from various parts of plants, such as flowers, leaves, fruits, and roots. The study explores the properties of plant pigments like anthocyanins, carotenoids, and chlorophyll, which exhibit distinct color changes in response to different pH levels. Key methods for preparing these indicators include aqueous extraction, alcohol-based extractions, and maceration. The pH sensitivity of these plant extracts is examined by testing them against standard acid-base solutions, where they demonstrate vibrant color shifts, making them suitable for applications in educational, scientific, and environmental contexts.

Keywords: Indicator ; Dye; Synthetic Indicator; Natural Indicator; Natural source; Acid-base Identification .

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The Study Schiff Bases: Synthesis And Application As Molecular Sensor

Sujit Madhavrao Deore and Asst. Prof. Dr. Namita A. More
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Abstract

Aluminium is highly abundant in the earth's crust and has played a pivotal role in various industries for centuries. Its versatility and abundance have led to its widespread use in everything from food packaging to construction materials. However, this extensive use has also raised concerns about its potential impact on human health and the environment. This study aimed to synthesize and apply a Schiff base molecule, N-(2-hydroxy-1- naphthylmethylidene)-o-aminoacetophenone (N-HyNA), as an optical sensor for aluminium ion (Al 3+) determination. The synthesis of N-HyNA was achieved with a high yield of 85 % through the reaction of 2-Hydroxy-1-naphthaldehyde and 2-aminoacetonephenone. N-HyNA showed a maximum absorption wavelength at 465.0 nm, and fluorescence emission at 357.0 nm with the excitation wavelength of 278.0 nm. Both absorption and fluorescence signals of N-HyNA were selectively quenched in the presence of aluminium ion.

Under optimal conditions for Al 3+ detection, the absorption mode of N-HyNA with DMSO as a solvent had the limit of detection (LOD) of 0.005 ppm and detection range of 0.01–2.0 ppm, while the fluorescence mode with EtOH as a solvent had the LOD of 0.013 ppm and detection range of 0.05–0.40 ppm.

Keywords: Aluminium detection, Absorption spectroscopy; solvent effects; metal ion detection; optical sensors

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To Study the Preparation of Schiff Base Ligand

Rujvi Mukund Bhagat and Prof. Ankita Mhaske
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Abstract

The development of Schiff base is a major step forward in the area of coordination chemistry. Schiff bases, a class of organic compounds, carry the imine: azomethine (>C=N-) functional group. Schiff bases play an influencing role in the development of coordination chemistry and were a key point in the development of inorganic, bioinorganic chemistry and optical materials. The ability of Schiff base ligands to form stable metal complexes with a wide range of transition and other metal ions makes them extremely useful. Condensation of a primary amine with an aldehyde or ketone yields a Schiff bases. In this project, we will focused on introducing Schiff bases, classified them and their metal complexes. The new Schiff base synthesis From various and Aldehyde And Amine under magnetic stirrer method. The Schiff base are yellow colour solid and having sharp melting point and insoluble in Organic solvent.

Keywords: Schiff base ligands, condensation reaction, coordination chemistry, Metal complexes, Metal ion

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Extended Fine Structure of X-ray K-Absorption Discontinuity in Copper(II) Complexes

Jaishree Bhale
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Abstract

Two copper (II) complexes, Cu(DNPH))2(SO4)2 and Cu(DNPH))2(Cl2)2 of 2,4 dinitropheynl hydrazine (DNPH) had been prepared. Copper K-edge, extended X-ray absorption fine structure(EXAFS) spectra of prepared complexes have been obtained using BL-8 Dispersive Extended X-ray Absorption Fine Structure (EXAFS) beamline at the 2.5-GeV INDUS-2 Synchrotron Source, RRCAT(Raja Ramanna Center for Advance Technology),Indore, India. The EXAFS data obtained has been used to determine the bond length. Four different methods, i.e., Levy's, Lytle, Lytle, Sayers and Stern's (LSS) and Fourier transformation have been used to determined the bond length. Data analysis program Athena and Origin 8 professional have been used to process the obtained data. The results of the study have been reported in this paper.

Keywords: Copper(II)complexes, EXAFS, RRCAT, Athena, Origin 8

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Heavy Metal Contaminations in The Groundwater: An Assessment Of Nagothane Region Dist. Raigad (M.S.), India.

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Abstract

A study was conducted to evaluate the heavy metal contamination status of groundwater in Nagothane region Dist. Raigad (Maharashtra), India. Heavy metals are probably harmful and insidious pollutants because of their non biodegradable nature. Most of the heavy metals are toxic to many fresh water organisms and man. A study was therefore undertaken to assess the variation in some of the heavy metal contents of ground water near Nagothane. Cu, Cr, Zn, Pb, Cd and Ni are estimated by using atomic absorption spectrometer, Perkin Elmer AA200. The quality of heavy metals in drinking water should be checked time to time; as heavy metal accumulation will cause numerous problems to living being. Ten groundwater samples were collected mainly from dug wells from the area in the year 2023-2024. As there is very little information available about the heavy metal contamination status in the study area, the present work will help to be acquainted with the suitability of groundwater for drinking applications as well as it will enhance the database. It was found that the concentration of heavy metal such as Cu, Cr, Zn, Pb near to Nagothane of Amba river exceeds the permissible limit, where as metal Cd and Ni were below the permissible limits. Therefore, pressing awareness is needed for the betterment of water quality; for the sake of safe drinking water.

Keywords: Groundwater, Heavy metals, Nagothane region, spectrometer.

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Valorization of Marble Sludge Waste in Biodiesel Production using a Central Composite Design

Prerana V. Rajiwale
D.G. Tatkare Mahavidyalay of Arts, Sci., Comm., IT., BMS & B.A.F., Mangaon - Raigad

Abstract

This work addresses the scarcity of energy resources and environmental issues by concentrating on the synthesis of biodiesel by the transesterification of waste cooking oil with methanol. Marble sludge (MS), a novel heterogeneous catalyst was used to speed up the rate of reaction. The catalyst's physical and chemical characteristics were thoroughly examined using a variety of methods, including X-ray diffraction, X-ray Fluorescence, SEM, particle size distribution, and BET analysis. Using the MScatalyst, the study investigated impact of important parameters on the yield of biodiesel from waste cooking oil with the aid of response surface methodology using Design-Expert version 13 software. These parameters included temperature (50–70℃), reaction time (1–4 h), catalyst concentration (1–5 wt%), and methanol-to-oil molar ratio (5–20 mol/mol). Optimization of the parameters was performed for economic targets to lower the production cost of biodiesel. The results showed that a methanol- to-oil molar ratio of 20:1, a catalyst of 5 wt%, and a reaction time of 1 h at 57℃ were the ideal parameters for obtaining a biodiesel yield of 93.5%. The resultant biodiesel revealed promising characteristics, such as a flash point of 160℃, a kinematic viscosity of 4 mm2/s, and a density of 0.871 g/cm3. The study demonstrates the significant consequences and real-world advantages of using rational engineering methods to use MS as a very effective, stable, and easily recoverable catalyst for the long-term, sustainable generation of biodiesel from waste cooking oil.

Keywords: Marble Sludge, Heterogenous catalyst, Biodiesel, Response surface methodology, Optimization

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A Preparation of Biodiesel from Used Cooking Oil

Siddhesh Chogale
D. G. Tatkare Mahavidyalaya Mangaon Mangaon, Raigad-(MH)

Abstract

Biodiesel is an efficient substitute for diesel due to ts unique properties like cutback ngreenhouse gas emissions, non-sulfur emissions, non particulate matter pollutants and Insignificant toxicty and biodegradabiity. This not only helps 10 reduce the pollution level i Is also cheaper compared to other modes of fuel. When UCO is used as feedstock this again reduces the production cost. Growing concer regarding energy resources and the environment has increased interest in the study of altemative Sources of energy. To meet increasing energy requirements, there has been growing Interest in alternative fuels Ike biodiesel to provide suitable diesel oil substitute for ternal combustion engines. Biodiesel offer a very promising alternative to diesel ol since they are renewable and have similar properties. It is a promising subsiitute as an ahtemative fuel and has gained significant attention due 10 the predicted shortness of conventional fuels and environmental concen. The utilization of liquid fuels such as biodiesel produced from waste cooking ofl by transesterification process represents one of the most promising options fo the use of conventional fossil fuels. However, as: the biodiesel is produced from vegetable oils and anima fats, there are concerns that biodiesel feedstock may compete with food supply n the long-term. Hence, the recent focus rely on using waste cooking oil as the substantial feed stocks for biodiesel production. The alcohol and catalyst mixture is then charged into a closed reaction vessel and the ols added. The reaction system is totaly closed to the atmosphere to prevent the loss of alcohol, since it easily vaporizable. The reaction mixture s kept just ear the boing point of the cohol 10 speed up the reaction. Excess alcohol is normally used to ensure total conversion of the oil 0 its esters as there is no problem of recovering of the alcohol for ater use ate recycling.

Keywords: Biodiesel, Substitute, Efficient, Properties, Cutback, Greenhouse, Gas, Emission, Non Sulfur, Pollutants, Toxic, Biodegradable, Cheaper, Feedstock, Energy, Environment, Substitute, Catalyst, Alcohol, Vapourize, Boiling Point.

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A Critical Evaluation of Pesticides Residues in Vegetables And Fruits

Shubham Subhash Gorivale
D.G. Tatkare Mahavidyalaya Mangaon- Raigad

Abstract

The present investigations was carried out on a critical evaluation of pesticides residues in vegetables and fruits carried out during the 2024 – 2025.The vegetables viz., tomato, cabbage, cauliflower okra, brinjal, green chillies and capsicum, and fruits viz.,banana, sweet orange, pomegranate, grapes, guava and mango collected from Market. Samples were analyzed by multi residue method and pesticide residues were estimated by Gas chromatography and Mass spectroscopy. All samples (24) of tomato, cabbage, cauliflower, okra, brinjal, green chilli capsicum was contaminated with one or more pesticide residues. The results indicated that among fruits, none of the 24 samples of banana was contaminated with one or more pesticide residues while all samples (24) of sweet orange, grapes and guavas were contaminated with one or more pesticide residues while 23 out of twenty-four samples of pomegranate were contaminated with one or more pesticide residues, 4 out of twelve of samples of mango were contaminated with pesticide residues.

Keywords: Fruits, Vegetables, Pesticide Residues.

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A Comprehensive Study on Determination of Iron in 'Iron' Tablets by Redox Titration Method

Manisha Mahendra Singh
D. G. Tatkare Mahavidyalaya Mangaon, Mangaon, Raigad, (MH)

Abstract

This study on determination of iron in iron tablet by redox titration is investigates the iron content in an iron tablet using a redox titration method, where the ferrous ions within the dissolved tablet are oxidized to ferric ions by a standardized potassium permanganate solution, allowing for the precise quantification of iron based on the volume of titrant required to reach the endpoint, as indicated by a persistent pink color change; this method provides a reliable assessment of the actual iron content in the tablet compared to the labeled value Iron is an essential trace element, required for haemoglobin formation and the oxidative process of living tissues. A comparative study of the determination of iron in iron tablets was carried out using Redox titration on five samples of capsule containing iron. The capsules were analyzed using Redox titration on five of the samples containing iron content inform of ferrous fumarate Base on the results for the analysis of all the sample it can be concluded that Max iron have the highest percentage of iron which is best supplements for adult lacking high percentage of iron. However, Astyfer has the lowest amount of iron which is the best supplement for infants who require very low amount of iron supplements.

Keywords: Iron, Tablet, Redox, Supplement

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A Study of Formulation and Evaluation of Herbal Hair Tonic using Tea Tree Oil

Priya Pandurang Salunkhe and Asst. Prof. Pankaj Gaikwad
D.G. Tatkare Mahavidyalay Mangaon - Raigad

Abstract

Nowadays, people are interested in hair preparations and conditioner materials, such as shampoos, hair tonic and conditioner formulations containing herbal extracts. Hair tonic is a product which is used to style hair. The objective of present study involves preparation of herbal hair tonic by using jojoba oil, tea tree oil, onion seed oil and coconut oil and its evaluation for physicochemical properties. The final preparation of these ingredients is formulated in batches with change in concentration. The formulation of different concentrations was characterized for proximate analysis including moisture content, total ash, acid insoluble ash, water soluble ash, water insoluble ash, sulphated ash. The formulation gives good results for antifungal and antibacterial activity also the formulation having good consistency good spread ability, homogeneity, appearance and pH.

Keywords: Herbal formulations, antifungal activity, antibacterial activity, hair tonic, Jojoba oil.

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Side Effects of Dapsone

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Assistant Professor Department of Chemistry, Veer Wajekar A.S.C.College Phunde, Uran, Raigad, Maharashtra, India[3]

Abstract

Dapsone is an antibiotic commonly used to treat conditions such as leprosy, dermatitis herpetiformis, and as a prophylactic treatment for Pneumocystis jirovecii pneumonia in immunocompromised individuals. Despite its therapeutic efficacy, dapsone is associated with a range of side effects that may limit its use or lead to significant clinical complications. This project aims to explore and document the side effects of dapsone, emphasizing both common and rare adverse reactions. The investigation focuses on hematologic, dermatologic, and hepatic complications, including hemolysis, methemoglobinemia, and liver toxicity. Additionally, the project reviews the mechanisms behind these side effects, highlighting genetic predispositions and the role of oxidative stress. A comprehensive literature review, along with case studies, will be utilized to assess the prevalence, clinical management, and preventive measures related to dapsone-induced side effects. The outcome of this project will provide a better understanding of the risks associated with dapsone therapy, facilitating improved patient care and safety in clinical settings.

Keywords: Dapsone, Hemolysis, Methemoglobinemia, Pneumonia

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A Preparation of Synthesis of Azo Derivatives of Some Primary Amines & Phenols

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Abstract

The synthesis of Azo derivatives from primary amines and phenols plays a crucial role in the development of dyes, pigments, and biologically active compounds. In this study, we explore the synthesis of various azo compounds through the diazotization of primary amines followed by coupling with phenolic compounds. The reaction conditions, including temperature, pH, and solvent choice, are systematically varied to optimize yields and selectivity of the azo products. Additionally, the potential applications of these compounds in dyeing processes, as well as their biological activity, are also evaluated. The results indicate that the synthesized azo derivatives exhibit promising properties, including stability, color intensity, and antimicrobial activity, opening avenues for their use in textile and pharmaceutical industries. The synthesis of primary amines and phenols is a crucial aspect of organic chemistry, with significant applications in pharmaceuticals, agrochemicals, and material sciences. This research focuses on the development and optimization of synthetic routes for selected primary amines and phenols using cost-effective and environmentally friendly methodologies. Various synthetic strategies, including reductive amination, nucleophilic substitution, and catalytic hydrogenation, were explored for amine synthesis. For phenols, electrophilic substitution and hydroxylation techniques were employed to achieve high yields and purity. The study also examined the impact of reaction parameters such as temperature, catalysts, and solvents on the efficiency of the synthesis.

Keywords: Primary amines, Organic synthesis, Chemical transformations, Functional group interconversion, Green Chemistry, Yield Optimization, Catalysis & Phenols, etc.

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Harnessing the Power of Nanotechnology: Innovations in Agricultural Sustainability

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Abstract

Nanotechnology has emerged as a revolutionary instrument in the agricultural sector, presenting creative solutions to tackle the escalating challenges of sustainability, resource management, and food safety. Nanomaterials, including nanoparticles, nanocomposites, and nanosensors, are transforming agricultural methodologies by facilitating accurate delivery mechanisms, reducing chemical application, and enhancing environmental protection. Furthermore, nanotechnology plays a significant role in assessing soil quality, identifying pathogens, and boosting nutrient absorption in crops. The influence of nanotechnology is also seen in the advancement of irrigation systems through nanomaterials that help decrease water consumption and enhance moisture retention in the soil, fostering more sustainable farming techniques. The combination of nanotechnology with smart farming practices allows for a more exact, data-oriented strategy in agriculture, leading to higher yields while conserving resources. However, despite these promising developments, the incorporation of nanotechnology into agriculture encounters hurdles concerning environmental safety, regulation, and societal acceptance. This article examines the current landscape of research, showcases significant advancements, and outlines potential future pathways for utilizing nanotechnology to promote agricultural sustainability. This review investigates the various uses of nanotechnology in farming, emphasizing its ability to boost crop yield, enhance pest management, optimize fertilization processes, and preserve water supplies. By leveraging the capabilities of nanotechnology, agriculture can fulfill the needs of an expanding global population while reducing its environmental impact.

Keywords: Nanotechnology, agricultural sustainability, crop productivity, pest control, nano sensors, nutrient uptake, environmental safety.

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Kinetics Mechanism & Novel method Of Esterification

Pranay Gajanan Gije and Asst. Prof. Tejashree Suryawanshi
D. G. Tatkare Mahavidyalaya Mangaon –Raigad

Abstract

The susceptibility of the carbonyl group towards nucleophilic attack affords the construction of various organic compounds. Thus, investigations of carbonyl activation applying greener methodologies are highly important. In the present work, among the investigated N-halo compounds, N-fluorobenzenesulfonimide (NFSi) has been found as an efficient and selective catalyst in the reaction of direct esterification of aryl and alkyl carboxylic acids supported by microwave (MW) irradiation. The comprehensive esterification of different benzoic acids and mono-, di- and tri-carboxy alkyl derivatives was performed, whereby significant reaction time reductions were achieved. The presented method used NFSi as an easily manipulatable, non-metal, water- and air-tolerant catalyst, allowing simple synthetic and isolation procedures and energy saving, compared to conventional methodologies. Importantly, in contrast to esterification under thermal conditions, where N-halo compounds behave as pre-catalysts, in the MW-supported protocol, a distinct reaction mechanism has been proposed that assumes NFSi as a sustainable catalyst. Moreover, a scale-up of the industrially important derivative was performed.

Esterification is a pivotal chemical reaction extensively used in the synthesis of esters, compounds that find applications in diverse fields such as food additives, cosmetics, pharmaceuticals, and biofuels. This project investigates the kinetics and reaction mechanism of esterification, focusing on the interaction between carboxylic acids and alcohols, catalyzed by acid. The study emphasizes both experimental and theoretical aspects to provide a comprehensive understanding of the process.

Keywords: Esterification, N-fluorobenzenesulfonimide, microwave Irradiation, metal-free catalyst; aryl acids; alkyl acids

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Development of Eco-Friendly Cleaning Products Using Biodegradable Polymers

Shubham Vijay Yerunkar
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Abstract

With growing concerns over the environmental impact of conventional cleaning products, there is an increasing demand for sustainable alternatives that are both effective and non-toxic. This project focuses on the development of eco-friendly cleaning products using biodegradable polymers derived from renewable sources. The primary aim is to explore the potential of biodegradable polymers, such as polysaccharides (chitosan, cellulose derivatives) and polyesters (polylactic acid, polyhydroxyalkanoates), as key ingredients in household cleaning formulations. These polymers are chosen for their biodegradability, cleaning effi ciency, and safety. Various formulations are developed and tested for their cleaning performance on common stains, such as oil and grease, as well as their biodegradation rate, using established environmental standards. Additionally, toxicity tests are conducted to ensure the safety of the cleaning products on aquatic life. The research findings are expected to demonstrate that biodegradable polymer- based cleaning products can match or exceed the performance of conventional products while offering significant environmental benefits, including reduced plastic waste and lower toxicity. This project aims to contribute to the development of more sustainable cleaning solutions, supporting the transition toward greener consumer products and promoting eco-friendly choices in household maintenance.

Keywords: Sustainable cleaning products, Biodegradable polymers, Polysaccharides, Cellulose derivatives, Eco-friendly formulations, Renewable resources, green consumer products, Eco-friendly household maintenance, Renewable cleaning materials.

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A Study on Green Synthesis of Iron Oxide Nanoparticles using Plant Extract

Ganesh Gajanan Gaikar
D G Tatkare Mahavidyalay Mangaon-Raigad

Abstract

Green synthesis is more beneficial than traditional chemical synthesis because it costs less, decreases pollution, and improves environmental and human health safety. Green chemistry became an eye-catching topic of the past few years because of its wide range of applications in various fields such as cosmetic, pharmaceutical and agro-chemical plant extracts instead of industrial chemical agents to reduce metal ions, has been developed. Malabar" Nuts (adulsa) is one of the potential plants for bio synthesis of nanoparticle due to eco- friendly nature. Plant extract contains reducing and capping agents. In the present study, Malabar Nuts (adulsa) plant extract was to use to synthesize nanoparticles.

Adulsa, an evergreen shrub, is used in traditional medicine for its therapeutic benefits, particularly in treating respiratory ailments like asthma and bronchitis. A study aims to develop a topical ointment containing Adulsa extract for skin infections. The ointment is tested for its physicochemical properties, including pH, color, odor, and stability. The extract shows significant antibacterial activity against common skin pathogens. The ointment also includes rose water and citric acid. The study concludes Adulsa extract holds potential for effective skin infections treatments, highlighting the importance of traditional medicinal plants in modern therapeutic applications.

Keywords: Adulsa, Malabar Nuts, Nanoparticles, Plant extract, Green Chemistry, catalyst.

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A Review on Digitizing and Documenting Traditional Medicinal Plant Knowledge Using Biodiversity Informatics

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Abstract

Traditional medicinal knowledge (TMK) is an invaluable resource passed down through generations, playing a crucial role in healthcare, particularly in rural and indigenous communities. However, rapid urbanization, environmental degradation, and inadequate documentation threaten its survival. Biodiversity informatics has emerged as a transformative tool for digitizing and preserving TMK, integrating ethnobotanical surveys, digital databases, and scientific validation methods. This review examines research conducted since 2000 on the role of biodiversity informatics in documenting medicinal plant knowledge, ensuring accessibility, and addressing challenges such as biopiracy and equitable benefit-sharing. Ethnobotanical surveys form the foundation of TMK documentation, with participatory approaches enhancing data accuracy and ethical compliance. Digital databases such as the Global Biodiversity Information Facility (GBIF) and the Traditional Knowledge Digital Library (TKDL) have revolutionized knowledge preservation, while scientific validation of medicinal plants strengthens the bridge between traditional wisdom and modern medicine. Challenges such as intellectual property rights, data standardization, and fair compensation persist, but emerging technologies like artificial intelligence and blockchain offer promising solutions. This review underscores the need for collaborative efforts among researchers, policymakers, and local communities to ensure the sustainable utilization and protection of traditional medicinal plant knowledge.

Keywords: Traditional medicinal knowledge, biodiversity informatics, ethnobotanical surveys, digital databases, scientific validation, biopiracy, artificial intelligence, blockchain, intellectual property rights.

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A Comprehensive Studies on the Metal Complexes Derived from Mixed Ligands

Rasika Kashinath Narhe and Asst. Prof. Pankaj Gaikwad
D. G. Tatkare Mahavidyalay, Mangaon-Raigad

Abstract

The synthesis and characterization of metal complexes derived from mixed ligands represent a significant advancement in coordination chemistry. This study provides a detailed investigation into the properties, synthesis, and applications of metal complexes that involve two or more different ligands coordinated to a central metal ion. By exploring various combinations of hard andsoft ligands, the influence of ligand type and metal center on stability, geometry, and reactivity is examined. The mixed ligand approach allows for enhanced control over the electronic, steric, and spectroscopic properties of the complexes, which have potential applications in catalysis, bioinorganic chemistry, and materials science. Advanced spectroscopic techniques, including UV-Vis, FTIR, NMR, and X-ray crystallography, were employed to study the structural and electronic properties of these complexes. Additionally, the study explores the mechanistic pathways involved in reactions mediated by these complexes, providing insights into their reactivity and potential for use in industrial and pharmaceutical processes. The results highlight the versatility and functionalization potential of mixed-ligand metal complexes, paving the way for future research into their design and application in various fields.

This abstract provides a broad overview of the study while highlighting key aspects like synthesis, characterization techniques, and applications.

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Extraction of Bioactive Compounds from River Tamarind (Leucaena leucocephala) Leaves

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Assistant Professor Department of Chemistry Veer Wajekar College Phunde , Uran[4]

Abstract

Leucaena leucocephala (River tamarind) is a fast-growing leguminous plant rich in bioactive phytochemicals, including flavonoids, tannins, alkaloids, saponins, and phenolic compounds. This study investigates various extraction techniques—aqueous, solvent-based, and Soxhlet extraction—to optimize the yield of bioactive compounds from its leaves. Aqueous extraction involves boiling dried leaf powder in distilled water, while solvent extraction employs ethanol or methanol for enhanced phytochemical recovery. Soxhlet extraction offers a high-efficiency method for isolating potent compounds. The extracts were characterized using UV-Vis spectroscopy, FTIR, and GC-MS to determine their chemical composition and potential applications. Results reveal that Leucaena leucocephala leaf extracts exhibit strong antimicrobial, antioxidant, and reducing properties, making them promising candidates for pharmaceutical, agricultural, and green nanotechnology applications. This research underscores the significance of plant-based extractions as a sustainable and cost-effective alternative to synthetic compounds.

Keywords: Leucaena leucocephala, Phytochemical Extraction, Bioactive Compounds, Antimicrobial Activity, Antioxidant Properties, Green Nanotechnology, Soxhlet Extraction, Sustainable Chemistry.

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Isolation of Endophytic Fungi from Selected Mangroves

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Abstract

Marine fungi represent an ecological group rather than a taxonomic classification, with an estimated global fungal diversity of approximately 1.5 million species. Among them, endophytic fungi are widely distributed, with China reporting the highest number of isolates from mangrove plants. In this study, endophytic fungi were isolated from the leaves of Aegiceras corniculatum, collected from the coastal region of Murud-Janjira, Raigad district, Maharashtra, India. The leaf samples were thoroughly washed with distilled water and surface-sterilized using $HgCl_2$ and alcohol. Sterilized leaf segments (1 cm × 1 cm) were aseptically inoculated onto potato dextrose agar (PDA) medium and incubated at 26°C for 10 days. After incubation, fungal colonies were observed, purified, and identified based on morphological and molecular characteristics. This study contributes to the understanding of endophytic fungal diversity associated with mangrove ecosystems.

Keywords: Endophytic fungi, PDA, Mangrove, Aegiceras corniculatum

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A Study of Impact of Synthetic Detergent on Water Bodies

Sonali Subhash Gorivale
D.G. Tatkare Mahavidyalay Mangaon – Raigad.

Abstract

Among the different contaminants, detergent as an important pollutant has serious risks to natural ecosystems. Furthermore, detergents can pass into the wastewater treatment plants and have bad effect on their performance. They are part of human life and consumed for different aims especially hygienic purposes. Therefore, detergent components can enter to soil and water bodies from different sources. Detergents affect fauna and flora, and they have direct and indirect effects on ecosystems. Eutrophication, foaming, and altering parameters such as temperature, salinity, turbidity, and pH are more important, and their effects need to be managed and controlled.

Researchers confirmed that aerobic processes are able to degrade the most of detergents but anaerobic degradation is not possible because of restricted metabolic pathways and toxicity of them. Therefore, production of environment-friendly detergent is an important issue around the world. Graphical abstract . Water bodies are natural or artificial accumulations of water, covering a significant portion of the Earth's surface and playing a crucial role in maintaining ecological balance.

They include oceans, seas, rivers, lakes, ponds, and wetlands, each with unique characteristics and ecosystems. Oceans and seas, the largest water bodies, regulate global climate and support diverse marine life. Rivers and lakes are vital for freshwater supply, agriculture, and human settlements.

Smaller bodies like ponds and wetlands provide critical habitats for wildlife and help in groundwater recharge. Understanding and preserving these water bodies is essential for sustaining biodiversity, mitigating climate change, and ensuring the availability of clean water for future generations.

Keywords: synthetic detergents water pollutions Aquatic Ecosystem.

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Titrimetric Analysis of Calcium Carbonate in Different Brands of Toothpaste

Mayur Mahesh Rasal and Asst. Prof. Mehreen Dawre
D. G. Tatkare Mahavidyalay, Mangaon-Raigad

Abstract

Calcium carbonate ($CaCO_3$) is a widely used abrasive and filler in toothpaste formulations, contributing to cleaning efficiency and neutralizing acids in the oral cavity. This study aims to determine the calcium carbonate content in different brands of toothpaste using a titrimetric method. The analysis involves dissolving the toothpaste sample in acid, followed by back titration with a standardized sodium hydroxide (NaOH) solution. The experiment follows a neutralization reaction where excess hydrochloric acid (HCl) reacts with calcium carbonate, and the remaining acid is titrated against NaOH. The results are used to compare the calcium carbonate content among various brands to evaluate their compliance with standard formulations. The study provides insight into the quality and consistency of toothpaste formulations, which is essential for consumer health and product effectiveness.

Keywords: Calcium Carbonate, Toothpaste analysis, Titrimetic method, Neutralization, Consumer Products.

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Study of Effect of Asparagus Racemosus Extracts on Lead-Induced Toxicity in Labeo Rohita

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Abstract

The current investigation studied the extract of Asparagus racemosus as remedies for lead (Pb) induced toxicity in Labeo rohita fish. Lead poses significant risks to aquatic life and human health even at low levels. Acute toxicity tests were conducted to determine the appropriate doses of Pb and the plant extracts. The 96-hour LC 50 for Pb was determined to be 3.78 mg/L, while the aqueous extracts of Asparagus racemosus exhibited LC 50 values of 352.19 mg/L. Sub-acute chronic exposure experiments were then performed on adult rohu exposed to Pb (0.37 mg/L) and treated with Asparagus racemosus extract (3.52 mg/L). The results indicated that treatment with this extracts normalized hematological parameters such as hemoglobin (Hb) and red blood cell (RBC) count, which were adversely affected by Pb exposure. Moreover, the extracts exhibited positive effects on antioxidant enzymes such as superoxide dismutase (SOD), catalase (CAT), and glutathione S-transferase (GST) in various tissues. Histological analyses revealed improvements in tissue structures, with Asparagus racemosus extracts mitigating Pb-induced damage in the liver, kidney, gills, and muscles of the fish. Overall, the findings underscored the potential of Asparagus racemosus extracts as effective remedies against Pb toxicity in fish. Further experimental validations, particularly focusing on these plant extracts, are recommended to comprehensively understand and utilize their protective properties in addressing heavy metal toxicity in aquatic ecosystems.

Keywords: Aphrodisiac, Adaptogenic plant, Asparagus racemosus, SOD, GST.

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Palladium Supported SBA-15 Catalyst for the Selective Low-Temperature Gas Phase Aerobic Oxidation of Alcohols to Aldehydes

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Abstract

The efficient catalytic system for the oxidation of alcohols using wetness impregnation and hydrazine reduction method under mild reaction conditions has been investigated in detail. This method resulted in uniform Pd nanoparticle dispersion in the 4 – 6 nm range. The hydrazine reduction method prepares a catalyst with excellent stability and enhanced low-temperature activity, suitable for gas-phase oxidation of non-activated primary and secondary aliphatic and activated benzyl alcohol. Detailed characterization of the Cu-SBA-15 catalyst was performed using XRD, XPS, TG-DTA, and TPR analytical techniques. These techniques reveal that this method effectively makes Cu particles tiny and highly dispersed into channels of SBA-15 and on the external surface of SBA-15. The results indicated that CuO was the primary active component on the supported catalysts before calcination. The Cu2O grain has good dispersion on the nanoscale. This catalytic system resulted in complete conversion and high selectivity at 220oC and aerobic oxidizing reaction conditions.

Keywords: Gas phase aerobic oxidation, benzyl alcohol to benzaldehyde, hydrazine reduction method, and mesoporous silica.

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A Study on Preparation of Bio Plastics using Vegetables and Fruits waste

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Abstract

Plastic pollution is a growing environmental issue due to the non-biodegradability of conventional plastics. This study explores the preparation of bio plastic using vegetable and fruit waste as an eco-friendly alternative. Organic waste rich in starch, cellulose, and pectin, such as potato peels, banana peels, and citrus fruit waste, is utilized to develop biodegradable plastics. The bio plastic is prepared by extracting these natural polymers and blending them with glycerol and vinegar as plasticizers. The mixture is heated and molded into thin sheets. The produced bio plastic is tested for mechanical properties, water absorption, and biodegradability. Results indicate that the bio plastic exhibits good flexibility, strength, and rapid decomposition compared to synthetic plastics. The addition of plasticizers enhances flexibility, while starch and cellulose improve durability.

This study highlights the potential of fruit and vegetable waste in creating sustainable bio plastics, reducing plastic pollution and promoting waste valorization. Further research is needed to optimize production techniques and improve water resistance for broader applications. The findings support the development of biodegradable plastics as a viable alternative to synthetic polymers, contributing to environmental conservation and sustainable waste management.

Keywords: Bio plastic, Vegetable waste, Fruit waste, Biodegradable, Sustainability, Starch, Cellulose, Pectin

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Efficient Synthesis Via Microwave Asisted Reaction

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Abstract

Microwave-assisted reactions have emerged as a revolutionary technique in the field of organic synthesis, offering significant advantages over traditional heating methods. The application of microwave irradiation in chemical reactions has garnered immense attention due to its ability to accelerate reaction rates, improve yields, and enhance selectivity, all while reducing reaction times and energy consumption. This technology has revolutionized the way chemists approach synthesis, providing a more sustainable and efficient alternative to conventional heating methods. The principle behind microwave-assisted reactions lies in the selective absorption of electromagnetic radiation by polar molecules, such as solvents and reactants, leading to rapid and uniform heating of the reaction mixture. Unlike conventional heating methods, which rely on conduction or convection, microwave irradiation generates internal heat within the molecules themselves, resulting in faster and more efficient reactions.

Keywords: Binol, sulfanilic acid, Nitronaphthalene, Chromatography etc

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Extraction of Silica from Rice Hush Ash

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Abstract

Rice is one of the major crops grown through the world. Once the paddy is separated from the rice grain, the kernel (hull) is removed from rest of the grain. This constitutes about one third of the total mass of grains, commonly termed as „Rice Husk‟ or „Rice Hull‟. Rice husk is an agricultural residue abundantly available in rice producing countries. The annual rice husk produced in India amounts generally approximately 12 million tones. Rice husk is generally not recommended as cattle feed since its cellulose and other sugar contents are low. Furfural and rice bran oil are extracted from rice husk. Industries use rice husk as fuel in boilers and for power generation. Among the different types of biomasses used for gasification, rice husk has a high ash varying from 18-20%. Silica is the major constituent of rice husk ash varying from85-95%. In this project an attempt is made to introduce a simple process to manufacture precipitated silica from this waste rice husk. It solves the disposal problem of husk as well as valuable product is manufactured from it. Experimental data shows better performance as well as easy industrial implementation of the process. The paper describes the treatment of rice husk with acid and base, namely, hydrochloric acid and sodium hydroxide to yield precipitates of silica. As rice husk contains over 80-90% silica when converted to ash, it becomes important to extract it. A simple non-conventional method for extracting silica in the amorphous form is based on alkaline extraction followed by acid precipitation. Rice husk ash was prepared and washed with acid to remove the mineral impurities. Further, it was treated with sodium hydroxide to form sodium silicate solution. The silicate solution formed was it rated with hydrochloric acid and precipitation (in the form of gel) formation takes place below pH 10.

Keywords: Pollution, Environmental Issues, Energy, Photocatalysis, light irradiation.

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Extraction And Formulation of Essential Oil from Lemongrass

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Abstract

Lemongrass (Cymbopogon citratus) is a widely known aromatic plant rich in essential oils with significan tmedicinal, antimicrobial, and therapeutic properties. The formulation of the essential oil involves stabilization techniques, dilution with carrier oils, and potential incorporation into commercial products such as perfumes, cosmetics, and medicinal formulations. The formulated oil exhibits promising antimicrobial and antioxidant properties, making it suitable for various applications in pharmaceuticals, cosmetics, and food preservation. The extracted oil is analyzed using Gas Chromatography-Mass Spectrometry (GC-MS) to identify key bioactive compounds, primarily citral, which contributes to its strong lemon-like aroma and bioactivity. The results highlight the efficiency of different extraction techniques, with steam distillation providing a higher yield and better retention of volatile compounds. This study focuses on the extraction and formulation of essential oil from lemongrass using various extraction techniques, primarily steam distillation and hydro distillation. The essential oil yield and composition are influenced by factors such as plant maturity, extraction method, and processing conditions

Keywords: Lamongress, Essential oil, Extration ,steam distillation, Hydro distillation, citral.

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Synthesized Polypyrrole (Ppy Nps) Nanocrystal Effect on Antimycobacterial, Cytotoxicity Performance

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Abstract

Polypyrrole (Ppy Nps) are some of the most attractive nanomaterials because of their unusual physicochemical, mechanical, and electrical properties as well as their broad range of potential applications. The improvement of new resistant strains of antimycobacterial to current antibiotics has become a serious problem in public health administrative; therefore, there is a strong incentive to develop new Antimycobacterial agent [1].This makes current research in Anti TB agent nanomaterials particularly timely. Early studies indicated that the PolyNps size and surface area are important material characteristics from a toxicological perspective [2–5]. As the size of Ppy Nps decreases, the specific surface area increases, leading to increased opportunity for interaction and uptake by living cells. The Polypyrrole nanoparticles (Ppy Nps) we tested against three different Mycobacterium species like M.tuberculosis (MTCC-300), M.pheli (MTCC-1723), and M.avim (MTCC-1724). In contrast to Ppy Nps, where the direct interactions between NPs and bacteria were limited, Ppy Nps to three different strains enhanced Ppy Nps toxicity to cells and dramatically reduced cellular blood toxicity. Potential anti-oxidant agent Oxidative polymerization reaction Ppy Nps reduced the total number of living Mycobacterium strain. The PpyNps are characterization by XRD, SEM, TEM, FTIR,

Keywords: Polypyrrole (PpyNps), Antimycobacterial, Hemolytic assay, XRD, SEM, TEM, and FTIR.

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Solvent and Catalyst Free Acylation of Anilines with Acetic Acid

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Abstract

An efficient and green microwave assisted protocol to prepare amide from amine via acylation without using catalyst provides quantitative yields in short reaction times. Synthesis of Acetanilide under microwave irradiation was described, in which Aniline was directly reacted with glacial acetic acid without any catalytic agents. The reaction took place in 40−50 min in the frequency range of 160 MHz, with almost quantitative yields. By applying green synthesis method, we avoid use of any hazardous or toxic materials.

Quantitative yields are produced in a short amount of time by an effective and environmentally friendly microwave assisted approach that produces amide from amine via acylation without the need for a catalyst. Analine and glacial acetic acid were directly combined during the synthesis of acetanilide under microwave irradiation, without the use of any catalysis agent. We don't employ any harmful or toxic components by using the green synthesis techniques.

Keywords: Acylation, microwave irradiation, amide, amine, aniline, acetanilide, green synthesis.

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